

Pantheon Report

Generated at 2019-01-02 19:16:20 (UTC).

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

Repeated the test of 19 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

NTP offsets were measured against `nets.org.sg` and have been applied to correct the timestamps in logs.

System info:

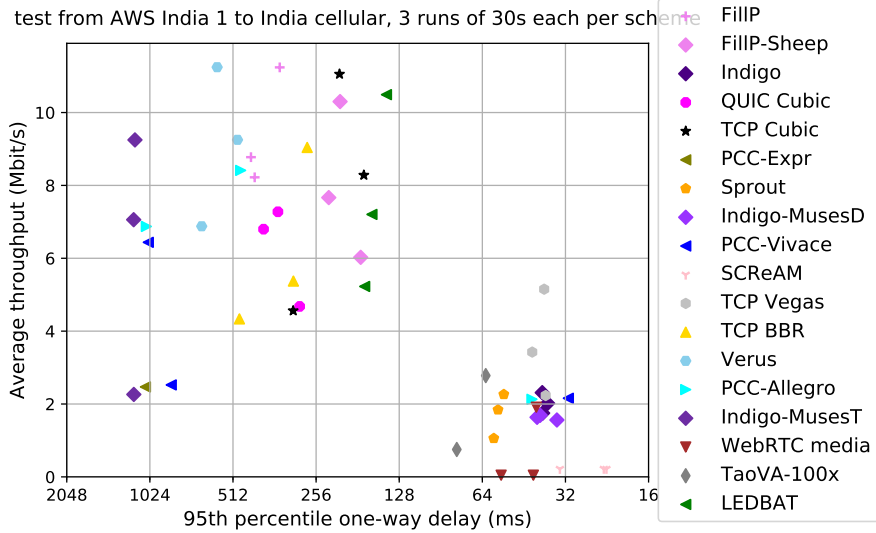
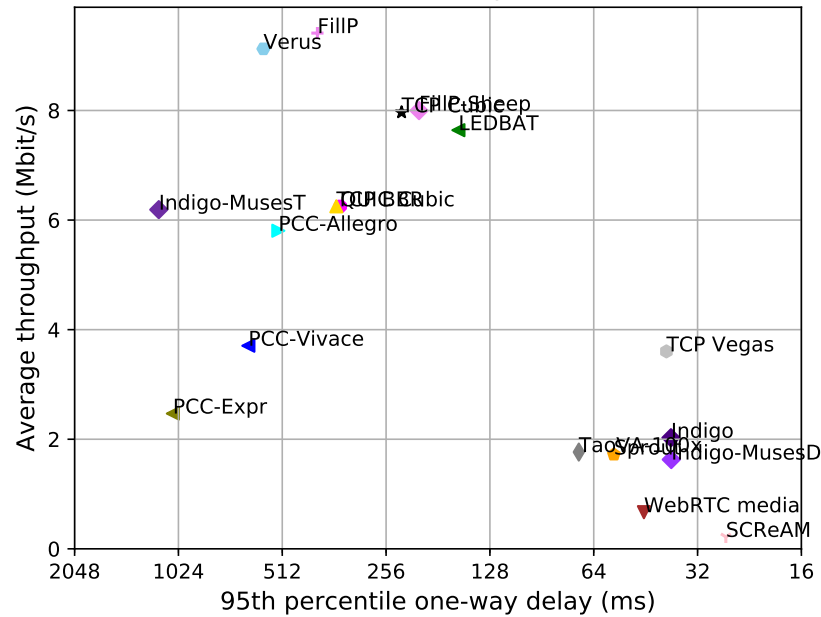
```
Linux 4.15.0-1029-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
```

Git summary:

```
branch: muses @ c654af0b7d59d4ef4b914cfac404e1fc2e96dc68
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfc58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecd90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ 65ac1b19bbefed0c6349ae986009b4fa8643c40a
third_party/muses-refactored @ 31f8f0ba8ef8b1da76c2bc0cd0a7850c33ff64fb
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 India 1 to India 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	6.25	356.78	0.60
Copa	0	N/A	N/A	N/A
TCP Cubic	3	7.97	230.83	0.28
FillP	3	9.41	404.88	0.68
FillP-Sheep	3	8.00	205.49	0.46
Indigo	3	2.03	38.22	0.05
Indigo-MusesD	3	1.63	38.14	0.03
Indigo-MusesT	3	6.19	1167.54	82.05
LEDBAT	3	7.64	157.98	0.23
PCC-Allegro	3	5.80	525.54	6.80
PCC-Expr	1	2.47	1062.80	72.40
QUIC Cubic	3	6.25	347.47	1.04
SCReAM	3	0.22	26.50	0.04
Sprout	3	1.72	55.95	0.06
TaoVA-100x	2	1.76	70.70	55.14
TCP Vegas	3	3.60	39.39	0.06
Verus	3	9.12	580.68	1.55
PCC-Vivace	3	3.71	642.09	2.47
WebRTC media	3	0.67	45.78	0.02

Run 1: Statistics of TCP BBR

Start at: 2019-01-02 18:27:22

End at: 2019-01-02 18:27:52

Local clock offset: 8.585 ms

Remote clock offset: 26.573 ms

Below is generated by plot.py at 2019-01-02 19:15:29

Datalink statistics

-- Total of 1 flow:

Average throughput: 4.34 Mbit/s

95th percentile per-packet one-way delay: 485.245 ms

Loss rate: 0.60%

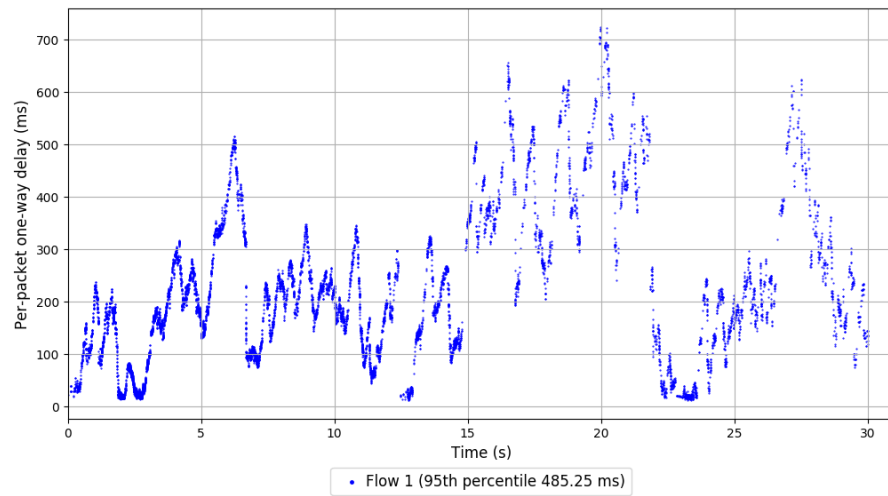
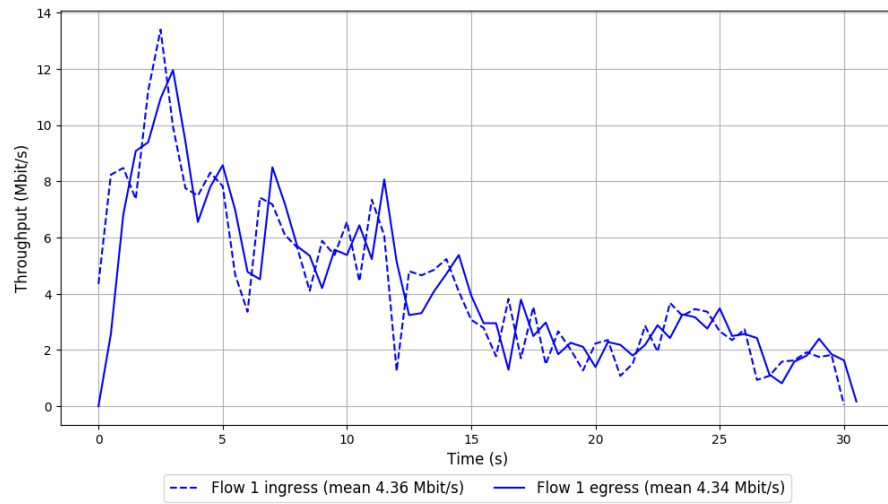
-- Flow 1:

Average throughput: 4.34 Mbit/s

95th percentile per-packet one-way delay: 485.245 ms

Loss rate: 0.60%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2019-01-02 18:48:54

End at: 2019-01-02 18:49:24

Local clock offset: 6.128 ms

Remote clock offset: 9.542 ms

Below is generated by plot.py at 2019-01-02 19:15:30

Datalink statistics

-- Total of 1 flow:

Average throughput: 5.37 Mbit/s

95th percentile per-packet one-way delay: 309.355 ms

Loss rate: 0.48%

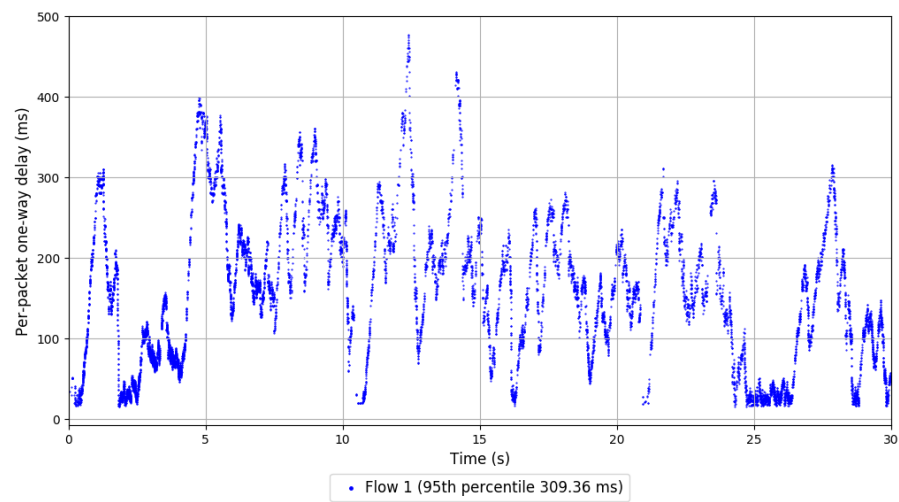
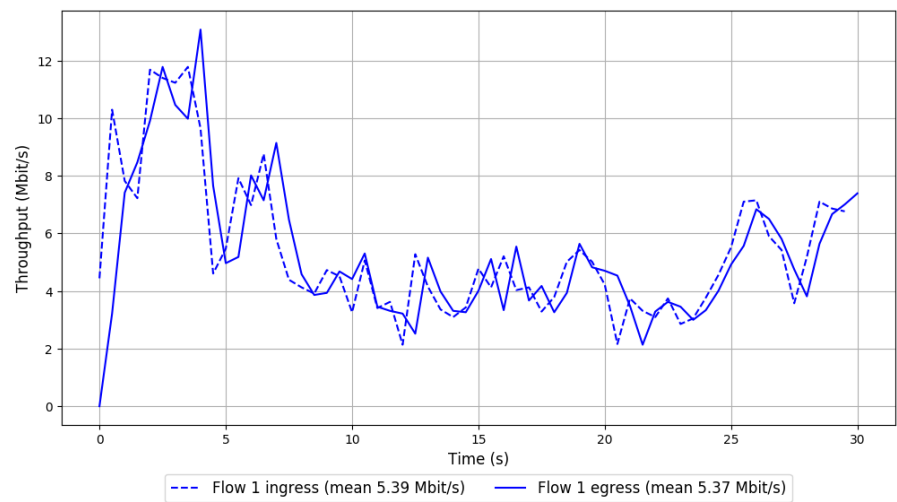
-- Flow 1:

Average throughput: 5.37 Mbit/s

95th percentile per-packet one-way delay: 309.355 ms

Loss rate: 0.48%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2019-01-02 19:10:12

End at: 2019-01-02 19:10:42

Local clock offset: 4.31 ms

Remote clock offset: 2.157 ms

Below is generated by plot.py at 2019-01-02 19:15:34

Datalink statistics

-- Total of 1 flow:

Average throughput: 9.04 Mbit/s

95th percentile per-packet one-way delay: 275.742 ms

Loss rate: 0.72%

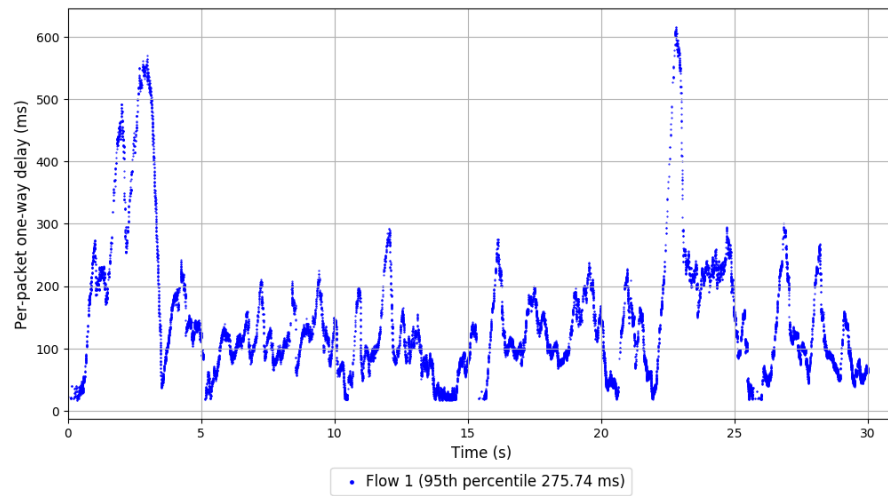
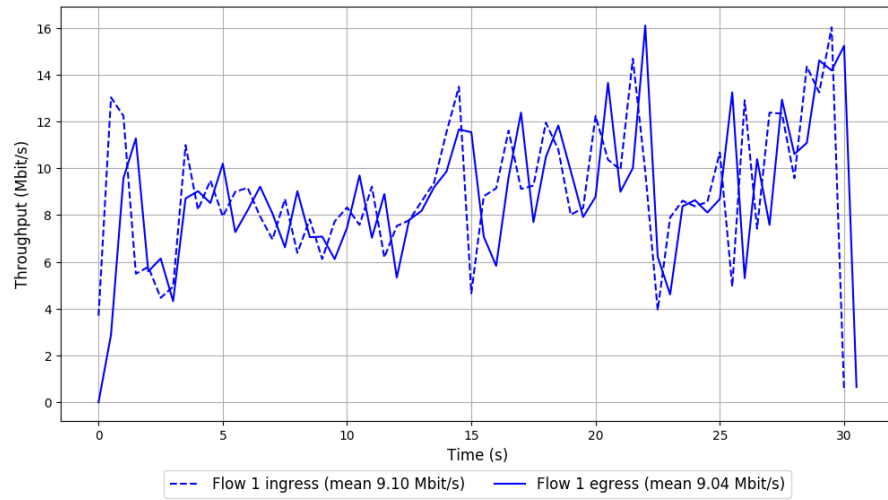
-- Flow 1:

Average throughput: 9.04 Mbit/s

95th percentile per-packet one-way delay: 275.742 ms

Loss rate: 0.72%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

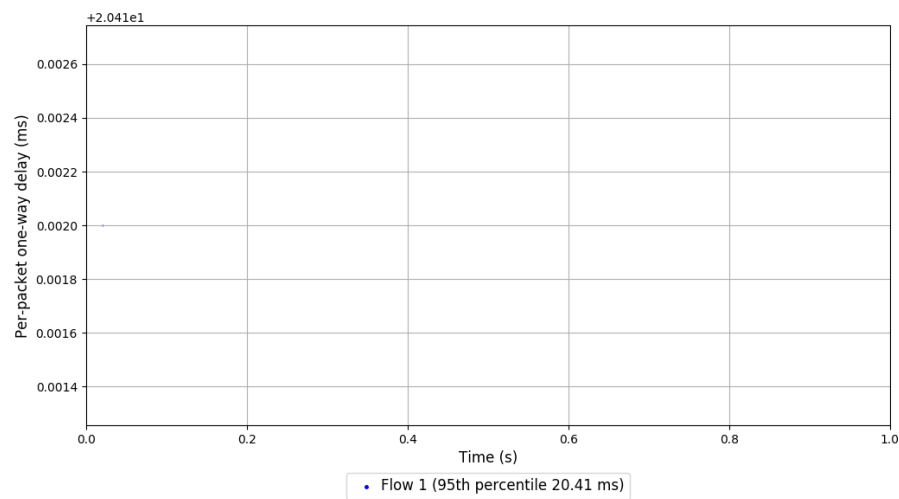
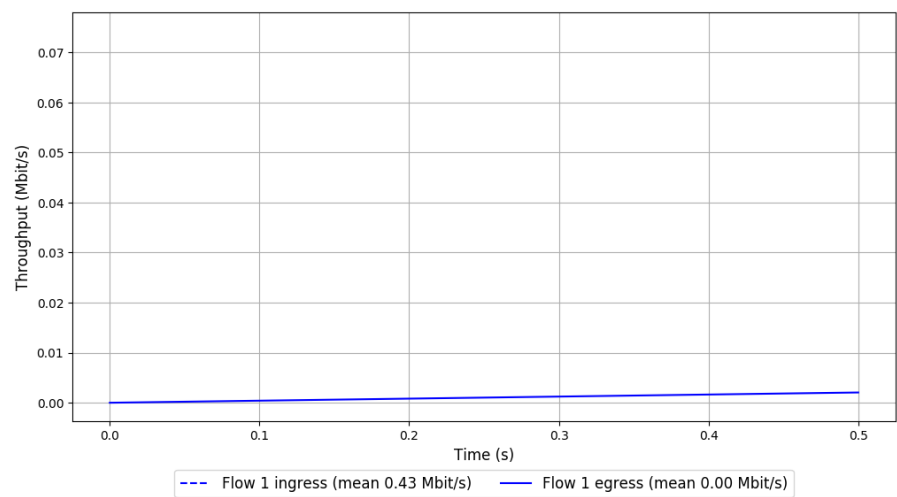
Start at: 2019-01-02 18:23:58

End at: 2019-01-02 18:24:28

Local clock offset: 7.566 ms

Remote clock offset: 26.859 ms

Run 1: Report of Copa — Data Link



Run 2: Statistics of Copa

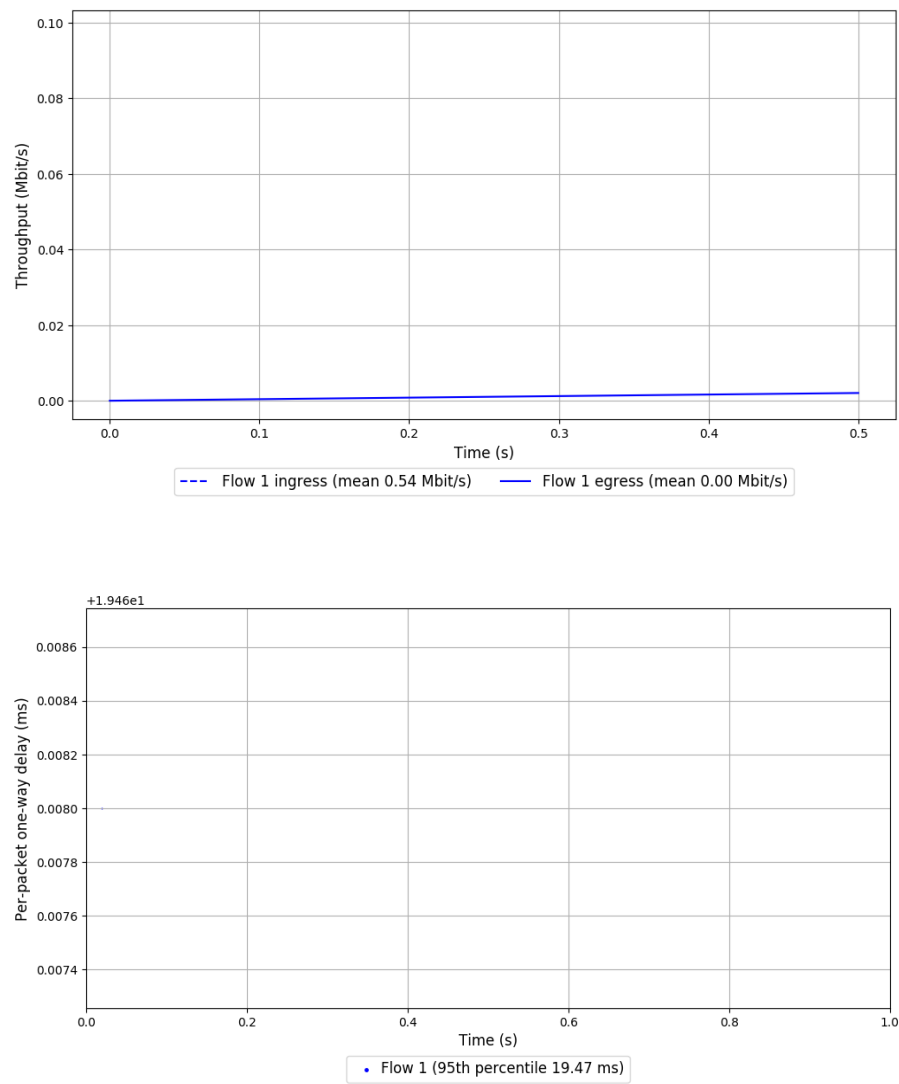
Start at: 2019-01-02 18:45:33

End at: 2019-01-02 18:46:03

Local clock offset: 6.809 ms

Remote clock offset: 10.829 ms

Run 2: Report of Copa — Data Link



Run 3: Statistics of Copa

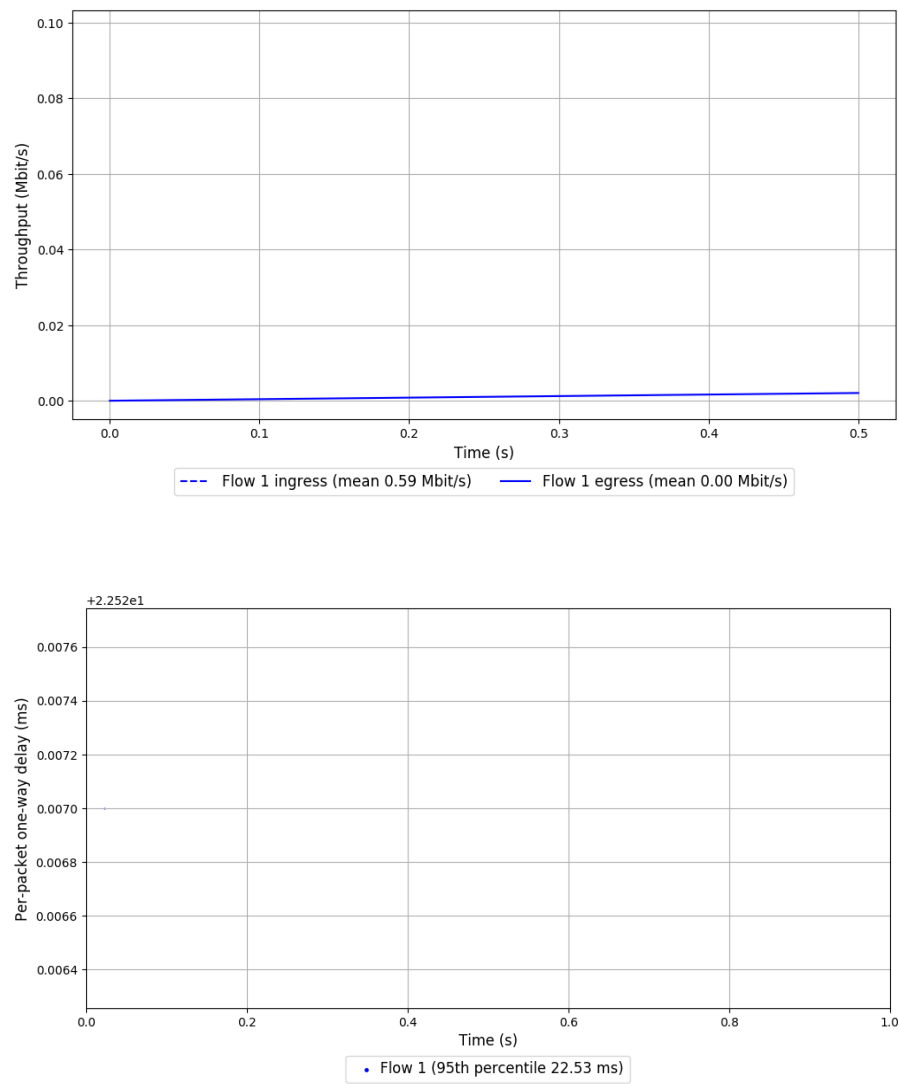
Start at: 2019-01-02 19:06:53

End at: 2019-01-02 19:07:23

Local clock offset: 3.158 ms

Remote clock offset: 2.604 ms

Run 3: Report of Copa — Data Link

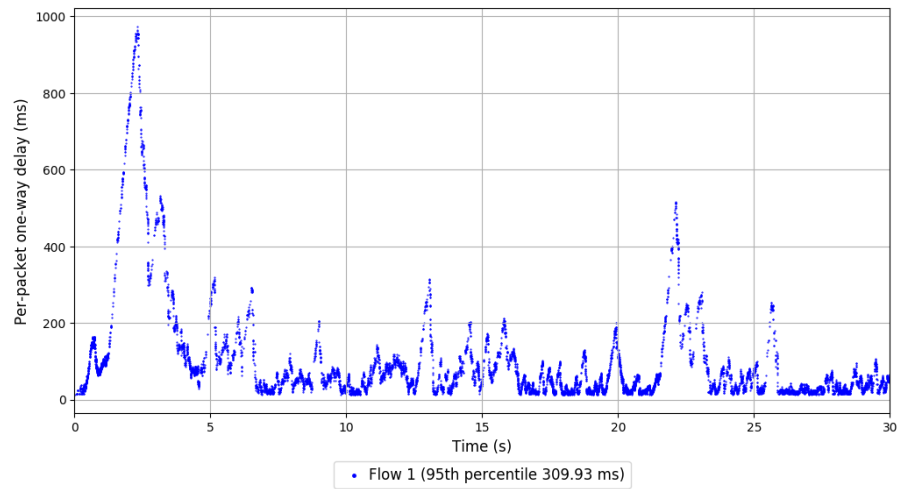
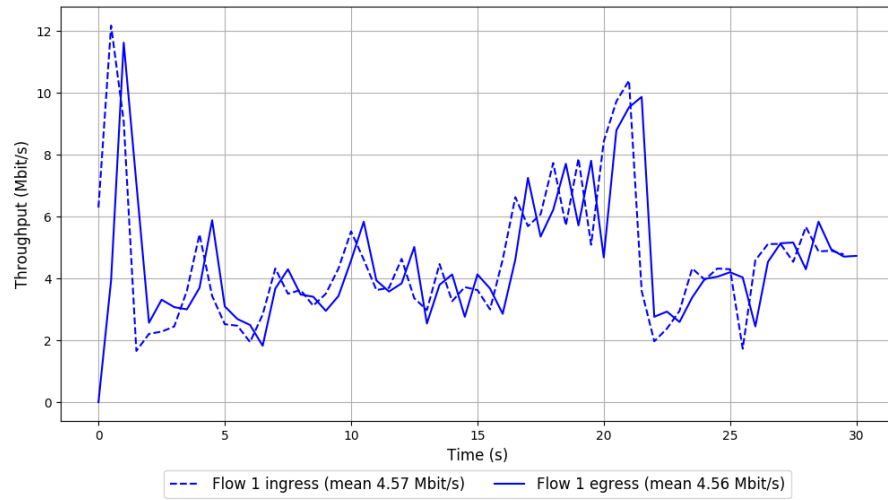


Run 1: Statistics of TCP Cubic

Start at: 2019-01-02 18:21:45
End at: 2019-01-02 18:22:15
Local clock offset: 8.546 ms
Remote clock offset: 27.198 ms

Below is generated by plot.py at 2019-01-02 19:15:34
Datalink statistics
-- Total of 1 flow:
Average throughput: 4.56 Mbit/s
95th percentile per-packet one-way delay: 309.928 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 4.56 Mbit/s
95th percentile per-packet one-way delay: 309.928 ms
Loss rate: 0.31%

Run 1: Report of TCP Cubic — Data Link

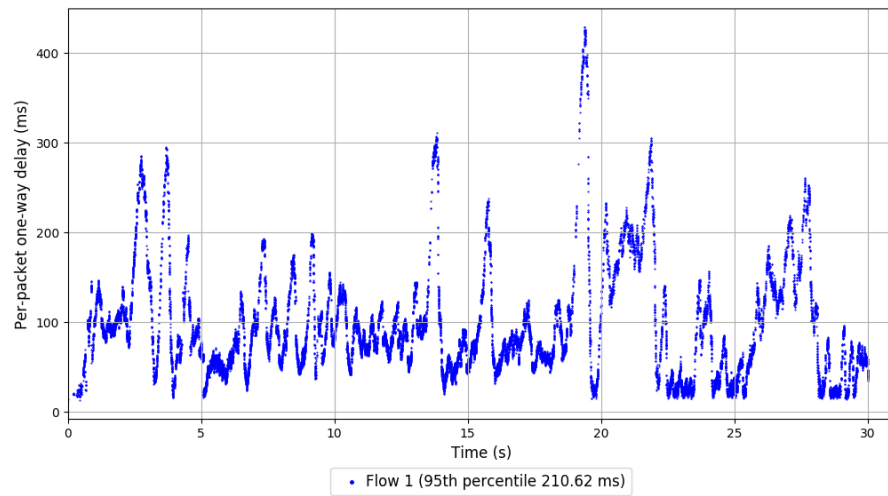
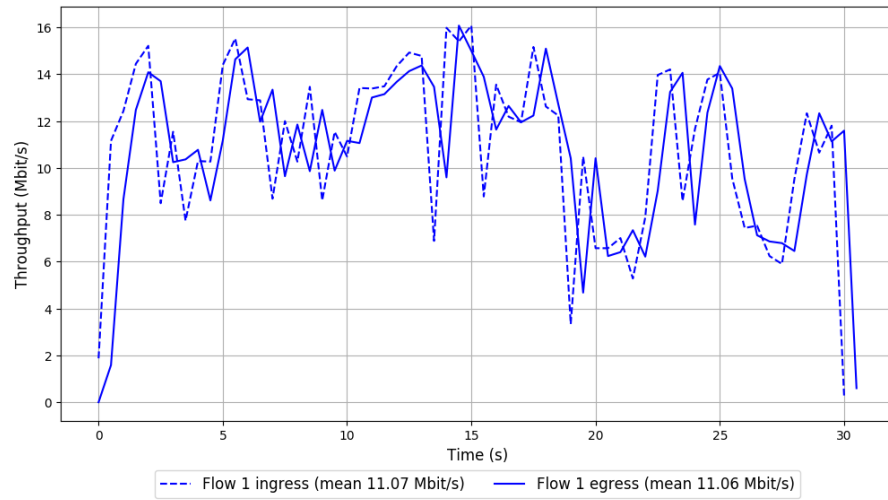


Run 2: Statistics of TCP Cubic

Start at: 2019-01-02 18:43:16
End at: 2019-01-02 18:43:46
Local clock offset: 5.439 ms
Remote clock offset: 13.873 ms

Below is generated by plot.py at 2019-01-02 19:15:37
Datalink statistics
-- Total of 1 flow:
Average throughput: 11.06 Mbit/s
95th percentile per-packet one-way delay: 210.615 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 11.06 Mbit/s
95th percentile per-packet one-way delay: 210.615 ms
Loss rate: 0.14%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2019-01-02 19:04:39

End at: 2019-01-02 19:05:09

Local clock offset: 6.223 ms

Remote clock offset: 2.833 ms

Below is generated by plot.py at 2019-01-02 19:15:37

Datalink statistics

-- Total of 1 flow:

Average throughput: 8.28 Mbit/s

95th percentile per-packet one-way delay: 171.945 ms

Loss rate: 0.40%

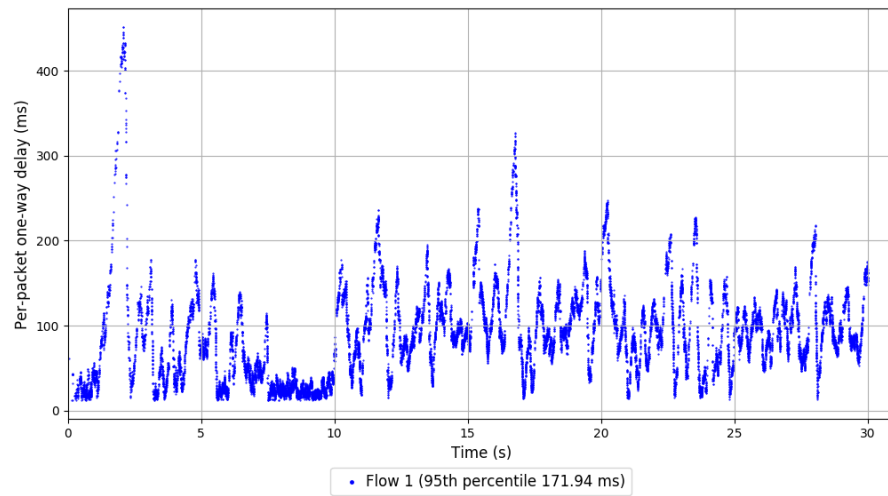
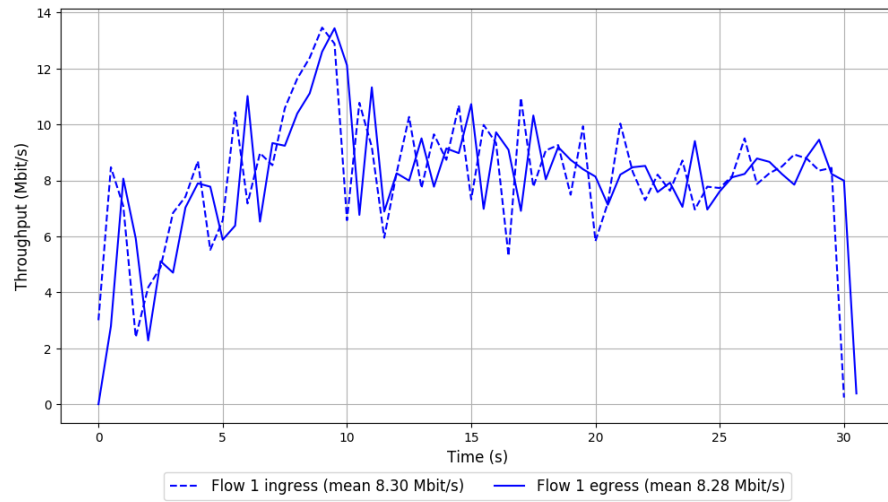
-- Flow 1:

Average throughput: 8.28 Mbit/s

95th percentile per-packet one-way delay: 171.945 ms

Loss rate: 0.40%

Run 3: Report of TCP Cubic — Data Link

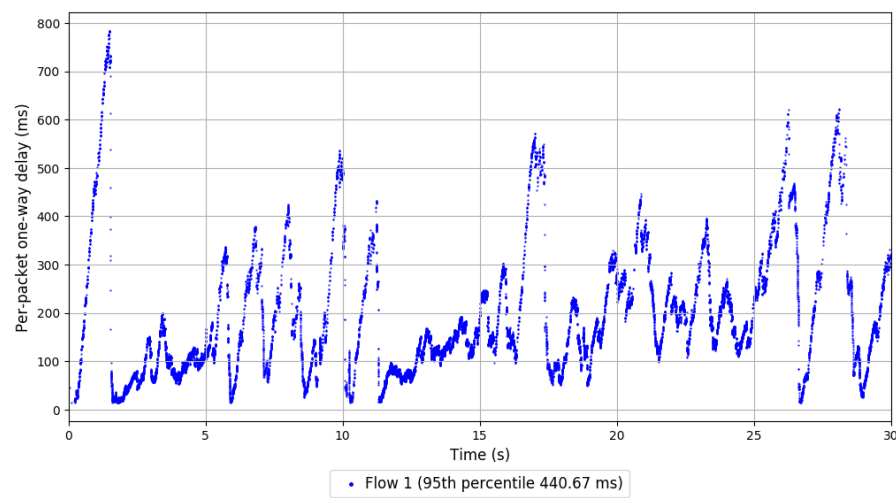
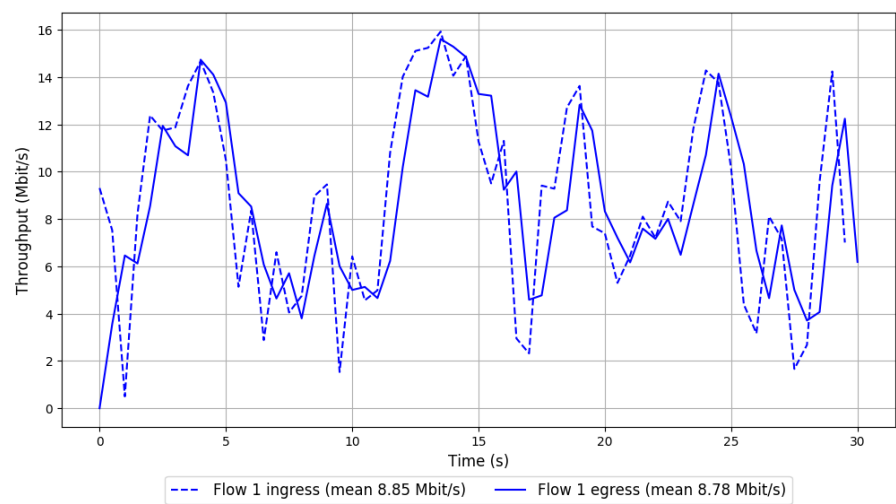


Run 1: Statistics of FillP

Start at: 2019-01-02 18:17:13
End at: 2019-01-02 18:17:43
Local clock offset: 6.212 ms
Remote clock offset: 28.261 ms

Below is generated by plot.py at 2019-01-02 19:15:38
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.78 Mbit/s
95th percentile per-packet one-way delay: 440.668 ms
Loss rate: 0.95%
-- Flow 1:
Average throughput: 8.78 Mbit/s
95th percentile per-packet one-way delay: 440.668 ms
Loss rate: 0.95%

Run 1: Report of FillP — Data Link

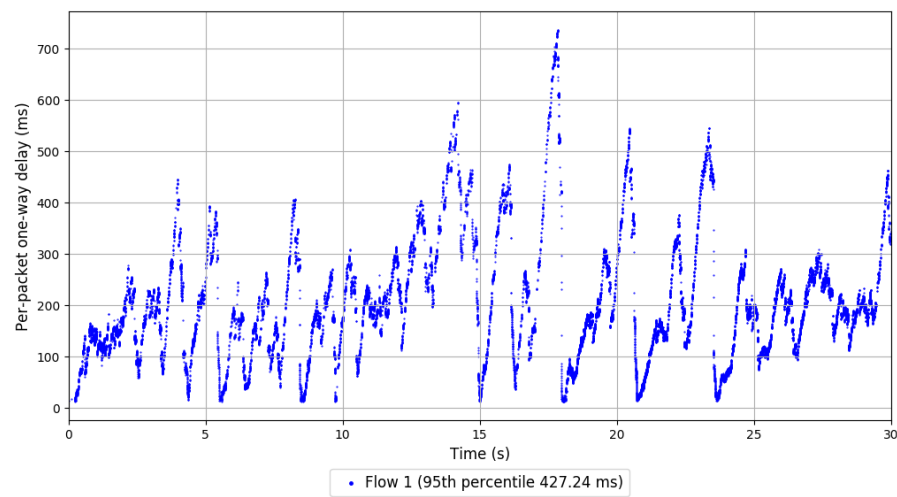
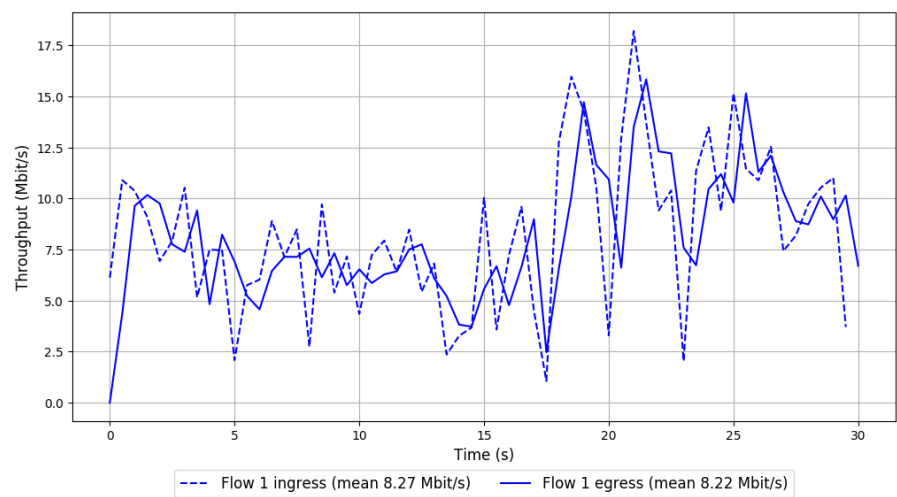


Run 2: Statistics of FillP

Start at: 2019-01-02 18:38:38
End at: 2019-01-02 18:39:08
Local clock offset: 5.853 ms
Remote clock offset: 17.778 ms

Below is generated by plot.py at 2019-01-02 19:15:38
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.22 Mbit/s
95th percentile per-packet one-way delay: 427.239 ms
Loss rate: 0.61%
-- Flow 1:
Average throughput: 8.22 Mbit/s
95th percentile per-packet one-way delay: 427.239 ms
Loss rate: 0.61%

Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

Start at: 2019-01-02 19:00:07

End at: 2019-01-02 19:00:37

Local clock offset: 4.744 ms

Remote clock offset: 3.908 ms

Below is generated by plot.py at 2019-01-02 19:15:47

Datalink statistics

-- Total of 1 flow:

Average throughput: 11.24 Mbit/s

95th percentile per-packet one-way delay: 346.734 ms

Loss rate: 0.49%

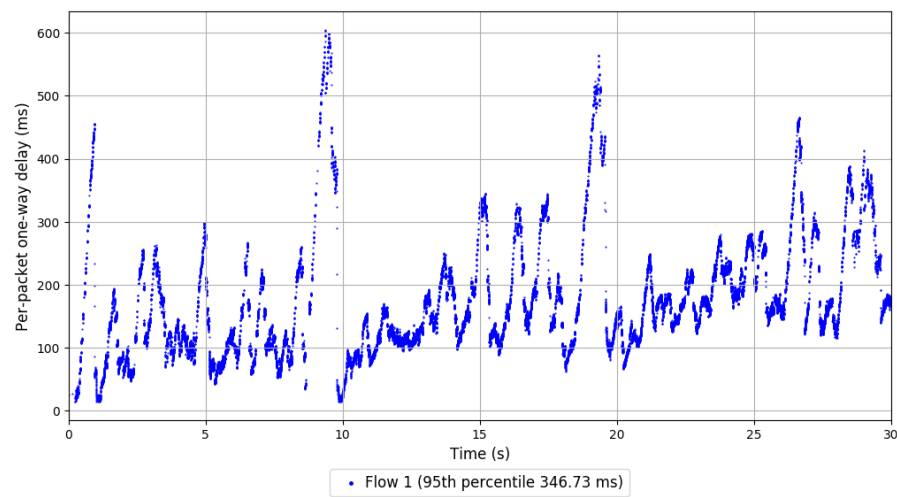
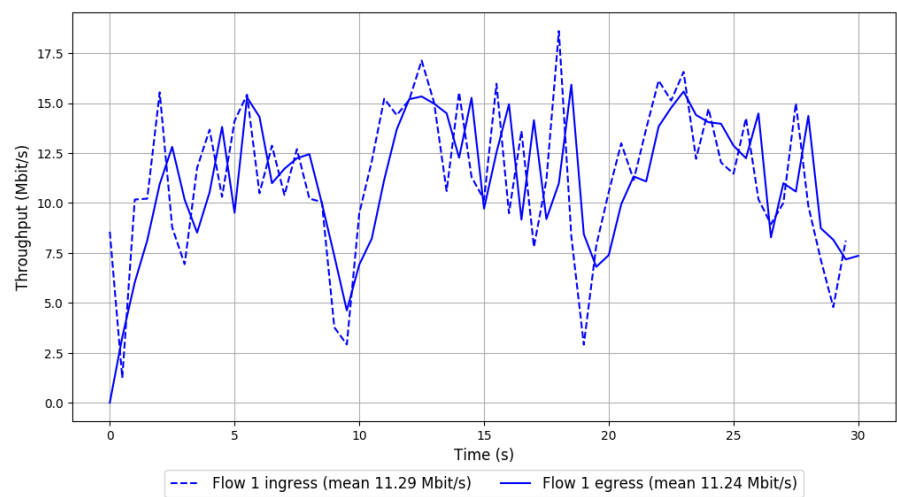
-- Flow 1:

Average throughput: 11.24 Mbit/s

95th percentile per-packet one-way delay: 346.734 ms

Loss rate: 0.49%

Run 3: Report of FillP — Data Link



Run 1: Statistics of FillP-Sheep

Start at: 2019-01-02 18:19:30

End at: 2019-01-02 18:20:00

Local clock offset: 7.102 ms

Remote clock offset: 27.91 ms

Below is generated by plot.py at 2019-01-02 19:15:47

Datalink statistics

-- Total of 1 flow:

Average throughput: 7.67 Mbit/s

95th percentile per-packet one-way delay: 230.363 ms

Loss rate: 0.10%

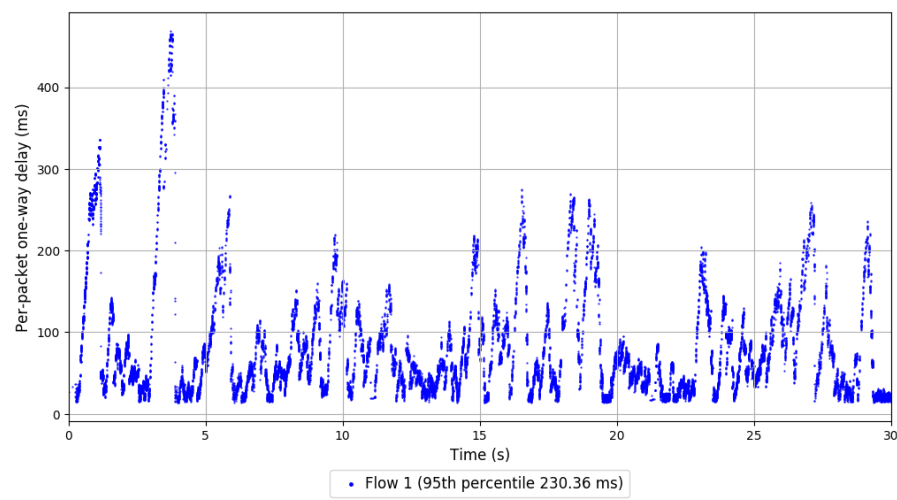
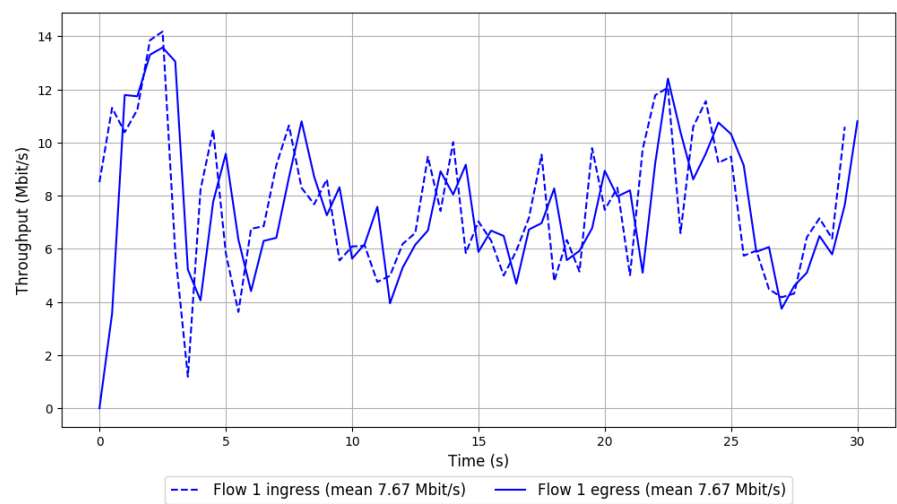
-- Flow 1:

Average throughput: 7.67 Mbit/s

95th percentile per-packet one-way delay: 230.363 ms

Loss rate: 0.10%

Run 1: Report of FillP-Sheep — Data Link

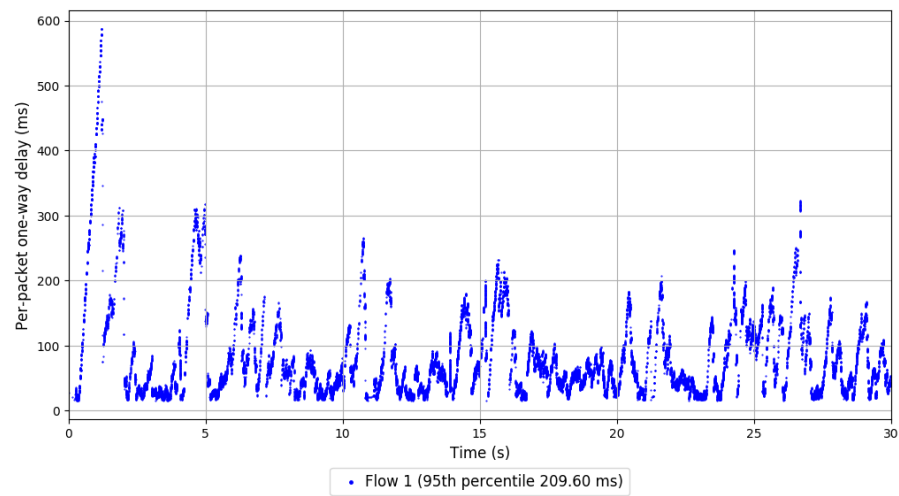
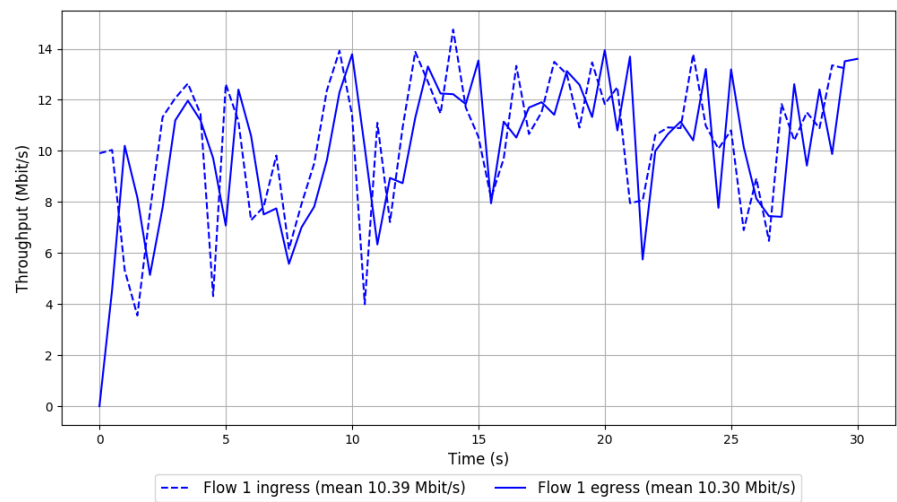


Run 2: Statistics of FillP-Sheep

Start at: 2019-01-02 18:40:54
End at: 2019-01-02 18:41:24
Local clock offset: 4.182 ms
Remote clock offset: 15.836 ms

Below is generated by plot.py at 2019-01-02 19:15:47
Datalink statistics
-- Total of 1 flow:
Average throughput: 10.30 Mbit/s
95th percentile per-packet one-way delay: 209.598 ms
Loss rate: 0.94%
-- Flow 1:
Average throughput: 10.30 Mbit/s
95th percentile per-packet one-way delay: 209.598 ms
Loss rate: 0.94%

Run 2: Report of FillP-Sheep — Data Link



Run 3: Statistics of FillP-Sheep

Start at: 2019-01-02 19:02:21

End at: 2019-01-02 19:02:51

Local clock offset: 5.512 ms

Remote clock offset: 2.925 ms

Below is generated by plot.py at 2019-01-02 19:15:47

Datalink statistics

-- Total of 1 flow:

Average throughput: 6.03 Mbit/s

95th percentile per-packet one-way delay: 176.495 ms

Loss rate: 0.35%

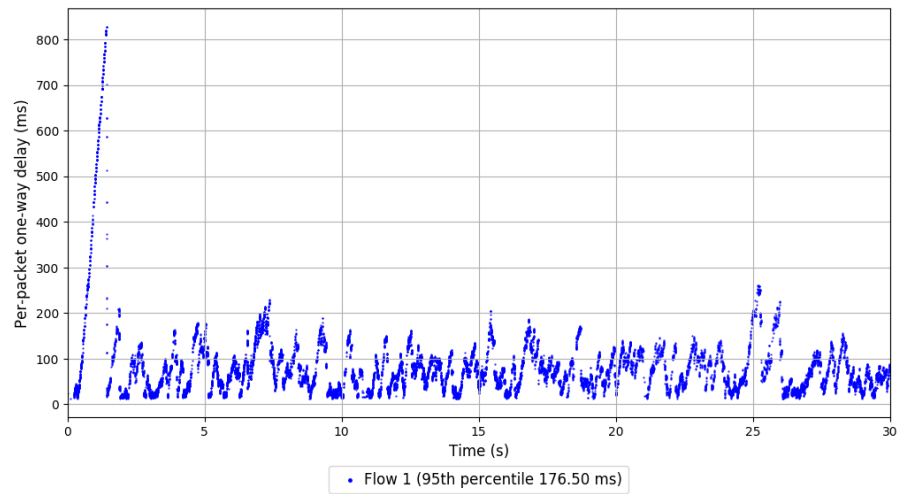
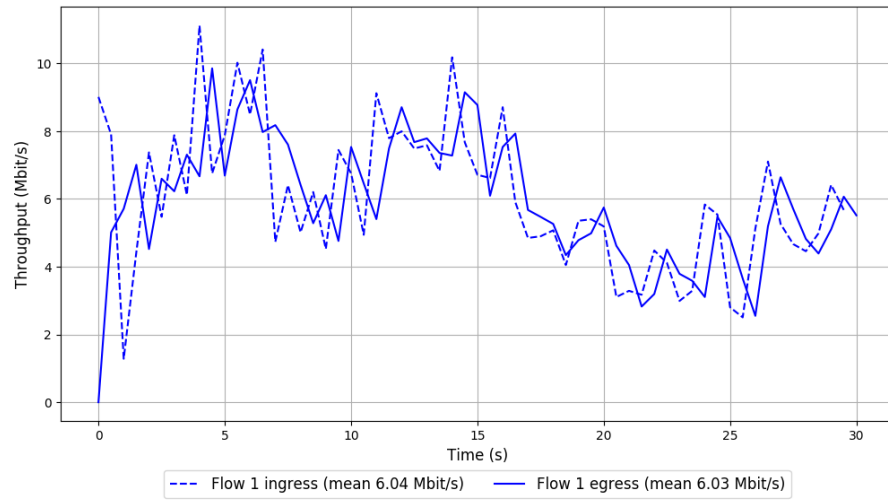
-- Flow 1:

Average throughput: 6.03 Mbit/s

95th percentile per-packet one-way delay: 176.495 ms

Loss rate: 0.35%

Run 3: Report of FillP-Sheep — Data Link

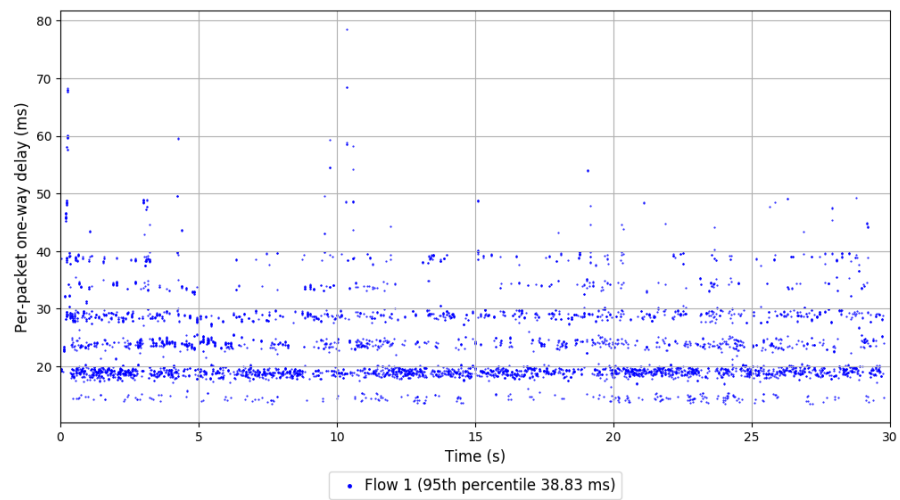
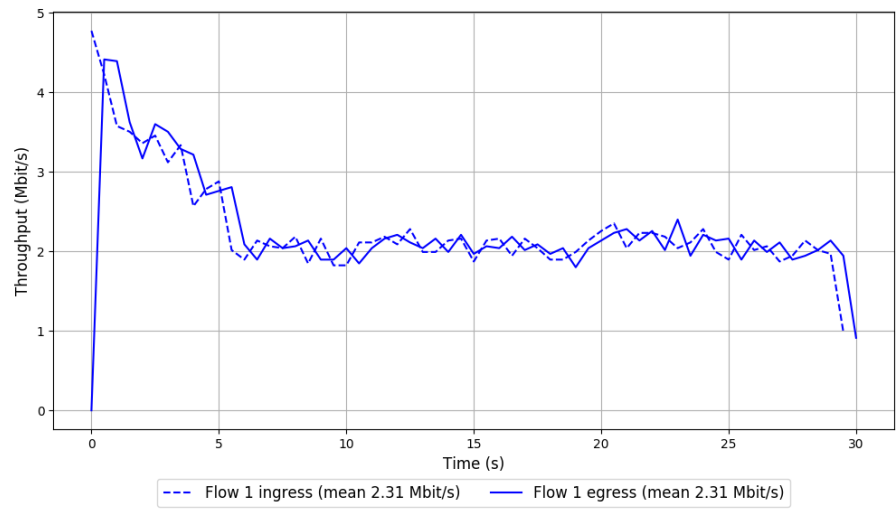


Run 1: Statistics of Indigo

Start at: 2019-01-02 18:20:37
End at: 2019-01-02 18:21:07
Local clock offset: 7.222 ms
Remote clock offset: 27.368 ms

Below is generated by plot.py at 2019-01-02 19:15:47
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.31 Mbit/s
95th percentile per-packet one-way delay: 38.828 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 2.31 Mbit/s
95th percentile per-packet one-way delay: 38.828 ms
Loss rate: 0.09%

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2019-01-02 18:42:10

End at: 2019-01-02 18:42:40

Local clock offset: 5.598 ms

Remote clock offset: 14.56 ms

Below is generated by plot.py at 2019-01-02 19:15:47

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.02 Mbit/s

95th percentile per-packet one-way delay: 37.130 ms

Loss rate: 0.04%

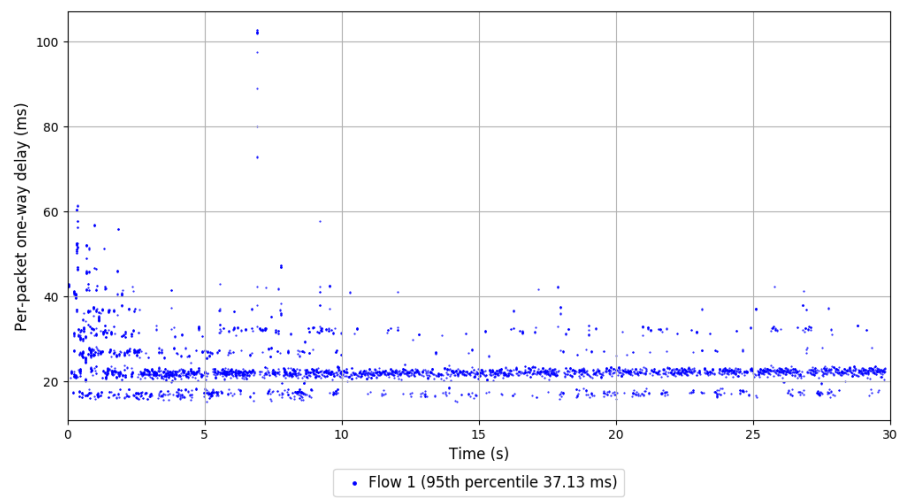
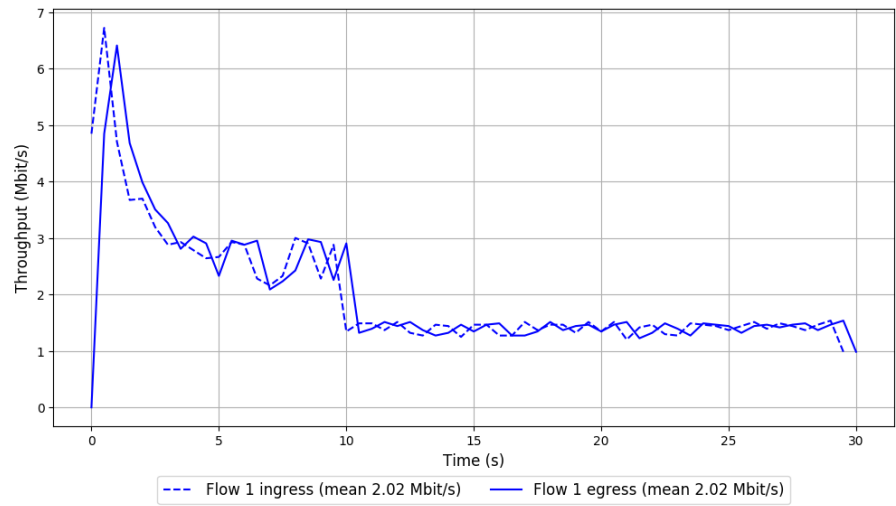
-- Flow 1:

Average throughput: 2.02 Mbit/s

95th percentile per-packet one-way delay: 37.130 ms

Loss rate: 0.04%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2019-01-02 19:03:28

End at: 2019-01-02 19:03:58

Local clock offset: 3.684 ms

Remote clock offset: 3.43 ms

Below is generated by plot.py at 2019-01-02 19:15:47

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.75 Mbit/s

95th percentile per-packet one-way delay: 38.706 ms

Loss rate: 0.02%

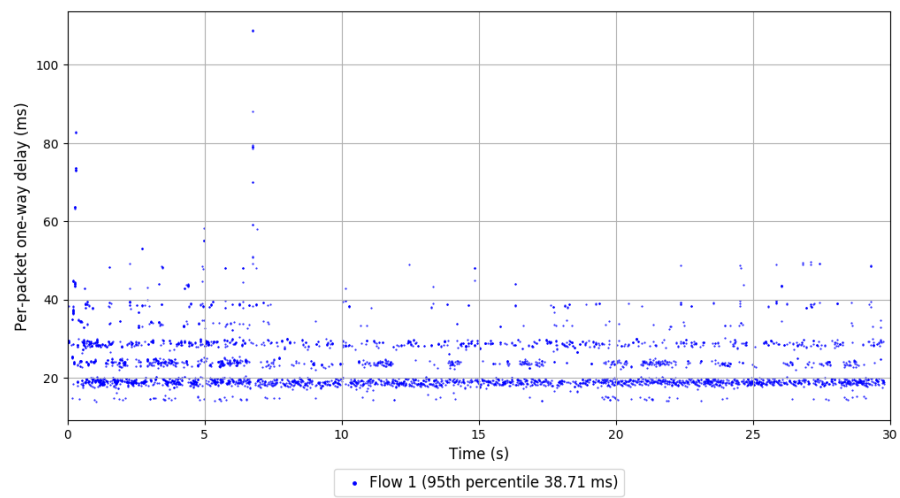
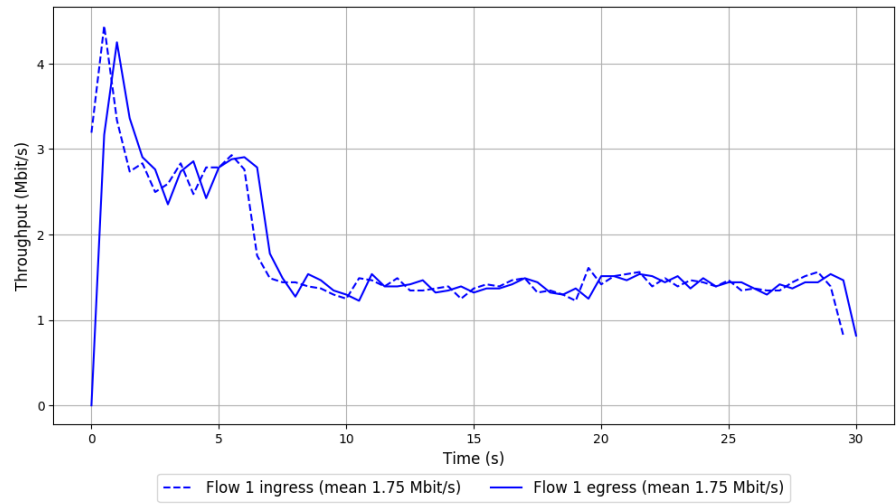
-- Flow 1:

Average throughput: 1.75 Mbit/s

95th percentile per-packet one-way delay: 38.706 ms

Loss rate: 0.02%

Run 3: Report of Indigo — Data Link

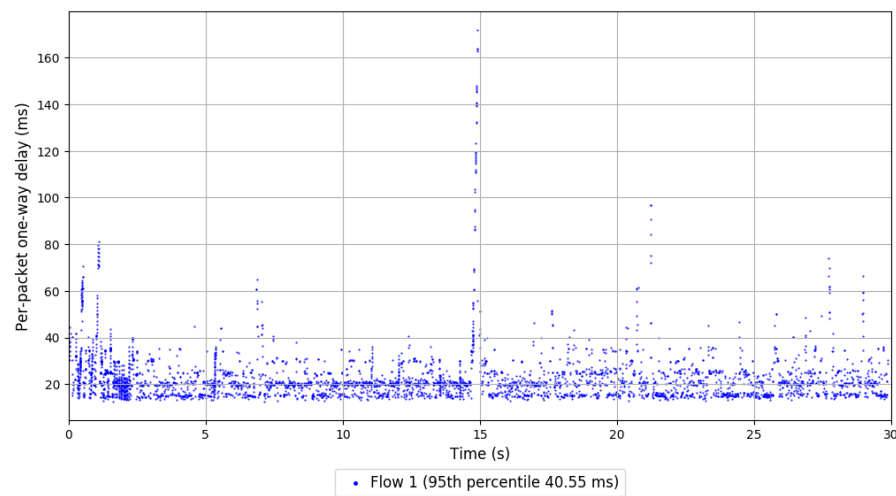
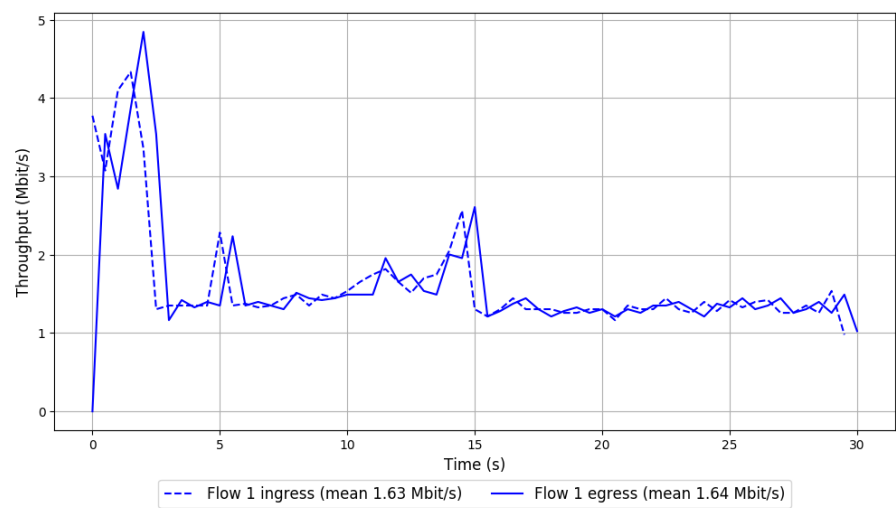



```
Run 1: Statistics of Indigo-MusesD

Start at: 2019-01-02 18:22:52
End at: 2019-01-02 18:23:22
Local clock offset: 9.166 ms
Remote clock offset: 27.051 ms

# Below is generated by plot.py at 2019-01-02 19:15:47
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.64 Mbit/s
95th percentile per-packet one-way delay: 40.550 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.64 Mbit/s
95th percentile per-packet one-way delay: 40.550 ms
Loss rate: 0.00%
```

Run 1: Report of Indigo-MusesD — Data Link



Run 2: Statistics of Indigo-MusesD

Start at: 2019-01-02 18:44:27

End at: 2019-01-02 18:44:57

Local clock offset: 4.032 ms

Remote clock offset: 12.485 ms

Below is generated by plot.py at 2019-01-02 19:15:47

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.56 Mbit/s

95th percentile per-packet one-way delay: 34.367 ms

Loss rate: 0.05%

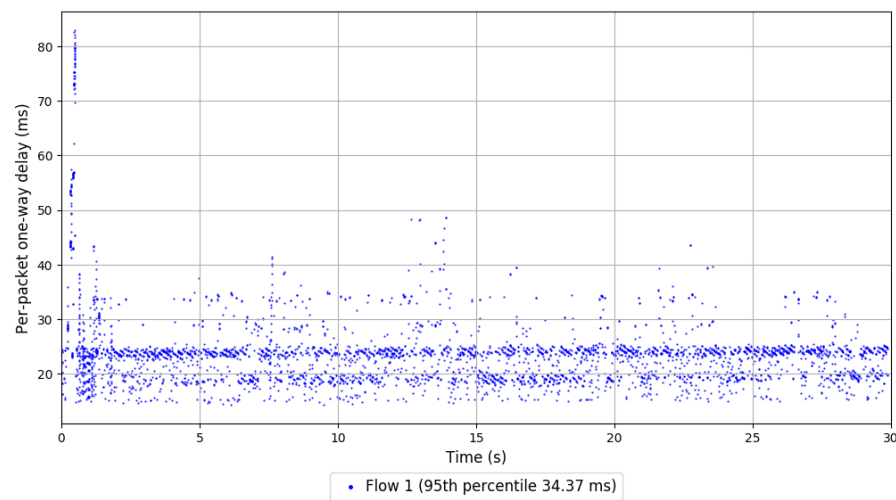
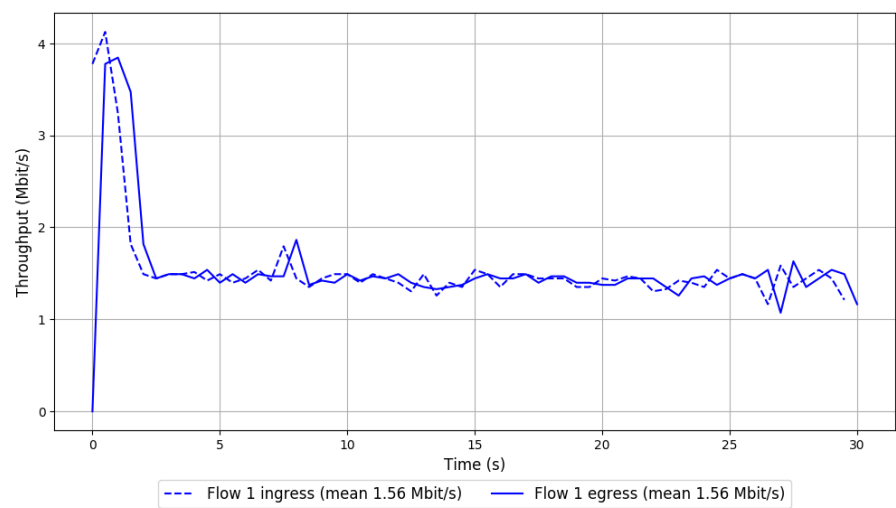
-- Flow 1:

Average throughput: 1.56 Mbit/s

95th percentile per-packet one-way delay: 34.367 ms

Loss rate: 0.05%

Run 2: Report of Indigo-MusesD — Data Link



Run 3: Statistics of Indigo-MusesD

Start at: 2019-01-02 19:05:47

End at: 2019-01-02 19:06:17

Local clock offset: 3.291 ms

Remote clock offset: 2.585 ms

Below is generated by plot.py at 2019-01-02 19:15:47

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.69 Mbit/s

95th percentile per-packet one-way delay: 39.511 ms

Loss rate: 0.05%

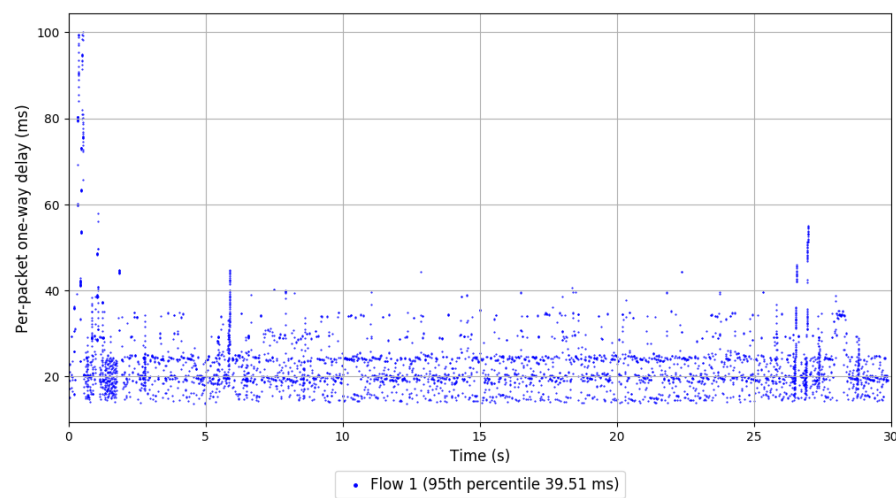
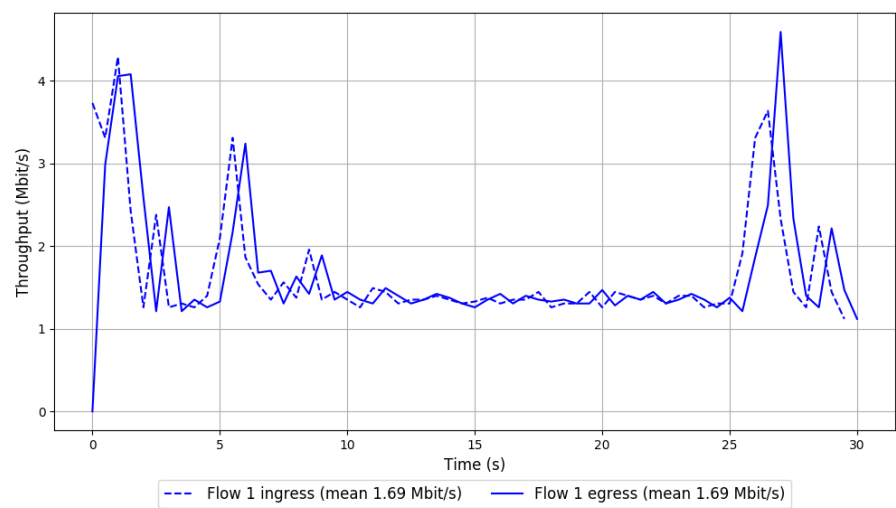
-- Flow 1:

Average throughput: 1.69 Mbit/s

95th percentile per-packet one-way delay: 39.511 ms

Loss rate: 0.05%

Run 3: Report of Indigo-MusesD — Data Link



Run 1: Statistics of Indigo-MusesT

Start at: 2019-01-02 18:11:36

End at: 2019-01-02 18:12:06

Local clock offset: 7.511 ms

Remote clock offset: 30.437 ms

Below is generated by plot.py at 2019-01-02 19:15:50

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.26 Mbit/s

95th percentile per-packet one-way delay: 1170.726 ms

Loss rate: 90.30%

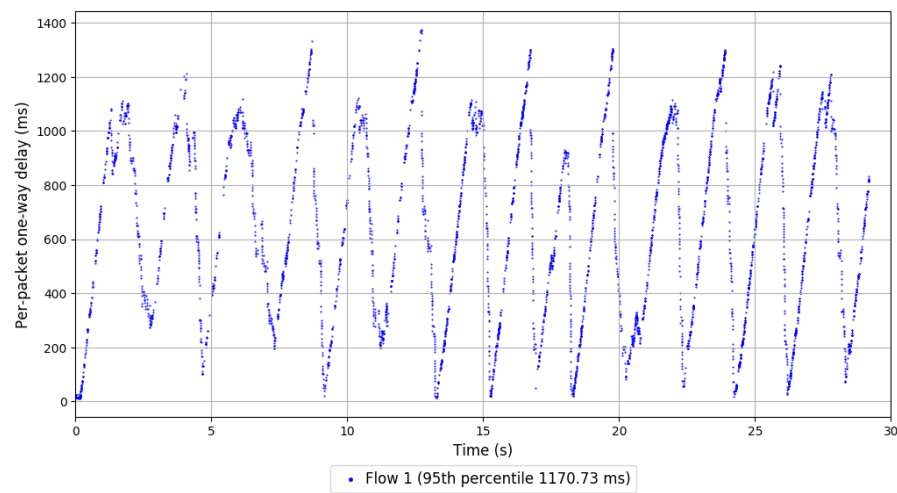
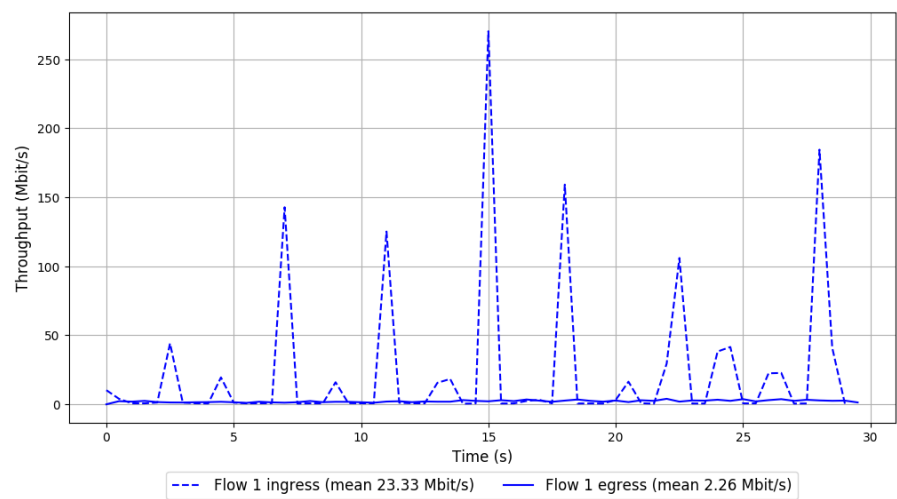
-- Flow 1:

Average throughput: 2.26 Mbit/s

95th percentile per-packet one-way delay: 1170.726 ms

Loss rate: 90.30%

Run 1: Report of Indigo-MusesT — Data Link



Run 2: Statistics of Indigo-MusesT

Start at: 2019-01-02 18:32:59

End at: 2019-01-02 18:33:29

Local clock offset: 7.3 ms

Remote clock offset: 25.783 ms

Below is generated by plot.py at 2019-01-02 19:16:00

Datalink statistics

-- Total of 1 flow:

Average throughput: 7.06 Mbit/s

95th percentile per-packet one-way delay: 1172.210 ms

Loss rate: 78.05%

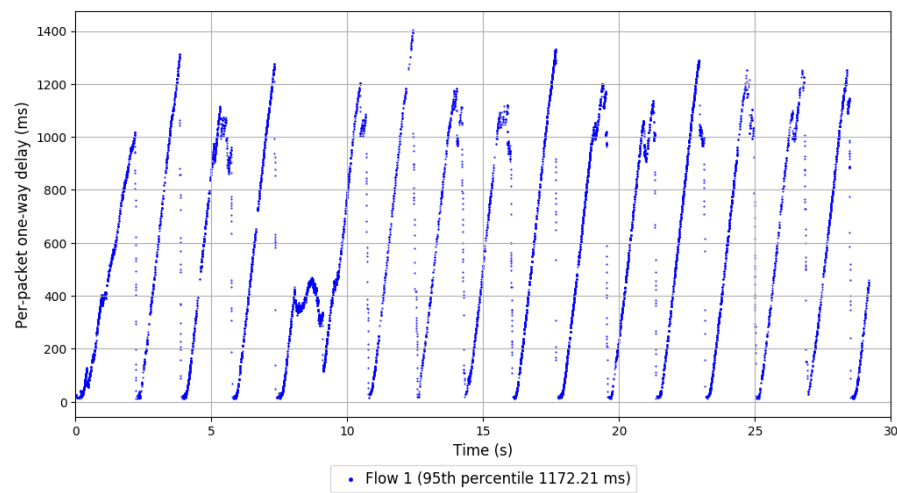
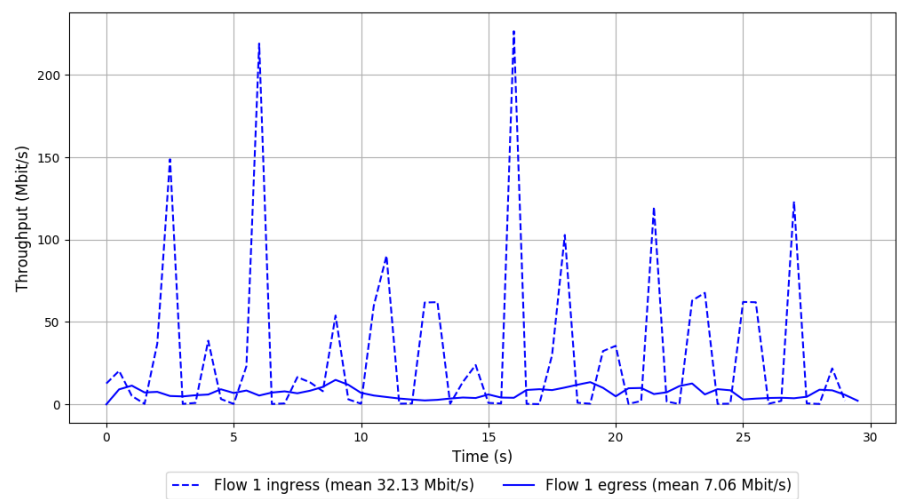
-- Flow 1:

Average throughput: 7.06 Mbit/s

95th percentile per-packet one-way delay: 1172.210 ms

Loss rate: 78.05%

Run 2: Report of Indigo-MusesT — Data Link



Run 3: Statistics of Indigo-MusesT

Start at: 2019-01-02 18:54:31

End at: 2019-01-02 18:55:01

Local clock offset: 6.793 ms

Remote clock offset: 4.397 ms

Below is generated by plot.py at 2019-01-02 19:16:08

Datalink statistics

-- Total of 1 flow:

Average throughput: 9.25 Mbit/s

95th percentile per-packet one-way delay: 1159.677 ms

Loss rate: 77.79%

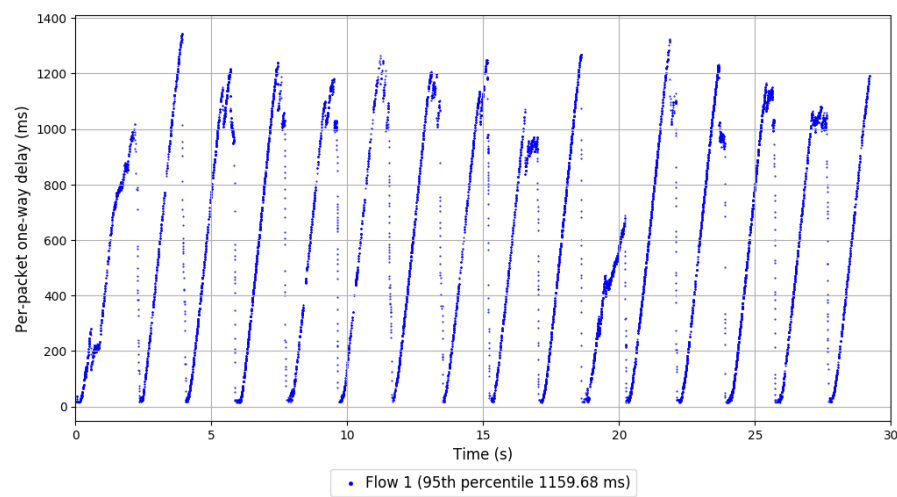
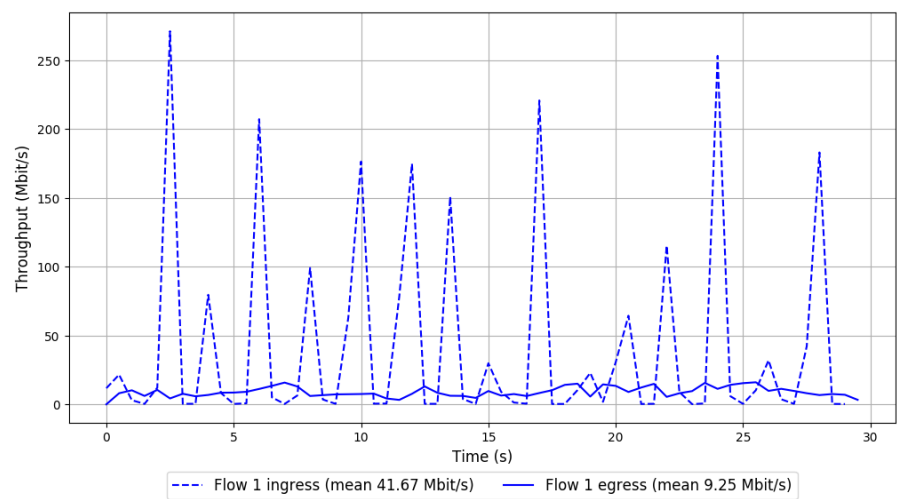
-- Flow 1:

Average throughput: 9.25 Mbit/s

95th percentile per-packet one-way delay: 1159.677 ms

Loss rate: 77.79%

Run 3: Report of Indigo-MusesT — Data Link

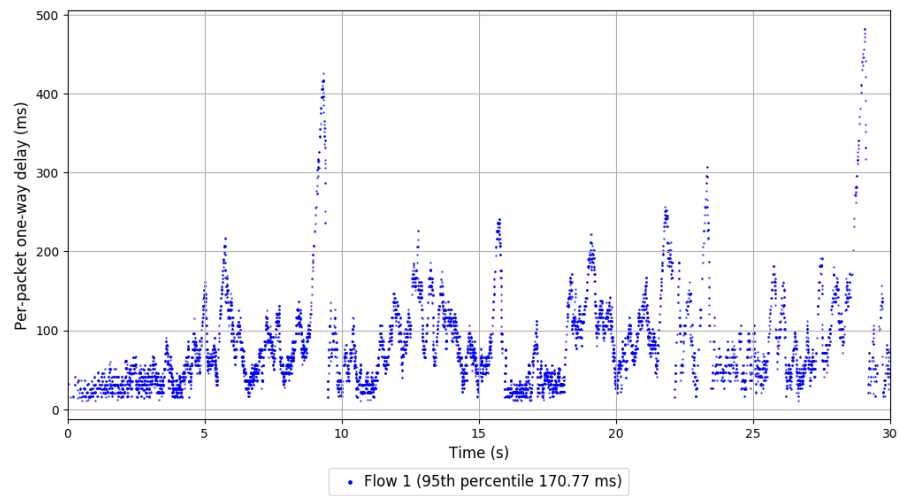
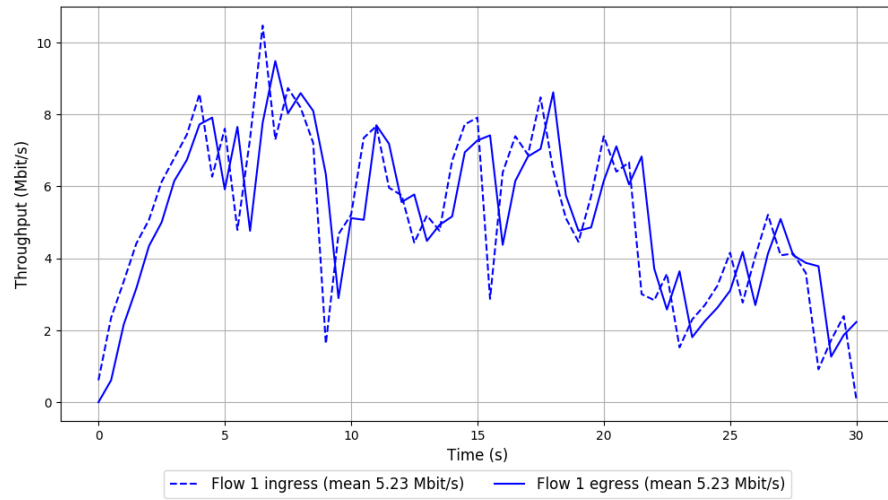


```
Run 1: Statistics of LEDBAT

Start at: 2019-01-02 18:14:56
End at: 2019-01-02 18:15:26
Local clock offset: 7.977 ms
Remote clock offset: 29.004 ms

# Below is generated by plot.py at 2019-01-02 19:16:08
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.23 Mbit/s
95th percentile per-packet one-way delay: 170.767 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 5.23 Mbit/s
95th percentile per-packet one-way delay: 170.767 ms
Loss rate: 0.21%
```

Run 1: Report of LEDBAT — Data Link

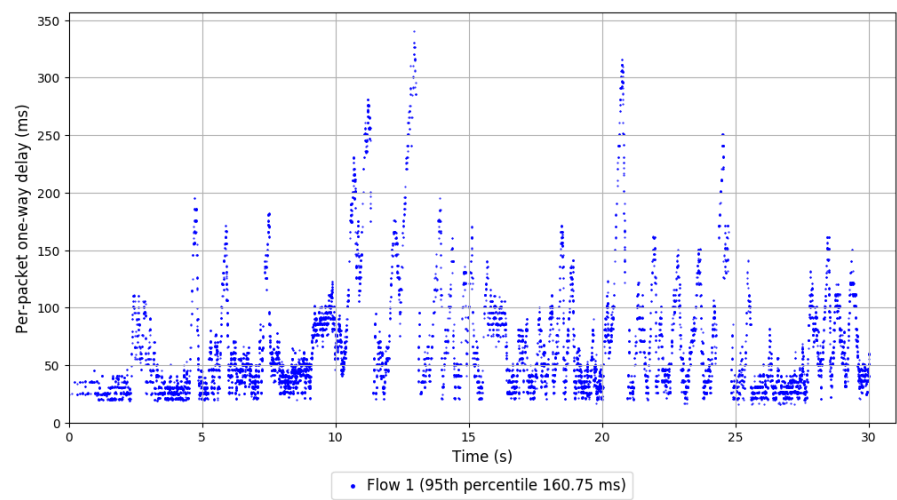
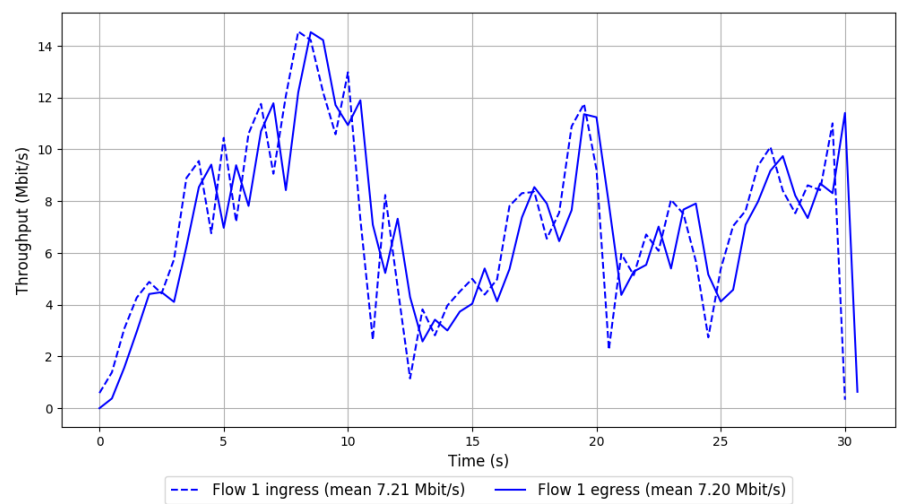


Run 2: Statistics of LEDBAT

Start at: 2019-01-02 18:36:22
End at: 2019-01-02 18:36:52
Local clock offset: 4.259 ms
Remote clock offset: 20.688 ms

Below is generated by plot.py at 2019-01-02 19:16:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.20 Mbit/s
95th percentile per-packet one-way delay: 160.753 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 7.20 Mbit/s
95th percentile per-packet one-way delay: 160.753 ms
Loss rate: 0.18%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2019-01-02 18:57:53

End at: 2019-01-02 18:58:23

Local clock offset: 5.129 ms

Remote clock offset: 3.73 ms

Below is generated by plot.py at 2019-01-02 19:16:08

Datalink statistics

-- Total of 1 flow:

Average throughput: 10.49 Mbit/s

95th percentile per-packet one-way delay: 142.410 ms

Loss rate: 0.31%

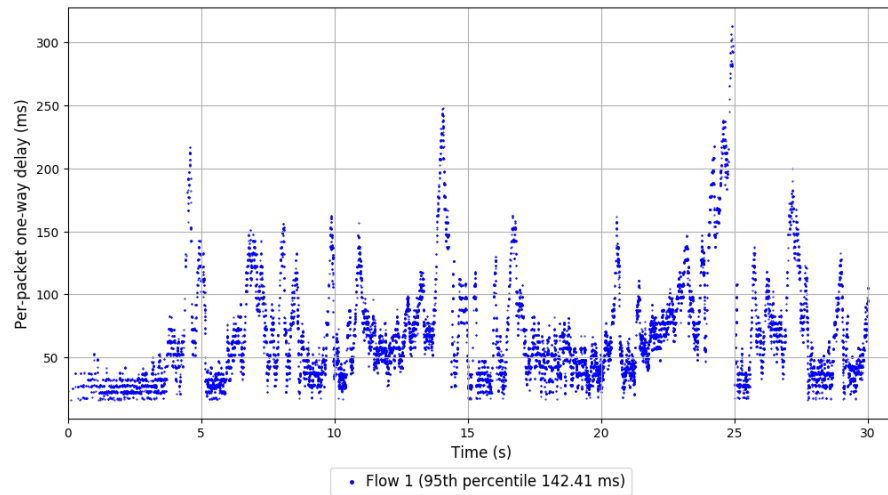
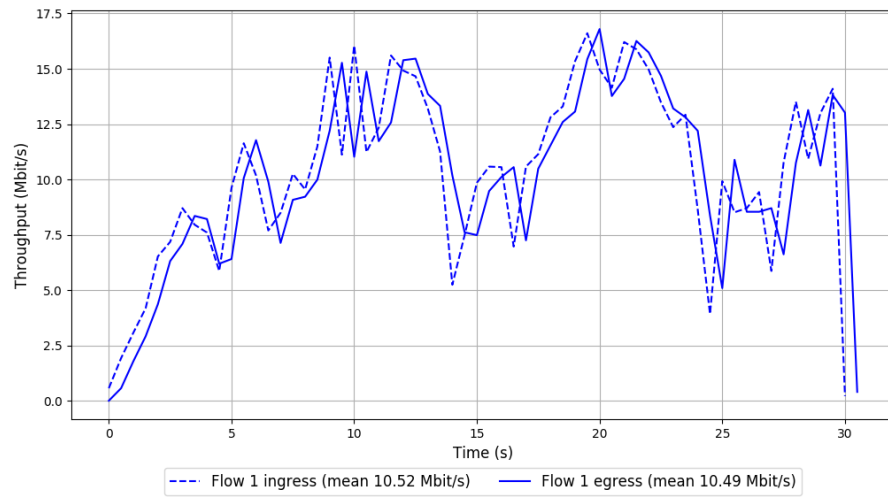
-- Flow 1:

Average throughput: 10.49 Mbit/s

95th percentile per-packet one-way delay: 142.410 ms

Loss rate: 0.31%

Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of PCC-Allegro

Start at: 2019-01-02 18:25:04

End at: 2019-01-02 18:25:34

Local clock offset: 9.623 ms

Remote clock offset: 26.736 ms

Below is generated by plot.py at 2019-01-02 19:16:08

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.13 Mbit/s

95th percentile per-packet one-way delay: 42.302 ms

Loss rate: 0.11%

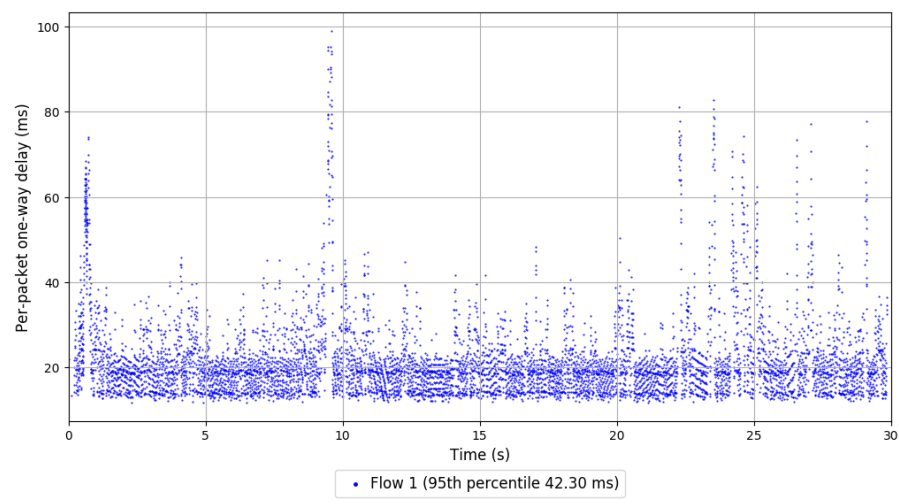
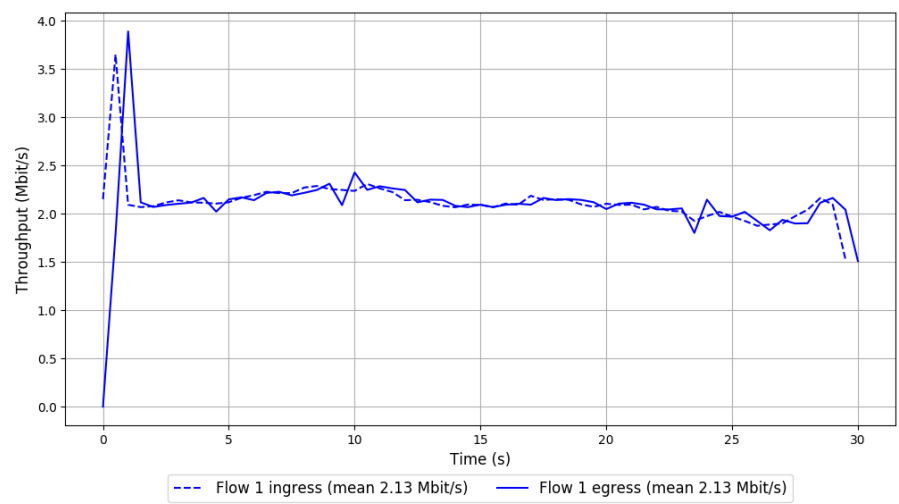
-- Flow 1:

Average throughput: 2.13 Mbit/s

95th percentile per-packet one-way delay: 42.302 ms

Loss rate: 0.11%

Run 1: Report of PCC-Allegro — Data Link

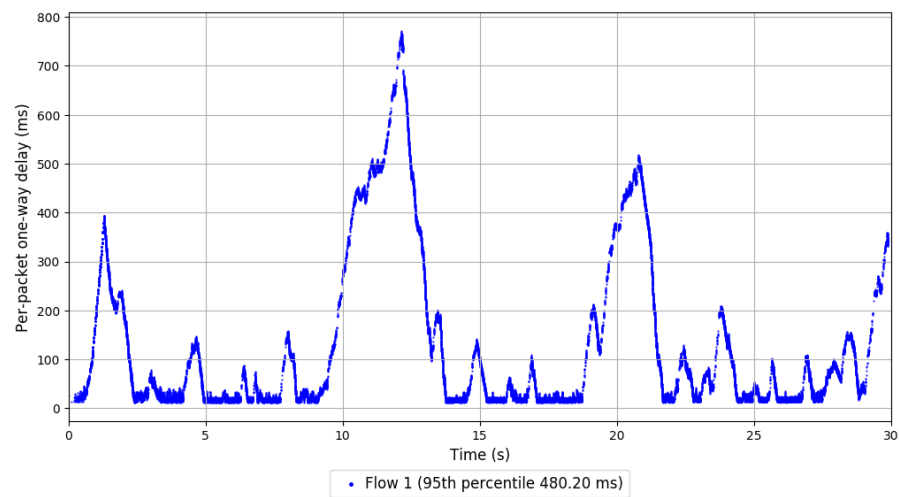
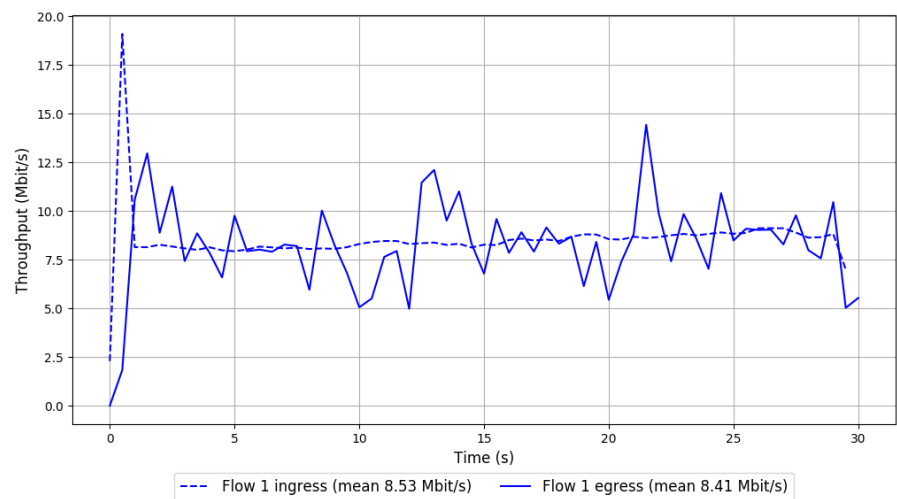


Run 2: Statistics of PCC-Allegro

Start at: 2019-01-02 18:46:39
End at: 2019-01-02 18:47:09
Local clock offset: 7.369 ms
Remote clock offset: 10.614 ms

Below is generated by plot.py at 2019-01-02 19:16:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.41 Mbit/s
95th percentile per-packet one-way delay: 480.201 ms
Loss rate: 1.41%
-- Flow 1:
Average throughput: 8.41 Mbit/s
95th percentile per-packet one-way delay: 480.201 ms
Loss rate: 1.41%

Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

Start at: 2019-01-02 19:07:59

End at: 2019-01-02 19:08:29

Local clock offset: 6.364 ms

Remote clock offset: 2.549 ms

Below is generated by plot.py at 2019-01-02 19:16:08

Datalink statistics

-- Total of 1 flow:

Average throughput: 6.87 Mbit/s

95th percentile per-packet one-way delay: 1054.131 ms

Loss rate: 18.87%

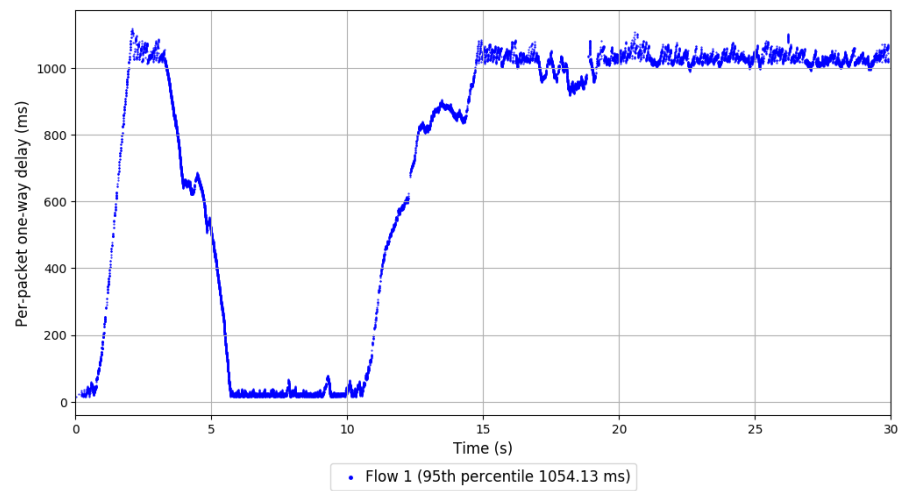
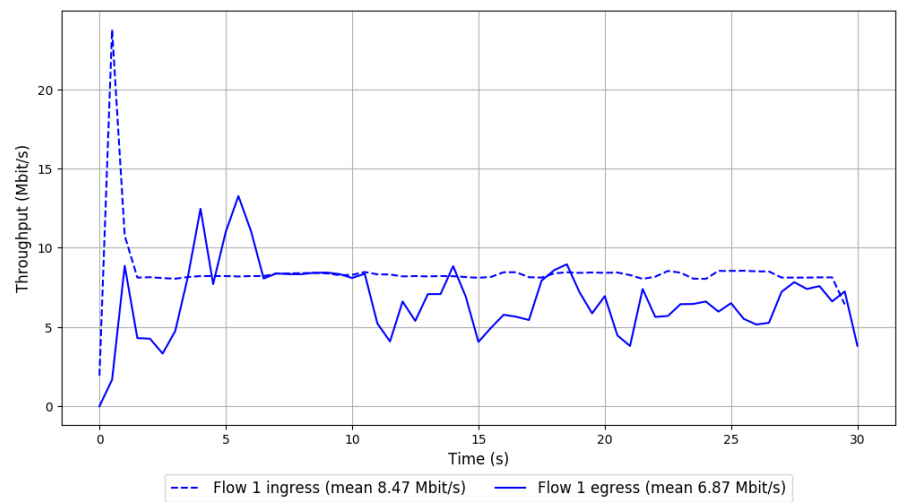
-- Flow 1:

Average throughput: 6.87 Mbit/s

95th percentile per-packet one-way delay: 1054.131 ms

Loss rate: 18.87%

Run 3: Report of PCC-Allegro — Data Link

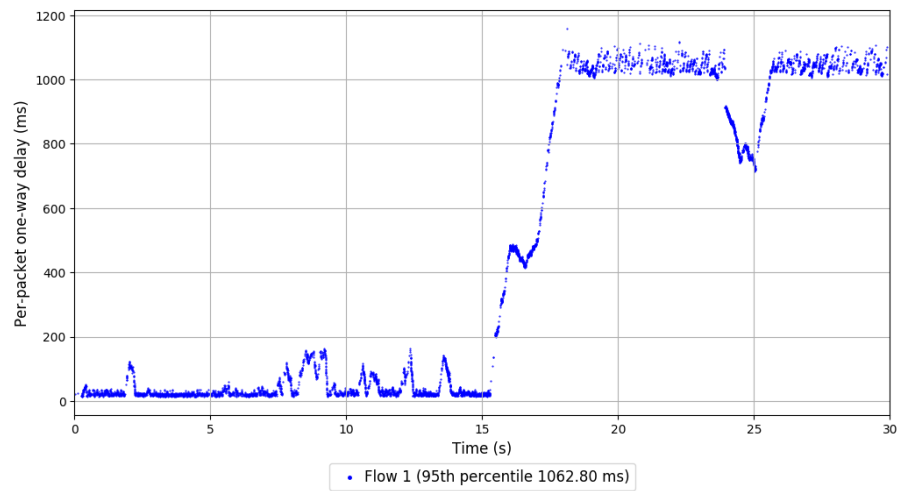
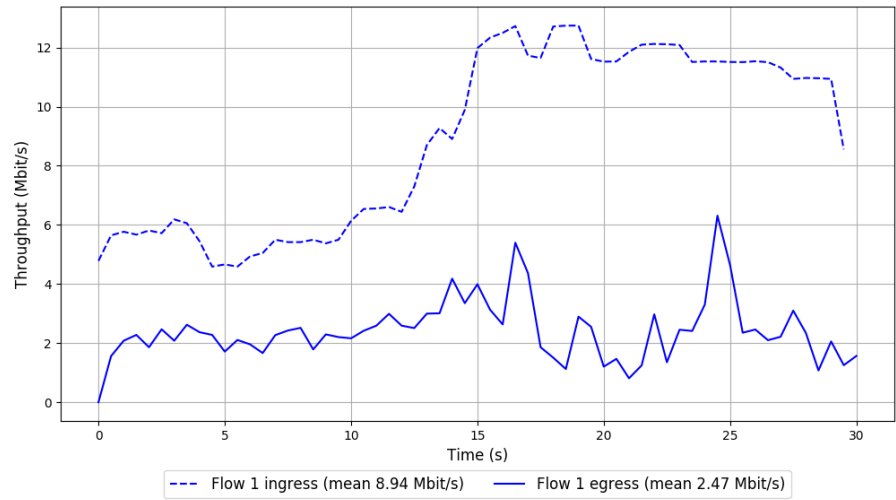



```
Run 1: Statistics of PCC-Expr

Start at: 2019-01-02 18:28:29
End at: 2019-01-02 18:28:59
Local clock offset: 6.744 ms
Remote clock offset: 27.078 ms

# Below is generated by plot.py at 2019-01-02 19:16:08
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.47 Mbit/s
95th percentile per-packet one-way delay: 1062.798 ms
Loss rate: 72.40%
-- Flow 1:
Average throughput: 2.47 Mbit/s
95th percentile per-packet one-way delay: 1062.798 ms
Loss rate: 72.40%
```

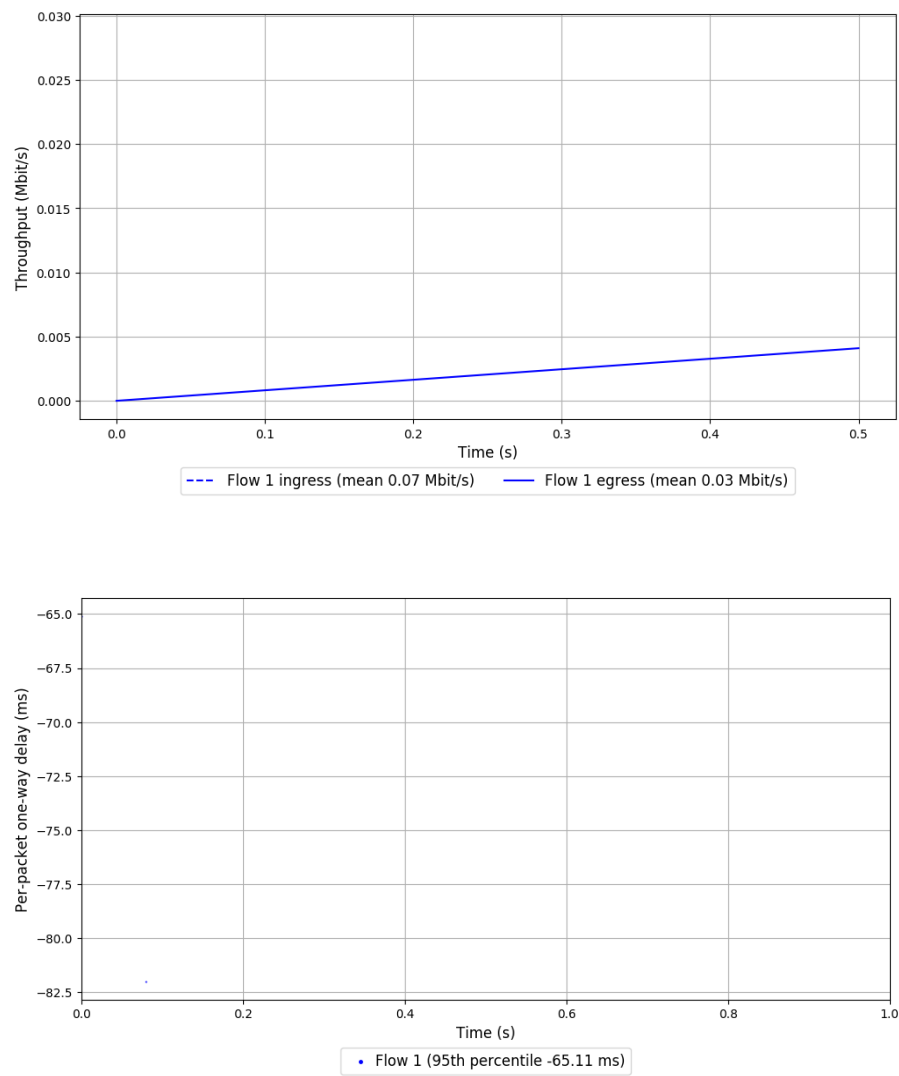
Run 1: Report of PCC-Expr — Data Link



Run 2: Statistics of PCC-Expr

Start at: 2019-01-02 18:50:03
End at: 2019-01-02 18:50:34
Local clock offset: 4.864 ms
Remote clock offset: -92.932 ms

Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

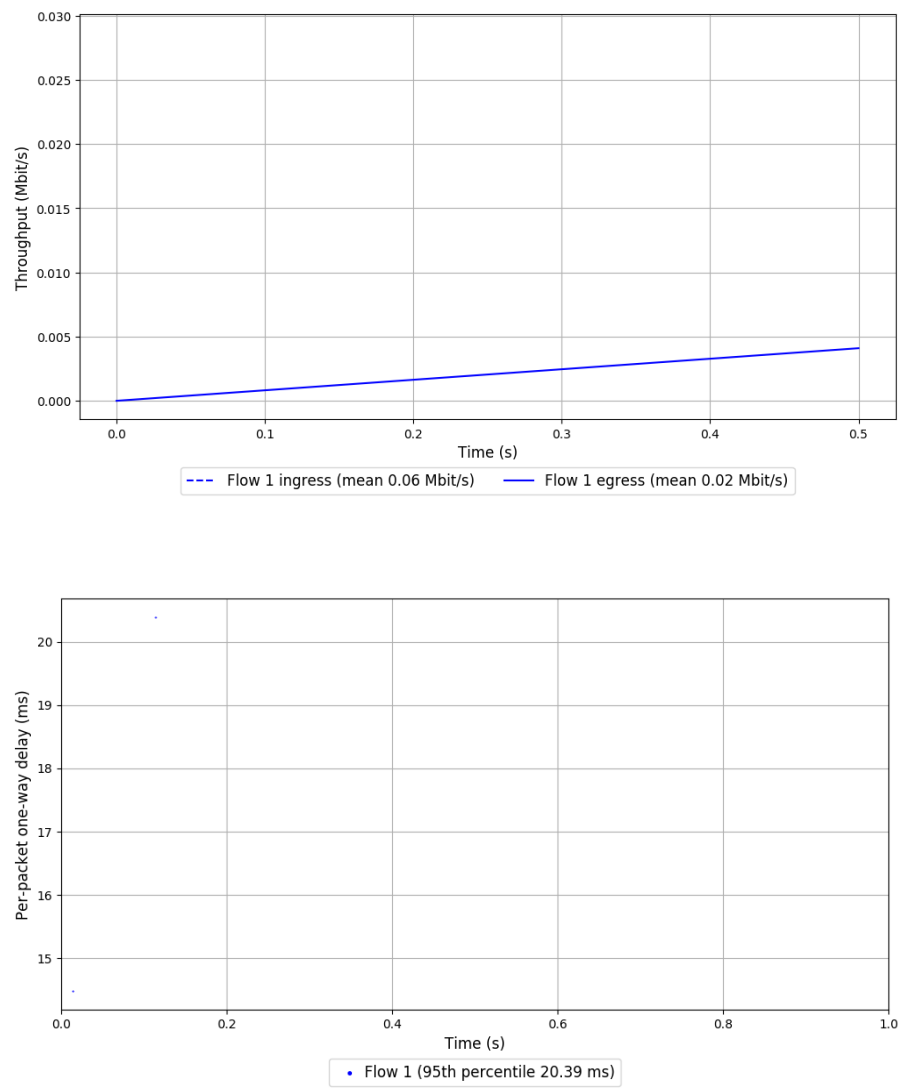
Start at: 2019-01-02 19:11:21

End at: 2019-01-02 19:11:51

Local clock offset: 5.357 ms

Remote clock offset: 2.109 ms

Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2019-01-02 18:13:49

End at: 2019-01-02 18:14:19

Local clock offset: 6.066 ms

Remote clock offset: 29.892 ms

Below is generated by plot.py at 2019-01-02 19:16:08

Datalink statistics

-- Total of 1 flow:

Average throughput: 4.68 Mbit/s

95th percentile per-packet one-way delay: 293.600 ms

Loss rate: 1.08%

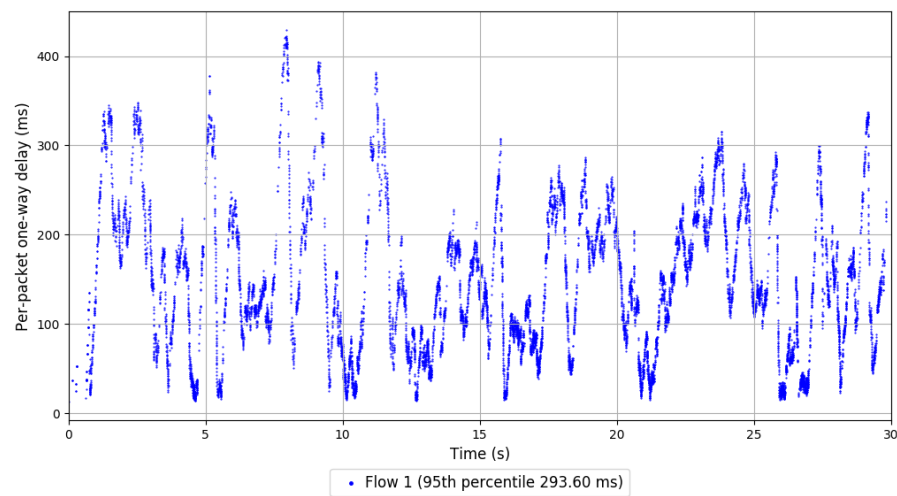
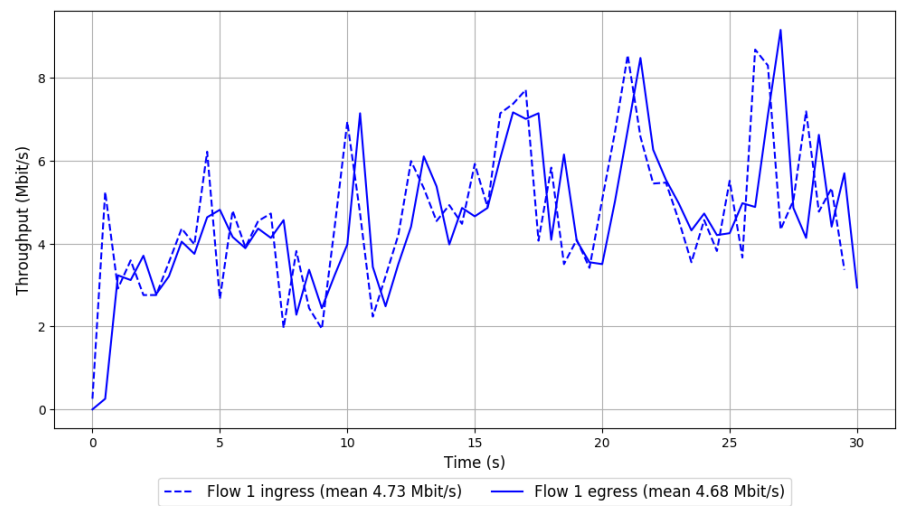
-- Flow 1:

Average throughput: 4.68 Mbit/s

95th percentile per-packet one-way delay: 293.600 ms

Loss rate: 1.08%

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2019-01-02 18:35:14

End at: 2019-01-02 18:35:44

Local clock offset: 5.949 ms

Remote clock offset: 21.376 ms

Below is generated by plot.py at 2019-01-02 19:16:08

Datalink statistics

-- Total of 1 flow:

Average throughput: 6.80 Mbit/s

95th percentile per-packet one-way delay: 396.783 ms

Loss rate: 1.40%

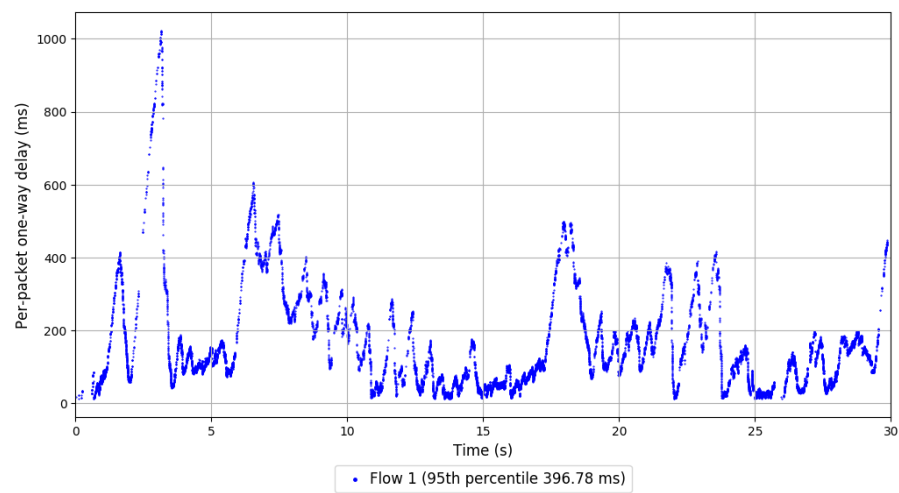
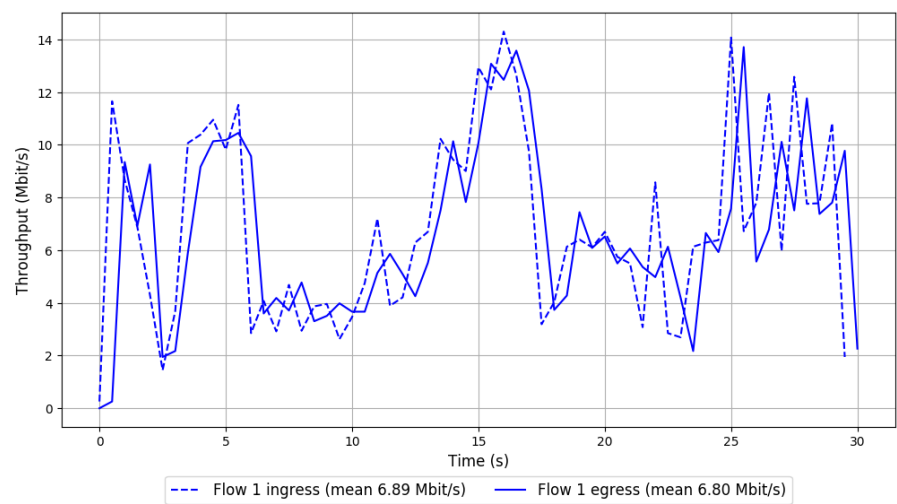
-- Flow 1:

Average throughput: 6.80 Mbit/s

95th percentile per-packet one-way delay: 396.783 ms

Loss rate: 1.40%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2019-01-02 18:56:45

End at: 2019-01-02 18:57:15

Local clock offset: 7.55 ms

Remote clock offset: 4.462 ms

Below is generated by plot.py at 2019-01-02 19:16:09

Datalink statistics

-- Total of 1 flow:

Average throughput: 7.28 Mbit/s

95th percentile per-packet one-way delay: 352.023 ms

Loss rate: 0.64%

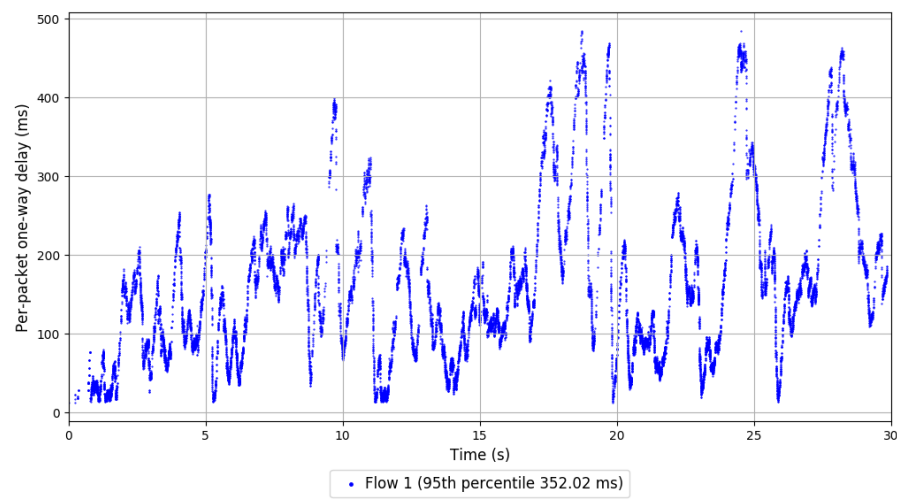
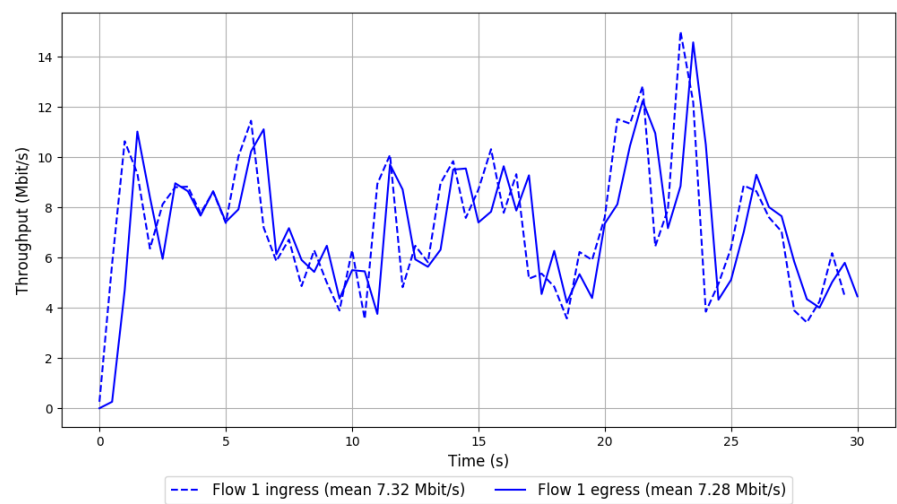
-- Flow 1:

Average throughput: 7.28 Mbit/s

95th percentile per-packet one-way delay: 352.023 ms

Loss rate: 0.64%

Run 3: Report of QUIC Cubic — Data Link

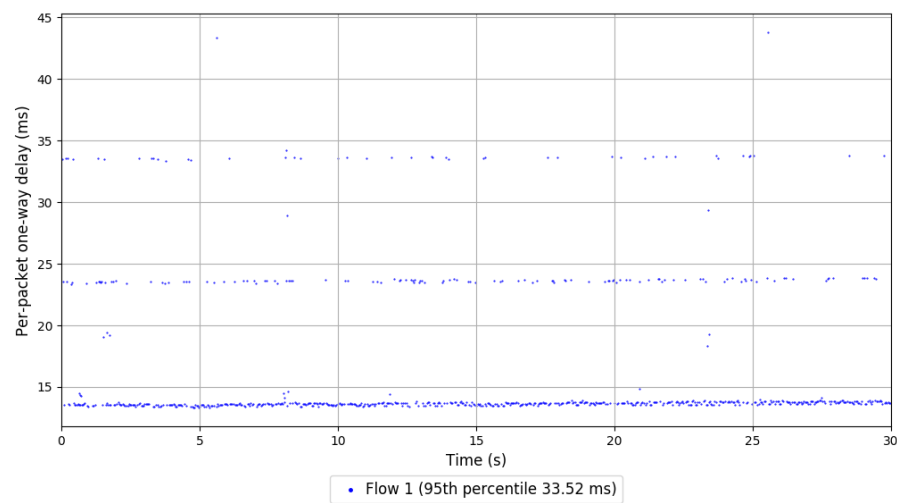
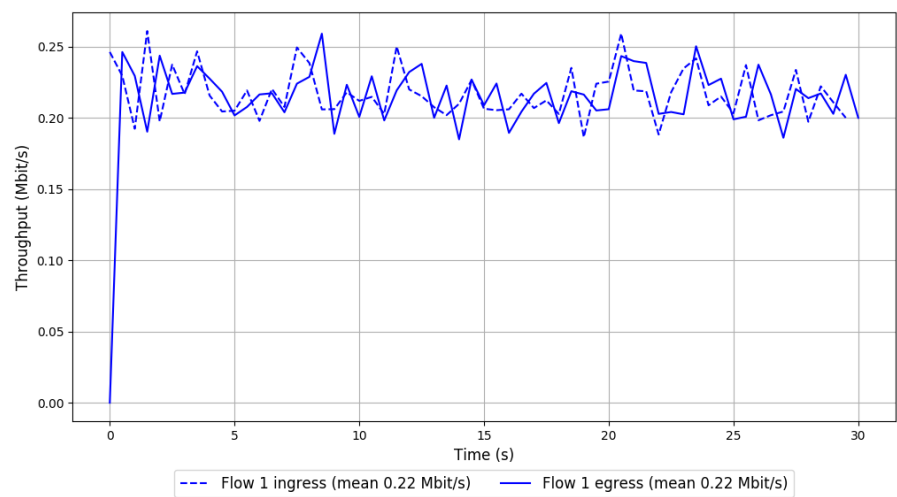


Run 1: Statistics of SCReAM

Start at: 2019-01-02 18:16:07
End at: 2019-01-02 18:16:37
Local clock offset: 7.13 ms
Remote clock offset: 29.512 ms

Below is generated by plot.py at 2019-01-02 19:16:09
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 33.519 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 33.519 ms
Loss rate: 0.00%

Run 1: Report of SReAM — Data Link

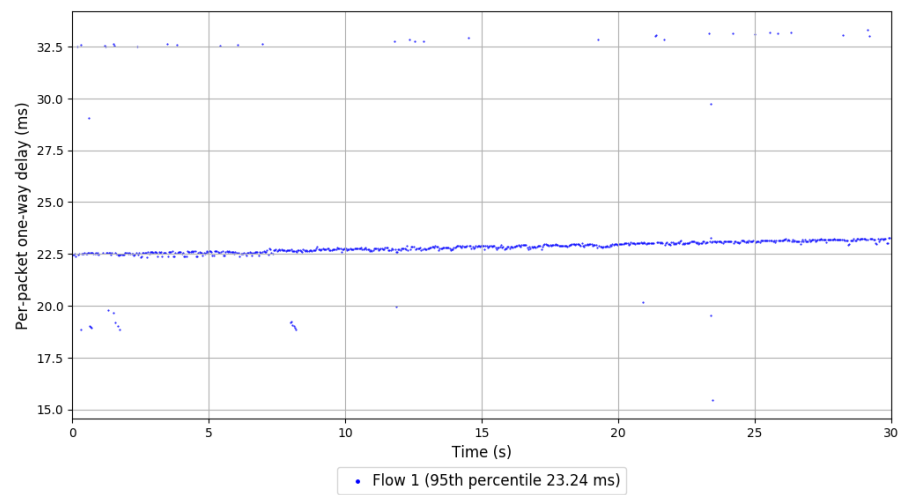
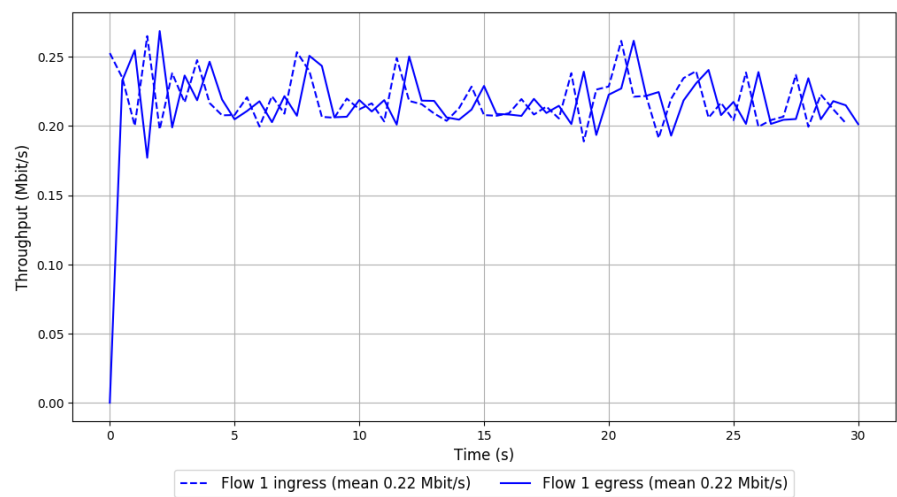


Run 2: Statistics of SCReAM

Start at: 2019-01-02 18:37:32
End at: 2019-01-02 18:38:02
Local clock offset: 6.208 ms
Remote clock offset: 19.841 ms

Below is generated by plot.py at 2019-01-02 19:16:09
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 23.239 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 23.239 ms
Loss rate: 0.13%

Run 2: Report of SReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2019-01-02 18:59:01

End at: 2019-01-02 18:59:31

Local clock offset: 5.802 ms

Remote clock offset: 3.731 ms

Below is generated by plot.py at 2019-01-02 19:16:09

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 22.732 ms

Loss rate: 0.00%

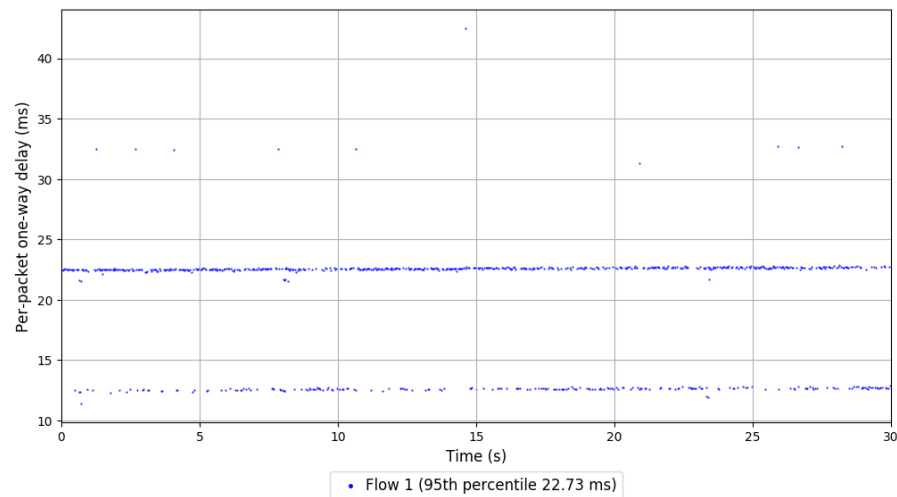
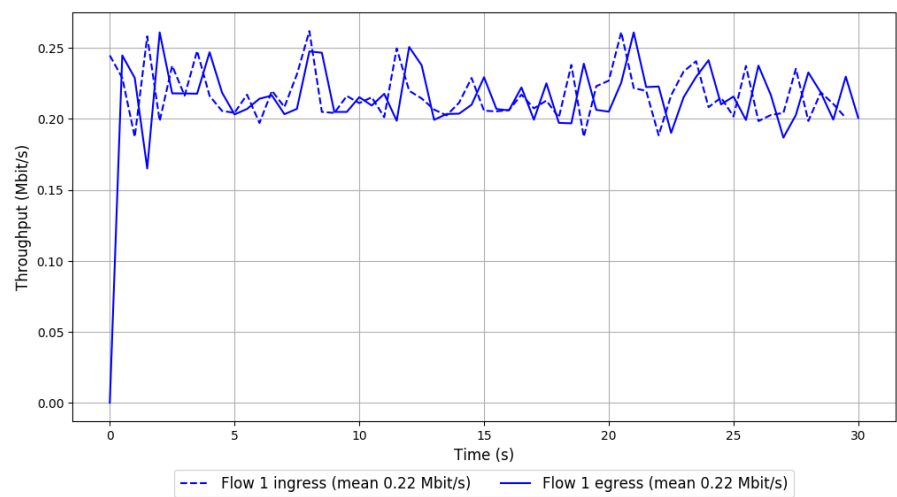
-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 22.732 ms

Loss rate: 0.00%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of Sprout

Start at: 2019-01-02 18:12:42

End at: 2019-01-02 18:13:12

Local clock offset: 6.257 ms

Remote clock offset: 30.46 ms

Below is generated by plot.py at 2019-01-02 19:16:09

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.06 Mbit/s

95th percentile per-packet one-way delay: 58.175 ms

Loss rate: 0.07%

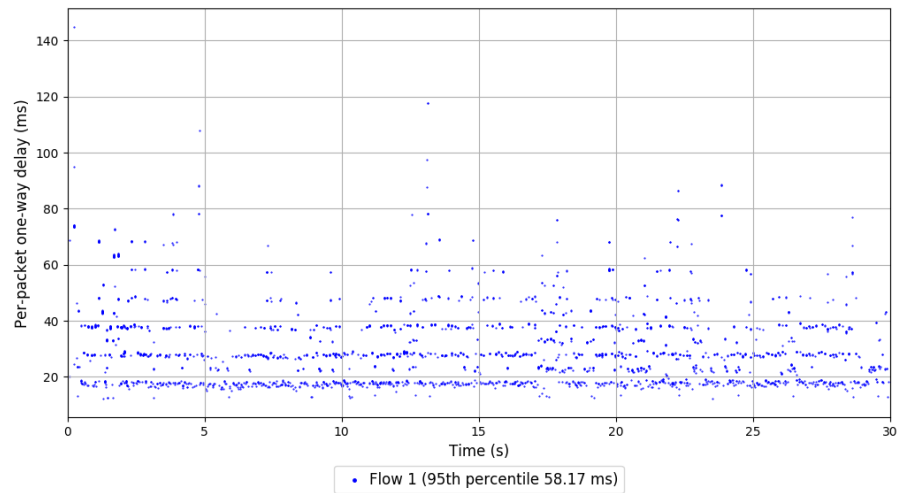
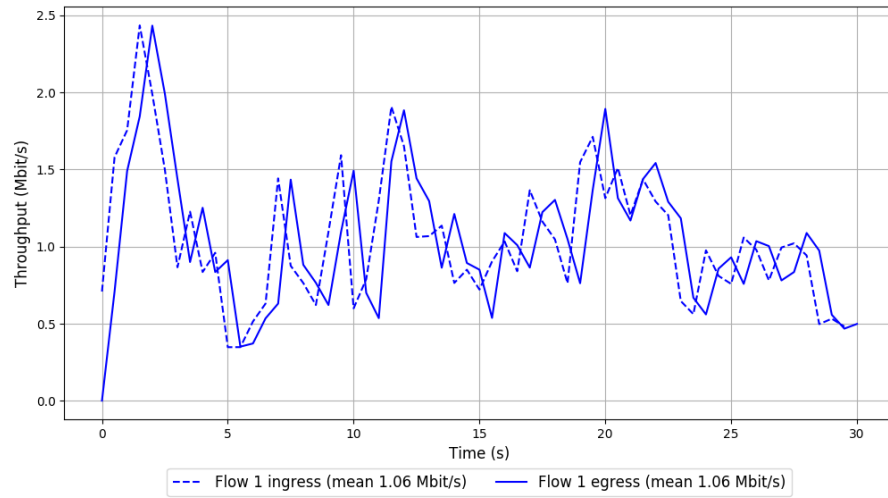
-- Flow 1:

Average throughput: 1.06 Mbit/s

95th percentile per-packet one-way delay: 58.175 ms

Loss rate: 0.07%

Run 1: Report of Sprout — Data Link



Run 2: Statistics of Sprout

Start at: 2019-01-02 18:34:07

End at: 2019-01-02 18:34:37

Local clock offset: 5.298 ms

Remote clock offset: 24.66 ms

Below is generated by plot.py at 2019-01-02 19:16:09

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.84 Mbit/s

95th percentile per-packet one-way delay: 56.158 ms

Loss rate: 0.00%

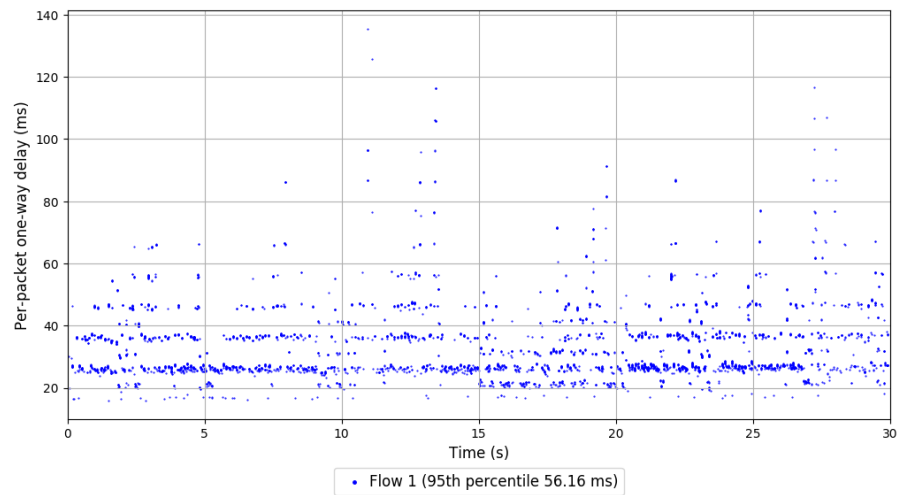
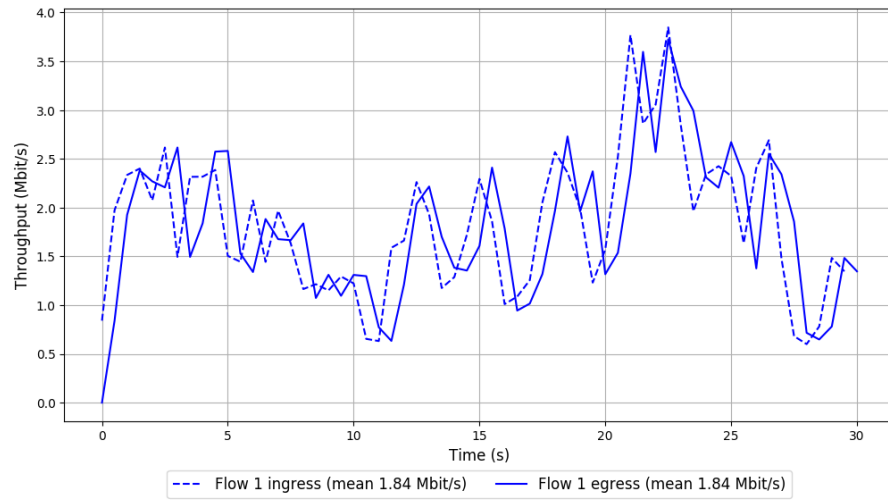
-- Flow 1:

Average throughput: 1.84 Mbit/s

95th percentile per-packet one-way delay: 56.158 ms

Loss rate: 0.00%

Run 2: Report of Sprout — Data Link



Run 3: Statistics of Sprout

Start at: 2019-01-02 18:55:39

End at: 2019-01-02 18:56:09

Local clock offset: 8.47 ms

Remote clock offset: 4.116 ms

Below is generated by plot.py at 2019-01-02 19:16:09

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.26 Mbit/s

95th percentile per-packet one-way delay: 53.506 ms

Loss rate: 0.11%

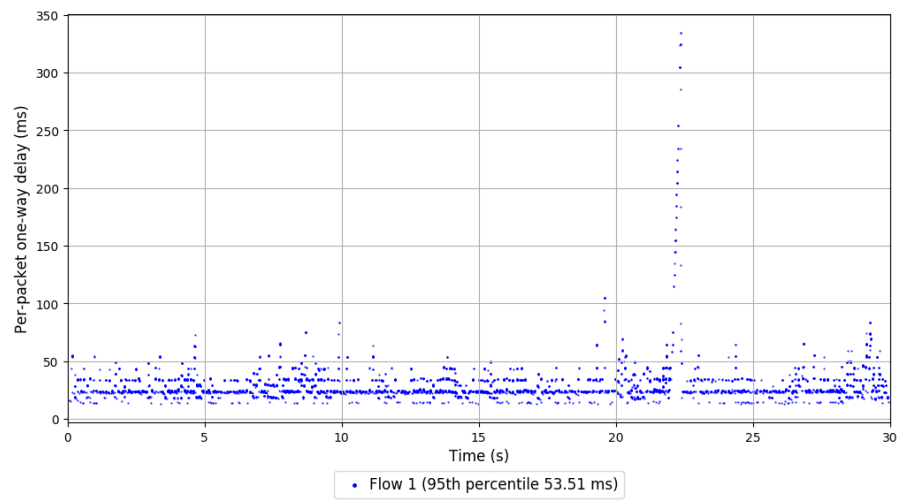
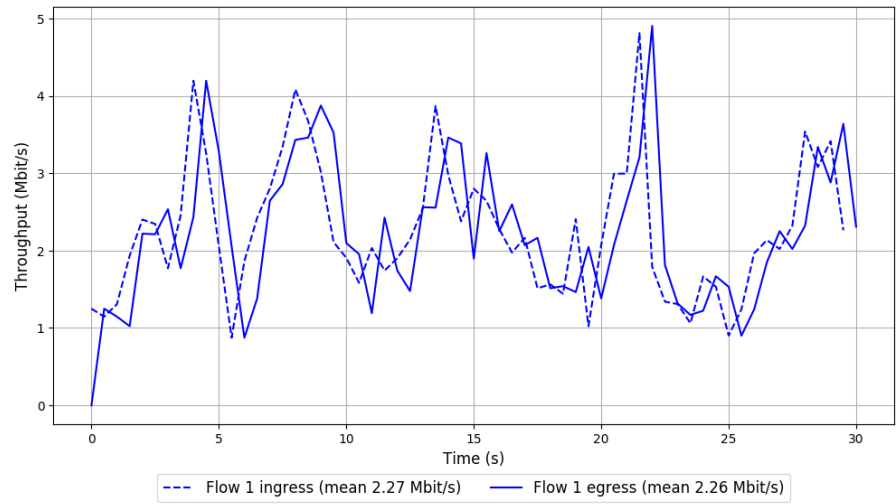
-- Flow 1:

Average throughput: 2.26 Mbit/s

95th percentile per-packet one-way delay: 53.506 ms

Loss rate: 0.11%

Run 3: Report of Sprout — Data Link

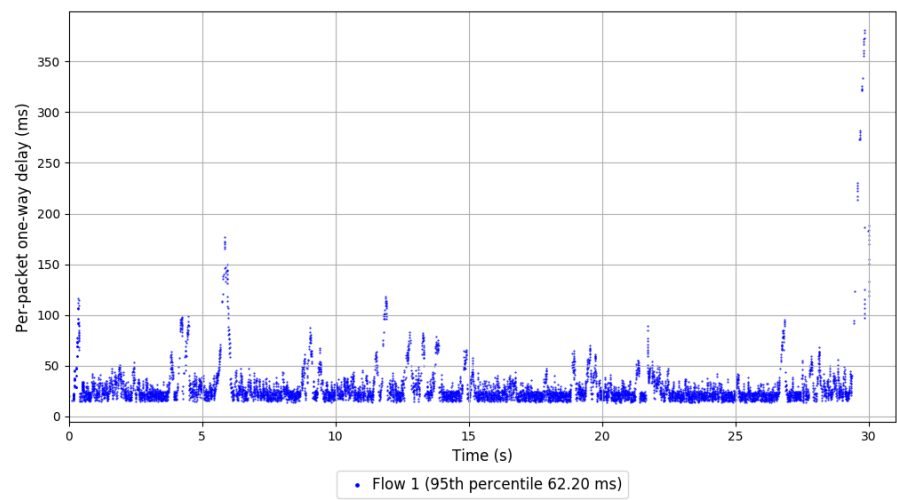
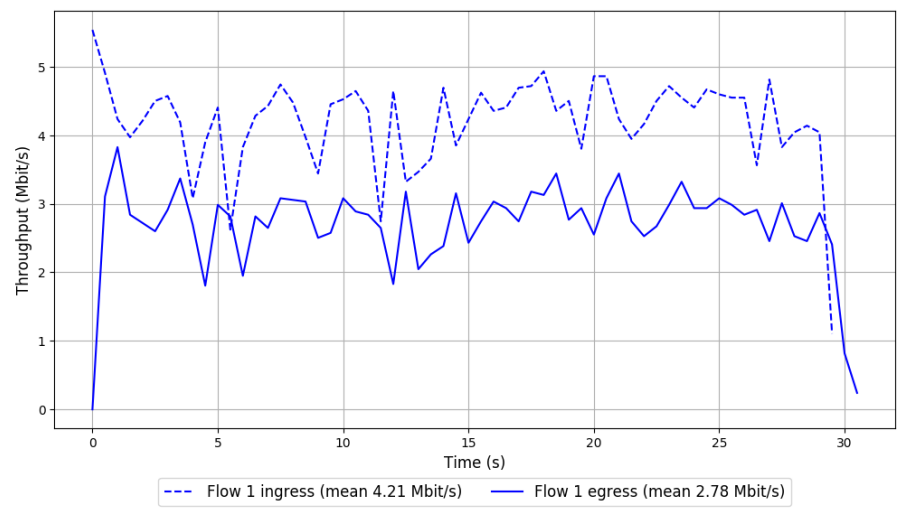


Run 1: Statistics of TaoVA-100x

Start at: 2019-01-02 18:26:10
End at: 2019-01-02 18:26:40
Local clock offset: 7.676 ms
Remote clock offset: 26.382 ms

Below is generated by plot.py at 2019-01-02 19:16:09
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.78 Mbit/s
95th percentile per-packet one-way delay: 62.202 ms
Loss rate: 33.93%
-- Flow 1:
Average throughput: 2.78 Mbit/s
95th percentile per-packet one-way delay: 62.202 ms
Loss rate: 33.93%

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



Run 2: Statistics of TaoVA-100x

Start at: 2019-01-02 18:47:47

End at: 2019-01-02 18:48:17

Local clock offset: 5.539 ms

Remote clock offset: 9.324 ms

Below is generated by plot.py at 2019-01-02 19:16:09

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.75 Mbit/s

95th percentile per-packet one-way delay: 79.203 ms

Loss rate: 76.35%

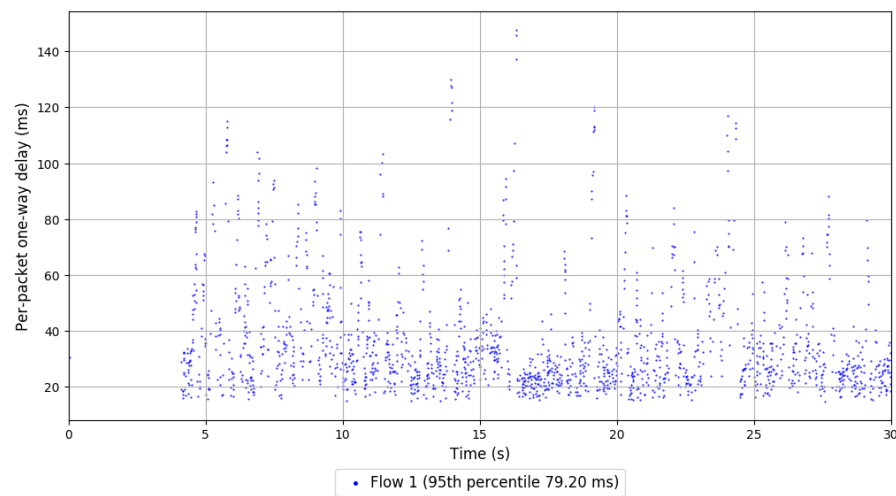
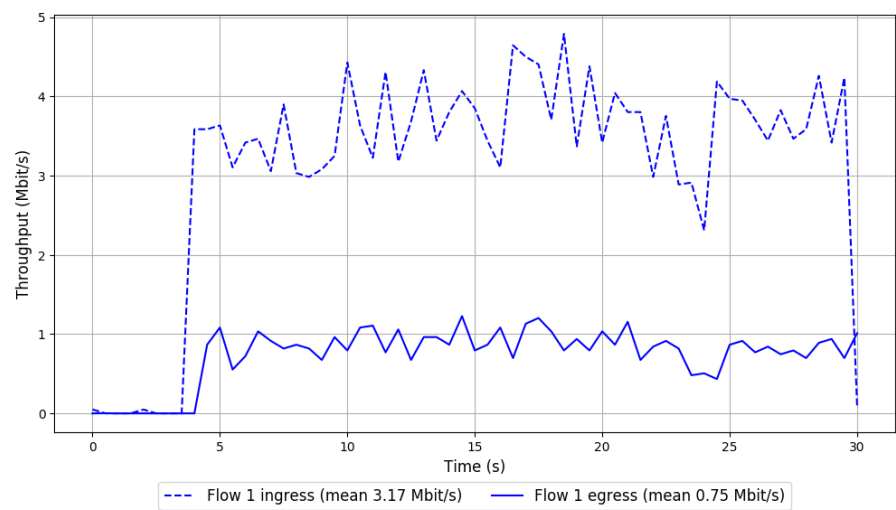
-- Flow 1:

Average throughput: 0.75 Mbit/s

95th percentile per-packet one-way delay: 79.203 ms

Loss rate: 76.35%

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



Run 3: Statistics of TaoVA-100x

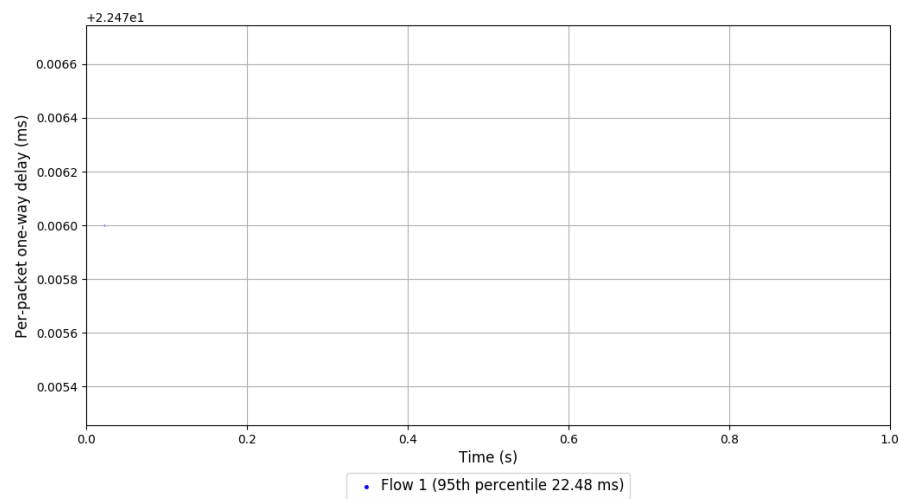
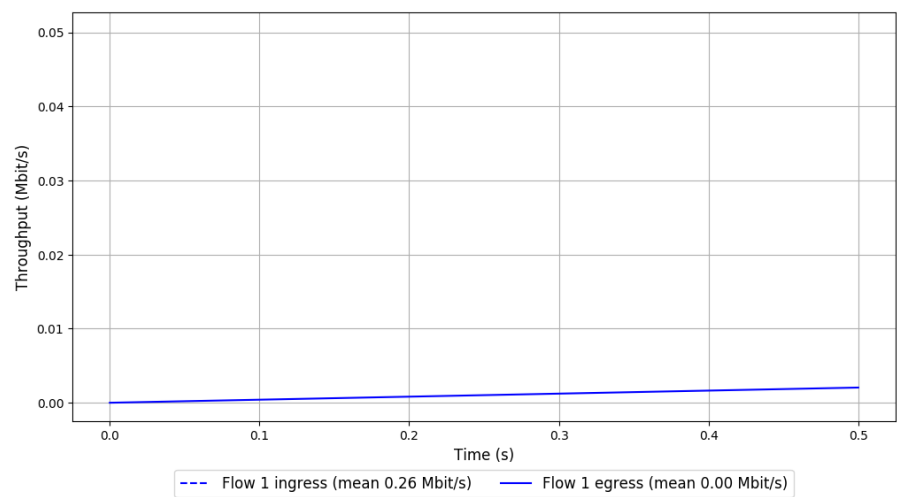
Start at: 2019-01-02 19:09:06

End at: 2019-01-02 19:09:36

Local clock offset: 2.967 ms

Remote clock offset: 2.231 ms

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



Run 1: Statistics of TCP Vegas

Start at: 2019-01-02 18:29:37

End at: 2019-01-02 18:30:07

Local clock offset: 8.208 ms

Remote clock offset: 26.78 ms

Below is generated by plot.py at 2019-01-02 19:16:09

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.23 Mbit/s

95th percentile per-packet one-way delay: 37.740 ms

Loss rate: 0.07%

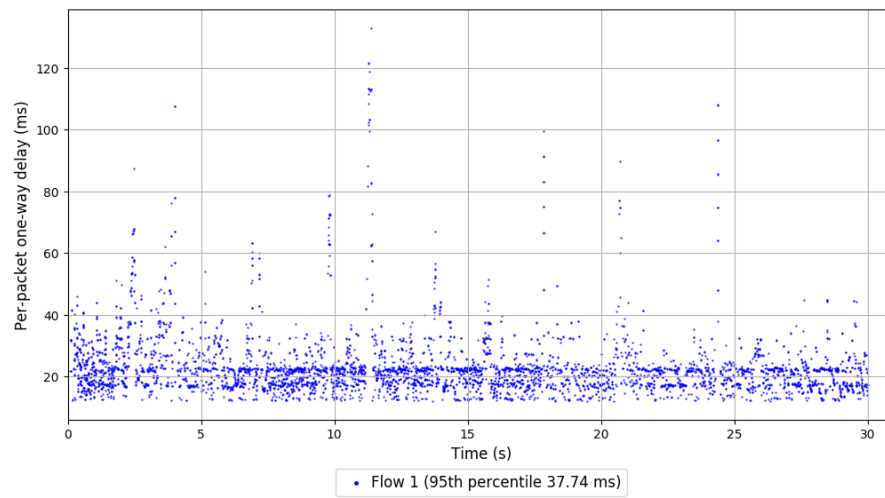
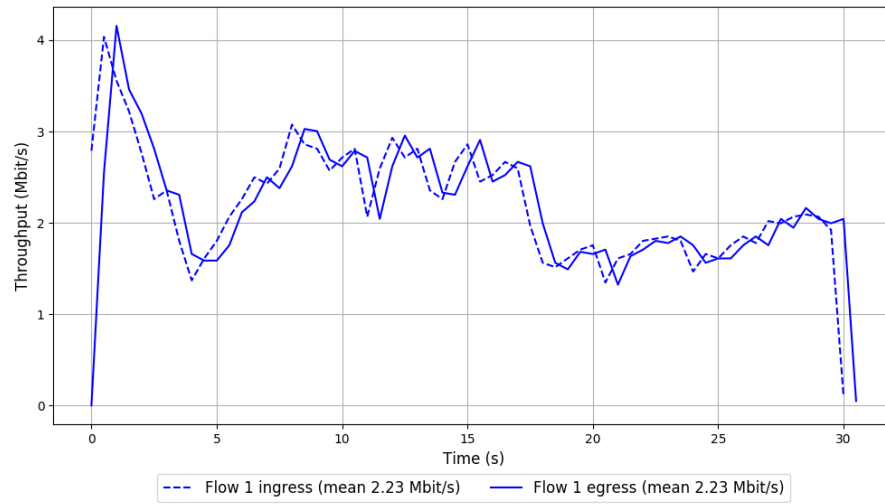
-- Flow 1:

Average throughput: 2.23 Mbit/s

95th percentile per-packet one-way delay: 37.740 ms

Loss rate: 0.07%

Run 1: Report of TCP Vegas — Data Link



Run 2: Statistics of TCP Vegas

Start at: 2019-01-02 18:51:09

End at: 2019-01-02 18:51:39

Local clock offset: 5.753 ms

Remote clock offset: 6.64 ms

Below is generated by plot.py at 2019-01-02 19:16:10

Datalink statistics

-- Total of 1 flow:

Average throughput: 3.43 Mbit/s

95th percentile per-packet one-way delay: 42.218 ms

Loss rate: 0.08%

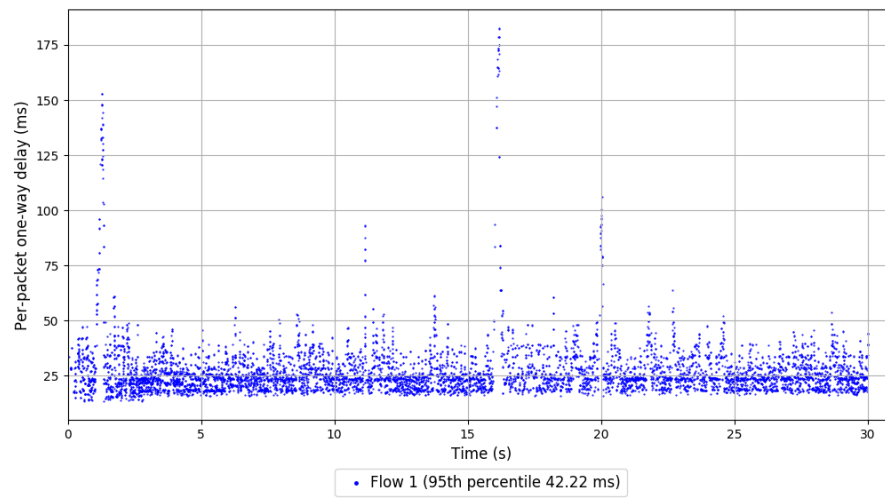
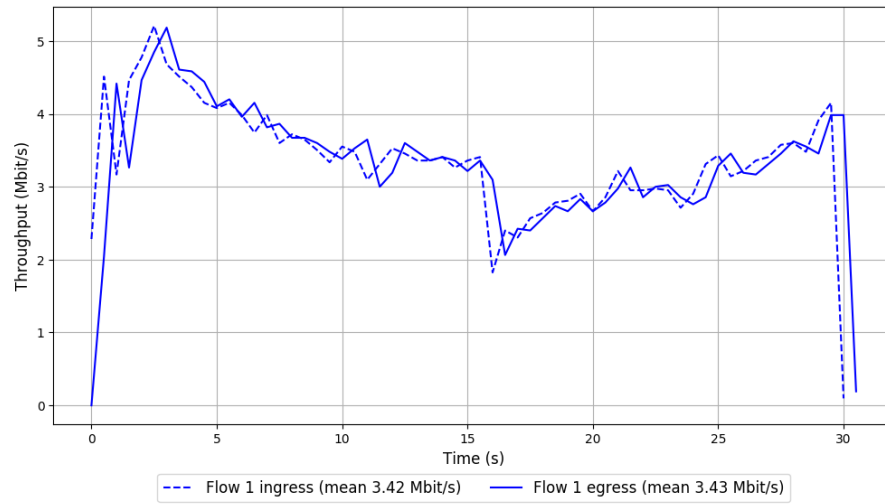
-- Flow 1:

Average throughput: 3.43 Mbit/s

95th percentile per-packet one-way delay: 42.218 ms

Loss rate: 0.08%

Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2019-01-02 19:12:28

End at: 2019-01-02 19:12:58

Local clock offset: 3.284 ms

Remote clock offset: 1.537 ms

Below is generated by plot.py at 2019-01-02 19:16:13

Datalink statistics

-- Total of 1 flow:

Average throughput: 5.15 Mbit/s

95th percentile per-packet one-way delay: 38.217 ms

Loss rate: 0.03%

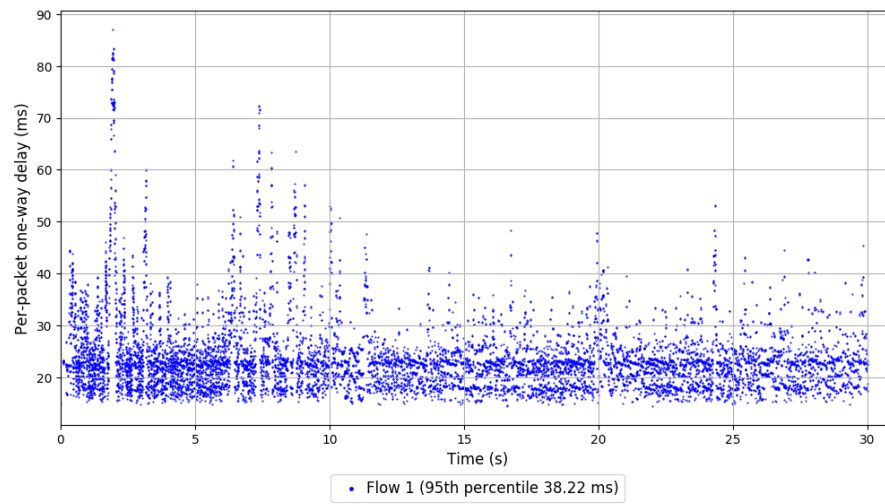
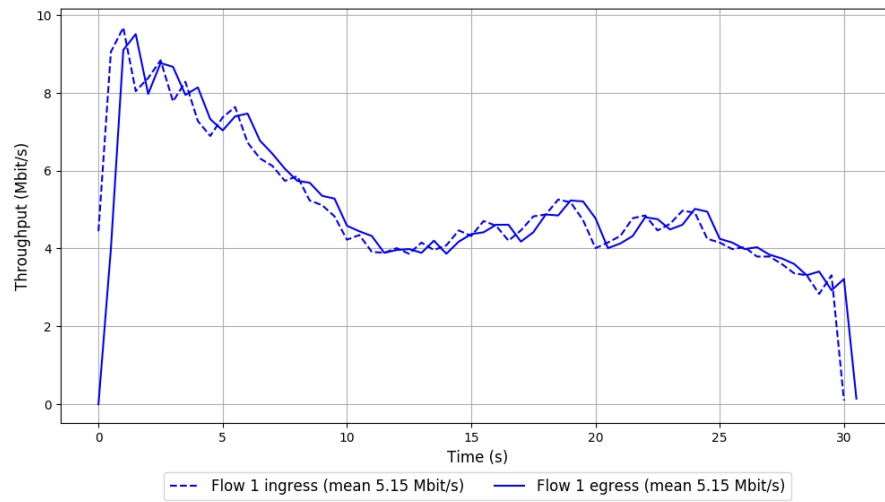
-- Flow 1:

Average throughput: 5.15 Mbit/s

95th percentile per-packet one-way delay: 38.217 ms

Loss rate: 0.03%

Run 3: Report of TCP Vegas — Data Link

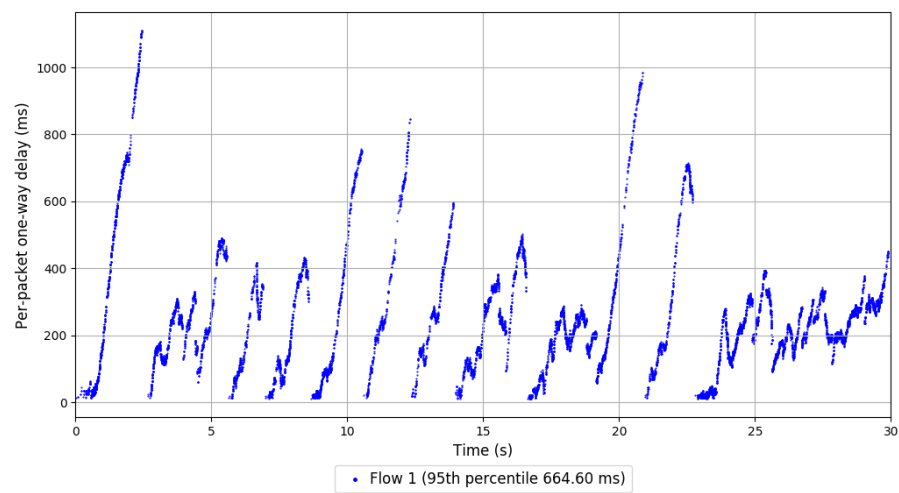
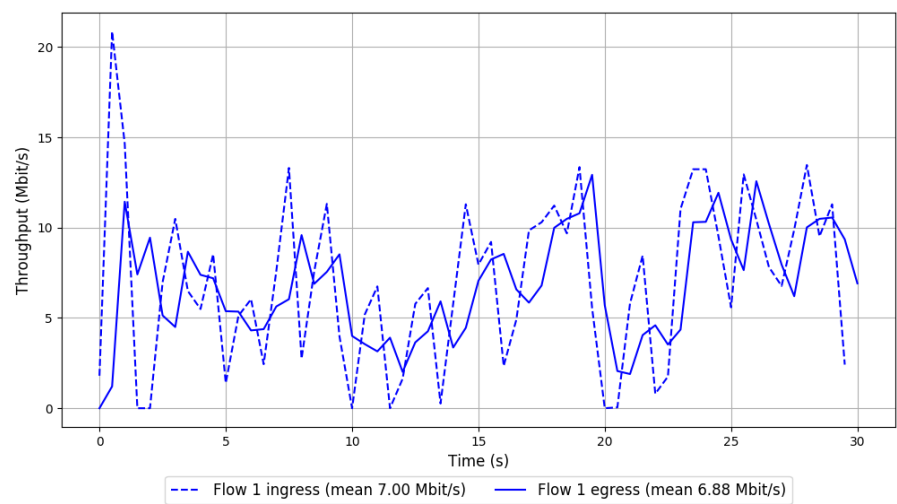


Run 1: Statistics of Verus

Start at: 2019-01-02 18:31:50
End at: 2019-01-02 18:32:20
Local clock offset: 8.464 ms
Remote clock offset: 26.353 ms

Below is generated by plot.py at 2019-01-02 19:16:15
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.88 Mbit/s
95th percentile per-packet one-way delay: 664.599 ms
Loss rate: 1.66%
-- Flow 1:
Average throughput: 6.88 Mbit/s
95th percentile per-packet one-way delay: 664.599 ms
Loss rate: 1.66%

Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2019-01-02 18:53:22

End at: 2019-01-02 18:53:52

Local clock offset: 8.703 ms

Remote clock offset: 5.981 ms

Below is generated by plot.py at 2019-01-02 19:16:18

Datalink statistics

-- Total of 1 flow:

Average throughput: 11.24 Mbit/s

95th percentile per-packet one-way delay: 584.314 ms

Loss rate: 1.36%

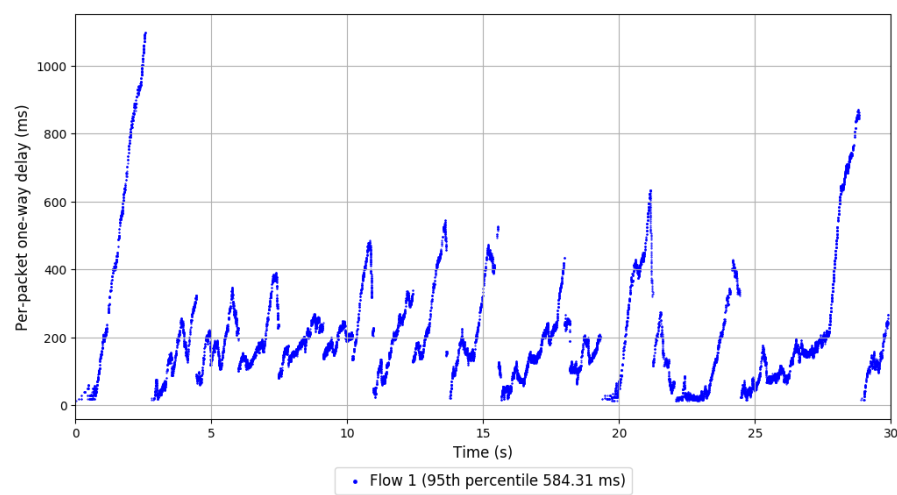
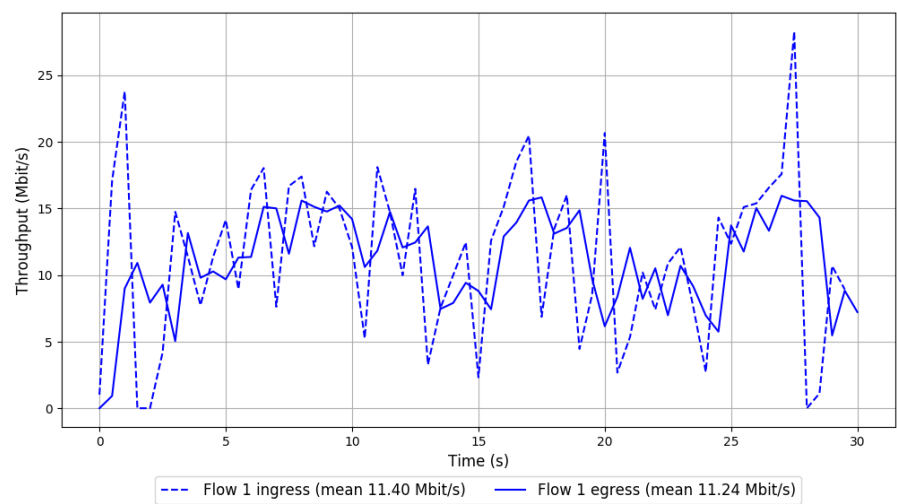
-- Flow 1:

Average throughput: 11.24 Mbit/s

95th percentile per-packet one-way delay: 584.314 ms

Loss rate: 1.36%

Run 2: Report of Verus — Data Link



Run 3: Statistics of Verus

Start at: 2019-01-02 19:14:42

End at: 2019-01-02 19:15:12

Local clock offset: 3.953 ms

Remote clock offset: 1.312 ms

Below is generated by plot.py at 2019-01-02 19:16:18

Datalink statistics

-- Total of 1 flow:

Average throughput: 9.25 Mbit/s

95th percentile per-packet one-way delay: 493.114 ms

Loss rate: 1.63%

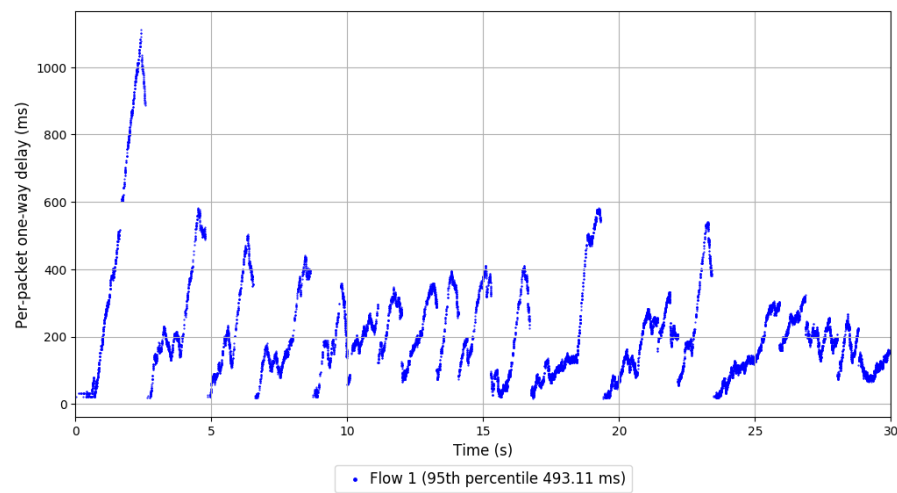
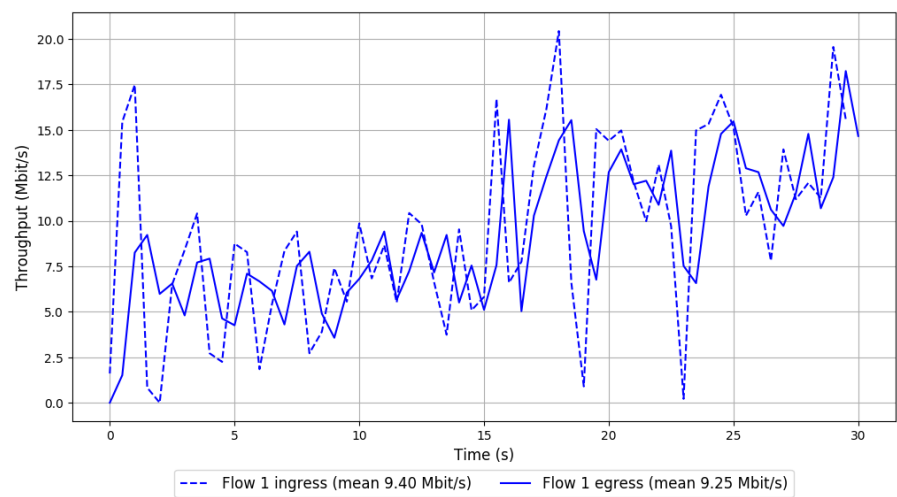
-- Flow 1:

Average throughput: 9.25 Mbit/s

95th percentile per-packet one-way delay: 493.114 ms

Loss rate: 1.63%

Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

Start at: 2019-01-02 18:18:22

End at: 2019-01-02 18:18:52

Local clock offset: 6.809 ms

Remote clock offset: 28.301 ms

Below is generated by plot.py at 2019-01-02 19:16:18

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.52 Mbit/s

95th percentile per-packet one-way delay: 857.160 ms

Loss rate: 0.20%

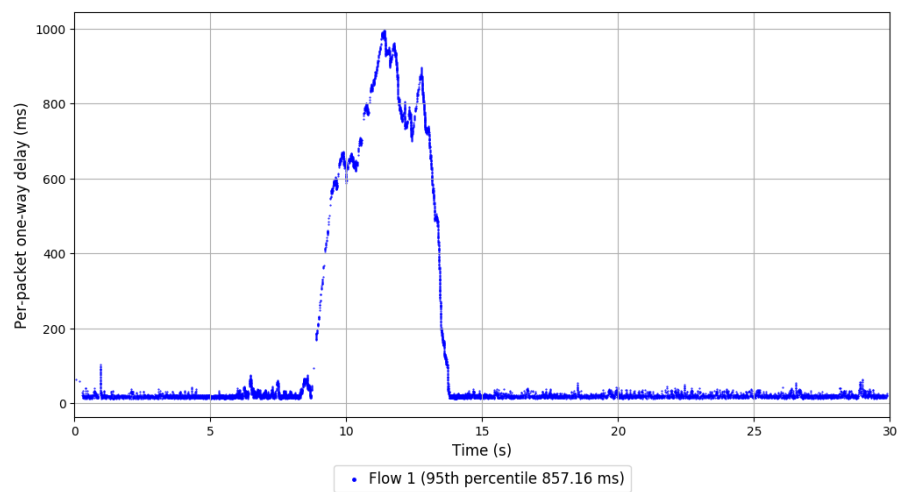
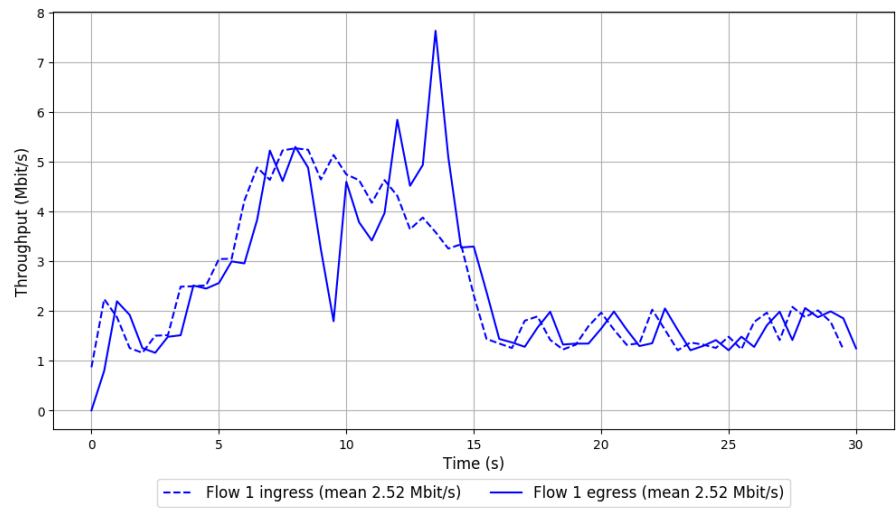
-- Flow 1:

Average throughput: 2.52 Mbit/s

95th percentile per-packet one-way delay: 857.160 ms

Loss rate: 0.20%

Run 1: Report of PCC-Vivace — Data Link

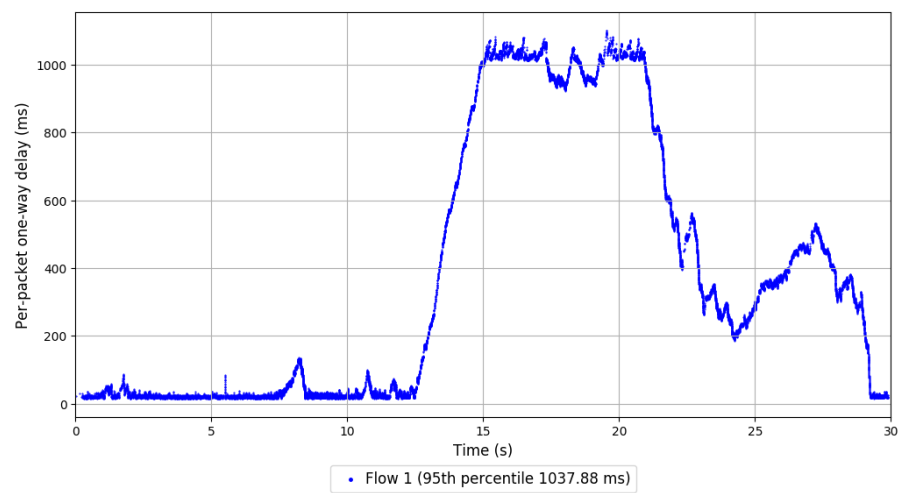
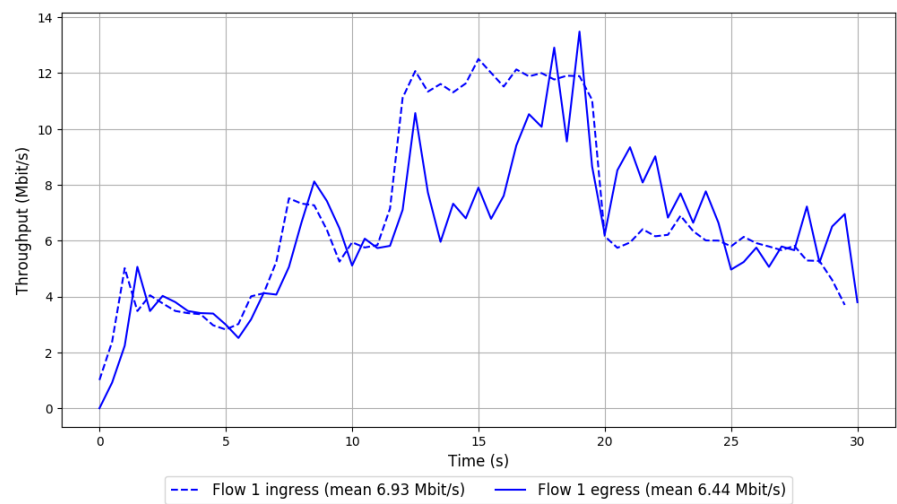


Run 2: Statistics of PCC-Vivace

Start at: 2019-01-02 18:39:47
End at: 2019-01-02 18:40:17
Local clock offset: 4.762 ms
Remote clock offset: 16.248 ms

Below is generated by plot.py at 2019-01-02 19:16:18
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.44 Mbit/s
95th percentile per-packet one-way delay: 1037.875 ms
Loss rate: 7.17%
-- Flow 1:
Average throughput: 6.44 Mbit/s
95th percentile per-packet one-way delay: 1037.875 ms
Loss rate: 7.17%

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

Start at: 2019-01-02 19:01:14

End at: 2019-01-02 19:01:44

Local clock offset: 5.095 ms

Remote clock offset: 3.521 ms

Below is generated by plot.py at 2019-01-02 19:16:18

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.16 Mbit/s

95th percentile per-packet one-way delay: 31.246 ms

Loss rate: 0.05%

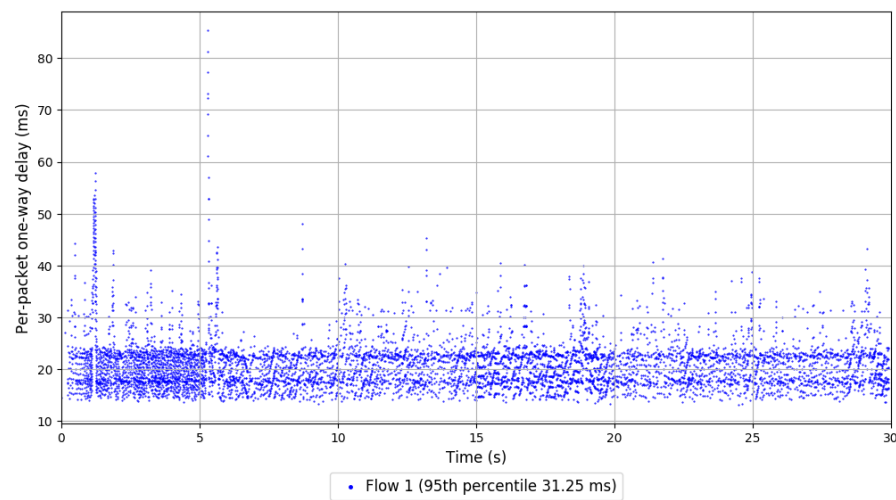
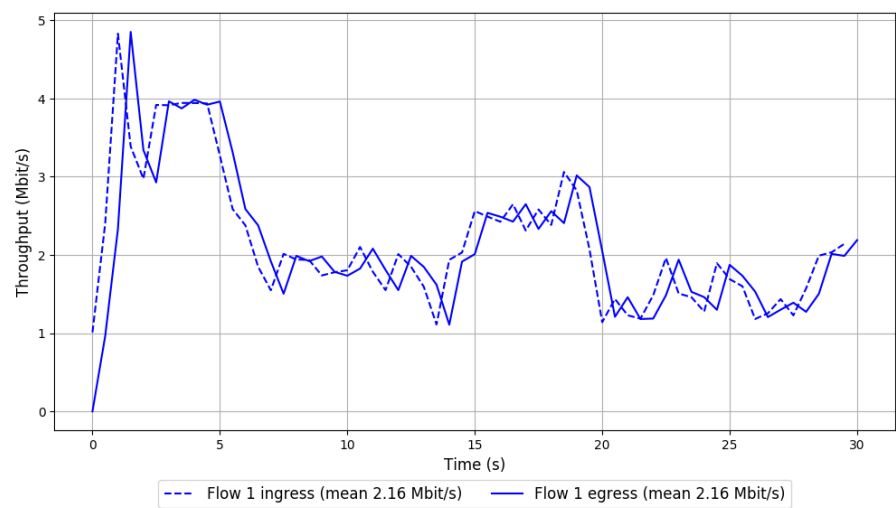
-- Flow 1:

Average throughput: 2.16 Mbit/s

95th percentile per-packet one-way delay: 31.246 ms

Loss rate: 0.05%

Run 3: Report of PCC-Vivace — Data Link

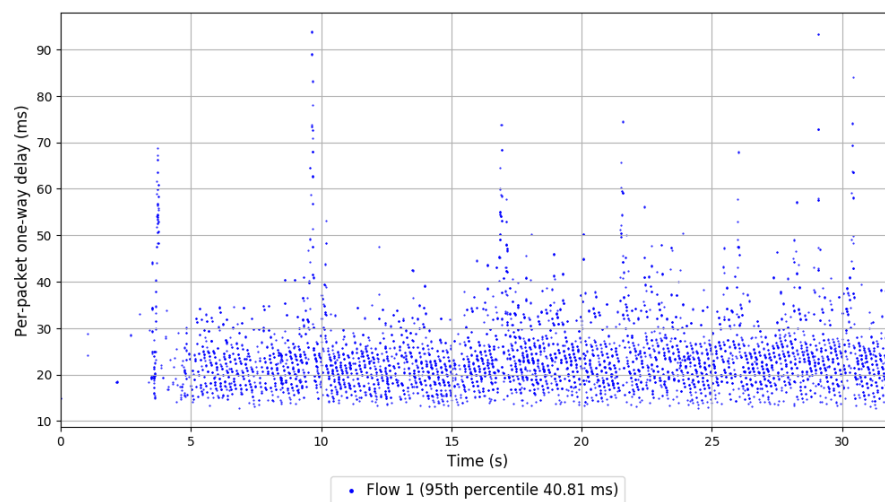
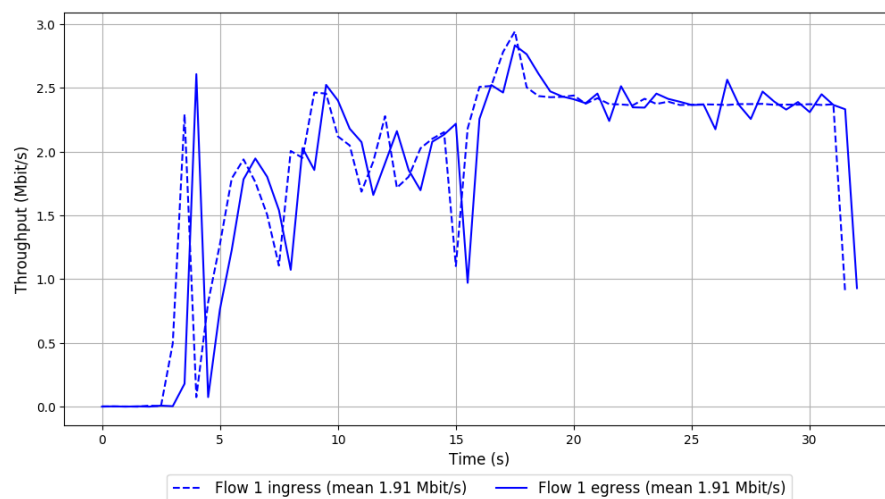



```
Run 1: Statistics of WebRTC media

Start at: 2019-01-02 18:30:43
End at: 2019-01-02 18:31:13
Local clock offset: 5.426 ms
Remote clock offset: 25.62 ms

# Below is generated by plot.py at 2019-01-02 19:16:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 40.809 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 40.809 ms
Loss rate: 0.07%
```

Run 1: Report of WebRTC media — Data Link



Run 2: Statistics of WebRTC media

Start at: 2019-01-02 18:52:16

End at: 2019-01-02 18:52:46

Local clock offset: 7.344 ms

Remote clock offset: 6.287 ms

Below is generated by plot.py at 2019-01-02 19:16:18

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 54.710 ms

Loss rate: 0.00%

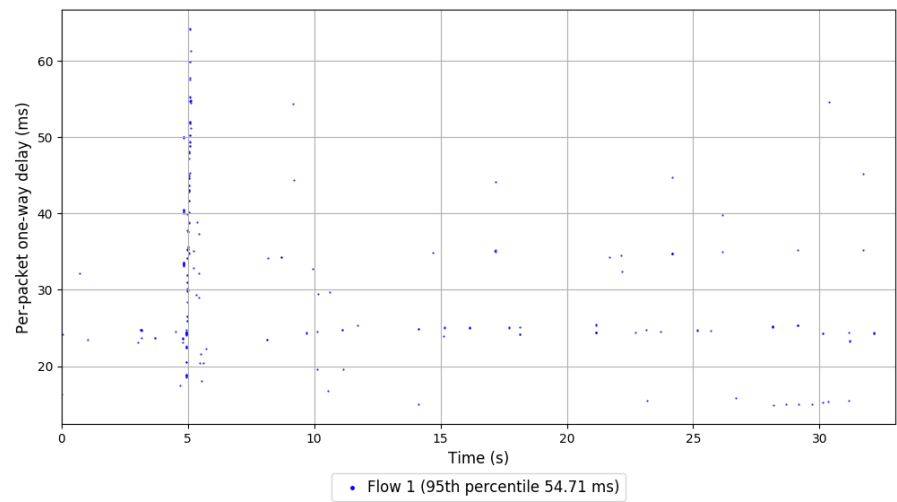
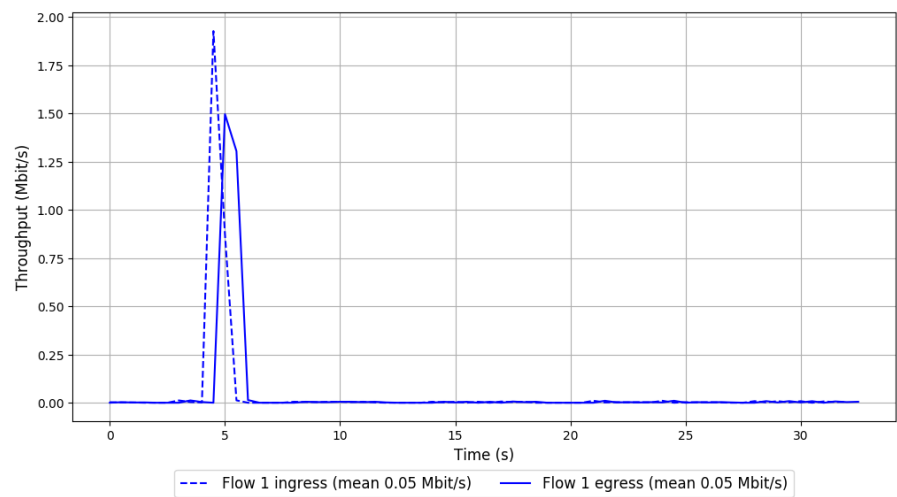
-- Flow 1:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 54.710 ms

Loss rate: 0.00%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2019-01-02 19:13:35

End at: 2019-01-02 19:14:05

Local clock offset: 4.509 ms

Remote clock offset: 1.179 ms

Below is generated by plot.py at 2019-01-02 19:16:18

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 41.821 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 41.821 ms

Loss rate: 0.00%

Run 3: Report of WebRTC media — Data Link

