IQRA NATIONAL UNIVERSITY

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Assignment : Mid Term

Subject : Data Communication And Network

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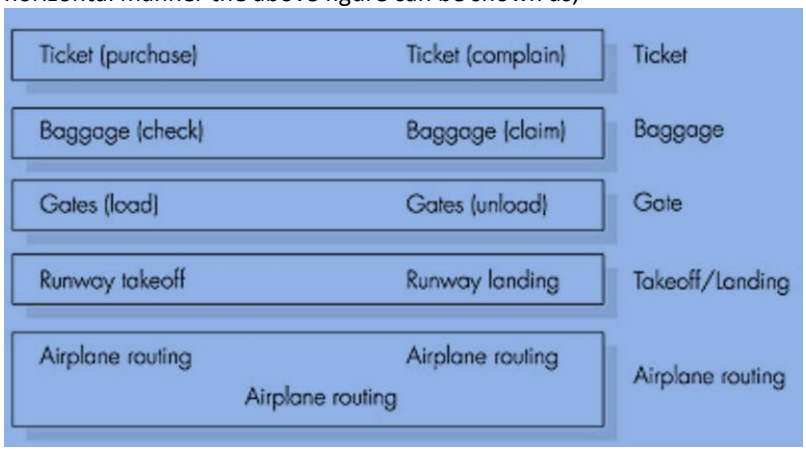
Ans:

One way to describe this system might be to describe the series of actions you take (or others take for you) when you fly on an airline. You purchase your ticket, check your bags, go to the gate, and eventually get loaded onto the plane. The plane takes off and is routed to its destination. After your plane lands, you de-plane at the gate and claim your bags. If the trip was bad, you complain about the flight to the ticket agent (getting nothing for your effort).

Already, we can see some analogies here with computer networking: You are being shipped from source to destination by the airline; a packet is shipped from source host to destination host in the Internet. In a horizontal manner the above figure can be shown as;



Q2:

Ans:

Advantages:

1. By combining these layers the functionality is performed by a single layer and overhead is reduced.

2. Higher Bandwidth as number of layers is reduced.

3. It reflects the real-life separation of application from the TCP-downward sections of the OSI model.

Disadvantages:

1. More functions need to be performed by single layer.

2. Can make reasoning about the architecture of network systems less effective.

3. 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.

Q3:

Ans:

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:
Ans:
a. Solution:

SNR(dB) = 10 * $\log_{10}$(SNR) SNR = $10^{(SNR(dB)/10)}$
SNR = $10^{(30/10)}$ SNR = 10^{3} = 1000
As we know that;
Capacity = bandwidth * $\log_2$(1 + SNR)
Capacity = 15 KHz * $\log_2$(1 + 1000)
Capacity = 15 KHz * $\log_2$(1001)
Capacity = 15 KHz * 9.97
Capacity = 149.55 Kbps
b. Solution:

SNR(dB) = 10 * $\log_{10}$(SNR) SNR = $10^{(SNR(dB)/10)}$
SNR = $10^{(2/10)}$ SNR = $10^{0.2}$ = 1.6
As we know that;
Capacity = bandwidth * $\log_2$(1 + SNR)
Capacity = 100 KHz * $\log_2$(1 + 1.6)
Capacity = 100 KHz * $\log_2$(2.6)
Capacity = 100 KHz * 1.38
Capacity = 138 Kbps
c. Solution:

SNR(dB) = 10 * $\log_{10}$(SNR) SNR = $10^{(SNR(dB)/10)}$
SNR = $10^{(10/10)}$ SNR = 10^{1} = 10
As we know that;
Capacity = bandwidth * $\log_2$(1 + SNR)
Capacity = 0.5 MHz * $\log_2$(1 + 10)
Capacity = 0.5 MHz * $\log_2$(11)
Capacity = 0.5 MHz * 3.46
Capacity = 1.73 Mbps

Q5:
Ans: Solution:
Using Nyquist's equation: **C = 2 * B * log2M.**
We have C = 4800 bps
log2M = 8, because a signal element encodes a 4-bit word. (So, actually M=256).
16B = 4800
and we have **B = 300 Hz**

Q6:
Ans:
Solution:
Here number of bits = 8 bit, and Bit Duration = 8 ns
So;
Bit rate = 8 bit/8 ns
Bit rate = 1 bit/ns
Bit rate = 1 * 10^{9} bit/sec
Bit rate = 1 Gbit/sec

Q7:
Ans:
Solution:

As we know that;
Capacity = bandwidth * $\log_2(1 + SNR)$
Here Capacity = 40 Mbps, and bandwidth = 6 MHz, putting in above equation;
40 Mbps = 6 MHz * $\log_2(1 + SNR)$
$40 * 10^6$ bps = $6 * 10^6$ Hz * $\log_2(1 + SNR)$
$\log_2(1 + SNR) = 40/6$
$\log_2(1 + SNR) = 6.67$
$1 + SNR = 2^{6.67}$
1 + SNR = 102
SNR = 101

Q8:
Ans:
Solution:
Frequencies = 20 to 40 KHz
So Bandwidth = 40 KHz – 20 KHz
Bandwidth = 20 KHz
Amplitude = 10 V for the lowest and the highest signals,
30 V for the 30 KHz.
Frequency Spectrum: