

Pantheon Report

Generated at 2019-07-31 04:44:50 (UTC).

Tested in mahimahi: mm-delay 60 mm-link 10mbps.trace 10mbps.trace

Repeated the test of 21 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

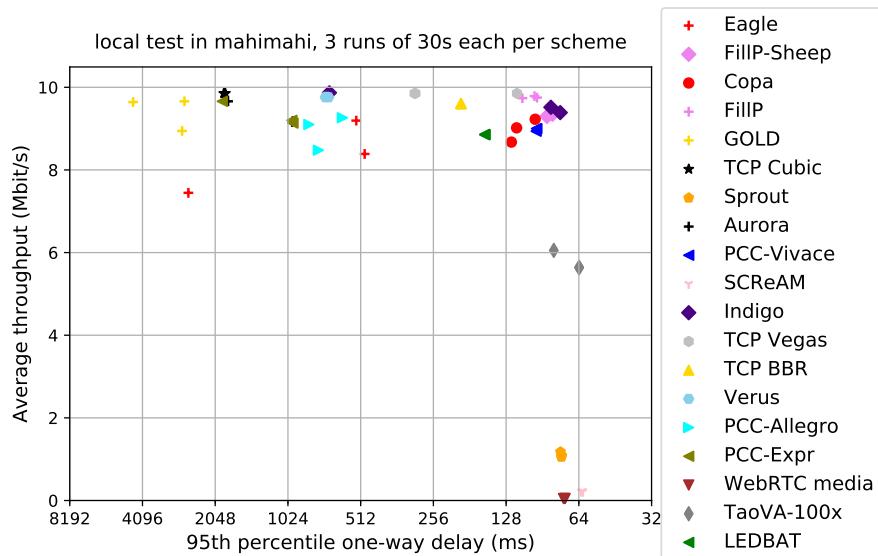
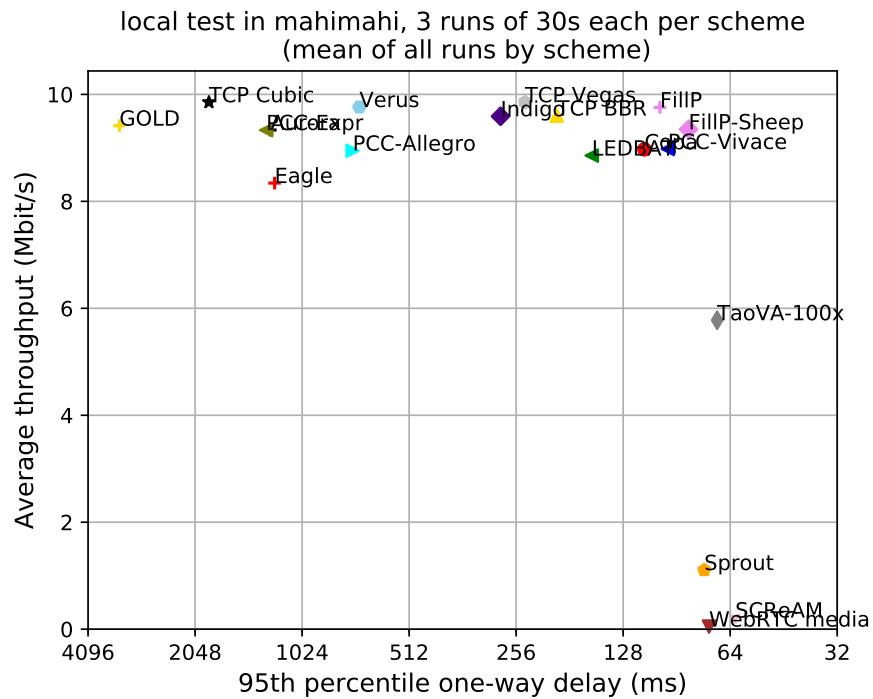
System info:

```
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 @ 138eb6b4b2c0007910fe7d36deaa0b276df38be2
third_party/aurora @ f3e943d61015b39960854ba6391797e0c7984d74
third_party/aurora-model @ e292c316c23fb837255c4e142e40590d154bbe95
third_party/eagle @ f66d3a824f0abdd3b1d0afc0cc323607b2c38eca
  D sender-receiver/sender-receiver/sender_receiver/envs/model-xentropy.pt
third_party/fillp @ d6da1459332fceef56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fc45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfe58e562f4
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
```



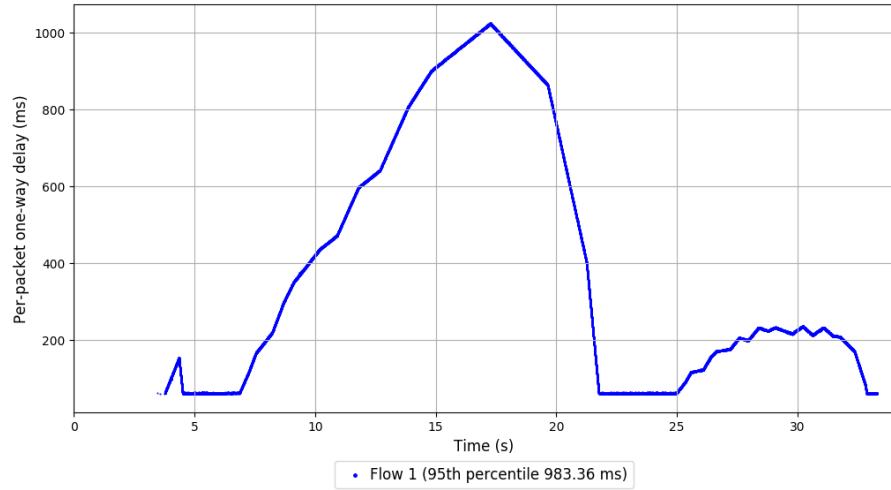
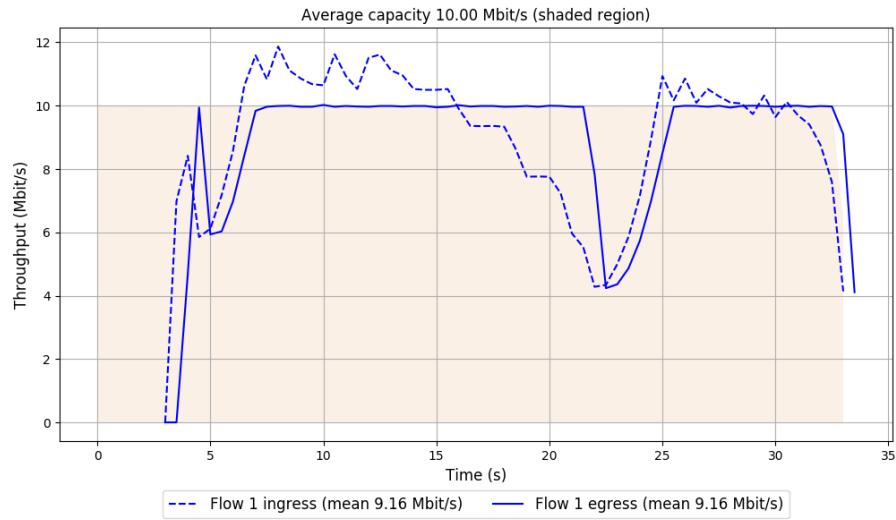
scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
Aurora	3	9.33	1257.91	2.26
TCP BBR	3	9.60	196.78	0.58
Copa	3	8.97	111.53	0.25
TCP Cubic	3	9.85	1872.11	5.50
Eagle	3	8.34	1223.84	1.63
FillP	3	9.76	100.87	0.29
FillP-Sheep	3	9.35	83.81	0.26
GOLD	3	9.41	3344.44	12.65
GoldLSTM	0	N/A	N/A	N/A
Indigo	3	9.59	283.23	0.22
LEDBAT	3	8.86	156.86	0.59
PCC-Allegro	3	8.95	738.06	0.26
PCC-Expr	3	9.33	1292.19	2.19
QUIC Cubic	0	N/A	N/A	N/A
SCReAM	3	0.22	61.96	0.17
Sprout	3	1.11	75.72	0.36
TaoVA-100x	3	5.77	69.64	0.29
TCP Vegas	3	9.85	241.77	0.52
Verus	3	9.76	706.71	1.65
PCC-Vivace	3	8.98	95.87	0.24
WebRTC media	3	0.05	73.41	0.00

```
Run 1: Statistics of Aurora

Start at: 2019-07-31 04:10:24
End at: 2019-07-31 04:10:54

# Below is generated by plot.py at 2019-07-31 04:42:49
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.16 Mbit/s (91.6% utilization)
95th percentile per-packet one-way delay: 983.356 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 9.16 Mbit/s
95th percentile per-packet one-way delay: 983.356 ms
Loss rate: 0.16%
```

Run 1: Report of Aurora — Data Link



Run 2: Statistics of Aurora

Start at: 2019-07-31 04:22:34

End at: 2019-07-31 04:23:04

Below is generated by plot.py at 2019-07-31 04:42:50

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 9.18 Mbit/s (91.8% utilization)

95th percentile per-packet one-way delay: 978.735 ms

Loss rate: 0.15%

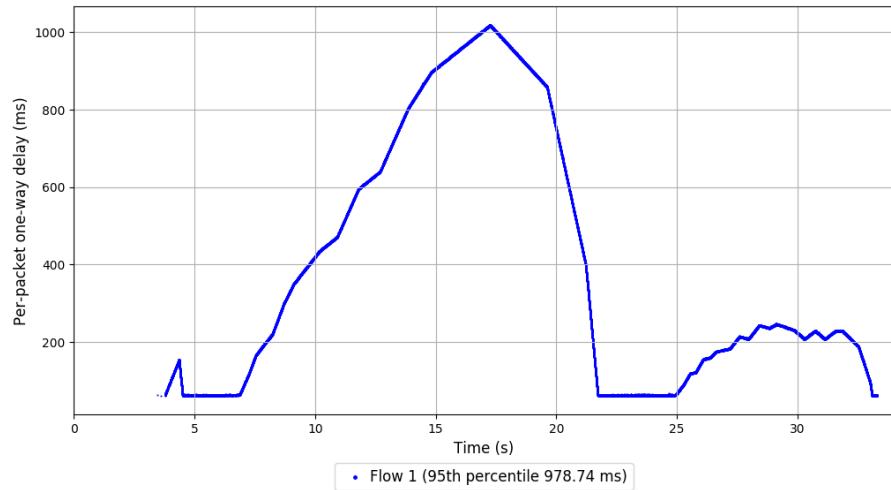
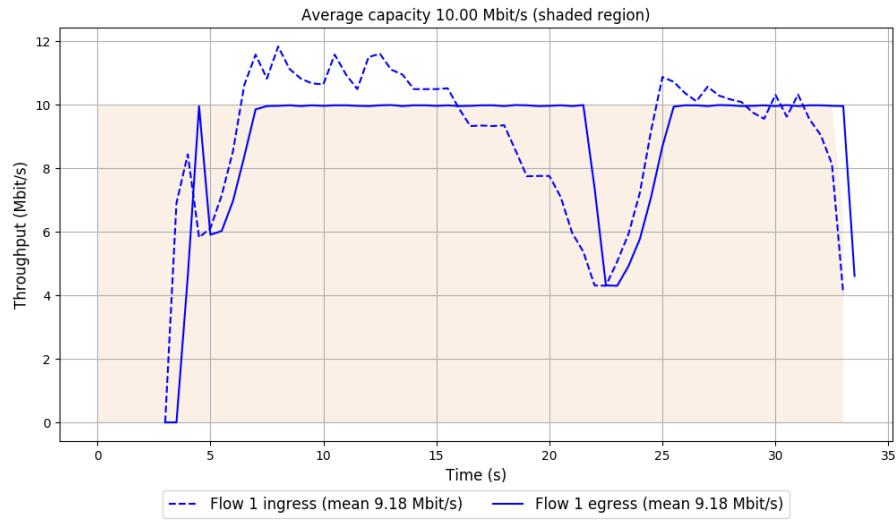
-- Flow 1:

Average throughput: 9.18 Mbit/s

95th percentile per-packet one-way delay: 978.735 ms

Loss rate: 0.15%

Run 2: Report of Aurora — Data Link



```
Run 3: Statistics of Aurora
```

```
Start at: 2019-07-31 04:34:44
```

```
End at: 2019-07-31 04:35:14
```

```
# Below is generated by plot.py at 2019-07-31 04:42:51
```

```
# Datalink statistics
```

```
-- Total of 1 flow:
```

```
Average capacity: 10.00 Mbit/s
```

```
Average throughput: 9.66 Mbit/s (96.6% utilization)
```

```
95th percentile per-packet one-way delay: 1811.640 ms
```

```
Loss rate: 6.47%
```

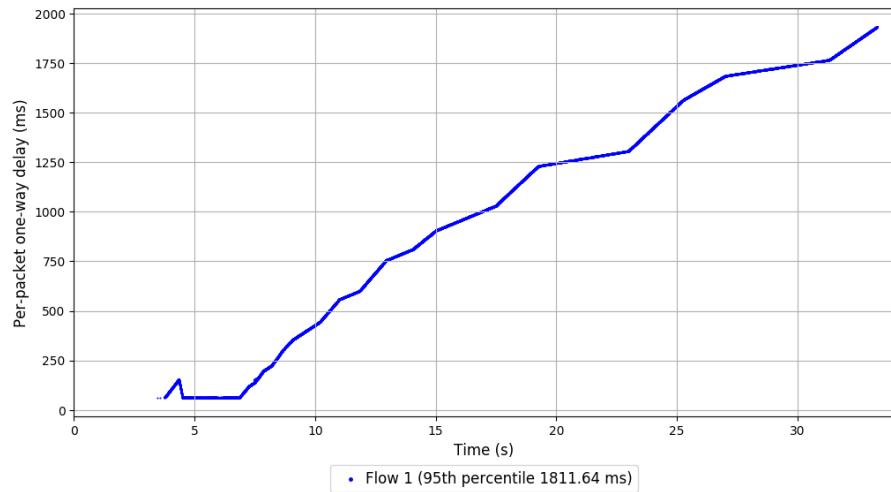
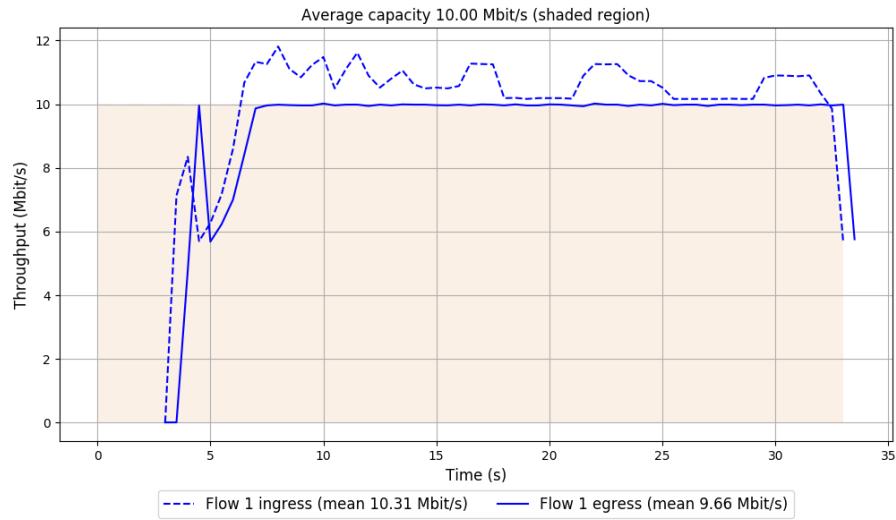
```
-- Flow 1:
```

```
Average throughput: 9.66 Mbit/s
```

```
95th percentile per-packet one-way delay: 1811.640 ms
```

```
Loss rate: 6.47%
```

Run 3: Report of Aurora — Data Link



Run 1: Statistics of TCP BBR

Start at: 2019-07-31 04:12:09

End at: 2019-07-31 04:12:39

Below is generated by plot.py at 2019-07-31 04:42:51

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 9.60 Mbit/s (96.0% utilization)

95th percentile per-packet one-way delay: 197.371 ms

Loss rate: 0.59%

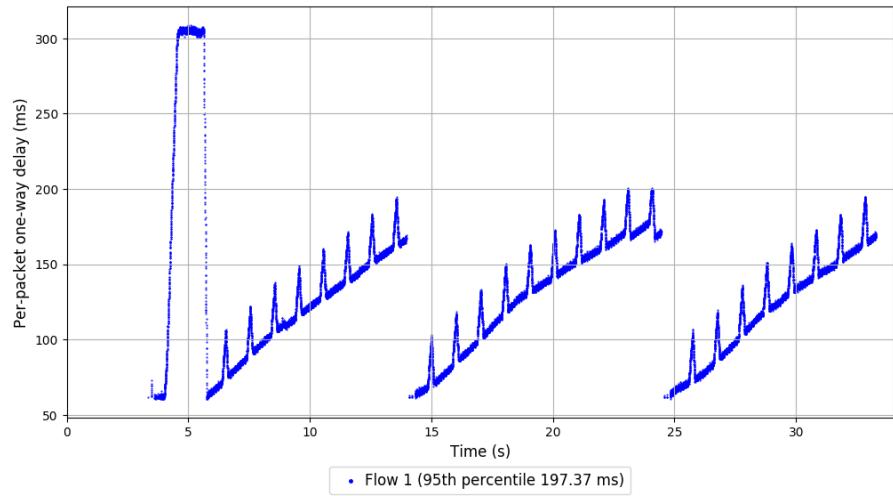
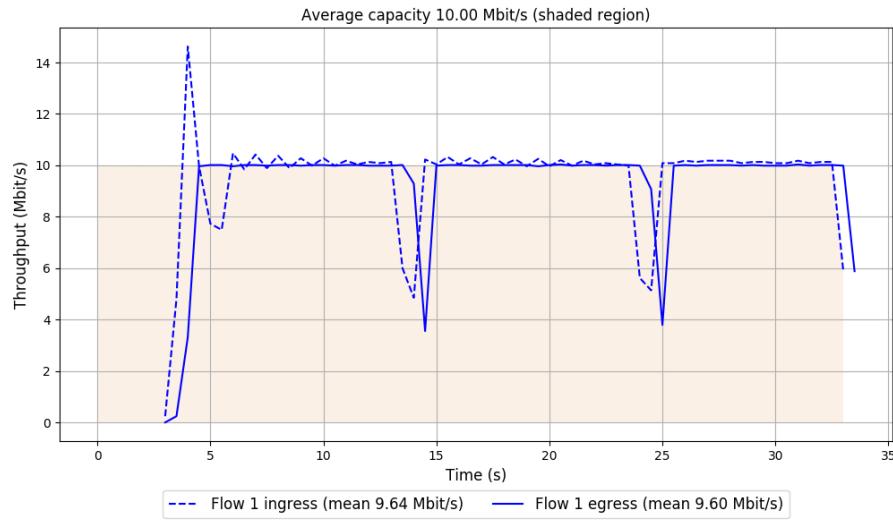
-- Flow 1:

Average throughput: 9.60 Mbit/s

95th percentile per-packet one-way delay: 197.371 ms

Loss rate: 0.59%

Run 1: Report of TCP BBR — Data Link



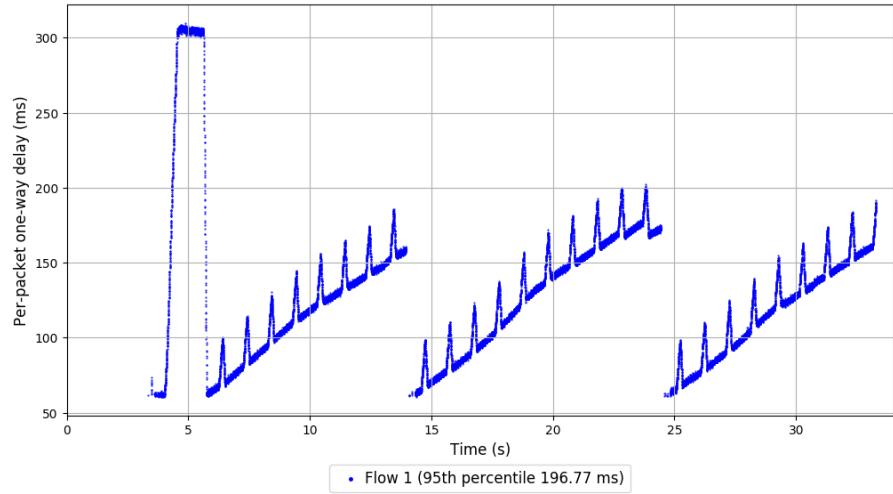
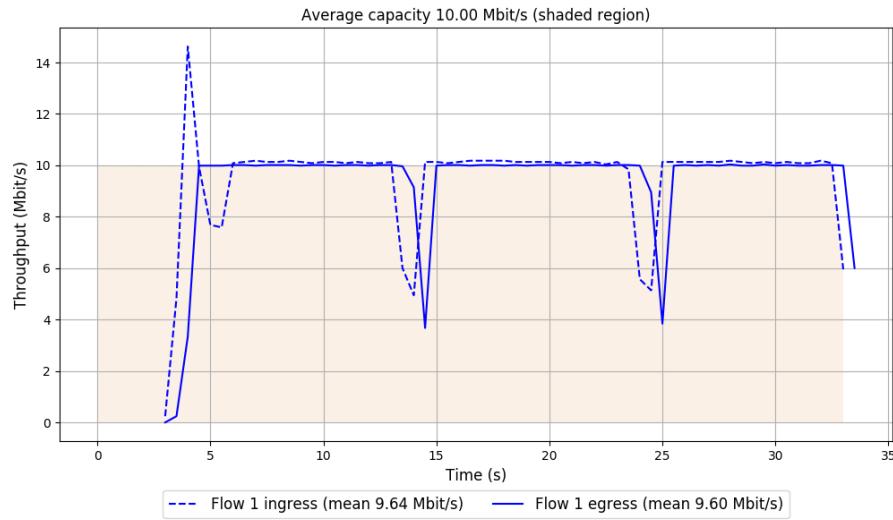
Run 2: Statistics of TCP BBR

Start at: 2019-07-31 04:24:19

End at: 2019-07-31 04:24:49

```
# Below is generated by plot.py at 2019-07-31 04:42:51
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.60 Mbit/s (96.0% utilization)
95th percentile per-packet one-way delay: 196.768 ms
Loss rate: 0.55%
-- Flow 1:
Average throughput: 9.60 Mbit/s
95th percentile per-packet one-way delay: 196.768 ms
Loss rate: 0.55%
```

Run 2: Report of TCP BBR — Data Link

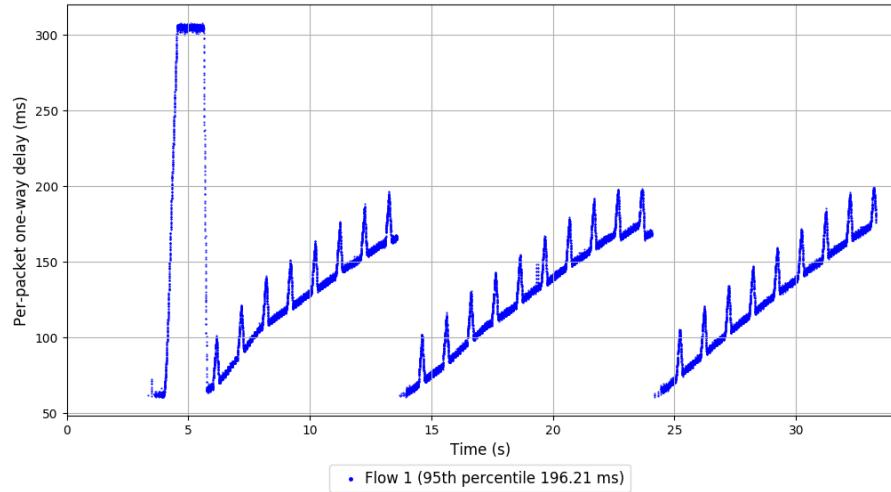
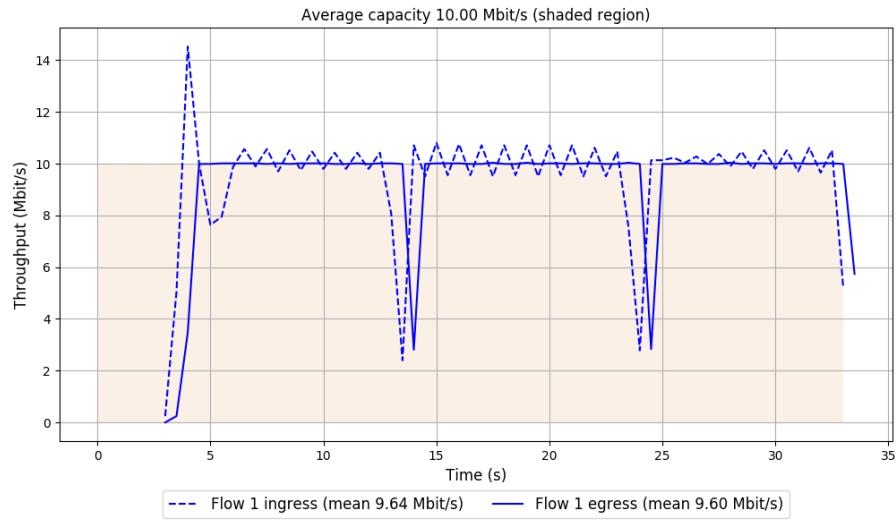


```
Run 3: Statistics of TCP BBR

Start at: 2019-07-31 04:36:29
End at: 2019-07-31 04:36:59

# Below is generated by plot.py at 2019-07-31 04:42:51
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.60 Mbit/s (96.0% utilization)
95th percentile per-packet one-way delay: 196.207 ms
Loss rate: 0.59%
-- Flow 1:
Average throughput: 9.60 Mbit/s
95th percentile per-packet one-way delay: 196.207 ms
Loss rate: 0.59%
```

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

Start at: 2019-07-31 04:06:54

End at: 2019-07-31 04:07:24

Below is generated by plot.py at 2019-07-31 04:43:04

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 9.02 Mbit/s (90.2% utilization)

95th percentile per-packet one-way delay: 115.827 ms

Loss rate: 0.24%

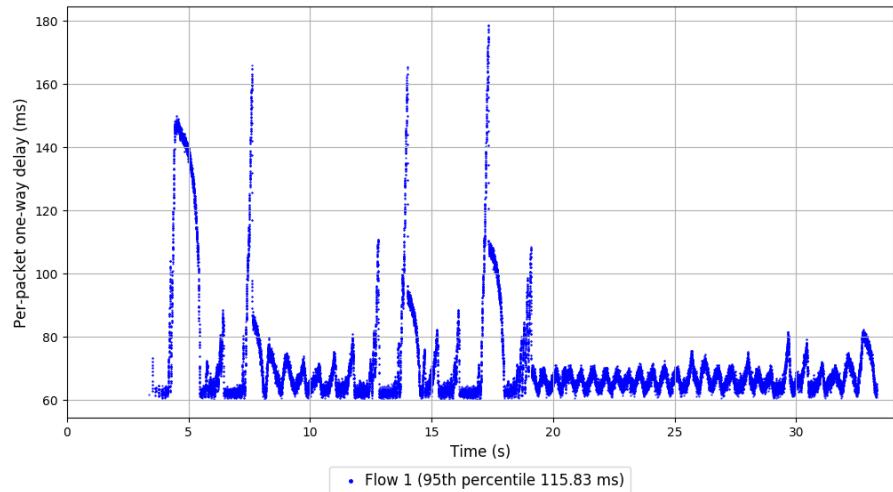
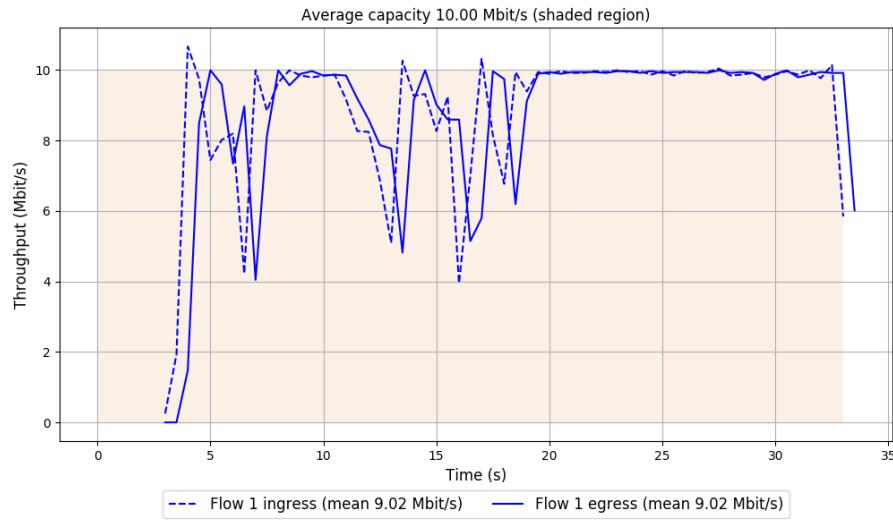
-- Flow 1:

Average throughput: 9.02 Mbit/s

95th percentile per-packet one-way delay: 115.827 ms

Loss rate: 0.24%

Run 1: Report of Copa — Data Link



Run 2: Statistics of Copa

Start at: 2019-07-31 04:19:04

End at: 2019-07-31 04:19:34

Below is generated by plot.py at 2019-07-31 04:43:04

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 8.67 Mbit/s (86.7% utilization)

95th percentile per-packet one-way delay: 121.731 ms

Loss rate: 0.26%

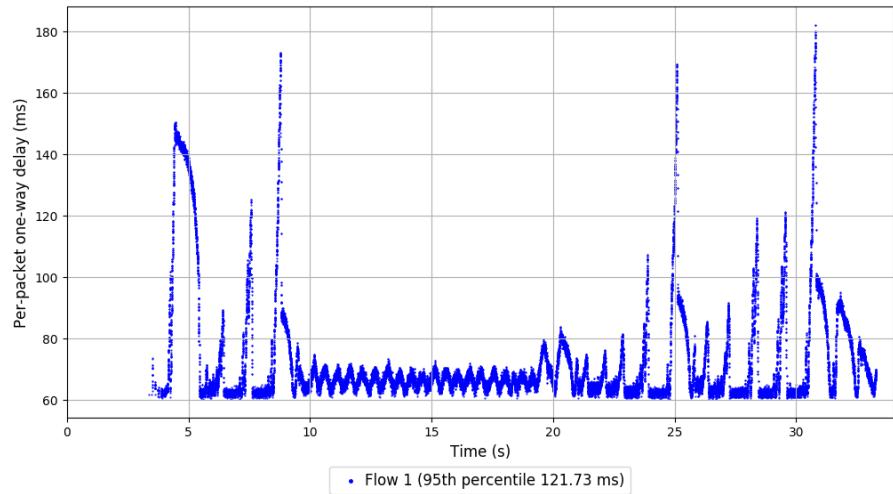
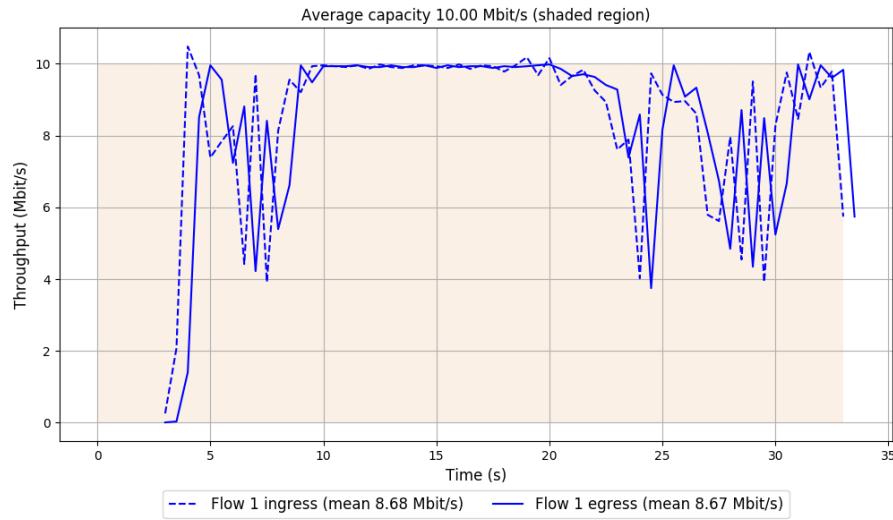
-- Flow 1:

Average throughput: 8.67 Mbit/s

95th percentile per-packet one-way delay: 121.731 ms

Loss rate: 0.26%

Run 2: Report of Copa — Data Link



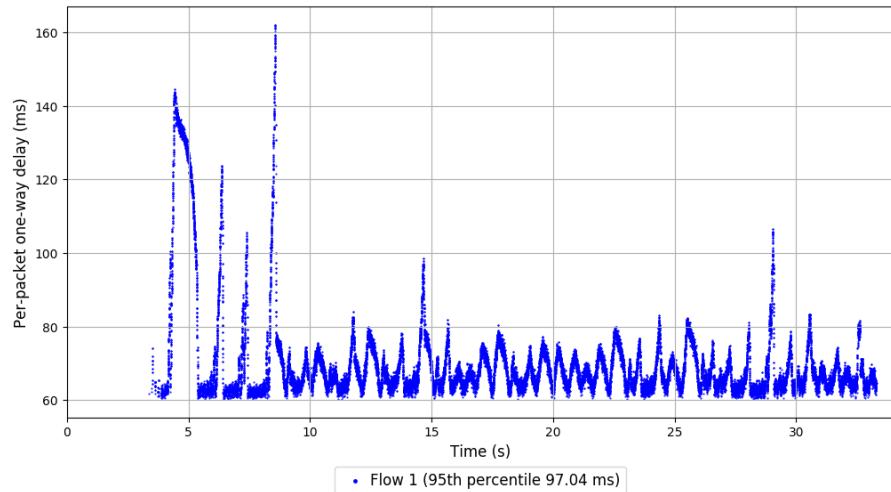
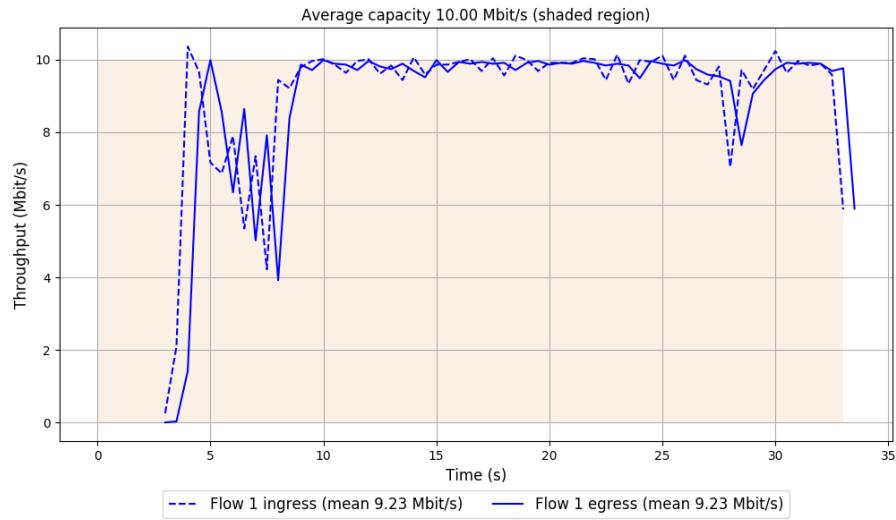
Run 3: Statistics of Copa

Start at: 2019-07-31 04:31:14

End at: 2019-07-31 04:31:44

```
# Below is generated by plot.py at 2019-07-31 04:43:07
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.23 Mbit/s (92.3% utilization)
95th percentile per-packet one-way delay: 97.037 ms
Loss rate: 0.24%
-- Flow 1:
Average throughput: 9.23 Mbit/s
95th percentile per-packet one-way delay: 97.037 ms
Loss rate: 0.24%
```

Run 3: Report of Copa — Data Link

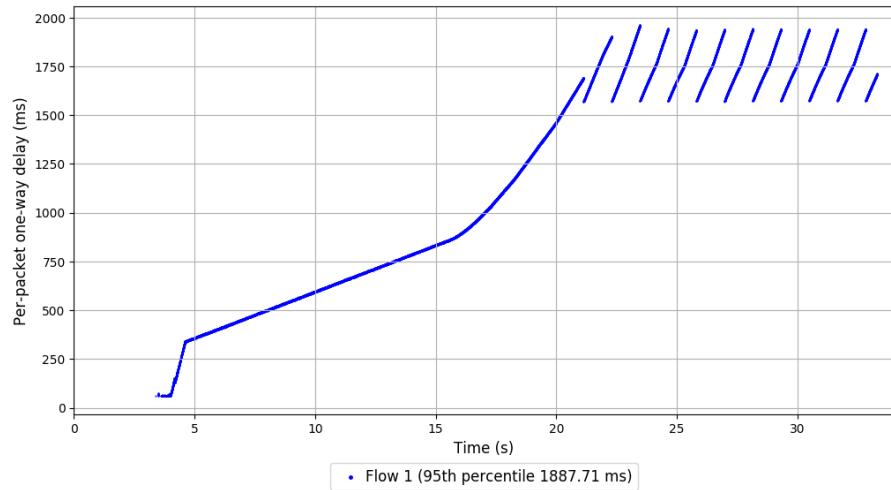
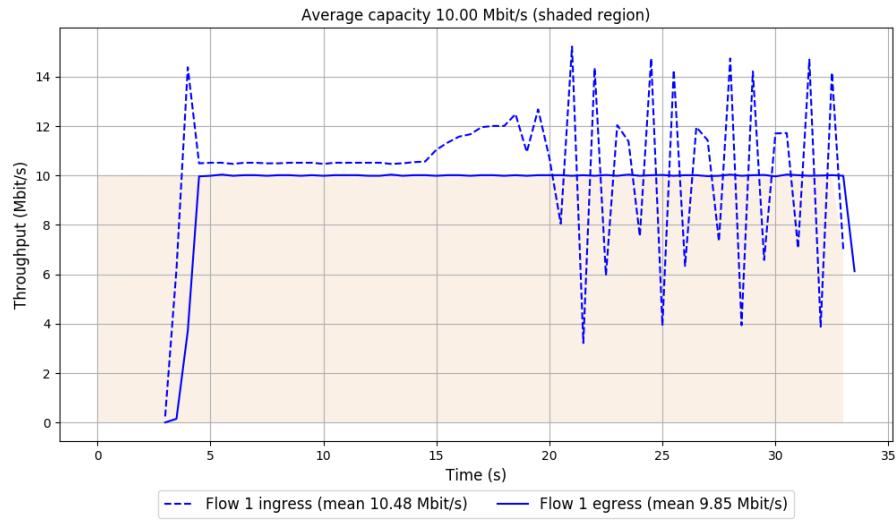


```
Run 1: Statistics of TCP Cubic

Start at: 2019-07-31 04:09:15
End at: 2019-07-31 04:09:45

# Below is generated by plot.py at 2019-07-31 04:43:07
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.85 Mbit/s (98.5% utilization)
95th percentile per-packet one-way delay: 1887.706 ms
Loss rate: 5.93%
-- Flow 1:
Average throughput: 9.85 Mbit/s
95th percentile per-packet one-way delay: 1887.706 ms
Loss rate: 5.93%
```

Run 1: Report of TCP Cubic — Data Link

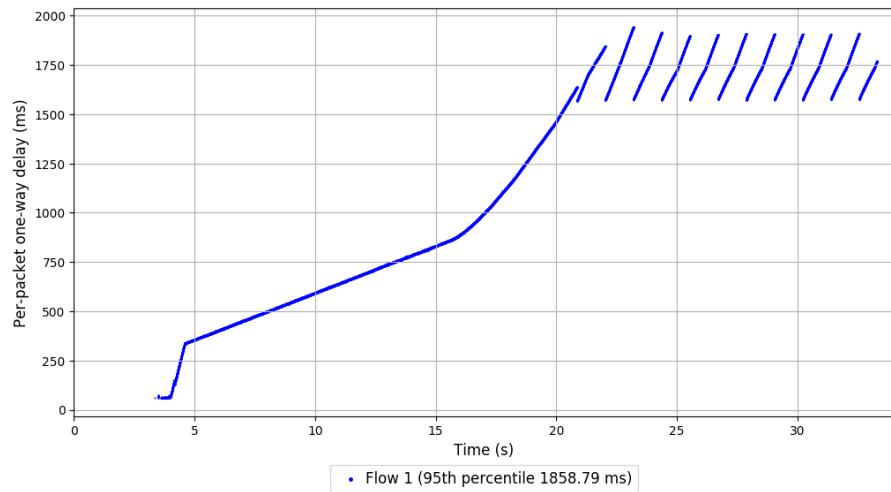
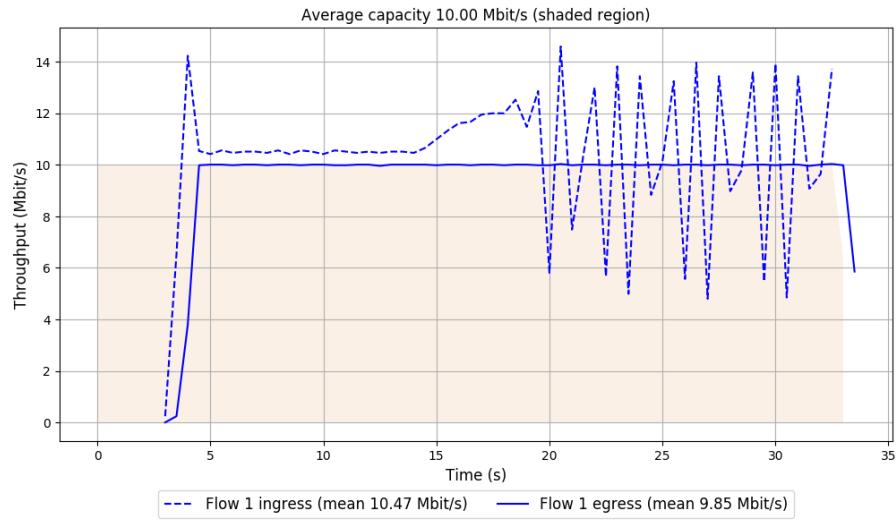


```
Run 2: Statistics of TCP Cubic

Start at: 2019-07-31 04:21:24
End at: 2019-07-31 04:21:54

# Below is generated by plot.py at 2019-07-31 04:43:07
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.85 Mbit/s (98.5% utilization)
95th percentile per-packet one-way delay: 1858.786 ms
Loss rate: 5.12%
-- Flow 1:
Average throughput: 9.85 Mbit/s
95th percentile per-packet one-way delay: 1858.786 ms
Loss rate: 5.12%
```

Run 2: Report of TCP Cubic — Data Link

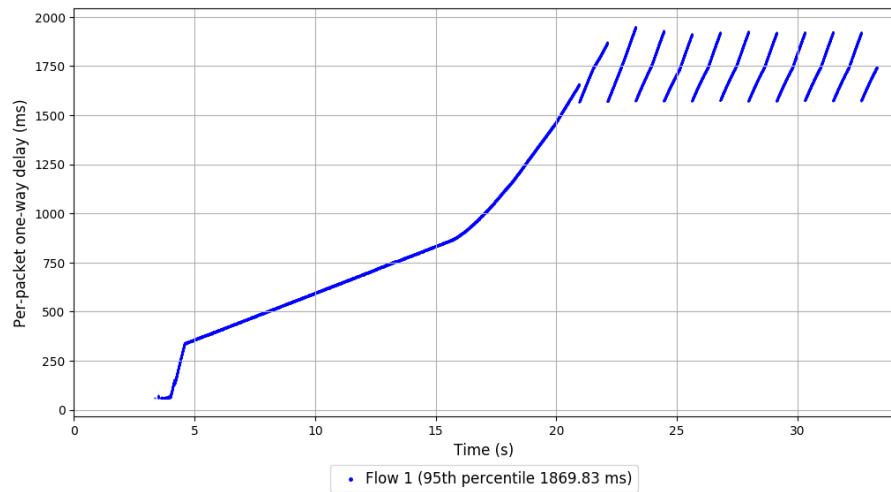
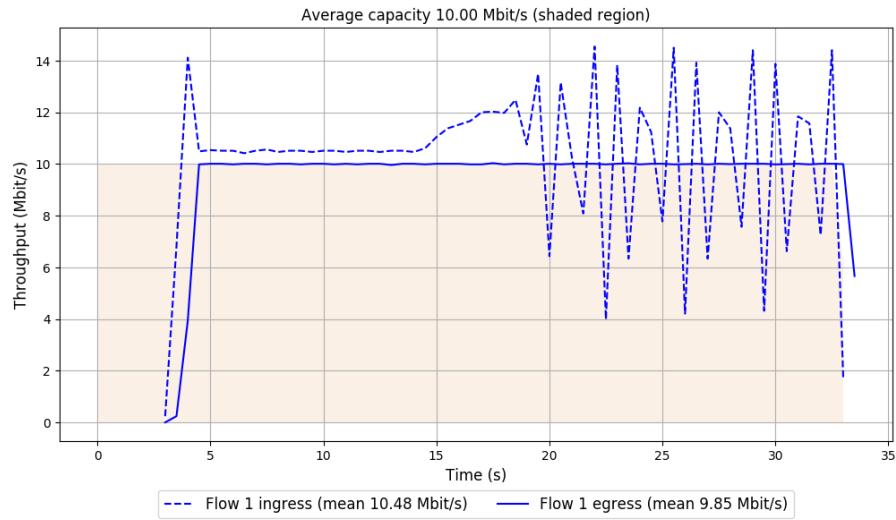


```
Run 3: Statistics of TCP Cubic

Start at: 2019-07-31 04:33:34
End at: 2019-07-31 04:34:04

# Below is generated by plot.py at 2019-07-31 04:43:07
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.85 Mbit/s (98.5% utilization)
95th percentile per-packet one-way delay: 1869.833 ms
Loss rate: 5.44%
-- Flow 1:
Average throughput: 9.85 Mbit/s
95th percentile per-packet one-way delay: 1869.833 ms
Loss rate: 5.44%
```

Run 3: Report of TCP Cubic — Data Link



```
Run 1: Statistics of Eagle
```

```
Start at: 2019-07-31 04:05:45
```

```
End at: 2019-07-31 04:06:15
```

```
# Below is generated by plot.py at 2019-07-31 04:43:12
```

```
# Datalink statistics
```

```
-- Total of 1 flow:
```

```
Average capacity: 10.00 Mbit/s
```

```
Average throughput: 8.39 Mbit/s (83.9% utilization)
```

```
95th percentile per-packet one-way delay: 492.894 ms
```

```
Loss rate: 4.21%
```

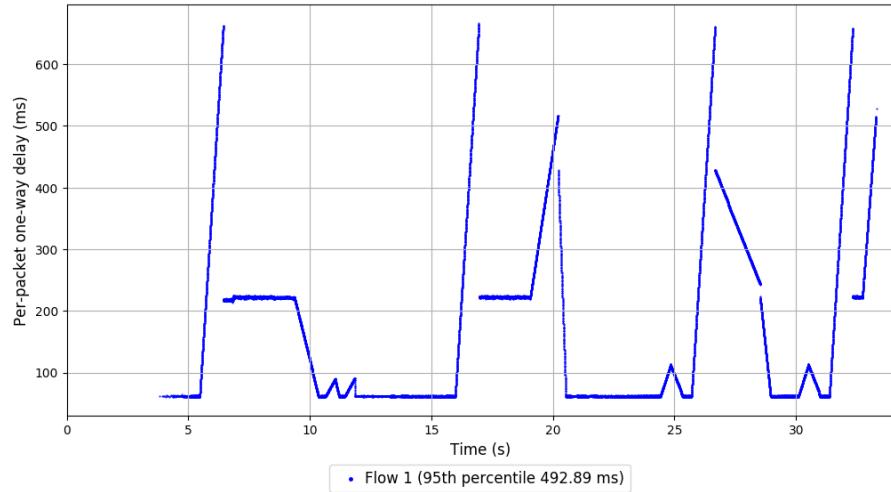
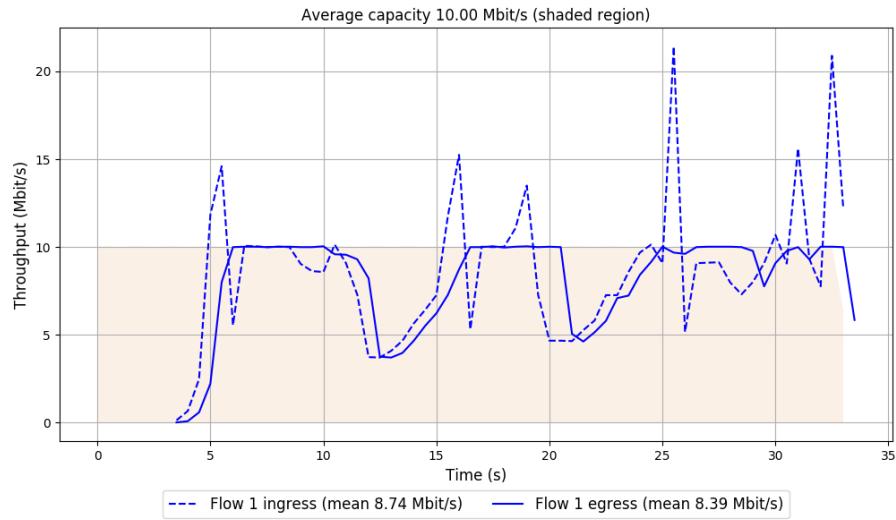
```
-- Flow 1:
```

```
Average throughput: 8.39 Mbit/s
```

```
95th percentile per-packet one-way delay: 492.894 ms
```

```
Loss rate: 4.21%
```

