

在Catalyst 2层交换机和2948G-L3/4908G-L3交换机之间的EtherChannel和Trunking配置示例

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简介

本文描述Catalyst 2950和Catalyst 2948G-L3交换机之间的以太网信道设置和802.1q 中继。根据用于接口或端口形成以太网信道的速度，以太网信道被称为快速以太网信道(FEC)或吉比特以太网信道(GEC)。

注意： Catalyst 2950交换机支持仅802.1q中继和不支持Inter-Switch Link (ISL)协议(ISL)建立中继。Catalyst 2948G-L3和Catalyst 4908G-L3交换机共用同一个软件镜像，因此用于本文的Catalyst 2948G-L3配置也适用于Catalyst 4908G-L3交换机。

在此配置示例中，Catalyst 2950交换机上的2个快速以太网接口，被捆绑到配有Catalyst 2948G-L3交换机的2个快速以太网接口的FEC。FEC、GEC、端口通道和信道组是指在本文的EtherChannel。

开始使用前

规则

有关文档规则的详细信息，请参阅 [Cisco 技术提示规则](#)。

先决条件

本文描述交换机提供的示例配置和相关show命令输出。关于各别的交换机的详细资料和特定警告或者指南，参见以下文件：

- [配置EtherChannel的Catalyst 2950交换机](#)
- [Catalyst 2950交换机ConfiguringVLAN中继](#)
- [配置EtherChannel的Catalyst 2948G-L3交换机](#)
- [配置VLAN封装的Catalyst 2948G-L3交换机](#)

使用的组件

本文档中的信息基于以下软件和硬件版本。

- 运行Cisco IOS软件12.0(14)W5(20)的Catalyst 2948G-L3交换机
- 运行Cisco IOS软件12.1(12c)EA1的Catalyst 2950交换机

本文档中的信息都是基于特定实验室环境中的设备创建的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您是在真实网络上操作，请确保您在使用任何命令前已经了解其潜在影响。

背景理论

从配置的角度，Catalyst 2948G-L3交换机是路由器。它使用一Cisco IOS line命令，并且默认情况下，所有接口是路由接口。

默认情况下Catalyst 2948G-L3交换机不延伸您的VLAN。因为所有接口是路由接口，所以每个接口必须属于不同的网络或子网。如果您希望两个或多个接口属于相同子网，在这些接口上需要配置桥接。

Catalyst 2948G-L3交换机不支持其他Catalyst交换机上发现的协商协议，例如VLAN中继协议(VTP)、动态中继协议(DTP)和端口侵略协议(PAgP)。我们建议这些协议在连接到Catalyst 2948G-L3交换机的Catalyst 2950接口上是关闭的。

在Catalyst 2948G-L3交换机上，在中继上的本地VLAN收的所有数据流在软件中被路由。这意味着流量被发送到CPU。当很大量数据流在此VLAN上发送时，会引起Catalyst 2948G-L3交换机上的高CPU负荷，并对网络性能具有负面影响。建议创建假的VLAN (例如VLAN 99)，这种VLAN可以用作中继线的本地VLAN。所有用户数据流在其他VLAN中发送并在硬件中路由，从而实现更好的性能。

配置

本部分提供有关如何配置本文档所述功能的信息。

注意：要查找本文档所用命令的其他信息，请使用[命令查找工具](#)（[仅限注册用户](#)）。

创建端口信道

当配置以太网信道时，建议您通过遵从下面的步骤创建一条端口信道。这在配置过程中将避免与生成树协议的可能的问题。如果一端在另一边配置为信道之前配置为信道，会出现STP循环。结果，交换机可以将环路中涉及的接口放在 `Errordisabled` 状态。以下步骤是此特定配置情形的指南。

