Module 8: Network Access Basic Routing & Advanced Routing Concept , Switching Concepts –

1. Explain Switch

A network switch is a networking device that operates at the Data Link Layer (Layer 2) of the OSI model. It is responsible for forwarding data packets based on MAC addresses. Unlike a hub, which broadcasts data to all devices, a switch intelligently forwards data to the correct device, improving network efficiency. Some Layer 3 switches can also perform routing functions.

Key Features of a Switch:

- Learns and stores MAC addresses in a MAC address table.

- Reduces network congestion by sending data only to the intended recipient.

- Operates in full-duplex mode, allowing simultaneous data transmission and reception.

2. Explain Switch Boot Sequence

The boot sequence of a Cisco switch follows these steps:

1. Power-On Self-Test (POST):

- The switch checks its hardware components (CPU, memory, interfaces) to ensure they are functioning properly.

2. Load the Boot Loader:

- A small program stored in ROM initializes hardware and prepares to load the operating system.

3. Initialize the Flash File System:

- The switch locates the Cisco IOS image stored in flash memory.

4. Load the Cisco IOS Image:

- The switch loads the IOS (Internetwork Operating System) into RAM.

5. Locate and Apply the Configuration File:

- The switch searches for the startup configuration file stored in NVRAM.

- If a configuration file exists, it is applied.

- If no configuration file is found, the switch enters setup mode to allow manual configuration.

3. Explain Three Methods to Access Switch Command Line Interface (CLI)

To configure and manage a Cisco switch, you can access the CLI (Command Line Interface) using the following methods:

1. Console Access (Out-of-Band Management):

- Requires a console cable (RJ-45 to DB-9) and a terminal emulator like PuTTY or Tera Term.

- Used for initial configuration when no network access is available.

2. Telnet (Remote Access):

- Allows remote login to the switch via IP network.

- Not secure as data is transmitted in plaintext.

- Requires enabling the VTY (virtual terminal) lines on the switch.

3. SSH (Secure Shell – Remote Access):

- A more secure alternative to Telnet that uses encryption.

- Requires setting up an IP address on the switch and configuring SSH authentication.

4. Explain and Configuring the Cisco Internet Operating System (IOS)

Cisco IOS (Internetwork Operating System) is the operating system that runs on Cisco switches, routers, and other network devices. It provides the CLI interface for configuring and managing devices.

Basic IOS Configuration on a Switch

1. Access CLI: Use a console cable, Telnet, or SSH.

2. Enter Privileged EXEC Mode:

Switch> enable

Switch

3. Enter Global Configuration Mode:

Switch configure terminal

Switch(config)

4. Set a Hostname:

Switch(config) hostname MySwitch

MySwitch(config)

5. Set a Password for Console Access:

MySwitch(config) line console 0

MySwitch(config-line) password cisco

MySwitch(config-line) login

MySwitch(config-line) exit

6. Enable SSH (Secure Remote Access):

MySwitch(config) ip domain-name example.com

MySwitch(config) crypto key generate rsa

MySwitch(config) username admin secret password123

MySwitch(config) line vty 0 4

MySwitch(config-line) transport input ssh

MySwitch(config-line) login local

MySwitch(config-line) exit

7. Save Configuration:

MySwitch write memory

5. Explain Switch Port

A switch port is a physical interface on a network switch that allows devices to connect and communicate.

Types of Switch Ports:

1. Access Port:

- Connects end devices (PCs, printers, etc.).

- Carries traffic for a single VLAN.

- Example: `Switch(config-if) switchport mode access`

2. Trunk Port:

- Used to connect switches or routers.

- Carries traffic for multiple VLANs using 802.1Q tagging.

- Example: `Switch(config-if) switchport mode trunk`

3. Hybrid Port (Cisco-specific feature):

- Can function as both an access and trunk port.

4. EtherChannel:

- Groups multiple physical ports into a single logical link to increase bandwidth.

3-enable secret [password] is Hashed using the algorithm.

1. MD5
2. AH
3. PSK
4. ESP
5. WPA2

Ans A.MD5

4- An engineer connects to Router R1 and issues a show ip ospf neighbor command. The status of neighbor 2.2.2.2 lists FULL/BDR. What does the BDR mean?

1. R1 is an Area Border Router.
2. R1 is a backup designated router.
3. Router 2.2.2.2 is an Area Border Router.
4. Router 2.2.2.2 is a backup designated router.

Ans. D. Router 2.2.2.2 is a backup designated router.

5-Which command is used to view the neighbor discovery table on a PC?

1. Show ipv6 neighbor
2. Show ipv6 neighbors
3. Netsh interface ipv6 show neighbor
4. Netsh interface ipv6 show neighbors

Ans. Netsh interface ipv6 show neighbor

6-What type of variable is being shown? Routers = [R1,R2,R3]

1. List
2. Dictionary
3. Simple
4. Unsigned integers

Ans. A.List

7- Identify the fields in an Ipv4 header. (Choose three)

1. Host component
2. Time to Live
3. Source address
4. Destination address
5. Network address

Ans. B. Time to Live , C. Source address & D. Destination address