



Eastern University Sri Lanka

**Advanced Networking,
Virtualization and Cloud
Computing
CS 4163**

Practical ICA – (Assessment) 01

| | |
|---------------------|--------------------|
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1.0 Network Topology

Create a hierarchical network composed of three layers:

1. Core Layer – Minimum of 2 core routers or switches.
2. Aggregation/Distribution Layer – Minimum of 3 devices.
3. Access Layer – Minimum of 4 access switches.

Requirements:

- Ensure logical separation between layers to support future enhancements (e.g., SDN policy enforcement).
- Use Cisco Packet Tracer to create a network topology diagram including all layers.
- Provide a clear and labeled diagram explaining your topology design.

IP Addressing and VLAN Segmentation

- Develop an IP addressing scheme for your network.
- Configure basic IP addressing on routers and switches.
- Create at least two VLANs (e.g., one for Management/Engineering, another for Guest/Other Users).
- Assign VLANs on access layer switches.
- Configure inter-VLAN routing using a router or Layer 3 switch.
- Use sub-interfaces if required to enable routing between VLANs.
- Provide screenshots of the configuration output.

Submit (git push) your .pkt file along with a document explaining the IP addressing scheme and VLAN configurations.

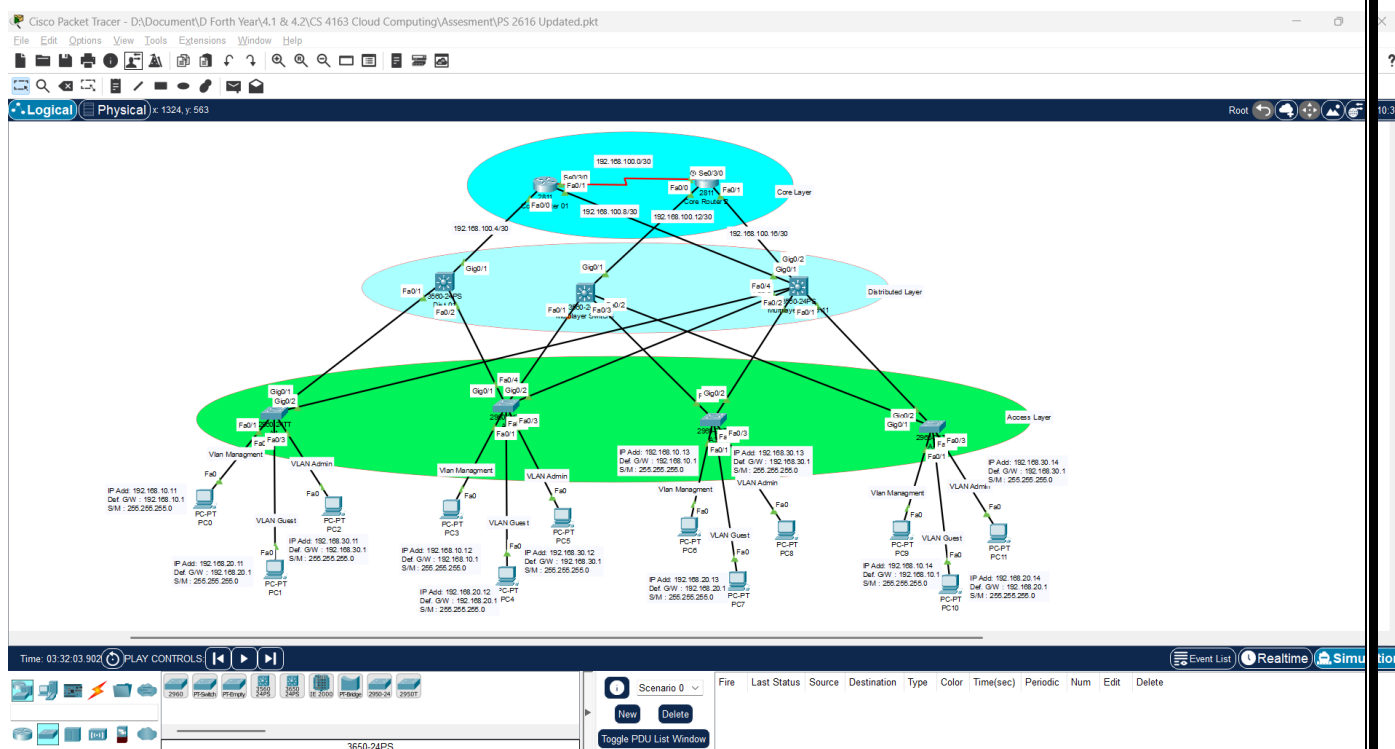


Figure 1 Network Topology Diagram



1.1 VLAN Configuration Table

| VLAN | Name | Device | Interface | Subnet | IP Address |
|------|-----------|--------------------------------------|-----------|---------------|----------------|
| 10 | Managment | PC0 | Fa0 | 255.255.255.0 | 192.168.10.11 |
| 10 | Managment | PC3 | Fa0 | 255.255.255.1 | 192.168.10.12 |
| 10 | Managment | PC6 | Fa0 | 255.255.255.2 | 192.168.10.13 |
| 10 | Managment | PC9 | Fa0 | 255.255.255.3 | 192.168.10.14 |
| 20 | Guest | PC1 | Fa0 | 255.255.255.3 | 192.168.20.11 |
| 20 | Guest | PC4 | Fa0 | 255.255.255.4 | 192.168.20.12 |
| 20 | Guest | PC7 | Fa0 | 255.255.255.5 | 192.168.20.13 |
| 20 | Guest | PC10 | Fa0 | 255.255.255.6 | 192.168.20.14 |
| 30 | Admin | PC2 | Fa0 | 255.255.255.6 | 192.168.30.11 |
| 30 | Admin | PC5 | Fa0 | 255.255.255.7 | 192.168.30.12 |
| 30 | Admin | PC8 | Fa0 | 255.255.255.8 | 192.168.30.13 |
| 30 | Admin | PC11 | Fa0 | 255.255.255.9 | 192.168.30.14 |
| | | Distributed Layer Switch 01 (Dist 1) | Gig0/1 | 255.255.252.0 | 192.168.100.6 |
| | | Distributed Layer Switch 02 (Dist 2) | Gig0/1 | 255.255.252.0 | 192.168.100.14 |
| | | | Gig0/1 | 255.255.252.0 | 192.168.100.10 |
| | | Distributed Layer Switch 03 (Dist 3) | Gig0/2 | 255.255.252.0 | 192.168.100.18 |
| | | Core Layer Router01 (core1) | Fa0/0 | 255.255.252.0 | 192.168.100.5 |
| | | | Fa0/1 | 255.255.252.0 | 192.168.100.9 |
| | | | Se0/3/0 | 255.255.252.0 | 192.168.100.1 |
| | | Core Layer Router02 (core2) | Fa0/0 | 255.255.252.0 | 192.168.100.13 |
| | | | Fa0/1 | 255.255.252.0 | 192.168.100.17 |

Figure 2VLAN Configuration Table

1.1.1 For A1 (Access layer Switch 01)

```
enable
configure terminal
```

----VLANs----

```
vlan 10
name Management
exit
```

```
vlan 20
name Guest
exit
```

```
vlan 30
name Admin
exit
```

```
vlan 999
name Native
exit
```



----Assign VLANs to access ports---

```
interface fa0/1
switchport mode access
switchport access vlan 10
exit
```

```
interface fa0/2
switchport mode access
switchport access vlan 20
exit
```

```
interface fa0/3
switchport mode access
switchport access vlan 30
exit
```

