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Subject # CCN

Semester # 7<sup>th</sup>

Degree # BS (SE)

Mid-term

Date # 24-8-2020.

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Question # 01

Part # a

Answer #

Physical layer data link layer and network support layers and sessions. Presentation and application layers are user support layers. The transport layer links these layers by segmenting and rearranging the data.

⇒ These layers deals with the electric specifications, Physical connection, transport timing and reliability. The user support layers are:

Presentation layer  
Application layer

Question # of  
Part # B

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The signal received may differ from the signal transmitted. The effect will degrade the signal quality for analog signals and introduce bit errors for digital signals. There are three types of transmission impairment, namely delay distortion, and noise.

Attenuation:

It means loss of energy. The strength of signal decreases with increasing distance which causes loss of energy. This is overcoming resistance of medium. This is also known as attenuated signal.

Distortion:-

It means change 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 also leads to delay distortion. Therefore, they have different phases at receiver's end from what they had at sender end.

## • Noise:-

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The random or unwanted signal that mixes up with the original signal is called noise.

## Part # C

The Shannon channel capacity is a formula that relates the bandwidth of a channel, the channel's SNR, and bit rate.

## [Shannon's Channel Capacity]

The channel capacity is the bit rate at which data can be sent along a channel with a negligible error rate. Attempting to send bit faster than this rate will increase the error rate beyond a negligible value. This will have large negative effect on our communications system. Notice that for a fixed bandwidth, as SNR decreases, the bitrate must be decrease.

## part # D

Flow control and Error control are the control mechanism at data link layer and transport layer. whenever the sender sends the data to the receiver to these mechanism

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help in proper delivering of a reliable data to receiver. The main difference the flow control and error.

## Part # E

Piggybacking means to ride over something in two-way communication, whenever a frame is received, the receiver waits and does not send the control frame.

The receiver waits until its network layer passes in the next data packet. The delayed acknowledgement is then attached to this outgoing data frame.

This technique of temporality delaying the acknowledgement so that it can be hooked this next outgoing data frame is known as piggybacking it use in transport of OSI.

This network optimization technique has some advantages and disadvantage as similar to most of the other thing. The main disadvantage is, blocking of ack for some time. This may causes a connection to go down or may cause a service problem if the delay is more than expected. To avoid problems, piggybacking uses a very small duration timer.

On the advantages side, better <sup>(5)</sup> use of bandwidth. The underlying cable and intermediate switches, router etc, will be less loaded. If someone is paying the cost to utilize a network based on message, then the cost will be also reduced.

PART # F

HDLC - short for High-level Data Link Control, a transmission protocol used at the data link layer of the OSI seven layer model for data communication. The HDLC protocol embeds information in a data frame and allows devices to control data flow and control correct errors.

- Normal Response Mode (NRM) - <sup>unbalanced.</sup>

Here, two types of

The secondary station responds only to the primary station. They send commands and secondary

- Asynchronous:-

The secondary station can initiate a message

Asynchronous balanced:-

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Both stations send and receiver over its part of duplex line.

Transfer mode:-

HDLC supports two types of transfer mode, normal response mode and asynchronous balanced mode.

HDLC Frame:-

HDLC is a bit-oriented protocol where each frame contains up to six fields:-

Flag:-

It is a bit-oriented protocol where each of the receiver.

It is an 8-bit oriented protocol that marks the beginning and the end of the frame. The bit pattern of the flag is 01111110.

Address:-

It contains the address of the receiver.

It is frame is send by the Primary station, it contains the address of the primary station. The address field may be from 1 byte to several bytes.

Control:-

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It is 1 or 2 bytes containing flow and error control information.

Payload:-

This 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 back check sequence for error detection. The standard code used is CRC.

Types of HDLC frames:-

There are three types of HDLC frames. The type of frame is determined by the control field to the frame.

- I-frame
- S-frame
- U-frame

Part # 5

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Noiseless Channels:-

Let us first assume we have an ideal channel in which no frames are lost, duplicated, or corrupted.

1- Simple Protocol:

It has no flow or error control. It is a unidirectional protocol in which data frames are travelling in only one direction - from the sender or receiver, which can also accept the packet immediately.

2- Stop-and-wait Protocol:-

If data frames arrive at the receiver site faster than they can be processed, the frames must be stored until their use.

Part # 4

In digital communication, differential coding is a technique used to provide unambiguous signal reception when using

some of modulating.

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The common type of modulation that require differential coding include phase shift keying and quadrature amplitude modulation.

Question # 2

Answer #

Before using the destination address in an intermediate or the destination nodes, the packet goes through error checking that may help the node find the corruption and discard the packet. Normally the upper layer protocol will inform the source to resend the packet.

Part # a

How long does it take to send out a single character (8 bits)?

$$(8/100)_s = 0.008_s = 8ms.$$

Part # b

How long does it take to send a file of 100,000 characters: (10)

$$((100,000 \times 8) / 1000) s = 800s$$

Part # k

$$C = B \times \log_2(1 + \text{SNR})$$

$$100 * 10^3 = 4 * 10^3 \log_2(1 + \text{SNR})$$

$$\log_2(1 + \text{SNR}) = 25$$

$$1 + \text{SNR} = 2^{25}$$

$$\text{SNR} = 2^{25} - 1 = 33,554,431$$

$$\text{SNR}_{\text{dB}} = 10 \log_{10}(33,554,431) \approx 75 \text{ dB}$$

Question #3

Answer, Part # m

The primary maintain a separate logical link with each secondary station on the link.

Contained Station:

Contained the feature of primary and secondary. A contained station

may issue both commands and  
resplies.

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Unbalanced configurations:

Consist of one primary and one or  
more secondary station. and supports  
both of full-duplex and  
half duplex.

ARM:

used with an unbalanced configuration  
the secondary and initiate without  
explicit process.