

## Pantheon Report

Generated at 2018-10-09 20:02:57 (UTC).

Tested in mahimahi: mm-delay 30 mm-link 12mbps.trace 12mbps.trace  
--uplink-queue=droptail --uplink-queue-args=bytes=45000

Repeated the test of 18 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

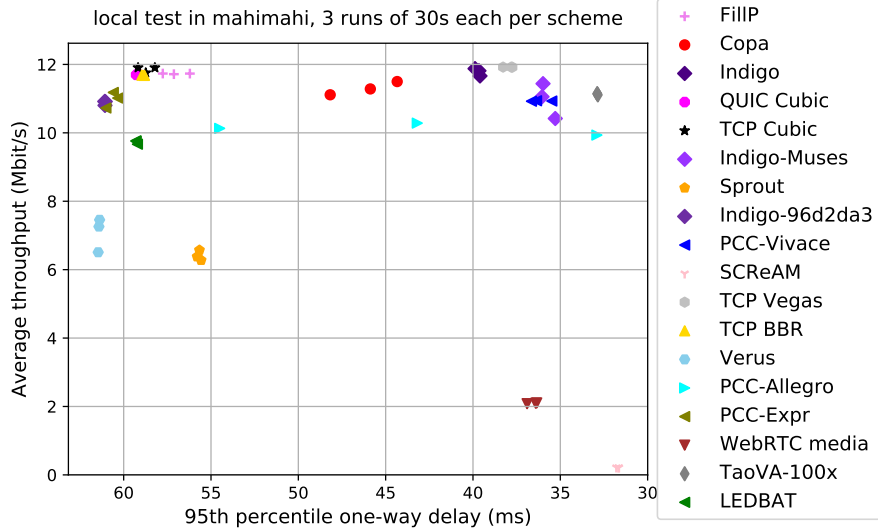
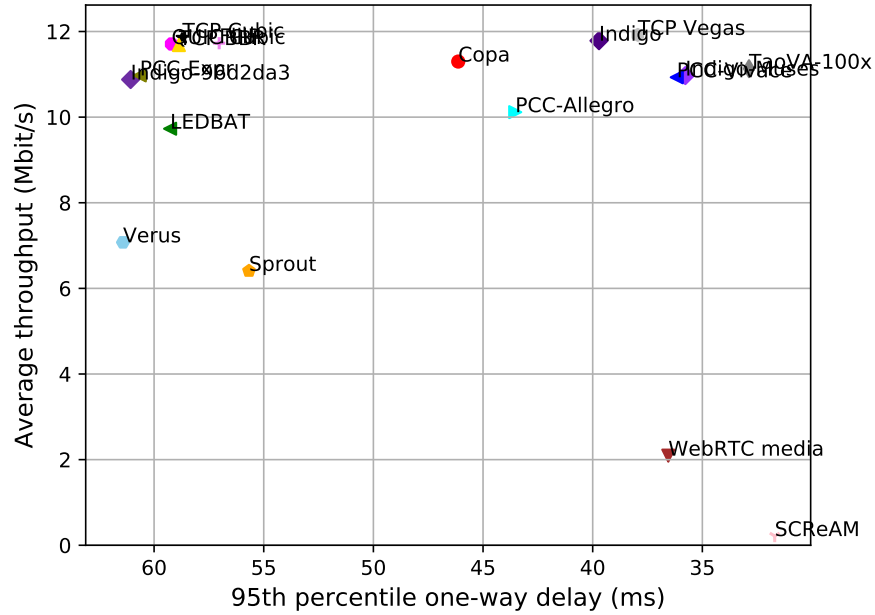
### System info:

```
Linux 4.15.0-1021-gcp
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
```

### Git summary:

```
branch: muses @ 2e19c0464530faa92c63f8217c9971438a26a3be
third_party/fillp @ 5332fc9127c63565e13f4933b336c02d1aabdac6
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfe58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/indigo-96d2da3 @ 8413272d46f8aa0bcb967ed7048b6a8f994abb95
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ 65ac1b19bbefed0c6349ae986009b4fa8643c40a
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, 3 runs of 30s each per scheme  
(mean of all runs by scheme)



scheme	# runs	mean avg tput (Mbit/s)	mean 95th-%ile delay (ms)	mean loss rate (%)
		flow 1	flow 1	flow 1
TCP BBR	3	11.68	58.87	2.64
Copa	3	11.30	46.13	0.69
TCP Cubic	3	11.86	58.71	0.47
FillP	3	11.73	57.03	1.91
Indigo	3	11.78	39.71	0.30
Indigo-96d2da3	3	10.88	61.07	73.33
LEDBAT	3	9.73	59.27	0.77
Indigo-Muses	3	10.97	35.77	0.17
PCC-Allegro	3	10.11	43.53	0.91
PCC-Expr	3	10.98	60.65	0.66
QUIC Cubic	3	11.71	59.21	0.32
SCReAM	3	0.21	31.70	0.13
Sprout	3	6.41	55.67	0.63
TaoVA-100x	3	11.13	32.87	0.73
TCP Vegas	3	11.92	37.94	0.33
Verus	3	7.08	61.42	88.89
PCC-Vivace	3	10.93	36.17	0.14
WebRTC media	3	2.09	36.55	0.10

Run 1: Statistics of TCP BBR

Start at: 2018-10-09 19:30:33

End at: 2018-10-09 19:31:03

# Below is generated by plot.py at 2018-10-09 20:00:45

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.69 Mbit/s (97.4% utilization)

95th percentile per-packet one-way delay: 58.956 ms

Loss rate: 2.68%

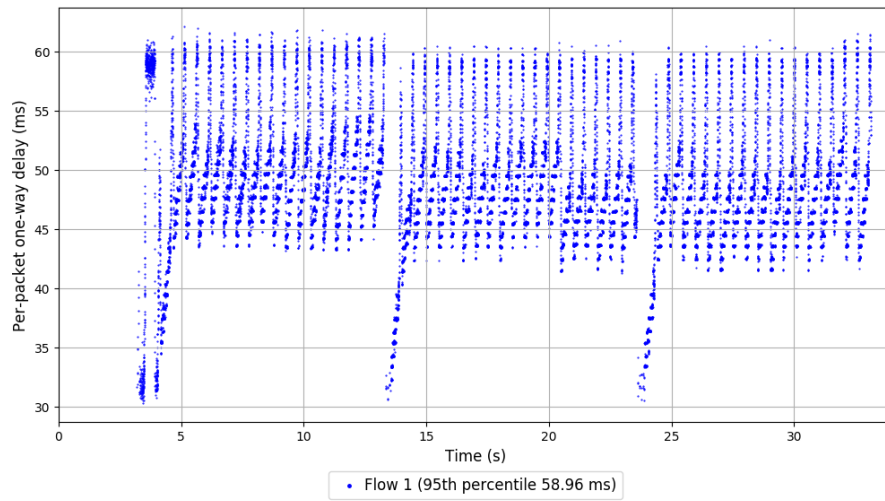
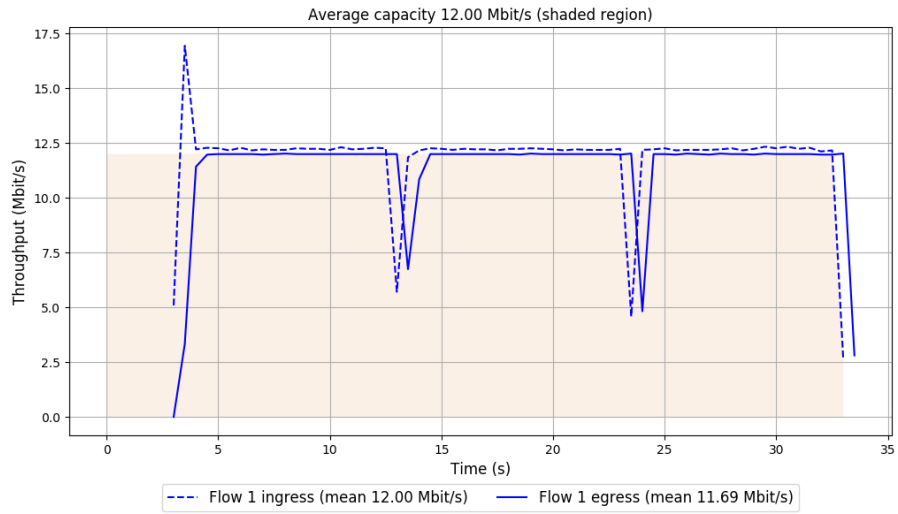
-- Flow 1:

Average throughput: 11.69 Mbit/s

95th percentile per-packet one-way delay: 58.956 ms

Loss rate: 2.68%

# Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-10-09 19:41:13

End at: 2018-10-09 19:41:43

# Below is generated by plot.py at 2018-10-09 20:00:45

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.68 Mbit/s (97.3% utilization)

95th percentile per-packet one-way delay: 58.827 ms

Loss rate: 2.59%

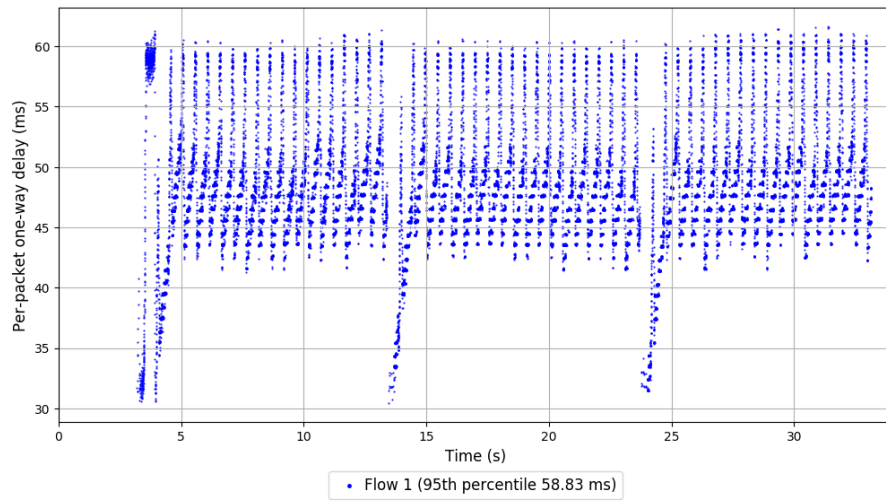
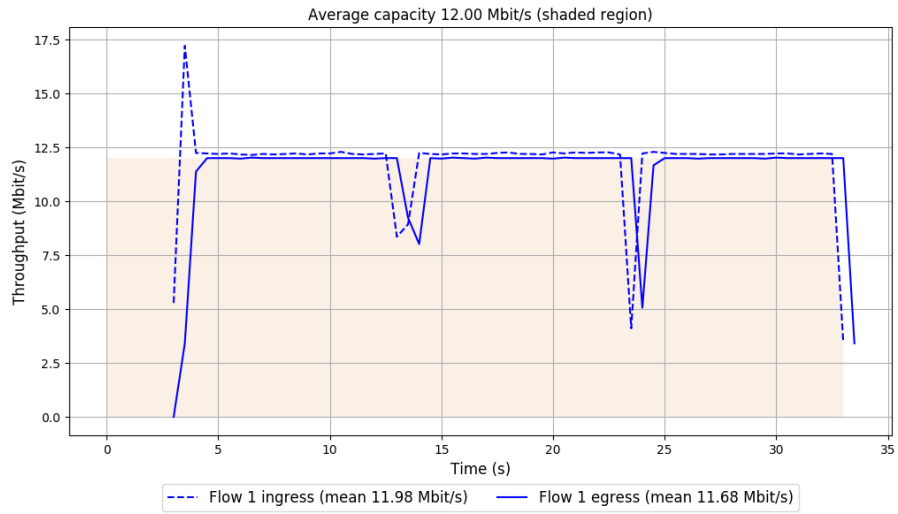
-- Flow 1:

Average throughput: 11.68 Mbit/s

95th percentile per-packet one-way delay: 58.827 ms

Loss rate: 2.59%

## Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2018-10-09 19:51:54

End at: 2018-10-09 19:52:24

# Below is generated by plot.py at 2018-10-09 20:00:45

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.68 Mbit/s (97.4% utilization)

95th percentile per-packet one-way delay: 58.818 ms

Loss rate: 2.66%

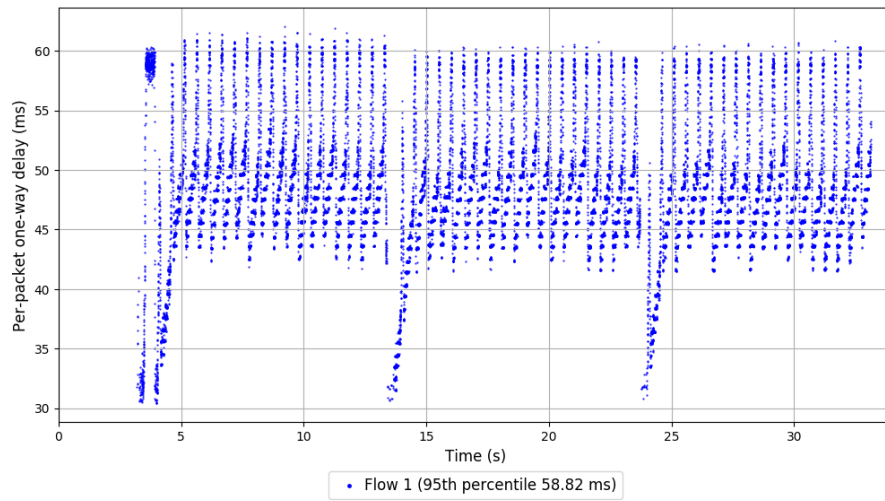
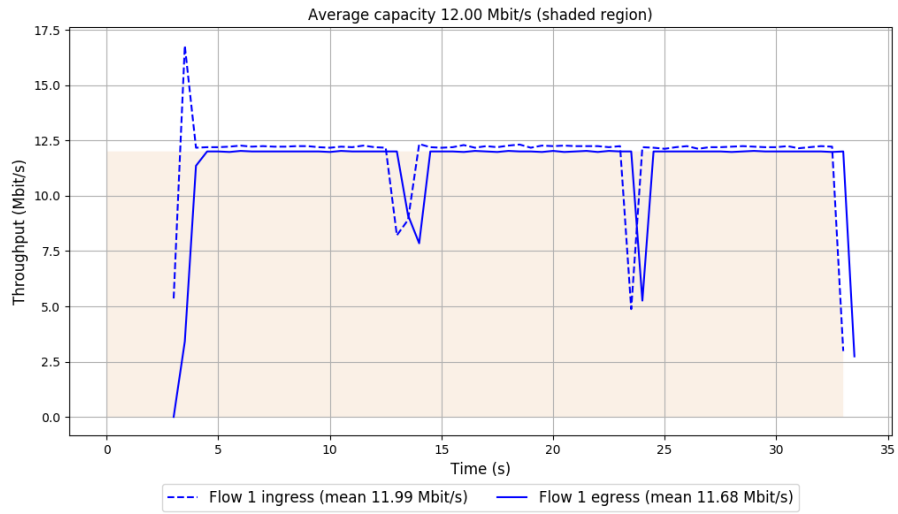
-- Flow 1:

Average throughput: 11.68 Mbit/s

95th percentile per-packet one-way delay: 58.818 ms

Loss rate: 2.66%

### Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

Start at: 2018-10-09 19:37:39

End at: 2018-10-09 19:38:09

# Below is generated by plot.py at 2018-10-09 20:00:56

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.28 Mbit/s (94.0% utilization)

95th percentile per-packet one-way delay: 45.877 ms

Loss rate: 0.35%

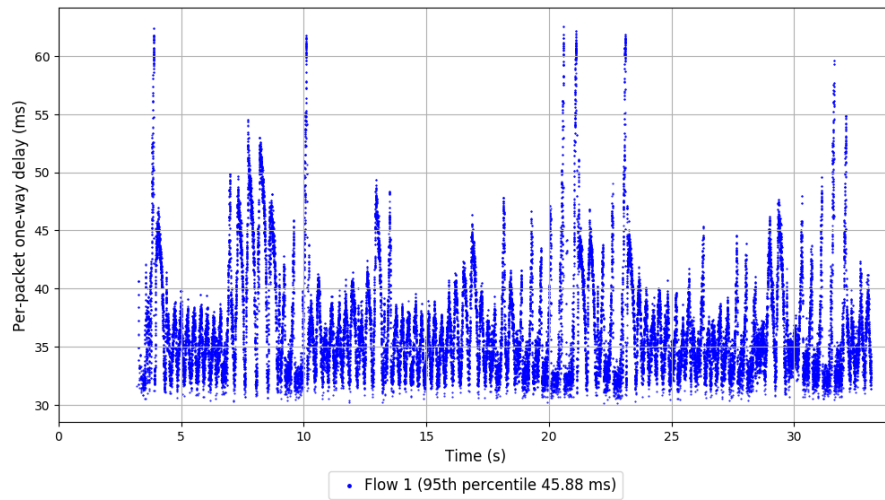
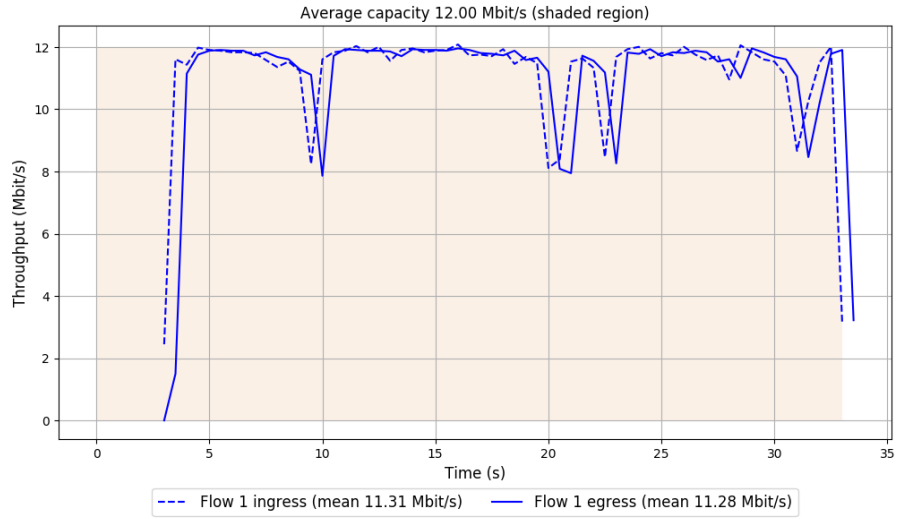
-- Flow 1:

Average throughput: 11.28 Mbit/s

95th percentile per-packet one-way delay: 45.877 ms

Loss rate: 0.35%

# Run 1: Report of Copa — Data Link



Run 2: Statistics of Copa

Start at: 2018-10-09 19:48:20

End at: 2018-10-09 19:48:50

