

Pantheon Report

Generated at 2019-07-08 03:13:19 (UTC).

Tested in mahimahi: mm-delay 20 mm-link Verizon-LTE-short.up Verizon-LTE-short.down

Repeated the test of 19 congestion control schemes once.

Each test lasted for 30 seconds running 1 flow.

System info:

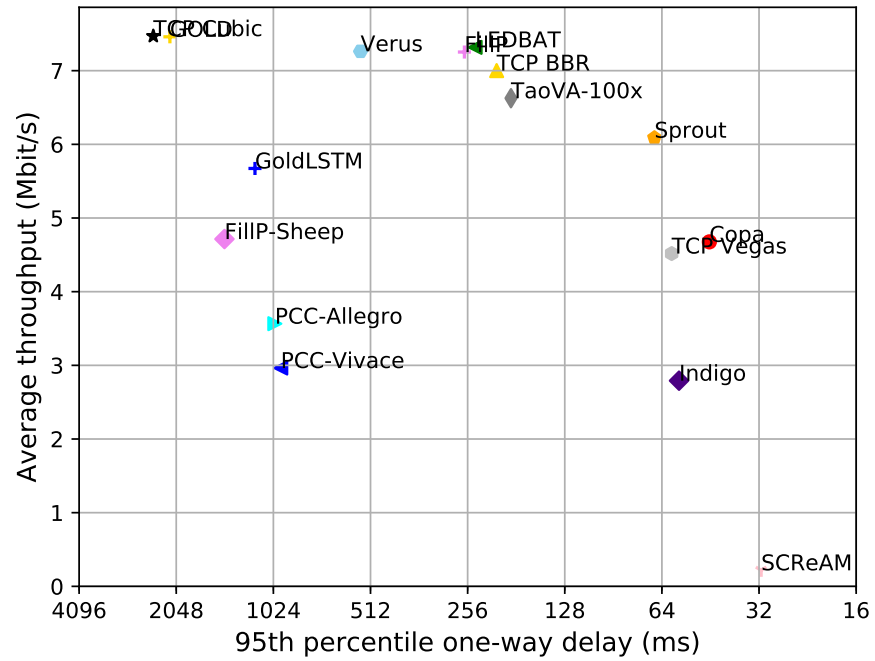
```
Linux 4.15.0-54-generic
net.core.default_qdisc = fq
net.core.rmem_default = 212992
net.core.rmem_max = 212992
net.core.wmem_default = 212992
net.core.wmem_max = 212992
net.ipv4.tcp_rmem = 4096 87380 6291456
net.ipv4.tcp_wmem = 4096 16384 4194304
```

Git summary:

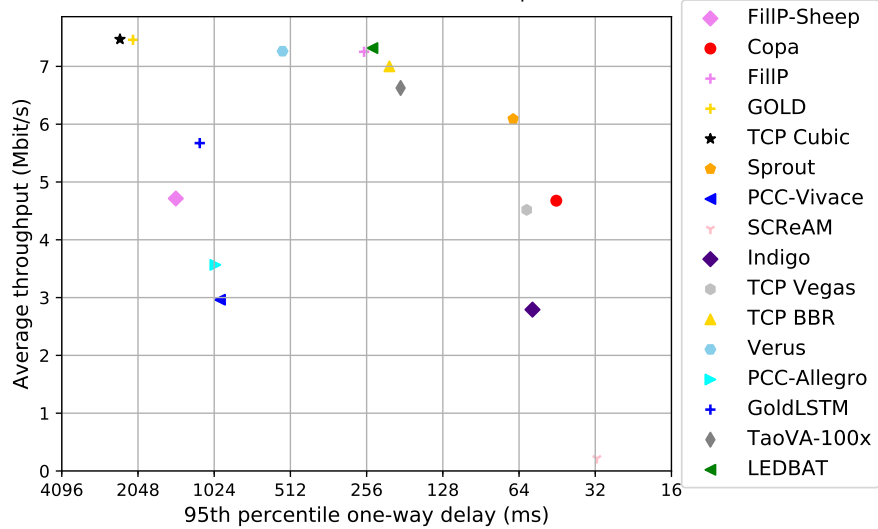
```
branch: master @ 869e3c7e2b098913ac6a549c364a5fd287806c20
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf58e562f4
third_party/gold @ e47bed6d7495aa223eec8de2c7a43035967074ef
M environment/__pycache__/datagram_pb2.cpython-36.opt-1.pyc
M environment/__pycache__/datagram_pb2.cpython-36.pyc
M environment/__pycache__/environment.cpython-36.opt-1.pyc
M environment/__pycache__/helpers.cpython-36.opt-1.pyc
M environment/__pycache__/helpers.cpython-36.pyc
M environment/__pycache__/mahimahi.cpython-36.opt-1.pyc
M environment/__pycache__/project_root.cpython-36.opt-1.pyc
M environment/__pycache__/project_root.cpython-36.pyc
M environment/__pycache__/receiver.cpython-36.opt-1.pyc
M environment/__pycache__/receiver.cpython-36.pyc
M environment/logs.txt
M model
third_party/goldLSTM @ 6b512ee75b163fd680d7bf3cde4cf6d6aa7102c4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ f866d3f58d27afd942717625ee3a354cc2e802bd
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
M receiver/src/buffer.h
M receiver/src/core.cpp
M sender/src/buffer.h
M sender/src/core.cpp
third_party/pcc-experimental @ cd43e34e3f5f5613e8acd08fab92c4eb24f974ab
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
```

```
third_party/scream-reproduce @ f099118d1421aa3131bf11ff1964974e1da3bdb2
  M src/ScreamClient
  M src/ScreamServer
third_party/sprout @ 366e35c6178b01e31d4a46ad18c74f9415f19a26
  M src/examples/cellsim.cc
  M src/examples/sproutbt2.cc
  M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
  M src/verus.hpp
  M tools/plot.py
third_party/vivace @ 2baf86211435ae071a32f96b7d8c504587f5d7f4
third_party/webrtc @ 3f0cc2a9061a41b6f9dde4735770d143a1fa2851
```

local test in mahimahi, 1 run of 30s each per scheme
(mean of all runs by scheme)



local test in mahimahi, 1 run of 30s each per scheme



scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	1	7.00	208.12	0.52
Copa	1	4.68	45.61	0.11
TCP Cubic	1	7.47	2412.55	7.51
FillP	1	7.25	261.98	0.24
FillP-Sheep	1	4.71	1451.73	0.32
GOLD	1	7.46	2142.88	4.56
GoldLSTM	1	5.67	1167.68	3.35
Indigo	1	2.79	56.64	0.06
LEDBAT	1	7.32	242.82	0.51
PCC-Allegro	1	3.57	1013.20	2.95
PCC-Expr	0	N/A	N/A	N/A
QUIC Cubic	0	N/A	N/A	N/A
SCReAM	1	0.22	31.53	0.00
Sprout	1	6.09	67.51	0.03
TaoVA-100x	1	6.63	187.91	0.07
TCP Vegas	1	4.52	59.69	0.14
Verus	1	7.26	549.86	0.14
PCC-Vivace	1	2.96	971.73	1.02
WebRTC media	0	N/A	N/A	N/A

Run 1: Statistics of TCP BBR

Start at: 2019-07-08 03:05:46

End at: 2019-07-08 03:06:16

Below is generated by plot.py at 2019-07-08 03:12:54

Datalink statistics

-- Total of 1 flow:

Average capacity: 7.50 Mbit/s

Average throughput: 7.00 Mbit/s (93.4% utilization)

