

Pantheon Report

Generated at 2019-01-18 18:48:33 (UTC).

Data path: AWS California 1 on *ens5 (local)* → Stanford cellular on *ppp0 (remote)*.

Repeated the test of 21 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

NTP offsets were measured against `time.stanford.edu` and have been applied to correct the timestamps in logs.

System info:

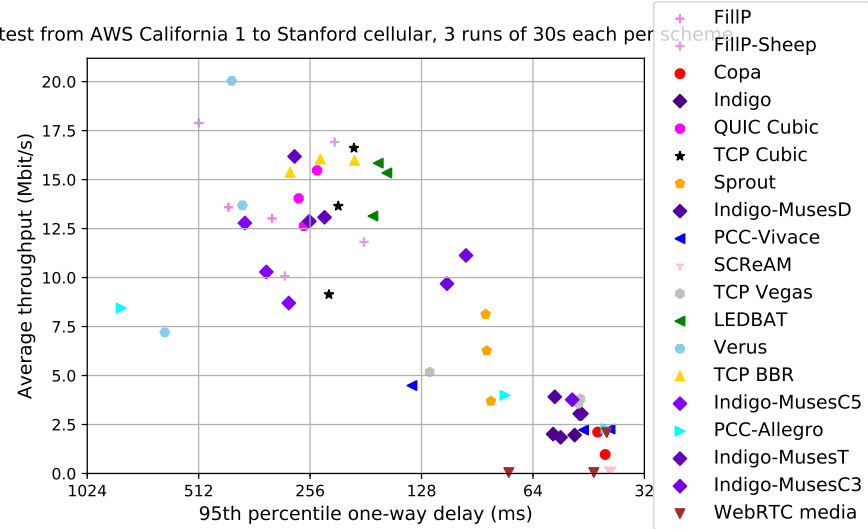
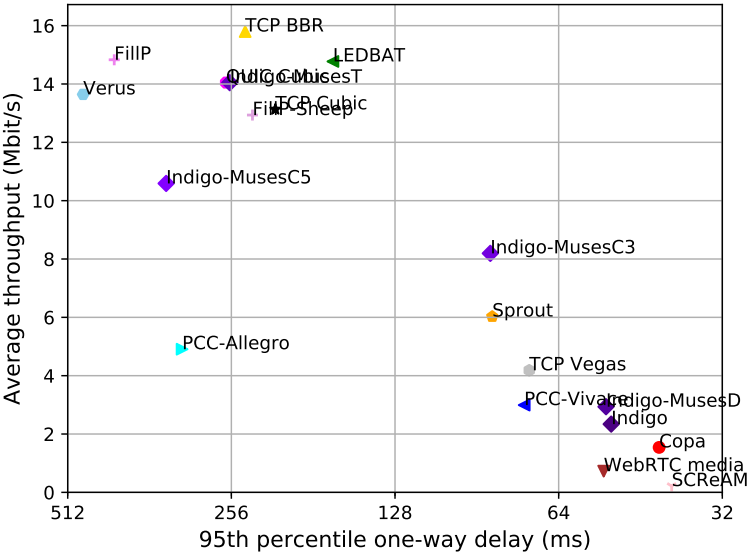
```
Linux 4.15.0-1031-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
```

