802.1Q Trunking Between Catalyst Switches Running CatOS and Cisco IOS System Software

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Introduction

This document provides sample configurations for IEEE 802.1Q trunking between Catalyst switches running Catalyst OS (CatOS) system software and modular Layer 3 (L3) switches running Cisco IOS® System Software. Switches running CatOS include the Catalyst 4500/4000, 5500/5000, and 6500/6000 series switches. Modular L3 switches running Cisco IOS Software include the Catalyst 4500/4000 and Catalyst 6500/6000 series switches. The sample configurations use a Catalyst 4000 (CatOS) and a Catalyst 6500 (Cisco IOS Software), but any of the switches just mentioned could have been used to achieve the same results.

Trunking is a way to carry traffic from several VLANs over a point−to−point link between the two devices. Two ways that Ethernet trunking can be implemented are:

- Inter−Switch Link Protocol (ISL) (Cisco proprietary protocol)
- 802.1Q (IEEE standard)

Prerequisites

Requirements

For system requirements, guidelines and restrictions related to 802.1Q and ISL on Catalyst switches, refer to: System Requirements to Implement Trunking.

Components Used

To create the examples in this document, these switches were used:

- Catalyst 4000 switch with Supervisor Engine II (WS−X4013) running CatOS software version 8.1.3

- Catalyst 6509 with Supervisor Engine 2/Multilayer Switch Feature Card 2 (MSFC2) running Cisco IOS Software Release 12.1(20)E2 on the Supervisor Engine and MSFC2

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

For more information on document conventions, refer to Cisco Technical Tips Conventions.

Background Theory

This document includes only the configuration files from the switches and the output from the related sample **show** commands. For details on how to configure an 802.1Q trunk between Catalyst switches, refer to the LAN Product Support Pages.

In 802.1Q trunking, all VLAN packets are tagged on the trunk link, except the native VLAN. The native VLAN packets are sent untagged on the trunk link. Therefore, the native VLAN should be the same on both switches configured for trunking. This way, you can deduce to which VLAN a frame belongs when you receive a frame with no tag. By default, VLAN 1 is the native VLAN on all switches.

- In CatOS, the native VLAN can be changed by issuing the **set vlan** *vlan−id mod/port* command, where *mod/port* is the trunk port.
- In Cisco IOS Software, the native VLAN can be changed by issuing the **switchport trunk native vlan** *vlan−id* **interface** command which is configured on the trunk port.

Configure

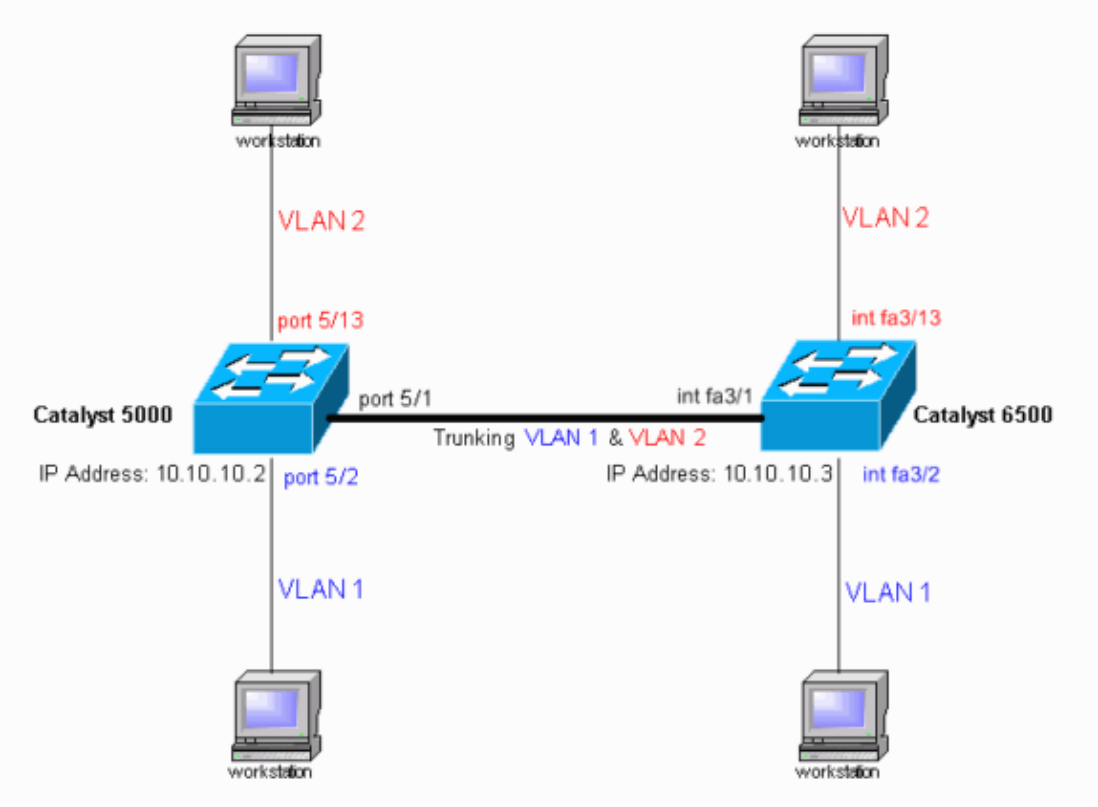
In this section, you are presented with the information to configure the features described in this document.