95th percentile per-packet one-way delay: 208.122 ms

Loss rate: 0.52%

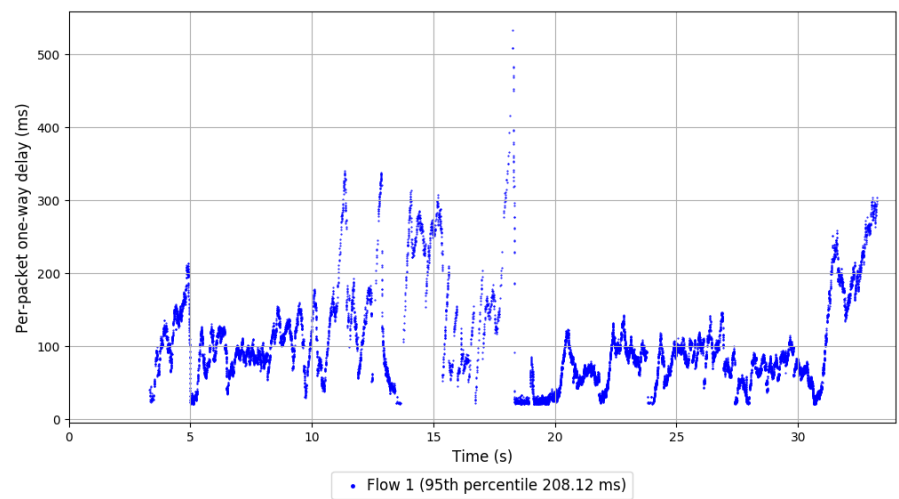
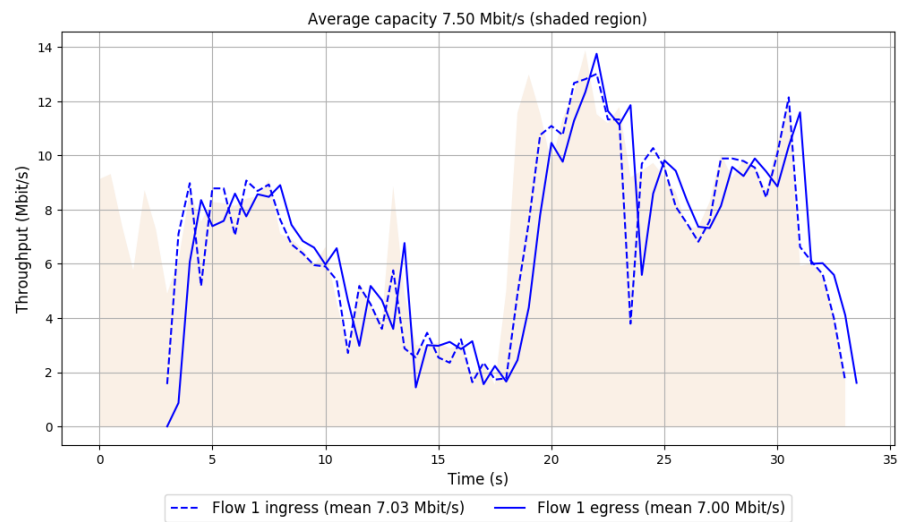
-- Flow 1:

Average throughput: 7.00 Mbit/s

95th percentile per-packet one-way delay: 208.122 ms

Loss rate: 0.52%

Run 1: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

Start at: 2019-07-08 03:01:11

End at: 2019-07-08 03:01:41

Below is generated by plot.py at 2019-07-08 03:12:55

Datalink statistics

-- Total of 1 flow:

Average capacity: 7.51 Mbit/s

Average throughput: 4.68 Mbit/s (62.3% utilization)

95th percentile per-packet one-way delay: 45.613 ms

Loss rate: 0.11%

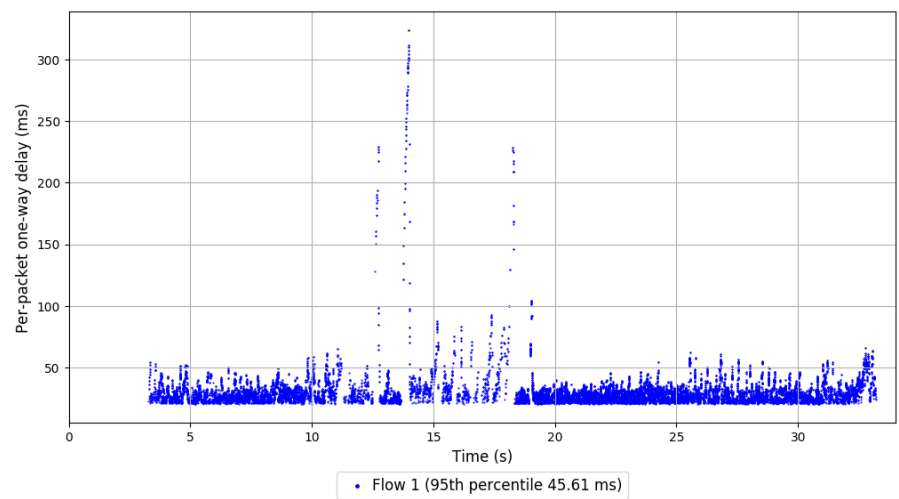
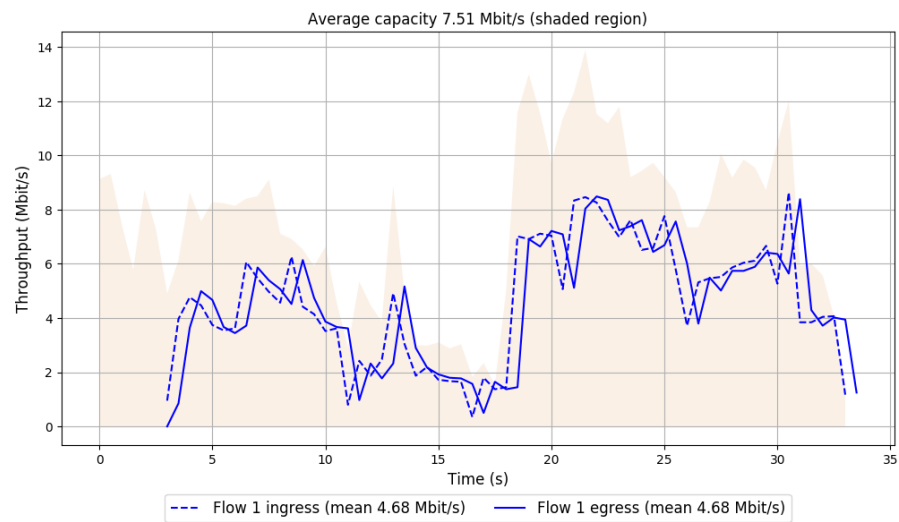
-- Flow 1:

Average throughput: 4.68 Mbit/s

95th percentile per-packet one-way delay: 45.613 ms

Loss rate: 0.11%

Run 1: Report of Copa — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2019-07-08 03:03:29

End at: 2019-07-08 03:03:59

Below is generated by plot.py at 2019-07-08 03:12:55

Datalink statistics

-- Total of 1 flow:

Average capacity: 7.50 Mbit/s

Average throughput: 7.47 Mbit/s (99.6% utilization)

95th percentile per-packet one-way delay: 2412.550 ms

Loss rate: 7.51%

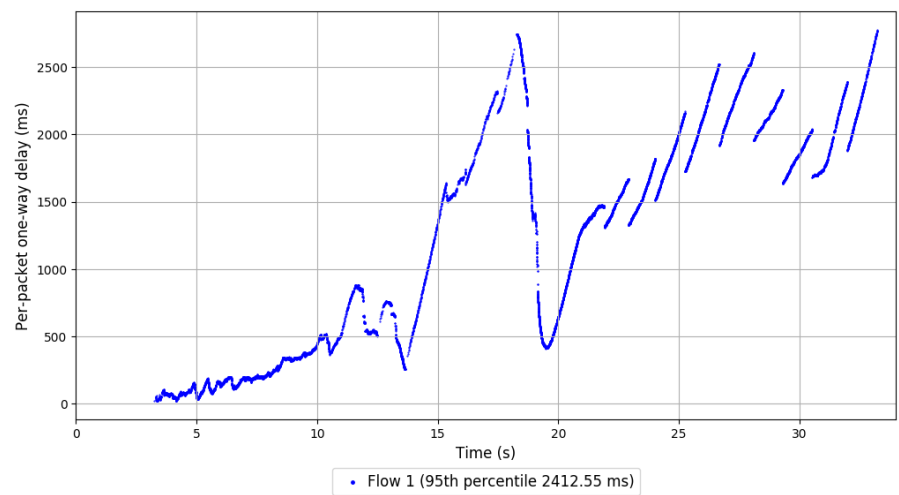
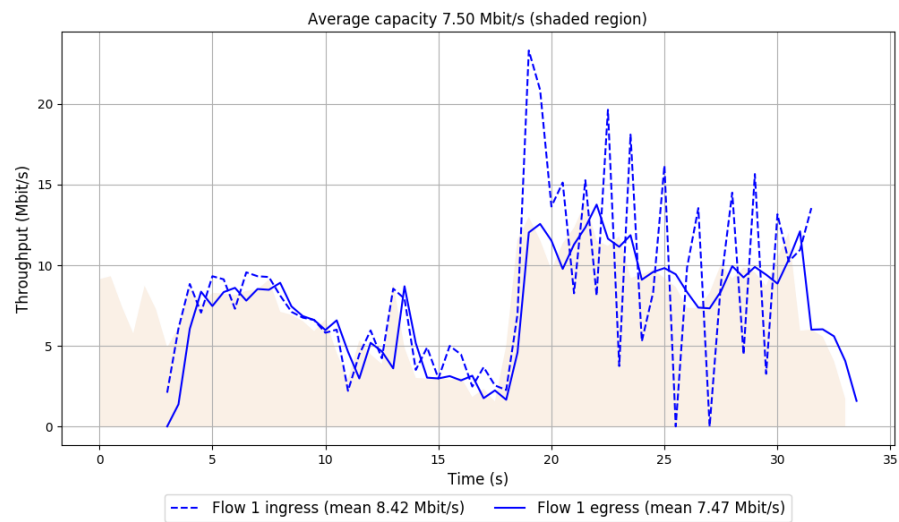
-- Flow 1:

Average throughput: 7.47 Mbit/s

95th percentile per-packet one-way delay: 2412.550 ms

Loss rate: 7.51%

Run 1: Report of TCP Cubic — Data Link

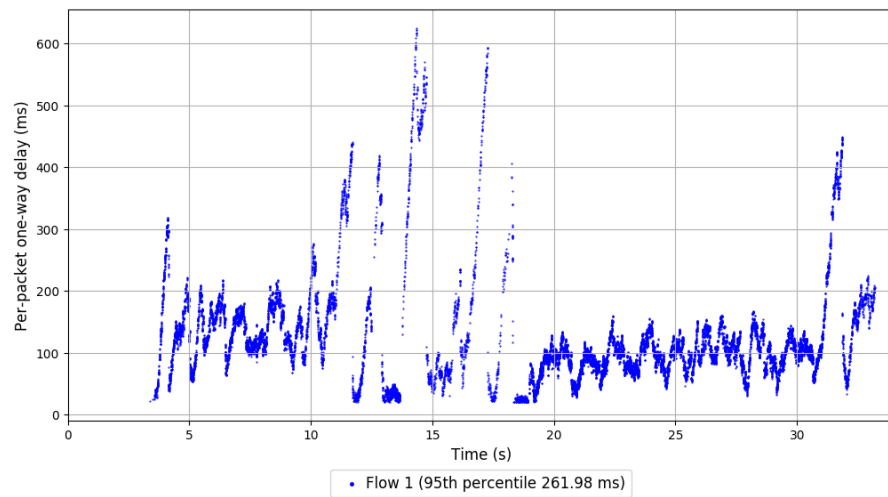
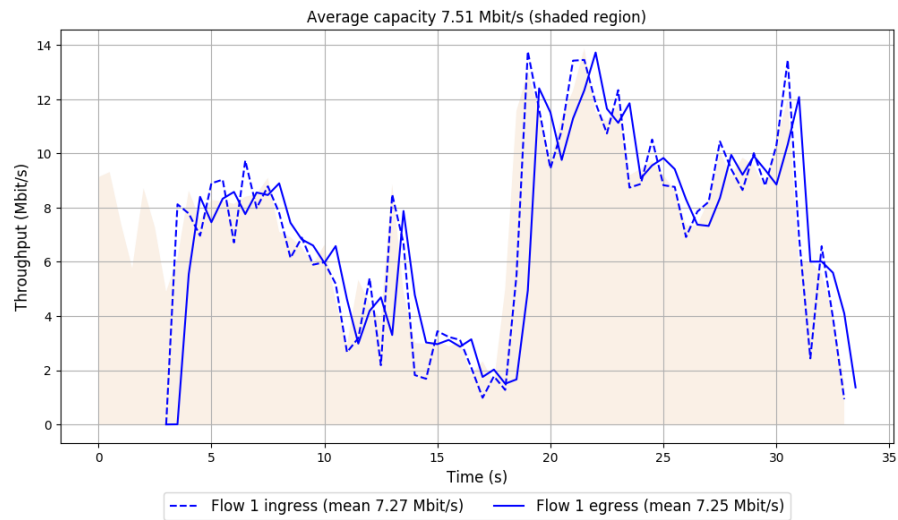


```
Run 1: Statistics of FillP

Start at: 2019-07-08 03:07:30
End at: 2019-07-08 03:08:00

# Below is generated by plot.py at 2019-07-08 03:12:56
# Datalink statistics
-- Total of 1 flow:
Average capacity: 7.51 Mbit/s
Average throughput: 7.25 Mbit/s (96.6% utilization)
95th percentile per-packet one-way delay: 261.982 ms
Loss rate: 0.24%
-- Flow 1:
Average throughput: 7.25 Mbit/s
95th percentile per-packet one-way delay: 261.982 ms
Loss rate: 0.24%
```

Run 1: Report of FillP — Data Link



Run 1: Statistics of FillP-Sheep

Start at: 2019-07-08 03:00:36

End at: 2019-07-08 03:01:06

Below is generated by plot.py at 2019-07-08 03:12:56

Datalink statistics

-- Total of 1 flow:

Average capacity: 7.49 Mbit/s

Average throughput: 4.71 Mbit/s (62.9% utilization)

95th percentile per-packet one-way delay: 1451.728 ms

Loss rate: 0.32%

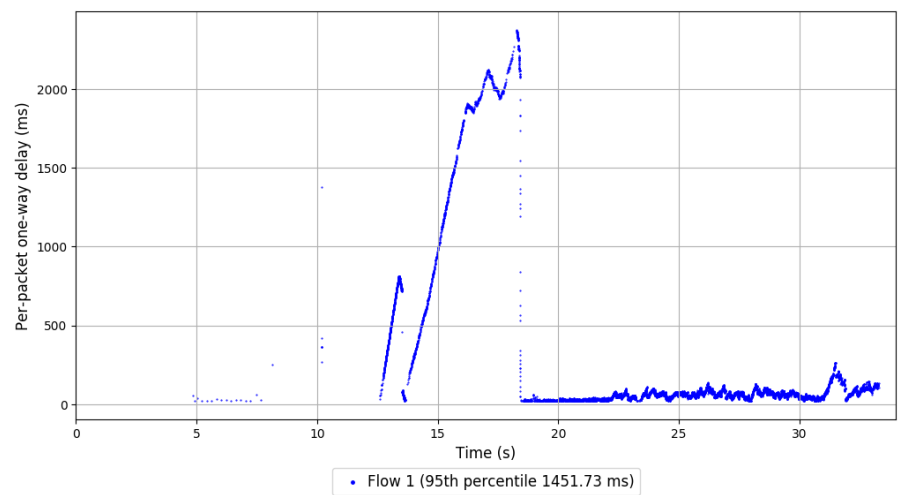
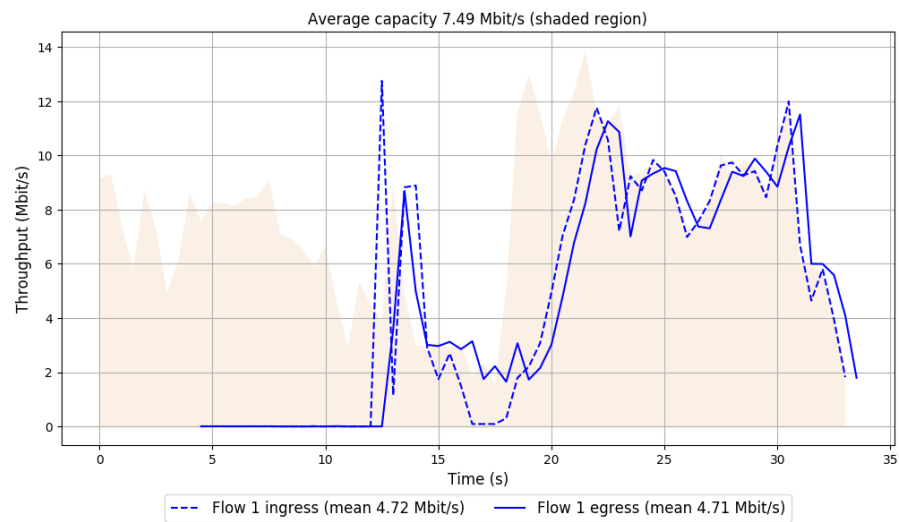
-- Flow 1:

Average throughput: 4.71 Mbit/s

95th percentile per-packet one-way delay: 1451.728 ms

Loss rate: 0.32%

Run 1: Report of FillP-Sheep — Data Link

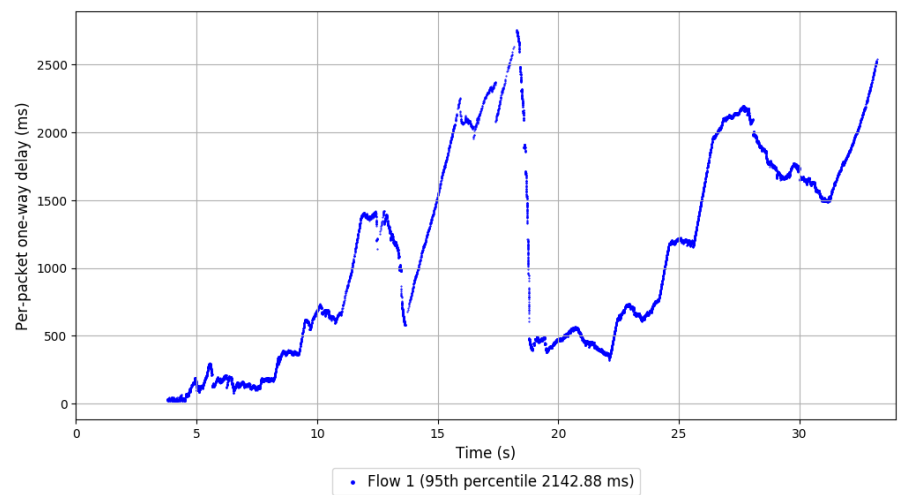
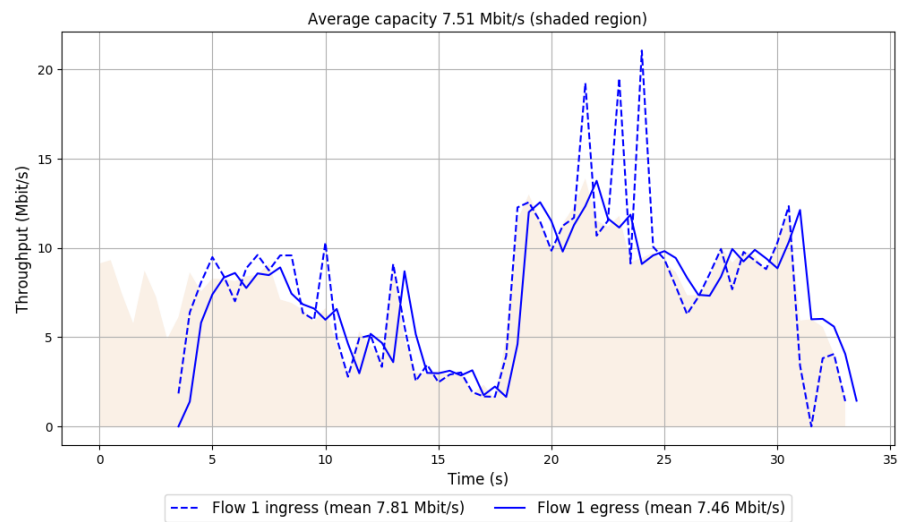


```
Run 1: Statistics of GOLD

Start at: 2019-07-08 03:02:54
End at: 2019-07-08 03:03:24

# Below is generated by plot.py at 2019-07-08 03:12:56
# Datalink statistics
-- Total of 1 flow:
Average capacity: 7.51 Mbit/s
Average throughput: 7.46 Mbit/s (99.4% utilization)
95th percentile per-packet one-way delay: 2142.876 ms
Loss rate: 4.56%
-- Flow 1:
Average throughput: 7.46 Mbit/s
95th percentile per-packet one-way delay: 2142.876 ms
Loss rate: 4.56%
```

Run 1: Report of GOLD — Data Link

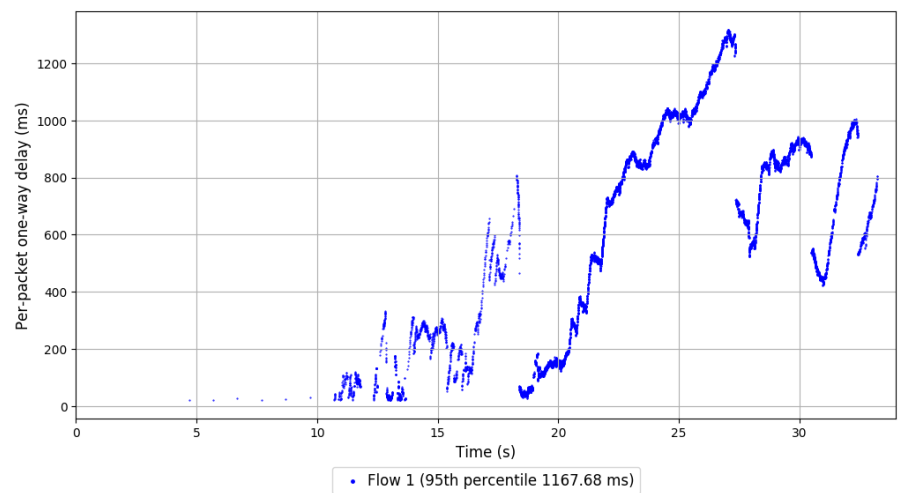
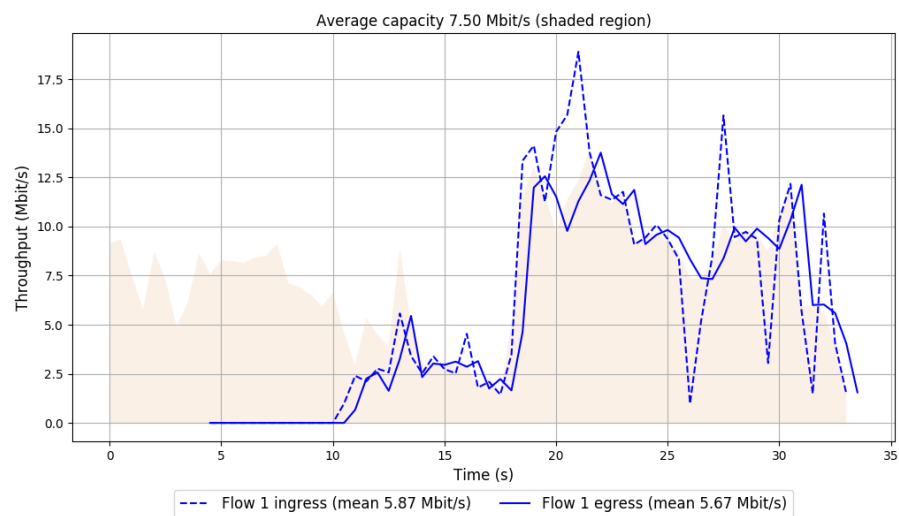



```
Run 1: Statistics of GoldLSTM

Start at: 2019-07-08 03:06:21
End at: 2019-07-08 03:06:51

# Below is generated by plot.py at 2019-07-08 03:13:05
# Datalink statistics
-- Total of 1 flow:
Average capacity: 7.50 Mbit/s
Average throughput: 5.67 Mbit/s (75.6% utilization)
95th percentile per-packet one-way delay: 1167.679 ms
Loss rate: 3.35%
-- Flow 1:
Average throughput: 5.67 Mbit/s
95th percentile per-packet one-way delay: 1167.679 ms
Loss rate: 3.35%
```

Run 1: Report of GoldLSTM — Data Link



Run 1: Statistics of Indigo

Start at: 2019-07-08 03:01:45

End at: 2019-07-08 03:02:15

Below is generated by plot.py at 2019-07-08 03:13:05

Datalink statistics

-- Total of 1 flow:

Average capacity: 7.50 Mbit/s

Average throughput: 2.79 Mbit/s (37.2% utilization)

95th percentile per-packet one-way delay: 56.641 ms

Loss rate: 0.06%

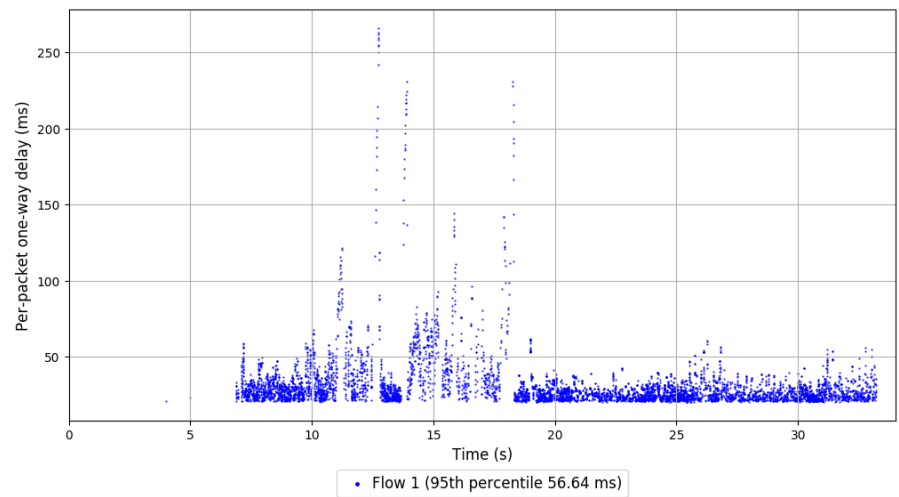
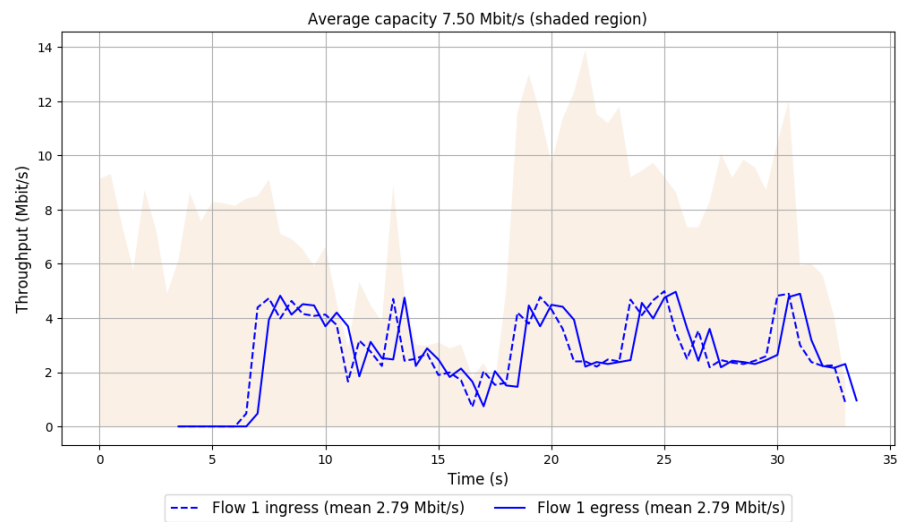
-- Flow 1:

Average throughput: 2.79 Mbit/s

95th percentile per-packet one-way delay: 56.641 ms

Loss rate: 0.06%

Run 1: Report of Indigo — Data Link

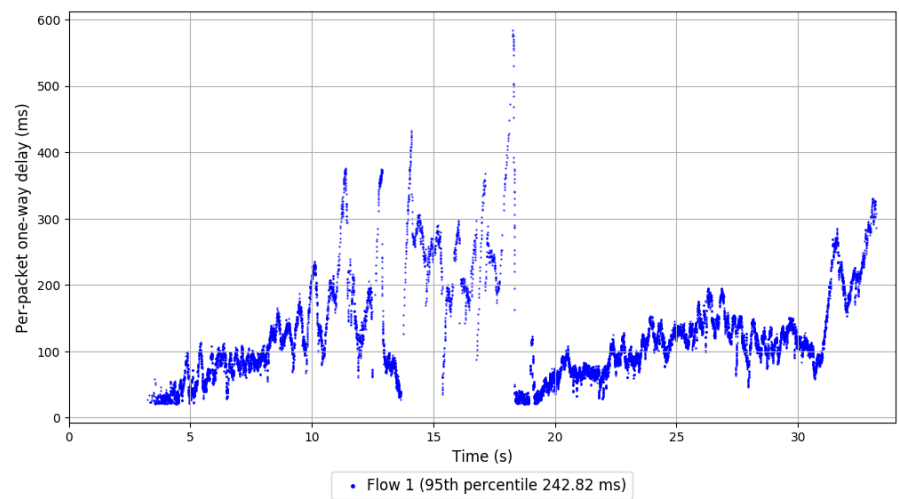
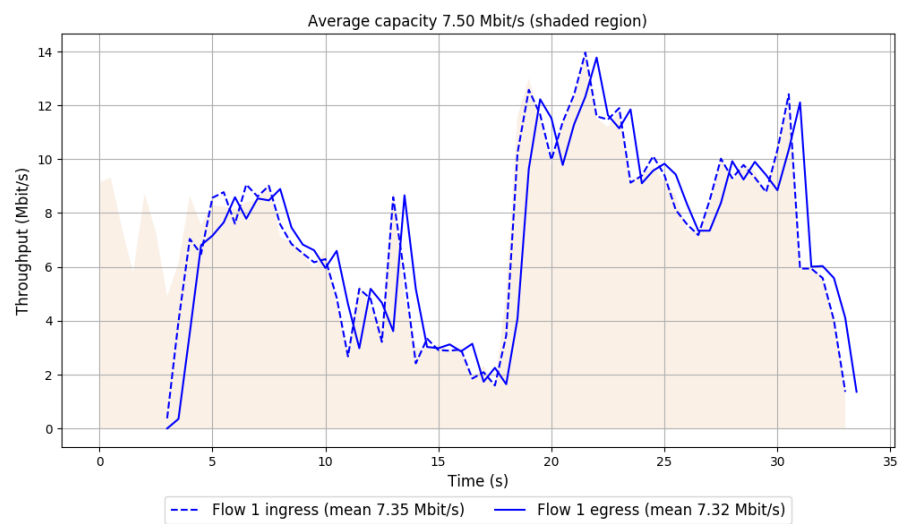


```
Run 1: Statistics of LEDBAT

Start at: 2019-07-08 03:10:26
End at: 2019-07-08 03:10:57

# Below is generated by plot.py at 2019-07-08 03:13:06
# Datalink statistics
-- Total of 1 flow:
Average capacity: 7.50 Mbit/s
Average throughput: 7.32 Mbit/s (97.5% utilization)
95th percentile per-packet one-way delay: 242.818 ms
Loss rate: 0.51%
-- Flow 1:
Average throughput: 7.32 Mbit/s
95th percentile per-packet one-way delay: 242.818 ms
Loss rate: 0.51%
```

Run 1: Report of LEDBAT — Data Link

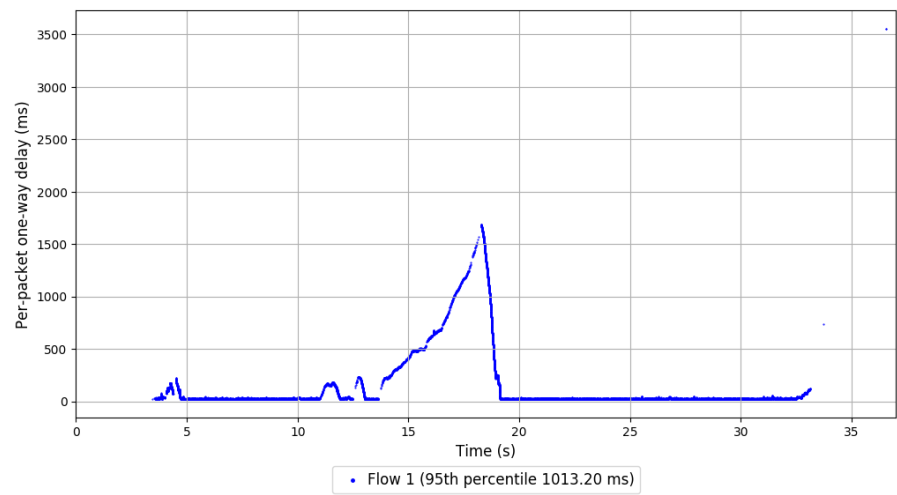
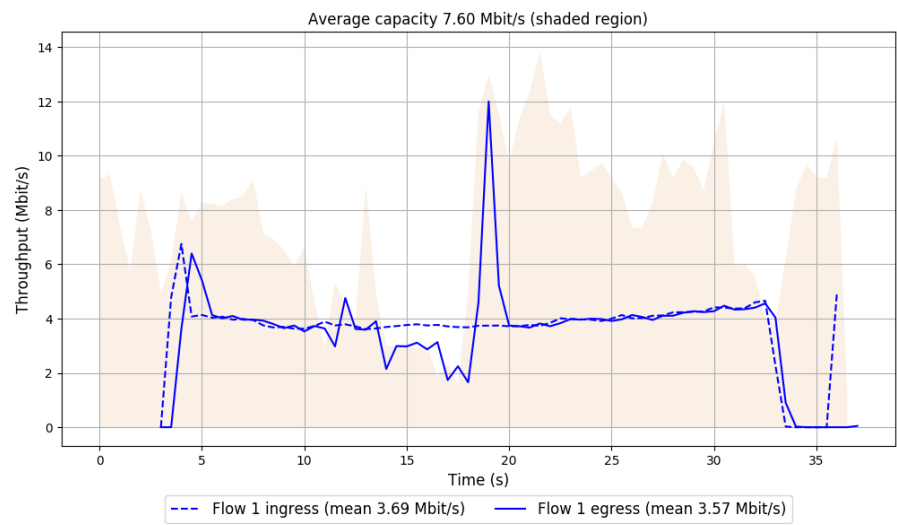


```
Run 1: Statistics of PCC-Allegro

Start at: 2019-07-08 03:09:13
End at: 2019-07-08 03:09:43

# Below is generated by plot.py at 2019-07-08 03:13:06
# Datalink statistics
-- Total of 1 flow:
Average capacity: 7.60 Mbit/s
Average throughput: 3.57 Mbit/s (46.9% utilization)
95th percentile per-packet one-way delay: 1013.196 ms
Loss rate: 2.95%
-- Flow 1:
Average throughput: 3.57 Mbit/s
95th percentile per-packet one-way delay: 1013.196 ms
Loss rate: 2.95%
```

