

Pantheon Report

Generated at 2018-12-10 21:53:01 (UTC).

Data path: AWS India 2 on `ens5` (*local*) → Stanford 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 `time.stanford.edu` and have been applied to correct the timestamps in logs.

System info:

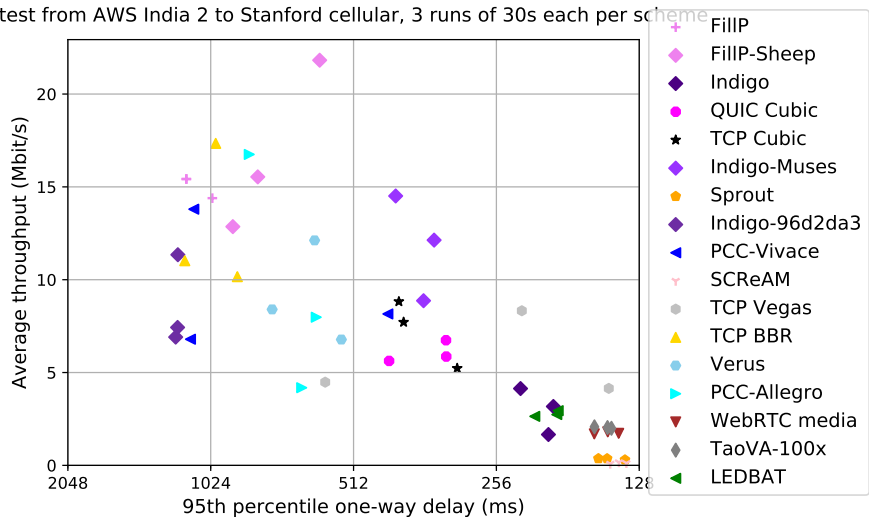
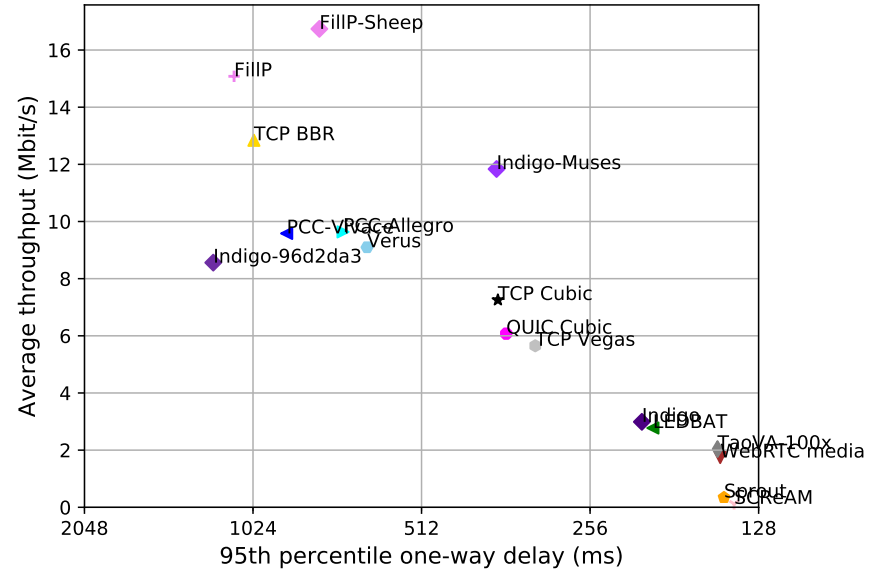
```
Linux 4.15.0-1029-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
```

Git summary:

```
branch: muses @ c6268d7c473682290bfe9901ef81a6b6a1e51d3c
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecd90c077e64d
third_party/indigo-96d2da3 @ 8413272d46f8aa0bcb967ed7048b6a8f994abb95
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ 65ac1b19bbefed0c6349ae986009b4fa8643c40a
third_party/pantheon-tunnel @ f866d3f58d27afd942717625ee3a354cc2e802bd
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
M receiver/src/buffer.h
M receiver/src/core.cpp
M sender/src/buffer.h
M sender/src/core.cpp
third_party/pcc-experimental @ cd43e34e3f5f5613e8acd08fab92c4eb24f974ab
third_party/proto-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 2 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	12.84	1020.19	3.89
Copa	0	N/A	N/A	N/A
TCP Cubic	3	7.25	374.05	0.52
FillP	3	15.08	1106.94	9.84
FillP-Sheep	3	16.74	779.41	2.29
Indigo	3	2.99	206.90	0.40
Indigo-96d2da3	3	8.56	1205.83	72.12
LEDBAT	3	2.78	197.73	0.52
Indigo-Muses	3	11.84	376.09	0.27
PCC-Allegro	3	9.64	707.04	2.35
PCC-Expr	0	N/A	N/A	N/A
QUIC Cubic	3	6.08	361.44	0.69
SCReAM	3	0.12	141.61	0.00
Sprout	3	0.34	147.59	0.00
TaoVA-100x	3	2.04	151.61	12.78
TCP Vegas	3	5.65	320.72	0.05
Verus	3	9.10	640.56	1.74
PCC-Vivace	3	9.58	891.71	6.27
WebRTC media	3	1.74	149.91	0.06

Run 1: Statistics of TCP BBR

Start at: 2018-12-10 20:41:15

End at: 2018-12-10 20:41:45

Local clock offset: -2.517 ms

Remote clock offset: 1.01 ms

Below is generated by plot.py at 2018-12-10 21:52:11

Datalink statistics

-- Total of 1 flow:

Average throughput: 17.34 Mbit/s

95th percentile per-packet one-way delay: 999.515 ms

Loss rate: 2.37%

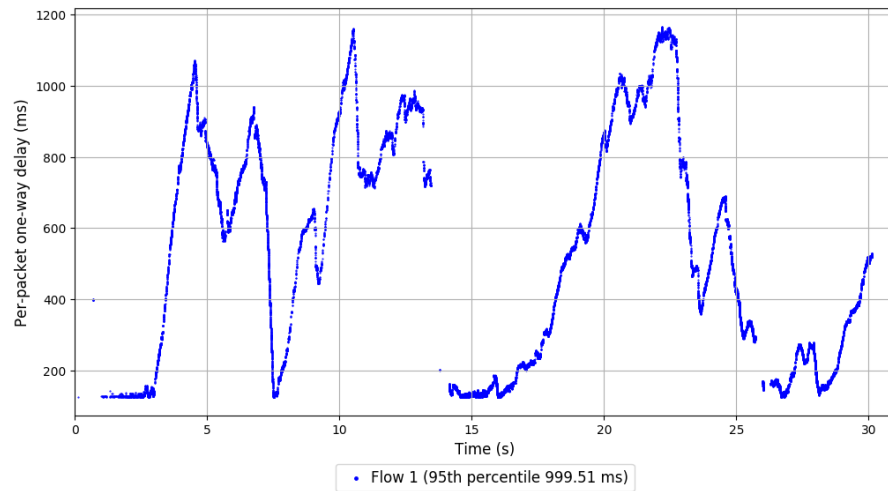
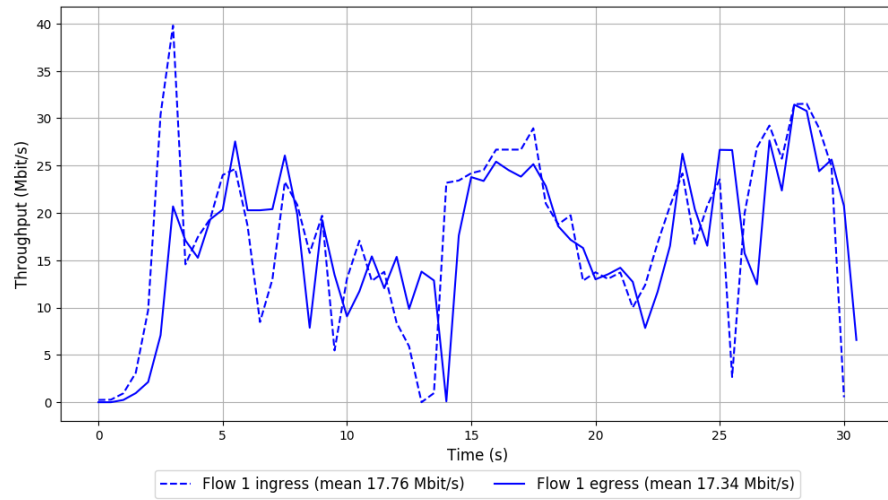
-- Flow 1:

Average throughput: 17.34 Mbit/s

95th percentile per-packet one-way delay: 999.515 ms

Loss rate: 2.37%

Run 1: Report of TCP BBR — Data Link

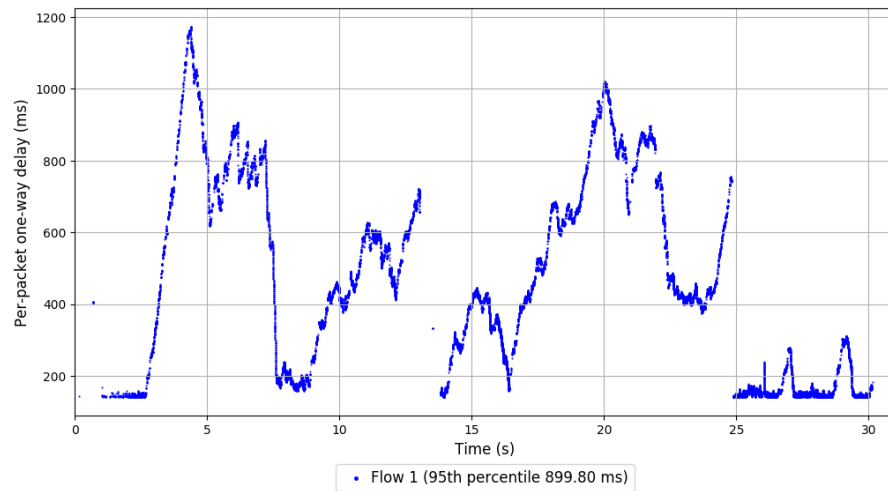
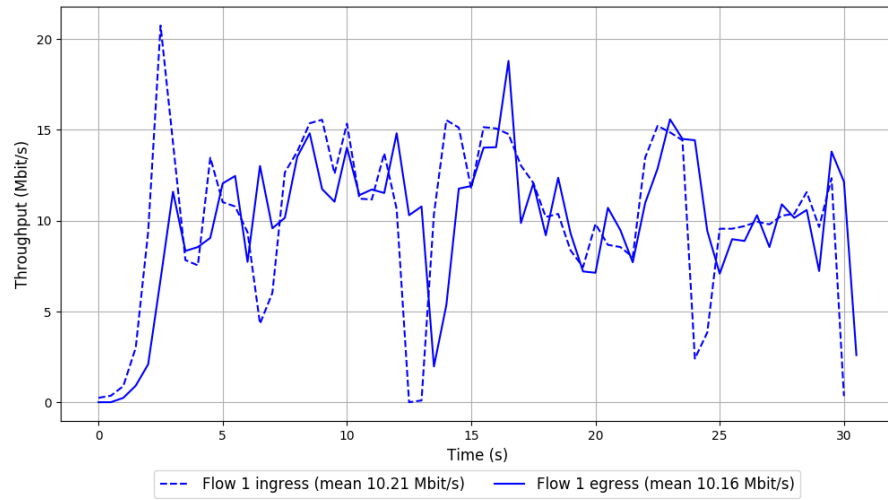


Run 2: Statistics of TCP BBR

Start at: 2018-12-10 21:06:19
End at: 2018-12-10 21:06:49
Local clock offset: -22.254 ms
Remote clock offset: 0.655 ms

Below is generated by plot.py at 2018-12-10 21:52:11
Datalink statistics
-- Total of 1 flow:
Average throughput: 10.16 Mbit/s
95th percentile per-packet one-way delay: 899.805 ms
Loss rate: 0.47%
-- Flow 1:
Average throughput: 10.16 Mbit/s
95th percentile per-packet one-way delay: 899.805 ms
Loss rate: 0.47%

Run 2: Report of TCP BBR — Data Link

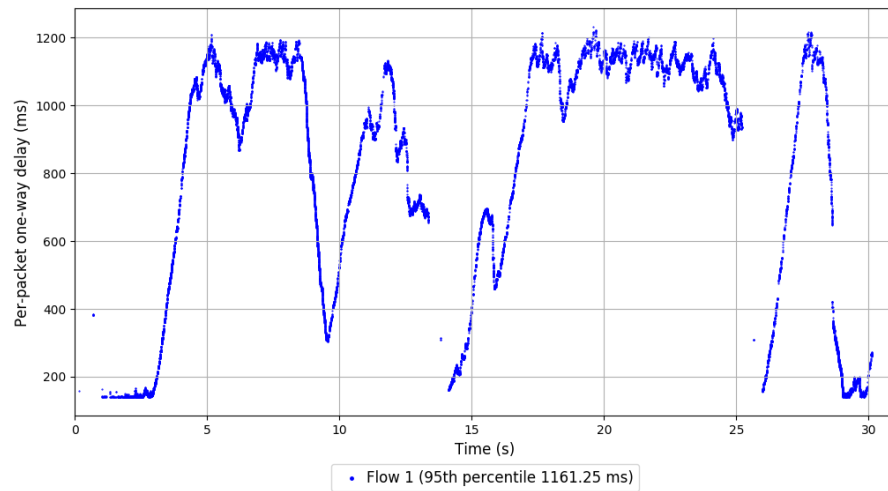
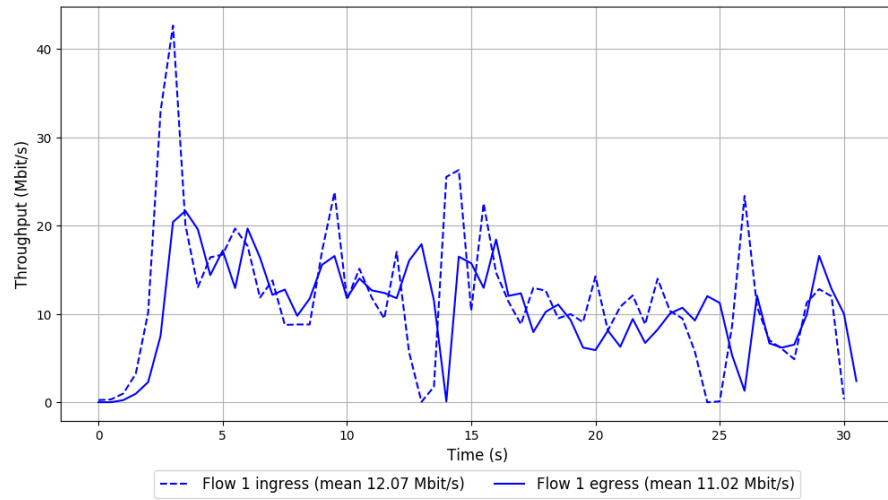


Run 3: Statistics of TCP BBR

Start at: 2018-12-10 21:31:26
End at: 2018-12-10 21:31:56
Local clock offset: -31.041 ms
Remote clock offset: 0.1 ms

Below is generated by plot.py at 2018-12-10 21:52:11
Datalink statistics
