Computer Network (CO3094)

Assignment

Computer Network Lab 1a

Advisor: Nguyen Manh Thin
Students: Dang Cao Cuong - 1952598

HO CHI MINH CITY, MAY 2021

Contents

1 Part 1

1. Network Interface Card(NIC)
NIC functions:

- It plays role as translator that helps to convert data into digital signal.

- Network card provides both communication methods like as wired and wireless.

- It acts as middleware in between computer and data network. For example, when user sends the requests for any query on the internet then LAN card receives data from the user system, and then send them to the server over the internet, then finally it receives the needed data back from internet for viewing for users.

- This network card uses both OSI model layer such as physical and data link layer. Physical layer is used for transmitting signal and network layer to transfer data packets.

Check NIC of a computer, what is its MAC address?
We use the Command Prompt then commands "getmac/v". After that, we get the result: 98-28-A6-38-35-B9
Cable to connect NIC to a network

- Type:RJ-45

- Standard: Ethernet cable

2. Hubs
Roles of hub in a network: A Hub is a networking device that allows you to connect multiple PCs to a single network. It is used to connect segments of a LAN. A hub stores various ports, so when a packet arrives at one port, it is copied to various other ports.
Main characteristics:

- It works with broadcasting and shared bandwidth.

- It has 1 broadcast domain and 1 collision domain

- Works at the physical layer of the OSI model

- Provides support for half-duplex transmission mode

- A hub has just a single broadcast domain

- Does not support spanning tree protocol

- Packet collisions occur mostly inside a hub

Weaknesses of hub:

- It's mostly half-Duplex

- Does not offer dedicated bandwidth

- It can not select Network's Best Path.

- There is no mechanism of any kind to reduce network traffic.

- Possibility of the device differentiation

- Network size

Hub ports:

- 4/12 ports

3. Switches
Roles of switches in a network:

A network switch is a computer networking device that connects various devices together on a single computer network. It may also be used to route information in the form of electronic data sent over networks. Since the process of linking network segments is also called bridging, switches are usually referred to as bridging devices.

Main characteristics:

- It is Datalink layer device (Layer 2)

- It works with fixed bandwidth

- It maintains a MAC address table

- Allows you to create virtual LAN

- It works as a multi-port bridge

- Mostly comes with 24 to 48 ports

- Supports half and full-duplex transmission modes

Differences between hubs and switches:

- Hub

  – A hub operates on the physical layer.
  – Hubs perform frame flooding that can be unicast, multicast, or broadcast.
  – Just a singular domain of collision is present in a hub.
  – To connect a network of personal computers should be joined through a central hub.
  – Hub is a passive device
  – A network hub can't store MAC addresses.
  – Its speed is up to 10 Mbps

- Switch

  – A switch operates on the data link layer.
  – It performs broadcast, then the unicast and multicast as needed.

- Varied ports have separate collision domains

- Allow connecting multiple devices and ports

- A switch is an active device

- Switches use CAM (Content Accessible Memory) that can be accessed by ASIC (Application Specific Integrated Chips)

- 10/100 Mbps, 1 Gbps, 10 Gbps

Weaknesses of switches:

- Not as good as a router for limiting Broadcasts

- Communication between VLAN's requires inter VLAN routing, but these days, there are many Multilayer switches available in the market.

- Handling Multicast packets that requires quite a bit of configuration & proper designing.

- Reduces the number of Broadcast domains

Switch port: 4-48 ports
4. Routers
Roles of routers in a network:

- Routers are computer networking devices that serve two primary functions: (1) create and maintain a local area network and (2) manage the data entering and leaving the network as well as data moving inside of the network.

  Main characteristics of routers:

  A router works on the 3rd layer (Network Layer) of the OSI model, and it is able to communicate with its adjacent devices with the help of IP addresses and subnet. A router provides high-speed internet connectivity with the different types of ports like gigabit, fast-Ethernet, and STM link port.

  Differences between routers and switches:

  Routers:

    - Routers operate at Layer 3 (Network) of the OSI model.

