Configuring an ISL Trunk Between a Catalyst 2948G−L3 and Catalyst 2900/3500XL or 2970 Series Switches

Document ID: 12019

Contents

Introduction

This document discusses how to configure an Inter−Switch Link (ISL) Protocol trunk between a Cisco Catalyst 2948G−L3 and Catalyst 2900/3500XL or 2970 series switches. When you connect a Catalyst 2948G−L3 to a switch, the configuration tasks are the same as those to connect a router to a switch. The configuration example in this document uses the Catalyst 2948G−L3 as a router and uses the Catalyst 3500XL as the Layer 2 (L2) switch. You can substitute the Catalyst 2900XL or 2970 for the 3500XL, for the purposes of this document.

To use the concept of VLANs on the Catalyst 2948G−L3, you must use bridge groups. Each bridge group is considered a separate VLAN. These bridge groups correspond to the VLAN number of the connected switch.

Prerequisites

Requirements

Before you attempt this configuration, ensure that you connect a crossover cable between the 2900/3500XL or 2970 and the 2948G−L3. Typically, you use a straight−through cable between a router and a switch; but with the Catalyst 2948G−L3, you use a crossover cable to connect to another switch. This is the same crossover cable that you would use for a switch−to−switch connection.

Readers of this document should have knowledge of these topics:

  - The Catalyst 2940 and 2950/2955 series switches do not support ISL encapsulation. For information on ISL encapsulation support and other trunking requirements for Catalyst switches, refer to System Requirements to Implement Trunking.
  - The Catalyst 2948G−L3 has reached end of life (EoL). For details and recommended replacement products, refer to EoL / EoS for Cisco Catalyst 2948G−L3 and 4908G−L3 Switches.

Components Used

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

- Cisco IOS® Software Release 12.0(25)W5(27) for Layer 3 (L3) Switch/Router (CAT2948G–IN–M)
- Cisco IOS Software Release 12.0(5)WC9 (C3500XL–C3H2S–M) (fc1)

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.
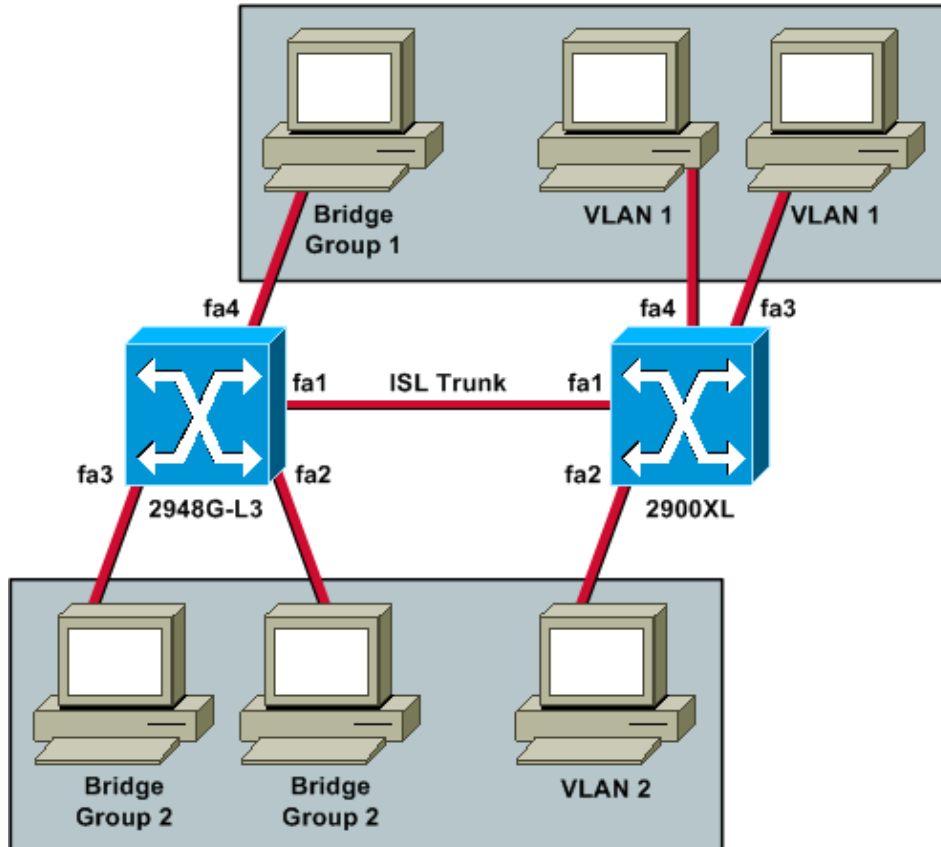
Configure

This section provides information to configure the features described in this document.

