Report for Assignment #GP5: Performance Evaluation of PIE on FLENT

Network Topology for Test Bed Setup:

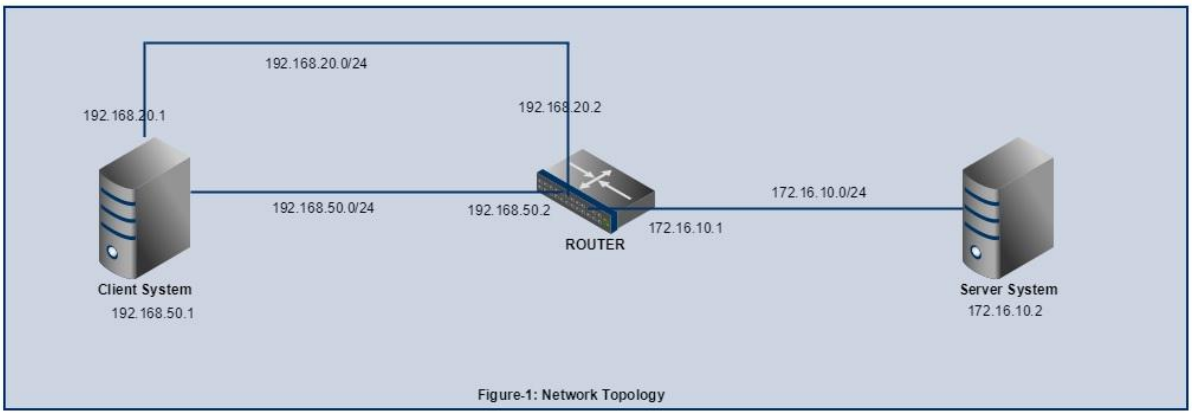


Figure-1: Network Topology

Client IP eno1: 192.168.50.1/24
Router IP eno1: 192.168.50.2/24
Router IP enx0000000001220: 172.16.10.1/24
Server IP: 172.16.10.2/24

Client Control Channel IP enx000000001b40: 192.168.20.1/24
Router Control Channel IP enx00000000100c: 192.168.20.2/24
This is used for getting status from router, ssh on the router is configured as password less on Router from client.

Link Speed from Router to Server is 100 Mbps. Link Speed form Router to Client is 1000 Mbps

Flent Test Cases:

Test Case #1.Varying parameter “Tupdate” Keeping “Target” value default.
Queue Discipline: Pie

1. A. When no additional traffic.

(I).target 20ms and tupdate 1ms
@Router# sudo tc qdisc add dev enx000000001220 root pie target 20ms tupdate value.
Value = (1,15,30,60)

@Client#./run-flent rrul -p totals --test-parameter bandwidth=800M --test-parameter upload_stream=num_cpus --test-parameter download_streams=num_cpus --test-parameter qdisc_stats_hosts=pg@192.168.20.2 --test-parameter qdisc_stats_interfaces=enx000000001220 -l 60 -H 172.16.10.2 -t pie60_t20_tu_1_without_traffic -o _pie60_t20_tu1_without_traffic.png

PLOTS:

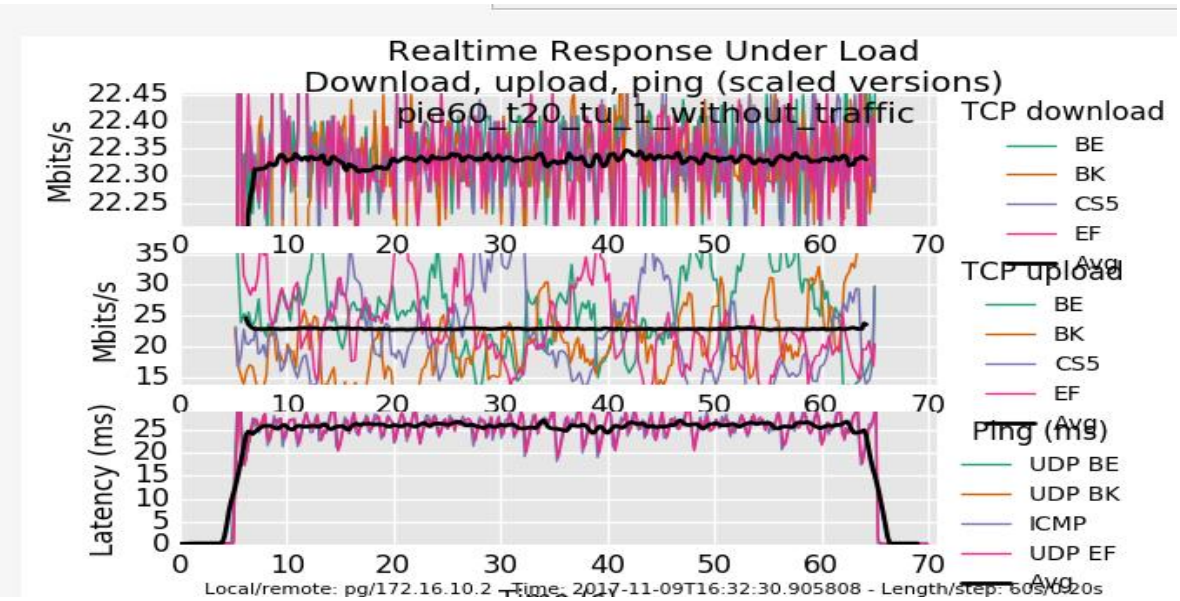


Figure 1: Download, Upload and latency Plot when qdisc is Pie and parameter target 20ms and tupdate 1ms at router and there is normal Traffic

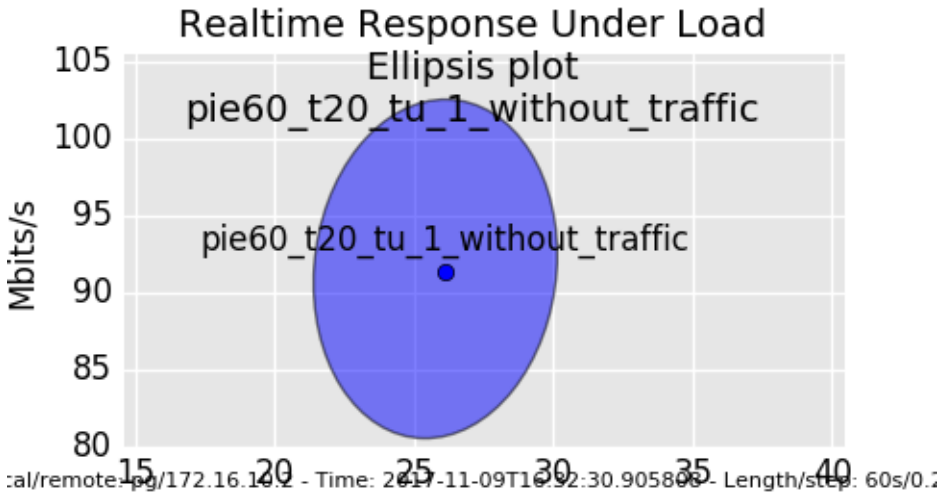


Figure 2: Ellipsis Plot when qdisc is Pie and parameter target 20ms and tupdate 1ms at router and there is normal Traffic

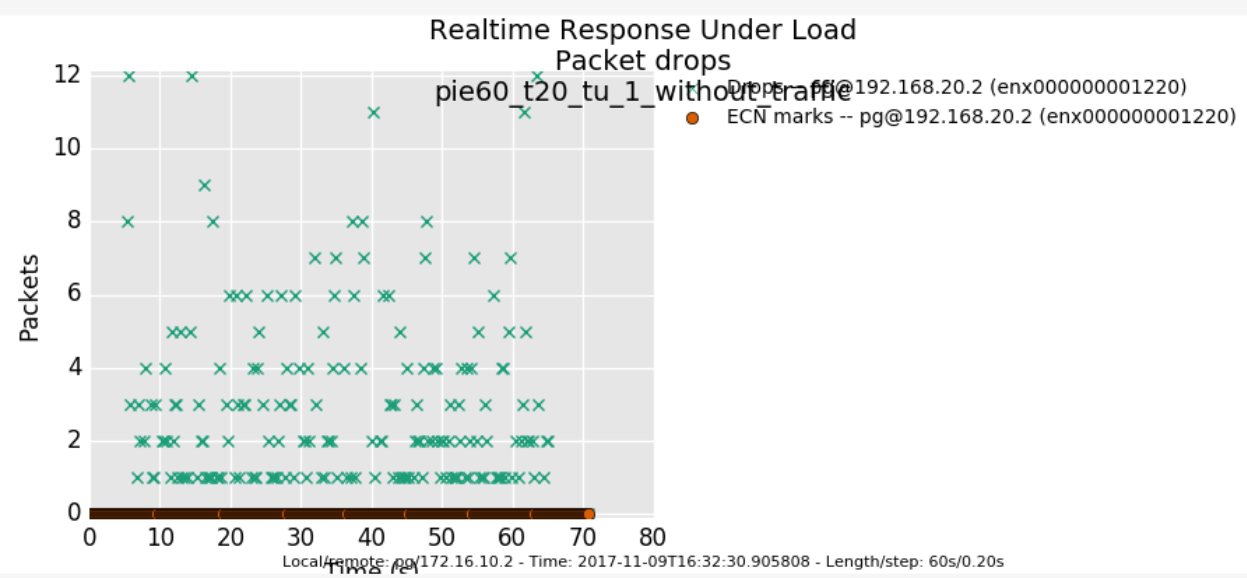


Figure 3: Packet Drops plot when qdisc is Pie and parameter target 20ms and tupdate 1ms at router and there is normal Traffic