在Catalyst 2948G-L3交换机上：

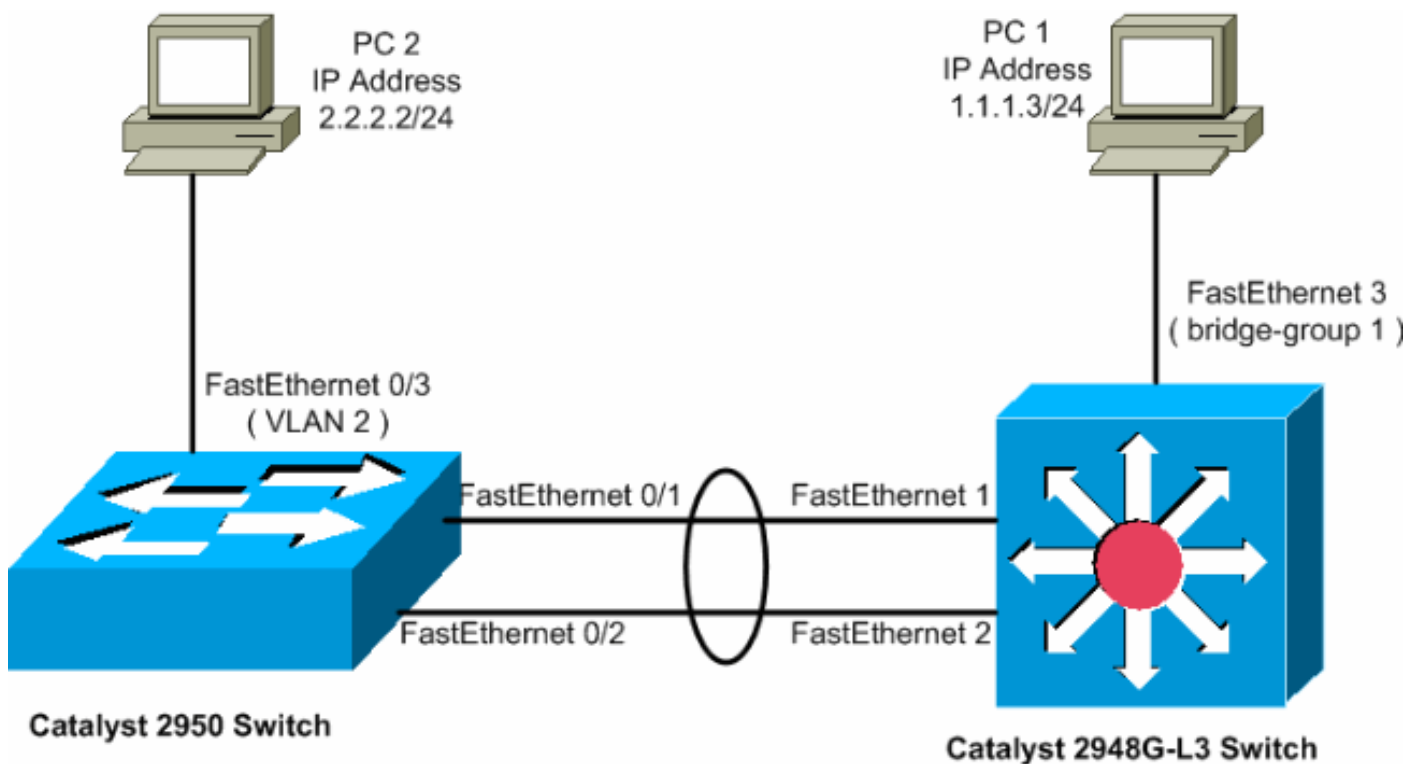
1. 配置将在端口信道中的接口在管理 shut down模式。
2. 创建端口通道(信道组)。端口信道运载不同的VLAN，因此为中继上存在的每个VLAN创建一个子接口。在802.1q中继线上，中继线上传输的所有信息包都被加上标签，但本地VLAN上数据流除外。因此，您需要通过在末端放置关键字"本地"来区分与本地VLAN相应的子接口。如前所述，最好使用没有用户数据流的虚拟VLAN。
3. 默认情况下Catalyst 2948G-L3交换机有所有路由端口。2948G-L3中的能够与2950上不同VLAN连接的端口，您必须执行桥接。属于同一VLAN(网络或子网)的接口(和子接口)必须配置为属于同一网桥组。要路由这些区别网桥组之间，必须启用集成路由和桥接(IRB)。

在Catalyst 2950交换机上：

1. 配置将属于中继线信道的接口，并确定DTP处于关闭状态。这是通过在物理接口上发出 **switchport nonegotiate** 命令来完成的。在VLAN数据库中配置假的VLAN (本例中的VLAN 99)，该VLAN在中继线中将用作本地VLAN。除非另外说明，在802.1Q中继的本地VLAN是VLAN1。您需要在两个接口上指定您将VLAN 99作为本地VLAN使用。这是通过在物理接口上发出 **switchport trunk native vlan 99** 命令来完成的。
2. 创建端口信道并且是确保设置信道模式至打开状态(这就关闭了PAgP)。
3. 通过发出no shut命令，重新启用以前在Catalyst 2948G-L3交换机上禁用的接口。

网络图

本文档使用下图所示的网络设置。



配置

本文档使用如下所示的配置。

- [Catalyst 2948G-L3](#)
- [Catalyst 2950](#)

