**Networking –** connecting devices

Local Arear Network (LAN) – connect short distances

Wide Area Network(WAN) – connect large geographical area

Metropolitan Area Network(MAN) – connect for town or city

Storage Area Network (SAN) – share storage area to multiple devices

**Networking Devices:**

1. Hub – connect computers as single lan network, 4,8,12,24,48 ports are availble

1a. Passive hub: Forward signal to all ports except incoming port

1b. Active hub: same like passive, improve quality by amplifying it (repeater)

1. Bridge – seperating LAN to small segments
2. Modem – Analog to Digital and Digital to analog
3. Switch – Not broadcast to all ports, it control of broadcasting
4. Router – Layer 3 device. Based on routing table signals sents to devices

**IP Address:**

Internet protocol. To identify a device or server

Two types of IP:

1. Public IP
2. Private IP

Two portions:

1. Network Portion
2. Host Portion

Two version of IP:

1. IPV4

-made up of 32 bits

-Broken into 4 octets (1octet=8bit)

-each octets ranges 0 to 255 in decimel or 00000000 to 11111111 in binary

-eg.194.68.10.11

-subnet is an logical subdivision of an IP network.

-subnet mask: 32bit number to identify network & host portion in IP

it is made of putting network bit as 1 and host bit as 0

11111111.00000000.00000000.00000000 ==== 255.0.0.0

**Five classes in IPV4:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Class** | **Public Network-Range** | **Supports** | **subnet mask:** |
| A | 1.0.0.1 - 126.255.255.255 | 16,777,214 host 126 n/w | 255.0.0.0 |
| B | 128.0.0.1 - 191.255.255.255 | 65,534 host 16,382 n/w | 255.255.0.0 |
| C | 192.0.0.1 - 223.255.255.255 | 254 host 20,97,150 n/w | 255.255.255.0 |
| D | 224.0.0.1 - 239.255.255.255 Reserved for Multicasting | | |
| E | 240.0.0.1 - 254.255.255.254 Reserved for Reasearch & Development | | |

**Private Ip Addressing(can use in local office)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Class** | **Private Network** | **Subnet mask** | **Addrese range** |
| A | 10.0.0.0 **to** 10.255.255.255 | 255.0.0.0 | 10.0.0.0 – 10.255.255.255 |
| B | 172.16.0.0 **to** 172.31.255.255 | 255.240.0.0 | 172.16.0.0 – 172.31.255.255 |
| C | 192.168.0.0 **to** 192.168.255.255 | 255.255.0.0 | 192.168.0.0 – 192.168.255.255 |

**Reserved address:**

|  |  |
| --- | --- |
| 0.0.0.0 | Default route |
| 127.0.0.0 | loopback address(testing) |
| 169.254.0.0 | apipa(automatic private ip address |
| 255.255.255.255 | broadcast address |

Question: 85.100.200.178. this type a because 85 is A

How to find network id- 85.0.0.0

How to find first host- 85.0.0.1

How to find last host – 85.255.255.254

How to find network id – 85.255.255.255

**IPV6**

**IP Routing:**

1. Static Routing

2. Dynamic Routing

2.a. Interior Fateway Protocol (IGP)

2.a.1. Link state Routing protocol eg.OSPF,ISIS

2.a.2. Distance Vector Routing protocol eg.RIP,IGRP

2.a.3. Hybrid Routing Protocol eg. EIGRP

2.b, Exterior Gateway Protocol (BGP)

**Toplogies**:

|  |  |  |
| --- | --- | --- |
| 1.Bus Topology | utilise a common backbone |  |
| 2.Ring Topology | Each device has 2 neighbour |  |
| 3.Star Topology | has a central hub |  |
| 4.Tree Topology | combination of bus and star topology |  |
| 5.Mesh Topology | interconnected to all other devices |  |

**OSI Layers:** Open systems Interconnect Model

defined by ISO internation organisation for standard

basic standard for all network devices

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Layer** | **Description** | **Data units** |
| Lower layer | Physical layer | hardware | Bits |
| Data link layer | control physical layer, mac addressing(48bit) | Frames |
| Network layer | ipv4,ipv6 | Packets |
| Transport layer | tcp,udp | Segments |
| Upper layer | session layer | session storage |  |
| presentation layer | ascii |  |
| application layer | http,smtp,ftp |  |

1.Lower layer:

1.physical layer(hardware)

2.data link layer(control physical layer, mac addressing)

3.network layer(ipv4,ipv6,routers)

4.transport layer(tcp,udp)

2.Upper layer

1.sessions layer(session storage)

2.presentation layer(ascii)

3.application layer (http,smtp,ftp)

**Ports:**

1 to 65,535

0 to 1023 standard and predefined

1024 to 49151 registered and paid

49151 to 65,535 private port numbers

HTTP TCP port 80

SMTP TCP port 25 & POP TCP port 110

|  |  |  |
| --- | --- | --- |
| **Protocol** | **Port number** | **TCP or UDP** |
| FTP | 20,21 | TCP |
| SSH | 22 | TCP |
| SMTP | 23 | TCP |
| DNS | 25 | UDP |
| TFTP | 53 | UDP |
| HTTP | 69 | TCP |
| POP3 | 80 | TCP |
| IMAP4 | 143 | TCP |
| HTTPS | 443 | TCP |

**Mac Address:**

Media Access Control- physical address identifies hardware interface

48 bit Hexadecimal

MM:MM:MM:SS:SS:SS M-manufacturer id, series number of NIC(network interface card)