EECS 563

Homework #9

1. With all other network parameters fixed, as the bit rate of a random-access network increases the Smax decreases. True or False

2. A Slotted ALOHA protocol is used to share a 2 Mb/s radio channel. The system uses fixed length frames which are 5000 bits long.

a. Find the maximum packet arrival rate in packets/sec?

b. Would you operate the network using the rate found in part a)? Justify your answer

3. Suppose that a LAN is used to interconnect a set of formation walking robots. Discuss the appropriateness of using a token ring, Slotted ALOHA network and CSMA-CD network for this application.

4. How are collision detected for the following protocols? Relative to a packet transmission time what is time scale that collisions are detected for the following random-access protocols:

a. ALOHA

b. Slotted ALOHA

c. p- persistent CSMA

d. CSMA-CD

e. DOCSIS

5. A CSMA/CD network operates on a coax cable (the propagation speed in coax is $0.88 * 3 X10^8$ m/s) at 100 Mb/s with a packet size of 1500 bytes.

a. Plot the maximum throughput as the network size varies from 0.1 to 10 km.

Hint: use

Average Normalized Delay for a CSMA/CD Network as a function of load as the packet length, size of network and link rate

b. Do CSMA/CD networks scale as the data rate increase?

6. Describe how IEEE 802.11 addresses the hidden terminal problem.

7. What is CSMA/CA and what protocol standard uses CSMA/CA?

8. A reservation system has the following parameters:

Rate= 100 Mb/s

Packet length = 1500 Bytes

Mini slot size = 100μs

What is the maximum throughput for the following cases:

a. One minislot used to make one frame reservation

b. One minislot used to make 10 frame reservation

c. Nodes contend for reservation minislots using Slotted ALOHA

9. What is the difference between a switch and a router?

10. In IEEE 802.11 what is the difference between the infrastructure and Ad hoc modes?

11. What is an advantage of a VLAN

12. What abstraction is provided by generalized forwarding?

13. What information is contained in a flow table?

14. What provides user identity in 4G/5G networks?

15. What is the difference between handoff and mobility in 4G/5G networks?

16. What is the difference between a GEO, and LEO satellite?

17. How would a system using generalized forwarding, e.g., an SDN, block all traffic from a specific IP address from being forwarded?