The configurations in this document were implemented in an isolated lab environment. Ensure that you understand the potential impact of any configuration or command on your network before using it. The configurations on all devices were cleared with the **clear config all** and **write erase** commands to ensure that they had a default configuration.

Note: To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only) .

Network Diagram

This document uses this network setup:



Configurations

This document uses these configurations:

- Catalyst 4000 Switch
- Catalyst 6500 Switch

Note: Comments and explanations are displayed in blue italics.

Catalyst 4000 Switch

```
#version 8.1(3)
!
!
#system web interface version(s)
!
#system
set system name  cat4000
!
#frame distribution method
set port channel all distribution mac both
!
#vtp
set vtp domain cisco

!--- In this example, the VLAN Trunk Protocol (VTP) domain name is the same
!--- on both sides. This is required for the autonegotiation of the trunk
!--- by the Dynamic Trunking Protocol (DTP).


set vtp mode client vlan

!--- In this example, the VTP mode is set to client.
!--- Set the VTP mode according to your network requirements.
```

```
!--- For more details, refer to
!--- Understanding and Configuring VLAN Trunk Protocol (VTP).


!
#ip
set interface sc0 1 10.10.10.2/255.255.255.0 10.10.10.255

!--- This is the IP address used for management.

!--- Output suppressed.

!
#module 1 : 2-port 1000BaseX Supervisor
!
#module 2 empty
!
#module 3 empty
!
#module 4 empty
!
#module 5 : 48-port Inline Power Module
set vlan 2    5/13-24

!--- Ports 5/13-24 have been assigned to VLAN 2.



set trunk 5/1  desirable dot1q 1-1005,1025-4094

!--- The trunking mode is set to desirable mode, which means
!--- the port automatically tries to form a trunk with a
!--- neighboring port set to desirable, auto, or on mode.

!--- For recommended trunk mode settings, refer to
!--- the Dynamic Trunking Protocol section of
!--- Best Practices for Catalyst 4500/4000, 5500/5000, and 6500/6000
Series Switches Running CatOS Configuration and Management.

!--- Output suppressed.


set spantree portfast    5/2-24 enable
set port channel 5/2-24 mode off

!--- The macro command set port host 5/2-24 was used to do three things:
!--- disable trunking, disable port channeling, and enable spantree portfast.

!--- For details on using the set port host command, refer to
!--- Using Portfast and Other Commands to Fix Workstation Startup Connectivity Delays.

!
#module 6 empty
end
```

Catalyst 6500 Switch

```
Current configuration : 4408 bytes
!
version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
```

```
hostname cat6500
!
boot system flash sup-bootflash:c6sup22-jsv-mz.121-20.E2
enable password mysecret

!--- This is the privileged mode password used in the example.


!
ip subnet-zero
!
!
!
mls flow ip destination
mls flow ipx destination
!
redundancy
 mode rpr-plus
 main-cpu
  auto-sync running-config
  auto-sync standard
!
!
!
interface GigabitEthernet2/1
 no ip address
 shutdown
!
interface GigabitEthernet2/2
 no ip address
 shutdown
!
interface fastethernet3/1
 switchport

!--- The switchport command must be entered once,
!--- without any keywords, to configure the interface as a Layer 2 port.
!--- The interface is now automatically configured with the default command
!--- switchport mode dynamic desirable.

!--- This means the interface is ready to autonegotiate trunking
!--- encapsulation and form a trunk link (using DTP) with a neighbor port
!--- in desirable, auto, or on mode.

!--- For recommended trunk mode settings, refer to
!--- the "Dynamic Trunking Protocol" section of
!--- Best Practices for Catalyst 6500/6000 Series and Catalyst 4500/4000
Series Switches Running Cisco IOS Software.



!
interface FastEthernet3/2
 switchport
 switchport mode access
 spanning-tree portfast


!--- The interface range fastethernet mod/beginport - endport
!--- command is used to configure interfaces 3/2 - 24 at once.

!--- Next, the switchport command is issued (if this has not been done already).


switchport mode access
 spanning-tree portfast
```

```
!--- Next, issue the macro command switchport host 3/2 - 24 to automatically
!--- configure these ports as access ports and to enable spantree portfast.

!--- For details on using the switchport host command, refer to
!--- Using Portfast and Other Commands to Fix Workstation Startup Connectivity Delays.


!
interface FastEthernet3/13
 switchport
 switchport access vlan 2

!--- Interfaces 3/13 - 24 are placed in VLAN 2
!--- using the switchport access vlan 2 command.


 switchport mode access
 spanning-tree portfast


!--- Output suppressed.


!
interface FastEthernet3/24
 shutdown
 switchport
 switchport access vlan 2
 switchport mode access
 spanning-tree portfast


!--- Output suppressed.

!
interface FastEthernet3/48
 no ip address
 shutdown
!
interface vlan 1
 ip address 10.10.10.3 255.255.255.0

!--- This is the IP address used for management.

!
ip classless
no ip http server
!
!
!
line con 0
line vty 0 4
 password mysecret


!--- This is the Telnet password used in the example.


 login
 transport input lat pad mop telnet rlogin udptn nasi
!
!
end

cat6500#
```

Verify

This section provides information you can use to confirm your configuration is working properly.

show Commands

Certain **show** commands are supported by the Output Interpreter (registered customers only) tool, which allows you to view an analysis of **show** command output.