Catalyst 2948G-L3

```
2948G-L3#show run !--- The following configuration shows
how to configure Catalyst 2948G-L3 !--- for bridging and
connect to a Catalyst 2950 with 802.1Q trunking !---
over EtherChannel. For configuring interVLAN-routing on
Catalyst !--- 2948G-L3, refer to Catalyst 2948G-L3
Sample Configurations. Building configuration... Current
configuration: !! version 12.0 no service pad service
timestamps debug uptime service timestamps log datetime
no service password-encryption ! hostname 2948G-L3 !!
ip subnet-zero ! !--- Enable IRB when routing between
different !--- bridge groups is needed. bridge irb ! !--
- Configure a logical interface for the EtherChannel.
interface Port-channel1 no ip address no ip directed-
broadcast hold-queue 300 in ! !--- Create a subinterface
for each VLAN on the port channel. ! interface Port-
channel1.1 !--- Specify the encapsulation and VLAN
number. encapsulation dot1Q 1 no ip redirects no ip
directed-broadcast !--- Add the subinterface to the
appropriate bridge group. !--- All the interfaces (and
subinterfaces) that belong to the !--- same VLAN
(network or subnet) should be configured to fall !--- in
the same bridge group. bridge-group 1 ! !--- Configure a
subinterface for the second VLAN. !--- This procedure
must be repeated for every VLAN. ! interface Port-
channel1.2 encapsulation dot1Q 2 no ip redirects no ip
directed-broadcast bridge-group 2 ! !--- Configure a
subinterface for the native VLAN. ! interface Port-
channel1.99 encapsulation dot1Q 99 native no ip
redirects no ip directed-broadcast !--- Note in this
case you do not put any bridge group !--- statements
under this subinterface. A dummy VLAN has been chosen !-
-- as the native VLAN on which you do not put any
traffic, !--- so there is no need to have this routed. !
interface FastEthernet1 no ip address no ip directed-
broadcast !--- Configure the port to channel 1. channel-
group 1 ! interface FastEthernet2 no ip address no ip
directed-broadcast !--- Configure the port to channel 1.
channel-group 1 ! interface FastEthernet3 no ip address
no ip directed-broadcast !--- The device connected on
this interface belongs !--- to the same subnet (VLAN 1)
as subinterface 1 on !--- the port channel, so this
interface has to be added to !--- bridge-group 1.
bridge-group 1 ! !--- If there are any other interfaces
that belong to !--- the same VLAN (subnet), they all
have to be added to !--- the respective bridge group. (
... Output is suppressed) !!! a routed interface for
bridge-group 1 interface BVI1 ip address 1.1.1.1
255.255.255.0 no ip directed-broadcast no ip route-cache
cef !! a routed interface for bridge-group 2 interface
BVI2 ip address 2.2.2.1 255.255.255.0 no ip directed-
broadcast no ip route-cache cef ! ip classless !!
bridge 1 protocol ieee command enables bridging using
the IEEE 802.1d spanning-tree bridge 1 protocol ieee !
The bridge 1 route ip command specifies that IP will be
routed bridge 1 route ip ! bridge 2 protocol ieee
command enables bridging using the IEEE 802.1d spanning-
tree bridge 2 protocol ieee ! bridge 2 route ip command
specifies that IP will be routed bridge 2 route ip !
line con 0 transport input none line aux 0 line vty 0 4
login ! end
```

Catalyst 2950

```

5-2950-24##show run Building configuration... Current
configuration : 1986 bytes ! version 12.1 no service
single-slot-reload-enable no service pad service
timestamps debug uptime service timestamps log uptime no
service password-encryption ! hostname 5-2950-24# !!
!--- VLAN 2 is created for this lab set up, !--- and
VLAN 1 is created by default. vlan 2 ip subnet-zero !---
For information on VTP, refer to !--- Understanding and
Configuring VLAN Trunk Protocol \(VTP\) vtp domain cisco
vtp mode transparent ! spanning-tree extend system-id !
!--- A logical port-channel interface is automatically
created !--- when ports are grouped into a channel
group. ! interface Port-channell !--- The switchport
trunk native vlan 99 command is !--- issued on the Fast
Ethernet interface. switchport trunk native vlan 99 !---
The switchport mode trunk command is !--- issued on the
Fast Ethernet interface. switchport mode trunk !-- The
switchport nonegotiate command is !--- issued on the
Fast Ethernet interface. switchport nonegotiate no ip
address flowcontrol send off ! interface FastEthernet0/1
!--- Configure the port to be in trunking mode.
switchport mode trunk !--- Configure a dummy VLAN as the
native VLAN. !--- For this example, VLAN 99 is used.
switchport trunk native vlan 99 !--- Disable the DTP
negotiation on this interface !--- (the Catalyst 2948G-
L3 switch does not support these frames). switchport
nonegotiate no ip address !--- Configure the port to
channel without PAgP. channel-group 1 mode on !
interface FastEthernet0/2 !--- Configure the port to be
in trunking mode. switchport mode trunk !--- Configure a
dummy VLAN as the native VLAN. !--- For this example,
VLAN 99 is used. switchport trunk native vlan 99 !---
Disable the DTP negotiation on this interface !--- (the
Catalyst 2948G-L3 switch does not support these frames).
switchport nonegotiate no ip address !--- Configure the
port to channel without PAgP. channel-group 1 mode on !
interface FastEthernet0/3 !--- The PC2 on this interface
belongs to VLAN 2. switchport access vlan 2 switchport
mode access no ip address !--- On the userports, enable
portfast to increase !--- the STP convergence time.
spanning-tree portfast ! ( ... Output is suppressed) !
interface Vlan1 ip address 1.1.1.2 255.255.255.0 no ip
route-cache ! ip http server !! line con 0 line vty 5
15 ! end

```

验证

此部分提供您能使用确认您的配置正常工作的信息。

[命令输出解释程序工具](#) ([仅限注册用户](#)) 支持某些 **show** 命令，使用此工具可以查看对 **show** 命令输出的分析。

用于 Catalyst 2950 的 show 命令

以下show命令验证了用于Catalyst 2950 交换机的配置。(如下面的输出所示)。

```

5-2950-24##show vlan VLAN Name Status Ports -----
-----
1 default active 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 Fa0/3 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 Remote SPAN VLANs -----
----- Primary Secondary Type Ports -----
- -----
5-2950-24##show interfaces port-
channel 1 trunk Port Mode Encapsulation Status Native vlan Po1 on 802.1q trunking 99 Port Vlans
allowed on trunk Po1 1-4094 Port Vlans allowed and active in management domain Po1 1-2 Port
Vlans in spanning tree forwarding state and not pruned Po1 1-2 5-2950-24##show interface port-
channel 1 Port-channel1 is up, line protocol is up Hardware is EtherChannel, address is
0005.7428.0e02 (bia 0005.7428.0e02) MTU 1500 bytes, BW 200000 Kbit, DLY 1000 usec, reliability
255/255, txload 1/255, rxload 1/255 Encapsulation ARPA, loopback not set Full-duplex, 100Mb/s
input flow-control is off, output flow-control is off Members in this channel: Fa0/1 Fa0/2 ARP
type: ARPA, ARP Timeout 04:00:00 Last input 00:00:01, output 00:00:00, output hang never Last
clearing of "show interface" counters never Input queue: 0/75/0/0 (size/max/drops/flushes);
Total output drops: 0 Queueing strategy: fifo Output queue :0/40 (size/max) 5 minute input rate
25000 bits/sec, 39 packets/sec 5 minute output rate 39000 bits/sec, 59 packets/sec 11609 packets
input, 955786 bytes, 0 no buffer Received 11590 broadcasts, 0 runts, 0 giants, 0 throttles 0
input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored 0 watchdog, 11583 multicast, 0 pause input 0
input packets with dribble condition detected 17396 packets output, 1442093 bytes, 0 underruns 0
output errors, 0 collisions, 1 interface resets 0 babbles, 0 late collision, 0 deferred 0 lost
carrier, 0 no carrier, 0 PAUSE output 0 output buffer failures, 0 output buffers swapped out 5-
2950-24##show interface port-channel 1 switchport Name: Po1 Switchport: Enabled Administrative
Mode: trunk Operational Mode: trunk Administrative Trunking Encapsulation: dot1q Operational
Trunking Encapsulation: dot1q Negotiation of Trunking: Off Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 99 (Inactive) Administrative private-vlan host-association: none
Administrative private-vlan mapping: none Operational private-vlan: none Trunking VLANs Enabled:
ALL Pruning VLANs Enabled: 2-1001 Protected: false Voice VLAN: none (Inactive) Appliance trust:
none 5-2950-24##show cdp neighbors 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 5-2948G-L3 Fas 0/1 144 R T Cat2948G Port-channel 5-2948G-L3 Fas 0/2
178 R T Cat2948G Fas 2 5-2948G-L3 Fas 0/1 178 R T Cat2948G Fas 1 PC2#ping 1.1.1.3 Type escape
sequence to abort. Sending 5, 100-byte ICMP Echos to 1.1.1.3, timeout is 2 seconds: !!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/4/4 ms

```

[用于 Catalyst 2948G-L3 的 show 命令](#)

