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Cisco Nexus 1000V License Configuration Guide, Release 4.2(1)SV2(2.1)

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C O N T E N T S

Preface

This preface contains the following sections:

Audience

This publication is for experienced network administrators who configure and maintain Cisco Nexus devices.

This guide is for network and server administrators with the following experience and knowledge:

- An understanding of virtualization
- Using VMware software to create a virtual machine and configure a VMware vSwitch

Note Knowledge of VMware vNetwork Distributed Switch is not required.

Document Conventions

Command descriptions use the following conventions:

Convention	Description
bold	Bold text indicates the commands and keywords that you enter literally as shown.
Italic	Italic text indicates arguments for which the user supplies the values.

Convention	Description
[x]	Square brackets enclose an optional element (keyword or argument).
[x | y]	Square brackets enclosing keywords or arguments separated by a vertical bar indicate an optional choice.
{x | y}	Braces enclosing keywords or arguments separated by a vertical bar indicate a required choice.
[x {y | z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
variable	Indicates a variable for which you supply values, in context where italics cannot be used.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Examples use the following conventions:

Convention	Description
screen font	Terminal sessions and information the switch displays are in screen font.
boldface screen font	Information you must enter is in boldface screen font.
italic screen font	Arguments for which you supply values are in italic screen font.
< >	Nonprinting characters, such as passwords, are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

This document uses the following conventions:

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Related Documentation for Nexus 1000V Series NX-OS Software for VMware vSphere

This section lists the documents used with the Cisco Nexus 1000V and available on Cisco.com at the following URL:

http://www.cisco.com/en/US/products/ps9902/tsd_products_support_series_home.html

General Information

Cisco Nexus 1000V Documentation Roadmap

Cisco Nexus 1000V Release Notes

Cisco Nexus 1000V and VMware Compatibility Information

Install and Upgrade

Cisco Nexus 1000V Installation and Upgrade Guide

Configuration Guides

Cisco Nexus 1000V High Availability and Redundancy Configuration Guide

Cisco Nexus 1000V Interface Configuration Guide

Cisco Nexus 1000V Layer 2 Switching Configuration Guide

Cisco Nexus 1000V License Configuration Guide

Cisco Nexus 1000V Network Segmentation Manager Configuration Guide

Cisco Nexus 1000V Port Profile Configuration Guide

Cisco Nexus 1000V Quality of Service Configuration Guide

Cisco Nexus 1000V REST API Plug-in Configuration Guide

Cisco Nexus 1000V Security Configuration Guide

Cisco Nexus 1000V System Management Configuration Guide

Cisco Nexus 1000V vCenter Plugin Configuration Guide

Cisco Nexus 1000V VXLAN Configuration Guide

Programming Guide

Cisco Nexus 1000V XML API Configuration Guide

Reference Guides

Cisco Nexus 1000V Command Reference

Cisco Nexus 1000V Resource Availability Reference

Troubleshooting and Alerts

Cisco Nexus 1000V Troubleshooting Guide

Cisco Nexus 1000V Password Recovery Procedure

Cisco NX-OS System Messages Reference

Cloud Services Platform Documentation

The *Cisco Cloud Services Platform* documentation is available at http://www.cisco.com/en/US/partner/products/ps12752/tsd_products_support_series_home.html.

Virtual Security Gateway Documentation

The *Cisco Virtual Security Gateway for Nexus 1000V Series Switch* documentation is available at http://www.cisco.com/en/US/products/ps11208/tsd_products_support_model_home.html.

Virtual Wide Area Application Services (vWAAS) Documentation

The *Virtual Wide Area Application Services* documentation is available at http://www.cisco.com/en/US/products/ps6870/tsd_products_support_series_home.html.

ASA 1000V Cloud Firewall Documentation

The *ASA 1000V Cloud Firewall* documentation is available at http://www.cisco.com/en/US/products/ps12233/tsd_products_support_series_home.html.

Documentation Feedback

To provide technical feedback on this document, or to report an error or omission, please send your comments to nexus1k-docfeedback@cisco.com . We appreciate your feedback.

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS version 2.0.

New and Changed Information

This chapter contains the following sections:

New and Changed Information for License Configuration

This section lists new and changed content in this document by software release and where it is located.

To find additional information about new features or command changes, see the *Cisco Nexus 1000V Release Notes* and *Cisco Nexus 1000V Command Reference*.