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:

If you want all three PCs to be able to ping each other and have a default gateway, then you must use bridging

with integrated routing and bridging (IRB).

The Catalyst 2948G–L3 is the L3 device in this scenario. Because it is an L3 device, it can not have two L3 interfaces in the same subnet. That is why you need to use bridge groups on the interfaces and tie them together with a bridge virtual interface (BVI), BVI 2.

The BVI 2 IP address is the default gateway for all of the PCs and devices in VLAN 2 or bridge group 2.

Configurations

This document uses these configurations:

- 2948G–L3
- 2900/3500XL or 2970

2948G–L3

```
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
!
!
ip subnet-zero
bridge irb
!
!
!
interface FastEthernet1

!--- This interface is the ISL trunk to the switch.

 no ip address
 no ip directed-broadcast
!
interface FastEthernet1.1
 encapsulation isl 1
 no ip redirects
 no ip directed-broadcast
 bridge-group 1

!--- Use bridge-group 1 for the trunk subinterface.
!--- You can not use an IP address here because of the subnet
!--- overlap that would occur due to BVI 1, which is in the
!--- same subnet.

!
interface FastEthernet1.2
 encapsulation isl 2
 no ip redirects
 no ip directed-broadcast
 bridge-group 2
!
interface FastEthernet2
 no ip address
```

```
 no ip directed-broadcast
 bridge-group 2
```

```
!
interface FastEthernet3
 no ip address
 no ip directed-broadcast
 bridge-group 2
```

```
!
interface FastEthernet4
 no ip address
 no ip directed-broadcast
 bridge-group 1
```

```
!
interface BVI1
 ip address 10.1.1.1 255.255.0.0
```

```
 no ip directed-broadcast
 no ip route-cache cef
!
interface BVI2
```

```
 ip address 10.2.2.2 255.255.0.0
 no ip directed-broadcast
 no ip route-cache cef
!
ip classless
!
bridge 1 protocol ieee
```

```
 bridge 1 route ip
```

```
bridge 2 protocol ieee
 bridge 2 route ip
!
line con 0
 transport input none
line aux 0
line vty 0 4
 login
!
end
```

2900/3500XL or 2970

```
3500XL# vlan database

3500XL(vlan)# vlan 2

VLAN 2 added:
    Name: VLAN0002

3500XL(vlan)# exit

APPLY completed.
Exiting....
3500XL#

!--- The Catalyst 2970 gives you the option to configure VLANs
!--- from the VLAN database or from global configuration mode:

2970# configure terminal

Enter configuration commands, one per line.  End with CNTL/Z.

2970(config)# vlan 2

2970(config-vlan)# end

2970#
```

```
!--- The switchport configurations on the Catalyst 2900/3500XL
!--- and on the 2970 are identical, for the purposes of this
!--- document. Remember that the Catalyst 2970 has 10/100/1000
!--- ports (1000Base-T), so the interfaces in this output
!--- would instead be labeled Gigabit Ethernet 0/1, 0/2,
!--- and so forth.

Current configuration:
!
version 12.0
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 3500XL
!
interface FastEthernet0/1
 switchport mode trunk

!--- This port is an ISL trunk.

!
interface FastEthernet0/2
 switchport access vlan 2

!--- This port is in VLAN 2.

!
interface FastEthernet0/3

!--- This port is in the default VLAN 1.

!
interface FastEthernet0/4
!
!
interface VLAN1
 ip address 10.1.1.100 255.255.0.0
```

```
!--- This is the IP address of the management interface.

 no ip directed-broadcast
 no ip route-cache
!
snmp-server engineID local 000000090200000AF484CC80
snmp-server community public RO
!
line con 0
 exec-timeout 0 0
 transport input none
 stopbits 1
line vty 0 4
 login
line vty 5 15
 login
!
end
```

Verify

This section provides information to confirm that your configuration is working properly.

