
UNIVERSITI SAINS MALAYSIA

Semester II Examination
Academic Session 2010/2011

April/May 2011

EEE 521 – COMPUTER AND DATA COMMUNICATIONS NETWORKS

Time: 3 Hours

INSTRUCTION TO CANDIDATE:

Please ensure that this examination paper contains **EIGHT** printed pages and **SIX** questions before answering.

Answer **FIVE** questions.

Distribution of marks for each question is stated accordingly.

All questions must be answered in English.

1. (a) As a network administrator of your organization, you are assigned to distribute the IP addresses according to 6 departments: Maintenance Department, Administration Department, Engineering Department, Customer Department, Sales Department, and Security Department.

Using the Class B network 175.2.0.0, subnet the network so that you will have 254 usable subnets and at least 200 hosts in each subnet. List the first 6 subnets as part of the departments' IP assignments, their subnet address and the broadcast address for each of the subnets, as well as the usable host range available in the subnet.

(8 marks)

- (b) Given the address 198.4.10.1/15. By obtaining the appropriate network addresses, subnet the given network into 4 more subnets. List the subnet addresses and the broadcast addresses for each of the subnets, as well as the usable host range available in the subnet.

(8 marks)

- (c) Discuss the differences between connection-oriented service and connectionless service.

(4 marks)

2. (a) Consider the following router connection nodes with their respective cost metrics.

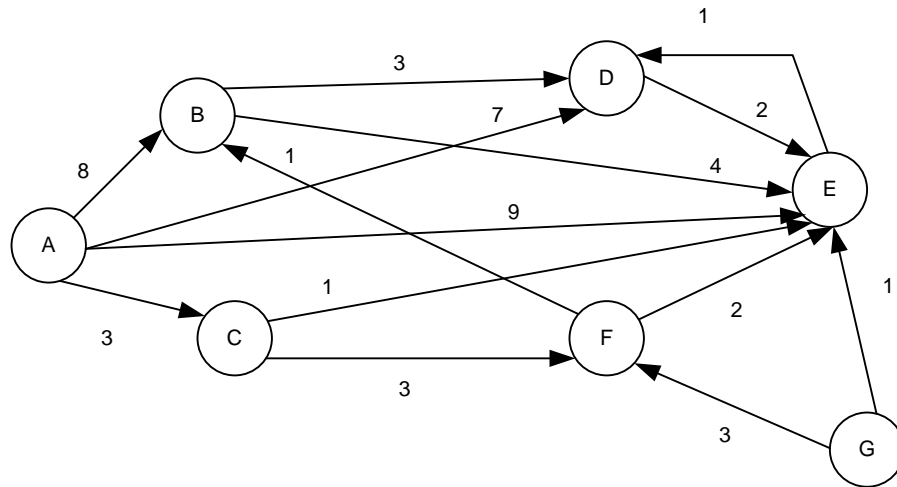


Figure 2(a)

- (i) Use the Dijkstra's algorithm to find the most cost-effective routes from A to the rest of the nodes. What can be said about node G?
- (ii) Use the Bellman Ford's algorithm to find the most cost-effective routes from A to the rest of the nodes if the cost metrics for BE is -4, CF is -3, and DE is -2 respectively.
- (iii) Re-do part ii) using Dijkstra's algorithm. Compare the answer with that of Bellman Ford's and discuss why Dijkstra's algorithm is unusable in this case.

(16 marks)

(b) Briefly elaborate on the Address Resolution Protocol (ARP) and Reverse Address Resolution Protocol (RARP).

(4 marks)

3. (a) Discuss the following:

(i) Calling of static and non-static methods from Java Networking API

(ii) The silly window syndrome with respect to the Transmission Control Protocol. How does the Nagle and Clark algorithm help address the silly window syndrome.

(10 marks)

(b) Consider the network diagram given in Figure 3 (b).

