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Chapter-3

Data link layer

Q-1

a) What is Data link layer? Describe it. 6

b) What is functionality of Data-link Layer? Describe it. 6

c) How many sublayer in Data link layer? 2

Q-2. a) What is flow control and error control? Describe it. 6

b) How many types techniques available to detect errors? Describe it. 6

c) What is selective repeat ARQ? 2

Q-3.

a) what is DCN in computer Network? 9

b) How many types of error in computer Network? Describe it. 6

c) Describe about Error Correction. 9

chapter-9
Network layer

Q-4.

a) What is functionalities? Describe it. 5

b) What are the Network Layer Features? 5

c) Write down the Network Layer Introduction. 9

Q-5.

a) What is Network Addressing? How many kinds of it.

5

b) What is router?

3

c) Describe unicast routing and ~~brad~~ broadcast routing.

6

Q-6.

a) What is Routing Algorithms? Describe it.

6

b) What is Tunneling? Describe it.

6

c) What is Internetworking?

2

Q-7.

- a) what is IP Address? 2
- b) Describe Address Resolution protocol. 5
- c) What is Packet Fragmentation? Describe it. 7

Q-8.

- a) What is Internet Control Message Protocol? Describe it. 7
- b) Describe about Internet Protocol Version 6. 7.

1 No Ans: /

a) Data link layer: Data link layer is second layer of OSI Layered Model.

This layer is one of the most complicated layers and has functionalities and liabilities. Data link layer hide the details of underlying hardware and represents to upper layer as the medium to communicate.

Data link layer works between two hosts which are directly connected in some sense.

b) Functionality of Data link layer:

Data link layer does many tasks on behalf of upper layer. There are:

- i) Fragmenting: Data link layer takes packets from Network Layer and encapsulates them into Frames. Then it sends each frame bit by bit on the hardware.
- ii) Addressing: Data link layer provides layer-2 hardware addressing mechanism.
- iii) Error Control: Sometimes signals may have encountered problem in transmission.

| 2 No Ans: |

a) Flow Control: When a data frame is sent from one host to another over a single medium, it is required that the sender and receiver should work at the same speed. That is sender sends at a speed of the receiver or receiver differs. What if the speed. If a sender is sending too fast the receiver may be overloaded and data may be lost.

b) Two types mechanism can be deployed to control the flow:

1) Stop and Wait:

This type flow control mechanism forces the sender after transmitting a data frame to stop and wait until the acknowledgement of the data-frame sent is received. Sending window in this flow control mechanism both sender and receiver agree on the number of data frames after which the acknowledgement should be sent. As we learnt stop and wait flow control mechanism.

3 No Ans:

a) Data-link-layer uses some error control mechanism to ensure that frames are transmitted with certain level of accuracy. But to understand how error is controlled, it is essential to know what types of errors may occur.

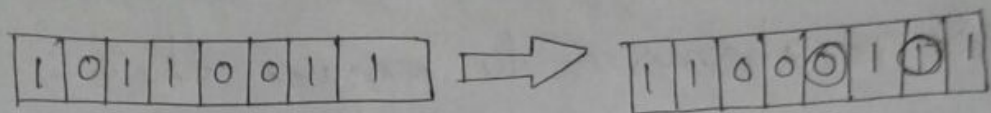
b) There are three types of errors in computer network.

i) Single bit error



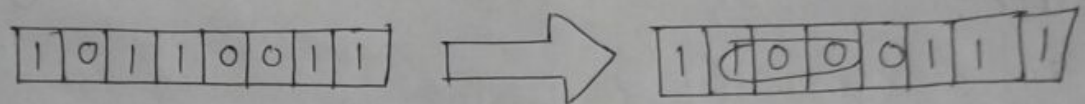
In frame, there is only one bit.

ii) Multiple bits error:



Frame is received with more than one bits in corrupted state.

iii) Burst error:



Frame contains more than 1 consecutive bits corrupted.

c) Error Correction: In the digital world, error correction can be done two ways:

i) Backward ~~error~~ error correction:

when the receiver detects an error in the data received, it requests back the sender to retransmit the data unit. Backward error correction is simple and can be efficiently used where retransmitting is not expensive.

ii) Forward error correction: when

the receiver data some error in the data received, it executes error correcting code which helps it to auto-recover and to correct some kinds of error.

