

# EtherChannel Between 在运行 Cisco IOS系统软件的Catalyst 3550/3560/3750 系列交换机和 Catalyst 交换机之间的EtherChannel 配置示例

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## 简介

本文档为如何在运行 Cisco IOS® 系统软件的 Catalyst 3550 和 Catalyst 6500/6000 之间设置 EtherChannel 提供了示例。可以根据用于形成 EtherChannel 的接口或端口的速度，将 EtherChannel 称为 Fast EtherChannel 或千兆 EtherChannel。

**注意：**本文档中应用于 Catalyst 3550 交换机的 EtherChannel 命令也可以应用于 Catalyst 3750 系列交换机。

## 先决条件

### 要求

本文档没有任何特定的要求。

## 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软件版本12.1(14)ea的Catalyst 3550交换机
- Catalyst 6500/6000交换机运行Cisco IOS软件版本12.1(13)E1

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您使用的是真实网络，请确保您已经了解所有命令的潜在影响。

## 规则

有关文档规则的详细信息，请参阅 [Cisco 技术提示规则](#)。

## 背景理论

在本文档中，Catalyst 3550 交换机上的两个千兆以太网接口--3550 上的千兆以太网接口是 10/100/1000 协商以太网接口--已与运行 Cisco IOS 系统软件的 Catalyst 6500/6000 交换机上的两个快速以太网接口一起被捆绑到 Fast EtherChannel 中，以形成第 2 层 (L2) EtherChannel。

**注意：**在本文档中，Fast EtherChannel、千兆 EtherChannel、端口信道和信道组都指 EtherChannel。

本文档中的 Catalyst 交换机配置适用于运行 Cisco IOS 系统软件的所有 Catalyst 6500/6000 或 Catalyst 4500/4000 系列交换机。

本文档只显示交换机的配置文件，以及相关示例 **show** 命令的输出。有关如何配置 EtherChannel 的详细信息，请参阅以下文档：

- [配置 EtherChannel](#) (Catalyst 3550 交换机) 的 *配置第 2 层 EtherChannel* 部分
- [配置 EtherChannel](#) (Catalyst 3560 交换机) 的 *配置第 3 层 EtherChannel* 部分
- [配置 EtherChannel](#) (Catalyst 3750 交换机) 的 *配置第 2 层 EtherChannel* 部分
- [配置第 3 层和第 2 层 EtherChannel](#) (运行 Cisco IOS 系统软件的 Catalyst 6500/6000)
- [了解和配置 EtherChannel](#) (运行 Cisco IOS 系统软件的 Catalyst 4500/4000) 的 *配置第 2 层 EtherChannel* 部分

## 重要说明

可以使用适当的命令手动配置 EtherChannel。还可以使用端口聚合协议 (PAgP) 自动配置 EtherChannel，以使交换机可与另一端协商信道。有关 PAgP 的详细信息，请参阅以下文档：

- [配置 EtherChannel](#) (Catalyst 3550 交换机) 的 *了解端口聚合协议 (PAgP)* 部分
- [配置 EtherChannel](#) (Catalyst 3560 交换机) 的 *了解端口聚合协议 (PAgP)* 部分
- [配置 EtherChannel](#) (Catalyst 3750 交换机) 的 *端口聚合协议 (PAgP)* 部分
- [配置 EtherChannel](#) (运行 Cisco IOS 系统软件的 Catalyst 6500/6000) 的 *了解端口聚合协议 (PAgP)* 部分
- [了解和配置 EtherChannel](#) (运行 Cisco IOS 系统软件的 Catalyst 4500/4000) 的 *了解端口聚合协议 (PAgP)* 部分

本文档中的配置是使用 desirable 模式实施的。如果计划手动配置 EtherChannel，请使用所提供的步骤来创建端口信道。这可避免在配置过程中出现生成树协议 (STP) 问题。如果一端在另一端可以

配置为信道之前已配置为信道，则 STP 可能关闭一些端口状态为错误禁用 [errdisable] 的端口。

请执行以下步骤以创建端口信道：

1. 保留要用于端口信道的接口状态为管理性关闭。
2. 在 Catalyst 6500/6000 交换机上创建端口信道（信道组）。确保将信道模式设置为 on，例如，channel-group 1 mode on。
3. 在 Catalyst 3550、3560 或 3750 交换机上创建端口信道。确保将信道模式设置为 on。
4. 使用 **no shut** 命令重新启用 Catalyst 6500/6000 交换机上之前被禁用的接口。