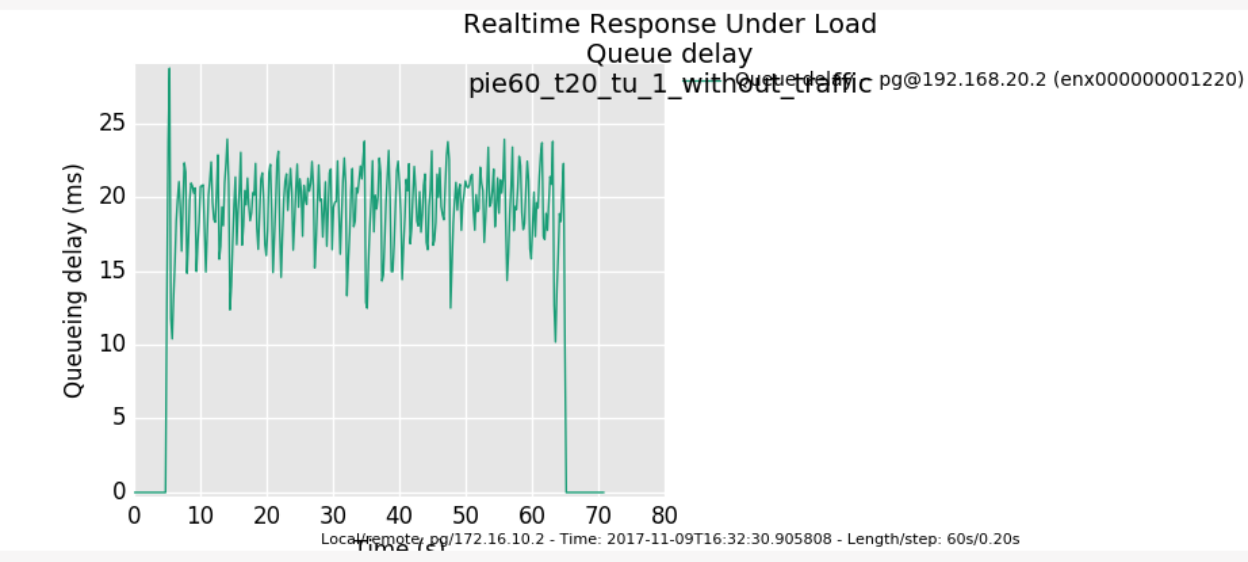


Figure 4: Queuing delay plot when qdisc is Pie and parameter target 20ms and tupdate 1ms at router and there is normal Traffic

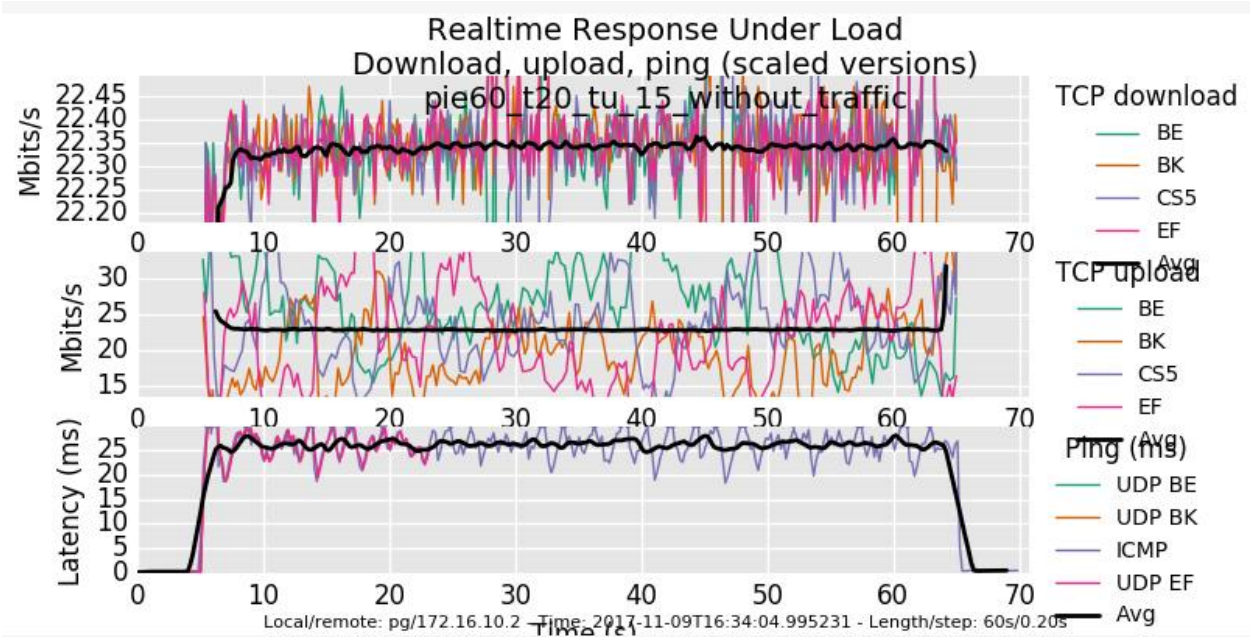


Figure 5: Download, Upload and latency Plot when qdisc is Pie and parameter target 20ms and tupdate 15ms at router and there is normal Traffic

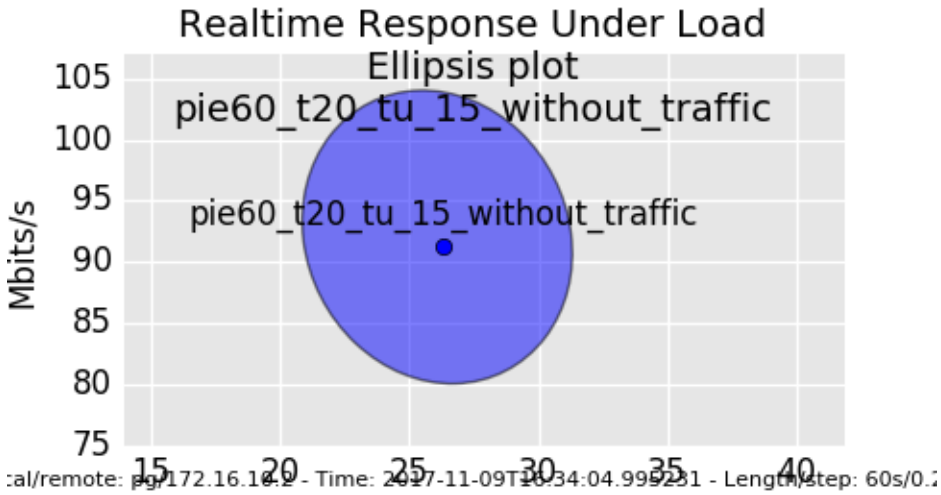


Figure 6: Ellipsis Plot when qdisc is Pie and parameter target 20ms and tupdate 15ms at router and there is normal Traffic

