Tutorial - Data Link layer

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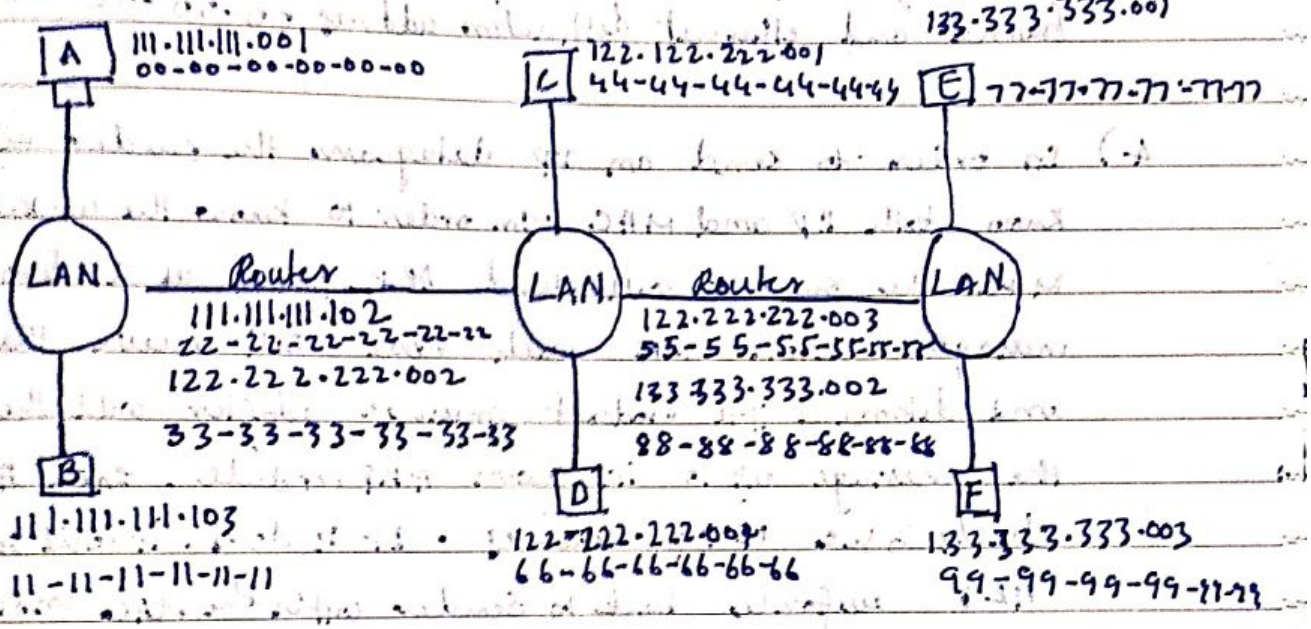
1) Ethernet is connectionless upper layer protocols like TCP establishes connection connection is implemented through software and connection oriented ethernet is also there but by default ethernet is connectionless

2. 2^{48} 48bit MAC address

3



d i) forwarding table in adapter A determines that the datagram should be routed to interface 111.111.111.002

ii) This adapter in A creates and ethernet packet with ethernet destination address 22-22-22-22-22-22

iii) The first router receives the packet and extracts datagram the data gram is routed to 122.222.222.0

iv) The first router sends the ethernet packet with the dest address as 55-55-55-55-55-55 and Src add of 33-33-33-33-33-33 via interface with IP 122.222.222.002

v) process continues until packet reaches host F

e) ARP and must now determine the LAN address of 111.111.111.002 host A sends out an ARP query packet with an broadcast ethernet frame. the first router receives the query packet and sends host A and ARP response packet this ARP packet is carried by ethernet frames and ethernet destination address 00-00-00-00-00-00

4) In order to send an IP datagram the sender must know both IP and MAC. In order to know the unknown MAC the sender will send ARP query as a broadcast message across LAN each node will receive the message and determine if it broadcast message adapter will then send the message up to its own ARP module. Each ARP module checks to see if IP matches. If is does it will send the ARP response back to sender with the MAC inside a frame of packet.

5) C's adapter will process the frames, but the adapter will not pass the datagram up the protocol stack. If the LAN Broadcast address is used, the C's adapter will both process the frames and pass the datagrams up the protocol stack.

6) → An IP datagram sent from the source host to the destination host will travel over 3 interfaces

→ 3 forwarding tables will be indexed to move the datagram from the source to the destination.

7.

CSMA/CD	CSMA/CA
1) CSMA/CD is effective after a collision	It is effective before collision
2) It is used in wired networks	Commonly used in wireless
3 It use only reduced to recovery time	minimizes the possibility of collision
4 resends data frame when Conflict occur	will first transmit the intent to send for data transfer
5 Is more efficient than simple CSMA	less it is similar to Simple CSMA.

8. (0 to $2^K - 1$) x RTT

10) → Physical address doesn't change

→ The IP address may need to changed to reflect a new Subnetwork ID and HostId

→ the solution is same for laptop

$P(x) = x^3 + x^2 + x^0$ (1101)

$G(x) = x^6 + x^3 + x^2$ (1001100)

multiply by the number of bits in CRC polynomial

$x^3(x^6 + x^3 + x^2)$

$x^9 + x^6 + x^5$ (1001100000)

1111101
1101 | 1001100000
1101
1001
1101
0100
1101
1110
1101
1100
1101
001

we then divide and determine the remainder i.e "001" so the transmitted message is

1001100 001

11. Suppose two nodes start to transmit at the same time a packet of length L over a broadcast channel rate R

→ the propagation delay b/w the two nodes is d_{prop}

→ If transfer nodes at same time, then receive the bits of packets from another node while $[d_{prop} < L/R]$

∴ the collison occured