## 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](#)）。

## 网络图

本文档使用此图中所示的网络设置：

**注意：**Catalyst 3550 上的千兆以太网接口是 10/100/1000 Mbps 协商以太网接口。Catalyst 3550 上的千兆端口还可以连接到 Catalyst 6500/6000 上的快速以太网 (100 Mbps) 端口。

**注意：**Catalyst 3750 系列交换机支持跨堆叠 EtherChannel，该 EtherChannel 允许不同堆叠交换机的接口成为同一个 EtherChannel 组的成员。有关堆叠交换机环境中 EtherChannel 的详细信息，请参阅 Catalyst 3750 系列交换机的文档[配置 EtherChannel](#) 的 *EtherChannel* 和 *交换机堆叠* 部分。

## 配置

本文档使用以下配置：

- [Catalyst 3550](#)
- [Catalyst 6500/6000](#)

### Catalyst 3550

```
Building configuration...
Current configuration : 1610 bytes
!
version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Cat3550
!
enable password ww
!
ip subnet-zero
no ip finger
```

```
!  
!  
!  
!--- A logical port-channel interface is automatically  
created !--- when ports are grouped into a channel  
group. interface Port-channel 1 !--- In this example,  
the L2 EtherChannel is configured. !--- A Layer 3 (L3)  
EtherChannel can also be configured on the Catalyst 3550  
switches. !--- For more information, refer to the  
document Configuring EtherChannel. switchport mode  
access no ip address snmp trap link-status! !--- Note:  
The Gigabit Ethernet interface on the Catalyst 3550 is a  
!--- 10/100/1000 Mbps negotiated Ethernet interface. The  
Gigabit port on the Catalyst 3550 is !--- connected to a  
FastEthernet (100 Mbps) port on the Catalyst 6500/6000.  
!--- The port is a member of channel group 1.  
  
interface GigabitEthernet0/1  
  switchport mode access  
  no ip address  
  snmp trap link-status  
  channel-group 1 mode desirable  
!  
!--- The port is a member of channel group 1. interface  
GigabitEthernet0/2 switchport mode access  
  no ip address  
  snmp trap link-status  
  channel-group 1 mode desirable  
!  
interface GigabitEthernet0/3  
  switchport mode access  
  no ip address  
  snmp trap link-status  
!  
!--- Output suppressed. interface GigabitEthernet0/12  
switchport mode access no ip address snmp trap link-  
status !--- Interface VLAN1 is required for management  
purposes. interface Vlan1 ip address 10.1.1.1  
255.255.255.0 ! ip classless ip http server ! ! line con  
0 transport input none line vty 5 15 ! end
```

## Catalyst 6500/6000

Building configuration...

Current configuration : 5869 bytes

```
!  
version 12.1  
service timestamps debug uptime  
service timestamps log uptime  
no service password-encryption  
!  
hostname cat6500  
!  
boot buffersize 126968  
boot bootldr bootflash:c6msfc-boot-mz.121-4.E1  
enable password ww  
!  
redundancy  
  main-cpu  
  auto-sync standard
```

```

ip subnet-zero
!
!
no ip finger
!
!
!
!

!--- A logical port-channel interface is automatically
created !--- when ports are grouped into a channel
group. interface Port-channel 1 no ip address switchport
switchport mode access ! interface GigabitEthernet1/1 no
ip address shutdown ! interface GigabitEthernet1/2 no ip
address shutdown ! !--- Note: The Gigabit Ethernet
interface on the Catalyst 3550 is a !--- 10/100/1000
Mbps negotiated Ethernet interface. The Gigabit port on
the Catalyst 3550 is !--- connected to a FastEthernet
(100 Mbps) port on the Catalyst 6500/6000.

interface FastEthernet3/1
  no ip address

!--- In this example, the L2 EtherChannel is configured.
!--- An L3 EtherChannel can also be configured on the
Catalyst 6500/6000 running !--- Cisco IOS System
Software. For more details, refer to the document !---
Configuring EtherChannel. !--- On a Catalyst 6500/6000,
you must issue the switchport !--- command once, without
any keywords, in order to configure the interface as an
L2 port. !--- By default, all the ports are router ports
(L3 ports). !--- On a Catalyst 4500/4000 switch, all
ports are L2 ports by default; !--- no additional
command is required.

switchport
!--- This command puts the interface in VLAN1, by
default. switchport mode access
!--- The port is a member of channel group 1. channel-
group 1 mode desirable
!
interface FastEthernet3/2
  no ip address
!--- On a Catalyst 6500/6000, you must issue the
switchport !--- command once, without any keywords, in
order to configure the interface as an L2 port. !--- By
default, all the ports are router ports (L3 ports). !---
On a Catalyst 4500/4000 switch, all ports are L2 ports
by default; !--- no additional command is required.

switchport
!--- This command puts the interface in VLAN1, by
default. switchport mode access
!--- The port is a member of channel group 1. channel-
group 1 mode desirable
!
interface FastEthernet3/3
  no ip address
switchport
  switchport mode access
!

!--- Output suppressed. ! interface FastEthernet3/48 no
ip address switchport switchport mode access ! !---

```

```
Interface VLAN1 is required for management purposes.
interface Vlan1 ip address 10.1.1.2 255.255.255.0 ! ip
classless no ip http server ! ! ! line con 0 transport
input none line vty 0 4 ! end
```

注意：本[配置示例](#)显示一个使用接入链路的 EtherChannel 配置。同一配置也适用于 EtherChannel 中继链路。[发出 switchport mode trunk 命令，或者允许交换机使用 dynamic desirable 模式来协商模式。](#)有关如何配置中继的详细信息，请参阅文档[配置 VLAN 的配置 VLAN 中继部分](#)。

## Port-Channel子接口配置

Port-Channel的配置的另一示例与子接口的在Catalyst 3560交换机运行Cisco IOS软件版本12.2(25)。

### Catalyst 3560

Building configuration...

```
Current configuration : 5869 bytes
!
version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname cat6500
!
boot buffersize 126968
boot bootldr bootflash:c6msfc-boot-mz.121-4.E1
enable password ww
!
redundancy
  main-cpu
    auto-sync standard
ip subnet-zero
!
!
no ip finger
!
!
!
!

!--- A logical port-channel interface is automatically
created !--- when ports are grouped into a channel
group. interface Port-channel 1 no ip address switchport
switchport mode access ! interface GigabitEthernet1/1 no
ip address shutdown ! interface GigabitEthernet1/2 no ip
address shutdown ! !--- Note: The Gigabit Ethernet
interface on the Catalyst 3550 is a !--- 10/100/1000
Mbps negotiated Ethernet interface. The Gigabit port on
the Catalyst 3550 is !--- connected to a FastEthernet
(100 Mbps) port on the Catalyst 6500/6000.

interface FastEthernet3/1
  no ip address
```

```
!--- In this example, the L2 EtherChannel is configured.
!--- An L3 EtherChannel can also be configured on the
Catalyst 6500/6000 running !--- Cisco IOS System
```

```
Software. For more details, refer to the document !---  
Configuring EtherChannel. !--- On a Catalyst 6500/6000,  
you must issue the switchport !--- command once, without  
any keywords, in order to configure the interface as an  
L2 port. !--- By default, all the ports are router ports  
(L3 ports). !--- On a Catalyst 4500/4000 switch, all  
ports are L2 ports by default; !--- no additional  
command is required.
```

```
switchport  
!--- This command puts the interface in VLAN1, by  
default. switchport mode access  
!--- The port is a member of channel group 1. channel-  
group 1 mode desirable  
!  
interface FastEthernet3/2  
no ip address  
!--- On a Catalyst 6500/6000, you must issue the  
switchport !--- command once, without any keywords, in  
order to configure the interface as an L2 port. !--- By  
default, all the ports are router ports (L3 ports). !---  
On a Catalyst 4500/4000 switch, all ports are L2 ports  
by default; !--- no additional command is required.
```

```
switchport  
!--- This command puts the interface in VLAN1, by  
default. switchport mode access  
!--- The port is a member of channel group 1. channel-  
group 1 mode desirable  
!  
interface FastEthernet3/3  
no ip address  
switchport  
switchport mode access  
!  
!--- Output suppressed. ! interface FastEthernet3/48 no  
ip address switchport switchport mode access ! !---  
Interface VLAN1 is required for management purposes.  
interface Vlan1 ip address 10.1.1.2 255.255.255.0 ! ip  
classless no ip http server ! ! ! line con 0 transport  
input none line vty 0 4 ! end
```