Q No Ans:

a) Functionalities: Devices which work on Network Layer mainly focus on routing. Routing may include various tasks aimed to achieve a single goal. There can be

i) Addressing devices and networks.

ii) Population routing tables are static routes.

iii) Queuing incoming and outgoing data and then according to quality of service constraints set for those packets.

iv) Interconnecting between two different networks.

v) Delivering packet to destination with best efforts.

vi) Parallel connection oriented and connection less mechanism.

b) Network Layer Features:

- i) Quality of service management.
- ii) Load balancing and link management.
- iii) Security.
- iv) Interrelation of different protocols and subnets with different schema.
- v) Different logical network design over the physical network design.
- vi) L3 VPN and tunnels can be used to provide end to end dedicated connectivity.

c) Network layer Introduction: Network layer takes the responsibility for routing packets from destination within or outside a subnet. Two different subnet may have different addressing schemes or non-compatible addressing types. Same with protocols, two different subnet may be operating on different protocols which are not compatible with each other. Network layer has the responsibility to route the packets from source to destination mapping different addressing schemes and protocols.

[5 No Ans.]

a) DCN: DCN means dynamic circuit network. DCN is Advanced computer networking technology that combines packet-switched communication based on the internet. Protocol as used in the internet with circuit-switched.

b) Different type of computer Network:

- i) Personal area network.
- ii) Local Area Network.
- iii) Metropolitan Area Network.
- iv) Wide Area Network.

c) The internet ~~grow~~ growth has become explosive and it seems impossible to escape the bombardment of www.

com's seen constantly on television, heard of radio and seen in magazines. Because the internet has become such a large of our lives

a good ~~under~~ understanding is needed to use this new tool most effectively.

This whitepaper explains the underlying ~~infra~~ infrastructure and technologies that make the internet work. It does not go into great depth, but covers enough of each ~~area~~ area to give basic understanding of the concept involved.

[6 No Ans.]

a) The LAN technologies will assist the device on the network to communicate with each other. These LAN technologies is special combinations of software and hardware which makes the network perform at a specific speed and in the certain way. There are four types of frames.

10 Base T: It is one among several adaptations of standard Ethernet for the local LAN's. This 10 Base is also known as twisted pair ethernet. This cable more flexible and thinner when compared to the coaxial cable.