Table 1: New and Changed Features for the Cisco Nexus 1000V License Configuration Guide

Feature	Description	Changed in Release	Where Documented
Licensing for New Software Installation	Updated the supported number of hosts and the default licenses for the Essential and Advanced edition.	4.2(1)SV2(2.1)	Installing and Configuring Licenses, on page 9
Tier based licensing	The VXLAN gateway is an Advanced licensing feature.	4.2(1)SV2(2.1)	Overview, on page 3, Installing and Configuring Licenses, on page 9
Tier based licensing	The Cisco Nexus 1000V is shipped in two editions: Essential and Advanced.	4.2(1)SV2(1.1)	Overview, on page 3, Installing and Configuring Licenses, on page 9
Supporting Licenses	Updated the number and the trial period of the default licenses.	4.2(1)SV1(5.2)	Overview, on page 3
vEthernet interfaces	vEthernet interfaces are no longer brought down immediately when their licenses expire.	4.2(1)SV1(5.1)	Overview, on page 3

Feature	Description	Changed in Release	Where Documented
Monitoring license usage	A system message is generated every hour listing the modules that are unlicensed.	4.2(1)SV1(4a)	Overview, on page 3
Monitoring license usage	A system message is generated when more licenses are being used than are installed.	4.2(1)SV1(4)	Overview, on page 3
Transferring licenses from the license pool to VEMs	Added the **svs license transfer license_pool dst-vem module** command. This command transfers licenses from the license pool to the VEMs.	4.2(1)SV1(4)	Installing and Configuring Licenses, on page 9
Display license information	The **show module vem** *module* **license-info** command was added. This command displays the license mode and the usage of licenses by each module.	4.2(1)SV1(4)	Overview, on page 3
Evaluation licenses	Evaluation licenses are included in the software image. Additional evaluation licenses can be downloaded from Cisco.com and installed separately. Evaluation licenses downloaded from Cisco.com can be of varied duration.	4.2(1)SV1(3)	Overview, on page 3
Display license expiration	The **show license usage package_name** command output is updated to show the date of the nearest license expiration.	4.2(1)SV1(3)	Installing and Configuring Licenses, on page 9
Evaluation licenses	Evaluation licenses are available as part of the software installation or upgrade. A separate evaluation license file no longer needs to be installed.	4.2(1)SV1(2)	Overview, on page 3
License statistics	The **show license usage package_name** command output is updated to show the number of evaluation and permanent licenses that are available, installed, and in use on the VSM.	4.2(1)SV1(2)	Installing and Configuring Licenses, on page 9

Overview

This chapter contains the following sections:

Information About Licenses

One Cisco Nexus 1000V license is needed for each installed server CPU on every Virtual Ethernet Module (VEM) in the distributed architecture. There is no limit to the number of cores per CPU.

Figure 1: Cisco Nexus 1000V Distributed Architecture
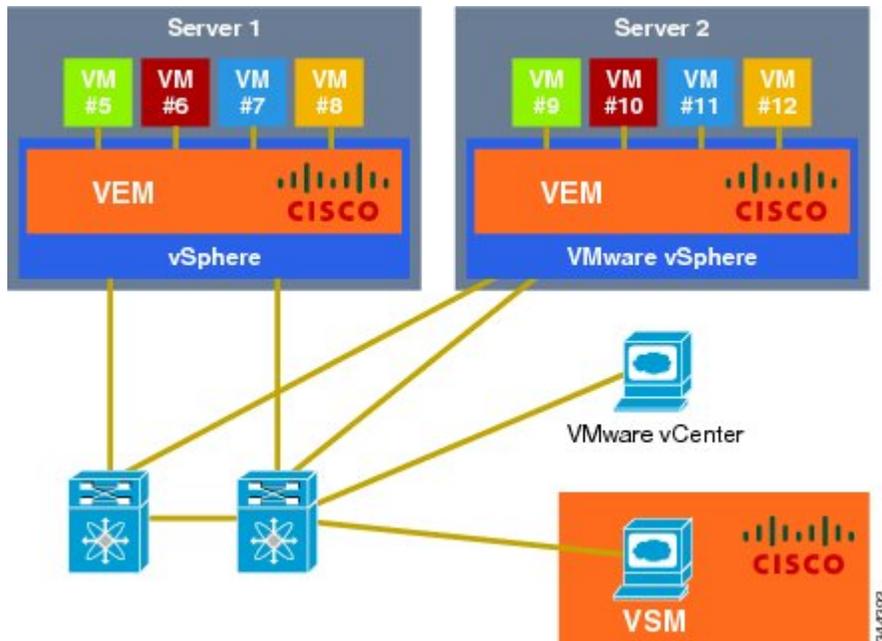
Tier-based Licensing

The Cisco Nexus 1000V uses a tier-based licensing approach with the following editions:

- Essential—No additional licenses are required. All basic features are available and all Virtual Ethernet Modules (VEMs) are automatically licensed to use these basic features. The necessary default licenses are automatically checked out from the Cisco license pool.

- Advanced—A license is required for each CPU socket on each VEM in order to use the advanced Cisco Nexus 1000V features. As soon as the switch is configured to use the Advanced edition, it checks the appropriate licenses out from the license pool.

  The Advanced edition includes the following features:

    ◦ Cisco TrustSec (CTS)

    ◦ DHCP Snooping

    ◦ IP Source Guard

    ◦ Dynamic ARP Inspection

    ◦ VXLAN Gateway

You can switch between the editions at any time as long as you have the appropriate licenses available for the Advanced edition. All modules must use either the Essential edition or the Advanced edition. You cannot mix the two and have some modules use the Essential edition while others use the Advanced edition.

> **Note**   The Cisco Nexus 1000V software is licensed as `NEXUS1000V_LAN_SERVICES_PKG`. Cisco VSG and ASA 1000V services are packaged and licensed separately.