-- Total of 1 flow:
Average throughput: 11.02 Mbit/s
95th percentile per-packet one-way delay: 1161.248 ms
Loss rate: 8.83%
-- Flow 1:
Average throughput: 11.02 Mbit/s
95th percentile per-packet one-way delay: 1161.248 ms
Loss rate: 8.83%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

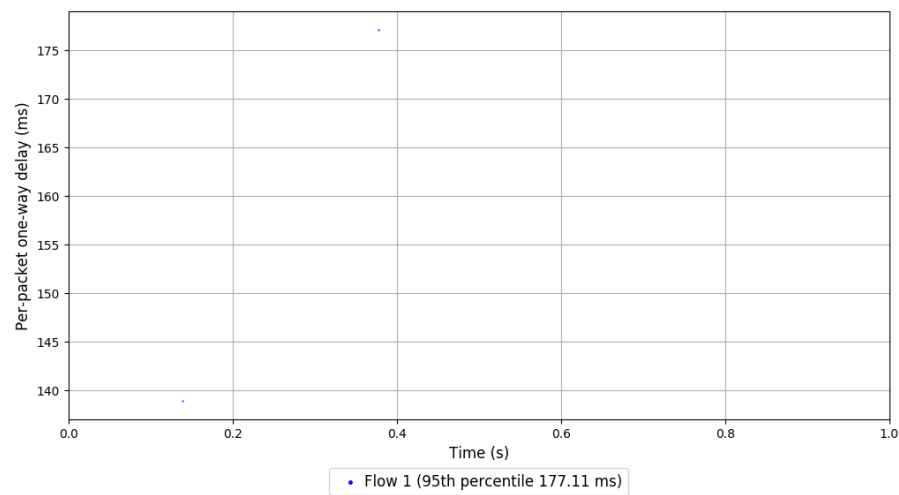
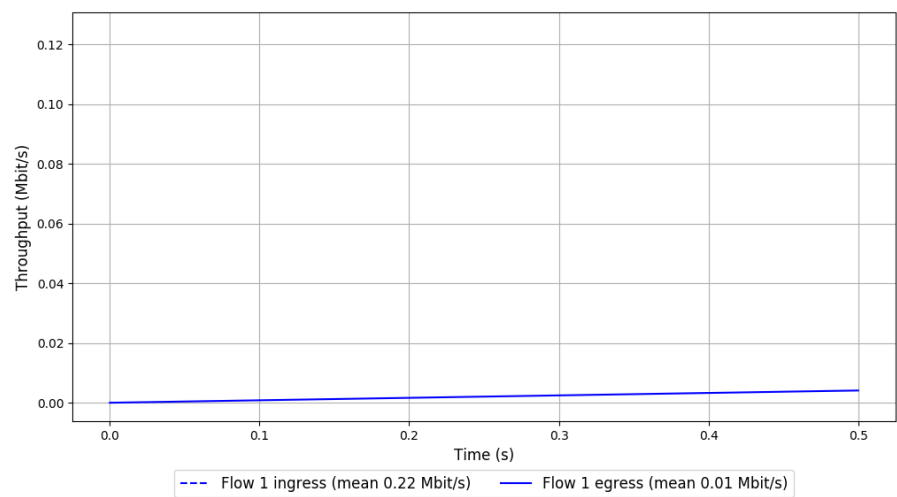
Start at: 2018-12-10 20:57:06

End at: 2018-12-10 20:57:36

Local clock offset: -19.935 ms

Remote clock offset: 0.498 ms

Run 1: Report of Copa — Data Link



Run 2: Statistics of Copa

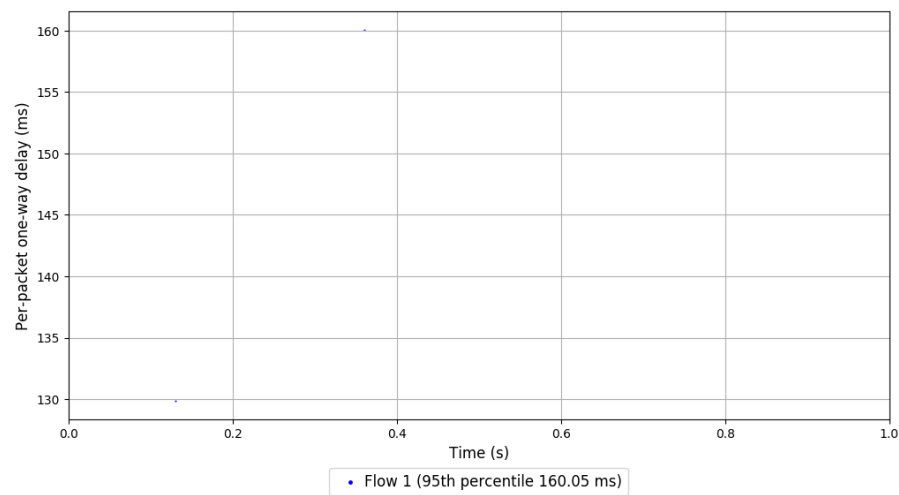
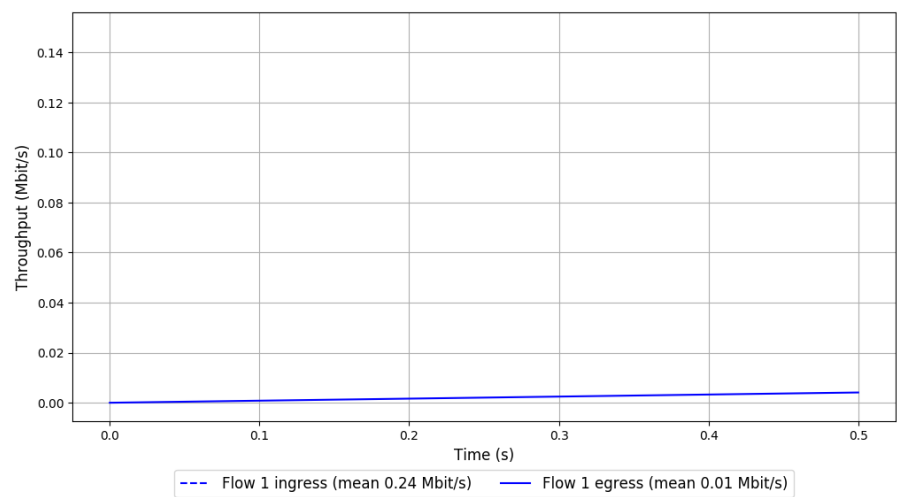
Start at: 2018-12-10 21:22:13

End at: 2018-12-10 21:22:43

Local clock offset: -24.568 ms

Remote clock offset: 0.444 ms

Run 2: Report of Copa — Data Link



Run 3: Statistics of Copa

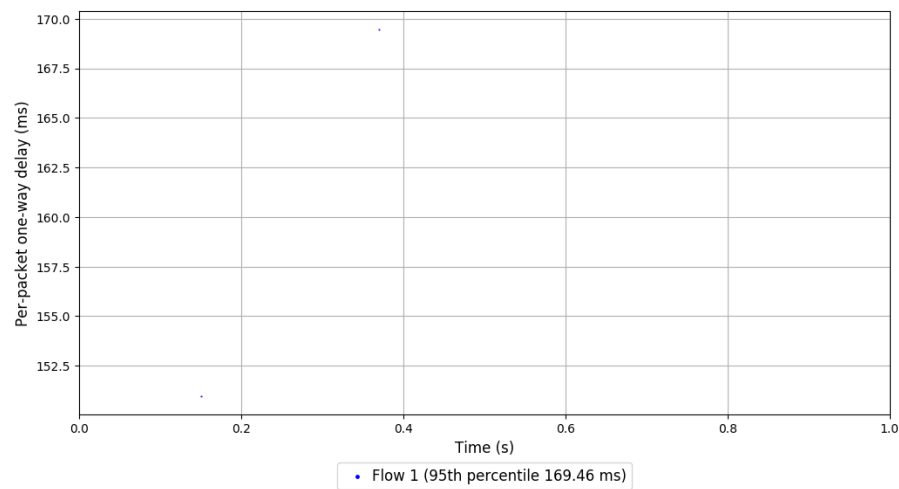
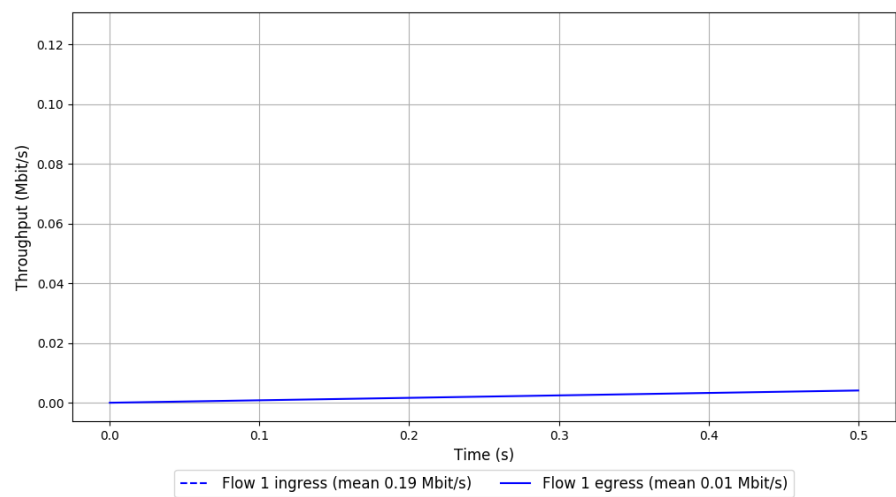
Start at: 2018-12-10 21:47:16

End at: 2018-12-10 21:47:46

Local clock offset: -10.779 ms

Remote clock offset: 0.227 ms

Run 3: Report of Copa — Data Link

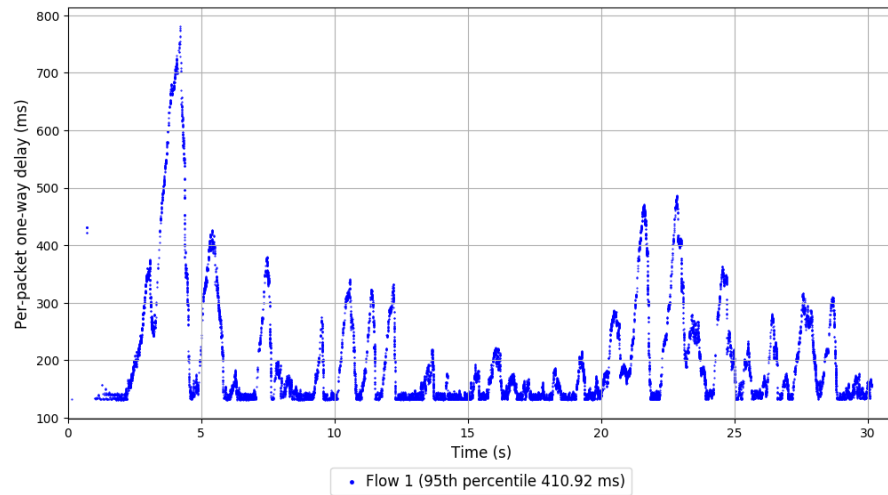
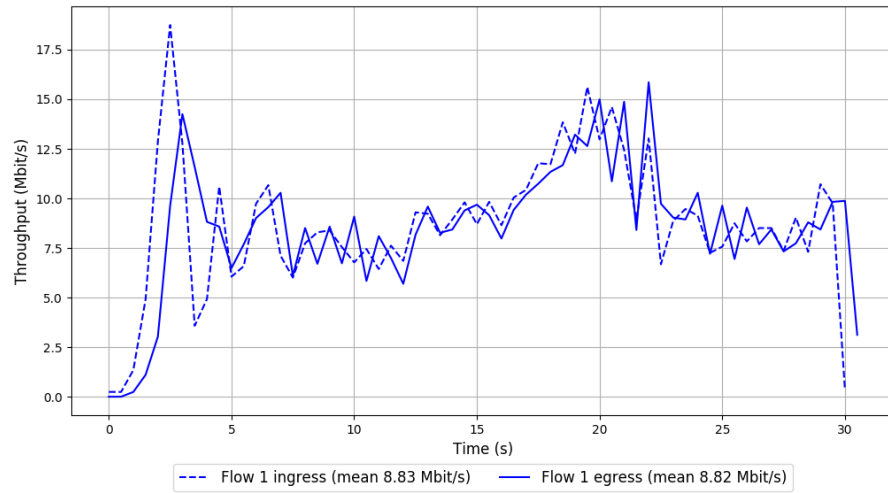


Run 1: Statistics of TCP Cubic

Start at: 2018-12-10 20:43:57
End at: 2018-12-10 20:44:27
Local clock offset: -13.391 ms
Remote clock offset: 0.81 ms

Below is generated by plot.py at 2018-12-10 21:52:11
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.82 Mbit/s
95th percentile per-packet one-way delay: 410.922 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 8.82 Mbit/s
95th percentile per-packet one-way delay: 410.922 ms
Loss rate: 0.14%

Run 1: Report of TCP Cubic — Data Link

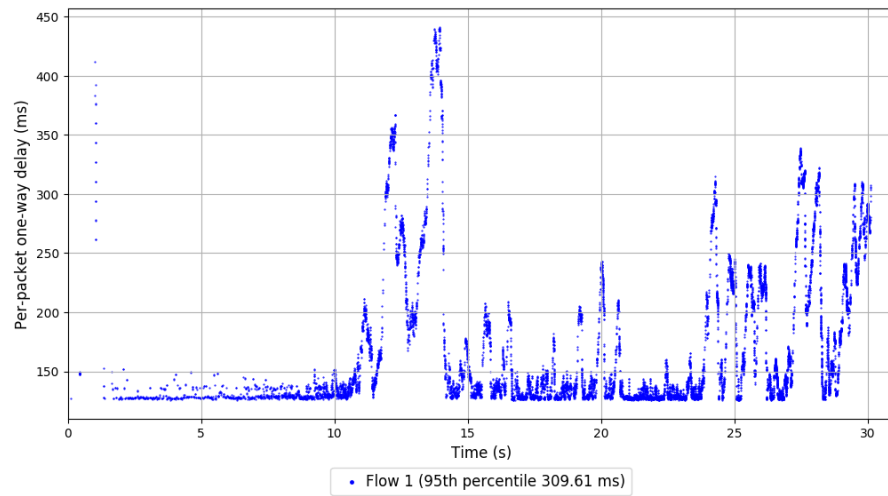
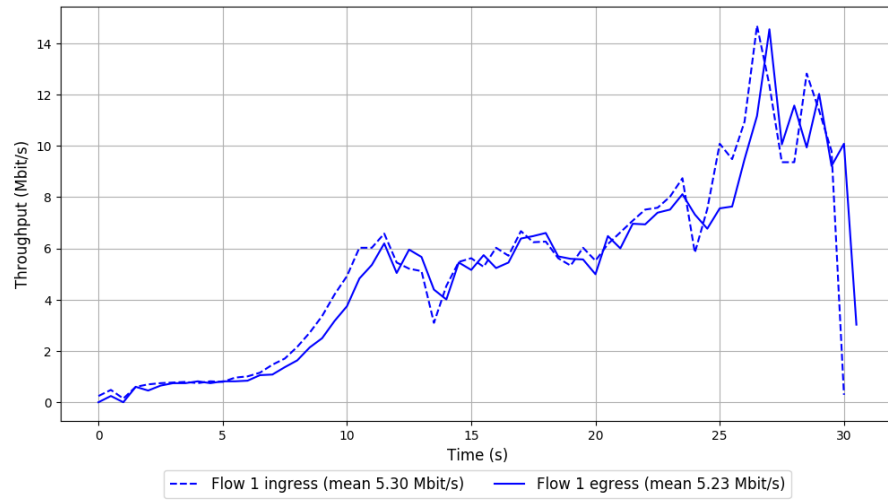


Run 2: Statistics of TCP Cubic

Start at: 2018-12-10 21:09:04
End at: 2018-12-10 21:09:34
Local clock offset: -11.343 ms
Remote clock offset: 0.763 ms

Below is generated by plot.py at 2018-12-10 21:52:11
Datalink statistics
-- Total of 1 flow:
Average throughput: 5.23 Mbit/s
95th percentile per-packet one-way delay: 309.607 ms
Loss rate: 1.33%
-- Flow 1:
Average throughput: 5.23 Mbit/s
95th percentile per-packet one-way delay: 309.607 ms
Loss rate: 1.33%

Run 2: Report of TCP Cubic — Data Link

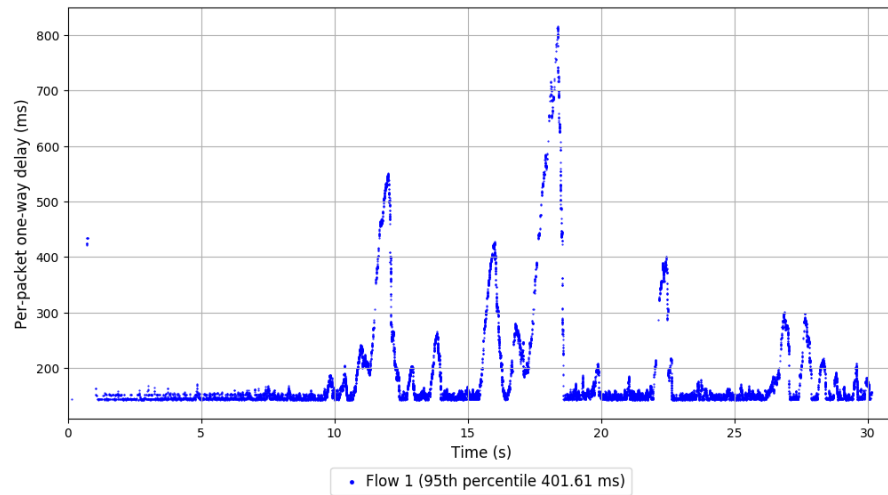
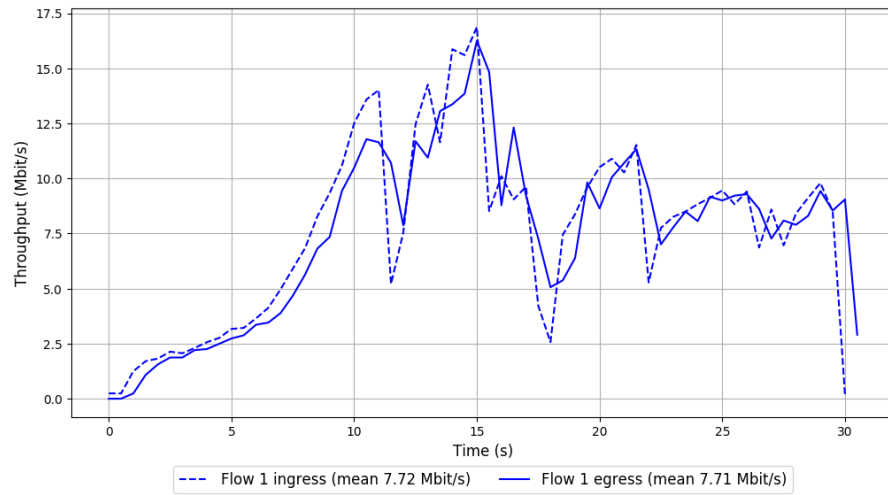


Run 3: Statistics of TCP Cubic

Start at: 2018-12-10 21:34:05
End at: 2018-12-10 21:34:36
Local clock offset: -30.806 ms
Remote clock offset: 0.141 ms

Below is generated by plot.py at 2018-12-10 21:52:11
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.71 Mbit/s
95th percentile per-packet one-way delay: 401.614 ms
Loss rate: 0.08%
-- Flow 1:
Average throughput: 7.71 Mbit/s
95th percentile per-packet one-way delay: 401.614 ms
Loss rate: 0.08%

Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of FillP

Start at: 2018-12-10 20:53:09

End at: 2018-12-10 20:53:39

Local clock offset: -13.66 ms

Remote clock offset: 0.481 ms

Below is generated by plot.py at 2018-12-10 21:52:16

Datalink statistics

-- Total of 1 flow:

Average throughput: 15.42 Mbit/s

95th percentile per-packet one-way delay: 1153.317 ms

Loss rate: 11.02%