100 Base T : It functions at a rate . b)

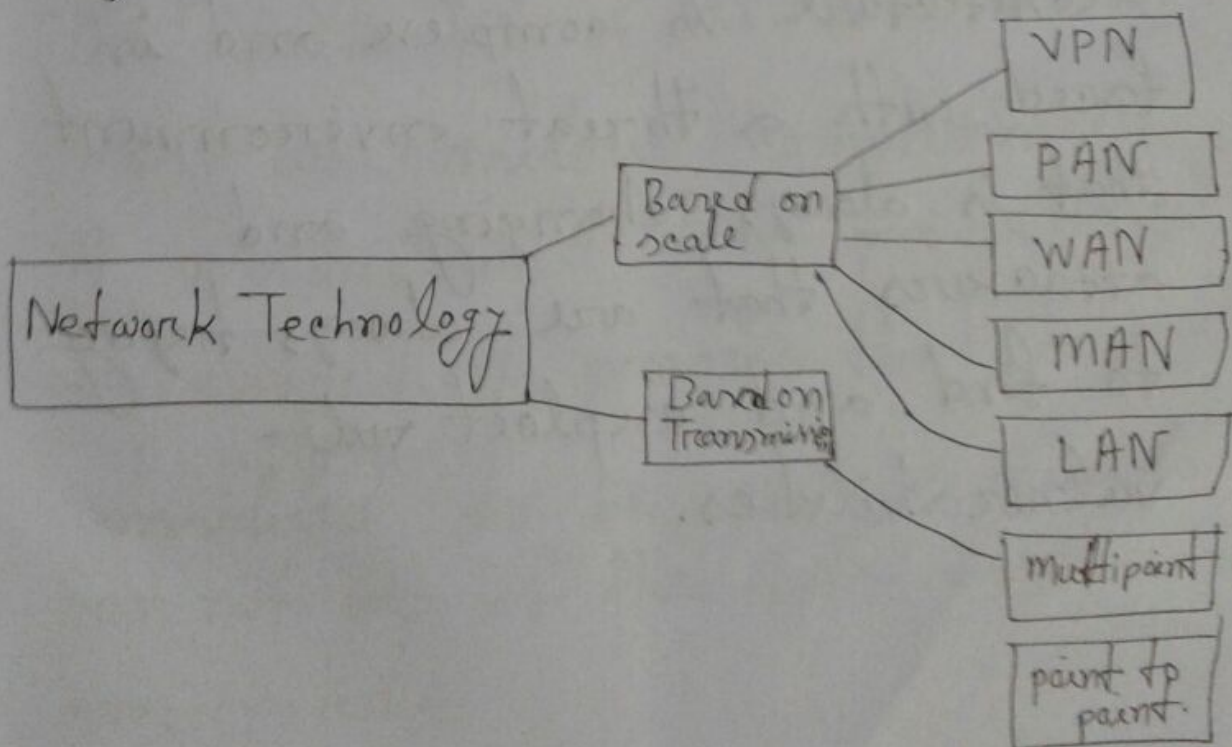
100 mbs speed. It is also known as fast Ethernet. This implies that the designation refers to both the fiber and copper based ethernet version. 100 Base T based on the CD LAN method.

1000 Base T : It is a cheaper version of the Gigabit ethernet, which is used the IEEE 802.3ab standard.

It uses a pairs of category 5 unshielded twisted pair to accomplish the Gigabit data rate.

b) Network Technology: The technology which is used to exchange the data between small and large information. This technology can be used in educational institutions as well as business. Network technicians know the installation, configuration and troubleshooting of the network technology.

Types of network technology:



[7 No Ans:]

a) IP Address: Every computer in a network has an IP Address by which it can be uniquely identified and addressed. An ip address is called logical Address. This Address may change every time in a computer network.

b) Address Resolution Protocol: While communications, a host needs Layer-2 (MAC) address of the destination machine which belongs to the

same broadcast domain or network.

A MAC address is physically burnt into the Network Interface Card (NIC) of a machine and it never changes. On the other hand, IP address on the public domain is rarely changed in case of some fault, the MAC address also changed. This way, for Layer-2 communication to take place a mapping between the two is required. To know the MAC address of remote host on a broadcast domain, a computer

wishing to initiate communication
sends out an ARP broadcast message
asking, "Who is this IP Address."

c) Packet Fragmentation: Most Ethernet
segments have their maximum
~~trans~~ transmission unit fixed to
1500 bytes. A data packet size
is less than or equal to the
size of packet the transmit
network can handle it is
processed normally. If the packet

is larger it is broken ~~to~~ into smaller pieces and then it forwarded.

This is called packet fragmentation. Each fragment contains the same destination and source address and routed through transmit path easily.

At the receiving end it is assembled again.

If a packet with don't fragment bit set to 1 comes to a router which can not handle the packet.

[8 No Ans:]

Q Internet Control Message Protocol:

ICMP-echo and ICMP reply are the most commonly used ICMP message check. When a host

receives an ICMP-echo request, it is bound to send back an ICMP-echo-reply. If there is

any problem in the transit network, the ICMP will report that problem.

b) Internet Protocol Version 4:

IPv4 is 32 bit addressing schema used as TCP/IP host addressing mechanism. IP Addressing enables every host on the TCP network to be uniquely identifiable.

IPv4 provides hierarchical addressing scheme which enable it to divide the network into sub network. each will be well-defined number of host. IP Addresses are divided into many categories.