Tutorial 4

ELEC3506/9506 – Communication Networks

1. Define the random access mechanism and give examples

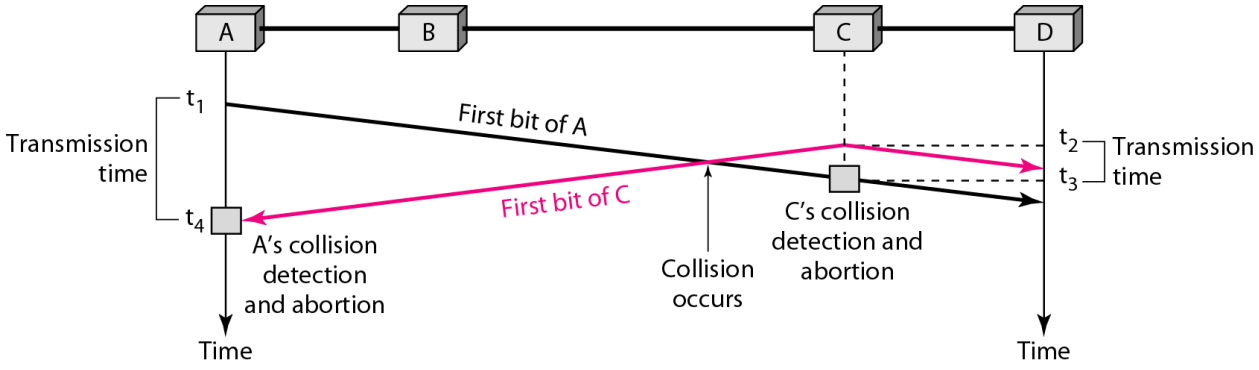
2. Define controlled access mechanism and give examples

3. Compare and contrast a random access protocol with a controlled access protocol. Define why collision is an issue in a random access protocol but not in a controlled access protocol.

4. In a CSMA/CD network with a data rate of 10 Mbps, the minimum frame size is found to be 512 bits for the correct operation of the collision detection process. What should be the minimum frame size if we increase the date rate to 100 Mbps?

5. In a CSMA/CD network with a data rate of 10 Mbps, the maximum distance between any station pair is found to be 2500 m for the correct operation of the collision detection process. What should be the maximum distance if we increase the date rate to 100 Mbps?

6. In the below figure, the data rate is 10 Mbps, the distance between station A and C is 2000 m, and the propagation speed is $2 * 10^8$ m/s. Station A starts sending a long frame at time t_1=0; station C starts sending a long frame at time t_2=3μs. The size of the frame is long enough to guarantee the detection of collision by both stations. Find:
    a. The time when station C hears the collision (t_3)
    b. The time when station A hears the collision (t_4)
    c. The number of bits station A has sent before detecting the collision
    d. The number of bits station C has sent before detecting the collision



7. How is the preamble field of the IEEE 802.3 MAC Frame different from the SFD field?

8. What are the advantages of dividing an Ethernet LAN with a bridge?

9. What is the relationship between a switch and a bridge?

10. Why is there no need for CSMA/CD on a full-duplex LAN?

11. An Ethernet MAC layer receives 42 bytes of data from the upper layer. How many bytes of padding must be added to the data?

12. An Ethernet MAC layer receives 1510 bytes of data from the upper layer. Can the data be encapsulated in one frame? If not, how many frames need to be sent? What is the size of data in each frame?

13. What is the difference between a BSS and an ESS?

14. Discuss the three types of mobility in a WLAN

15. What is the access method used by WLANs?

16. What is the purpose of the NAV?

17. Compare and contrast CSMA/CD with CSMA/CA