

**Hardware Networking**

**Network Access**

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**1. Explain Switch**

* A **switch** is a network device that connects multiple devices in a **Local Area Network (LAN)**.
* It operates at **Layer 2** (Data Link Layer) of the **OSI model** and forwards data based on **MAC addresses**.
* Unlike a **hub**, a switch sends data only to the intended recipient, improving network performance.
* **Types of Switches:**
  1. **Managed Switch:** Allows configuration and network control.
  2. **Unmanaged Switch:** Works automatically without configuration.

**2. Explain Switch Boot Sequence**

When a switch is powered on, it follows these steps:

1. **Power-On Self-Test (POST):**
   * The switch checks its hardware (CPU, RAM, interfaces).
2. **Boot Loader Execution:**
   * A small program in ROM runs and locates the operating system.
3. **Loading the Cisco IOS:**
   * The switch loads the **IOS (Internetwork Operating System)** from **Flash memory**.
   * If the IOS is missing, the switch enters **ROMMON mode** (recovery mode).
4. **Loading Configuration:**
   * The switch loads its **startup configuration** from **NVRAM**.
   * If no configuration is found, it enters **setup mode** for initial configuration.

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

1. **Console Access:**
   * Uses a **console cable** and software like **Putty or Tera Term**.
   * Needed for initial setup.
2. **Telnet/SSH (Remote Access):**
   * Requires an **IP address** on the switch.
   * **Telnet** is unencrypted, while **SSH** is secure.
3. **AUX (Auxiliary) Port Access:**
   * Uses a **modem connection** for remote access.
   * Rarely used today.

**4. Explain and Configure Cisco Internet Operating System (IOS)**

* **Cisco IOS** is the operating system used on Cisco switches and routers.
* **Basic Configuration:**

|  |  |
| --- | --- |
| **Enter Privileged Mode** | Enable |
| **Enter Global Configuration Mode** | configure terminal |
| **Set Hostname** | hostname MySwitch |
| **Set Enable Password** | enable secret mypassword |
| **Save Configuration** | write memory |

**5. Explain Switch Port**

* A **switch port** is a physical interface on a switch where devices connect.
* **Types of Switch Ports:**
  1. **Access Port:** Connects to **end devices (PCs, printers, etc.)** and belongs to a **single VLAN**.
  2. **Trunk Port:** Connects to **another switch or router** and carries **multiple VLANs**.
  3. **Hybrid Port:** Can function as both an **access and trunk port**.

**6. OSPF Neighbor Relationship Formation**

* **OSPF Neighbor Requirements:**
  1. **Same subnet** on interfaces.
  2. **Same OSPF area** (e.g., area 0).
  3. **Matching hello and dead timers**.
  4. **Same authentication settings**.
* **Observations from the Configuration:**
  1. Each router has a **different OSPF process ID**, but this does not affect neighbor relationships.
  2. The **OSPF area** is not shown. If they have different areas, they will not become neighbors.
  3. **Assuming they are all in area 0**, they should form neighbors.

**Answer:** **R1 and R2 will form a neighbor relationship.**

**7. Enable Secret Password Hashing Algorithm**

**Answer: MD5 (Message Digest Algorithm 5)**

**Reason:**

* Cisco uses **MD5** hashing to store passwords securely.
* MD5 is a **one-way cryptographic function** that protects passwords from being stored in plain text.

**8. Meaning of FULL/BDR in OSPF**

**Answer: Router 2.2.2.2 is a Backup Designated Router (BDR).**

**Explanation:**

* **BDR (Backup Designated Router)** is the backup for the **Designated Router (DR)** in OSPF.
* If the DR fails, the BDR takes over.
* **FULL state** means that the routers have exchanged all OSPF information.

**9. Command to View the Neighbor Discovery Table on a PC**

**Answer: netsh interface ipv6 show neighbor**

**Explanation:**

* The netsh command in Windows manages network settings.
* netsh interface ipv6 show neighbor displays IPv6 neighbors (similar to ARP for IPv4).

**10. Identify the Type of Variable**

**Answer: List**

**Reason:**

* In Python, a **list** is a collection of items enclosed in **square brackets [ ]**.
* It allows storing multiple values in a single variable.

**11. Identify Fields in an IPv4 Header (Choose Three)**

**Answer:**

1. **Time to Live (TTL)** → Limits the number of hops a packet can travel.
2. **Source Address** → Identifies the sender's IP address.
3. **Destination Address** → Identifies the receiver's IP address.

**Incorrect Choices:**

* **Host Component** → Not a field in an IPv4 header.
* **Network Address** → No direct field called "Network Address."