ORDRE DES INGÉNIEURS DU QUÉBEC

MAY 2017 SESSION

Open-book examination
Calculators : only authorized models
Duration : 3 hours

16-EL-B1 Information Technology Networks

Question 1 (6 points)

Answer the following questions by TRUE or FALSE and justify your answer.

A. Using the subnet mask /28, computers which IP addresses are 132.207.67.113 and 132.207.67.63 belong to the same subnet. **(1 point)**

B. The goal of ARP (Address Resolution Protocol) is to use private addresses in a local area network and one valid public IP address on Internet. **(1 point)**

C. TCP (Transmission Control Protocol) is used at the level 4 of the protocol stack in order to transport in real-time, voice and other applications. **(1 point)**

D. RTP (Real-time Transport Protocol) packets are encapsulated in UDP datagram or TCP segment. **(1 point)**

E. BGP (Border Gateway Protocol) is a routing protocol used to route inter-AS (AS : Autonomous System). **(1 point)**

F. Stop-and-Wait and Sliding Window technics are flow control protocols. **(1 point)**

Question 2 (6 points)

An application real-time uses the network depicted at Figure 1. The server sends a video to the client in real-time. To have a good quality of service (QoS), the client must receive 25 images per second. Suppose that an image is 10 Kbytes and UDP is used. The network can't send a 10K Bytes packet, so the image will be fragmented is smaller packets. The control information added to each packet is 100 bytes.

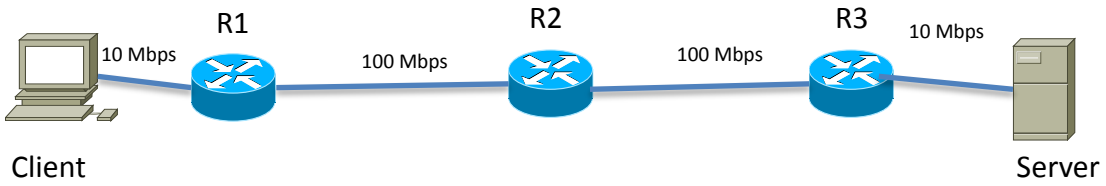

Figure 1.

a. If the packet's size is 1-Kbyte plus 100 bytes control information, is it possible for the server to send the video? Explain you answer. **(3 points)**
b. If the packet's size is 1-byte plus 100 bytes control information, is it possible for the server send the video? Explain you answer. **(3 points)**

Question 3 (4 points)

Let consider the network topology depicted at Figure 2. Each physical link is represented by a line and the cost of this link is indicated by the numerical value stated above the line. Each router runs the link state routing protocol OSPF (Open Shortest Path First) with a global view of the network.

Only for routers A and B :

a. Use Dijkstra (OSPF uses Dijkstra) to determine the shortest paths and the cost of the paths to each destination.

b. Fill the following table (Table 1) for each router (A and B), to obtain their routing table, respectively.
Note : Use the notation A-B, to point out the interface of the router A used to join the router B.

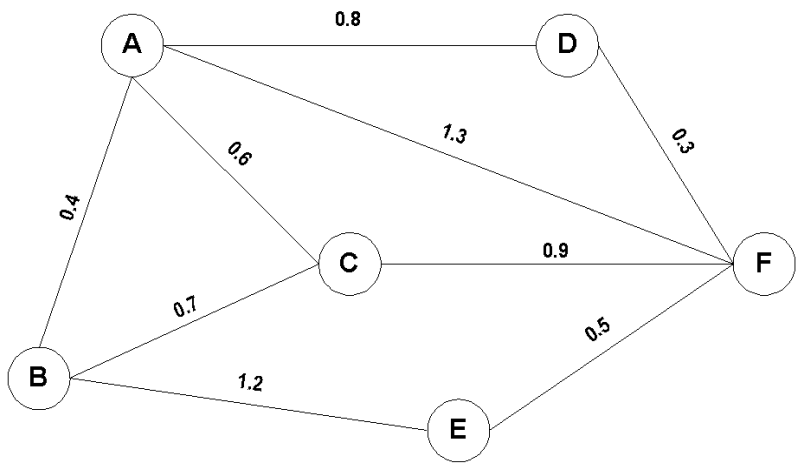

Figure 2.

Table 1. Router X

Destination	Interface
A	X -?
B	X -?
C	X - ?
D	X -?
E	X -?
F	X -?

Question 4 (4 points)

An application client/server use the network depicted at Figure 3. The server sends a packet (1000 bytes) to the client. There are two routes Route1 = (R1-R2-R3) and Route2 = (R1-R4-R5-R6-R7-R3) for the communication between the client and the server and the network uses OSPF routing protocol. Which is the best route for the communication? Explain your answer.

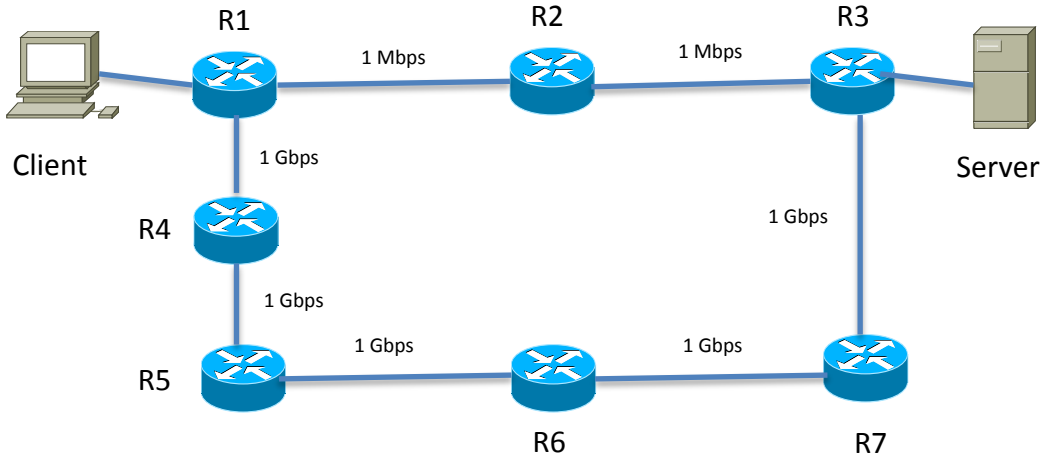

Figure 3.