Lab – Configuring EtherChannel (Instructor Version)

**Instructor Note**: Red font color or Gray highlights indicate text that appears in the instructor copy only.

1. Topology



1. Addressing Table

|  |  |  |  |
| --- | --- | --- | --- |
| Device | Interface | IP Address | Subnet Mask |
| S1 | VLAN 99 | 192.168.99.11 | 255.255.255.0 |
| S2 | VLAN 99 | 192.168.99.12 | 255.255.255.0 |
| S3 | VLAN 99 | 192.168.99.13 | 255.255.255.0 |
| PC-A | NIC | 192.168.10.1 | 255.255.255.0 |
| PC-B | NIC | 192.168.10.2 | 255.255.255.0 |
| PC-C | NIC | 192.168.10.3 | 255.255.255.0 |

1. Objectives

Part 1: Configure Basic Switch Settings

Part 2: Configure PAgP

Part 3: Configure LACP

1. Background / Scenario

Link aggregation allows the creation of logical links that are comprised of two or more physical links. This provides increased throughput beyond using only one physical link. Link aggregation also provides redundancy if one of the links fails.

In this lab, you will configure EtherChannel, a form of link aggregation used in switched networks. You will configure EtherChannel using Port Aggregation Protocol (PAgP) and Link Aggregation Control Protocol (LACP).

**Note**: PAgP is a Cisco-proprietary protocol that you can only run on Cisco switches and on switches that are licensed vendors to support PAgP. LACP is a link aggregation protocol that is defined by IEEE 802.3ad, and it is not associated with any specific vendor.

LACP allows Cisco switches to manage Ethernet channels between switches that conform to the 802.3ad protocol. You can configure up to 16 ports to form a channel. Eight of the ports are in active mode and the other eight are in standby mode. When any of the active ports fail, a standby port becomes active. Standby mode works only for LACP, not for PAgP.

**Note**: The switches used with CCNA hands-on labs are Cisco Catalyst 2960s with Cisco IOS Release 15.0(2) (lanbasek9 image). Other switches and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and output produced might vary from what is shown in the labs.

**Note**: Make sure that the switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

**Instructor Note**: Refer to the Instructor Lab Manual for the procedures to initialize and reload devices.

1. Required Resources
* 3 Switches (Cisco 2960 with Cisco IOS Release 15.0(2) lanbasek9 image or comparable)
* 3 PCs (Windows 7, Vista, or XP with terminal emulation program, such as Tera Term)
* Console cables to configure the Cisco IOS devices via the console ports
* Ethernet cables as shown in the topology
1. Configure Basic Switch Settings

In Part 1, you will set up the network topology and configure basic settings, such as the interface IP addresses, device access, and passwords.

* 1. Cable the network as shown in the topology.

Attach the devices as shown in the topology diagram, and cable as necessary.

* 1. Initialize and reload the switches.
	2. Configure basic settings for each switch.
		1. Disable DNS lookup.
		2. Configure the device name as displayed in the topology.
		3. Encrypt plain text passwords.
		4. Create a MOTD banner warning users that unauthorized access is prohibited.
		5. Assign **class** as the encrypted privileged EXEC mode password.
		6. Assign **cisco** as the console and vty password and enable login.
		7. Configure logging synchronous to prevent console message from interrupting command entry.
		8. Shut down all switchports except the ports connected to PCs.
		9. Configure VLAN 99 and name it **Management**.
		10. Configure VLAN 10 and name it **Staff**.
		11. Configure the switch ports with attached hosts as access ports in VLAN 10.
		12. Assign the IP addresses according to the Addressing Table.
		13. Copy the running configuration to startup configuration.
	3. Configure the PCs.

Assign IP addresses to the PCs according to the Addressing Table.

1. Configure PAgP

PAgP is a Cisco proprietary protocol for link aggregation. In Part 2, a link between S1 and S3 will be configured using PAgP.

* 1. Configure PAgP on S1 and S3.

For a link between S1 and S3, configure the ports on S1 with PAgP desirable mode and the ports on S3 with PAgP auto mode. Enable the ports after PAgP modes have been configured.