Run 1: Report of PCC-Allegro — Data Link

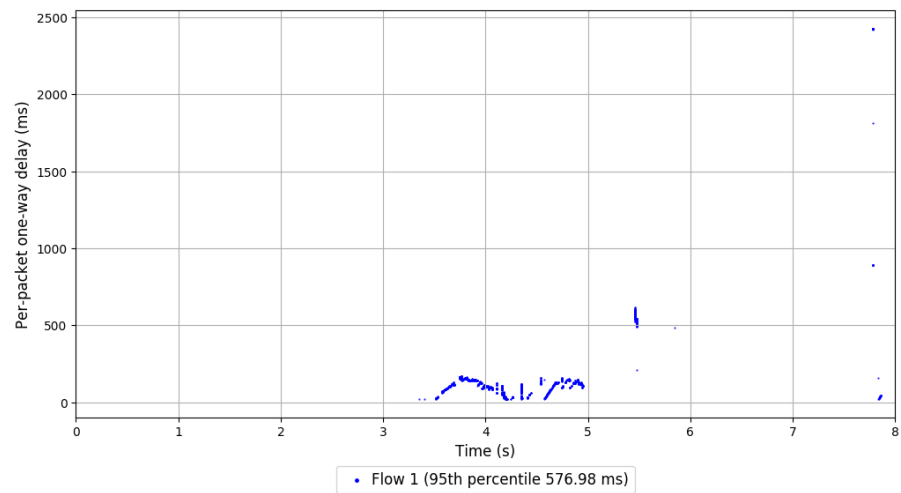
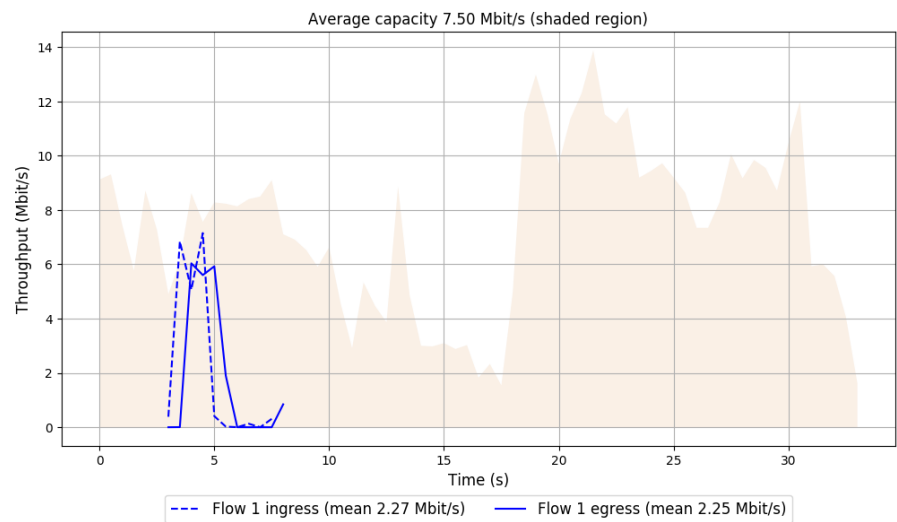


Run 1: Statistics of PCC-Expr

Start at: 2019-07-08 03:11:01

End at: 2019-07-08 03:11:31

Run 1: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2019-07-08 03:08:39

End at: 2019-07-08 03:09:09

Run 1: Report of QUIC Cubic — Data Link

Figure is missing

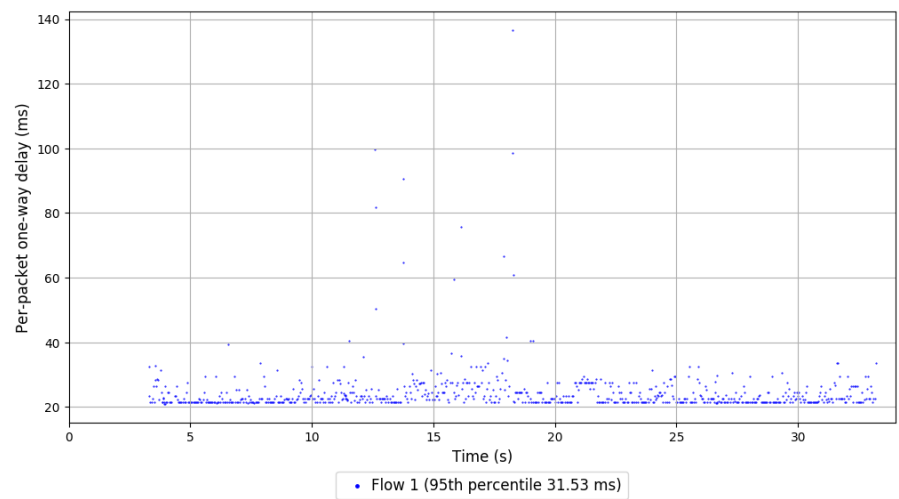
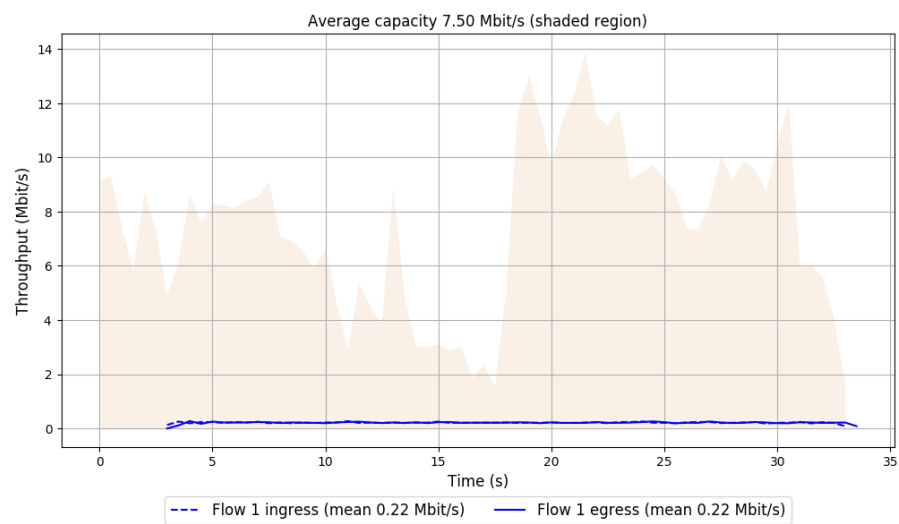
Figure is missing

```
Run 1: Statistics of SCReAM

Start at: 2019-07-08 03:08:05
End at: 2019-07-08 03:08:35

# Below is generated by plot.py at 2019-07-08 03:13:06
# Datalink statistics
-- Total of 1 flow:
Average capacity: 7.50 Mbit/s
Average throughput: 0.22 Mbit/s (2.9% utilization)
95th percentile per-packet one-way delay: 31.527 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 31.527 ms
Loss rate: 0.00%
```

Run 1: Report of SReAM — Data Link



Run 1: Statistics of Sprout

Start at: 2019-07-08 03:04:04

End at: 2019-07-08 03:04:34

Below is generated by plot.py at 2019-07-08 03:13:13

Datalink statistics

-- Total of 1 flow:

Average capacity: 7.51 Mbit/s

Average throughput: 6.09 Mbit/s (81.1% utilization)