You can use the **show switch edition** command to display the current switch edition and other licensing information.

Changing from the Essential to the Advanced Edition

When you reconfigure the switch to use the Advanced edition by using the **svs switch edition advanced** command, the software immediately checks out the required licenses for all the modules present in the system.

If the number of licenses required is more than the number of licenses available, an error message appears and the reconfiguration fails. You must obtain additional licenses to operate the switch in the Advanced edition and activate the advanced features. The number of licenses available and the number of licenses required is shown in the error message.

Changing from the Advanced to the Essential Edition

When you reconfigure the switch to use the Essential edition by using the **svs switch edition essential** command, the software immediately returns any checked out licenses to the Cisco license pool.

If the license check-in process fails and a module still has licenses checked out, you must use the **license transfer** command to manually transfer these licenses back to the license pool.

> **Note**   Before configuring the switch edition to use the Essential edition, you must disable all the advanced features by using the **no feature** command. The change to the Essential edition fails if any advanced feature is enabled.

Licensing and High Availability

- License installation is a nondisruptive process.
- The license file is shared by both Virtual Supervisor Modules (VSMs) in an HA pair.
- If your system has dual supervisors, the licensed software runs on both supervisor modules and provides failover protection.
- Uninstalling a license file results in a service disruption.

Types of Licenses

Default Licenses

There are 1024 default licenses preinstalled with the Cisco Nexus 1000V software that are valid for 60 days from the date of VSM installation. These default licenses allow you to use the Cisco Nexus 1000V Advanced Edition for a 60-day trial period before you must purchase permanent licenses.

Default licenses are invalidated when one of the following occurs:

- You install a permanent license file.
- You install an evaluation license file.
- The license trial period expires.

⚠

Caution   Service Disruption—Even though virtual Ethernet (vEthernet) interfaces are not dropped on unlicensed VEMs, the following events might affect the vEthernet interfaces:

- Any new vEthernet interfaces are not brought up.
- Any existing vEthernet interfaces remain down with the "VEM Unlicensed" status if the switch configuration changes or the module or port flaps.

If you need additional licenses to cover all VEM CPU sockets, you must obtain either permanent licenses or evaluation licenses from Cisco.com. For additional licensing information, contact your Cisco representative.

Permanent Licenses

Permanent licenses do not expire. You can purchase permanent licenses for a fixed number of VEM CPU sockets. You need one license for each CPU socket on each VEM. The license file specifies the number of licenses that you have purchased.

When you upgrade to a new software release, all previously installed permanent licenses remain in effect.

When you purchase permanent licenses, make sure to request enough licenses to cover all of the CPU sockets in the CPUs in all of your VEMs. If you do not have enough licenses available to cover all of the CPU sockets on a particular VEM, no licenses are applied to that VEM. The entire VEM remains unlicensed until sufficient licenses become available to cover all of its CPU sockets.

Any extra licenses are placed into a pool of available licenses on the VSM to be used as needed.

After you purchase a license package, you then install the package on your VSM. The license package name is similar to the following: `NEXUS1000V_LAN_SERVICES_PKG`.

After installing permanent licenses, you can remove the evaluation license file from the pool if desired.

Evaluation Licenses

Evaluation licenses allow you to try Cisco Nexus 1000V before you purchase permanent licenses.

The evaluation period starts when you install the evaluation license file. Unlike default licenses, an evaluation license is not invalidated when you install a permanent license. Instead, evaluation licenses expire only when the license file reaches its expiration date. The validity period might vary and the expiration date is mentioned in the license file.

⚠️

Caution   Service Disruption—Even though vEthernet interfaces are not dropped on unlicensed VEMs, the following events might affect the vEthernet interfaces:

- Any new vEthernet interfaces are not brought up.

- vEthernet interfaces remain down with a "VEM Unlicensed" reason if there is a reattach due to a configuration change, module flap, or a port flap.

After installing permanent licenses, you can remove the evaluation license file from the pool if desired.

Evaluation license packs are available from Cisco.com.

Overdraft Licenses

Overdraft licenses are used when the installed licenses are used up. Overdraft licenses can prevent a service disruption if you exceed the number of permanent or evaluation licenses specified in your license file.

The number of overdraft licenses provided is based on the number of licenses that you ordered. If the number of licenses installed is less than or equal to 64, the number of overdraft licenses provided is 16 (or 30 percent of the installed licenses).

The expiration of an overdraft license is tied to the expiration date of the installed license.

Monitoring Licensing Usage

A system message similar to the following is generated when more licenses are being used than are installed. This message indicates that you should add more permanent licenses:

```
%LICMGR-2-LOG_LIC_USAGE: Feature NEXUS1000V_LAN_SERVICES_PKG is using 17 licenses,
only 16 licenses are installed. Please contact your Cisco account team or partner to purchase
 Licenses or downgrade to Essential Edition. To activate your purchased licenses, click on
 www.cisco.com/go/license.
```

A system message similar to the following is generated if there are not enough licenses available for a particular VEM:

```
%VEM_MGR_UNLICENSED: License for VEM 7 could not be obtained. Please contact your Cisco
account team or partner to purchase Licenses or downgrade to Essential Edition. To activate
 your purchased licenses, click on www.cisco.com/go/license.
```

A system message similar to the following is generated every hour with a list of modules that are unlicensed:

```
%VEM_MGR_UNLICENSED_MODS: Modules are not licensed. This will result in network connectivity
 issues. Please contact your Cisco account team or partner to purchase Licenses or downgrade
 to Essential Edition. To activate your purchased licenses, click on www.cisco.com/go/license.
```

Pool of Available Licenses

If you have licenses that are unused, the VSM stores these unused licenses in a pool of available licenses. Before you can uninstall a license file, you must first return all licenses from its VEMs to the pool.

