

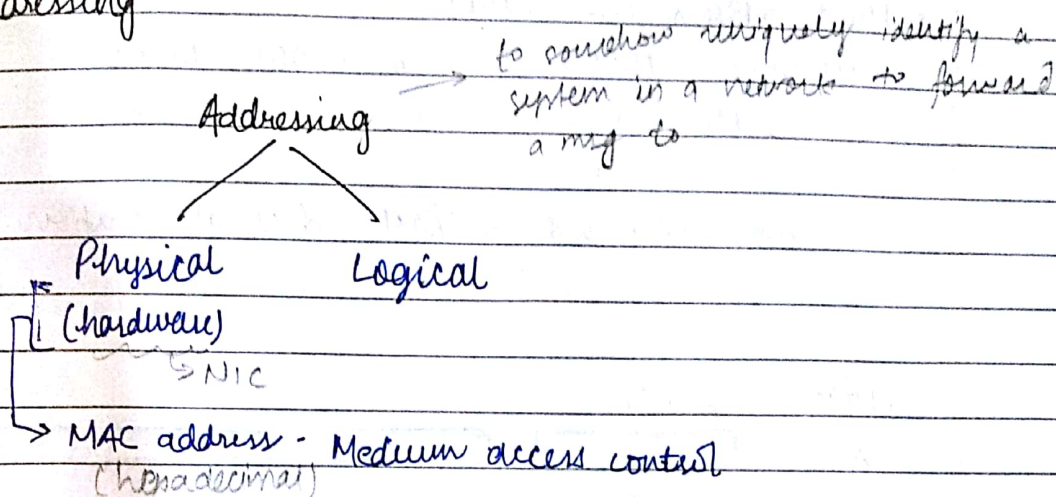
Devices

IP Addressing

NIC - Network interface card

Socket Programming

## # Addressing



\* Address conflict - If MAC address matches on transmitting some message. No transmission happens. That is why we need logical addressing.

\* Physical addressing can be sufficient for intra-connected network. But for inter-connected networks, we require logical addressing.

## # Logical addressing (Universal/global addressing)

→ Network information center (NIC) - provides a range of addresses for our network devices. Validates logical address for us.

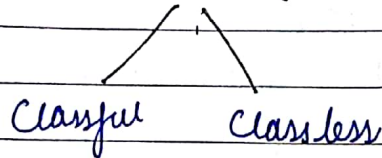
→ Internet protocol → IP addresses

IPv4 - old. 32 bit binary address. Address space exhausted.

IPv6 - newer. 128 bit binary address.  $2^{128}$  addresses.



# # IPv4 addressing



## # IPv4 address representation

11110000 1000 0000 00000001 00100010  
240 . 128 . 1 . 34

240.128.1.34 → Dotted decimal notation

More user friendly

Class	Range	1	2	3	4
A	0-127	0			
B	128-191	10			
C	192-223	110			
D	224-255	1110			
E	256-255	1111			

232.16.201.1 - Class D

15. 301. 43. 1 - Invalid  
X

Class A }  
Class B } Host identification  
Class C }

Class D ] Multicasting

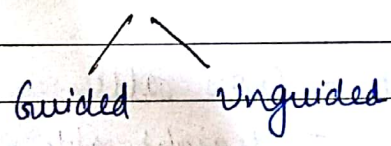
barely used  
worst ← Class E ] Local and experimental purpose  
or, reserved for future use.

