NS2-OFFLINE

CSE 322

JANUARY 30, 2023

MD. ZARZEES UDDIN SHAH CHOWDHURY
1805009
Lab group: A1
princezarzees5075@gmail.com

Mac type: 802.11

IEEE 802.11 standard, popularly known as Wi-Fi, lays down the architecture and specifications of wireless LANs (WLANs). Wi-Fi or WLAN uses high frequency radio waves instead of cables for connecting the devices in LAN. Users connected by WLANs can move around within the area of network coverage.

The 802.11 MAC sublayer provides an abstraction of the physical layer to the logical link control sublayer and upper layers of the OSI network. It is responsible for encapsulating frames and describing frame formats.

Routing Protocol: DSR

The Dynamic Source Routing protocol (DSR) is a simple and efficient routing protocol designed specifically for use in multi-hop wireless ad hoc networks of mobile nodes. DSR allows the network to be completely self-organizing and self-configuring, without the need for any existing network infrastructure or administration. The protocol is composed of the two main mechanisms of "Route Discovery" and "Route Maintenance", which work together to allow nodes to discover and maintain routes to arbitrary destinations in the ad hoc network. All aspects of the protocol operate entirely on-demand, allowing the routing packet overhead of DSR to scale automatically to only that needed to react to changes in the routes currently in use.

Agent: TCP Tahoe

Tahoe is a lake in the USA. This particular TCP was designed around that lake and hence it was named **TCP Tahoe**. It was the first TCP variant with in-built congestion control algorithms.

TCP is known as a connection-oriented protocol, which ensures reliability, and is also responsible for congestion control mechanisms in the network.

Application: TELNET

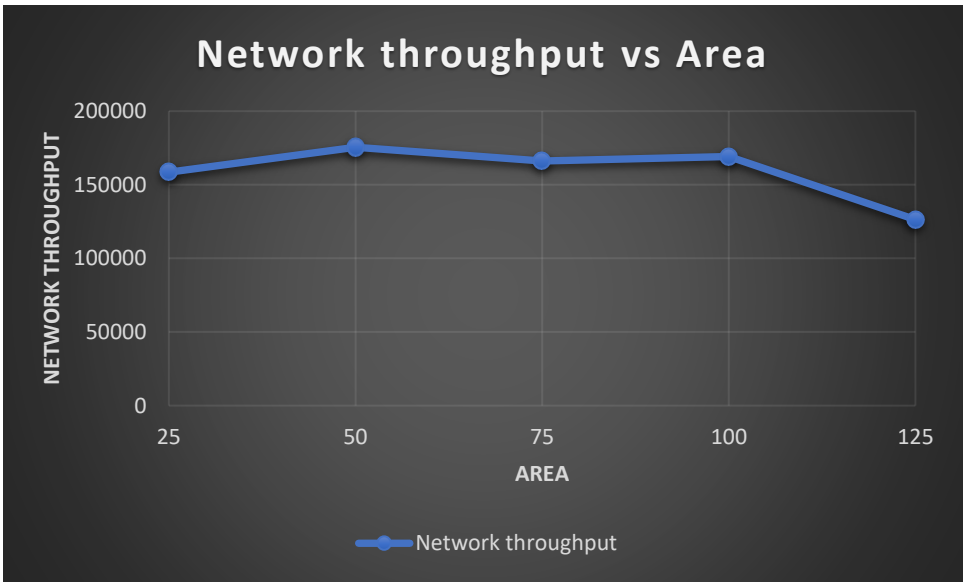
Telnet (short for "teletype network") is a client/server application protocol that provides access to virtual terminals of remote systems on local area networks or the Internet. Telnet consists of two components: (1) the protocol itself which specifies how two parties to communicate and (2) the software application that provides the service.

