

# Configuring EtherChannel and 802.1Q Trunking with Catalyst 2948G–L3s and CatOS Based Switches

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## Introduction

This document discusses and provides a sample configuration of Fast EtherChannel (FEC) and 802.1Q trunking, between a Catalyst 2948G–L3 switch that runs Cisco IOS® software and switches that run CatalystOS (all models, including Catalyst 4000, 5000, and 6000 series switches).

## Prerequisites

### Requirements

For a list of Catalyst switches that support 802.1Q and ISL trunking encapsulations, refer to System Requirements to Implement Trunking.

There are certain guidelines for the configuration of EtherChannel and trunking. Refer to the documentation for your switch software. For example, if you are running CatalystOS (CatOS) software release 8.2.x on a Catalyst 6500/6000, refer to the Catalyst 6500 Series Software Configuration Guide, 8.2 and carefully examine any configuration guidelines and restrictions in the Configuring Ethernet VLAN Trunks and Configuring EtherChannel sections.

### Components Used

The information in this document is based on these software and hardware versions:

- Catalyst 2948G with CatOS 7.1.2 installed (802.1Q only)
- Catalyst 2948G–L3 with Cisco IOS Software Release 12.0(14)W5(20) installed

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 the Cisco Technical Tips Conventions.

## Background Theory

The use of EtherChannel can provide increased bandwidth and redundancy. EtherChannel is convenient because it scales the bandwidth without any increase in the complexity of the design. Spanning-tree treats the EtherChannel bundle as a single link, so no loops are introduced. Routing protocols also treat the EtherChannel as a single routed interface with a common IP address. EtherChannel bundling provides up to 1600 Mbps FEC (Fast EtherChannel), full duplex, or 16 Gbps Gigabit EtherChannel (GEC). Trunking carries traffic from several VLANs over a point-to-point link between the two devices. Two methods of trunking are Inter-Switch Link Protocol (ISL, a Cisco-proprietary protocol) or 802.1Q (an IEEE standard). This document specifically deals with 802.1Q trunking.

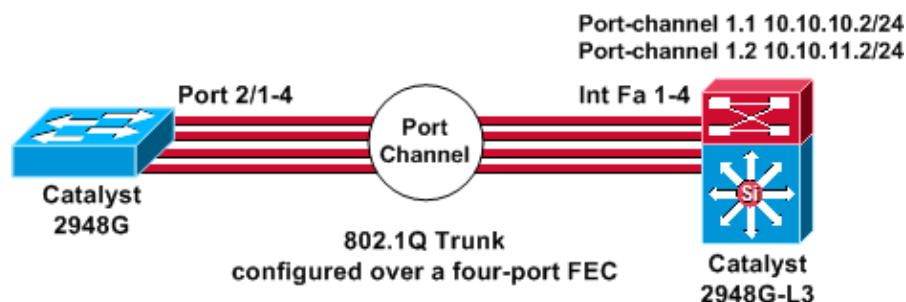
## Configure

In this section, the configurations presented will include a four-port FEC and 802.1Q trunk between the 2948G-L3 and a CatOS switch.

**Note:** To find additional information about the commands 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 2948G
- Catalyst 2948G-L3

Catalyst 2948G
CatOS (enable) <code>show config</code>
This command shows non-default configurations only. Use 'show config all' to show both default and non-default

```

configurations.
.....

.....
..

begin
!
# ***** NON-DEFAULT CONFIGURATION *****
!
!
!
#time: Thu Nov 21 2002, 15:24:27
!
#version 7.1(2)
!
!
#system web interface version(s)
set prompt CatOS
!
#test
!
#frame distribution method
set port channel all distribution mac both
!
#ip
set interface sc0 1 10.10.10.1/255.255.255.0 10.10.10.255
set interface sl0 down
set interface me1 down
set ip alias default          0.0.0.0
set ip alias cat              10.10.10.2
!
#spantree
#vlan                          <VlanID>
!
#set boot command
set boot config-register 0x2102
clear boot system all
!

!--- Ports 2/1 to 2/4 are assigned to a port channel.

#port channel
set port channel 2/1-4 29
!
#multicast filter
set igmp filter disable
!
#module 1 : 0-port Switching Supervisor
!

!--- The trunking mode is specified as 802.1Q, because it
!--- is the only encapsulation that is supported on the
!--- 2948G. The mode is set to nonegotiate, because the
!--- 2948G-L3 does not support Dynamic Trunking Protocol (DTP).

#module 2 : 50-port 10/100/1000 Ethernet
set trunk 2/1 nonegotiate 802.1Q 1-1005
set trunk 2/2 nonegotiate 802.1Q 1-1005
set trunk 2/3 nonegotiate 802.1Q 1-1005
set trunk 2/4 nonegotiate 802.1Q 1-1005

!--- The channel mode is set to on, because 2948G-L3
!--- does not support Port Aggregation Protocol (PAgP).

set port channel 2/1-4 mode on
end

```

## Catalyst 2948G-L3

```
2948G-L3# show run
```

```
Building configuration...
```

```
Current configuration:
```

```
!  
version 12.0  
no service pad  
service timestamps debug uptime  
service timestamps log uptime  
no service password-encryption  
!  
hostname 2948G-L3  
!  
enable secret 5 $1$bNvR$33puy1WCyrdKMvlnj61Js.  
!  
ip subnet-zero  
!  
!  
!--- The logical port-channel interface must be created  
!--- before you put the physical interfaces into the  
!--- channel group.interface port-channel1.  
  
no ip address  
no ip directed-broadcast  
hold-queue 300 in  
!  
!--- Specify the native VLAN: VLAN 1 in this example,  
!--- which is the default. For performance and security  
!--- reasons, it is recommended that you keep the user  
!--- traffic off of the native or management VLAN.  
  
interface Port-channel1.1  
encapsulation 802.1Q 1 native  
ip address 10.10.10.2 255.255.255.0  
no ip redirects  
no ip directed-broadcast  
!  
interface Port-channel1.2  
encapsulation 802.1Q 2  
ip address 10.10.11.2 255.255.255.0  
no ip directed-broadcast  
!  
!--- Specify all of the physical ports that are part  
!--- of the logical port channel interface.  
  
interface FastEthernet1  
no ip address  
no ip directed-broadcast  
channel-group 1  
!  
interface FastEthernet2  
no ip address  
no ip directed-broadcast  
channel-group 1  
!  
interface FastEthernet3  
no ip address  
no ip directed-broadcast  
channel-group 1  
!
```



(registered customers only) .

