Date: 10/07/2024

Lab Practical #03:

Study of different network devices in detail.

Practical Assignment #03:

1. Give difference between below network devices.
   - Hub and Switch
   - Switch and Router
   - Router and Gateway
2. Working of below network devices:
   - Switch
   - Router
   - Gateway

Hub and Switch

No.	Hub	Switch
1	Physical layer. Hubs are classified as Layer 1 devices per the OSI model.	Data link Layer. Network switches operate at Layer 2 of the OSI model.
2	Passive Device (Without Software).	Active Device (With Software) & Networking device.
3	Hubs always perform frame flooding : may be unicast, multicast or broadcast.	First broadcast : then unicast & multicast as needed.
4	A network hub cannot learn or store MAC address.	A network switch stores MAC addresses in a lookup table.
5	Half duplex.	Full duplex.

Switch and Router

No.	Switch	Router
1	LAN for office, Data Center or Campus environment.	WAN for Office, Data center or Campus environment.
2	Does not support MPLS and VPN services.	Router provides MPLS and VPN services like PPP etc.
3	Forwarding is performed by specialized ASICs.	Performed by software.
4	Smaller routing table compared to router.	Considerably bigger to support multiple route entires.
5	Transmission mode : Half & Full duplex	Transmission mode : Full duplex.

Date: 10/07/2024

Router and Gateway

No.	Router	Gateway
1	Can only work with similar networks.	Can work with dissimilar networks
2	Using TCP/IP and UDP protocols.	Using different protocols.
3	Routes data packet from one network to another based on internal routing tables.	Converts the data packets protocols from one format to another
4	Support both static and dynamic routing.	Doesn't support both.
5	Connect purely dedicated physical hardware.	Can connect a physical and virtual devices.

Working of below network devices:

1. Switch
   - When the source wants to send the data packet to the destination, the packet first enters the switch and the switch reads its header and finds the MAC address of the destination to identify the device then it sends the packet out through the appropriate ports that lead to the destination devices.
   - Switch established a temporary connection between the source and destination for communication and terminates and connection once the conversation is done. Also, it offers full bandwith to network traffic going to and from a device simultaneously to reduce collision.

How Does a Network Switch Works?

Date: 10/07/2024

2. Router

- Consider a router as an air traffic controller, and consider data packets as planes flying to various airports. Each packet must be directed as quickly as possible to its destination, just as each plane has a distinct destination and travels a distinct route. A router assists in guiding data packets to their intended IP address, just like an air traffic controller ensures that aircraft reach their destinations without getting lost or experiencing significant disruptions in a route.
- An internal routing table, which is a list of routes to different network destinations, is used by a router to effectively direct packets. In order to determine the destination of a packet, the router first scans its header. Then, it consults the routing table. Forward packet to next packet.

3. Gateway

- The user end's application made a request for a certain amount of data via its portal to the gateway. For example, A smart door made a request for the data type : "password" and send this request to the gateway.
- The gateway sends this request for a password to the server.
- The server receives the request and search for the data type : "password" for a certain "id" and made the data "password" transfer to the gateway.
- The data is then sent to the smart door interface where it is matched with the data entered for data type : "password". If these two data matches then the door gets unlocked.