Internet Technologies (COMP90007)

Assignment No. 1

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Question 1:

Solution :

Since its given ,video clip – 10 sec , 30 frame per sec, 1280 X 720 pixels per frame which needs 3 bytes per pixel
Bits in 10 frame = 1280 X 720 X 24 (1 byte =8 bits)
*   =22118400 bits*
Bits in 30 frames = 22118400 X 30
*   =663552000*
Bits in 10 second video clip = 663552000 X 10
*   = 6635520000 bits*
Latency = Time Delay + Propagation delay = Message in bits /Rate of transmission + length of channel/speed of signal .
Message in bits = 6635520000 bits
Transmission rate = 56kbps
Length of the channel = 10000000 m (distance between sender & receiver)
Speed of signal = 200000000 m/s
Part1)
 Latency = 6635520 kbits /56kbps + 10000000m/(200000000 m/s)=   118491.428 sec+0.05 sec
  Answer   = **118491.478571 seconds**

Part 2)

Latency = 6635.520 Mbps / 100 Mbps + 10000000m/(200000000 m/s)
  Answer   = **66.4052 seconds**

Question 2 :

Solution 2:

Given here,
 Channel bandwidth = 8 KHz
 Max data rate = 128 kbps

Part 1) Channel is noisy,

According to Shannon's theorem relation between Max data rate with bandwidth and Sound to Noise ratio (S/N) is given as (channel is nosiy) :

Max. data rate = B X $\log_2$ (1+ (S/N)) bits/ sec

128 = 8 X log2 (1+ S/N)
16 = log2(1+S/N)
S/N = 2^(16) -1

S/N (dB) = 10 X $\log_{10}$ (S/N)
S/N (dB) = 10 X $\log_{10}$((2^16) -1)
S/N (dB) = 10 X $\log_{10}$ (65535)   (2^ 16 = 65536)
S/N (dB) = 10 X 4.816   (log 65535 base 10 = 4.816)
Answer : S/N (dB) = 48.16 dB

Part 2)

Channel is noiseless,
According to Nyquist's theorem , relation between Max data rate with bandwidth and signal level is given as (channel is noisless) :

Max. data rate = 2 X B X $\log_2$ (V) bits /sec

128 = 2 X 8 X log2 (V)

8 = log2(V)

V = 2^ 8

Answer : We need a signal which has signal level of 256. That means 8 bits per pulse or sample .
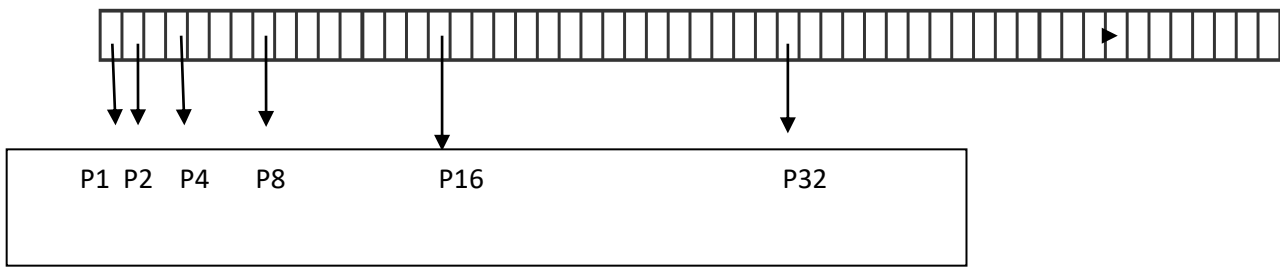
Question 3:

Solution 3:

As given we are using Hamming code to correct errors. According to formula to calculate check bits ,

2^c >= d+c-1   where c= check bits , d = data bits
Given data bits d= 48

Answer : Minimum check bits required = 6

The redundant bits are placed at positions corresponding to power of 2- **1, 2, 4, 8, 16 and 32**

P1	P2	P4	P8	P16	P32

Question 4:

Solution 4 :

Benefits of layered structure in network are :
1)   It prevents other layers to get affected from changes in one layer .
2)   It allows different software and hardware to communicate with each other .

Question 5 :

Solution 5 :

Part (1):

Answer : I searched for site **(http://vornlocher.de/tower.html)**

The IP address of the source is **192.168.1.4**

The IP address of the destination is **88.217.240.50**   **(http://vornlocher.de)**

To check confirm the IP address of the source one can run command **"ipconfig"** in cmd
(Command Prompt) of the system.

To check confirm the IP address one can open the browser and paste the destination
IP address and check .

Answer 2: Flow graph

The image below shows about the tcp stream when the connection is established between source
and destination .The two service primitives that the graph depicts is "CONNECT" and "ACCEPT".The
graph shows how the source is sending the connection request as SYN and the destination is
accepting the connection and sending back SYN ACK as an acknowledgement.

The starting green patch indicates the Connection and acceptance of the network between source
and destination.

Time	192.168.1.4		relay-a4ad563a.net.anydesk.com	Comment
		vornlocher.ve.m-online.net		
0.000000	51538	SYN → 80		Seq = 0
0.143247	51538	SYN, ACK ← 80		Seq = 0 Ack = 1
0.143325	51538	ACK → 80		Seq = 1 Ack = 1
0.143842	51538	PSH, ACK - Len: 551 → 80		Seq = 1 Ack = 1
0.289006	51538	ACK ← 80		Seq = 1 Ack = 552
0.289848	51538	PSH, ACK - Len: 211 → 80		Seq = 1 Ack = 552
0.331267	51538	ACK ← 80		Seq = 552 Ack = 212
1.290820	51538	FIN, ACK → 80		Seq = 212 Ack = 552
1.290904	51538	ACK → 80		Seq = 552 Ack = 213
6.770808	51527	ACK ← 80		Seq = 1 Ack = 1
6.771047	51527	ACK → 80		Seq = 1 Ack = 2
16.946097	51527	ACK ← 80		Seq = 1 Ack = 1
16.946177	51527	ACK → 80		Seq = 1 Ack = 2
23.896550	51538	FIN, ACK → 80		Seq = 552 Ack = 213
23.897741	51541	SYN → 80		Seq = 0

Submitted by :

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