- **show port channel statistics** Displays the Admin Group of the port channel and displays whether PAgP is in use on the port channel.

Verify that PAgP is not in use on the links.

```
CatOS (enable) show port channel status
```

Port	Admin Group	PAgP Pkts Transmitted	PAgP Pkts Received	PAgP Pkts InFlush	PAgP Pkts RetnFlush	PAgP Pkts OutFlush	PAgP Pkts InError
2/1	29	0	0	0	0	0	0
2/2	29	0	0	0	0	0	0
2/3	29	0	0	0	0	0	0
2/4	29	0	0	0	0	0	0

- **show trunk** Displays the the trunking mode, encapsulation, and native VLAN.

Verify that trunking is enabled on the physical interfaces and on the port channel interface. Also, verify that the trunking mode is correctly set to `nonegotiate`.

**Note:** On a 802.1Q trunk, the native VLAN must match on both sides.

```
CatOS (enable) show trunk
```

\* - indicates vtp domain mismatch

Port	Mode	Encapsulation	Status	Native vlan
2/1	nonegotiate	802.1Q	trunking	1
2/2	nonegotiate	802.1Q	trunking	1
2/3	nonegotiate	802.1Q	trunking	1
2/4	nonegotiate	802.1Q	trunking	1
Port	Vlans allowed on trunk			
2/1	1-1005			
2/2	1-1005			
2/3	1-1005			
2/4	1-1005			
Port	Vlans allowed and active in management domain			
2/1	1			
2/2	1			
2/3	1			
2/4	1			
Port	Vlans in spanning tree forwarding state and not pruned			
2/1	1			
2/2	1			
2/3	1			
2/4	1			

## Catalyst 2948G-L3 show Commands

- **show interfaces port-channel 1** Provides the status of the port channel and the ports that are a member of the port channel group.

Verify that all of the physical interfaces that are a part of the EtherChannel can be seen as members.

```
2948G-L3# show interfaces port-channel 1
```

```
Port-channel1 is up, line protocol is up  
Hardware is FEChannel, address is 0008.a308.1c07 (bia 0000.0000.0000)
```

```
MTU 1500 bytes, BW 400000 Kbit, DLY 100 usec, rely 255/255, load 1/255
Encapsulation ARPA, loopback not set, keepalive set (10 sec)
Half-duplex, Unknown Speed, Media type unknown
ARP type: ARPA, ARP Timeout 04:00:00
```

```
No. of active members in this channel: 4
```

```
Member 0 : FastEthernet2
```

```
Member 1 : FastEthernet1
```

```
Member 2 : FastEthernet4
```

```
Member 3 : FastEthernet3
```

```
Last input 00:00:00, output 00:00:55, output hang never
```

```
Last clearing of "show interface" counters never
```

```
Queueing strategy: fifo
```

```
Output queue 0/40, 0 drops; input queue 0/300, 0 drops
```

```
5 minute input rate 0 bits/sec, 0 packets/sec
```

```
5 minute output rate 0 bits/sec, 0 packets/sec
```

```
596128 packets input, 50714549 bytes, 0 no buffer
```

```
Received 7 broadcasts, 0 runts, 0 giants, 0 throttles
```

```
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
```

```
0 watchdog, 0 multicast
```

```
0 input packets with dribble condition detected
```

```
44294 packets output, 17498215 bytes, 0 underruns
```

```
0 output errors, 0 collisions, 0 interface resets
```

```
0 babbles, 0 late collision, 0 deferred
```

```
0 lost carrier, 0 no carrier
```

```
0 output buffer failures, 0 output buffers swapped out
```

- **show cdp neighbor** Lists all of the directly connected Cisco devices that are discovered through CDP.

Verify that the switch on the other end is visible through all physical ports.

```
2948G-L3# show cdp neighbor
```

```
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater
```

Device ID	Local Intrfce	Holdtme	Capability	Platform	Port ID
JAB032400H2	Port-channel1.1	126	T S	WS-C2948	2/3
JAB032400H2	Port-channel1.1	124	T S	WS-C2948	2/4
JAB032400H2	Port-channel1.1	123	T S	WS-C2948	2/1
JAB032400H2	Port-channel1.1	123	T S	WS-C2948	2/2

## Troubleshoot

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

## Related Information

- [Catalyst 2948G-L3 Documents](#)
- [Configuring ISL and 802.1q Trunking Between a CatOS Switch and an External Router \(InterVLAN Routing\)](#)
- [Catalyst 2948G-L3 Sample Configurations – Single VLAN, Multi-VLAN, and Multi-VLAN Distribution Layer Connecting to Network Core](#)
- [Hardware Troubleshooting for Catalyst 2948G-L3/4908G-L3 Series Switches](#)
- [LAN Product Support](#)
- [LAN Switching Technology Support](#)
- [Technical Support & Documentation – Cisco Systems](#)