----Assign VLANs to Trunk ports---

```
interface range gig0/1 - 2
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up

Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#
Switch(config)#vlan 10
Switch(config-vlan)#name Management
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#vlan 20
Switch(config-vlan)#name Guest
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#vlan 30
Switch(config-vlan)#name Admin
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#vlan 999
Switch(config-vlan)#name Native
Switch(config-vlan)#
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#
Switch(config)#interface fa0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface fa0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface fa0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
```

Figure 3 Access layer Switch 01 Access port Configuration



```
A1
Physical Config CLI Attributes
IOS Command Line Interface

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (999), with
Switch GigabitEthernet1/0/3 (1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (999), with
Switch GigabitEthernet1/0/3 (1).
%SPANTREE-2-RECV_FVID_ERR: Received BPDU with inconsistent peer vlan id 1 on GigabitEthernet0/1
VLAN999.

%SPANTREE-2-BLOCK_FVID_LOCAL: Blocking GigabitEthernet0/1 on VLAN999. Inconsistent local vlan.

%SPANTREE-2-RECV_FVID_ERR: Received BPDU with inconsistent peer vlan id 1 on GigabitEthernet0/2
VLAN999.

%SPANTREE-2-BLOCK_FVID_LOCAL: Blocking GigabitEthernet0/2 on VLAN999. Inconsistent local vlan.

Switch(config-if-range)#
Switch(config-if-range)#
Switch(config-if-range)#
Switch(config-if-range)#exit
Switch(config)#interface range gig0/1 - 2
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#switchport trunk allowed vlan 10,20,30
Switch(config-if-range)#switchport trunk native vlan 999
Switch(config-if-range)#no shut
Switch(config-if-range)#exit
Switch(config)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (999), with
Switch GigabitEthernet1/0/3 (1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (999), with
Switch GigabitEthernet1/0/3 (1).

Switch(config)#end
Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#
```

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Figure 4 Access layer Switch 01 Trunk port Configuration

1.1.2 For A2 (Access layer Switch 02)

enable
configure terminal

----VLANs----

vlan 10
name Management
exit

vlan 20
name Guest
exit

vlan 30
name Admin
exit

vlan 999
name Native



exit

----Assign VLANs to access ports---

```
interface fa0/1
switchport mode access
switchport access vlan 10
exit
```

```
interface fa0/2
switchport mode access
switchport access vlan 20
exit
```

```
interface fa0/3
switchport mode access
switchport access vlan 30
exit
```

----Assign VLANs to Trunk ports---

```
interface range gig0/1 - 2
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
```

```
interface range fa0/4
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
```

```
A2
Physical Config CLI Attributes
IOS Command Line Interface

%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up

Switch>
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#
Switch(config)#vlan 10
Switch(config-vlan)#name Management
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#vlan 20
Switch(config-vlan)#name Guest
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#vlan 30
Switch(config-vlan)#name Admin
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#vlan 999
Switch(config-vlan)#name Native
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#interface fa0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface fa0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface fa0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#exit
Switch(config)#

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```

Figure 5 Access layer Switch 02 Access port configuration



```
Switch(config)#
Switch(config)#interface range gig0/1 - 2
Switch(config-if-range)#switchport mode trunk

Switch(config-if-range)#switchport trunk allowed vlan 10,20,30
Switch(config-if-range)#switchport trunk native vlan 999
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

Switch(config-if-range)#no shut
Switch(config-if-range)#exit
Switch(config)#
Switch(config)#end
Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Switch#
%SYS-5-CONFIG_I: Configured from console by console

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (999), with
Switch GigabitEthernet1/0/4 (1).
%SPANTRIE-2-RECV_FVID_ERR: Received BPDU with inconsistent peer vlan id 1 on GigabitEthernet0/2
VLAN999.

%SPANTRIE-2-BLOCK_FVID_LOCAL: Blocking GigabitEthernet0/2 on VLAN999. Inconsistent local vlan.
%SPANTRIE-2-RECV_FVID_ERR: Received BPDU with inconsistent peer vlan id 1 on GigabitEthernet0/1
VLAN999.

%SPANTRIE-2-BLOCK_FVID_LOCAL: Blocking GigabitEthernet0/1 on VLAN999. Inconsistent local vlan.

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (999), with
Switch GigabitEthernet1/0/4 (1).
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (999), with
```

Figure 6 Access layer Switch 02 Trunk port Configuration

1.1.3 For A3 (Access layer Switch 03)

enable
configure terminal

----VLANs----

vlan 10
name Management
exit

vlan 20
name Guest
exit

vlan 30
name Admin
exit

vlan 999
name Native
exit

----Assign VLANs to access ports---

interface fa0/1
switchport mode access



```
switchport access vlan 10
exit
```

```
interface fa0/2
switchport mode access
switchport access vlan 20
exit
```

```
interface fa0/3
switchport mode access
switchport access vlan 30
exit
```

----Assign VLANs to Trunk ports---

```
interface range gig0/1 - 2
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
```

```
Switch>
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#
Switch(config)#vlan 10
Switch(config-vlan)#name Management
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#vlan 20
Switch(config-vlan)#name Guest
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#vlan 30
Switch(config-vlan)#name Admin
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#vlan 999
Switch(config-vlan)#name Native
Switch(config-vlan)#exit
Switch(config)#
Switch(config)#
Switch(config)#interface fa0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface fa0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface fa0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#exit
Switch(config)#
```

Figure 7 Access layer Access Port Configurations Switch 03



```
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface fa0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface range gig0/1 - 2
Switch(config-if-range)#switchport mode trunk

Switch(config-if-range)#switchport trunk allowed vlan 10,20,30
Switch(config-if-range)#switchport trunk native vlan 999
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

Switch(config-if-range)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (999), with
Switch GigabitEthernet1/0/5 (1).
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (999), with
Switch GigabitEthernet1/0/2 (1).
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (999), with
Switch GigabitEthernet1/0/5 (1).
%SPANTREE-2-RECV_FVID_ERR: Received BPDU with inconsistent peer vlan id 1 on GigabitEthernet0/2
VLAN999.
%SPANTREE-2-BLOCK_FVID_LOCAL: Blocking GigabitEthernet0/2 on VLAN0999. Inconsistent local vlan.
%SPANTREE-2-RECV_FVID_ERR: Received BPDU with inconsistent peer vlan id 1 on GigabitEthernet0/1
VLAN999.
%SPANTREE-2-BLOCK_FVID_LOCAL: Blocking GigabitEthernet0/1 on VLAN0999. Inconsistent local vlan.
|
```

Figure 8 Access layer Trunk port Configurations Switch 03

1.1.4 For A4 (Access layer Switch 04)

enable
configure terminal

----VLANs----

vlan 10
name Management
exit

vlan 20
name Guest
exit

vlan 30
name Admin
exit

vlan 999
name Native
exit

----Assign VLANs to access ports---

interface fa0/1



```
switchport mode access
switchport access vlan 10
exit
```

```
interface fa0/2
switchport mode access
switchport access vlan 20
exit
```

```
interface fa0/3
switchport mode access
switchport access vlan 30
exit
```

----Assign VLANs to Trunk ports----

