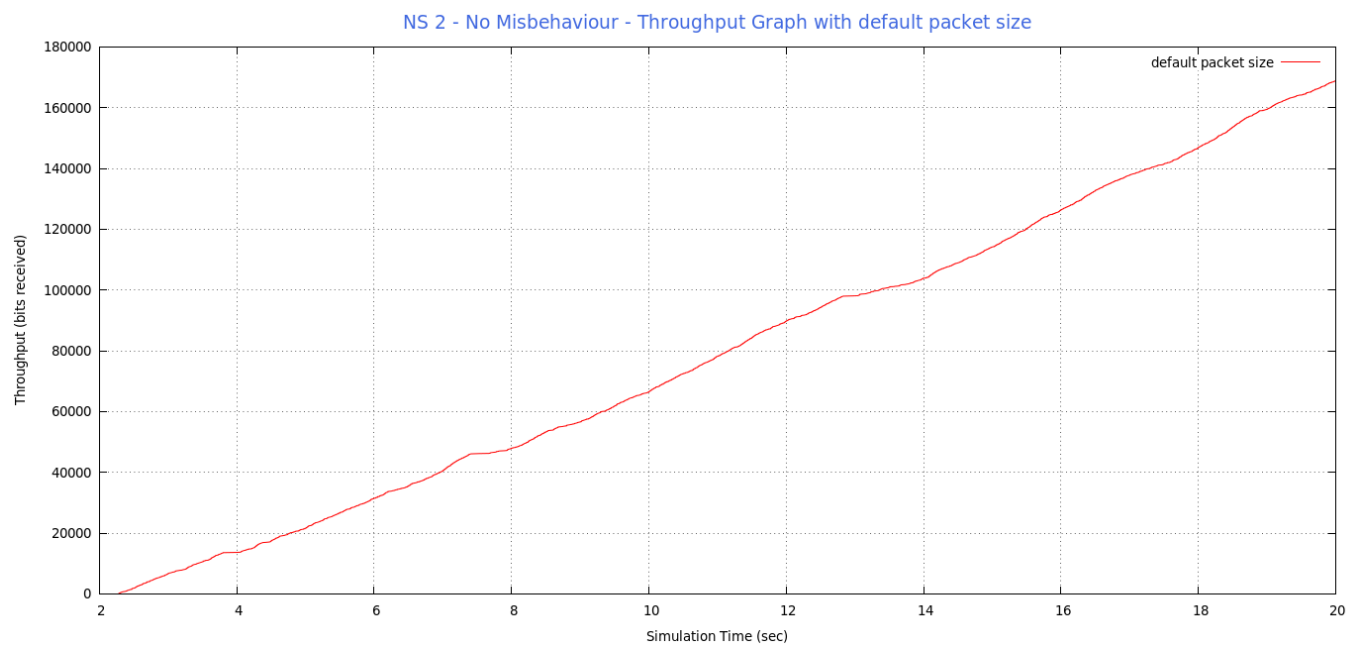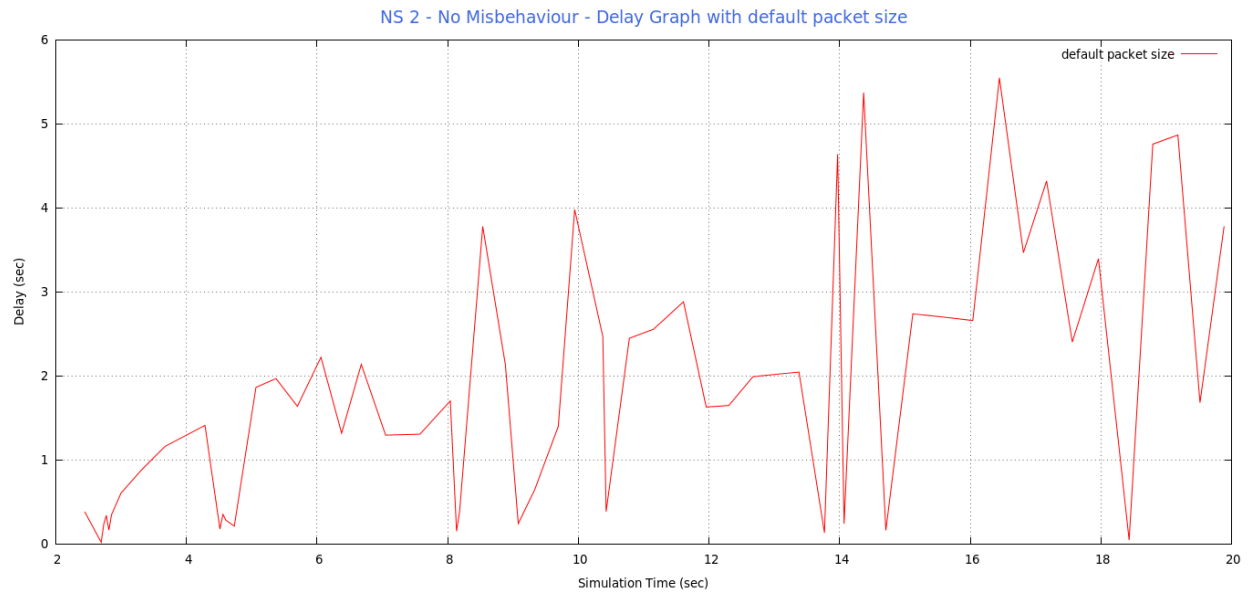# 16SN616 - Wireless Security
Assignment 2

1. Network with 50 nodes and default packet size with no misbehavior :

Throughput:

No packet size is specified here and hence the default packet size is used. The throughput increases linearly with respect to time.

Delay:

NS 2 - No Misbehaviour - Delay Graph with default packet size

Once again the tcl script was run without specifying the packet size and hence the default packet is chosen by ns 2. The nodes can be seen sending packets and as more and more packets are sent, the medium becomes busier and busier and hence there are significant increases in the delay. As more and more packets are delivered the backoff timer is reduced and therefore collisions rise and hence delay increases.

2. Nodes with varying packet size – No Misbehavior

Throughput:

NS 2 - No Misbehaviour - Throughput Graph with varying packet size
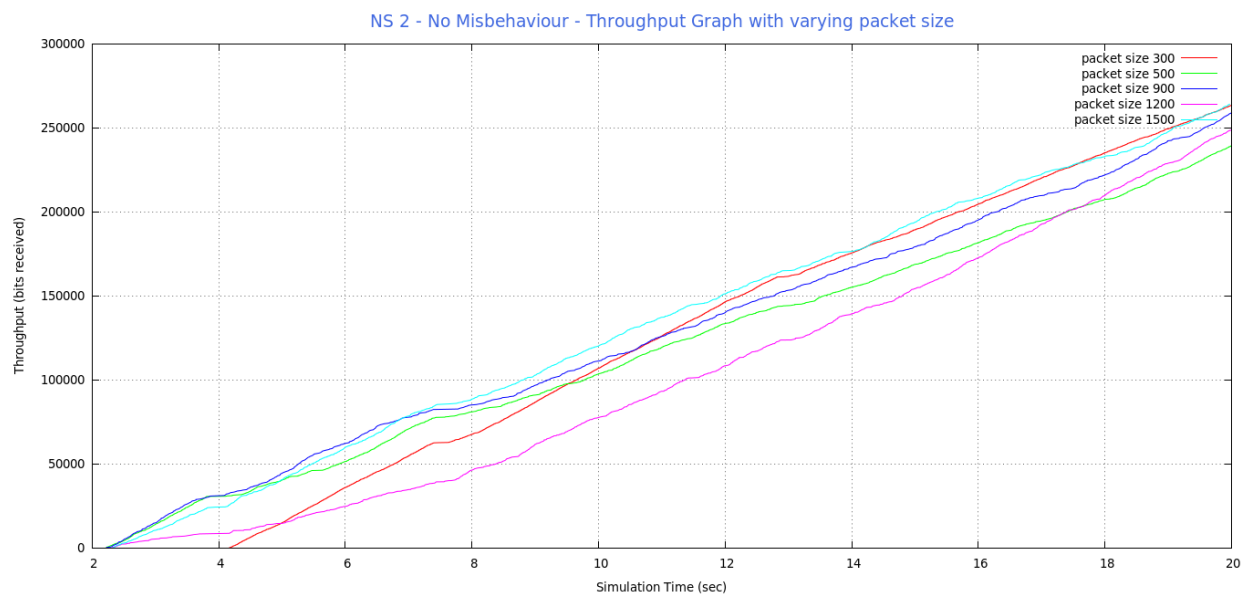
From the above graph we can see that the throughput increases along with the increase in the packet size. The throughput for the packet sizes 300 and 1500 from the above graph show similar throughput although for longer simulations the throughput for the packet of size 300 is more than that of the bigger packet 1500. It is safe to assume that the bigger the packet size the lesser the throughput and hence the decrease in the throughput for bigger packet sizes.