    - Router will offer NAT, NetFlow and QoS Services

    - Networking device 2/4/8 ports.

    - Less Duplex

    - The speed limit is 1-10 Mbps for wireless and 100 Mbps for wired connection.

    - In Router, every port has its own broadcast domain

    - Routers can work within both wired and wireless network situations

  Switchs:

    - Network switches operate at layer two (Data Link Layer) of the OSI model.

- Switch will not offer such services.
- A switch is a multi-port bridge. 24/48 ports.
- In Full Duplex, So, no Collision occurs
- The speed limit for the switch is 10/100Mbps.
- The switch has one broadcast domain except VLAN implemented.
- Switches are restricted to wired network connections.

Router ports: 2/4/5/8

5. Access Points
Roles of access points:

- An access point is a wireless network device that acts as a portal for devices to connect to a local area network. Access points are used for extending the wireless coverage of an existing network and for increasing the number of users that can connect to it.

Main characteristics of access points:

- An access point serves as the connection point between wireless and wired networks or as the center point of a stand-alone wireless network. In large installations, wireless users within the radio range of an access point can roam throughout a facility while maintaining seamless, uninterrupted access to the network.

Access point's interfaces:

- An access point only provides an interface/portal for wireless clients to connect to your existing LAN. ... It 'routes' traffic between two different networks, usually the Internet on the WAN side, and your local area network on the LAN side.

Compare access point and other networking devices mentioned above:

- Hubs Hubs are used to connect computers on a network so as to communicate with each other. Each computer plugs into the hub with a cable, and information sent from one computer to another passes through the hub.

  A hub can't identify the source or destination of the information it receives, so it sends the information to all of the computers connected to it, including the one that sent it. A hub can send or receive information, but it can't do both at the same time.

- Switches

  Switches functions the same way as hubs, but they can identify the intended destination of the information that they receive, so they send that information to only the computers that its intended for.

  Switches can send and receive information at the same time, and faster than hubs can. Switches are best recommended on a home or office network where you have more computers and want to use the network for activities that require passing a lot of information between computers.

- Routers

  Routers are better known as intermediary devices that enable computers and other network components to communicate or pass information between two networks e.g. between your home network and the Internet.

  The most astounding thing about routers is their capability to direct network traffic. Routers can be wired (using cables) or wireless. Routers also typically provide built-in security, such as a firewall.

- Access Points

  Access points provide wireless access to a wired Ethernet network. An access point plugs into a hub, switch, or wired router and sends out wireless signals. This enables computers and devices to connect to a wired network wirelessly.

  You can move from one location to another and continue to have wireless access to a network. When you connect to the Internet using a public wireless network in an airport, hotel or in public, you are usually connecting through an access point. Some routers are equipped with a wireless access point capability, in this case you don't need a wireless access Point

6. Modem

- Dial-up modem: A dial-up modem transmits computer data over an ordinary switched telephone line that has not been designed for data use. This contrasts with leased line modems, which also operate over lines provided by a telephone company, but ones which are intended for data use and do not impose the same signaling constraints.

- ADSL Modem: ADSL is a contended service which means the service is shared with other users in your business and the local area, causing slower connections at

- ADSL Modem: ADSL is a contended service which means the service is shared with other users in your business and the local area, causing slower connections at busy times. For this reason ADSL broadband is not recommended for VoIP and Streaming services, as these can be seriously affected resulting in poor speech quality and buffering.

- Cable Modem: A cable modem delivers high-speed Internet to your devices by using coaxial cables that connect to the back of the modem and the bolt-like outlet in your wall or on your cable box. DSL and dial-up modems use a cable that connects to your phone line

2 Part 2

Connnecting network devices:

- Computer and hub: Straight

- Computer and switch: Straight

- Computer and router: Crossover

- Computer hub and hub: Crossover

- Hub and switch: Crossover

- Hub and router: Straight

- Switch and switch: Crossover

- Swith and router: Straight

- Router and router: Crossover