```
interface range gig0/1 - 2
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
```

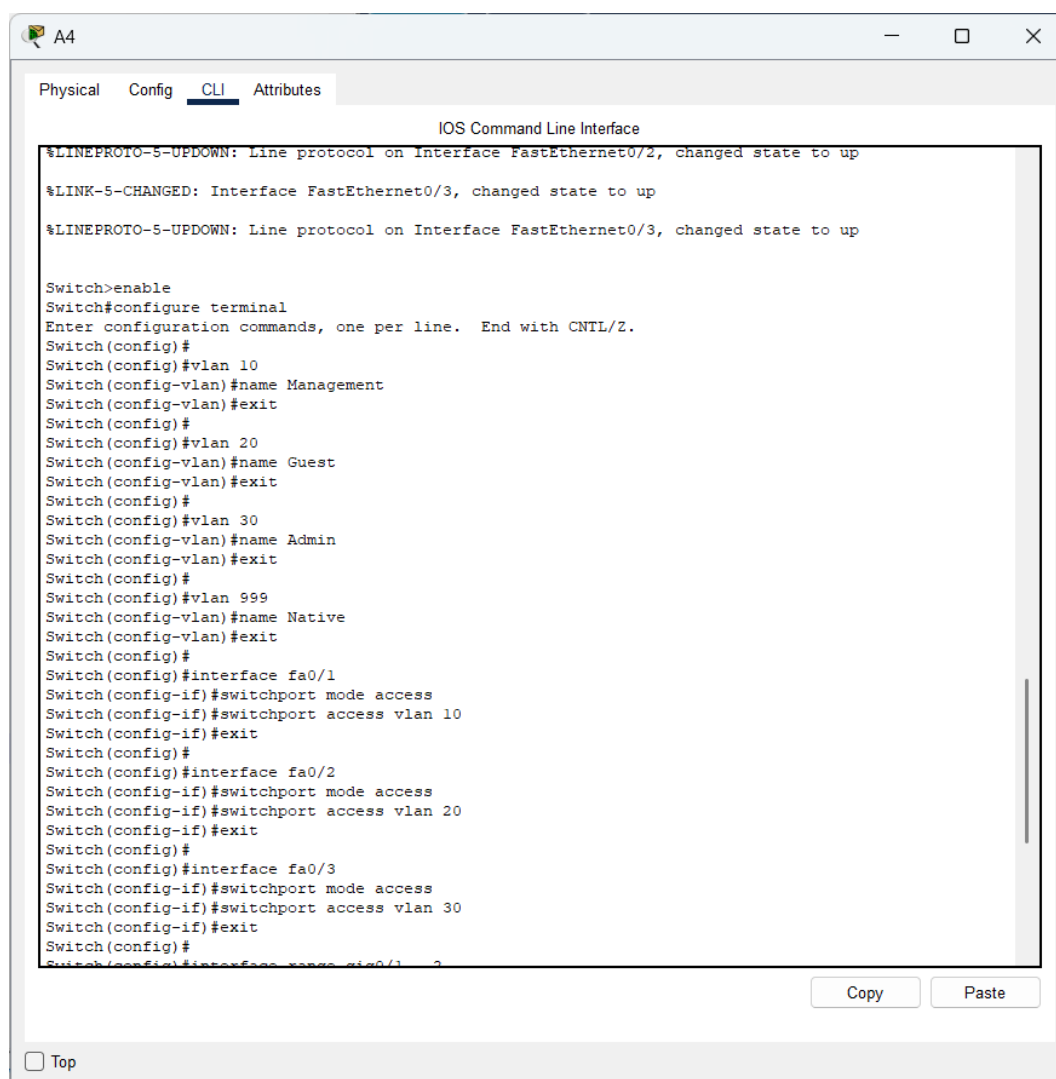


Figure 9 Access layer Access port configurations Switch 04



```
Switch(config)#
Switch(config)#interface range gig0/1 - 2
Switch(config-if-range)#switchport mode trunk

Switch(config-if-range)#switchport trunk allowed vlan 10,20,30
Switch(config-if-range)#switchport trunk native vlan 999
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

Switch(config-if-range)#no shut
Switch(config-if-range)#exit
Switch(config)#
Switch(config)#end
Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Switch#
%SYS-5-CONFIG_I: Configured from console by console

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/2 (999), with
Switch GigabitEthernet1/0/6 (1).

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet0/1 (999), with
Switch GigabitEthernet1/0/3 (1).

%SPANTREE-2-RECV_FVID_ERR: Received BPDU with inconsistent peer vlan id 1 on GigabitEthernet0/2
VLAN999.

%SPANTREE-2-BLOCK_FVID_LOCAL: Blocking GigabitEthernet0/2 on VLAN999. Inconsistent local vlan.
|
%SPANTREE-2-RECV_FVID_ERR: Received BPDU with inconsistent peer vlan id 1 on GigabitEthernet0/1
VLAN999.

%SPANTREE-2-BLOCK_FVID_LOCAL: Blocking GigabitEthernet0/1 on VLAN999. Inconsistent local vlan.
```

Figure 10 Access layer Trunk port configuration Switch 04

1.1.5 For DIST 01 (Distribution layer Switch 01)

enable
configure terminal

vlan 10
name Management
exit

vlan 20
name Guest
exit

vlan 30
name Admin
exit

vlan 999
name Native
exit



ip routing

--Inter-VLAN routing via SVIs--

```
interface vlan 10
ip address 192.168.10.1 255.255.255.0
no shutdown
exit
```

```
interface vlan 20
ip address 192.168.20.1 255.255.255.0
no shutdown
exit
```

```
interface vlan 30
ip address 192.168.30.1 255.255.255.0
no shutdown
exit
```

---Trunk links to access switches and core Routers---

```
interface fa0/1
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
no shutdown
exit
```

```
interface fa0/2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
no shutdown
exit
```

