

Pantheon Report

Generated at 2018-10-09 22:13:35 (UTC).

Tested in mahimahi: mm-delay 30 mm-link 12mbps.trace 12mbps.trace
--uplink-queue=droptail --uplink-queue-args=bytes=9000

Repeated the test of 18 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

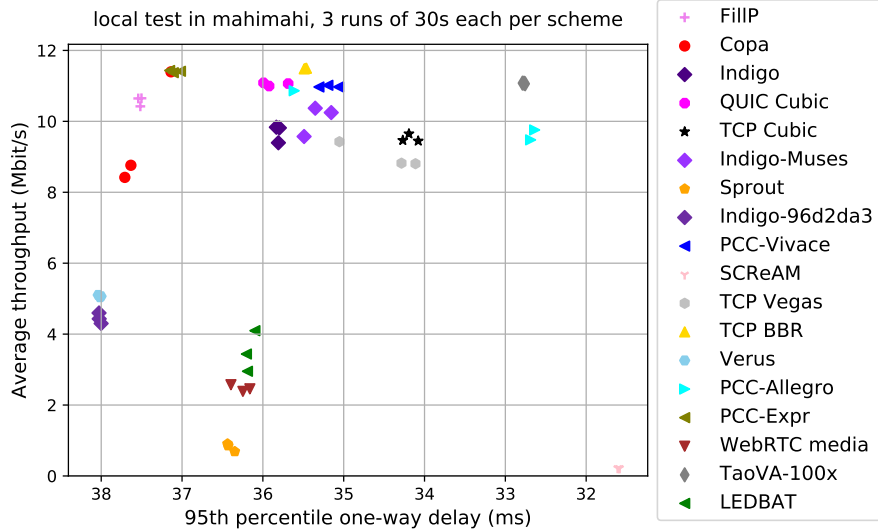
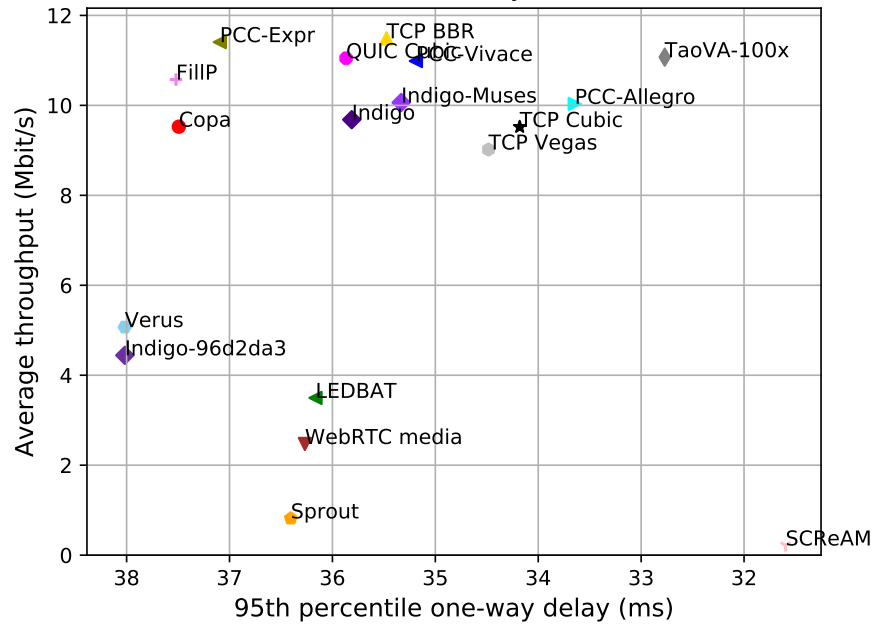
System info:

```
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	11.49	35.47	4.16
Copa	3	9.53	37.49	28.73
TCP Cubic	3	9.52	34.18	0.20
FillP	3	10.57	37.52	15.07
Indigo	3	9.68	35.81	65.74
Indigo-96d2da3	3	4.44	38.02	76.34
LEDBAT	3	3.50	36.16	2.80
Indigo-Muses	3	10.06	35.33	3.02
PCC-Allegro	3	10.03	33.65	0.78
PCC-Expr	3	11.40	37.09	2.38
QUIC Cubic	3	11.05	35.87	0.46
SCReAM	3	0.21	31.60	0.04
Sprout	3	0.82	36.40	12.77
TaoVA-100x	3	11.07	32.77	0.79
TCP Vegas	3	9.02	34.48	0.21
Verus	3	5.07	38.02	97.42
PCC-Vivace	3	10.99	35.19	0.29
WebRTC media	3	2.47	36.27	2.50

Run 1: Statistics of TCP BBR

Start at: 2018-10-09 21:44:44

End at: 2018-10-09 21:45:14

Below is generated by plot.py at 2018-10-09 22:11:28

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.48 Mbit/s (95.7% utilization)

95th percentile per-packet one-way delay: 35.488 ms

Loss rate: 4.20%

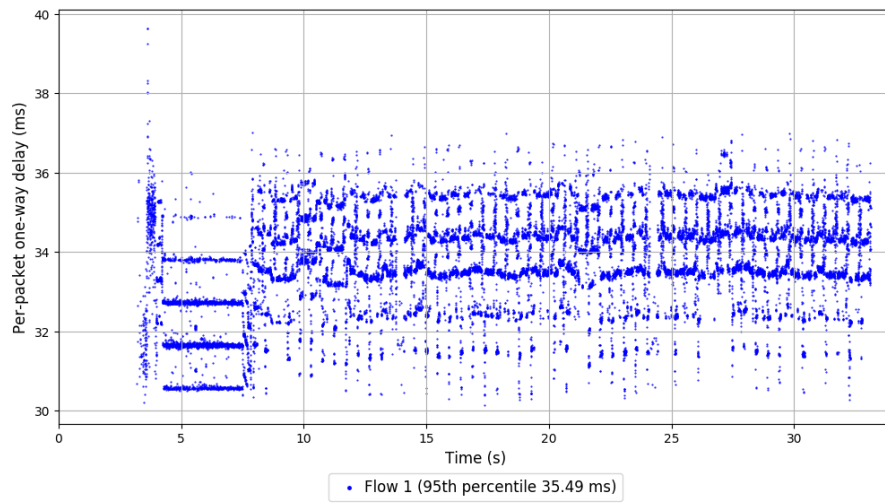
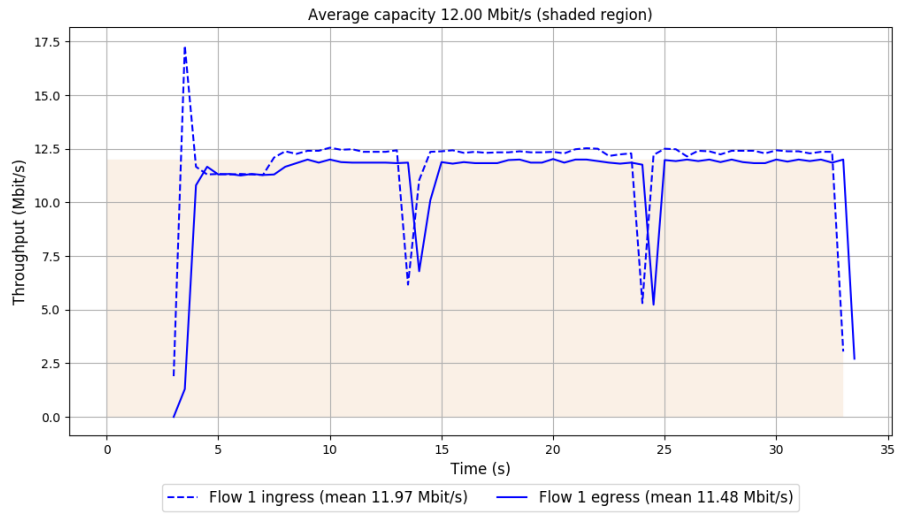
-- Flow 1:

Average throughput: 11.48 Mbit/s

95th percentile per-packet one-way delay: 35.488 ms

Loss rate: 4.20%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-10-09 21:55:25

End at: 2018-10-09 21:55:55

Below is generated by plot.py at 2018-10-09 22:11:28

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: 35.461 ms

Loss rate: 4.26%

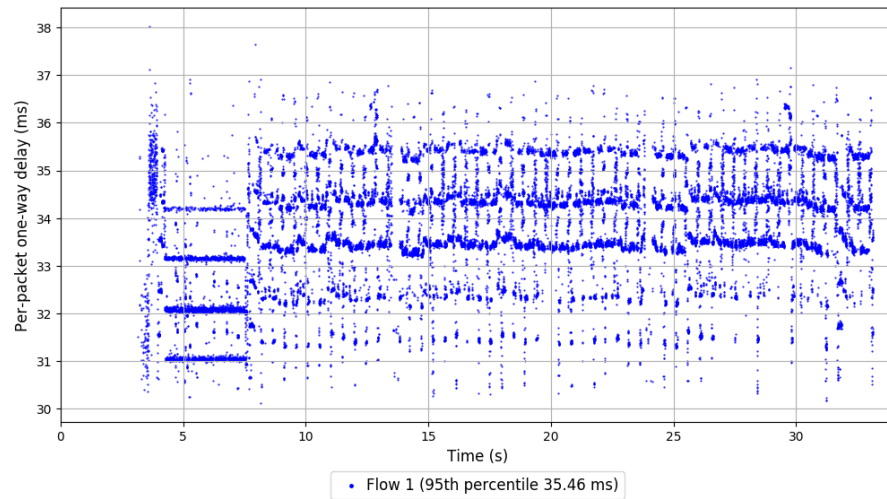
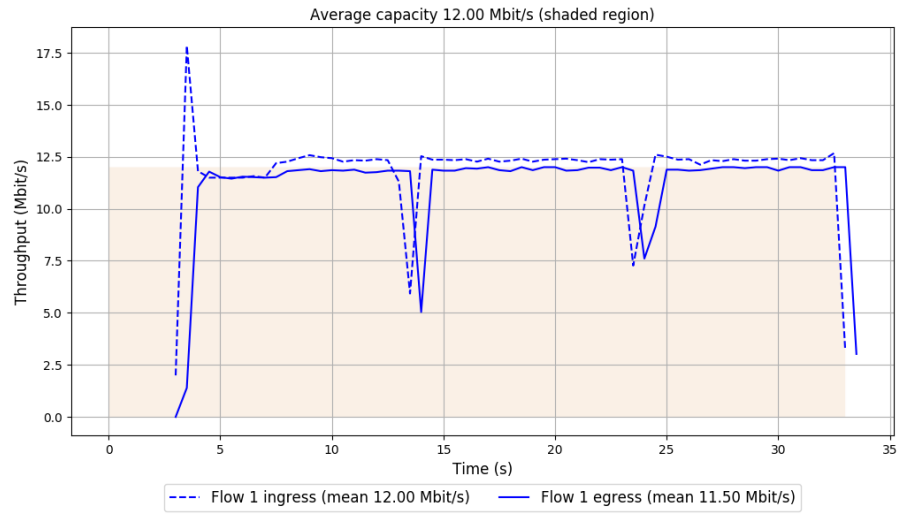
-- Flow 1:

Average throughput: 11.50 Mbit/s

95th percentile per-packet one-way delay: 35.461 ms

Loss rate: 4.26%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2018-10-09 22:06:07

End at: 2018-10-09 22:06:37

Below is generated by plot.py at 2018-10-09 22:11:28

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.49 Mbit/s (95.8% utilization)

95th percentile per-packet one-way delay: 35.475 ms

Loss rate: 4.03%

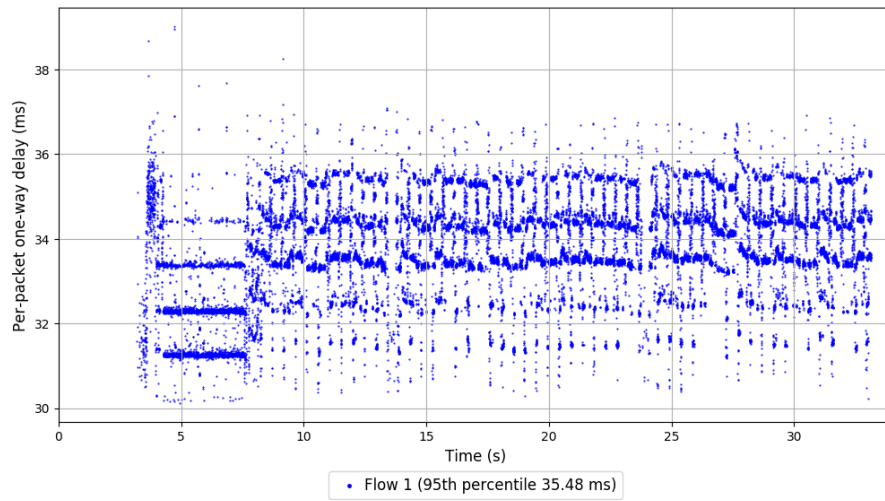
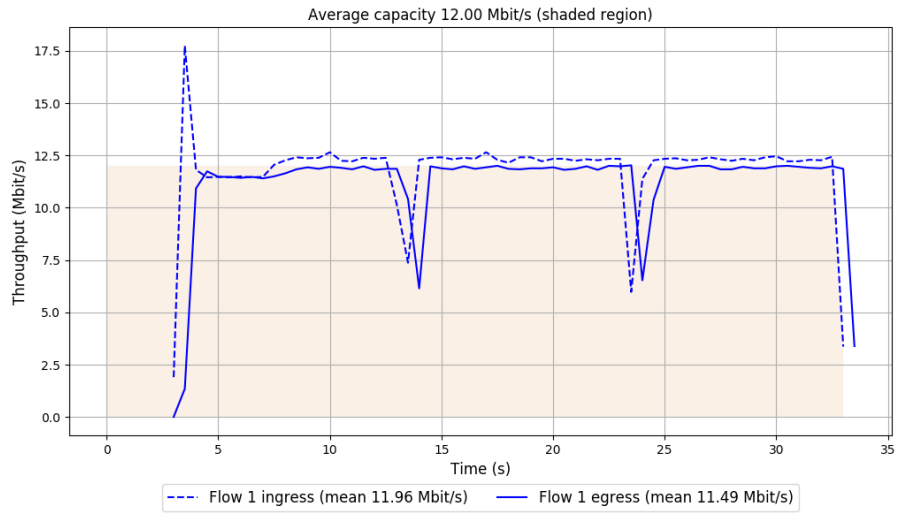
-- Flow 1:

Average throughput: 11.49 Mbit/s

95th percentile per-packet one-way delay: 35.475 ms

Loss rate: 4.03%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

Start at: 2018-10-09 21:41:47

End at: 2018-10-09 21:42:17

Below is generated by plot.py at 2018-10-09 22:11:42

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.40 Mbit/s (95.0% utilization)

95th percentile per-packet one-way delay: 37.137 ms

Loss rate: 12.09%

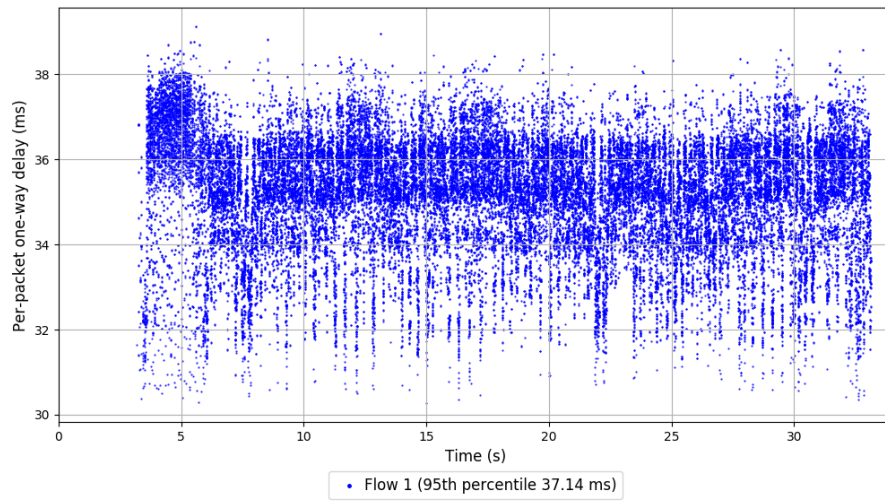
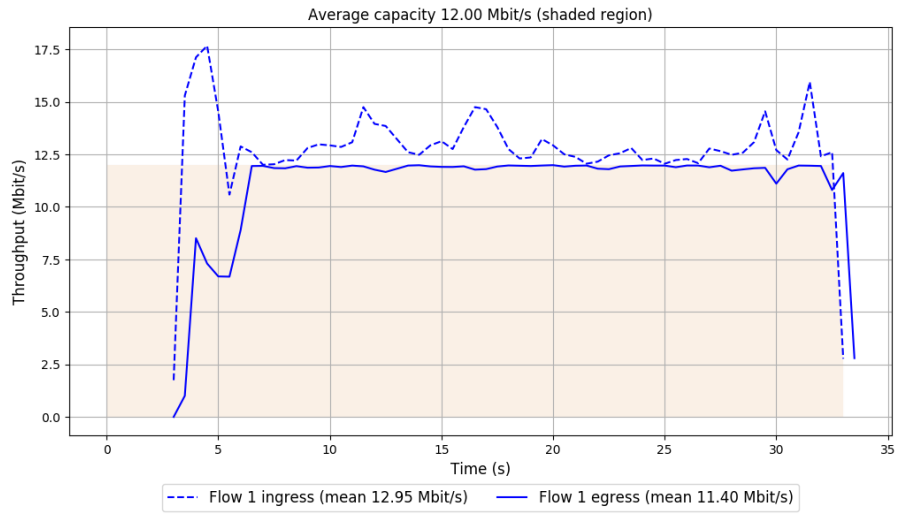
-- Flow 1:

Average throughput: 11.40 Mbit/s

95th percentile per-packet one-way delay: 37.137 ms

Loss rate: 12.09%

Run 1: Report of Copa — Data Link



Run 2: Statistics of Copa

Start at: 2018-10-09 21:52:28

End at: 2018-10-09 21:52:58

Below is generated by plot.py at 2018-10-09 22:11:42

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 8.76 Mbit/s (73.0% utilization)

95th percentile per-packet one-way delay: 37.633 ms

Loss rate: 34.11%

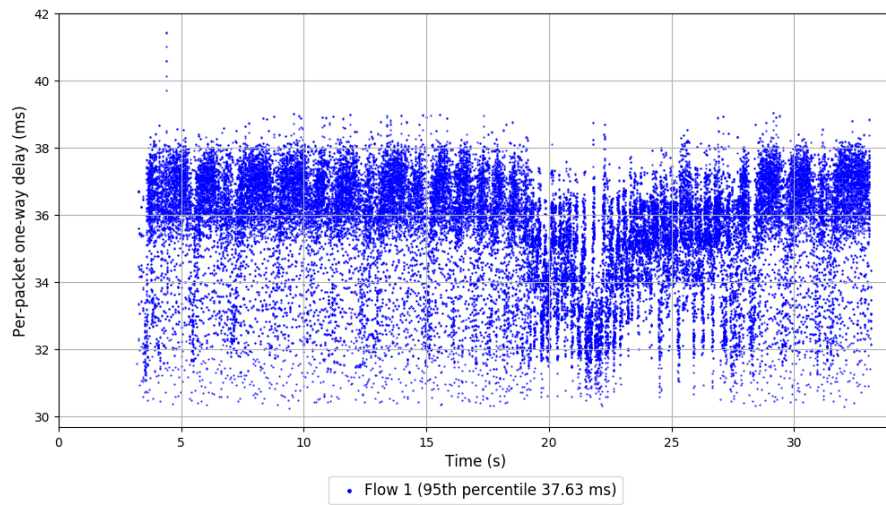
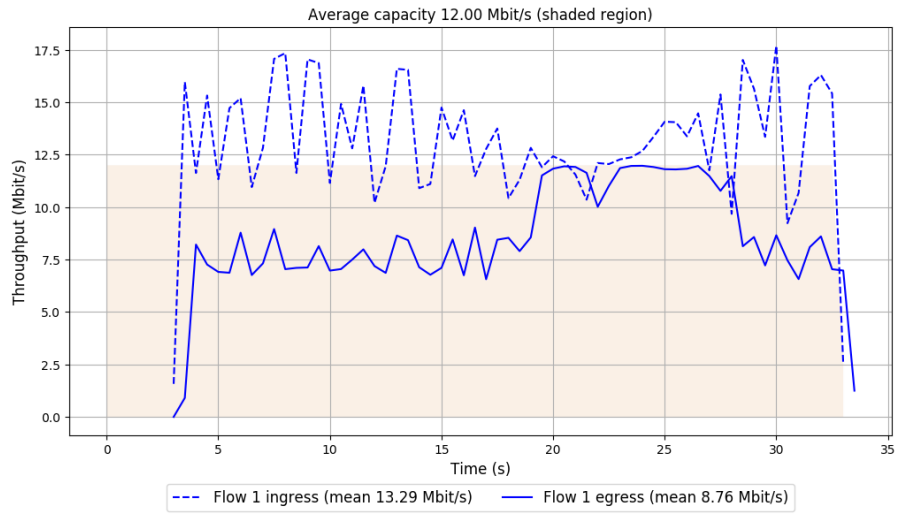
-- Flow 1:

Average throughput: 8.76 Mbit/s

95th percentile per-packet one-way delay: 37.633 ms

Loss rate: 34.11%

Run 2: Report of Copa — Data Link



Run 3: Statistics of Copa

Start at: 2018-10-09 22:03:10

End at: 2018-10-09 22:03:40

Below is generated by plot.py at 2018-10-09 22:11:42

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 8.42 Mbit/s (70.2% utilization)

95th percentile per-packet one-way delay: 37.708 ms

Loss rate: 39.98%

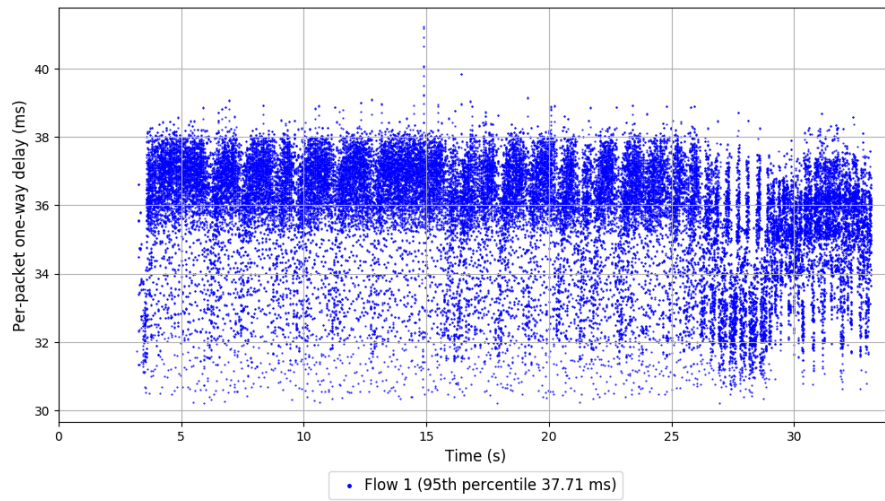
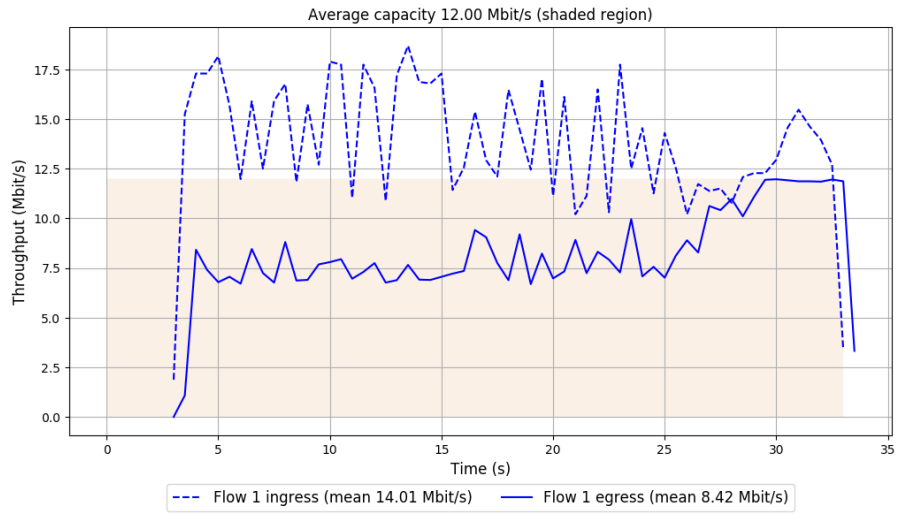
-- Flow 1:

Average throughput: 8.42 Mbit/s

95th percentile per-packet one-way delay: 37.708 ms

Loss rate: 39.98%

Run 3: Report of Copa — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2018-10-09 21:39:24

End at: 2018-10-09 21:39:54

Below is generated by plot.py at 2018-10-09 22:11:42

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.45 Mbit/s (78.7% utilization)

95th percentile per-packet one-way delay: 34.078 ms

Loss rate: 0.19%

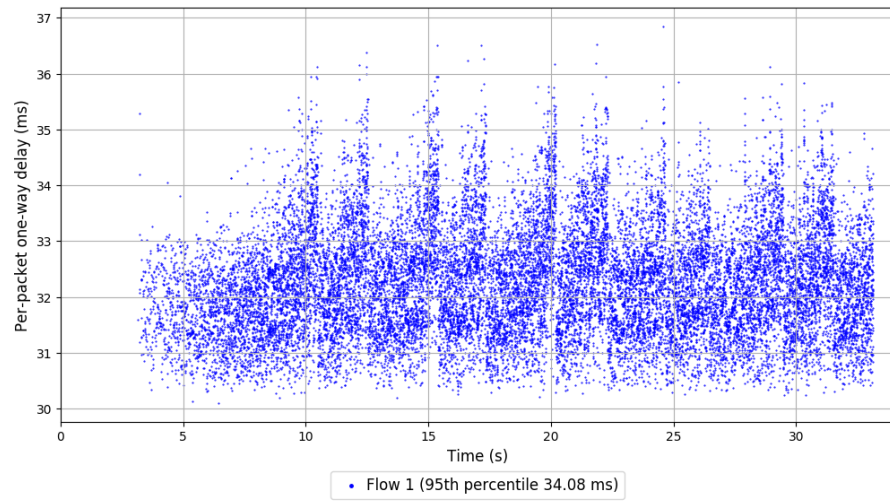
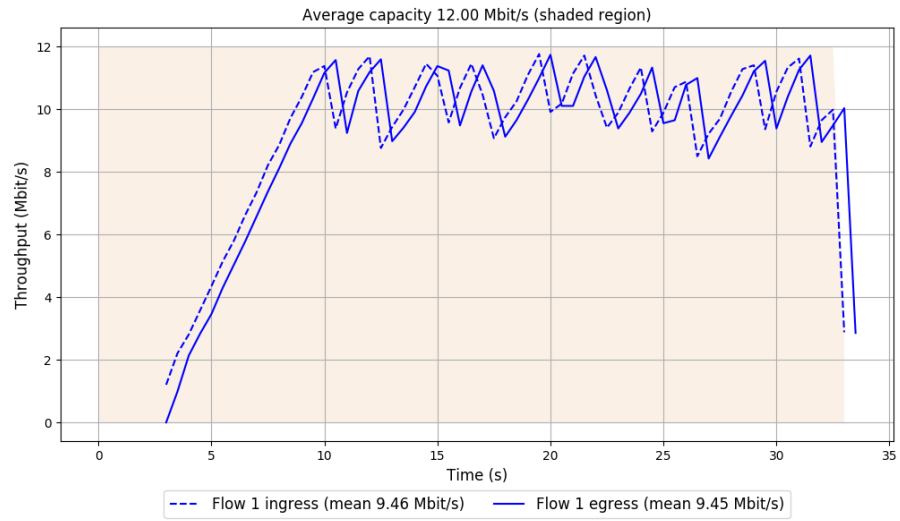
-- Flow 1:

Average throughput: 9.45 Mbit/s

95th percentile per-packet one-way delay: 34.078 ms

Loss rate: 0.19%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2018-10-09 21:50:05

End at: 2018-10-09 21:50:36

Below is generated by plot.py at 2018-10-09 22:11:43

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.65 Mbit/s (80.4% utilization)

95th percentile per-packet one-way delay: 34.193 ms

Loss rate: 0.19%

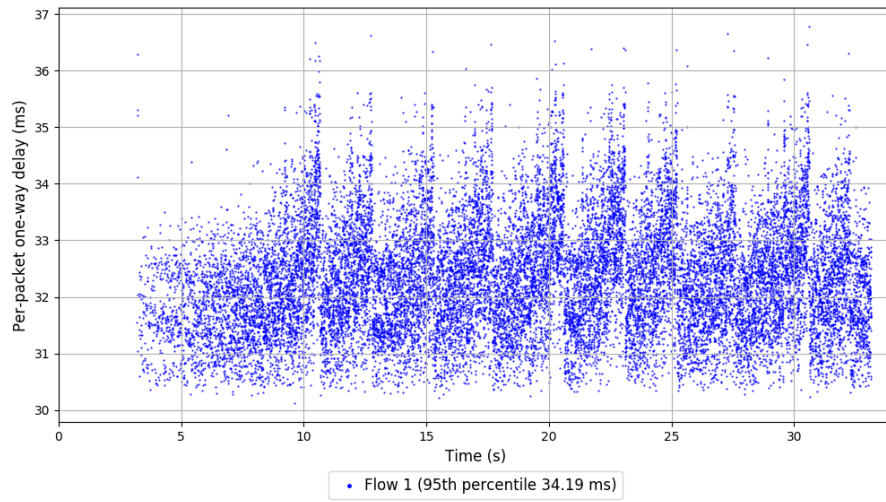
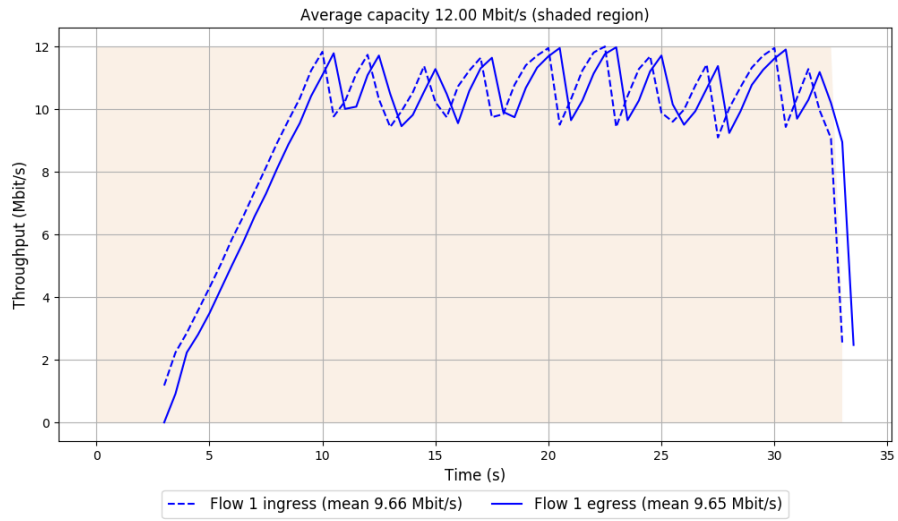
-- Flow 1:

Average throughput: 9.65 Mbit/s

95th percentile per-packet one-way delay: 34.193 ms

Loss rate: 0.19%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2018-10-09 22:00:48

End at: 2018-10-09 22:01:18

Below is generated by plot.py at 2018-10-09 22:11:43

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.47 Mbit/s (78.9% utilization)

95th percentile per-packet one-way delay: 34.269 ms

Loss rate: 0.21%

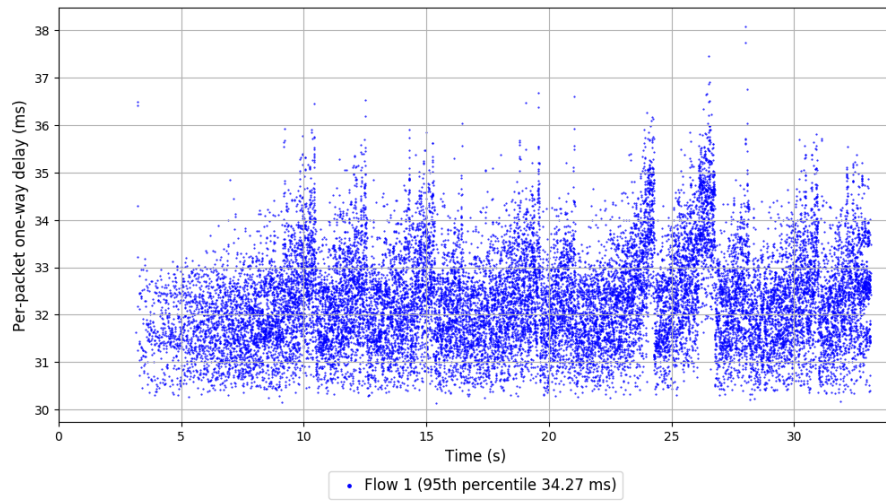
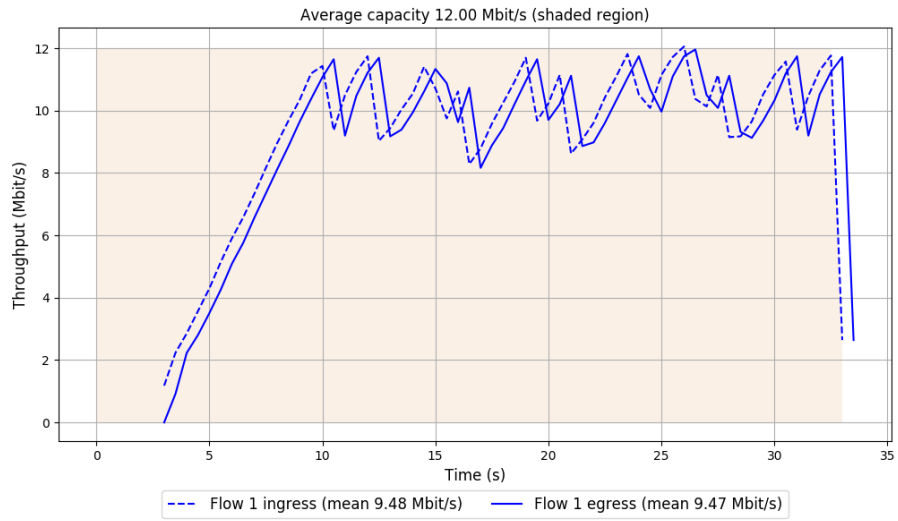
-- Flow 1:

Average throughput: 9.47 Mbit/s

95th percentile per-packet one-way delay: 34.269 ms

Loss rate: 0.21%

Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of FillP

Start at: 2018-10-09 21:47:43

End at: 2018-10-09 21:48:13

Below is generated by plot.py at 2018-10-09 22:11:49

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.42 Mbit/s (86.9% utilization)

95th percentile per-packet one-way delay: 37.516 ms

Loss rate: 16.01%

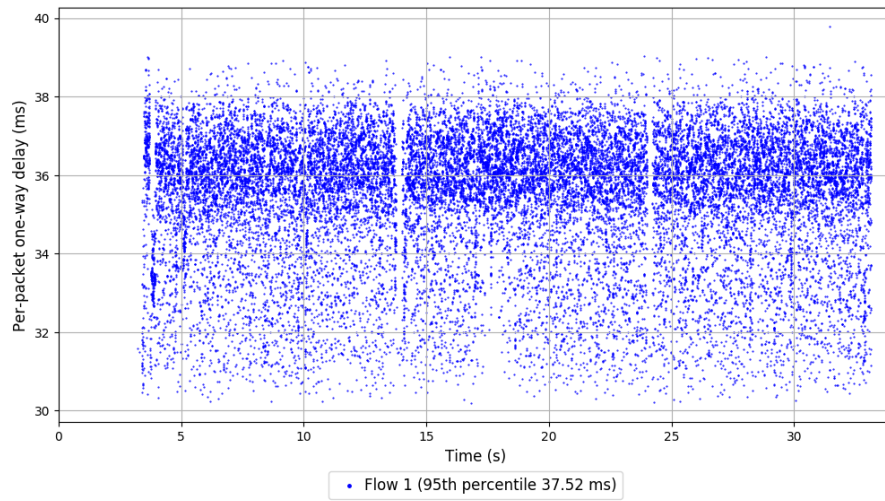
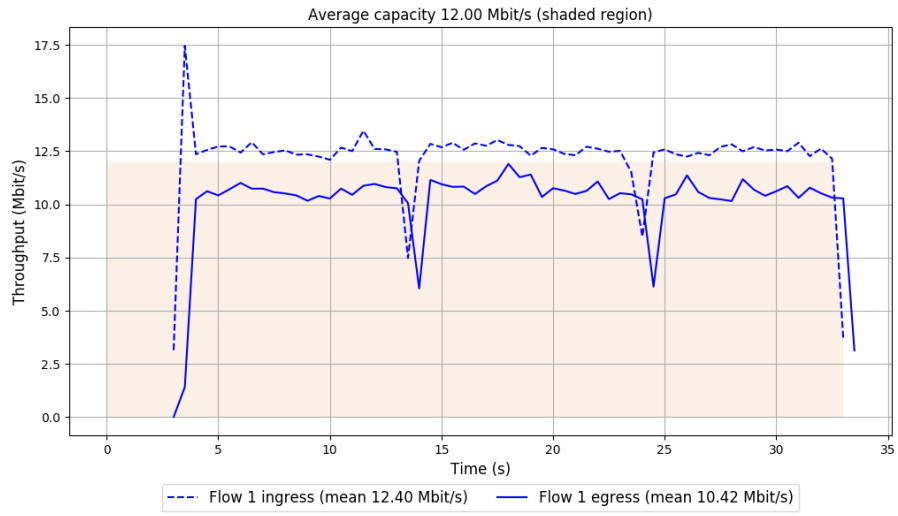
-- Flow 1:

Average throughput: 10.42 Mbit/s

95th percentile per-packet one-way delay: 37.516 ms

Loss rate: 16.01%

Run 1: Report of FillP — Data Link



Run 2: Statistics of FillP

Start at: 2018-10-09 21:58:25

End at: 2018-10-09 21:58:55

Below is generated by plot.py at 2018-10-09 22:11:52

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.65 Mbit/s (88.8% utilization)

95th percentile per-packet one-way delay: 37.502 ms

Loss rate: 14.26%

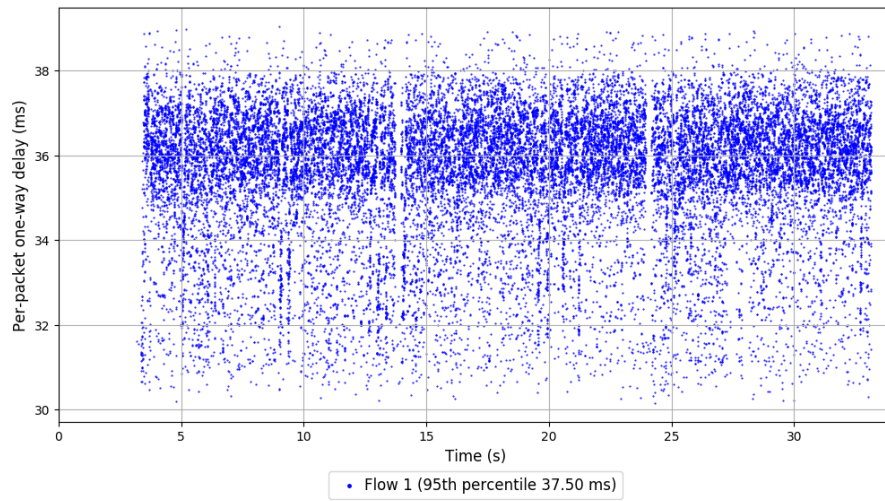
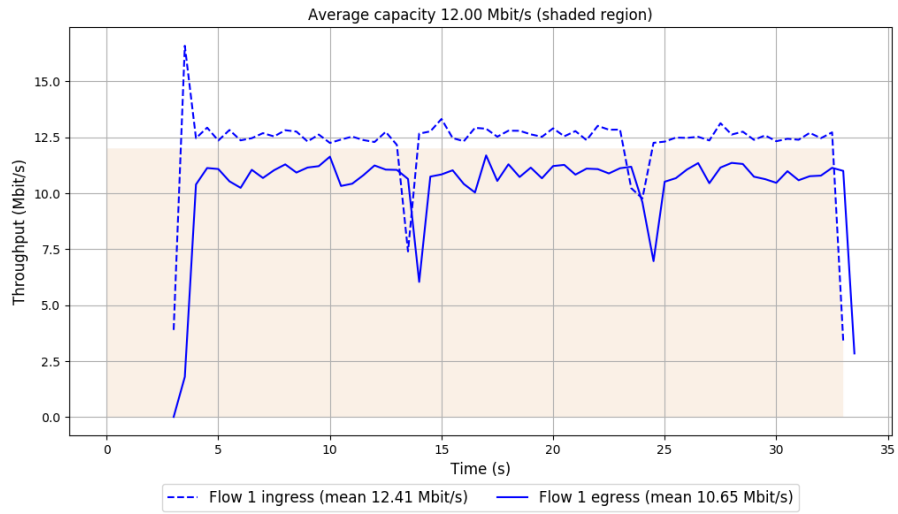
-- Flow 1:

Average throughput: 10.65 Mbit/s

95th percentile per-packet one-way delay: 37.502 ms

Loss rate: 14.26%

Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

Start at: 2018-10-09 22:09:08

End at: 2018-10-09 22:09:38

Below is generated by plot.py at 2018-10-09 22:11:52

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.65 Mbit/s (88.7% utilization)

95th percentile per-packet one-way delay: 37.542 ms

Loss rate: 14.95%

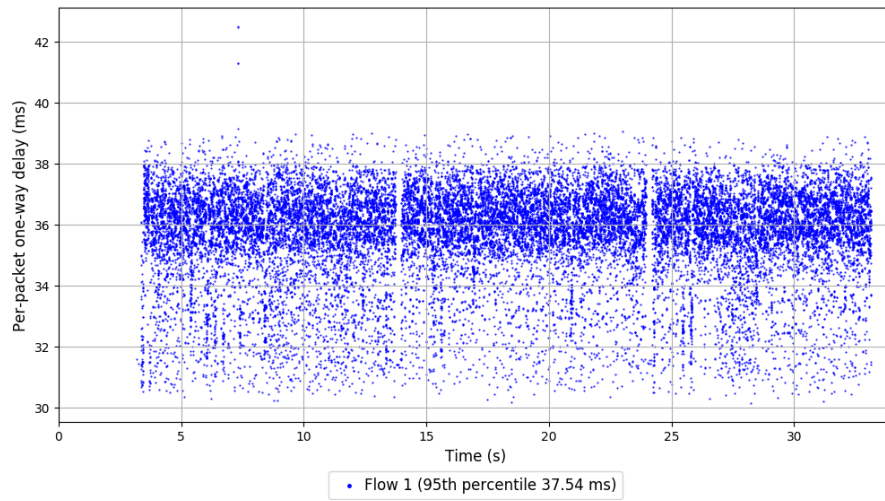
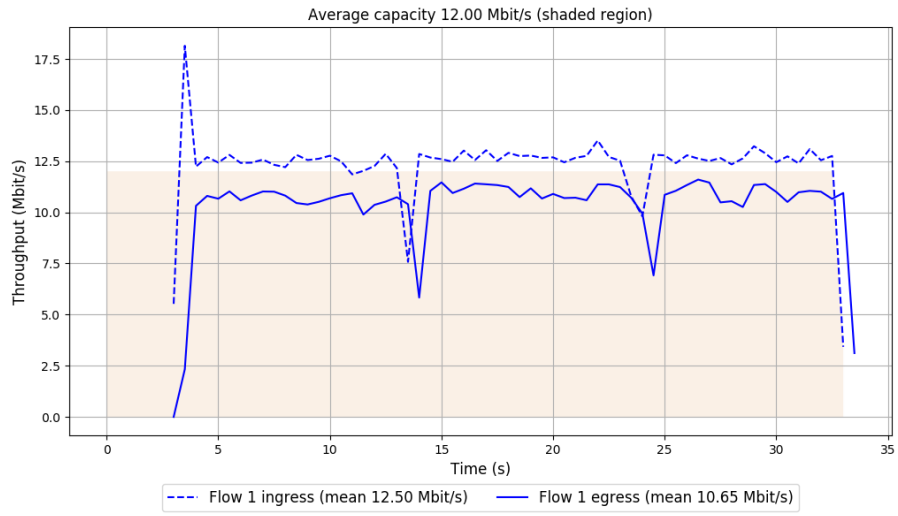
-- Flow 1:

Average throughput: 10.65 Mbit/s

95th percentile per-packet one-way delay: 37.542 ms

Loss rate: 14.95%

Run 3: Report of FillP — Data Link



Run 1: Statistics of Indigo

Start at: 2018-10-09 21:46:32

End at: 2018-10-09 21:47:02

Below is generated by plot.py at 2018-10-09 22:11:53

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.82 Mbit/s (81.8% utilization)

95th percentile per-packet one-way delay: 35.796 ms

Loss rate: 63.43%

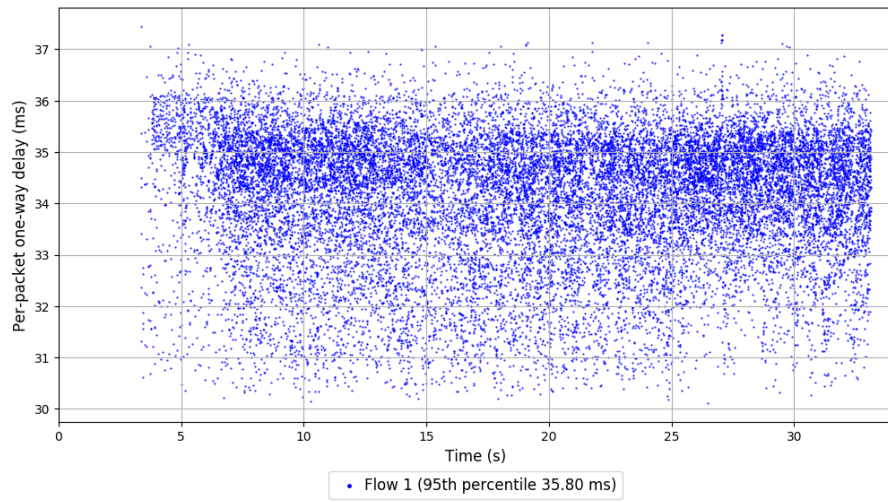
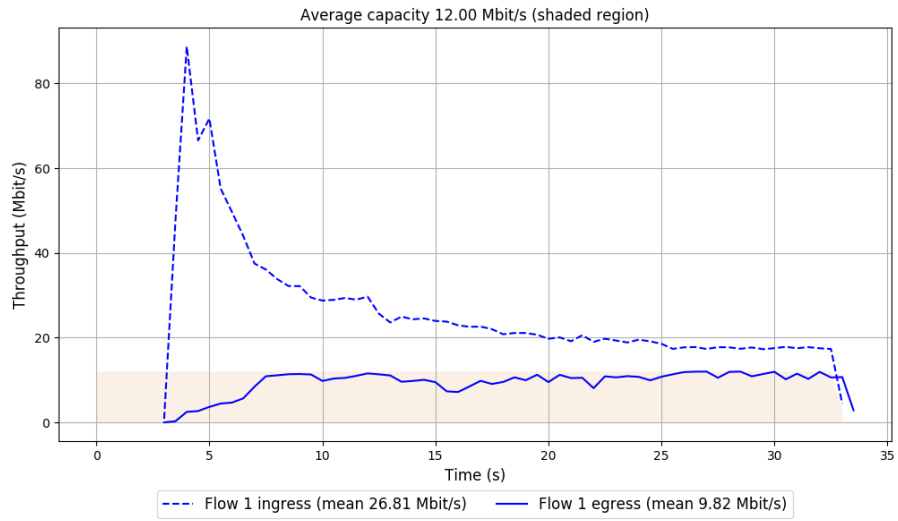
-- Flow 1:

Average throughput: 9.82 Mbit/s

95th percentile per-packet one-way delay: 35.796 ms

Loss rate: 63.43%

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2018-10-09 21:57:14

End at: 2018-10-09 21:57:44

Below is generated by plot.py at 2018-10-09 22:12:09

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.83 Mbit/s (81.9% utilization)

95th percentile per-packet one-way delay: 35.833 ms

Loss rate: 68.13%

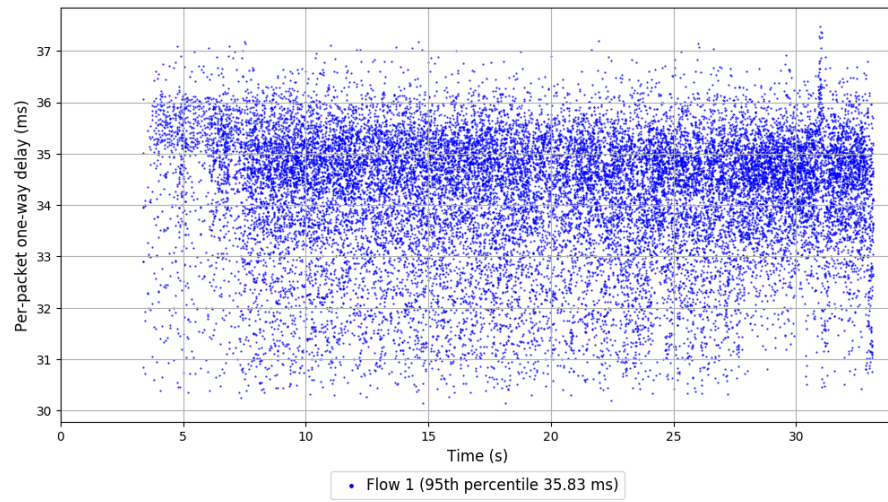
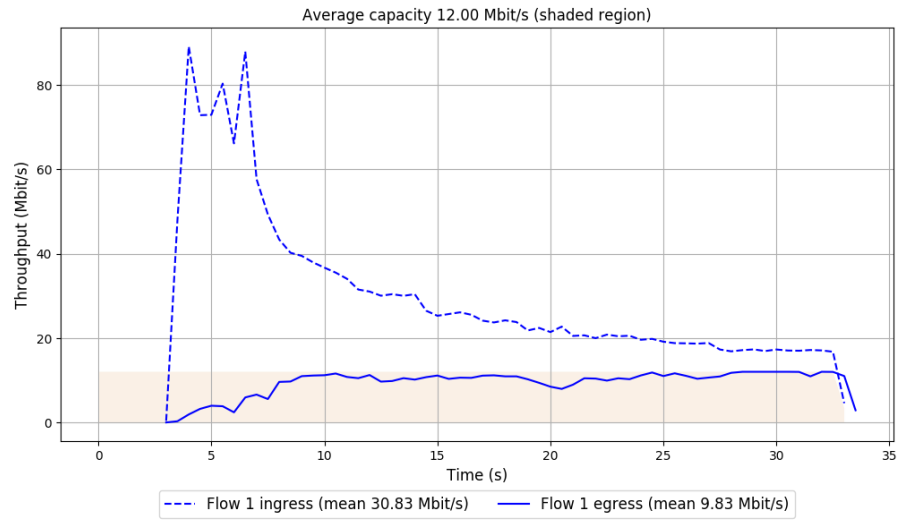
-- Flow 1:

Average throughput: 9.83 Mbit/s

95th percentile per-packet one-way delay: 35.833 ms

Loss rate: 68.13%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-10-09 22:07:57

End at: 2018-10-09 22:08:27

Below is generated by plot.py at 2018-10-09 22:12:09

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.40 Mbit/s (78.3% utilization)

95th percentile per-packet one-way delay: 35.808 ms

Loss rate: 65.67%

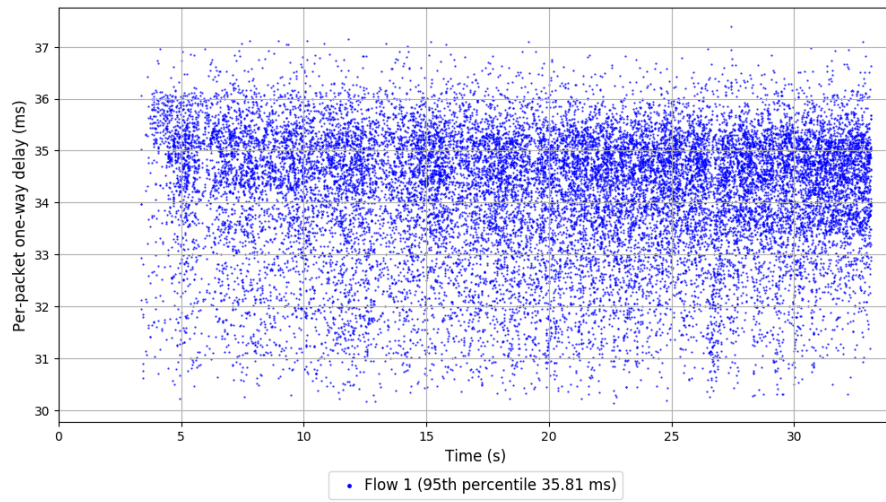
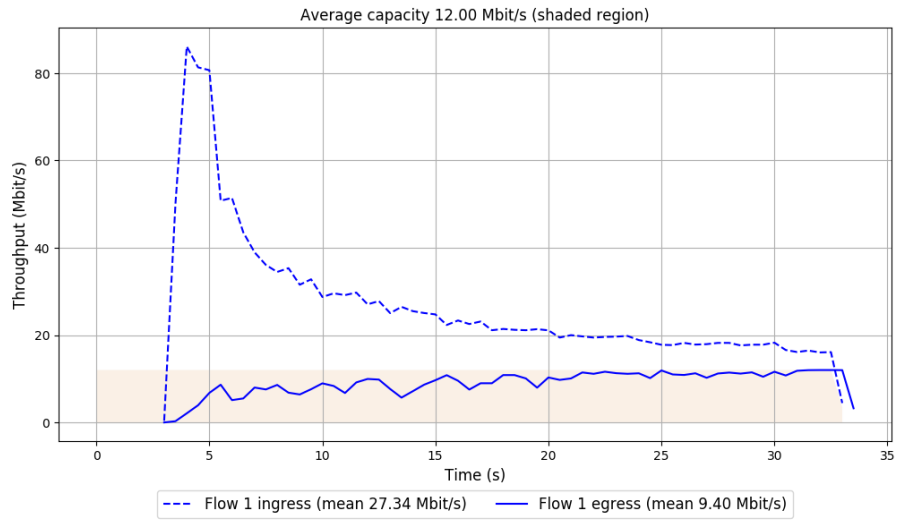
-- Flow 1:

Average throughput: 9.40 Mbit/s

95th percentile per-packet one-way delay: 35.808 ms

Loss rate: 65.67%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of Indigo-96d2da3

Start at: 2018-10-09 21:42:23

End at: 2018-10-09 21:42:53

Below is generated by plot.py at 2018-10-09 22:12:09

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 4.43 Mbit/s (36.9% utilization)

95th percentile per-packet one-way delay: 38.025 ms

Loss rate: 76.48%

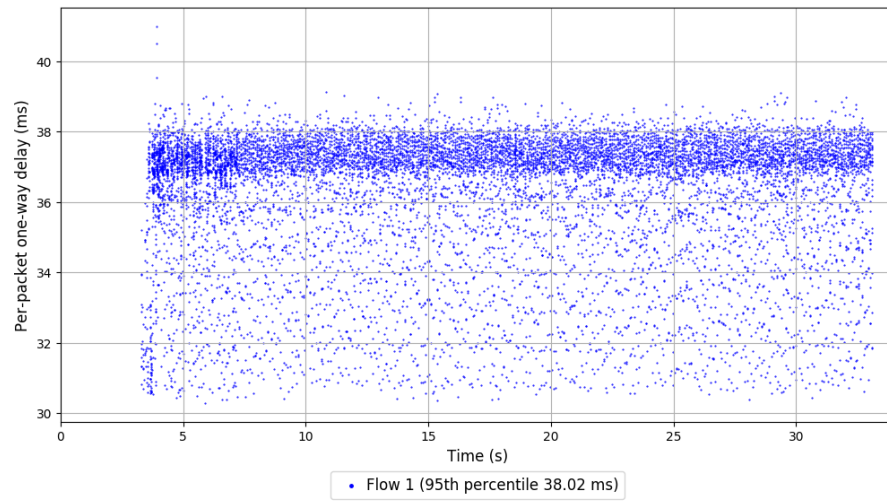
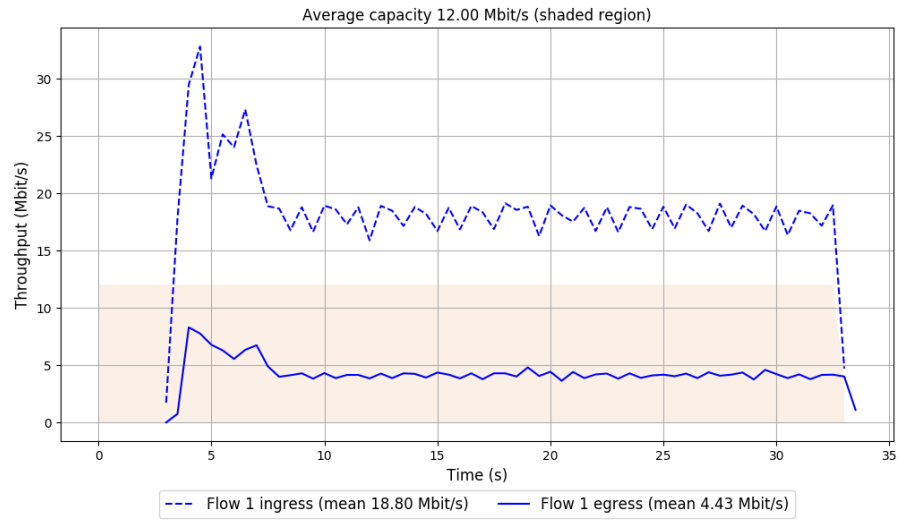
-- Flow 1:

Average throughput: 4.43 Mbit/s

95th percentile per-packet one-way delay: 38.025 ms

Loss rate: 76.48%

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



Run 2: Statistics of Indigo-96d2da3

Start at: 2018-10-09 21:53:04

End at: 2018-10-09 21:53:34

Below is generated by plot.py at 2018-10-09 22:12:09

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 4.30 Mbit/s (35.8% utilization)

95th percentile per-packet one-way delay: 38.001 ms

Loss rate: 76.28%

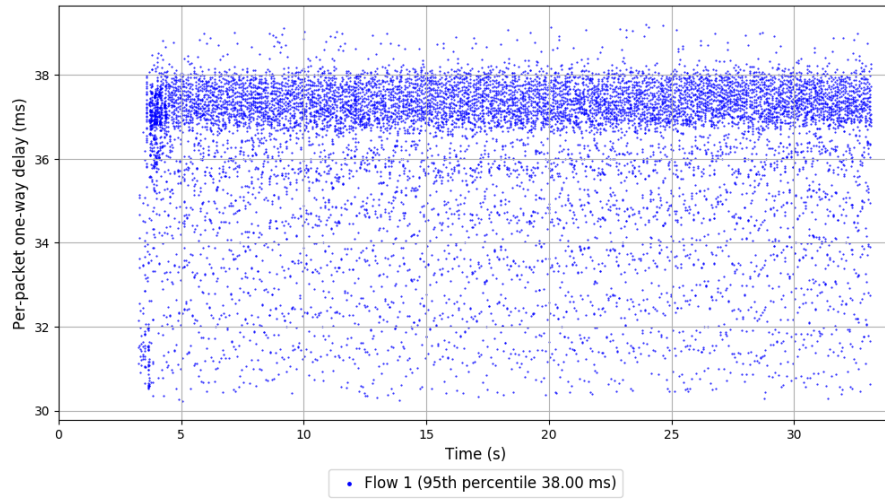
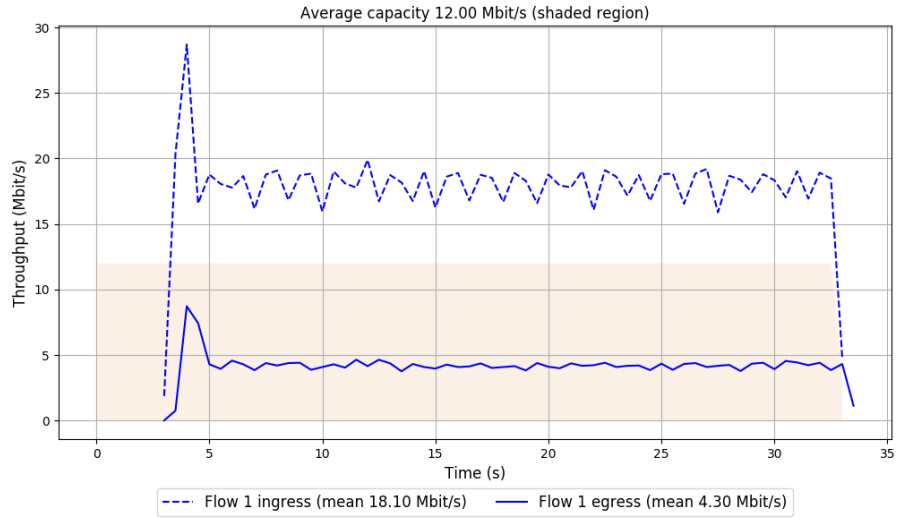
-- Flow 1:

Average throughput: 4.30 Mbit/s

95th percentile per-packet one-way delay: 38.001 ms

Loss rate: 76.28%

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



Run 3: Statistics of Indigo-96d2da3

Start at: 2018-10-09 22:03:46

End at: 2018-10-09 22:04:16

Below is generated by plot.py at 2018-10-09 22:12:09

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 4.60 Mbit/s (38.3% utilization)

95th percentile per-packet one-way delay: 38.027 ms

Loss rate: 76.27%

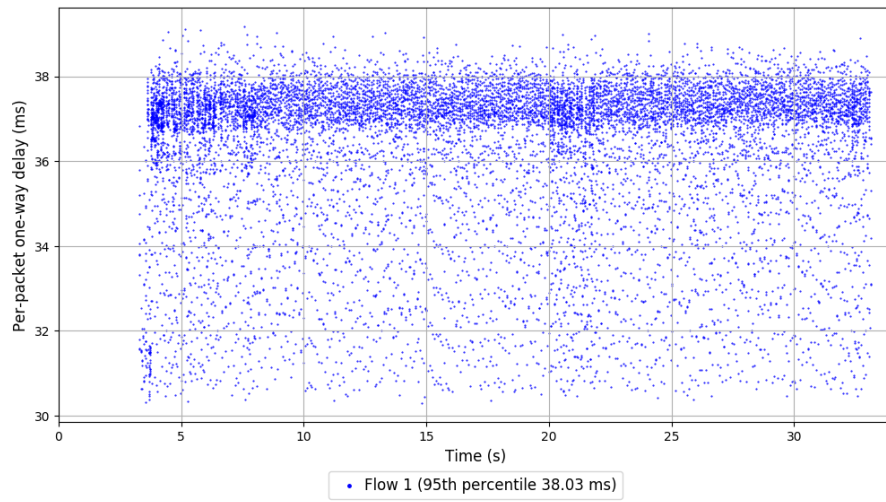
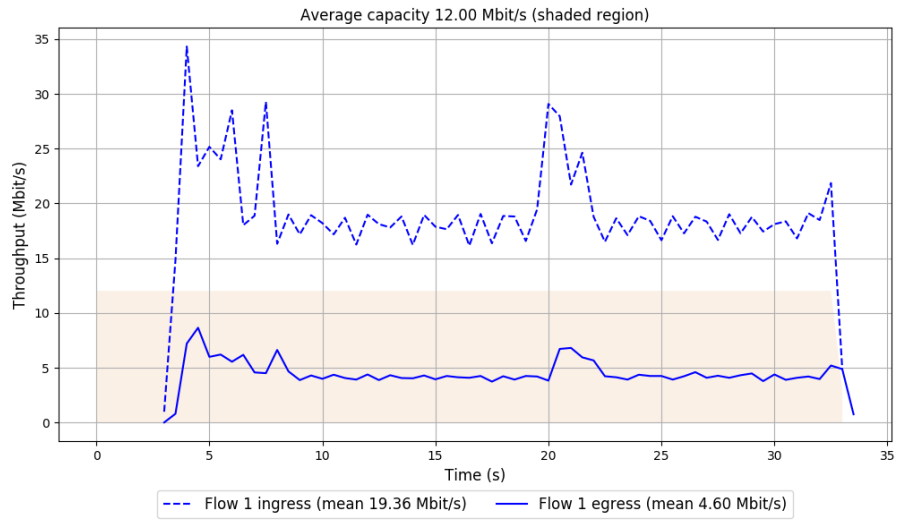
-- Flow 1:

Average throughput: 4.60 Mbit/s

95th percentile per-packet one-way delay: 38.027 ms

Loss rate: 76.27%

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



Run 1: Statistics of LEDBAT

Start at: 2018-10-09 21:45:57

End at: 2018-10-09 21:46:27

Below is generated by plot.py at 2018-10-09 22:12:09

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 4.10 Mbit/s (34.1% utilization)

95th percentile per-packet one-way delay: 36.099 ms

Loss rate: 2.48%

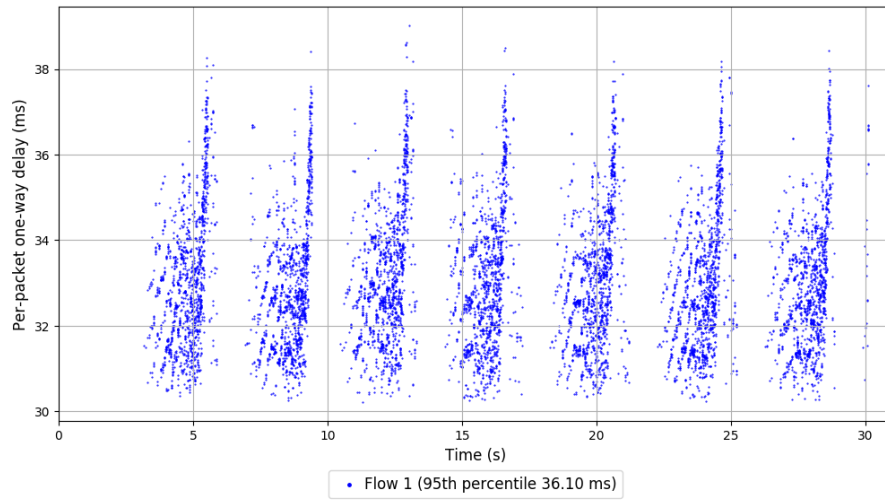
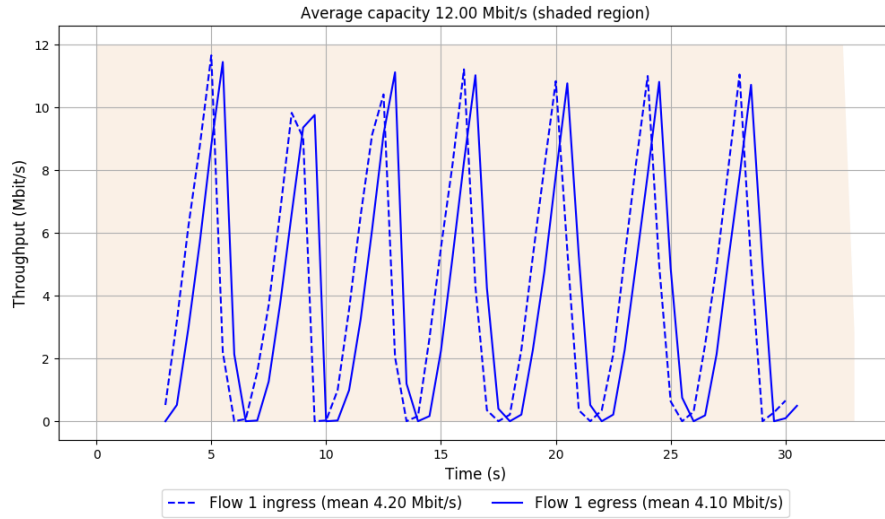
-- Flow 1:

Average throughput: 4.10 Mbit/s

95th percentile per-packet one-way delay: 36.099 ms

Loss rate: 2.48%

Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2018-10-09 21:56:39

End at: 2018-10-09 21:57:09

Below is generated by plot.py at 2018-10-09 22:12:09

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 2.95 Mbit/s (24.6% utilization)

95th percentile per-packet one-way delay: 36.191 ms

Loss rate: 3.12%

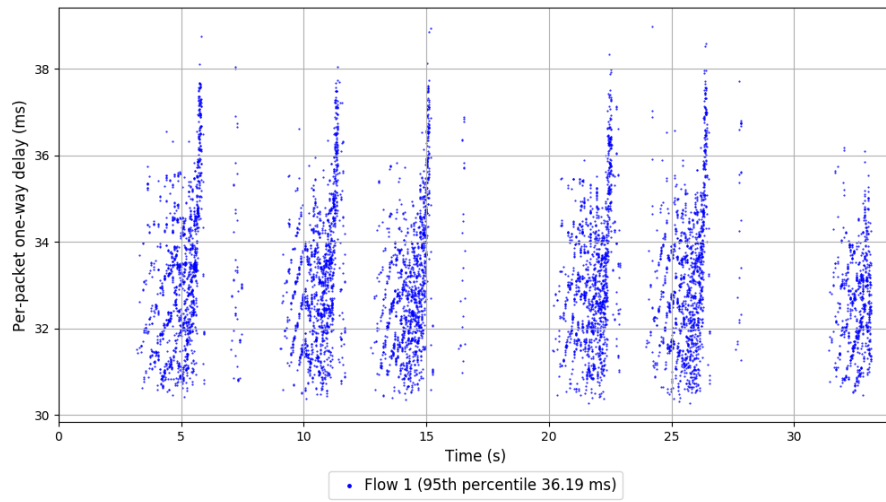
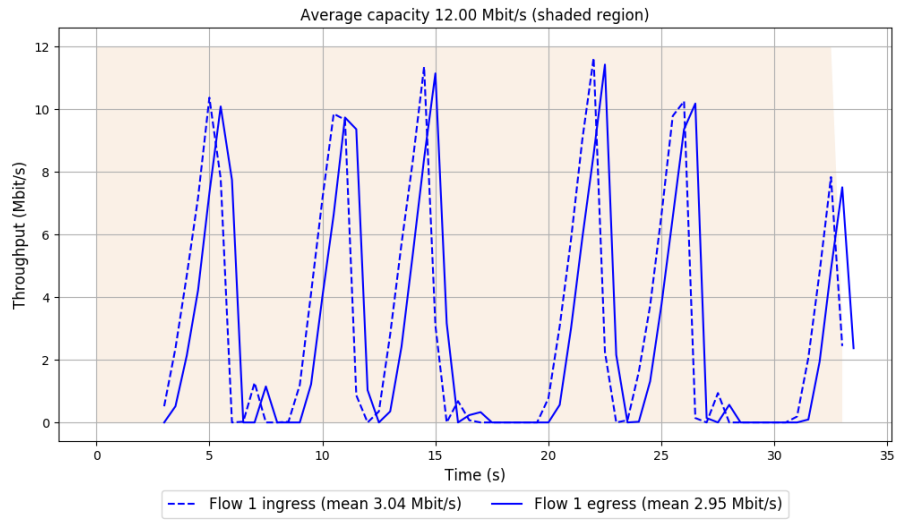
-- Flow 1:

Average throughput: 2.95 Mbit/s

95th percentile per-packet one-way delay: 36.191 ms

Loss rate: 3.12%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2018-10-09 22:07:22

End at: 2018-10-09 22:07:52

Below is generated by plot.py at 2018-10-09 22:12:09

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 3.44 Mbit/s (28.7% utilization)

95th percentile per-packet one-way delay: 36.204 ms

Loss rate: 2.79%

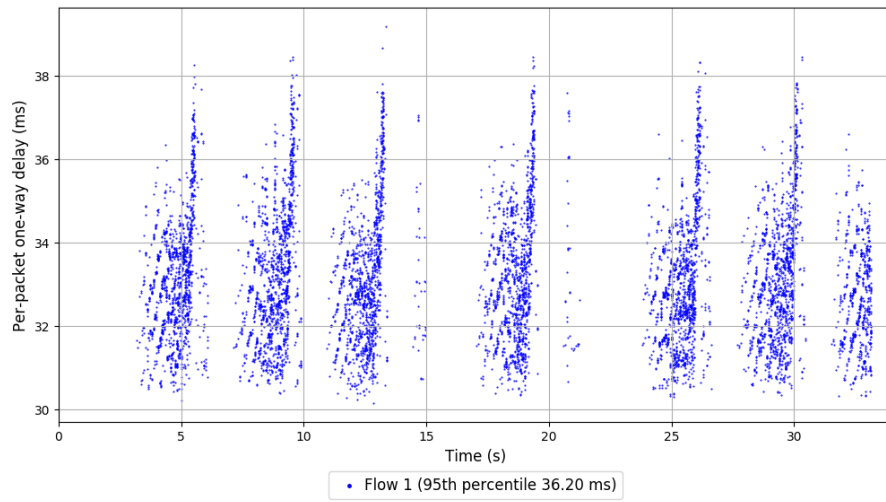
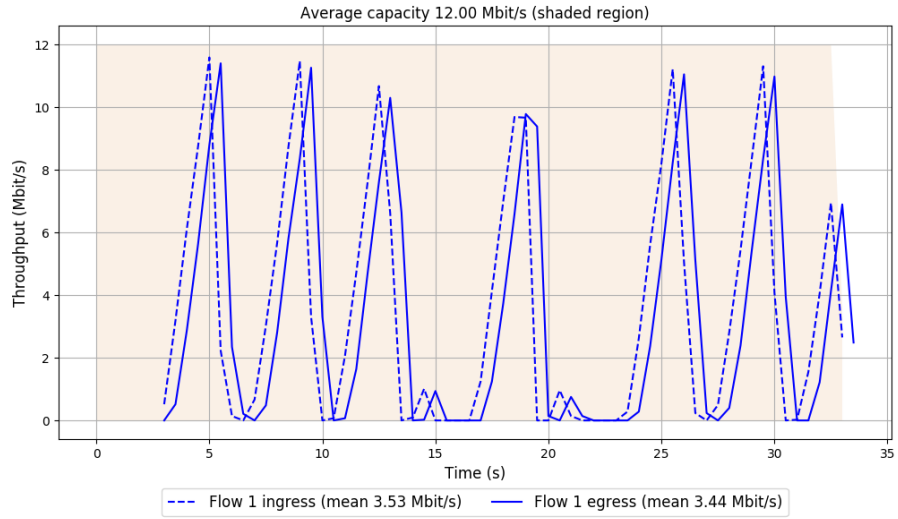
-- Flow 1:

Average throughput: 3.44 Mbit/s

95th percentile per-packet one-way delay: 36.204 ms

Loss rate: 2.79%

Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of Indigo-Muses

Start at: 2018-10-09 21:40:35

End at: 2018-10-09 21:41:05

Below is generated by plot.py at 2018-10-09 22:12:19

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.25 Mbit/s (85.4% utilization)

95th percentile per-packet one-way delay: 35.154 ms

Loss rate: 1.95%

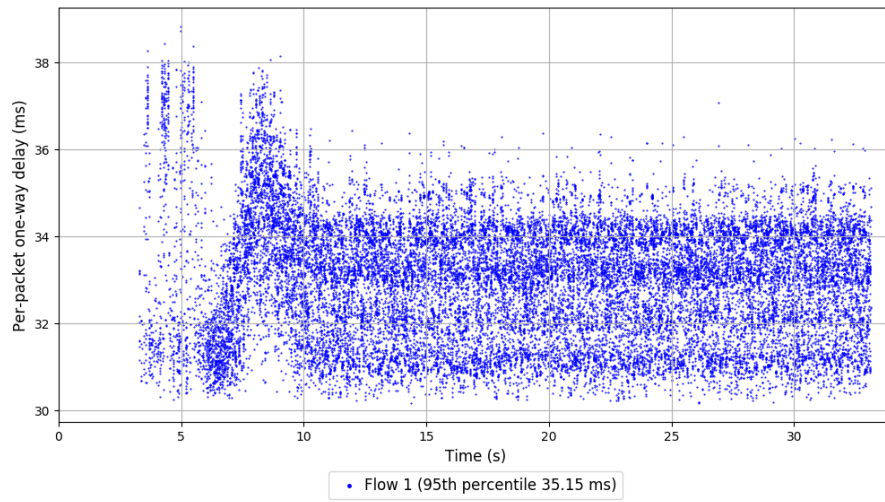
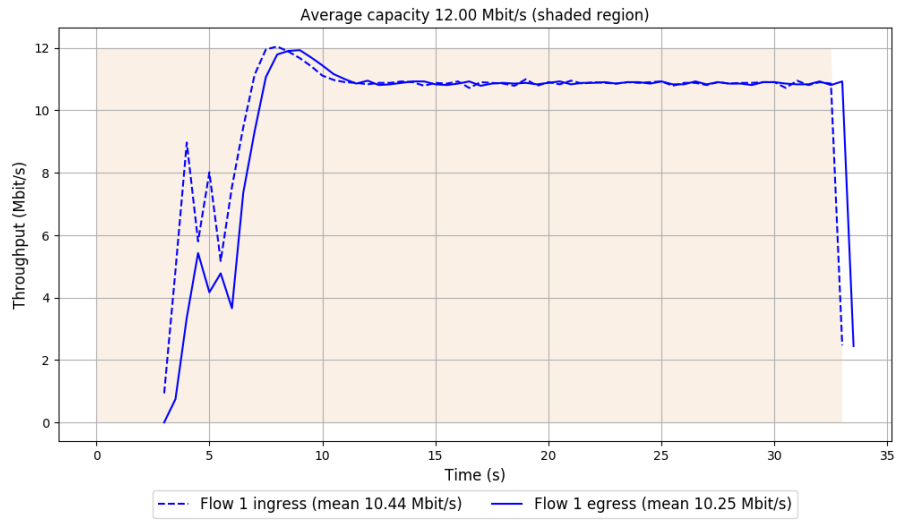
-- Flow 1:

Average throughput: 10.25 Mbit/s

95th percentile per-packet one-way delay: 35.154 ms

Loss rate: 1.95%

Run 1: Report of Indigo-Muses — Data Link



Run 2: Statistics of Indigo-Muses

Start at: 2018-10-09 21:51:17

End at: 2018-10-09 21:51:47

Below is generated by plot.py at 2018-10-09 22:12:21

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.37 Mbit/s (86.4% utilization)

95th percentile per-packet one-way delay: 35.352 ms

Loss rate: 3.18%

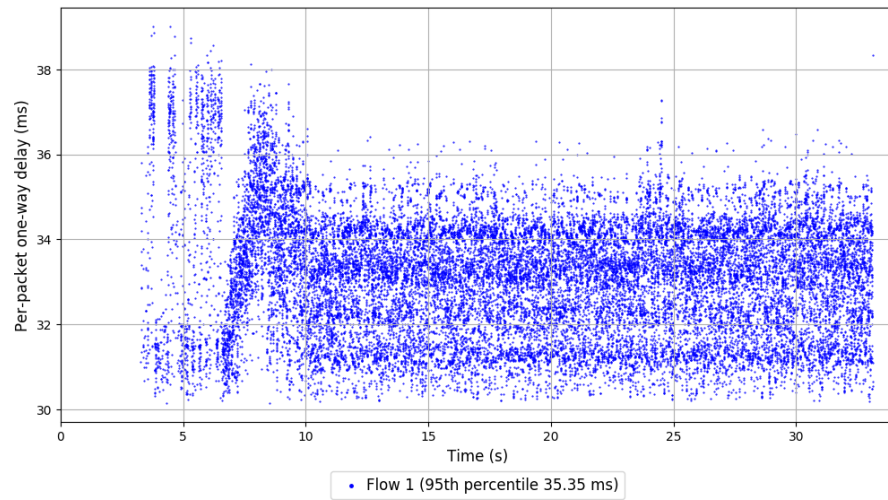
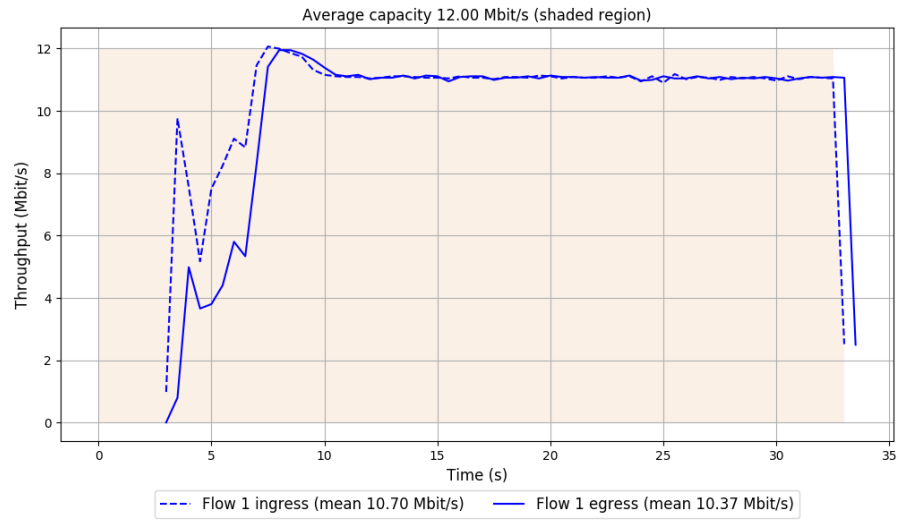
-- Flow 1:

Average throughput: 10.37 Mbit/s

95th percentile per-packet one-way delay: 35.352 ms

Loss rate: 3.18%

Run 2: Report of Indigo-Muses — Data Link



Run 3: Statistics of Indigo-Muses

Start at: 2018-10-09 22:01:59

End at: 2018-10-09 22:02:29

Below is generated by plot.py at 2018-10-09 22:12:21

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.57 Mbit/s (79.8% utilization)

95th percentile per-packet one-way delay: 35.490 ms

Loss rate: 3.92%

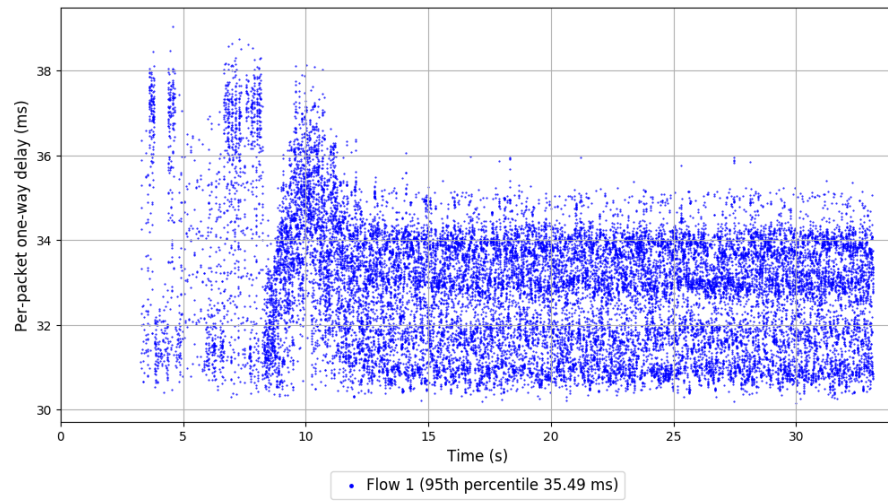
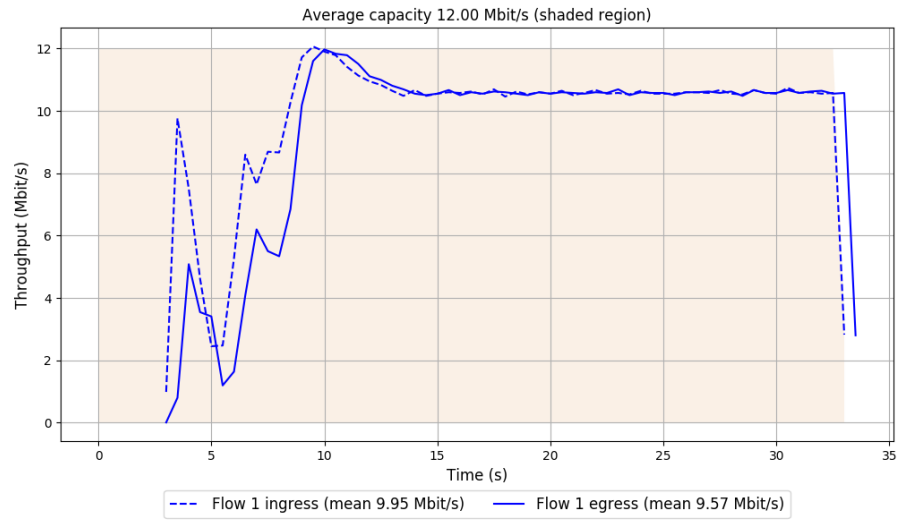
-- Flow 1:

Average throughput: 9.57 Mbit/s

95th percentile per-packet one-way delay: 35.490 ms

Loss rate: 3.92%

Run 3: Report of Indigo-Muses — Data Link



Run 1: Statistics of PCC-Allegro

Start at: 2018-10-09 21:42:58

End at: 2018-10-09 21:43:28

Below is generated by plot.py at 2018-10-09 22:12:24

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.86 Mbit/s (90.5% utilization)

95th percentile per-packet one-way delay: 35.612 ms

Loss rate: 0.82%

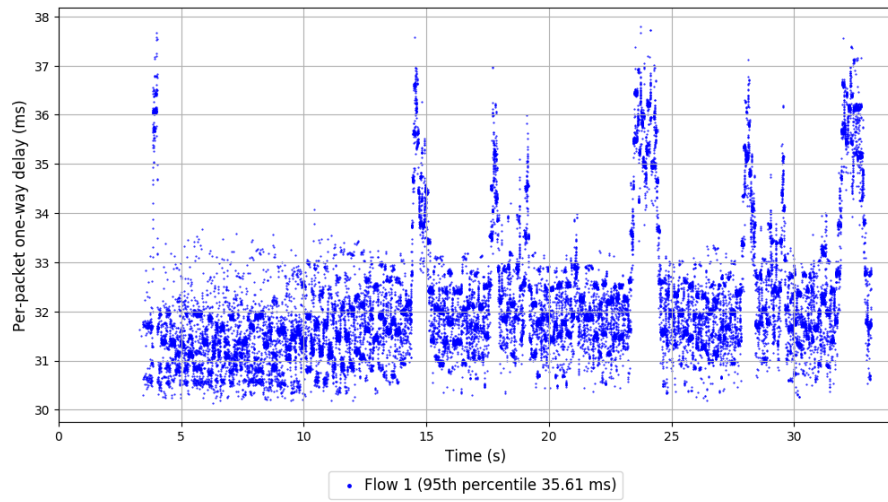
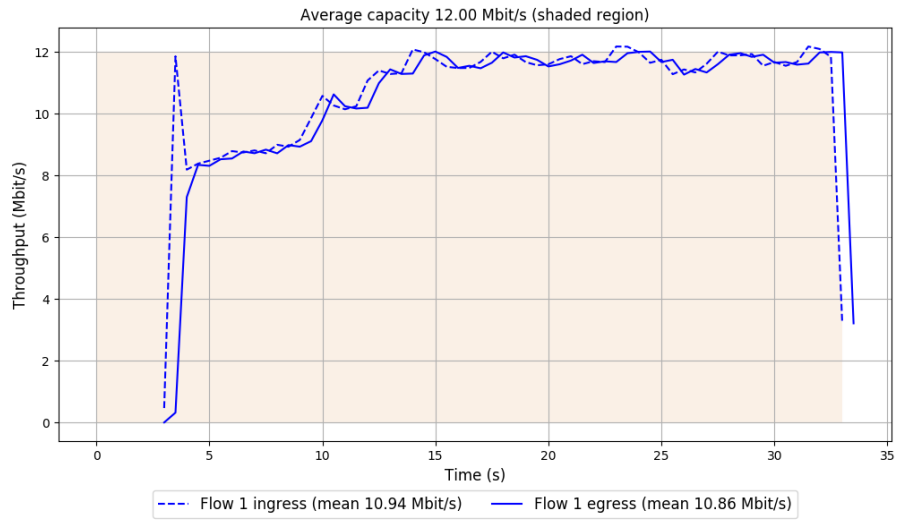
-- Flow 1:

Average throughput: 10.86 Mbit/s

95th percentile per-packet one-way delay: 35.612 ms

Loss rate: 0.82%

Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

Start at: 2018-10-09 21:53:39

End at: 2018-10-09 21:54:09

Below is generated by plot.py at 2018-10-09 22:12:24

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: 32.637 ms

Loss rate: 0.76%

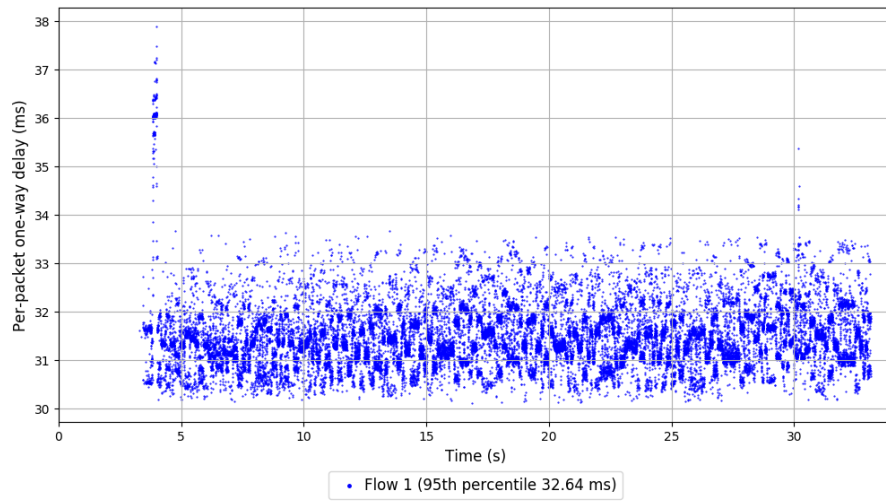
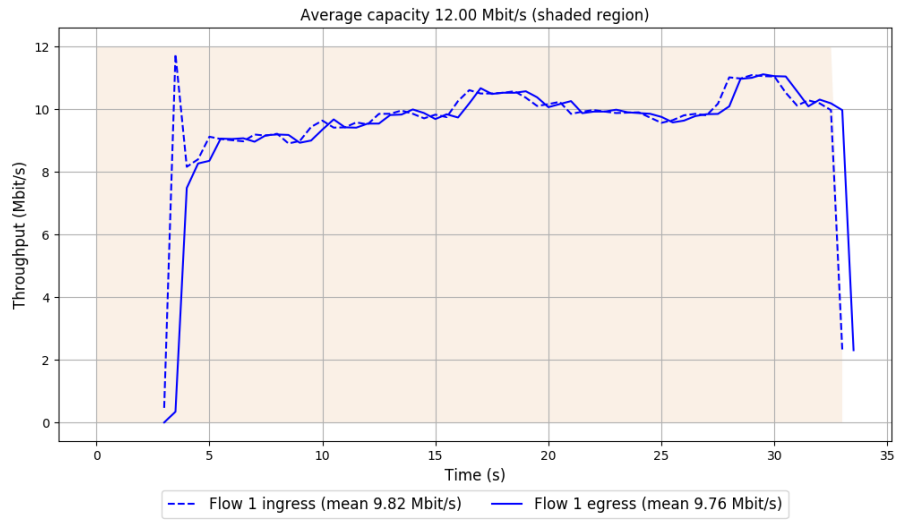
-- Flow 1:

Average throughput: 9.76 Mbit/s

95th percentile per-packet one-way delay: 32.637 ms

Loss rate: 0.76%

Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

Start at: 2018-10-09 22:04:21

End at: 2018-10-09 22:04:51

Below is generated by plot.py at 2018-10-09 22:12:26

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.48 Mbit/s (79.0% utilization)

95th percentile per-packet one-way delay: 32.687 ms

Loss rate: 0.76%

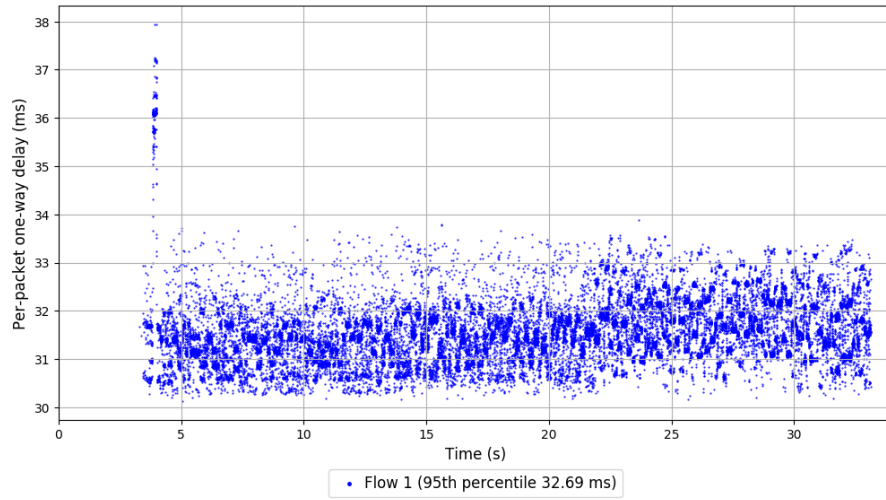
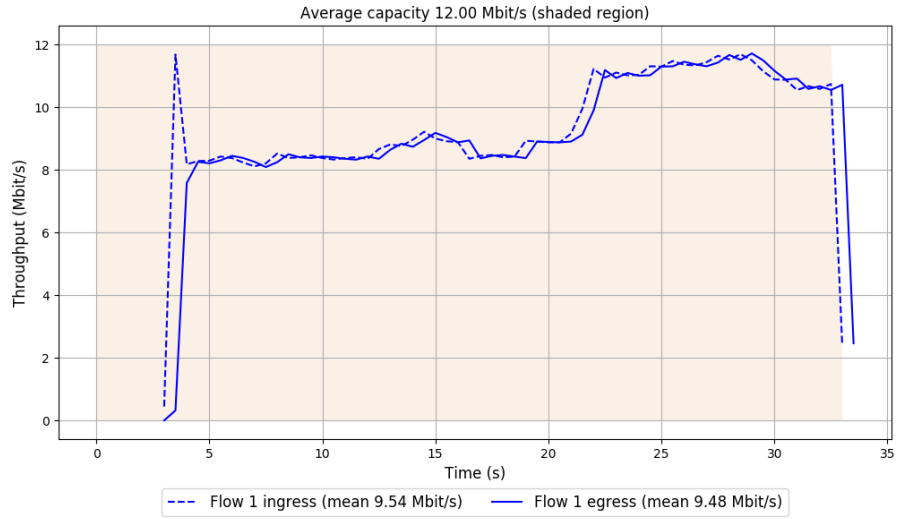
-- Flow 1:

Average throughput: 9.48 Mbit/s

95th percentile per-packet one-way delay: 32.687 ms

Loss rate: 0.76%

Run 3: Report of PCC-Allegro — Data Link



Run 1: Statistics of PCC-Expr

Start at: 2018-10-09 21:48:54

End at: 2018-10-09 21:49:24

Below is generated by plot.py at 2018-10-09 22:12:41

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.43 Mbit/s (95.3% utilization)

95th percentile per-packet one-way delay: 37.154 ms

Loss rate: 2.66%

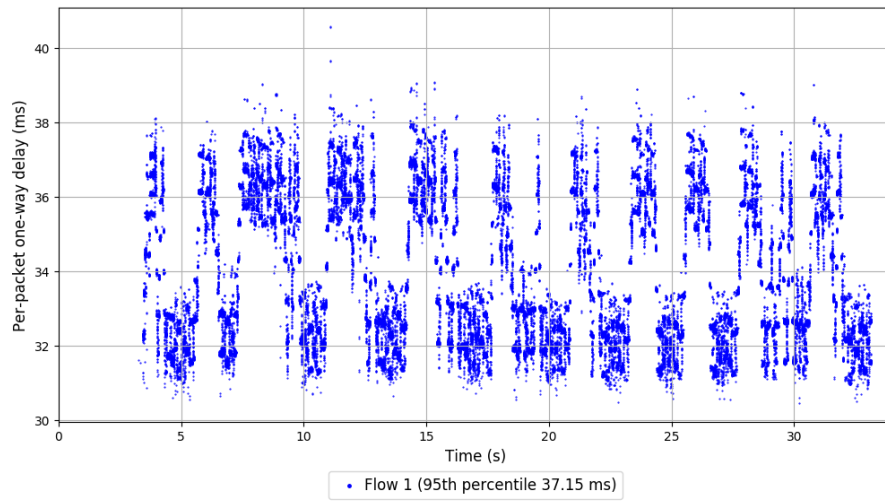
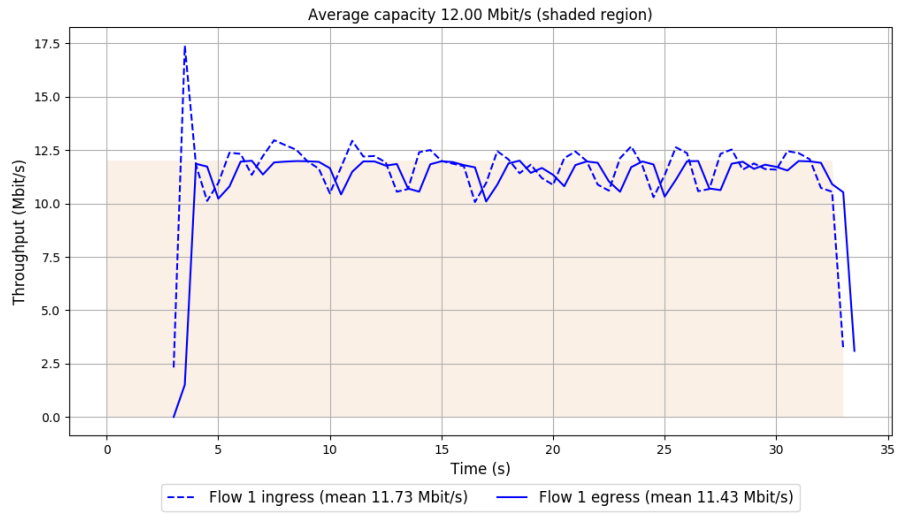
-- Flow 1:

Average throughput: 11.43 Mbit/s

95th percentile per-packet one-way delay: 37.154 ms

Loss rate: 2.66%

Run 1: Report of PCC-Expr — Data Link



Run 2: Statistics of PCC-Expr

Start at: 2018-10-09 21:59:36

End at: 2018-10-09 22:00:06

Below is generated by plot.py at 2018-10-09 22:12:42

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.37 Mbit/s (94.8% utilization)

95th percentile per-packet one-way delay: 37.109 ms

Loss rate: 2.32%

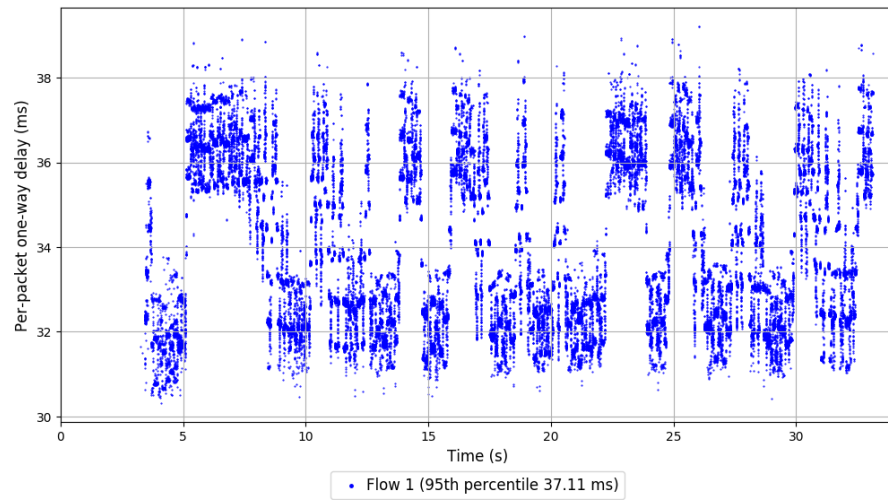
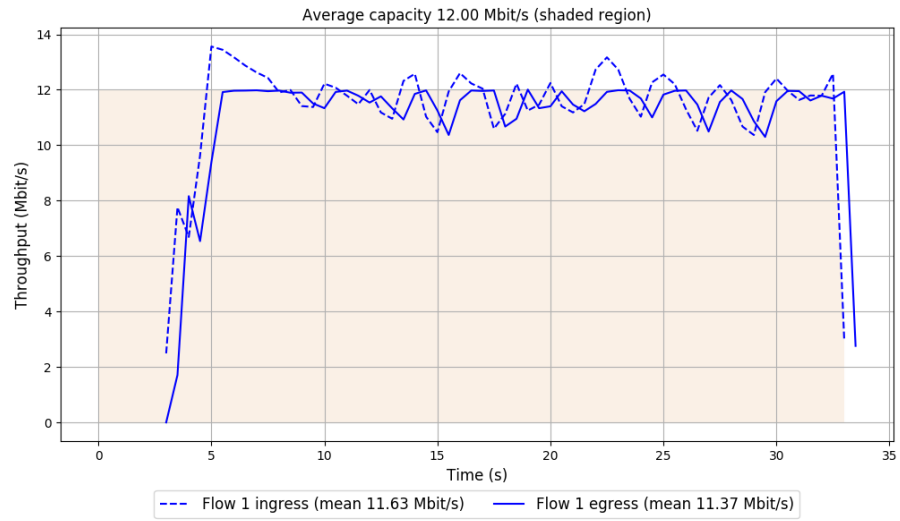
-- Flow 1:

Average throughput: 11.37 Mbit/s

95th percentile per-packet one-way delay: 37.109 ms

Loss rate: 2.32%

Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

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

End at: 2018-10-09 22:10:49

Below is generated by plot.py at 2018-10-09 22:12:53

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.41 Mbit/s (95.1% utilization)

95th percentile per-packet one-way delay: 37.020 ms

Loss rate: 2.17%

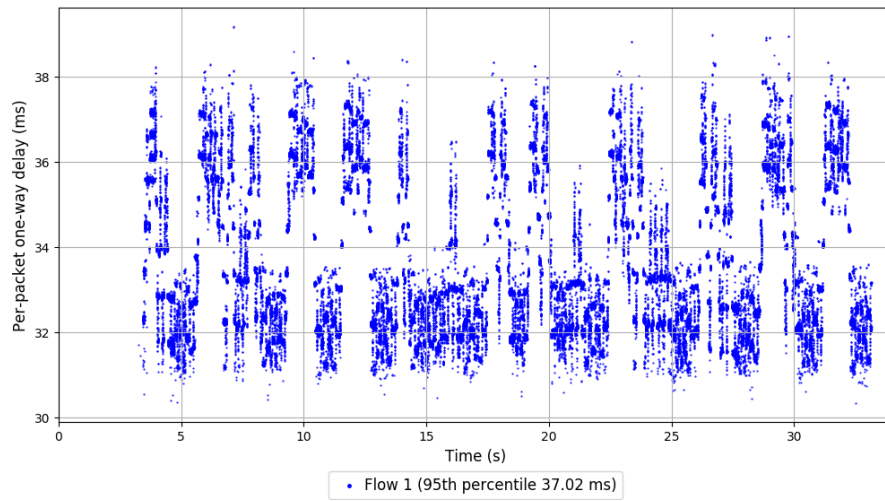
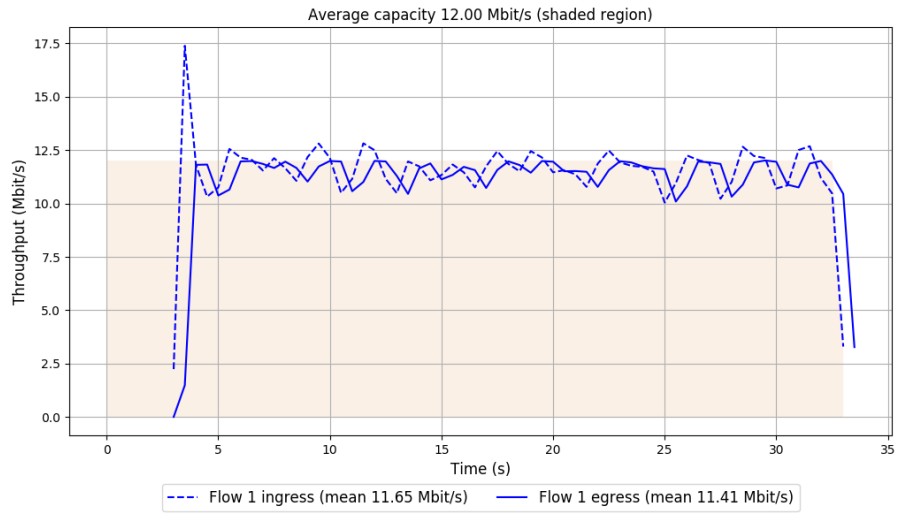
-- Flow 1:

Average throughput: 11.41 Mbit/s

95th percentile per-packet one-way delay: 37.020 ms

Loss rate: 2.17%

Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2018-10-09 21:48:18

End at: 2018-10-09 21:48:48

Below is generated by plot.py at 2018-10-09 22:12:53

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.07 Mbit/s (92.2% utilization)

95th percentile per-packet one-way delay: 35.687 ms

Loss rate: 0.46%

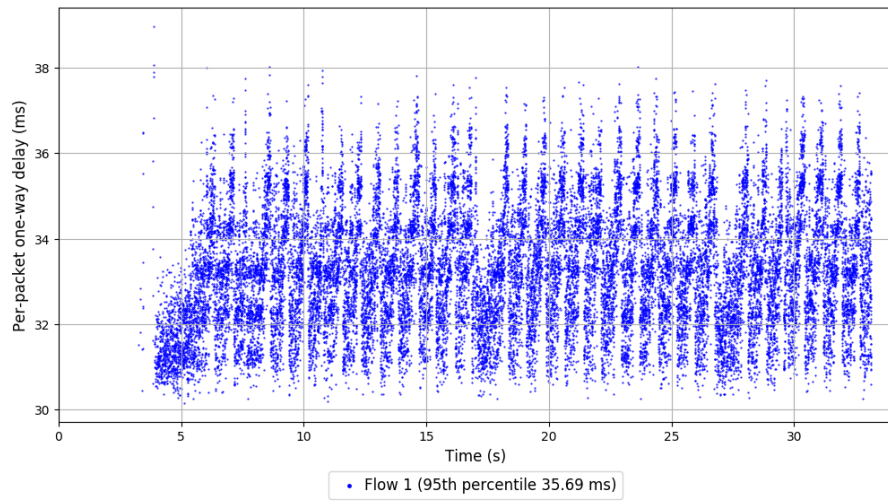
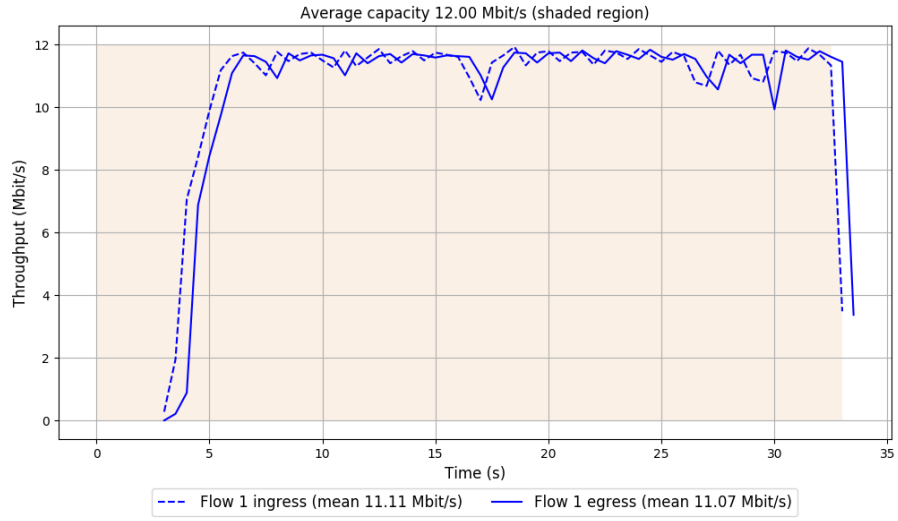
-- Flow 1:

Average throughput: 11.07 Mbit/s

95th percentile per-packet one-way delay: 35.687 ms

Loss rate: 0.46%

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2018-10-09 21:59:00

End at: 2018-10-09 21:59:30

Below is generated by plot.py at 2018-10-09 22:12:53

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.09 Mbit/s (92.4% utilization)

95th percentile per-packet one-way delay: 35.992 ms

Loss rate: 0.44%

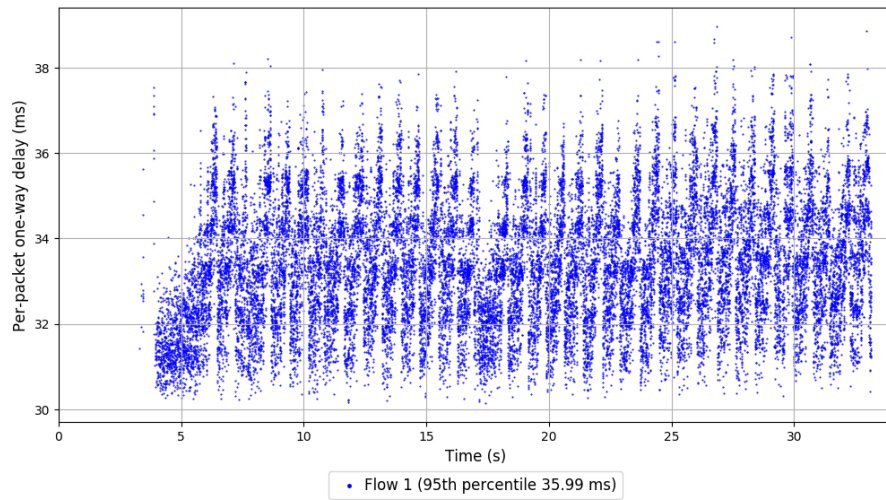
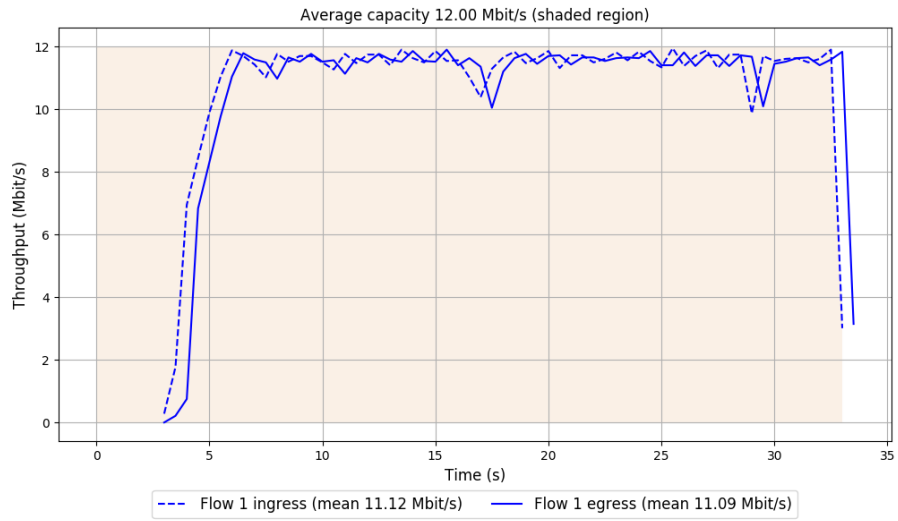
-- Flow 1:

Average throughput: 11.09 Mbit/s

95th percentile per-packet one-way delay: 35.992 ms

Loss rate: 0.44%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2018-10-09 22:09:43

End at: 2018-10-09 22:10:13

Below is generated by plot.py at 2018-10-09 22:12:53

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.00 Mbit/s (91.6% utilization)

95th percentile per-packet one-way delay: 35.923 ms

Loss rate: 0.47%

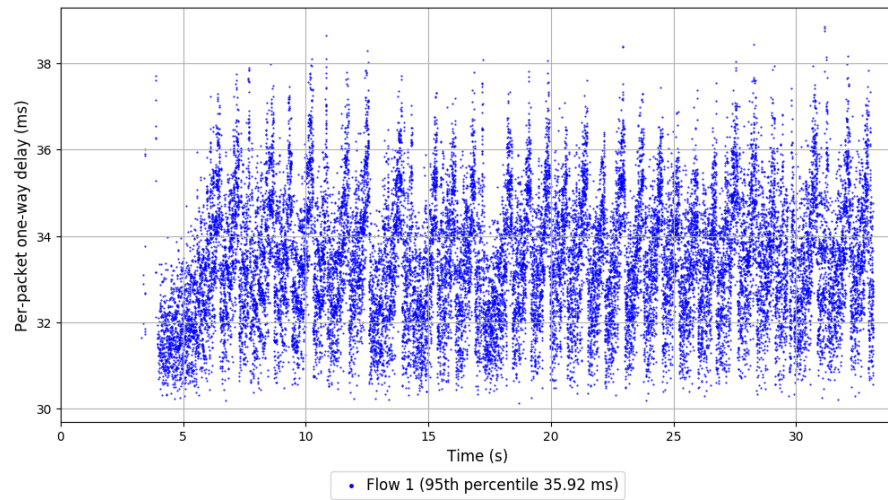
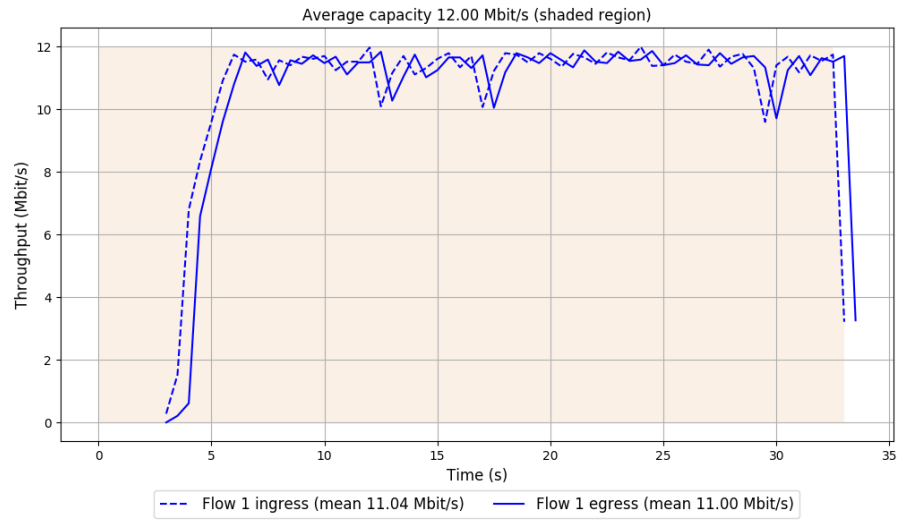
-- Flow 1:

Average throughput: 11.00 Mbit/s

95th percentile per-packet one-way delay: 35.923 ms

Loss rate: 0.47%

Run 3: Report of QUIC Cubic — Data Link



Run 1: Statistics of SCReAM

Start at: 2018-10-09 21:47:08

End at: 2018-10-09 21:47:38

Below is generated by plot.py at 2018-10-09 22:12:53

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: 31.611 ms

Loss rate: 0.00%

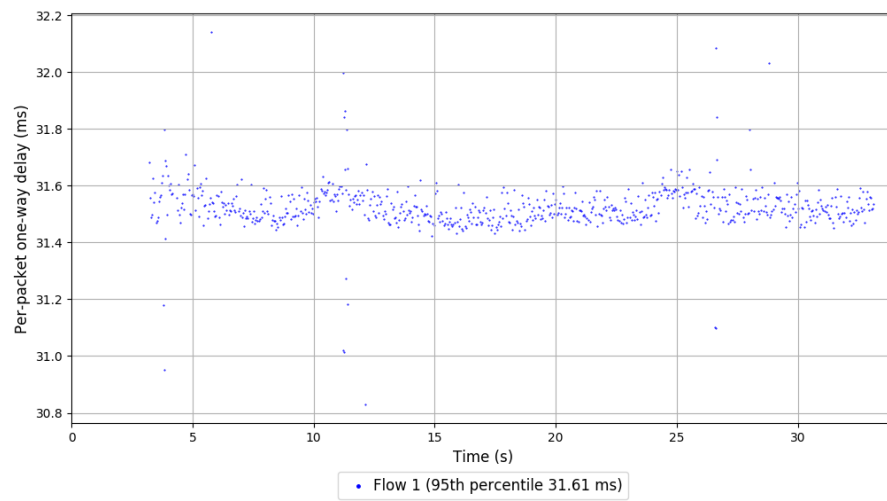
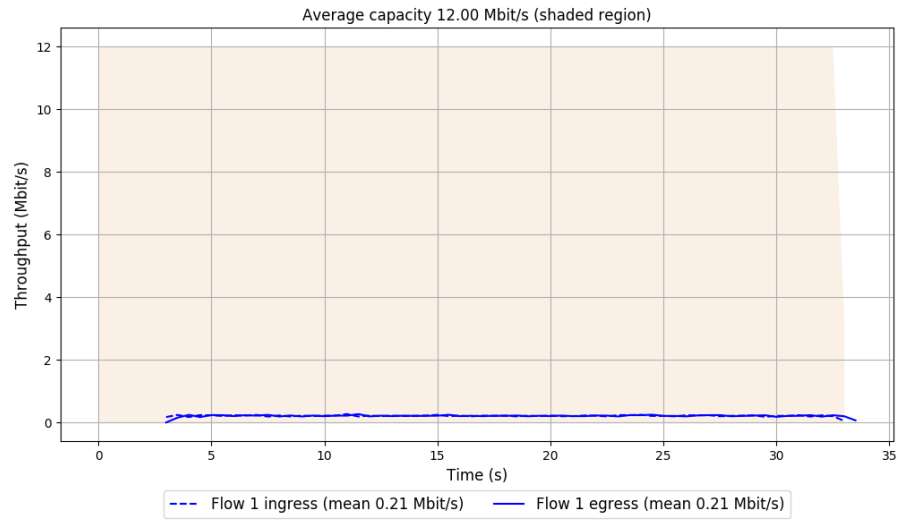
-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 31.611 ms

Loss rate: 0.00%

Run 1: Report of SCReAM — Data Link



Run 2: Statistics of SCReAM

Start at: 2018-10-09 21:57:50

End at: 2018-10-09 21:58:20

Below is generated by plot.py at 2018-10-09 22:12:53

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: 31.593 ms

Loss rate: 0.00%

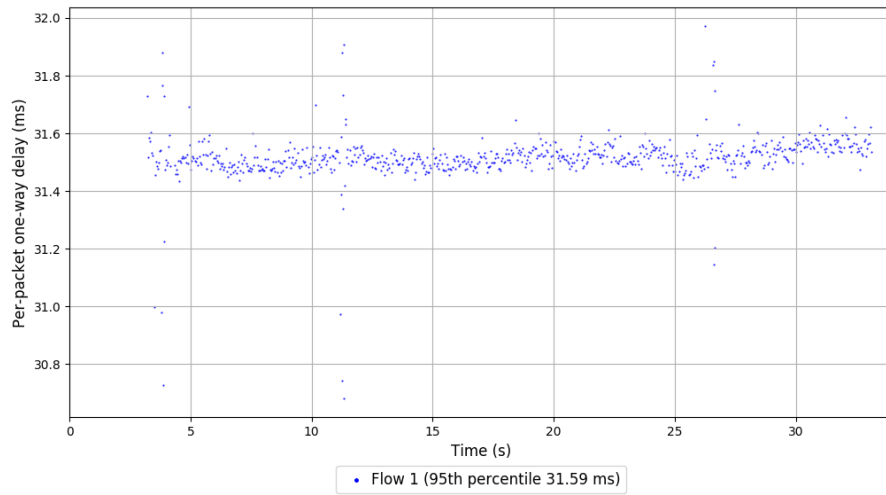
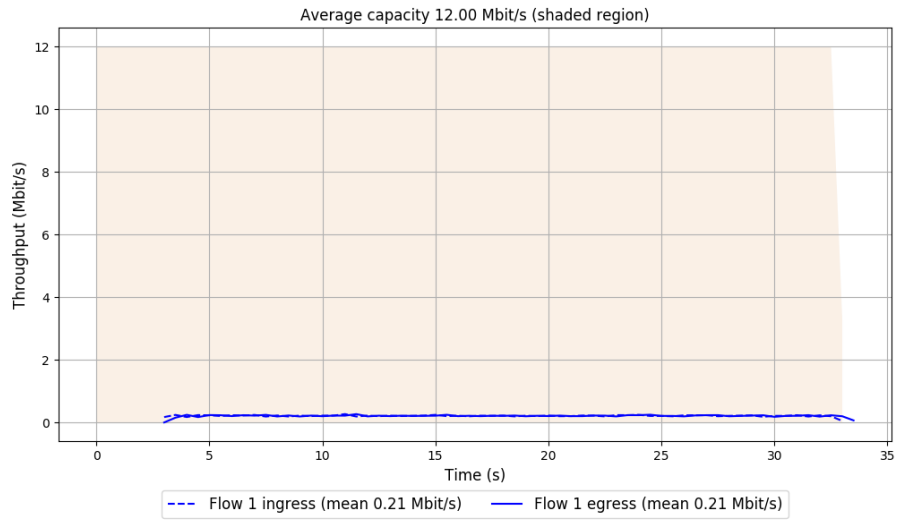
-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 31.593 ms

Loss rate: 0.00%

Run 2: Report of SCReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2018-10-09 22:08:33

End at: 2018-10-09 22:09:03

Below is generated by plot.py at 2018-10-09 22:12:53

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: 31.586 ms

Loss rate: 0.13%

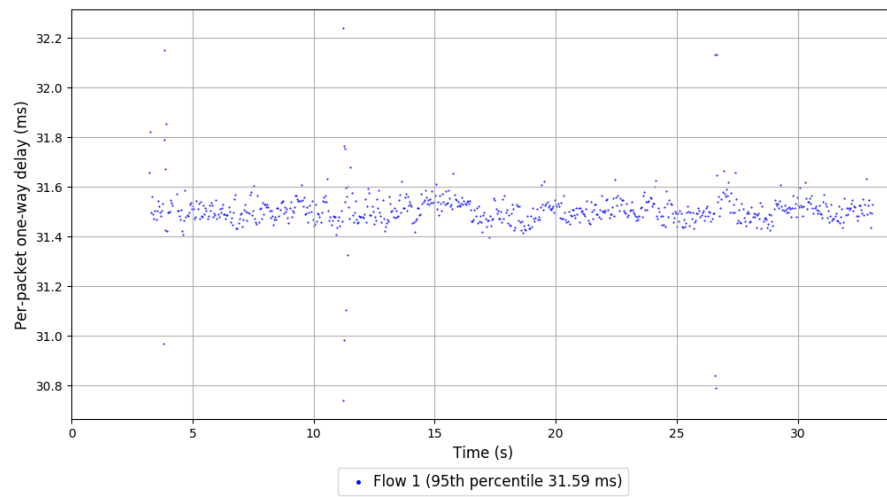
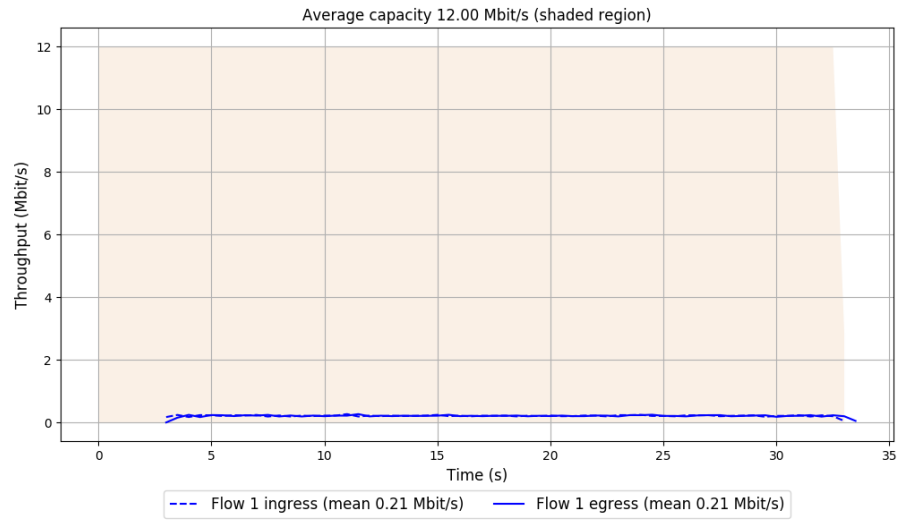
-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 31.586 ms

Loss rate: 0.13%

Run 3: Report of SCReAM — Data Link



Run 1: Statistics of Sprout

Start at: 2018-10-09 21:43:34

End at: 2018-10-09 21:44:04

Below is generated by plot.py at 2018-10-09 22:12:53

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 0.69 Mbit/s (5.7% utilization)

95th percentile per-packet one-way delay: 36.348 ms

Loss rate: 12.92%

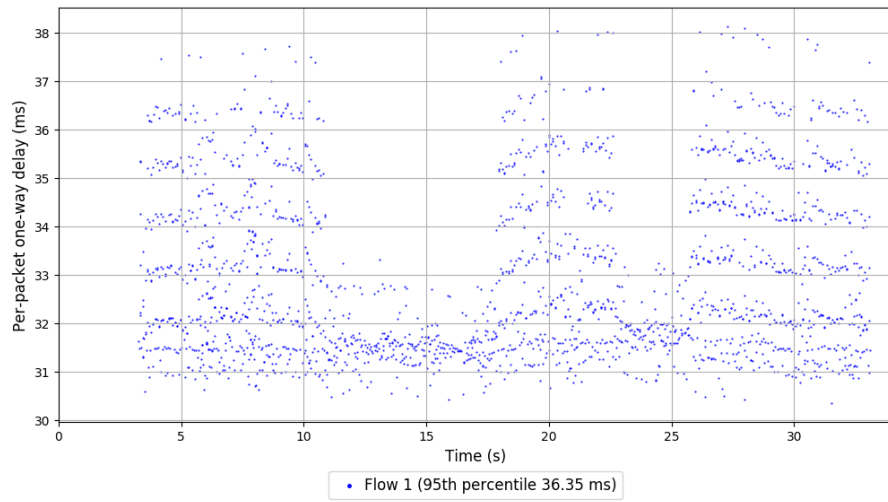
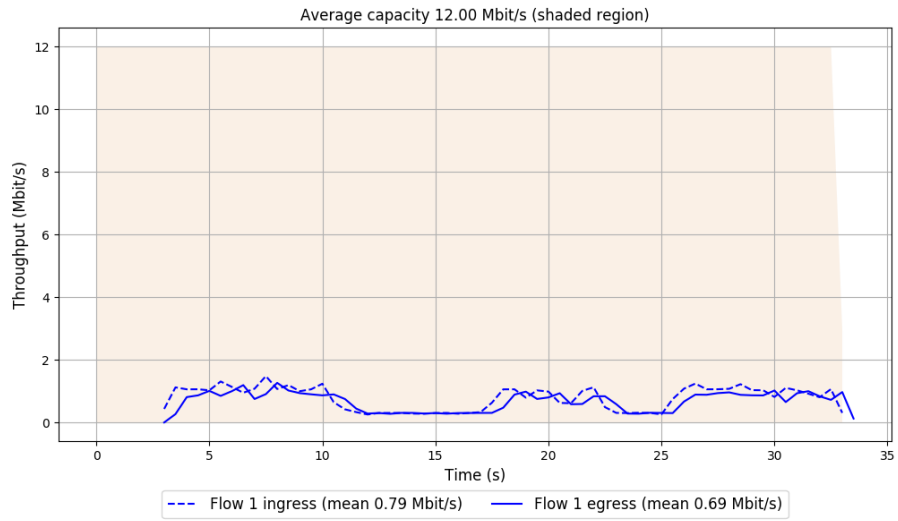
-- Flow 1:

Average throughput: 0.69 Mbit/s

95th percentile per-packet one-way delay: 36.348 ms

Loss rate: 12.92%

Run 1: Report of Sprout — Data Link



Run 2: Statistics of Sprout

Start at: 2018-10-09 21:54:15

End at: 2018-10-09 21:54:45

Below is generated by plot.py at 2018-10-09 22:12:53

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 0.85 Mbit/s (7.1% utilization)

95th percentile per-packet one-way delay: 36.429 ms

Loss rate: 12.28%

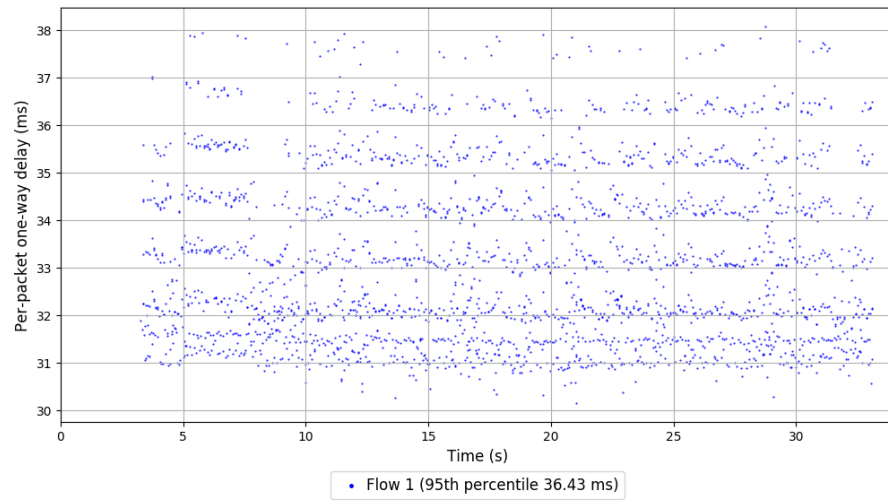
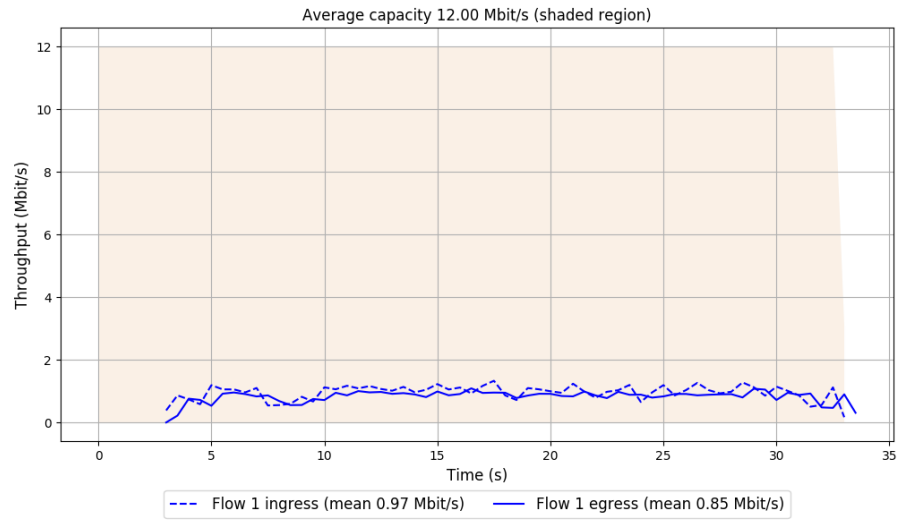
-- Flow 1:

Average throughput: 0.85 Mbit/s

95th percentile per-packet one-way delay: 36.429 ms

Loss rate: 12.28%

Run 2: Report of Sprout — Data Link



Run 3: Statistics of Sprout

Start at: 2018-10-09 22:04:57

End at: 2018-10-09 22:05:27

Below is generated by plot.py at 2018-10-09 22:12:53

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 0.91 Mbit/s (7.6% utilization)

95th percentile per-packet one-way delay: 36.437 ms

Loss rate: 13.11%

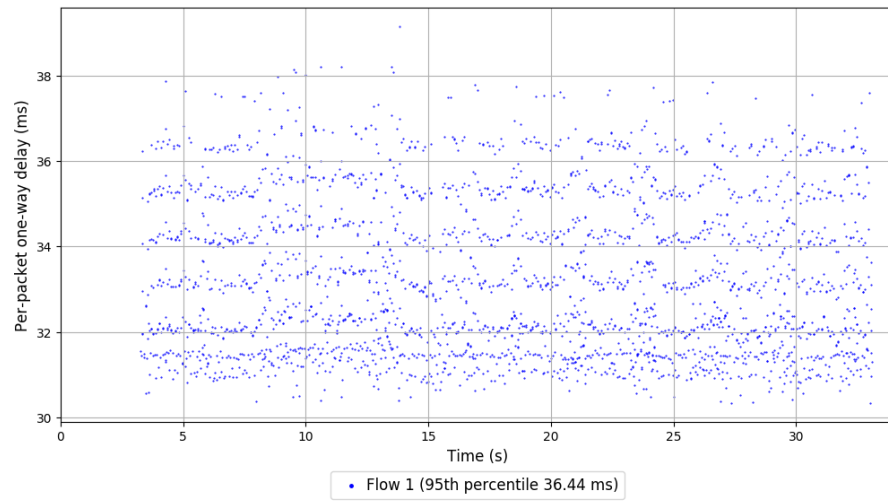
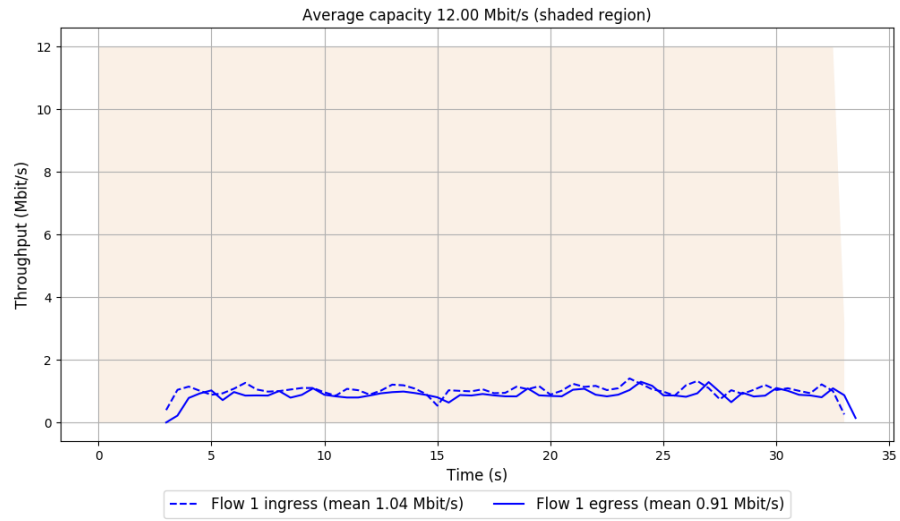
-- Flow 1:

Average throughput: 0.91 Mbit/s

95th percentile per-packet one-way delay: 36.437 ms

Loss rate: 13.11%

Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

Start at: 2018-10-09 21:40:00

End at: 2018-10-09 21:40:30

Below is generated by plot.py at 2018-10-09 22:13:11

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.08 Mbit/s (92.3% utilization)

95th percentile per-packet one-way delay: 32.788 ms

Loss rate: 0.78%

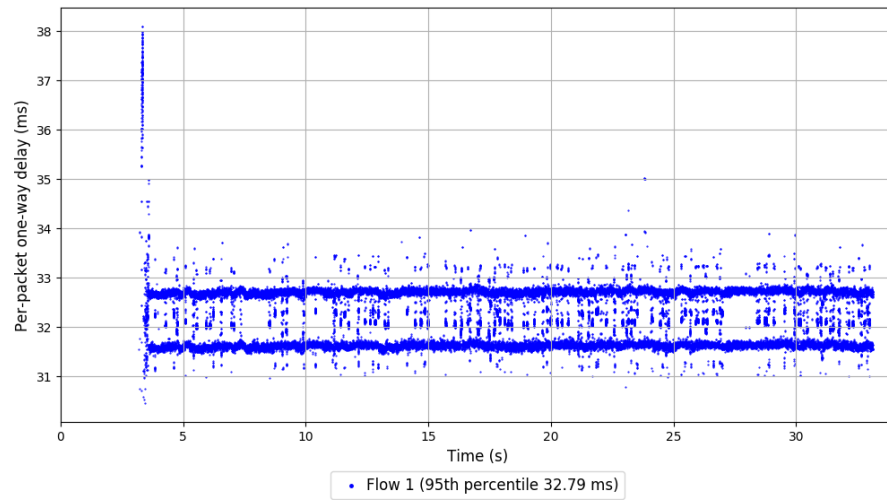
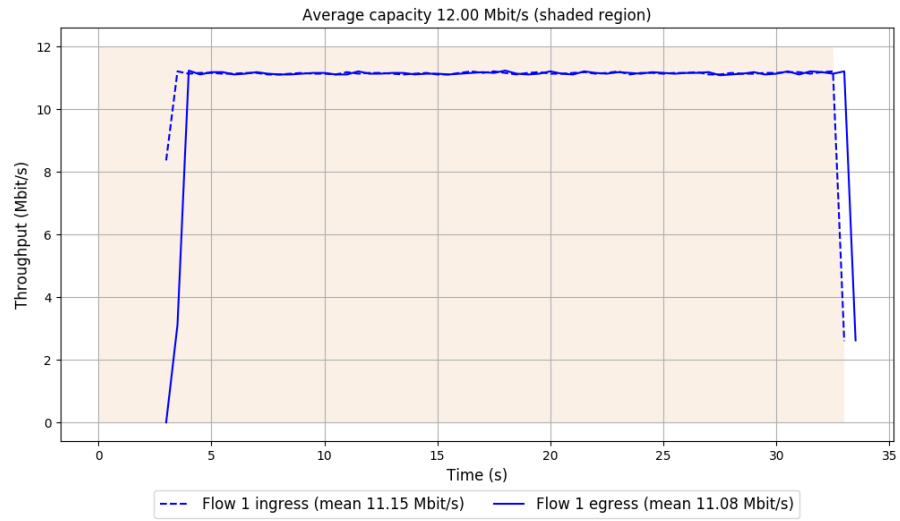
-- Flow 1:

Average throughput: 11.08 Mbit/s

95th percentile per-packet one-way delay: 32.788 ms

Loss rate: 0.78%

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



Run 2: Statistics of TaoVA-100x

Start at: 2018-10-09 21:50:41

End at: 2018-10-09 21:51:11

Below is generated by plot.py at 2018-10-09 22:13:12

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.08 Mbit/s (92.3% utilization)

95th percentile per-packet one-way delay: 32.769 ms

Loss rate: 0.78%

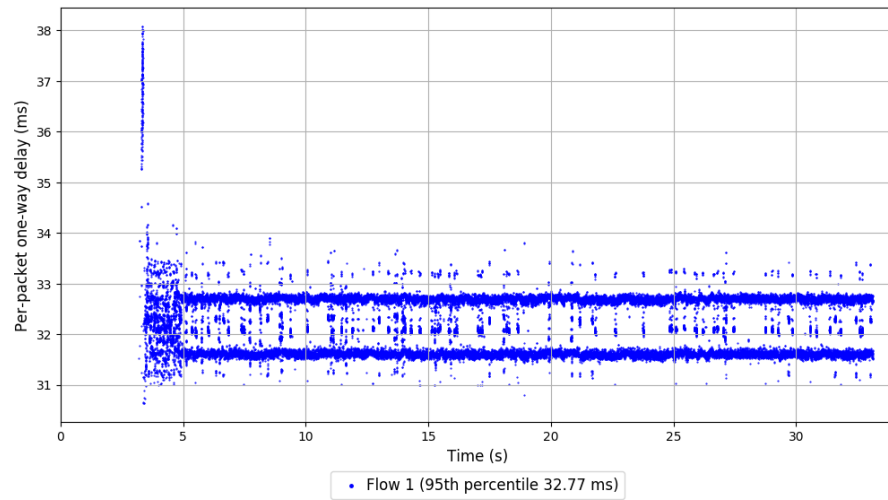
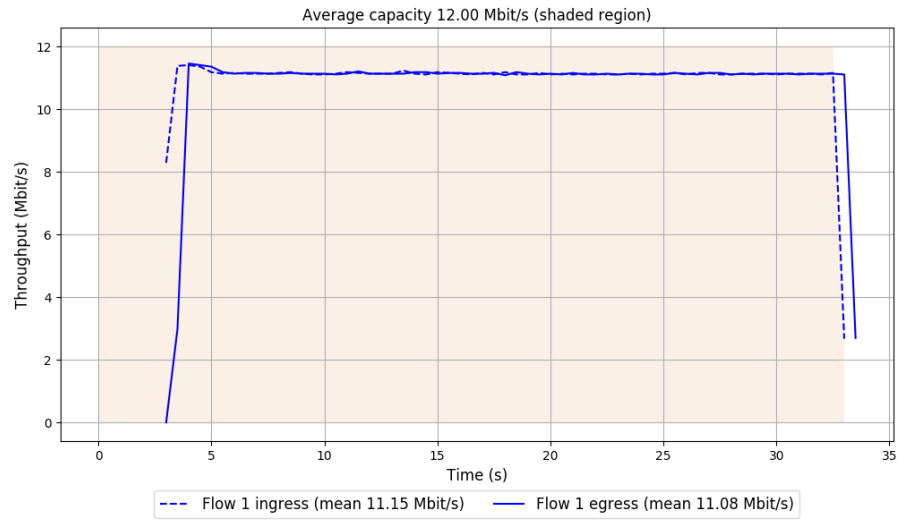
-- Flow 1:

Average throughput: 11.08 Mbit/s

95th percentile per-packet one-way delay: 32.769 ms

Loss rate: 0.78%

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



Run 3: Statistics of TaoVA-100x

Start at: 2018-10-09 22:01:23

End at: 2018-10-09 22:01:53

Below is generated by plot.py at 2018-10-09 22:13:12

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.06 Mbit/s (92.2% utilization)

95th percentile per-packet one-way delay: 32.755 ms

Loss rate: 0.81%

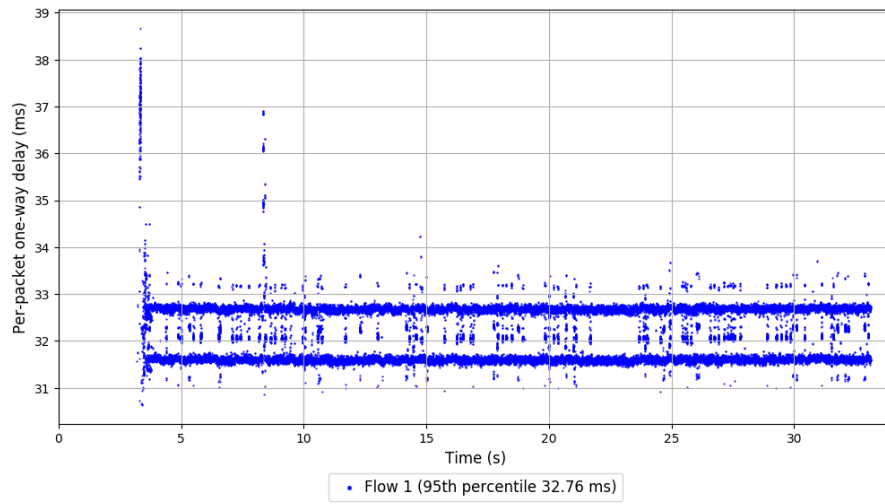
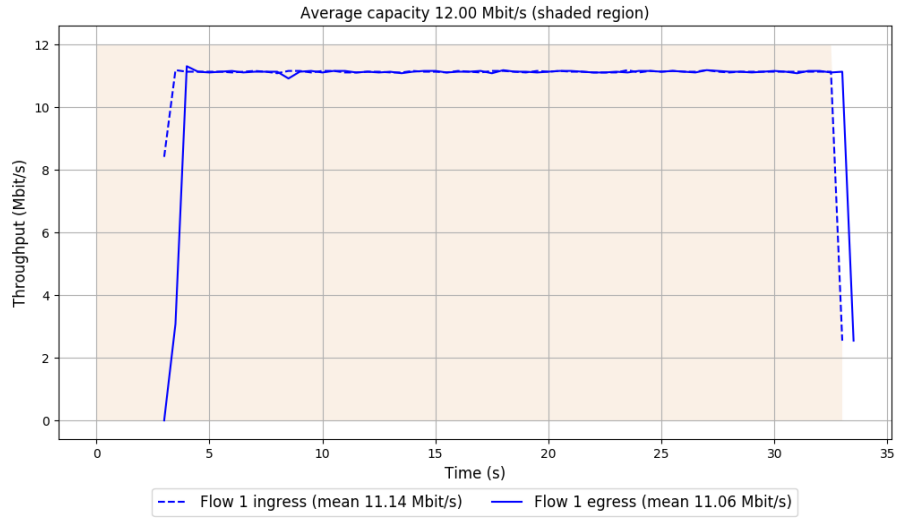
-- Flow 1:

Average throughput: 11.06 Mbit/s

95th percentile per-packet one-way delay: 32.755 ms

Loss rate: 0.81%

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



Run 1: Statistics of TCP Vegas

Start at: 2018-10-09 21:38:49

End at: 2018-10-09 21:39:19

Below is generated by plot.py at 2018-10-09 22:13:12

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.43 Mbit/s (78.6% utilization)

95th percentile per-packet one-way delay: 35.053 ms

Loss rate: 0.22%

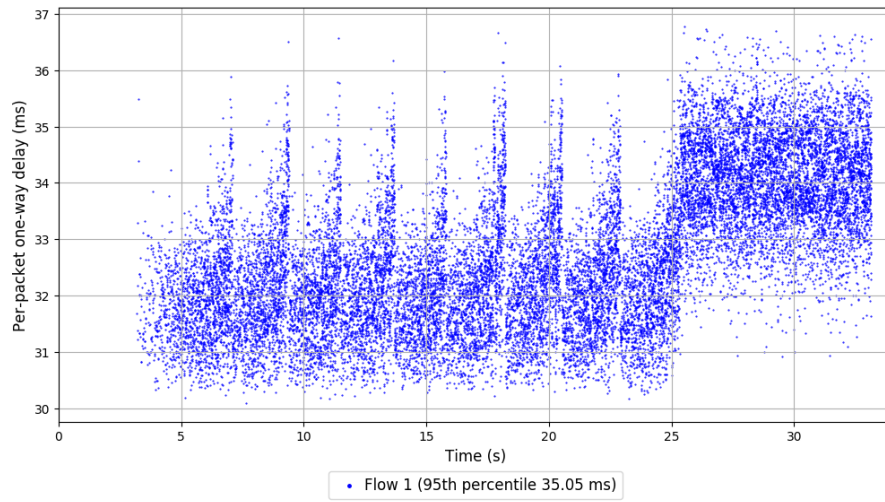
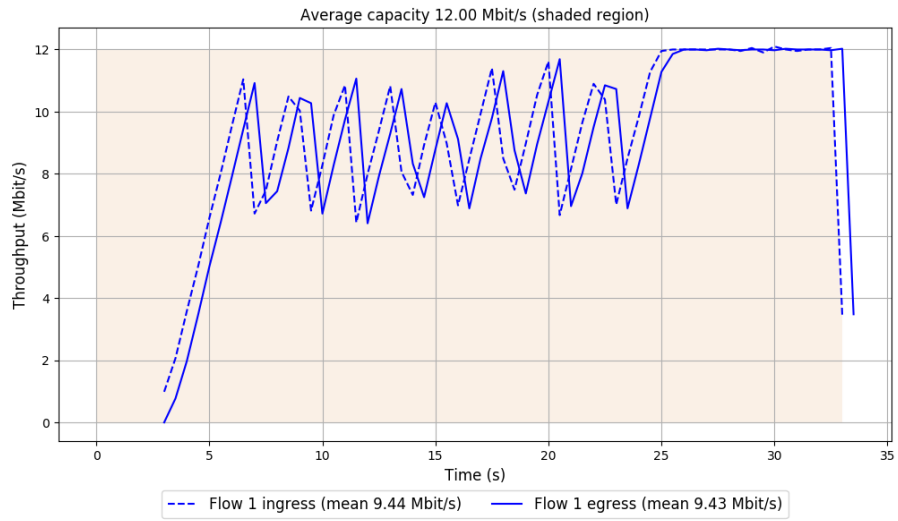
-- Flow 1:

Average throughput: 9.43 Mbit/s

95th percentile per-packet one-way delay: 35.053 ms

Loss rate: 0.22%

Run 1: Report of TCP Vegas — Data Link



Run 2: Statistics of TCP Vegas

Start at: 2018-10-09 21:49:30

End at: 2018-10-09 21:50:00

Below is generated by plot.py at 2018-10-09 22:13:12

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 8.82 Mbit/s (73.5% utilization)

95th percentile per-packet one-way delay: 34.285 ms

Loss rate: 0.24%

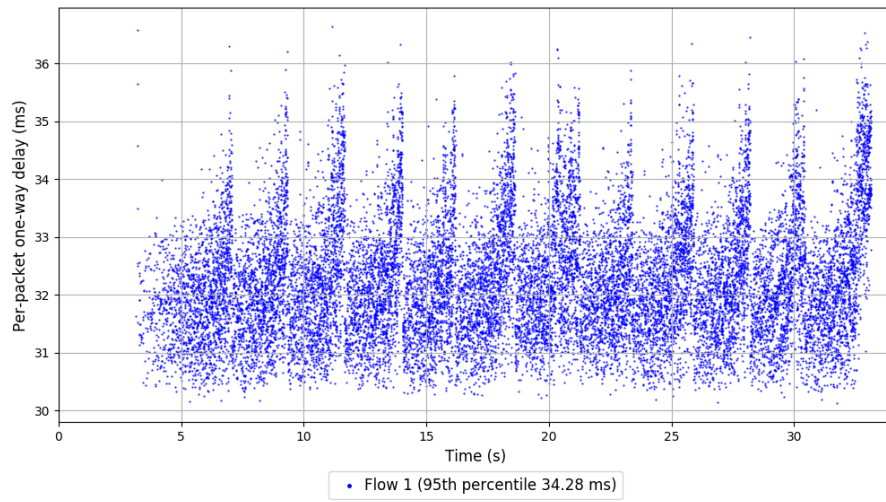
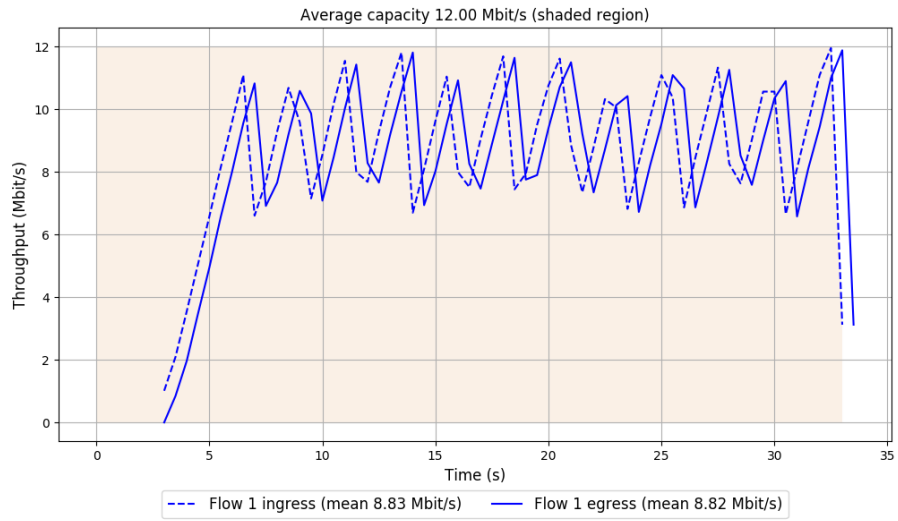
-- Flow 1:

Average throughput: 8.82 Mbit/s

95th percentile per-packet one-way delay: 34.285 ms

Loss rate: 0.24%

Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2018-10-09 22:00:12

End at: 2018-10-09 22:00:42

Below is generated by plot.py at 2018-10-09 22:13:12

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 8.81 Mbit/s (73.4% utilization)

95th percentile per-packet one-way delay: 34.112 ms

Loss rate: 0.17%

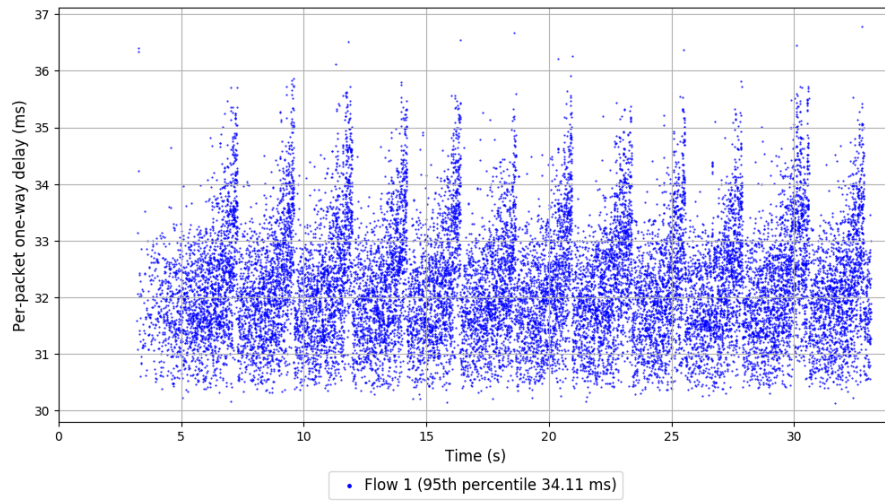
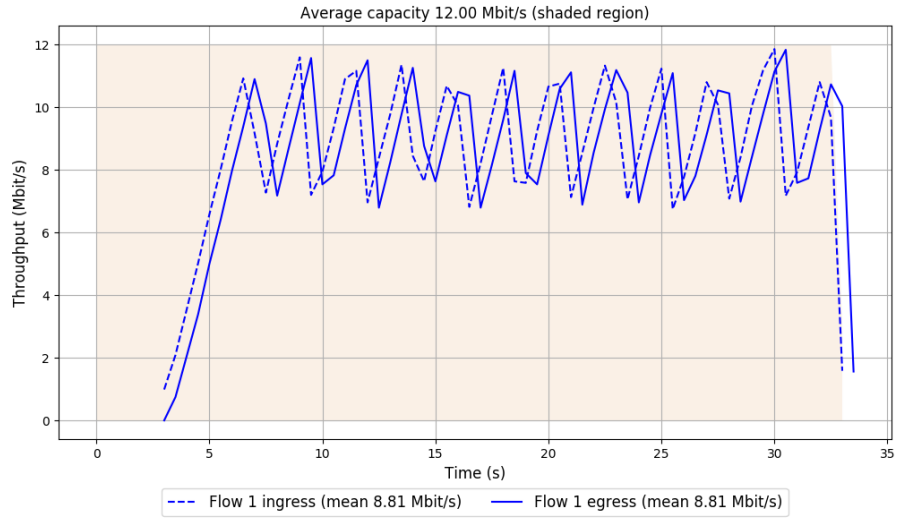
-- Flow 1:

Average throughput: 8.81 Mbit/s

95th percentile per-packet one-way delay: 34.112 ms

Loss rate: 0.17%

Run 3: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2018-10-09 21:45:19

End at: 2018-10-09 21:45:49

Below is generated by plot.py at 2018-10-09 22:13:31

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 5.04 Mbit/s (42.0% utilization)

95th percentile per-packet one-way delay: 38.015 ms

Loss rate: 96.66%

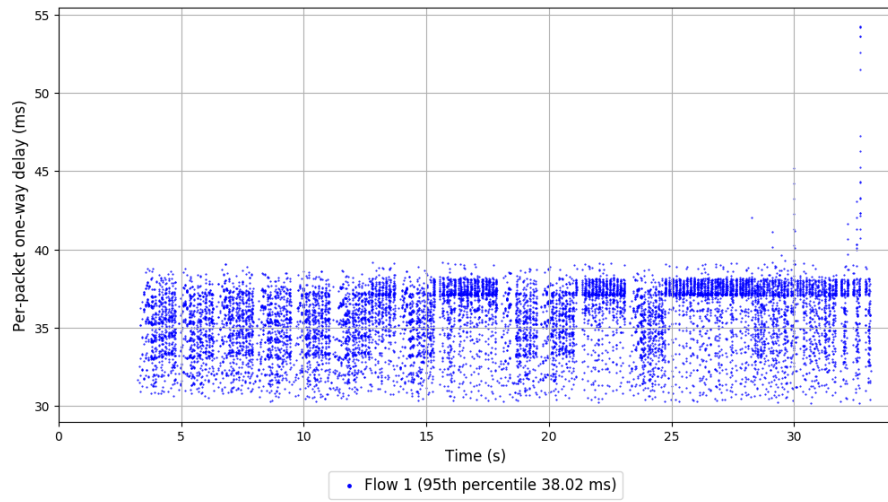
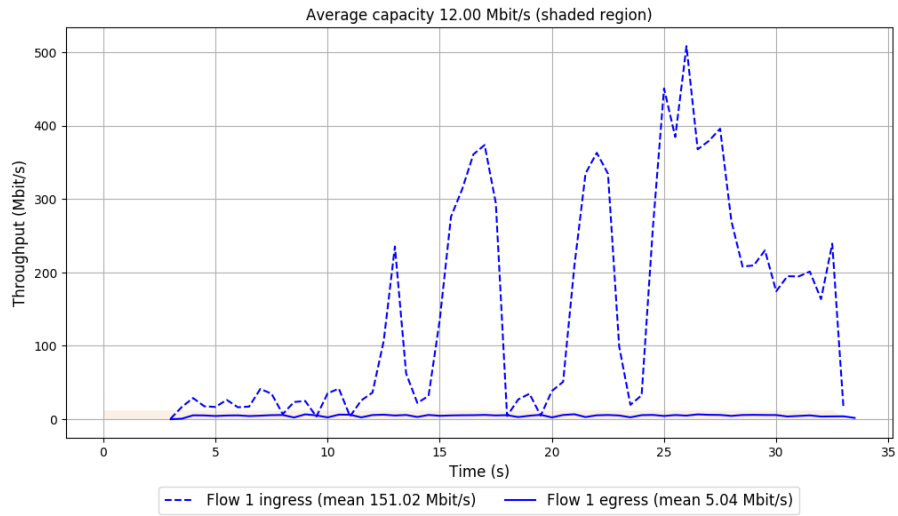
-- Flow 1:

Average throughput: 5.04 Mbit/s

95th percentile per-packet one-way delay: 38.015 ms

Loss rate: 96.66%

Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2018-10-09 21:56:00

End at: 2018-10-09 21:56:30

Below is generated by plot.py at 2018-10-09 22:13:33

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 5.07 Mbit/s (42.2% utilization)

95th percentile per-packet one-way delay: 38.002 ms

Loss rate: 97.57%

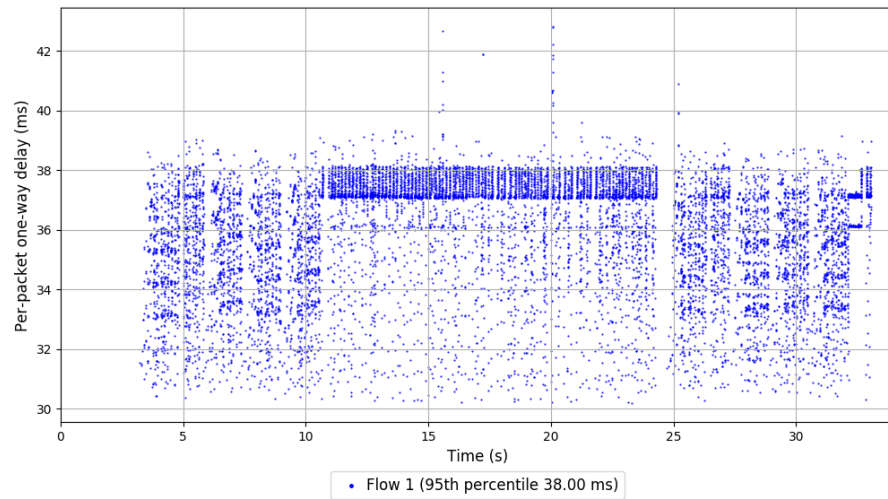
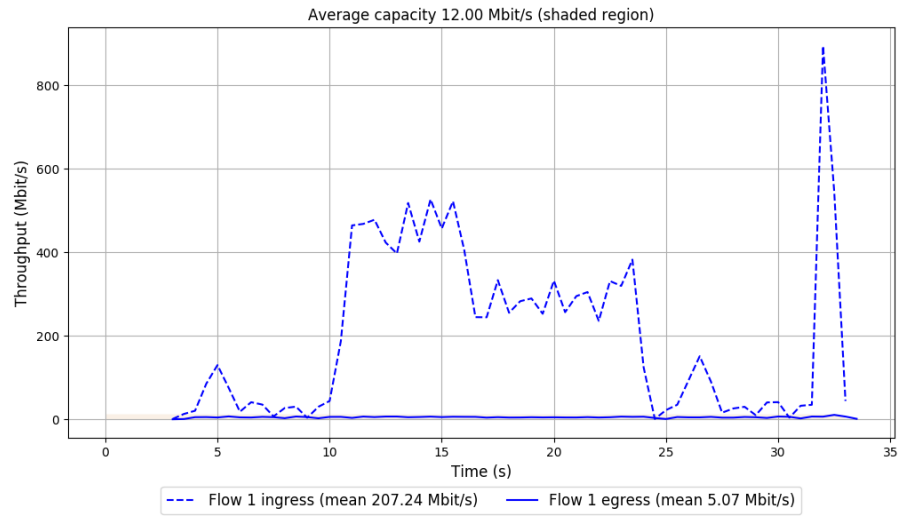
-- Flow 1:

Average throughput: 5.07 Mbit/s

95th percentile per-packet one-way delay: 38.002 ms

Loss rate: 97.57%

Run 2: Report of Verus — Data Link



Run 3: Statistics of Verus

Start at: 2018-10-09 22:06:42

End at: 2018-10-09 22:07:12

Below is generated by plot.py at 2018-10-09 22:13:34

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 5.10 Mbit/s (42.5% utilization)

95th percentile per-packet one-way delay: 38.037 ms

Loss rate: 98.03%

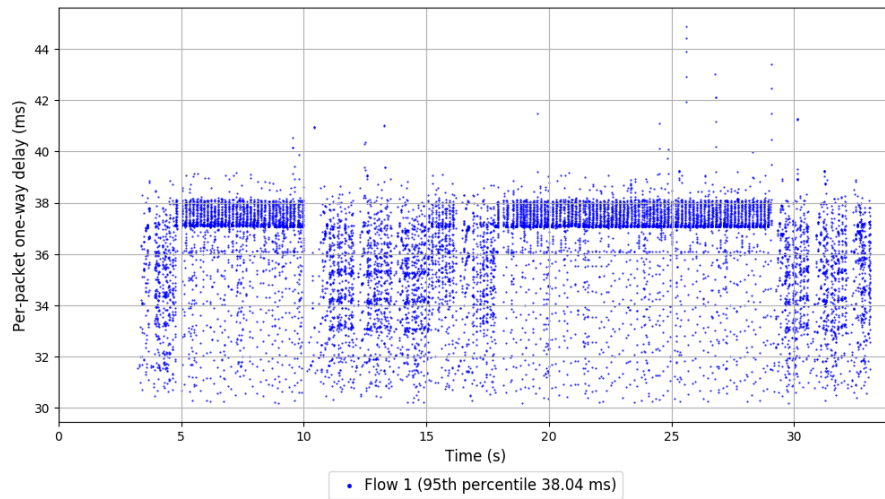
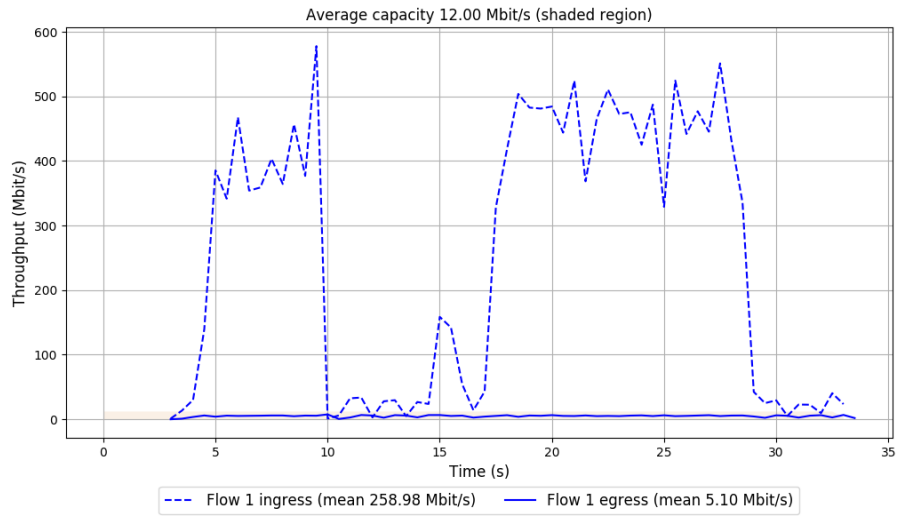
-- Flow 1:

Average throughput: 5.10 Mbit/s

95th percentile per-packet one-way delay: 38.037 ms

Loss rate: 98.03%

Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

Start at: 2018-10-09 21:41:11

End at: 2018-10-09 21:41:41

Below is generated by plot.py at 2018-10-09 22:13:34

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: 35.196 ms

Loss rate: 0.29%

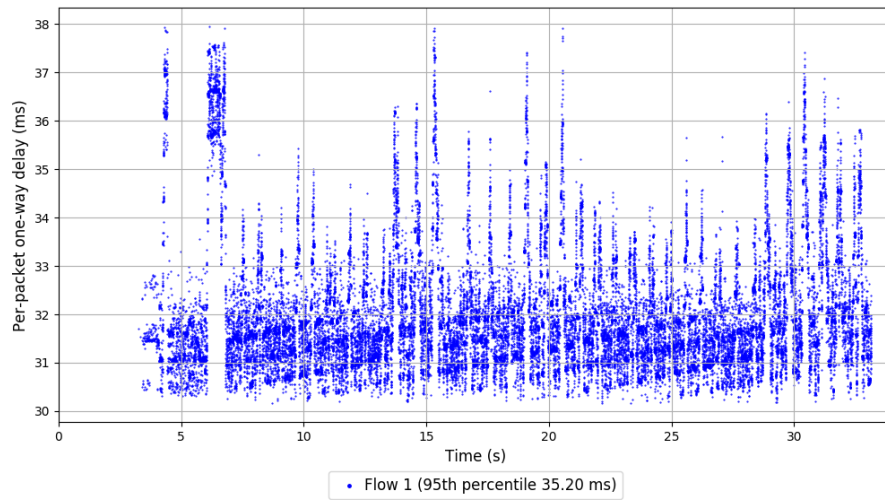
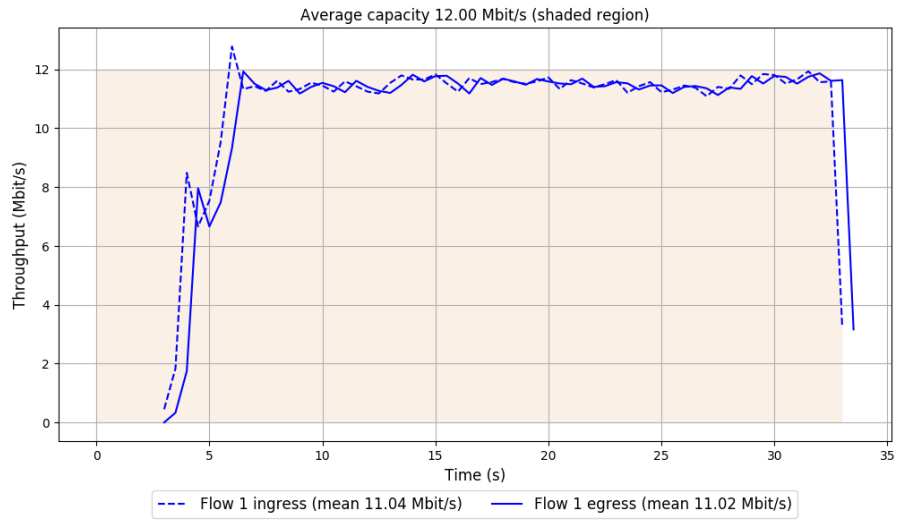
-- Flow 1:

Average throughput: 11.02 Mbit/s

95th percentile per-packet one-way delay: 35.196 ms

Loss rate: 0.29%

Run 1: Report of PCC-Vivace — Data Link



Run 2: Statistics of PCC-Vivace

Start at: 2018-10-09 21:51:52

End at: 2018-10-09 21:52:22

Below is generated by plot.py at 2018-10-09 22:13:34

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.97 Mbit/s (91.4% utilization)

95th percentile per-packet one-way delay: 35.064 ms

Loss rate: 0.29%

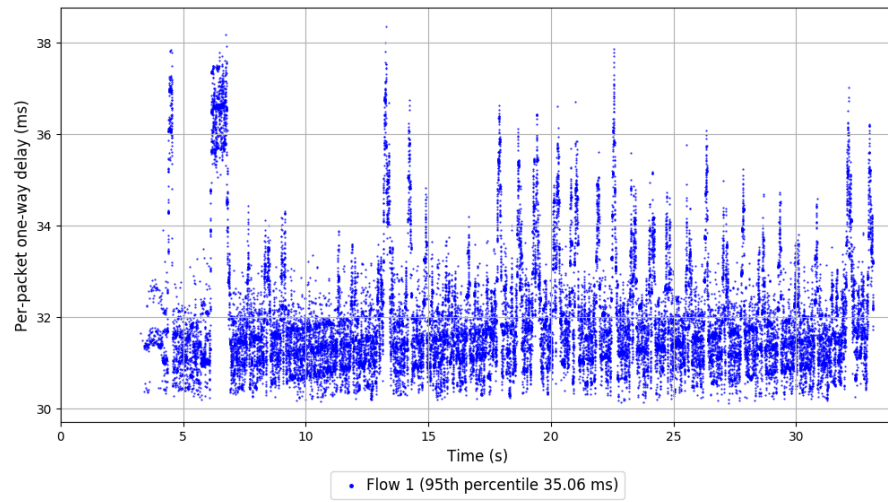
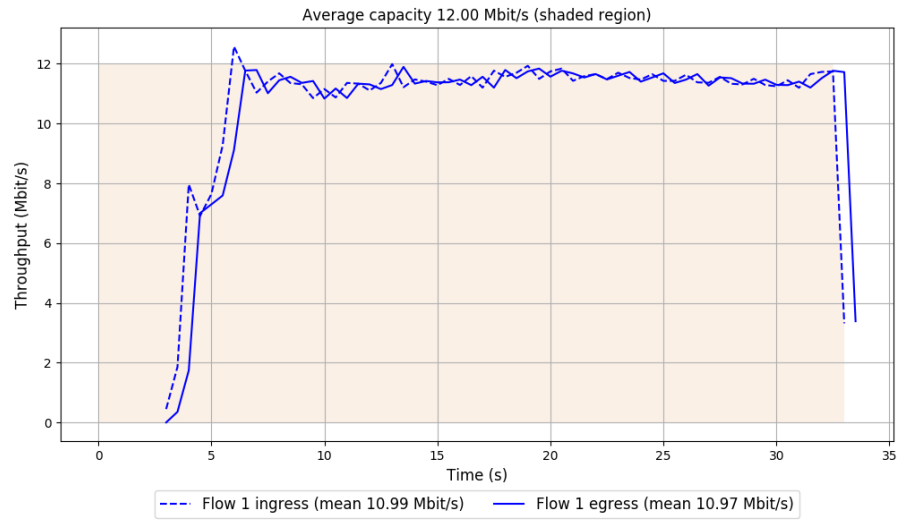
-- Flow 1:

Average throughput: 10.97 Mbit/s

95th percentile per-packet one-way delay: 35.064 ms

Loss rate: 0.29%

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

Start at: 2018-10-09 22:02:34

End at: 2018-10-09 22:03:04

Below is generated by plot.py at 2018-10-09 22:13:34

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.97 Mbit/s (91.4% utilization)

95th percentile per-packet one-way delay: 35.307 ms

Loss rate: 0.30%

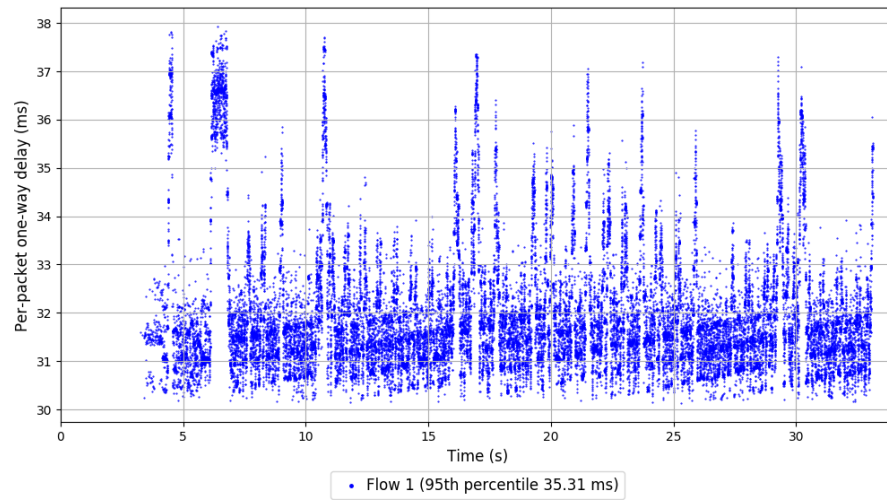
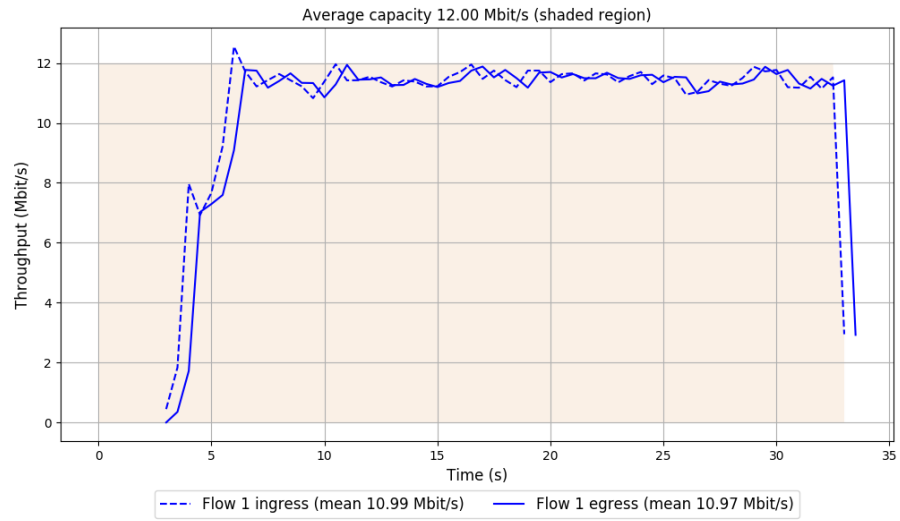
-- Flow 1:

Average throughput: 10.97 Mbit/s

95th percentile per-packet one-way delay: 35.307 ms

Loss rate: 0.30%

Run 3: Report of PCC-Vivace — Data Link



Run 1: Statistics of WebRTC media

Start at: 2018-10-09 21:44:09

End at: 2018-10-09 21:44:39

Below is generated by plot.py at 2018-10-09 22:13:34

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 2.46 Mbit/s (20.5% utilization)

95th percentile per-packet one-way delay: 36.161 ms

Loss rate: 1.88%

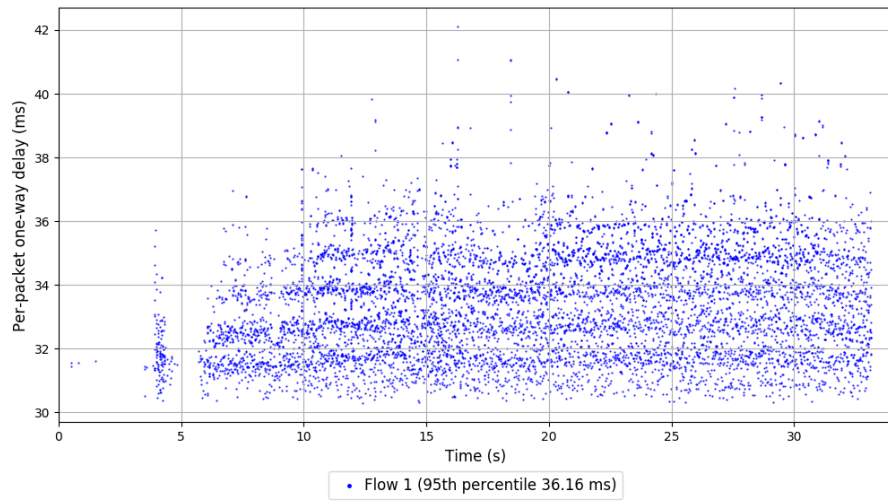
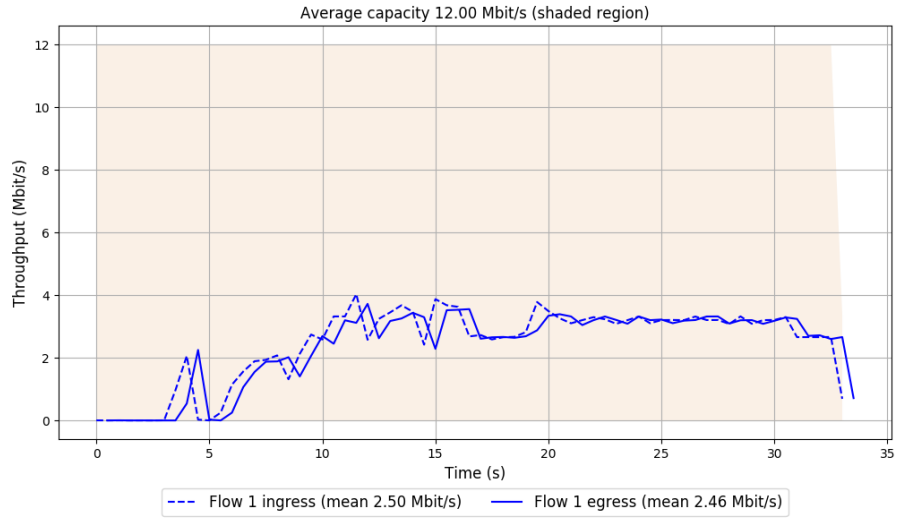
-- Flow 1:

Average throughput: 2.46 Mbit/s

95th percentile per-packet one-way delay: 36.161 ms

Loss rate: 1.88%

Run 1: Report of WebRTC media — Data Link



Run 2: Statistics of WebRTC media

Start at: 2018-10-09 21:54:50

End at: 2018-10-09 21:55:20

Below is generated by plot.py at 2018-10-09 22:13:34

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 2.38 Mbit/s (19.9% utilization)

95th percentile per-packet one-way delay: 36.247 ms

Loss rate: 1.57%

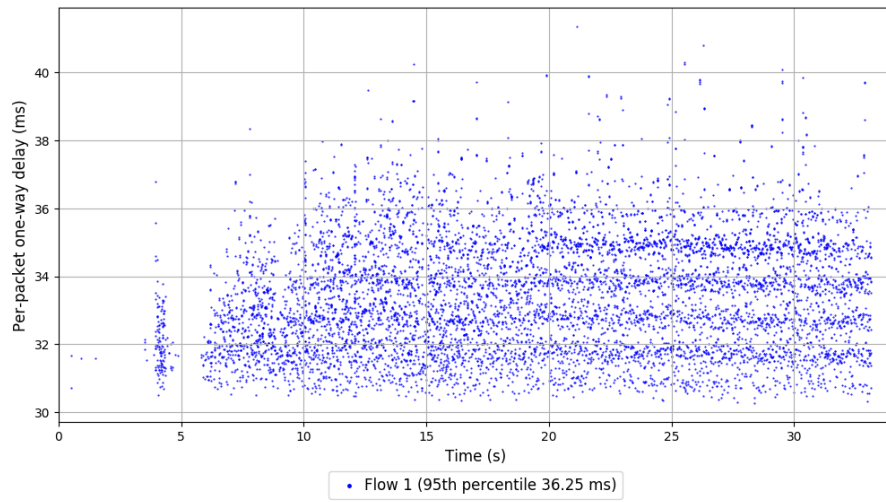
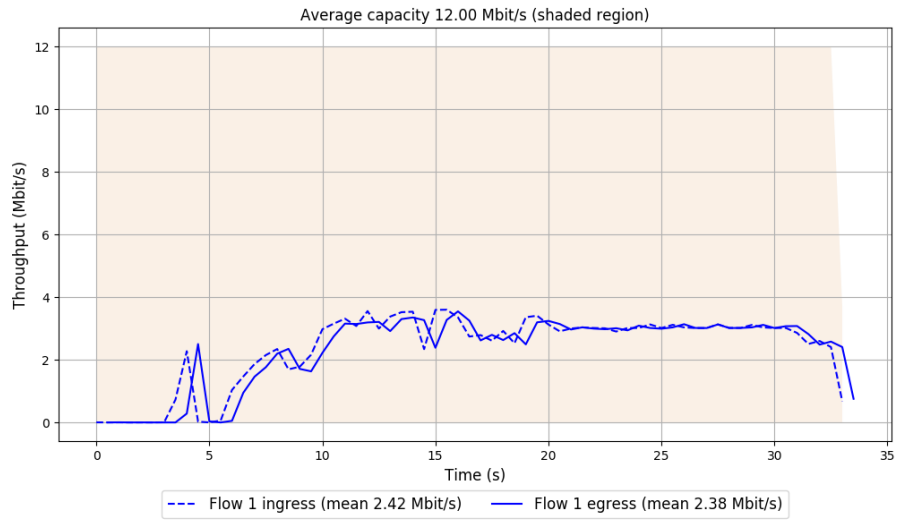
-- Flow 1:

Average throughput: 2.38 Mbit/s

95th percentile per-packet one-way delay: 36.247 ms

Loss rate: 1.57%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2018-10-09 22:05:32

End at: 2018-10-09 22:06:02

Below is generated by plot.py at 2018-10-09 22:13:34

Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 2.57 Mbit/s (21.4% utilization)

95th percentile per-packet one-way delay: 36.395 ms

Loss rate: 4.04%

-- Flow 1:

Average throughput: 2.57 Mbit/s

95th percentile per-packet one-way delay: 36.395 ms

Loss rate: 4.04%

Run 3: Report of WebRTC media — Data Link