S1(config)# **interface range f0/3-4**

S1(config-if-range)# **channel-group 1 mode desirable**

Creating a port-channel interface Port-channel 1

S1(config-if-range)# **no shutdown**

S3(config)# **interface range f0/3-4**

S3(config-if-range)# **channel-group 1 mode auto**

Creating a port-channel interface Port-channel 1

S3(config-if-range)# **no shutdown**

\*Mar 1 00:09:12.792: %LINK-3-UPDOWN: Interface FastEthernet0/3, changed state to up

\*Mar 1 00:09:12.792: %LINK-3-UPDOWN: Interface FastEthernet0/4, changed state to up

S3(config-if-range)#

\*Mar 1 00:09:15.384: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up

\*Mar 1 00:09:16.265: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up

S3(config-if-range)#

\*Mar 1 00:09:16.357: %LINK-3-UPDOWN: Interface Port-channel1, changed state to up

\*Mar 1 00:09:17.364: %LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel1, changed state to up

\*Mar 1 00:09:44.383: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

* 1. Examine the configuration on the ports.

Currently the F0/3, F0/4, and Po1 (Port-channel1) interfaces on both S1 and S3 are in access operational mode with the administrative mode in dynamic auto. Verify the configuration using the **show run interface** *interface-id* and **show interfaces** *interface-id***switchport** commands, respectively. The example configuration outputs for F0/3 on S1 are as follows:

S1# **show run interface f0/3**

Building configuration...

Current configuration : 103 bytes

!

interface FastEthernet0/3

 channel-group 1 mode desirable

S1# **show interfaces f0/3 switchport**

Name: Fa0/3

Switchport: Enabled

Administrative Mode: dynamic auto

Operational Mode: static access (member of bundle Po1)

Administrative Trunking Encapsulation: dot1q

Operational Trunking Encapsulation: native

Negotiation of Trunking: On

Access Mode VLAN: 1 (default)

Trunking Native Mode VLAN: 1 (default)

Administrative Native VLAN tagging: enabled

Voice VLAN: none

Administrative private-vlan host-association: none

Administrative private-vlan mapping: none

Administrative private-vlan trunk native VLAN: none

Administrative private-vlan trunk Native VLAN tagging: enabled

Administrative private-vlan trunk encapsulation: dot1q

Administrative private-vlan trunk normal VLANs: none

Administrative private-vlan trunk associations: none

Administrative private-vlan trunk mappings: none

Operational private-vlan: none

Trunking VLANs Enabled: ALL

Pruning VLANs Enabled: 2-1001

Capture Mode Disabled

Capture VLANs Allowed: ALL

Protected: false

Unknown unicast blocked: disabled

Unknown multicast blocked: disabled

Appliance trust: none

* 1. Verify that the ports have been aggregated.

S1# **show etherchannel summary**

Flags: D - down P - bundled in port-channel

 I - stand-alone s - suspended

 H - Hot-standby (LACP only)

 R - Layer3 S - Layer2

 U - in use f - failed to allocate aggregator

 M - not in use, minimum links not met

 u - unsuitable for bundling

 w - waiting to be aggregated

 d - default port

Number of channel-groups in use: 1

Number of aggregators: 1

Group Port-channel Protocol Ports

------+-------------+-----------+-----------------------------------------------

1 Po1(SU) PAgP Fa0/3(P) Fa0/4(P)

S3# **show etherchannel summary**

Flags: D - down P - bundled in port-channel

 I - stand-alone s - suspended

 H - Hot-standby (LACP only)

 R - Layer3 S - Layer2

 U - in use f - failed to allocate aggregator

 M - not in use, minimum links not met

 u - unsuitable for bundling

 w - waiting to be aggregated

 d - default port

Number of channel-groups in use: 1

Number of aggregators: 1

Group Port-channel Protocol Ports

------+-------------+-----------+-----------------------------------------------

1 Po1(SU) PAgP Fa0/3(P) Fa0/4(P)

What do the flags, SU and P, indicate in the Ethernet summary?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The flag P indicates that the ports are bundled in a port-channel. The flag S indicates that the port-channel is a Layer 2 EtherChannel. The U flag indicates that the EtherChannel is in use.

* 1. Configure trunk ports.

After the ports have been aggregated, commands applied at the port channel interface affect all the links that were bundled together. Manually configure the Po1 ports on S1 and S3 as trunk ports and assign them to native VLAN 99.

S1(config)# **interface port-channel 1**

S1(config-if)# **switchport mode trunk**

S1(config-if)# **switchport trunk native vlan 99**

S3(config)# **interface port-channel 1**

S3(config-if)# **switchport mode trunk**

S3(config-if)# **switchport trunk native vlan 99**

* 1. Verify that the ports are configured as trunk ports.
		1. Issue the **show run** **interface** *interface-id* commands on S1 and S3. What commands are listed for F0/3 and F0/4 on both switches? Compare the results to the running configuration for the Po1 interface? Record your observation.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

switchport trunk native vlan 99

switchport mode trunk

The commands related to trunk configuration are the same. When the trunk commands were applied to the EtherChannel, the commands also affected the individual links in the bundle.

S1# **show run interface po1**

Building configuration...

Current configuration : 92 bytes

!

interface Port-channel1

 switchport trunk native vlan 99

 switchport mode trunk

end

S1# **show run interface f0/3**

Building configuration...

Current configuration : 126 bytes

!

interface FastEthernet0/3

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 1 mode desirable

end

* + 1. Issue the **show interfaces trunk** and **show spanning-tree** commands on S1 and S3. What trunk port is listed? What is the native VLAN? What is concluding result from the output?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The trunk port listed is Po1. The native VLAN is 99. After the links are bundled, only the aggregated interface is listed in some **show** commands.

From the **show spanning-tree** output, what is port cost and port priority for the aggregated link?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The port cost for Po1 is 12, and the port priority is 128.

S1# **show interfaces 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 1,10,99

Port Vlans in spanning tree forwarding state and not pruned

Po1 1,10,99

S3# **show interfaces 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 1,10,99

Port Vlans in spanning tree forwarding state and not pruned

Po1 1,10,99

S1# **show spanning-tree**

VLAN0001

 Spanning tree enabled protocol ieee

 Root ID Priority 32769

 Address 0cd9.96e8.7400

 Cost 12

 Port 64 (Port-channel1)

 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

 Bridge ID Priority 32769 (priority 32768 sys-id-ext 1)

 Address 0cd9.96e8.8a00

 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

 Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type

------------------- ---- --- --------- -------- --------------------------------

Po1 Root FWD 12 128.64 P2p

VLAN0010

 Spanning tree enabled protocol ieee

 Root ID Priority 32778

 Address 0cd9.96e8.7400

 Cost 12

 Port 64 (Port-channel1)

 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

 Bridge ID Priority 32778 (priority 32768 sys-id-ext 10)

 Address 0cd9.96e8.8a00

 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

 Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type

------------------- ---- --- --------- -------- --------------------------------

Fa0/6 Desg FWD 19 128.6 P2p

Po1 Root FWD 12 128.64 P2p

VLAN0099

 Spanning tree enabled protocol ieee

 Root ID Priority 32867

 Address 0cd9.96e8.7400

 Cost 12

 Port 64 (Port-channel1)

 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

 Bridge ID Priority 32867 (priority 32768 sys-id-ext 99)

 Address 0cd9.96e8.8a00

 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

 Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type

------------------- ---- --- --------- -------- --------------------------------

Po1 Root FWD 12 128.64 P2p

S3# **show spanning-tree**

VLAN0001

 Spanning tree enabled protocol ieee

 Root ID Priority 32769

 Address 0cd9.96e8.7400

 This bridge is the root

 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

 Bridge ID Priority 32769 (priority 32768 sys-id-ext 1)

 Address 0cd9.96e8.7400

 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

 Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type

------------------- ---- --- --------- -------- --------------------------------

Po1 Desg FWD 12 128.64 P2p

VLAN0010

 Spanning tree enabled protocol ieee

 Root ID Priority 32778

 Address 0cd9.96e8.7400

 This bridge is the root

 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

 Bridge ID Priority 32778 (priority 32768 sys-id-ext 10)

 Address 0cd9.96e8.7400

 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

 Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type

------------------- ---- --- --------- -------- --------------------------------

Fa0/18 Desg FWD 19 128.18 P2p

Po1 Desg FWD 12 128.64 P2p

VLAN0099

 Spanning tree enabled protocol ieee

 Root ID Priority 32867

 Address 0cd9.96e8.7400

 This bridge is the root

 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

 Bridge ID Priority 32867 (priority 32768 sys-id-ext 99)

 Address 0cd9.96e8.7400

 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

 Aging Time 300 sec

Interface Role Sts Cost Prio.Nbr Type

------------------- ---- --- --------- -------- --------------------------------

Po1 Desg FWD 12 128.64 P2p

1. Configure LACP

LACP is an open source protocol for link aggregation developed by the IEEE. In Part 3, the link between S1 and S2, and the link between S2 and S3 will be configured using LACP. Also, the individual links will be configured as trunks before they are bundled together as EtherChannels.

* 1. Configure LACP between S1 and S2.

