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SUBJECT: DATA COMMUNICATION AND NETWORKING

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Question/Answer

Q1: Protocol layering can be found in many aspects of our lives such as air travelling. Imagine you make a round-trip to spend some time on vacation at a resort. You need to go through some processes at your city airport before flying. You also need to go through some processes when you arrive at the resort airport. Show the protocol layering for the round trip using some layers such as baggage checking/claiming, boarding/unboarding, takeoff/landing.

Answer:

This system might be describe the series of action. When you want to travel through airplane. You purchase your ticket, check your bags, go to the gate and eventually get loaded onto the plane. The plane take off and is routed to its destination. After your plane lands you come out of the plane.

Booking a tickets and resorts, Packing a Luggage , Go to airport, airport entry, checking a bags, Boarding, Take-off, landing, off-boarding, calcimining, go to resort,

Q2: Give some advantages and disadvantages of combining the session, presentation, and application layer in the OSI model into one single application layer in the Internet (TCP/IP) mode.

ANSWER:

Advantages:

I. Single layer to study as all the functionalities is provided at this layer.

II. All functionalities are provided in one layer.

III. Bandwidth for more layers were reserved through this one layer that will reduce to one.

IV. Higher bandwidth as number of layers is reduced.

V. It reflects the real-life separation of application from the TCP-downward section of the OSI model.

Disadvantages:

I. Can make reasoning about the architecture of network system less effective.

II. There will be security issues as the network security and application security will open at a single point which may expose our network open to our threat.

III. Handling an error will be reside in a big layer

IV. If application layer open at a single point so there will be security issues as network issues.

Q3: In Figure, computer A sends a message to computer D via LANl, router Rl, and LAN2. Show the contents of the packets and frames at the network and data link layer for each hop interface.

Answer:

COMPUTER A:

Contents of Segment at Transport layer

Data	Header

Contents of Packet at Network layer

A	D	Data	Header

Contents of Frame at Data link layer

4240	A	D	m	n	Data	H2	T2

COMPUTER D:

Contents of Segment at Transport layer

Data	Header

Contents of Packet at Network layer

A	D	Data	Header

Contents of Frame at Data link layer

8082	A	D	m	n	Data	H2	T2

Q4: What is the theoretical capacity of a channel in each of the following cases?

Answer:

a) Bandwidth = 15 KHz SNR dB=30
b) Bandwidth = 100 KHz SNR dB=2
c) Bandwidth = 0.5MHz SNR dB=10

Solution:

C= b x (SNRdb) / 3

a) C = 15*30/3 = 150 kbps
b) C = 100*2/3 = 66.66 kbps
c) C = 0.5*10/3 =1.67 mbps

Q5: A designed system is operated at 4800 bps. If a signal element encodes an 8 bit word, what is minimum required bandwidth of the channel?

ANSWER:

Solution:

B_{min}= N/2 x $\log_2$ L

4800/1000 bps = 4.8Kbps

B = 4.8 / 2 x $\log_2$ 8 = 35590.42 Hz

Q6: What is the bit rate for the signal given below?

ANSWER:

Solution:

No of bits = 8bps

Bit duration = 8ns

Bit Rate = 8/8

Bit Rate = 1*10^9 bps

Bit Rate = 1Gbps

Q7: A capacity of the channel is given as 40 Mbps, the bandwidth of the channel is 6 MHz assuming white thermal noise, what signal-to-noise ratio is required to achieve this capacity?

ANSWER:

Solution:

We know that,

Capacity=bandwidth * log2 (1+SNR)

C= 40Mbps , B =6MHz

Putting values in equation

40*10^6 bps = 6*10^6 Hz * log2 (1+SNR)

Log2 (1+SNR) = 40/6

Log2 (1+SNR) = 6.67

1+SNR = 2^6.67

SNR = 101.83 -1

SNR = 100.83 levels

Q8:

ANSWER: