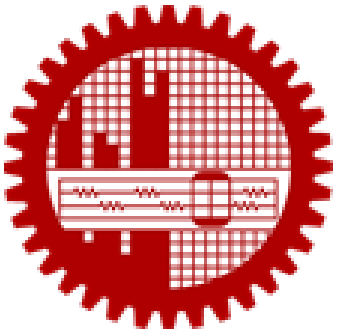

BANGLADESH UNIVERSITY OF ENGINEERING & TECHNOLOGY

NETWORK SIMULATOR - 2

COURSE NUMBER: CSE 322

LAB GROUP: A2

SUBMITTED BY:

SHAMIUL HASAN (1505038)

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

LEVEL – 3, TERM – 2

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY

Topologies Under Simulation:

1. Wired
2. Wireless 802.11 (Static)

Parameters Under Variation:

1. Number of nodes
2. Number of flows
3. Number of packets per second
4. Coverage area for static wireless node

Modifications Made In The Simulator:

1. Changes in the AODV Protocol. In 'aodv.cc' file, we changed the void AODV::recvRequest(Packet *p) function. In this function, we changed the general AODV algorithm and used RAODV (Randomized AODV). We are randomly selecting an estimated drop factor and if the drop factor is less than actual drop factor, we are dropping it. We found this on a paper linked here.
2. Changes in RTT calculation. In 'tcp.cc' file we created a function named 'void TcpAgent::rtt_update_modified(double tao)'. The default rtt calculation algorithm takes exponential average of sample rtts to calculate new rtt. We are taking last 10 rtt samples and taking their average as new rtt sample.
3. We made changes in TCP Congestion Control. In 'tcp.cc' file, we added another case in 'void TcpAgent::opencwnd()' function and wrote our new TCP Congestion Control algorithm from intuition.
4. In 'ns-allinone-2.35/ns-2.35/mobile->omni-antenna.cc' file, we changed the variable gr to 5*gt.

Results with Graphs:

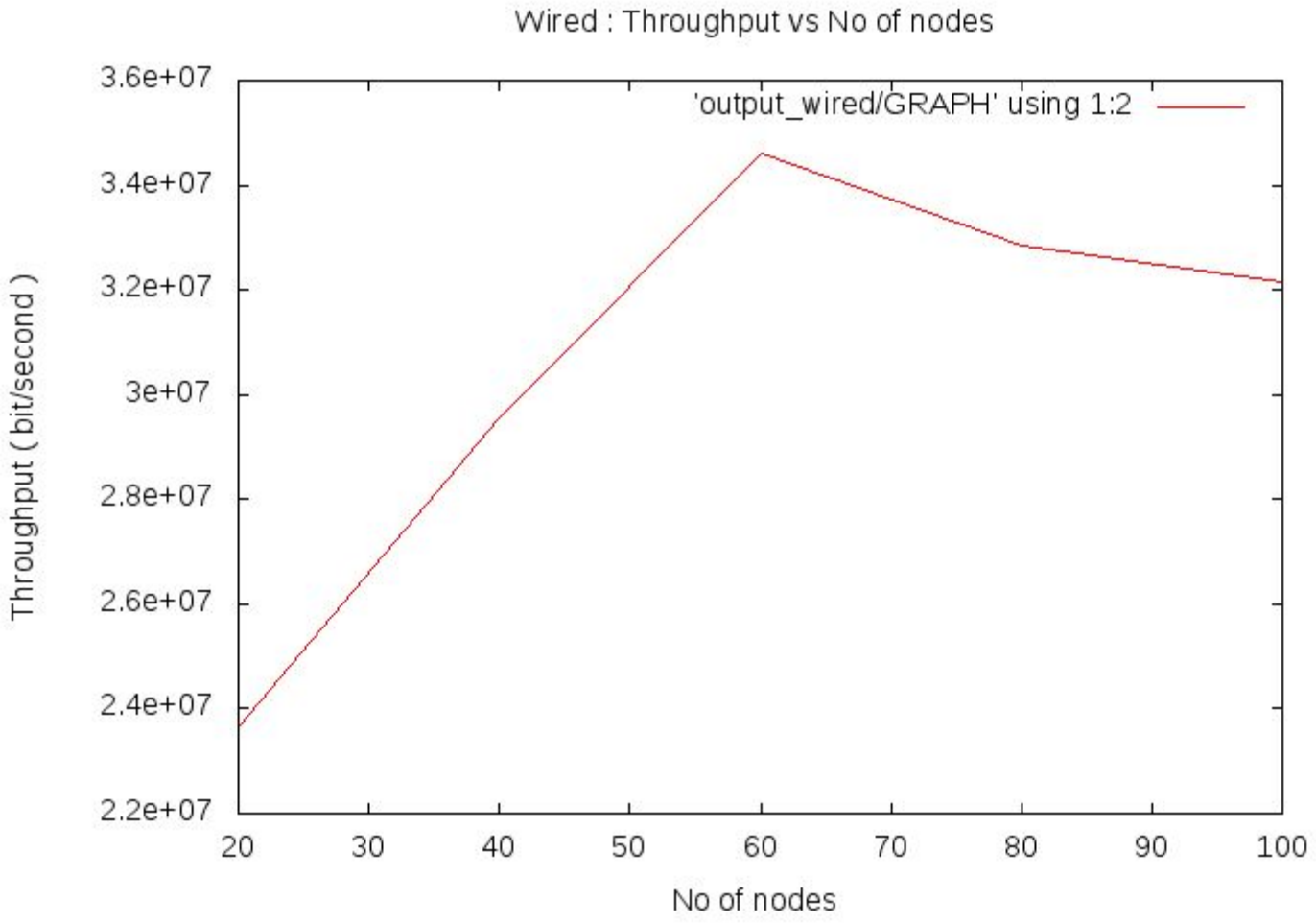
For each parameter under variation, 5 (five) sets of data were generated.

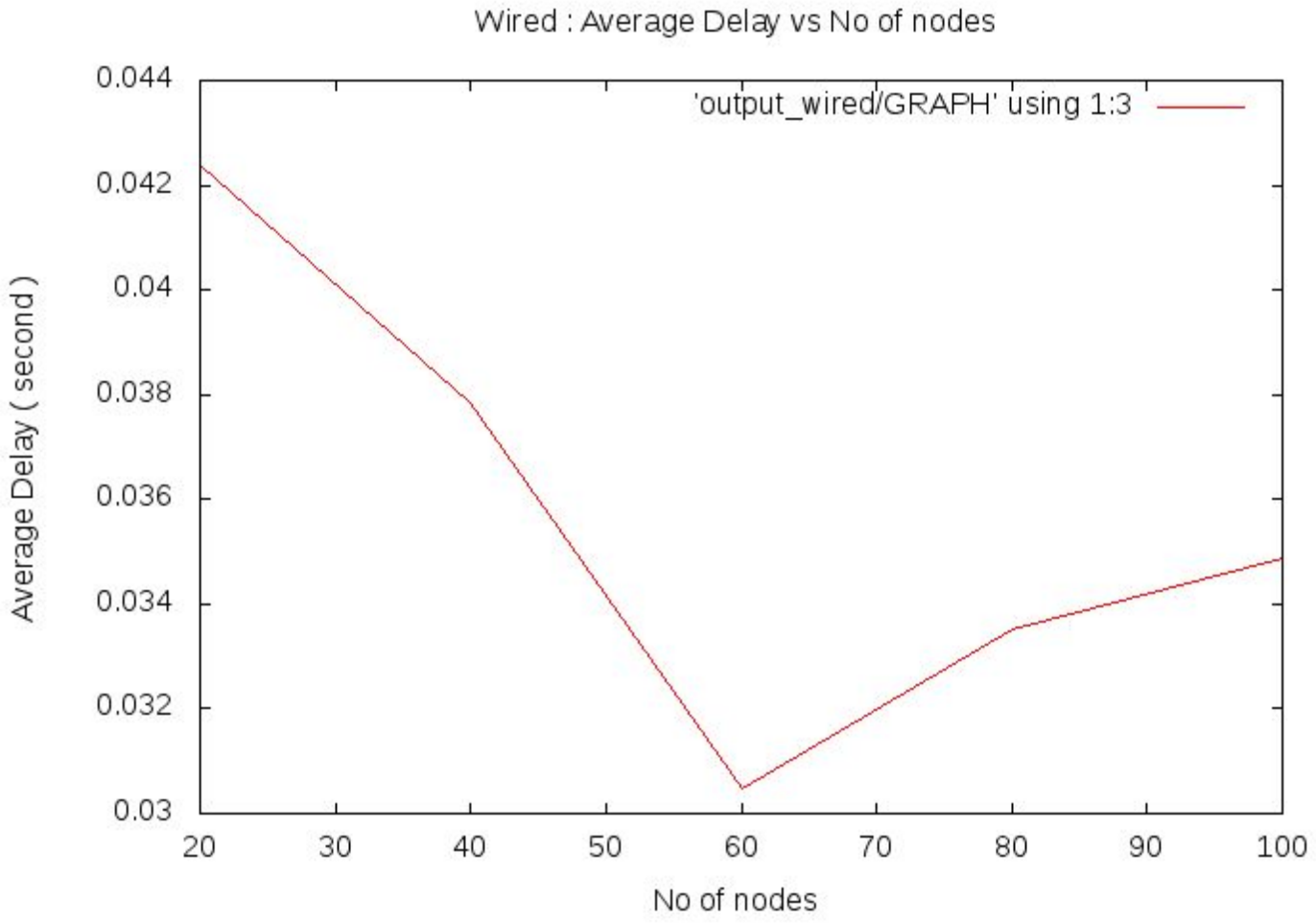
The metrics that were observed are listed below:

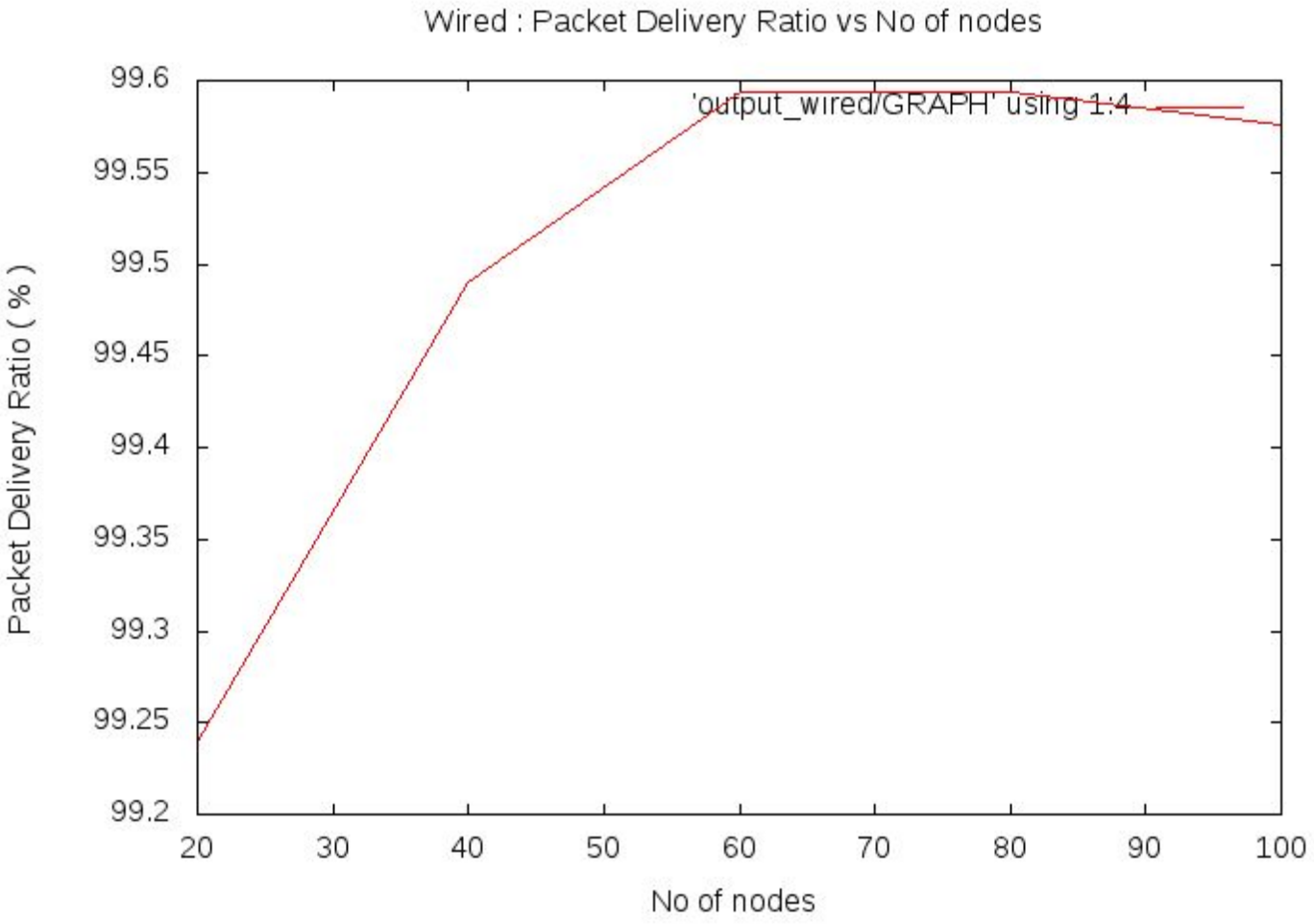
1. Network throughput
2. End-to- end delay
3. Packet delivery ratio (total # of packets delivered to end destination / total # of packets sent
4. Packet drop ratio (total # of packets dropped / total # of packets sent)
5. Total energy consumption
6. Energy consumption per byte of data

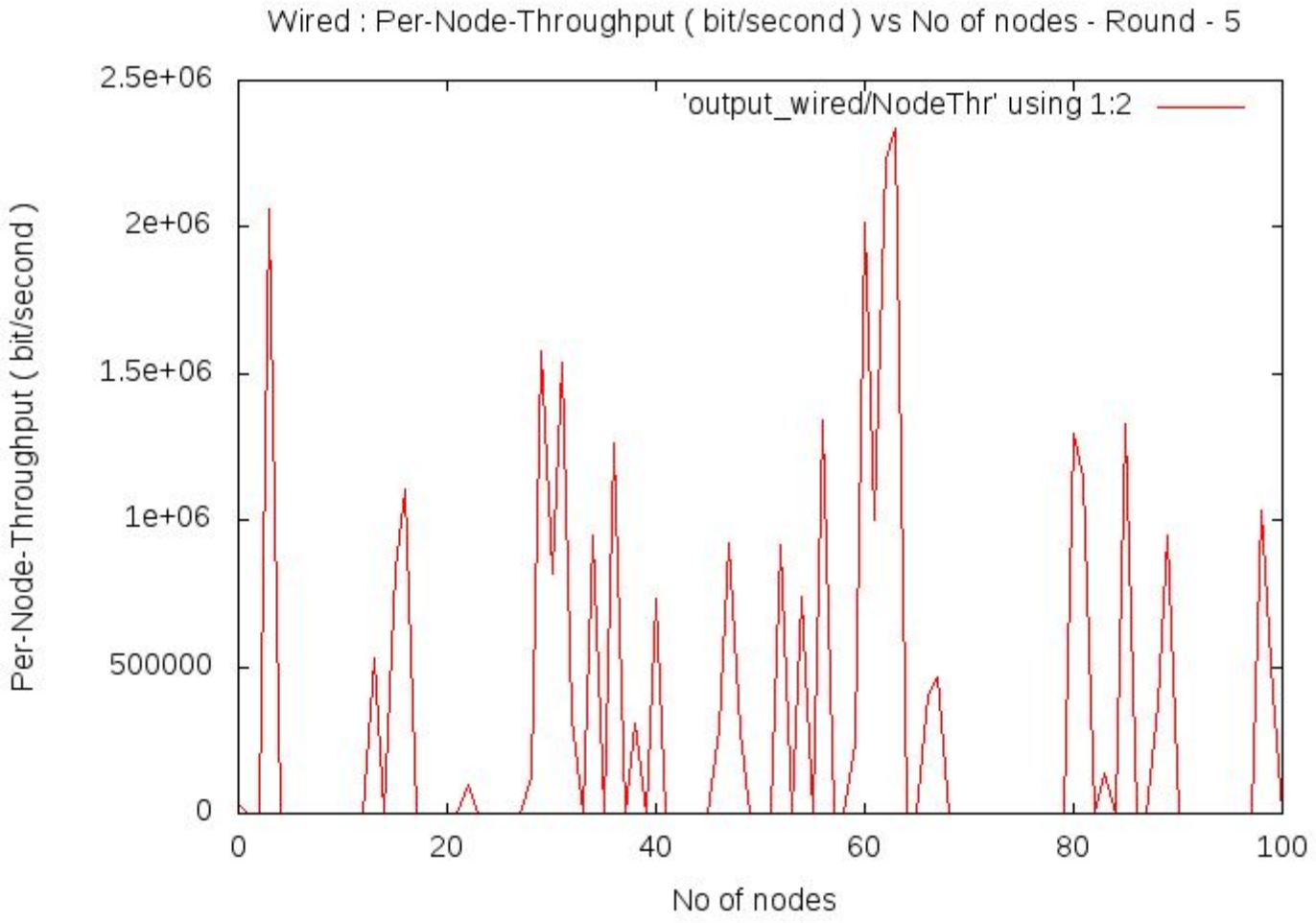
The graphs were generated using the gnu gnuplot tool.

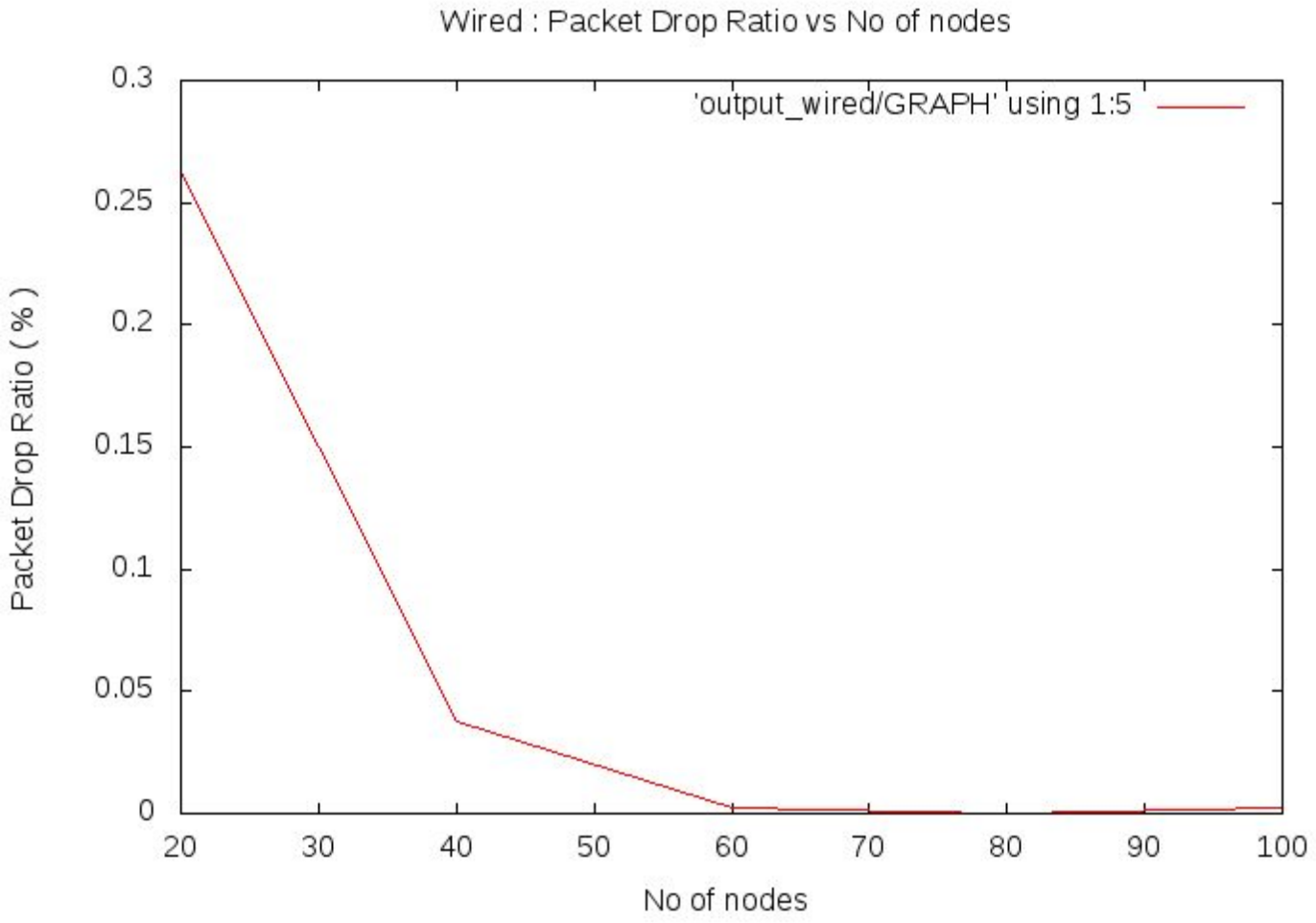
Wired (Before Modification)

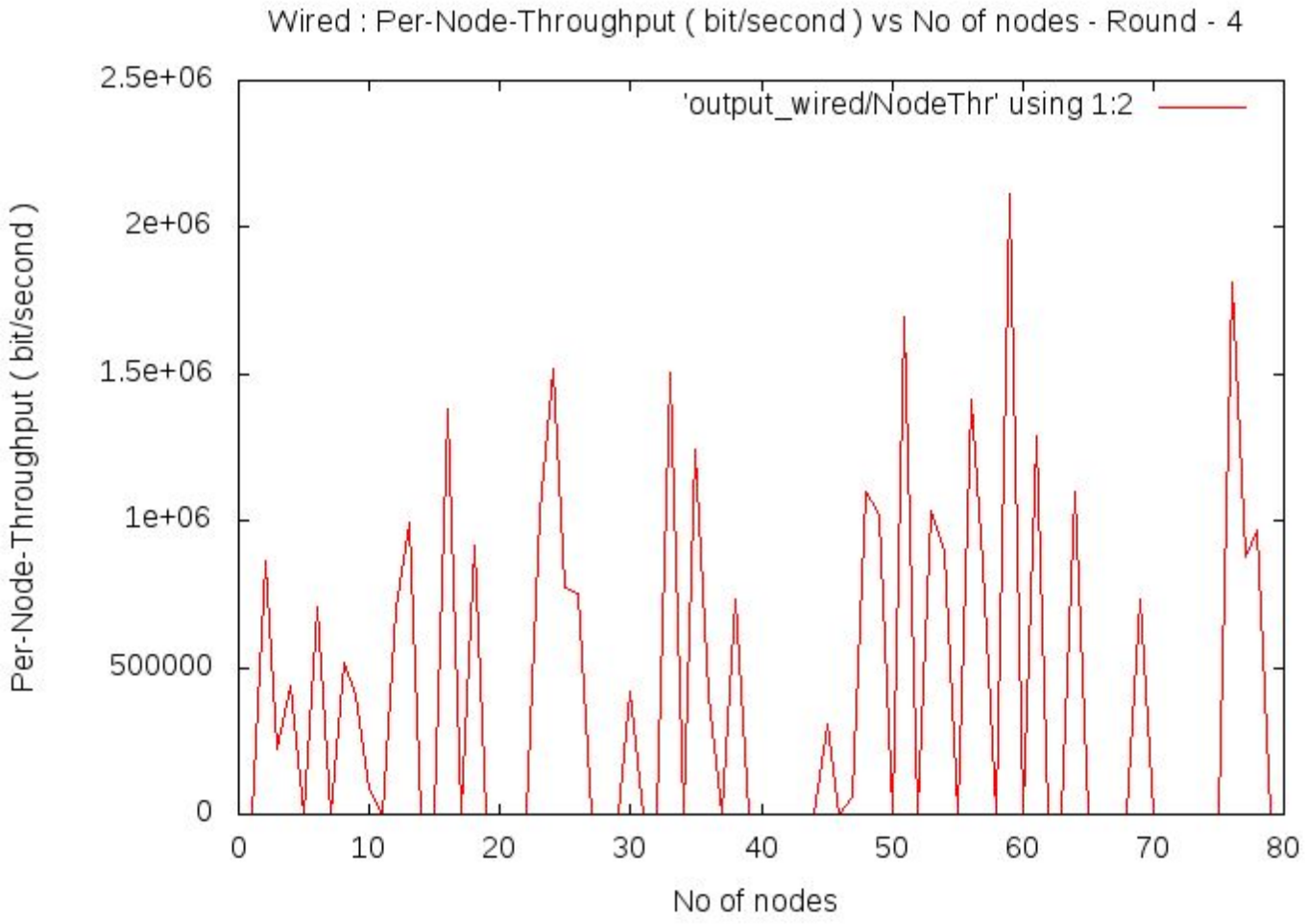

Wired : Throughput vs No of nodes
'output_wired/GRAPH' using 1:2
Throughput (bit/second)
No of nodes
3.6e+07
3.4e+07
3.2e+07
3e+07
2.8e+07
2.6e+07
2.4e+07
2.2e+07
20
30
40
50
60
70
80
90
100

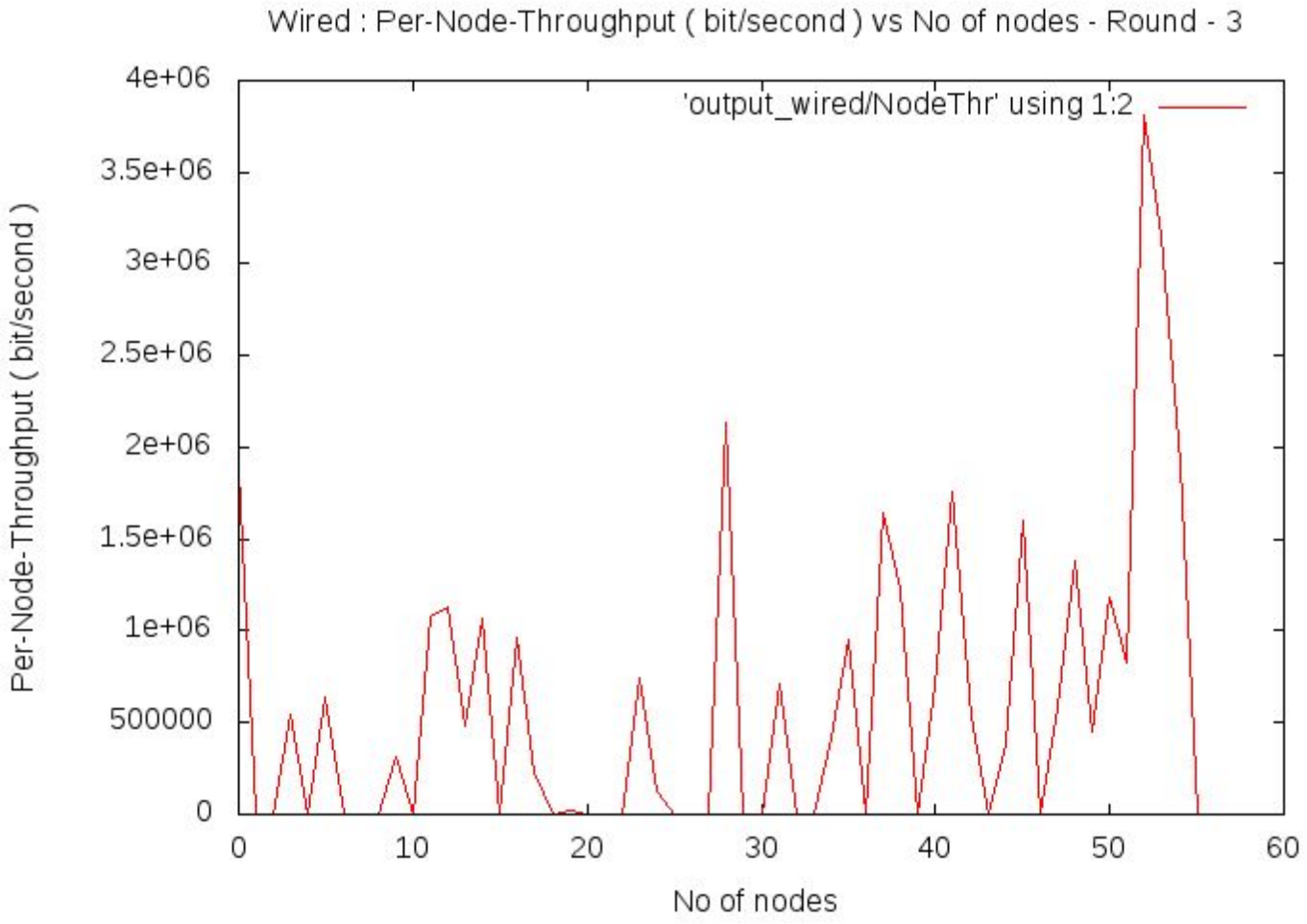

Wired : Average Delay vs No of nodes
'output_wired/GRAPH' using 1:3
Average Delay (second)
No of nodes
0.044
0.042
0.04
0.038
0.036
0.034
0.032
0.03
20
30
40
50
60
70
80
90
100

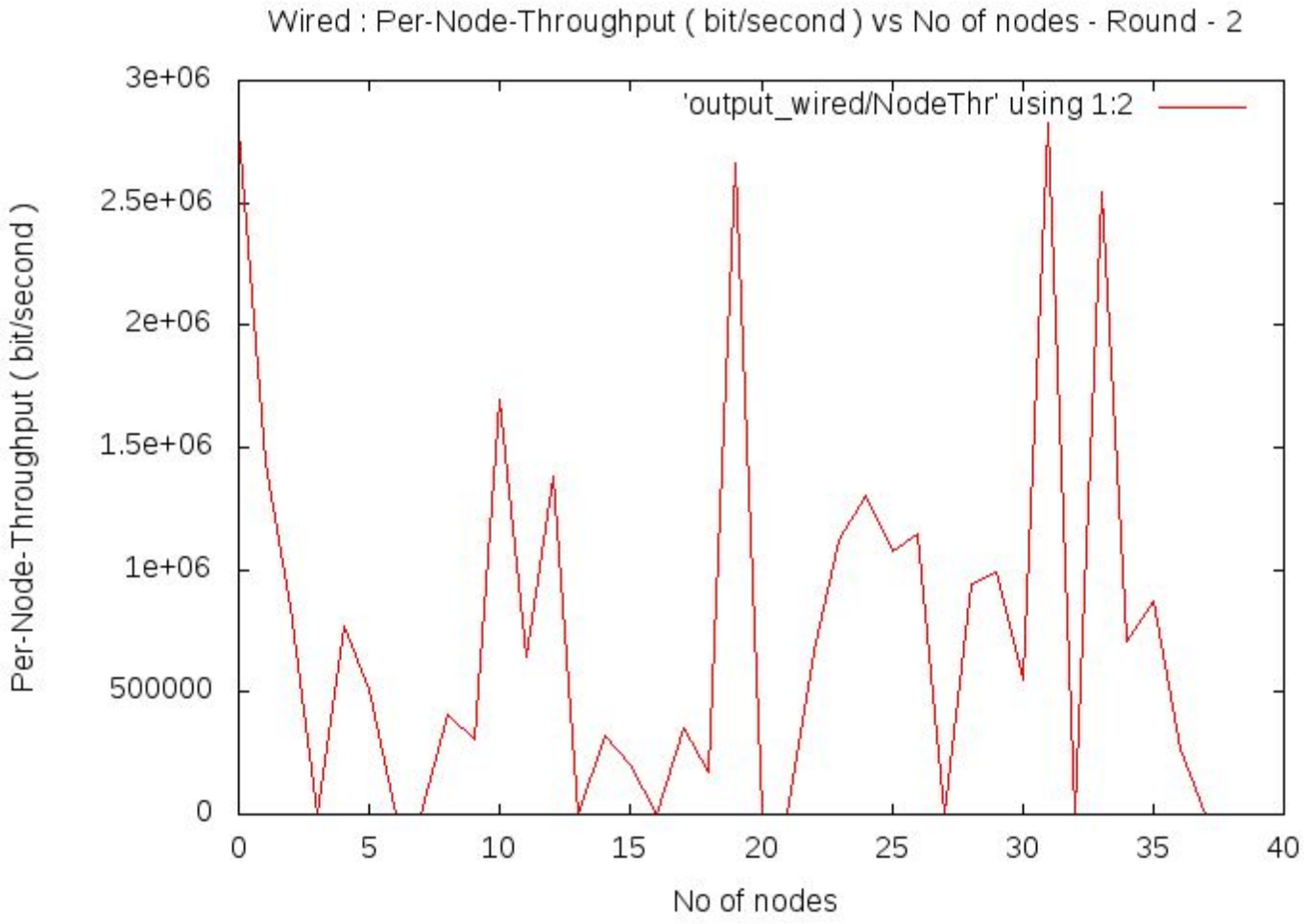

Wired : Packet Delivery Ratio vs No of nodes
'output_wired/GRAPH' using 1:4
Packet Delivery Ratio (%)
No of nodes
99.6
99.55
99.5
99.45
99.4
99.35
99.3
99.25
99.2
20
30
40
50
60
70
80
90
100

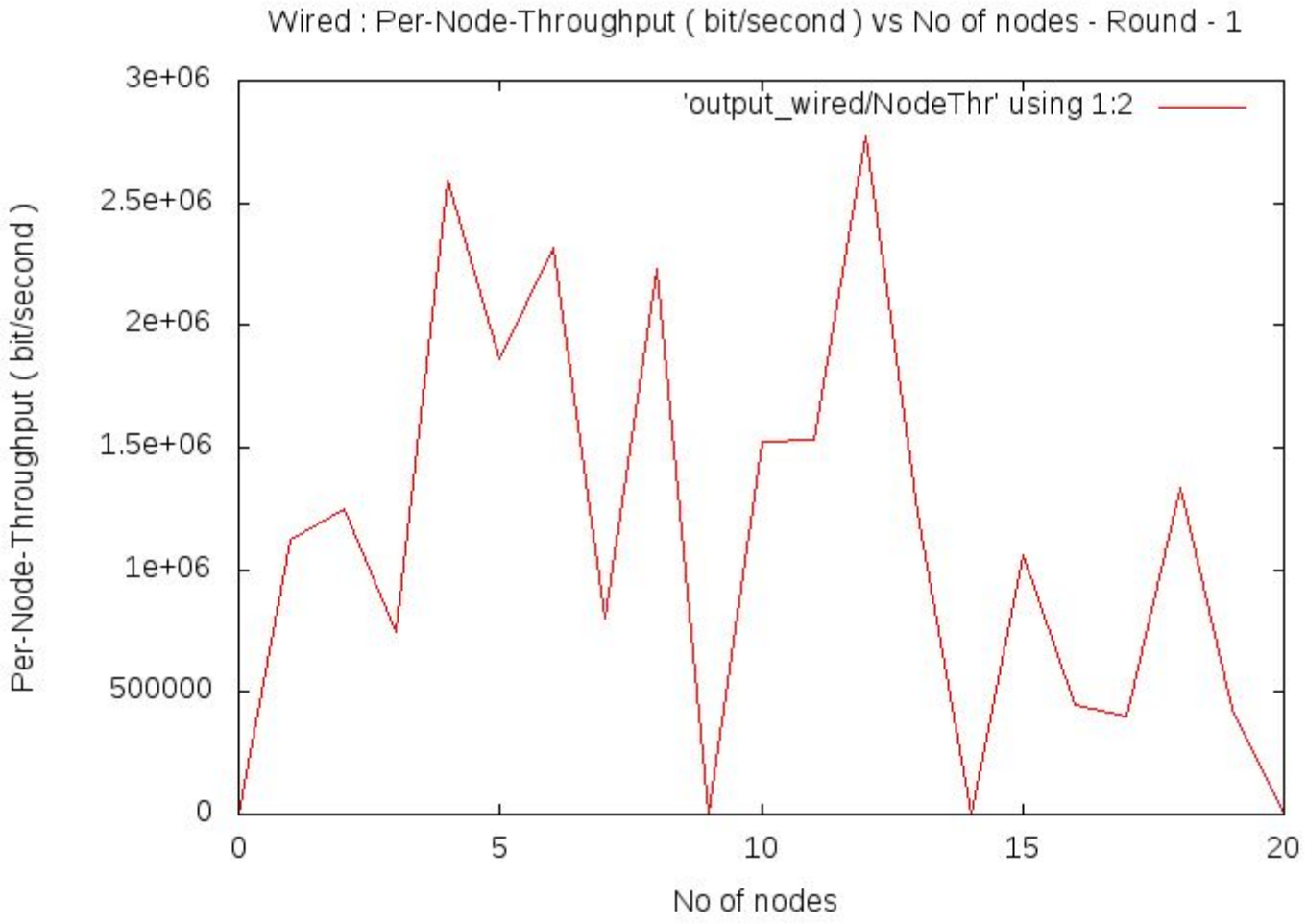

Wired : Per-Node-Throughput (bit/second) vs No of nodes - Round - 5
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
20
40
60
80
100

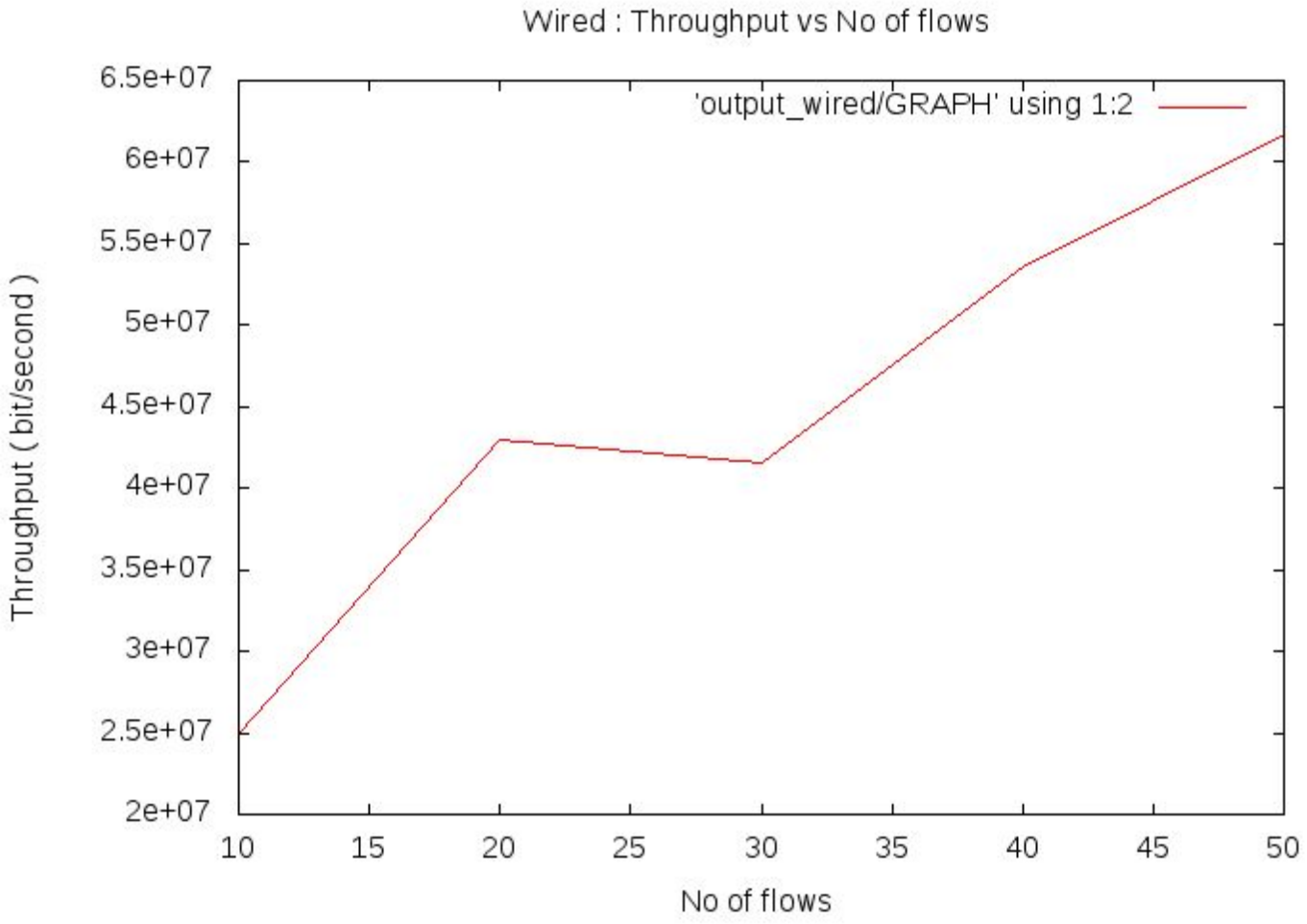

Wired : Packet Drop Ratio vs No of nodes
'output_wired/GRAPH' using 1:5
Packet Drop Ratio (%)
No of nodes
0.3
0.25
0.2
0.15
0.1
0.05
0
20
30
40
50
60
70
80
90
100

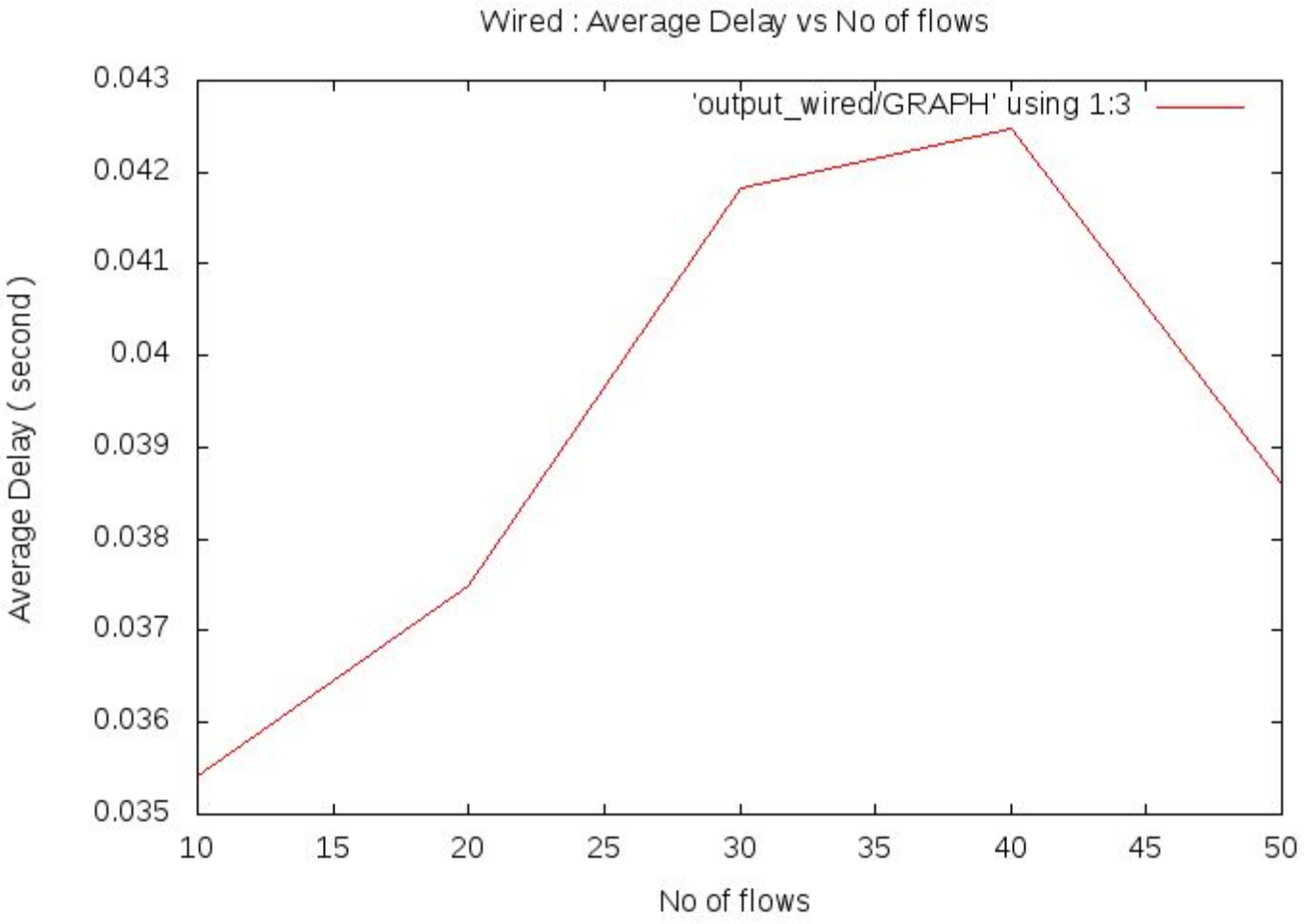

Wired : Per-Node-Throughput (bit/second) vs No of nodes - Round - 4
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
10
20
30
40
50
60
70
80


Wired : Per-Node-Throughput (bit/second) vs No of nodes - Round - 3
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
4e+06
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
10
20
30
40
50
60

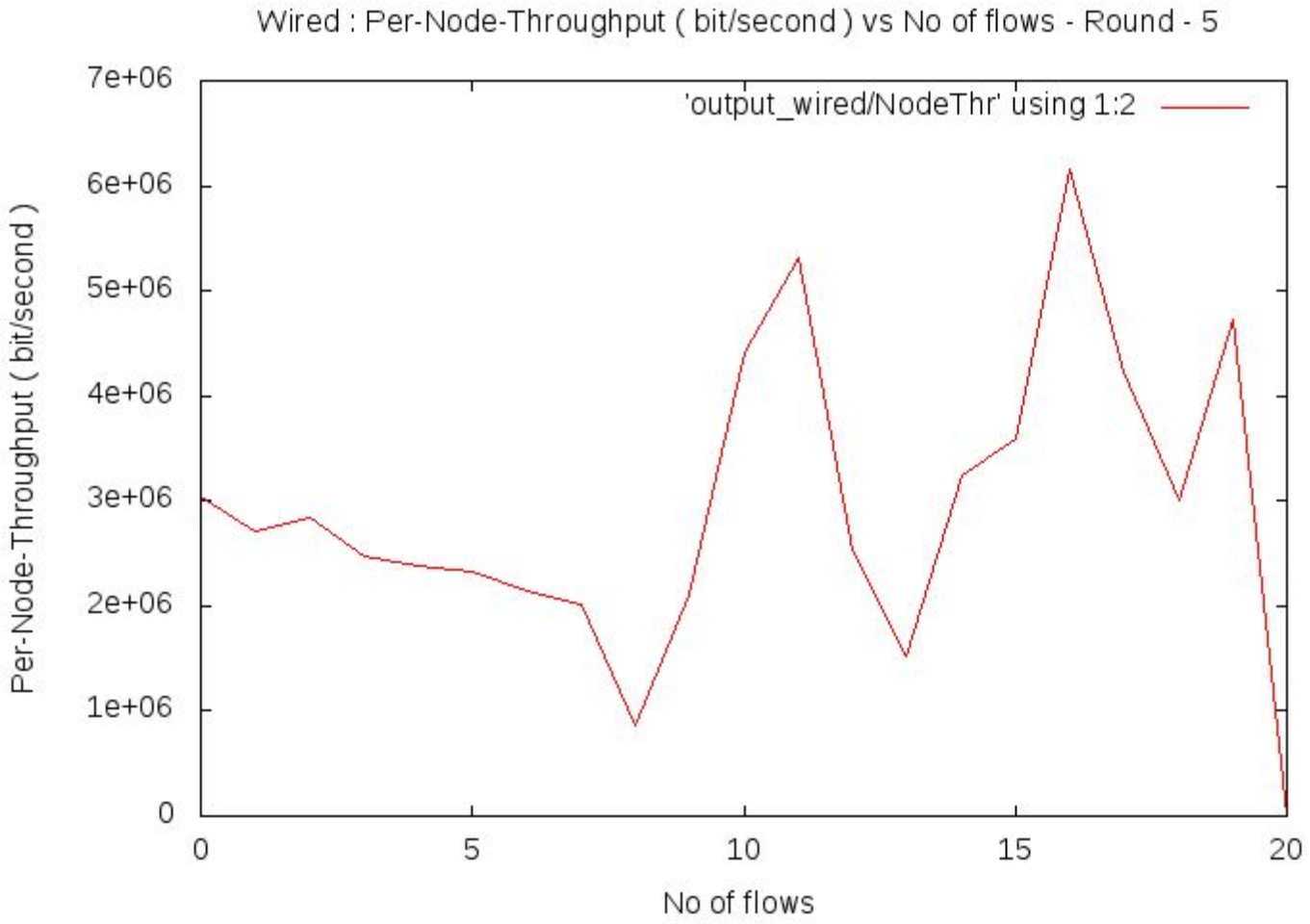

Wired : Per-Node-Throughput (bit/second) vs No of nodes - Round - 2
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20
25
30
35
40

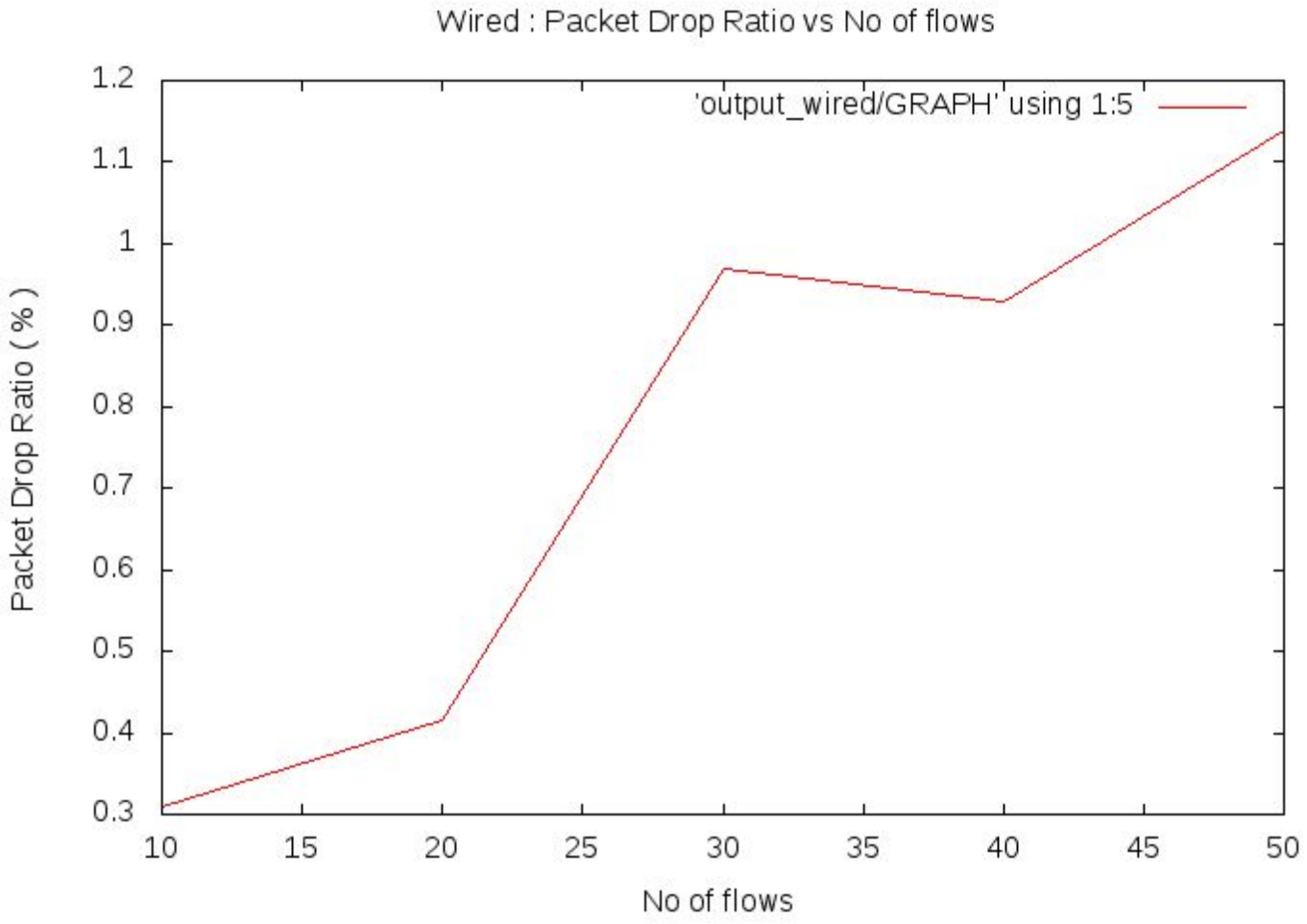

Wired : Per-Node-Throughput (bit/second) vs No of nodes - Round - 1
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20

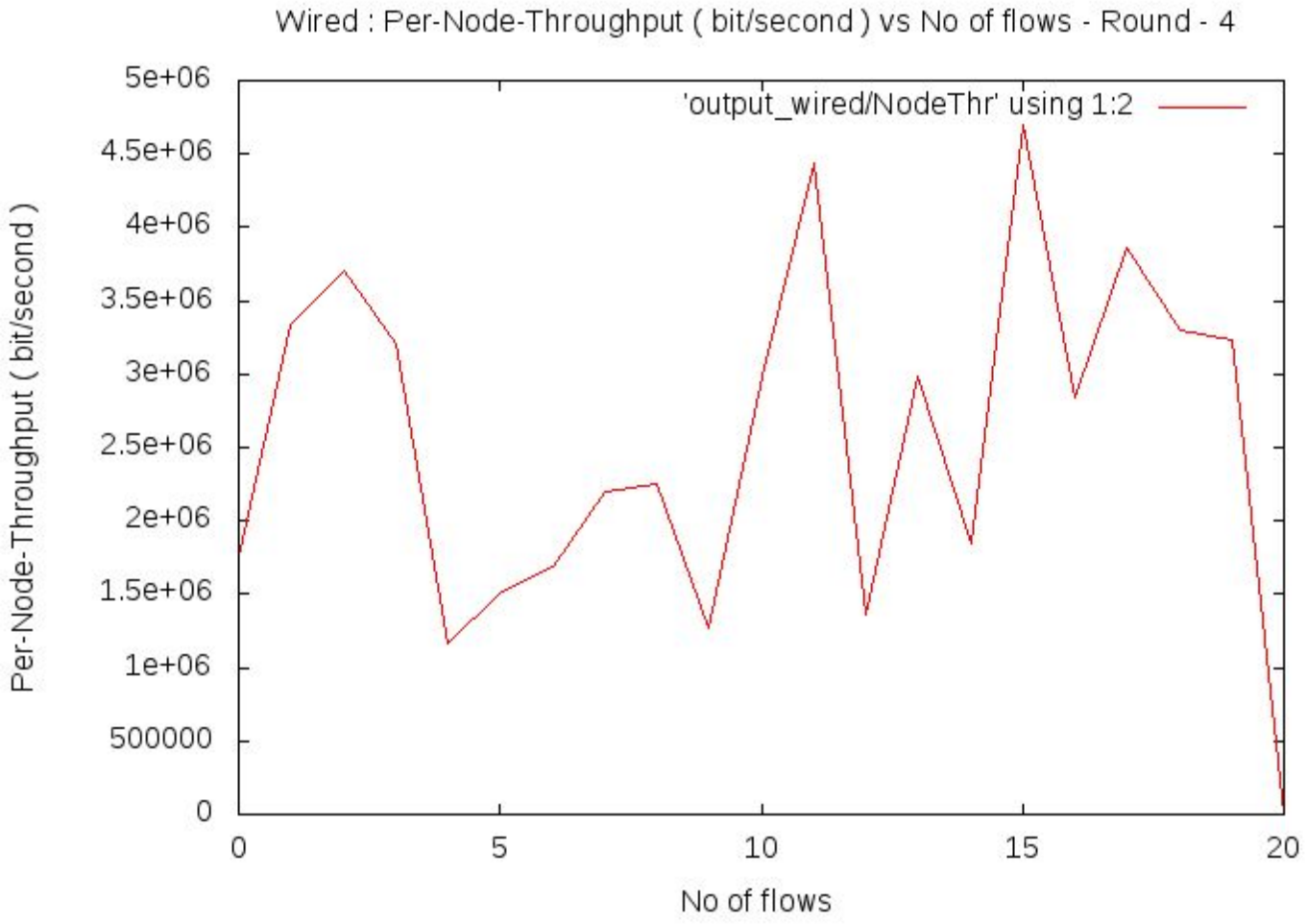

Wired : Throughput vs No of flows
'output_wired/GRAPH' using 1:2
Throughput (bit/second)
No of flows
6.5e+07
6e+07
5.5e+07
5e+07
4.5e+07
4e+07
3.5e+07
3e+07
2.5e+07
2e+07
10
15
20
25
30
35
40
45
50

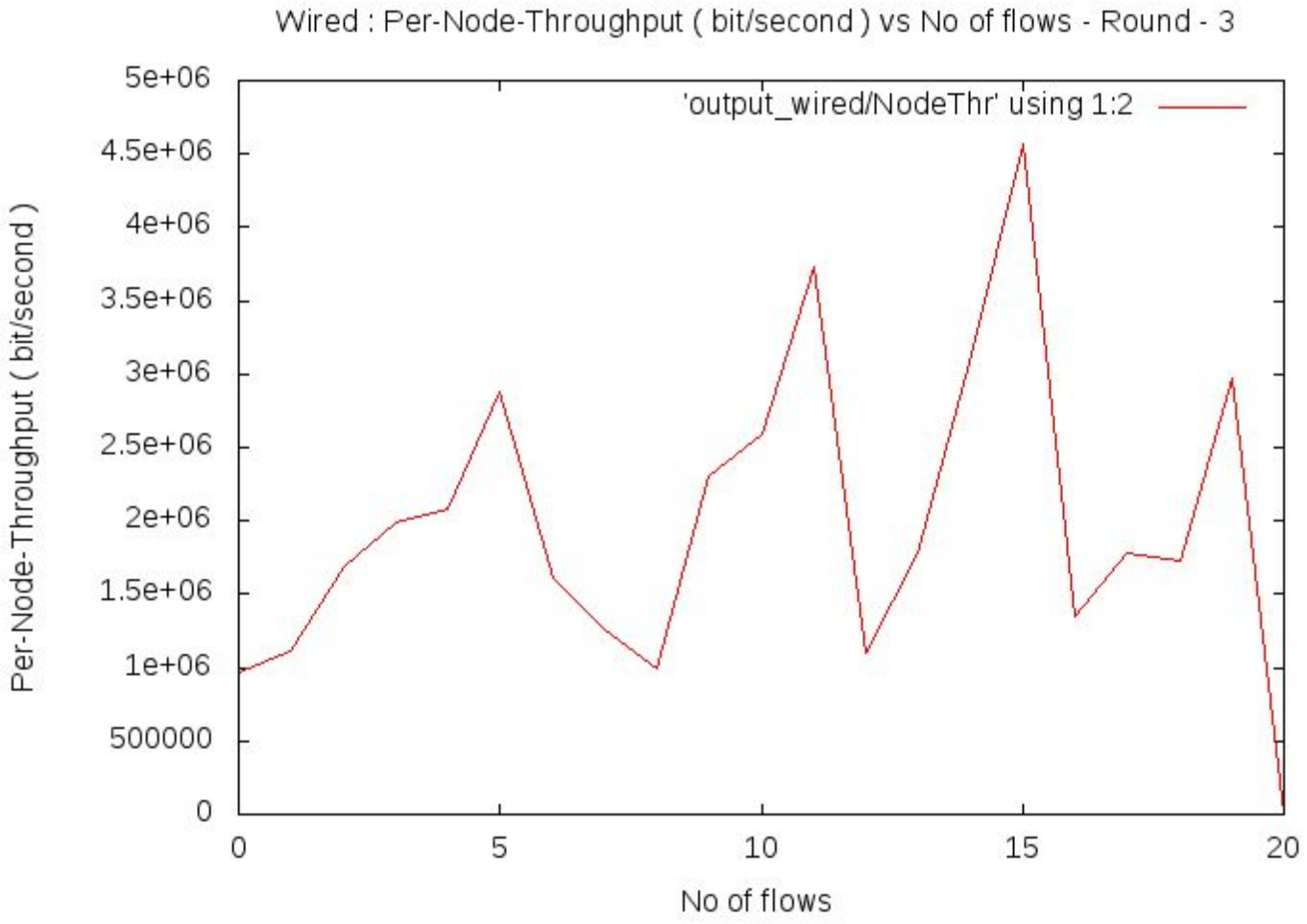

Wired : Average Delay vs No of flows
'output_wired/GRAPH' using 1:3
Average Delay (second)
No of flows
0.043
0.042
0.041
0.04
0.039
0.038
0.037
0.036
0.035
10
15
20
25
30
35
40
45
50

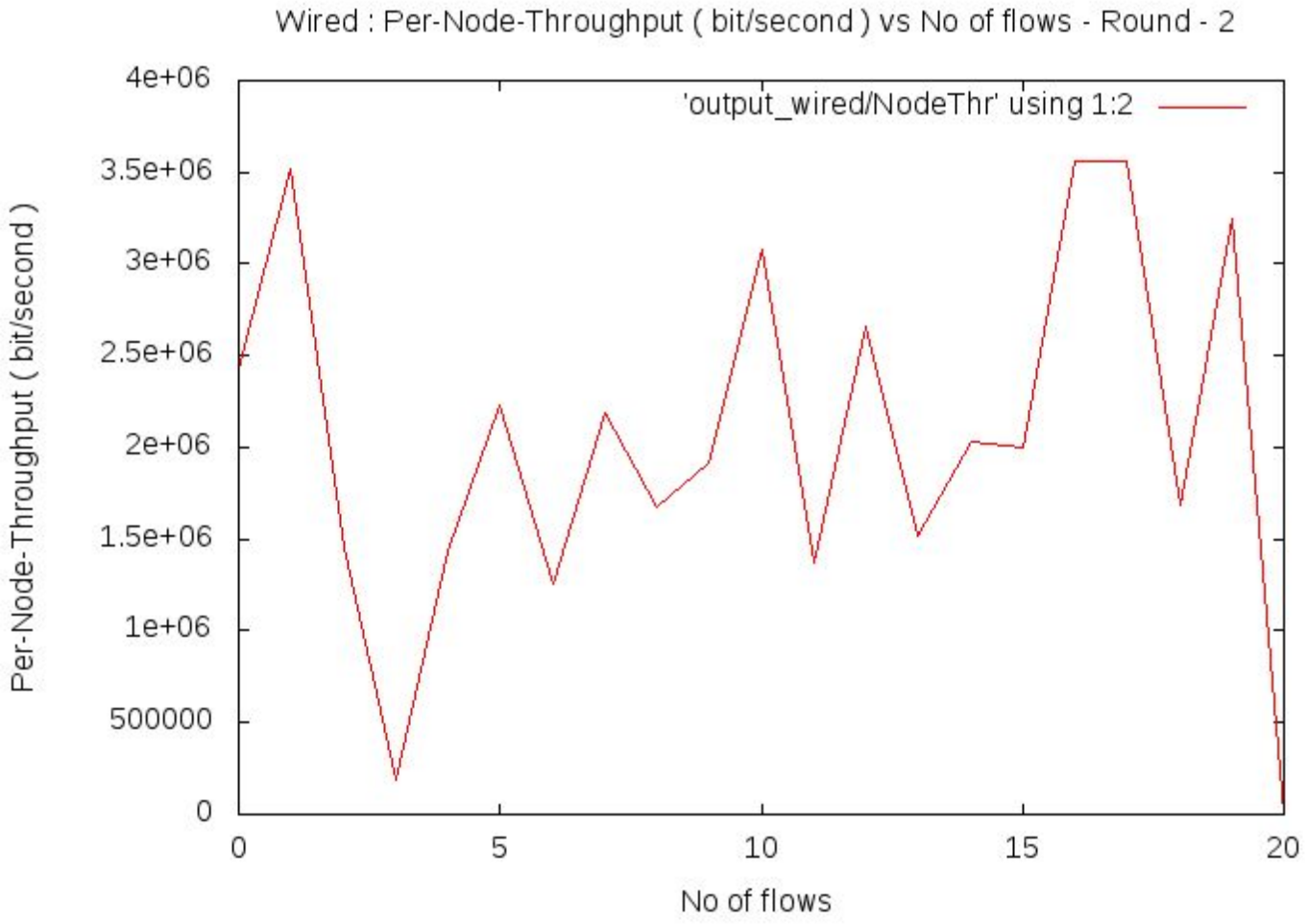

Wired : Packet Delivery Ratio vs No of flows
'output_wired/GRAPH' using 1:4
Packet Delivery Ratio (%)
No of flows
99.3
99.2
99.1
99
98.9
98.8
98.7
98.6
98.5
98.4
98.3
10
15
20
25
30
35
40
45
50

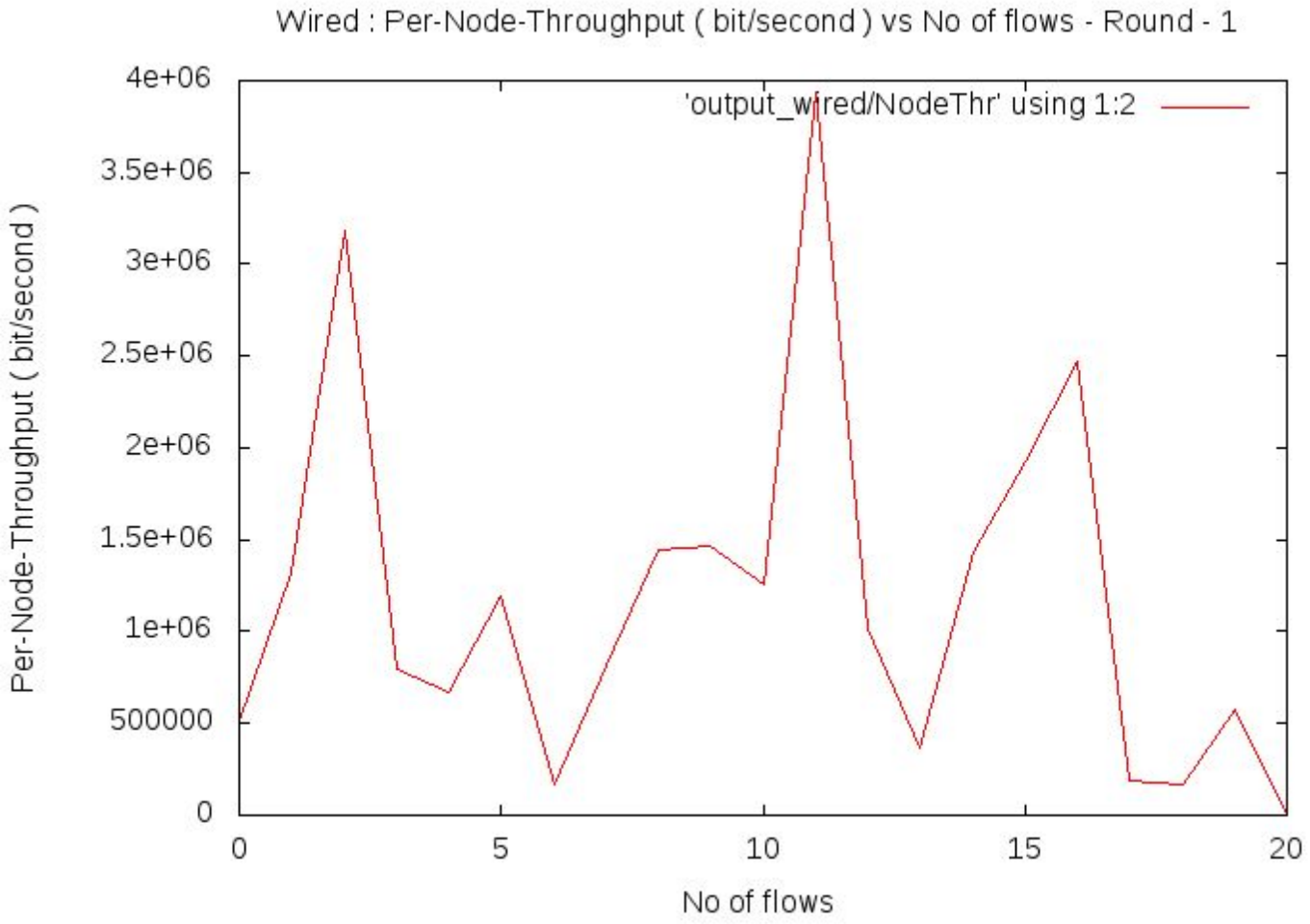

Wired : Per-Node-Throughput (bit/second) vs No of flows - Round - 5
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
7e+06
6e+06
5e+06
4e+06
3e+06
2e+06
1e+06
0
0
5
10
15
20

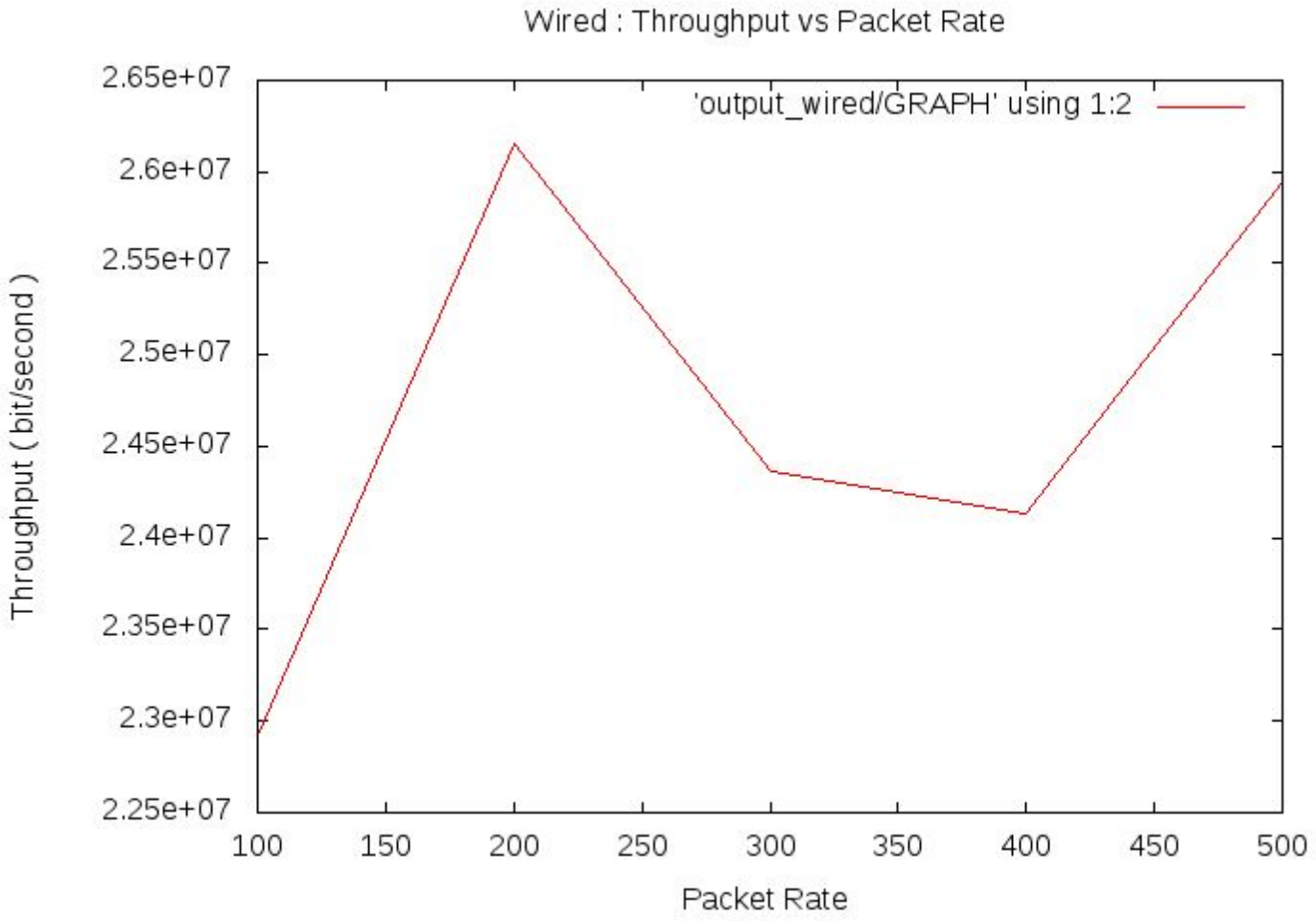

Wired : Packet Drop Ratio vs No of flows
'output_wired/GRAPH' using 1:5
Packet Drop Ratio (%)
No of flows
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
10
15
20
25
30
35
40
45
50