```
interface gig0/1
no switchport
ip address 192.168.100.6 255.255.255.252
no shutdown
exit
```

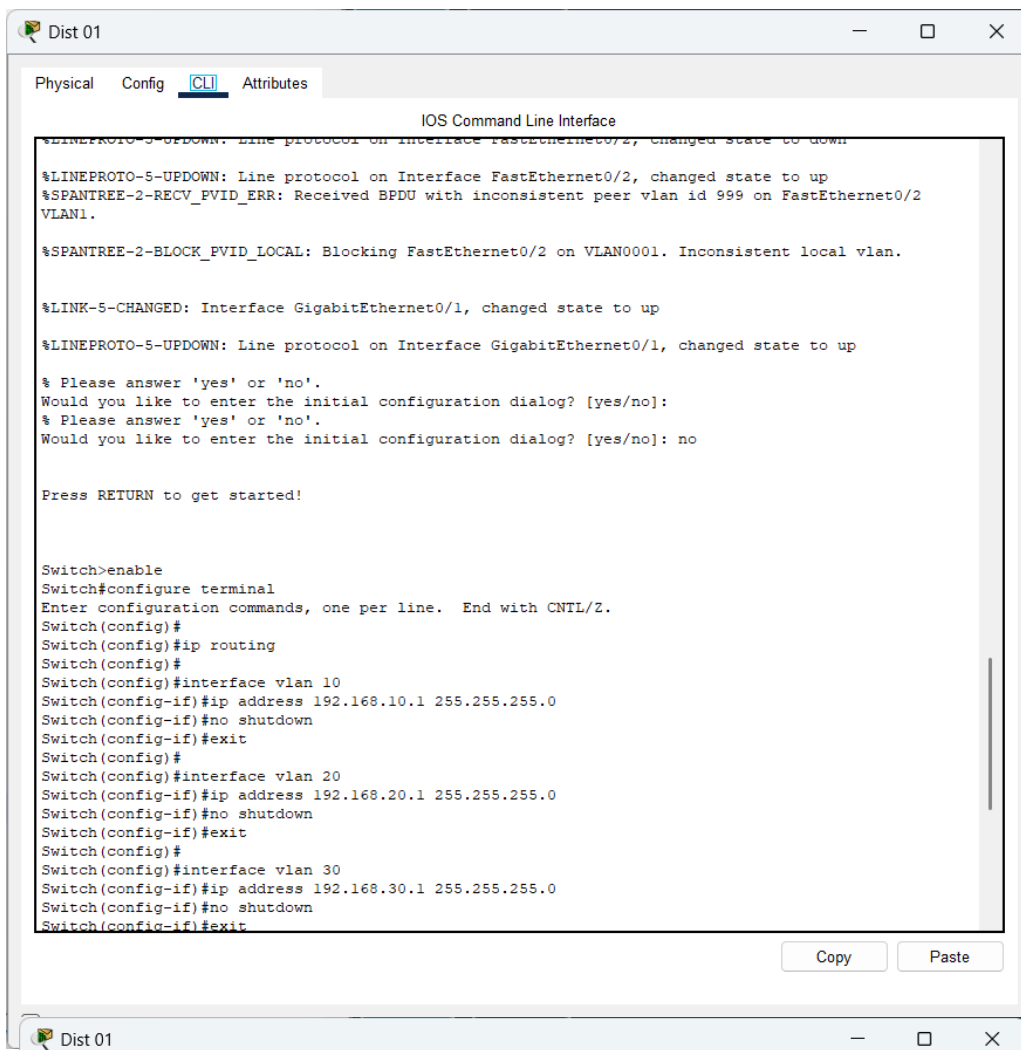


Figure 11 Distribution layer Switch 01 Configuration

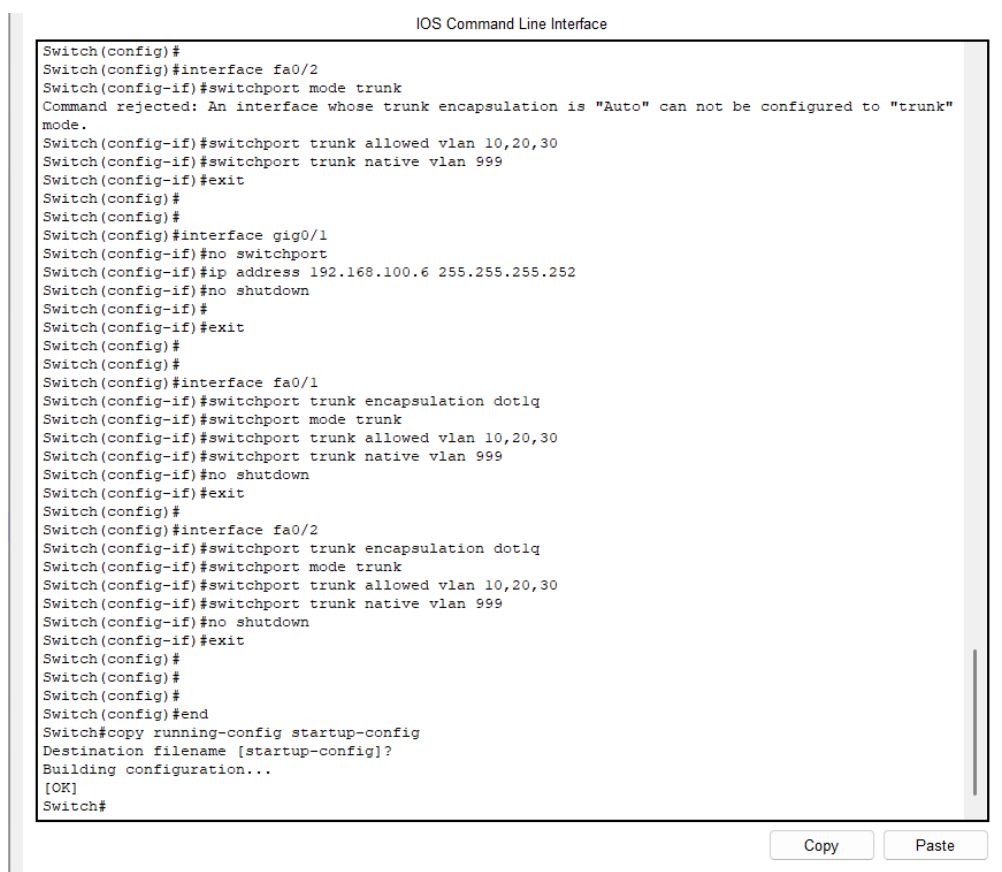


Figure 12 Distribution layer Switch 01 Configuration



1.1.6 For DIST 02 (Distribution layer Switch 02)

```
enable  
configure terminal
```

```
vlan 10  
name Management  
exit
```

```
vlan 20  
name Guest  
exit
```

```
vlan 30  
name Admin  
exit
```

```
vlan 999  
name Native  
exit
```

```
ip routing
```

--Inter-VLAN routing via SVIs--

```
interface vlan 10  
ip address 192.168.10.1 255.255.255.0  
no shutdown  
exit
```

```
interface vlan 20  
ip address 192.168.20.1 255.255.255.0  
no shutdown  
exit
```

```
interface vlan 30  
ip address 192.168.30.1 255.255.255.0  
no shutdown  
exit
```

---Trunk links to access switches and Routing ---

```
interface fa0/1  
switchport trunk encapsulation dot1q  
switchport mode trunk  
switchport trunk allowed vlan 10,20,30  
switchport trunk native vlan 999  
exit
```

```
interface fa0/2  
switchport trunk encapsulation dot1q
```




```
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
exit
```

```
interface fa0/3
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
exit
```

