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Answer

1)

(a) Define Physical and Logical address?

Answer:-

Physical Address:- Physical address also known as the link address, is the address of a node as defined by its LAN or WAN. It is included in the frame used by the data link layer. It is lowest-level address. The physical address have authority over the network.

Logical address:- Logical address are necessary for universal communications that are independent of underlying physical networks. A universal addressing system is needed in which each host can be identified uniquely, regardless of the underlying physical network.

Q1(b) List the functionalities of data link layer.

Answer:- Data Link layer does many tasks on behalf of upper layers. These are:

Framing:- Data link layer takes packets from network layer and encapsulates them into frames.

Addressing:- Data link layer provides layer-2 hardware addressing mechanism. Hardware address is assumed to be unique on the link.

Synchronization:- When data frames are sent on the link, both machines must be synchronized in order to transform to take place.

Error Control:- Sometimes signals may have encountered problem in transition and the bits are flipped. These errors detected and attempted to recover actual data bits.

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11(e) How to convert analog signals with digital signals. explain with examples.

Answer:-

Analog to digital conversion microphones create analog voice and camera events analog videos which are treated as analog data. PDM is one of the most commonly used method to convert analog data into digital form. It involves three steps :-

sampling:- The analog signals sampled every T interval. Most important factor in sampling is the rate at which analog signal is sampled. According to Nyquist theorem, The sampling rate must be at least two times of the highest frequency of the signal.

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Quantization- Sampling yields discrete form of continuous analog signal. Every discrete pattern shows the amplitude of the analog signal at that instance. The quantization is done between the maximum amplitude value and the minimum amplitude value. Quantization is approximation of instantaneous analog value.

Encoding- In encoding each approximated value is then converted into binary format.

2) (a) Define channel capacity. Which factors its depends on?

Answer- The speed of transmission of information is said to be channel capacity. We count it as data rate in digital world. It depends on numerous factors such as:-

(i) Bandwidth- The physical limitation of underlying media.

(ii) Error-rate :- Incorrect reception of information because of noise.

(iii) Encoding :- The number of levels used for signaling.

Q1(b) Explain Multiplexing and switching.

Answer :- It is a technique to mix and send data streams over a single medium. The three types of multiplexing techniques include the following :-

(i) Frequency Division Multiplexing (FDM)

(ii) Wave-Length Division Multiplexing (WDM)

(iii) Time Division Multiplexing (TDM)

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Switching is a mechanism by which data/information sent from source towards destination which are not directly connected.

Switching can be categorized as:-

- (i) Circuit Switching
- (ii) Message Switching
- (iii) Packet Switching

Q) Compare the physical and data link layer functions?

Answer:-

The two layers is compared below:-

(i) Physical Layer:- A physical layer is concerned with the connection of devices to the media. It also defines the physical technology. It helps in synchronization in bits. It helps to convert digital bits into electrical signals.

(i) Data Link Layer :- It divides the streams of bits received from the network layer into manageable data units called frames. It adds a header to the frame to define physical address of the sender or receiver of the frame.

3] @ Briefly explain the error-control mechanism

Answer :-

when the data frame is transmitted, there is a probability that data frame may be lost in the transmit or it is received corrupted. In both cases, the receiver does not receive the correct data-frame and sender does not know anything about any loss.

Requirement of error-control mechanism :-

5m :-

Error detection- the sender and receiver either both or any must ascertain that there is some error in the transmit.

Positive ACK- When the receiver receives a correct frame, it should acknowledge it.

Negative ACK- When the receiver receives a damaged frame or a duplicated frame, it sends a NACK back to the sender and the sender must re-transmit the control/correct frame.

Q16 How many techniques are available in data link layer to control the errors by ARQ?

Answer- There are three types of techniques available which Data link layer may belong to control the errors by automatic

12 Repeat Requests (ARQ).

(i) Stop and wait ARQ:- This transition occurs when the sender maintains a time-out counter. When a frame is sent, the sender starts the timeout counter. If acknowledgement of frames comes in time, the sender, the sender transmits the next frame in queue. If acknowledgement does not come in time the sender assumes that either the frame or its acknowledgement is lost in transmit. If a negative acknowledgement is received, the sender retransmits the frame.

(ii) Go-BaK-N ARQ:- The stop and wait ARQ mechanism does not utilize the resources at their best. when the acknowledgement is received,

the sender sits idle and does nothing. In Go-Back-N ARQ method both sender and receiver maintain a window. The sending window size enables the sender to send multiple frames without receiving the acknowledgement of the previous ones. The receiving window enables the receiver to receive multiple frames and acknowledge them. The receiver keeps track of incoming frame's sequence number.

(iii) Selective Repeat ARQ:- In Go-Back-N ARQ, it is assumed that the receiver does not have any buffer space for its window size and has to process each frame as it comes. This enforces the sender to retransmit all the frames which are not acknowledged. In Selective-Repeat ARQ, the receiver while keeping track of sequence numbers, buffers

the frames in memory and sends NACK for only frames which is missing or damaged. The sender in this case sends only packet for which NACK is received.

