

Course No: 322

Course Title: Computer Networks Sessional

***Report On Offline 2: Network Simulation for Mac
Type:802.15.4, Routing Protocol: DSR, UDP Agent, and
Exponential Traffic.***

Submitted By:

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Date:29.1.23

Specification:

Mac Type: 802.15.4

Routing Protocol: DSR

Agent+Traffic: UDP+Exponential

Node Positioning: Grid

Flow: Random Source Random Destination

Mac 802.15.4:

IEEE 802.15.4 is a standard for wireless personal area networks (WPANs) that defines the physical and media access control (MAC) layers for low-rate wireless communications. The standard is aimed at low-cost, low-power, and low-data rate applications, and is typically used in Internet of Things (IoT) devices, home automation systems, and industrial control systems. It operates in the 2.4 GHz. The MAC layer in 802.15.4 is responsible for managing access to the wireless medium, handling packet transmission and reception, and providing security features such as encryption and authentication.

DSR Routing Protocol:

DSR (Dynamic Source Routing) is a routing protocol for mobile ad-hoc networks (MANETs). It is a reactive protocol, which means that it only finds a route to a destination when a source node wants to send data to that destination.

In DSR, each node maintains a route cache, which contains the routes it has previously learned. When a source node wants to send data to a destination, it first checks its route cache for a valid route. If a route is

found, the source node uses that route to send the data. If no route is found, the source node initiates a route discovery process.

UDP Agent:

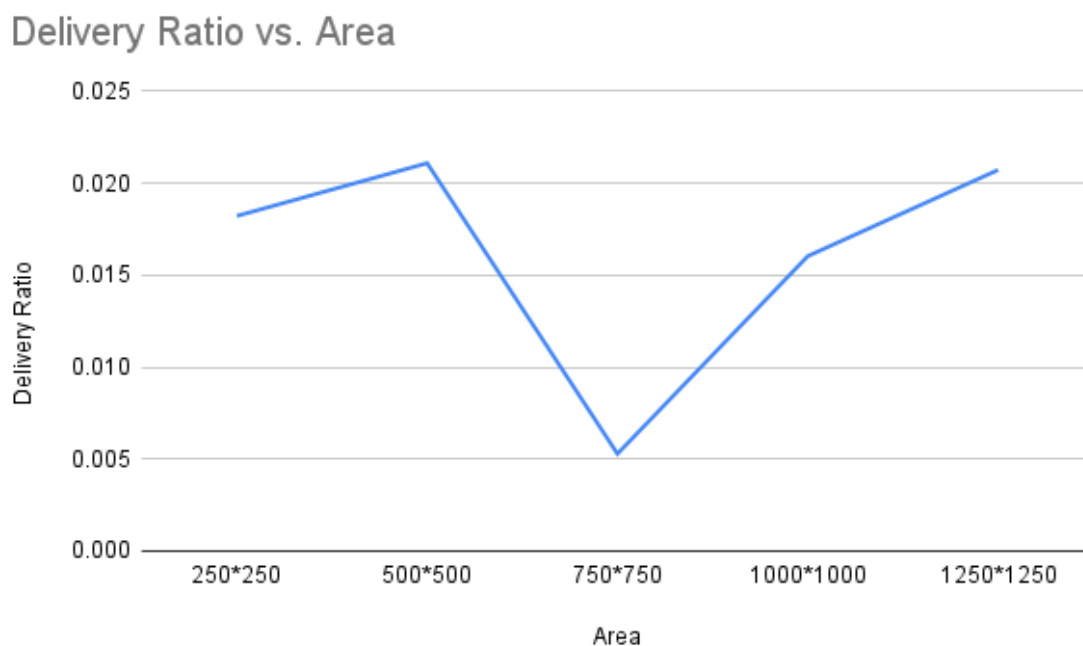
UDP (User Datagram Protocol) is a transport-layer protocol that provides a connectionless communication service. It is a simple and lightweight protocol that is commonly used for applications that do not require the reliability and overhead of TCP (Transmission Control Protocol).

Exponential Traffic:

Exponential traffic refers to a traffic pattern characterized by an exponentially distributed inter-arrival time between packets. In other words, the time between consecutive packets is modeled by an exponential distribution.

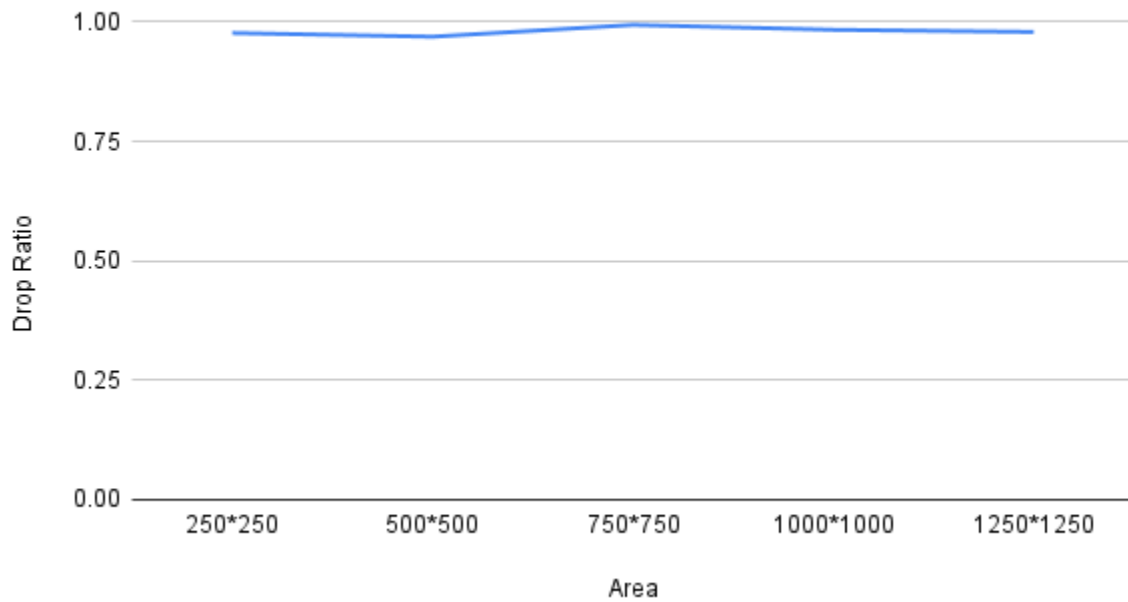
The exponential distribution is according to the Poisson distribution.

Area vs Delivery Ratio:



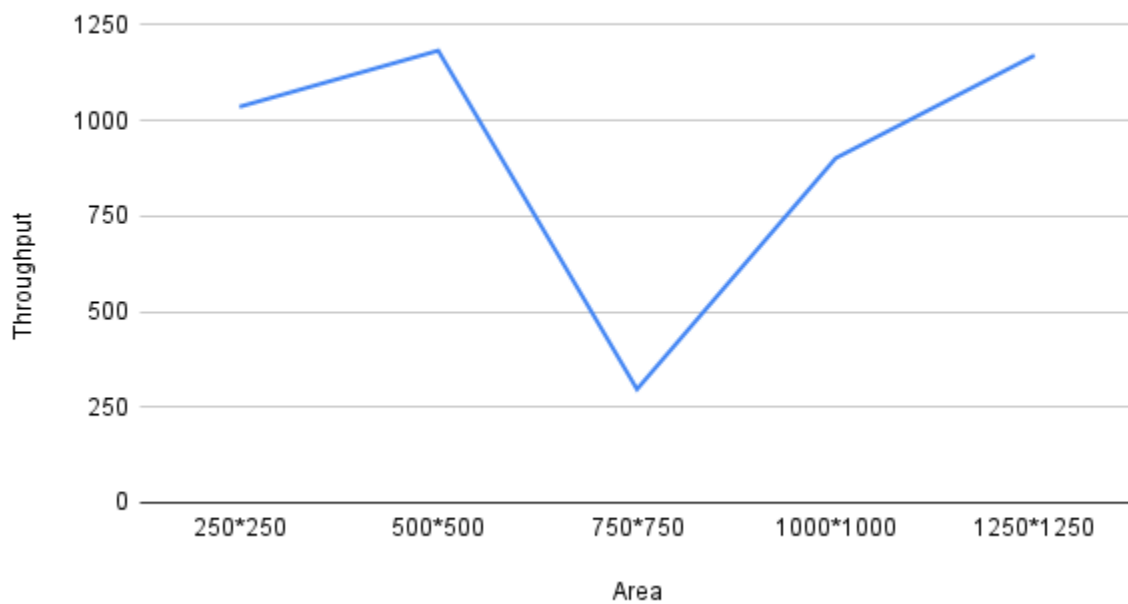
Area vs Drop Ratio:

Drop Ratio vs. Area



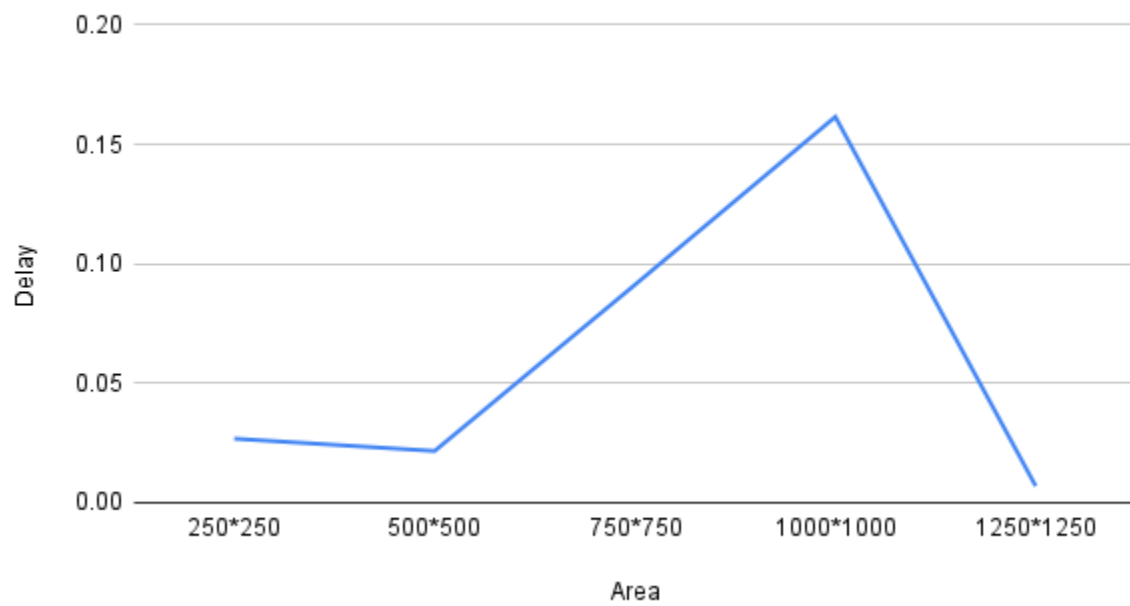
Area vs Throughput:

Throughput vs. Area



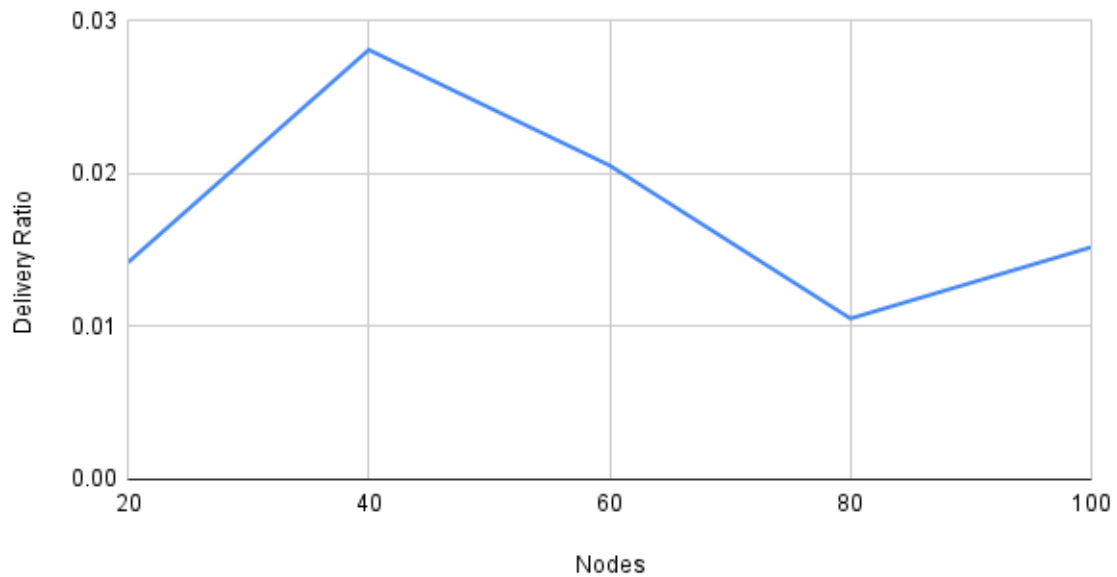
Area vs Avg. Delay:

Delay vs. Area



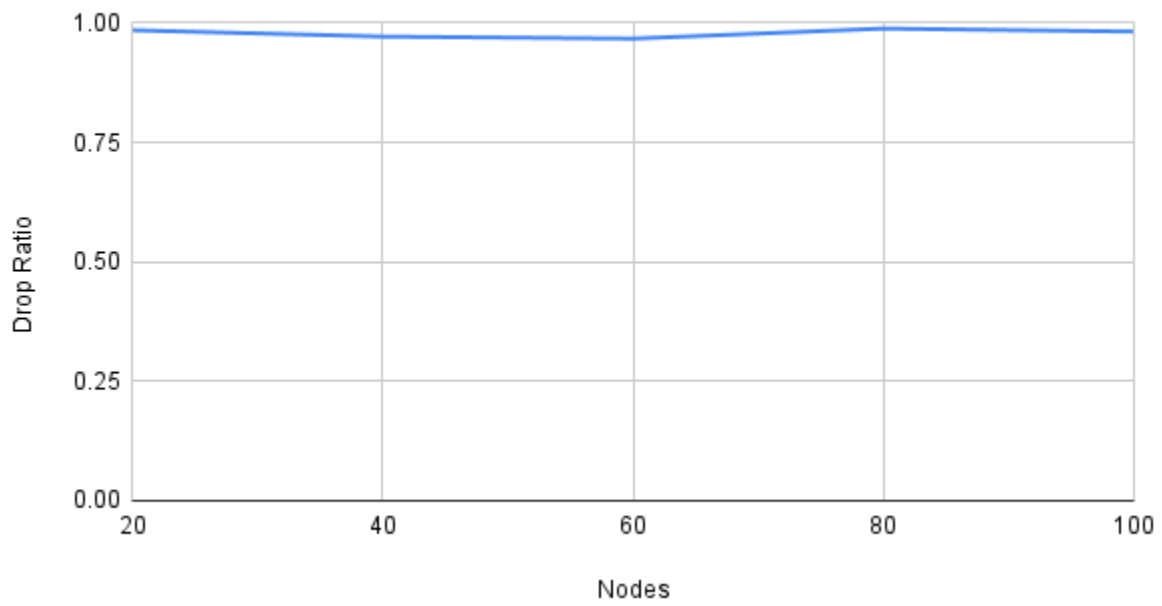
Node vs Delivery Ratio:

Delivery Ratio vs. Nodes



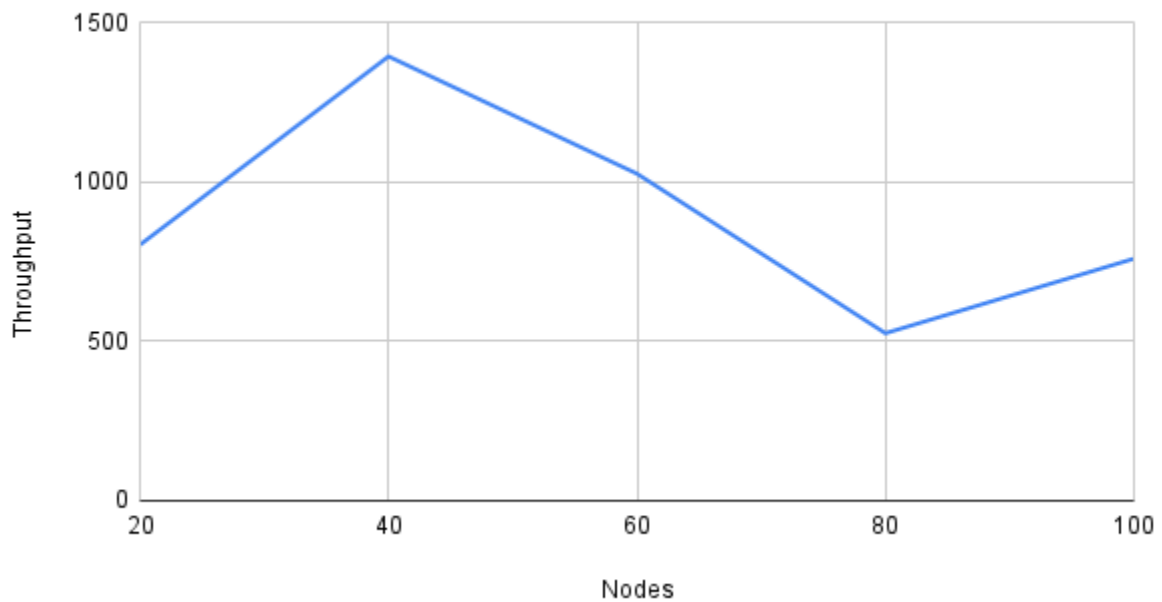
Node vs Drop Ratio:

Drop Ratio vs. Nodes



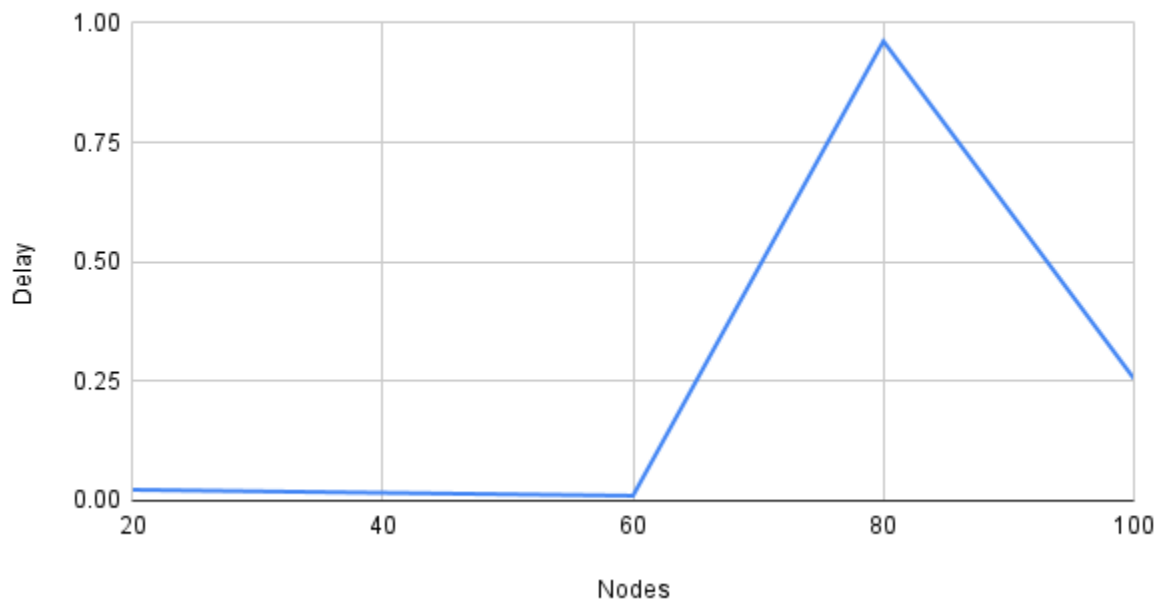
Node vs Throughput:

Throughput vs. Nodes



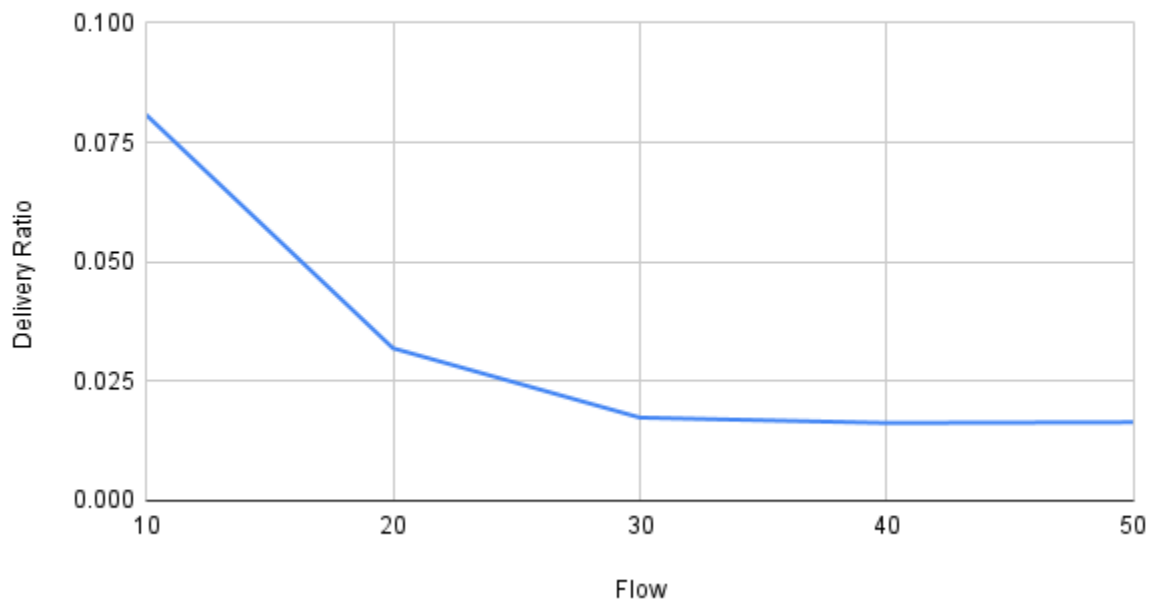
Node vs Avg. Delay:

Delay vs. Nodes



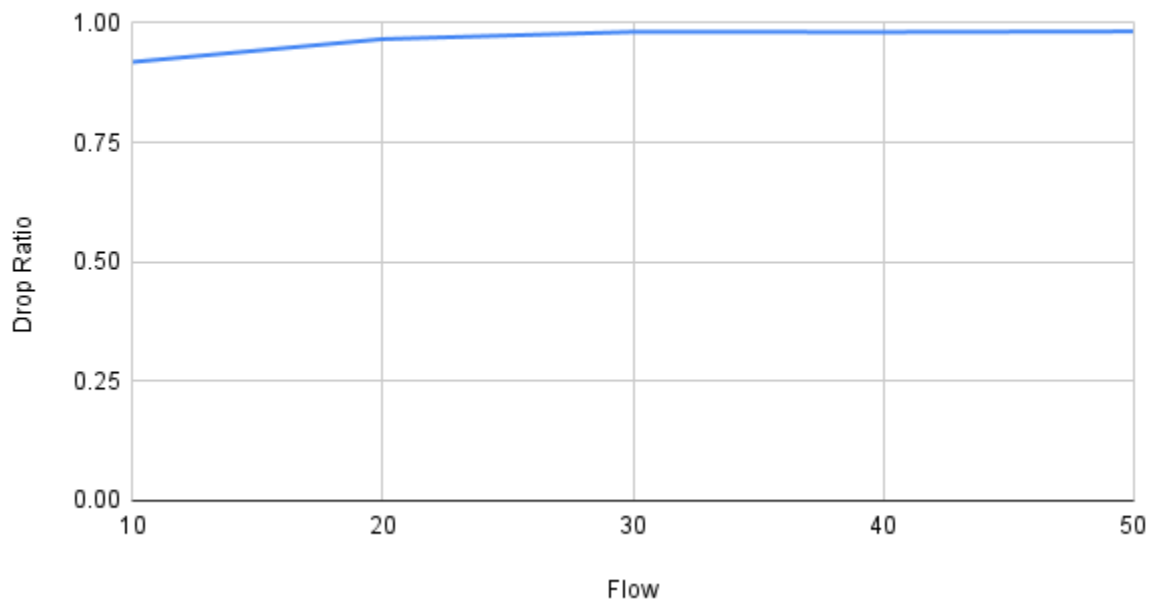
Flow vs Delivery Ratio:

Delivery Ratio vs. Flow



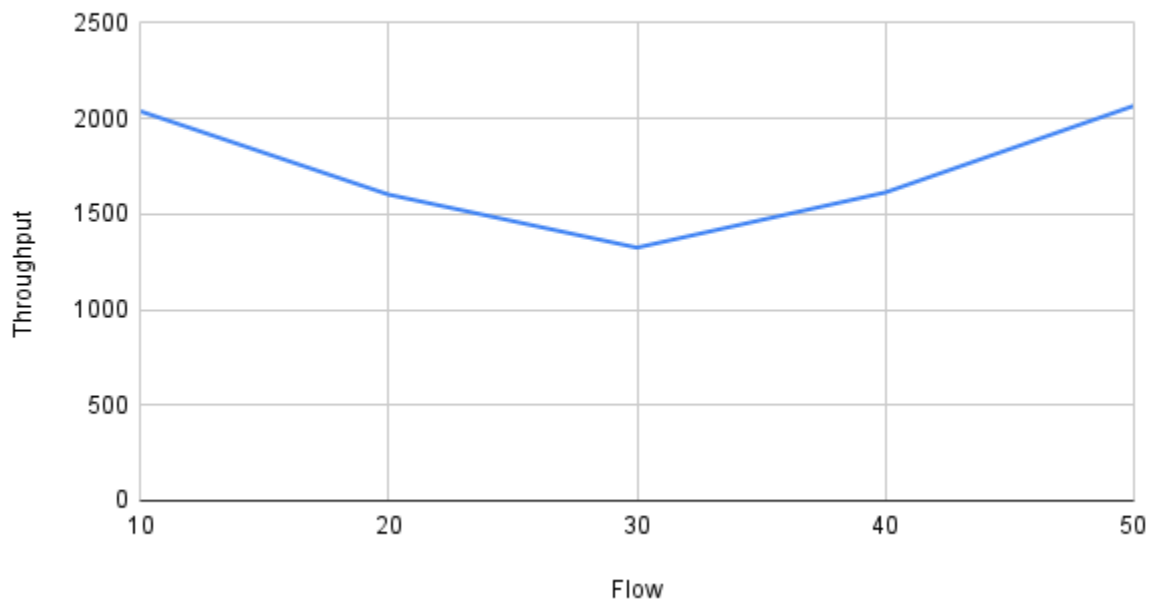
Flow vs Drop Ratio:

Drop Ratio vs. Flow



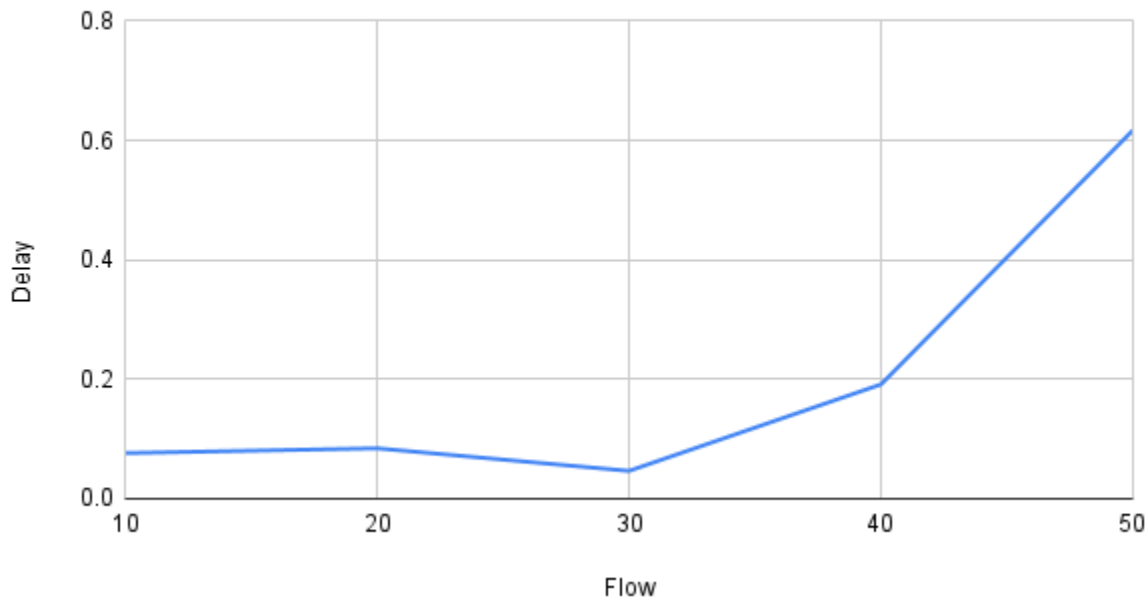
Flow vs Throughput:

Throughput vs. Flow



Flow vs Avg. Delay:

Delay vs. Flow



Observation:

As Mac 802.15.4 is designed for short communication range when the nodes are mobile most of the packets are dropped. Again if we increase the packet size then the drop ratio further increases.

Because of random source and destination the graphs are unpredictable. Running same configuration different time some times increases or decreases the metrics. As random func in tcl generates random value depending on time (uses micro seconds as seed) the results varies.