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QNo1:- Protocol layering for Air Travelling

Ans:- Protocol layering

Sender	Received	
check Resort (book set)	Resort (stay)	} Checking
Trivale (To Airport)	Trivale (To Resort)	
Ticket (Purchase)	Ticket (complaing)	} Ticketing
baggage (check)	baggage (claim)	} baggage
Gate (load People, bags)	gate (unload People, bags)	} gate
Take off	landing	} Takeoff, landing
AirPlane Routing	AirPlane Routing	} Routing

AirPlane Routing

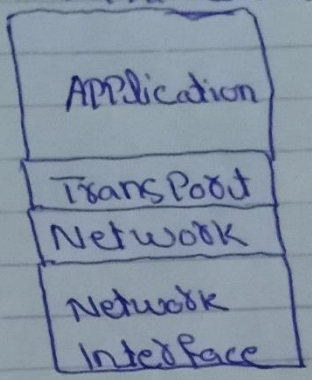
QNo2:- Give some Advantages and Disadvantages of combing The Three layers.

Ans:- The OSI Reference Model is Just a Theoretical model. it specifies an "Ideal" Protocols stack. on The other Hand TCP/IP was developed before The OSI model does not explicitly contain all The layers but a working model and a Protocol suit. The data link and Physical layers are combined into one and every Thing above The network layer is Regarded as an Application layer.

OSI Reference Model

7. Application
6. Presentation
5. Session
4. Transport
3. Network
2. Data Link
1. Physical

TCP/IP conceptual layer



Following of some of the Advantages and Disadvantages of combining the three layers of OSI Model, i.e Application, Session and Presentation into one TCP/IP layers ie Application

Advantages

① Reduced Encapsulation:-
Three layers in OSI mean that the Application data is Encapsulated three times instead of one with one layer of TCP/IP.

② Easy of Management:-
The combination of layers make the management easy because the lower layers are managed by networking Professional while the Top Application layer is easy to manage by Application Professional.

Disadvantages

① Increase overhead on Application layer
The single layer reduces the overall overhead but increase the overhead on a single layer because one Application layer perform the tasks of three layers.

② Security issues:-
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.

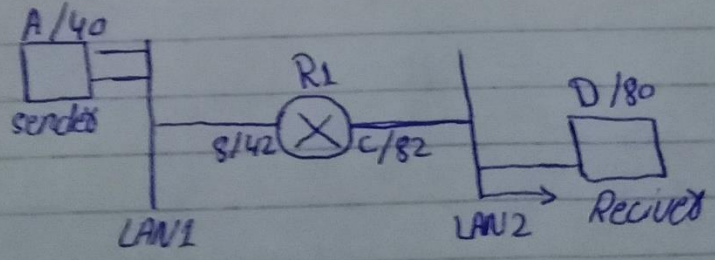
④ Reduces overhead of overall network.
All the function are performed on a single layer so the overall of the network is Reduced.

⑤ Higher bandwidth as number of layer are Reduced.

⑥ it Reflects the Real life separation of Application from the TCP downward section of the osi model.

③ it make Troubleshooting Hard as multiple errors may reside at a single.

Q No 3 ⇒ Assume that the communication is between a Process Runing.....?