```
interface gig0/1
no switchport
ip address 192.168.100.14 255.255.255.252
no shutdown
```

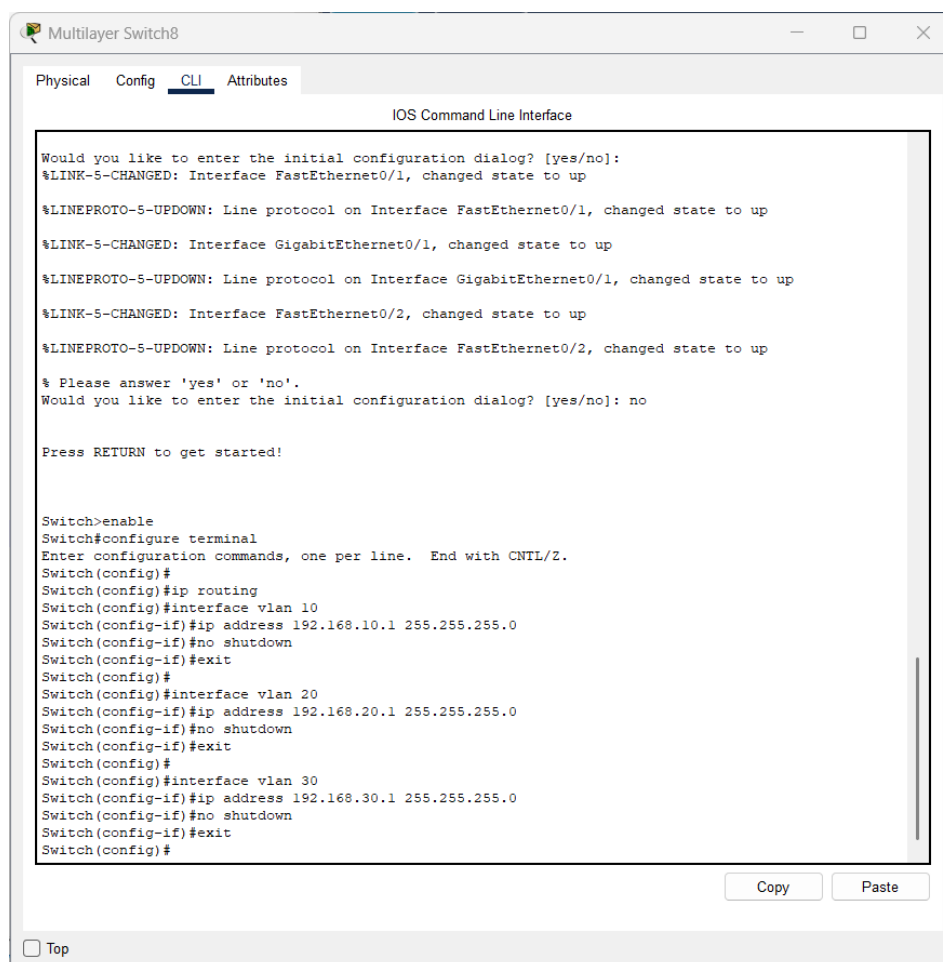


Figure 13 Distribution layer Switch 02 Configuration



```
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface vlan 20
Switch(config-if)#ip address 192.168.20.1 255.255.255.0
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface vlan 30
Switch(config-if)#ip address 192.168.30.1 255.255.255.0
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#interface fa0/1
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#switchport mode trunk

Switch(config-if)#switchport trunk allowed vlan 10,20,30
Switch(config-if)#switchport trunk native vlan 999
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface fa0/2
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#switchport mode trunk

Switch(config-if)#switchport trunk allowed vlan 10,20,30
Switch(config-if)#switchport trunk native vlan 999
Switch(config-if)#exit
Switch(config)#
Switch(config)#
Switch(config)#interface gig0/1
Switch(config-if)#no switchport
Switch(config-if)#ip address 192.168.100.14 255.255.255.252
Switch(config-if)#no shutdown
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#
Switch(config-if)#end
Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Switch#
```

Figure 14 Distribution layer Switch 02 Configurations

1.1.7 For DIST 03 (Distribution layer Switch 03)

enable
configure terminal

vlan 10
name Management
exit

vlan 20
name Guest
exit

vlan 30
name Admin
exit

vlan 999
name Native
exit

ip routing

--Inter-VLAN routing via SVIs--

interface vlan 10



```
ip address 192.168.10.1 255.255.255.0
no shutdown
exit
```

```
interface vlan 20
ip address 192.168.20.1 255.255.255.0
no shutdown
exit
```

```
interface vlan 30
ip address 192.168.30.1 255.255.255.0
no shutdown
exit
```

---Trunk links to access switches---

```
interface fa0/1
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
exit
```

```
interface fa0/2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
exit
```

```
interface fa0/3
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
exit
```

```
interface fa0/4
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk allowed vlan 10,20,30
switchport trunk native vlan 999
exit
```

```
interface gig0/1
no switchport
ip address 192.168.100.10 255.255.255.252
no shutdown
```

```
interface gig0/2
```



```
no switchport
ip address 192.168.100.18 255.255.255.252
no shutdown
exit
```

```
show interfaces status
show ip interface brief
show vlan brief
```

Multilayer Switch11

Physical Config CLI Attributes

IOS Command Line Interface

```
%SPANTREE-2-BLOCK_EVID_LOCAL: Blocking FastEthernet0/4 on VLAN0001. Inconsistent local vlan.

%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

% Please answer 'yes' or 'no'.
Would you like to enter the initial configuration dialog? [yes/no]:
% Please answer 'yes' or 'no'.
Would you like to enter the initial configuration dialog? [yes/no]: no

Press RETURN to get started!

Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#
Switch(config)#ip routing
Switch(config)#interface vlan 10
Switch(config-if)#ip address 192.168.10.1 255.255.255.0
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface vlan 20
Switch(config-if)#ip address 192.168.20.1 255.255.255.0
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface vlan 30
Switch(config-if)#ip address 192.168.30.1 255.255.255.0
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#
```

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Figure 15 Distribution layer Switch 03 Configurations



Multilayer Switch11

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Switch(config)#
Switch(config)#
Switch(config)#interface fa0/1
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan 10,20,30
Switch(config-if)#switchport trunk native vlan 999
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface fa0/2
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan 10,20,30
Switch(config-if)#switchport trunk native vlan 999
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface fa0/3
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan 10,20,30
Switch(config-if)#switchport trunk native vlan 999
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface fa0/4
Switch(config-if)#switchport trunk encapsulation dot1q
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan 10,20,30
Switch(config-if)#switchport trunk native vlan 999
Switch(config-if)#exit
Switch(config)#
Switch(config)#interface gig0/1
Switch(config-if)#no switchport
Switch(config-if)#ip address 192.168.100.10 255.255.255.252
Switch(config-if)#no shutdown
Switch(config-if)#
Switch(config-if)#interface gig0/2
Switch(config-if)#no switchport
Switch(config-if)#ip address 192.168.100.18 255.255.255.252
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#
Switch(config)#
Switch(config)#end
Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Switch#
```

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Figure 16 Distribution layer Switch 03 Configurations



The screenshot shows a PC3 desktop environment with a window titled 'PC3' containing a 'Command Prompt' window. The Command Prompt displays the following output:

```
Ping statistics for 192.168.30.12:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.10.14

Pinging 192.168.10.14 with 32 bytes of data:

Reply from 192.168.10.14: bytes=32 time<1ms TTL=128
Reply from 192.168.10.14: bytes=32 time<1ms TTL=128
Reply from 192.168.10.14: bytes=32 time<1ms TTL=128
Reply from 192.168.10.14: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.14:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
      Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.20.14

Pinging 192.168.20.14 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.20.14:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.30.14

Pinging 192.168.30.14 with 32 bytes of data:

Reply from 192.168.10.1: Destination host unreachable.
Reply from 192.168.10.1: Destination host unreachable.
Reply from 192.168.10.1: Destination host unreachable.
Reply from 192.168.10.1: Destination host unreachable.

Ping statistics for 192.168.30.14:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
C:\>
C:\>
```

Figure 17 After switch configuration

2.0 Security Policies and ACLs

- Implement and configure Access Control Lists (ACLs) on routers/firewalls to restrict inter VLAN traffic based on your security policies.
- Document each ACL entry with comments and screenshots showing successful traffic filtering.