Run 1: Report of Eagle — Data Link



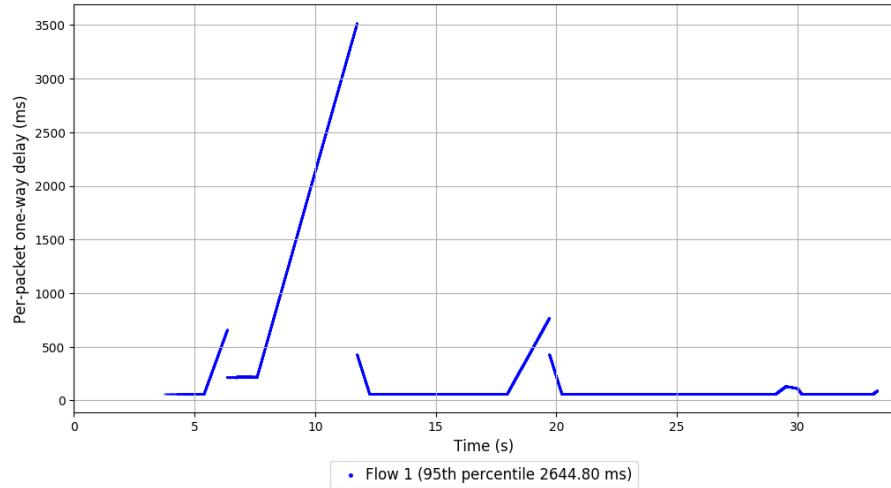
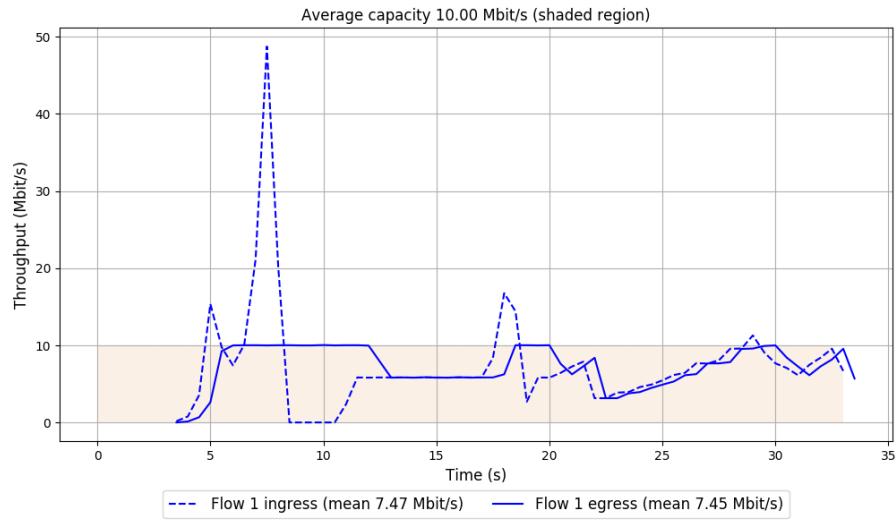
Run 2: Statistics of Eagle

Start at: 2019-07-31 04:17:55

End at: 2019-07-31 04:18:25

```
# Below is generated by plot.py at 2019-07-31 04:43:14
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 7.45 Mbit/s (74.5% utilization)
95th percentile per-packet one-way delay: 2644.801 ms
Loss rate: 0.49%
-- Flow 1:
Average throughput: 7.45 Mbit/s
95th percentile per-packet one-way delay: 2644.801 ms
Loss rate: 0.49%
```

Run 2: Report of Eagle — Data Link



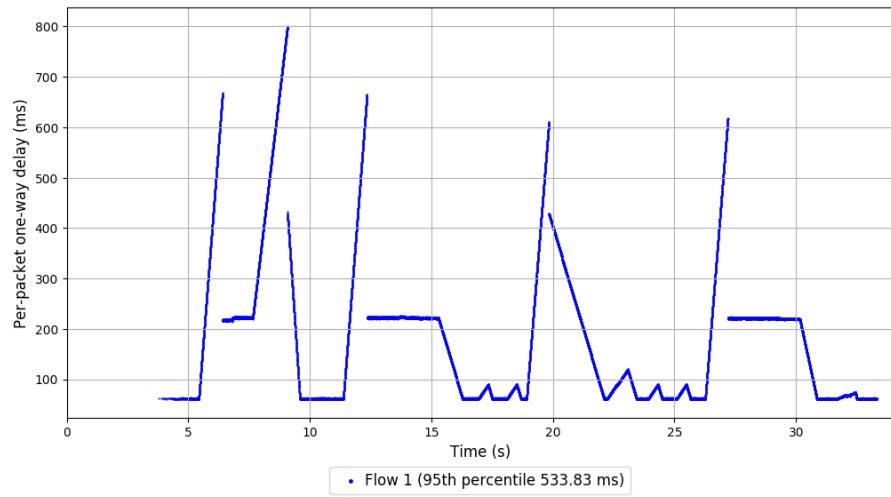
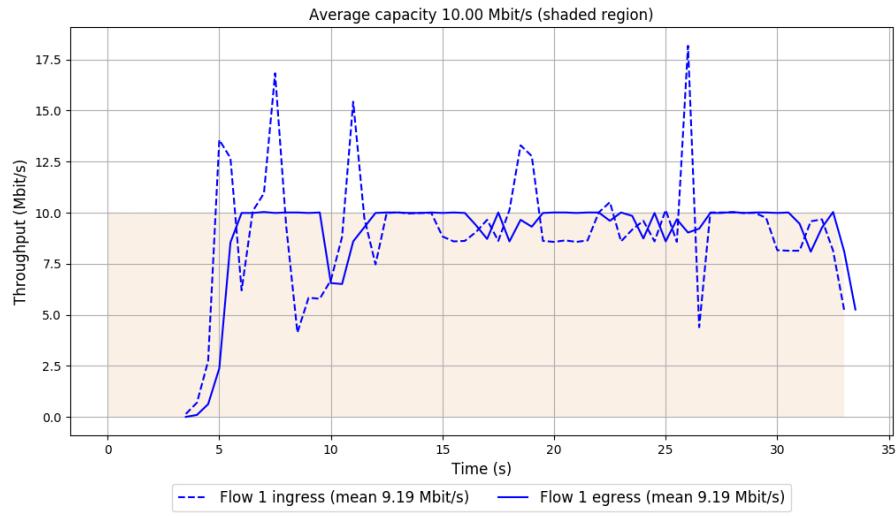
Run 3: Statistics of Eagle

Start at: 2019-07-31 04:30:04

End at: 2019-07-31 04:30:34

```
# Below is generated by plot.py at 2019-07-31 04:43:17
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.19 Mbit/s (91.9% utilization)
95th percentile per-packet one-way delay: 533.829 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 9.19 Mbit/s
95th percentile per-packet one-way delay: 533.829 ms
Loss rate: 0.18%
```

Run 3: Report of Eagle — Data Link

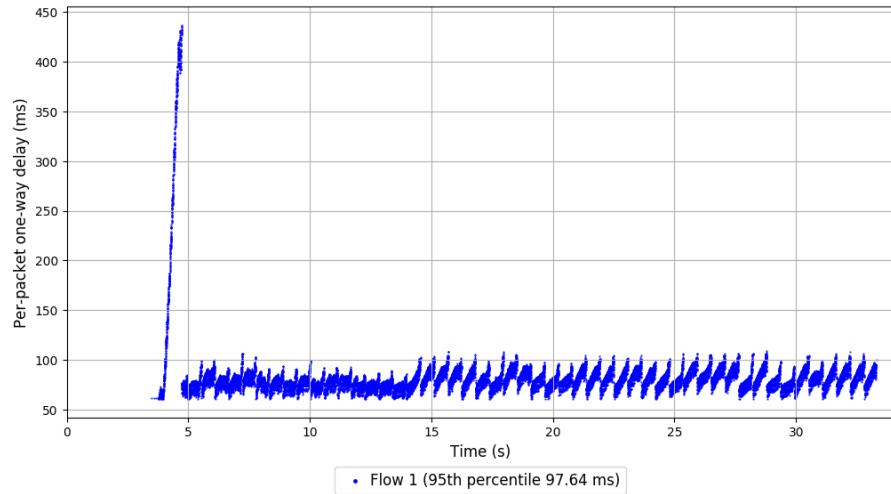
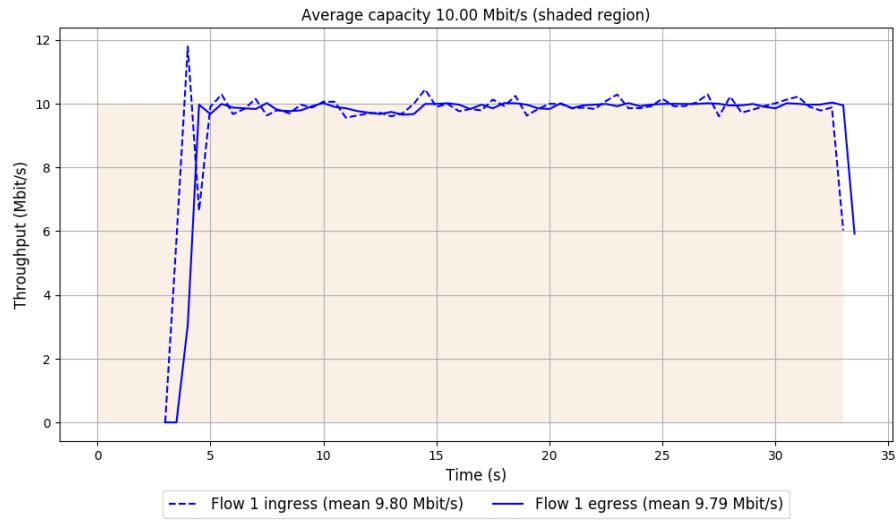


```
Run 1: Statistics of FillP

Start at: 2019-07-31 04:13:53
End at: 2019-07-31 04:14:23

# Below is generated by plot.py at 2019-07-31 04:43:21
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.79 Mbit/s (97.8% utilization)
95th percentile per-packet one-way delay: 97.640 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 9.79 Mbit/s
95th percentile per-packet one-way delay: 97.640 ms
Loss rate: 0.29%
```

Run 1: Report of FillP — Data Link



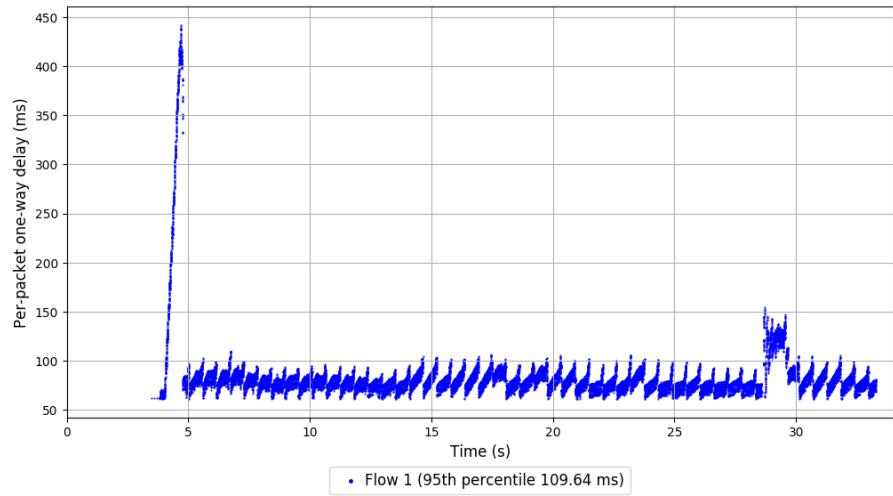
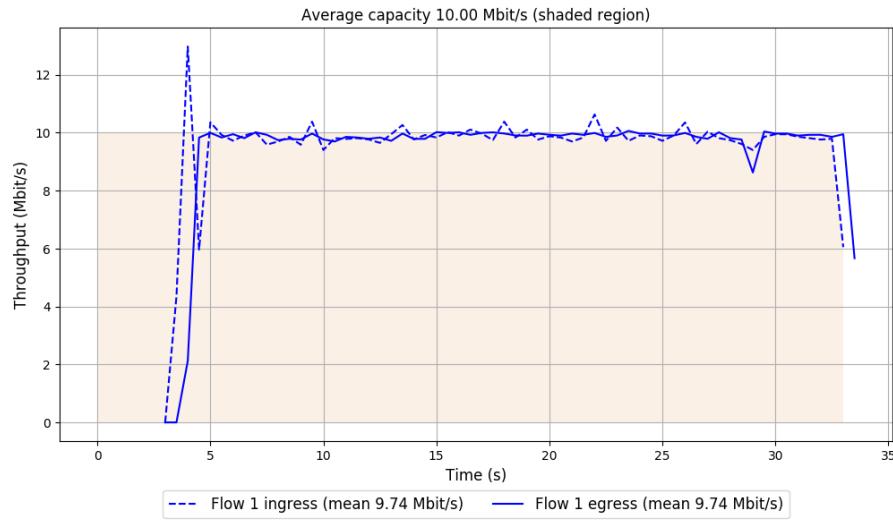
Run 2: Statistics of FillP

Start at: 2019-07-31 04:26:02

End at: 2019-07-31 04:26:32

```
# Below is generated by plot.py at 2019-07-31 04:43:21
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.74 Mbit/s (97.4% utilization)
95th percentile per-packet one-way delay: 109.637 ms
Loss rate: 0.30%
-- Flow 1:
Average throughput: 9.74 Mbit/s
95th percentile per-packet one-way delay: 109.637 ms
Loss rate: 0.30%
```

Run 2: Report of FillP — Data Link



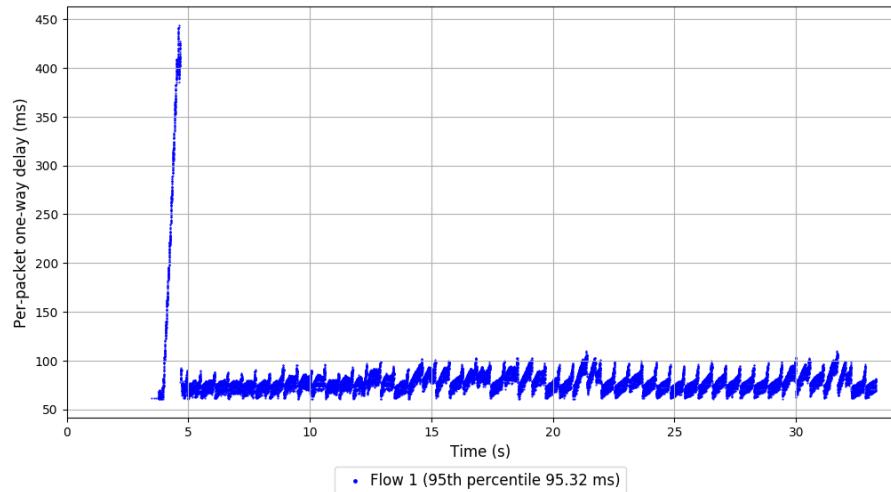
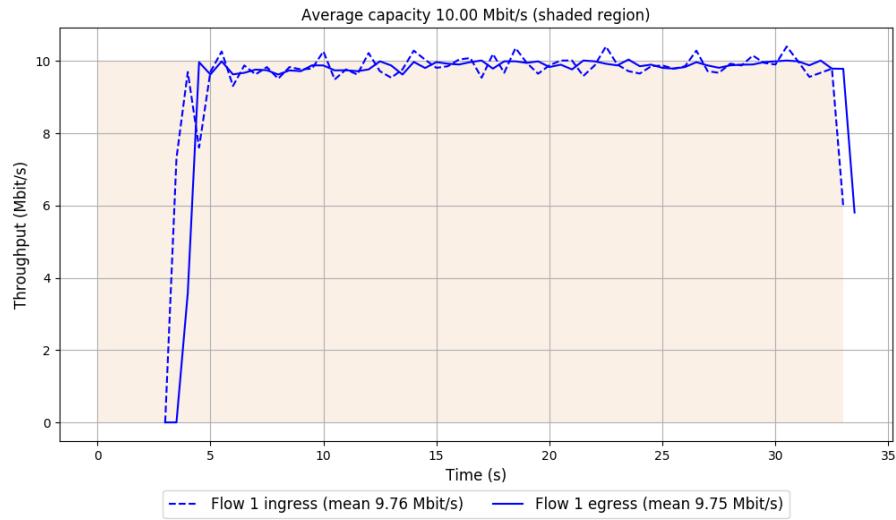
Run 3: Statistics of FillP

Start at: 2019-07-31 04:38:12

End at: 2019-07-31 04:38:42

```
# Below is generated by plot.py at 2019-07-31 04:43:22
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.75 Mbit/s (97.5% utilization)
95th percentile per-packet one-way delay: 95.321 ms
Loss rate: 0.28%
-- Flow 1:
Average throughput: 9.75 Mbit/s
95th percentile per-packet one-way delay: 95.321 ms
Loss rate: 0.28%
```

Run 3: Report of FillP — Data Link

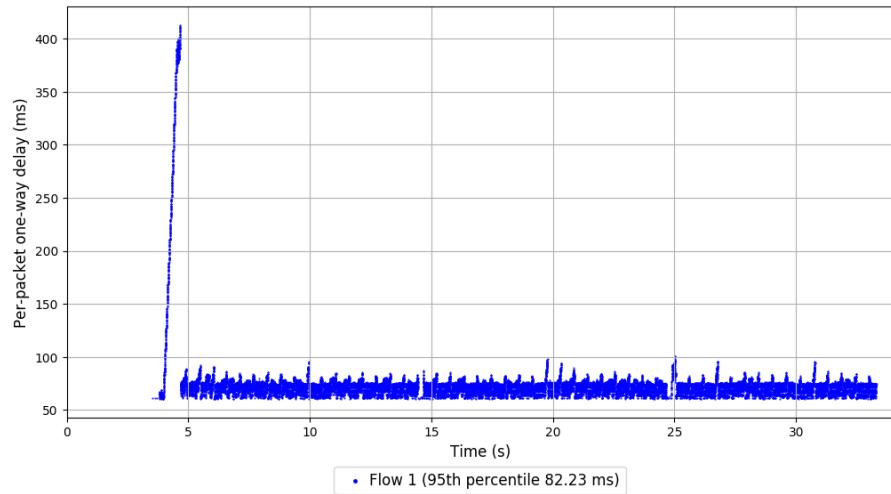
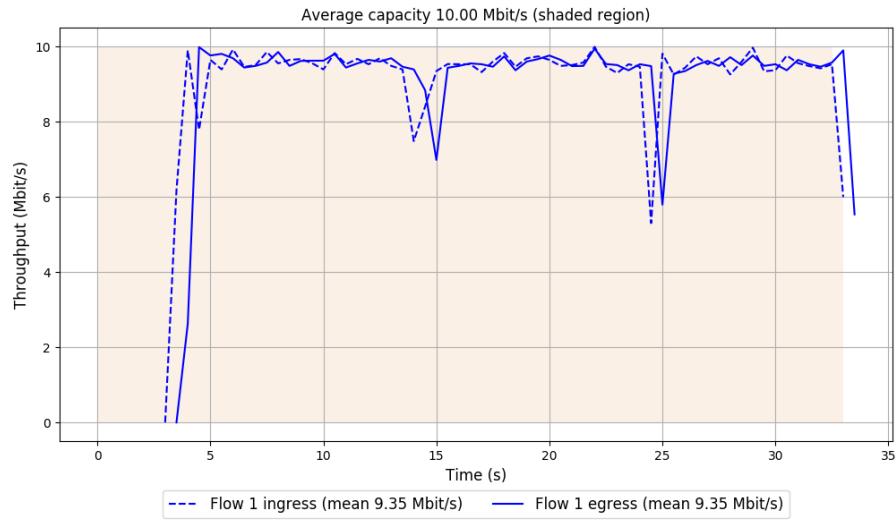


```
Run 1: Statistics of FillP-Sheep

Start at: 2019-07-31 04:06:20
End at: 2019-07-31 04:06:50

# Below is generated by plot.py at 2019-07-31 04:43:28
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.35 Mbit/s (93.5% utilization)
95th percentile per-packet one-way delay: 82.232 ms
Loss rate: 0.26%
-- Flow 1:
Average throughput: 9.35 Mbit/s
95th percentile per-packet one-way delay: 82.232 ms
Loss rate: 0.26%
```

Run 1: Report of FillP-Sheep — Data Link

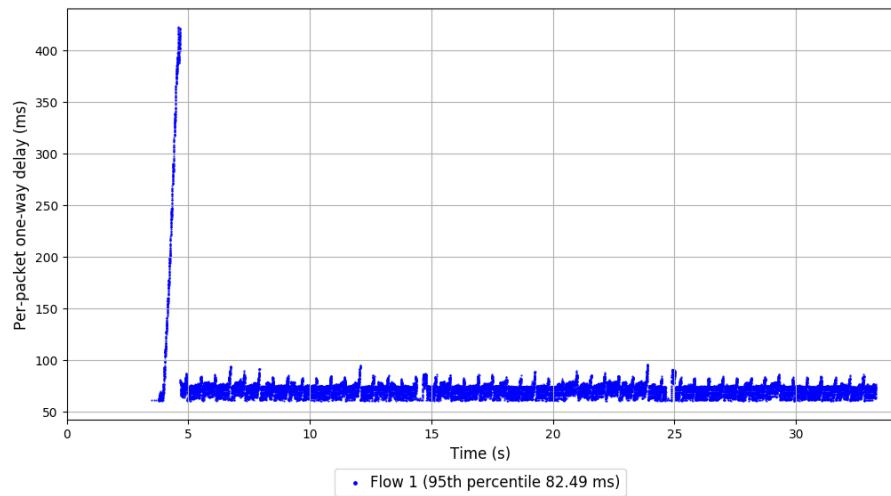
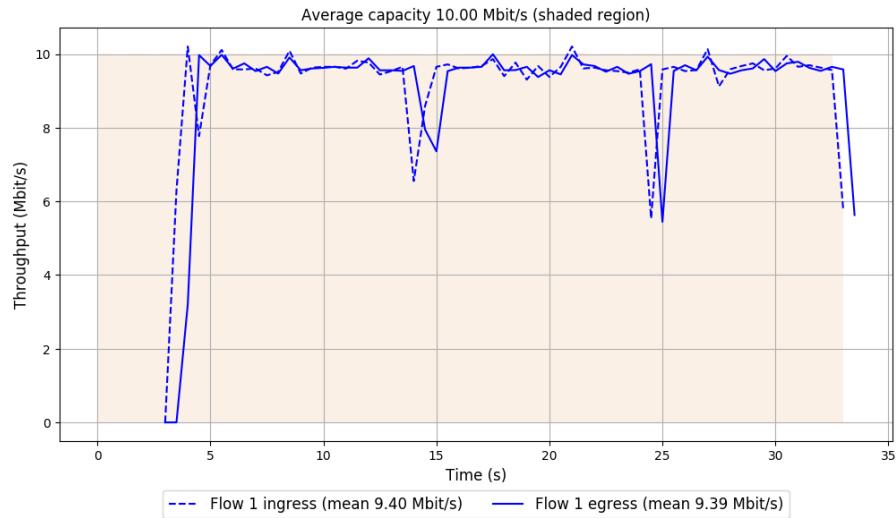


```
Run 2: Statistics of FillP-Sheep

Start at: 2019-07-31 04:18:30
End at: 2019-07-31 04:19:00

# Below is generated by plot.py at 2019-07-31 04:43:30
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.39 Mbit/s (93.9% utilization)
95th percentile per-packet one-way delay: 82.490 ms
Loss rate: 0.28%
-- Flow 1:
Average throughput: 9.39 Mbit/s
95th percentile per-packet one-way delay: 82.490 ms
Loss rate: 0.28%
```

Run 2: Report of FillP-Sheep — Data Link

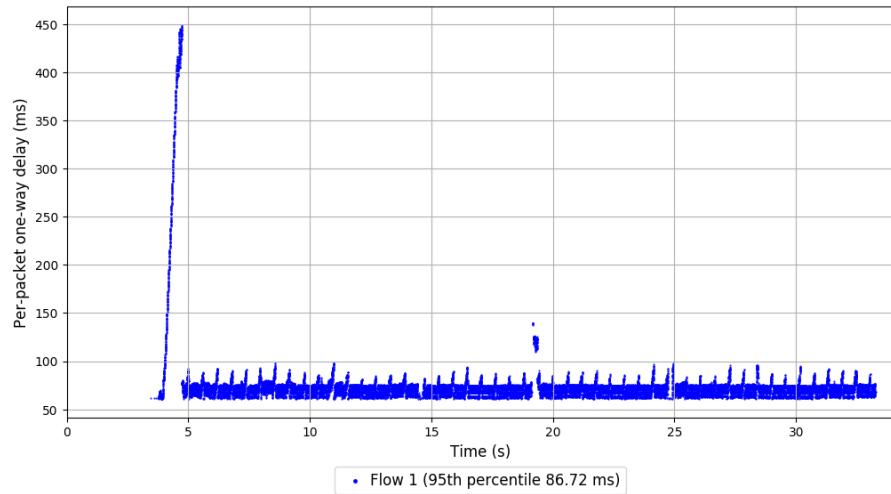
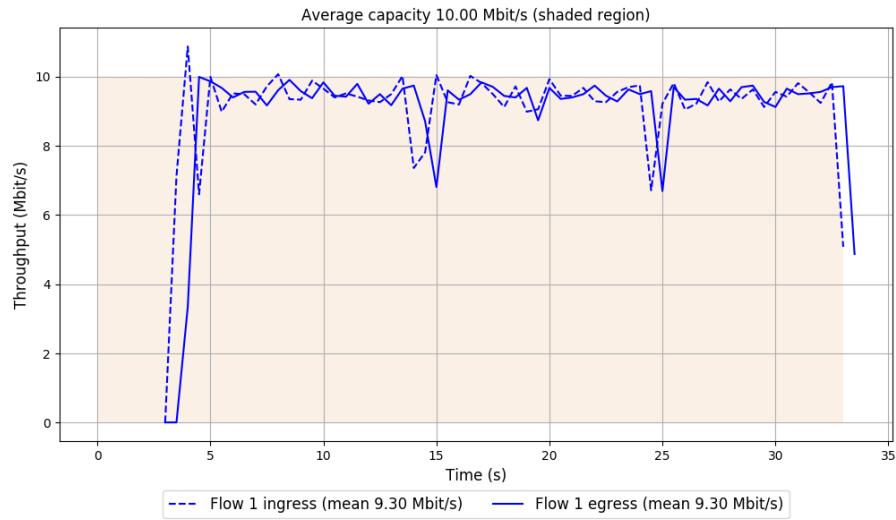


```
Run 3: Statistics of FillP-Sheep

Start at: 2019-07-31 04:30:39
End at: 2019-07-31 04:31:09

# Below is generated by plot.py at 2019-07-31 04:43:31
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.30 Mbit/s (93.0% utilization)
95th percentile per-packet one-way delay: 86.717 ms
Loss rate: 0.24%
-- Flow 1:
Average throughput: 9.30 Mbit/s
95th percentile per-packet one-way delay: 86.717 ms
Loss rate: 0.24%
```

Run 3: Report of FillP-Sheep — Data Link



```
Run 1: Statistics of GOLD
```

```
Start at: 2019-07-31 04:08:40
```

```
End at: 2019-07-31 04:09:10
```

```
# Below is generated by plot.py at 2019-07-31 04:43:33
```

```
# Datalink statistics
```

```
-- Total of 1 flow:
```

```
Average capacity: 10.00 Mbit/s
```

```
Average throughput: 9.66 Mbit/s (96.6% utilization)
```

```
95th percentile per-packet one-way delay: 2746.845 ms
```

```
Loss rate: 9.19%
```

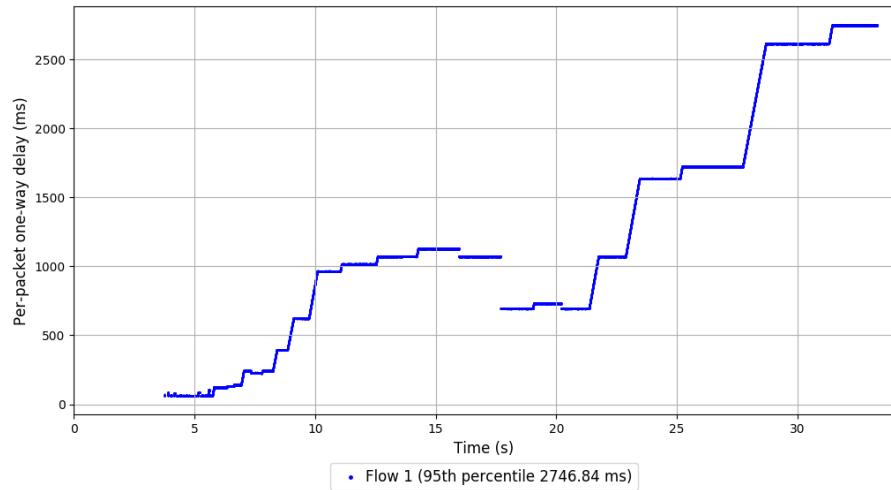
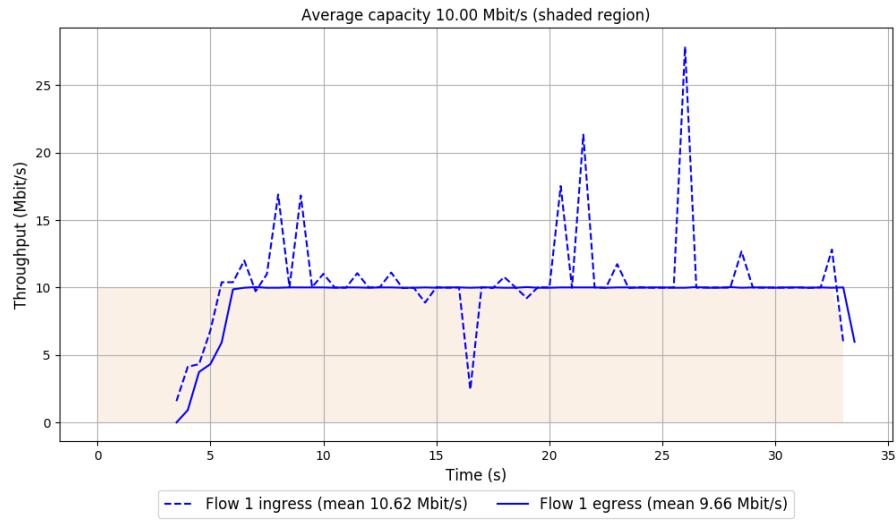
```
-- Flow 1:
```

```
Average throughput: 9.66 Mbit/s
```

```
95th percentile per-packet one-way delay: 2746.845 ms
```

```
Loss rate: 9.19%
```

Run 1: Report of GOLD — Data Link



Run 2: Statistics of GOLD

Start at: 2019-07-31 04:20:49

End at: 2019-07-31 04:21:19

Below is generated by plot.py at 2019-07-31 04:43:35

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 8.94 Mbit/s (89.4% utilization)

95th percentile per-packet one-way delay: 2807.716 ms

Loss rate: 9.61%

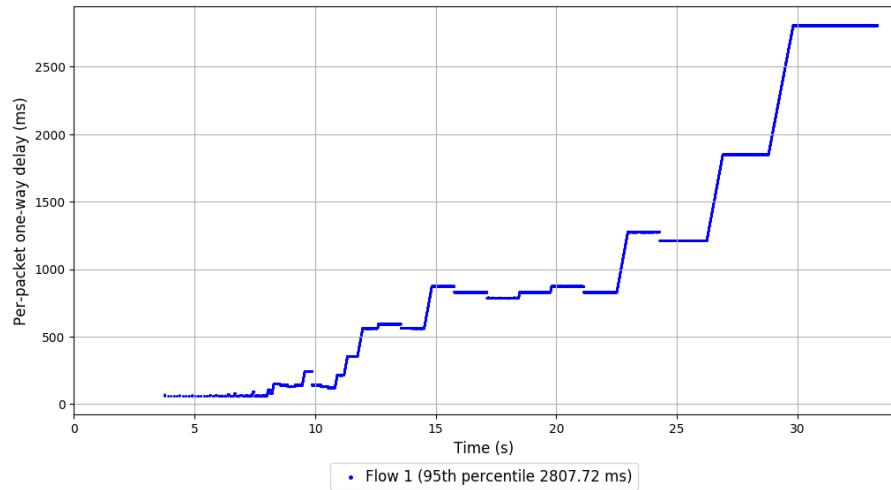
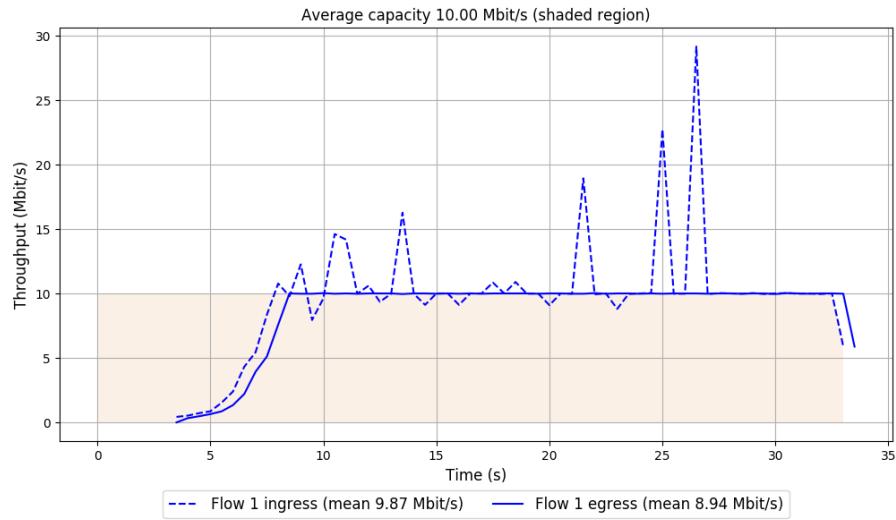
-- Flow 1:

Average throughput: 8.94 Mbit/s

95th percentile per-packet one-way delay: 2807.716 ms

Loss rate: 9.61%

Run 2: Report of GOLD — Data Link



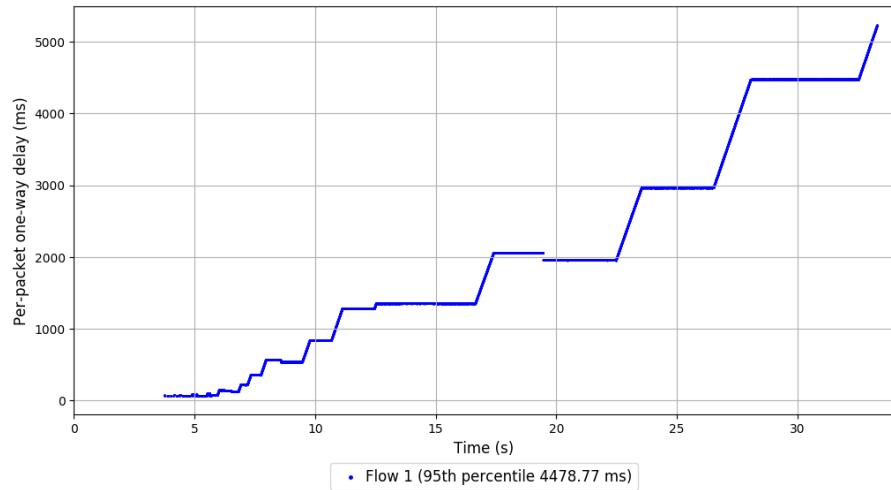
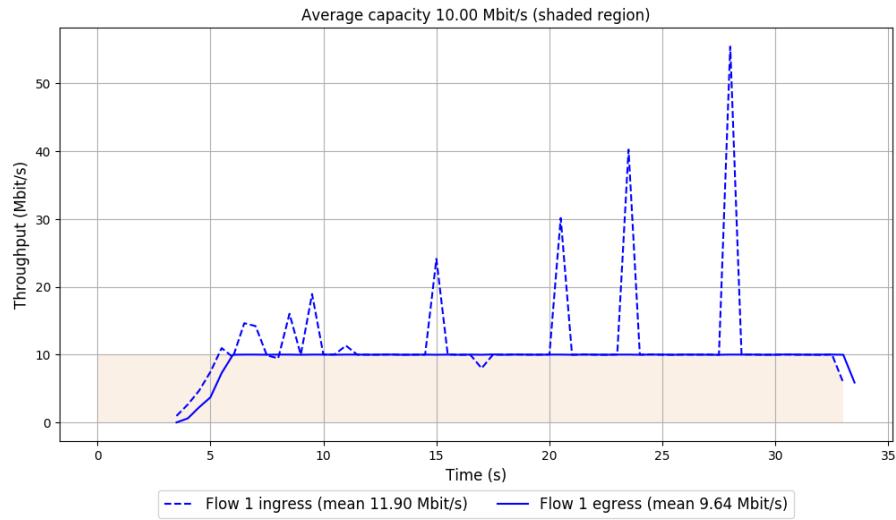
Run 3: Statistics of GOLD

Start at: 2019-07-31 04:32:59

End at: 2019-07-31 04:33:29

```
# Below is generated by plot.py at 2019-07-31 04:43:39
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.64 Mbit/s (96.4% utilization)
95th percentile per-packet one-way delay: 4478.774 ms
Loss rate: 19.16%
-- Flow 1:
Average throughput: 9.64 Mbit/s
95th percentile per-packet one-way delay: 4478.774 ms
Loss rate: 19.16%
```

Run 3: Report of GOLD — Data Link

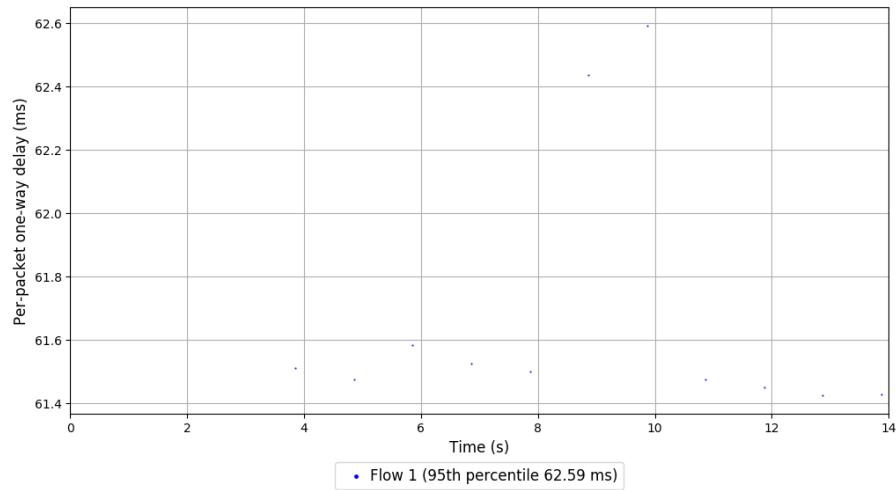
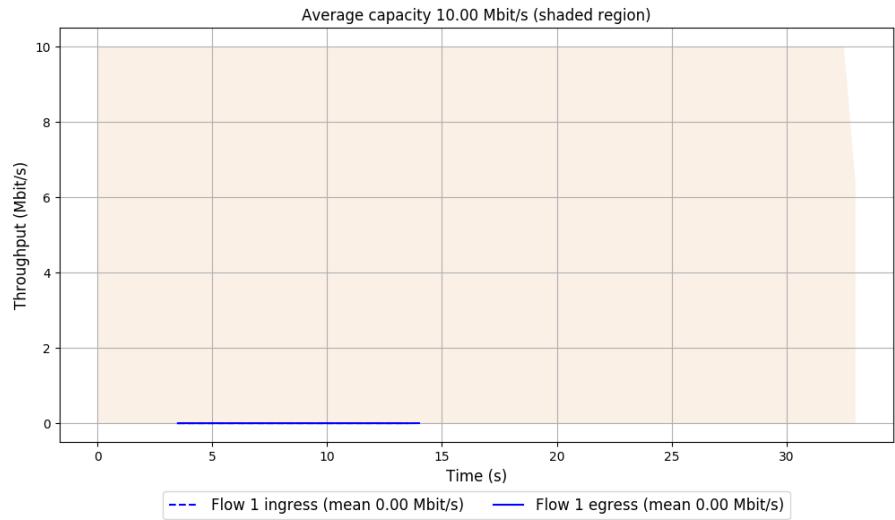


Run 1: Statistics of GoldLSTM

Start at: 2019-07-31 04:12:43

End at: 2019-07-31 04:13:13

Run 1: Report of GoldLSTM — Data Link

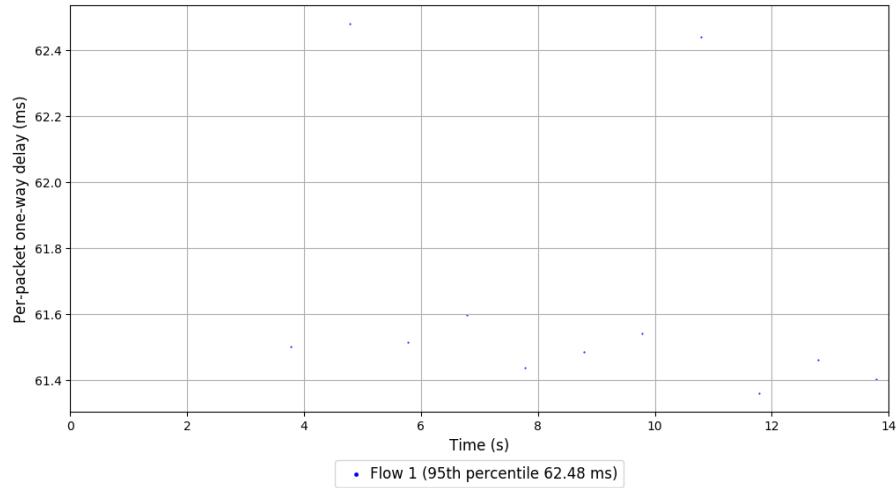
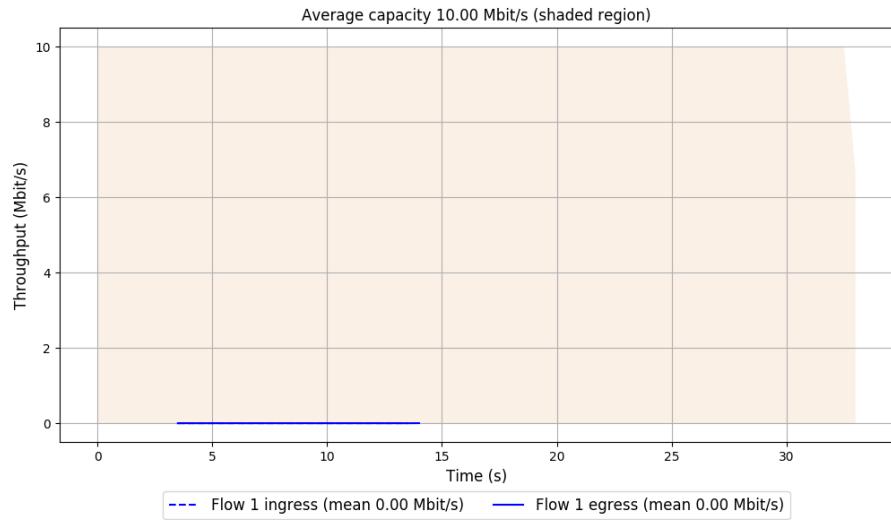


Run 2: Statistics of GoldLSTM

Start at: 2019-07-31 04:24:53

End at: 2019-07-31 04:25:23

Run 2: Report of GoldLSTM — Data Link

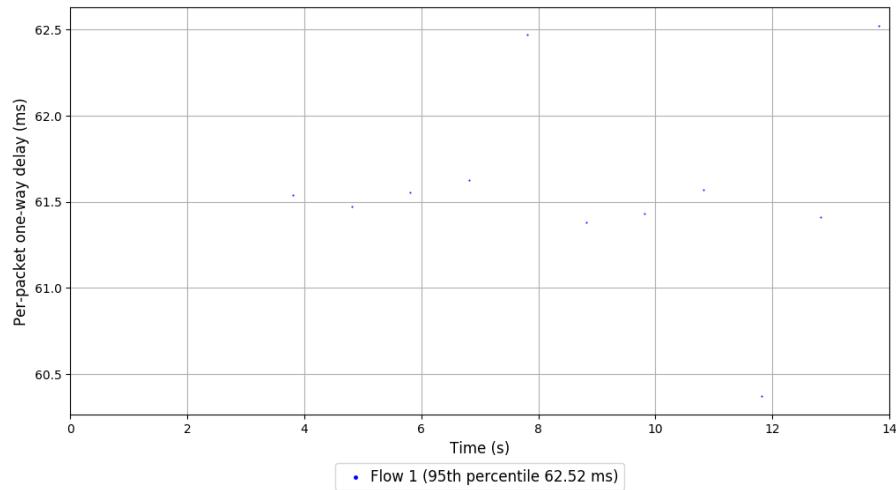
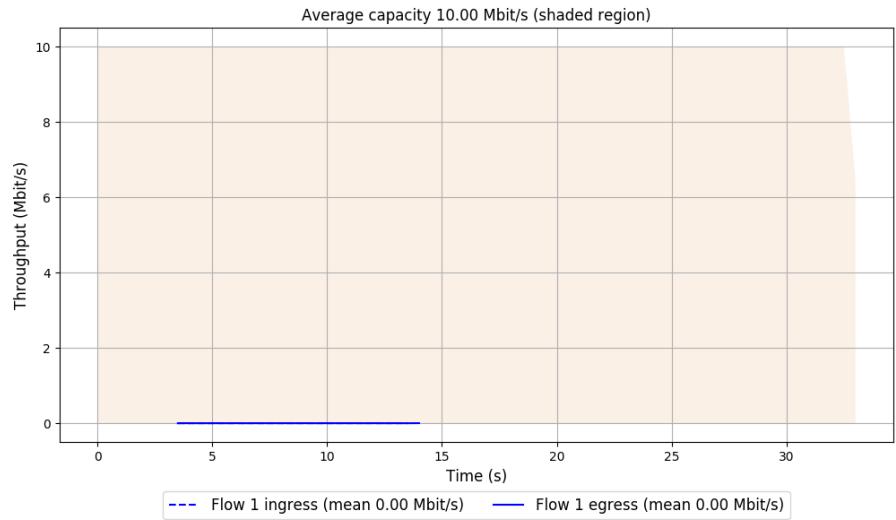


Run 3: Statistics of GoldLSTM

Start at: 2019-07-31 04:37:03

End at: 2019-07-31 04:37:33

Run 3: Report of GoldLSTM — Data Link



Run 1: Statistics of Indigo

Start at: 2019-07-31 04:07:30

End at: 2019-07-31 04:08:00

Below is generated by plot.py at 2019-07-31 04:43:48

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 9.87 Mbit/s (98.7% utilization)

95th percentile per-packet one-way delay: 689.727 ms

Loss rate: 0.22%

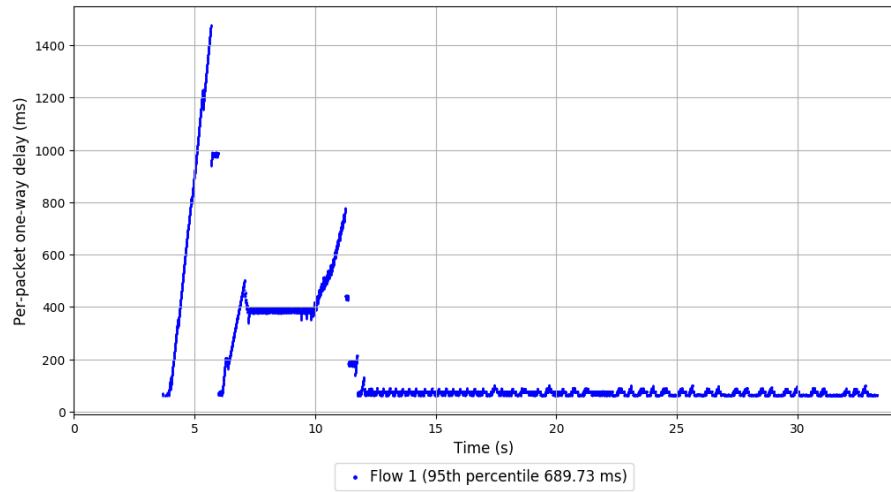
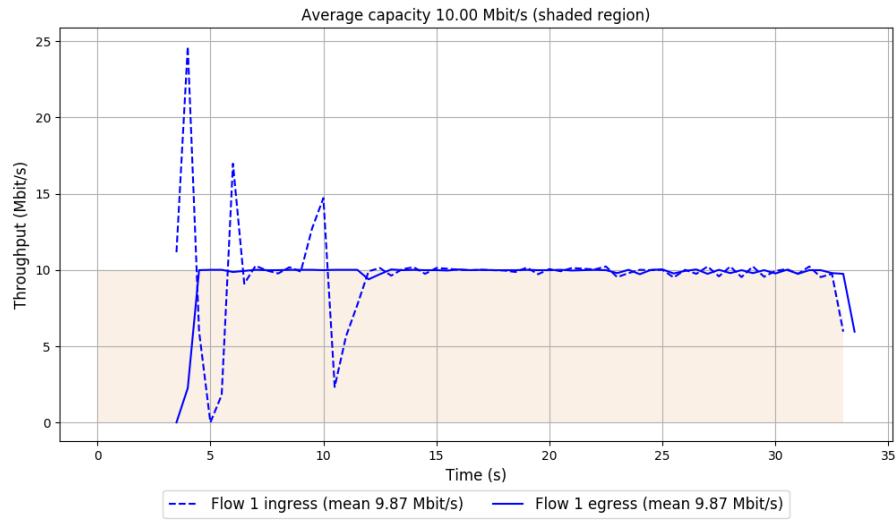
-- Flow 1:

Average throughput: 9.87 Mbit/s

95th percentile per-packet one-way delay: 689.727 ms

Loss rate: 0.22%

Run 1: Report of Indigo — Data Link



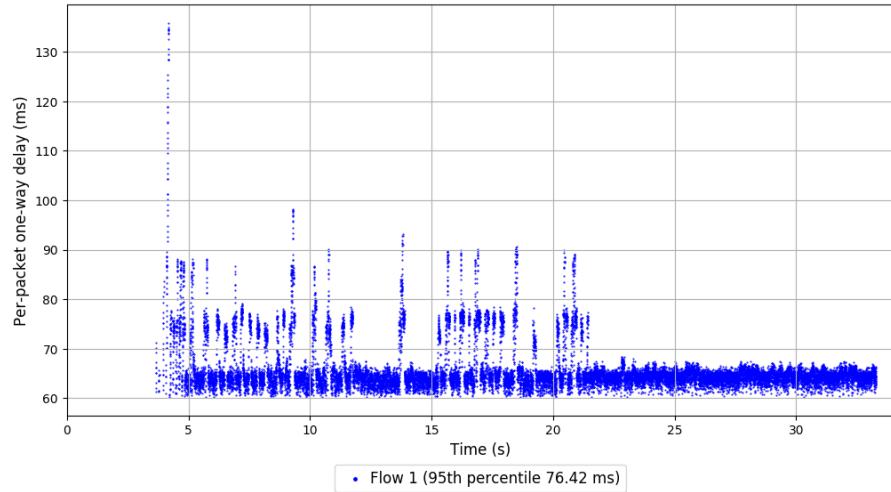
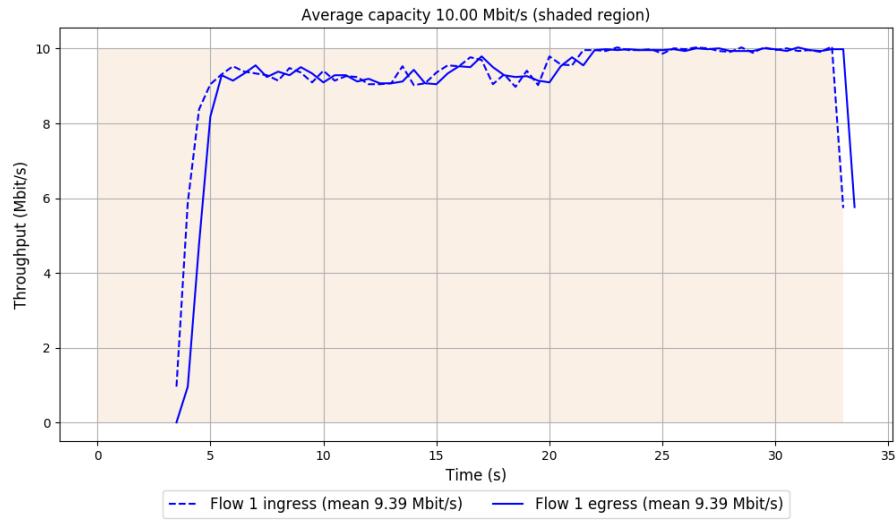
Run 2: Statistics of Indigo