On Catalyst switches running CatOS, use these commands:

- **show port capabilities** *module/port*
- **show port** *module/port*
- **show trunk** *module/port*
- **show vtp domain**

On Catalyst 6000 switches running Cisco IOS Software, use the following commands:

- **show interfaces** *interface−type module/port* **trunk**
- **show vlan**

Sample show Command Output

Catalyst 4000 Switch

The **show port capabilities** *module/port* command is used to check whether the port is capable of trunking.

```
cat4000> (enable) show port capabilities 5/1
Model                   WS−X4148−RJ45V
Port                    5/1
Type                    10/100BaseTX
Speed                   auto,10,100
Duplex                  half,full
Trunk encap type        802.1Q
Trunk mode              on,off,desirable,auto,nonegotiate
Channel                 5/1−48
Flow control            no
Security                yes
Dot1x                   yes
Membership              static,dynamic
Fast start              yes
QOS scheduling          rx−(none),tx−(2q1t)
CoS rewrite             no
ToS rewrite             no
Rewrite                 no
UDLD                    yes
Inline power            auto,off,static
AuxiliaryVlan           1..1000,1025..4094,untagged,none
SPAN                    source,destination,reflector
Link debounce timer     yes
IGMPFilter              yes
Dot1q−all−tagged        no
cat4000> (enable)
```

The **show port** *module/port* command shows the status of a particular port and whether it is trunking.

```
cat4000> (enable) show port status 5/1
Port  Name              Status     Vlan       Level  Duplex Speed Type
```

```
----- ----------------- ---------- ---------- ------ ------ ----- ------------
 5/1                    connected  trunk      normal a-full a-100 10/100BaseTX
cat4000> (enable)
```

The **show trunk** command is used to verify the trunking status and configuration.

```
cat4000> (enable) show trunk
* - indicates vtp domain mismatch
# - indicates dot1q-all-tagged enabled on the port
Port      Mode         Encapsulation  Status        Native vlan
--------  -----------  -------------  ------------  -----------
 5/1      desirable    dot1q          trunking      1

Port      Vlans allowed on trunk
--------  ---------------------------------------------------------------------
 5/1      1-1005,1025-4094

Port      Vlans allowed and active in management domain
--------  ---------------------------------------------------------------------
 5/1      1-2

Port      Vlans in spanning tree forwarding state and not pruned
--------  ---------------------------------------------------------------------
 5/1      1-2
cat4000> (enable)
```

The **show vtp domain** command is used to check the VTP information.

```
cat4000> (enable) show vtp domain
Version      : running VTP1 (VTP3 capable)
Domain Name  : cisco                          Password  : not configured
Notifications: disabled                       Updater ID: 10.10.10.3

Feature        Mode           Revision
-------------- -------------- -----------
VLAN           Client         21

Pruning             : disabled
VLANs prune eligible: 2-1000
```

Catalyst 6500 Switch

The **show interfaces** *interface-type module/port* **trunk** command tells whether the port is trunking.

```
cat6500# show interfaces fastethernet 3/1 trunk

Port      Mode         Encapsulation  Status        Native vlan
Fa3/1     desirable    n-802.1q       trunking      1

Port      Vlans allowed on trunk
Fa3/1     1-4094

Port      Vlans allowed and active in management domain
Fa3/1     1-2

Port      Vlans in spanning tree forwarding state and not pruned
Fa3/1     1-2
cat6500#
```

The **show vlan** command gives information about the VLANs and the ports that belong to a particular VLAN.

```
cat6500# show vlan
```

```
VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa3/2, Fa3/3, Fa3/4, Fa3/5
                                                 Fa3/6, Fa3/7, Fa3/8, Fa3/9
                                                 Fa3/10, Fa3/11, Fa3/12
2    VLAN0002                          active    Fa3/13, Fa3/14, Fa3/15, Fa3/16
                                                 Fa3/17, Fa3/18, Fa3/19, Fa3/20
                                                 Fa3/21, Fa3/22, Fa3/23, Fa3/24
1002 fddi-default                      act/unsup
1003 token-ring-default                act/unsup
1004 fddinet-default                   act/unsup
1005 trnet-default                     act/unsup


!--- Output suppressed.

cat6500#
```

Note: Only those ports that are configured as Layer 2 nontrunk ports are displayed.

Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

Related Information

- **LAN Product Support Pages**
- **LAN Switching Support Page**
- **Technical Support − Cisco Systems**

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