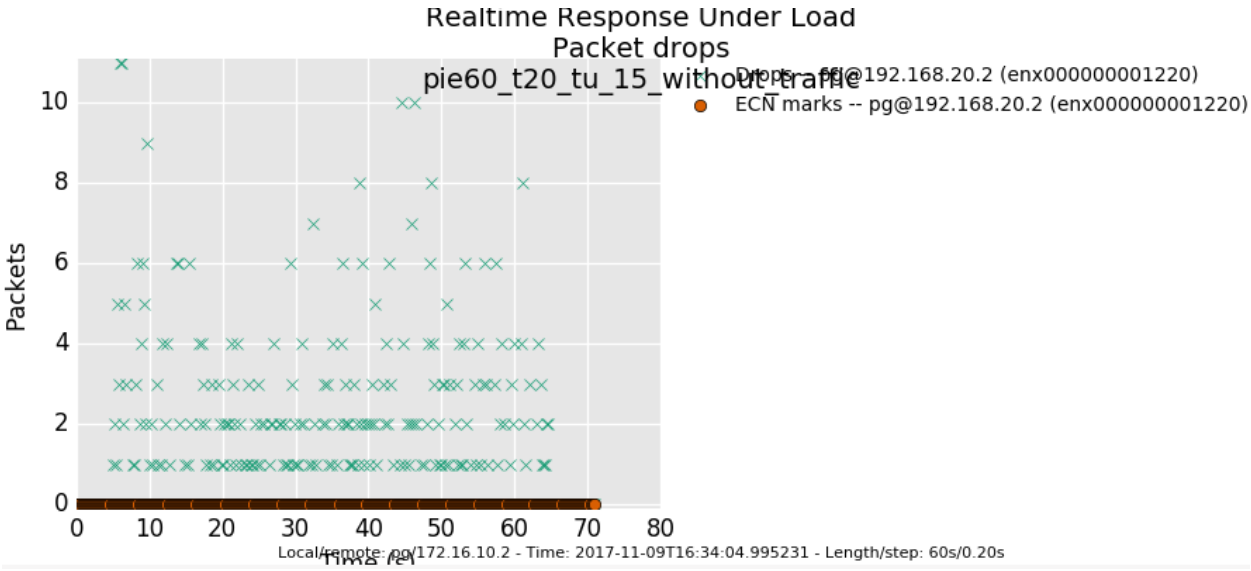


Figure 7: Packet drops Plot when qdisc is Pie and parameter target 20ms and tupdate 15ms at router and there is normal Traffic

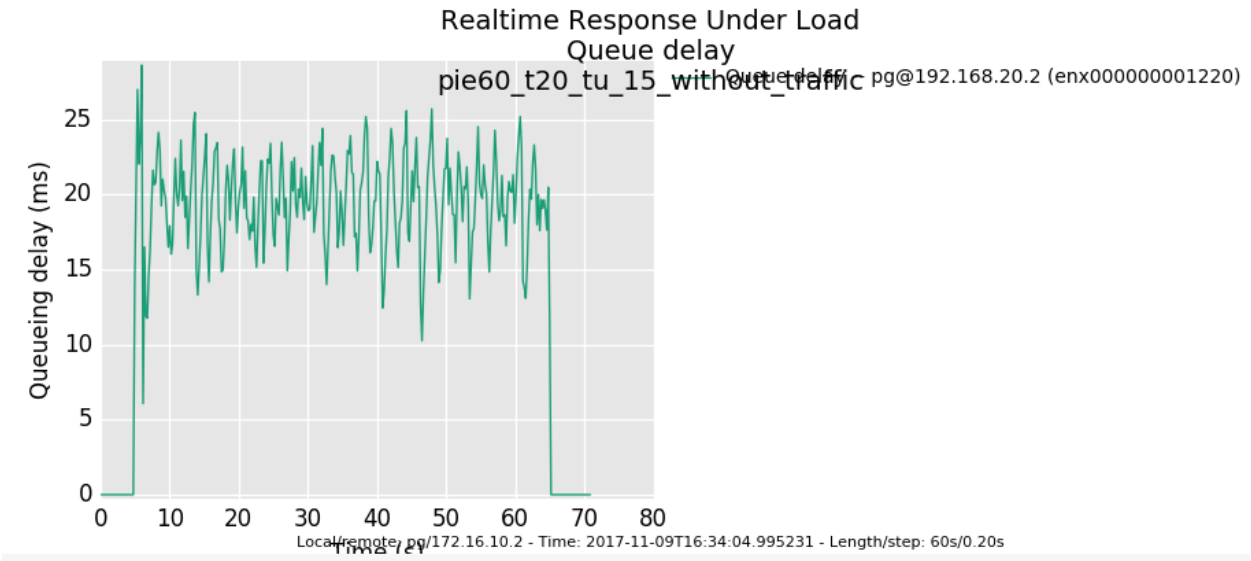


Figure 8: Queue delay Plot when qdisc is Pie and parameter target 20ms and tupdate 15ms at router and there is normal Traffic.

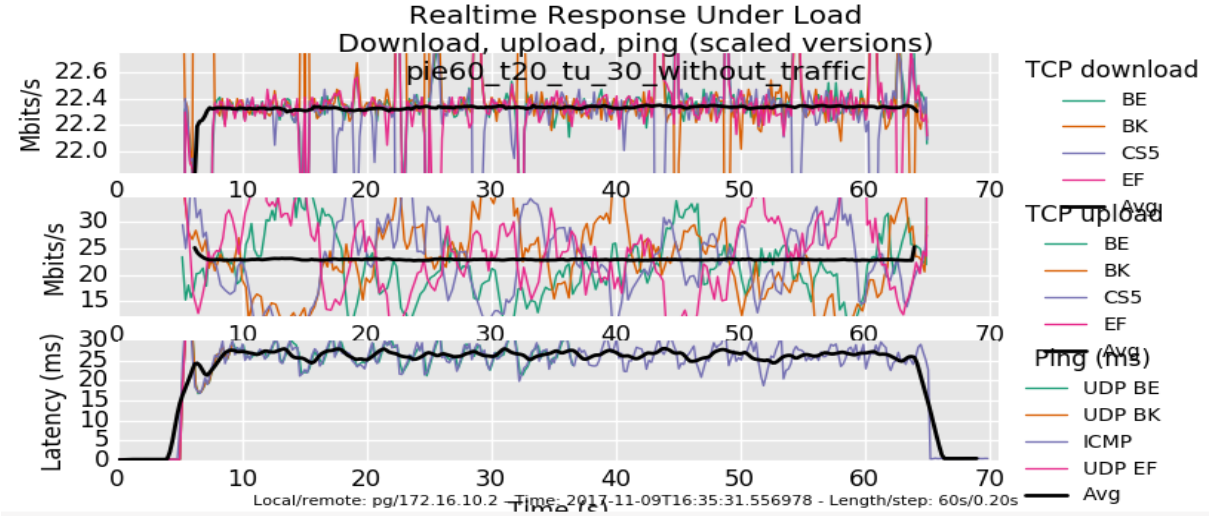


Figure 9: Download,Upload,Latency Plot when qdisc is Pie and parameter target 20ms and tupdate 30ms at router and there is normal Traffic

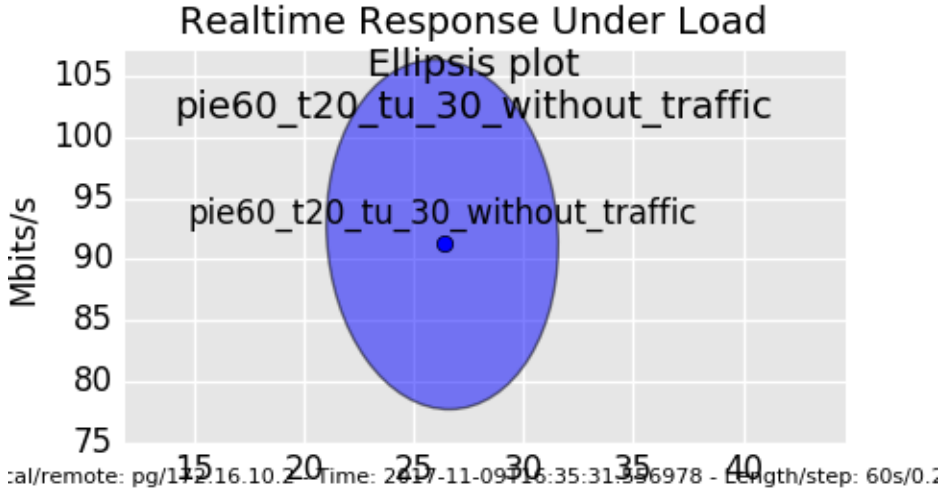


Figure 10: ellipsis plot when qdisc is Pie and parameter target 20ms and tupdate 30ms at router and there is normal Traffic

