COMSATS University Islamabad, Lahore Campus
Department of Electrical and Computer Engineering

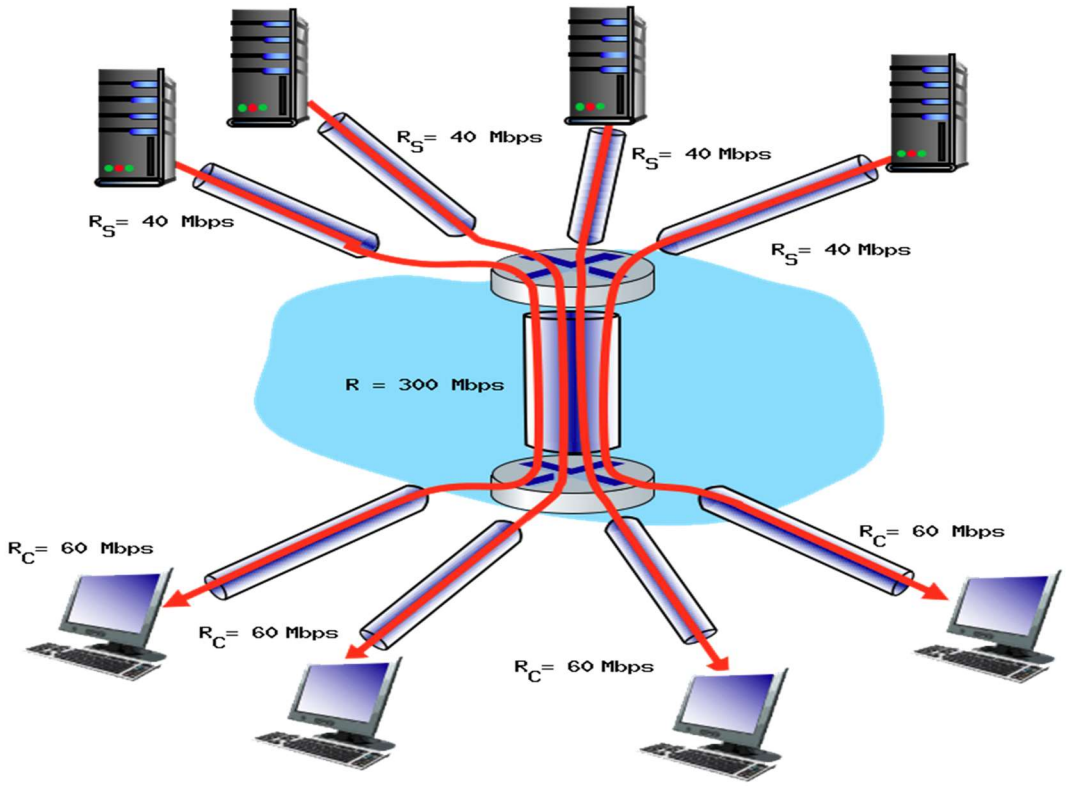
Assignment No 1-Spring 2025

Course Title:	Data Comm & Computer Networks			Course Code:	CPE314	Credit Hours:	4(3,1)
Course	Eng. Ahmad Mudassir			Program Name:	BCE		
Semester:	6th	Batch: FALL 22	Section:	A,B	Date:	12/4/2025	
Deadline	**28th April 25 , 4 PM**			**Maximum Marks:**		**20**	
Student's name:				Reg. No.	CUI/	/LHR	

Important Instructions / Guidelines:

- Any copied answer script will be marked with zero grade.
- No Submissions after the Deadline strictly.

Question 1: **(CLO2-PLO4-C4) (10)**



Consider the scenario shown above, 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 = 300 Mbps. The four links from the servers to the shared link have a transmission capacity of R_s = 40 Mbps. Each of the four links from the shared middle link to a client has a transmission capacity of R_c = 60 Mbps.

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 fairly shared (divides its transmission rate equally)?**
b) **Which link is the bottleneck link? Format as Rc, Rs, or R**
c) **Assuming that the servers are sending at the maximum rate possible, what are the link utilizations for the server links (R_s)? Answer as a decimal**

d) Assuming that the servers are sending at the maximum rate possible, what are the link utilizations for the client links (R_c)? Answer as a decimal

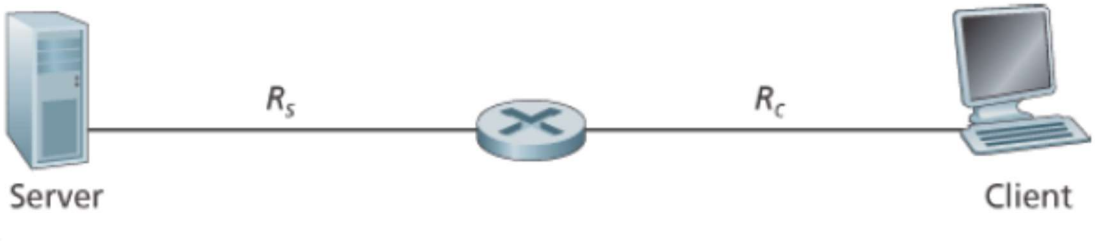
e) Assuming that the servers are sending at the maximum rate possible, what is the link utilizations for the shared link (R)? Answer as a decimal

Question 2: **(CLO2-PLO4-C4) (10)**

Consider Figure below, Assume that we know the bottleneck link along the path from the server to the client is the first link with rate *R* bits/sec. Suppose we send a pair of packets back to back from the server to the client, and there is no other traffic on this path. Assume each packet of size *L* bits, and both links have the same propagation delay *d* .

a. What is the packet inter-arrival time at the destination? That is, how much time elapses from when the last bit of the first packet arrives until the last bit of the second packet arrives?

b. Now assume that the second link is the bottleneck link (i.e.Rc<Rs). Is it possible that the second packet queues at the input queue of the second link? Explain. Now suppose that the server sends the second packet *T* seconds after sending the first packet. How large must *T* be to ensure no queuing before the second link? Explain.



The End **Good Luck** 😊