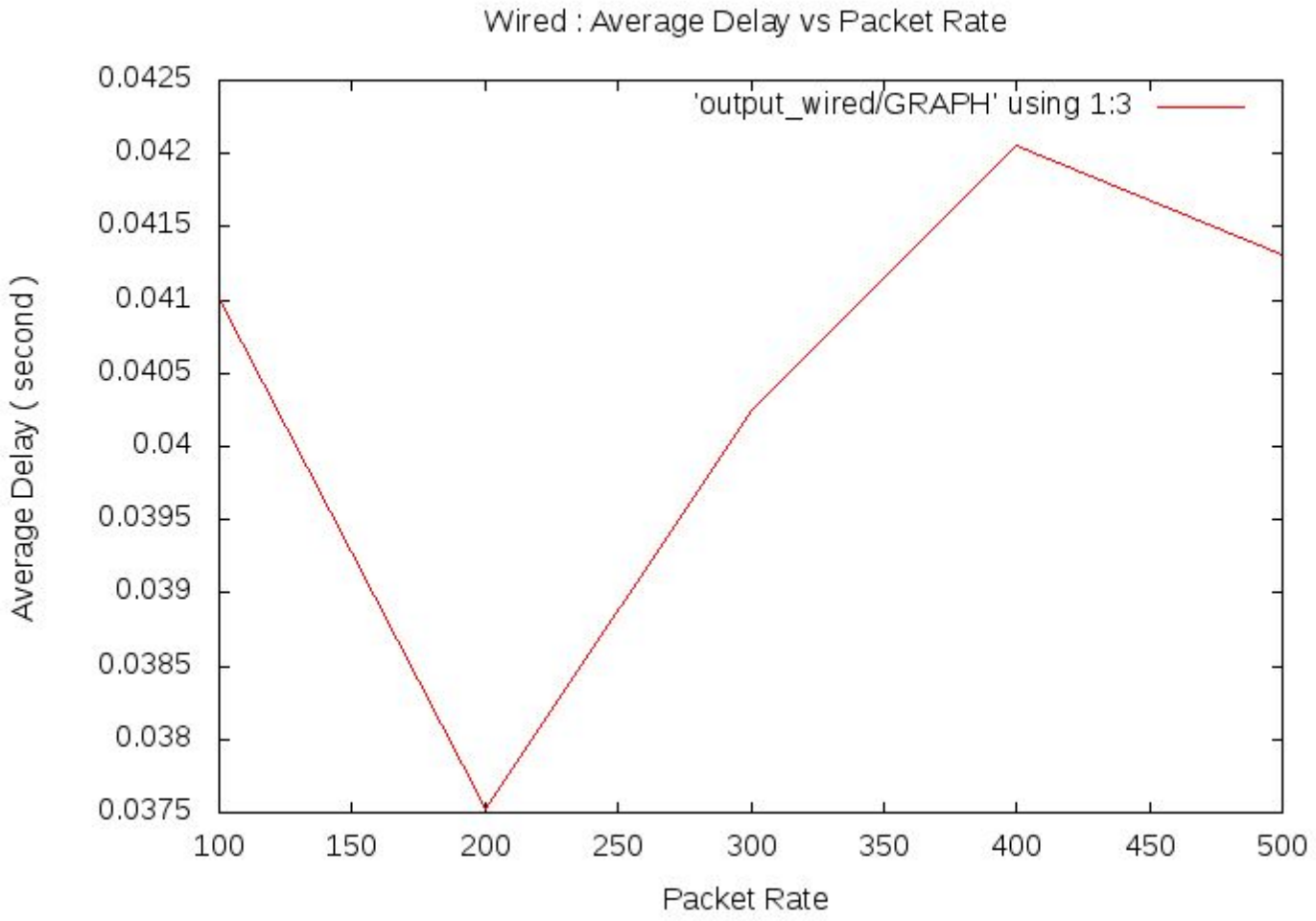

Wired : Per-Node-Throughput (bit/second) vs No of flows - Round - 4
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
5e+06
4.5e+06
4e+06
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20

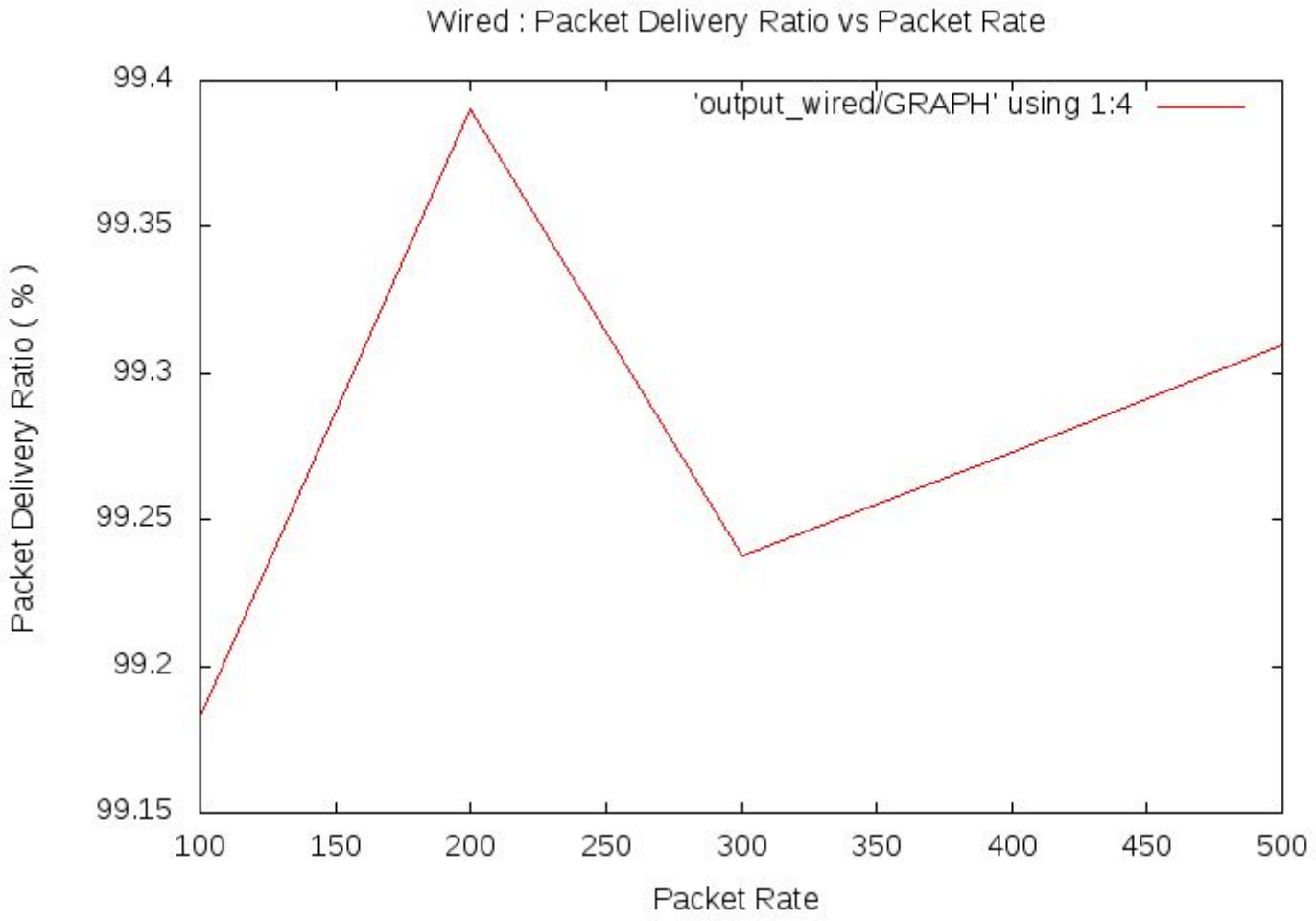

Wired : Per-Node-Throughput (bit/second) vs No of flows - Round - 3
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
5e+06
4.5e+06
4e+06
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20

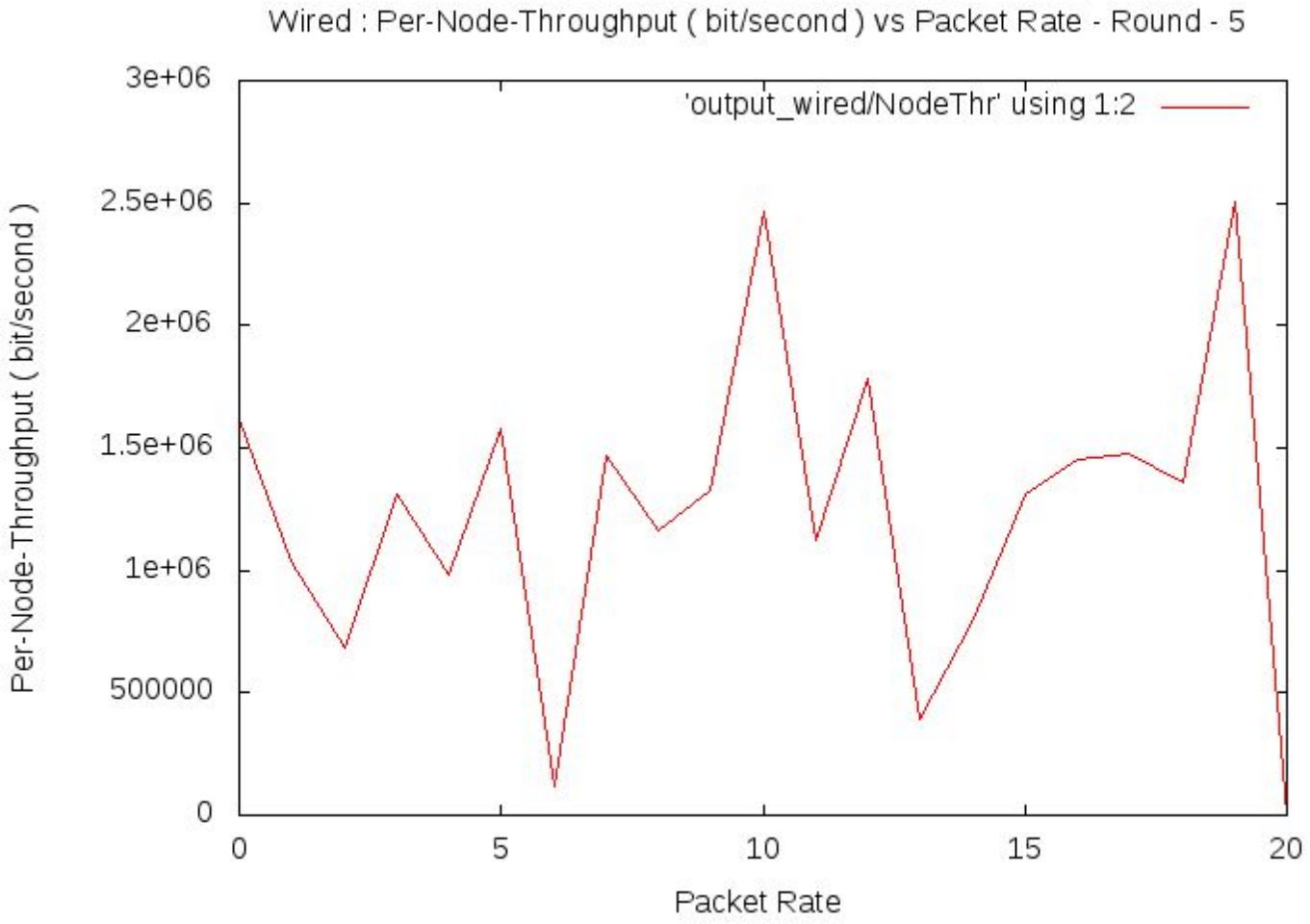

Wired : Per-Node-Throughput (bit/second) vs No of flows - Round - 2
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
4e+06
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20

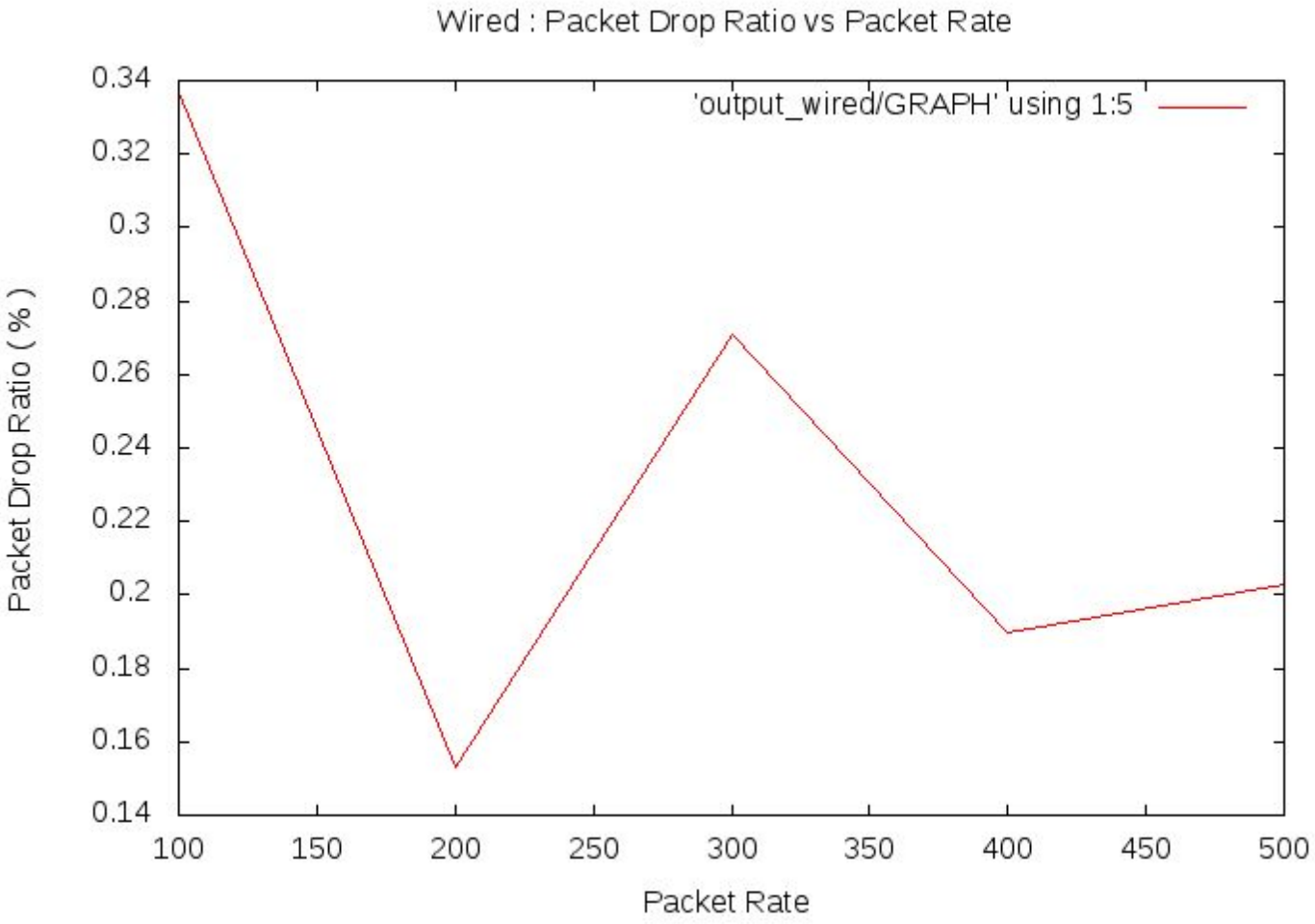

Wired : Per-Node-Throughput (bit/second) vs No of flows - Round - 1
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
4e+06
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20

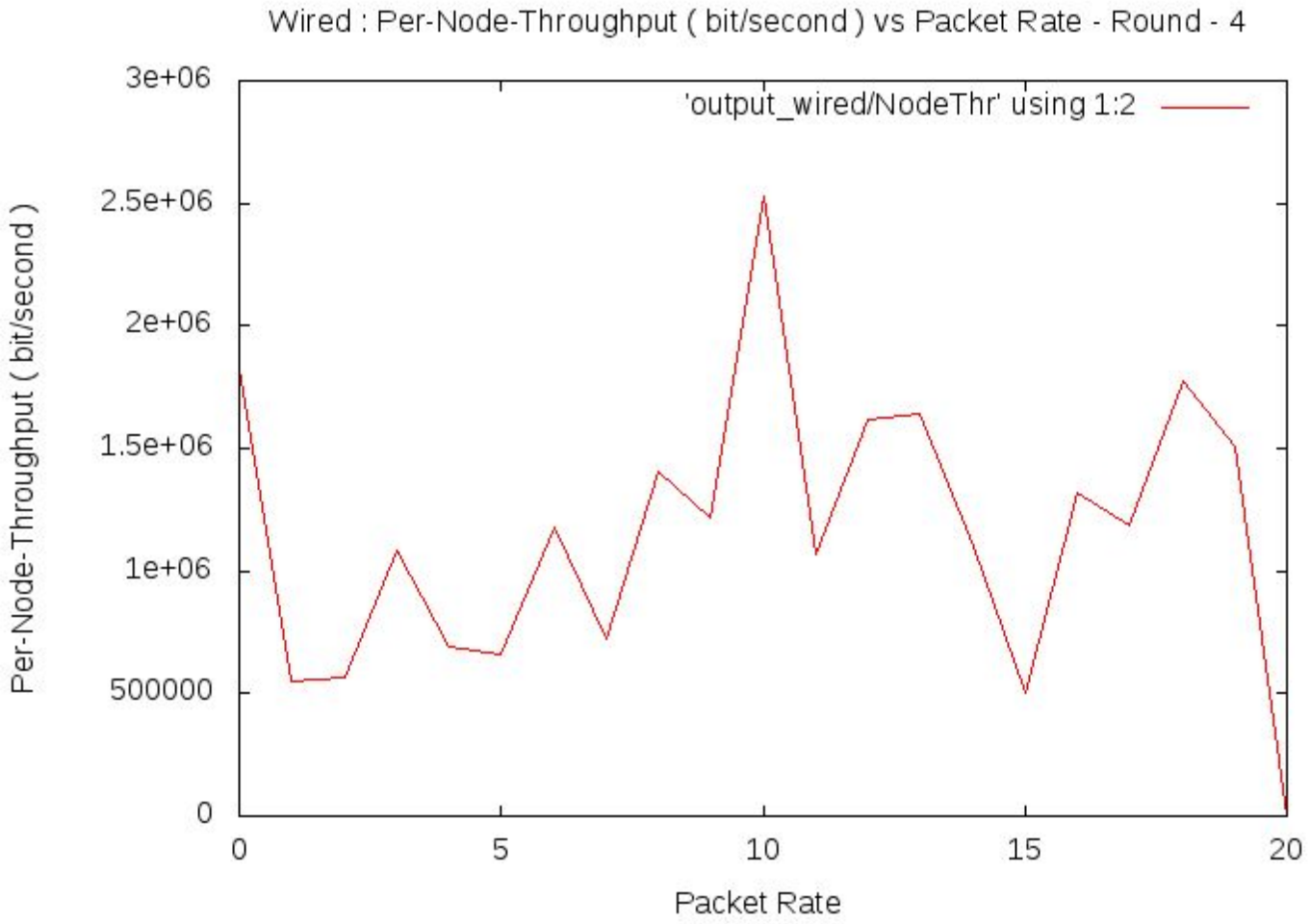

Wired : Throughput vs Packet Rate
'output_wired/GRAPH' using 1:2
Throughput (bit/second)
Packet Rate
2.65e+07
2.6e+07
2.55e+07
2.5e+07
2.45e+07
2.4e+07
2.35e+07
2.3e+07
2.25e+07
100
150
200
250
300
350
400
450
500

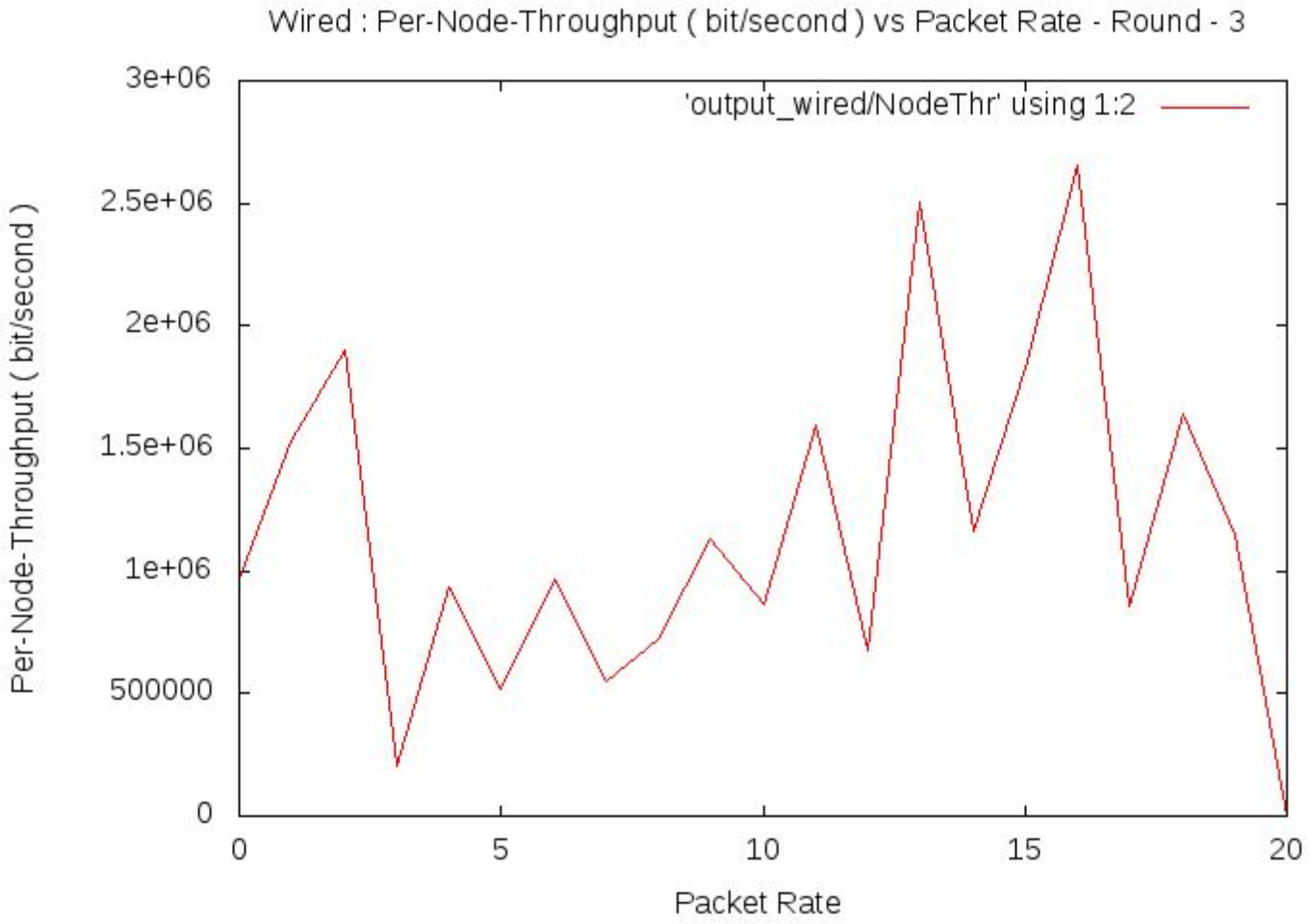

Wired : Average Delay vs Packet Rate
'output_wired/GRAPH' using 1:3
Average Delay (second)
Packet Rate
0.0425
0.042
0.0415
0.041
0.0405
0.04
0.0395
0.039
0.0385
0.038
0.0375
100
150
200
250
300
350
400
450
500

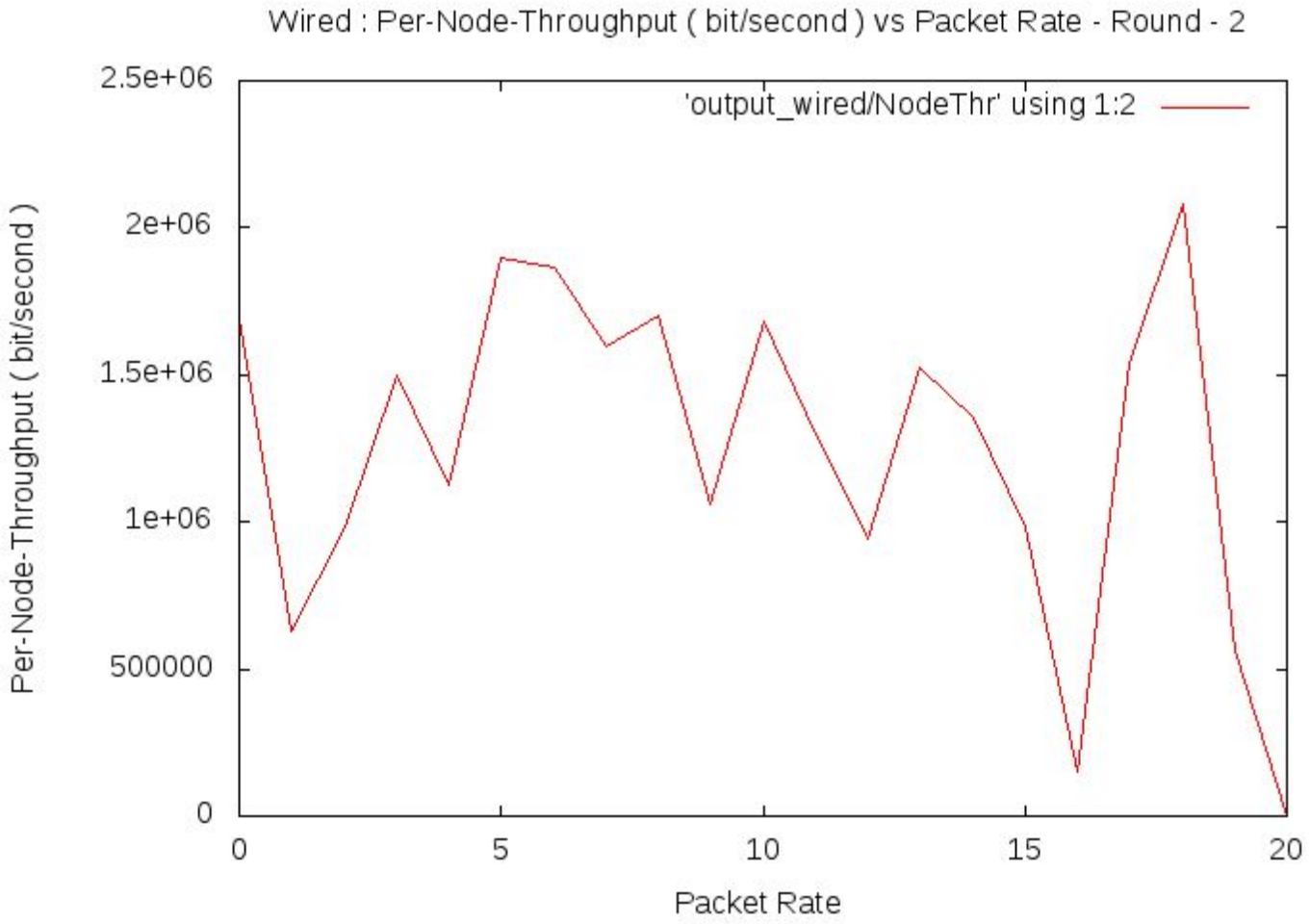

Wired : Packet Delivery Ratio vs Packet Rate
'output_wired/GRAPH' using 1:4
Packet Delivery Ratio (%)
99.4
99.35
99.3
99.25
99.2
99.15
100
150
200
250
300
350
400
450
500
Packet Rate

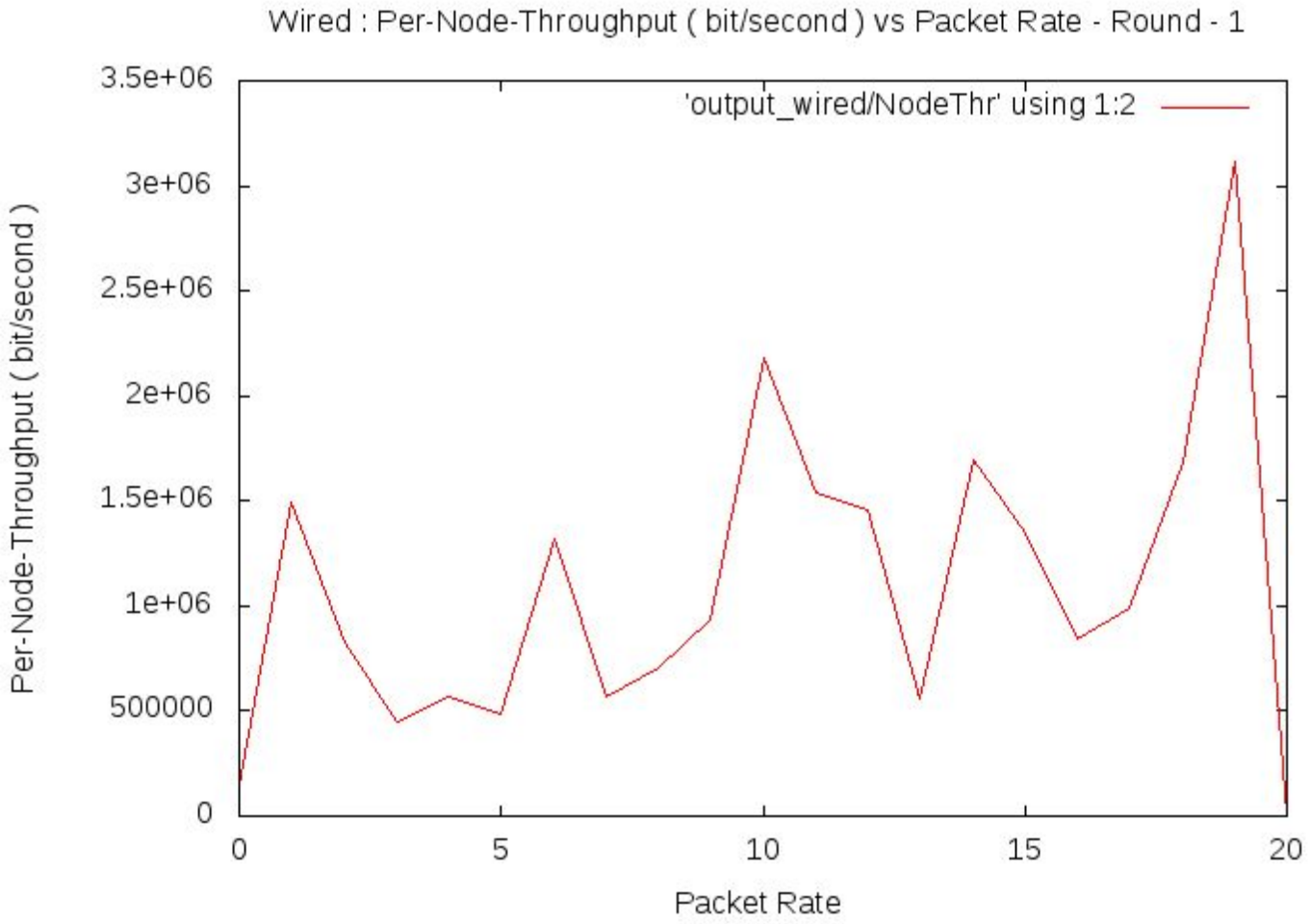

Wired : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 5
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20


Wired : Packet Drop Ratio vs Packet Rate
'output_wired/GRAPH' using 1:5
Packet Drop Ratio (%)
0.34
0.32
0.3
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
100
150
200
250
300
350
400
450
500
Packet Rate

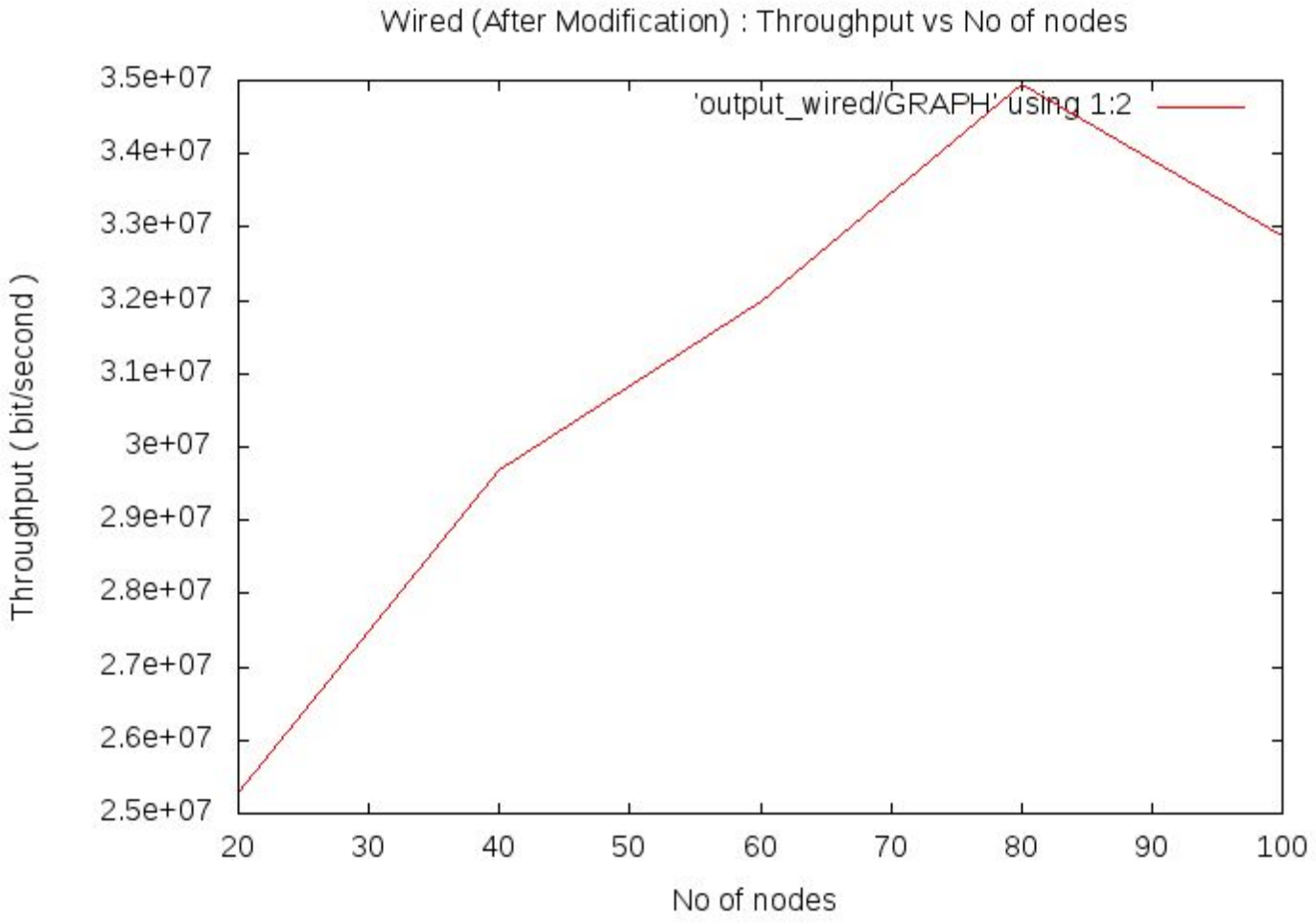

Wired : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 4
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20

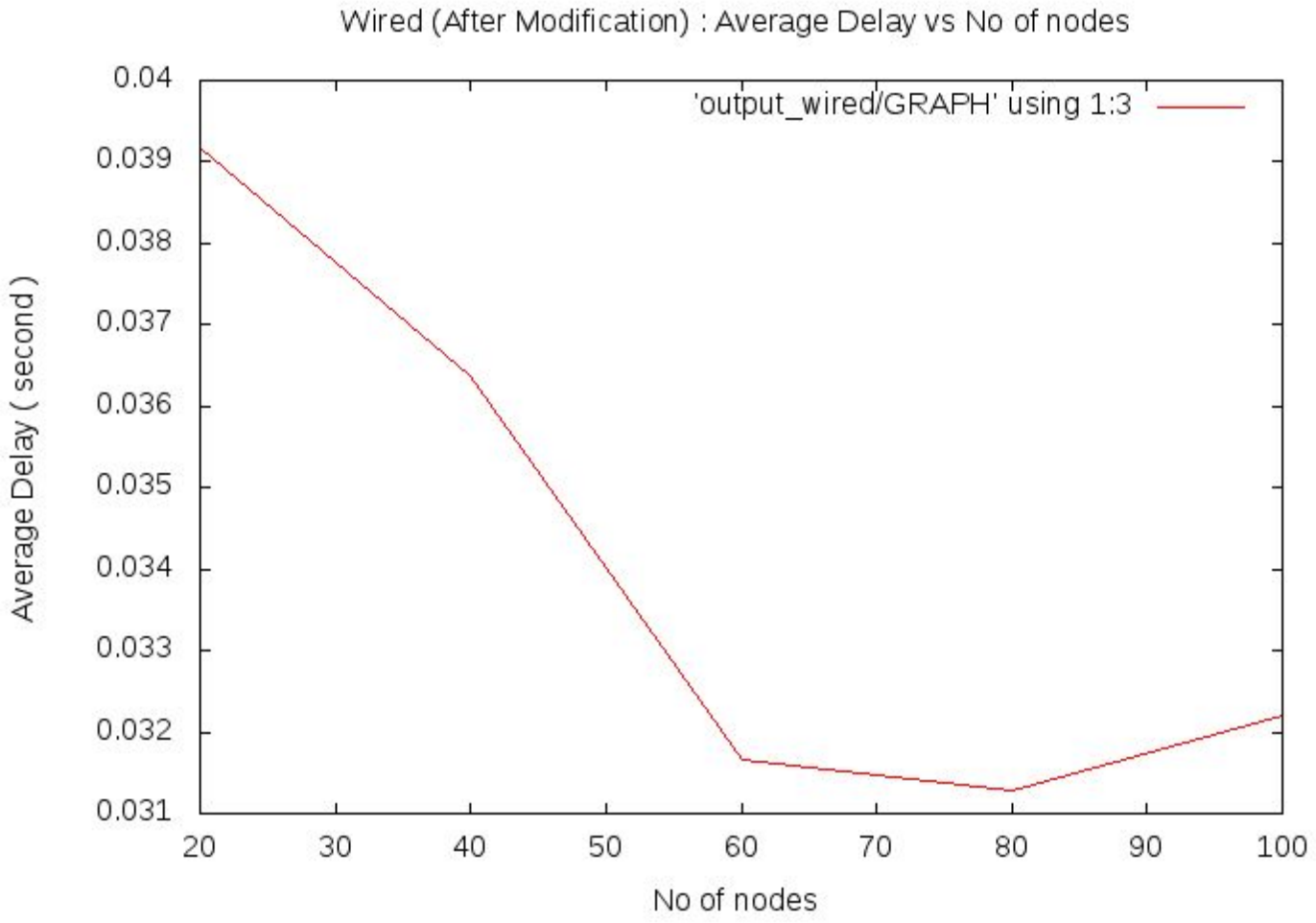

Wired : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 3
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20
Packet Rate


Wired : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 2
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20
Packet Rate

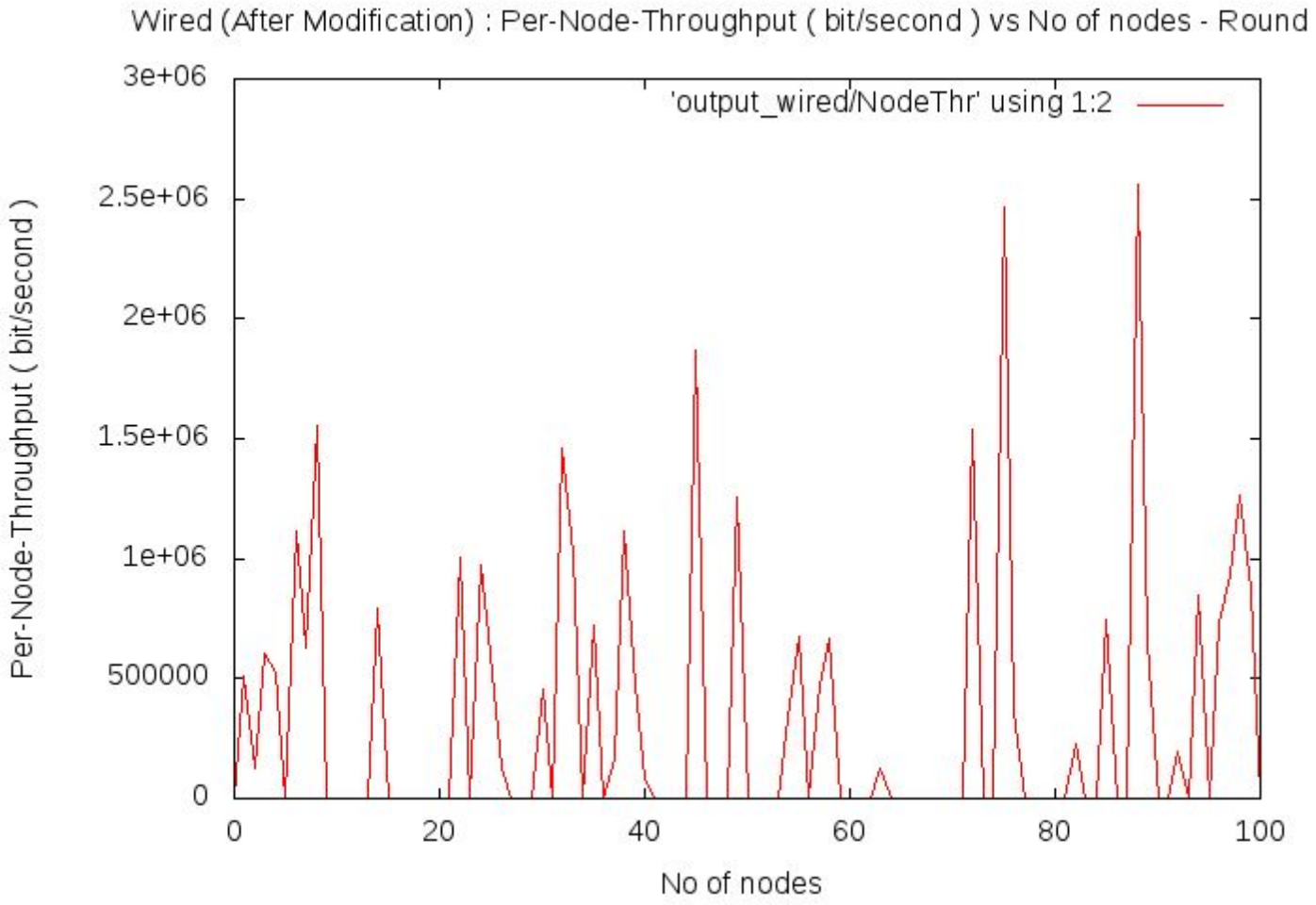

Wired : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 1
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20

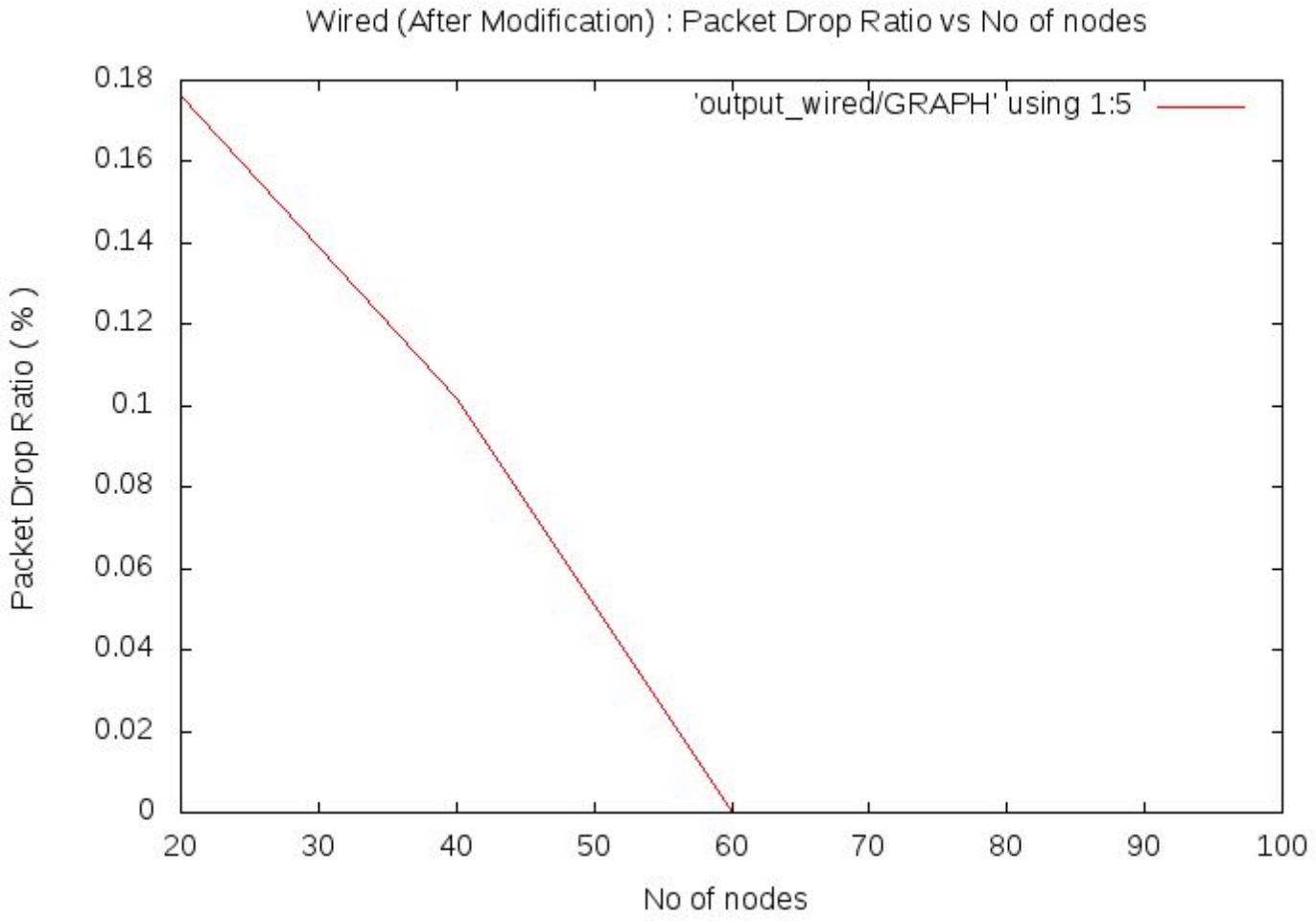
Wired (After Modification)

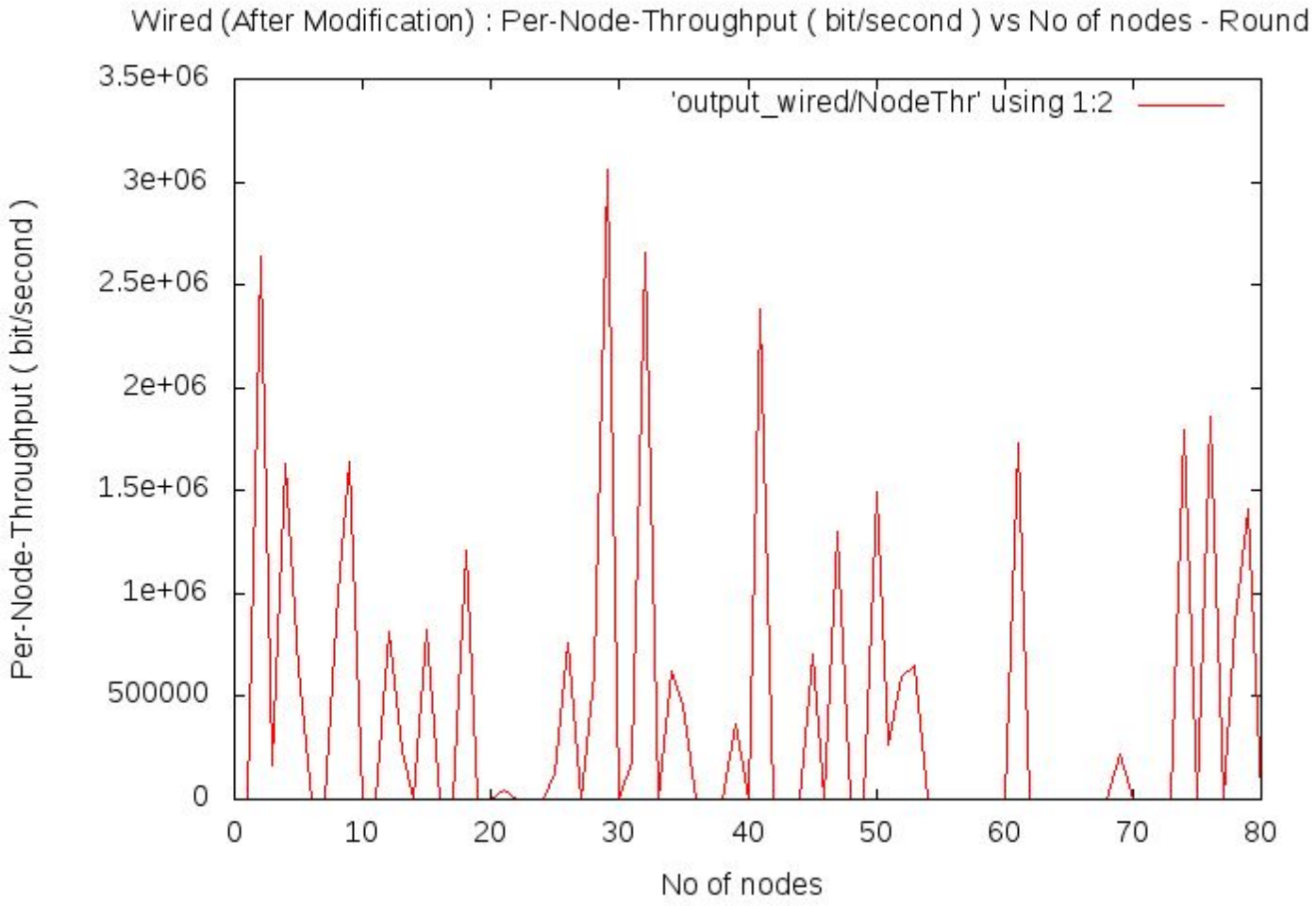

Wired (After Modification) : Throughput vs No of nodes
'output_wired/GRAPH' using 1:2
Throughput (bit/second)
No of nodes
3.5e+07
3.4e+07
3.3e+07
3.2e+07
3.1e+07
3e+07
2.9e+07
2.8e+07
2.7e+07
2.6e+07
2.5e+07
20
30
40
50
60
70
80
90
100

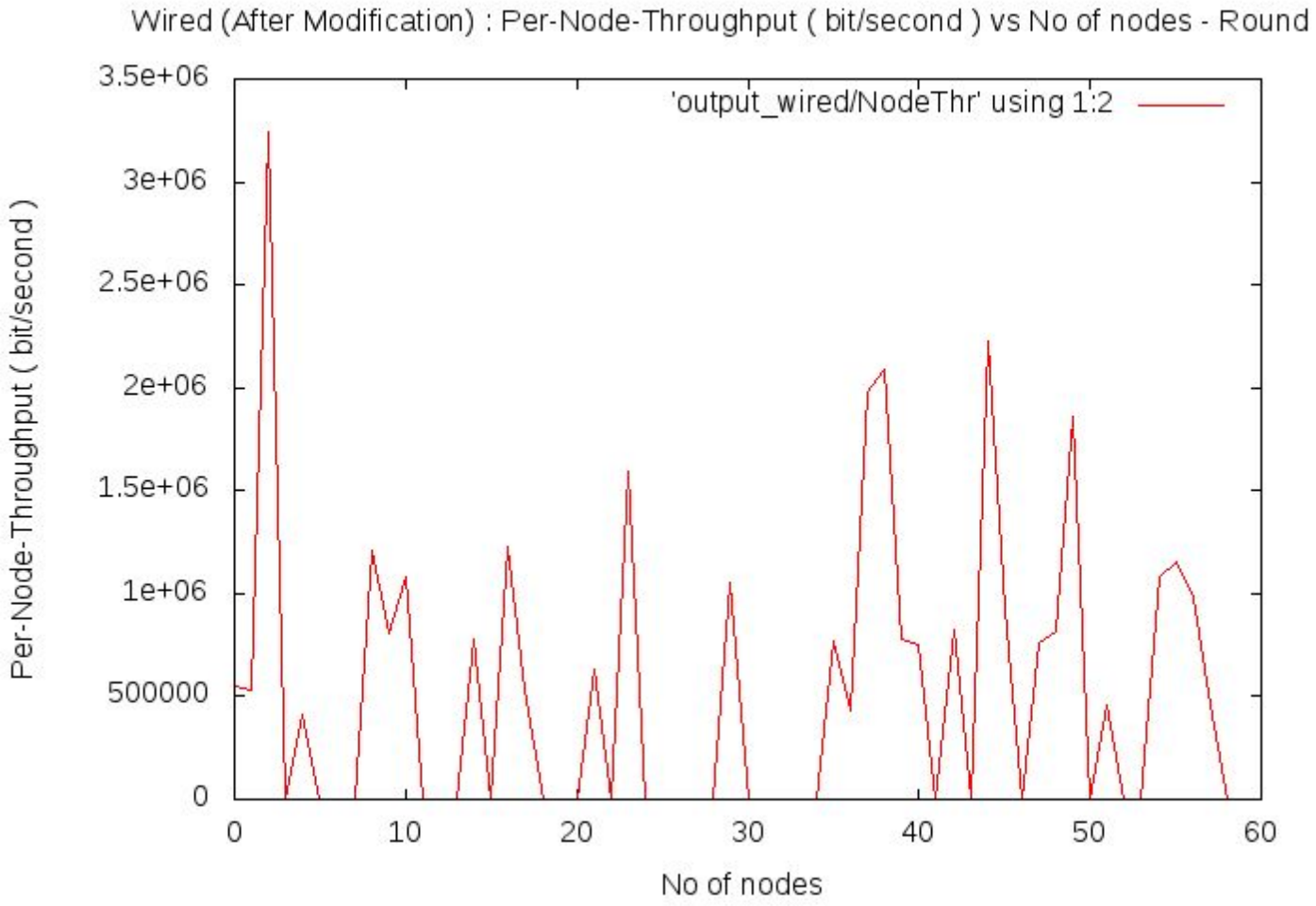

Wired (After Modification) : Average Delay vs No of nodes
'output_wired/GRAPH' using 1:3
Average Delay (second)
0.04
0.039
0.038
0.037
0.036
0.035
0.034
0.033
0.032
0.031
20
30
40
50
60
70
80
90
100
No of nodes

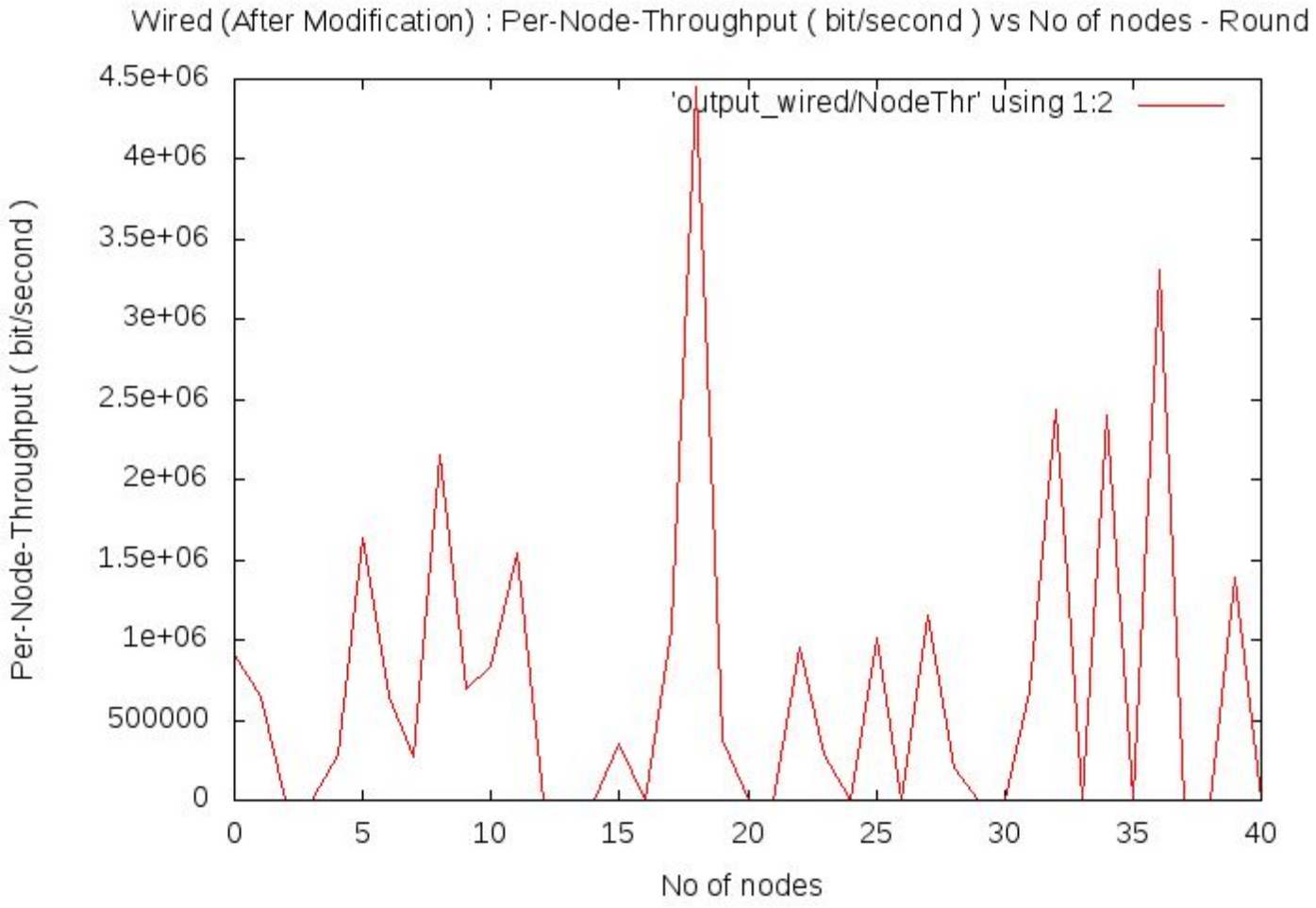

Wired (After Modification) : Packet Delivery Ratio vs No of nodes
'output_wired/GRAPH' using 1:4
Packet Delivery Ratio (%)
99.65
99.6
99.55
99.5
99.45
99.4
99.35
99.3
20
30
40
50
60
70
80
90
100
No of nodes

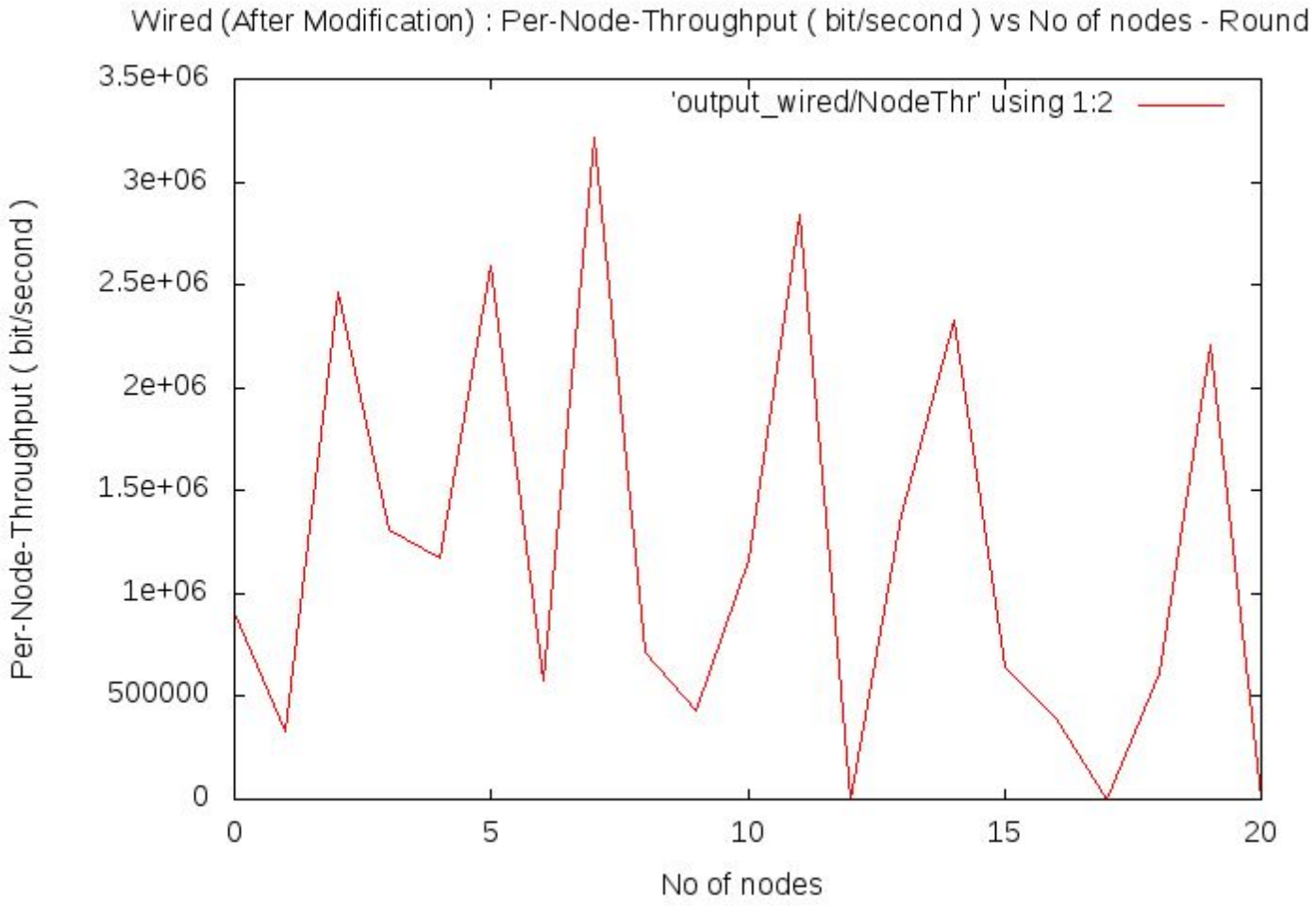

Wired (After Modification) : Per-Node-Throughput (bit/second) vs No of nodes - Round
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
20
40
60
80
100

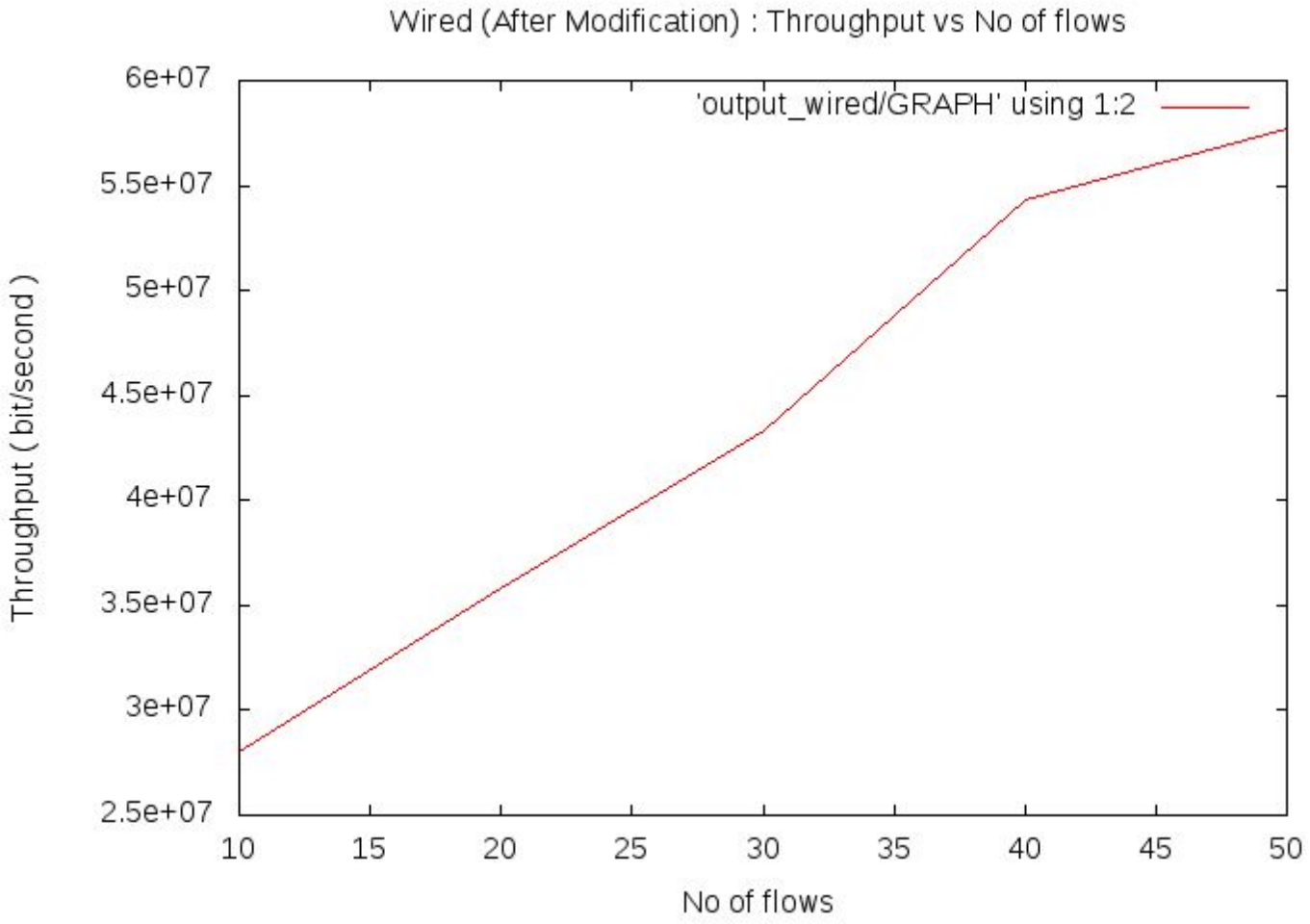

Wired (After Modification) : Packet Drop Ratio vs No of nodes
'output_wired/GRAPH' using 1:5
Packet Drop Ratio (%)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
20
30
40
50
60
70
80
90
100
No of nodes

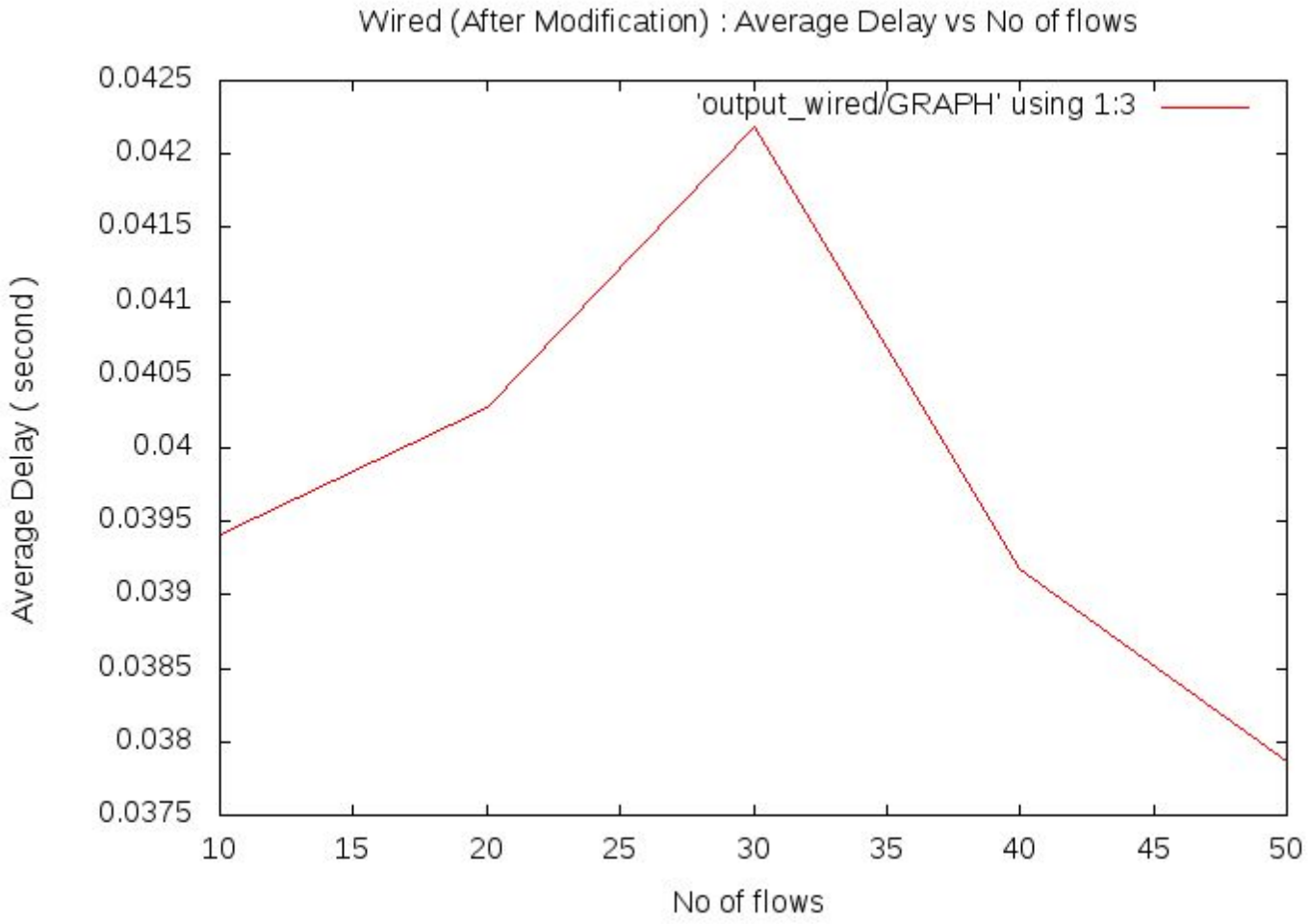

Wired (After Modification) : Per-Node-Throughput (bit/second) vs No of nodes - Round
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
10
20
30
40
50
60
70
80


Wired (After Modification) : Per-Node-Throughput (bit/second) vs No of nodes - Round
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
10
20
30
40
50
60


Wired (After Modification) : Per-Node-Throughput (bit/second) vs No of nodes - Round
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
4.5e+06
4e+06
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20
25
30
35
40

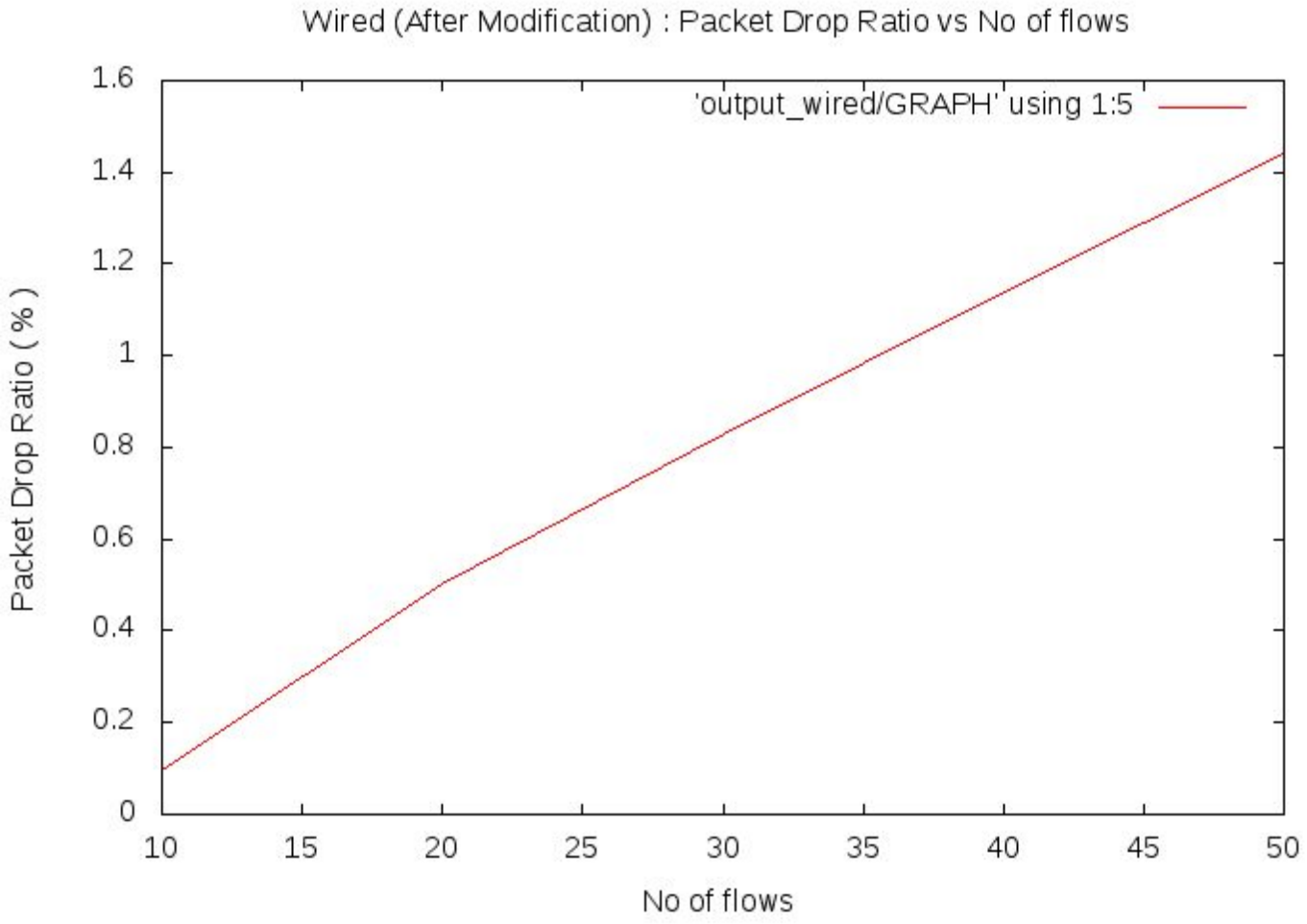

Wired (After Modification) : Per-Node-Throughput (bit/second) vs No of nodes - Round
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20

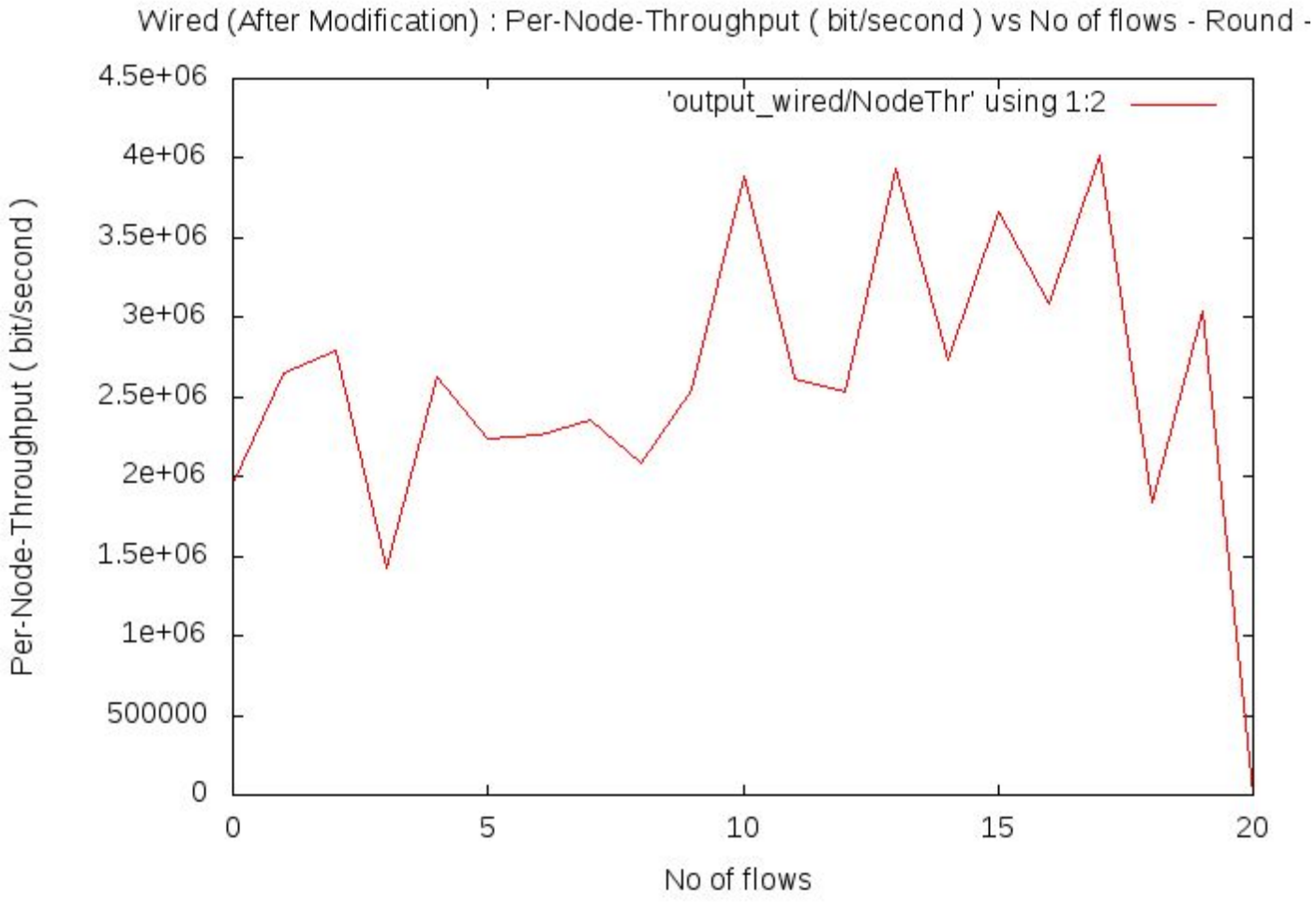

Wired (After Modification) : Throughput vs No of flows
'output_wired/GRAPH' using 1:2
Throughput (bit/second)
No of flows
6e+07
5.5e+07
5e+07
4.5e+07
4e+07
3.5e+07
3e+07
2.5e+07
10
15
20
25
30
35
40
45
50

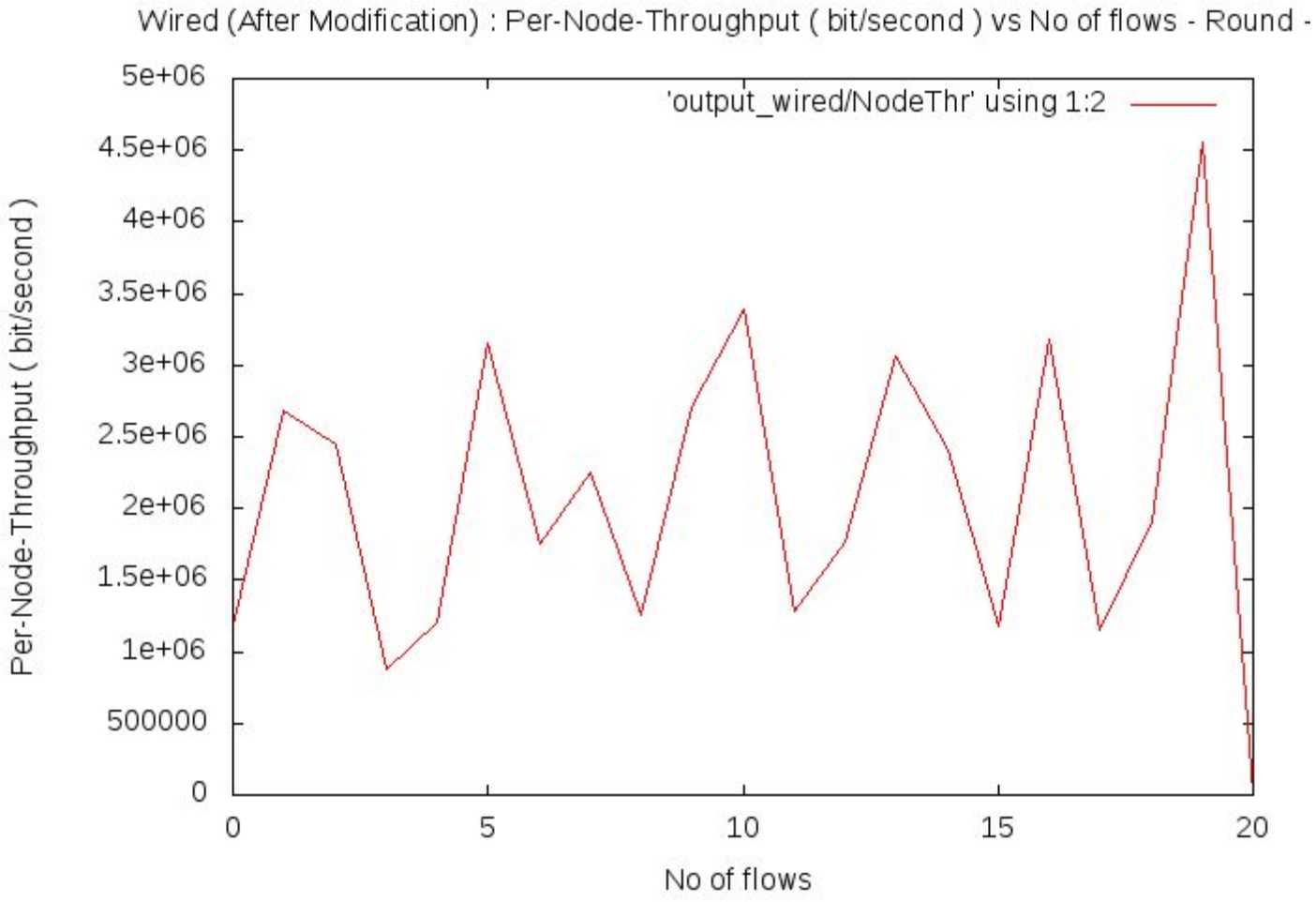

Wired (After Modification) : Average Delay vs No of flows
'output_wired/GRAPH' using 1:3
Average Delay (second)
No of flows
0.0425
0.042
0.0415
0.041
0.0405
0.04
0.0395
0.039
0.0385
0.038
0.0375
10
15
20
25
30
35
40
45
50

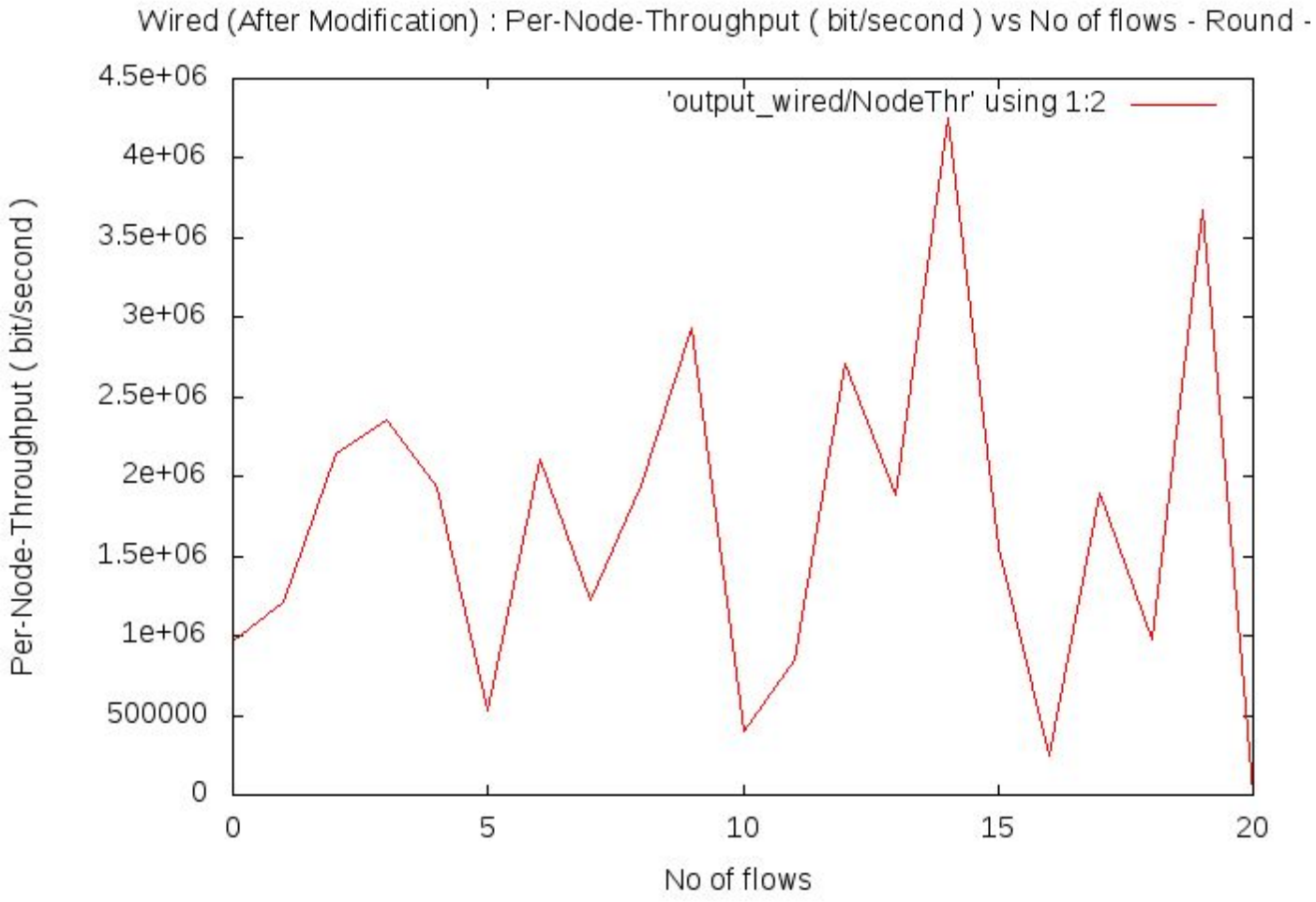

Wired (After Modification) : Packet Delivery Ratio vs No of flows
'output_wired/GRAPH' using 1:4
Packet Delivery Ratio (%)
99.4
99.2
99
98.8
98.6
98.4
98.2
98
10
15
20
25
30
35
40
45
50
No of flows

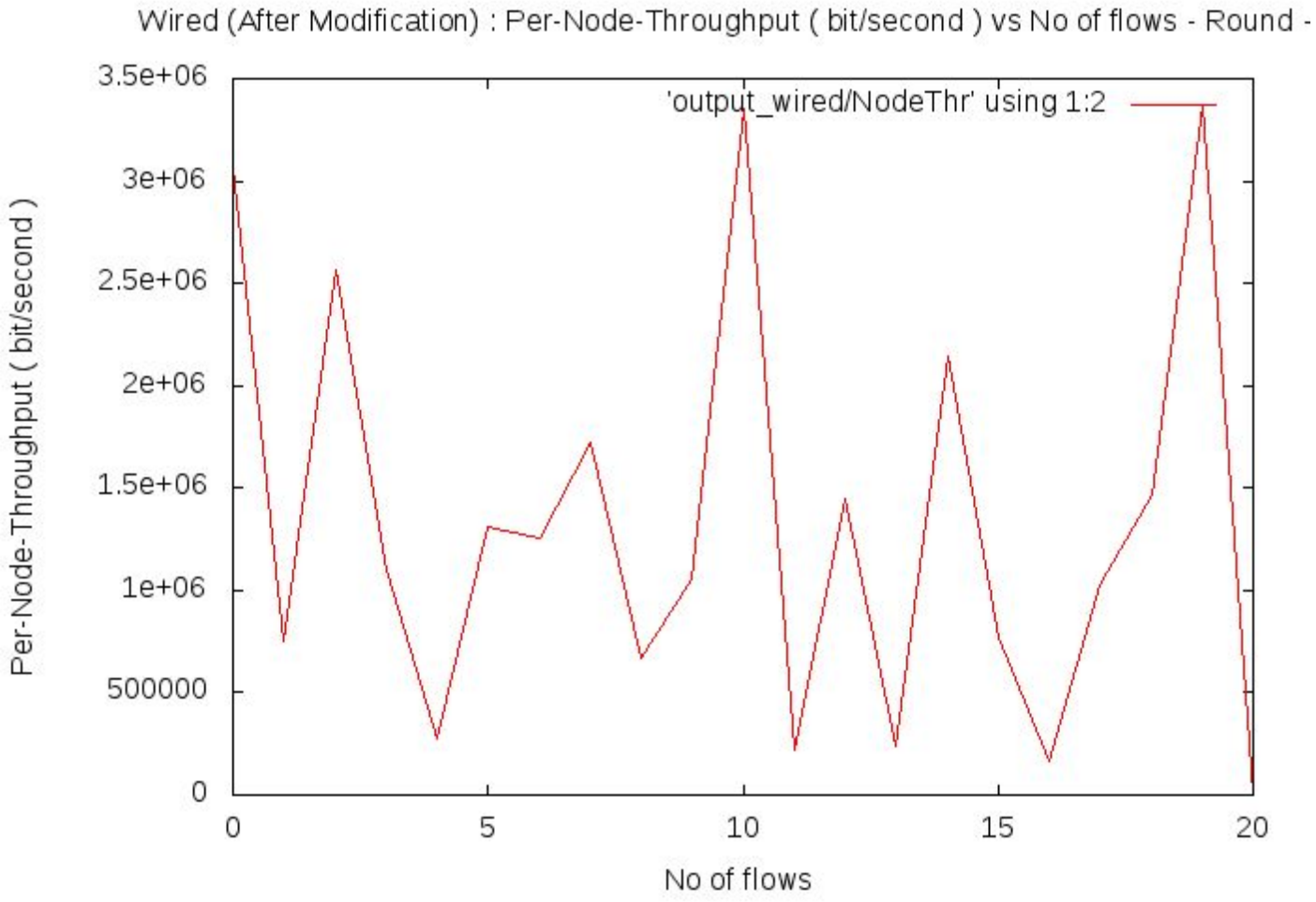

Wired (After Modification) : Per-Node-Throughput (bit/second) vs No of flows - Round -
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
4.5e+06
4e+06
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20

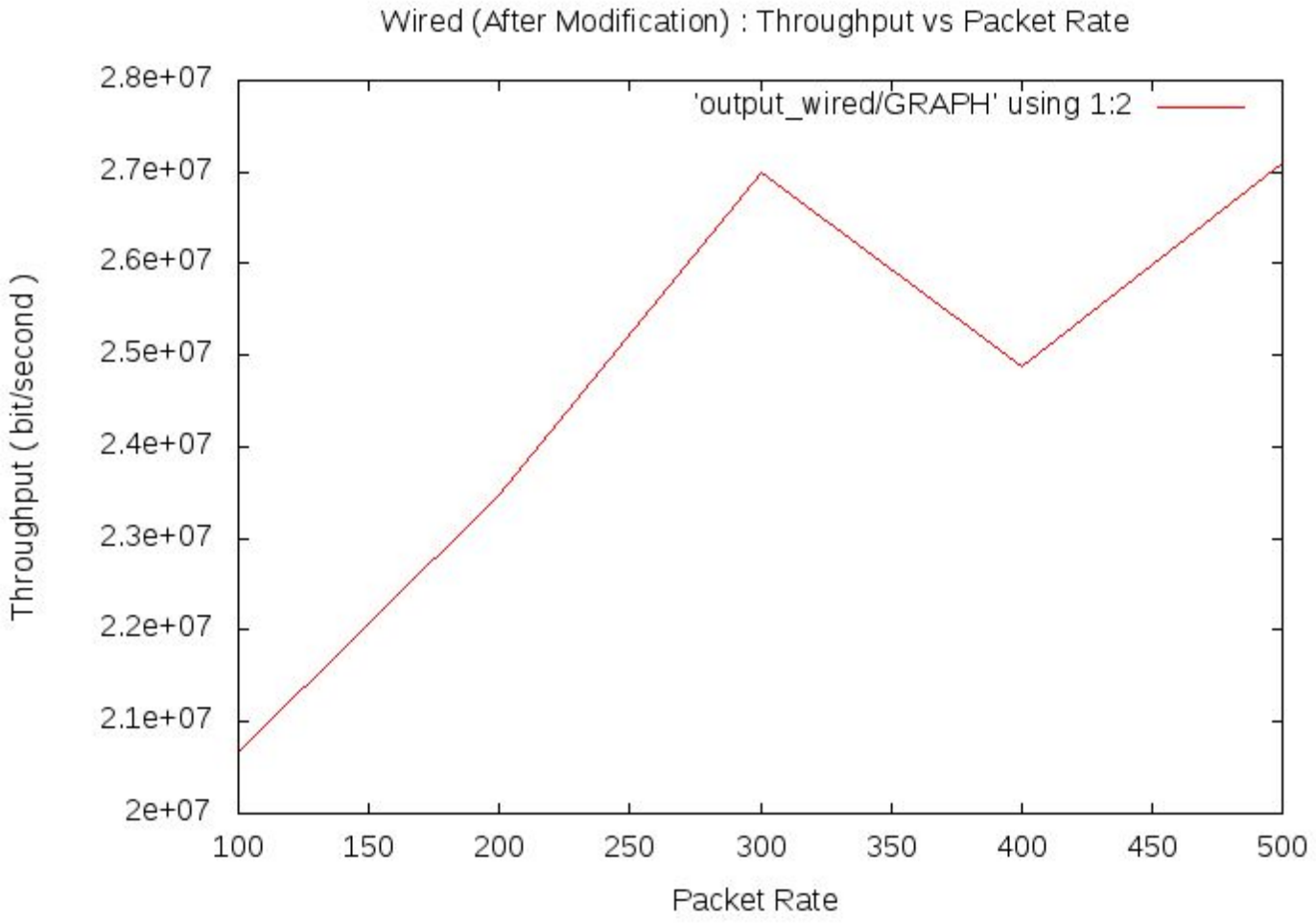

Wired (After Modification) : Packet Drop Ratio vs No of flows
'output_wired/GRAPH' using 1:5
Packet Drop Ratio (%)
No of flows
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
10
15
20
25
30
35
40
45
50

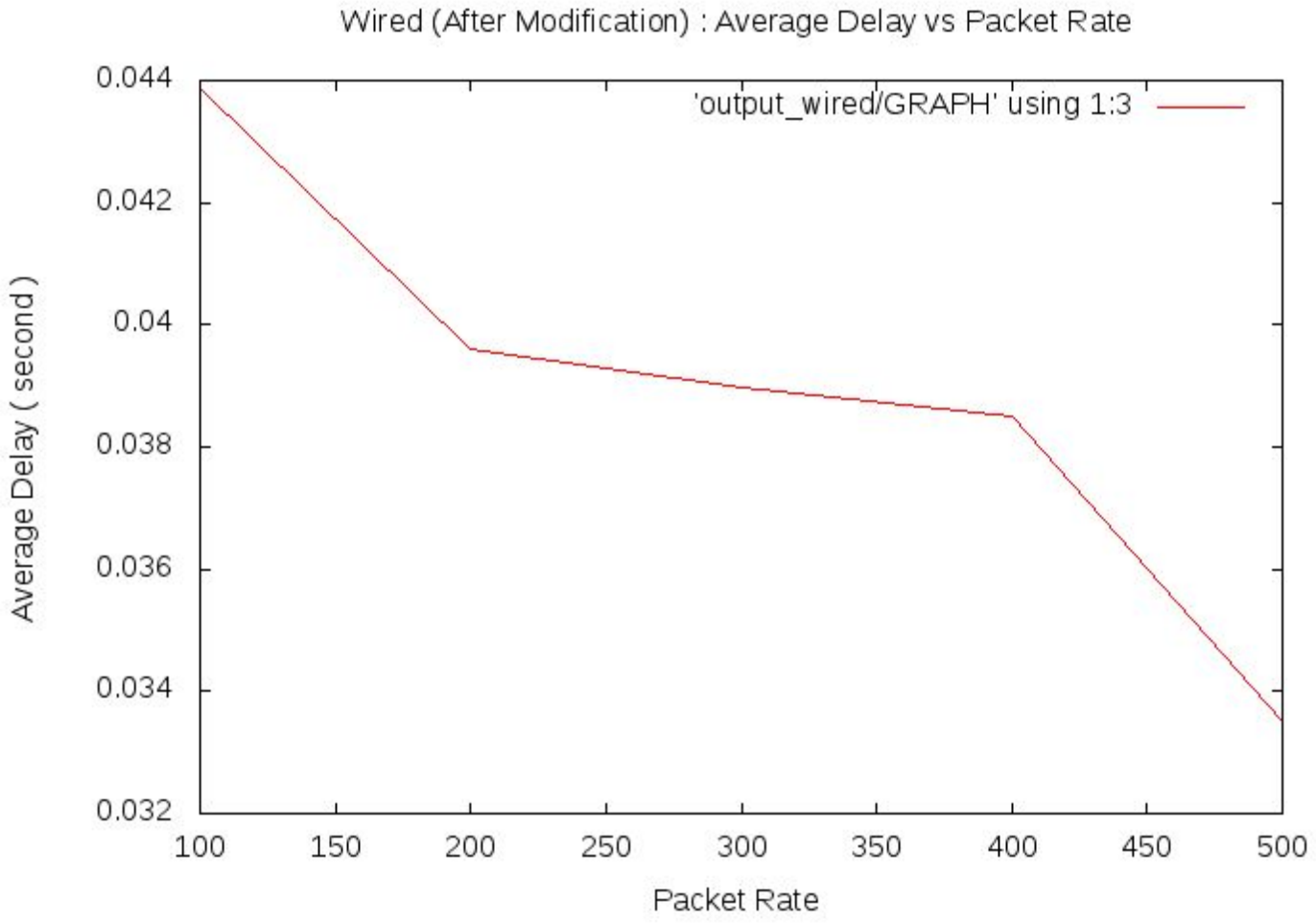

Wired (After Modification) : Per-Node-Throughput (bit/second) vs No of flows - Round -
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
4.5e+06
4e+06
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20


Wired (After Modification) : Per-Node-Throughput (bit/second) vs No of flows - Round -
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
5e+06
4.5e+06
4e+06
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20

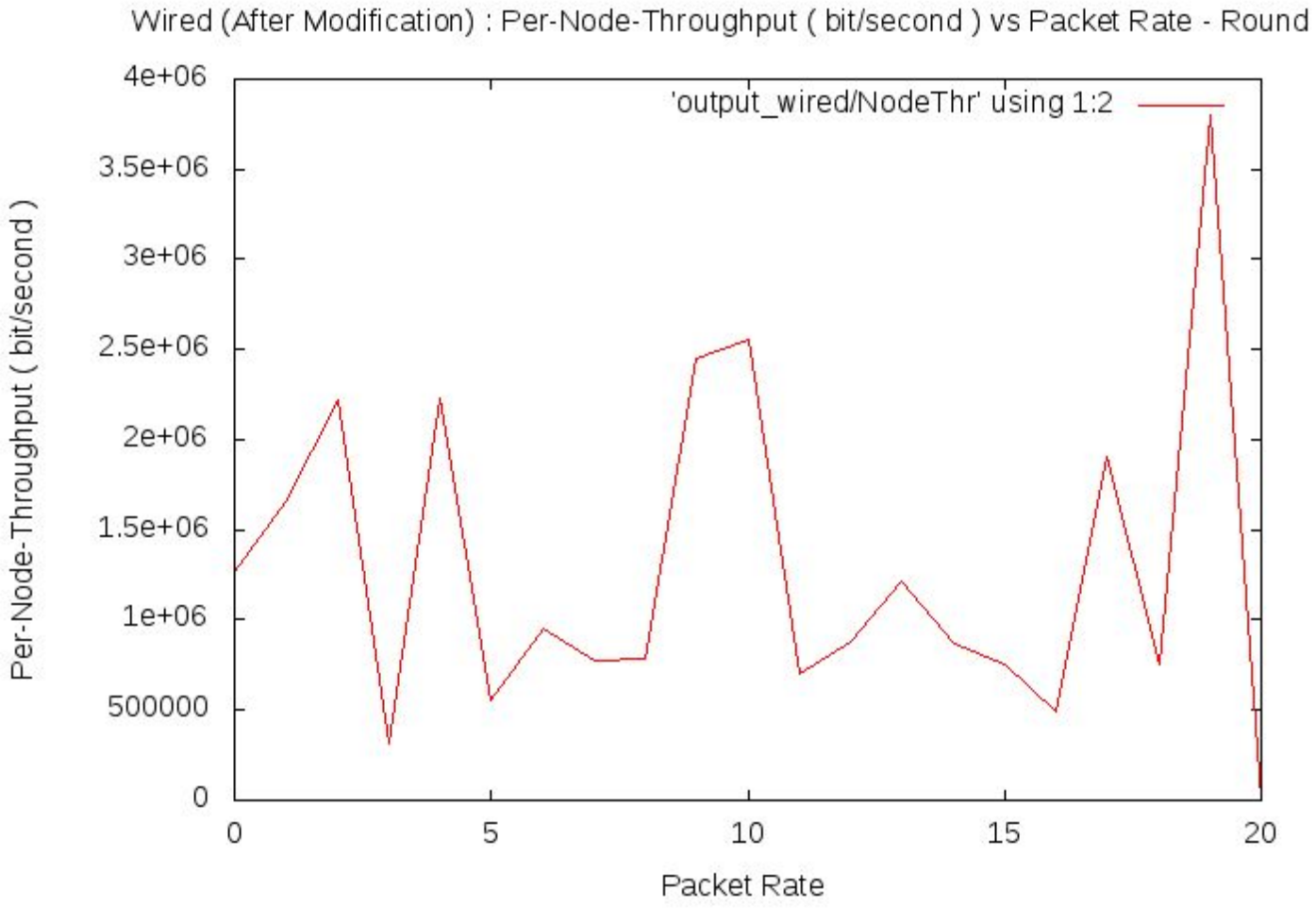

Wired (After Modification) : Per-Node-Throughput (bit/second) vs No of flows - Round -
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
4.5e+06
4e+06
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20

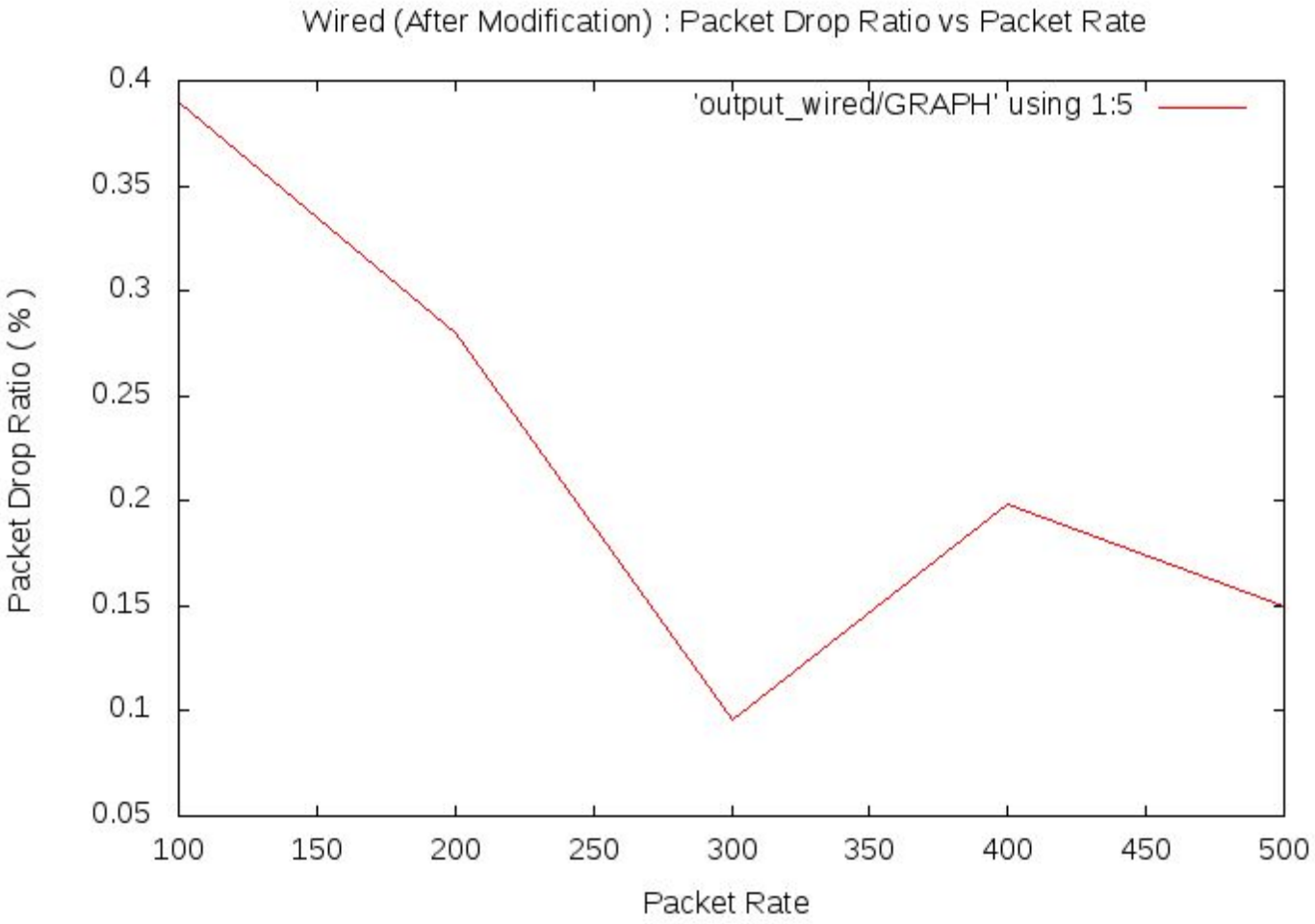

Wired (After Modification) : Per-Node-Throughput (bit/second) vs No of flows - Round -
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20

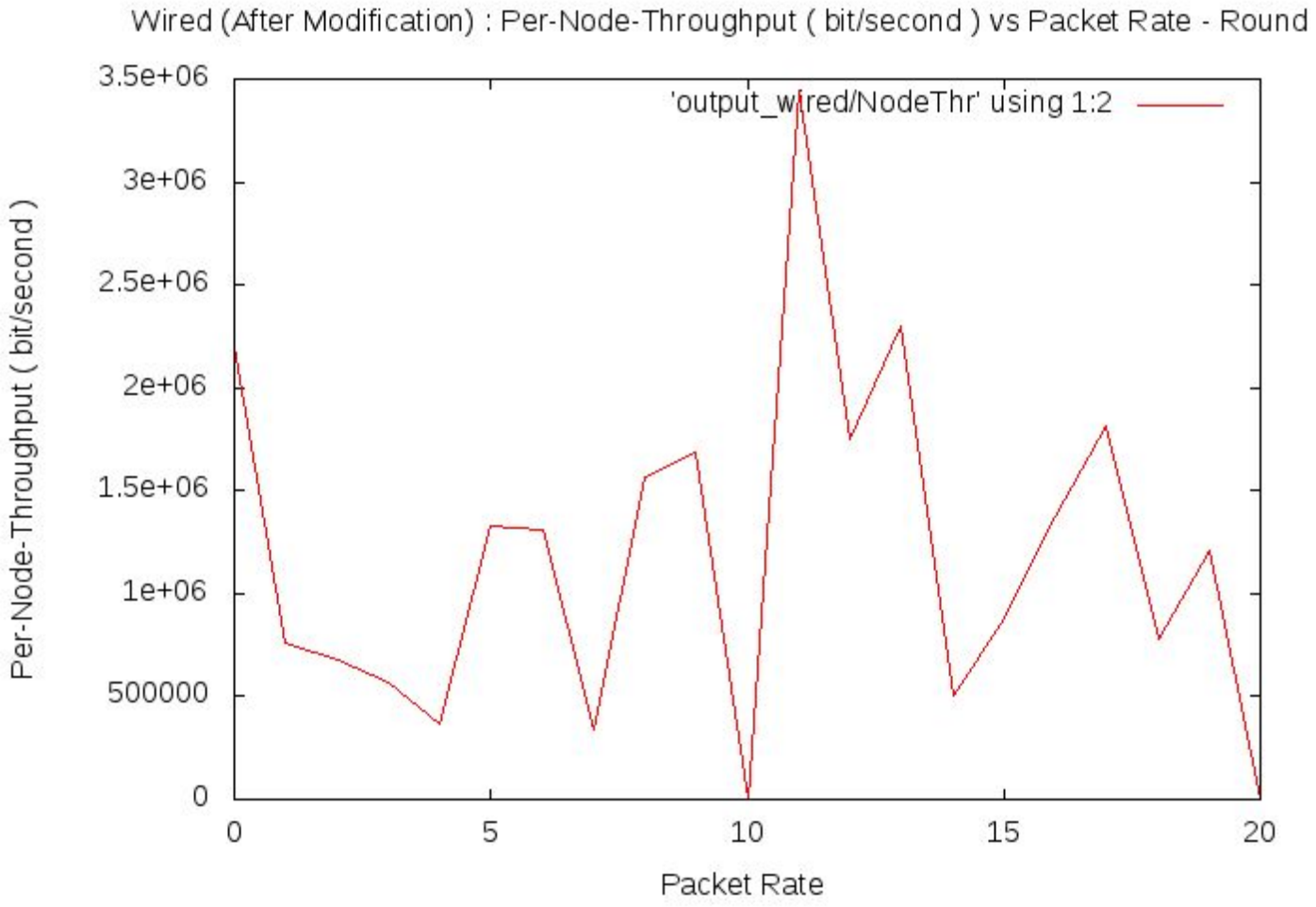

Wired (After Modification) : Throughput vs Packet Rate
'output_wired/GRAPH' using 1:2
Throughput (bit/second)
Packet Rate
2.8e+07
2.7e+07
2.6e+07
2.5e+07
2.4e+07
2.3e+07
2.2e+07
2.1e+07
2e+07
100
150
200
250
300
350
400
450
500

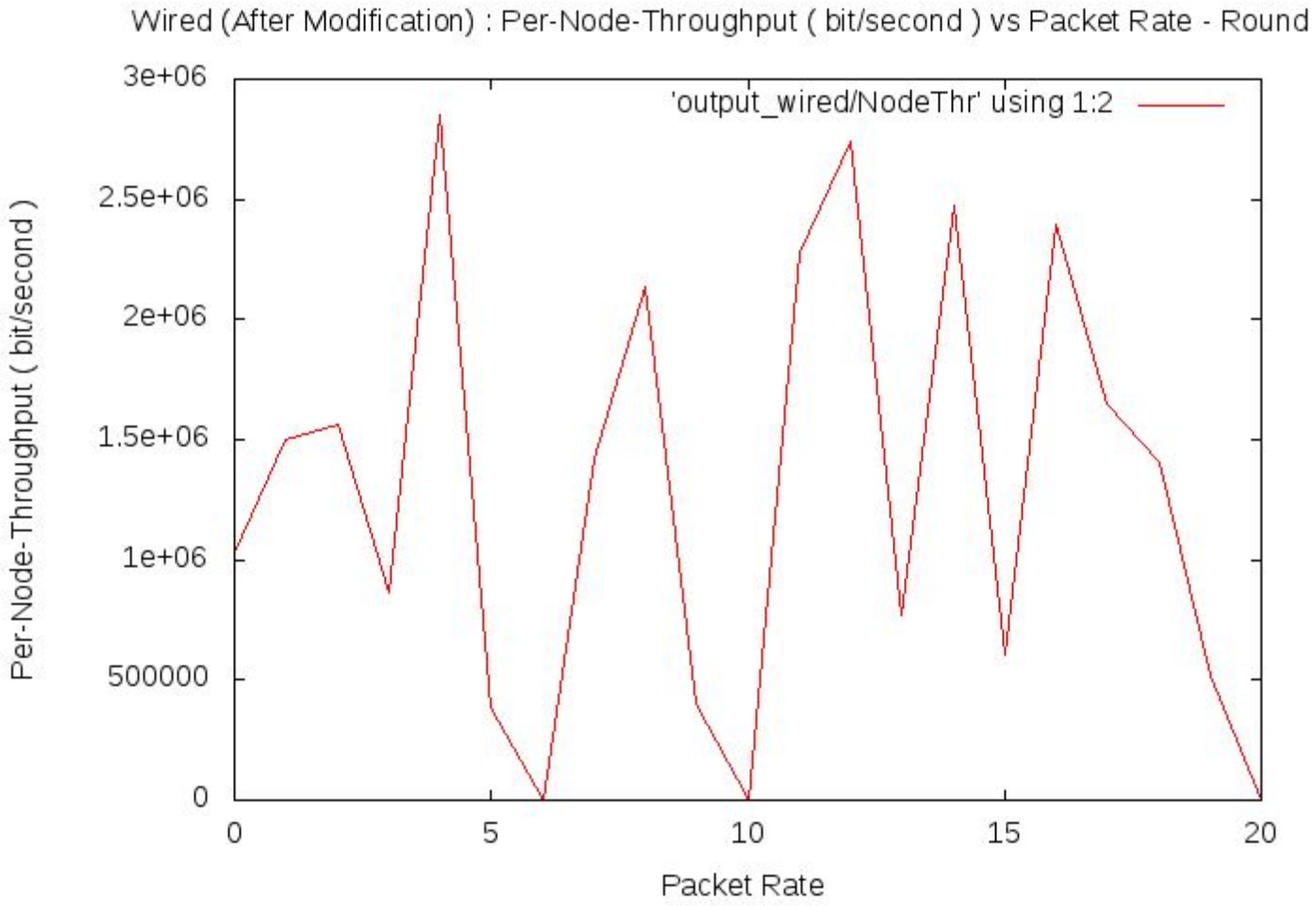

Wired (After Modification) : Average Delay vs Packet Rate
'output_wired/GRAPH' using 1:3
Average Delay (second)
0.044
0.042
0.04
0.038
0.036
0.034
0.032
100
150
200
250
300
350
400
450
500
Packet Rate

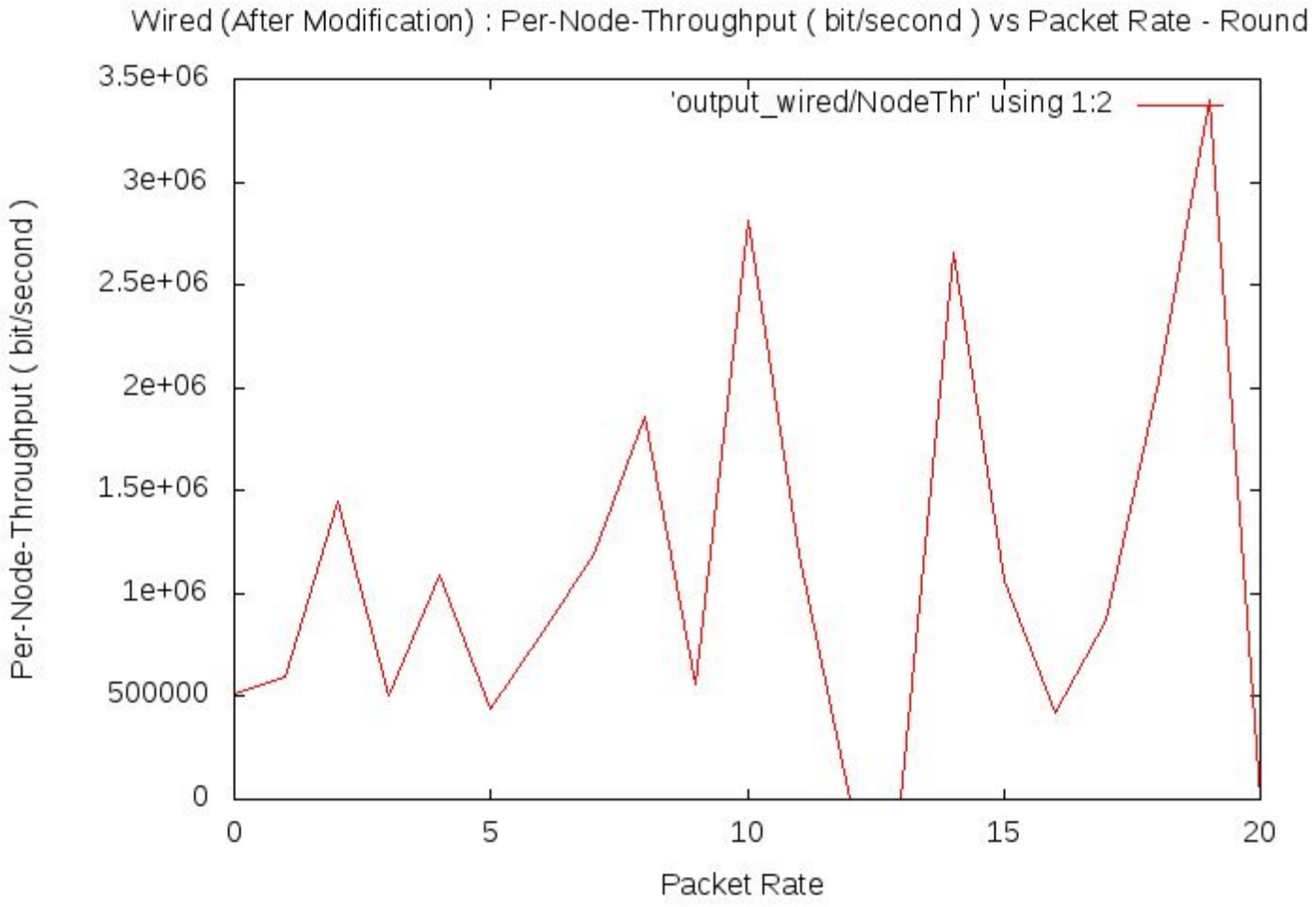

Wired (After Modification) : Packet Delivery Ratio vs Packet Rate
'output_wired/GRAPH' using 1:4
Packet Delivery Ratio (%)
99.5
99.45
99.4
99.35
99.3
99.25
99.2
99.15
99.1
100
150
200
250
300
350
400
450
500
Packet Rate

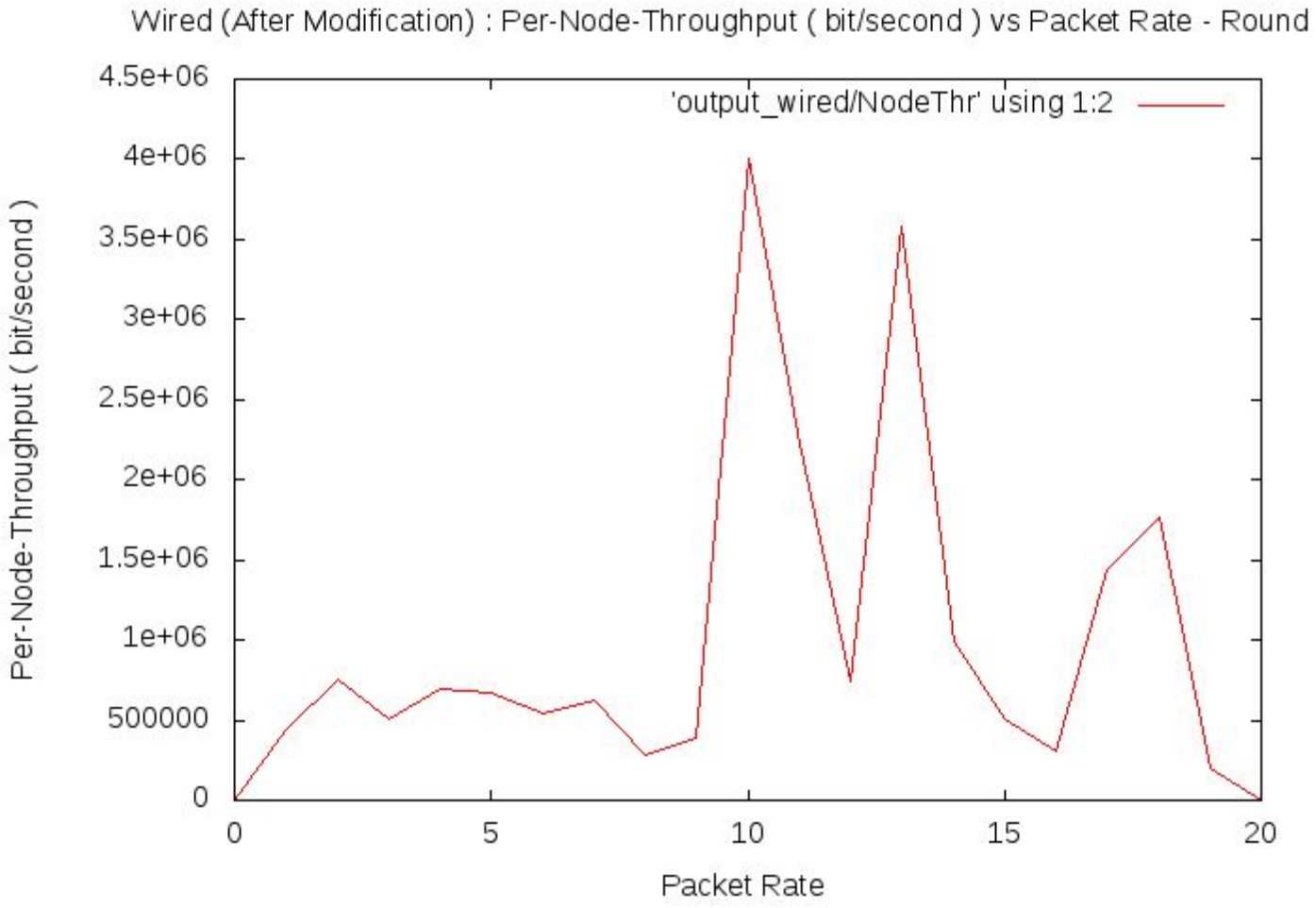

Wired (After Modification) : Per-Node-Throughput (bit/second) vs Packet Rate - Round
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
4e+06
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20
Packet Rate


Wired (After Modification) : Packet Drop Ratio vs Packet Rate
'output_wired/GRAPH' using 1:5
Packet Drop Ratio (%)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
100
150
200
250
300
350
400
450
500
Packet Rate

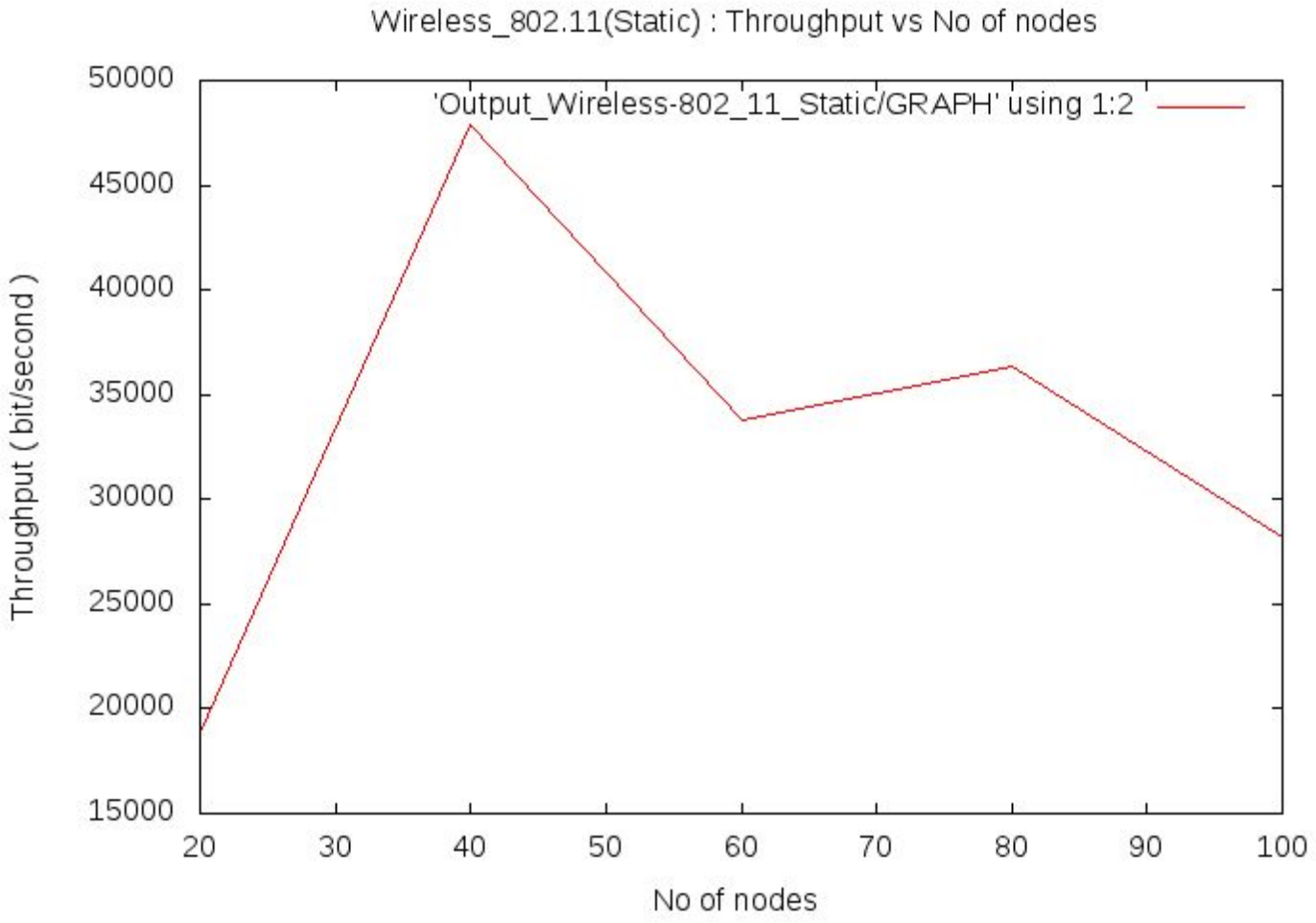

Wired (After Modification) : Per-Node-Throughput (bit/second) vs Packet Rate - Round
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20
Packet Rate

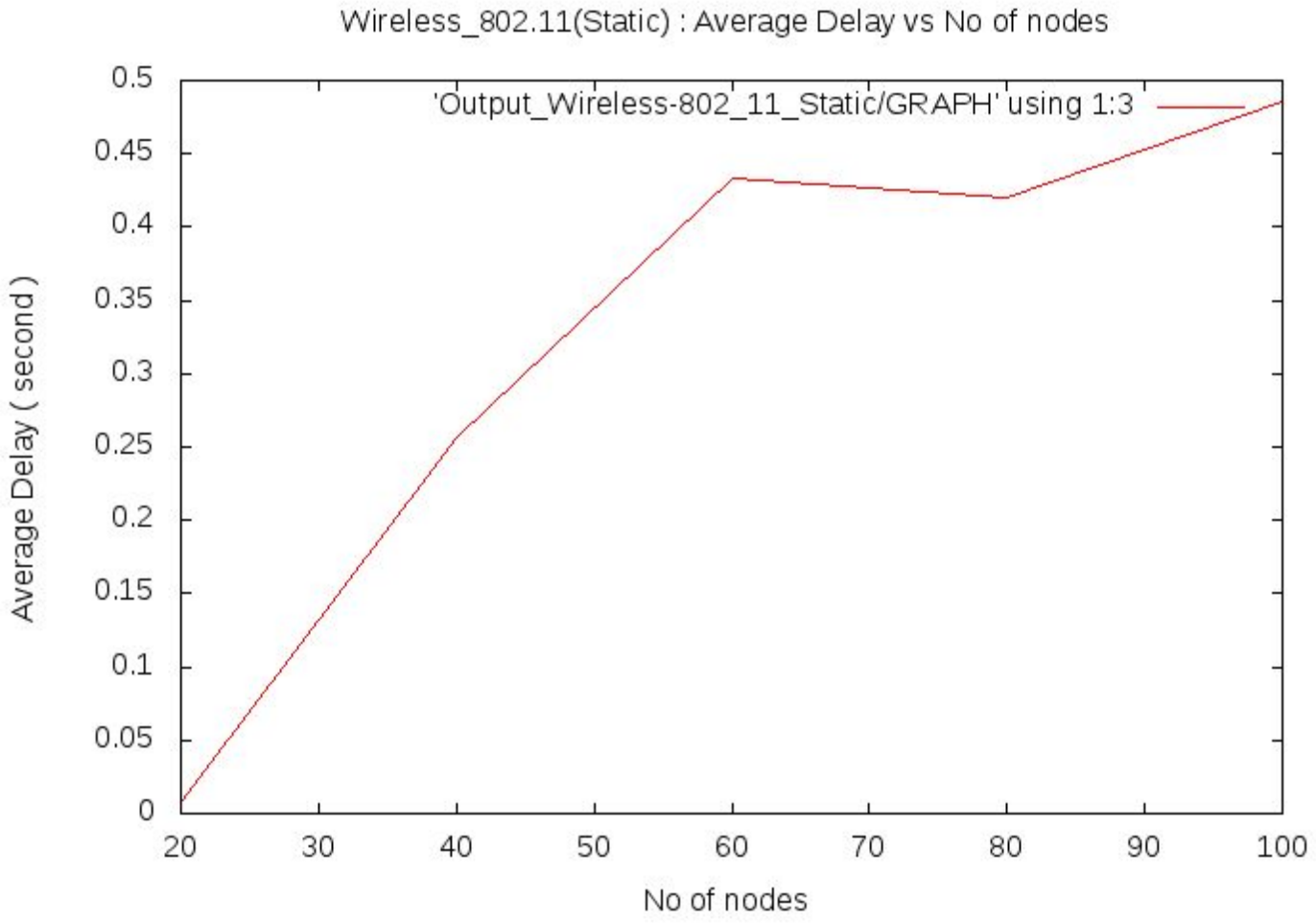

Wired (After Modification) : Per-Node-Throughput (bit/second) vs Packet Rate - Round
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20
Packet Rate

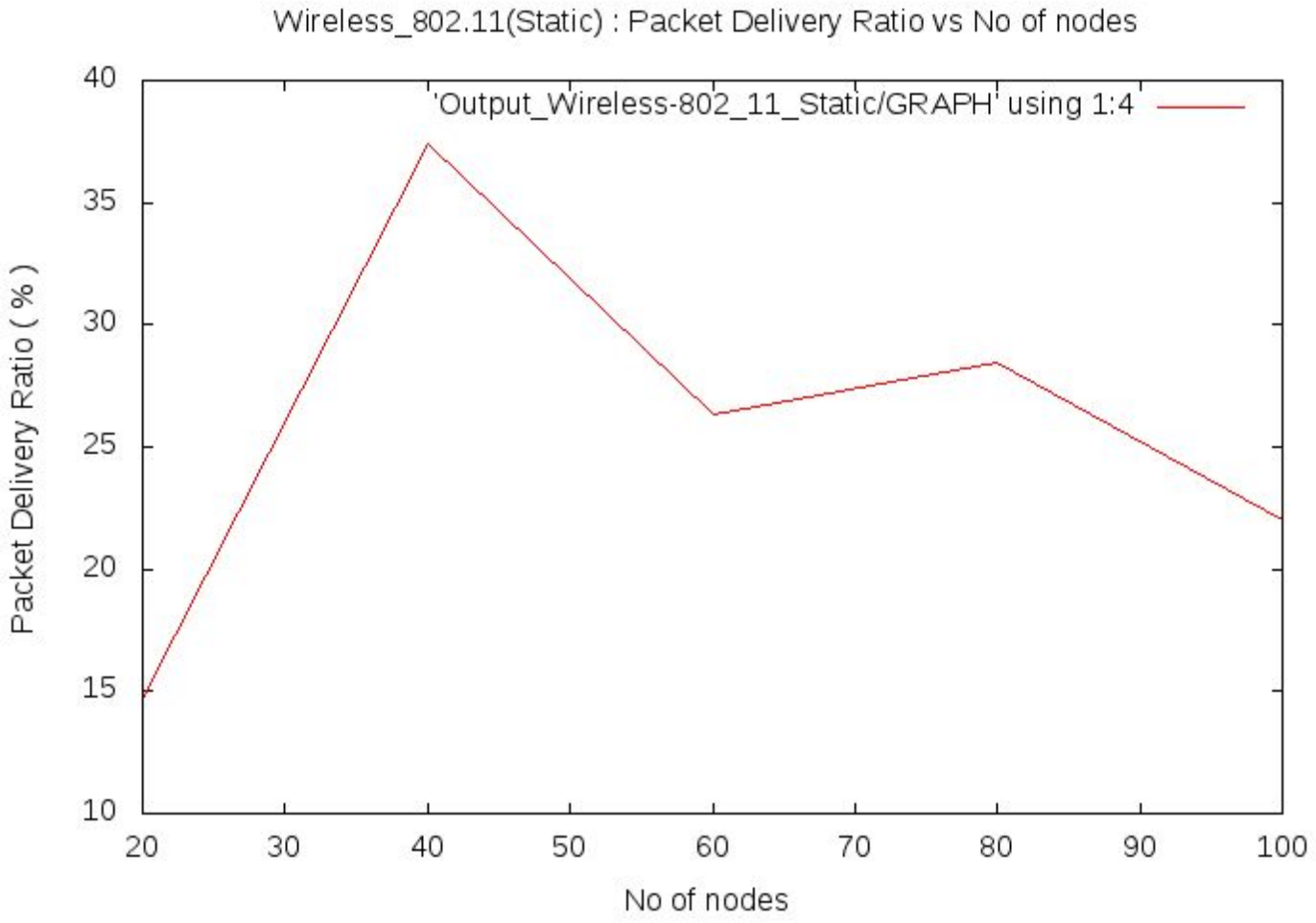

Wired (After Modification) : Per-Node-Throughput (bit/second) vs Packet Rate - Round
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20
Packet Rate

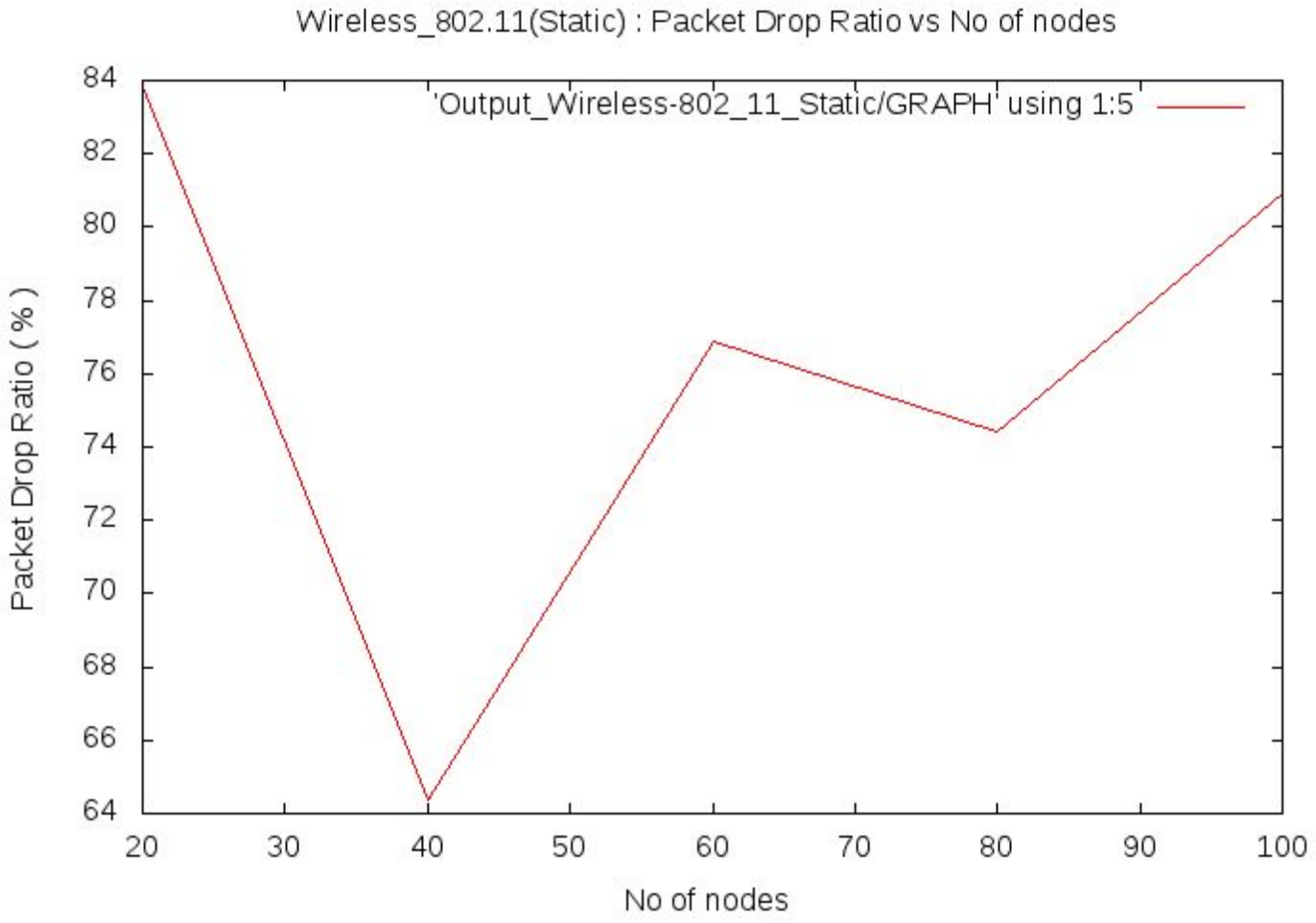

Wired (After Modification) : Per-Node-Throughput (bit/second) vs Packet Rate - Round
'output_wired/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
4.5e+06
4e+06
3.5e+06
3e+06
2.5e+06
2e+06
1.5e+06
1e+06
500000
0
0
5
10
15
20
Packet Rate

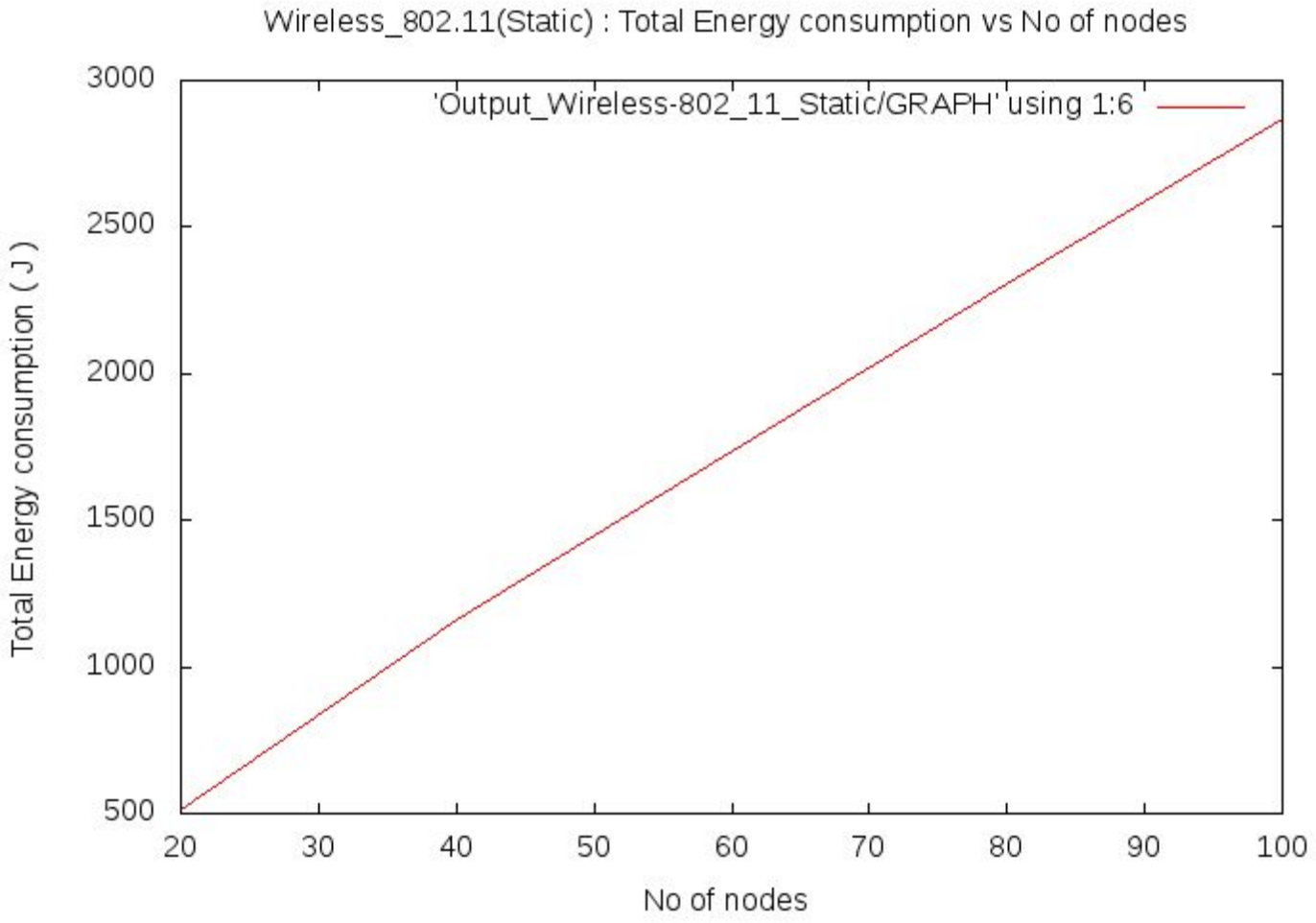
Wireless 802.11 (Static) (Before Modification)

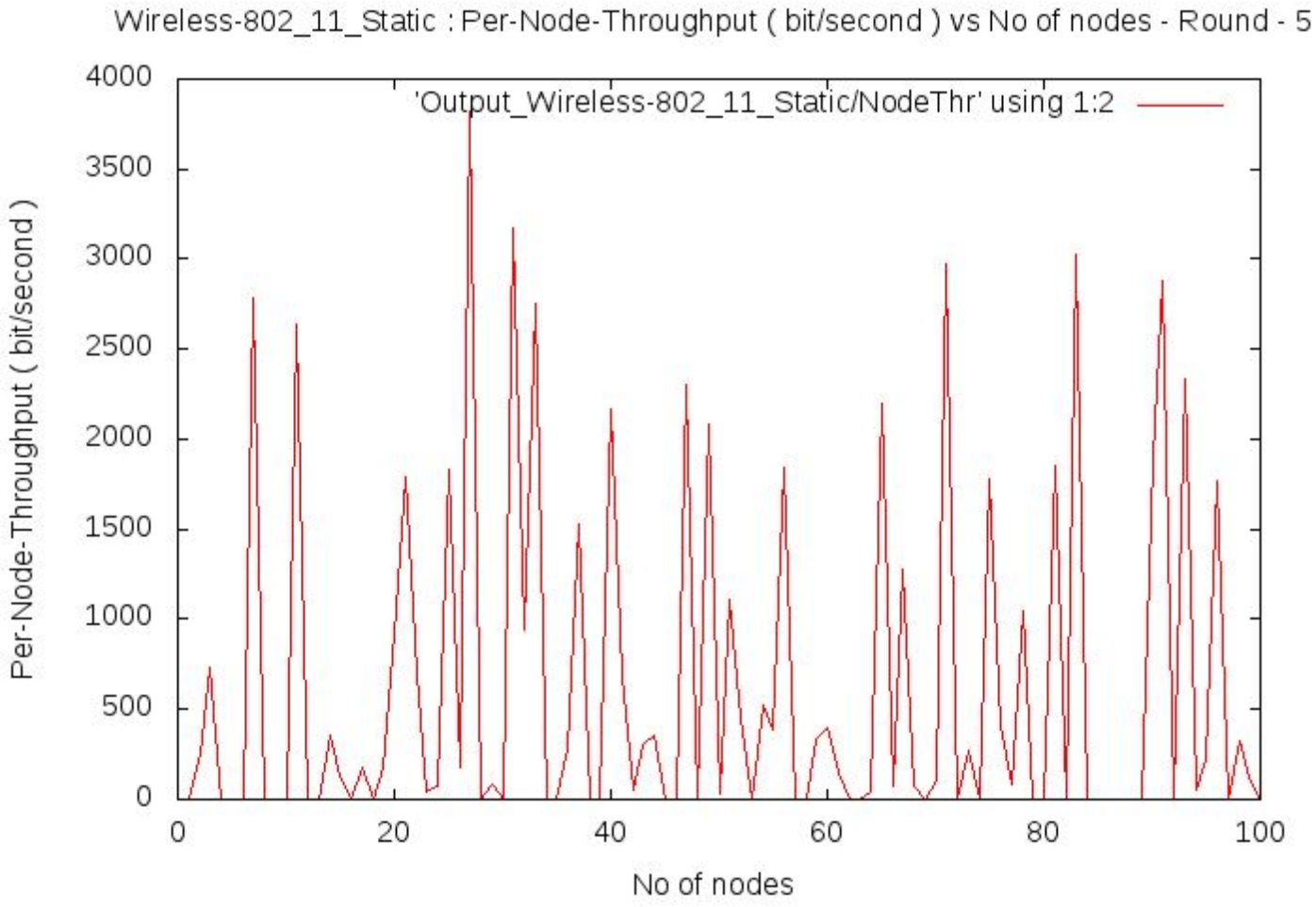

Wireless_802.11(Static) : Throughput vs No of nodes
'Output_Wireless-802_11_Static/GRAPH' using 1:2
Throughput (bit/second)
No of nodes
50000
45000
40000
35000
30000
25000
20000
15000
20
30
40
50
60
70
80
90
100

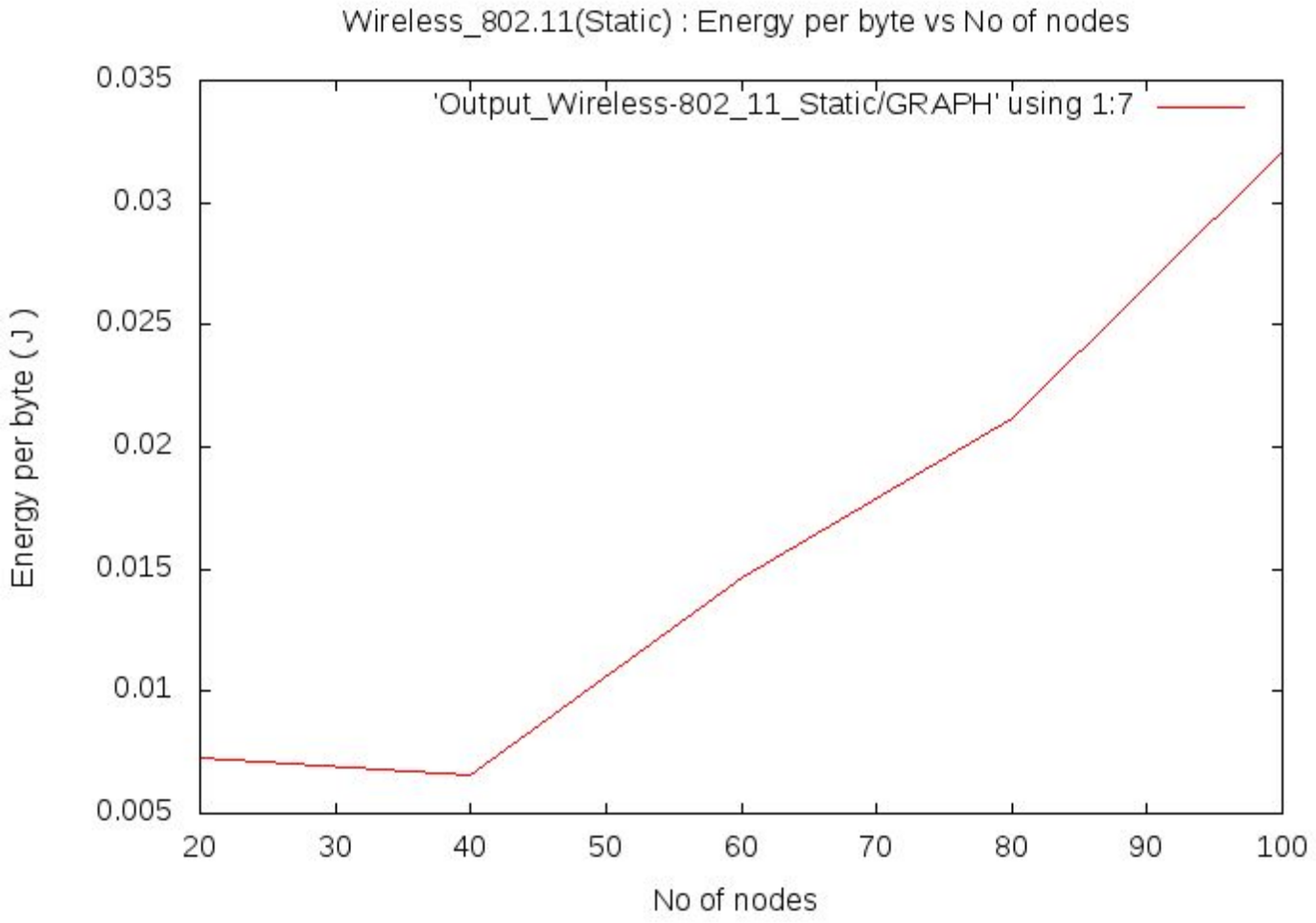

Wireless_802.11(Static) : Average Delay vs No of nodes
'Output_Wireless-802_11_Static/GRAPH' using 1:3
Average Delay (second)
No of nodes
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
20
30
40
50
60
70
80
90
100

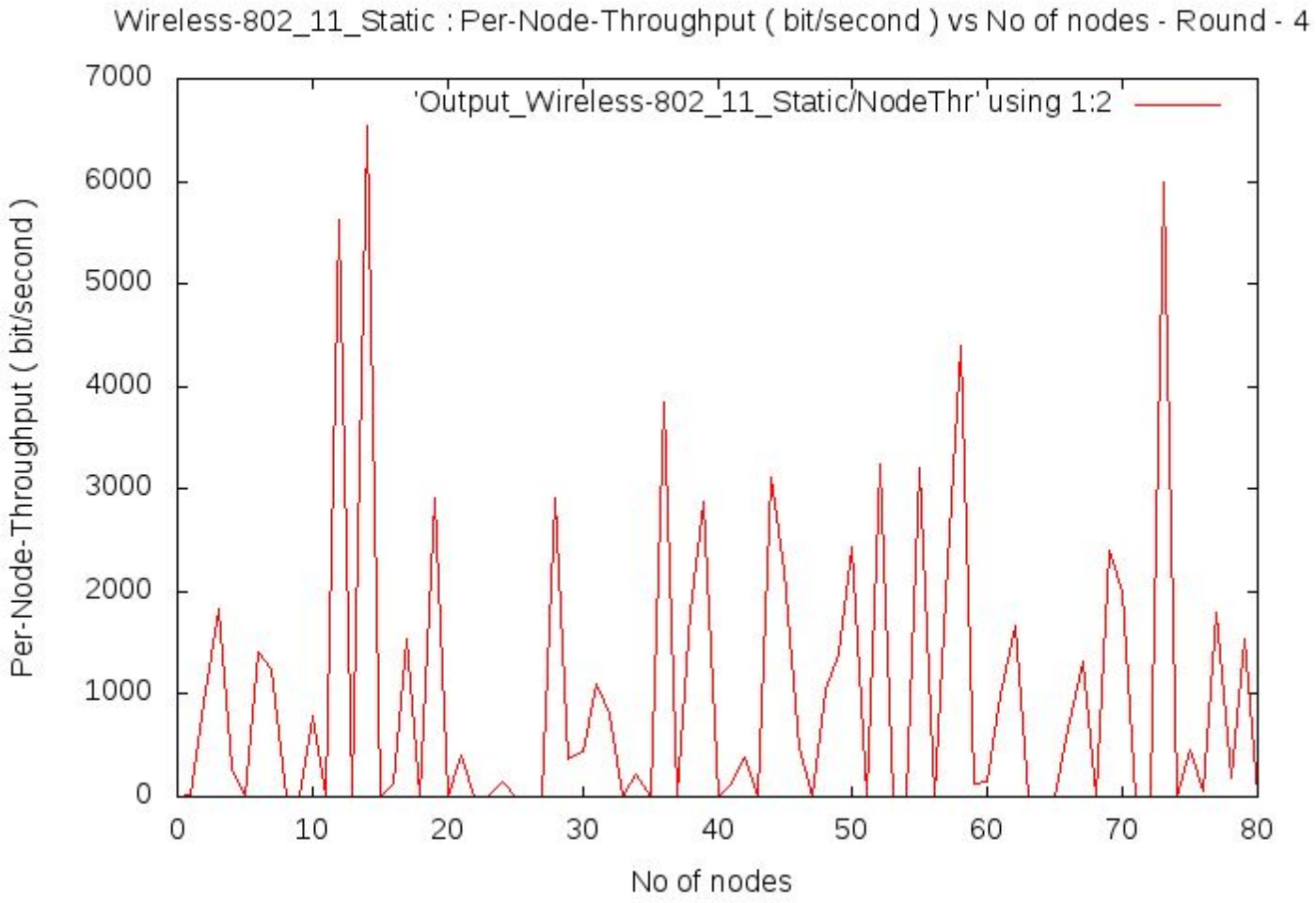

Wireless_802.11(Static) : Packet Delivery Ratio vs No of nodes
'Output_Wireless-802_11_Static/GRAPH' using 1:4
Packet Delivery Ratio (%)
No of nodes
40
35
30
25
20
15
10
20
30
40
50
60
70
80
90
100

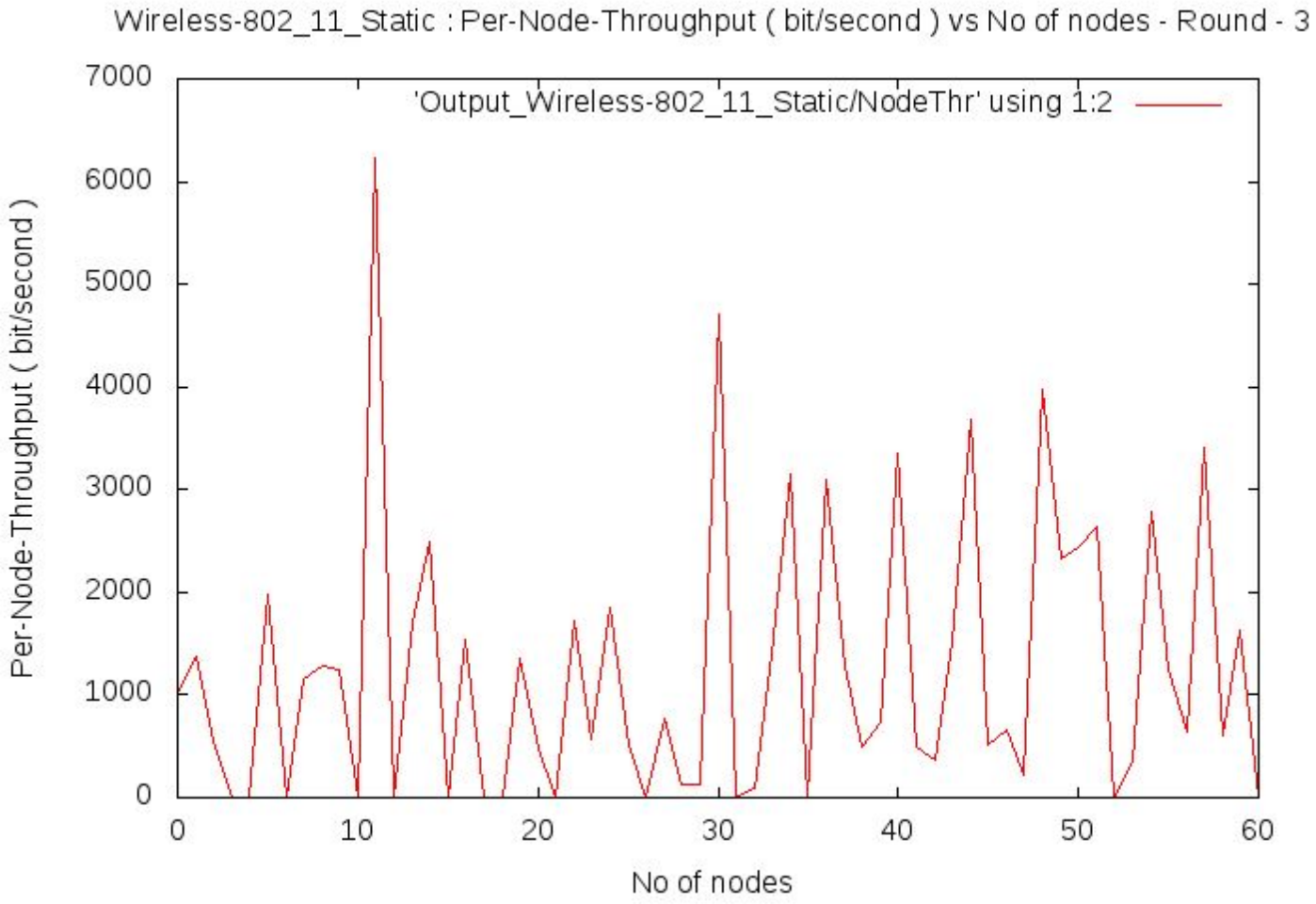

Wireless_802.11(Static) : Packet Drop Ratio vs No of nodes
'Output_Wireless-802_11_Static/GRAPH' using 1:5
Packet Drop Ratio (%)
No of nodes
84
82
80
78
76
74
72
70
68
66
64
20
30
40
50
60
70
80
90
100

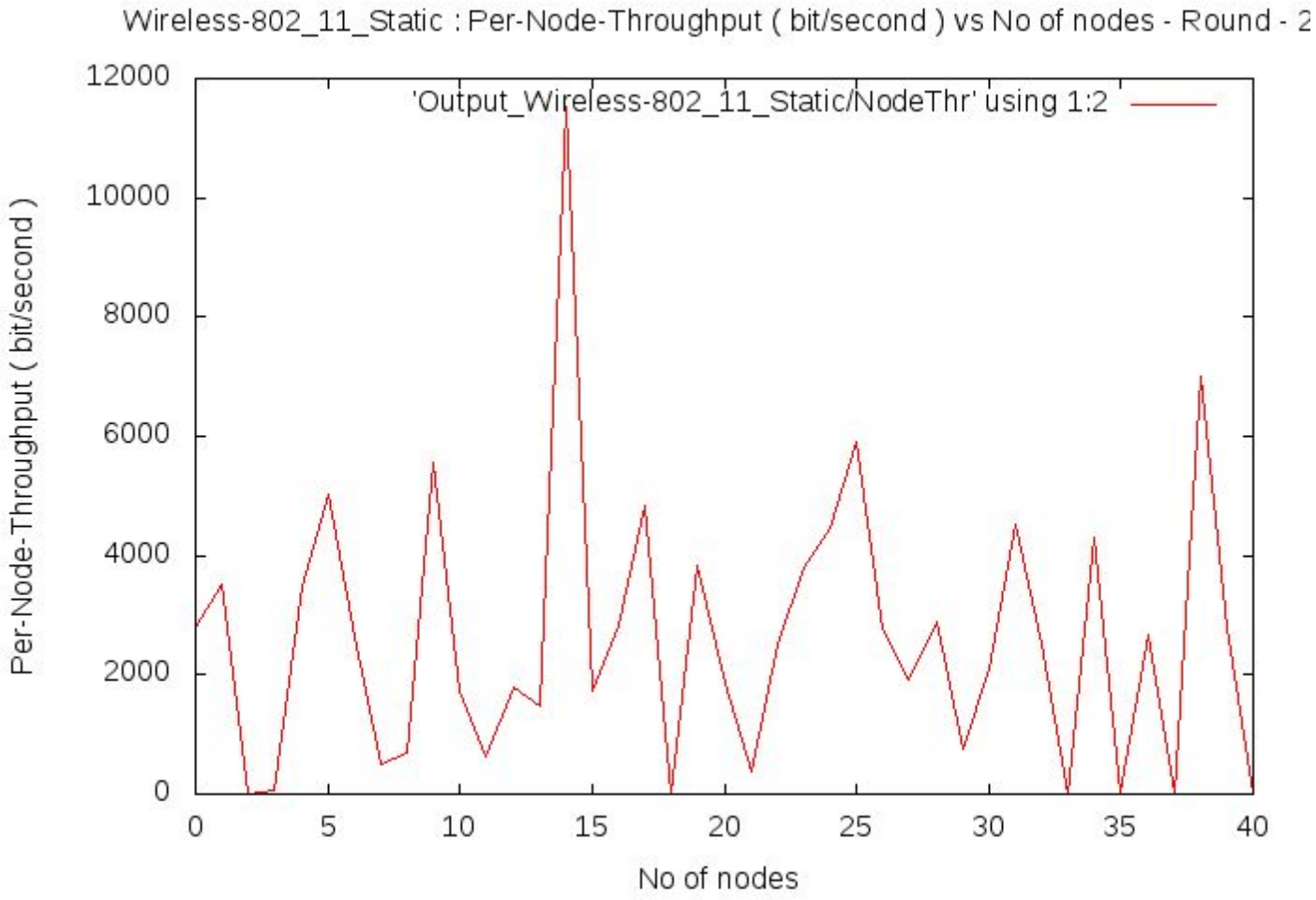

Wireless_802.11(Static) : Total Energy consumption vs No of nodes
'Output_Wireless-802_11_Static/GRAPH' using 1:6
Total Energy consumption (J)
No of nodes
3000
2500
2000
1500
1000
500
20
30
40
50
60
70
80
90
100

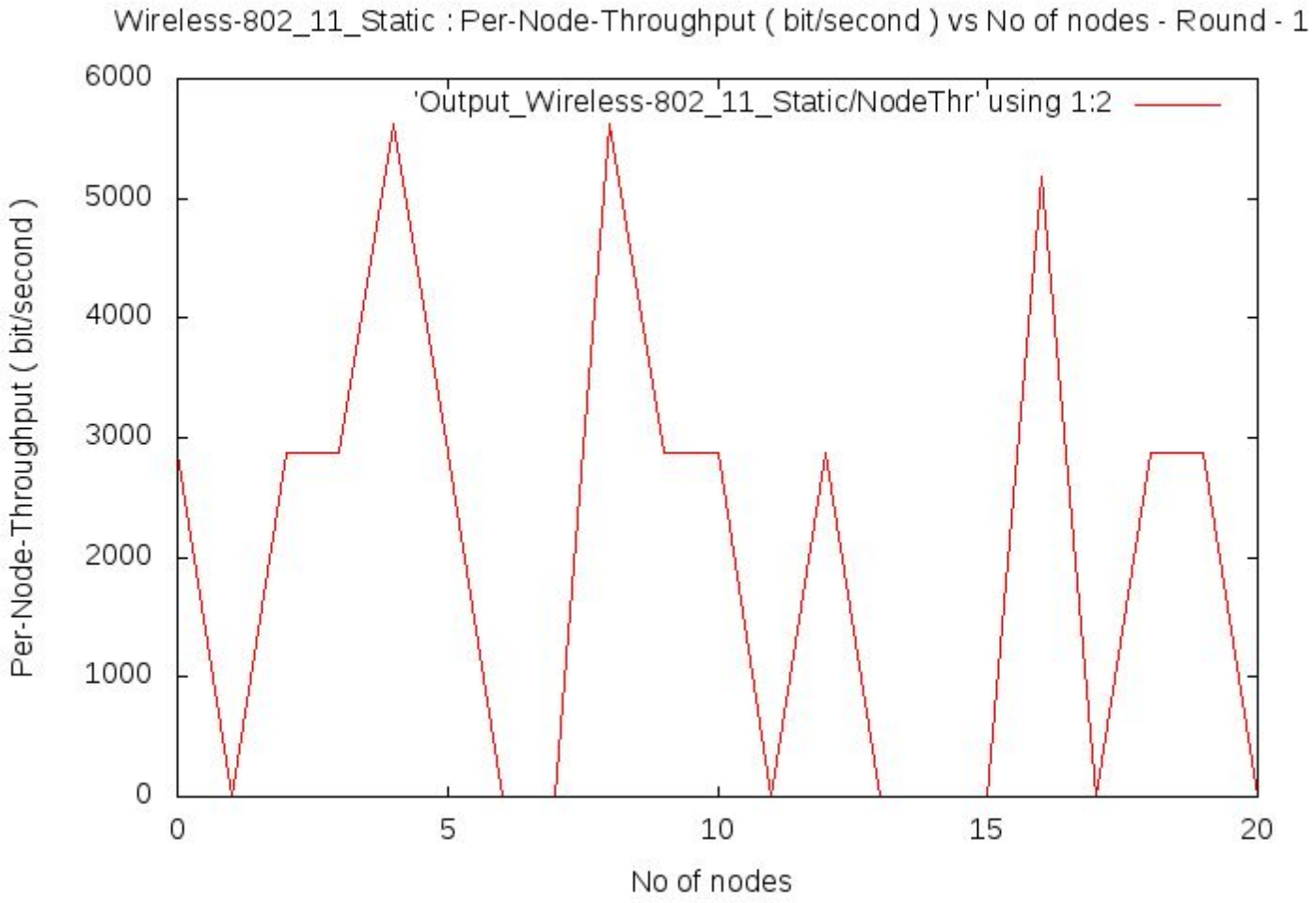

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of nodes - Round - 5
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
0
500
1000
1500
2000
2500
3000
3500
4000
0
20
40
60
80
100

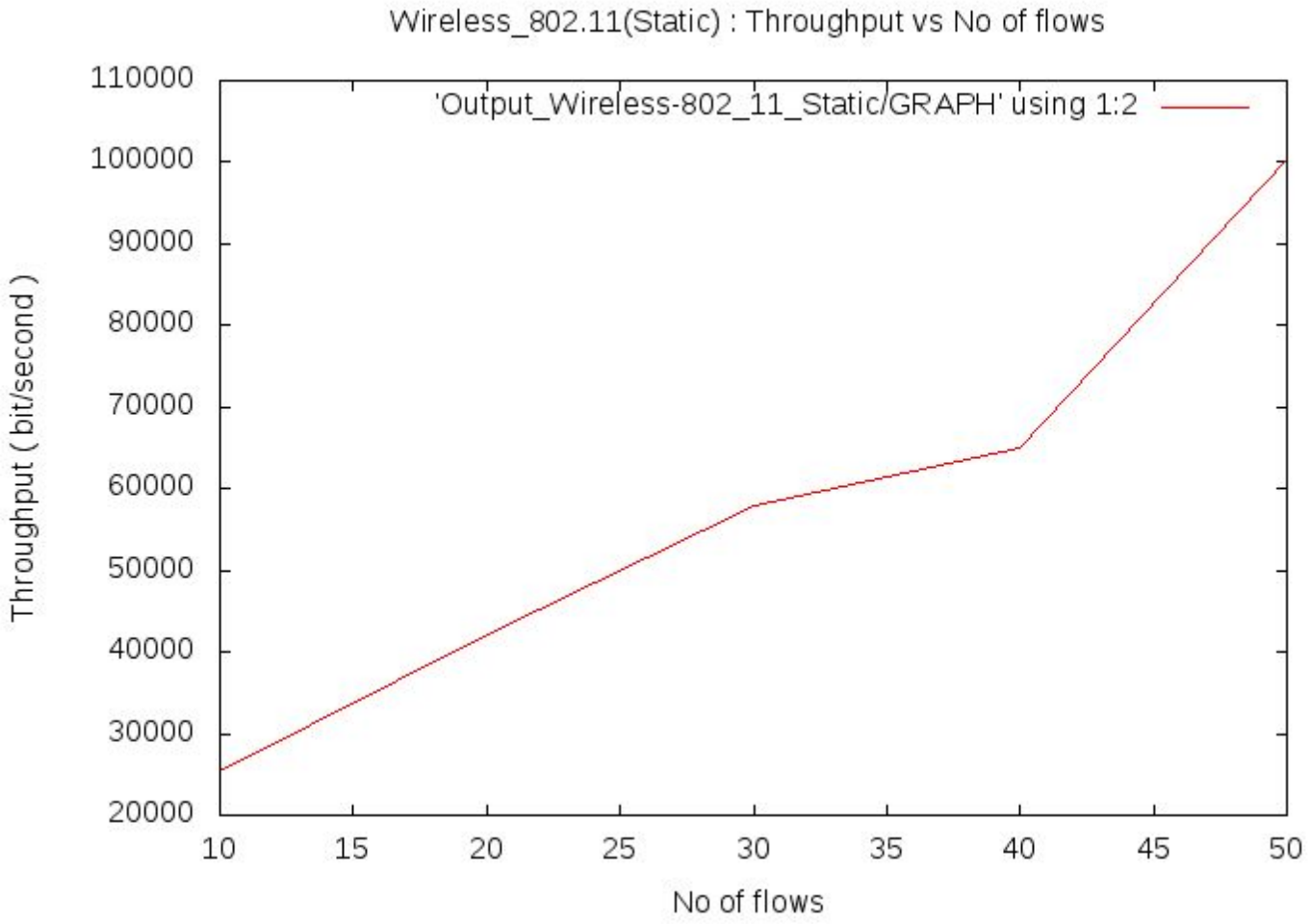

Wireless_802.11(Static) : Energy per byte vs No of nodes
'Output_Wireless-802_11_Static/GRAPH' using 1:7
Energy per byte (J)
No of nodes
0.035
0.03
0.025
0.02
0.015
0.01
0.005
20
30
40
50
60
70
80
90
100

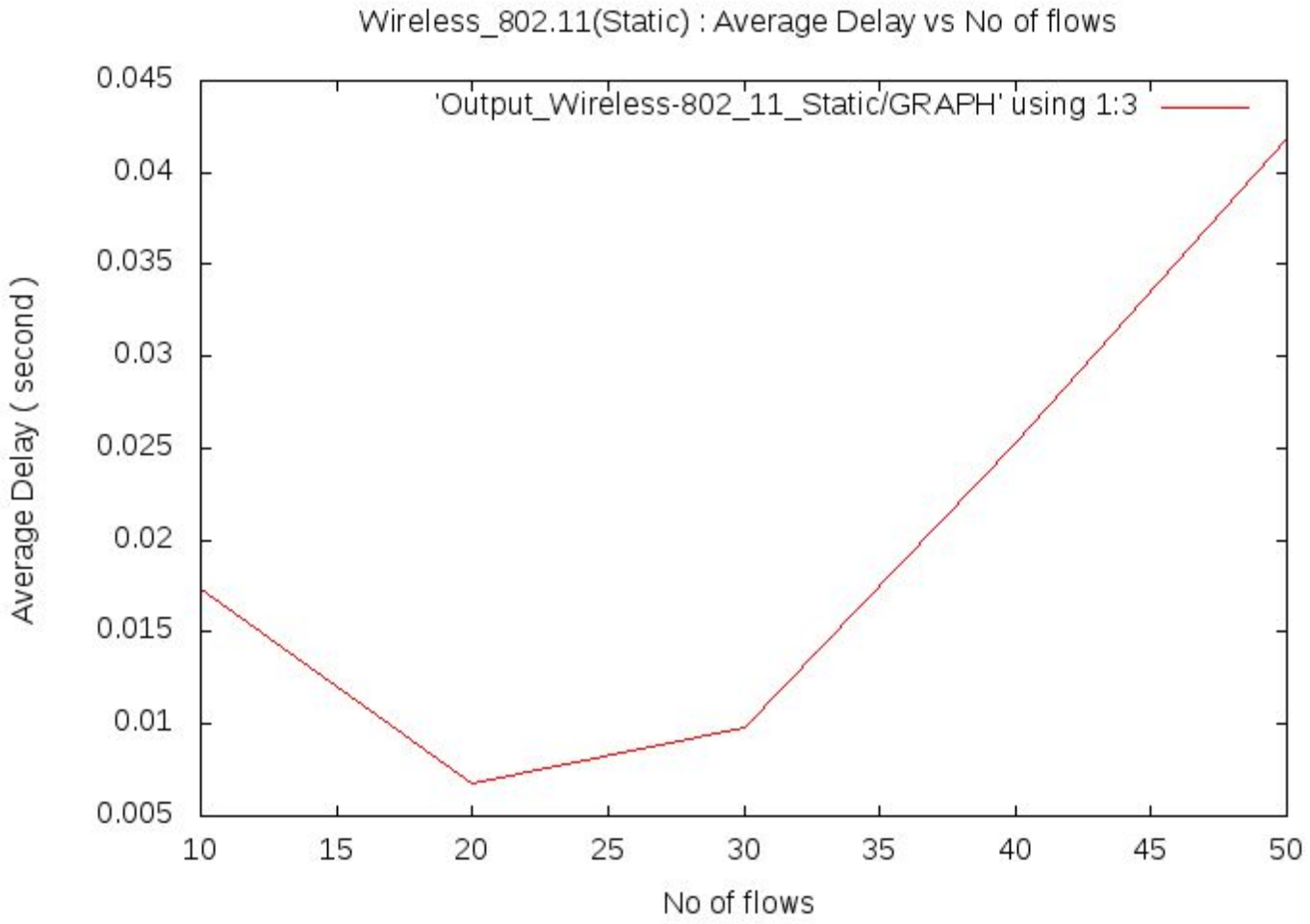

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of nodes - Round - 4
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
0
1000
2000
3000
4000
5000
6000
7000
0
10
20
30
40
50
60
70
80

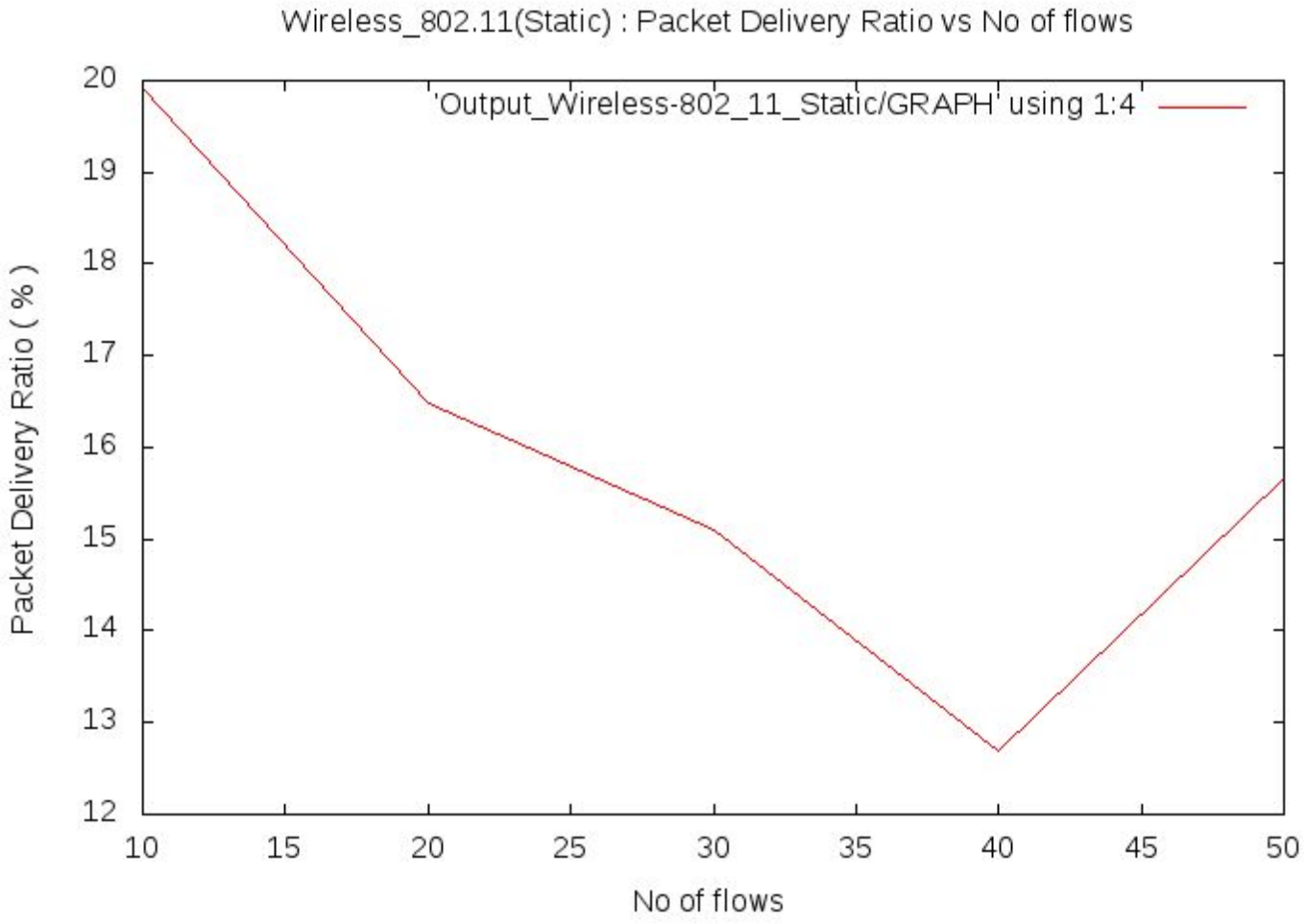

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of nodes - Round - 3
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
0
1000
2000
3000
4000
5000
6000
7000
0
10
20
30
40
50
60

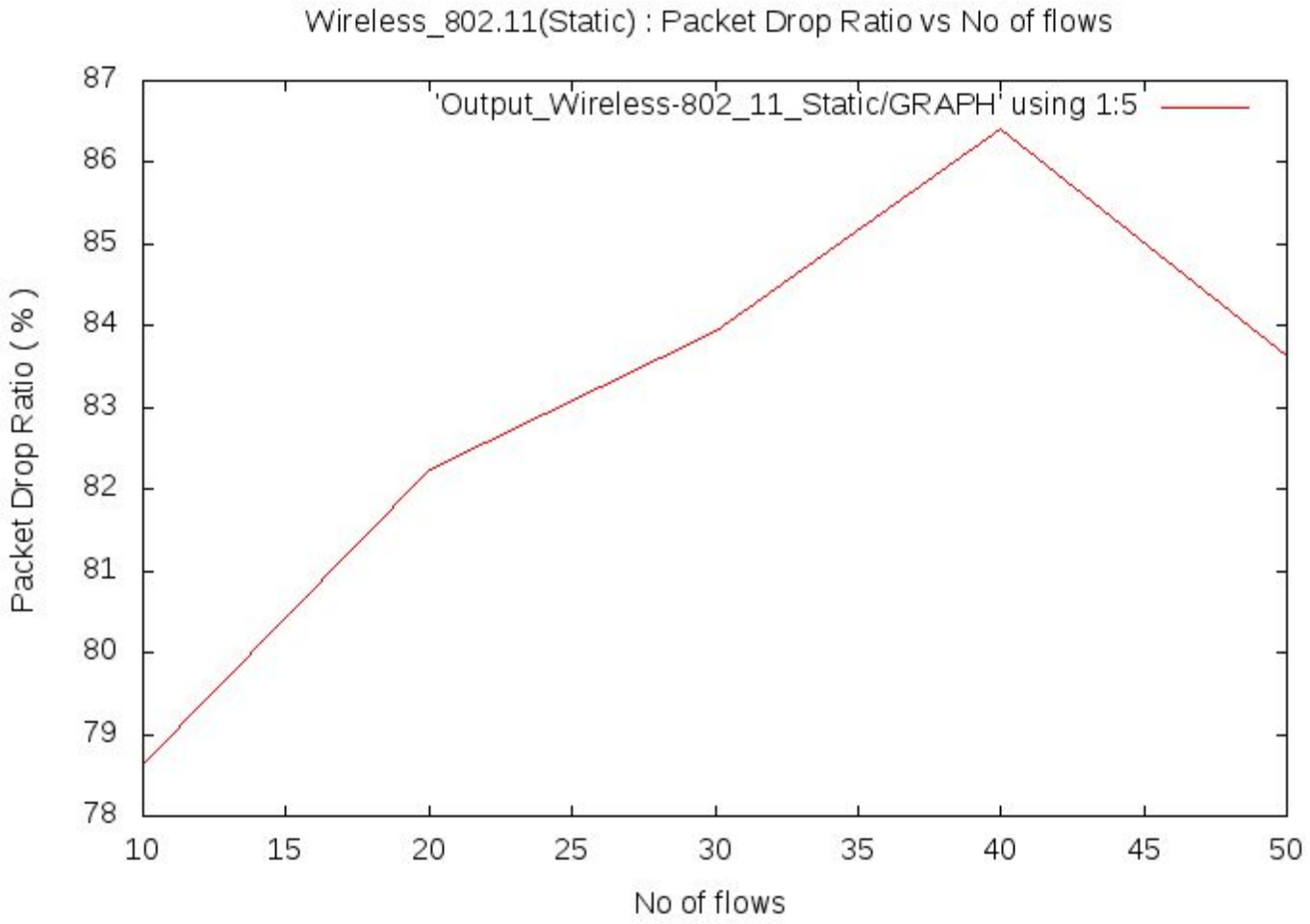

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of nodes - Round - 2
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
0
2000
4000
6000
8000
10000
12000
0
5
10
15
20
25
30
35
40

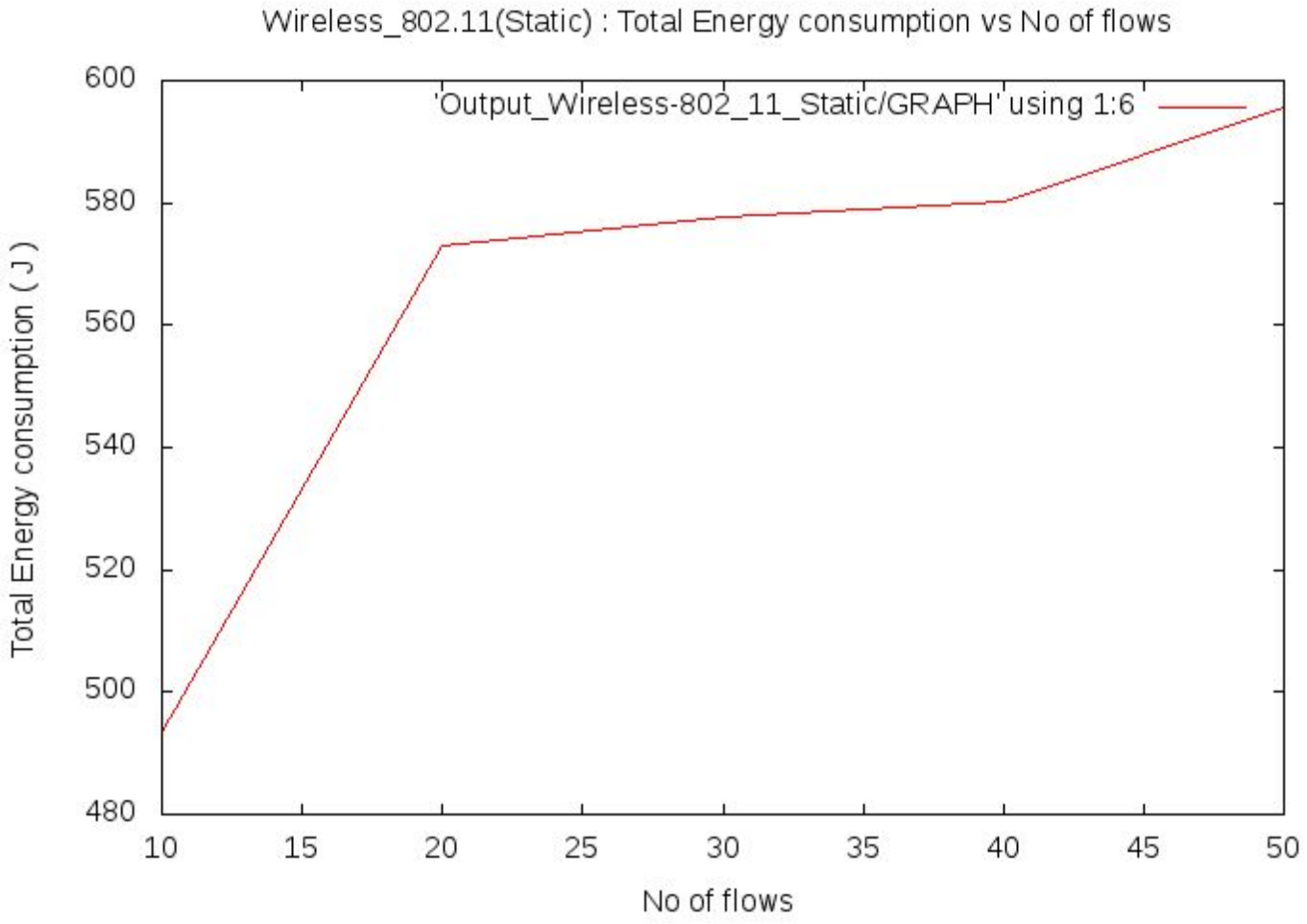

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of nodes - Round - 1
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
6000
5000
4000
3000
2000
1000
0
0
5
10
15
20

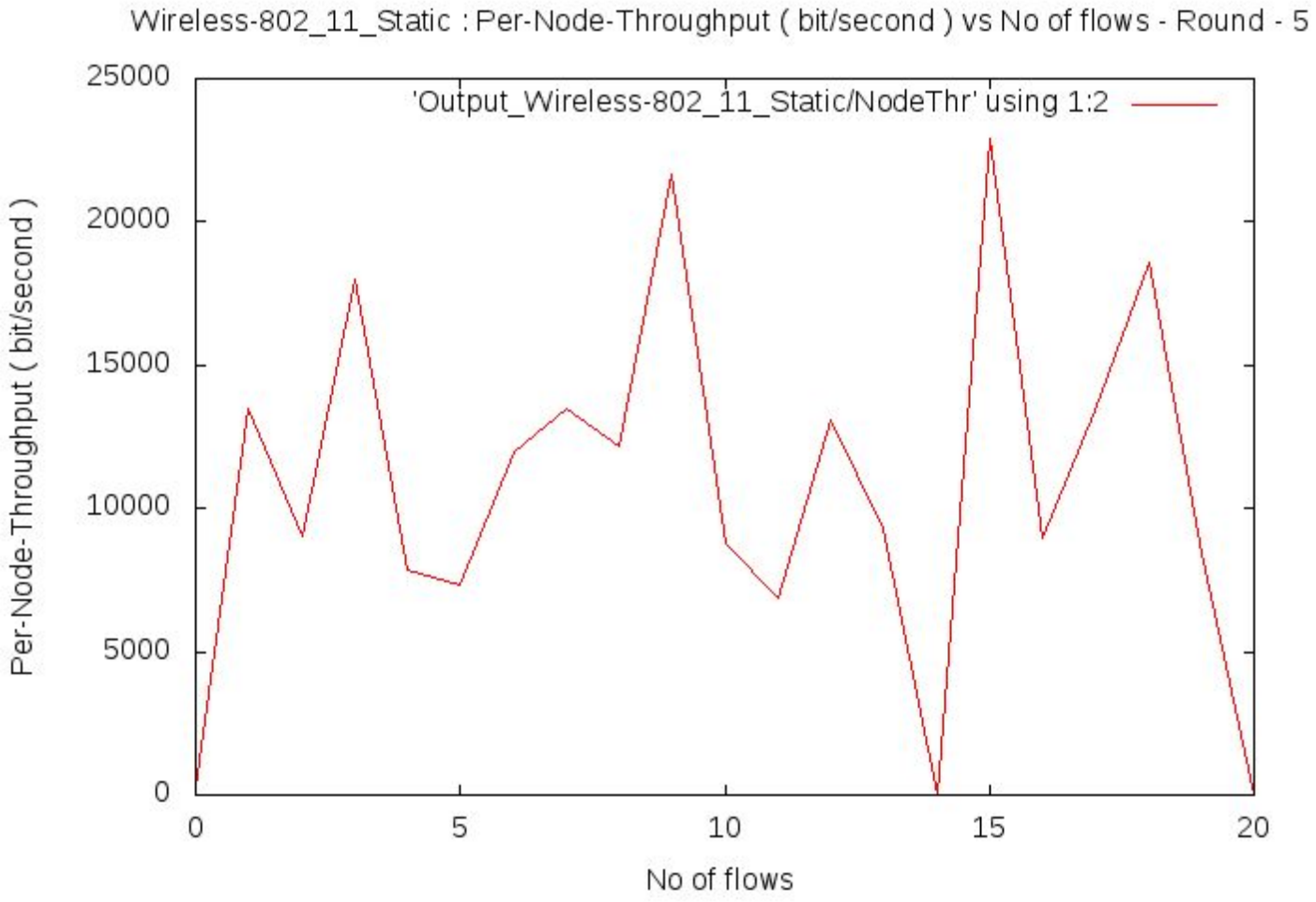

Wireless_802.11(Static) : Throughput vs No of flows
'Output_Wireless-802_11_Static/GRAPH' using 1:2
Throughput (bit/second)
No of flows
110000
100000
90000
80000
70000
60000
50000
40000
30000
20000
10
15
20
25
30
35
40
45
50

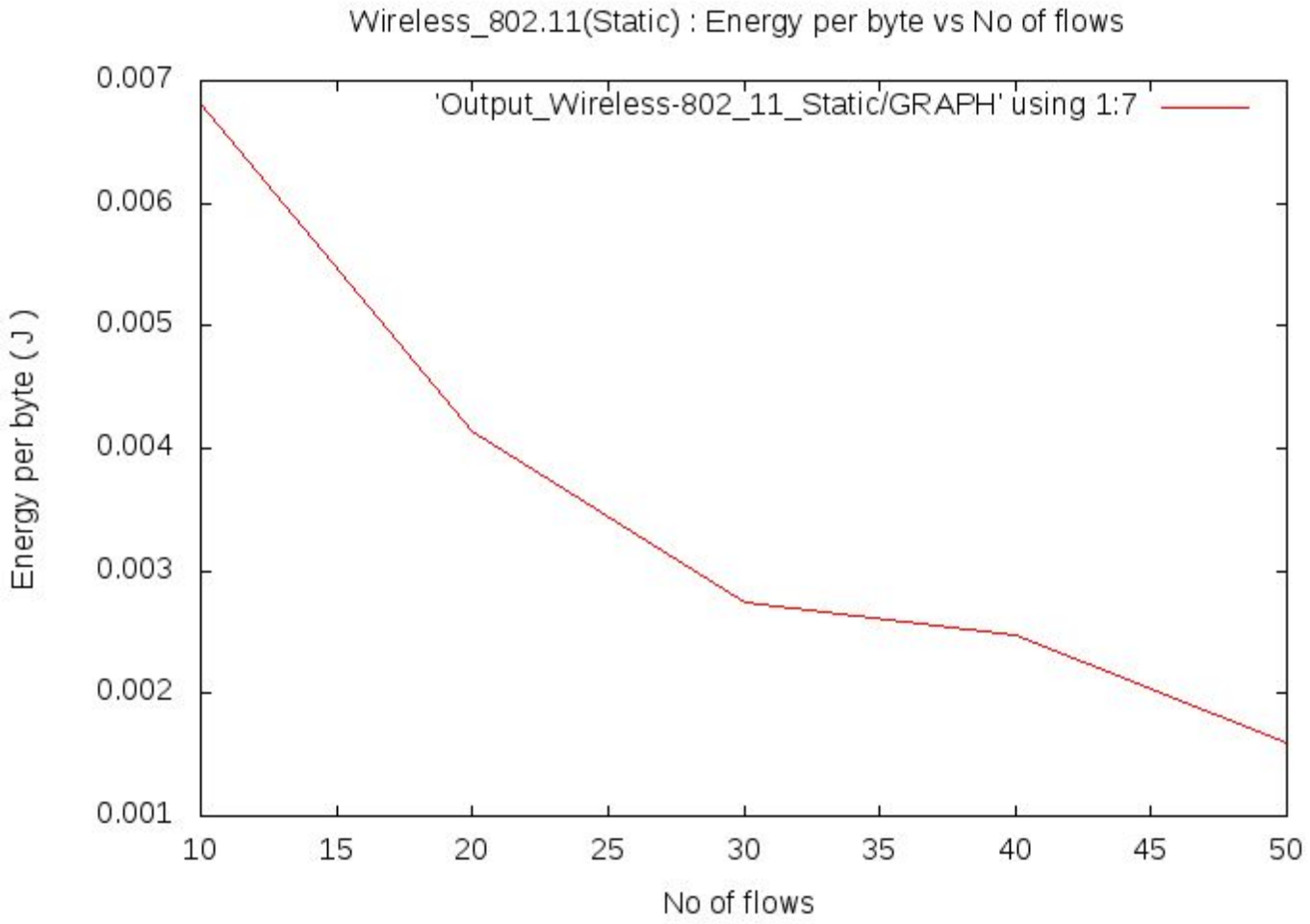

Wireless_802.11(Static) : Average Delay vs No of flows
'Output_Wireless-802_11_Static/GRAPH' using 1:3
Average Delay (second)
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
10
15
20
25
30
35
40
45
50
No of flows

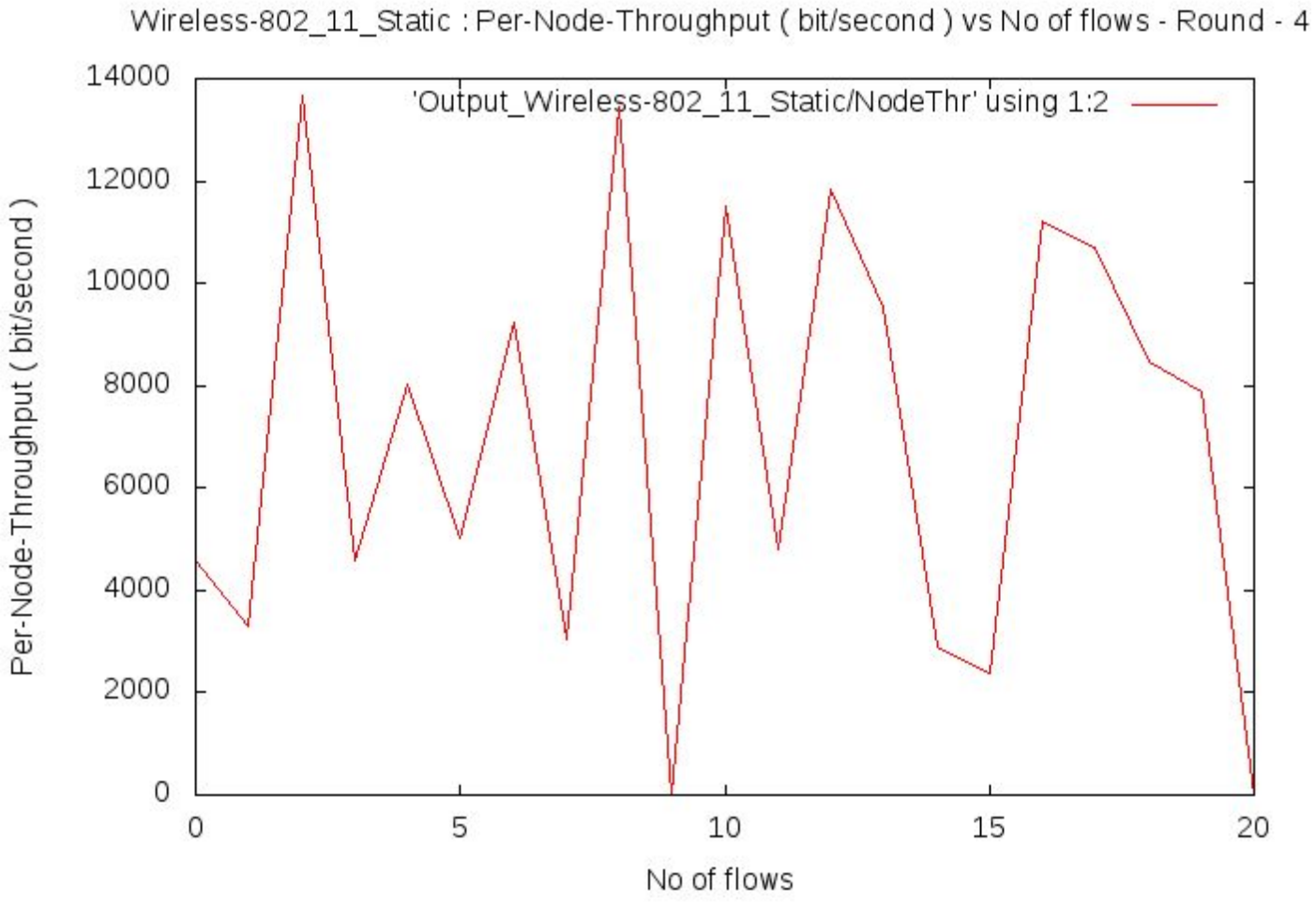

Wireless_802.11(Static) : Packet Delivery Ratio vs No of flows
'Output_Wireless-802_11_Static/GRAPH' using 1:4
Packet Delivery Ratio (%)
No of flows
20
19
18
17
16
15
14
13
12
10
15
20
25
30
35
40
45
50

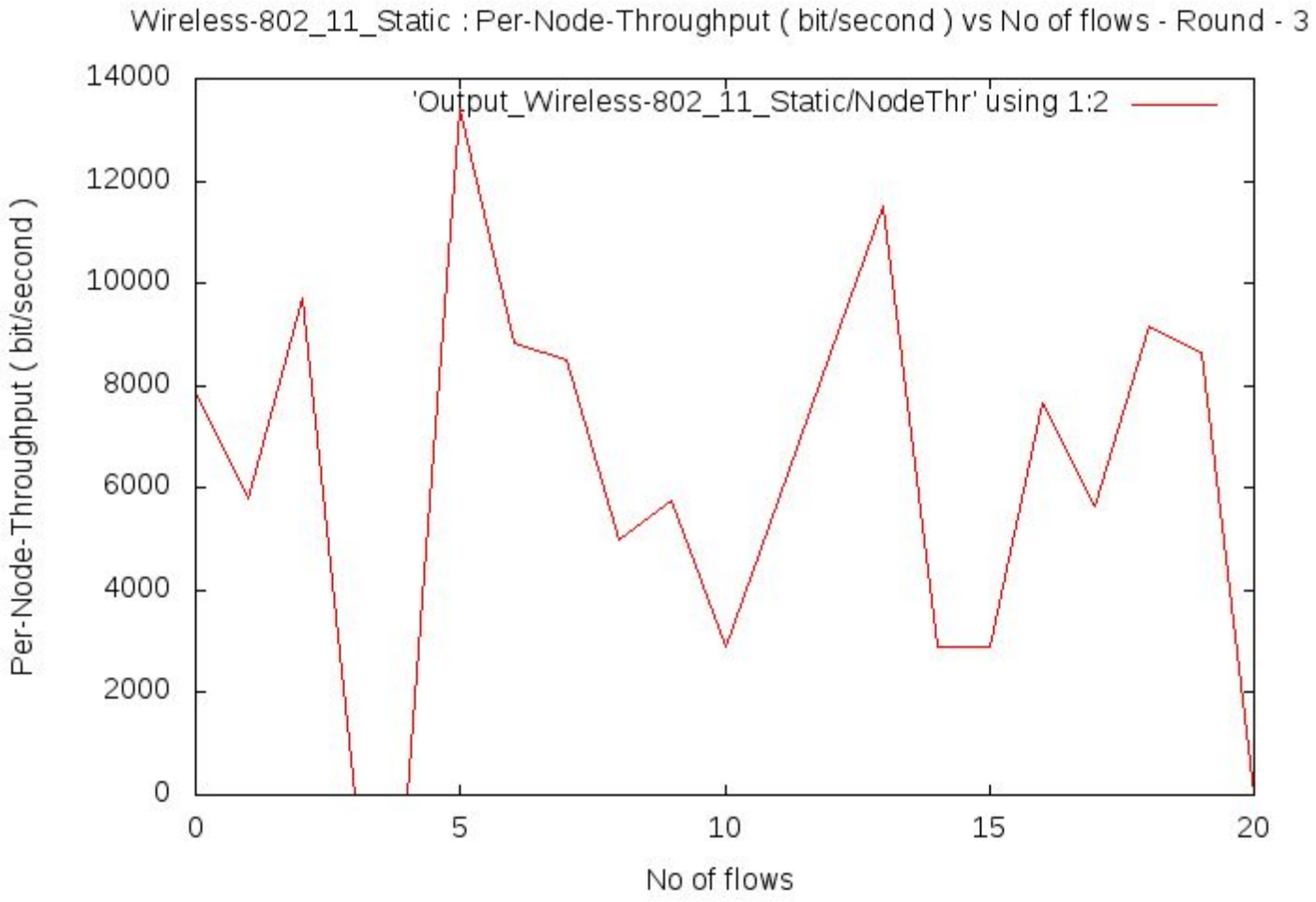

Wireless_802.11(Static) : Packet Drop Ratio vs No of flows
'Output_Wireless-802_11_Static/GRAPH' using 1:5
Packet Drop Ratio (%)
No of flows
87
86
85
84
83
82
81
80
79
78
10
15
20
25
30
35
40
45
50

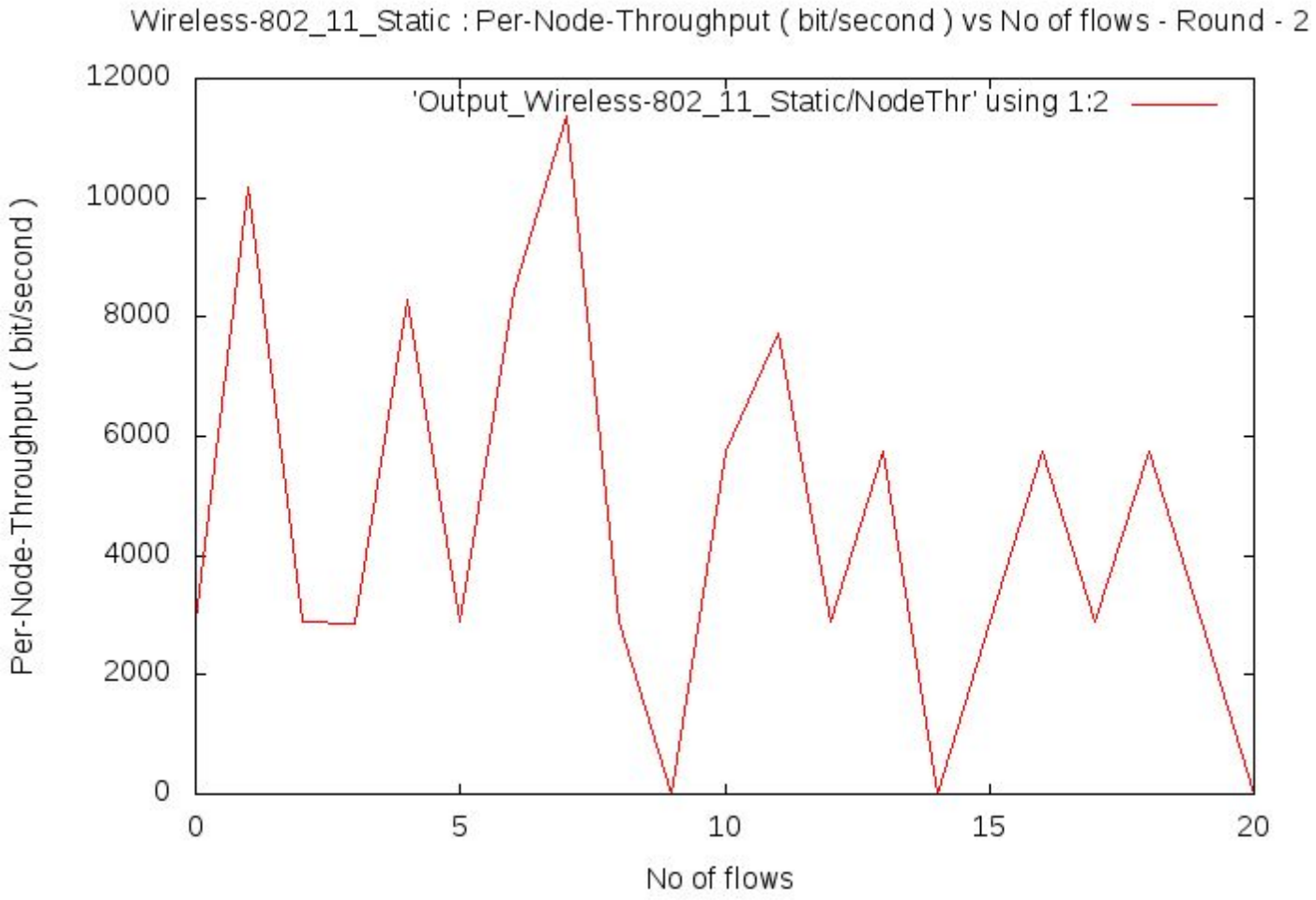

Wireless_802.11(Static) : Total Energy consumption vs No of flows
'Output_Wireless-802_11_Static/GRAPH' using 1:6
Total Energy consumption (J)
No of flows
600
580
560
540
520
500
480
10
15
20
25
30
35
40
45
50

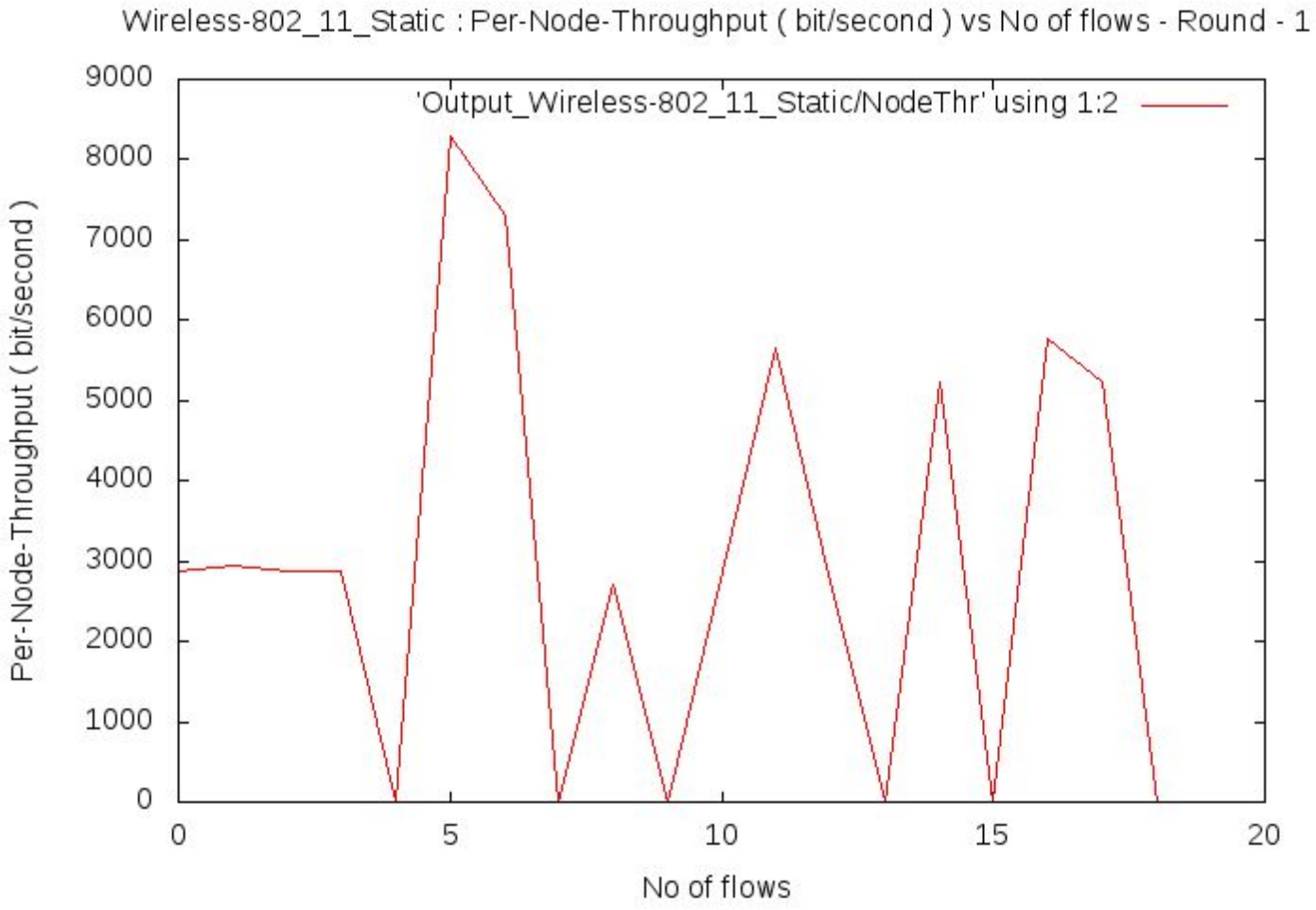

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of flows - Round - 5
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
25000
20000
15000
10000
5000
0
0
5
10
15
20

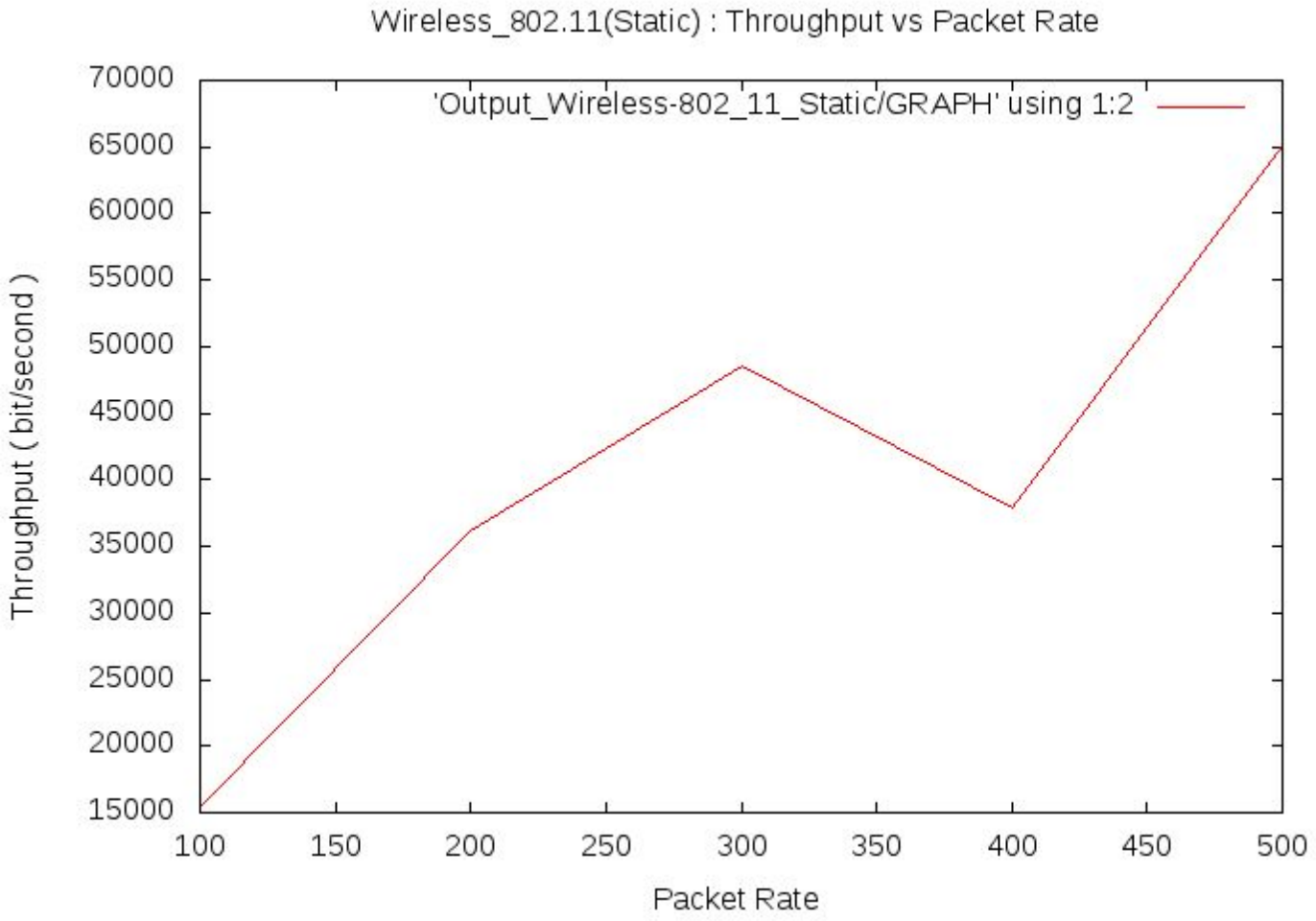

Wireless_802.11(Static) : Energy per byte vs No of flows
'Output_Wireless-802_11_Static/GRAPH' using 1:7
Energy per byte (J)
0.007
0.006
0.005
0.004
0.003
0.002
0.001
10
15
20
25
30
35
40
45
50
No of flows

