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Question 1

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

Ans- Physical, datalink

Ans- The OSI Model is a logical & conceptual Model that defines network communication used by systems open to interconnection & communica with other systems. The open System Interconnecto (OSI packet transfer by using various layers of protocols.

Functions of each layers in the OSI Model

- Physical layer
- Data Link layer
- Network Layer
- Transport Layer
- Session Layer
- Presentation Layer
- Application Layer.

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

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

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

- Transport Layer:- The transport layer is responsible for the delivery of a message from one process

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

- Presentation layer:- The presentation layer is responsible for translation, compression & encryption.

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

Question 1 Part(b):- Describe three types of Transmission impairment.

Ans:- Signals travel through transmission media, which are not perfect. The imperfection causes signal 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 sent is not what is received. Three causes of impairment are attenuation, distortion, & noise.

- Attenuation
- Distortion
- Noise

- Attenuation:- It means loss of energy. The strength 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.

- 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 though a medium. Every component arrive at different time which leads to delay distortion. Therefore, Therefore, they have different phases at receiver end from what they had at Senders end.

- 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, crosstalk noise, thermal noise & impulse noise which may corrupt the signal.

Question 1:-Part(c)

What does the Shannon Capacity have to do with communications?

Ans- Shannon Information Capacity C has 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.

Ans
Part (d)

BASIS FOR COMPARISON	Flow Control	Error Control
1 Basic	Flow control is meant for the Proper transmission of the data from Sender to the reciver.	Error control is meant for delivering the error-free data to the receiver.

BASIS for Comparison	Flow Control	Error Control
Approach	Feedback-based flow control & rate-based flow control are the approaches to achieve the proper flow control	Parity checking, cyclic Redundancy Code (CRC) & checksum are the approaches to detect the error in data. Hanning Code, Binary Convolution Codes, Reed-Solomon Code, Low-Density Parity Check Codes are the approaches to correct the error in data.
impact	avoid overrunning of recivers buffer & prevents the data loss	Detects & Correct the error occured in the data

The Main difference between the flow control & error control is that the flow control observes the Proper flow of the data from sender to receiver, on the other hand, the error contol observes that the data delivered to the reciever is error free & reliable

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 acknowledgment, 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 acknowledgment 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 successfull 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 respond 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 begaring 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.

Question:1(g) Brief the protocols for noiseless Channels?

Ans:- Noiseless & Noisc Channel Protocols

- Taxonomy of Protocol.
  - Simplest Protocol
  - Stop-&-wait Protocol.
  - Noisy Channels
  - Sequence Number
  - Design of the Stop-&-wait ARQ Protocol
  - Stop-&-Wait ARQ Protocol.
  - Send (Sliding) window for Go-Back-N ARQ

(h) What is differential encoding? Also Explain the difference between NRZ-L and NRZI. And name the coding schemes of multilevel & bi-phase.

Ans :- Differential encoding is a digital-encoding technique where by a binary value is denoted by a signal change rather than a particular signal state. Using differential encoding, binary data in any user-defined FSK or FSK modulation can be encoded during the modulation process via symbol table.

Fundamental difference exists between NRZ-L & NRZI.

- with NRZ-L the receiver has to check the voltage level for each bit to determine whether the bit is a 0 or a 1.
- with NRZI, the receiver has to check whether there is a change at the beginning of the bit to determine if it is a 0 or a 1.

Multilevel line codes i.e. Multilevel feedback balanced codes.

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 SNRdB? what is SNR?.

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

$100 \times 10^3 = 4 \times 10^3 \times SNRdB/3 \Rightarrow 100 \times 3/4 = SNRdB \Rightarrow$

$75 = SNRdB$

$SNRdB = 10 \times \log 10 SNR \Rightarrow 75 = 10 \times \log 10 SNR \Rightarrow$

$SNR = 10.$