# Ultra Cloud Core Subscriber Microservices Infrastructure - Operations Guide

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# About this Guide

**Note** The documentation set for this product strives to use bias-free language. For purposes of this documentation set, bias-free is defined as language that does not imply discrimination based on age, disability, gender, racial identity, ethnic identity, sexual orientation, socioeconomic status, and intersectionality. While any existing biased terms are being substituted, exceptions may be present in the documentation due to language that is hardcoded in the user interfaces of the product software, language used based on RFP documentation, or language that is used by a referenced third-party product.

This preface describes the Cisco *Subscriber Microservices Infrastructure (SMI)*, how it is organized and its document conventions.

This guide describes the Cluster Manager and includes infrastructure and interfaces, feature descriptions, specification compliance, session flows, configuration instructions, and CLI commands for monitoring and troubleshooting the system.

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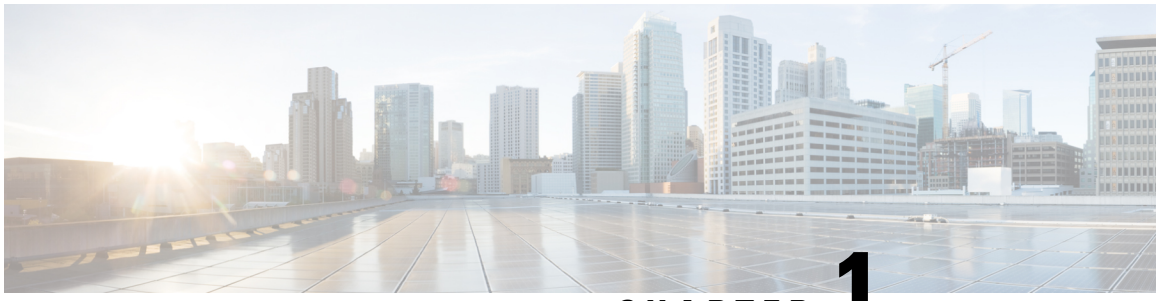
# Conventions Used

The following tables describe the conventions used throughout this documentation.

| Notice Type | Description |
|---|---|
| Information Note | Provides information about important features or instructions. |
| Caution | Alerts you of potential damage to a program, device, or system. |
| Warning | Alerts you of potential personal injury or fatality. May also alert you of potential electrical hazards. |

| Typeface Conventions | Description |
|---|---|
| Text represented as a `screen display` | This typeface represents displays that appear on your terminal screen, for example:<br>`Login:` |
| Text represented as **commands** | This typeface represents commands that you enter, for example:<br>**show ip access-list**<br>This document always gives the full form of a command in lowercase letters. Commands are not case sensitive. |
| Text represented as a **command** *variable* | This typeface represents a variable that is part of a command, for example:<br>**show card** *slot_number*<br>*slot_number* is a variable representing the desired chassis slot number. |
| Text represented as menu or sub-menu names | This typeface represents menus and sub-menus that you access within a software application, for example:<br>Click the **File** menu, then click **New** |



CHAPTER 1

# Ultra Cloud Core Subscriber Microservices Infrastructure - Overview



## Ultra Cloud Core Subscriber Microservices Infrastructure Overview

The Ultra Cloud Core Subscriber Microservices Infrastructure (SMI) provides a run time environment for deploying and managing Cisco's cloud-native network functions (cNFs), also referred to as applications.

It is built around open source projects like Kubernetes (K8s), Docker, Helm, etcd, confd, and gRPC and provides a common set of services used by deployed cNFs including:

- **Protocol Load Balancing**: These microservices provide the external NF interfaces (HTTP, Diameter, GTP, LDAP, etc.) and load balance requests to the application microservices. They normalize internal communications and allow application evolution independent of the interface evolution. Each protocol type is usually implemented as a separate microservice. gRPC is used for internal communication with the application microservices
- **Database Service**: The database service provides a normalized gRPC interface to the application microservices. The database service can interface to different databases allowing the use of different back-end databases depending on the application requirements while maintaining the same interface.
- **Cisco Service Mesh**: This service provides rule-based control over load balancing decisions across different application containers. Through this service, SMI supports and automates operations such as canary upgrades, new service roll-outs, and in-service upgrades.
- **Telemetry Service**: Telemetry functionality is provided through a common set of microservices which collect real-time statistics, alarms, logs from various deployed application components, and translates and streams them to external functions.
- **Dashboard Service**: The dashboard service works with the telemetry service to provide operational overview data for application containers such as state, utilization, and key performance indicators (KPIs).

Cisco's cNFs are implemented as a set of microservices that make use of the common platform services offered by SMI. Refer to the NF's documentation for additional details.

# SMI on Bare Metal - Overview

The SMI extends the deployment of Virtual Network Functions (VNF) and Cloud-Native Network Functions (CNFs) to bare metal servers (Cisco UCS-C servers) with the current release. Also, the SMI supports vertically integrated deployment on bare metal servers.

The following are some of the significant features deploying SMI on Bare Metal servers:

- Elimination of VIM-related overhead on Bare Metal servers
- Zero touch deployment for both VNF and CNF based applications
- Automated infrastructure upgrades
- Exposed API for deployment, configuration, and management to enable automation.
- Addresses edge deployment
    - Provides single compute user plane to run at remote sites
- Scales out without any additional overhead
- Ground up API (NETCONF, REST) driven design and architecture
    - All the interfaces are compliant with northbound NFVO (for instance, NSO).
- Simplification and remote management
- Removes shared storage from the architecture
- Single monitoring endpoint for both server and application health

**Note** The SMI has the ability to run virtual machines for legacy applications. Currently, it supports only User Plane Function (UPF). Future releases will support legacy (Cisco and partner) virtual applications.

# Subscriber Microservices Infrastructure Architecture

The Ultra Cloud Core Subscriber Microservices Infrastructure (SMI) is a layered stack of cloud technologies that enable the rapid deployment of, and seamless life cycle operations for microservices-based applications.

The SMI stack consists of the following:

- **SMI Cluster Manager** — Creates the Kubernetes (K8s) cluster, creates the software repository, and provides ongoing Life Cycle Management (LCM) for the cluster including deployment, upgrades, and expansion.

**Note** The SMI Cluster Manager can install all SMI based applications (including the SMI Cluster Manager) in a Day-0 manner. For Day-1 configurations, you can utilize the deployed application Ops Center.

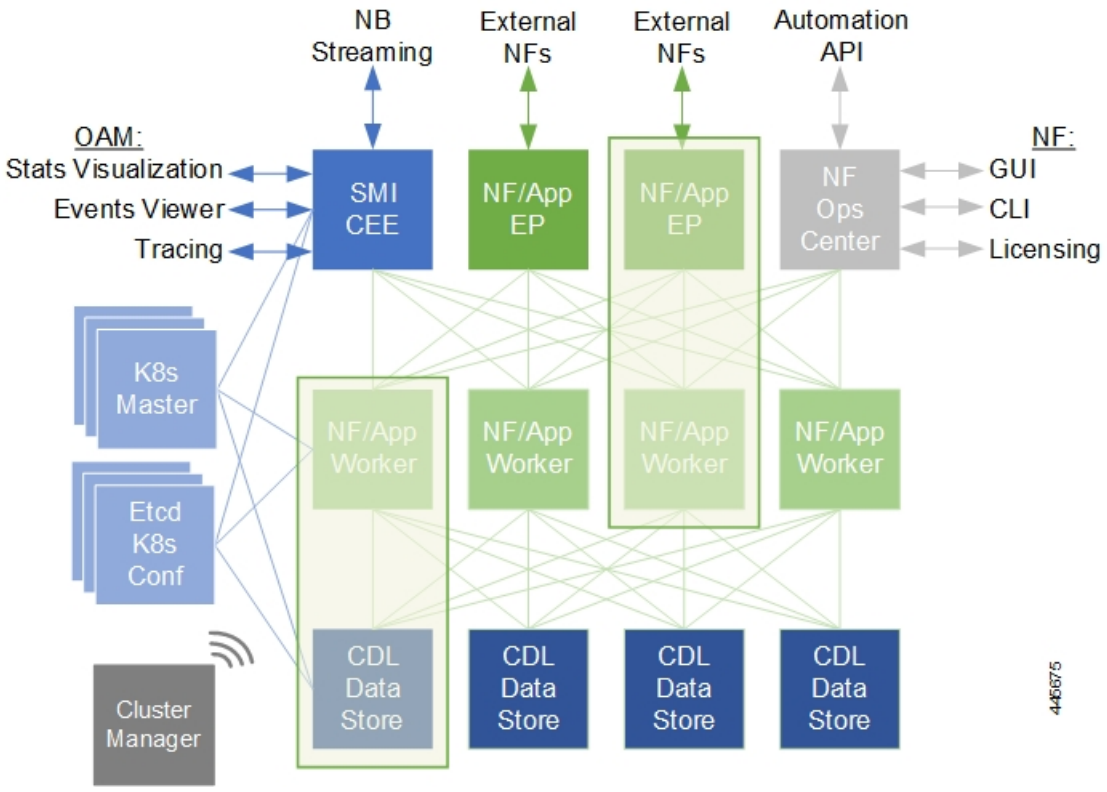
The SMI Cluster Manager supports the following platforms:

- **VMware** — The Cluster Manager deploys the base images using the vSphere APIs.
- **Bare Metal** — The Cluster Manager configures:
  - UCS-C server based hosts using Cisco Integrated Management Controller (CIMC) APIs.
- **Manual** — The Cluster Manager allows other systems (NSO/ESC) to provision the base image and configure the K8s Cluster.

- **Kubernetes Management** — Includes the K8s control plane and etcd functions which provide LCM for the cNF applications deployed in the cluster as well as provides cluster health monitoring and resources scheduling.
- **Common Execution Environment (CEE)** — Provides common utilities and OAM functionalities for Cisco cNFs and applications, including licensing and entitlement functions, configuration management, telemetry and alarm visualization, logging management, and troubleshooting utilities. Additionally, it provides consistent interaction and experience for all customer touch points and integration points in relation to these tools and deployed applications.
- **Common Data Layer (CDL)** — Provides a high performance, low latency, stateful data store, designed specifically for 5G and subscriber applications. This next generation data store offers HA in local or geo-redundant deployments.
- **Service Mesh** — Provides sophisticated message routing between application containers, enabling managed interconnectivity, additional security, and the ability to deploy new code and new configurations in low risk manner.
- **NF/Application Worker nodes** — The containers that comprise an NF application pod.
- **NF/Application Endpoints (EPs)** – The NF's/application's interfaces to other entities on the network.
- **Application Programming Interfaces (APIs)** — SMI provides various APIs for deployment, configuration, and management automation.
- **Ops Center** — The SMI run time environment, as well as each Cisco cloud native application, includes an innovative management interface called Ops Center. This Netconf/Restconf interface, based on Yang schema, enables all configurations for SMI and Cisco cloud native applications, to be automated or managed directly through a CLI.

Figure 1 depicts how these components interconnect to comprise a microservice-based NF/application.

*Figure 1: SMI Components*



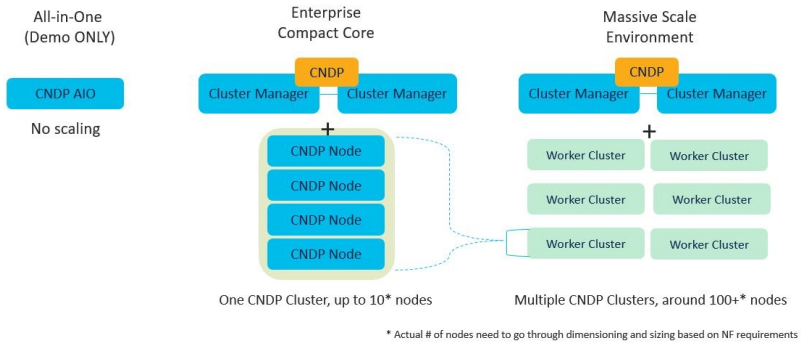

# SMI Bare Metal - Architecture

The SMI enables the deployment of Cluster Manager on Bare Metal servers. The following are some of the salient features of SMI Bare Metal architecture:

- Enables all the application containers to run on the bare metal servers with enough resource isolation
- Provides a migration path for SMI on VM to SMI on bare metal
- Automated bring up at the Data Center
- Hardware agnostic architecture

The following figure depicts the high-level SMI Bare Metal Architecture:

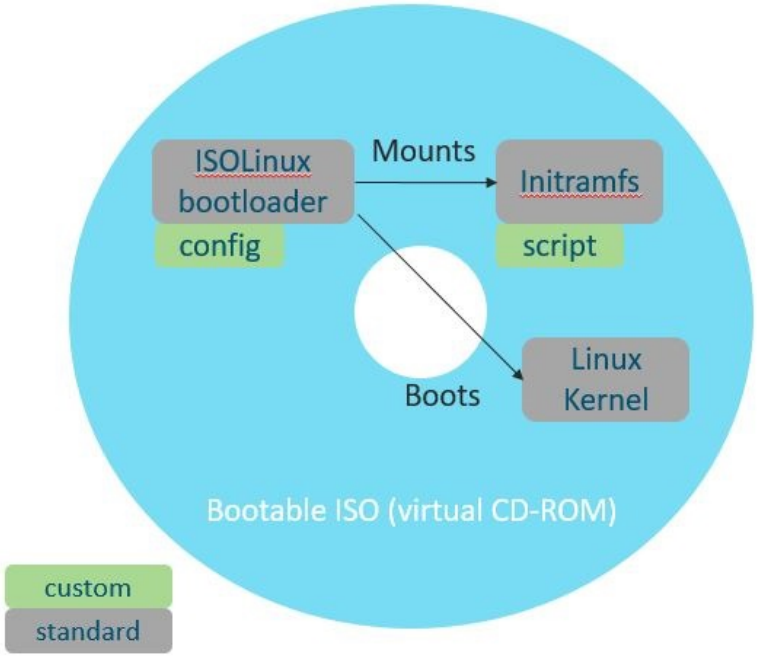
*Figure 2: SMI Bare Metal High-level Architecture*




With the help of a Bootable ISO, the SMI Cluster Manager boots the Linux Kernel from the base image. This allows compatibility with most of the standard hardware platforms. A customized script downloads and writes the HD image using the Initial RAM File System. Also, the Bootable ISOs smaller size - 23 Mega Bytes (MB) - reduces latency.

The following figure depicts the operations of the Bootable ISO:

*Figure 3: Bootable ISO*




## SMI Bare Metal Deployment Architecture

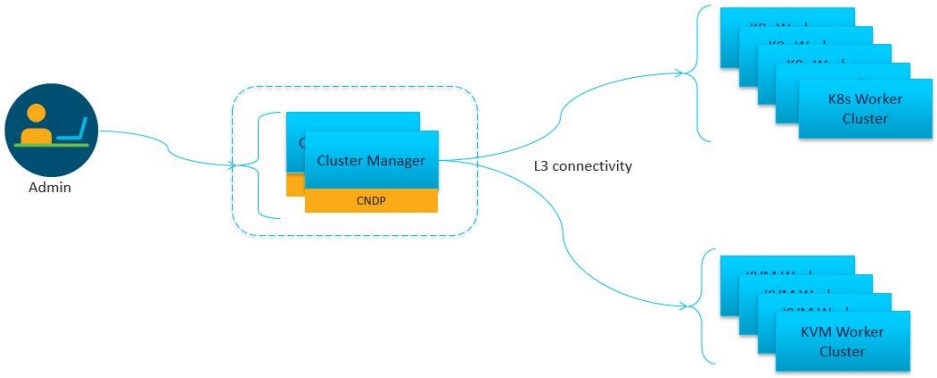
The SMI Bare Metal deployment architecture comprises of a two node Management Cluster. The two node cluster comprises of a SMI CEE (for monitoring) and SMI Cluster Manager running on it. Also, the two node cluster is responsible for:

- Installing and upgrading the BIOS, host OS, Kubernetes, KVM.

- Installing and upgrading Kubernetes based NFs.
- Adding the day-0 configuration to installed NFs.
- Installing StarOS NFs (UPF).
- Monitoring and Alerting.

The SMI Cluster Manager provisions and manages the Life Cycle Management (LCM) of each worker node for both the K8s and Kernel based Virtual Machine (KVM) infrastructure. The following figure depicts the high-level architecture of SMI Bare Metal Deployment architecture:

***Figure 4: SMI Bare Metal Deployment Architecture***




# K8s Cluster Manager

SMI operational components and microservices are deployed on VMs. (Refer to *SMI VM Quantities and Sizing* for details.)

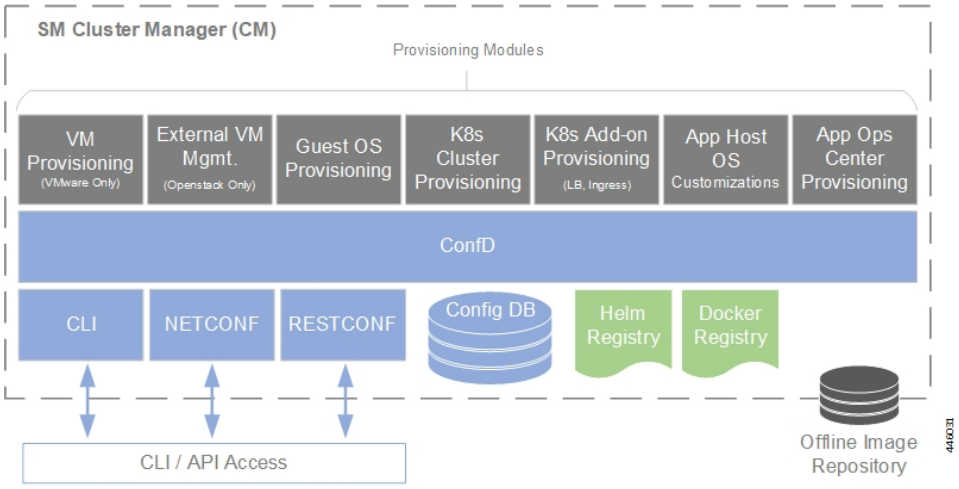
The SMI Cluster Manager (CM) is also deployed as a VM and is used to bootstrap the deployment of other components and applications.

The CM works with the Virtual Infrastructure Manager (VIM) to instantiate the required VMs. In VMware environments, the CM instantiates the virtual machines (VMs) required for the cluster. In OpenStack environments, the CM makes an API call to an orchestrator or Virtual Network Function Manager (VNFM) to instantiate VMs.

The VMs are deployed with a guest OS that is provided with SMI. Once instantiated, the CM provisions the OS, and deploys or provisions the SMI microservices (for example, K8s control plane, K8s etcd, and so on.).

Once all VMs and K8s components are built, the CM can deploy 5G application Ops Centers, which enable NETCONF/RESTCONF interfaces for application configuration and management. All of these actions are API driven and all can be automated and orchestrated.

*Figure 5: SMI Cluster Manager Functionality*




Scheduling rules such as affinity and anti-affinity help guide K8s for proper node placement, as well as adding node taint and tolerances. Because K8s uses a declarative method of deployment, operators simply need to update the desired number of services and K8s manages scheduling and maintains the correct number of services, even during failure scenarios.

# K8s Resource Management

SMI leverages the native resource reservation controls in K8s.

K8s provides a framework to intelligently place pods on the correct server, VM, and/or node, and assign the appropriate system resources, including:

- Service taints, tolerances, affinity, and anti-affinity rules
  - Provides rules for pod placement across available hardware
  - Prevents resource "hotspots" by separating pods with similar resource profiles
  - Provides high availability (HA) by ensuring secondary instances through pod separation
- CPU reservation
  - Allows applications to specify CPUs/CPU requirements (similar to CPU pinning)
  - Prevents negative impacts from context switching, or noisy/grabby neighbors
- Pod quality of service (QoS) definition (e.g. the quality and range of resources available to the Pods)
  - Guaranteed (resource requests = resource limits)
  - Burstable (resource requests > resource limits)
  - Best effort (no resource requests nor limits)

DSCP is implemented at the network level to manage the quality of service and ensure critical traffic is prioritized.

# Common Execution Environment

SMI's Common Execution Environment (CEE) provides OAM capabilities for deployed NFs.

The CEE captures information (key metrics) from the NFs in a centralized way for engineers to debug and troubleshoot the overall solution.

There is only one CEE available per K8s cluster, which provides the common set of tools for all deployed NFs. CEE life cycle is independent of NF and it comes equipped with a dedicated Ops Center, which provides the user interface (CLI) and APIs for managing the monitoring tools.

## Monitoring and Debugging

The SMI platform provides multiple layers of health checking:

- **Deployment health checks** — These confirm that the infrastructure meets the application requirements.

  **NOTE**: Some deployment health checks (input/output operations per second (IOPS) validation and network throughput) may impact performance and should only be executed during the deployment phase.

- **Run time health checks** — These checks are constantly running in the background to verify that logging and tracing are set to the lowest levels, and to check error rates and alarms.

- **Pod health checks** — These confirm that the pod is alive and service availability. If the pod fails the health check, it is killed and re-scheduled onto another available node.

- **Performance checks** — The checks provide such data as transactions per second (TPS), number of records (sessions), CPU and memory utilization, errors, etc.

Statistics are available for viewing through Grafana, as well as for streaming using Prometheus. They are also available in bulkstat format. The granularity of statistics can be as small as 1 second. Statistics are stored for up to 3 days using Thanos to compress and compact the data.

Logging utilizes journald and rsyslog to collect and distribute logs northbound to a fully featured logging platform. SMI also includes logging utilities to collect snapshots for troubleshooting and uploading to Cisco TAC support centers. Logging verbosity and detail levels are set via API, and can be set to Critical, Error, Warning, Informational, or Debug.

Application and platform events can be forwarded northbound using Prometheus plugins such as VES and/or SNMP.

## Tracing

Cisco's cloud native based applications are designed to tag messages in a method compatible with OpenTracing project guidelines.

SMI provides tooling and centralized storage for continuous tracings of cNFs even as they may span across multiple nodes.

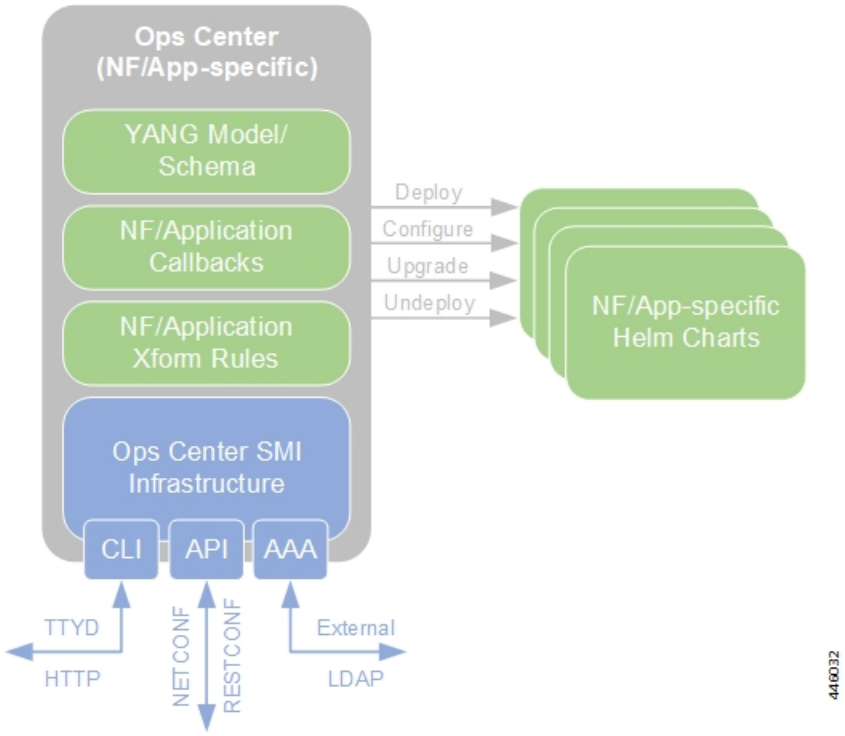
This tracing shows all "message spans" from platform ingress to platform egress as well as how long each unit of work takes.

# Ops Center

Cisco's cNFs consist of Helm charts (applications and charts) and Docker files (images).

To simplify and establish consistent operations across the various charts and images that comprise each NF, each NF is designed with an Ops Center. Ops Centers provide a common, stable CLI/API for operators to deploy and manage the NF in a holistic way.

***Figure 6: NF/Application Ops Center***




SMI provides the following functionality in relation to NF Ops Centers:

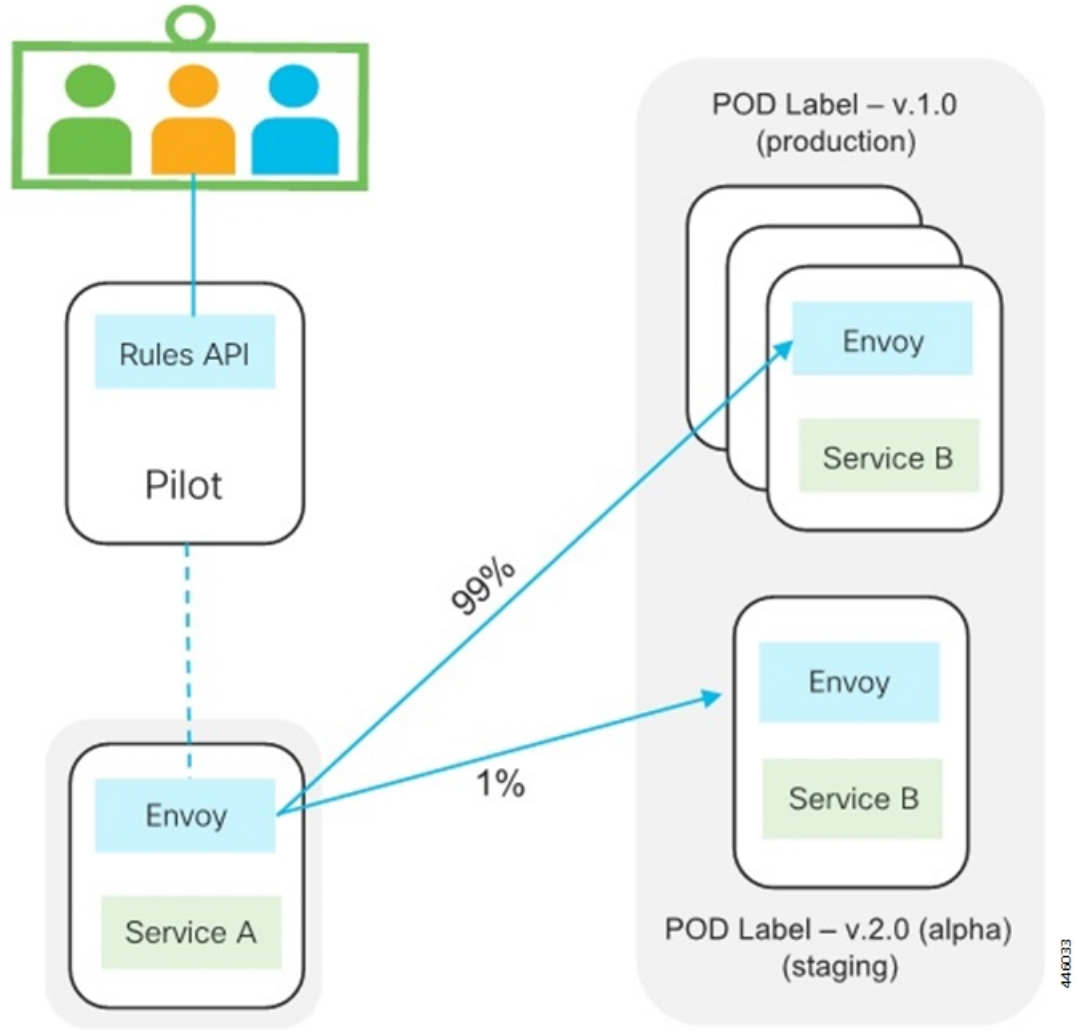
- Common NETCONF, RESTCONF, and CLI interfaces, which allows for integration network orchestrators such as Cisco's Network Services Orchestrator (NSO) without need for a custom network element driver (NED)
- A YANG model for the application
- Audit logging and configuration validation
- Lightweight Directory Access Protocol (LDAP) interface directory information services — for example, Active Directory (AD) — to ensure all applications use a common set of user accounts
- Cisco Smart Licensing integration
- Callbacks into the application to execute operational commands
- NETCONF Access Control (NACM) security model

# Service Mesh

The Service Mesh enabled through SMI connects and manages messages between all pods and services in the cluster. Using this service mesh, traffic is steered within the cluster to finely control which NF components are part of the traffic flow.

Granular controls such as traffic percentage, or application-based traffic characteristics — for example, access point name (APN), subscription permanent identifier (SUPI), or other layer 7 attribute value pairs (AVPs) — are used to control traffic within the cluster. This control enables selective and precise upgrades, such as "canary upgrades". This limits risk and impact when deploying changes in-service and in production. It also affords the ability to selectively drain or decommission NFs.

***Figure 7: SMI Service Mesh***




Besides traffic management applications, the service mesh aids in tracking the flow of traffic between services and nodes, providing security to prevent unauthorized service access and isolating rogue services.

# Common Data Layer

The Common Data Layer (CDL) component enabled through SMI provides the clean separation of stateful (also known as backing services) and stateless services (e.g. application services).

CDL provides services for efficiently managing stateful subscriber and identity information across all deployed Cisco NFs. The CDL is an in-memory database designed specifically for high performance carrier grade requirements and subscriber data. Separating stateful services in this way allows for the stateless application services to be autonomous, lightweight, upgradable, recoverable, and rapidly scalable.

Stateful services must address the availability, consistency, and portability of state. These typically require replication across one or more containers while maintaining state consistency.

As such, CDL redundancy is achieved by local and remote replication of session data. In addition, a background process scans the data store for inconsistencies, stale data, and corruption, and corrects them both locally and remotely.

# SMI VM Quantities and Sizing

Table 1 and Table 2 provide SMI VM quantity and sizing recommendations.

**NOTE**: Individual NFs are deployed as K8s workers through SMI. They each have their own VM recommendations. Refer to the NF documentation for details.

***Table 1: SMI VM Function and Quantities***

| VM Purpose | Redundancy | # VMs |
|---|---|---|
| SMI Cluster Manager | NA | 1 |
| K8s Control Plane | 3 | 3 |
| K8s Etcd | 3 | 3 |
| OAM | 3 | 3 |

***Table 2: SMI VM Sizing Recommendations***

| VM Function | vCPUs | NUMA per VM (Single/Double) | CPU Pinned | RAM (GB) | Boot Volume Size (GB) | Data Volume Size (GB) |
|---|---|---|---|---|---|---|
| SMI Cluster Manager | 2 | 1 | Yes | 16 | 40 | 100 |
| K8s Control Plane | 2 | 1 | Yes | 16 | 100 | 20 |
| K8s Etcd (CDL) | 2 | 1 | Yes | 16 | 100 | 20 |
| OAM | 12 | 1 | Yes | 112 | 100 | 200 |

# SMI Bare Metal Hardware Requirements

The following table lists the minimum Bare Metal requirements for deploying SMI Cluster Manager.

***Table 3: SMI Bare Metal Hardware Requirements (UCS-C Series)***

| Item | Requirements |
|---|---|
| Server | Cisco UCS C220 M5/M6/M7 |

| Item | Requirements |
|---|---|
| Networking | • Cisco Catalyst 3850 Switches<br>• Cisco Nexus 9000 Series Switches |
| bbg | SSD<br>**Note** For Disk drives, you must use SSDs to improve the read/write access speed. |

**Note** The Bare Metal requirements listed in the table for deploying SMI Cluster Manager are for reference only. For specific requirements, contact your Cisco account representative.

# Redundancy

SMI enables redundancy at multiple levels:

- **Network** — This is provided by the infrastructure and hardware with dual networking paths, dual NICs, and interface bonding. It is also provided by the SMI platform through the use of virtual IP addesses (VIPs), load balancers (LBs), and through the use of Cisco's Service Mesh.
- **K8s cluster** — The K8s cluster leverages a multiple control plane design.

  In order to avoid potential conflicts if two components modify the same objects, K8s implements a leader/follower pattern for the controller manager and the scheduler. Each group elects one leader, then the other group members assume follower roles. At any point in time, only the leader is active, and the followers are passive.

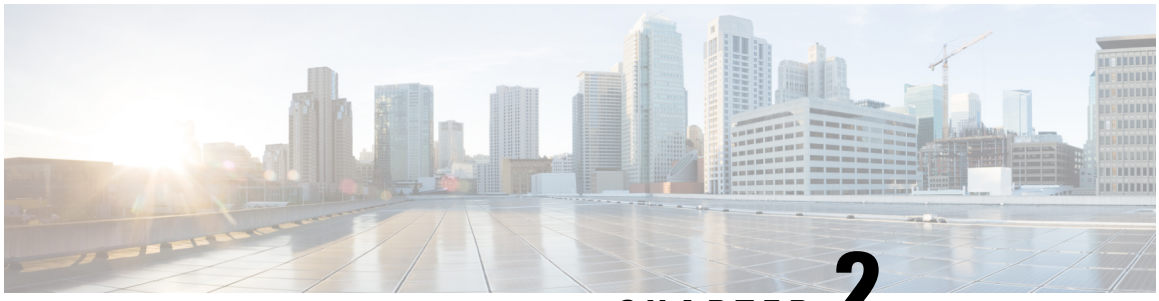
  K8s configuration (etcd) also uses a consensus-based leader/follower election process. Storage includes Storage Area Network/Network Area Storage (SAN/NAS) for persistence during server of VM failure. On leader failure, a new election takes place to determine a new leader. When the old leader recovers, it comes back as follower. Nothing happens on follower failure.
- **OAM services** — OAM services are deployed in large VMs on two or more nodes. Storage includes SAN/NAS for persistence during VM failure. Services are designed to reserve 50%+ capacity per server in order to allow K8s to reschedule services to next available OAM nodes without impact during a failure.
- **NF applications** — Cisco's stateless applications support N+1 redundancy and rely on K8s to monitor and reschedule when necessary. Application components are distributed across servers for HA purposes.

# Security

SMI provides several secure methods for accessing, managing, and configuring the system, all based on APIs, including the Ops Center CLI, and NETCONF/RESTCONF interfaces.

Monitoring interfaces such as Grafana also integrate security and authentication using LDAP Systems Security Services Daemon (SSSD) and Secure Architecture for the Networked Enterprise (SANE).

Access and any configuration changes using the provided CLI and/or API are securely logged.



CHAPTER 2

# SMI Cluster Manager Operations



## Overview

The Subscriber Microservices Infrastructure (SMI) Kubernetes (K8s) Cluster Manager allows you to deploy the virtual machines (VMs) – provisioned through the vCenter – on your VMware environment. You can deploy the SMI K8s Cluster Manager either in All-in-one (AIO) or Multimode configurations. In the multimode configuration, the SMI K8s Cluster Manager can manage multiple clusters - with the minimum being three clusters. Also, the in-built Ingress support in K8s allows you to access the K8s cluster over HTTP.

The SMI K8s cluster includes the following VMs:

- **Control Plane** – The stateless control plane VMs.
- **ETCD** – The database for the K8s metadata. It is separated from the control plane VMs.
- **OAM** – The OAM nodes reserved for CEE. It performs monitoring and logging.
- **APP** – The SMI applications such as SMF, PCF and so on

The subsequent sections provide more information about the different components in the SMI K8s Cluster Manager.

# Sync API

The Sync API is responsible for deploying the VMs, provisioning the base OS, applications, and application host OS. It also provisions the K8s and add-ons (associated with K8s) in both the VMware and OpenStack environments.

For application provisioning, the Sync API allows you to install the applications and configure it through their own APIs. All the 5G applications come equipped with its own Ops Centers. The SMI K8s Cluster Manager allows you to deploy these application Ops Center on top of it.

**Note** The SMI supports only the UTC time zone by default. Use this time zone for all your deployment and installation activities related to the SMI.

# Offline Images

All the applications (5G and Cisco Cable) based on the SMI framework are provided as helm charts (templating for K8s) and docker images. The Helm charts provide the metadata and docker images provide the application containers in the K8s cluster.

For the offline deployment, the docker images and helm charts are provided as TAR balls for loading into the K8s.

For online deployment, anyone with access to devhub.cisco.com can pull these docker images and helm charts through the CLI. Also, you can customize specific applications that are loaded into the SMI K8s Cluster Manager using the customization (docker) image.

# Command Line Interface

The SMI K8s Cluster Manager Command Line Interface (CLI) consists of two major components: Environment and Clusters.

- **Environment** – The environment defines the vCenter environment to be used. It has two options: *vCenter* or *Manual*. For OpenStack environments, select the M*anual* option in the CLI to skip deploying the VMs on to the cluster.
- **Cluster** – You can specify the SMI K8s Cluster Manager to link to the specific cluster through the CLI. In addition, you can also define cluster configurations such as Virtual-IP address, size, Kubernetes add-ons and so on

To view the current running configuration, use the *show run config* command in the CLI.

# Operating the SMI Cluster Manager on Bare Metal

The SMI Cluster Manager manages the configuration and life-cycle of the Kubernetes Cluster and the VNF Nodes (UPF) deployed on Bare Metal servers. The subsequent sections describe the operations involved in deploying the remote clusters on Bare Metal (Cisco UCS) servers.

## Deploying Remote Clusters

This section describes the procedure to deploy a remote Kubernetes and UPF cluster using the SMI Cluster Manager on Cisco UCS servers.

### Deploying Kubernetes Cluster

You can deploy a Kubernetes Cluster when a Cluster Manager (HA or AIO or Inception) is already available. To deploy a Kubernetes Cluster:

1. Setup the cluster configuration.
   - The following is a sample UCS Configuration for deploying a Kubernetes Cluster:

```
software cnf cee
 url <repo_url>
 user <user_name>
 password <password>
 sha256 <sha256_hash>
exit

 # associating to Bare Metal environment
environments bare-metal
 ucs-server
 exit

# General cluster configuration
clusters <cluster_name>
  environment bare-metal
  addons ingress bind-ip-address <bind_ip_address>
  addons cpu-partitioner enabled
  configuration master-virtual-ip <master_vip>
  configuration master-virtual-ip-interface <master_vip_interface_name>
#For example, eno1
  configuration allow-insecure-registry true
 node-defaults initial-boot default-user <username> #For example, cloud-user

 node-defaults initial-boot default-user-ssh-public-key
  "<SSH_Public_Key>"
 node-defaults initial-boot default-user-password <password>
 node-defaults netplan template
 node-defaults initial-boot netplan ethernets eno1
  dhcp4    false
  dhcp6    false
  gateway4 <gateway_ipv4address>
  nameservers search [ <domain_name> ]
```

```
 nameservers addresses [ <ipv4address>...<ipv4address> ]
exit
node-defaults k8s ssh-username <username>
node-defaults k8s ssh-connection-private-key
"<SSH_Private_Key>"
#initial-boot section of node-defaults
 node-defaults ucs-server host initial-boot networking static-ip
netmask <ipv4_address>
 node-defaults ucs-server host initial-boot networking static-ip
gateway <ipv4_address>
 node-defaults ucs-server host initial-boot networking static-ip
dns <ipv4_address>
  node-defaults ucs-server cimc user <username>
  node-defaults ucs-server cimc password <password>
  node-defaults ucs-server cimc remote-management sol enabled
  node-defaults ucs-server cimc remote-management sol baud-rate
<baud_rate>
  node-defaults ucs-server cimc remote-management sol comport
<com_port>
  node-defaults ucs-server cimc remote-management sol ssh-port
<ssh_port>
  node-defaults ucs-server cimc networking ntp enabled
 node-defaults ucs-server cimc networking ntp servers <ntp_server_url>

  exit

node-defaults os proxy https-proxy <proxy_server>
node-defaults os proxy no-proxy <proxy_servers>
node-defaults os ntp enabled
node-defaults os ntp servers <ntp_server_url> #For exmaple,
ntp.esl.cisco.comnode-defaults os proxy https-proxy http://proxy-wsa.esl.cisco.com:80

exit

#node configuration
 ucs-server host initial-boot networking static-ip ipv4-address
<ipv4address>
 ucs-server cimc ip-address <ipv4address>
 ucs-server cimc storage-adaptor create-virtual-drive true
 exit

# control plane node configuration
nodes <control_plane_node_name> #For example, control-plane-1
 k8s node-type control-plane
 k8s ssh-ip <ipv4address>
 k8s node-labels <node_label/node_type> #For example, smi.cisco.com/oam
 exit
 ucs-server host initial-boot networking static-ip ipv4-address
<ipv4address>
 ucs-server cimc ip-address <ipv4address>
 ucs-server cimc storage-adaptor create-virtual-drive true
 exit
nodes <control_plane_node_name> #For example, control-plane-2
 k8s node-type control-plane
 k8s ssh-ip <ipv4address>
```

```
  k8s node-labels <node_label/node_type> #For example, smi.cisco.com/oam
  exit
  ucs-server host initial-boot networking static-ip ipv4-address
<ipv4address>
  ucs-server cimc ip-address <ipv4address>
  ucs-server cimc storage-adaptor create-virtual-drive true
  exit
 nodes <control_plane_node_name> #For example, control-plane-3
  k8s node-type control-plane
  k8s ssh-ip <ipv4address> \
  k8s node-labels <node_label/node_type>  #For example, smi.cisco.com/node-type
 oam
  exit
  ucs-server host initial-boot networking static-ip ipv4-address
<ipv4address>
  ucs-server cimc ip-address <ipv4address>
  ucs-server cimc storage-adaptor create-virtual-drive true
  exit
 ops-centers cee <ops_center_name> #For example, cee
  repository-local <repo_name> cee-2020-02-0-i04
 exit
exit
```

2. Login to the Cluster Manager CLI and enter the configuration mode
   - Add the Kubernetes Cluster configuration to deploy the Kubernetes Cluster.

**Note** A sample Kubernetes Cluster Configuration is provided here.

3. Commit the configuration.
4. Run the synchronization.

   **clusters** *cluster_name* **actions sync run debug true**

5. Monitor the progress of the synchronization.

   **monitor sync-logs** *cluster_name*

**Note** The synchronization completes after 30 minutes approximately. The time taken for synchronization is based on network speed, VM power, and so on.

The node names are added to `/etc/host` as part of the sync process. You can connect to the nodes using the node name from the control plane node.

# Deploying Remote UPF Clusters

The SMI Cluster Manager uses the Kernel Based Virtual Machine (KVM) to deploy the User Plane Function (UPF) on Bare Metal Servers. The subsequent sections describe the procedures involved in installing the KVM and UPF.

## Installing Kernel Based Virtual Machine and User Plane VM

The SMI Cluster Manager utilizes the Kernel Based Virtualization (KVM) – a virtualization technology – to deploy the User Plane Function (UPF) VMs.

To deploy the KVM and UPF:

1. Setup the KVM and UPF configuration

   The following is a sample KVM and UPF configuration

```
software upf <version_number> #For example, v748
 url <repo_url>
 user <username>
 password <password>
 sha256 <sha256_hash> #For example,
9141df47188fb795f3805fd61abf8784d52d2916f32014f564572a6cbbf7c545
 description "<description>" #For example, "UPF software version v748"
 exit

 # associating to Bare Metal environment
environments bare-metal
 ucs-server
 exit

# General cluster configuration
clusters <cluster_name>
  environment bare-metal
  addons ingress bind-ip-address <bind_ip_address>
  addons cpu-partitioner enabled
  configuration master-virtual-ip <master_vip>
  configuration master-virtual-ip-interface <master_vip_interface_name> #For
 example, eno1
  configuration allow-insecure-registry true
  node-defaults ssh-username <username>
  node-defaults initial-boot default-user <username>
  node-defaults initial-boot default-user-ssh-public-key
  "<SSH_Public_key>"
  node-defaults ssh-connection-private-key
  "-----BEGIN OPENSSH PRIVATE KEY-----
    <SSH_Private_Key>
  -----END OPENSSH PRIVATE KEY-----\n"
   node-defaults initial-boot default-user-password <password>
   node-defaults initial-boot netplan ethernets <ethernet_interface> #For
example, eno1
    dhcp4 false
    dhcp6 false
    gateway4 <gateway_ipv4_address>
    nameservers search <<domain_name>>
    nameservers addresses <nameserver_ipv4_addresses>
```

```
    exit

 # initial-boot section of node-defaults
   node-defaults ucs-server host initial-boot networking static-ip
netmask <ipv4_address>
   node-defaults ucs-server host initial-boot networking static-ip
gateway <ipv4_address>
   node-defaults ucs-server host initial-boot networking static-ip dns
 <ipv4_address>
   node-defaults ucs-server cimc user <username>
   node-defaults ucs-server cimc password <password>
   node-defaults ucs-server cimc remote-management sol enabled
   node-defaults ucs-server cimc remote-management sol baud-rate
<baud_rate>
   node-defaults ucs-server cimc remote-management sol comport <com_port>

   node-defaults ucs-server cimc remote-management sol ssh-port <ssh_port>

   node-defaults ucs-server cimc networking ntp enabled
   node-defaults ucs-server cimc networking ntp servers <ntp_server_url>
   exit

   node-defaults os proxy https-proxy <proxy_server>
   node-defaults os proxy no-proxy <proxy_servers>
   node-defaults os ntp enabled
   node-defaults os ntp servers <ntp_server_url>
   #For monitoring the LCM's IP range (Optional)
   node-defaults kvm monitoring local-ip-address-range <ipv4address/subnet>

   exit
   node-type-defaults kvm
     os netplan-additions bridges <bridge_name> #For example, ex4000
     addresses <ipv4_address/subnet>
     exit
   exit

#node configuration
 nodes <node_name> #For example, kvm-1
  ssh-ip <ssh_ipv4address>
  type kvm
  vms <vm_name> kvm-1
    upf software <software_version> #For example, v748
    upf networking management ip <ipv4addess>
    upf networking management netmask <ipv4address>
    upf networking management gateway <ipv4address>
    upf networking management interface-type bridge
    upf networking management bridge name <bridge_name> #For example, ex4000
    type upf
    exit
  vms <vm_name> #For example, upf2
    upf software <software_version> #For example, v748
    upf networking management ip  <ipv4address>
    upf networking management netmask <ipv4address>
    upf networking management gateway <ipv4address>
```

```
    upf networking management interface-type bridge
    upf networking management bridge name <bridge_name> #For example, ex4000
    type upf
    exit

#Default VM configuration
vm-defaults upf day0 username username
  vm-defaults upf day0 password password
  ucs-server host initial-boot networking static-ip ipv4-address
<ipv4address>
  ucs-server cimc ip-address <ipv4address>
  ucs-server cimc storage-adaptor create-virtual-drive true

  initial-boot netplan ethernets <interface_name> #For example, eno1
   addresses <ipv4address/subnet>
   exit
 exit

# control-plane node configuration
  ucs-server host initial-boot networking static-ip ipv4-address
<ipv4address>
  ucs-server cimc ip-address <ipv4address>
  ucs-server cimc storage-adaptor create-virtual-drive true
    initial-boot netplan ethernets <interface_name> #For example, eno1
   addresses <ipv4address/subnet>
  #Configure secure boot (optional)
  ucs-server cimc bios configured-boot-mode Uefi
  ucs-server cimc bios uefi-secure-boot yes
  exit
 exit
   ucs-server host initial-boot networking static-ip ipv4-address
<ipv4address>
  ucs-server cimc ip-address <ipv4address>
  ucs-server cimc storage-adaptor create-virtual-drive true
  initial-boot netplan ethernets <interface_name> #For example, eno1
   addresses <ipv4address/subnet>
  exit
 exit
 ops-centers cee <ops_center_name> #For example, cee
  repository-local <repo_name> cee-2020-02-0-i04
 exit
exit
```

**Note** For the Clusters on Edge deployments, you must define the **ucs-server host initial-boot networking** parameter. This reduces latency in bringing up the ISO media in CIMC.

The following is an example configuration for deploying UPF on remote sites:

```
ucs-server host initial-boot networking static-ip ipv4-address <IPv4address>
ucs-server host initial-boot networking static-ip netmask <IPv4address>
ucs-server host initial-boot networking static-ip gateway <IPv4address>
ucs-server host initial-boot networking static-ip dns <IPv4address>
```

If **ucs-server host initial-boot networking** parameter is not defined, the CIMC can timeout (and throw errors) while trying to download a SMI hard drive image instead of embedding it into the ISO file (30 MB versus 300 MB).

2. Login to the Cluster Manager CLI and enter configuration mode.
   - Add the KVM and UPF configuration to deploy the KVM and UPF clusters.

**Note** A sample configuration to deploy KVM and UPF clusters is provided here.

   - Commit and exit the configuration.
   - Validate the cluster configuration in the Cluster Manager.

     **Example:**

```
clusters cndp-testbed-cm actions validate-config run log-level DEBUG vmware-checks
false k8s-node-checks false
This will run validation.  Are you sure? [no,yes] yes
message 2020-05-06 19:50:38.597 INFO __main__: Verifying ntp config ......
...
...
2020-05-06 19:50:45.723 INFO __main__: You have not run all checks together. Run
clusters cndp-testbed-cm actions validate run

valid TRUE
```

3. Configure KVM using the following configuration:

```
configure
   clusters <cluster_name>
  vm-defaults
  node-defaults kvm monitoring local-ip-address-range ip-address-and-prefix

           node-type-defaults kvm
           nodes
  type <k8s/kvm>
  vms <name>
  ssh-ip <kvm_IP>
           exit
        exit
```

4. Configure the UPF using the following configuration. The following parameters are specific to UPF configuration:
   - **day 0** – Specifies the configuration applicable to the VM when it is first created. After initial creation (day 0), changes here will not apply unless the VM is deleted and redeployed.
     - **username** – Specifies the StarOS administrator username
     - **password** – Specifies the StarOS administrator password
     - **syslog-ip** – Specifies the StarOS logging syslog IP
   - **networking** – Specifies the configuration for the management interface.

**Note** Other networks are expected to be provisioned as day 1 configuration by talking directly to the UPF.

     - **IP_Address** - Specifies the IP address.
     - **Netmask**- Specifies the Netmask.
     - **Gateway**- Specifies the Gateway.
     - **interface-type** - Only bridge is supported for now.
     - **bridge name** - Specifies the bridge name. For more details, see the bridge section defined in KVM configuration.
     - **domain-name** - Specifies the domain name.
     - **name-servers** - Specifies the name servers.
   - **ntp-servers** – Specifies the NTP (Network Time Protocol) settings for UPF.
   - **software** – Specifies the link to version of UPF to deploy.
   - **nodes [name] vms** - Currently, two UPFs are allowed per node to align with NUMA.
     - **type (upf - default upf)** - Provides the ability for additional types of VMs in the future. Currently, UPF is the only choice.
   - **os enable-passthrough [true_or_false]** - To use PCI Passthrough to pass the NIC to UPF, enable-passthrough must be enabled. By default UPFs use SRIOV to configure the network interfaces.
   - **os num-vfs-per-pf [vf_num]** - Specifies the number of VFs created for each PF. The default value is 16.

5. Run the synchronization.

   **clusters** *cluster_name* **actions sync run debug true**

6. Monitor the progress of the cluster synchronization.

   **monitor sync-logs** *cluster_name*

7. Connect to the UPF node through console in KVM after the synchronization is complete

**virsh console** *<upf_name>* **serial1--force**

or SSH to UPF if the bridge is configured locally

**ssh** *username@management_ip*

**Note** For authentication, you can use the username and password configured in Day 0 configuration. Also, the SMI Cluster Manger is not required for operating the deployed VMs.

**NOTES:**

- **vm-defaults** - Allows configuring the necessary values across all the VMs. It is available at cluster and node level.
- **kvm monitoring local-ip-address-range** *ip-address-and-prefix* – Specifies the IP configuration for UPF LCM.
- **node-type-defaults kvm** - Allows configuring the necessary values across all the KVMs.
- **type** <*k8s/kvm*> - Allows only nodes of type kvm to be run
- **vms** <*name*> - Specifies the VM configuration.
- **ssh-ip** <*kvm_IP*> - Specifies the KVM IPv4 address

## Upgrading the UPF Clusters

You can upgrade the UPF Clusters using the SMI Cluster Manager. To upgrade, use the following configurations:

1. Login to the Inception Cluster Manager CLI and enter the Global Configuration mode.
2. To upgrade, add a new software definition for the software.

```
configure
  software upf <upf_software_version>
  url <repo_url>
  user <user_name>
  password <password>
  sha256 <SHA256_hash_key>
  exit
```

**Example:**

```
SMI Cluster Manager# config
SMI Cluster Manager(config)# software upf <upf_software_version>
SMI Cluster Manager(config)# url <repo_url>
SMI Cluster Manager(config)#user <username>
SMI Cluster Manager(config)#password "<password>"
SMI Cluster Manager(config)#sha256 <sha256_hash_key>
SMI Cluster Manager(config)#exit
SMI Cluster Manager(config)#
```

3. Commit the changes.
4. Trigger the Cluster synchronization.

```
configure
  clusters <cluster_name> actions sync run debug true
```

**Example:**

```
Cluster Manager# config
Cluster Manager(config)# clusters cndp-testbed actions sync run debug true
```

5. Monitor the upgrade progress

   ```
   monitor syc-logs <cluster_name>
   ```

   **Example:**

   ```
   Cluster Manager# monitor syc-logs cndp-testbed-cm
   ```

6. Login to the CEE control plane node after the Cluster synchronization completes.

   ```
   https://cli.upf-ops-center.<ipv4_address>.<domain_name>/
   ```

7. Verify the software version using the following command.

   ```
   show system ops-center
   ```

   **Example:**

   ```
   SMI Cluster Manager# show system ops-center
   ```

**NOTES:**

- **software upf** <*upf_software_version*> - Specifies the UPF software package.
- **url** <*repo_url*> - Specifies the *HTTP/HTTP/file* URL of the software.
- **user** <*user_name*> - Specifies the username for *HTTP/HTTPS* authentication.
- **password** <*password*> - Specifies the password used for downloading the software package.
- **sha256** <*SHA256_hash_key*> - Specifies the SHA256 hash of the downloaded software.

## Deploying the CEE Clusters

You can deploy the CEE Clusters using the SMI Cluster Manager. To deploy a CEE Cluster, use the following configurations:

**Note** From the SMI Cluster Manager perspective, the product refers to Common Execution Environment (CEE). The deployment procedure mentioned in the subsequent section is specific to CEE. However, you can follow the same procedure to deploy 5G Network Functions (SMF or PCF) using the SMI Cluster Manager.

1. Setup the Cluster Manager Configuration.

   The following is an sample UCS configuration for deploying CEE Clusters.

   ```
   software cnf <software_version> #For example, cee-2020-02-0-i04
    url <repo_url>
    user <username>
    password <password>
    sha256 <sha256_hash>
   exit
   ```

```
environments bare-metal
 ucs-server
exit
clusters <cluster_name> #For example, cndp-testbed
  ops-centers cee <app_name> #For example, cee
  repository-local <repo_name> #For example, cee-2020-02-0-i04
 exit
exit
```

2. Login to the Cluster Manager CLI and enter the Global Configuration mode.
3. Commit the changes.
4. Trigger the Cluster synchronization.

   ```
   configure
     clusters <cluster_name> actions sync run debug true
   ```

   **Example:**

   ```
   Cluster Manager# config
   Cluster Manager(config)# clusters cndp-testbed actions sync run debug true
   ```

5. Monitor the upgrade progress

   ```
   monitor syc-logs <cluster_name>
   ```

   **Example:**

   ```
   Cluster Manager# monitor syc-logs cndp-testbed-cm
   ```

6. Login to the CEE control plane node after the Cluster synchronization completes.

   **https://cli.cee-cee-ops-center.<ipv4_address>.<domain_name>/**

**NOTES:**

- **software cnf** <*cnf_software_version*> - Specifies the Cloud Native Function software package.
- **url** <*repo_url*> - Specifies the *HTTP/HTTP/file* URL of the software.
- **user** <*user_name*> - Specifies the username for *HTTP/HTTPS* authentication.
- **password** <*password*> - Specifies the password used for downloading the software package.
- **sha256** <*SHA256_hash_key*> - Specifies the SHA256 hash of the downloaded software.

## Upgrading the CEE Clusters

You can upgrade the CEE Clusters using the SMI Cluster Manager. To upgrade, use the following configurations:

1. Login to the Inception Cluster Manager CLI and enter the Global Configuration mode.
2. To upgrade, add a new software definition for the software.

   ```
   configure
     software cnf <cnf_software_version>
     url <repo_url>
     user <user_name>
     password <password>
   ```

```
sha256 <SHA256_hash_key>
exit
```

**Example:**

```
SMI Cluster Manager# config
SMI Cluster Manager(config)# software cnf <cnf_software_version>
SMI Cluster Manager(config)# url <repo_url>
SMI Cluster Manager(config)#user <username>
SMI Cluster Manager(config)#password "<password>"
SMI Cluster Manager(config)#sha256 <sha256_hash_key>
SMI Cluster Manager(config)#exit
SMI Cluster Manager(config)#
```

3. Commit the changes.
4. Trigger the Cluster synchronization.

```
configure
  clusters <cluster_name> actions sync run debug true
```

**Example:**

```
Cluster Manager# config
Cluster Manager(config)# clusters cndp-testbed actions sync run debug true
```

5. Monitor the upgrade progress

```
monitor syc-logs <cluster_name>
```

**Example:**

```
Cluster Manager# monitor syc-logs cndp-testbed-cm
```

6. Login to the CEE control plane node after the Cluster synchronization completes.

```
https://cli.cee-ops-center.<ipv4_address>.<domain_name>/
```

7. Verify the software version using the following command.

```
show system ops-center
```

**Example:**

```
SMI Cluster Manager# show system ops-center
```

**NOTES:**

- **software cnf** <*cnf_software_version*> - Specifies the CNF software package.
- **url** <*repo_url*> - Specifies the *HTTP/HTTP/file* URL of the software.
- **user** <*user_name*> - Specifies the username for *HTTP/HTTPS* authentication.
- **password** <*password*> - Specifies the password used for downloading the software package.
- **sha256** <*SHA256_hash_key*> - Specifies the SHA256 hash of the downloaded software.

# Life Cycle Management of the Virtual Machines

The SMI Cluster Manager supports the complete Life Cycle Management (LCM) of the deployed VMs — currently UPF. The different processes in the LCM of a VM includes:

- VM Provisioning
- VM Removal
- VM Recovery
- VM Recovery Configuration
- Adding a New Node
- Removing an Existing Node
- Server Return Material Authorizations (RMAs)

The subsequent sections describe all the processes involved in LCM of the VM.

## Provisioning the Virtual Machine

Provisioning a Virtual Machine involves creating and configuring a VM based on the requirements. In Bare Metal deployments, the UPF VM is provisioned using the KVM technology. For more details on provisioning the UPF VM using KVM, see Installing Kernel Based Virtual Machine and User Plane VM section.

## Removing the Virtual Machine

You can remove the UPF VM through the KVM cluster from the *ConfD* CLI. To remove the UPF VM, use the following configuration:

1. Login to the *ConfD* CLI
2. Remove the VM using the following configuration

```
cluster <kvm_cm_name>
nodes <node_name>
no vms <upf_vm_name>
commit
```

3. Run the following command to trigger the cluster synchronization and remove the UPF VM from cluster

```
clusters cluster_name actions sync run debug true
```

**NOTES:**

- **cluster** <*kvm_cm_name*> - Specifies the KVM cluster
- **nodes** <*node_name*> - Specifies the VM node.
- **no vms** <*upf_vm_name*> - Removes the specified UPF VM

## Recovering the Virtual Machine

The *staros_monitor* service is responsible for monitoring the deployed UPF VMs. You can verify the status of the *systemd* service using the following command:

```
systemctl status staros_monitor
```

You must ping the UPF VFNM interfaces repeatedly until the *staros_monitor* service recovers an unhealthy UPF VM. Also, the *staros_monitor* service restarts the UPF in the following conditions:

- When the UPF VM is stopped.
- When the UPF VM is running but not responding to the *ping* command.

**Note** For troubleshooting any issues, you can view the logs captured in the */var/log/staros_monitor.log* file. Also, you can configure the failure occurrence and *Ping* interval through */data/upf/monitor/staros_monitor.cfg* file. You must restart the *staros_monitor* service for the changes to take effect.

### Configuring the Virtual Machine Recovery

To monitor the VMs locally, a bridge called *kvm-monitoring* is created locally. You can configure the local and VNFM IPs of the VM using the following command:

**node-defaults kvm monitoring local-ip-address-range** *<local_IP_address_range>*

The following are the IP assignments when you configure the local IP address range to 192.168.0.0/24:

- Local Bridge: 192.168.0.1
- VM assigned to NUMA node 0: 192.168.0.2
- VM assigned to NUMA node 1: 192.168.0.3. The default value of **local-ip-address-range** is *192.168.1.0/24*.

**NOTES:**

- **kvm monitoring** - Specifies the locally created bridge for montioring the VMs.
- *<local_IP_address_range>* - Specifies the local IP address range. The default value is *192.168.1.0/24*

## Adding and Removing UPF Nodes

You can add a new UPF node to the existing cluster when required. To add a new UPF node, see Installing Kernel Based Virtual Machine and User Plane VM section.

Similarly, you can remove an existing UPF node when required. To remove an existing node, see Recovering the Virtual Machine section.

## Server RMAs

For Return Material Authorization (RMA) servers, you can replace the old node and replace it with a new one. When the hardware is fixed, you can synchronize the cluster and deploy the VM. For more information on replacing the Bare Metal nodes, see SMI Cluster RMA section.

# UCS Firmware Upgrade

The firmware upgrade process runs on the UCS server's Cisco Integrated Management Controller (CIMC). After triggering the upgrade, a synchronization process connects to the CIMC at regular (pre-configured) intervals to verify the progress of the upgrade. The upgrade process continues to run even if there is a loss of connectivity between the Cluster Manager running the synchronization process and UCS firmware upgrade.

The UCS firmware upgrade process involves:

1. The Cluster synchronization is triggered with the appropriate firmware version added to the configuration.
2. The Cluster manager (CM) authenticates with the CIMC.
3. The CM compares the current running version of the firmware with the firmware version inside the ISO image.

**Note** The CM proceeds with the upgrade if there is a discrepancy between the versions. Otherwise, the CM skips the upgrade process.

4. The CIMC receives an API call to begin the firmware upgrade from the CM. Also, the API call includes the link for the ISO image the CIMC server needs to download. The ISO image is located in the CM.
5. The CIMC triggers the server reboot and starts downloading the ISO image.

**Note** The firmware upgrade aborts if there is no access to the ISO image. Consequently, the server boots up and the sync process fails.

6. The CM starts verifying the status of the firmware (for a maximum time period of 120 minutes) with the CIMC.
7. The CIMC successfully downloads the ISO image and mounts it as media on the server. The server boots from the media and starts the firmware upgrade process.
8. The server restarts multiple times before finishing with the upgrade process. The CIMC upgrades and disconnects access to any Graphical User Interface (GUI).

**Note** The sync process waits for the CIMC to come online. It reconnects and re-authenticates with the CIMC.

9. The firmware upgrade process completes and the server reboots. The server boots from the media again and firmware validation beings. If successful the firmware process completes and the server boots. If a failure is identified the firmware upgrade is marked as failed and the sync process fails as well

**Note** If the validation is successful the firmware upgrade process ends and boots the server. If the validation fails, the failure is identified and the firmware upgrade and sync process is marked as a failure.

10. The CM sync process receives a success answer from the CIMC. The sync process continues to next step.

## Updating the UCS Server Firmware

The SMI Cluster Manager allows updating the UCS server firmware remotely or locally in a data center. This section describes the procedures involved in updating the UCS Server firmware using the SMI Cluster Manager.

To update the UCS firmware, use the following configurations:

1. Setup the UCS configuration.

   The following is a sample UCS configuration:

```
software ucs software_version
 url repo_url
 sha512 file_checksum
exit
software ucs software_version
 url repo_url
 sha512 ssh_key
exit
software upf software_version
 url repo_url
 sha256 ssh_key
exit
environments ucs
 ucs-server
exit
...
 nodes node_name
  ssh-ip ipv4address
  type kvm
  vms node_name
   upf networking management ip ipv4address
  exit
  ucs-server cimc ip-address ipv4address
  ucs-server software software_version
  initial-boot netplan vlans vlan_name
   addresses ipv4address/subnet
  exit
 exit
 nodes node_name
  ssh-ip ipv4address
  type kvm
  vms node_name
   upf networking management ip ipv4address
  exit
  ucs-server cimc ip-address ipv4address
  initial-boot netplan vlans vlan_name
   addresses ipv4address/subnet
  exit
 exit
```

**Note** Cisco Integrated Management Controller (CIMC) manages the life cycle of all the components - including firmware updates - in UCS C Series servers. The UCS firmware is updated through the CIMC API.

2. Log in to SMI Cluster Manager CLI and enter the configuration mode.
   a. Add the UCS firmware configuration.

**Note** A sample UCS configuration is provided here.

**b.** Commit and exit the configuration.

3. Configure the UCS firmware.

   **a.** To configure the firmware version for UCS servers inside a cluster, use the following configuration:

   ```
   configure
     node-defaults
       ucs-server software software_version
       exit
   ```

   **b.** To configure the firmware version for UCS servers at the node level, use the following configuration:

   ```
   configure
     nodes node_name
       ucs-server software software_version
       exit
   ```

**Note** All the UCS firmware configuration parameters are applicable only for UCS based environments. You can add multiple versions of the firmware software under the **software** section in the UCS configuration. It is recommended to have a minimum of two versions (new and old) provisioned. You can download the UCS firmware software from https://software.cisco.com/

4. Trigger the cluster synchronization, using the following command.

   **clusters** *cluster_name* **actions sync run debug true**

   **Example:**

   ```
   SMI-CM# clusters test actions sync run debug true
   This will run sync.  Are you sure? [no,yes] yes
   ```

5. Monitor the progress of the cluster synchronization, using the following command.

   **monitor sync-logs** *cluster_name*

**Note**

- The cluster synchronization process time depends on the number of UCS servers planned for an upgrade. The average time taken for updating a single UCS server ranges from 30-50 minutes.
- You can select the upgrade strategy manually using the following command:

  **clusters** *cluster_name* **actions sync run upgrade-strategy { rolling | concurrent }**

**NOTES:**

- **node-defaults ucs-server software** *software_version* - Specifies the default version of UCS firmware to be applied to all UCS servers inside a cluster.
- **nodes** *node_name* **ucs-server software** *software_version* - Specifies the version of UCS firmware to be applied to all UCS servers at the node level.
- **clusters** *cluster_name* - Specifies the name of the cluster.
- **actions sync run** - Triggers the cluster synchronization
- **upgrade-strategy** - Specifies the upgrade strategy. **rolling** specifies the rolling upgrade strategy. **concurrent** specifies the concurrent upgrade strategy. The default upgrade strategy is *auto*.

## Failure Scenarios

The UCS firmware upgrade process may fail for multiple reasons. The following are some of the most common reasons:

1. **Hardware Issues** - Faulty components, power, and cabling issues. It most often requires Return Merchandise Authorization (RMA), component re-seating or visual inspection of the hardware.
2. **Software Failure** - This happens when certain components fail to apply the new software version. These components will skip the upgrade process and fall back to the previous or backup version.
3. **Unsupported Hardware** - The upgrade fails, if the new firmware does not support some of the components.
4. **Software Misconfiguration** - If the inappropriate firmware package is used or an attempt to upgrade to an incorrect or unsupported firmware version, the upgrade process fails.
5. **Timeout** - If the upgrade takes more than 2 hours to complete, the sync process time outs and fails.

**Note** The CIMC performs a list of prerequisites before proceeding with the firmware installation. When all the prerequisites are successful, the CIMC proceeds with the upgrade. There is no dry-run option available for the firmware upgrade.

## Failure Impact

The impact of the firmware upgrade failure falls into the following three categories:

1. **Non-Service Impacting** - The server continues to work. This is the most common behavior. The reason for the failure are software misconfiguration, software failure or a failed prerequisites verification. In such a scenario, it's recommended to troubleshoot the failure, fix the problem and upgrade firmware again either automatically (using the same sync process) or manually. A restart of the CIMC may also reset and unblock the issue.
2. **Partially Service Impacting** – The server continues to work with some performance, connectivity or stability issues. An unsupported hardware, incorrect firmware version, or an issue introduced with the new firmware may have caused this. In such a scenario, it's recommended to perform a BUG scrub or validation to ensure that the OS version, drivers, firmware and hardware combination is officially supported by Cisco. You can perform the validation here:

   https://ucshcltool.cloudapps.cisco.com/public/

3. **Service Impacting** – The server fails to boot or becomes inaccessible. If the firmware upgrade failure affects the CIMC access, then the server either must be sent for a RMA or physical access may be required. A hardware issue or a fatal error (needs further investigation by TAC team) might have caused this.

**Note** When you are unable to identify the root cause, it is recommended to open a TAC case and involve a UCS expert to help further troubleshoot the issue.

## Troubleshooting

If one or multiple servers fail to upgrade the firmware, you must follow these steps to isolate and identify the origin or root cause of the issue:

1. Verify the output of the sync process. It contains the high-level details of the root cause and exact step where of the firmware upgrade failed.
2. You can also use the CLI for the status of the last firmware for a node or multiple nodes in a cluster.
3. Based on the error, the root cause may have caused by either of the following reasons:
   a. An incorrect UCS CIMC password was provided
   b. An incorrect ISO was provided or the ISO was corrupt
   c. The CIMC failed to download the ISO image. A firewall, security-group, or Cluster-Manager (based on the deployment) may have caused this issue
   d. The CIMC failed to trigger, run, or validate the firmware upgrade
4. Access the CIMC server and verify the server console, SEL and alerts or issues for more details (if required).
5. Based on the sync logs and the CIMC data, identify the problem and its resolution. If required, perform a CIMC reboot
6. If you can identify the error and resolve the issue, re-run the upgrade either automatically (through sync process) or manually. You must have the ISO image to perform this operation
7. Open a TAC case and involve an UCS expert, if you are unable to find the root cause or resolve the issue.

## UCS Server Health Check

SMI allows you to perform extended heath check and monitoring of the deployed UCS servers. The method is capable of communicating with supported UCS C-series servers.

The server health check is a steadfast method to check and report the server health before executing a cluster-sync operation. This check reduces the disruptions caused by cluster-sync failures.

The existing health reporting system within the REST (Redfish) API of the UCS servers is leveraged to obtain information from multiple hardware platforms.

The sync-log reports the following information:

- **TASK** section displays the following details:

  - Host information—Hostname, Serial Number, Model, Firmware version, HTTPS Certificate validity, and Current Faults
  - Summary information—Processors, Memory, Fans, Storage, PCI Devices, Power Supplies, and MLOM

- **Current System Faults** section lists the faults present on the server at sync time.

  The format of the fault entries is "Date Raised Severity (fault identifier number) Component: Description: What action is required". Note that all faults have an action.

  For example: **"2024-03-06 12:11:21 Critical (F0185) DDR4_P1_E1_ECC: DIMM 9 is inoperable : Check or replace DIMM"**

- **Checking for recent POST events** section in the log helps with debugging. The System Event Log (SEL) is used to display host reboots and uptimes.

  The POST Time column displays the time taken for the host to complete the Power On Self Test (POST). The short uptimes indicate host reboot loops, and longer uptimes indicate firmware upgrades or hardware component replacements.

- **System Warnings** section accumulates the data returned from the server.

  The warnings provide additional information on faults or other issues. It will also contain the current firmware recommendations to use. If the versions do not match, it will indicate future upgrades and does not necessarily require immediate action.

- Warnings in the following scenarios:
  - Any health check such as thermal health and memory check that is not OK
  - Mismatched disk sizes
  - HDD found when SSD is expected
  - Power Policy or Fan Policy is not as expected
  - The following warnings are displayed for firmware checks on M5 servers only:
    - *UCS team recommends firmware versions of at least 4.3.2.230270 for M5 servers*
    - If the firmware version is less than or equal to 4.1.2: *Firmware version 4.0(4h) is not supported*
    - If potential compatibility issues are identified with the firmware version: *Firmware Version: 4.0(4h) - Potential compatibility issue*

- Failures in the following scenarios when:
  - The server reports Critical health status
  - The CIMC reports Critical health status
  - The Host is powered off
  - No storage controllers are found
  - No drives are found
  - Any DIMM failure

- The server cannot be reached for reasons such as bad IP/credentials and so on

### Overriding Health Check Sync Failure

The health check is performed prior to the software download tasks to provide a quick exit if there are actionable issues. The check is non-intrusive and you can perform only read operations.

If you want to proceed with a sync knowing there are health issues with the server, you can execute the following CLI command to override the check failure:

**clusters** *cluster_name* **nodes** *node_name* **ucs-server ignore-health { false | true }**

If **ignore-health** is configured, then cluster sync may fail.

### Configuring Server-Check Synchronization Phase

SMI supports an additional server-check synchronization phase to review the condition of the servers anytime.

To execute the server-check sync phase, use the following command in Cluster Configuration mode:

**clusters** *cluster_name* **actions sync run sync-phase server-check**

To view the sync-log report, use the following command:

**monitor sync-logs** *cluster_name*

# SMI Cluster RMA

This section describes procedures involved in replacing a Bare Metal node within a SMI Cluster in the event of node failure or planned maintenance.

The NSO must subscribe to the notification stream **alert notification** to receive the *k8-node-not-ready* alert, when the node(s) become unresponsive due to unplanned node(s) outage, and requires it to be removed from the cluster before putting it in maintenance mode and continue. See the *Notifications* and *Alerts Reference* section for more details on the alert notifications and references.

**Important** CNDP does not support cluster upgrade and RMA in the same cluster sync.

## Prerequisites for RMA Process

For GR deployment, the node-monitor pods starts automatically. During RMA procedure, the node-monitor pod automatically shutdown the rack if multi-compute failure is detected when the node is drain and deleted.

Before starting RMA process, perform the following:

1. Switch the role for both the instance to other rack using `geo switch-role role` command and make sure the target rack for RMA is in STANDBY_ERROR role for both the instances.
2. Disable the node-monitor pod.
   a. Take the backup of daemonsets.

```
kubectl get daemonsets node-monitor -n cn -o yaml > node-monitor.yaml
```

b. Delete node-monitor pods.

```
kubectl delete daemonsets node-monitor -n cn
```

3. Continue with RMA procedure. For more information, see the link.
4. Once RMA procedure is complete, check if the node-monitor pods are already spawned.

```
kubectl get pods -n cn -o wide | grep node-monitor
```

If the node-monitor pods have not started, restart them.

```
kubectl create -f node-monitor.yaml
```

**Note** `node-monitor.yaml` file is same as in Step 2.a, on page 37.

5. Correct the role for the instances accordingly.

**Note** For both earlier and current SMI versions:

- If you are replacing hardware components during an RMA procedure that contain firmware, such as an mLOM card, before adding the repaired or replaced node back to the cluster, you must run the HUU (Host Upgrade Utility) to ensure that the component is compatible with the system before syncing the node back into service.
- As part of RMA, if you remove a node from the cluster and before you return it to the manufacturer, you must purge all data on the device as per instructions provided by the hardware vendor.

## Unified RMA Procedure for Planned and Failure Events on Bare Metal

For the SMI version 2020.02.2.41 and later, the RMA (Return Merchandise Authorization) procedure for planned maintenance and any unplanned node failure events is unified for the SMI Bare Metal stacked cluster. The same procedure is applicable for both primary and worker nodes. This feature simplifies the automation and MOP requirements for both NSO and user.

**Note** For information on the RMA procedures for all previous versions of SMI Bare Metal, refer to the following sections in this guide:

- Control Plane Bare Metal Node Failure - Unplanned
- Control Plane Bare Metal Node Maintenance - Planned

### Unified RMA Procedure for the Control Plane and Worker Nodes

This section describes the unified RMA procedure applicable to the following scenarios:

- Replace a working control plane Bare Metal node or worker node for maintenance.
- Replace a failed Bare Metal control plane node or worker node in a stacked cluster.

**Notes:**

- If you are performing RMA for a control plane node, you must ensure that the majority of control plane nodes are still available during the RMA process.
- Disable **auto-sync** before you perform the RMA procedure.

Use the following steps to replace a working or failed control plane or worker node:

1. Drain and remove the node which is sent for maintenance, using the following command:

   **clusters** *cluster_name* **nodes***node_name* **actions sync drain remove-node true**

   **Example:**

   ```
   SMI Cluster Deployer# clusters kali-stacked nodes controlplane1 actions sync drain
   remove-node true
   This will run drain on the node, disrupting pods running on the node.  Are you sure?
   [no,yes] yes
   message accepted
   ```

2. For a planned maintenance scenario, shutdown the node if the node is still running.

3. Assign the node to *maintenance* mode in the cluster configuration using the following CLI commands:

   ```
   config
     clusters cluster_name
       nodes node_name
         maintenance true
       commit
     end
   ```

   **Example:**

   ```
   SMI Cluster Deployer(config)# clusters kali-stacked
   SMI Cluster Deployer(config-clusters-kali-stacked)# nodes controlplane1
   SMI Cluster Deployer(config-nodes-controlplane1)# maintenance true
   SMI Cluster Deployer(config-nodes-controlplane1)# commit
   Commit complete.
   SMI Cluster Deployer(config-nodes-controlplane1)# end
   SMI Cluster Deployer#
   ```

4. The node is ready for the RMA process.

**Note** If the remaining nodes must be upgraded or updated, run a cluster sync in this state. However, it's not a part of the RMA process.

5. Add the node back to the cluster when it is repaired or replaced and available.

**Note** If the remaining nodes have been upgraded to a new SMI release during the time when this node was under maintenance, then it's recommended to clear the boot drive and delete the virtual drive on the node. This step ensures that virtual drive is in a clean state without the previous state before you add it back. However, removal of the virtual drive is not required for a new replacement node.

6. Attach the new Bare Metal node and remove it from the *maintenance* mode in the cluster configuration using the following commands:

```
config
  clusters cluster_name
    nodes node_name
      maintenance false
    commit
  end
```

**Example:**

```
SMI Cluster Deployer(config)# clusters kali-stacked
SMI Cluster Deployer(config-clusters-kali-stacked)# nodes controlplane1
SMI Cluster Deployer(config-nodes-controlplane1)# maintenance false
SMI Cluster Deployer(config-nodes-controlplane1)# commit
Commit complete.
SMI Cluster Deployer(config-nodes-controlplane1)# end
SMI Cluster Deployer#
```

7. Run the cluster synchronization using the following command:

```
clusters cluster_name actions sync run debug true
```

**Example:**

```
SMI Cluster Deployer# clusters kali-stacked actions sync run debug true
This will run sync.  Are you sure? [no,yes] yes
message accepted
```

8. Monitor the cluster synchronization using the following command:

```
monitor sync-logs cluster_name
```

**Example:**

```
SMI Cluster Deployer# monitor sync-logs kali-stacked
2020-09-30 01:50:02.159 DEBUG cluster_sync.kali-stacked: Cluster name: kali-stacked
2020-09-30 01:50:02.160 DEBUG cluster_sync.kali-stacked: Force VM Redeploy: false
2020-09-30 01:50:02.160 DEBUG cluster_sync.kali-stacked: Force partition Redeploy: false

2020-09-30 01:50:02.160 DEBUG cluster_sync.kali-stacked: reset_k8s_nodes: false
2020-09-30 01:50:02.160 DEBUG cluster_sync.kali-stacked: purge_data_disks: false
2020-09-30 01:50:02.160 DEBUG cluster_sync.kali-stacked: upgrade_strategy: auto
2020-09-30 01:50:02.160 DEBUG cluster_sync.kali-stacked: sync_phase: all
2020-09-30 01:50:02.160 DEBUG cluster_sync.kali-stacked: debug: true
.
.
.
.
2020-09-30 01:53:27.638 DEBUG cluster_sync.kali-stacked: Cluster sync successful
2020-09-30 01:53:27.638 DEBUG cluster_sync.kali-stacked: Ansible sync done
2020-09-30 01:53:27.638 INFO cluster_sync.kali-stacked: _sync finished.  Opening lock
```

9. To verify the status of the cluster, use the following command:

```
clusterscluster_name actions k8s cluster-status
```

**Example:**

```
pods-desired-count 99
pods-ready-count 99
pods-desired-are-ready true
etcd-healthy true
all-ok true
```

**NOTES:**

- **clusters** *cluster_name* - Specifies the K8s cluster.
- **nodes** *node_name* - Specifies the control plane Bare Metal node.
- **maintenance** *true/false* - Assigns or removes the primary control plane Bare Metal mode to maintenance mode.
- **actions sync run debug true** - Synchronizes the cluster configuration.
- **actions k8s cluster-status** - Displays the status of the cluster.

## SMI Bare Metal Stacked Cluster

In SMI Bare Metal deployment, a stacked cluster is defined as a cluster containing three Bare Metal control plane nodes with a primary control plane, OAM, and other applications hosted on the same three nodes. A healthy stacked cluster needs at least two working control plane nodes to perform all the functions. When the two control plane nodes fail, the entire cluster fails and you must redeploy the entire cluster. You can run the K8s cluster synchronization from the current Active node of the Cluster Manager HA.

The subsequent sections provide information about handling the stacked cluster in the event of a Bare Metal node failure (unplanned) or planned maintenance.

### Control Plane Baremetal Node Failure - Unplanned

This section describes the procedure to replace a failed primary Bare Metal control plane 1 node in a stacked cluster. When the primary control plane 1 Bare Metal node fails, the node status changes to *NotReady*. You can use the following command to view the status of the nodes in the cluster:

**`kubectl get nodes`**

In the following example, the status of the primary control plane 1 node changes to *NotReady* after it fails.

```
user1-cloud@kali-stacked-control-plane:~$ kubectl get nodes
NAME                          STATUS     ROLES           AGE    VERSION
kali-stacked-control-plane1   NotReady   control-plane   136m   v1.21.0
kali-stacked-control-plane2   Ready      control-plane   10h    v1.21.0
kali-stacked-control-plane3   Ready      control-plane   10h    v1.21.0
```

All the pods in the failed primary control plane 1 Bare Metal node remains either terminated or in pending state. You verify the status of the pods using the **kubectl get pods** command as shown in the following example:

```
user1-cloud@kali-stacked-controlplane3:~$ kubectl get pods -A
NAMESPACE           NAME                                                READY   STATUS
RESTARTS   AGE
kube-system         calico-kube-controllers-5d7fff4bc6-lxkpc            1/1     Running   0
        7h26m
kube-system         calico-node-tx7zg                                   1/1     Running   0
        10h
kube-system         calico-node-v6m7v                                   1/1     Running   0
        10h
kube-system         coredns-66d57f55d9-6dnsn                            1/1     Running   0
        136m
kube-system         coredns-66d57f55d9-rdtbd                            1/1     Running   0
        136m
kube-system         etcd-kali-stacked-controlplane2                     1/1     Running   0
        10h
kube-system         etcd-kali-stacked-controlplane3                     1/1     Running   0
        10h
```

```
kube-system         kube-apiserver-kali-stacked-controlplane2        1/1     Running   0
        10h
kube-system         kube-apiserver-kali-stacked-controlplane3        1/1     Running   0
        10h
```

To replace the failed primary control plane 1 Bare Metal node:

1. Delete the failed primary control plane 1 Bare Metal node using the following command:

   **kubectl delete node** *node_name*

   **Example:**

   ```
   user1-cloud@kali-stacked-controlplane3:~$ kubectl delete node kali-stacked-controlplane1
   node "kali-stacked-controlplane1" deleted
   ```

2. Assign the primary control plane 1 Bare Metal node to *maintenance* mode in the cluster configuration using the following commands:

   ```
   configure
     clusters cluster_name
     nodes controlplane1
     maintenance true
     commit
     end
   ```

   **Example:**

   ```
   SMI Cluster Deployer(config)# clusters kali-stacked
   SMI Cluster Deployer(config-clusters-kali-stacked)# nodes controlplane1
   SMI Cluster Deployer(config-nodes-controlplane1)# maintenance true
   SMI Cluster Deployer(config-nodes-controlplane1)# commit
   Commit complete.
   SMI Cluster Deployer(config-nodes-controlplane1)# end
   SMI Cluster Deployer#
   ```

3. The node is ready for the RMA process.

**Note** If the remaining nodes need to be upgraded or NFs need to be synchronized, run a cluster sync in this state. However, it's not a part of the RMA process.

4. Add the node back to the cluster when it is repaired or replaced and available.

**Note** If you add a node after it's repaired, ensure that the disks are clean by clearing the boot drive and virtual drive on the node. This step is to ensure that the virtual drive is in a clean state without the previous state before you add it back. However, removal of the virtual drive is not required for a new replacement node.

5. Attach the new primary control plane 1 Bare Metal node and remove it from the *maintenance* mode in the cluster configuration using the following commands:

   ```
   configure
     clusters cluster_name
     nodes controlplane1
     maintenance false
   ```

```
commit
end
```

**Example:**

```
SMI Cluster Deployer(config)# clusters kali-stacked
SMI Cluster Deployer(config-clusters-kali-stacked)# nodes controlplane1
SMI Cluster Deployer(config-nodes-controlplane1)# maintenance false
SMI Cluster Deployer(config-nodes-controlplane1)# commit
Commit complete.
SMI Cluster Deployer(config-nodes-controlplane1)# end
SMI Cluster Deployer#
```

6. Run the cluster synchronization using the following command:

   **clusters** *cluster_name* **actions sync run debug true**

   **Example:**

   ```
   SMI Cluster Deployer# clusters kali-stacked actions sync run debug true
   This will run sync.  Are you sure? [no,yes] yes
   message accepted
   ```

7. Verify the status of the cluster using the following command:

   **clusters** *cluster_name* **actions k8s cluster-status**

   **Example:**

   ```
   SMI Cluster Deployer# clusters kali-stacked actions k8s cluster-status
   pods-desired-count 40
   pods-ready-count 39
   pods-desired-are-ready true
   etcd-healthy true
   all-ok true
   ```

**NOTES:**

- **clusters** *cluster_name* - Specifies the K8s cluster.
- **nodes controlplane1** - Specifies primary control plane 1 Bare Metal node.
- **maintenance** *true/false* - Assigns or removes the primary control plane 1 Bare Metal mode to maintenance mode
- **actions sync run debug true** - Synchronizes the cluster configuration.
- **actions k8s cluster-status** - Displays the status of the cluster.

## Control Plane Bare Metal Node Maintenance - Planned

This section describes the procedures involved in replacing a working primary control plane Bare Metal node for maintenance. To replace a primary control plane Bare Metal node for maintenance, use the following:

1. Drain and remove the control plane node which is sent for maintenance, using the following command:

   **clusters** *cluster_name* **nodes controlplane1 actions sync drain remove-node true**

   **Example:**

   ```
   SMI Cluster Deployer# clusters kali-stacked nodes controlplane1 actions sync drain
   remove-node true
   This will run drain on the node, disrupting pods running on the node.  Are you sure?
   ```

```
[no,yes] yes
message accepted
```

2. Verify the status of the control plane node using the following command:

   **clusters** *cluster_name* **nodes controlplane1 actions sync logs**

   **Example:**

```
SMI Cluster Deployer# clusters kali-stacked nodes controlplane1 actions sync logs
logs 2020-09-30 01:46:14.498 DEBUG cluster_sync.kali-stacked.controlplane1: Cluster name:
 kali-stacked
2020-09-30 01:46:14.498 DEBUG cluster_sync.kali-stacked.controlplane1: Node name:
controlplane1
2020-09-30 01:46:14.499 DEBUG cluster_sync.kali-stacked.controlplane1: debug: false
2020-09-30 01:46:14.499 DEBUG cluster_sync.kali-stacked.controlplane1: remove_node: true
.
.
.
.
2020-09-30 01:46:53.028 DEBUG cluster_sync.kali-stacked.controlplane1: Cluster sync
successful
2020-09-30 01:46:53.029 DEBUG cluster_sync.kali-stacked.controlplane1: Ansible sync done

2020-09-30 01:46:53.029 INFO cluster_sync.kali-stacked.controlplane1: _sync finished.
Opening lock
```

3. Shutdown the node.

4. Assign the primary control plane Bare Metal node to *maintenance* mode in the cluster configuration using the following commands:

```
configure
  clusters cluster_name
  nodes controlplane1
  maintenance true
  commit
  end
```

   **Example:**

```
SMI Cluster Deployer(config)# clusters kali-stacked
SMI Cluster Deployer(config-clusters-kali-stacked)# nodes controlplane1
SMI Cluster Deployer(config-nodes-controlplane1)# maintenance true
SMI Cluster Deployer(config-nodes-controlplane1)# commit
Commit complete.
SMI Cluster Deployer(config-nodes-controlplane1)# end
SMI Cluster Deployer#
```

5. The node is ready for the RMA process.

**Note** If the remaining nodes need to be upgraded or NFs need to be synchronized, run a cluster sync in this state. However, it's not a part of the RMA process.

6. Add the node back to the cluster when it is repaired or replaced and available.

**Note** If you add a node after it's repaired, ensure that the disks are clean by clearing the boot drive and virtual drive on the node. This step is to ensure that the virtual drive is in a clean state without the previous state before you add it back. However, removal of the virtual drive is not required for a new replacement node.

7. Attach the new primary control plane Bare Metal node and remove it from the *maintenance* mode in the cluster configuration using the following commands:

   ```
   configure
     clusters cluster_name
     nodes controlplane1
     maintenance false
     commit
     end
   ```

   **Example:**

   ```
   SMI Cluster Deployer(config)# clusters kali-stacked
   SMI Cluster Deployer(config-clusters-kali-stacked)# nodes controlplane1
   SMI Cluster Deployer(config-nodes-controlplane1)# maintenance false
   SMI Cluster Deployer(config-nodes-controlplane1)# commit
   Commit complete.
   SMI Cluster Deployer(config-nodes-controlplane1)# end
   SMI Cluster Deployer#
   ```

8. Run the cluster synchronization using the following command:

   **clusters** *cluster_name* **actions sync run debug true**

   **Example:**

   ```
   SMI Cluster Deployer# clusters kali-stacked actions sync run debug true
   This will run sync.  Are you sure? [no,yes] yes
   message accepted
   ```

**NOTES:**

- **clusters** *cluster_name* - Specifies the K8s cluster.
- **nodes controlplane1** - Specifies primary control plane 1 Bare Metal node.
- **maintenance** *true/false* - Assigns or removes the primary control plane 1 Bare Metal mode to maintenance mode
- **actions sync run debug true** - Synchronizes the cluster configuration.
- **actions k8s cluster-status** - Displays the status of the cluster.

## Stacked Cluster with Worker Nodes

For scaling the NFs, you can add a number of worker nodes along with the stacked control plane nodes. After adding the worker nodes to the stacked control plane nodes, you can distribute the NFs to the worker nodes.

This section describes procedures involved in replacing a Bare Metal worker node within a SMI Cluster in the event of node failure or planned maintenance.

## Worker Bare Metal Node Failure - Unplanned

This section describes the procedure to replace a failed primary Bare Metal worker node in a stacked cluster. When the primary worker Bare Metal node fails, the node status changes to *NotReady*.

Verify the status of the nodes in the cluster using the following command:

**kubectl get nodes**

In the following example, the status of the primary worker node changes to *NotReady* after it fails.

```
user1-cloud@kali-stacked-controlplane1:~$ kubectl get nodes
NAME                          STATUS     ROLES           AGE    VERSION
kali-stacked-cmts-worker1     NotReady   <none>          38m    v1.21.0
kali-stacked-cmts-worker2     Ready      <none>          38m    v1.21.0
kali-stacked-cmts-worker3     Ready      <none>          38m    v1.21.0
kali-stacked-controlplane1    Ready      control-plane   125m   v1.21.0
kali-stacked-controlplane2    Ready      control-plane   13h    v1.21.0
kali-stacked-controlplane3    Ready      control-plane   13h    v1.21.0
```

To replace the failed primary Bare Metal worker node in the Cluster:

1. Delete the failed primary worker Bare Metal node using the following command:

   **kubectl delete node** *node_name*

   **Example:**

   ```
   user1-cloud@kali-stacked-controlplane3:~$ kubectl delete node kali-stacked-cmts-worker1
   node "kali-stacked-cmts-worker1" deleted
   ```

2. Assign the primary worker Bare Metal node to *maintenance* mode in the cluster configuration using the following commands:

   ```
   configure
     clusters cluster_name
     nodes worker_node
     maintenance true
     commit
     end
   ```

   **Example:**

   ```
   SMI Cluster Deployer(config)# clusters kali-stacked
   SMI Cluster Deployer(config-clusters-kali-stacked)# nodes cmts-worker1
   SMI Cluster Deployer(config-nodes-cmts-worker1)# maintenance true
   SMI Cluster Deployer(config-nodes-cmts-worker1)# commit
   Commit complete.
   SMI Cluster Deployer(config-nodes-cmts-worker1)# end
   ```

3. The node is ready for the RMA process.

**Note** If the remaining nodes need to be upgraded or NFs need to be synchronized, run a cluster sync in this state. However, it's not a part of the RMA process.

4. Add the node back to the cluster when it is repaired or replaced and available.

**Note** If you add a node after it's repaired, ensure that the disks are clean by clearing the boot drive and virtual drive on the node. This step is to ensure that the virtual drive is in a clean state without the previous state before you add it back. However, removal of the virtual drive is not required for a new replacement node.

5. Attach the new primary worker Bare Metal node and remove it from the *maintenance* mode in the cluster configuration using the following commands:

   ```
   configure
     clusters cluster_name
     nodes worker_node
     maintenance false
     commit
     end
   ```

   **Example:**

   ```
   SMI Cluster Deployer(config)# clusters kali-stacked
   SMI Cluster Deployer(config-clusters-kali-stacked)# nodes cmts-worker1
   SMI Cluster Deployer(config-nodes-cmts-worker1)# maintenance false
   SMI Cluster Deployer(config-nodes-cmts-worker1)# commit
   Commit complete.
   SMI Cluster Deployer(config-nodes-cmts-worker1)# end
   SMI Cluster Deployer#
   ```

6. Run the cluster synchronization using the following command:

   ```
   clusters cluster_name actions sync run debug true
   ```

   **Example:**

   ```
   SMI Cluster Deployer# clusters kali-stacked actions sync run debug true
   This will run sync.  Are you sure? [no,yes] yes
   message accepted
   ```

7. Verify the status of the cluster using the following command:

   ```
   clusters cluster_name actions k8s cluster-status
   ```

   **Example:**

   ```
   SMI Cluster Deployer# clusters kali-stacked actions k8s cluster-status
   pods-desired-count 67
   pods-ready-count 67
   pods-desired-are-ready true
   etcd-healthy true
   all-ok true
   ```

8. Verify the status of the pods redeployed on the added worker node using the following command:

   ```
   clusters cluster_name nodes worker_node actions k8s pod-status
   show-pod-details
   Value for 'show-pod-details' [false,true]: true
   ```

   **Example:**

   ```
   SMI Cluster Deployer# clusters kali-stacked nodes cmts-worker1 actions k8s pod-status
   show-pod-details
   Value for 'show-pod-details' [false,true]: true
   pods {
       name calico-node-67gs6
   ```

```
    namespace kube-system
    owner-kind DaemonSet
    owner-name calico-node
    ready true
}
pods {
    name coredns-f9fd979d6-b2gsb
    namespace kube-system
    owner-kind ReplicaSet
    owner-name coredns-f9fd979d6
    ready true
}
pods {
    name kube-proxy-5m9qh
    namespace kube-system
    owner-kind DaemonSet
    owner-name kube-proxy
    ready true
}
pods {
    name maintainer-2nxlq
    namespace kube-system
    owner-kind DaemonSet
    owner-name maintainer
    ready true
}
pods {
    name charts-cee-2020-02-0-i21-4
    namespace registry
    owner-kind StatefulSet
    owner-name charts-cee-2020-02-0-i21
    ready true
}
pods {
    name charts-cluster-deployer-2020-02-0-i22-5
    namespace registry
    owner-kind StatefulSet
    owner-name charts-cluster-deployer-2020-02-0-i22
    ready true
}
pods {
    name registry-cee-2020-02-0-i21-5
    namespace registry
    owner-kind StatefulSet
    owner-name registry-cee-2020-02-0-i21
    ready true
}
pods {
    name registry-cluster-deployer-2020-02-0-i22-5
    namespace registry
    owner-kind StatefulSet
    owner-name registry-cluster-deployer-2020-02-0-i22
    ready true
}
pods {
    name software-unpacker-3
    namespace registry
    owner-kind StatefulSet
    owner-name software-unpacker
    ready true
}
pods {
    name keepalived-jrj4g
    namespace smi-vips
```

```
    owner-kind DaemonSet
    owner-name keepalived
    ready true
}
pods-count 10
pods-available-to-drain-count 6
```

**Note** You can follow the same procedure to replace one or more failed worker nodes in the cluster.

**NOTES:**

- **clusters** *cluster_name* - Specifies the K8s cluster.
- **nodes worker** - Specifies primary worker Bare Metal node.
- **maintenance** *true/false* - Assigns or removes the primary control plane 1 Bare Metal mode to maintenance mode
- **actions sync run debug true** - Synchronizes the cluster configuration.
- **actions k8s cluster-status** - Displays the status of the cluster.

## Worker Bare Metal Node Maintenance - Planned

This section describes the procedures involved in replacing a working primary worker Bare Metal node for maintenance. To replace a primary worker Bare Metal node for maintenance, use the following:

1. Drain and remove the worker node which is sent for maintenance, using the following command:

   **clusters** *cluster_name* **nodes** *worker_node* actions sync drain remove-node true

   **Example:**

   ```
   [installer-controlplane] SMI Cluster Deployer# clusters kali-stacked nodes cmts-worker1
    actions sync drain remove-node true
   This will run drain on the node, disrupting pods running on the node.  Are you sure?
   [no,yes] yes
   message accepted
   ```

2. Verify the status of the worker node using the following command:

   **clusters** *cluster_name* **nodes** *worker_node* **actions sync logs**

   **Example:**

   ```
   [installer-controlplane] SMI Cluster Deployer# clusters kali-stacked nodes cmts-worker1
    actions sync logs
   logs 2020-10-06 20:01:48.023 DEBUG cluster_sync.kali-stacked.cmts-worker1: Cluster name:
    kali-stacked
   2020-10-06 20:01:48.024 DEBUG cluster_sync.kali-stacked.cmts-worker1: Node name:
   cmts-worker1
   2020-10-06 20:01:48.024 DEBUG cluster_sync.kali-stacked.cmts-worker1: debug: false
   2020-10-06 20:01:48.024 DEBUG cluster_sync.kali-stacked.cmts-worker1: remove_node: true

   .
   .
   .
   .
   2020-10-06 20:02:30.057 DEBUG cluster_sync.kali-stacked.cmts-worker1: Cluster sync
   successful
   ```

```
2020-10-06 20:02:30.058 DEBUG cluster_sync.kali-stacked.cmts-worker1: Ansible sync done

2020-10-06 20:02:30.058 INFO cluster_sync.kali-stacked.cmts-worker1: _sync finished.
Opening lock
```

3. Shutdown the node.
4. Assign the primary control plane Bare Metal node to *maintenance* mode in the cluster configuration using the following commands:

```
configure
  clusters cluster_name
  nodes worker_node
  maintenance true
  commit
  end
```

**Example:**

```
[installer-controlplane] SMI Cluster Deployer# config
Entering configuration mode terminal
[installer-controlplane] SMI Cluster Deployer(config)# clusters kali-stacked
[installer-controlplane] SMI Cluster Deployer(config-clusters-kali-stacked)# nodes
cmts-worker1
[installer-controlplane] SMI Cluster Deployer(config-nodes-cmts-worker1)# maintenance
true
[installer-controlplane] SMI Cluster Deployer(config-nodes-cmts-worker1)# commit
Commit complete.
[installer-controlplane] SMI Cluster Deployer(config-nodes-cmts-worker1)# end
```

5. The node is ready for the RMA process.

**Note** If the remaining nodes need to be upgraded or NFs need to be synchronized, run a cluster sync in this state. However, it's not a part of the RMA process.

6. Add the node back to the cluster when it is repaired or replaced and available.

**Note** If you add a node after it's repaired, ensure that the disks are clean by clearing the boot drive and virtual drive on the node. This step is to ensure that the virtual drive is in a clean state without the previous state before you add it back. However, removal of the virtual drive is not required for a new replacement node.

7. Attach the new primary worker Bare Metal node and remove it from the *maintenance* mode in the cluster configuration using the following commands:

```
configure
  clusters cluster_name
  nodes worker_node
  maintenance false
  commit
  end
```

**Example:**

```
SMI Cluster Deployer# config
Entering configuration mode terminal
```

```
[installer-controlplane] SMI Cluster Deployer(config)# clusters kali-stacked
[installer-controlplane] SMI Cluster Deployer(config-clusters-kali-stacked)# nodes
cmts-worker1
[installer-controlplane] SMI Cluster Deployer(config-nodes-cmts-worker1)# maintenance
false
[installer-controlplane] SMI Cluster Deployer(config-nodes-cmts-worker1)# commit
Commit complete.
[installer-controlplane] SMI Cluster Deployer(config-nodes-cmts-worker1)# end
```

8. Run the cluster synchronization using the following command:

   **clusters** *cluster_name* **actions sync run debug true**

   **Example:**

   ```
   SMI Cluster Deployer# clusters kali-stacked actions sync run debug true
   This will run sync.  Are you sure? [no,yes] yes
   message accepted
   ```

**NOTES:**

- **clusters** *cluster_name* - Specifies the K8s cluster.
- **nodes worker** - Specifies primary worker Bare Metal node.
- **maintenance** *true/false* - Assigns or removes the primary control plane 1 Bare Metal mode to maintenance mode
- **actions sync run debug true** - Synchronizes the cluster configuration.
- **actions k8s cluster-status** - Displays the status of the cluster.

## KVM Bare Metal Node Failure

For KVM Bare Metal node failures, you must replace the failed or faulty KVM Bare Metal node and run a cluster synchronization. When the cluster synchronizes successfully, the SMI Cluster Manager retains its database for Day 0 configuration. However, for Day 1 configuration, the SMI Cluster Manager retains its database from the Network Services Orchestrator (NSO).

**Note** The SMI does not support any other data backup or restore methods currently.

## Node Failures in SMI Cluster Manager HA

Unlike a typical a Kubernetes cluster, the SMI Bare Metal HA consists of two AIO Bare Metal nodes running independently but synchronized in data using an underlying Distributed Replicated Block Device (DRBD) driver. The data synchronization happens in a specific manner with restrictions. Also, the DRBD utilizes the master keepalived for switchovers. You can run the synchronization for the SMI Cluster Manager HA from the Inception Server.

The subsequent sections provide more information about replacing failed nodes in SMI Bare Metal Cluster Manager HA mode.

### Active Bare Metal Node Failure - Unplanned

When an Active node fails in a Cluster Manager HA model, the Standby node becomes the Active node and continues to upgrade the remote clusters or the NFs. To replace the failed Active node:

1. Remove the Active node.

**Note** Upgrade or synchronize the remote clusters using the Standby node.

For more information on upgrading the SMI Cluster Manager in HA mode, see *Upgrading SMI Cluster Manager in HA* section in *UCC SMI Cluster Manager Deployment Guide*.

2. Update the Cluster Manager HA configuration to swap the backup and control-plane node types when the Active node is up and running.

```
nodes active
  k8s node-type backup #originally this would be control-plane type in the fresh
deployment
 exit
 nodes standby
  k8s node-type control-plane #originally this would be backup type in fresh
deployment
exit
```

3. Run the cluster synchronization.

**clusters** *cluster_name* **actions sync run debug true**

**Example:**

```
SMI Cluster Deployer# clusters trysjc-ha actions sync run debug true
This will run sync.  Are you sure? [no,yes] yes
message accepted
```

4. Verify the status of the cluster and pods when the Active and Standby nodes are up and running.

**clusters** *cluster_name* **actions k8s cluster-status**

**kubectl get pods -n** *namespace*

5. Log in to the Ops Center service and verify whether the cluster configuration and CEE data are retained.

6. Once the active node is back from maintenance, update the Cluster Manager HA configuration to swap the backup and control-plane node types.

```
nodes active
  k8s node-type control-plane #originally this would be control-plane type in the
 fresh deployment
 exit
 nodes standby
  k8s node-type backup #originally this would be backup type in fresh deployment
exit
```

**NOTES:**

- **clusters** *cluster_name* - Specifies the K8s cluster.
- **actions sync run debug true** - Synchronizes the cluster configuration.
- **actions k8s cluster-status** - Displays the status of the cluster.

### Active Bare Metal Maintenance - Planned

This section describes the procedures involved in replacing an Active node for maintenance. To replace a an Active node for maintenance, use the following procedure:

1. Shutdown the Active node.

**Note** Upgrade or synchronize the remote clusters using the Standby node.

For more information on upgrading the SMI Cluster Manager in HA mode, see *Upgrading SMI Cluster Manager in HA* section in *UCC SMI Cluster Manager Deployment Guide*.

2. Update the Cluster Manager HA configuration to swap the backup and control plane node types when the Active node is up and running.

```
nodes active
  k8s node-type backup #originally this would be control-plane type in the fresh
deployment
 exit
 nodes standby
  k8s node-type control-plane #originally this would be backup type in fresh
deployment
exit
```

3. Run the cluster synchronization.

**clusters** *cluster_name* **actions sync run debug true**

**Example:**

```
SMI Cluster Deployer# clusters trysjc-ha actions sync run debug true
This will run sync.  Are you sure? [no,yes] yes
message accepted
```

4. Verify the status of the cluster and pods when the Active and Standby nodes are up and running.

**clusters** *cluster_name* **actions k8s cluster-status**

**kubectl get pods -n** *namespace*

5. Log in to the Ops Center service and verify whether the cluster configuration and CEE data are retained.

**NOTES:**

- **clusters** *cluster_name* - Specifies the K8s cluster.
- **actions sync run debug true** - Synchronizes the cluster configuration.
- **actions k8s cluster-status** - Displays the status of the cluster.

### Standby Bare Metal Node Failure or Maintenance

This section describes the procedures involved in replacing a Standby node which has either failed (unplanned) or removed for maintenance (planned). To replace a Standby node, use the following:

1. Shutdown the Standby node.

**Note** Upgrade or synchronize the remote clusters using the Standby node.

For more information on upgrading the SMI Cluster Manager in HA mode, see *Upgrading SMI Cluster Manager in HA* section

in *UCC SMI Cluster Manager Deployment Guide*.

2. Add the Standby node to the same HA configuration when the Standby node is up and running.
3. Run the cluster synchronization.

   **clusters** *cluster_name* **actions sync run debug true**

   **Example:**

   ```
   SMI Cluster Deployer# clusters trysjc-ha actions sync run debug true
   This will run sync.  Are you sure? [no,yes] yes
   message accepted
   ```

4. Verify the status of the cluster and pods when the Active and Standby nodes are up and running.

   **clusters** *cluster_name* **actions k8s cluster-status**

   **kubectl get pods -n** *namespace*

5. Log in to the Ops Center service and verify whether the cluster configuration and CEE data are retained.

**NOTES:**

- **clusters** *cluster_name* - Specifies the K8s cluster.
- **actions sync run debug true** - Synchronizes the cluster configuration.
- **actions k8s cluster-status** - Displays the status of the cluster.

## SMI Cluster Manager AIO Node Failure or Planned Maintenance

When the SMI Cluster Manager is deployed in All-In-One (AIO) mode, the CEE replicates the data across all the three nodes (*control plane*, *worker* and *etcd*).

Also, the SMI Cluster Manager AIO model does not support the back up and recovery of operational data. Therefore, you must ensure the following to prevent the loss of monitoring data when a double node or triple node failure occurs:

1. Back up the CEE configuration for the Ops Center using the standard Ops Center backup and restore functionality.
2. Back up the Cluster Manager configuration for the Ops Center (remote cluster configuration) using the standard Ops Center backup and restore functionality.
3. For planned maintenance or unplanned outage in the SMI AIO mode, you can perform a cluster synchronization and restore the backed-up configuration.
4. Export the metrics (KPIs) from bulk stats regularly.
5. Gather Alerts in an external system.

# Disaster Recovery

This section describes the procedure to redeploy the SMI Cluster Manager HA, when both the Active and Standby nodes fail or when the entire site or cluster is down.

### Active and Standby Node Failure - Unplanned

When both the Active and Standby node fails in a SMI Cluster Manager HA model, you can redeploy the SMI Cluster Manager in HA mode using the Inception Server. To redeploy the SMI Cluster Manager HA using the Inception Server, use the following procedure:

1. Log in to the Inception Server CLI and perform a cluster synchronization.

   **clusters** *cluster_name* **actions sync run debug true**

   **Example:**

   ```
   SMI Cluster Deployer# clusters trysjc-ha actions sync run debug true
   This will run sync.  Are you sure? [no,yes] yes
   message accepted
   ```

**Note** In the event of an unplanned outage, you cannot restore the data since the SMI does not backup data periodically in the background. However, in the event of planned maintenance, you can restore the data from the storage node manually. You can restore the data using the *scp* command on the storage node:

**scp -i** *../test_key2.pem* **-r host_name@<ipv4address>:/data**

2. Copy the backed up data from the storage node and verify whether the NFs, CM and CEE configurations are present.

**Note** Restore the backed up data only when the Active and Standby nodes and all the pods within these nodes are up and running.

**NOTES:**

- **clusters** *cluster_name* - Specifies the K8s cluster.
- **actions sync run debug true** - Synchronizes the cluster configuration.

### Restoring an Entire Site or Cluster

When an entire site or cluster is down, you can redeploy the SMI Cluster Manager HA with NFs, CEE and remote cluster configurations using the Inception Server. To restore an entire site or cluster, use the following:

1. Redeploy the SMI Cluster Manager HA through Inception server. For more information, see *Active and Standby Node Failure - Unplanned* section.
2. Verify whether the NFs, CM and CEE configurations are present.

# CEE Data Replication

The CEE replicates the data across all the three nodes (*control plane*, *worker*, and *etcd*). Also, the SMI Cluster Manager AIO model does not support the back up and recovery of operational data. Therefore, you must ensure the following to prevent the loss of monitoring data when a double node or triple node failure occurs:

1. Back up the CEE configuration for the Ops Center using the standard Ops Center backup and restore functionality.
2. Back up the Cluster Manager configuration for the Ops Center (remote cluster configuration) using the standard Ops Center backup and restore functionality.
3. For planned maintenance or unplanned outage in the SMI AIO mode, you can perform a cluster synchronization and restore the backed-up configuration.
4. Export the metrics (KPIs) from bulk stats regularly.
5. Gather Alerts in an external system.

# Notifications

The SMI comes equipped with different notification streams to verify the event status (cluster or node synchronization) or synchronization state of the current cluster or nodes in it.

The show notification stream provides notification details for alert notifications, license status and system status.

**show notification stream ?**

```
Possible completions:
  alert-notification   Notifications for alerts
  license-status       Notifications for smart agent licensing will be generated here
  system-status        Notifications for system status
```

The NSO must subscribe to the **alert-notification** notification stream to receive alerts.

You can access the notification stream using the following command *show* command in the SMI Cluster Manager CLI:

**show notification stream** *{node-state | node-status | sync-state | sync-status}*

### Sync-State Notification

You can access the synchronization state of a given cluster using the **sync-state** notification. After every cluster synchronization, a **sync-state** notification is registered as sent.

The following example displays the deployment of a stacked cluster:

```
SMI Cluster Deployer# show notification stream sync-state
notification
 eventTime 2020-10-07T18:58:27.368+00:00
 sync-state-notification
  cluster <stacked_cluster_name>
  state DEPLOYED
 !
!
notification
 eventTime 2020-10-07T19:07:56.114+00:00
 sync-state-notification
  cluster <stacked_cluster_name>
  state DEPLOYED
```

```
 !
!
notification
 eventTime 2020-10-07T19:46:54.531+00:00
 sync-state-notification
  cluster <stacked_cluster_name>
  state DEPLOYED
 !
!
notification
 eventTime 2020-10-08T15:59:56.697+00:00
 sync-state-notification
  cluster <stacked_cluster_name>
  state DEPLOYED
 !
!
The node-state-notification could be used to assess the state of the node in a cluster
deloyment sync process. Below example shows the state of control plane and worker nodes are
 joined in <stacked_cluster_name> cluster. Before reaching JOINED state if the join process
 is still running they would show up as JOINING.
[installer-controlplane] SMI Cluster Deployer# show notification stream node-state
notification
 eventTime 2020-10-07T19:46:54.531+00:00
 node-state-notification
  cluster <stacked_cluster_name>
  node cmts-worker3
  state JOINED
 !
!
notification
 eventTime 2020-10-07T19:46:54.532+00:00
 node-state-notification
  cluster <stacked_cluster_name>
  node controlplane2
  state JOINED
 !
!
notification
 eventTime 2020-10-07T19:46:54.534+00:00
 node-state-notification
  cluster <stacked_cluster_name>
  node cmts-worker2
  state JOINED
 !
!
notification
 eventTime 2020-10-07T19:46:54.535+00:00
 node-state-notification
  cluster <stacked_cluster_name>
  node controlplane3
  state JOINED
 !
!
notification
 eventTime 2020-10-07T19:46:54.535+00:00
 node-state-notification
  cluster <stacked_cluster_name>
  node controlplane1
  state JOINED
 !
!
notification
 eventTime 2020-10-07T19:46:54.54+00:00
 node-state-notification
```

```
  cluster <stacked_cluster_name>
  node cmts-worker1
  state JOINED
 !
!
```

### Node-State Notification

You can view the node state in a cluster deployment synchronization process using the **node-state** notification.

The following example displays the state of control plane and worker nodes that have joined the stacked cluster. The node state is displayed as *JOINING*, if the process is running. Otherwise, the node state is displayed as *JOINED*.

```
SMI Cluster Deployer# show notification stream node-state
notification
 eventTime 2020-10-07T19:46:54.531+00:00
 node-state-notification
  cluster <stacked_cluster_name>
  node cmts-worker3
  state JOINED
 !
!
notification
 eventTime 2020-10-07T19:46:54.532+00:00
 node-state-notification
  cluster <stacked_cluster_name>
  node controlplane2
  state JOINED
 !
!
notification
 eventTime 2020-10-07T19:46:54.534+00:00
 node-state-notification
  cluster <stacked_cluster_name>
  node cmts-worker2
  state JOINED
 !
!
notification
 eventTime 2020-10-07T19:46:54.535+00:00
 node-state-notification
  cluster <stacked_cluster_name>
  node controlplane3
  state JOINED
 !
!
notification
 eventTime 2020-10-07T19:46:54.535+00:00
 node-state-notification
  cluster <stacked_cluster_name>
  node controlplane1
  state JOINED
 !
!
notification
 eventTime 2020-10-07T19:46:54.54+00:00
 node-state-notification
  cluster <stacked_cluster_name>
  node cmts-worker1
  state JOINED
```

```
 !
!
```

### Sync-Status Notification

You view the progression of the cluster synchronization process using the **sync-status** notification.

The following example displays the different states (SYNC-START, ERROR and DONE) of the cluster synchronization process:

```
SMI Cluster Deployer# show notification stream sync-status
notification
 eventTime 2020-10-08T16:05:53.326+00:00
 sync-status-notification
  cluster <stacked_cluster_name>
  status ERROR
 !
!
notification
 eventTime 2020-10-08T16:12:48.042+00:00
 sync-status-notification
  cluster <stacked_cluster_name>
  status SYNC-START
 !
!
notification
 eventTime 2020-10-08T16:26:23.444+00:00
 sync-status-notification
  cluster <stacked_cluster_name>
  status ERROR
 !
!
notification
 eventTime 2020-10-08T16:26:23.446+00:00
 sync-status-notification
  cluster <stacked_cluster_name>
  status ERROR
 !
!
notification
 eventTime 2020-10-08T16:31:42.551+00:00
 sync-status-notification
  cluster <stacked_cluster_name>
  status SYNC-START
 !
!
notification
 eventTime 2020-10-08T16:43:33.498+00:00
 sync-status-notification
  cluster <stacked_cluster_name>
  status DONE
 !
!
notification
 eventTime 2020-10-08T20:04:21.386+00:00
 sync-status-notification
  cluster kali-stacked
  status SYNC-START
 !
!
notification
 eventTime 2020-10-08T20:04:21.386+00:00
 sync-status-notification
  cluster kali-stacked
```

```
  status SYNC-START
 !
!
notification
 eventTime 2020-10-08T20:27:32.155+00:00
 sync-status-notification
  cluster kali-stacked
  status DONE
 !
!
```

### Node-Status Notification

You can view the status of the node synchronization using the **node-status** notification. The following example displays the status of the nodes in a stacked cluster:

```
SMI Cluster Deployer# show notification stream node-status
notification
 eventTime 2020-09-25T19:59:56.728+00:00
 node-status-notification
cluster kali-vm3
node controlplane
status DONE
 !
!
notification
 eventTime 2020-09-29T16:36:05.962+00:00
 node-status-notification
cluster kali
node etcd1
status DONE
 !
!
notification
 eventTime 2020-09-29T20:54:18.415+00:00
 node-status-notification
cluster kali-stacked
node controlplane1
status DONE
 !
!
notification
 eventTime 2020-09-30T01:28:57.355+00:00
 node-status-notification
cluster kali-stacked
node controlplane1
status DONE
 !
!
notification
 eventTime 2020-09-30T01:46:53.034+00:00
 node-status-notification
cluster kali-stacked
node controlplane1
status DONE
 !
!
notification
 eventTime 2020-09-30T04:17:25.701+00:00
 node-status-notification
cluster kali-stacked
node controlplane1
status ERROR
 !
```

```
!
notification
 eventTime 2020-10-06T20:02:30.108+00:00
 node-status-notification
cluster kali-stacked
node cmts-worker1
status DONE
 !
!
```

### VM Status Alerts

The NSO needs to know the state of the NF (Network Function) that has been deployed and notifications for the following states:

- DEPLOYED
- ALIVE
- UNDEPLOYED
- ERROR
- RECOVERING
- RECOVERY_FAILED

**Note** The SMI supports VM status notification for UPF only.

The following parameters are introduced in the notification streams for the VM status notifications:

***Table 4:***

| Parameter | Description |
|---|---|
| **vm-state-notification stream** | The **vm-state-notification** stream has the following details:<br>• cluster_name: the cluster holds KVM nodes<br>• node_name: KVM node name<br>• vm_name: UPF name<br>• state: VM state<br>• message: Carries useful information such as error message or mgmt-ip when the state of the VM is ALIVE. |

| Parameter | Description |
|---|---|
| **alert-notification stream** | The **alert-notification stream** has the following labels:<br>• node_name: KVM node name<br>• vm_name: UPF name<br>• state: VM state<br>• message: Carries useful info such as error message or mgmt-ip when state is ALIVE. |

Depending on the life cycle stage of the VM, notifications are generated from either the Cluster Manager or CEE Ops-Center and sent to the NSO. When VM gets deleted or redeployed, the UNDEPLOYED notification is sent to the Cluster Manager notification stream. All other notifications are generated by the Alert Manager and then sent to the CEE Ops-Center notification stream.

### Cluster Manager Notification

The Cluster Manager sends vm-state-notification for the UNDEPLOYED VM state.

### CEE Ops-Center Notification

The CEE Ops-Center alert-notification sends the following alerts for different VM states:

- vm-deployed: minor - DEPLOYED
- vm-alive: minor – ALIVE (alert lasts for a short time and disappears automatically)
- vm-error: major - ERROR
- vm-recovering: warning - RECOVERING
- vm-recovery_failed: critical - RECOVERY_FAILED

All required fields are included in alert labels for notification from alert-notification. All VM alerts are viewable on the Grafana dashboard.

### VM Action Notifications

**Delete Action**: When delete VM action is triggered, CM sends notifications that the VM is deleted. The VM states are UNDEPLOYED and ERROR for vm delete action.

```
clusters abc-cluster-15 nodes kvm-1 vms upf1 actions delete
```

**Redeploy Action**: When VM is in RECOVERY_FAILED state, NSO sends a request to redeploy the VM. A redeploy action does both delete action and sync action.

```
clusters abc-cluster-15 nodes kvm-1 vms upf1 actions redeploy
```

**Redeploy Action Notification**: The redeploy action sends a notification to the CM. The redeploy vm action has the following 4 states: UNDEPLOYED, ERROR, REDEPLOYED, REDEPLOY_ERROR.

```
show notification stream vm-state


notification
```

```
eventTime 2021-02-23T21:27:28.692+00:00
vm-state-notification
cluster_name cndp-testbed
node_name kvm-1
vm_name upf2
state UNDEPLOYED
message
!
!
notification
eventTime 2021-02-23T21:29:18.699+00:00
vm-state-notification
cluster_name cndp-testbed
node_name kvm-1
vm_name upf2
state REDEPLOYED
message
!
!
```

### Configuring the Alert Notification in CEE

The user must configure alert notifications when they deploy the UPF VMs. Log in to the CEE cli to add the following configuration:

```
config
bulk-stats prune-interval-days 3
prometheus kvm-metrics defaults private-key "-----BEGIN OPENSSH PRIVATE
KEY-----LGXtil23N4YV=\n-----END OPENSSH PRIVATE KEY-----\n"
prometheus kvm-metrics defaults user cloud-user
prometheus kvm-metrics monitor-server 10.194.62.41
hostname abc-bm-15-controlplane
exit
```

**Note** The user must replace the IP, hostname, private key and user details.

### Sample Notification from the Alert Notification Stream

```
notification
eventTime 2021-01-08T03:28:54.501+00:00
smi-alert-notification
starts-at 2021-01-08T03:28:24.493874101Z
ends-at 0001-01-01T00:00:00Z
alert-status firing
smi-alert-notification alert-label
name alertname
value vm-recovery-failed
!
smi-alert-notification alert-label
name cluster
value test-cee-kvm_cee-voice
!
smi-alert-notification alert-label
name hostname
value test-bm-15-controlplane
!
smi-alert-notification alert-label
name instance
```

```
value metrics-proxy-test-bm-15-controlplane:9100
!
smi-alert-notification alert-label
name job
value metrics-proxy
!
smi-alert-notification alert-label
name message
value 10.1.1.3
!
smi-alert-notification alert-label
name monitor
value prometheus
!
smi-alert-notification alert-label
name node_name
value controlplane
!
smi-alert-notification alert-label
name replica
value test-cee-kvm_cee-voice
!
smi-alert-notification alert-label
name severity
value critical
!
smi-alert-notification alert-label
name state
value RECOVERY_FAILED
!
smi-alert-notification alert-label
name vm_name
value upf2
!
smi-alert-notification alert-annotation
name summary
value upf2 failed to recover.
!
smi-alert-notification alert-annotation
name type
value Equipment Alarm
!
!
!
```

# Configurable Host Profile Support

This section describes the procedure to configure BIOS using host profiles on Cisco UCS servers.

## Adding a Host Profile

This section describes the sequence of operation about how to add a host-profile to the software configuration configured on the CM.

1. To use host profiles, add the **.tgz** file to the software configuration on the CM by using the following CLI configuration and sync.

   **config**
   **software**
   **host-profile** *host-profile_name* **url** *software_url* **user** *user_name* **password** *passowrd*

**NOTES**:

- **host-profile** *host-profile_name* - Specify the name of the host profile, which is used to configure the BIOS settings for a UCS server.
- **url** *software_url* - Specify the HTTP, HTTPS, or file URL of the software. File format must be "file:///absolute/path/to/file".

  Must be a URI in the pattern (http:|https:|file:/)//.*.
- **user** *user_name* - Specify the user name for HTTP/HTTPS authentication.

  Must be a string.
- **password** *passowrd* - Specify the password for downloading software package.

  Must be an aes-cfb-128-encrypted string.

The following CLI commands form a sample configuration.

```
software host-profile cndp-upf
 url             https://www.abc.com/ucs/profile/cndp-upf-profile.tgz
 user            smi-readonly.gen
 password        $8$abc
 sha256          b01dc4d47926e7a35e352c2f2d1c9f8b280fd44a89d0657281ff858387669753
exit
```

2. To add the host-profile name in the cluster configuration, use the following CLI configuration.

```
config
    clusters cluster_name
        nodes node_name
            host-profile host-profile_name
            commit
            exit
```

**NOTES**:

- **clusters** *cluster_name* - Specify the name used to uniquely identify the cluster. Must be an alphanumeric string, and can contain the hyphen (-) character, however it must not start with a hyphen.

  Must be a string.
- **nodes** *node_name* -

  Specify the name of the node. name can be an alphanumeric string containing the hyphen (-). A host name cannot start with a hyphen (-). For example, kashaio-123.

  Must be a string.
- **host-profile** *host-profile_name* - Specify the name of the host profile, which is used to configure the BIOS settings for a UCS server.

The following CLI commands form a sample configuration.

```
config
clusters example-upf nodes kvm-1 host-profile cndp-upf
commit
top
exit
```

To return to the default settings, remove host-profile setting from the node. The following CLI commands form a sample configuration.

```
config
no clusters example-upf nodes kvm-1 host-profile
commit
exit
```

# BIOS Settings

The BIOS profile allows access to all the settings on all the CIMC variants.

The following sample configuration shows the default values when a host-profile is *not* configured for the node. You can create a host profile once you have the necessary tokens.

```
profiles:
  bios:
    name: cndp_default_settings
    description: "Default CIMC BIOS settings for CNDP"
    pids:
      UCSC-C220-M5SX:
        description: "Default CIMC BIOS settings for UCSC-C220-M5SX (the original)"
        tokens:
          cpuPerformance: hpc
          cpuEnergyPerformance: balanced-performance
          eppProfile: Performance
          intelHyperThreadingTech: disabled
          packageCstateLimit: C0 C1 State
          usbPortInternal: disabled
          usbPortKvm: enabled
          usbPortRear: disabled
          usbPortSdCard: disabled

      UCSC-C220-M6S:
        description: "Default CIMC BIOS settings for UCSC-C220-M6S"
        tokens:
          cpuPerformance: hpc
          cpuEnergyPerformance: balanced-performance
          eppProfile: Performance
          intelHyperThreadingTech: disabled
          packageCstateLimit: C0 C1 State
          usbPortInternal: disabled
          usbPortRear: disabled

      UCSC-C220-M7S
        description: "Default CIMC BIOS settings for UCSC-C220-M7S"
        tokens:
          CPUPerformance: HPC
          CpuEngPerfBias: Balanced Performance
          EPPProfile: Performance
          IntelHyperThread: Disabled
          PackageCstateLimit: C0 C1 State
          UsbPortRear: Disabled

      UCSC-C240-M4SX:
        tokens:
          cpuPerformance: enterprise
          cpuEnergyPerformance: balanced-performance
          ## not supported eppProfile: Performance
          intelHyperThreadingTech: Disabled
          packageCstateLimit: C0/C1
          usbPortInternal: Disabled
```

```
usbPortKvm: Enabled
usbPortRear: Disabled
usbPortSdCard: Disabled
```

To add a host profile, see the Adding a Host Profile, on page 64 section.

# Hyper Threading Support on KVM

The Hyper Threading (HT) allows more than one thread to run on each core to enable more work in parallel.

To enabled or disabled HT, see the BIOS Settings, on page 66 section.

When HT is enabled on the UCS server, the total CPU number doubles, which impacts the following:

- Isolation CPU setting
- VM CPU allocation
- UPF CPU Worker Count setting

### Isolation CPU Pinning

When HT is disabled, one CPU from each socket is reserved for the base OS. The configuration is as follows:

```
cloud-user@user-bm-15-controlplane:~$ cat/proc/cmdline

BOOT_IMAGE=/vmlinuz

root=LABEL=cloudimg-rootfs ro intel_iommu=on isolcpus=1-19,21-39 hugepagesz=1G
            hugepages=312 console=ttyS0,115200 console=tty1
```

When HT is enabled, **isolcpus** parameter is set to:

```
isolcpus=1-19,21-39,41-59,61-79
```

### CPU Worker Count

The *VPP_CPU_WORKER_CNT* is set in the day 0 configuration. It depends on a number of other parameters such as the UPF flavor configuration, SR-IOV, HT setting, and the vCPU allocation.

The *VPP_CPU_WORKER_CNT* is adjusted according to the UPF flavor configuration. The UPF VM can be with different flavors, such as full VM (1 UPF), half VM (2 UPFs) and quarter VM (4 UPFs) in the UCS environment.

The SR-IOV provides capabilities to configure multiple VFs per PF.

The NIC allows the number of Rx and Tx queues to be configured per VF. The maximum Rx and Tx queues depends on the SR-IOV or PCI_PT configuration. A maximum of 16 Rx and Tx queues can be configured per VF in SR-IOV.

The *VPP_CPU_WORKER_CNT* configuration overrides the default value for PCI_PT and SR-IOV.

When HT is enabled, the CPU number is doubled and the *VPP_CPU_WORKER_CNT* is also doubled.

The tables below summarizes the Worker Count details.

*Table 5: Parameters With HT Disabled*

| Flavor | Number of UPFs | Worker Count | Rx Queues | Tx Queues | vCPUs |
|---|---|---|---|---|---|
| Full | 1 | 16 | 16 | 16 | 38 |
| Half (default) | 2 | 8 | 8 | 9 | 19 |
| Quarter | 4 | 4 | 4 | 5 | 9 |

*Table 6: Paraemeters with HT Enabled*

| Flavor | Number of UPFs | Worker Count | Rx Queues | Tx Queues | vCPUs |
|---|---|---|---|---|---|
| full | 1 | 16 | 16 | 16 | 76 |
| half (default) | 2 | 16 | 16 | 16 | 38 |
| quarter | 4 | 8 | 8 | 9 | 18 |

You can check the worker count configuration as follows:

```
isoinfo -R -i /data/upf/libvirt/xml/upf1/upf1-cfg.iso -x /staros_param.cfg
```

### Emulator Pinning

You can set the emulator pinning during the VM CPU allocation:

```
<emulatorpin cpuset="0,40”/> <emulatorpin cpuset="20,60”/>
```

To verify the VM CPU allocation, run the following command:

```
virsh dumpxml upf2
```

The KVM node must be redeployed if the HT setting is changed (for example, from enabled to disabled).

# CPU Isolation

*Table 7: Feature History*

| Feature Name | Release Information | Feature Description |
|---|---|---|
| CPU Isolation | 2023.04 | SMI provides a higher level of CPU isolation for VPP workers to support cnUPF. Using the host profile, SMI defines isolcpu to isolate CPUs from the kernel scheduler. |

SMI provides a higher level of CPU isolation for VPP workers. With CPU isolation, no other processes can be scheduled on "isolcpu" CPUs where VPP workers are pinned.

SMI uses the host profile to define isolcpu that isolates CPUs from the kernel scheduler. It does not prevent K8s containers from changing their affinities to run on isolcpus. Depending on the deployment, SMI also provides the flexibility to use VPP workers and session managers for CPU isolation.

# How it Works

CPU isolation utilizes a containerd Node Resource Interface (NRI) plugin (v0.3.0) that subscribes for pod or container lifecycle events.

NRI is a common framework for plugging extensions into OCI-compatible container runtimes. It provides basic mechanisms for plugins to track the state of containers and to make limited changes to their configuration.

### Using the NRI Plugin

The following built-in rules apply for the plugin:

- The CPU isolator ignores containers in a pod with prefix name as "vpc-"
- If the annotation smi.cisco.com/cpuset exists, CPU isolator adjusts the CPU set using its value
- Otherwise the value of environment "CPUSET_KUBEPODS" is used.

The following steps describe how to start the NRI plugin:

- Retain the CPU set for K8s to all CPUs
- During a CreateContainer event, the plugin adjusts the container's CPU set based on the following conditions:
  - if it is a VPC container, it does nothing so that VPP workers can be pinned to isolated CPUs
  - for other non-VPC containers, it creates a customized CPU set to exclude the isolated CPU

# Sample Configuration

CM calculates the CPU set of kubepods and passes it as the environment value "CPUSET_KUBEPODS" to create a static pod for CPU isolator.

To define isolcpu from host profile, the following is a sample host profile configuration:

```
---
profile_version: 2
profiles:
  bios:
    name: test_bios_settings
    description: "CIMC BIOS settings"
    pids:
      UCSC-C220-M5SX:
        description: "Copy of Default CIMC BIOS settings for UCSC-C220-M5SX"
        tokens:
          cpuPerformance: hpc
          cpuEnergyPerformance: balanced-performance
          eppProfile: Performance
          packageCstateLimit: C0 C1 State
          usbPortInternal: disabled
          usbPortKvm: enabled
          usbPortRear: disabled
          usbPortSdCard: disabled
  linux:
    cisco_c220_m5_dual_numa:
      # name: no longer used
      description: "Cisco M5 Dual Numa Test Profle"
      grub:
        dedicate-cpus:
```

```
          numa-0: '0%'
          numa-1: '26-39'
        hugepages:
          numa-0:
            2m: 0%
            1g: 0%
          numa-1:
            2m: 20%
            1g: 50
       addition-grub-cmd-line: "intel_iommu=on intel_pstate=disable intel_idle.max_cstate=1
pcie_aspm.policy=performance idle=poll clocksource=tsc tsc=reliable skew_tick=1 nosoftlockup"

      sysctl:
        net.ipv4.neigh.default.gc_thresh1: 8192
        net.ipv4.neigh.default.gc_thresh2: 32768
        net.ipv4.neigh.default.gc_thresh3: 65536
        net.ipv6.neigh.default.gc_thresh1: 8192
        net.ipv6.neigh.default.gc_thresh2: 32768
        net.ipv6.neigh.default.gc_thresh3: 65536
      sysfs:
        /sys/module/nvme_core/parameters/io_timeout: 4294967295
      sriov:
      - match:
          pf-name:  enp94s*
        vfs-per-pf: 4
        dpdk-vfs-per-pf: 2
        dpdk-bind: vfio-pci
      - match:
          pf-name:  enp216s*
        vfs-per-pf: 16

    cisco_c220_m5_single_numa:
      description: "Cisco M5 Single Numa Test Profle"
      grub:
        dedicate-cpus:
          numa-0: '26-39'
        hugepages:
          numa-0:
            2m: 20%
            1g: 0%
        # single core needs intel_iommu=off
       addition-grub-cmd-line: "intel_iommu=off intel_pstate=disable intel_idle.max_cstate=1
pcie_aspm.policy=performance idle=poll clocksource=tsc tsc=reliable skew_tick=1 nosoftlockup"

      sysctl:
        net.ipv4.neigh.default.gc_thresh1: 8192
        net.ipv4.neigh.default.gc_thresh2: 32768
        net.ipv4.neigh.default.gc_thresh3: 65536
        net.ipv6.neigh.default.gc_thresh1: 8192
        net.ipv6.neigh.default.gc_thresh2: 32768
        net.ipv6.neigh.default.gc_thresh3: 65536
      sysfs:
        /sys/module/nvme_core/parameters/io_timeout: 4294967295
      sriov:
      - match:
          pf-name:  enp94s*
        vfs-per-pf: 4
        dpdk-vfs-per-pf: 2
        dpdk-bind: vfio-pci
      - match:
          pf-name:  enp216s*
        vfs-per-pf: 16
```

# Single-Root Input/Output Virtualization

## Overview

The Single Root I/O Virtualization (SR-IOV) specification is a Peripheral Component Interconnect (PCI) passthrough hardware standard that regulates the device assignment. The PCI passthrough natively shares a single resource with multiple guests. PCI passthrough enables the virtual machines to bypass the hypervisor and virtual switch layer, and communicate directly with the PCI devices residing on the host. SR-IOV is an extension of the PCI passthrough specification. In the PCI configuration space, a single physical device that has SR-IOV capability enabled is virtualized as multiple devices. Each device is a secured and distinct unit with isolation at the resource level, which means it has its own set of storage and configurations. This mechanism provides data transfer at the near wire-speed along with low latency.

The SMI on Bare Metal platform supports both, PCF passthrough and the SR-IOV standards in the form of plugins. In the CNDP-KVM-UPF implementation, the VM and network devices are by default configured to support SR-IOV Virtual Functions (VFs). If you want to pass the network resources to network function (UPF) through the PCI passthrough standard, then enable the PCI passthrough for the network device.

### How it Works

The SMI on Bare Metal platform lets the NF (UPF) select the PCI passthrough or SR-IOV as a network resource management plugin. The PCI passthrough allows the NF to have an exclusive access to the the physical PCI devices such as network card through a VM. The PCI devices may not be physically attached to the guest host however, they provide an efficient and seamless interaction to the NF.

The SR-IOV enables the virtual machines to have parallel access to the physical network cards installed on the hypervisor. Traditionally, the physical devices had one-to-one mapping with the VMs, which required several hardware resources and memory capacity. SR-IOV has introduced Virtual Functions (VFs) that are lightweight Peripheral Component Interconnect Express (PCIs) function. The PCI is an interface standard that is responsible for connecting high-speed components. The VFs are the self-sufficient components required for processing input/output requests between VMs. Each VF is derived from the Physical Function (PF). The number of VFs that a VM supports is based on the underlying hardware device's capacity. For instance, the hypervisor can map one or more VFs to a virtualized guest. The VF's configuration space is mapped to the space that the virtualized guest has presented to the VF. This is essentially the space that the hypervisor allocates to the virtualized guest.

Following is the sample XML configuration of PCI passthrough and SR-IOV standards:

PCI passthrough:

```
<hostdev mode='subsystem' type='pci' managed='yes'>
  <driver name='vfio'/>
  <source>
    <address domain='0x0000' bus='0x5e' slot='0x00' function='0x0'/>
  </source>
</hostdev>
```

SR-IOV:

```
<interface type='hostdev' managed='yes'>
  <mac address='02:11:11:22:22:04'/>
  <driver name='vfio'/>
  <source>
    <address type='pci' domain='0x0000' bus='0x5e' slot='0x0a' function='0x1'/>
  </source>
</interface>
```

## Enabling Support for PCI Passthrough

This section describes how to enable a VM to support PCI Passthrough.

If the VM uses the SR-IOV mechanism, then ensure that the VF number for the associated PF and MAC address is available.

Use the following configuration to configure the PCF passthrough option on the VM:

```
cluster cluster_name
   nodes node_name
      type kvm
         os enable-passthrough  {true|false}
         os num-vfs-per-pf number_of_vf_per_pf
   exit
exit
```

**NOTES:**

- **cluster** *cluster_name* – Specify the name of the cluster.
- **nodes** *node_name* – Specify the name of the node.
- **os enable-passthrough {true|false}** – Configures the PCI passthrough capability for the VM. Default value is "false".
- **os num-vfs-per-pf** *number_of_vf_per_pf* – Specifies the number of the VF for each physical function. Default value is 16.

# IPSec Support for SMF N4 Interfaces

## Feature Summary and Revision History

### Summary Data

| | |
|---|---|
| Applicable Product (s) or Functional Area | KVM-based application deployment support |
| Applicable Platforms | Bare Metal, OpenStack, VMware |
| Feature Default Setting | Disabled – Configuration Required |
| Related Changes in this Release | Not Applicable |
| Related Documentation | *UCC SMI Operations Guide* |

### Revision History

| Revision Details | Release |
|---|---|
| Added support for the following functionality:<br>• IPSec Monitoring | 2023.01.0 |

| Revision Details | Release |
|---|---|
| • Configuring IPSec certificates under strongSwan configuration | |
| First introduced. | 2020.02.2.47 |

# Feature Description

This feature introduces strongSwan, a keying daemon, which uses the Internet Key Exchange (IKE) protocols, IKEv1 and IKEv2, to establish **security associations** (SA) between two peers in a network. Such an IKE session is denoted as **IKE_SA** in this chapter. The IKE provides strong authentication for both peers and derives unique cryptographic session keys. Besides authentication and key material, IKE also provides the means to exchange configuration information and to negotiate IPsec SAs, which are often called as **CHILD_SAs**. IPsec SAs define which network traffic is to be secured and how it has to be encrypted and authenticated.

The strongSwan feature is available as an add-on from the Cluster Manager (CM). Use the CM Ops-Center to configure this add-on. In the current release, the SMI uses strongSwan version 5.9.3.

SMI allows monitoring of IPSec certificates—sends certificate expiry alerts and updates certificate through strongSwan configuration.

### Configuration Parameters

In this section, see the description for different configuration parameters available for the strongSwan add-on feature. Use the CM Ops-Center to configure these parameters.

- **`name`**: Specifies the name of the connection, which can be used for connection specific operations, for example, up or down.
- **`auto { ignore |add |route |start }`**: Specifies the operation, if any, that should be automatically performed at IPsec startup. The **add** option loads a connection without starting it, whereas **route** loads a connection and installs kernel traps. If traffic is detected between the leftsubnet and rightsubnet, a connection is established. The **start** option loads a connection and brings it up immediately. The **ignore** option ignores the connection and is the same as deleting a connection from the config file.

  The default value is **ignore**.
- **`keyexchange { ikev1 | ikev2 }`** : Specifies the method of key exchange and the protocol to use to initialize the connection.
- **`type { tunnel | transport | transport_proxy | passthrough | drop }`**: Specifies the type of the connection. Currently, the accepted values are **tunnel**, signifying a host-to-host, host-to-subnet, or subnet-to-subnet tunnel. The **transport** option signifies a host-to-host transport mode, whereas the **transport_proxy** option signifies the special Mobile IPv6 transport proxy mode. The **passthrough** option signifies that no IPsec processing should be done at all and **drop** signifies that packets must be discarded.
- **`left`** `or` **`right { ip address`** *`ip_address`* **`| fqdn`** *`fqdn`* **`| %any | %any4 | %any6 | range | subnet }`**: Specifies the IP address or FQDN of the participant public-network interface. The value **%any** for the local endpoint signifies an address to be filled in (by automatic keying) during negotiation. If the local peer initiates the connection setup, then the routing table is queried to determine the correct local IP address. If the local peer is responding to a connection setup, then any IP address

that is assigned to a local interface is accepted. The value **%any4** restricts address selection to IPv4 addresses and **%any6** restricts address selection to IPv6 addresses.

- **leftsubnet** or **rightsubnet** *ip subnet*: Specifies the private subnet behind the left participant, expressed as either network or netmask.
- **leftid** or **rightid** *id*: Specifies how the left or right participant must be identified for authentication. The default values are left or right or the subject of the certificate configured. It must match the full subject DN or one of the subjectAltName extensions contained in the certificate.
- **leftsendcert { never | no | ifasked | always | yes }**: Defines whether a peer must send a certificate request (CR) payload in order to get a certificate in return.
- **leftauth** or **rightauth{ pubkey | psk | eap | xauth }**: Specifies the authentication method to use locally (left) or require from the remote (right) side. The acceptable values are **pubkey** for public key encryption (RSA/ECDSA), **psk** for pre-shared key authentication, **eap** to use the Extensible Authentication Protocol, and **xauth** for IKEv1 eXtended Authentication.

  **Pubkey** is the default option.
- **psk** *pre-shared key*: Specifies the required setting if leftauth or rightauth is configured as **psk**.
- **esp { cipher suites | aes128-sha256 }**: A comma-separated list of ESP encryption or authentication algorithms is used for the connection, for example, **aes128-sha256**. The notation is encryption-integrity[-dhgroup][-esnmode]. For IKEv2, multiple algorithms (separated by -) of the same type can be included in a single proposal. IKEv1 only includes the first algorithm in a proposal.

  **aes128-sha256** is the default option.
- **ike { cipher suites | aes128-sha256-modp3072 }**: A comma-separated list of IKE/ISAKMP SA encryption or authentication algorithms is used, for example, **aes128-sha256-modp3072**. The notation is encryption-integrity[-prf]-dhgroup. In IKEv2, multiple algorithms and proposals might be included, such as aes128-aes256-sha1-modp3072-modp2048 or 3des-sha1-md5-modp1024.
- **ikelifetime { time** *time* **| 3h }**: Specifies how long the keying channel of a connection (ISAKMP or IKE SA) must last before being renegotiated.
- **lifetime { time** *time* **| 1h }**: Specifies how long a particular instance of a connection should last, from successful negotiation to expiry.
- **dpdaction { none | clear | hold | restart }**: Specifies the action to be taken when dead peer is detected.

  **none** is the default value.
- **dpddelay { time** *time* **| 30s }**: Defines the period time interval with which INFORMATIONAL exchanges are sent to the peer. These are only sent if no other traffic is received.
- **dpdtimeout { time** *time* **| 150s }**: Defines the timeout interval after which, all the connections to a peer are deleted in case of inactivity.
- **inactivity time** *time*: Defines the timeout interval after which, a CHILD_SA is closed if it did not send or receive any traffic.
- **closeaction { none | clear | hold | restart }**: Defines the action to take if the remote peer unexpectedly closes a CHILD_SA (see **dpdaction** for the description of different options). If the peer uses reauthentication or uniqueids checking, **closeaction** must not be used, these events might trigger the defined action when it's not desired.

- **nodes** *list_of_node_names*: Specifies the node names on which IPSec connection must be established.
- **serverCert** *server_certificate*: Specifies the content of Server certificate in the **pem** format to be used for this connection.

**Note** This keyword is not supported under strongSwan configuration.

- **serverPrivKey** *server_private_key*: Specifies the content of server private key in the **pem** format to be used for this connection.

**Note** This keyword is not supported under strongSwan configuration.

- **serverPrivKeyPassphrase** *passphrase*: Specifies the passphrase used to encrypt the **server-priv-key** value.
- **server-secret**: Pass an existing TLS secret for this connection.

## Installing strongSwan

This section describes how to install the strongSwan feature.

**Install strongSwan as an Add-on from the CM**

Use the following steps to install strongSwan as an add-on from the CM Ops-Center:

1. Use the following CLI commands to enable the strongSwan add-on:

   **clusters** *cluster_name* **addons strongswan enabled**

2. Set all the strongSwan parameters for **connection** (refer to the *Configuration Parameters* section for more details on available parameters).
3. Trigger the cluster sync operation.

**Note** The strongSwan pods run on all the nodes, however traffic is accepted only on those nodes, which are configured by using the "nodes" parameter in the CM Ops-Center. strongSwan does not accept or send any traffic on non-configured nodes.

### Configuring IPSec Certificates

To configure IPSec certificates under strongSwan configuration, use the following procedure:

1. Create TLS associated secret for server and CA certificate.

   **Note:** Create strongSwan-related secrets inside the smi-strongswan namespace.

   **Example:**

   ```
   [test-cm-controlplane] SMI Cluster Deployer# show running-config clusters secrets ca-cert
   clusters test-aio
   ```

```
 secrets ca-cert smi-strongswan 134-ca
  certificate "-----BEGIN
CERTIFICATE-----\nMIIDqzCzQubm.................1Ac1L+s4M3ug==\n-----END
CERTIFICATE-----\n"
 exit
 secrets ca-cert smi-strongswan 135-ca
  certificate "-----BEGIN
CERTIFICATE-----\nMIIFqzCCA5Og.................9XdMDiQANHgf7w\n-----END
CERTIFICATE-----\n"
 exit
 secrets ca-cert smi-strongswan ca-1
  certificate "-----BEGIN
CERTIFICATE-----\nMIID0TCCArmg.................UNvF0nAmIX0qxg4\n-----END
CERTIFICATE-----\n"
 exit
 secrets ca-cert smi-strongswan ca-2
  certificate "-----BEGIN PRIVATE
KEY-----\nMIIEvQIBADAN.................tbNDzGAnF29nus=\n-----END PRIVATE KEY-----\n"
 exit
exit
```

2. Refer the secrets in strongSwan configuration. The strongSwan configuration shows the available TLS and certificates.

   **Example:**

```
[test-cm-controlplane] SMI Cluster Deployer# show running-config clusters karan-aio
strongswan connections server-secret
clusters test-aio
 strongswan connections a-to-b
  server-secret a-to-b
 exit
exit

[test-cm-controlplane] SMI Cluster Deployer# show running-config clusters karan-aio
strongswan ca-certs
clusters test-aio
strongswan ca-certs [ 134-ca 135-ca ]
exit
```

# Operating the SMI Cluster Manager on vCenter VMware

This section describes how to instantiate the K8s Cluster on the SMI Cluster Manager in a VMware vSphere environment. The SMI Cluster Manager is the de-facto orchestrator for the K8s Cluster. It requires add-ons like *Ngnix-Ingress*, *Istio*, and so on. Also, the Ops Center is required for all the Cisco Cloud products using the SMI.

SMI supports datacenters at the root level and within folders. If the datacenter is within a folder, then the entire path from the root until the datacenter is mentioned in the *datacenter-path* field. If the vSphere cluster is organised within folders, SMI can auto-detect the cluster as long as the name is unique with the datacenter.

The SMI Cluster Manager currently provisions the following:

1. Base OS, creation of nodes and virtual machines in VMware vSphere virtualization environment.
2. Deployment of K8s multi-control plane cluster with Calico pod networking.
3. Deployment of K8s addon applications.
4. Application provisioning. You can either deploy the Ops Center alone or the entire product.

5. Product based Host OS customization for nodes with specific labels.

# Supported Configurations

The SMI Cluster Manager supports the following three VM configurations:

***Table 8: Functional Test HA***

| | CPU | Cores Per Socket | RAM | Data Disk | Home Disk | Root Disk |
|---|---|---|---|---|---|---|
| Control Plane | 2 CPU | 1 | 16 GB | 20 GB | 5 GB | 100 GB |
| ETCD | 1 CPU | 1 | 8 GB | 20 GB | 5 GB | 100 GB |
| Worker | 8 CPU | 1 | 32 GB | 200 GB | 5 GB | 100 GB |

**Important** These configurations are applicable only for testing in the Lab environment. It is not supported in the production environment.

***Table 9: Functional Test AIO***

| | CPU | Cores Per Socket | RAM | Data Disk | Home Disk | Root Disk |
|---|---|---|---|---|---|---|
| Control Plane | 6 CPU | 1 | 32 GB | 200 GB | 5 GB | 100 GB |

**Important** These configurations are applicable only for testing in the Lab environment. It is not supported in the production environment.

**Note** Individual NFs are deployed as K8s workers through SMI. They each have their own VM recommendations. Refer to the NF documentation for details.