Delay:
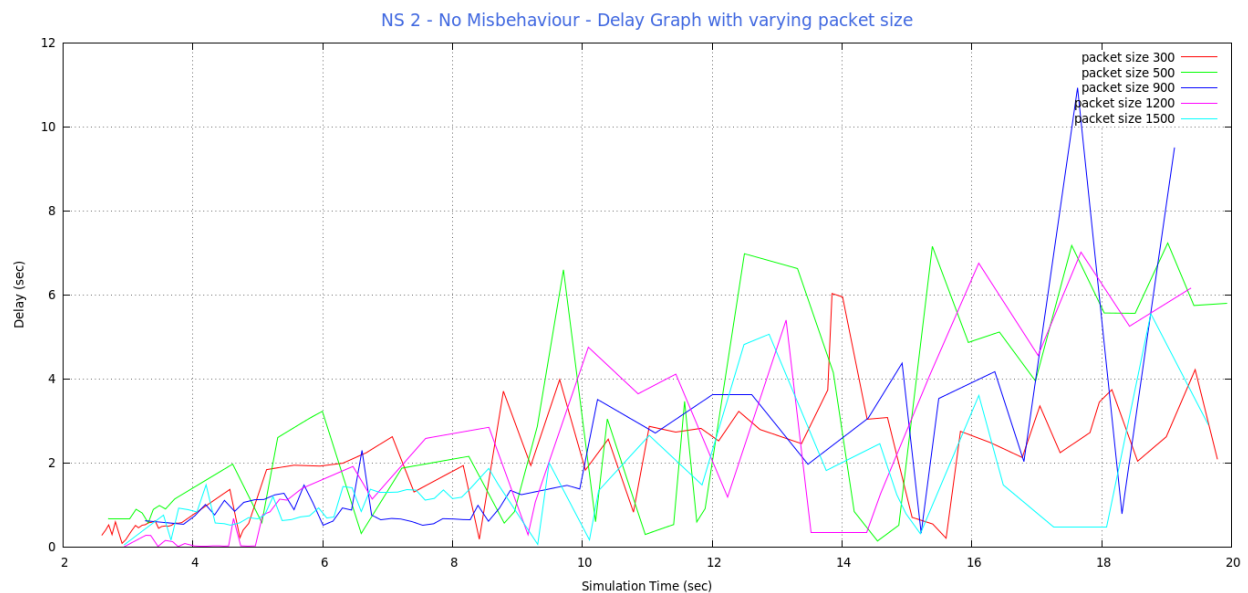
There seems to be an overall slow and increase in the delay for all packet sizes. The delay for the packet size of 900 seems to be the highest and the packet size of 300 seems to have the lowest. As the simulation progresses there seems to be an increase in traffic and hence the increase in the overall delay. The delay awk script takes the average of every 100 delays and hence those packets are subsequently dropped.

3. Contention Window Misbehavior – All Nodes Misbehaving

Throughput:

NS 2 - Contention Window Misbehaviour - Throughput Graph with varying packet size and All Nodes Misbehaving
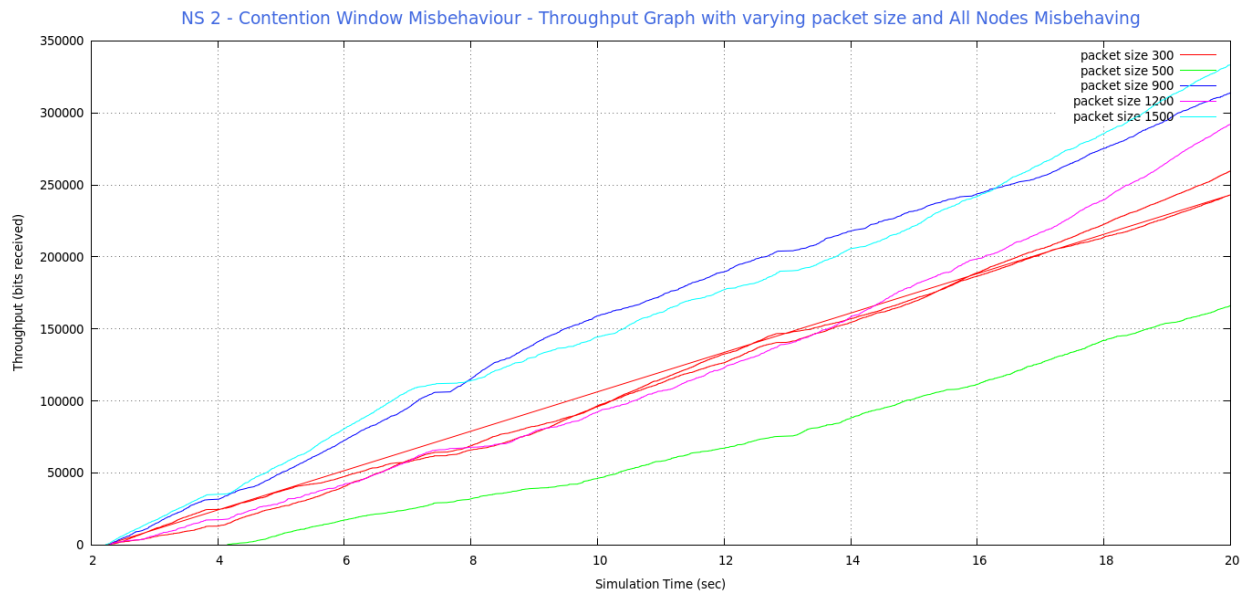
The CWMin and CWMax values are set to over 1023 and are chosen randomly. It is observed that the throughput of the nodes with packet size 1500 has the highest throughput and the packet size with 500 has the lowest throughput. Since the values are set to random packet drops are very possible and hence for the lower packet size values the throughput drops.

Delay:

NS 2 - Contention Window Misbehaviour - Delay Graph with varying packet size and All Nodes Misbehaving
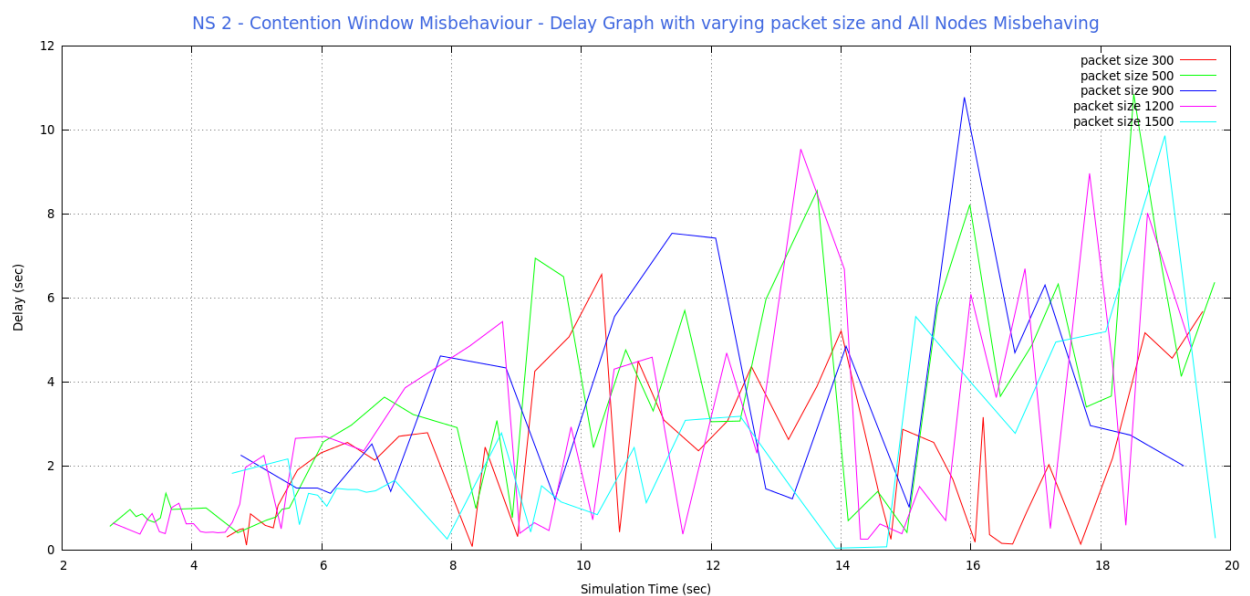
We can see here that as the packet size increases the more it experiences delay. This is possibly due to the fact that there may occur collisions and many packets are dropped. Also since the awk script for delay considers this as a 0 dip the delay sharply decreases and plunges towards a 0 value. The highest delay is experienced by all the packets that are really big in size – namely the 900, 1200 and 1500 sizes. Before these packets can be entirely transmitted many other packets of smaller size maybe transmitted and hence can cause collisions and thus increasing delay.

