

Faculty of Data Sciences

Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Topi

CE313-L

Computer Networks

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Lab 5

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Lab Overview:

This lab focuses on configuring VLANs on switches, assigning switch ports to VLANs, configuring management VLANs, trunking, and testing inter-VLAN communication. The lab demonstrates key concepts in network management using VLANs and prepares the network for scalability and enhanced security by logically segmenting traffic.

Summary:

Step 1: Network Setup and Switch Configuration

1. **Network Cabling:** The network topology was set up using multiple switches (S1, S2, and S3). Switches were connected, and existing configurations were cleared before starting the VLAN configuration.
2. **Switch Configuration:** Each switch was configured with the following commands:
 - **Hostname** was set for each switch.
 - **DNS lookup** was disabled to prevent unnecessary delays in resolving names.
 - **Passwords** were configured for different modes:
 - `class` for EXEC mode
 - `cisco` for console and vty access
 - **Unused Ports** were shutdown on S2 and S3 using the `shutdown` command to disable them for security.

Step 2: VLAN Configuration on Switches S1, S2, and S3

1. **Creating VLANs:** On **S1**, the following VLANs were created and named:
 - VLAN 10: faculty/staff
 - VLAN 20: students
 - VLAN 30: guest
 - VLAN 99: management
2. Similarly, VLANs were created on **S2** and **S3** using the same names and VLAN IDs.

Step 3: Assigning Ports to VLANs on Switches S2 and S3

1. Port Assignment on S3:

- Ports **fa0/6-10** were assigned to VLAN 30 (guest).
- Ports **fa0/11-17** were assigned to VLAN 10 (faculty/staff).
- Ports **fa0/18-24** were assigned to VLAN 20 (students).

2. Similar port assignments were made on S2.

Verification: The `show vlan id vlan-number` command was used to confirm that ports had been correctly assigned to each VLAN.

Step 4: Management VLAN Configuration

1. Assigning Management VLAN 99:

- **S1** was assigned the IP address **172.17.99.11** on VLAN 99.
- **S2** was assigned **172.17.99.12**, and **S3** was assigned **172.17.99.13**.
- The management VLAN allows for IP-based communication between switches and any hosts connected to VLAN 99.

2. Securing Management Ports:

- VLAN 99 was configured as the management VLAN, and care was taken to secure the ports assigned to VLAN 99.

Step 5: Configuring Trunks and Native VLAN on All Switches

1. Trunk Configuration:

- Trunking was enabled on **fa0/1-5** on each switch, allowing them to carry traffic for all VLANs.
- **VLAN 99** was configured as the **native VLAN** on these trunk ports, ensuring untagged traffic would be assigned to VLAN 99.

2. Verification: The `show interface trunk` command confirmed the configuration of trunks and native VLAN on all switches.

Step 6: Testing VLAN and Inter-VLAN Communication

1. Pinging Management Addresses:

- From **S1**, the management addresses of **S2** and **S3** were pinged to verify communication. Both pings were successful, confirming IP connectivity across the management VLAN.

2. Host Ping Tests:

- **PC2** was used to ping various hosts:
 - Ping to **PC1 (172.17.10.21)** failed because the hosts were on different VLANs and subnets.
 - Ping to **PC5**, which was on the same VLAN and subnet as PC2, succeeded.

3. Changing VLAN Assignment for PC1:

- **PC1** was moved from VLAN 10 to VLAN 20 by reassigning its port on **S2**.
- After the reassignment, a ping from **PC2** to **PC1** still failed because they were in different subnets, even though they were in the same VLAN.

4. Changing PC1's IP Address:

- The IP address of **PC1** was changed to **172.17.20.21**, which placed it in the same subnet as **PC2**.
- After this change, the ping from **PC2** to **PC1** was successful, confirming that both hosts could communicate within the same VLAN and subnet.

Step 7: Documentation and Cleanup

1. Documenting Configurations:

- The running configurations of all switches were captured and saved for future reference.

2. Cleanup:

- The configurations were erased, switches were reloaded, and all cabling was disconnected.
- PCs were reconnected to the appropriate networks, and TCP/IP settings were restored as needed.

Conclusion:

This lab demonstrated the configuration of VLANs, port assignments, trunking, and VLAN management on multiple switches. Key network management tasks, such as securing management VLANs, ensuring proper trunking between switches, and testing

communication between hosts in different VLANs, were covered. The successful completion of the lab illustrates the benefits of VLAN segmentation for security and scalability in a network environment.

Attached are some screenshots:

```
s2#show vlan id 10
```

VLAN	Name	Status	Ports
10	faculty/staff	active	Fa0/11, Fa0/12, Fa0/13, Fa0/14 Fa0/15, Fa0/16, Fa0/17

VLAN	Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
10	enet	100010	1500	-	-	-	-	-	0	0

...

```
s1#ping 172.17.99.12
```

```
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 172.17.99.12, timeout is 2 seconds:  
.....  
Success rate is 60 percent (3/5), round-trip min/avg/max = 0/0/0 ms
```

```
s1#ping 172.17.99.13
```

```
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 172.17.99.13, timeout is 2 seconds:  
...!!!  
Success rate is 60 percent (3/5), round-trip min/avg/max = 0/1/4 ms
```

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 172.17.10.21

Pinging 172.17.10.21 with 32 bytes of data:

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

Ping statistics for 172.17.10.21:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>ping 172.17.99.12

Pinging 172.17.99.12 with 32 bytes of data:

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

Ping statistics for 172.17.99.12:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```