

Pantheon Report

Generated at 2019-10-21 22:53:08 (UTC).

Tested in mahimahi: mm-delay 28 mm-loss uplink 0.0477 mm-link 10mbps.trace
10mbps.trace --uplink-queue=droptail --uplink-queue-args=packets=14

Repeated the test of 5 congestion control schemes 5 times.

Each test lasted for 30 seconds running 1 flow.

System info:

Linux 4.15.0-65-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

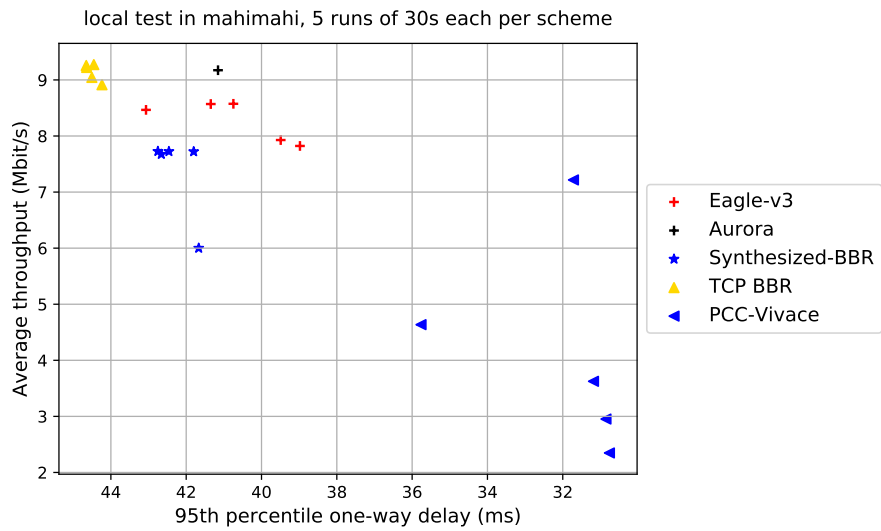
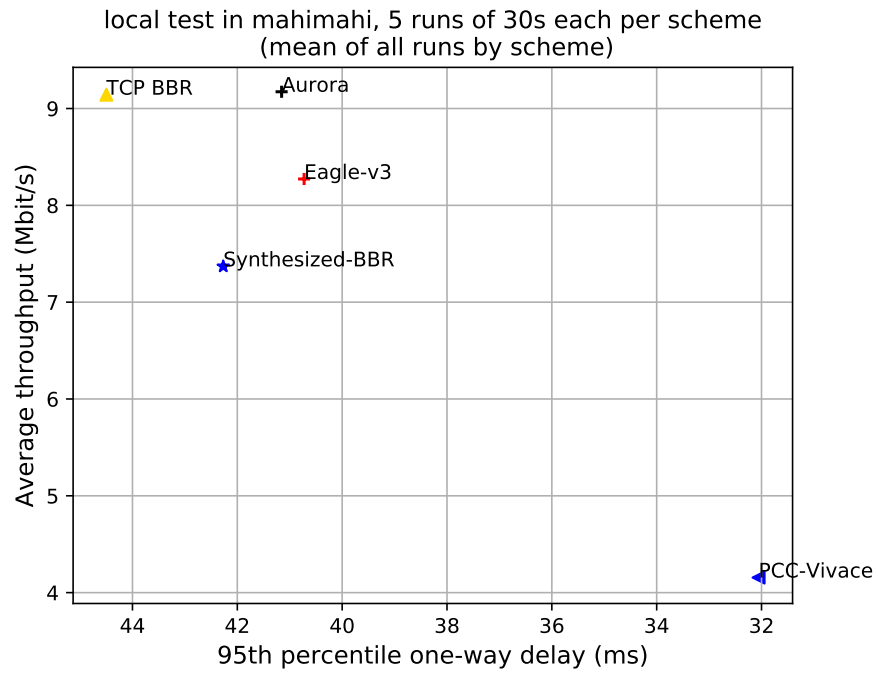
Git summary:

branch: master @ b54fc866b3140559c1fa1782d26fa636f7a43a8d
third_party/aurora @ f3e943d61015b39960854ba6391797e0c7984d74
third_party/aurora-model @ e292c316c23fb837255c4e142e40590d154bbe95
third_party/eagle-v1 @ c68d985e042be5c30704c0aee48c363861951a95
third_party/eagle-v2 @ c8a1737b3c84d7d49eada5b8785045d272a70120
third_party/eagle-v3 @ a63fea7809d9b57a6dbfc95c54181b54157c2b45
M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/datagram_pb2.cpython-36
M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/helpers.cpython-36.pyc
M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/mahimahi.cpython-36.pyc
M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/project_root.cpython-36
M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/receiver.cpython-36.pyc
M sender-receiver/sender-receiver/sender_receiver/envs/model-xentropy/model-xentropy.pt
M sender-receiver/sender-receiver/sender_receiver/logs.txt
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfc458e562f4
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/synthesizedBBR @ a63fea7809d9b57a6dbfc95c54181b54157c2b45
M sender-receiver/sender-receiver/sender_receiver/__pycache__/__init__.cpython-36.pyc
M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/__init__.cpython-36.pyc
M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/datagram_pb2.cpython-36.pyc
M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/helpers.cpython-36.pyc
M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/mahimahi.cpython-36.pyc
M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/project_root.cpython-36.pyc
M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/receiver.cpython-36.pyc
M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/sender_receiver_env.cpython-36.pyc
M sender-receiver/sender-receiver/sender_receiver/envs/model-xentropy/model-xentropy.py
M sender-receiver/sender-receiver/sender_receiver/envs/sender_receiver_env.py
M sender-receiver/sender-receiver/sender_receiver/logs.txt
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
M src/verus.hpp
M tools/plot.py
third_party/vivace @ 2baf86211435ae071a32f96b7d8c504587f5d7f4
third_party/webrtc @ 3f0cc2a9061a41b6f9dde4735770d143a1fa2851

```



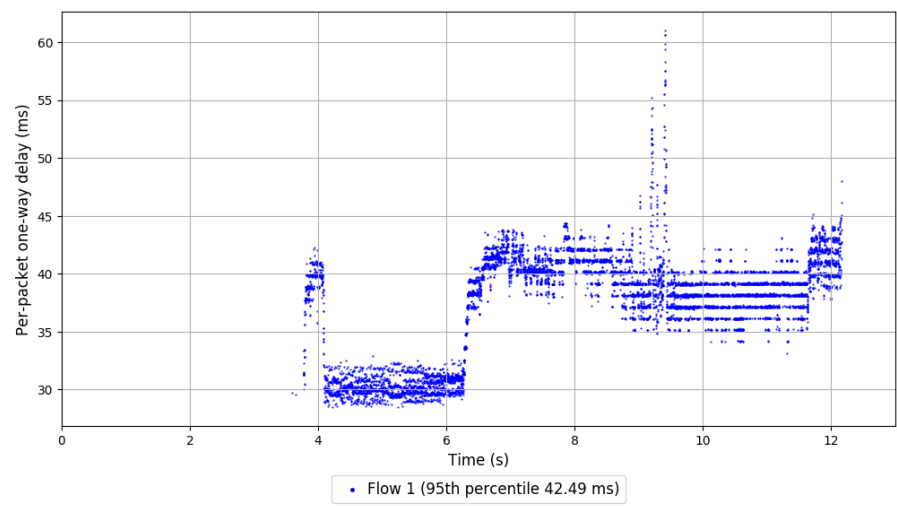
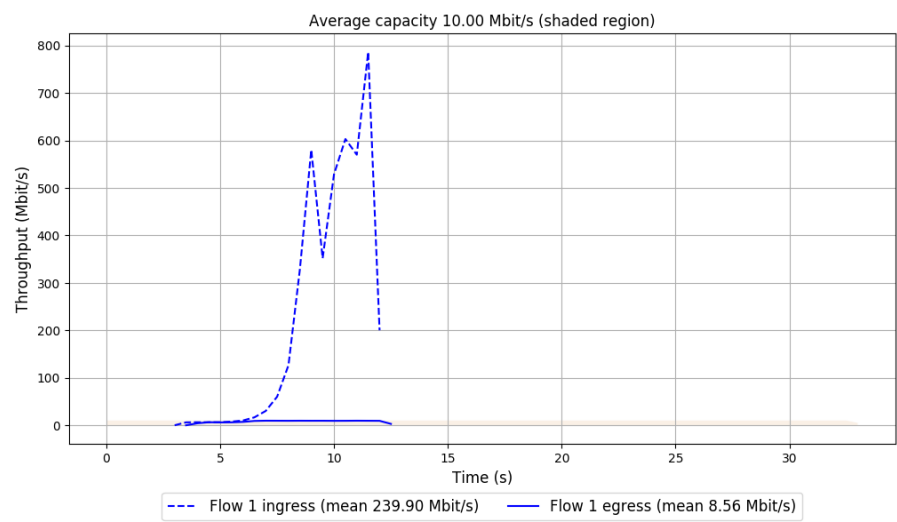
scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
Aurora	1	9.17	41.16	98.07
TCP BBR	5	9.14	44.50	6.80
Eagle-v3	5	8.27	40.73	5.69
Synthesized-BBR	5	7.37	42.27	5.50
PCC-Vivace	5	4.16	32.06	5.00

Run 1: Statistics of Aurora

Start at: 2019-10-21 22:38:35

End at: 2019-10-21 22:39:05

Run 1: Report of Aurora — Data Link

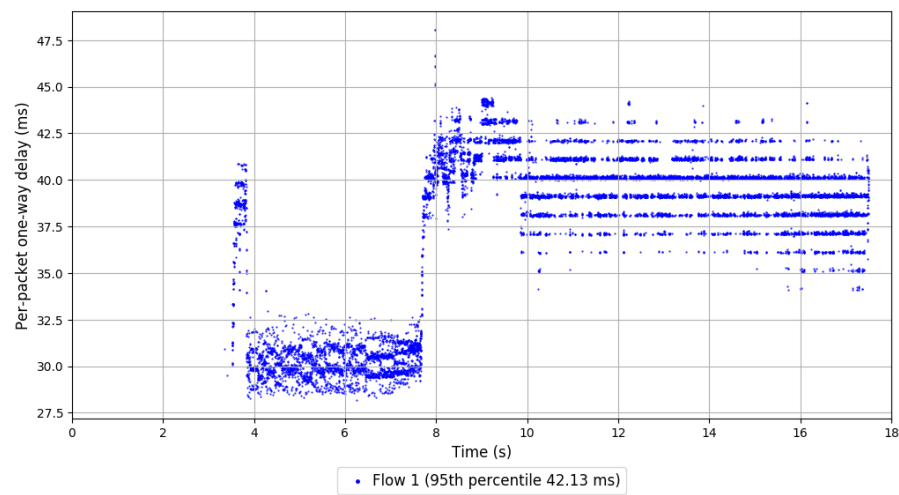
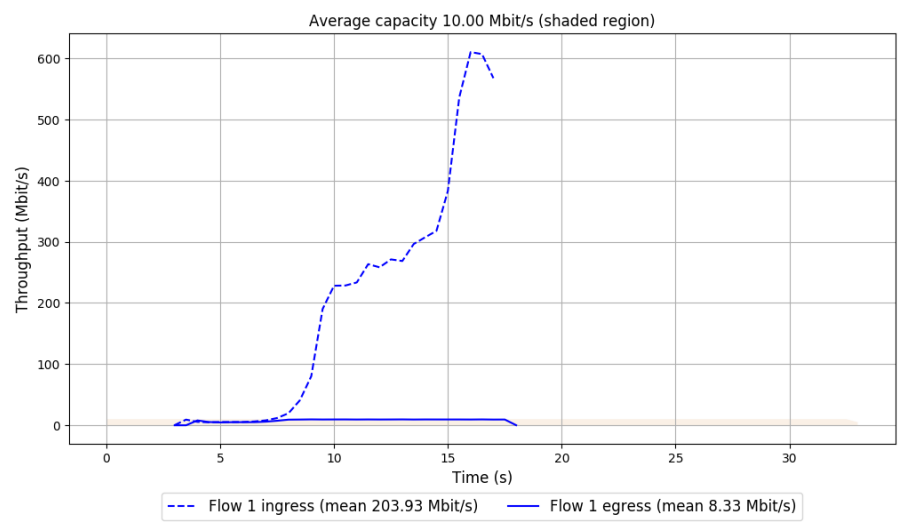


Run 2: Statistics of Aurora

Start at: 2019-10-21 22:41:30

End at: 2019-10-21 22:42:00

Run 2: Report of Aurora — Data Link

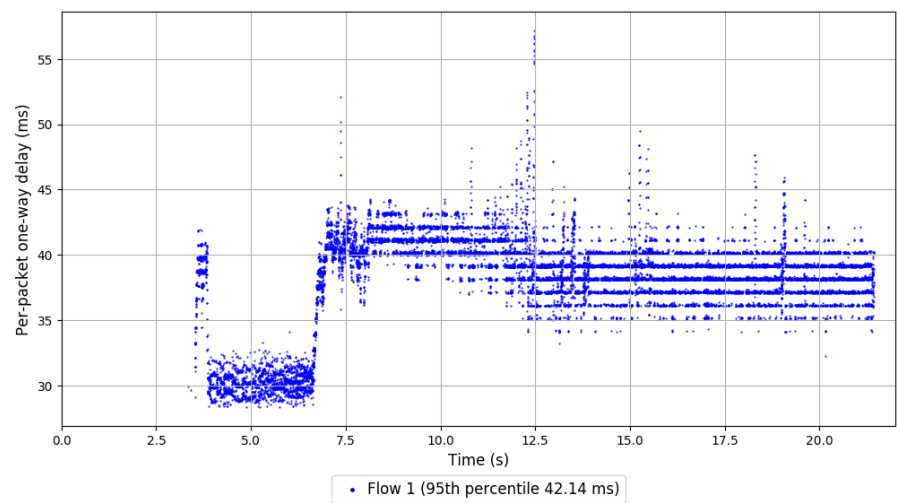
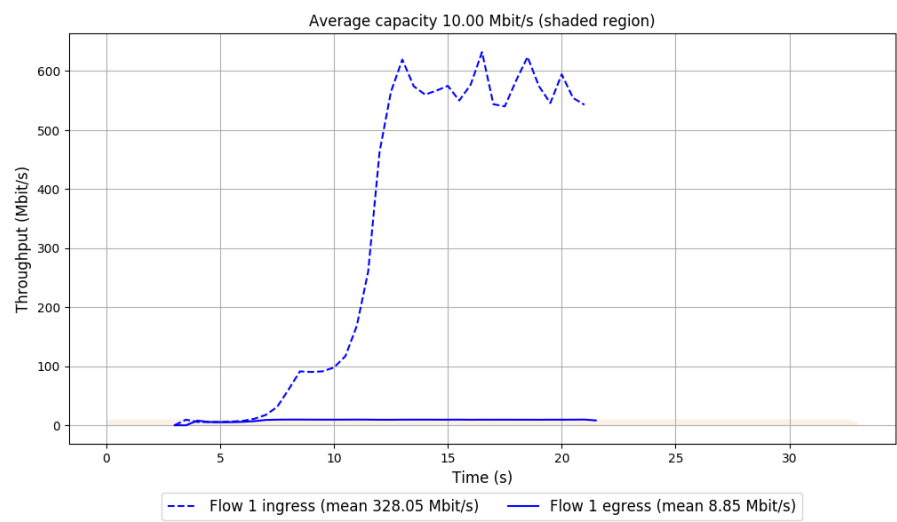


Run 3: Statistics of Aurora

Start at: 2019-10-21 22:44:27

End at: 2019-10-21 22:44:57

Run 3: Report of Aurora — Data Link