4. Contention Window Misbehavior – Some Nodes Misbehaving
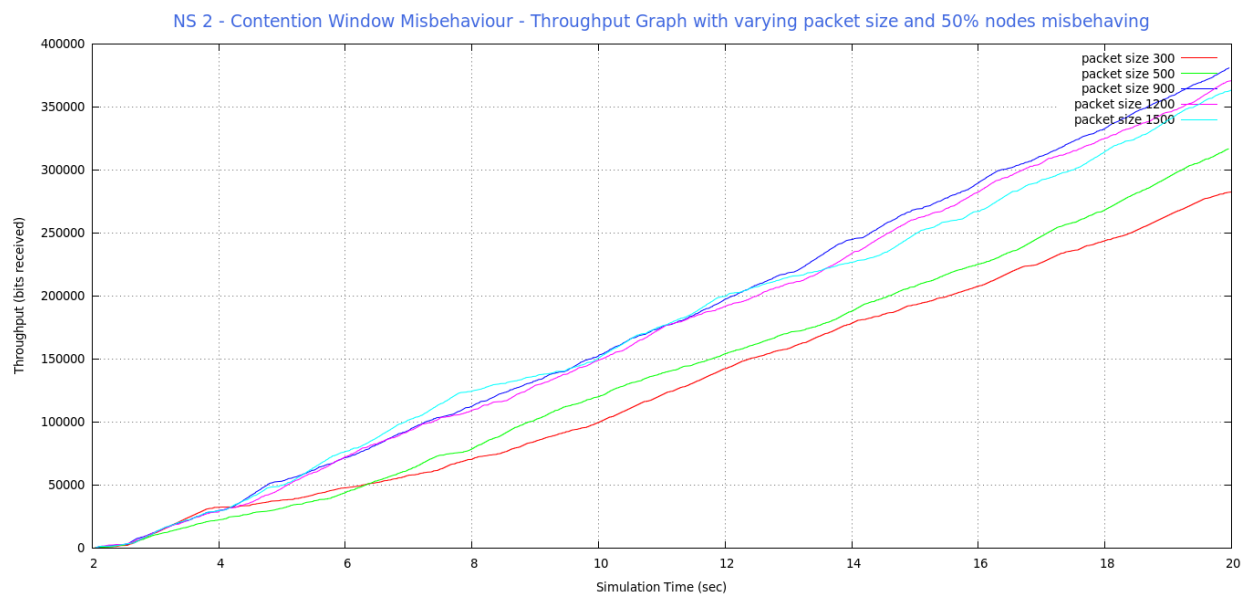
Throughput:

The throughput seems initially the same, however they become more sparse and diverse as the simulation time increases. This could be attributed to the fact that the nodes of the varying packet sizes experience congestion control and also because of collisions. Here it is in from the graph that the nodes with the size 900, 1200 and 1500 experience congestion to a much lesser degree than that off the smaller sized packets (possibly).

Delay:

NS 2 - Contention Window Misbehaviour - Delay Graph with varying packet size and 50% nodes misbehaving
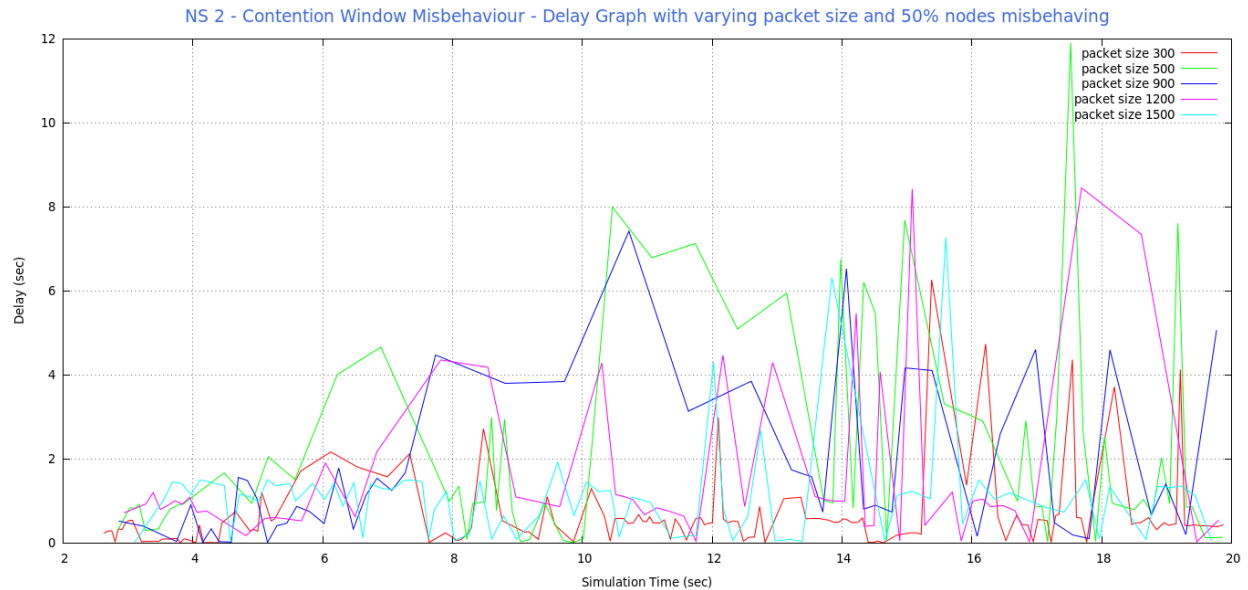
The delay for the packet size of 500 bytes peaks in this scenario. Half the nodes in this case are only subjected to the CWMin and CWMax random values and hence it is safe to conclude that there is a significant drop in the number of packets of the size of 500 bytes. When the delay increases in the above graph it is due to packet drop experienced due to high collision.