2.1 ACL Configuration

Allow access to VLAN 10 & VLAN 20. Block VLAN 30. for VLAN 10 (Management)

```
ip access-list extended VLAN10_ACCESS
```

```
deny ip 192.168.10.0 0.0.0.255 192.168.30.0 0.0.0.255
```

```
permit ip 192.168.10.0 0.0.0.255 192.168.0.0 0.0.255.255
```

```
exit
```

Allow only local access. Block access to VLAN 10 & VLAN 30. (for VLAN 20 (Guest))

```
ip access-list extended VLAN20_ACCESS
```



```
deny ip 192.168.20.0 0.0.0.255 192.168.10.0 0.0.0.255
deny ip 192.168.20.0 0.0.0.255 192.168.30.0 0.0.0.255
permit ip 192.168.20.0 0.0.0.255 192.168.20.0 0.0.0.255
exit
```

```
interface vlan 10
ip access-group VLAN10_ACCESS in
exit
```

```
interface vlan 20
ip access-group VLAN20_ACCESS in
exit
```

```
Switch>
Switch>en
Switch>config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#ip access-list extended VLAN10_ACCESS
Switch(config-ext-nacl)#deny ip 192.168.10.0 0.0.0.255 192.168.30.0 0.0.0.255
Switch(config-ext-nacl)#permit ip 192.168.10.0 0.0.0.255 192.168.0.0 0.0.255.255
Switch(config-ext-nacl)#exit
Switch(config)#
Switch(config)#
Switch(config)#ip access-list extended VLAN20_ACCESS
Switch(config-ext-nacl)#deny ip 192.168.20.0 0.0.0.255 192.168.10.0 0.0.0.255
Switch(config-ext-nacl)#deny ip 192.168.20.0 0.0.0.255 192.168.30.0 0.0.0.255
Switch(config-ext-nacl)#permit ip 192.168.20.0 0.0.0.255 192.168.20.0 0.0.0.255
Switch(config-ext-nacl)#exit
Switch(config)#
Switch(config)#
Switch(config)#interface vlan 10
Switch(config-if)#ip access-group VLAN10_ACCESS in
Switch(config-if)#
Switch(config-if)#interface vlan 20
Switch(config-if)#ip access-group VLAN20_ACCESS in
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#no shut
Switch(config)#
^
% Invalid input detected at '^' marker.

Switch(config)#
?Bad filename
%Error parsing filename (Bad file number)
Switch(config)#
Switch(config)#end
Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Switch#
%SYS-5-CONFIG_I: Configured from console by console
```

Figure 18 ACL Configurations



After Apply ACL

```
PC3
Physical Config Desktop Programming Attributes
Command Prompt
Ping statistics for 192.168.30.12:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.10.14

Pinging 192.168.10.14 with 32 bytes of data:

Reply from 192.168.10.14: bytes=32 time<1ms TTL=128
Reply from 192.168.10.14: bytes=32 time<1ms TTL=128
Reply from 192.168.10.14: bytes=32 time<1ms TTL=128
Reply from 192.168.10.14: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.14:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.20.14

Pinging 192.168.20.14 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.20.14:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.30.14

Pinging 192.168.30.14 with 32 bytes of data:

Reply from 192.168.10.1: Destination host unreachable.
Reply from 192.168.10.1: Destination host unreachable.
Reply from 192.168.10.1: Destination host unreachable.
Reply from 192.168.10.1: Destination host unreachable.

Ping statistics for 192.168.30.14:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
C:\>
C:\>
```

Figure 19 After ACL Configuration for VLAN 20 (Guest)

```
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ping 192.168.10.11

Pinging 192.168.10.11 with 32 bytes of data:

Reply from 192.168.10.11: bytes=32 time<1ms TTL=127
Reply from 192.168.10.11: bytes=32 time<1ms TTL=127
Reply from 192.168.10.11: bytes=32 time<1ms TTL=127
Reply from 192.168.10.11: bytes=32 time=1ms TTL=127

Ping statistics for 192.168.10.11:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.20.11

Pinging 192.168.20.11 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.20.11:
  Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 192.168.30.11

Pinging 192.168.30.11 with 32 bytes of data:

Reply from 192.168.30.11: bytes=32 time<1ms TTL=128
Reply from 192.168.30.11: bytes=32 time<1ms TTL=128
Reply from 192.168.30.11: bytes=32 time<1ms TTL=128
Reply from 192.168.30.11: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.30.11:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
C:\>
C:\>
C:\>
```

Figure 20 After ACL Configuration for VLAN 10 (Management)



```
PC7
Physical Config Desktop Programming Attributes
Command Prompt
C:\>ping 192.168.10.11

Pinging 192.168.10.11 with 32 bytes of data:

Reply from 192.168.10.11: bytes=32 time=18ms TTL=127
Reply from 192.168.10.11: bytes=32 time<1ms TTL=127
Reply from 192.168.10.11: bytes=32 time<1ms TTL=127
Reply from 192.168.10.11: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.10.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 18ms, Average = 4ms

C:\>ping 192.168.30.11

Pinging 192.168.30.11 with 32 bytes of data:

Reply from 192.168.30.11: bytes=32 time=16ms TTL=127
Reply from 192.168.30.11: bytes=32 time<1ms TTL=127
Reply from 192.168.30.11: bytes=32 time<1ms TTL=127
Reply from 192.168.30.11: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.30.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 16ms, Average = 4ms

C:\>ping 192.168.20.11

Pinging 192.168.20.11 with 32 bytes of data:

Reply from 192.168.20.11: bytes=32 time<1ms TTL=128
Reply from 192.168.20.11: bytes=32 time<1ms TTL=128
Reply from 192.168.20.11: bytes=32 time<1ms TTL=128
Reply from 192.168.20.11: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.20.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
C:\>
```

Figure 21 After ACL Configuration for VLAN 30 (Admin)

3.0 Failover and Redundancy

- Implement a redundancy protocol such as HSRP, VRRP, or a dynamic routing protocol on
- routers/switches for automatic failover.
- Simulate a network device or link failure and show how traffic is automatically rerouted.
- Document how the failover mechanism works with:
 - o Detailed notes
 - o Simulation captures/screenshots of before and after the failure
 - o Clear comments on the behaviour observed

3.1 What is the Failover?

Failover is a backup operational mode in which the functions of a system component are assumed by a secondary component when the primary becomes unavailable. An organization can fail over either after failure or during scheduled down time. (Contributor, 2023)



3.2 What is the network redundancy?

Network redundancy is the process of **providing multiple paths for traffic** so that data can keep flowing even in the event of a failure. Put simply: more redundancy equals more reliability. It also helps with distributed site management. The idea is that if one device fails, another can automatically take over. By adding a little bit of complexity, we reduce the probability that a failure will take the network down. (Dooley, 2024)

3.3 What is the HSRP (Host Standby Router Protocol)?

HSRP is the cisco proprietary Protocol designed to provide network redundancy for IP network. It ensures that Traffic Immediately and transparently recovers from first hop Failures in network edge devices or access circuits. (HSRP (Hot Standby Routing Protocol), n.d.)