Git summary:

```
branch: muses @ c80a283586bf7b0cc1fe08c69c8f60d56498f81c
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ c3eee875824760ec5b2fd207fefe166e1afe2170
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-quick @ 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

test from AWS California 1 to Stanford cellular, 3 runs of 30s each per scheme
(mean of all runs by scheme)



scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	15.80	241.45	0.36
Copa	2	1.54	41.82	32.39
TCP Cubic	3	13.13	212.48	0.60
FillP	3	14.83	420.43	0.70
FillP-Sheep	3	12.94	234.11	0.62
Indigo	3	2.34	51.23	0.08
Indigo-MusesC3	3	8.19	85.49	0.14
Indigo-MusesC5	3	10.59	337.44	0.87
Indigo-MusesD	3	2.93	52.37	0.03
Indigo-MusesT	3	14.04	257.71	0.57
LEDBAT	3	14.77	166.54	0.36
PCC-Allegro	3	4.91	315.34	0.98
PCC-Expr	0	N/A	N/A	N/A
QUIC Cubic	3	14.05	261.98	0.73
SCReAM	3	0.22	39.66	0.13
Sprout	3	6.03	84.79	0.16
TaoVA-100x	0	N/A	N/A	N/A
TCP Vegas	3	4.18	72.49	0.10
Verus	3	13.64	479.58	3.06
PCC-Vivace	3	2.99	74.07	0.07
WebRTC media	3	0.73	52.89	0.05

Run 1: Statistics of TCP BBR

Start at: 2019-01-18 17:43:14

End at: 2019-01-18 17:43:44

Local clock offset: -3.754 ms

Remote clock offset: 5.471 ms

Below is generated by plot.py at 2019-01-18 18:47:31

Datalink statistics

-- Total of 1 flow:

Average throughput: 15.37 Mbit/s

95th percentile per-packet one-way delay: 289.856 ms

Loss rate: 0.30%

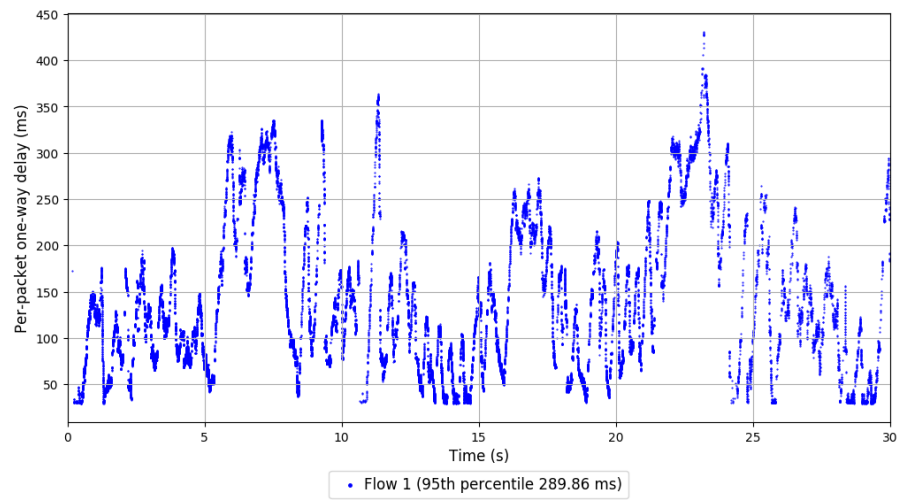
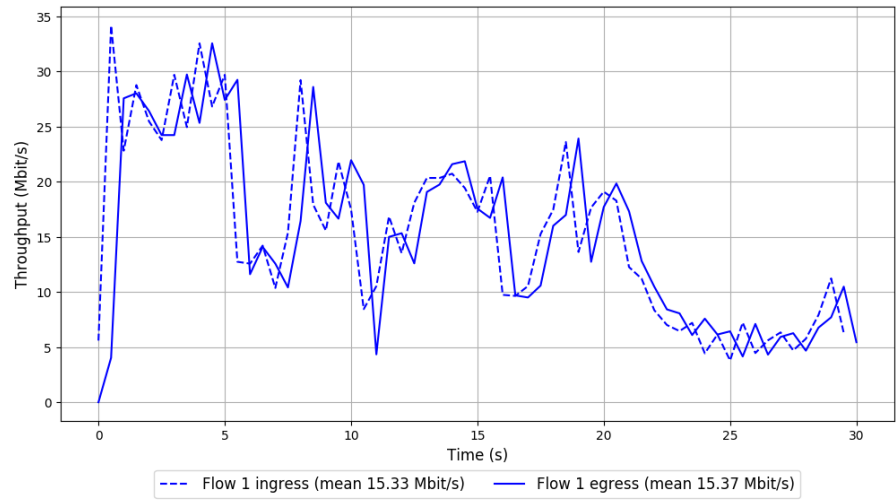
-- Flow 1:

Average throughput: 15.37 Mbit/s

95th percentile per-packet one-way delay: 289.856 ms

Loss rate: 0.30%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2019-01-18 18:08:50

End at: 2019-01-18 18:09:20

Local clock offset: -3.129 ms

Remote clock offset: 9.124 ms

Below is generated by plot.py at 2019-01-18 18:47:32

Datalink statistics

-- Total of 1 flow:

Average throughput: 16.05 Mbit/s

95th percentile per-packet one-way delay: 240.218 ms

Loss rate: 0.24%

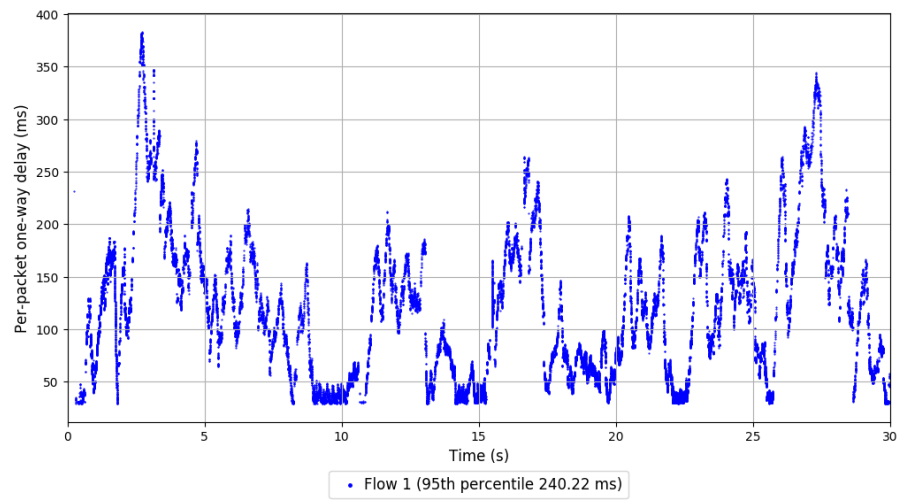
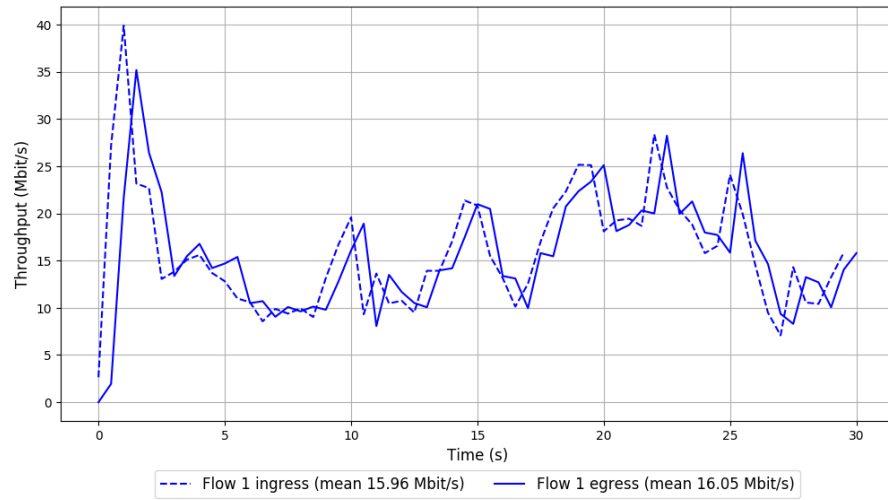
-- Flow 1:

Average throughput: 16.05 Mbit/s

95th percentile per-packet one-way delay: 240.218 ms

Loss rate: 0.24%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2019-01-18 18:34:26

End at: 2019-01-18 18:34:56

Local clock offset: -2.963 ms

Remote clock offset: 4.638 ms

Below is generated by plot.py at 2019-01-18 18:47:32

Datalink statistics

-- Total of 1 flow:

Average throughput: 15.98 Mbit/s

95th percentile per-packet one-way delay: 194.265 ms

Loss rate: 0.53%

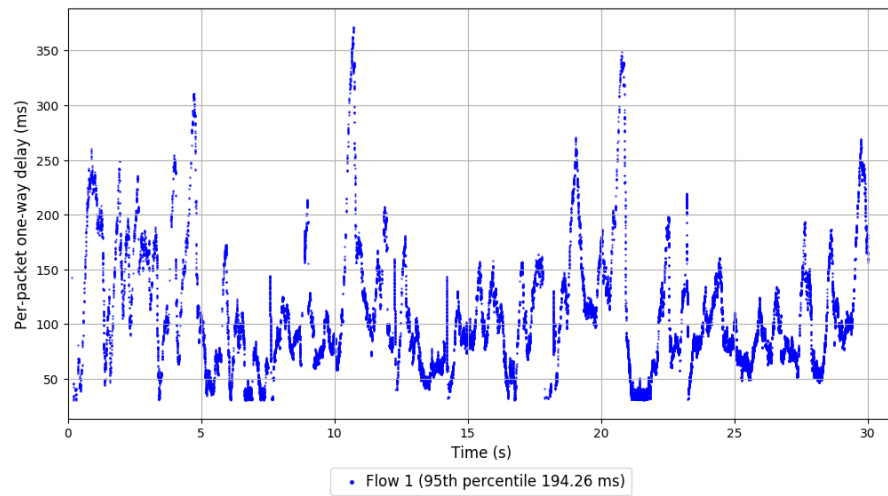
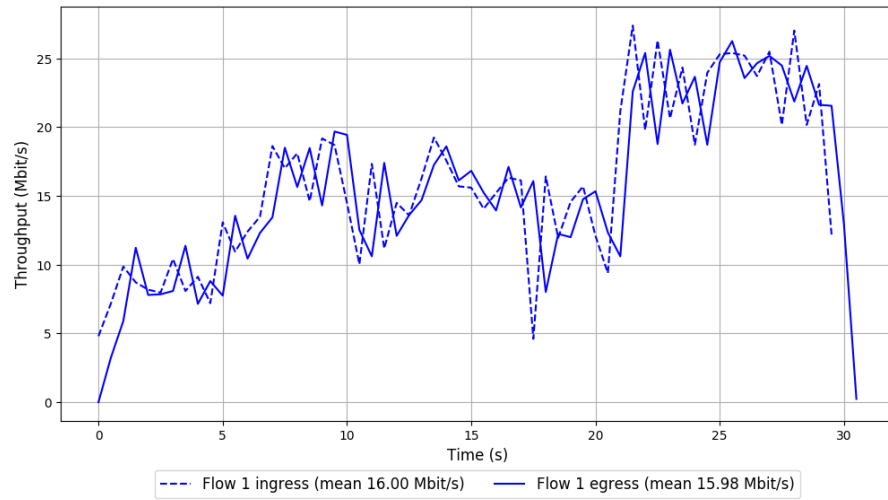
-- Flow 1:

Average throughput: 15.98 Mbit/s

95th percentile per-packet one-way delay: 194.265 ms

Loss rate: 0.53%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

Start at: 2019-01-18 17:37:08

End at: 2019-01-18 17:37:38

Local clock offset: -3.602 ms

Remote clock offset: 4.256 ms

Below is generated by plot.py at 2019-01-18 18:47:32

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.11 Mbit/s

95th percentile per-packet one-way delay: 42.799 ms

Loss rate: 21.28%

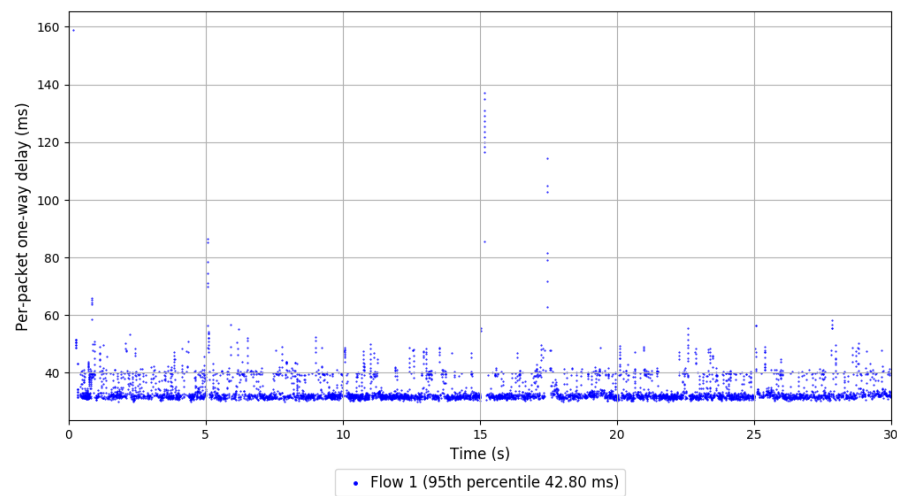
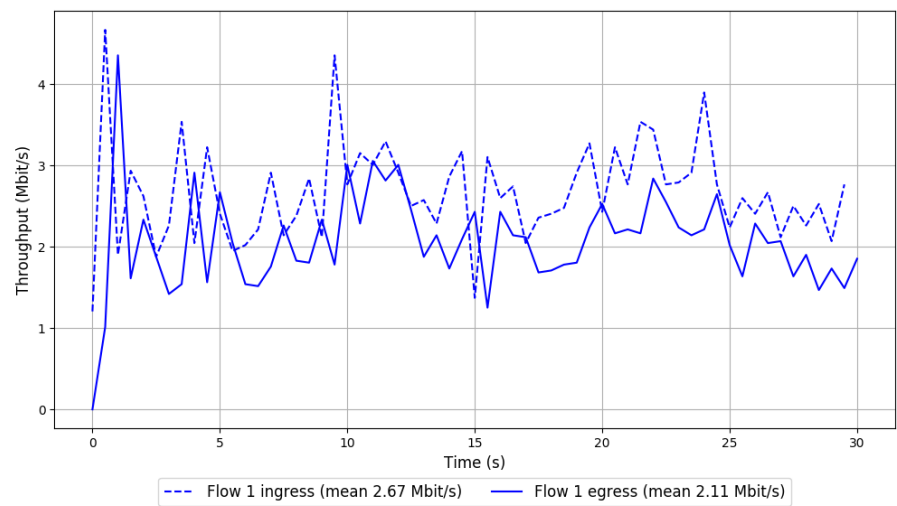
-- Flow 1:

Average throughput: 2.11 Mbit/s

95th percentile per-packet one-way delay: 42.799 ms

Loss rate: 21.28%

Run 1: Report of Copa — Data Link

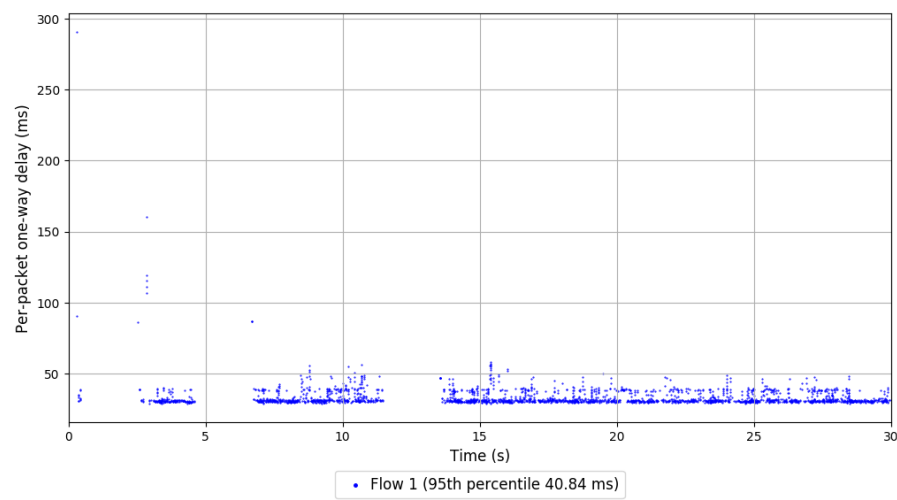
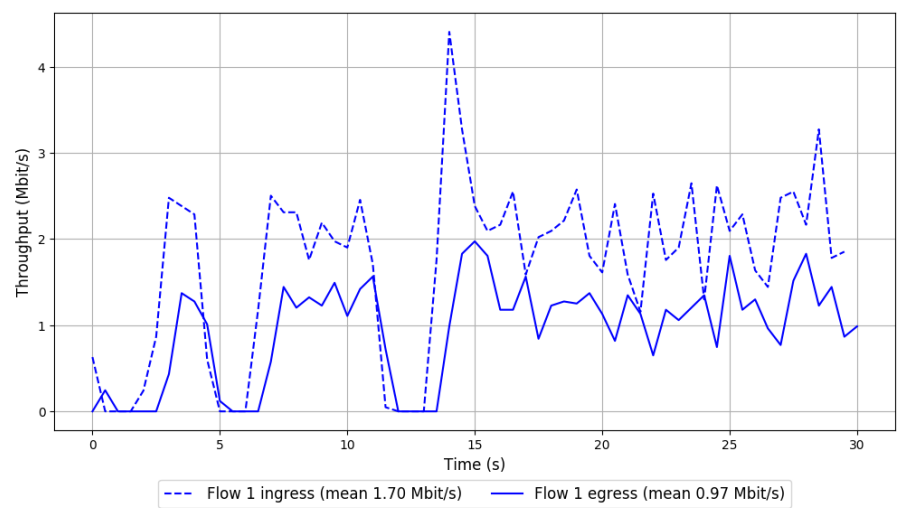


Run 2: Statistics of Copa

Start at: 2019-01-18 18:02:44
End at: 2019-01-18 18:03:14
Local clock offset: -3.137 ms
Remote clock offset: 8.236 ms

Below is generated by plot.py at 2019-01-18 18:47:32
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 40.838 ms
Loss rate: 43.51%
-- Flow 1:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 40.838 ms
Loss rate: 43.51%

Run 2: Report of Copa — Data Link



Run 3: Statistics of Copa

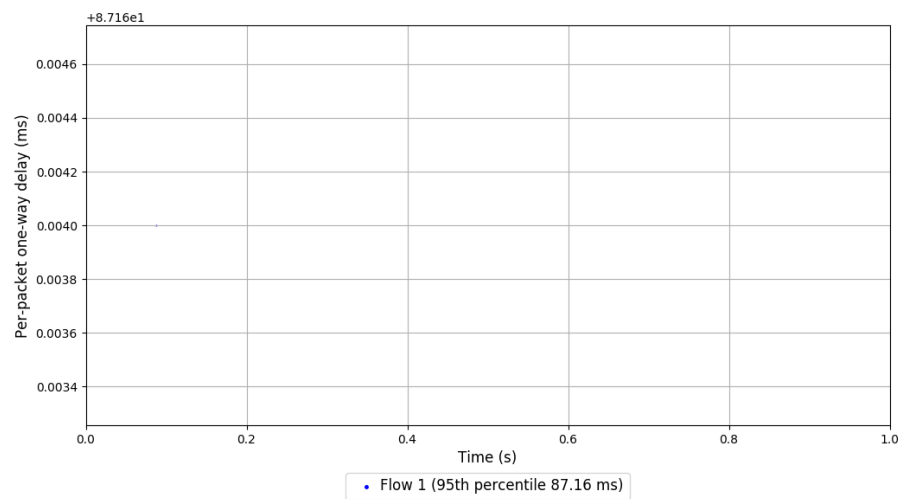
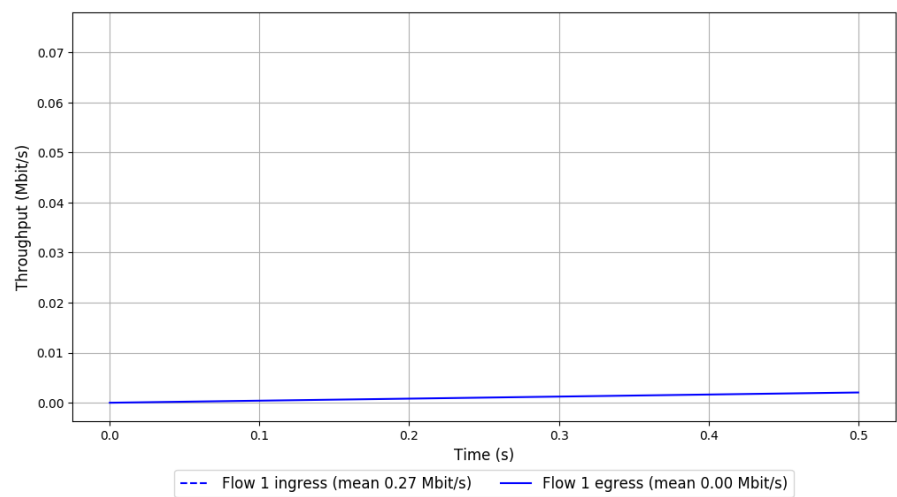
Start at: 2019-01-18 18:28:20

End at: 2019-01-18 18:28:50

Local clock offset: -2.98 ms

Remote clock offset: 10.186 ms

Run 3: Report of Copa — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2019-01-18 17:50:33

End at: 2019-01-18 17:51:03

Local clock offset: -3.865 ms

Remote clock offset: 6.681 ms

Below is generated by plot.py at 2019-01-18 18:47:32

Datalink statistics

-- Total of 1 flow:

Average throughput: 16.61 Mbit/s

95th percentile per-packet one-way delay: 194.858 ms

Loss rate: 0.79%

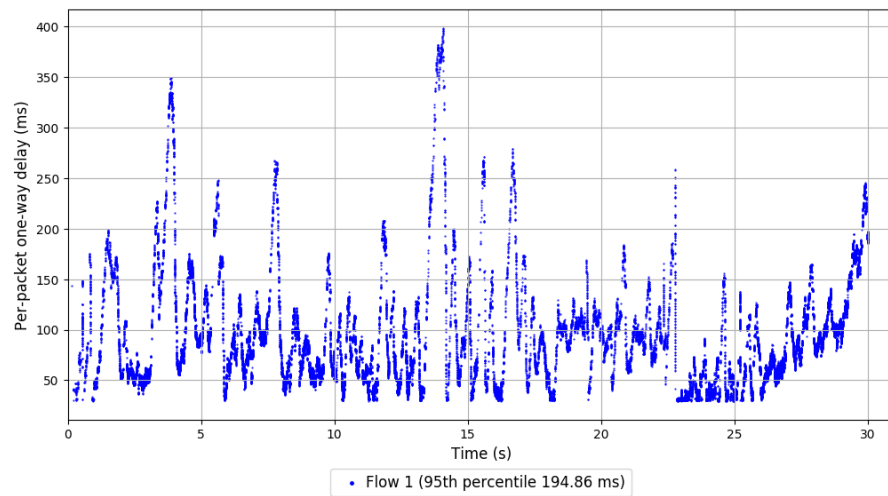
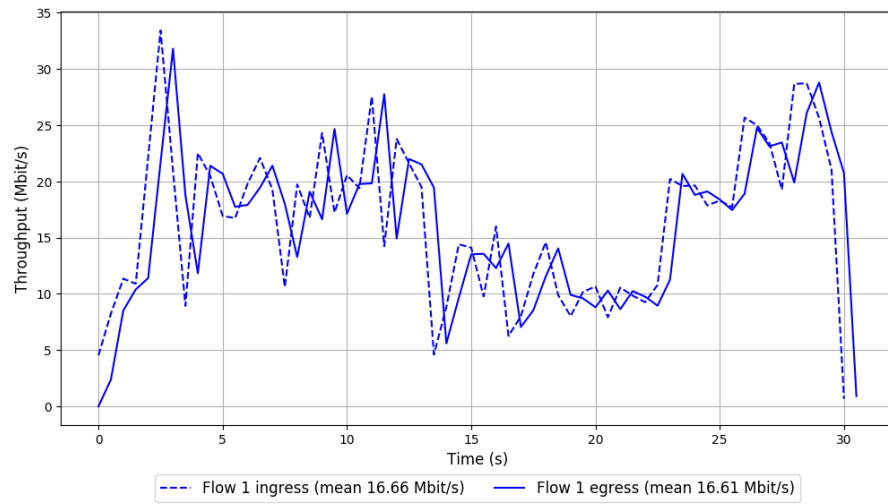
-- Flow 1:

Average throughput: 16.61 Mbit/s

95th percentile per-packet one-way delay: 194.858 ms

Loss rate: 0.79%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2019-01-18 18:16:09

