WIRELESS SECURITY

PROJECT 2

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The overall topology given for this project has 21 nodes grid topology. Dimension as given the question as 350x150m.Now placing the nodes with the co-ordinates of 50 meters apart. With 3 nodes in a row and 7 nodes in a column.

CBR is connected to the specifications given the table along with packet rate of 70kbps and packet size of 250bytes(ideal case).

Pair no	Source node id	Sink node id
1	1	8
2	8	9
3	17	10
4	10	11
5	11	12
6	5	12
7	14	21
8	13	14
9	9	16

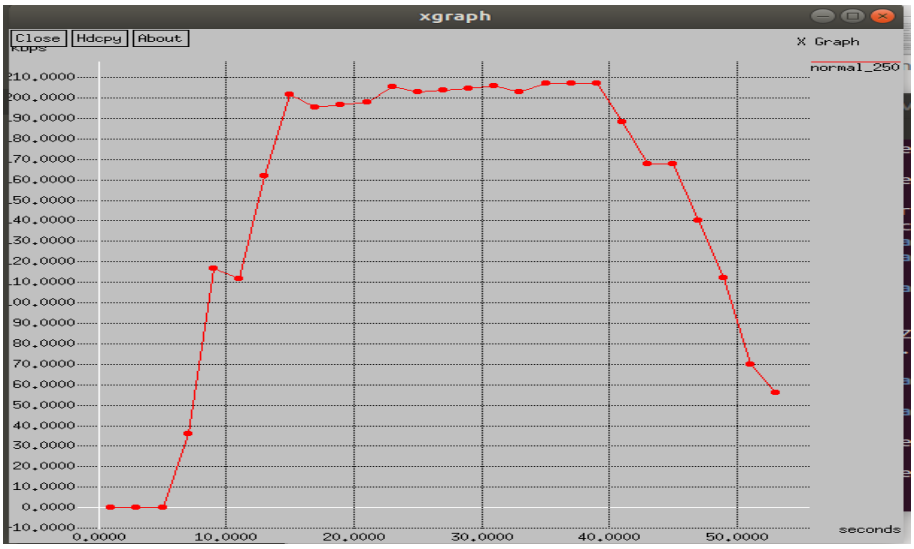
Now we need give time for the particular nodes with the following scenarios.

Pair no	Start time	Stop time
1	5	40
2	10	55
3	12	30
4	20	55
5	30	45
6	10	50
7	5	49
8	12	30
9	6	47

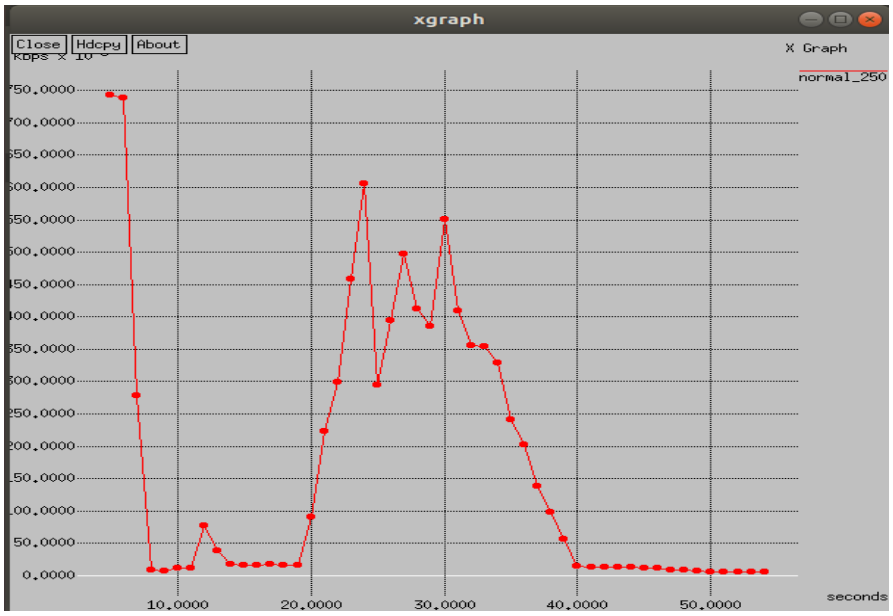
Particular nodes where misbehaviour should be applied is

Node id	Contension window min	Contension window max
9	64	96
11	32	96
17	10	64
13	1	32
21	32	128

Scenario 1: for the above specifications we need to find throughput and end to end delay i.e with default packet size 250 without any misbehaviour



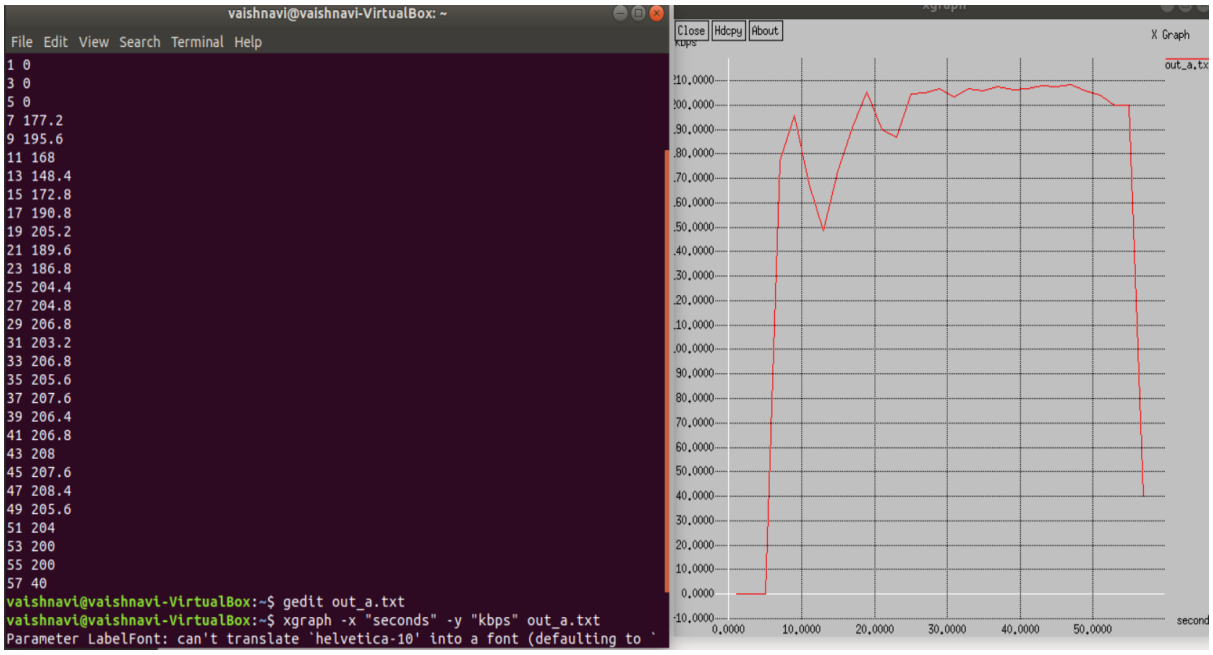
- This above graph shows the throughput for the default packet size of 250 bytes.



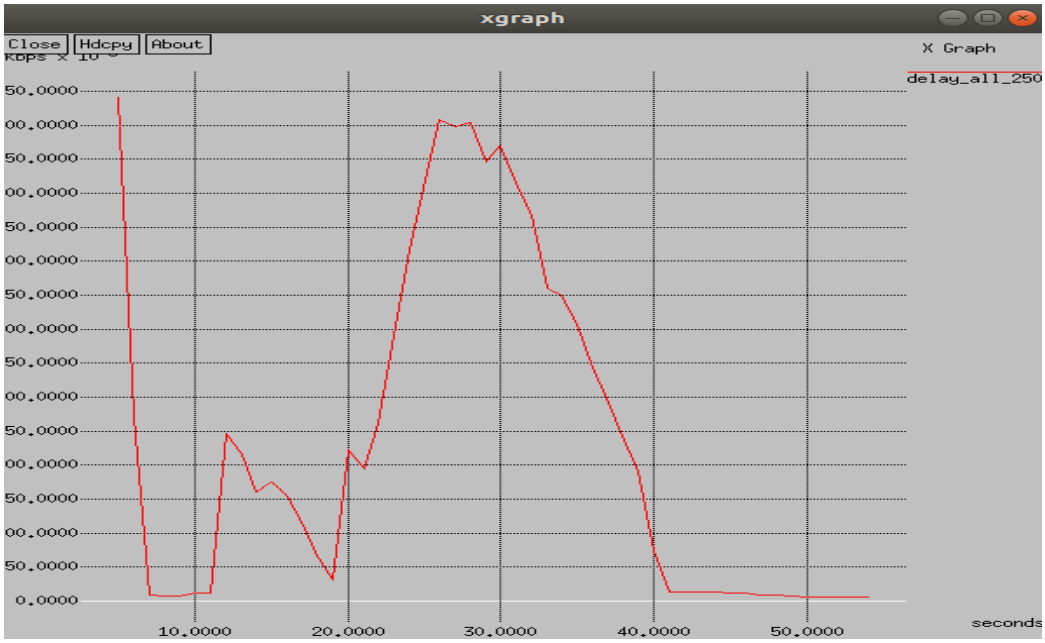
This above graph is the representation for delay with default packet size of 250 bytes.

Scenario2:

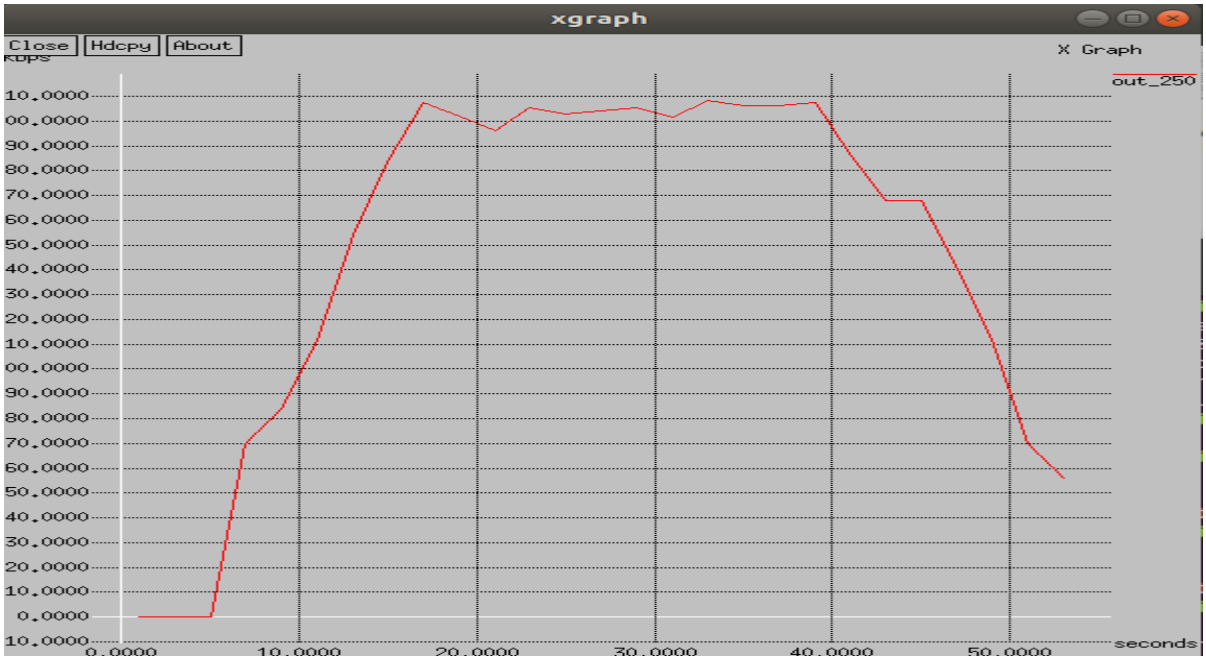
Default packet size 250 bytes 1. all nodes misbehaving 2. Some nodes misbehaving.



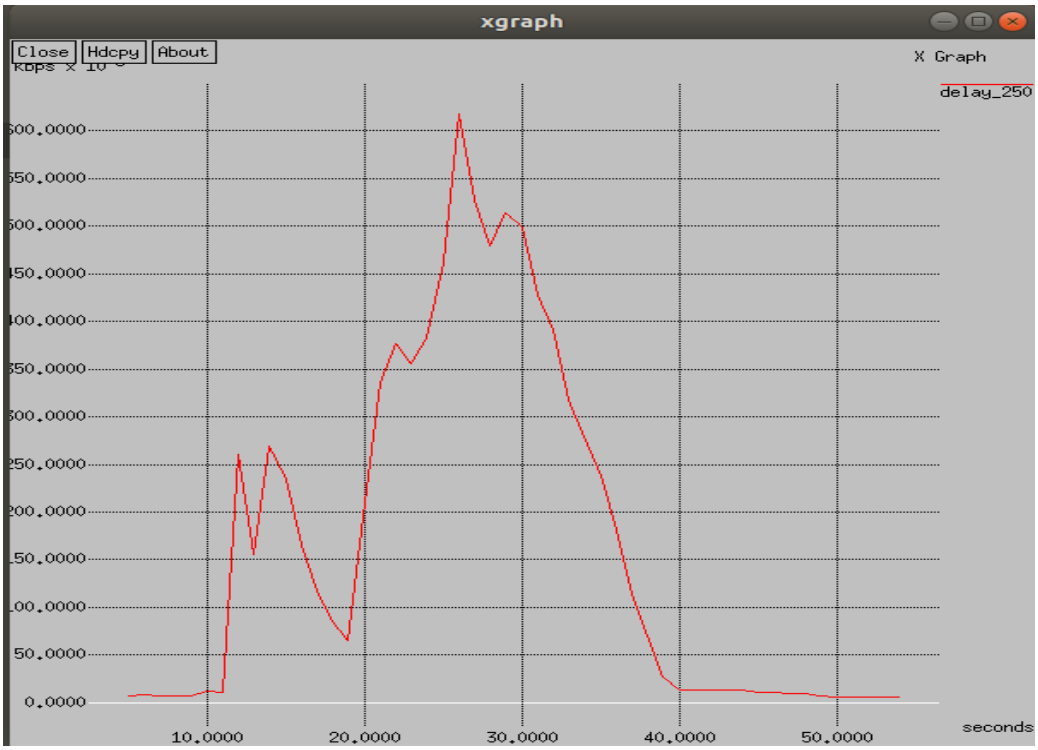
This above graph is the represention of throughput for all nodes misbehaving.



This above graph shows the representation of delay for all nodes misbehaving.

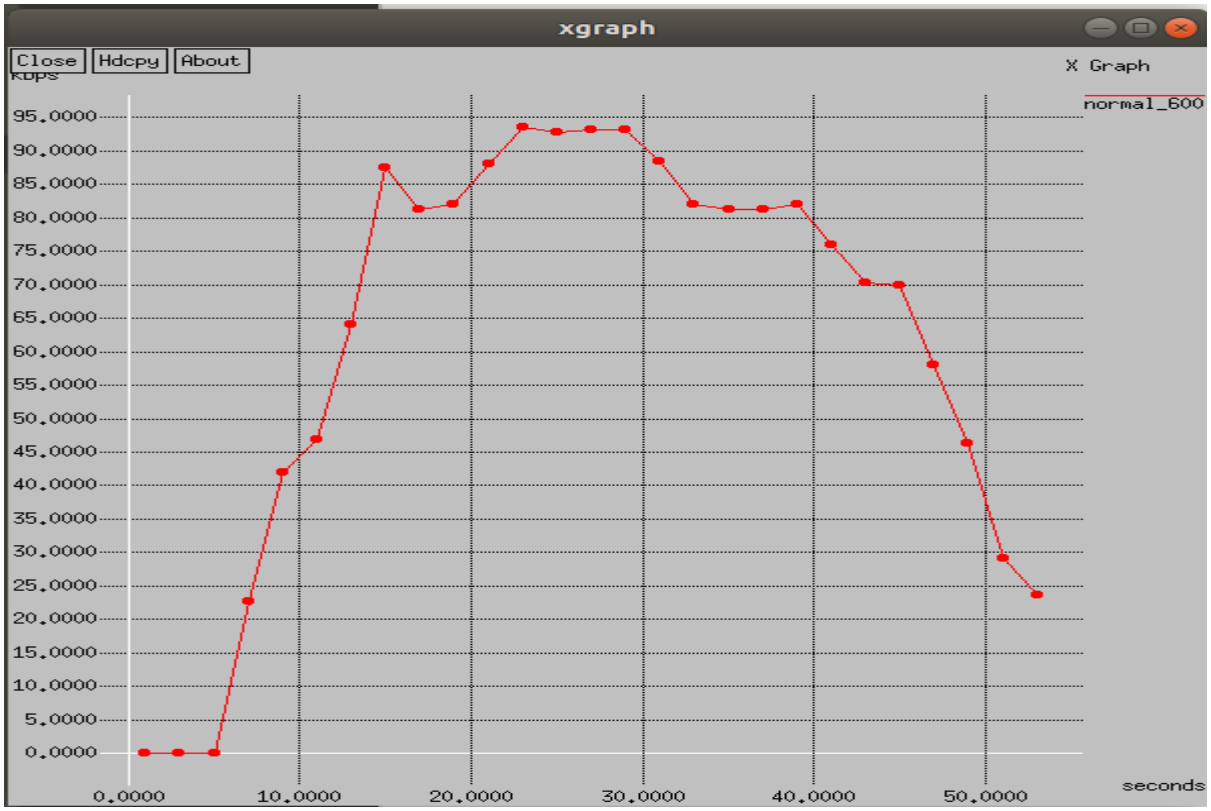


This above graph shows the throughput representation of some nodes misbehaving.

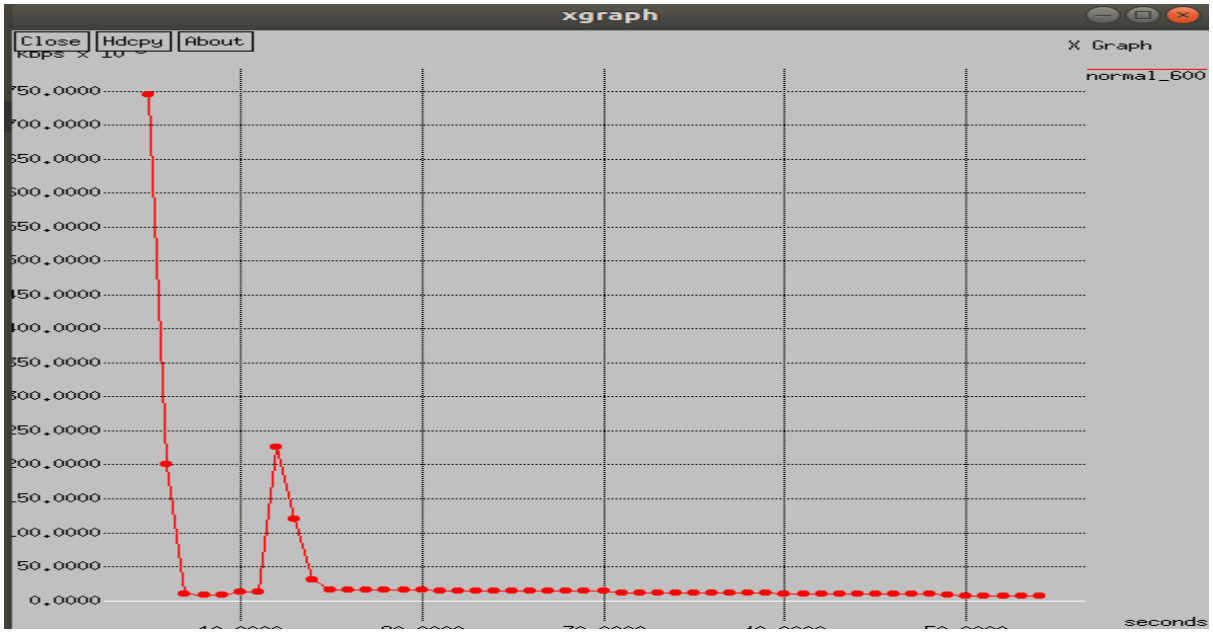


This graph shows the delay of particular nodes misbehaving.

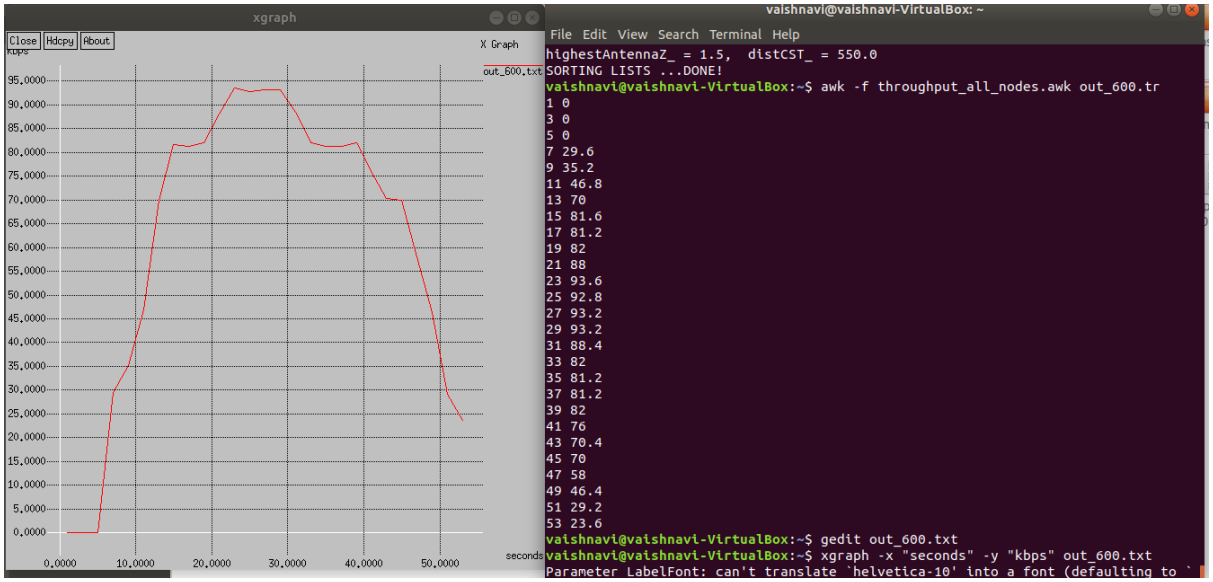
Scenario 3: 600 bytes and 900 bytes



This above graph shows throghput for 600 bytes without any misbehaviour.

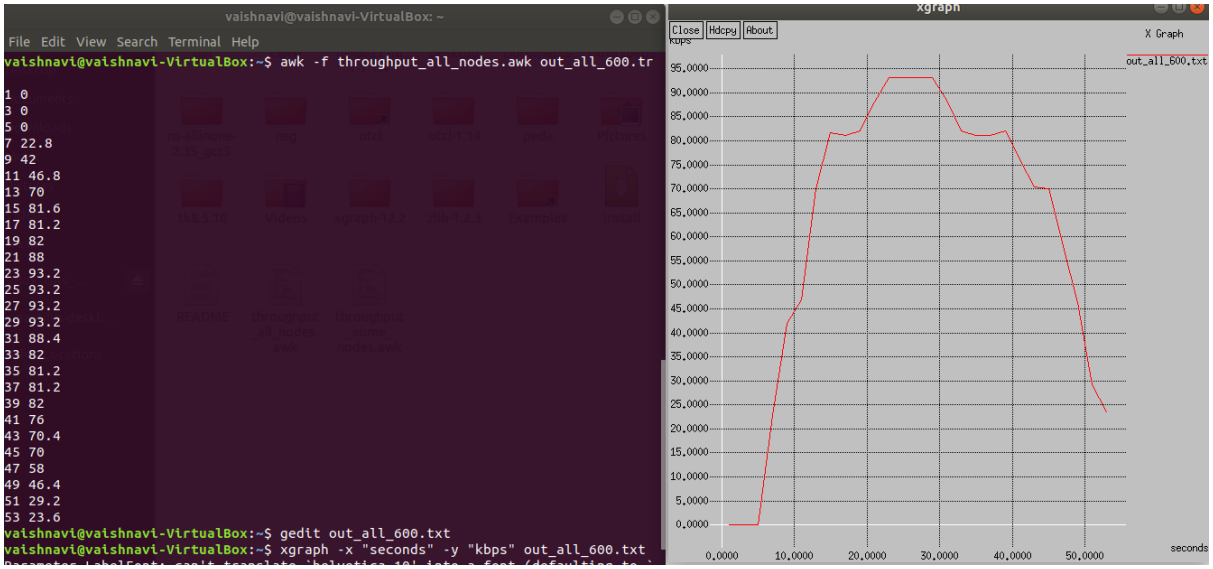


This graph shows the delay for 600 bytes without any misbehaviour.