Once a license has been assigned to the VEM, you can configure how the system treats that license if the VEM goes out of service for any reason.

Nonvolatile Licensing

With nonvolatile licensing, once a license has been assigned to a VEM, it remains checked out to that VEM even if the VEM is offline. If you want to decommission a VEM, you must manually return its licenses to the pool or the licenses remain unavailable to any other VEMs in the system.

This process enables the VEM to return to service immediately after it comes back online. The VEM does not have to wait while acquiring new licenses.

Volatile Licensing

With volatile licensing, when any VEM goes offline its licenses are immediately returned to the VSM license pool. Once the VEM comes back online, it must acquire new licenses from the license pool.

The following events trigger a renegotiation and synchronization of licenses between the VSM and its VEMs:

- Clock change in the VSM system clock
- VSM reload
- Installing a new license file
- Clearing an existing license file

During the license renegotiation process, system messages alert you if licenses are returned to the VSM pool for a VEM that is offline. This process requires no action on your part because the licenses are returned to the VEM when it comes back online.

⚠ **Caution**   Service Disruption—Volatile licenses are removed from a VEM during a loss in connectivity and must be reassigned when connectivity resumes. We recommend that you use nonvolatile licensing and you transfer unused licenses as described in Transferring Licenses to the License Pool, on page 17.

Installing and Configuring Licenses

This chapter contains the following sections:

Licensing Guidelines and Limitations

Licensing has the following configuration guidelines and limitations:

- If you modify a permanent license key file, it is invalidated.

- When you purchase permanent licenses, the license key file is sent to you in an e-mail. The license key authorizes use on only the host ID device. You must obtain a separate license key file for each of your VSMs.

- A license file contains the number of licenses ordered for your VSM. One license is required for each CPU socket on each VEM, but you do not need a license for the VSM itself.

- A VSM can have more than one license file depending on the number of CPU sockets on each VEM.

- You must have a role equivalent to that of network-admin to install, uninstall, or copy a permanent license file. For information about user accounts and roles, see the *Cisco Nexus 1000V Security Configuration Guide*.

- If you are installing multiple permanent licenses for the same VSM, also called license stacking, each permanent license key filename must be unique.

- Licenses cannot be applied to a VEM unless sufficient licenses are in the pool to cover all of its CPU sockets.

- If a license is in use, you cannot delete its license file. You must first transfer all licenses from the VEMs to the VSM license pool before uninstalling the license file.

- When you install a permanent license file, all default and evaluation licenses are invalidated.

Default License Configuration Settings

Configuration Option	Description
license filename	`NEXUS1000V_LAN_SERVICES_PKG`
switch edition	New installs use the Essential edition by default.
	Upgrades use the same addition as the previous install, if one was configured. If not, upgrades use the Advanced edition by default.
volatile/nonvolatile licensing	The Cisco Nexus 1000V uses nonvolatile licensing by default, which maintains the link between a license and its assigned VEM until you manually transfer that license, even if the VEM goes out of service.

Licensing Changes in the Current Release

You can install the licenses on the Cisco Nexus 1000V by using the **install license** command. When a module (VEM) comes up, it request licenses from the Cisco Nexus 1000V License Manager.

If the license checkout fails, the module is marked as unlicensed and the virtual Ethernet (vEth) interfaces that are attached to that module are not allowed to come up. For the software upgrades, if the switch is still in the default licensing period, it is extended for another 60 days from the software upgrade date.

License Expiry Warnings

As the evaluation license expiration date approaches, the license expiry warning log message informs Advanced edition users about the need to install permanent licenses or change the system to the Essential edition before the evaluation license expiration date. When the Advanced edition is active, messages are logged every day starting from 4 weeks before the license expiry date and every hour on the last day before the licenses expire.

After the expiration date, the existing modules and the interfaces continue to operate and the switch continues to forward the traffic, but if an interface or module flaps, it stays down until the valid licenses are installed or

the switch is changed to the Essential edition. In addition, any new interfaces or modules come up in the unlicensed state.

You can disable the advanced features and change the switch edition to Essential even after the licenses have expired.

Licensing for New Software Installation

By default, the switch uses the Essential edition which can be deployed across 128 hosts with a maximum of 512 CPUs. Default licenses are valid for 60 days from the time of installation. During this time you are allowed to change the switch edition to Advanced and try out the advanced features. A maximum of 1024 licenses (up to 128 hosts) are supported during the default license period for the Advanced edition.

