

Exercise for the lecture
Algorithms for Radio Networks
Winter 2013/14
Sheet 2

EXERCISE 1:

1. Algorithms Comparison

Compare the following four algorithms Aloha, Slotted Aloha, CSMA/CD and CSMA/CA according to:

- How does a node access the medium?
- How does a node behave if the medium is busy?
- How does a node determine success/failure of the transmission?
- What does a node do when a conflict occur?

2. Slotted Aloha

Consider a system of four nodes $\{\text{Node}_1, \text{Node}_2, \text{Node}_3, \text{Node}_4\}$ communicating in a channel using Slotted Aloha. Each node tries to send packets in each slot with a probability p :

- What happens when G (expectation of the transmission per packet length) is less than 1 or larger than 1?
- What is the probability of Node_3 succeeding for the first time in slot 4?
- What is the probability that some of the nodes succeed in slot 3?
- What is the probability that first success happens in slot 2?

3. Simulation of MAC algorithms

Simulate the following four MAC algorithms:

- (a) Aloha
- (b) Slotted Aloha
- (c) CSMA
Assume the signal needs 0.1 frames in length to arrive at other participants.
- (d) CSMA over long distance
Assume the signal needs 1 frame in length to arrive at other participants.

For the simulation use a random number generator to create timestamps for packets to be sent. Vary the number of timestamps generated to create different loads. Assume an infinite number of participants, so no participant ever sends two packets during the simulated time.

Create a diagram using the gathered data for the throughput with respect to the load as seen in the lecture.