Start at: 2019-07-31 04:19:39

End at: 2019-07-31 04:20:09

```
# Below is generated by plot.py at 2019-07-31 04:43:48
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.39 Mbit/s (93.9% utilization)
95th percentile per-packet one-way delay: 76.418 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 9.39 Mbit/s
95th percentile per-packet one-way delay: 76.418 ms
Loss rate: 0.23%
```

Run 2: Report of Indigo — Data Link



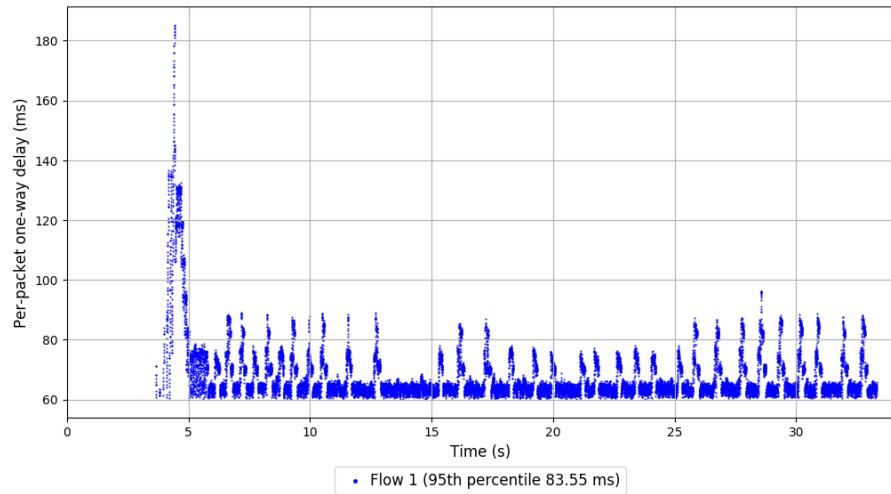
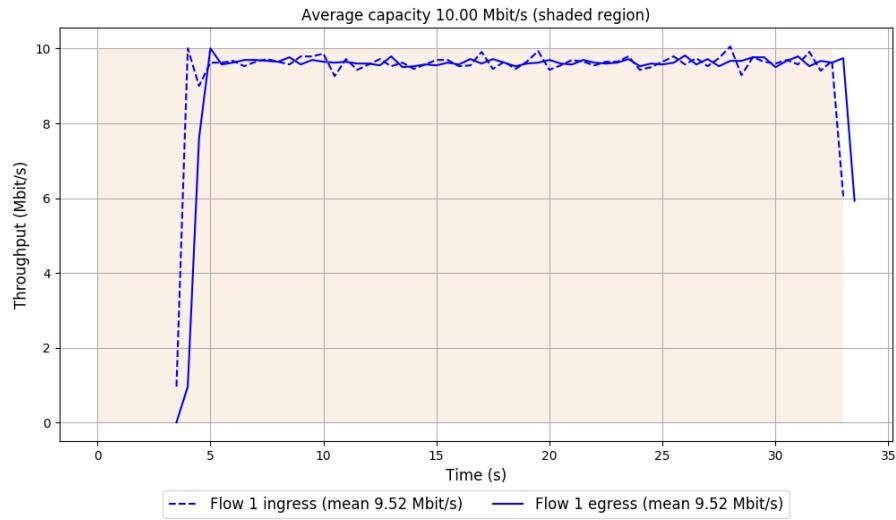
Run 3: Statistics of Indigo

Start at: 2019-07-31 04:31:49

End at: 2019-07-31 04:32:19

```
# Below is generated by plot.py at 2019-07-31 04:43:49
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.52 Mbit/s (95.2% utilization)
95th percentile per-packet one-way delay: 83.549 ms
Loss rate: 0.22%
-- Flow 1:
Average throughput: 9.52 Mbit/s
95th percentile per-packet one-way delay: 83.549 ms
Loss rate: 0.22%
```

Run 3: Report of Indigo — Data Link

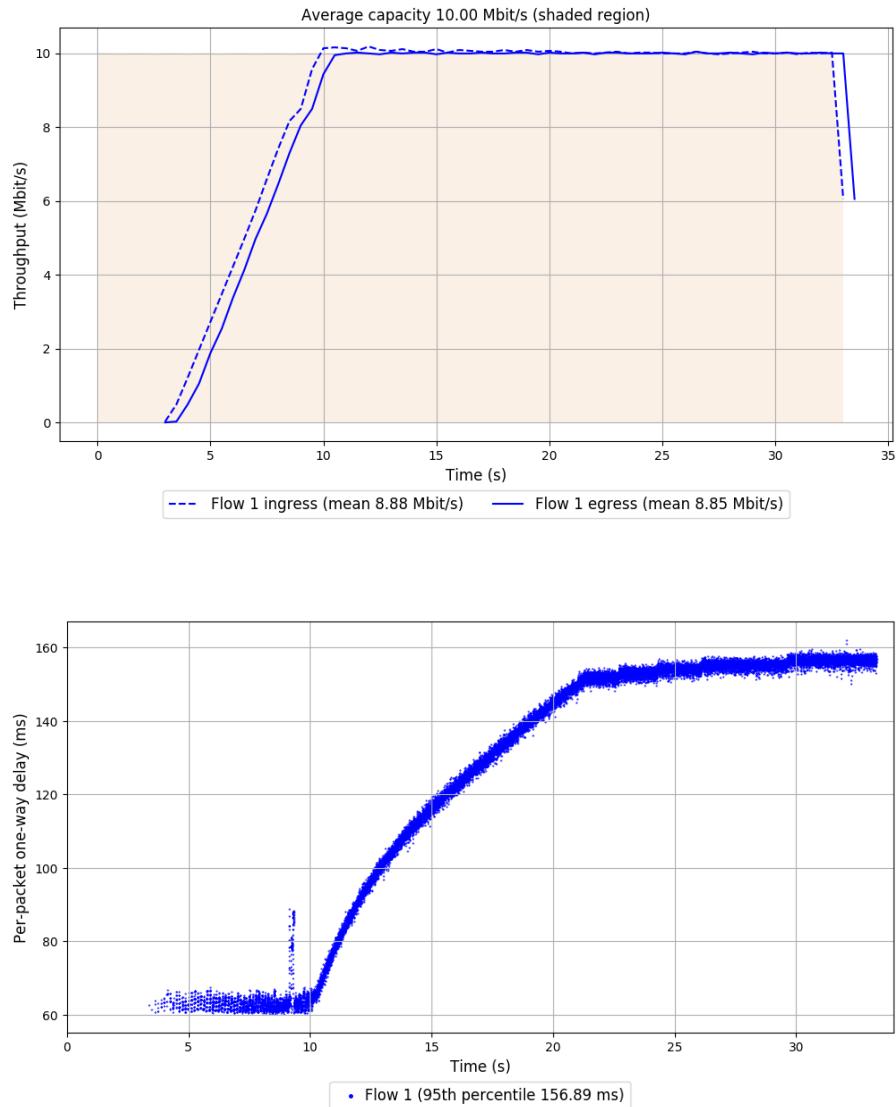


```
Run 1: Statistics of LEDBAT

Start at: 2019-07-31 04:16:45
End at: 2019-07-31 04:17:15

# Below is generated by plot.py at 2019-07-31 04:43:49
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 8.85 Mbit/s (88.5% utilization)
95th percentile per-packet one-way delay: 156.892 ms
Loss rate: 0.59%
-- Flow 1:
Average throughput: 8.85 Mbit/s
95th percentile per-packet one-way delay: 156.892 ms
Loss rate: 0.59%
```

Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2019-07-31 04:28:54

End at: 2019-07-31 04:29:24

Below is generated by plot.py at 2019-07-31 04:43:51

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 8.86 Mbit/s (88.6% utilization)

95th percentile per-packet one-way delay: 156.886 ms

Loss rate: 0.59%

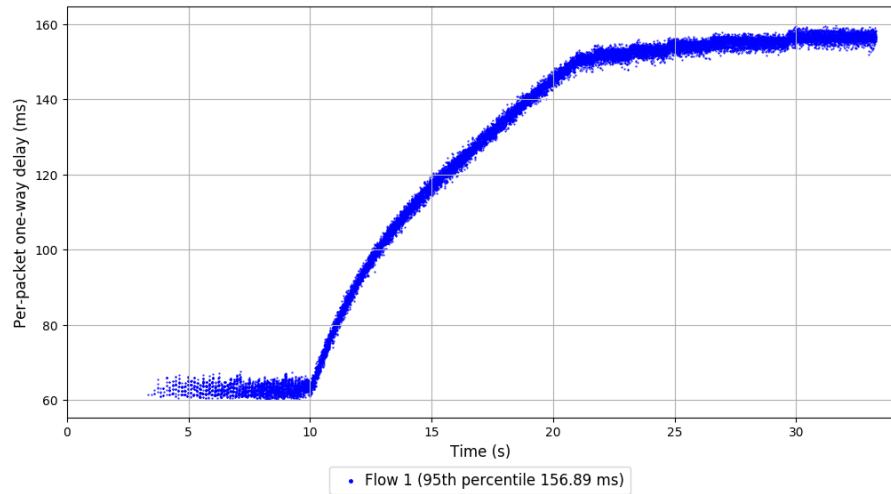
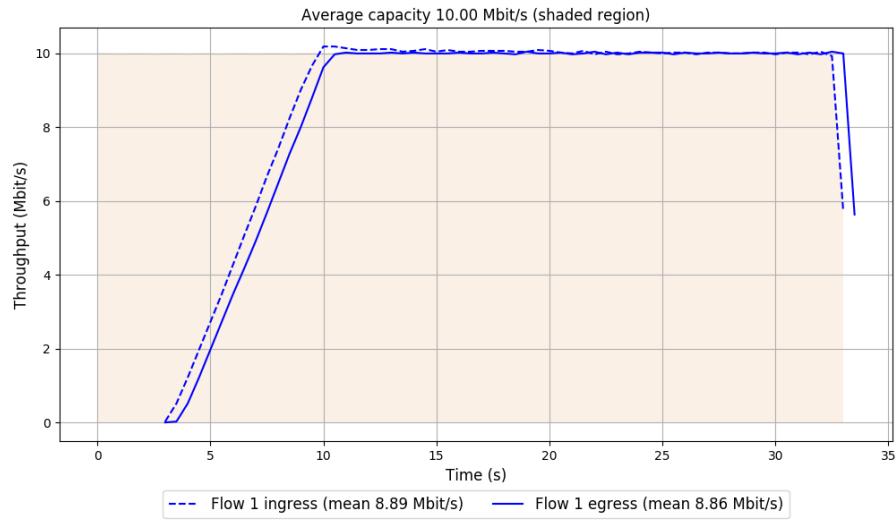
-- Flow 1:

Average throughput: 8.86 Mbit/s

95th percentile per-packet one-way delay: 156.886 ms

Loss rate: 0.59%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2019-07-31 04:41:04

End at: 2019-07-31 04:41:34

Below is generated by plot.py at 2019-07-31 04:43:53

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 8.86 Mbit/s (88.6% utilization)

95th percentile per-packet one-way delay: 156.808 ms

Loss rate: 0.58%

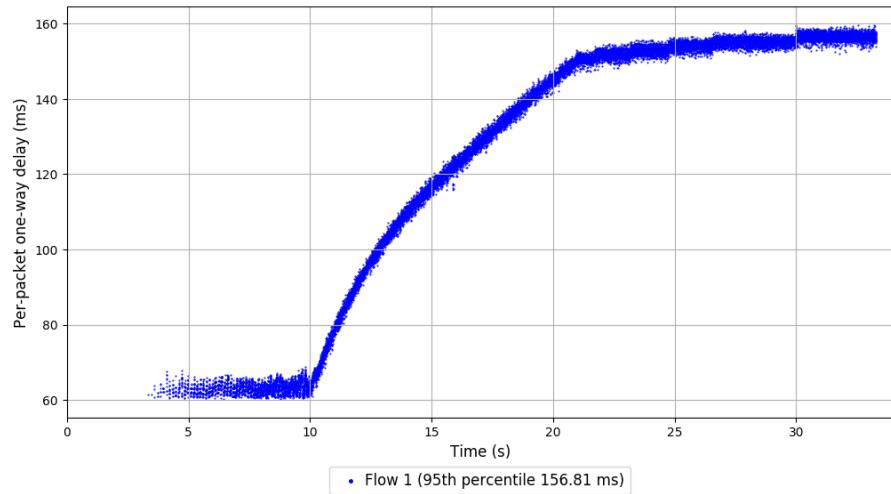
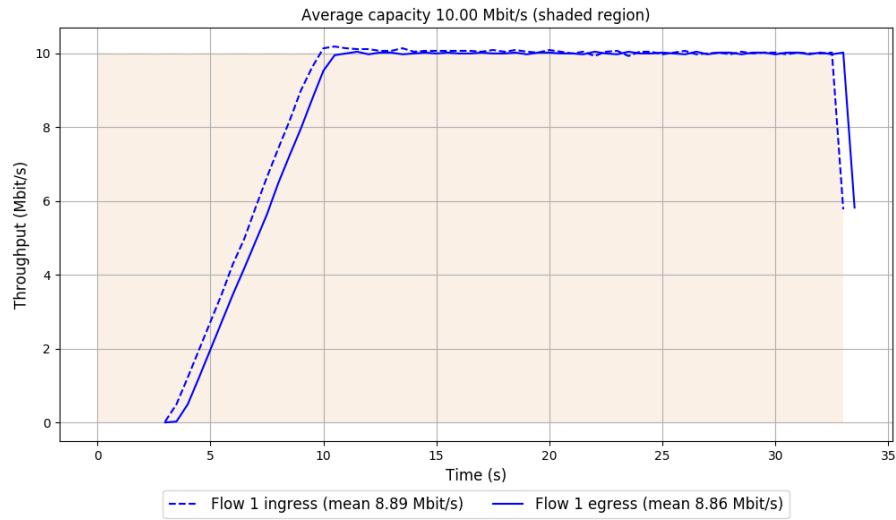
-- Flow 1:

Average throughput: 8.86 Mbit/s

95th percentile per-packet one-way delay: 156.808 ms

Loss rate: 0.58%

Run 3: Report of LEDBAT — Data Link

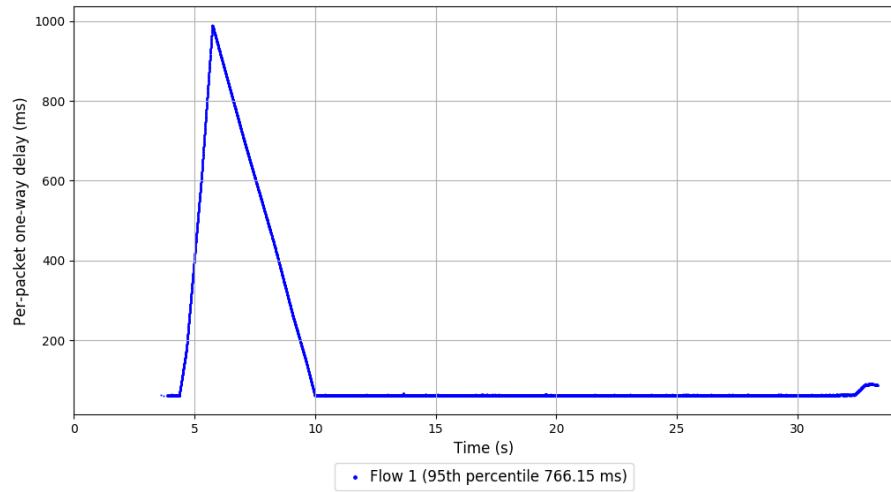
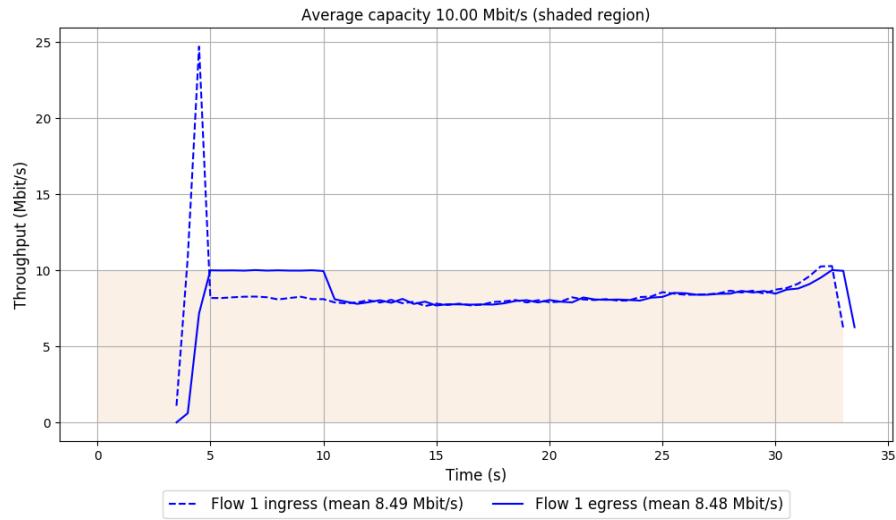


```
Run 1: Statistics of PCC-Allegro

Start at: 2019-07-31 04:15:36
End at: 2019-07-31 04:16:06

# Below is generated by plot.py at 2019-07-31 04:44:00
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 8.48 Mbit/s (84.8% utilization)
95th percentile per-packet one-way delay: 766.149 ms
Loss rate: 0.34%
-- Flow 1:
Average throughput: 8.48 Mbit/s
95th percentile per-packet one-way delay: 766.149 ms
Loss rate: 0.34%
```

Run 1: Report of PCC-Allegro — Data Link

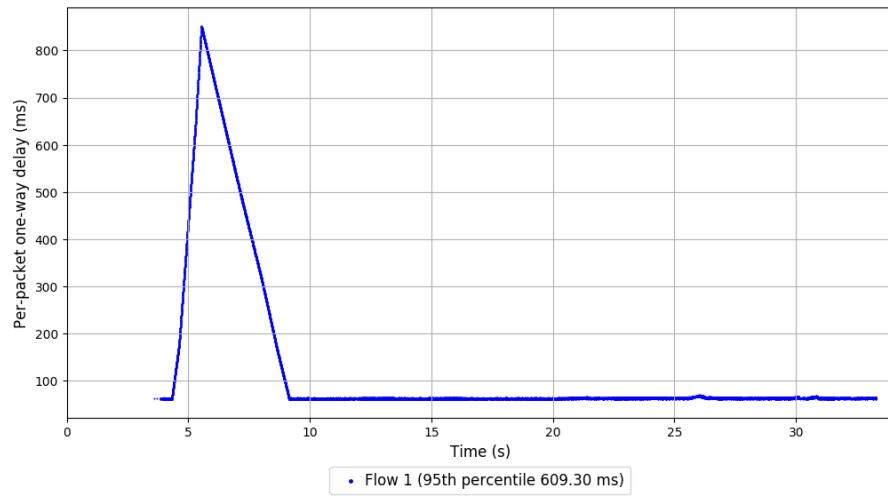
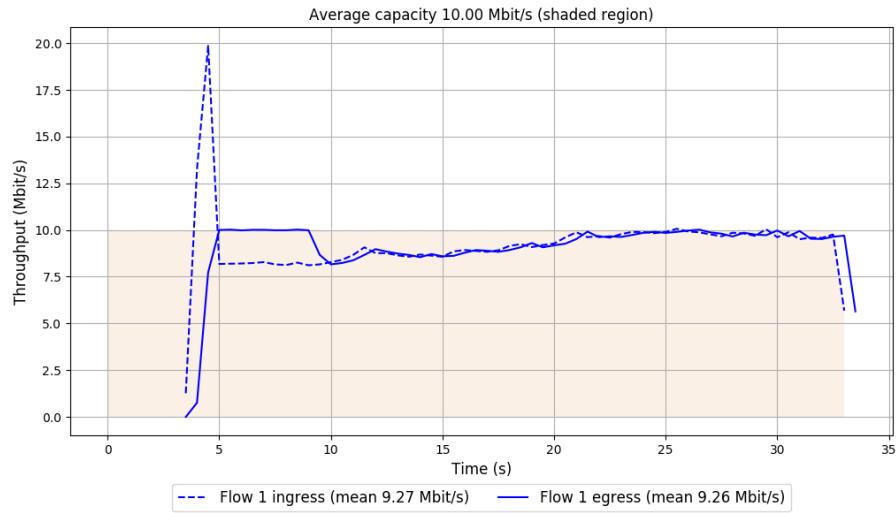


```
Run 2: Statistics of PCC-Allegro

Start at: 2019-07-31 04:27:45
End at: 2019-07-31 04:28:15

# Below is generated by plot.py at 2019-07-31 04:44:00
# 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: 609.298 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 9.26 Mbit/s
95th percentile per-packet one-way delay: 609.298 ms
Loss rate: 0.23%
```

Run 2: Report of PCC-Allegro — Data Link

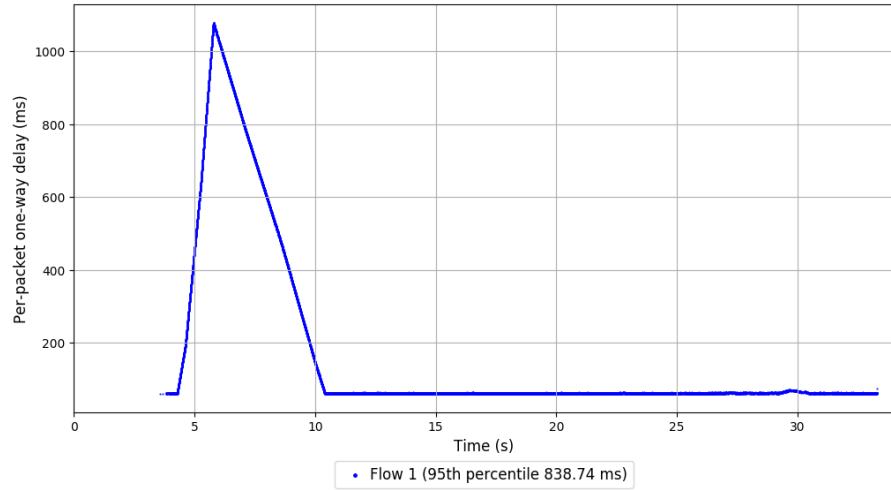
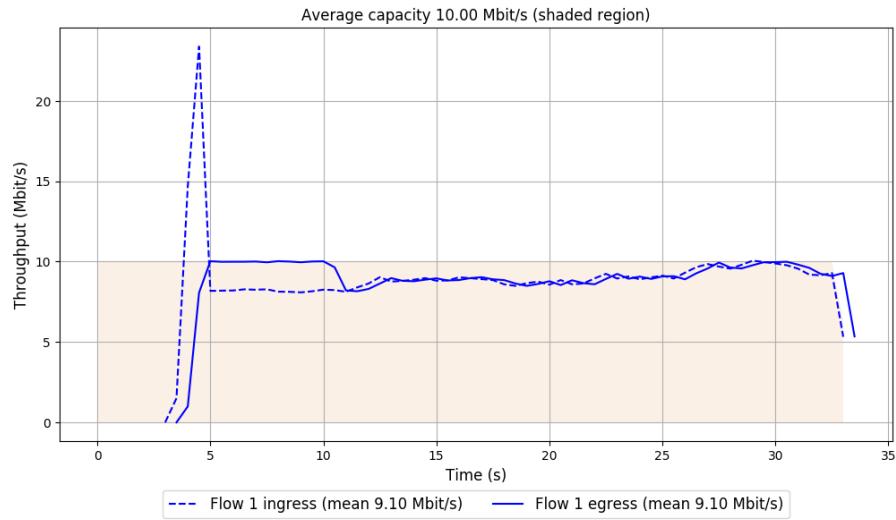


```
Run 3: Statistics of PCC-Allegro

Start at: 2019-07-31 04:39:55
End at: 2019-07-31 04:40:25

# Below is generated by plot.py at 2019-07-31 04:44:01
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.10 Mbit/s (91.0% utilization)
95th percentile per-packet one-way delay: 838.741 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 9.10 Mbit/s
95th percentile per-packet one-way delay: 838.741 ms
Loss rate: 0.21%
```

