EtherChannel Between Catalyst 3550/3750 Series Switches and Catalyst Switches Running Cisco IOS System Software Configuration Example

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Introduction

This document provides a sample configuration for how to set up an EtherChannel between a Catalyst 3550 and a Catalyst 6500/6000 running Cisco IOS® System Software. EtherChannel can be called Fast EtherChannel or Gigabit EtherChannel, depending upon the speed of interfaces or ports used to form the EtherChannel.

Note: The EtherChannel commands applied to the Catalyst 3550 switch in this document can also be applied to Catalyst 3750 series switches.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

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

- Catalyst 3550 switch running Cisco IOS Software Release 12.1(14)EA
- Catalyst 6500/6000 switch running Cisco IOS Software Release 12.1(13)E1

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

Refer to Cisco Technical Tips Conventions for more information on document conventions.

Background Theory

In this document, two Gigabit Ethernet interfaces on a Catalyst 3550 switch −− the GigabitEthernet interface on the 3500 is a 10/100/1000 negotiated Ethernet interface −− have been bundled into a Fast EtherChannel with two Fast Ethernet interfaces from a Catalyst 6500/6000 switch running Cisco IOS System Software to form a Layer 2 (L2) EtherChannel.

Note: In this document, Fast EtherChannel, Gigabit EtherChannel, port channel, and channel group all refer to EtherChannel.

The Catalyst switch configuration in this document applies to any Catalyst 6500/6000 or Catalyst 4500/4000 series switch running Cisco IOS System Software.

This document shows configuration files for the switches only, as well as output from the related sample **show** commands. For details on how to configure an EtherChannel, refer to these documents:

- *Configuring Layer 2 EtherChannels* section of Configuring EtherChannel (Catalyst 3550 switch)
- *Configuring Layer 3 EtherChannels* section of Configuring EtherChannel (Catalyst 3560 switch)
- *Configuring Layer 2 EtherChannels* section of Configuring EtherChannel (Catalyst 3750 switch)
- Configuring Layer 3 and Layer 2 EtherChannel (Catalyst 6500/6000 running Cisco IOS System Software)
- *Configuring Layer 2 EtherChannel* section of Understanding and Configuring EtherChannel (Catalyst 4500/4000 running Cisco IOS System Software)

Important Notes

EtherChannel can be configured manually with the appropriate commands. You can also configure the EtherChannel automatically with Port Aggregation Protocol (PAgP) in order to have the switch negotiate the channel with the other side. For details on PAgP, refer to these documents:

- *Understanding the Port Aggregation Protocol* section of Configuring EtherChannel (Catalyst 3550 switch)
- *Understanding the Port Aggregation Protocol* section of Configuring EtherChannel (Catalyst 3560 switch)
- *Port Aggregation Protocol* section of Configuring EtherChannels (Catalyst 3750 switch)
- *Understanding the Port Aggregation Protocol* section of Configuring EtherChannel (Catalyst 6500/6000 running Cisco IOS System Software)
- *Understanding the Port Aggregation Protocol* section of Understanding and Configuring EtherChannel (Catalyst 4500/4000 running Cisco IOS System Software)

The configurations in this document are implemented with use of the desirable mode. If you plan to configure the EtherChannel manually, use the steps provided in order to create a port channel. This avoids problems with Spanning Tree Protocol (STP) during the configuration process. STP can shut down some ports, with a port status of error−disabled [errdisable], if one side is configured as a channel before the other side can be configured as a channel.

Perform these steps in order to create a port channel:

1. Leave the interfaces to be used in port channeling as administratively shutdown.
2. Create the port channel (channel group) on the Catalyst 6500/6000 switch.

   Ensure that you set the channel mode to `on`, for example, `channel-group 1 mode on`.
3. Create port channels on the Catalyst 3550, 3560 or 3750 switch.

   Ensure that you set the channel mode to `on`.
4. Reenable the interfaces that were disabled earlier on the Catalyst 6500/6000 switch with the **no shut** command.

