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ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION

SUMMER SEMESTER, 2021-2022

DURATION: 1 HOUR 30 MINUTES

FULL MARKS: 75

CSE 4839: Internetworking Protocols

Programmable calculators are not allowed. Do not write anything on the question paper.

Answer all 3 (three) questions. Figures in the right margin indicate full marks of questions whereas corresponding CO and PO are written within parentheses.

1. a) What do you understand by the Internet? Explain in brief the Nuts-and-Bolts view of the Internet. 1+4
(CO1)
(PO1)
- b) Consider a network with 20 routers. Two hosts, A and C, are connected to this network, with a distance of 75 km between them. There are two routers between hosts A and C. Each router takes 20 msec to process a single packet. The propagation speed of the network is $2.7 \times 10^8 \text{ ms}^{-1}$. Suppose that all links in the network use TDM with 16 slots and have a transmission rate of 2 Mbps. It takes 800 msec to establish an end-to-end circuit before Host A can begin to transmit the file. The maximum size of an IP packet is 65535 bytes. Consider that there is no queuing delay in the network. The maximum size of an IP packet is 65535 bytes. Consider that there is no queuing delay in the network. How long does it take to send a file of 400,000 bytes from Host A to Host C over a circuit-switched network? 15
(CO1)
(PO2)
- c) 1+1+3
(CO1)
(PO2)

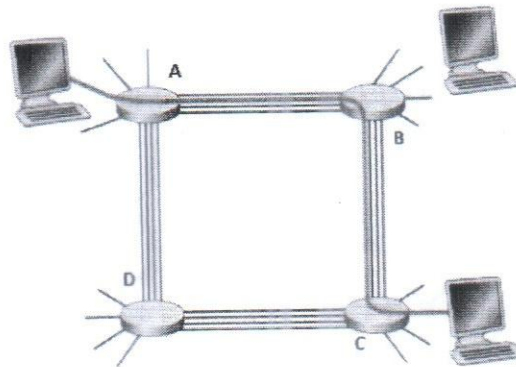


Figure 1: A simple circuit-switched network consisting of four switches and four links for Question 1.c)

Consider the circuit-switched network in Figure 1. There are 4 circuits on each link. Label the four switches A, B, C, and D, going in a clockwise direction.

- i. What is the maximum number of simultaneous connections that can be in progress at any one time in this network?
- ii. Suppose that all connections are between switches A and C. What is the maximum number of simultaneous connections that can be in progress?
- iii. Suppose we want to make four connections between switches A and C, and another four connections between switches B and D. Can we route these calls through the four links to accommodate all eight connections? Explain.

2. a) Host A sends a datagram to host B. Host B never receives the datagram, and host A never receives the notification of failure. Give different possible explanations why host B does not receive the datagram. Why does host A not receive the failure notification? 5+5
(CO3)
(PO2)
- b) Communication involving mobile IP can be inefficient. The inefficiency can be severe or moderate. Explain those inefficiencies with the help of diagrams. Write down the solutions to those inefficiencies. 5+5
(CO2)
(PO1)
- c) A computer, B, sends a timestamp request message to another computer, C. B receives the corresponding timestamp response message at 3:46:09 A.M. The values of the original timestamp, received timestamp, and the transmit timestamp fields of the received response message are 13560000, 13563000, and 13564000 (in milliseconds) respectively. Each field holds a number representing time measured in milliseconds from midnight in Universal Time (formerly called Greenwich Mean Time) 5
(CO3)
(PO2)
- What is the sending trip time? What is the receiving trip time? What is the round-trip time? What is the difference between the sender clock and the receiver clock?
3. a) While on the road, Mr. X was sending an urgent message to a coworker. He changed his network connection during this transmission. 10
(CO2)
(PO1)
- Explain, with appropriate diagrams, how the three phases of mobile communication ensure seamless transmission of the urgent message from Mr. X to a coworker, even when the network connection changes during transmission.

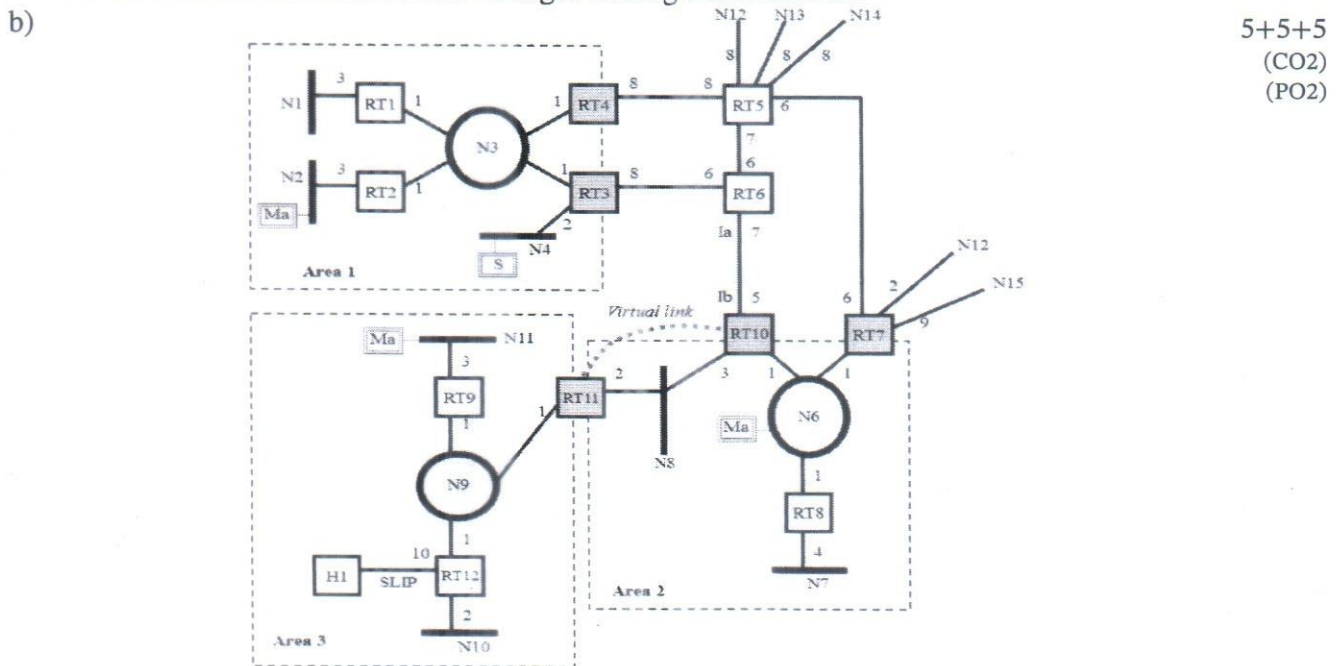


Figure 2: MOSPF with Areas for Question 3.b)

In the network depicted in Figure 2, the multicast routing protocol used is Multicast OSPF (MOSPF). The source of the multicast message, labeled as S, is located in Area 1 and it is being sent to a multicast group with members present in all three areas as indicated in Figure 2.

- i. Describe the steps involved in the distribution of a multicast message from source S in Area 1 to members of a multicast group present in all three areas.
- ii. Illustrate the MOSPF trees for the Source, Backbone, and Destination areas.
- iii. Explain how the router's multicast routing tables are updated based on the MOSPF trees. Write down the updated table.