***Table 10: Production***

| | CPU | Cores Per Socket | RAM | Data Disk | Home Disk | Root Disk |
|---|---|---|---|---|---|---|
| Control Plane | 2 CPU | 2 | 16 GB | 20 GB | 5 GB | 100 GB |
| ETCD | 2 CPU | 2 | 16 GB | 20 GB | 5 GB | 100 GB |
| Worker | 36 CPU | 36 | 164 GB | 200 GB | 5 GB | 100 GB |

# Prerequisites

The prerequisites for instantiating the K8s Cluster on SMI Cluster Manager are:

1. SMI Cluster Manager AIO.
2. Local web server that hosts the products offline TAR ball version(s).

# Requirements

SMI Cluster Manager (all versions are supported).

# Components Used

The following component is used for deploying and upgrading the product in the offline environment:

- SMI Cluster Manager.

# Configuring the vCenter Environment

To configure the vCenter environment, use the following configuration:

1. Configure the vCenter environment with the required configuration parameters through the SMI Cluster Manager CLI. A sample configuration is shown below:

```
environments laas
   vcenter server vcenter_server_ipv4_address
   vcenter port vcenter_port
   vcenter allow-self-signed-cert true (to allow self signed certs)
   vcenter user vcenter_username
   vcenter password vcenter_password
  vcenter datastore vcenter_host_datastore (the corresponding vcenter host datastore)

   vcenter cluster vcenter_cluster (the vcenter cluster containing the above host)
   vcenter datacenter-path datacenter_path
   vcenter datacenter vcenter_datacenter
   vcenter host vcenter_host_ipv4_address
   vcenter nics network_ID
   exit
exit
```

**Important** You can add each vCenter environment to one or more K8s Cluster configuration. For VMs managed in the OpenStack environment, you can use the following configuration:

```
environments openstack
   manual
exit
```

2. Configure the cluster essentials like node defaults which includes, initial boot, K8s, operating system NTP, and node configurations. In a multi-mode environment, a minimum of 3 control planes, 3 etcd, and

3 OAM (worker or product) nodes are required. The number of worker nodes and its type depends on the product that is being installed. For more information about the worker nodes and labels, see the relevant product documentation. The following example shows the cluster configuration which is not specific to any products.

**Note** Based on the customer requirements, you can choose to either include or exclude the following cluster configurations:

- Volume provisioning – Configure volume provisioning while using persistent volumes.
- Network Proxy – Configure network proxies based on the requirements.
- Local NTP with Authentication – For configuring local NTP server with authentication, see Configuring the Local NTP Server with Authentication and Tracking section.
- Virtual IPs (VIPs) – Configure virtual IP addresses based on the requirements.
- Product registry secrets – Set up secrets to protect product registries.
- Node labels – If required, assign specific labels to nodes.

```
clusters <cluster_name>

        # associating an existing vcenter environment
        environment <vcenter_environment> #Example:laas

        # General cluster configuration
        configuration master-virtual-ip <keepalived_ipv4_address>
        configuration master-virtual-ip-cidr
<netmask_of_additional_master_virtual_ip> #Default is 32
        configuration master-virtual-ip-interface <interface_name>
        configuration additional-master-virtual-ip <ipv4_address>
        configuration additional-master-virtual-ip-cidr
<netmask_of_additional_master_virtual_ip> #Default is 32
        configuration additional-master-virtual-ip-interface
<interface_name>
       configuration virtual-ip-vrrp-router-id <virtual_router_id> #To support
 multiple instances of VRRP in the same subnet
        configuration pod-subnet <pod_subnet> #To avoid conflict with already
existing subnets
        configuration size <functional_test_ha/functional_test_aio/production>
        configuration allow-insecure-registry <true> #To allow insecure
registries

       # istio and nginx ingress addons
        addons ingress bind-ip-address <keepalived_ipv4_address>
        addons istio enabled

        # vsphere volume provider configuration
        addons vsphere-volume-provider server <vcenter_server_ipv4_address>
        addons vsphere-volume-provider server-port <vcenter_port>
       addons vsphere-volume-provider allow-insecure <true> #To allow self
 signed certs
        addons vsphere-volume-provider user <vcenter_username>
```

```
        addons vsphere-volume-provider password <vcenter_password>
        addons vsphere-volume-provider datacenter <vcenter_datacenter>
        addons vsphere-volume-provider datastore <vcenter_nfs_storage>
#Corresponding vcenter nfs storage
        addons vsphere-volume-provider network <network_id>
        addons vsphere-volume-provider folder
<cluster_folder_containing_the_VMs>

        # Openstack volume provider configuration
        addons openstack-volume-provider username <username>
        addons openstack-volume-provider password <password>
        addons openstack-volume-provider auth-url <auth_url>
        addons openstack-volume-provider tenant-id <tenant_id>
        addons openstack-volume-provider domain-id <domain_id>

        # initial-boot section of node-defaults for vmware
        node-defaults initial-boot default-user <default_username>
        node-defaults initial-boot default-user-ssh-public-key
<public_ssh_key>
        node-defaults initial-boot netplan template


        # initial-boot section of node-defaults for VMs managed in Openstack
        node-defaults initial-boot default-user <default_user>
        node-defaults netplan template
          #jinja2:variable_start_string:'__DO_NOT_ESCAPE__' ,
variable_end_string:'__DO_NOT_ESCAPE__'
          #

        #k8s related config of node-defaults
        node-defaults k8s ssh-username <default_k8s_ssh_username>
        node-defaults k8s ssh-connection-private-key
               -----BEGIN RSA PRIVATE KEY-----
               <SSH_Private_Key>
               -----END RSA PRIVATE KEY-----

          # os related config of node-defaults
          node-defaults os proxy https-proxy <https_proxy>
          node-defaults os proxy no-proxy <no_proxy_info>
          node-defaults os ntp servers <local_ntp_server>
          exit

          # node configuration of multinode cluster. vmware related info overrides the
 defaults provided in the environment 'laas' associated with the cluster

     nodes node_name #For example, etcd1
        k8s node-type etcd
        k8s ssh-ip ipv4address
        k8s node-ip ipv4address
        vmware datastore datastore_name
        vmware host host_name
        vmware performance latency-sensitivity normal
        vmware performance memory-reservation false
        vmware performance cpu-reservation false
        vmware sizing ram-mb ram_size_in_mb
        vmware sizing cpus cpu_size
```

```
      vmware sizing disk-root-gb disk_root_size_in_gb
      vmware nics network_ID
   exit
exit
nodes node_name #For example, etcd2
    k8s node-type etcd
    k8s ssh-ip ipv4address
    k8s node-ip ipv4address
    vmware datastore datastore_name
    vmware host host_name
    vmware performance latency-sensitivity normal
    vmware performance memory-reservation false
    vmware performance cpu-reservation false
    vmware sizing ram-mb ram_size_in_mb
    vmware sizing cpus cpu_size
    vmware sizing disk-root-gb disk_root_size_in_gb
    vmware nics network_ID
  exit
exit
nodes node_name #For example, etcd3
    k8s node-type etcd
    k8s ssh-ip ipv4address
    k8s node-ip ipv4address
    vmware datastore datastore_name
    vmware host host_name
    vmware performance latency-sensitivity normal
    vmware performance memory-reservation false
    vmware performance cpu-reservation false
    vmware sizing ram-mb ram_size_in_mb
    vmware sizing cpus cpu_size
    vmware sizing disk-root-gb disk_root_size_in_gb
    vmware nics network_ID
  exit
exit
nodes node_name #For example, controlplane1
    k8s node-type control-plane
    k8s ssh-ip ipv4address
    k8s node-ip ipv4address
    vmware datastore datastore_name
    vmware host host_name
    vmware performance latency-sensitivity normal
    vmware performance memory-reservation false
    vmware performance cpu-reservation false
    vmware sizing ram-mb ram_size_in_mb
    vmware sizing cpus cpu_size
    vmware sizing disk-root-gb disk_root_size_in_gb
    vmware nics network_ID
   exit
exit
nodes node_name #For example, controlplane2
   k8s node-type control-plane
```

```
    k8s ssh-ip ipv4address
    k8s node-ip ipv4address
    vmware datastore datastore_name
    vmware host host_name
    vmware performance latency-sensitivity normal
    vmware performance memory-reservation false
    vmware performance cpu-reservation false
    vmware sizing ram-mb ram_size_in_mb
    vmware sizing cpus cpu_size
    vmware sizing disk-root-gb disk_root_size_in_gb
    vmware nics network_ID
    exit
  exit
nodes node_name #For example, controlplane3
    k8s node-type control-plane
    k8s ssh-ip ipv4address
    k8s node-ip ipv4address
    vmware datastore datastore_name
    vmware host host_name
    vmware performance latency-sensitivity normal
    vmware performance memory-reservation false
    vmware performance cpu-reservation false
    vmware sizing ram-mb ram_size_in_mb
    vmware sizing cpus cpu_size
    vmware sizing disk-root-gb disk_root_size_in_gb
    vmware nics network_ID
    exit
exit
nodes node_name #For example, oam1
    k8s node-type worker
    k8s ssh-ip ipv4address
    k8s node-ip ipv4address
    k8s node-labels node_labels
    exit
    vmware datastore datastore_name
    vmware host host_name
    vmware performance latency-sensitivity normal
    vmware performance memory-reservation false
    vmware performance cpu-reservation false
    vmware sizing ram-mb ram_size_in_mb
    vmware sizing cpus cpu_size
    vmware sizing disk-root-gb disk_root_size_in_gb
    vmware nics network_ID
    exit
exit
nodes node_name #For example, oam2
    k8s node-type worker
    k8s ssh-ip ipv4address
    k8s node-ip ipv4address
    k8s node-labels node_labels
    exit
```

```
    vmware datastore datastore_name
    vmware host host_name
    vmware performance latency-sensitivity normal
    vmware performance memory-reservation false
    vmware performance cpu-reservation false
    vmware sizing ram-mb ram_size_in_mb
    vmware sizing cpus cpu_size
    vmware sizing disk-root-gb disk_root_size_in_gb
    vmware nics network_ID
    exit
exit
nodes node_name #For example, oam3
    k8s node-type worker
    k8s ssh-ip ipv4address
    k8s node-ip ipv4address
    k8s node-labels node_labels
    exit
    vmware datastore datastore_name
    vmware host host_name
    vmware performance latency-sensitivity normal
    vmware performance memory-reservation false
    vmware performance cpu-reservation false
    vmware sizing ram-mb ram_size_in_mb
    vmware sizing cpus cpu_size
    vmware sizing disk-root-gb disk_root_size_in_gb
    vmware nics network_ID
    exit
exit
nodes node_name #For example, session-data1
    k8s node-type worker
    k8s ssh-ip ipv4address
    k8s node-ip ipv4address
    k8s node-labels node_labels #For example, smi.cisco.com/cdl-ep true
    exit
    k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-index-1 true
    exit
    k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-index-2 true
    exit
    k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-1 true
    exit
    k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-2 true
    exit
    k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-3 true
    exit
    k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-4 true
    exit
    k8s node-labelsnode_labels/node_type #For example, smi.cisco.com/node-type db
    exit
   k8s node-labelsnode_labels/vm_type #For example, smi.cisco.com/vm-type session
    exit
```

```
    vmware datastore datastore_name
    vmware host host_name
    vmware performance latency-sensitivity normal
    vmware performance memory-reservation false
    vmware performance cpu-reservation false
    vmware sizing ram-mb ram_size_in_mb
    vmware sizing cpus cpu_size
    vmware sizing disk-root-gb disk_root_size_in_gb
    vmware nics network_ID
    exit
  exit
  nodes node_name #For example, session-data2
    k8s node-type worker
    k8s ssh-ip ipv4address
    k8s node-ip ipv4address
    k8s node-labels node_labels #For example, smi.cisco.com/cdl-ep true
    exit
    k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-index-1 true
    exit
    k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-index-2 true
    exit
    k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-1 true
    exit
    k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-2 true
    exit
    k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-3 true
    exit
    k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-4 true
    exit
    k8s node-labelsnode_labels/node_type #For example, smi.cisco.com/node-type db

    exit
   k8s node-labelsnode_labels/vm_type #For example, smi.cisco.com/vm-type session

    exit
    vmware datastore datastore_name
    vmware host host_name
    vmware performance latency-sensitivity normal
    vmware performance memory-reservation false
    vmware performance cpu-reservation false
    vmware sizing ram-mb ram_size_in_mb
    vmware sizing cpus cpu_size
    vmware sizing disk-root-gb disk_root_size_in_gb
    vmware nics network_ID
    exit
  exit
  nodes node_name #For example, session-data3
    k8s node-type worker
    k8s ssh-ip ipv4address
    k8s node-ip ipv4address
    k8s node-labels node_labels #For example, smi.cisco.com/cdl-ep true
    exit
```

```
 k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-index-3 true
 exit
 k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-index-4 true
 exit
 k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-5 true
 exit
 k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-6 true
 exit
 k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-7 true
 exit
 k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-8 true
 exit
 k8s node-labelsnode_labels/node_type #For example, smi.cisco.com/node-type db

 exit
 k8s node-labelsnode_labels/vm_type #For example, smi.cisco.com/vm-type session

 exit
 vmware datastore datastore_name
 vmware host host_name
 vmware performance latency-sensitivity normal
 vmware performance memory-reservation false
 vmware performance cpu-reservation false
 vmware sizing ram-mb ram_size_in_mb
 vmware sizing cpus cpu_size
 vmware sizing disk-root-gb disk_root_size_in_gb
 vmware nics network_ID
 exit
exit
nodes node_name #For example, session-data4
 k8s node-type worker
 k8s ssh-ip ipv4address
 k8s node-ip ipv4address
 k8s node-labels node_labels #For example, smi.cisco.com/cdl-ep true
 exit
 k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-index-3 true
 exit
 k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-index-4 true
 exit
 k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-5 true
 exit
 k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-6 true
 exit
 k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-7 true
 exit
 k8s node-labelsnode_labels #For example, smi.cisco.com/cdl-slot-8 true
 exit
 k8s node-labelsnode_labels/node_type #For example, smi.cisco.com/node-type db

 exit
 k8s node-labelsnode_labels/vm_type #For example, smi.cisco.com/vm-type session
```

```
      exit
      vmware datastore datastore_name
      vmware host host_name
      vmware performance latency-sensitivity normal
      vmware performance memory-reservation false
      vmware performance cpu-reservation false
      vmware sizing ram-mb ram_size_in_mb
      vmware sizing cpus cpu_size
      vmware sizing disk-root-gb disk_root_size_in_gb
      vmware nics network_ID
      exit
   exit
exit
          # Virtual IPs
         virtual-ips <name> #Example: rxdiam

           vrrp-interface <interface_name>
           vrrp-router-id <router_id>

           ipv4-addresses <ipv4_address>
             mask <netmassk>
             broadcast <broadcast_ipv4_address>
             device <interface_name>
           exit
           # nodes associated with the virtual-ip
           hosts <node_name> #Example: smi-cluster-core-protocol1
             priority <priority_value>
           exit
           hosts <node_name> #Example: smi-cluster-core-protocol2
             priority <priority_value>
           exit
         exit
          # Secrets for product registry
         secrets docker-registry <secret_name>
           docker-server <server_name or docker_registry>
           docker-username <username>
           docker-password <password>
           docker-email <email>
           namespace <k8s_namespace> #Example: cee-voice
         exit
         ops-centers <app_name> <instance_name> #Example: cee data
           repository <artifactory_url>




           username <username>
           password <password>

           initial-boot-parameters use-volume-claims <true/false> #True to
use persistent volumes and vice versa
           initial-boot-parameters first-boot-password <password> #First
boot password for product opscenter
           initial-boot-parameters auto-deploy <true/false> #Auto deploys all
```

```
 the services of the product else deploys the opscenter only
          initial-boot-parameters single-node <true/false> #True for single
node and false for multi node deployments
          initial-boot-parameters image-pull-secrets
<docker_registry_secrets_name>
          exit
        exit
```

**Important** For clusters managed within the OpenStack environment, you can exclude the *initial-boot* section of *node-defaults* configuration parameters. Also, replace the K8s **vSphere-volume-provider** configuration with K8s **openstack-volume-provider** configuration.

# Triggering the Cluster Synchronization

You can trigger the cluster synchronization to complete the vCenter configuration. To synchronize the cluster, use the following configurations:

1. Trigger the cluster synchronization.

```
configure
    clusters cluster_name actions sync run
    clusters cluster_name actions sync run debug true
    clusters cluster_name actions sync logs
    monitor sync-logs cluster_name
    clusters cluster_name actions sync status
    exit
```

**Example**:

```
SMI Cluster Manager# clusters test1 actions sync run
SMI Cluster Manager# clusters test1 actions sync run debug true
SMI Cluster Manager# clusters test1 actions sync logs
SMI Cluster Manager# monitor sync-logs test1
SMI Cluster Manager# clusters test1 actions sync status
```

2. Upgrade the cluster using the following configuration.

```
configure
    clusters cluster_name actions sync run upgrade-strategy concurrent
    clusters cluster_name actions sync run upgrade-startegy concurrent
debug true reset-k8s-nodes true
    clusters cluster_name actions sync run upgrade-strategy rolling
   clusters cluster_name actions sync run upgrade-strategy rolling debug
 true reset-k8s-nodes true
    exit
```

**Example**:

```
SMI Cluster Manager# clusters test1 actions sync run upgrade-strategy concurrent
SMI Cluster Manager# clusters test1 actions sync run upgrade-startegy concurrent debug
true reset-k8s-nodes true
SMI Cluster Manager# clusters test1 actions sync run upgrade-strategy rolling
SMI Cluster Manager# clusters test1 actions sync run upgrade-strategy rolling debug true
 reset-k8s-nodes true
```

3. Redeploy the nodes using the following configuration.

```
configure
    clusters cluster_name actions sync run upgrade-strategy rolling
force-vm-redeploy true debug true
    clusters cluster_name actions sync run force-vm-redeploy true
purge-data-disks true
    exit
```

**Example**:

```
SMI Cluster Manager# clusters test1 actions sync run upgrade-strategy rolling
force-vm-redeploy true debug true
SMI Cluster Manager# clusters test1 actions sync run force-vm-redeploy true
purge-data-disks true
```

**Notes**:

- **clusters** *cluster_name* – Specifies the information about the nodes to be deployed. *cluster_name* is the name of the cluster.
- **actions** – Specifies the actions performed on the cluster.
- **sync run** – Triggers the cluster synchronization.
- **sync logs** – Shows the current cluster synchronization logs.
- **sync status** – Shows the current status of the cluster synchronization.
- **debug true** – Enters the debug mode.
- **monitor sync logs** – Monitors the cluster synchronization process.
- **upgrade-strategy concurrent** – This strategy is similar to the existing cluster synchronization where everything is upgraded at once.
    - **reset-k8s-nodes** – Resets the K8s on the node instead of deleting and redeploying them all at once.
- **upgrade-strategy rolling** – The rolling upgrade is a new upgrade strategy where upgrades are performed node-by-node.

**Note** You can use the rolling upgrade strategy to upgrade only the K8s cluster and product. If there are no changes in the product charts, the upgrade fails. For upgrading one node at a time, see Upgrading Node-by-Node (OpenStack) section.

    - **reset-k8s-nodes** – Resets the K8s on that specific node instead of redeploying it.
- **force-vm-redeploy true** – Traverses through each node (one at a time) to delete and upgrade the nodes. The redeploying process is similar to a fresh installation of nodes except for the retention of the data directory, which holds information about the previous installation. Redeploying the node involves:
    - Making API calls for draining and replacing the VMs.
    - Synchronizing (through the Sync API) the node.
    - Verifying the cluster and pod status before proceeding to the next node.

- **purge-data-disks true** – Removes the data disks and makes it as new installation. You can use this option for corrupted *etcds*. For instance, when you have replaced two *etcds* and ended up with the one having the old data, you can purge the disk and reset the cluster completely.

# Upgrading Node-by-Node (OpenStack)

You can upgrade nodes within a K8s cluster one at a time using the node-by-node upgrade process. But this upgrade process is limited only to the node level. You cannot run the cluster synchronization and node-by-node synchronization in tandem. It is possible to run the synchronization on two independent nodes, which has been replaced and are ready to go back to the cluster, simultaneously. Also, you can run parts of the synchronization specific to that node (*control plane*, *etcd*, and *worker*) without running a cluster wide synchronization. You need to drain and synchronize a combination of *etcd*, *control plane* and *worker* nodes to begin with the upgrade process.

To upgrade node-by-node, use the following configurations:

1. Drain the node.

   **clusters** *cluster_name* **nodes** *node_name* **actions sync drain**

   **Example**:

   ```
   SMI Cluster Manager# clusters test1 nodes etcd1 actions sync drain
   ```

2. Verify the status of the drained node.

   **clusters** *cluster_name* **nodes** *node_name* **actions sync status**

   **Example**:

   ```
   SMI Cluster Manager# clusters test1 nodes etcd1 actions sync status
   ```

3. Verify the pod status of the drained node.

   **clusters** *cluster_name* **nodes** *node_name* **actions k8s pod-status**

   **Example**:

   ```
   SMI Cluster Manager# clusters test1 nodes etcd1 actions k8s pod-status
   ```

4. Run a synchronization on the node.

   **clusters** *cluster_name* **nodes** *node_name* **actions sync run**

   **Example**:

   ```
   SMI Cluster Manager# clusters test1 nodes etcd1 actions sync run
   ```

**Note** The host OS is upgraded during cluster synchronization automatically on Bare Metal deployments.

5. Verify the cluster status. Ensure that the parameter **all-ok** is **true** before proceeding to the next node.

   **clusters** *cluster_name* **actions k8s cluster-status**

   **Example**:

   ```
   SMI Cluster Manager# clusters test1 actions k8s cluster-status
    pods-desired-count 26
    pods-ready-count 26
   ```

```
 pods-desired-are-ready true
 etcd-healthy true
 all-ok true
```

6. Verify the status of the pods on a specific node before proceeding to the next node.

   **clusters** *cluster_name* **nodes** *node_name* **actions k8s pod-status show-pod-details**

   **Example**:

```
SMI Cluster Manager# clusters test1 nodes cmts-worker1 actions k8s pod-status
show-pod-details
 Value for 'show-pod-details' [false,true]: true
 pods {
  name calico-node-c65zf
  namespace kube-system
  owner-kind DaemonSet
  owner-name calico-node
  ready true
 }
 pods {
  name coredns-6db4464669-k6pqz
  namespace kube-system
  owner-kind ReplicaSet
  owner-name coredns-6db4464669
  ready true
 }
 pods {
  name kube-proxy-tfxcq
  namespace kube-system
  owner-kind DaemonSet
  owner-name kube-proxy
  ready true
 }
 pods {
  name nginx-ingress-controller-6f8f8c4cc7-q5b7c
  namespace nginx-ingress
  owner-kind ReplicaSet
  owner-name nginx-ingress-controller-6f8f8c4cc7
  ready true
 }
 pods {
  name keepalived-cmbnf
  namespace smi-vips
  owner-kind DaemonSet
  owner-name keepalived
  ready true
 }
pods-count 5
pods-available-to-drain-count 2
```

**Notes**:

- **nodes** *node_name* – Specifies the nodes present in the cluster. *node_name* is the name of the node.
- **sync drain** – Drains or cordons the selected node in preparation for an upgrade.
- **sync status** – Shows the status of the drained node.
- **k8s pod-status** – Shows the status of the k8s pods scheduled on the node.
- **sync run** – Upgrades or synchronizes the node.
- **k8s cluster-status** – Shows an overall status of the cluster including pod and *etcd* based statistics.

- **show-pod-details** *true* – Shows the list of pods in addition to the counts.

# Deploying and Upgrading the Products in Offline Environments

Using the SMI Cluster Manager, you can download the product's offline TAR ball and the host its charts and corresponding images in the local registries. The SMI Cluster Manager supports the deployment of the product's Ops Center and all the applications and services associated with it. This section describes the procedures involved in deploying and upgrading the products in offline environment using the SMI Cluster Manager.

## Prerequisites

The prerequisites for deploying and upgrading the products in offline environments are:

1. SMI Cluster Manager AIO.
2. Local repositories that hosts the product offline TAR ball version(s).

## Requirements

SMI Cluster Manager (all versions are supported).

## Components Used

The following component is used to orchestrate the K8s Cluster and load the products:

- The SMI Cluster Manager.

## Deploying the Products in Offline Environments

This section describes the procedures involved in deploying the products in offline environment using the SMI Cluster Manager.

**Note** From the SMI Cluster Manager perspective, the product refers to Common Execution Environment (CEE). The deployment procedure mentioned in the subsequent section is specific to CEE. However, you can follow the same procedure to deploy 5G Network Functions (SMF or PCF) using the SMI Cluster Manager.

### Deploying the Product

To deploy the product, perform the following:

1. Use the following configuration to install the product

```
configure
  software cnf software_name
    url HTTP_HTTPS_File_URL
    user username
```

```
password password
sha256 sha256_hash
exit
```

2. Link the CEE into the desired cluster in the **ops-centers** section.

```
configure
  clusters cluster_name ops-center app_name instance_name
  repository-local cnf_repo
  exit
```

3. Download the TAR ball from the URL.

```
software-packages download URL
```

**Example**:

```
SMI Cluster Manager# software-packages download
http://<ipv4address>:<port_number>/packages/cee-2019-08-21.tar
```

4. Verify whether the TAR balls are loaded.

```
software-packages list
```

**Example**:

```
SMI Cluster Manager# software-packages list
[ cee-2019-08-21 ]
[ sample ]
```

5. Configure the necessary Ops Center parameters in the required cluster to deploy the product.

```
configure
   cluster cluster_name
      ops-centers app_name instance_name
         repository url
         netconf-ip ipv4_address
         netconf-port port
         ssh-ip ipv4_address
         ssh-port port
         ingress-hostname <ipv4_address>.<customer_specific_domain_name>
         initial-boot-parameters use-volume-claims true/false
         initial-boot-parameters first-boot-password password
         initial-boot-parameters auto-deploy true/false
         initial-boot-parameters single-node true/false
         initial-boot-parameters image-pull-secrets
         exit
   exit
```

**Example**:

```
SMI Cluster Manager# config
SMI Cluster Manager(config)# clusters test2
SMI Cluster Manager(config-clusters-test2)# ops-centers cee data
SMI Cluster Manager(config-ops-centers-cee/data)# repository
http://charts.<ipv4address>.<domain_name>/cee-2019-08-21/
SMI Cluster Manager(config-ops-centers-cee/data)# initial-boot-parameters
use-volume-claims false
SMI Cluster Manager(config-ops-centers-cee/data)# initial-boot-parameters
first-boot-password Cisco@123
SMI Cluster Manager(config-ops-centers-cee/data)# initial-boot-parameters auto-deploy
```

```
true
SMI Cluster Manager(config-ops-centers-cee/data)# initial-boot-parameters single-node
false
SMI Cluster Manager(config-ops-centers-cee/data)# exit
SMI Cluster Manager(config-clusters-test2)# exit
SMI Cluster Manager(config)#
```

6. Configure the secrets, if your local registry contains secrets.

```
configure
   cluster cluster_name
      secrets docker-registry secret_name
         docker-server server_name
         docker-username username
         docker-password password
         docker-email email
         namespace k8s namespace
         commit
         exit
      exit
```

**Example**:

```
SMI Cluster Manager# config
SMI Cluster Manager(config)# clusters test2
SMI Cluster Manager(config-clusters-test2)# secrets docker-registry sec1
SMI Cluster Manager(config-docker-registry-sec1)# docker-server serv1
SMI Cluster Manager(config-docker-registry-sec1)# docker-username user1
SMI Cluster Manager(config-docker-registry-sec1)# docker-password Cisco@123
SMI Cluster Manager(config-docker-registry-sec1)# docker-email reg@cisco.com
SMI Cluster Manager(config-docker-registry-sec1)# namespace ns1
SMI Cluster Manager(config-docker-registry-sec1)# exit
SMI Cluster Manager(config-clusters-test2)# exit
SMI Cluster Manager(config)#
```

7. Run the cluster synchronization.

```
clusters cluster_name actions sync run
```

**Example**:

```
SMI Cluster Manager# clusters test2 actions sync run
```

**Notes**:

- **software-packages download** *url* – Specifies the software packages to be downloaded through HTTP/HTTPS.
- **software-packages list** – Specifies the list of available software packages.
- **ops-centers** *app_name instance_name* – Specifies the product Ops Center and instance. *app_name* is the application name. *instance_name* is the name of the instance.
- **repository** *url* - Specifies the local registry URL for downloading the charts.
- **netconf-ip** *ipv4_address* – Specifies the Ops Center netconf IPv4 address.
- **netconf-port** *port* – Specifies the Ops Center netconf port number.
- **ssh-ip** *ipv4_address* – Specifies the SSH IPv4 address for the Ops Center.
- **ssh-port** *port* - Specifies the SSH port number for the Ops Center.

- **ingress-hostname** *<ipv4_address>.<customer_specific_domain_name>* – Specifies the ingress hostname to be set to the Ops Center. *<customer_specific_domain_name>* specifies the customer's domain name.
- **initial-boot-parameters** – Specifies the initial boot parameters for deploying the helm charts.
  - **use-volume-claims** *true/false* – Specifies the usage of persistent volumes. Set this option to True to use persistent volumes. The default value is true.
  - **first-boot-password** *password* – Specifies the first boot password for the product's Ops Center.
  - **auto-deploy** *true/false* – Auto deploys all the services of the product. Set this option to false to deploy only the product's Ops Center.
  - **single-node** *true/false* – Specifies the product deployment on a single node. Set this option to false for multi node deployments.
  - **image-pull-secrets** – Specifies the docker registry secret name to be used.
- **secrets docker-registry** *secret_name* – Specifies the secret name for your docker registry.
  - **docker-server** *server_name* – Specifies the docker server name.
  - **docker-username** *username* – Specifies the docker registry user name.
  - **docker-password** *password* – Specifies the docker registry password.
  - **docker-email** *email* – Specifies the docker registry email.
  - **namespace** *namespace* – Specifies the docker registry namespace.

**NOTES:**

- **software cnf** *software_name* - Specifies the Cisco's Cloud Native software. *software_name* is the name of the Cloud Native software.
  - **url** *HTTP_HTTPS_File_URL* - Specifies the repository URL.
  - **user** *username* - Specifies the username for HTTP/HTTPS authentication.
  - **password** *password* - Specifies the password used for downloading the software package.
  - **sha256** *sha256_hash* - Specifies the SHA256 hash of the software download.

To deploy the product, perform the following:

1. Login to the SMI Cluster Manager CLI using the ingress URL.

   **`https://cli.smi-cluster-manager.`***`<IP_address>.<customer_specific_domain_name>`*

   **NOTES**:

   - *customer_specific_domain_name* - Specifies the customer's domain name.

2. Use the following configuration to install the CEE

```
configure
  software cnf software_name
    url HTTP_HTTPS_File_URL
```

```
user username
password password
sha256 sha256_hash
exit
```

**NOTES:**

- **software cnf** *software_name* - Specifies the Cisco's Cloud Native software. *software_name* is the name of the Cloud Native software.
  - **url** *HTTP_HTTPS_File_URL* - Specifies the repository URL.
  - **user** *username* - Specifies the username for HTTP/HTTPS authentication.
  - **password** *password* - Specifies the password used for downloading the software package.
  - **sha256** *sha256_hash* - Specifies the SHA256 hash of the software download.

3. Link the product (CEE or Network Functions) into the desired cluster in the **ops-centers**.

```
configure
  clusters cluster_name ops-center app_name instance_name
  repository-local cnf_repo
  exit
```

**NOTES:**

- **repository-local** *cnf_repo* - Specifies the CNF repository.

4. Run the cluster synchronization to deploy the CEE Ops Center and wait for the synchronization to complete.

```
clusters cluster_name actions sync run
```

**NOTES:**

- **clusters** *cluster_name* **actions sync run** - Synchronizes the committed changes to the cluster.

5. Verify the cluster synchronization through cluster sync status or log commands.

```
clusters cluster_name actions sync status
clusters cluster_name actions sync logs
```

**NOTES:**

- **clusters** *cluster_name* **actions sync status** - Displays the status of the cluster synchronization.
- **clusters** *cluster_name* **actions sync logs**- Displays the logs generated during the cluster synchronization process.

## Verifying the Product Deployment

You can verify the status of the product deployment through the product CLI. To verify, use the following commands:

1. Log in to the SMI product CLI. For example, CEE.
2. Verify whether the charts are loaded in the specific instance (verify the namespace).

**show helm charts**

**Example**:

```
cee# show helm charts
CHART         INSTANCE                              STATUS    VERSION     REVISION RELEASE
                                  NAMESPACE
--------------------------------------------------------------------------------------------
cee-ops-center         cee-global-ops-center             deployed  2023.02.1.d249  1
0.7.0-2023-02-1-0513-230331051211-dec612f  cee-global
cnat-monitoring        cee-global-cnat-monitoring        deployed  2023.02.1.d249  1
0.7.0-2023-02-1-0031-230331183330-58ec41c  cee-global
product-documentation  cee-global-product-documentation  deployed  2023.02.1.d249  1
0.8.0-2023-02-1-0131-230321085503-2699cb5  cee-global
pv-manager             cee-global-pv-manager             deployed  2023.02.1.d249  1
0.3.0-2023-02-1-0029-230320155437-e484272  cee-global
smi-autoheal           cee-global-smi-autoheal           deployed  2023.02.1.d249  1
0.2.0-2023-02-1-0030-230330084451-99684bf  cee-global
smi-show-tac           cee-global-smi-show-tac           deployed  2023.02.1.d249  1
0.4.0-2023-02-1-0189-230331050005-81130f1  cee-global
storage-provisioner    cee-global-storage-provisioner    deployed  2023.02.1.d249  1
0.3.0-2023-02-1-0120-230320160505-1597fdb  cee-global
telegraf-monitoring    cee-global-telegraf-monitoring    deployed  2023.02.1.d249  1
0.1.0-2023-02-1-0048-230330084426-9b02da0  cee-global
```

3. Verify the status of the system.

   **show system status**

   **Example**:

   ```
   cee# show system status
   system status deployed true
   system status percent-ready 100.0
   ```

**Notes**:

- **show helm charts** – Displays the helm release details.
- **show system status** – Displays the status of the system.

# Upgrading the Products in Offline Environments

Using the SMI Cluster Manager, you can upgrade the product's Ops Center and all the applications and services associated with it. This section describes the procedures involved in upgrading the products in offline environment using the SMI Cluster Manager.

# Deploying the Helm Charts in Sequential Order

*Table 11: Feature History*

| Feature Name | Release Information | Feature Description |
|---|---|---|
| Sequential Deployment of Helm Charts in Ops-Center | 2024.02.1 | |

| Feature Name | Release Information | Feature Description |
|---|---|---|
| | | This feature provides NF users the flexibility to manage the deployment of helm charts by introducing chart priority groups.<br><br>It allows users to control the order in which the helm charts are deployed, ensuring that pods related to high-priority charts are available before deploying the lower-priority charts.<br><br>This feature introduces the following new CLI commands:<br><br>• **helm ordered_deployment enable true**—Use this command to enable sequential deployment.<br><br>• **helm ordered_deployment chart** *chart_name* **priority_group** *priority_id*—Use this command to order the helm charts.<br><br>Prior to executing this command, you must enable sequential deployment.<br><br>**Important** When you configure this feature through NSO, you will observe that helm charts are removed from the device. This issue happens as the chart names that are loaded in Ops-center are not synced to NSO, thereby causing an illegal reference error.<br><br>It is recommended that you sync the configuration from the device (using **sync-from** CLI) before initiating the ordered deployment |

| Feature Name | Release Information | Feature Description |
|---|---|---|
| | | configuration. |

SMI supports the sequential helm chart deployment feature in the base ops-center through op-center configuration. NFs should use the specific ops-center branch and a minimum version of 7.71400.7 as the ops-center-yang-compiler.

To deploy the helm charts in a sequential manner, use the following steps:

1. Before upgrading NF product through cluster-sync, disable the config sync at NF ops-center.

```
[tb2-smi-blr-s1-c1/global] cee# system synch stop
Wed Mar  27 04:05:54.301 UTC+00:00
[tb2-smi-blr-s1-c1/global] cee#
Message from confd-api-manager at 2024-03-27 04:05:57...
Synchronization process is not running - config changes are not
processed.  Enable synch with: system synch start
[tb2-smi-blr-s1-c1/global] cee#
```

**Note** You are required to perform config sync stop or start operation only when

- the sequential deployment feature is not available in the existing ops-center.
- the helm charts are added or deleted in the new NF software.

2. Upgrade the NF software through cluster sync. Note that the cluster sync will upgrade only ops-center. Rest of the charts will not be upgraded due to config sync stop.

```
[tb2-smi-blr-s1-c1/global] cee# show helm charts
Wed Mar  27 04:08:14.528 UTC+00:00
CHART           INSTANCE         STATUS    VERSION   REVISION  RELEASE      NAMESPACE
-----------------------------------------------------------------------------------------------
cee-ops-center    cee-global-ops-center     deployed  2024.02.1.d181 10  0.7.0-2024-02-1
 cee-global
cnat-monitoring   cee-global-cnat-monitoring deployed  2024.02.1.i05  9   0.7.0-2024-02-1
 cee-global
product-documentation cee-global-product-documentation deployed 2024.02.1.i05  9
0.8.0-2024-02-1 cee-global
pv-manager       cee-global-pv-manager     deployed  2024.02.1.i05  10  0.3.0-2024-02-1
 cee-global
smi-autoheal     cee-global-smi-autoheal   deployed  2024.02.1.i05  10  0.2.0-2024-02-1
 cee-global
smi-show-tac     cee-global-smi-show-tac   deployed  2024.02.1.i05  9   0.4.0-2024-02-1
 cee-global
storage-provisioner cee-global-storage-provisioner deployed 2024.02.1.i05  9
0.3.0-2024-02-1 cee-global
telegraf-monitoring cee-global-telegraf-monitoring deployed 2024.02.1.i05  9
0.1.0-2024-02-1 cee-global
```

3. Configure the parameters that are used to sequentialize the deployment of helm charts.

```
[tb2-smi-blr-s1-c1/global] cee(config)# helm ordered_deployment
Possible completions:
chart                Chart specific deployment configuration
```

```
continue_on_timeout  Continue/Stop after Chart bringup timeout
enable               Enable/Disable Ordered Helm Chart Deployment On
Upgrade
timeout              Wait interval (in seconds) for Chart bringup (all
 pods Ready)
```

```
[tb2-smi-blr-s1-c1/global] cee(config)# helm ordered_deployment enable
 true
Wed Mar  27 04:23:10.852 UTC+00:00
```

```
[tb2-smi-blr-s1-c1/global] cee(config)# helm ordered_deployment chart
Possible completions:
cnat-monitoring kvm-metrics     product-documentation     pv-manager
      smi-autoheal      smi-logs-forwarder      smi-show-tac
storage-provisioner      telegraf-monitoring
```

```
[tb2-smi-blr-s1-c1/global] cee(config)# helm ordered_deployment chart
 cnat-monitoring priority_group 20
Wed Mar  27 04:24:10.852 UTC+00:00
[tb2-smi-blr-s1-c1/global] cee(config)# helm ordered_deployment chart
 storage-provisioner priority_group 10
```

**NOTES**:

- **helm ordered_deployment enable { false | true }**: Enable or disable the sequential deployment of helm charts. Default: false
- **helm ordered_deployment chart** *chart_name* **priority_group** *priority_id*: Specify the chart name and the chart priority group ID. The priority group ID decides the helm chart deployment order. The priority group configuration is specific to the helm charts and not the sub-charts.

  The *priority_id* is an integer ranging from 1 to 99 with 1 being the highest priority and 99 being the lowest priority. Default: 99

  The chart assigned the priority group ID of 1 gets deployed first before the other charts assigned the priority group ID of 2,3,4, and so on. Note that the other charts will not be deployed until all the pods associated with the first chart are deployed. Charts with the same priority group will be deployed simultaneously.

**Note** You must use **helm ordered_deployment enable true** command before configuring **helm ordered_deployment chart** *name* **priority_group** *priority_id* command.

If the **ordered_deployment** is not enabled or if the **priority_group** is not defined for charts, NF follows the default deployment that is bringing up all the charts in parallel.

- **helm ordered_deployment continue_on_timeout**: Set this configuration to **true** or **false** to continue or stop the helm chart deployment after the chart bring-up timeout. Default: true
- **helm ordered_deployment timeout** *time_interval*: Specify the timeout interval, in seconds, until then the chart waits for all its pods to get deployed.

  The *time_interval* is an integer ranging from 0 to 3600. Default: 600

If any failure is encountered in higher priority group chart deployment, the deployment stops or continues depending on the **continue_after_timeout** parameter.

- If the sequential deployment feature is not available in any of the ops-centers, enable this feature and perform the NF software upgrade.
- If there are any new helm charts available through the NF software upgrade, update the ordered deployment configuration parameters for the new charts. Similarly, if there are any charts to be removed as part of software upgrade, make sure to first remove the chart from ordered-deployment configuration and then proceed with the software upgrade through cluster sync.

4. Enable the config sync. It will upgrade the chart as per the ordered deployment configuration.

```
[tb2-smi-blr-s1-c1/global] cee# system synch start
Wed Mar  27 04:23:10.852 UTC+00:00
[tb2-smi-blr-s1-c1/global] cee#
```

```
[tb2-smi-blr-s1-c1/global] cee# show helm charts

Wed Mar  27 04:24:54.336 UTC+00:00

CHART           INSTANCE         STATUS    VERSION   REVISION  RELEASE      NAMESPACE
-------------------------------------------------------------------------------------------------------
cee-ops-center    cee-global-ops-center     deployed  2024.02.1.d181 10  0.7.0-2024-02-1
 cee-global
cnat-monitoring   cee-global-cnat-monitoring deployed  2024.02.1.i05  9   0.7.0-2024-02-1
 cee-global
product-documentation cee-global-product-documentation deployed 2024.02.1.i05  9
0.8.0-2024-02-1 cee-global
pv-manager       cee-global-pv-manager     deployed  2024.02.1.i05  10  0.3.0-2024-02-1
 cee-global
smi-autoheal     cee-global-smi-autoheal   deployed  2024.02.1.i05  10  0.2.0-2024-02-1
 cee-global
smi-show-tac     cee-global-smi-show-tac   deployed  2024.02.1.i05  9   0.4.0-2024-02-1
 cee-global
storage-provisioner cee-global-storage-provisioner deployed 2024.02.1.i05  9
0.3.0-2024-02-1 cee-global
telegraf-monitoring cee-global-telegraf-monitoring deployed 2024.02.1.i05  9
0.1.0-2024-02-1 cee-global

[tb2-smi-blr-s1-c1/global] cee#

cloud-user@tb2-smi-blr-s1-c1-master1:~$ helm ls -n cee-global

NAME         NAMESPACE     REVISION  UPDATED               STATUS     CHART
               APP VERSION
cee-global-cnat-monitoring  cee-global   10  2024-03-27 04:24:17.178670318 +0000 UTC
deployed  cnat-monitoring-0.7.0-2024-02-1-0032-240321173925-2c8a968   2024.02.1.d181
cee-global-ops-center       cee-global   10  2024-03-27 04:07:39.542317449 +0000 UTC
deployed  cee-ops-center-0.7.0-2024-02-1-0547-240326113917-f8d2d25    2024.02.1.d181
cee-global-product-documentation cee-global  10  2024-03-27 04:24:33.537482349 +0000 UTC
  deployed product-documentation-0.8.0-2024-02-1-0149-240216180844-dd04f43 2024.02.1.d181
cee-global-pv-manager       cee-global  11    2024-03-27 04:24:33.491414622 +0000 UTC
 deployed  pv-manager-0.3.0-2024-02-1-0036-240216180715-0677f38       2024.02.1.d181
cee-global-smi-autoheal     cee-global  11    2024-03-27 04:24:33.495848154 +0000 UTC
 deployed  smi-autoheal-0.2.0-2024-02-1-0040-240216180748-13dd903     2024.02.1.d181
cee-global-smi-show-tac     cee-global  10    2024-03-27 04:24:33.550657024 +0000 UTC
 deployed  smi-show-tac-0.4.0-2024-02-1-0207-240321173848-84f417c     2024.02.1.d181
cee-global-storage-provisioner cee-global  10 2024-03-27 04:24:11.514250682 +0000 UTC
 deployed  storage-provisioner-0.3.0-2024-02-1-0127-240216180827-d0e9159 2024.02.1.d181
cee-global-telegraf-monitoring cee-global  10 2024-03-27 04:24:33.494447625 +0000 UTC
 deployed  telegraf-monitoring-0.1.0-2024-02-1-0064-240216180755-97cf3c1 2024
```

See the updated timestamp to confirm the sequential deployment of charts.

# Upgrading the Product

To upgrade the product, perform the following:

1. Download the latest TAR ball from the URL.

   **software-packages download** *URL*

   **Example**:

   ```
   SMI Cluster Manager# software-packages download
   http://<ipv4address>:<port_number>/packages/cee-2019-08-21.tar
   ```

2. Verify whether the TAR balls are loaded.

   **software-packages list**

   **Example**:

   ```
   SMI Cluster Manager# software-packages list
   [ cee-2019-08-21 ]
   [ sample ]
   ```

3. Update the repository URL to point the correct product chart release to upgrade the product.

   **configure**
   **cluster** *cluster_name*
   **ops-centers** *app_name instance_name*
   **repository** *url*
   **exit**
   **exit**

   **Example**:

   ```
   SMI Cluster Manager# config
   SMI Cluster Manager(config)# clusters test2
   SMI Cluster Manager(config-clusters-test2)# ops-centers cee data
   SMI Cluster Manager(config-ops-centers-cee/data)# repository
   http://charts.<ipv4address>.<domain_name>/cee-2019-08-21/
   SMI Cluster Manager(config-ops-centers-cee/data)# exit
   SMI Cluster Manager(config-clusters-test2)# exit
   ```

4. Configure the secrets, if your local registry contains secrets.

   **configure**
   **cluster** *cluster_name*
   **secrets docker-registry** *secret_name*
   **docker-server** *server_name*
   **docker-username** *username*
   **docker-password** *password*
   **docker-email** *email*
   **namespace k8s** *namespace*
   **commit**
   **exit**
   **exit**

   **Example**:

   ```
   SMI Cluster Manager# config
   SMI Cluster Manager(config)# clusters test2
   SMI Cluster Manager(config-clusters-test2)# secrets docker-registry sec1
   SMI Cluster Manager(config-docker-registry-sec1)# docker-server serv1
   ```

```
SMI Cluster Manager(config-docker-registry-sec1)# docker-username user1
SMI Cluster Manager(config-docker-registry-sec1)# docker-password Cisco@123
SMI Cluster Manager(config-docker-registry-sec1)# docker-email reg@cisco.com
SMI Cluster Manager(config-docker-registry-sec1)# namespace ns1
SMI Cluster Manager(config-docker-registry-sec1)# exit
SMI Cluster Manager(config-clusters-test2)# exit
SMI Cluster Manager(config)#
```

5. Run the cluster synchronization.

   **clusters** *cluster_name* **actions sync run**

   **Example**:

   ```
   SMI Cluster Manager# clusters test2 actions sync run
   ```

## Verifying the Product Upgrade

You can verify the status of the product upgrade through the product CLI. To verify, use the following commands:

1. Log in to the SMI product CLI. For example, CEE.
2. Verify whether the charts are loaded in the specific instance (verify the namespace).

   **show helm charts**

   **Example**:

   ```
   cee# show helm charts
   CHART         INSTANCE                              STATUS    VERSION     REVISION RELEASE
                                    NAMESPACE
   ------------------------------------------------------------------------------------------
   cee-ops-center         cee-global-ops-center             deployed  2023.02.1.d249  1
   0.7.0-2023-02-1-0513-230331051211-dec612f  cee-global
   cnat-monitoring        cee-global-cnat-monitoring        deployed  2023.02.1.d249  1
   0.7.0-2023-02-1-0031-230331183330-58ec41c  cee-global
   product-documentation  cee-global-product-documentation  deployed  2023.02.1.d249  1
   0.8.0-2023-02-1-0131-230321085503-2699cb5  cee-global
   pv-manager             cee-global-pv-manager             deployed  2023.02.1.d249  1
   0.3.0-2023-02-1-0029-230320155437-e484272  cee-global
   smi-autoheal           cee-global-smi-autoheal           deployed  2023.02.1.d249  1
   0.2.0-2023-02-1-0030-230330084451-99684bf  cee-global
   smi-show-tac           cee-global-smi-show-tac           deployed  2023.02.1.d249  1
   0.4.0-2023-02-1-0189-230331050005-81130f1  cee-global
   storage-provisioner    cee-global-storage-provisioner    deployed  2023.02.1.d249  1
   0.3.0-2023-02-1-0120-230320160505-1597fdb  cee-global
   telegraf-monitoring    cee-global-telegraf-monitoring    deployed  2023.02.1.d249  1
   0.1.0-2023-02-1-0048-230330084426-9b02da0  cee-global
   ```

3. Verify the status of the system.

   **show system status**

   **Example**:

   ```
   cee# show system status
   system status deployed true
   system status percent-ready 100.0
   ```

**Notes**:

- **show helm charts** – Displays the helm release details.

- **show system status** – Displays the status of the system.

# Rollback to an Earlier Version

To rollback to an earlier version of the product, perform the following:

1. Update the repository URL to point an earlier version of the product chart release to rollback the product.

   ```
   configure
      cluster cluster_name
         ops-centers app_name instance
            repository url
            exit
         exit
   ```

   **Example**:

   ```
   SMI Cluster Manager# config
   SMI Cluster Manager(config)# clusters test2
   SMI Cluster Manager(config)# ops-centers cee data
   SMI Cluster Manager(config-clusters-test2)# ops-centers cee data
   SMI Cluster Manager(config-ops-centers-cee/data)# repository
   http://charts.<ipv4address>.<domain_name>/cee-2019-07-22/
   SMI Cluster Manager(config-ops-centers-cee/data)# exit
   SMI Cluster Manager(config-clusters-test2)# exit
   ```

2. Configure the secrets, if your local registry contains secrets.

   ```
   configure
      cluster cluster_name
         secrets docker-registry secret_name
            docker-server server_name
            docker-username username
            docker-password password
            docker-email email
            namespace k8s namespace
            commit
            exit
         exit
   ```

   **Example**:

   ```
   SMI Cluster Manager# config
   SMI Cluster Manager(config)# clusters test2
   SMI Cluster Manager(config-clusters-test2)# secrets docker-registry sec1
   SMI Cluster Manager(config-docker-registry-sec1)# docker-server serv1
   SMI Cluster Manager(config-docker-registry-sec1)# docker-username user1
   SMI Cluster Manager(config-docker-registry-sec1)# docker-password Cisco@123
   SMI Cluster Manager(config-docker-registry-sec1)# docker-email reg@cisco.com
   SMI Cluster Manager(config-docker-registry-sec1)# namespace ns1
   SMI Cluster Manager(config-docker-registry-sec1)# exit
   SMI Cluster Manager(config-clusters-test2)# exit
   SMI Cluster Manager(config)#
   ```

3. Run the cluster synchronization.

   ```
   clusters cluster_name actions sync run
   ```

   **Example**:

```
SMI Cluster Manager# clusters test2 actions sync run
```

# Viewing Pod Details

You can view the details of the current pods through CEE Ops Center. To view the pod details, use the following command (in CEE Ops Center CLI):

**cluster pods** *instance_name pod_name* **detail**

**Note**

- **cluster** – Specifies the K8s cluster.
- **pods** – Specifies the current pods in the cluster.
- *instance_name* – Specifies the name of the instance.
- *pod_name* – Specifies the name of the pod.
- **detail** – Displays the details of the specified pod.

The following example displays the details of the pod named *alertmanager-0* in the *cee-data* instance.

**Example:**

```
cee# cluster pods cee-data alertmanager-0 detail
details apiVersion: "v1"
kind: "Pod"
metadata:
  annotations:
    alermanager.io/scrape: "true"
    cni.projectcalico.org/podIP: "192.168.1.137/32"
    config-hash: "5532425ef5fd02add051cb759730047390b1bce51da862d13597dbb38dfbde86"
  creationTimestamp: "2020-02-26T06:09:13Z"
  generateName: "alertmanager-"
  labels:
    component: "alertmanager"
    controller-revision-hash: "alertmanager-67cdb95f8b"
    statefulset.kubernetes.io/pod-name: "alertmanager-0"
  name: "alertmanager-0"
  namespace: "cee"
  ownerReferences:
  - apiVersion: "apps/v1"
    kind: "StatefulSet"
    blockOwnerDeletion: true
    controller: true
    name: "alertmanager"
    uid: "82a11da4-585e-11ea-bc06-0050569ca70e"
  resourceVersion: "1654031"
  selfLink: "/api/v1/namespaces/cee/pods/alertmanager-0"
  uid: "82aee5d0-585e-11ea-bc06-0050569ca70e"
spec:
  containers:
  - args:
    - "/alertmanager/alertmanager"
    - "--config.file=/etc/alertmanager/alertmanager.yml"
    - "--storage.path=/alertmanager/data"
    - "--cluster.advertise-address=$(POD_IP):6783"
    env:
    - name: "POD_IP"
```

```
      valueFrom:
        fieldRef:
          apiVersion: "v1"
          fieldPath: "status.podIP"
    image: "<path_to_alert_manager_image>"
    imagePullPolicy: "IfNotPresent"
    name: "alertmanager"
    ports:
    - containerPort: 9093
      name: "web"
      protocol: "TCP"
    resources: {}
    terminationMessagePath: "/dev/termination-log"
    terminationMessagePolicy: "File"
    volumeMounts:
    - mountPath: "/etc/alertmanager/"
      name: "alertmanager-config"
    - mountPath: "/alertmanager/data/"
      name: "alertmanager-store"
    - mountPath: "/var/run/secrets/kubernetes.io/serviceaccount"
      name: "default-token-kbjnx"
      readOnly: true
  dnsPolicy: "ClusterFirst"
  enableServiceLinks: true
  hostname: "alertmanager-0"
  nodeName: "for-smi-cdl-1b-worker94d84de255"
  priority: 0
  restartPolicy: "Always"
  schedulerName: "default-scheduler"
  securityContext:
    fsGroup: 0
    runAsUser: 0
  serviceAccount: "default"
  serviceAccountName: "default"
  subdomain: "alertmanager-service"
  terminationGracePeriodSeconds: 30
  tolerations:
  - effect: "NoExecute"
    key: "node-role.kubernetes.io/oam"
    operator: "Equal"
    value: "true"
  - effect: "NoExecute"
    key: "node.kubernetes.io/not-ready"
    operator: "Exists"
    tolerationSeconds: 300
  - effect: "NoExecute"
    key: "node.kubernetes.io/unreachable"
    operator: "Exists"
    tolerationSeconds: 300
  volumes:
  - configMap:
      defaultMode: 420
      name: "alertmanager"
    name: "alertmanager-config"
  - emptyDir: {}
    name: "alertmanager-store"
  - name: "default-token-kbjnx"
    secret:
      defaultMode: 420
      secretName: "default-token-kbjnx"
status:
  conditions:
  - lastTransitionTime: "2020-02-26T06:09:02Z"
    status: "True"
```

```
    type: "Initialized"
  - lastTransitionTime: "2020-02-26T06:09:06Z"
    status: "True"
    type: "Ready"
  - lastTransitionTime: "2020-02-26T06:09:06Z"
    status: "True"
    type: "ContainersReady"
  - lastTransitionTime: "2020-02-26T06:09:13Z"
    status: "True"
    type: "PodScheduled"
  containerStatuses:
  - containerID: "docker://821ed1a272d37e3b4c4c9c1ec69b671a3c3fe6eb4b42108edf44709b9c698ccd"

    image: "<path_to_alert_manager_image>"
    imageID:
"docker-pullable:/<path_to_alert_manager_directory>@sha256:c4bf05aa677a050fba9d86586b04383ca089bd784d2cb9e544b0d6b7ea899d9b"

    lastState: {}
    name: "alertmanager"
    ready: true
    restartCount: 0
    state:
      running:
        startedAt: "2020-02-26T06:09:05Z"
  hostIP: "<host_ipv4address>"
  phase: "Running"
  podIP: "<pod_ipv4address>"
  qosClass: "BestEffort"
  startTime: "2020-02-26T06:09:02Z"
cee#
```

# Configuring the Local NTP Server with Authentication and Tracking

This section describes how to configure the local NTP server with authentication and tracking.

## Configuring the Local NTP Server

On a network with multiple systems, it's always recommended to set up a single system as the NTP server for all the other local systems. The cloud providers follow the same model to run their own NTP pools within their data centers. The benefits of following this model include, reduced load on external connections and remote NTP servers, proper synchronization of the local systems with each other even when the external connection or servers goes down.

You can enable a local server in the configuration file.

1. Specify the network and subnet from where the connections arrive to enable the local server. In addition, you can create an access list and test it on the server using the following command:

   **accheck** *address*

   For instance, you can use the following configuration to allow connections from 192.168.2.0/24 and all of the 10.0.0.0/8 subnet:

   ```
   allow 192.168.2.0/24
   allow 10.0.0.0/8
   ```

2. Restart the *Chrony* service for the configuration to take effect as shown in the following sample configuration file.

```
user1@cluster-manager:~$ vi /etc/chrony/chrony.conf
user1@cluster-manager:~$ sudo vi /etc/chrony/chrony.conf
user1@cluster-manager:~$ sudo systemctl daemon-reload
user1@cluster-manager:~$ sudo systemctl restart chrony
user1@cluster-manager:~$ sudo systemctl status chrony
 chrony.service - chrony, an NTP client/server
   Loaded: loaded (/lib/systemd/system/chrony.service; enabled; vendor preset: enabled)

   Active: active (running) since Tue 2019-11-19 17:54:26 UTC; 10s ago
     Docs: man:chronyd(8)
           man:chronyc(1)
           man:chrony.conf(5)
  Process: 14237 ExecStartPost=/usr/lib/chrony/chrony-helper update-daemon (code=exited,
 status=0/SUCCESS)
  Process: 14196 ExecStart=/usr/lib/systemd/scripts/chronyd-starter.sh $DAEMON_OPTS
(code=exited, status=0/SUCCESS)
 Main PID: 14233 (chronyd)
    Tasks: 1 (limit: 4915)
   CGroup: /system.slice/chrony.service
           └─14233 /usr/sbin/chronyd

Nov 19 17:54:26 cluster-manager systemd[1]: Starting chrony, an NTP client/server...
Nov 19 17:54:26 cluster-manager chronyd[14233]: chronyd version 3.2 starting (+CMDMON
+NTP +REFCLOCK +RTC +PRIVDROP +SCFILTER +SECHASH +SIGND +ASYNCDNS +IPV6 -DEBUG)
Nov 19 17:54:26 cluster-manager chronyd[14233]: Frequency -12.134 +/- 0.024 ppm read
from /var/lib/chrony/chrony.drift
Nov 19 17:54:26 cluster-manager systemd[1]: Started chrony, an NTP client/server.
Nov 19 17:54:31 cluster-manager chronyd[14233]: Selected source 171.68.38.65
```

3. Verify the connection to the server using the **chronyc activity** command. Also, the **chronyc clients** command allows you to view the list of clients connected to the server. In the following example, you can verify the server connection and clients connected to it.

```
user1@cluster-manager:~$ sudo chronyc activity
200 OK
2 sources online
0 sources offline
0 sources doing burst (return to online)
0 sources doing burst (return to offline)
0 sources with unknown address
user1@cluster-manager:~$ sudo chronyc clients
Hostname                      NTP   Drop Int IntL Last     Cmd   Drop Int  Last
===============================================================================
```

**Note** There are no clients displayed in the clients list since none of them are configured currently.

4. Enter the local server in Cluster Manger configuration.

5. Run the cluster synchronization as follows.

```
configure
   node-defaults os ntp servers clock.cisco.com
   exit
```

6. Verify the clients on the local server after all the nodes synchronize successfully.

```
user1cluster-manager:~$ sudo chronyc clients
Hostname                      NTP   Drop Int IntL Last     Cmd   Drop Int  Last
```

```
===============================================================================
192.168.2.109                 11      0   6   -     7        0      0   -     -
192.168.2.110                  9      0   6   -    49        0      0   -     -
192.168.2.111                  8      0   6   -    52        0      0   -     -
192.168.2.107                  4      0   1   -    59        0      0   -     -
192.168.2.108                  4      0   1   -    59        0      0   -     -
192.168.2.106                  4      0   1   -    58        0      0   -     -
192.168.2.51                   4      0   1   -    58        0      0   -     -
192.168.2.53                   4      0   1   -    58        0      0   -     -
192.168.2.52                   4      0   1   -    58        0      0   -     -
```

7. Alternatively, you can verify the sources on any of the nodes in the cluster and track the status of the synchronization using the **chronyc sources** and **chronyc tracking** commands.

```
user1@kali-worker3:~$ sudo chronyc sources
210 Number of sources = 1
MS Name/IP address         Stratum Poll Reach LastRx Last sample
===============================================================================

192.168.2.56                 2   6   377    25    -13us[  -18us] +/- 1106us

user1-cloud@kali-worker3:~$ sudo chronyc tracking
Reference ID : AC161238 (192.168.2.56)
Stratum : 3
Ref time (UTC) : Tue Nov 19 19:07:07 2019
System time : 0.000000037 seconds slow of NTP time
Last offset : +0.000035999 seconds
RMS offset : 0.000020778 seconds
Frequency : 13.682 ppm slow
Residual freq : +0.084 ppm
Skew : 0.228 ppm
Root delay : 0.001795322 seconds
Root dispersion : 0.000163470 seconds
Update interval : 64.2 seconds
Leap status : Normal
```

# Configuring the Local NTP Server with Authentication

Generally, all cloud providers set up authentication for their local servers. To verify the authentication status of the local servers, use the **chronyc** command as follows:

```
user1@kali-worker3:~$ sudo chronyc ntpdata 192.168.2.56 | grep Authenticated
Authenticated   : No
```

To secure your local servers:

1. Select the key-id and n-bit Secure Hash Algorithm (SHA) key.
   - The following example shows the default key generation.

     ```
     user1@cluster-manager:~$ sudo chronyc keygen
     1 SHA1 HEX:959623F106595B9E75BE328C265CA9C86560D88E
     ```

   - The following example shows the key generation with key-id 27 and 512 bit SHA key.

     ```
     user1@cluster-manager:~$ sudo chronyc keygen 27 SHA512 512
     27 SHA512
     HEX:80E68E6AEB1B994217282568AF2A0EA8E4731F6CDC5CC5635C799676864BD68B4317FA897B54F10DCFE8F5F36
     7E03626ACD0A5048BAA8E1A615A44C4FCF731B3
     ```

2. Add the keys to the **/etc/chrony/chrony.keys** file to configure the authentication.

3. Restart the *Chrony* as follows.

```
user1@cluster-manager:~$ sudo systemctl daemon-reload
user1-cloud@cluster-manager:~$ sudo systemctl restart chrony
user1-cloud@cluster-manager:~$ sudo systemctl status chrony
● chrony.service - chrony, an NTP client/server
   Loaded: loaded (/lib/systemd/system/chrony.service; enabled; vendor preset: enabled)

   Active: active (running) since Tue 2019-11-19 19:29:08 UTC; 8s ago
     Docs: man:chronyd(8)
           man:chronyc(1)
           man:chrony.conf(5)
  Process: 20452 ExecStartPost=/usr/lib/chrony/chrony-helper update-daemon (code=exited,
 status=0/SUCCESS)
  Process: 20406 ExecStart=/usr/lib/systemd/scripts/chronyd-starter.sh $DAEMON_OPTS
(code=exited, status=0/SUCCESS)
 Main PID: 20445 (chronyd)
    Tasks: 1 (limit: 4915)
   CGroup: /system.slice/chrony.service
           └─20445 /usr/sbin/chronyd

Nov 19 19:29:08 cluster-manager systemd[1]: Starting chrony, an NTP client/server...
Nov 19 19:29:08 cluster-manager chronyd[20445]: chronyd version 3.2 starting (+CMDMON
+NTP +REFCLOCK +RTC +PRIVDROP +SCFILTER +SECHASH +SIGND +ASYNCDNS +IPV6 -DEBUG)
Nov 19 19:29:08 cluster-manager chronyd[20445]: Frequency -12.095 +/- 0.044 ppm read
from /var/lib/chrony/chrony.drift
Nov 19 19:29:08 cluster-manager systemd[1]: Started chrony, an NTP client/server.
Nov 19 19:29:13 cluster-manager chronyd[20445]: Selected source 171.68.38.65
```

4. Update the NTP configuration in the cluster manager.

5. Run the cluster synchronization as follows.

```
node-defaults os ntp servers 192.168.2.56
  key-id   27
  sha-type SHA512
  sha-key
80E68E6AEB1B994217282568AF2A0EA8E4731F6CDC5CC5635C799676864BD68B4317FA897B54F10DCFE8F5F36
7E03626ACD0A5048BAA8E1A615A44C4FCF731B3
 exit
```

6. Verify the authentication status on all the nodes connected to the local server after synchronization.

```
user1@kali-worker3:~$ sudo chronyc ntpdata 192.168.2.56 | grep Authenticated
Authenticated   : Yes
```

# K8s Certificates Auto-Renewal

## Certificate Management with Kubeadm

In kubeadm v1.21.0, client certificates generated by kubeadm expire after 1 year. The root certificates expires in 10 years. This feature enables monitoring and automatic renewal of kubeadm certificates before the expiry date from the CM or CEE. The CEE triggers an alert to notify the user of any certificate that is going to expire in 30 days.

The smi-cluster-maintainer pod monitors the k8s certificates and automate the renewal process, regardless of the cluster sync.

# How it Works

This section describes the sequence of operation for the feature.

1. The certificates in CM managed K8s clusters, control planes, workers, and external ETCD nodes is checked every 12 hours.
2. If any certificate is expiring in 60 days on the nodes, then the auto-renew process is triggered.
   - If the renewal is successful, then the following checks shows all the certificates as valid.
   - If the renewal is unsuccessful, then the auto-renew process is re-initiated for the next cycle or iteration of validating the certificates.
3. If any certificate is expiring in 30 days on the nodes, then the auto-renew process is triggered along with sending an alert to the user.

   In such cases, a manual intervention might be required to renew the certificates, which are nearing their expiry date.

   The kubernetes certificate expiry alert is show below.

   **Rules:**

   - **Alert:** kube_certificate_expiring
     - **Annotations:**
       - **Type:** Kubernetes Certificate Expiring Alarm
       - **Summary:** "Kubernetes certificate {{ $labels.cert_path }} on host: {{ $labels.node_name }} is expiring in {{ $labels.days_to_expiry }} days."
     - **Expression:**

       ```
       |
            kube_certificate_expiring != 0
       ```

     - **Labels:**
       - **Severity:** critical

**Note** The certificate auto-renewal process must restart the api-server. You might experience a temporary k8s API downtime during the certificate auto-renewal process.

# Ops Center Converged Core Naming Convention Support

## Feature Description

The SMF Ops Center name has changed to 'cn' from 'SMF' to accommodate the Ops Centers for SMF, cnSGW, or a combination of both. This name change breaks backward compatibility for the pods with earlier versions in relation to namespaces and IMS nodes.

This feature provides a new optional CLI configuration 'app-name-override' which ensures backward compatibility. The package name is derived by using this new field and is used in the URL to download the correct package. The previous method to derive namespaces is used to ensure that the existing namespaces remain unchanged.

## Configuring the Ops Center Converged Core Naming Convention Support

This section describes a sample CLI command configuration for configuring the feature.

```
ops-centers smf data
  app-name-override       cn
  repository-local        smfi25
  sync-default-repository true
  netconf-ip              209.165.200.224
  netconf-port            2026
  ssh-ip                  209.165.200.224
  ssh-port                2028
  ingress-hostname        209.165.200.224.nip.io
  initial-boot-parameters use-volume-claims false
  initial-boot-parameters first-boot-password $8$5WnH/gUgKtPAPfXdU8CaURcKnaQOAc9imkIBHnjZLM=

  initial-boot-parameters auto-deploy true
  initial-boot-parameters single-node true
exit
```

**NOTES:**

- <*app-name*>: Mention the application name. In the above code sample, it is **smf**.
- <*instance*>: Mention the instance name. In the above code sample, it is **data**.
- **app-name-override** <*override_value*>: Mention the override value. In the above code sample, it is **cn**.

To download the ops center packages, the default behavior is to derive the ops center package name as **smf-ops-center**. In this release, if the app-name-override value is set to 'cn', the new behaviour is to derive the package name as **cn-ops-center**.

**Note** This feature ensures that you keep the existing namespaces, yet use the converged ops center name 'cn' from the override field to ensure backward compatibility for the NF pods, which were deployed in previous releases.

# Docker Subnet Override Support

## Feature Description

By default, Docker uses the subnet range, 172.17.0.0/16 for container networking. If the same subnet range or an IP address from the range is already being used by some other resource in the same cluster environment, it might lead to a conflict.

This feature enables the user to configure and override the default value for the Docker subnet used by the SMI Cluster Manager (CM) or Inception VM. For the CM, this configuration is set by using the CM Ops-Center, whereas the Inception VM uses the deploy.yaml file to achieve the same configuration.

The deploy.yaml is enhanced to contain additional parameter, **configuration** with a sub-parameter, **docker-address-pools**. This YAML file contains a **base** for the CIDR range to use and a **size** for the size of the subnet to reserve for the new network.

## Configuring the Docker Subnet Override

This section describes the configuration details for the Docker subnet override feature.

Use the following command to configure the Docker subnet override feature.

**configuration docker-address-pools pool-name** *docker_bridge_address_pool_name* **[ base** *docker_bridge_subnet* **| size** *size* **]**

**base *docker_bridge_subnet***

Specify the docker bridge subnet.

Must be a string in the ipv4-address-and-prefix-length pattern.

-Or-

Must be a string in the ipv6-address-and-prefix-length pattern.

Default Value: 172.17.0.0/16.

**pool-name** *docker_bridge_address_pool_name*

Specify the pool name of the docker bridge address pool.

Must be a string.

**size** *size*

Specify the size. For example, 16, 24, etc.

Must be an integer in the range of 8-24.

Default Value: 24.

# IPSec Support for SMF N4 Interfaces

## Feature Summary and Revision History

### Summary Data

| | |
|---|---|
| Applicable Product (s) or Functional Area | KVM-based application deployment support |
| Applicable Platforms | Bare Metal, OpenStack, VMware |
| Feature Default Setting | Disabled – Configuration Required |
| Related Changes in this Release | Not Applicable |
| Related Documentation | *UCC SMI Operations Guide* |

### Revision History

| Revision Details | Release |
|---|---|
| Added support for the following functionality:<br>• IPSec Monitoring<br>• Configuring IPSec certificates under strongSwan configuration | 2023.01.0 |
| First introduced. | 2020.02.2.47 |

## Feature Description

This feature introduces strongSwan, a keying daemon, which uses the Internet Key Exchange (IKE) protocols, IKEv1 and IKEv2, to establish **security associations** (SA) between two peers in a network. Such an IKE session is denoted as **IKE_SA** in this chapter. The IKE provides strong authentication for both peers and derives unique cryptographic session keys. Besides authentication and key material, IKE also provides the means to exchange configuration information and to negotiate IPsec SAs, which are often called as **CHILD_SAs**. IPsec SAs define which network traffic is to be secured and how it has to be encrypted and authenticated.

The strongSwan feature is available as an add-on from the Cluster Manager (CM). Use the CM Ops-Center to configure this add-on. In the current release, the SMI uses strongSwan version 5.9.3.

SMI allows monitoring of IPSec certificates—sends certificate expiry alerts and updates certificate through strongSwan configuration.

#### Configuration Parameters

In this section, see the description for different configuration parameters available for the strongSwan add-on feature. Use the CM Ops-Center to configure these parameters.

- **name**: Specifies the name of the connection, which can be used for connection specific operations, for example, up or down.
- **auto { ignore |add |route |start }**: Specifies the operation, if any, that should be automatically performed at IPsec startup. The **add** option loads a connection without starting it, whereas **route** loads a connection and installs kernel traps. If traffic is detected between the leftsubnet and rightsubnet, a connection is established. The **start** option loads a connection and brings it up immediately. The **ignore** option ignores the connection and is the same as deleting a connection from the config file.

  The default value is **ignore**.
- **keyexchange { ikev1 | ikev2 }** : Specifies the method of key exchange and the protocol to use to initialize the connection.
- **type { tunnel | transport | transport_proxy | passthrough | drop }**: Specifies the type of the connection. Currently, the accepted values are **tunnel**, signifying a host-to-host, host-to-subnet, or subnet-to-subnet tunnel. The **transport** option signifies a host-to-host transport mode, whereas the **transport_proxy** option signifies the special Mobile IPv6 transport proxy mode. The **passthrough** option signifies that no IPsec processing should be done at all and **drop** signifies that packets must be discarded.
- **left** or **right { ip address** *ip_address* **| fqdn** *fqdn* **| %any | %any4 | %any6 | range | subnet }**: Specifies the IP address or FQDN of the participant public-network interface. The value **%any** for the local endpoint signifies an address to be filled in (by automatic keying) during negotiation. If the local peer initiates the connection setup, then the routing table is queried to determine the correct local IP address. If the local peer is responding to a connection setup, then any IP address that is assigned to a local interface is accepted. The value **%any4** restricts address selection to IPv4 addresses and **%any6** restricts address selection to IPv6 addresses.
- **leftsubnet** or **rightsubnet** *ip subnet*: Specifies the private subnet behind the left participant, expressed as either network or netmask.
- **leftid** or **rightid** *id*: Specifies how the left or right participant must be identified for authentication. The default values are left or right or the subject of the certificate configured. It must match the full subject DN or one of the subjectAltName extensions contained in the certificate.
- **leftsendcert { never | no | ifasked | always | yes }**: Defines whether a peer must send a certificate request (CR) payload in order to get a certificate in return.
- **leftauth** or **rightauth{ pubkey | psk | eap | xauth }**: Specifies the authentication method to use locally (left) or require from the remote (right) side. The acceptable values are **pubkey** for public key encryption (RSA/ECDSA), **psk** for pre-shared key authentication, **eap** to use the Extensible Authentication Protocol, and **xauth** for IKEv1 eXtended Authentication.

  **Pubkey** is the default option.
- **psk** *pre-shared key*: Specifies the required setting if leftauth or rightauth is configured as **psk**.
- **esp { cipher suites | aes128-sha256 }**: A comma-separated list of ESP encryption or authentication algorithms is used for the connection, for example, **aes128-sha256**. The notation is encryption-integrity[-dhgroup][-esnmode]. For IKEv2, multiple algorithms (separated by -) of the same type can be included in a single proposal. IKEv1 only includes the first algorithm in a proposal.

  **aes128-sha256** is the default option.
- **ike { cipher suites | aes128-sha256-modp3072 }**: A comma-separated list of IKE/ISAKMP SA encryption or authentication algorithms is used, for example, **aes128-sha256-modp3072**.

The notation is encryption-integrity[-prf]-dhgroup. In IKEv2, multiple algorithms and proposals might be included, such as aes128-aes256-sha1-modp3072-modp2048 or 3des-sha1-md5-modp1024.

- **ikelifetime { time** *time* **| 3h }**: Specifies how long the keying channel of a connection (ISAKMP or IKE SA) must last before being renegotiated.
- **lifetime { time** *time* **| 1h }**: Specifies how long a particular instance of a connection should last, from successful negotiation to expiry.
- **dpdaction { none | clear | hold | restart }**: Specifies the action to be taken when dead peer is detected.