End at: 2019-01-18 18:16:39

Local clock offset: -3.234 ms

Remote clock offset: 9.985 ms

Below is generated by plot.py at 2019-01-18 18:47:32

Datalink statistics

-- Total of 1 flow:

Average throughput: 9.14 Mbit/s

95th percentile per-packet one-way delay: 227.701 ms

Loss rate: 0.48%

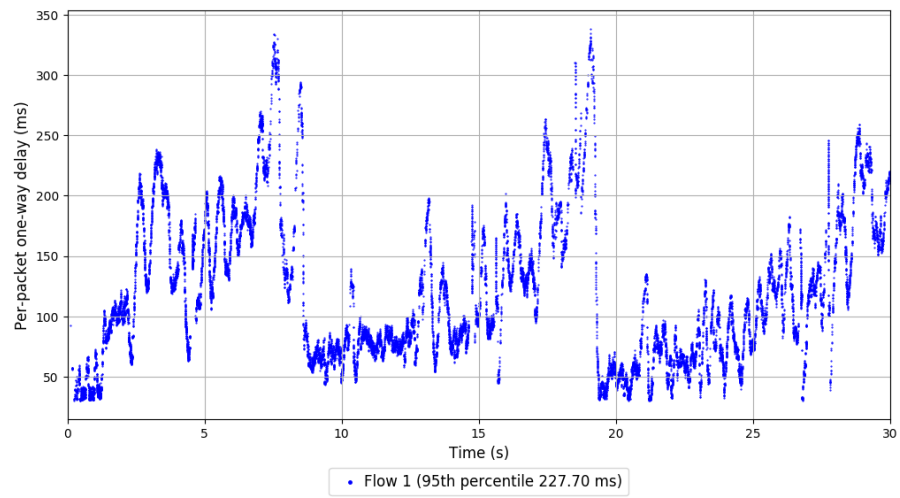
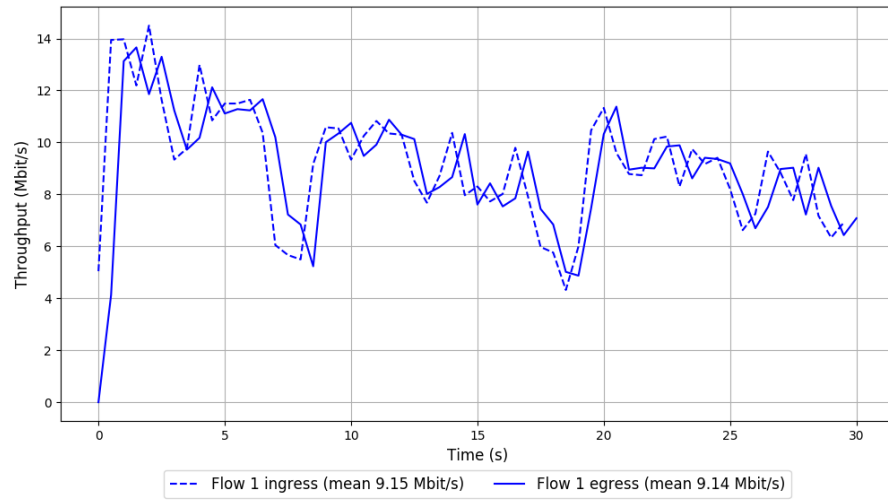
-- Flow 1:

Average throughput: 9.14 Mbit/s

95th percentile per-packet one-way delay: 227.701 ms

Loss rate: 0.48%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2019-01-18 18:41:45

End at: 2019-01-18 18:42:15

Local clock offset: -3.008 ms

Remote clock offset: 1.195 ms

Below is generated by plot.py at 2019-01-18 18:47:32

Datalink statistics

-- Total of 1 flow:

Average throughput: 13.65 Mbit/s

95th percentile per-packet one-way delay: 214.886 ms

Loss rate: 0.53%

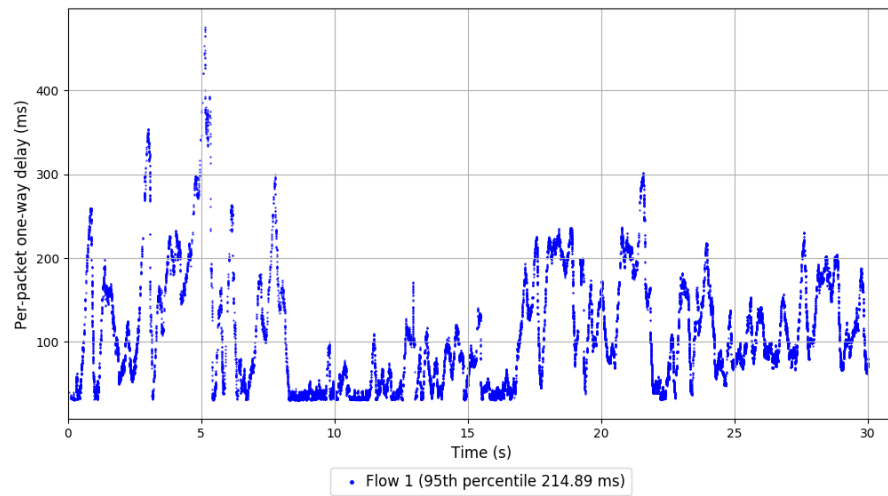
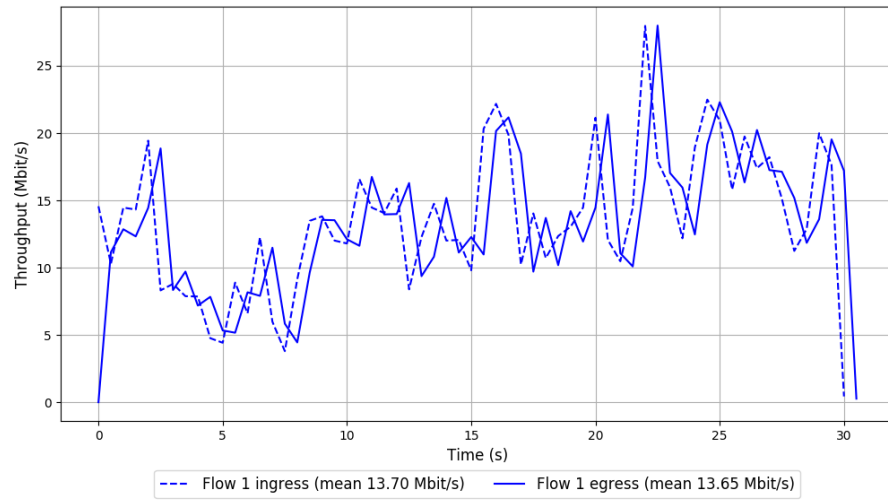
-- Flow 1:

Average throughput: 13.65 Mbit/s

95th percentile per-packet one-way delay: 214.886 ms

Loss rate: 0.53%

Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of FillP

Start at: 2019-01-18 17:38:21

End at: 2019-01-18 17:38:51

Local clock offset: -3.627 ms

Remote clock offset: 4.507 ms

Below is generated by plot.py at 2019-01-18 18:47:40

Datalink statistics

-- Total of 1 flow:

Average throughput: 17.89 Mbit/s

95th percentile per-packet one-way delay: 511.604 ms

Loss rate: 1.00%

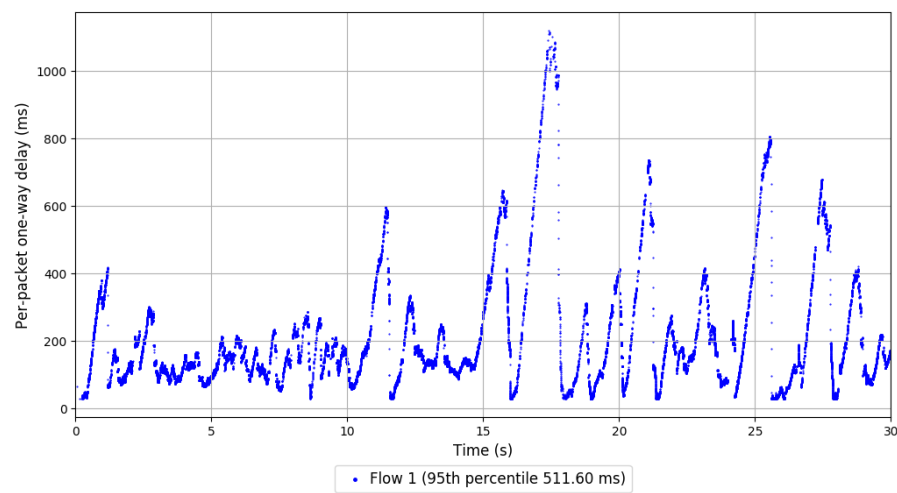
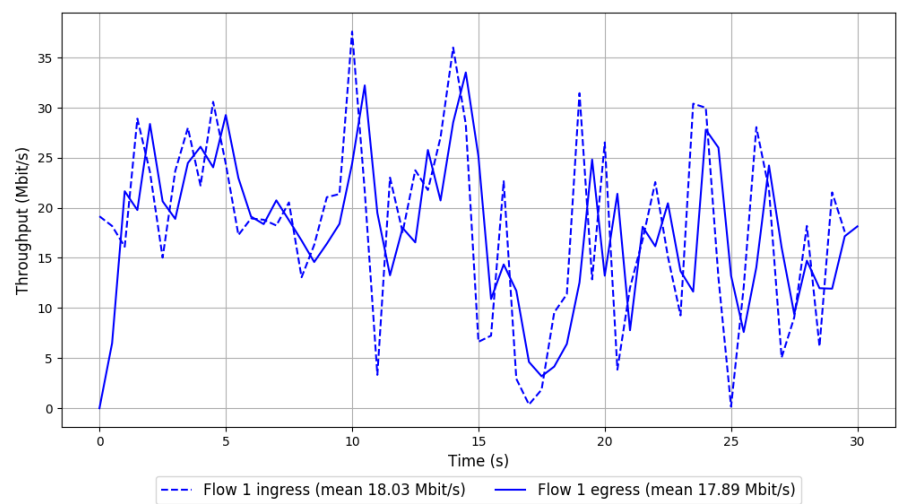
-- Flow 1:

Average throughput: 17.89 Mbit/s

95th percentile per-packet one-way delay: 511.604 ms

Loss rate: 1.00%

Run 1: Report of FillP — Data Link



Run 2: Statistics of FillP

Start at: 2019-01-18 18:03:57

End at: 2019-01-18 18:04:27

Local clock offset: -3.118 ms

Remote clock offset: 8.523 ms

Below is generated by plot.py at 2019-01-18 18:47:40

Datalink statistics

-- Total of 1 flow:

Average throughput: 13.59 Mbit/s

95th percentile per-packet one-way delay: 425.302 ms

Loss rate: 0.49%

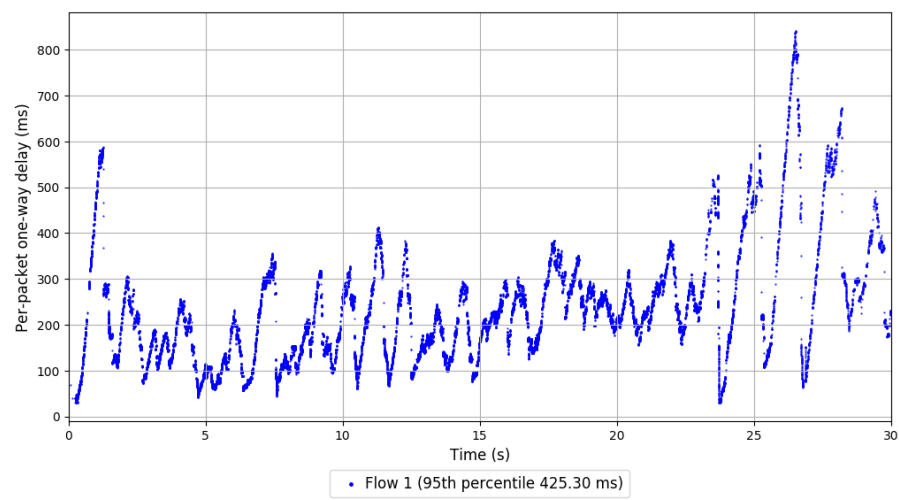
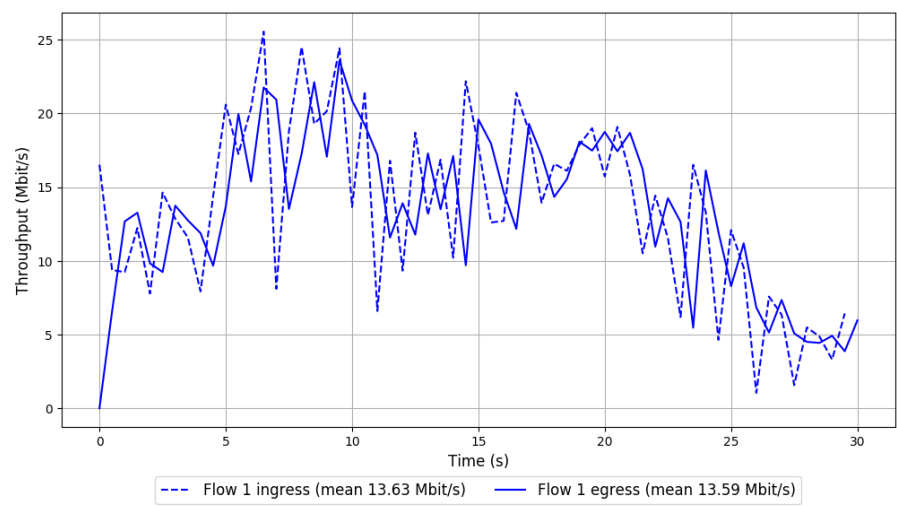
-- Flow 1:

Average throughput: 13.59 Mbit/s

95th percentile per-packet one-way delay: 425.302 ms

Loss rate: 0.49%

Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

Start at: 2019-01-18 18:29:33

End at: 2019-01-18 18:30:03

Local clock offset: -2.978 ms

Remote clock offset: 8.908 ms

Below is generated by plot.py at 2019-01-18 18:47:42

Datalink statistics

-- Total of 1 flow:

Average throughput: 13.02 Mbit/s

95th percentile per-packet one-way delay: 324.370 ms

Loss rate: 0.60%

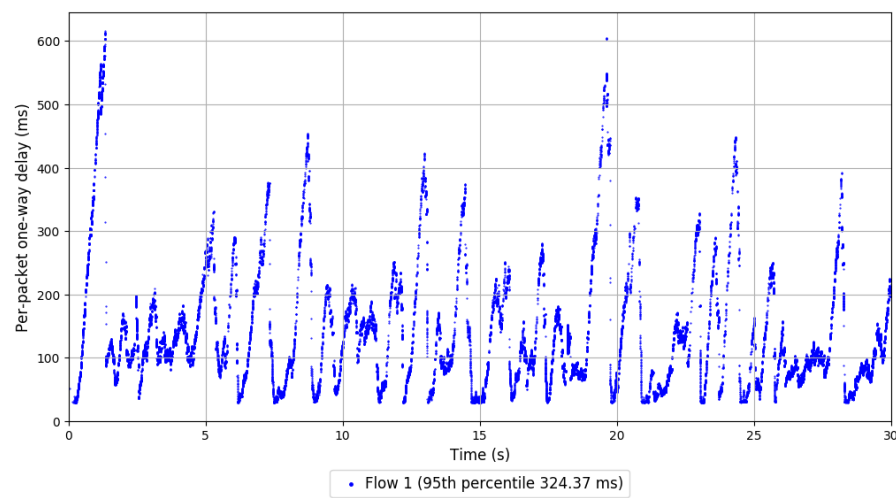
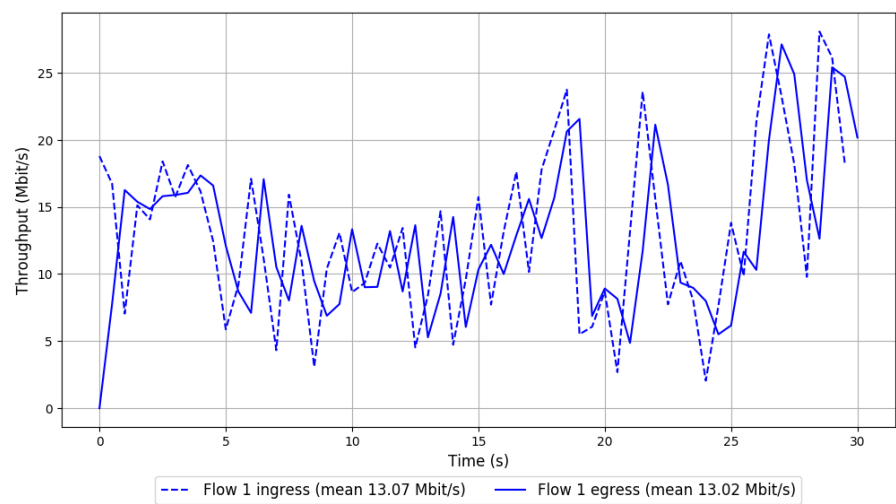
-- Flow 1:

Average throughput: 13.02 Mbit/s

95th percentile per-packet one-way delay: 324.370 ms

Loss rate: 0.60%

Run 3: Report of FillP — Data Link



Run 1: Statistics of FillP-Sheep

Start at: 2019-01-18 17:49:20

End at: 2019-01-18 17:49:50

Local clock offset: -3.969 ms

Remote clock offset: 6.391 ms

Below is generated by plot.py at 2019-01-18 18:47:45

Datalink statistics

-- Total of 1 flow:

Average throughput: 11.81 Mbit/s

95th percentile per-packet one-way delay: 183.012 ms

Loss rate: 0.14%

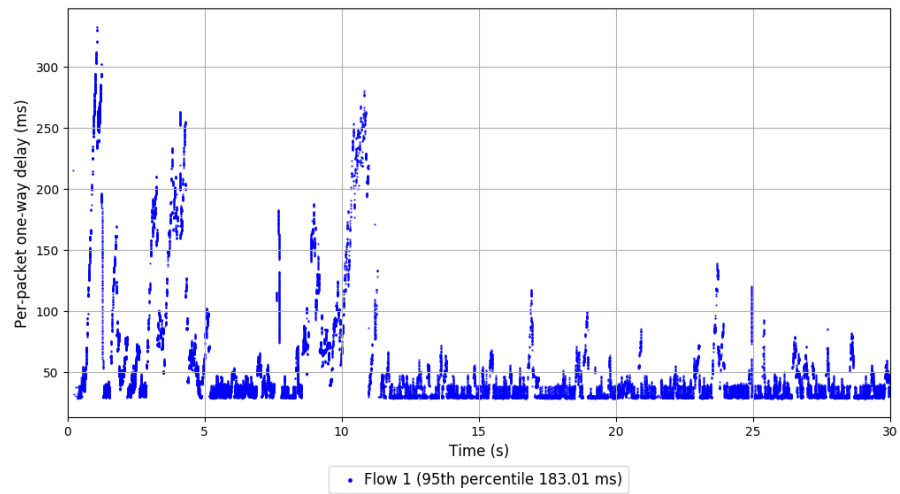
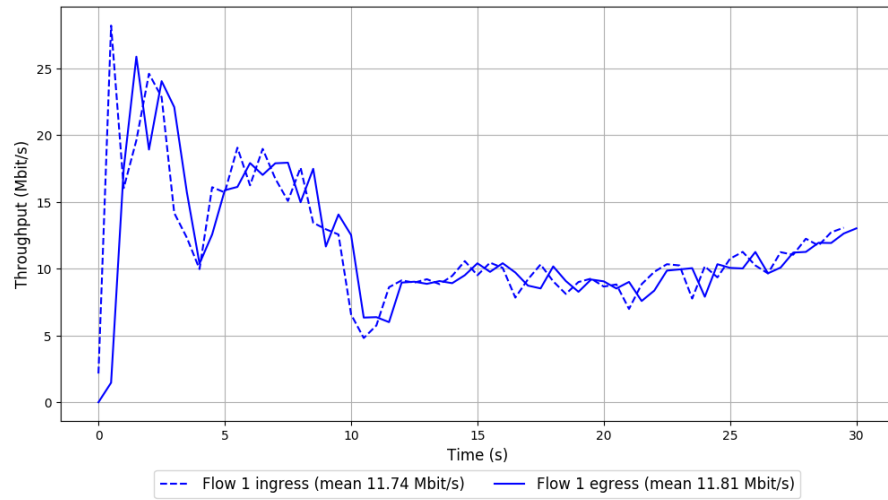
-- Flow 1:

Average throughput: 11.81 Mbit/s

95th percentile per-packet one-way delay: 183.012 ms

Loss rate: 0.14%

Run 1: Report of FillP-Sheep — Data Link



Run 2: Statistics of FillP-Sheep

Start at: 2019-01-18 18:14:56

End at: 2019-01-18 18:15:26

Local clock offset: -3.217 ms

Remote clock offset: 9.939 ms

Below is generated by plot.py at 2019-01-18 18:47:45

Datalink statistics

-- Total of 1 flow:

Average throughput: 10.08 Mbit/s

95th percentile per-packet one-way delay: 299.526 ms

Loss rate: 1.31%

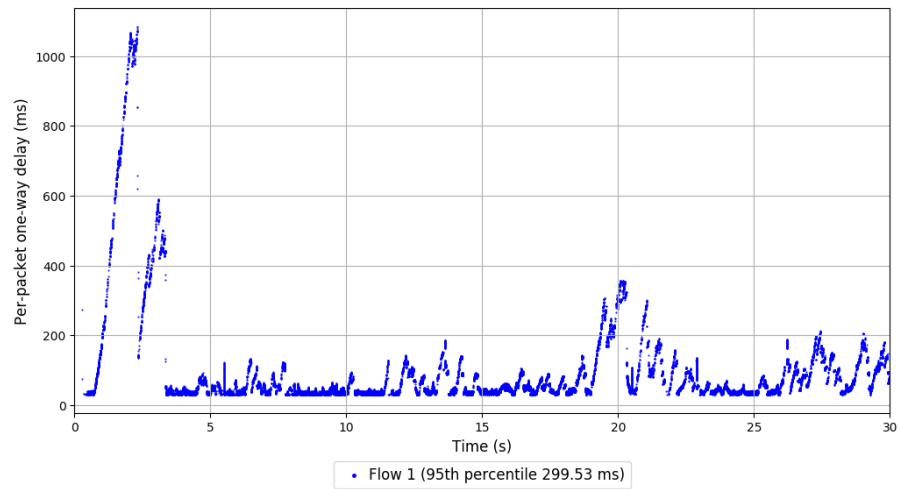
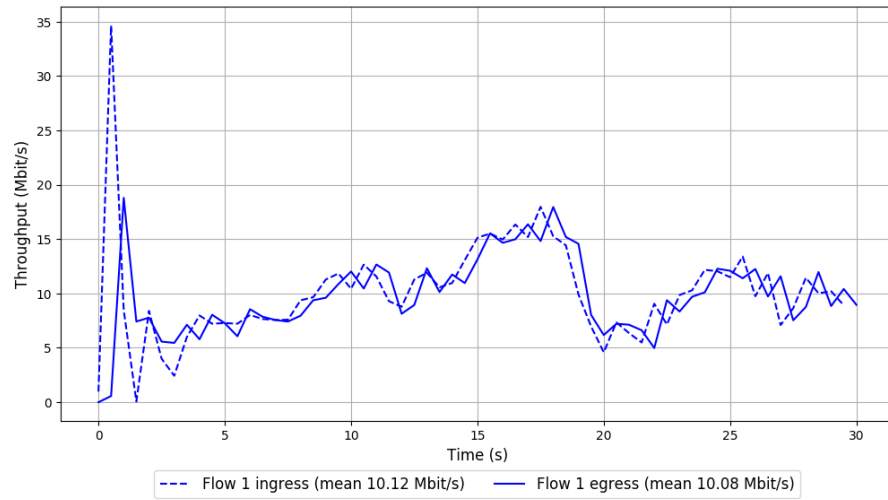
-- Flow 1:

Average throughput: 10.08 Mbit/s

95th percentile per-packet one-way delay: 299.526 ms

Loss rate: 1.31%

Run 2: Report of FillP-Sheep — Data Link



Run 3: Statistics of FillP-Sheep

Start at: 2019-01-18 18:40:31

End at: 2019-01-18 18:41:01

Local clock offset: -2.997 ms

Remote clock offset: 1.621 ms

Below is generated by plot.py at 2019-01-18 18:47:54

Datalink statistics

-- Total of 1 flow:

Average throughput: 16.92 Mbit/s

95th percentile per-packet one-way delay: 219.788 ms

Loss rate: 0.42%

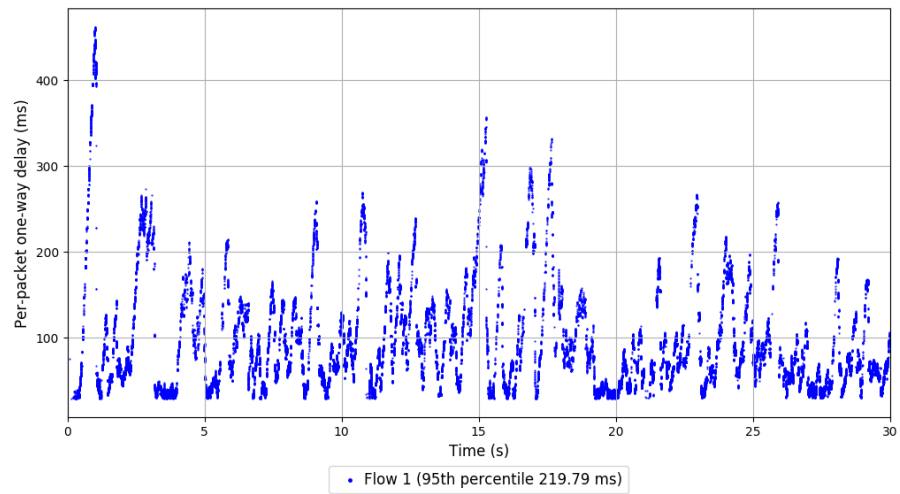
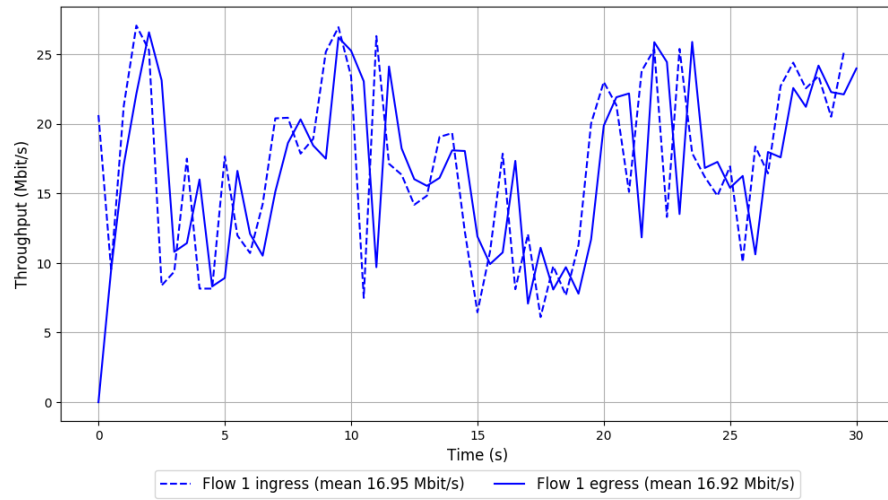
-- Flow 1:

Average throughput: 16.92 Mbit/s

95th percentile per-packet one-way delay: 219.788 ms

Loss rate: 0.42%

Run 3: Report of FillP-Sheep — Data Link

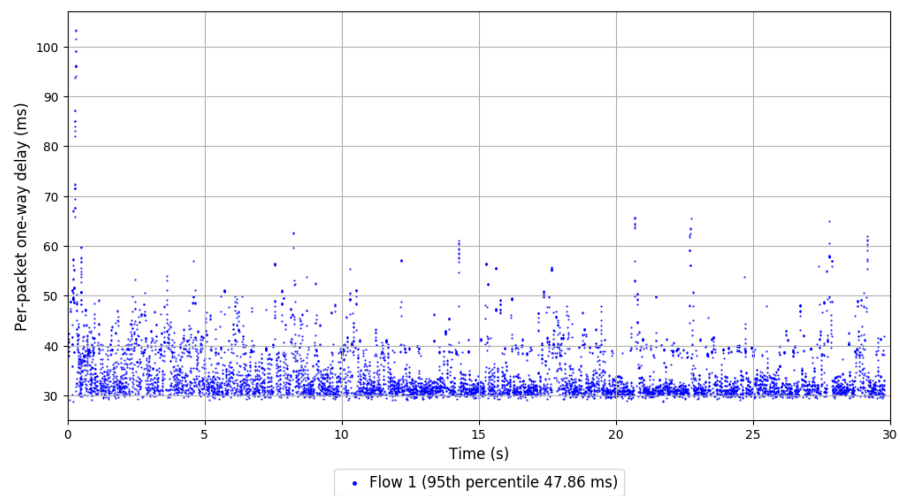
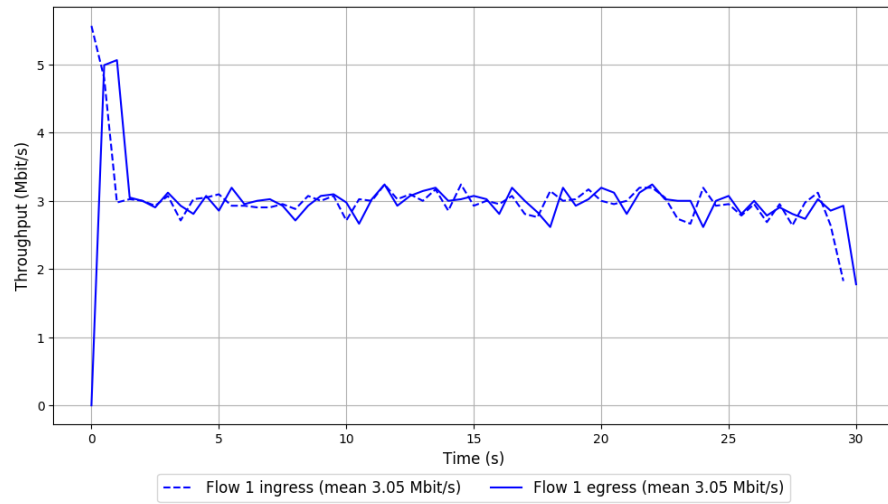


