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Homework - 1

Answer 1:

R1 is transmission rate between sending host and switch

R2 is transmission rate between switch and receiving host

L is the length of packet

Transmission delay (d_{trans}) = $\frac{\text{Packet length}}{\text{link bandwidth}}$

∴ Total end to end delay = $\frac{L}{R1} + \frac{L}{R2}$

Answer 2:

Transmission delay (d_{trans}) = $\frac{L}{R}$

where L: Packet length (bits)
R: link bandwidth (bps)

It is given that the length of packet is 1000 byte. 1 byte is equal to 8 bit

Therefore 1000 byte = 8×1000 bits

$= 8000$ bits

Link bandwidth = 2 Mbps = 2,000,000 bps

Hence,

Transmission delay (d_{trans}) = $\frac{L}{R}$

$= \frac{8000}{2,000,000}$

$= 4ms$

Propogation delay (d_{prop}) = $\frac{d}{S}$

where d: length of physical link
S: propogation speed

Here length of physical link is 2500 km which is $2500 \times 1000 = 2500000m$

$\therefore$ Propogation delay (d_{prop}) = $\frac{d}{s}$

$= \frac{2500000}{2.5 \times 10^8}$

$= 10\,ms$

Total time = $d_{trans} + d_{prop}$

$= 4 + 10$

Total time = $\underline{14\,ms}$

The delay depend on packet length as you need packet length to get transmission delay. The delay also depend on transmission rate.

Answer 3:

a. Propogation delay (d_{prop}) = $\frac{d}{S}$

where d is length of physical link and S is propogation speed

$\therefore d_{prop} = \frac{20,000 \times 1000}{2.5 \times 10^8}$

$= 0.08s$

$R = 2Mbps = 2000000$ bps

$\therefore$ Bandwidth delay product $= R * d_{prop}$

$= 2000000 \times 0.08$

Bandwidth delay product = 160,000 bits

b. Bandwidth delay product is max number of data on a network link at a given time Here the bandwidth delay product for the link is 160,000 bits hence maximum number of bits in link at given time is 160,000 bits

c)

The bandwidth delay product is the maximum amount of data that can be on a link at a given time.

Answer 4:

The ip address 198.1.17/24 indicate that 24 bit is assigned to subnet part and 8 bits for the host

Subnet 1 requires to support 60 interfaces to represent 60 interfaces we would need 64 bits ie 2^6

Subnet 2 requires to support 90 interfaces ie we would need $2^7 = 128$ bits

Subnet 3 needs to support 12 interfaces ie we would need $2^4 = 16$ bits

Each of the interface would require 1 network address and 1 broadcast address

Subnet 1 : 198.1.17.0/26

Subnet 2 : 198.1.17.128/25

Subnet 3 : 198.1.17.65/28

Answer 5 :

a.

Destination address	Link Interface
H1	interface 1

Here as you can see that the routing table specifies that if the destination address is of H1 then use interface 1

b. No we cannot write forwarding table in this scenario as forwarding table can be written depending on destination addresses.

Answer 6:

Step	N	D(s), p(s)	D(t), p(t)	D(v), p(v)	D(w), p(w)	D(x), p(x)	D(y), p(y)	D(z), p(z)
0	u	∞	∞	3,u	2,u	∞	∞	∞
1	uw	6,w	∞	3,u		3,w	∞	∞
2	uwv	6,w	∞			3,w	5,v	∞
3	uwvx	6,w	8,x				5,v	6,y
4	uwvxy	6,w	8,x					6,y
5	uwvxys		8,x					6,y
6	uwvxysz		8,x					
7	uwvxyszt							

The highlighted part is shortest path at each step that is considered and then the node is picked.

Final shortest path to each vertex