  **none** is the default value.
- **dpddelay { time** *time* **| 30s }**: Defines the period time interval with which INFORMATIONAL exchanges are sent to the peer. These are only sent if no other traffic is received.
- **dpdtimeout { time** *time* **| 150s }**: Defines the timeout interval after which, all the connections to a peer are deleted in case of inactivity.
- **inactivity time** *time*: Defines the timeout interval after which, a CHILD_SA is closed if it did not send or receive any traffic.
- **closeaction { none | clear | hold | restart }**: Defines the action to take if the remote peer unexpectedly closes a CHILD_SA (see **dpdaction** for the description of different options). If the peer uses reauthentication or uniqueids checking, **closeaction** must not be used, these events might trigger the defined action when it's not desired.
- **nodes** *list_of_node_names*: Specifies the node names on which IPSec connection must be established.
- **serverCert** *server_certificate*: Specifies the content of Server certificate in the **pem** format to be used for this connection.

**Note** This keyword is not supported under strongSwan configuration.

- **serverPrivKey** *server_private_key*: Specifies the content of server private key in the **pem** format to be used for this connection.

**Note** This keyword is not supported under strongSwan configuration.

- **serverPrivKeyPassphrase** *passphrase*: Specifies the passphrase used to encrypt the **server-priv-key** value.
- **server-secret**: Pass an existing TLS secret for this connection.

# Installing strongSwan

This section describes how to install the strongSwan feature.

**Install strongSwan as an Add-on from the CM**

Use the following steps to install strongSwan as an add-on from the CM Ops-Center:

1. Use the following CLI commands to enable the strongSwan add-on:

   **clusters** *cluster_name* **addons strongswan enabled**

2. Set all the strongSwan parameters for **connection** (refer to the *Configuration Parameters* section for more details on available parameters).

3. Trigger the cluster sync operation.

**Note** The strongSwan pods run on all the nodes, however traffic is accepted only on those nodes, which are configured by using the "nodes" parameter in the CM Ops-Center. strongSwan does not accept or send any traffic on non-configured nodes.

### Configuring IPSec Certificates

To configure IPSec certificates under strongSwan configuration, use the following procedure:

1. Create TLS associated secret for server and CA certificate.

   **Note:** Create strongSwan-related secrets inside the smi-strongswan namespace.

   **Example:**

```
[test-cm-controlplane] SMI Cluster Deployer# show running-config clusters secrets ca-cert
clusters test-aio
 secrets ca-cert smi-strongswan 134-ca
  certificate "-----BEGIN
CERTIFICATE-----\nMIIDqzCzQubm..................1Ac1L+s4M3ug==\n-----END
CERTIFICATE-----\n"
 exit
 secrets ca-cert smi-strongswan 135-ca
  certificate "-----BEGIN
CERTIFICATE-----\nMIIFqzCCA5Og..................9XdMDiQANHgf7w\n-----END
CERTIFICATE-----\n"
 exit
 secrets ca-cert smi-strongswan ca-1
  certificate "-----BEGIN
CERTIFICATE-----\nMIID0TCCArmg..................UNvF0nAmIX0qxg4\n-----END
CERTIFICATE-----\n"
 exit
 secrets ca-cert smi-strongswan ca-2
  certificate "-----BEGIN PRIVATE
KEY-----\nMIIEvQIBADAN..................tbNDzGAnF29nus=\n-----END PRIVATE KEY-----\n"
 exit
exit
```

2. Refer the secrets in strongSwan configuration. The strongSwan configuration shows the available TLS and certificates.

   **Example:**

```
[test-cm-controlplane] SMI Cluster Deployer# show running-config clusters karan-aio
strongswan connections server-secret
clusters test-aio
 strongswan connections a-to-b
  server-secret a-to-b
 exit
exit
```

```
[test-cm-controlplane] SMI Cluster Deployer# show running-config clusters karan-aio
strongswan ca-certs
clusters test-aio
strongswan ca-certs [ 134-ca 135-ca ]
exit
```

# Parallel Node Upgrade with Deployment Zone Strategy

## Feature Summary and Revision History

### Summary Data

| | |
|---|---|
| Applicable Product (s) or Functional Area | KVM-based application deployment support<br>K8s-based application deployment support |
| Applicable Platforms | Bare Metal, OpenStack, VMware |
| Feature Default Setting | Disabled – Configuration Required |
| Related Changes in this Release | Not Applicable |
| Related Documentation | *UCC SMI Operations Guide* |

### Revision History

| **Revision Details** | **Release** |
|---|---|
| First introduced. | 2020.02.3.10 |

## Feature Description

The current in-service upgrade strategy only supports upgrading one node at a time. For bigger clusters, more than six nodes, this upgrade strategy leads to longer upgrade periods, which mostly exceed the maintenance window (MW) limits.

This feature enables you to perform parallel upgrades for multiple nodes concurrently for faster in-service upgrades without impacting the availability and replication for any NF.

#### Architecture

This following images show the high-level design of the group upgrade flow for K8s and KVMs.

*Figure 8: Upgrade Flow for K8s Clusters*

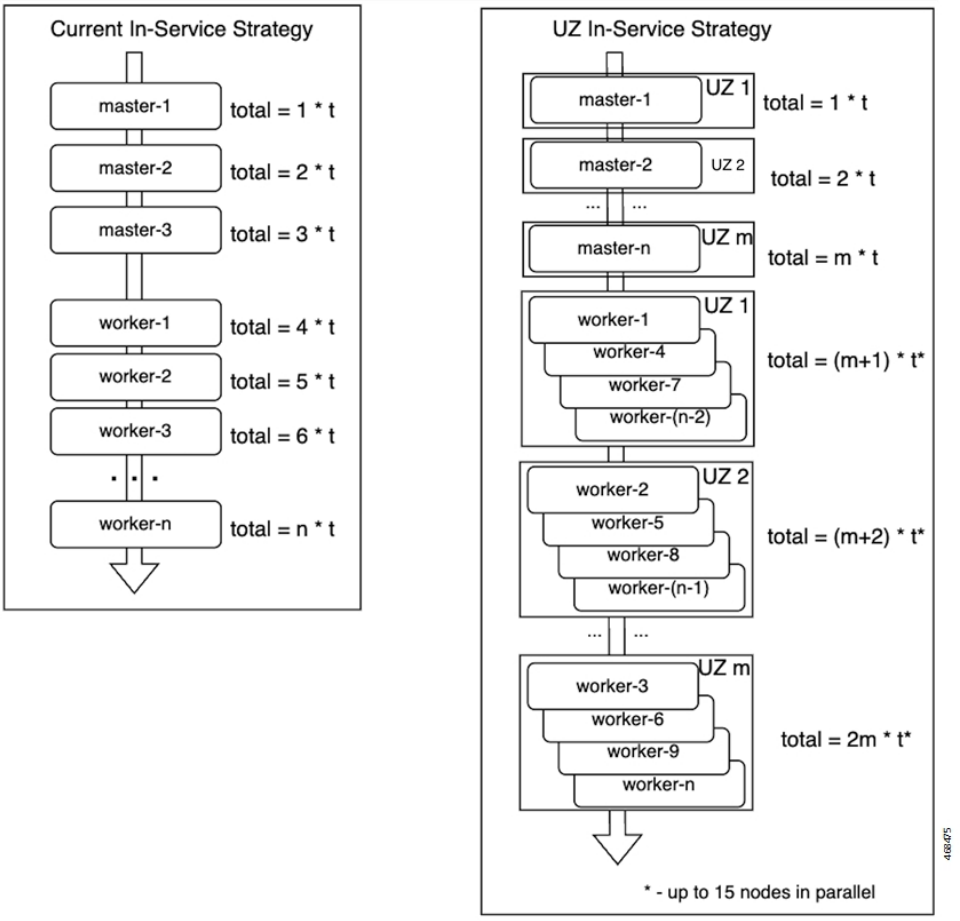
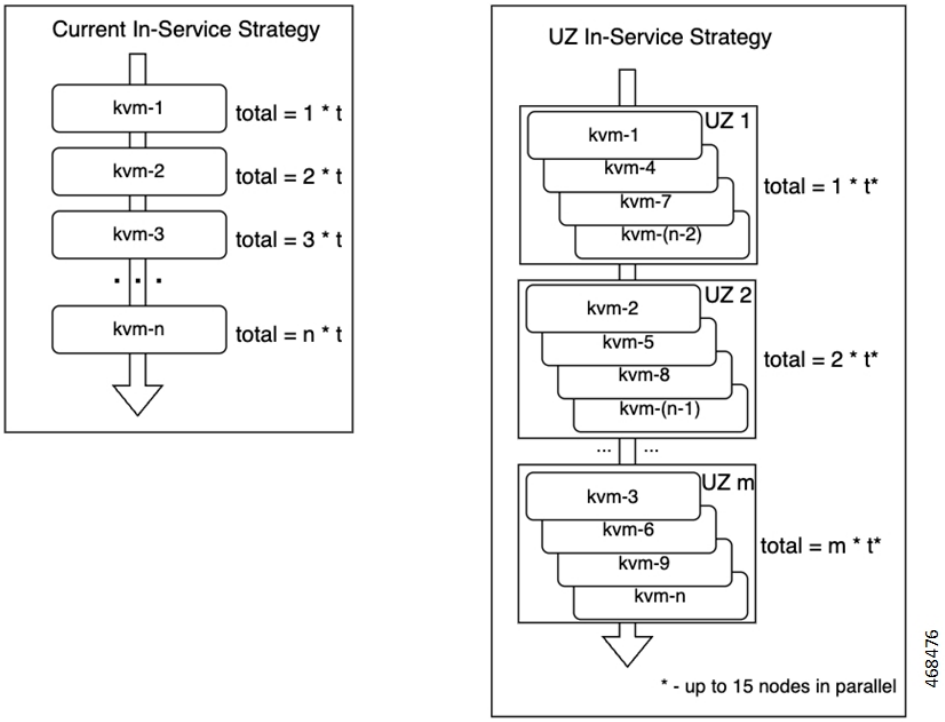


*Figure 9: Upgrade Flow for KVM Clusters*




# How it Works

This section describes how the feature works.

This feature enables users to group servers into upgrade groups, which are similar to availability zones. The nodes in each upgrade group are upgraded in parallel (the maximum number of parallel nodes supported is 15).

The upgrade groups are upgraded in a sequential manner. For example, the control plane groups are not upgraded concurrently with the worker groups, but one at a time.

### Requirements and Limitations

Some requirements and limitations associated with this feature are as follows.

- If the feature is disabled, the SMI reverts to the previous method of performing consecutive upgrade for the nodes.
- If the feature is enabled, the upgrade group configuration becomes mandatory for all nodes.

- There must be a majority of control plane or etcd nodes running at all time (for example, two out of three control planes should be always running).
- All the worker or KVM nodes should be distributed among the upgrade zone in a manner that ensures the majority of nodes never gets upgraded at the same time.
- The upgrade groups feature applies to the control plane, worker, KVM, and etcd node types,but doesn't apply to the CM-HA nodes.
- For the K8s clusters, the nodes include the upgrade group name as a new label. This label enables the NFs to use the affinity and anti-affinity rules to achieve proper HA and replication. The NFs can use the upgrade-zone provisioned node label or use custom defined ones to enable the application to align with the affinity rule.

# Configuring the Deployment Zone Strategy

This section describes how to configure the upgrade groups for different nodes.

Use the following command to configure the upgrade groups for different nodes.

```
configuration enable-upgrade-zones true
   upgrade-zones zone_name
   exit
   nodes node_name
   upgrade-zone zone_name
   exit
```

**Note** In this release, the zone upgrade strategy is applicable for only the **auto** option for cluster **upgrade-strategy**. See the following example configuration:

```
clusters foo actions sync run upgrade-strategy
Possible completions:
auto concurrent rolling
```

When **upgrade-strategy** is set to **auto** and calculated as **rolling**, Cluster Manager evaluates the upgrade zone configuration and performs a zone-based upgrade. If the **upgrade-strategy** is **auto** and calculated as **concurrent**, then it performs a concurrent upgrade regardless of the initial configuration.

**Configuration Example:**

```
clusters ott-bm1-c1

configuration enable-upgrade-zones true

upgrade-zones zone1
exit
upgrade-zones zone2
exit
upgrade-zones zone3
exit

nodes mm1-controlplane1
upgrade-zone zone1
exit
nodes mm1-controlplane2
upgrade-zone zone2
```

```
exit
nodes mm1-controlplane3
upgrade-zone zone3
exit
nodes mm1-etcd1
upgrade-zone zone1
exit
nodes mm1-etcd2
upgrade-zone zone2
exit
nodes mm1-etcd3
upgrade-zone zone3
exit
nodes mm1-worker1
upgrade-zone zone1
exit
nodes mm1-worker2
upgrade-zone zone2
exit
nodes mm1-worker3
upgrade-zone zone3
exit
nodes mm1-worker4
upgrade-zone zone1
exit
nodes mm1-worker5
upgrade-zone zone2
exit
nodes mm1-worker6
upgrade-zone zone3
exit
nodes mm1-worker7
upgrade-zone zone1
exit
commit
end
```

# Path Based Routing for Inception Server

## Feature Summary and Revision History

### Summary Data

| | |
|---|---|
| Applicable Product (s) or Functional Area | KVM-based application deployment support<br>K8s-based application deployment support |
| Applicable Platforms | Bare Metal, OpenStack, VMware |
| Feature Default Setting | Disabled – Configuration Required |
| Related Changes in this Release | Not Applicable |
| Related Documentation | *UCC SMI Operations Guide* |

## Revision History

| Revision Details | Release |
|---|---|
| First introduced. | 2022.02.1 |

# Feature Description

This feature enables the SMI to support path based URL routing for its nginx routing (external traffic) in Inception VM from the traditional host based approach for the following ingress.

- cli.smi-deployer.deployer.example.com
- restconf.smi-deployer.deployer.example.com

# Configuring the Path Based Routing for Inception Server

This section describes how to enable the path based routing for Inception server.

Use the following argument in the deploy script to enable path based ingress for RESTCONF and CLI:

```
-i or --path-based-ingress
```

**Configuration Example:**

```
./deploy -p 209.165.200.224 -f Passwd@123 -i
```

After you enable the path based ingress, SSH and RESTCONF of inception server are accessible using the following URLs:

```
API: https://209.165.200.224/smi-deployer/restconf
```

If you provide the hostname in "--external-zone-name" along with the path based ingress argument, then the entire hostname is replaced with the provided host name.

**Configuration Example:**

```
./deploy -p 209.165.200.224 -f Csco@123 -i --external-zone-name abc.com
```

After you enable the path based ingress, SSH and RESTCONF of inception server are accessible using the following URLs:

```
SSH (cli): ssh admin@127.0.0.1 -p 2022

API: https://abc.com/smi-deployer/restconf
```

# CA Signed Certificate for Path-based Ingress

## Feature Summary and Revision History

### Summary Data

| | |
|---|---|
| Applicable Product (s) or Functional Area | KVM-based application deployment support<br>K8s-based application deployment support |
| Applicable Platforms | Bare Metal, OpenStack, VMware |
| Feature Default Setting | Disabled – Configuration Required |
| Related Changes in this Release | Not Applicable |
| Related Documentation | *UCC SMI Operations Guide* |

### Revision History

| Revision Details | Release |
|---|---|
| Added support for provisioning CA certificates. | 2023.01.0 |
| First introduced. | 2022.02.1 |

## Feature Description

This feature enables you to configure certificates signed by your own CA or external CA for path-based ingress URLs.

You can provision the certificates used for both REST APIs and K8s APIs through cluster manager and Ops-center. The recommended method to configure a certificate and its corresponding private key is to provision the certificate as a TLS secret using the existing yang container.

#### Certificate Expiry Check

The provisioned certificates must be monitored for expiry. The kube-certificate-expiring alert is automatically raised in advance to renew and update the certificate and key.

The alerts have the following severity levels:

- 30 days before expiry—Raise alert with Info severity
- 20 days before expiry—Raise alert with Major severity
- 15 days before expiry—Raise alert with Critical severity

# Configuring Certificate for Path-based Ingress

This section describes how to configure TLS and CA certificates for path-based ingress.

### Configuring TLS Certificate

Use the following procedure from cluster deployer to configure the certificates for path-based ingress.

1. Create a secret.

   Use the following sample configuration to populate a certificate and its corresponding private key. The provided certificate and private key is stored as K8s TLS secret on the cluster under the mentioned namespace.

   ```
   cluster cluster_name
      secrets tls namespace secret_name
         private-key private_key_content
         certificate certificate_content
         exit
      exit
   ```

   **Example:**

   ```
   clusters sample-cluster
     secrets tls cee-global sample-secret
       private-key "$8$9n3U7OLEclVQoDpp/4VqkSLkeSmFbjx/
   Mt6eEGN4EWoKPY1r9nqSWSZ40advmhDFsPFQZWfM\nhq/wpRzHXBZGp/
   dNtNO+wpaQuxsT3CmkmRKFIHviUn4bEwBKfTCCsw7a5+66q3rm5vX4/nSw\
   nNy4DrgTu4iFDzVYVKAYzoxWGzCqhKIaSqELjsW7gchEowC\n
       certificate "-----BEGIN CERTIFICATE-----\nMIID0zCCArugAw
   IBAgIUPHTzpMTVUNVDQzJ/FM9tfCsAG2AwDQYJKoZIhvcNAQEL
   \nBQAwaDELMAkGA1UEBhMCVVMxCzAJBgNVBAgMAkNBMQsw
   \n-----END CERTIFICATE-----\n"
       exit
     exit
   exit
   ```

2. Configure path-based ingress secret.

   Use the following sample configuration to add the secret name for path-based ingresses.

   ```
   clusters <cluster_name>
      ops-centers <opscenter_name> <instance_name>
         initial-boot-parameters path-based-ingress true
         initial-boot-parameters path-based-ingress-secret <secret_name>
         exit
      exit
   exit
   ```

**Note** You must set **path-based-ingress** to **true** for getting the option to configure **path-based-ingress-secret**.

   **Example:**

   ```
   clusters sample-cluster
    ops-centers cee global
     initial-boot-parameters path-based-ingress true
     initial-boot-parameters path-based-ingress-secret sample-secret
   ```

```
    exit
   exit
  exit
```

3. Run cluster sync to create and configure the secret as well as configure ingress to use the secret.

### Verifying the Certificate for Path-based Ingress Configuration

This section describes how to verify the certificate for path-based ingress configuration.

Use the following CLI command to get the ingress in YAML and verify the configured secret name:

```
kubectl get ing -n <namespace> <ingress-name> -o yaml
```

**Command Output Example:**

```
cloud-user@sample-aio-controlplane:~$ kubectl get ing -n cee-global
cli-ingress-cee-global-ops-center -o yaml

apiVersion: networking.k8s.io/v1
kind: Ingress
...
spec:
  rules:
  - host: 10.x.x.x
    http:
      paths:
      - backend:
          service:
            name: ops-center-cee-global-ops-center
            port:
              number: 7681
        path: /cee-global/cli
        pathType: ImplementationSpecific
  tls:
  - hosts:
    - 10.x.x.x.
    secretName: sample-secret
```

Run the **curl** command to verify the section "Server certificate:" to check whether the certificate is used properly.

```
cloud-user@satya-aio-controlplane:~$ curl -k -v https://10.x.x.x.nip.io/cee-global/cli
*   Trying 10.x.x.x...
* TCP_NODELAY set
* Connected to 10.x.x.x.nip.io (10.x.x.x) port 443 (#0)
* ALPN, offering h2
* ALPN, offering http/1.1
* successfully set certificate verify locations:
*   CAfile: /etc/ssl/certs/ca-certificates.crt
  CApath: /etc/ssl/certs
* TLSv1.3 (OUT), TLS handshake, Client hello (1):
* TLSv1.3 (IN), TLS handshake, Server hello (2):
* TLSv1.3 (IN), TLS Unknown, Certificate Status (22):
* TLSv1.3 (IN), TLS handshake, Unknown (8):
* TLSv1.3 (IN), TLS Unknown, Certificate Status (22):
* TLSv1.3 (IN), TLS handshake, Certificate (11):
* TLSv1.3 (IN), TLS Unknown, Certificate Status (22):
* TLSv1.3 (IN), TLS handshake, CERT verify (15):
* TLSv1.3 (IN), TLS Unknown, Certificate Status (22):
* TLSv1.3 (IN), TLS handshake, Finished (20):
* TLSv1.3 (OUT), TLS change cipher, Client hello (1):
* TLSv1.3 (OUT), TLS Unknown, Certificate Status (22):
* TLSv1.3 (OUT), TLS handshake, Finished (20):
```

```
* SSL connection using TLSv1.3 / TLS_AES_256_GCM_SHA384
* ALPN, server accepted to use h2
* Server certificate:
*  subject: C=US; ST=CA; L=SF; O=sample-signed.cisco.com; CN=10.x.x.x
*  start date: Jul 12 04:19:56 2022 GMT
*  expire date: Jul 11 04:19:56 2024 GMT
*  issuer: C=US; ST=CA; L=SF; O=sample-signed.cisco.com; CN=10.x.x.x
*  SSL certificate verify result: self signed certificate (18), continuing anyway.
* Using HTTP2, server supports multi-use
* Connection state changed (HTTP/2 confirmed)
* Copying HTTP/2 data in stream buffer to connection buffer after upgrade: len=0
* TLSv1.3 (OUT), TLS Unknown, Unknown (23):
* TLSv1.3 (OUT), TLS Unknown, Unknown (23):
* TLSv1.3 (OUT), TLS Unknown, Unknown (23):
* Using Stream ID: 1 (easy handle 0x56498909f550)
* TLSv1.3 (OUT), TLS Unknown, Unknown (23):
> GET /cee-global/cli HTTP/2
> Host: 10.x.x.x
> User-Agent: curl/7.58.0
> Accept: */*
```

### Configuring CA Certificate

To configure the CA certificate, use the following configuration in Ops-center:

```
secrets ca-cert secret_name
   certificate certificate_content
   exit
```

To configure the CA certificate, use the following configuration in cluster-manager:

```
cluster cluster_name
   secrets ca-cert namespace secret_name
      private-key private_key_content
      certificate certificate_content
      exit
   exit
```

**NOTES**:

- If you add invalid certificate content and expired certificate, you will be prompted to correct the configuration.
- CA certificate is stored in generic (Opaque) secret type.
- The secrets are monitored and auto-healed if the user deletes the data by mistake.

# OnDemand LDAP Connectivity Check

## Feature Summary and Revision History

### Summary Data

| | |
|---|---|
| Applicable Product (s) or Functional Area | KVM-based application deployment support |

| | |
|---|---|
| | K8s-based application deployment support |
| Applicable Platforms | Bare Metal, OpenStack, VMware |
| Feature Default Setting | Disabled – Configuration Required |
| Related Changes in this Release | Not Applicable |
| Related Documentation | *UCC CEE Configuration and Administration Guide*<br>*UCC SMI Operations Guide* |

## Revision History

| Revision Details | Release |
|---|---|
| First introduced. | 2022.02.1 |

# Feature Description

The SMI Ops Center provides an external authentication using LDAP support. The LDAP configuration can be configured in the SMI Ops Center using CLI or the RESTCONF APIs.

This feature enables you to validate a new LDAP configuration before adding it to the system or an existing LDAP configuration.

# How it Works

This section describes how the feature works.

### How to Validate a New Configuration

The steps to validate a new LDAP configuration are as follows.

1. Login to the SMI Ops Center.
2. Provide the LDAP new configuration inputs to validate (see the following example ).

```
[pv/global] cee# smildap validate-security-config validate-new-security-config { ?
Possible completions:
  base-dn                LDAP Base DN
  bind-dn                LDAP Bind DN
  group-attr             Group attribute
  group-mapping          LDAP group to application security mapping
  ldap-filter            LDAP Filter - use %s to sub username
  ldap-server-url        LDAP Server URL (https://tools.ietf.org/html/rfc2255)
  ldap-username-domain   LDAP Username Domain
  password               Password
  username               Existing User name in LDAP server
```

3. Validate the LDAP new configuration (see the following example configuration).

```
cee(config)# smildap validate-security-config validate-new-security-config
{ base-dn dc=smi-lab,dc=com bind-dn cn=%s,ou=people,dc=smi-lab,dc=com group-attr
memberOf group-mapping { group admin ldap-group group1 } username user5 password
Passwd@123 ldap-filter cn=%s ldap-server-url ldap://209.165.200.224 }
```

```
Mon Jun  20 05:02:24.635 UTC+00:00
message accept "admin" external-user-group 1117 1117 /tmp
```

### How to Validate an Existing LDAP Configuration

Use the following example configuration to validate an existing LDAP configuration.

```
cee# smildap validate-security-config validate-current-security-config

Mon Jun  20 05:07:41.765 UTC+00:00

Value for 'username' (<string>): user5

Value for 'password' (<string>): ********

message accept "admin" external-user-group 1117 1117 /tmp
```

# Provisioning Local Users

A new YANG model is introduced in SMI to support user management in compliance with Cisco Secure Development Life-cycle (CSDL) requirements.

**Note** This new YANG model is applicable to SMI Cluster Manager and all other product Ops Centers.

# User Management

This chapter describes how to create and manage local users using the Ops Center CLI (for both the products and SMI Cluster Manager Ops Center).

**Important** Users with administrator privileges can add, modify, and delete other users and groups. All the other users only have privileges to change their own password.

## Adding a User

To add a new user, use the following configurations:

```
configure
  smiuser add-user username username password password
  exit
```

**Notes:**

- **smiuser add-user** - Adds a new local user.
- **username** *username* - Specifies the name of the user.

  *username* must be alphanumeric string.
- **password** *password* - Specifies the password. The password must meet the following criteria:
  - Minimum 8 characters in length.

- Contain at least one lowercase character.
- Contain at least one uppercase character.
- Contain at least one numeric character.
- Contain at least one special character, which includes the following:
  - [ '~', '@', '#', '%', '^', '&', '*', '(', ')', '_', '+', '`', '-', '=', '{', '}', '[', ']', ':', "", ';', '\', '|', '<', '>', '?', ',', '.', '/', '$']
  - Password must not start with '$'.
- Password must not be too simplistic or based on dictionary word.
- Do not re-use passwords.

  Use the following command to configure the number of passwords to keep in history:

  ```
  password requisite pam_pwhistory.so debug enforce_for_root remember=12
  ```
- Minimum number of days that are allowed between password changes is seven.

The following example adds a new user called 'user1' and assigns the password for the new user.

```
cee# configure terminal
  smiuser add-user username user1 password Cisco@123
message User added
```

The following example adds a new user called 'user2' and assigns the password for the new user.

```
cee# configure terminal
  smiuser add-user username user2 password Cisco@12345
message User added
```

In the following example, when an existing user name (user2) is added as a new user, the Ops Center displays an error message.

```
cee# configure terminal
  smiuser add-user username user2 password Cisco@12345
message User already exists
```

## Creating Unprivileged Users with SSH Key

The SMI Cluster Manager allows creating unprivileged users on cluster nodes with SSH key access. These users will remain even after the SMI Cluster Manager is upgraded. Also, the SMI Cluster Manager considers the users created with the comment *smi.user* to be managed by the Cluster Manager. If an existing user, who is not an *smi.user*, is added to the configuration, the SMI Cluster Manager throws an error during cluster synchronization to prevent damaging or blocking communication to the system.

To add a SSH key and password to an user on all the nodes, use the following configuration:

```
configure
  node-defaults os users username
    password password
    authorized-keys key_name
    algorithm ssh_algorithm
    key-data  key_data
    exit
  authorized-keys key_name
```

```
   algorithm ssh_algorithm
   key-data key_data
   exit
 exit
```

To add a SSH key and password to an user on a specific node, use the following configuration:

```
configure
  node node_name os users username
    password password
    authorized-keys key_name
    algorithm ssh_algorithm
    key-data  key_data
    exit
   authorized-keys key_name
    algorithm ssh_algorithm
    key-data key_data
    exit
  exit
```

**NOTES:**

- **node-defaults os users** *username* - Specifies the default value applicable to all the nodes for the selected user. *username* is the name of the user to be created.
- **node** *node_name* **os users** *username* - Specifies the default value applicable to the specific node for the selected user. *node_name* is the name of the specific node. *username* is the name of the user to be created.
- **password** *password* - Specifies the password used for authentication.
- **authorized-keys** *key_name* - Specifies the name of the SSH key.
- **algorithm** *ssh_algorithm* - Specifies the SSH algorithm used for generating the SSH key. For example, SSH-RSA or SSH-Ed25519 algorithm.
- **key-data** *key_data* - Specifies the generated SSH key.

## Deleting a User

To delete a user, use the following configuration:

```
configure
  smiuser delete-user username username
  exit
```

**Note**

- **smiuser delete-user** - Deletes a local user.
- **username** *username* - Specifies the name of the user.

  *username* must be alphanumeric string.

The following example deletes a user called 'user2'.

```
cee# configure terminal
  smiuser delete-user username user2
message User deleted
```

In the following example, when a non-existing user is deleted, the Ops Center displays an error message.

```
cee# configure terminal
  smiuser delete-user username user2
message User does not exist
```

## Modifying the Password

To modify the password (for self), use the following configuration:

```
configure
 smiuser change-self-password current_password current password new_password
new_password
 confirm_password new_password password_expire_days number_of_days
 exit
```

**Note**

- **smiuser change-password** - Modifies the password for an user.
- **current_password** *current_password* - Specifies the current password for an user.
- **new_password** *new_password* - Assign a new password for the user. For information on password policy, see Adding a User section.
- **confirm_password** *new_password* - Enter the newly assigned password one more time.
- **password_expire_days** *number_of_days* - (Optional) Specifies the expiry date of the password. The default value is 180 days.

The following example updates the password for the current user.

```
cee# configure terminal
  smiuser change-self-password current_password Cisco@123 new_password Cisco@345
  confirm_password Cisco@345 password_expire_days 180
message Password updated successfully
```

The following example updates the password for the user called 'user1' without assigning the password expiry date.

```
cee# configure terminal
  smiuser change-self-password current_password Cisco@123 new_password Cisco@345
confirm_password Cisco@345
message Password updated successfully
```

### Reset the Administrator Password

You can reset the administrator password if you have access to the K8s Cluster through **kubectl** command-line utility.

To reset the administrator password:

1. Enter the Ops Center Pod's EXEC mode.
2. Use the following command to reset the administrator password.

   **kubectl exec -it** *<pod_name>* **-n** *<pod_namespace>* **/usr/local/bin/reset-admin**

3. Enter the new password when prompted.

**NOTES:**

- **kubectl exec -it** - Executes a command inside a container. **-it** passes the standard input stream to the container or TTY.
- <*pod_name*> **-n** - Specifies the name of the Pod. **-n** specifies the namespace scope for this CLI request.
- <*pod_namespace*> - Specifies the namespace of the Pod.
- **/usr/local/bin/reset-admin** - Resets the administrator password.

## Modifying the Password for Other Users

You can modify the password for other users using the following configuration:

```
configure
  smiuser change-password username username current_password current_password
new_password new_password
  confirm_password new_password password_expire_days number_of_days
  exit
```

**Note**

- **smiuser change-password** - Modifies the password for an user.
- **username** *username* - Specifies the name of the user.

  *username* must be alphanumeric string.
- **current_password** *current_password* - Specifies the current password for an user.
- **new_password** *new_password* - Assign a new password for the user. For information on password policy, see Adding a User section.
- **confirm_password** *new_password* - Enter the newly assigned password one more time.
- **password_expire_days** *number_of_days* - (Optional) Specifies the expiry date of the password. The default value is 180 days.

The following example updates the password for the user called 'user1'.

```
cee# configure terminal
  smiuser change-password username user1 current_password Cisco@123 new_password Cisco@345
 confirm_password Cisco@345 password_expire_days 180
message Password updated successfully
```

The following example updates the password for the user called 'user1' without assigning the optional password expiry date.

```
cee# configure terminal
  smiuser change-password username user1 current_password Cisco@123 new_password Cisco@345
 confirm_password Cisco@345
message Password updated successfully
```

The following example updates the password for the user called 'user1' without assigning the password expiry date.

```
cee# configure terminal
  smiuser change-password username user1 current_password Cisco@123 new_password Cisco@345
 confirm_password Cisco@345
message Password updated successfully
```

The following example updates the password for the user called 'user1' with an existing password.

```
cee# configure terminal
  smiuser change-password username user1 current_password Cisco@345 new_password Cisco@345
 confirm_password Cisco@345
message Password has been already used
```

The following example updates the password for the user called 'user1' with different values for new password and confirm password parameters.

```
cee# configure terminal
  smiuser change-password username user1 current_password Cisco@345 new_password Cisco@345
 confirm_password Cisco@567
message Passwords do not match
```

## Updating the Password Length

To update the length of the password, use the following configuration:

```
configure
smiuser update-password-length length number_of_characters
 exit
```

**Note**

- **smiuser update-password-length** - Updates the length of the password.
- **length** *number_of_characters* - Specifies the length of the password. *number_of_characters* must be a numeric value.

The following example updates the minimum length of the password to 10 characters.

```
cee# configure terminal
  smiuser update-password-length length 10
message Password updated successfully
```

# Group Management

This chapter describes how to create and manage user groups using the Ops Center CLI (of both the products and SMI Cluster Manager).

## Adding a User Group

To add a user group, use the following configuration:

```
configure
smiuser add-group groupname group_name
 exit
```

**Note**

- **smiuser add-group** - Adds a new user group.
- **groupname** *group_name* - Specifies the name of the user group. *group_name* must be a alphanumeric value.

The following example adds a new user group called 'group1'.

```
cee# configure terminal
  smiuser add-group groupname group1
message Group added
```

In the following example, when a user group that already exists is added, the Ops Center displays an error message.

```
cee# configure terminal
  smiuser add-group groupname group1
message Group already exists
```

## Deleting a User Group

To delete a user group, use the following configuration:

```
configure
smiuser delete-group groupname group_name
 exit
```

**Note**

- **smiuser delete-group** - Deletes a user group.
- **groupname** *group_name* - Specifies the name of the user group. *group_name* must be a alphanumeric value.

The following example deletes a new user group called 'group2'.

```
cee# configure terminal
  smiuser delete-group groupname group2
message Group deleted
```

In the following example, when a user group that does not exist is deleted, the Ops Center displays an error message.

```
cee# configure terminal
  smiuser delete-group groupname group2
message Group does not exist
```

## Assigning an User to an User Group

To assign an user to an user group, use the following configuration:

```
configure
  smiuser assign-user-group username username group group_name
   exit
```

**Note**

- **smiuser assign-user-group** - Assigns an user to a user group.
- **username** *username* - Specifies the name of the user. *username* must be alphanumeric value.
- **groupname** *group_name* - Specifies the name of the user group. *group_name* must be a alphanumeric value.

The following example assigns an user called 'user1' to a group called 'group1'.

```
cee# configure terminal
  smiuser assign-user-group username user1 group group1
message User assigned to group successfully
```

The following example assigns a non-existing user to an existing group.

```
cee# configure terminal
  smiuser assign-user-group username user20 group group1
message User does not exist
```

The following example assigns a non-existing group to an existing user.

```
cee# configure terminal
  smiuser assign-user-group username user1 group group10
message Group does not exist
```

## Unassigning a User from a User Group

To unassign a user from a user group, use the following configuration:

```
configure
  smiuser unassign-user-group username username group group_name
   exit
```

**Note**

- **smiuser unassign-user-group** - Removes an user from a user group.
- **username** *username* - Specifies the name of the user. *username* must be alphanumeric value.
- **groupname** *group_name* - Specifies the name of the user group. *group_name* must be a alphanumeric value.

The following example removes an user from a group.

```
cee# configure terminal
  smiuser unassign-user-group username user1 group group1
message User un-assigned from group successfully
```

The following example removes a non-existing user from a group.

```
cee# configure terminal
  smiuser unassign-user-group username user10 group group1
message User is not a member of this group
```

The following example removes an user from an non-existing group.

```
cee# configure terminal
  smiuser unassign-user-group username user1 group group10
message Group does not exist
```

# Resiliency and Redundancy

For resiliency and redundancy, SMI utilizes Kubernetes version 1.16. For more information on the various Kubernetes components, see https://v1-16.docs.kubernetes.io/docs/concepts/overview/components/

**Note** SMI implements Kubernetes with a highly available three ETCD and three control plane nodes setup.

# SMI User and Audit Tracking Commands

This section provides the list of user and audit tracking commands used in SMI.

**Note**

- All these commands are executed on the node's terminal. Users with **sudo** access can execute these commands.
- You need the **wtmp** and **btmp** files in the **/var/log** directory for the system to store log information.

### User Tracking Commands

The following commands are used for user tracking in SMI.

***Table 12: User Tracking Commands***

| Command | Description |
|---|---|
| **last -F** | Displays the list of users logged in the last session along with information such as date and time of last log in.<br>**Note**<br>• All the user information (log in and log out details) are stored in the **/var/log/wtmp** file. The command fetches all the user information stored in this file from the time the **wtmp** file was created.<br>• The list of users in the current session are displayed as *still logged in*. |
| **last reboot** | Displays the number of times the system was rebooted. |
| **lastb** | Displays the list of bad log in attempts recorded in the **/var/log/btmp** file. |

| Command | Description |
|---|---|
| **lastlog** | Displays each user's last logged information - login name, port, and last login time - recorded in **var/log/lastlog** file. |

### Audit Tracking Commands

The following commands are used for audit tracking in SMI.

*Table 13: Audit Tracking Commands*

| Command | Description |
|---|---|
| **sudo aureport -au -i \| more** | Displays a summary of audit daemon logs report. |
| **sudo cat /var/log/auth.log \| grep "Failed password"** | Displays a list of failed SSH log in attempts. |
| **sudo journalctl _SYSTEMD_UNIT=ssh.service \| egrep "Failed\|Failure"** | Displays a list of all the failed log in attempts. |
| **sudo journalctl -q _TRANSPORT=audit** | Displays audit logs for SSH, SFTP and SCP. |

# TCP and UDP Open Ports

This section lists the TCP and UDP services and the corresponding open ports in the Kubernetes cluster nodes (*control plane*, *worker* and *etcd*).

The following table lists the TCP and UDP services and the corresponding open ports for the Primary *control plane* node.

*Table 14: Primary Control Plane Node - Open Ports*

| Pod | Description | Port |
|---|---|---|
| kubelet | kubelet is the lowest level component in Kubernetes. It's responsible for what's running on an individual machine. You can think of it as a process watcher like supervisord but focused on running containers. It has one job: given a set of containers to run, make sure they are all running. | 10248, 10250 |
| kube-proxy | kube-proxy is a network proxy that runs on each node in your cluster, implementing part of the Kubernetes Service. concept. kube-proxy maintains network rules on nodes. These network rules allow network communication to your Pods from network sessions inside or outside of your cluster. | 10249, 443, 10256 |
| calico-node | A node resource representing a node running Calico. When adding a host to a Calico cluster, a node resource needs to be created which contains the configuration for the calico/node instance running on the host. | 9099 |

| Pod | Description | Port |
|---|---|---|
| kube-controller | The Kubernetes controller manager is a daemon that embeds the core control loops shipped with Kubernetes. The controller is a control loop that watches the shared state of the cluster through the apiserver and makes changes attempting to move the current state towards the desired state. | 10257 |
| kube-scheduler | kube-scheduler is the default scheduler for Kubernetes and runs as part of the control plane. A scheduler watches for newly created Pods that have no Node assigned. For every Pod that the scheduler discovers, the scheduler becomes responsible for finding the best Node for that Pod to run on | 10259 |
| bird | BIRD is an open source BGP client that is used to exchange routing information between hosts. The routes that Felix programs into the kernel for endpoints are picked up by BIRD and distributed to BGP peers on the network, which provides inter-host routing. If configured, there will be two BIRD processes running in the calico/node container. One for IPv4 (bird) and one for IPv6 (bird6). | 3179 |
| systemd-resolv | systemd-resolved is a system service that provides network name resolution to local applications. | 53 |
| sshd | sshd (SSH Daemon) is the daemon program for ssh. Together these programs replace rlogin and rsh and provide secure encrypted communications between two untrusted hosts over an insecure network. | 22 |
| kube-apiserver | The kubelet takes a set of PodSpecs and ensures that the described containers are running and healthy. kube-apiserver - REST API that validates and configures data for API objects such as pods, services, replication controllers. | 6443 |
| node_exporter | Node Exporter is a Prometheus exporter for hardware and OS metrics with pluggable metric collectors. It allows you to measure various machine resources such as memory, disk and CPU utilization. | 9100 |
| chronyd | chronyd provides support to work out the gain or loss rate of the 'real-time clock', i.e. the clock that maintains the time when the computer is turned off. It can use this data when the system boots to set the system time from a corrected version of the real-time clock. | 323, 123 |

The following table lists the TCP and UDP services and the corresponding open ports for Secondary *control plane* node.

*Table 15: Secondary Control Plane Node - Open Ports*

| Pod | Description | Port |
|---|---|---|
| kubelet | kubelet is the lowest level component in Kubernetes. It's responsible for what's running on an individual machine. You can think of it as a process watcher like supervisord but focused on running containers. It has one job: given a set of containers to run, make sure they are all running. | 10248, 36189, 10250 |
| kube-proxy | kube-proxy is a network proxy that runs on each node in your cluster, implementing part of the Kubernetes Service. concept. kube-proxy maintains network rules on nodes. These network rules allow network communication to your Pods from network sessions inside or outside of your cluster. | 10249, 10256 |
| calico-node | A node resource representing a node running Calico. When adding a host to a Calico cluster, a node resource needs to be created which contains the configuration for the calico/node instance running on the host. | 9099 |
| kube-controller | The Kubernetes controller manager is a daemon that embeds the core control loops shipped with Kubernetes. The controller is a control loop that watches the shared state of the cluster through the apiserver and makes changes attempting to move the current state towards the desired state. | 10257 |
| kube-scheduler | kube-scheduler is the default scheduler for Kubernetes and runs as part of the control plane. A scheduler watches for newly created Pods that have no Node assigned. For every Pod that the scheduler discovers, the scheduler becomes responsible for finding the best Node for that Pod to run on | 10259 |
| bird | BIRD is an open source BGP client that is used to exchange routing information between hosts. The routes that Felix programs into the kernel for endpoints are picked up by BIRD and distributed to BGP peers on the network, which provides inter-host routing. If configured, there will be two BIRD processes running in the calico/node container. One for IPv4 (bird) and one for IPv6 (bird6). | 3179 |
| systemd-resolv | systemd-resolved is a system service that provides network name resolution to local applications. | 53 |

| Pod | Description | Port |
|---|---|---|
| sshd | sshd (SSH Daemon) is the daemon program for ssh. Together these programs replace rlogin and rsh, and provide secure encrypted communications between two untrusted hosts over an insecure network. | 22 |
| kube-apiserver | The kubelet takes a set of PodSpecs and ensures that the described containers are running and healthy. kube-apiserver - REST API that validates and configures data for API objects such as pods, services, replication controllers. | 6443 |
| node_exporter | Node Exporter is a Prometheus exporter for hardware and OS metrics with pluggable metric collectors. It allows you to measure various machine resources such as memory, disk and CPU utilization. | 9100 |
| chronyd | chronyd provides support to work out the gain or loss rate of the 'real-time clock', i.e. the clock that maintains the time when the computer is turned off. It can use this data when the system boots to set the system time from a corrected version of the real-time clock. | 323, 123 |

The following table lists the TCP and UDP services and the corresponding open ports for *etcd* node.

***Table 16: ETCD Node - Open Ports***

| Pod | Description | Port |
|---|---|---|
| kubelet | kubelet is the lowest level component in Kubernetes. It's responsible for what's running on an individual machine. You can think of it as a process watcher like supervisord but focused on running containers. It has one job: given a set of containers to run, make sure they are all running. | 10248, 10250, 10255 |
| etcd | etcd is a distributed key-value store, which accepts TLS traffic, non-TLS traffic or both TLS and non-TLS traffic. | 2379, 2380, 2381 |
| systemd-resolv | systemd-resolved is a system service that provides network name resolution to local applications. | 53 |
| sshd | sshd (SSH Daemon) is the daemon program for ssh. Together these programs replace rlogin and rsh, and provide secure encrypted communications between two untrusted hosts over an insecure network. | 22 |

| Pod | Description | Port |
|---|---|---|
| chronyd | chronyd provides support to work out the gain or loss rate of the 'real-time clock', i.e. the clock that maintains the time when the computer is turned off. It can use this data when the system boots to set the system time from a corrected version of the real-time clock. | 323, 123 |
| node-exporter | Exports the node metrics to Prometheus and to be viewable on the Grafana dashboard in Host details and summary dashboards. | 9100 |

The following table lists the TCP and UDP services and the corresponding open ports for *worker* node.

***Table 17: Worker Node - Open Ports***

| Pod | Description | Port |
|---|---|---|
| kubelet | kubelet is the lowest level component in Kubernetes. It's responsible for what's running on an individual machine. You can think of it as a process watcher like supervisord but focused on running containers. It has one job: given a set of containers to run, make sure they are all running. | 10248, 10250 |
| kube-proxy | kube-proxy is a network proxy that runs on each node in your cluster, implementing part of the Kubernetes Service. concept. kube-proxy maintains network rules on nodes. These network rules allow network communication to your Pods from network sessions inside or outside of your cluster. | 10249, 10256 |
| calico-node | A node resource representing a node running Calico. When adding a host to a Calico cluster, a node resource needs to be created which contains the configuration for the calico/node instance running on the host. | 9099 |
| bird | BIRD is an open source BGP client that is used to exchange routing information between hosts. The routes that Felix programs into the kernel for endpoints are picked up by BIRD and distributed to BGP peers on the network, which provides inter-host routing. If configured, there will be two BIRD processes running in the calico/node container. One for IPv4 (bird) and one for IPv6 (bird6). | 3179 |
| systemd-resolv | systemd-resolved is a system service that provides network name resolution to local applications. | 53 |

| Pod | Description | Port |
|---|---|---|
| sshd | sshd (SSH Daemon) is the daemon program for ssh. Together these programs replace rlogin and rsh, and provide secure encrypted communications between two untrusted hosts over an insecure network. | 22 |
| node_exporter | Node Exporter is a Prometheus exporter for hardware and OS metrics with pluggable metric collectors. It allows you to measure various machine resources such as memory, disk and CPU utilization. | 9100 |
| chronyd | chronyd provides support to work out the gain or loss rate of the 'real-time clock', i.e. the clock that maintains the time when the computer is turned off. It can use this data when the system boots to set the system time from a corrected version of the real-time clock. | 323, 123 |

# Configurable Option to Control Ping Properties

SMI monitors applications such as the UPF that are deployed in KVM-based clusters. Monitoring, in part, is performed through pings sent at regular intervals to verify that the applications are alive. If an application is unresponsive for a certain number of times, then the monitoring service attempts to restart it.

The ping interval and the number of failure occurrences are now configurable using the following commands:

**node-defaults kvm monitoring ping-interval** *<#_seconds>*

**node-defaults kvm monitoring failure-occurrence** *<#_instances>*

*<#_seconds>* is any integer value. The minimum value is 3 and the default value is 10 seconds.

*<#_instances>* is any integer value. The minimum value is 3 and the default value is 10 times.

Upon changing these values and running a sync, the monitoring service is restarted and the new configuration is applied.

# IFTASK Forwarder type

In past releases, SMI provided support for the Vector Packet Processing (VPP) data plane development kit (DPDK) forwarder for use with StarOS-based applications such as the 5G User Plane Function.

SMI now supports the use of the DPDK Internal Forwarder (IFTASK) for use with StarOS-based applications.

IFTASK support is enabled by the forwarder-type parameter as part of the day 0 configuration:

**nodes control-plane**

**[ no ] vm-defaults upf day0 forwarder-type { IFTASK | VPP }**

If the forwarder type command is not issued, then VPP will be used as the forwarder type by default.

Once IFTASK has been set, the no variant of this command can be used to re-enable the VPP forwarder type.

When the forwarder type is set to IFTASK, the following additional parameters are used as part of the UPF day 0 configuration:

- IFTASK_SERVICE_TYPE=0
- IFTASK_CORES=44
- IFTASK_MCDMA_CORES=50

These parameters are hard-coded and set automatically by SMI during the deployment process.

# Customer Data Recovery and Backup

## Feature Description

Since the server-less Amazon Aurora database (DB) service is not available across regions, it's necessary to have a disaster recovery process for customer data when the DB in an active region fails. The disaster recovery procedure mainly involves generating the same DB snapshot in a different backup region and making all the other clusters connect to the restored DB.

## Data Recovery and Backup Procedure

This section describes the customer data recovery and backup procedure.

**Prerequisite**

You must enable continuous automatic backup of ConfigDB Aurora DB on an active cluster.

**AWS Backup Overview**

Amazon Web Services (AWS) Backup is a fully-managed service that makes it easy to centralize and automate data protection across AWS services, in the cloud, and on premises. Using this service, one can configure backup policies and monitor activity for your AWS resources in one place. It automates and consolidate backup tasks that were previously performed service-by-service and removes the need to create custom scripts and manual processes.

**Note** To use the AWS Backup service, you must opt in to have the AWS Backup service to back up the assigned resources.

**Supported Resources**

The supported resources include Amazon Elastic Compute Cloud (Amazon EC2) instances, Amazon Elastic Block Store (Amazon EBS) volumes, Amazon Relational Database Service (Amazon RDS) databases (including Amazon Aurora clusters), Amazon DynamoDB tables, Amazon Neptune databases, Amazon DocumentDB (with MongoDB compatibility) databases, Amazon Elastic File System (Amazon EFS) file systems, Amazon FSx for Lustre file systems, Amazon FSx for Windows File Server file systems, and AWS Storage Gateway volumes.

**Backup Rules**

Define a backup rule to specify the backup schedule, backup window, destination regions, and lifecycle rules.

- **Frequency** - **hourly**, daily, weekly, monthly
- **Backup window** - **default** or custom
- **Retention period** - **days**, weeks, months, years
- **Destination regions** - List of available regions

**Note** The recommended values are for every 1 hour with a retention period of 7 days with at least 3 destination regions.

**Resource Assignment**

After you create the rule, assign the desired services to perform the backup. In this case, the Aurora DB is assigned to the rule.

### DB Recovery Procedure

This section describes the steps required to recover data.

1. Create an AWS SMI substrate on the specified region provided to you with the AWS account , for example, us-west-2, so you can deploy the SMI cluster.
2. Deploy the SMI cluster and initiate all the required SMI cluster components except the ConfigDB database, these are ConfigFE, ConfigBE, and the monitoring clusters on the specified region provided with your AWS account.
3. After a resource (ConfigDB) is backed up at least once in the active region, for example, us-east-2, it is considered protected and is available to be restored using the AWS Backup dashboard under **protected resources** in each region. Each resource has specific steps to restore from the backup. Initiate the ConfigDB in the backup region, for example, us-west-2.
4. Configure and initiate the backup cluster active state. After the Aurora DB is restored, configure the ConfigDB to point to the newly restored resource ARN and secret ARN to enable the ConfigDB to access the DB.

   After the DB is connected, ensure that all the other clusters connect to ConfigDB and are fully active.
5. Configure the vault KMS and storage using information about the newly restored DB.
6. Verify the vault encryption and decryption. For example, the encrypted fields on the us-east-2 are decrypted on the us-west-2 region.

# CIMC Certificate Renewal

The Cisco® Integrated Management Controller (IMC) is a baseboard management controller that provides embedded server management for Cisco UCS® C-Series Rack Servers and Cisco UCS S-Series Storage Servers. The Cisco IMC enables system management in the data center and across distributed locations.

The CIMC certificates are valid only for 3 years. If the certificate expires in less than 90 days, it must be renewed.

To renew the CIMC certificate, use the following configuration:

```
config
  clusters cluster_name
    node-defaults ucs-server cimc certificate rehydrate { true | false}
    exit
```

**NOTES:**

- When the certificate is renewed, the CIMC drops connections for 15 to 60 seconds while the host key is updated.
- The default setting is **false**. When set to **true**, it renews the certificate that expires in less than 90 days.
- Every cluster synchronization log displays the expiry date of the certificate.

# XFS File System

***Table 18: Feature History***

| Feature Name | Release Information | Feature Description |
|---|---|---|
| Configurable XFS File System | 2023.04 | SMI supports a new XFS filesystem to install the */data* partition using Mongo DB for new deployments. |

SMI utilizes the XFS filesystem to install */data* partition using Mongo DB.

By default, all partitions are formatted using ext4.

**Note** XFS works only with new deployments.

## How it Works

The following steps describe how to enable data partition using XFS:

1. When **partition** is defined under **os**, run cluster-sync to create a file named **smi-fs** that contains the customized file system type information.

   **smi-fs** is a valid shell file containing variable assignments (all instances of **-** are converted to **_**).

   The file is created under:

   - */scripts* in cloud-init iso file for VMware
   - */smi/cloud-init/* in smi-install-iso file for bare metal

   For example:

   ```
   # cat /smi/cloud-init/smi-fs
   smi_fs_smi_state=FS_TYPE=xfs
   ```

The above variable assignment indicates that smi-state partition must be formatted using XFS as the file system type.

**smi_fs_** is added as prefix to the variable name to avoid any name conflict.

2. During a fresh installation, the **init**ialize script (shared-iso-files/templates/**init**ialize) in the bootable ISO creates the file system using the information from **smi-fs**.
3. After reboot, another **init**ialize script (shared-iso-files/templates/**base**-image-initialize) which is installed under */etc/initramfs-tools/smi-init/initialize* updates */etc/fstab* with the correct entries.

**Note** If a separate disk is used for */data*, the initialization of data partition is done in **base**-image-initialize.

# Configuring XFS

To format OS partition with the XFS option, use the following sample configuration:

**Cluster Level:**

```
config
  clusters cluster_name
    node-defaults os partition smi-data
      fs-type { ext4 | xfs }
      exit
```

**Node Level:**

```
config
  clusters cluster_name
    nodes node_name
      os partition smi-data
      fs-type { ext4 | xfs }
      exit
```

**NOTES:**

- **smi-data**—Use when there is a separate disk for the */data* directory (VMware, OpenStack, and so on).
- **fs-type { ext4 | xfs }**—Specify the ext4 or XFS file system.

### Verifying the Configuration

To verify the configuration, use the following commands:

- **smi-state** is formatted with **xfs** using the following configuration:

```
os partition smi-state
   fs-type xfs
   exit
```

- **fstab**:

```
$ cat /etc/fstab | grep xfs
LABEL=smi-state /mnt/stateful_partition xfs defaults 0 0
```

- **blkid**:

```
$ blkid | grep xfs
/dev/sda5: LABEL="smi-state" UUID="9e717cb9-c1fb-4190-9283-aa20afe24d3a" TYPE="xfs"
PARTLABEL="smi-state" PARTUUID="7251ecd2-9623-4a37-88f8-b969b836634d"
```

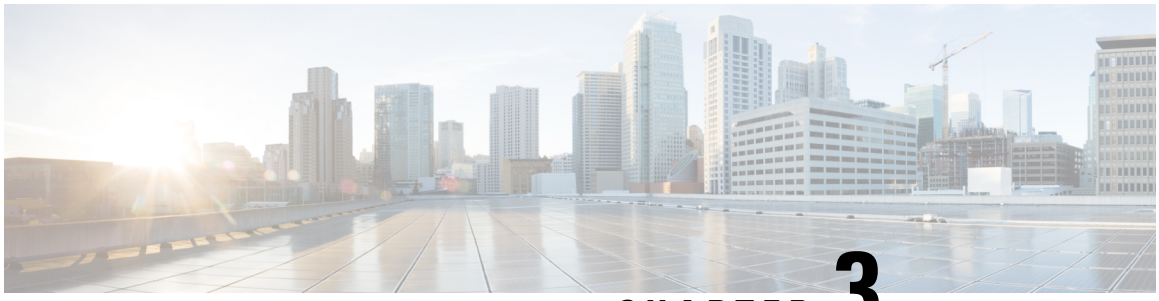
# Cluster Access for OS Users

SMI supports the access of OS users to SMI cluster upon login using the configurable **addons secure-access { enabled | disabled }** CLI command in the Cluster Configuration mode. By default, this command is disabled to reduce the resource usage in the K8s cluster.

The helm chart is created to deploy Daemonsets onto master nodes. Only the access controller pod on the active master will run and manage user access.

To enable or disable the access of OS users to the SMI cluster, use the following configuration:

```
config
  clusters cluster_name
    addons secure-access { enabled | disabled }
    end
```



CHAPTER 3

# SMI Cluster Level Metrics



## CPU Category

**node_cpu_seconds_total**

Description: Seconds the cpus spent in each mode

Sample Query: `avg(irate(node_cpu_seconds_total{mode=~\"irq|softirq\"}[1m])) by (instance) * 100`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `cpu`

  Label Description: the cpu number

  Example: cpu0, cpu1, etc

- Label: `mode`

  Label Description: the cpu mode

  Example: system, user, sotirq, irq, idle, iowait, etc

# Disk Category

### node_disk_bytes_read

Description: This metrics gives the total number of bytes read successfully.

Sample Query: `sum(irate(node_disk_bytes_read[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

  Label Description: the name of the disk device

  Example: vdb, vdd, sr0

### node_disk_read_time_seconds_total

Description: This metrics gives the total number of seconds spent by all reads

Sample Query: `sum(irate(node_disk_read_time_seconds_total[1m])) by (instance) / sum(irate(node_disk_reads_completed_total[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

  Label Description: the name of the disk device

  Example: vdb, vdd, sr0

### node_disk_reads_completed_total

Description: This metrics gives the total number of reads completed successfully.

Sample Query: `sum(irate(node_disk_reads_completed_total[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

Labels:

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

  Label Description: the name of the disk device

  Example: vdb, vdd, sr0

#### node_disk_write_time_seconds_total

Description: This metrics gives the total number of seconds spent by all writes

Sample Query: `sum(irate(node_disk_write_time_seconds_total[1m])) by (instance) / sum(irate(node_disk_writes_completed_total[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

Labels:

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

Labels:

- Label: `device`

  Label Description: the name of the disk device

  Example: vdb, vdd, sr0

#### node_disk_writes_completed_total

Description: This metrics gives the total number of writes completed successfully.

Sample Query: `sum(irate(node_disk_writes_completed[1m])) by (instance)`

Labels:

- Label: `instance`

Label Description: the virtual machine/instance

Example: controlplane-0, control-0, dra-director-1, etc

Labels:

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

Labels:

- Label: `device`

  Label Description: the name of the disk device

  Example: vdb, vdd, sr0

#### node_disk_written_bytes_total

Description: This metrics gives the total number of bytes written successfully.

Sample Query: `sum(irate(node_disk_written_bytes_total[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

Labels:

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

Labels:

- Label: `device`

  Label Description: the name of the disk device

  Example: vdb, vdd, sr0

# File System Category

#### node_filesystem_free_bytes

Description: This metrics gives the total number of bytes of the free disk space available on the instance

Sample Query: `sum(node_filesystem_free_bytes{mountpoint=\"/data\"}) by (device, instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

  Label Description: the name of the disk device

  Example: /dev/vda3, /dev/vdb

- Label: `fstype`

  Label Description: the file system type

  Example: ext4

- Label: `mountpoint`

  Label Description: the file system mount directory

  Example: /data, /tootfs

#### node_filesystem_size_bytes

Description: This metrics gives the total number of bytes of the total disk space provisioned on the instance

Sample Query: `sum(node_filesystem_size_bytes{mountpoint=\"/data\"}) by (device, instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

  Label Description: the name of the disk device

  Example: /dev/vda3, /dev/vdb

- Label: `fstype`

  Label Description: the file system type

  Example: ext4

- Label: `mountpoint`

  Label Description: the file system mount directory

Example: /data, /tootfs

# Load Category

### node_load1

Description: This metrics gives the 1m load average.

Sample Query: `avg(irate(node_load1[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

### node_load15

Description: This metrics gives the 15m load average.

Sample Query: `avg(irate(node_load15[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

### node_load5

Description: This metrics gives the 5m load average.

Sample Query: `avg(irate(node_load5[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

Labels:

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

# Memory Category

**node_memory_MemFree_bytes**

Description: This metrics gives the total number of bytes of the free memory available on the node

Sample Query: `sum(node_memory_MemFree_bytes) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

**node_memory_MemTotal_bytes**

Description: This metrics gives the total number of bytes of the total memory provisioned on the node

Sample Query: `sum(node_memory_MemTotal_bytes) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

# Network Category

**node_network_receive_bytes_total**

Description: This metrics gives the total number of bytes received over the network device

Sample Query: `sum(irate(node_network_receive_bytes_total[1m])) by (device)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

  Label Description: the name of the network device/interface

  Example: ens3, ens4

#### node_network_transmit_bytes_total

Description: This metrics gives the total number of bytes sent over the network device

Sample Query: `sum(irate(node_network_transmit_bytes_total[1m])) by (device)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: controlplane-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

  Label Description: the name of the network device/interface

  Example: ens3, ens4

# System Status Category

#### cluster_sync_count_cancel

Description: Shows the count of all cancelled cluster sync runs.

Sample Query: `cluster_sync_count_cancel`

Labels:

- Label: `cluster`

  Label Description: The name of the cluster the sync is running for

  Example: cluster-smf-22, up-upf-cluster01

### cluster_sync_count_failed

Description: Shows the count of all failed cluster sync runs.

Sample Query: `cluster_sync_count_failed`

Labels:

- Label: `cluster`

  Label Description: The name of the cluster the sync is running for

  Example: cluster-smf-22, up-upf-cluster01

### cluster_sync_count_init

Description: Shows the count of all initiated cluster sync runs.

Sample Query: `cluster_sync_count_init`

Labels:

- Label: `cluster`

  Label Description: The name of the cluster the sync is running for

  Example: cluster-smf-22, up-upf-cluster01

### cluster_sync_count_success

Description: Shows the count of all successful cluster sync runs.

Sample Query: `cluster_sync_count_success`

Labels:

- Label: `cluster`

  Label Description: The name of the cluster the sync is running for

  Example: cluster-smf-22, up-upf-cluster01

### cluster_sync_duration

Description: Shows the duration of the cluster sync run.

Sample Query: `cluster_sync_duration`

Labels:

- Label: `cluster`

  Label Description: The name of the cluster the sync is running for

  Example: cluster-smf-22, up-upf-cluster01

### cluster_sync_running

Description: Indicate status of cluster sync run. Value 1 = Cluster sync running. Value 0 = Cluster sync not running.

Sample Query: `cluster_sync_running`

Labels:

- Label: `cluster`

  Label Description: The name of the cluster the sync is running for

  Example: cluster-smf-22, up-upf-cluster01

#### node_sync_count_cancel

Description: Shows the count of all cancelled cluster node sync runs.

Sample Query: `node_sync_count_cancel`

Labels:

- Label: `cluster`

  Label Description: The name of the cluster the sync is running for

  Example: cluster-smf-22, up-upf-cluster01

Labels:

- Label: `node`

  Label Description: The name of the node the sync is running for

  Example: kvmnode01, controlplane01

#### node_sync_count_failed

Description: Shows the count of all failed cluster node sync runs.

Sample Query: `node_sync_count_failed`

Labels:

- Label: `cluster`

  Label Description: The name of the cluster the sync is running for

  Example: cluster-smf-22, up-upf-cluster01

Labels:

- Label: `node`

  Label Description: The name of the node the sync is running for

  Example: kvmnode01, controlplane01

#### node_sync_count_init

Description: Shows the count of all initiated cluster node sync runs.

Sample Query: `node_sync_count_init`

Labels:

- Label: `cluster`

  Label Description: The name of the cluster the sync is running for

  Example: cluster-smf-22, up-upf-cluster01

Labels:

- Label: `node`

  Label Description: The name of the node the sync is running for

  Example: kvmnode01, controlplane01

#### node_sync_count_success

Description: Shows the count of all successful cluster node sync runs.

Sample Query: `node_sync_count_success`

Labels:

- Label: `cluster`

  Label Description: The name of the cluster the sync is running for

  Example: cluster-smf-22, up-upf-cluster01

Labels:

- Label: `node`

  Label Description: The name of the node the sync is running for

  Example: kvmnode01, controlplane01,

#### node_sync_duration

Description: Shows the duration of the cluster node sync run.

Sample Query: `node_sync_duration`

Labels:

- Label: `cluster`

  Label Description: The name of the cluster the sync is running for

  Example: cluster-smf-22, up-upf-cluster01

Labels:

- Label: `node`

  Label Description: The name of the node the sync is running for

  Example: kvmnode01, controlplane01

### node_sync_running

Description: Indicate status of cluster node sync run. Value 1 = Cluster node sync running. Value 0 = Cluster node sync not running.

Sample Query: `node_sync_running`

Labels:

- Label: `cluster`

  Label Description: The name of the cluster the sync is running for

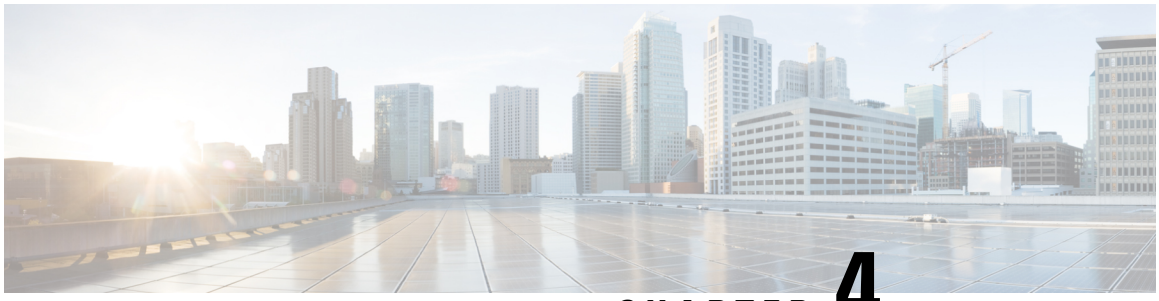
  Example: cluster-smf-22, up-upf-cluster01

Labels:

- Label: `node`

  Label Description: The name of the node the sync is running for

  Example: kvmnode01, controlplane01



CHAPTER 4

# SMI Application Level Statistics and KPI



# Subscriber Microservices Infrastructure Monitoring Key Performance Indicators

This section describes the Key Performance Indicators (KPIs) that are useful for tracking the overall health of Subscriber Microservices Infrastructure (SMI).

## Licensing KPIs

The following custom statistics and queries enable you to monitor the license count for a product's entitlement.

### entitlement status

| | |
|---|---|
| **Description** | Captures the current requested license counts for a product's entitlement. |
| **Metric Type** | Gauge |
| **Data Type** | Int |
| **Statistics** | `entitlement_status{enforce_mode="Eval"}`<br>**NOTES**:<br>• `enforce_mode`: The current enforcement mode used by an entitlement. For example, Invalid, Init, Waiting, InCompliance, OutOfCompliance, Overage, Eval, EvalExpired, AuthorizedPeriodExpired, InvalidTag, ReservedInCompliance, and NotAuthorized<br>• `tag`: The entitlement tag that reports to the smart licensing server. For example, regid.2019-03.com.cisco.SMI-TEST-ALL, and 1.0_63366461-0177-4c93-8eea-c9b02e9843f8. |

# System Status KPIs

The following custom statistics and queries enable you to monitor the status of the system.

## system_mode

| | |
|---|---|
| **Description** | Indicates the current mode the system is running on. |
| **Metric Type** | Gauge |
| **Data Type** | Int |
| **Statistics** | `system_mode`<br>**NOTES**:<br>• `0`: The system is in shutdown mode.<br>• `1`: The system is running.<br>• `2`: The system is under maintenance.<br>• `-1`: The system mode is unknown. |

## system_synch_running

| | |
|---|---|
| **Description** | Specifies whether the system configuration synch process is running or not. |
| **Metric Type** | Gauge |
| **Data Type** | Int |
| **Statistics** | `system_synch_running`<br>**NOTES**:<br>• `1`: The system configuration sync process is running.<br>• `0`: The system configuration sync process is running. |

## system_running_percent

| | |
|---|---|
| **Description** | Captures the percentage of the system currently in use. |
| **Metric Type** | Gauge |
| **Data Type** | Percent |
| **Statistics** | `system_running_percent` |

# System Configuration KPIs

The following custom statistics and queries enable you to monitor the system configuration.

## system_configuration_backup_total

| | |
|---|---|
| **Description** | Captures the total number of system configuration backups that are executed. |
| **Metric Type** | Counter |
| **Data Type** | Configuration Count |
| **Statistics** | `irate(system_configuration_backup_total[1m])`<br>**NOTES**:<br>`status`: The status of the executed backups. For example, success or error. |

## configuration_change_total

| | |
|---|---|
| **Description** | Captures the total number of configuration changes that are executed. |
| **Metric Type** | Counter |
| **Data Type** | Configuration Count |
| **Statistics** | `sum(irate(configuration_change_total[1m]))` |

# Prometheus KPIs

The following custom statistics and queries enable you to monitor the Prometheus KPIs.

## helm_chart_deploy_success

| | |
|---|---|
| **Description** | Captures the helm chart deployment status. |
| **Metric Type** | Gauge |
| **Data Type** | Int |
| **Statistics** | `chart="chart_name",release="release_name",chartVersion="chart_version"`<br>**NOTES:**<br>• *1*: The helm chart deployment is successful.<br>• *0*: The helm chart deployment failed. |

## system_synch_error

| | |
|---|---|
| **Description** | Specifies the status of system synchronization. |
| **Metric Type** | Gauge |
| **Data Type** | Int |
| **Statistics** | `system_synch_error`<br>**NOTES:**<br>• *1*: The system synchronization is successful.<br>• *0*: The system synchronization failed. |

## system_synch_pending

| | |
|---|---|
| **Description** | Specifies the status of the system synchronization progress. |
| **Metric Type** | Gauge |
| **Data Type** | Int |
| **Statistics** | `system_synch_pending`<br>**NOTES:**<br>• *1*: The system synchronization is pending.<br>• *0*: The system synchronization is not pending. |

## system_configuration_backup_pending

| | |
|---|---|
| **Description** | Specifies the status of the DB to configmap backup progress. |
| **Metric Type** | Gauge |
| **Data Type** | Int |
| **Statistics** | `system_synch_backup_pending`<br>**NOTES:**<br>• *1*: The backup of DB to configmap is pending.<br>• *0*: The backup of DB to configmap is not pending. |

## helm_repository_status

| | |
|---|---|
| **Description** | Specifies the status of the helm repositories. |
| **Metric Type** | Gauge |

| | |
|---|---|
| **Data Type** | Int |
| **Statistics** | `helm_repository_status`<br>**NOTES:**<br>• *1*: The helm repository is reachable.<br>• *0*: The helm repository is unreachable. |

## Statistics from Open Source Collector Services

SMI exposes statistics from the following Open Source Collector Services:

***Table 19: Open Source Collector Services***

| Collector Service | Documentation |
|---|---|
| kube-state-metrics | https://github.com/kubernetes/kube-state-metrics/tree/release-1.8/docs |
| cAdvisor | https://github.com/google/cadvisor/blob/v0.33.1/docs/storage/prometheus.md |
| node exporter | https://github.com/prometheus/node_exporter/tree/v0.18.1 |

Please refer to the collector documentation for more information on the statistics supported.

# SMI Bulkstatistics Support

SMI supports the configuration of bulkstatistics through the CEE Ops Center.

The following bulkstatistics are considered KPIs. It is recommended that they be configured for effective monitoring of your deployment:

- system-mode
- system-running-percent
- configuration-change-total
- cpu-core-count
- node-load-1
- node-load-5
- node-load-15
- node-disk-rate-read-bytes
- node-disk-wite-read-bytes
- node-memory-free-bytes
- network-transmit-bond-bytes-total

- network-receive-bond-bytes-total
- network-carrier-bond-changes-total
- network-transmit-ens-bytes-total
- network-receive-ens-bytes-total
- network-carrier-ens-changes-total
- k8s-pods-status
- active-alerts
- filesystem-root-avail-bytes
- filesystem-data-avail-bytes
- kubelet-running-pod-count
- entitlement-status
- memory-used
- cpu-idle
- cpu-softirq
- cpu-system
- cpu-iowait
- cpu-steal
- cpu-user
- kubelet-node-status
- network-errors-total
- daemonset-ready-percent
- deployment-ready-percent
- statefulset-ready-percent

Additional details on the above bulkstatistics is provided in Appendix A: Bulkstatistic KPI Details.

# Appendix A: Bulkstatistic KPI Details

## system-mode

| | |
|---|---|
| **Query Expression**: | `system_mode` |
| **Namespace Specific**: | Y |
| **Label**: | |

| | |
|---|---|
| **Description**: | Indicates if the system is running or shutdown. 1 is running, 0 is shutdown. |
| **Unit**: | Boolean |
| **Type**: | Gauge |
| **Threshold of Normal**: | 1 |

# system-running-percent

| | |
|---|---|
| **Query Expression**: | `system_running_percent` |
| **Namespace Specific**: | Y |
| **Label**: | |
| **Description**: | This percent of the system pods that are running currently. |
| **Unit**: | Percentage |
| **Type**: | Gauge |
| **Threshold of Normal**: | 100 |

# configuration-change-total

| | |
|---|---|
| **Query Expression**: | `configuration_change_total` |
| **Namespace Specific**: | Y |
| **Label**: | |
| **Description**: | This total number of configuration changes executed |
| **Unit**: | Changes |
| **Type**: | Counter |
| **Threshold of Normal**: | N/A |

# cpu-core-count

| | |
|---|---|
| **Query Expression**: | `count(count(node_cpu_seconds_total) without (mode)) without (cpu)` |
| **Namespace Specific**: | N |

| | |
|---|---|
| **Label**: | hostname |
| **Description**: | The total CPU cores on a given host. |
| **Unit**: | Cores |
| **Type**: | Gauge |
| **Threshold of Normal**: | N/A |

# node-load-1

| | |
|---|---|
| **Query Expression**: | `node_load1` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The Linux load1 value. |
| **Unit**: | Load |
| **Type**: | Gauge |
| **Threshold of Normal**: | Ratio < 1 compared to cpu-core-count |

# node-load-5

| | |
|---|---|
| **Query Expression**: | `node_load5` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The Linux load5 value. |
| **Unit:** | Load |
| **Type**: | Gauge |
| **Threshold of Normal**: | Ratio < 1 compared to cpu-core-count |

# node-load-15

| | |
|---|---|
| **Query Expression**: | `node_load15` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The Linux load15 value. |

| | |
|---|---|
| **Unit**: | Load |
| **Type**: | Gauge |
| **Threshold of Normal**: | Ratio < 1 compared to cpu-core-count |

# node-disk-rate-read-bytes

| | |
|---|---|
| **Query Expression**: | `sum(rate(node_disk_read_bytes_total[5m])) by (hostname)` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The disk read byte rate (5 minute rate) for a host. |
| **Unit**: | Bytes |
| **Type**: | Gauge |
| **Threshold of Normal**: | Workload dependent |

# node-disk-write-read-bytes

| | |
|---|---|
| **Query Expression**: | `sum(rate(node_disk_written_bytes_total[5m])) by (hostname)` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The disk write byte rate (5 minute rate) for a host. |
| **Unit**: | Bytes |
| **Type**: | Gauge |
| **Threshold of Normal**: | Workload dependent |

# node-memory-free-bytes

| | |
|---|---|
| **Query Expression**: | `node_memory_MemFree_bytes` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The bytes of free memory for a host |
| **Unit**: | Bytes |

| | |
|---|---|
| **Type**: | Gauge |
| **Threshold of Normal**: | < 1,000,000,000 |

# network-transmit-bond-bytes-total

| | |
|---|---|
| **Query Expression**: | `sum(node_network_transmit_bytes_total{device=~"bond[0-9]"}) by (hostname)` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The bytes transmitted over the "bond" interfaces |
| **Unit**: | Bytes |
| **Type**: | Counter |
| **Threshold of Normal**: | |

# network-receive-bond-bytes-total

| | |
|---|---|
| **Query Expression**: | `sum(node_network_receive_bytes_total{device=~"bond[0-9]"}) by (hostname)` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The bytes received over the "bond" interfaces |
| **Unit**: | Bytes |
| **Type**: | Counter |
| **Threshold of Normal**: | |

# network-carrier-bond-changes-total

| | |
|---|---|
| **Query Expression**: | `sum(node_network_carrier_changes_total{device=~"bond[0-9]"}) by (hostname)` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The total instances of "bond" carrier changes. |
| **Unit**: | Changes |
| **Type**: | Counter |
| **Threshold of Normal**: | |

# network-transmit-ens-bytes-total

| | |
|---|---|
| **Query Expression**: | `sum(node_network_transmit_bytes_total{device=~"ens.*"}) by (hostname)` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The bytes transmitted over the "ens" interfaces |
| **Unit**: | Bytes |
| **Type**: | Counter |
| **Threshold of Normal**: | |

# network-receive-ens-bytes-total

| | |
|---|---|
| **Query Expression**: | `sum(node_network_receive_bytes_total{device=~"ens.*"}) by (hostname)` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The bytes received over the "ens" interfaces |
| **Unit**: | Bytes |
| **Type**: | Counter |
| **Threshold of Normal**: | |

# network-carrier-ens-changes-total

| | |
|---|---|
| **Query Expression**: | `sum(node_network_carrier_changes_total{device=~"ens.*"}) by (hostname)` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The total instances of "ens" carrier changes. |
| **Unit**: | Changes |
| **Type**: | Counter |
| **Threshold of Normal**: | |

# k8s-pods-status

| | |
|---|---|
| **Query Expression**: | `sum(kube_pod_status_phase) by (phase)` |
| **Namespace Specific**: | N |

| | |
|---|---|
| **Label**: | phase |
| **Description**: | The total kubernetes pods by phase. Phases are "Running", "Pending", "Failed", "Succeeded" |
| **Unit**: | Pods |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# active-alerts

| | |
|---|---|
| **Query Expression**: | `sum(ALERTS{alertstate="firing"}) by (alertname)` |
| **Namespace Specific**: | N |
| **Label**: | alertname |
| **Description**: | The current active alerts. |
| **Unit**: | Alerts |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# filesystem-root-avail-bytes

| | |
|---|---|
| **Query Expression**: | `avg(node_filesystem_avail_bytes{device="/dev/sda1"}) by (hostname)` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The current available bytes for root disk |
| **Unit**: | Bytes |
| **Type**: | Gauge |
| **Threshold of Normal**: | < 10,000,000,000 |

# filesystem-data-avail-bytes

| | |
|---|---|
| **Query Expression**: | `avg(node_filesystem_avail_bytes{device="/dev/vda1"}) by (hostname)` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The current available bytes for data disk |
| **Unit**: | Bytes |

| | |
|---|---|
| **Type**: | Gauge |
| **Threshold of Normal**: | < 10,000,000,000 |

# kubelet-running-pod-count

| | |
|---|---|
| **Query Expression**: | `kubelet_running_pod_count` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The current running pod count by host. |
| **Unit**: | Pods |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# entitlement_status

| | |
|---|---|
| **Query Expression**: | `entitlement_status{enforce_mode!="InCompliance"}` |
| **Namespace Specific**: | N |
| **Label**: | tag |
| **Description**: | The current out of compliance entitlements. |
| **Unit**: | Int32 |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# memory-used

| | |
|---|---|
| **Query Expression**: | `sum(node_memory_MemTotal_bytes) by (hostname) - sum(node_memory_MemFree_bytes) by (hostname)` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The bytes of used memory on the host. |
| **Unit**: | Int64 |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# cpu-idle

| | |
|---|---|
| **Query Expression**: | `avg(rate(node_cpu_seconds_total{mode=\"idle\"}[1m])) by (hostname)*100.00` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The 1 minute average CPU idle time on the node. |
| **Unit**: | Int64 |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# cpu-softirq

| | |
|---|---|
| **Query Expression**: | `avg(rate(node_cpu_seconds_total{mode=\"softirq\"}[1m])) by (hostname)*100.00` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The 1 minute average CPU softirq time on the node. |
| **Unit**: | Int64 |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# cpu-system

| | |
|---|---|
| **Query Expression**: | `avg(rate(node_cpu_seconds_total{mode=\"system\"}[1m])) by (hostname)*100.00` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The 1 minute average CPU system time on the node. |
| **Unit**: | Int64 |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# cpu-iowait

| | |
|---|---|
| **Query Expression**: | `avg(rate(node_cpu_seconds_total{mode=\"iowait\"}[1m])) by (hostname)*100.00` |

| | |
|---|---|
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The 1 minute average CPU iowait time on the node. |
| **Unit**: | Int64 |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# cpu-steal

| | |
|---|---|
| **Query Expression**: | `avg(rate(node_cpu_seconds_total{mode=\"steal\"}[1m])) by (hostname)*100.00` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The 1 minute average CPU steal time on the node. |
| **Unit**: | Int64 |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# cpu-user

| | |
|---|---|
| **Query Expression**: | `avg(rate(node_cpu_seconds_total{mode=\"user\"}[1m])) by (hostname)*100.00` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The 1 minute average CPU user time on the node. |
| **Unit**: | Int64 |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# kubelet-node-status

| | |
|---|---|
| **Query Expression**: | `sum(kube_node_status_condition{status=\"true\"}) by (condition)` |
| **Namespace Specific**: | N |
| **Label**: | condition |
| **Description**: | The kubelet node status by condition. |

| | |
|---|---|
| **Unit**: | Int32 |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# network-errors-total

| | |
|---|---|
| **Query Expression**: | `sum(node_network_receive_errs_total) by (hostname)` |
| **Namespace Specific**: | N |
| **Label**: | hostname |
| **Description**: | The number of network errors by node. |
| **Unit**: | Int64 |
| **Type**: | Counter |
| **Threshold of Normal**: | |

# daemonset-ready-percent

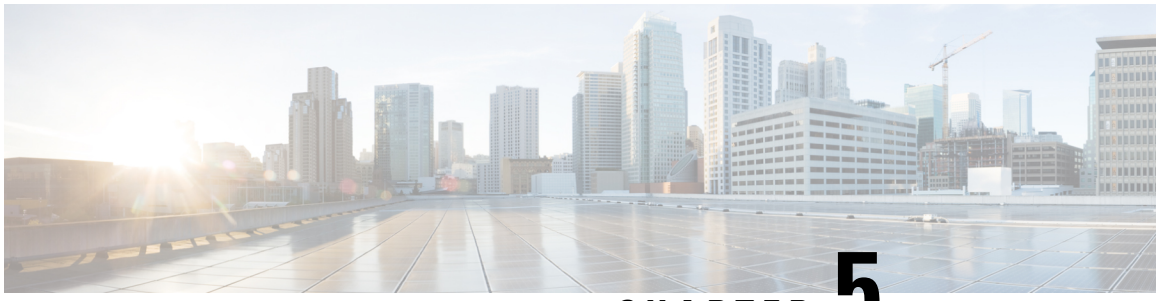
| | |
|---|---|
| **Query Expression**: | `kube_daemonset_status_number_ready/kube_daemonset_status_desired_number_scheduled * 100` |
| **Namespace Specific**: | N |
| **Label**: | daemonset |
| **Description**: | The percent ready for the given daemonset. |
| **Unit**: | Float |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# deployment-ready-percent

| | |
|---|---|
| **Query Expression**: | `kube_deployment_status_replicas_available/ kube_deployment_status_replicas * 100` |
| **Namespace Specific**: | N |
| **Label**: | deployment |
| **Description**: | The percent ready for the given deployment. |
| **Unit**: | Float |
| **Type**: | Gauge |
| **Threshold of Normal**: | |

# statefulset-ready-percent

| | |
|---|---|
| **Query Expression**: | `kube_statefulset_status_replicas_ready/ kube_statefulset_status_replicas * 100` |
| **Namespace Specific**: | N |
| **Label**: | statefulset |
| **Description**: | The percent ready for the given statefulset |
| **Unit**: | Float |
| **Type**: | Gauge |
| **Threshold of Normal**: | |



CHAPTER 5

# Alerts Reference

This chapter lists the default alerts available in the SMI Cluster Manager.



# Alerts Reference

### Alerts Summary

***Table 20: Alerts Summary***

| Alarm Name | Description | Active Alert Duration * | System Impact | Associated Alerts | Validation | Resolution |
|---|---|---|---|---|---|---|
| server-alert | UCS server hardware alerts | Always | Depending on the hardware component, it can impact the full node functionality and might cause all pods to go down on the node. | k8s-node-not-ready<br>kvm-node-not-ready | Verify the CEE alerts. If there is a **k8s-node-not-ready** or **kvm-node-not-ready** alert, then it means the hardware issue might have caused the OS to crash. | Check the CIMC of the node to troubleshoot the problem and decide if an RMA is required. |
| server-not-reachable-alert | UCS server hardware alert | Always | CIMC server is not reachable. | — | Check CEE and if the alert is present, escalate immediately. | — |
| k8s-node-not-ready | K8s node is in NotReady state for more than 1 minute | 30 minutes | The node is not reporting health-check. There could be multiple reasons for this alert, for example, node down, OS crash, network issues, hardware, or a bug. | - | Verify the node status on the cluster. Investigate potential reason for the node being not ready. | This may be expected during MW. If node stays in the non-ready state outside MW, then contact your Cisco Account representative to troubleshoot. |

| Alarm Name | Description | Active Alert Duration * | System Impact | Associated Alerts | Validation | Resolution |
|---|---|---|---|---|---|---|
| k8s-node-status-change | K8s node Ready status changed during the last 5 minutes | 30 minutes | The node changed state from Ready to Not Ready and back due to network issues, reboots, or other issues. | - | Verify the node status on the cluster. Investigate potential reason for the node changing status. | This may be expected during MW. If a node continues to change state outside MW, then contact your Cisco Account representative to troubleshoot. |
| kvm-node-not-ready | KVM node is not reachable for more than 1 minute | 1 hour | The node is not reporting health-check. There could be multiple reasons for this alert, for example, node down, OS crash, network issues, hardware, or a bug. | - | Verify the CEE alerts to ensure that the alerts are active. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| kvm-tunnels-flapping | KVM node reachability changed during the last 5 minutes | 1 hour | The connectivity to KVM node is not stable. | - | Verify the CEE alerts to ensure that the alerts are active. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| k8s-pod-restarting | Pod restarting one or more times during the last 5 minutes | 1 hour | The overall impact is minimal and is expected during MW. Verify the service alerts. | - | Verify the CEE alerts to ensure that the alerts are active. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| k8s-pod-crashing-loop | Pod restarting two or more times during the last 5 minutes | 1 hour | The overall impact is minimal and is expected during MW. Verify the service alerts. This alert indicates a continuous problem that needs investigation. | - | Verify the CEE alerts to ensure that the alerts are active. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |

| Alarm Name | Description | Active Alert Duration * | System Impact | Associated Alerts | Validation | Resolution |
|---|---|---|---|---|---|---|
| k8s-pod-pending | Pod is in pending state and cannot be scheduled for more than 1 minute | 1 hour | This alert is expected during MW or when a node is down. Otherwise, this alert might be because of deployment misconfiguration. | k8s-node-not-ready | Verify the CEE alerts to ensure that the alerts are active. Check if nodes are in the NotReady state. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| k8s-pod-not-ready | Pod is not able to get into ready state for more than 1 minute | 1 hour | This alert is expected for a short duration during MW, otherwise it points to application issues that need to be investigated. | - | Verify the CEE alerts to ensure that the alerts are active. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| k8s-deployment-generation-mismatch | An upgrade or change to a deployment failed | 1 hour | Some upgrade failed to run properly. | - | - | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| k8s-deployment-replica-mismatch | Not all the pods in a replica are running for more than two minutes | 1 hour | This alert is triggered when the pods are crashing or are unable to be deployed as part of a deployment. If too many application pods in a replica are not running, then this can cause a service impact. | k8s-pod-not-ready k8s-pod-pending k8s-pod-crashing-loop | Verify the CEE alerts to investigate the reason for the pods not getting deployed or running. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| k8s-ss-mismatch | Not all the pods in a stateful set are running for more than two minutes | 1 hour | This alert is triggered when the pods are crashing or are unable to be deployed as part of a stateful set. If too many application pods in a stateful set are not running, then this can cause a service impact. | k8s-pod-not-ready k8s-pod-pending k8s-pod-crashing-loop | Verify the CEE alerts to investigate the reason for the pods not getting deployed or running. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |

| Alarm Name | Description | Active Alert Duration * | System Impact | Associated Alerts | Validation | Resolution |
|---|---|---|---|---|---|---|
| k8s-ss-generation -mismatch | An upgrade or change to a stateful set failed | 1 hour | Some upgrade failed to run properly. | - | - | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| k8s-ss-update -not-rolled-out | The upgrade of a stateful set is stuck | 1 hour | Some upgrade failed to run properly. | - | - | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| k8s-daemonset-rollout-stuck | Not all the pods in a daemonset are running for more than five minutes | 1 hour | Some daemonset pods are having issues to run on nodes. Daemon pods are critical for different functionalities. If they are not running, then there can be a short or long term impact to the service. | k8s-pod-not-ready k8s-pod-pending k8s-pod-crashing-loop | Verify the CEE alerts to investigate the reason for the pods not getting deployed or running. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| k8s-daemonset-not-scheduled | Not all the pods in a daemonset are scheduled for more than 5 minutes | 1 hour | This is a rare case where daemon sets can not be scheduled, daemonsets have toleration for almost all taints and hence, the pods should get scheduled. This alert points to an issue with K8s or node resources. | k8s-pod-pending | Verify the CEE alerts to investigate the reason for the pods not getting deployed or running. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| k8s-daemonset-mischeduled | Daemonset pods are running where these are not supposed to run | 1 hour | This alert is a rare case and can be triggered during some upgrade. This alert indicates a larger K8s issue. | - | Verify the CEE alerts to investigate the reason for the pods not getting deployed or running. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |

| Alarm Name | Description | Active Alert Duration * | System Impact | Associated Alerts | Validation | Resolution |
|---|---|---|---|---|---|---|
| pod-oom-killed | Pod got killed and restarted due to OOM in the last five minutes | Always | The pod is crossing the memory limit. This is an application issue and indicates a misconfiguration or a memory leak issue. Depending on the functionality, there can be a service impact. | - | Verify the CEE alerts to investigate the reason for the pods not getting deployed or running. | Contact your Cisco Account representative to troubleshoot. |
| container-memory-usage-high | Pod crossed the 80% memory limit in the last five minutes | Always | The pod is crossing the memory limit. This is an application issue and indicates a misconfiguration or a memory leak issue. Depending on the functionality, there can be a service impact. | - | Verify the CEE alerts to investigate the reason for the pods not getting deployed or running. | Contact your Cisco Account representative to troubleshoot. |
| pod-not-ready-but-all-containers-ready | Pod is not ready, but all its containers are ready | 1 hour | This is a K8s issue and is caused when the pod is not correctly marked as running. Self-healing restarts the pod. If the alert stays on for too long, then it means either the self-healing is not working or there is a bigger issue. | - | Verify the CEE alerts and investigate the pod with the issue. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| vm-deployed | UPF VM deployed | None | This is a notification that the VM is deployed | - | - | - |
| vm-alive | UPF VM running | None | This is a notification that the VM is running | - | - | - |

| Alarm Name | Description | Active Alert Duration * | System Impact | Associated Alerts | Validation | Resolution |
|---|---|---|---|---|---|---|
| vm-error | UPF VM is in error state | 1 hour | The VM is in error state | - | Verify the CEE alerts to investigate the KVM VMs. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| vm-recovering | UPF VM is recovering | None | This alert is a notification that the VM is recovering. | - | - | - |
| vm-recovery-failed | UPF VM recovering failed | 1 hour | The VM failed to recover. | - | Verify the Ops Center to assess the reason for the failure. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| ops-system-sync-running | The Ops Center is running a **sync** operation | None | This alert is triggered during an upgrade. The Ops Center is trying to either upgrade the application or apply recently changed configuration. | - | - | - |
| ops-latest-sync-failed | The Ops Center **sync** operation failed | 1 hour | The Ops Center **sync** operation failed to complete. This alert indicates an issue with either new release or with the latest configuration. | - | Verify the Ops Center to assess the reason for the failure. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| helm-deploy-failure | An application helm deployment failed | 1 hour | This alerts is triggered when one of the applications fails to deploy the helm chart, usually due to misconfiguration or release issues. | - | Verify the Ops Center to assess the reason for the failure. | If the alert stays active, then contact your Cisco Account representative to troubleshoot. |
| node-disk-running-full-24hours | The node disk is estimated to run out space in less than 24 hours | Always | The node is projected to run out of space in one of the partitions in less than 24 hours. | - | Verify the CEE alert and escalate immediately. | - |

| Alarm Name | Description | Active Alert Duration * | System Impact | Associated Alerts | Validation | Resolution |
|---|---|---|---|---|---|---|
| node-disk-running-full-2hours | The node disk is estimated to run out space in less than two hours | Always | The node is projected to run out of space in one of the partitions in less than 2 hours. If the K8s partition is affected, this alert might severely impact the services on the node. | - | Verify the CEE alert and escalate immediately. | - |
| k8s-persisent-volume-usage | The persistent volume has less than 3% free space | Always | The volume is almost full or full and most likely is impacting the application. | - | Verify the CEE alert and escalate immediately. | - |
| k8s-persisent-volume-usage-projected-full | The persistent volume will reach 100% usage in less than four days and is currently at 85% or more | Always | The volume is projected to get full in less than four days, potentially impacting the application. | - | Verify the CEE alert and escalate immediately. | - |
| kube_certificate_expiring | Alert that the k8s certificates are about to expire | Always | The K8s certificates have to be renewed every year. With the automated process, this alert is not triggered. | - | Verify the CEE alert and escalate immediately. | - |
| kubelet-too-many-pods | Too many pods attempted to be deployed on one node | Always | The applications are designed to not exceed the max pod limit. If the alert is seen, then it indicates a misconfiguration. | - | Verify the CEE alert and escalate immediately. | - |
| clock-skew-detected | Clock skew detected on a node | Always | The node is having a wrong NTP configuration or the NTP servers have issues. This issue might be seen on new systems. | - | Verify the CEE alert and escalate immediately. | - |

| Alarm Name | Description | Active Alert Duration * | System Impact | Associated Alerts | Validation | Resolution |
|---|---|---|---|---|---|---|
| clock-is-not -in-synch | Clock is not in synch with NTP for last five minutes | Always | The node is not able to get the clock in sync with NTP. Either the NTP configuration is incorrect or there is some network issue. | - | Verify the CEE alert and escalate immediately. | - |
| network-receive-errors | Specific network is seeing receive errors in the last two minutes | Always | Networking issue with received packets. | - | Verify the CEE alert and escalate immediately. | - |
| network-transmit-errors | Specific network is seeing transmit errors in the last two minutes | Always | Networking issue with sent packets. | - | Verify the CEE alert and escalate immediately. | - |
| network-interface-flapping | Specific network up/down status is changing in the last two minutes | Always | Networking issue with specific interface. | - | Verify the CEE alert and escalate immediately. | - |
| k8s-cpu-overcommit | The CPU is overcommited compared to quota on namespaces | Always | This alert indicates a deployment misconfiguration. | - | Verify the CEE alert and escalate immediately. | - |
| k8s-mem-overcommit | The memory is overcommited compared to quota on namespaces | Always | This alert indicates a deployment misconfiguration. | - | Verify the CEE alert and escalate immediately. | - |
| k8s-quota-exceeded | A namespace is using more than 90% of its allocated CPU/memory quota | Always | This alert indicates a deployment misconfiguration. | - | Verify the CEE alert and escalate immediately. | - |

| Alarm Name | Description | Active Alert Duration * | System Impact | Associated Alerts | Validation | Resolution |
|---|---|---|---|---|---|---|
| cpu-throttling-high | K8s is throttling the pod CPU for more than 25% of the time in last five minutes | 1 hour | Application is running too hot and CPU throttling is too high. If the application pods are affected, then this can result in a service impact. | - | Verify the CEE alert and escalate immediately. | - |
| cndp-ha-switchover | Cluster Manager switchover from primary to standby | 1 hour | This alert indicates a CM failover either caused by MW, RMA or a hardware issue. | - | Verify the CEE alert and escalate immediately. | - |
| backup-node-down | Cluster Manager Backup node is in not reachable from primary | 1 hour | The backup CM is not reachable from primary either because of network issues or a hardware issue, RMA, or MW. | - | Verify the CEE alert and escalate immediately. | - |
| user_password_expiring | User password will expire in less than <configured number of days> | Always | User password will expire and must be updated | - | Verify the CEE alert and escalate immediately. | - |
| user_password_expired | User password expired | Always | User password expired | - | Verify the CEE alert and escalate immediately. | - |
| k8s-persisent-volume-errors | Persistent volume has issues | Always | Persistent volume has issues and can impact the application using it. Most likely, there is a hardware issue or it can be caused by a failed install or upgrade. | - | Verify the CEE alert and escalate immediately. | - |
| k8s-version-mismatch | The system has K8s components with different versions | Always | The components should always run on the same K8s version. This alert can be triggered by a failed upgrade. | - | Verify the CEE alert and escalate immediately. | - |

| Alarm Name | Description | Active Alert Duration * | System Impact | Associated Alerts | Validation | Resolution |
|---|---|---|---|---|---|---|
| k8s-client-errors | Specific K8s API server is having issues communicating with the API server | Always | This alert is triggered by either a failed upgrade, connectivity or incorrect/expired certificates. It indicates a major impact to applications or service. | - | Verify the CEE alert and escalate immediately. | - |
| prometheus | Various errors related to Prometheus | 1 hour | This alert indicates issues with Prometheus or monitoring and must be investigated. | - | Verify the CEE alert and escalate immediately. | - |
| node-disk-running-Low-24hours | The node disk partition is > 75%, and will be >80 in less than 24 hours | Always | Node disk partition is projected to be 80% full within the next 24 hours. | - | Verify the CEE alert and escalate immediately. | - |
| node-disk-running-Low-2hours | The node disk partition is > 75%, and will be >80% in less than 2 hours | Always | Node disk partition is projected to be 80% full within the next 2 hours. | - | Verify the CEE alert and escalate immediately. | - |
| * Escalate to investigate when the alert is active for longer than the specified time period. | | | | | | |

### Alert Details

#### cndp-ha

**Rules:**

- **Alert:** cndp-ha-switchover
  - **Annotations:**
    - **Type:** Switching Over To Primary
    - **Summary:** "CNDP-HA is switched {{ $labels.hostname }} over to primary."
  - **Expression:**

```
|
        ha_is_failed_over == 1
```

- **For:** 1m
- **Labels:**
  - **Severity:** major

- **Alert:** backup-node-down
  - **Annotations:**
    - **Type:** Backup node down
    - **Summary:** "The Backup CM node of {{ $labels.hostname }} is down."
  - **Expression:**

```
|
          backup_node_status == 0
```

  - **For:** 1m
  - **Labels:**
    - **Severity:** major

### kubernetes-apps

**Rules:**

- **Alert:** pod-oom-killed
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** 'Pod {{ $labels.namespace }}/{{ $labels.pod }} got OOM Killed.'
  - **Expression:**

```
|

sum_over_time(kube_pod_container_status_terminated_reason{reason="OOMKilled"}[5m])
 > 0
```

  - **For:** 1m
  - **Labels:**
    - **Severity:** critical

- **Alert:** container-memory-usage-high
  - **Annotations:**

- **Type:** Processing Error Alarm
- **Summary:** 'Pod {{ $labels.namespace }}/{{ $labels.pod }}/{{ $labels.name }} uses high memory {{ printf "%.2f" $value }}%.'

- **Expression:**

```
|
      ((container_memory_usage_bytes{pod!="",container!="POD",image!=""} -
container_memory_cache{pod!="",container!="POD",image!=""}) /
(container_spec_memory_limit_bytes{pod!="",container!="POD",image!=""} != 0)) * 100
 > 80
```

- **For:** 2m
- **Labels:**
  - **Severity:** critical

- **Alert:** pod-not-ready-but-all-containers-ready
  - **Expression:**

```
>
      (count by (namespace, pod) (kube_pod_status_ready{condition="true"} == 0))
      and
      (
        (count by (namespace, pod) (kube_pod_container_status_ready==1))
        unless
        (count by (namespace, pod) (kube_pod_container_status_ready==0))
      )
```

  - **For:** 5m
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Pod {{ $labels.namespace }}/{{ $labels.pod }} ({{ $labels.container}}) is restarting {{ printf "%.2f" $value }} times / 5 minutes.

  - **Expression:**

```
|
      rate(kube_pod_container_status_restarts_total[5m]) * 60 * 5 > 0
```

  - **For:** 1m
  - **Labels:**
    - **Severity:** minor

- **Alert:** k8s-pod-crashing-loop
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Pod {{ $labels.namespace }}/{{ $labels.pod }} ({{ $labels.container}}) is restarting {{ printf "%.2f" $value }} times / 5 minutes.
  - **Expression:**

```
|
     rate(kube_pod_container_status_restarts_total[5m]) * 60 * 5 >= 2
```

  - **For:** 1m
  - **Labels:**
    - **Severity:** critical

- **Alert:** k8s-pod-pending
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Pod {{ $labels.namespace }}/{{ $labels.pod }} has been in pending state state for longer than 1 minute.
  - **Expression:**

```
|
     sum by (namespace, pod) (kube_pod_status_phase{
phase=~"Failed|Pending|Unknown"}) > 0
```

  - **For:** 1m
  - **Labels:**
    - **Severity:** critical

- **Alert:** k8s-pod-not-ready
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Pod {{ $labels.namespace }}/{{ $labels.pod }} has been in a non-ready state for longer than 1 minute.
  - **Expression:**

```
|
```

```
sum by (namespace, pod) (kube_pod_status_ready{condition="false"}) > 0
```

- **For:** 1m
- **Labels:**
  - **Severity:** critical

- **Alert:** k8s-deployment-generation-mismatch
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Deployment generation for {{ $labels.namespace }}/{{ $labels.deployment }} does not match, this indicates that the Deployment has failed but has not been rolled back.
  - **Expression:**

```
|
    kube_deployment_status_observed_generation
      !=
    kube_deployment_metadata_generation
```

  - **For:** 5m
  - **Labels:**
    - **Severity:** critical

- **Alert:** k8s-deployment-replica-mismatch
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Deployment {{ $labels.namespace }}/{{ $labels.deployment }} has not matched the expected number of replicas for longer than 2 minutes.
  - **Expression:**

```
|
    kube_deployment_spec_replicas
      !=
    kube_deployment_status_replicas_available
```

  - **For:** 2m
  - **Labels:**
    - **Severity:** critical

- **Alert:** k8s-ss-mismatch
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** StatefulSet {{ $labels.namespace }}/{{ $labels.statefulset }} has not matched the expected number of replicas for longer than 5 minutes.
  - **Expression:**

```
|
    kube_statefulset_status_replicas_ready
      !=
    kube_statefulset_status_replicas
```

  - **For:** 5m
  - **Labels:**
    - **Severity:** critical

- **Alert:** k8s-ss-generation-mismatch
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** StatefulSet generation for {{ $labels.namespace }}/{{ $labels.statefulset }} does not match, this indicates that the StatefulSet has failed but has not been rolled back.
  - **Expression:**

```
|
    kube_statefulset_status_observed_generation
      !=
    kube_statefulset_metadata_generation
```

  - **For:** 5m
  - **Labels:**
    - **Severity:** critical

- **Alert:** k8s-ss-update-not-rolled-out
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** StatefulSet {{ $labels.namespace }}/{{ $labels.statefulset }} update has not been rolled out.

- **Expression:**

```
|
      max without (revision) (
        kube_statefulset_status_current_revision
          unless
        kube_statefulset_status_update_revision
      )
        *
      (
        kube_statefulset_replicas
          !=
        kube_statefulset_status_replicas_updated
      )
```

- **For:** 5m
- **Labels:**
  - **Severity:** critical

- **Alert:** k8s-daemonset-rollout-stuck
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Only {{ $value }}% of the desired Pods of DaemonSet {{ $labels.namespace }}/{{ $labels.daemonset }} are scheduled and ready.
  - **Expression:**

```
|
      kube_daemonset_status_number_ready
        /
      kube_daemonset_status_desired_number_scheduled * 100 < 100
```

  - **For:** 5m
  - **Labels:**
    - **Severity:** critical

- **Alert:** k8s-daemonset-not-scheduled
  - **Annotations:**
    - **Type:** Processing Error Alarm

- **Summary:** '{{ $value }} Pods of DaemonSet {{ $labels.namespace }}/{{ $labels.daemonset }} are not scheduled.'

- **Expression:**

```
|
    kube_daemonset_status_desired_number_scheduled
    kube_daemonset_status_current_number_scheduled > 0
```

- **For:** 5m

- **Labels:**
  - **Severity:** major

- **Alert:** k8s-daemonset-mischeduled
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** '{{ $value }} Pods of DaemonSet {{ $labels.namespace }}/{{ $labels.daemonset }} are running where they are not supposed to run.'
  - **Expression:**

```
|
    kube_daemonset_status_number_misscheduled > 0
```

  - **For:** 5m
  - **Labels:**
    - **Severity:** major

- **Alert:** k8s-cronjob-running
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** CronJob {{ $labels.namespace }}/{{ $labels.cronjob }} is taking more than 1h to complete.
  - **Expression:**

```
|
    time() - kube_cronjob_next_schedule_time > 3600
```

  - **For:** 1h
  - **Labels:**

- **Severity:** major

- **Alert:** k8s-job-completion
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Job {{ $labels.namespace }}/{{ $labels.job_name }} is taking more than one hour to complete.
  - **Expression:**

```
|
     kube_job_spec_completions - kube_job_status_succeeded  > 0
```

  - **For:** 1h
  - **Labels:**
    - **Severity:** major

- **Alert:** k8s-job-failed
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Job {{ $labels.namespace }}/{{ $labels.job_name }} failed to complete.
  - **Expression:**

```
|
     kube_job_status_failed  > 0
```

  - **For:** 1h
  - **Labels:**
    - **Severity:** major

- **Alert:** k8s-pod-cpu-usage-high
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** '{{ $labels.namespace }}.{{ $labels.pod }} pod cpu usage is above 80%.'
  - **Expression:**

```
|
```

```
      sum(rate(container_cpu_usage_seconds_total{container!="POD", pod!="",
image!=""}[5m])) by (namespace, pod) * 100 /
sum(kube_pod_container_resource_limits_cpu_cores) by (namespace, pod) > 80
```

- **For:** 1m
- **Labels:**
  - **Severity:** major

### kubernetes-resources

**Rules:**

- **Alert:** k8s-cpu-overcommit
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Cluster has overcommitted CPU resource requests for Namespaces.
  - **Expression:**

```
|
      sum(kube_resourcequota{ type="hard", resource="cpu"})
        /
      sum(kube_node_status_allocatable_cpu_cores)
        > 1.5
```

  - **For:** 2m
  - **Labels:**
    - **Severity:** major

- **Alert:** k8s-mem-overcommit
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Cluster has overcommitted memory resource requests for Namespaces.
  - **Expression:**

```
|
      sum(kube_resourcequota{ type="hard", resource="memory"})
        /
      sum(kube_node_status_allocatable_memory_bytes)
        > 1.5
```

- **For:** 2m
- **Labels:**
  - **Severity:** major

- **Alert:** k8s-quota-exceeded
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Namespace {{ $labels.namespace }} is using {{ printf "%0.0f" $value }}% of its {{ $labels.resource }} quota.
  - **Expression:**

```
|
     100 * kube_resourcequota{ type="used"}
       / ignoring(instance, job, type)
     (kube_resourcequota{ type="hard"} > 0)
       > 90
```

  - **For:** 2m
  - **Labels:**
    - **Severity:** major

- **Alert:** cpu-throttling-high
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** '{{ printf "%0.0f" $value }}% throttling of CPU in namespace {{ $labels.namespace }} for container {{ $labels.container }} in pod {{ $labels.pod }}.'
  - **Expression:**

```
 "100 * sum(increase(container_cpu_cfs_throttled_periods_total{container!=\"\",
      }[5m])) by (container, pod, namespace)\n
/\nsum(increase(container_cpu_cfs_periods_total{}[5m]))
      by (container, pod, namespace)\n  > 25 \n"
```

  - **For:** 2m
  - **Labels:**
    - **Severity:** major

### kubernetes-storage

**Rules:**

- **Alert:** k8s-persisent-volume-usage
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** The PersistentVolume claimed by {{ $labels.persistentvolumeclaim }} in Namespace {{ $labels.namespace }} is only {{ printf "%0.2f" $value }}% free.
  - **Expression:**

```
|
    100 * kubelet_volume_stats_available_bytes
      /
    kubelet_volume_stats_capacity_bytes
      < 3
```

  - **Labels:**
    - **Severity:** critical

- **Alert:** k8s-persisent-volume-usage-projected-full
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Based on recent sampling, the PersistentVolume claimed by {{ $labels.persistentvolumeclaim }} in Namespace {{ $labels.namespace }} is expected to fill up within four days. Currently {{ printf "%0.2f" $value }}% is available.
  - **Expression:**

```
|
    100 * (
      kubelet_volume_stats_available_bytes
        /
      kubelet_volume_stats_capacity_bytes
    ) < 15
    and
    predict_linear(kubelet_volume_stats_available_bytes[6h], 4 * 24 * 3600) < 0
```

  - **For:** 5m
  - **Labels:**
    - **Severity:** critical

- **Alert:** k8s-persisent-volume-errors
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** The persistent volume {{ $labels.persistentvolume }} has status {{ $labels.phase }}.
  - **Expression:**

```
|

kube_persistentvolume_status_phase{phase=~"Failed|Pending",namespace=~"(kube-.*|default|logging)"}
 > 0
```

  - **Labels:**
    - **Severity:** critical

### kubernetes-system

**Rules:**

- **Alert:** k8s-node-not-ready
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** '{{ $labels.node }} has been unready for more than 1 minutes.'
  - **Expression:**

```
|
     kube_node_status_condition{condition="Ready",status="true"} == 0
```

  - **For:** 1m
  - **Labels:**
    - **Severity:** critical

- **Alert:** k8s-node-status-change
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** '{{ $labels.node }} status was changed in the past 5 minutes.'
  - **Expression:**

```
|
```

```
changes(kube_node_status_condition{condition="Ready",status="true"}[5m]) > 0
```

- **For:** 0m
- **Labels:**
  - **Severity:** major

- **Alert:** k8s-version-mismatch
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** There are {{ $value }} different semantic versions of Kubernetes components running.
  - **Expression:**

```
|
     count(count by (gitVersion)
(label_replace(kubernetes_build_info,"gitVersion","$1","gitVersion","(v[0-9]*.[0-9]*.[0-9]*).*")))
 > 1
```

  - **For:** 5m
  - **Labels:**
    - **Severity:** major

- **Alert:** k8s-client-errors
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Kubernetes API server client '{{ $labels.job }}/{{ $labels.instance }}' is experiencing {{ printf "%0.0f" $value }}% errors.'
  - **Expression:**

```
|
     (sum(rate(rest_client_requests_total{code=~"5.."}[5m])) by (instance, job)
       /
     sum(rate(rest_client_requests_total[5m])) by (instance, job))
     * 100 > 1
```

  - **For:** 2m
  - **Labels:**
    - **Severity:** major

- **Alert:** kubelet-too-many-pods
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Kubelet {{ $labels.instance }} is running {{ $value }} Pods, close to the limit of 110.
  - **Expression:**

```
|
     kubelet_running_pod_count > 110 * 0.9
```

  - **For:** 5m
  - **Labels:**
    - **Severity:** critical

- **Alert:** k8s-client-cert-expiration
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** A client certificate used to authenticate to the apiserver is expiring in less than 30 days
  - **Expression:**

```
|
     apiserver_client_certificate_expiration_seconds_count > 0 and
histogram_quantile(0.01, sum by (job, le)
(rate(apiserver_client_certificate_expiration_seconds_bucket[5m]))) < 2592000
```

  - **Labels:**
    - **Severity:** warning

- **Alert:** k8s-client-cert-expiration
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** A client certificate used to authenticate to the apiserver is expiring in less than 24.0 hours.
  - **Expression:**

```
|
```

```
      apiserver_client_certificate_expiration_seconds_count > 0 and
histogram_quantile(0.01, sum by (job, le)
(rate(apiserver_client_certificate_expiration_seconds_bucket[5m]))) < 86400
```

- **Labels:**
  - **Severity:** critical

### general.rules

**Rules:**

- **Alert:** watchdog
  - **Annotations:**
    - **Type:** Communications Alarm
    - **Summary:** | This is an alert meant to ensure that the entire alerting pipeline is functional. This alert is always firing, therefore it should always be firing in Alertmanager and always fire against a receiver. There are integrations with various notification mechanisms that send a notification when this alert is not firing.
  - **Expression:**

    ```
    vector(1)
    ```

  - **Labels:**
    - **Severity:** minor

### sync.rules

**Rules:**

- **Alert:** ops-system-sync-running
  - **Annotations:**
    - **Type:** Communications Alarm
    - **Summary:** | ops center system upgrade for {{ $labels.namespace }} is in progress
  - **Expression:**

    ```
    system_ops_upgrade_running > 0
    ```

  - **Labels:**
    - **Severity:** minor

- **Alert:** ops-latest-sync-failed
  - **Annotations:**

- **Type:** Communications Alarm
- **Summary:** | ops center latest system sync for {{ $labels.namespace }} failed

- **Expression:**

```
system_synch_error > 0
```

- **Labels:**
  - **Severity:** major

### kube-prometheus-node-alerting.rules

**Rules:**

- **Alert:** node-disk-running-full-24hours
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Device {{ $labels.device }} of node-exporter {{ $labels.namespace }}/{{ $labels.pod }} will be full within the next 24 hours.
  - **Expression:**

```
|
      (node:node_filesystem_usage: > 0.85) and
(predict_linear(node:node_filesystem_avail:[6h], 3600 * 24) < 0)
```

  - **For:** 5m
  - **Labels:**
    - **Severity:** major

- **Alert:** node-disk-running-full-2hours
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Device {{ $labels.device }} of node-exporter {{ $labels.namespace }}/{{ $labels.pod }} will be full within the next 2 hours.
  - **Expression:**

```
|
      (node:node_filesystem_usage: > 0.85) and
(predict_linear(node:node_filesystem_avail:[30m], 3600 * 2) < 0)
```

  - **Labels:**

- **Severity:** critical

### node-time

**Rules:**

- **Alert:** clock-skew-detected
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Clock skew detected on hostname {{ $labels.hostname }} . Ensure NTP is configured correctly on this host.
  - **Expression:**

```
|
    abs(node_timex_offset_seconds) > 0.03
```

  - **For:** 2m
  - **Labels:**
    - **Severity:** major

- **Alert:** clock-is-not-in-synch
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Clock not in synch detected on hostname {{ $labels.hostname }} . Ensure NTP is configured correctly on this host.
  - **Expression:**

```
|
    min_over_time(node_timex_sync_status[5m]) == 0
    and
    node_timex_maxerror_seconds >= 16
```

  - **For:** 10m
  - **Labels:**
    - **Severity:** major

### node-network

**Rules:**

- **Alert:** network-receive-errors
  - **Annotations:**
    - **Type:** Communications Alarm
    - **Summary:** Network interface "{{ $labels.device }}" showing receive errors on hostname {{ $labels.hostname }}"
  - **Expression:**

```
|
    rate(node_network_receive_errs_total{device!~"veth.+"}[2m]) > 0
```

  - **For:** 2m
  - **Labels:**
    - **Severity:** major

- **Alert:** network-transmit-errors
  - **Annotations:**
    - **Type:** Communications Alarm
    - **Summary:** Network interface "{{ $labels.device }}" showing transmit errors on hostname {{ $labels.hostname }}"
  - **Expression:**

```
|
    rate(node_network_transmit_errs_total{device!~"veth.+"}[2m]) > 0
```

  - **For:** 2m
  - **Labels:**
    - **Severity:** major

- **Alert:** network-interface-flapping
  - **Annotations:**
    - **Type:** Communications Alarm
    - **Summary:** Network interface "{{ $labels.device }}" changing it's up status often on hostname {{ $labels.hostname }}"
  - **Expression:**

```
|
    changes(node_network_up{device!~"veth.+"}[2m]) > 2
```

- **For:** 2m
- **Labels:**
  - **Severity:** major

- **Alert:** kvm-tunnels flapping
  - **Annotations:**
    - **Type:** Communications Alarm
    - **Summary:** Pod {{ $labels.namespace }}/{{ $labels.pod }} tunnel to ({{ $labels.ip}}:{{$labels.port}}) is flapping {{ printf "%.2f" $value }} times / 5 minutes.
  - **Expression:**

```
|
    changes(kvm_metrics_tunnels_up[5m]) > 2
```

  - **For:** 5m
  - **Labels:**
    - **Severity:** major

- **Alert:** kvm-node-not-ready
  - **Annotations:**
    - **Type:** Communications Alarm
    - **Summary:** KVM node {{ $labels.hostname }}({{ $labels.ip}}) is not reachable.
  - **Expression:**

```
|
    changes(kvm_metrics_tunnels_up[2m]) > 0
```

  - **For:** 0m
  - **Labels:**
    - **Severity:** major

### fluentbit.rules

**Rules:**

- **Alert:** fluent-proxy-output-retries-failed
  - **Annotations:**
    - **Type:** Communications Alarm
    - **Summary:** 'Fluent-proxy {{ $labels.namespace }}/{{ $labels.pod }} output retries failed for target: {{ $labels.name }}'
  - **Expression:**

```
|
     rate(fluentbit_output_retries_failed_total{pod=~"fluent-proxy.*"}[5m]) > 0
```

  - **For:** 5m
  - **Labels:**
    - **Severity:** major

### prometheus.rules

**Rules:**

- **Alert:** prometheus-config-reload-failed
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Reloading Prometheus' configuration failed

      Reloading Prometheus' configuration has failed for {{ $labels.namespace }}/{{ $labels.pod }}
  - **Expression:**

```
|
     prometheus_config_last_reload_successful == 0
```

  - **For:** 2m
  - **Labels:**
    - **Severity:** major

- **Alert:** prometheus-notification-q-running-full
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Prometheus' alert notification queue is running full

Prometheus' alert notification queue is running full for {{ $labels.namespace }}/{{ $labels.pod }}

- **Expression:**

```
|
      predict_linear(prometheus_notifications_queue_length[5m], 60 * 30) >
prometheus_notifications_queue_capacity
```

- **For:** 10m
- **Labels:**
  - **Severity:** major

- **Alert:** prometheus-error-sending-alerts
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Errors while sending alert from Prometheus

      Errors while sending alerts from Prometheus {{ $labels.namespace }}/{{ $labels.pod }} to Alertmanager {{$labels.Alertmanager}}

  - **Expression:**

```
|
      rate(prometheus_notifications_errors_total[5m]) /
rate(prometheus_notifications_sent_total[5m]) > 0.01
```

  - **For:** 2m
  - **Labels:**
    - **Severity:** major

- **Alert:** prometheus-error-sending-alerts
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Errors while sending alerts from Prometheus

      Errors while sending alerts from Prometheus {{ $labels.namespace }}/{{ $labels.pod }} to Alertmanager {{$labels.Alertmanager}}

  - **Expression:**

```
|
      rate(prometheus_notifications_errors_total[5m]) /
rate(prometheus_notifications_sent_total[5m]) > 0.03
```

- **Labels:**
  - **Severity:** critical

- **Alert:** prometheus-not-connected-to-alertmanagers
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Prometheus is not connected to any Alertmanagers

      Prometheus {{ $labels.namespace }}/{{ $labels.pod }} is not connected to any Alertmanagers
  - **Expression:**

    ```
    |
        prometheus_notifications_alertmanagers_discovered < 1
    ```
  - **For:** 2m
  - **Labels:**
    - **Severity:** major

- **Alert:** prometheus-tsdb-reloads-failing
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Prometheus has issues reloading data blocks from disk

      '{{$labels.job}} at {{$labels.instance}} had {{$value | humanize}} reload failures over the last four hours.'
  - **Expression:**

    ```
    |
        increase(prometheus_tsdb_reloads_failures_total[2h]) > 0
    ```
  - **For:** 5m
  - **Labels:**
    - **Severity:** major

- **Alert:** prometheus-tsdb-compactions-failing
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Prometheus has issues compacting sample blocks

'{{$labels.job}} at {{$labels.instance}} had {{$value | humanize}} compaction failures over the last four hours.'

- **Expression:**

  ```
  |
      increase(prometheus_tsdb_compactions_failed_total[2h]) > 0
  ```

- **For:** 5m
- **Labels:**
  - **Severity:** major

- **Alert:** prometheus-tsdb-wal-corruptions
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Prometheus write-ahead log is corrupted

      '{{$labels.job}} at {{$labels.instance}} has a corrupted write-ahead log (WAL).'

  - **Expression:**

    ```
    |
        prometheus_tsdb_wal_corruptions_total > 0
    ```

  - **For:** 5m
  - **Labels:**
    - **Severity:** major

- **Alert:** prometheus-not-ingesting-samples
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Prometheus isn't ingesting samples

      Prometheus {{ $labels.namespace }}/{{ $labels.pod }} isn't ingesting samples.

  - **Expression:**

    ```
    |
        rate(prometheus_tsdb_head_samples_appended_total[5m]) <= 0
    ```

  - **For:** 5m
  - **Labels:**

- **Severity:** major

- **Alert:** prometheus-target-scrapes-duplicate
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Prometheus has many samples rejected

      '{{ $labels.namespace }}/{{ $labels.pod }} has many samples rejected due to duplicate timestamps but different values'

  - **Expression:**

```
|
    increase(prometheus_target_scrapes_sample_duplicate_timestamp_total[5m]) > 0
```

  - **For:** 10m
  - **Labels:**
    - **Severity:** warning

- **Alert:** prometheus-remote-write-behind
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** Prometheus remote write is behind

      'Prometheus {{ $labels.namespace }}/{{ $labels.pod }} remote write is {{ $value | humanize }} seconds behind for target: {{ $labels.url }}.'

  - **Expression:**

```
|
    (
      max_over_time(prometheus_remote_storage_highest_timestamp_in_seconds[5m])
ignoring(remote_name, url) group_right

max_over_time(prometheus_remote_storage_queue_highest_sent_timestamp_seconds[5m])
    )
    > 120
```

  - **For:** 15m
  - **Labels:**
    - **Severity:** major

- **Alert:** ssl-earliest-cert-expiry
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** SSL cerificate expires in 30 days

      '{{ $labels.namespace }}/{{ $labels.pod }} ssl certificate expires in 30 days'
  - **Expression:**

    ```
    |
        probe_ssl_earliest_cert_expiry - time() < 86400 * 30
    ```
  - **Labels:**
    - **Severity:** major

- **Alert:** ssl-earliest-cert-expiry
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** SSL cerificate expires in 7 days

      '{{ $labels.namespace }}/{{ $labels.pod }} ssl certificate expires in 7 days'
  - **Expression:**

    ```
    |
        probe_ssl_earliest_cert_expiry - time() < 86400 * 7
    ```
  - **Labels:**
    - **Severity:** critical

- **Alert:** helm-deploy-failure
  - **Annotations:**
    - **Type:** Processing Error Alarm
    - **Summary:** 'Helm chart failed to deploy for 5 minutes'

      'Helm chart {{$labels.chart}}/{{ $labels.namespace }} deployment failed'
  - **Expression:**

    ```
    |
        helm_chart_deploy_success < 1
    ```
  - **Labels:**

- **Severity:** critical

- **For:** 5m

### server

**Rules:**

- **Alert:** server-alert
- **Annotations:**
- **Type:** Equipment Alarm
- **dn:** "{{ $labels.cluster }}/{{ $labels.server }}/{{ $labels.fault_id }}/{{ $labels.id }}"
- **Summary:** "{{ $labels.description }}"
- **Expression:**

```
|
    sum(server_alert) by ( id, description, fault_id, server, cluster, severity, affectedDn)
== 1
```

- **For:** 1m
- **Alert:** server-not-reachable-alert
  - **Annotations:**
    - **Type:** Equipment Alarm
    - **Summary:** "{{ $labels.description }}"
  - **Expression:**

```
  |
       sum(cimc_server_not_reachable_alert) by (server, cluster, description) == 1
```

  - **For:** 1m
  - **Labels:**
  - **Severity:** critical

### k8s.rules

**Rules:**

- **Expression:**

```
      sum(rate(container_cpu_usage_seconds_total{ image!="", container!="POD"}[5m]))
by (namespace)
```

- **Record:** namespace:container_cpu_usage_seconds_total:sum_rate

- **Expression:**

```
sum by (namespace, pod, container) (
  rate(container_cpu_usage_seconds_total{ image!="", container!="POD"}[5m])
)
```

  - **Record:** namespace_pod_container:container_cpu_usage_seconds_total:sum_rate

- **Expression:**

```
sum(container_memory_usage_bytes{image!="", container!="POD"} -
container_memory_cache{image!="", container!="POD"}) by (namespace)
```

  - **Record:** namespace:container_memory_usage_bytes:sum

- **Expression:**

```
sum(
  label_replace(
    label_replace(
      kube_pod_owner{ owner_kind="ReplicaSet"},
      "replicaset", "$1", "owner_name", "(.*)"
    ) * on(replicaset, namespace) group_left(owner_name) kube_replicaset_owner,
    "workload", "$1", "owner_name", "(.*)"
  )
) by (namespace, workload, pod)
```

  - **Labels:**
    - **workload_type:** deployment

  - **Record:** mixin_pod_workload

- **Expression:**

```
sum(
  label_replace(
    kube_pod_owner{ owner_kind="DaemonSet"},
    "workload", "$1", "owner_name", "(.*)"
  )
) by (namespace, workload, pod)
```

  - **Labels:**
    - **workload_type:** daemonset

  - **Record:** mixin_pod_workload

- **Expression:**

```
sum(
  label_replace(
    kube_pod_owner{ owner_kind="StatefulSet"},
    "workload", "$1", "owner_name", "(.*)"
  )
) by (namespace, workload, pod)
```

  - **Labels:**
    - **workload_type:** statefulset
  - **Record:** mixin_pod_workload

### node.rules

**Rules:**

- **Expression:**

```
max(label_replace(kube_pod_info, "pod", "$1", "pod", "(.*)")) by (node, namespace,
pod)
```

  - **Record:** 'node_namespace_pod:kube_pod_info:'

- **Expression:**

```
1 - avg(rate(node_cpu_seconds_total{mode="idle"}[1m]))
```

  - **Record:** :node_cpu_utilisation:avg1m

- **Expression:**

```
1 -
sum(node_memory_MemFree_bytes + node_memory_Cached_bytes +
node_memory_Buffers_bytes)
/
sum(node_memory_MemTotal_bytes)
```

  - **Record:** ':node_memory_utilisation:'

- **Expression:**

```
sum(node_memory_MemFree_bytes + node_memory_Cached_bytes +
node_memory_Buffers_bytes)
```

  - **Record:** :node_memory_MemFreeCachedBuffers_bytes:sum

- **Expression:**

```
sum(node_memory_MemTotal_bytes)
```

  - **Record:** :node_memory_MemTotal_bytes:sum

- **Expression:**

```
avg(irate(node_disk_io_time_seconds_total{device=~"nvme.+|rbd.+|sd.+|vd.+|xvd.+|dm-.+"}[1m]))
```

  - **Record:** :node_disk_utilisation:avg_irate

- **Expression:**

```
avg(irate(node_disk_io_time_weighted_seconds_total{device=~"nvme.+|rbd.+|sd.+|vd.+|xvd.+|dm-.+"}[1m]))
```

  - **Record:** :node_disk_saturation:avg_irate

- **Expression:**

```
       max by (instance, namespace, pod, device)
((node_filesystem_size_bytes{fstype=~"ext[234]|btrfs|xfs|zfs"}
       - node_filesystem_avail_bytes{fstype=~"ext[234]|btrfs|xfs|zfs"})
       / node_filesystem_size_bytes{fstype=~"ext[234]|btrfs|xfs|zfs"})
```

  - **Record:** 'node:node_filesystem_usage:'

- **Expression:**

```
       max by (instance, namespace, pod, device)
(node_filesystem_avail_bytes{fstype=~"ext[234]|btrfs|xfs|zfs"} /
node_filesystem_size_bytes{fstype=~"ext[234]|btrfs|xfs|zfs"})
```

  - **Record:** 'node:node_filesystem_avail:'

- **Expression:**

```
       sum(irate(node_network_receive_bytes_total{device!~"veth.+"}[1m])) +
       sum(irate(node_network_transmit_bytes_total{device!~"veth.+"}[1m]))
```

  - **Record:** :node_net_utilisation:sum_irate

- **Expression:**

```
       sum(irate(node_network_receive_drop_total{device!~"veth.+"}[1m])) +
       sum(irate(node_network_transmit_drop_total{device!~"veth.+"}[1m]))
```

  - **Record:** :node_net_saturation:sum_irate

- **Expression:**

```
       max(
         max(
           kube_pod_info{host_ip!=""}
         ) by (node, host_ip)
         * on (host_ip) group_right (node)
         label_replace(
```

```
         (max(node_filesystem_files{ mountpoint="/"}) by (instance)), "host_ip", "$1",
"instance", "(.*):.*"
        )
      ) by (node)
```

- **Record:** ':node:node_inodes_total:'

- **Expression:**

```
      max(
        max(
          kube_pod_info{ host_ip!=""}
        ) by (node, host_ip)
        * on (host_ip) group_right (node)
        label_replace(
         (max(node_filesystem_files_free{ mountpoint="/"}) by (instance)), "host_ip",
"$1", "instance", "(.*):.*"
        )
      ) by (node)
```

- **Record:** ':node:node_inodes_free:'

- **Expression:**

-

```
      sum by (node) (
        (node_memory_MemFree_bytes + node_memory_Cached_bytes +
node_memory_Buffers_bytes)
        * on (namespace, pod) group_left(node)
         node_namespace_pod:kube_pod_info:
      )
```

- **Record:** node:node_memory_bytes_available:sum

- **Expression:**

-

```
      sum by (node) (
        node_memory_MemTotal_bytes
        * on (namespace, pod) group_left(node)
                  node_namespace_pod:kube_pod_info:
             )
```

- **Record:** node:node_memory_bytes_total:sum

- **Expression:**

```
 max without(endpoint, instance, job, pod, service) (kube_node_labels and on(node)
kube_node_role{role="control-plane"})
```

- **Labels:**

  label_node_role_kubernetes_io: control-plane

  **Record:** cluster:master_nodes

### kube-prometheus-node-recording.rules

**Rules:**

- **Expression:**

```
sum(rate(node_cpu_seconds_total{mode!="idle",mode!="iowait"}[3m])) BY
 (instance)
```

  - **Record:** instance:node_cpu:rate:sum

- **Expression:**

```
sum((node_filesystem_size_bytes{mountpoint="/"} -
node_filesystem_free_bytes{mountpoint="/"}))
 BY (instance)
```

  - **Record:** instance:node_filesystem_usage:sum

- **Expression:**

```
sum(rate(node_network_receive_bytes_total[3m])) BY (instance)
```

  - **Record:** instance:node_network_receive_bytes:rate:sum

- **Expression:**

```
sum(rate(node_network_transmit_bytes_total[3m])) BY (instance)
```

  - **Record:** instance:node_network_transmit_bytes:rate:sum

- **Expression:**

```
sum(rate(node_cpu_seconds_total{mode!="idle",mode!="iowait"}[5m])) WITHOUT
 (cpu, mode) / ON(instance) GROUP_LEFT() count(sum(node_cpu_seconds_total)
 BY (instance, cpu)) BY (instance)
```

  - **Record:** instance:node_cpu:ratio

- **Expression:**

```
sum(rate(node_cpu_seconds_total{mode!="idle",mode!="iowait"}[5m]))
```

  - **Record:** cluster:node_cpu:sum_rate5m

- **Expression:**

```
cluster:node_cpu:sum_rate5m / ON(cluster) GROUP_LEFT()
count(sum(node_cpu_seconds_total)
 BY (cluster, cpu)) BY (cluster)
```

- **Record:** cluster:node_cpu:ratio

### kubernetes.rules

**Rules:**

- **Expression:**

```
      sum(container_memory_usage_bytes{container!="POD",container!="",pod!=""} -
container_memory_cache{container!="POD",container!="",pod!=""})
       BY (pod, namespace)
```

  - **Record:** pod:container_memory_usage_bytes:sum

- **Expression:**

```
      sum(container_spec_cpu_shares{container!="POD",container!="",pod!=""})
       BY (pod, namespace)
```

  - **Record:** pod:container_spec_cpu_shares:sum

- **Expression:**

```
sum(rate(container_cpu_usage_seconds_total{container!="POD",container!="",pod!=""}[5m]))
       BY (pod, namespace)
```

  - **Record:** pod:container_cpu_usage:sum

- **Expression:**

```
      sum(container_fs_usage_bytes{container!="POD",container!="",pod!=""})
       BY (pod, namespace)
```

  - **Record:** pod:container_fs_usage_bytes:sum

- **Expression:**

```
      sum(container_memory_usage_bytes{container!=""} -
container_memory_cache{container!=""}) BY (namespace)
```

  - **Record:** namespace:container_memory_usage_bytes:sum

- **Expression:**

```
      sum(container_spec_cpu_shares{container!=""}) BY (namespace)
```

  - **Record:** namespace:container_spec_cpu_shares:sum

- **Expression:**

```
      sum(rate(container_cpu_usage_seconds_total{container!="POD",container!=""}[5m]))
       BY (namespace)
```

  - **Record:** namespace:container_cpu_usage:sum

- **Expression:**

```
      sum(container_memory_usage_bytes{container!="POD",container!="",pod!=""} -
container_memory_cache{container!="POD",container!="",pod!=""})
       BY (cluster) / sum(machine_memory_bytes) BY (cluster)
```

  - **Record:** cluster:memory_usage:ratio

- **Expression:**

```
      sum(container_spec_cpu_shares{container!="POD",container!="",pod!=""})
       / 1000 / sum(machine_cpu_cores)
```

  - **Record:** cluster:container_spec_cpu_shares:ratio

- **Expression:**

```
sum(rate(container_cpu_usage_seconds_total{container!="POD",container!="",pod!=""}[5m]))
       / sum(machine_cpu_cores)
```

  - **Record:** cluster:container_cpu_usage:ratio

- **Expression:**

```
      kube_node_labels and on(node)
kube_node_spec_taint{key="node-role.kubernetes.io/master"}
```

  - **Labels:**
    - **label_node_role_kubernetes_io:** master
  - **Record:** cluster:master_nodes

- **Expression:**

```
     sum((cluster:master_nodes * on(node) group_left kube_node_status_capacity_cpu_cores)
       or on(node) (kube_node_labels * on(node) group_left
kube_node_status_capacity_cpu_cores))
       BY (label_beta_kubernetes_io_instance_type, label_node_role_kubernetes_io)
```

  - **Record:** cluster:capacity_cpu_cores:sum

- **Expression:**

```
      sum((cluster:master_nodes * on(node) group_left
kube_node_status_capacity_memory_bytes)
       or on(node) (kube_node_labels * on(node) group_left
kube_node_status_capacity_memory_bytes))
       BY (label_beta_kubernetes_io_instance_type, label_node_role_kubernetes_io)
```

  - **Record:** cluster:capacity_memory_bytes:sum

- **Expression:**

```
sum(node:node_memory_bytes_total:sum - node:node_memory_bytes_available:sum)
```

- **Record:** cluster:memory_usage_bytes:sum

- **Expression:**

```
sum(cluster:master_nodes or on(node) kube_node_labels ) BY
(label_beta_kubernetes_io_instance_type,
label_node_role_kubernetes_io)
```

- **Record:** cluster:node_instance_type_count:sum

- **Expression:**

```
sum(etcd_object_counts) BY (instance)
```

- **Record:** instance:etcd_object_counts:sum

### user-password-expiry

**Rules:**

- **Alert:** user_password_expiring
  - **Annotations:**
    - **Type:** Cluster Node User Password Expiring Alarm
    - **Summary:** "{{ $labels.user_name }} password on host: {{ $labels.node_name }} is expiring in {{ $labels.days_to_expire }} days."
  - **Expression:**

```
|
User_password_expiration == 1
```

  - **Labels:**
    - **Severity:** critical

- **Alert:** user_password_expired
  - **Annotations:**
    - **Type:** Cluster Node User Password Expired Alarm
    - **Summary:** "{{ $labels.user_name }} password on host: {{ $labels.node_name }} is expired {{ $labels.days_to_expire }} days ago."
  - **Expression:**

```
|
User_password_expiration == 2
```

- **Labels:**
  - **Severity:** critical

### VM State Alert

**Rules:**

- **Alert:** vm-deployed
  - **Annotations:**
    - **Type:** Equipment Alarm
    - **Summary:** "{{ $labels.vm_name }} is deployed."
  - **Expression:**

```
|
     upf_state == 2
```

  - **For:** 5s
  - **Labels:**
    - **Severity:** minor
    - **State:** DEPLOYED

- **Alert:** vm-alive
  - **Annotations:**
    - **Type:** Equipment Alarm
    - **Summary:** "{{ $labels.vm_name }} is alive."
  - **Expression:**

```
|
     upf_state == 1 and changes(upf_state[2m]) > 0
```

  - **For:** 5s
  - **Labels:**
    - **Severity:** minor
    - **State:** ALIVE

- **Alert:** vm-error

- **Annotations:**
  - **Type:** Equipment Alarm
  - **Summary:** "{{ $labels.vm_name }} is down."
- **Expression:**

```
|
     upf_state == 0
```

- **For:** 5s
- **Labels:**
  - **Severity:** major
  - **State:** ERROR

- **Alert:** vm-recovering
  - **Annotations:**
    - **Type:** Equipment Alarm
    - **Summary:** "{{ $labels.vm_name }} is recovering."
  - **Expression:**

```
|
     upf_state == 3
```

  - **For:** 5s
  - **Labels:**
    - **Severity:** warning
    - **State:** RECOVERING

- **Alert:** vm-recovery-failed
  - **Annotations:**
    - **Type:** Equipment Alarm
    - **Summary:** "{{ $labels.vm_name }} failed to recover."
  - **Expression:**

```
|
     upf_state == 4
```

- **For:** 5s
- **Labels:**
  - **Severity:** critical
  - **State:** RECOVERY_FAILED

### confd-user-status

**Rules:**

- **Alert:** confd_user_password_expiring
  - **Annotations:**
    - **Type:** Confd User Status Alarm
    - **Summary:** "Confd user {{ $labels.namespace }}/{{ $labels.confdUser }} password is expiring in less than 60 days."
  - **Expression:**

```
|
      confd_user_password_days_to_expiry changelesser 60 and
confd_user_password_days_to_expiry >= 0
```

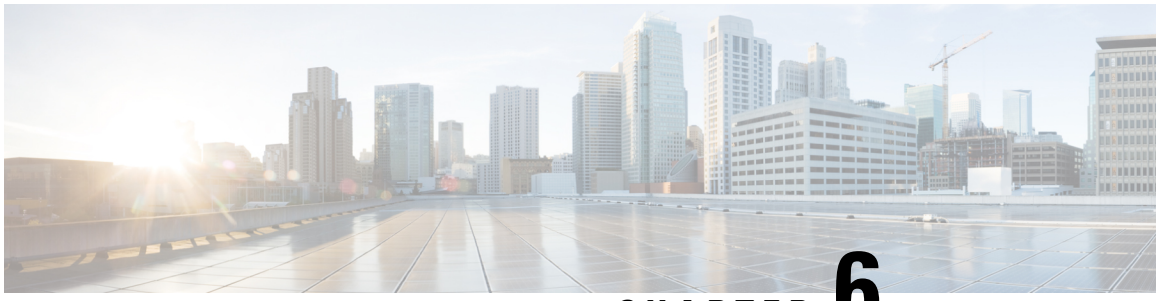
  - **Labels:**
    - **Severity:** major

- **Alert:** confd_user_password_expired
  - **Annotations:**
    - **Type:** Confd User Status Alarm
    - **Summary:** "Confd user {{ $labels.namespace }}/{{ $labels.confdUser }} password is expired."
  - **Expression:**

```
|
      confd_user_password_days_to_expiry < 0
```

  - **Labels:**
    - **Severity:** critical

Alerts Reference



CHAPTER 6

# SMI MIB Reference



## Cisco Cloud Native Execution Environment MIB - CISCO-CNEE-MIB.my

The MIB module for the Cisco Cloud Native Execution Environment (CNEE) platform. This MIB only handles notifications from the CNEE.

**Note** The Cisco Cloud Native Execution Environment (CNEE) MIB (CISCO-CNEE-MIB.my) uses definitions that are defined in the Cisco Enterprise Structure of Management Information (SMI) MIB (CISCO-SMI.my).

```
-- ****************************************************************
-- CISCO-CNEE-MIB.my
-- Copyright (c) 2018 by cisco Systems Inc.
-- All rights reserved.
-- ****************************************************************
CISCO-CNEE-MIB DEFINITIONS ::= BEGIN
IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
    NOTIFICATION-TYPE
        FROM SNMPv2-SMI
    MODULE-COMPLIANCE,
    NOTIFICATION-GROUP,
    OBJECT-GROUP
        FROM SNMPv2-CONF
    TEXTUAL-CONVENTION,
    DateAndTime
```

```
        FROM SNMPv2-TC
    ciscoMgmt
        FROM CISCO-SMI;
ciscoCneeMIB MODULE-IDENTITY
    LAST-UPDATED    "201910120000Z"
    ORGANIZATION    "Cisco Systems, Inc."
    CONTACT-INFO
            "Cisco Systems
            Customer Service
            Postal: 170 W Tasman Drive
            San Jose, CA  95134
            USA
            Tel: +1 800 553-NETS"
    DESCRIPTION
        "The MIB module for the Cisco Cloud Native
         Execution Environment (CNEE) platform.
        This MIB only handles notifications from the CNEE."
    REVISION        "201910120000Z"
    DESCRIPTION
        "Added cneeFaultClusterName, cneeFaultNamespace, cneeFaultHostname
         and cneeFaultInstance fields to identify the faults."
    REVISION        "201809190000Z"
    DESCRIPTION
        "Initial version of this MIB module."
    ::= { ciscoMgmt 999 }
-- Textual Conventions definition will be defined before this line
ciscoCneeMIBNotifs  OBJECT IDENTIFIER
    ::= { ciscoCneeMIB 0 }
ciscoCneeMIBFaults  OBJECT IDENTIFIER
    ::= { ciscoCneeMIB 1 }
ciscoCneeMIBConform  OBJECT IDENTIFIER
    ::= { ciscoCneeMIB 2 }
cneeFaultId OBJECT-TYPE
    SYNTAX          OCTET STRING (SIZE  (1..64))
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Uniquely identify the fault within a monitored entity."
    ::= { ciscoCneeMIBFaults 1 }
cneeFaultSource OBJECT-TYPE
```

```
    SYNTAX          OCTET STRING (SIZE  (1..128))
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Uniquely identify the monitored entity
         It can be a hostname or IP Address or
         human readable identity."
    ::= { ciscoCneeMIBFaults 2 }
cneeFaultSeverity OBJECT-TYPE
    SYNTAX          OCTET STRING (SIZE  (1..16))
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Indicates the level of urgency for operator attention
         Refer 3GPP TS32.111-5 v9.0.0 section 4.3."
    ::= { ciscoCneeMIBFaults 3 }
cneeFaultTime OBJECT-TYPE
    SYNTAX          DateAndTime
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "The date and time when the fault is detected."
    ::= { ciscoCneeMIBFaults 4 }
cneeFaultType OBJECT-TYPE
    SYNTAX          OCTET STRING (SIZE  (1..64))
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Indicates the type of fault
         Refer 3GPP TS32.111-5 v9.0.0 section 4.3."
    ::= { ciscoCneeMIBFaults 5 }
cneeFaultAdditionalInfo OBJECT-TYPE
    SYNTAX          OCTET STRING (SIZE  (1..2048))
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Additional Information about the fault."
    ::= { ciscoCneeMIBFaults 6 }
cneeFaultClusterName OBJECT-TYPE
    SYNTAX          OCTET STRING (SIZE  (1..128))
```

```
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "The cluster name associated to the fault."
    ::= { ciscoCneeMIBFaults 7 }
cneeFaultNamespace OBJECT-TYPE
    SYNTAX          OCTET STRING (SIZE  (1..128))
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Identifies the namespace associated to
        the fault.  This field is not always available for
        every fault."
    ::= { ciscoCneeMIBFaults 8 }
cneeFaultHostname OBJECT-TYPE
    SYNTAX          OCTET STRING (SIZE  (1..128))
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Identifies the hostname or ip address associated
        with the fault.  This field is not always available
        for every fault."
    ::= { ciscoCneeMIBFaults 9 }
cneeFaultInstance OBJECT-TYPE
    SYNTAX          OCTET STRING (SIZE  (1..128))
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Identifies the instance associated to
        the fault.  The instance is set by the alert rule
        creator and may not reference a host but could reference
        a process or KPI that is associated to the fault.  This
        field is not always available for every fault"
    ::= { ciscoCneeMIBFaults 10 }
cneeVnfAlias OBJECT-TYPE
    SYNTAX          OCTET STRING (SIZE  (1..128))
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Alias for the monitored entity"
```

```
    ::= { ciscoCneeMIBFaults 11 }
cneeAffectedDn OBJECT-TYPE
    SYNTAX          OCTET STRING (SIZE  (1..128))
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Uniquely identify the affected DN of the
        component with the fault issue
        This field is not always available
        for every fault."
    ::= { ciscoCneeMIBFaults 12 }
-- Default Notification Type
cneeFaultActiveNotif NOTIFICATION-TYPE
    OBJECTS         {
                        cneeFaultId,
                        cneeFaultSource,
                        cneeFaultSeverity,
                        cneeFaultTime,
                        cneeFaultType,
                        cneeFaultAdditionalInfo,
                        cneeFaultClusterName,
                        cneeFaultNamespace,
                        cneeFaultHostname,
                        cneeFaultInstance,
                        cneeVnfAlias,
                        cneeAffectedDn
                    }
    STATUS          current
    DESCRIPTION
        "This notification is generated by CNEE
         whenever a fault gets triggered."
   ::= { ciscoCneeMIBNotifs 1 }
cneeFaultClearNotif NOTIFICATION-TYPE
    OBJECTS         {
                        cneeFaultId,
                        cneeFaultSource,
                        cneeFaultSeverity,
                        cneeFaultTime,
                        cneeFaultType,
                        cneeFaultAdditionalInfo,
```

```
                        cneeFaultClusterName,
                        cneeFaultNamespace,
                        cneeFaultHostname,
                        cneeFaultInstance,
                        cneeVnfAlias,
                        cneeAffectedDn
                    }
    STATUS          current
    DESCRIPTION
        "This notification is generated by CNEE
         whenever a fault gets cleared."
   ::= { ciscoCneeMIBNotifs 2 }
ciscoCneeMIBCompliances  OBJECT IDENTIFIER
    ::= { ciscoCneeMIBConform 1 }
ciscoCneeMIBGroups  OBJECT IDENTIFIER
    ::= { ciscoCneeMIBConform 2 }
cneeMIBCompliance MODULE-COMPLIANCE
    STATUS          current
    DESCRIPTION
        "The compliance statement for entities that support
        the Cisco CNEE Managed Objects"
    MODULE          -- this module
    MANDATORY-GROUPS {
                        cneeMIBFaultGroup,
                        cneeMIBNotificationGroup
                    }
    ::= { ciscoCneeMIBCompliances 1 }
-- Units of Conformance
cneeMIBFaultGroup OBJECT-GROUP
    OBJECTS         {
                        cneeFaultId,
                        cneeFaultSource,
                        cneeFaultSeverity,
                        cneeFaultTime,
                        cneeFaultType,
                        cneeFaultAdditionalInfo,
                        cneeFaultClusterName,
                        cneeFaultNamespace,
                        cneeFaultHostname,
                        cneeFaultInstance,
```

```
                        cneeVnfAlias,
                        cneeAffectedDn
                    }
    STATUS          current
    DESCRIPTION
        "The set of CNEE Fault groups defined by this MIB"
    ::= { ciscoCneeMIBGroups 1 }
cneeMIBNotificationGroup NOTIFICATION-GROUP
   NOTIFICATIONS    { cneeFaultActiveNotif,
                      cneeFaultClearNotif }
    STATUS          current
    DESCRIPTION
        "The set of CNEE notifications defined by this MIB"
    ::= { ciscoCneeMIBGroups 2 }
END
```

# Cisco Enterprise Structure of Management Information MIB - CISCO-SMI.my

The Structure of Management Information for the Cisco Enterprise.

**Note** The Cisco Cloud Native Execution Environment (CNEE) MIB (CISCO-CNEE-MIB.my) uses definitions that are defined in the Cisco Enterprise Structure of Management Information (SMI) MIB (CISCO-SMI.my).

```
-- ****************************************************************
-- CISCO-SMI.my:  Cisco Enterprise Structure of Management Information
--
-- April 1994, Jeffrey T. Johnson
--
-- Copyright (c) 1994-1997, 2001, 2009, 2012, 2016 by cisco Systems Inc.
-- All rights reserved.
--
-- ****************************************************************
CISCO-SMI DEFINITIONS ::= BEGIN
IMPORTS
    MODULE-IDENTITY,
    OBJECT-IDENTITY,
    enterprises
        FROM SNMPv2-SMI;
```

```
cisco MODULE-IDENTITY
    LAST-UPDATED    "201601150000Z"
    ORGANIZATION    "Cisco Systems, Inc."
    CONTACT-INFO
            "Cisco Systems
            Customer Service
            Postal: 170 West Tasman Drive
            San Jose, CA  95134
            USA
            Tel: +1 800 553-NETS
            E-mail: cs-snmp@cisco.com"
    DESCRIPTION
        "The Structure of Management Information for the
        Cisco enterprise."
    REVISION        "201601150000Z"
    DESCRIPTION
        "Added ciscoLDAP under cisco"
    REVISION        "201208290000Z"
    DESCRIPTION
        "Added ciscoSMB under otherEnterprises"
    REVISION        "200902030000Z"
    DESCRIPTION
        "Added ciscoSB under otherEnterprises"
    REVISION        "200203210000Z"
    DESCRIPTION
        "Added ciscoPKI for PKI policy and extension OIDs"
    REVISION        "200105220000Z"
    DESCRIPTION
        "Added transport protocol domains."
    REVISION        "200011012246Z"
    DESCRIPTION
        "Added ciscoDomains to define new transports.  Also added
        ciscoCpeCIB, which will contain managed objects that
        contribute to the CPE Configuration Information Base (CIB)."
    REVISION        "200001110000Z"
    DESCRIPTION
        "Added ciscoPolicy, ciscoPolicyAuto, ciscoPIB, and
        ciscoPibToMib."
    REVISION        "9704090000Z"
    DESCRIPTION
```

```
        "Added ciscoPartnerProducts to generate sysObjectID
        for partner platforms"
    REVISION        "9505160000Z"
    DESCRIPTION
        "New oid assignments for Cisco REPEATER MIB and others."
    REVISION        "9404262000Z"
    DESCRIPTION
        "Initial version of this MIB module."
    ::= { enterprises 9 }
-- assigned by IANA
ciscoProducts OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoProducts is the root OBJECT IDENTIFIER from
        which sysObjectID values are assigned.  Actual
        values are defined in CISCO-PRODUCTS-MIB."
    ::= { cisco 1 }
local OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "Subtree beneath which pre-10.2 MIBS were built."
    ::= { cisco 2 }
temporary OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "Subtree beneath which pre-10.2 experiments were
        placed."
    ::= { cisco 3 }
pakmon OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "reserved for pakmon"
    ::= { cisco 4 }
workgroup OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "subtree reserved for use by the Workgroup Business Unit"
    ::= { cisco 5 }
otherEnterprises OBJECT-IDENTITY
    STATUS          current
```

```
    DESCRIPTION
        "otherEnterprises provides a root object identifier
        from which mibs produced by other companies may be
        placed.  mibs produced by other enterprises are
        typicially implemented with the object identifiers
        as defined in the mib, but if the mib is deemed to
        be uncontrolled, we may reroot the mib at this
        subtree in order to have a controlled version."
    ::= { cisco 6 }
ciscoSB OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoSB provides root Object Identifier for Management
        Information Base for products of Cisco Small Business.
        This includes products rebranded from linksys aquisition.
        MIB numbers under this root are managed and controlled
        by ciscosb_mib@cisco.com."
    ::= { otherEnterprises 1 }
ciscoSMB OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoSMB provides root Object Identifier for Management
        Information Base for products of Cisco built for Small and
        Medium Business market.The MIB numbers under this root are
        managed and controlled by ciscosmb_mib@cisco.com"
    ::= { otherEnterprises 2 }
ciscoAgentCapability OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoAgentCapability provides a root object identifier
        from which AGENT-CAPABILITIES values may be assigned."
    ::= { cisco 7 }
ciscoConfig OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoConfig is the main subtree for configuration mibs."
    ::= { cisco 8 }
ciscoMgmt OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
```

```
        "ciscoMgmt is the main subtree for new mib development."
    ::= { cisco 9 }
ciscoExperiment OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoExperiment provides a root object identifier
        from which experimental mibs may be temporarily
        based.  mibs are typicially based here if they
        fall in one of two categories
        1) are IETF work-in-process mibs which have not
        been assigned a permanent object identifier by
        the IANA.
        2) are cisco work-in-process which has not been
        assigned a permanent object identifier by the
        cisco assigned number authority, typicially because
        the mib is not ready for deployment.
        NOTE WELL:  support for mibs in the ciscoExperiment
        subtree will be deleted when a permanent object
        identifier assignment is made."
    ::= { cisco 10 }
ciscoAdmin OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoAdmin is reserved for administratively assigned
        OBJECT IDENTIFIERS, i.e. those not associated with MIB
        objects"
    ::= { cisco 11 }
ciscoModules OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoModules provides a root object identifier
        from which MODULE-IDENTITY values may be assigned."
    ::= { cisco 12 }
lightstream OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "subtree reserved for use by Lightstream"
    ::= { cisco 13 }
ciscoworks OBJECT-IDENTITY
    STATUS          current
```

```
    DESCRIPTION
        "ciscoworks provides a root object identifier beneath
        which mibs applicable to the CiscoWorks family of network
        management products are defined."
    ::= { cisco 14 }
newport OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "subtree reserved for use by the former Newport Systems
        Solutions, now a portion of the Access Business Unit."
    ::= { cisco 15 }
ciscoPartnerProducts OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoPartnerProducts is the root OBJECT IDENTIFIER from
        which partner sysObjectID values may be assigned. Such
        sysObjectID values are composed of the ciscoPartnerProducts
        prefix, followed by a single identifier that is unique for
        each partner, followed by the value of sysObjectID of the
        Cisco product from which partner product is derived.  Note
        that the chassisPartner MIB object defines the value of the
        identifier assigned to each partner."
    ::= { cisco 16 }
ciscoPolicy OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoPolicy is the root of the Cisco-assigned OID
        subtree for use with Policy Management."
    ::= { cisco 17 }
-- Note that 1.3.6.1.4.1.9.17.1 is currently unassigned
ciscoPIB OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoPIB is the root of the Cisco-assigned OID
        subtree for assignment to PIB (Policy Information
        Base) modules."
    ::= { ciscoPolicy 2 }
ciscoPolicyAuto OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
```

```
        "ciscoPolicyAuto is the root of the Cisco-assigned
        OID subtree for OIDs which are automatically assigned
        for use in Policy Management."
    ::= { cisco 18 }
-- Note that 1.3.6.1.4.1.9.18.1 is currently unassigned
ciscoPibToMib OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoPibToMib is the root of the Cisco-assigned
        OID subtree for MIBs which are algorithmically
        generated/translated from Cisco PIBs with OIDs
        assigned under the ciscoPIB subtree.
        These generated MIBs allow management
        entities (other the current Policy Server) to
        read the downloaded policy.  By convention, for PIB
        'ciscoPIB.x', the generated MIB shall have the
        name 'ciscoPibToMib.x'."
    ::= { ciscoPolicyAuto 2 }
ciscoDomains OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoDomains provides a root object identifier from which
        different transport mapping values may be assigned."
    ::= { cisco 19 }
ciscoCIB OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoCIB is the root of the Cisco-assigned OID subtree for
        assignment to MIB modules describing managed objects that
        part of the CPE automatic configuration framework."
    ::= { cisco 20 }
ciscoCibMmiGroup OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoCibMmiGroup is the root of the Cisco-assigned OID
        subtree for assignment to MIB modules describing managed
        objects supporting the Modem Management Interface (MMI),
        the interface that facilitates CPE automatic configuration."
    ::= { ciscoCIB 1 }
ciscoCibProvGroup OBJECT-IDENTITY
```

```
    STATUS          current
    DESCRIPTION
        "ciscoCibStoreGroup is the root of the Cisco-assigned OID
        subtree for assignment to MIB modules describing managed
        objects contributing to the Configuration Information Base
        (CIB)."
    ::= { ciscoCIB 2 }
ciscoPKI OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoPKI is the root of cisco-assigned OID subtree for PKI
        Certificate Policies and Certificate Extensions."
    ::= { cisco 21 }
ciscoLDAP OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoLDAP is the root of the Cisco-assigned OID
        subtree for assignment to LDAP (Lightweight Directory
        Access Protocol) modules."
    ::= { cisco 22 }
-- ciscoAdmin assignments follow
ciscoProxy OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoProxy OBJECT IDENTIFIERS are used to uniquely name
        party mib records created to proxy for SNMPv1."
    ::= { ciscoAdmin 1 }
ciscoPartyProxy  OBJECT IDENTIFIER
    ::= { ciscoProxy 1 }
ciscoContextProxy  OBJECT IDENTIFIER
    ::= { ciscoProxy 2 }
-- Administrative assignments for repeaters
ciscoRptrGroupObjectID OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "ciscoRptrGroupObjectID OBJECT IDENTIFIERS are used to
        uniquely identify groups of repeater ports for use by the
        SNMP-REPEATER-MIB (RFC 1516) rptrGroupObjectID object."
    ::= { ciscoAdmin 2 }
ciscoUnknownRptrGroup OBJECT-IDENTITY
```

```
    STATUS          current
    DESCRIPTION
        "The identity of an unknown repeater port group."
    ::= { ciscoRptrGroupObjectID 1 }
cisco2505RptrGroup OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The authoritative identity of the Cisco 2505 repeater
        port group."
    ::= { ciscoRptrGroupObjectID 2 }
cisco2507RptrGroup OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The authoritative identity of the Cisco 2507 repeater
        port group."
    ::= { ciscoRptrGroupObjectID 3 }
cisco2516RptrGroup OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The authoritative identity of the Cisco 2516 repeater
        port group."
    ::= { ciscoRptrGroupObjectID 4 }
ciscoWsx5020RptrGroup OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The authoritative identity of the wsx5020 repeater
        port group."
    ::= { ciscoRptrGroupObjectID 5 }
-- Administrative assignments for chip sets
ciscoChipSets OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "Numerous media-specific MIBS have an object, defined as
        an OBJECT IDENTIFIER, which is the identity of the chipset
        realizing the interface.  Cisco-specific chipsets have their
        OBJECT IDENTIFIERS assigned under this subtree."
    ::= { ciscoAdmin 3 }
ciscoChipSetSaint1 OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
```

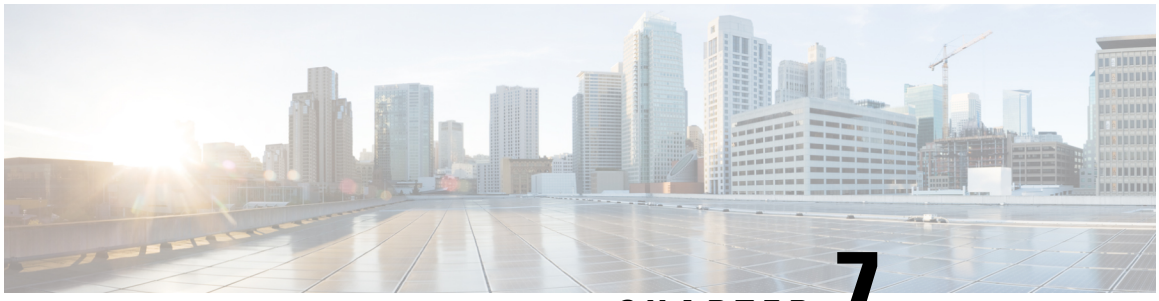
```
        "The identity of the Rev 1 SAINT ethernet chipset
        manufactured for cisco by LSI Logic."
    ::= { ciscoChipSets 1 }
ciscoChipSetSaint2 OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The identity of the Rev 2 SAINT ethernet chipset
        manufactured for cisco by LSI Logic."
    ::= { ciscoChipSets 2 }
ciscoChipSetSaint3 OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The identity of the Rev 3 SAINT ethernet chipset
        manufactured for cisco by Plessey."
    ::= { ciscoChipSets 3 }
ciscoChipSetSaint4 OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The identity of the Rev 4 SAINT ethernet chipset
        manufactured for cisco by Mitsubishi."
    ::= { ciscoChipSets 4 }
-- Transport protocol domains
--
-- The textual conventions for these domains are defined in CISCO-TM.
ciscoTDomains  OBJECT IDENTIFIER
    ::= { ciscoDomains 99999 }
ciscoTDomainUdpIpv4 OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The UDP over IPv4 transport domain.  The corresponding
        transport address is of type CiscoTAddressIPv4."
    ::= { ciscoTDomains 1 }
ciscoTDomainUdpIpv6 OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The UDP over IPv6 transport domain.  The corresponding
        transport address is of type CiscoTAddressIPv6 for global IPv6
        addresses and CiscoTAddressIPv6s for scoped IPv6 addresses."
    ::= { ciscoTDomains 2 }
ciscoTDomainTcpIpv4 OBJECT-IDENTITY
```

```
    STATUS          current
    DESCRIPTION
        "The TCP over IPv4 transport domain.  The corresponding
        transport address is of type CiscoTAddressIPv4."
    ::= { ciscoTDomains 3 }
ciscoTDomainTcpIpv6 OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The TCP over IPv6 transport domain.  The corresponding
        transport address is of type CiscoTAddressIPv6 for global IPv6
        addresses and CiscoTAddressIPv6s for scoped IPv6 addresses."
    ::= { ciscoTDomains 4 }
ciscoTDomainLocal OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The Posix Local IPC transport domain. The corresponding
        transport address is of type CiscoTAddressLocal.  The Posix
        Local IPC transport domain incorporates the well known UNIX
        domain sockets."
    ::= { ciscoTDomains 5 }
ciscoTDomainClns OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The CLNS transport domain.  The corresponding transport
        address is of type CiscoTAddressOSI."
    ::= { ciscoTDomains 6 }
ciscoTDomainCons OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The CONS transport domain.  The corresponding transport
        address is of type CiscoTAddressOSI."
    ::= { ciscoTDomains 7 }
ciscoTDomainDdp OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The DDP transport domain.  The corresponding transport
        address is of type CiscoTAddressNBP."
    ::= { ciscoTDomains 8 }
ciscoTDomainIpx OBJECT-IDENTITY
    STATUS          current
```

```
    DESCRIPTION
        "The IPX transport domain.  The corresponding transport
        address is of type CiscoTAddressIPX."
    ::= { ciscoTDomains 9 }
ciscoTDomainSctpIpv4 OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The SCTP over IPv4 transport domain.  The corresponding
        transport address is of type CiscoTAddressIPv4."
    REFERENCE
        "RFC 2960 - Stream Control Transmission Protocol. R. Stewart,
        Q. Xie, K. Morneault, C. Sharp, H. Schwarzbauer, T. Taylor,
        I. Rytina, M. Kalla, L. Zhang, V. Paxson. October 2000."
    ::= { ciscoTDomains 10 }
ciscoTDomainSctpIpv6 OBJECT-IDENTITY
    STATUS          current
    DESCRIPTION
        "The SCTP over IPv6 transport domain.  The corresponding
        transport address is of type CiscoTAddressIPv6 for global IPv6
        addresses and CiscoTAddressIPv6s for scoped IPv6 addresses."
    REFERENCE
        "RFC 2960 - Stream Control Transmission Protocol. R. Stewart,
        Q. Xie, K. Morneault, C. Sharp, H. Schwarzbauer, T. Taylor,
        I. Rytina, M. Kalla, L. Zhang, V. Paxson. October 2000."
    ::= { ciscoTDomains 11 }
END
```

PART I

# SMI Cluster Manager Configuration Command Reference



CHAPTER 7

# Clusters Configuration Command Reference

This chapter describes the CLI commands that are used to configure a cluster environment and subsequent preferences for corresponding nodes. Use the following commands to also configure software package parameters and for node-specific OS and Kubernetes management.

Some keywords and commands are common across multiple commands and configuration modes respectively. Use the information in the Command Modes section only as a reference to navigate to the command in the applicable configuration modes.

# clusters

Configures the cluster environment.

## Command Modes

Exec > Global Configuration (config)

## Syntax Description

**clusters** *cluster_name* **environment** *environment_name*

**enviroment *environment_name***

Specify the environment used to deploy.

***cluster_name***

Specify the name used to uniquely identify the cluster.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

## Usage Guidelines

Use this command to configure clusters enviroment.

# clusters actions k8s cluster-status

Displays the overall status of the cluster.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`actions k8s cluster-status`**

**Usage Guidelines** Use this command to view the overall status of the cluster.

# clusters actions show info

Displays the TCP, UDP, NTP, and log-level information for the clusters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`actions show info { log-level`** *`log_level`* **`| ntp-info { false | true } | tcp-connections { false | true } | udp-connections { false | true } }`**

**log-level *log_level***

Specify the log level.

Must be one of the following:

- **CRITICAL**
- **DEBUG**
- **ERROR**
- **INFO**
- **WARNING**

Default Value: INFO.

**ntp-info { false | true }**

Specify whether to display the NTP clock server information.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**tcp-connections { false | true }**

Specify whether to fetch TCP services and connections.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**udp-connections { false | true }**

Spewcify whether to fetch UDP services and connections.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**Usage Guidelines** Use this command to view the TCP, UDP, NTP, and log-level information for the clusters.

# clusters actions show logs

Displays the cluster configuration logs.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** `actions show logs`

**Usage Guidelines** Use this command to view the cluster configuration logs.

# clusters actions sync cancel

Cancels cluster synchronization.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** `actions sync cancel`

**Usage Guidelines** Use this command to cancel cluster synchronization.

# clusters actions sync logs

Displays the cluster synchronization logs.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** `actions sync logs`

**Usage Guidelines** Use this command to view the cluster synchronization logs.

# clusters actions sync run

Runs cluster synchronization.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

```
run { ansible-strategy ansible_strategy | debug { false | true } |
force-partition-redeploy { false | true } | purge-data-disks { false |
true } | reset-k8s-nodes { false | true } | sync-phase sync_phase |
upgrade-strategy upgrade_strategy | vm-redeploy { false | true } }
```

**ansible-strategy *ansible_strategy***

Specify the Ansible strategy for synchronization.

Must be one of the following:

- **free**
- **linear**

Default Value: linear.

**debug { false | true }**

Specfy whether to debug.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**force-partition-redeploy { false | true }**

Specify whether to force redeploying the partition.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**purge-data-disks { false | true }**

Specify whether to purge data disks.

Must be one of the following:

- **false**

- **true**

Default Value: false.

**reset-k8s-nodes { false | true }**

Specify whether to reset the K8s nodes.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**sync-phase *sync_phase***

Specify the synchronization phase.

Must be one of the following:

- **all**
- **distributed-registry**
- **netplan**
- **opscenter**
- **server-check**

Default Value: all.

**upgrade-strategy *upgrade_strategy***

Specify the upgrade strategy.

Must be one of the following:

- **auto**
- **concurrent**: Concurrent upgrade
- **rolling**: Rolling upgrade

Default Value: auto.

**vm-redeploy { false | true }**

Specify whether to redeploy the VM.

Must be one of the following:

- **false**
- **true**

Default Value: **false**

**Usage Guidelines** Use this command to run cluster synchronization.

# clusters actions sync status

Displays the cluster synchronization status.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`status`**

**Usage Guidelines** Use this command to view the cluster synchronization status.

# clusters actions validate-cluster logs

Displays the validate cluster logs.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`actions validate-cluster logs`**

**Usage Guidelines** Use this command to view the validate cluster logs.

# clusters actions validate-cluster run

Runs cluster validation.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`actions validate-cluster run log-level`** *`log_level`*

**log-level *log_level***

Specify the log level.

Must be one of the following:

- **CRITICAL**: Critical.
- **DEBUG**: Debug.
- **ERROR**: Error.
- **INFO**: Info.
- **WARNING**: Warning.

Default Value: INFO.

**Usage Guidelines** Use this command to run cluster validation.

# clusters actions validate-config logs

Displays the validate cluster logs.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`actions validate-config logs`**

**Usage Guidelines** Use this command to view the validate cluster logs.

# clusters actions validate-config run

Validates the cluster configuration.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`run { k8s-node-checks { false | true } | log-level log-level`** *`log_level`* **`| netplan { false | true } | ntp { false | true } | proxy { false | true } | ssh { false | true } | vmware-checks { false | true } | k8s-label-checks { false | true } | vip-checks { false | true } }`**

**k8s-label-checks { false | true }**

Validates that the K8s nodes satisfy OAM label requirements.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**k8s-node-checks { false | true }**

Validates the K8s nodes configuration size.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**log-level *log_level***

Specify the log-level.

Must be one of the following:

- **CRITICAL**

- **DEBUG**
- **ERROR**
- **INFO**
- **WARNING**

Default Value: INFO.

**netplan { false | true }**

Validates the netplan configuration.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**ntp { false | true }**

Validates the NTP server configuration.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**proxy { false | true }**

Validates the proxy server configuration.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**ssh { false | true }**

Validates the SSH configuration.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**vip-checks { false | true }**

Validates that no VIP is assigned to more than one virtual-ip groups.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**vmware-checks { false | true }**

Validates the vcenter, datastore, and host configuration before synchronzing.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**Usage Guidelines** Use this command to validate the cluster configuration.

# clusters addons cilium

Configure the Cilium addon.

**Important** This command is deprecated in 2024.02.1 and later releases.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** `addons cilium { enabled | disabled }`

**cilium { enabled | disabled }**

Specify to enable or disable the Cilium addon.

**Usage Guidelines** Use this command to configure the Cilium addon. Cilium must be installed as K8s addon on top of Calico.

# clusters addons cpu-partitioner

Configures the CPU Partitioner addon.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** `addons cpu-partitioner { disabled | enabled }`

**enabled**

Specify whether to enable or disable the distributed-registry.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**tier *tier***

Specify the tier.

Must be one of the following:

- **large**
- **medium**
- **small**

Default Value: medium.

**Usage Guidelines** Use this command to configure the CPU Partitioner addon. Addons implement kubernetes basic functionality like Ingress and other functionality expected to be provided by the kubernetes cluster.

# clusters addons distributed-registry

Configures the Ingress host name to be set to the registry.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`distributed-registry ingress-hostname`** *`ingress_host_name`*

**ingress-hostname *ingress_host_name***

Specify the ingress hostname to be set to the registry, *ip_address*.nip.io or abc.com.

Must be a string.

**Usage Guidelines** Addons implement kubernetes basic functionality like Ingress and other functionality expected to be provided by the kubernetes cluster. Use this command to configure the ingress host name to be set to the registry.

# clusters addons ingress

Configures the Ingress addon.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

**ingress service-type { bind-ip-address-internal** *ip_address* **| bind-ip-address** *ip_address* **| enabled { false | true } | failure-threshold** *failure_threshold* **| timeout-seconds** *timeout_duration* **}**

**bind-ip-address-internal *ip_address***

Specify the internal bind IP address.

**bind-ip-address *ip_address***

Specify the IP address for binding.

**enabled { false | true }**

Specify whether to enable or disable.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**failure-threshold *failure_threshold***

Specify the failure threshold.

Must be an integer.

Default Value: 3.

**timeout-seconds *timeout_duration***

Specify the timeout in seconds.

Must be an integer.

Default Value: 1.

**Usage Guidelines**

Use this command to configure the Ingress addon. Addons implement kubernetes basic functionality like Ingress and other functionality expected to be provided by the kubernetes cluster.

# clusters addons istio

Configures the Istio addon.

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

**addons istio enabled { false | true }**

**istio enabled { false | true }**

Specify whether to enable or disable the Istio addon. To enable, set to true.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**Usage Guidelines** Use this command to configure the Istio addon. Addons implement kubernetes basic functionality like Ingress and other functionality expected to be provided by the kubernetes cluster.

# clusters addons kubernetes-dashboard

Configures the Kubernetes Dashboard addon.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`addons kubernetes-dashboard enabled { false | true }`**

**enabled { false | true }**

Specify whether to enable or disable the Kubernetes dashboard.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**Usage Guidelines** Use this command to configure the Kubernetes Dashboard addon. Addons implement kubernetes basic functionality like Ingress and other functionality expected to be provided by the kubernetes cluster.

# clusters addons network

Configures the Network addon.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`addons network type`** *`network_type`*

**type *network_type***

Specify the network type.

Must be one of the following:

- **calico**

Default Value: calico.

**Usage Guidelines** Use this command to configure the Network addon. Addons implement kubernetes basic functionality like Ingress and other functionality expected to be provided by the kubernetes cluster.

# clusters addons secure-access

Configures the access of OS users to the SMI cluster upon login.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`addons secure-access [ enabled | disabled ]`**

**secure-access [ enabled | disabled ]**

Specify to enable or disable secure access.

By default, secure access is disabled to reduce resource usage in the K8s cluster.

**Usage Guidelines** Use this command to manage the access of OS users to the SMI cluster upon login. Only the access controller pod on the active master will run and manage user access.

# clusters auto-sync

Configures auto-sync parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`clusters auto-sync lock-to-version`** *`lock_to_version`*

**lock-to-version *lock_to_version***

If the current cluster manager version (show version) matches this version, then the auto-sync applies.

Must be a string.

**Usage Guidelines** Use this command to configure auto-sync parameters.

# clusters auto-sync upgrade-cm-version

Upgrades the cluster to the current Cluster Manager version.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`auto-sync upgrade-cm-version`**

**Usage Guidelines** Use this command to upgrade the cluster to the current Cluster Manager version.

# clusters cluster-manager

Allows installation of cluster-manager onto a cluster.

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

**cluster-manager { enabled { false | true } | ingress-hostname** *ingress_host_name* **| iso-download-ip** *ip_address* **| netconf-ip** *ip_address* **| netconf-port** *port_number* **| password** *repo_password* **| repository-local** *cluster_manager_cnf* **| repository** *product_chart_repo_url* **| ssh-port** *port_number* **| username** *repo_user_name* **}**

**enabled { false | true }**

Specify whether to enable or disable cluster-manager installation.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**ingress-hostname *ingress_host_name***

Specify the ingress host name to be set to the Cluster Manager in the format *ip-address*.nip.io or abc.com.

Must be a string.

**iso-download-ip *ip_address***

Specify the existing IP address to be bound for direct ISO download.

**netconf-ip *ip_address***

Specify the NETCONF IP address for the Ops Center.

**netconf-port *port_number***

Specify the NETCONF port number for the Ops Center.

Must be an integer.

Default Value: 830.

**password *repo_password***

Specify the password if any to log into the repository.

**repository-local *cluster_manager_cnf***

Specify the Cluster Manager CNF.

**repository *product_chart_repo_url***

Specify the product chart repo URL. See conforming rules in RFC 3305, RFC 3986, RFC 3966, RFC 4694, RFC 4759, RFC 4904, and RFC 5017.

**ssh-port *port_number***

Specify the SSH port number for Ops Center.

Must be an integer.

Default Value: 2022.

**username *repo_user_name***

Specify the user name if any to log into the repository.

Must be a string.

**Usage Guidelines** Use this command to install cluster-manager onto a cluster.

# clusters cluster-manager initial-boot-parameters

Configures the initial boot parameters for helm chart deployment.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`initial-boot-parameters { first-boot-password`** *`password`* **`| kube-control-plane-ip`** *`ssh_ip_address`* **`}`**

**first-boot-password *password***

Specify the initial boot password for the Cluster Manager CLI.

**kube-control-plane-ip *ssh_ip_address***

Specify the SSH IP address for Cluster Manager Ops Center.

**Usage Guidelines** Use this command to configure the initial boot parameters for helm chart deployment.

# clusters cluster-manager initial-boot-parameters image-pull-secrets

Configures the image pull secret.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`image-pull-secrets`** *`image_pull_secret_name`*

***image_pull_secret_name***

Specify the name of the image pull secret.

Must be a string.

**Usage Guidelines** Use this command to configure the image pull secret.

# clusters cluster-manager proxy

Enables a proxy for accessing online repositories.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **proxy ip** *ip_address*

**ip *ip_address***

Specify the proxy's IP address.

**Usage Guidelines** Use this command to enable a proxy for accessing online repositories.

# clusters configuration

Configures the kubernetes cluster-wide configurations.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **configuration { additional-master-virtual-ip-cidr** *cidr_notation_netmask* **| additional-master-virtual-ip** *ip_address* **| additional-master-virtual-ipv6-cidr** *cidr_notation_netmask* **| additional-master-virtual-ipv6** *ipv6_address* **| addtional-master-virtual-ip-interface** *string* **| allow-insecure-registry { false | true } | customization-image** *docker_image* **| default-not-ready-toleration** *notready_toleration_time* **| default-unreachable-toleration** *unreachable_toleration_time* **| docker-ipv6-cidr** *ipv6_cidr_docker_subnet* **| enable-pod-security-policy { false | true } | enable-wireguard { false | true } | ipv6-mode** *ipv6_mode* **| keepalived-auth** *aes_encrypted_string* **| master-keepalived-multicast { false | true } | master-virtual-ip-cidr** *cidr_notation* **| master-virtual-ip-interface** *ethernet_interface* **| master-virtual-ip** *ip_address* **| master-virtual-ipv6-cidr** *cidr_notation_netmask* **| master-virtual-ipv6** *ipv6_address* **| node-monitor-grace-period** *grace_period* **| node-monitor-period** *monitor_period* **| node-status-update-frequency** *update_frequency* **| pod-subnet-ipv6** *ipv6_pod_subnet* **| pod-subnet** *pod_subnet* **| restrict-logging { false | true } | service-subnet-ipv6** *ipv6_service_subnet* **| service-subnet** *service_subnet* **| size** *cluster_size* **| virtual-ip-vrrp-router-id** *vrrp_router_id* **| calico-ipv6-cidr** *calico_ipv6_cidr* **}**

**additional-master-virtual-ip-cidr *cidr_notation_netmask***

Specfies the CIDR notation (netmask) of additional master virtual IP.

Must be an integer in the range of 0-32.

Default Value: 32.

**additional-master-virtual-ip *ip_address***

Specfies the virtual IPv4 address used to provide additional access to the HA kubernetes masters. This must be set on initial cluster creation.

**additional-master-virtual-ipv6-cidr *cidr_notation_netmask***

Specify the CIDR notation (netmask) of additional-master-virtual-ipv6.

Must be an integer in the range of 0-120.

Default Value: 112.

**additional-master-virtual-ipv6 *ipv6_address***

Specify the virtual IPv6 address used to provide additional access to the HA kubernetes masters. This must be set on initial cluster creation.

**addtional-master-virtual-ip-interface *string***

Specify the ethernet interface to which the additional master IP will be assigned. This will correspond to netplan network IDs.

Must be a string.

Default Value: ens192.

**allow-insecure-registry { false | true }**

Specify whether to allow the use of insecure docker and helm registries.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**calico-ipv6-cidr *calico_ipv6_cidr***

Specify the Calico IPv6 CIDR.

**customization-image *docker_image***

Specify the Docker image to use for customizing the VMs deployed in the cluster.

Must be a string.

**default-not-ready-toleration *notready_toleration_time***

Specify the pod eviction toleration time when the node is not ready, in seconds.

Default value: 30 seconds

**default-unreachable-toleration *unreachable_toleration_time***

Specify the pod eviction toleration time when the node is unreachable, in seconds.

Default value: 30 seconds

**docker-ipv6-cidr *ipv6_cidr_docker_subnet***

Specify the fixed IPv6 CIDR docker subnet.

Default Value: fd00::/80.

**enable-pod-security-policy { false | true }**

Specify whether to enable or disable pod security policy.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**enable-wireguard { false | true }**

Specify whether to enable or disable Wireguard.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**error-on-automatic-rolling-upgrade { false | true }**

Specify whether to allow or block automatic base image or firmware based rolling upgrades.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**ipv6-mode *ipv6_mode***

Specify whether to allow dual-stack pod and service subnets.

Must be one of the following:

- **dual-stack**
- **none**

Default Value: none.

**keepalived-auth *aes_encrypted_string***

Specify the authentication password for Keepalived.

Default Value: 4be37dc3b4c90194d1600c483e10ad1d.

**master-keepalived-multicast { false | true }**

Specify whether to enable or disable master keepalived multicast.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**master-virtual-ip-cidr *cidr_notation***

Specify the CIDR notation of the additional master virtual IP.

Must be an integer in the range of 0-32.

Default Value: 32.

**master-virtual-ip-interface *ethernet_interface***

Specify the ethernet interface to which the master IP will be assigned.

Must be a string.

Default Value: ens192.

**master-virtual-ip *ip_address***

Specify the virtual IPv4 address used to make the kubernetes masters Highly Available (HA).

**master-virtual-ipv6-cidr *cidr_notation_netmask***

Specify the CIDR notation (netmask) of additional-master-virtual-ipv6.

Must be an integer in the range of 0-112.

Default Value: 112.

**master-virtual-ipv6 *ipv6_address***

Specify the virtual IPv6 address used to make the kubernetes masters HA. This must be set on initial cluster creation.

**node-monitor-grace-period *grace_period***

Specify the node to be marked unhealthy after a period that it became unresponsive, in seconds.

Default value: 40 seconds

**node-monitor-period *monitor_period***

Specify the period for syncing NodeStatus in NodeController, in seconds.

Default value: 5 seconds

**node-status-update-frequency *update_frequency***

Specify the node status update interval from kubelet to kube-controller, in seconds.

Default value: 10 seconds

**pod-subnet-ipv6 *ipv6_pod_subnet***

Specify the the IPv6 pod subnet to configure k8s and calico.

Default Value: fd20::0/112.

**pod-subnet *pod_subnet***

Specify the pod subnet to configure k8s and calico.

Default Value: 192.168.0.0/16.

**restrict-logging { false | true }**

Specify whether to allow logging of critical information on failure for debugging purposes.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**Note** It's recommended to always set **restrict-logging** to **true**. Setting it to false is not secure and could result in unauthorized access to critical user data.

**service-subnet-ipv6 *ipv6_service_subnet***

Specify the the IPv6 service subnet to configure k8s and calico.

Default Value: fd40::0/112.

**service-subnet *service_subnet***

Specify the service subnet to configure k8s and calico.

Default Value: 10.96.0.0/12.

**size *cluster_size***

Specify the cluster size.

Must be one of the following:

- **functional-test-aio**
- **functional-test-ha**
- **production**

Default Value: production.

**virtual-ip-vrrp-router-id *vrrp_router_id***

Specify the VRRP router ID. If multiple instances of VRRP are in use on the same subnet, router ID must be unique. This is typically needed if running multiple SMI k8s clusters in the same subnet. Issues will show up with virtual IP not binding properly.

Must be an integer in the range of 1-255.

**Usage Guidelines** Use this command to configure the kubernetes cluster-wide configurations.

# clusters configuration cilium

Configure Cilium on the K8s cluster.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`configuration cilium { enabled | disabled }`**

**configuration { enabled | disabled }**

Specify to enable or disable Cilium.

**Usage Guidelines** Use this configuration to enable Cilium in chaining mode with Calico. The command is disabled by default.

# clusters configuration docker-address-pools

Configures the default docker bridge network address pools.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`configuration docker-address-pools pool-name`** *`docker_bridge_address_pool_name`* **`[ base`** *`docker_bridge_subnet`* **`| size`** *`size`* **`]`**

**base *docker_bridge_subnet***

Specify the docker bridge subnet.

Default Value: 172.17.0.0/16.

**pool-name *docker_bridge_address_pool_name***

Specify the pool name of the docker bridge address pool.

Must be a string.

**size *size***

Specify the size. For example, 16, 24, etc.

Must be an integer in the range of 8-24.

Default Value: 24.

**Usage Guidelines** Use this command to configure the default docker bridge network address pools.

# clusters node-defaults

Configures the default configuration that applies to all nodes. All options are overridable at the node level.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`clusters node-defaults ssh-username`** *`user_name`* **`ssh-connection-private-key`** *`private_key`*

**host-profile *host_profile_name***

Specify the customizable tuning details package.

**ssh-connection-private-key *private_key***

Specify the SSH private key used for connecting to the node.

**ssh-username *user_name***

Specify the SSH user name used for connecting to the node.

Must be a string.

**Usage Guidelines** Use this command to configure the default configuration that applies to all nodes. All options are overridable at the node level.

# clusters node-defaults initial-boot

Configures the initial boot parameters for the node.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults initial-boot { default-user`** *`default_user_name`* **`| default-user-password`** *`default_user_password`* **`| default-user-ssh-public-key`** *`default_user_ssh_public_key`* **`}`**

**default-user-password *default_user_password***

Specify the password for the default user.

**default-user-ssh-public-key *default_user_ssh_public_key***

Specify the public keys allowed to connect via SSH for the default user.

Must be a string.

**default-user *default_user_name***

Specify the default user created when this node is deployed.

Must be a string.

**default-user-password-expiration-days *default_user_password_expiration_days***

Specify the password expiration days for the default user.

Must be an integer in the range of 1-9999.

**Usage Guidelines** Use this command to configure the initial boot parameters for the node. Cloud-init configurations that only take effect on initial boot of OS and will not cause respin without other changes.

# clusters node-defaults initial-boot netplan

Configures initial boot netplan parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`netplan renderer`** *`renderer_type`*

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure initial boot netplan parameters.

**Note** By default, **netplan** restricts the user to add and apply new IP addresses to the physical interfaces that are already used for bond interfaces.

# clusters node-defaults initial-boot netplan bonds

Configures netplan bonds device type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions bonds** *bond_name* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | device-id** *device_id* **| dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *id_list* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions bonds** *bond_name* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | device-id** *device_id* **| dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *id_list* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

#### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

#### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

#### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**interfaces *id_list***

Specify the ID list. All devices matching this ID list will be added to the bond.

Must be a string.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**Note** It is recommended to set MTU to the lowest path MTU.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the clusters bonds.

# clusters node-defaults initial-boot netplan bonds dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp4-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-defaults initial-boot netplan bonds dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-defaults initial-boot netplan bonds nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-defaults initial-boot netplan bonds optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-defaults initial-boot netplan bonds parameters

Configures customization parameters for special bonding options.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Syntax Description** **parameters { ad-select** *aggregation_selection_mode* **| all-slaves-active { false | true } | arp-interval** *arp_interval_value* **| arp-ip-targets** *ipv4_address* **| down-delay** *down_delay_interval* **| fail-over-mac-policy** *failover_mac_policy* **| gratuitous-arp** *arp_packets* **| lacp-rate** *lacp_rate* **| learn-packet-interval** *learn_packet_interval* **| mii-monitor-interval** *mii_monitor_interval* **| min-links** *minimum_links* **| mode** *bonding_mode* **| packets-per-slave** *packets_per_slave* **| primary-reselect-policy** *reselection_policy* **| primary** *primary_device* **| resend-igmp** *igmp_reports* **| transmit-hash-policy** *transmit_hash_policy* **| up-delay** *up_delay_interval* **}**

#### ad-select *aggregation_selection_mode*

Specify the aggregation selection mode.

Must be one of the following:

- **bandwidth**
- **count**
- **stable**

#### all-slaves-active { false | true }

Specify whether the bond should drop or deliver the duplicate frames received on inactive ports.

Must be one of the following:

- **false**
- **true**

#### arp-interval *arp_interval_value*

Specify the interval value for how to determine the frequency of ARP link monitoring.

Must be a string.

#### arp-ip-targets *ipv4_address*

Specify the IPs of other hosts on the link which should be sent ARP requests in order to validate that a slave is up.

#### down-delay *down_delay_interval*

Specify the delay before disabling a link once the link has been lost.

Must be a string.

**fail-over-mac-policy *failover_mac_policy***

Specify whether to set all slaves to the same MAC address when adding them to the bond, or how else the system should handle MAC addresses.

Must be one of the following:

- **active**
- **follow**
- **none**

**gratuitous-arp *arp_packets***

Specify the number of ARP packets to send after failover.

Must be an integer in the range of 1-255.

**lacp-rate *lacp_rate***

Specify the rate at which Link Aggregation Control Protocol Data Unit (LACPDU) are transmitted.

Must be one of the following:

- **fast**
- **slow**

**learn-packet-interval *learn_packet_interval***

Specify the interval between sending learning packets to each slave.

Must be a string.

**mii-monitor-interval *mii_monitor_interval***

Specify the interval for MII monitoring. That is, verifying if an interface of the bond has carrier.

Must be a string.

**min-links *minimum_links***

Specify the minimum number of link up in a bond to consider the bond interface to be up.

Must be an integer.

**mode *bonding_mode***

Specify the bonding mode used for the interfaces.

Must be one of the following:

- **802.3ad**
- **active-backup**
- **balance-alb**
- **balance-rr**

- **balance-tlb**
- **balance-xor**
- **broadcast**

**packets-per-slave *packets_per_slave***

Specify the number of packets to transmit on a slave before switching to the next.

Must be an integer in the range of 0-65535.

**primary-reselect-policy *reselection_policy***

Specify the reselection policy for the primary slave.

Must be one of the following:

- **always**
- **better**
- **failure**

**primary *primary_device***

Specify the device to be used as a primary slave, or preferred device to use as a slave for the bond, whenever it is available.

Must be a string.

**resend-igmp *igmp_reports***

Specify the number of IGMP membership reports issued on a failover event.

Must be an integer in the range of 0-255.

**transmit-hash-policy *transmit_hash_policy***

Specify the transmit hash policy for the selection of slaves.

Must be one of the following:

- **encap2+3**
- **encap3+4**
- **layer2+3**
- **layer2**
- **layer3+4**

**up-delay *up_delay_interval***

Specify the delay before enabling a link once the link is physically up.

Must be a string.

**Usage Guidelines** Use this command to configure customization parameters for special bonding options.

# clusters node-defaults initial-boot netplan bonds routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

**from *source_ip_address***

Specify the source IP address for traffic going through the route.

**metric *relative_priority_value***

Specify the relative priority of the route.

Must be an integer.

**on-link { false | true }**

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope *route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

## Usage Guidelines

Use this command to configure static routing for the device.

# clusters node-defaults initial-boot netplan bonds routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-defaults initial-boot netplan bridges

Configures netplan bridge type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions bridges** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *interface_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions bridges** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *interface_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**interfaces *interface_id***

Adds all the devices matching this ID to the bridge.

Must be a string.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**Note** It is recommended to set MTU to the lowest path MTU.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**

- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the bridge type.

# clusters node-defaults initial-boot netplan bridges dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

#### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-defaults initial-boot netplan bridges dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-routes { false | true }

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-defaults initial-boot netplan bridges nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-defaults initial-boot netplan bridges optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-defaults initial-boot netplan bridges parameters

Configures the customization parameters for special bridging options.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Syntax Description** **`parameters { ageing-time`** *`ageing_time`* **`| forward-delay`** *`forward_delay_period`* **`| hello-time`** *`hello_time_interval`* **`| max-age`** *`maximum_age`* **`| path-cost`** *`cost_of_path`* **`| post-port-priority`** *`post_port_priority_range`* **`| priority`** *`priority_value`* **`| stp { false | true } }`**

**ageing-time *ageing_time***

Specify the period of time to keep a MAC address in the forwarding database after a packet is received.

Must be a string.

**forward-delay *forward_delay_period***

Specify the period of time the bridge will remain in Listening and Learning states before getting to the Forwarding state.

Must be a string.

**hello-time *hello_time_interval***

Specify the interval between two hello packets being sent out from the root and designated bridges.

Must be a string.

**max-age *maximum_age***

Specify the maximum age of a hello packet.

Must be a string.

**path-cost *cost_of_path***

Specify the cost of a path on the bridge.

Must be a string.

**post-port-priority *post_port_priority_range***

Specify the port priority range.

Must be an integer in the range of 0-63.

**priority *priority_value***

Specify the priority value for the bridge.

Must be an integer.

**stp { false | true }**

Specify whether the bridge should use Spanning Tree protocol.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the customization parameters for special bridging options.

# clusters node-defaults initial-boot netplan bridges routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

**from *source_ip_address***

Specify the source IP address for traffic going through the route.

**metric *relative_priority_value***

Specify the relative priority of the route.

Must be an integer.

**on-link { false | true }**

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope *route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-defaults initial-boot netplan bridges routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-defaults initial-boot netplan ethernets

Configures netplan ethernets device type.

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

**node-defaults os netplan-additions ethernets** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description**

**os netplan-additions ethernets** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

#### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

#### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

#### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

#### device-id *device_id*

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure netplan ethernet dvice type.

# clusters node-defaults initial-boot netplan ethernets auth

Configures the authentication parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Syntax Description** **auth key-management** *key_management_mode* **[ ca-certificate** *path_to_trusted_ca_cert_file* **| client-certificate** *path_to_client_cert_file* **| client-key-password** *client_key_password* **| client-key** *path_to_client_key_file* **]**

**ca-certificate *path_to_trusted_ca_cert_file***

Specify the path to a file with one or more trusted Certificate Authority (CA) certificates.

Must be a string.

**client-certificate *path_to_client_cert_file***

Specify the path to a file containing the certificate to be used by the client during authentication.

Must be a string.

**client-key-password *client_key_password***

Specify the password to use to decrypt the private key specified in client-key if it is encrypted.

Must be a string.

**client-key *path_to_client_key_file***

Specify the path to a file containing the private key corresponding to client-certificate.

Must be a string.

**key-management *key_management_mode***

Specify the key management mode.

Must be one of the following:

- **802.1x**
- **none**

**Usage Guidelines** Use this command to configure the authentication parameters.

# clusters node-defaults initial-boot netplan ethernets dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**

- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

## Usage Guidelines

Use this command to override the default DHCP4 behavior.

# clusters node-defaults initial-boot netplan ethernets dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-defaults initial-boot netplan ethernets nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **nameservers { search** *domain_name* **| addresses** *ip_addresses* **}**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-defaults initial-boot netplan ethernets optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-defaults initial-boot netplan ethernets routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**

- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-defaults initial-boot netplan ethernets routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-defaults initial-boot netplan tunnels

Configures the tunnel mode.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions tunnels** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **ipv6-privacy { false | true } | link-local** *link_local_address* **| local** *ip_address* **| macaddress** *mac_address* **| mode** *tunnel_mode* **| mtu** *number_of_mtu* **| optional { false | true } | remote** *ip_address* **| renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions tunnels** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **ipv6-privacy { false | true } | link-local** *link_local_address* **| local** *ip_address* **| macaddress** *mac_address* **| mode** *tunnel_mode* **| mtu** *number_of_mtu* **| optional { false | true } | remote** *ip_address* **| renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**local *ip_address***

Specify the IP address of the local endpoint of the tunnel.

**macaddress *mac_address***

Specify the MAC address.

**mode *tunnel_mode***

Specify the tunnel mode.

Must be one of the following:

- **gre**
- **gretap**
- **ip6gre**
- **ip6gretap**
- **ip6ip6**
- **ipip6**
- **ipip**
- **isatap**
- **sit**
- **vti6**
- **vti**

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

It is recommended to set MTU to the lowest path MTU.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**remote *ip_address***

Specify the IP address of the remote endpoint of the tunnel.

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the tunnel mode.

# clusters node-defaults initial-boot netplan tunnels dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

#### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-defaults initial-boot netplan tunnels dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-defaults initial-boot netplan tunnels key

Configures the keys to use for the tunnel.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Syntax Description** **`key { input`** *`input_key`* **`| output`** *`output_key`* **`}`**

**input *input_key***

Specify the input key for the tunnel.

Must be a string.

**output *output_key***

Specify the output key for the tunnel.

Must be a string.

**Usage Guidelines** Use this command to configure the keys to use for the tunnel.

# clusters node-defaults initial-boot netplan tunnels nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-defaults initial-boot netplan tunnels optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-defaults initial-boot netplan tunnels routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope *route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-defaults initial-boot netplan tunnels routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-defaults initial-boot netplan vlans

Configures the Virtual LAN parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions vlans** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| id** *vlan_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| link** *interface_name* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions vlans** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| id** *vlan_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| link** *interface_name* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**id *vlan_id***

Specify the Virtual LAN ID.

Must be an integer in the range of 0-4094.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**link *interface_name***

Specify the interface name of the underlying device definition on which this VLAN gets created.

Must be a string.

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**Note** It is recommended to set MTU to the lowest path MTU.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the Virtual LAN parameters.

# clusters node-defaults initial-boot netplan vlans dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

#### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-defaults initial-boot netplan vlans dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-routes { false | true }

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-defaults initial-boot netplan vlans nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **nameservers { search** *domain_name* **| addresses** *ip_addresses* **}**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-defaults initial-boot netplan vlans optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-defaults initial-boot netplan vlans routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

#### table *table_number*

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

#### type *route_type*

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**

- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-defaults initial-boot netplan vlans routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

**routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines**

Use this command to configure policy routing for the device.

# clusters node-defaults k8s

Configures Kubernetes-specific parameters.

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

**node-defaults k8s { ssh-connection-password** *password* **| ssh-connection-private-key** *private_key* **| ssh-username** *user_name* **}**

**host-profile *host_profile_name***

Specify the customizable tuning details package.

**max-pods *max_pods***

Specify the maximum number of pods per node. Uses kubernetes default if not set.

Must be an integer in the range of 10-2000.

**ssh-connection-private-key *private_key***

Specify the SSH private key used for connecting to the node.

**ssh-username *user_name***

Specify the SSH user name used for connecting to the node.

Must be a string.

**Usage Guidelines** Use this command to configure Kubernetes-specific parameters.

# clusters node-defaults k8s cpu-manager

Configures CPU Manager parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

```
cpu-manager cpu-manager-policy cpu_manager_policy {
cpu-manager-reconcile-period cpu_manager_reconcile_period | system-reserved-cpu
 system_reserved_cpu | system-reserved-memory system_reserved_memory |
system-reserved-ephemeral-storage storage_memory | kube-reserved-cpu
kube_reserved_cpu | kube-reserved-memory kube_reserved_memory |
kube-reserved-ephemeral-storage kube_reserved_ephemeral_storage }
```

**cpu-manager-policy *cpu_manager_policy***

Specify the CPU Manager policy.

Must be one of the following:

- **none**
- **static**

Default Value: none.

**cpu-manager-reconcile-period *cpu_manager_reconcile_period***

Specify the CPU Manager reconciliation period. If not supplied, defaults to NodeStatusUpdateFrequency (default 10s) when policy is static.

Must be an integer in the range of 10-60.

Default Value: 10.

**kube-reserved-cpu *kube_reserved_cpu***

Specify the Kube-reserved CPU.

Must be of type decimal64, with 2 fraction digits in the range of 0-36.

Default Value: 1.

**kube-reserved-ephemeral-storage *kube_reserved_ephemeral_storage***

Specify the Kube-reserved ephemeral storage memory in GB.

Must be an integer in the range of 2-512.

Default Value: 2.

**kube-reserved-memory *kube_reserved_memory***

Specify the Kube-reserved memory in MB.

Must be an integer in the range of 2000-524288.

Default Value: 2000.

**system-reserved-cpu *system_reserved_cpu***

Specify the system-reserved CPU.

Must be of type decimal64, with 2 fraction digits in the range of 0-36.

Default Value: 1.

**system-reserved-ephemeral-storage *storage_memory***

Specify the system-reserved ephemeral storage memory in GB.

Must be an integer in the range of 2-512.

Default Value: 2.

**system-reserved-memory *system_reserved_memory***

Specify the system-reserved memory in MB.

Must be an integer in the range of 2000-524288.

Default Value: 2000.

**Usage Guidelines** Use this command to configure CPU Manager parameters.

# clusters node-defaults k8s node-labels

Configures k8s node labels.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`node-defaults k8s node-labels`** *`key value`*

***key***

Specify the prefix for the node label.

Must be a string in the k8s-keytype pattern. For information on the k8s-keytype pattern, see the *Input Pattern Types* chapter.

***value***

Specify the suffix for the node label.

Must be a string in the k8s-valuetype pattern. For information on the k8s-valuetype pattern, see the *Input Pattern Types* chapter.

**Usage Guidelines** Use this command to configure the k8s node labels.

# clusters node-defaults kvm fluent-forwarding

Configures KVM Fluent Forwarding parameters.

**Command Modes** Exec

**Syntax Description** **`fluent-forwarding host`** *`host_name`* **`port`** *`port_number`*

**disable-tls { false | true }**

Specify whether to enable or disable TLS communciation with Splunk endpoint.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**disable-tls-verification { false | true }**

Specify whether to enable or disable TLS certification verification.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**host *host_name***

Specify the host name.

Must be a string.

**port *port_number***

Specify the Fluentbit or Fluentd instance port number.

Must be an integer.

Default Value: 2020.

**Usage Guidelines** Use this command to configure Fluent forwarding parameters.

# clusters node-defaults kvm monitoring

Configures monitoring parameters.

**Command Modes** Exec

**Syntax Description** **monitoring local-ip-address-range** *local_ip_address_range* **ping-interval** *ping_interval* **failure-occurrence** *failure_occurrence*

**failure-occurrence *failure_occurrence***

Specify to override the failure occurrence number of the UPF monitoring service.

Must be an integer in the range of 3-65535.

**local-ip-address-range *local_ip_address_range***

Specify the local IP range for monitoring.

**ping-interval *ping_interval***

Specify to override the ping interval in UPF monitoring service.

Must be an integer in the range of 3-65535.

**Usage Guidelines** Use this command to configure monitoring parameters.

# clusters node-defaults netplan

Configures netplan template parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults netplan template** *template_name*

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **netplan template** *template_name*

**template *template_name***

Specify the netplan YAML template used to define network configurations.

Must be a string.

**Usage Guidelines** Use this command to configure netplan template parameters.

# clusters node-defaults os

Configures OS-specific parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults os tac-password`** *`tac_password`*

**tac-password *tac_password***

Specify the TAC password to enable Cisco TAC access.

**Usage Guidelines** Use this command to configure OS-specifc parameters.

# clusters node-defaults os disable-log-ratelimit

Enables or disables JournalID rate limiting.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`disable-log-ratelimit enabled { false | true }`**

**enabled { false | true }**

Specify whether to enable or disable JournalID rate limiting.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to enable or disable JournalID rate limiting.

# clusters node-defaults os netplan-additions

Allows adding to netplan configuration from initial-boot (cloud-init). NOTE: currently only routes are supported and not all netplan fields are available.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults os netplan-additions`**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **`os netplan-additions`**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to add netplan configuration from initial-boot. Currently, only routes are supported and not all netplan fields are available.

# clusters node-defaults os netplan-additions actions preview-netplan

Displays a preview of netplan YAML and validates with "netplan generate". This command displays only the commited data and is useful for debugging.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions actions preview-netplan**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions actions preview-netplan**

**Usage Guidelines** Use this command to preview the netplan.

# clusters node-defaults os netplan-additions bonds

Configures netplan bonds device type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions bonds** *bond_name* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | device-id** *device_id* **| dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *id_list* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions bonds** *bond_name* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | device-id** *device_id* **|**

**dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *id_list* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

### device-id *device_id*

Specify the netplan device ID.

Must be a string.

### dhcp-identifier *dhcp_identifier*

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

### dhcp4 { false | true }

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4** ***ipv4_address***

Specify the default gateway for IPv4.

**gateway6** ***ipv6_address***

Specify the default gateway for IPv6.

**interfaces** ***id_list***

Specify the ID list. All devices matching this ID list will be added to the bond.

Must be a string.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local** ***link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress** ***mac_address***

Specify the MAC address.

**mtu** ***number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**Note** It is recommended to set MTU to the lowest path MTU.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the clusters bonds.

# clusters node-defaults os netplan-additions bonds dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**

- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

## Usage Guidelines

Use this command to override the default DHCP4 behavior.

# clusters node-defaults os netplan-additions bonds dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-defaults os netplan-additions bonds nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-defaults os netplan-additions bonds optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **optional-addresses** *optional_addresses*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-defaults os netplan-additions bonds parameters

Configures customization parameters for special bonding options.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Syntax Description** **parameters { ad-select** *aggregation_selection_mode* **| all-slaves-active { false | true } | arp-interval** *arp_interval_value* **| arp-ip-targets** *ipv4_address* **| down-delay** *down_delay_interval* **| fail-over-mac-policy** *failover_mac_policy* **| gratuitous-arp** *arp_packets* **| lacp-rate** *lacp_rate* **| learn-packet-interval** *learn_packet_interval* **| mii-monitor-interval** *mii_monitor_interval* **| min-links** *minimum_links* **| mode** *bonding_mode* **| packets-per-slave** *packets_per_slave* **| primary-reselect-policy** *reselection_policy* **| primary** *primary_device* **| resend-igmp**

```
igmp_reports | transmit-hash-policy transmit_hash_policy | up-delay up_delay_interval
}
```

**ad-select *aggregation_selection_mode***

Specify the aggregation selection mode.

Must be one of the following:

- **bandwidth**
- **count**
- **stable**

**all-slaves-active { false | true }**

Specify whether the bond should drop or deliver the duplicate frames received on inactive ports.

Must be one of the following:

- **false**
- **true**

**arp-interval *arp_interval_value***

Specify the interval value for how to determine the frequency of ARP link monitoring.

Must be a string.

**arp-ip-targets *ipv4_address***

Specify the IPs of other hosts on the link which should be sent ARP requests in order to validate that a slave is up.

**down-delay *down_delay_interval***

Specify the delay before disabling a link once the link has been lost.

Must be a string.

**fail-over-mac-policy *failover_mac_policy***

Specify whether to set all slaves to the same MAC address when adding them to the bond, or how else the system should handle MAC addresses.

Must be one of the following:

- **active**
- **follow**
- **none**

**gratuitous-arp *arp_packets***

Specify the number of ARP packets to send after failover.

Must be an integer in the range of 1-255.

**lacp-rate *lacp_rate***

Specify the rate at which Link Aggregation Control Protocol Data Unit (LACPDU) are transmitted.

Must be one of the following:

- **fast**
- **slow**

**learn-packet-interval *learn_packet_interval***

Specify the interval between sending learning packets to each slave.

Must be a string.

**mii-monitor-interval *mii_monitor_interval***

Specify the interval for MII monitoring. That is, verifying if an interface of the bond has carrier.

Must be a string.

**min-links *minimum_links***

Specify the minimum number of link up in a bond to consider the bond interface to be up.

Must be an integer.

**mode *bonding_mode***

Specify the bonding mode used for the interfaces.

Must be one of the following:

- **802.3ad**
- **active-backup**
- **balance-alb**
- **balance-rr**
- **balance-tlb**
- **balance-xor**
- **broadcast**

**packets-per-slave *packets_per_slave***

Specify the number of packets to transmit on a slave before switching to the next.

Must be an integer in the range of 0-65535.

**primary-reselect-policy *reselection_policy***

Specify the reselection policy for the primary slave.

Must be one of the following:

- **always**
- **better**
- **failure**

**primary *primary_device***

Specify the device to be used as a primary slave, or preferred device to use as a slave for the bond, whenever it is available.

Must be a string.

**resend-igmp *igmp_reports***

Specify the number of IGMP membership reports issued on a failover event.

Must be an integer in the range of 0-255.

**transmit-hash-policy *transmit_hash_policy***

Specify the transmit hash policy for the selection of slaves.

Must be one of the following:

- **encap2+3**
- **encap3+4**
- **layer2+3**
- **layer2**
- **layer3+4**

**up-delay *up_delay_interval***

Specify the delay before enabling a link once the link is physically up.

Must be a string.

**Usage Guidelines** Use this command to configure customization parameters for special bonding options.

# clusters node-defaults os netplan-additions bonds routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope *route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-defaults os netplan-additions bonds routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`routing-policy`** *`source_ip_address`* **`{ mark`** *`mark_value`* **`| priority`** *`priority_value`* **`| table`** *`table_number`* **`| to`** *`destination_ip_address`* **`| type-of-service`** *`type_of_service_number`* **`}`**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-defaults os netplan-additions bridges

Configures netplan bridge type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions bridges** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *interface_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions bridges** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *interface_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**interfaces *interface_id***

Adds all the devices matching this ID to the bridge.

Must be a string.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**Note** It is recommended to set MTU to the lowest path MTU.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**

- **networkd**

**Usage Guidelines** Use this command to configure the bridge type.

# clusters node-defaults os netplan-additions bridges dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-defaults os netplan-additions bridges dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-defaults os netplan-additions bridges nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-defaults os netplan-additions bridges optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**

- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-defaults os netplan-additions bridges parameters

Configures the customization parameters for special bridging options.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Syntax Description** **`parameters { ageing-time`** *`ageing_time`* **`| forward-delay`** *`forward_delay_period`* **`| hello-time`** *`hello_time_interval`* **`| max-age`** *`maximum_age`* **`| path-cost`** *`cost_of_path`* **`| post-port-priority`** *`post_port_priority_range`* **`| priority`** *`priority_value`* **`| stp { false | true } }`**

**ageing-time *ageing_time***

Specify the period of time to keep a MAC address in the forwarding database after a packet is received.

Must be a string.

**forward-delay *forward_delay_period***

Specify the period of time the bridge will remain in Listening and Learning states before getting to the Forwarding state.

Must be a string.

**hello-time *hello_time_interval***

Specify the interval between two hello packets being sent out from the root and designated bridges.

Must be a string.

**max-age *maximum_age***

Specify the maximum age of a hello packet.

Must be a string.

**path-cost *cost_of_path***

Specify the cost of a path on the bridge.

Must be a string.

**post-port-priority *post_port_priority_range***

Specify the port priority range.

Must be an integer in the range of 0-63.

**priority *priority_value***

Specify the priority value for the bridge.

Must be an integer.

**stp { false | true }**

Specify whether the bridge should use Spanning Tree protocol.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the customization parameters for special bridging options.

# clusters node-defaults os netplan-additions bridges routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

#### table *table_number*

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-defaults os netplan-additions bridges routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-defaults os netplan-additions ethernets

Configures netplan ethernets device type.

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

**node-defaults os netplan-additions ethernets** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description**

**os netplan-additions ethernets** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**Note** It is recommended to set MTU to the lowest path MTU.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure netplan ethernet dvice type.

# clusters node-defaults os netplan-additions ethernets auth

Configures the authentication parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Syntax Description** **auth key-management** *key_management_mode* **[ ca-certificate** *path_to_trusted_ca_cert_file* **| client-certificate** *path_to_client_cert_file* **| client-key-password** *client_key_password* **| client-key** *path_to_client_key_file* **]**

**ca-certificate *path_to_trusted_ca_cert_file***

Specify the path to a file with one or more trusted Certificate Authority (CA) certificates.

Must be a string.

**client-certificate *path_to_client_cert_file***

Specify the path to a file containing the certificate to be used by the client during authentication.

Must be a string.

**client-key-password *client_key_password***

Specify the password to use to decrypt the private key specified in client-key if it is encrypted.

Must be a string.

**client-key *path_to_client_key_file***

Specify the path to a file containing the private key corresponding to client-certificate.

Must be a string.

**key-management *key_management_mode***

Specify the key management mode.

Must be one of the following:

- **802.1x**
- **none**

**Usage Guidelines** Use this command to configure the authentication parameters.

# clusters node-defaults os netplan-additions ethernets dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-routes { false | true }

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-defaults os netplan-additions ethernets dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-defaults os netplan-additions ethernets nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **nameservers { search** *domain_name* **| addresses** *ip_addresses* **}**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-defaults os netplan-additions ethernets optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-defaults os netplan-additions ethernets routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-defaults os netplan-additions ethernets routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-defaults os netplan-additions tunnels

Configures the tunnel mode.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions tunnels** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **ipv6-privacy { false | true } | link-local** *link_local_address* **| local** *ip_address* **| macaddress** *mac_address* **| mode** *tunnel_mode* **| mtu** *number_of_mtu* **| optional { false | true } | remote** *ip_address* **| renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions tunnels** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **ipv6-privacy { false | true } | link-local** *link_local_address* **| local** *ip_address* **| macaddress** *mac_address* **| mode** *tunnel_mode* **| mtu** *number_of_mtu* **| optional { false | true } | remote** *ip_address* **| renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**local *ip_address***

Specify the IP address of the local endpoint of the tunnel.

**macaddress *mac_address***

Specify the MAC address.

**mode *tunnel_mode***

Specify the tunnel mode.

Must be one of the following:

- **gre**
- **gretap**
- **ip6gre**
- **ip6gretap**
- **ip6ip6**
- **ipip6**
- **ipip**
- **isatap**
- **sit**
- **vti6**
- **vti**

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**Note** It is recommended to set MTU to the lowest path MTU.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**remote *ip_address***

Specify the IP address of the remote endpoint of the tunnel.

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the tunnel mode.

# clusters node-defaults os netplan-additions tunnels dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-defaults os netplan-additions tunnels dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-defaults os netplan-additions tunnels key

Configures the keys to use for the tunnel.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Syntax Description** **`key { input`** *`input_key`* **`| output`** *`output_key`* **`}`**

**input *input_key***

Specify the input key for the tunnel.

Must be a string.

**output *output_key***

Specify the output key for the tunnel.

Must be a string.

**Usage Guidelines** Use this command to configure the keys to use for the tunnel.

# clusters node-defaults os netplan-additions tunnels nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-defaults os netplan-additions tunnels optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-defaults os netplan-additions tunnels routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

#### table *table_number*

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

#### type *route_type*

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**

- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-defaults os netplan-additions tunnels routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-defaults os netplan-additions vlans

Configures the Virtual LAN parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions vlans** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| id** *vlan_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| link** *interface_name* **|**

**macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

## Command Modes

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

## Syntax Description

**os netplan-additions vlans** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| id** *vlan_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| link** *interface_name* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

### device-id *device_id*

Specify the netplan device ID.

Must be a string.

### dhcp-identifier *dhcp_identifier*

Assign the setting (when set to mac) over to systemd-networkd to use the device’s MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

### dhcp4 { false | true }

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4** ***ipv4_address***

Specify the default gateway for IPv4.

**gateway6** ***ipv6_address***

Specify the default gateway for IPv6.

**id** ***vlan_id***

Specify the Virtual LAN ID.

Must be an integer in the range of 0-4094.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local** ***link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**link** ***interface_name***

Specify the interface name of the underlying device definition on which this VLAN gets created.

Must be a string.

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**Note** It is recommended to set MTU to the lowest path MTU.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the Virtual LAN parameters.

# clusters node-defaults os netplan-additions vlans dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-defaults os netplan-additions vlans dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-defaults os netplan-additions vlans nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **nameservers { search** *domain_name* **| addresses** *ip_addresses* **}**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-defaults os netplan-additions vlans optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-defaults os netplan-additions vlans routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-defaults os netplan-additions vlans routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-defaults os ntp

Configures the NTP servers for the nodes.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`ntp enabled { false | true }`**

**enabled { false | true }**

Specify whether to enable or disable providing the NTP servers for configuration.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the NTP servers for the nodes.

# clusters node-defaults os ntp clients-allow

Configures the client subnets allowed to use cluster as relay.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`clients-allow subnet`** *`subnet`*

**subnet *subnet***

Specify the client subnets that could use current cluster as NTP relay server. For example, 192.168.0.0/16.

**Usage Guidelines** Use this command to configure the client subnets allowed to use cluster as relay.

# clusters node-defaults os ntp servers

Configures the time server parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`ntp servers`** *`url`* **`{ key-id`** *`key_id`* **`| sha-key`** *`sha_key`* **`| sha-type`** *`sha_type`* **`}`**

**key-id *key_id***

Specify the key ID for the chrony server keys.

Must be a string.

**sha-key *sha_key***

Specify the SHA authentication key with chrony server.

Must be a string in the hextype pattern. For information on the hextype pattern, see the *Input Pattern Types* chapter.

**sha-type *sha_type***

Specify the type of SHA for the chrony server keys. For instance, SHA1, SHA256, SHA512, etc. See: https:

Must be one of the following:

- **RMD128**
- **RMD160**
- **RMD256**
- **RMD320**
- **SHA1**
- **SHA256**
- **SHA384**
- **SHA512**
- **TIGER**
- **WHIRLPOOL**

***url***

Specify the NTP server URL. For example, clock.cisco.com.

Must be a string.

**Usage Guidelines** Use this command to configure time server parameters, which need to be input into the NTP conf.

# clusters node-defaults os partition

Configure the file system type for */data* partition.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

```
node-defaults os partition smi-data fs-type { ext4 | xfs }
```

**fs-type { ext4 | xfs }**

Specify the file system type as ext4 or XFS for data partition.

- **ext4**—Specify the ext4 (fourth extended filesystem) type.

  By default, all partitions are formatted using ext4.

- **xfs**—Specify the XFS type for data partition to install Mongo DB.

**Usage Guidelines** Use this command to configure the file system type for data partition at the cluster level.

# clusters node-defaults os proxy

Configures the proxy servers at the node level.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os proxy { http-proxy** *http_proxy* **| https-proxy** *https_proxy* **| no-proxy** *no_proxy_hosts* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os proxy { http-proxy** *http_proxy* **| https-proxy** *https_proxy* **| no-proxy** *no_proxy_hosts* **}**

**http-proxy *http_proxy***

Specify to send HTTP traffic to the specified HTTP proxy.

Must be a string.

**https-proxy *https_proxy***

Specify to send HTTPS traffic to the specified HTTP proxy.

Must be a string.

**no-proxy *no_proxy_hosts***

Specify the hosts to avoid proxy.

Must be a string.

**Usage Guidelines** Use this command to configure the proxy servers at the node level.

# clusters node-defaults os tuned

Enable or disable installing tuned.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** `node-defaults os tuned { disabled | enabled }`

**enabled**

Specify whether to enable or disable installing tuned.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to enable or disable installing tuned.

# clusters node-defaults os users

Configures the list of SMI-managed users managed on this default. Excludes "initial-boot" (cloud-init) provisioned users.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** `node-defaults os users` *user_name* `password` *password*

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** `os users` *user_name* `password` *password*

**group *access_privilege***

Specify the user's access privilege. The group defines the user's access privilege.

Must be one of the following:

- **smi-cluster-admin**
- **smi-read-only**
- **smi-superuser**

Default Value: smi-read-only.

**password *password***

Specify the password for this entry. It can be a already hashed value (/etc/shadow). Unencrypted will be hashed.

***user_name***

Specify the user name.

Must be a string of 0-32 characters.

**Usage Guidelines** Use this command to configure the list of SMI-managed users managed on this default. Excludes "initial-boot" (cloud-init) provisioned users.

# clusters node-defaults os users authorized-keys

Configures a list of public SSH keys for this user. These keys are allowed for SSH authentication, as described in RFC 4253.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os users** *user_name* **[ authorized-keys** *ssh_key_name* **[ algorithm** *algorithm_name* **| key-data** *key_data* **] ]**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Users Configuration (config-users-*user_name*)

**Syntax Description** **authorized-keys** *ssh_key_name* **[ algorithm** *algorithm_name* **| key-data** *key_data* **] ]**

**algorithm *algorithm_name***

Specify the public key algorithm name for this SSH key.

Must be one of the following:

- **ssh-ed25519**
- **ssh-rsa**

**key-data *key_data***

Specify the binary public key data.

Must be of type binary.

***ssh_key_name***

Specify a name for the SSH key.

Must be a string.

**Usage Guidelines** Use this command to configure a list of public SSH keys for this user. These keys are allowed for SSH authentication, as described in RFC 4253. This corresponds to a public key as: <algorithm> <key-data> <name>. For example, ssh-rsa AAAABRUY...bh+3+jA= test-key-laptop.

# clusters node-defaults ucs-server

Configures UCS server parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **ucs-server software** *ucs_software_version*

**software *ucs_software_version***

Specify the UCS software version.

**Usage Guidelines** Use this command to configure UCS server parameters.

# clusters node-defaults ucs-server cimc

Configures CIMC parameters.

**Command Modes** Exec

**Syntax Description** **cimc ip-address** *cimc_ip_address* **user** *cimc_user_name* **password** *cimc_user_password*

**password *cimc_user_password***

Specify the CIMC password.

**user *cimc_user_name***

Specify the CIMC user name.

Must be a string.

**Usage Guidelines** Use this command to configure the CIMC user name and password.

# clusters node-defaults ucs-server cimc bios

Configures CIMC BIOS boot order parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **bios**

**Usage Guidelines** Use this command to configure the CIMC BIOS boot order parameters.

# clusters node-defaults ucs-server cimc certificate

Renews the CIMC certificate.

The CIMC certificates are valid only for 3 years. If the certificate expires in less than 90 days, it must be renewed.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **cimc certificate rehydrate { true | false}**

**rehydrate { true | false}**

When set to **true**, it renews the certificate that expires in less than 90 days.

The default setting is **false**.

**Usage Guidelines** Use this command to renew the CIMC certificate.

# clusters node-defaults ucs-server cimc networking ntp

Configures the CIMC network-related parameters.

**Command Modes** Exec

**Syntax Description** `networking ntp enabled { false | true }`

**enabled { false | true }**

Specify whether to provide the NTP servers to configure.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the CIMC network-related parameters.

# clusters node-defaults ucs-server cimc networking ntp servers

Configures the time servers for CIMC to connect.

**Command Modes** Exec

**Syntax Description** `ntp servers url` *server_url*

**url *server_url***

Specify the time server's URL. For example, clock.cisco.com.

Must be a string.

**Usage Guidelines** Use this command to configure the time servers for CIMC to connect.

# clusters node-defaults ucs-server cimc remote-management sol

Configures the provision of SoL baud rate, com port, and SSH port parameters.

**Command Modes** Exec

**Syntax Description** **sol compport enabled { false | true } baud-rate** *baud_rate com_port_number* **ssh-port** *ssh_port_number*

**baud-rate *baud_rate***

Specify the serial baud rate the system uses for SoL communication.

Must be one of the following:

- **115200**
- **19200**
- **38400**
- **57600**
- **9600**

**comport *com_port_number***

Specify the serial port the system uses for SoL communication.

Must be one of the following:

- **com0**
- **com1**

**enabled { false | true }**

Specify whether to when enabled provide the baud rate, comport, and ssh-port.

Must be one of the following:

- **false**
- **true**

**ssh-port *ssh_port_number***

Specify the SSH port of CIMC SoL communication.

Must be an integer.

**Usage Guidelines** Use this command to configure the provision of SoL baud rate, comport, and ssh-port parameters.

# clusters node-defaults ucs-server cimc storage-adaptor

Configures the CIMC storage adaptor management parameters.

**Command Modes** Exec

**Syntax Description** `storage-adaptor create-virtual-drive { false | true }`

**create-virtual-drive { false | true }**

Specify whether to create the virtual drive if it is not already created.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the CIMC storage adaptor management parameters.

# clusters node-defaults ucs-server host initial-boot networking

Configures the interface and IP information used to initially bootstrap the node.

**Command Modes** Exec

**Syntax Description** `host initial-boot networking interface interface_name`

**interface *interface_name***

Specify the interface name.

Must be a string.

Default Value: eno1.

**Usage Guidelines** Use this command to configure the interface and IP information used to initially bootstrap the node.

# clusters node-defaults ucs-server host initial-boot networking static-ip

Configures static IP parameters.

**Command Modes** Exec

**Syntax Description** `static-ip ipv4-address ipv4_address netmask netmask gateway gateway dns ip_address`

**dns *ip_address***

Specify the IP address.

You can configure a maximum of three elements with this keyword.

**gateway *gateway***

Specify the gateway.

Must be a string.

**ipv4-address *ipv4_address***

Specify the IPv4 address.

**netmask *netmask***

Specify the netmask.

**Usage Guidelines** Use this command to configure static IP parameters.

# clusters node-defaults vmware

Configures VMWare hypervisor (vCenter and ESXi host) sizing parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **vmware { datacenter** *datacenter_name* **| datastore** *datastore_name* **| host** *host_name* **}**

**datacenter *datacenter_name***

Specify the datacenter name to override the datacenter from the environment for this node.

Must be a string.

**datastore *datastore_name***

Specify the datastore name to override the datastore from the environment for this node.

Must be a string.

**host *host_name***

Specify the host name to override the host field from the environment for this node.

Must be a string.

**Usage Guidelines** Use this command to configure VMWare hypervisor (vCenter and ESXi host) sizing parameters.

# clusters node-defaults vmware nics

Configures list of networks assigned to VMs.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **vmware nics** *network_name*

**Command Modes** Exec > Global Configuration (config) > Environment Configuration (config-environments-*datastore_name*)

**Syntax Description** **vcenter nics** *network_name*

***network_name***

Specify the VMware network name.

Must be a string.

**Usage Guidelines** Use this command to configure a list of networks assigned to VMs.

# clusters node-defaults vmware numa-node-affinity

Configures the affinity to a processor socket.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **vmware numa-node-affinity** *cpu_socket_number*

***cpu_socket_number***

Specify the physical CPU socket number.

Must be an integer in the range of 0-15.

**Usage Guidelines** Use this command to configure affinity to a processor socket.

# clusters node-defaults vmware pci-device

Configures the list of PCI devices.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **vmware pci-device** *pci_device_key*

***pci_device_key***

Specify the PCI device key.

Must be a string in the pci-keytype pattern. For information on the pci-keytype pattern, see the *Input Pattern Types* chapter.

**Usage Guidelines** Use this command to configure the list of PCI devices.

# clusters node-defaults vmware performance

Configures VMware performance parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`vmware performance { cpu-reservation { false | true } | latency-sensitivity`** *`latency_sensitivity`* **`| memory-reservation { false | true } }`**

**cpu-reservation { false | true }**

CPU reservation info.

Must be one of the following:

- **false**
- **true**

**latency-sensitivity *latency_sensitivity***

Specify the latency-senstivity.

Must be one of the following:

- **high**: High.
- **low**: Low.
- **medium**: Medium.
- **normal**: Normal.

**memory-reservation { false | true }**

Memory reservation info.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure VMware performance parameters.

# clusters node-defaults vmware sizing

Configures VMWare hypervisor (vCenter and ESXi host) sizing parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`vmware sizing`** *`options`*

**cores-equal-cpus { false | true }**

Specify whether cores per socket allocated equal to CPUs.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**cpus *number_of_cpus***

Specify the number of CPUs allocated.

Must be an integer in the range of 1-256.

**ram-mb *ram_mb***

Specify the RAM in MB.

Must be an integer in the range of 4096-524288.

**Usage Guidelines** Use this command to configure VMWare hypervisor (vCenter and ESXi host) sizing parameters.

# clusters node-type-defaults

Configures the default configuration that applies to all nodes of a specific type. Takes precedence over node-defaults. All options are overridable at the node level.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-type-defaults`** *`node_type`*

**host-profile *host_profile_name***

Specify the customizable tuning details package.

**ssh-connection-private-key *private_key***

Specify the SSH private key used for connecting to the node.

**ssh-username *user_name***

Specify the SSH user name used for connecting to the node.

Must be a string.

***node_type***

Specify the node type.

Must be one of the following:

- **backup**
- **control-plane**
- **etcd**
- **kvm**
- **master**
- **worker**

**Important** The **master** node type is deprecated. Use the **control-plane** node type instead of **master**.

**Usage Guidelines** Use this command to configure the default configuration that applies to all nodes of a specific type. Takes precedence over node-defaults. All options are overridable at the node level.

# clusters node-type-defaults initial-boot

Configures the cloud-init configurations, which only take effect on initial boot of OS and will not cause respin without other changes.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **`initial-boot { default-user`** *`user_name`* **`| default-user-password`** *`password`* **`| default-user-ssh-public-key`** *`ssh_public_key`* **`}`**

**default-user-password *default_user_password***

Specify the password for the default user.

**default-user-ssh-public-key *default_user_ssh_public_key***

Specify the public keys allowed to connect via SSH for the default user.

Must be a string.

**default-user *default_user_name***

Specify the default user created when this node is deployed.

Must be a string.

**Usage Guidelines** Use this command to configure the cloud-init configurations, which only take effect on initial boot of OS and will not cause respin without other changes.

# clusters node-type-defaults initial-boot netplan

Configures initial boot netplan parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **netplan renderer** *renderer_type*

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure initial boot netplan parameters.

# clusters node-type-defaults initial-boot netplan bonds

Configures netplan bonds device type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions bonds** *bond_name* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | device-id** *device_id* **| dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *id_list* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions bonds** *bond_name* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | device-id** *device_id* **| dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *id_list* **|**

**ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

### device-id *device_id*

Specify the netplan device ID.

Must be a string.

### dhcp-identifier *dhcp_identifier*

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

### dhcp4 { false | true }

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

### dhcp6 { false | true }

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4** ***ipv4_address***

Specify the default gateway for IPv4.

**gateway6** ***ipv6_address***

Specify the default gateway for IPv6.

**interfaces** ***id_list***

Specify the ID list. All devices matching this ID list will be added to the bond.

Must be a string.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local** ***link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress** ***mac_address***

Specify the MAC address.

**mtu** ***number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the clusters bonds.

# clusters node-type-defaults initial-boot netplan bonds dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-type-defaults initial-boot netplan bonds dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-type-defaults initial-boot netplan bonds nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-type-defaults initial-boot netplan bonds optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-type-defaults initial-boot netplan bonds parameters

Configures customization parameters for special bonding options.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Syntax Description** **parameters { ad-select** *aggregation_selection_mode* **| all-slaves-active { false | true } | arp-interval** *arp_interval_value* **| arp-ip-targets** *ipv4_address* **| down-delay** *down_delay_interval* **| fail-over-mac-policy** *failover_mac_policy* **| gratuitous-arp** *arp_packets* **| lacp-rate** *lacp_rate* **| learn-packet-interval** *learn_packet_interval* **| mii-monitor-interval** *mii_monitor_interval* **| min-links** *minimum_links* **| mode** *bonding_mode* **| packets-per-slave** *packets_per_slave* **| primary-reselect-policy** *reselection_policy* **| primary** *primary_device* **| resend-igmp** *igmp_reports* **| transmit-hash-policy** *transmit_hash_policy* **| up-delay** *up_delay_interval* **}**

**ad-select *aggregation_selection_mode***

Specify the aggregation selection mode.

Must be one of the following:

- **bandwidth**
- **count**
- **stable**

**all-slaves-active { false | true }**

Specify whether the bond should drop or deliver the duplicate frames received on inactive ports.

Must be one of the following:

- **false**
- **true**

**arp-interval *arp_interval_value***

Specify the interval value for how to determine the frequency of ARP link monitoring.

Must be a string.

**arp-ip-targets *ipv4_address***

Specify the IPs of other hosts on the link which should be sent ARP requests in order to validate that a slave is up.

**down-delay *down_delay_interval***

Specify the delay before disabling a link once the link has been lost.

Must be a string.

**fail-over-mac-policy *failover_mac_policy***

Specify whether to set all slaves to the same MAC address when adding them to the bond, or how else the system should handle MAC addresses.

Must be one of the following:

- **active**
- **follow**
- **none**

**gratuitous-arp *arp_packets***

Specify the number of ARP packets to send after failover.

Must be an integer in the range of 1-255.

**lacp-rate *lacp_rate***

Specify the rate at which Link Aggregation Control Protocol Data Unit (LACPDU) are transmitted.

Must be one of the following:

- **fast**
- **slow**

**learn-packet-interval *learn_packet_interval***

Specify the interval between sending learning packets to each slave.

Must be a string.

**mii-monitor-interval *mii_monitor_interval***

Specify the interval for MII monitoring. That is, verifying if an interface of the bond has carrier.

Must be a string.

**min-links *minimum_links***

Specify the minimum number of link up in a bond to consider the bond interface to be up.

Must be an integer.

**mode *bonding_mode***

Specify the bonding mode used for the interfaces.

Must be one of the following:

- **802.3ad**
- **active-backup**
- **balance-alb**
- **balance-rr**
- **balance-tlb**
- **balance-xor**
- **broadcast**

**packets-per-slave *packets_per_slave***

Specify the number of packets to transmit on a slave before switching to the next.

Must be an integer in the range of 0-65535.

**primary-reselect-policy *reselection_policy***

Specify the reselection policy for the primary slave.

Must be one of the following:

- **always**
- **better**
- **failure**

**primary *primary_device***

Specify the device to be used as a primary slave, or preferred device to use as a slave for the bond, whenever it is available.

Must be a string.

**resend-igmp *igmp_reports***

Specify the number of IGMP membership reports issued on a failover event.

Must be an integer in the range of 0-255.

**transmit-hash-policy *transmit_hash_policy***

Specify the transmit hash policy for the selection of slaves.

Must be one of the following:

- **encap2+3**
- **encap3+4**
- **layer2+3**
- **layer2**
- **layer3+4**

**up-delay *up_delay_interval***

Specify the delay before enabling a link once the link is physically up.

Must be a string.

**Usage Guidelines** Use this command to configure customization parameters for special bonding options.

# clusters node-type-defaults initial-boot netplan bonds routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**

- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-type-defaults initial-boot netplan bonds routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-type-defaults initial-boot netplan bridges

Configures netplan bridge type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions bridges** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *interface_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions bridges** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *interface_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**interfaces *interface_id***

Adds all the devices matching this ID to the bridge.

Must be a string.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the bridge type.

# clusters node-type-defaults initial-boot netplan bridges dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp4-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-type-defaults initial-boot netplan bridges dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

#### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-type-defaults initial-boot netplan bridges nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-type-defaults initial-boot netplan bridges optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-type-defaults initial-boot netplan bridges parameters

Configures the customization parameters for special bridging options.

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Syntax Description**

**parameters { ageing-time** *ageing_time* **| forward-delay** *forward_delay_period* **| hello-time** *hello_time_interval* **| max-age** *maximum_age* **| path-cost** *cost_of_path* **| post-port-priority** *post_port_priority_range* **| priority** *priority_value* **| stp { false | true } }**

**ageing-time *ageing_time***

Specify the period of time to keep a MAC address in the forwarding database after a packet is received.

Must be a string.

**forward-delay *forward_delay_period***

Specify the period of time the bridge will remain in Listening and Learning states before getting to the Forwarding state.

Must be a string.

**hello-time *hello_time_interval***

Specify the interval between two hello packets being sent out from the root and designated bridges.

Must be a string.

**max-age *maximum_age***

Specify the maximum age of a hello packet.

Must be a string.

**path-cost *cost_of_path***

Specify the cost of a path on the bridge.

Must be a string.

**post-port-priority *post_port_priority_range***

Specify the port priority range.

Must be an integer in the range of 0-63.

**priority *priority_value***

Specify the priority value for the bridge.

Must be an integer.

**stp { false | true }**

Specify whether the bridge should use Spanning Tree protocol.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the customization parameters for special bridging options.

# clusters node-type-defaults initial-boot netplan bridges routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

#### table *table_number*

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

#### type *route_type*

Specify the route type.

Must be one of the following:

- **blackhole**

- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-type-defaults initial-boot netplan bridges routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-type-defaults initial-boot netplan ethernets

Configures netplan ethernets device type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions ethernets** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false |**

**true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

## Command Modes

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

## Syntax Description

**os netplan-additions ethernets** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

### device-id *device_id*

Specify the netplan device ID.

Must be a string.

### dhcp-identifier *dhcp_identifier*

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

### dhcp4 { false | true }

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4** ***ipv4_address***

Specify the default gateway for IPv4.

**gateway6** ***ipv6_address***

Specify the default gateway for IPv6.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local** ***link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress** ***mac_address***

Specify the MAC address.

**mtu** ***number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure netplan ethernet dvice type.

# clusters node-type-defaults initial-boot netplan ethernets auth

Configures the authentication parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Syntax Description** **auth key-management** *key_management_mode* **[ ca-certificate** *path_to_trusted_ca_cert_file* **| client-certificate** *path_to_client_cert_file* **| client-key-password** *client_key_password* **| client-key** *path_to_client_key_file* **]**

**ca-certificate *path_to_trusted_ca_cert_file***

Specify the path to a file with one or more trusted Certificate Authority (CA) certificates.

Must be a string.

**client-certificate *path_to_client_cert_file***

Specify the path to a file containing the certificate to be used by the client during authentication.

Must be a string.

**client-key-password *client_key_password***

Specify the password to use to decrypt the private key specified in client-key if it is encrypted.

Must be a string.

**client-key *path_to_client_key_file***

Specify the path to a file containing the private key corresponding to client-certificate.

Must be a string.

**key-management *key_management_mode***

Specify the key management mode.

Must be one of the following:

- **802.1x**
- **none**

**Usage Guidelines** Use this command to configure the authentication parameters.

# clusters node-type-defaults initial-boot netplan ethernets dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-type-defaults initial-boot netplan ethernets dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-routes { false | true }

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-type-defaults initial-boot netplan ethernets nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-type-defaults initial-boot netplan ethernets optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-type-defaults initial-boot netplan ethernets routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

#### table *table_number*

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

#### type *route_type*

Specify the route type.

Must be one of the following:

- **blackhole**

- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-type-defaults initial-boot netplan ethernets routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-type-defaults initial-boot netplan tunnels

Configures the tunnel mode.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions tunnels** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false |**

**true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **ipv6-privacy { false | true } | link-local** *link_local_address* **| local** *ip_address* **| macaddress** *mac_address* **| mode** *tunnel_mode* **| mtu** *number_of_mtu* **| optional { false | true } | remote** *ip_address* **| renderer** *renderer_type* **}**

## Command Modes

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

## Syntax Description

**os netplan-additions tunnels** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **ipv6-privacy { false | true } | link-local** *link_local_address* **| local** *ip_address* **| macaddress** *mac_address* **| mode** *tunnel_mode* **| mtu** *number_of_mtu* **| optional { false | true } | remote** *ip_address* **| renderer** *renderer_type* **}**

### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

### device-id *device_id*

Specify the netplan device ID.

Must be a string.

### dhcp-identifier *dhcp_identifier*

Assign the setting (when set to mac) over to systemd-networkd to use the device’s MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4** ***ipv4_address***

Specify the default gateway for IPv4.

**gateway6** ***ipv6_address***

Specify the default gateway for IPv6.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local** ***link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**local** ***ip_address***

Specify the IP address of the local endpoint of the tunnel.

**macaddress** ***mac_address***

Specify the MAC address.

**mode *tunnel_mode***

Specify the tunnel mode.

Must be one of the following:

- **gre**
- **gretap**
- **ip6gre**
- **ip6gretap**
- **ip6ip6**
- **ipip6**
- **ipip**
- **isatap**
- **sit**
- **vti6**
- **vti**

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**remote *ip_address***

Specify the IP address of the remote endpoint of the tunnel.

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

## Usage Guidelines

Use this command to configure the tunnel mode.

# clusters node-type-defaults initial-boot netplan tunnels dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp4-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-type-defaults initial-boot netplan tunnels dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

#### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-type-defaults initial-boot netplan tunnels key

Configures the keys to use for the tunnel.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Syntax Description** **key { input** *input_key* **| output** *output_key* **}**

**input *input_key***

Specify the input key for the tunnel.

Must be a string.

**output *output_key***

Specify the output key for the tunnel.

Must be a string.

**Usage Guidelines** Use this command to configure the keys to use for the tunnel.

# clusters node-type-defaults initial-boot netplan tunnels nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **nameservers { search** *domain_name* **| addresses** *ip_addresses* **}**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-type-defaults initial-boot netplan tunnels optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-type-defaults initial-boot netplan tunnels routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

#### table *table_number*

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-type-defaults initial-boot netplan tunnels routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-type-defaults initial-boot netplan vlans

Configures the Virtual LAN parameters.

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

**node-defaults os netplan-additions vlans** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| id** *vlan_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| link** *interface_name* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description**

**os netplan-additions vlans** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| id** *vlan_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| link** *interface_name* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

#### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

#### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

#### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**id *vlan_id***

Specify the Virtual LAN ID.

Must be an integer in the range of 0-4094.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**link *interface_name***

Specify the interface name of the underlying device definition on which this VLAN gets created.

Must be a string.

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the Virtual LAN parameters.

# clusters node-type-defaults initial-boot netplan vlans dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp4-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-type-defaults initial-boot netplan vlans dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-type-defaults initial-boot netplan vlans nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-type-defaults initial-boot netplan vlans optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-type-defaults initial-boot netplan vlans routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

**from *source_ip_address***

Specify the source IP address for traffic going through the route.

**metric *relative_priority_value***

Specify the relative priority of the route.

Must be an integer.

**on-link { false | true }**

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope *route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

## Usage Guidelines

Use this command to configure static routing for the device.

# clusters node-type-defaults initial-boot netplan vlans routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-type-defaults k8s

Configures Kubernetes-specific parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **`k8s { ssh-connection-password`** *`password`* **`| ssh-connection-private-key`** *`private_key`* **`| ssh-username`** *`user_name`* **`}`**

**host-profile *host_profile_name***

Specify the customizable tuning details package.

**max-pods *max_pods***

Specify the maximum number of pods per node. Uses kubernetes default if not set.

Must be an integer in the range of 10-2000.

**ssh-connection-private-key *private_key***

Specify the SSH private key used for connecting to the node.

**ssh-username *user_name***

Specify the SSH user name used for connecting to the node.

Must be a string.

**Usage Guidelines** Use this command to configure Kubernetes-specific parameters.

# clusters node-type-defaults k8s cpu-manager

Configures CPU Manager parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

```
cpu-manager cpu-manager-policy cpu_manager_policy {
cpu-manager-reconcile-period cpu_manager_reconcile_period | system-reserved-cpu
 system_reserved_cpu | system-reserved-memory system_reserved_memory |
system-reserved-ephemeral-storage storage_memory | kube-reserved-cpu
kube_reserved_cpu | kube-reserved-memory kube_reserved_memory |
kube-reserved-ephemeral-storage kube_reserved_ephemeral_storage }
```

**cpu-manager-policy *cpu_manager_policy***

Specify the CPU Manager policy.

Must be one of the following:

- **none**
- **static**

Default Value: none.

**cpu-manager-reconcile-period *cpu_manager_reconcile_period***

Specify the CPU Manager reconciliation period. If not supplied, defaults to NodeStatusUpdateFrequency (default 10s) when policy is static.

Must be an integer in the range of 10-60.

Default Value: 10.

**kube-reserved-cpu *kube_reserved_cpu***

Specify the Kube-reserved CPU.

Must be of type decimal64, with 2 fraction digits in the range of 0-36.

Default Value: 1.

**kube-reserved-ephemeral-storage *kube_reserved_ephemeral_storage***

Specify the Kube-reserved ephemeral storage memory in GB.

Must be an integer in the range of 2-512.

Default Value: 2.

**kube-reserved-memory *kube_reserved_memory***

Specify the Kube-reserved memory in MB.

Must be an integer in the range of 2000-524288.

Default Value: 2000.

**system-reserved-cpu *system_reserved_cpu***

Specify the system-reserved CPU.

Must be of type decimal64, with 2 fraction digits in the range of 0-36.

Default Value: 1.

**system-reserved-ephemeral-storage *storage_memory***

Specify the system-reserved ephemeral storage memory in GB.

Must be an integer in the range of 2-512.

Default Value: 2.

**system-reserved-memory *system_reserved_memory***

Specify the system-reserved memory in MB.

Must be an integer in the range of 2000-524288.

Default Value: 2000.

**Usage Guidelines** Use this command to configure CPU Manager parameters.

# clusters node-type-defaults k8s node-labels

Configures k8s node labels.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`node-defaults k8s node-labels`** *`key value`*

***key***

Specify the prefix for the node label.

Must be a string in the k8s-keytype pattern. For information on the k8s-keytype pattern, see the *Input Pattern Types* chapter.

***value***

Specify the suffix for the node label.

Must be a string in the k8s-valuetype pattern. For information on the k8s-valuetype pattern, see the *Input Pattern Types* chapter.

**Usage Guidelines** Use this command to configure the k8s node labels.

# clusters node-type-defaults kvm

Configures KVM parameters.

**Command Modes** Exec

**Syntax Description** **kvm** *options*

**Usage Guidelines** Use this command to configure KVM parameters.

# clusters node-type-defaults kvm fluent-forwarding

Configures KVM Fluent Forwarding parameters.

**Command Modes** Exec

**Syntax Description** **fluent-forwarding host** *host_name* **port** *port_number*

**disable-tls { false | true }**

Specify whether to enable or disable TLS communciation with Splunk endpoint.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**disable-tls-verification { false | true }**

Specify whether to enable or disable TLS certification verification.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**host *host_name***

Specify the host name.

Must be a string.

**port *port_number***

Specify the Fluentbit or Fluentd instance port number.

Must be an integer.

Default Value: 2020.

**Usage Guidelines** Use this command to configure Fluent forwarding parameters.

# clusters node-type-defaults kvm monitoring

Configures monitoring parameters.

**Command Modes** Exec

**Syntax Description** **monitoring local-ip-address-range** *local_ip_address_range* **ping-interval** *ping_interval* **failure-occurrence** *failure_occurrence*

**failure-occurrence *failure_occurrence***

Specify to override the failure occurrence number of the UPF monitoring service.

Must be an integer in the range of 3-65535.

**local-ip-address-range *local_ip_address_range***

Specify the local IP range for monitoring.

**ping-interval *ping_interval***

Specify to override the ping interval in UPF monitoring service.

Must be an integer in the range of 3-65535.

**Usage Guidelines** Use this command to configure monitoring parameters.

# clusters node-type-defaults netplan

Configures netplan template parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults netplan template** *template_name*

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **`netplan template`** *`template_name`*

**template *template_name***

Specify the netplan YAML template used to define network configurations.

Must be a string.

**Usage Guidelines** Use this command to configure netplan template parameters.

# clusters node-type-defaults os

Configures OS-specific parameters.

**Command Modes** Exec > Global Configuration (config) > Clusters Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`os { ntp | proxy { http-proxy`** *`http_proxy`* **`| https-proxy`** *`https_proxy`* **`| no-proxy`** *`no_proxy`* **`} }`**

**tac-password *tac_password***

Specify the TAC password to enable Cisco TAC access.

**Usage Guidelines** Use this command to configure OS-specific parameters.

# clusters node-type-defaults os disable-log-ratelimit

Enables or disables JournalID rate limiting.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`disable-log-ratelimit enabled { false | true }`**

**enabled { false | true }**

Specify whether to enable or disable JournalID rate limiting.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to enable or disable JournalID rate limiting.

# clusters node-type-defaults os netplan-additions

Allows adding to netplan configuration from initial-boot (cloud-init). NOTE: currently only routes are supported and not all netplan fields are available.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** `node-defaults os netplan-additions`

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** `os netplan-additions`

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to add netplan configuration from initial-boot. Currently, only routes are supported and not all netplan fields are available.

# clusters node-type-defaults os netplan-additions actions preview-netplan

Displays a preview of netplan YAML and validates with "netplan generate". This command displays only the commited data and is useful for debugging.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** `node-defaults os netplan-additions actions preview-netplan`

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** `os netplan-additions actions preview-netplan`

**Usage Guidelines** Use this command to preview the netplan.

# clusters node-type-defaults os netplan-additions bonds

Configures netplan bonds device type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions bonds** *bond_name* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | device-id** *device_id* **| dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *id_list* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions bonds** *bond_name* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | device-id** *device_id* **| dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *id_list* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

#### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

#### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

#### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

#### device-id *device_id*

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**interfaces *id_list***

Specify the ID list. All devices matching this ID list will be added to the bond.

Must be a string.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the clusters bonds.

# clusters node-type-defaults os netplan-additions bonds dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp4-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-routes { false | true }

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-type-defaults os netplan-additions bonds dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-type-defaults os netplan-additions bonds nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-type-defaults os netplan-additions bonds optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-type-defaults os netplan-additions bonds parameters

Configures customization parameters for special bonding options.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

## Syntax Description

**parameters { ad-select** *aggregation_selection_mode* **| all-slaves-active { false | true } | arp-interval** *arp_interval_value* **| arp-ip-targets** *ipv4_address* **| down-delay** *down_delay_interval* **| fail-over-mac-policy** *failover_mac_policy* **| gratuitous-arp** *arp_packets* **| lacp-rate** *lacp_rate* **| learn-packet-interval** *learn_packet_interval* **| mii-monitor-interval** *mii_monitor_interval* **| min-links** *minimum_links* **| mode** *bonding_mode* **| packets-per-slave** *packets_per_slave* **| primary-reselect-policy** *reselection_policy* **| primary** *primary_device* **| resend-igmp** *igmp_reports* **| transmit-hash-policy** *transmit_hash_policy* **| up-delay** *up_delay_interval* **}**

### ad-select *aggregation_selection_mode*

Specify the aggregation selection mode.

Must be one of the following:

- **bandwidth**
- **count**
- **stable**

### all-slaves-active { false | true }

Specify whether the bond should drop or deliver the duplicate frames received on inactive ports.

Must be one of the following:

- **false**
- **true**

### arp-interval *arp_interval_value*

Specify the interval value for how to determine the frequency of ARP link monitoring.

Must be a string.

### arp-ip-targets *ipv4_address*

Specify the IPs of other hosts on the link which should be sent ARP requests in order to validate that a slave is up.

### down-delay *down_delay_interval*

Specify the delay before disabling a link once the link has been lost.

Must be a string.

### fail-over-mac-policy *failover_mac_policy*

Specify whether to set all slaves to the same MAC address when adding them to the bond, or how else the system should handle MAC addresses.

Must be one of the following:

- **active**

- **follow**
- **none**

**gratuitous-arp** ***arp_packets***

Specify the number of ARP packets to send after failover.

Must be an integer in the range of 1-255.

**lacp-rate** ***lacp_rate***

Specify the rate at which Link Aggregation Control Protocol Data Unit (LACPDU) are transmitted.

Must be one of the following:

- **fast**
- **slow**

**learn-packet-interval** ***learn_packet_interval***

Specify the interval between sending learning packets to each slave.

Must be a string.

**mii-monitor-interval** ***mii_monitor_interval***

Specify the interval for MII monitoring. That is, verifying if an interface of the bond has carrier.

Must be a string.

**min-links** ***minimum_links***

Specify the minimum number of link up in a bond to consider the bond interface to be up.

Must be an integer.

**mode** ***bonding_mode***

Specify the bonding mode used for the interfaces.

Must be one of the following:

- **802.3ad**
- **active-backup**
- **balance-alb**
- **balance-rr**
- **balance-tlb**
- **balance-xor**
- **broadcast**

**packets-per-slave *packets_per_slave***

Specify the number of packets to transmit on a slave before switching to the next.

Must be an integer in the range of 0-65535.

**primary-reselect-policy *reselection_policy***

Specify the reselection policy for the primary slave.

Must be one of the following:

- **always**
- **better**
- **failure**

**primary *primary_device***

Specify the device to be used as a primary slave, or preferred device to use as a slave for the bond, whenever it is available.

Must be a string.

**resend-igmp *igmp_reports***

Specify the number of IGMP membership reports issued on a failover event.

Must be an integer in the range of 0-255.

**transmit-hash-policy *transmit_hash_policy***

Specify the transmit hash policy for the selection of slaves.

Must be one of the following:

- **encap2+3**
- **encap3+4**
- **layer2+3**
- **layer2**
- **layer3+4**

**up-delay *up_delay_interval***

Specify the delay before enabling a link once the link is physically up.

Must be a string.

## Usage Guidelines

Use this command to configure customization parameters for special bonding options.

# clusters node-type-defaults os netplan-additions bonds routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

**from *source_ip_address***

Specify the source IP address for traffic going through the route.

**metric *relative_priority_value***

Specify the relative priority of the route.

Must be an integer.

**on-link { false | true }**

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope *route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

## Usage Guidelines

Use this command to configure static routing for the device.

# clusters node-type-defaults os netplan-additions bonds routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-type-defaults os netplan-additions bridges

Configures netplan bridge type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions bridges** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *interface_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions bridges** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *interface_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**interfaces *interface_id***

Adds all the devices matching this ID to the bridge.

Must be a string.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the bridge type.

# clusters node-type-defaults os netplan-additions bridges dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **dhcp4-overrides { hostname** *host_name* **| route-metric** *route_metric_value* **| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-type-defaults os netplan-additions bridges dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-type-defaults os netplan-additions bridges nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **nameservers { search** *domain_name* **| addresses** *ip_addresses* **}**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-type-defaults os netplan-additions bridges optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-type-defaults os netplan-additions bridges parameters

Configures the customization parameters for special bridging options.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Syntax Description** **parameters { ageing-time** *ageing_time* **| forward-delay** *forward_delay_period* **| hello-time** *hello_time_interval* **| max-age** *maximum_age* **| path-cost** *cost_of_path* **| post-port-priority** *post_port_priority_range* **| priority** *priority_value* **| stp { false | true } }**

**ageing-time *ageing_time***

Specify the period of time to keep a MAC address in the forwarding database after a packet is received.

Must be a string.

**forward-delay *forward_delay_period***

Specify the period of time the bridge will remain in Listening and Learning states before getting to the Forwarding state.

Must be a string.

**hello-time *hello_time_interval***

Specify the interval between two hello packets being sent out from the root and designated bridges.

Must be a string.

**max-age *maximum_age***

Specify the maximum age of a hello packet.

Must be a string.

**path-cost *cost_of_path***

Specify the cost of a path on the bridge.

Must be a string.

**post-port-priority *post_port_priority_range***

Specify the port priority range.

Must be an integer in the range of 0-63.

**priority *priority_value***

Specify the priority value for the bridge.

Must be an integer.

**stp { false | true }**

Specify whether the bridge should use Spanning Tree protocol.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the customization parameters for special bridging options.

# clusters node-type-defaults os netplan-additions bridges routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**

- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-type-defaults os netplan-additions bridges routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-type-defaults os netplan-additions ethernets

Configures netplan ethernets device type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions ethernets** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions ethernets** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure netplan ethernet dvice type.

# clusters node-type-defaults os netplan-additions ethernets auth

Configures the authentication parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Syntax Description**

**auth key-management** *key_management_mode* **[ ca-certificate** *path_to_trusted_ca_cert_file* **| client-certificate** *path_to_client_cert_file* **| client-key-password** *client_key_password* **| client-key** *path_to_client_key_file* **]**

**ca-certificate** ***path_to_trusted_ca_cert_file***

Specify the path to a file with one or more trusted Certificate Authority (CA) certificates.

Must be a string.

**client-certificate** ***path_to_client_cert_file***

Specify the path to a file containing the certificate to be used by the client during authentication.

Must be a string.

**client-key-password** ***client_key_password***

Specify the password to use to decrypt the private key specified in client-key if it is encrypted.

Must be a string.

**client-key** ***path_to_client_key_file***

Specify the path to a file containing the private key corresponding to client-certificate.

Must be a string.

**key-management** ***key_management_mode***

Specify the key management mode.

Must be one of the following:

- **802.1x**
- **none**

**Usage Guidelines**

Use this command to configure the authentication parameters.

# clusters node-type-defaults os netplan-additions ethernets dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp4-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-routes { false | true }

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-type-defaults os netplan-additions ethernets dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-type-defaults os netplan-additions ethernets nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **nameservers { search** *domain_name* **| addresses** *ip_addresses* **}**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-type-defaults os netplan-additions ethernets optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-type-defaults os netplan-additions ethernets routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-type-defaults os netplan-additions ethernets routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-type-defaults os netplan-additions tunnels

Configures the tunnel mode.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions tunnels** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **ipv6-privacy { false | true } | link-local** *link_local_address* **| local** *ip_address* **| macaddress** *mac_address* **| mode** *tunnel_mode* **| mtu** *number_of_mtu* **| optional { false | true } | remote** *ip_address* **| renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions tunnels** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **ipv6-privacy { false | true } | link-local** *link_local_address* **| local** *ip_address* **| macaddress** *mac_address* **| mode** *tunnel_mode* **| mtu** *number_of_mtu* **| optional { false | true } | remote** *ip_address* **| renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**local *ip_address***

Specify the IP address of the local endpoint of the tunnel.

**macaddress *mac_address***

Specify the MAC address.

**mode *tunnel_mode***

Specify the tunnel mode.

Must be one of the following:

- **gre**
- **gretap**
- **ip6gre**
- **ip6gretap**
- **ip6ip6**
- **ipip6**
- **ipip**
- **isatap**
- **sit**
- **vti6**
- **vti**

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**remote *ip_address***

Specify the IP address of the remote endpoint of the tunnel.

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the tunnel mode.

# clusters node-type-defaults os netplan-additions tunnels dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-type-defaults os netplan-additions tunnels dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-type-defaults os netplan-additions tunnels key

Configures the keys to use for the tunnel.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Syntax Description** **key { input** *input_key* **| output** *output_key* **}**

**input *input_key***

Specify the input key for the tunnel.

Must be a string.

**output *output_key***

Specify the output key for the tunnel.

Must be a string.

**Usage Guidelines** Use this command to configure the keys to use for the tunnel.

# clusters node-type-defaults os netplan-additions tunnels nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-type-defaults os netplan-additions tunnels optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-type-defaults os netplan-additions tunnels routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

**from *source_ip_address***

Specify the source IP address for traffic going through the route.

**metric *relative_priority_value***

Specify the relative priority of the route.

Must be an integer.

**on-link { false | true }**

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope *route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

## Usage Guidelines

Use this command to configure static routing for the device.

# clusters node-type-defaults os netplan-additions tunnels routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-type-defaults os netplan-additions vlans

Configures the Virtual LAN parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions vlans** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| id** *vlan_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| link** *interface_name* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions vlans** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| id** *vlan_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| link** *interface_name* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4** ***ipv4_address***

Specify the default gateway for IPv4.

**gateway6** ***ipv6_address***

Specify the default gateway for IPv6.

**id** ***vlan_id***

Specify the Virtual LAN ID.

Must be an integer in the range of 0-4094.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local** ***link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**link** ***interface_name***

Specify the interface name of the underlying device definition on which this VLAN gets created.

Must be a string.

**macaddress** ***mac_address***

Specify the MAC address.

**mtu** ***number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**

- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the Virtual LAN parameters.

# clusters node-type-defaults os netplan-additions vlans dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **dhcp4-overrides { hostname** *host_name* **| route-metric** *route_metric_value* **| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters node-type-defaults os netplan-additions vlans dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-routes { false | true }

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters node-type-defaults os netplan-additions vlans nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters node-type-defaults os netplan-additions vlans optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters node-type-defaults os netplan-additions vlans routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

#### table *table_number*

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

#### type *route_type*

Specify the route type.

Must be one of the following:

- **blackhole**

- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters node-type-defaults os netplan-additions vlans routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters node-type-defaults os ntp

Configures the NTP servers for the nodes.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **ntp enabled { false | true }**

**enabled { false | true }**

Specify whether to enable or disable providing the NTP servers for configuration.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the NTP servers for the nodes.

# clusters node-type-defaults os ntp clients-allow

Configures the client subnets allowed to use cluster as relay.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **clients-allow subnet** *subnet*

**subnet *subnet***

Specify the client subnets that could use current cluster as NTP relay server. For example, 192.168.0.0/16.

**Usage Guidelines** Use this command to configure the client subnets allowed to use cluster as relay.

# clusters node-type-defaults os ntp servers

Configures the time server parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **ntp servers** *url* **{ key-id** *key_id* **| sha-key** *sha_key* **| sha-type** *sha_type* **}**

**key-id *key_id***

Specify the key ID for the chrony server keys.

Must be a string.

**sha-key *sha_key***

Specify the SHA authentication key with chrony server.

Must be a string in the hextype pattern. For information on the hextype pattern, see the *Input Pattern Types* chapter.

**sha-type *sha_type***

Specify the type of SHA for the chrony server keys. For instance, SHA1, SHA256, SHA512, etc. See: https:

Must be one of the following:

- **RMD128**
- **RMD160**
- **RMD256**
- **RMD320**
- **SHA1**
- **SHA256**
- **SHA384**
- **SHA512**
- **TIGER**
- **WHIRLPOOL**

***url***

Specify the NTP server URL. For example, clock.cisco.com.

Must be a string.

**Usage Guidelines** Use this command to configure time server parameters, which need to be input into the NTP conf.

# clusters node-type-defaults os proxy

Configures the proxy servers at the node level.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults os proxy { http-proxy`** *`http_proxy`* **`| https-proxy`** *`https_proxy`* **`| no-proxy`** *`no_proxy_hosts`* **`}`**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **`os proxy { http-proxy`** *`http_proxy`* **`| https-proxy`** *`https_proxy`* **`| no-proxy`** *`no_proxy_hosts`* **`}`**

**http-proxy *http_proxy***

Specify to send HTTP traffic to the specified HTTP proxy.

Must be a string.

**https-proxy *https_proxy***

Specify to send HTTPS traffic to the specified HTTP proxy.

Must be a string.

**no-proxy *no_proxy_hosts***

Specify the hosts to avoid proxy.

Must be a string.

**Usage Guidelines** Use this command to configure the proxy servers at the node level.

# clusters node-type-defaults os tuned

Enable or disable installing tuned.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults os tuned { disabled | enabled }`**

**enabled**

Specify whether to enable or disable installing tuned.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to enable or disable installing tuned.

# clusters node-type-defaults os users

Configures the list of SMI-managed users managed on this default. Excludes "initial-boot" (cloud-init) provisioned users.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults os users`** *`user_name`* **`password`** *`password`*

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **`os users`** *`user_name`* **`password`** *`password`*

**group *access_privilege***

Specify the user's access privilege. The group defines the user's access privilege.

Must be one of the following:

- **smi-cluster-admin**
- **smi-read-only**

- **smi-superuser**

Default Value: smi-read-only.

**password *password***

Specify the password for this entry. It can be a already hashed value (/etc/shadow). Unencrypted will be hashed.

***user_name***

Specify the user name.

Must be a string of 0-32 characters.

**Usage Guidelines** Use this command to configure the list of SMI-managed users managed on this default. Excludes "initial-boot" (cloud-init) provisioned users.

# clusters node-type-defaults os users authorized-keys

Configures a list of public SSH keys for this user. These keys are allowed for SSH authentication, as described in RFC 4253.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults os users`** *`user_name`* **`[ authorized-keys`** *`ssh_key_name`* **`[ algorithm`** *`algorithm_name`* **`| key-data`** *`key_data`* **`] ]`**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Users Configuration (config-users-*user_name*)

**Syntax Description** **`authorized-keys`** *`ssh_key_name`* **`[ algorithm`** *`algorithm_name`* **`| key-data`** *`key_data`* **`] ]`**

**algorithm *algorithm_name***

Specify the public key algorithm name for this SSH key.

Must be one of the following:

- **ssh-ed25519**
- **ssh-rsa**

**key-data *key_data***

Specify the binary public key data.

Must be of type binary.

***ssh_key_name***

Specify a name for the SSH key.

Must be a string.

**Usage Guidelines** Use this command to configure a list of public SSH keys for this user. These keys are allowed for SSH authentication, as described in RFC 4253. This corresponds to a public key as: <algorithm> <key-data> <name>. For example, ssh-rsa AAAABRUY...bh+3+jA= test-key-laptop.

# clusters node-type-defaults ucs-server

Configures UCS server parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **ucs-server** *options*

**software *ucs_software_version***

Specify the UCS software version.

**Usage Guidelines** Use this command to configure UCS server parameters.

# clusters node-type-defaults ucs-server cimc

Configures CIMC parameters.

**Command Modes** Exec

**Syntax Description** **cimc ip-address** *cimc_ip_address* **user** *cimc_user_name* **password** *cimc_user_password*

**password *cimc_user_password***

Specify the CIMC password.

**user *cimc_user_name***

Specify the CIMC user name.

Must be a string.

**Usage Guidelines** Use this command to configure the CIMC user name and password.

# clusters node-type-defaults ucs-server cimc bios

Configures CIMC BIOS boot order parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **bios**

**Usage Guidelines** Use this command to configure the CIMC BIOS boot order parameters.

# clusters node-type-defaults ucs-server cimc networking ntp

Configures the CIMC network-related parameters.

**Command Modes** Exec

**Syntax Description** `networking ntp enabled { false | true }`

**enabled { false | true }**

Specify whether to provide the NTP servers to configure.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the CIMC network-related parameters.

# clusters node-type-defaults ucs-server cimc networking ntp servers

Configures the time servers for CIMC to connect.

**Command Modes** Exec

**Syntax Description** `ntp servers url` *`server_url`*

**url *server_url***

Specify the time server's URL. For example, clock.cisco.com.

Must be a string.

**Usage Guidelines** Use this command to configure the time servers for CIMC to connect.

# clusters node-type-defaults ucs-server cimc remote-management sol

Configures the provision of SoL baud rate, com port, and SSH port parameters.

**Command Modes** Exec

**Syntax Description**

**sol comport enabled { false | true } baud-rate** *baud_rate com_port_number* **ssh-port** *ssh_port_number*

**baud-rate *baud_rate***

Specify the serial baud rate the system uses for SoL communication.

Must be one of the following:

- **115200**
- **19200**
- **38400**
- **57600**
- **9600**

**comport *com_port_number***

Specify the serial port the system uses for SoL communication.

Must be one of the following:

- **com0**
- **com1**

**enabled { false | true }**

Specify whether to when enabled provide the baud rate, comport, and ssh-port.

Must be one of the following:

- **false**
- **true**

**ssh-port *ssh_port_number***

Specify the SSH port of CIMC SoL communication.

Must be an integer.

**Usage Guidelines**

Use this command to configure the provision of SoL baud rate, comport, and ssh-port parameters.

# clusters node-type-defaults ucs-server cimc storage-adaptor

Configures the CIMC storage adaptor management parameters.

**Command Modes**

Exec

**Syntax Description**

**storage-adaptor create-virtual-drive { false | true }**

**create-virtual-drive { false | true }**

Specify whether to create the virtual drive if it is not already created.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the CIMC storage adaptor management parameters.

# clusters node-type-defaults ucs-server host initial-boot networking

Configures the interface and IP information used to initially bootstrap the node.

**Command Modes** Exec

**Syntax Description** **host initial-boot networking interface** *interface_name*

**interface *interface_name***

Specify the interface name.

Must be a string.

Default Value: eno1.

**Usage Guidelines** Use this command to configure the interface and IP information used to initially bootstrap the node.

# clusters node-type-defaults ucs-server host initial-boot networking static-ip

Configures static IP parameters.

**Command Modes** Exec

**Syntax Description** **static-ip ipv4-address** *ipv4_address* **netmask** *netmask* **gateway** *gateway* **dns** *ip_address*

**dns *ip_address***

Specify the IP address.

You can configure a maximum of three elements with this keyword.

**gateway *gateway***

Specify the gateway.

Must be a string.

**ipv4-address *ipv4_address***

Specify the IPv4 address.

**netmask *netmask***

Specify the netmask.

**Usage Guidelines** Use this command to configure static IP parameters.

# clusters node-type-defaults vmware

Configures VMWare hypervisor (vCenter and ESXi host) parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **vmware { datacenter** *datacenter_name* **| datastore** *datastore_name* **| host** *host_name* **}**

**datacenter *datacenter_name***

Specify the datacenter name to override the datacenter from the environment for this node.

Must be a string.

**datastore *datastore_name***

Specify the datastore name to override the datastore from the environment for this node.

Must be a string.

**host *host_name***

Specify the host name to override the host field from the environment for this node.

Must be a string.

**Usage Guidelines** Use this command to configure VMWare hypervisor (vCenter and ESXi host) parameters.

# clusters node-type-defaults vmware nics

Configures list of networks assigned to VMs.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`vmware nics`** *`network_name`*

**Command Modes** Exec > Global Configuration (config) > Environment Configuration (config-environments-*datastore_name*)

**Syntax Description** **`vcenter nics`** *`network_name`*

***network_name***

Specify the VMware network name.

Must be a string.

**Usage Guidelines** Use this command to configure a list of networks assigned to VMs.

# clusters node-type-defaults vmware numa-node-affinity

Configures the affinity to a processor socket.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`vmware numa-node-affinity`** *`cpu_socket_number`*

***cpu_socket_number***

Specify the physical CPU socket number.

Must be an integer in the range of 0-15.

**Usage Guidelines** Use this command to configure affinity to a processor socket.

# clusters node-type-defaults vmware pci-device

Configures the list of PCI devices.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`vmware pci-device`** *`pci_device_key`*

***pci_device_key***

Specify the PCI device key.

Must be a string in the pci-keytype pattern. For information on the pci-keytype pattern, see the *Input Pattern Types* chapter.

**Usage Guidelines** Use this command to configure the list of PCI devices.

# clusters node-type-defaults vmware performance

Configures VMware performance parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`vmware performance { cpu-reservation { false | true } | latency-sensitivity`** *`latency_sensitivity`* **`| memory-reservation { false | true } }`**

**cpu-reservation { false | true }**

CPU reservation info.

Must be one of the following:

- **false**
- **true**

**latency-sensitivity *latency_sensitivity***

Specify the latency-senstivity.

Must be one of the following:

- **high**: High.
- **low**: Low.
- **medium**: Medium.
- **normal**: Normal.

**memory-reservation { false | true }**

Memory reservation info.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure VMware performance parameters.

# clusters node-type-defaults vmware sizing

Configures VMWare hypervisor (vCenter and ESXi host) sizing parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`vmware sizing`** *`options`*

**cores-equal-cpus { false | true }**

Specify whether cores per socket allocated equal to CPUs.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**cpus *number_of_cpus***

Specify the number of CPUs allocated.

Must be an integer in the range of 1-256.

**ram-mb *ram_mb***

Specify the RAM in MB.

Must be an integer in the range of 4096-524288.

**Usage Guidelines** Use this command to configure VMWare hypervisor (vCenter and ESXi host) sizing parameters.

# clusters nodes

Configures the nodes for both OS and Kubernetes management.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`nodes`** *`node_name`* **`[ maintenance { false | true } ssh-ip {`** *`host_name`* **`|`** *`ip_address`* **`} type`** *`node_type`* **`]`**

**flavor *hardware_resource***

Specify the flavor.

Must be one of the following:

- **full**
- **half**

- **quarter**

Default Value: half.

**host-profile *host_profile_name***

Specify the customizable tuning details package.

**maintenance { false | true }**

Specify if the node is temporarily from the cluster due to a maintenance activity.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**ssh-connection-private-key *private_key***

Specify the SSH private key used for connecting to the node.

**ssh-ip { *host_name* | *ip_address* }**

Specify the host name or IP address used to connect via SSH for node managment.

Must be a string.

**ssh-username *user_name***

Specify the SSH user name used for connecting to the node.

Must be a string.

**type *node_type***

Specify the node type.

Must be one of the following:

- **k8s**
- **kvm**

Default Value: k8s.

***node_name***

Specify the name of the node. *name* can be an alphanumeric string conatining the hyphen (-). A host name cannot start with a hyphen (-). For example, Example: kashaio-123.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

## Usage Guidelines

Use this command to configure the nodes for both OS and Kubernetes management.

# clusters nodes actions k8s pod-status

Configures displaying the status of the k8s pods on the node.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** `actions k8s pod-status show-pod-details { false | true }`

**show-pod-details { false | true }**

Specify whether to display the list of pods in addition to the counts.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**Usage Guidelines** Use this command to configure displaying the status of the k8s pods scheduled on the node.

# clusters nodes actions sync cancel

Cancels the sync process.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** `actions sync cancel`

**Usage Guidelines** Use this command to cancel the sync process.

# clusters nodes actions sync drain

Drains the node in preparation for an upgrade.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** `drain { remove-node { false | true } | ansible-strategy` *`ansible_strategy`* `}`

**ansible-strategy *ansible_strategy***

Specify the Ansible strategy used for synchronization.

Must be one of the following:

- **free**

- **linear**

Default Value: free.

**remove-node { false | true }**

Specify whether to remove the specified node.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**Usage Guidelines** Use this command to drain the node in preparation for an upgrade.

# clusters nodes actions sync logs

Displays the node configuration logs.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`actions sync logs`**

**Usage Guidelines** Use this command to view the node configuration logs.

# clusters nodes actions sync run

Upgrades the node.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`actions sync run { ansible-strategy`** *`ansible_strategy`* **`| debug { false | true } | force-partition-redeploy { false | true } | purge-data-disks { false | true } | reset-k8s-nodes { false | true } | sync-phase`** *`sync_phase`* **`| vm-redeploy { false | true } }`**

**ansible-strategy *ansible_strategy***

Specify the Ansible strategy for synchronization.

Must be one of the following:

- **free**
- **linear**

Default Value: linear.

**debug { false | true }**

Specfy whether to debug.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**force-partition-redeploy { false | true }**

Specify whether to force redeploying the partition.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**purge-data-disks { false | true }**

Specify whether to purge data disks.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**reset-k8s-nodes { false | true }**

Specify whether to reset the K8s nodes.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**sync-phase *sync_phase***

Specify the synchronization phase.

Must be one of the following:

- **all**
- **distributed-registry**
- **opscenter**

Default Value: all.

**vm-redeploy { false | true }**

Specify whether to redeploy the VM.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**Usage Guidelines** Use this command to run sync on only one node. Typically needed for manual upgrade cases where cluster rolling upgrade is not used. Will disrupt operations on the node.

# clusters nodes actions sync serial-logs

Displays the node configuration serial logs.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`serial-logs`**

**Usage Guidelines** Use this command to view the node configuration serial logs.

# clusters nodes actions sync status

Displays the status of the node.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`actions sync status`**

**Usage Guidelines** Use this command to view the status of the node.

# clusters nodes cm

Configures Cluster Manager HA IP parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`cm ha-ip`** *`ha_ip`*

**ha-ip *ha_ip***

Specify Cluster Manager HA IP used by Keepalived and DRBD for internal communication. Defaults to ssh-ip.

Must be a string.

**Usage Guidelines** Use this command to configure Cluster Manager HA IP parameters.

# clusters nodes initial-boot

Configures the cloud-Init parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`initial-boot { [ default-user`** *`default_user`* **`] [ default-user-password`** *`password`* **`] [ default-user-ssh-public-key`** *`ssh_public_key`* **`] }`**

**default-user-password *default_user_password***

Specify the password for the default user.

**default-user-ssh-public-key *default_user_ssh_public_key***

Specify the public keys allowed to connect via SSH for the default user.

Must be a string.

**default-user *default_user_name***

Specify the default user created when this node is deployed.

Must be a string.

**Usage Guidelines** Use this command to configure the cloud-Init parameters (only first boot of VM).

# clusters nodes initial-boot netplan

Configures initial boot netplan parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`netplan renderer`** *`renderer_type`*

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**

- **networkd**

**Usage Guidelines** Use this command to configure initial boot netplan parameters.

# clusters nodes initial-boot netplan bonds

Configures netplan bonds device type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions bonds** *bond_name* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | device-id** *device_id* **| dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *id_list* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions bonds** *bond_name* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | device-id** *device_id* **| dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *id_list* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

#### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

#### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

#### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**

- **true**

### device-id *device_id*

Specify the netplan device ID.

Must be a string.

### dhcp-identifier *dhcp_identifier*

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

### dhcp4 { false | true }

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

### dhcp6 { false | true }

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

### gateway4 *ipv4_address*

Specify the default gateway for IPv4.

### gateway6 *ipv6_address*

Specify the default gateway for IPv6.

### interfaces *id_list*

Specify the ID list. All devices matching this ID list will be added to the bond.

Must be a string.

### ipv6-privacy { false | true }

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**

- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the clusters bonds.

# clusters nodes initial-boot netplan bonds dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters nodes initial-boot netplan bonds dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **dhcp6-overrides { hostname** *host_name* **| route-metric** *route_metric_value* **| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters nodes initial-boot netplan bonds nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters nodes initial-boot netplan bonds optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters nodes initial-boot netplan bonds parameters

Configures customization parameters for special bonding options.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Syntax Description** **`parameters { ad-select`** *`aggregation_selection_mode`* **`| all-slaves-active { false | true } | arp-interval`** *`arp_interval_value`* **`| arp-ip-targets`** *`ipv4_address`* **`| down-delay`** *`down_delay_interval`* **`| fail-over-mac-policy`** *`failover_mac_policy`* **`|`**

**gratuitous-arp** *arp_packets* **| lacp-rate** *lacp_rate* **| learn-packet-interval** *learn_packet_interval* **| mii-monitor-interval** *mii_monitor_interval* **| min-links** *minimum_links* **| mode** *bonding_mode* **| packets-per-slave** *packets_per_slave* **| primary-reselect-policy** *reselection_policy* **| primary** *primary_device* **| resend-igmp** *igmp_reports* **| transmit-hash-policy** *transmit_hash_policy* **| up-delay** *up_delay_interval* **}**

**ad-select *aggregation_selection_mode***

Specify the aggregation selection mode.

Must be one of the following:

- **bandwidth**
- **count**
- **stable**

**all-slaves-active { false | true }**

Specify whether the bond should drop or deliver the duplicate frames received on inactive ports.

Must be one of the following:

- **false**
- **true**

**arp-interval *arp_interval_value***

Specify the interval value for how to determine the frequency of ARP link monitoring.

Must be a string.

**arp-ip-targets *ipv4_address***

Specify the IPs of other hosts on the link which should be sent ARP requests in order to validate that a slave is up.

**down-delay *down_delay_interval***

Specify the delay before disabling a link once the link has been lost.

Must be a string.

**fail-over-mac-policy *failover_mac_policy***

Specify whether to set all slaves to the same MAC address when adding them to the bond, or how else the system should handle MAC addresses.

Must be one of the following:

- **active**
- **follow**
- **none**

**gratuitous-arp *arp_packets***

Specify the number of ARP packets to send after failover.

Must be an integer in the range of 1-255.

**lacp-rate *lacp_rate***

Specify the rate at which Link Aggregation Control Protocol Data Unit (LACPDU) are transmitted.

Must be one of the following:

- **fast**
- **slow**

**learn-packet-interval *learn_packet_interval***

Specify the interval between sending learning packets to each slave.

Must be a string.

**mii-monitor-interval *mii_monitor_interval***

Specify the interval for MII monitoring. That is, verifying if an interface of the bond has carrier.

Must be a string.

**min-links *minimum_links***

Specify the minimum number of link up in a bond to consider the bond interface to be up.

Must be an integer.

**mode *bonding_mode***

Specify the bonding mode used for the interfaces.

Must be one of the following:

- **802.3ad**
- **active-backup**
- **balance-alb**
- **balance-rr**
- **balance-tlb**
- **balance-xor**
- **broadcast**

**packets-per-slave *packets_per_slave***

Specify the number of packets to transmit on a slave before switching to the next.

Must be an integer in the range of 0-65535.

**primary-reselect-policy *reselection_policy***

Specify the reselection policy for the primary slave.

Must be one of the following:

- **always**
- **better**
- **failure**

**primary *primary_device***

Specify the device to be used as a primary slave, or preferred device to use as a slave for the bond, whenever it is available.

Must be a string.

**resend-igmp *igmp_reports***

Specify the number of IGMP membership reports issued on a failover event.

Must be an integer in the range of 0-255.

**transmit-hash-policy *transmit_hash_policy***

Specify the transmit hash policy for the selection of slaves.

Must be one of the following:

- **encap2+3**
- **encap3+4**
- **layer2+3**
- **layer2**
- **layer3+4**

**up-delay *up_delay_interval***

Specify the delay before enabling a link once the link is physically up.

Must be a string.

**Usage Guidelines** Use this command to configure customization parameters for special bonding options.

# clusters nodes initial-boot netplan bonds routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope *route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters nodes initial-boot netplan bonds routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters nodes initial-boot netplan bridges

Configures netplan bridge type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions bridges** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *interface_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions bridges** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *interface_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**interfaces *interface_id***

Adds all the devices matching this ID to the bridge.

Must be a string.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

## Usage Guidelines

Use this command to configure the bridge type.

# clusters nodes initial-boot netplan bridges dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp4-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters nodes initial-boot netplan bridges dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

#### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters nodes initial-boot netplan bridges nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters nodes initial-boot netplan bridges optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters nodes initial-boot netplan bridges parameters

Configures the customization parameters for special bridging options.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Syntax Description**

**parameters { ageing-time** *ageing_time* **| forward-delay** *forward_delay_period* **| hello-time** *hello_time_interval* **| max-age** *maximum_age* **| path-cost** *cost_of_path* **| post-port-priority** *post_port_priority_range* **| priority** *priority_value* **| stp { false | true } }**

**ageing-time *ageing_time***

Specify the period of time to keep a MAC address in the forwarding database after a packet is received.

Must be a string.

**forward-delay *forward_delay_period***

Specify the period of time the bridge will remain in Listening and Learning states before getting to the Forwarding state.

Must be a string.

**hello-time *hello_time_interval***

Specify the interval between two hello packets being sent out from the root and designated bridges.

Must be a string.

**max-age *maximum_age***

Specify the maximum age of a hello packet.

Must be a string.

**path-cost *cost_of_path***

Specify the cost of a path on the bridge.

Must be a string.

**post-port-priority *post_port_priority_range***

Specify the port priority range.

Must be an integer in the range of 0-63.

**priority *priority_value***

Specify the priority value for the bridge.

Must be an integer.

**stp { false | true }**

Specify whether the bridge should use Spanning Tree protocol.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the customization parameters for special bridging options.

# clusters nodes initial-boot netplan bridges routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

**from *source_ip_address***

Specify the source IP address for traffic going through the route.

**metric *relative_priority_value***

Specify the relative priority of the route.

Must be an integer.

**on-link { false | true }**

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope *route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters nodes initial-boot netplan bridges routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters nodes initial-boot netplan ethernets

Configures netplan ethernets device type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions ethernets** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions ethernets** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| ipv6-privacy { false | true } |**

**link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

### device-id *device_id*

Specify the netplan device ID.

Must be a string.

### dhcp-identifier *dhcp_identifier*

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

### dhcp4 { false | true }

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

### dhcp6 { false | true }

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4** ***ipv4_address***

Specify the default gateway for IPv4.

**gateway6** ***ipv6_address***

Specify the default gateway for IPv6.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local** ***link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress** ***mac_address***

Specify the MAC address.

**mtu** ***number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer** ***renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure netplan ethernet dvice type.

# clusters nodes initial-boot netplan ethernets auth

Configures the authentication parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Syntax Description** **auth key-management** *key_management_mode* **[ ca-certificate** *path_to_trusted_ca_cert_file* **| client-certificate** *path_to_client_cert_file* **| client-key-password** *client_key_password* **| client-key** *path_to_client_key_file* **]**

#### ca-certificate *path_to_trusted_ca_cert_file*

Specify the path to a file with one or more trusted Certificate Authority (CA) certificates.

Must be a string.

#### client-certificate *path_to_client_cert_file*

Specify the path to a file containing the certificate to be used by the client during authentication.

Must be a string.

#### client-key-password *client_key_password*

Specify the password to use to decrypt the private key specified in client-key if it is encrypted.

Must be a string.

#### client-key *path_to_client_key_file*

Specify the path to a file containing the private key corresponding to client-certificate.

Must be a string.

#### key-management *key_management_mode*

Specify the key management mode.

Must be one of the following:

- **802.1x**

- **none**

**Usage Guidelines** Use this command to configure the authentication parameters.

# clusters nodes initial-boot netplan ethernets dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters nodes initial-boot netplan ethernets dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters nodes initial-boot netplan ethernets nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters nodes initial-boot netplan ethernets optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters nodes initial-boot netplan ethernets routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

**from *source_ip_address***

Specify the source IP address for traffic going through the route.

**metric *relative_priority_value***

Specify the relative priority of the route.

Must be an integer.

**on-link { false | true }**

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope *route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

## Usage Guidelines

Use this command to configure static routing for the device.

# clusters nodes initial-boot netplan ethernets routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters nodes initial-boot netplan tunnels

Configures the tunnel mode.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions tunnels** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **ipv6-privacy { false | true } | link-local** *link_local_address* **| local** *ip_address* **| macaddress** *mac_address* **| mode** *tunnel_mode* **| mtu** *number_of_mtu* **| optional { false | true } | remote** *ip_address* **| renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions tunnels** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **ipv6-privacy { false | true } | link-local** *link_local_address* **| local** *ip_address* **| macaddress** *mac_address* **| mode** *tunnel_mode* **| mtu** *number_of_mtu* **| optional { false | true } | remote** *ip_address* **| renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**local *ip_address***

Specify the IP address of the local endpoint of the tunnel.

**macaddress *mac_address***

Specify the MAC address.

**mode *tunnel_mode***

Specify the tunnel mode.

Must be one of the following:

- **gre**
- **gretap**
- **ip6gre**
- **ip6gretap**
- **ip6ip6**
- **ipip6**
- **ipip**
- **isatap**

- **sit**
- **vti6**
- **vti**

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**remote *ip_address***

Specify the IP address of the remote endpoint of the tunnel.

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the tunnel mode.

# clusters nodes initial-boot netplan tunnels dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp4-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-routes { false | true }

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters nodes initial-boot netplan tunnels dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters nodes initial-boot netplan tunnels key

Configures the keys to use for the tunnel.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Syntax Description** **key { input** *input_key* **| output** *output_key* **}**

**input *input_key***

Specify the input key for the tunnel.

Must be a string.

**output *output_key***

Specify the output key for the tunnel.

Must be a string.

**Usage Guidelines** Use this command to configure the keys to use for the tunnel.

# clusters nodes initial-boot netplan tunnels nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters nodes initial-boot netplan tunnels optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**

- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters nodes initial-boot netplan tunnels routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

**from *source_ip_address***

Specify the source IP address for traffic going through the route.

**metric *relative_priority_value***

Specify the relative priority of the route.

Must be an integer.

**on-link { false | true }**

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope *route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters nodes initial-boot netplan tunnels routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters nodes initial-boot netplan vlans

Configures the Virtual LAN parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions vlans** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| id** *vlan_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| link** *interface_name* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions vlans** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4**

*ipv4_address* **| gateway6** *ipv6_address* **| id** *vlan_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| link** *interface_name* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4** ***ipv4_address***

Specify the default gateway for IPv4.

**gateway6** ***ipv6_address***

Specify the default gateway for IPv6.

**id** ***vlan_id***

Specify the Virtual LAN ID.

Must be an integer in the range of 0-4094.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local** ***link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**link** ***interface_name***

Specify the interface name of the underlying device definition on which this VLAN gets created.

Must be a string.

**macaddress** ***mac_address***

Specify the MAC address.

**mtu** ***number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the Virtual LAN parameters.

# clusters nodes initial-boot netplan vlans dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

#### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters nodes initial-boot netplan vlans dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-routes { false | true }

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters nodes initial-boot netplan vlans nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters nodes initial-boot netplan vlans optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters nodes initial-boot netplan vlans routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

## Syntax Description

**routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

### from *source_ip_address*

Specify the source IP address for traffic going through the route.

### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

### table *table_number*

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

### type *route_type*

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters nodes initial-boot netplan vlans routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

**routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines**

Use this command to configure policy routing for the device.

# clusters nodes k8s

Configures k8s specific configuration.

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description**

**k8s { node-ip** *node_ip* **| node-labels** *key value|* **node-type** *type* **| ssh-connection-private-key** *aes_encrypted_string* **| ssh-ip** *ssh_ip* **| ssh-username** *ssh_username* **| ssh-bind-to-ssh-ip { false | true } }**

**host-profile *host_profile_name***

Specify the customizable tuning details package.

**hostname-override *host_name_override***

Specify to force the host name in kubeadmin config for k8s.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

**max-pods *max_pods***

Specify the maximum number of pods per node. Uses kubernetes default if not set.

Must be an integer in the range of 10-2000.

**node-ip *node_ip***

Specify the node IP used by kubernetes for inter-node communication.

Must be a string.

**node-type *node_type***

Specify the Kubernetes node type.

Must be one of the following:

- **backup**
- **control-plane**
- **etcd**
- **master**
- **worker**

**Important** The **master** node type is deprecated. Use the **control-plane** node type instead of **master**.

Default Value: worker.

**ssh-connection-private-key *private_key***

Specify the SSH private key used for connecting to the node.

**ssh-ip *ssh_ip***

Specfies the host name or IP address used to connect through SSH for node management.

Must be a string.

**ssh-username *user_name***

Specify the SSH user name used for connecting to the node.

Must be a string.

**sshd-bind-to-ssh-ip { false | true }**

Specify if the SSHD should only listen on SSH IP.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**worker-type *worker_type***

Specify the worker type.

**Usage Guidelines** Use this command to configure k8s specific configuration.

# clusters nodes k8s cpu-manager

Configures CPU Manager parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

```
cpu-manager cpu-manager-policy cpu_manager_policy {
cpu-manager-reconcile-period cpu_manager_reconcile_period | system-reserved-cpu
 system_reserved_cpu | system-reserved-memory system_reserved_memory |
system-reserved-ephemeral-storage storage_memory | kube-reserved-cpu
kube_reserved_cpu | kube-reserved-memory kube_reserved_memory |
kube-reserved-ephemeral-storage kube_reserved_ephemeral_storage }
```

**cpu-manager-policy *cpu_manager_policy***

Specify the CPU Manager policy.

Must be one of the following:

- **none**
- **static**

Default Value: none.

**cpu-manager-reconcile-period *cpu_manager_reconcile_period***

Specify the CPU Manager reconciliation period. If not supplied, defaults to NodeStatusUpdateFrequency (default 10s) when policy is static.

Must be an integer in the range of 10-60.

Default Value: 10.

**kube-reserved-cpu *kube_reserved_cpu***

Specify the Kube-reserved CPU.

Must be of type decimal64, with 2 fraction digits in the range of 0-36.

Default Value: 1.

**kube-reserved-ephemeral-storage *kube_reserved_ephemeral_storage***

Specify the Kube-reserved ephemeral storage memory in GB.

Must be an integer in the range of 2-512.

Default Value: 2.

**kube-reserved-memory *kube_reserved_memory***

Specify the Kube-reserved memory in MB.

Must be an integer in the range of 2000-524288.

Default Value: 2000.

**system-reserved-cpu *system_reserved_cpu***

Specify the system-reserved CPU.

Must be of type decimal64, with 2 fraction digits in the range of 0-36.

Default Value: 1.

**system-reserved-ephemeral-storage *storage_memory***

Specify the system-reserved ephemeral storage memory in GB.

Must be an integer in the range of 2-512.

Default Value: 2.

**system-reserved-memory *system_reserved_memory***

Specify the system-reserved memory in MB.

Must be an integer in the range of 2000-524288.

Default Value: 2000.

**Usage Guidelines** Use this command to configure CPU Manager parameters.

# clusters nodes k8s node-labels

Configures k8s node labels.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`node-defaults k8s node-labels`** *`key value`*

***key***

Specify the prefix for the node label.

Must be a string in the k8s-keytype pattern. For information on the k8s-keytype pattern, see the *Input Pattern Types* chapter.

***value***

Specify the suffix for the node label.

Must be a string in the k8s-valuetype pattern. For information on the k8s-valuetype pattern, see the *Input Pattern Types* chapter.

**Usage Guidelines** Use this command to configure the k8s node labels.

# clusters nodes netplan variables

Configures the netplan template variables.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **netplan variables** *variable_name* **value** *variable_value*

**value *variable_value***

Specify the variable value.

Must be a string.

***variable_name***

Specify the variable name from the netplan template.

**Usage Guidelines** Use this command to configure the netplan template variables.

# clusters nodes os

Configures OS-specific parameters.

**Command Modes** Exec > Global Configuration (config)> Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **os [ additional-ssh-ips** *additional_ssh_hostnames_ips* **| enable-passthrough { false | true } | num-vfs-per-pf** *vf_per_pf* **| tac-password** *tac_password* **]**

**additional-ssh-ips *additional_ssh_hostnames_ips***

Specify additional host name or IP addresses used to connect via SSH for node management.

Must be a string.

**enable-passthrough { false | true }**

Specify whether to enable or disable PCI passthrough.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**num-vfs-per-pf *vf_per_pf***

Specify the VF number per PF.

Must be an integer.

Default Value: 16.

**tac-password *tac_password***

Specify the TAC password to enable Cisco TAC access.

**Usage Guidelines** Use this command to configure OS-specific parameters.

# clusters nodes os disable-log-ratelimit

Enables or disables JournalID rate limiting.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** `disable-log-ratelimit enabled { false | true }`

**enabled { false | true }**

Specify whether to enable or disable JournalID rate limiting.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to enable or disable JournalD rate limiting.

# clusters nodes os netplan-additions

Allows adding to netplan configuration from initial-boot (cloud-init). NOTE: currently only routes are supported and not all netplan fields are available.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults os netplan-additions`**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **`os netplan-additions`**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to add netplan configuration from initial-boot. Currently, only routes are supported and not all netplan fields are available.

# clusters nodes os netplan-additions actions preview-netplan

Displays a preview of netplan YAML and validates with "netplan generate". This command displays only the commited data and is useful for debugging.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults os netplan-additions actions preview-netplan`**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **`os netplan-additions actions preview-netplan`**

**Usage Guidelines** Use this command to preview the netplan.

# clusters nodes os netplan-additions bonds

Configures netplan bonds device type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults os netplan-additions bonds`** *`bond_name`* **`{ accept-ra { false | true } | addresses`** *`ip_address/prefix_length`* **`| critical { false | true } | device-id`** *`device_id`* **`| dhcp-identifier`** *`dhcp_identifier`* **`| dhcp4 { false | true } | dhcp6 { false | true } | gateway4`** *`ipv4_address`* **`| gateway6`** *`ipv6_address`* **`| interfaces`** *`id_list`* **`| ipv6-privacy { false | true } | link-local`** *`link_local_address`* **`| macaddress`** *`mac_address`* **`| mtu`** *`number_of_mtu`* **`| optional { false | true } | renderer`** *`renderer_type`* **`}`**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions bonds** *bond_name* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | device-id** *device_id* **| dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *id_list* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

#### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

#### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

#### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

#### device-id *device_id*

Specify the netplan device ID.

Must be a string.

#### dhcp-identifier *dhcp_identifier*

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

#### dhcp4 { false | true }

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**

- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4** ***ipv4_address***

Specify the default gateway for IPv4.

**gateway6** ***ipv6_address***

Specify the default gateway for IPv6.

**interfaces** ***id_list***

Specify the ID list. All devices matching this ID list will be added to the bond.

Must be a string.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local** ***link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress** ***mac_address***

Specify the MAC address.

**mtu** ***number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the clusters bonds.

# clusters nodes os netplan-additions bonds dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

#### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters nodes os netplan-additions bonds dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-routes { false | true }

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters nodes os netplan-additions bonds nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **nameservers { search** *domain_name* **| addresses** *ip_addresses* **}**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters nodes os netplan-additions bonds optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters nodes os netplan-additions bonds parameters

Configures customization parameters for special bonding options.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Syntax Description** **parameters { ad-select** *aggregation_selection_mode* **| all-slaves-active { false | true } | arp-interval** *arp_interval_value* **| arp-ip-targets** *ipv4_address* **| down-delay** *down_delay_interval* **| fail-over-mac-policy** *failover_mac_policy* **| gratuitous-arp** *arp_packets* **| lacp-rate** *lacp_rate* **| learn-packet-interval** *learn_packet_interval* **| mii-monitor-interval** *mii_monitor_interval* **| min-links** *minimum_links* **| mode** *bonding_mode* **| packets-per-slave** *packets_per_slave* **| primary-reselect-policy** *reselection_policy* **| primary** *primary_device* **| resend-igmp** *igmp_reports* **| transmit-hash-policy** *transmit_hash_policy* **| up-delay** *up_delay_interval* **}**

**ad-select *aggregation_selection_mode***

Specify the aggregation selection mode.

Must be one of the following:

- **bandwidth**
- **count**
- **stable**

**all-slaves-active { false | true }**

Specify whether the bond should drop or deliver the duplicate frames received on inactive ports.

Must be one of the following:

- **false**
- **true**

**arp-interval** ***arp_interval_value***

Specify the interval value for how to determine the frequency of ARP link monitoring.

Must be a string.

**arp-ip-targets** ***ipv4_address***

Specify the IPs of other hosts on the link which should be sent ARP requests in order to validate that a slave is up.

**down-delay** ***down_delay_interval***

Specify the delay before disabling a link once the link has been lost.

Must be a string.

**fail-over-mac-policy** ***failover_mac_policy***

Specify whether to set all slaves to the same MAC address when adding them to the bond, or how else the system should handle MAC addresses.

Must be one of the following:

- **active**
- **follow**
- **none**

**gratuitous-arp** ***arp_packets***

Specify the number of ARP packets to send after failover.

Must be an integer in the range of 1-255.

**lacp-rate** ***lacp_rate***

Specify the rate at which Link Aggregation Control Protocol Data Unit (LACPDU) are transmitted.

Must be one of the following:

- **fast**
- **slow**

**learn-packet-interval** ***learn_packet_interval***

Specify the interval between sending learning packets to each slave.

Must be a string.

**mii-monitor-interval** ***mii_monitor_interval***

Specify the interval for MII monitoring. That is, verifying if an interface of the bond has carrier.

Must be a string.

**min-links** ***minimum_links***

Specify the minimum number of link up in a bond to consider the bond interface to be up.

Must be an integer.

**mode** ***bonding_mode***

Specify the bonding mode used for the interfaces.

Must be one of the following:

- **802.3ad**
- **active-backup**
- **balance-alb**
- **balance-rr**
- **balance-tlb**
- **balance-xor**
- **broadcast**

**packets-per-slave** ***packets_per_slave***

Specify the number of packets to transmit on a slave before switching to the next.

Must be an integer in the range of 0-65535.

**primary-reselect-policy** ***reselection_policy***

Specify the reselection policy for the primary slave.

Must be one of the following:

- **always**
- **better**
- **failure**

**primary** ***primary_device***

Specify the device to be used as a primary slave, or preferred device to use as a slave for the bond, whenever it is available.

Must be a string.

**resend-igmp** ***igmp_reports***

Specify the number of IGMP membership reports issued on a failover event.

Must be an integer in the range of 0-255.

**transmit-hash-policy *transmit_hash_policy***

Specify the transmit hash policy for the selection of slaves.

Must be one of the following:

- **encap2+3**
- **encap3+4**
- **layer2+3**
- **layer2**
- **layer3+4**

**up-delay *up_delay_interval***

Specify the delay before enabling a link once the link is physically up.

Must be a string.

**Usage Guidelines** Use this command to configure customization parameters for special bonding options.

# clusters nodes os netplan-additions bonds routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

#### table *table_number*

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

#### type *route_type*

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters nodes os netplan-additions bonds routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters nodes os netplan-additions bridges

Configures netplan bridge type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

**node-defaults os netplan-additions bridges** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *interface_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description**

**os netplan-additions bridges** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| interfaces** *interface_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

#### accept-ra { false | true }

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

#### addresses *ip_address/prefix_length*

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

#### critical { false | true }

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

#### device-id *device_id*

Specify the netplan device ID.

Must be a string.

#### dhcp-identifier *dhcp_identifier*

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4** ***ipv4_address***

Specify the default gateway for IPv4.

**gateway6** ***ipv6_address***

Specify the default gateway for IPv6.

**interfaces** ***interface_id***

Adds all the devices matching this ID to the bridge.

Must be a string.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local** ***link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the bridge type.

# clusters nodes os netplan-additions bridges dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**

- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters nodes os netplan-additions bridges dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters nodes os netplan-additions bridges nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **nameservers { search** *domain_name* **| addresses** *ip_addresses* **}**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters nodes os netplan-additions bridges optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **optional-addresses** *optional_addresses*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters nodes os netplan-additions bridges parameters

Configures the customization parameters for special bridging options.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Syntax Description** **parameters { ageing-time** *ageing_time* **| forward-delay** *forward_delay_period* **| hello-time** *hello_time_interval* **| max-age** *maximum_age* **| path-cost** *cost_of_path* **| post-port-priority** *post_port_priority_range* **| priority** *priority_value* **| stp { false | true } }**

**ageing-time *ageing_time***

Specify the period of time to keep a MAC address in the forwarding database after a packet is received.

Must be a string.

**forward-delay *forward_delay_period***

Specify the period of time the bridge will remain in Listening and Learning states before getting to the Forwarding state.

Must be a string.