```
Run 1: Statistics of Indigo

Start at: 2019-01-18 17:35:55
End at: 2019-01-18 17:36:25
Local clock offset: -3.611 ms
Remote clock offset: 4.062 ms

# Below is generated by plot.py at 2019-01-18 18:47:54
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.05 Mbit/s
95th percentile per-packet one-way delay: 47.858 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 3.05 Mbit/s
95th percentile per-packet one-way delay: 47.858 ms
Loss rate: 0.04%
```

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2019-01-18 18:01:31

End at: 2019-01-18 18:02:01

Local clock offset: -3.157 ms

Remote clock offset: 8.231 ms

Below is generated by plot.py at 2019-01-18 18:47:54

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.01 Mbit/s

95th percentile per-packet one-way delay: 56.457 ms

Loss rate: 0.16%

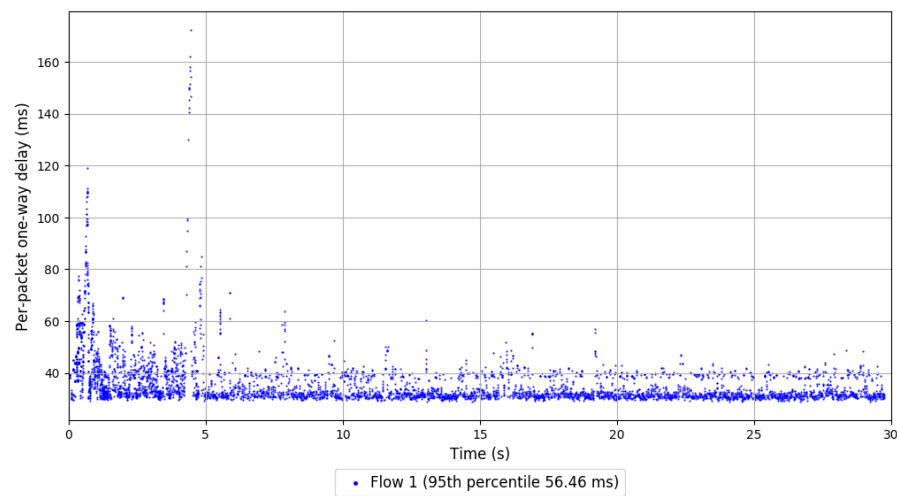
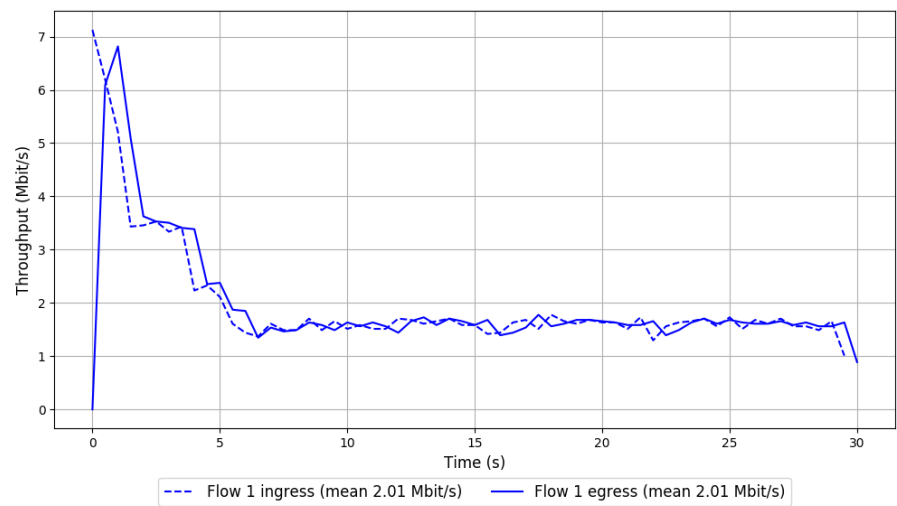
-- Flow 1:

Average throughput: 2.01 Mbit/s

95th percentile per-packet one-way delay: 56.457 ms

Loss rate: 0.16%

Run 2: Report of Indigo — Data Link

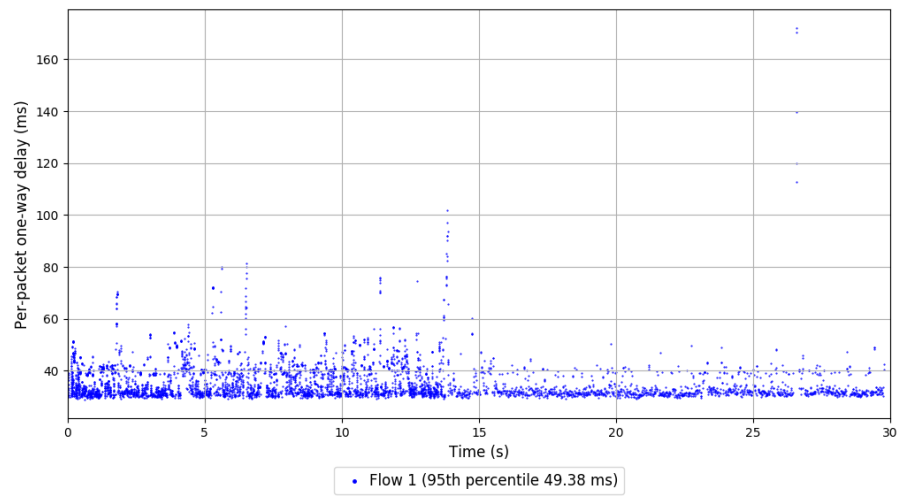
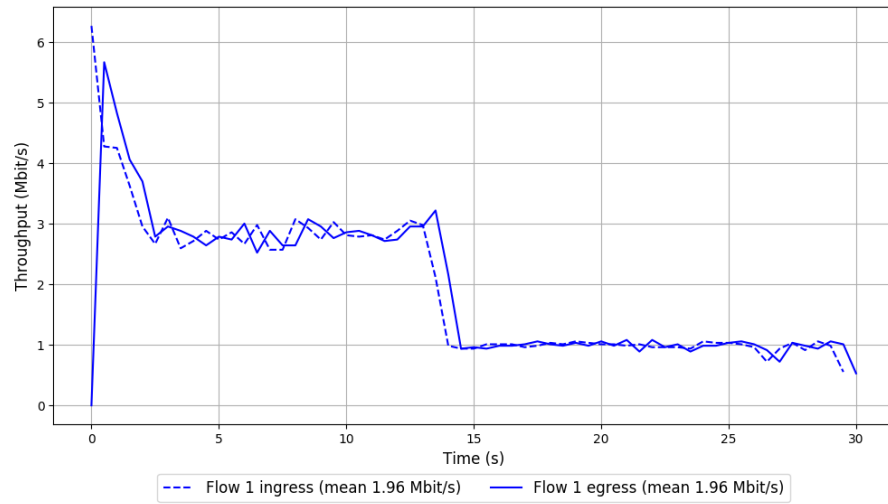


Run 3: Statistics of Indigo

Start at: 2019-01-18 18:27:07
End at: 2019-01-18 18:27:37
Local clock offset: -3.002 ms
Remote clock offset: 11.364 ms

Below is generated by plot.py at 2019-01-18 18:47:54
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.96 Mbit/s
95th percentile per-packet one-way delay: 49.383 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 1.96 Mbit/s
95th percentile per-packet one-way delay: 49.383 ms
Loss rate: 0.04%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of Indigo-MusesC3

Start at: 2019-01-18 17:39:34

End at: 2019-01-18 17:40:04

Local clock offset: -3.691 ms

Remote clock offset: 4.733 ms

Below is generated by plot.py at 2019-01-18 18:47:54

Datalink statistics

-- Total of 1 flow:

Average throughput: 11.13 Mbit/s

95th percentile per-packet one-way delay: 97.069 ms

Loss rate: 0.13%

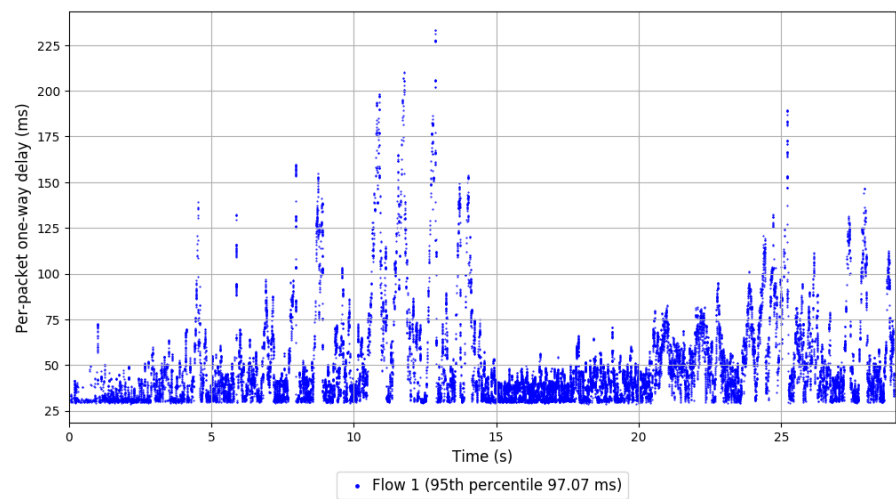
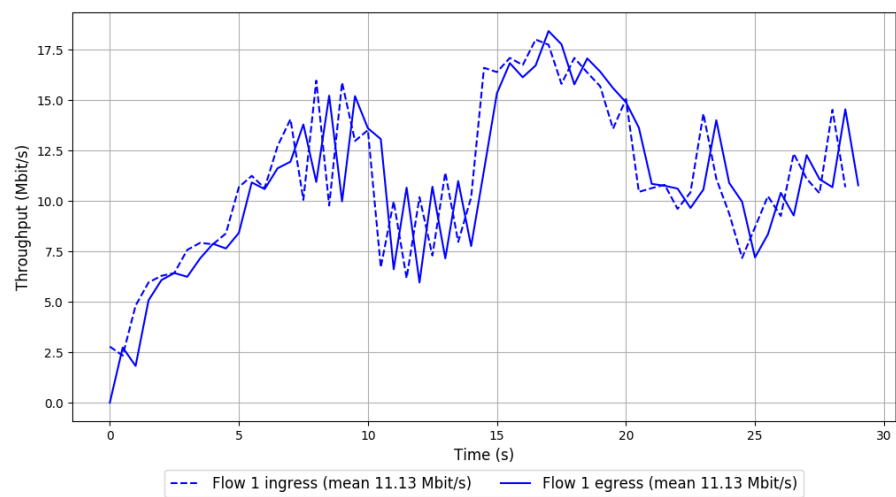
-- Flow 1:

Average throughput: 11.13 Mbit/s

95th percentile per-packet one-way delay: 97.069 ms

Loss rate: 0.13%

Run 1: Report of Indigo-MusesC3 — Data Link



Run 2: Statistics of Indigo-MusesC3

Start at: 2019-01-18 18:05:10

End at: 2019-01-18 18:05:41

Local clock offset: -3.132 ms

Remote clock offset: 8.651 ms

Below is generated by plot.py at 2019-01-18 18:47:54

Datalink statistics

-- Total of 1 flow:

Average throughput: 3.76 Mbit/s

95th percentile per-packet one-way delay: 50.137 ms

Loss rate: 0.16%

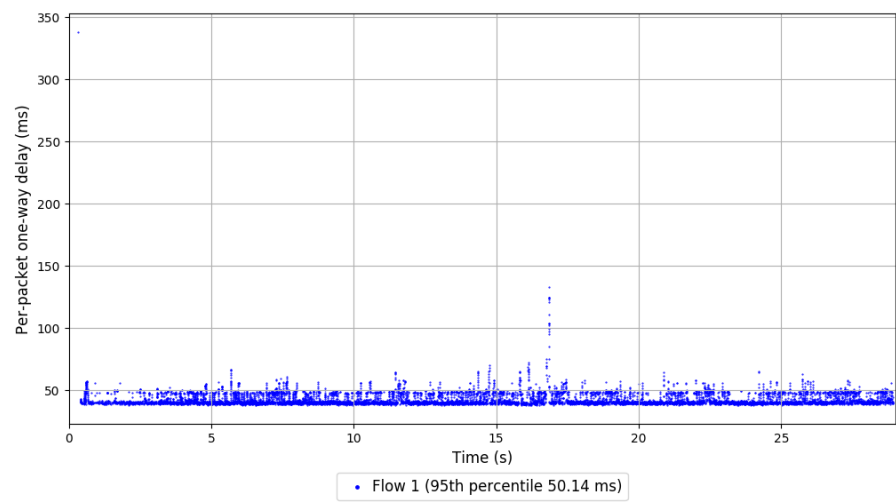
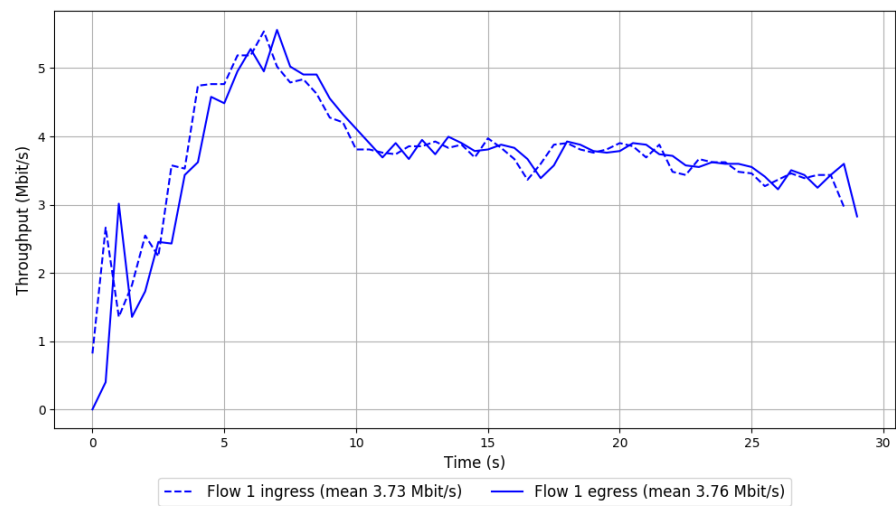
-- Flow 1:

Average throughput: 3.76 Mbit/s

95th percentile per-packet one-way delay: 50.137 ms

Loss rate: 0.16%

Run 2: Report of Indigo-MusesC3 — Data Link



Run 3: Statistics of Indigo-MusesC3

Start at: 2019-01-18 18:30:46

End at: 2019-01-18 18:31:16

Local clock offset: -2.974 ms

Remote clock offset: 7.665 ms

Below is generated by plot.py at 2019-01-18 18:47:54

Datalink statistics

-- Total of 1 flow:

Average throughput: 9.69 Mbit/s

95th percentile per-packet one-way delay: 109.256 ms

Loss rate: 0.13%

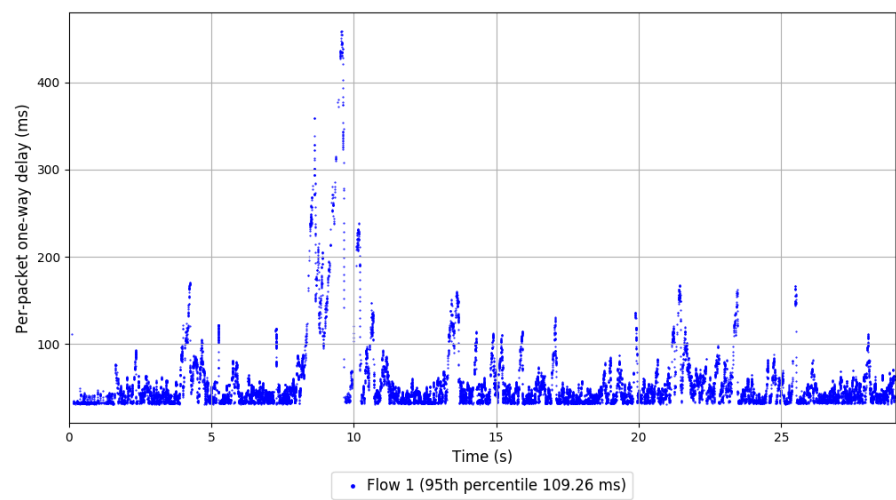
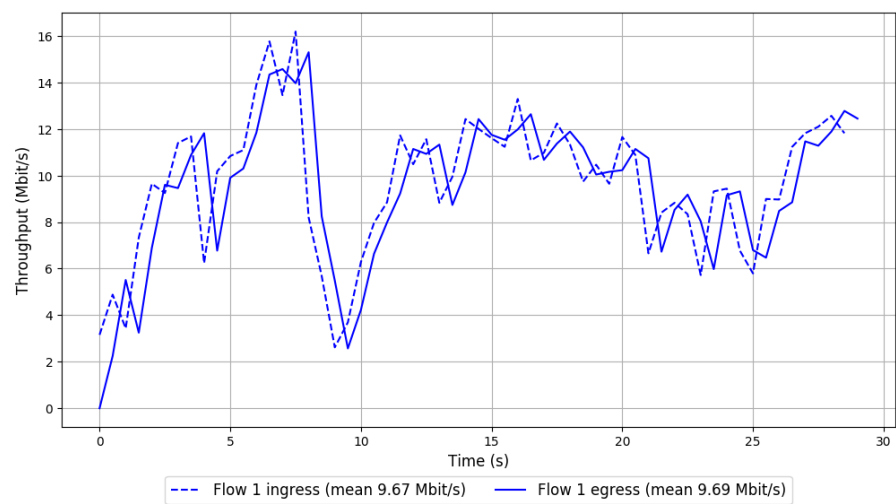
-- Flow 1:

Average throughput: 9.69 Mbit/s

95th percentile per-packet one-way delay: 109.256 ms

Loss rate: 0.13%

Run 3: Report of Indigo-MusesC3 — Data Link



Run 1: Statistics of Indigo-MusesC5

Start at: 2019-01-18 17:31:02

End at: 2019-01-18 17:31:32

Local clock offset: -3.622 ms

Remote clock offset: 2.673 ms

Below is generated by plot.py at 2019-01-18 18:47:54

Datalink statistics

-- Total of 1 flow:

Average throughput: 12.78 Mbit/s

95th percentile per-packet one-way delay: 384.077 ms

Loss rate: 0.40%

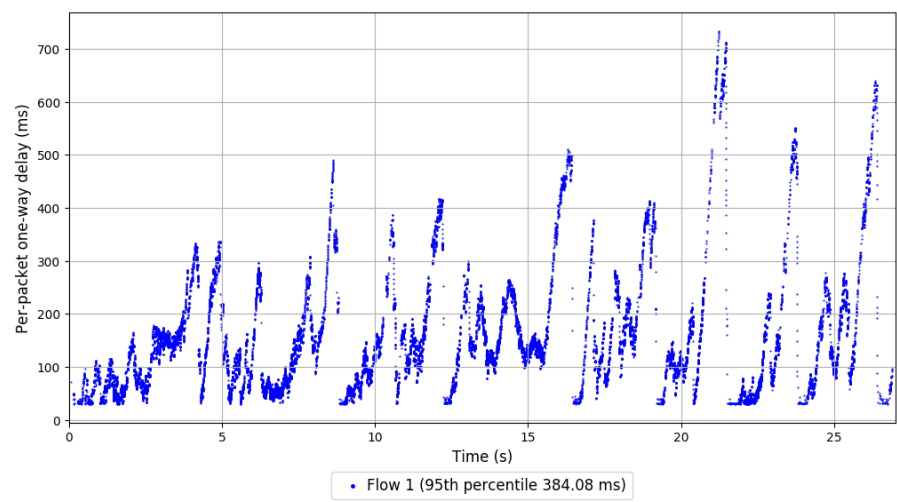
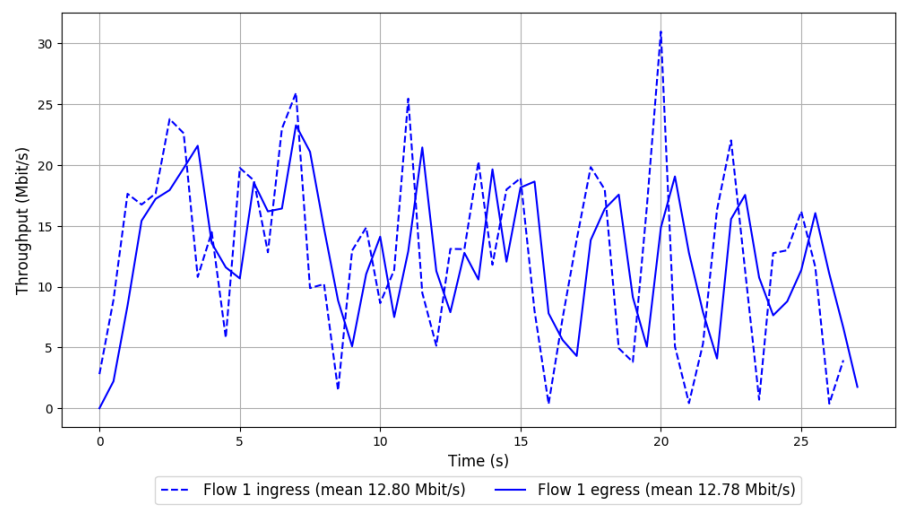
-- Flow 1:

Average throughput: 12.78 Mbit/s

95th percentile per-packet one-way delay: 384.077 ms

Loss rate: 0.40%

Run 1: Report of Indigo-MusesC5 — Data Link



Run 2: Statistics of Indigo-MusesC5

Start at: 2019-01-18 17:56:39

End at: 2019-01-18 17:57:09

Local clock offset: -3.331 ms

Remote clock offset: 7.531 ms

Below is generated by plot.py at 2019-01-18 18:47:54

Datalink statistics

-- Total of 1 flow:

Average throughput: 10.29 Mbit/s

95th percentile per-packet one-way delay: 335.942 ms

Loss rate: 1.13%

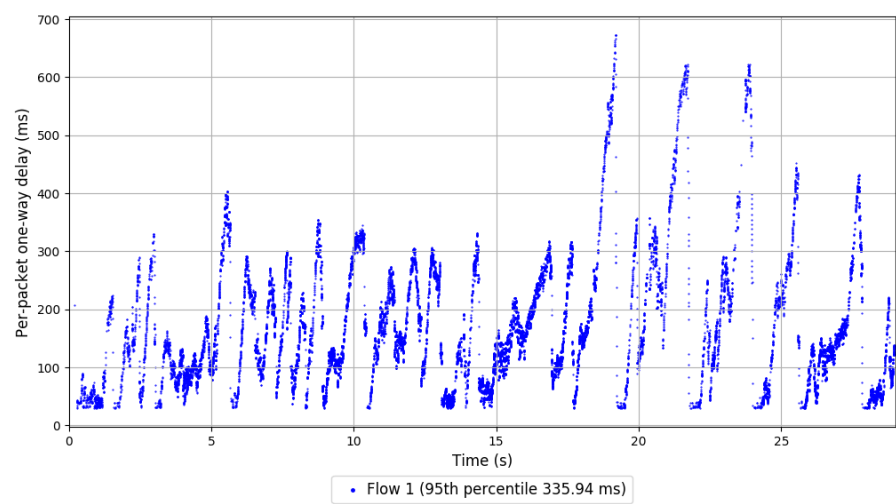
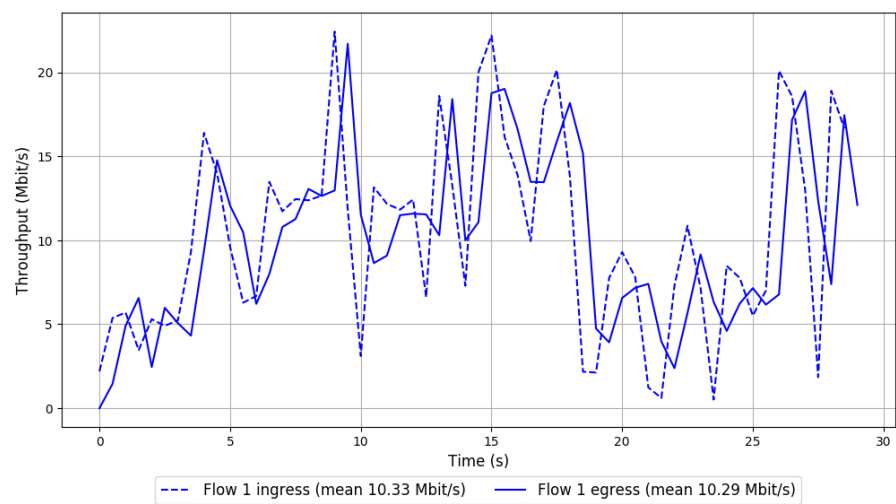
-- Flow 1:

Average throughput: 10.29 Mbit/s

95th percentile per-packet one-way delay: 335.942 ms

Loss rate: 1.13%

Run 2: Report of Indigo-MusesC5 — Data Link

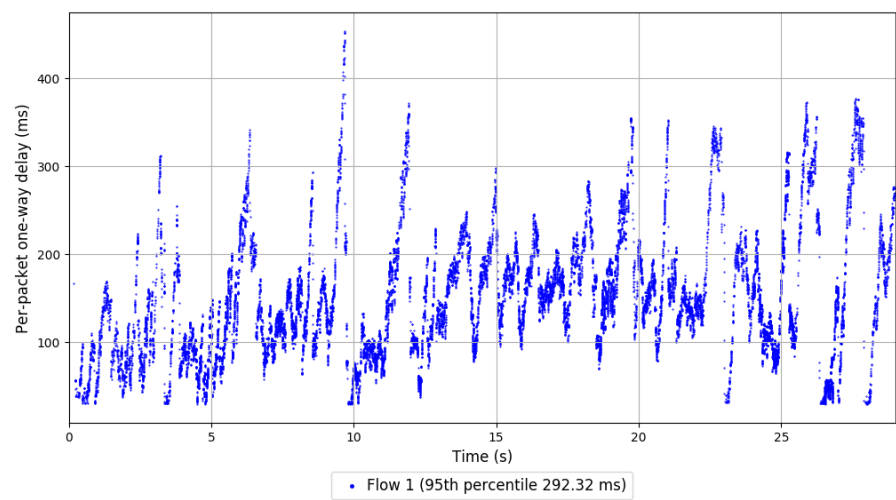
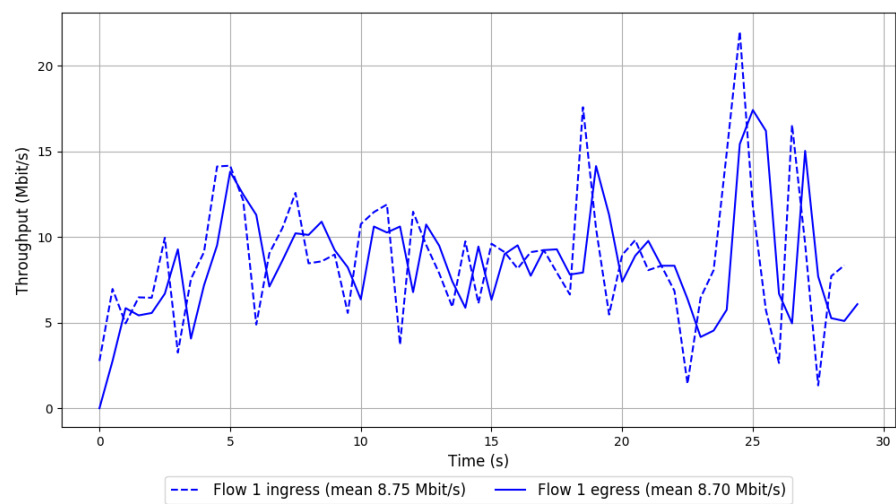


Run 3: Statistics of Indigo-MusesC5

Start at: 2019-01-18 18:22:15
End at: 2019-01-18 18:22:45
Local clock offset: -3.163 ms
Remote clock offset: 10.826 ms

Below is generated by plot.py at 2019-01-18 18:47:54
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.70 Mbit/s
95th percentile per-packet one-way delay: 292.316 ms
Loss rate: 1.07%
-- Flow 1:
Average throughput: 8.70 Mbit/s
95th percentile per-packet one-way delay: 292.316 ms
Loss rate: 1.07%

Run 3: Report of Indigo-MusesC5 — Data Link



Run 1: Statistics of Indigo-MusesD

Start at: 2019-01-18 17:48:07

End at: 2019-01-18 17:48:37

Local clock offset: -3.932 ms

Remote clock offset: 6.224 ms

Below is generated by plot.py at 2019-01-18 18:47:54

Datalink statistics

-- Total of 1 flow:

Average throughput: 3.91 Mbit/s

95th percentile per-packet one-way delay: 55.874 ms

Loss rate: 0.02%

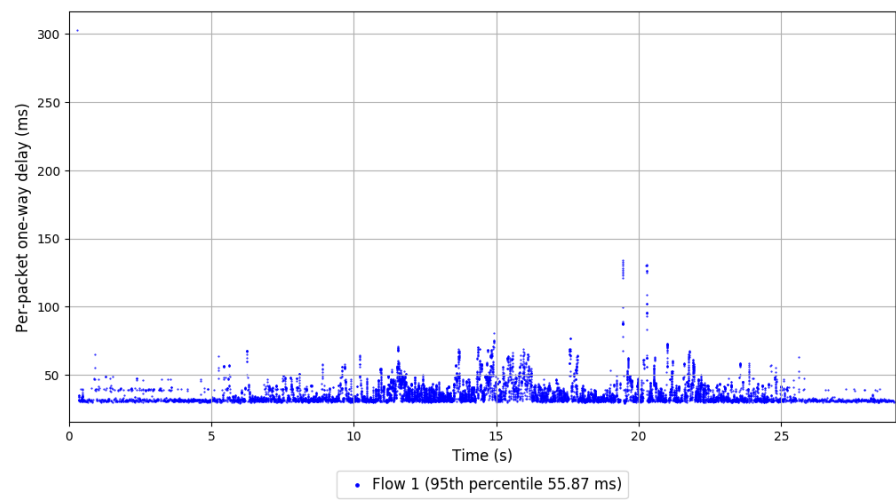
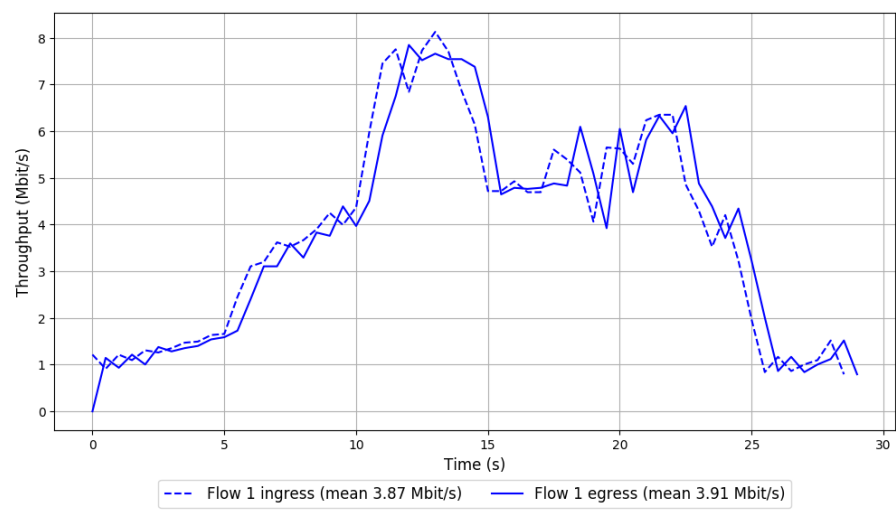
-- Flow 1:

Average throughput: 3.91 Mbit/s

95th percentile per-packet one-way delay: 55.874 ms

Loss rate: 0.02%

Run 1: Report of Indigo-MusesD — Data Link



Run 2: Statistics of Indigo-MusesD

Start at: 2019-01-18 18:13:42

End at: 2019-01-18 18:14:13

Local clock offset: -3.202 ms

Remote clock offset: 9.716 ms

Below is generated by plot.py at 2019-01-18 18:47:54

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.84 Mbit/s

95th percentile per-packet one-way delay: 53.898 ms

Loss rate: 0.04%

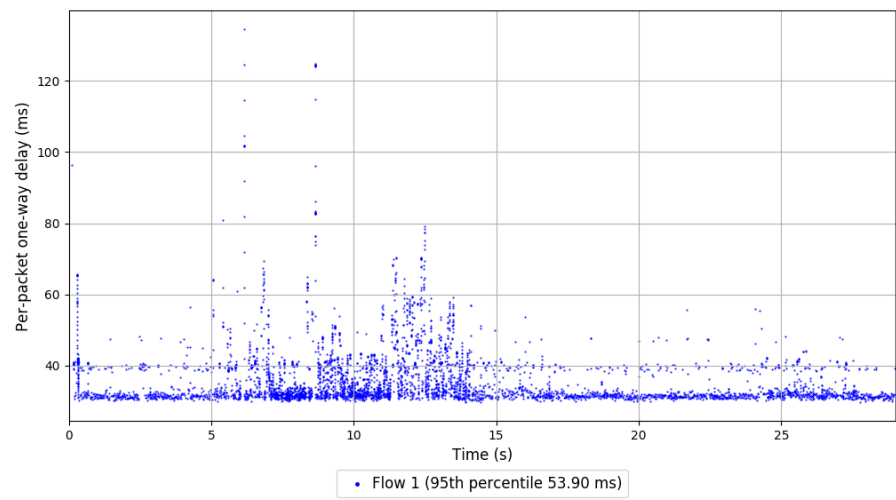
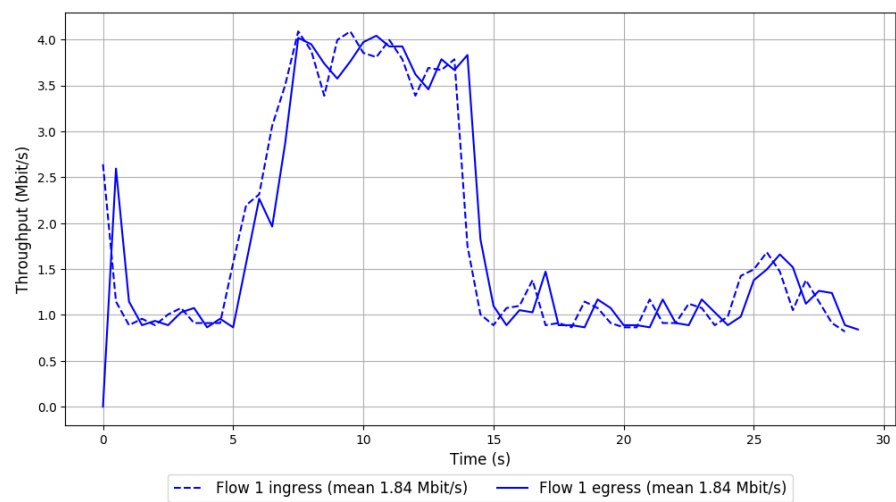
-- Flow 1:

Average throughput: 1.84 Mbit/s

95th percentile per-packet one-way delay: 53.898 ms

Loss rate: 0.04%

Run 2: Report of Indigo-MusesD — Data Link



Run 3: Statistics of Indigo-MusesD

Start at: 2019-01-18 18:39:18

End at: 2019-01-18 18:39:48

Local clock offset: -3.012 ms

Remote clock offset: 2.03 ms

Below is generated by plot.py at 2019-01-18 18:47:54

Datalink statistics

-- Total of 1 flow:

Average throughput: 3.05 Mbit/s

95th percentile per-packet one-way delay: 47.335 ms

Loss rate: 0.04%

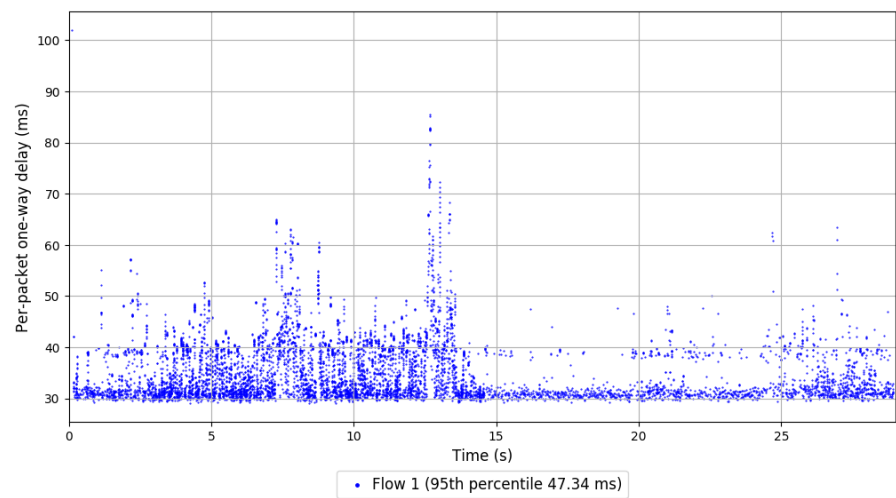
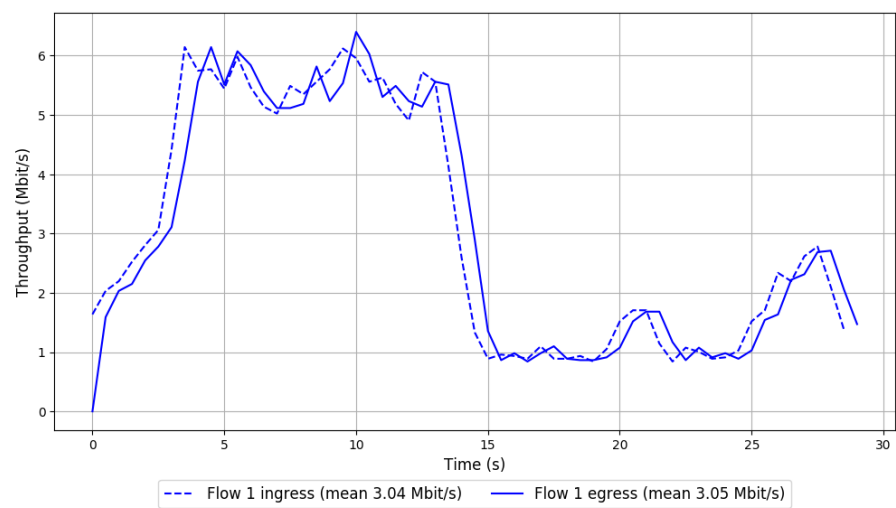
-- Flow 1:

Average throughput: 3.05 Mbit/s

95th percentile per-packet one-way delay: 47.335 ms

Loss rate: 0.04%

Run 3: Report of Indigo-MusesD — Data Link



Run 1: Statistics of Indigo-MusesT

Start at: 2019-01-18 17:45:40

End at: 2019-01-18 17:46:10

Local clock offset: -3.819 ms

Remote clock offset: 5.835 ms

Below is generated by plot.py at 2019-01-18 18:48:07

Datalink statistics

-- Total of 1 flow:

Average throughput: 16.18 Mbit/s

95th percentile per-packet one-way delay: 281.955 ms

Loss rate: 0.14%

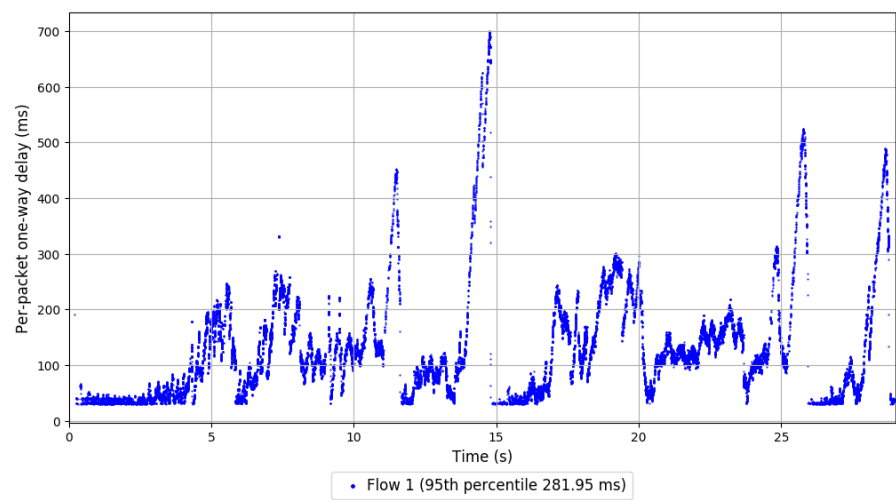
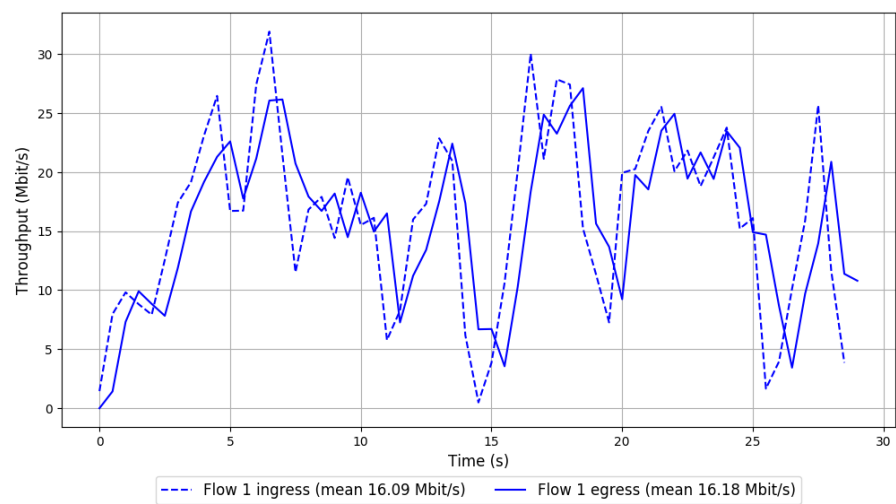
-- Flow 1:

Average throughput: 16.18 Mbit/s

95th percentile per-packet one-way delay: 281.955 ms

Loss rate: 0.14%

Run 1: Report of Indigo-MusesT — Data Link



Run 2: Statistics of Indigo-MusesT

Start at: 2019-01-18 18:11:16

End at: 2019-01-18 18:11:46

Local clock offset: -3.162 ms

Remote clock offset: 9.52 ms

Below is generated by plot.py at 2019-01-18 18:48:07

Datalink statistics

-- Total of 1 flow:

Average throughput: 12.87 Mbit/s

95th percentile per-packet one-way delay: 257.173 ms

Loss rate: 1.02%

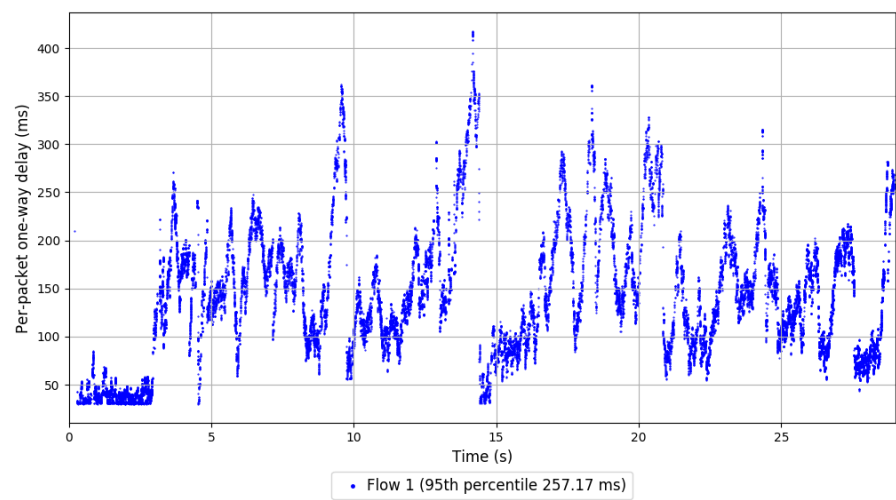
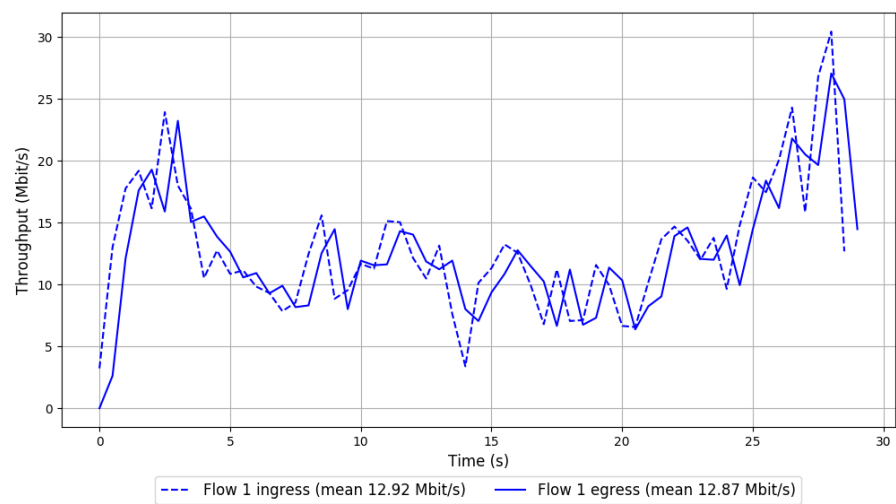
-- Flow 1:

Average throughput: 12.87 Mbit/s

95th percentile per-packet one-way delay: 257.173 ms

Loss rate: 1.02%

Run 2: Report of Indigo-MusesT — Data Link



Run 3: Statistics of Indigo-MusesT

Start at: 2019-01-18 18:36:52

End at: 2019-01-18 18:37:22

Local clock offset: -2.99 ms

Remote clock offset: 3.175 ms

Below is generated by plot.py at 2019-01-18 18:48:07

Datalink statistics

-- Total of 1 flow:

Average throughput: 13.08 Mbit/s

95th percentile per-packet one-way delay: 234.009 ms

Loss rate: 0.54%

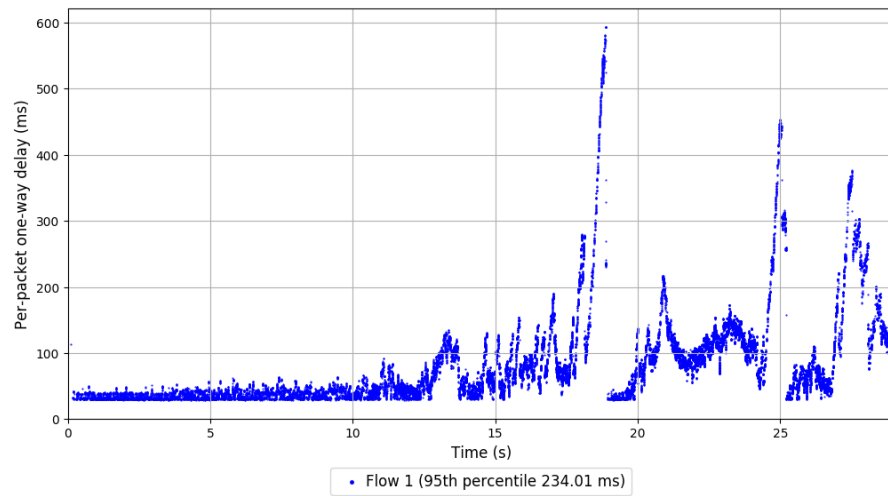
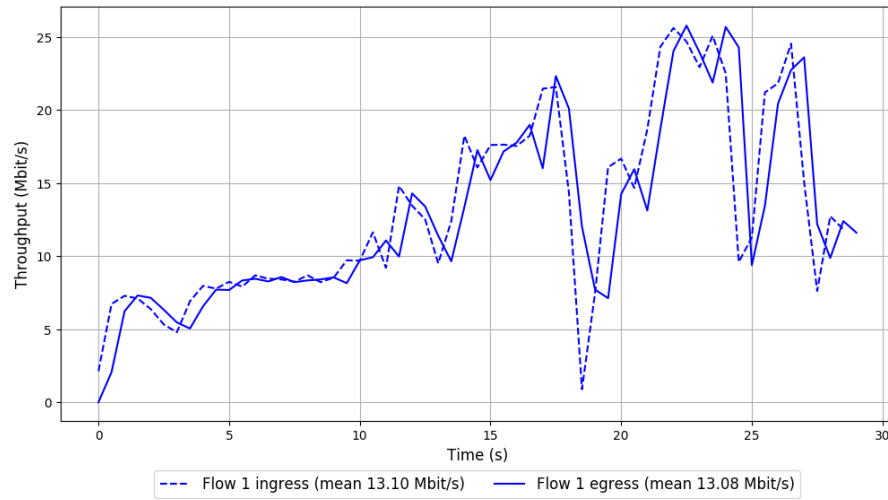
-- Flow 1:

Average throughput: 13.08 Mbit/s

95th percentile per-packet one-way delay: 234.009 ms

Loss rate: 0.54%

Run 3: Report of Indigo-MusesT — Data Link

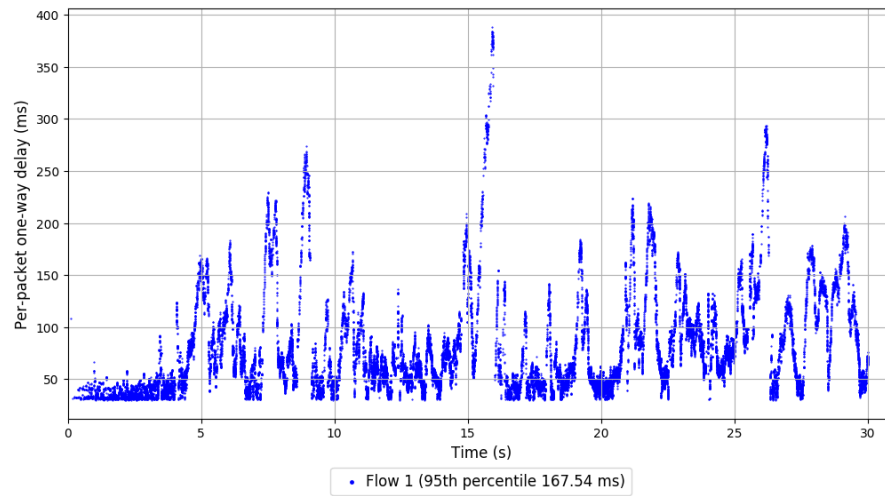
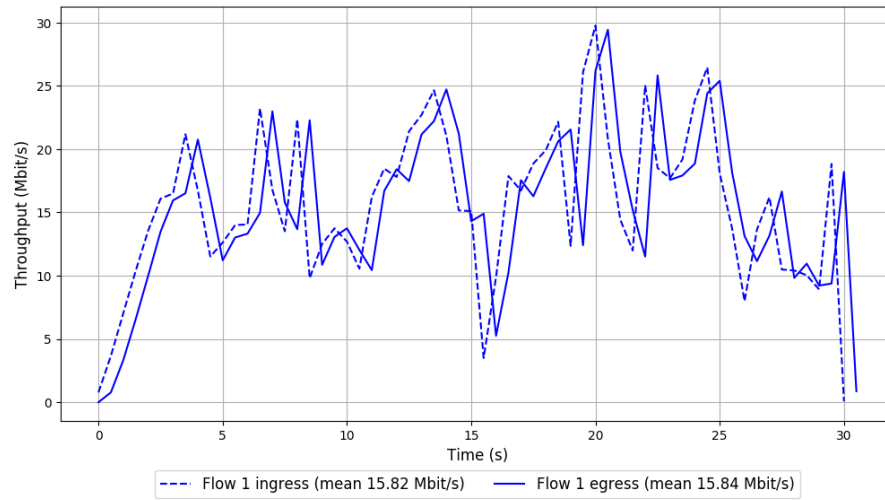