# Below is generated by plot.py at 2018-10-09 20:00:56

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.11 Mbit/s (92.6% utilization)

95th percentile per-packet one-way delay: 48.176 ms

Loss rate: 0.94%

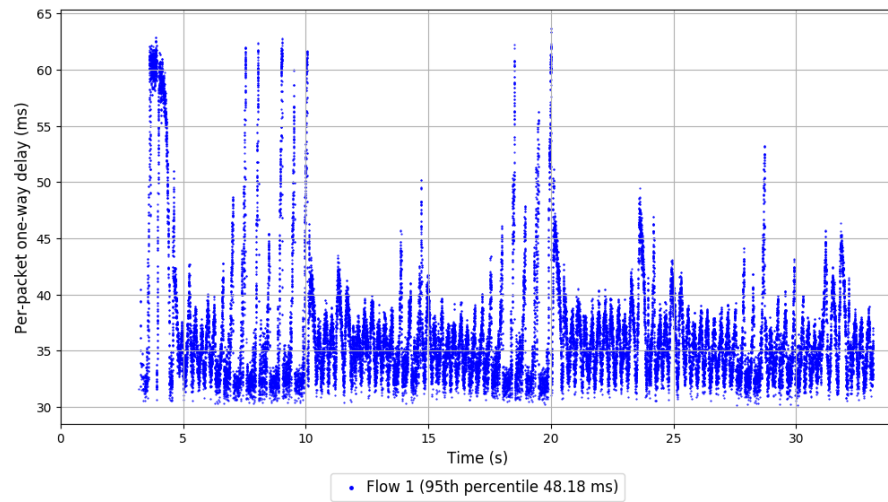
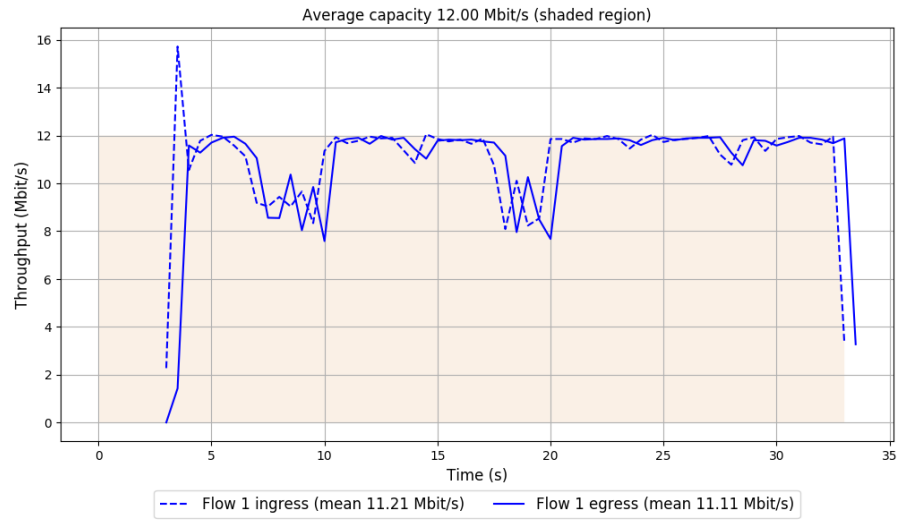
-- Flow 1:

Average throughput: 11.11 Mbit/s

95th percentile per-packet one-way delay: 48.176 ms

Loss rate: 0.94%

## Run 2: Report of Copa — Data Link



Run 3: Statistics of Copa

Start at: 2018-10-09 19:59:01

End at: 2018-10-09 19:59:31

# Below is generated by plot.py at 2018-10-09 20:00:57

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.50 Mbit/s (95.8% utilization)

95th percentile per-packet one-way delay: 44.340 ms

Loss rate: 0.77%

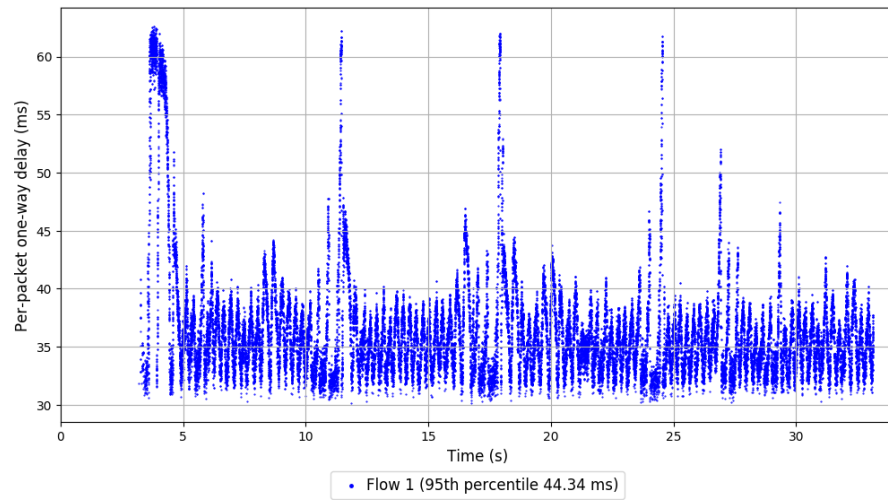
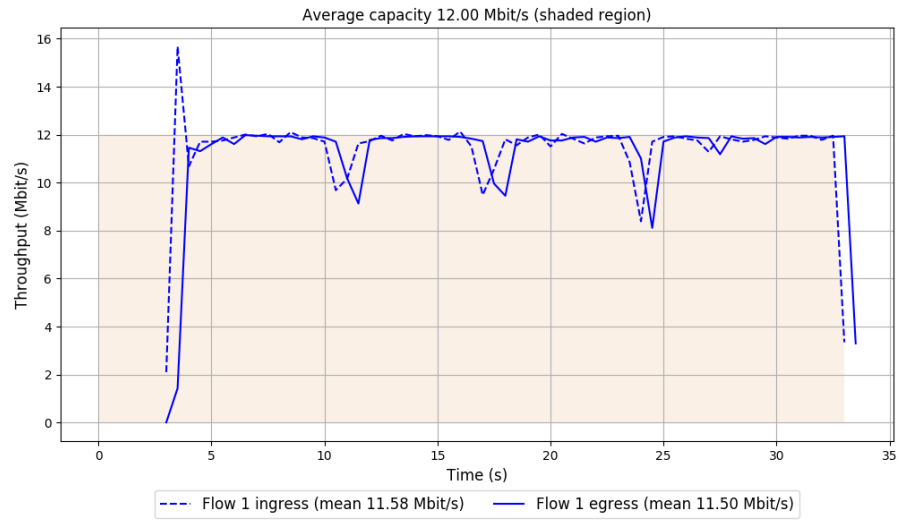
-- Flow 1:

Average throughput: 11.50 Mbit/s

95th percentile per-packet one-way delay: 44.340 ms

Loss rate: 0.77%

### Run 3: Report of Copa — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2018-10-09 19:29:57

End at: 2018-10-09 19:30:27

# Below is generated by plot.py at 2018-10-09 20:00:57

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.91 Mbit/s (99.2% utilization)

95th percentile per-packet one-way delay: 58.214 ms

Loss rate: 0.47%

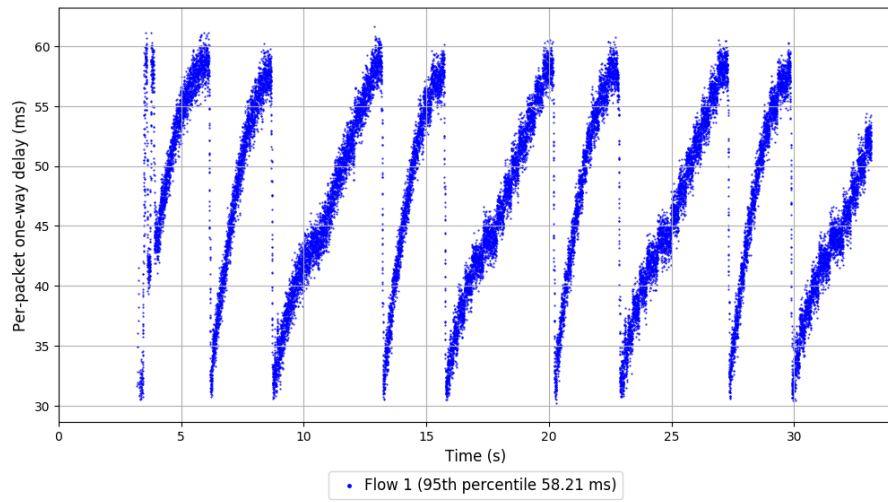
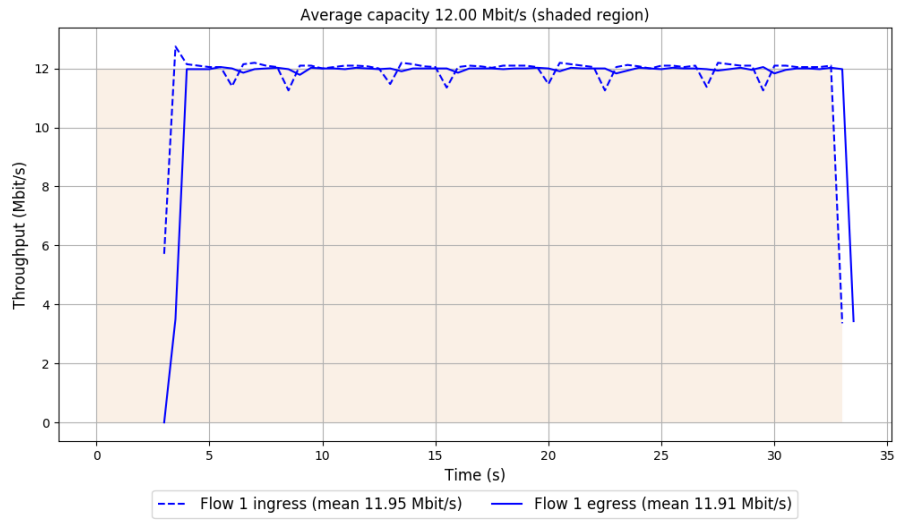
-- Flow 1:

Average throughput: 11.91 Mbit/s

95th percentile per-packet one-way delay: 58.214 ms

Loss rate: 0.47%

# Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2018-10-09 19:40:38

End at: 2018-10-09 19:41:08

# Below is generated by plot.py at 2018-10-09 20:00:57

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.75 Mbit/s (98.0% utilization)

95th percentile per-packet one-way delay: 58.738 ms

Loss rate: 0.47%

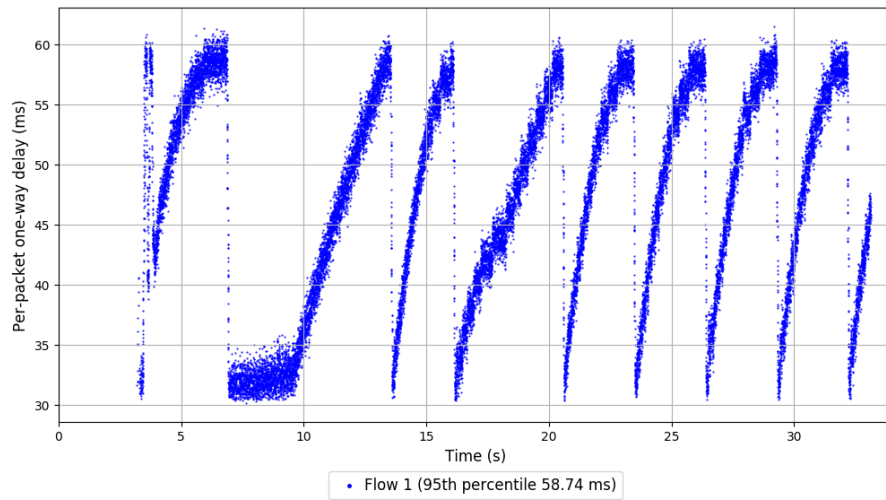
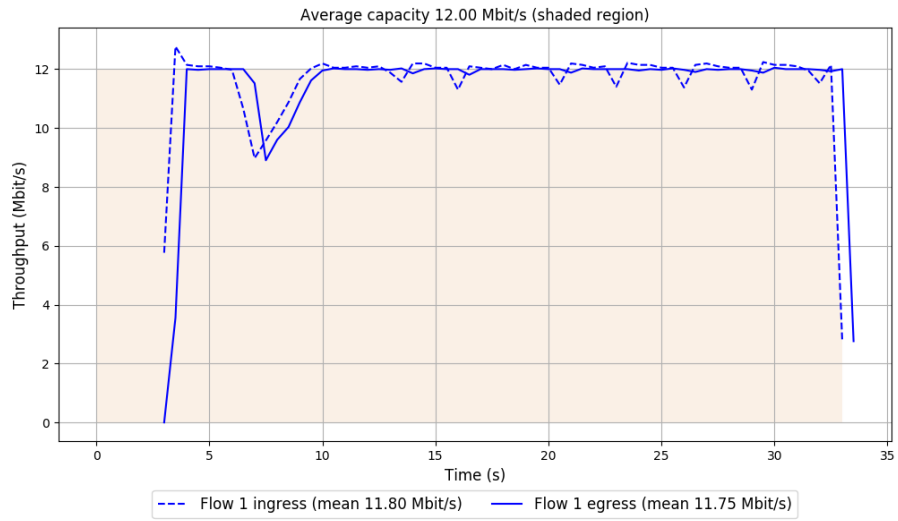
-- Flow 1:

Average throughput: 11.75 Mbit/s

95th percentile per-packet one-way delay: 58.738 ms

Loss rate: 0.47%

## Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2018-10-09 19:51:18

End at: 2018-10-09 19:51:48

# Below is generated by plot.py at 2018-10-09 20:01:06

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.91 Mbit/s (99.2% utilization)

95th percentile per-packet one-way delay: 59.176 ms

Loss rate: 0.48%

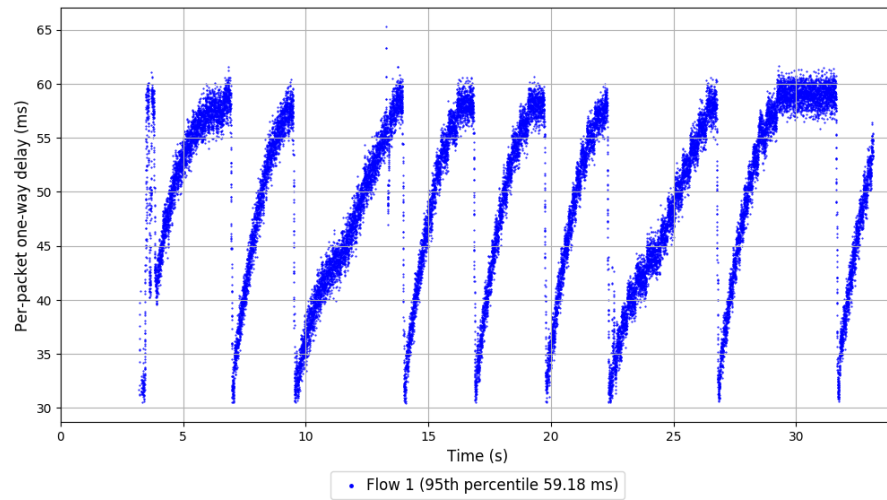
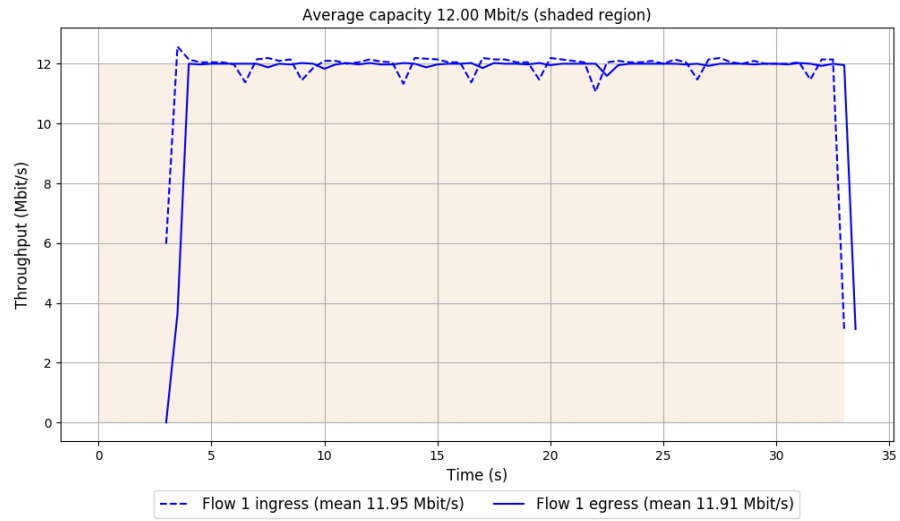
-- Flow 1:

Average throughput: 11.91 Mbit/s

95th percentile per-packet one-way delay: 59.176 ms

Loss rate: 0.48%

### Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of FillP

Start at: 2018-10-09 19:32:55

End at: 2018-10-09 19:33:25

# Below is generated by plot.py at 2018-10-09 20:01:09

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.72 Mbit/s (97.6% utilization)

95th percentile per-packet one-way delay: 57.125 ms

Loss rate: 1.42%

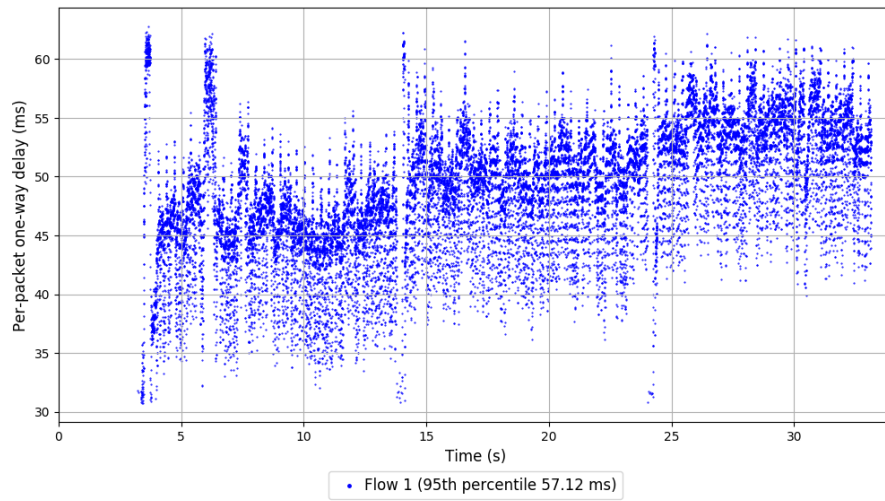
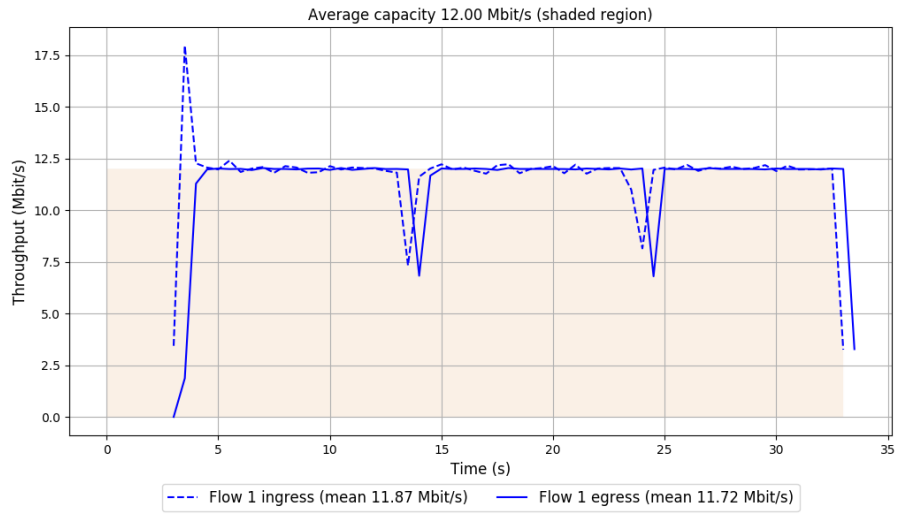
-- Flow 1:

Average throughput: 11.72 Mbit/s

95th percentile per-packet one-way delay: 57.125 ms

Loss rate: 1.42%

# Run 1: Report of FillP — Data Link



Run 2: Statistics of FillP

Start at: 2018-10-09 19:43:36

End at: 2018-10-09 19:44:06

# Below is generated by plot.py at 2018-10-09 20:01:10

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.73 Mbit/s (97.8% utilization)

95th percentile per-packet one-way delay: 57.760 ms

Loss rate: 1.97%

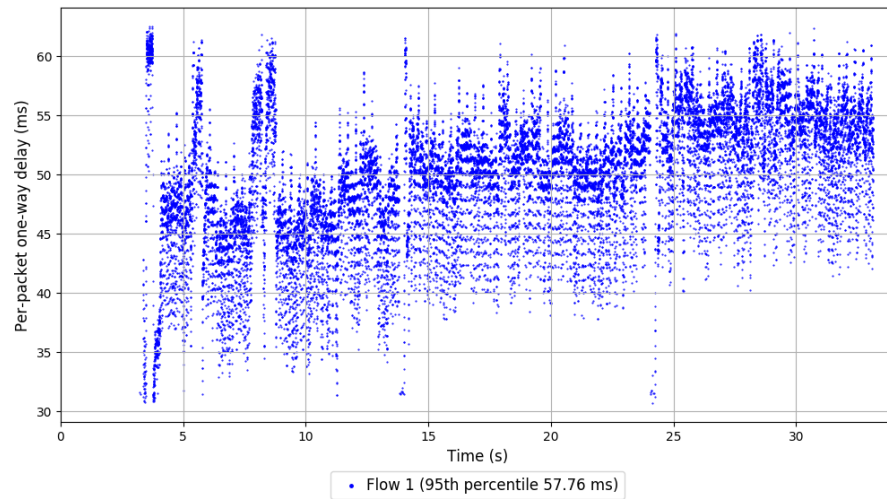
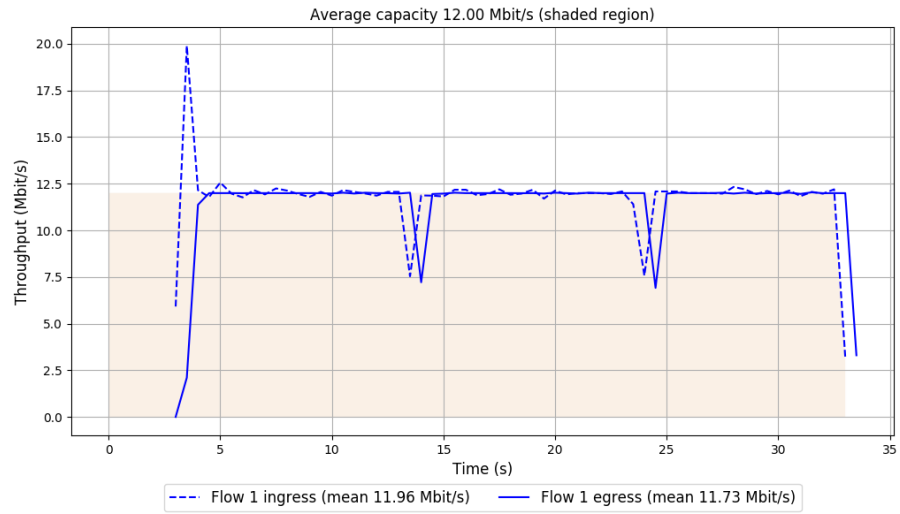
-- Flow 1:

Average throughput: 11.73 Mbit/s

95th percentile per-packet one-way delay: 57.760 ms

Loss rate: 1.97%

## Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

Start at: 2018-10-09 19:54:16

End at: 2018-10-09 19:54:46

# Below is generated by plot.py at 2018-10-09 20:01:10

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.73 Mbit/s (97.8% utilization)

95th percentile per-packet one-way delay: 56.210 ms

Loss rate: 2.35%

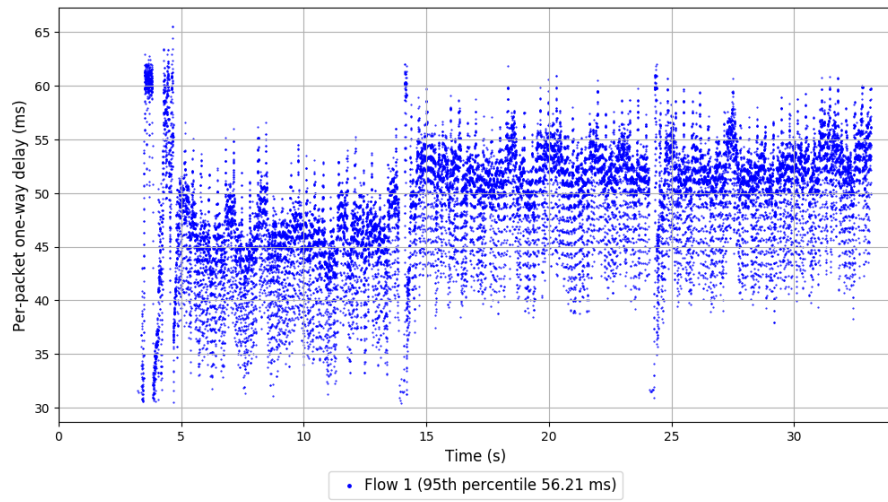
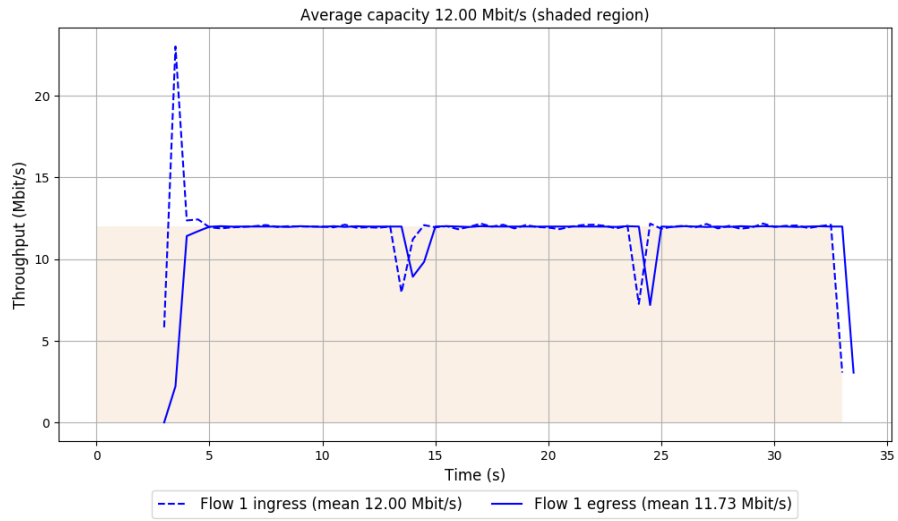
-- Flow 1:

Average throughput: 11.73 Mbit/s

95th percentile per-packet one-way delay: 56.210 ms

Loss rate: 2.35%

### Run 3: Report of FillP — Data Link



Run 1: Statistics of Indigo

Start at: 2018-10-09 19:35:17

End at: 2018-10-09 19:35:47

# Below is generated by plot.py at 2018-10-09 20:01:10

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.88 Mbit/s (99.0% utilization)

95th percentile per-packet one-way delay: 39.882 ms

Loss rate: 0.40%

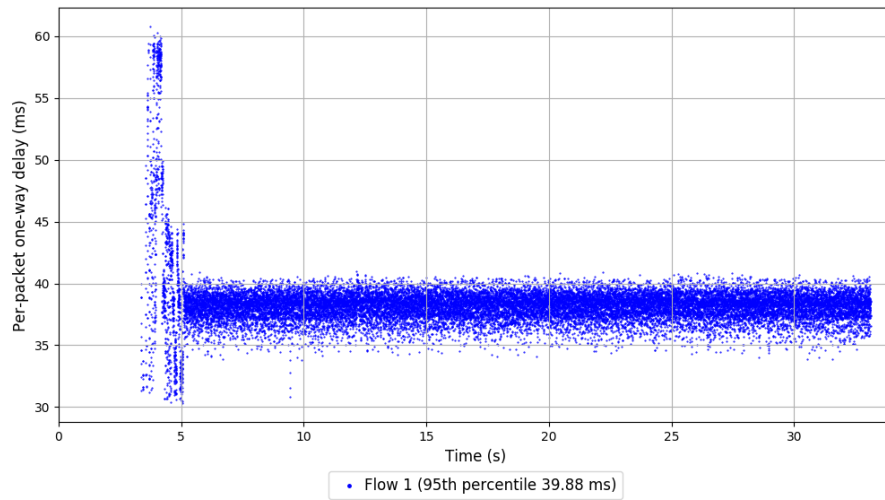
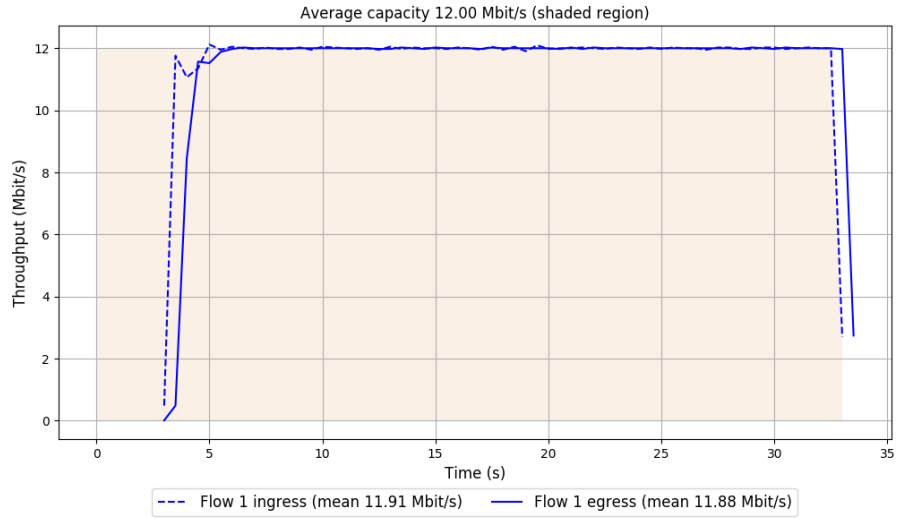
-- Flow 1:

Average throughput: 11.88 Mbit/s

95th percentile per-packet one-way delay: 39.882 ms

Loss rate: 0.40%

# Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2018-10-09 19:45:58

End at: 2018-10-09 19:46:28

# Below is generated by plot.py at 2018-10-09 20:01:16

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.81 Mbit/s (98.4% utilization)

95th percentile per-packet one-way delay: 39.658 ms

Loss rate: 0.25%

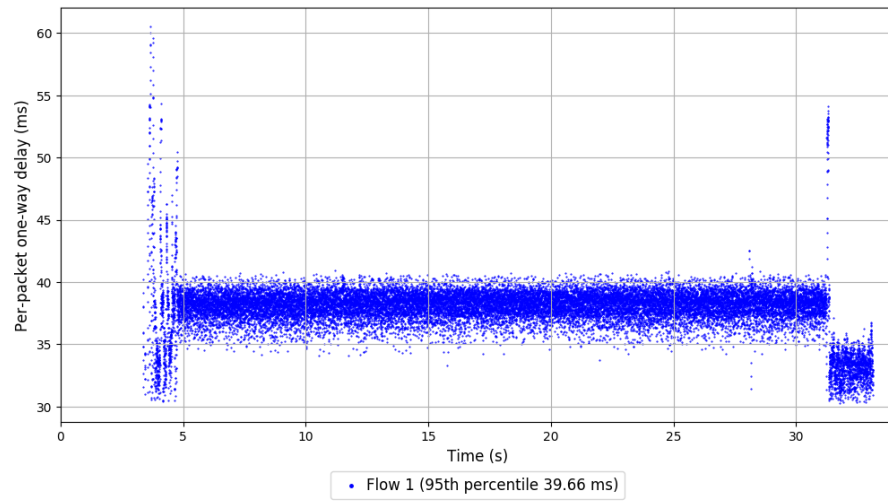
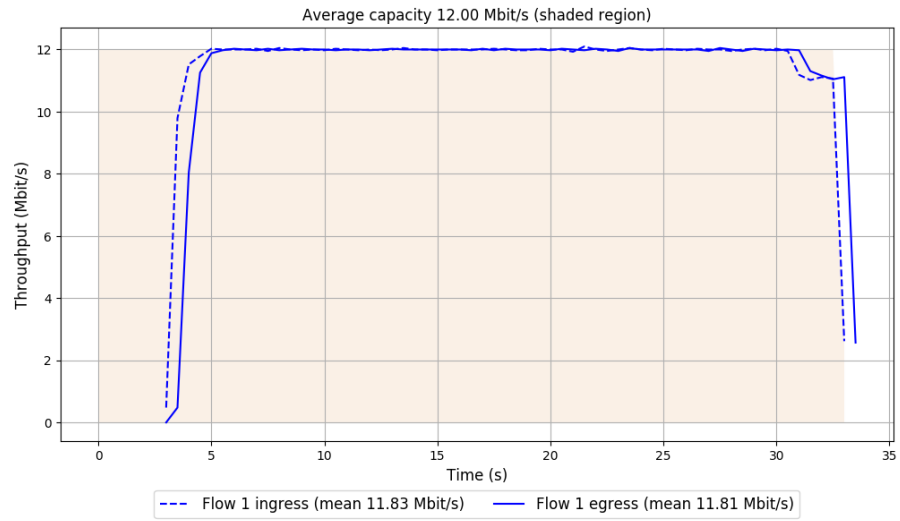
-- Flow 1:

Average throughput: 11.81 Mbit/s

95th percentile per-packet one-way delay: 39.658 ms

Loss rate: 0.25%

## Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-10-09 19:56:39

End at: 2018-10-09 19:57:09

# Below is generated by plot.py at 2018-10-09 20:01:17

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.66 Mbit/s (97.2% utilization)

95th percentile per-packet one-way delay: 39.599 ms

Loss rate: 0.24%

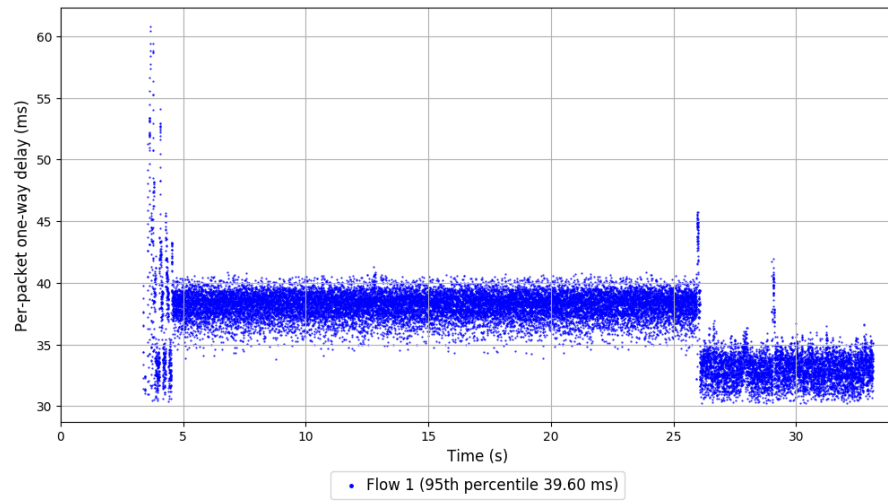
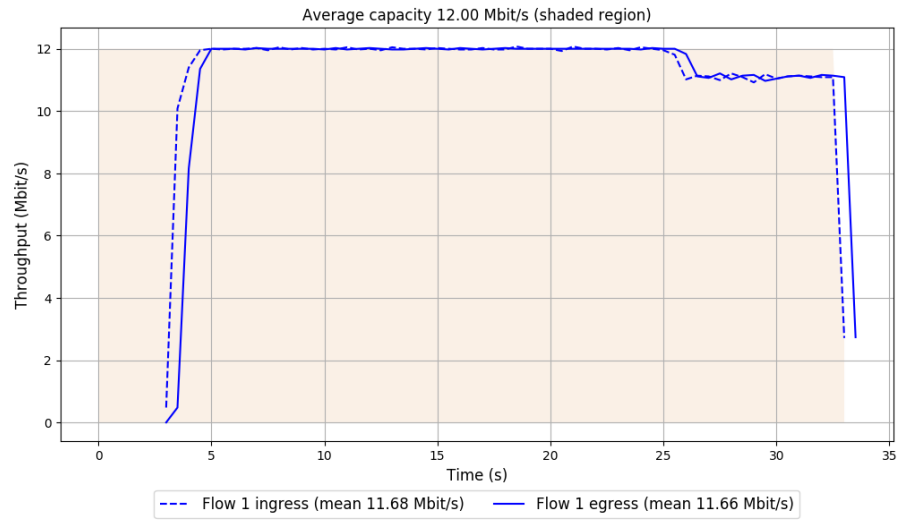
-- Flow 1:

Average throughput: 11.66 Mbit/s

95th percentile per-packet one-way delay: 39.599 ms

Loss rate: 0.24%

### Run 3: Report of Indigo — Data Link



Run 1: Statistics of Indigo-96d2da3

Start at: 2018-10-09 19:28:09

End at: 2018-10-09 19:28:39

# Below is generated by plot.py at 2018-10-09 20:01:28

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.80 Mbit/s (90.0% utilization)

95th percentile per-packet one-way delay: 61.070 ms

Loss rate: 74.02%

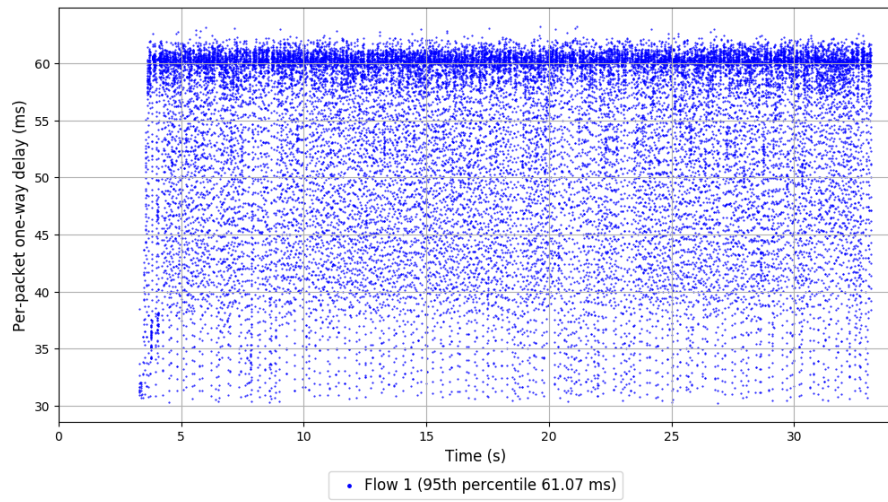
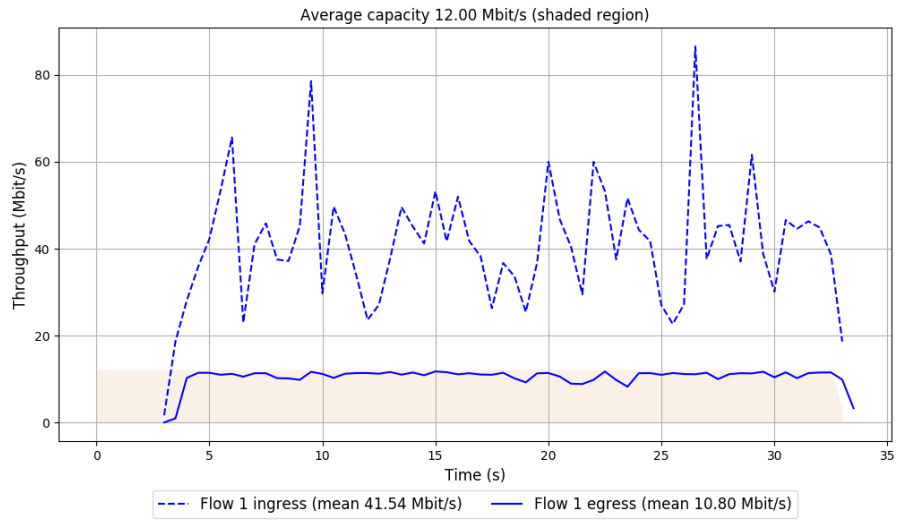
-- Flow 1:

Average throughput: 10.80 Mbit/s

95th percentile per-packet one-way delay: 61.070 ms

Loss rate: 74.02%

# Run 1: Report of Indigo-96d2da3 — Data Link



Run 2: Statistics of Indigo-96d2da3

Start at: 2018-10-09 19:38:50

End at: 2018-10-09 19:39:20

# Below is generated by plot.py at 2018-10-09 20:01:36

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.92 Mbit/s (91.0% utilization)

95th percentile per-packet one-way delay: 61.080 ms

Loss rate: 71.93%

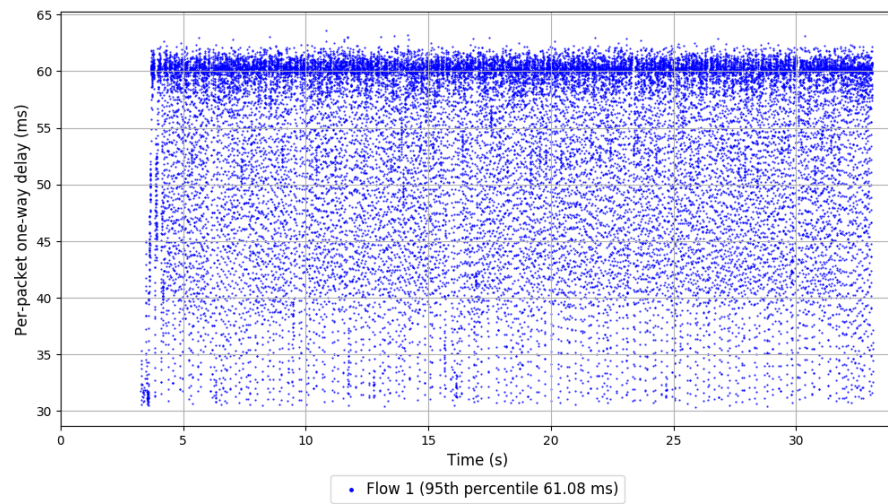
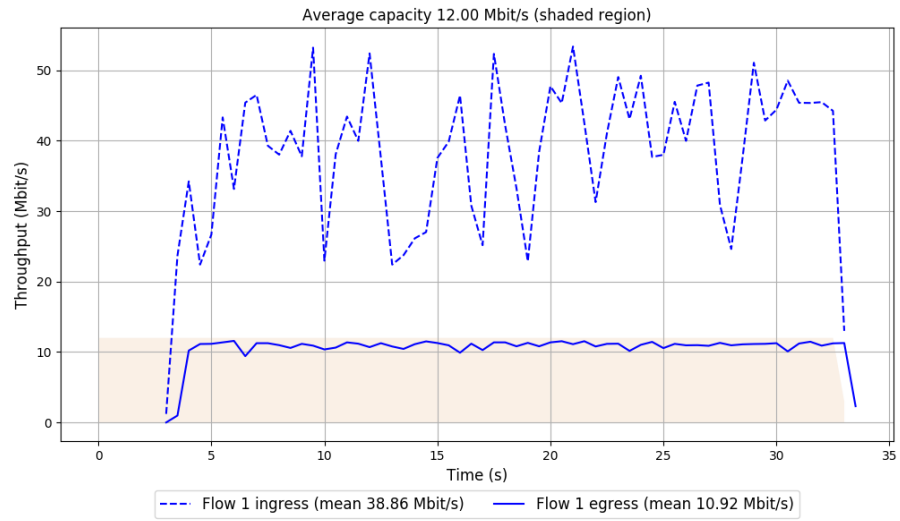
-- Flow 1:

Average throughput: 10.92 Mbit/s

95th percentile per-packet one-way delay: 61.080 ms

Loss rate: 71.93%

## Run 2: Report of Indigo-96d2da3 — Data Link



Run 3: Statistics of Indigo-96d2da3

Start at: 2018-10-09 19:49:31

End at: 2018-10-09 19:50:01

# Below is generated by plot.py at 2018-10-09 20:01:38

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.91 Mbit/s (90.9% utilization)

95th percentile per-packet one-way delay: 61.059 ms

Loss rate: 74.04%

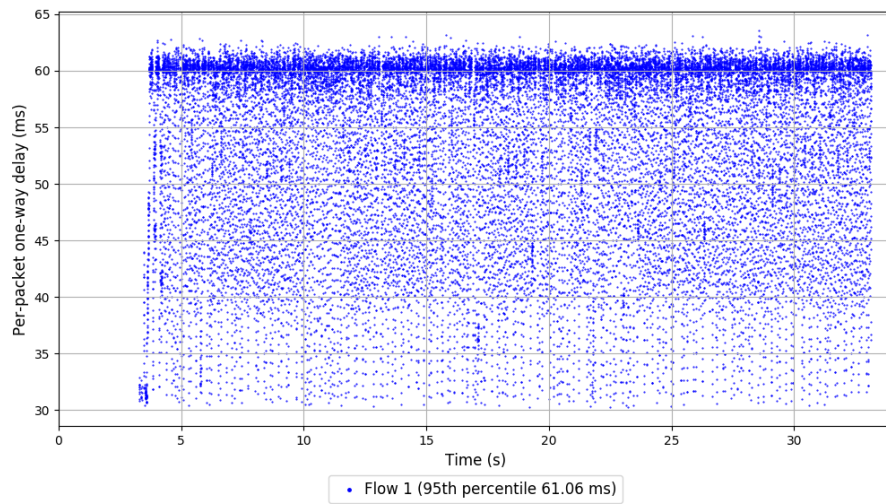
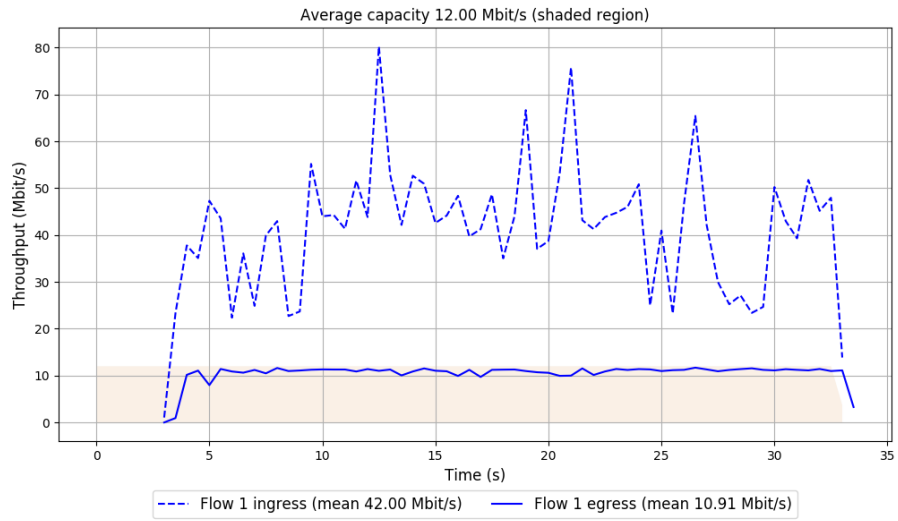
-- Flow 1:

Average throughput: 10.91 Mbit/s

95th percentile per-packet one-way delay: 61.059 ms

Loss rate: 74.04%

### Run 3: Report of Indigo-96d2da3 — Data Link



Run 1: Statistics of LEDBAT

Start at: 2018-10-09 19:33:31

End at: 2018-10-09 19:34:01

# Below is generated by plot.py at 2018-10-09 20:01:38

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.76 Mbit/s (81.4% utilization)

95th percentile per-packet one-way delay: 59.305 ms

Loss rate: 0.71%

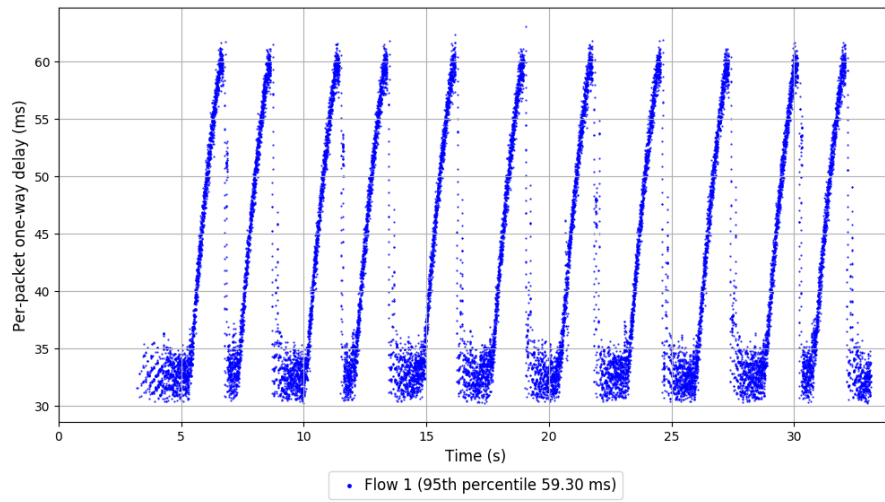
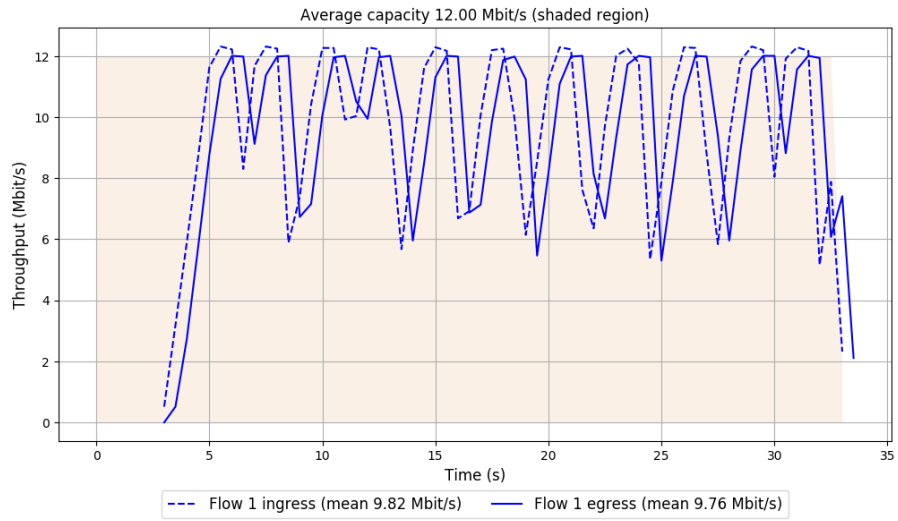
-- Flow 1:

Average throughput: 9.76 Mbit/s

95th percentile per-packet one-way delay: 59.305 ms

Loss rate: 0.71%

# Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2018-10-09 19:44:11

End at: 2018-10-09 19:44:41

# Below is generated by plot.py at 2018-10-09 20:01:38

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.76 Mbit/s (81.3% utilization)

95th percentile per-packet one-way delay: 59.290 ms

Loss rate: 0.77%

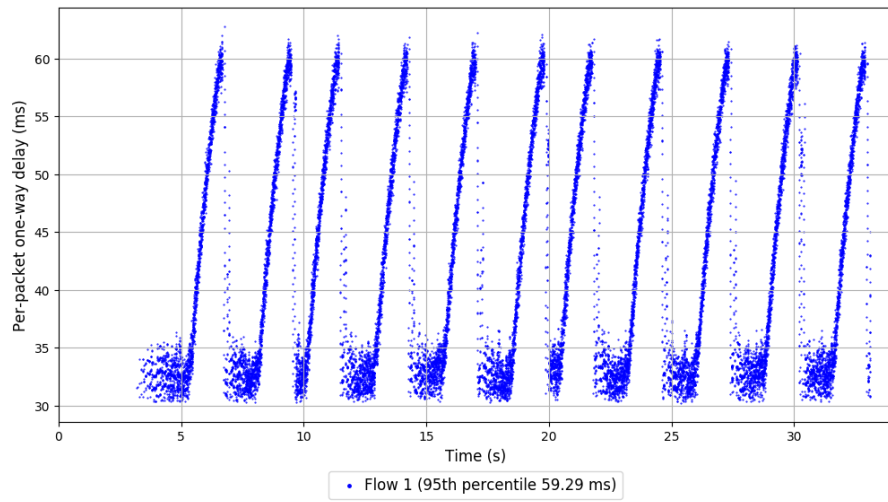
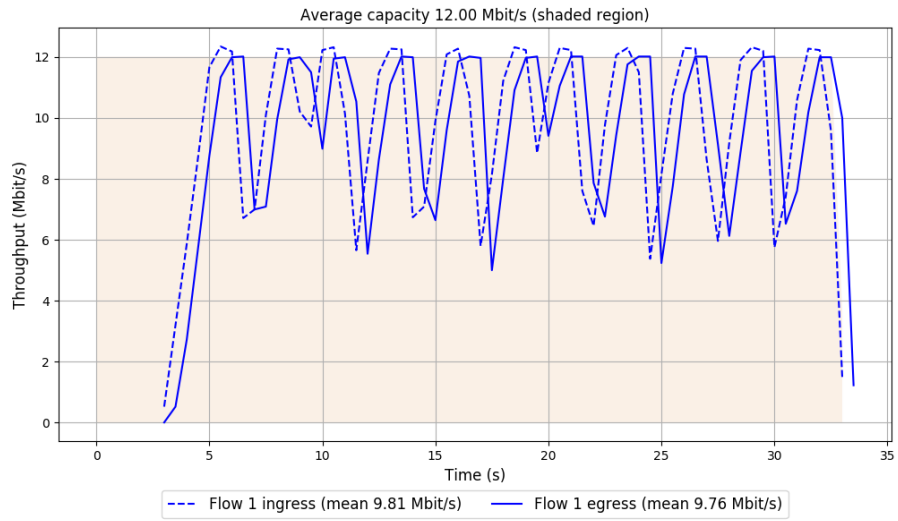
-- Flow 1:

Average throughput: 9.76 Mbit/s

95th percentile per-packet one-way delay: 59.290 ms

Loss rate: 0.77%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2018-10-09 19:54:52

End at: 2018-10-09 19:55:22

# Below is generated by plot.py at 2018-10-09 20:01:38

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.67 Mbit/s (80.6% utilization)

95th percentile per-packet one-way delay: 59.215 ms

Loss rate: 0.84%

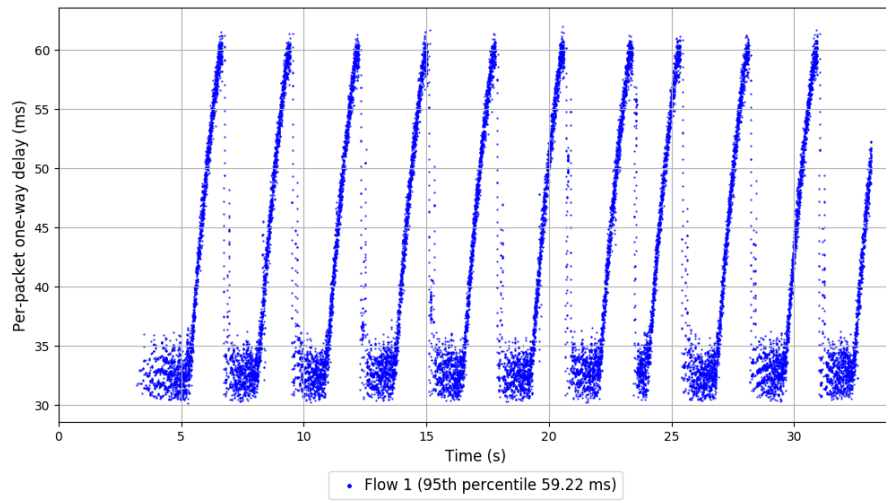
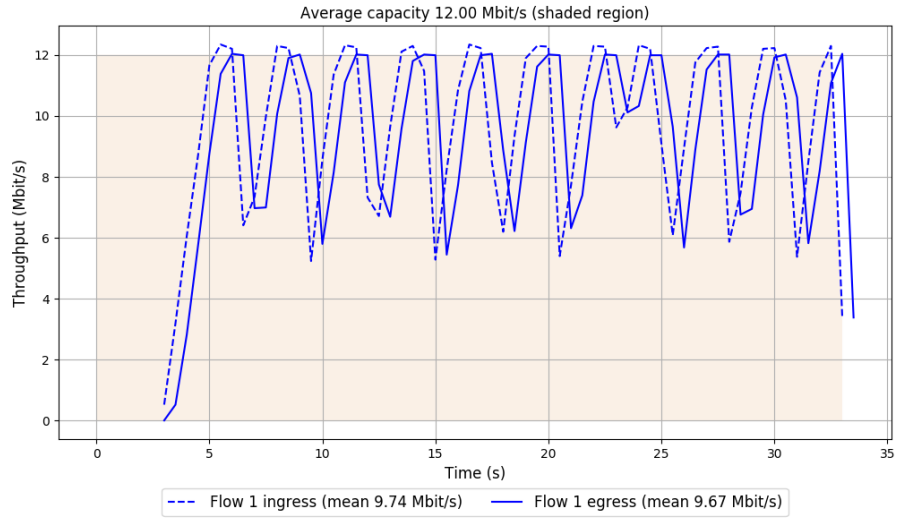
-- Flow 1:

Average throughput: 9.67 Mbit/s

95th percentile per-packet one-way delay: 59.215 ms

Loss rate: 0.84%

### Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of Indigo-Muses

Start at: 2018-10-09 19:36:29

End at: 2018-10-09 19:36:59

# Below is generated by plot.py at 2018-10-09 20:01:38

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.06 Mbit/s (92.1% utilization)

95th percentile per-packet one-way delay: 36.045 ms

Loss rate: 0.17%

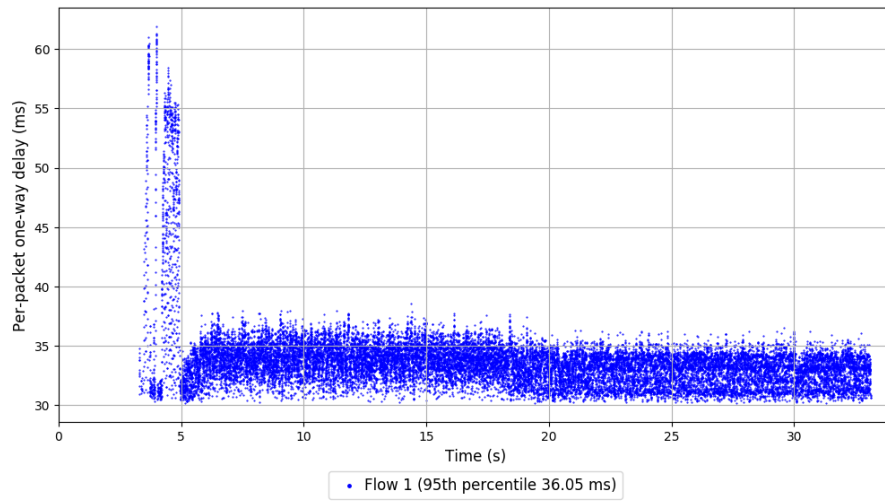
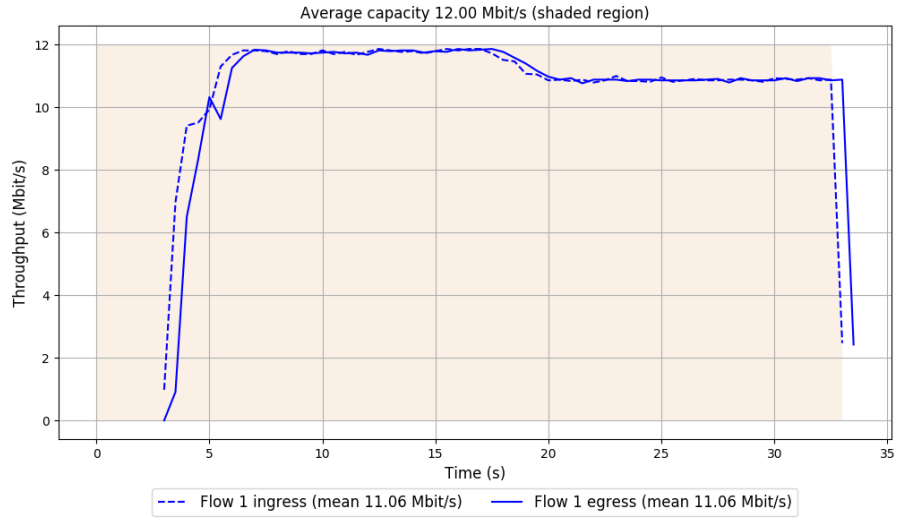
-- Flow 1:

Average throughput: 11.06 Mbit/s

95th percentile per-packet one-way delay: 36.045 ms

Loss rate: 0.17%

# Run 1: Report of Indigo-Muses — Data Link



Run 2: Statistics of Indigo-Muses

Start at: 2018-10-09 19:47:09

End at: 2018-10-09 19:47:39

# Below is generated by plot.py at 2018-10-09 20:01:38

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.42 Mbit/s (86.8% utilization)

95th percentile per-packet one-way delay: 35.289 ms

Loss rate: 0.17%

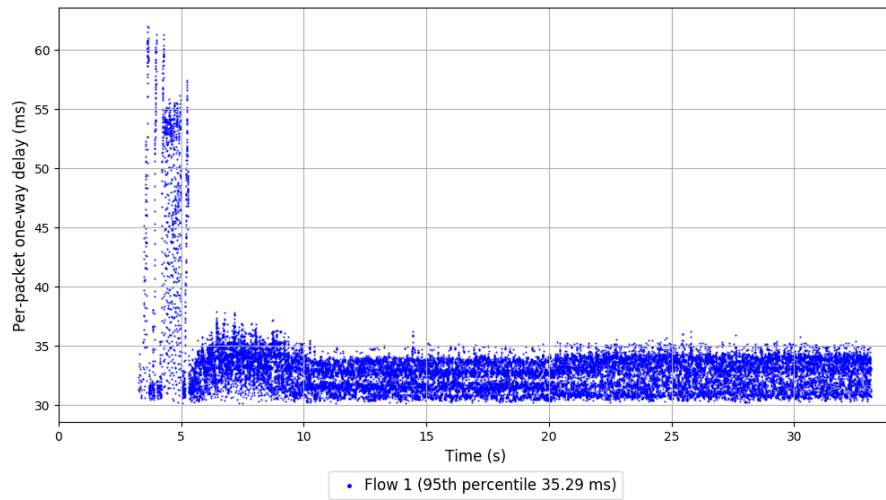
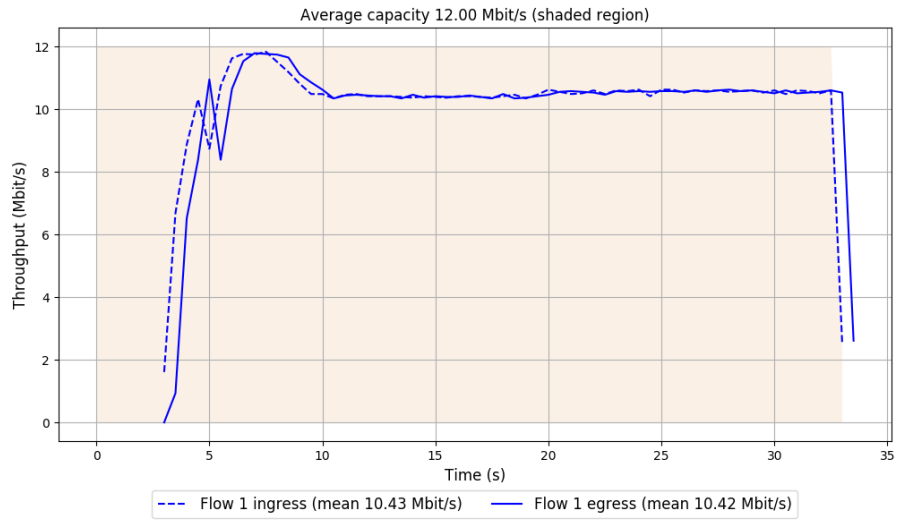
-- Flow 1:

Average throughput: 10.42 Mbit/s

95th percentile per-packet one-way delay: 35.289 ms

Loss rate: 0.17%

## Run 2: Report of Indigo-Muses — Data Link



Run 3: Statistics of Indigo-Muses

Start at: 2018-10-09 19:57:50

End at: 2018-10-09 19:58:20

# Below is generated by plot.py at 2018-10-09 20:01:47

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.44 Mbit/s (95.3% utilization)

95th percentile per-packet one-way delay: 35.989 ms

Loss rate: 0.17%

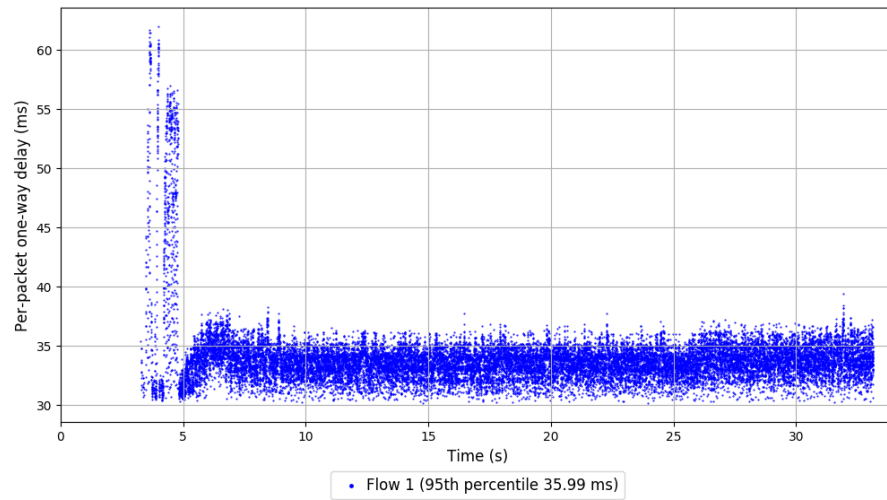
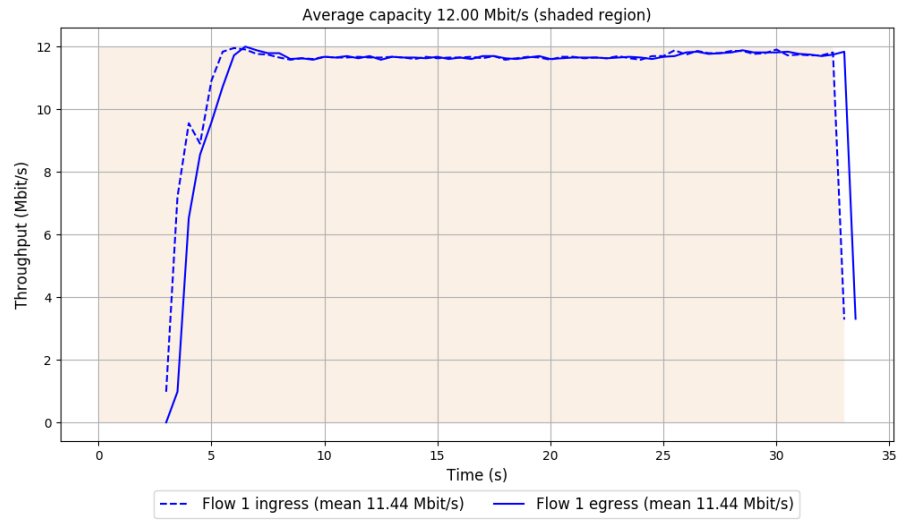
-- Flow 1:

Average throughput: 11.44 Mbit/s

95th percentile per-packet one-way delay: 35.989 ms

Loss rate: 0.17%

### Run 3: Report of Indigo-Muses — Data Link



Run 1: Statistics of PCC-Allegro

Start at: 2018-10-09 19:38:15

End at: 2018-10-09 19:38:45

# Below is generated by plot.py at 2018-10-09 20:01:47

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.93 Mbit/s (82.8% utilization)

95th percentile per-packet one-way delay: 32.904 ms

Loss rate: 0.90%

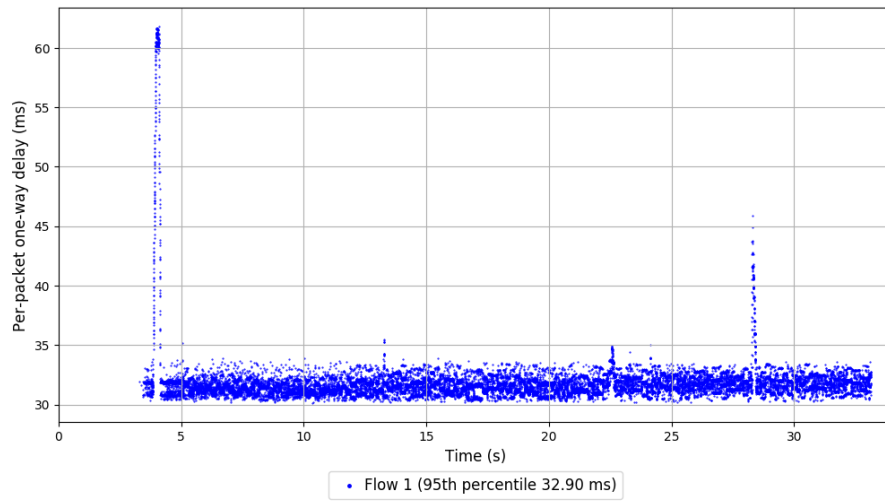
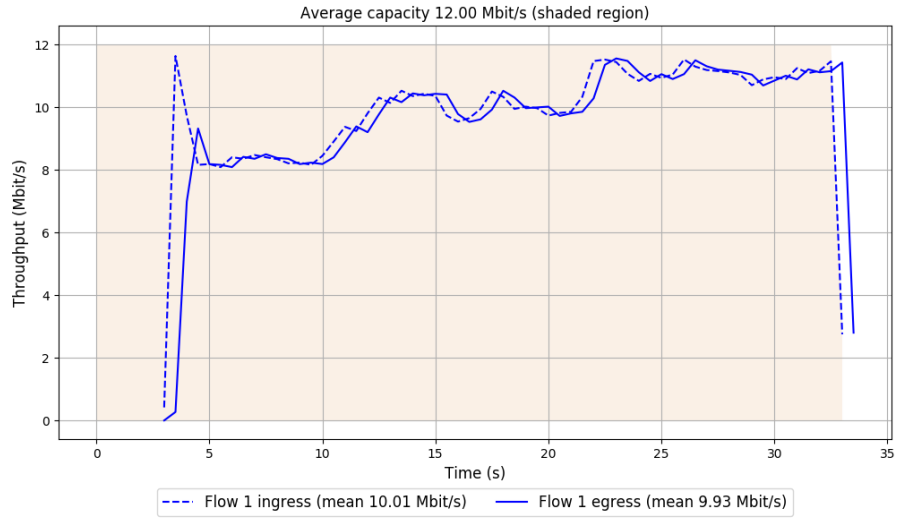
-- Flow 1:

Average throughput: 9.93 Mbit/s

95th percentile per-packet one-way delay: 32.904 ms

Loss rate: 0.90%

# Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

Start at: 2018-10-09 19:48:56

End at: 2018-10-09 19:49:26

# Below is generated by plot.py at 2018-10-09 20:01:48

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.28 Mbit/s (85.7% utilization)