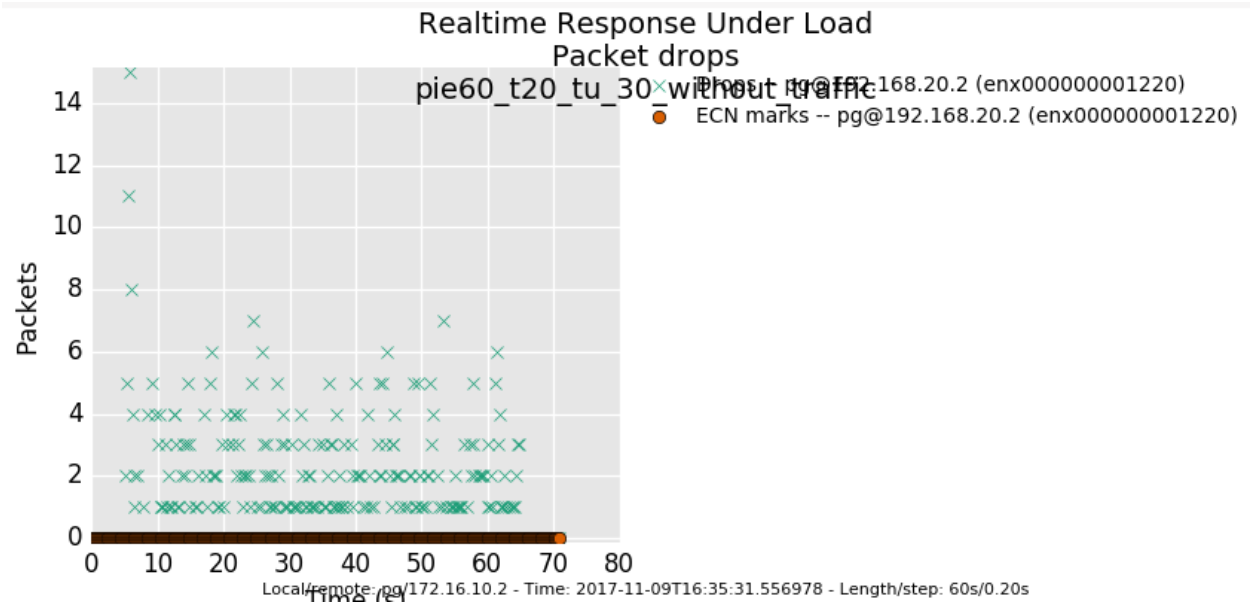


Figure 11: Packet Drop plot when qdisc is Pie and parameter target 20ms and tupdate 30ms at router and there is normal Traffic

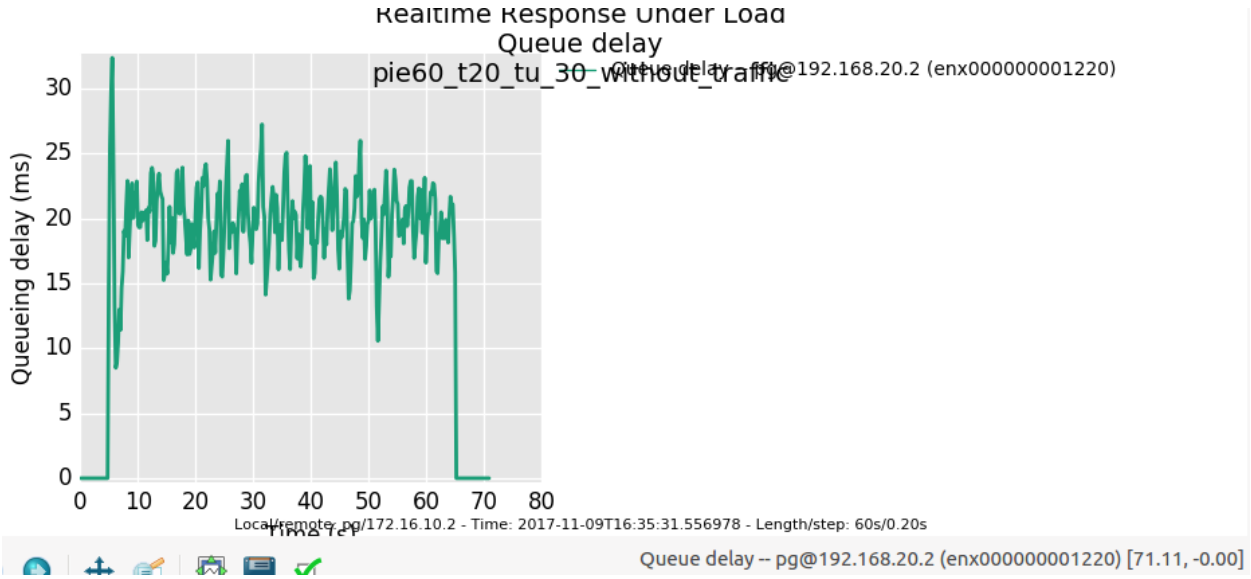


Figure 12: Queue delay plot when qdisc is Pie and parameter target 20ms and tupdate 30ms at router and there is normal Traffic

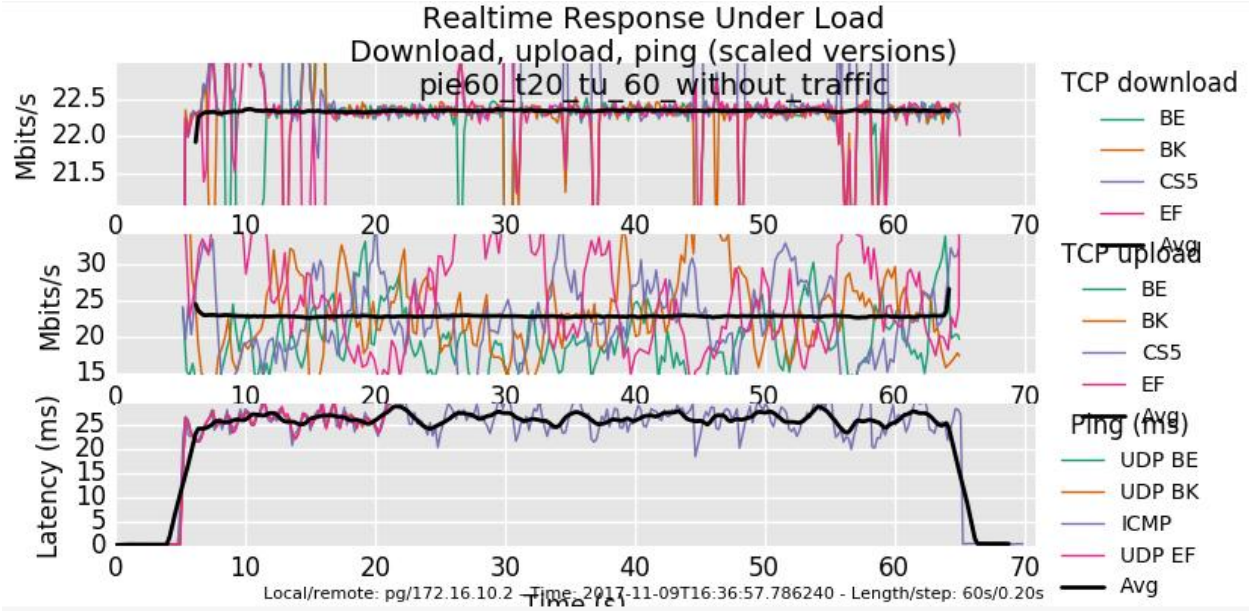


Figure 13: Download,upload and latency plot when qdisc is Pie and parameter target 20ms and tupdate 60ms at router and there is normal Traffic

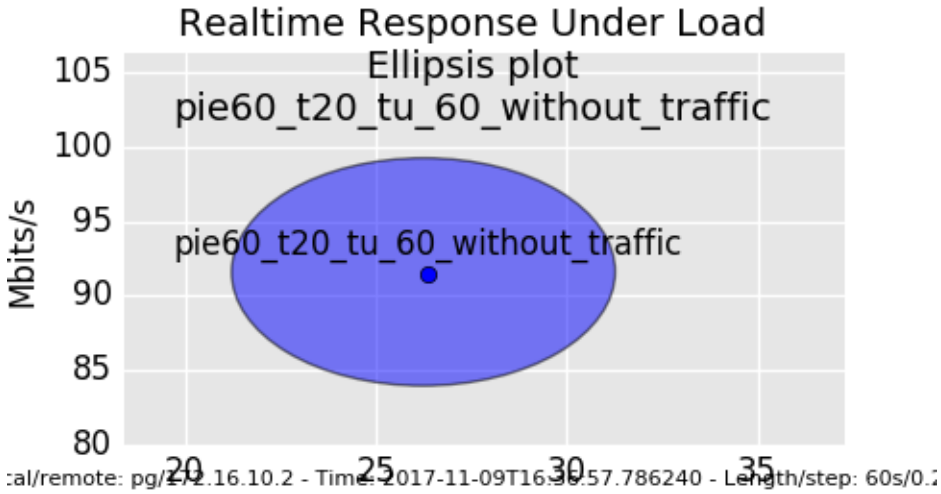
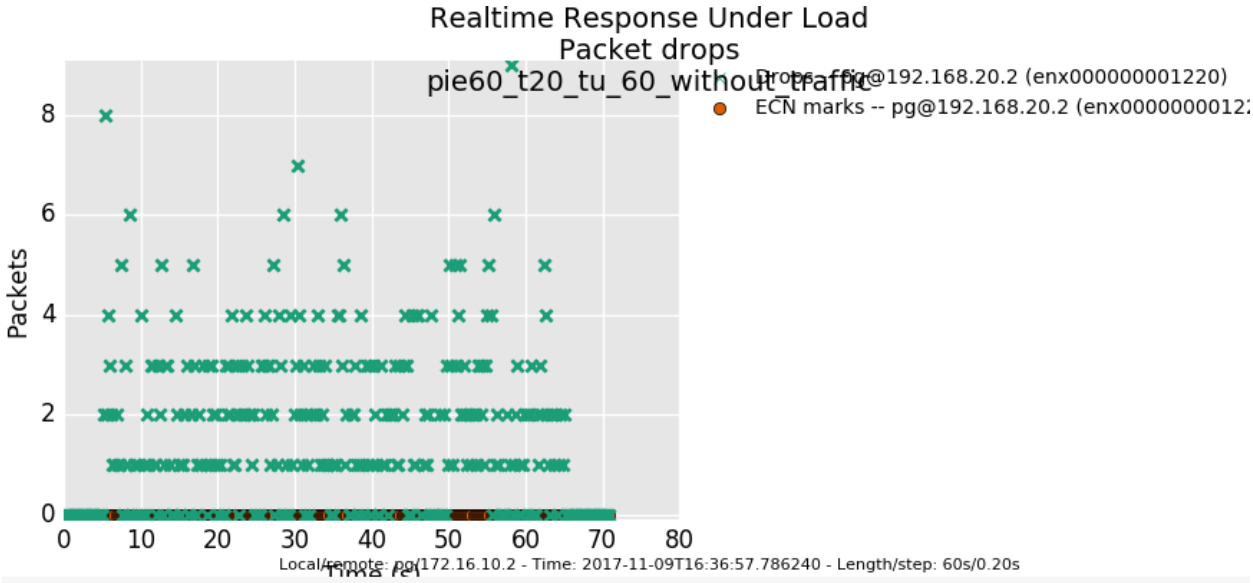


Figure 14: ellipsis plot when qdisc is Pie and parameter target 20ms and tupdate 60ms at router and there is normal Traffic



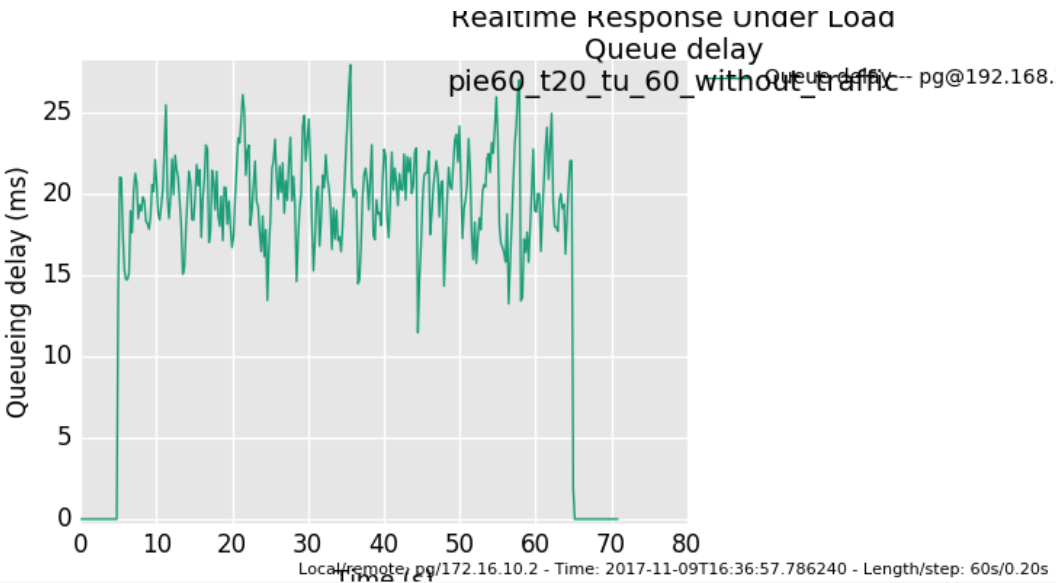


Figure 15: Packet Drop plot

when qdisc is Pie and parameter target 20ms and tupdate 60ms at router and there is normal Traffic
Figure 16:Queue Delay plot when qdisc is Pie and parameter target 20ms and tupdate 60ms at router and there is normal Traffic

Test Case #2

Keeping parameter “Tupdate” default and varying “target”

ii).target 20ms and tupdate 1ms
@Router# sudo tc qdisc add dev enx000000001220 root pie target value tupdate 30ms.
Value = (5,10,15,20)

@Client#./run-flent rrul -p totals --test-parameter bandwidth=800M --test-parameter upload_stream=num_cpus --test-parameter download_streams=num_cpus --test-parameter qdisc_stats_hosts=pg@192.168.20.2 --test-parameter qdisc_stats_interfaces=enx000000001220 -l 60 -H 172.16.10.2 -t pie60_t5_tu_30_without_traffic -o _pie60_t5_tu30_without_traffic.png

Plots:

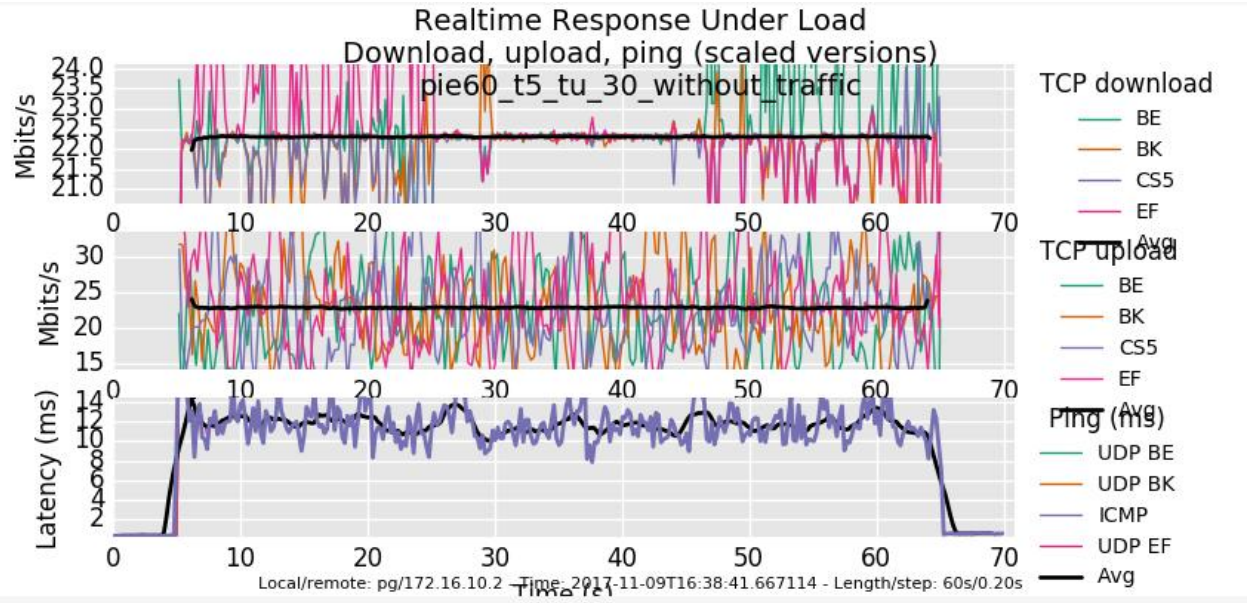


Figure 1:Download,Upload,Latency plot when qdisc is Pie and parameter target 5ms and tupdate 30ms at router and there is normal Traffic

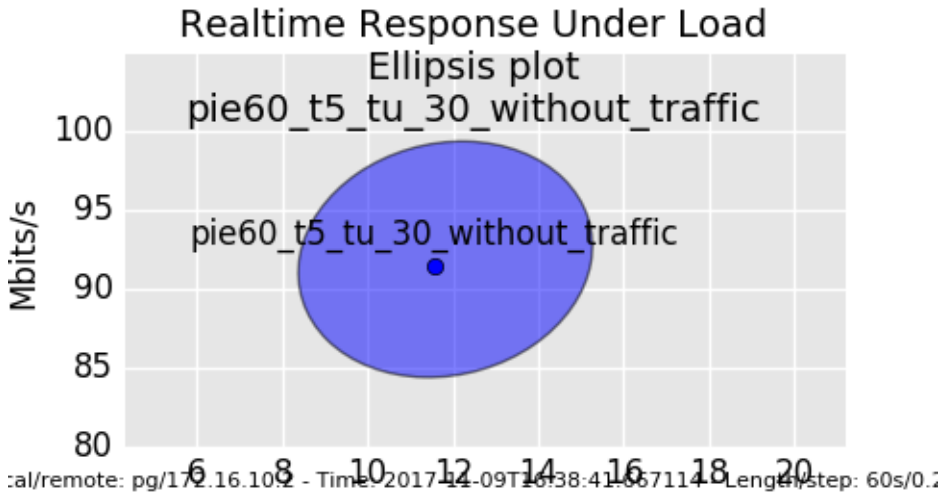


Figure 2:ellipsis plot when qdisc is Pie and parameter target 5ms and tupdate 30ms at router and there is normal Traffic

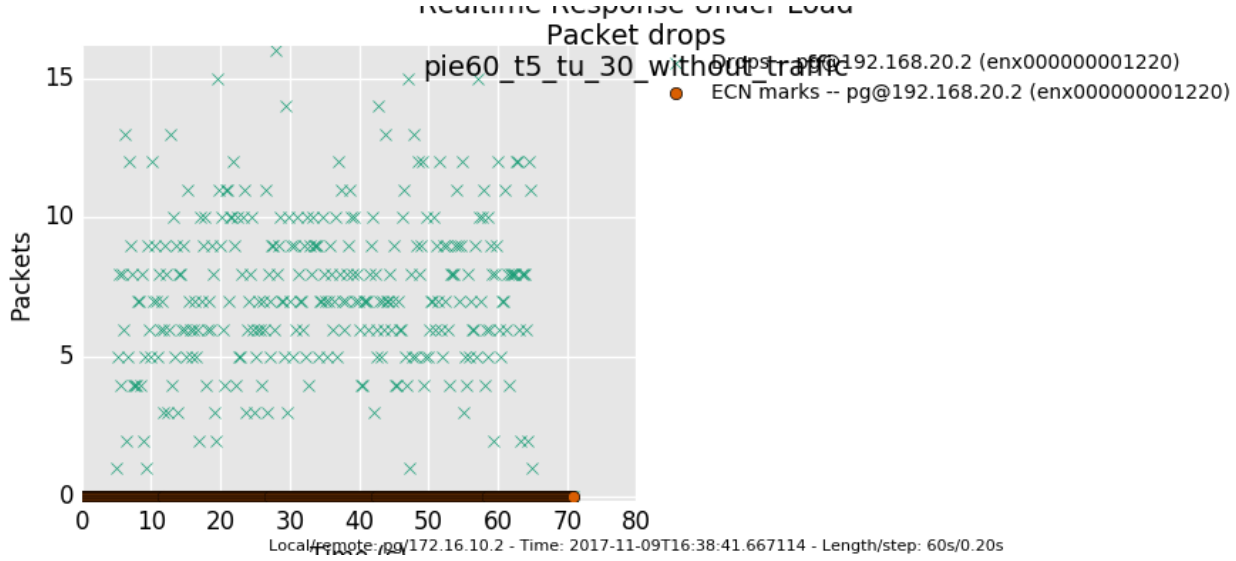
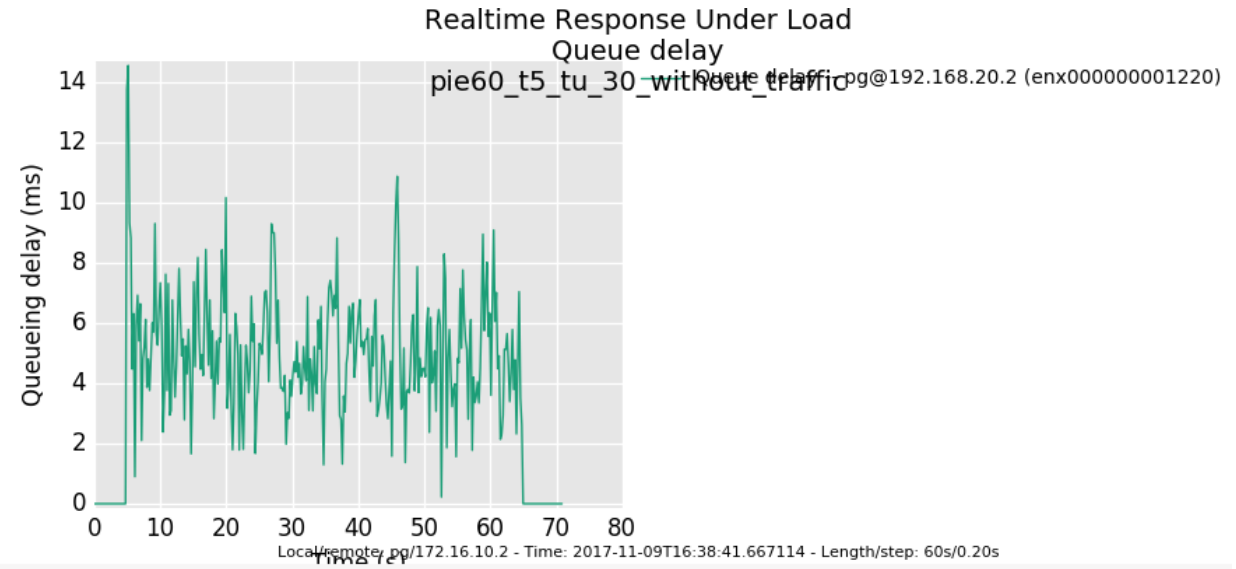


Figure 3:Packet Drops plot when qdisc is Pie and parameter target 5ms and



tupdate 30ms at router and there is normal Traffic

Figure 4:Queue Delay plot when qdisc is Pie and parameter target 5ms and tupdate 30ms at router and there is normal Traffic

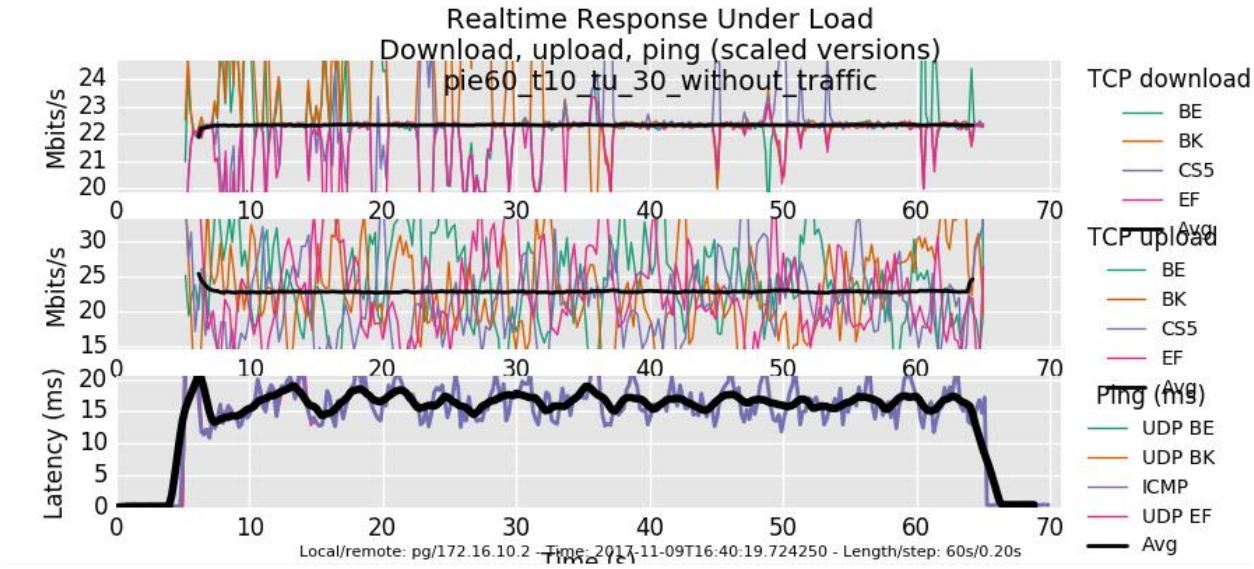


Figure 5: Download,Upload, plot when qdisc is Pie and parameter target 10ms and tupdate 30ms at router and there is normal Traffic

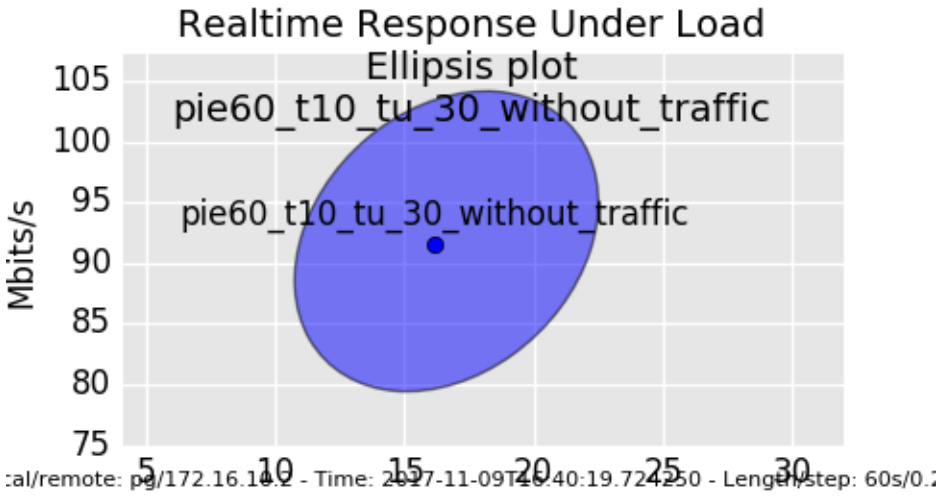


Figure 6: Ellipsis, plot when qdisc is Pie and parameter target 10ms and tupdate 30ms at router and there is normal Traffic

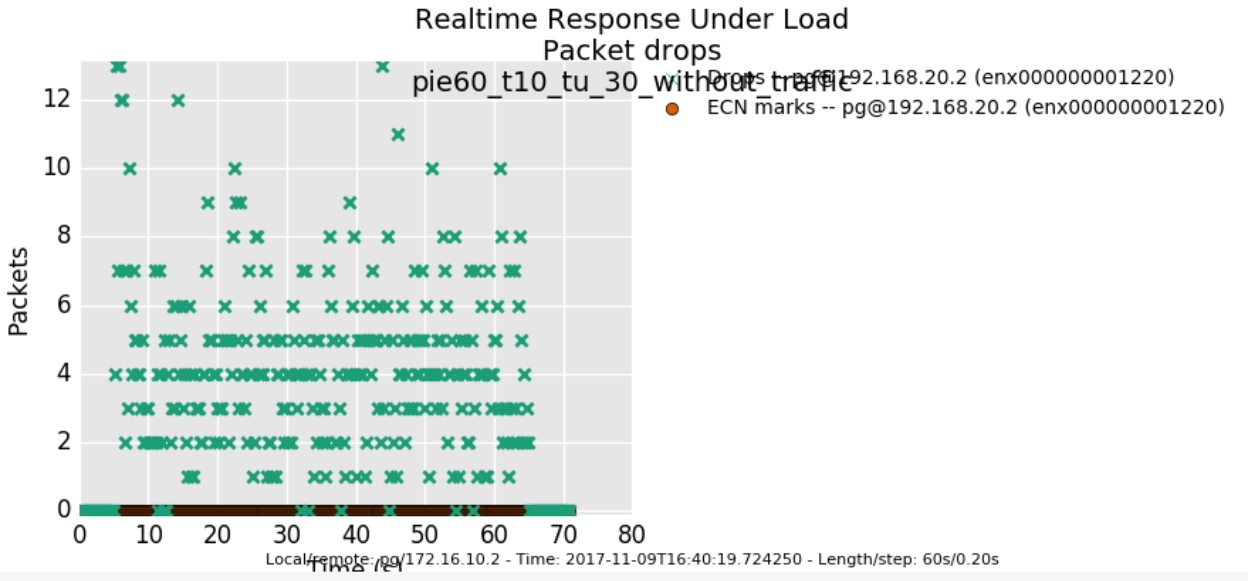


Figure 7: Packet Drops plot when qdisc is Pie and parameter target 10ms and tupdate 30ms at router and there is normal Traffic

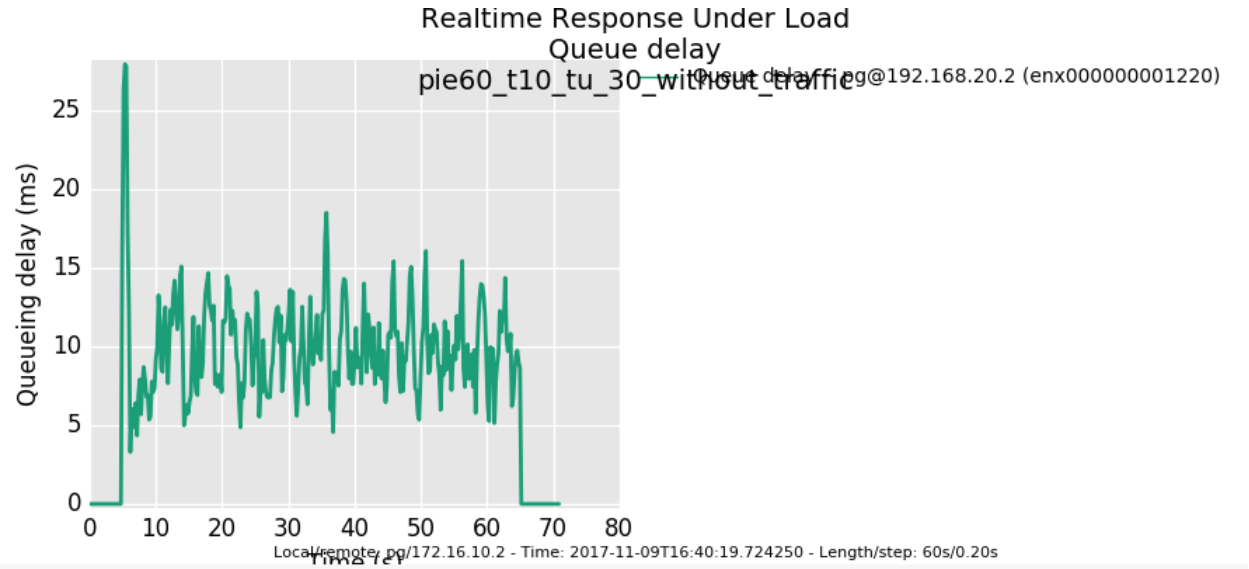


Figure 8: Queue delay plot when qdisc is Pie and parameter target 10ms and tupdate 30ms at router and there is normal Traffic

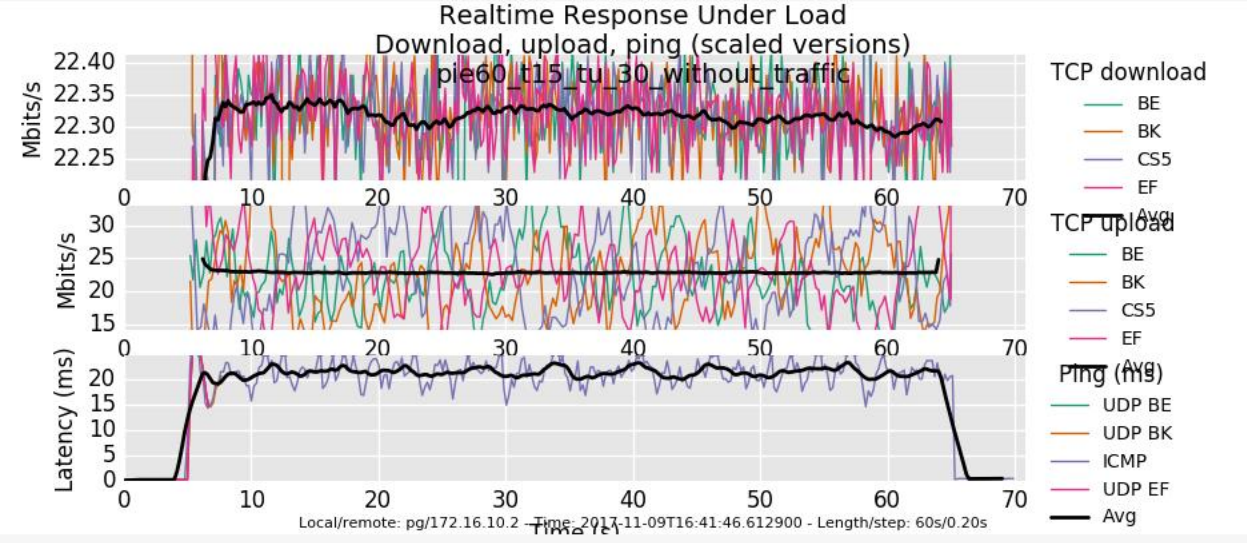


Figure 9: Download,upload,latency plot when qdisc is Pie and parameter target 15ms and tupdate 30ms at router and there is normal Traffic