The advanced features are available only when you change the switch edition to Advanced. When you install the evaluation or permanent licenses at any time during the default license period, the switch stops using the default licenses and starts using the installed licenses. When the default or the installed licenses expire, if the switch edition is Advanced, it remains in the Advanced edition. You can change the switch edition to the Essential edition even after the license has expired.

Licensing for Software Upgrades

When you upgrade the Cisco Nexus 1000V software, the default edition depends on whether your current software version uses tiered-based licensing.

- If you are upgrading from a version of the Cisco Nexus 1000V software that includes tier-based licensing, the upgraded Cisco Nexus 1000V software defaults to the same edition as your existing system.

- If you are upgrading from a version of the Cisco Nexus 1000V software that does not include tier-based licensing, the upgraded Cisco Nexus 1000V software defaults to the Advanced edition.

- If you are upgrading from any version of the Cisco Nexus 1000V software during the default evaluation period, the evaluation period is reset to 60 days and the software defaults to the Advanced edition.

At any time, if you change from the Advanced edition to the Essential edition, the software checks in any licenses that it has checked out of the license pool.

Configuring Switch Editions

Before You Begin

If you are changing from the Essential to the Advanced edition, make sure that you have sufficient licenses installed for all CPU sockets in the VEMs associated with the VSM.

If you are changing from the Advanced to the Essential edition, make sure that you have turned off all advanced features.

Procedure

	Command or Action	**Purpose**
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **svs switch edition**{*essential* | *advanced*}	Configures the Cisco Nexus 1000V switch edition. The command fails if you change the switch edition to Advanced and not enough licenses are available for all the modules, or if you change the switch edition to Essential but not all advanced features have been disabled. The software displays an error message if the command fails.
Step 3	switch(config)# **show switch edition**	(Optional) Displays the current edition of the Cisco Nexus 1000V switch, license usage and availability information, expiration dates, and the list of advanced features with their status. The number of available licenses is the number of default or installed licenses available (including overdraft licenses) minus the number of licenses in use. In the Essential edition, the number of licenses in use should always be 0. Any value other than 0 means that the license check in the process did not go through successfully. To recover from this situation, use the **license transfer** command to transfer the licenses back to the license pool. The Advanced edition, if there are multiple permanent license files are installed, the license expiry displays the shortest expiration date.
Step 4	switch(config)# **copy running-config startup-config**	(Optional) Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

This example shows how to display the current switch edition, change to the Advanced edition, and then confirm the change by showing the switch edition:

```
switch# configure terminal
switch(config)# show switch edition
    Switch Edition - Essential

    Advanced Features
    Feature Name            Feature State
    ----------------------------------------
    cts                     disabled
    dhcp snooping           disabled
    vxlan-gateway           disabled

    Licenses Available: 512
    Licenses in Use: 0
    License Expiry: Never

switch(config)# svs switch edition advanced
switch(config)# show switch edition
    Switch Edition - Advanced

    Advanced Features
    Feature Name            Feature State
    ----------------------------------------
    cts                     disabled
```

```
        dhcp snooping        enabled
        vxlan-gateway        enabled

        Licenses Available: 28
        Licenses in Use: 4
        License Expiry: 11 Dec 2012
switch(config)# copy running-config startup-config
switch(config)#
```

Obtaining and Installing a License

Obtaining the License File

License files have the following characteristics:

- A license file is tied to each VSM by the host ID or the serial number that is associated with the VSM device.

- A license file contains the number of licenses ordered for your VSM. One license is required for each CPU socket on each VEM, but no license is required for the VSM itself.

Before You Begin

- Make sure that you have your product authorization key (PAK),which is in your software license claim certificate.

  If you cannot locate your software license claim certificate, contact contact Cisco Technical Support.

- Log in to the CLI in EXEC mode.

- Your username must have a role that is equivalent to that of the network-admin role which allows you to copy files. For information about user accounts and roles, see the *Cisco Nexus 1000V Security Configuration Guide*.

Procedure

Step 1 Obtain the serial number, also called the host ID, for your VSM.

```
switch# show license host-id
License hostid: VDH=1280389551234985805
```

Note The host ID includes everything that appears after the equal sign (=). In this example, the host ID is 1280389551234985805.

Step 2 From your software license claim certificate, locate the product authorization key (PAK).

Step 3 Go to the Software Download site.

Step 4 From the Software Download site, go to the Product License Registration site.

Step 5 From the Product License Registration website, follow the instructions for registering your VSM license. The license key file is sent to you in an e-mail. The license key authorizes use on only the host ID device. You must obtain separate license key file(s) for each of your VSMs.

Caution Modifying the license key file in any way invalidates it. Make sure that you keep the file intact and unchanged.

Step 6 Save your license to a SCP/SFTP/TFTP server.

Step 7 Copy your license to bootflash on the VSM.

```
switch# copy scp://user@linux-box.cisco.com/home/user/n1kv_license.lic bootflash:
Enter vrf (If no input, current vrf 'default' is considered):
user@linux-box.cisco.com's password:
n1kv_license.lic                               100%  252    0.3KB/s   00:00

switch#
```

Installing the License File on the VSM

Before You Begin

- Make sure that the license file you are installing contains the number of licenses needed to cover all CPU sockets on all VEMs.