Q. Find the class of each address convert to dotted decimal notation & find the n/w & host id.

- a) 10110101 00011000 11010001 01010000
- b) 01000001 10010001 10111110 00101111
- c) 11101101 10000001 10010001 10101011
- d) 11110001 01110101 10000101 11110011
- e) 00010001 10000011 10001010 01111001
- f) 1001101 11010001 10000000 00010010
- g) 01111110 10001000 11011101 10001000

- a) 181. 24. 204. 80 - Class B
- b) 65. 145. 190. 47 - Class A
- c) 247. 129. 145. 171 - Class D
- d) 241. 117. 130. 243 - Class E
- e) 17. 131. 138. 121 - Class A
- f) 173. 209. 128. 18 - Class B
- g) 126. 136. 221. 136 - Class A

### Transmission medium



#### Guided medium

- Twisted pair cable (Shielded / unshielded)
- Coaxial cable
- Fiber optic cable

#### Unguided medium

- Electromagnetic wave

#### Twisted pair cable

- Two insulated copper wire arranged in a regular spiral pattern (cancels out interference)
- Least expensive
- Mostly used.



## UTP & STP

- Unshielded twisted pair (UTP) - 7 categories.
- Used with RJ45 connector.

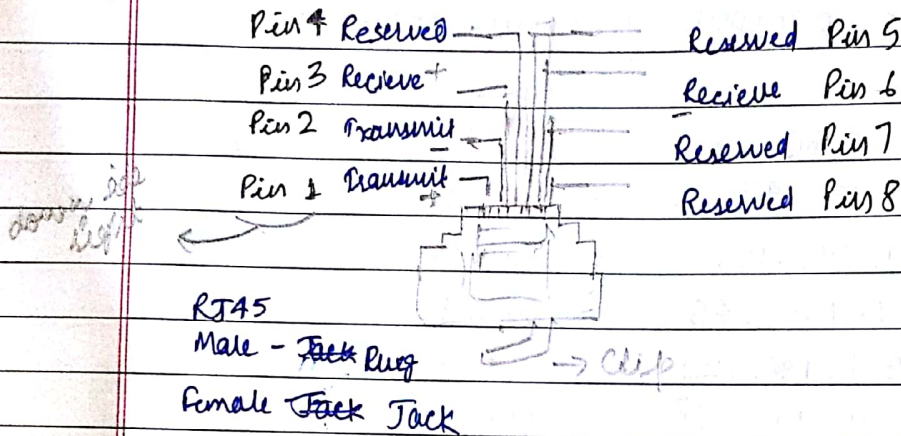
CAT5 - what we use.

RJ45 - 8 pins

Blue Orange

— Separator —

Brown green



T-568A } Straight through ethernet cables

T-568B }

PC-PC

For same types of devices - Cross cable

For diff " " " - Straight cable

568A - 568A

568B - 568B

568A - 568B

PC-PC

Crossover cable -

Pins

2 ↔ 6

1 ↔ 3

## Coaxial cable

- Plastic sheath cover → Dielectric layer
- Metal shield (Copper mesh) → prevents interference
- Braided copper wire

Thick coaxial cable - specified IEEE 802.3 10Base5

- 12mm diameter standard

- Usually yellow

- Max 100 devices

Thin coax

- IEEE 802.3 10Base2
- 5 mm diameter
- Usually black / dark.

BNC connectors

- Bayonet Neill-Concelman

T connector

- Connects three cables.
- used to split radio frequency power from a cable to two.

Vampire tap (Coaxial tap in)

- connects to thicknet load
- Ethernet 10Base-T LAN

# Network devicesHubs

- OSI layer 1 device
- Multicast repeater
- Receives signal from one port and sends it out to all other ports.
- Not secure
- Creates one large collision domain. Operates in half duplex usually.
- Types
  - Active (repeaters) - maintains the quality of signal
  - Passive - simply transfers

Ethernet hub

- CSMA/CD

Switch - OSI layer 2

- Filter and forwarding
- Maintains a CAM table (Content addressable memory)  
Also called FIB (forwarding information base) - has all MAC addresses
- Separate collision domains (Full duplex)



## Router

- Routes packet from one network to another
- OSI layer 3 (device (physical layer, data link, network layer))
- Traffic filtering
- ~~Links~~ connects to LANs & WANs together
- Dynamically updating routing table

Lecture-4

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