

Computer Networks 1

Lab 1a

Network Devices

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I. Objectives

- Get to know the basic network devices
- Understand functions of network devices
- Able to connect different network devices together to form a simple network

II. Content

1. Get to know network devices:

- ★ Network Interface Card (NIC)
- ★ Cables
- ★ Hub
- ★ Switches
- ★ Routers
- ★ Access Points
- ★ Modems

2. Understanding functions of network devices

a. Network Interface Card (NIC)



NIC functions: provides a computer with a dedicated, full-time connection to a network. It implements the physical layer circuitry necessary for communicating with a data link layer standard.

Check NIC of a computer, what is its MAC address? **30-D0-42-2C-3B-1A**

Cable to connect NIC to a network:

Type: BELDEN 9580

Standard: IEEE 802.3 10 Base 2

b. Hubs



Roles of hub in a network: is used to connect segments of a LAN (Local Area Network)

Main characteristics:

- Works with broadcasting and shared bandwidth
- Work at Physical Layer
- Has 1 broadcast domain and 1 collision domain
- Support half-duplex

Weakness of hub:

- Mostly Half-Duplex
- Does not offer dedicated bandwidth
- It cannot select Network's best path
- There is no mechanism of any kind to reduce network traffic

Hub ports: have 4/12 ports

c. Switches



Roles of switches in a network: connects various devices together on a single computer network.

Main characteristics of switches:

- It is Data Link layer device
- It works with fixed bandwidth
- It maintains a MAC address table
- Allows you to create virtual LAN
- Support half and full-duplex transmission modes
- It supports unicast (one-to-one), multicast (one-to-many) and broadcast (one-to-all) communication.

Difference between hubs and switches:

Hub	Switch
Operated on Physical Layer	Operated on Data Link Layer
Broadcast type transmission only	Unicast, multicast, broadcast
4/12 ports	24 to 48 ports
Half-Duplex	Half/Full-Duplex
Not provide Packet filtering	Provide Packet filtering

Weakness of switches:

- Handling Multicast packets that requires quite a bit of configuration & proper designing.
- Reduces the number of Broadcast domains.

Switch port: 24 to 48 ports. 3 types: access port, trunk port, hybrid port

d. Routers



Roles of routers in a network: Take the information from modem and deliver it to computer by forwarding data packets between computer networks.

Main characteristics of routers:

- Multi-port devices with high speed.
- Support filtering and encapsulation.
- Works on Network Layer
- Allows users to configure the port as their requirements in the network
- Creates various paths to forward the data
- Filter out the unwanted data

Differences between routers and switches:

Router	Switch
Works in Network Layer	Works in Data Link layer
Used by LAN and MAN	Used by LAN
Connect various networks simultaneously	Connect various devices simultaneously
Can work with wired and wireless networks	Can only work with the wired network

Routers ports: Aux port, AUI port, Serial port, Ethernet port, Console port, WIC port, HWIC port.

e. Access Points



Roles of access points: to extend the wireless coverage of an existing network and for increasing the number of users that can connect to it.

Main characteristics of access points:

- Allows more users to access.
- Brings more space which can connect to the internet.
- Network flexibility

Compare access point and other networking devices mentioned above: The router acts as a hub that sets up a LAN and manages all of the devices and communication in it. An access point, on the other hand, is a sub-device within the LAN that provides another location for devices to connect from and enables more devices to be on the network.

f. Modem

Cable Modem



Differentiate:

- Dial-up modem: Dial-up modems transmit analog signal via telephone lines. This modem is used mostly to make connections with ISP using analog signals.
- ADSL modem (Asymmetric Digital Subscriber Line): uses the telephone line for sending and receiving all information. ADSL modems have higher speed compare to conventional voice and modem.:
- Cable modem: In the cable modem, to use the coaxial cables those are connected to the back edge of the modem.

3. Connecting network devices

- a. Computer and hub: Straight through
- b. Computer and switch: Straight through
- c. Computer and router: Cross over
- d. Computer hub and hub: Cross over
- e. Hub and switch: Cross over



- f. Hub and router: Straight through
 - g. Switch and switch: Cross over
 - h. Switch and router: Straight through
 - i. Router and router: Cross over
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