Run 3: Report of PCC-Allegro — Data Link

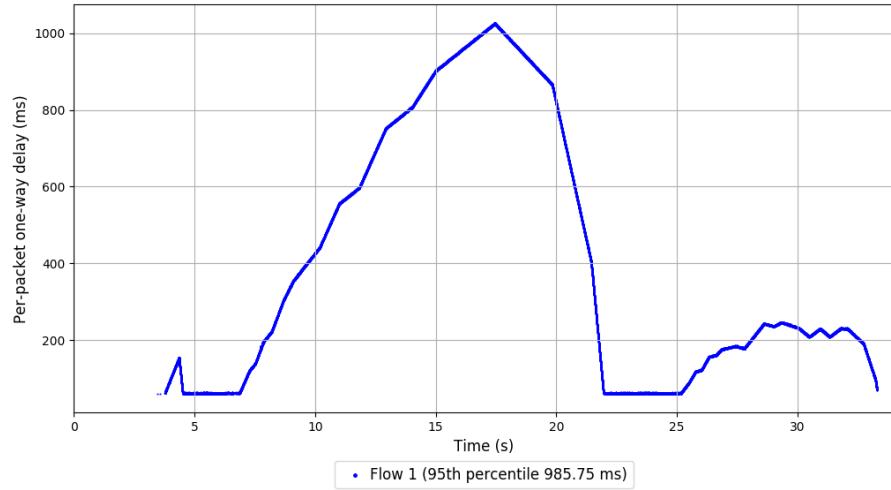
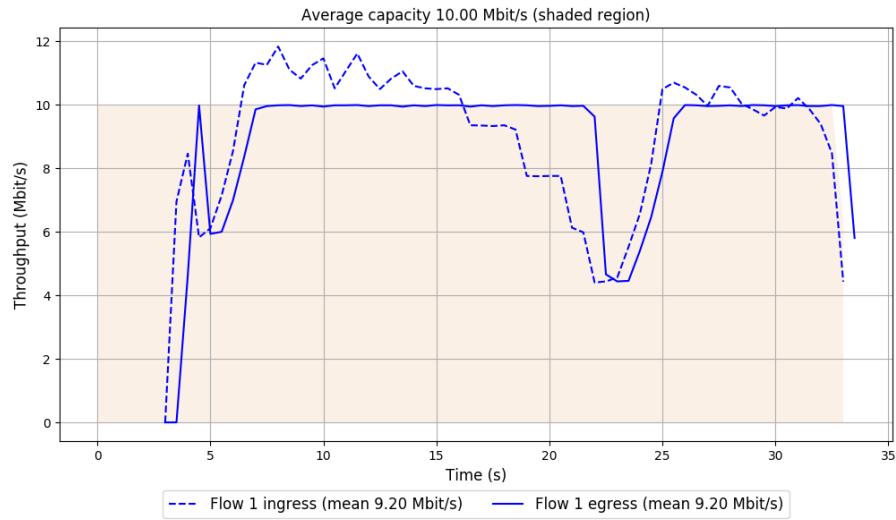


```
Run 1: Statistics of PCC-Expr

Start at: 2019-07-31 04:17:20
End at: 2019-07-31 04:17:50

# Below is generated by plot.py at 2019-07-31 04:44:10
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.20 Mbit/s (92.0% utilization)
95th percentile per-packet one-way delay: 985.747 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 9.20 Mbit/s
95th percentile per-packet one-way delay: 985.747 ms
Loss rate: 0.18%
```

Run 1: Report of PCC-Expr — Data Link

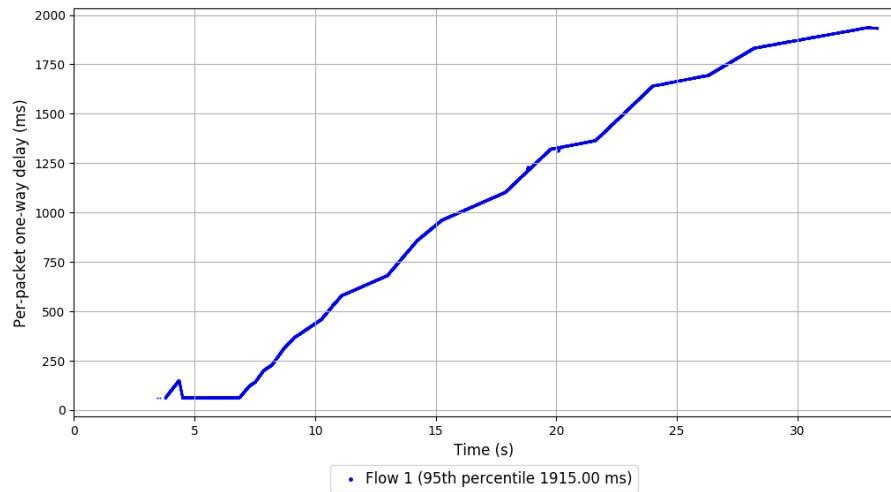
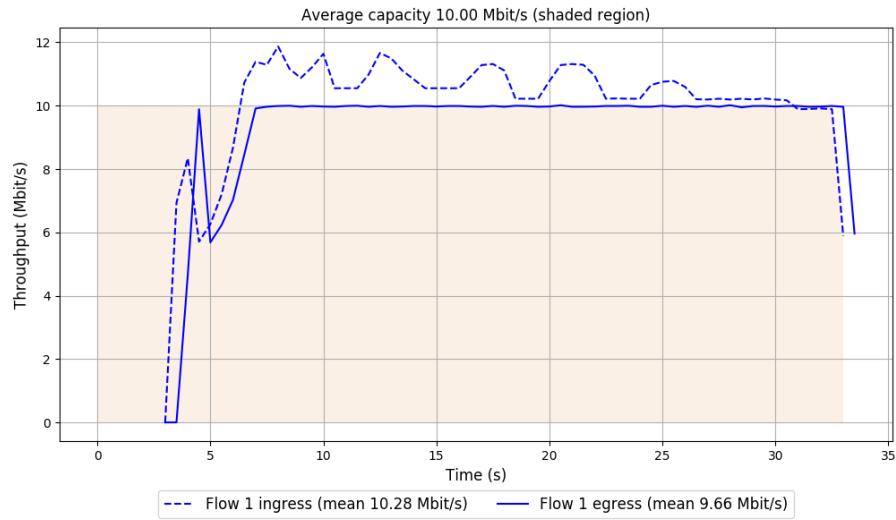


```
Run 2: Statistics of PCC-Expr

Start at: 2019-07-31 04:29:29
End at: 2019-07-31 04:29:59

# Below is generated by plot.py at 2019-07-31 04:44:12
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.66 Mbit/s (96.6% utilization)
95th percentile per-packet one-way delay: 1915.000 ms
Loss rate: 6.22%
-- Flow 1:
Average throughput: 9.66 Mbit/s
95th percentile per-packet one-way delay: 1915.000 ms
Loss rate: 6.22%
```

Run 2: Report of PCC-Expr — Data Link

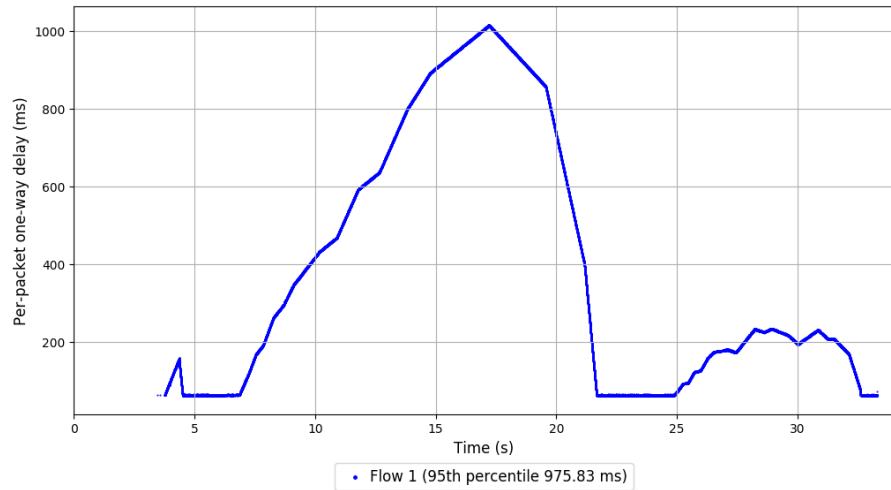
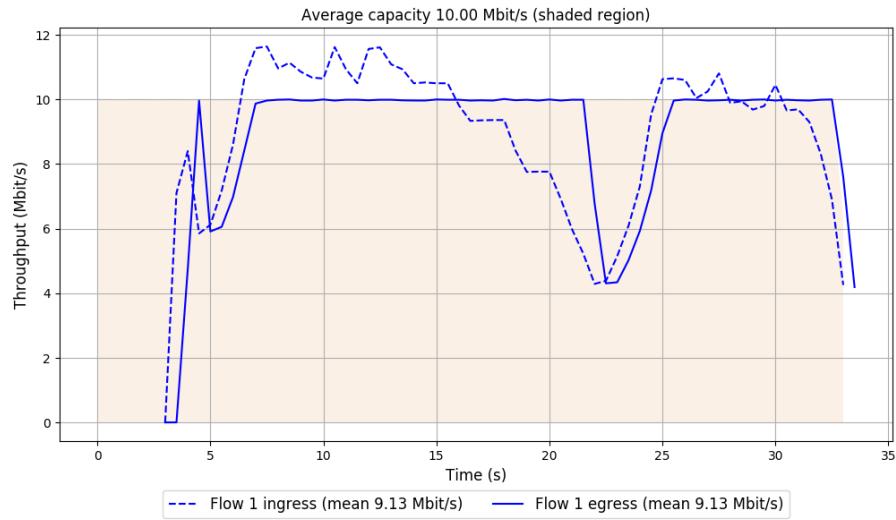


```
Run 3: Statistics of PCC-Expr

Start at: 2019-07-31 04:41:39
End at: 2019-07-31 04:42:09

# Below is generated by plot.py at 2019-07-31 04:44:17
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.13 Mbit/s (91.3% utilization)
95th percentile per-packet one-way delay: 975.831 ms
Loss rate: 0.17%
-- Flow 1:
Average throughput: 9.13 Mbit/s
95th percentile per-packet one-way delay: 975.831 ms
Loss rate: 0.17%
```

Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2019-07-31 04:15:02

End at: 2019-07-31 04:15:32

Run 1: Report of QUIC Cubic — Data Link

Figure is missing

Figure is missing

Run 2: Statistics of QUIC Cubic

Start at: 2019-07-31 04:27:11

End at: 2019-07-31 04:27:41

Run 2: Report of QUIC Cubic — Data Link

Figure is missing

Figure is missing

Run 3: Statistics of QUIC Cubic

Start at: 2019-07-31 04:39:21

End at: 2019-07-31 04:39:51

Run 3: Report of QUIC Cubic — Data Link

Figure is missing

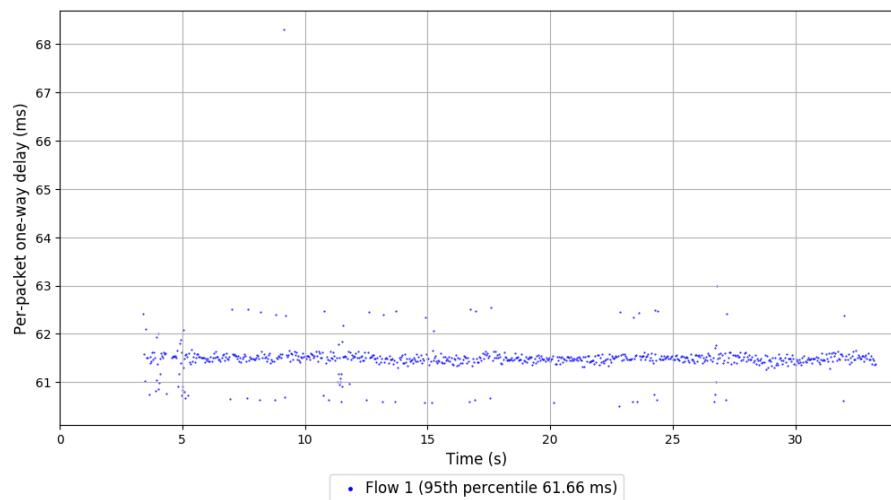
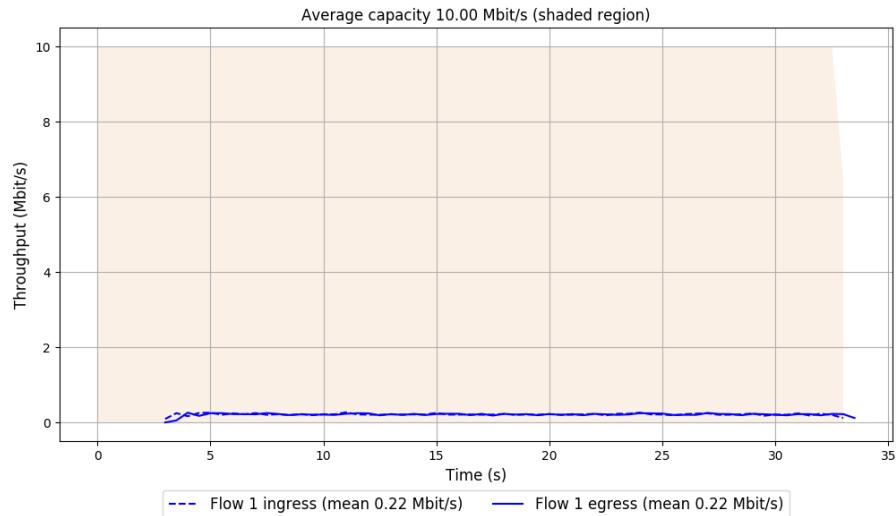
Figure is missing

```
Run 1: Statistics of SCReAM

Start at: 2019-07-31 04:14:27
End at: 2019-07-31 04:14:57

# Below is generated by plot.py at 2019-07-31 04:44:17
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 0.22 Mbit/s (2.2% utilization)
95th percentile per-packet one-way delay: 61.656 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 61.656 ms
Loss rate: 0.13%
```

Run 1: Report of SCReAM — Data Link



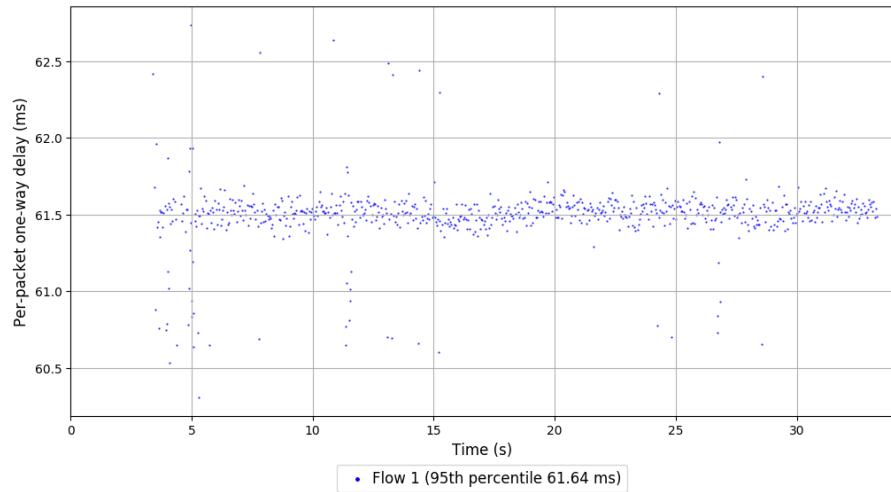
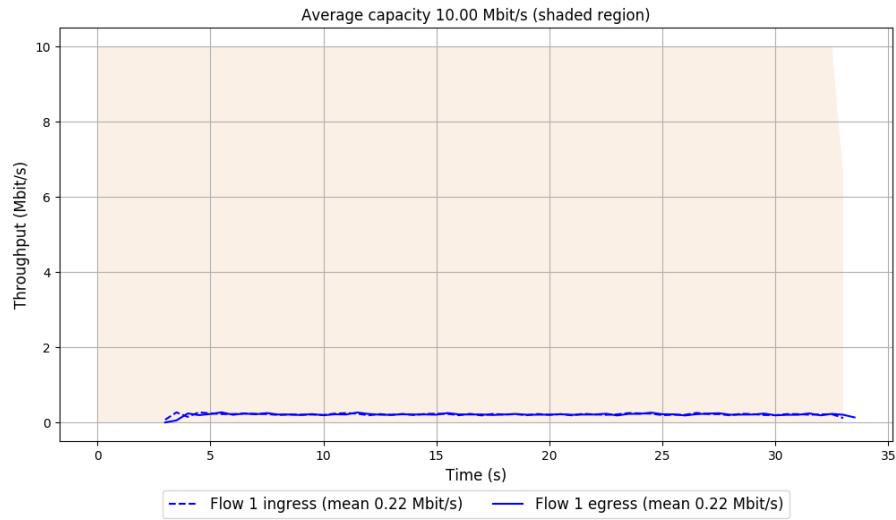
Run 2: Statistics of SCReAM

Start at: 2019-07-31 04:26:37

End at: 2019-07-31 04:27:07

```
# Below is generated by plot.py at 2019-07-31 04:44:17
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 0.22 Mbit/s (2.2% utilization)
95th percentile per-packet one-way delay: 61.640 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 61.640 ms
Loss rate: 0.13%
```

Run 2: Report of SCReAM — Data Link



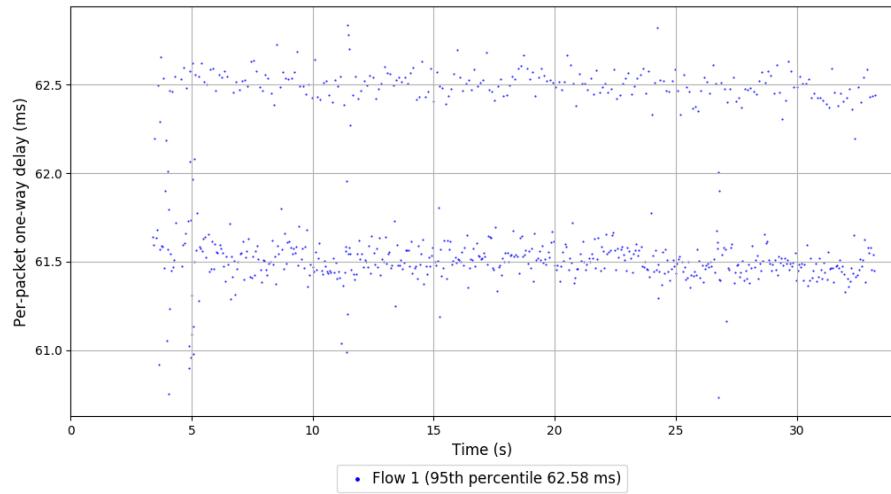
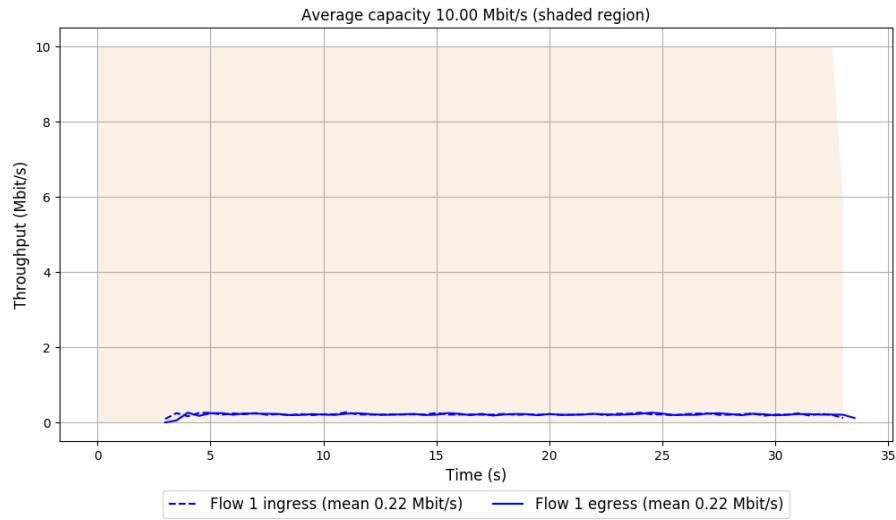
Run 3: Statistics of SCReAM

Start at: 2019-07-31 04:38:47

End at: 2019-07-31 04:39:17

```
# Below is generated by plot.py at 2019-07-31 04:44:17
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 0.22 Mbit/s (2.2% utilization)
95th percentile per-packet one-way delay: 62.575 ms
Loss rate: 0.26%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 62.575 ms
Loss rate: 0.26%
```

Run 3: Report of SCReAM — Data Link



Run 1: Statistics of Sprout

Start at: 2019-07-31 04:09:50

End at: 2019-07-31 04:10:20

Below is generated by plot.py at 2019-07-31 04:44:17

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 1.09 Mbit/s (10.9% utilization)

95th percentile per-packet one-way delay: 75.291 ms

Loss rate: 0.53%

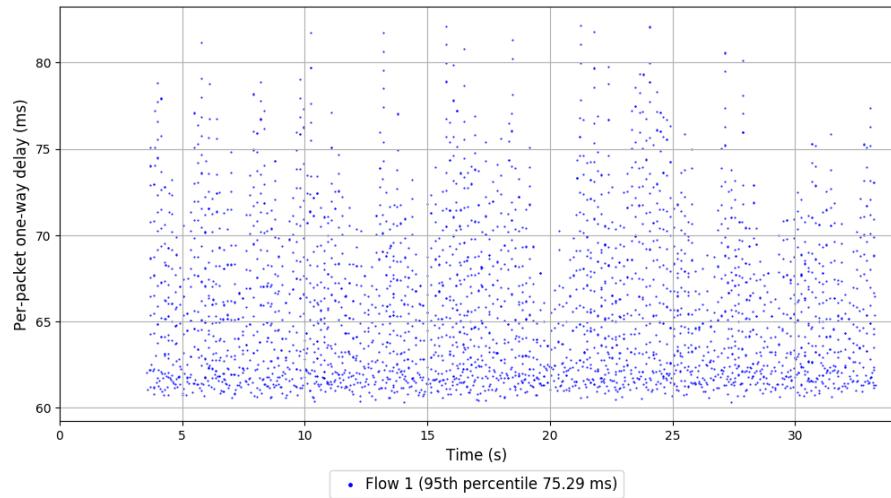
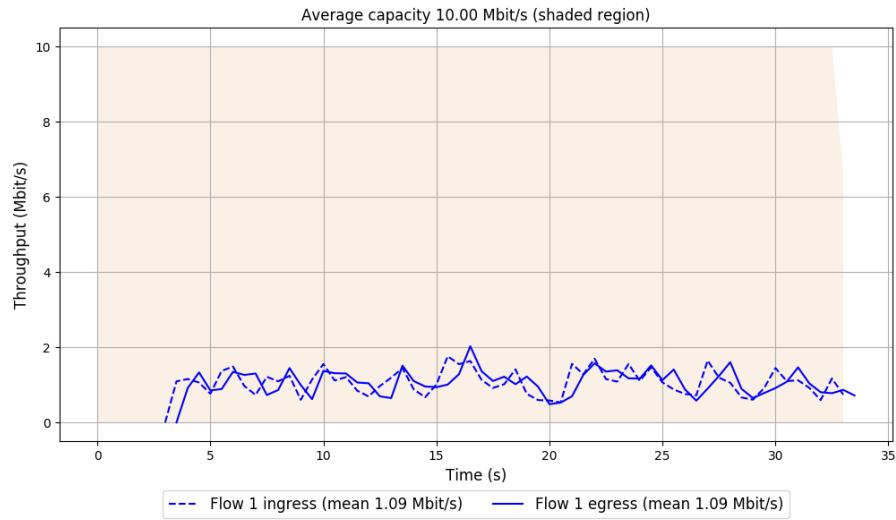
-- Flow 1:

Average throughput: 1.09 Mbit/s

95th percentile per-packet one-way delay: 75.291 ms

Loss rate: 0.53%

Run 1: Report of Sprout — Data Link



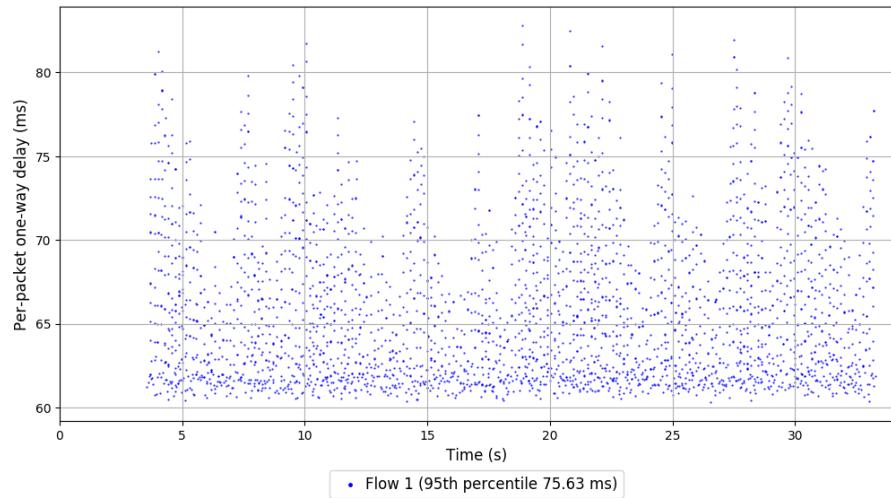
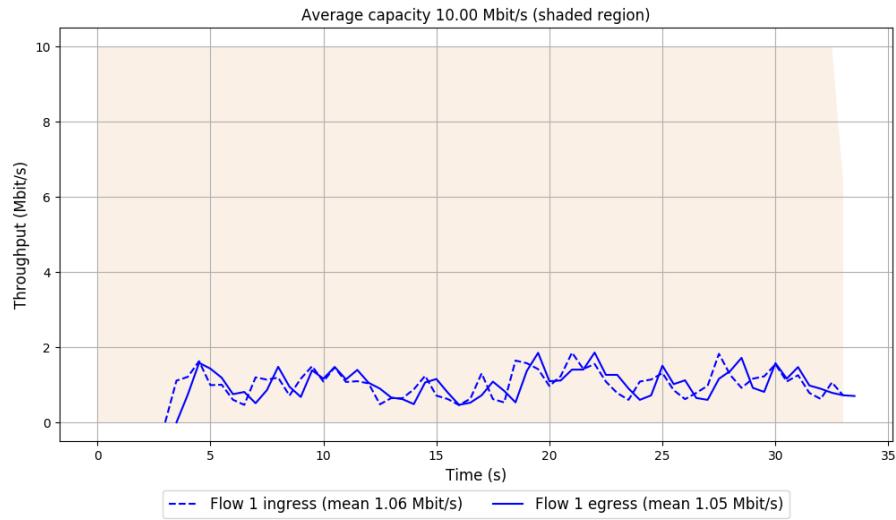
Run 2: Statistics of Sprout