Q3] (c) How many ways involve in error control mechanism? List the types of errors in data transmission.

Answer:-

Error control may involve two possible ways,

(i) Error detection

(ii) Error correction.

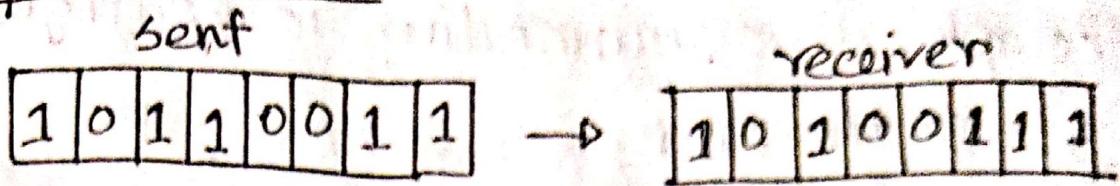
There are maybe three types of errors:

(i) Single bit error

Send	Received
1 0 1 1 0 0 1 1	1 0 1 1 0 1 1 1

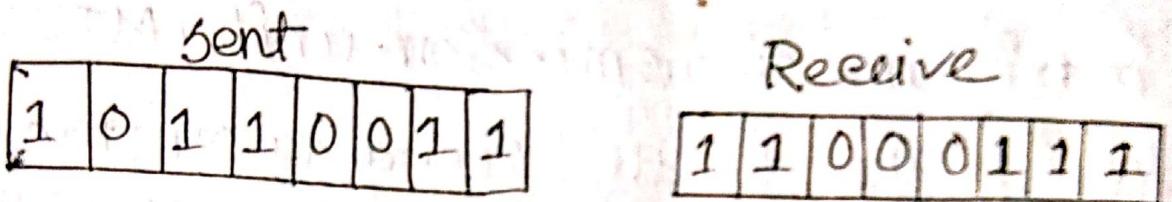
In a frame, there is only one bit, anywhere though, which is corrupt.

Multiple bits error :-



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

Burst error :-



Frame contains more than 1 consecutive bits corrupted.

41 (a) What is Tunneling?

Answer:- If they are two geographically separate networks, which want to communicate with each other, they may deploy a dedicated line between or through intermediate networks. Tunneling is a mechanism by which two or more networks communicate with each other.

others by passing intermediate network complexities. Tunnelling is configured at both ends.

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41(b) Explain Packet Fragmentation.

Answer— Most ethernet segments have their maximum transmission unit (MTU) fixed to packet length depending on the application. Devices in the transmit path also have their hardware and software capabilities which tell what amount of data that device can handle and what size of packet size is less than or equal to the size of packet the transmit network can handle, it can process neutrally. If the packet is larger, it is broken into smaller pieces then forwarded. This is 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 DF (don't fragment) bit set to 1 comes to a router which can not handle the packet because of its length, the packet is dropped.

When packet is received by a router has its MF (more fragment) bit set to 1, the router then knows that it is a fragmented packet and parts of the original packet is on the way.

If packet is fragmented too small, the overhead is increased. If the packet is

fragmented too large, intermediate routers may not be able to process it and it might get dropped.

41 (c) what does internet protocol version 4 means?
Explain.

Answer— Internet protocol version 4 (IPv4) is the forth version of the internet protocol and a widely used protocol in data communication over different kinds of networks. IPv4 is a connectionless protocol used in packet switched layer networks, such as ethernet. It provides the logical connection between network devices by providing identification for each device. There are many ways to configure IPv4 with all kinds of devices- including manual and automatic configurations- depending on the network type. IPv4 is based on the best effort model. This model generates neither delivery nor avoidance of duplicate delivery.

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These aspects are handled by the upper layer transport. IPv4 is the best 32-bit addressing scheme used to TCP/IP host addressing enables every host on the TCP/IP network to be uniquely identifiable. IPv4 provided hierarchical addressing scheme which enable it to divide the network into sub-networks, each with well-defined number of hosts.

5) @ what is data link-layer? What is its sublayers?

Answer: Data link layer is second layer of OSI Layered model. The layer is one of the most complicated layers and has complex functionalities and liabilities. Data link layer hides the detail of underlying hardware and represents itself to

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upper layer as the medium to communication

Data link layers has to sub-layers:-

(i) Logical Link Control:- It deals with protocols, flow-control, and error control.

(ii) Media-Access control:- It deals with actual control of media.

5(b) classify digital to analog conversion

Answer- When data from one computer is sent to another via some analog carrier, it is first converted into analog signals. Analog signals are modified to reflect digital data.

(i) Amplitude Shift Keying:- The amplitude of analog carrier signal is modified to reflect binary data, when binary data represents digit 1, the amplitude is held, otherwise it is set to 0.

(ii) Frequency Shift Keying:- The frequency of the analog carrier signal is modified to reflect binary data.