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

- **show interface fa0/1 switchport** Verify the status of the trunk on the 2900/3500XL or 2970 and see which VLANs are active.

```
3500XL# show interface fa0/1 switchport

Name: Fa0/1
Switchport: Enabled
Administrative mode: trunk
Operational Mode: trunk
Administrative Trunking Encapsulation: isl
Operational Trunking Encapsulation: isl
Negotiation of Trunking: Disabled
Access Mode VLAN: 0 ((Inactive))
Trunking Native Mode VLAN: 1 (default)
Trunking VLANs Enabled: ALL
Trunking VLANs Active: 1,2
Pruning VLANs Enabled: 2-1001

Priority for untagged frames: 0
Override vlan tag priority: FALSE
Voice VLAN: none
Appliance trust: none
Self Loopback: No
3500XL#
```

- **show vlan** Verify that the ports on the 2900/3500XL or 2970 are assigned to the correct VLANs.

```
3500XL# show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- --------------------------------
1    default                          active    Fa0/3, Fa0/4, Fa0/5, Fa0/6,
                                                Fa0/7, Fa0/8, Fa0/9, Fa0/10,
                                                Fa0/11, Fa0/12, Fa0/13, Fa0/14,
                                                Fa0/15, Fa0/16, Fa0/17, Fa0/18,
                                                Fa0/19, Fa0/20, Fa0/21, Fa0/22,
```

```
                                              Fa0/23, Fa0/24, Gi0/1, Gi0/2
    2    VLAN0002                       active  Fa0/2
    1002 fddi-default                   active
    1003 token-ring-default             active
    1004 fddinet-default                active
    1005 trnet-default                  active

    VLAN Type  SAID      MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
    ---- ----- --------- ----- ------ ------ -------- ---- -------- ------ ------
    1    enet  100001    1500  -      -      -        -    -        0      0
    2    enet  100002    1500  -      -      -        -    -        0      0
    1002 fddi  101002    1500  -      -      -        -    -        0      0
    1003 tr    101003    1500  -      -      -        -    -        0      0
    1004 fdnet 101004    1500  -      -      -        ieee -        0      0
    1005 trnet 101005    1500  -      -      -        ibm  -        0      0
    3500XL#
```

- **show interface bvi 1** Verify that the 2948G–L3 BVI interfaces and the line protocol are both up on the 2948G–L3.

```
    2948G-L3# show interface bvi 1

    BVI1 is up, line protocol is up
      Hardware is BVI, address is 0001.c75c.680a (bia 0000.0000.0000)
      Internet address is 10.1.1.1/16
      MTU 1500 bytes, BW 10000 Kbit, DLY 5000 usec, rely 255/255, load 1/255
      Encapsulation ARPA, loopback not set
      ARP type: ARPA, ARP Timeout 04:00:00
      Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
      Queueing strategy: fifo
      Output queue 0/0 (size/max)
    2948G-L3#
```

- **show bridge 1** Verify that bridge 1 is forwarding. You can also verify that Spanning Tree Protocol is enabled and forwarding with a **show spanning–tree** command.

```
    2948G-L3# show bridge 1

    Total of 300 station blocks, 299 free
    Codes: P - permanent, S - self

    Bridge Group 1:

        Address       Action   Interface
    00ee.1e9f.50c0    forward   Fa1.1

    2948G-L3#
```

Troubleshoot

This section provides tips and sample output to help to troubleshoot your configuration.

- Verify that you can ping across to the other device.
- Verify that PCs can ping other PCs in other VLANs.
- Ensure that the default gateway is correct. In this scenario, the default gateway is the respective BVIs on the 2948G–L3.

```
    2948G-L3# ping 10.1.1.100

    Type escape sequence to abort.
    Sending 5, 100-byte ICMP Echos to 10.1.1.100, timeout is 2 seconds:
    !!!!!
    Success rate is 100 percent (5/5), round-trip min/avg/max = 4/6/12 ms
```

```
2948G-L3# show arp

Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  10.2.2.2            -        0030.40d6.4008  ARPA   BVI2
Internet  10.1.1.1            -        0030.40d6.400a  ARPA   BVI1
Internet  10.1.1.100          1        00ee.1e9f.50c0  ARPA   BVI1
2948G-L3#
```

Related Information

- **LAN Product Support Pages**
- **LAN Switching Support Page**
- **Technical Support & Documentation – Cisco Systems**