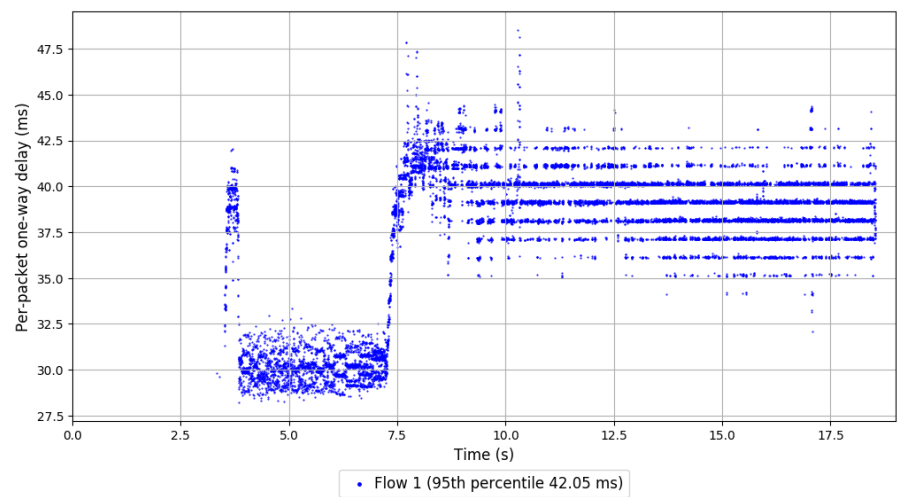
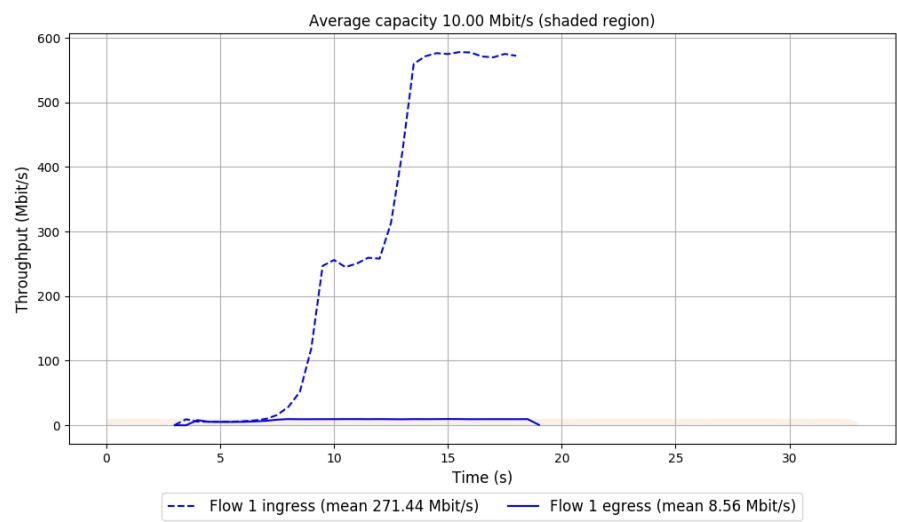


Run 4: Statistics of Aurora

Start at: 2019-10-21 22:47:24

End at: 2019-10-21 22:47:54

Run 4: Report of Aurora — Data Link



Run 5: Statistics of Aurora

Start at: 2019-10-21 22:50:20

End at: 2019-10-21 22:50:50

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 9.17 Mbit/s (91.7% utilization)

95th percentile per-packet one-way delay: 41.155 ms

Loss rate: 98.07%

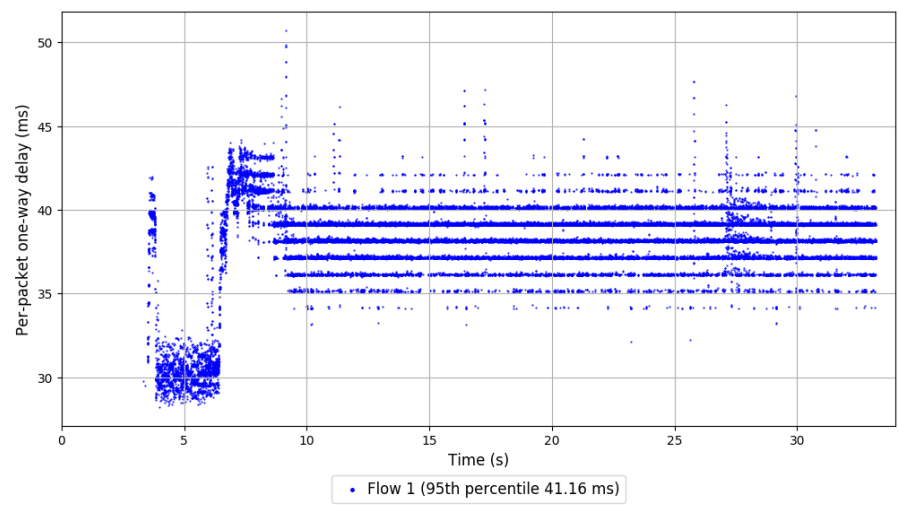
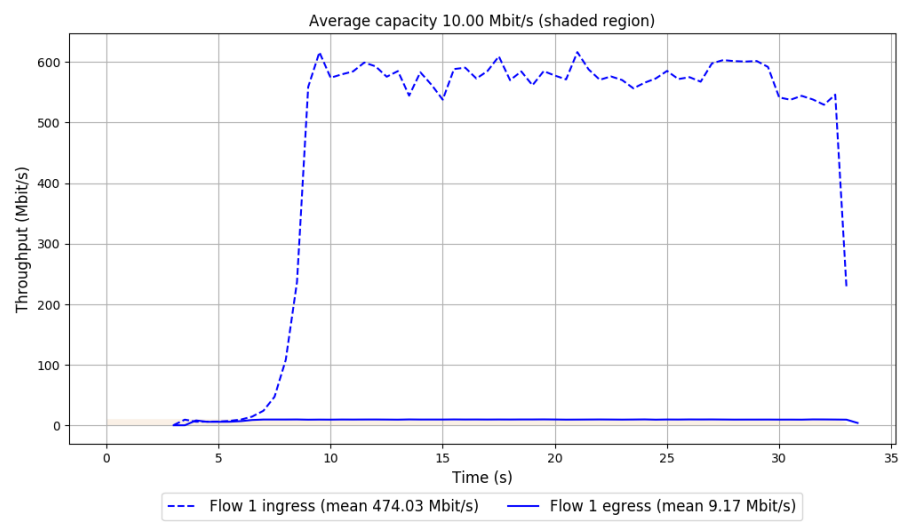
-- Flow 1:

Average throughput: 9.17 Mbit/s

95th percentile per-packet one-way delay: 41.155 ms

Loss rate: 98.07%

Run 5: Report of Aurora — Data Link

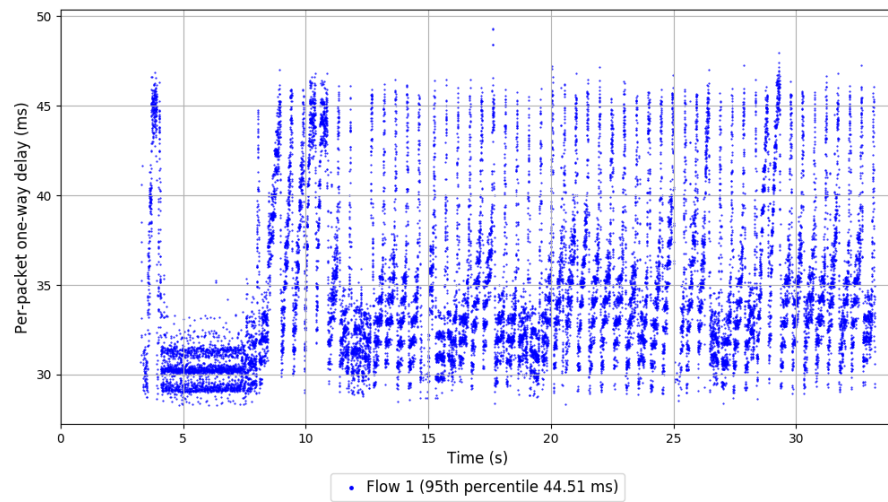
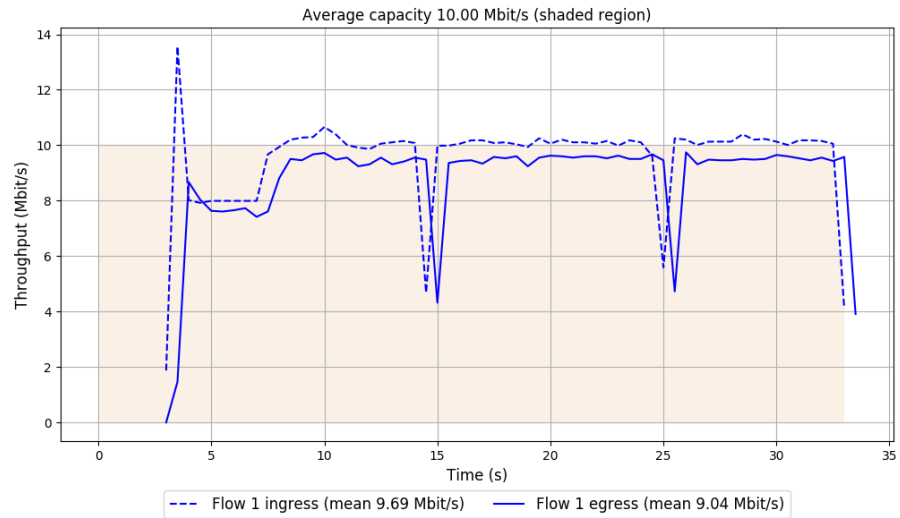


```
Run 1: Statistics of TCP BBR

Start at: 2019-10-21 22:36:52
End at: 2019-10-21 22:37:22

# Below is generated by plot.py at 2019-10-21 22:53:07
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.04 Mbit/s (90.4% utilization)
95th percentile per-packet one-way delay: 44.505 ms
Loss rate: 6.73%
-- Flow 1:
Average throughput: 9.04 Mbit/s
95th percentile per-packet one-way delay: 44.505 ms
Loss rate: 6.73%
```

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2019-10-21 22:39:46

End at: 2019-10-21 22:40:16

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 8.91 Mbit/s (89.1% utilization)

95th percentile per-packet one-way delay: 44.236 ms

Loss rate: 6.78%

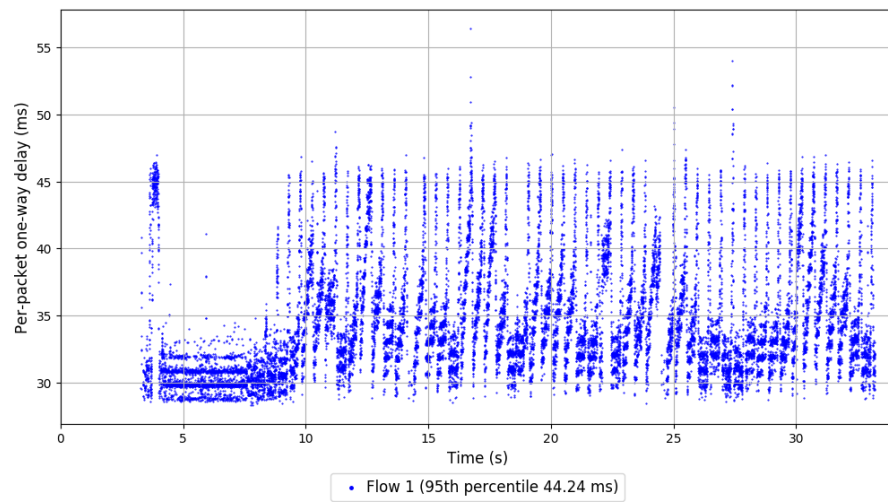
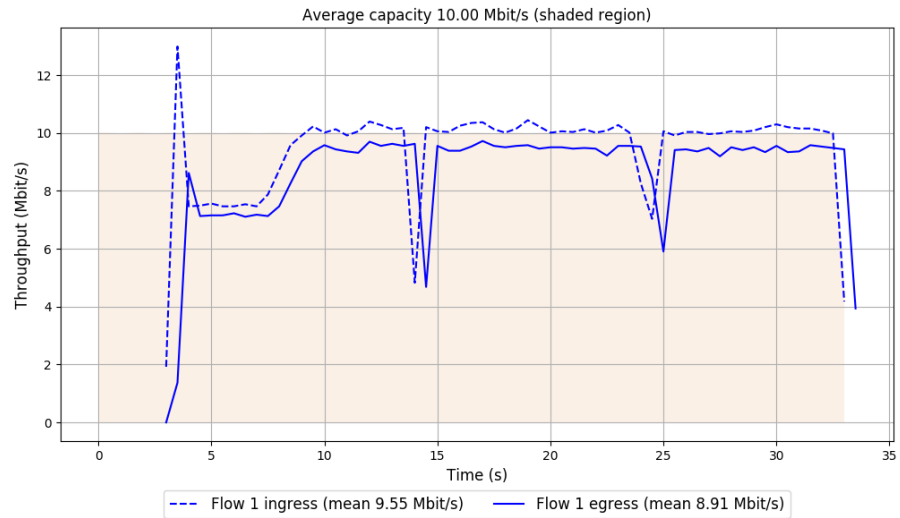
-- Flow 1:

Average throughput: 8.91 Mbit/s

95th percentile per-packet one-way delay: 44.236 ms

Loss rate: 6.78%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2019-10-21 22:42:42