S1(config)# **interface range f0/1-2**

S1(config-if-range)# **switchport mode trunk**

S1(config-if-range)# **switchport trunk native vlan 99**

S1(config-if-range)# **channel-group 2 mode active**

Creating a port-channel interface Port-channel 2

S1(config-if-range)# **no shutdown**

S2(config)# **interface range f0/1-2**

S2(config-if-range)# **switchport mode trunk**

S2(config-if-range)# **switchport trunk native vlan 99**

S2(config-if-range)# **channel-group 2 mode passive**

Creating a port-channel interface Port-channel 2

S2(config-if-range)# **no shutdown**

* 1. Verify that the ports have been aggregated.

What protocol is Po2 using for link aggregation? Which ports are aggregated to form Po2? Record the command used to verify.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Po2 is using LACP and F0/1 and F0/2 are aggregated to form Po2.

S1# **show etherchannel summary**

Flags: D - down P - bundled in port-channel

 I - stand-alone s - suspended

 H - Hot-standby (LACP only)

 R - Layer3 S - Layer2

 U - in use f - failed to allocate aggregator

 M - not in use, minimum links not met

 u - unsuitable for bundling

 w - waiting to be aggregated

 d - default port

Number of channel-groups in use: 2

Number of aggregators: 2

Group Port-channel Protocol Ports

------+-------------+-----------+-----------------------------------------------

1 Po1(SU) PAgP Fa0/3(P) Fa0/4(P)

2 Po2(SU) LACP Fa0/1(P) Fa0/2(P)

S2# **show etherchannel summary**

Flags: D - down P - bundled in port-channel

 I - stand-alone s - suspended

 H - Hot-standby (LACP only)

 R - Layer3 S - Layer2

 U - in use f - failed to allocate aggregator

 M - not in use, minimum links not met

 u - unsuitable for bundling

 w - waiting to be aggregated

 d - default port

Number of channel-groups in use: 1

Number of aggregators: 1

Group Port-channel Protocol Ports

------+-------------+-----------+-----------------------------------------------

2 Po2(SU) LACP Fa0/1(P) Fa0/2(P)

* 1. Configure LACP between S2 and S3.
		1. Configure the link between S2 and S3 as Po3 and use LACP as the link aggregation protocol.

S2(config)# **interface range f0/3-4**

S2(config-if-range)# **switchport mode trunk**

S2(config-if-range)# **switchport trunk native vlan 99**

S2(config-if-range)# **channel-group 3 mode active**

Creating a port-channel interface Port-channel 3

S2(config-if-range)# **no shutdown**

S3(config)# **interface range f0/1-2**

S3(config-if-range)# **switchport mode trunk**

S3(config-if-range)# **switchport trunk native vlan 99**

S3(config-if-range)# **channel-group 3 mode passive**

Creating a port-channel interface Port-channel 3

S3(config-if-range)# **no shutdown**

* + 1. Verify that the EtherChannel has formed.

S2# **show etherchannel summary**

Flags: D - down P - bundled in port-channel

 I - stand-alone s - suspended

 H - Hot-standby (LACP only)

 R - Layer3 S - Layer2

 U - in use f - failed to allocate aggregator

 M - not in use, minimum links not met

 u - unsuitable for bundling

 w - waiting to be aggregated

 d - default port

Number of channel-groups in use: 2

Number of aggregators: 2

Group Port-channel Protocol Ports

------+-------------+-----------+-----------------------------------------------

2 Po2(SU) LACP Fa0/1(P) Fa0/2(P)

3 Po3(SU) LACP Fa0/3(P) Fa0/4(P)

S3# **show etherchannel summary**

Flags: D - down P - bundled in port-channel

 I - stand-alone s - suspended

 H - Hot-standby (LACP only)

 R - Layer3 S - Layer2

 U - in use f - failed to allocate aggregator

 M - not in use, minimum links not met

 u - unsuitable for bundling

 w - waiting to be aggregated

 d - default port

Number of channel-groups in use: 2

Number of aggregators: 2

Group Port-channel Protocol Ports

------+-------------+-----------+-----------------------------------------------

1 Po1(SU) PAgP Fa0/3(P) Fa0/4(P)

3 Po3(SU) LACP Fa0/1(P) Fa0/2(P)

* 1. Verify end-to-end connectivity.

Verify that all devices can ping each other within the same VLAN. If not, troubleshoot until there is end-to-end connectivity.

**Note**: It may be necessary to disable the PC firewall to ping between PCs.

1. Reflection

What could prevent EtherChannels from forming?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Configuration mismatch, such as trunk port on one end and access port at the other end, different aggregation protocols and different port speed/duplex, would prevent the formation of EtherChannel.

1. Device Configs
2. Switch S1

S1# show vlan brief

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active Fa0/5, 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

10 Staff active Fa0/6

99 Management active

1002 fddi-default act/unsup

1003 token-ring-default act/unsup

1004 fddinet-default act/unsup

1005 trnet-default act/unsup

S1# show run

Building configuration...

Current configuration : 2339 bytes

!

version 15.0

no service pad

service timestamps debug datetime msec

service timestamps log datetime msec

service password-encryption

!

hostname S1

!

boot-start-marker

boot-end-marker

!

enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2

!

no aaa new-model

system mtu routing 1500

!

!

no ip domain-lookup

!

!

!

!

!

!

!

!

spanning-tree mode pvst

spanning-tree extend system-id

!

vlan internal allocation policy ascending

!

!

!

!

!

!

interface Port-channel1

 switchport trunk native vlan 99

 switchport mode trunk

!

interface Port-channel2

 switchport trunk native vlan 99

 switchport mode trunk

!

interface FastEthernet0/1

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 2 mode active

!

interface FastEthernet0/2

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 2 mode active

!

interface FastEthernet0/3

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 1 mode desirable

!

interface FastEthernet0/4

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 1 mode desirable

!

interface FastEthernet0/5

 shutdown

!

interface FastEthernet0/6

 switchport access vlan 10

 switchport mode access

!

interface FastEthernet0/7

 shutdown

!

interface FastEthernet0/8

 shutdown

!

interface FastEthernet0/9

 shutdown

!

interface FastEthernet0/10

 shutdown

!

interface FastEthernet0/11

 shutdown

!

interface FastEthernet0/12

 shutdown

!

interface FastEthernet0/13

 shutdown

!

interface FastEthernet0/14

 shutdown

!

interface FastEthernet0/15

 shutdown

!

interface FastEthernet0/16

 shutdown

!

interface FastEthernet0/17

 shutdown

!

interface FastEthernet0/18

 shutdown

!

interface FastEthernet0/19

 shutdown

!

interface FastEthernet0/20

 shutdown

!

interface FastEthernet0/21

 shutdown

!

interface FastEthernet0/22

 shutdown

!

interface FastEthernet0/23

 shutdown

!

interface FastEthernet0/24

 shutdown

!

interface GigabitEthernet0/1

 shutdown

!

interface GigabitEthernet0/2

 shutdown

!

interface Vlan1

 no ip address

!

interface Vlan99

 ip address 192.168.99.11 255.255.255.0

!

ip http server

ip http secure-server

!

!

banner motd ^C

 Unauthorized Access Prohibited.^C

!

line con 0

 password 7 0822455D0A16

 logging synchronous

 login

line vty 0 4

 password 7 0822455D0A16

 login

line vty 5 15

 password 7 1511021F0725

 login

!

end

1. Switch S2

S2# show vlan brief

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active 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, Fa0/19, Fa0/20, Fa0/21

 Fa0/22, Fa0/23, Fa0/24, Gi0/1

 Gi0/2

10 Staff active Fa0/18

99 Management active

1002 fddi-default act/unsup

1003 token-ring-default act/unsup

1004 fddinet-default act/unsup

1005 trnet-default act/unsup

S2# show run

Building configuration...

Current configuration : 2333 bytes

!

version 15.0

no service pad

service timestamps debug datetime msec

service timestamps log datetime msec

service password-encryption

!

hostname S2

!

boot-start-marker

boot-end-marker

!

enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2

!

no aaa new-model

system mtu routing 1500

!

!

no ip domain-lookup

!

!

!

!

!

!

!

!

spanning-tree mode pvst

spanning-tree extend system-id

!

vlan internal allocation policy ascending

!

!

!

!

!

!

interface Port-channel2

 switchport trunk native vlan 99

 switchport mode trunk

!

interface Port-channel3

 switchport trunk native vlan 99

 switchport mode trunk

!

interface FastEthernet0/1

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 2 mode passive

!

interface FastEthernet0/2

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 2 mode passive

!

interface FastEthernet0/3

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 3 mode active

!

interface FastEthernet0/4

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 3 mode active

!

interface FastEthernet0/5

 shutdown

!

interface FastEthernet0/6

 shutdown

!

interface FastEthernet0/7

 shutdown

!

interface FastEthernet0/8

 shutdown

!

interface FastEthernet0/9

 shutdown

!

interface FastEthernet0/10

 shutdown

!

interface FastEthernet0/11

 shutdown

!

interface FastEthernet0/12

 shutdown

!

interface FastEthernet0/13

 shutdown

!

interface FastEthernet0/14

 shutdown

!

interface FastEthernet0/15

 shutdown

!

interface FastEthernet0/16

 shutdown

!

interface FastEthernet0/17

 shutdown

!

interface FastEthernet0/18

 switchport access vlan 10

 switchport mode access

!

interface FastEthernet0/19

 shutdown

!

interface FastEthernet0/20

 shutdown

!

interface FastEthernet0/21

 shutdown

!

interface FastEthernet0/22

 shutdown

!

interface FastEthernet0/23

 shutdown

!

interface FastEthernet0/24

 shutdown

!

interface GigabitEthernet0/1

 shutdown

!

interface GigabitEthernet0/2

 shutdown

!

interface Vlan1

 no ip address

!

interface Vlan99

 ip address 192.168.99.12 255.255.255.0

!

ip http server

ip http secure-server

!

banner motd ^C

 Unauthorized Access Prohibited.^C

!

line con 0

 password 7 060506324F41

 logging synchronous

 login

line vty 0 4

 password 7 060506324F41

 login

line vty 5 15

 password 7 121A0C041104

 login

!

end

1. Switch S3

S3# show vlan brief

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active 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, Fa0/19, Fa0/20, Fa0/21

 Fa0/22, Fa0/23, Fa0/24, Gi0/1

 Gi0/2

10 Staff active Fa0/18

99 Management active

1002 fddi-default act/unsup

1003 token-ring-default act/unsup

1004 fddinet-default act/unsup

1005 trnet-default act/unsup

S3# show run

Building configuration...

Current configuration : 2331 bytes

!

version 15.0

no service pad

service timestamps debug datetime msec

service timestamps log datetime msec

service password-encryption

!

hostname S3

!

boot-start-marker

boot-end-marker

!

enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2

!

no aaa new-model

system mtu routing 1500

!

!

no ip domain-lookup

!

!

!

!

!

!

!

!

spanning-tree mode pvst

spanning-tree extend system-id

!

vlan internal allocation policy ascending

!

!

!

!

!

!

interface Port-channel1

 switchport trunk native vlan 99

 switchport mode trunk

!

interface Port-channel3

 switchport trunk native vlan 99

 switchport mode trunk

!

interface FastEthernet0/1

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 3 mode passive

!

interface FastEthernet0/2

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 3 mode passive

!

interface FastEthernet0/3

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 1 mode auto

!

interface FastEthernet0/4

 switchport trunk native vlan 99

 switchport mode trunk

 channel-group 1 mode auto

!

interface FastEthernet0/5

 shutdown

!

interface FastEthernet0/6

 shutdown

!

interface FastEthernet0/7

 shutdown

!

interface FastEthernet0/8

 shutdown

!

interface FastEthernet0/9

 shutdown

!

interface FastEthernet0/10

 shutdown

!

interface FastEthernet0/11

 shutdown

!

interface FastEthernet0/12

 shutdown

!

interface FastEthernet0/13

 shutdown

!

interface FastEthernet0/14

 shutdown

!

interface FastEthernet0/15

 shutdown

!

interface FastEthernet0/16

 shutdown

!

interface FastEthernet0/17

 shutdown

!

interface FastEthernet0/18

 switchport access vlan 10

 switchport mode access

!

interface FastEthernet0/19

 shutdown

!

interface FastEthernet0/20

 shutdown

!

interface FastEthernet0/21

 shutdown

!

interface FastEthernet0/22

 shutdown

!

interface FastEthernet0/23

 shutdown

!

interface FastEthernet0/24

 shutdown

!

interface GigabitEthernet0/1

 shutdown

!

interface GigabitEthernet0/2

 shutdown

!

interface Vlan1

 no ip address

!

interface Vlan99

 ip address 192.168.99.13 255.255.255.0

!

ip http server

ip http secure-server

!

!

banner motd ^C

 Unauthorized Access Prohibited.^C

!

line con 0

 password 7 045802150C2E

 logging synchronous

 login

line vty 0 4

 password 7 110A1016141D

 login

line vty 5 15

 password 7 070C285F4D06

 login

!

end