THE UNIVERSITY OF THE WEST INDIES

Mona Campus

Semester I ■ Semester II ☐ Supplemental/Summer School ☐

Mid-semester examinations of October ■ February/March ☐ June/July ☐ 2013

Course Code and Title: **COMP2190 – Net Centric Computing**

Date:	**October 15, 2013**	Time:	**9 am**
Duration:	**1 Hour**	Paper No:	**1**

Materials required:

Answer booklet:	**Normal**	■	**Special**	☐	**Not required**		☐
Calculator: (where applicable)	**Programmable**	☐	**Non-Programmable**	■	**Not required**		☐
Multiple Choice answer sheets:	**numerical**	☐	**alphabetical**	☐	**1-20**	■ **1-100**	☐
Auxiliary/Other material(s):	None						

Instructions to Candidates: **This paper has 5 page(s) and 3 questions**

Candidates are reminded that the examiners shall take into account the proper use of the English Language in determining the mark for each response.

Answer all questions.

The maximum number of marks you may earn for the entire paper is **30**. The number in [] by each question indicates the number of marks allotted to the question. Justify all your answers; full credit will be given only for properly supported answers, partial credit will be given where applicable.

Please write legibly and keep your answers concise. Points will be deducted for correct answers that also include incorrect or irrelevant information. Good skill!

NB: This paper may not be removed from the examination room.

DO NOT WRITE OR TYPE ON THE BACK OF THIS SHEET: USE ONE SIDE ONLY

INSTRUCTIONS: Each page must be signed by the First and Second Examiners, and where applicable the University and External Examiners. Completed forms should be handed to the Assistant Registrar (Examinations). Where applicable, the EXTERNAL EXAMINER is requested to sign the question paper and return it with comments, if any, (on a

Section 1

Question 1 *9 multiple choice sub-questions* **[9]**

Section 2

Question 2 **[13]** Consider Fig. 1 below, with three links, each with the specified transmission rate and link length.

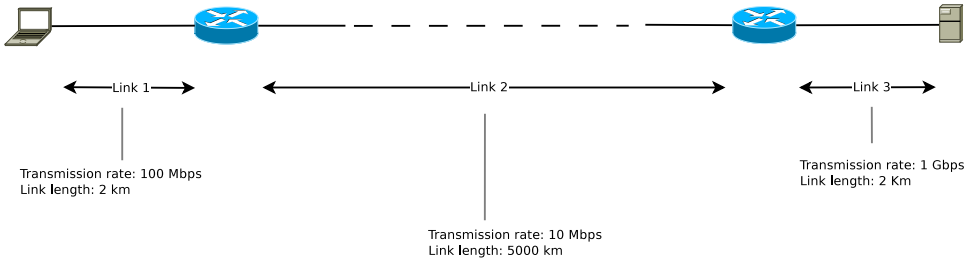

Figure 1: Diagram for Question 2

a. Given the speed of light propagation speed on each link is 2.5×10^8 m/s and a packet length of 8000 bits. Find the end-to-end delay (including the transmission delays and propagation delays on each of the three links, but ignoring queueing and processing delays) from when the leftmost host begins transmitting the first bit of a packet to the time when the last bit of that packet is received at the server at the right. Give your answer in milliseconds. **[6]**

b. Consider a scenario where Link 1 is shared amongst N_{cs} users using circuit switching. If each user requires 20 Mbps, how many users can be supported? **[1]**

c. For the remainder of this problem, suppose packet switching is used. Suppose there are 9 packet-switching users, each requiring 20 Mbps. Can this many users be supported under circuit-switching? Explain. **[1]**

d. For this problem and subsequent problems, you may assume that each user only needs to transmit 5% of the time. What is the probability that a given (specific) user is transmitting, and the remaining users are not transmitting? **[1]**

e. What is the probability that exactly one user (any one among the 9 users) is transmitting, and the remaining users are not transmitting? When one user is transmitting, what fraction of the link capacity will be used by this user? **[2]**

f. What is the probability that any 5 users (of the total 9 users) are transmitting and the remaining users are not transmitting? **[2]**

Question 3 **[8]** Consider an HTTP client that wants to retrieve a web document at a given URL. The IP address of the web server is initially unknown. The www object at the URL has one embedded GIF image that resides at the same server as the original object.

a. What transport and application layer protocols besides HTTP are needed in this scenario? **[2]**

b. Suppose that the time needed to contact and receive a reply from any server (for any protocol) is RTT. How many RTT's are needed from when the user first enters the URL until the complete document is displayed? Assume that non-persistent http is used, and that the server's IP address can be resolved in one hop. **[4]**

c. What is the purpose of the `IF-MODIFIED-SINCE` field in an http GET message? **[2]**

END

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