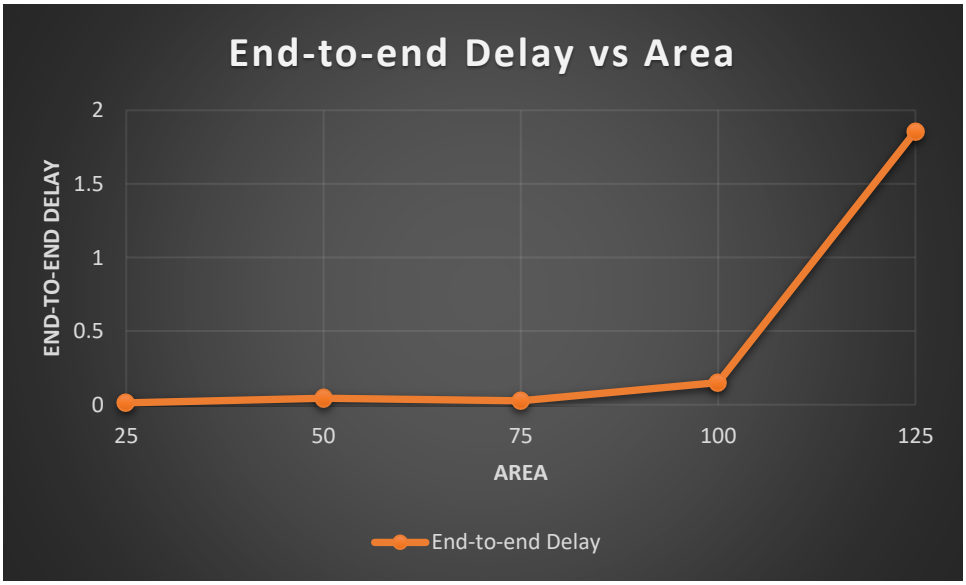
Note:

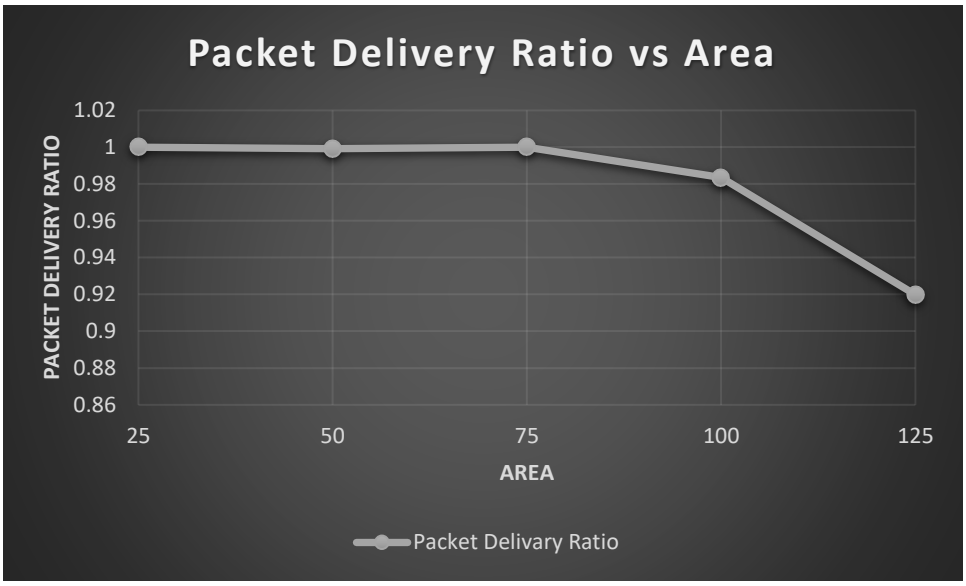
802.11 is used instead of **802.15.4**, because in ns2 trace file some packet size in 802.15.4 was noticed 16 bytes whereas the header size was taken 20 bytes. That’s why throughput was becoming negative.

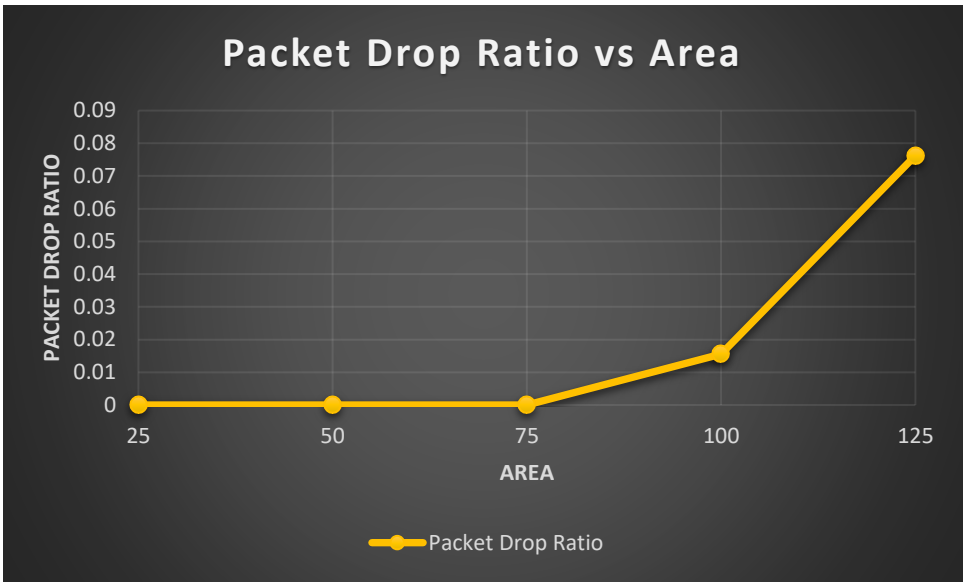
Varying area:

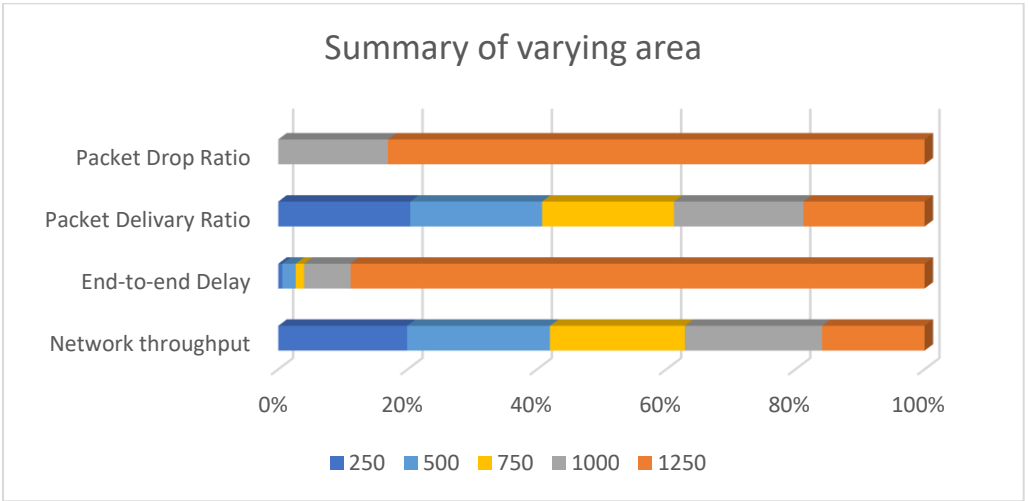
Area-Size	Network throughput	End-to-end Delay	Packet Delivery Ratio	Packet Drop Ratio
250	158478	0.0128567	1	0
500	175498	0.0434404	0.999238	0
750	166109	0.0271225	1	0
1000	169101	0.150063	0.983632	0.0155885
1250	126364	1.85721	0.919844	0.0762463





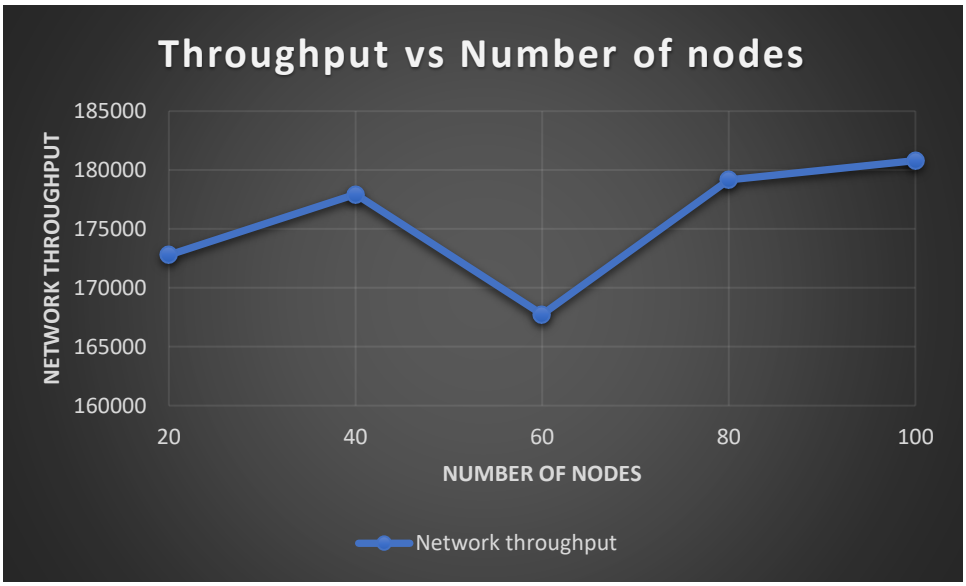

Packet Delivery Ratio vs Area
PACKET DELIVERY RATIO
1.02
1
0.98
0.96
0.94
0.92
0.9
0.88
0.86
25
50
75
100
125
AREA
Packet Delivary Ratio

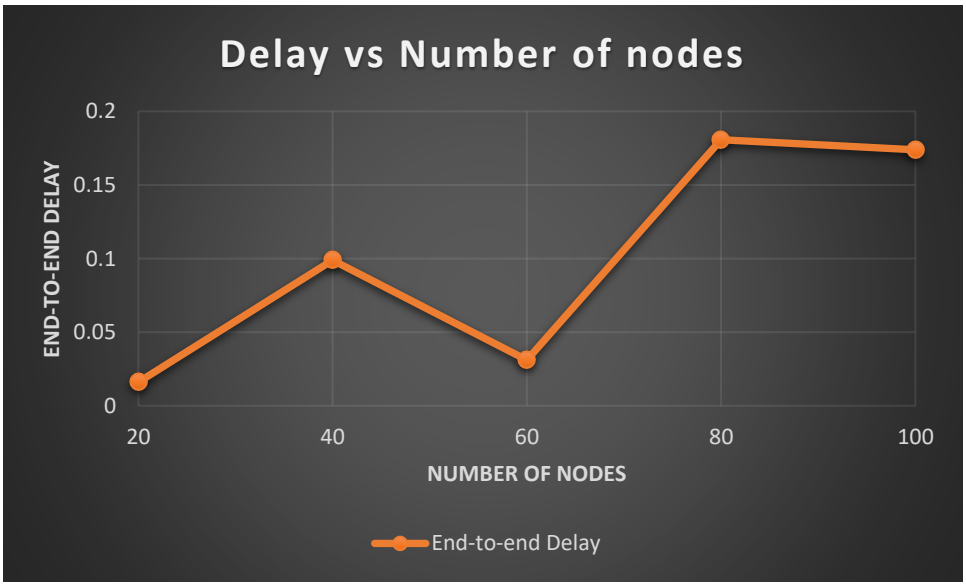

Packet Drop Ratio vs Area
PACKET DROP RATIO
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
25
50
75
100
125
AREA
Packet Drop Ratio

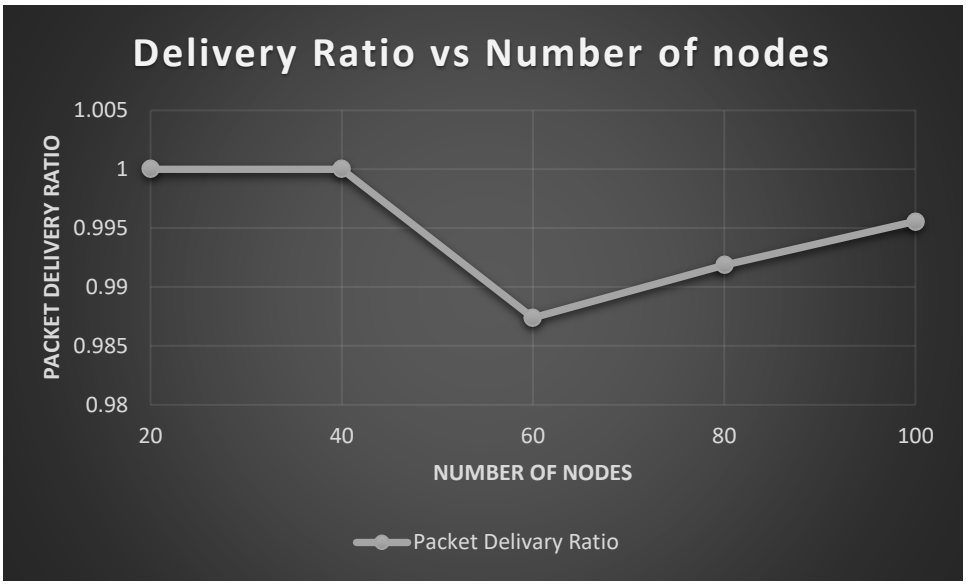

Summary of varying area
Packet Drop Ratio
Packet Delivary Ratio
End-to-end Delay
Network throughput
0%
20%
40%
60%
80%
100%
250
500
750
1000
1250

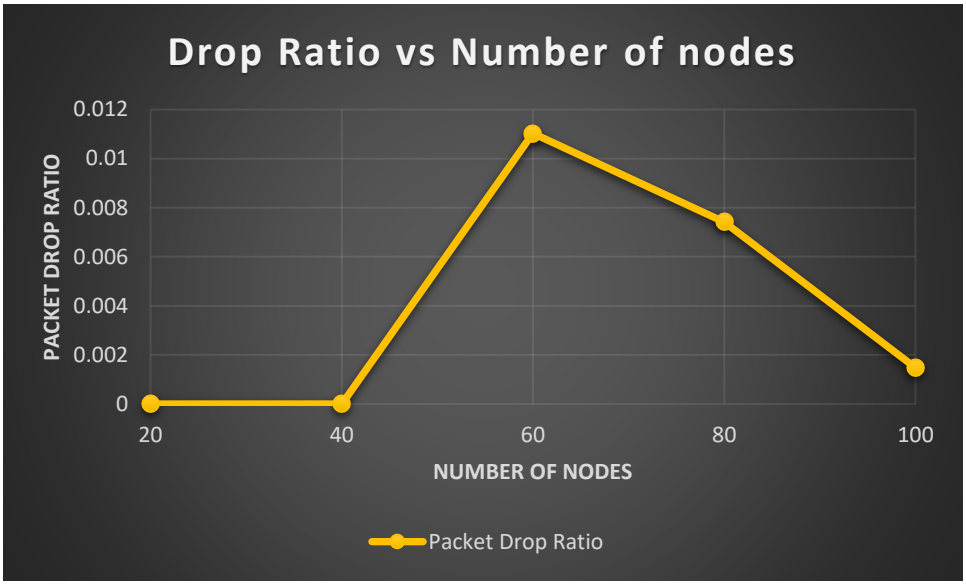
Varying number of nodes:

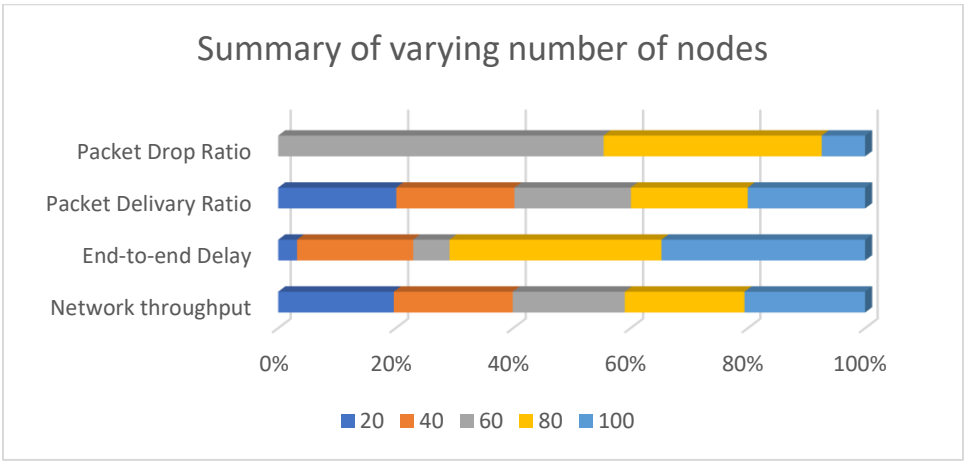
Number of nodes	Network throughput	End-to-end Delay	Packet Delivery Ratio	Packet Drop Ratio
20	172776	0.0160598	1	0
40	177944	0.0989963	1	0
60	167741	0.0309678	0.987392	0.0110323
80	179171	0.180739	0.991852	0.00740741
100	180803	0.173863	0.995578	0.00147384





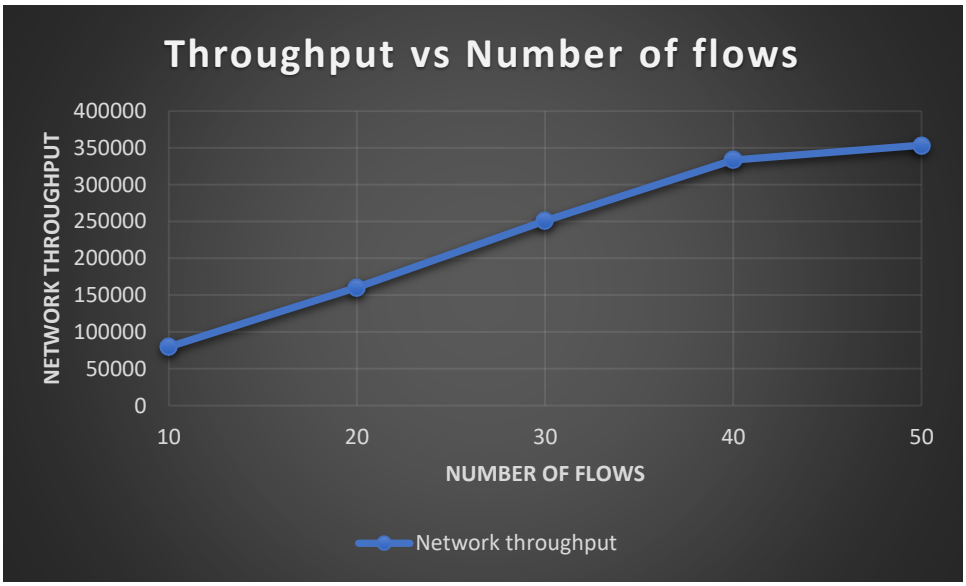

Delivery Ratio vs Number of nodes
PACKET DELIVERY RATIO
1.005
1
0.995
0.99
0.985
0.98
20
40
60
80
100
NUMBER OF NODES
Packet Delivary Ratio