End at: 2019-10-21 22:43:12

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 9.26 Mbit/s (92.6% utilization)

95th percentile per-packet one-way delay: 44.654 ms

Loss rate: 6.49%

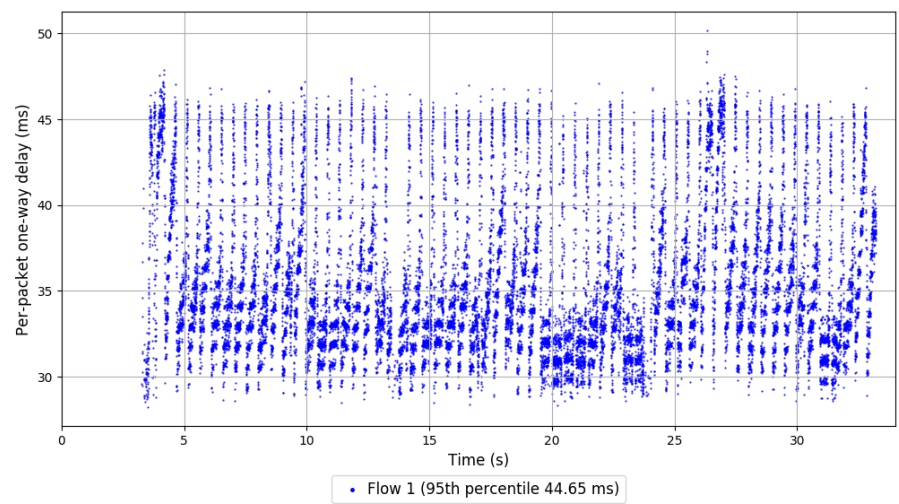
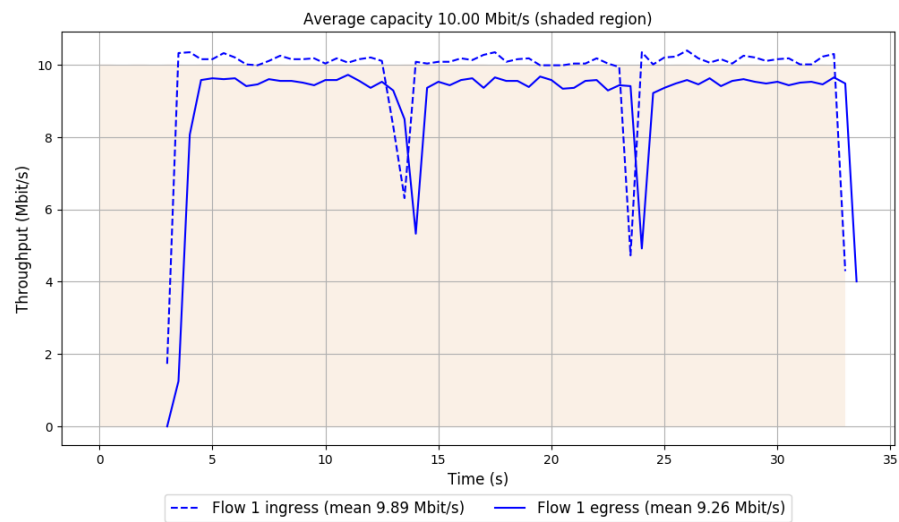
-- Flow 1:

Average throughput: 9.26 Mbit/s

95th percentile per-packet one-way delay: 44.654 ms

Loss rate: 6.49%

Run 3: Report of TCP BBR — Data Link



Run 4: Statistics of TCP BBR

Start at: 2019-10-21 22:45:41

End at: 2019-10-21 22:46:11

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 9.22 Mbit/s (92.2% utilization)

95th percentile per-packet one-way delay: 44.643 ms

Loss rate: 7.05%

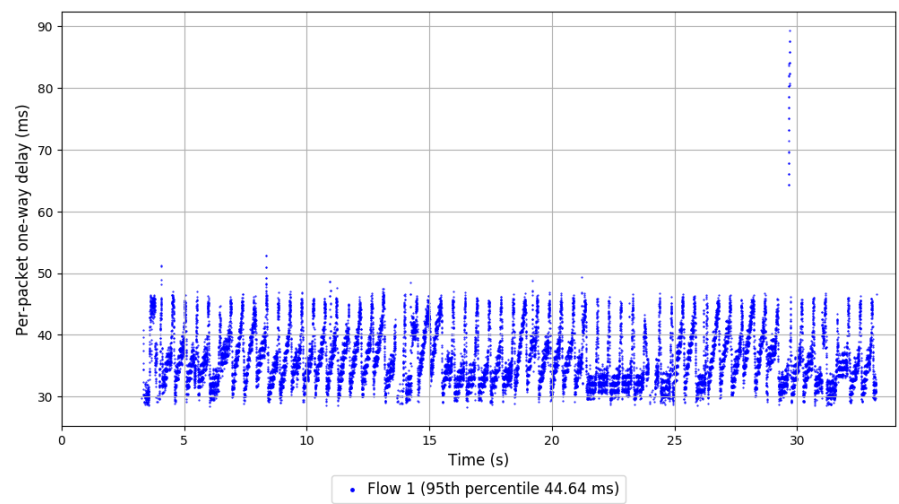
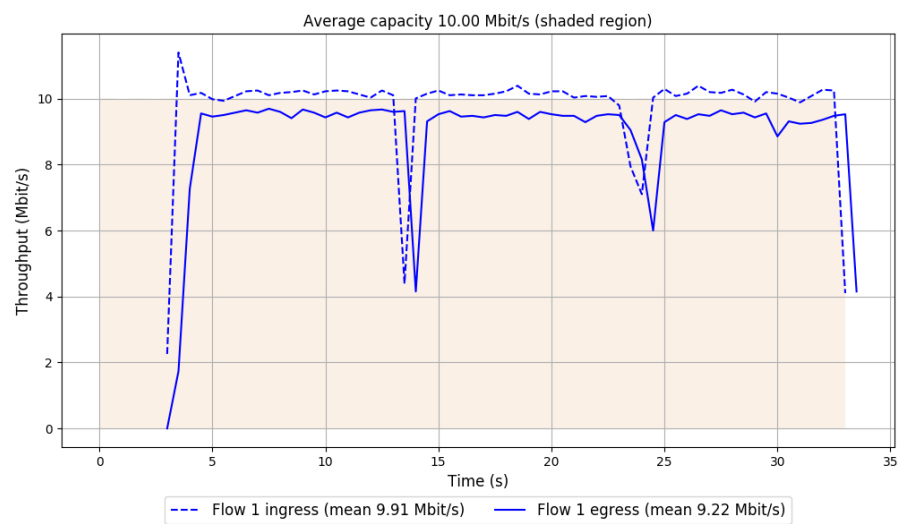
-- Flow 1:

Average throughput: 9.22 Mbit/s

95th percentile per-packet one-way delay: 44.643 ms

Loss rate: 7.05%

Run 4: Report of TCP BBR — Data Link



Run 5: Statistics of TCP BBR

Start at: 2019-10-21 22:48:37

End at: 2019-10-21 22:49:07

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 9.27 Mbit/s (92.7% utilization)

95th percentile per-packet one-way delay: 44.453 ms

Loss rate: 6.96%

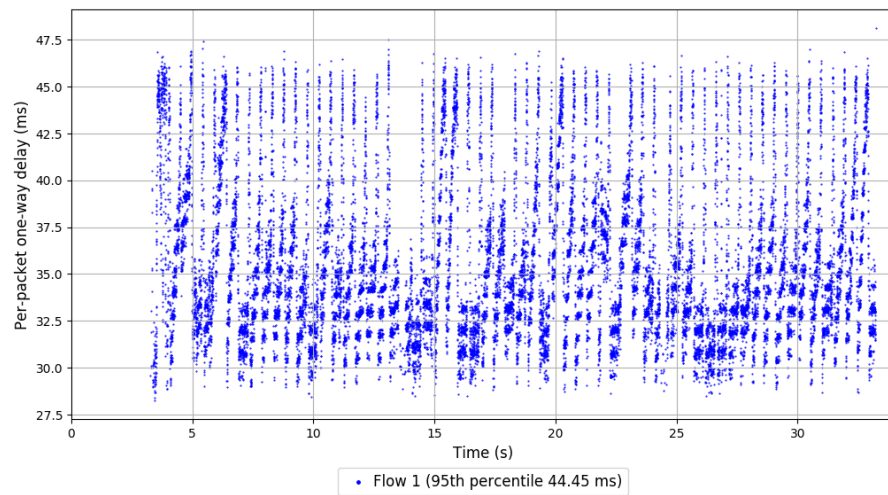
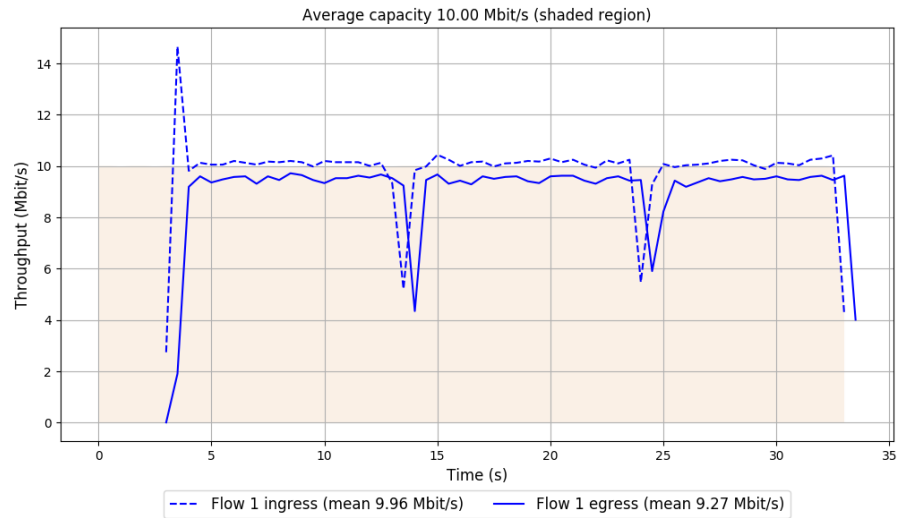
-- Flow 1:

Average throughput: 9.27 Mbit/s

95th percentile per-packet one-way delay: 44.453 ms

Loss rate: 6.96%

Run 5: Report of TCP BBR — Data Link



Run 1: Statistics of Eagle-v3

Start at: 2019-10-21 22:36:17

End at: 2019-10-21 22:36:47

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 7.82 Mbit/s (78.2% utilization)

95th percentile per-packet one-way delay: 38.979 ms

Loss rate: 6.09%

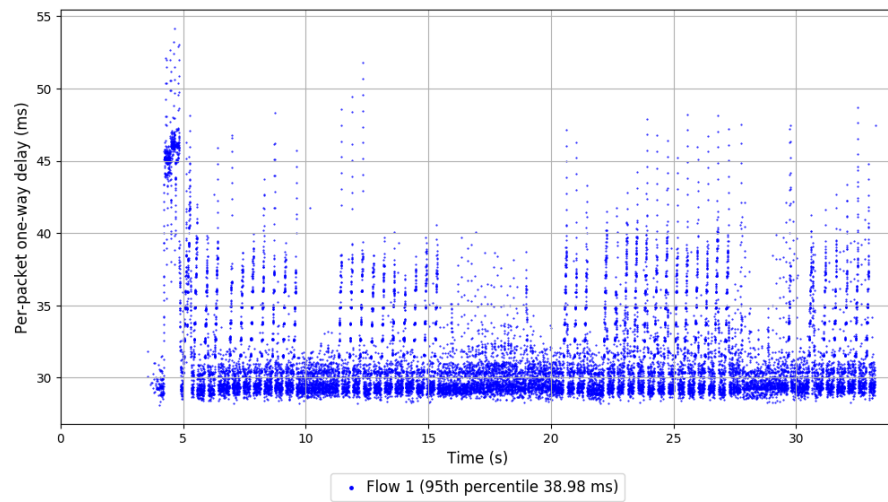
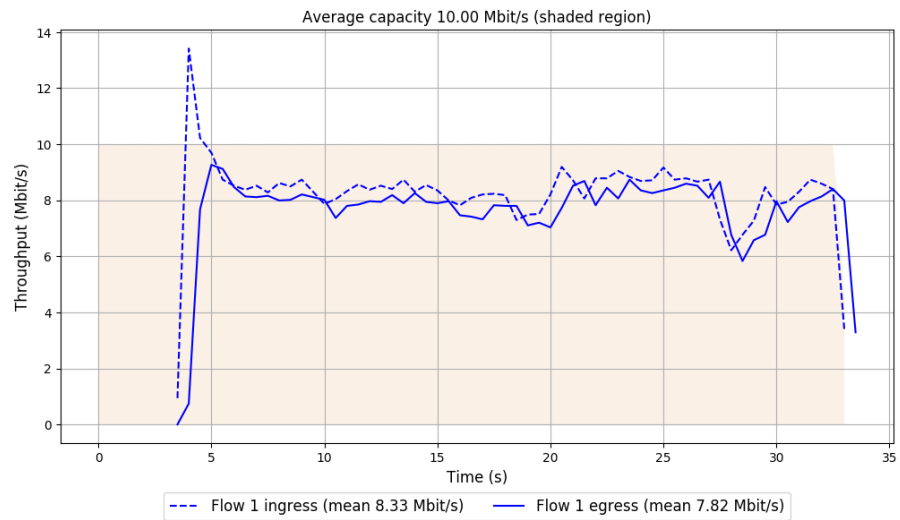
-- Flow 1:

Average throughput: 7.82 Mbit/s

95th percentile per-packet one-way delay: 38.979 ms

Loss rate: 6.09%

Run 1: Report of Eagle-v3 — Data Link



Run 2: Statistics of Eagle-v3

Start at: 2019-10-21 22:39:11

End at: 2019-10-21 22:39:41

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 7.93 Mbit/s (79.3% utilization)

95th percentile per-packet one-way delay: 39.490 ms

Loss rate: 4.64%

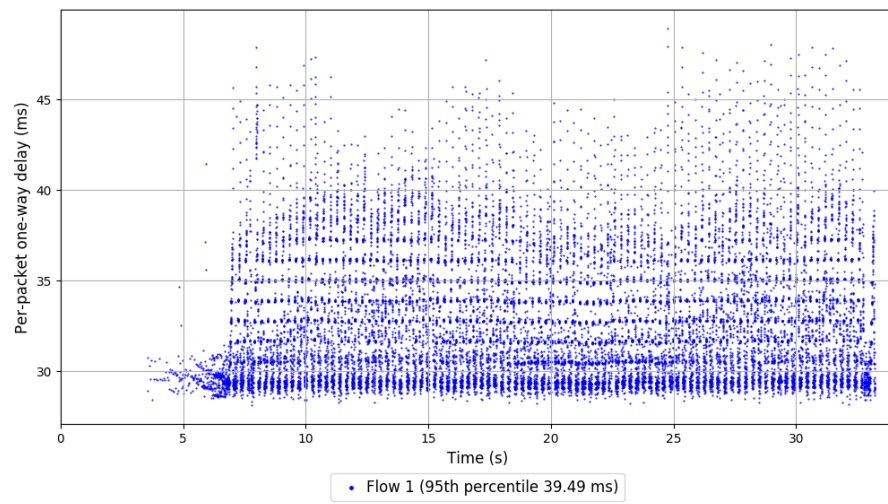
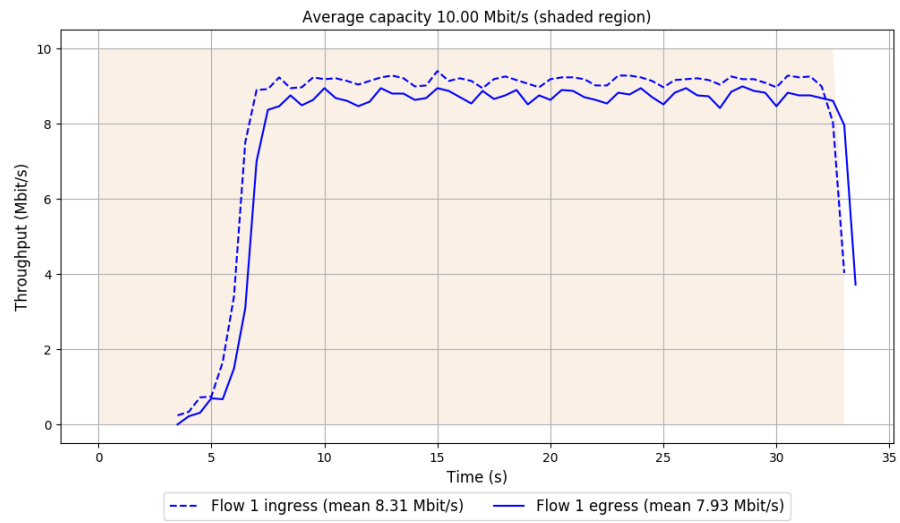
-- Flow 1:

Average throughput: 7.93 Mbit/s

95th percentile per-packet one-way delay: 39.490 ms

Loss rate: 4.64%

Run 2: Report of Eagle-v3 — Data Link



Run 3: Statistics of Eagle-v3

Start at: 2019-10-21 22:42:07

End at: 2019-10-21 22:42:37

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 8.47 Mbit/s (84.7% utilization)

95th percentile per-packet one-way delay: 43.067 ms

Loss rate: 6.01%

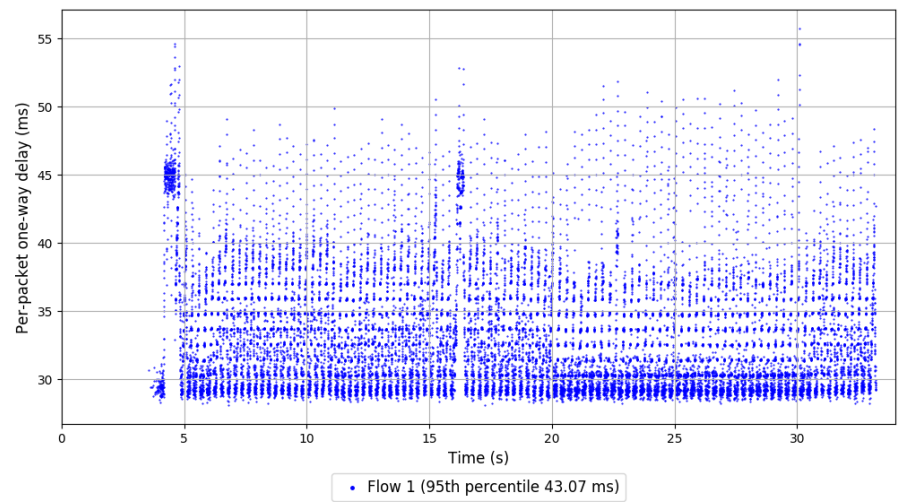
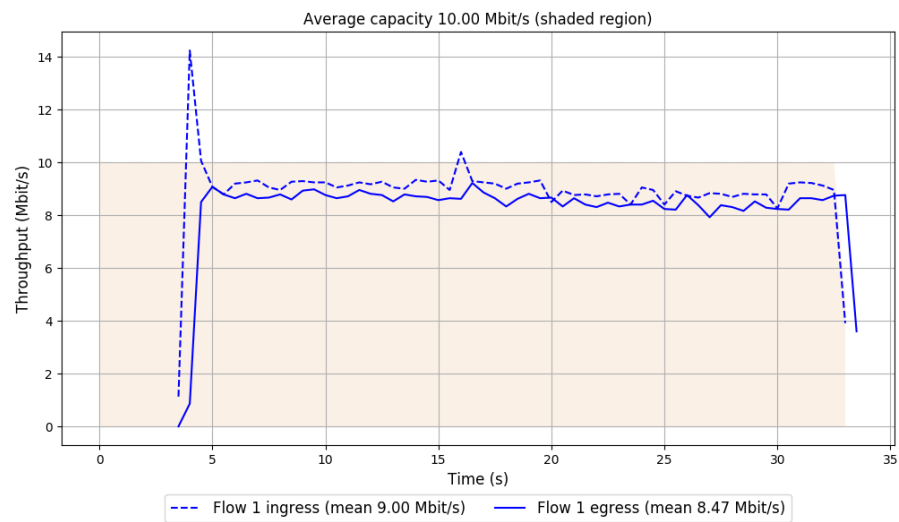
-- Flow 1:

Average throughput: 8.47 Mbit/s

95th percentile per-packet one-way delay: 43.067 ms

Loss rate: 6.01%

Run 3: Report of Eagle-v3 — Data Link



Run 4: Statistics of Eagle-v3

Start at: 2019-10-21 22:45:06

End at: 2019-10-21 22:45:36

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 8.57 Mbit/s (85.7% utilization)

95th percentile per-packet one-way delay: 40.747 ms

Loss rate: 5.88%

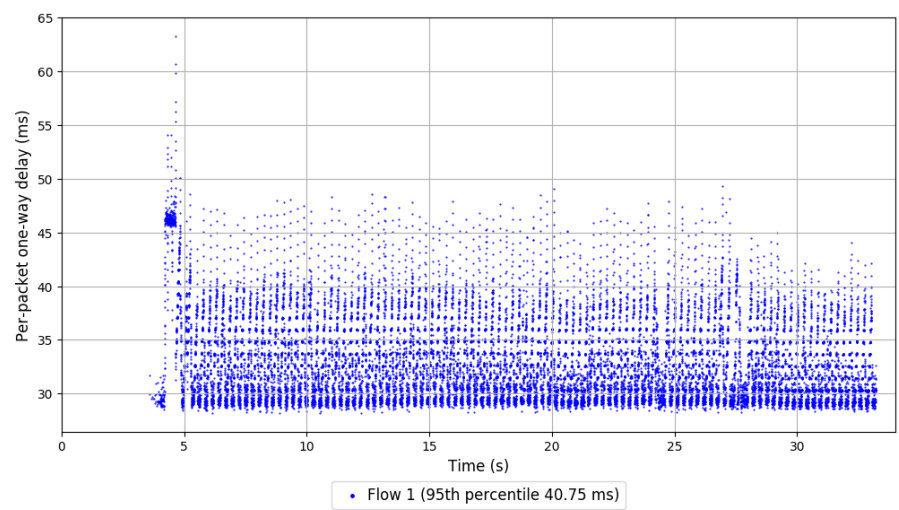
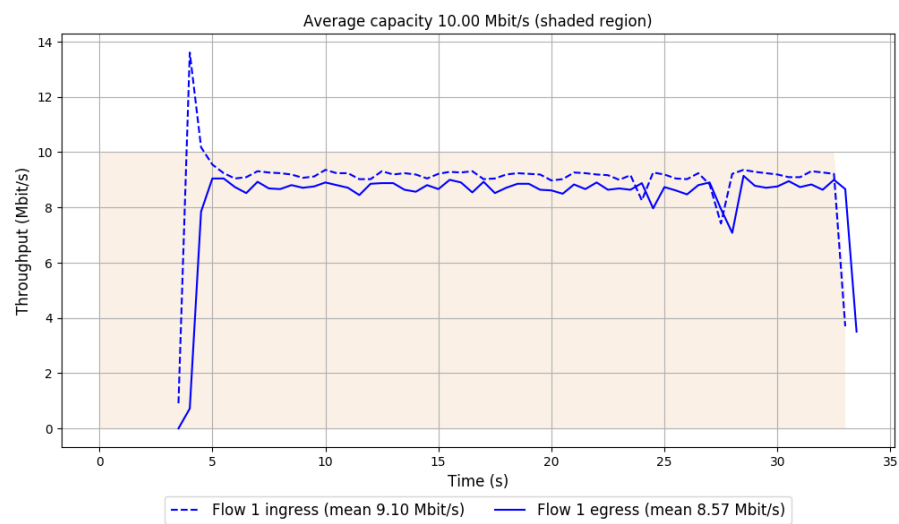
-- Flow 1:

Average throughput: 8.57 Mbit/s

95th percentile per-packet one-way delay: 40.747 ms

Loss rate: 5.88%

Run 4: Report of Eagle-v3 — Data Link



Run 5: Statistics of Eagle-v3

Start at: 2019-10-21 22:48:02

End at: 2019-10-21 22:48:32

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 8.57 Mbit/s (85.7% utilization)

