**Networking career development program.**

**Assignment: CCNA Module - 8: Network Access Basic Routing And Advance Routing Concept, Switching Concept –**

**Section 1. question and answer**

1. **Explain switch**

* A **switch** is a network device that connects multiple devices within a LAN and forwards data only to the intended recipient using MAC addresses. It improves network efficiency by reducing unnecessary traffic and supports full-duplex communication

• Operates at Layer 2 (Data Link Layer) of the OSI model.

• Uses MAC address table (CAM table) to forward traffic.

1. **Explain Switch Boot Sequence.**

* The switch boot sequence is the step-by-step process a switch follows when powered on, starting from hardware checks to loading the operating system and configuration files

⚙️ Switch Boot Sequence (Cisco Example)

Here’s a brief overview of the **5 main steps** in a typical Cisco switch boot process:

1. **Power-On Self Test (POST)**
   * The switch runs diagnostic tests stored in ROM to check hardware components like CPU, RAM, and interfaces.
   * LEDs on the switch indicate POST status (amber during test, green if successful).
2. **Load Boot Loader**
   * A small program stored in ROM initializes the CPU and basic hardware.
   * It prepares the switch to load the operating system (IOS).
3. **Load IOS (Internetwork Operating System)**
   * The switch loads the IOS from **flash memory**.
   * IOS is the main operating system that controls switch functions.
4. **Load Startup Configuration**
   * The switch checks **NVRAM** for a saved configuration file (startup-config).
   * If found, it loads the settings (like VLANs, interface configs, passwords)
5. **Switch Ready for Use**

* The switch enters **user EXEC mode**.
* If no configuration is found, it enters **setup mode** for manual configuration.

**🛠️ Quick CLI Check After Boot**

Switch> enable

Switch# show version

Switch# show running-config

1. **Explain Three Methods to access Switch Command Line Interface.**

* **🖥️ 1. Console Access (Local Access)**

How it works: Connect a PC directly to the switch using a console cable (usually RJ-45 to DB-9 or USB).

Software needed: Terminal emulator like PuTTY, Tera Term, or HyperTerminal.

Use case: Initial setup or recovery when remote access isn’t available.

**🌐 2. Telnet Access (Remote Access)**

* How it works: Access the switch CLI over the network using the Telnet protocol.
* Requirements:
  + Switch must have an IP address configured.
  + Telnet must be enabled.

**Bash command**

telnet 192.168.1.1

* **Use case**: Remote management (less secure than SSH).

**🔐 3. SSH Access (Secure Remote Access)**

* How it works: Securely access the switch CLI over the network using SSH (Secure Shell).
* Requirements:
  + IP address and hostname configured.
  + SSH and domain name enabled.
  + RSA key generated.

1. **Explain and Configuring the Cisco Internet Operating System.**

**🧠 What Is Cisco IOS?**

**Cisco IOS is a proprietary operating system used on Cisco devices to:**

* **Manage network traffic**
* **Configure routing and switching protocols**
* **Secure and monitor network activity**
* **Provide remote access and automation**

**It supports various command modes:**

* **User EXEC mode (Switch>)**
* **Privileged EXEC mode (Switch#)**
* **Global Configuration mode (Switch(config)#)**
* **Interface Configuration mode (Switch(config-if)#)**

**🛠️ Basic Cisco IOS Configuration Steps**

Here’s a practical example for configuring a Cisco switch or router:

**1. Access the Device**

* Use console, Telnet, or SSH to reach the CLI.

**2. Enter Privileged EXEC Mode**

Switch> enable Switch#

**3. Enter Global Configuration Mode**

Switch# configure terminal Switch(config)#

**4. Set Hostname**

Switch(config)# hostname MySwitch MySwitch(config)#

**5. Configure Interface**

MySwitch(config)# interface FastEthernet0/1 MySwitch(config-if)# description Connected to PC1 MySwitch(config-if)# switchport mode access MySwitch(config-if)# switchport access vlan 10 MySwitch(config-if)# no shutdown

**6. Set Console Password**

MySwitch(config)# line console 0 MySwitch(config-line)# password cisco MySwitch(config-line)# login

**7. Save Configuration**

MySwitch# write memory

**🔐 Optional: Enable SSH for Secure Access**

MySwitch(config)# ip domain-name example.com MySwitch(config)# crypto key generate rsa MySwitch(config)# username admin password admin123 MySwitch(config)# line vty 0 4 MySwitch(config-line)# login local MySwitch(config-line)# transport input ssh

This setup gives you a secure, manageable Cisco device ready for VLANs, routing, or AAA configuration. Want help building a full lab with NAT, RIP, and AAA? I can guide you step-by-step in Packet Tracer.

1. **Explain Switch Port.**

* **🧩 What Is a Switch Port?**

A switch port is a physical socket on a network switch where Ethernet cables are plugged in to connect devices.

It enables data transmission between connected devices using packet switching, which efficiently forwards data to the correct destination.

Each port operates at Layer 2 (Data Link Layer) of the OSI model, though some can also function at Layer 3 (Network Layer) in advanced switches.

* **🔌 Types of Switch Ports**

**Access Port**

Connects to end devices like PCs or printers.

Carries traffic for a single VLAN (Virtual Local Area Network).

**Trunk Port**

Connects to other switches or routers.

Can carry traffic for multiple VLANs using tagging (e.g., IEEE 802.1Q).

**Hybrid Port**

Combines features of both access and trunk ports.

Can carry multiple VLANs but treats untagged traffic as part of a default VLAN.

**⚙️ Key Functions**

* **Data forwarding**: Directs data packets only to the intended recipient device.
* **MAC address learning**: Switches learn and store the MAC addresses of connected devices to optimize traffic flow.
* **Loop prevention**: Uses protocols like STP (Spanning Tree Protocol) to avoid network loops.

**🛠️ Use Cases**

* Building **enterprise networks** with multiple departments (VLANs).
* Connecting **IoT devices**, servers, and workstations in offices.
* Creating **segmented networks** for better security and traffic management.

If you're setting up or managing a network, understanding switch ports is essential for ensuring efficient and secure communication between devices.

**Section 2. MCQS**

1. **1. 4-R1, R2, R3, and R4 have their Fast Ethernet 0/0 interfaces attached to the same VLAN. A network engineer has typed a configuration for each router by using a word processor. He will later copy and paste the configuration into the routers. Examine the following exhibit, which lists configuration for the four routers, as typed by the network engineer. Assuming that**

**all four routers can ping each other’s LAN IP addresses after the configuration has been applied, choose the routers that will be able to form a neighbor relationship with the other routers on the LAN. (You can assume that, if not shown in the exhibit, all other related parameters are still set to their defaults.) (Choose two)**

* B. R2 and D. R4

1. **enable secret [password] is hashed using the\_\_\_\_\_\_\_\_algorithm.**

* A. MD 5

1. **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?**

* D. Router 2.2.2.2 is a backup designated router.

1. **Which command is used to view the neighbor discovery table on a PC?**

* **C.** netsh interface ipv6 show neighbor

1. **What type of variable is being shown? Routers = [R1,R2,R3]**

* A. list

1. **Identify the fields in an IPv4 header. (Choose three)**

* B. Time to Live

C. Source address

D. Destination address