(iii) Quadrature Phase Shift Keying:- QPSK alters the phase, to reflect two binary digits at once. The serial data is converted into parallel in both sub-streams and then each stream is converted to digital signal using NRZ Technique.

5] (a) classify analog to analog conversion.

Answer:- Analog to analog conversion can be done three ways.

(i) Amplitude Modulation:- The amplitude of the carrier signal is modified to reflect the analog data. The amplitude of modulating signal is multiplied by the amplitude carrier frequency, which then reflects anal

analog data.

(ii) Frequency Modulation:- In this, the frequency of the carrier signal is modified to reflect the change in the voltage level of the modulating signal.

(iii) Phase Modulation:- In this, the phase of carrier signal is modulated in order to reflect the change in voltage of analog data signal. The phase of carrier signal is modulated in order to reflect the change in voltage of analog data signal.

Q1 a) Define network layer and its features

Answer:- Network layer take the responsibility for routing packets from source to destination within or outside a subnet. Two different subnet may be 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 responsibilities to route the packets from source to destination, mapping different addressing scheme and protocols.

Q1 b) Briefly explain network addressing

Answer:- Layer 3 network addressing is one of the major tasks of network layers. Network addresses are always logical i.e. these are software based addresses.

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which can be changed by appropriate configurations. A network address always points to host/node or it can represent a whole network. Network address is always configured on network interface card and is generally mapped by system with the MAC address of the machine for Layer2 communication.

IP address provides mechanism to differentiate between hosts and network. Because IP address are assigned in hierarchical manners. a host always resides under a specific network. The host which needs to communicate outside its subnet, needs to know destination networks address, where the packet/data is to be sent. Hosts in different subnet need a mechanism to locate each other. This task can be done by DNS.

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61 @ write down the protocols of network layer.

Answer:-

The following are examples of protocols of operating at the network layer.

- (i) CLNS - Connection less-made network service
- (ii) DDP - Datagram Delivery protocol
- (iii) EGP - Exterior Gateway protocol
- (iv) ICMP - Internet group management Protocol
- (v) IPv4/IPv6 - Internet protocol.

71 @ Define Network Routing

Answer:- When a device has multiple paths to reach a destination, it always selects one path by preferring it over others. This selection process is termed as Routing. Routing is done by special network devices called routers or it can be done by means of software process.

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71 (B) Explain different types of routing.

Answer:- Different types of routing is given below :-

(i) Unicast Routing:- Most of the internet and intranets known as unicast data or unicast traffic is sent with specified destination. Routing unicast data over the internet is called unicast Routing.

(ii) Broadcast Routing:- By default, the broadcast packets are not routed and forwarded by the routers on any network. Routers create broadcast domains. in some specials cases. A broadcast message is destined to all network devices.

(iii) Multicast Routing:- Multicast Routing is special case of broadcast routing with significance difference and challenges. In broadcast routing, packets are sent to all nodes even if they donot want it.

II (c) Explain different routing protocols

Answer:-

(i) Unicast Routing protocols :- There are two kinds of routing protocols available to route unicast packets:-

(a) Distance Vector Routing protocol:- Distance

vector routing protocols is simple routing protocols which takes routing decision on the number of hops between source and destination. A route with less number of protocols is.

considered as the best route.

(b) Link state routing protocol:- Link state protocol

is slightly complicated protocol than distance vector. It takes into account the states of link of all the routers in a network.

(ii) Multicast Routing protocols:- Unicast routing protocols use graphs while multicast routing protocols use trees; spanning tree to avoid loops. The optimal tree is called

shortest path spanning tree.

- DVMRP :- Distance vector Multicast Routing protocols
- MOSPE :- Multicast open shortest path first.
- CBT :- Core Based Tree
- PIM :- Protocol Independent Multicast.

Q81 @ Define OSI model. Is OSI and ISO comparable?

Answer :- The OSI model is layered framework from the design of networks system, that allows communication between all types of computer systems. It consists of seven separate but related layers.

We can't compare OSI and ISO model. ISO stands for international standards organization. It is an organization for

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agreement on international standard organization
for agreement on international standards
of network communication worldwide.

Q1(b) Define Physical Layer. When data is sent
over physical medium which signals it is
converted into?

Answer:- Physical Layer in the OSI model plays
the role of interacting with actual hardware
and signalling mechanism. Physical Layer is
the only layer of OSI network model which
actually deals with the physical connectivity
of two different stations.

When data is sent over physical medium.
It needs to be first converted into electro-
magnetic signals. Both digital and analog
data can be represented in digital or
analog analysis.

Digital signals :- Digital signals are discrete in nature and represent sequence of voltage pulse. Digital signals are used within the circuitry of a computer system.

Analog signals :- Analog signals are in continuous and wave form in nature and represented by continuous electro-magnetic waves.

Ans :-

81 (c) Error control mechanism may involve in two possible ways :-

(i) Error detection

(ii) Error correction