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CSC 425

EXTRA PROBLEMS

1) Use 3 switches

1) You were asked to design a LAN for a site that has 60 PCs.Each PC downloads 20 MB file every 10 minutes from the Internet Each PC uploads 800 KB every 8 minutes.

a) Determine the total traffic on the LAN.

b) How will you connect these PCs to each others and to the external world? **Explain** which interconnection devices you will use. **Sketch** your LAN.

a) Download Traffic
$\frac{60 \times 20 \times 10^3 \times 8}{10 \times 60} = 16 Mbps$

Upload Traffic
$\frac{60 \times 800 \times 10^3 \times 8}{8 \times 60} = 800 Kbps$

Total Traffic
$800 Kbps + 16 Mbps = 16.8 Mbps$

No, they are on different ports of the bridge ->

2) Which of the network fragments (a, b, c, d, e) represent collision domains? Do users on network fragments (b) and (c) collide together? And why? If all these network interconnection devices are Ethernet, give the expected throughput for the devices on the different network fragments (use the information in table 2 below to fill in table 1.

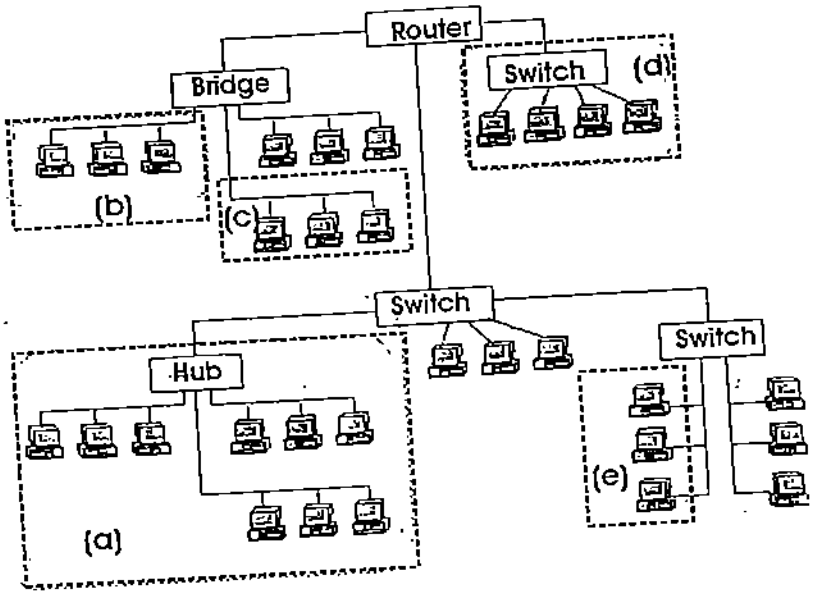
a b c e

Network Fragment	a	b	c	d	e
Throughput (bps)	0.4 Mbps	8Mbps	8Mbps	10Mbps	8Mbps

Table 1

Nbre of Stations	3	6	9
Normalized Throughput	0.8	0.6	0.4

Table 2



3) You are transmitting a file of 240,000 B. The header sizes are 20 B for the *AL*, 30 B for the *NL and* 26 bytes for the *LL*. The size of the frames is 1,000 B. Every frame is acknowledged. The ACK size is 10 B. Processing time of a single packet on the source side is 50 msec (for the Ack-frame); on the destination side, it is 650 msec (for the I-frame).Transmission rate R is 10Mbps and Propagation delay T_p is 10 msec. Calculate The Total Time required to transmit the whole file and the Normalized Throughput.

4) Total Time to Discard a Frame

How long can a workstation wait until its frame is discarded by the network adapter if this frame encounters 2 consecutives collision and the 3rd transmission attempt was successful? Assume the following:

- The size of the frame is 1518 Bytes and the LAN is an Ethernet LAN.
- The backoff time is always taken as its worst case.
- **Hint:** You need to consider all the possible delays: Transmission delay, time to recognize a collision and backoff time.

5) Round Trip Time (RTT)

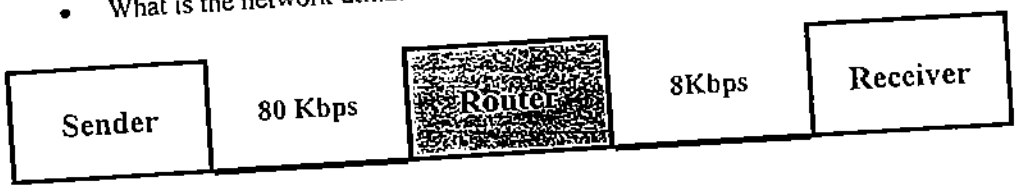
Supose that a 100Mbps link is being set up between earth and a communication satellite at an altitude of 36,000 km. An image file of 25 MB should be transfered from station A to station B on earth. Assume the speed of light = 3*10^8 m/s.

- Calculate the minimum Round Trip Time (RTT) for the link.
- Calculate the amount of data already sent when the sender receives the ACK from the receiver that the first bit has arrived.

6) Network Utilization

In Figure 2 the bit rate between sender and router is 80kbps and between receiver and router is 8kpbs. Suppose the sender transmits 10 packets with 1000 bytes in 1 second and the RTO (retransmission time out) is 2 times RTT(round trip time).

- Calculate the arrival time for the packets at the router and the receiver and the arrival time for ACKs at the sender. Fill in the table.
- Which packets will be unnecessary retransmitted?
- What is the network utilization?



Packet Number	Start Send	Packet Arrive (Router)	Packet Arrive (Receiver)	ACK Arrive (Sender)
1				
2				
3				
4				
5				

6				
7				
8				
9				
10				