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Q1 8=>

(a) Briefly describe the layer in the internet model are the network support Layer?

Ans 8=> The OSI Model is a logical Conceptual model that defines network communication used by System open to interconnection and communication with other systems. The open system Interconnecta (OSI model) also defines a logical network and effectively describes Computer packet transfer by using various layers of protocols.

Layer in the OSI model.

Physical layer
Data link Layer
Network layer
Transport Layer
Session layer
presentation layer
Application layer.

① physical layer:- The physical layer is responsible for movements of individual bits from one hop (node) to the next.

② Data link layer:- The data link layer is responsible for moving frames from one hop (node) to the next.

③ Network layer:- The network layer is responsible for the delivery of individual packets from the source host to the destination host.

④ Transport layer:- The transport layer is responsible for the delivery of a message from one process to another.

⑤ Session layer:- The session layer is responsible for dialog control and synchronization.

⑥ presentation layer:- The presentation layer is responsible for translation, compression, and encryption.

⑦ Application layer:- The application layer is responsible for providing services to the user.

(b) Describe three types of transmission impairment.

Ans:- Signals travel through transmission media, which are not perfect. The imperfection causes impairment. this means that the signal at the beginning of the medium is not the same as the signal at the end of the medium. what is sent is not what is received. Three causes of impairment are attenuation, distortion, and noise.

① Attenuation:- It means loss of energy, the strength ~~dec~~ of signal decreases with increasing distance which causes loss of energy in overcoming resistance of medium. This is also known as attenuated signal. Amplifiers are used to amplify the attenuated signal which gives the original signal back.

~~Attenuation~~ Distortion:- It means change in the shape of signal. this is generally seen in composite signals with different frequencies. Each frequency component has its own propagation speed travelling through a medium. Every component arrive at different time which leads to delay distortion. Therefore they have different phases at receiver end from what they had at senders end.

③ Noise:- The random or unwanted signal that mixes up with the original signal is called noise. There are several types of noise such as induced noise, crosstalk noise, thermal noise and impluse noise which may corrupt the signal.

(c) what does the Shannon capacity have to do with communications?.

Ans:- Shannon Information Capacity Chas long been used as a measure of the goodness of electronic communication channels. It Specifies the maximum rate at which data can be transmitted without error if an appropriate code is used (it took nearly a half-century to find codes that approached the Shannon capacity.

(d) Compare and Contrast flow control and error control.

Ans:- The main difference between the flow control and error control is that the flow control observes the proper flow of the data from sender to reciver, on the other hand, the error control observes that the data delivered to the receiver is error free and reliable.

Comparison Chart:-

Basis for Comparison	Flow Chart	Error Chart
Basis	flow control is meant for the proper transmission of the data from sender to the receiver.	Error control is meant for delivering the error-free data to the receiver.
Approach	Feedback-based flow control and rate-based flow control are the approaches to achieve the proper flow control.	parity checking, cyclic Redundancy code (CRC) and checksum are the approaches to detect the error in data. Hamming code, Binary Convolution codes, Reed-Solonan code, Low-Density parity check code are the approches to correct the error in data.
Impact	avoid overrunning of receivers buffer and prevents the data loss.	Detects and correct the error occurred in the data.

Q1 Part(e):

Explain piggybacking and its usefullness. in while layer of OSI is it used and why?

Ans:- Piggybacking data is a bit different from Sliding Protocol used in the OSI model. in the data frame itself, we incorporate one additional field for aeknoweledgment called ACK.

whenever party A wants to send data to Party B. it will carry additional ACK information in the PUSH as well.

For example:- if A has received 5 bytes from B. which sequence number starts from 12340 (through 12344), A will place "ACK 12345" as well in the current PUSH packeed to inform B it has received the bytes up to sequence number 12344 and expects to see 12345 next time. (ACK number

of the data to be PUSHED By the other Party.)

Three rules govern the Piggybacking data transfer.