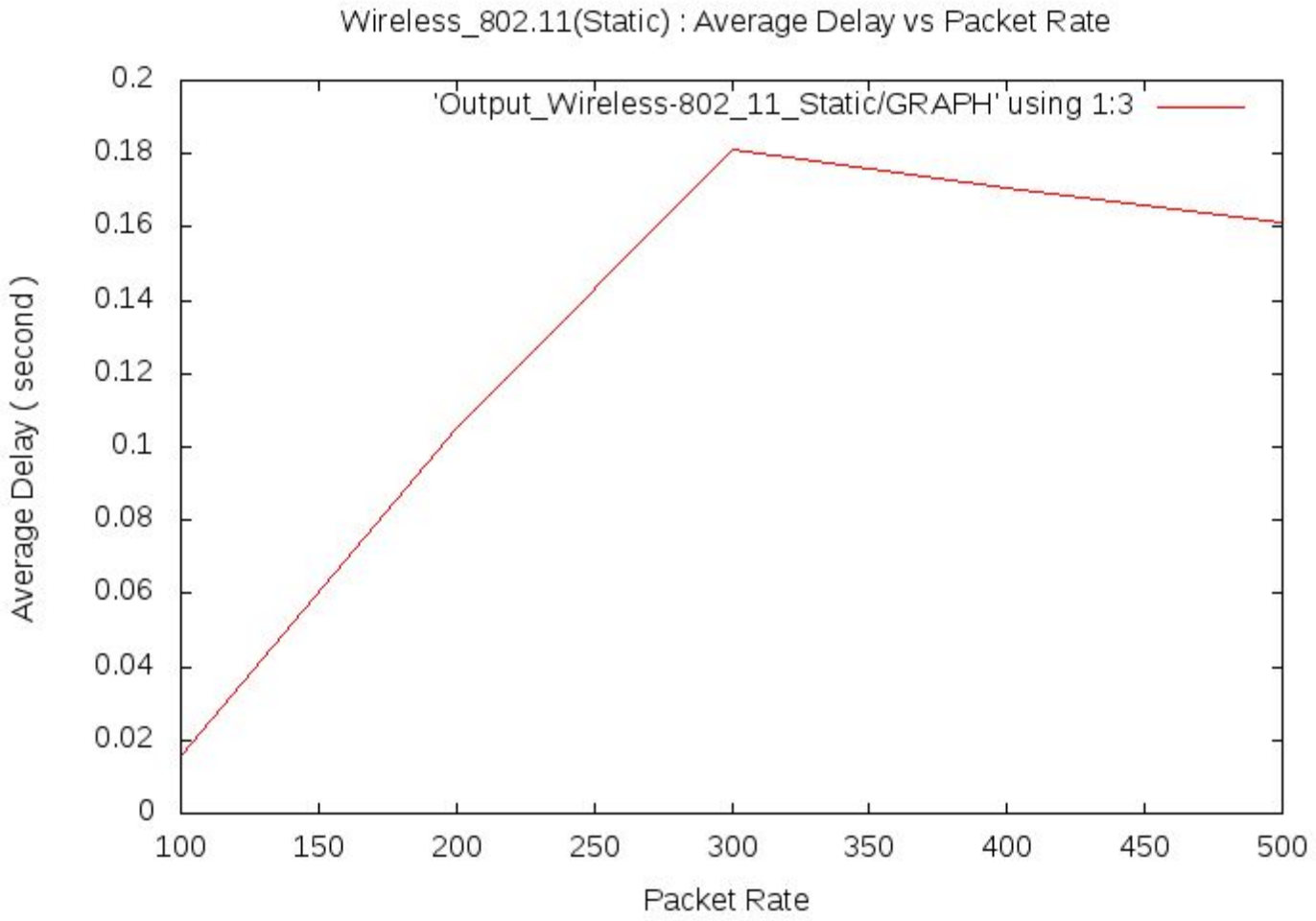

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of flows - Round - 4
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
0
2000
4000
6000
8000
10000
12000
14000
0
5
10
15
20

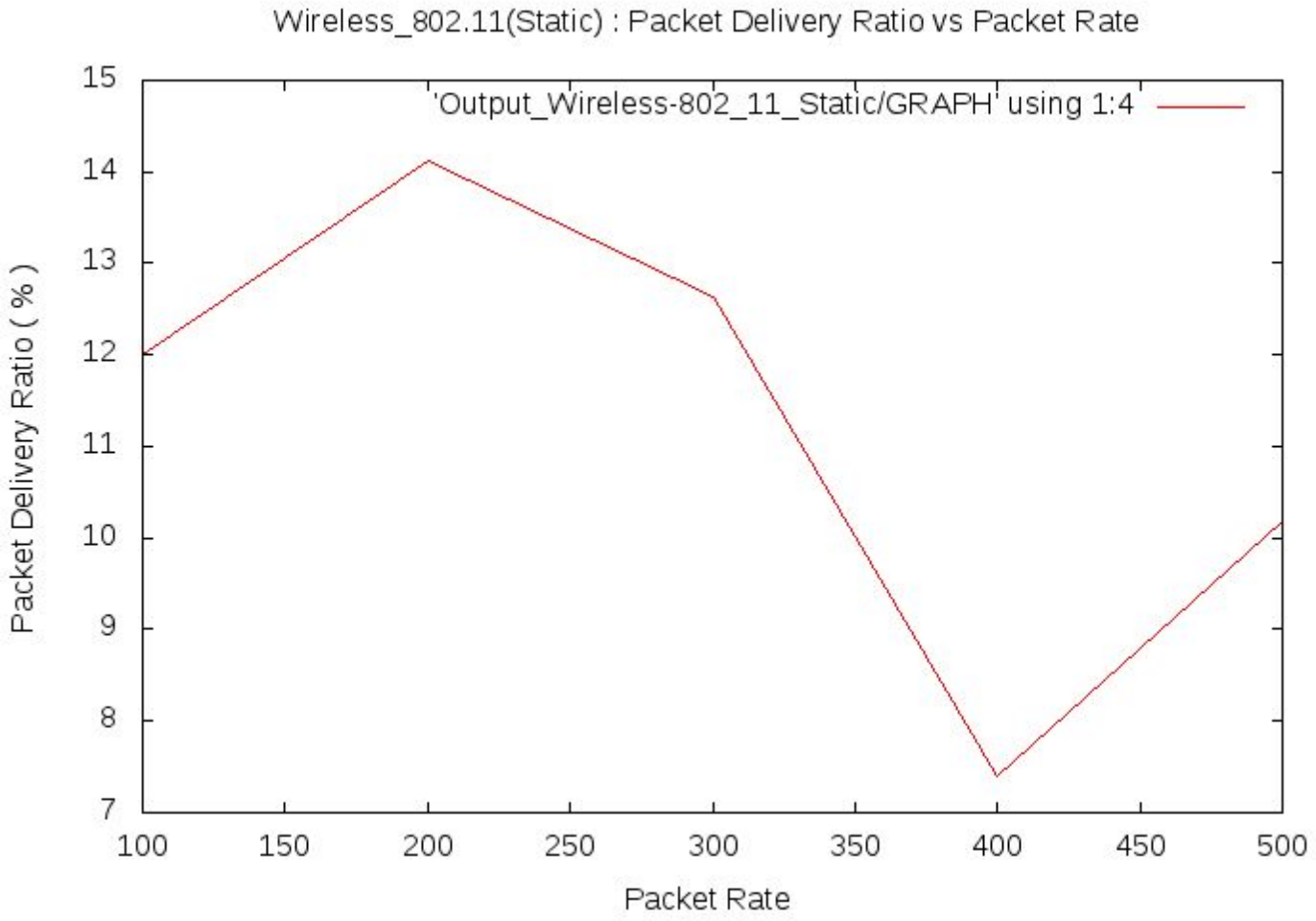

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of flows - Round - 3
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
0
2000
4000
6000
8000
10000
12000
14000
0
5
10
15
20

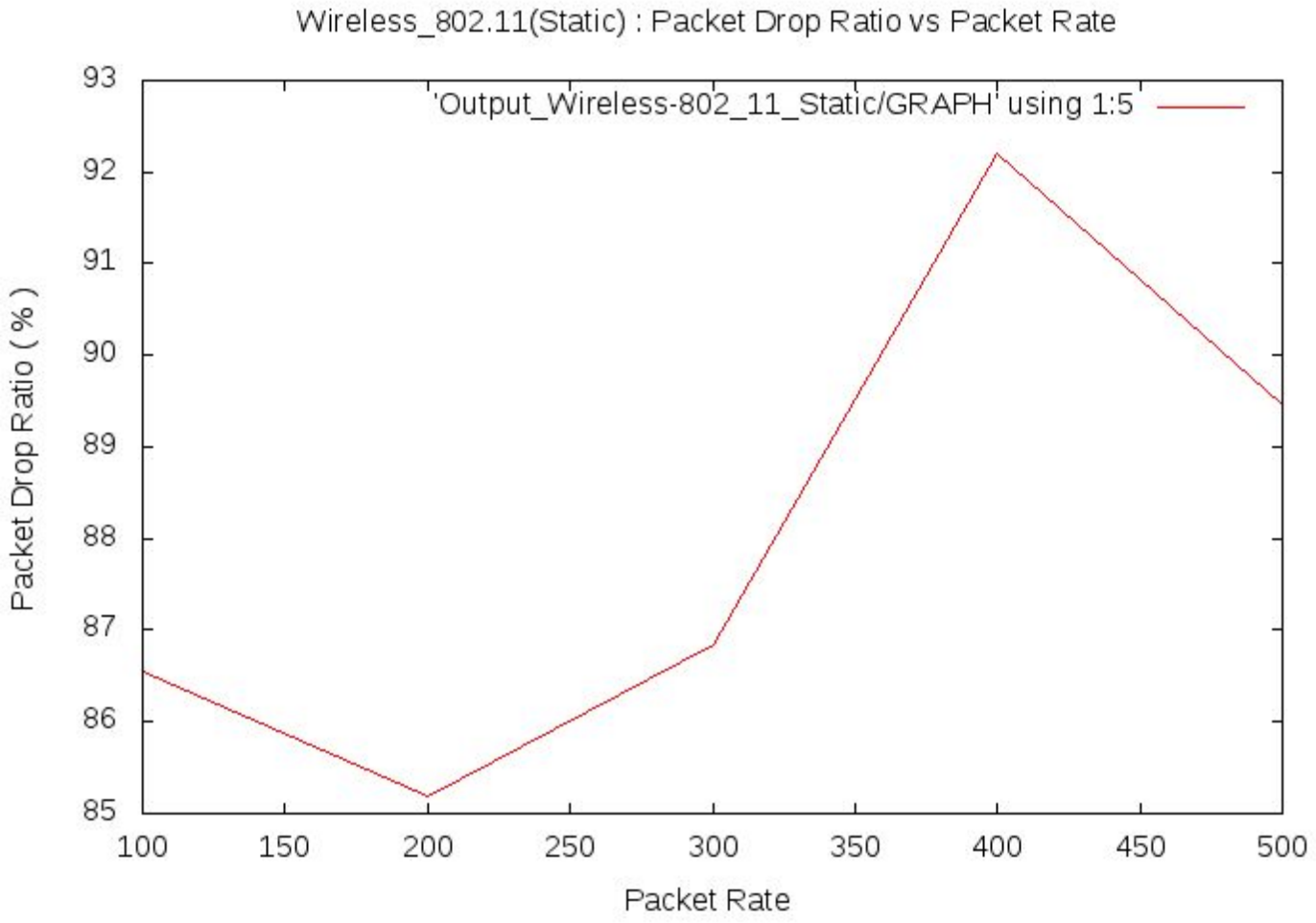

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of flows - Round - 2
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
0
2000
4000
6000
8000
10000
12000
0
5
10
15
20

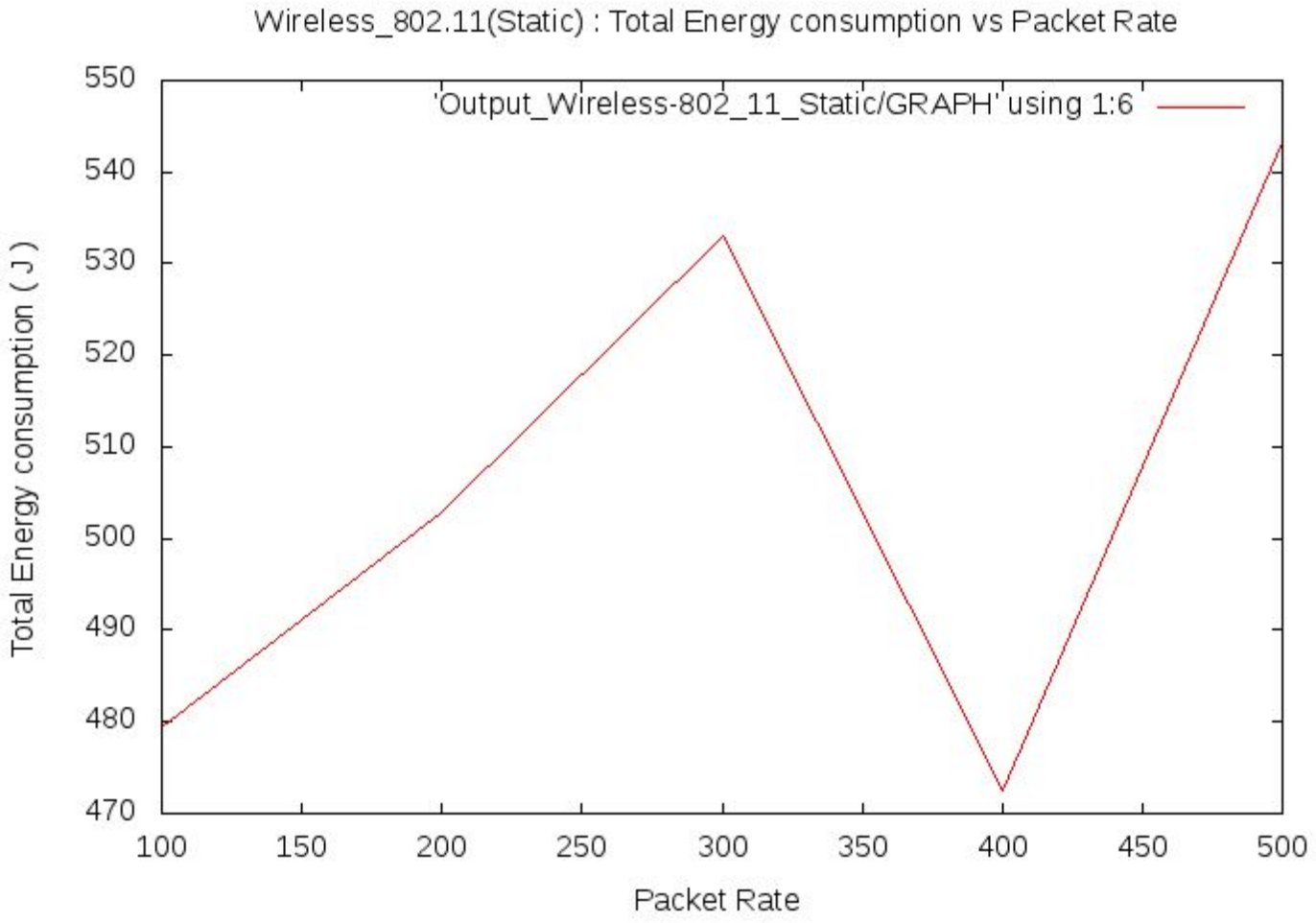

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of flows - Round - 1
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0
5
10
15
20

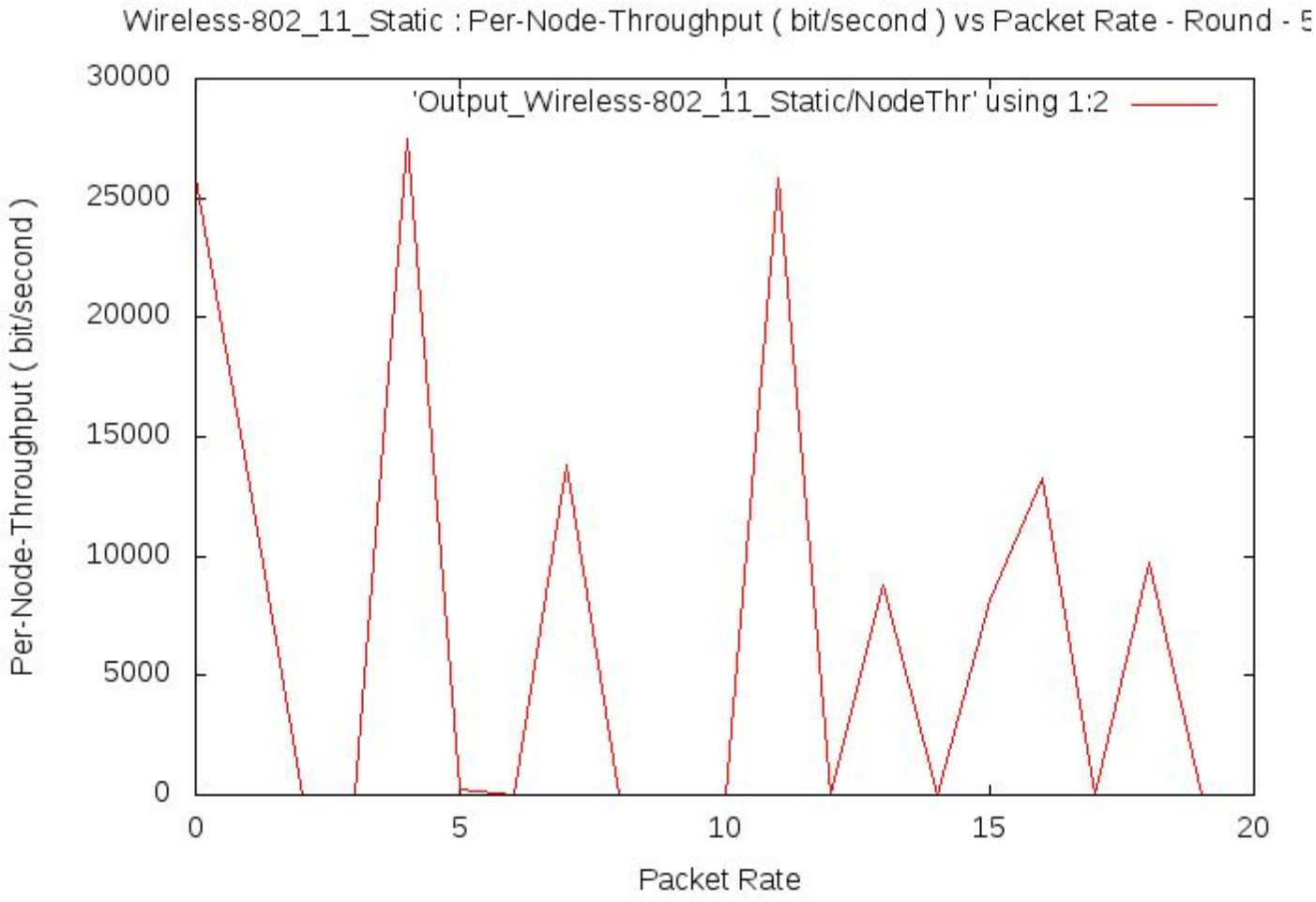

Wireless_802.11(Static) : Throughput vs Packet Rate
'Output_Wireless-802_11_Static/GRAPH' using 1:2
Throughput (bit/second)
Packet Rate
70000
65000
60000
55000
50000
45000
40000
35000
30000
25000
20000
15000
100
150
200
250
300
350
400
450
500

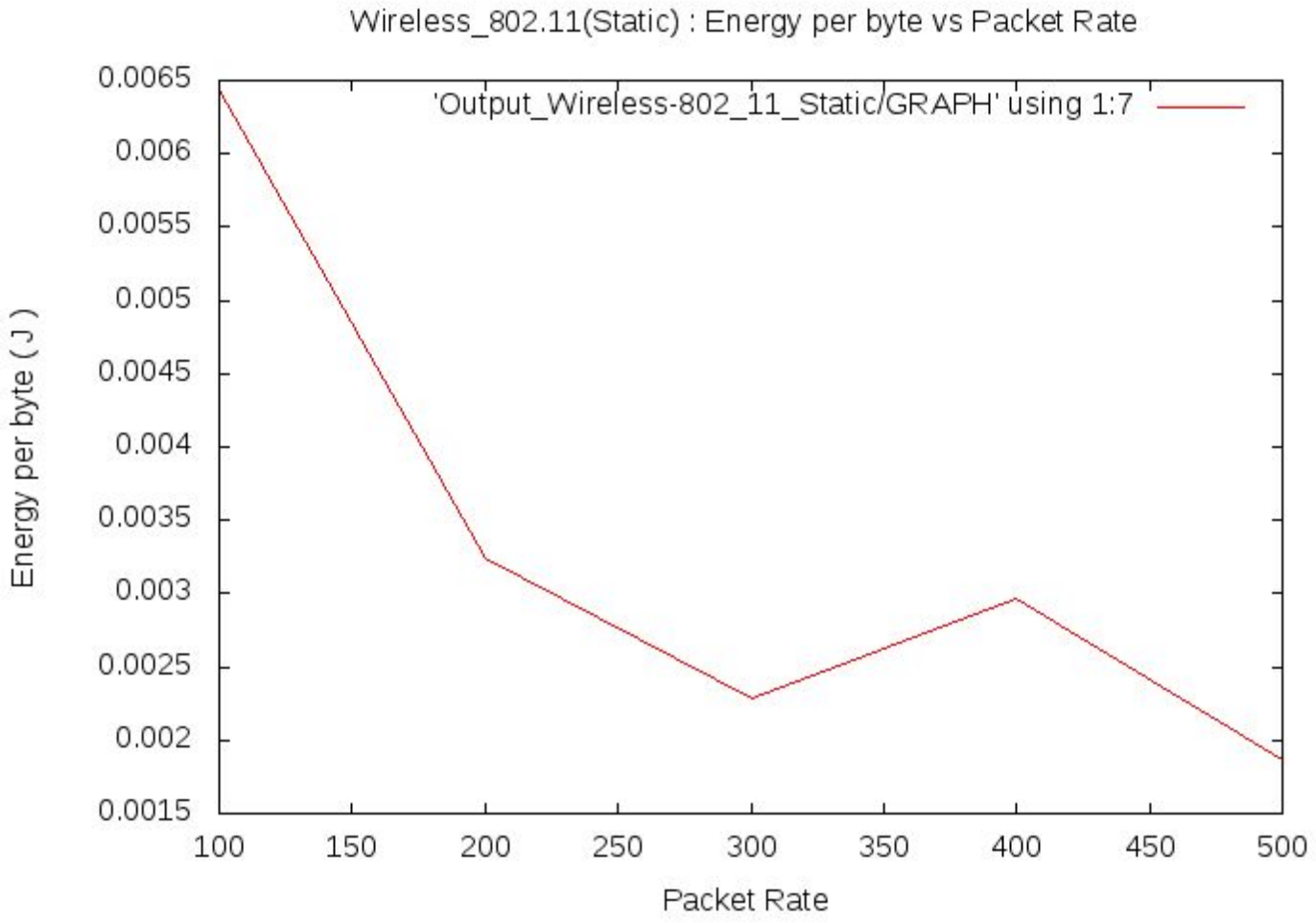

Wireless_802.11(Static) : Average Delay vs Packet Rate
'Output_Wireless-802_11_Static/GRAPH' using 1:3
Average Delay (second)
Packet Rate
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
100
150
200
250
300
350
400
450
500

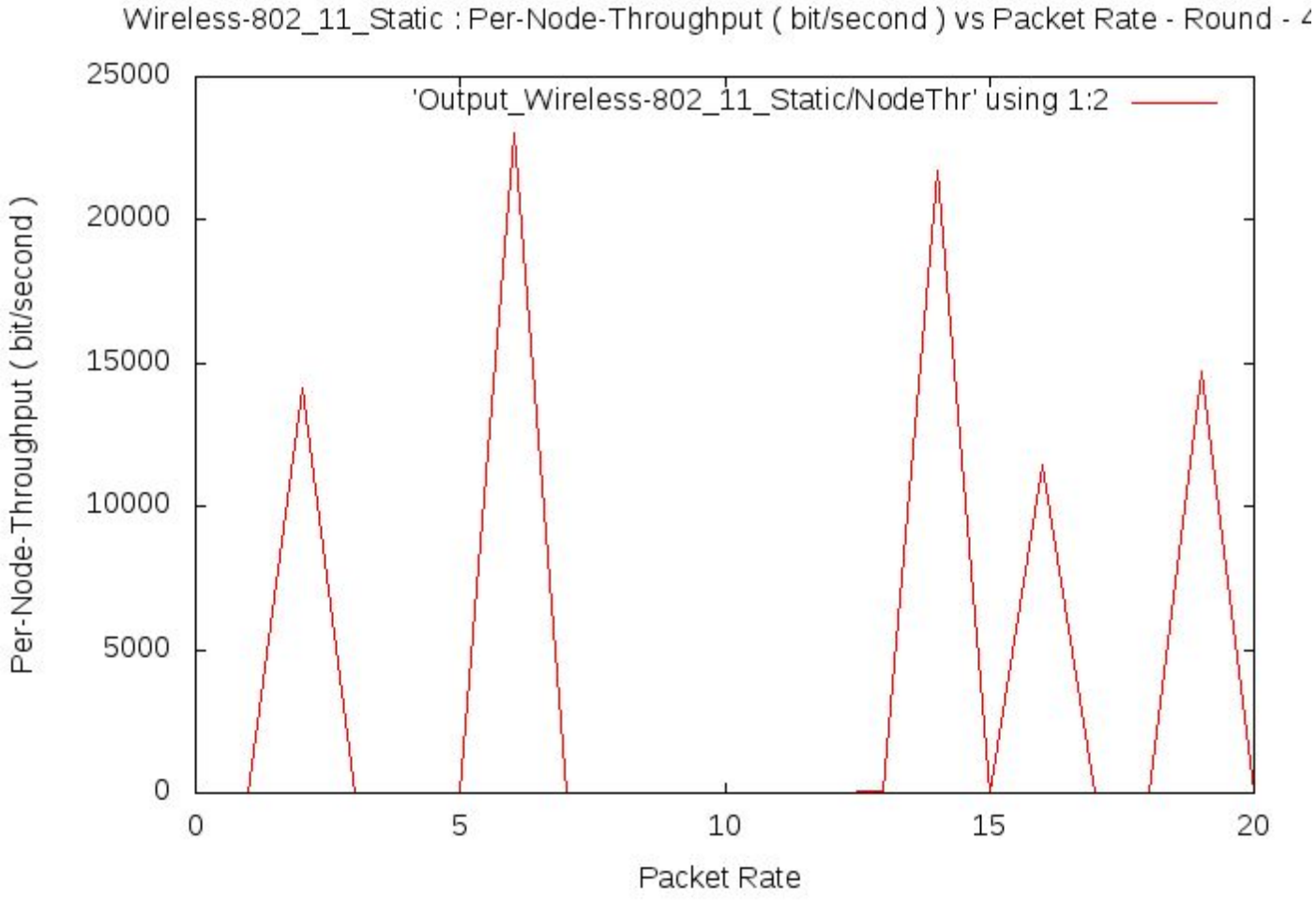

Wireless_802.11(Static) : Packet Delivery Ratio vs Packet Rate
'Output_Wireless-802_11_Static/GRAPH' using 1:4
Packet Delivery Ratio (%)
Packet Rate
15
14
13
12
11
10
9
8
7
100
150
200
250
300
350
400
450
500

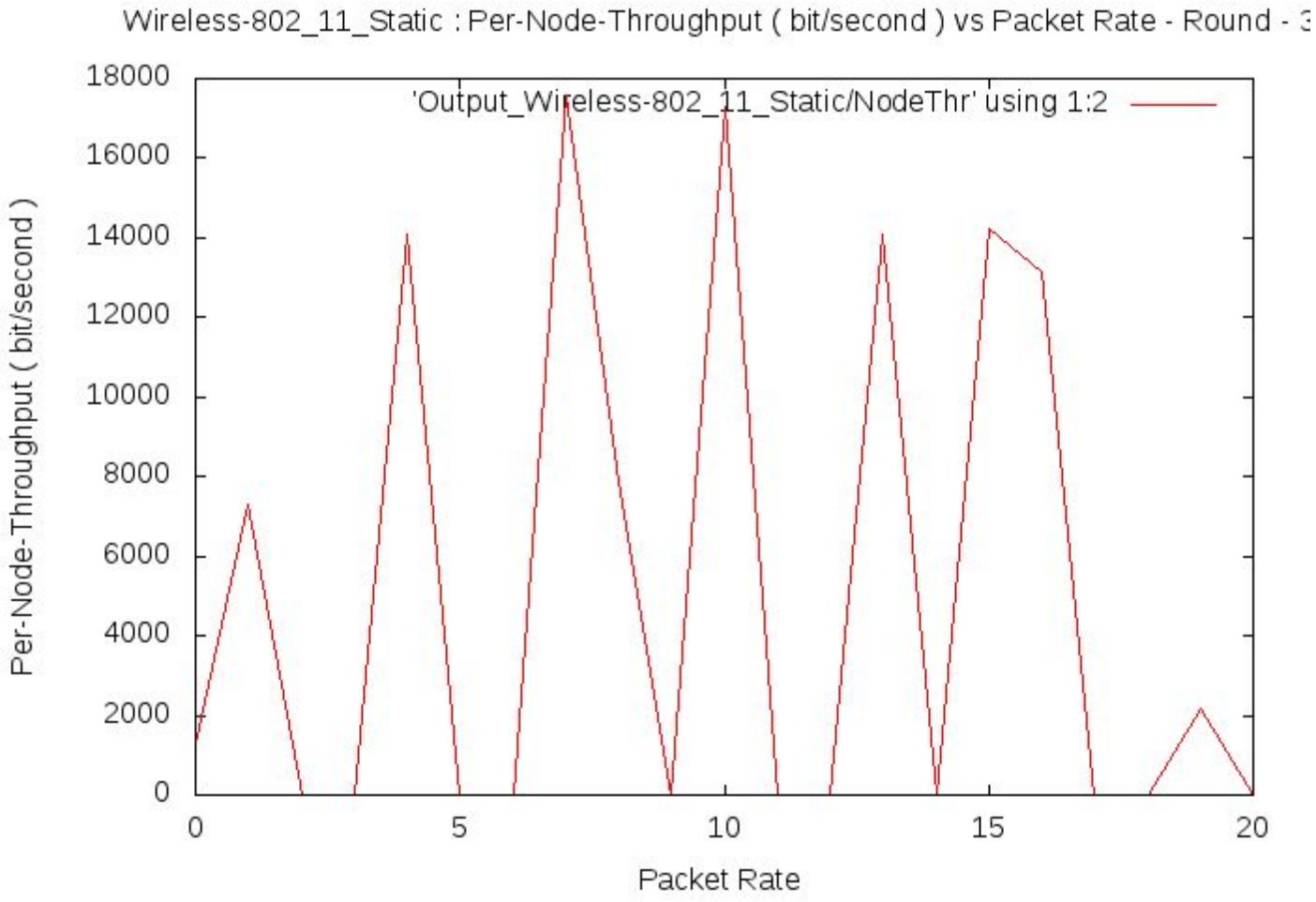

Wireless_802.11(Static) : Packet Drop Ratio vs Packet Rate
'Output_Wireless-802_11_Static/GRAPH' using 1:5
Packet Drop Ratio (%)
Packet Rate
93
92
91
90
89
88
87
86
85
100
150
200
250
300
350
400
450
500

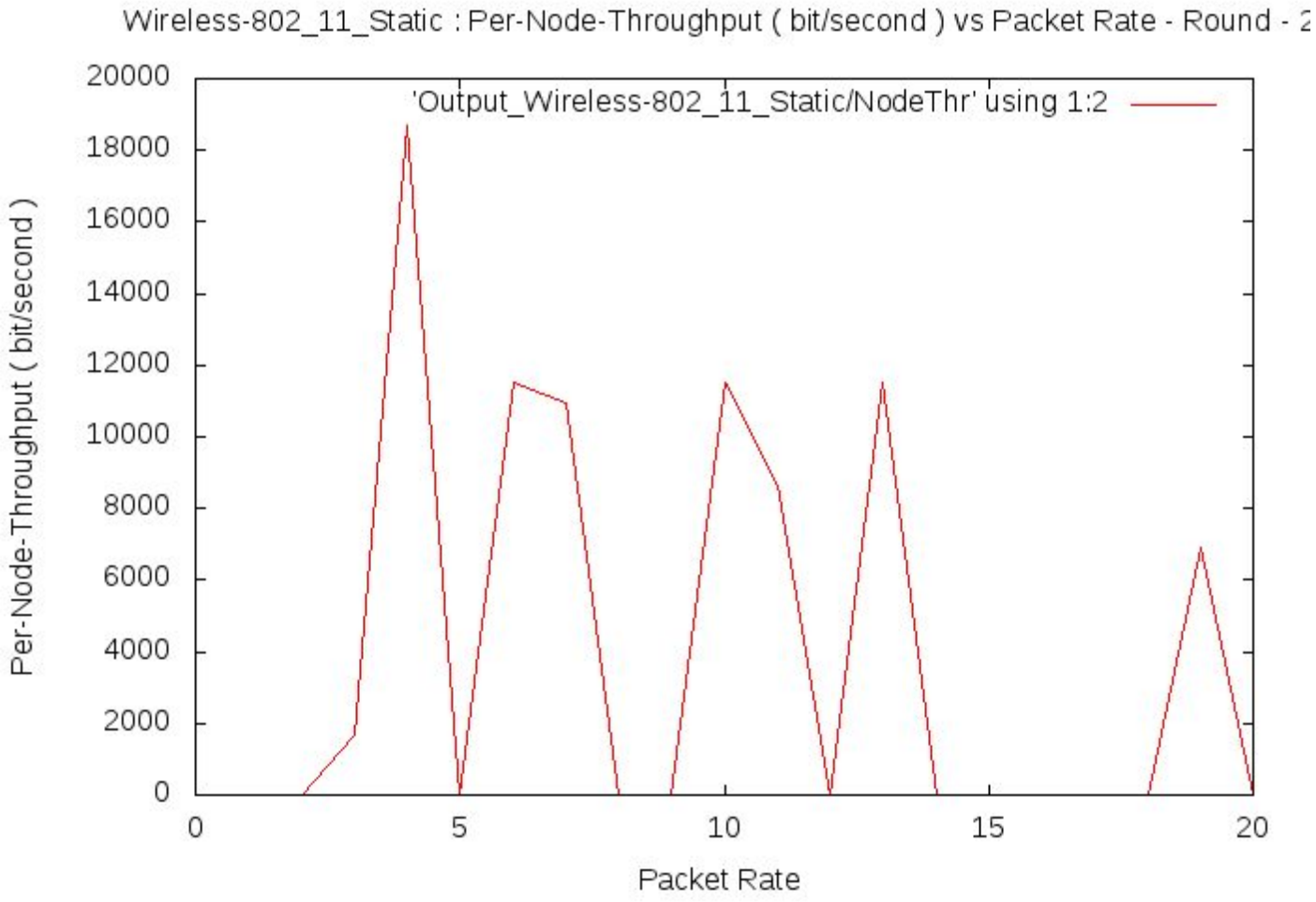

Wireless_802.11(Static) : Total Energy consumption vs Packet Rate
'Output_Wireless-802_11_Static/GRAPH' using 1:6
Total Energy consumption (J)
Packet Rate
550
540
530
520
510
500
490
480
470
100
150
200
250
300
350
400
450
500

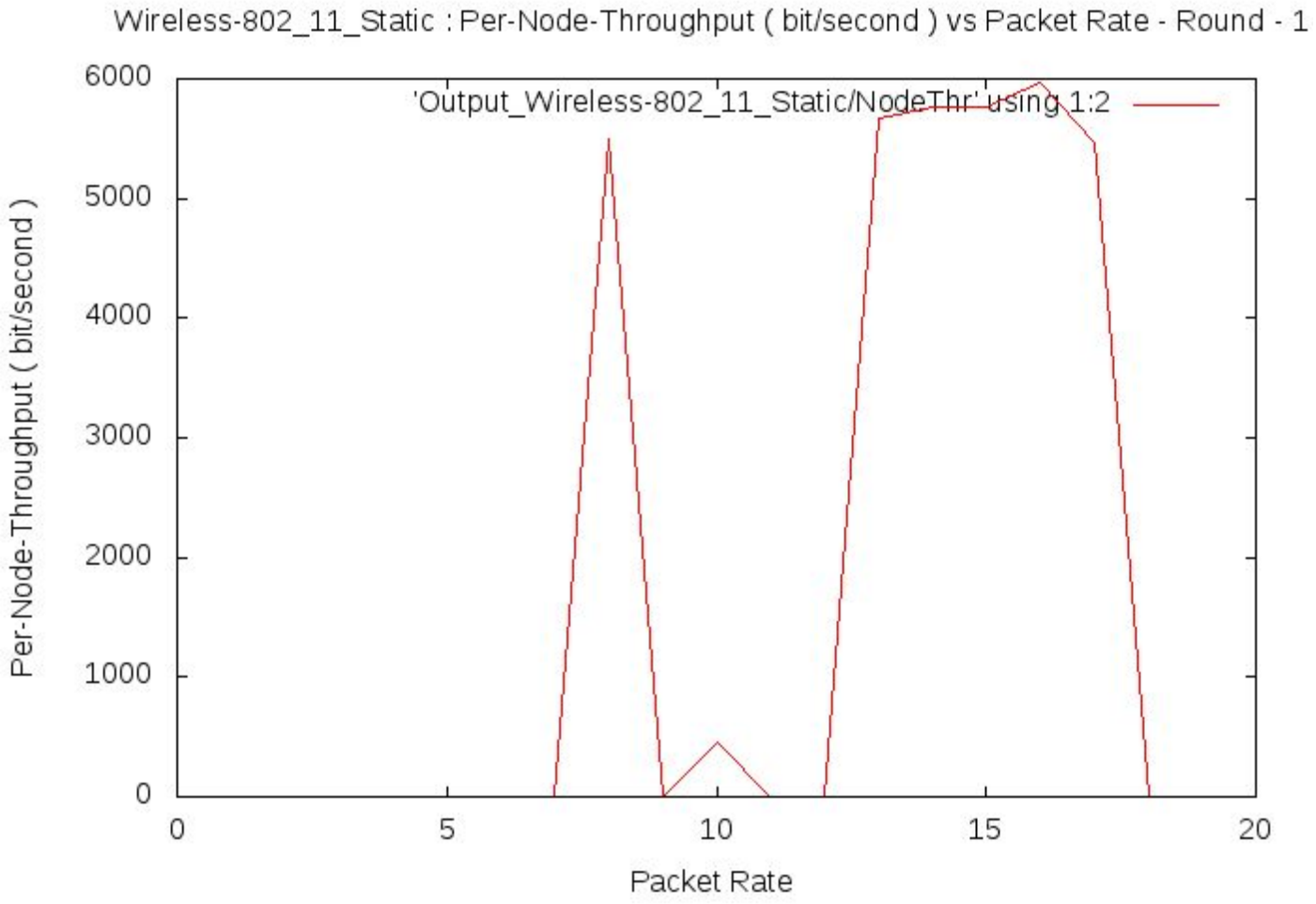

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 5
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
30000
25000
20000
15000
10000
5000
0
0
5
10
15
20

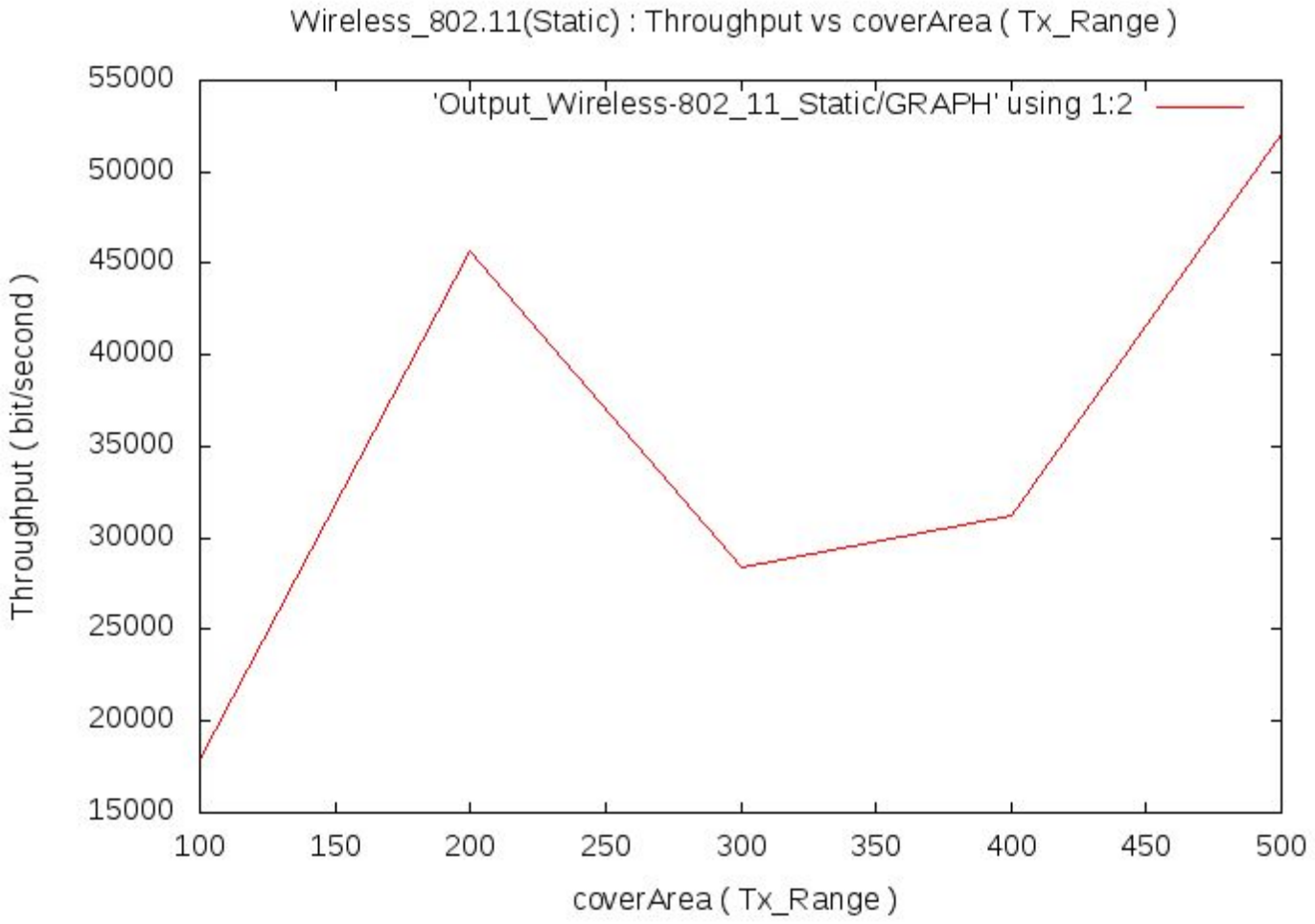

Wireless_802.11(Static) : Energy per byte vs Packet Rate
'Output_Wireless-802_11_Static/GRAPH' using 1:7
Energy per byte (J)
0.0065
0.006
0.0055
0.005
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
100
150
200
250
300
350
400
450
500
Packet Rate

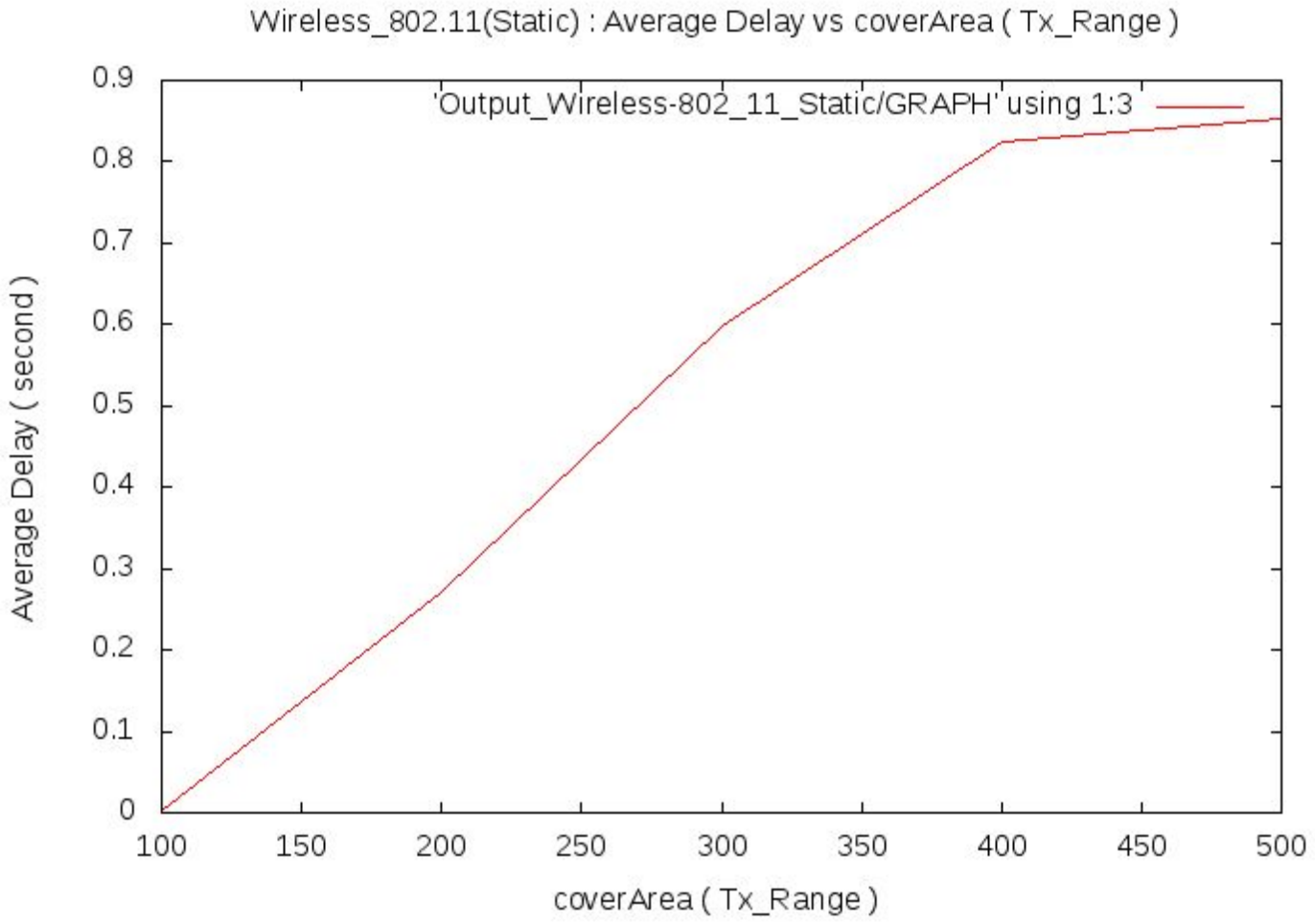

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 4
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
25000
20000
15000
10000
5000
0
0
5
10
15
20


Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 3
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20

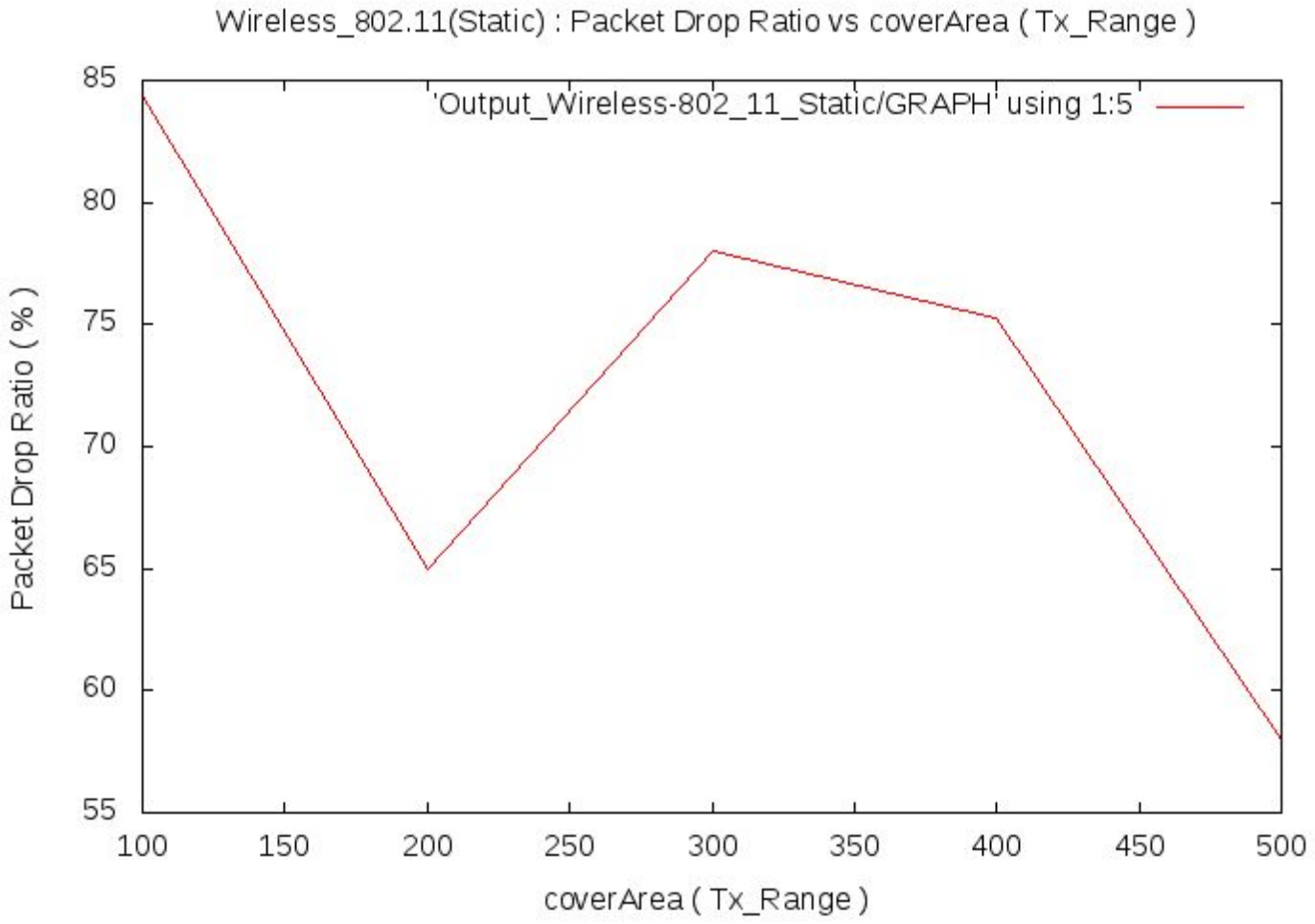

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 2
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20

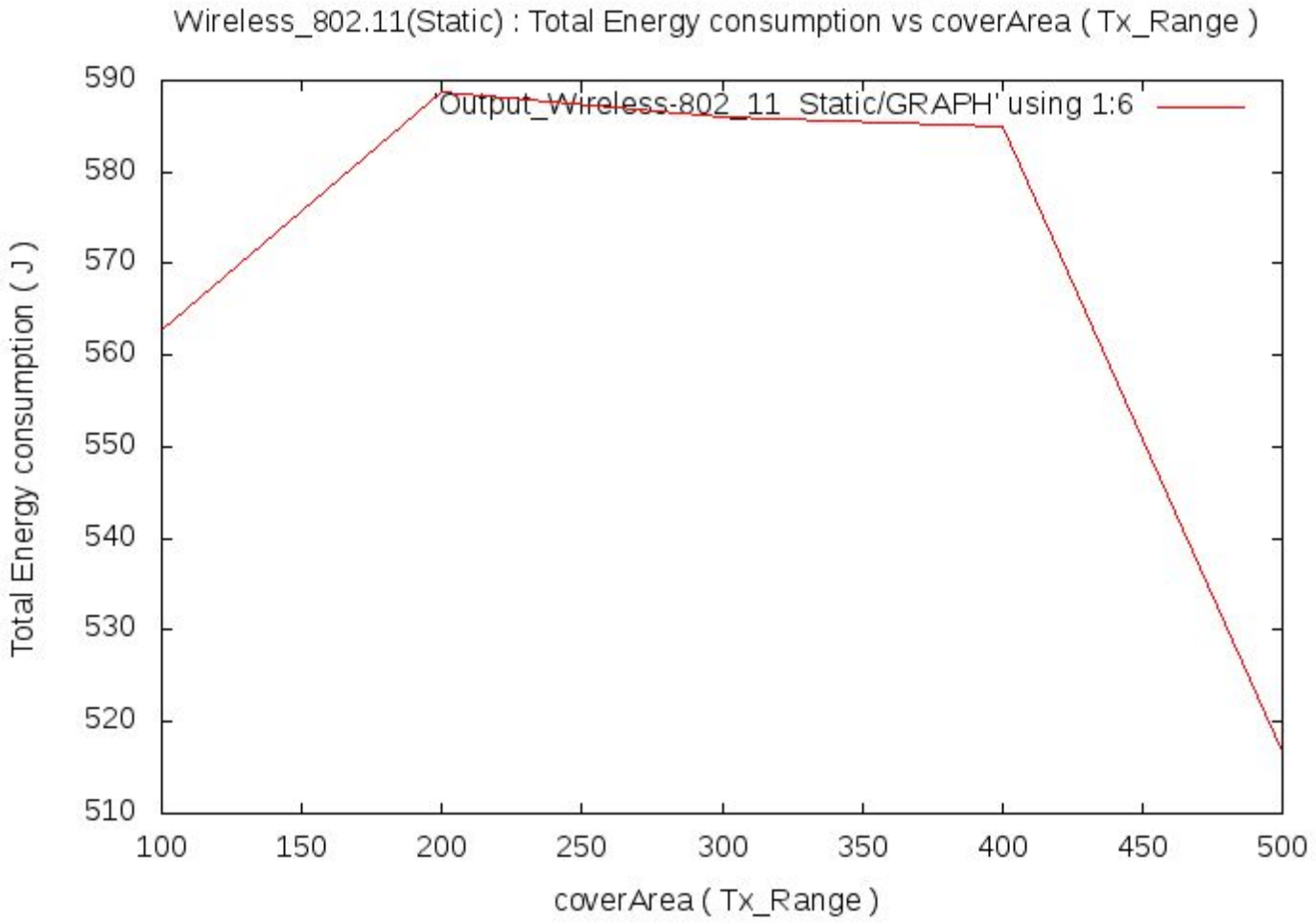

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 1
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
6000
5000
4000
3000
2000
1000
0
0
5
10
15
20

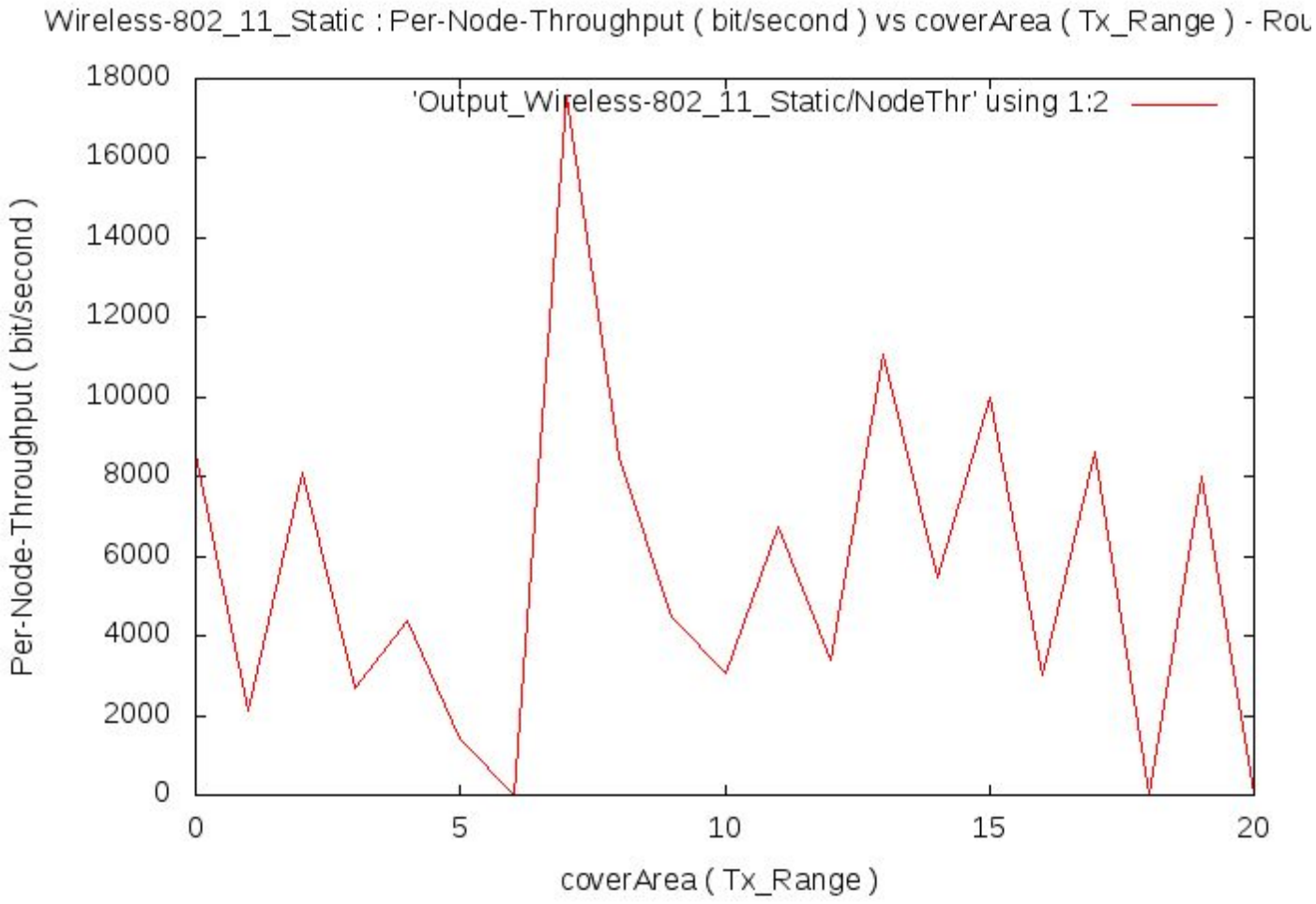

Wireless_802.11(Static) : Throughput vs coverArea (Tx_Range)
'Output_Wireless-802_11_Static/GRAPH' using 1:2
Throughput (bit/second)
coverArea (Tx_Range)
55000
50000
45000
40000
35000
30000
25000
20000
15000
100
150
200
250
300
350
400
450
500

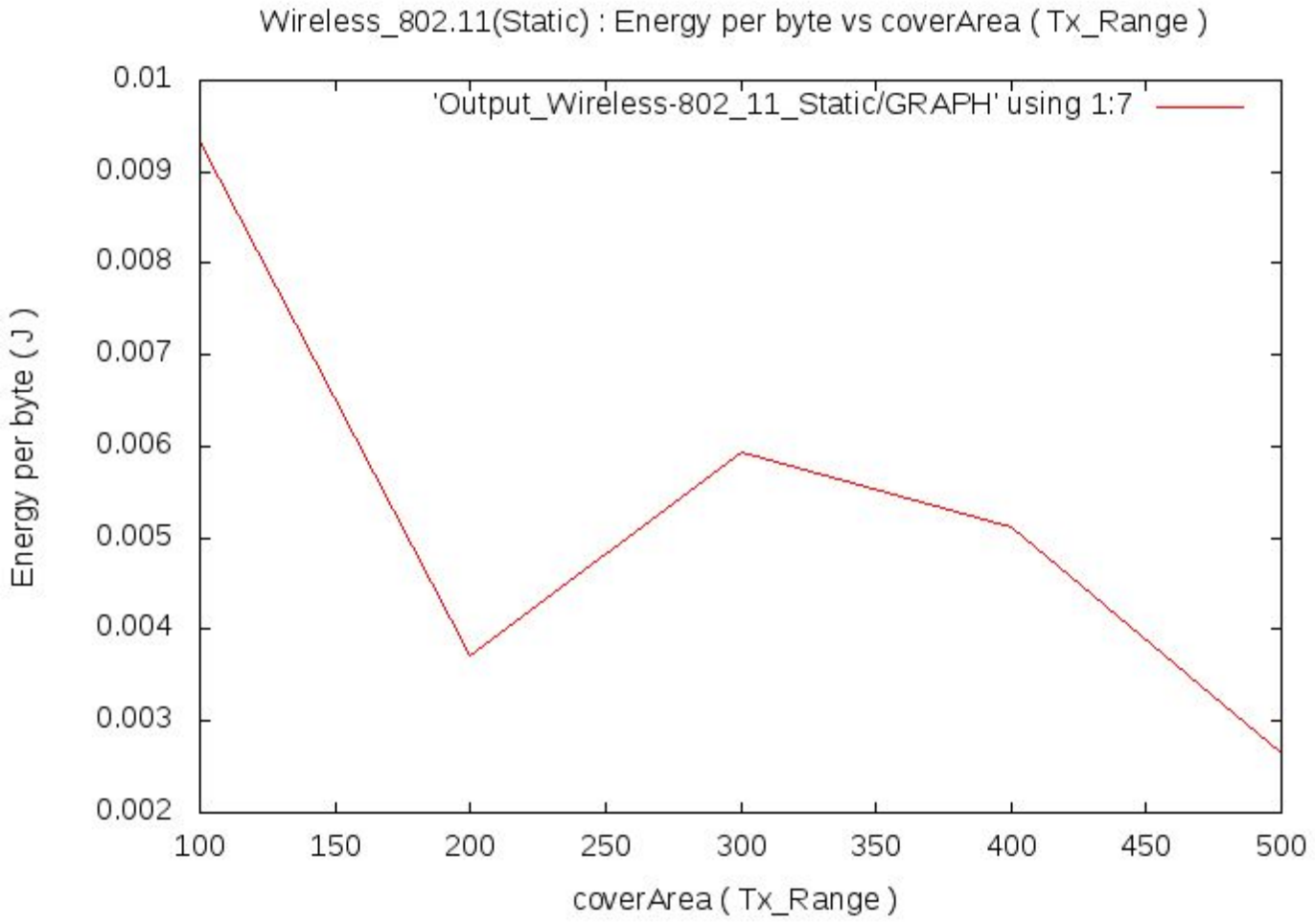

Wireless_802.11(Static) : Average Delay vs coverArea (Tx_Range)
'Output_Wireless-802_11_Static/GRAPH' using 1:3
Average Delay (second)
coverArea (Tx_Range)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
100
150
200
250
300
350
400
450
500

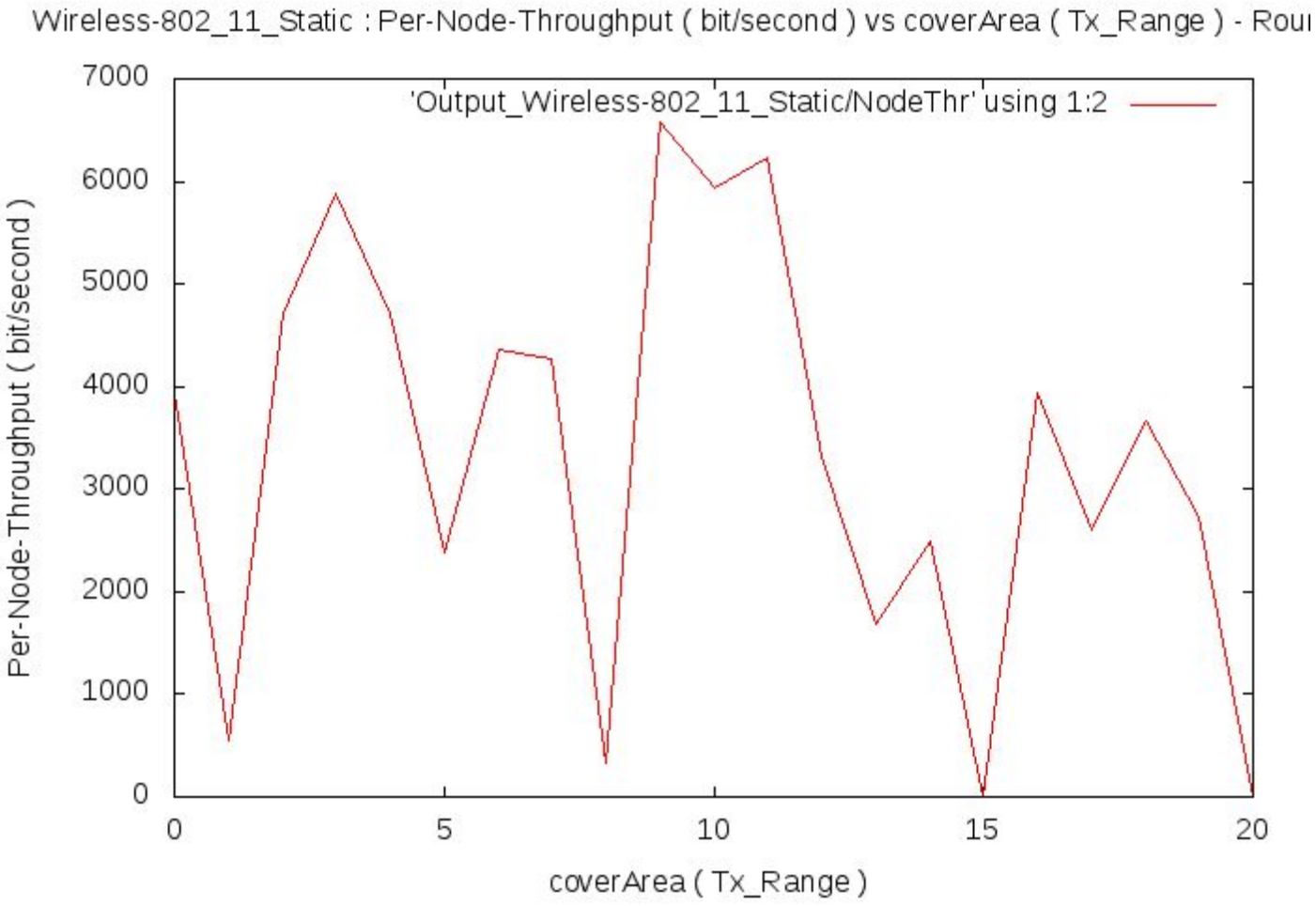

Wireless_802.11(Static) : Packet Delivery Ratio vs coverArea (Tx_Range)
'Output_Wireless-802_11_Static/GRAPH' using 1:4
Packet Delivery Ratio (%)
coverArea (Tx_Range)
45
40
35
30
25
20
15
10
100
150
200
250
300
350
400
450
500

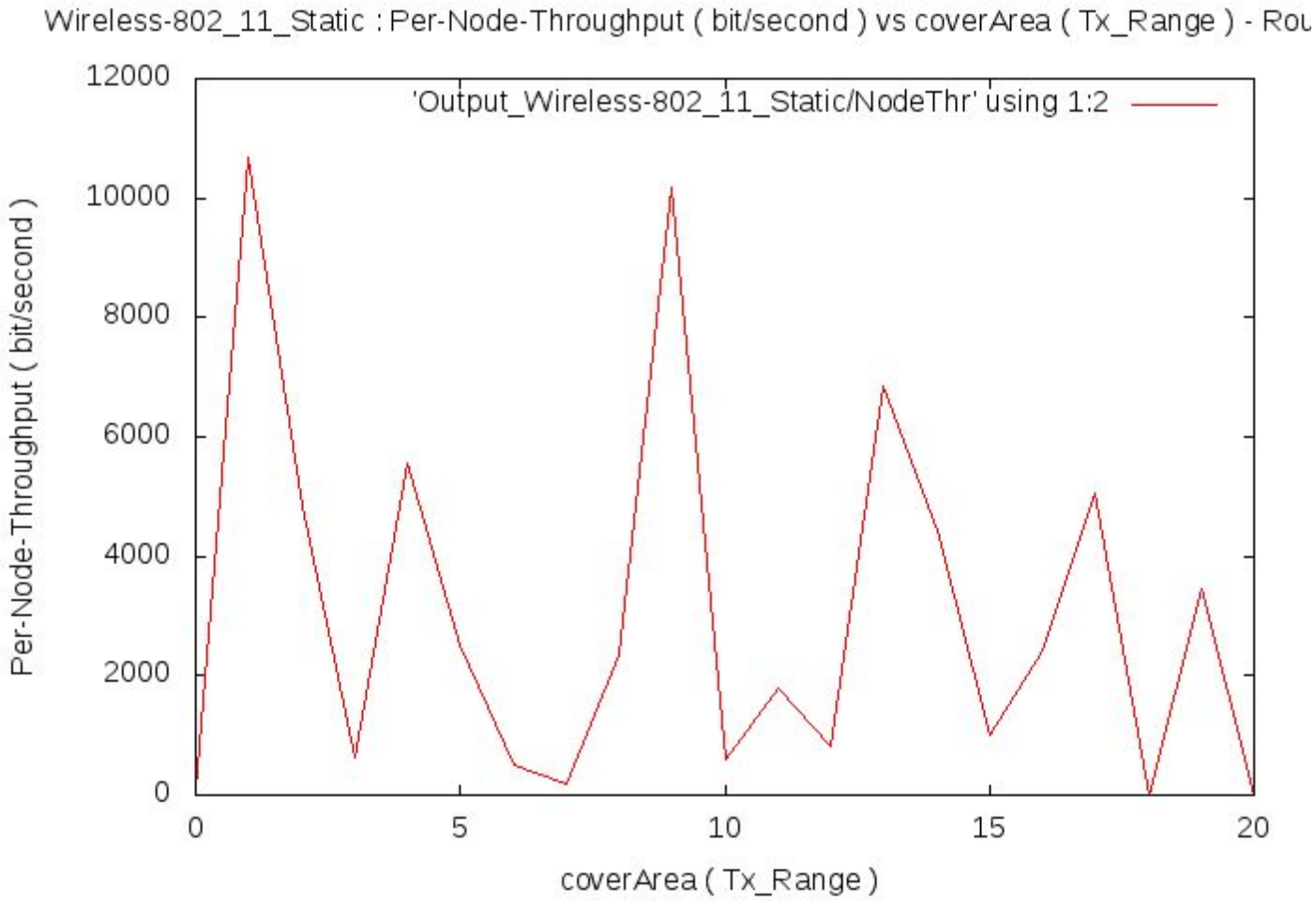

Wireless_802.11(Static) : Packet Drop Ratio vs coverArea (Tx_Range)
'Output_Wireless-802_11_Static/GRAPH' using 1:5
Packet Drop Ratio (%)
85
80
75
70
65
60
55
100
150
200
250
300
350
400
450
500
coverArea (Tx_Range)

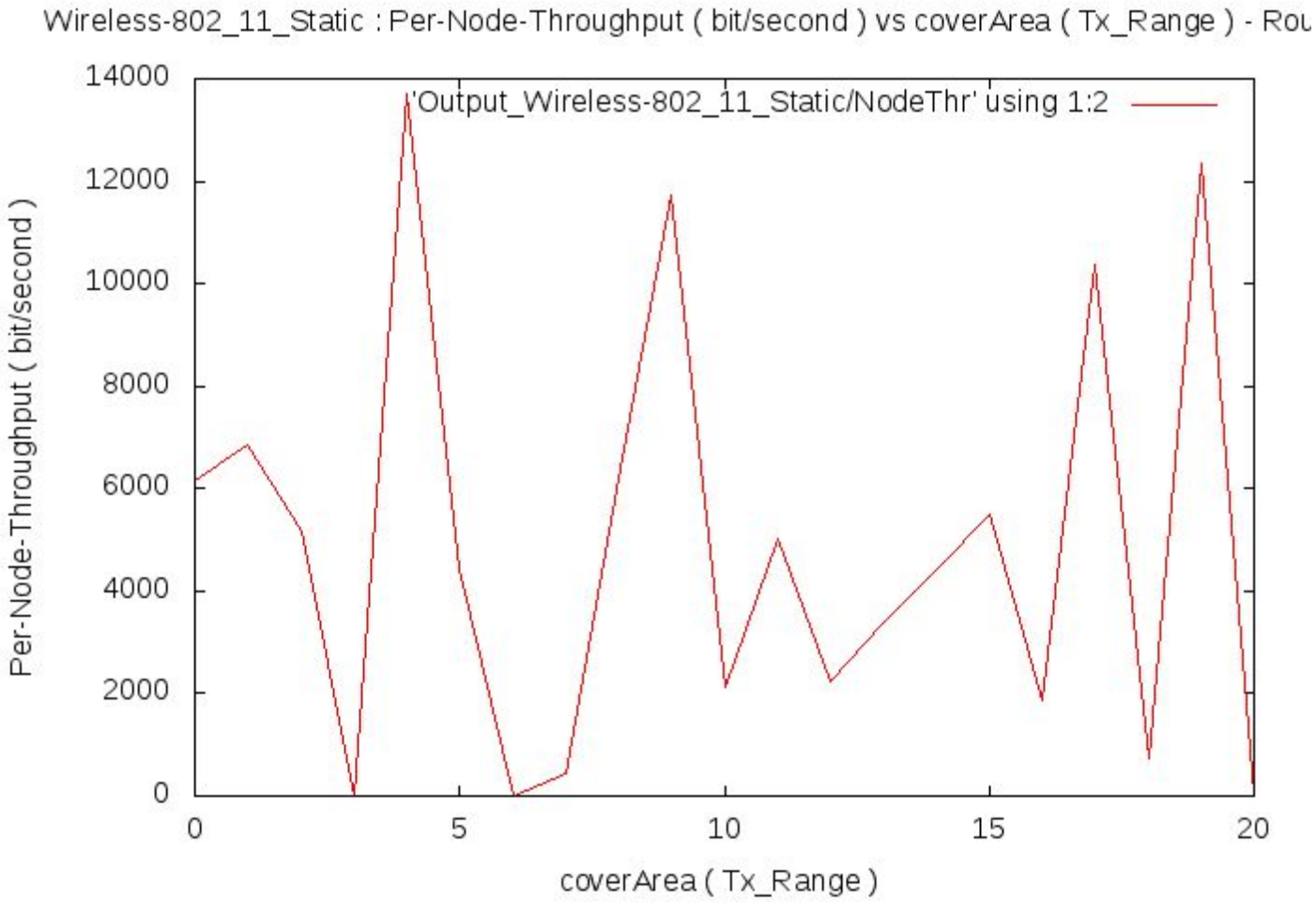

Wireless_802.11(Static) : Total Energy consumption vs coverArea (Tx_Range)
Output_Wireless-802_11_Static/GRAPH' using 1:6
Total Energy consumption (J)
coverArea (Tx_Range)
590
580
570
560
550
540
530
520
510
100
150
200
250
300
350
400
450
500

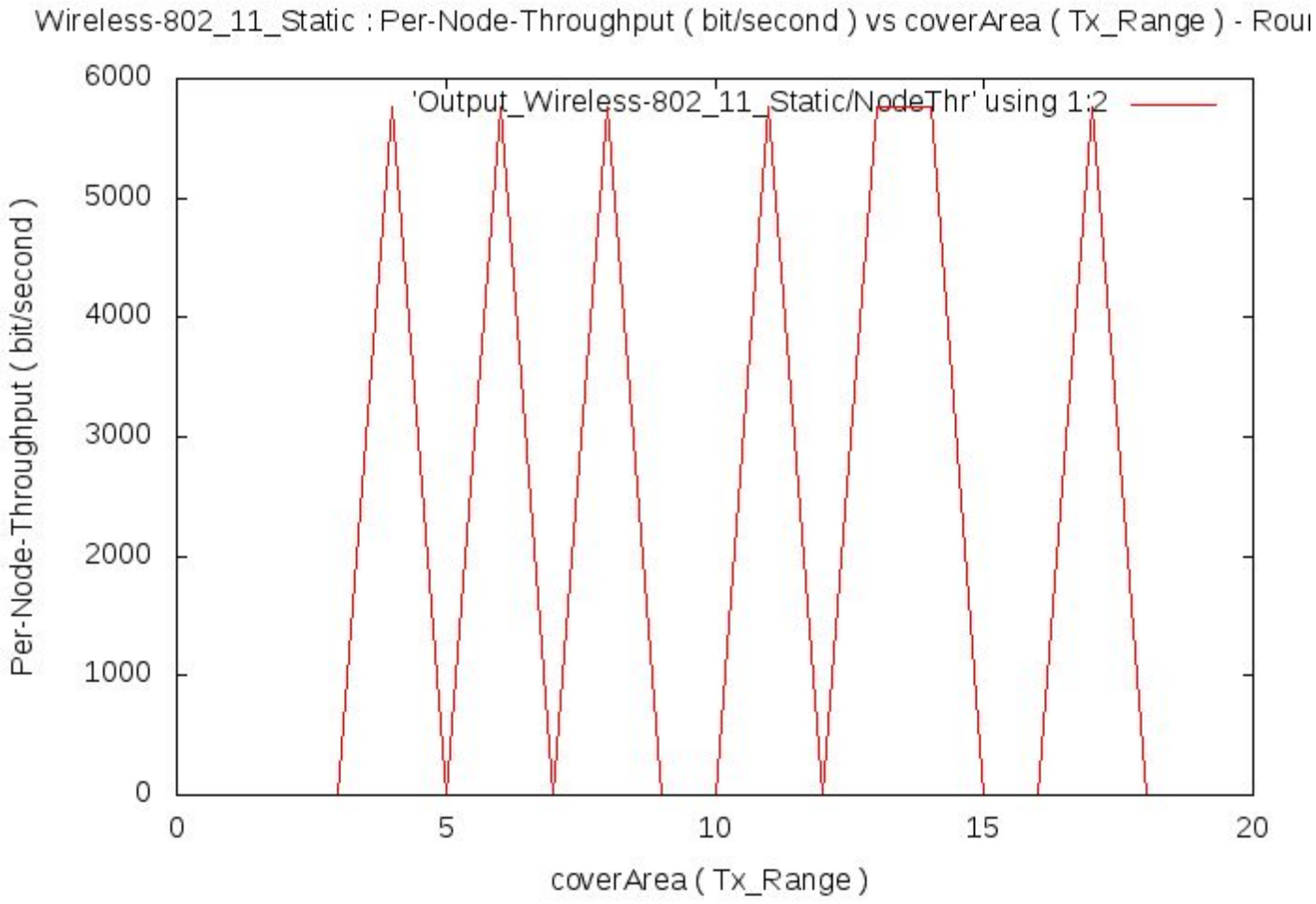

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs coverArea (Tx_Range) - Rou
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
coverArea (Tx_Range)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20


Wireless_802.11(Static) : Energy per byte vs coverArea (Tx_Range)
'Output_Wireless-802_11_Static/GRAPH' using 1:7
Energy per byte (J)
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
100
150
200
250
300
350
400
450
500
coverArea (Tx_Range)

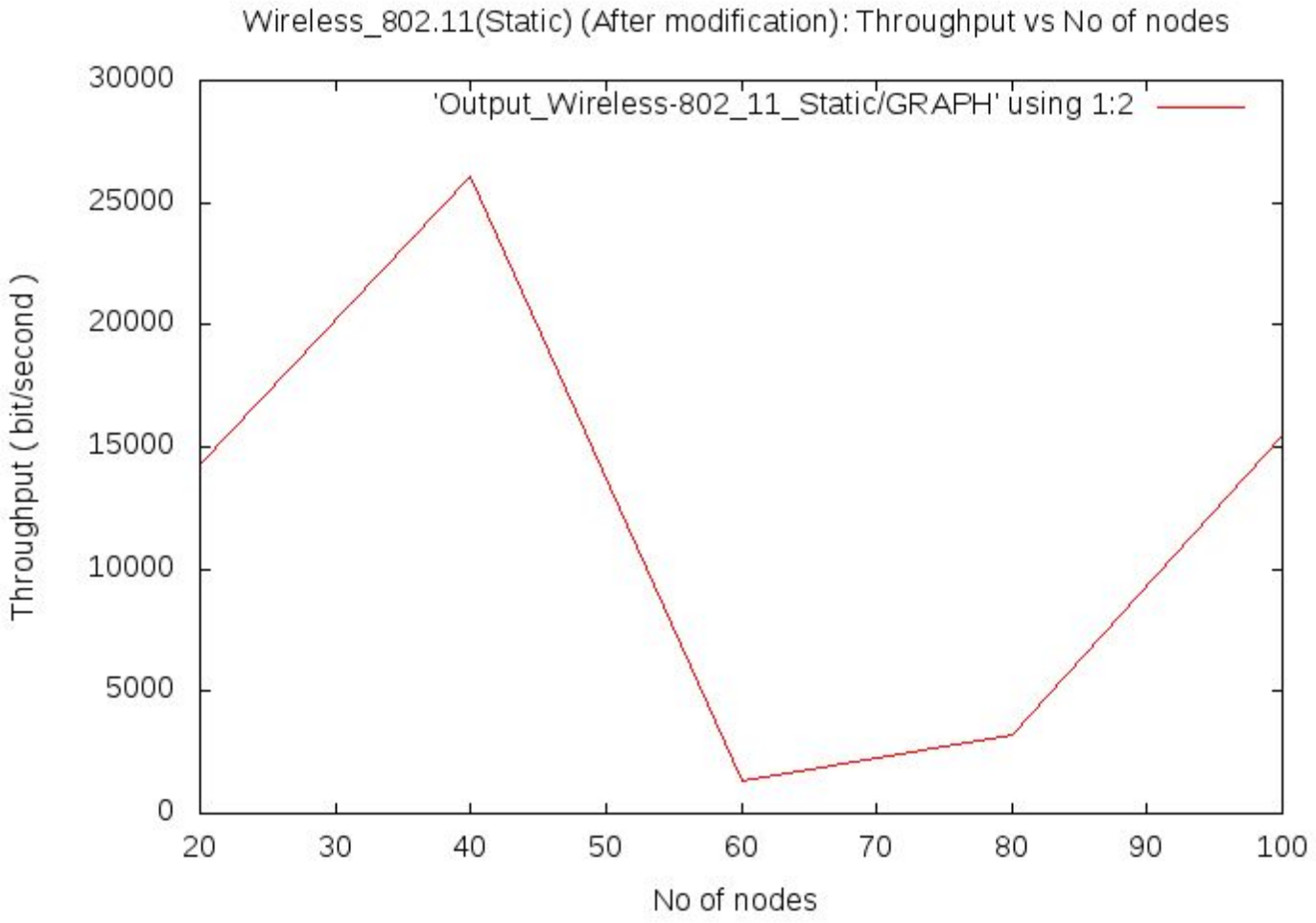

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs coverArea (Tx_Range) - Rou
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
coverArea (Tx_Range)
0
1000
2000
3000
4000
5000
6000
7000
0
5
10
15
20

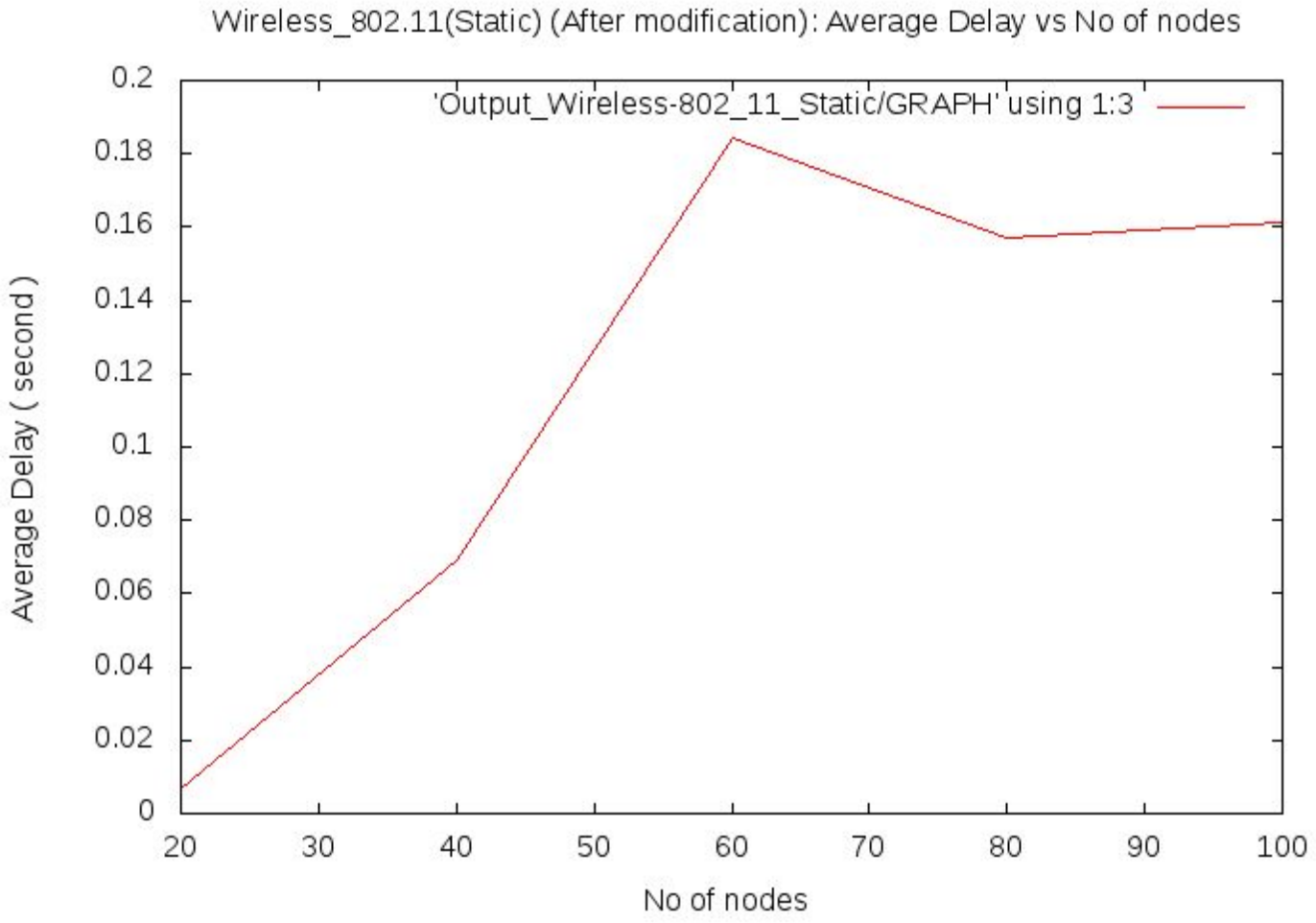

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs coverArea (Tx_Range) - Rou
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
coverArea (Tx_Range)
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20

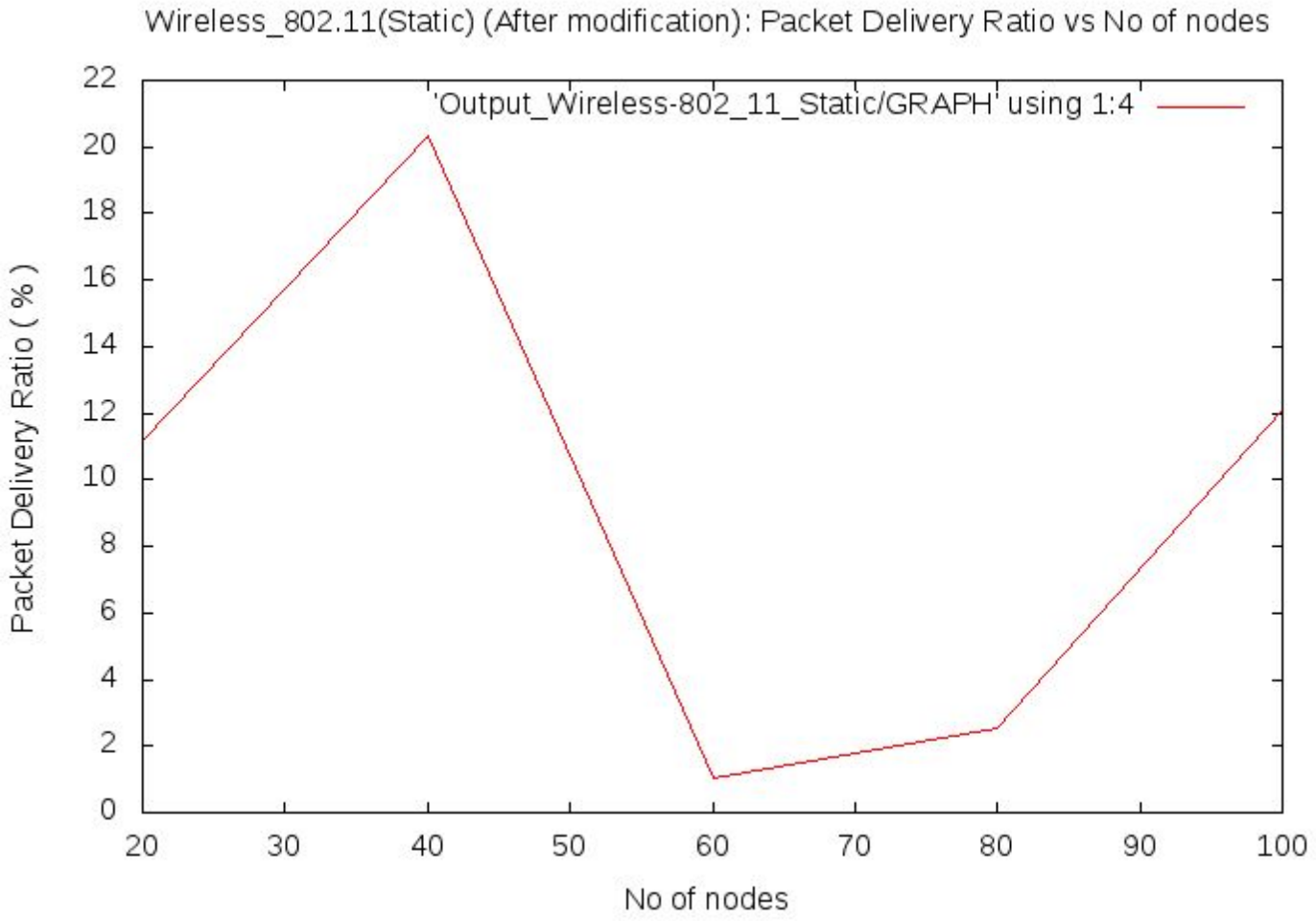

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs coverArea (Tx_Range) - Rou
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
coverArea (Tx_Range)
0
2000
4000
6000
8000
10000
12000
14000
0
5
10
15
20

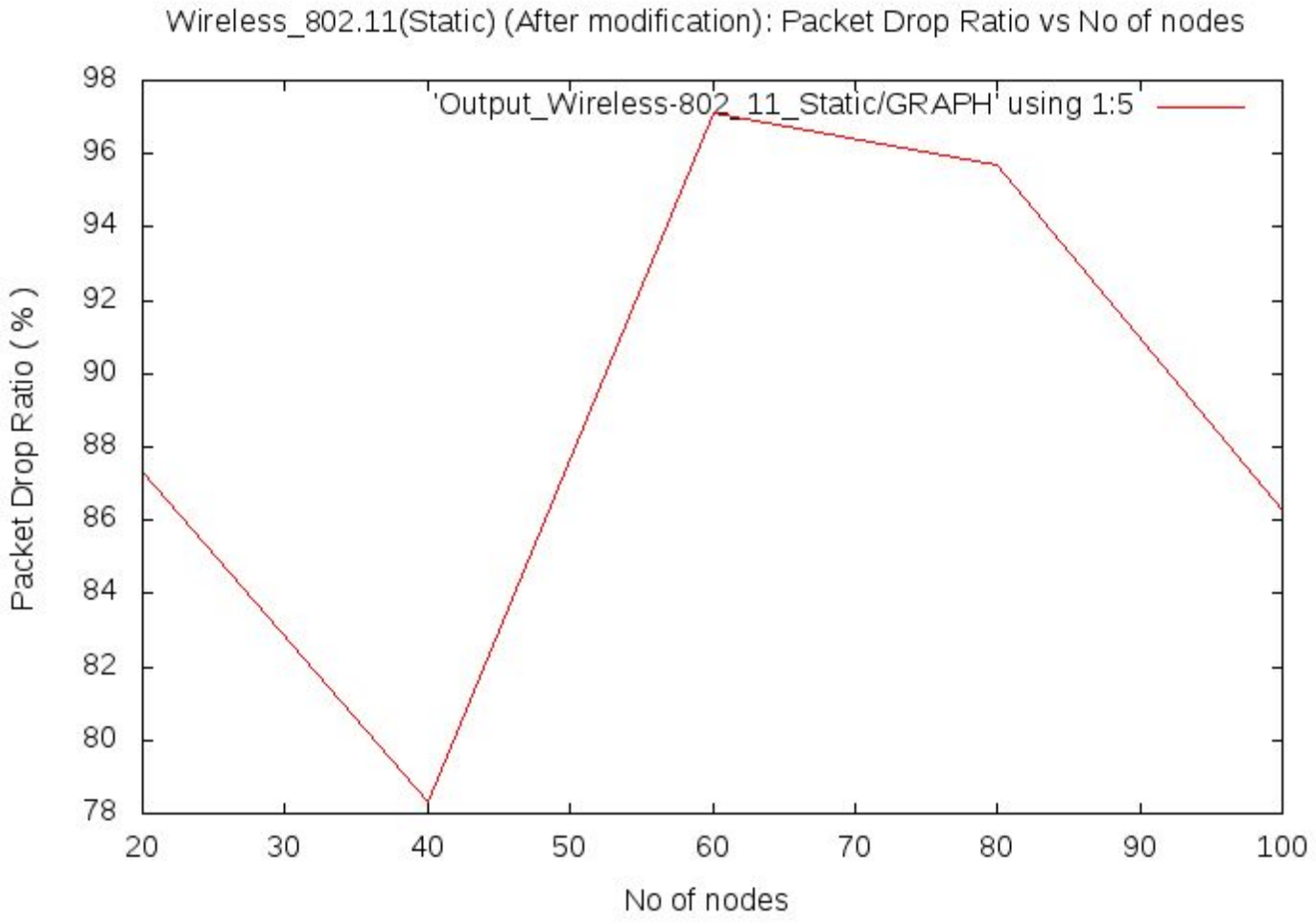

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs coverArea (Tx_Range) - Rou
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
6000
5000
4000
3000
2000
1000
0
0
5
10
15
20
coverArea (Tx_Range)

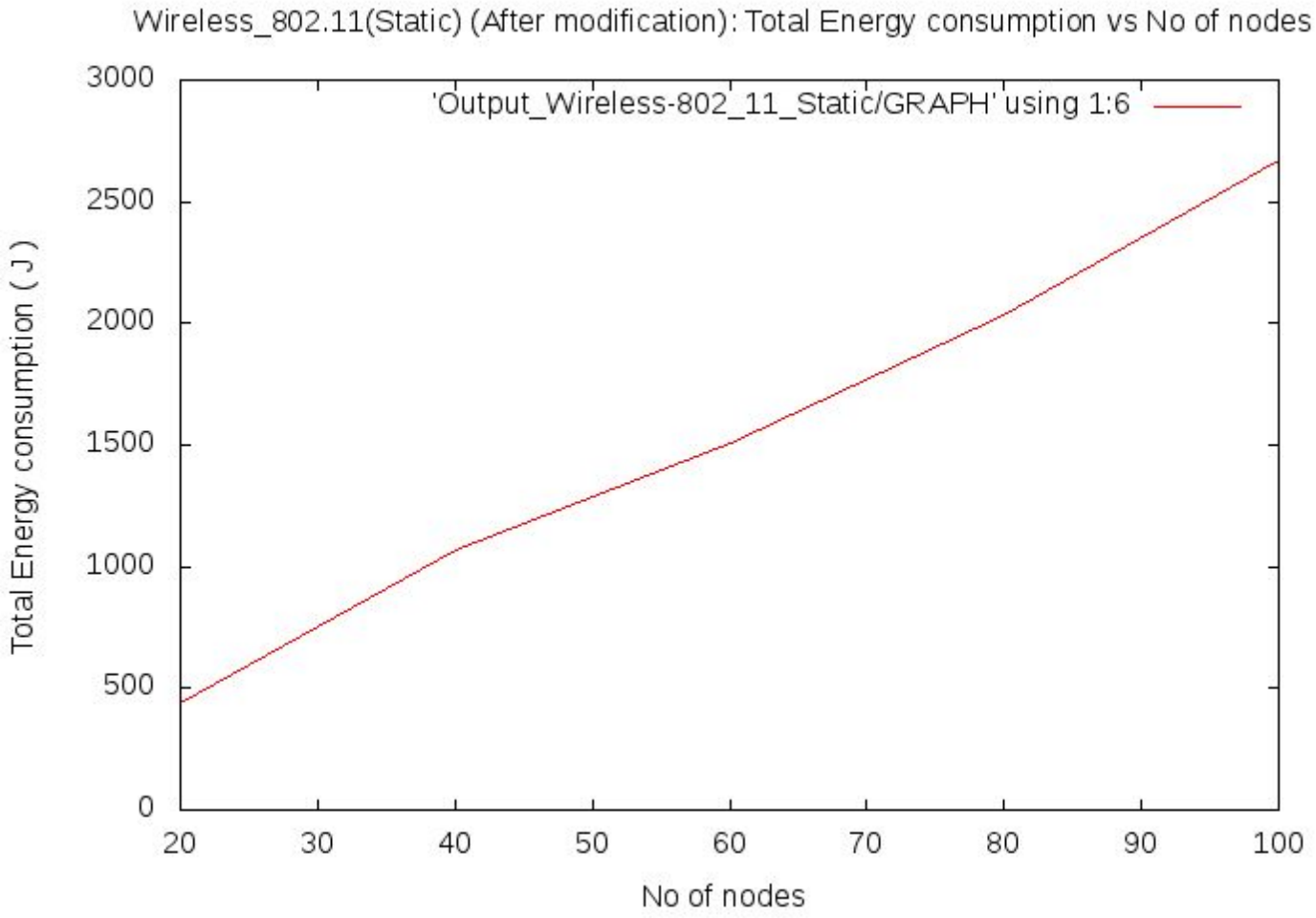
Wireless 802.11 (Static) (After Modification)

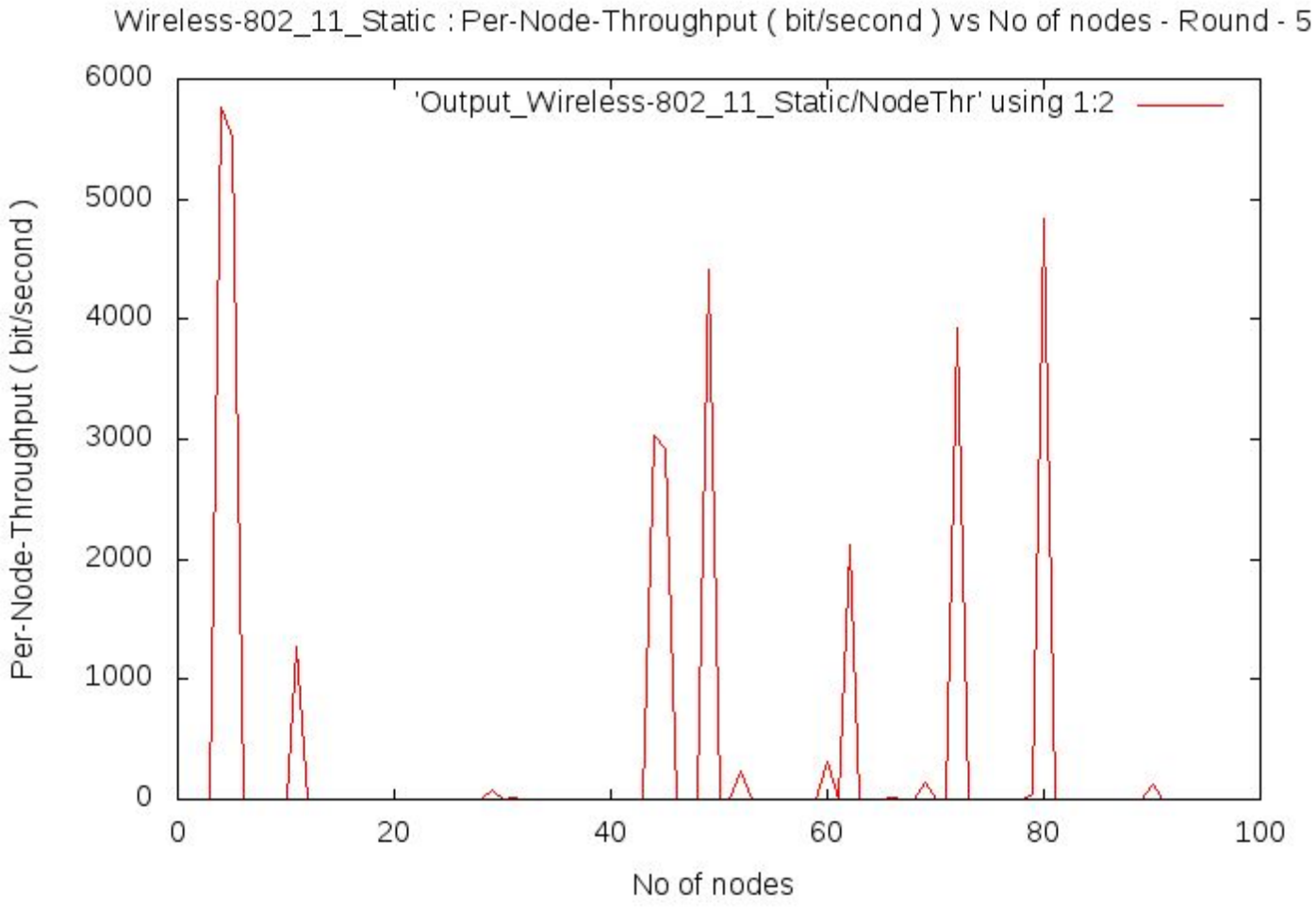

Wireless_802.11(Static) (After modification): Throughput vs No of nodes
'Output_Wireless-802_11_Static/GRAPH' using 1:2
Throughput (bit/second)
No of nodes
30000
25000
20000
15000
10000
5000
0
20
30
40
50
60
70
80
90
100

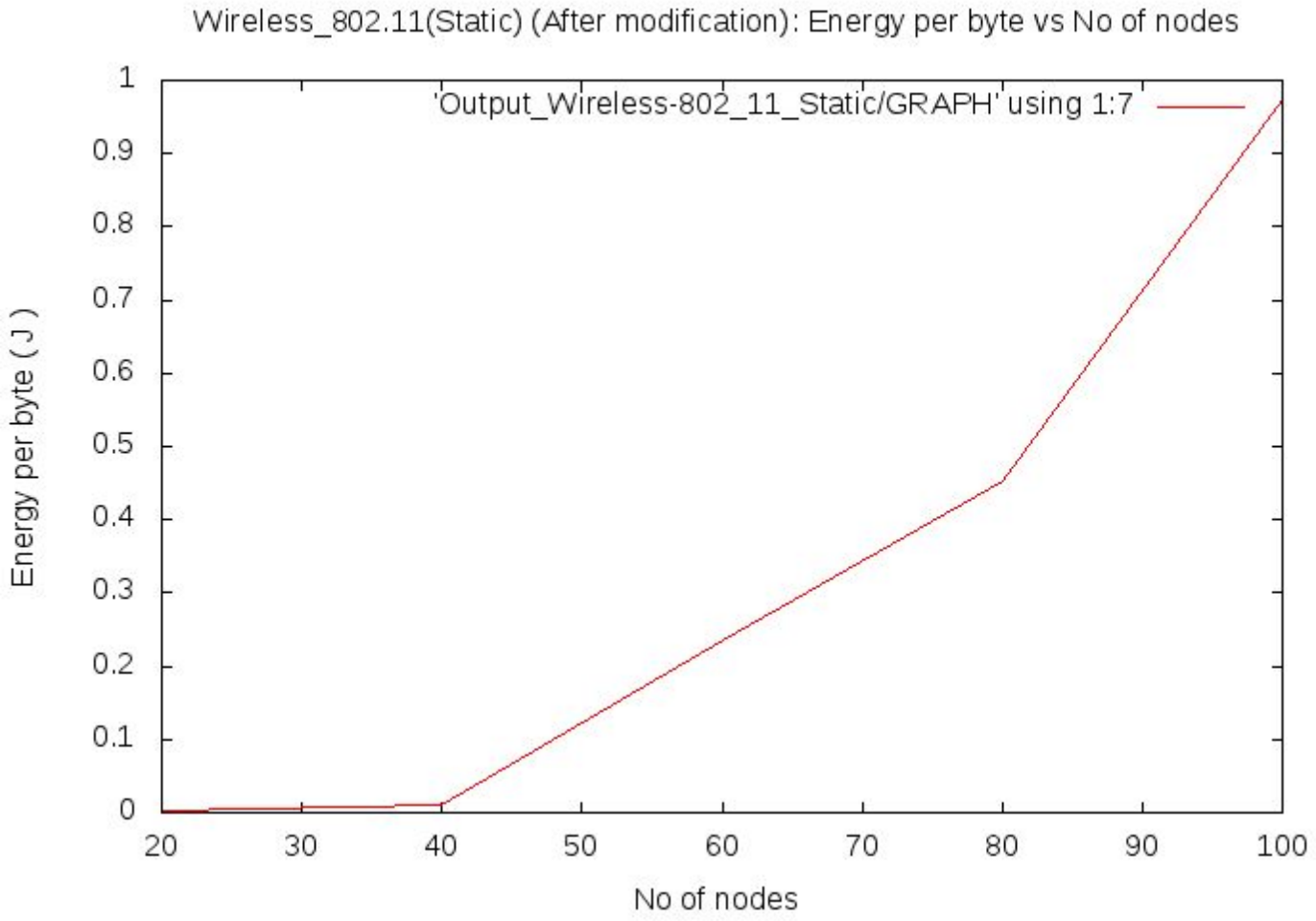

Wireless_802.11(Static) (After modification): Average Delay vs No of nodes
'Output_Wireless-802_11_Static/GRAPH' using 1:3
Average Delay (second)
No of nodes
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
20
30
40
50
60
70
80
90
100

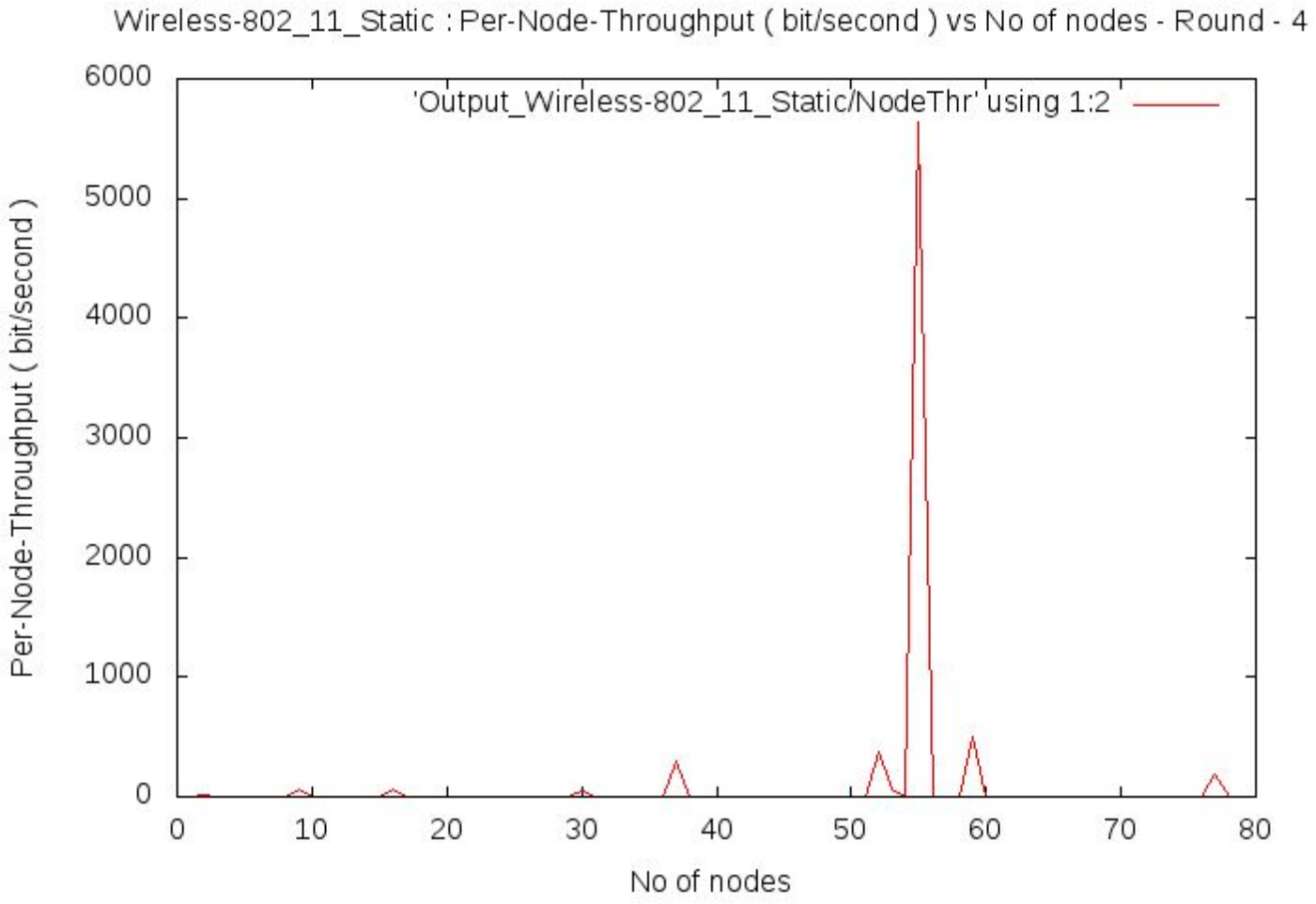

Wireless_802.11(Static) (After modification): Packet Delivery Ratio vs No of nodes
'Output_Wireless-802_11_Static/GRAPH' using 1:4
Packet Delivery Ratio (%)
No of nodes
0
2
4
6
8
10
12
14
16
18
20
22
20
30
40
50
60
70
80
90
100

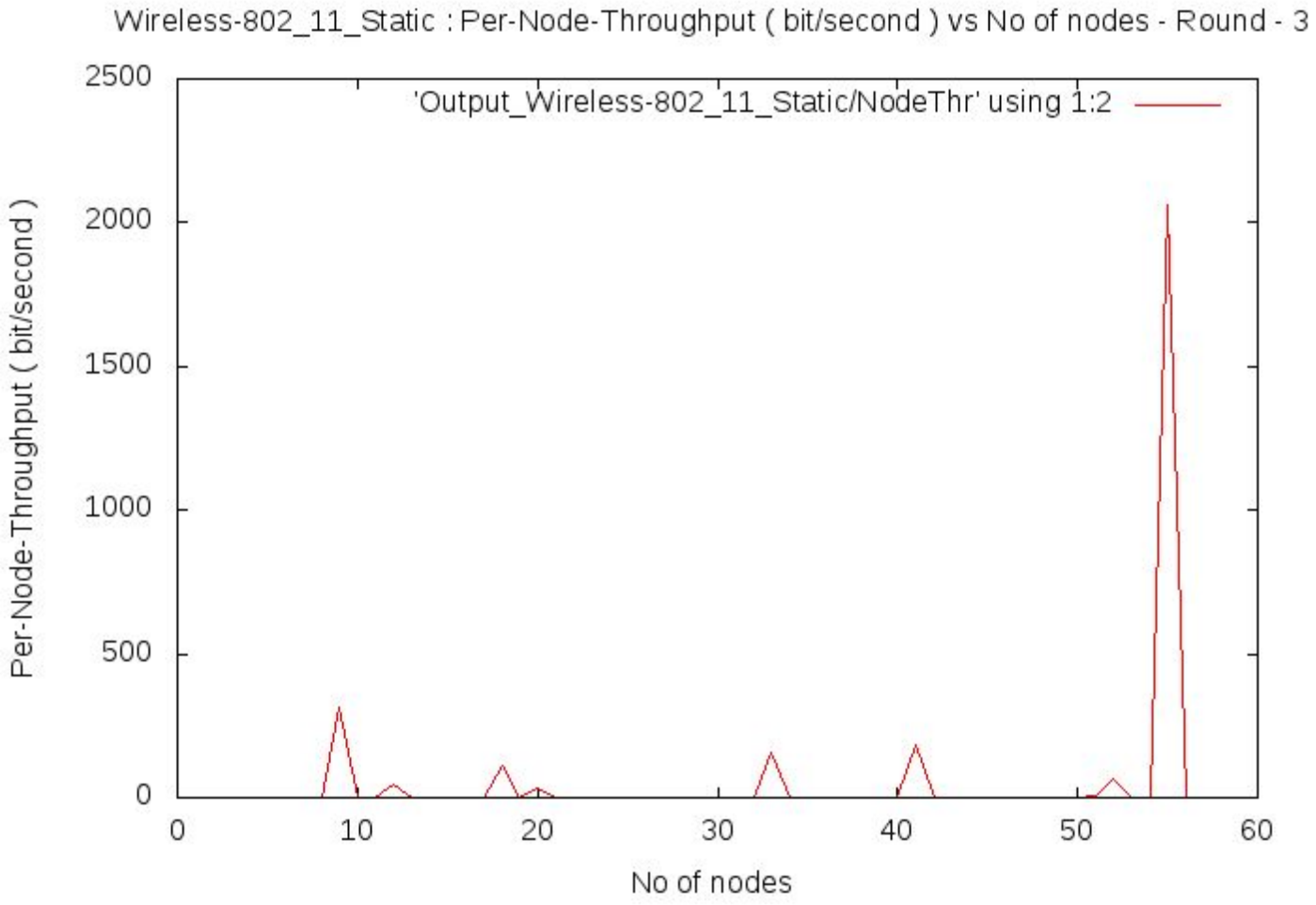

Wireless_802.11(Static) (After modification): Packet Drop Ratio vs No of nodes
'Output_Wireless-802_11_Static/GRAPH' using 1:5
Packet Drop Ratio (%)
No of nodes
98
96
94
92
90
88
86
84
82
80
78
20
30
40
50
60
70
80
90
100

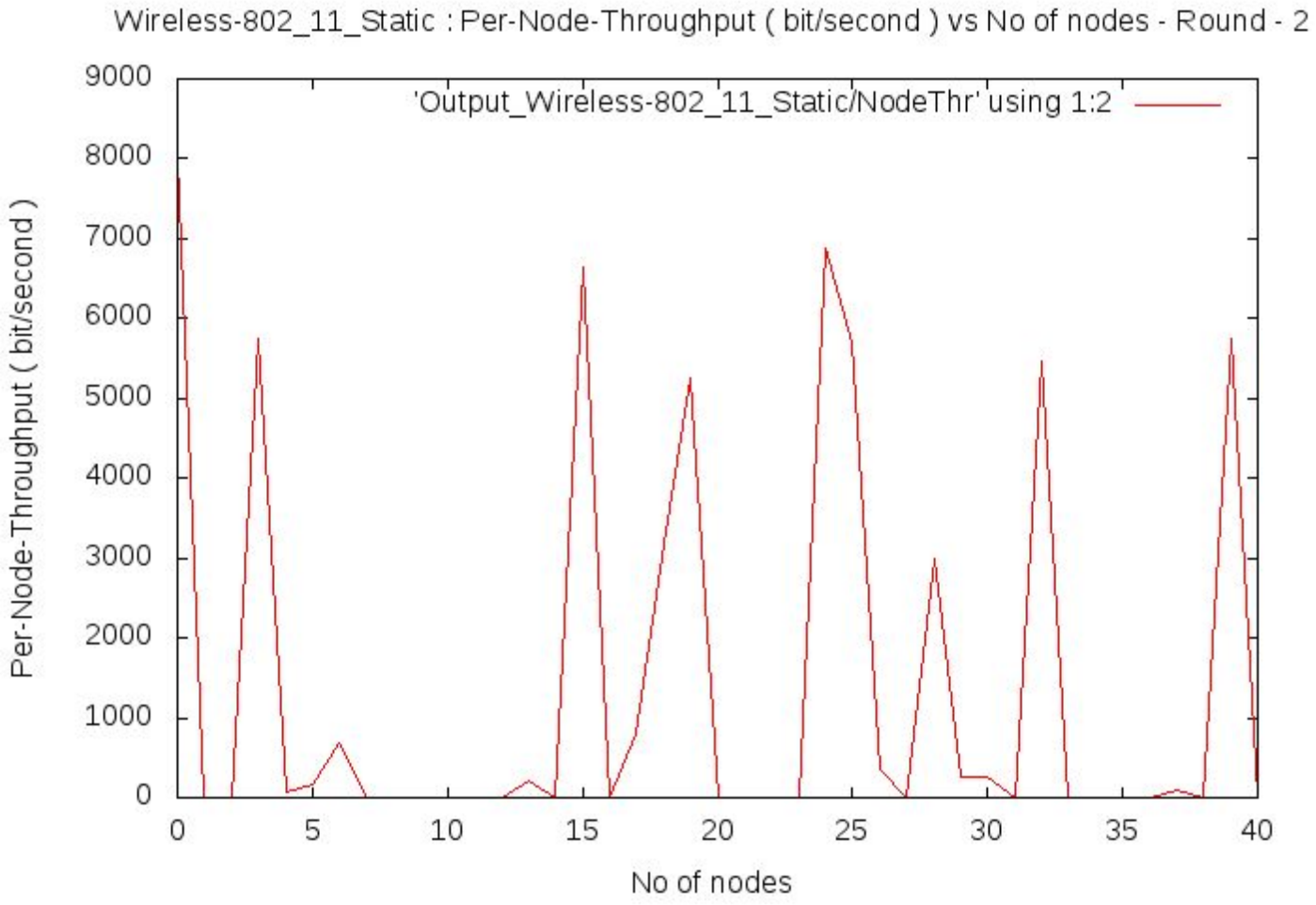

Wireless_802.11(Static) (After modification): Total Energy consumption vs No of nodes
'Output_Wireless-802_11_Static/GRAPH' using 1:6
Total Energy consumption (J)
No of nodes
3000
2500
2000
1500
1000
500
0
20
30
40
50
60
70
80
90
100

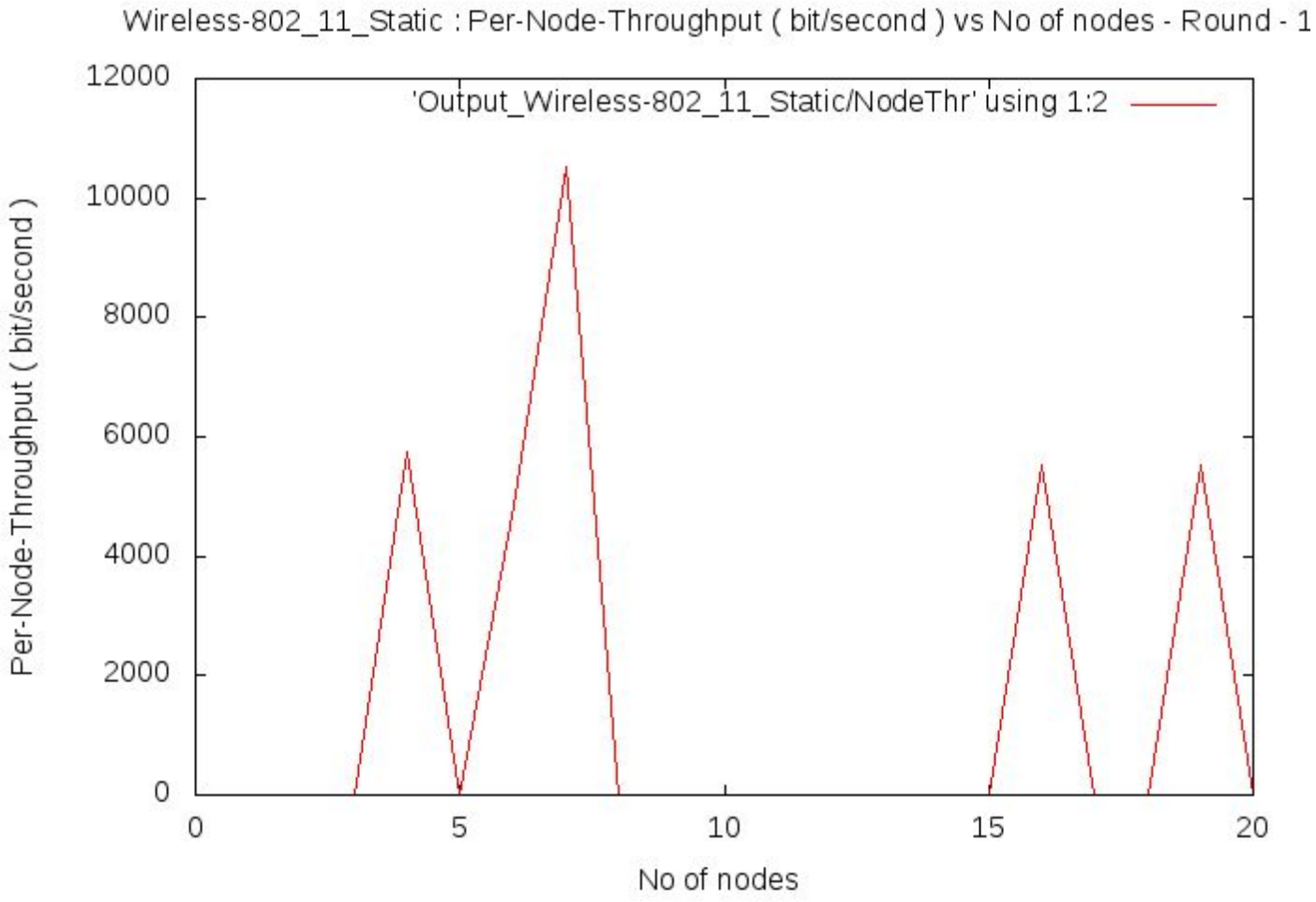

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of nodes - Round - 5
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
6000
5000
4000
3000
2000
1000
0
0
20
40
60
80
100

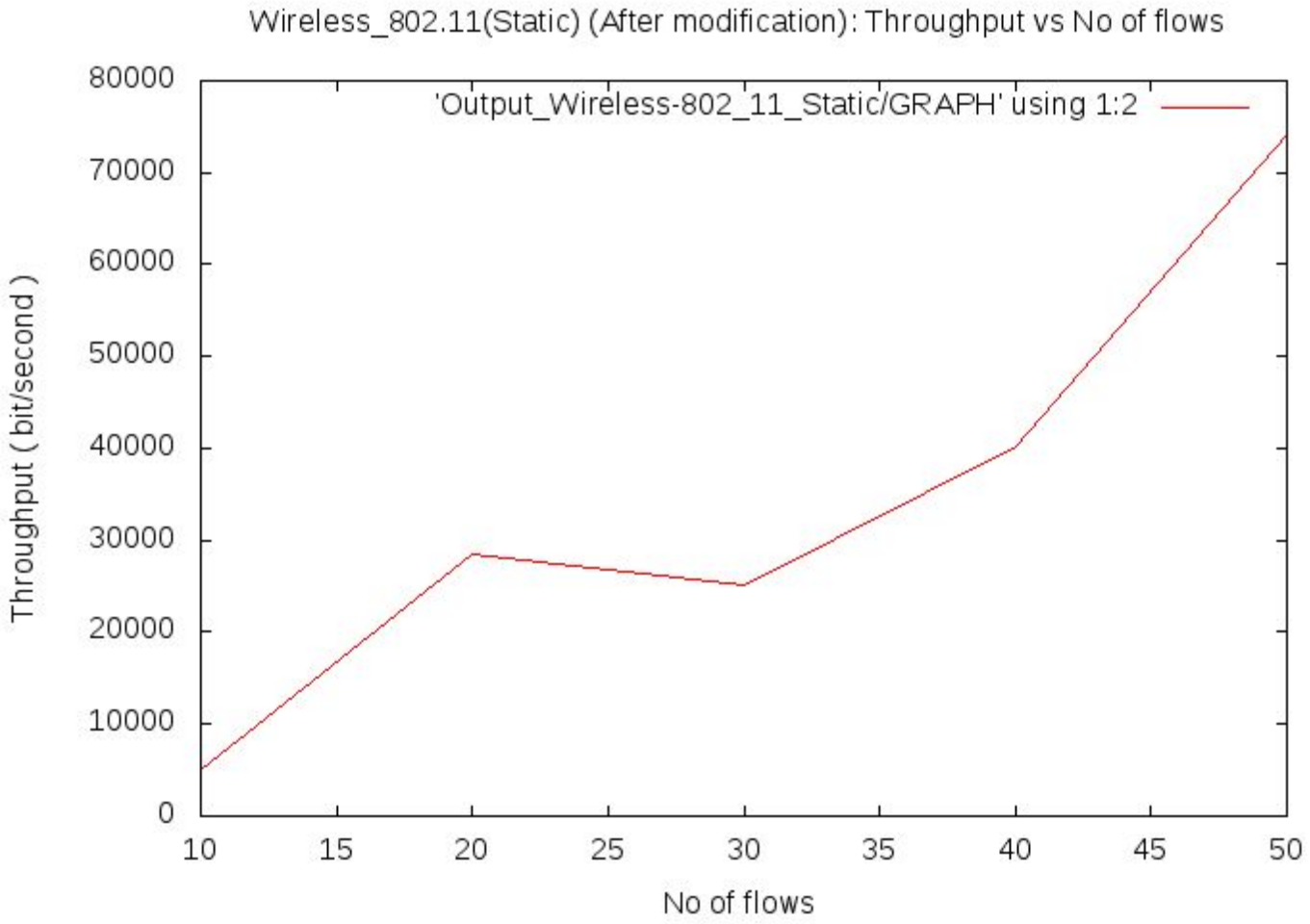

Wireless_802.11(Static) (After modification): Energy per byte vs No of nodes
'Output_Wireless-802_11_Static/GRAPH' using 1:7
Energy per byte (J)
No of nodes
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
20
30
40
50
60
70
80
90
100

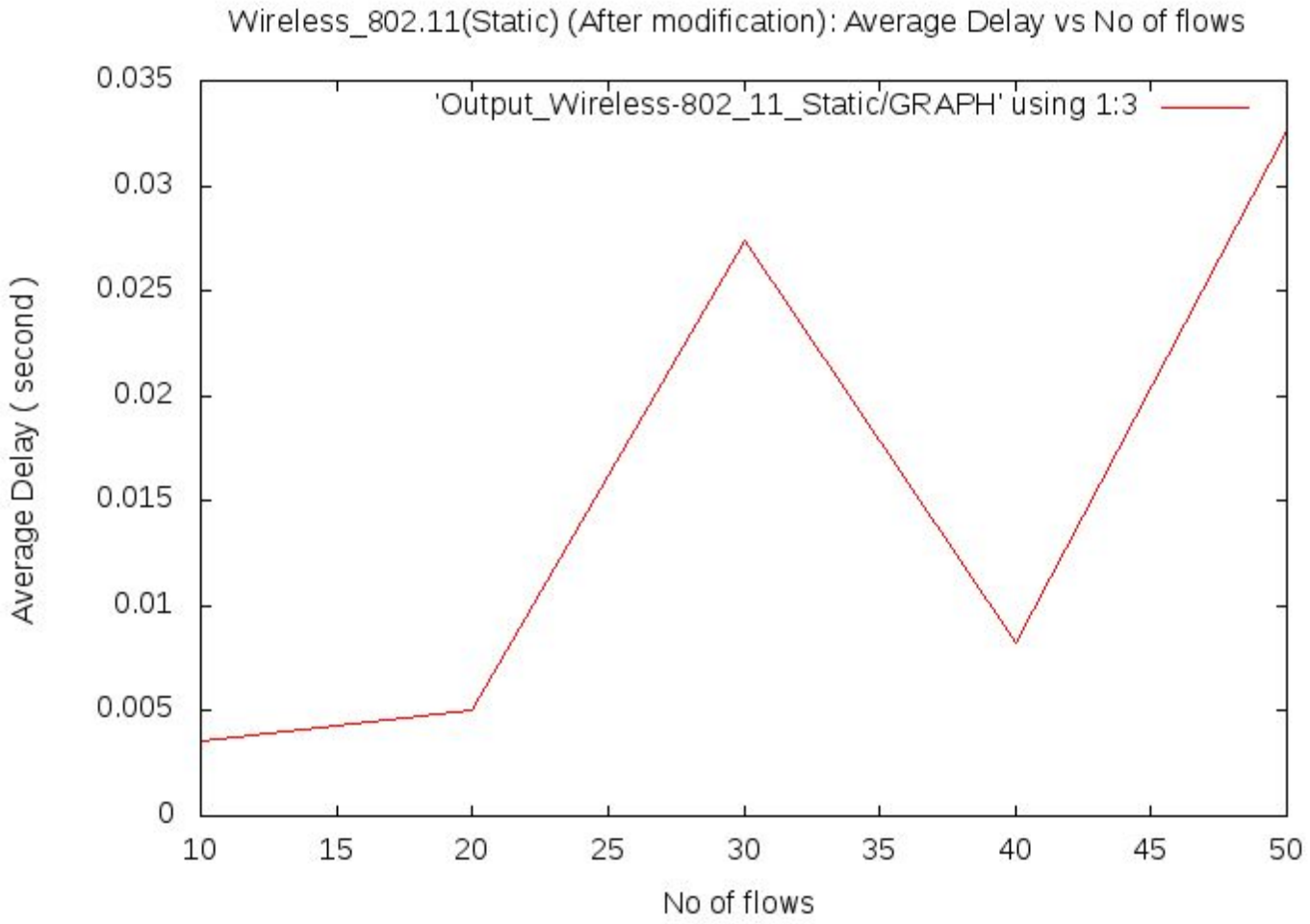

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of nodes - Round - 4
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
6000
5000
4000
3000
2000
1000
0
0
10
20
30
40
50
60
70
80

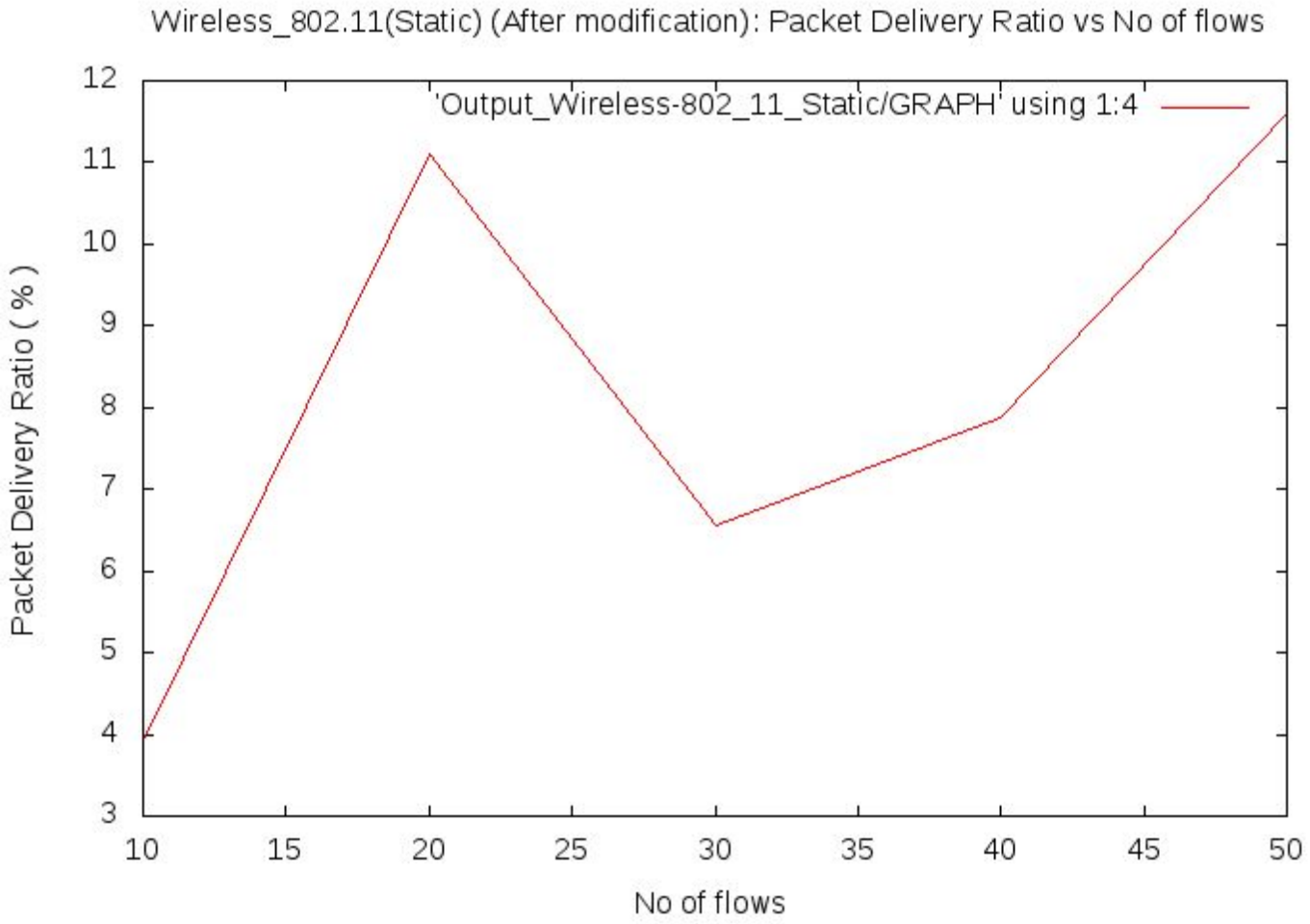

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of nodes - Round - 3
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
2500
2000
1500
1000
500
0
0
10
20
30
40
50
60

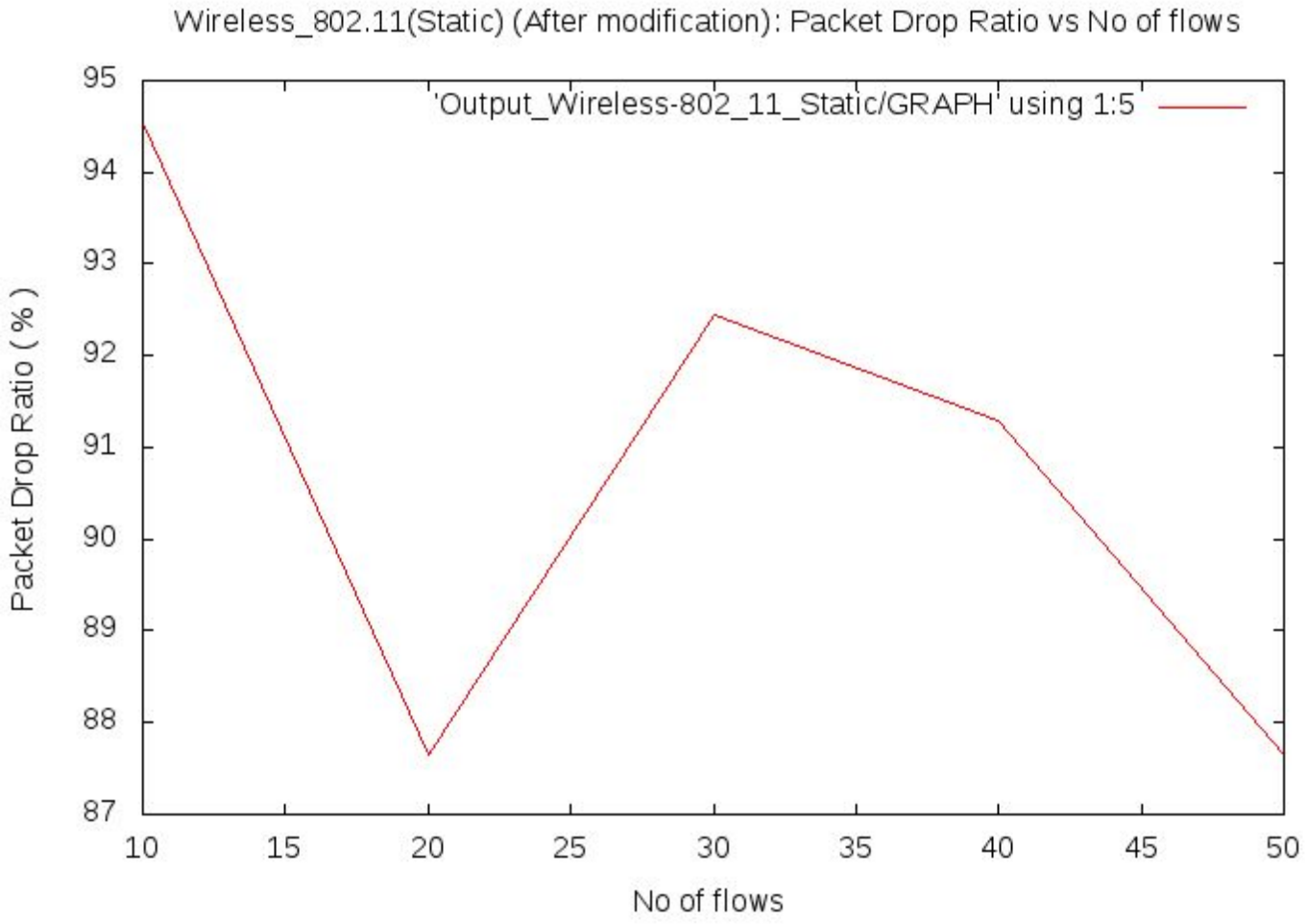

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of nodes - Round - 2
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0
5
10
15
20
25
30
35
40

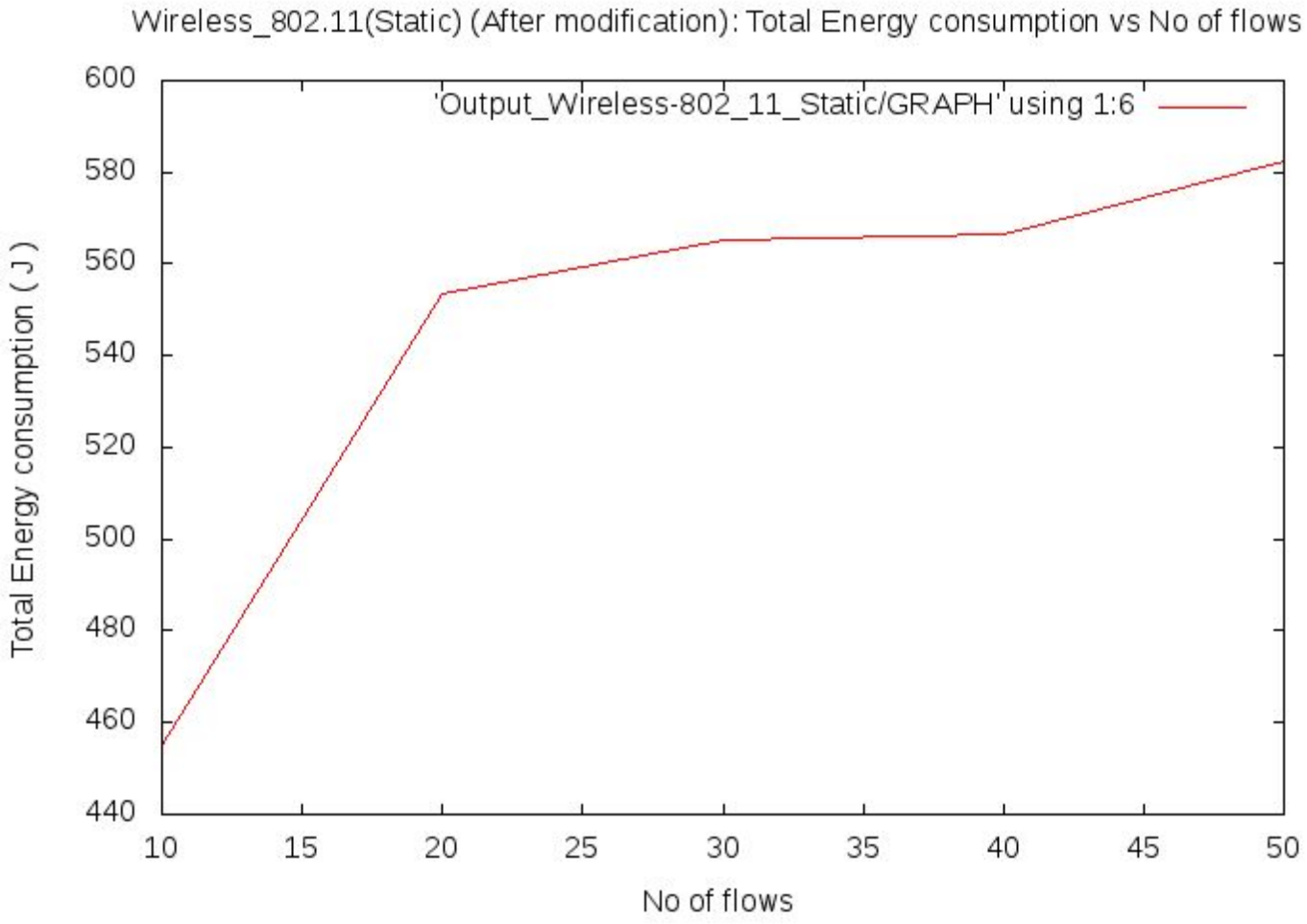

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of nodes - Round - 1
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of nodes
0
2000
4000
6000
8000
10000
12000
0
5
10
15
20

