

Project 3

Evaluate MAC random transmission protocol using NS-2

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Aim:

Evaluate performance of a simple wireless MAC protocol using NS-2 simulator.

Introduction:

Network simulator (NS-2) is used to implement and evaluate a wireless MAC (Medium Access Control) protocol for sensor networks. Created a new MAC protocol named MAC_GRP11 which has one sink and multiple sources. Source nodes send a single packet multiple times(X) in duration T. Performance of protocol is to be evaluated depending on change in value of X.

Description:

MAC_GRP11 is a simple MAC protocol with one sink and multiple sources. Source nodes send a single packet every T seconds. A single packet is sent X times at random time within T seconds to achieve a higher probability of packet delivery. The earlier packet should be delivered before a new packet is created.

The source nodes generate and transmit data as follows:

- 1) A data packet is generated every T seconds and has to be delivered to the sink before the next packet is generated.
- 2) The source nodes are equipped with only an RF transmitter, it is impossible for them to sense the channel or receive any acknowledgements (or negative acknowledgement) from the sink node.
- 3) In order to increase the chance of successful transmission, each node transmits X copies of each packet at random instants before the next packet is generated.

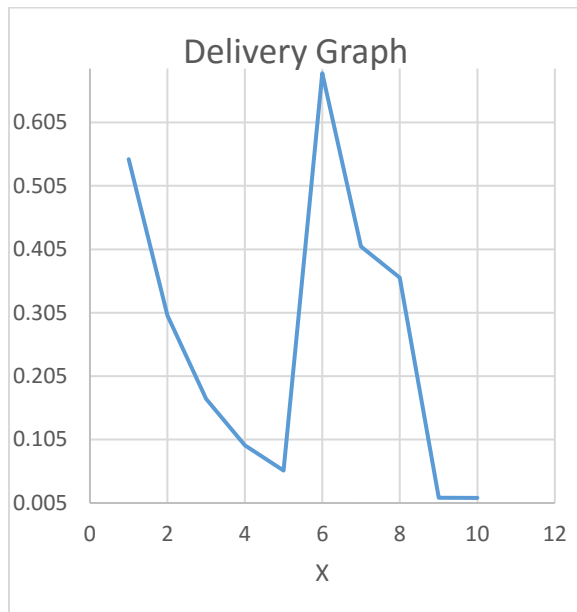
- 4) The source node picks X random instants of time within the interval $[0, T]$ (i.e. the interval between the time the current packet is generated to the time the next packet will be generated), and transmits the data packet at each of the X instants of time.

Results:

Following are the results obtained when simulation for MAC_GRP11 protocol is run.

X	Packets Sent	Packets Delivered	P (Probability of packets getting delivered)
1	493163	270111	0.547
2	977893	294932	0.301
3	1456379	1456379	0.1694
4	1918121	184210	0.0960
5	2343946	131538	0.0561
6	299515	204459	0.6826
7	696624	285015	0.4091
8	796173	286937	0.3603
9	2391886	31235	0.0133
10	2391886	31235	0.0130

Graph:



3. <http://www.isi.edu/nsnam/ns/ns-documentation.html>
4. <http://jhshi.me/home/>

Discussion:

From the results obtained and the graph, it is observed that as value of X increases, the probability of packets being delivered decreases. Packets are dropped at the sink node due to collision. At X=6 the probability of packets getting delivered increases and then as X is increased, probability decreases again. So when X increases collisions increase but an optimum probability of delivery is obtained at X=6.

Conclusion:

The performance of MAC_GRP11 decreases when X value increases. But at an optimum value of X the performance is the best.

References:

1. <http://www.isi.edu/nsnam/ns/tutorial/>
2. <http://www.isi.edu/nsnam/ns/>