```
Run 1: Statistics of LEDBAT

Start at: 2019-01-18 17:42:00
End at: 2019-01-18 17:42:30
Local clock offset: -3.737 ms
Remote clock offset: 5.308 ms

# Below is generated by plot.py at 2019-01-18 18:48:12
# Datalink statistics
-- Total of 1 flow:
Average throughput: 15.84 Mbit/s
95th percentile per-packet one-way delay: 167.545 ms
Loss rate: 0.22%
-- Flow 1:
Average throughput: 15.84 Mbit/s
95th percentile per-packet one-way delay: 167.545 ms
Loss rate: 0.22%
```

Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2019-01-18 18:07:36

End at: 2019-01-18 18:08:06

Local clock offset: -3.131 ms

Remote clock offset: 9.04 ms

Below is generated by plot.py at 2019-01-18 18:48:12

Datalink statistics

-- Total of 1 flow:

Average throughput: 13.14 Mbit/s

95th percentile per-packet one-way delay: 173.236 ms

Loss rate: 0.31%

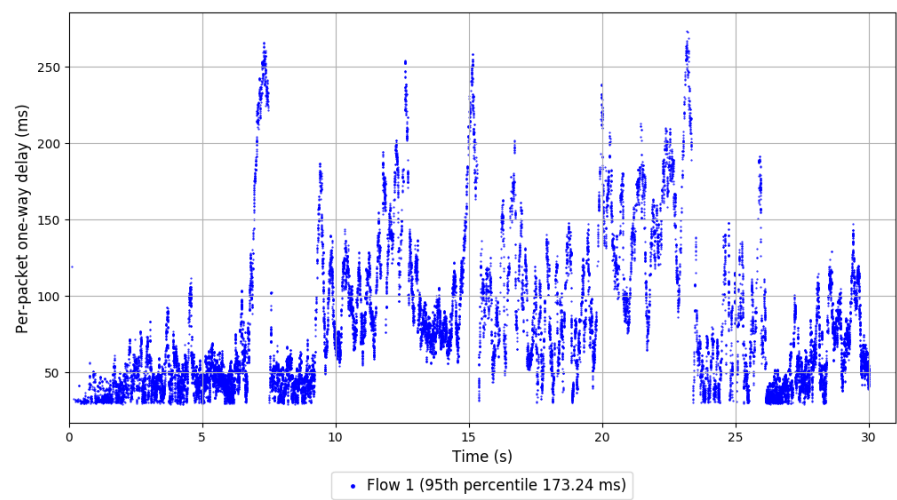
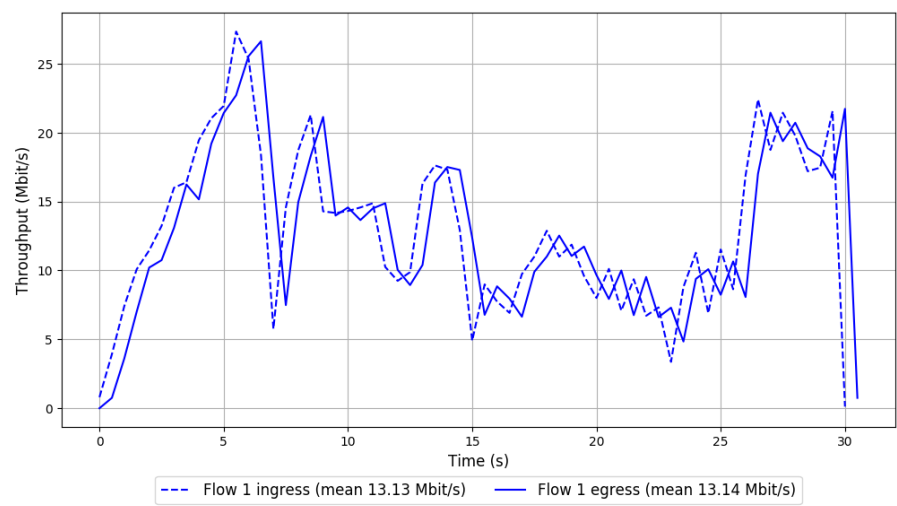
-- Flow 1:

Average throughput: 13.14 Mbit/s

95th percentile per-packet one-way delay: 173.236 ms

Loss rate: 0.31%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2019-01-18 18:33:12

End at: 2019-01-18 18:33:42

Local clock offset: -2.969 ms

Remote clock offset: 5.254 ms

Below is generated by plot.py at 2019-01-18 18:48:12

Datalink statistics

-- Total of 1 flow:

Average throughput: 15.34 Mbit/s

95th percentile per-packet one-way delay: 158.836 ms

Loss rate: 0.54%

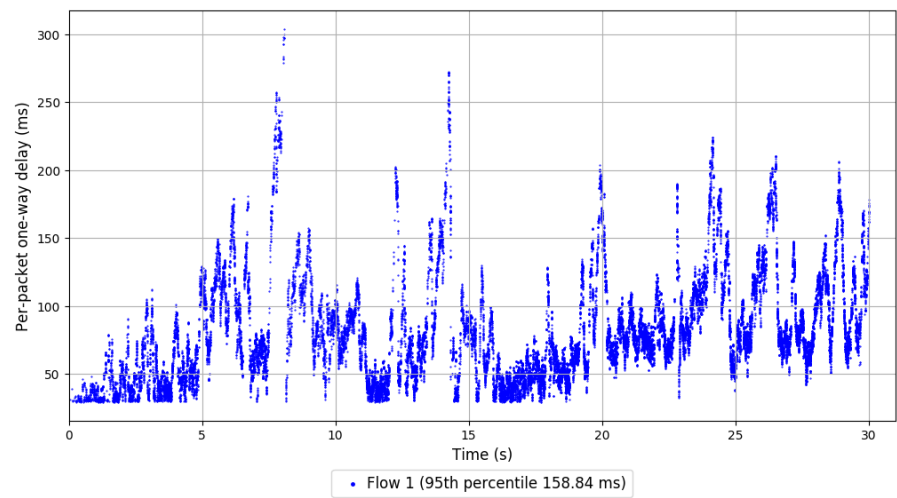
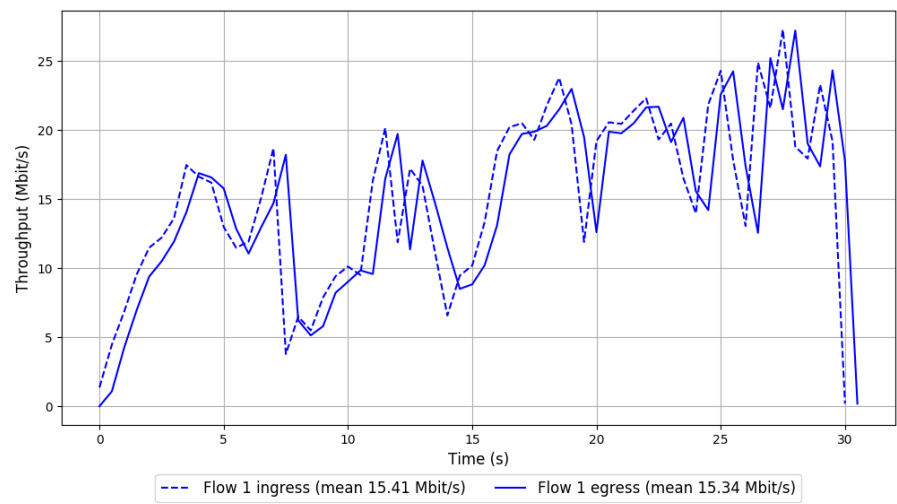
-- Flow 1:

Average throughput: 15.34 Mbit/s

95th percentile per-packet one-way delay: 158.836 ms

Loss rate: 0.54%

Run 3: Report of LEDBAT — Data Link

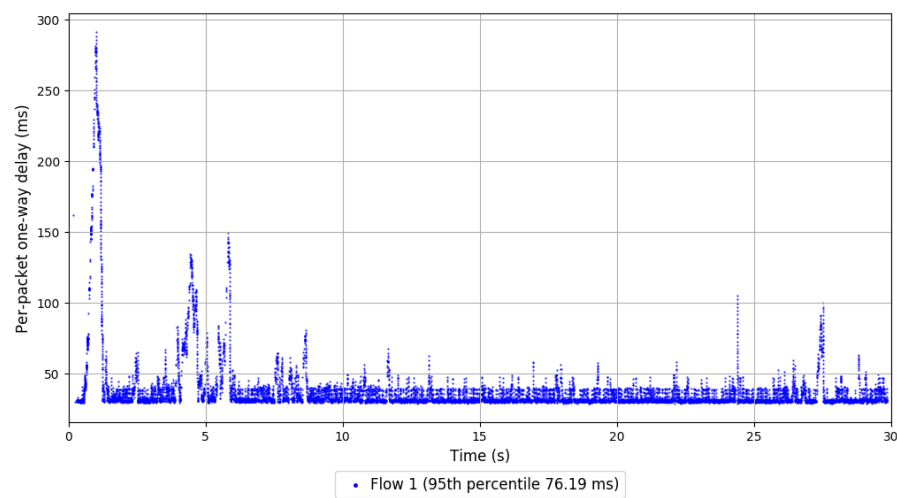
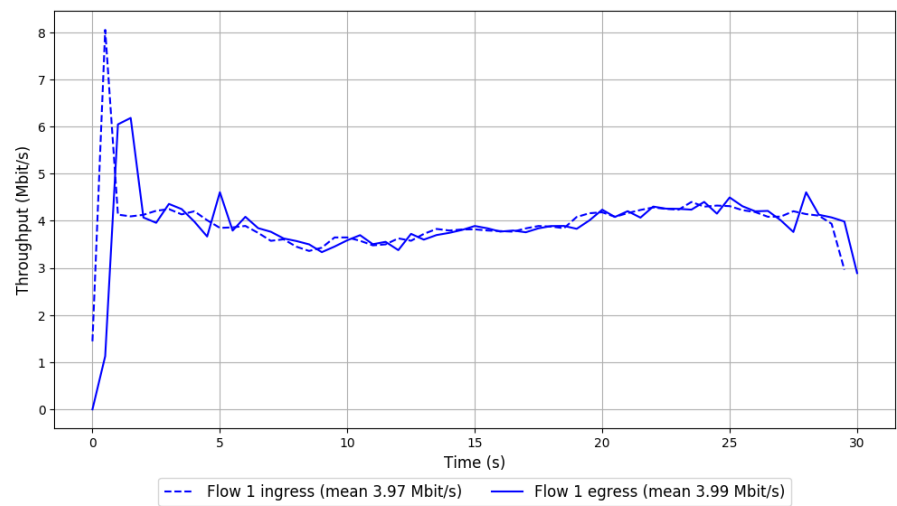


```
Run 1: Statistics of PCC-Allegro

Start at: 2019-01-18 17:53:00
End at: 2019-01-18 17:53:30
Local clock offset: -3.582 ms
Remote clock offset: 6.952 ms

# Below is generated by plot.py at 2019-01-18 18:48:12
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.99 Mbit/s
95th percentile per-packet one-way delay: 76.192 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 3.99 Mbit/s
95th percentile per-packet one-way delay: 76.192 ms
Loss rate: 0.13%
```

Run 1: Report of PCC-Allegro — Data Link

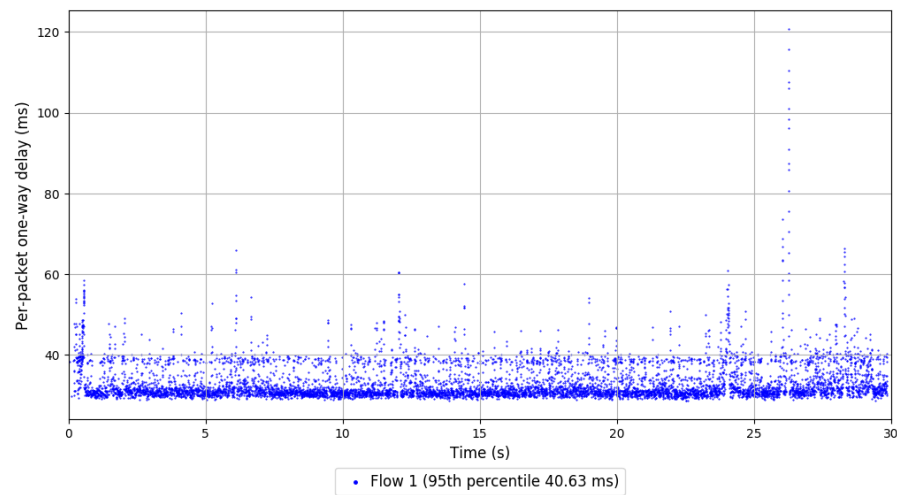
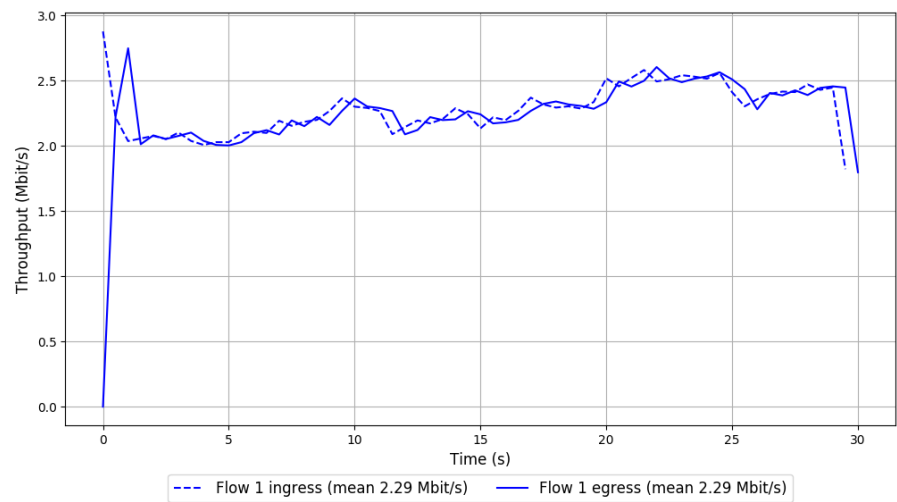


Run 2: Statistics of PCC-Allegro

Start at: 2019-01-18 18:18:35
End at: 2019-01-18 18:19:05
Local clock offset: -3.295 ms
Remote clock offset: 10.382 ms

Below is generated by plot.py at 2019-01-18 18:48:12
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.29 Mbit/s
95th percentile per-packet one-way delay: 40.631 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 2.29 Mbit/s
95th percentile per-packet one-way delay: 40.631 ms
Loss rate: 0.14%

Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

Start at: 2019-01-18 18:44:11

End at: 2019-01-18 18:44:41

Local clock offset: -3.052 ms

Remote clock offset: 0.596 ms

Below is generated by plot.py at 2019-01-18 18:48:12

Datalink statistics

-- Total of 1 flow:

Average throughput: 8.44 Mbit/s

95th percentile per-packet one-way delay: 829.209 ms

Loss rate: 2.66%

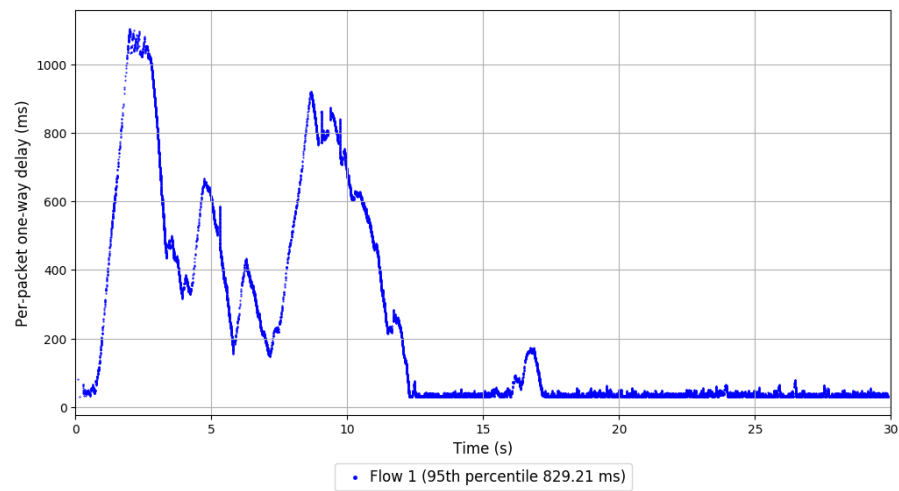
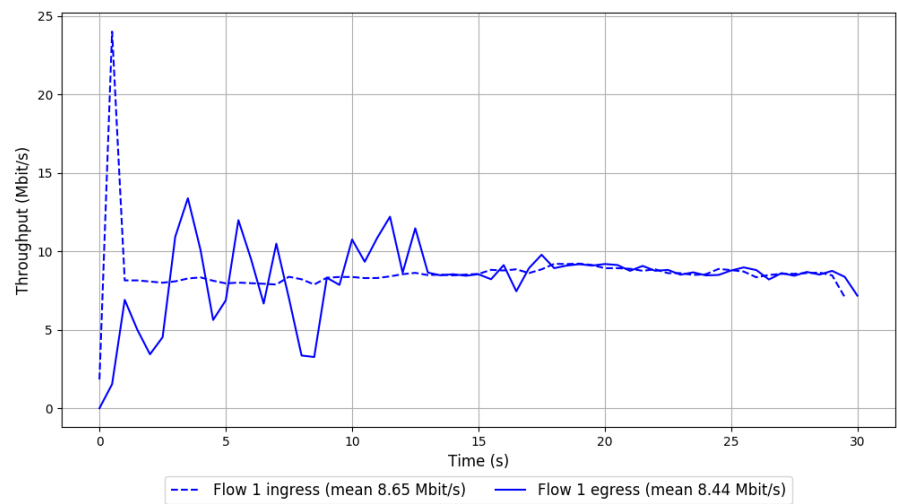
-- Flow 1:

Average throughput: 8.44 Mbit/s

95th percentile per-packet one-way delay: 829.209 ms

Loss rate: 2.66%

Run 3: Report of PCC-Allegro — Data Link



Run 1: Statistics of PCC-Expr

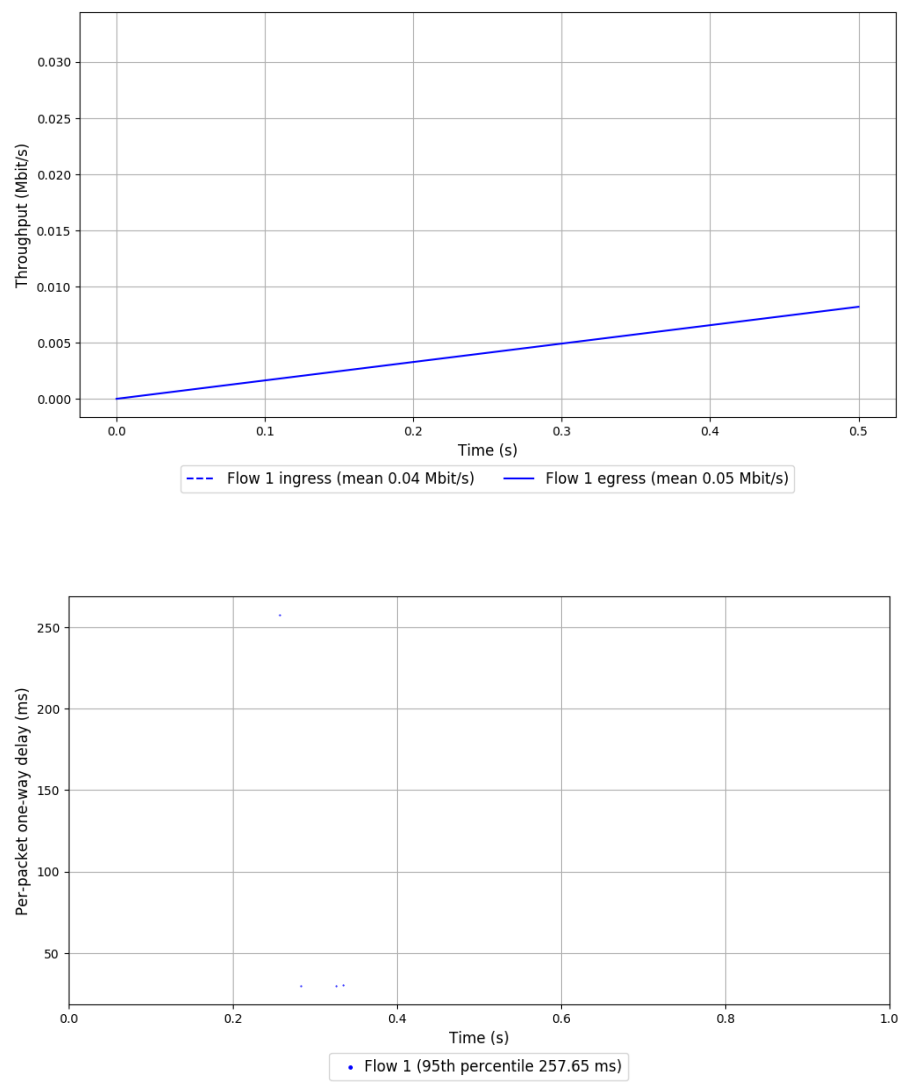
Start at: 2019-01-18 17:46:54

End at: 2019-01-18 17:47:24

Local clock offset: -3.9 ms

Remote clock offset: 6.001 ms

Run 1: Report of PCC-Expr — Data Link



Run 2: Statistics of PCC-Expr

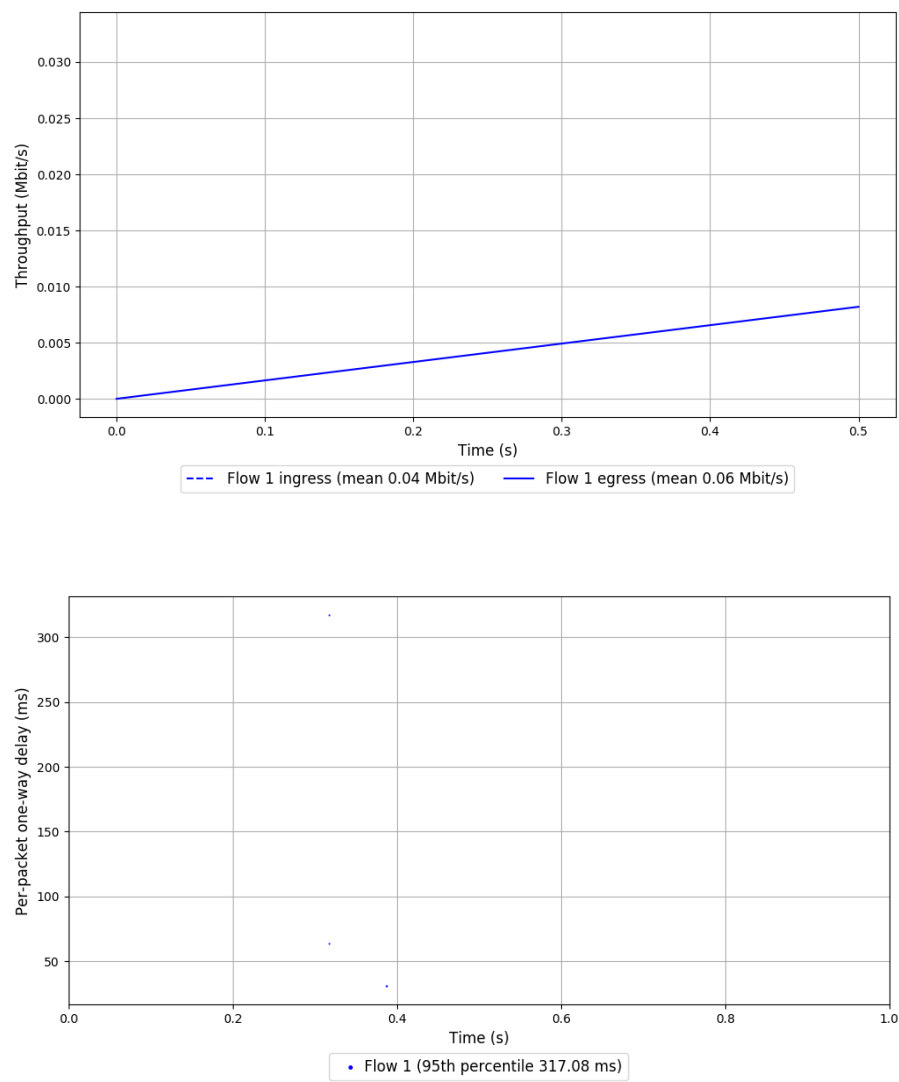
Start at: 2019-01-18 18:12:30

End at: 2019-01-18 18:13:00

Local clock offset: -3.182 ms

Remote clock offset: 9.556 ms

Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

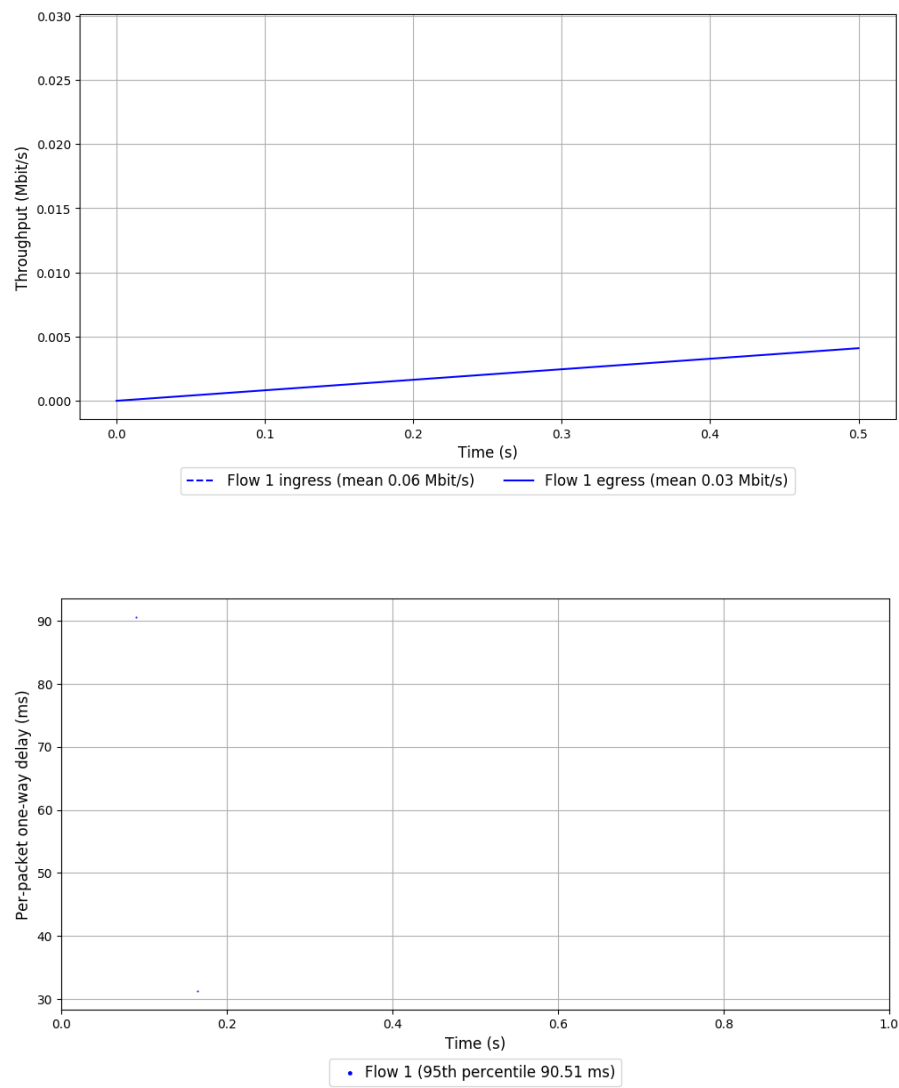
Start at: 2019-01-18 18:38:05

End at: 2019-01-18 18:38:35

Local clock offset: -2.97 ms

Remote clock offset: 2.444 ms

Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2019-01-18 17:51:47

End at: 2019-01-18 17:52:17

Local clock offset: -3.711 ms

Remote clock offset: 6.759 ms

Below is generated by plot.py at 2019-01-18 18:48:23

Datalink statistics

-- Total of 1 flow:

Average throughput: 15.47 Mbit/s

95th percentile per-packet one-way delay: 245.021 ms

Loss rate: 0.68%

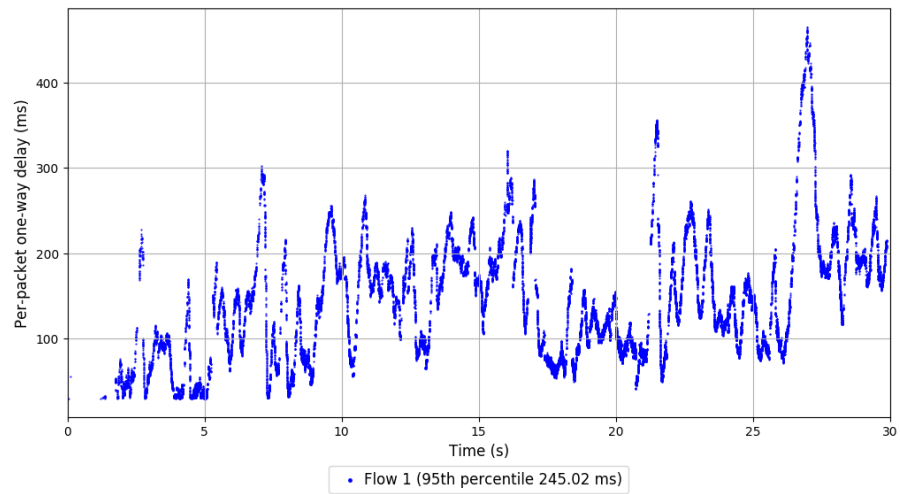
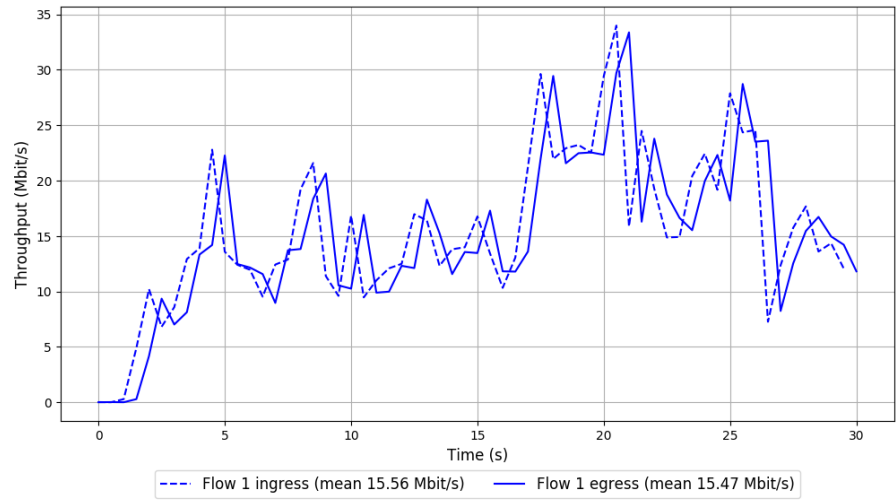
-- Flow 1:

Average throughput: 15.47 Mbit/s

95th percentile per-packet one-way delay: 245.021 ms

Loss rate: 0.68%

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2019-01-18 18:17:22

End at: 2019-01-18 18:17:52

Local clock offset: -3.268 ms

Remote clock offset: 10.136 ms

Below is generated by plot.py at 2019-01-18 18:48:23

Datalink statistics

-- Total of 1 flow:

Average throughput: 12.63 Mbit/s

95th percentile per-packet one-way delay: 266.057 ms

Loss rate: 0.73%

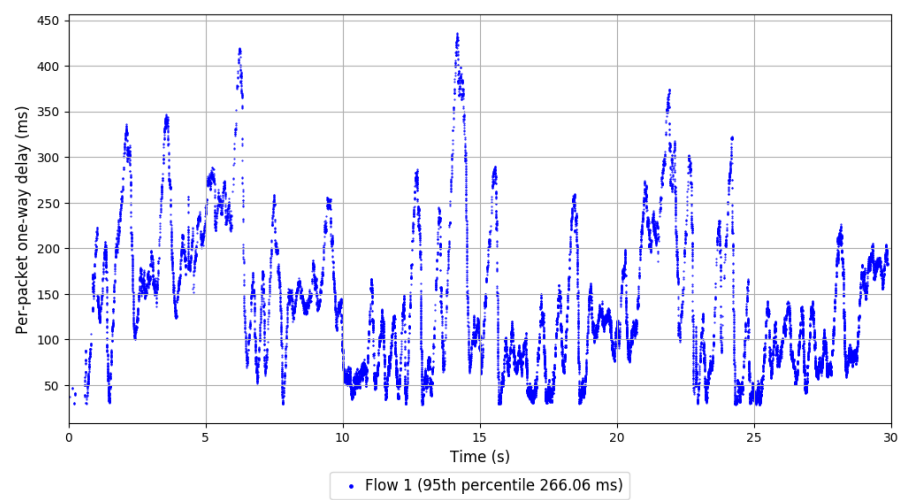
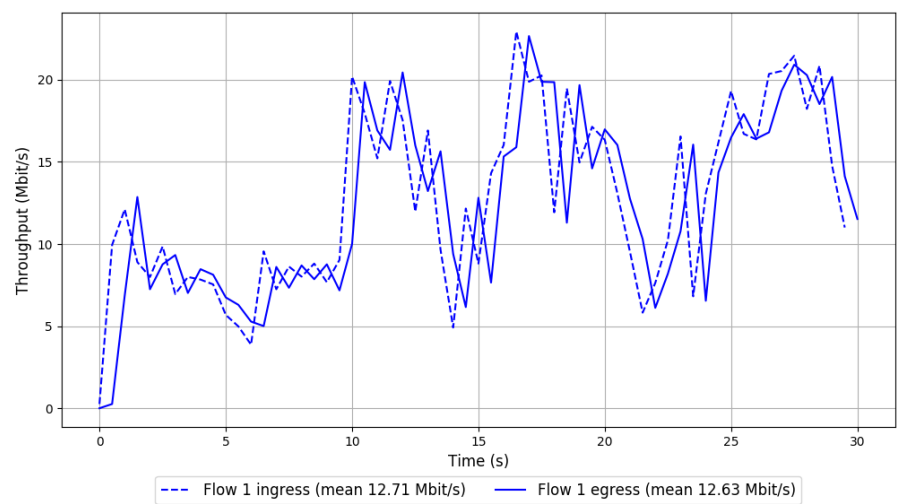
-- Flow 1:

Average throughput: 12.63 Mbit/s

95th percentile per-packet one-way delay: 266.057 ms

Loss rate: 0.73%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2019-01-18 18:42:58

End at: 2019-01-18 18:43:28

Local clock offset: -3.021 ms

Remote clock offset: 0.872 ms

Below is generated by plot.py at 2019-01-18 18:48:24

Datalink statistics

-- Total of 1 flow:

Average throughput: 14.04 Mbit/s

95th percentile per-packet one-way delay: 274.873 ms

Loss rate: 0.78%

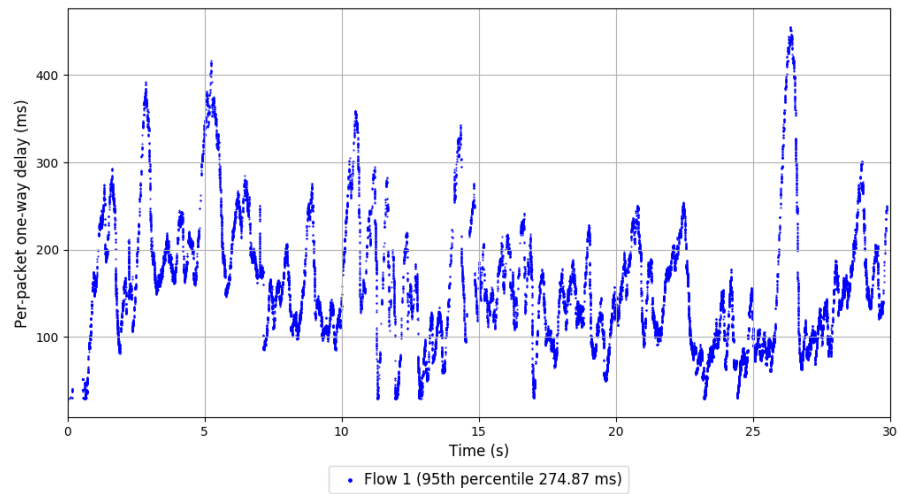
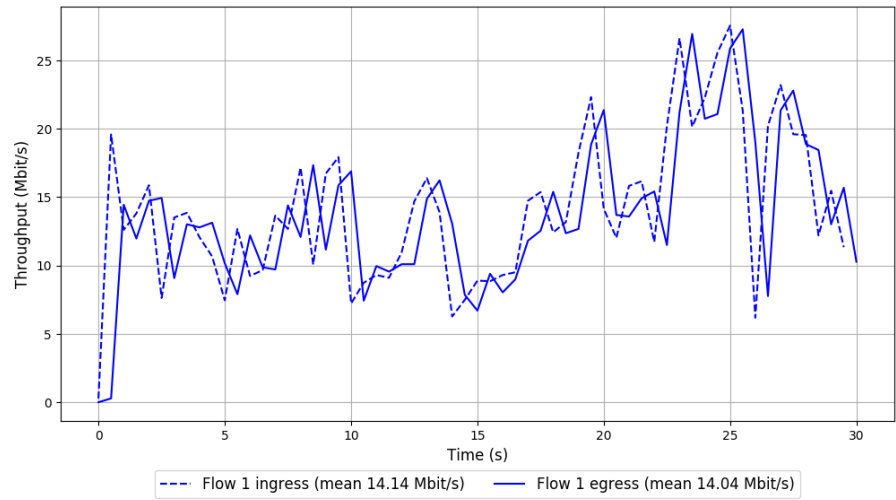
-- Flow 1:

Average throughput: 14.04 Mbit/s

95th percentile per-packet one-way delay: 274.873 ms

Loss rate: 0.78%

Run 3: Report of QUIC Cubic — Data Link



Run 1: Statistics of SCReAM

Start at: 2019-01-18 17:40:48

End at: 2019-01-18 17:41:18

Local clock offset: -3.702 ms

Remote clock offset: 5.045 ms

Below is generated by plot.py at 2019-01-18 18:48:24

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 40.138 ms

Loss rate: 0.13%

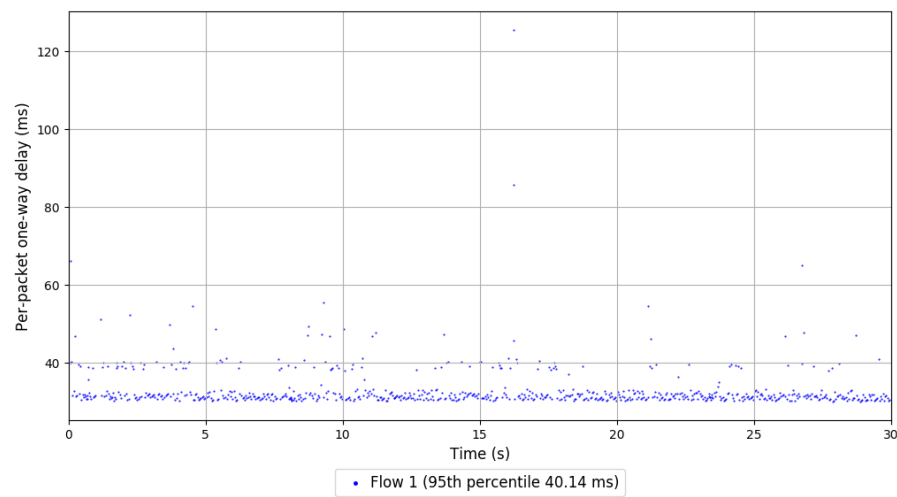
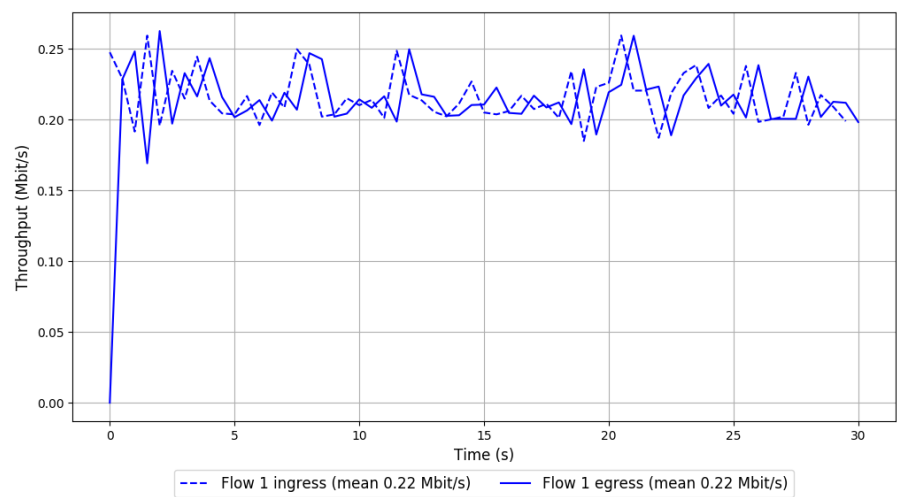
-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 40.138 ms

Loss rate: 0.13%

Run 1: Report of SReAM — Data Link



Run 2: Statistics of SCReAM

Start at: 2019-01-18 18:06:23

End at: 2019-01-18 18:06:54

Local clock offset: -3.138 ms

Remote clock offset: 8.752 ms

Below is generated by plot.py at 2019-01-18 18:48:24

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 39.063 ms

Loss rate: 0.13%

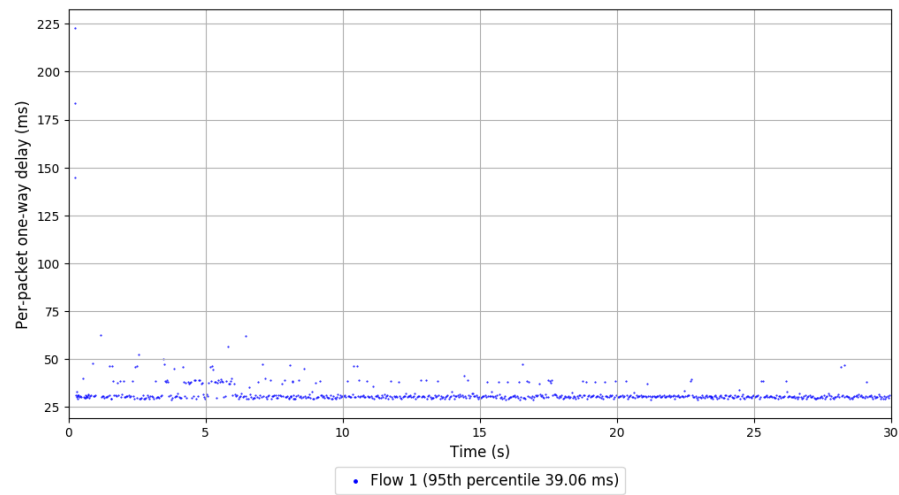
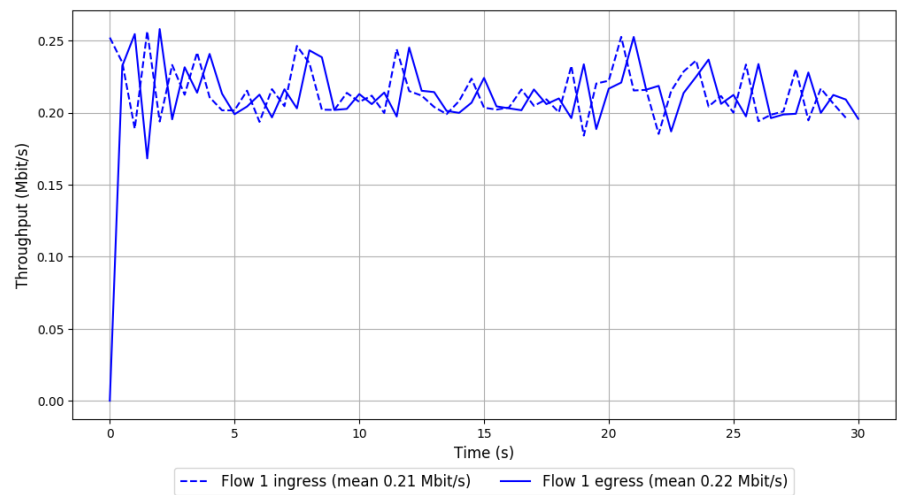
-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 39.063 ms

Loss rate: 0.13%