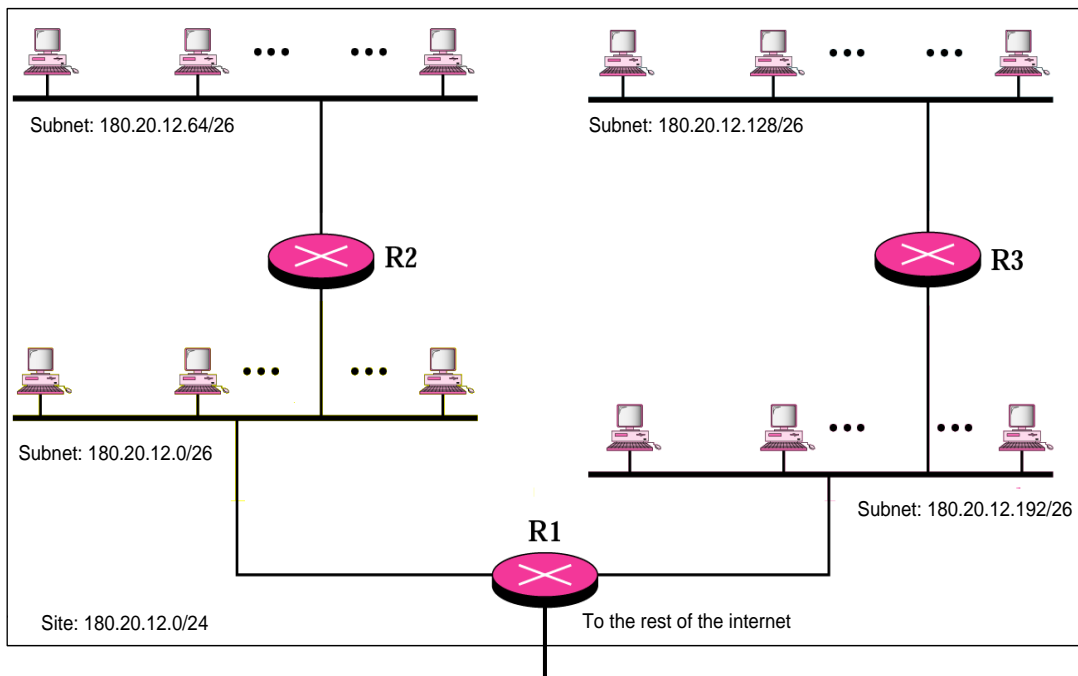


Figure 3 (b)

- (i) Identify the range of possible IP and Broadcast addresses for all the subnets
- (ii) The subnet 180.20.12.192/26 is to be subnetted into two more sub-networks. Using VLSM technique, identify the two sub-sub-networks addresses and the subnet mask along with the range of possible IP addresses.

(10 marks)

4. (a) Transmission Control Protocol (TCP) exploits the sliding window both at the sender and receiver. Assuming the window size is 7 and using an appropriate diagram, describe the case when the sliding window slides, expands, and shrinks in order to support flow control and error control.

(8 marks)

- (b) The use of redundant bridges can potentially cause loop problem in local area network. With an appropriate diagram, describe the loop problem.

(6 marks)

- (c) Given the following diagram of the spanning tree bridge network, determine which bridges would be used in forwarding packets.

(6 marks)

(i)

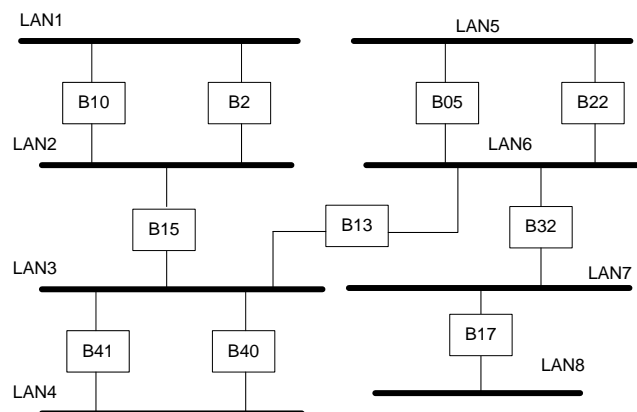


Figure 4 (b) (i)

(ii)

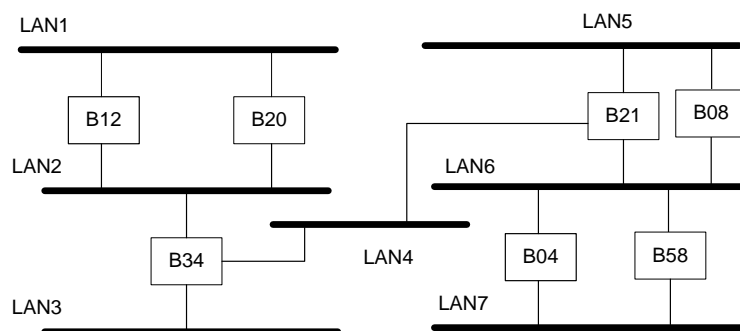


Figure 4 (b) (ii)

5. (a) By using appropriate diagrams, describe the operation of Selective-Repeat ARQ complete with its sliding window in the situation where the frame is lost.

(6 marks)

- (b) Discuss the following random access protocol:
- (i) Carrier Sense Multiple Access with Collision Detection (CSMA/CD) protocol
 - (ii) Slotted Aloha protocol
- (8 marks)
- (c) By choosing any valid Class C network, identify and construct a supernet network that can support 1100 hosts. Identify the range of usable network addresses, supernet masks, IP addresses, and broadcast addresses.
- (6 marks)
6. (a) Discuss the main functions of the Java Networking Classes given in **bold** for UDP and TCP given in Figure 6 (a).

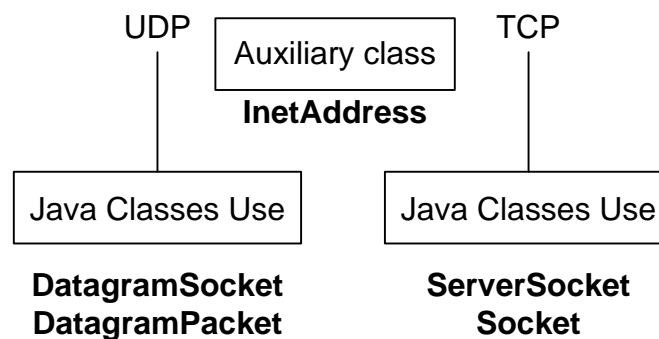


Figure 6 (a)

(8 marks)

- (b) Discuss the workings of Dynamic Host Configuration Protocol (DHCP):
- (i) DHP Server
 - (ii) In the case of newly installed computer in the network
 - (iii) In the case of relocated computer in the network

(12 marks)

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