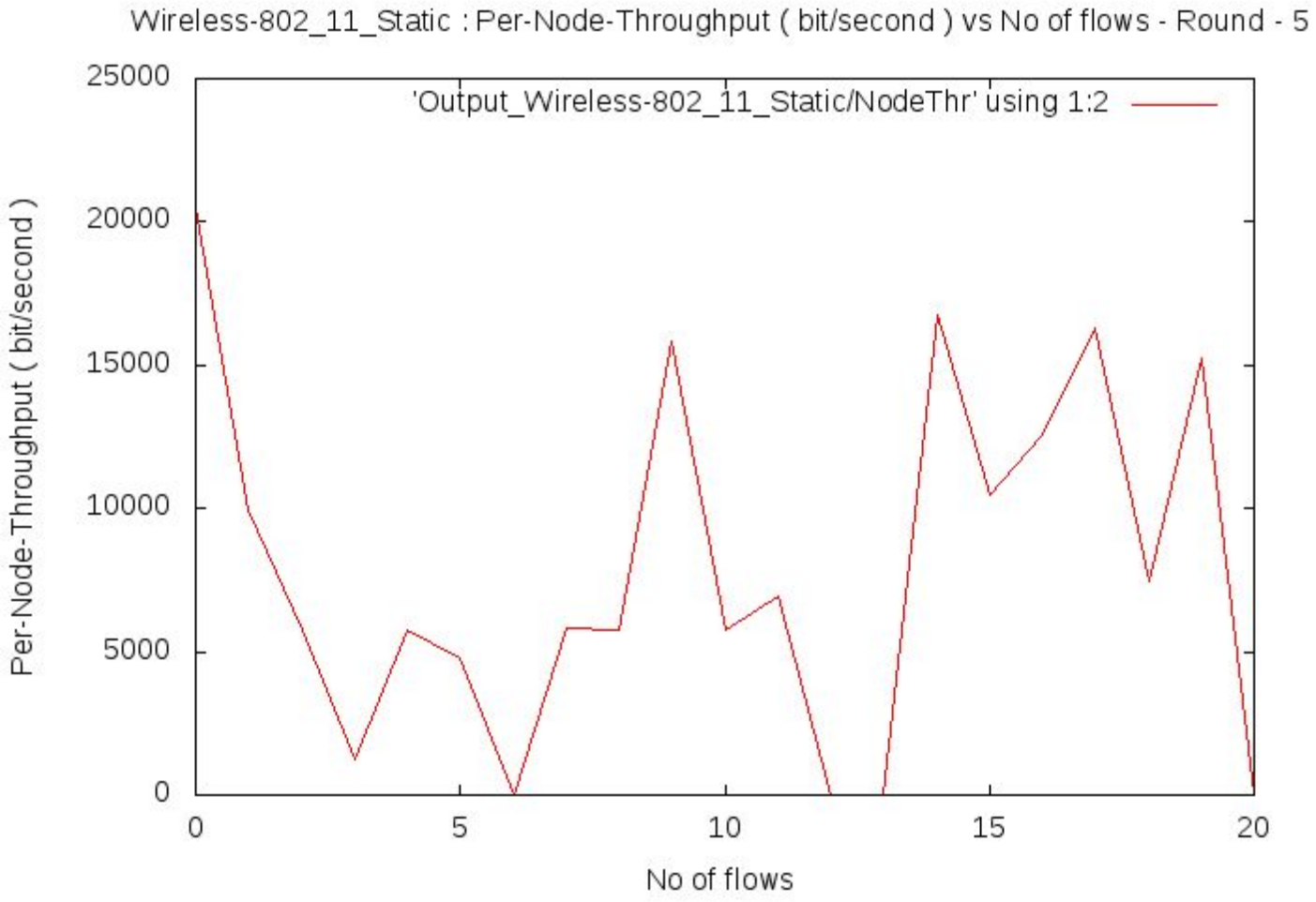

Wireless_802.11(Static) (After modification): Throughput vs No of flows
'Output_Wireless-802_11_Static/GRAPH' using 1:2
Throughput (bit/second)
No of flows
80000
70000
60000
50000
40000
30000
20000
10000
0
10
15
20
25
30
35
40
45
50

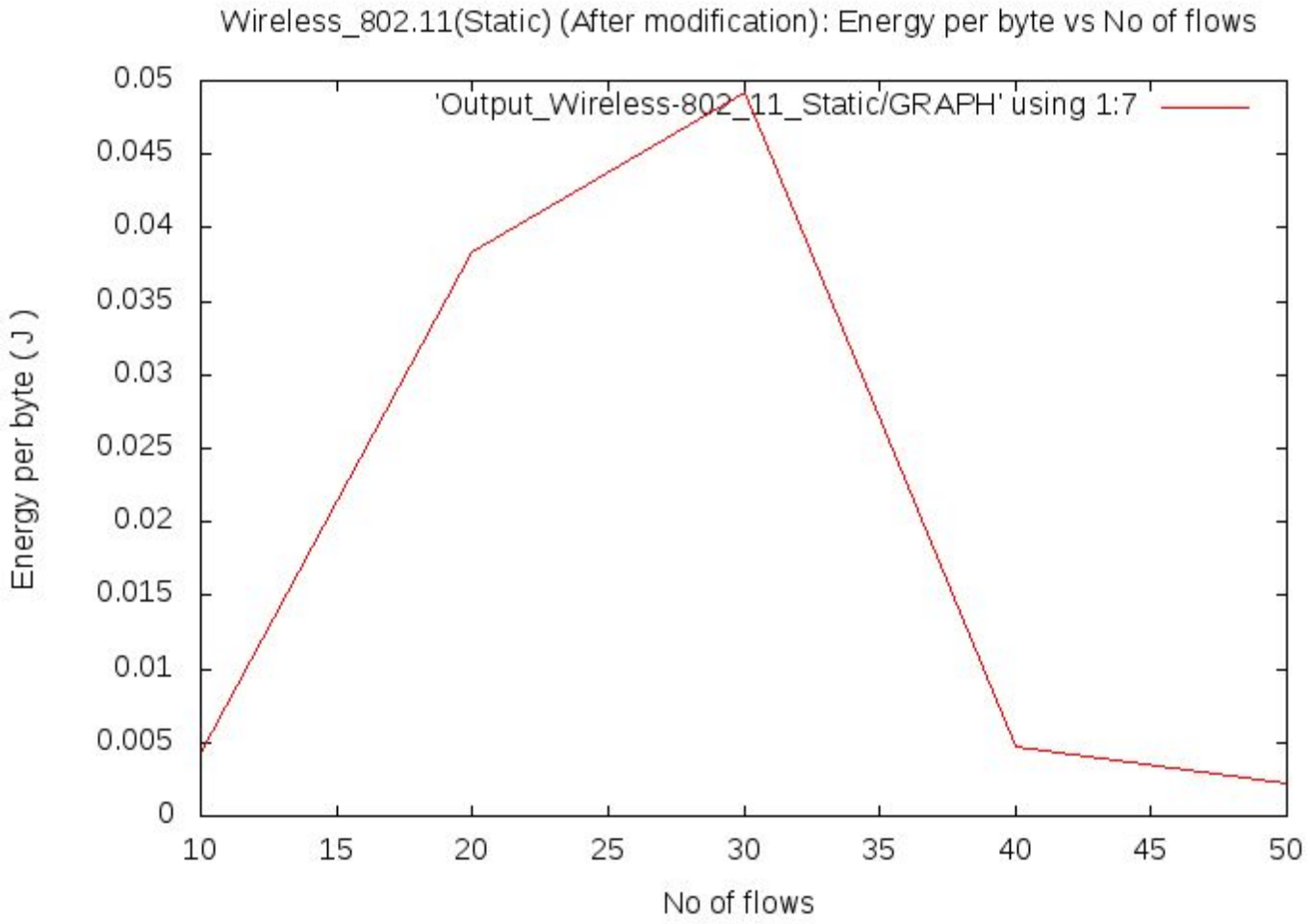

Wireless_802.11(Static) (After modification): Average Delay vs No of flows
'Output_Wireless-802_11_Static/GRAPH' using 1:3
Average Delay (second)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
10
15
20
25
30
35
40
45
50
No of flows

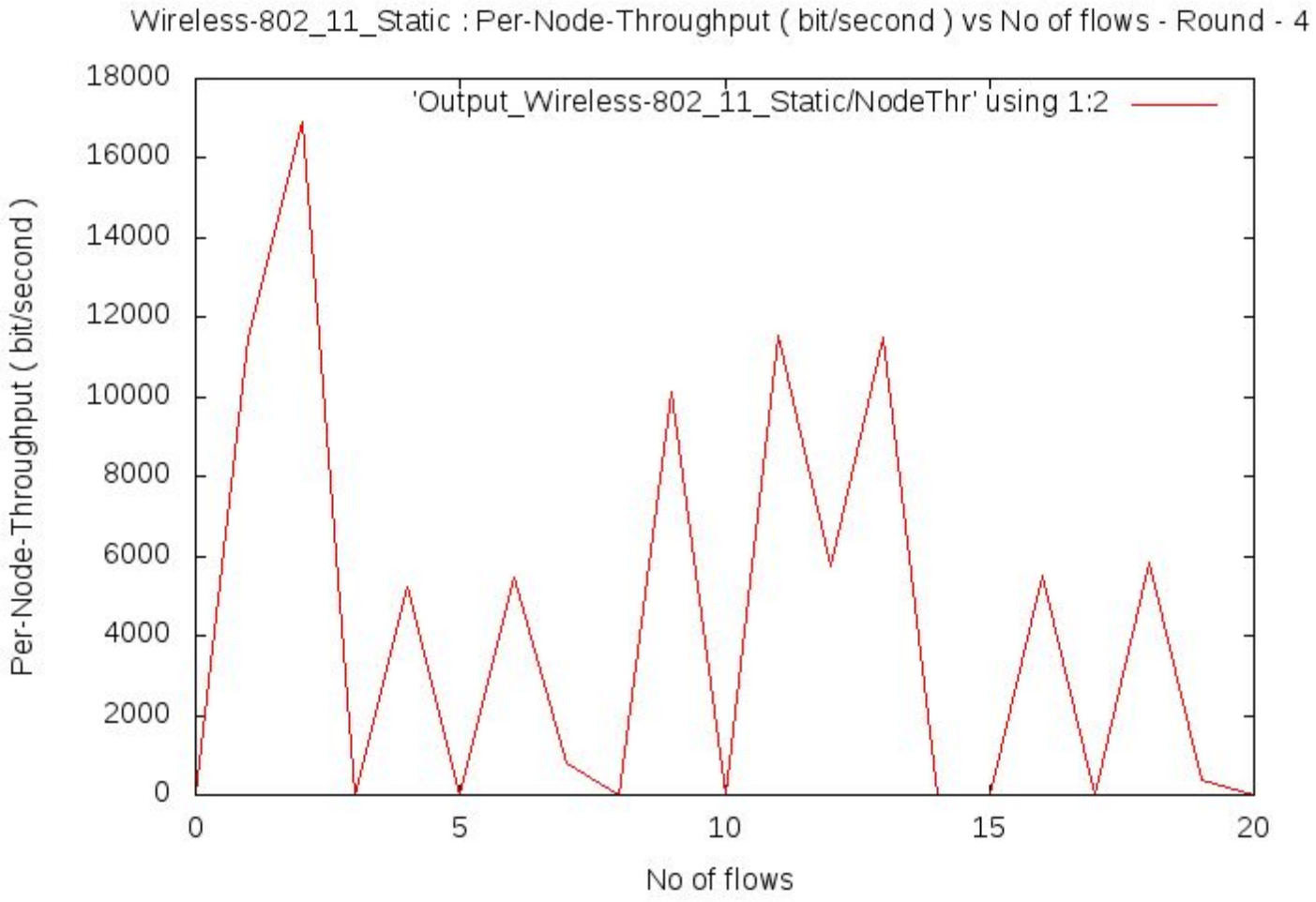

Wireless_802.11(Static) (After modification): Packet Delivery Ratio vs No of flows
'Output_Wireless-802_11_Static/GRAPH' using 1:4
Packet Delivery Ratio (%)
No of flows
12
11
10
9
8
7
6
5
4
3
10
15
20
25
30
35
40
45
50

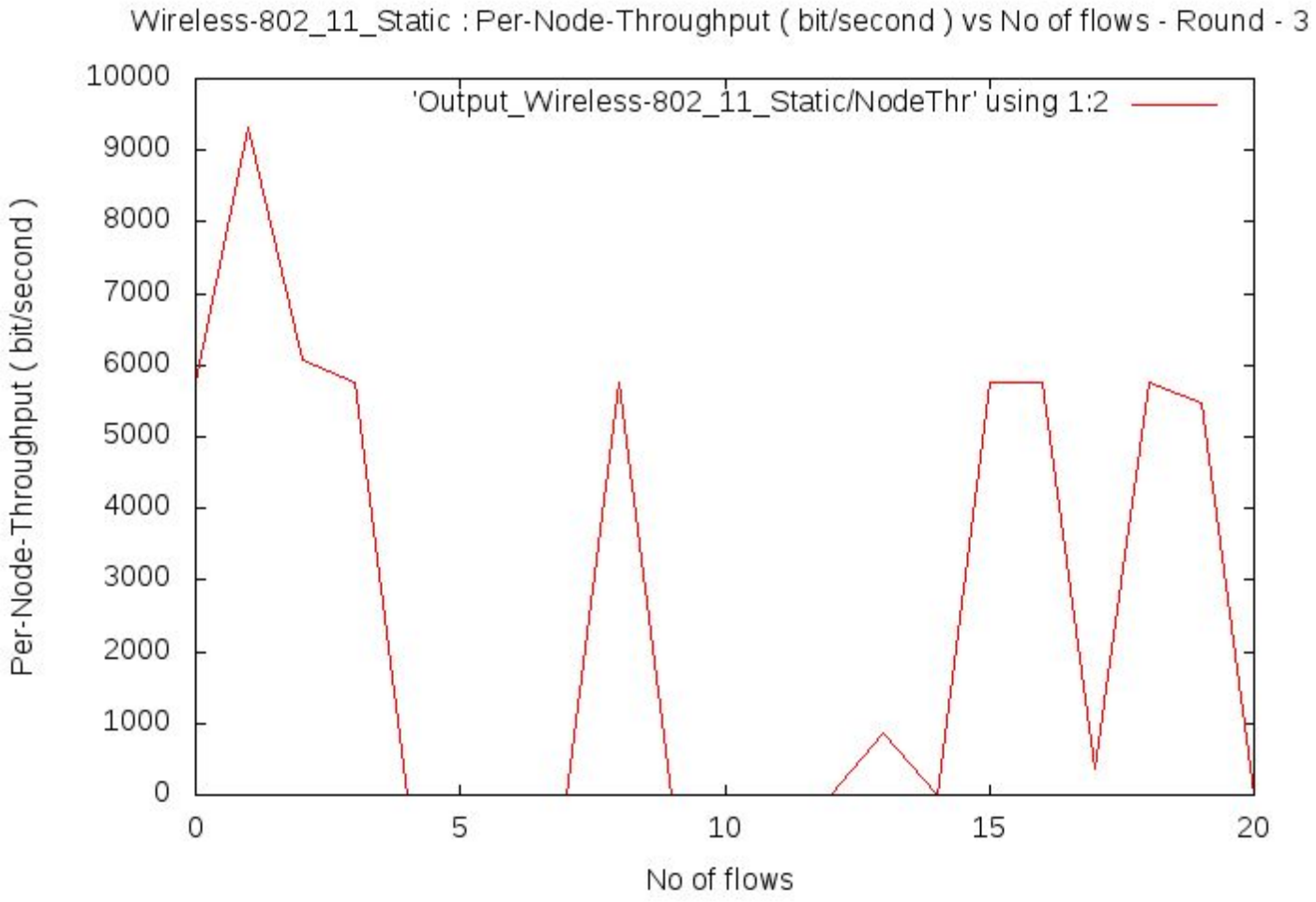

Wireless_802.11(Static) (After modification): Packet Drop Ratio vs No of flows
'Output_Wireless-802_11_Static/GRAPH' using 1:5
Packet Drop Ratio (%)
No of flows
95
94
93
92
91
90
89
88
87
10
15
20
25
30
35
40
45
50

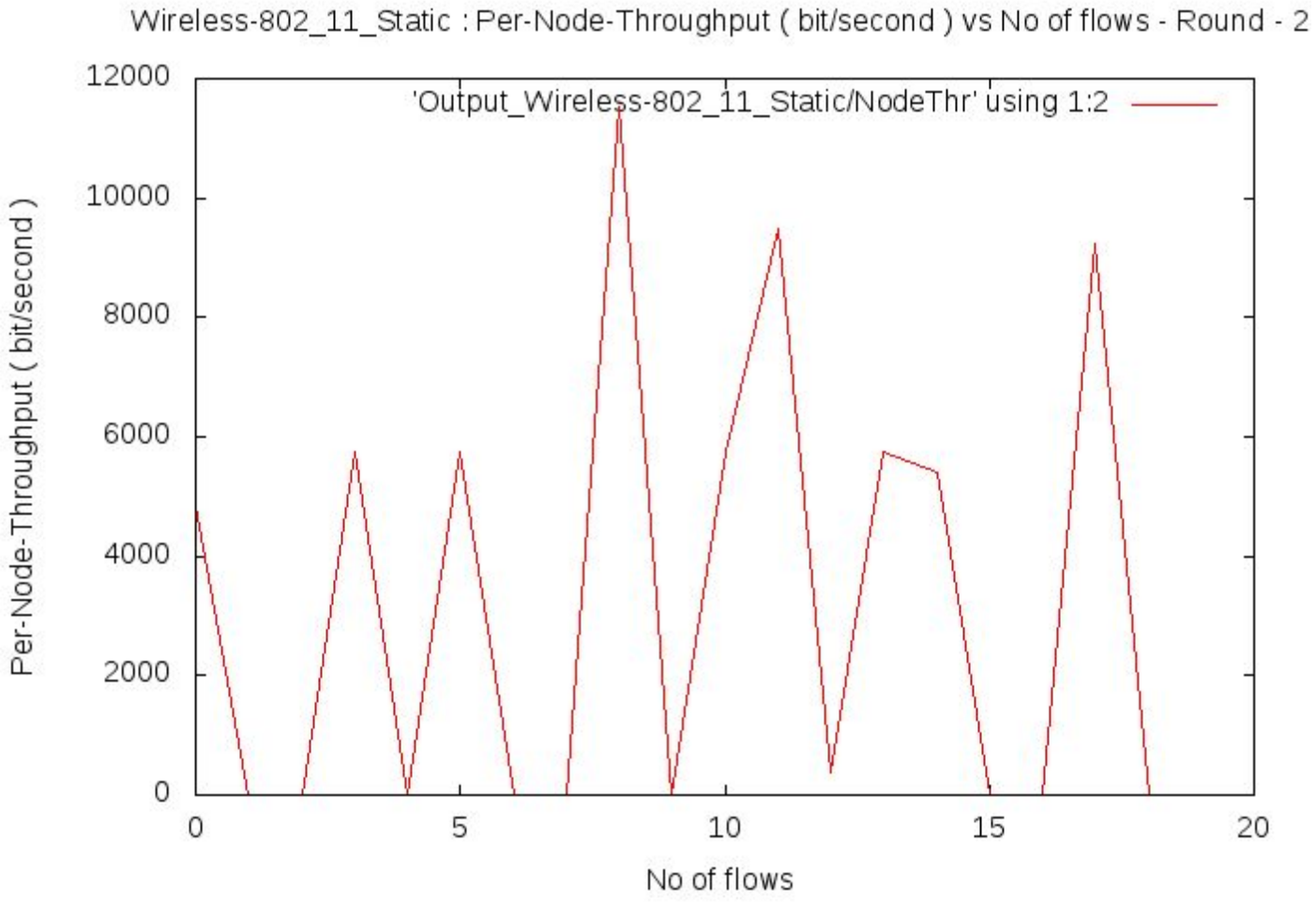

Wireless_802.11(Static) (After modification): Total Energy consumption vs No of flows
'Output_Wireless-802_11_Static/GRAPH' using 1:6
Total Energy consumption (J)
No of flows
600
580
560
540
520
500
480
460
440
10
15
20
25
30
35
40
45
50

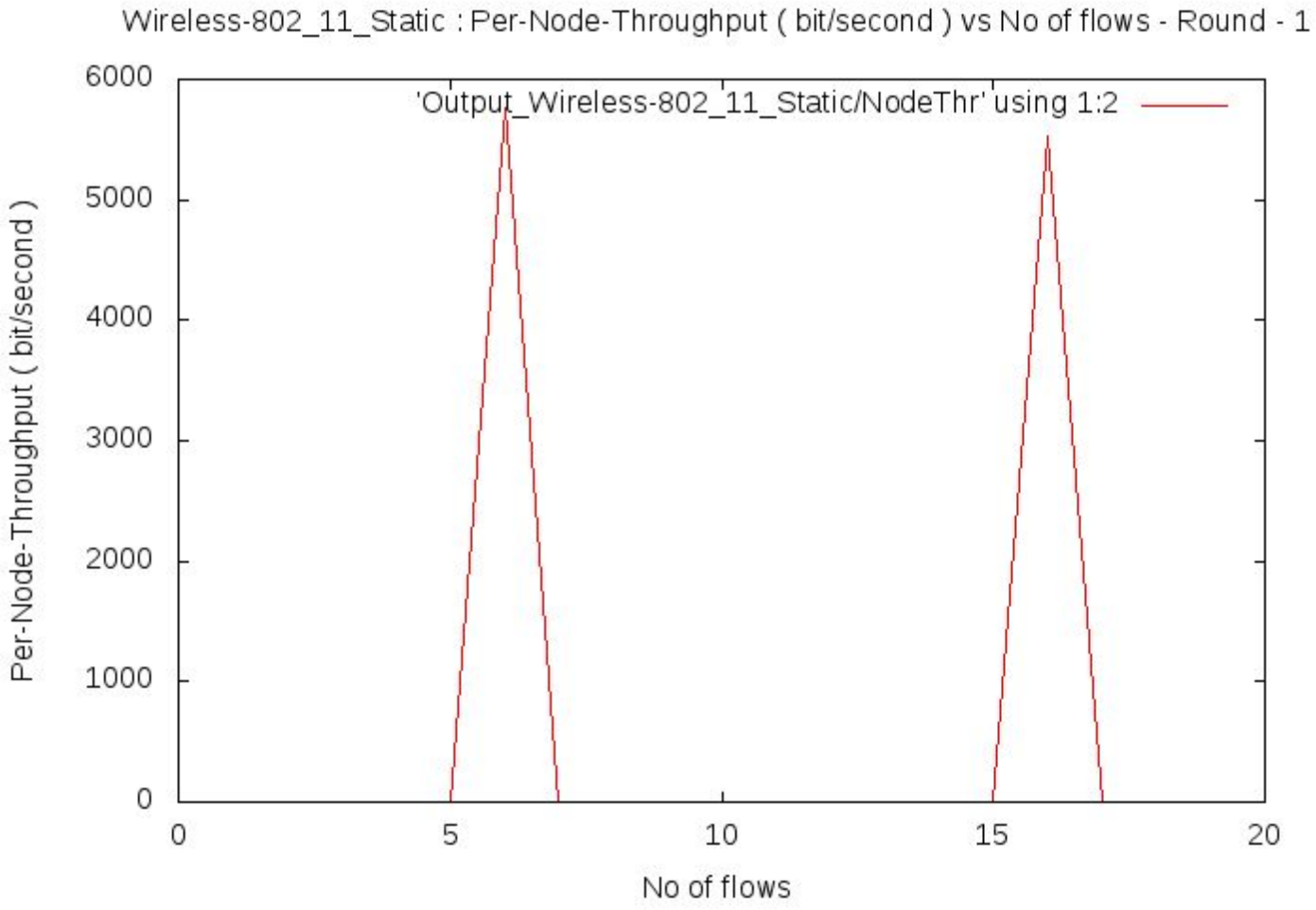

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of flows - Round - 5
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
25000
20000
15000
10000
5000
0
0
5
10
15
20

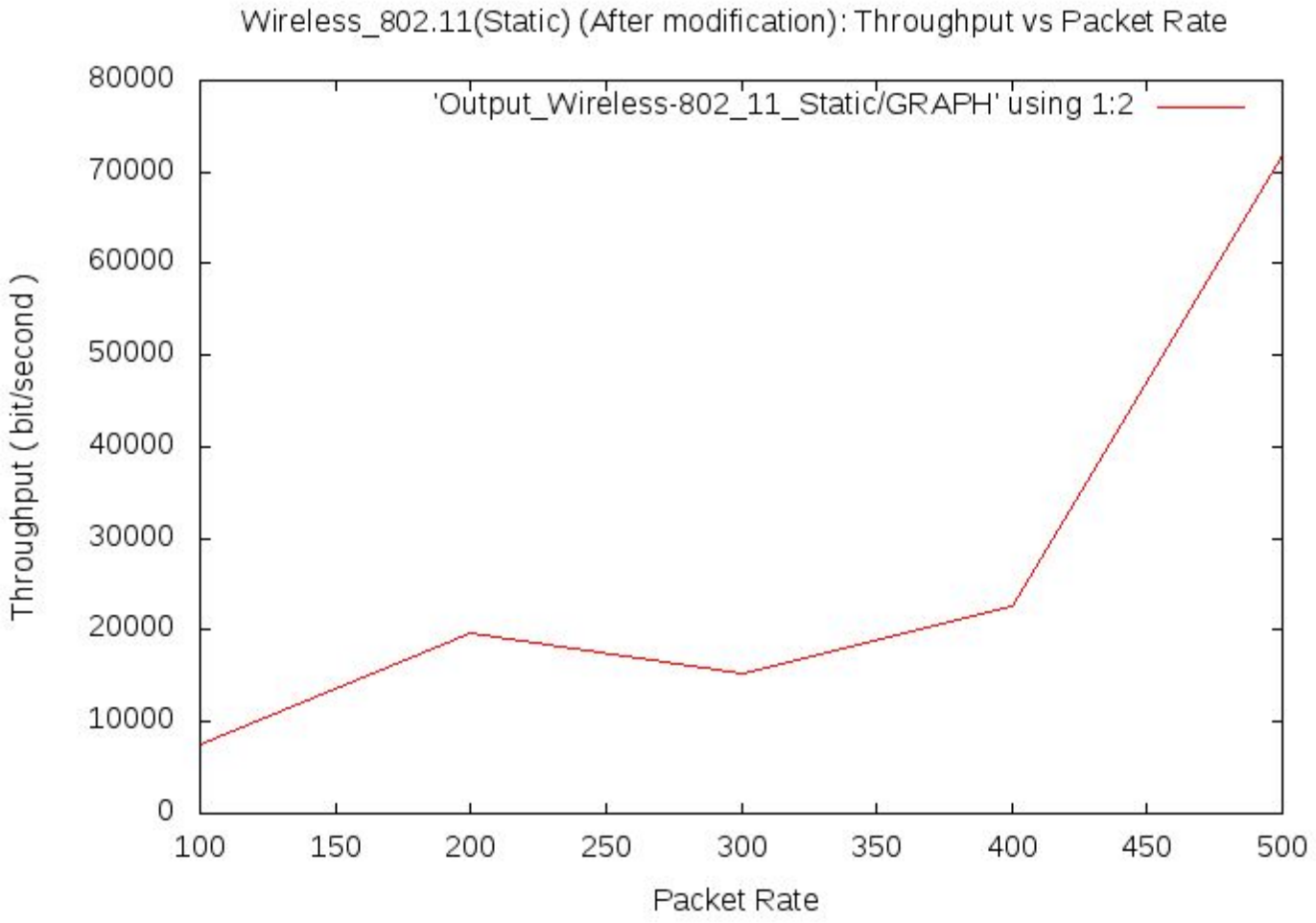

Wireless_802.11(Static) (After modification): Energy per byte vs No of flows
'Output_Wireless-802_11_Static/GRAPH' using 1:7
Energy per byte (J)
No of flows
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
10
15
20
25
30
35
40
45
50

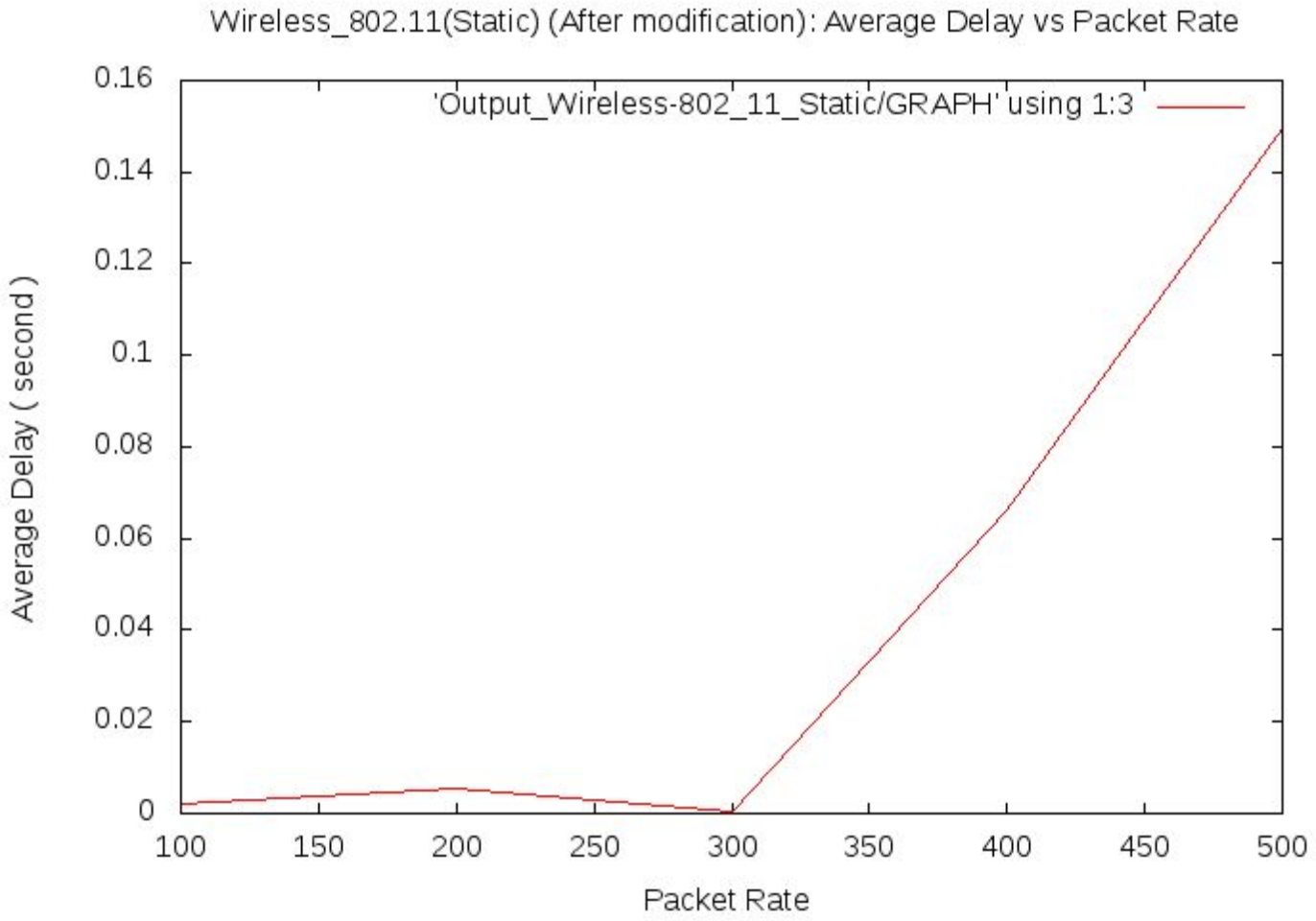

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of flows - Round - 4
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20

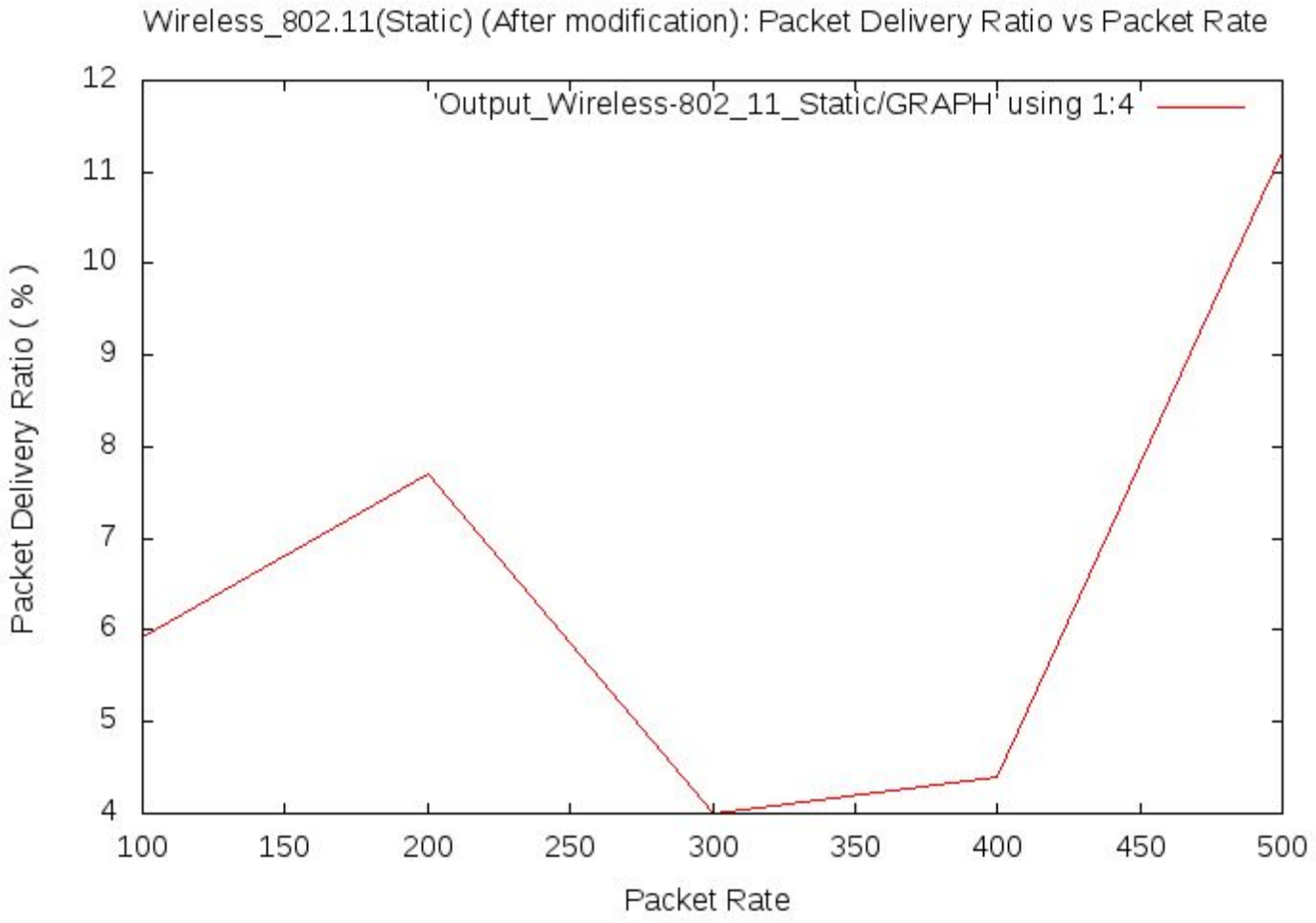

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of flows - Round - 3
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0
5
10
15
20

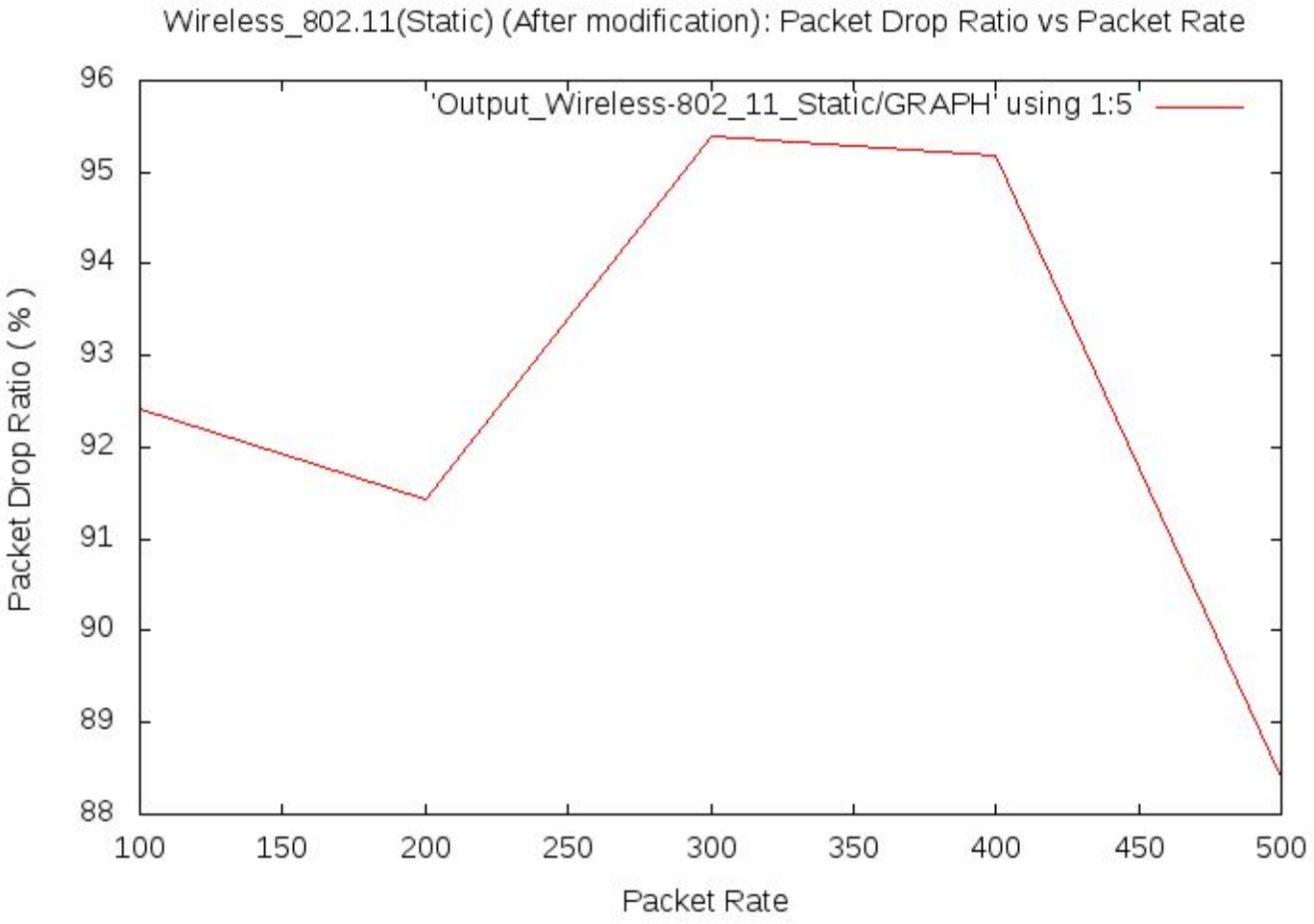

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of flows - Round - 2
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
0
2000
4000
6000
8000
10000
12000
0
5
10
15
20

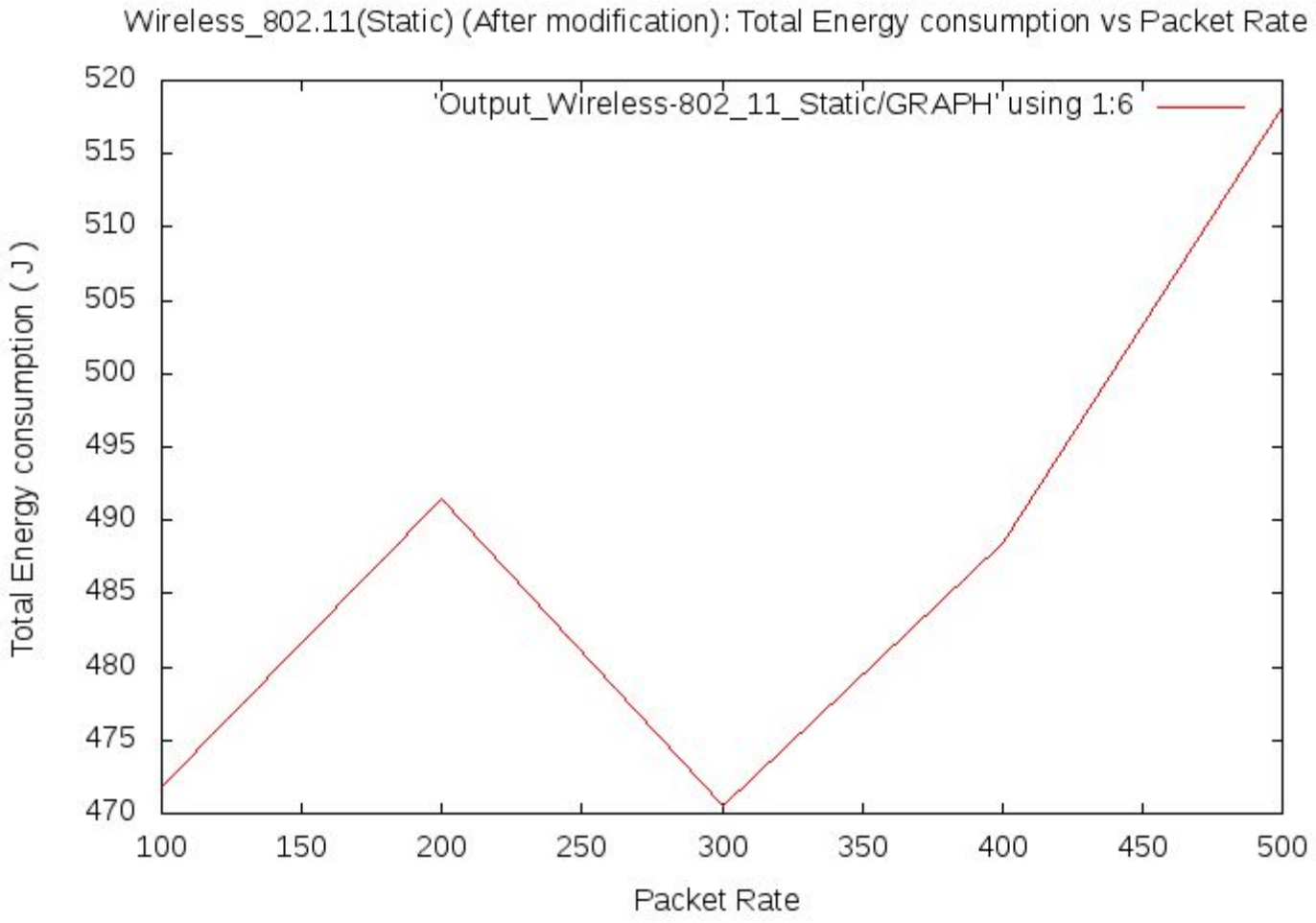

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs No of flows - Round - 1
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
No of flows
0
1000
2000
3000
4000
5000
6000
0
5
10
15
20

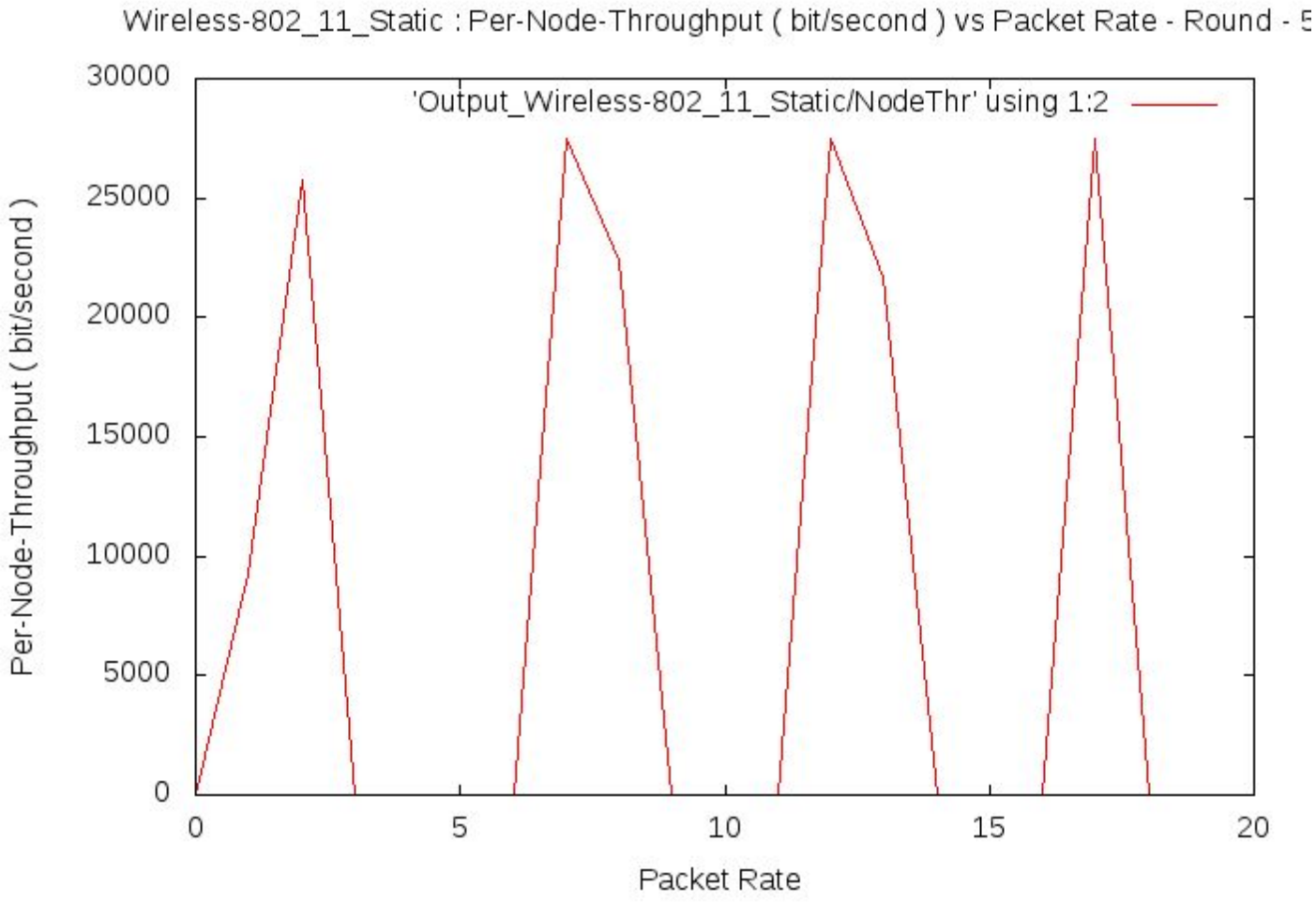

Wireless_802.11(Static) (After modification): Throughput vs Packet Rate
'Output_Wireless-802_11_Static/GRAPH' using 1:2
Throughput (bit/second)
Packet Rate
80000
70000
60000
50000
40000
30000
20000
10000
0
100
150
200
250
300
350
400
450
500

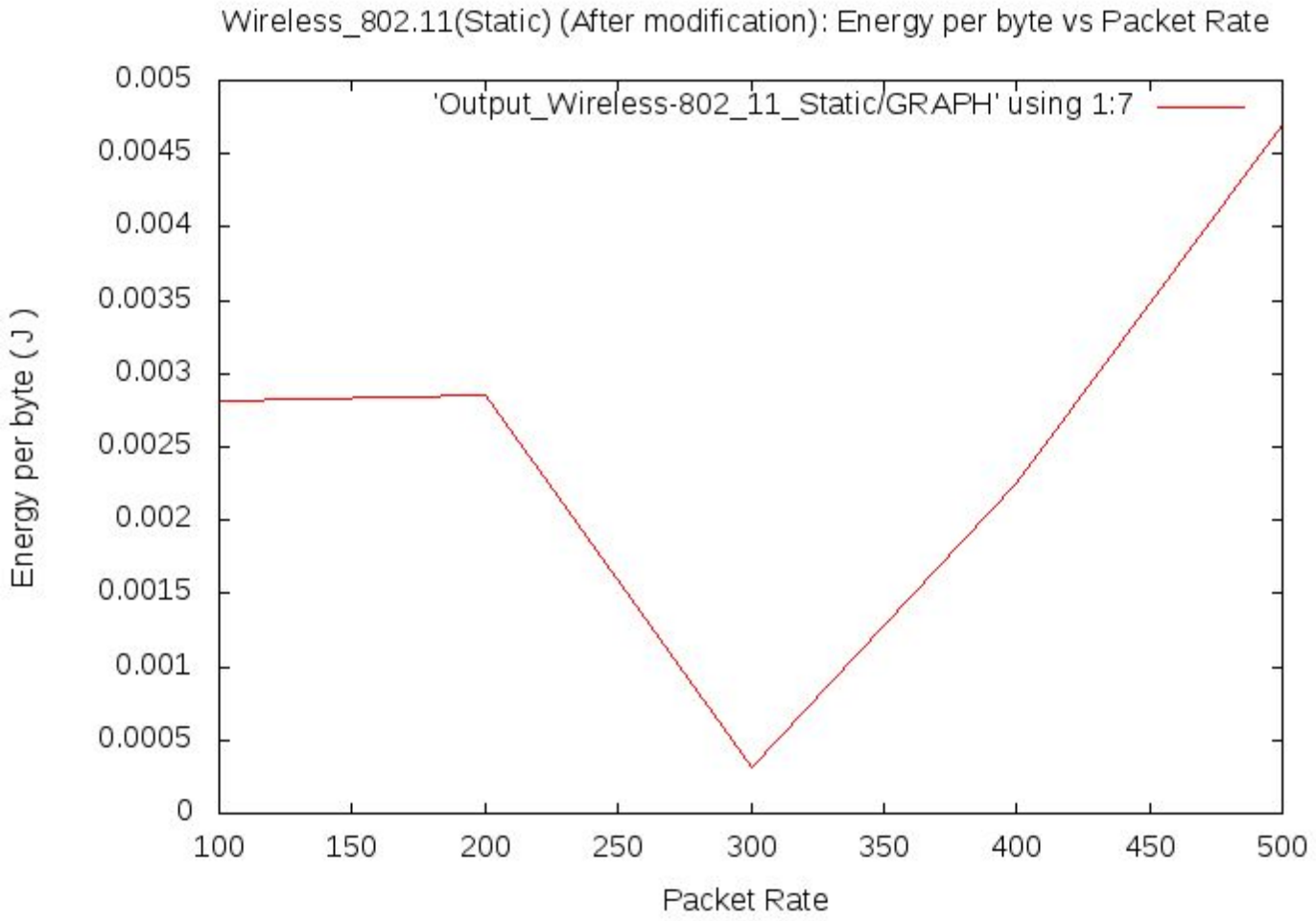

Wireless_802.11(Static) (After modification): Average Delay vs Packet Rate
'Output_Wireless-802_11_Static/GRAPH' using 1:3
Average Delay (second)
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
100
150
200
250
300
350
400
450
500
Packet Rate

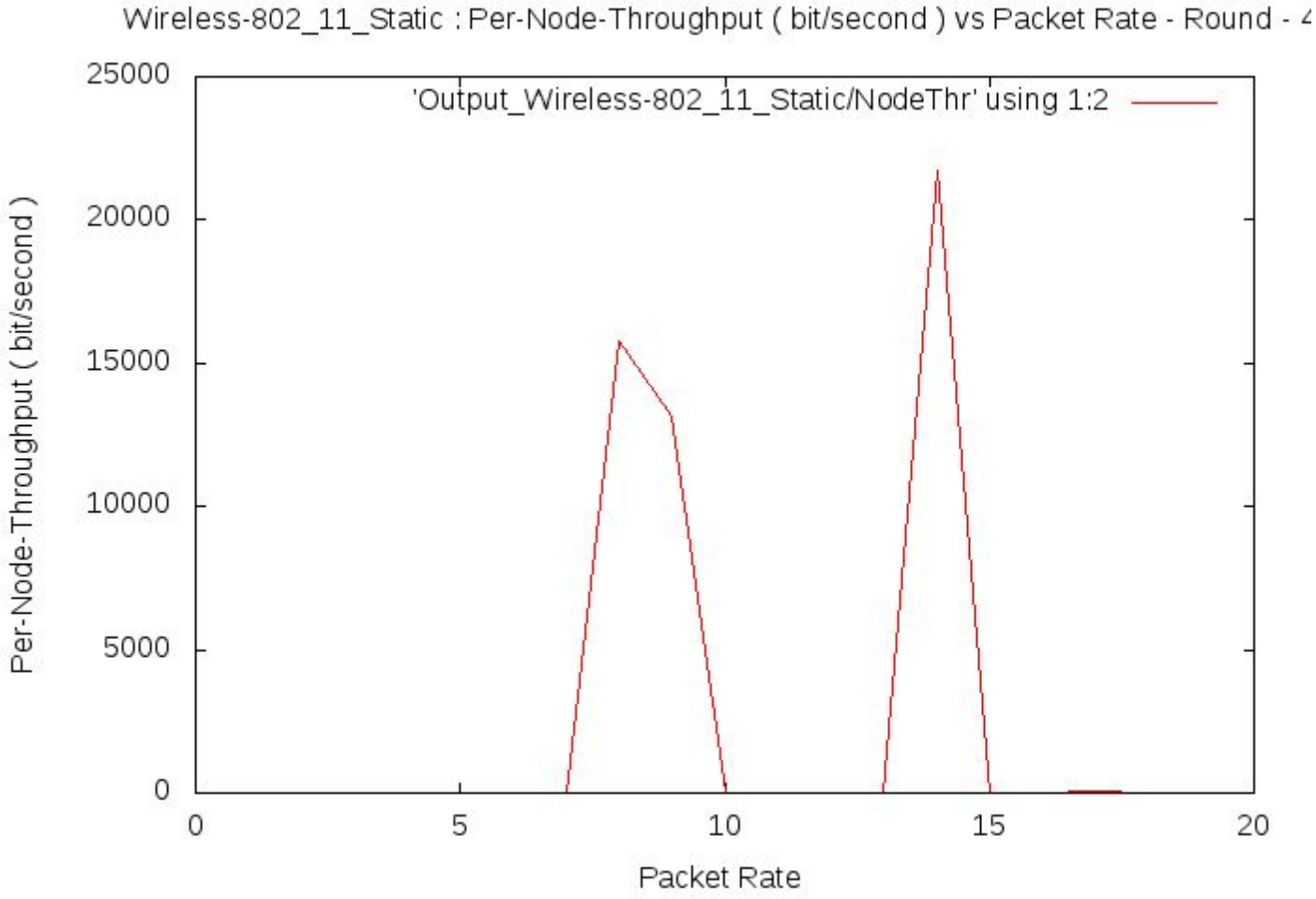

Wireless_802.11(Static) (After modification): Packet Delivery Ratio vs Packet Rate
'Output_Wireless-802_11_Static/GRAPH' using 1:4
Packet Delivery Ratio (%)
Packet Rate
12
11
10
9
8
7
6
5
4
100
150
200
250
300
350
400
450
500

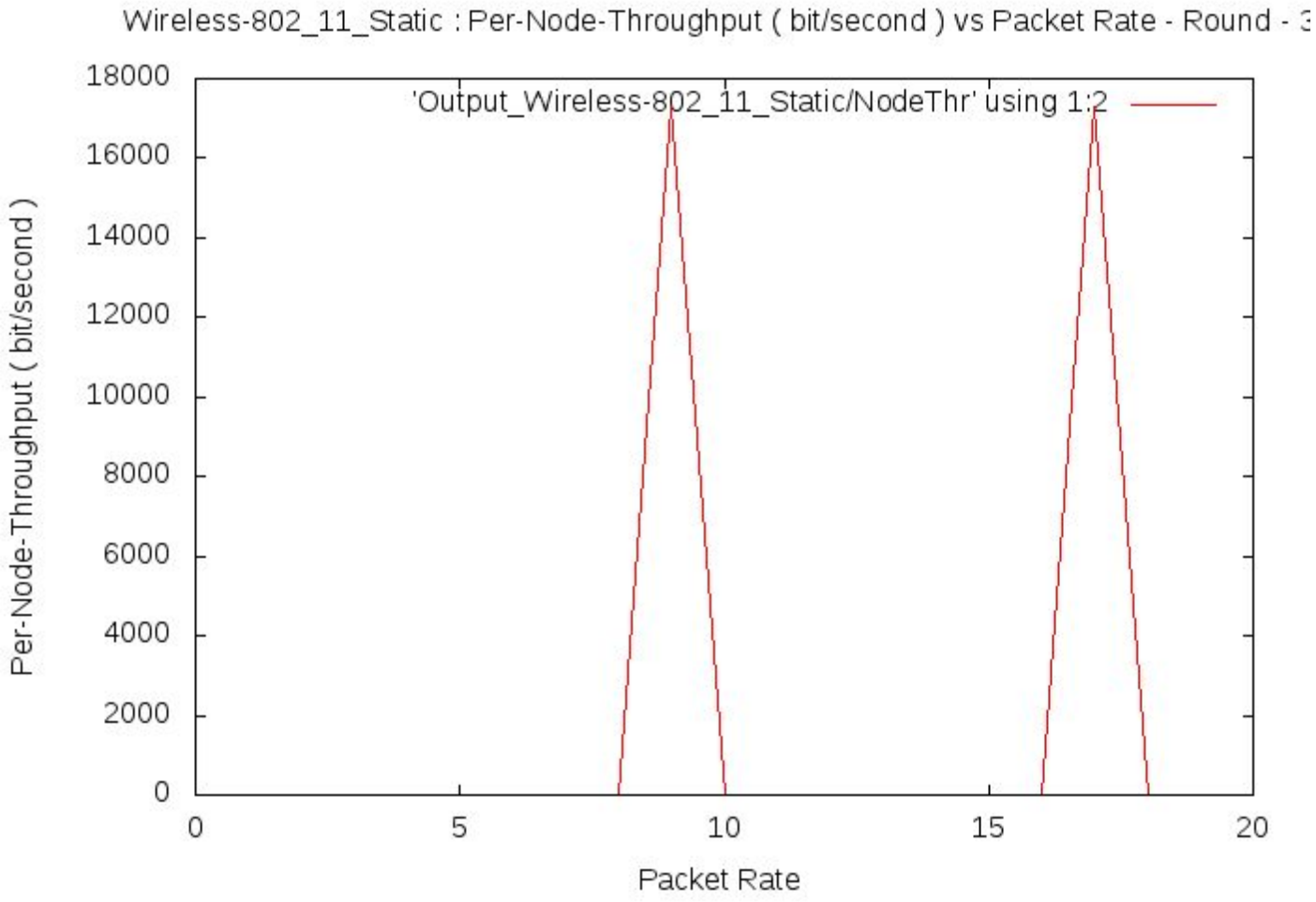

Wireless_802.11(Static) (After modification): Packet Drop Ratio vs Packet Rate
'Output_Wireless-802_11_Static/GRAPH' using 1:5
Packet Drop Ratio (%)
Packet Rate
96
95
94
93
92
91
90
89
88
100
150
200
250
300
350
400
450
500

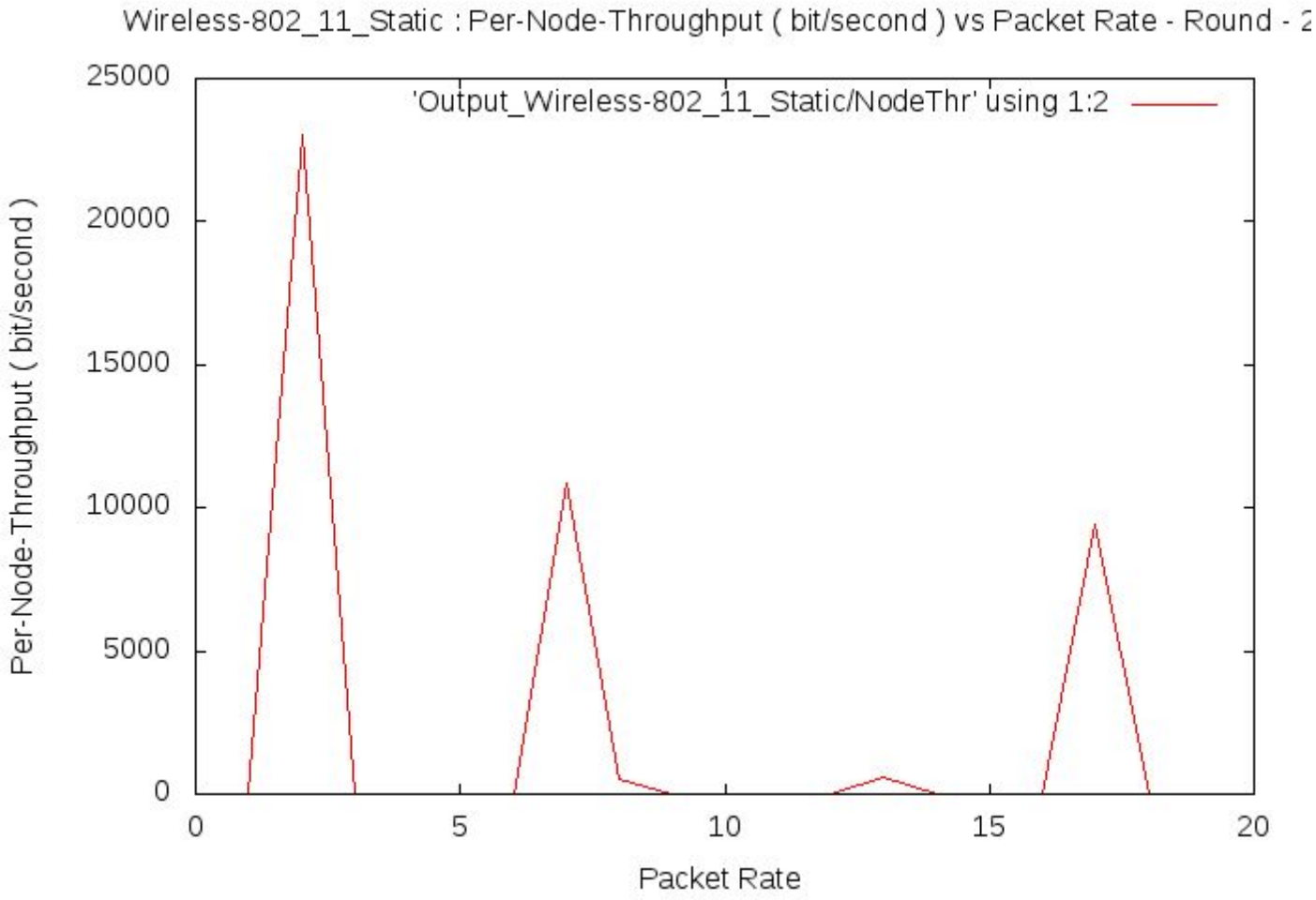

Wireless_802.11(Static) (After modification): Total Energy consumption vs Packet Rate
'Output_Wireless-802_11_Static/GRAPH' using 1:6
Total Energy consumption (J)
Packet Rate
520
515
510
505
500
495
490
485
480
475
470
100
150
200
250
300
350
400
450
500

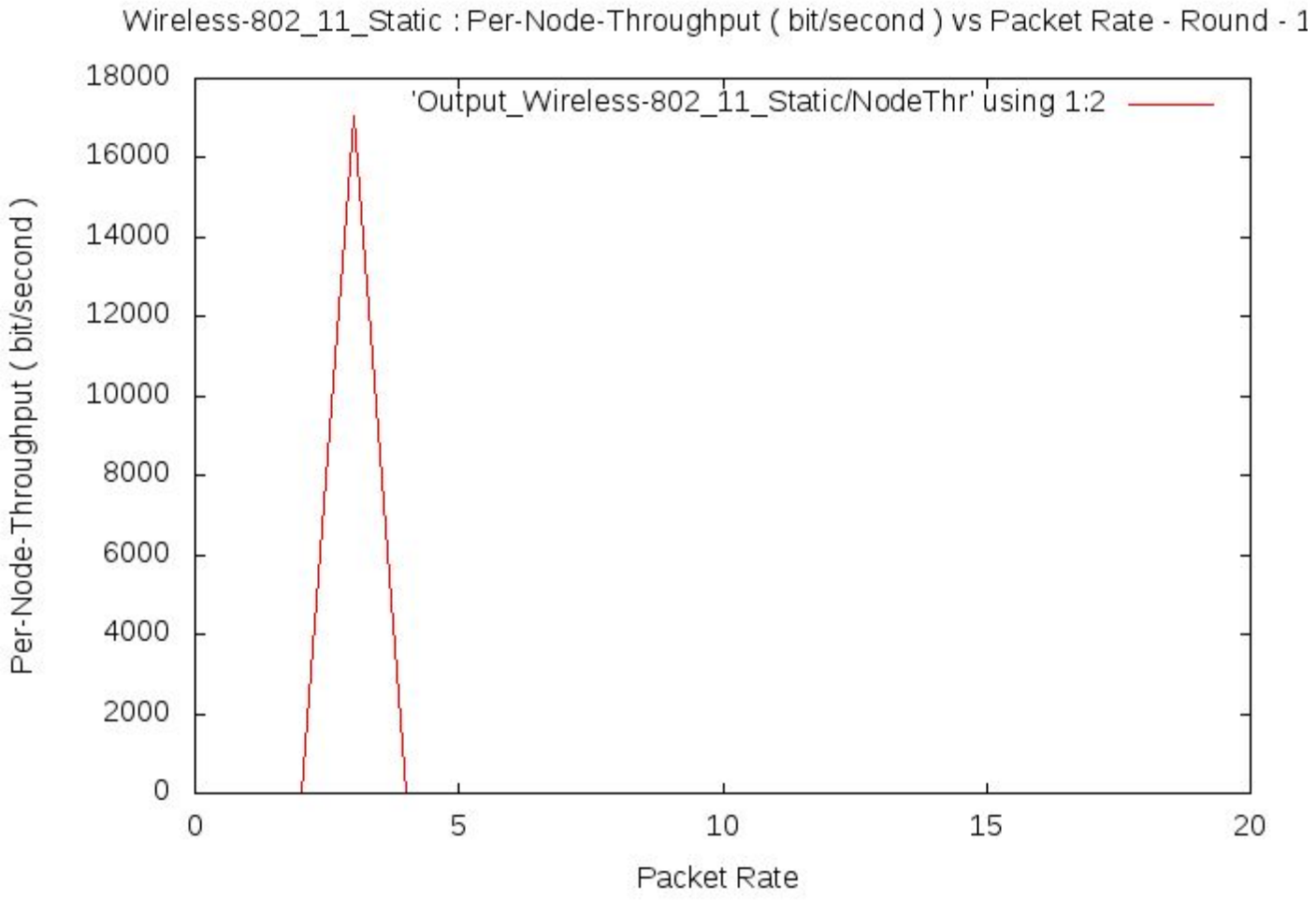

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 5
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
30000
25000
20000
15000
10000
5000
0
0
5
10
15
20

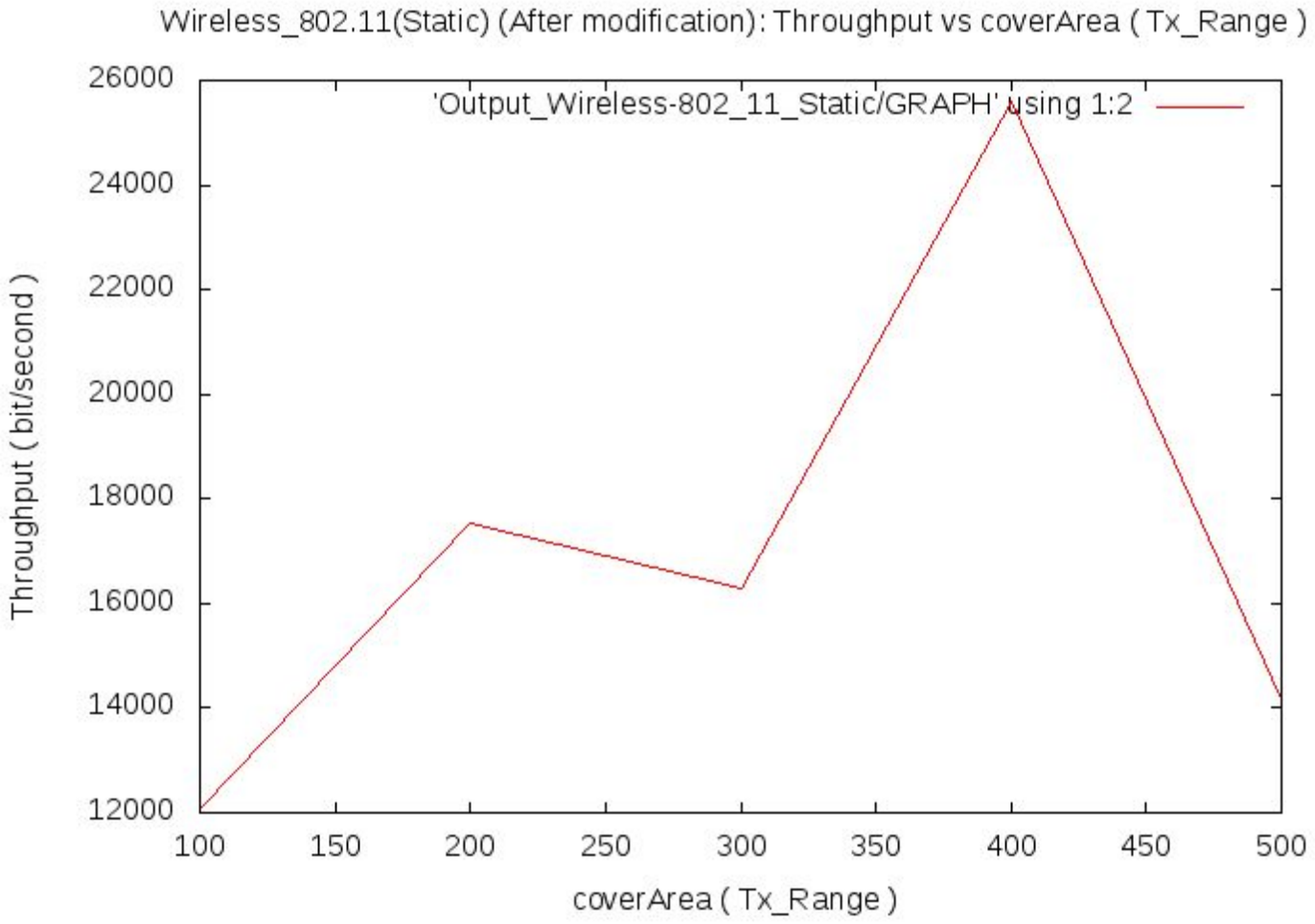

Wireless_802.11(Static) (After modification): Energy per byte vs Packet Rate
'Output_Wireless-802_11_Static/GRAPH' using 1:7
Energy per byte (J)
Packet Rate
0.005
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
100
150
200
250
300
350
400
450
500

