EECS 563

Homework #3

1. What are the sources of imperfect knowledge in networks?

2. Explain TDD.

3. In one configuration of a 5G system the frame time = 10ms, the slot time is 0.5ms, and 168 bits are sent in each slot time

a. Find the number of time slots/frame.

b. What is the bit time in μs?

c. What is the bit rate in kb/s?

d. User A is assigned 5 time slots and User B is assigned 15 time slots. What is User A's bit rate in kb/s? What is User B's bit rate in kb/s?

4. A allocation of 100MHz bandwidth, B, is the same an allocation of a bit rate R of 100 Mb/s, TRUE or FALSE.

5. Find the time to transmit a 250 MByte video file from Lawrence to Rome, Italy, a distance of about 8,400 km, over a 1000 Gb/s fiber optic link. The speed of light is ~2 x10^8 m/s in fiber. Clearly state any assumptions.

a. For a network using datagram packet switching.

b. For a network using virtual circuit packet switching.

6. Host A has a 3000 Byte message to send to destination host B. The network can only support 1500 Byte packets, so it takes 2 packets to send this message. Host A is connected to router 1 over a 20.0 km fiber link operating at 100 Mb/s; Router 1 is connected to router 2 over a 200 km fiber link operating at 1 Gb/s; and router 2 is connected to the destination host B over a 20 km fiber link operating at 100 Mb/s. Assume no overhead. Find the time to transmit the 3000 Byte message for:

a. datagram packet switching.

b. virtual circuit packet switching.

Clearly state any assumptions. The speed of light is ~2 x10^8 m/s in fiber.

7. How does a virtual circuit packet switched networks provide QoS?

8. What are the functions of the control plane?

9. Why is buffering required in the output port?

10. A set of 25 users generate traffic destined for the statistical multiplexer at the output port of a router. Each user has the following traffic characteristics :
Average packet length = 1000 bits, arrival rate = 40 packets/sec/user. The output port of the router operates at a rate R=100Mb/s.

a. What is the data rate into the statistical multiplexer in Mb/s?

b. What is the packet clocking time in μsec?

c. Define the load (sometimes called traffic intensity) on the statistical multiplexer as $\frac{\text{input rate}}{R}$, what is the load on this statistical multiplexer.

d. Do you expect the buffer (queue) in the statistical multiplexer to be empty or occupied most of

the time?

e. Repeat a-d with arrival rate = 4500 packets/sec/user and determine if the statistical multiplexer over loaded, i.e., load>1.