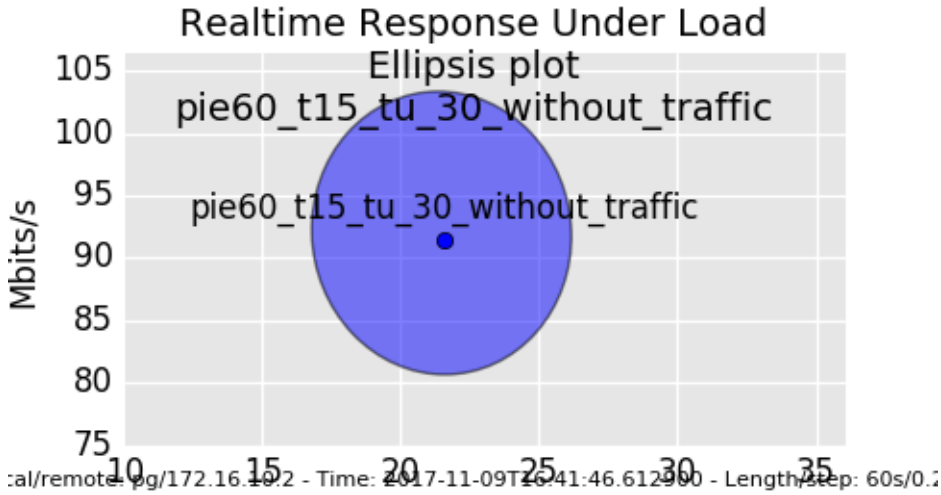


Figure 10:Ellipsis plot when qdisc is Pie and parameter target 15ms and tupdate 30ms at router and there is normal Traffic

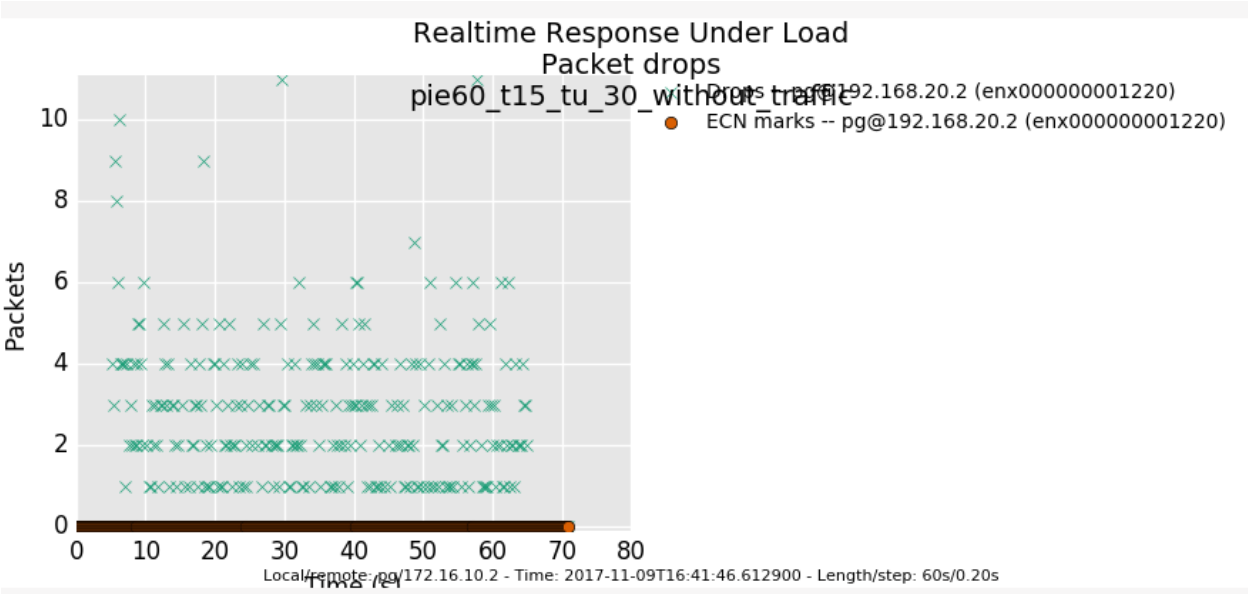


Figure 11:Packet Drops plot when qdisc is Pie and parameter target 15ms and tupdate 30ms at router and there is normal Traffic

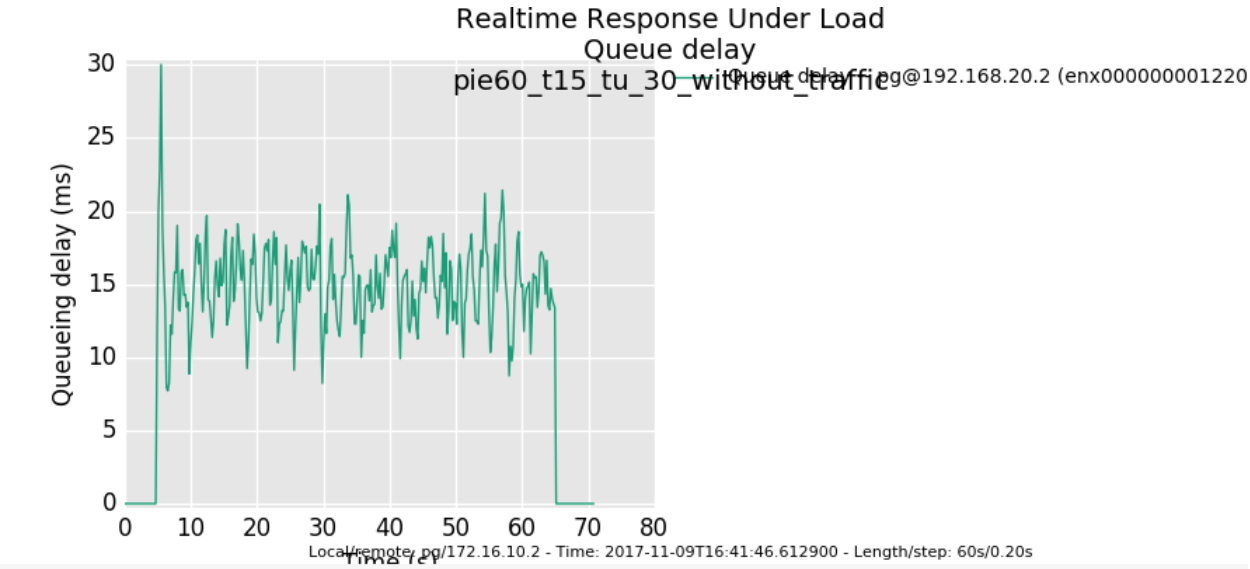


Figure 12:Delay plot when qdisc is Pie and parameter target 15ms and tupdate 30ms at router and there is normal Traffic

Observation Table:

	Latency Range(from ellipsis)	Throughput Range(from ellipsis)Mbits	Avg Latency	Avg Throughput	Queue Delay	Download speed	Upload speed
tupdate=1ms	**22-30**	**80-102**	**26**	**91**	20	22.34	24
tupdate=15ms	21-31	80-104	26	91	20	22.34	24
tupdate=30ms	21-31	79-106	26	91	20	22.3	24
tupdate=60ms	22-32	83-100	27	91.5	20	22.4	24

	Latency Range(from ellipsis)	Throughput Range(from ellipsis)Mbits	Avg Latency	Avg Throughput	Queue Delay	Download speed	Upload speed
target=5	8.5-15	84-99	11.5	91	5	22.5	24
target=10	11-21	79-104	16	91	10	22.5	23
target=15	16-26	81-104	22	91	15	22.35	24
target=20	21-31	79-106	26	91	20	22.3	24

Testing Scenario's:

Scenario1: Without any additional traffic other than the traffic generated by flent

Observation:

Done Analysis With changing the two parameters Target and Tupdate.

(i)Kept Tupdate Default and Varied Target(5,10,15,20)

Observed that the when the target is very less i.e 5ms . We are getting Good results i.e latency is very less and queuing delay is less i.e 5 .As Queue delay and latency is Considered as a measure of Congestion.

Here We will have better Perfomance.

When Target is Varied Upload Speed is Varied Download Speed is better.

(ii)Kept Target default and varied Tupdate(1,15,30,60)

With Varying The Tupdate there isn't much change in the behaviour as the latency,Queuing delay remain same.

To check the difference in performance we took a another Scenario with udp bursty Traffic

Scenario 2: With Additional UDPTraffic(Target default and Tupdate Varied)

The the Traffic is Generated at the rate of 100Mbps which passes through the bottle neck.

When Tupdate is set to 1ms there was a problem that Tupdate was not getting set to 1ms instead it is taking value as 4ms .

So, the plot generated generated by us wasn't appropriate .

Scenario 3: With Additional Tcp Traffic

Here we didnt see Much noticable difference in the performance of pie with the one with without additional traffic.

There was variation in latency and tcp download.