以下show命令验证了用于Catalyst 2948-L3 交换机的配置。（如下面的输出所示）。

```

5-2948G-L3##show interfaces port-channel 1 Port-channel1 is up, line protocol is up Hardware is
FEChannel, address is 0001.43ff.1407 (bia 0000.0000.0000) MTU 1500 bytes, BW 200000 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: 2 Member 0 : FastEthernet1 Member 1 : FastEthernet2 Last input
00:00:00, output 00:00:00, 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 2000 bits/sec, 4 packets/sec 5 minute output rate 1000 bits/sec, 1 packets/sec 27033
packets input, 2083710 bytes, 0 no buffer Received 6194 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 12808 packets output, 1945983 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 5-2948G-L3##show
vlan Virtual LAN ID: 1 (IEEE 802.1Q Encapsulation) vLAN Trunk Interfaces: GigabitEthernet49
GigabitEthernet50.1 Port-channel1.1 This is configured as native Vlan for the following
interface(s) : GigabitEthernet49 GigabitEthernet50 Protocols Configured: Address: Received:
Transmitted: IP 10.10.10.1 0 0 Bridging Bridge Group 1 3418 5 Virtual LAN ID: 2 (IEEE 802.1Q
Encapsulation) vLAN Trunk Interfaces: GigabitEthernet50.2 Port-channel1.2 Protocols Configured:
Address: Received: Transmitted: IP 20.20.20.1 0 0 Bridging Bridge Group 2 3952 9 Virtual LAN ID:
21 (IEEE 802.1Q Encapsulation) vLAN Trunk Interface: GigabitEthernet49.1 Protocols Configured:
Address: Received: Transmitted: Virtual LAN ID: 99 (IEEE 802.1Q Encapsulation) vLAN Trunk
Interface: Port-channel1.99 This is configured as native Vlan for the following interface(s) :

```



```
Port-channell Protocols Configured: Address: Received: Transmitted: 5-2948G-L3#show spanning-  
tree Bridge group 1 is executing the IEEE compatible Spanning Tree protocol Bridge Identifier  
has priority 32768, address 0001.43ff.1409 Configured hello time 2, max age 20, forward delay 15  
We are the root of the spanning tree Topology change flag not set, detected flag not set Times:  
hold 1, topology change 35, notification 2 hello 2, max age 20, forward delay 15 Timers: hello  
0, topology change 0, notification 0 bridge aging time 300 Port 6 (FastEthernet3) of Bridge  
group 1 is forwarding Port path cost 19, Port priority 128 Designated root has priority 32768,  
address 0001.43ff.1409 Designated bridge has priority 32768, address 0001.43ff.1409 Designated  
port is 6, path cost 0 Timers: message age 0, forward delay 0, hold 0 BPDU: sent 4107, received  
2 Port 58 (Port-channell.1 DOT1Q) of Bridge group 1 is forwarding Port path cost 12, Port  
priority 128 Designated root has priority 32768, address 0001.43ff.1409 Designated bridge has  
priority 32768, address 0001.43ff.1409 Designated port is 58, path cost 0 Timers: message age 0,  
forward delay 0, hold 0 BPDU: sent 5240, received 502 Bridge group 2 is executing the IEEE  
compatible Spanning Tree protocol Bridge Identifier has priority 32768, address 0000.0c00.d08c  
Configured hello time 2, max age 20, forward delay 15 Current root has priority 0, address  
0010.0db1.804f Root port is 59 (Port-channell.2), cost of root path is 50 Topology change flag  
not set, detected flag not set Times: hold 1, topology change 35, notification 2 hello 2, max  
age 20, forward delay 15 Timers: hello 0, topology change 0, notification 0 bridge aging time  
300 Port 59 (Port-channell.2 DOT1Q) of Bridge group 2 is forwarding Port path cost 12, Port  
priority 128 Designated root has priority 0, address 0010.0db1.804f Designated bridge has  
priority 32770, address 0005.7428.0e00 Designated port is 65, path cost 38 Timers: message age  
3, forward delay 0, hold 0 BPDU: sent 1790, received 3964 PC1#ping 2.2.2.2 Type escape sequence  
to abort. Sending 5, 100-byte ICMP Echos to 2.2.2.2, timeout is 2 seconds: !!!!! Success rate is  
100 percent (5/5), round-trip min/avg/max = 4/4/4 ms
```

故障排除

目前没有针对此配置的故障排除信息。

相关信息

- [了解和配置 VLAN 中继协议 \(VTP\)](#)
- [Catalyst 2948G-L3 示例配置](#)
- [交换机产品支持](#)
- [LAN 交换技术支持](#)
- [技术支持和文档 - Cisco Systems](#)