95th percentile per-packet one-way delay: 43.188 ms

Loss rate: 0.83%

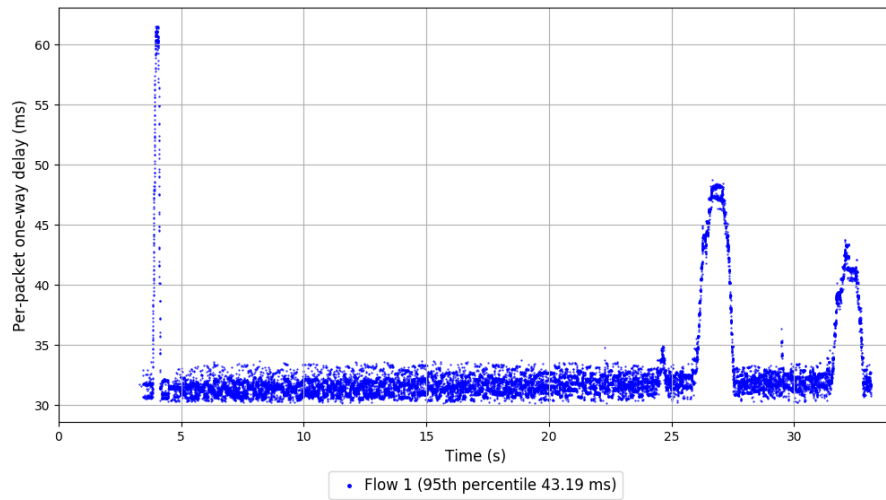
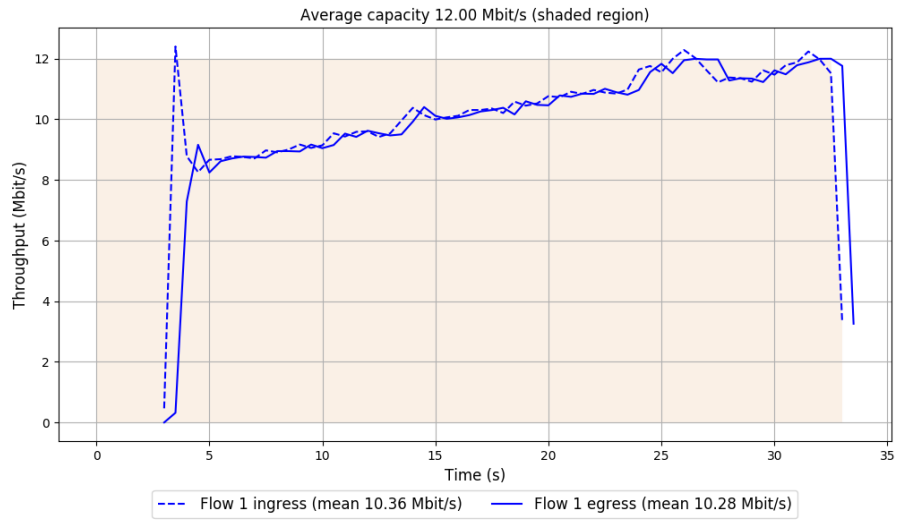
-- Flow 1:

Average throughput: 10.28 Mbit/s

95th percentile per-packet one-way delay: 43.188 ms

Loss rate: 0.83%

## Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

Start at: 2018-10-09 19:59:37

End at: 2018-10-09 20:00:07

# Below is generated by plot.py at 2018-10-09 20:01:49

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.13 Mbit/s (84.4% utilization)

95th percentile per-packet one-way delay: 54.503 ms

Loss rate: 0.99%

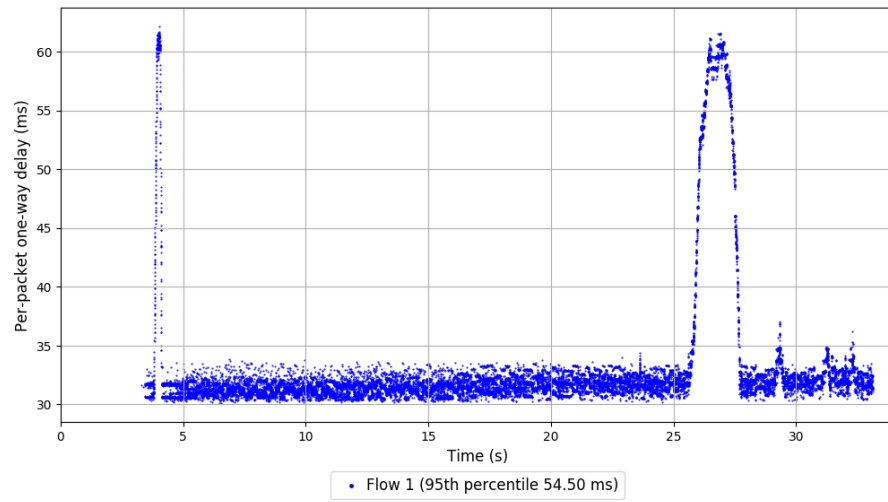
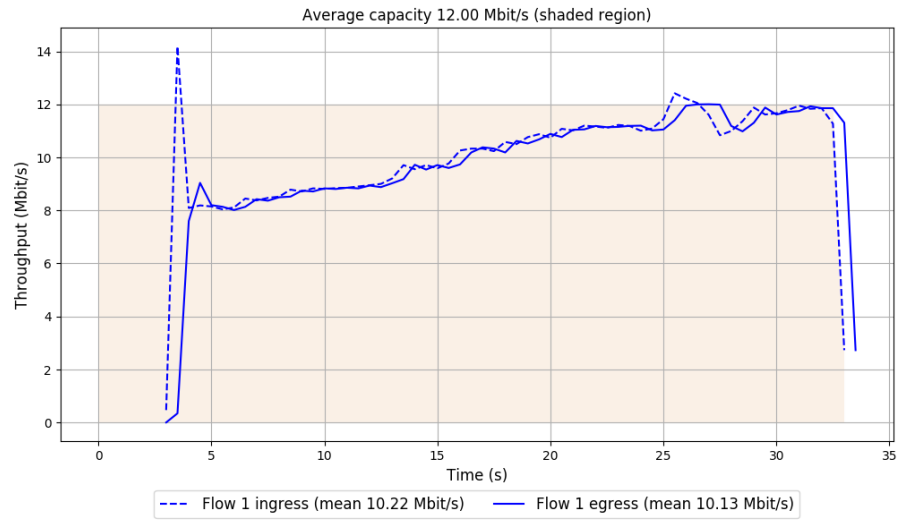
-- Flow 1:

Average throughput: 10.13 Mbit/s

95th percentile per-packet one-way delay: 54.503 ms

Loss rate: 0.99%

### Run 3: Report of PCC-Allegro — Data Link



Run 1: Statistics of PCC-Expr

Start at: 2018-10-09 19:31:08

End at: 2018-10-09 19:31:38

# Below is generated by plot.py at 2018-10-09 20:02:08

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.73 Mbit/s (89.4% utilization)

95th percentile per-packet one-way delay: 61.019 ms

Loss rate: 0.87%

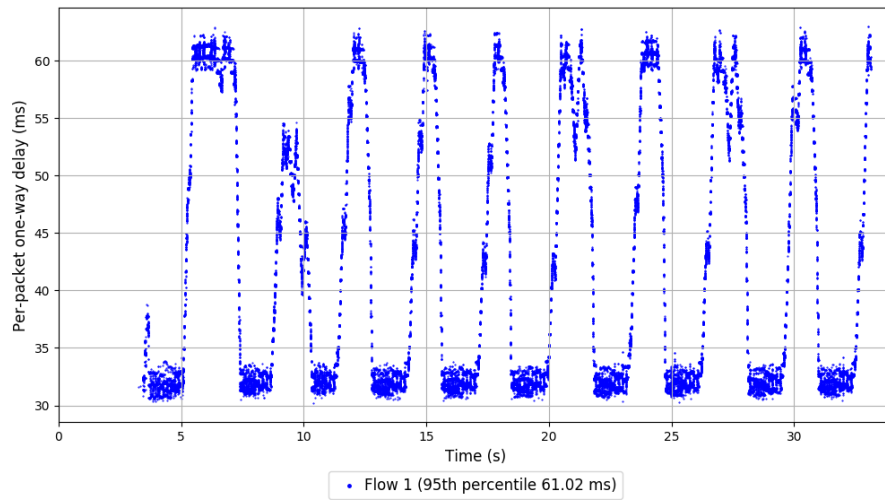
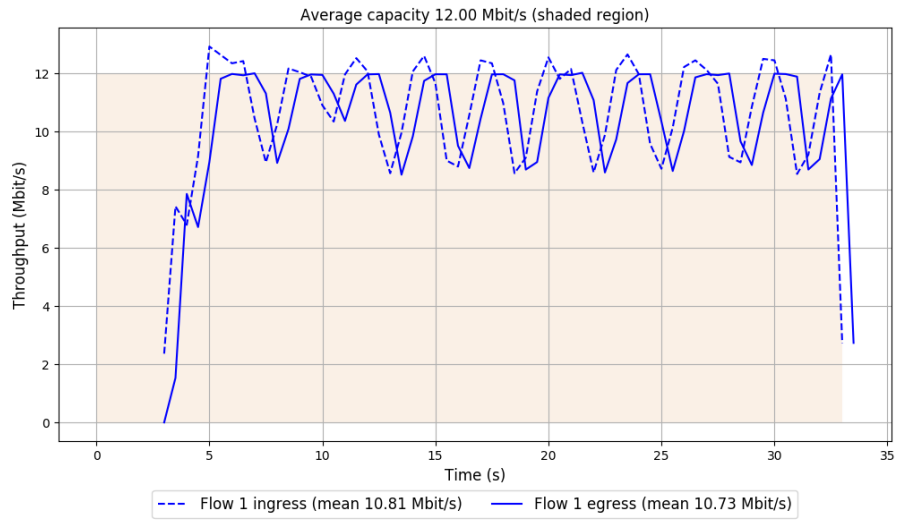
-- Flow 1:

Average throughput: 10.73 Mbit/s

95th percentile per-packet one-way delay: 61.019 ms

Loss rate: 0.87%

# Run 1: Report of PCC-Expr — Data Link



Run 2: Statistics of PCC-Expr

Start at: 2018-10-09 19:41:49

End at: 2018-10-09 19:42:19

# Below is generated by plot.py at 2018-10-09 20:02:09

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.18 Mbit/s (93.2% utilization)

95th percentile per-packet one-way delay: 60.596 ms

Loss rate: 0.61%

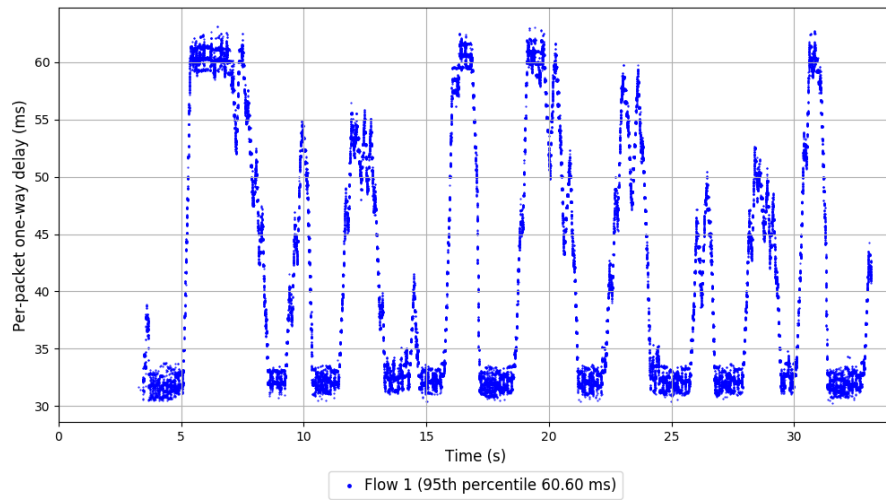
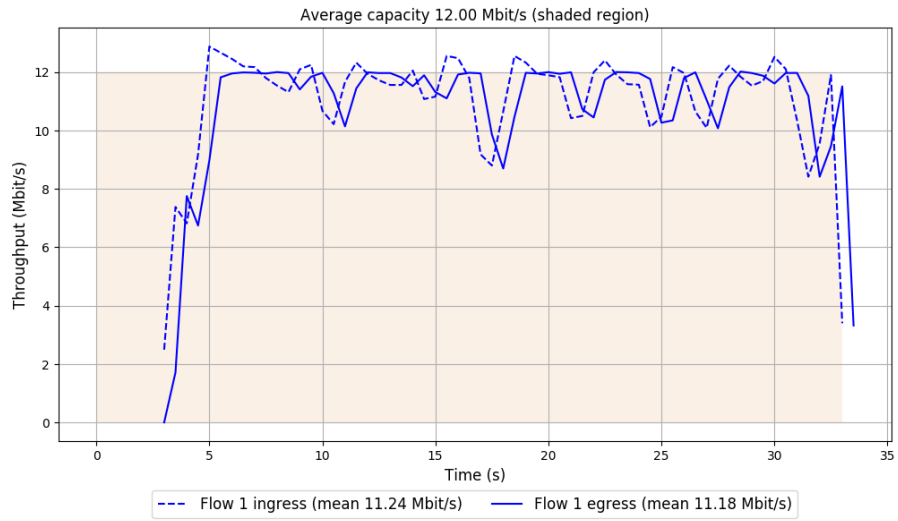
-- Flow 1:

Average throughput: 11.18 Mbit/s

95th percentile per-packet one-way delay: 60.596 ms

Loss rate: 0.61%

## Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

Start at: 2018-10-09 19:52:29

End at: 2018-10-09 19:52:59

# Below is generated by plot.py at 2018-10-09 20:02:10

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.02 Mbit/s (91.8% utilization)

95th percentile per-packet one-way delay: 60.344 ms

Loss rate: 0.49%

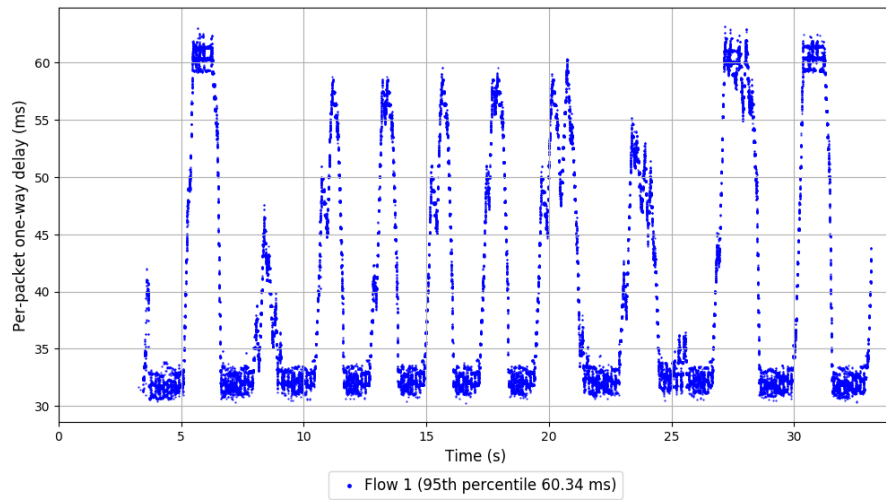
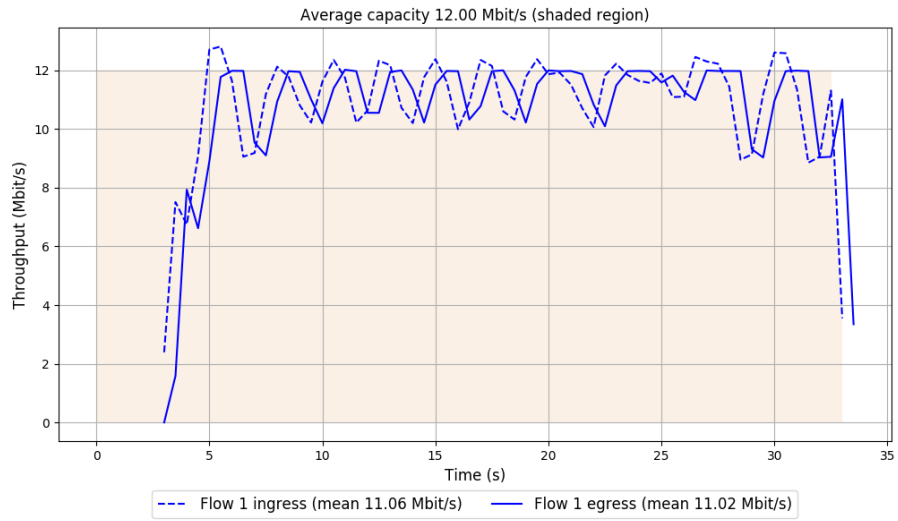
-- Flow 1:

Average throughput: 11.02 Mbit/s

95th percentile per-packet one-way delay: 60.344 ms

Loss rate: 0.49%

### Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2018-10-09 19:34:42

End at: 2018-10-09 19:35:12

# Below is generated by plot.py at 2018-10-09 20:02:10

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.70 Mbit/s (97.5% utilization)

95th percentile per-packet one-way delay: 59.287 ms

Loss rate: 0.32%

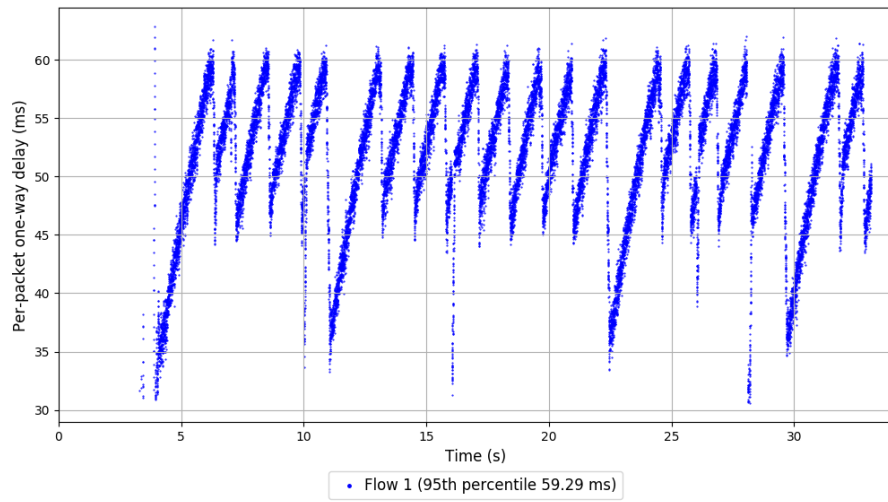
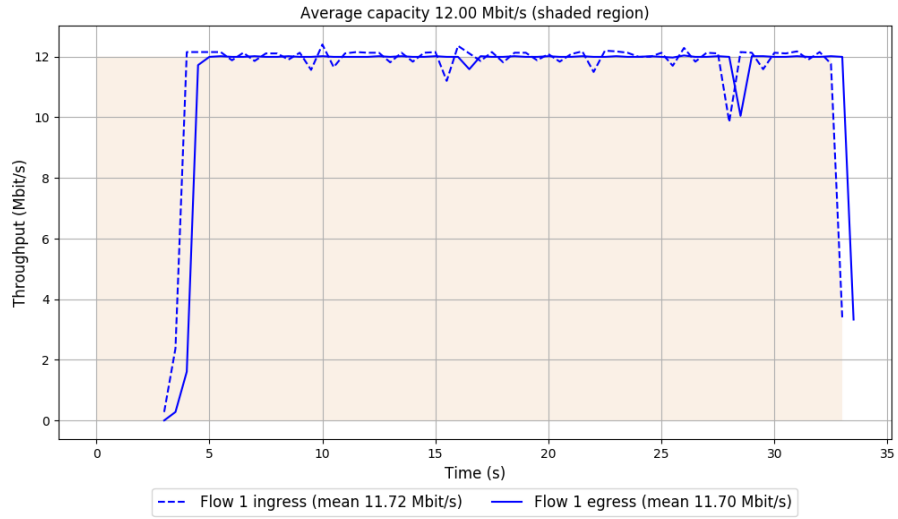
-- Flow 1:

Average throughput: 11.70 Mbit/s

95th percentile per-packet one-way delay: 59.287 ms

Loss rate: 0.32%

# Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2018-10-09 19:45:23

End at: 2018-10-09 19:45:53

# Below is generated by plot.py at 2018-10-09 20:02:10

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.70 Mbit/s (97.5% utilization)

95th percentile per-packet one-way delay: 59.134 ms

Loss rate: 0.31%

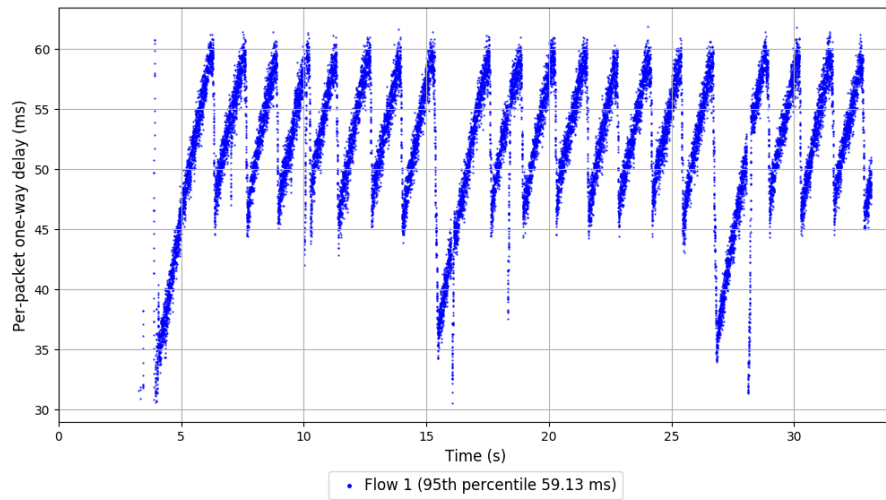
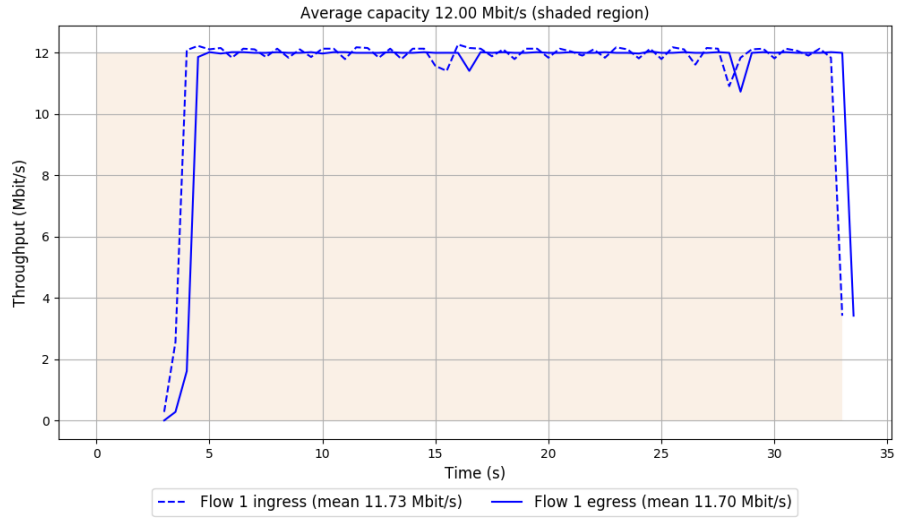
-- Flow 1:

Average throughput: 11.70 Mbit/s

95th percentile per-packet one-way delay: 59.134 ms

Loss rate: 0.31%

## Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2018-10-09 19:56:03

End at: 2018-10-09 19:56:33

# Below is generated by plot.py at 2018-10-09 20:02:11

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.72 Mbit/s (97.7% utilization)

95th percentile per-packet one-way delay: 59.195 ms

Loss rate: 0.32%

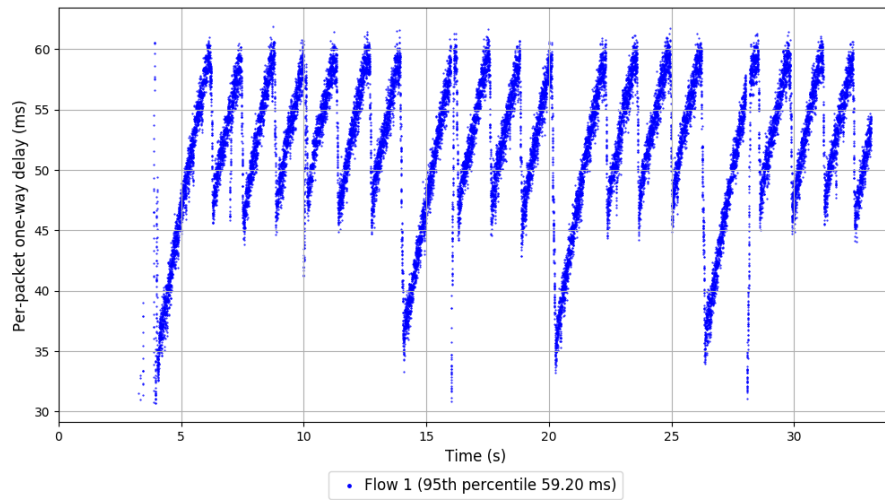
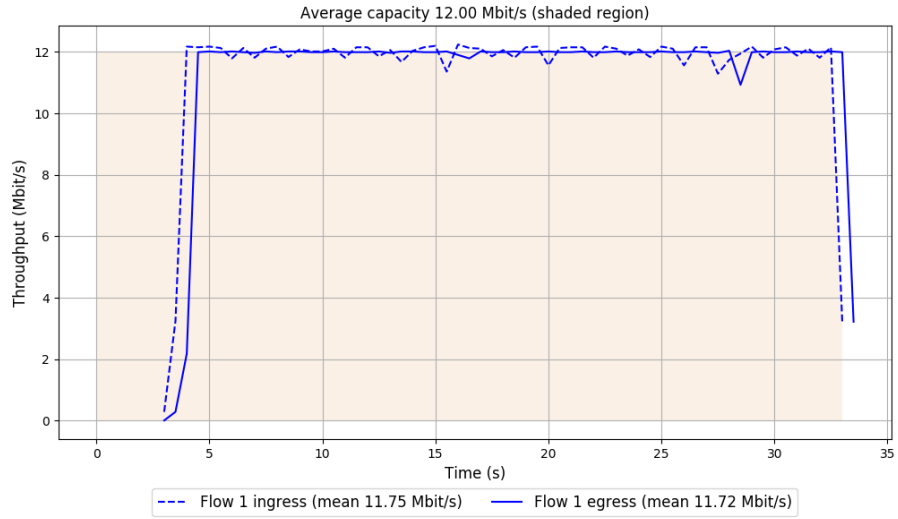
-- Flow 1:

Average throughput: 11.72 Mbit/s

95th percentile per-packet one-way delay: 59.195 ms

Loss rate: 0.32%

### Run 3: Report of QUIC Cubic — Data Link



Run 1: Statistics of SCReAM

Start at: 2018-10-09 19:37:04

End at: 2018-10-09 19:37:34

# Below is generated by plot.py at 2018-10-09 20:02:11

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 0.21 Mbit/s (1.8% utilization)

95th percentile per-packet one-way delay: 31.665 ms

Loss rate: 0.13%

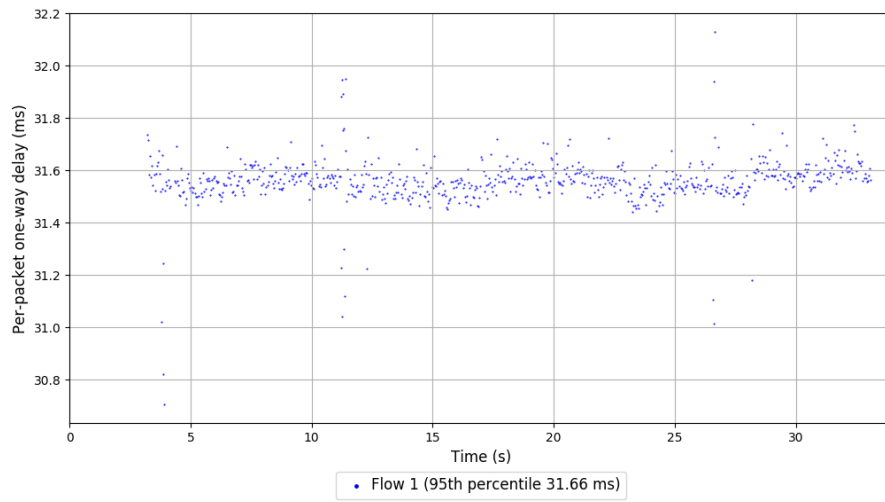
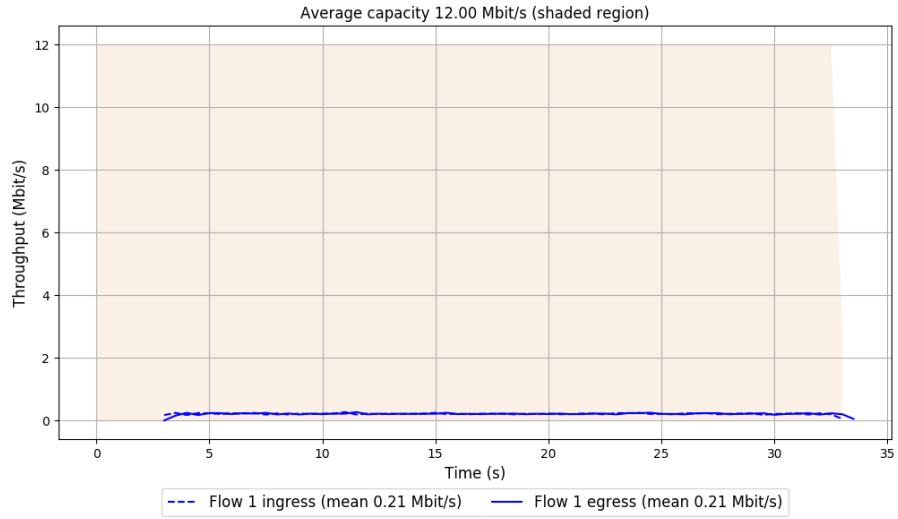
-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 31.665 ms

Loss rate: 0.13%

# Run 1: Report of SCReAM — Data Link



Run 2: Statistics of SCReAM

Start at: 2018-10-09 19:47:45

End at: 2018-10-09 19:48:15

# Below is generated by plot.py at 2018-10-09 20:02:11

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 0.21 Mbit/s (1.8% utilization)

95th percentile per-packet one-way delay: 31.644 ms

Loss rate: 0.13%

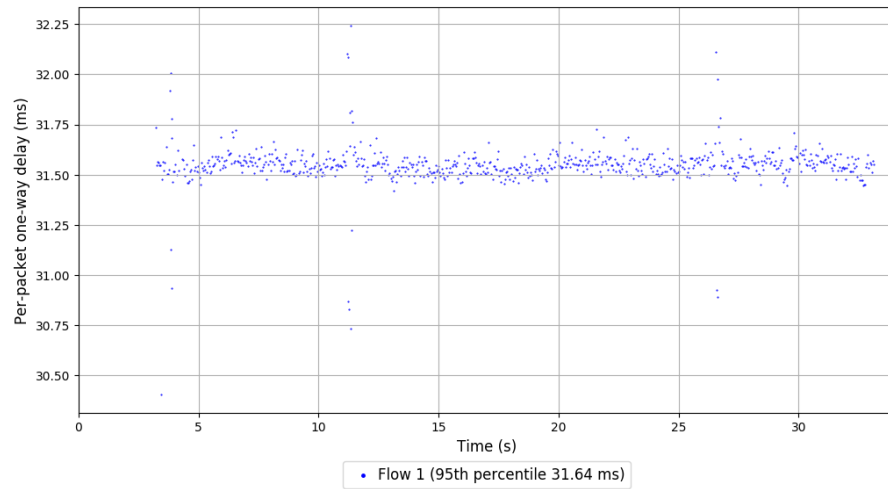
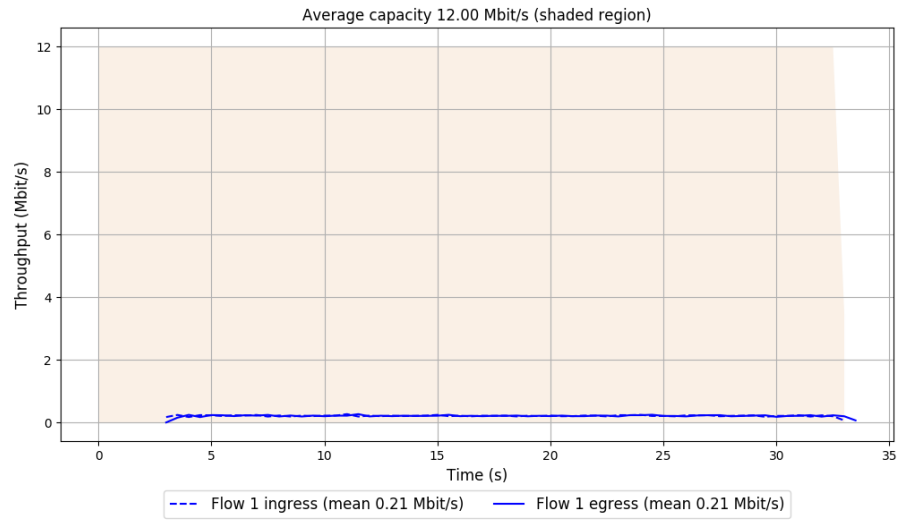
-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 31.644 ms

Loss rate: 0.13%

## Run 2: Report of SCReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2018-10-09 19:58:26

End at: 2018-10-09 19:58:56

# Below is generated by plot.py at 2018-10-09 20:02:11

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 0.21 Mbit/s (1.8% utilization)

95th percentile per-packet one-way delay: 31.793 ms

Loss rate: 0.13%

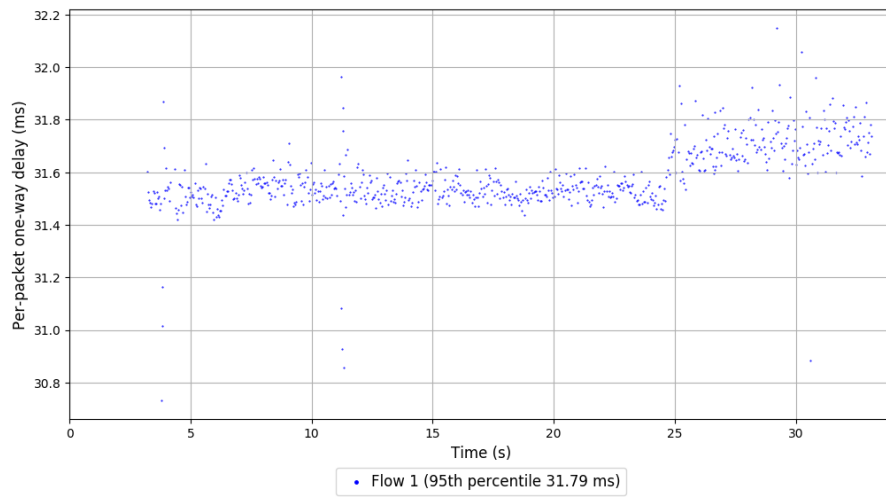
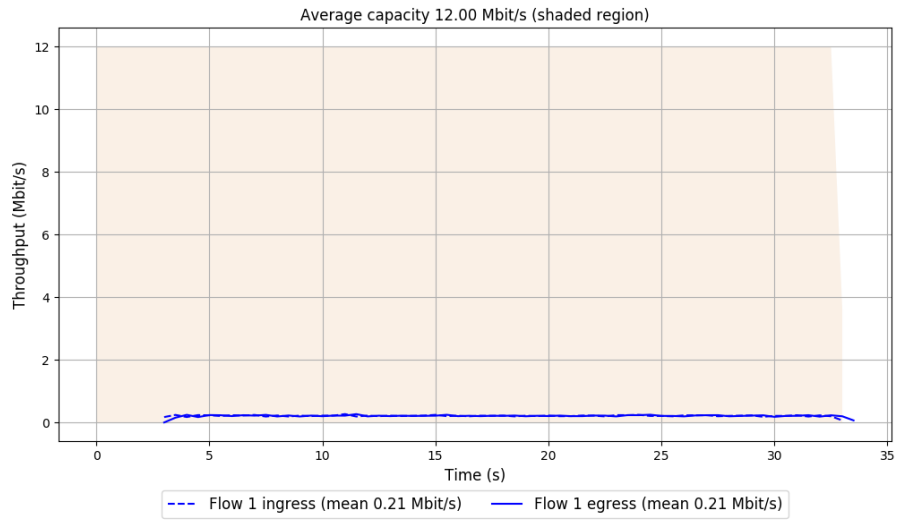
-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 31.793 ms

Loss rate: 0.13%

### Run 3: Report of SCReAM — Data Link



Run 1: Statistics of Sprout

Start at: 2018-10-09 19:29:22

End at: 2018-10-09 19:29:52

# Below is generated by plot.py at 2018-10-09 20:02:12

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 6.57 Mbit/s (54.8% utilization)

95th percentile per-packet one-way delay: 55.661 ms

Loss rate: 0.58%

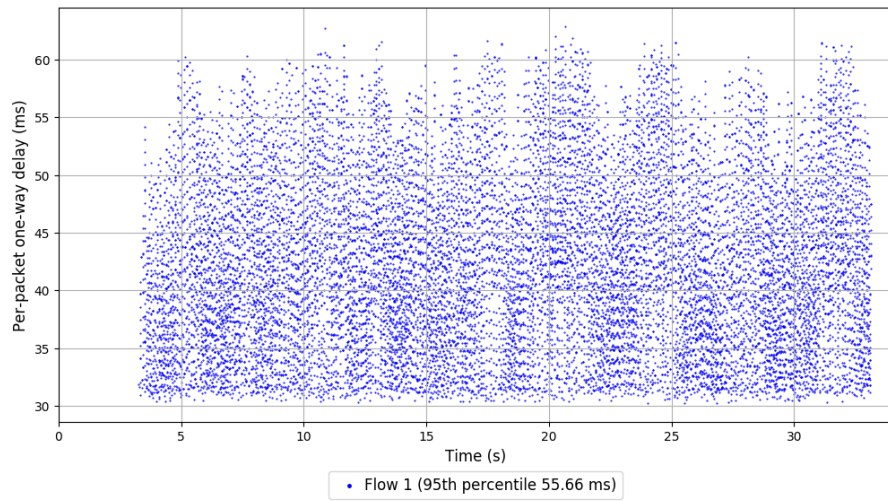
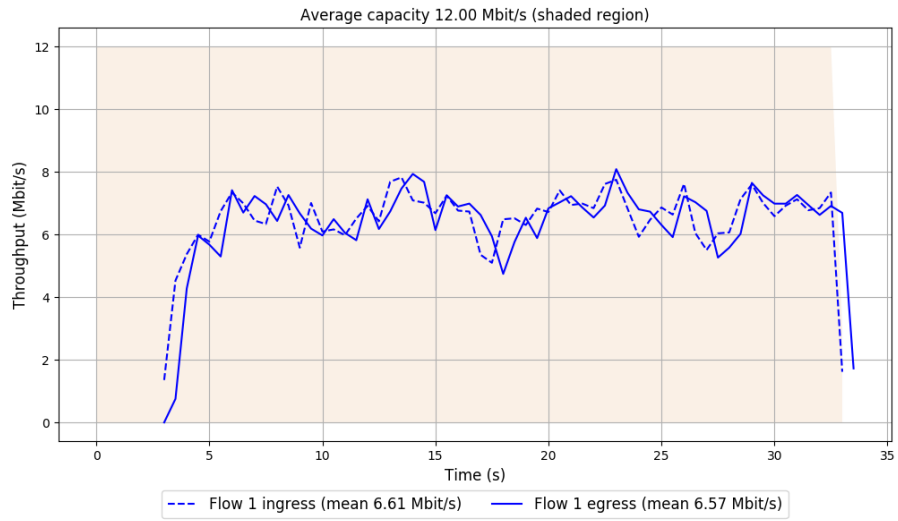
-- Flow 1:

Average throughput: 6.57 Mbit/s

95th percentile per-packet one-way delay: 55.661 ms

Loss rate: 0.58%

# Run 1: Report of Sprout — Data Link



Run 2: Statistics of Sprout

Start at: 2018-10-09 19:40:03

End at: 2018-10-09 19:40:33

# Below is generated by plot.py at 2018-10-09 20:02:16

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 6.28 Mbit/s (52.3% utilization)

95th percentile per-packet one-way delay: 55.566 ms

Loss rate: 0.75%

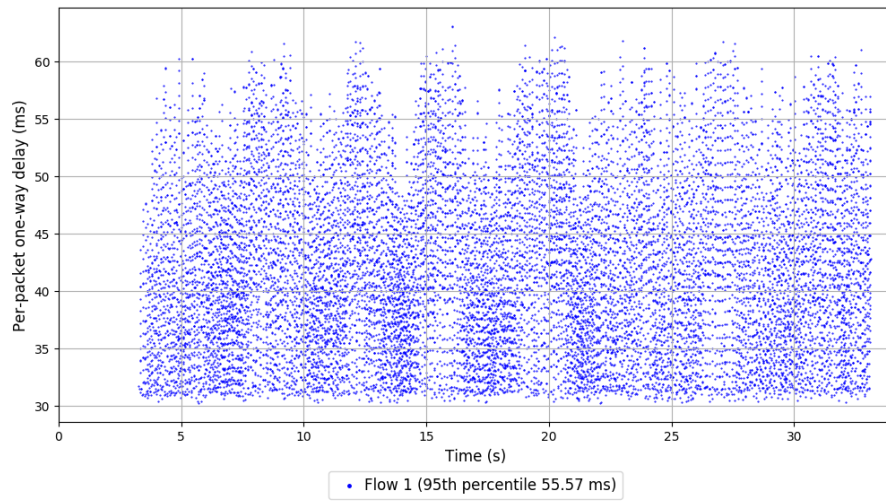
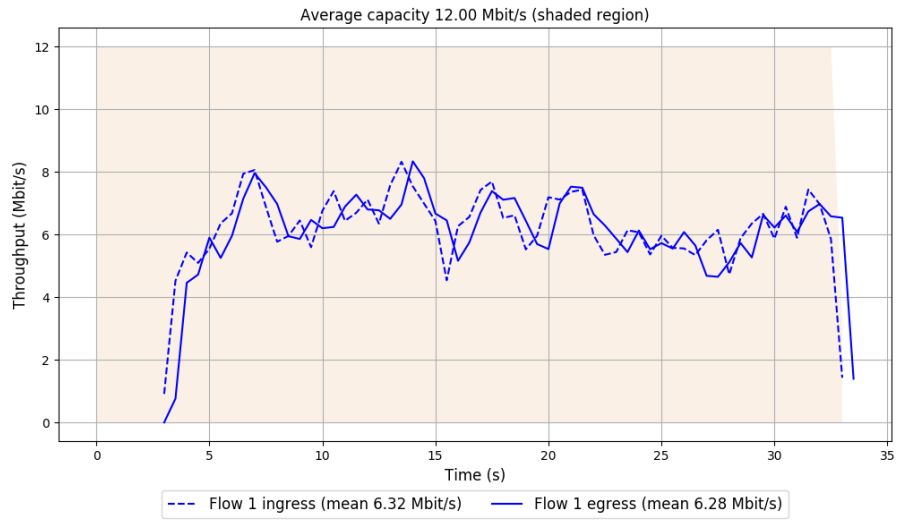
-- Flow 1:

Average throughput: 6.28 Mbit/s

95th percentile per-packet one-way delay: 55.566 ms

Loss rate: 0.75%

## Run 2: Report of Sprout — Data Link



Run 3: Statistics of Sprout

Start at: 2018-10-09 19:50:43

End at: 2018-10-09 19:51:13

# Below is generated by plot.py at 2018-10-09 20:02:17

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 6.38 Mbit/s (53.2% utilization)

95th percentile per-packet one-way delay: 55.792 ms

Loss rate: 0.57%

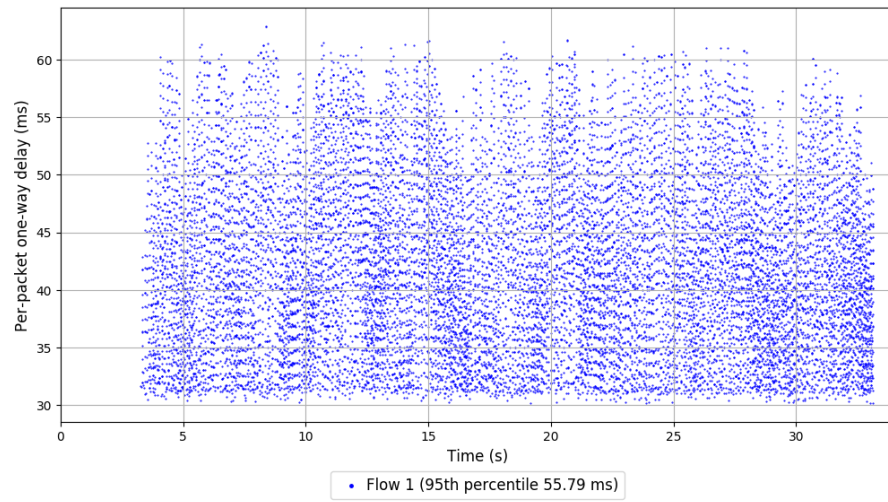
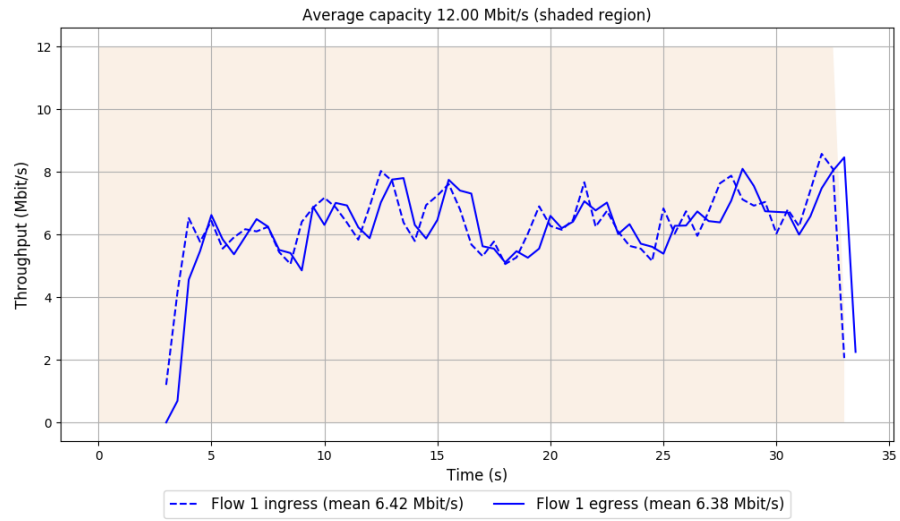
-- Flow 1:

Average throughput: 6.38 Mbit/s

95th percentile per-packet one-way delay: 55.792 ms

Loss rate: 0.57%

### Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

Start at: 2018-10-09 19:34:06

End at: 2018-10-09 19:34:36

# Below is generated by plot.py at 2018-10-09 20:02:38

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.14 Mbit/s (92.8% utilization)

95th percentile per-packet one-way delay: 32.883 ms

Loss rate: 0.68%

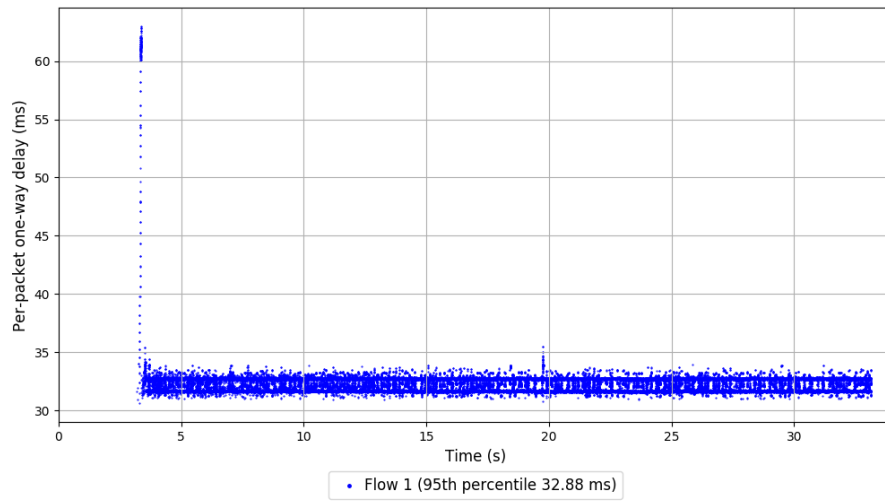
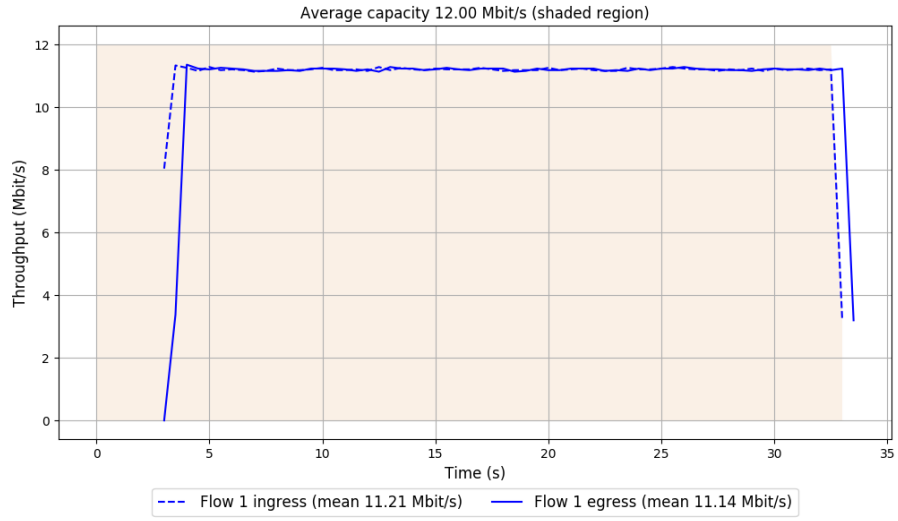
-- Flow 1:

Average throughput: 11.14 Mbit/s

95th percentile per-packet one-way delay: 32.883 ms

Loss rate: 0.68%

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



Run 2: Statistics of TaoVA-100x

Start at: 2018-10-09 19:44:47

End at: 2018-10-09 19:45:17

# Below is generated by plot.py at 2018-10-09 20:02:39

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.14 Mbit/s (92.8% utilization)

95th percentile per-packet one-way delay: 32.887 ms

Loss rate: 0.69%

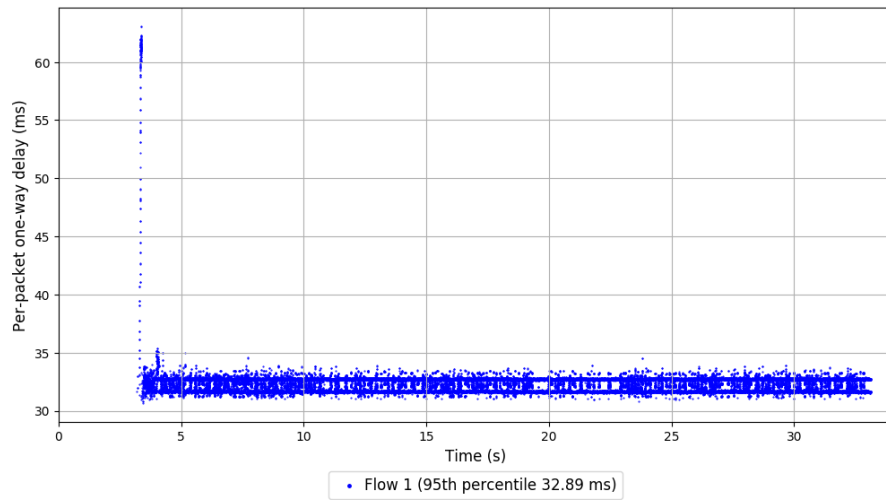
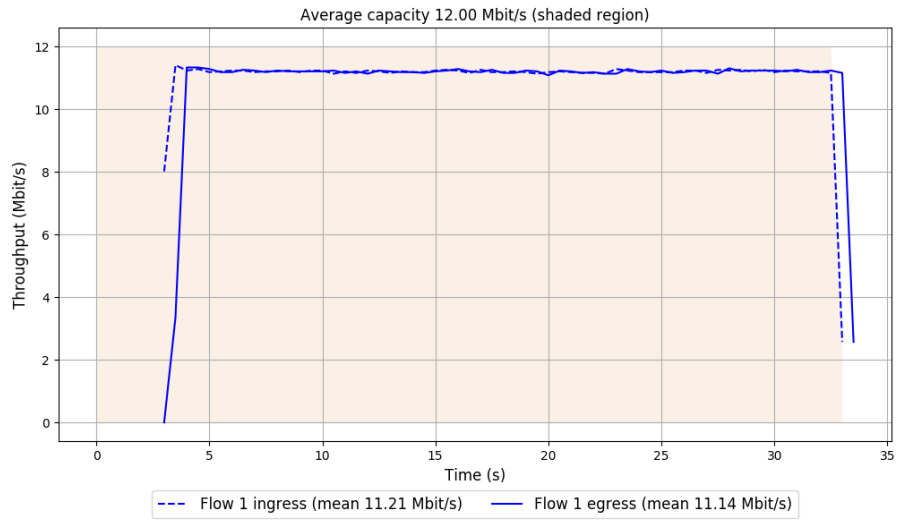
-- Flow 1:

Average throughput: 11.14 Mbit/s

95th percentile per-packet one-way delay: 32.887 ms

Loss rate: 0.69%

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



Run 3: Statistics of TaoVA-100x

Start at: 2018-10-09 19:55:27

End at: 2018-10-09 19:55:57

# Below is generated by plot.py at 2018-10-09 20:02:39

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.11 Mbit/s (92.6% utilization)

95th percentile per-packet one-way delay: 32.850 ms

Loss rate: 0.82%

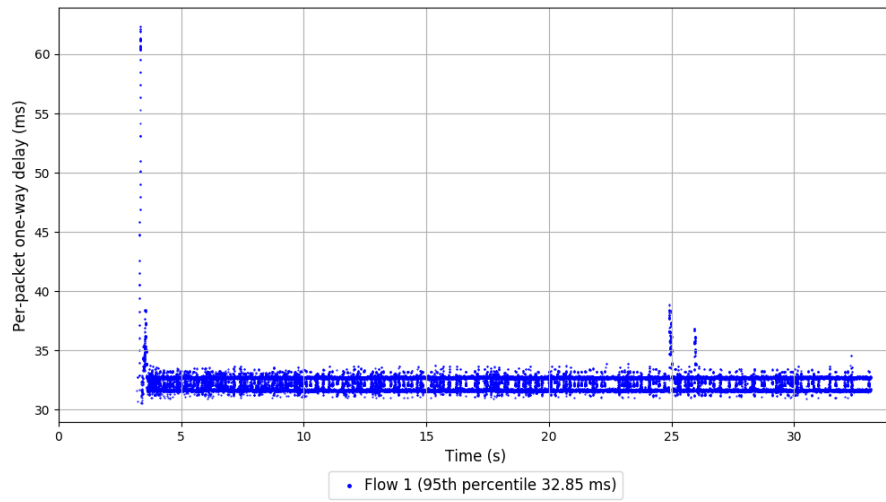
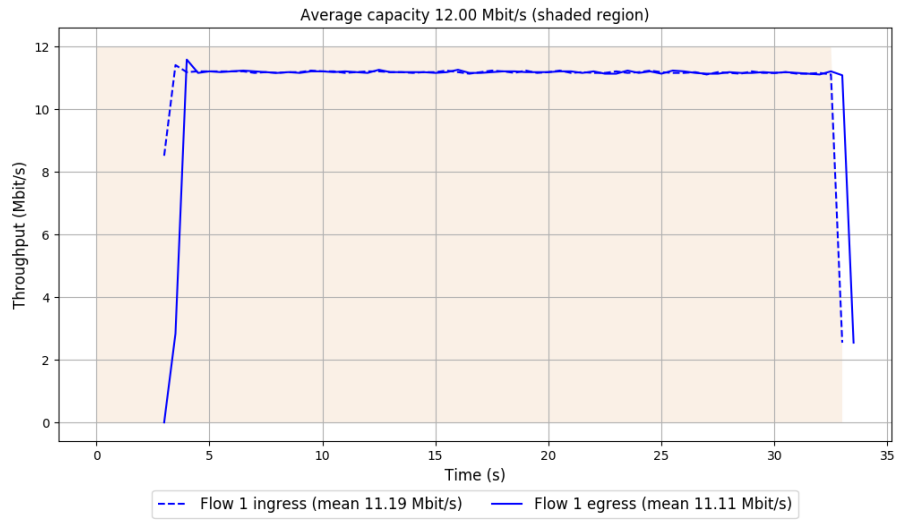
-- Flow 1:

Average throughput: 11.11 Mbit/s

95th percentile per-packet one-way delay: 32.850 ms

Loss rate: 0.82%

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



Run 1: Statistics of TCP Vegas

Start at: 2018-10-09 19:35:53

End at: 2018-10-09 19:36:23

# Below is generated by plot.py at 2018-10-09 20:02:39

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.92 Mbit/s (99.3% utilization)

95th percentile per-packet one-way delay: 37.806 ms

Loss rate: 0.33%

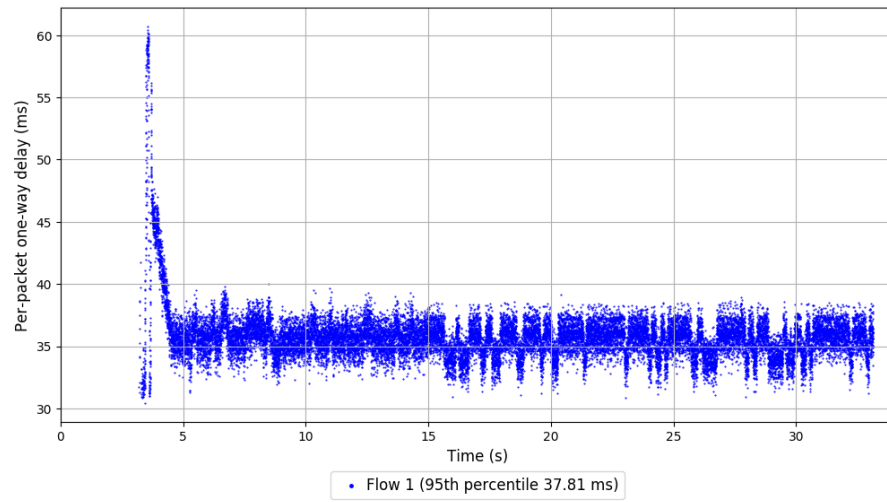
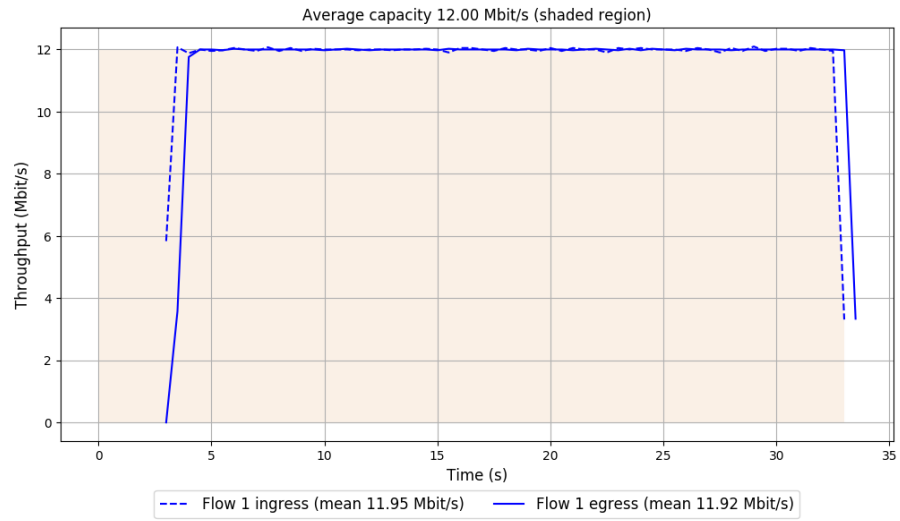
-- Flow 1:

Average throughput: 11.92 Mbit/s

95th percentile per-packet one-way delay: 37.806 ms

Loss rate: 0.33%

### Run 1: Report of TCP Vegas — Data Link



Run 2: Statistics of TCP Vegas

Start at: 2018-10-09 19:46:34

End at: 2018-10-09 19:47:04

# Below is generated by plot.py at 2018-10-09 20:02:39

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.92 Mbit/s (99.3% utilization)

95th percentile per-packet one-way delay: 37.746 ms

Loss rate: 0.32%

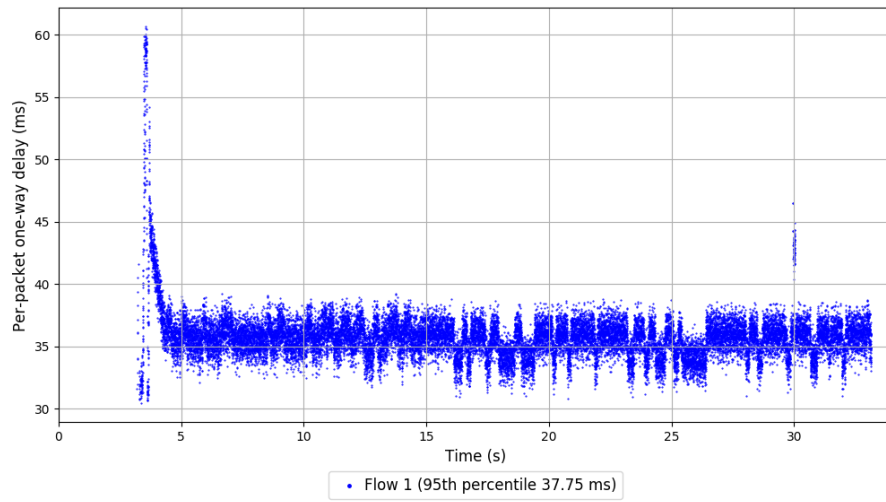
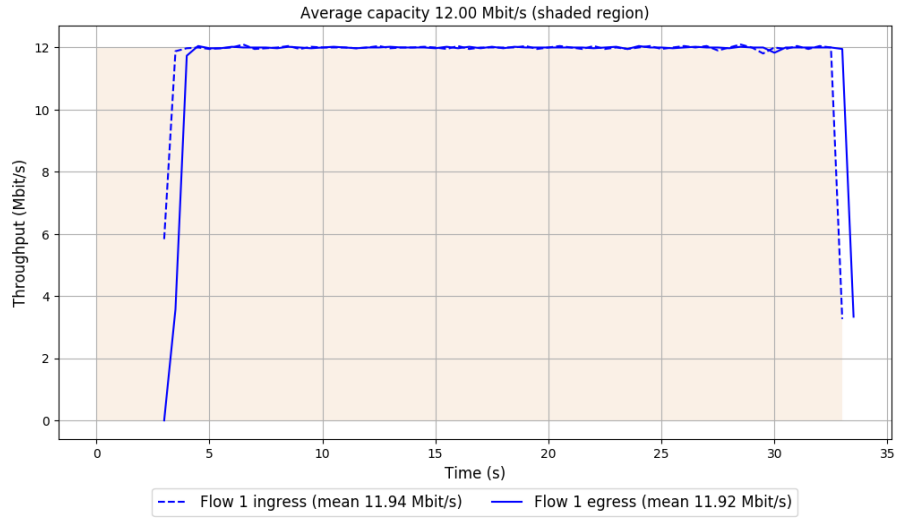
-- Flow 1:

Average throughput: 11.92 Mbit/s

95th percentile per-packet one-way delay: 37.746 ms

Loss rate: 0.32%

## Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2018-10-09 19:57:15

End at: 2018-10-09 19:57:45

# Below is generated by plot.py at 2018-10-09 20:02:39

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.92 Mbit/s (99.3% utilization)

95th percentile per-packet one-way delay: 38.276 ms

Loss rate: 0.34%

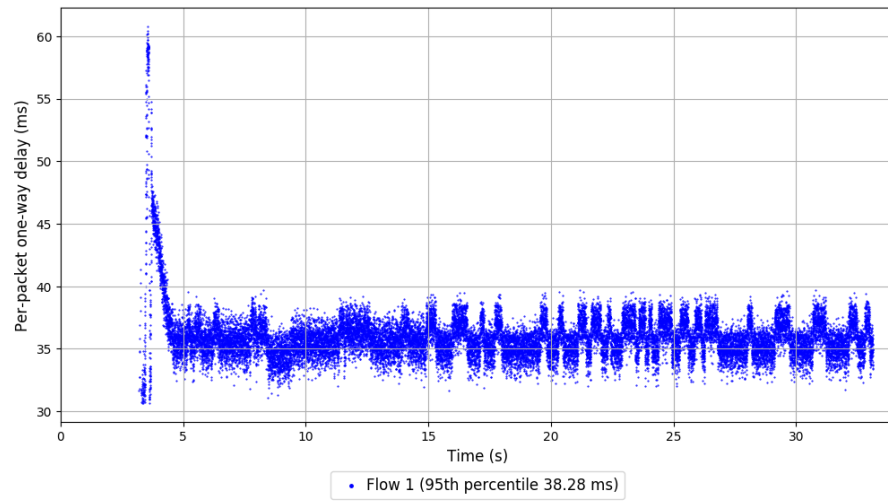
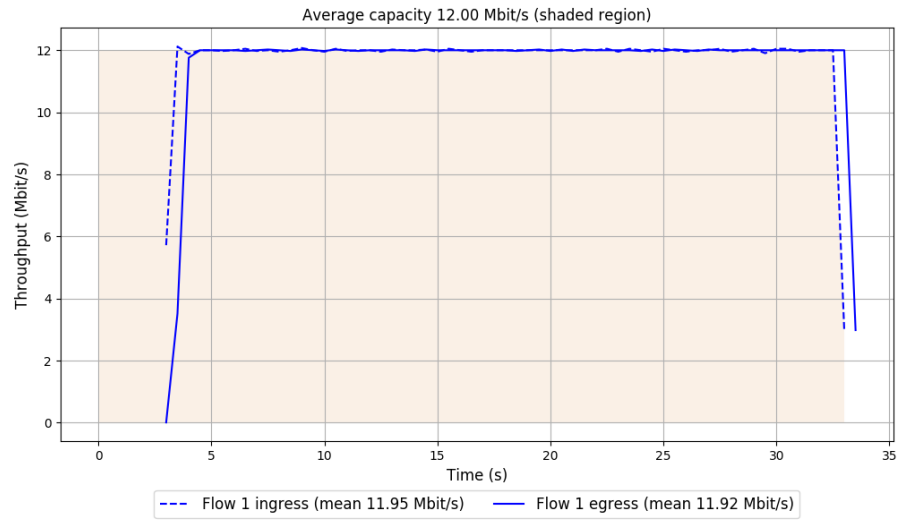
-- Flow 1:

Average throughput: 11.92 Mbit/s

95th percentile per-packet one-way delay: 38.276 ms

Loss rate: 0.34%

### Run 3: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2018-10-09 19:28:45

End at: 2018-10-09 19:29:15

# Below is generated by plot.py at 2018-10-09 20:02:54

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 7.26 Mbit/s (60.5% utilization)

95th percentile per-packet one-way delay: 61.417 ms

Loss rate: 90.65%

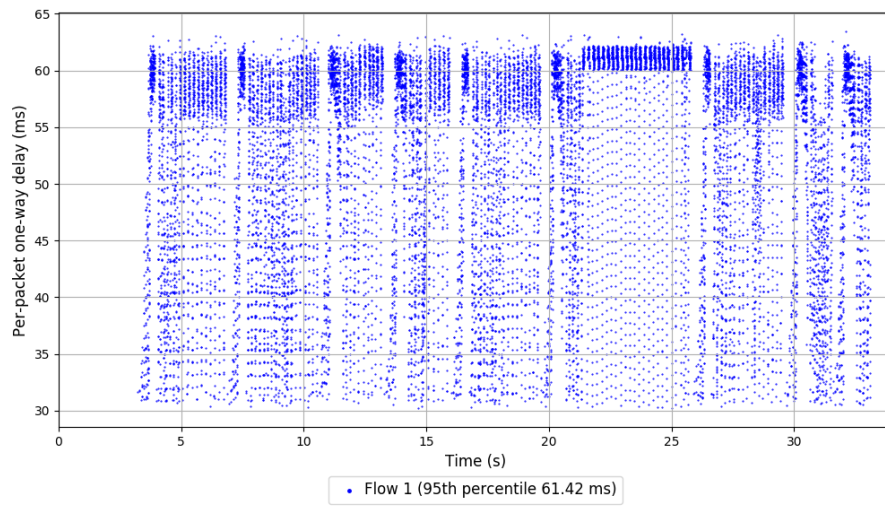
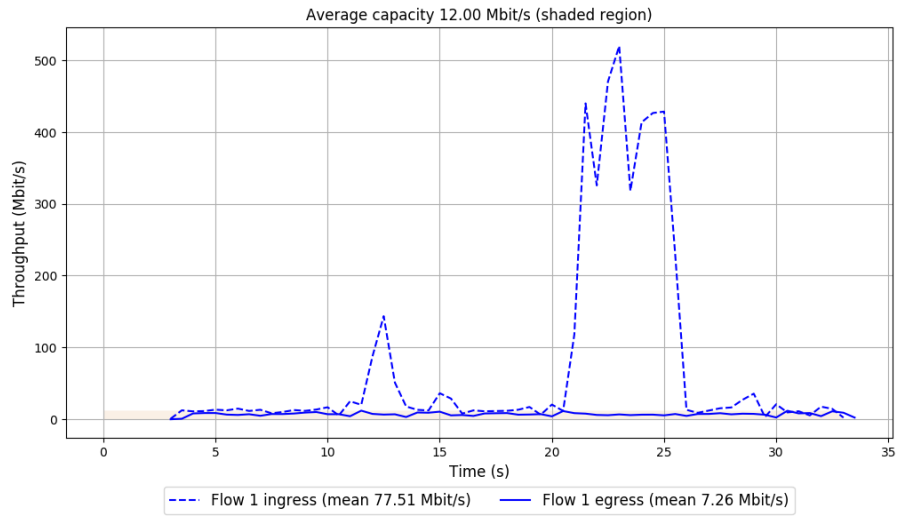
-- Flow 1:

Average throughput: 7.26 Mbit/s

95th percentile per-packet one-way delay: 61.417 ms

Loss rate: 90.65%

# Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2018-10-09 19:39:26

End at: 2018-10-09 19:39:56

# Below is generated by plot.py at 2018-10-09 20:02:54

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 7.46 Mbit/s (62.1% utilization)

95th percentile per-packet one-way delay: 61.378 ms

Loss rate: 88.95%

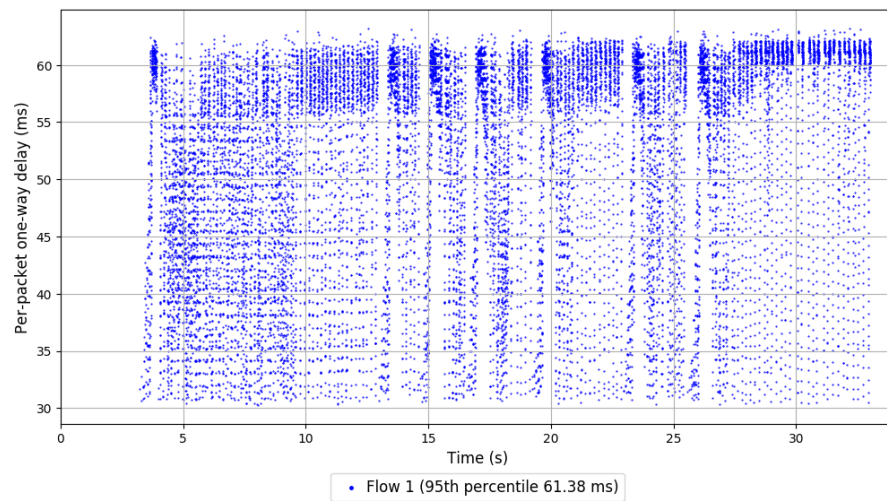
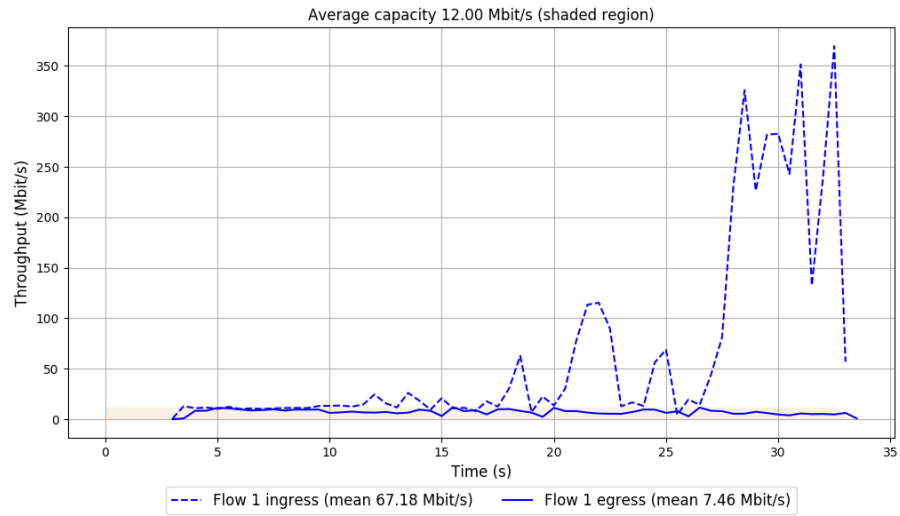
-- Flow 1:

Average throughput: 7.46 Mbit/s

95th percentile per-packet one-way delay: 61.378 ms

Loss rate: 88.95%

## Run 2: Report of Verus — Data Link



Run 3: Statistics of Verus

Start at: 2018-10-09 19:50:07

End at: 2018-10-09 19:50:37

# Below is generated by plot.py at 2018-10-09 20:02:56

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 6.51 Mbit/s (54.2% utilization)

95th percentile per-packet one-way delay: 61.459 ms

Loss rate: 87.08%

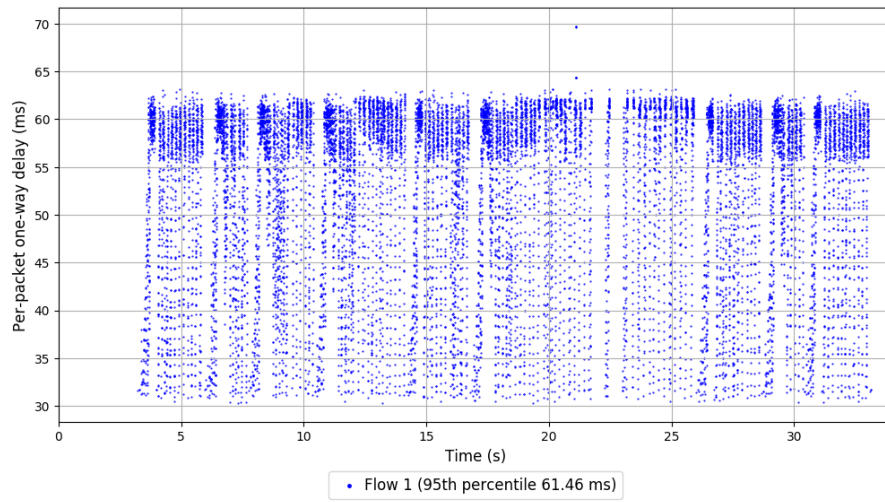
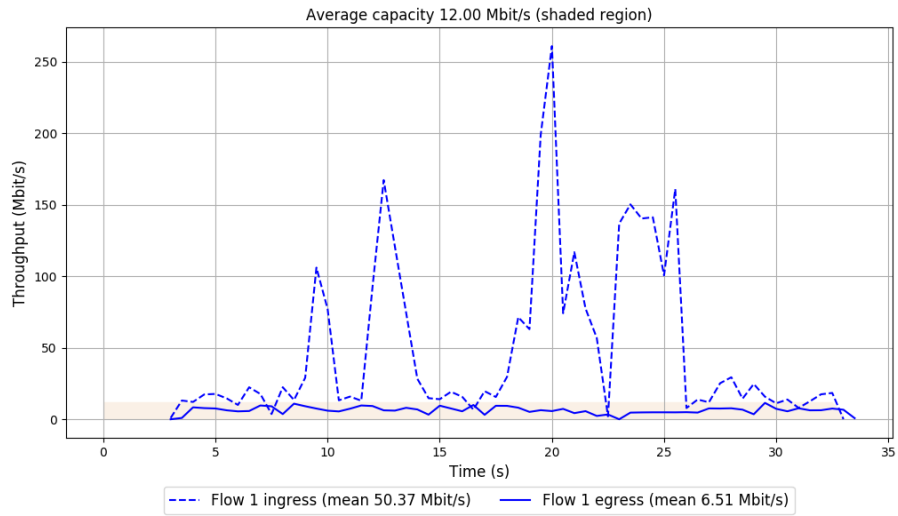
-- Flow 1:

Average throughput: 6.51 Mbit/s

95th percentile per-packet one-way delay: 61.459 ms

Loss rate: 87.08%

### Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

Start at: 2018-10-09 19:31:44

End at: 2018-10-09 19:32:14

# Below is generated by plot.py at 2018-10-09 20:02:56

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.94 Mbit/s (91.1% utilization)

95th percentile per-packet one-way delay: 36.361 ms

Loss rate: 0.14%

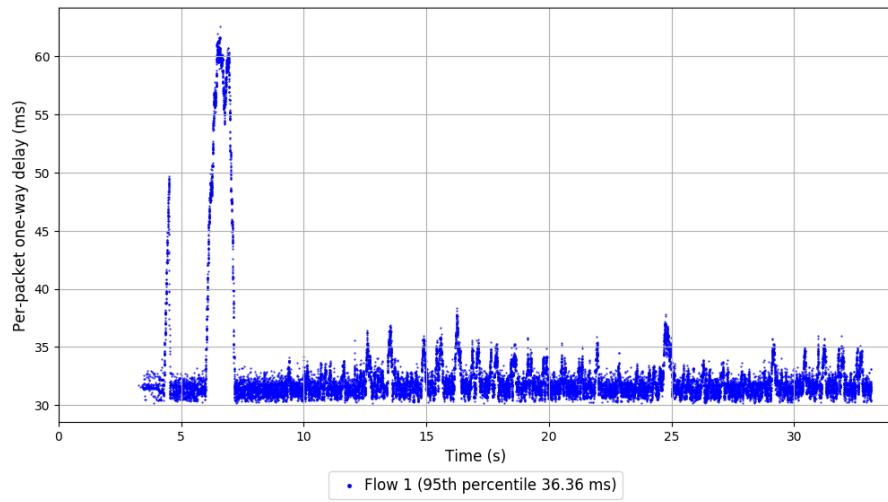
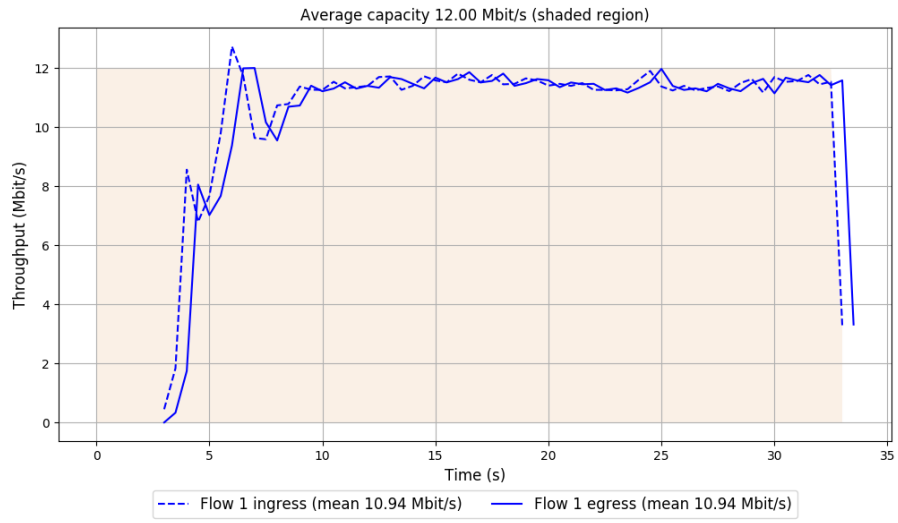
-- Flow 1:

Average throughput: 10.94 Mbit/s

95th percentile per-packet one-way delay: 36.361 ms

Loss rate: 0.14%

# Run 1: Report of PCC-Vivace — Data Link



Run 2: Statistics of PCC-Vivace

Start at: 2018-10-09 19:42:25

End at: 2018-10-09 19:42:55

# Below is generated by plot.py at 2018-10-09 20:02:56

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.92 Mbit/s (91.0% utilization)

95th percentile per-packet one-way delay: 36.653 ms

Loss rate: 0.14%

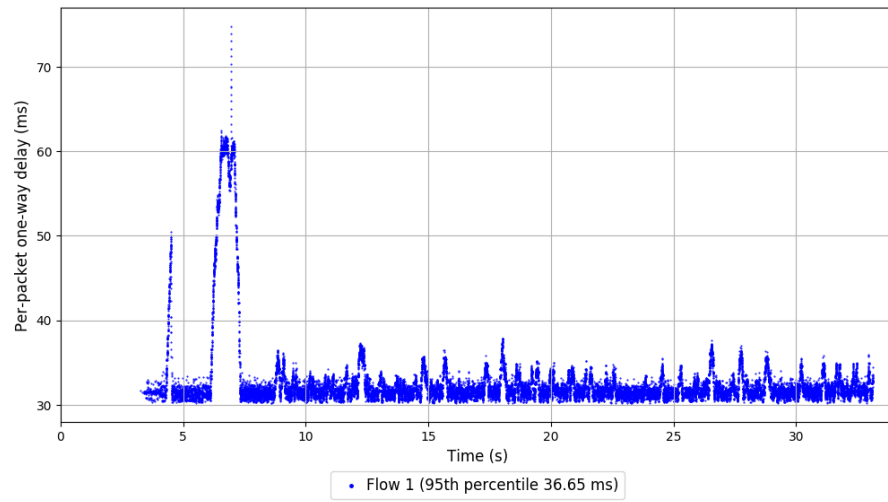
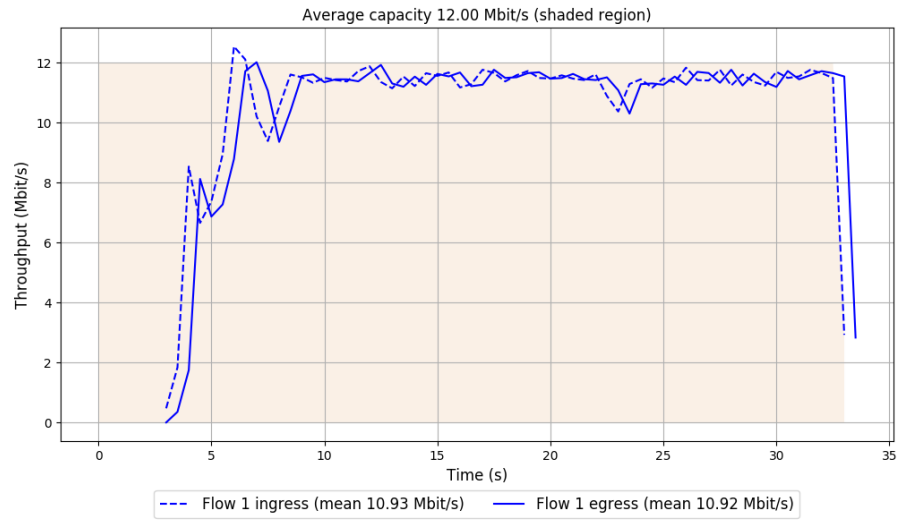
-- Flow 1:

Average throughput: 10.92 Mbit/s

95th percentile per-packet one-way delay: 36.653 ms

Loss rate: 0.14%

## Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

Start at: 2018-10-09 19:53:05

End at: 2018-10-09 19:53:35

# Below is generated by plot.py at 2018-10-09 20:02:56

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.93 Mbit/s (91.1% utilization)

95th percentile per-packet one-way delay: 35.487 ms

Loss rate: 0.15%

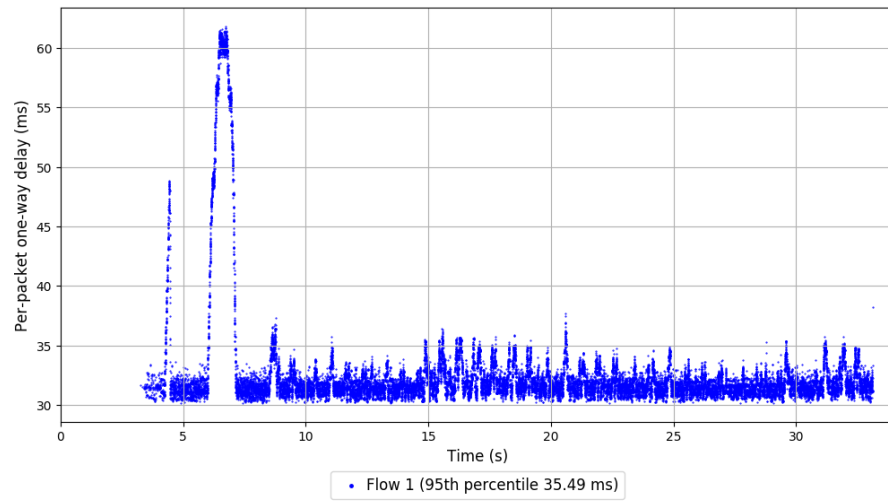
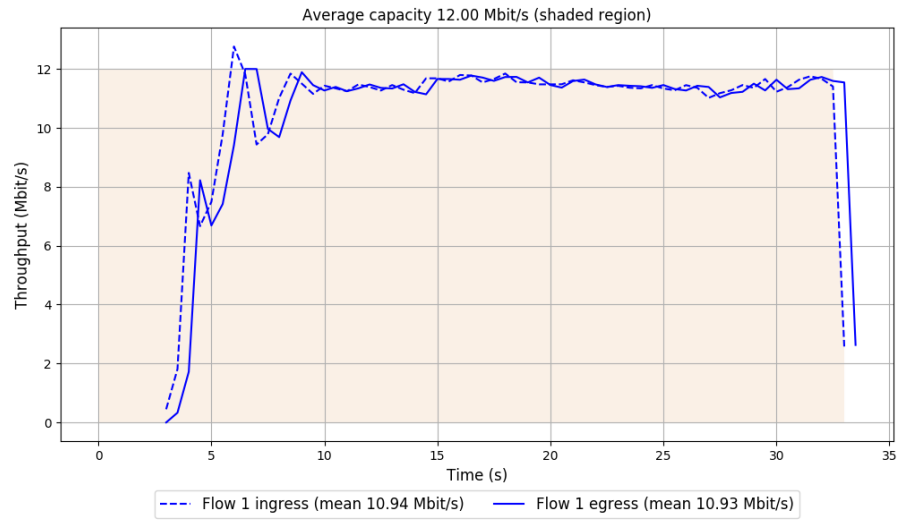
-- Flow 1:

Average throughput: 10.93 Mbit/s

95th percentile per-packet one-way delay: 35.487 ms

Loss rate: 0.15%

### Run 3: Report of PCC-Vivace — Data Link



Run 1: Statistics of WebRTC media

Start at: 2018-10-09 19:32:20

End at: 2018-10-09 19:32:50

# Below is generated by plot.py at 2018-10-09 20:02:56

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 2.09 Mbit/s (17.4% utilization)

95th percentile per-packet one-way delay: 36.409 ms

Loss rate: 0.09%

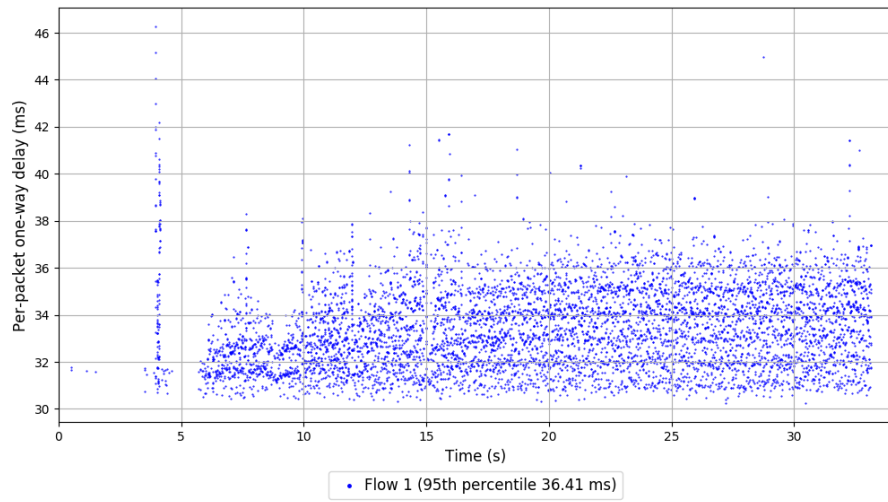
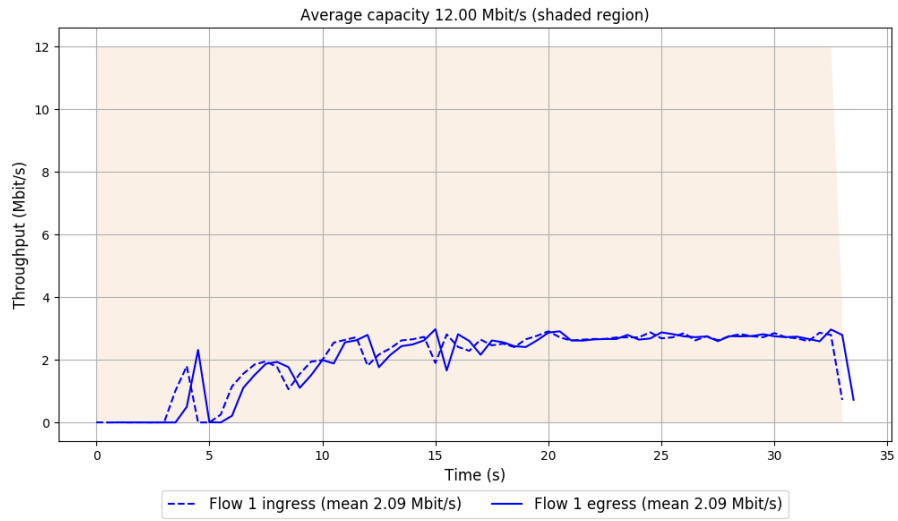
-- Flow 1:

Average throughput: 2.09 Mbit/s

95th percentile per-packet one-way delay: 36.409 ms

Loss rate: 0.09%

# Run 1: Report of WebRTC media — Data Link



Run 2: Statistics of WebRTC media

Start at: 2018-10-09 19:43:01

End at: 2018-10-09 19:43:31

# Below is generated by plot.py at 2018-10-09 20:02:56

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 2.08 Mbit/s (17.3% utilization)

95th percentile per-packet one-way delay: 36.900 ms

Loss rate: 0.10%

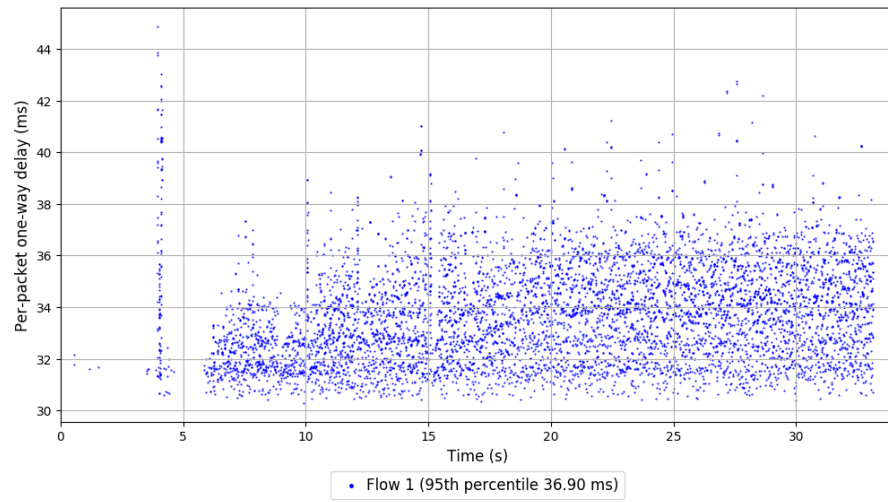
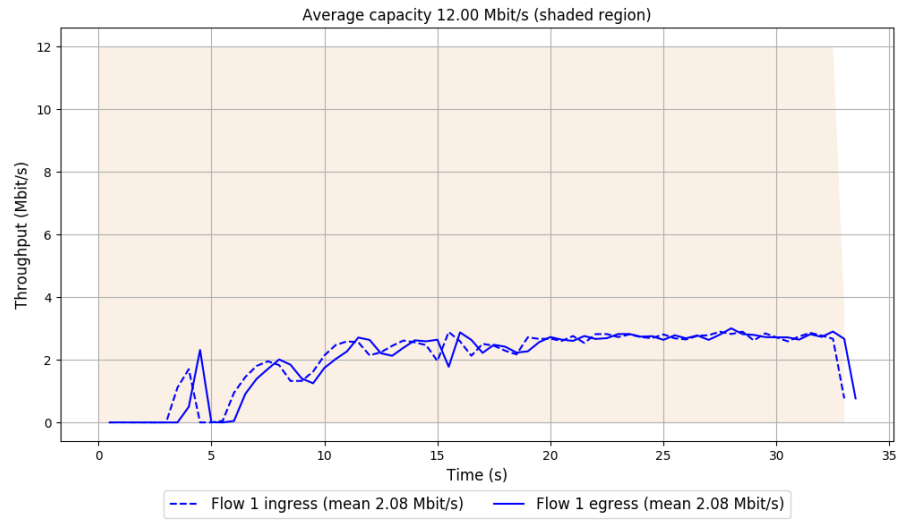
-- Flow 1:

Average throughput: 2.08 Mbit/s

95th percentile per-packet one-way delay: 36.900 ms

Loss rate: 0.10%

## Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2018-10-09 19:53:41

End at: 2018-10-09 19:54:11

# Below is generated by plot.py at 2018-10-09 20:02:56

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 2.10 Mbit/s (17.5% utilization)

95th percentile per-packet one-way delay: 36.351 ms

Loss rate: 0.12%

-- Flow 1:

Average throughput: 2.10 Mbit/s

95th percentile per-packet one-way delay: 36.351 ms

Loss rate: 0.12%

### Run 3: Report of WebRTC media — Data Link