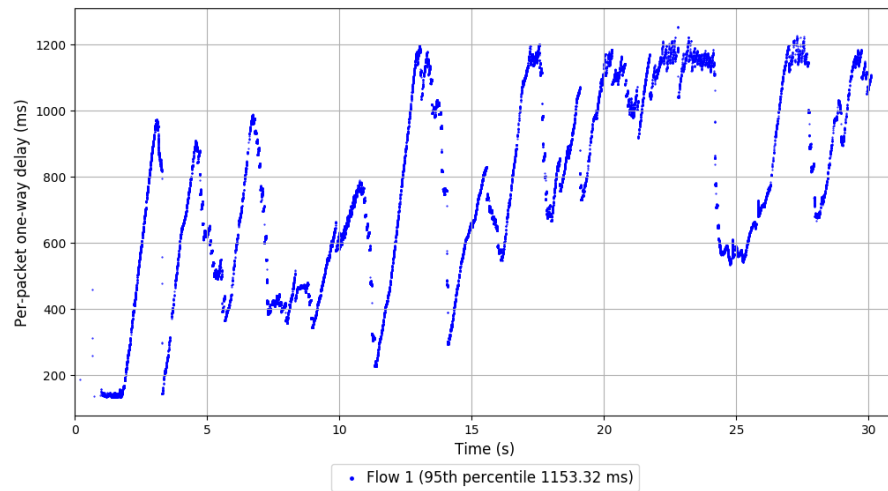
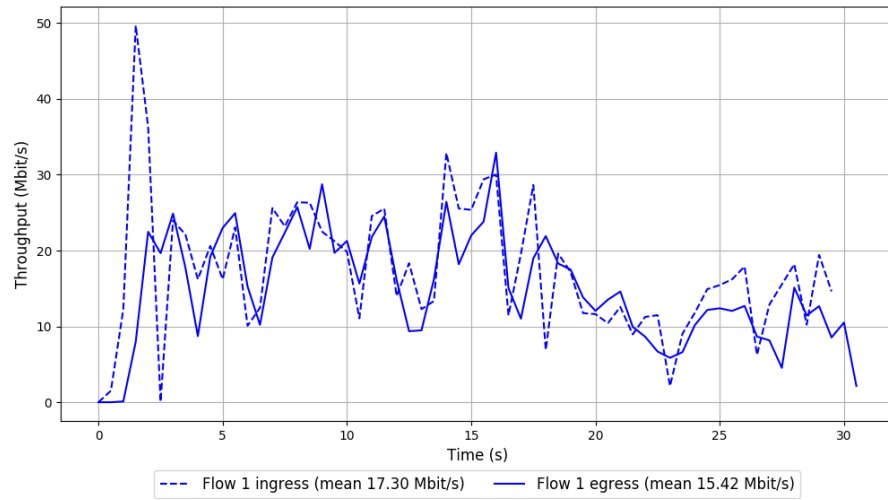
-- Flow 1:

Average throughput: 15.42 Mbit/s

95th percentile per-packet one-way delay: 1153.317 ms

Loss rate: 11.02%

Run 1: Report of FillP — Data Link

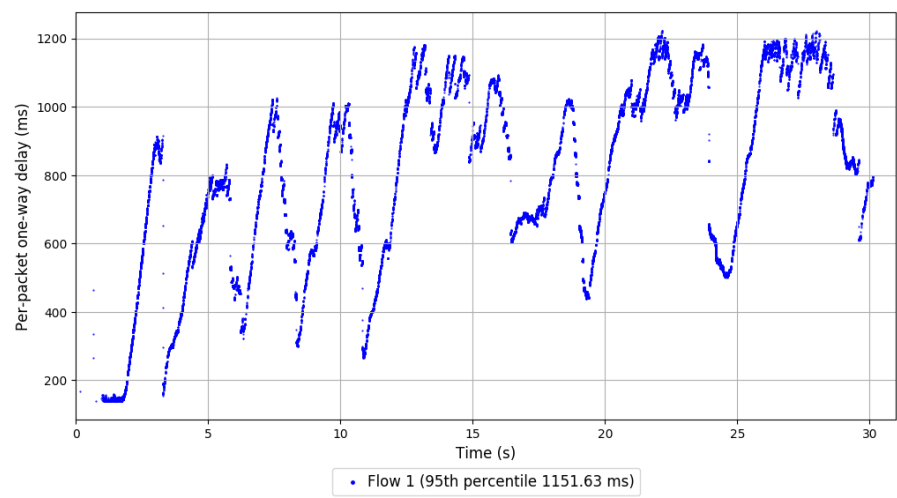
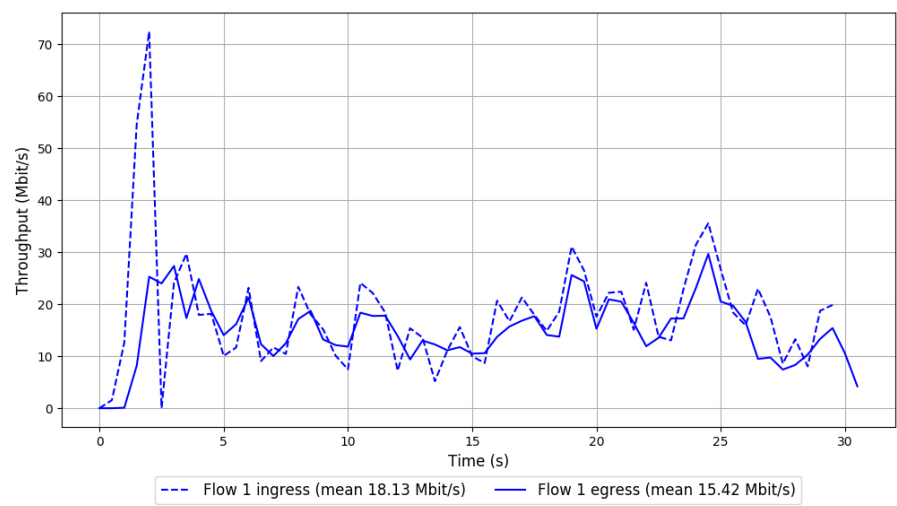


Run 2: Statistics of FillP

Start at: 2018-12-10 21:18:15
End at: 2018-12-10 21:18:45
Local clock offset: -33.731 ms
Remote clock offset: 0.674 ms

Below is generated by plot.py at 2018-12-10 21:52:16
Datalink statistics
-- Total of 1 flow:
Average throughput: 15.42 Mbit/s
95th percentile per-packet one-way delay: 1151.626 ms
Loss rate: 15.05%
-- Flow 1:
Average throughput: 15.42 Mbit/s
95th percentile per-packet one-way delay: 1151.626 ms
Loss rate: 15.05%

Run 2: Report of FillP — Data Link

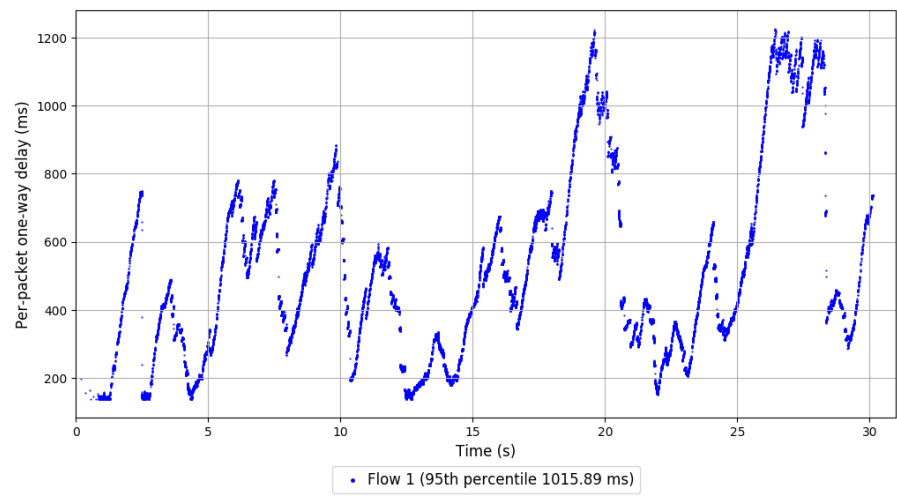
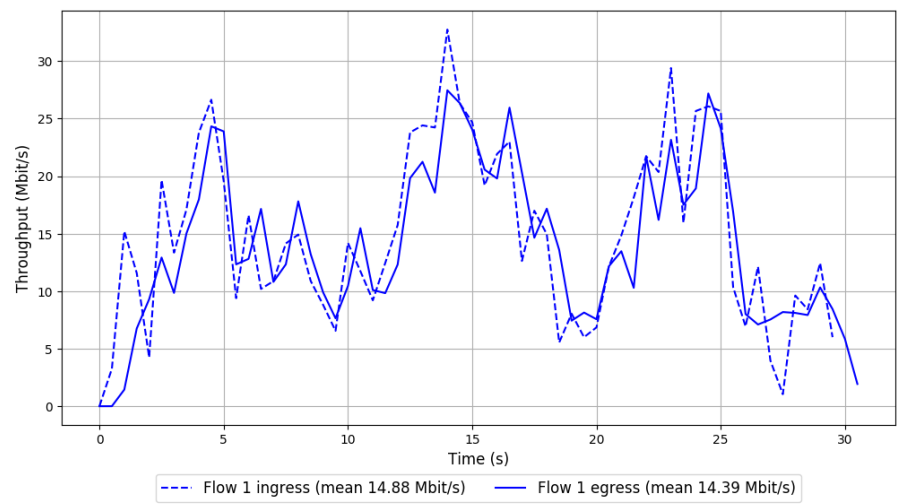


Run 3: Statistics of FillP

Start at: 2018-12-10 21:43:18
End at: 2018-12-10 21:43:48
Local clock offset: -22.511 ms
Remote clock offset: 0.132 ms

Below is generated by plot.py at 2018-12-10 21:52:18
Datalink statistics
-- Total of 1 flow:
Average throughput: 14.39 Mbit/s
95th percentile per-packet one-way delay: 1015.887 ms
Loss rate: 3.45%
-- Flow 1:
Average throughput: 14.39 Mbit/s
95th percentile per-packet one-way delay: 1015.887 ms
Loss rate: 3.45%

Run 3: Report of FillP — Data Link

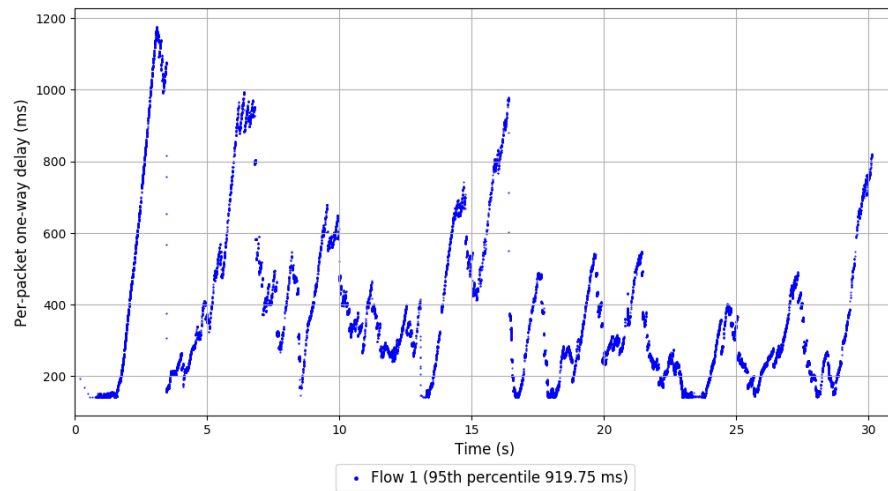
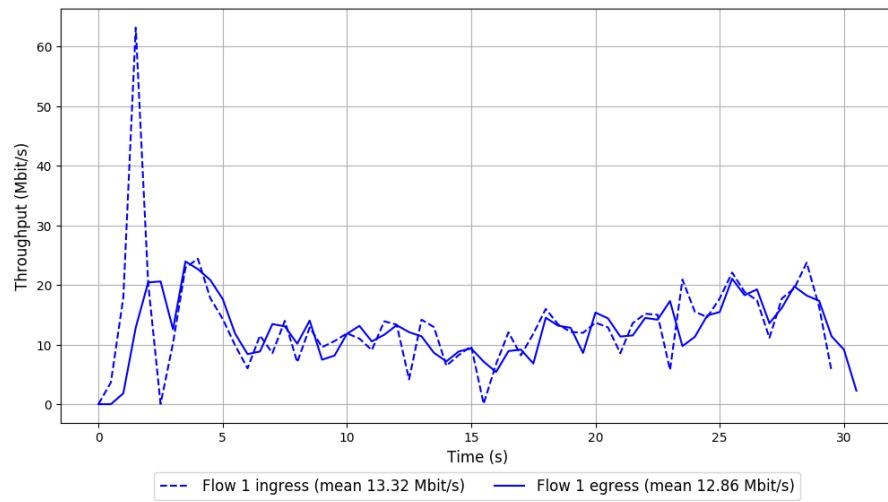


Run 1: Statistics of FillP-Sheep

Start at: 2018-12-10 20:47:53
End at: 2018-12-10 20:48:23
Local clock offset: -19.621 ms
Remote clock offset: 0.58 ms

Below is generated by plot.py at 2018-12-10 21:52:19
Datalink statistics
-- Total of 1 flow:
Average throughput: 12.86 Mbit/s
95th percentile per-packet one-way delay: 919.746 ms
Loss rate: 3.52%
-- Flow 1:
Average throughput: 12.86 Mbit/s
95th percentile per-packet one-way delay: 919.746 ms
Loss rate: 3.52%

Run 1: Report of FillP-Sheep — Data Link

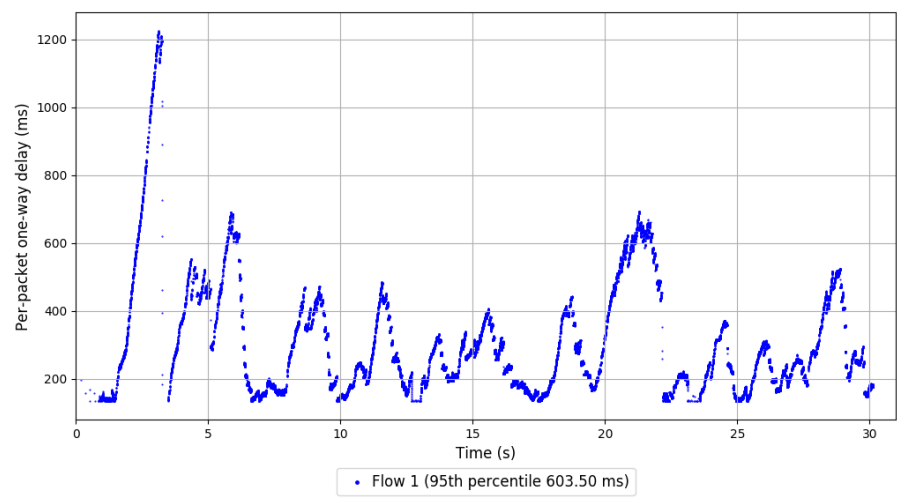
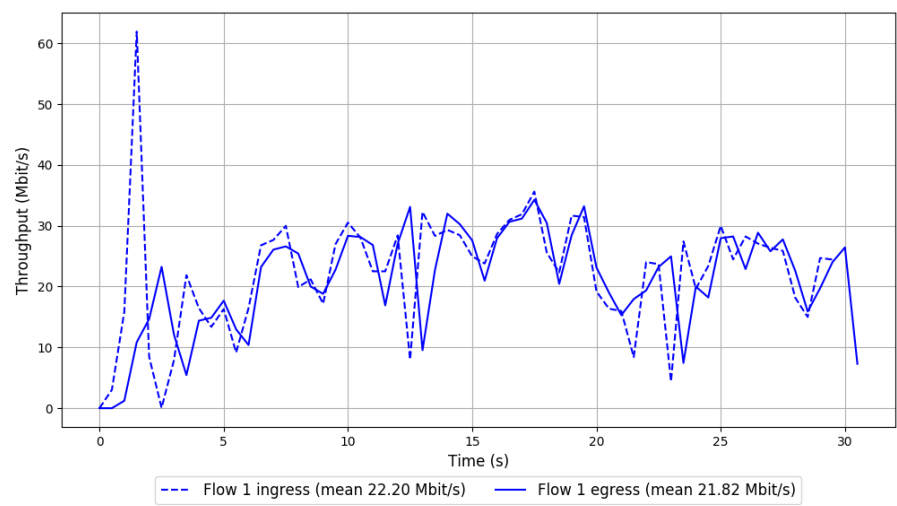


Run 2: Statistics of FillP-Sheep

Start at: 2018-12-10 21:13:00
End at: 2018-12-10 21:13:30
Local clock offset: -20.45 ms
Remote clock offset: 0.743 ms

Below is generated by plot.py at 2018-12-10 21:52:30
Datalink statistics
-- Total of 1 flow:
Average throughput: 21.82 Mbit/s
95th percentile per-packet one-way delay: 603.501 ms
Loss rate: 1.94%
-- Flow 1:
Average throughput: 21.82 Mbit/s
95th percentile per-packet one-way delay: 603.501 ms
Loss rate: 1.94%

Run 2: Report of FillP-Sheep — Data Link

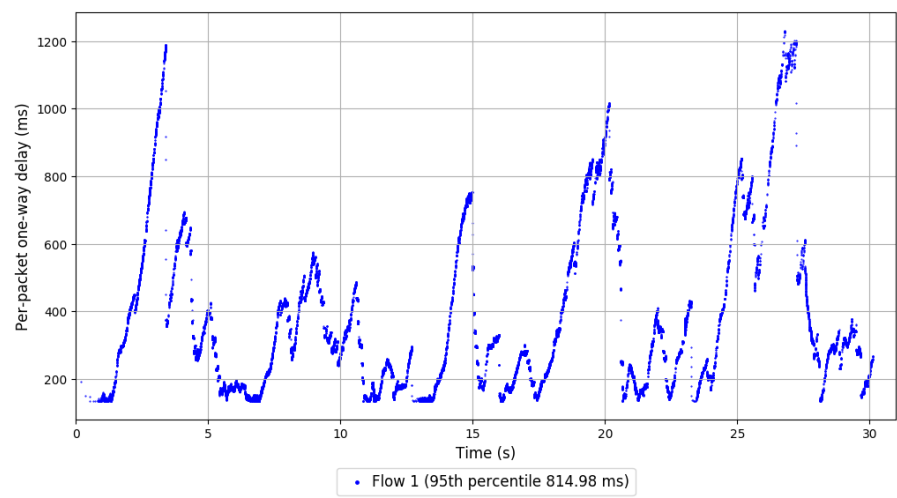
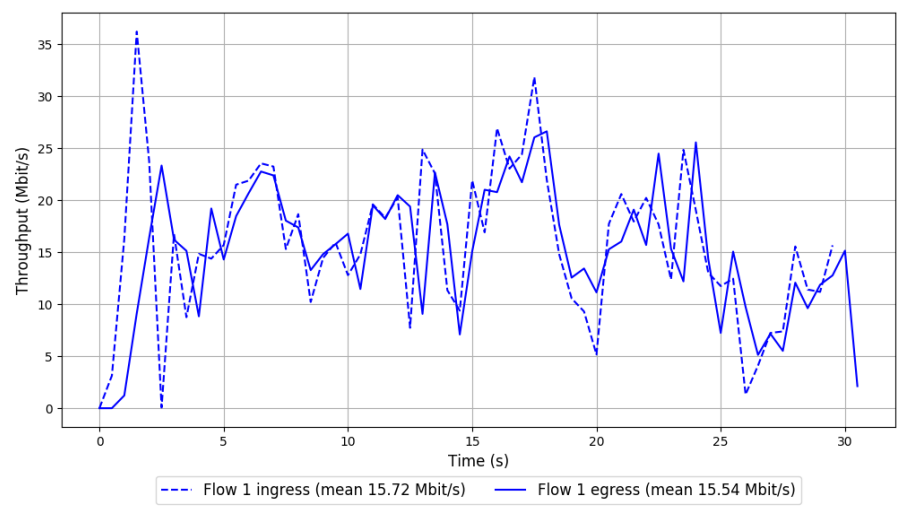


Run 3: Statistics of FillP-Sheep

Start at: 2018-12-10 21:38:02
End at: 2018-12-10 21:38:32
Local clock offset: -17.463 ms
Remote clock offset: 0.101 ms

Below is generated by plot.py at 2018-12-10 21:52:30
Datalink statistics
-- Total of 1 flow:
Average throughput: 15.54 Mbit/s
95th percentile per-packet one-way delay: 814.979 ms
Loss rate: 1.40%
-- Flow 1:
Average throughput: 15.54 Mbit/s
95th percentile per-packet one-way delay: 814.979 ms
Loss rate: 1.40%

Run 3: Report of FillP-Sheep — Data Link

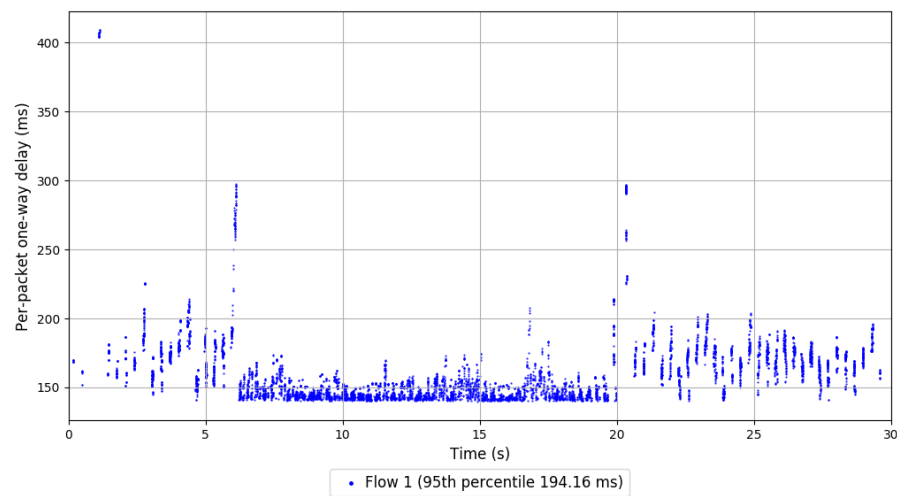
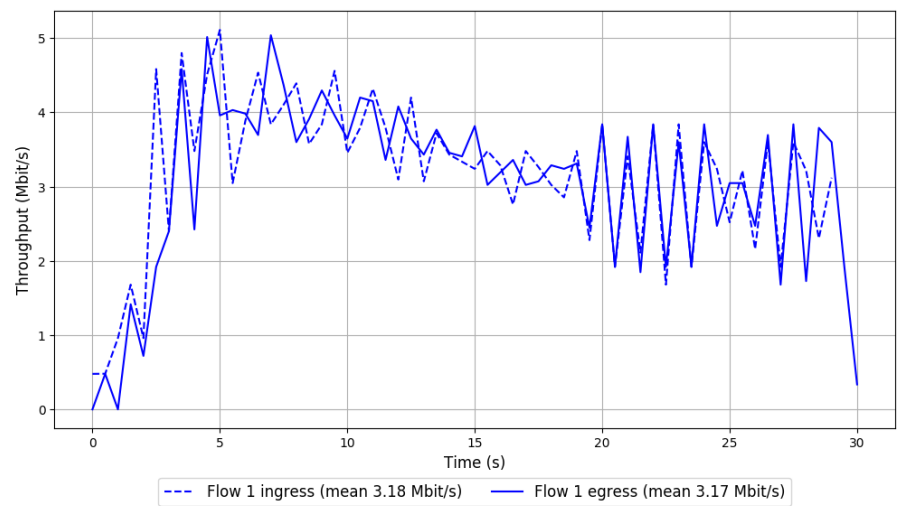


Run 1: Statistics of Indigo

Start at: 2018-12-10 20:39:56
End at: 2018-12-10 20:40:26
Local clock offset: -12.377 ms
Remote clock offset: 0.94 ms

Below is generated by plot.py at 2018-12-10 21:52:30
Datalink statistics
-- Total of 1 flow:
Average throughput: 3.17 Mbit/s
95th percentile per-packet one-way delay: 194.158 ms
Loss rate: 0.47%
-- Flow 1:
Average throughput: 3.17 Mbit/s
95th percentile per-packet one-way delay: 194.158 ms
Loss rate: 0.47%

Run 1: Report of Indigo — Data Link

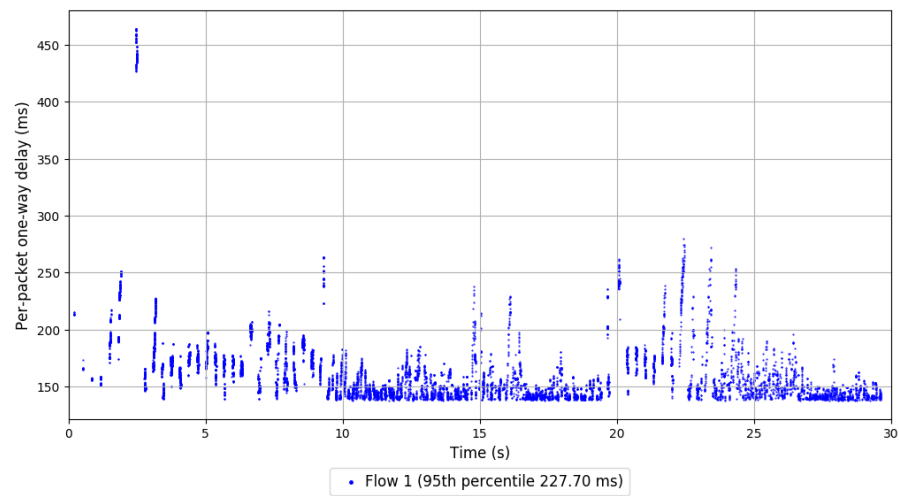
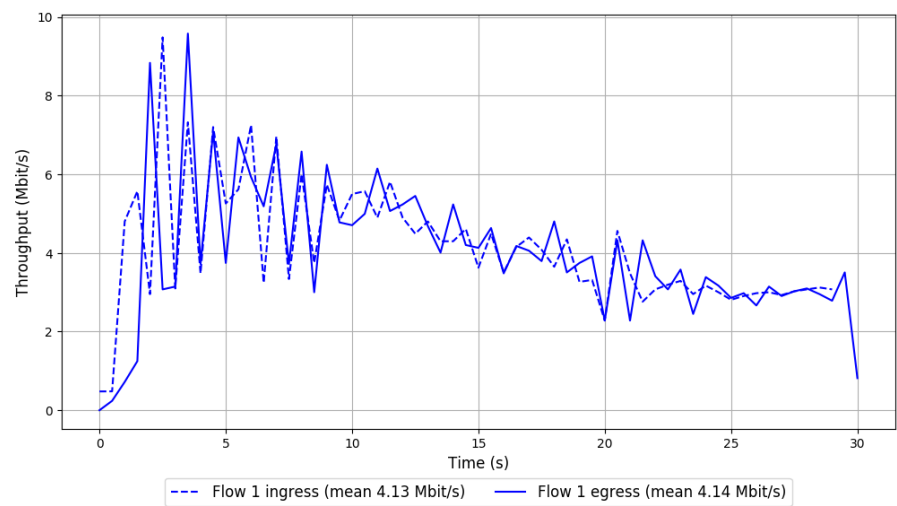


Run 2: Statistics of Indigo

Start at: 2018-12-10 21:05:00
End at: 2018-12-10 21:05:30
Local clock offset: -20.789 ms
Remote clock offset: 0.67 ms

Below is generated by plot.py at 2018-12-10 21:52:30
Datalink statistics
-- Total of 1 flow:
Average throughput: 4.14 Mbit/s
95th percentile per-packet one-way delay: 227.696 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 4.14 Mbit/s
95th percentile per-packet one-way delay: 227.696 ms
Loss rate: 0.01%

Run 2: Report of Indigo — Data Link

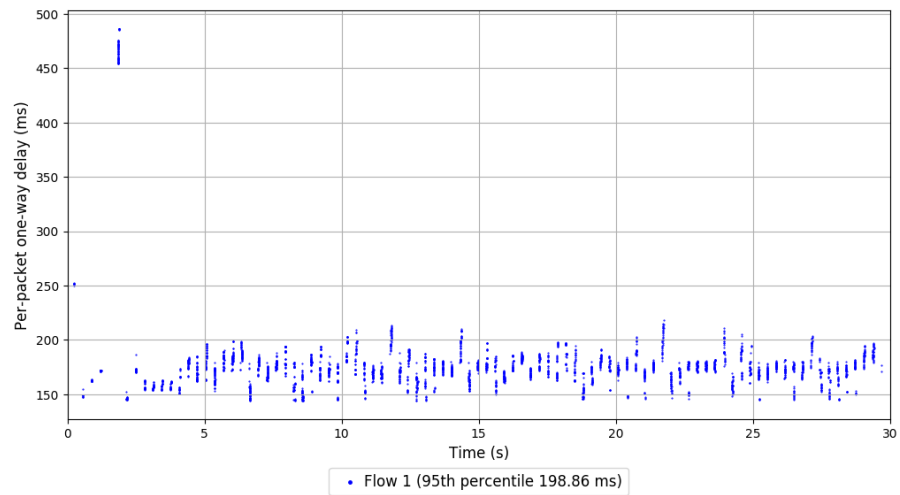
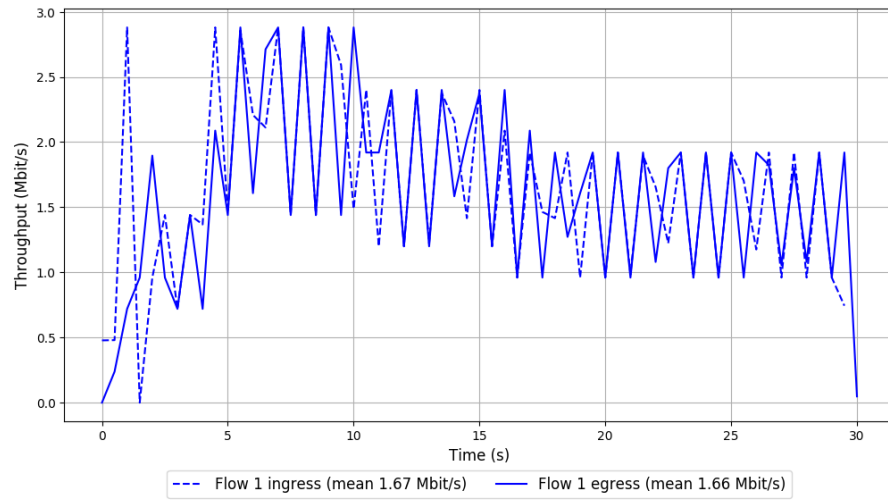


Run 3: Statistics of Indigo

Start at: 2018-12-10 21:30:07
End at: 2018-12-10 21:30:37
Local clock offset: -34.829 ms
Remote clock offset: 0.223 ms

Below is generated by plot.py at 2018-12-10 21:52:30
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.66 Mbit/s
95th percentile per-packet one-way delay: 198.859 ms
Loss rate: 0.73%
-- Flow 1:
Average throughput: 1.66 Mbit/s
95th percentile per-packet one-way delay: 198.859 ms
Loss rate: 0.73%

Run 3: Report of Indigo — Data Link

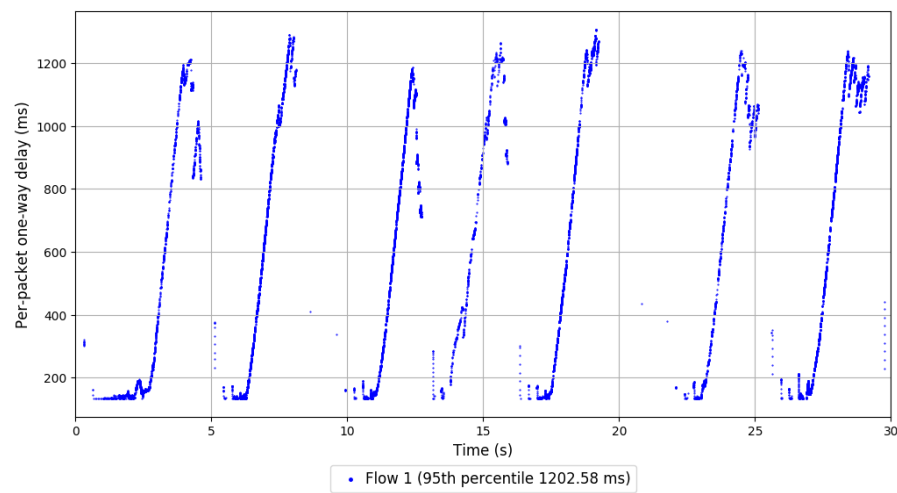
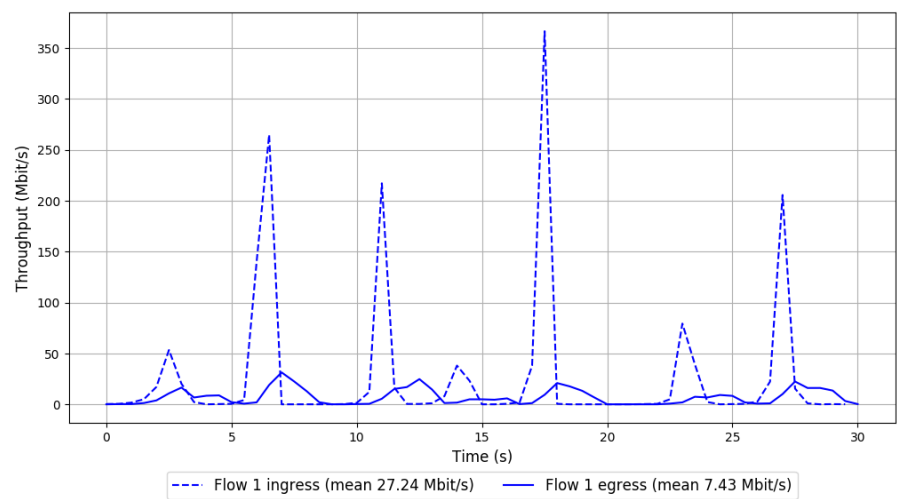


Run 1: Statistics of Indigo-96d2da3

Start at: 2018-12-10 21:01:03
End at: 2018-12-10 21:01:33
Local clock offset: -13.411 ms
Remote clock offset: 0.542 ms

Below is generated by plot.py at 2018-12-10 21:52:30
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.43 Mbit/s
95th percentile per-packet one-way delay: 1202.579 ms
Loss rate: 72.81%
-- Flow 1:
Average throughput: 7.43 Mbit/s
95th percentile per-packet one-way delay: 1202.579 ms
Loss rate: 72.81%

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

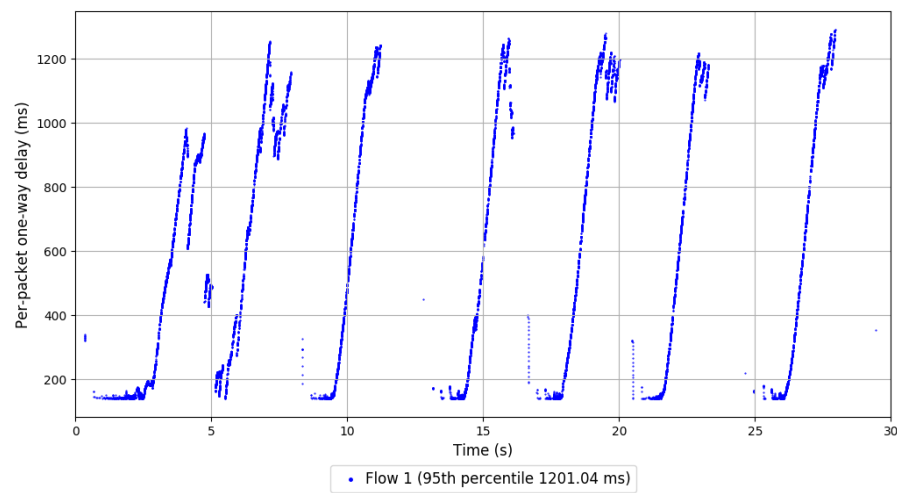
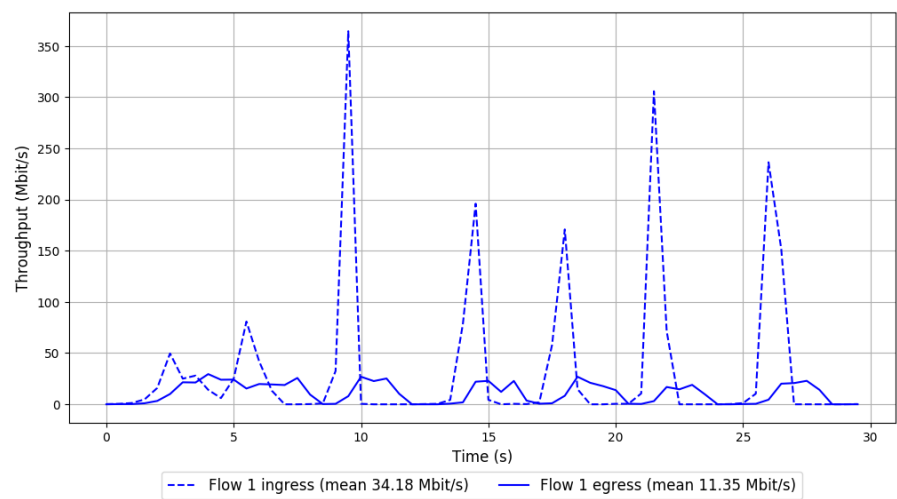


Run 2: Statistics of Indigo-96d2da3

Start at: 2018-12-10 21:26:10
End at: 2018-12-10 21:26:40
Local clock offset: -41.605 ms
Remote clock offset: 0.324 ms

Below is generated by plot.py at 2018-12-10 21:52:35
Datalink statistics
-- Total of 1 flow:
Average throughput: 11.35 Mbit/s
95th percentile per-packet one-way delay: 1201.038 ms
Loss rate: 67.36%
-- Flow 1:
Average throughput: 11.35 Mbit/s
95th percentile per-packet one-way delay: 1201.038 ms
Loss rate: 67.36%

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

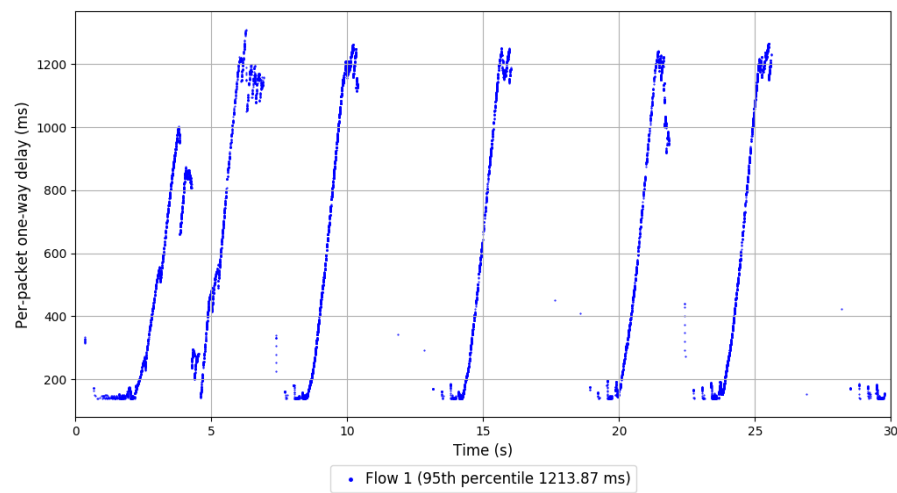
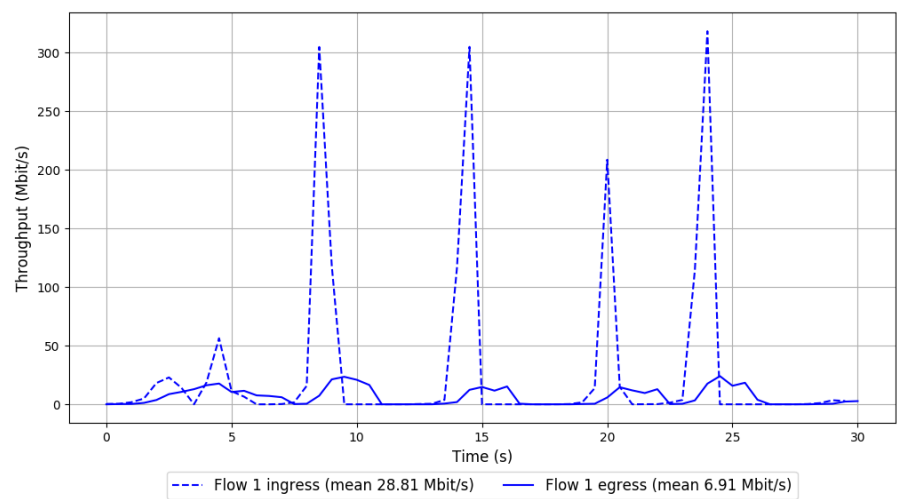


Run 3: Statistics of Indigo-96d2da3

Start at: 2018-12-10 21:51:12
End at: 2018-12-10 21:51:42
Local clock offset: -23.889 ms
Remote clock offset: 0.634 ms

Below is generated by plot.py at 2018-12-10 21:52:35
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.91 Mbit/s
95th percentile per-packet one-way delay: 1213.867 ms
Loss rate: 76.19%
-- Flow 1:
Average throughput: 6.91 Mbit/s
95th percentile per-packet one-way delay: 1213.867 ms
Loss rate: 76.19%

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

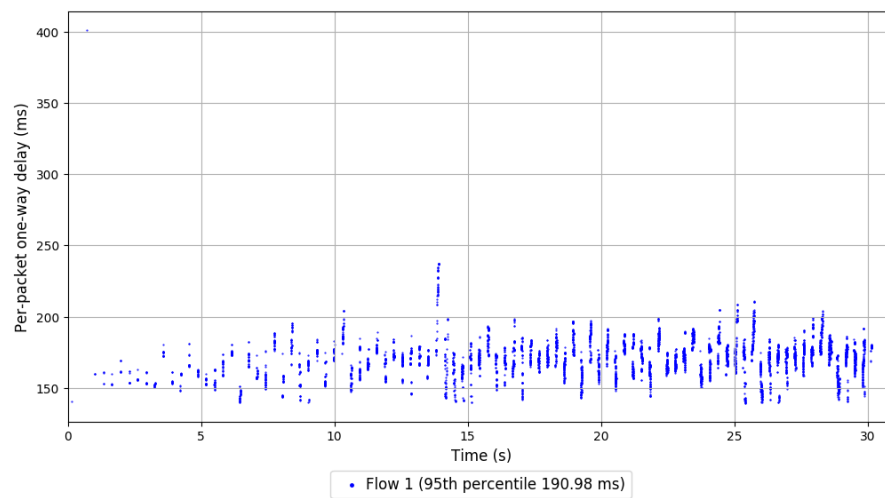
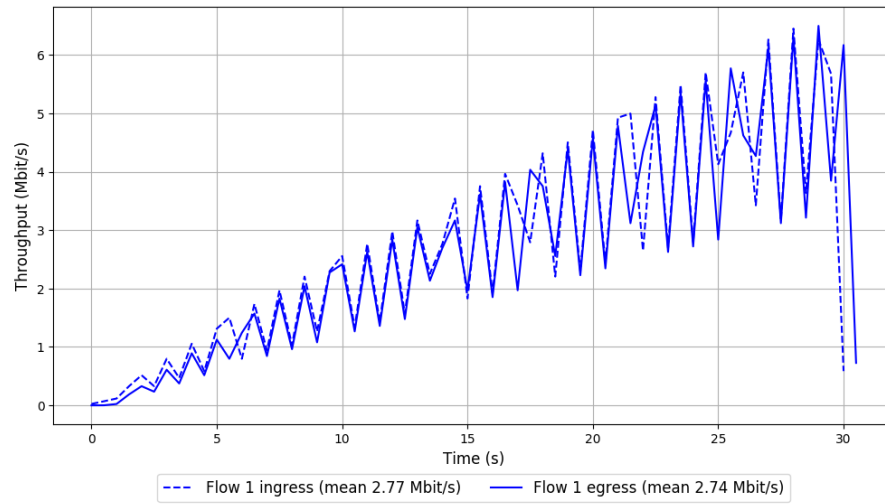


```
Run 1: Statistics of LEDBAT

Start at: 2018-12-10 20:38:34
End at: 2018-12-10 20:39:04
Local clock offset: -10.038 ms
Remote clock offset: 0.93 ms

# Below is generated by plot.py at 2018-12-10 21:52:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.74 Mbit/s
95th percentile per-packet one-way delay: 190.979 ms
Loss rate: 1.30%
-- Flow 1:
Average throughput: 2.74 Mbit/s
95th percentile per-packet one-way delay: 190.979 ms
Loss rate: 1.30%
```

Run 1: Report of LEDBAT — Data Link

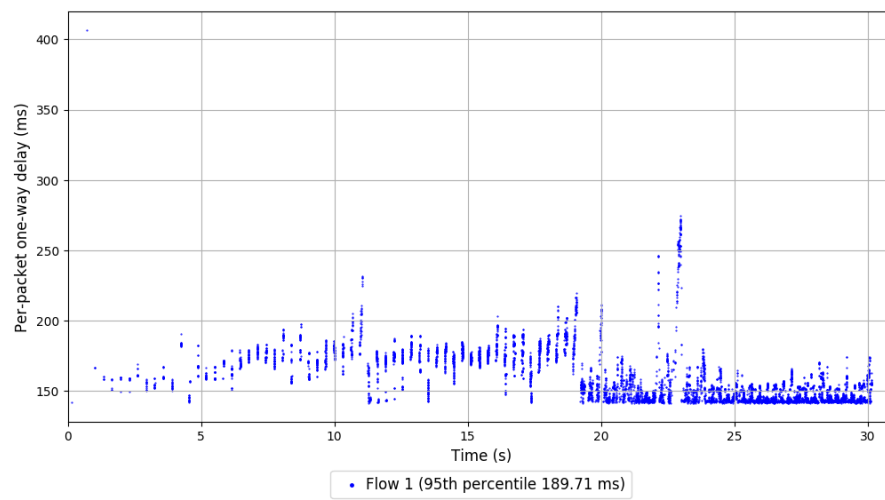
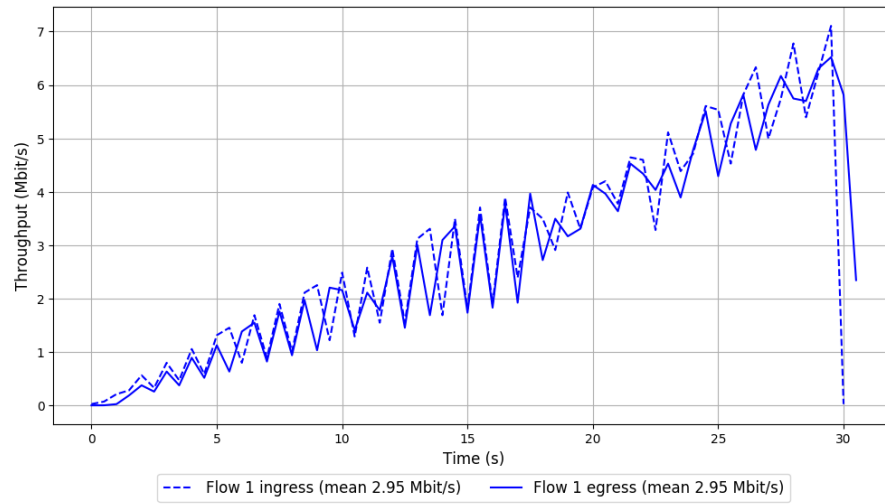


Run 2: Statistics of LEDBAT

Start at: 2018-12-10 21:03:41
End at: 2018-12-10 21:04:11
Local clock offset: -21.077 ms
Remote clock offset: 0.567 ms

Below is generated by plot.py at 2018-12-10 21:52:35
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.95 Mbit/s
95th percentile per-packet one-way delay: 189.714 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 2.95 Mbit/s
95th percentile per-packet one-way delay: 189.714 ms
Loss rate: 0.15%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2018-12-10 21:28:48

End at: 2018-12-10 21:29:18

Local clock offset: -40.84 ms

Remote clock offset: 0.168 ms

Below is generated by plot.py at 2018-12-10 21:52:35

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.64 Mbit/s

95th percentile per-packet one-way delay: 212.505 ms

Loss rate: 0.10%

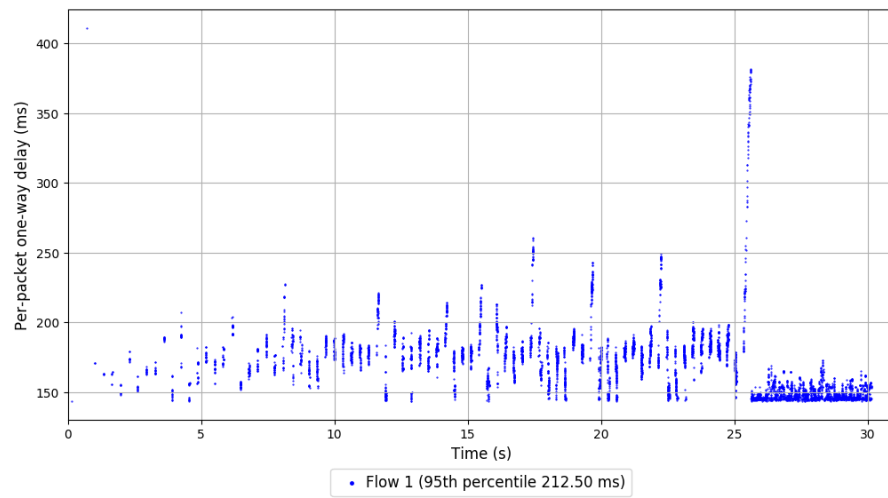
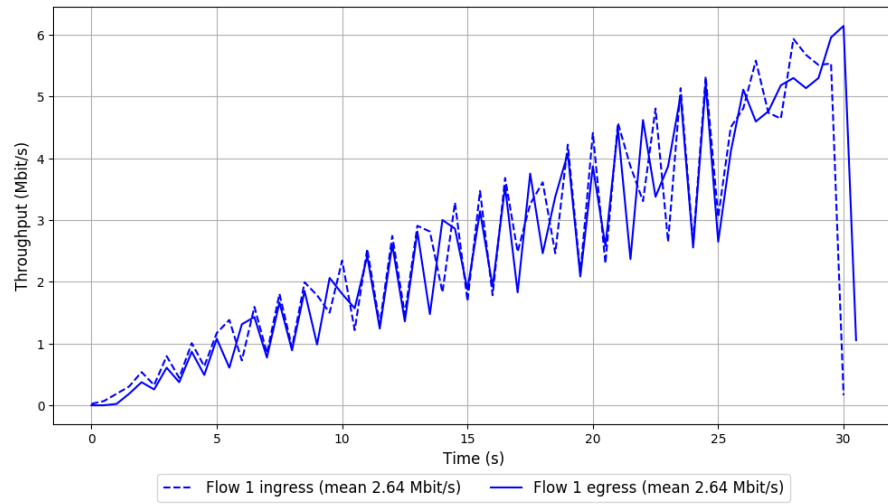
-- Flow 1:

Average throughput: 2.64 Mbit/s

95th percentile per-packet one-way delay: 212.505 ms

Loss rate: 0.10%

Run 3: Report of LEDBAT — Data Link

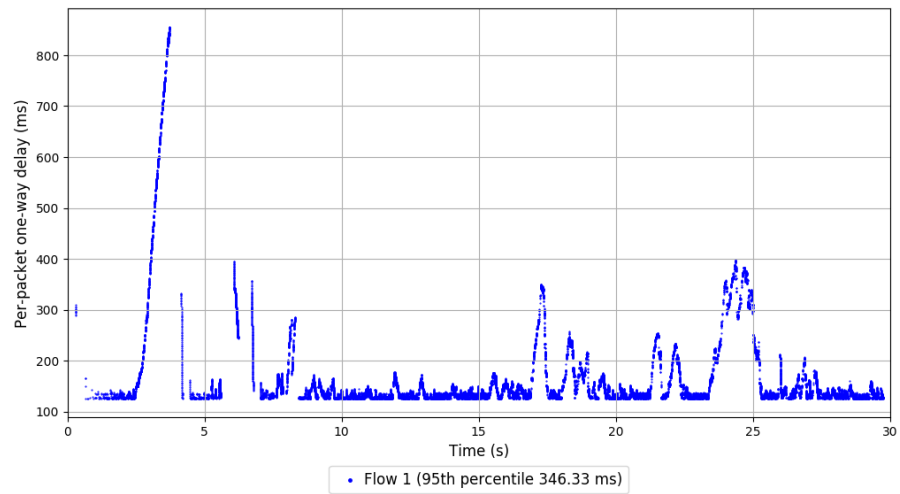
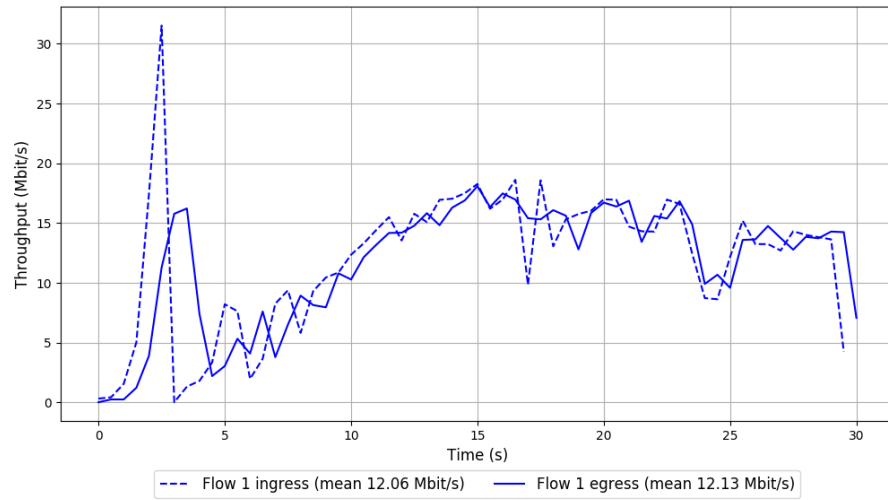


```
Run 1: Statistics of Indigo-Muses

Start at: 2018-12-10 20:58:24
End at: 2018-12-10 20:58:54
Local clock offset: -9.188 ms
Remote clock offset: 0.582 ms

# Below is generated by plot.py at 2018-12-10 21:52:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 12.13 Mbit/s
95th percentile per-packet one-way delay: 346.335 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 12.13 Mbit/s
95th percentile per-packet one-way delay: 346.335 ms
Loss rate: 0.06%
```

Run 1: Report of Indigo-Muses — Data Link

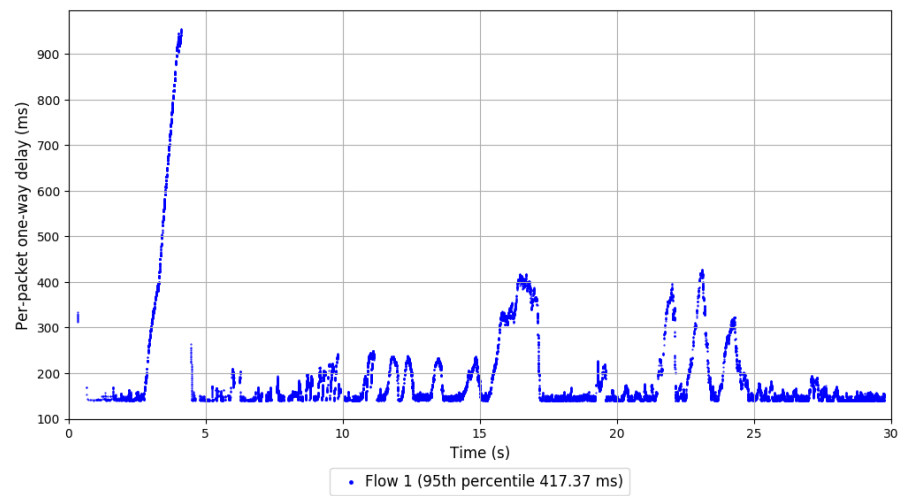
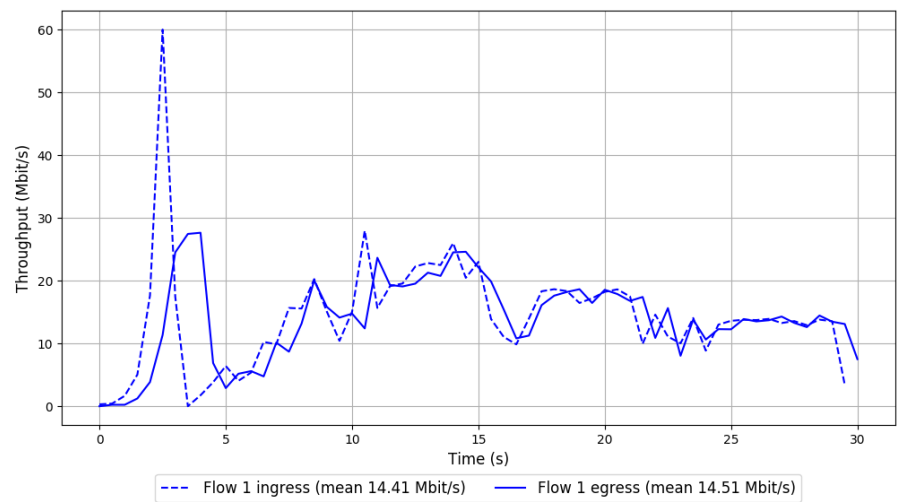


Run 2: Statistics of Indigo-Muses

Start at: 2018-12-10 21:23:31
End at: 2018-12-10 21:24:01
Local clock offset: -38.244 ms
Remote clock offset: 0.386 ms

Below is generated by plot.py at 2018-12-10 21:52:41
Datalink statistics
-- Total of 1 flow:
Average throughput: 14.51 Mbit/s
95th percentile per-packet one-way delay: 417.370 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 14.51 Mbit/s
95th percentile per-packet one-way delay: 417.370 ms
Loss rate: 0.04%

Run 2: Report of Indigo-Muses — Data Link

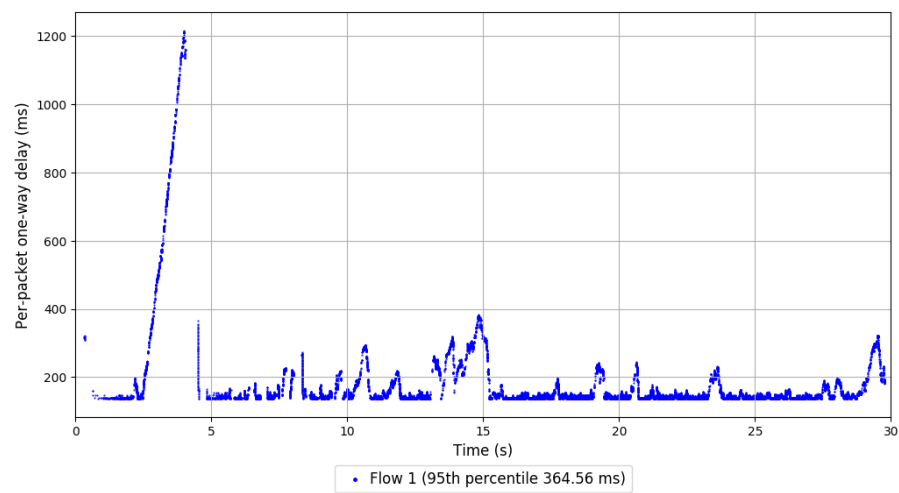
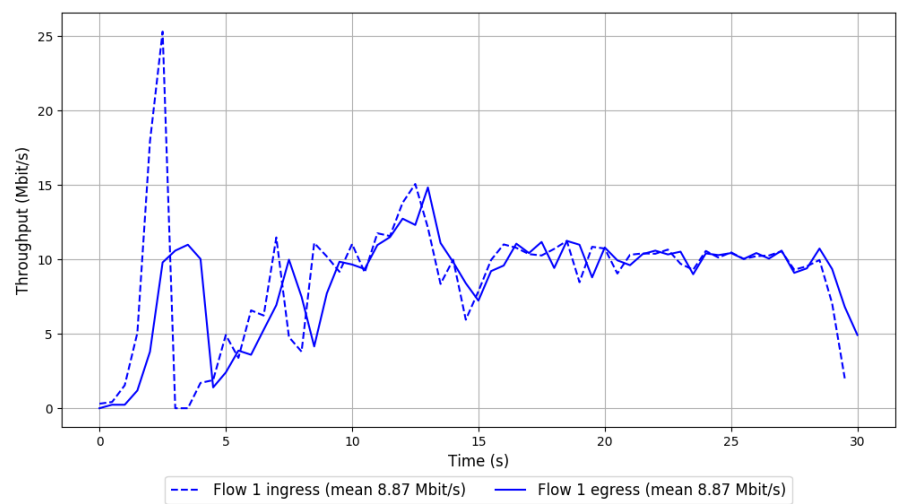


Run 3: Statistics of Indigo-Muses

Start at: 2018-12-10 21:48:34
End at: 2018-12-10 21:49:04
Local clock offset: -22.607 ms
Remote clock offset: 0.317 ms

Below is generated by plot.py at 2018-12-10 21:52:41
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.87 Mbit/s
95th percentile per-packet one-way delay: 364.558 ms
Loss rate: 0.70%
-- Flow 1:
Average throughput: 8.87 Mbit/s
95th percentile per-packet one-way delay: 364.558 ms
Loss rate: 0.70%

Run 3: Report of Indigo-Muses — Data Link



Run 1: Statistics of PCC-Allegro

Start at: 2018-12-10 20:59:43

End at: 2018-12-10 21:00:13

Local clock offset: -9.496 ms

Remote clock offset: 0.532 ms

Below is generated by plot.py at 2018-12-10 21:52:48

Datalink statistics

-- Total of 1 flow:

Average throughput: 16.75 Mbit/s

95th percentile per-packet one-way delay: 849.223 ms

Loss rate: 3.09%

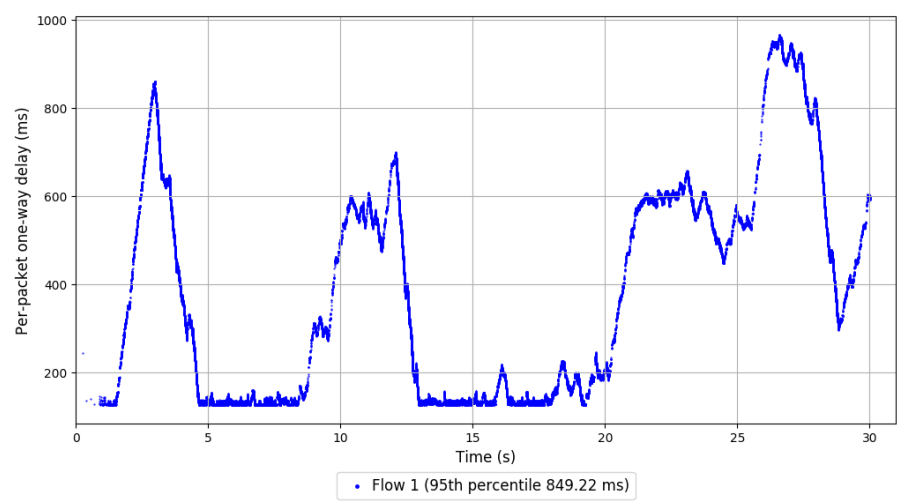
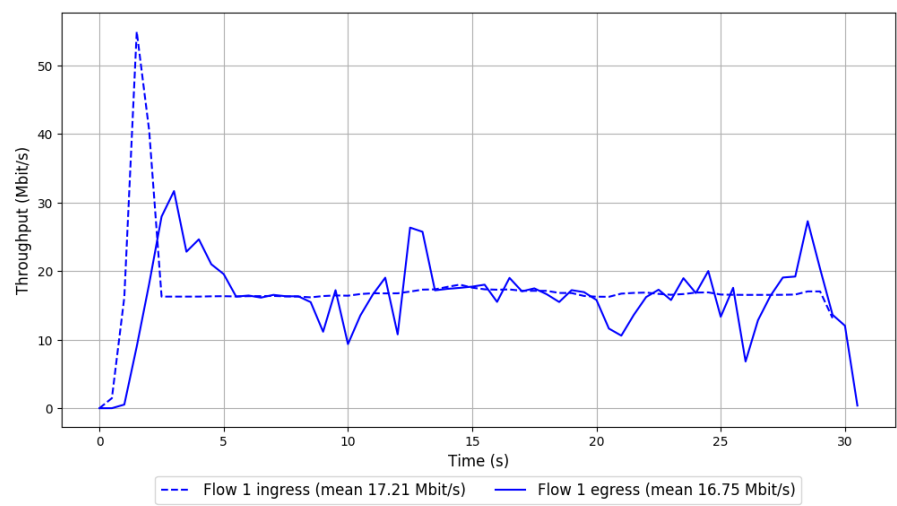
-- Flow 1:

Average throughput: 16.75 Mbit/s

95th percentile per-packet one-way delay: 849.223 ms

Loss rate: 3.09%

Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

Start at: 2018-12-10 21:24:51

End at: 2018-12-10 21:25:21

Local clock offset: -34.25 ms

Remote clock offset: 0.279 ms

Below is generated by plot.py at 2018-12-10 21:52:48

Datalink statistics

-- Total of 1 flow:

Average throughput: 7.98 Mbit/s

95th percentile per-packet one-way delay: 613.553 ms

Loss rate: 3.87%

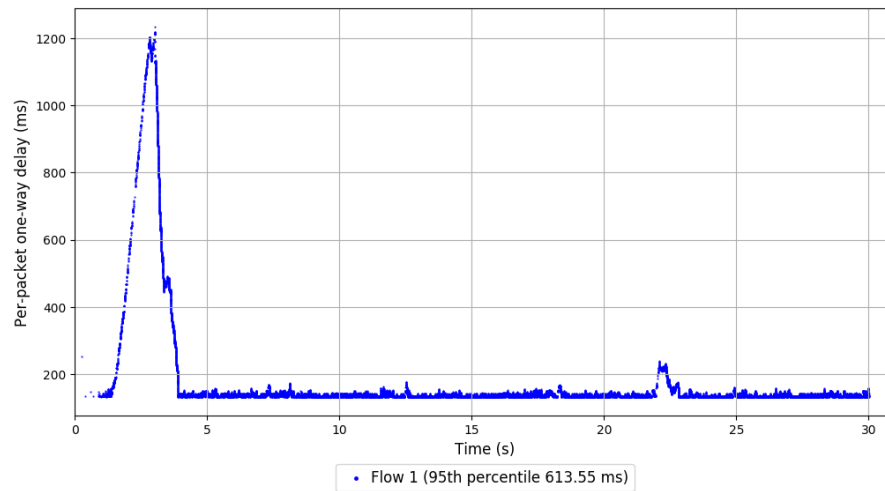
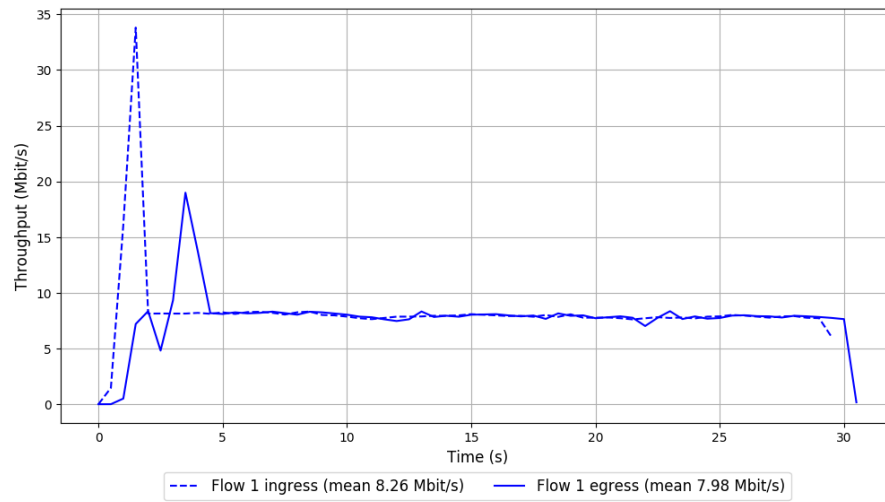
-- Flow 1:

Average throughput: 7.98 Mbit/s

95th percentile per-packet one-way delay: 613.553 ms

Loss rate: 3.87%

Run 2: Report of PCC-Allegro — Data Link

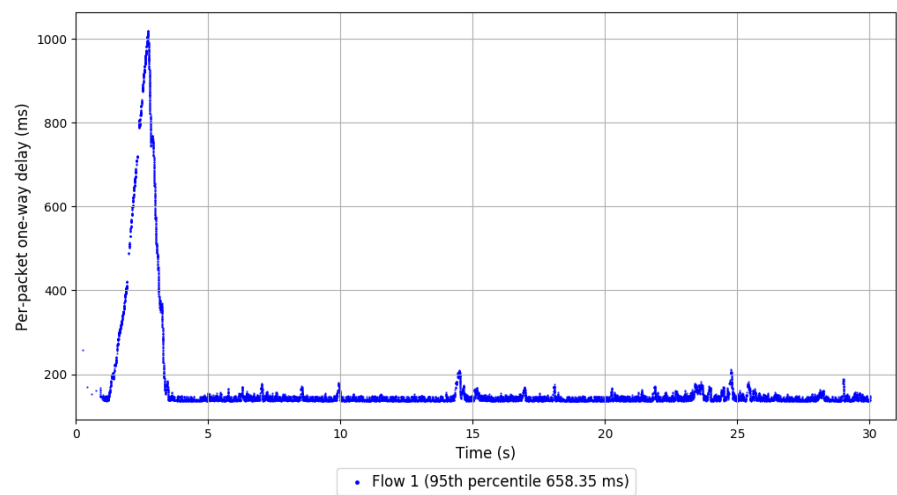
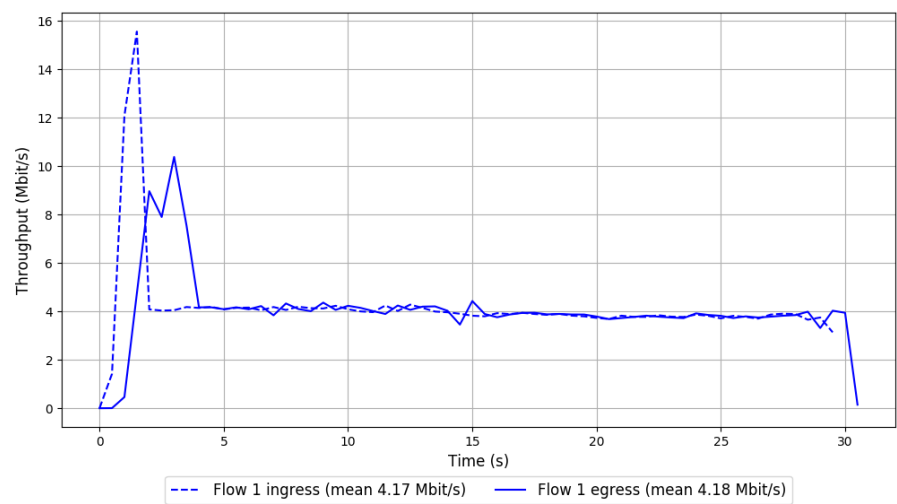


Run 3: Statistics of PCC-Allegro

Start at: 2018-12-10 21:49:53
End at: 2018-12-10 21:50:23
Local clock offset: -22.735 ms
Remote clock offset: 0.173 ms

Below is generated by plot.py at 2018-12-10 21:52:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 4.18 Mbit/s
95th percentile per-packet one-way delay: 658.353 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 4.18 Mbit/s
95th percentile per-packet one-way delay: 658.353 ms
Loss rate: 0.10%

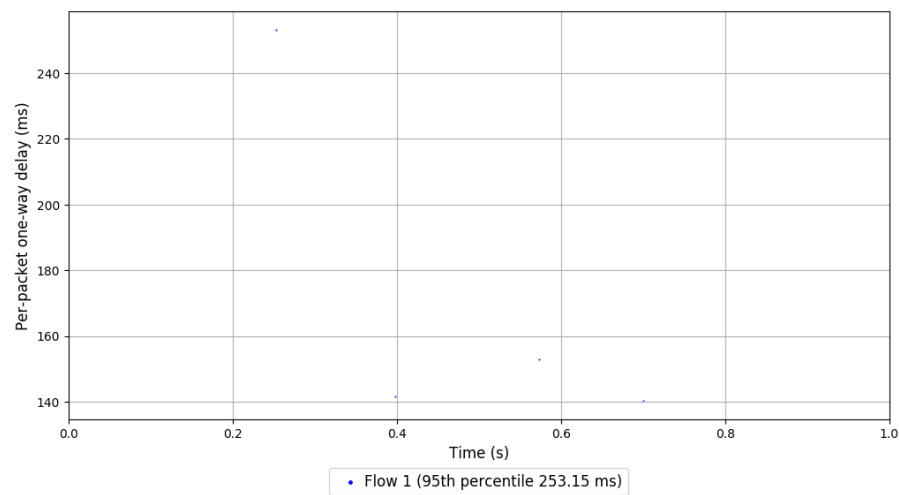
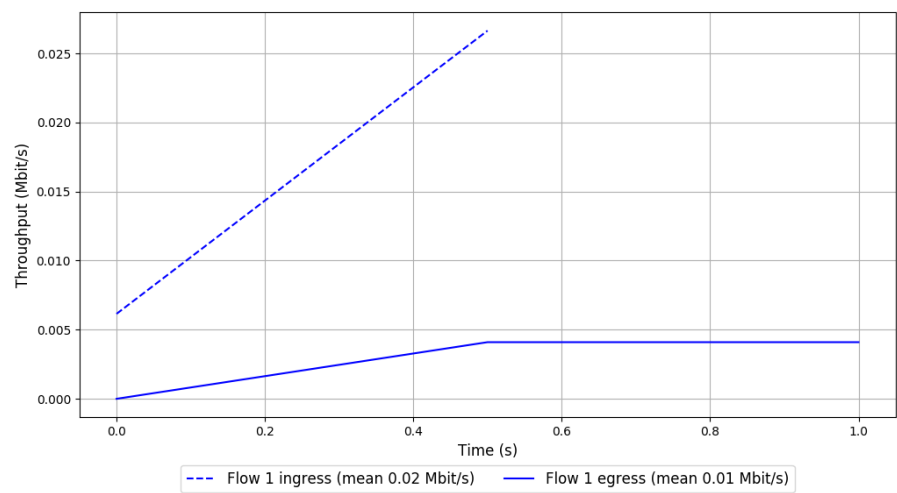
Run 3: Report of PCC-Allegro — Data Link



Run 1: Statistics of PCC-Expr

Start at: 2018-12-10 20:45:16
End at: 2018-12-10 20:45:46
Local clock offset: -19.181 ms
Remote clock offset: 0.744 ms

Run 1: Report of PCC-Expr — Data Link



Run 2: Statistics of PCC-Expr

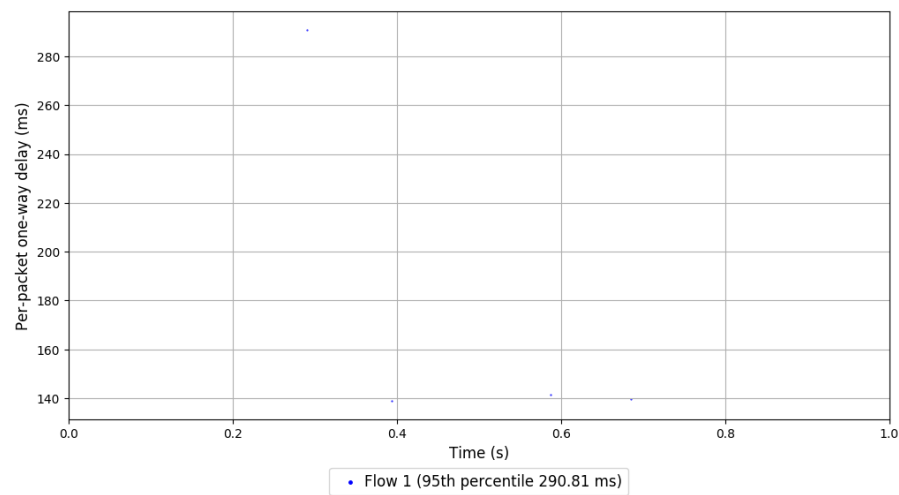
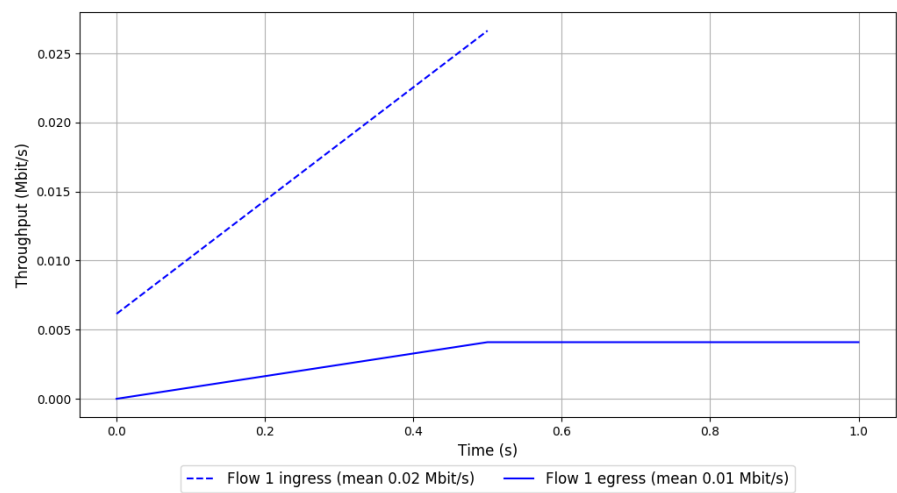
Start at: 2018-12-10 21:10:23

End at: 2018-12-10 21:10:53

Local clock offset: -23.915 ms

Remote clock offset: 0.684 ms

Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

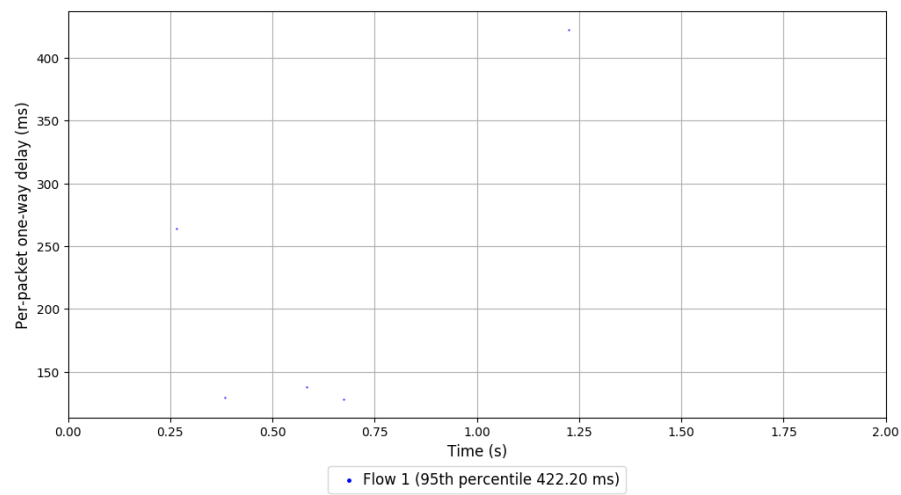
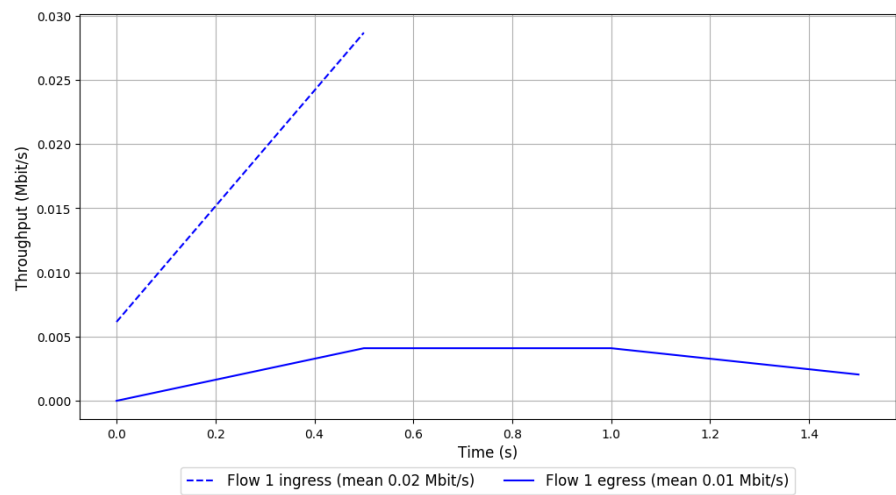
Start at: 2018-12-10 21:35:25

End at: 2018-12-10 21:35:55

Local clock offset: -12.158 ms