Configure

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

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 the network setup shown in this diagram:



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 can also be connected to a FastEthernet (100 Mbps) port on a Catalyst 6500/6000.

Note: The Catalyst 3750 series switches support cross−stack EtherChannel, which allows interfaces from different stack switches to be members of the same EtherChannel group. For more information on EtherChannel in a stacked switch environment, refer to the *EtherChannel and Switch Stacks* section of the Configuring EtherChannels documentation for Catalyst 3750 series switches.

Configurations

This document uses these configurations:

- 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
```

Note: This configuration example shows an EtherChannel configuration with access links. The same configuration applies to EtherChannel trunk links. Issue the **switchport mode trunk** command, or allow the switches to negotiate the mode with the **dynamic desirable** mode. For more information on how to configure trunking, refer to the *Configuring VLAN Trunks* section of the document Configuring VLANs.

Port−Channel Sub Interface Configuration

Another example of the configuration of Port−Channel with sub interface in Catalyst 3560 switch running Cisco IOS Software Release 12.2(25).

Catalyst 3560

```
Building configuration...

Current configuration : 2480 bytes
!
version 12.2
!
interface Port-channel5
no switchport
no ip address
!
interface Port-channel5.690
!
interface Port-channel10
no switchport
no ip address
!
interface Port-channel10.1
!
interface Port-channel10.690
!
interface Port-channel11
no switchport
no ip address
```

Verify

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

In order to verify the port channel in Catalyst 6500/6000 and Catalyst 3500 switches running Cisco IOS System Software, issue these commands:

- **show interfaces port−channel** *channel−group−number*
- **show etherchannel** *channel−group−number* **summary**

In order to check the STP status in Catalyst 6500/6000 and Catalyst 3500 switches running Cisco IOS System Software, issue this command:

- **show spanning−tree vlan** *vlan−number* **detail**

Catalyst 3550

```
Cat3550#show interface port−channel 1
Port−channel1 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−channel1
  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−channel1) 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 10.1.1.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
```

Catalyst 6500/6000

```
Cat6500# show interface port-channel 1
Port-channel1 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-channel1), 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-channel1) 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
```

Troubleshoot

Err−Disable State

A common issue during EtherChannel configuration is that the interfaces go into `err−disable` mode. This can be seen when Etherchannel is switched to the ON mode in one switch, and the other switch is not configured immediately. If left in this state for a minute or so, STP on the switch where EtherChannel is enabled thinks there is a loop. This causes the channeling ports to be put in `err−disable` state. See this example for more information on how to determine if your EtherChannel interfaces are in the `err−disable` state:

```
%SPANTREE-2-CHNL_MISCFG: Detected loop due to etherchannel misconfiguration of Gi0/9
%PM-4-ERR_DISABLE: channel-misconfig error detected on Po10, putting Gi0/9 in err-disable
%PM-4-ERR_DISABLE: channel-misconfig error detected on Po10, putting Gi0/10 in err-disable

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
```

The error message states that the EtherChannel encountered a spanning tree loop. In order to resolve the issue, set the channel mode to `desirable` on both sides of the connection, and then re−enable the interfaces:

```
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
```

This causes each side to form a channel only if they both agree to channel. If they do not agree to channel, they continue to function as normal ports.

After the channel mode is set to `desirable` on both the sides of the connection, issue the **shutdown** and **no shutdown** commands on the associated interface to re−enable the ports by manually:

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

"speed nonegotiate" Command Does not Appear in the Running Configuration

The **speed nonegotiate** command configured on a port channel does not always appear in the running configuration. This happens because nonegotiate on port channel interface depends on that of bundled ports. It is inserted when the port channel is active and based on the individual channel ports configuration.

Related Information

- **System Requirements to Implement EtherChannel on Catalyst Switches**
- **Sample Configuration: EtherChannel Between Catalyst Switches Running CatOS and Cisco IOS System Software**
- **Switches Product Support**
- **LAN Switching Technology Support**
- **Technical Support & Documentation − Cisco Systems**

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