Homework Assignment 3: 100 points

Due date: Nov. 8, 2024 (Friday)

Question 1: (20 points)

(a) Please specify three examples of MAC which are based on the rationale of "random access". (5 points)

(b) Can CSMA completely avoid collisions? Please explain your solution. (5 points)

(c) What are the differences between CSMA/CD and CSMA/CA? (10 points)

Question 2: (20 points)

(a) As shown in Figure 1, suppose that host A sends a datagram to host B. Will the source/destination IP addresses be changed when the datagram traverses through the router R? (10 points)

(b) As shown in Figure 1, suppose that host A sends a datagram to host B. Will the source/destination MAC addresses be changed when the frame traverses through the router R? (10 points)

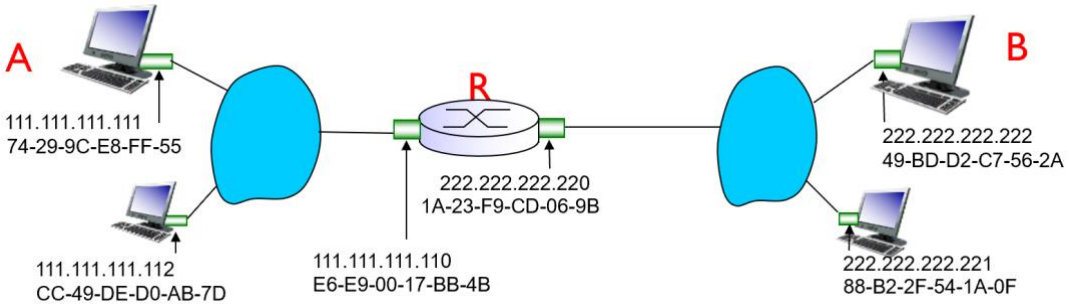

Figure 1

Question 3: (20 points)

(a) What are the differences between the function of the network layer and the function of the data link layer? (10 points)

(b) What the difference between the MAC address and IP address? (10 points)

Question 4: (20 points)

Please explain the difference between the Link-State based routing algorithm and the Distance-Vector based algorithm.

Question 5: (20 points)

(a) Consider the network topology shown in Figure 2. Suppose that the distance vector based algorithm is used for routing. Please specify convergence process as shown in the following Figure 3. (10 points)

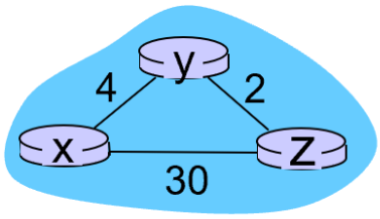

Figure 2

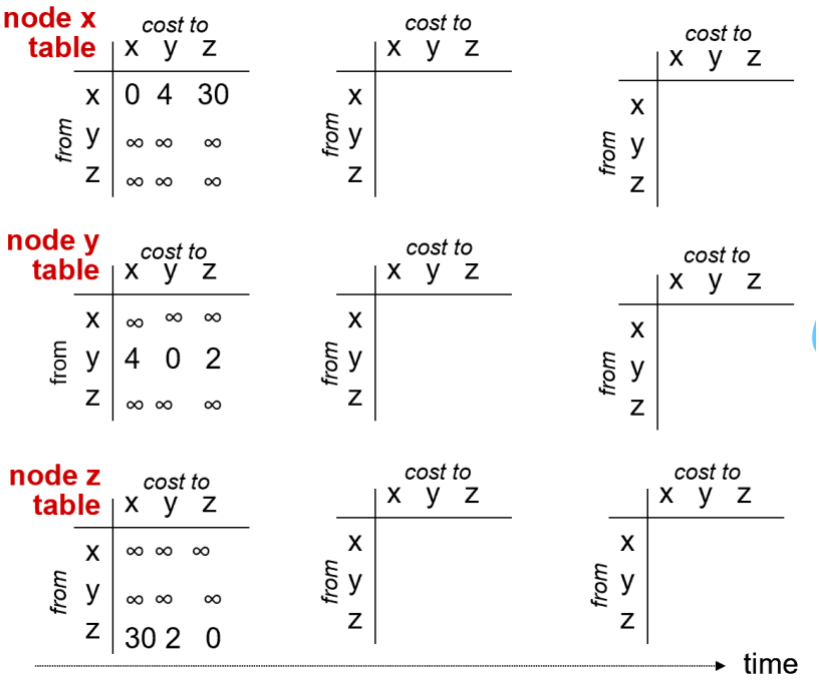

Figure 3

(b) After convergence of the distance vector based algorithm in the above Question 3(a), if the link cost between router x and router y is increased to 60 as shown in Figure 4 below, will the distance vector based algorithm converge quickly after this increased link cost? Please explain your reasons. (10 points)

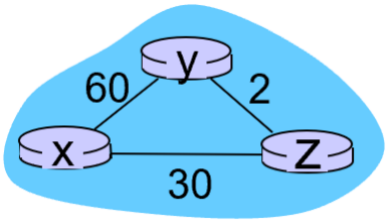

Figure 4