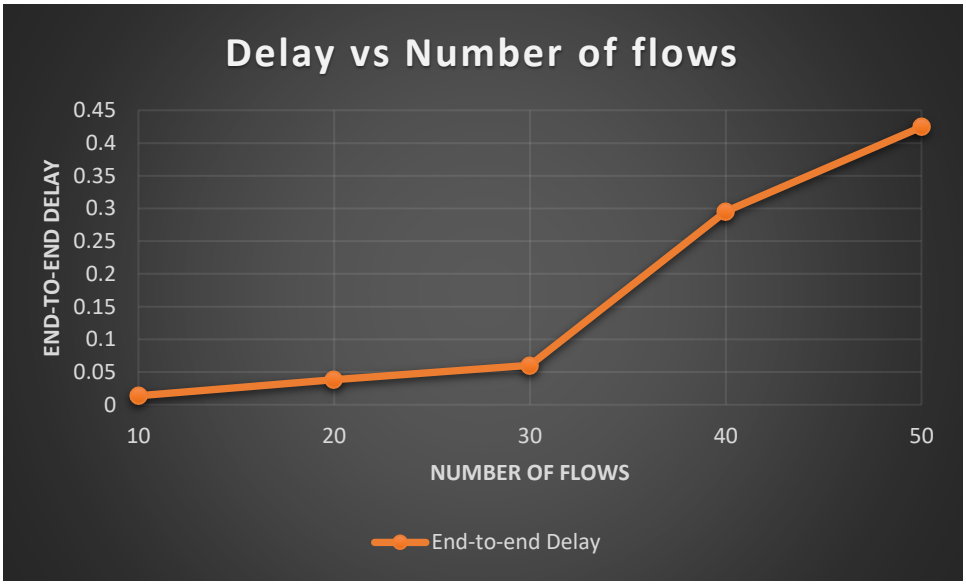

Drop Ratio vs Number of nodes
PACKET DROP RATIO
0.012
0.01
0.008
0.006
0.004
0.002
0
20
40
60
80
100
NUMBER OF NODES
Packet Drop Ratio

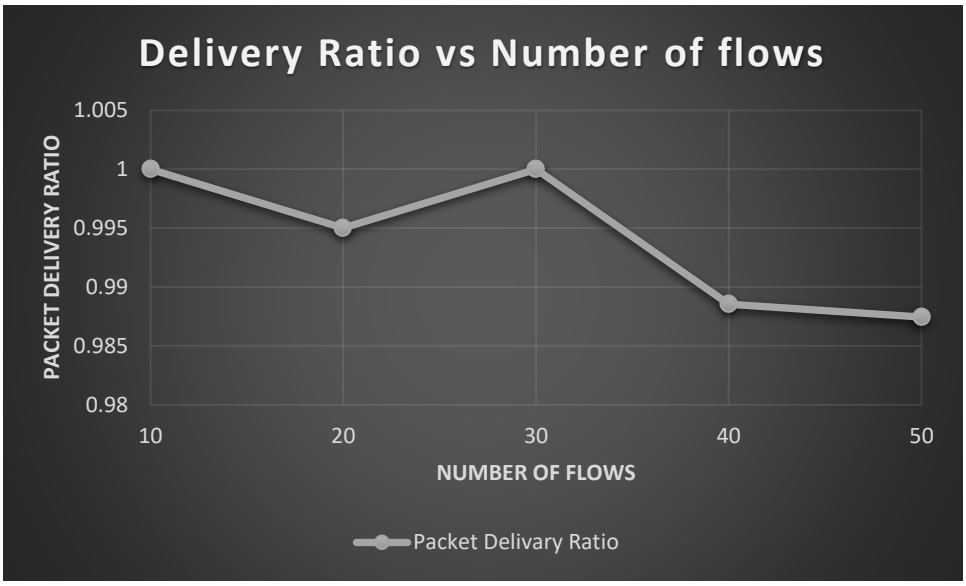

Summary of varying number of nodes
Packet Drop Ratio
Packet Delivary Ratio
End-to-end Delay
Network throughput
0%
20%
40%
60%
80%
100%
20
40
60
80
100

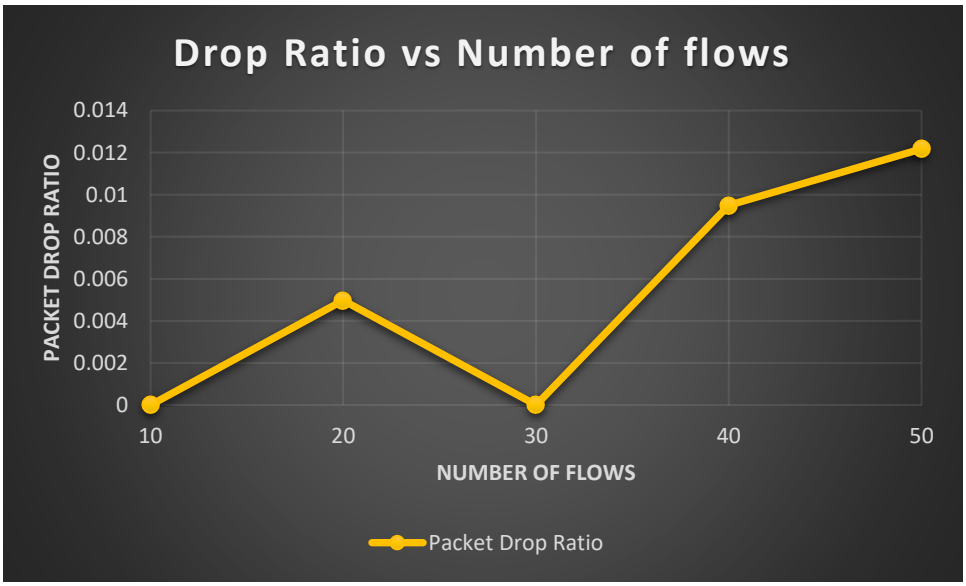
Varying number of flows:

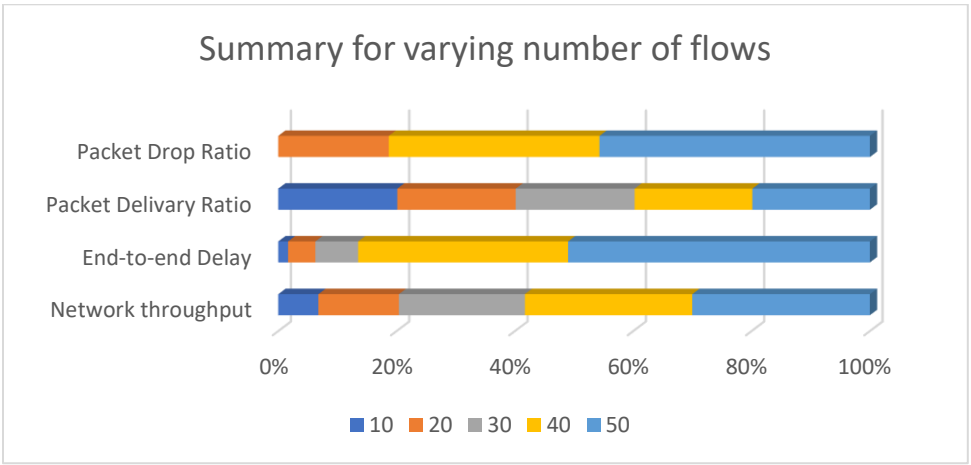
Number of flows	Network throughput	End-to-end Delay	Packet Delivery Ratio	Packet Drop Ratio
10	79861.3	0.0137567	1	0
20	160400	0.0384364	0.995025	0.00497512
30	251005	0.0601646	1	0
40	333467	0.295381	0.988533	0.00948992
50	353803	0.424536	0.987454	0.0121771






Delivery Ratio vs Number of flows
PACKET DELIVERY RATIO
1.005
1
0.995
0.99
0.985
0.98
10
20
30
40
50
NUMBER OF FLOWS
Packet Delivary Ratio


Drop Ratio vs Number of flows
PACKET DROP RATIO
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
10
20
30
40
50
NUMBER OF FLOWS
Packet Drop Ratio


Summary for varying number of flows
Packet Drop Ratio
Packet Delivary Ratio
End-to-end Delay
Network throughput
0%
20%
40%
60%
80%
100%
10
20
30
40
50

Discussion:

When area increases, network throughput decreases. As packets have to traverse longer distance, a smaller number of bits received. For same reason, end-to-end delay increases, packet delivery ratio decreases and packet drop ratio increases.

Increasing number of nodes may decrease throughput due to congestion and long routing path. But it also increases throughput sometimes, because packets can now travel along different nodes and reach the destination. That's why delivery ratio, drop ratio, delay vary widely, sometimes increasing and sometimes decreasing.

When number of flows increases, throughput increases as more packets are transmitting. But it leads to increasing delay due to congestion and collision. For same reason delay and drop ratio increase and delivery ratio decreases.

Above arguments are drawn from observation. It may vary widely as every time a random node is chosen as a sink. If the chosen node is near the middle, packet delivery ratio and throughput may increase. On the other hand, if the sink is near the border, delivery ratio and throughput may decrease.

THE END