Remote clock offset: 0.135 ms

Run 3: Report of PCC-Expr — Data Link

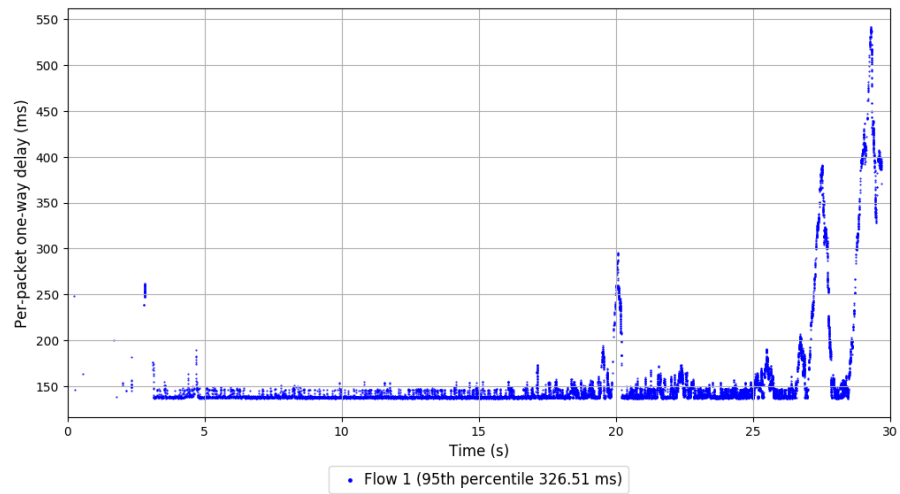
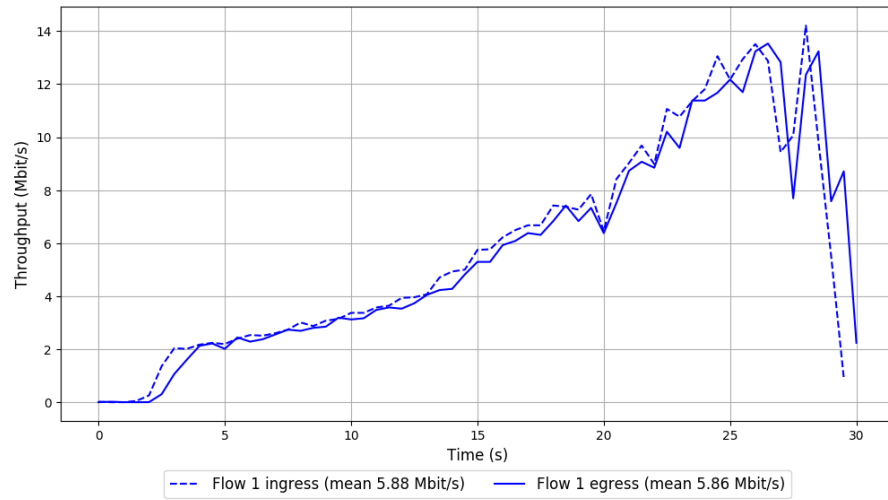


Run 1: Statistics of QUIC Cubic

Start at: 2018-12-10 20:51:50
End at: 2018-12-10 20:52:20
Local clock offset: -16.583 ms
Remote clock offset: 0.498 ms

Below is generated by plot.py at 2018-12-10 21:52:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 5.86 Mbit/s
95th percentile per-packet one-way delay: 326.514 ms
Loss rate: 0.67%
-- Flow 1:
Average throughput: 5.86 Mbit/s
95th percentile per-packet one-way delay: 326.514 ms
Loss rate: 0.67%

Run 1: Report of QUIC Cubic — Data Link

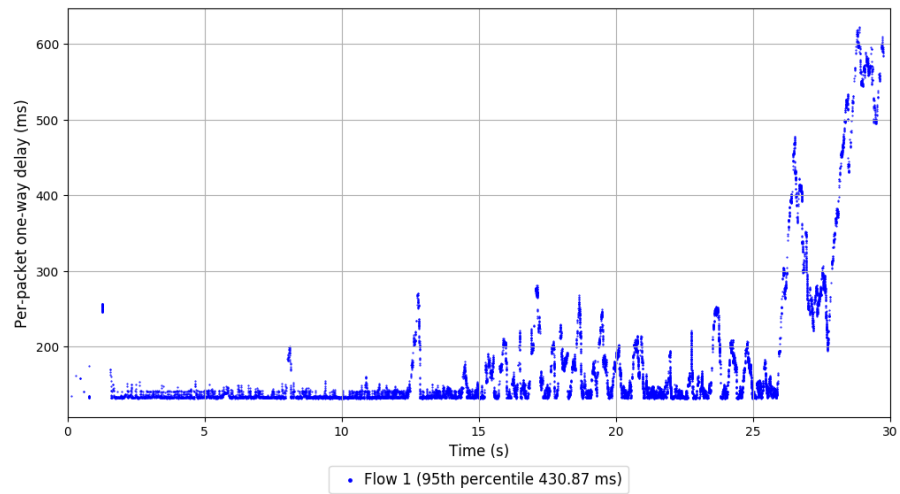
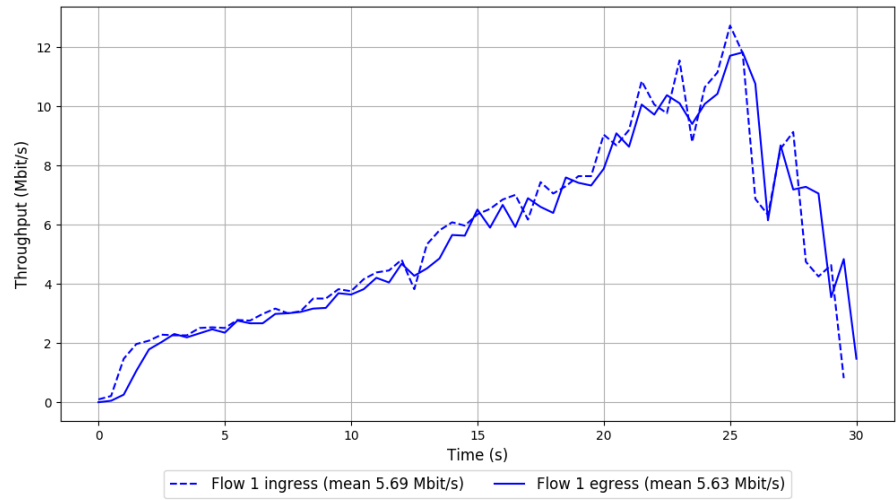


Run 2: Statistics of QUIC Cubic

Start at: 2018-12-10 21:16:56
End at: 2018-12-10 21:17:26
Local clock offset: -24.948 ms
Remote clock offset: 0.717 ms

Below is generated by plot.py at 2018-12-10 21:52:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 5.63 Mbit/s
95th percentile per-packet one-way delay: 430.872 ms
Loss rate: 1.22%
-- Flow 1:
Average throughput: 5.63 Mbit/s
95th percentile per-packet one-way delay: 430.872 ms
Loss rate: 1.22%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2018-12-10 21:41:58

End at: 2018-12-10 21:42:28

Local clock offset: -14.74 ms

Remote clock offset: 0.184 ms

Below is generated by plot.py at 2018-12-10 21:52:48

Datalink statistics

-- Total of 1 flow:

Average throughput: 6.74 Mbit/s

95th percentile per-packet one-way delay: 326.920 ms

Loss rate: 0.17%

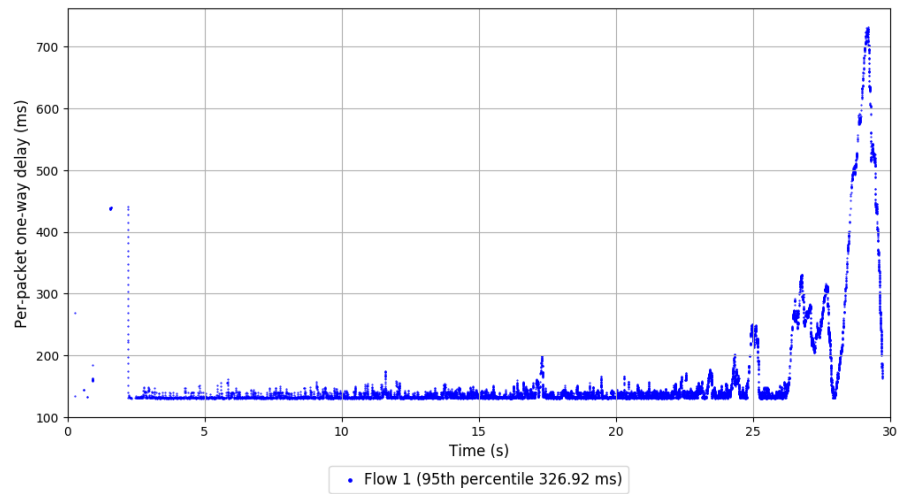
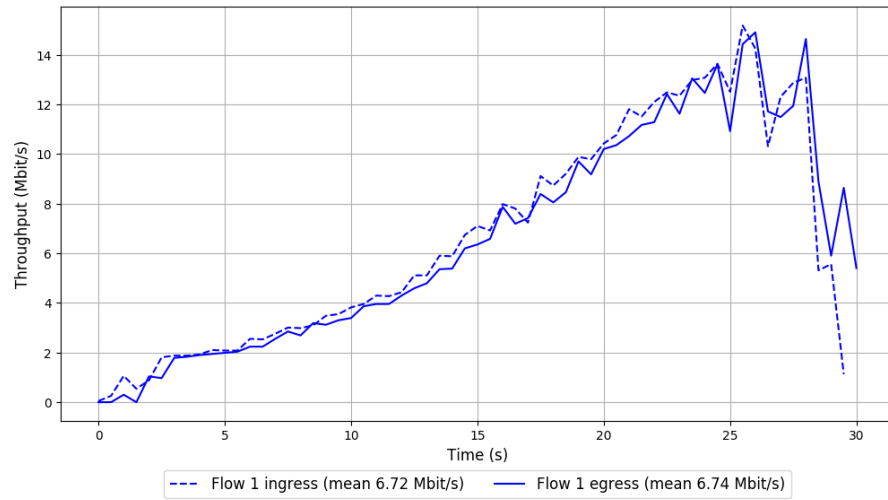
-- Flow 1:

Average throughput: 6.74 Mbit/s

95th percentile per-packet one-way delay: 326.920 ms

Loss rate: 0.17%

Run 3: Report of QUIC Cubic — Data Link

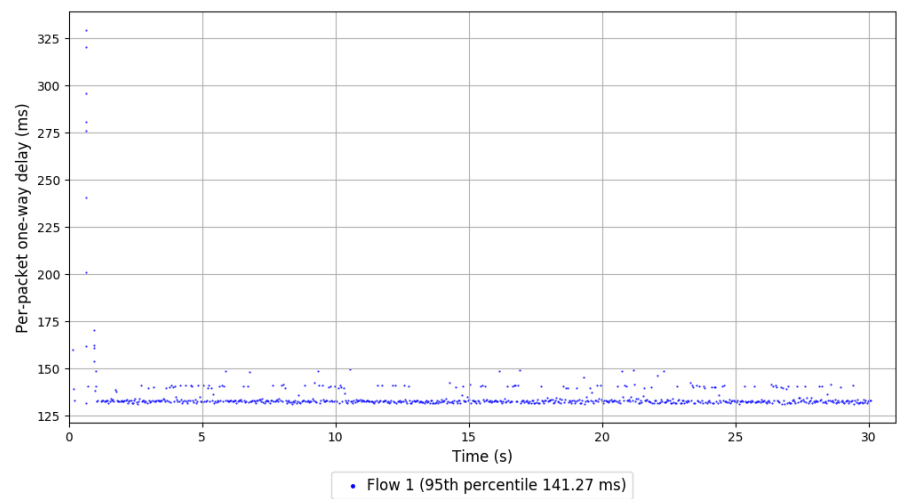
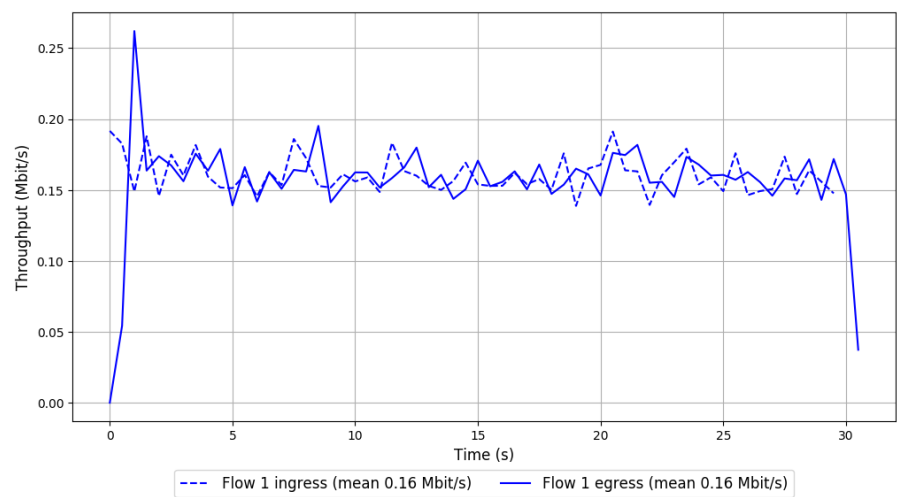


Run 1: Statistics of SCReAM

Start at: 2018-12-10 20:50:32
End at: 2018-12-10 20:51:02
Local clock offset: -10.126 ms
Remote clock offset: 0.61 ms

Below is generated by plot.py at 2018-12-10 21:52:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 141.273 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 141.273 ms
Loss rate: 0.00%

Run 1: Report of SReAM — Data Link

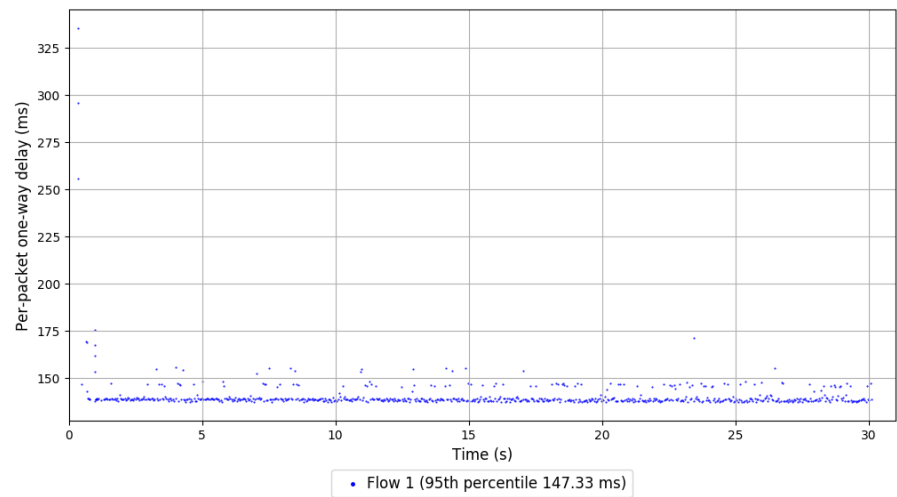
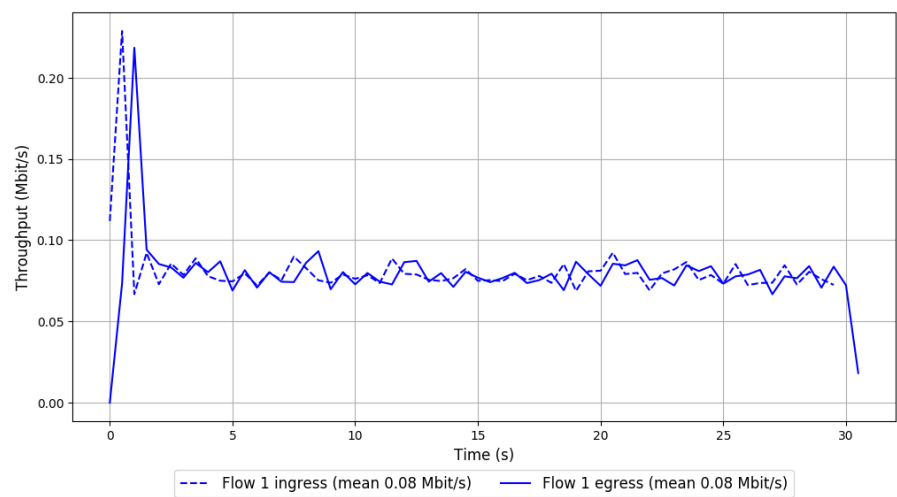


Run 2: Statistics of SCReAM

Start at: 2018-12-10 21:15:38
End at: 2018-12-10 21:16:08
Local clock offset: -29.283 ms
Remote clock offset: 0.919 ms

Below is generated by plot.py at 2018-12-10 21:52:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 147.334 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 147.334 ms
Loss rate: 0.00%

Run 2: Report of SReAM — Data Link

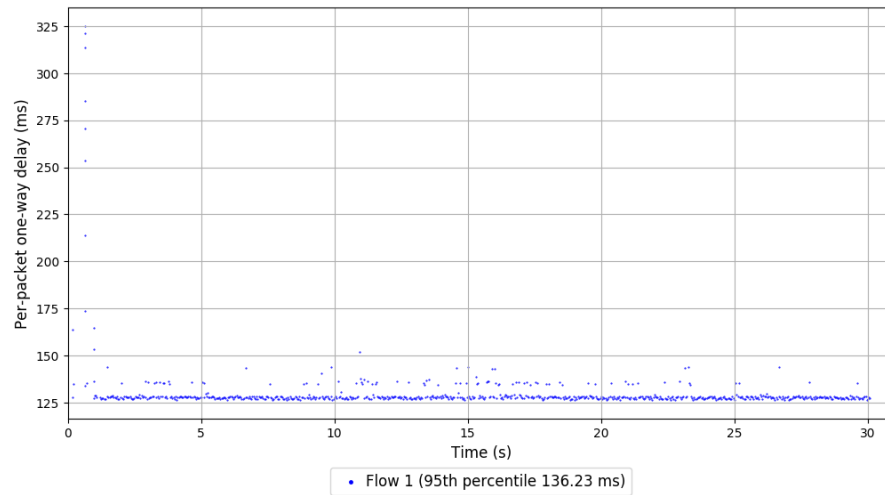
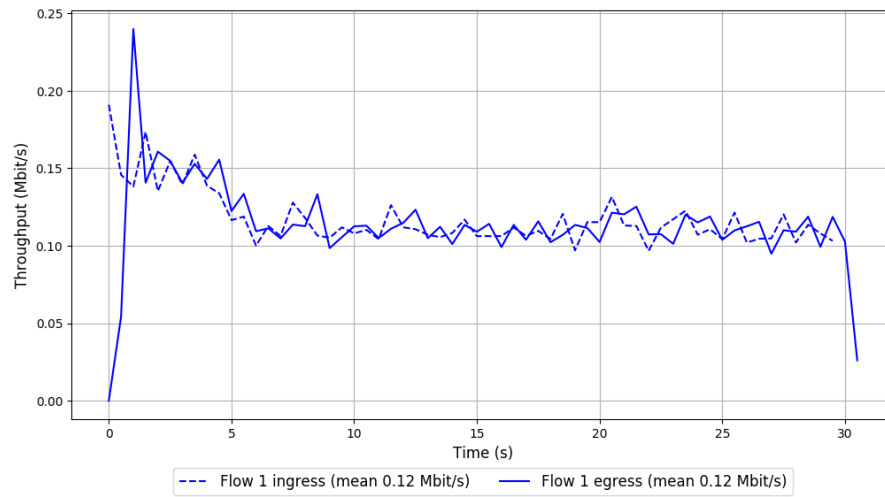


Run 3: Statistics of SCReAM

Start at: 2018-12-10 21:40:40
End at: 2018-12-10 21:41:10
Local clock offset: -10.407 ms
Remote clock offset: 0.162 ms

Below is generated by plot.py at 2018-12-10 21:52:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 136.233 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 136.233 ms
Loss rate: 0.00%