95th percentile per-packet one-way delay: 41.347 ms

Loss rate: 5.82%

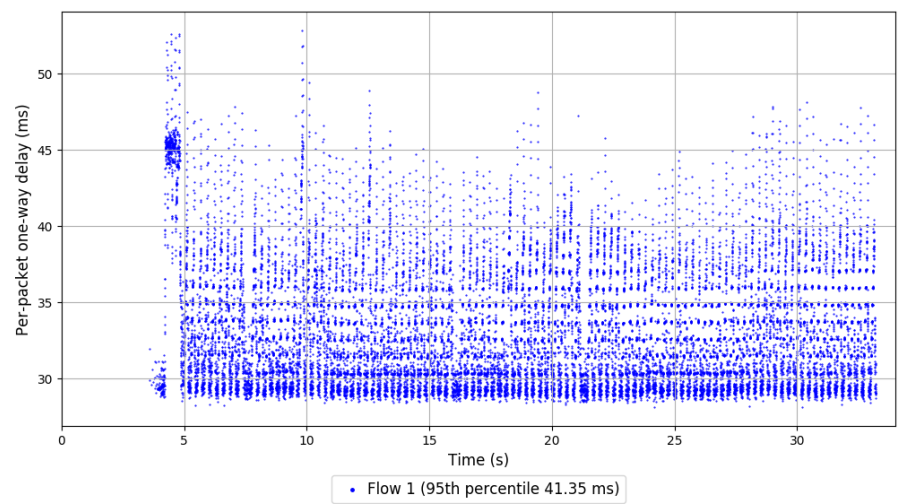
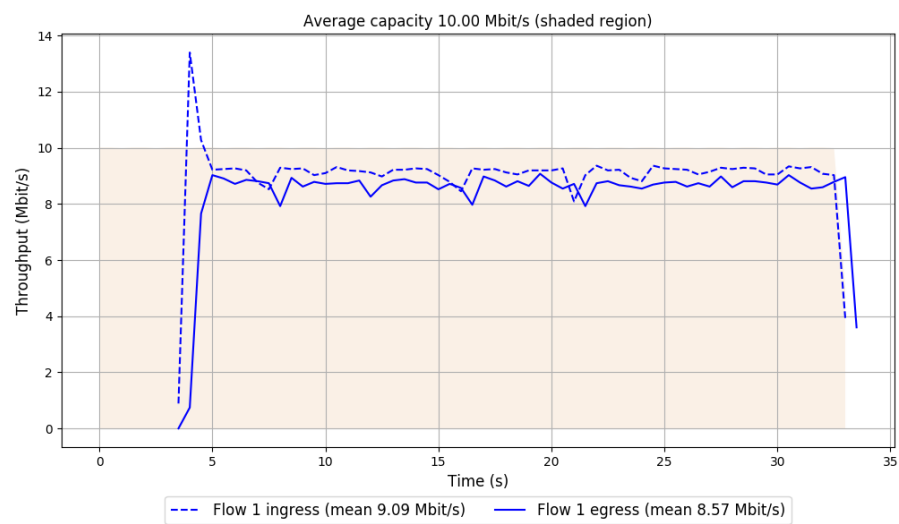
-- Flow 1:

Average throughput: 8.57 Mbit/s

95th percentile per-packet one-way delay: 41.347 ms

Loss rate: 5.82%

Run 5: Report of Eagle-v3 — Data Link



Run 1: Statistics of Synthesized-BBR

Start at: 2019-10-21 22:37:26

End at: 2019-10-21 22:37:56

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 6.00 Mbit/s (60.0% utilization)

95th percentile per-packet one-way delay: 41.668 ms

Loss rate: 5.30%

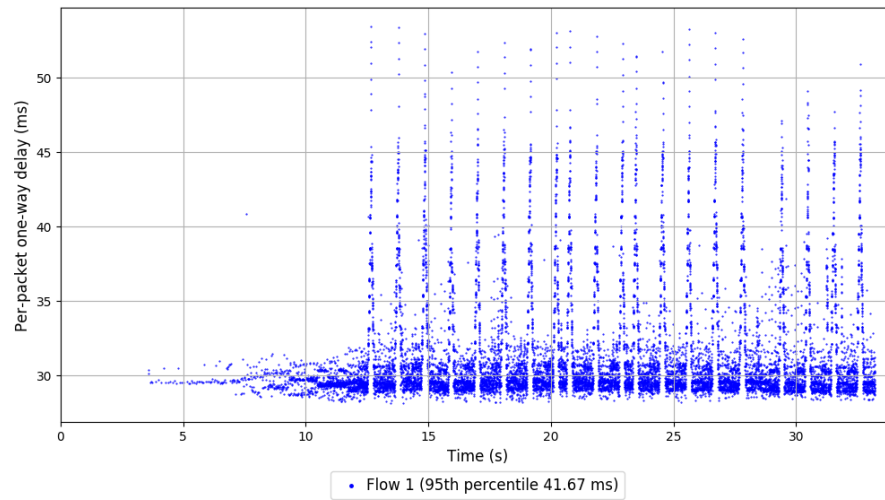
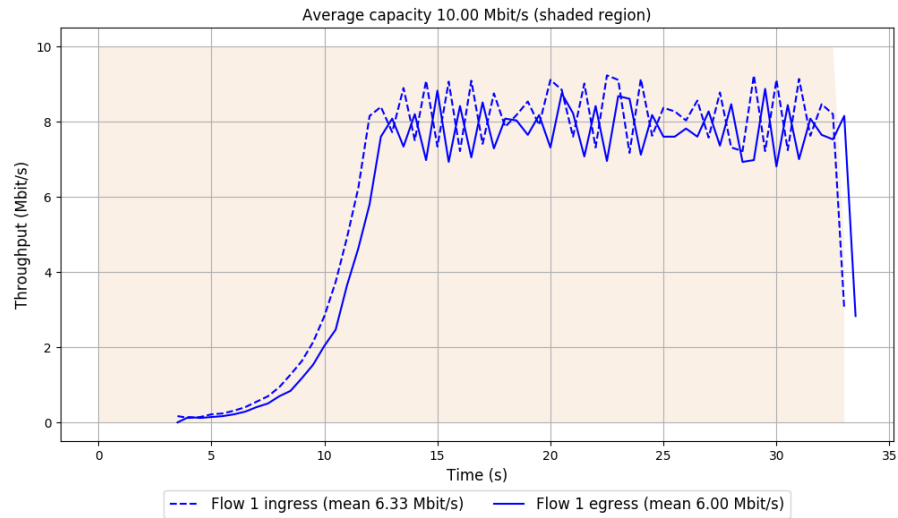
-- Flow 1:

Average throughput: 6.00 Mbit/s

95th percentile per-packet one-way delay: 41.668 ms

Loss rate: 5.30%

Run 1: Report of Synthesized-BBR — Data Link



Run 2: Statistics of Synthesized-BBR

Start at: 2019-10-21 22:40:21

End at: 2019-10-21 22:40:51

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 7.72 Mbit/s (77.2% utilization)

95th percentile per-packet one-way delay: 41.801 ms

Loss rate: 5.47%

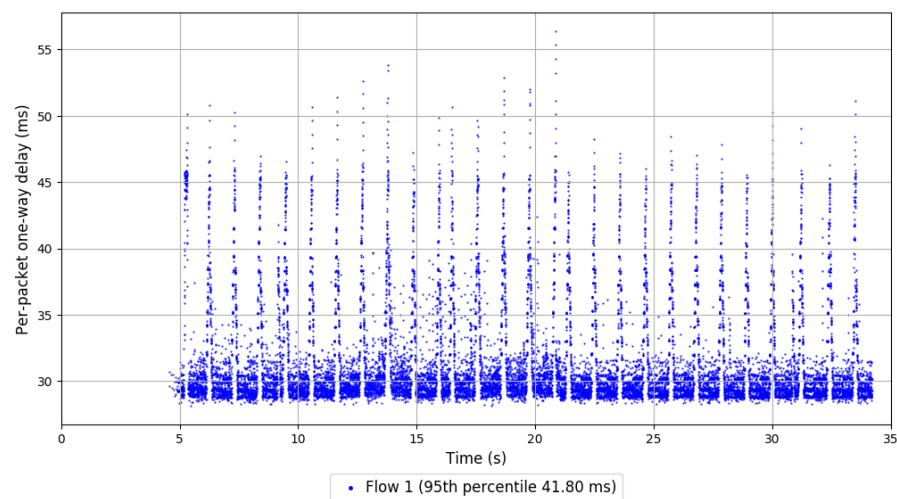
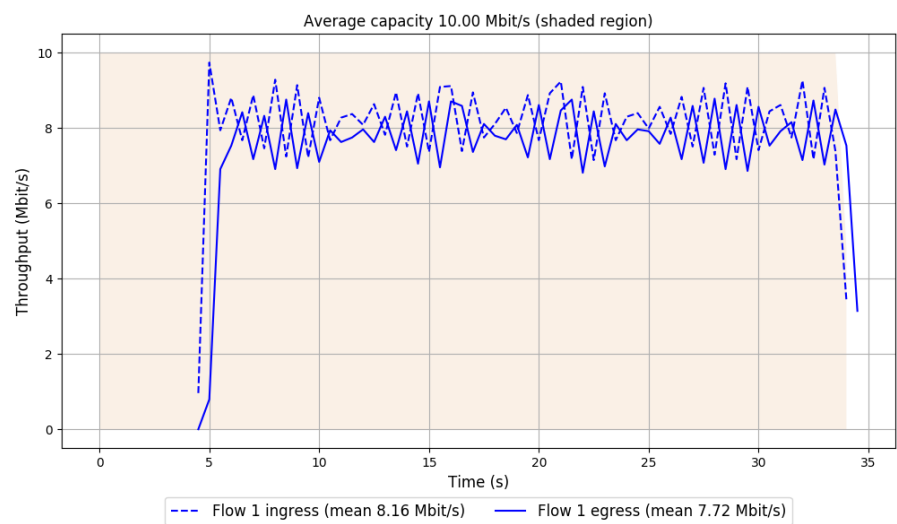
-- Flow 1:

Average throughput: 7.72 Mbit/s

95th percentile per-packet one-way delay: 41.801 ms

Loss rate: 5.47%

Run 2: Report of Synthesized-BBR — Data Link



Run 3: Statistics of Synthesized-BBR

Start at: 2019-10-21 22:43:16

End at: 2019-10-21 22:43:47

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 7.73 Mbit/s (77.3% utilization)

95th percentile per-packet one-way delay: 42.752 ms

Loss rate: 5.58%

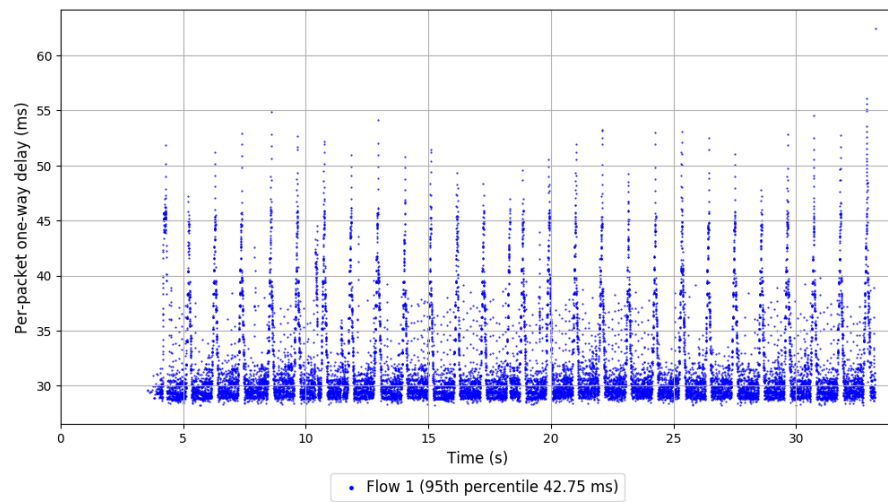
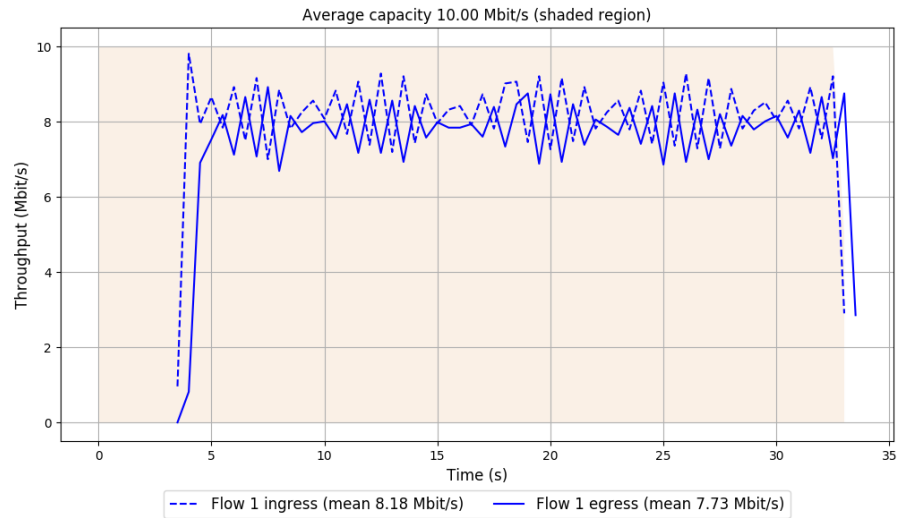
-- Flow 1:

Average throughput: 7.73 Mbit/s

95th percentile per-packet one-way delay: 42.752 ms

Loss rate: 5.58%

Run 3: Report of Synthesized-BBR — Data Link



Run 4: Statistics of Synthesized-BBR

Start at: 2019-10-21 22:46:15

End at: 2019-10-21 22:46:45

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 7.72 Mbit/s (77.2% utilization)

95th percentile per-packet one-way delay: 42.459 ms

Loss rate: 5.68%

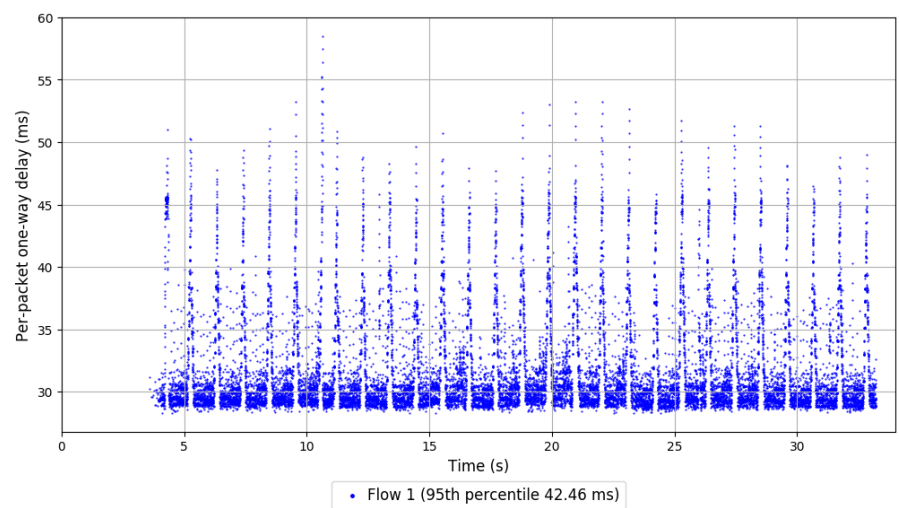
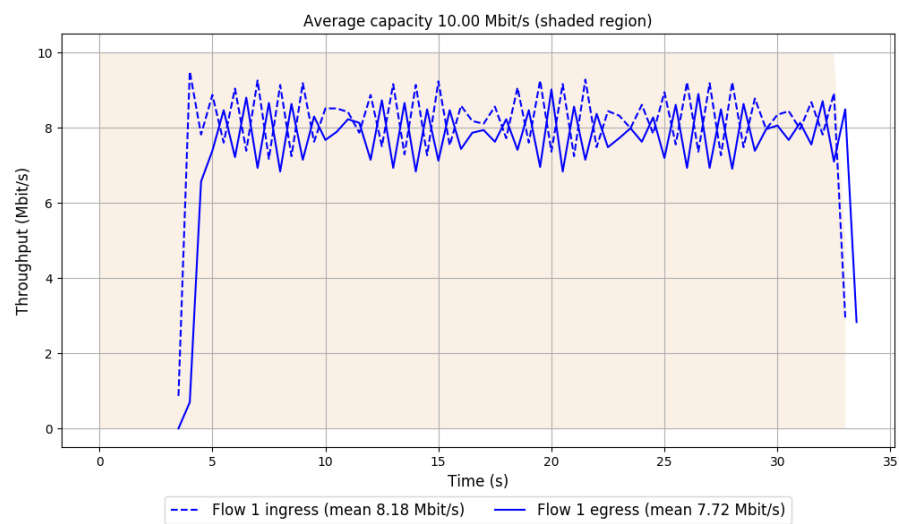
-- Flow 1:

Average throughput: 7.72 Mbit/s

95th percentile per-packet one-way delay: 42.459 ms

Loss rate: 5.68%

Run 4: Report of Synthesized-BBR — Data Link



Run 5: Statistics of Synthesized-BBR

Start at: 2019-10-21 22:49:11

End at: 2019-10-21 22:49:42

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 7.67 Mbit/s (76.7% utilization)

95th percentile per-packet one-way delay: 42.661 ms

Loss rate: 5.45%

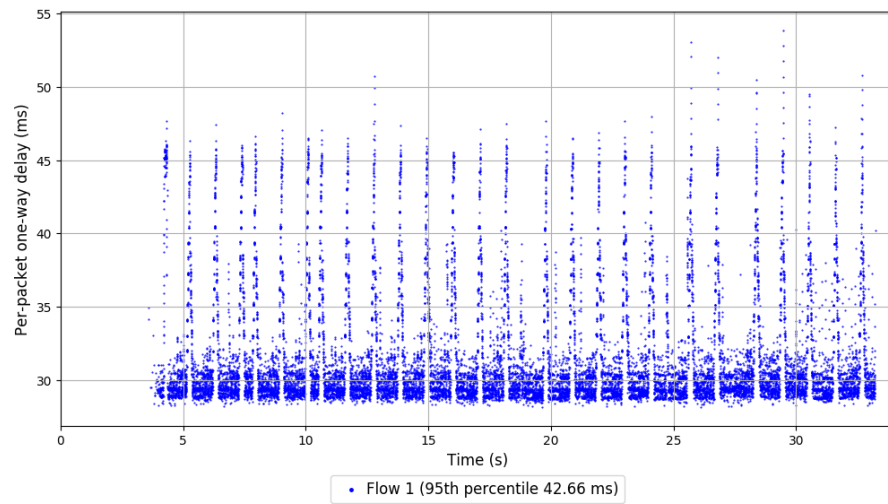
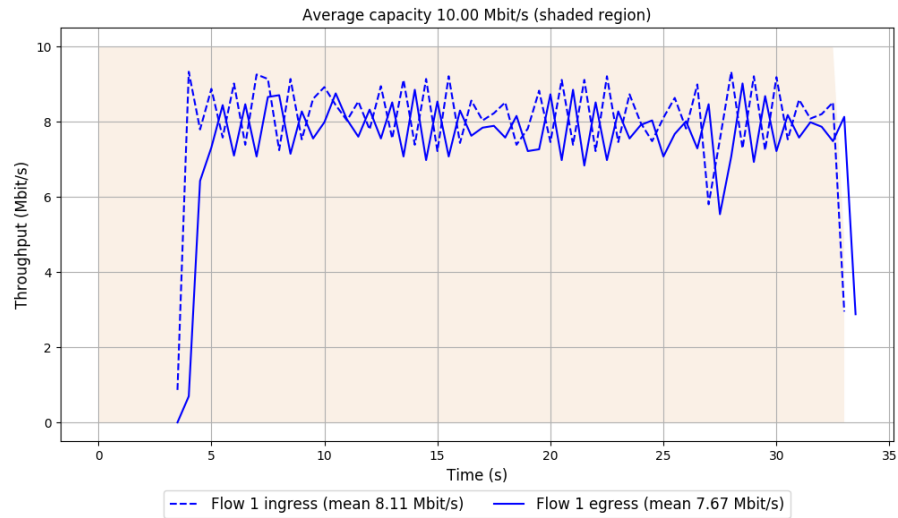
-- Flow 1:

Average throughput: 7.67 Mbit/s

95th percentile per-packet one-way delay: 42.661 ms

Loss rate: 5.45%

Run 5: Report of Synthesized-BBR — Data Link



Run 1: Statistics of PCC-Vivace

Start at: 2019-10-21 22:38:01

End at: 2019-10-21 22:38:31

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 2.35 Mbit/s (23.5% utilization)

95th percentile per-packet one-way delay: 30.762 ms

Loss rate: 5.05%

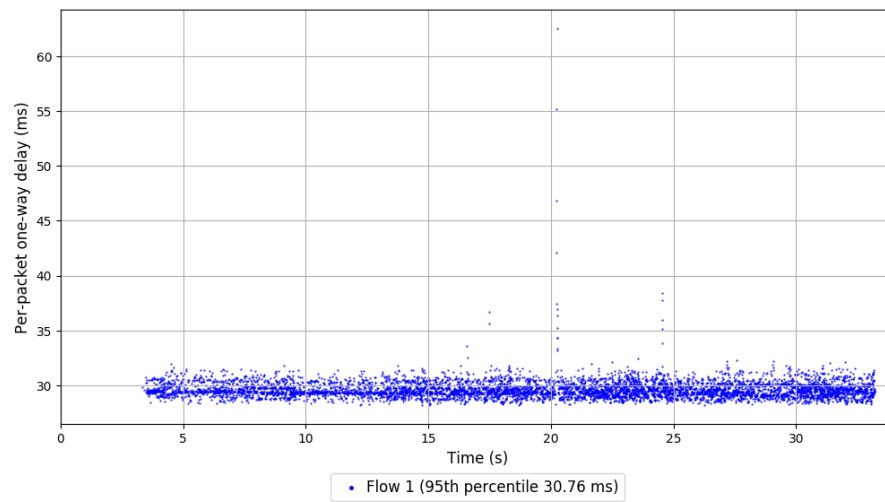
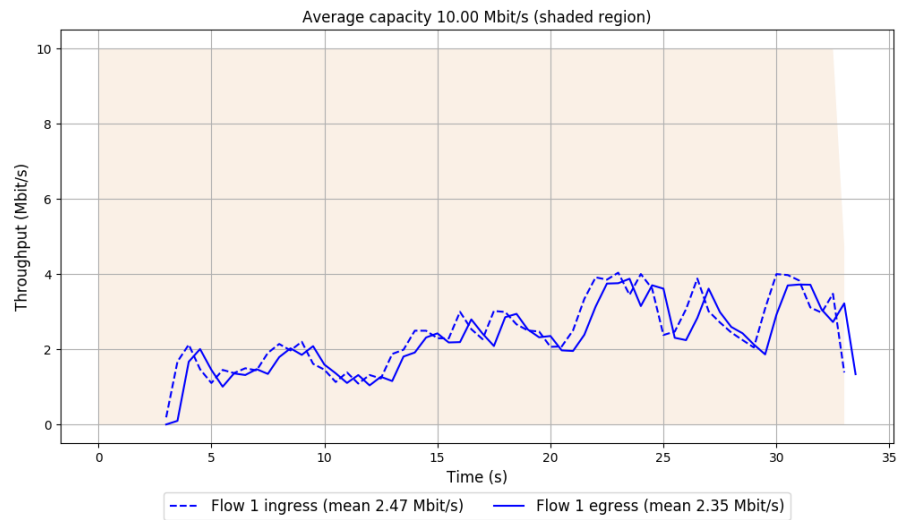
-- Flow 1:

Average throughput: 2.35 Mbit/s

95th percentile per-packet one-way delay: 30.762 ms

Loss rate: 5.05%

Run 1: Report of PCC-Vivace — Data Link



Run 2: Statistics of PCC-Vivace

Start at: 2019-10-21 22:40:56

End at: 2019-10-21 22:41:26

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 2.95 Mbit/s (29.5% utilization)