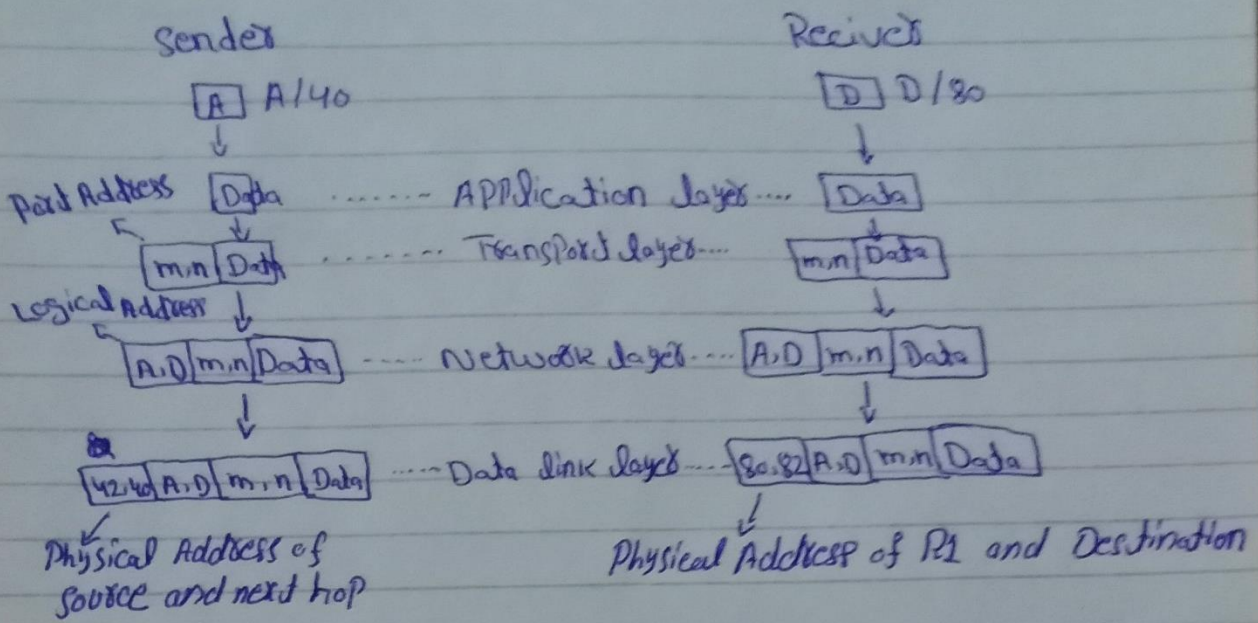


Ans ⇒ Given Data :=>

Sender
Logical Address : A
Physical Address : 40
Process Running at Port : m

Reciver
Logical Address : D
Physical Address : 80
Process Running at Port : n

contexts of the Packet as follow.



Because the Physical address of sender is 40 and the next hop address is 42 so the frame will add its own Physical address and the Address of next hop. 42 / Router R1.
At the Reciving end when the frame leaves R1, it will add its own Physical Address (82) and the Reciver Physical Address 80,..
It is Important to note that the logical Addresses remain the same throghout the Process only the Physical Address are changing...

Q No 4 What is the theoretical capacity of a channel in each of the following cases:

(a) Bandwidth = 15 KHz 15000 Hz

$SNR_{db} = 30$

Solution: Now $C = B \log_2 (1 + SNR) \longrightarrow (1)$

for finding SNR we know that

$SNR_{db} = 10 \log_{10} (SNR) \longrightarrow (2)$

Putting the values in (2)

$$\frac{\cancel{30}^{3}}{\cancel{10}} = \frac{\cancel{10}}{\cancel{10}} \log_{10} (SNR)$$

$$3 = \log_{10} SNR$$

As $\boxed{\log x = y \Rightarrow 10^{\log x} = 10^{y} \Rightarrow x = 10^{y}}$

Now To get rid of the log we will take base 10 into both side

$$10^{3} = 10^{\cancel{\log_{10}}(SNR)}$$

$$1000 = SNR$$

Now Put in (1)

$$C = 15 kh2 \log_2 (1 + 1000)$$

$$= 15 kh2 \log_2 (1001)$$

$$= 15 kh2 \cdot 9.967$$

$$C = 149.505 kbps$$

or 149,505 bps

Theoritical capacity of the channel.

(3) Bandwidth = 100 khz
SNRdb = 2

Solution: Now

$$C = B \log_2 (1 + SNR) \longrightarrow (1)$$

For finding SNR we know that

$$SNR_{db} = 10 \log_{10} (SNR) \longrightarrow (2)$$

Putting the values in (2)

$$2 = 10 \log_{10} (SNR)$$

$$\frac{2}{10} = \frac{10}{10} \log_{10} (SNR)$$

$$0.2 = \log_{10} (SNR)$$

Now To get rid of the log we will take base 10 into both side

$$10^{0.2} = 10^{\log_{10} (SNR)}$$

$$1.58 = SNR$$

Now Put in (1)