- Know that this procedure installs the license file using the name `n1kv_license.lic`. You can specify a different name if needed.

- If you are installing multiple licenses for the same VSM, also called license stacking, make sure that each license key filename is unique.

- Repeat this procedure for each additional license file that you are installing, or stacking, on the VSM.

- You are logged in to the CLI in EXEC mode.

- You must have a role with privileges equivalent to that of the network-admin role to install a license. For information about user accounts and roles, see the *Cisco Nexus 1000V Security Configuration Guide*.

Procedure

	Command or Action	**Purpose**
Step 1	switch# **install license bootflash:** *filename*	Installs the license from the active VSM console.
		Note If you specify a license filename, the file is installed with the specified name. Otherwise, the default filename is used.
		The license is installed on the VSM and each VEM automatically acquires a license for every CPU socket.
Step 2	switch# **show license file** *filename*	Verifies the license installation by displaying the license configured for the VSM.
Step 3	switch# **show license usage** *package_name*	Verifies the license installation by displaying it in the license usage table.
		Note If you already have VEMs installed, the output of this command shows installed VEMs and sockets.

	Command or Action	Purpose
Step 4	switch# **copy running-config startup-config**	(Optional) Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

This example shows how to install a license file and then display its contents and usage:

```
switch# install license bootflash:n1kv_license.lic
Installing license ..done
switch# show license file n1kv_license.lic
SERVER this_host ANY
VENDOR cisco
INCREMENT NEXUS1000V_LAN_SERVICES_PKG cisco 1.0 permanent 10 \
        HOSTID=VDH=1575337335122974806 \
        NOTICE="<LicFileID>n1kv_license.lic</LicFileID><LicLineID>0</LicLineID> \
        <PAK>PAK12345678</PAK>" SIGN=3AF5C2D26E1A
switch# show license usage NEXUS1000V_LAN_SERVICES_PKG
----------------------------------------
Feature Usage Info
----------------------------------------
        Installed Licenses : 10
     Default Eval Licenses : 0
    Max Overdraft Licenses : 16
 Installed Licenses in Use : 4
 Overdraft Licenses in Use : 0
      Default Eval Lic in Use : 0
      Default Eval days left : 0
         Licenses Available : 22
           Shortest Expiry : Never
----------------------------------------
Application
----------------------------------------
VEM 3 - Socket 1
VEM 4 - Socket 1
VEM 4 - Socket 2
VEM 5 - Socket 1
----------------------------------------
switch#
```

Note The **Default Eval days** left field displays the number of default evaluation days that are remaining before the license expires, not including the present day.

Verifying the License Configuration

To verify the license configuration, use one of the following commands:

Command	Purpose
show license	Displays the license filename for the VSM.
show license brief	Displays the license installed on the VSM.
show license file *filename*	Displays the contents of the license file installed on the VSM, including the license filename and the expiration date for evaluation licenses.

Command	Purpose
show license usage	Displays the total number of licenses in use on the VEMs.
show license usage *package_name*	Displays statistics about the number of evaluation and permanent licenses available, installed, and in use on the VSM. When you use this command, the **Default Eval days** left field displays the number of default evaluation days that are remaining before the license expires, not including the present day.
show module vem [*module*] **license-info**	Displays the license mode and the usage of licenses by each module.

Transferring Licenses

Transferring Licenses Between VEMs

You can transfer licenses from one VEM to another, for example, when one VEM is removed from service.

- Licenses cannot be transferred to a VEM unless there are sufficient licenses in the pool to cover all of its CPUs.

- When licenses are successfully transferred from one VEM to another, the virtual Ethernet interfaces on the source VEM are removed from service, and the virtual Ethernet interfaces on the destination VEM are brought into service. The licenses on the source VEM are checked in regardless of any failure that might occur while the destination module is being licensed.

Before You Begin

- Log in to the CLI in EXEC mode.

- You know the VEM that you want to transfer licenses from and the number of licenses it has.

- You know the VEM that you are transferring licenses to and the number of licenses required.

- You know the number of CPUs installed on the destination VEM.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **svs license transfer src-vem** *vem_no* **dst-vem** *vem_no*	Transfers the licenses from one VEM to another.

	Command or Action	Purpose
Step 3	switch# **show license usage** *package_name*	Verifies the transfer by displaying the licenses in use on each VEM.
Step 4	switch(config)# **copy running-config startup-config**	(Optional) Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

This example shows how to transfer a license from VEM 3 to VEM 5 and verify the transfer in the license usage:

```
switch# configure terminal
switch(config)# svs license transfer src-vem 3 dst-vem 5
switch(config)# show license usage NEXUS1000V_LAN_SERVICES_PKG
--------------------------------------
Feature Usage Info
--------------------------------------
         Installed Licenses : 29
       Default Eval Licenses : 0
     Max Overdraft Licenses : 16
  Installed Licenses in Use : 2
  Overdraft Licenses in Use : 0
      Default Eval Lic in Use : 0
     Default Eval days left : 0
          Licenses Available : 43
             Shortest Expiry : 01 Jul 2011
--------------------------------------
Application
--------------------------------------
VEM 5 - Socket 1
VEM 5 - Socket 2
--------------------------------------
switch(config)# copy running-config startup-config
switch(config)#
```

Transferring Licenses to the License Pool

You can transfer licenses from a VEM to the VSM license pool. This procedure must be performed in the following cases:

- If you want to uninstall a license file that contains one or more licenses currently assigned to a VEM.

- If you are using nonvolatile licensing and you want to take a VEM out of service.

Note When you transfer its licenses to the VSM license pool, all virtual Ethernet interfaces on the VEM are removed from service.

Before You Begin

Log in to the CLI in EXEC mode.

Procedure

	Command or Action	**Purpose**
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **svs license transfer src-vem** *vem_no* **license_pool**	Transfers the licenses from a VEM to the license pool.
Step 3	switch(config)# **show module vem** *module* **license-info**	(Optional) Verifies the transfer by displaying the licenses in use on the VEM.
Step 4	switch(config)# **copy running-config startup-config**	(Optional) Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

This example shows how to transfer a license from VEM 3 to the license pool:

```
switch# configure terminal
switch(config)# svs license transfer src-vem 3 license_pool
switch(config)# copy running-config startup-config
```

Transferring Licenses from the License Pool to a VEM

Before You Begin

- Configure the switch to use the Advanced edition.

- Log in to the CLI in EXEC mode.

- Verify that there are enough available licenses for all CPU sockets on the VEM. If the license request fails for a module, enter the **svs license transfer license_pool dst-vem** *module* command to transfer the licenses from the license pool to the VEM.

Procedure

	Command or Action	**Purpose**
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **svs license transfer license_pool dst-vem** *module*	Transfers a license from the license pool to the VEM. The *module* argument range is from 3 to 66.
Step 3	switch(config)# **show module vem** *module* **license-info**	Verifies the transfer by displaying the licenses in use on each VEM.

	Command or Action	Purpose
Step 4	switch(config)# **copy running-config startup-config**	(Optional) Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

This example shows how to transfer licences to the CPU sockets on VEM 3 and verify that these licenses have been applied:

```
switch# configure terminal
switch(config)# svs license transfer license_pool dst-vem 3
switch(config)# show module vem 3 license-info
Licenses are Sticky
Mod     Socket Count   License Usage Count     License Version   License Status
---     -----------    -------------------     ---------------   --------------
3       2              2                       1.0               licensed
switch(config)# copy running-config startup-config
switch(config)#
```

Configuring Volatile Licenses

Enabling Volatile Licenses

You can enable volatile licenses so that whenever a VEM is taken out of service, its licenses are returned to the VSM pool of available licenses.

⚠️

Caution Service Disruption—Volatile licenses are removed from a VEM during a loss in connectivity and must be reassigned when connectivity resumes. We recommend that you use nonvolatile licensing and you transfer unused licenses as described in Transferring Licenses to the License Pool, on page 17.

Before You Begin

Log in to the CLI in EXEC mode.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **svs license volatile**	Enables volatile licenses in the running configuration.
Step 3	switch(config)# **copy running-config startup-config**	(Optional) Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

This example shows how to enable volatile licensing:

```
switch# configure terminal
switch(config)# svs license volatile
switch(config)# copy running-config startup-config
switch(config)#
```

Disabling Volatile Licenses

You can disable volatile licenses so that whenever a VEM is taken out of service, its licenses are not returned to the VSM pool of available licenses.

Note By default, the licenses are nonvolatile (sticky) in nature, which is the recommended configuration. This configuration ensures that the licenses are reserved for a VEM. Even after a period of brief connectivity loss between the VEM and the VSM, the VEM is guaranteed to get the needed licenses.

Before You Begin

Log in to the CLI in EXEC mode.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **no svs license volatile**	Disables volatile licenses in the running configuration.
Step 3	switch(config)# **copy running-config startup-config**	(Optional) Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

This example shows how to disable a volatile license:

```
switch# configure terminal
switch(config)# no svs license volatile
switch(config)# copy running-config startup-config
switch(config)#
```

Changing the Serial Number in a License

You can change the serial number, or host ID, associated with a license. This process is also called rehosting and is required if you replace a VSM in your network with a new VSM.

⚠️ **Caution**   Service Disruption—When you remove a VSM from your network, the vEthernet interfaces on the VEMs are removed from service and the traffic flowing to them from Virtual Machines (VMs) is dropped. This traffic flow is not resumed until you add a new VSM and, new license file with the new host ID.

- A license file is tied to each VSM by the host ID associated with the VSM device.

- A license file contains the number of licenses ordered for your VSM. One license is required for each CPU on each VEM.

- A VSM can have more than one license file depending on the number of installed VEM CPUs.

- If you have multiple license files stacked on your VSM, repeat this process for each license file.

Before You Begin

- You have a copy of your existing license files with the host ID of the existing VSM.

- Log in to the CLI in EXEC mode.

- Your username must have the network-admin role that allows you to copy files. For information about user accounts and roles, see the *Cisco Nexus 1000V Security Configuration Guide*.