Run 2: Report of SReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2019-01-18 18:31:59

End at: 2019-01-18 18:32:29

Local clock offset: -2.967 ms

Remote clock offset: 6.456 ms

Below is generated by plot.py at 2019-01-18 18:48:24

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 39.770 ms

Loss rate: 0.13%

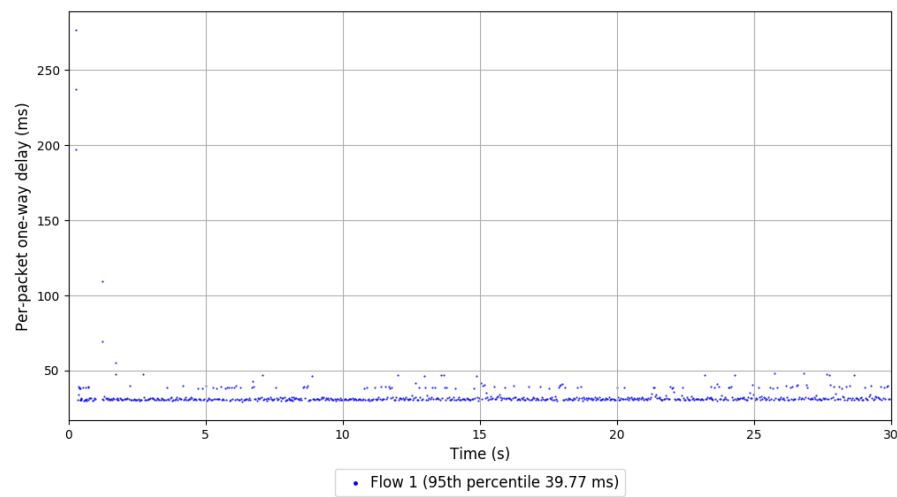
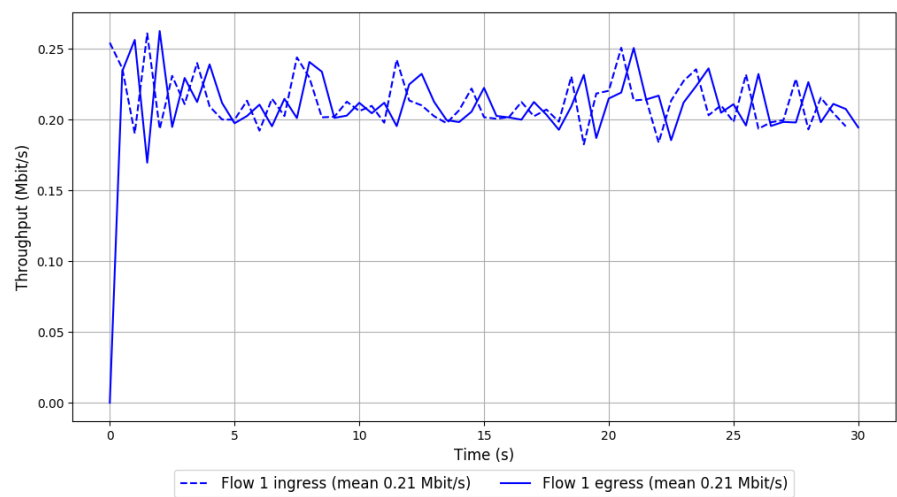
-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 39.770 ms

Loss rate: 0.13%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of Sprout

Start at: 2019-01-18 17:33:29

End at: 2019-01-18 17:33:59

Local clock offset: -3.591 ms

Remote clock offset: 3.414 ms

Below is generated by plot.py at 2019-01-18 18:48:24

Datalink statistics

-- Total of 1 flow:

Average throughput: 8.12 Mbit/s

95th percentile per-packet one-way delay: 85.914 ms

Loss rate: 0.05%

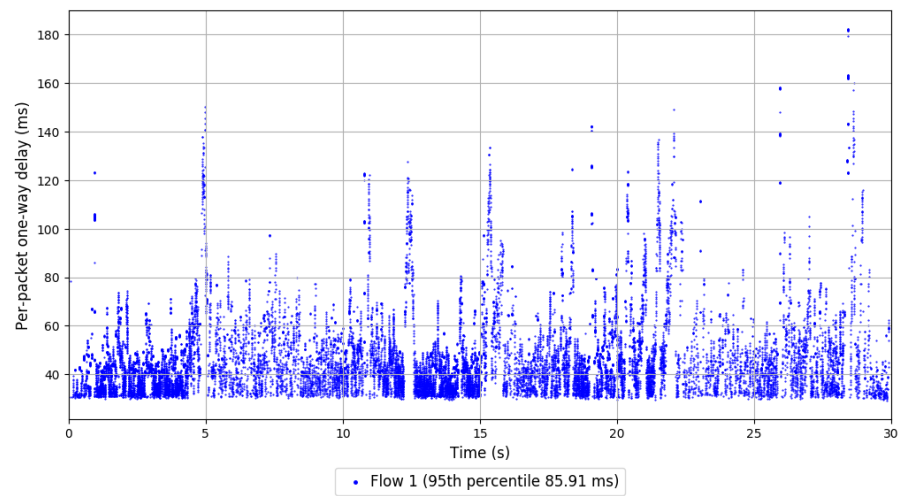
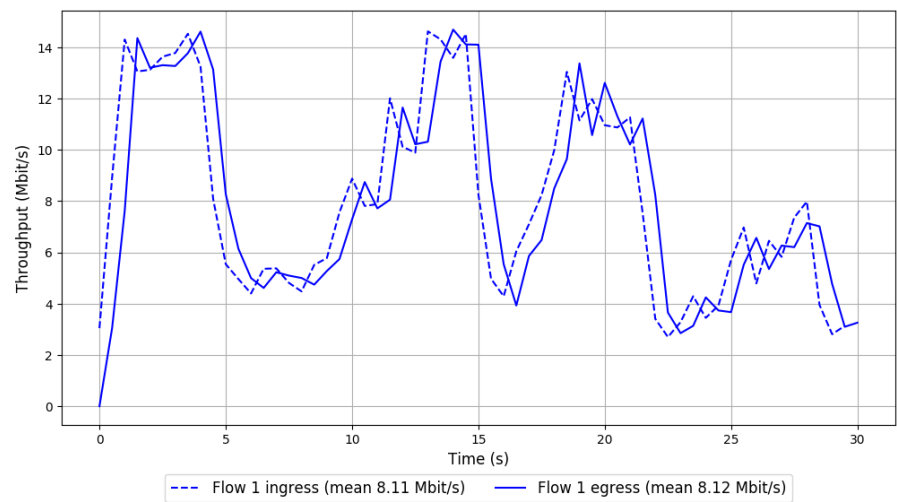
-- Flow 1:

Average throughput: 8.12 Mbit/s

95th percentile per-packet one-way delay: 85.914 ms

Loss rate: 0.05%

Run 1: Report of Sprout — Data Link



Run 2: Statistics of Sprout

Start at: 2019-01-18 17:59:05

End at: 2019-01-18 17:59:35

Local clock offset: -3.22 ms

Remote clock offset: 7.823 ms

Below is generated by plot.py at 2019-01-18 18:48:24

Datalink statistics

-- Total of 1 flow:

Average throughput: 6.27 Mbit/s

95th percentile per-packet one-way delay: 85.314 ms

Loss rate: 0.29%

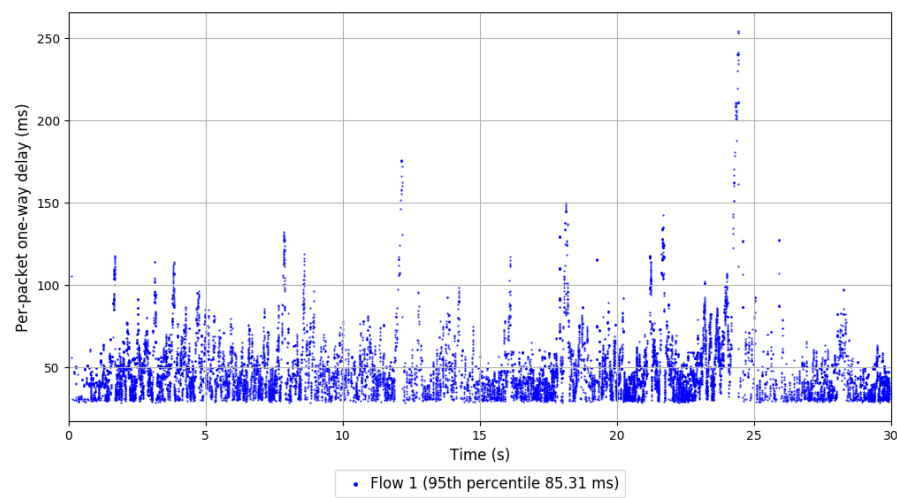
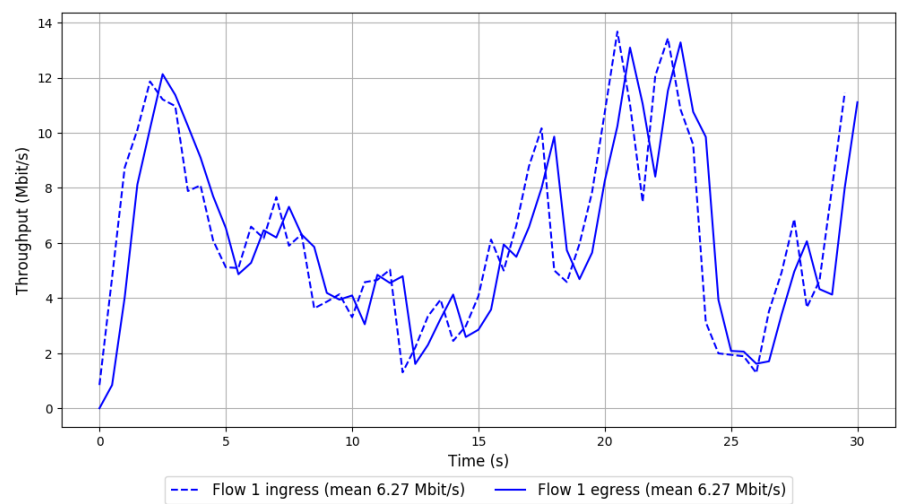
-- Flow 1:

Average throughput: 6.27 Mbit/s

95th percentile per-packet one-way delay: 85.314 ms

Loss rate: 0.29%

Run 2: Report of Sprout — Data Link

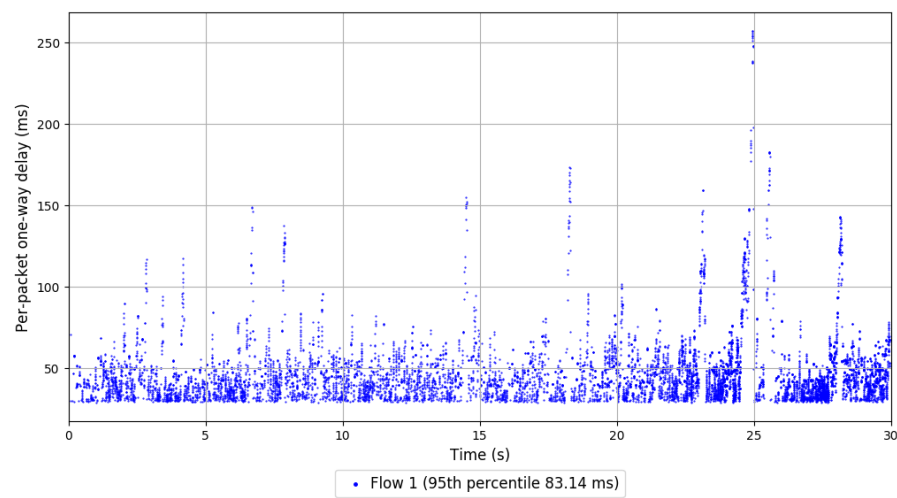
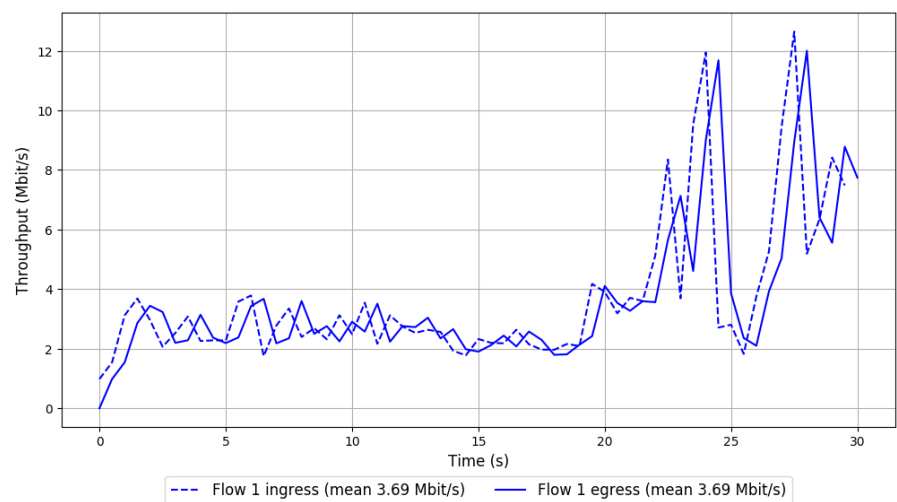


Run 3: Statistics of Sprout

Start at: 2019-01-18 18:24:41
End at: 2019-01-18 18:25:11
Local clock offset: -3.082 ms
Remote clock offset: 11.199 ms

Below is generated by plot.py at 2019-01-18 18:48:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 3.69 Mbit/s
95th percentile per-packet one-way delay: 83.145 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 3.69 Mbit/s
95th percentile per-packet one-way delay: 83.145 ms
Loss rate: 0.15%

Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

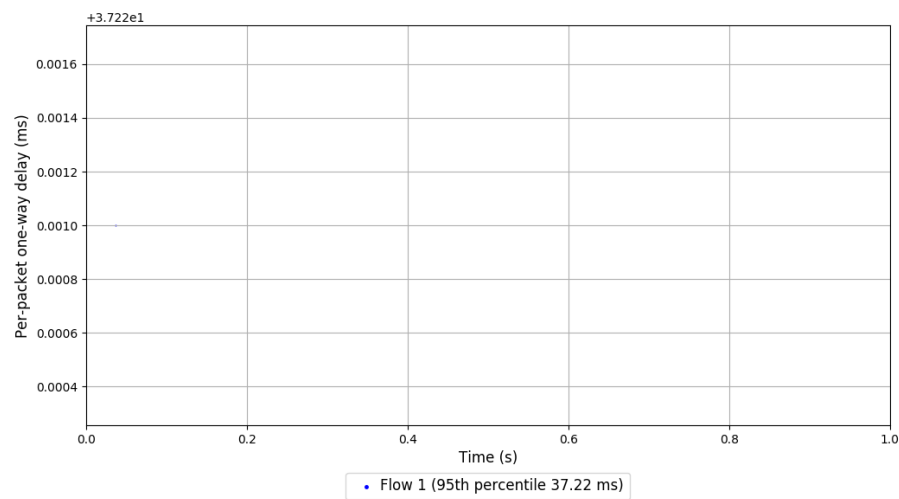
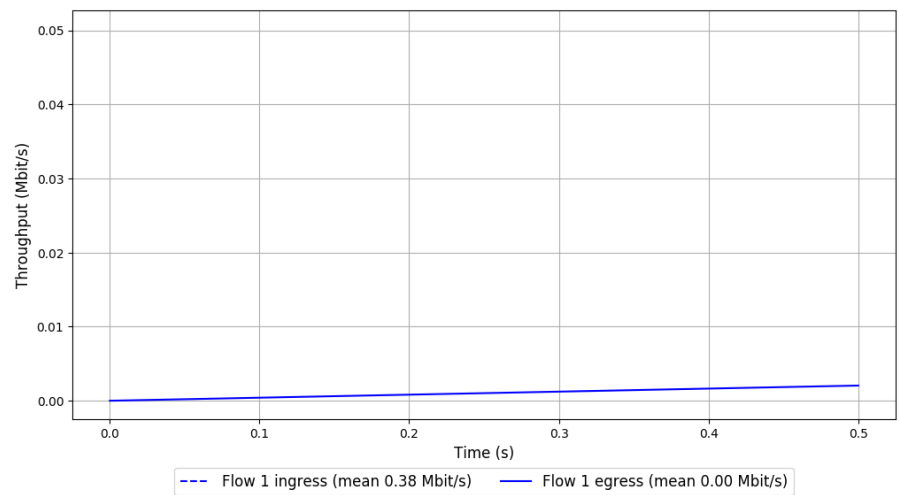
Start at: 2019-01-18 17:32:16

End at: 2019-01-18 17:32:46

Local clock offset: -3.602 ms

Remote clock offset: 3.088 ms

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



Run 2: Statistics of TaoVA-100x

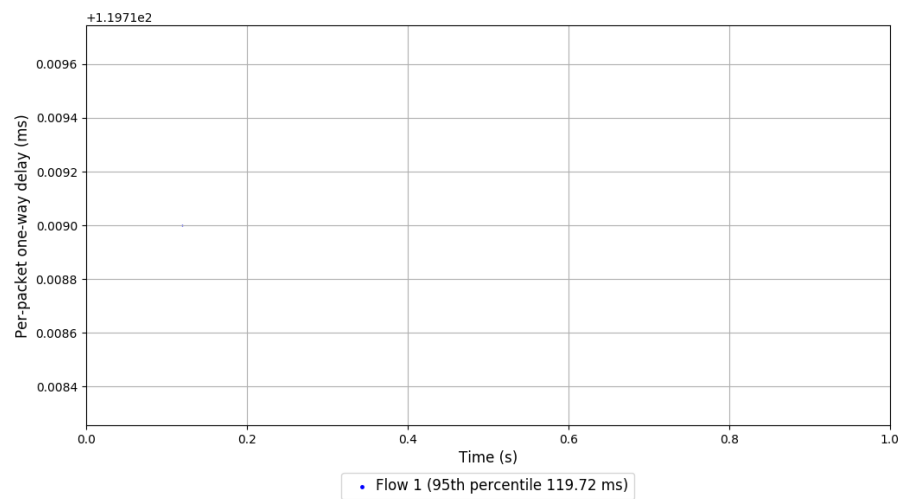
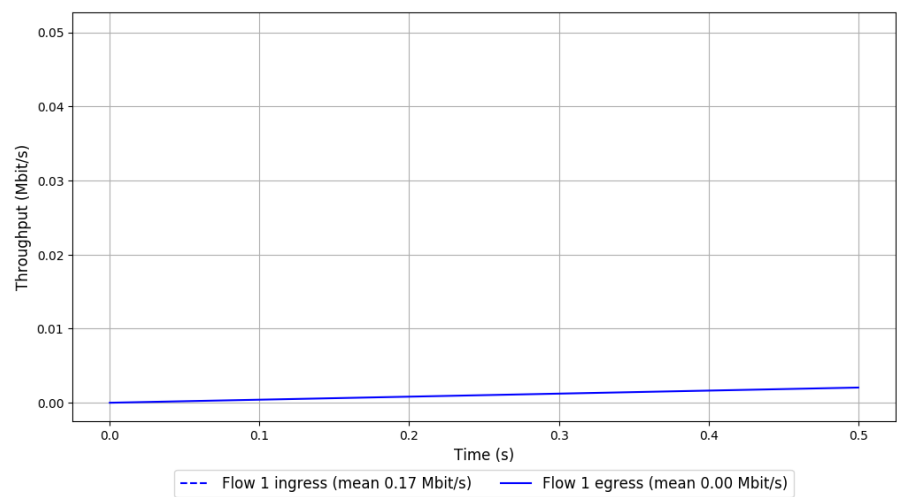
Start at: 2019-01-18 17:57:52

End at: 2019-01-18 17:58:22

Local clock offset: -3.285 ms

Remote clock offset: 7.654 ms

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



Run 3: Statistics of TaoVA-100x

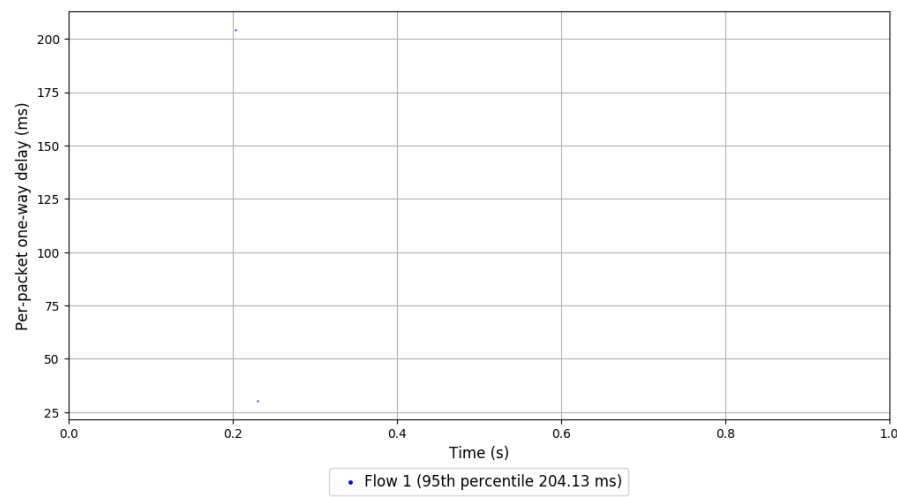
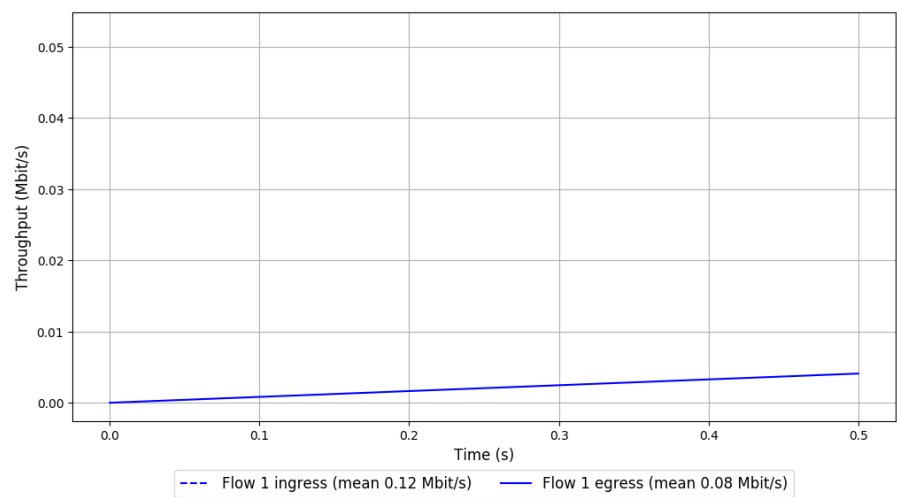
Start at: 2019-01-18 18:23:28

End at: 2019-01-18 18:23:58

Local clock offset: -3.115 ms

Remote clock offset: 10.962 ms

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



Run 1: Statistics of TCP Vegas

Start at: 2019-01-18 17:55:26

End at: 2019-01-18 17:55:56

Local clock offset: -3.411 ms

Remote clock offset: 7.366 ms

Below is generated by plot.py at 2019-01-18 18:48:24

Datalink statistics

-- Total of 1 flow:

Average throughput: 3.81 Mbit/s

95th percentile per-packet one-way delay: 47.670 ms

Loss rate: 0.13%

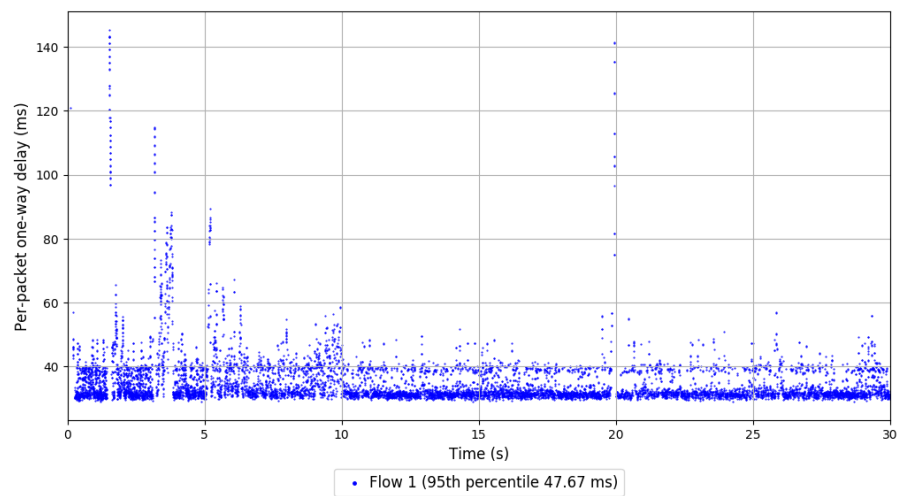
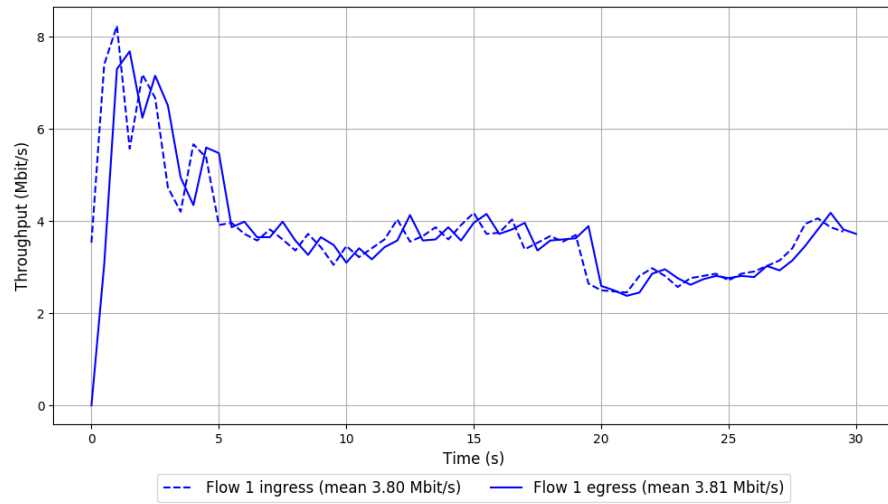
-- Flow 1:

Average throughput: 3.81 Mbit/s

95th percentile per-packet one-way delay: 47.670 ms

Loss rate: 0.13%

Run 1: Report of TCP Vegas — Data Link

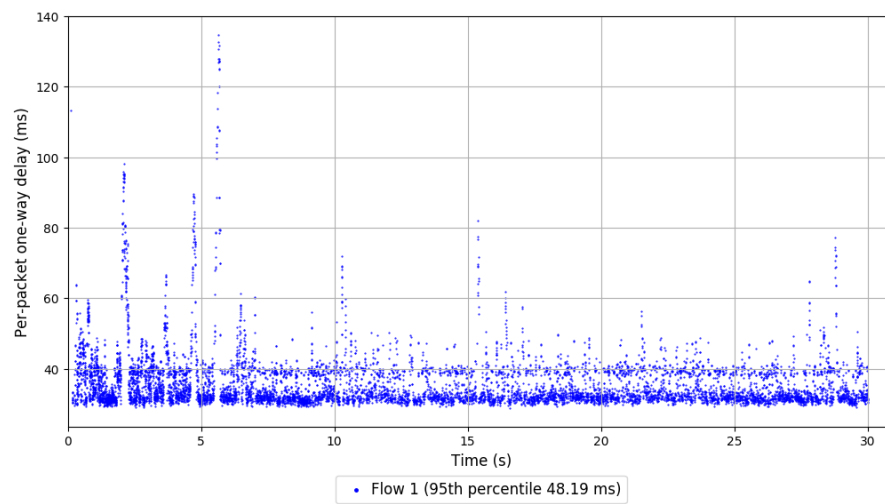
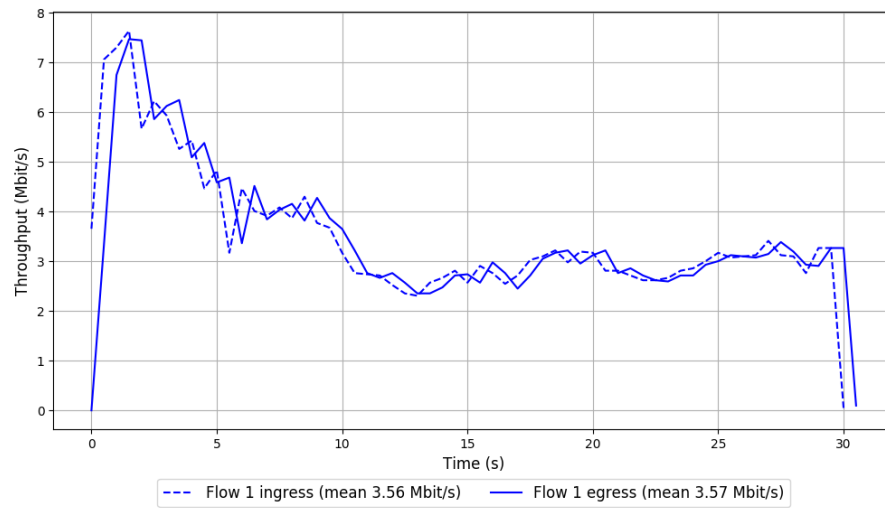


Run 2: Statistics of TCP Vegas

Start at: 2019-01-18 18:21:02
End at: 2019-01-18 18:21:32
Local clock offset: -3.226 ms
Remote clock offset: 10.701 ms

Below is generated by plot.py at 2019-01-18 18:48:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 3.57 Mbit/s
95th percentile per-packet one-way delay: 48.192 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 3.57 Mbit/s
95th percentile per-packet one-way delay: 48.192 ms
Loss rate: 0.07%

Run 2: Report of TCP Vegas — Data Link

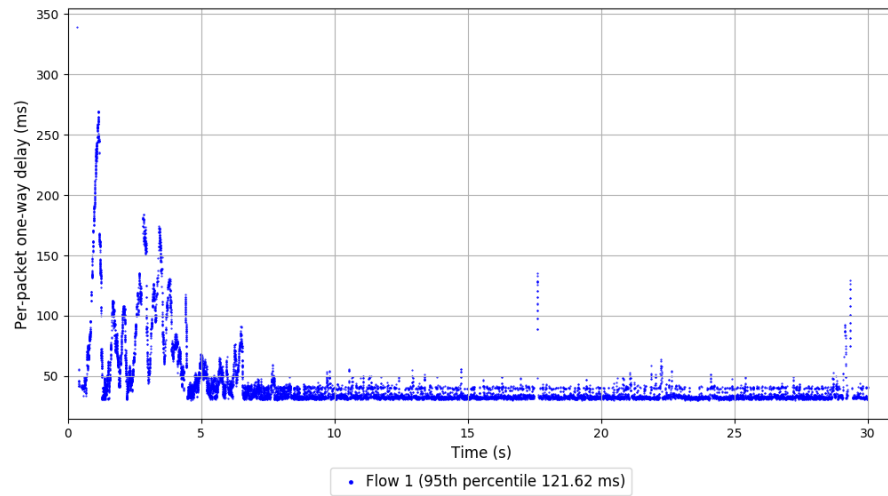
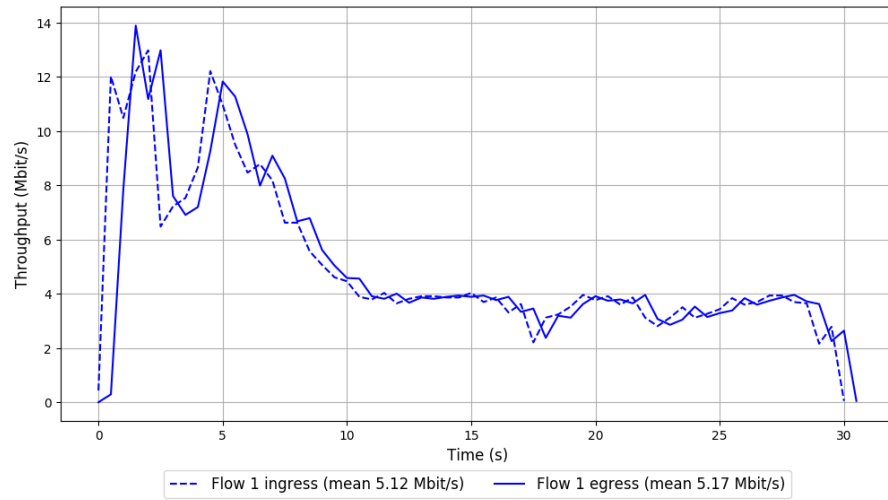


Run 3: Statistics of TCP Vegas

Start at: 2019-01-18 18:46:38
End at: 2019-01-18 18:47:08
Local clock offset: -3.077 ms
Remote clock offset: -0.055 ms

Below is generated by plot.py at 2019-01-18 18:48:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 5.17 Mbit/s
95th percentile per-packet one-way delay: 121.621 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 5.17 Mbit/s
95th percentile per-packet one-way delay: 121.621 ms
Loss rate: 0.10%

Run 3: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2019-01-18 17:54:13