95th percentile per-packet one-way delay: 67.508 ms

Loss rate: 0.03%

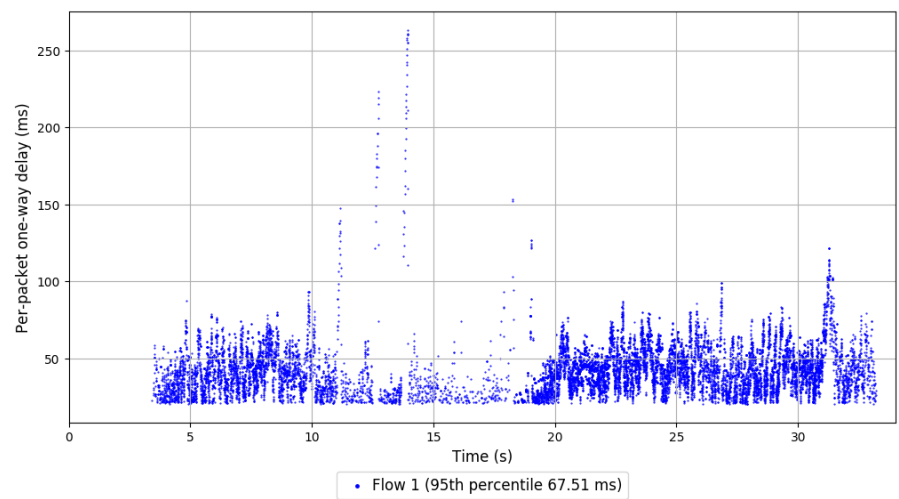
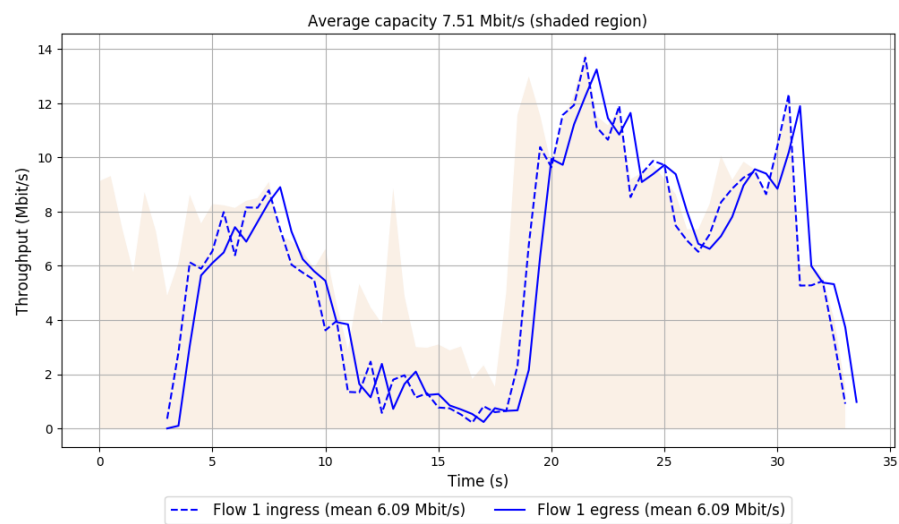
-- Flow 1:

Average throughput: 6.09 Mbit/s

95th percentile per-packet one-way delay: 67.508 ms

Loss rate: 0.03%

Run 1: Report of Sprout — Data Link

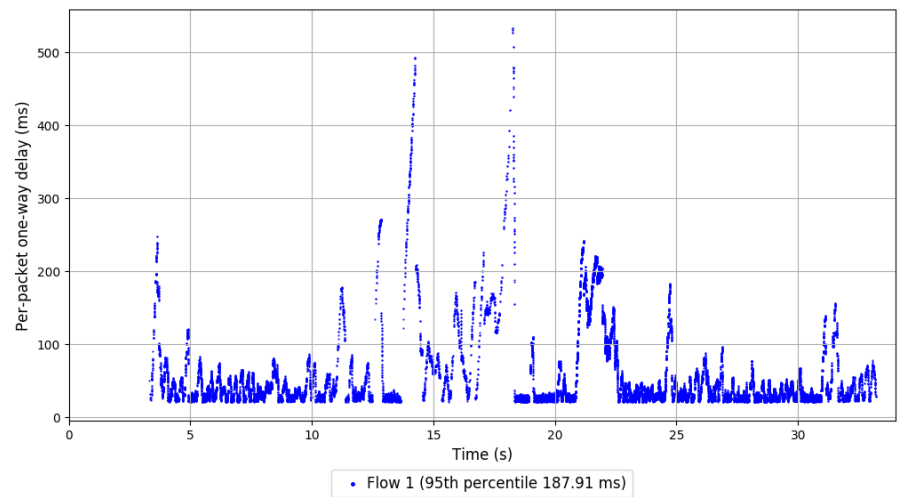
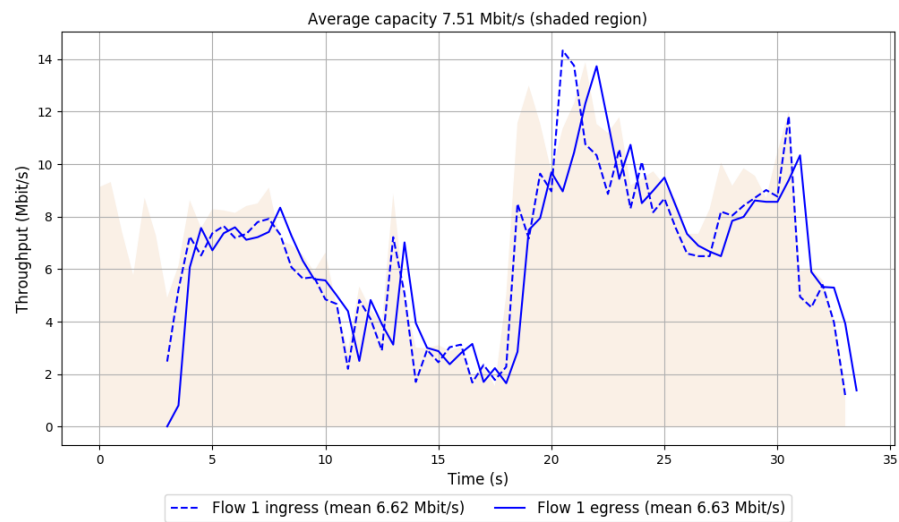



```
Run 1: Statistics of TaoVA-100x

Start at: 2019-07-08 03:06:55
End at: 2019-07-08 03:07:25

# Below is generated by plot.py at 2019-07-08 03:13:15
# Datalink statistics
-- Total of 1 flow:
Average capacity: 7.51 Mbit/s
Average throughput: 6.63 Mbit/s (88.3% utilization)
95th percentile per-packet one-way delay: 187.910 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 6.63 Mbit/s
95th percentile per-packet one-way delay: 187.910 ms
Loss rate: 0.07%
```

Run 1: Report of TaoVA-100x — Data Link



Run 1: Statistics of TCP Vegas

Start at: 2019-07-08 03:05:12

End at: 2019-07-08 03:05:42

Below is generated by plot.py at 2019-07-08 03:13:15

Datalink statistics

-- Total of 1 flow:

Average capacity: 7.51 Mbit/s

Average throughput: 4.52 Mbit/s (60.2% utilization)

95th percentile per-packet one-way delay: 59.693 ms

Loss rate: 0.14%

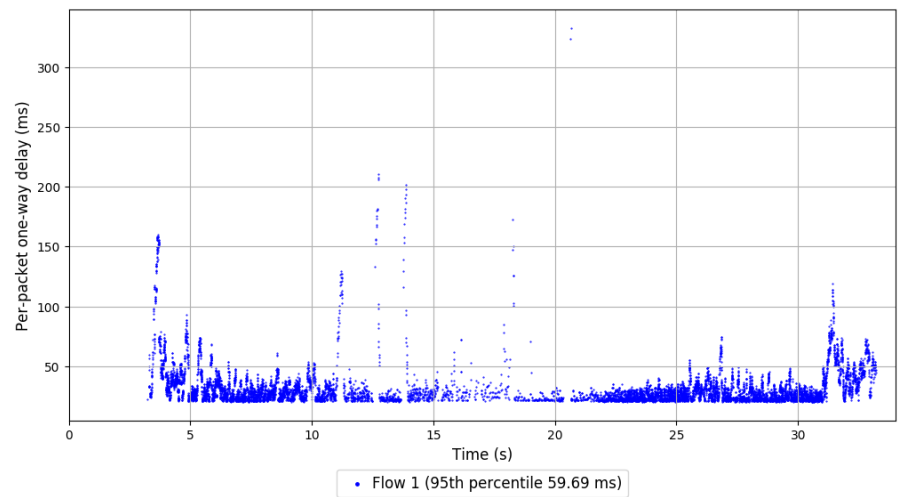
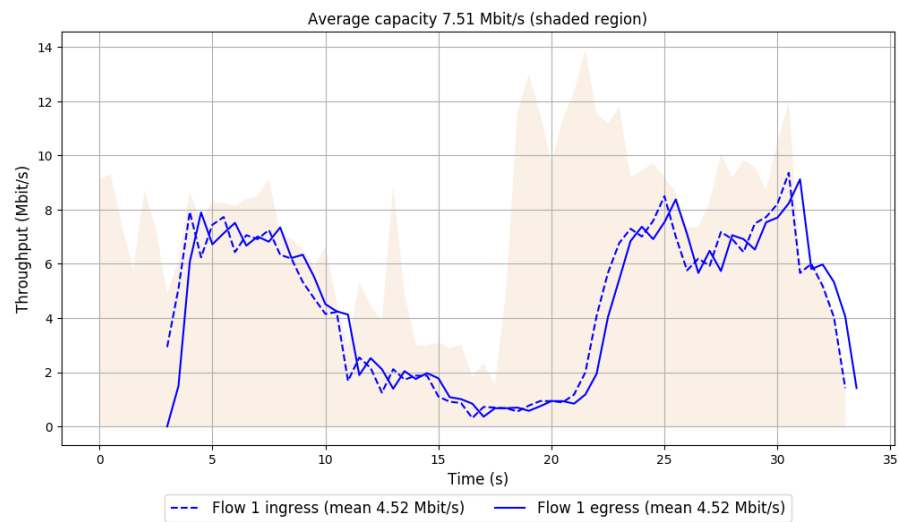
-- Flow 1:

Average throughput: 4.52 Mbit/s

95th percentile per-packet one-way delay: 59.693 ms

Loss rate: 0.14%

Run 1: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2019-07-08 03:02:20

End at: 2019-07-08 03:02:50

Below is generated by plot.py at 2019-07-08 03:13:15

Datalink statistics

-- Total of 1 flow:

Average capacity: 7.50 Mbit/s

Average throughput: 7.26 Mbit/s (96.8% utilization)

95th percentile per-packet one-way delay: 549.855 ms

Loss rate: 0.14%

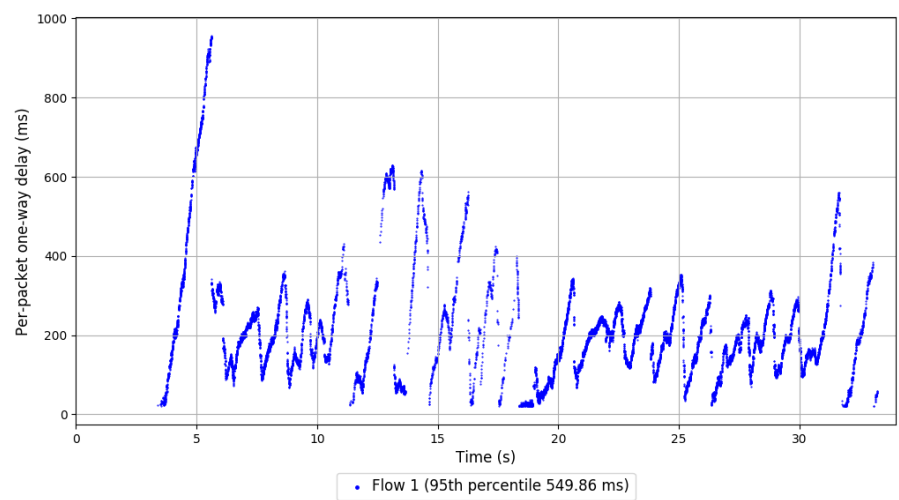
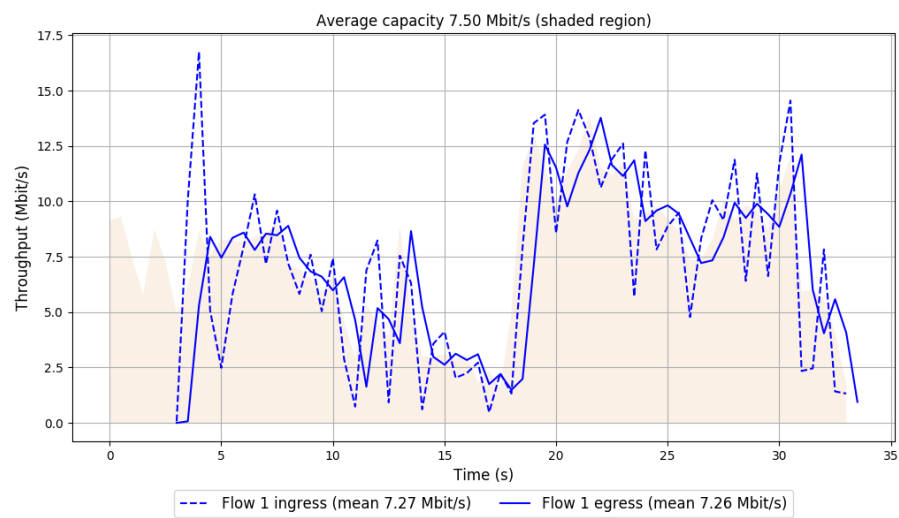
-- Flow 1:

Average throughput: 7.26 Mbit/s

95th percentile per-packet one-way delay: 549.855 ms

Loss rate: 0.14%

Run 1: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

Start at: 2019-07-08 03:04:38

End at: 2019-07-08 03:05:08

Below is generated by plot.py at 2019-07-08 03:13:15

Datalink statistics

-- Total of 1 flow:

Average capacity: 7.51 Mbit/s

Average throughput: 2.96 Mbit/s (39.5% utilization)

95th percentile per-packet one-way delay: 971.731 ms

Loss rate: 1.02%

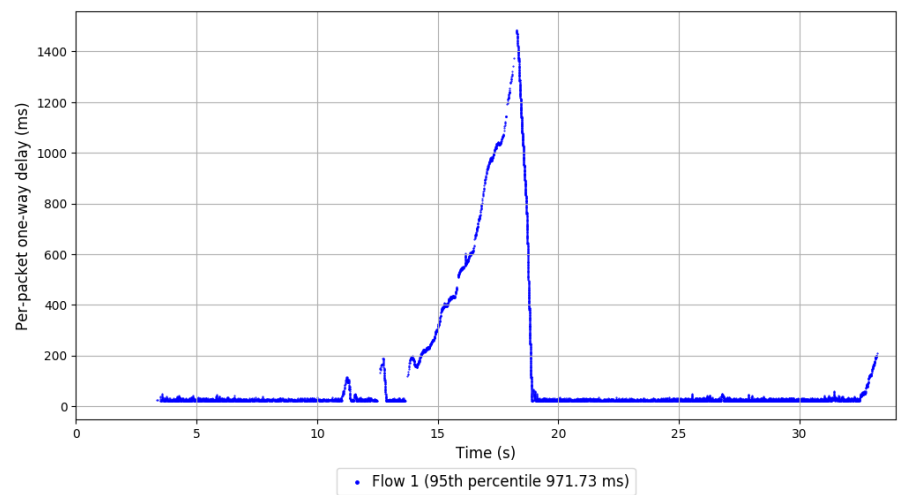
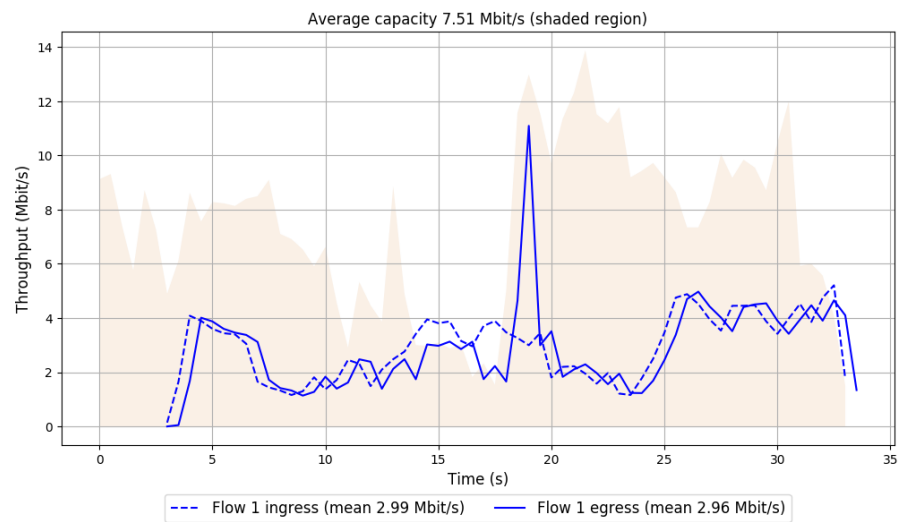
-- Flow 1:

Average throughput: 2.96 Mbit/s

95th percentile per-packet one-way delay: 971.731 ms

Loss rate: 1.02%

Run 1: Report of PCC-Vivace — Data Link



Run 1: Statistics of WebRTC media

Start at: 2019-07-08 03:09:51

End at: 2019-07-08 03:10:21

Run 1: Report of WebRTC media — Data Link

