<u>CSE 322</u>

<u>NS2 Offline Report</u>

Submitted By

Md. Shahrukh Islam

Student ID: 1805098

Computer Science and Engineering

Bangladesh University of Engineering and Technology

Problem with 802.15.4 + AODV combination:

Negative throughput was coming. Because AODV produces 16 byte packets. And subtracting the 20 byte header gives negative throughput.

So the produce report and graphs 802.11 was used instead of 802.15.4

Mention in your report: 15.4 + AODV produces 16 byte packets. Subtracting the 20 byte header gives -ve throughput.

Wireless MAC 802.15.4

The 802.15.4 MAC (Media Access Control) layer is responsible for managing the access to the wireless channel and ensuring that multiple devices can share the channel without interfering with each other. It provides a set of rules and procedures for devices to follow when transmitting and receiving data.

The 802.15.4 MAC protocol includes several key features:

- A device can transmit only when it receives a clear channel indication from the CSMA-CA algorithm.
- The protocol supports both beacon-enabled and non beacon-enabled modes of operation.
- The protocol supports both uncoordinated and coordinated access to the channel.
- It uses a low data rate of 250 kbps, and is designed to operate in the 2.4 GHz

AODV Routing Protocol

AODV (Ad hoc On-demand Distance Vector) is a routing protocol for mobile ad hoc networks (MANETs). It is a reactive protocol, which means that it only establishes routes between nodes when it is necessary for data transmission.

AODV is a simpler and more efficient protocol than DSDV. AODV uses the concept of route discovery and route maintenance to establish and maintain routes between nodes.

When a node wants to send data to another node, it first checks its routing table to see if it has a valid route to the destination. If it does not, the node initiates a route discovery process by broadcasting a route request (RREQ) packet. Other nodes receiving the RREQ packet update their routing tables and, if they have a route to the destination, they unicast a route reply (RREP) packet back to the source node. Once the source node receives the RREP packet, it has a valid route to the destination and can begin transmitting data.

If a link breaks during data transmission, the nodes that detect the break send a route error (RERR) packet to inform the source node that the route is no longer valid. The source node then initiates a new route discovery process to find an alternate route to the destination.

AODV has several advantages:

- It is simple and easy to implement.
- It is efficient and scalable for large networks.
- It uses minimal control overhead.
- It quickly adapts to changes in the network topology.
- It allows for a high degree of flexibility in network configurations.

However, it also has some limitations, such as high control overhead.

UDP Agent

UDP (User Datagram Protocol) is a transport layer protocol that is used to send and receive data packets over a network. It is a connectionless protocol, which means that it does not establish a reliable end-to-end connection before transmitting data. Instead, it simply sends packets of data to the destination without checking for their delivery.

Here are some of the key features of the UDP agent:

- The UDP agent can be used to create both unicast and multicast flows.
- The agent can be configured to send packets at a fixed rate or at a variable rate using CBR (Constant Bit Rate) traffic.
- The agent can be configured to send packets of a fixed size or a variable size.
- The agent can be configured to use a specific destination port number.
- The agent can be used to simulate real-time applications that use the UDP protocol, such as VoIP and online gaming.

One important thing to keep in mind is that since UDP does not establish a reliable connection, it is not error-checked and does not guarantee that data will be received in the order it was sent. Therefore, it is not suitable for applications that require guaranteed delivery of packets. However, it is often used in applications where a small amount of packet loss is acceptable, such as streaming media or online gaming.

CBR application

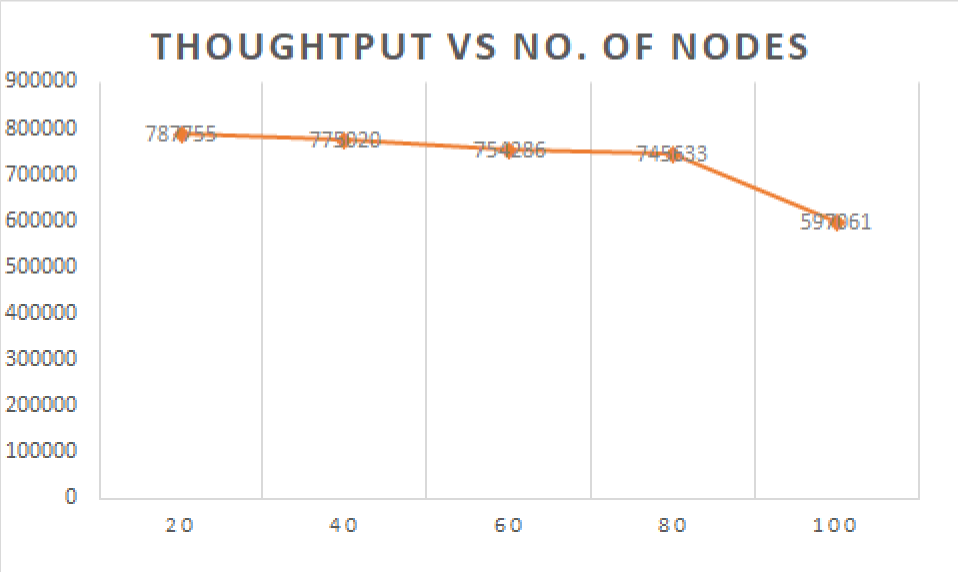
CBR (Constant Bit Rate) traffic is a type of network traffic that is characterised by a constant and unchanging rate of data transfer. It is used to simulate real-time applications that require a constant and predictable flow of data, such as voice over IP (VoIP) and video streaming.

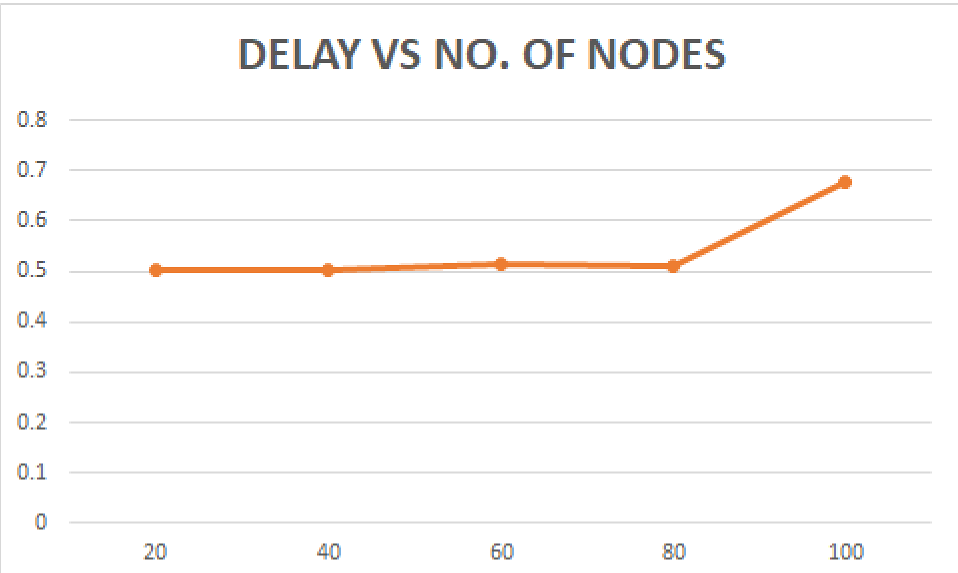
CBR traffic is generated by a CBR agent in the network simulation, which can be configured to send a fixed number of packets at a constant rate. The rate at which packets are sent is specified in bits per second (bps) or packets per second (pps). The agent can also be configured to send packets of a fixed size, which is specified in bytes.

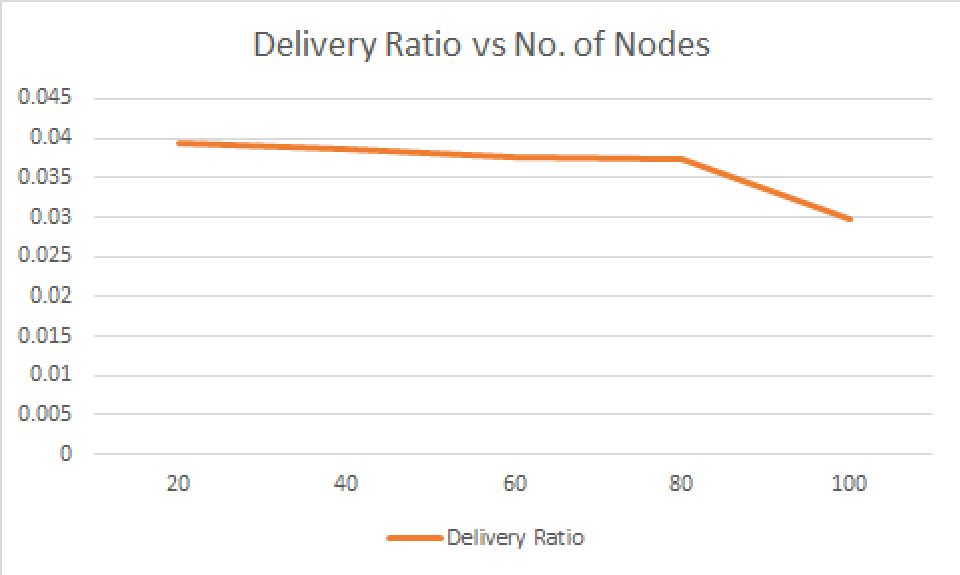
CBR traffic can be useful in evaluating the performance of a network under different conditions, such as varying the number of nodes or changing the network topology. It can also be used to evaluate the performance of different routing protocols or congestion control mechanisms.

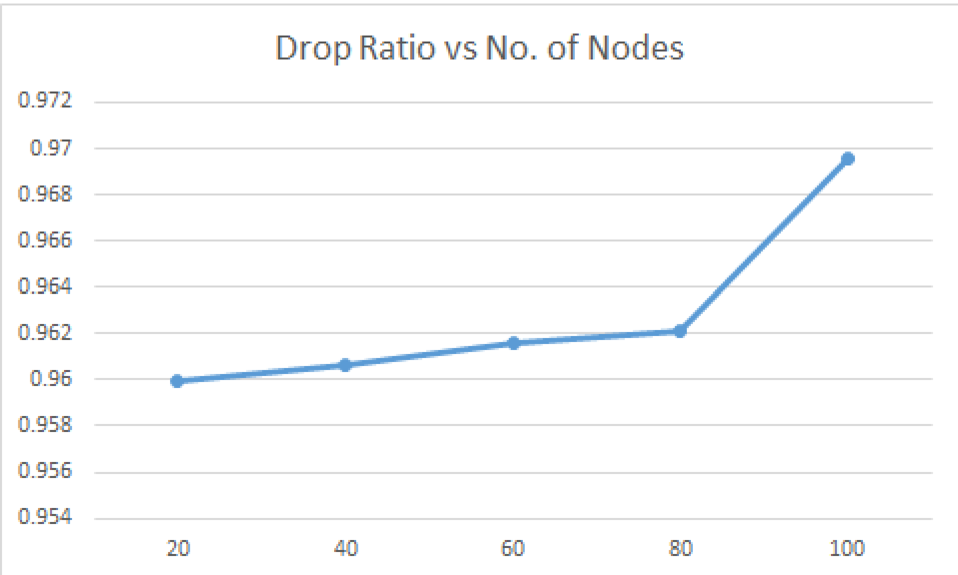
One of the main advantages of CBR traffic is that it is predictable and deterministic, which makes it easy to evaluate the performance of a network.

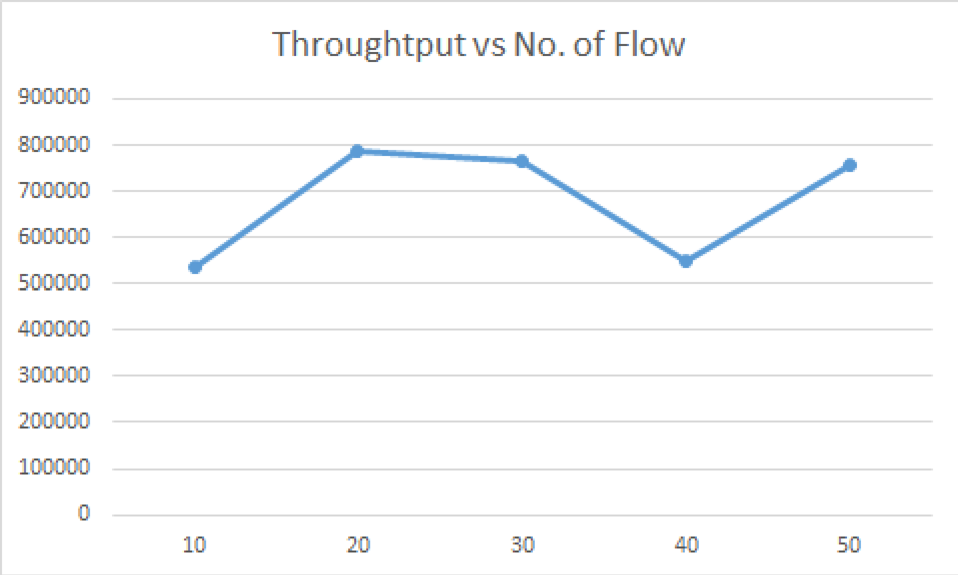
Graphs:

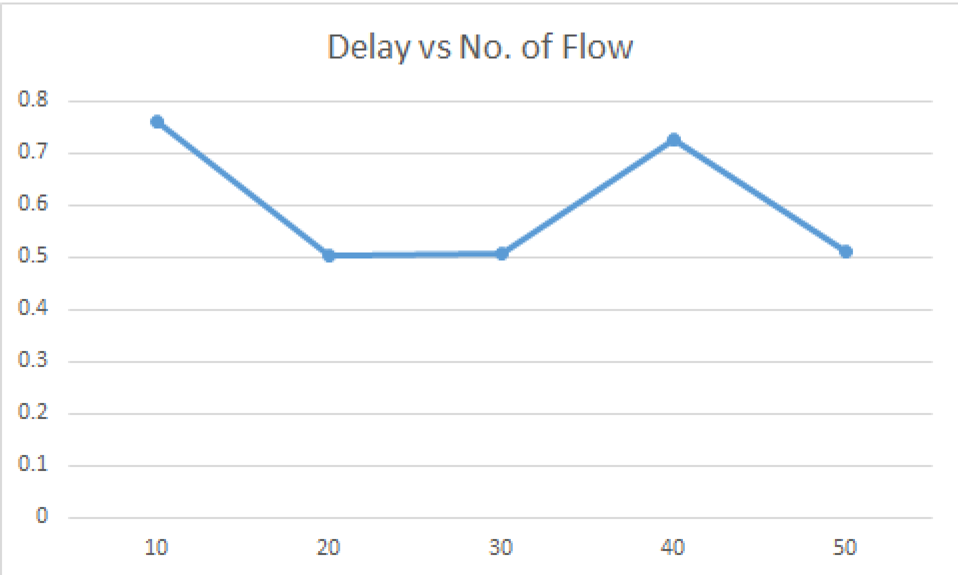

THOUGHTPUT VS NO. OF NODES
900000
800000
700000
600000
500000
400000
300000
200000
100000
0
787755
775020
754286
745633
597061
20
40
60
80
100

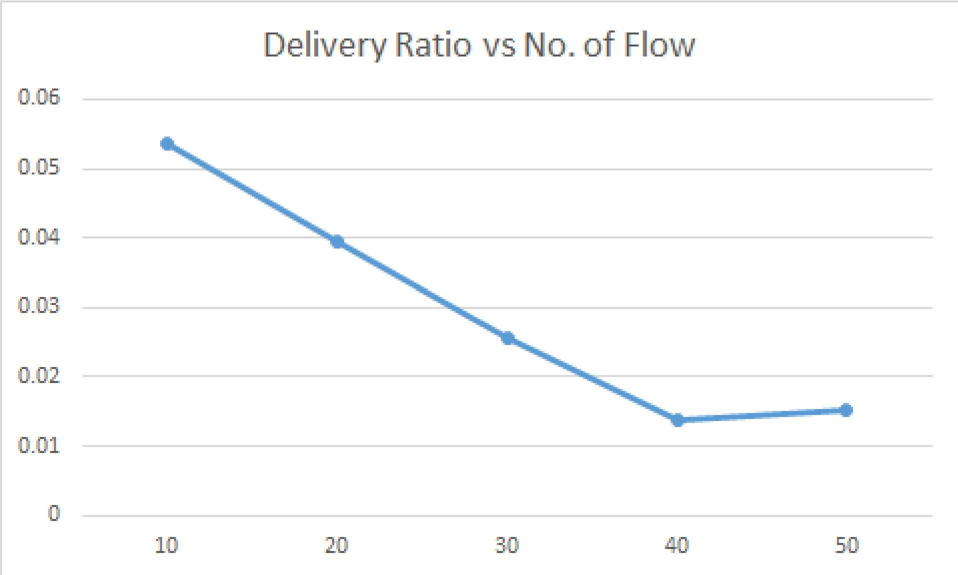

DELAY VS NO. OF NODES
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
20
40
60
80
100

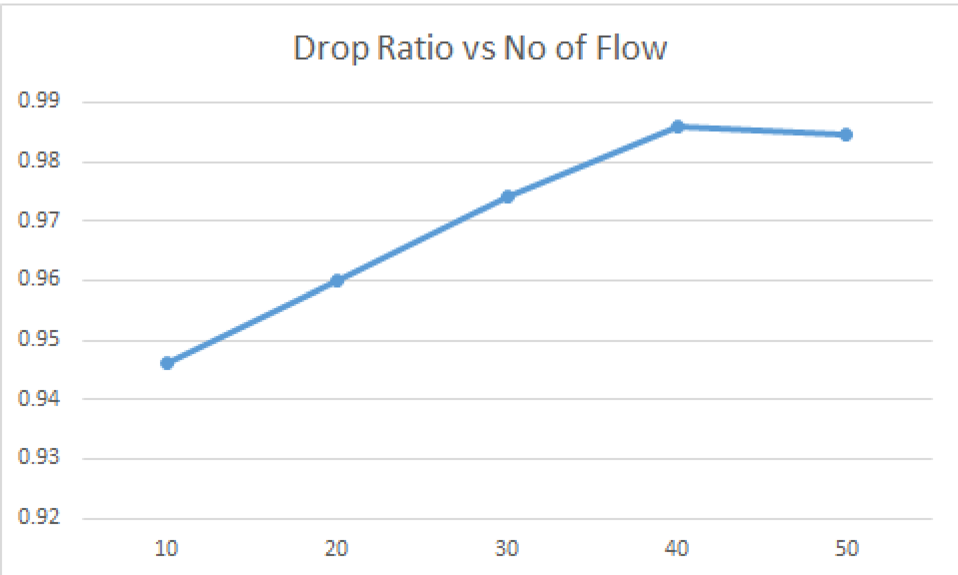

Delivery Ratio vs No. of Nodes
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
20
40
60
80
100
Delivery Ratio

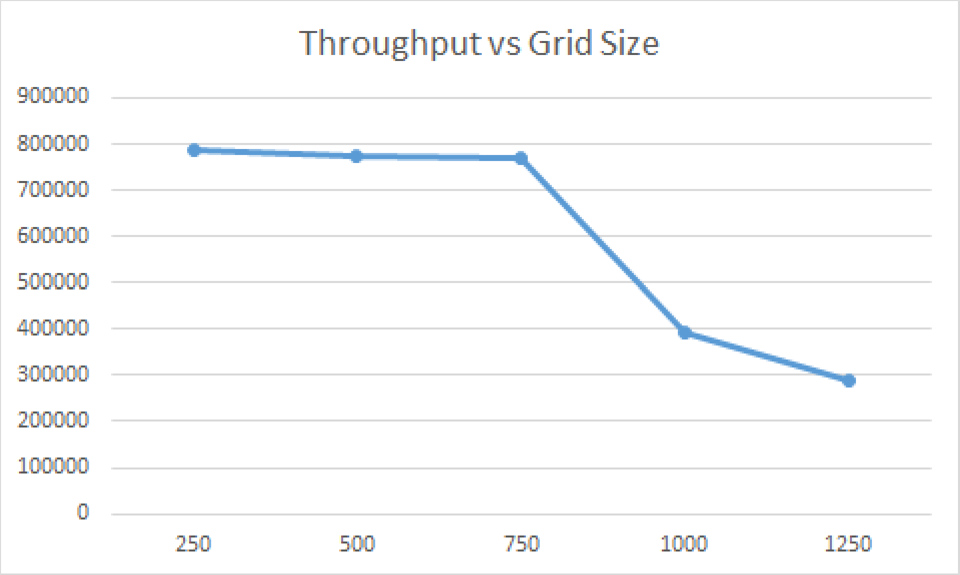

Drop Ratio vs No. of Nodes
0.972
0.97
0.968
0.966
0.964
0.962
0.96
0.958
0.956
0.954
20
40
60
80
100

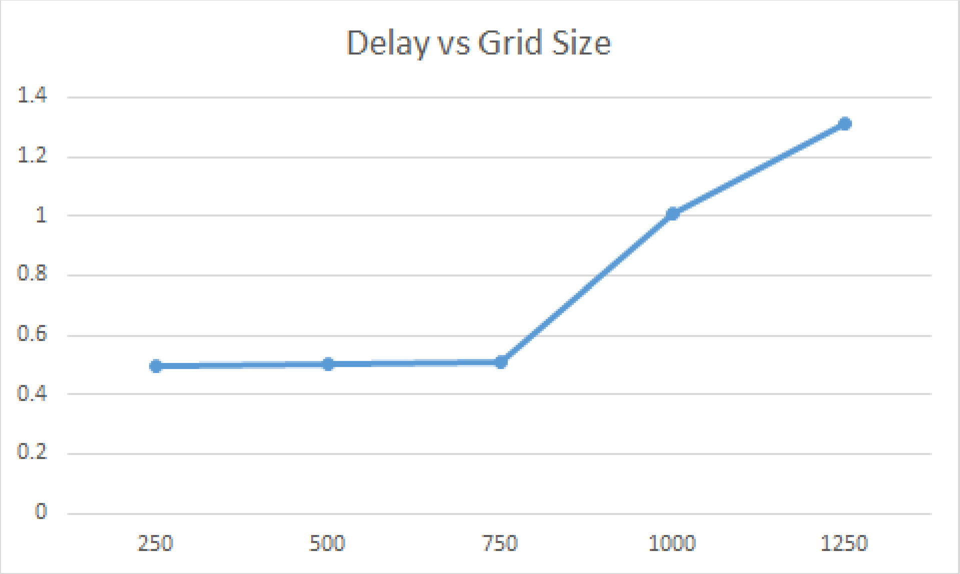

Throughtput vs No. of Flow
900000
800000
700000
600000
500000
400000
300000
200000
100000
0
10
20
30
40
50

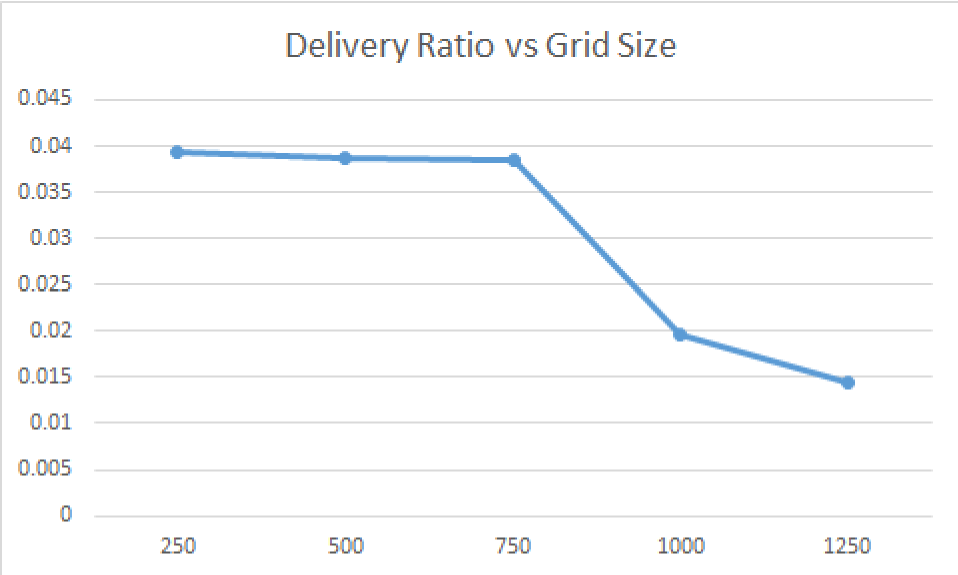

Delay vs No. of Flow
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
10
20
30
40
50

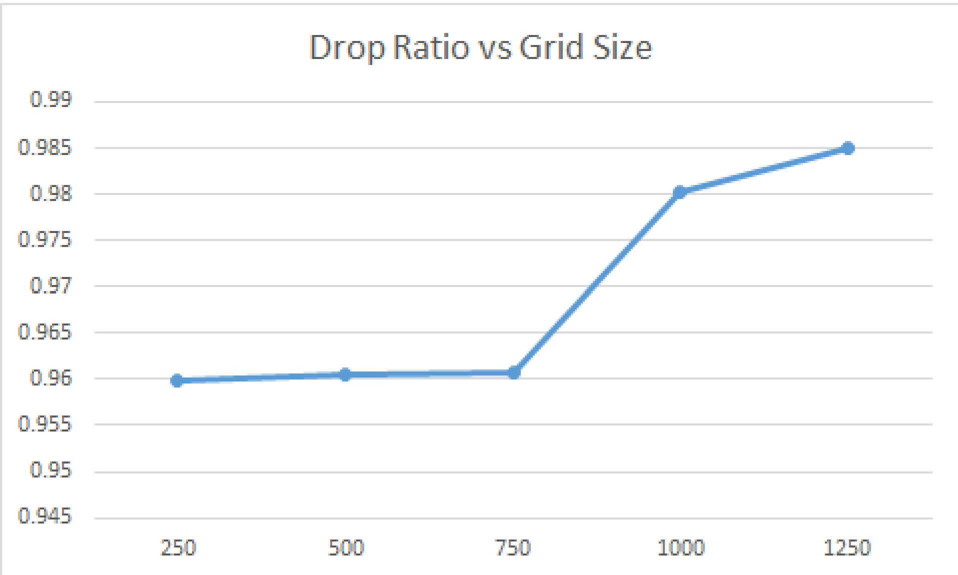

Delivery Ratio vs No. of Flow
0.06
0.05
0.04
0.03
0.02
0.01
0
10
20
30
40
50


Drop Ratio vs No of Flow
0.99
0.98
0.97
0.96
0.95
0.94
0.93
0.92
10
20
30
40
50


Throughput vs Grid Size
900000
800000
700000
600000
500000
400000
300000
200000
100000
0
250
500
750
1000
1250


Delay vs Grid Size
1.4
1.2
1
0.8
0.6
0.4
0.2
0
250
500
750
1000
1250


Delivery Ratio vs Grid Size
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
250
500
750
1000
1250


Drop Ratio vs Grid Size
0.99
0.985
0.98
0.975
0.97
0.965
0.96
0.955
0.95
0.945
250
500
750
1000
1250

Observations:

- Increment of nodes reduces throughput.
- Increment of nodes increases delay.
- Increment of nodes decreases delivery ratio.
- Increment of nodes increases drop ratio.
- Increment of flows decreases delivery ratio.
- Increment of flows increases drop ratio.
- Increment of grid size reduces throughput.
- Increment of grid size increases delay.
- Increment of grid size decreases delivery ratio.
- Increment of grid size increases drop ratio.