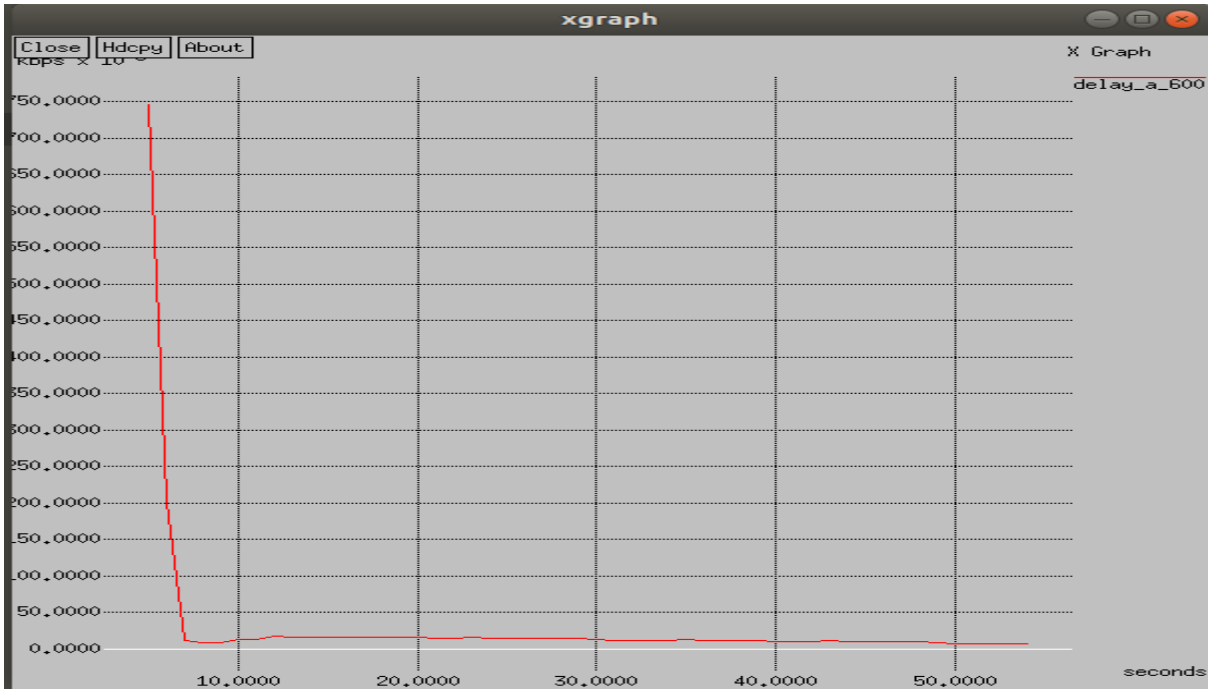


This graph shows the throughput for particular nodes (600 bytes).

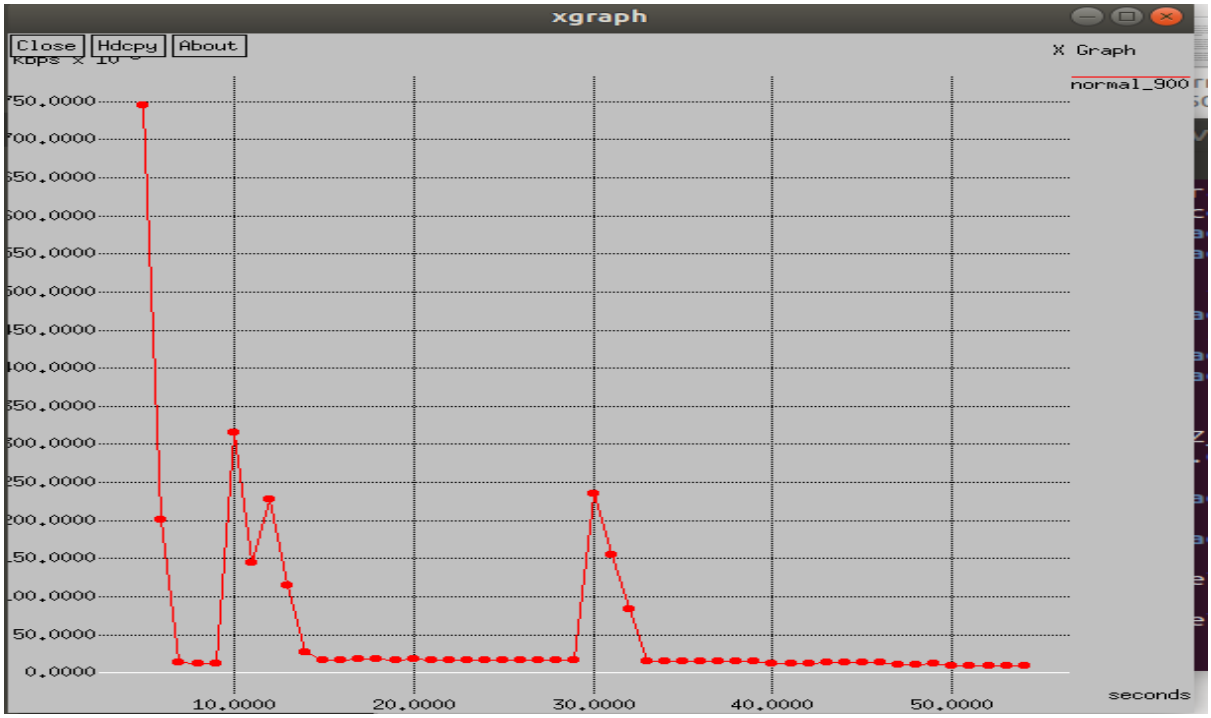
This above graph shows the delay representation of particular nodes with 600 bytes.



This above graph shows the throughput for all nodes misbehaving 600 bytes.

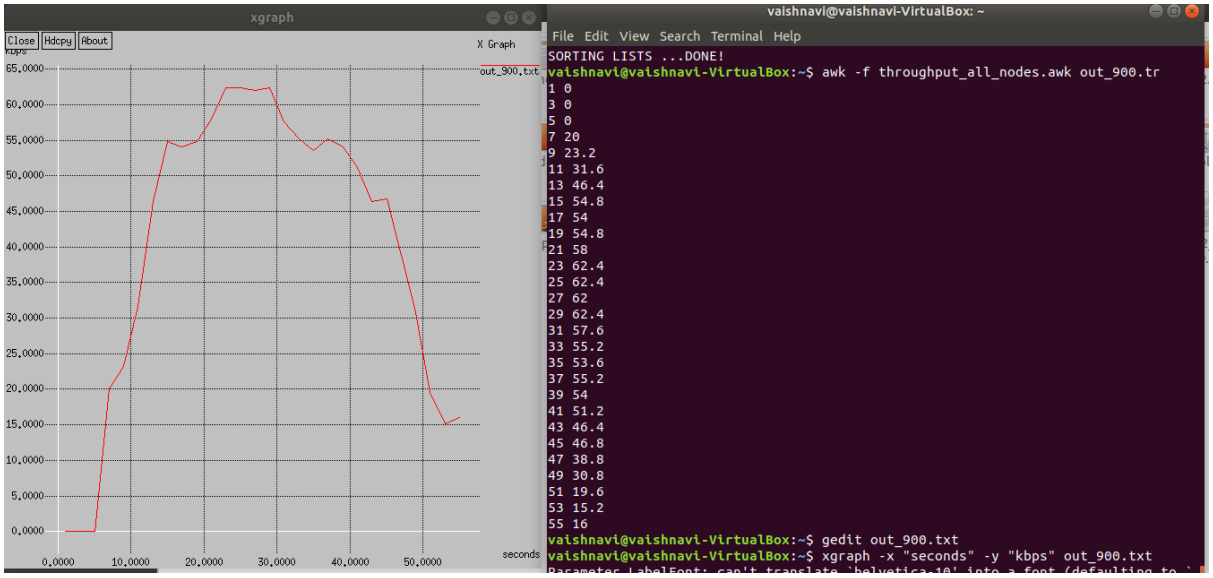


This above graph shows the delay for all nodes misbehaving 600 bytes.

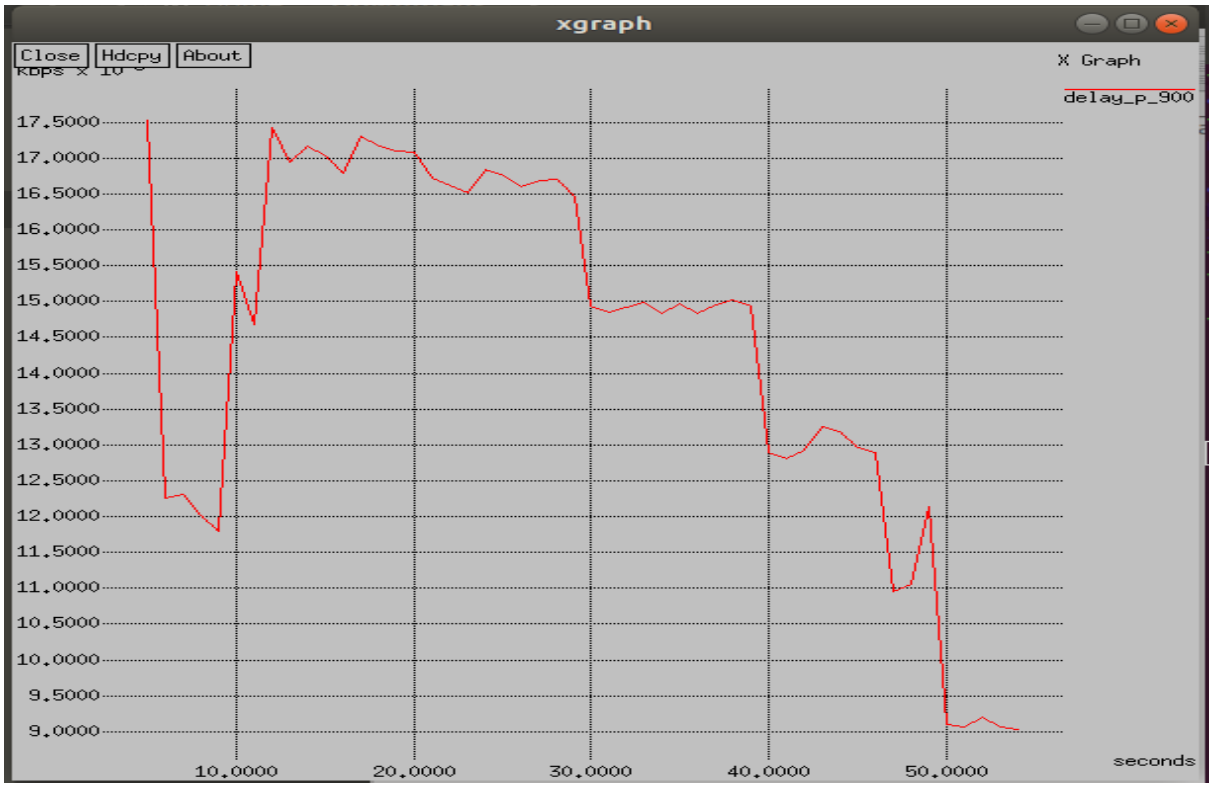


This graph shows the delay for 900 bytes without any misbehaviour.

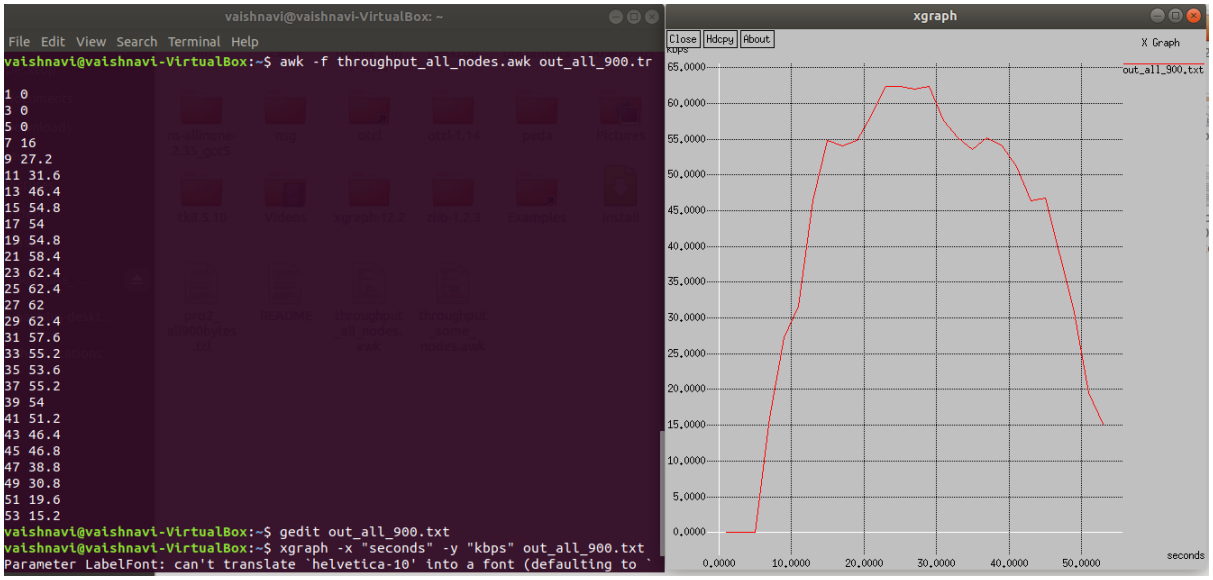
Scenario 4



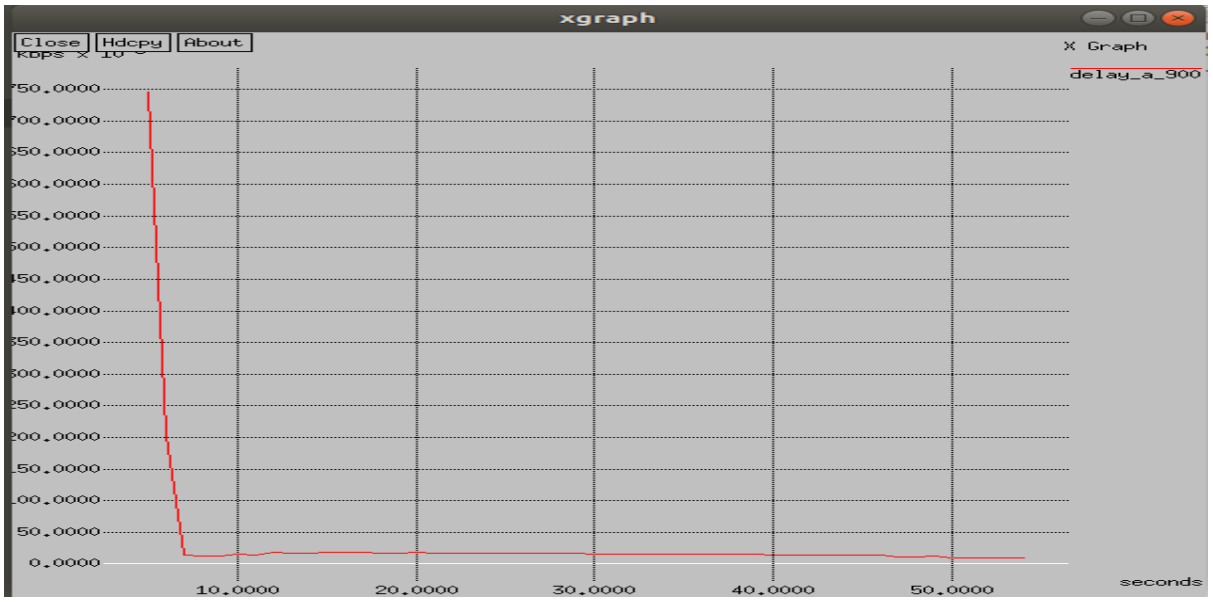
This graph shows the throughput for particular nodes (900 bytes).



This graph shows the delay for particular nodes (900 bytes).

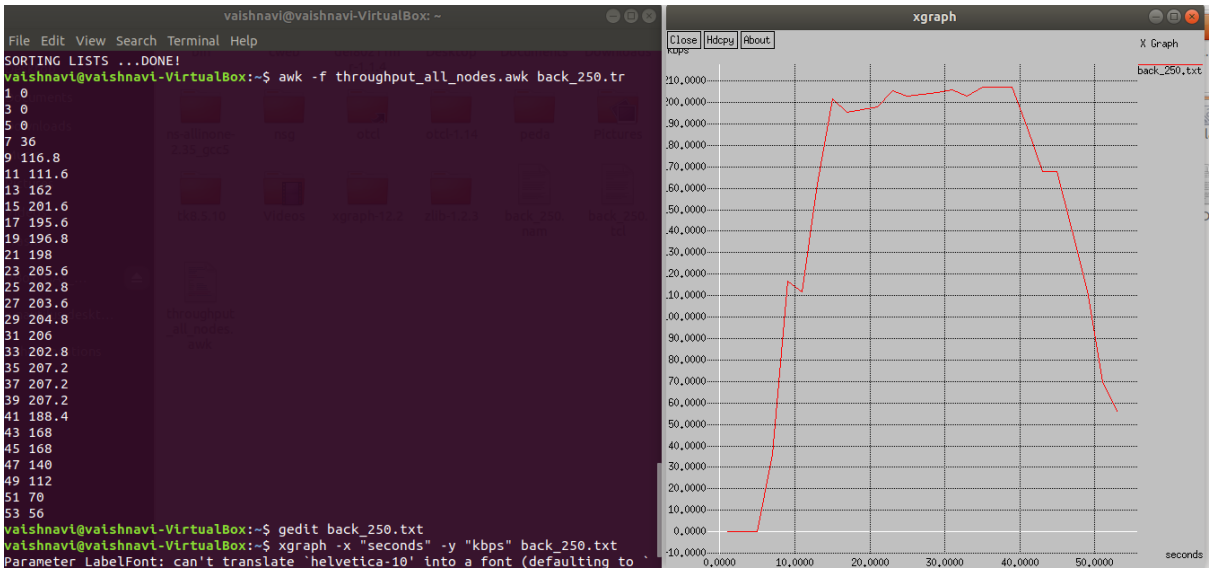


This graph shows the throughput for all nodes misbehaving(900 bytes).

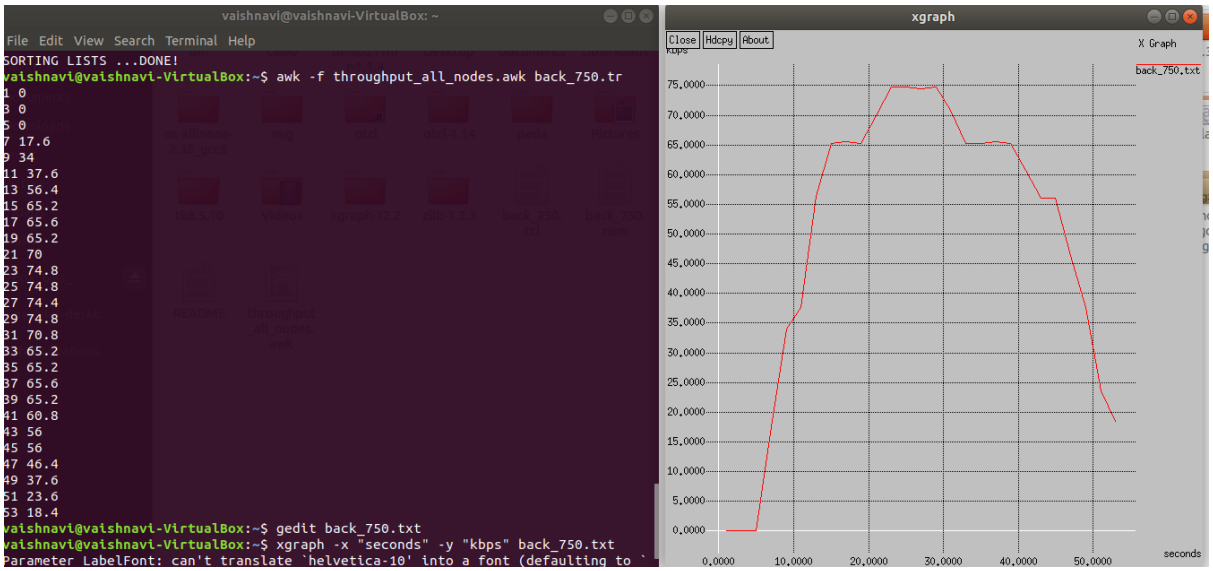


This graph shows the delay for all nodes mebehaving (900 bytes).

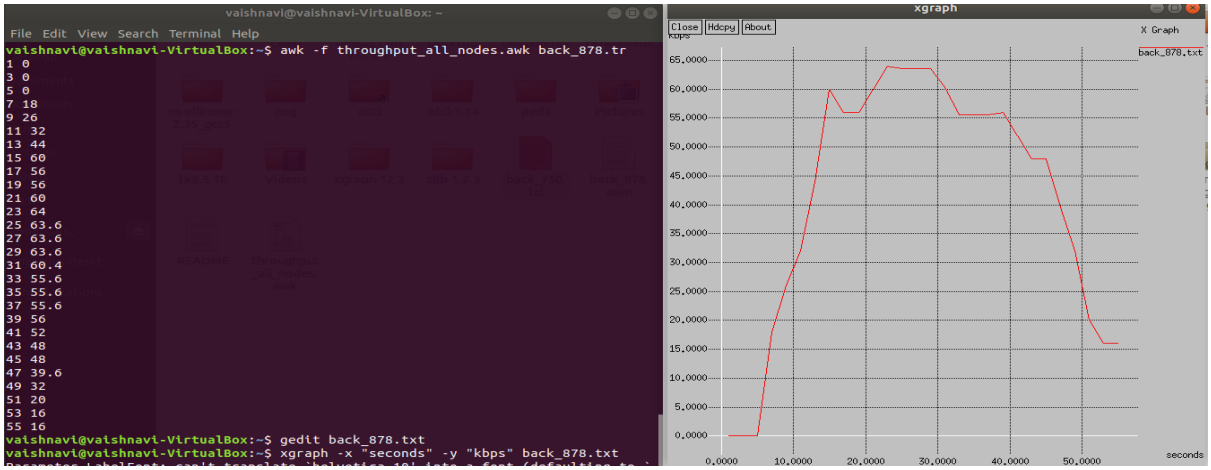
Scenario5



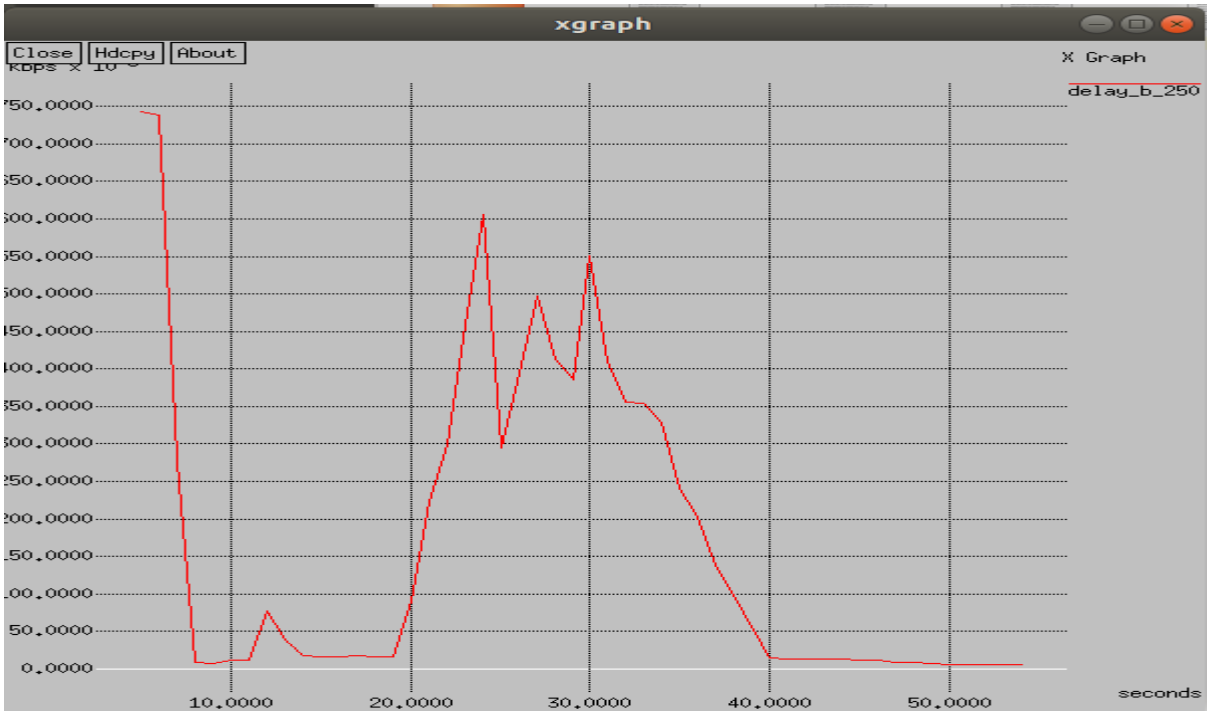
This graph shows the throughput for back off timer for nodes with 250 bytes.



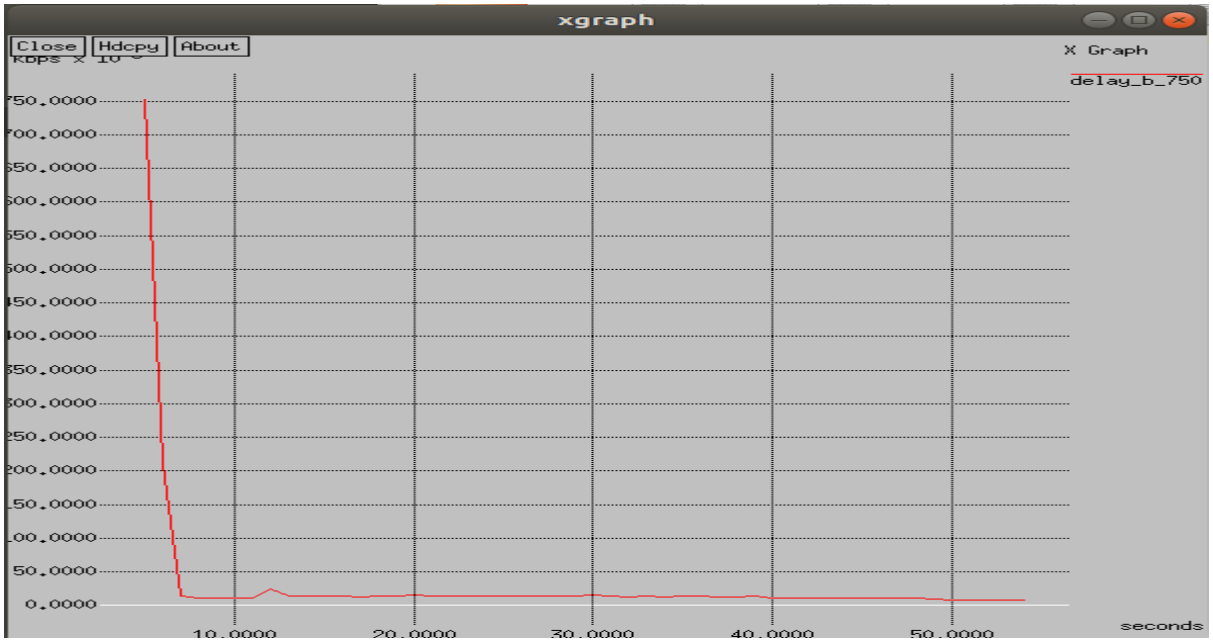
This graph shows the throughput for back off timer for all nodes misbehaving (750 bytes).



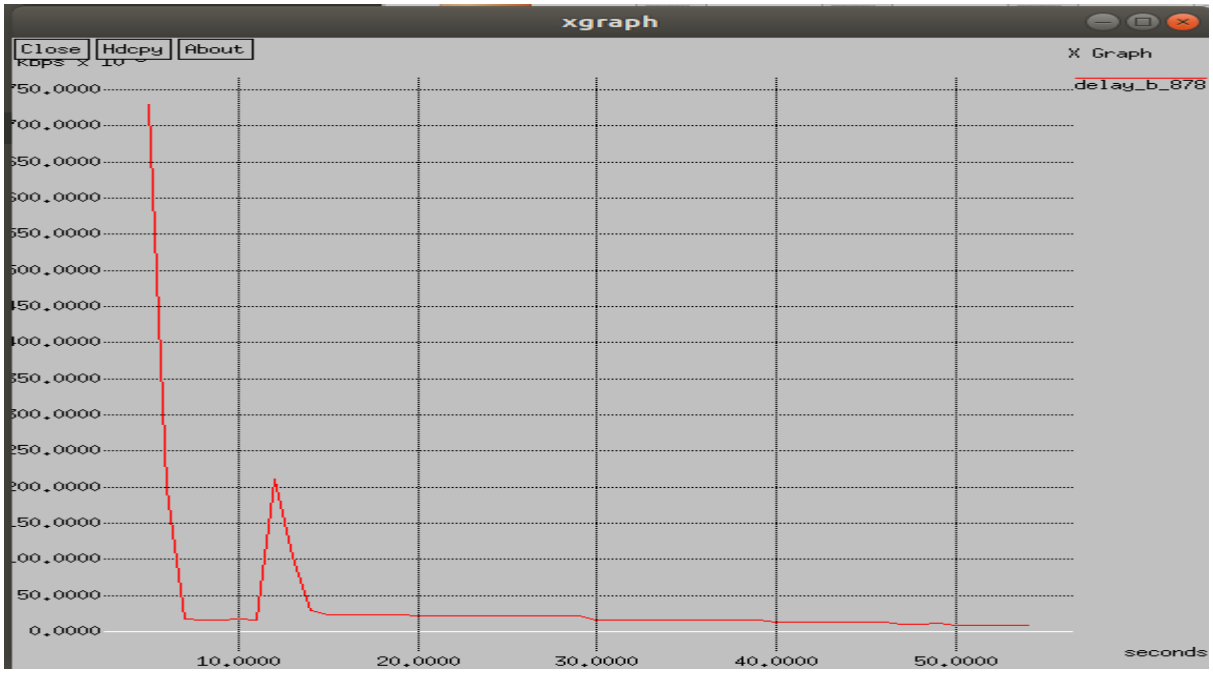
This graph shows the throughput for back off timer for some node misbehaving (878 bytes).



This graph shows the delay for back off timer for (250 bytes).

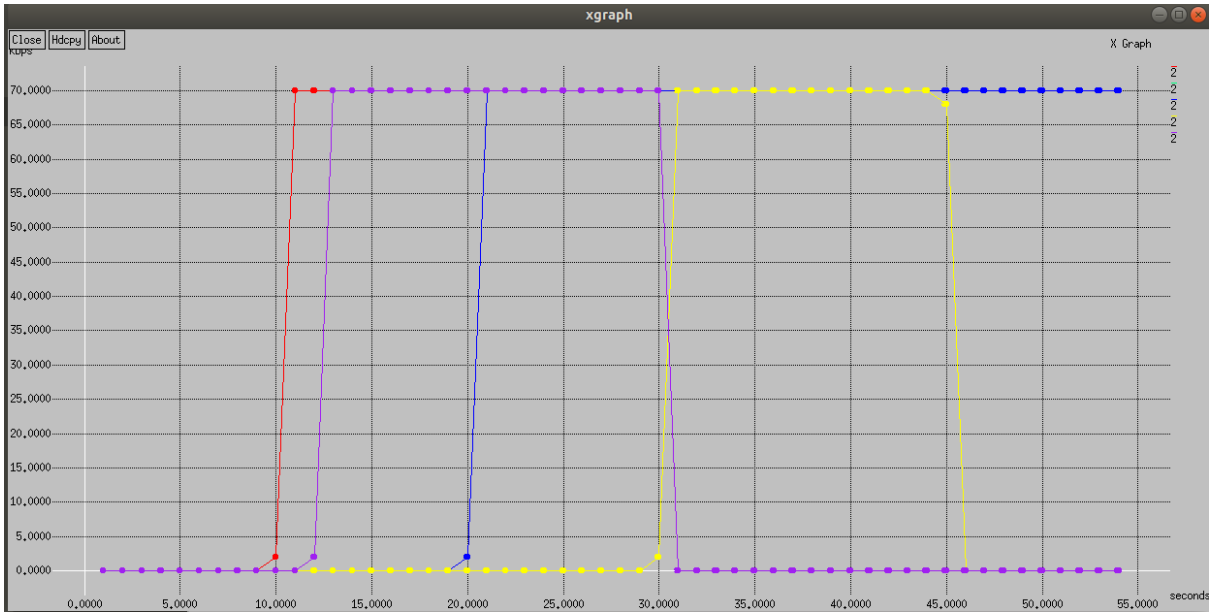


This graph shows the delay for back off timer for (750 bytes).

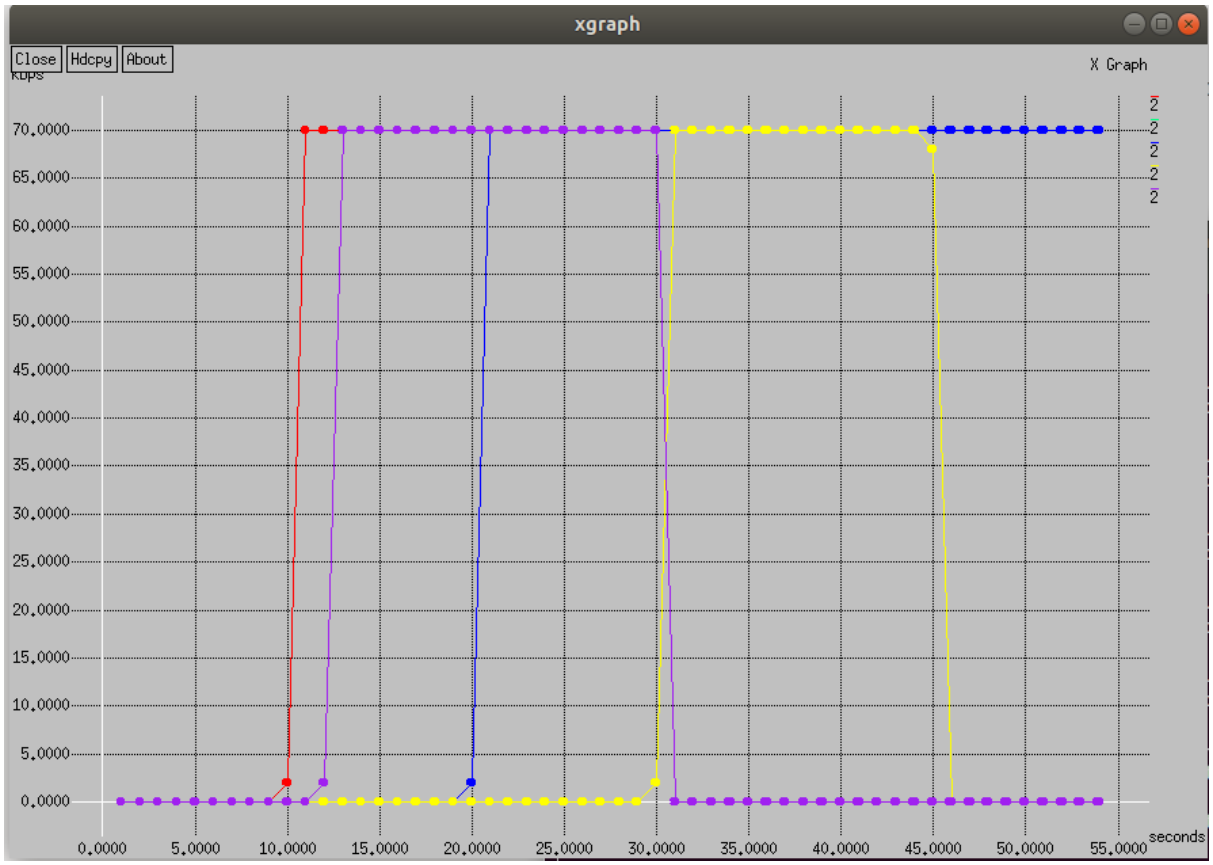


This graph shows the delay for back off timer for (878 bytes).

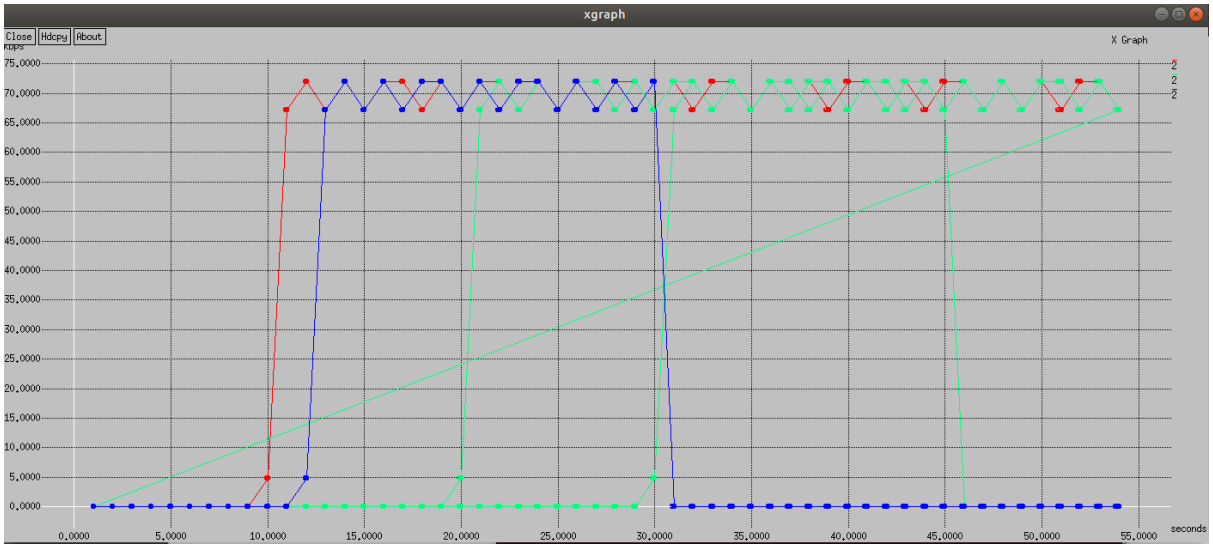
THROUGHPUT FOR NODES 2 3 4 5 8



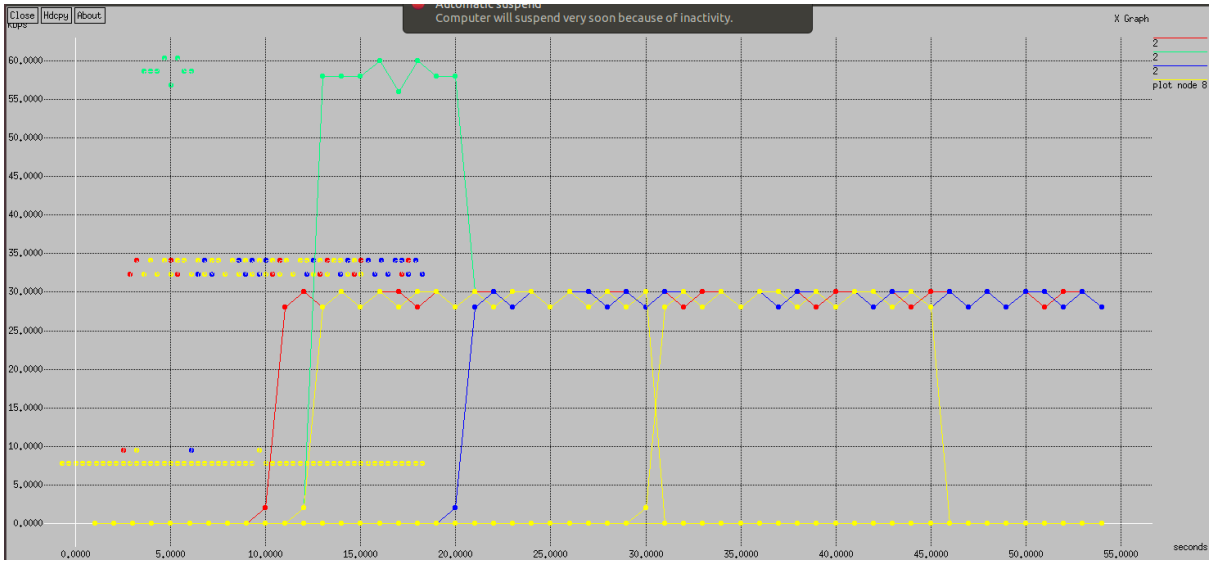
Throughput of the nodes 2,3,4,5,8 together with packet size 250 bytes for all nodes misbehaving.



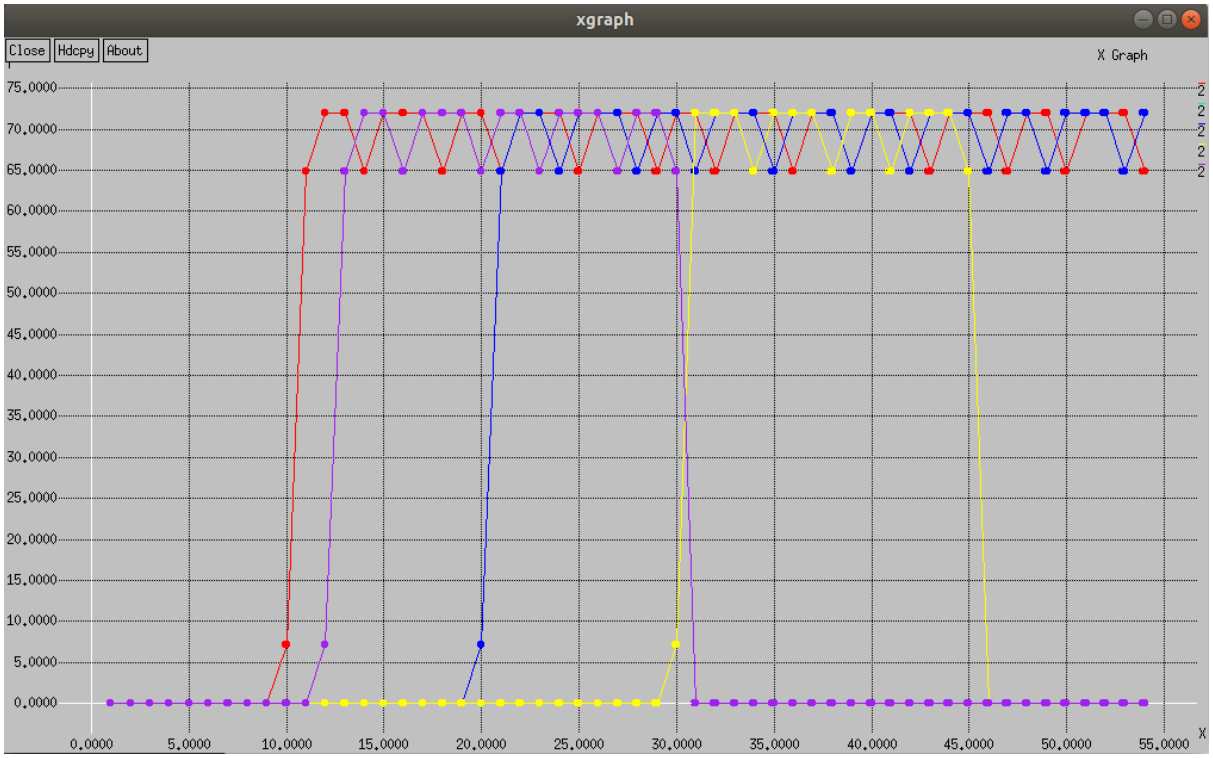
Throughput of all the nodes 2,3,4,5,8 together with packet size 250 bytes for particular nodes misbehaving.



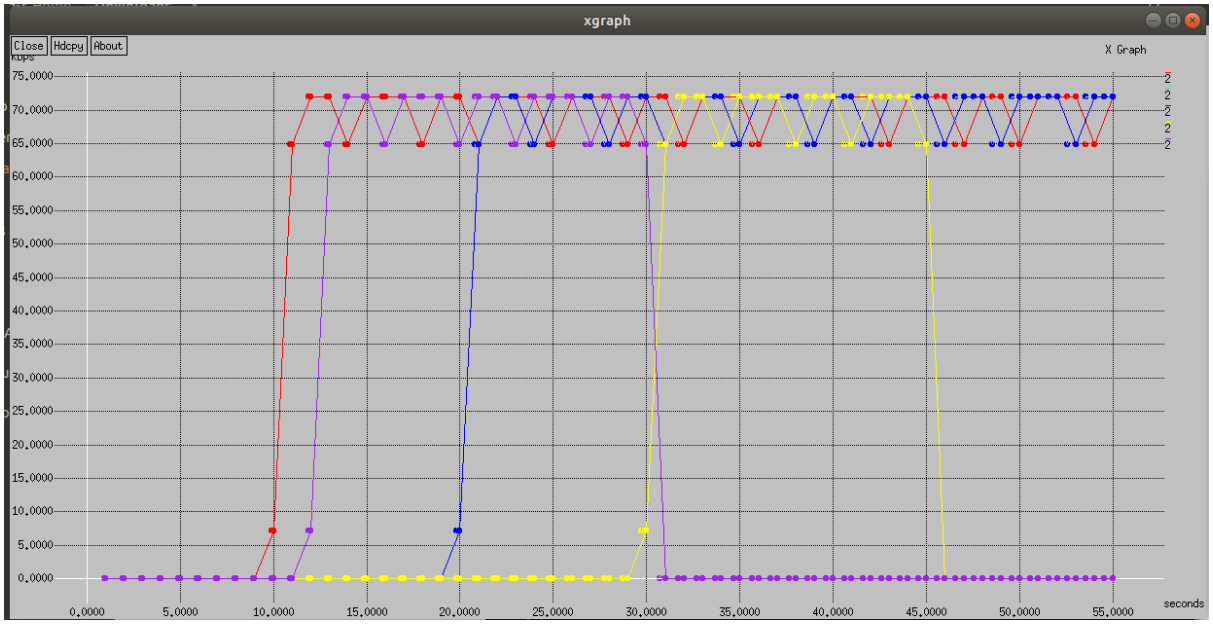
Throughput of the nodes 2,3,4,5,8 together with packet size 600 bytes for all nodes misbehaving.



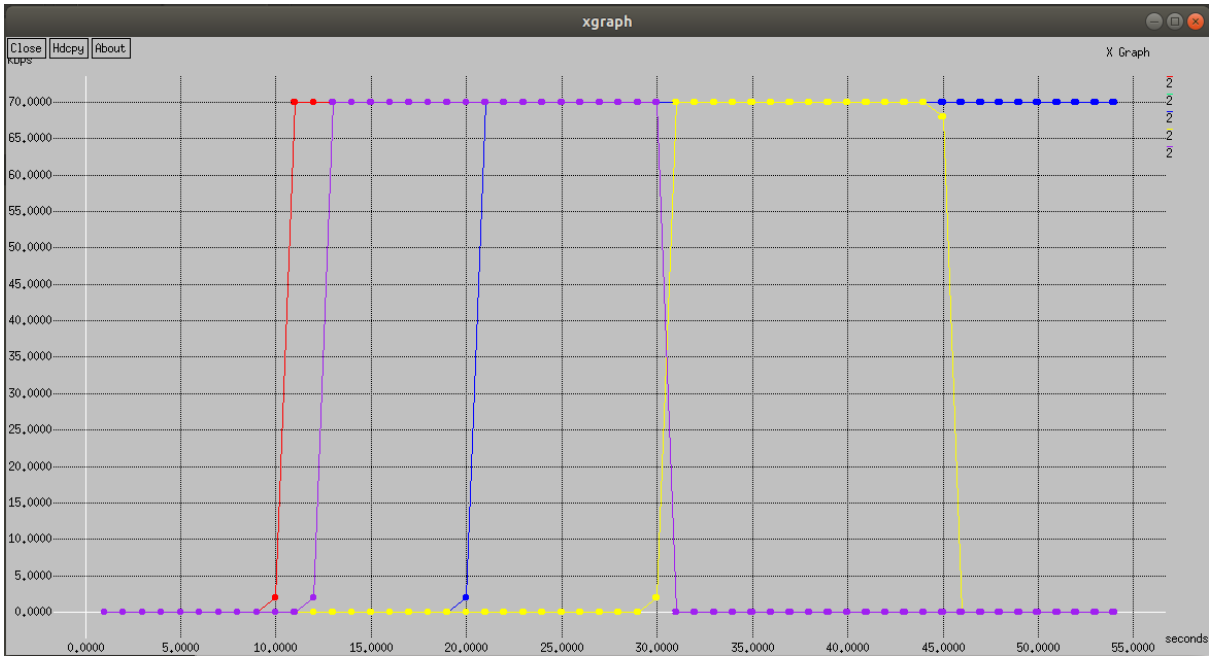
Throughput of all the nodes 2,3,4,5,8 together with packet size 600 bytes for particular nodes misbehaving.



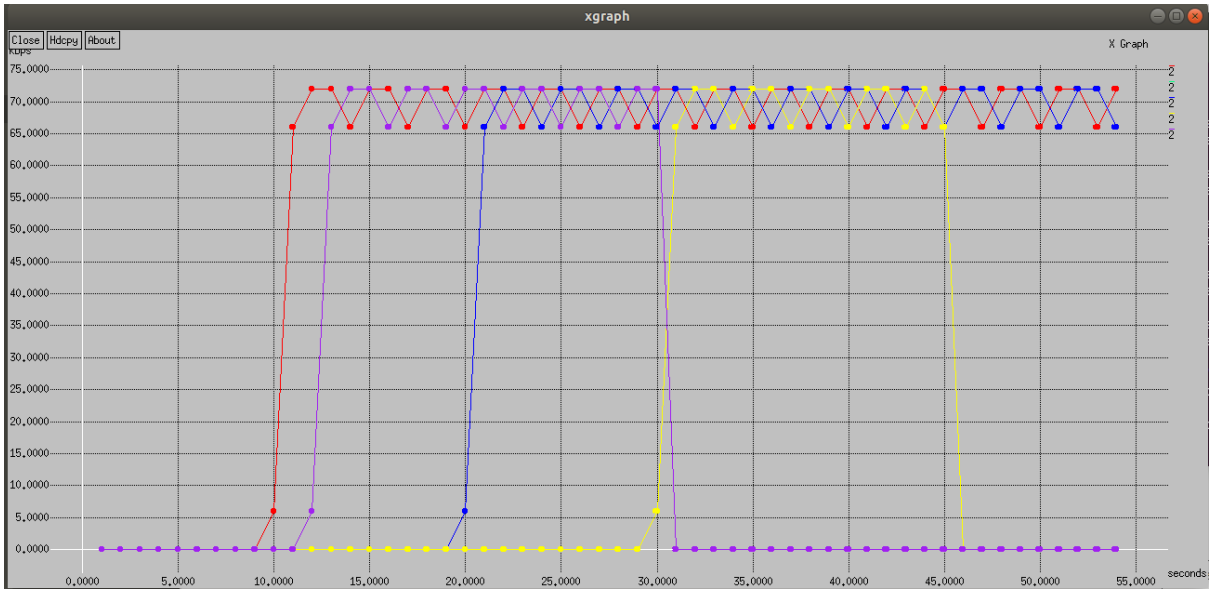
Throughput of the nodes 2,3,4,5,8 together with packet size 900 bytes for all nodes misbehaving.



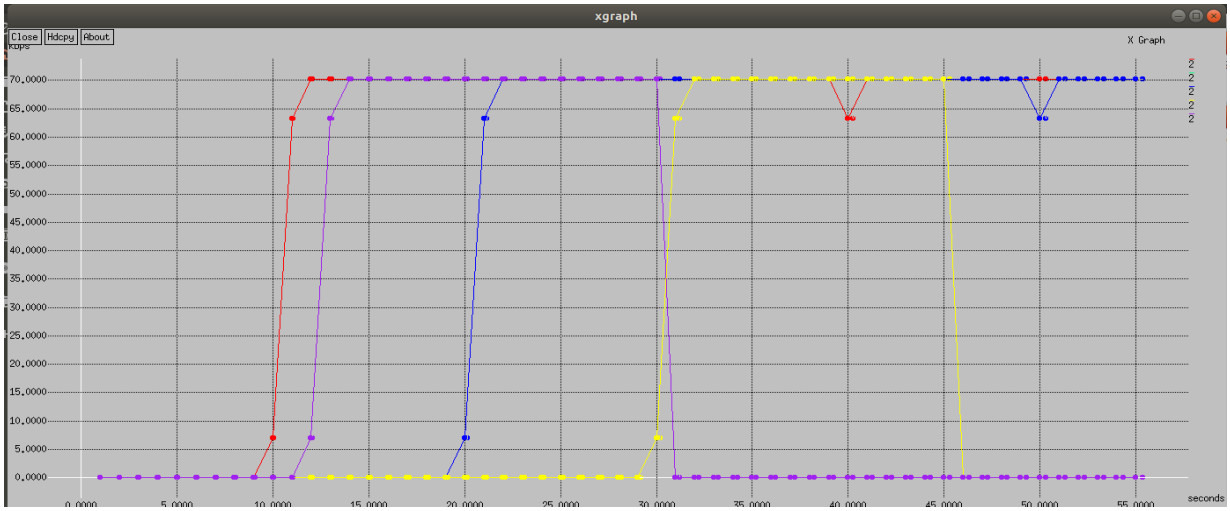
Throughput of all the nodes 2,3,4,5,8 together with packet size 900 bytes for particular nodes misbehaving.



Throughput of the nodes 2,3,4,5,8 together with packet size 250 bytes for modes with back off timer.

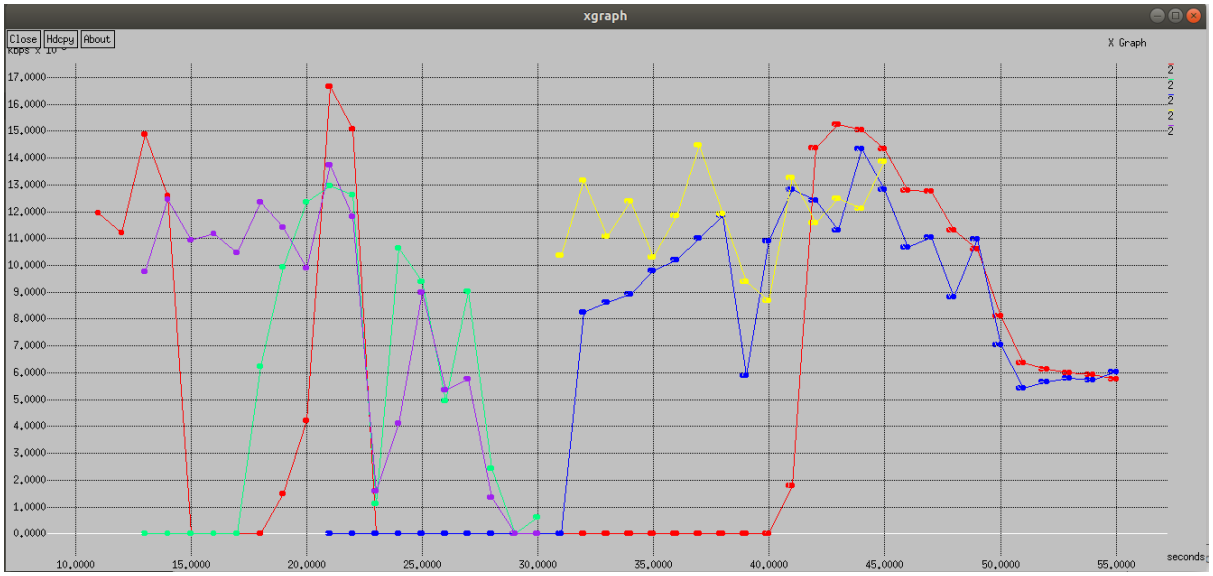


Throughput of the nodes 2,3,4,5,8 together with packet size 750 bytes for modes with back off timer.

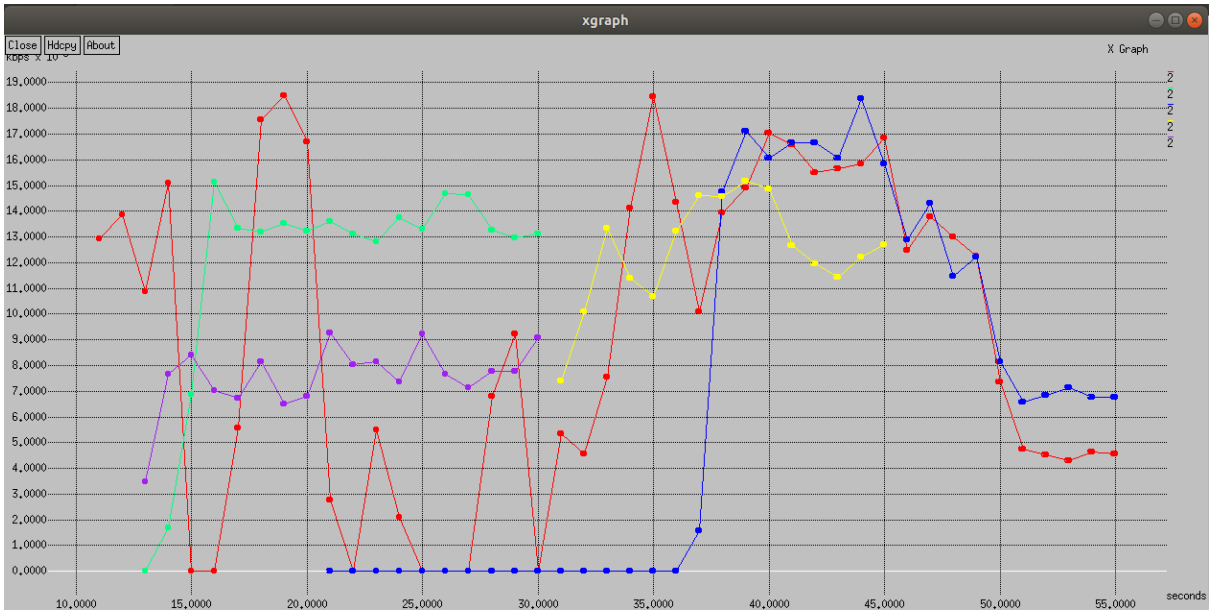


Throughput of the nodes 2,3,4,5,8 together with packet size 878 bytes for modes with back off timer.

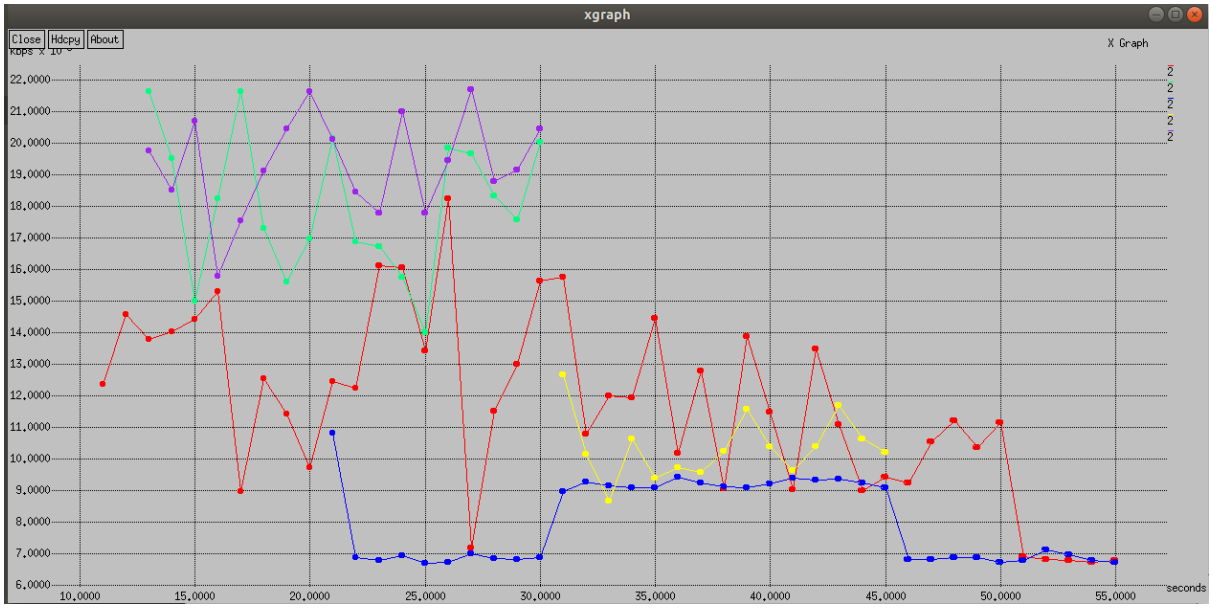
DELAYFOR NODES 2 3 4 5 8



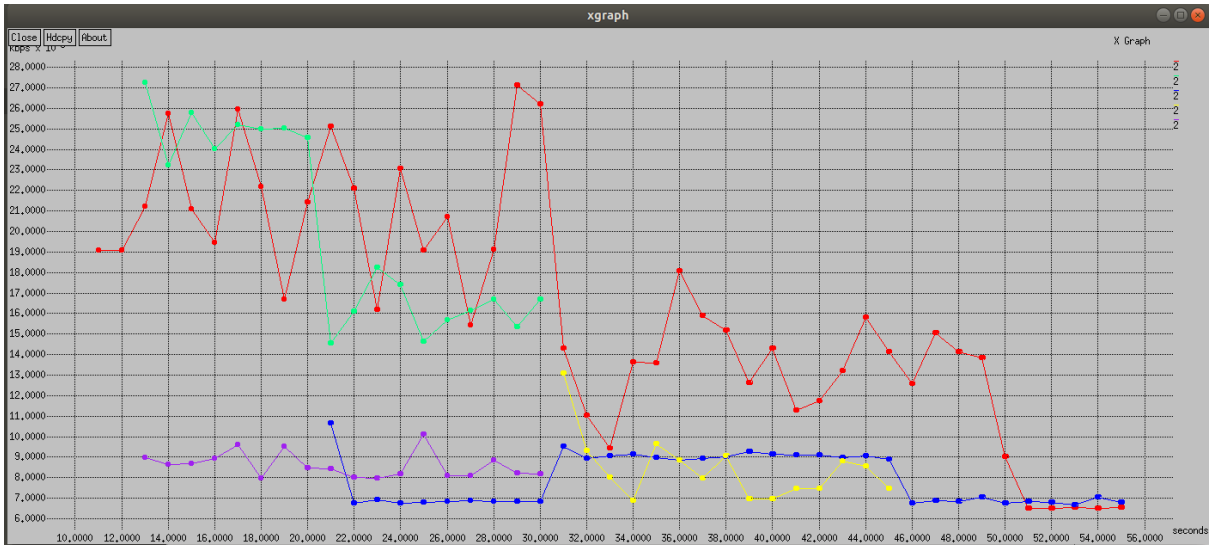
Delay for the nodes 2,3,4,5,8 together with packet size 250 bytes for all nodes misbehaving



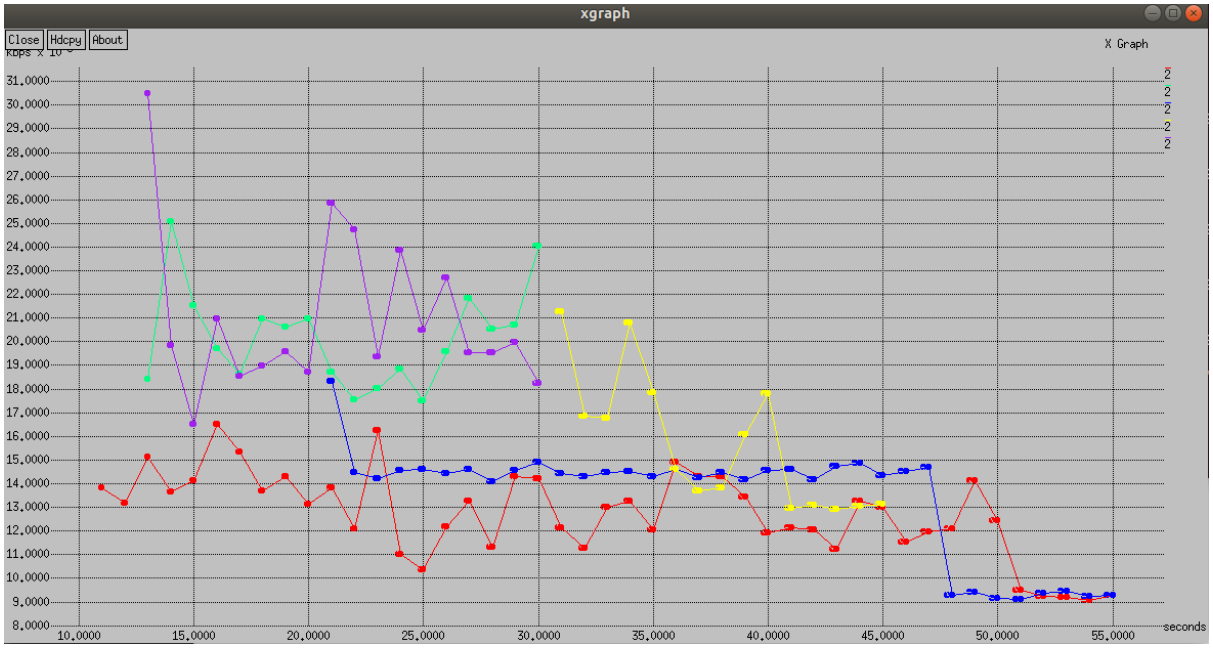
Delay for the nodes 2,3,4,5,8 together with packet size 250 bytes for particular nodes misbehaving



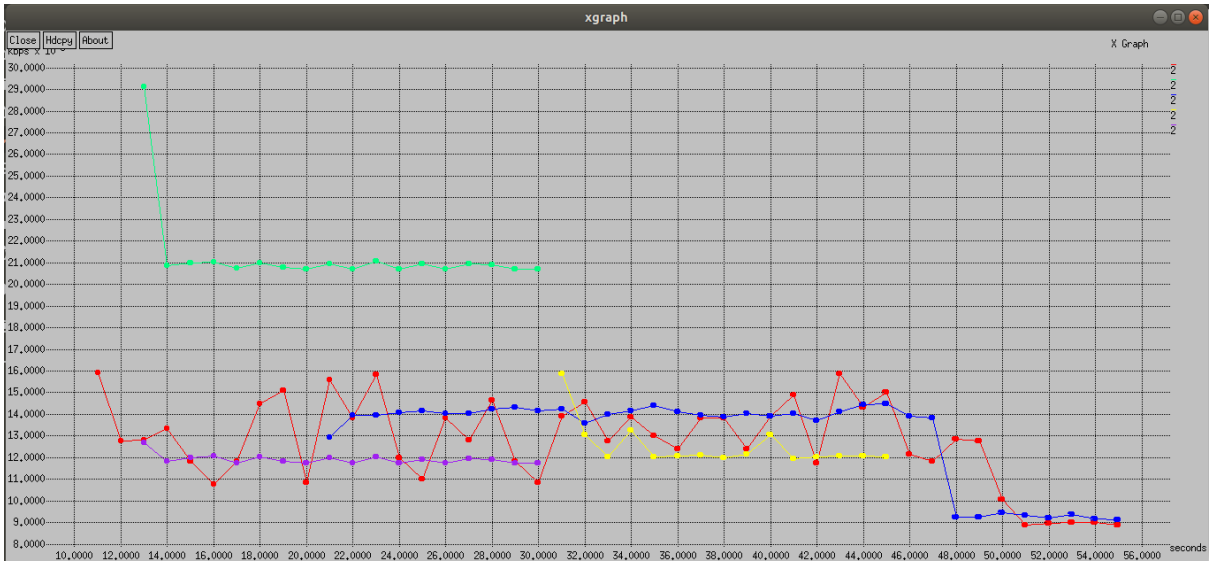
Delay for the nodes 2,3,4,5,8 together with packet size 600 bytes for all nodes misbehaving



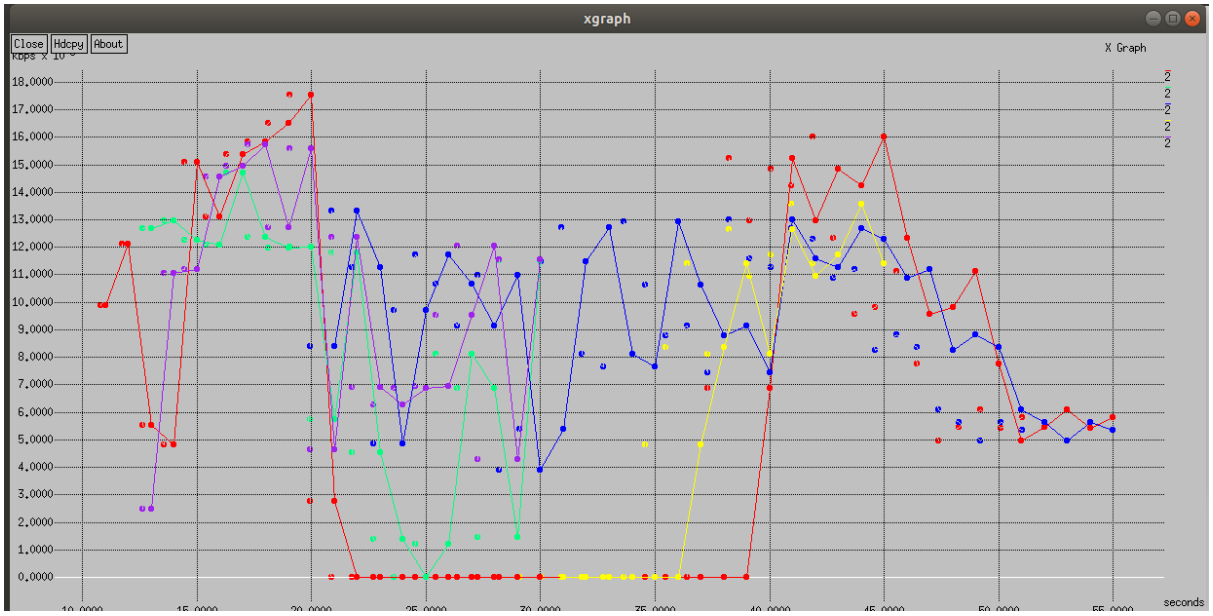
Delay for the nodes 2,3,4,5,8 together with packet size 600 bytes for particular nodes misbehaving



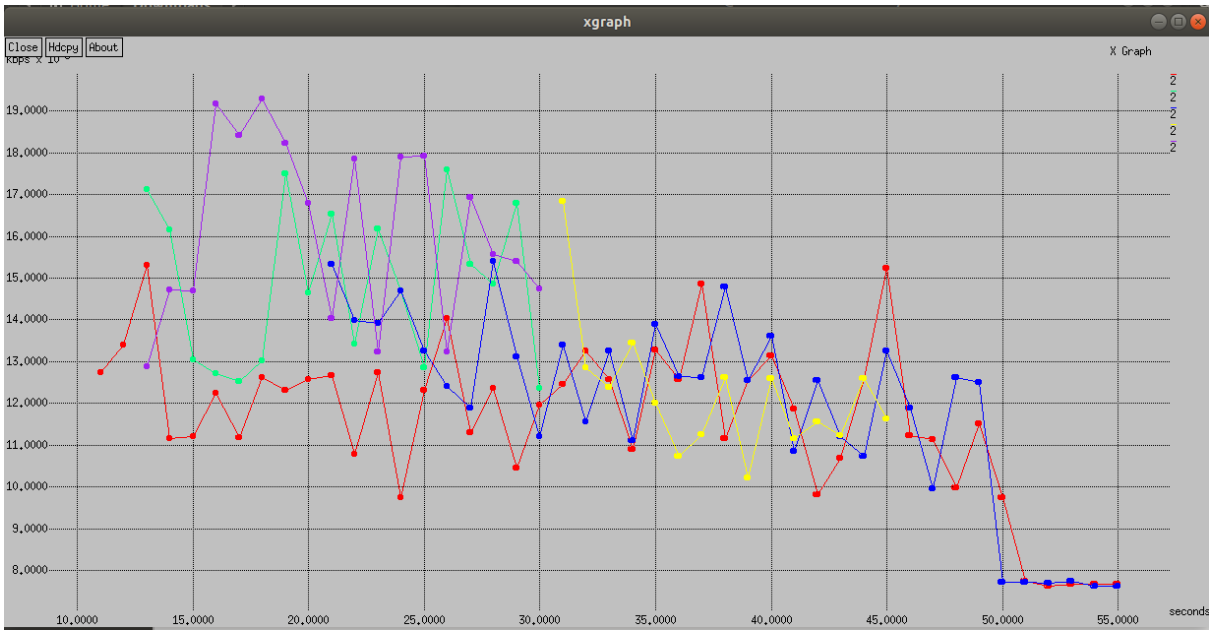
Delay for the nodes 2,3,4,5,8 together with packet size 900 bytes for all nodes misbehaving



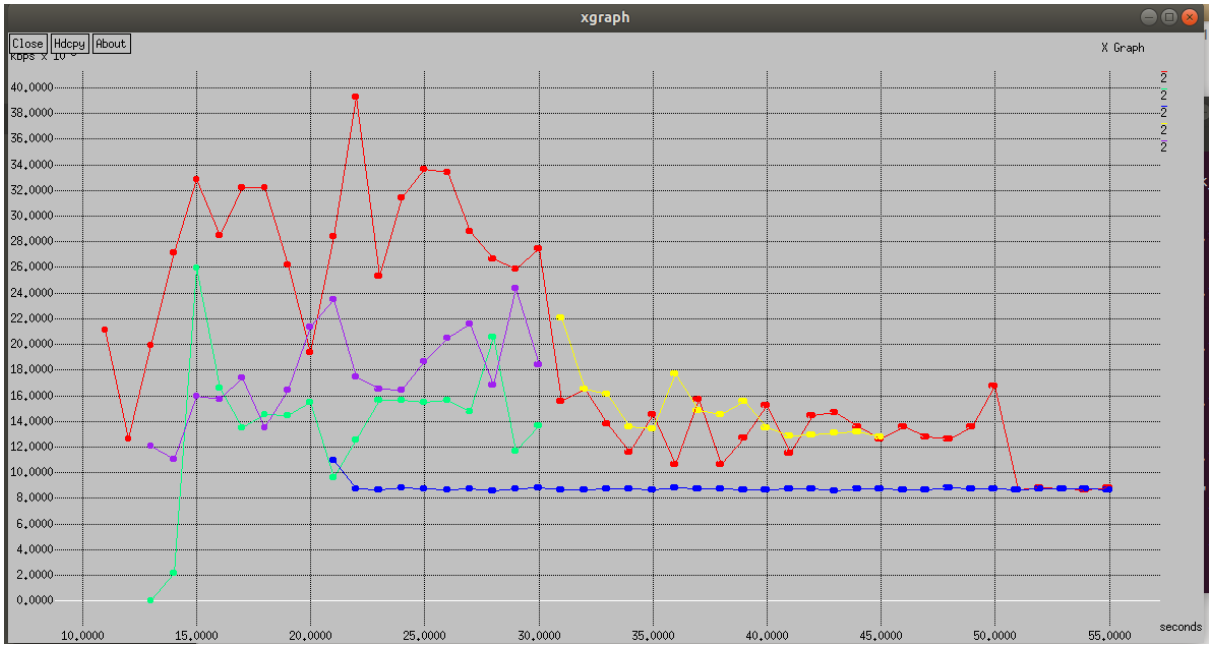
Delay for the nodes 2,3,4,5,8 together with packet size 900 bytes for particular nodes misbehaving



Delay for the nodes 2,3,4,5,8 together with packet size 250 bytes for back off timer.



Delay for the nodes 2,3,4,5,8 together with packet size 750 bytes for back off timer.



Delay for the nodes 2,3,4,5,8 together with packet size 878 bytes for back off timer.

SOME FINDINGS.

- A backoff procedure shall be performed immediately after the end of every transmission with the More Fragments bit equal to 0 of an MPDU of type Data, Management, or Control, even if no additional transmissions are currently queued. In the case of successful acknowledged transmissions, this backoff procedure shall begin at the end of the received ACK frame. In the case of unsuccessful transmissions requiring acknowledgment, this backoff procedure shall begin at the end of the ACKTimeout interval.
- An individual mobile node may attempt to benefit from other nodes, but refuse to share its own resources. Such nodes are called selfish nodes or misbehaving nodes.
- Delay and throughput are very much dependent on the packet size and the connection density.
- Nodes transmit data to the nearest access point, which delivers it either to another node in coverage area or to some other node(s) on the Internet.
- In contention-based MACs, the packet interval is dependent on the packet length. Therefore, the packet transmission interval and the channel access time is decreased, when the packet size is reduced. This increases channel reservation competition and may lead to the network congestion and decreased throughput of the network
- when the packet payload is increased, the number of packets sent from the source node is reduced and the packet interval becomes longer. Then the channel is free for a longer

period of time between packets, which reduces the channel reservation competition and increases the probability of getting a free channel. However, when the packet size increases, the bit errors caused by the channel increase the probability of a packet error, which increases packet loss and decreases throughput.

- Higher the packet size Highest is the delay
- In the IEEE 802.11, an exponential backoff has been adopted, which means whenever a collision occurs, the contention window (CW) of the station is doubled until it reaches the maximum value. The purpose of increasing CW is to reduce the collision probability by distributing the traffic into a larger time space
- If a station having a packet to transmit initially senses the medium to be busy; then the station waits until the medium becomes idle for DIFS period, and then chooses a random "backoff counter" which determines the amount of time the station must wait until it is allowed to transmit its packet.
- During the period in which the medium is idle, the transmitting station decreases its backoff counter.
- This process is repeated until the backoff counter reaches to zero and the station is allowed to transmit. The idle period after a DIFS period is referred to as CW. The IEEE 802.11 MAC layer protocol adopts exponential backoff
- CW is initially assigned the minimum contention window size CWmin. Then, the CW is doubled each time the station experiences a collision until the CW reaches to CWmax which is the maximum contention window size. When the CW is increased to CWmax, it remains the same even if there are more collisions. After every successful transmission, CW is reset to the initial value CWmin. A packet will be discarded if it cannot be successfully transmitted after it is retransmitted for a specific retry times