HSRP allows multiple routers to work together to present the illusion of a single virtual router to the hosts on the LAN. This set of routers is known as an HSRP group or a standby group. A single router, elected from the group, is responsible for forwarding the packets sent to the virtual router. This router is known as the Active router. Another router is elected as the Standby router. If the Active router fails, the Standby router takes over the packet-forwarding duties (Understand the Hot Standby Router Protocol Features and Functionality, 2023)

3.4 What are the HSRP States?

- ✓ Initial State: - when the interface Goes in up state
- ✓ Learn State: -The router is trying to learn Virtual IP Address
- ✓ Listen State: - The router knows Virtual IP address and listened from Active and Standby routers
- ✓ Speak State: -The router is sending and participating in the election to become the active router
- ✓ Standby State: - This is the router which will become the active routers and continuously sending message to active router (Kareemoddin, 2016)

3.5 Why Use HSRP Instead of Static Gateway?

| Static Gateway | HSRP |
|-------------------------|----------------------------|
| Single point of failure | No single point of failure |
| Manual reconfiguration | Automatic failover |
| Downtime likely | Minimal to no downtime |

3.6 HSRP Implementation

```
on Core1
interface Vlan10
ip address 192.168.10.2 255.255.255.0
standby 10 ip 192.168.10.1
standby 10 priority 110
standby 10 preempt
no shutdown
exit
```

```
interface Vlan20
ip address 192.168.20.2 255.255.255.0
standby 20 ip 192.168.20.1
```



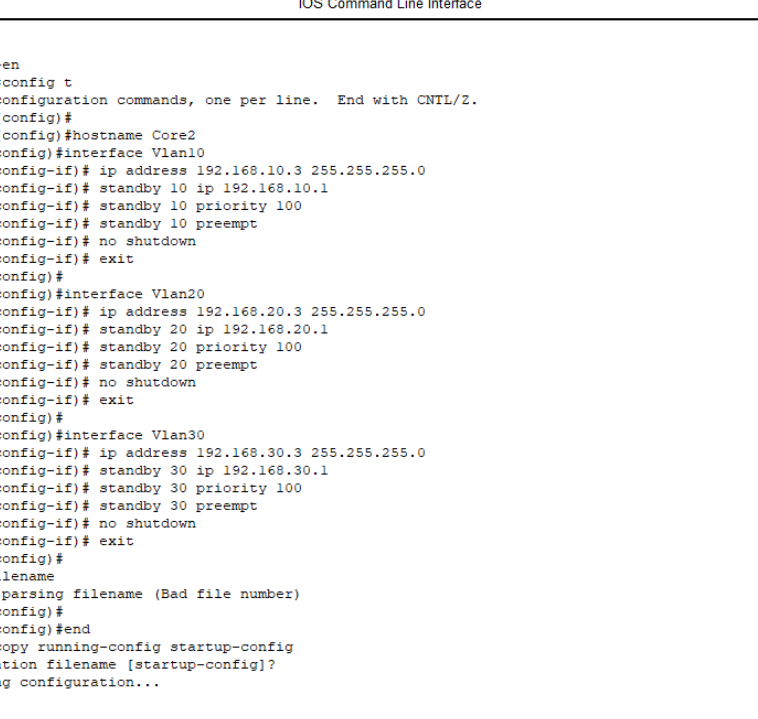
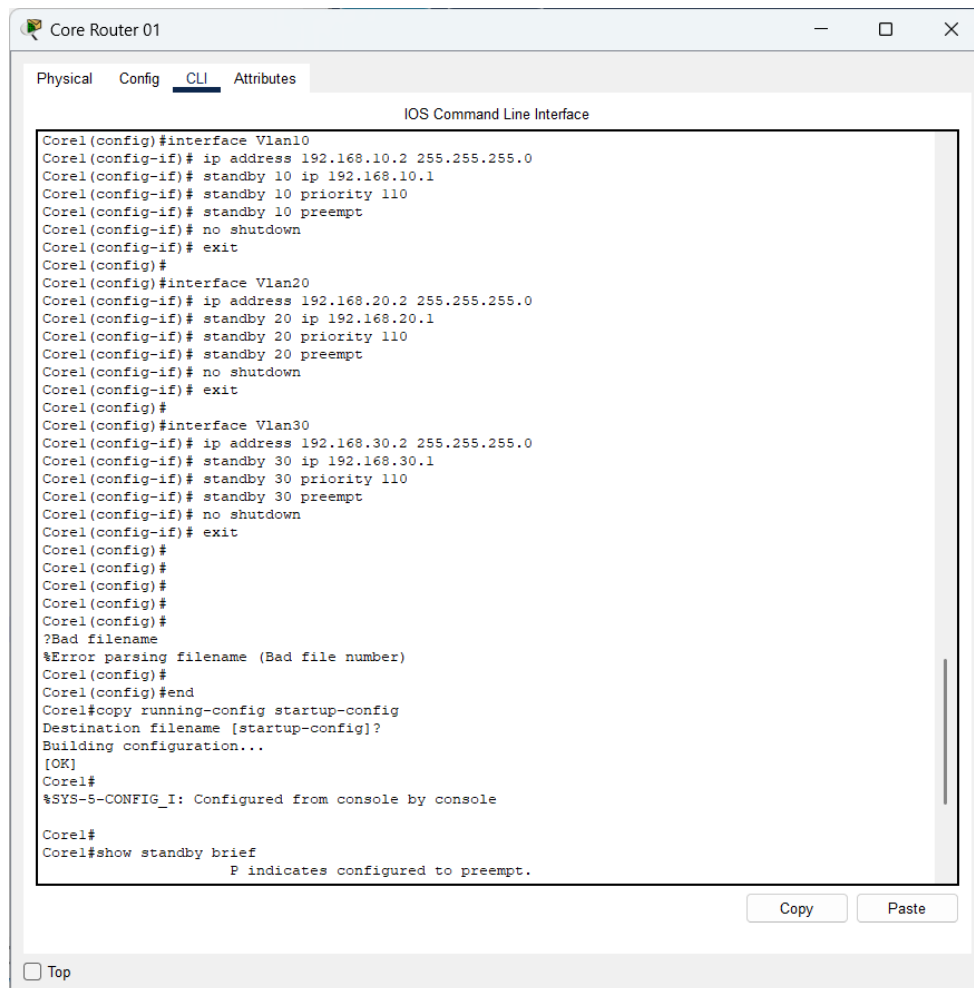
```
standby 20 priority 110
standby 20 preempt
no shutdown
exit
```

```
interface Vlan30
ip address 192.168.30.2 255.255.255.0
standby 30 ip 192.168.30.1
standby 30 priority 110
standby 30 preempt
no shutdown
exit
```

```
on Core2
interface Vlan10
ip address 192.168.10.3 255.255.255.0
standby 10 ip 192.168.10.1
standby 10 priority 100
standby 10 preempt
no shutdown
exit
```

```
interface Vlan20
ip address 192.168.20.3 255.255.255.0
standby 20 ip 192.168.20.1
standby 20 priority 100
standby 20 preempt
no shutdown
exit
```

```
interface Vlan30
ip address 192.168.30.3 255.255.255.0
standby 30 ip 192.168.30.1
standby 30 priority 100
standby 30 preempt
no shutdown
exit
```



The screenshot shows the 'Core Router 2' window with the 'CLI' tab selected. The title bar includes 'Core Router 2' and standard window controls. The main area is titled 'IOS Command Line Interface' and displays a series of commands and their outputs. The configuration process starts with entering configuration mode, then configuring three interfaces: Vlan10, Vlan20, and Vlan30. Each interface is assigned an IP address and a standby IP, with priority and preempt settings. After exiting configuration mode, an attempt is made to copy the running configuration to the startup configuration, which results in a 'Bad filename' error. The session ends with a confirmation message.

```

Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#
Router(config)#hostname Core2
Core2(config)#interface Vlan10
Core2(config-if)# ip address 192.168.10.3 255.255.255.0
Core2(config-if)# standby 10 ip 192.168.10.1
Core2(config-if)# standby 10 priority 100
Core2(config-if)# standby 10 preempt
Core2(config-if)# no shutdown
Core2(config-if)# exit
Core2(config)#
Core2(config)#interface Vlan20
Core2(config-if)# ip address 192.168.20.3 255.255.255.0
Core2(config-if)# standby 20 ip 192.168.20.1
Core2(config-if)# standby 20 priority 100
Core2(config-if)# standby 20 preempt
Core2(config-if)# no shutdown
Core2(config-if)# exit
Core2(config)#
Core2(config)#interface Vlan30
Core2(config-if)# ip address 192.168.30.3 255.255.255.0
Core2(config-if)# standby 30 ip 192.168.30.1
Core2(config-if)# standby 30 priority 100
Core2(config-if)# standby 30 preempt
Core2(config-if)# no shutdown
Core2(config-if)# exit
Core2(config)#
?Bad filename
%Error parsing filename (Bad file number)
Core2(config)#
Core2(config)#end
Core2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Core2#
%SYS-5-CONFIG_I: Configured from console by console

```

At the bottom right of the window, there are two buttons: 'Copy' and 'Paste'.

