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[Ans No - 4]

Network Topology:- network topology refers to how nodes, system, devices are connected with each other how they are arranged to be easily managed. There are two approach for topology

1) physical level

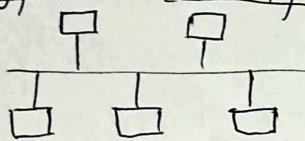
- actual connection wires, how they are setup and how they are arranged.

2) logical level.

- this will define how data will be transferred and where it will go.

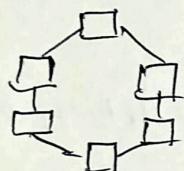
Type :- Bus topology

- this is the simplest kind of topology in which a common bus is connected to various taps and dropline.



bus topology.

Ring topology - ring topology in which each computer is connected to exactly two other computer to form the ring.



Star topology :- all nodes are connected to a centralized hub.

- Ring topology.

Mesh topology :- is a computer net-topology in which nodes are interconnected with each other.

Tree topology - all the nodes are directly and indirectly connected to main bus cable.

Hybrid topology:- this is a combination of two or more types of topologies.

[Ans No - 3]

Data flow:- The flow of information, data between nodes can take variety of forms. There are three types of dataflow.

1) Simplex :- communication is always unidirectional, in which either one of nodes will transmit and others will receive.

e.g. - keyboard, traditional monitor, cpu.

2) Half Duplex - communication is in both direction but not at the same time, or at a time only one device will transmit data. i.e. if one device is sending then other device will be receiving and vice versa.

eg. - walkie-talkie.

3) Full Duplex - communication can be done in both direction simultaneously. both sending and receiving can be done at same time in both of devices.

eg. - telephone line.

[Ans NO - 06]

TCP/IP protocol suite - is a set of protocol used on computer network. It provides an end-to-end connectivity by specifying how data should be packetized, addressed, transmitted, routed and received. Some protocol includes are -

- 1) ARP - address resolution protocol used to associate an IP add. with MAC address.
- 2) IP - used to deliver packets from the source host to the destination host based on IP address.
- 3) ICMP - used to detect and report network error condition by ping
- 4) TCP - a connection-oriented protocol that enables reliable data transfer between two computer.
- 5) UDP - a connectionless protocol for data transfer. since a session is not created before the data transfer.
- 6) FTP - used for file transfer from one host to another
- 7) TelNet - used to connect and issue command on a remote pc
- 8) DNS - used for host names to the IP address resolution.
- 9) HTTP :- used to transfer files on WWW.

[Ans NO - 16]

There are three necessary criteria -

- 1) Performance :- Performance is measured on various factors, such as the amount of time required for message to travel from one device to another.

Reliability - Network Reliability is measured by the frequency of failure , time to take recover from failure , the network robustness.

Security :- Network must be secured . The data is sent should reach its destination safely without any third - party reading or altering the data midway. Therefore network must be secured no data loss should occur

[Answer No - 7]

1) LAN - Local area network that interconnect computers within limited area such as school , college , university.
Devices - ethernet , hub - switch , wifi

2) MAN - metropolitan area network is a network that inter-connect user with computer resource in geographic region of metropolitan area (city).
Devices - switch - hub , router - bridge

3) WAN - wide area network is a network that extends over a large geographical area for the primary purpose of computer network.

LAN \leftarrow WAN \rightarrow LAN two lan are in long distance

1) WWAN - the internet is known as wide wide area network

5) SAN - Storage Area Network also we can say cloud computing such as google drive , one drive , amazon web ser. etc. this can be accessed from anywhere.

[Ans No - 9]

1) Mesh topology - since it is point to point link , for n device $\frac{n(n-1)}{2}$ links are required.

2) Ring topology - every device is connected to 2 dev. therefore n links required.

3) Bus topology - device are connected to main cable using drop line , therefore $(n-1)$ cables are required.

4) Star topology - using star hub each device is connected , therefore n cable links are required.

Ans No - 11

a) wavelength :- wavelength is the distance between identical points in the adjacent cycles of a waveform signal propagated in space or along a wire. In wireless system, this length is usually measured in m, cm, mm.

wavelength is inversely related to frequency, higher frequency result in shorter wavelength.

b) phase - phase involves the relationship between the position of amplitude crests and trough of two waveform. phase can be measured in distance, times or degree. If the peak of two signal with the same frequency are in alignment at the same time, then they are said to be in phase.

Ans No - 13

a) Bandwidth - Bandwidth is the data transfer capacity of a computer network in bits per second. It is a measure of how much information a network can transfer. The higher the bandwidth, the quicker the speed of network. Denoted as kbps, mbps, gbps.

b) latency - latency is a measure of delay, it measures the time taking to get some data to its destination network. It is usually measured as round trip delay - the time taken for information to get it to its destination and back again.

Ans No - 2

Packet switching is the transfer of small pieces of data across various network. These data chunks or "packets" allow for faster, more efficient data transfer.

Often when a user send a file across the network, it gets transferred into smaller data packets not in one piece.

e.g. - a 3MB file will be divided into packets, each with a packet header that includes the

(5)

origin IP address, the destination IP addresses, the number of packets for entire data file, and the sequence number.

[Ans No - 8]

Circuit switching is a connection-oriented network switching technique. The route is established between the destination and source and entire message transmitted through this.

- 1) circuit establishment - it establishes connection set, source and destination through number of switching centers.
- 2) Data transfer - this helps to transfer data and the connection will be established till the end parties are communicating.
- 3) circuit disconnection - after completion of data transfer the connection relinquished. It involves the removal of all links between sender & receiver.

[Ans No - 14]

STOP AND WAIT ARQ -

- used in connection-oriented communication, offers error and flow control, and is used in data link and transport layers, mainly implements the sliding window protocol concept with window size 1.

propagation delay = distance between routers / velocity of propagation.

round trip time = $2 \times$ propagation delay

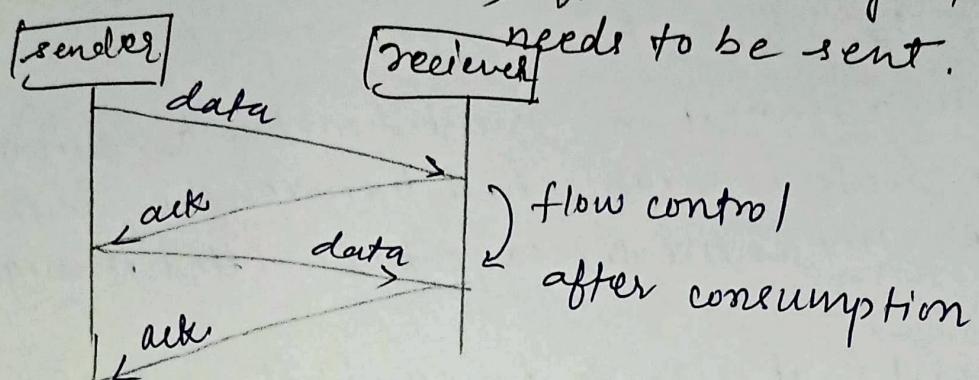
Time out = $2 \times$ round trip time

Time to live = $2 \times$ time out (max 180 sec)

- ★ Sender :
rule 1) send one data packet at a time.
rule 2) send next packet after acknowledgement of previous packet.

Receiver :- rule1) send acknowledgement after receiving
and consuming data packets.

rule2) after consuming packet acknowledgement
needs to be sent.



problems :-

- 1) loss data
- 2) loss acknowledgement
- 3) Delay.

