

Comparing analytical and actual throughput of IEEE 802.11 DCF mode

Optional computer assignment

Due: 5 Bahman 1395

Consider a network using IEEE 802.11 DCF mode as MAC protocol. There are n nodes where they all always have packet to transmit. Assume all the nodes can hear all the transmissions including RTS, CTS, DATA, and ACK. The system parameters are given below. Vary the number of nodes n from 2 to 10 with steps of 2 ($n=2,4,6,8,10$) and calculate the following throughputs:

1. Use the equations provided in the class to find the throughput of the system (bytes per time unit). You need to analytically find p , τ , P_s , P_{tr} , T_s , and T_c . Then find throughput S using equation below

$$S = \frac{P_s P_{tr} E[P]}{(1 - P_{tr})\sigma + P_{tr} P_s T_s + P_{tr} (1 - P_s) T_c}$$

2. Develop a simulator which model the actual system and can simulate it. Then, find the actual throughput of the system. Find the actual value for probability of collision (p) and the probability of transmission (τ) for each node using simulations and compare with the analytical results.

Slot time = 1 time unit;

DIFS = 2 time unit;

SIFS = 1 time unit;

ACK = 1 time unit;

Packet transmission time = 10 time units.

Propagation delay: ignored;

RTS and CTS = 1 time unit;

CWmin = 2 time unit;

CWmax = 2^6 time unit;

Average packet payload size = 100 bytes.