**hello-time *hello_time_interval***

Specify the interval between two hello packets being sent out from the root and designated bridges.

Must be a string.

**max-age *maximum_age***

Specify the maximum age of a hello packet.

Must be a string.

**path-cost *cost_of_path***

Specify the cost of a path on the bridge.

Must be a string.

**post-port-priority *post_port_priority_range***

Specify the port priority range.

Must be an integer in the range of 0-63.

**priority *priority_value***

Specify the priority value for the bridge.

Must be an integer.

**stp { false | true }**

Specify whether the bridge should use Spanning Tree protocol.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the customization parameters for special bridging options.

# clusters nodes os netplan-additions bridges routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters nodes os netplan-additions bridges routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters nodes os netplan-additions ethernets

Configures netplan ethernets device type.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions ethernets** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions ethernets** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

### device-id *device_id*

Specify the netplan device ID.

Must be a string.

### dhcp-identifier *dhcp_identifier*

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

### dhcp4 { false | true }

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

### dhcp6 { false | true }

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

### gateway4 *ipv4_address*

Specify the default gateway for IPv4.

### gateway6 *ipv6_address*

Specify the default gateway for IPv6.

### ipv6-privacy { false | true }

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure netplan ethernet dvice type.

# clusters nodes os netplan-additions ethernets auth

Configures the authentication parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Syntax Description**

**auth key-management** *key_management_mode* **[ ca-certificate** *path_to_trusted_ca_cert_file* **| client-certificate** *path_to_client_cert_file* **| client-key-password** *client_key_password* **| client-key** *path_to_client_key_file* **]**

**ca-certificate** ***path_to_trusted_ca_cert_file***

Specify the path to a file with one or more trusted Certificate Authority (CA) certificates.

Must be a string.

**client-certificate** ***path_to_client_cert_file***

Specify the path to a file containing the certificate to be used by the client during authentication.

Must be a string.

**client-key-password** ***client_key_password***

Specify the password to use to decrypt the private key specified in client-key if it is encrypted.

Must be a string.

**client-key** ***path_to_client_key_file***

Specify the path to a file containing the private key corresponding to client-certificate.

Must be a string.

**key-management** ***key_management_mode***

Specify the key management mode.

Must be one of the following:

- **802.1x**
- **none**

**Usage Guidelines**

Use this command to configure the authentication parameters.

# clusters nodes os netplan-additions ethernets dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes**

Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp4-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-routes { false | true }

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters nodes os netplan-additions ethernets dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters nodes os netplan-additions ethernets nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **nameservers { search** *domain_name* **| addresses** *ip_addresses* **}**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters nodes os netplan-additions ethernets optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters nodes os netplan-additions ethernets routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

#### scope *route_scope*

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**

- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters nodes os netplan-additions ethernets routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters nodes os netplan-additions tunnels

Configures the tunnel mode.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions tunnels** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **ipv6-privacy { false | true } | link-local** *link_local_address* **| local** *ip_address* **| macaddress** *mac_address* **| mode** *tunnel_mode* **| mtu** *number_of_mtu* **| optional { false | true } | remote** *ip_address* **| renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions tunnels** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **ipv6-privacy { false | true } | link-local** *link_local_address* **| local** *ip_address* **| macaddress** *mac_address* **| mode** *tunnel_mode* **| mtu** *number_of_mtu* **| optional { false | true } | remote** *ip_address* **| renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**local *ip_address***

Specify the IP address of the local endpoint of the tunnel.

**macaddress *mac_address***

Specify the MAC address.

**mode *tunnel_mode***

Specify the tunnel mode.

Must be one of the following:

- **gre**
- **gretap**
- **ip6gre**
- **ip6gretap**
- **ip6ip6**
- **ipip6**
- **ipip**
- **isatap**
- **sit**
- **vti6**
- **vti**

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**

- **true**

**remote *ip_address***

Specify the IP address of the remote endpoint of the tunnel.

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

**Usage Guidelines** Use this command to configure the tunnel mode.

# clusters nodes os netplan-additions tunnels dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp4-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

#### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters nodes os netplan-additions tunnels dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp6-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

### use-mtu { false | true }

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

### use-ntp { false | true }

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

### use-routes { false | true }

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters nodes os netplan-additions tunnels key

Configures the keys to use for the tunnel.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Syntax Description** **`key { input`** *`input_key`* **`| output`** *`output_key`* **`}`**

**input *input_key***

Specify the input key for the tunnel.

Must be a string.

**output *output_key***

Specify the output key for the tunnel.

Must be a string.

**Usage Guidelines** Use this command to configure the keys to use for the tunnel.

# clusters nodes os netplan-additions tunnels nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters nodes os netplan-additions tunnels optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters nodes os netplan-additions tunnels routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope *route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type *route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via *gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters nodes os netplan-additions tunnels routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters nodes os netplan-additions vlans

Configures the Virtual LAN parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os netplan-additions vlans** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| id** *vlan_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| link** *interface_name* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **os netplan-additions vlans** *device_id* **{ accept-ra { false | true } | addresses** *ip_address/prefix_length* **| critical { false | true } | dhcp-identifier** *dhcp_identifier* **| dhcp4 { false | true } | dhcp6 { false | true } | gateway4** *ipv4_address* **| gateway6** *ipv6_address* **| id** *vlan_id* **| ipv6-privacy { false | true } | link-local** *link_local_address* **| link** *interface_name* **| macaddress** *mac_address* **| mtu** *number_of_mtu* **| optional { false | true } | renderer** *renderer_type* **}**

**accept-ra { false | true }**

Specify whether to accept or reject the Router Advertisement that would have the kernel configure IPv6 by itself.

Must be one of the following:

- **false**
- **true**

**addresses *ip_address/prefix_length***

Specify to add static addresses to the interface in addition to the ones received through DHCP or RA.

**critical { false | true }**

Designate the connection as "critical to the system", meaning that special care will be taken by systemd-networkd to not release the IP from DHCP when the daemon is restarted.

Must be one of the following:

- **false**
- **true**

**device-id *device_id***

Specify the netplan device ID.

Must be a string.

**dhcp-identifier *dhcp_identifier***

Assign the setting (when set to mac) over to systemd-networkd to use the device's MAC address as a unique identifier rather than a RFC4361-compliant Client ID.

Must be a string.

**dhcp4 { false | true }**

Specify whether to enable or disable DHCP for IPv4.

Must be one of the following:

- **false**
- **true**

**dhcp6 { false | true }**

Specify whether to enable or disable DHCP for IPv6.

Must be one of the following:

- **false**
- **true**

**gateway4 *ipv4_address***

Specify the default gateway for IPv4.

**gateway6 *ipv6_address***

Specify the default gateway for IPv6.

**id *vlan_id***

Specify the Virtual LAN ID.

Must be an integer in the range of 0-4094.

**ipv6-privacy { false | true }**

Specify whether to enable or disable IPv6 Privacy Extensions (RFC 4941) for the specified interface, and prefer temporary addresses.

Must be one of the following:

- **false**
- **true**

**link-local *link_local_address***

Specify the link-local addresses to bring up.

Must be one of the following:

- **ipv4**
- **ipv6**

**link *interface_name***

Specify the interface name of the underlying device definition on which this VLAN gets created.

Must be a string.

**macaddress *mac_address***

Specify the MAC address.

**mtu *number_of_mtu***

Specify the Maximum Transmission Unit (MTU) for the interface.

Must be an integer.

**optional { false | true }**

Specify whether an optional device is required for booting.

Must be one of the following:

- **false**
- **true**

**renderer *renderer_type***

Specify to use the given networking backend for this definition.

Must be one of the following:

- **NetworkManager**
- **networkd**

## Usage Guidelines

Use this command to configure the Virtual LAN parameters.

# clusters nodes os netplan-additions vlans dhcp4-overrides

Overrides the default DHCP4 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description**

```
dhcp4-overrides { hostname host_name | route-metric route_metric_value |
send-hostname { false | true } | use-dns { false | true } | use-hostname
 { false | true } | use-mtu { false | true } | use-ntp { false | true }
| use-routes { false | true } }
```

**hostname *host_name***

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

**route-metric *route_metric_value***

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

**send-hostname { false | true }**

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

**use-dns { false | true }**

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-hostname { false | true }**

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP4 behavior.

# clusters nodes os netplan-additions vlans dhcp6-overrides

Overrides the default DHCP6 behavior.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`dhcp6-overrides { hostname`** *`host_name`* **`| route-metric`** *`route_metric_value`* **`| send-hostname { false | true } | use-dns { false | true } | use-hostname { false | true } | use-mtu { false | true } | use-ntp { false | true } | use-routes { false | true } }`**

#### hostname *host_name*

Specify the host name sent to the DHCP server, instead of the machine's host name.

Must be a string.

#### route-metric *route_metric_value*

Specify the default metric value for automatically-added routes. Use this to prioritize routes for devices by setting a higher metric on a preferred interface.

Must be an integer.

#### send-hostname { false | true }

Specify whether the machine's host name will be sent to the DHCP server. When set to true, the machine's host name will be sent to the DHCP server.

Must be one of the following:

- **false**
- **true**

#### use-dns { false | true }

Specify whether the DNS servers received from the DHCP server will be used, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

#### use-hostname { false | true }

Specify whether the host name received from the DHCP server will be set as the transient host name of the system.

Must be one of the following:

- **false**
- **true**

**use-mtu { false | true }**

Specify whether the MTU received from the DHCP server will be set as the MTU of the network interface. When set to false, the MTU advertised by the DHCP server will be ignored.

Must be one of the following:

- **false**
- **true**

**use-ntp { false | true }**

Specify whether the NTP servers received from the DHCP server will be used by systemd-timesyncd, and will take precedence over any that are statically configured.

Must be one of the following:

- **false**
- **true**

**use-routes { false | true }**

Specify whether the routes received from the DHCP server will be installed in the routing table normally. When set to false, routes from the DHCP server will be ignored. In such a scenario, the user is responsible for adding static routes (if required) for correct network operation. This allows users to avoid installing a default gateway for interfaces configured through DHCP.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to override the default DHCP6 behavior.

# clusters nodes os netplan-additions vlans nameservers

Configures the DNS servers and search domains.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`nameservers { search`** *`domain_name`* **`| addresses`** *`ip_addresses`* **`}`**

**addresses *ip_addresses***

Specify the DNS server IP address.

**search *domain_name***

Specify the search domain name.

Must be a string.

**Usage Guidelines** Use this command to configure the DNS servers and search domains.

# clusters nodes os netplan-additions vlans optional-addresses

Configures types of addresses that are not required for a device to be considered online.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **`optional-addresses`** *`optional_addresses`*

**optional-addresses *optional_addresses***

Specify the address type that is required for a device to be considered online.

Must be one of the following:

- **dhcp4**
- **dhcp6**
- **ipv4-ll**
- **ipv6-ra**
- **static**

**Usage Guidelines** Use this command to specify types of addresses that are not required for a device to be considered online.

# clusters nodes os netplan-additions vlans routes

Configures static routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routes** *destination_ip_address* **{ from** *source_ip_address* **| metric** *relative_priority_value* **| on-link { false | true } | scope** *route_scope* **| table** *table_number* **| type** *route_type* **| via** *gateway_ip_address* **}**

#### from *source_ip_address*

Specify the source IP address for traffic going through the route.

#### metric *relative_priority_value*

Specify the relative priority of the route.

Must be an integer.

#### on-link { false | true }

Specify whether the route is directly connected to the interface. When set to true, specifies that the route is directly connected to the interface.

Must be one of the following:

- **false**
- **true**

**scope** ***route_scope***

Specify the route scope and how wide-ranging it is to the network.

Must be one of the following:

- **global**
- **host**
- **link**

**table** ***table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**type** ***route_type***

Specify the route type.

Must be one of the following:

- **blackhole**
- **prohibit**
- **unicast**
- **unreachhable**

**via** ***gateway_ip_address***

Specify the gateway IP address to use for this route.

***destination_ip_address***

Specify the destination IP address for the route.

**Usage Guidelines** Use this command to configure static routing for the device.

# clusters nodes os netplan-additions vlans routing-policy

Configures policy routing for the device.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Bridges Configuration (config-bridges-*bridge_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bonds Configuration (config-bonds-*bond_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Bridges Configuration (config-bridges-*bridge_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Ethernets Configuration (config-ethernets-*ethernet_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > VLANS Configuration (config-vlans-*vlans_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Tunnels Configuration (config-tunnels-*tunnels_device_id*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > VLANs Configuration (config-vlans-*vlans_device_id*)

**Syntax Description** **routing-policy** *source_ip_address* **{ mark** *mark_value* **| priority** *priority_value* **| table** *table_number* **| to** *destination_ip_address* **| type-of-service** *type_of_service_number* **}**

**from *source_ip_address***

Specify the source IP address to match traffic for this policy rule.

**mark *mark_value***

Specify the routing policy rule match on traffic that has been marked by the IP tables firewall with this value.

Must be an integer in the range of 1-maximum.

**priority *priority_value***

Specify the priority for the routing policy rule to influence the order in which routing rules are processed.

Must be an integer.

**table *table_number***

Specify the table number to use for the route.

Must be an integer in the range of 1-maximum.

**to *destination_ip_address***

Specify to match on traffic going to the specified destination.

**type-of-service *type_of_service_number***

Specify to match this policy rule based on the type of service number applied to the traffic.

Must be an integer.

**Usage Guidelines** Use this command to configure policy routing for the device.

# clusters nodes os ntp

Configures the NTP servers for the nodes.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`ntp enabled { false | true }`**

**enabled { false | true }**

Specify whether to enable or disable providing the NTP servers for configuration.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the NTP servers for the nodes.

# clusters nodes os ntp clients-allow

Configures the client subnets allowed to use cluster as relay.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`clients-allow subnet`** *`subnet`*

**subnet *subnet***

Specify the client subnets that could use current cluster as NTP relay server. For example, 192.168.0.0/16.

**Usage Guidelines** Use this command to configure the client subnets allowed to use cluster as relay.

# clusters nodes os ntp servers

Configures the time server parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **ntp servers** *url* **{ key-id** *key_id* **| sha-key** *sha_key* **| sha-type** *sha_type* **}**

**key-id *key_id***

Specify the key ID for the chrony server keys.

Must be a string.

**sha-key *sha_key***

Specify the SHA authentication key with chrony server.

Must be a string in the hextype pattern. For information on the hextype pattern, see the *Input Pattern Types* chapter.

**sha-type *sha_type***

Specify the type of SHA for the chrony server keys. For instance, SHA1, SHA256, SHA512, etc. See: https:

Must be one of the following:

- **RMD128**
- **RMD160**
- **RMD256**
- **RMD320**
- **SHA1**
- **SHA256**
- **SHA384**
- **SHA512**
- **TIGER**
- **WHIRLPOOL**

***url***

Specify the NTP server URL. For example, clock.cisco.com.

Must be a string.

**Usage Guidelines** Use this command to configure time server parameters, which need to be input into the NTP conf.

# clusters nodes os partition

Configure the file system type for data partition.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`os partition smi-data fs-type { ext4 | xfs }`**

**fs-type { ext4 | xfs }**

Specify the file system type as ext4 or XFS for data partition.

- **ext4**—Specify the ext4 (fourth extended filesystem) type.

  By default, all partitions are formatted using ext4.

- **xfs**—Specify the XFS type for data partition to install Mongo DB.

**Usage Guidelines** Use this command to configure the file system type for data partition at the node level.

# clusters nodes os proxy

Configures the proxy servers at the node level.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults os proxy { http-proxy`** *`http_proxy`* **`| https-proxy`** *`https_proxy`* **`| no-proxy`** *`no_proxy_hosts`* **`}`**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **`os proxy { http-proxy`** *`http_proxy`* **`| https-proxy`** *`https_proxy`* **`| no-proxy`** *`no_proxy_hosts`* **`}`**

**http-proxy *http_proxy***

Specify to send HTTP traffic to the specified HTTP proxy.

Must be a string.

**https-proxy *https_proxy***

Specify to send HTTPS traffic to the specified HTTP proxy.

Must be a string.

**no-proxy *no_proxy_hosts***

Specify the hosts to avoid proxy.

Must be a string.

**Usage Guidelines** Use this command to configure the proxy servers at the node level.

# clusters nodes os tuned

Enable or disable installing tuned.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults os tuned { disabled | enabled }`**

**enabled**

Specify whether to enable or disable installing tuned.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to enable or disable installing tuned.

# clusters nodes os users

Configures the list of SMI-managed users managed on this default. Excludes "initial-boot" (cloud-init) provisioned users.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`node-defaults os users`** *`user_name`* **`password`** *`password`*

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Syntax Description** **`os users`** *`user_name`* **`password`** *`password`*

**group *access_privilege***

Specify the user's access privilege. The group defines the user's access privilege.

Must be one of the following:

- **smi-cluster-admin**
- **smi-read-only**
- **smi-superuser**

Default Value: smi-read-only.

**password *password***

Specify the password for this entry. It can be a already hashed value (/etc/shadow). Unencrypted will be hashed.

***user_name***

Specify the user name.

Must be a string of 0-32 characters.

**Usage Guidelines** Use this command to configure the list of SMI-managed users managed on this default. Excludes "initial-boot" (cloud-init) provisioned users.

# clusters nodes os users authorized-keys

Configures a list of public SSH keys for this user. These keys are allowed for SSH authentication, as described in RFC 4253.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **node-defaults os users** *user_name* **[ authorized-keys** *ssh_key_name* **[ algorithm** *algorithm_name* **| key-data** *key_data* **] ]**

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*) > Users Configuration (config-users-*user_name*)

**Syntax Description** **authorized-keys** *ssh_key_name* **[ algorithm** *algorithm_name* **| key-data** *key_data* **] ]**

**algorithm *algorithm_name***

Specify the public key algorithm name for this SSH key.

Must be one of the following:

- **ssh-ed25519**
- **ssh-rsa**

**key-data *key_data***

Specify the binary public key data.

Must be of type binary.

***ssh_key_name***

Specify a name for the SSH key.

Must be a string.

**Usage Guidelines** Use this command to configure a list of public SSH keys for this user. These keys are allowed for SSH authentication, as described in RFC 4253. This corresponds to a public key as: <algorithm> <key-data> <name>. For example, ssh-rsa AAAABRUY...bh+3+jA= test-key-laptop.

# clusters nodes ucs-server

Configures UCS server parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **ucs-server** *options*

**software *ucs_software_version***

Specify the UCS software version.

**Usage Guidelines** Use this command to configure UCS server parameters.

# clusters nodes ucs-server cimc

Configures CIMC parameters.

**Command Modes** Exec

**Syntax Description** **cimc ip-address** *cimc_ip_address* **user** *cimc_user_name* **password** *cimc_user_password*

**password *cimc_user_password***

Specify the CIMC password.

**user *cimc_user_name***

Specify the CIMC user name.

Must be a string.

**Usage Guidelines** Use this command to configure the CIMC user name and password.

# clusters nodes ucs-server cimc bios

Configures CIMC BIOS boot order parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **bios**

**Usage Guidelines** Use this command to configure the CIMC BIOS boot order parameters.

# clusters nodes ucs-server cimc networking ntp

Configures the CIMC network-related parameters.

**Command Modes** Exec

**Syntax Description** `networking ntp enabled { false | true }`

**enabled { false | true }**

Specify whether to provide the NTP servers to configure.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the CIMC network-related parameters.

# clusters nodes ucs-server cimc networking ntp servers

Configures the time servers for CIMC to connect.

**Command Modes** Exec

**Syntax Description** `ntp servers url server_url`

**url *server_url***

Specify the time server's URL. For example, clock.cisco.com.

Must be a string.

**Usage Guidelines** Use this command to configure the time servers for CIMC to connect.

# clusters nodes ucs-server cimc remote-management sol

Configures the provision of SoL baud rate, com port, and SSH port parameters.

**Command Modes** Exec

**Syntax Description** `sol comport enabled { false | true } baud-rate baud_rate com_port_number ssh-port ssh_port_number`

**baud-rate *baud_rate***

Specify the serial baud rate the system uses for SoL communication.

Must be one of the following:

- **115200**
- **19200**
- **38400**

- **57600**
- **9600**

**comport *com_port_number***

Specify the serial port the system uses for SoL communication.

Must be one of the following:

- **com0**
- **com1**

**enabled { false | true }**

Specify whether to when enabled provide the baud rate, comport, and ssh-port.

Must be one of the following:

- **false**
- **true**

**ssh-port *ssh_port_number***

Specify the SSH port of CIMC SoL communication.

Must be an integer.

**Usage Guidelines** Use this command to configure the provision of SoL baud rate, comport, and ssh-port parameters.

# clusters nodes ucs-server cimc storage-adaptor

Configures the CIMC storage adaptor management parameters.

**Command Modes** Exec

**Syntax Description** `storage-adaptor create-virtual-drive { false | true }`

**create-virtual-drive { false | true }**

Specify whether to create the virtual drive if it is not already created.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure the CIMC storage adaptor management parameters.

# clusters nodes ucs-server host initial-boot networking

Configures the interface and IP information used to initially bootstrap the node.

**Command Modes** Exec

**Syntax Description** **host initial-boot networking interface** *interface_name*

**interface *interface_name***

Specify the interface name.

Must be a string.

Default Value: eno1.

**Usage Guidelines** Use this command to configure the interface and IP information used to initially bootstrap the node.

# clusters nodes ucs-server host initial-boot networking static-ip

Configures static IP parameters.

**Command Modes** Exec

**Syntax Description** **static-ip ipv4-address** *ipv4_address* **netmask** *netmask* **gateway** *gateway* **dns** *ip_address*

**dns *ip_address***

Specify the IP address.

You can configure a maximum of three elements with this keyword.

**gateway *gateway***

Specify the gateway.

Must be a string.

**ipv4-address *ipv4_address***

Specify the IPv4 address.

**netmask *netmask***

Specify the netmask.

**Usage Guidelines** Use this command to configure static IP parameters.

# clusters nodes ucs-server ignore-health

Configure this command to override cluster synchronization failure.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`ucs-server ignore-health { false | true }`**

**ucs-server ignore-health { false | true }**

Specify to override cluster sync failure.

**Usage Guidelines** Use this command to override cluster synchronization failure. If **ignore-health** is configured, then cluster sync may fail.

# clusters nodes vm-defaults upf

Configures UPF-specific configuration.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`vm-defaults upf`** *`options`*

**ntp-servers *ntp_server***

Specify the NTP time server.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

**software *software_upf***

Specify the UPF hard drive image to use.

**Usage Guidelines** Use this command to configure UPF-specific configuration.

# clusters nodes vm-defaults upf day0

Configures Day0 parameters.

**Command Modes** Exec

**Syntax Description** **`day0 username`** *`user_name`* **`password`** *`password`* **`syslog-ip`** *`ip_address`* **`vpp-cpu-worker-cnt`** *`number_of_threads`* **`forwarder-type`** *`forwarder_type`*

**forwarder-type *forwarder_type***

Specify the UPF forwarder type. Default Value: VPP.

Must be one of the following:

- **IFTASK**
- **VPP**

**password *password***

Specify the StarOS password to login.

**syslog-ip *ip_address***

Specify the IP address for Sys Log.

**username *user_name***

Specify the StarOS user name to login.

Must be a string.

**vpp-cpu-worker-cnt *number_of_threads***

Specify the number of VPP worker threads.

Must be an integer in the range of 2-320.

**Usage Guidelines** Use this command to configure Day0 parameters.

# clusters nodes vm-defaults upf networking management

Configures the networking management parameters.

**Command Modes** Exec

**Syntax Description** **management ip** *ip_address* **netmask** *netmask* **gateway** *gateway_ip_address* **domain-name** *domain_name* **name-servers** *dns_name_server* **ipv6** *ipv6_address* **ipv6-prefix-length** *ipv6_prefix_length* **ipv6-gateway** *ipv6_address* **interface-type** *interface_type*

**domain-name *domain_name***

Specify the default search domain.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

**gateway *gateway_ip_address***

Specify the gateway to use.

**interface-type *interface_type***

Specify the interface to wire into the virtual machine.

Must be one of the following:

- **bridge**

**ip *ip_address***

Specify the IP address to assign.

**ipv6-gateway *ipv6_address***

Specify the IPv6 gateway address.

**ipv6-prefix-length *ipv6_prefix_length***

Specify the length of the subnet prefix.

Must be an integer in the range of 0-128.

**ipv6 *ipv6_address***

Specify the IPv6 address to assign.

**name-servers *dns_name_server***

Specify the DNS name server.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

**netmask *netmask***

Specify the netmask associated with the IP address.

**Usage Guidelines** Use this command to configure the networking management parameters.

# clusters nodes vm-defaults upf networking management bridge

Configures the bridge name.

**Command Modes** Exec

**Syntax Description** **bridge** *bridge_name*

***bridge_name***

Specify the bridge name.

Must be a string.

**Usage Guidelines** Use this command to configure the bridge name.

# clusters nodes vms

Configures the VM name in KVM.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **vms** *vm_name_in_kvm*

**type *type***

Specify the type.

Must be one of the following:

- **upf**

Default Value: upf.

***vm_name_in_kvm***

Specify the name of the VM in KVM.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

**Usage Guidelines** Use this command to configure the VM name in KVM.

You can configure a maximum of four elements with this command.

# clusters nodes vms actions delete

Deletes UPF VM and allows upgrade/changes.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **actions delete**

**Usage Guidelines** Use this command to delete UPF VM and allow upgrade/changes.

# clusters nodes vms actions redeploy

Redeploys UPF VM and and allows upgrades/changes. Note that this can be service impacting.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **redeploy**

**Usage Guidelines** Use this command to redeploy UPF VM and and allow upgrades/changes. Note that this can be service impacting.

# clusters nodes vms upf

Configures UPF node parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **upf** *options*

**ntp-servers *ntp_server***

Specify the NTP time server.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

**software *software_upf***

Specify the UPF hard drive image to use.

**Usage Guidelines** Use this command to configure UPF node parameters.

# clusters nodes vms upf day0

Configures Day0 parameters.

**Command Modes** Exec

**Syntax Description** **day0 username** *user_name* **password** *password* **syslog-ip** *ip_address* **vpp-cpu-worker-cnt** *number_of_threads* **forwarder-type** *forwarder_type*

**forwarder-type *forwarder_type***

Specify the UPF forwarder type. Default Value: VPP.

Must be one of the following:

- **IFTASK**
- **VPP**

**password *password***

Specify the StarOS password to login.

**syslog-ip *ip_address***

Specify the IP address for Sys Log.

**username *user_name***

Specify the StarOS user name to login.

Must be a string.

**vpp-cpu-worker-cnt *number_of_threads***

Specify the number of VPP worker threads.

Must be an integer in the range of 2-320.

**Usage Guidelines** Use this command to configure Day0 parameters.

# clusters nodes vms upf networking management

Configures the networking management parameters.

**Command Modes** Exec

**Syntax Description** **management ip** *ip_address* **netmask** *netmask* **gateway** *gateway_ip_address* **domain-name** *domain_name* **name-servers** *dns_name_server* **ipv6** *ipv6_address* **ipv6-prefix-length** *ipv6_prefix_length* **ipv6-gateway** *ipv6_address* **interface-type** *interface_type*

**domain-name *domain_name***

Specify the default search domain.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

**gateway *gateway_ip_address***

Specify the gateway to use.

**interface-type *interface_type***

Specify the interface to wire into the virtual machine.

Must be one of the following:

- **bridge**

**ip *ip_address***

Specify the IP address to assign.

**ipv6-gateway *ipv6_address***

Specify the IPv6 gateway address.

**ipv6-prefix-length *ipv6_prefix_length***

Specify the length of the subnet prefix.

Must be an integer in the range of 0-128.

**ipv6 *ipv6_address***

Specify the IPv6 address to assign.

**name-servers *dns_name_server***

Specify the DNS name server.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

**netmask *netmask***

Specify the netmask associated with the IP address.

**Usage Guidelines** Use this command to configure the networking management parameters.

# clusters nodes vms upf networking management bridge

Configures the bridge name.

**Command Modes** Exec

**Syntax Description** **bridge** *bridge_name*

***bridge_name***

Specify the bridge name.

Must be a string.

**Usage Guidelines** Use this command to configure the bridge name.

# clusters nodes vmware

Configures VMWare hypervisor (vCenter and ESXi host) specific configurations.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **vmware { datacenter** *datacenter_name* **| datastore** *datastore_name* **| host** *host_name* **}**

**datacenter *datacenter_name***

Specify the datacenter name to override the datacenter from the environment for this node.

Must be a string.

**datastore *datastore_name***

Specify the datastore name to override the datastore from the environment for this node.

Must be a string.

**host *host_name***

Specify the host name to override the host field from the environment for this node.

Must be a string.

**Usage Guidelines** Use this command to configure VMWare hypervisor (vCenter and ESXi host) specific configurations.

# clusters nodes vmware nics

Configures list of networks assigned to VMs.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **vmware nics** *network_name*

**Command Modes** Exec > Global Configuration (config) > Environment Configuration (config-environments-*datastore_name*)

**Syntax Description** **vcenter nics** *network_name*

***network_name***

Specify the VMware network name.

Must be a string.

**Usage Guidelines** Use this command to configure a list of networks assigned to VMs.

# clusters nodes vmware numa-node-affinity

Configures the affinity to a processor socket.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **vmware numa-node-affinity** *cpu_socket_number*

***cpu_socket_number***

Specify the physical CPU socket number.

Must be an integer in the range of 0-15.

**Usage Guidelines** Use this command to configure affinity to a processor socket.

# clusters nodes vmware pci-device

Configures the list of PCI devices.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`vmware pci-device`** *`pci_device_key`*

***pci_device_key***

Specify the PCI device key.

Must be a string in the pci-keytype pattern. For information on the pci-keytype pattern, see the *Input Pattern Types* chapter.

**Usage Guidelines** Use this command to configure the list of PCI devices.

# clusters nodes vmware performance

Configures VMware performance parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **`vmware performance { cpu-reservation { false | true } | latency-sensitivity`** *`latency_sensitivity`* **`| memory-reservation { false | true } }`**

**cpu-reservation { false | true }**

CPU reservation info.

Must be one of the following:

- **false**
- **true**

**latency-sensitivity *latency_sensitivity***

Specify the latency-senstivity.

Must be one of the following:

- **high**: High.
- **low**: Low.
- **medium**: Medium.
- **normal**: Normal.

**memory-reservation { false | true }**

Memory reservation info.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to configure VMware performance parameters.

# clusters nodes vmware sizing

Configures VMWare hypervisor (vCenter and ESXi host) parameters.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **`vmware sizing`** *`options`*

**cores-equal-cpus { false | true }**

Specify whether cores per socket allocated equal to CPUs.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**cpus *number_of_cpus***

Specify the number of CPUs allocated.

Must be an integer in the range of 1-256.

**disk-data-gb *disk_data_gb***

Specify the data disk (/data) size in GB.

Must be an integer in the range of 20-2048.

**disk-home-gb *disk_home_gb***

Specify the home disk (/home) in GB.

Must be an integer in the range of 5-2048.

**disk-root-gb *disk_root_gb***

Specify the root partition size in GB.

Must be an integer in the range of 20-2048.

**ram-mb *ram_mb***

Specify the RAM in MB.

Must be an integer in the range of 4096-524288.

**Usage Guidelines** Use this command to configure VMWare hypervisor (vCenter and ESXi host) sizing parameters.

# clusters ops-centers

Allows installation of application Ops Centers used to install and manage applications.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description**

```
ops-centers app_name instance { repository url | netconf-ip ip_address |
netconf-port port_number | ssh-ip ip_address | ssh-port port_number |
ingress-hostname ip-address.nip.io | app-name-override app_name_to_override }
```

**app-name-override *app_name_to_override***

Specify the app name to be overridden.

Must be a string.

**ingress-hostname *ip_address*.nip.io**

Specify the ingress host name to be set to the Ops Center. Uses the *ip_address*.nip.io format.

Must be a string.

**netconf-ip *ip_address***

Specify the NETCONF IPv4 address for the Ops Center.

**netconf-port *port_number***

Specify the NETCONF port number for the Ops Center.

Must be an integer.

Default Value: 830.

**password *repo_password***

Specify the password if any to login into the repository.

**repository-local *cnf_repository_name***

Specify the name of the Cloud Native Function (CNF) repository to utilize.

**repository *url***

Specify the product chart repository URL.

**ssh-ip *ip_address***

Specify the SSH IP address for the Ops Center.

**ssh-ip *port_number***

Specify the SSH port number for the Ops Center.

Must be an integer.

Default Value: 2022.

**sync-default-repository { false | true }**

Specify whether to synchronize the default helm repository to Ops Center.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**username *repo_user_name***

Specify the user name if any to login into the repository.

Must be a string.

***app_name***

Specify the app name of the Ops Center. For example, cee, ccmts. Chart name will be app-name-ops-center.

Must be a string.

***instance_name***

Specify the name of the instance. For example, data, infra, etc.

Must be a string.

**Usage Guidelines** Use this command to allow installation of application Ops Centers used to install and manage applications.

# clusters ops-centers initial-boot-parameters

Configures the initial boot parameters for helm chart deployment.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Ops Centers Configuration (config-ops-centers-*app_name*/*instance*)

**Syntax Description**

```
initial-boot-parameters { auto-deploy { false | true } |
first-boot-password password | single-node { false | true } |
use-volume-claims { false | true } | path-based-ingress { false | true }
 }
```

**auto-deploy { false | true }**

Specify whether to auto-deploy all the services of the product. To deploy only the product's Ops Center, set to false.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**first-boot-password *password***

Specify the first boot password for the product's Ops Center.

Default Value: p@ssw0rd.

**path-based-ingress { false | true }**

Specify to enable or disable path-based routing.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**single-node { false | true }**

Specify whether to deploy the product chart on a single node. For multi-node deployments, set to false.

Must be one of the following:

- **false**
- **true**

Default Value: true.

**use-volume-claims { false | true }**

Specify the usage of persistent volumes. To use persistent volumes, set to true.

Must be one of the following:

- **false**

- **true**

Default Value: false.

**Usage Guidelines** Use this command to configure the initial boot parameters for helm chart deployment.

# clusters ops-centers initial-boot-parameters image-pull-secrets

Configures the docker registry secret name.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **image-pull-secrets** *secret_name*

***secret_name***

Specify the docker registry secret name.

Must be a string.

**Usage Guidelines** Use this command to configure the docker registry secret name.

# clusters secrets docker-registry

Configures the registry secret name.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **secrets docker-registry** *secret_name* **{ docker-email** *email_address* **| docker-password** *password* **| docker-server** *server_name* **| docker-username** *user_name* **| namespace** *namespace* **}**

**docker-email *email_address***

Specify the docker registry email address.

Must be a string.

**docker-password *password***

Specify the docker registry password.

**docker-server *server_name***

Specify the name of the docker-server. For example, regcred.

Must be a string.

**docker-username *user_name***

Specify the docker registry user name.

Must be a string.

**namespace *namespace***

Specify the docker registry namespace.

Must be a string.

***secret_name***

Specify name of the secret. For example, regcred.

Must be a string.

**Usage Guidelines** Configures the Kuberentes cluster-wide secrets. Use this command to configure the registy secret name.

# clusters secrets tls

Configures the TLS associated secret.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **tls { namespace** *namespace* **secret-name** *name* **{ private-key** *string* **| certificate** *path_to_cert* **} }**

**certificate *path_to_cert***

Specify the path to the PEM encoded public key certificate.

Must be a string.

**namespace *namespace***

Specify the Kubernetes namespaces to create secret.

Must be a string.

**private-key *string***

Specify the private-key associated with the certificate.

**secret-name *name***

Specify the name of the secret. For example, cert-grafana-ingress.

Must be a string.

**Usage Guidelines** Configures the Kuberentes cluster-wide secrets. Use this command to configure the TLS associated secret.

# clusters strongswan ca-certs

Configures the list of Certificate Authority(CA) certificates used for verifying the peer certificate.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** `ca-certs`

**ca-cert *certificate_content***

Specify the content of the CA certificate in pem format."

Must be a string.

**name *certificate_name***

Specify the name of the CA certificate."

Must be a string.

**Usage Guidelines** Use this command to configure the list of Certificate Authority(CA) certificates used for verifying the peer certificate.

# clusters strongswan connections

Configures strongSwan connection parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** `connection`

**auto { ignore | add | route | start | passthrough }**

Specify the operation, if any, that should be automatically performed at IPsec startup.

Must be one of the following:

- **add**
- **ignore**
- **passthrough**
- **route**
- **start**

Default Value: start.

**closeaction { none | clear | hold | restart }**

Specify the action to take if the remote peer unexpectedly closes a CHILD_SA. If the peer uses reauthentication or uniqueids checking, closeaction must not be used, these events might trigger the defined action when it's not desired.

Must be one of the following:

- **clear**
- **hold**

- **none**
- **restart**

Default Value: none.

**dpdaction { none | clear | hold | restart }**

Specify action to be taken when dead peer is detected.

Must be one of the following:

- **clear**
- **hold**
- **none**
- **restart**

Default Value: none.

**dpddelay { time *time_duration* | 30s }**

Specify the period of time interval with which INFORMATIONAL exchanges are sent to the peer. These are only sent if no other traffic is received.

Must be a string.

Default Value: 30s.

**dpdtimeout { time *time_duration* | 150s }**

Specify the timeout interval after which, all the connections to a peer are deleted in case of inactivity.

Must be a string.

Default Value: 150s.

**esp { cipher suites | aes128-sha256 }**

Specify a comma-separated list of ESP encryption or authentication algorithms is used for the connection.

Must be a string.

Default Value: aes128-sha256.

**ike { cipher suites | aes128-sha256-modp3072 }**

Specify a comma-separated list of IKE/ISAKMP SA encryption or authentication algorithms is used for the connection.

Must be a string.

Default Value: aes128-sha256-modp3072.

**ikelifetime { time *time_duration* | 3h }**

Specify how long the keying channel of a connection (ISAKMP or IKE SA) must last before being renegotiated.

Must be a string.

Default Value: 3h.

**inactivity { time *time_duration* }**

Specify the timeout interval after which, a CHILD_SA is closed if it did not send or receive any traffic.

Must be a string.

**keyexchange { ikev1 | ikev2 }**

Specify the method of key exchange and the protocol to use to initialize the connection.

Must be one of the following:

- **ikev1**
- **ikev2**

Default Value: ikev2.

**left { ip address *ip_address* | fqdn *fqdn* | %any | %any4 | %any6 | range | subnet }**

Specify the IP address or FQDN of the initiator public-network interface.

Must be a string.

**leftauth { pubkey | psk | eap | xauth }**

Specify the authentication method to use locally (left) side.

Must be one of the following:

- **eap**
- **psk**
- **pubkey**

Default Value: pubkey.

**leftid *id_value***

Specify how the left participant must be identified for authentication.

Must be a string.

**leftsendcert { never | no | ifasked | always | yes }**

Specify whether a peer must send a certificate request (CR) payload in order to get a certificate in return.

Must be one of the following:

- **always**
- **ifasked**
- **never**

- **no**
- **yes**

Default Value: ifasked.

**leftsubnet *ip_subnet***

Specify the private subnet behind the initiator, expressed as either network or netmask.

Must be a string.

**lifetime { time *time_duration* | 1h }**

Specify how long a particular instance of a connection should last, from successful negotiation to expiry.

Must be a string.

Default Value: 1h.

**name *connection_name***

Specify the name of the connection, which can be used for connection specific operations.

Must be a string.

**psk *pre-shared_key***

Specify the required setting if leftauth or rightauth is configured as psk.

Must be a string.

**right { ip address *ip_address* | fqdn *fqdn* | %any | %any4 | %any6 | range | subnet }**

Specify the IP address or FQDN of the responder public-network interface.

Must be a string.

**rightauth { pubkey | psk | eap | xauth }**

Specify the authentication method to use from the remote (right) side.

Must be one of the following:

- **eap**
- **psk**
- **pubkey**

Default Value: pubkey.

**rightid *id_value***

Specify how the right participant must be identified for authentication.

Must be a string.

**rightsubnet *ip_subnet***

Specify the private subnet behind the responder, expressed as either network or netmask.

Must be a string.

**server-cert *server_certificate***

Specify the content of Server certificate in the pem format to be used for this connection.

Must be a string.

**server-priv-key-passphrase *passphrase***

Specify the passphrase used to encrypt the server-priv-key value.

**server-priv-key *server_private_key***

Specify the content of server private key in the pem format to be used for this connection.

**type { tunnel | transport | transport_proxy | passthrough | drop }**

Specify the type of connection.

Must be one of the following:

- **drop**
- **passthrough**
- **transport**
- **transport_proxy**
- **tunnel**

Default Value: tunnel.

**Usage Guidelines** Use this command to configure the strongSwan connection parameters.

# clusters virtual-ips

Configures virtual IPs within the k8s cluster.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **virtual-ips** *vip_group_name* **{ check-port** *port_number* **| vrrp-interface** *interface_name* **| vrrp-router-id** *router_id* **}**

**check-port *port_number***

Specify the check-port number. Set it to true to check if a localhost is listening on the expected port. If the port is not listening, the VRRP instance (or synch group) should not be up. This only applies to certain use cases - typically where an application is utilizing host networking and providing a service over this port.

Must be an integer in the range of 1-65535.

**vrrp-interface *name***

Specify the host interface name that this VRRP instance is bound to.

Must be a string.

**vrrp-router-id *router_id***

Specify the VRRP router ID. 51 is reserved.

Must be an integer from the following: 1-50, 52-255.

***vip_group_name***

Specify the logical grouping of virtual IPs. This will set the VRRP instance.

Must be a string of 0-8 characters in the pattern [a-z][0-9a-z]*.

**Usage Guidelines** Use this command to configure virtual IPs within the k8s cluster.

# clusters virtual-ips check-interface

Configures host interfaces to track.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Virtual IPs Grouping Configuration (config-virtual-ips-*group_name*)

**Syntax Description** **`check-interface`** *`interface_name`*

***interface_name***

Specify the interface name.

Must be a string.

**Usage Guidelines** Use this command to configure host interfaces to track.

# clusters virtual-ips hosts

Configures the host addresses.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Virtual IPs Grouping Configuration (config-virtual-ips-*group_name*)

**Syntax Description** **`hosts`** *`host_name`* **`priority`** *`priority`*

**priority *priority***

Specify the priority of the host.

Must be an integer in the range of 1-100.

Default Value: 50.

***host_name***

Specify the host name to run the logical VIP group.

**Usage Guidelines** Use this command to configure the host address.

# clusters virtual-ips ipv4-addresses

Configures virtual IPv4 addresses.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Virtual IPs Grouping Configuration (config-virtual-ips-*group_name*)

**Syntax Description** **ipv4-addresses** *ipv4_address* **{ mask** *netmask* **| broadcast** *ip_address* **| device** *interface_name* **}**

**broadcast *ip_address***

Specify the broadcast IPv4 address.

**device *interface_name***

Specify the device to attach to the virtual IP.

Must be a string.

**mask *mask***

Specify the mask value.

Must be an integer in the range of 1-32.

***ip_address***

Specify the IPv4 address.

**Usage Guidelines** Use this command to configure the virtual IPv4 addresses.

# clusters virtual-ips ipv6-addresses

Configures the virtual IPv6 addresses.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Virtual IPs Grouping Configuration (config-virtual-ips-*group_name*)

**Syntax Description** **ipv6-addresses** *ipv6_address* **{ device** *device_name* **| mask** *netmask* **}**

**device *device_name***

Specify the device name to attach to the VIP.

Must be a string.

**mask *netmask***

Specify the netmask.

Must be an integer in the range of 1-128.

***ipv6_address***

Specify the IPv6 address.

**Usage Guidelines** Use this command to configure the virtual IPv6 addresses.

# clusters vm-defaults upf

Configures the default configurations that will apply to all VMs. Will be overriden by node or vm level options.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Syntax Description** **vm-defaults upf** *options*

**ntp-servers *ntp_server***

Specify the NTP time server.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

**software *software_upf***

Specify the UPF hard drive image to use.

**Usage Guidelines** Use this command to configure UPF-specific parameters.

# clusters vm-defaults upf day0

Configures Day0 parameters.

**Command Modes** Exec

**Syntax Description** **day0 username** *user_name* **password** *password* **syslog-ip** *ip_address* **vpp-cpu-worker-cnt** *number_of_threads* **forwarder-type** *forwarder_type*

**forwarder-type *forwarder_type***

Specify the UPF forwarder type. Default Value: VPP.

Must be one of the following:

- **IFTASK**
- **VPP**

**password *password***

Specify the StarOS password to login.

**syslog-ip *ip_address***

Specify the IP address for Sys Log.

**username *user_name***

Specify the StarOS user name to login.

Must be a string.

**vpp-cpu-worker-cnt *number_of_threads***

Specify the number of VPP worker threads.

Must be an integer in the range of 2-320.

**Usage Guidelines** Use this command to configure Day0 parameters.

# clusters vm-defaults upf networking management

Configures the networking management parameters.

**Command Modes** Exec

**Syntax Description** **management ip** *ip_address* **netmask** *netmask* **gateway** *gateway_ip_address* **domain-name** *domain_name* **name-servers** *dns_name_server* **ipv6** *ipv6_address* **ipv6-prefix-length** *ipv6_prefix_length* **ipv6-gateway** *ipv6_address* **interface-type** *interface_type*

**domain-name *domain_name***

Specify the default search domain.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

**gateway *gateway_ip_address***

Specify the gateway to use.

**interface-type *interface_type***

Specify the interface to wire into the virtual machine.

Must be one of the following:

- **bridge**

**ip *ip_address***

Specify the IP address to assign.

**ipv6-gateway *ipv6_address***

Specify the IPv6 gateway address.

**ipv6-prefix-length *ipv6_prefix_length***

Specify the length of the subnet prefix.

Must be an integer in the range of 0-128.

**ipv6 *ipv6_address***

Specify the IPv6 address to assign.

**name-servers *dns_name_server***

Specify the DNS name server.

Must be a string of 1-253 characters in the hostname-rule pattern. For information on the hostname-rule pattern, see the *Input Pattern Types* chapter.

**netmask *netmask***

Specify the netmask associated with the IP address.

**Usage Guidelines** Use this command to configure the networking management parameters.

# clusters vm-defaults upf networking management bridge

Configures the bridge name.

**Command Modes** Exec

**Syntax Description** **bridge** *bridge_name*

***bridge_name***

Specify the bridge name.

Must be a string.

**Usage Guidelines** Use this command to configure the bridge name.

# environments

Configures environment available for clusters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **environments** *datastore_name*

***datastore_name***

Specify the name of the datastore used for files and VMs.

Must be a string.

**Usage Guidelines** Use this command to configure the environment available for clusters.

# environments manual

Allows generating artifacts to deploy manually.

**Command Modes** Exec > Global Configuration (config) > Environment Configuration (config-environments-*datastore_name*)

**Syntax Description** **manual**

**Usage Guidelines** Use this command to generate artifacts to deploy manually.

# environments ucs-server

Allows linking UCS servers to deploy automatically.

**Command Modes** Exec > Global Configuration (config) > Environment Configuration (config-environments-*datastore_name*)

**Syntax Description** **ucs-server**

**Usage Guidelines** Use this command to generate artifacts to be deployed automatically.

# environments vcenter

Deploy using the vCenter API.

**Command Modes** Exec > Global Configuration (config) > Environment Configuration (config-environments-*datastore_name*)

**Syntax Description** **vcenter { allow-self-signed-cert { false | true } | cluster** *cluster_name* **| datacenter-path** *datacenter_path* **| datacenter** *datacenter_name* **| datastore** *datastore_name* **| host** *host_name* **| nics** *network_name* **| password** *password* **| port** *port_number* **| server** *server_url* **| user** *user_name* **}**

**allow-self-signed-cert { false | true }**

Specify whether the server allows a self-signed certificate to access or not.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**cluster *cluster_name***

Specify the cluster used for the placement of VM template.

Must be a string.

**datacenter-path *datacenter_path***

Specify the entire path of the datacenter from the root (to support datacenters located within one or more folders).

**datacenter *datacenter_name***

Specify the name of the vCenter datacenter.

Must be a string.

**datastore *datastore***

Specify the name of the datastore used for files and VMs.

Must be a string.

**host *host_name***

Specify the default host used to deploy the VMs if one is not specified on the node.

Must be a string.

**password**

Specify the password to login.

**port *port_number***

Specify the port number of vCenter or ESXi host.

Must be an integer.

Default Value: 443.

**server *ip_address_server_name***

Specify the IP address or domain name of vCenter or ESXi host.

Must be a string.

**user *user_name***

Specify the user name to login.

Must be a string.

## Usage Guidelines

Use this command to deploy using the vCenter API.

# environments vcenter nics

Configures list of networks assigned to VMs.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Node Type Defaults Configuration (config-node-type-defaults-*node_type*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **vmware nics** *network_name*

**Command Modes** Exec > Global Configuration (config) > Environment Configuration (config-environments-*datastore_name*)

**Syntax Description** **vcenter nics** *network_name*

***network_name***

Specify the VMware network name.

Must be a string.

**Usage Guidelines** Use this command to configure a list of networks assigned to VMs.

# show version

Displays version information.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **show version**

**Usage Guidelines** Use this command to view the app-version the chart-version information.

# software cnf

Configures the Cloud-Native Network Function software package parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **cnf** *software_name* **url** *software_url* **user** *user_name* **password** *password* **accept-self-signed-certificate { false | true } description** *software_download_description*

**url *software_url***

Specify the HTTP, HTTPS, or file URL of the software. File format must be "file:

***software_name***

Specify the name used to identify the software in other places.

Must be a string in the pattern [a-zA-Z0-9\.\-_+]*.

pattern '(http:|https:|file:/)

**accept-self-signed-certificate { false | true }**

Specify whether to accept self-signed certificate.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**description *software_download_description***

Specify the textual description of the software download.

Must be a string.

**password *password***

Specify the password for downoading software package.

**sha256 *sha256_hash***

Specify the SHA256 hash of the software download.

Must be a string in the pattern '[A-Fa-f0-9]{64}'.

**sha512 *sha512_hash***

Specify the SHA512 hash of the software download.

Must be a string in the pattern '[A-Fa-f0-9]{128}'.

**url *software_url***

Specify the HTTP, HTTPS, or file URL of the software. File format must be "file:

**user *user_name***

Specify the user name for HTTP/HTTPS authentication.

Must be a string.

***software_name***

Specify the name used to identify the software in other places.

Must be a string in the pattern [a-zA-Z0-9\.\-_+]*.

**Usage Guidelines** Use this command to configure the Cloud-Native Network Function software package parameters.

# software host-profile

Configures server host profile information.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **host-profile** *software_name* **url** *software_url* **user** *user_name* **password** *password* **accept-self-signed-certificate { false | true } description** *software_download_description*

**url *software_url***

Specify the HTTP, HTTPS, or file URL of the software. File format must be "file:

***software_name***

Specify the name used to identify the software in other places.

Must be a string in the pattern [a-zA-Z0-9\.\-_+]*.

pattern '(http:|https:|file:/)

**accept-self-signed-certificate { false | true }**

Specify whether to accept self-signed certificate.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**description *software_download_description***

Specify the textual description of the software download.

Must be a string.

**password *password***

Specify the password for downoading software package.

**sha256 *sha256_hash***

Specify the SHA256 hash of the software download.

Must be a string in the pattern '[A-Fa-f0-9]{64}'.

**sha512 *sha512_hash***

Specify the SHA512 hash of the software download.

Must be a string in the pattern '[A-Fa-f0-9]{128}'.

**url *software_url***

Specify the HTTP, HTTPS, or file URL of the software. File format must be "file:

**user *user_name***

Specify the user name for HTTP/HTTPS authentication.

Must be a string.

***software_name***

Specify the name used to identify the software in other places.

Must be a string in the pattern [a-zA-Z0-9\.\-_+]*.

**Usage Guidelines** Use this command to configure server host profile information.

# software ucs

Configures Unified Computing Systems (UCS) C series software image parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **ucs** *software_name* **url** *software_url* **user** *user_name* **password** *password* **accept-self-signed-certificate { false | true } description** *software_download_description*

**url *software_url***

Specify the HTTP, HTTPS, or file URL of the software. File format must be "file:

***software_name***

Specify the name used to identify the software in other places.

Must be a string in the pattern [a-zA-Z0-9\.\-_+]*.

pattern '(http:|https:|file:/)

**accept-self-signed-certificate { false | true }**

Specify whether to accept self-signed certificate.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**description *software_download_description***

Specify the textual description of the software download.

Must be a string.

**password *password***

Specify the password for downoading software package.

**sha256 *sha256_hash***

Specify the SHA256 hash of the software download.

Must be a string in the pattern '[A-Fa-f0-9]{64}'.

**sha512 *sha512_hash***

Specify the SHA512 hash of the software download.

Must be a string in the pattern '[A-Fa-f0-9]{128}'.

**url *software_url***

Specify the HTTP, HTTPS, or file URL of the software. File format must be "file:

**user *user_name***

Specify the user name for HTTP/HTTPS authentication.

Must be a string.

***software_name***

Specify the name used to identify the software in other places.

Must be a string in the pattern [a-zA-Z0-9\.\-_+]*.

**Usage Guidelines** Use this command to configure Unified Computing Systems (UCS) C series software image parameters.

# software upf

Configures parameters for hard drive images used in User Plane Functions (UPF) parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description**

```
upf software_name url software_url user user_name password password
accept-self-signed-certificate { false | true } description
software_download_description
```

**url *software_url***

Specify the HTTP, HTTPS, or file URL of the software. File format must be "file:

***software_name***

Specify the name used to identify the software in other places.

Must be a string in the pattern [a-zA-Z0-9\.\-_+]*.

pattern '(http:|https:|file:/)

**accept-self-signed-certificate { false | true }**

Specify whether to accept self-signed certificate.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**description *software_download_description***

Specify the textual description of the software download.

Must be a string.

**password *password***

Specify the password for downoading software package.

**sha256 *sha256_hash***

Specify the SHA256 hash of the software download.

Must be a string in the pattern '[A-Fa-f0-9]{64}'.

**sha512 *sha512_hash***

Specify the SHA512 hash of the software download.

Must be a string in the pattern '[A-Fa-f0-9]{128}'.

**url *software_url***

Specify the HTTP, HTTPS, or file URL of the software. File format must be "file:

**user *user_name***

Specify the user name for HTTP/HTTPS authentication.

Must be a string.

***software_name***

Specify the name used to identify the software in other places.

Must be a string in the pattern [a-zA-Z0-9\.\-_+]*.

**Usage Guidelines** Use this command to configure parameters for hard drive images used in User Plane Functions (UPF).

# worker-types

Configures worker types parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **worker-types** *worker_type_name*

**generated { false | true }**

Specify whether generated.

Must be one of the following:

- **false**
- **true**

Default Value: false.

***worker_type_name***

Specify the worker type name.

Must be a string.

**Usage Guidelines** Use this command to configure worker types parameters.

# worker-types k8s node-labels

Configures k8s node labels.

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*)

**Command Modes** Exec > Global Configuration (config) > Cluster Configuration (config-clusters-*cluster_name*) > Nodes Configuration (config-nodes-*node_name*)

**Syntax Description** **node-defaults k8s node-labels** *key value*

***key***

Specify the prefix for the node label.

Must be a string in the k8s-keytype pattern. For information on the k8s-keytype pattern, see the *Input Pattern Types* chapter.

***value***

Specify the suffix for the node label.

Must be a string in the k8s-valuetype pattern. For information on the k8s-valuetype pattern, see the *Input Pattern Types* chapter.

**Usage Guidelines** Use this command to configure the k8s node labels.

# worker-types k8s node-taints

Allows tainting nodes.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **k8s node-taints effect** *effect* **key** *key* **value** *value*

**effect *effect***

Specify the effect. It can contain an optional prefix, for example, example.com/.

Must be one of the following:

- **NoExecute**
- **NoSchedule**
- **PreferNoSchedule**

**key *key***

Specify the key. It can contain an optional prefix, for example, example.com/.

Must be a string in the k8s-keytype pattern. For information on the k8s-keytype pattern, see the *Input Pattern Types* chapter.

**value *value***

Specify the value. *value* Must be an alphanumeric string, it can contain the integer 0 (zero), the underscore (_), hyphen (-), and period (.) characters in between, and blank spaces with the "" characters, but it must start and end with alphanumeric characters. It can contain an optional prefix, for example, an_example-value.works.

Must be a string in the k8s-valuetype pattern. For information on the k8s-valuetype pattern, see the *Input Pattern Types* chapter.

**Usage Guidelines** Use this command to allow tainting nodes.

# worker-types vmware sizing

Configures VMware sizing parameters.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **vmware sizing** *options*

**cores-equal-cpus { false | true }**

Specify whether cores per socket allocated equal to CPUs.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**cpus *number_of_cpus***

Specify the number of CPUs allocated.

Must be an integer in the range of 1-256.

**disk-data-gb *disk_data_gb***

Specify the data disk (/data) size in GB.

Must be an integer in the range of 20-2048.

**disk-home-gb *disk_home_gb***

Specify the home disk (/home) in GB.

Must be an integer in the range of 5-2048.

**disk-root-gb *disk_root_gb***

Specify the root partition size in GB.

Must be an integer in the range of 20-2048.

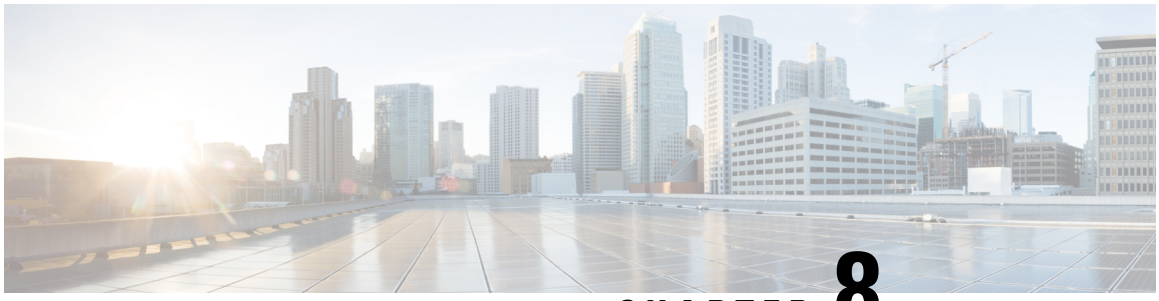
**ram-mb *ram_mb***

Specify the RAM in MB.

Must be an integer in the range of 4096-524288.

## Usage Guidelines

Use this command to configure VMware sizing parameters.



CHAPTER 8

# Ops Center Security Configuration Command Reference



## ldap-security

Enables the LDAP security for user groups.

**Command Modes**

Exec > Global Configuration (config)

**Syntax Description**

**ldap-security { base-dn** *base_domain_name* **| group-attr** *group_attributes* **| ldap-filter** *ldap_filter* **| ldap-server-url** *ldap_server_url* **| ldap-username-domain** *ldap_username_domain*}

**base-dn *base_domain_name***

Specify the LDAP base domain name.

Must be a string.

**group-attr *group_attributes***

Specify the group attributes.

Must be a string.

**ldap-filter *ldap_filter***

Specify the LDAP filter.

Must be a string.

**ldap-server-url *ldap_server_url***

Specify the LDAP server URL.

Must be a string.

**ldap-username-domain *ldap_username_domain***

Specify the LDAP username domain.

Must be a string.

**Usage Guidelines** Use this command to enable LDAP security for user groups.

# ldap-security group-mapping

Configures the LDAP group to application security mapping.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`ldap-security group-mapping`** *`ldap_group_name nacm_group_name`*

***ldap_group_name***

Specify the LDAP group name.

Must be a string.

***nacm_group_name***

Specify the NACM group name.

**Usage Guidelines** Use this command to configure LDAP group to application security mapping.

# smiuser add-group

Adds an SMI user group.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **smiuser add-group groupname** *group_name*

**groupname *group_name***

Specify the group name in PAM.

Must be a string.

**Usage Guidelines** Use this command to add a user group.

# smiuser add-user

Creates a new SMI user.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **smiuser add-user { password** *password* **| username** *user_name*}

**password *password***

Specify the password for the created user.

Must be a string.

**username *user_name***

Specify the user name.

Must be a string.

**Usage Guidelines** Use this command to create a new user.

# smiuser assign-user-group

Assigns a user to a user group.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **smiuser assign-user-group username** *user_name* **groupname** *group_name*

**groupname *group_name***

Specify the group name in PAM.

Must be a string.

**username *user_name***

Specify the user name in PAM.

Must be a string.

**Usage Guidelines** Use this command to assign a user to user group.

# smiuser change-password

Change the SMI user password.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **smiuser change-password { confirm-password** *confirm_password* **| current-password** *current_password* **| new-password** *new_password* **| password-expire-days** *password_expiry* **| username** *user_name*}

**confirm-password *confirm_password***

Confirm the new password.

Must be a string.

**current-password *current_password***

Specify the current password.

Must be a string.

**new-password *new_password***

Specify the new password for the user.

Must be a string.

**password-expire-days *password_expiry***

Specify the number of days before the password expires.

Must be an integer in the range of 0-9999.

Default Value: 180.

**username *user_name***

Specify the user name.

Must be a string.

**Usage Guidelines** Use this command to change the password for the user.

# smiuser change-password-age

Change the password age.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **smiuser change-password-age { username** *user_name* **| password-expire-days** *password_expiry*}

**password-expire-days *password_expiry***

Specify the number of days before password expires.

Must be an integer in the range of 0-9999.

Default Value: 180.

**username *user_name***

Specify the user name.

Must be a string.

**Usage Guidelines** Use this command to change the password age.

# smiuser change-self-password

Change the password for self.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **smiuser change-self-password { confirm-password** *confirm_password* **| current-password** *current_password* **| new-password** *new_password* **| password-expire-days** *password_expire_days*}

**confirm-password *confirm_password***

Confirm the new password.

Must be a string.

**current-password *current_password***

Specify the current password.

Must be a string.

**new-password *new_password***

Specify the new password.

Must be a string.

**password-expire-days *password_expiry***

Specify the password expiry period in days.

Must be an integer in the range of 0-9999.

Default Value: 180.

**Usage Guidelines** Use this command to change password for self.

# smiuser delete-group

Deletes an SMI user group.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`smiuser delete-group groupname`** *`group_name`*

**groupname *group_name***

Specify the group name in PAM.

Must be a string.

**Usage Guidelines** Use this command to delete an SMI user group.

# smiuser delete-user

Deletes SMI user.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`smiuser delete-user`** *`user_name`*

***user_name***

Specify the user name.

Must be a string.

**Usage Guidelines** Use this command to delete a specified SMI user.

# smiuser list-groups

Lists groups.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`list-groups`**

**Usage Guidelines** Use this command to list groups.

# smiuser list-users

Lists SMI users.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`list-users`**

**Usage Guidelines** Use this command to list users.

# smiuser show-user

Displays the list of users.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`show-user`** *`user_name`*

***user_name***

Specify the user name.

Must be a string.

**Usage Guidelines** Use this command to view the list of users.

# smiuser unassign-user-group

Unassigns a user from a user group.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`smiuser unassign-user-group username`** *`user_name`* **`groupname`** *`group_name`*

**groupname *group_name***

Specify the name of the group.

Must be a string.

**username *user_name***

Specify the name of the user in PAM.

Must be a string.

**Usage Guidelines** Use this command to unassign a user from a user group.

# smiuser unlock-user

Unlocks SMI user.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **unlock-user** *user_name*

***user_name***

Specify the user name.

Must be a string.

**Usage Guidelines** Use this command to unlock a specified SMI users.

# smiuser update-password-length

Updates password length.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **smiuser update-password-length length** *password_length*

**length *password_length***

Specify the length of the password.

Must be an integer.

**Usage Guidelines** Use this command to update the password length.

# tacacs-security

Enables TACACS+ security settings.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **tacacs-security { remote-addr** *remote_address* **| service** *service_name*}

**remote-addr *remote_address***

Specify the remote address.

Must be a string.

**service *service_name***

Specify the TACACS+ auth service name.

Must be a string.

**Usage Guidelines** Use this command to enable TACACS+ security settings.

# tacacs-security server

Configures the TACACS+ server settings.

**Command Modes**

Exec > Global Configuration (config)

**Syntax Description**

**tacacs-security server** *server_priority* **{ address** *ip_address* **| key** *server_key* **| port** *port_number*}

**address *ip_address***

Specify the TACACS+ IP address.

**key *server_key***

Specify the TACACS+ server key.

Must be a string.

**port *port_number***

Specify the TACACS+ server port.

Must be an integer in the range of 1-65535.

Default Value: 49.

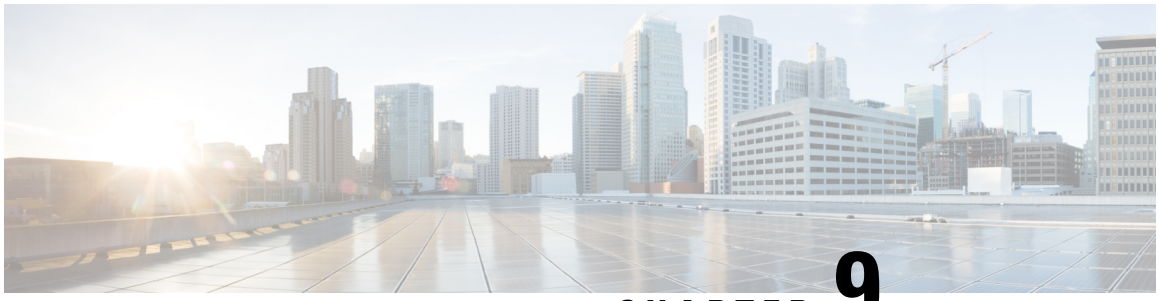
***server_priority***

Specify the server priority.

Must be an integer in the range of 1-4.

**Usage Guidelines**

Use this command to configure the TACACS+ server settings.



CHAPTER 9

# Mobile Ops Center Configuration Command Reference

# helm repository

Configures the helm repository used to deploy the Ops Center.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **helm repository** *repository_name* **[ access-token** *repo_access_token* **| password** *repo_password* **| url** *repo_url* **| username** *repo_username* **]**

**helm repository *repository_name***

Specify the name of helm repository.

Must be a string.

**access-token *repo_access_token***

Specify the access token for the helm repository.

Must be a string.

**password *repo_password***

Specify the password if any to login into the repository.

Must be a string.

**url *repo_url***

Specify the helm chart repository URL.

**username *repo_username***

Specify the user name if any to login into the repository.

Must be a string.

**Usage Guidelines** Use this command to configure the helm repository.

# helm default-repository

Configures the default repository of helm chart.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **helm default repository** *repository_name*

**helm default-repository *repository_name***

Specify the configured default repository of helm chart.

Must be a string.

**Usage Guidelines** Use this command to configure the default repository.

# helm ordered_deployment

Enables or disables the sequential deployment of helm charts.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **helm ordered_deployment { chart** *chart_name* **priority_group** *priority_id* **| continue_on_timeout { false | true } | enable { false | true } | timeout** *time_interval* **}**

#### helm ordered_deployment enable { false | true }

Enable or disable the sequential deployment of helm charts.

Default: false

#### chart *chart_name*

Specify the name of helm chart to be deployed.

Must be a string.

#### priority_group *priority_id*

Specify the priority of helm chart. The priority group ID decides the helm chart deployment order. The priority group configuration is specific to the helm charts and not the sub-charts.

The chart assigned the priority group ID of 1 gets deployed first before the other charts assigned the priority group ID of 2,3,4, and so on. Note that the other charts will not be deployed until all the pods associated with the first chart are deployed. Charts with the same priority group will be deployed simultaneously.

If the **ordered_deployment** is not enabled or if the **priority_group** is not defined for charts, NF follows the default deployment that is bringing up all the charts in parallel.

*priority_id* must be an integer ranging from 1 to 99 with 1 being the highest priority and 99 being the lowest priority.

Default: 99

#### continue_on_timeout { false | true }

Use this configuration to continue or stop the helm chart deployment after the chart bring-up timeout.

Default: true

#### timeout *timeout_interval*

Specify the timeout interval, in seconds, after which the chart bring-up will be continued or stopped.

Must be an integer ranging from 0 to 3600. Default: 600

**Usage Guidelines** Use this command to configure the sequential deployment of helm charts.

# license smart

Configures smart licensing for SMI applications.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`license smart url`** *`smart_licensing_server_url`*

**url *smart_licensing_server_url***

Specify the URL to connect for Smart Licensing.

Must be a string.

Default Value: default.

**Usage Guidelines** Use this command to configure smart licensing for SMI applications.

# license smart deregister

Deregisters VNF from Smart Licensing.

**Command Modes** Exec

**Syntax Description** **`license smart deregister`**

**Usage Guidelines** Use this command to deregister the VNF from smart licensing.

# license smart register

Registers the VNF for Smart Licensing.

**Command Modes** Exec

**Syntax Description** **`license smart register { idtoken`** *`id_token`* **`| force}`**

**force**

Forces the agent registration.

**idtoken *id_token***

Specify the ID Token to register the agent.

Must be a string.

**Usage Guidelines** Use this command to register the VNF for smart licensing.

# license smart renew ID

Renews smart agent license registration information.

**Command Modes** Exec

**Syntax Description** `license smart renew ID`

**Usage Guidelines** Use this command to renew smart agent license registration information.

# license smart renew auth

Initiates a manual update of the license usage information with Cisco.

**Command Modes** Exec

**Syntax Description** `license smart renew auth`

**Usage Guidelines** Use this command to initiate a manual update of the license usage information with Cisco.

# license smart reservation

Enables or disables the Smart Licensing feature.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** `license smart reservation`

**Usage Guidelines** Use this command to enable or disable the Smart Licensing feature.

# license smart reservation cancel

Cancels a smart license reservation request.

**Command Modes** Exec

**Syntax Description** `license smart reservation cancel`

**Usage Guidelines** Use this command to cancel a smart license reservation request.

# license smart reservation install

Installs a smart license reservation authorization code.

**Command Modes** Exec

**Syntax Description** **`license smart reservation install key`** *`authorization_code`*

**key *authorization_code***

Specify the authorization code from the CSSM.

Must be a string.

**Usage Guidelines** Use this command to install a smart license reservation authorization code.

# license smart reservation request

Requests a license reservation.

**Command Modes** Exec

**Syntax Description** **`license smart reservation request`**

**Usage Guidelines** Use this command to request a license reservation.

# license smart reservation return

Returns a smart license reservation.

**Command Modes** Exec

**Syntax Description** **`license smart reservation return authorization`** *`authorization_code`*

**authorization *authorization_code***

Specify the authorization code from the CSSM.

Must be a string.

**Usage Guidelines** Use this command to return a smart license reservation.

# license smart status

Displays Smart Licensing status information.

**Command Modes** Exec

**Syntax Description** **`license smart status`**

**status-only**

Specify whether to toggle between status only or more verbose output.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**Usage Guidelines** Use this command to view Smart Licensing status information.

# license smart udi

Displays Smart Licensing Unique Device Identifier (UDI).

**Command Modes** Exec

**Syntax Description** `license smart udi [ pid | sn ]`

**pid**

Specify the product ID of the UDI.

Must be a string.

**sn**

Serial number of the UDI.

Must be a string.

**Usage Guidelines** Use this command to view smart licensing UDI.

# ops

Displays the list of Ops Centers installed in the clusters.

**Command Modes** Exec

**Syntax Description** `show ops`

**Usage Guidelines** Use this command to view the list of Ops Centers installed in the clusters.

# ops center

Displays the currently deployed Ops Center in clusters.

**Command Modes** Exec

**Syntax Description** **show ops center [ release** *helm_release* **| cli-host** *cli_host_uri* **| id** *product_id* **| product** *product* **| rest-host** *restconf_host_uri* **| rest-host-internal** *restconf_host_internal_uri* **]**

**cli-host *cli_host_uri***

Specify the CLI host URI.

Must be a string.

**id *product_id***

Specify the ID of the deployed product.

Must be a string.

**product *product***

Specify the product containing the release.

Must be a string.

**release *helm_release***

Specify the Helm Release containing the Ops Center.

Must be a string.

**rest-host-internal *restconf_host_internal_uri***

Specify the RESTCONF host internal URI.

Must be a string.

**rest-host *restconf_host_uri***

Specify the RESTCONF host URI.

Must be a string.

**Usage Guidelines** Use this command to view the currently deployed Ops Center in clusters.

# ssh-settings

Configures the SSH settings for Ops Center SSH connection.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **ssh-settings enable-aes-cbc { false | true}**

**enable-aes-cbc { false | true}**

Specify to enable or disable the aes128-cbc and aes256-cbc for SSH encryption.

Must be one of the following:

- **false**
- **true**

Default Value: false.

**Usage Guidelines** Use this command to configure the SSH settings for Ops Center SSH connection.

# system

Configures the Network Function system commands.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`system mode`** *`system_mode`*

**mode *system_mode***

Specify the mode of the system.

Must be one of the following:

- **maintenance**
- **running**
- **shutdown**

Default Value: shutdown.

**Usage Guidelines** Use this command to configure Network Functions commands.

# system ops-center

Runs Ops Center diagnostics.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** **`system ops-center repository`** *`repository_url`*

**repository *repository_url***

Specify the Helm repository originally used to deploy the Ops Center.

Must be a string.

**Usage Guidelines** Use this command to run the Ops Center diagnostics.

# system ops-center stop

Stops the synchronization process.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** `system ops-center stop`

**Usage Guidelines** Use this command to stop the synchronization process.

# system ops-center-debug

Debugs the Ops Center.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** `system ops-center-debug status`

**status**

Status of the Ops Center debugging process.

Must be one of the following:

- **false**
- **true**

**Usage Guidelines** Use this command to debug the Ops Center.

# system ops-center-debug start

Starts the Ops Center debugging process.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** `system ops-center-debug start`

**Usage Guidelines** Use this command to start the Ops Center debugging process.

# system ops-center-debug stop

Stops the Ops Center debugging process.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** `system ops-center-debug stop`

**Usage Guidelines** Use this command to stop the Ops Center debugging process.

# system status

Displays the system status.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** `system status { deployed { false | true } | percent-ready}`

**deployed { false | true}**

Indicates if the system is set to run.

Must be one of the following:

- **false**
- **true**

**percent-ready**

Indicates the percentage of system running.

Must be of type decimal64, with 2 fraction digits.

**Usage Guidelines** Use this command to view the system status.

# system synch

Indicates the status of automatic synching of the configuration.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** `system synch`

**Usage Guidelines** Use this command to find out the status of automatic synching of the configuration.

# system synch start

Starts the synching process.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** `system synch start`

**Usage Guidelines** Use this command to start the synching process.

# system synch stop

Stops the synching process.

**Command Modes** Exec > Global Configuration (config)

**Syntax Description** `system synch stop`

**Usage Guidelines** Use this command to stop the synching process.

# system upgrade

Forces an upgrade of the product.

**Command Modes** Exec

**Syntax Description** `system upgrade`

**Usage Guidelines** Use this command to force an upgrade of the product.

# system uuid-override

Forces the UUID to a new value.

**Command Modes** Exec

**Syntax Description** `system uuid-override new-uuid` *`new_uuid`*

**new-uuid *new_uuid***

Specify the ID token to register agent.

Must be a string.

**Usage Guidelines** Use this command to force a new value to the UUID.