Start at: 2019-07-31 04:21:59

End at: 2019-07-31 04:22:29

```
# Below is generated by plot.py at 2019-07-31 04:44:17
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 1.05 Mbit/s (10.5% utilization)
95th percentile per-packet one-way delay: 75.632 ms
Loss rate: 0.56%
-- Flow 1:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 75.632 ms
Loss rate: 0.56%
```

Run 2: Report of Sprout — Data Link



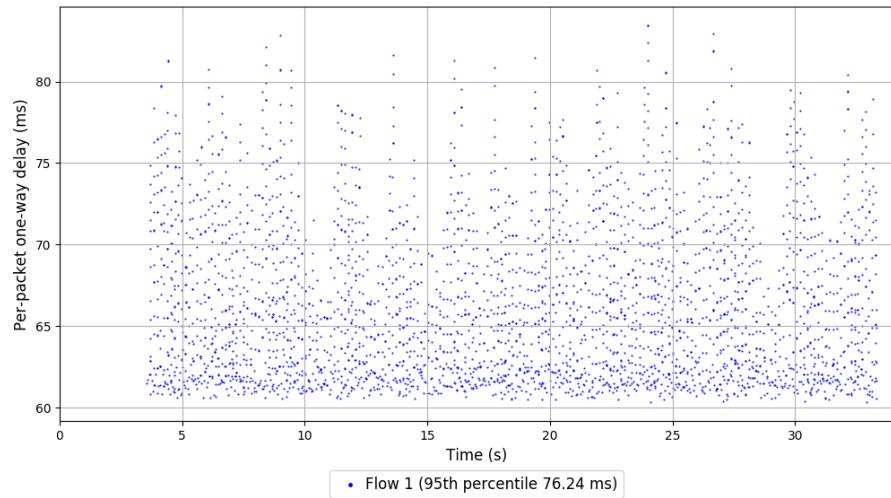
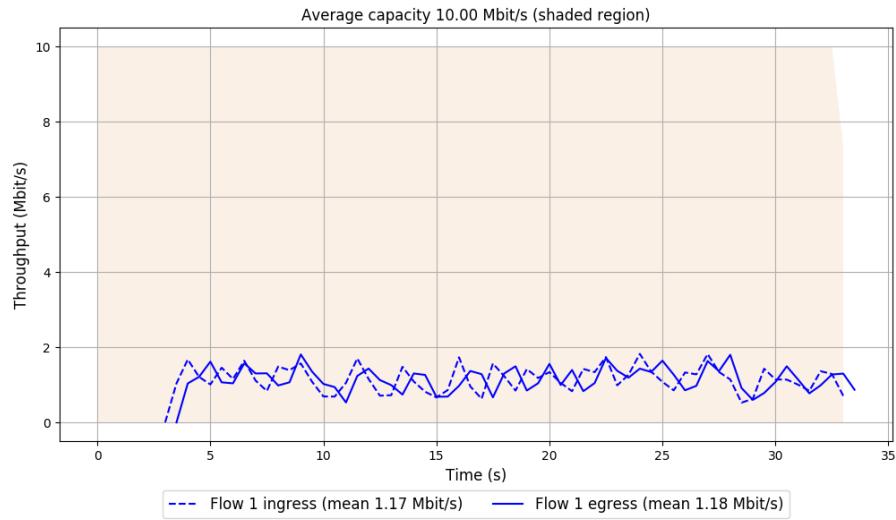
Run 3: Statistics of Sprout

Start at: 2019-07-31 04:34:09

End at: 2019-07-31 04:34:39

```
# Below is generated by plot.py at 2019-07-31 04:44:17
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 1.18 Mbit/s (11.8% utilization)
95th percentile per-packet one-way delay: 76.237 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 76.237 ms
Loss rate: 0.00%
```

Run 3: Report of Sprout — Data Link

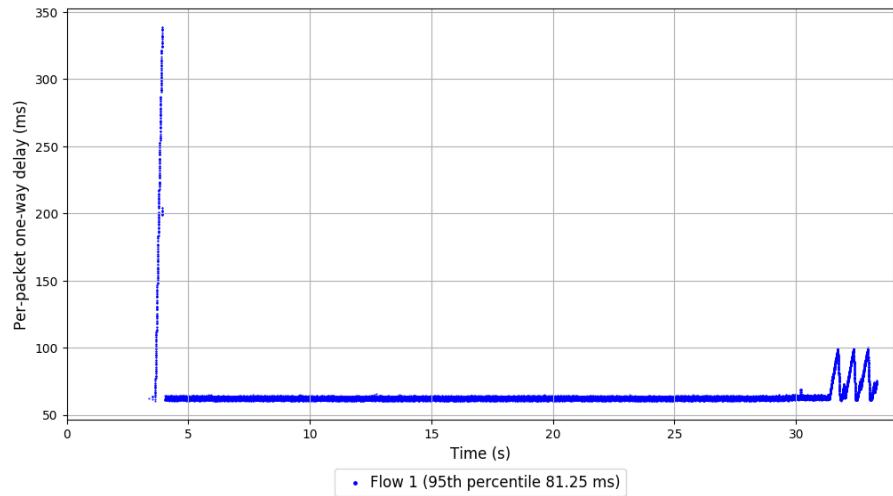
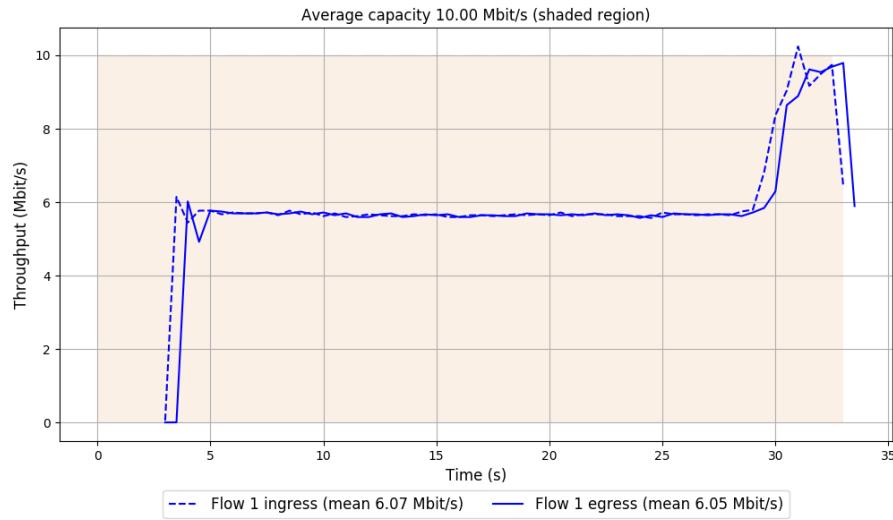


```
Run 1: Statistics of TaoVA-100x

Start at: 2019-07-31 04:13:18
End at: 2019-07-31 04:13:48

# Below is generated by plot.py at 2019-07-31 04:44:26
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 6.05 Mbit/s (60.5% utilization)
95th percentile per-packet one-way delay: 81.249 ms
Loss rate: 0.45%
-- Flow 1:
Average throughput: 6.05 Mbit/s
95th percentile per-packet one-way delay: 81.249 ms
Loss rate: 0.45%
```

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



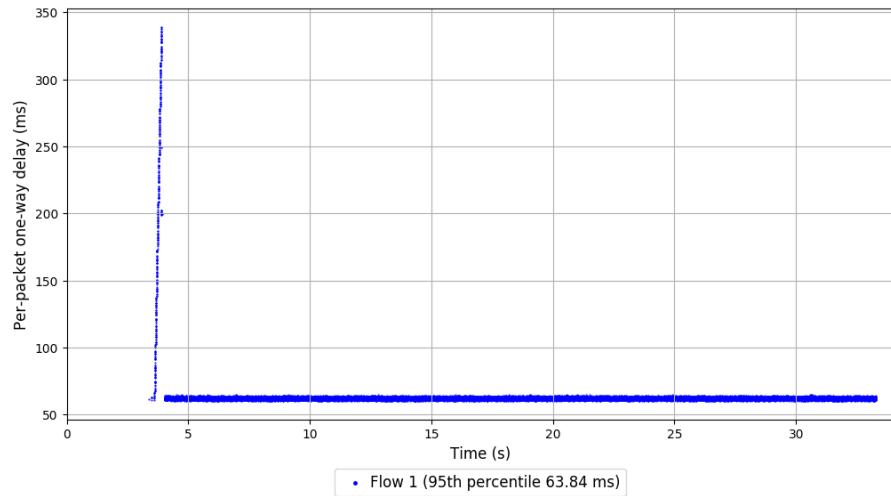
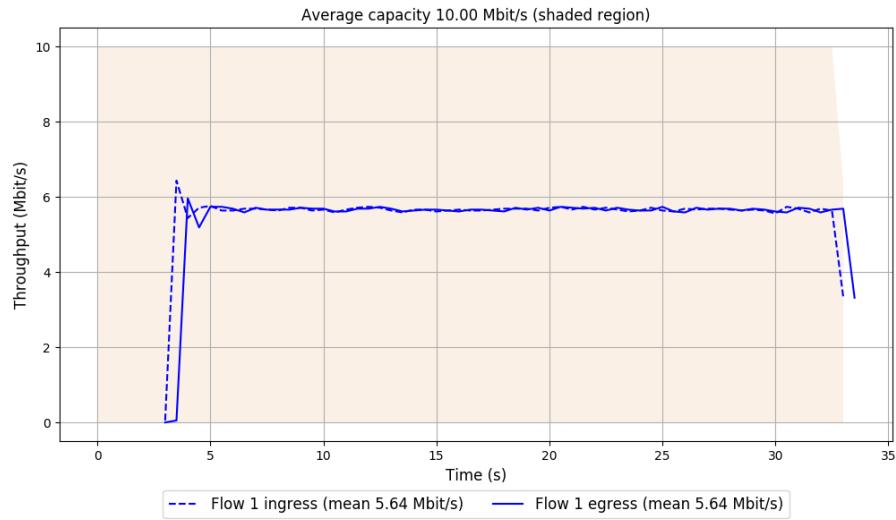
Run 2: Statistics of TaoVA-100x

Start at: 2019-07-31 04:25:27

End at: 2019-07-31 04:25:57

```
# Below is generated by plot.py at 2019-07-31 04:44:30
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 5.64 Mbit/s (56.4% utilization)
95th percentile per-packet one-way delay: 63.838 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 5.64 Mbit/s
95th percentile per-packet one-way delay: 63.838 ms
Loss rate: 0.21%
```

Run 2: Report of TaoVA-100x — Data Link

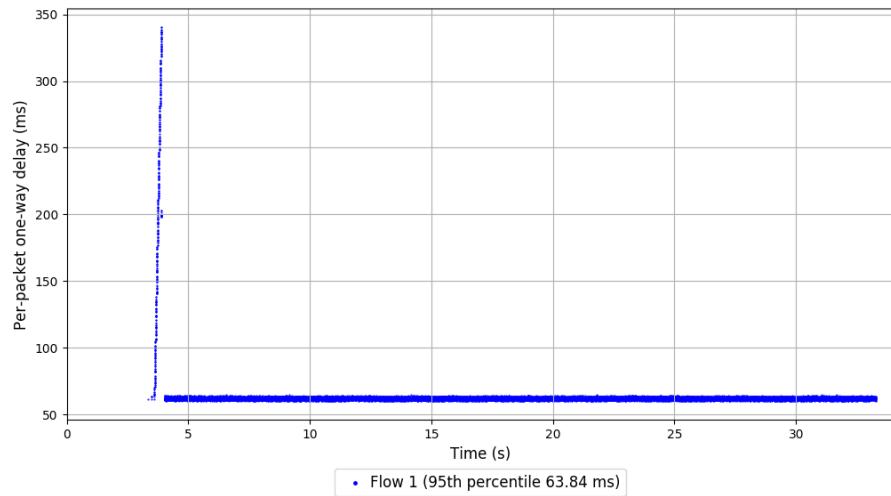
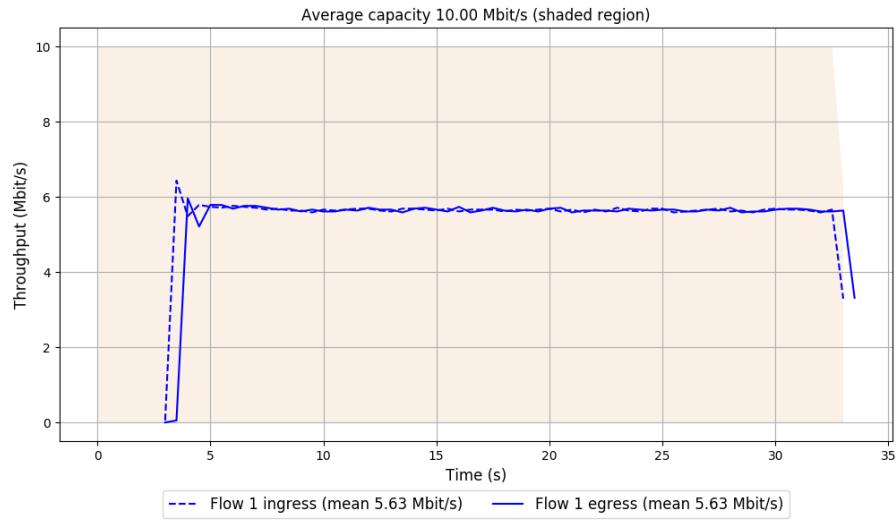


```
Run 3: Statistics of TaoVA-100x

Start at: 2019-07-31 04:37:37
End at: 2019-07-31 04:38:08

# Below is generated by plot.py at 2019-07-31 04:44:30
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 5.63 Mbit/s (56.3% utilization)
95th percentile per-packet one-way delay: 63.837 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 5.63 Mbit/s
95th percentile per-packet one-way delay: 63.837 ms
Loss rate: 0.20%
```

Run 3: Report of TaoVA-100x — Data Link

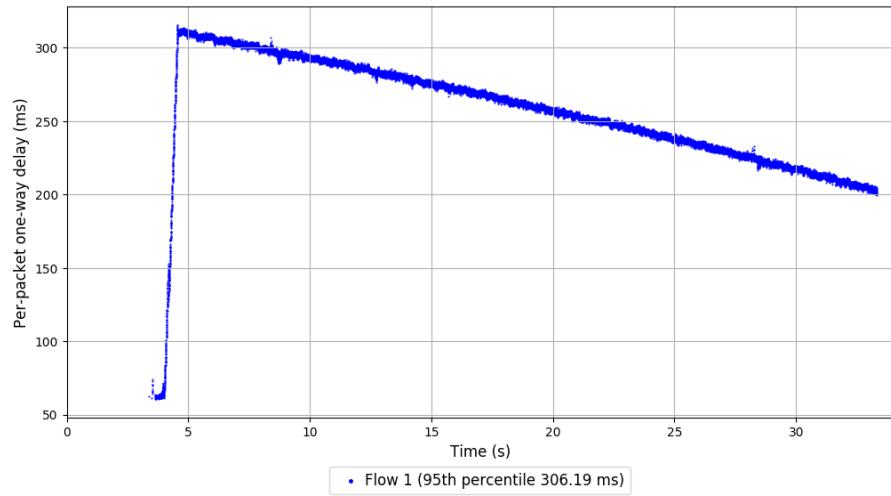
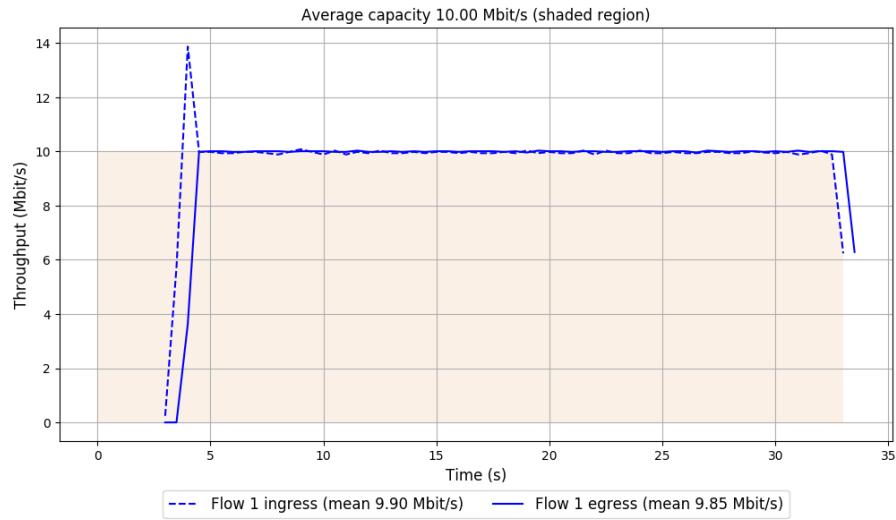


```
Run 1: Statistics of TCP Vegas

Start at: 2019-07-31 04:11:34
End at: 2019-07-31 04:12:04

# Below is generated by plot.py at 2019-07-31 04:44:30
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.85 Mbit/s (98.5% utilization)
95th percentile per-packet one-way delay: 306.191 ms
Loss rate: 0.67%
-- Flow 1:
Average throughput: 9.85 Mbit/s
95th percentile per-packet one-way delay: 306.191 ms
Loss rate: 0.67%
```

Run 1: Report of TCP Vegas — Data Link



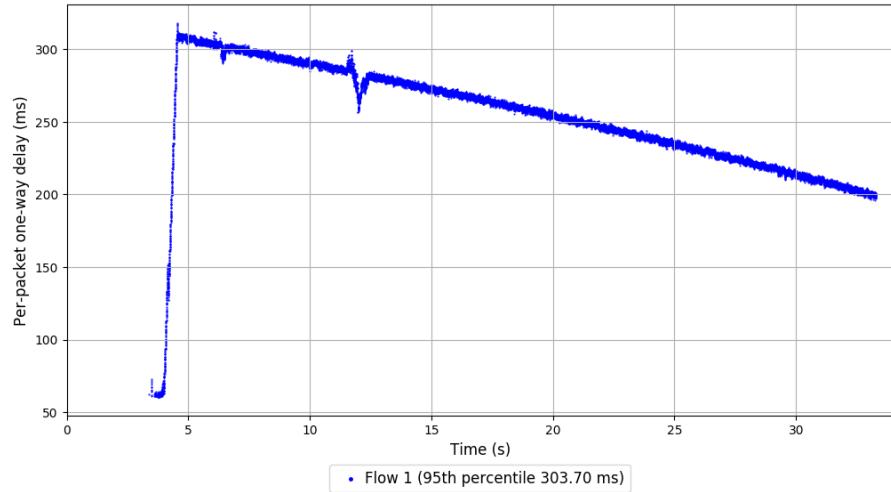
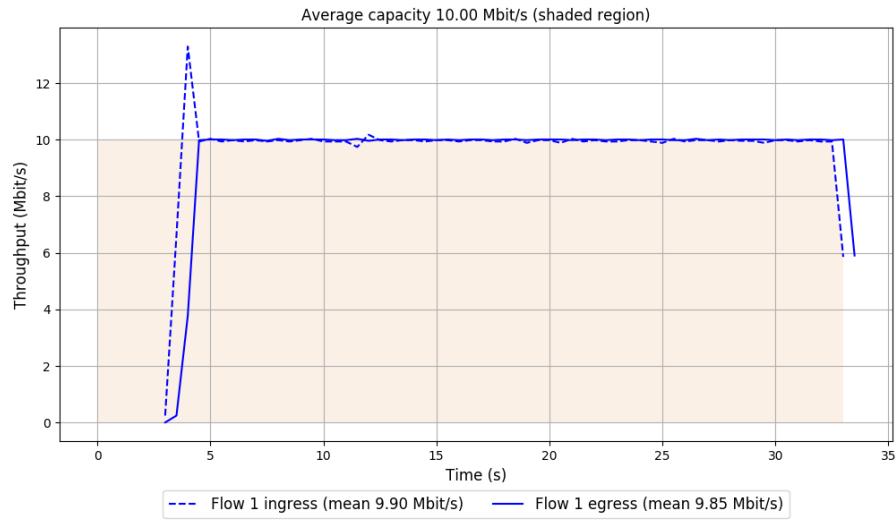
Run 2: Statistics of TCP Vegas

Start at: 2019-07-31 04:23:44

End at: 2019-07-31 04:24:14

```
# Below is generated by plot.py at 2019-07-31 04:44:30
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.85 Mbit/s (98.5% utilization)
95th percentile per-packet one-way delay: 303.697 ms
Loss rate: 0.66%
-- Flow 1:
Average throughput: 9.85 Mbit/s
95th percentile per-packet one-way delay: 303.697 ms
Loss rate: 0.66%
```

Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2019-07-31 04:35:54

End at: 2019-07-31 04:36:24

Below is generated by plot.py at 2019-07-31 04:44:30

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 9.85 Mbit/s (98.5% utilization)

95th percentile per-packet one-way delay: 115.420 ms

Loss rate: 0.23%

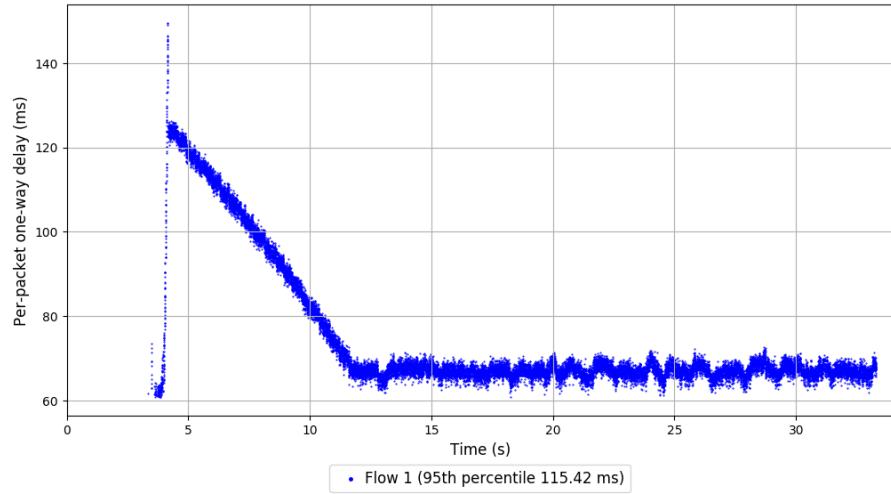
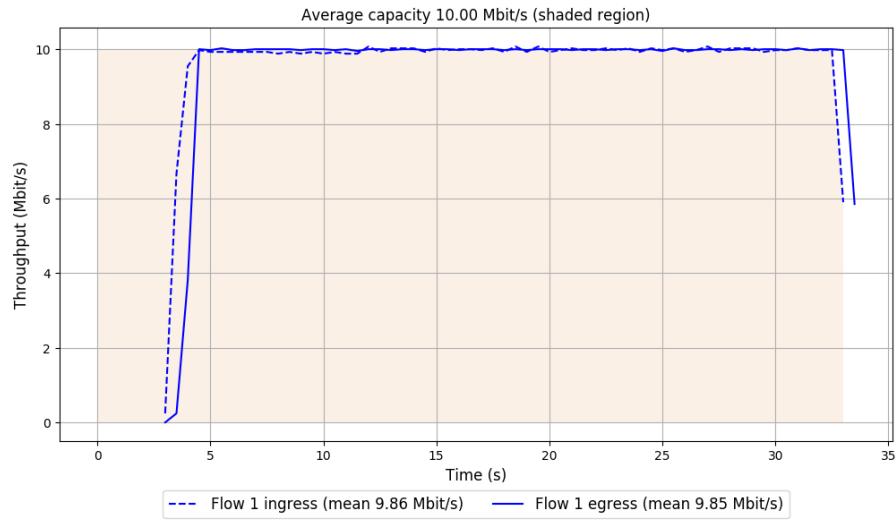
-- Flow 1:

Average throughput: 9.85 Mbit/s

95th percentile per-packet one-way delay: 115.420 ms

Loss rate: 0.23%

Run 3: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2019-07-31 04:08:05

End at: 2019-07-31 04:08:35

Below is generated by plot.py at 2019-07-31 04:44:36

Datalink statistics

-- Total of 1 flow:

Average capacity: 10.00 Mbit/s

Average throughput: 9.76 Mbit/s (97.6% utilization)

95th percentile per-packet one-way delay: 717.003 ms

Loss rate: 1.30%

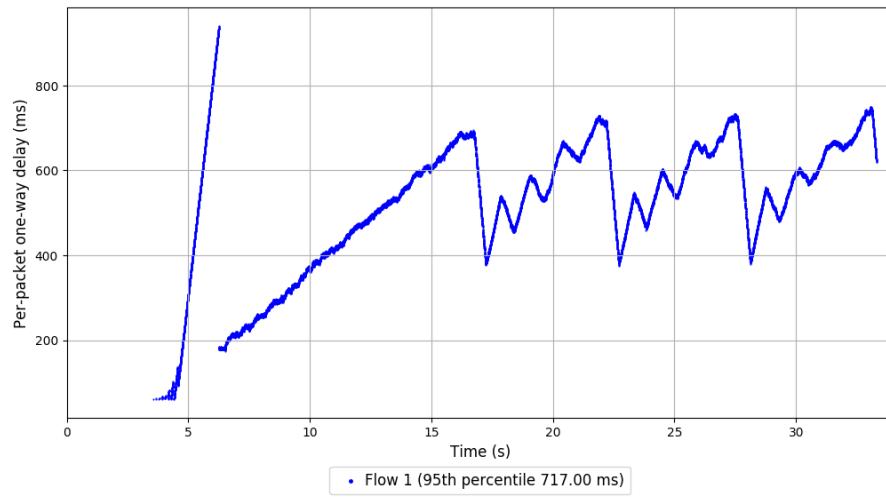
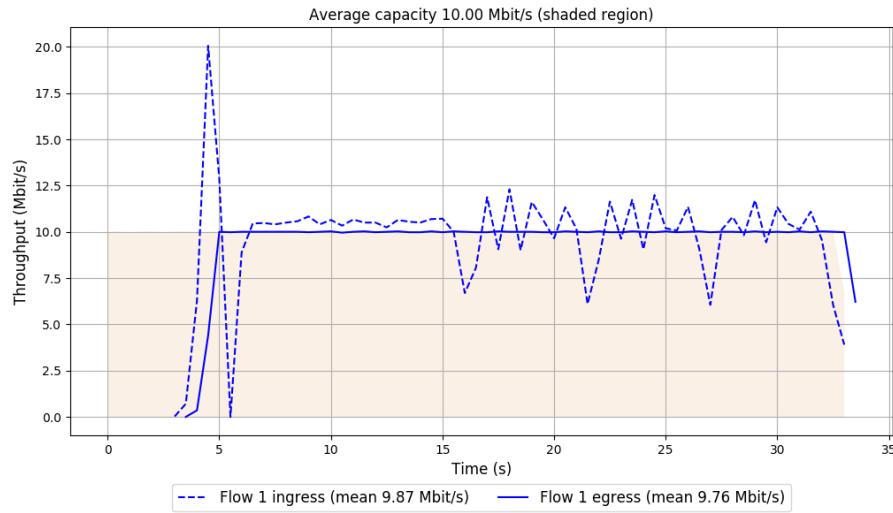
-- Flow 1:

Average throughput: 9.76 Mbit/s

95th percentile per-packet one-way delay: 717.003 ms

Loss rate: 1.30%

Run 1: Report of Verus — Data Link



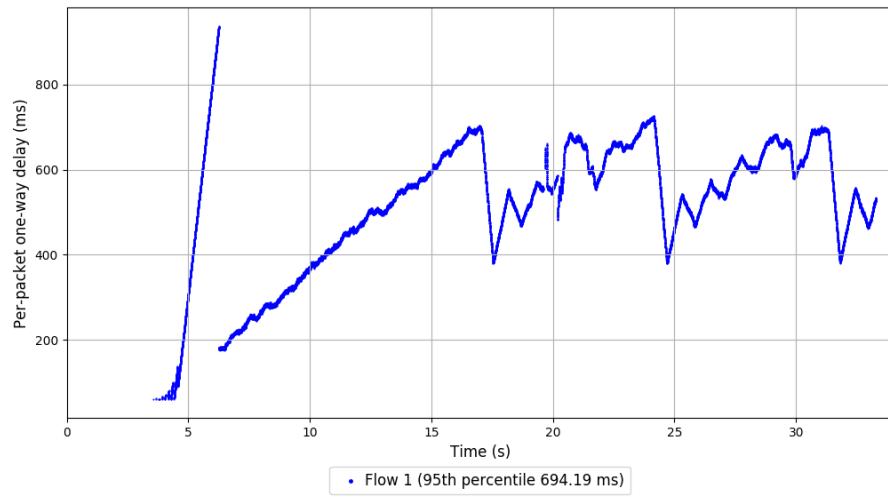
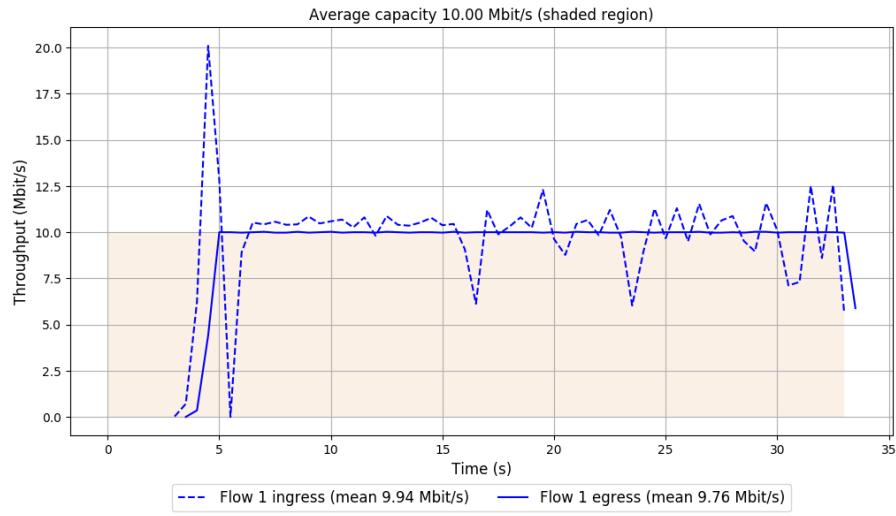
Run 2: Statistics of Verus

Start at: 2019-07-31 04:20:15

End at: 2019-07-31 04:20:45

```
# Below is generated by plot.py at 2019-07-31 04:44:38
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.76 Mbit/s (97.6% utilization)
95th percentile per-packet one-way delay: 694.188 ms
Loss rate: 1.97%
-- Flow 1:
Average throughput: 9.76 Mbit/s
95th percentile per-packet one-way delay: 694.188 ms
Loss rate: 1.97%
```

Run 2: Report of Verus — Data Link



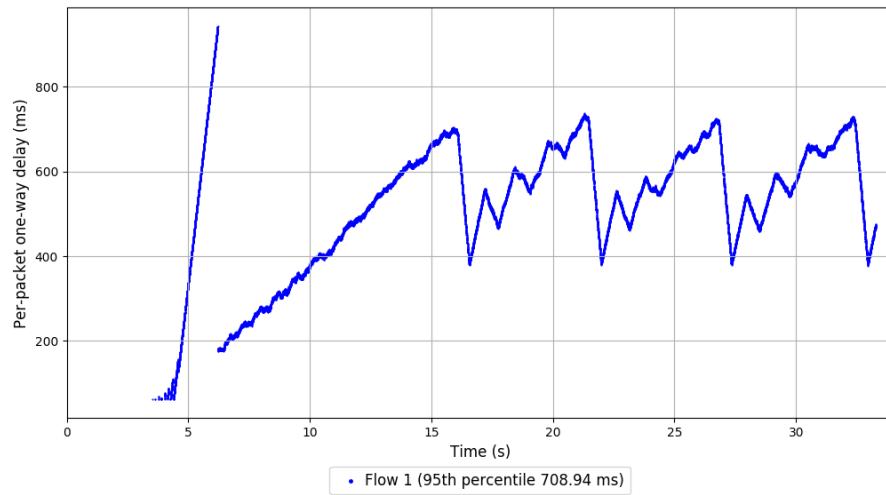
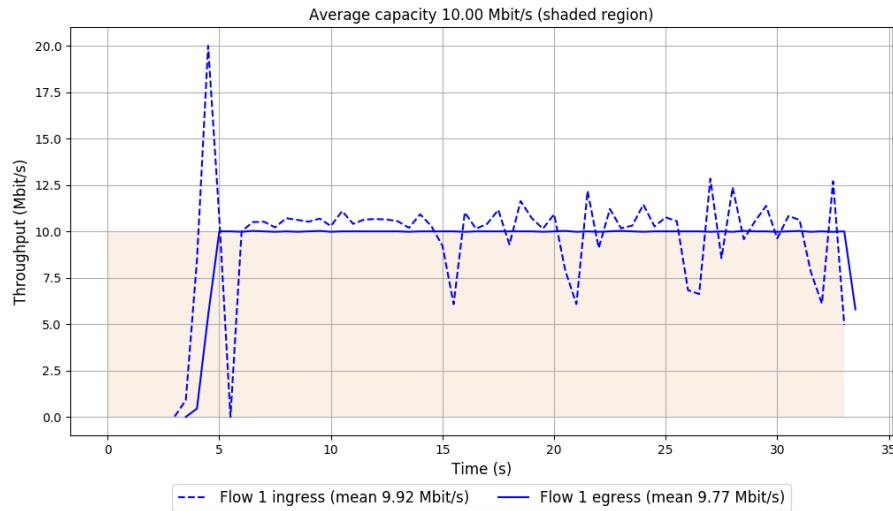
Run 3: Statistics of Verus

Start at: 2019-07-31 04:32:24

End at: 2019-07-31 04:32:54

```
# Below is generated by plot.py at 2019-07-31 04:44:43
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.77 Mbit/s (97.7% utilization)
95th percentile per-packet one-way delay: 708.942 ms
Loss rate: 1.69%
-- Flow 1:
Average throughput: 9.77 Mbit/s
95th percentile per-packet one-way delay: 708.942 ms
Loss rate: 1.69%
```

Run 3: Report of Verus — Data Link

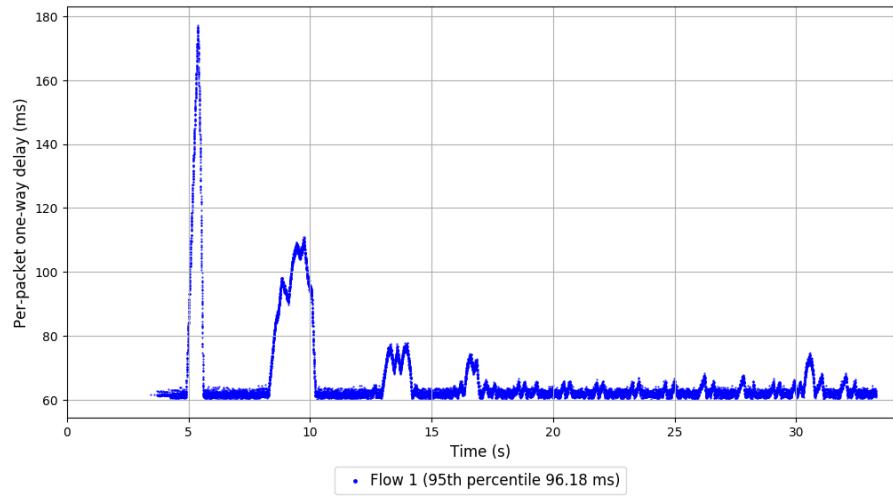
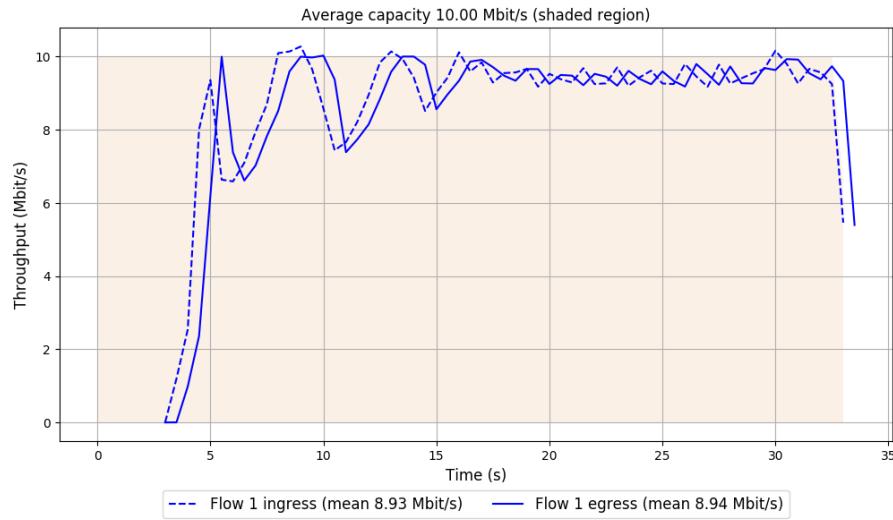


```
Run 1: Statistics of PCC-Vivace

Start at: 2019-07-31 04:10:59
End at: 2019-07-31 04:11:29

# Below is generated by plot.py at 2019-07-31 04:44:45
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 8.94 Mbit/s (89.4% utilization)
95th percentile per-packet one-way delay: 96.181 ms
Loss rate: 0.22%
-- Flow 1:
Average throughput: 8.94 Mbit/s
95th percentile per-packet one-way delay: 96.181 ms
Loss rate: 0.22%
```

Run 1: Report of PCC-Vivace — Data Link

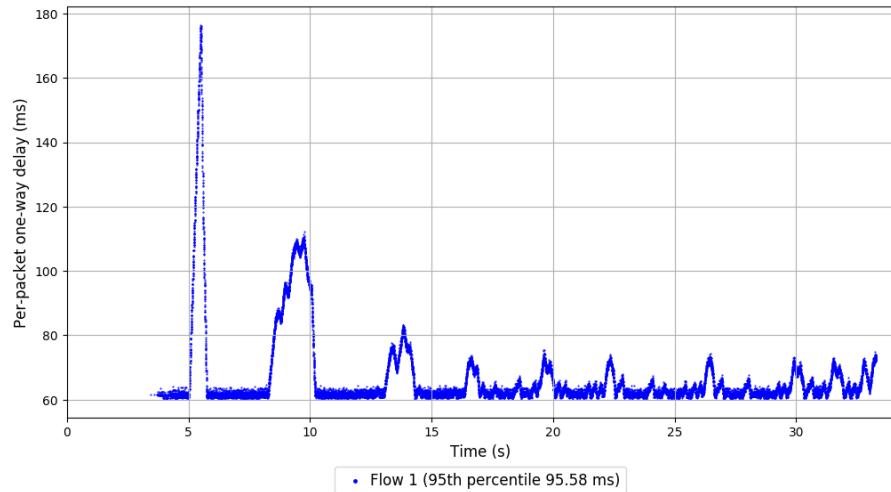
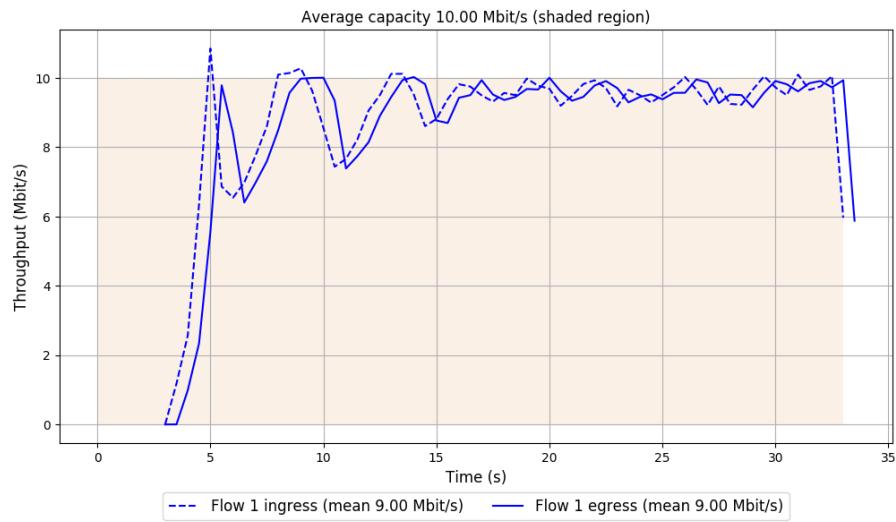


```
Run 2: Statistics of PCC-Vivace

Start at: 2019-07-31 04:23:09
End at: 2019-07-31 04:23:39

# Below is generated by plot.py at 2019-07-31 04:44:45
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.00 Mbit/s (90.0% utilization)
95th percentile per-packet one-way delay: 95.576 ms
Loss rate: 0.26%
-- Flow 1:
Average throughput: 9.00 Mbit/s
95th percentile per-packet one-way delay: 95.576 ms
Loss rate: 0.26%
```

Run 2: Report of PCC-Vivace — Data Link

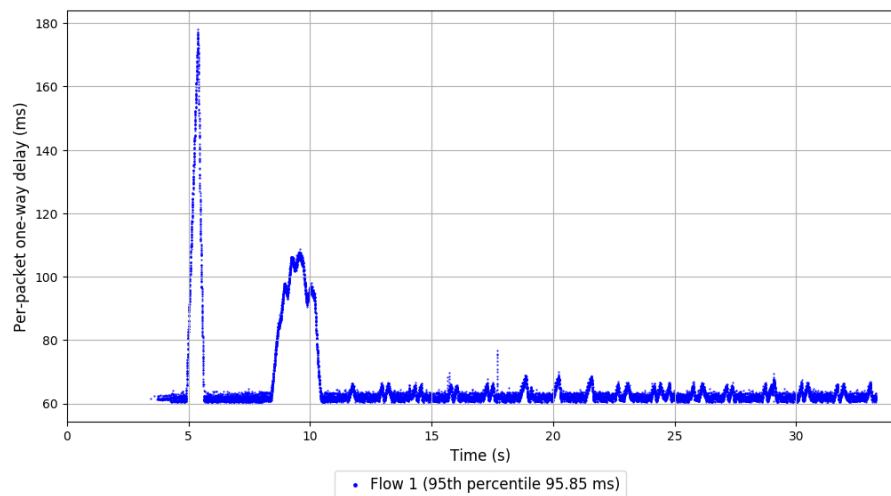
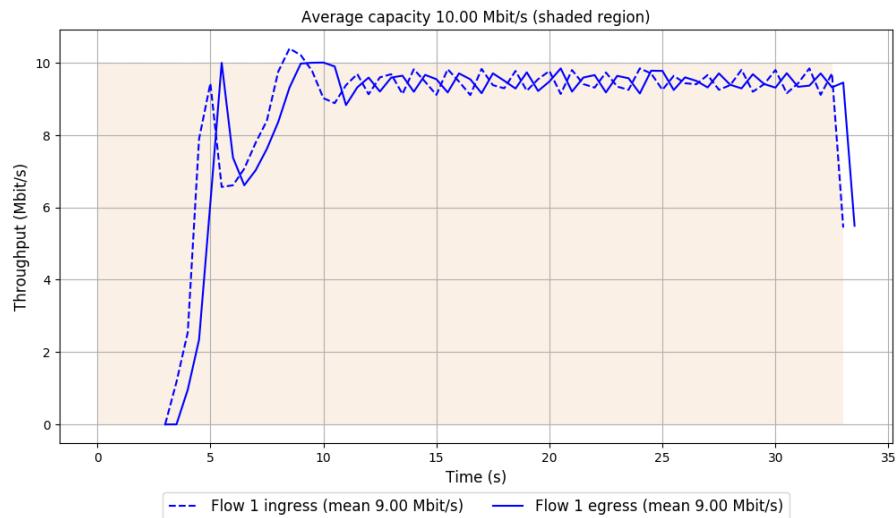


```
Run 3: Statistics of PCC-Vivace

Start at: 2019-07-31 04:35:19
End at: 2019-07-31 04:35:49

# Below is generated by plot.py at 2019-07-31 04:44:45
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.00 Mbit/s (90.0% utilization)
95th percentile per-packet one-way delay: 95.852 ms
Loss rate: 0.24%
-- Flow 1:
Average throughput: 9.00 Mbit/s
95th percentile per-packet one-way delay: 95.852 ms
Loss rate: 0.24%
```

Run 3: Report of PCC-Vivace — Data Link

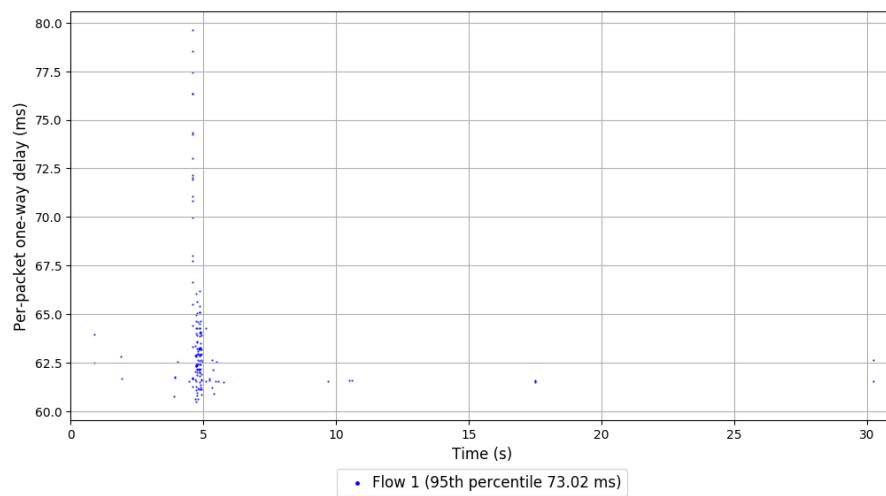
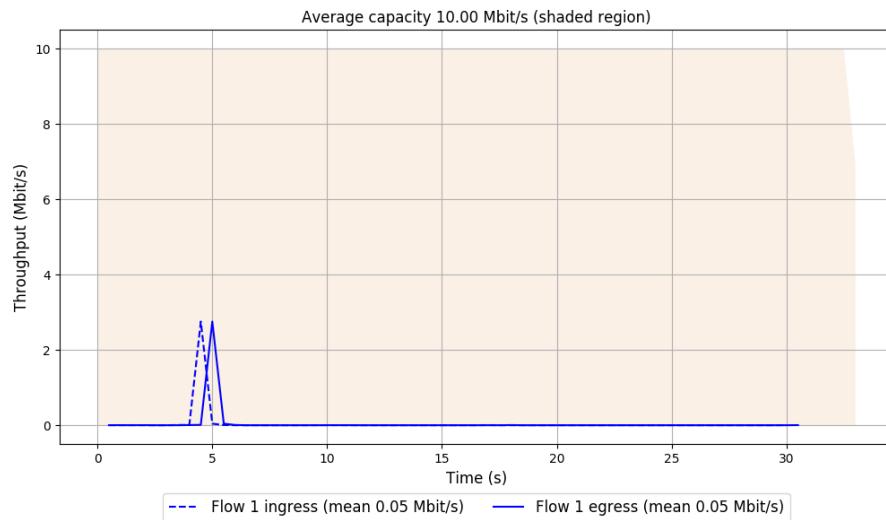


```
Run 1: Statistics of WebRTC media

Start at: 2019-07-31 04:16:11
End at: 2019-07-31 04:16:41

# Below is generated by plot.py at 2019-07-31 04:44:45
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 0.05 Mbit/s (0.5% utilization)
95th percentile per-packet one-way delay: 73.016 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 73.016 ms
Loss rate: 0.00%
```

Run 1: Report of WebRTC media — Data Link

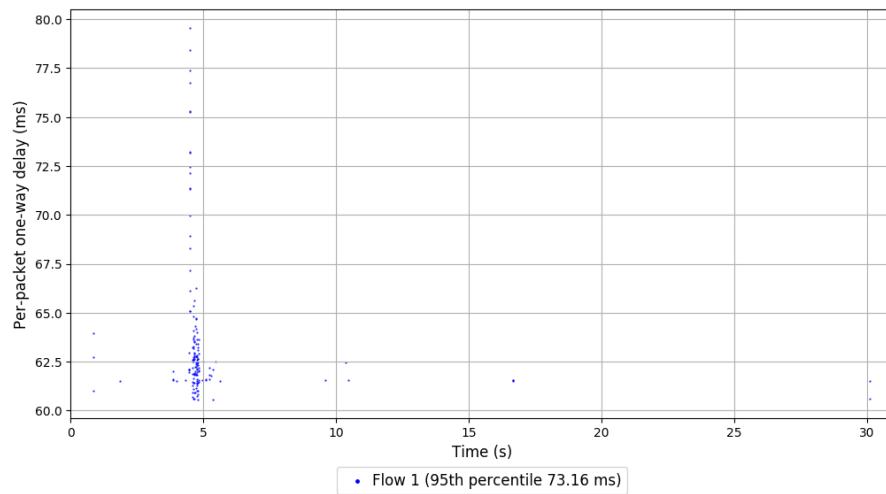
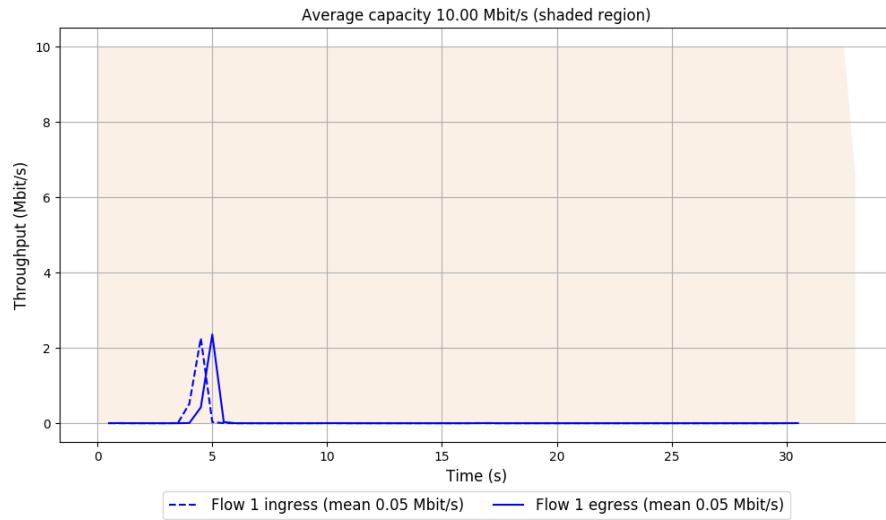


```
Run 2: Statistics of WebRTC media

Start at: 2019-07-31 04:28:20
End at: 2019-07-31 04:28:50

# Below is generated by plot.py at 2019-07-31 04:44:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 0.05 Mbit/s (0.5% utilization)
95th percentile per-packet one-way delay: 73.163 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 73.163 ms
Loss rate: 0.00%
```

Run 2: Report of WebRTC media — Data Link



```
Run 3: Statistics of WebRTC media

Start at: 2019-07-31 04:40:30
End at: 2019-07-31 04:41:00

# Below is generated by plot.py at 2019-07-31 04:44:47
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 0.05 Mbit/s (0.5% utilization)
95th percentile per-packet one-way delay: 74.038 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 74.038 ms
Loss rate: 0.00%
```

Run 3: Report of WebRTC media — Data Link