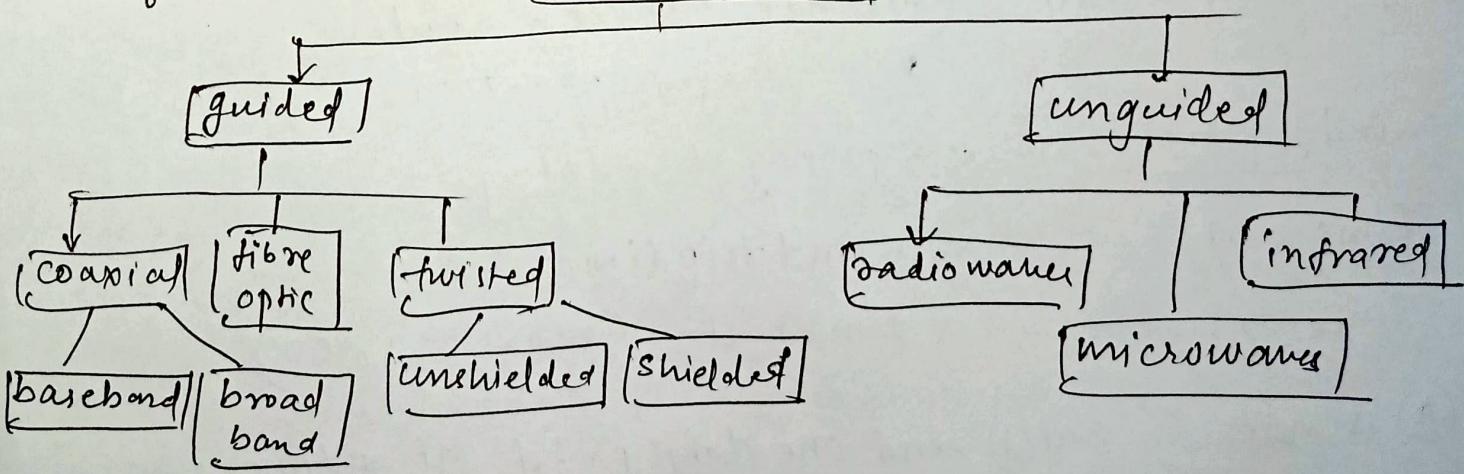
[Answer No - 17]

Transmission media :- is a communication channel that carries the information from sender to receiver. Data is transmitted through electromagnetic signals. The main functionality of transmission media is to carry the information of bits through LAN. This is a physical path between transmitter and receiver in data communication network based ^{is} in copper then signal will be electrical signals. if it is ⁱⁿ a fibre based then signal will be light pulses.

The transmission media is available in the lowest level of OSI reference model i.e. physical layer.

classification :-

[transmission]



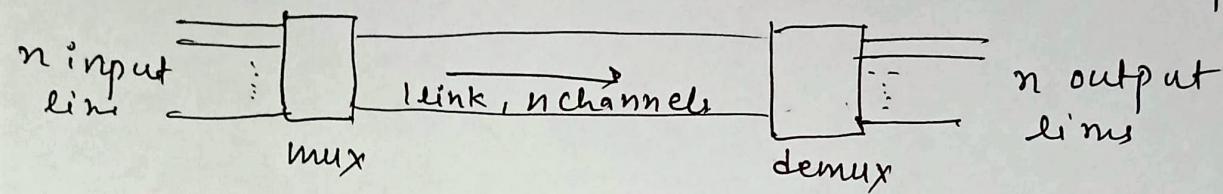
classification

Ans No - 16

Multiplexing : is a technique used to combine and send the multiple data stream over a single medium. This process is combining of data stream is known as multiplexing. hardware used for multiplexing is known as multiplexer.

concept of multiplexing :-

$\text{mux} = \text{multiplexer}$
 $\text{demux} = \text{demultiplexer}$



multiplexing techniques are :-

multiplexing

frequency-division multiplexing

wavelength division multiplexing

time division multiplexing

synchronous TDM

Asynchronous TDM

Ans No - 10

- ① A low pass channel has an upper limit to the frequency that it will pass, while a band-pass channel has both an upper limit and a lower limit to the frequency that it'll pass.
- ② Band pass channel is widely used in wireless transmitter and receiver. The main function is to filter it. A low pass channel pass low frequency

③ A low pass channel has a bandwidth starting from zero ; a band pass channel has both bandwidth that does not starts from zero.

④ In base band pass channel the signal transmitted over a single frequency as discrete pulses meaning the full bandwidth of base band system, but low pass do not offer the same for frequency.