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**1.Network Interface Card**

NIC functions: Transmits signals at the physical layer and delivr data packets at the network player.

Code of NIC processors: 10795

Check NIC of a computer, what is its MAC address? hardware address

Cable to connect NIC to a network: Ethernet cable with an RJ-45 connector

Type: ethernet and wireless

**2.Hub**

Roles of hub in a network: connection point for devices in a network

Weaknesses of hub: can’t control traffic of data, limited port to connect client, so it is not suitable for large network, process one by one for every work received.

Main characteristics of hub: Hub sends all the data packet to all the port.

Hub ports:  [8P8C](https://en.wikipedia.org/wiki/8P8C),  [BNC](https://en.wikipedia.org/wiki/BNC_connector), AUI

**3.Switches**

Roles of switches in a network: used as the network connection point for hosts at the edge of a network

Main characteristics of switches:

Differences between hubs and switches: A hub works on the physical layer (Layer 1) of OSI model while Switch works on the data link layer (Layer 2). Switch is more efficient than the hub. A switch can join multiple computers within one LAN, and a hub just connects multiple Ethernet devices together as a single segment. Switch is smarter than hub to determine the target of the forwarding data. Since switch has a higher performance, its cost will also become more expensive.

Weaknesses of switches: Unless the switch is expensive enough to include "port mirroring" capability, a sniffer is of limited use on a switch because the switch automatically filters out the traffic the sniffer would like to get.

Main characteristics of switches: creates virtual connection line to connect 2 individuals privately, ensure full bandwidth. Provides larger bandwidth for every connection by creating smaller conflict point.

Switch ports: Access Ports, Trunk Ports, Tunnel Ports

**4.Routers**

Roles of router in a network: Forwards data packets between computer networks. Routers perform the traffic directing functions on the Internet

Main characteristics of routers:

-Routers are multi-port devices with high – speed backbones

-Routers also support filtering and encapsulation like bridges

-Like bridges routers are also self-learning, as they can communicate their existence. to other devices and can learn of the existence of new routers, nodes and LAN segments

-Route traffic by considering the network as a whole. It shows that they use a high level of intelligence to accomplish this task. This characteristic makes them superior than hubs and bridges because they simply view the network on a link-by-link basis

-The packet handled by router may include destination address, packet priority level, least-cost route, minimum route delay, minimum route distance, and route congestion level

-Routers constantly monitor the condition of the network, as a whole to dynamically adapt to changes in the condition of the network

-They typically provide some level of redundancy so that they are less susceptible to catastrophic failure.

Differences between routers and switches:

The main objective of router is to connect various networks simultaneously, works in network layer, used by LAN as well as MAN Through router data is sent in the form of packet. While the main objective of switch is to connect various devices simultaneously, works in data link layer, switch is used by only LAN, data is sent in the form of packet and frame.

Router ports:  LAN ports and WAN ports

**5. Access Points**

Roles of access points:  creates a wireless local area network, or WLAN, usually in an office or large building, projects a Wi-Fi signal to a designated area

Main characteristics of access points:

Local wireless networks, Local switch using wired ports, pass-through ports

Access point’s interfaces: wifi interfaces: IBSS,AP, AP/VLAN,WDS,…

Compare access point and other networking devices mentioned above:

Advantages: More users access, broader range of transmission, flexible networking, multi-AP interconnection

Disadvantages: High cost, inability to be used alone, poor stability

**6. Modem**

Differentiate:

• Dial-up modem: use standard telephone lines to transmit and receive information, used in the old days

• ADSL Modem:  enables faster data transmission over copper telephone lines than a conventional voiceband modem can provide

• Cable Modem: connects computer devices with your Internet service provider,  uses coax cable  rather than a telephone or DSL line

**7. Connecting network devices:**

The type of network cable can be used for below network connections:

a) Computer and hub Crossed cable

b) Computer and switch Ethernet crossover cable

c) Computer and router Ethernet cable

d) Computer hub and hub Crossed cable

e) Hub and switch Ethernet Crossover Cable

f) Hub and router Ethernet Crossover Cable

g) Switch and switch Ethernet Crossover Cable

h) Swith and router Ethernet Crossover Cable

k) Router and router crossover cable