$$C = 100 khz \log_2 (1 + 1.58)$$

$$C = 100 khz \log_2 (2.58)$$

$$C = 100 khz \cdot 1.36$$

$$C = 136 kbps$$

Theoritical capacity of the channel

Q. Bandwidth = 0.5 mHz

SNR_{db} = 10

Solution

Now $C = B \log_2 (1 + SNR)$ — ①

For finding SNR we know that

$SNR_{db} = 10 \log_{10} (SNR)$ — ②

Putting the values in ②

$$\frac{\cancel{10}}{\cancel{10}} = \frac{10 \log_{10} (SNR)}{10}$$

$$1 = \log_{10} (SNR)$$

Now to get rid of the log we will take base 10 into both side

$$10^1 = \cancel{10}^{\cancel{\log_{10}}(SNR)}$$

$$10 = SNR$$

Now Put in ①

$$C = 0.5\ mHz \log_2 (1 + 10)$$

$$C = 0.5\ mHz \log_2 (11)$$

$$C = 0.5\ mHz \cdot 3.45$$

$$C = 1.725\ mbps$$

Theoritical capacity of the channel.

Qno5:- A digitilized system is operated at 4800 bps. If a single element encode an 8-bit word, what is the minimum required bandwidth of the channel?

Ans:- Given data:

system operating at 4800 bps

signal element encoding 8-bit word

minimum required bandwidth of the channel

As per the given details, we will use nyquist equation for this

i.e $C = 2B \log_2 m$

$C = 4800$ bps

$\log_2 m = 8$ because the signal element encoding 8 bit word

Putting in the formula

$C = 2B \log_2 m$

$4800 = 2B \times 8$

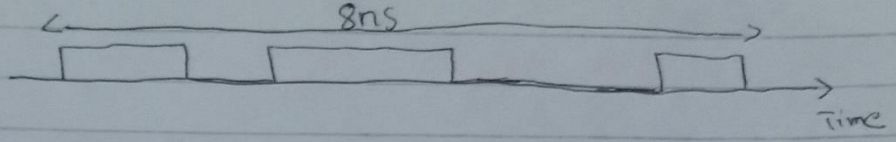
Divide each side by 8

$\frac{4800}{8} = 2B$

$\frac{600}{2} = \frac{2B}{2}$

$B = 300$ Hz

Qno6: What is the bit rate for the signal?



Ans: The signal has two levels
So the number of bits needed
Pr level are
No of bits = $\log_2^2 = 1$ —(A)
It show that the digital signal
Transformed 1 bit at a time and
as shown in the question
8ns time and the bits Transformed
are also 8 as Pr formula (A)
8ns = 8 bits => 1ns = 1 bit
and
1sec = 10^9 ns
So bit rate = no of bits in 1 second
So this signal sent
1,000,000,000 bPs ==> 1 Gbps

Qno 7 :- A capacity of the channel as 40 Mbps, bandwidth of the channel 6 MHz. What signal-To-noise Ratio?

Ans:-

$$C = B \log_2 (1+SNR)$$

$$40 \times 10^6 = 6 \times 10^6 \log_2 (1+SNR)$$

$$40000000 = 6000000 \log_2 (1+SNR)$$

$$\frac{40000000}{6000000} = \frac{6000000}{6000000} \log_2 (1+SNR)$$

$$6.66 = \log_2 (1+SNR)$$

To get Rid of $\log_2$ we will Take the base 2 of both side

$$2^{6.66} = 2^{\log_2 (1+SNR)}$$

$$101.125 = 1+SNR$$

$$101-1 = SNR$$

$$100 = SNR$$

$$SNR = 100$$

Qno 8:

A composite signal that is non-periodic contains frequencies from 20 to 40 kHz ---> ----- ?

Solution:

Given Data:

signal is non-periodic

frequency Range: 20 kHz To 40 kHz

lowest frequency: 20 kHz

Highest frequency: 40 kHz

Peak amplitude for 20 kHz is 10 V

Peak amplitude for 30 kHz is 30 V

Peak amplitude for 40 kHz is 10 V

Since the signal is non-periodic, therefore the frequency domain will be made of a continuous spectrum of frequencies The spectrum can be plotted as given below ---