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**Assignment Module - 7 : CCNA - Network Fundamentals**

1. **Which of the following messages in the DHCP process are broadcasted? (Choose two)**

**Ans.** A) Request and C) Discover

1. **Which command would you use to ensure that an ACL does not block web-based TCP traffic?**

Ans. B) permit tcp any any eq 80

1. **Explanation of Network Topologies.**

Ans.

1. **Bus Topology** : Bus Topology is a network where all nodes are connected with each other with a single backbone cable. In this topology when one node wants to access another node on the network then it puts a massage addressed to that device on the bus network.
2. **Ring Topology :** When each device is serially connected in a closed ring pattern with a single cable then the network system is called ring topology. Ring topology pass a massage one node to another node and it also needs the token or the opportunity to transmit.
3. **Star Topology :** In this configuration all nodes are connected to a central hub with separated cables. Here the central node or hub acts like the main server or the other nodes which are connected to the central node act like client device.
4. **Mesh Topology:** Here each & every node in network are interconnected with each other.it works independently.
5. **Hybrid Topology:** Hybrid topology is the combination of two or more different network topologies. This network is a mixture of both peer to peer & client to server network. It can be wired and wireless network.
6. **Explanation of TCP/IP model.**

Ans. The TCP/IP model have four layers structure to transmit data across IP network.

1. **Application Layer ( Layer 4 ) :** it provides interface to end user for interact with applications and network services like HTTP, FTP,SMTP,DNS etc . It also defines standard data format and presentation of data.
2. **Transport layer (Layer 3 ) :** The Transport layer provides “end-to-end” communication to ensure that packets arrive in sequence and without error. It does so by acknowledging reception of data and retransmitting lost packets. This layer uses Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) as its core protocols.
3. **Internet Layer ( Layer 2 )** : The internet layer is responsible for accepting, routing and delivering data packages. The core protocols of the internet layer include internet protocol (IP), Address Resolution Protocol (ARP) protocol, internet Control Message Protocol (ICMP) protocol and Internet Group Management Protocol (IGMP). This layer of the TCP/IP reference model is the equivalent of the Network layer of the OSI model.
4. **Network Interface Layer ( Layer 1 )** : The Network interface layer or the Network Access layer is responsible for transferring TCP/IP packets on and off the network medium. TCP/IP, which can transfer data irrespective of the network access method, frame format, or medium, can be used to communicate among different network types.
5. **Explanation Of LAN and WAN network**

Ans. **LAN ( Local Area Network ) :** The Local Area Network is a common network domain that connects a group of computer system and network devices in a smaller range of areas, usually within a building, either through Fast Ethernet or Gigabit Ethernet

**WAN ( Wide Area Network ) :** WAN is a method of communication between two or more different geographical locations through a service provider (ISP) with high speed technology. WAN connects multiple LANs through as established network (Internet) which is relatively expensive in cost.

1. **Operation of switch**

Ans. A network switch connects devices within a network (often a local area network, or LAN\*) and forwards data packets to and from those devices. Unlike a router, a switch only sends data to the single device.

1. **Purpose and functions of Network devices:**

**Ans. NIC (Network Interface Card )** : It is indeed a circuit board or a card that is installed in a computer so that it can be connoted to a network. Actually the network interface card provides the computer with a dedicated, full-time connection to a network.

**Repeater** : Repeater is a network device, which used to regenerate or replicate a signal. It removes the unwanted noise in an incoming signal. Unlike an analog signal, the original digital signal, even if weak or distorted, can be clearly perceived and restored. Repeater operates at Layer 1 of OSI.

**HUB :** Basically a hub is a common connection point for devices in a network. Hubs are commonly used to connect segments of a LAN. A hub contains multiple ports When a packet arrives at one port, it is copied to the other ports so that all segments of the LAN can see all packets. HUB operate at Layer 1 of OSI.

**Switch :** A network switch connects devices within a network (often a local area network, or LAN\*) and forwards data packets to and from those devices. Unlike a router, a switch only sends data to the single device. Switch operates at Layer 2 of OSI

**Bridge :** Bridge devices inspect incoming network traffic and determine whether to forward or discard it according to its intended destination. Bridge device operate at the data link layer 2 of the OSI model.

**Gateway :** A gateway is a network node which connects two network in different protocols. Gateways can take several forms, including routers or computers and can perform a variety of tasks.

**Router :** Router is one of the most used networking devices used to sharing internet connection between two devices. The operation of router is complicate as it can be both software and hardware and operate at layer 3 of OSI.

1. **The appropriate media, cables, ports and connectors to connect switches to other.**

Ans. **. 1. Media**

* **Copper cables:**
* Twisted Pair Cables : Shielded
  + - **Cat 5e** (up to 100 Mbps)
    - **Cat 6** (up to 1 Gbps or 10 Gbps, depending on distance)
    - **Cat 6a** (up to 10 Gbps)
    - **Cat 7** (up to 10 Gbps, shielded)
* **Fiber Optic Cables** (for long-distance, high-speed connections):
  + **Single-mode fiber (SMF)** (long-distance, high-bandwidth)
  + **Multi-mode fiber (MMF)** (shorter-distance, higher bandwidth than copper)

**2. Cables**

* **Ethernet Cables**:
  + **Cat 5e, Cat 6, Cat 6a, Cat 7, Cat 8** twisted pair cables with RJ45 connectors for copper connections.
  + Fiber optic cables with different connector types (e.g., LC, SC, ST, MTP/MPO).

**3.Ports**

* **Ethernet Ports** (typically found on most switches):
  + **RJ45 Ports** (for twisted pair copper cables, support 10/100/1000/10000 Mbps speeds depending on the port type).
* **SFP/SFP+ Ports** (for fiber optic connections):
  + **SFP (Small Form-factor Pluggable)** (usually for Gigabit Ethernet or Fiber connections).
  + **SFP+** (for 10 Gbps Ethernet or higher-speed fiber optic connections).
  + **QSFP** (Quad Small Form-factor Pluggable) (used for 40 Gbps Ethernet and higher).
* **PoE Ports** (Power over Ethernet ports for powering devices like IP phones or cameras):
  + RJ45 ports with PoE support.

**4. Connectors**

* **RJ45 Connectors** (for Ethernet copper cables):
  + Standard connectors for twisted pair cables (Cat 5e, Cat 6, etc.).
* **LC, SC, ST Connectors** (for fiber optic cables):
  + **LC** (Lucent Connector, small form factor, commonly used in high-density applications).
  + **SC** (Standard Connector, larger than LC, used in data centers).
  + **ST** (Straight Tip, used in older installations).
  + **MTP/MPO** (multi-fiber push-on, for high-density, high-performance connections in data centers).

1. **Network Devices and Hosts :**

**Ans. Network Devices :**

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4. **Switch** : A network switch connects devices within a network (often a local area network, or LAN\*) and forwards data packets to and from those devices. Unlike a router, a switch only sends data to the single device. Switch operates at Layer 2 of OSI
5. **Bridge** : Bridge devices inspect incoming network traffic and determine whether to forward or discard it according to its intended destination. Bridge device operate at the data link layer 2 of the OSI model.
6. **Gateway** : A gateway is a network node which connects two network in different protocols. Gateways can take several forms, including routers or computers and can perform a variety of tasks.
7. **Router** : Router is one of the most used networking devices used to sharing internet connection between two devices. The operation of router is complicate as it can be both software and hardware and operate at layer 3 of OSI.

**Hosts:**

* **Computers :** 
  + **Function**: Desktops, laptops, and servers are examples of hosts that generate, receive, and process network traffic.
  + **Example**: Desktop PCs, workstations, file servers, application servers.
* **Smartphones and Tablets :** 
  + **Function**: Mobile devices, such as smartphones and tablets, can connect to a network either via Wi-Fi or mobile data and are considered hosts.
  + **Example**: iPhones, Android devices, tablets.
* **Printers and Scanners**
  + **Function**: Network-enabled printers and scanners are hosts in a network that can send and receive data, allowing users to print or scan remotely.
  + **Example**: Network printers, multi-functional printers.
* **IoT Devices**
  + **Function**: Internet of Things (IoT) devices, such as smart thermostats, cameras, sensors, and smart speakers, are hosts that connect to a network to exchange data.
  + **Example**: Smart thermostats, security cameras, smart speakers (Amazon Alexa, Google Home).
* **VoIP Phones**
  + **Function**: Voice-over-IP (VoIP) phones are networked devices that transmit voice data over the internet or private networks instead of traditional phone lines.
  + **Example**: IP phones used in business environments.
* **Servers**
  + **Function**: Servers are powerful hosts designed to provide resources, services, or data to other devices on the network. These can include web servers, database servers, and file servers.
  + **Example**: Web servers, DNS servers, mail servers.
* **Network Attached Storage (NAS)**
  + **Function**: NAS devices are specialized file storage devices that provide shared access to data over a network, functioning as hosts that provide storage resources to users or other devices.
  + **Example**: Personal or enterprise-level NAS devices.