Procedure

Step 1   Obtain the serial number, also called the host ID, for your new VSM:

```
switch# show license host-id
License hostid: VDH=1280389551234985805
```

Note   The host ID number appears after the equal sign (=). In this example, the host ID is 1280389551234985805.

Step 2   E-mail the following information to licensing@cisco.com, requesting that the license file be rehosted to the new host ID:

- The old host ID

- The new host ID

A new license key file, with the host ID of the new VSM, is sent to you in an e-mail within 48 hours.

Note   Do not modify the license key file. The license key file is invalidated if you modify it.

Step 3   Save your license to a SCP/SFTP/TFTP server.

Step 4   Copy your license to bootflash on the VSM.

```
switch# copy scp://user@linux-box.cisco.com/home/user/n1kv_license.lic bootflash:
Enter vrf (If no input, current vrf 'default' is considered):
user@linux-box.cisco.com's password:
n1kv_license.lic                              100%  252     0.3KB/s   00:00
switch#
```

What to Do Next

Install the license file on the VSM.

Feature History for Licenses

This table includes only the updates for those releases that have resulted in additions or changes to the feature.

Feature Name	Releases	Feature Information
VXLAN gateway	4.2(1)SV2(2.1)	The **show switch edition** displays the VXLAN gateway as an Advanced edition feature.
Licensing for new software installation	4.2(1)SV2(2.1)	The Essential edition is updated to be deployed across 124 hosts and the Advanced edition is updated to support a maximum of maximum of 1024 licenses.
Default license	4.2(1)SV2(1.1)	512 default licenses are included for the Essential edition in the software image. In addition, 512 default licenses are also available for the Advanced edition that are valid for 60 days from the date of installation.
Evaluation license	4.0(4)SV1(3)	16 evaluation licenses that are valid for 60 days are included in the software image. More evaluation licenses of varied durations can be downloaded from Cisco.com and installed separately.
Evaluation license	4.0(4)SV1(2)	Evaluation licenses are part of the software installation or upgrade. A separate evaluation license file no longer needs to be installed.
show license usage *package_name* command	4.0(4)SV1(2)	The **show license usage** *package_name* command output is updated to show statistics about the number of evaluation and permanent licenses available, installed, and in use on the VSM.
License	4.0(4)SV1(1)	This feature was introduced.

Licensing Terminology

This chapter contains the following sections:

Licensing Terminology

Term	Definition
Advanced Features	Features that are available only in the Advanced edition.
Default license	A license bundled with the software that is installed automatically when you install the software.
Edition	Essential and Advanced switch editions.
Evaluation license	A temporary license. Evaluation licenses are valid for a specified number of days and are tied to a host ID (device serial number).
Host ID	A unique chassis serial number that is specific to each device.
Incremental license	A license for additional CPU sockets that were not included in the initial license file. License keys are incremental—If you purchase some CPU sockets now and others later, the license file and the software detect the sum of all sockets for the specified device.
License enforcement	A mechanism that prevents a feature from being used without first obtaining a license.
License key file	A file that specifies the total licensed CPU sockets for your system. Each file is uniquely named and is specific to a VSM. The file contains digital signatures to prevent tampering and modification. License keys are required to use the product and are enforced within a specified time span.

Term	Definition
Licensed application	A software application or component that requires a license to be used.
Licensed feature	Permission to use a particular feature through a license file, a hardware object, or a legal contract. This permission is limited to the number of users, number of instances, time span, and the implemented device.
Missing license	If the bootflash has been corrupted or a supervisor module replaced after you have installed a license, that license shows as "missing." The product still works. You should reinstall the license as soon as possible.
Node locked license	A license that can only be used on a particular device that uses the unique host ID for the device.
Overdraft license	Overdraft licenses are used when the installed licenses are used up. Overdraft licenses can prevent a service disruption if you exceed the number of permanent or evaluation licenses specified in your license file. The number of overdraft licenses provided is based on the number of licenses ordered.
Permanent license	A license that is not time bound is called a permanent license.
Product Authorization Key (PAK)	A unique code, provided in the software license claim certificate, that allows you to obtain a license key. You use this key at a website to register for your license. After you register, your license key file and installation instructions are sent to you in an e-mail.
Rehosting	The process of changing a license to reflect a different device serial number or host ID. A host ID is unique to each device.
Software license claim certificate	A document that entitles its rightful owner to use licensed features on one device as described in that document. This document provides the product authorization key (PAK).
Support	If you purchased Cisco support through a Cisco reseller, contact the reseller directly. If you purchased support directly from Cisco, contact Cisco Technical Support.
Stacking	The process of adding multiple license files on a single VSM.
Volatile licenses	A feature that automatically captures unused licenses when a VEM is taken out of service and adds them to the VSM license pool so that they can be reused by another VEM. In contrast, if its licenses are nonvolatile, the VEM does not release them during a loss in network connectivity with the VSM. When connectivity is returned, the VEM can resume normal activity without further interruption. Volatile licenses are disabled by default. The licenses in VEMs are nonvolatile and are not released when a VEM is removed from service.