## 验证

[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。

要验证运行 Cisco IOS 系统软件的 Catalyst 6500/6000 和 Catalyst 3500 交换机中的端口信道，请发出以下命令：

- [show interfaces port-channel channel-group-number](#)
- [show etherchannel channel-group-number summary](#)

要检查运行 Cisco IOS 系统软件的 Catalyst 6500/6000 和 Catalyst 3500 交换机中的 STP 状态，请发出以下命令：

- [show spanning-tree vlan vlan-number detail](#)

## Catalyst 3550

```
Cat3550#show interface port-channel 1
```

```
Port-channell is up, line protocol is up  
Hardware is EtherChannel, address is 0002.4b28.db02 (bia 0002.4b28.db02)  
MTU 1500 bytes, BW 200000 Kbit, DLY 1000 usec,  
reliability 255/255, txload 1/255, rxload 1/255  
Encapsulation ARPA, loopback not set  
Keepalive set (10 sec)
```

```
Full-duplex, 100Mb/s
```

```
input flow-control is off, output flow-control is off
```

```
Members in this channel: Gi0/1 Gi0/2
```

```
ARP type: ARPA, ARP Timeout 04:00:00  
Last input 00:03:27, 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 0/75, 0 drops  
5 minute input rate 0 bits/sec, 0 packets/sec  
5 minute output rate 0 bits/sec, 0 packets/sec  
26 packets input, 5344 bytes, 0 no buffer  
Received 17 broadcasts, 0 runts, 0 giants, 0 throttles  
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored  
0 input packets with dribble condition detected  
59 packets output, 5050 bytes, 0 underruns  
0 output errors, 0 collisions, 2 interface resets  
0 babbles, 0 late collision, 0 deferred  
0 lost carrier, 0 no carrier  
0 output buffer failures, 0 output buffers swapped out
```

```
Cat3550#show spanning-tree vlan 1 detail
```

```
VLAN1 is executing the ieee compatible Spanning Tree protocol  
Bridge Identifier has priority 32768, address 0002.4b28.db01  
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  
Number of topology changes 1 last change occurred 00:00:38 ago  
    from Port-channell  
Times: hold 1, topology change 35, notification 2  
    hello 2, max age 20, forward delay 15  
Timers: hello 0, topology change 0, notification 0, aging 0
```

```
Port 65 (Port-channell) of VLAN1 is forwarding
```

```
Port path cost 12, Port priority 128, Port Identifier 128.65.  
Designated root has priority 32768, address 0002.4b28.db01  
Designated bridge has priority 32768, address 0002.4b28.db01  
Designated port id is 128.65, designated path cost 0  
Timers: message age 0, forward delay 0, hold 0  
Number of transitions to forwarding state: 1  
BPDU: sent 34, received 0
```

```
Cat3550# show etherchannel 1 summary
```

```
Flags:  D - down           P - in port-channel  
        I - stand-alone  s - suspended  
        R - Layer3       S - Layer2  
        U - port-channel in use
```

```
Group Port-channel  Ports
```

```
-----+-----+-----  
1      Po1(SU)      Gi0/1(P)  Gi0/2(P)
```

```
Cat3550# ping 10.1.1.2
```





Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms

## 故障排除

### Err-Disable 状态

在 EtherChannel 配置过程中，一个常见问题是接口进入了 err-disable 模式。当一台交换机上的 Etherchannel 切换到 On 模式，而另一台交换机没有立即配置时，可以看到这种情况。如果保持此状态一分钟左右，已启用 EtherChannel 的交换机上的 STP 会认为存在环路。这将导致信道端口被置于 err-disable 状态。有关如何确定 EtherChannel 接口是否处于 err-disable 状态的详细信息，请参阅以下示例：

```
Cat6500# show interface port-channel 1
Port-channell is up, line protocol is up
  Hardware is EtherChannel, address is 0002.7ef1.36e1 (bia 0002.7ef1.36e1)
  MTU 1500 bytes, BW 200000 Kbit, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Full-duplex, 100Mb/s
  Members in this channel: Fa3/1 Fa3/2
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/2000, 0 drops
  5 minute input rate 1000 bits/sec, 1 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    407 packets input, 34994 bytes, 0 no buffer
    Received 311 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
    93 packets output, 16598 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
```

```
Cat6500# show spanning-tree vlan 1 detail

VLAN1 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address 00d0.024f.6001
Configured hello time 2, max age 20, forward delay 15
Current root has priority 32768, address 0002.4b28.db01
Root port is 833 (Port-channell), cost of root path is 12
Topology change flag not set, detected flag not set
Number of topology changes 0 last change occurred 00:02:13 ago
Times: hold 1, topology change 35, notification 2
      hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 300

Port 833 (Port-channell) of VLAN1 is forwarding
  Port path cost 12, Port priority 128, Port Identifier 131.65.
  Designated root has priority 32768, address 0002.4b28.db01
  Designated bridge has priority 32768, address 0002.4b28.db01
  Designated port id is 128.65, designated path cost 0
  Timers: message age 1, forward delay 0, hold 0
```

```
Number of transitions to forwarding state: 1
BPDU: sent 0, received 66
```

Cat6500# **show etherchannel 1 summary**

```
Flags:  D - down           P - in port-channel
        I - stand-alone  S - suspended
        R - Layer3       S - Layer2
```

```
Group Port-channel  Ports
```

```
-----+-----+-----+-----+-----+-----+-----+-----
1      Po1(SU)      Fa3/1(P)  Fa3/2(P)
```

Cat6500# **ping 10.1.1.1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms

Switch1#**show etherchannel summary**

```
Flags:  D - down           P - in port-channel
        I - stand-alone  S - suspended
        H - Hot-standby (LACP only)
        R - Layer3       S - Layer2
        u - unsuitable for bundling
        U - in use       f - failed to allocate aggregator
        d - default port
```

Number of channel-groups in use: 1

Number of aggregators: 1

```
Group Port-channel  Protocol  Ports
```

```
-----+-----+-----+-----+-----+-----+-----+-----
10     Po10(SD)      -         Gi0/9(D)  Gi0/10(D)
```

Switch1#**show interfaces GigabitEthernet 0/9 status**

```
Port      Name              Status      Vlan    Duplex  Speed Type
Gi0/9                       err-disabled 1          auto    auto 10/100/1000BaseTX
```

Switch1#**show interfaces GigabitEthernet 0/10 status**

```
Port      Name              Status      Vlan    Duplex  Speed Type
Gi0/10                       err-disabled 1          auto    auto 10/100/1000BaseTX
```

该错误消息表明 EtherChannel 遇到了生成树环路。为了解决问题，设置信道模式对在连接的两边，然后重新启用接口：

Switch1#**configure terminal**

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

Switch1(config)#**interface gi0/9**

Switch1(config-if)#**channel-group 10 mode desirable**

这将导致只有在两端都同意建立信道时，每端才会形成信道。如果两端不都同意建立信道，则它们将继续用作普通端口。

将连接两端的信道模式都设置为 desirable 之后，对关联接口发出 **shutdown** 和 **no shutdown** 命令以手动重新启用端口：

Switch1(config-if)#**shutdown**

Switch1(config-if)#**no shutdown**

## [speed nonegotiate 命令未出现于运行配置中](#)

[在端口信道上配置的 speed nonegotiate 命令并不是总是出现在运行配置中。](#)之所以发生这种情况，是因为端口信道接口上的 nonegotiate 取决于捆绑的端口的 nonegotiate 配置。当端口信道处于活动状态时，会根据各个信道端口配置将它插入。

## [相关信息](#)

- [在 Catalyst 交换机上实施 EtherChannel 的系统要求](#)
- [配置示例：运行 CatOS 和 Cisco IOS 系统软件的 Catalyst 交换机之间的 EtherChannel](#)
- [交换机产品支持](#)
- [LAN 交换技术支持](#)
- [技术支持和文档 - Cisco Systems](#)