- if station A wants to send both data and an acknowledgment, it keeps both field there.
- if station A wants to send the acknow-ledgment, after a short period of time to see whether a data frame needs to be sent, then decide whether send an ACK frame alone or attach a data frame with it.
- if station A wants to send just the data, then the Previous acknowledg-ment field is sent along with the data. station B simply ignores this duplicate ACK frame upon receiving

Usefulness...

improves the efficienty, better use of availible channel ~~wi~~ bandwidth.

Q2 Part (f)

Brief HDLC w.r.t station types, transfer modes, frame types supported and flag field purpose?

Answer:- High-level Data Link control (HDLC) is a group of communication protocols of the data link layer for transmitting data between network points or nodes. Since it is a data link protocol, data is organized into frames. A frame is transmitted via the network to the destination that verifies its successful arrival. it is a bit-oriented protocol that is applicable for both point-to-point and multipoint communications.

Transfer Modes:- HDLC supports two types of transfer modes, normal

responce mode and asynchronous balanced mode.

Normal Responce Mode (NRM)

Here two types of stations are there, a primary station that send commonds and secondary station that can respond to be received commonds. it is used for both Point-to-Point and multipoint communications.

- ## Asynchronous Balanced mode (ABM)

Here the configuration is balanced i-e each station can both send commonds and reponed to commonds. it is used for only Point-to-Point communications.

HDLC Frame

HDLC is a bit-oriented Protocol where each frame contains up to

Part (f) cont.....

fields. The structure varies according to the type of frame. The fields of a HDLC frame are.

- Flag:- it is an 8-bit sequance that marks the beganing and the end of the frame. The bit Pattern of the flag is 01111110.
- Address:- it contain the address to the receiver. if the frame is sent by the primary station, it contains the addresses of the secondary station (s). if it is sent by the secondary station. it containes the address of the primary station. The address field may be from 1 bytes to several bytes.
- control:- it is 1 or 2 bytes containing flow and error control information.

Payload:- the carries the data from the network layer, its length may vary from one network to another.

- FCS:- it is a 2 bytes or 4 bytes frame check sequence for error detection. the standard code used is CRC.

Types of HDLC frames:-

Three types of HDLC Frames:

- I-frame- I-frame or information frames carry user data from the network layer. they also include flow and error control information that is piggybacked on user data the first bit of control field of I-frame is 0.

Part (f) Cont.---2

S - frame:- S-frames or supervisory frames do not contain information field. They are used for flow and error control when Piggybacking is not required. The first two bits of control field of S-frame is 10.

U - frame:- U-frame or Un-numbered frames are used for myraid miscellaneous functions. Like link management. it may contain an information field, if required. The first two bits of control field of U-frame is 11.

Q 2.

(i) Suppose a computer sends a packet at the network Layer to another computer somwhere in the Internet. the logical destination address of the packet is corrupted. what happens to the packet? How can the source computer be informed of the situation?

ANS!- Before using the destination address in an intermediate or the destination node, the packet goes through error checking that may help the node find the corruption (with a high probability) and discard the packet. Normally the upper layer protocal will inform the source to resend the packet.

(ii) A device is sending out data at the rate of 1 Mbps, How long does it take to send out a single character (8 bits)?

ANS!- Sol:- a. Bit duration = 100 bits ÷ 1000 bps = 0.1 Sec
b. Bit duration = 8 bits ÷ 1000 bps = 0.008 ~~bps~~ Sec.
c. Bit duration = 1 X 8 bits ÷ 1000 bps = 0.008 Se

(K) We have a channel with 4 KHz bandwidth. If we want to send data at 100 Kbps. what is the minium SNR$_{dB}$? what is SNR?.

Ans:- Sol:- Given $B = 4KH_2$, $N = 100$ kbps

$100 \times 10^3 = 4 \times 10^3 \times SNR_{dB}/3 \Rightarrow 100 \times 3/4 = SNR_{dB} \Rightarrow$

$75 = SNR_{dB}$

$SNR_{dB} = 10 \times \log_{10} SNR \Rightarrow 75 = 10 \times \log_{10} SNR \Rightarrow$

$SNR = 10.$