End at: 2019-01-18 17:54:43

Local clock offset: -3.474 ms

Remote clock offset: 7.126 ms

Below is generated by plot.py at 2019-01-18 18:48:29

Datalink statistics

-- Total of 1 flow:

Average throughput: 7.20 Mbit/s

95th percentile per-packet one-way delay: 631.842 ms

Loss rate: 7.82%

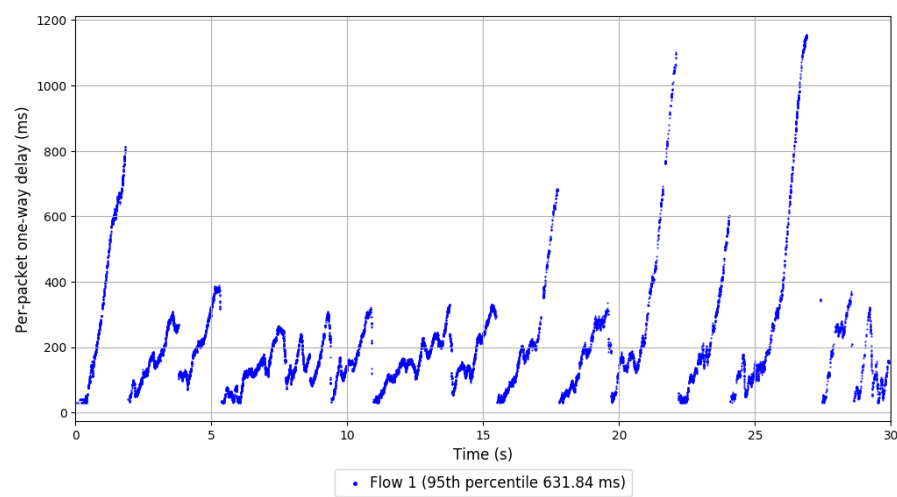
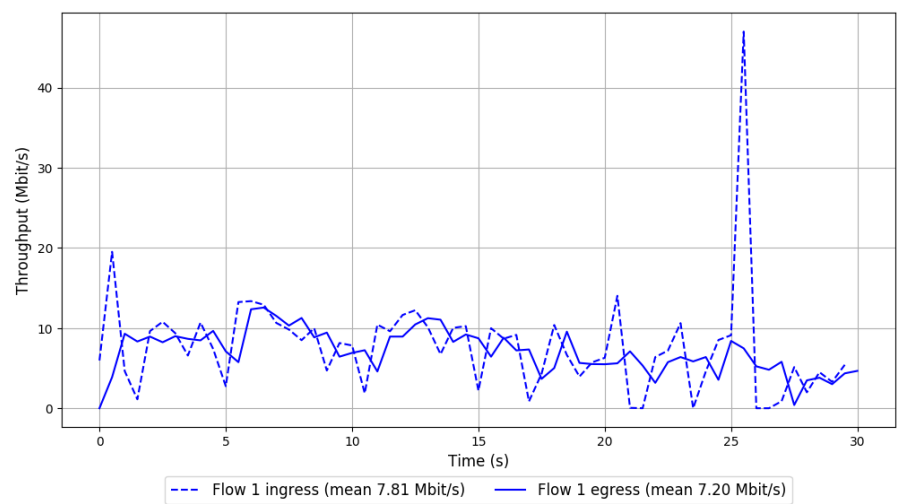
-- Flow 1:

Average throughput: 7.20 Mbit/s

95th percentile per-packet one-way delay: 631.842 ms

Loss rate: 7.82%

Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2019-01-18 18:19:48

End at: 2019-01-18 18:20:18

Local clock offset: -3.298 ms

Remote clock offset: 10.48 ms

Below is generated by plot.py at 2019-01-18 18:48:31

Datalink statistics

-- Total of 1 flow:

Average throughput: 13.69 Mbit/s

95th percentile per-packet one-way delay: 389.977 ms

Loss rate: 1.15%

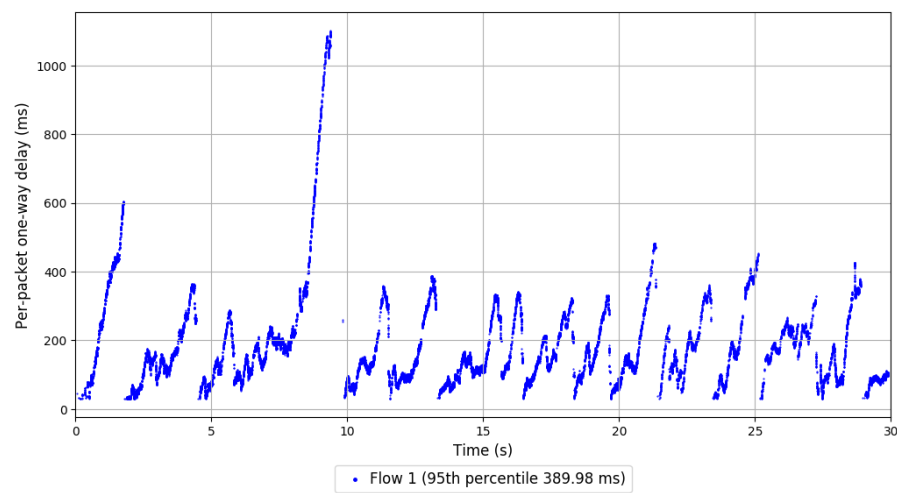
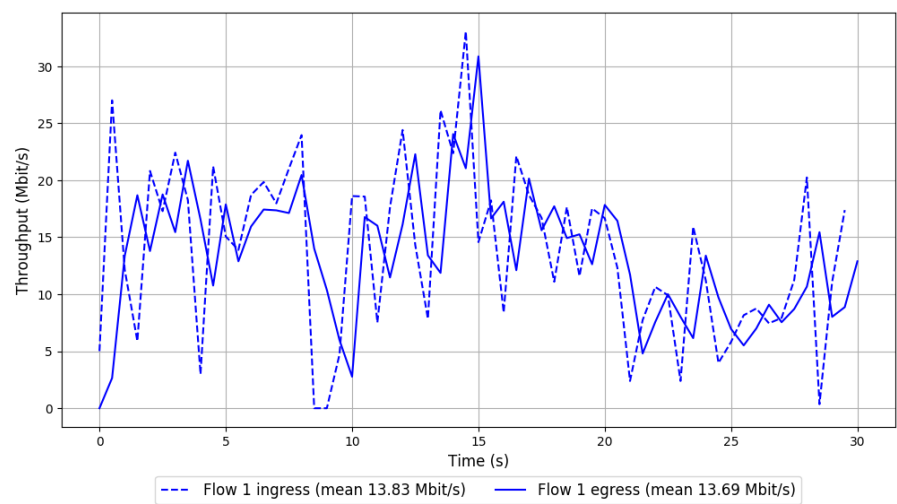
-- Flow 1:

Average throughput: 13.69 Mbit/s

95th percentile per-packet one-way delay: 389.977 ms

Loss rate: 1.15%

Run 2: Report of Verus — Data Link



Run 3: Statistics of Verus

Start at: 2019-01-18 18:45:25

End at: 2019-01-18 18:45:55

Local clock offset: -3.054 ms

Remote clock offset: 0.203 ms

Below is generated by plot.py at 2019-01-18 18:48:31

Datalink statistics

-- Total of 1 flow:

Average throughput: 20.04 Mbit/s

95th percentile per-packet one-way delay: 416.915 ms

Loss rate: 0.20%

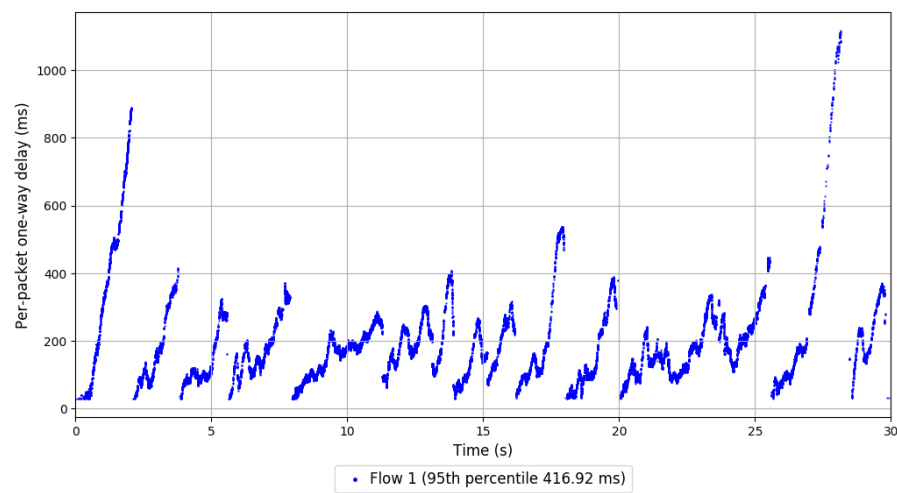
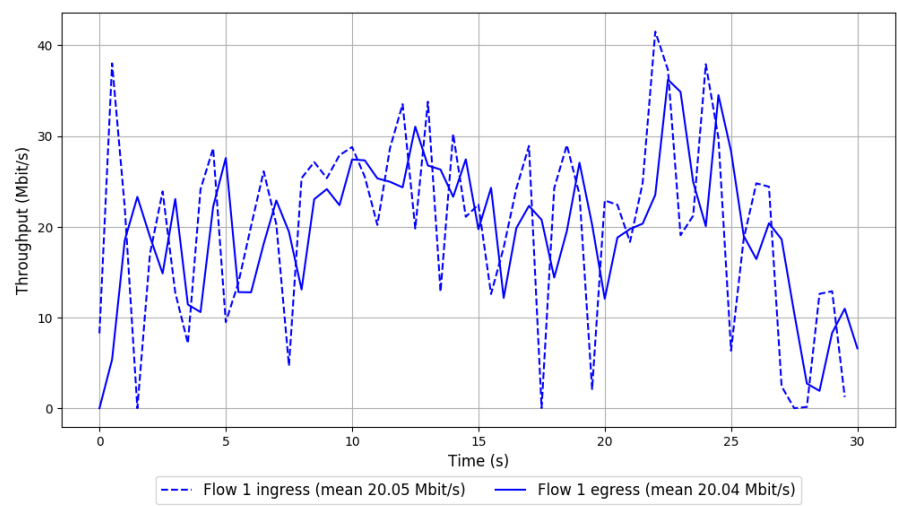
-- Flow 1:

Average throughput: 20.04 Mbit/s

95th percentile per-packet one-way delay: 416.915 ms

Loss rate: 0.20%

Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

Start at: 2019-01-18 17:44:27

End at: 2019-01-18 17:44:57

Local clock offset: -3.806 ms

Remote clock offset: 5.771 ms

Below is generated by plot.py at 2019-01-18 18:48:31

Datalink statistics

-- Total of 1 flow:

Average throughput: 4.49 Mbit/s

95th percentile per-packet one-way delay: 135.863 ms

Loss rate: 0.07%

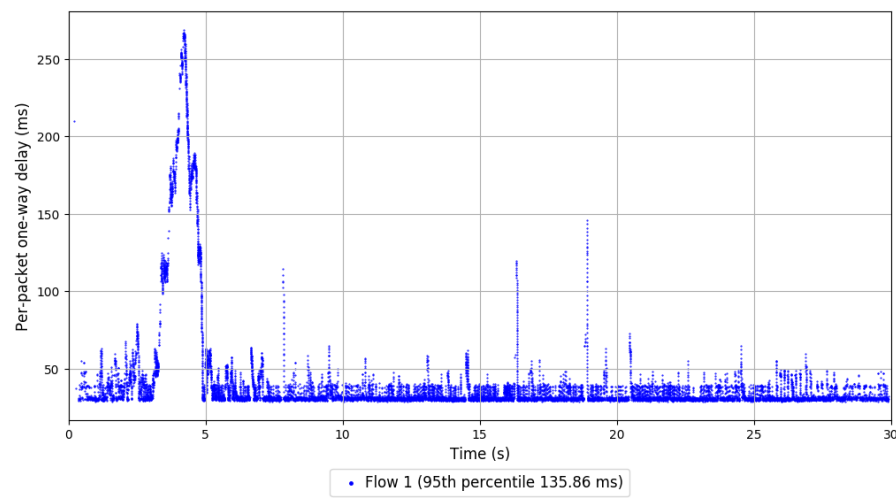
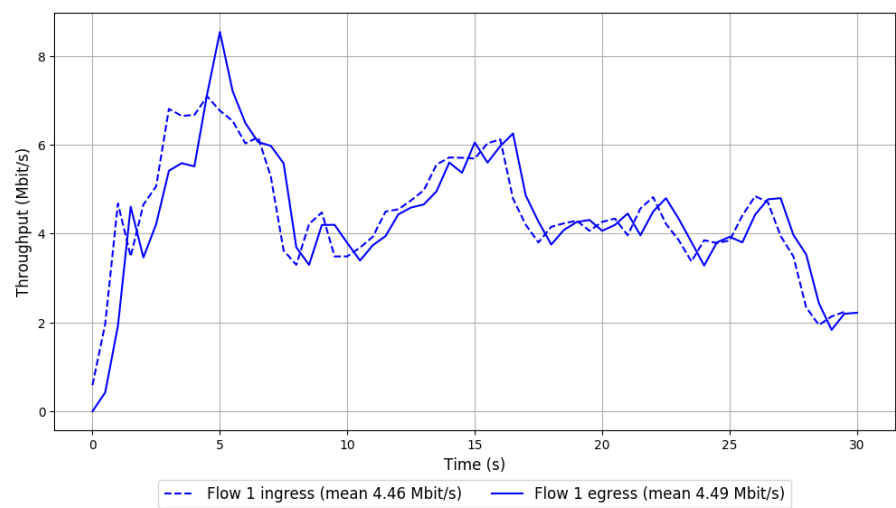
-- Flow 1:

Average throughput: 4.49 Mbit/s

95th percentile per-packet one-way delay: 135.863 ms

Loss rate: 0.07%

Run 1: Report of PCC-Vivace — Data Link



Run 2: Statistics of PCC-Vivace

Start at: 2019-01-18 18:10:03

End at: 2019-01-18 18:10:33

Local clock offset: -3.149 ms

Remote clock offset: 9.296 ms

Below is generated by plot.py at 2019-01-18 18:48:31

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.22 Mbit/s

95th percentile per-packet one-way delay: 46.735 ms

Loss rate: 0.04%

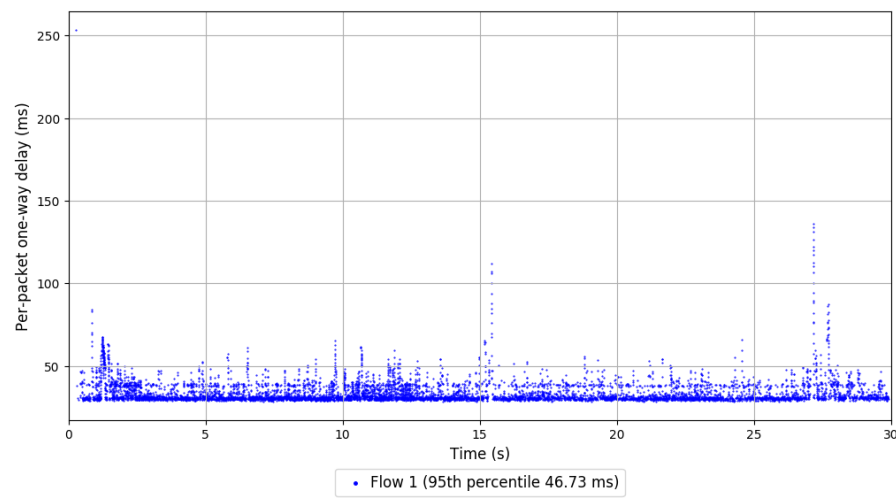
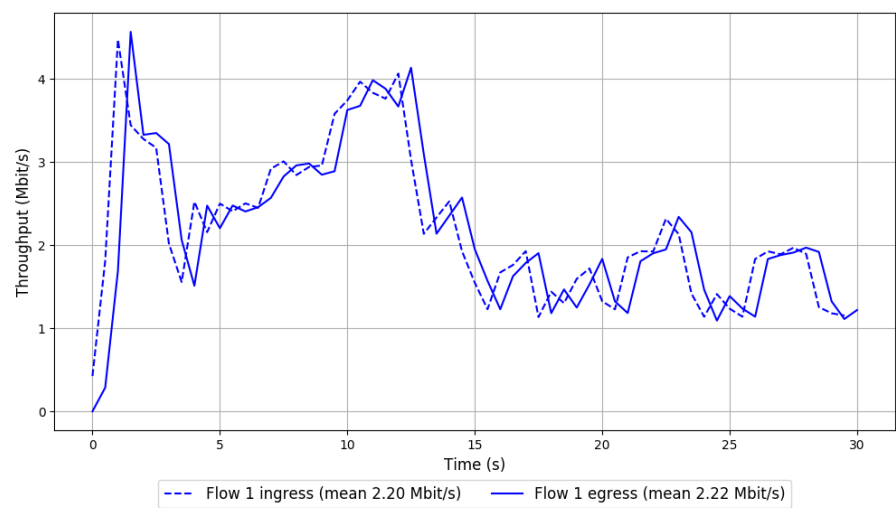
-- Flow 1:

Average throughput: 2.22 Mbit/s

95th percentile per-packet one-way delay: 46.735 ms

Loss rate: 0.04%

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

Start at: 2019-01-18 18:35:39

End at: 2019-01-18 18:36:09

Local clock offset: -2.968 ms

Remote clock offset: 3.814 ms

Below is generated by plot.py at 2019-01-18 18:48:31

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.27 Mbit/s

95th percentile per-packet one-way delay: 39.624 ms

Loss rate: 0.10%

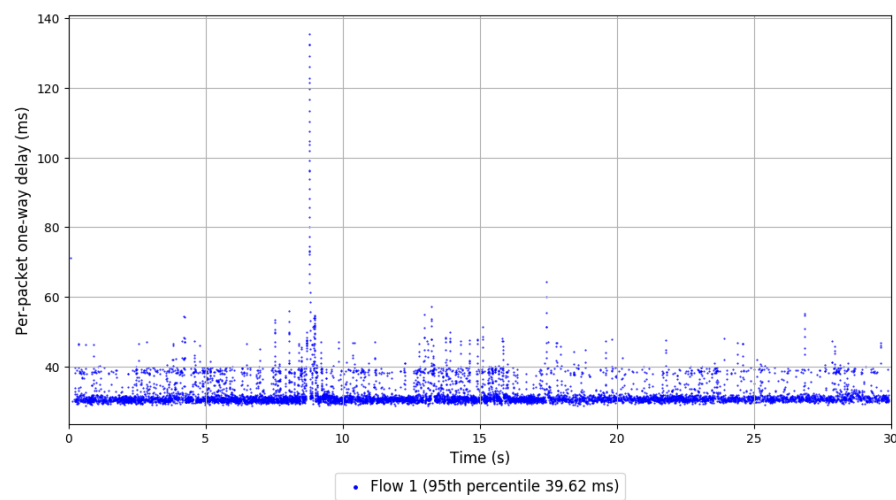
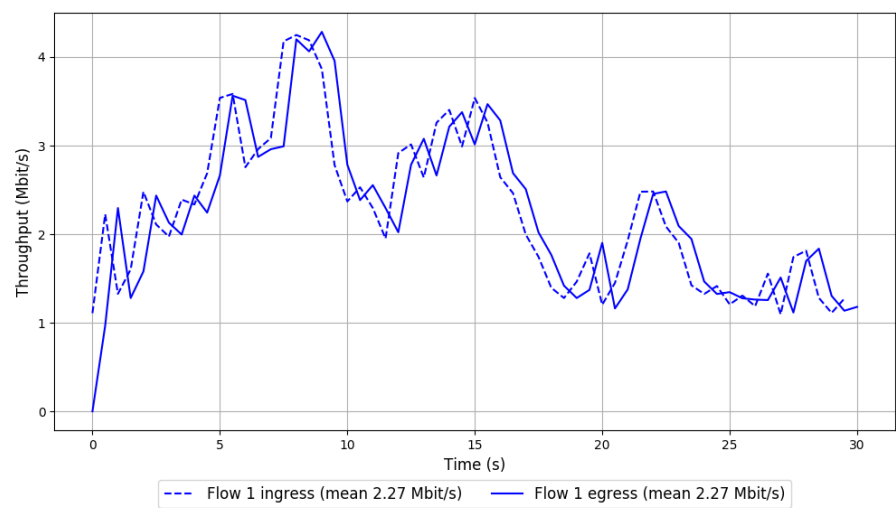
-- Flow 1:

Average throughput: 2.27 Mbit/s

95th percentile per-packet one-way delay: 39.624 ms

Loss rate: 0.10%

Run 3: Report of PCC-Vivace — Data Link



Run 1: Statistics of WebRTC media

Start at: 2019-01-18 17:34:42

End at: 2019-01-18 17:35:12

Local clock offset: -3.592 ms

Remote clock offset: 3.745 ms

Below is generated by plot.py at 2019-01-18 18:48:31

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.09 Mbit/s

95th percentile per-packet one-way delay: 40.462 ms

Loss rate: 0.15%

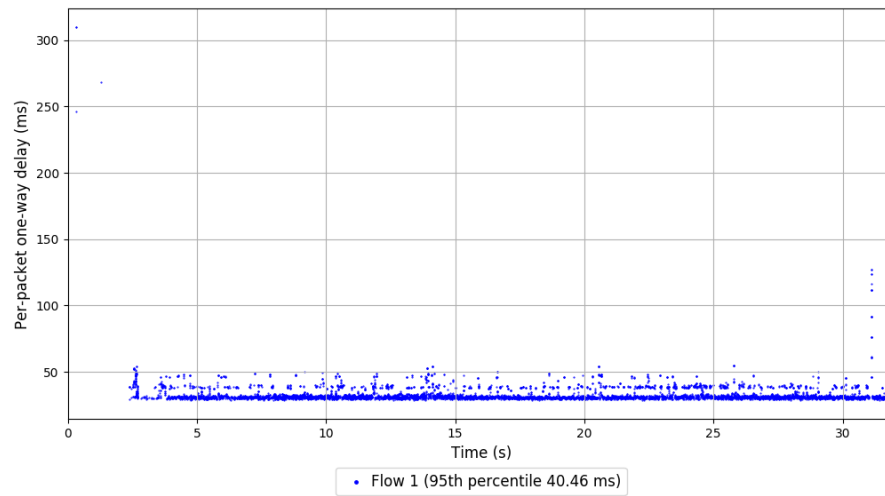
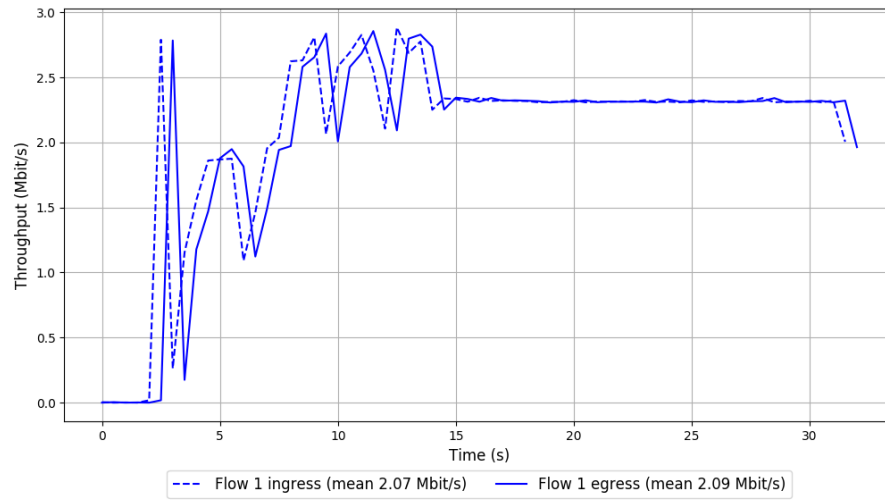
-- Flow 1:

Average throughput: 2.09 Mbit/s

95th percentile per-packet one-way delay: 40.462 ms

Loss rate: 0.15%

Run 1: Report of WebRTC media — Data Link



Run 2: Statistics of WebRTC media

Start at: 2019-01-18 18:00:18

End at: 2019-01-18 18:00:48

Local clock offset: -3.219 ms

Remote clock offset: 7.99 ms

Below is generated by plot.py at 2019-01-18 18:48:31

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 74.386 ms

Loss rate: 0.00%

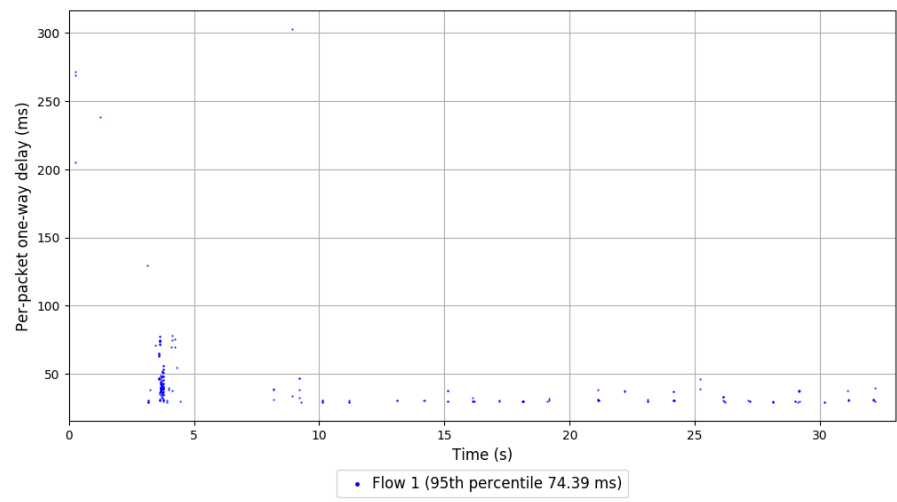
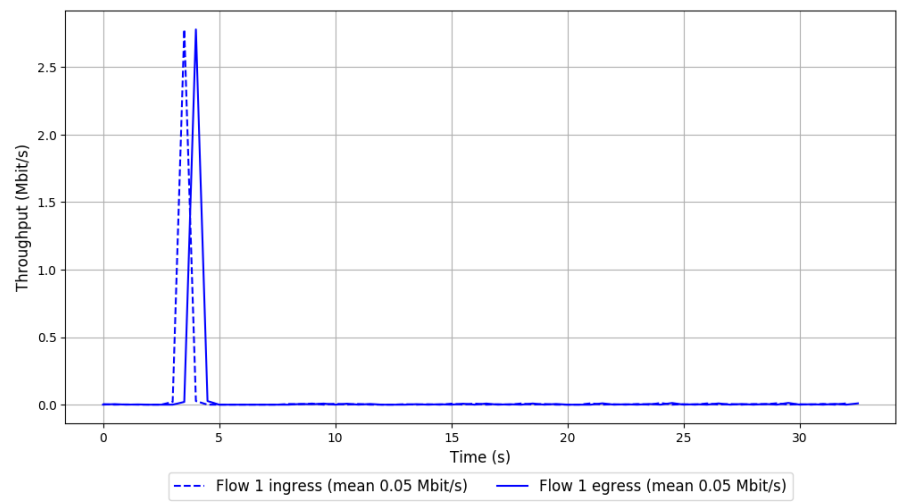
-- Flow 1:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 74.386 ms

Loss rate: 0.00%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2019-01-18 18:25:54

End at: 2019-01-18 18:26:24

Local clock offset: -3.057 ms

Remote clock offset: 11.25 ms

Below is generated by plot.py at 2019-01-18 18:48:31

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 43.819 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 43.819 ms

Loss rate: 0.00%

Run 3: Report of WebRTC media — Data Link

