

National University of Computer and Emerging Sciences, Lahore Campus



Course: Computer Networks
Program: BS(Computer Science)
Duration: 20 Minutes
Date: 11 Sep, 2019
Section: E

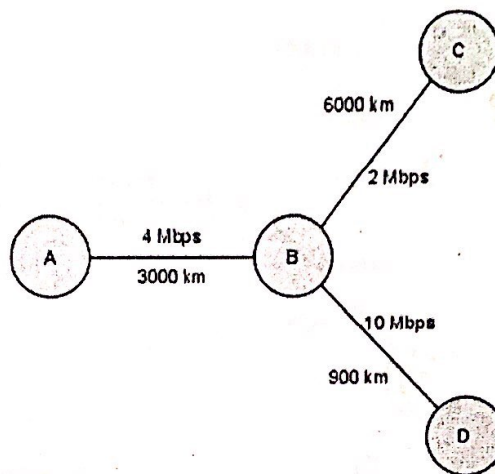
Course Code: CS307
Semester: Fall 2019
Total Marks: 20
Quiz: 1
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Question 1: [Marks 8]

Assume data travels through the links at the speed of light.



(a) What is the transmission delay if

- A sends a 500byte packet to B
- B sends a 500byte packet to D

(b) What is the propagation delay between

- A to B
- B to D

Question 2: [Marks 6]

A wants to send a 500byte packet to D through B. B is supposed to follow the store-and-forward model, that is, B will receive the whole packet from A and then start transmitting the packet to D.

- What is the end-to-end delay seen by the packet?
- What will be the throughput from A to D?

Question 3: [Mark 6]

- If D starts sending 500 byte packets back-to-back to B, then how many packets will D have transmitted before B starts receiving the first packet sent by D?
- What does this value have to do with the term "bandwidth-delay product"? (Extra Credit)

[Marks 3]

Q1) a) $d_{\text{tran}} = \frac{L}{R}$

$$= \frac{500 \times 8}{4 \times 10^6}$$

$$= 0.001 \text{ s}$$

$$d_{\text{tran}} = \frac{500 \times 8}{10 \times 10^6}$$

$$= 0.0004 \text{ s}$$

b) $d_{\text{prop}} = \frac{\text{distance}}{\text{speed}}$

$$= \frac{3000000}{3 \times 10^8}$$

$$= 0.01 \text{ s}$$

$$d_{\text{prop}} = \frac{400000}{3 \times 10^8}$$

$$= 0.0013 \text{ s}$$

Q2) a) $= d_{\text{trans A-B}} + d_{\text{prop A-B}} + d_{\text{trans B-D}} + d_{\text{prop B-D}}$

$$= 0.001 + 0.01 + 0.0004 + 0.0013$$

$$= 0.0127 \text{ s}$$

b) The throughput from A-D will be the A-B link which is 4 Mbps

Q3) a) $\frac{0.003}{0.0004} = 7.5$

This means that when 1st packet arrives at B, D would have transmitted 7 packets ~~and half of the 8th packet~~

b) Bandwidth delay product is the value which indicates that how many ^{maximum} bits can there be at a certain time in the link. This means there will be $500 \times 7 = 3500$ bits in the link or 7 packets