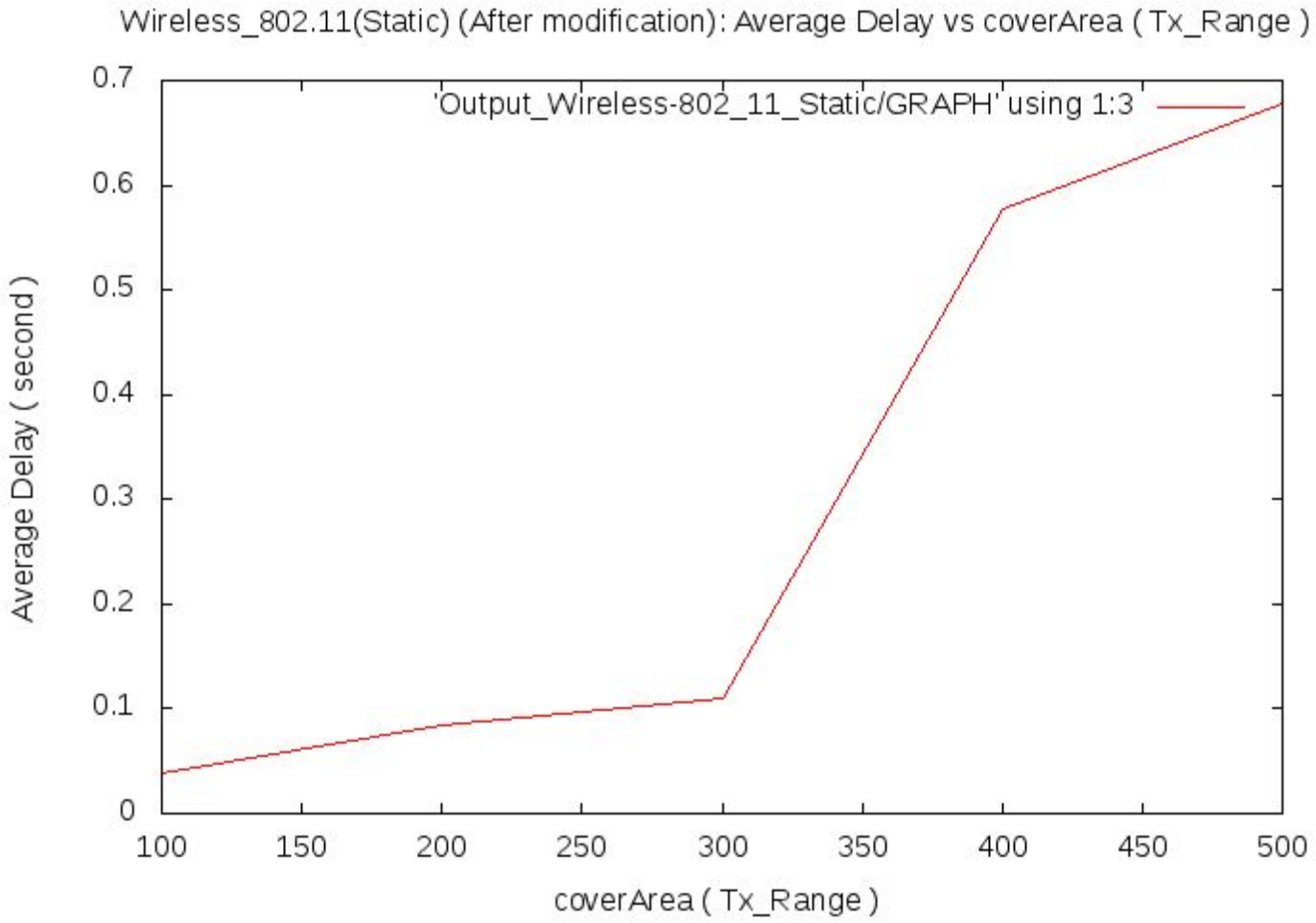

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 4
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
25000
20000
15000
10000
5000
0
0
5
10
15
20

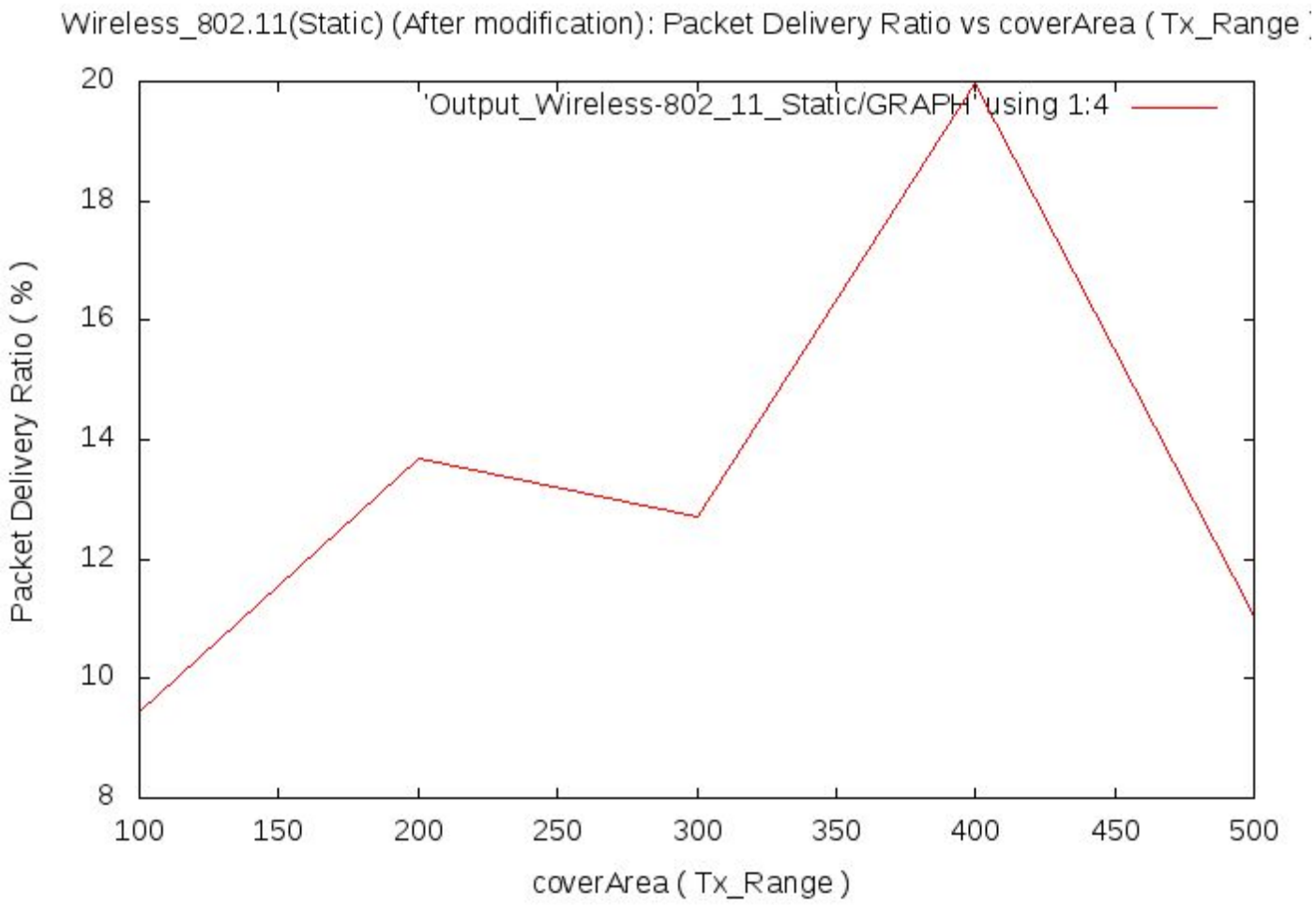

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 3
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20

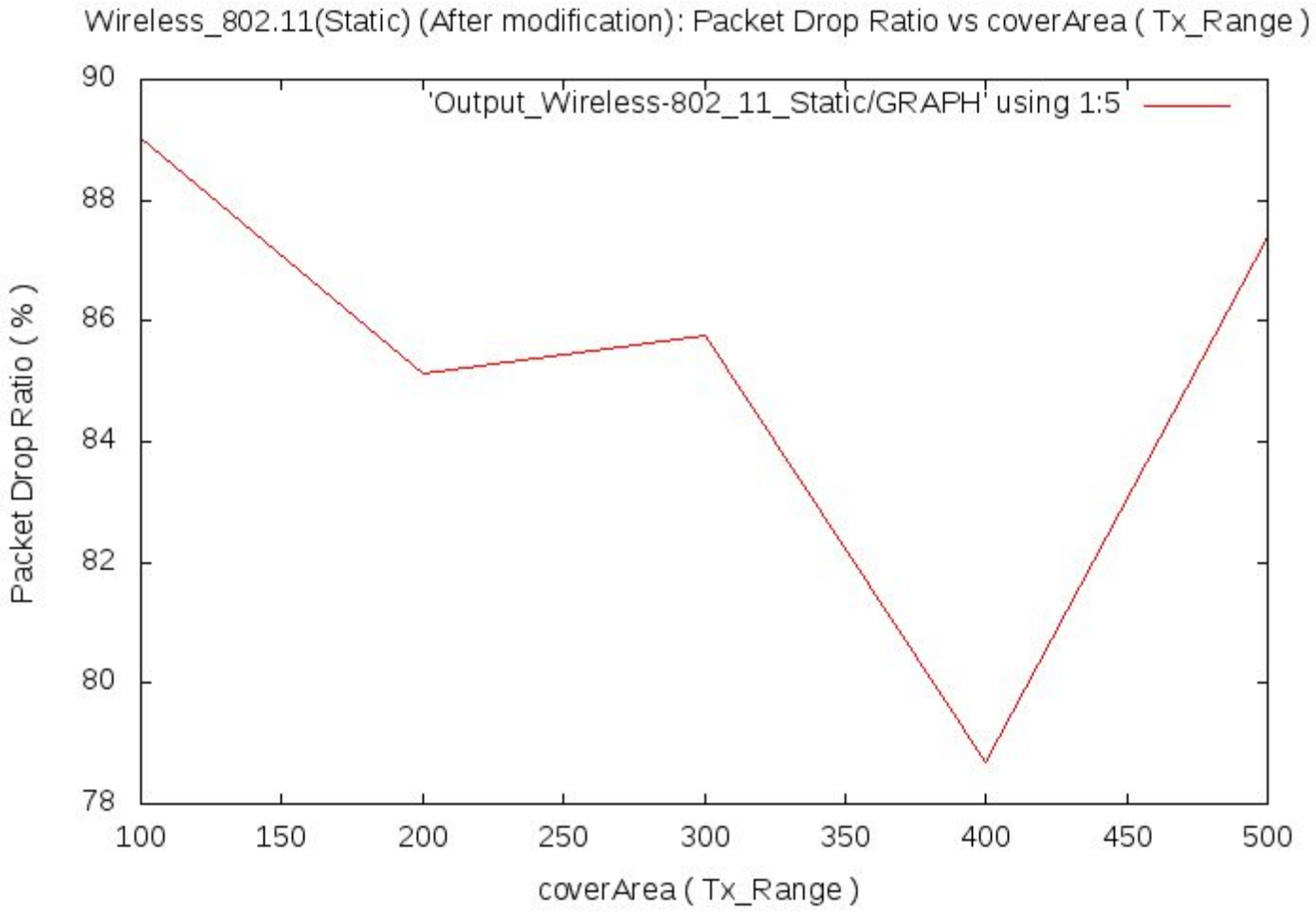

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 2
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
25000
20000
15000
10000
5000
0
0
5
10
15
20

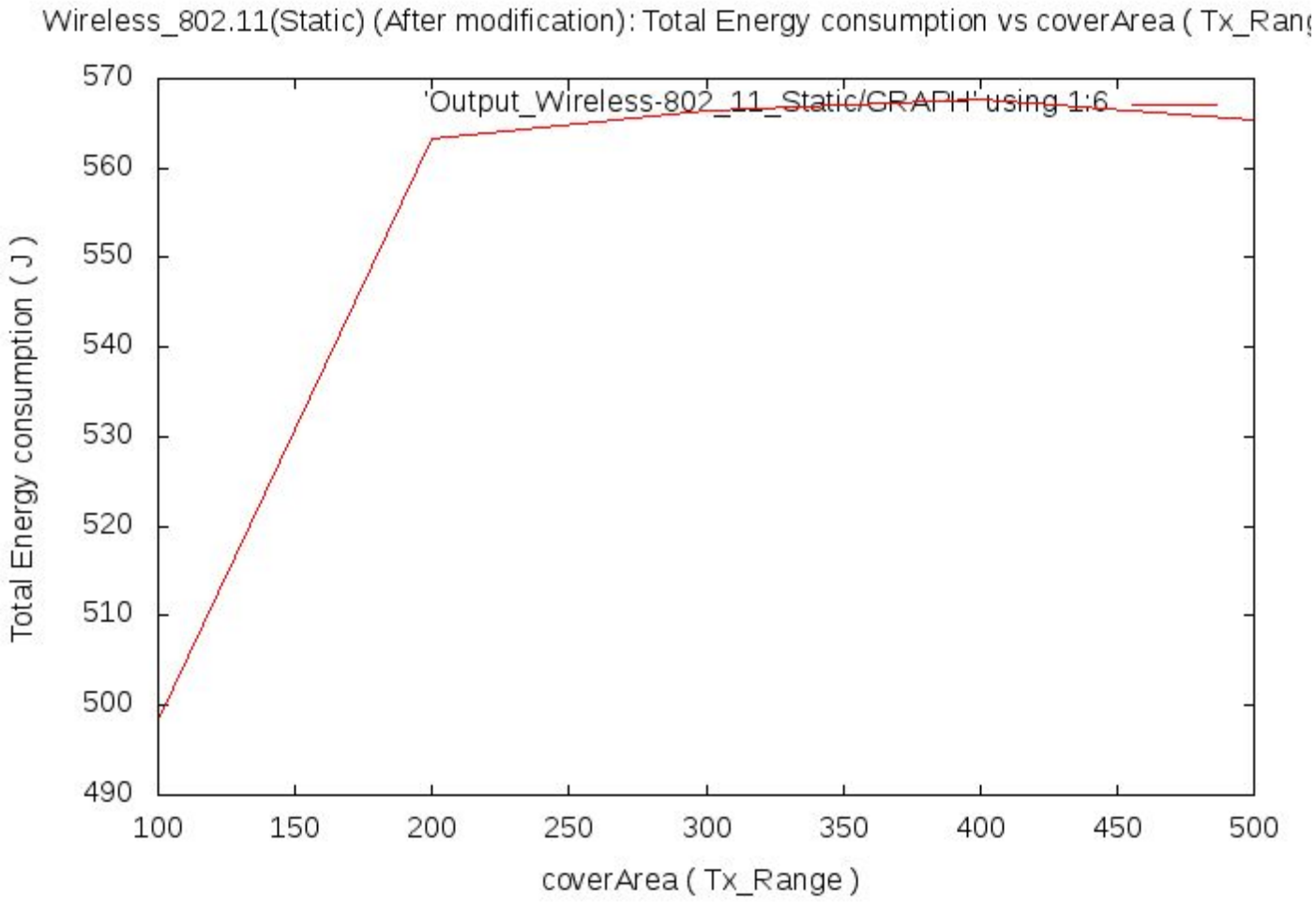

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs Packet Rate - Round - 1
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
Packet Rate
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20

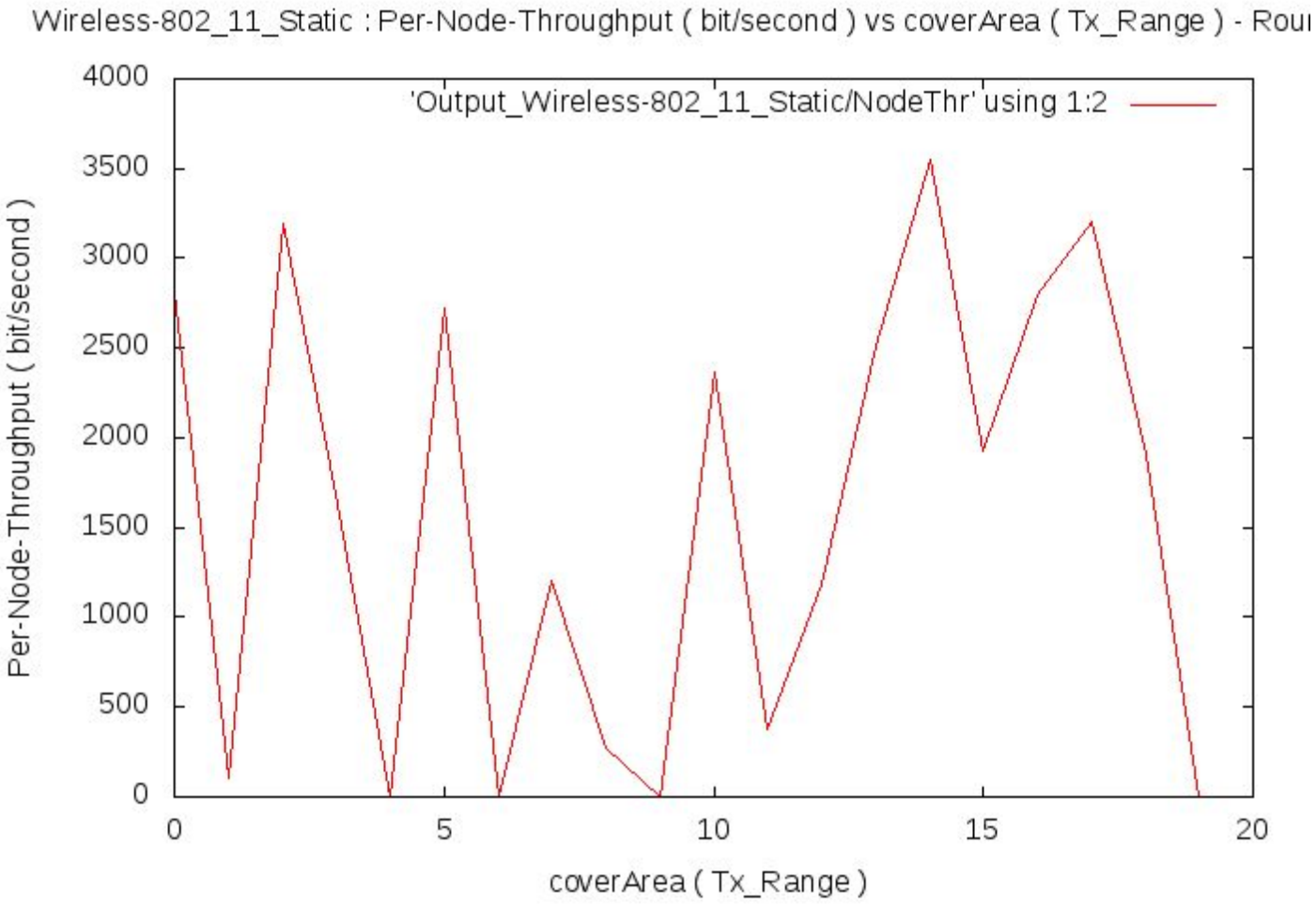

Wireless_802.11(Static) (After modification): Throughput vs coverArea (Tx_Range)
'Output_Wireless-802_11_Static/GRAPH' using 1:2
Throughput (bit/second)
coverArea (Tx_Range)
26000
24000
22000
20000
18000
16000
14000
12000
100
150
200
250
300
350
400
450
500

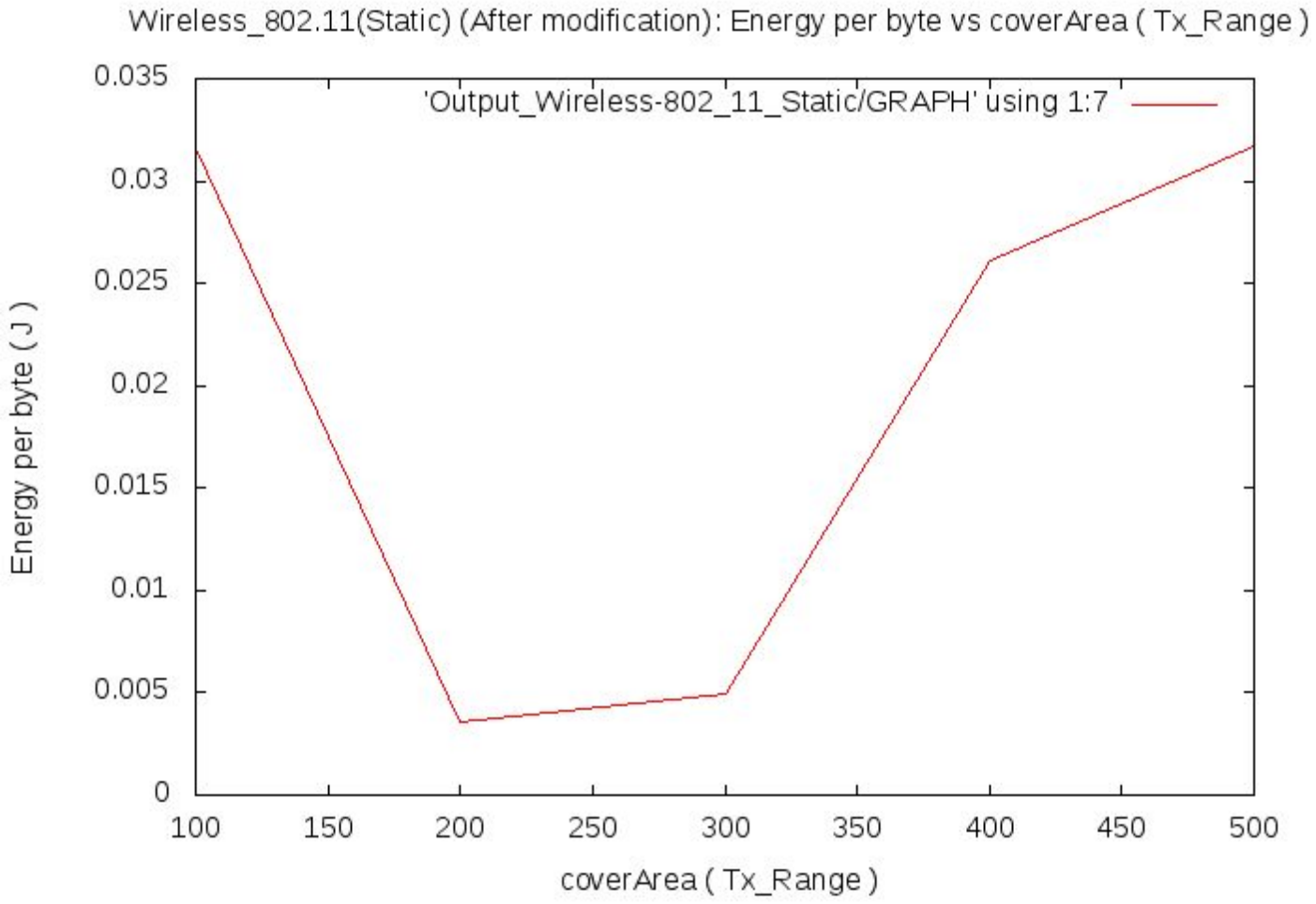

Wireless_802.11(Static) (After modification): Average Delay vs coverArea (Tx_Range)
'Output_Wireless-802_11_Static/GRAPH' using 1:3
Average Delay (second)
coverArea (Tx_Range)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
100
150
200
250
300
350
400
450
500

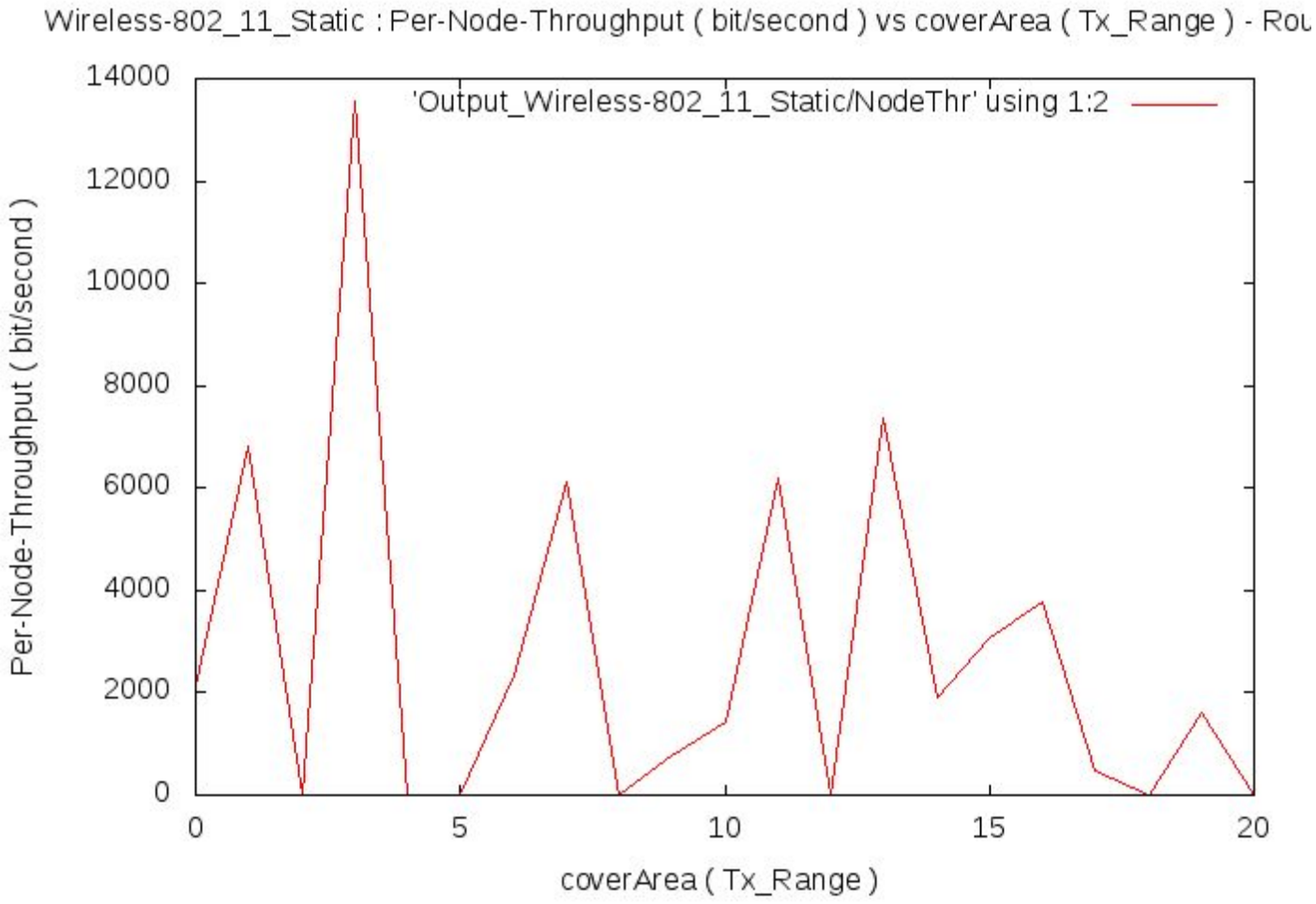

Wireless_802.11(Static) (After modification): Packet Delivery Ratio vs coverArea (Tx_Range)
'Output_Wireless-802_11_Static/GRAPH' using 1:4
Packet Delivery Ratio (%)
coverArea (Tx_Range)
20
18
16
14
12
10
8
100
150
200
250
300
350
400
450
500

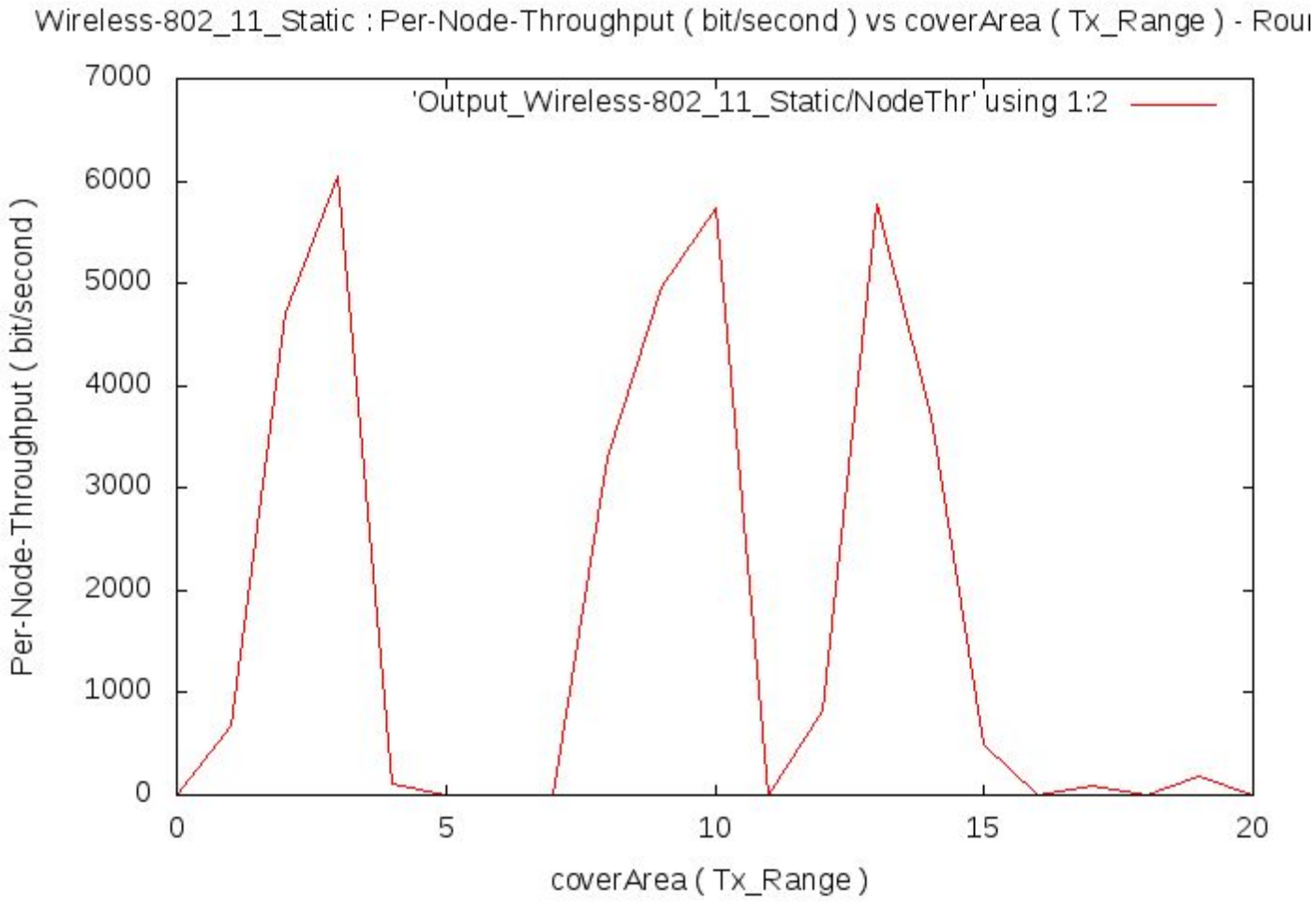

Wireless_802.11(Static) (After modification): Packet Drop Ratio vs coverArea (Tx_Range)
'Output_Wireless-802_11_Static/GRAPH' using 1:5
Packet Drop Ratio (%)
coverArea (Tx_Range)
90
88
86
84
82
80
78
100
150
200
250
300
350
400
450
500

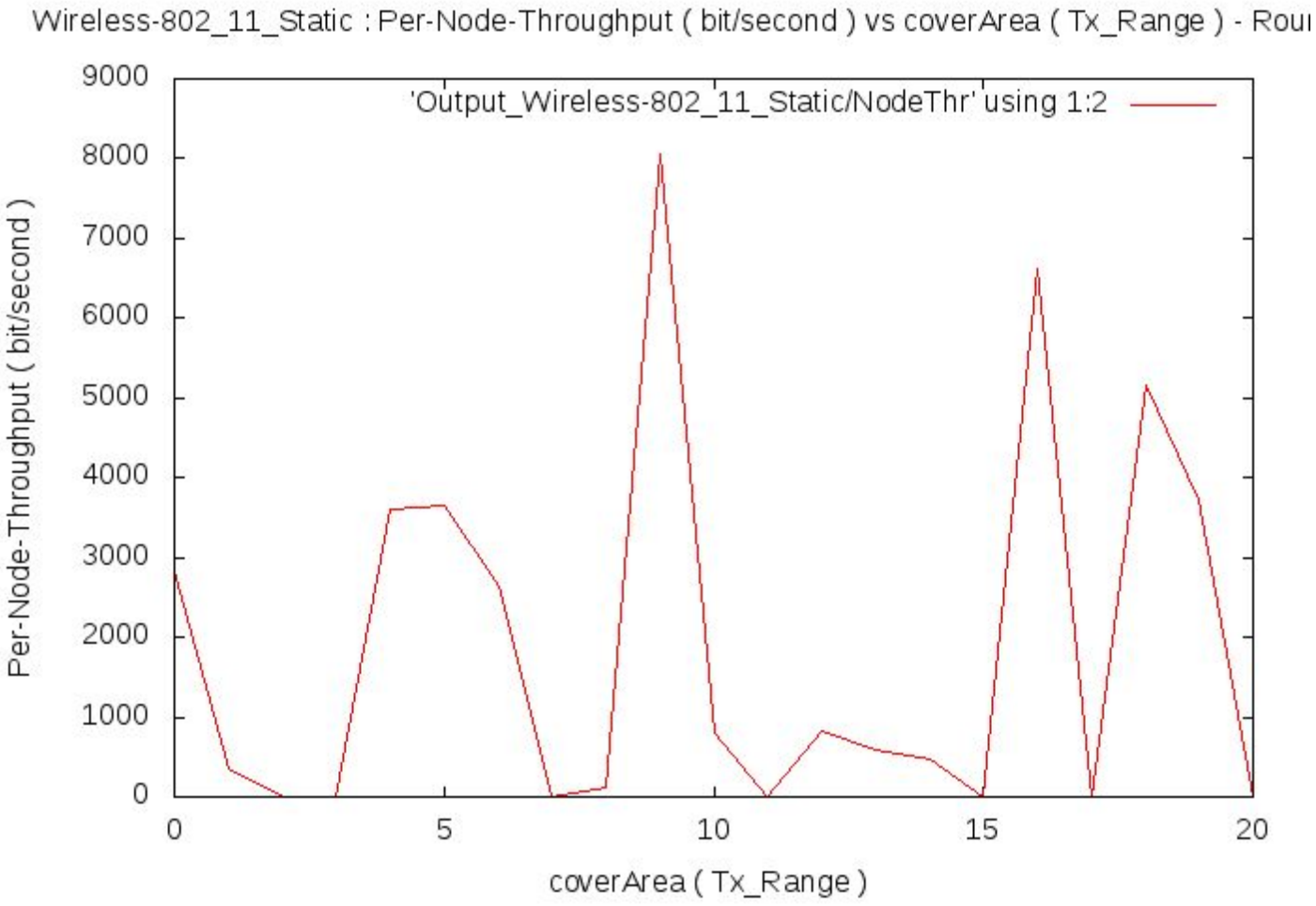

Wireless_802.11(Static) (After modification): Total Energy consumption vs coverArea (Tx_Rang
'Output_Wireless-802_11_Static/GRAPH' using 1:6
Total Energy consumption (J)
570
560
550
540
530
520
510
500
490
100
150
200
250
300
350
400
450
500
coverArea (Tx_Range)

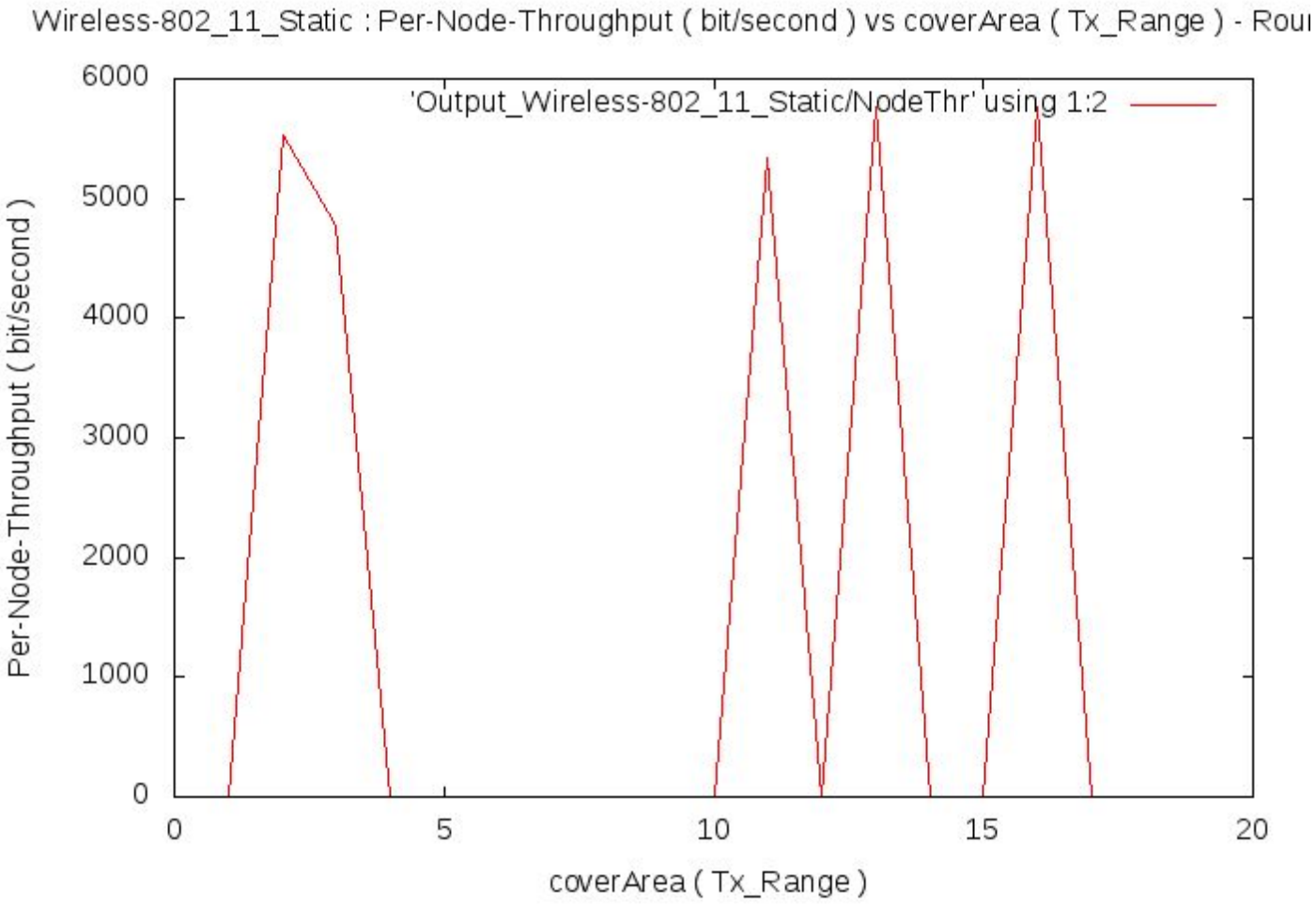

Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs coverArea (Tx_Range) - Rou
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
coverArea (Tx_Range)
0
500
1000
1500
2000
2500
3000
3500
4000
0
5
10
15
20


Wireless_802.11(Static) (After modification): Energy per byte vs coverArea (Tx_Range)
'Output_Wireless-802_11_Static/GRAPH' using 1:7
Energy per byte (J)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
100
150
200
250
300
350
400
450
500
coverArea (Tx_Range)


Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs coverArea (Tx_Range) - Rou
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
coverArea (Tx_Range)
14000
12000
10000
8000
6000
4000
2000
0
0
5
10
15
20


Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs coverArea (Tx_Range) - Rou
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
coverArea (Tx_Range)
0
1000
2000
3000
4000
5000
6000
7000
0
5
10
15
20


Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs coverArea (Tx_Range) - Rou
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0
5
10
15
20
coverArea (Tx_Range)


Wireless-802_11_Static : Per-Node-Throughput (bit/second) vs coverArea (Tx_Range) - Rou
'Output_Wireless-802_11_Static/NodeThr' using 1:2
Per-Node-Throughput (bit/second)
6000
5000
4000
3000
2000
1000
0
0
5
10
15
20
coverArea (Tx_Range)

Observations:

For Wired:

Node Varying:

1. Drop ratio decreases for TCP congestion window increasing and new RTT calculation.
2. Rest of the parameters are staying almost same.

Flows Varying:

1. Drop ratio decrease and becomes one-third.
2. Throughput slightly decreases (negligible).
3. Rest of the parameters are staying almost same.

Packet Rate Varying:

1. Drop ratio decreases a lot.
2. Throughtput slightly decreases.
3. Rest of the parameters are staying almost same.

Summary:

1. This modification slightly improves the drop ratio and throughput in some cases.
2. TCP congestion window was increased. It caused the decrement in Drop Ratio.
3. The increased gain of the antennae helped to improve performance, but at the cost of higher power dissipation.

For Wireless 802.11 (Static):

For Node Varying:

1. Average delay becomes half of the before one.
2. Energy per byte decrease and become 0.035 times of previous one.
3. Delivery Ratio decreases by half.
4. Throughput decreases to 60%.
5. Total energy remains same.

For Flow Varying:

1. Avg delay and energy per byte decreases.
2. Delivery ratio becomes 60%.
3. Throughput becomes 72%.

Packet Size Vary:

1. Avg delay decreases a little.
2. Energy per byte decreases a little.
3. Delivery ratio decreases.
4. Throughput increases by 10000.
5. Energy consump decreases.

Coverage Area Vary:

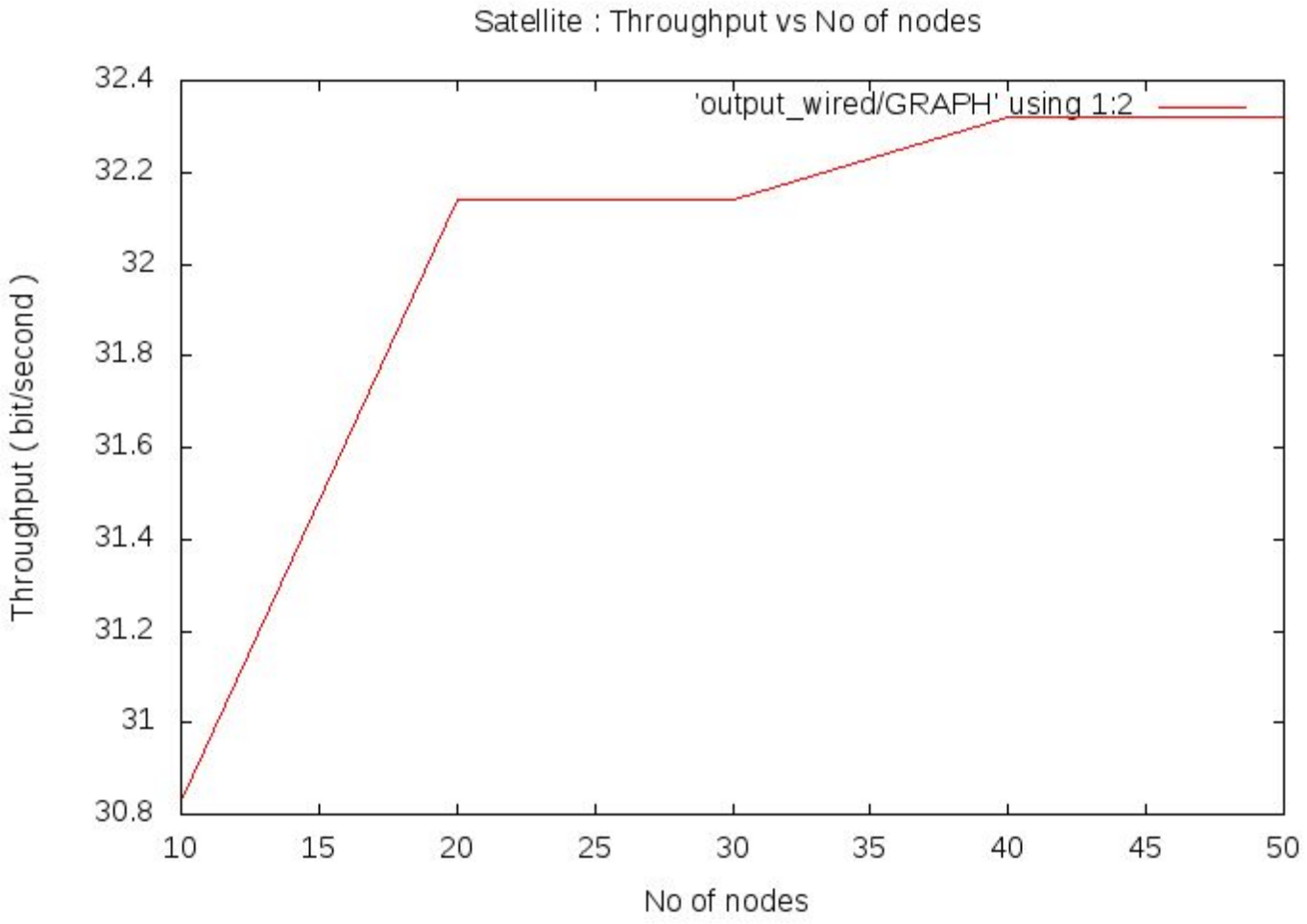
1. Energy per byte become one-third.
2. Del ratio becomes half.
3. Throughput becomes half.

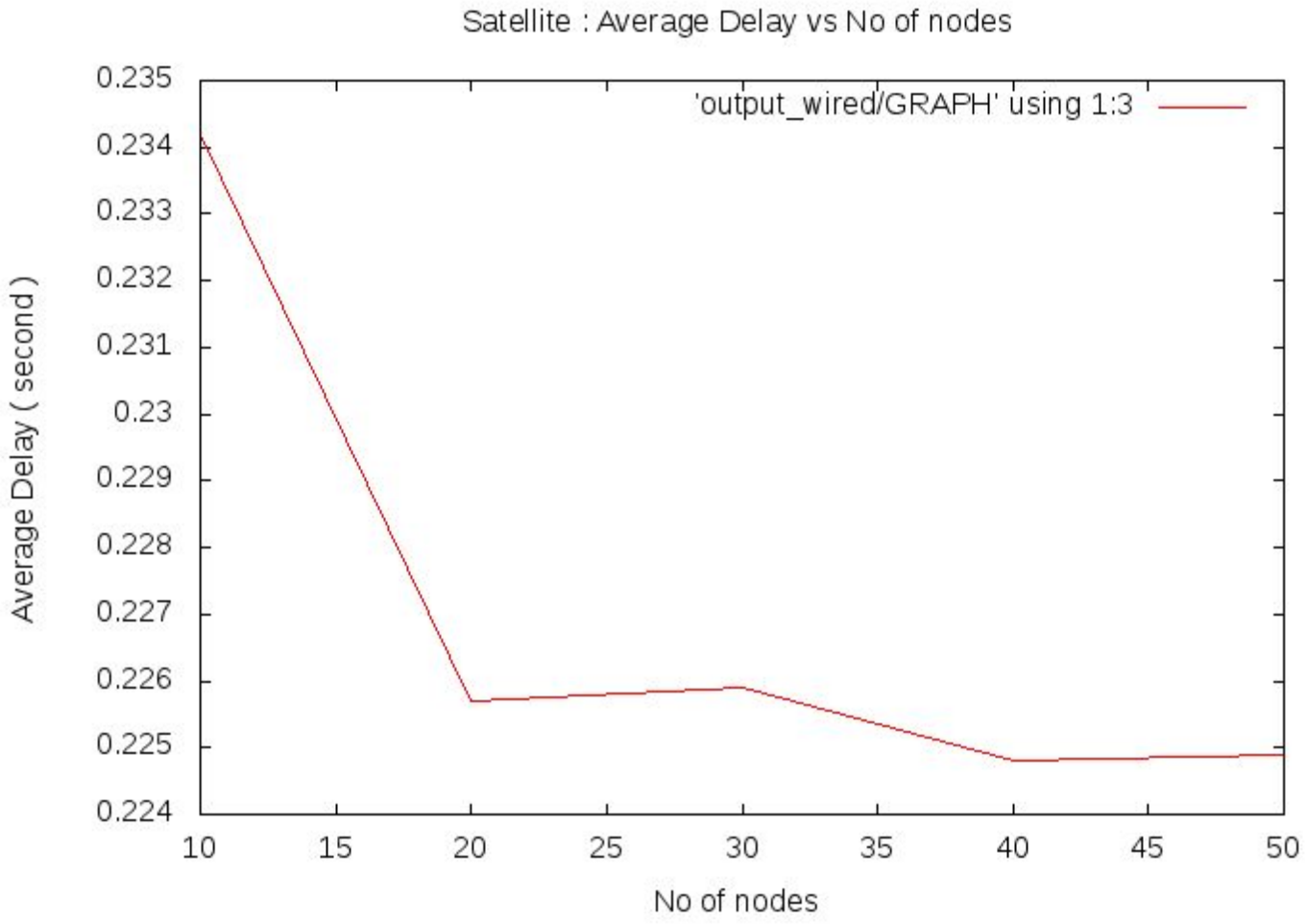
Summary:

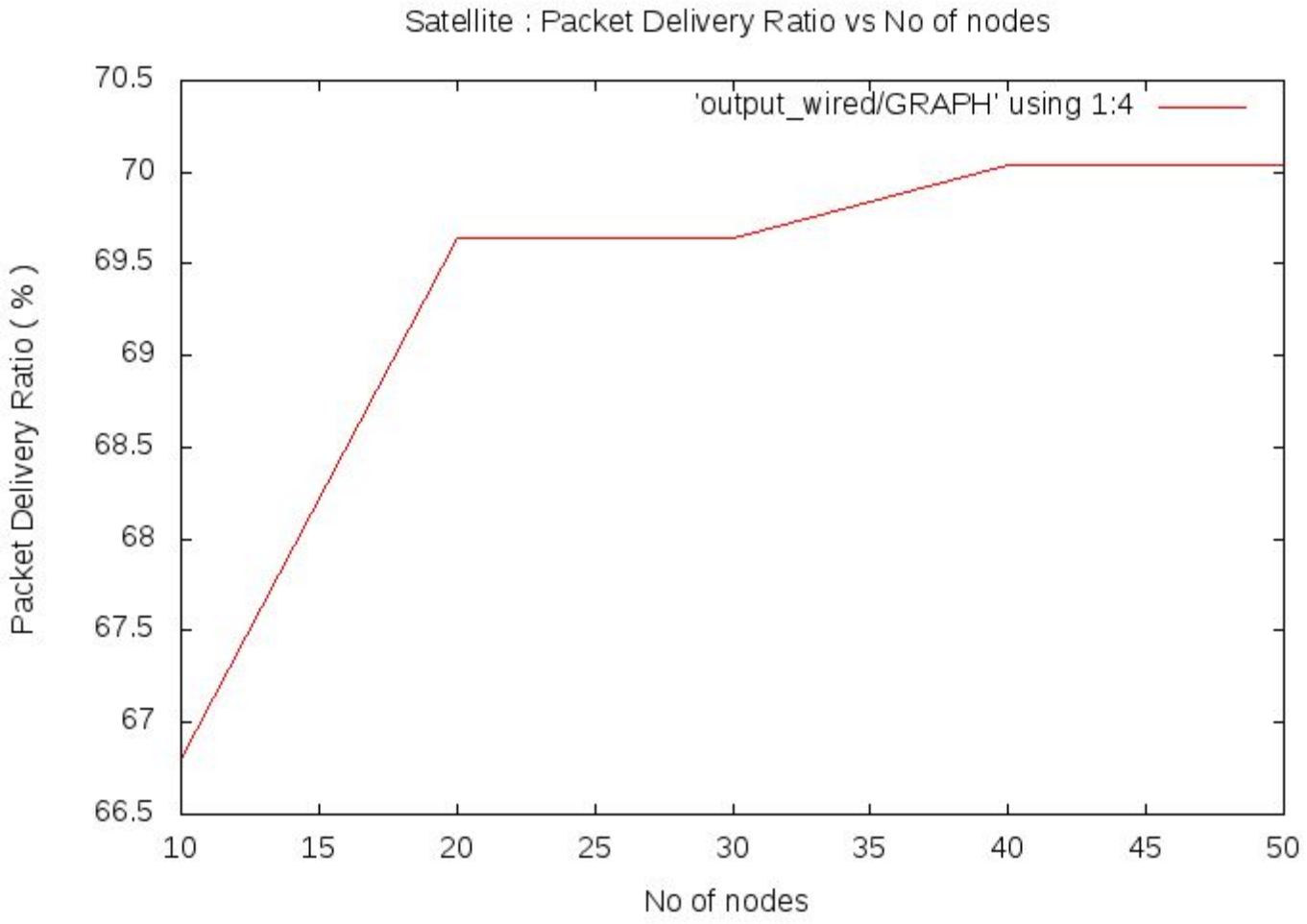
1. This modification was based on a paper named "Performance Evaluation of Two Congestion Control Mechanisms with On-Demand Distance Vector (AODV) Routing Protocol for Mobile and Wireless Networks.
2. In these simulation we can see that RAODV decreases the throughput most of the time. But this protocol is supposed to give improved result. For some reason we couldn't achieve the expected result.
3. RAODV might cause to drop a recent packet from the queue which could be needed soon. In that case it will cause a drop and increase drop ratio.

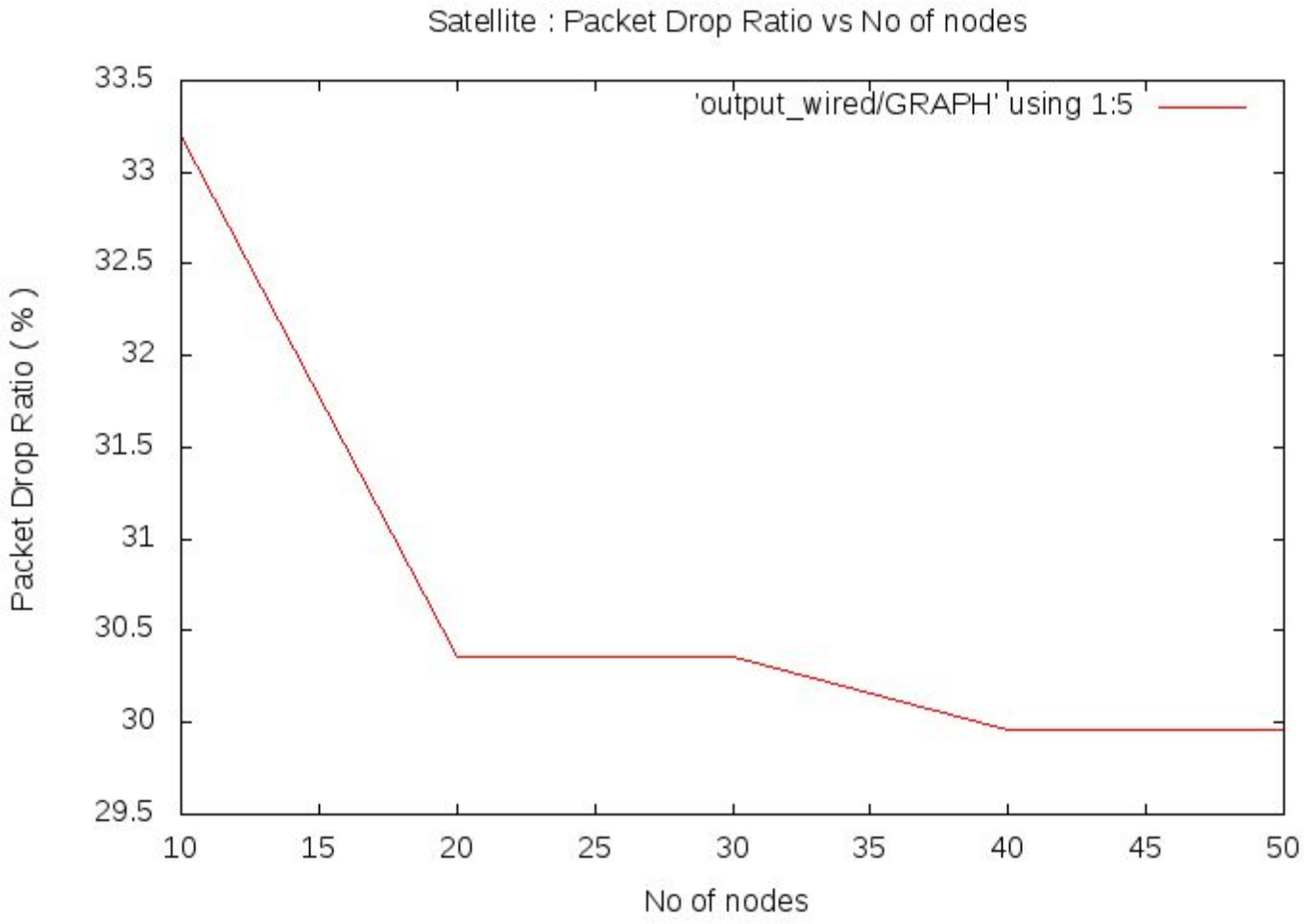
Bonus

Satellite

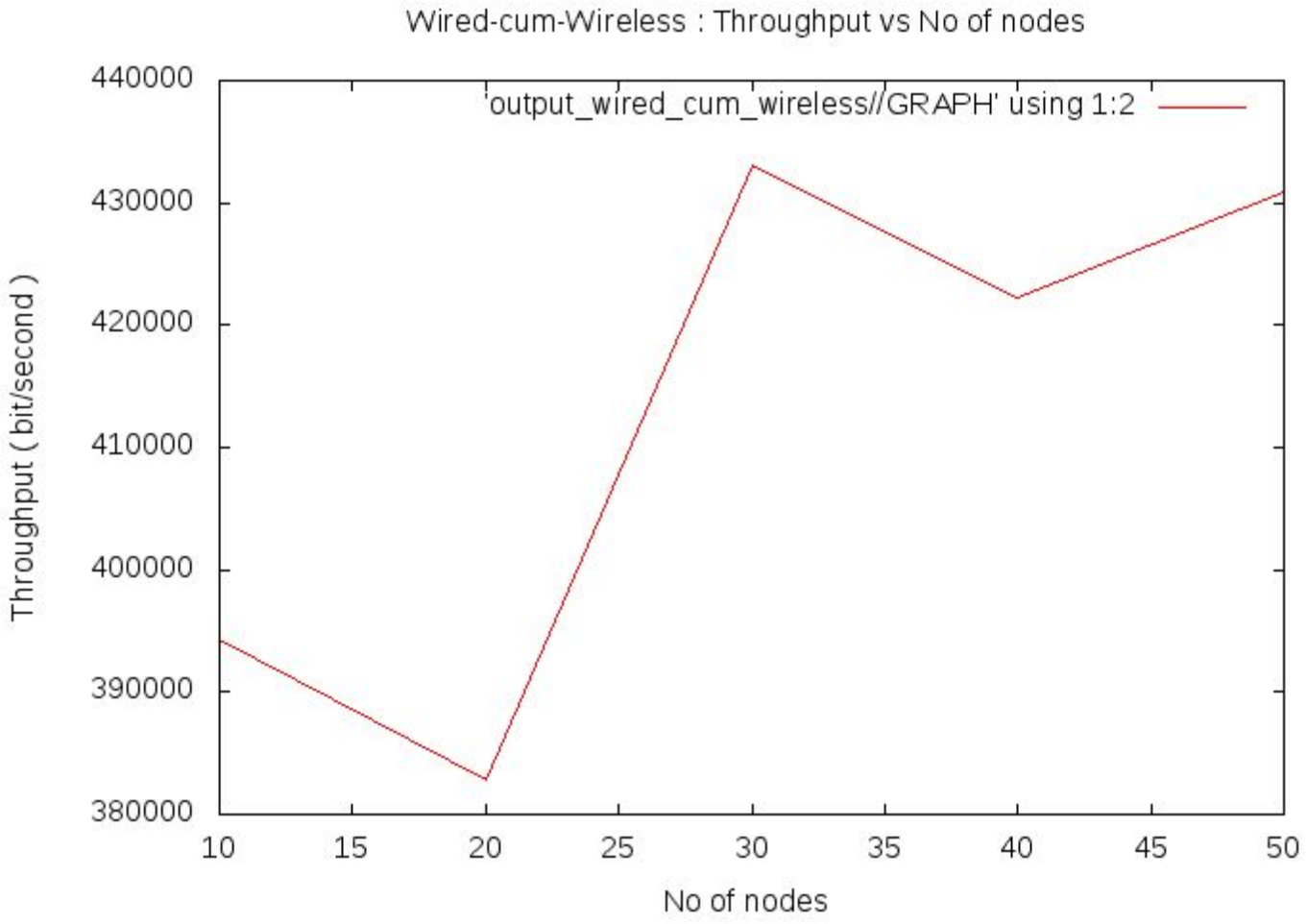

Satellite : Throughput vs No of nodes
'output_wired/GRAPH' using 1:2
Throughput (bit/second)
No of nodes
32.4
32.2
32
31.8
31.6
31.4
31.2
31
30.8
10
15
20
25
30
35
40
45
50

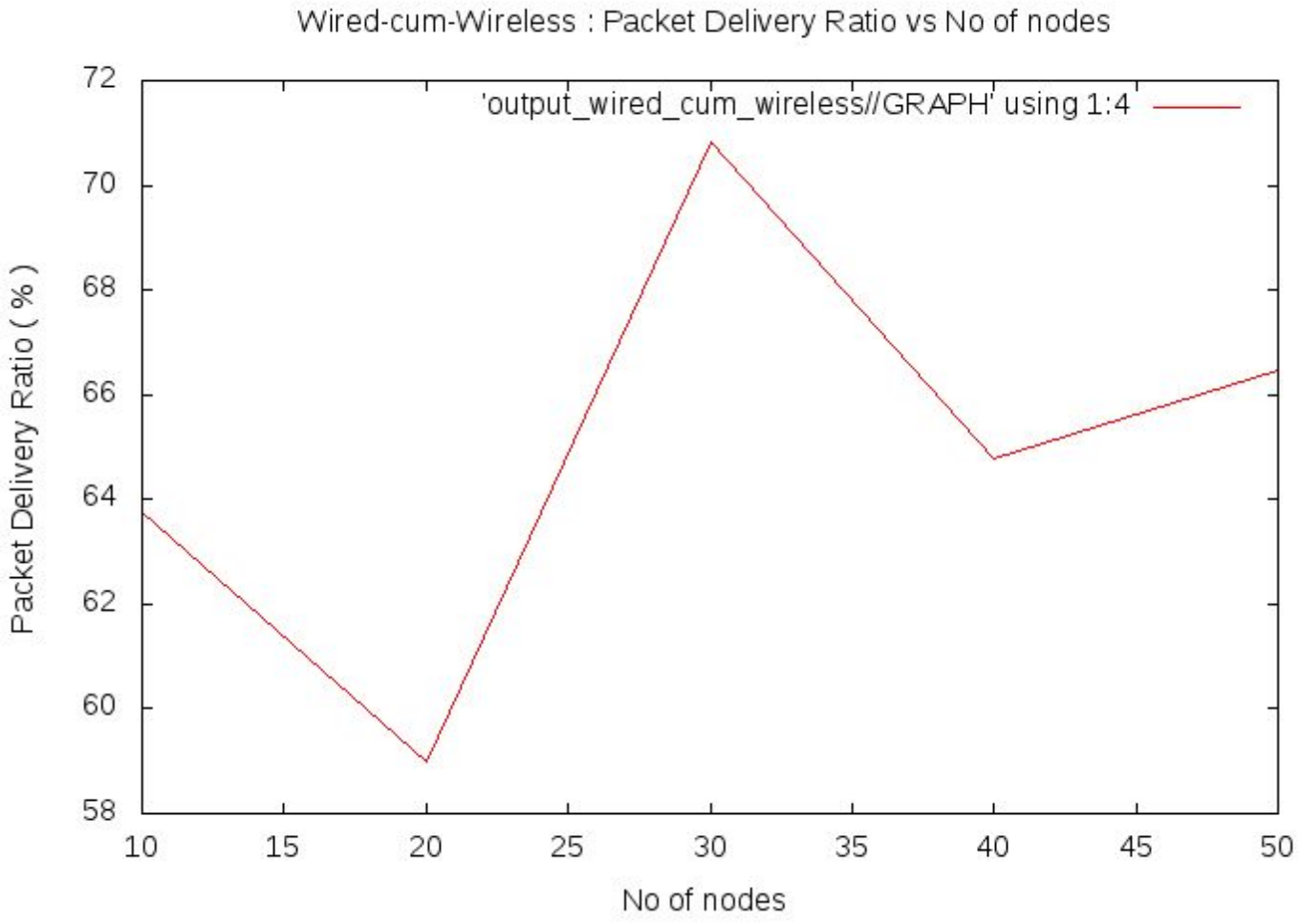

Satellite : Average Delay vs No of nodes
'output_wired/GRAPH' using 1:3
Average Delay (second)
No of nodes
0.235
0.234
0.233
0.232
0.231
0.23
0.229
0.228
0.227
0.226
0.225
0.224
10
15
20
25
30
35
40
45
50

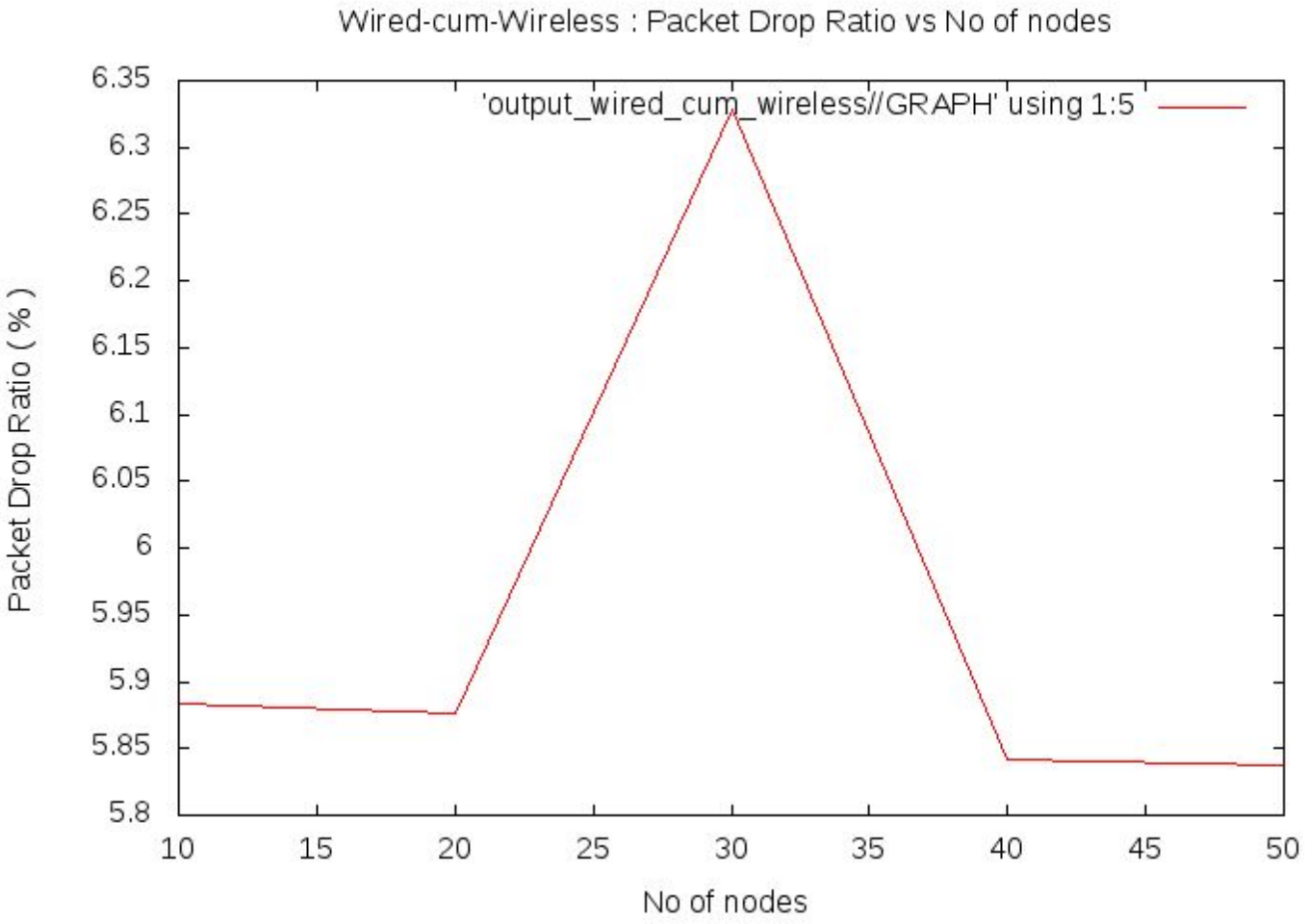

Satellite : Packet Delivery Ratio vs No of nodes
'output_wired/GRAPH' using 1:4
Packet Delivery Ratio (%)
No of nodes
70.5
70
69.5
69
68.5
68
67.5
67
66.5
10
15
20
25
30
35
40
45
50


Satellite : Packet Drop Ratio vs No of nodes
'output_wired/GRAPH' using 1:5
Packet Drop Ratio (%)
No of nodes
33.5
33
32.5
32
31.5
31
30.5
30
29.5
10
15
20
25
30
35
40
45
50

Wired to Wireless Cross Connection


Wired-cum-Wireless : Throughput vs No of nodes
'output_wired_cum_wireless//GRAPH' using 1:2
Throughput (bit/second)
No of nodes
440000
430000
420000
410000
400000
390000
380000
10
15
20
25
30
35
40
45
50


Wired-cum-Wireless : Packet Delivery Ratio vs No of nodes
'output_wired_cum_wireless//GRAPH' using 1:4
Packet Delivery Ratio (%)
No of nodes
72
70
68
66
64
62
60
58
10
15
20
25
30
35
40
45
50


Wired-cum-Wireless : Packet Drop Ratio vs No of nodes
'output_wired_cum_wireless//GRAPH' using 1:5
Packet Drop Ratio (%)
No of nodes
6.35
6.3
6.25
6.2
6.15
6.1
6.05
6
5.95
5.9
5.85
5.8
10
15
20
25
30
35
40
45
50