1 Fixed Assignment

Consider the following examples. Would you recommend the usage of an FDMA system with a service rate of 100 frames per second? Why or why not?

1. 10 users, each user generates 15 frames per second

2. 10 users, 5 users generate 1 frame per second, the other 5 generate 15 frames per second

3. 10 users, each user generates 9 frames per second

2 ALOHA

1. A large population of ALOHA users manages to generate 50 requests/sec, including both originals and retransmissions. Time is slotted in units of 40 msec. What is the throughput S of the system (requests/sec)?

2. A group of N stations share a 56-kbps pure ALOHA channel. Each station outputs a 1000-bit frame on average once every 100 sec, even if the previous one has not yet been sent (e.g., the stations can buffer outgoing frames). What is the maximum value of N?

3. A pure ALOHA network transmits 200-bit frames on a shared channel of 200 kbps. What is the requirement to make this frame collision-free?

4. Consider the delay of pure ALOHA versus slotted ALOHA at low load. Which one is less? Explain your answer.

3 CSMA vs. ALOHA

1. Specify the vulnerability times, i.e., the time span in which transmitted frames can collide with previously transmitted frames, for ALOHA and CSMA.

2. “CSMA always outperforms ALOHA.“ Is this statement true?

4 CSMA Access Modes

Consider the three CSMA access modes 1-, non-, and p-persistent.

1. Sketch the timing of sensing and transmitting data for these three cases and the according flow charts.

2. What is the relationship between non-persistent and 1-persistent CSMA regarding throughput and delay?

3. Which scheme of CSMA offers balance regarding throughput and delay?

5 CSMA/CD

1. What does the CD stand for in CSMA/CD? In which systems is it applied? And what does a node do in case of a collision?

2. Which requirement has to be met in order to detect a collision and why?

3. A network using CSMA/CD has a bandwidth C of 10 Mbps. If the maximum propagation time (including the delays in the devices) is 25.6 μs, what is the minimum size L of the frame?