National University of Computer and Emerging Sciences, Karachi
FAST School of Computing
Quiz- I-- Solution, Fall-21
07th October 2021

Course Code: CS307	Course Name: Computer Networks
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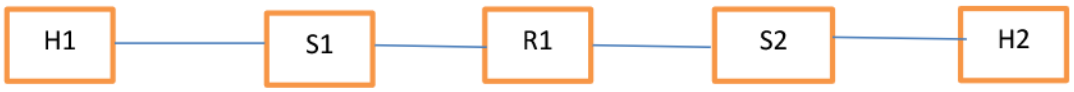
Student Roll No:	Section:

Time Allowed: 30 minutes. **Maximum Points: 25 points**

Question #1: Highlight the correct layers traversed by a packet from H1 to H2 in a connection in the following setting H1, H2 represent host, S1 represent Ethernet switch and R1, R2 are Routers.



Host	Ethernet Switch	Router	Ethernet Switch	Host
Application	Application	Application	Application	Application
Transport	Transport	Transport	Transport	Transport
Network	Network	Network	Network	Network
Data link	Data link	Data link	Data link	Data link
Physical	Physical	Physical	Physical	Physical

Question #2: Write the full form of:

ANSI	American National Standards Institute
TCP	Transmission Control Protocol
RFC	Request for Comments
DHCP	Dynamic Host Configuration Protocol
SMTP	Simple Mail Transfer Protocol

Question #3: Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three links, of rates R1 = 1800 kbps, R2 = 4.6 Mbps, and R3 = 1.8 Mbps.

a) Assuming no other traffic in the network, what is the throughput for the file transfer?

Answer:

Throughput = Min (1800kbps, 4600kpbs, 1800kbps) = 1800 kbps

b. Suppose the file is 8 MB. Dividing the file size by the throughput, roughly how long will it take to transfer the file to Host B?

Answer:

[(8*10^6)*8] / (1800*10^3) = 35.55 seconds.

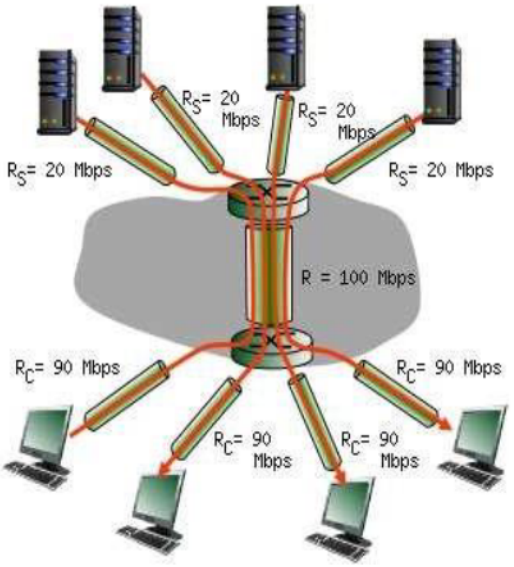
Question #4: How long does it take a packet of length 50Kbytes to propagate over a link of distance 2, 500 km, propagation speed 1.8 x 10^8 m/s, and transmission rate 200.5 Mbps? Recalculate for distance = 3000m.

Answer:

Propagation delay = d/s = (2500 x 10^3/ 1.8 x 10^8) = 13.8 msec and

Propagation delay = d/s = (3000 / 1.8 x 10^8) = 16.6 usec

Question #5: **Consider the scenario shown in figure 1, with four different servers connected to four different clients over four three-hop paths. The four pairs share a common middle hop with a transmission capacity of R = 100 Mbps. The four links from the servers to the shared link have a transmission capacity of RS = 20 Mbps. Each of the four links from the shared middle link to a client has a transmission capacity of RC = 90 Mbps per second. You might want to review Figure 1 in the text before answering the following questions:**



a) What is the maximum achievable end-end throughput (in Mbps) for each of four client-to-server pairs, assuming that the middle link is fair-shared (i.e., divides its transmission rate equally among the four pairs)?

Answer:

The maximum achievable end-end-throughput is 20 Mbps.

b) Which link is the bottleneck link for each session?

Answer:

This is the transmission capacity of the first hop, which is the bottleneck link, since the first-hop transmission capacity of 20 Mbps is less than one quarter of the shared-link transmission capacity (100/4 = 25 Mbps) and less than the third-hop transmission capacity of 90 Mbps.

c) Assuming that the senders are sending at the maximum rate possible, what are the link utilizations for the sender links (RS), client links (RC), and the middle link (R)?

Answer:

The utilization of sender links is 100%. The utilization of receiver links is 22.22%. The utilization of the middle link is 80%.