Figure 23 HSRP Implementation for Route02 (core02)



3.6.1 After Apply HSRP Implementation

Core Router 01

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Core1(config)#interface Vlan30
Core1(config-if)# ip address 192.168.30.2 255.255.255.0
Core1(config-if)# standby 30 ip 192.168.30.1
Core1(config-if)# standby 30 priority 110
Core1(config-if)# standby 30 preempt
Core1(config-if)# no shutdown
Core1(config-if)# exit
Core1(config)#
Core1(config)#
Core1(config)#
Core1(config)#
Core1(config)#
Core1(config)#
?Bad filename
%Error parsing filename (Bad file number)
Core1(config)#
Core1(config)#end
Core1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Core1#
%SYS-5-CONFIG_I: Configured from console by console

Core1#
Core1#show standby brief
          P indicates configured to preempt.
          |
Interface Grp Pri P State Active Standby Virtual IP
Vl10      10   110 P Init unknown unknown 192.168.10.1
Vl20      20   110 P Init unknown unknown 192.168.20.1
Vl30      30   110 P Init unknown unknown 192.168.30.1
Core1#
Core1#
Core1#
?Bad filename
%Error parsing filename (Bad file number)
Core1#
Core1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Core1#
```

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Figure 24 After apply HSRF Implementation Check Status in Router 01

Core Router 02

Physical Config **CLI** Attributes

IOS Command Line Interface

```
Core2(config-if)# standby 10 ip 192.168.10.1
Core2(config-if)# standby 10 priority 100
Core2(config-if)# standby 10 preempt
Core2(config-if)# no shutdown
Core2(config-if)# exit
Core2(config)#
Core2(config)#interface Vlan20
Core2(config-if)# ip address 192.168.20.3 255.255.255.0
Core2(config-if)# standby 20 ip 192.168.20.1
Core2(config-if)# standby 20 priority 100
Core2(config-if)# standby 20 preempt
Core2(config-if)# no shutdown
Core2(config-if)# exit
Core2(config)#
Core2(config)#interface Vlan30
Core2(config-if)# ip address 192.168.30.3 255.255.255.0
Core2(config-if)# standby 30 ip 192.168.30.1
Core2(config-if)# standby 30 priority 100
Core2(config-if)# standby 30 preempt
Core2(config-if)# no shutdown
Core2(config-if)# exit
Core2(config)#
Core2(config)#
?Bad filename
%Error parsing filename (Bad file number)
Core2(config)#
Core2(config)#end
Core2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Core2#
%SYS-5-CONFIG_I: Configured from console by console

Core2#show standby brief
          P indicates configured to preempt.
          |
Interface Grp Pri P State Active Standby Virtual IP
Vl10      10   100 P Init unknown unknown 192.168.10.1
Vl20      20   100 P Init unknown unknown 192.168.20.1
Vl30      30   100 P Init unknown unknown 192.168.30.1
Core2#
Core2#
```

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Figure 25 After apply HSRF Implementation Check Status in Router 02



```
Core Router 2
Physical Config CLI Attributes
IOS Command Line Interface

Core2(config)#interface Vlan30
Core2(config-if)# ip address 192.168.30.3 255.255.255.0
Core2(config-if)# standby 30 ip 192.168.30.1
Core2(config-if)# standby 30 priority 100
Core2(config-if)# standby 30 preempt
Core2(config-if)# no shutdown
Core2(config-if)# exit
Core2(config)#
?Bad filename
%Error parsing filename (Bad file number)
Core2(config)#
Core2(config)#end
Core2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Core2#
%SYS-5-CONFIG_I: Configured from console by console

Core2#show standby brief
          P indicates configured to preempt.
          |
Interface Grp Pri P State Active Standby Virtual IP
V110      10  100 P Init unknown unknown 192.168.10.1
V120      20  100 P Init unknown unknown 192.168.20.1
V130      30  100 P Init unknown unknown 192.168.30.1
Core2#
Core2#
Core2#
%LINK-3-UPDOWN: Interface Serial0/3/0, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to down

Core2#show standby brief
          P indicates configured to preempt.
          |
Interface Grp Pri P State Active Standby Virtual IP
V110      10  100 P Init unknown unknown 192.168.10.1
V120      20  100 P Init unknown unknown 192.168.20.1
V130      30  100 P Init unknown unknown 192.168.30.1
Core2#
Core2#
```

Figure 26 After apply When power of Router 01 Check Status in Router 02

```
Physical Config CLI Attributes
IOS Command Line Interface

If you require further assistance please contact us by sending email to
export@cisco.com.

cisco 2811 (MPC860) processor (revision 0x200) with 60416K/5120K bytes of memory
Processor board ID JAD05190MTZ (4292891495)
10 FastEthernet interface(s)
2 Low-speed serial(sync/async) network interface(s)
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)

Press RETURN to get started!

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up
%LINK-3-UPDOWN: Interface Serial0/3/0, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to down

Core1>
Core1>en
Core1#config t
Enter configuration commands, one per line. End with CNTL/Z.
Core1(config)#show standby brief
          ^
% Invalid input detected at '^' marker.

Core1(config)#exit
Core1#
%SYS-5-CONFIG_I: Configured from console by console

Core1#show standby brief
          P indicates configured to preempt.
          |
Interface Grp Pri P State Active Standby Virtual IP
V110      10  110 P Init unknown unknown 192.168.10.1
V120      20  110 P Init unknown unknown 192.168.20.1
V130      30  110 P Init unknown unknown 192.168.30.1
Core1#
Core1#
```

Figure 27 After apply When power of Router 02 Check Status in Router 01



References

- ❖ Contributor, T. (2023, June 20). *TechTarget Network* . Retrieved from <https://www.techtarget.com/searchstorage/definition/failover>
- ❖ Dooley, K. (2024, June 03). *Network Redundancy and Why It Matters*. Retrieved from Auvik.com: <https://www.auvik.com/franklyit/blog/simple-network-redundancy/>
- ❖ *HSRP (Hot Standby Routing Protocol)*. (n.d.). Retrieved from NetworkLessons: <https://networklessons.com/cisco/ccie-routing-switching/hsrp-hot-standby-routing-protocol>
- ❖ Kareemoddin, M. (2016, November 05). *Network & Security Consultant* . Retrieved from HSRP State: <https://www.kareemccie.com/2016/11/hsrp-states.html>
- ❖ *Understand the Hot Standby Router Protocol Features and Functionality*. (2023, September 13). Retrieved from Cisco: <https://www.cisco.com/c/en/us/support/docs/ip/hot-standby-router-protocol-hsrp/9234-hsrpguidetoc.html>