95th percentile per-packet one-way delay: 30.854 ms

Loss rate: 5.15%

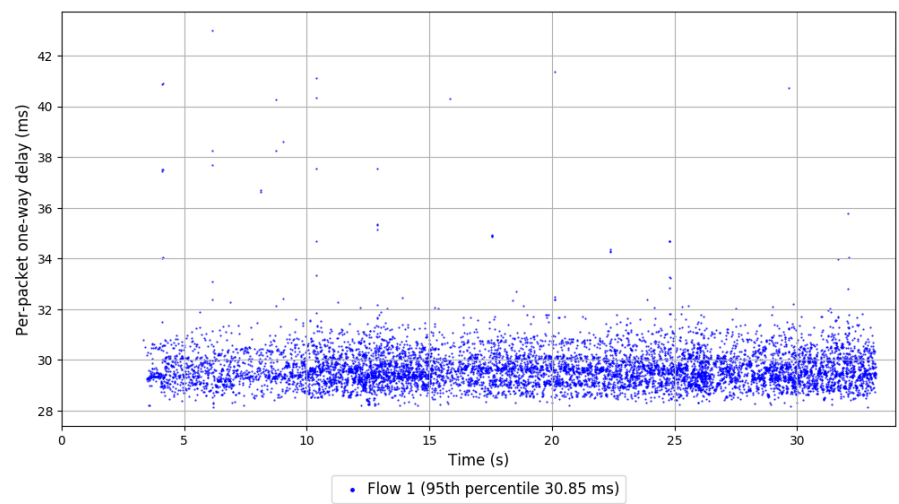
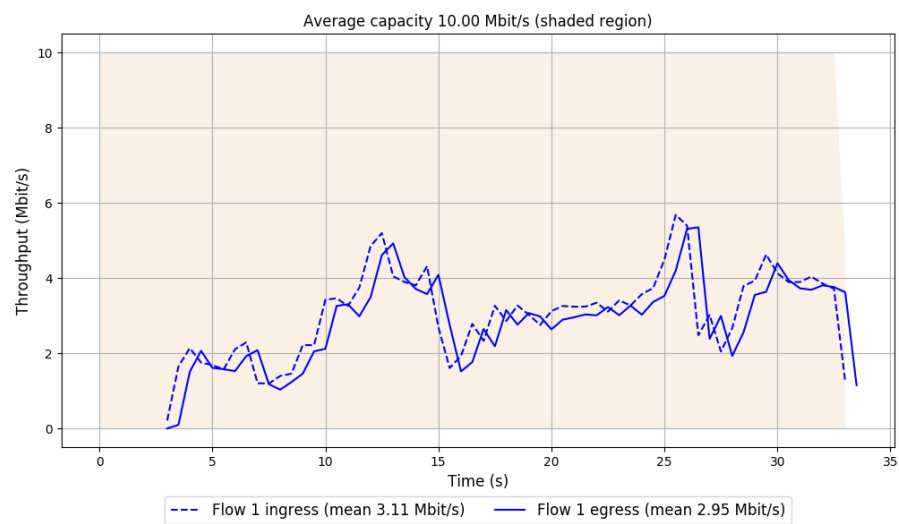
-- Flow 1:

Average throughput: 2.95 Mbit/s

95th percentile per-packet one-way delay: 30.854 ms

Loss rate: 5.15%

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

Start at: 2019-10-21 22:43:52

End at: 2019-10-21 22:44:22

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 7.22 Mbit/s (72.2% utilization)

95th percentile per-packet one-way delay: 31.717 ms

Loss rate: 4.94%

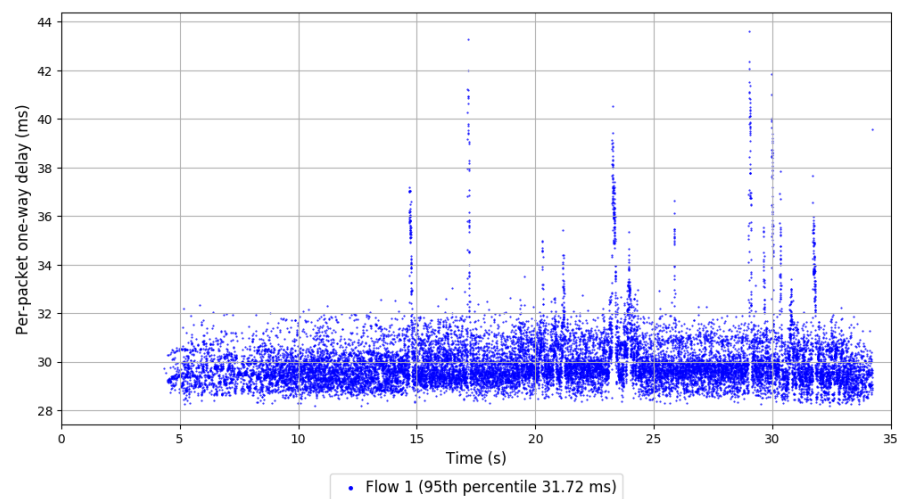
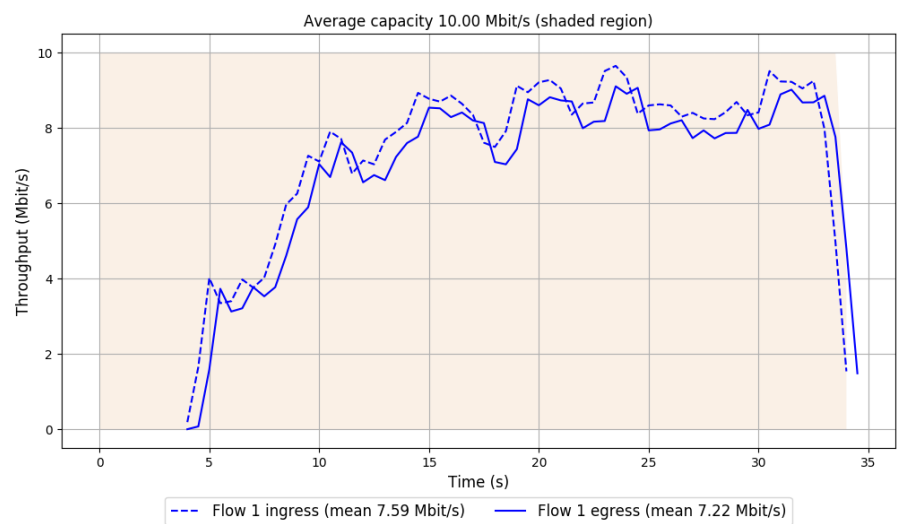
-- Flow 1:

Average throughput: 7.22 Mbit/s

95th percentile per-packet one-way delay: 31.717 ms

Loss rate: 4.94%

Run 3: Report of PCC-Vivace — Data Link



Run 4: Statistics of PCC-Vivace

Start at: 2019-10-21 22:46:50

End at: 2019-10-21 22:47:20

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 4.64 Mbit/s (46.4% utilization)

95th percentile per-packet one-way delay: 35.765 ms

Loss rate: 5.07%

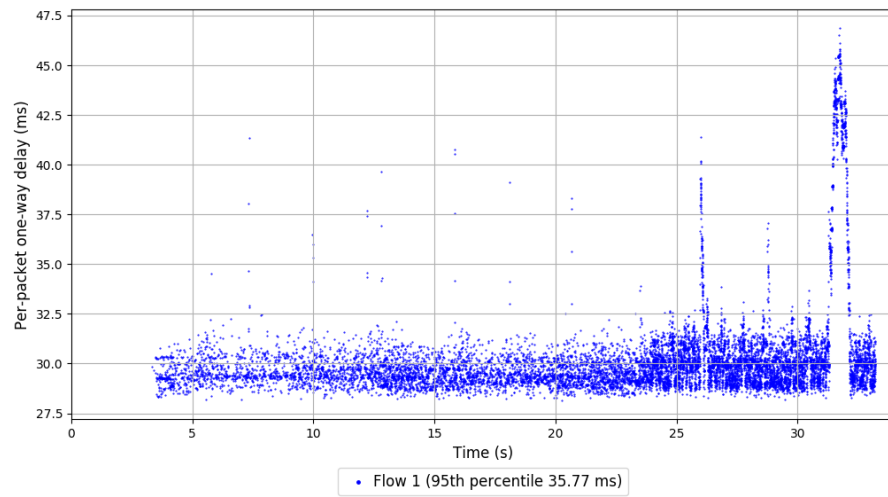
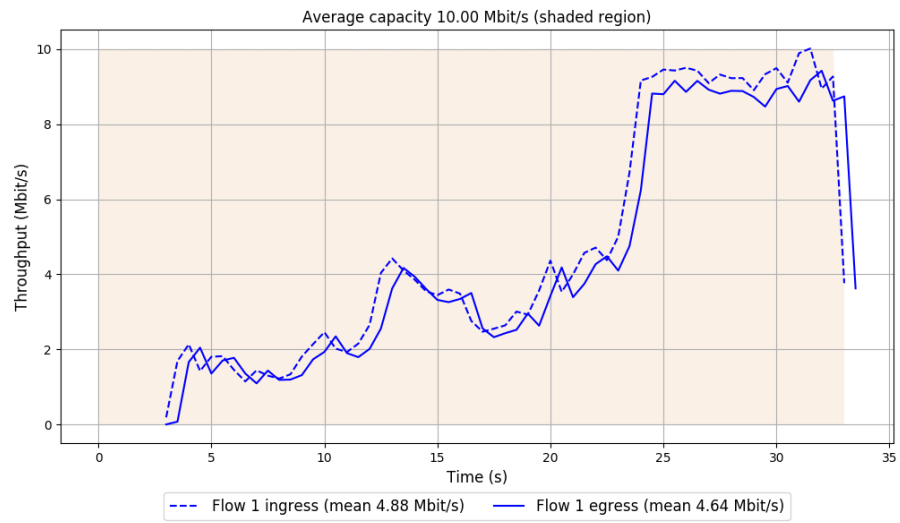
-- Flow 1:

Average throughput: 4.64 Mbit/s

95th percentile per-packet one-way delay: 35.765 ms

Loss rate: 5.07%

Run 4: Report of PCC-Vivace — Data Link



Run 5: Statistics of PCC-Vivace

Start at: 2019-10-21 22:49:46

End at: 2019-10-21 22:50:16

Below is generated by plot.py at 2019-10-21 22:53:07

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 3.63 Mbit/s (36.3% utilization)

95th percentile per-packet one-way delay: 31.185 ms

Loss rate: 4.78%

-- Flow 1:

Average throughput: 3.63 Mbit/s

95th percentile per-packet one-way delay: 31.185 ms

Loss rate: 4.78%

Run 5: Report of PCC-Vivace — Data Link

