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CSE 322

Offline on NS2

Wireless MAC: 802.11

IEEE 802.11 is part of the IEEE 802 set of local area network (LAN) technical standards, and specifies the set of media access control (MAC) and physical layer (PHY) protocols for implementing wireless local area network (WLAN) computer communication. (Source: Wikipedia)

The components of an 802.11 wireless MAC are as follows:

- Stations: comprises of all devices and equipment that are connected to the wireless LAN
- Basic Service Set: A basic service set is a group of stations communicating at the physical layer level.
- Extended Service Set− It is a set of all connected BSS.
- Distribution System− It connects access points in ESS.
  (Source: tutorialspoint)

Routing Protocol: DSDV

Destination-Sequenced Distance-Vector Routing (DSDV) is a table-driven routing scheme for ad hoc mobile networks based on the Bellman-Ford algorithms. Each entry in the routing table contains a sequence number, the sequence numbers are generally even if a link is present; else, an odd number is used. The number is generated by the destination, and the emitter needs to send out the next update with this number. (Source: Wikipedia)

The main advantage of this routing protocol is the availability of paths to all destinations in the network which results in the less delay in path setup. On the contrary, DSDV requires a constant bandwidth for the routing tables even when the network is idle. Also, this protocol is not suitable for highly dynamic or large scale networks.

Agent Layer: TCP Tahoe

Transmission Control Protocol is a layer 4 protocol in the OSI reference model. This protocol uses a network congestion-avoidance algorithm that includes various aspects of an additive increase/multiplicative decrease (AIMD) scheme, along with other schemes including slow start and congestion window (CWND), to achieve congestion avoidance.

TCP Tahoe consider retransmission timeout (RTO) and duplicate ACKs as packet loss events. If three duplicate ACKs are received (i.e. four ACKs acknowledging the same packet, which are not piggybacked on data and do not change the receiver's advertised window), Tahoe performs a fast retransmit, sets the slow start threshold to half of the current congestion window, reduces the congestion window to 1 MSS, and resets to slow start state. (Source: Wikipedia)

Application Layer: Telnet

Telnet (short for "teletype network") is a client/server application protocol that provides access to virtual terminals of remote systems on LANs or the Internet. Telnet consists of two components:

(1) The protocol itself which specifies how two parties to communicate

(2) The software application that provides the service.

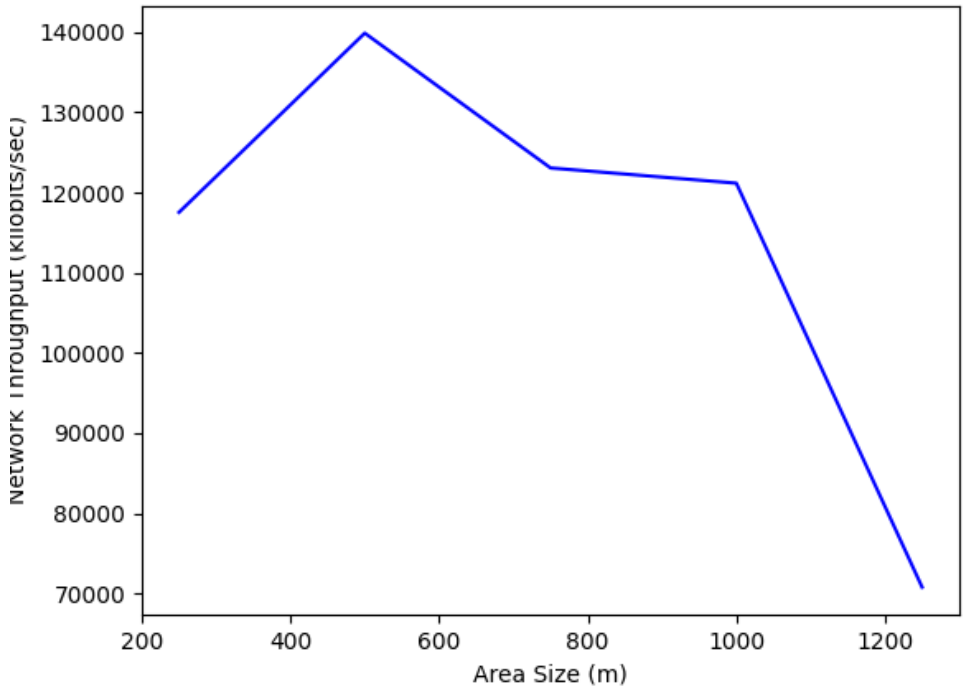
Node Positioning: Grid

Flow: 1 sink, random source

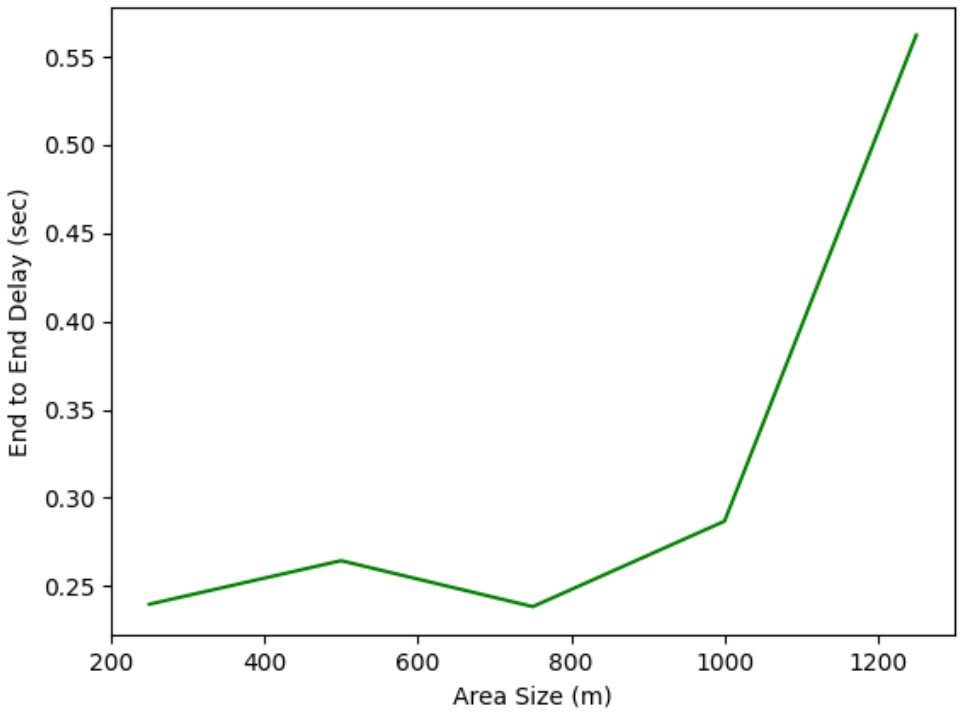
Graphs without random motion

Varying Area:

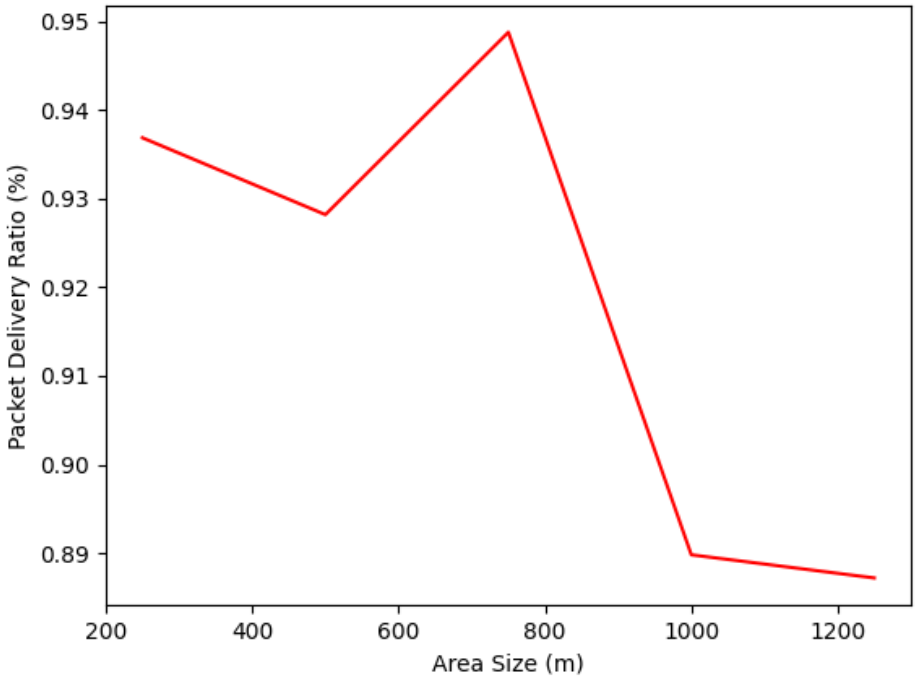
Average Throughput



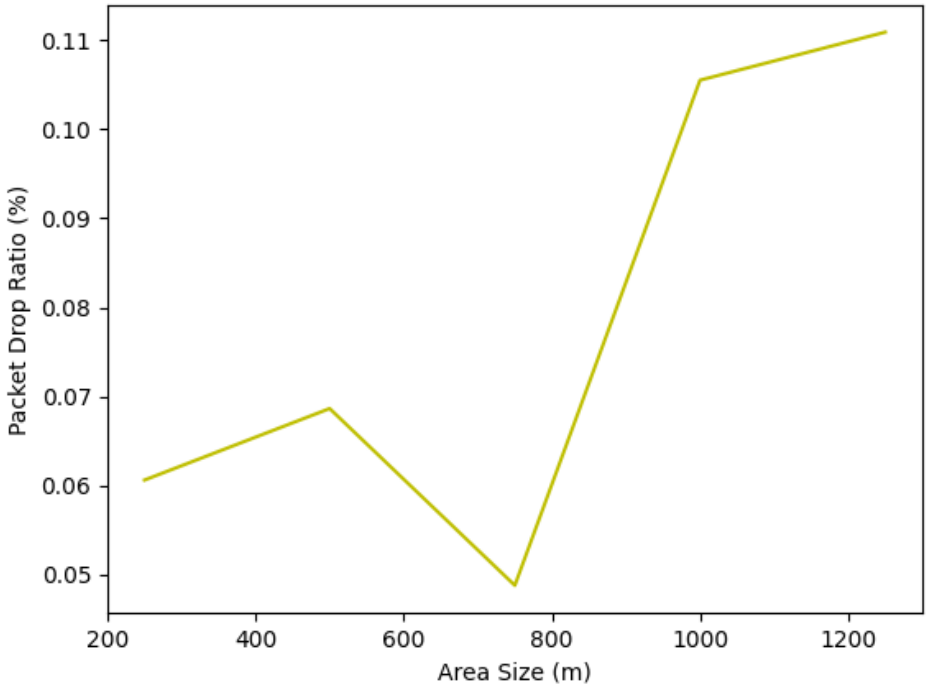
End-to-end Delay



Packet Delivery Ratio

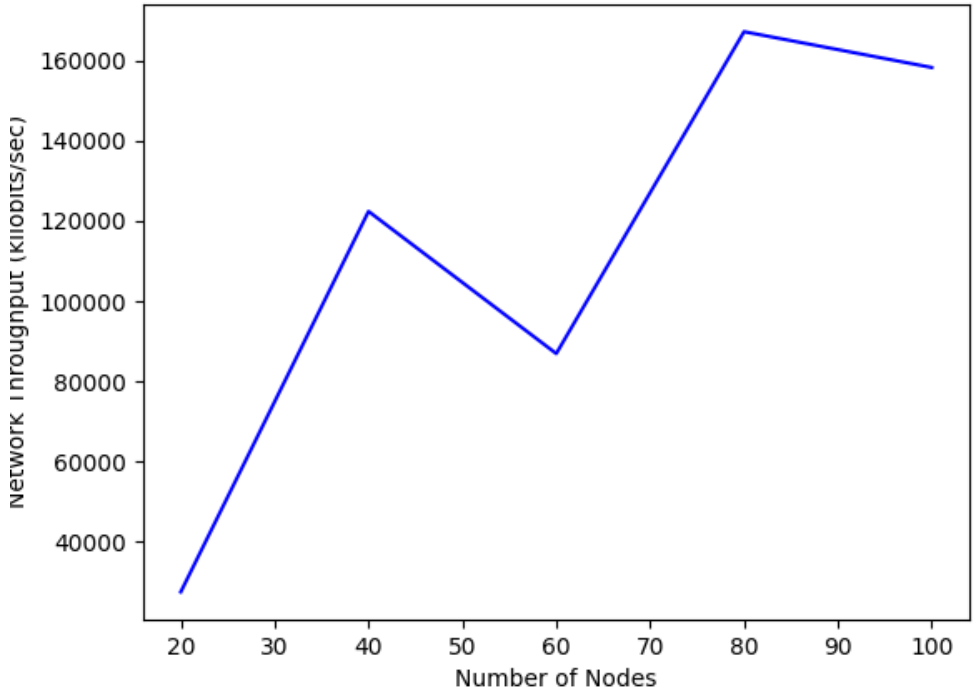


Packet Drop Ratio

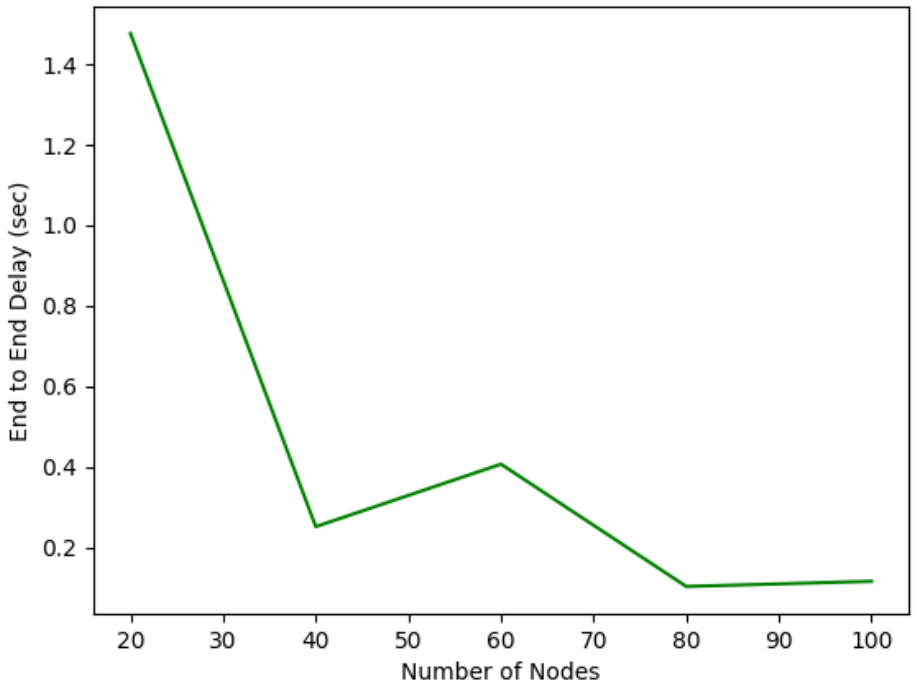


Varying Number of Nodes:

Average Throughput



End-to-end Delay



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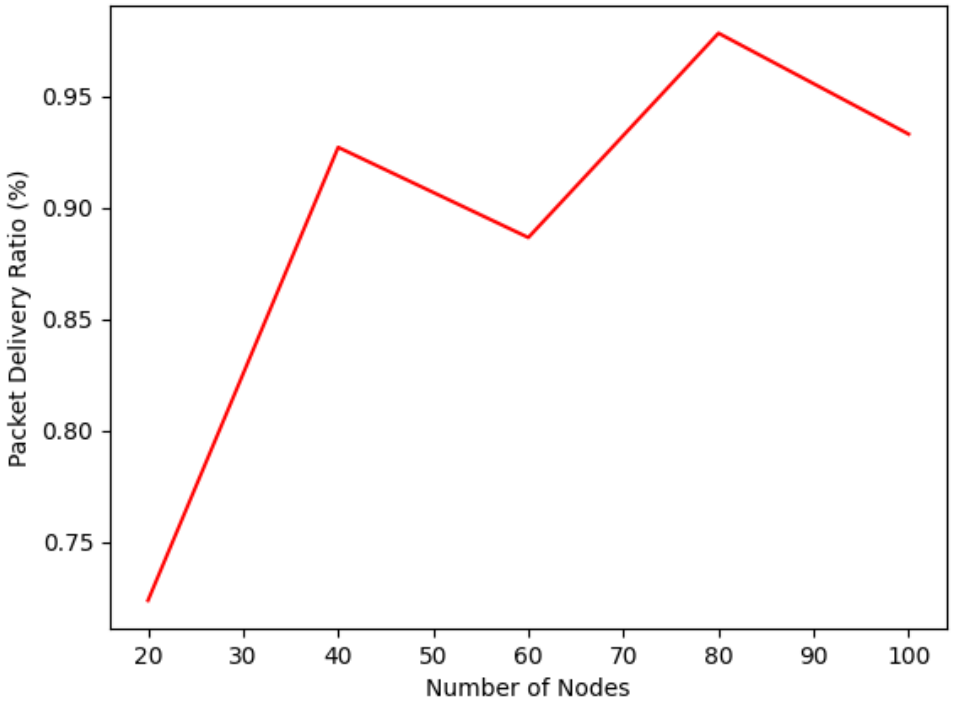

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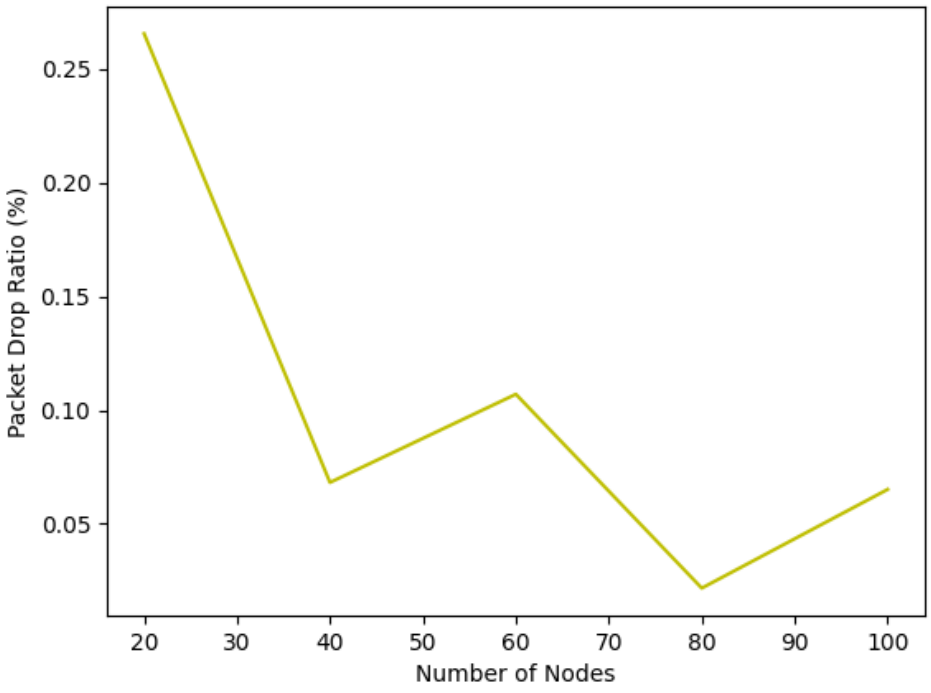
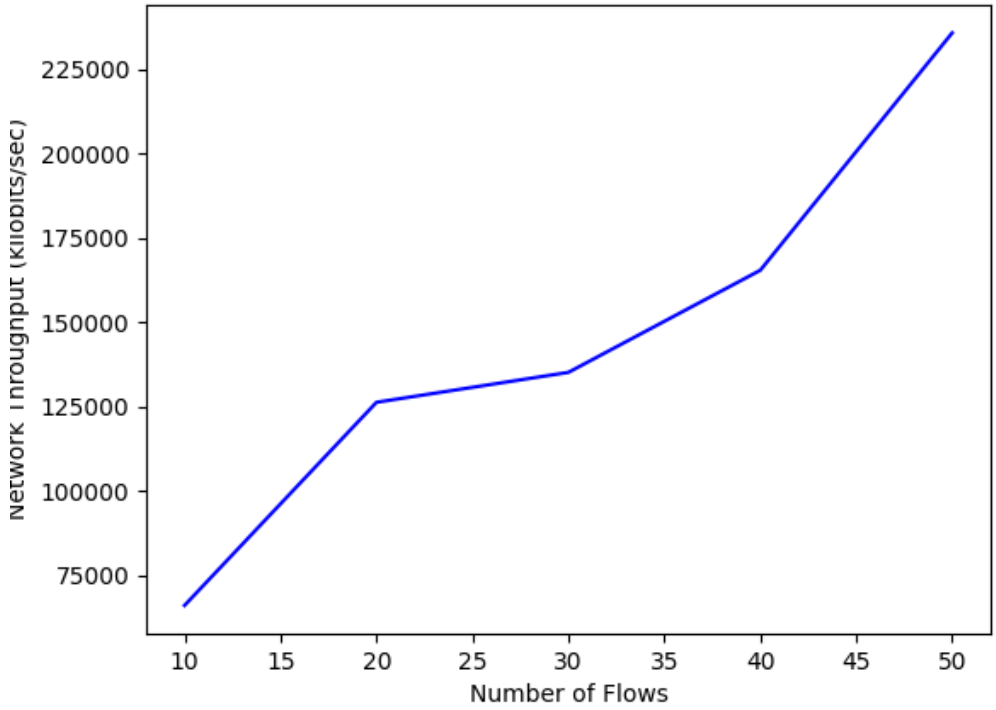
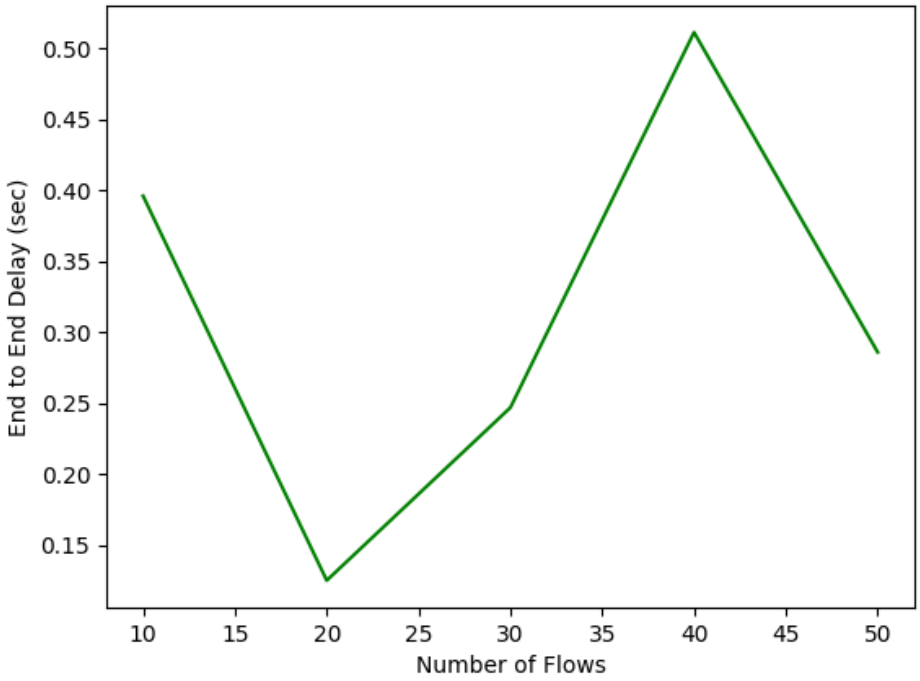


Varying Number of Flows:

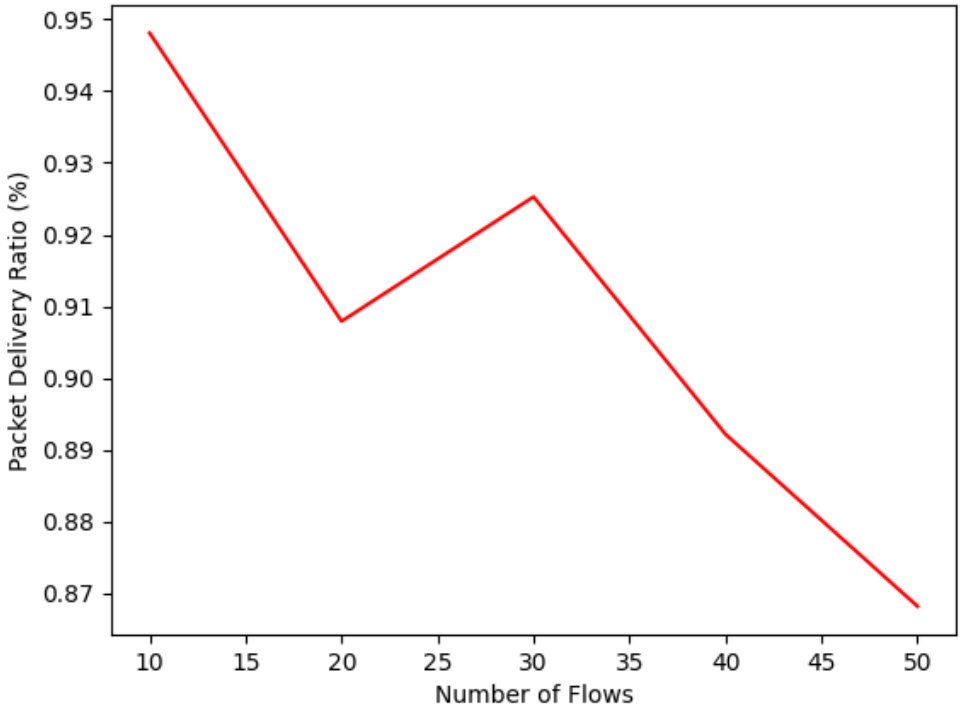
Average Throughput



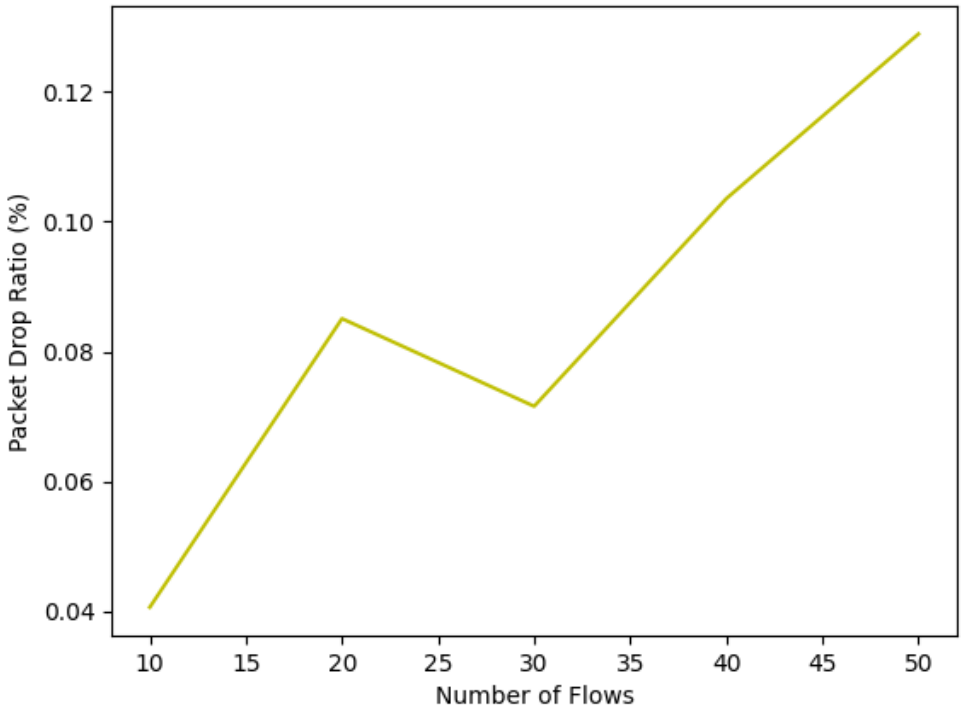
End-to-end Delay



Packet Delivery Ratio



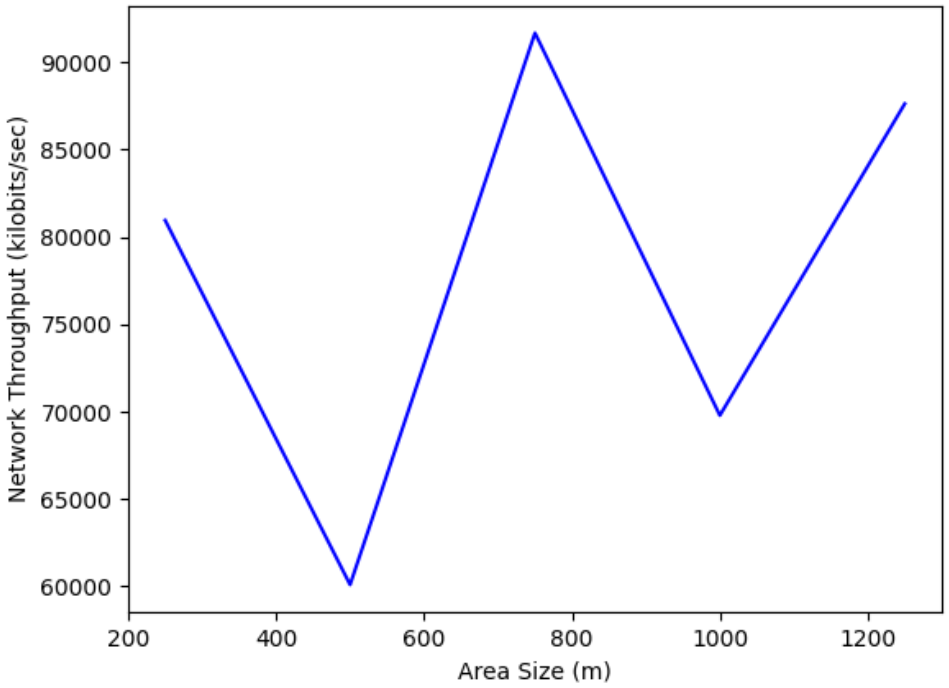
Packet Drop Ratio



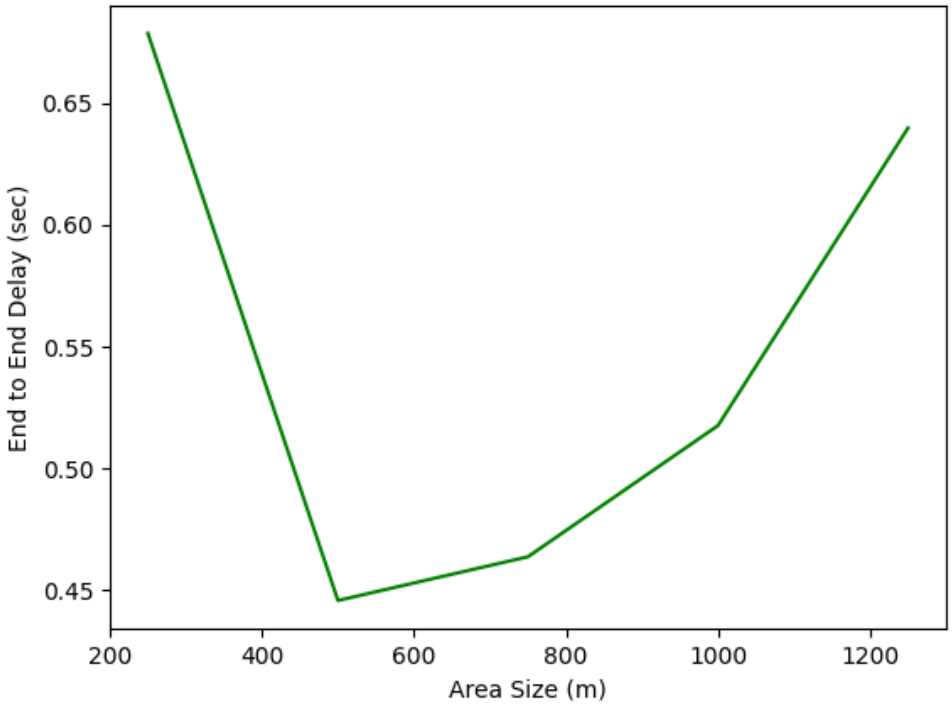
Graphs with random motion

Varying Area:

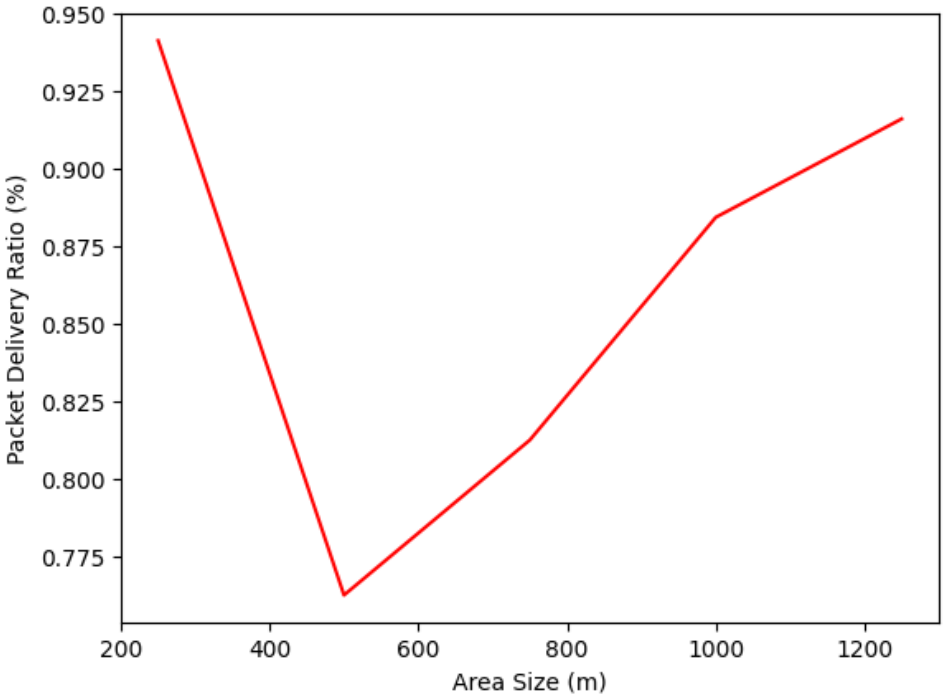
Average Throughput



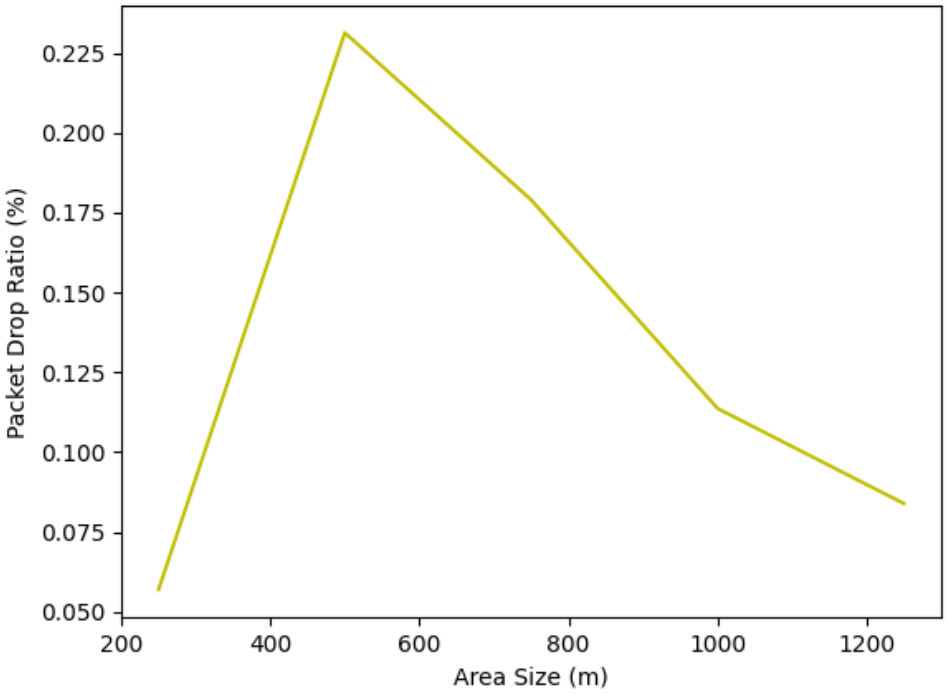
End-to-end Delay



Packet Delivery Ratio

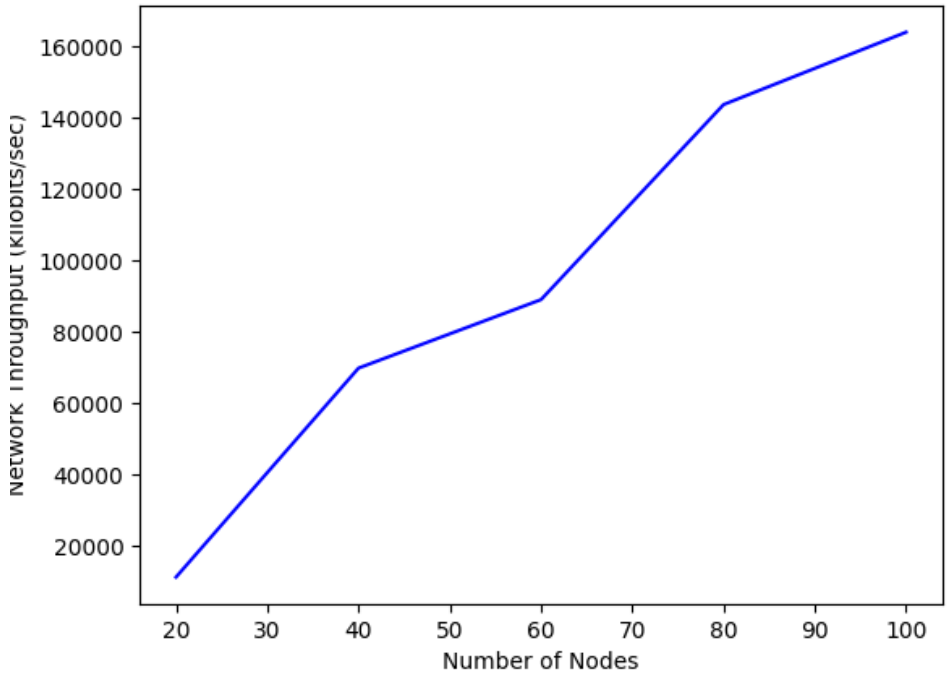


Packet Drop Ratio

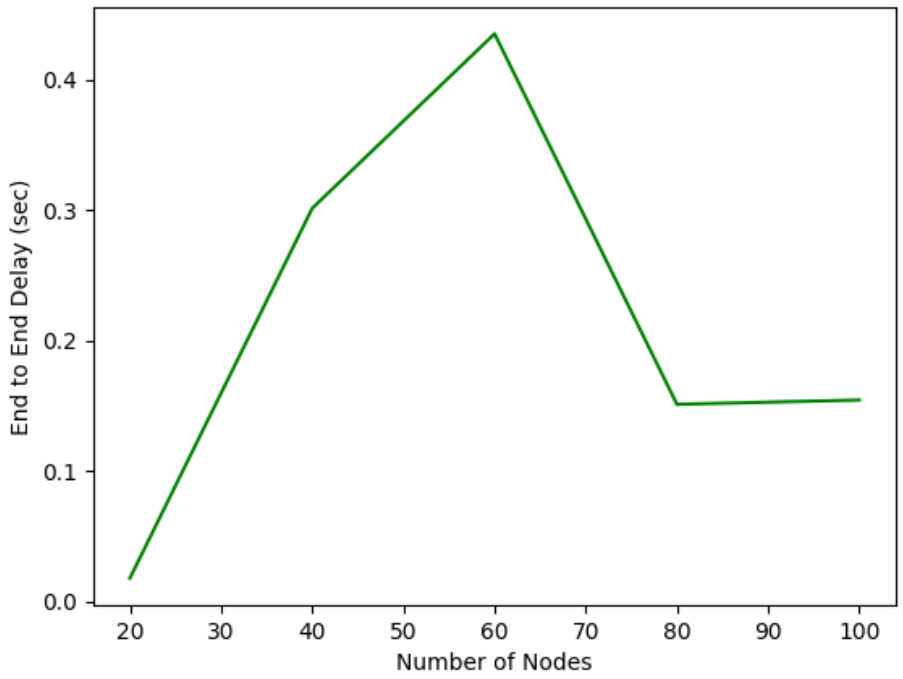


Varying Number of Nodes:

Average Throughput



End-to-end Delay



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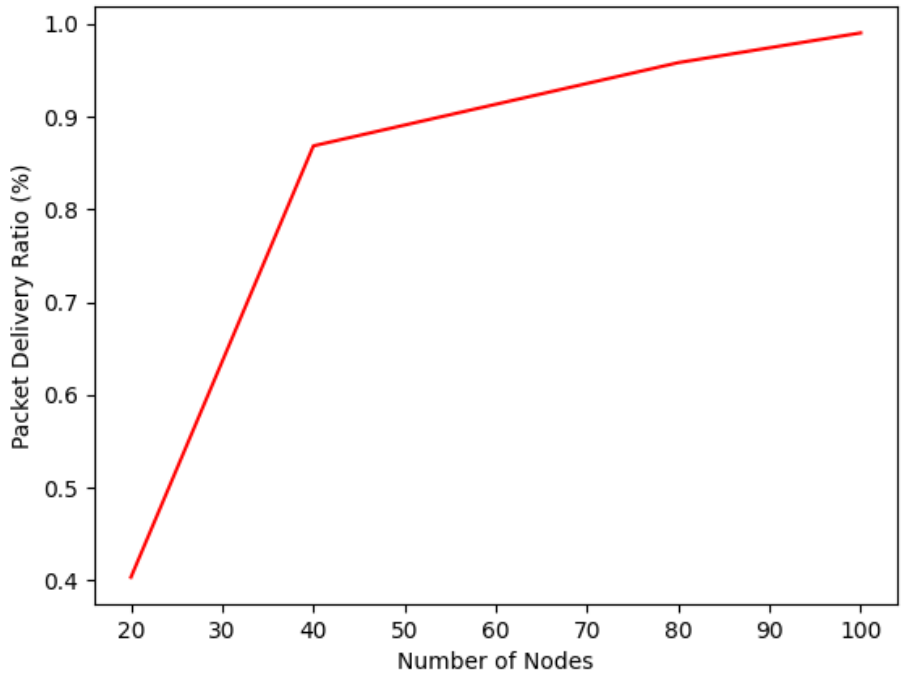
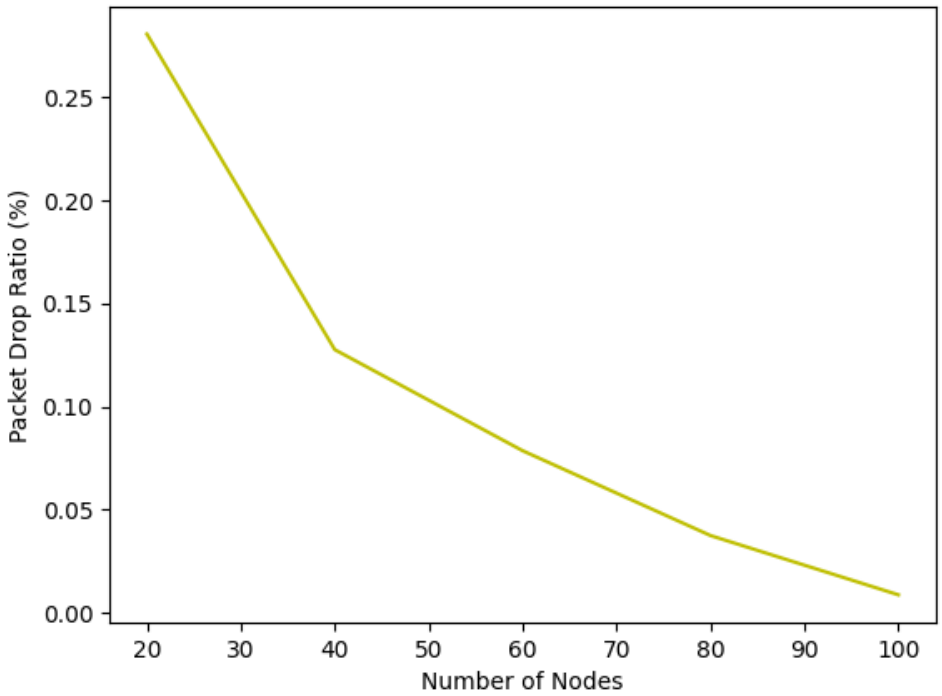
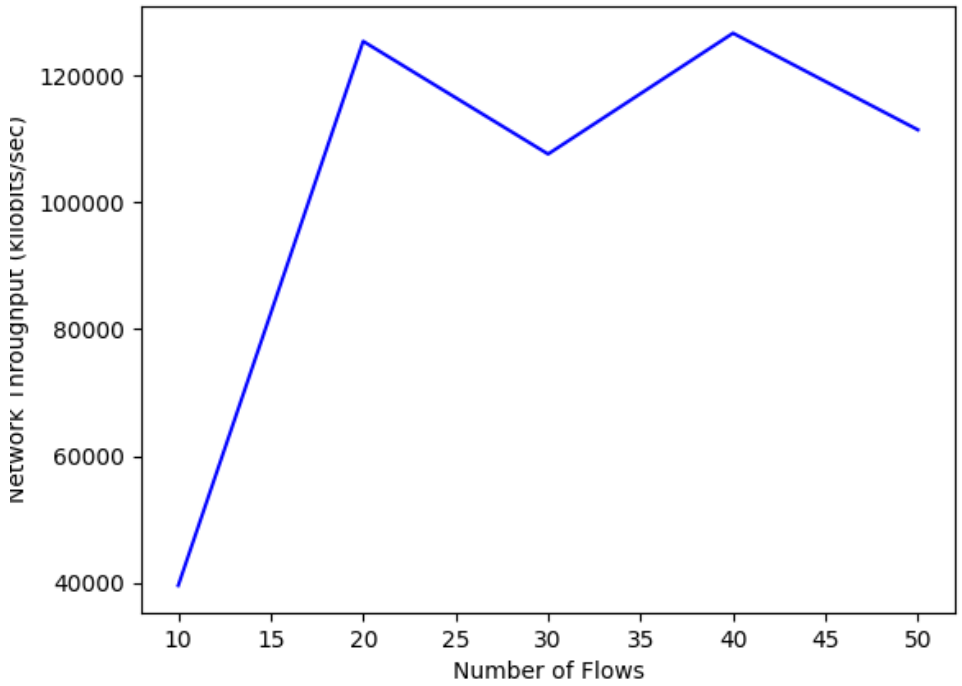


Packet Drop Ratio

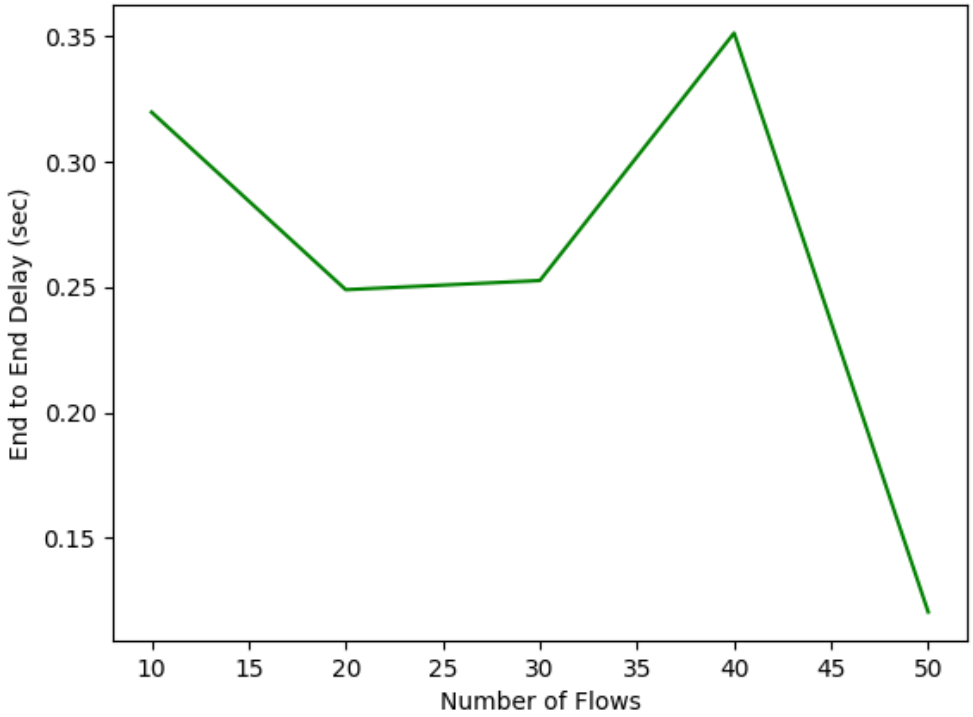


Varying Number of Flows:

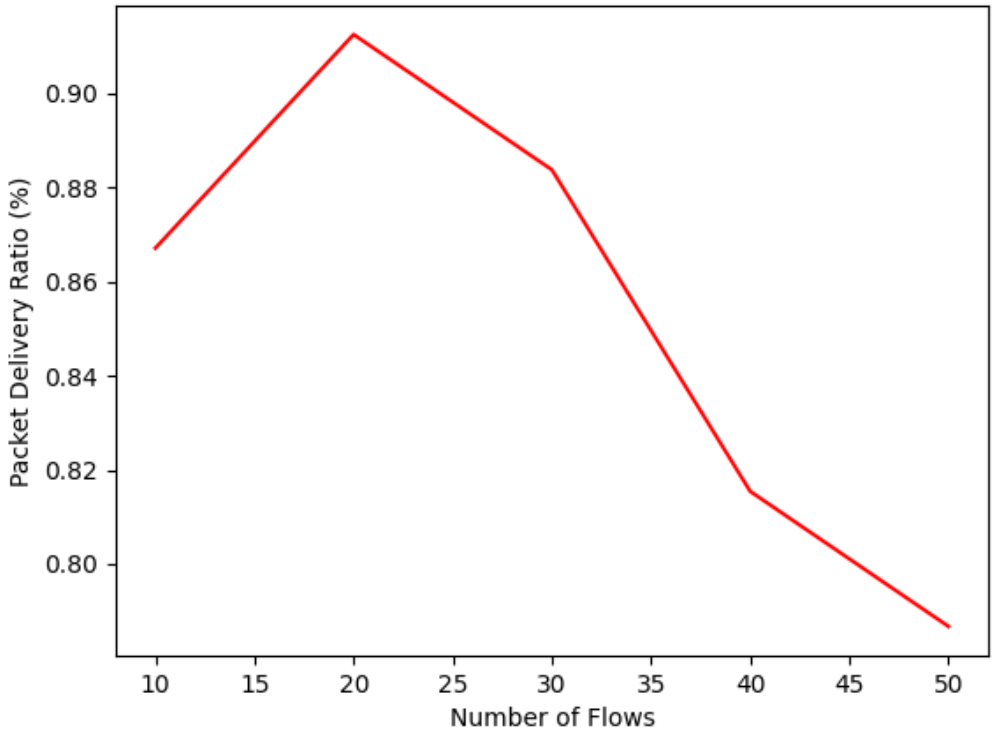
Average Throughput



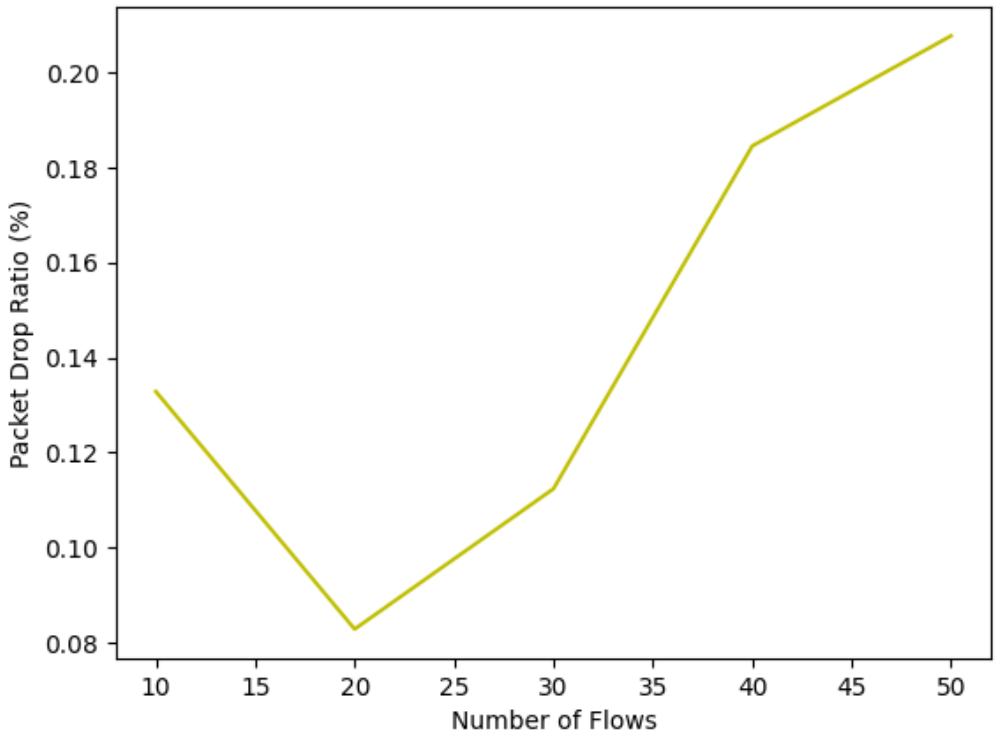
End-to-end Delay



Packet Delivery Ratio



Packet Drop Ratio



Observations:

1. As we have introduced randomness in motion of the nodes, the results are not deterministic and comes different in every run of the program.
2. Since my configuration have a single sink and random sources, as the number of nodes increases, the amount of packet drop increases. The opposite happens for varying number of flows or area.
3. Average throughput for every configuration is almost inversely proportional to the end-to-end delay.