Run 3: Report of SReAM — Data Link

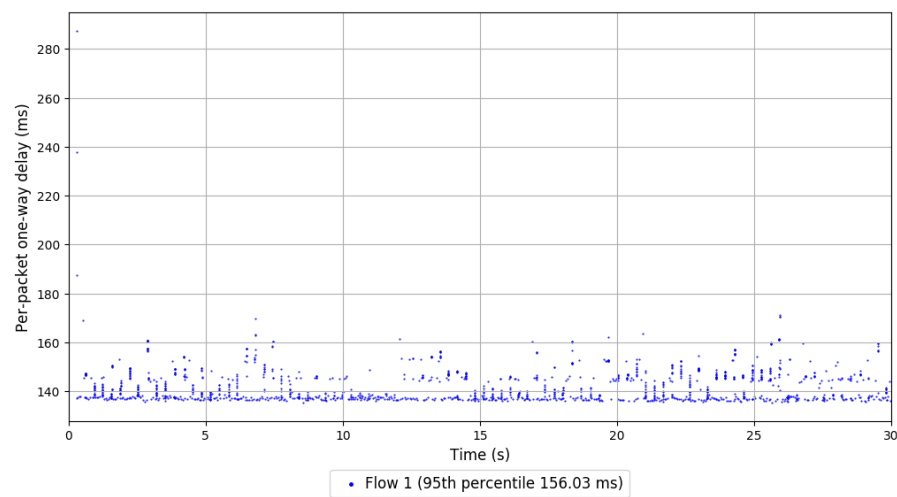
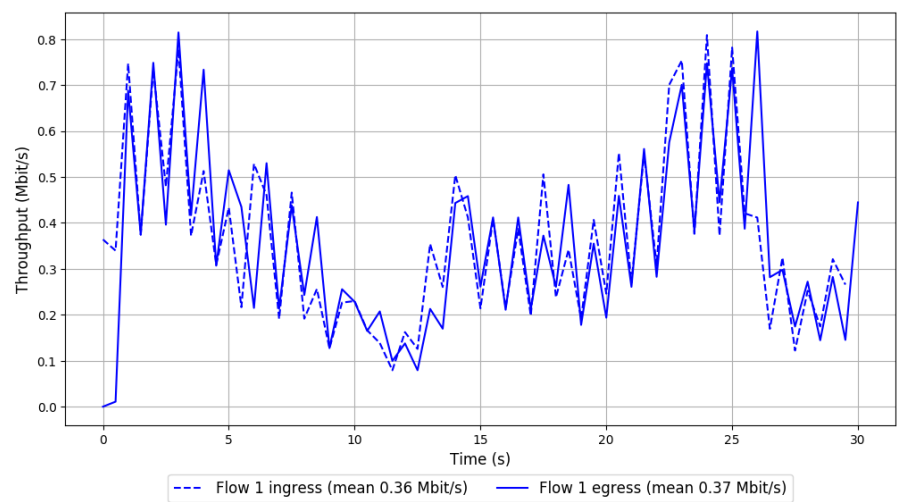


Run 1: Statistics of Sprout

Start at: 2018-12-10 20:55:48
End at: 2018-12-10 20:56:18
Local clock offset: -20.284 ms
Remote clock offset: 0.488 ms

Below is generated by plot.py at 2018-12-10 21:52:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 156.031 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 156.031 ms
Loss rate: 0.01%

Run 1: Report of Sprout — Data Link

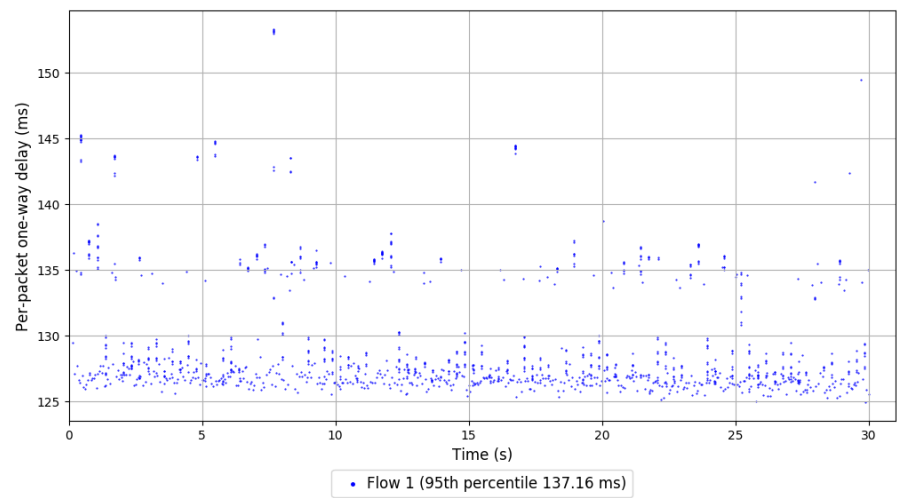
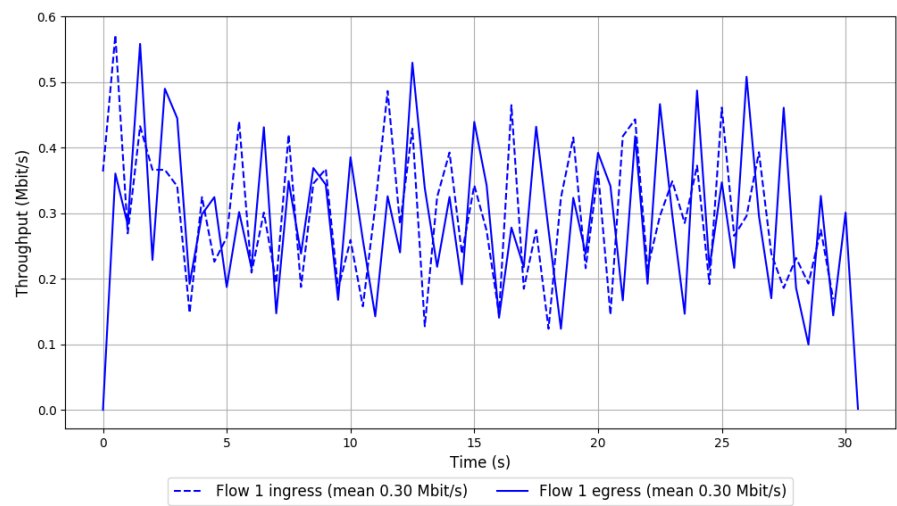


Run 2: Statistics of Sprout

Start at: 2018-12-10 21:20:55
End at: 2018-12-10 21:21:25
Local clock offset: -23.23 ms
Remote clock offset: 0.437 ms

Below is generated by plot.py at 2018-12-10 21:52:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 137.165 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 137.165 ms
Loss rate: 0.00%

Run 2: Report of Sprout — Data Link

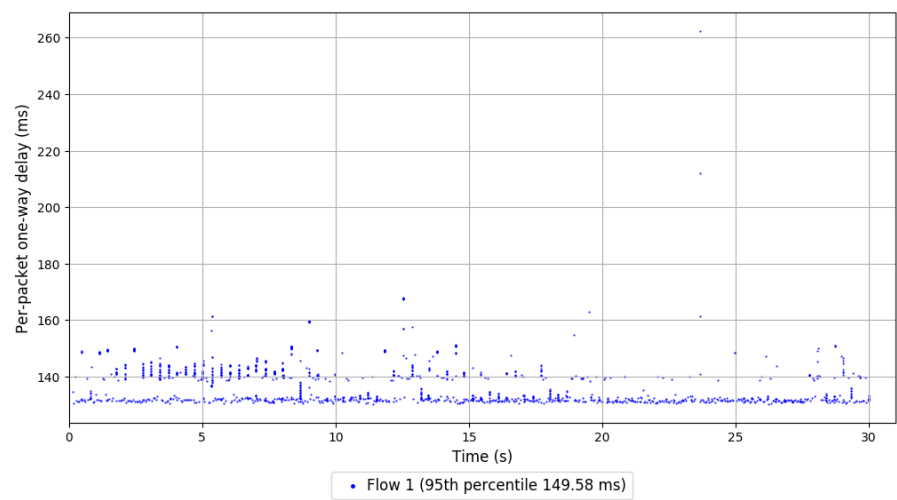
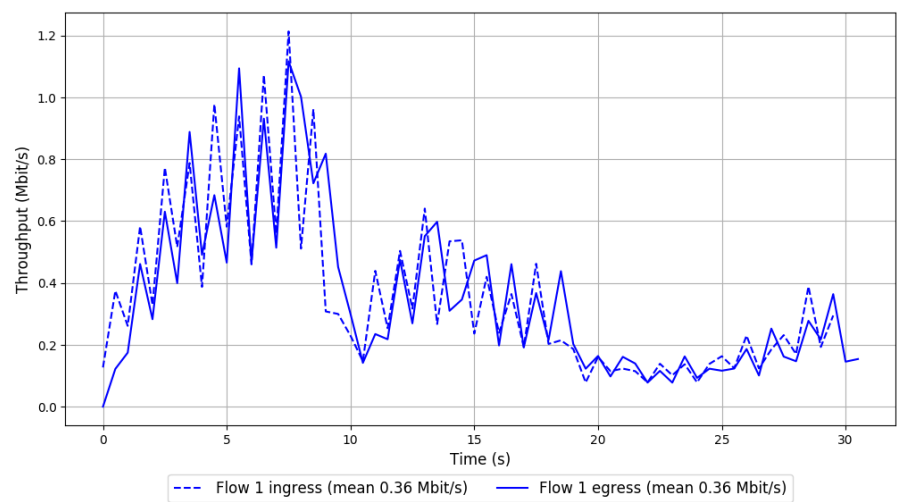


Run 3: Statistics of Sprout

Start at: 2018-12-10 21:45:58
End at: 2018-12-10 21:46:28
Local clock offset: -14.969 ms
Remote clock offset: 0.289 ms

Below is generated by plot.py at 2018-12-10 21:52:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 149.582 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 149.582 ms
Loss rate: 0.00%

Run 3: Report of Sprout — Data Link

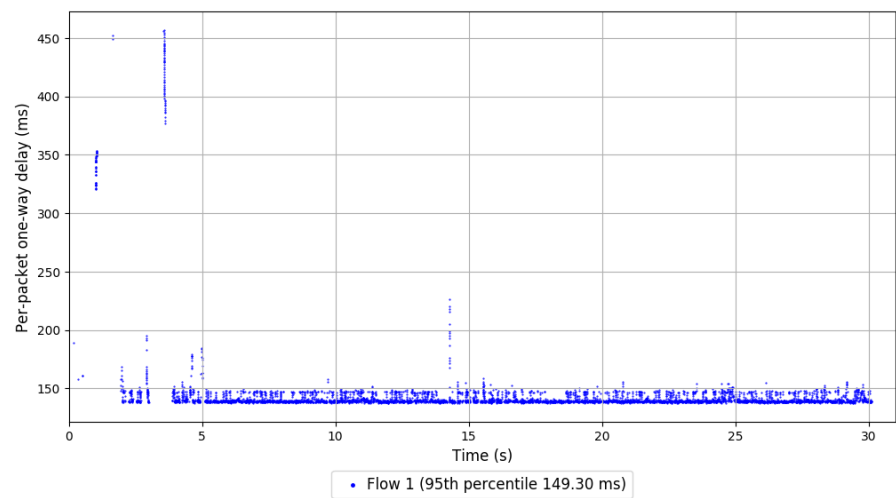
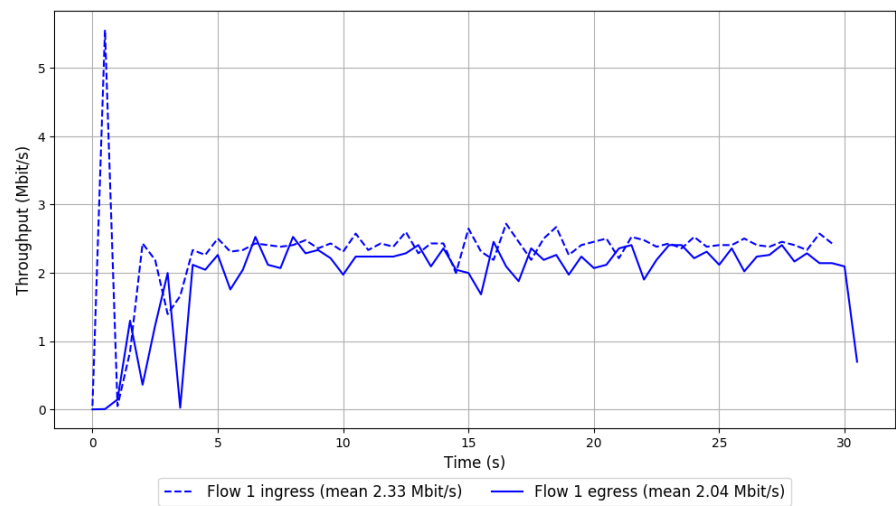


Run 1: Statistics of TaoVA-100x

Start at: 2018-12-10 20:49:13
End at: 2018-12-10 20:49:43
Local clock offset: -14.698 ms
Remote clock offset: 0.556 ms

Below is generated by plot.py at 2018-12-10 21:52:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.04 Mbit/s
95th percentile per-packet one-way delay: 149.297 ms
Loss rate: 12.61%
-- Flow 1:
Average throughput: 2.04 Mbit/s
95th percentile per-packet one-way delay: 149.297 ms
Loss rate: 12.61%

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

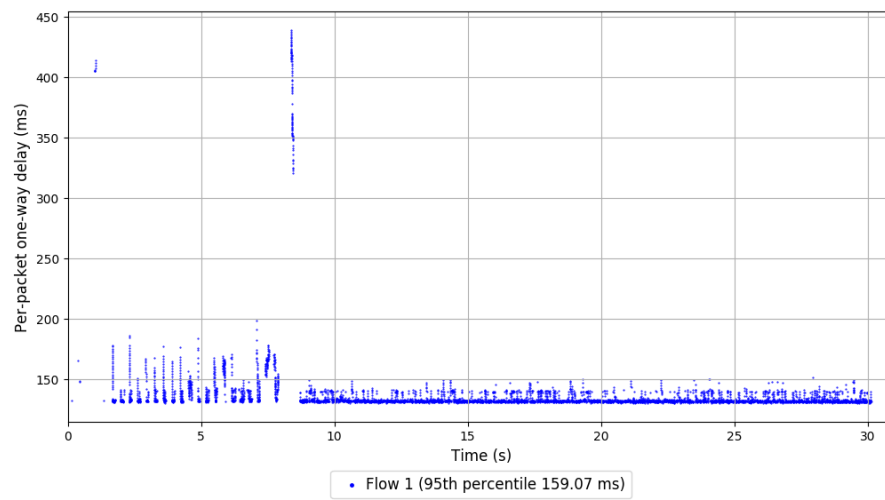
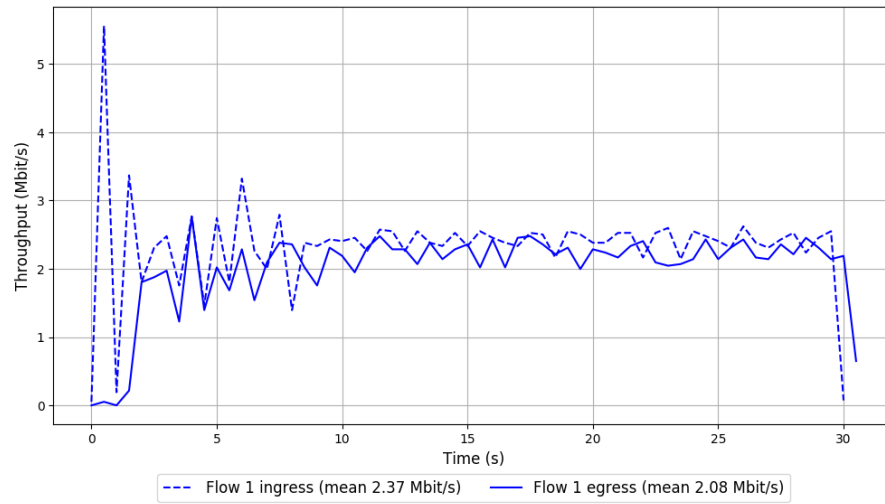


Run 2: Statistics of TaoVA-100x

Start at: 2018-12-10 21:14:19
End at: 2018-12-10 21:14:49
Local clock offset: -20.539 ms
Remote clock offset: 0.849 ms

Below is generated by plot.py at 2018-12-10 21:52:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.08 Mbit/s
95th percentile per-packet one-way delay: 159.066 ms
Loss rate: 12.57%
-- Flow 1:
Average throughput: 2.08 Mbit/s
95th percentile per-packet one-way delay: 159.066 ms
Loss rate: 12.57%

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

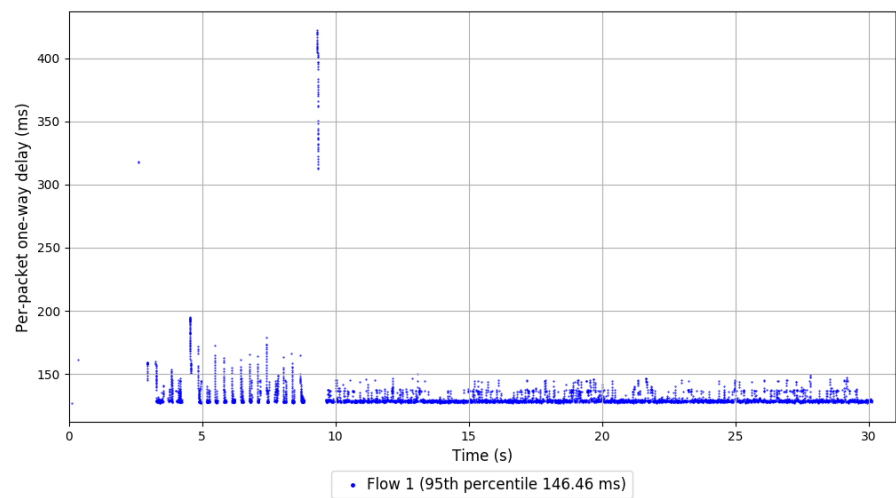
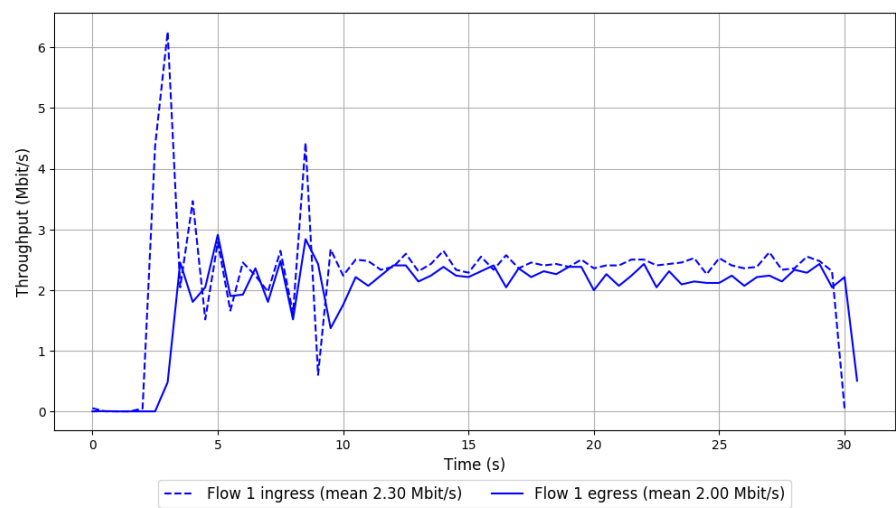


Run 3: Statistics of TaoVA-100x

Start at: 2018-12-10 21:39:21
End at: 2018-12-10 21:39:51
Local clock offset: -10.476 ms
Remote clock offset: 0.095 ms

Below is generated by plot.py at 2018-12-10 21:52:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 146.459 ms
Loss rate: 13.16%
-- Flow 1:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 146.459 ms
Loss rate: 13.16%

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

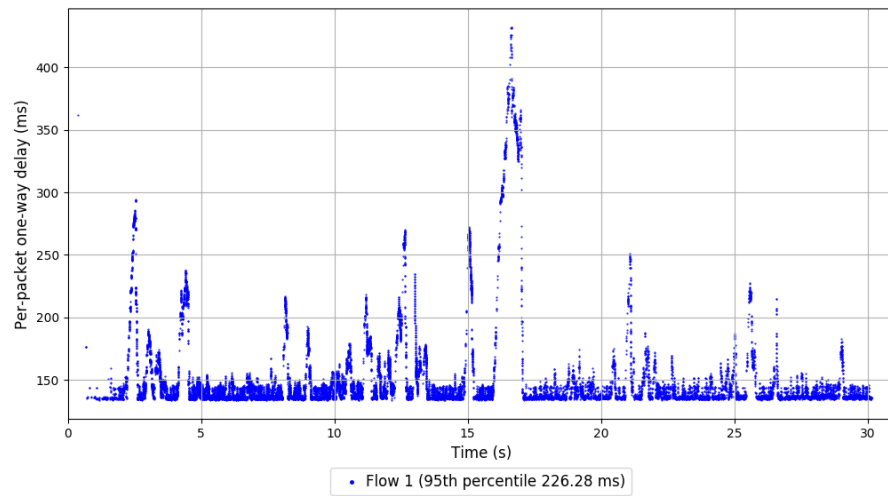
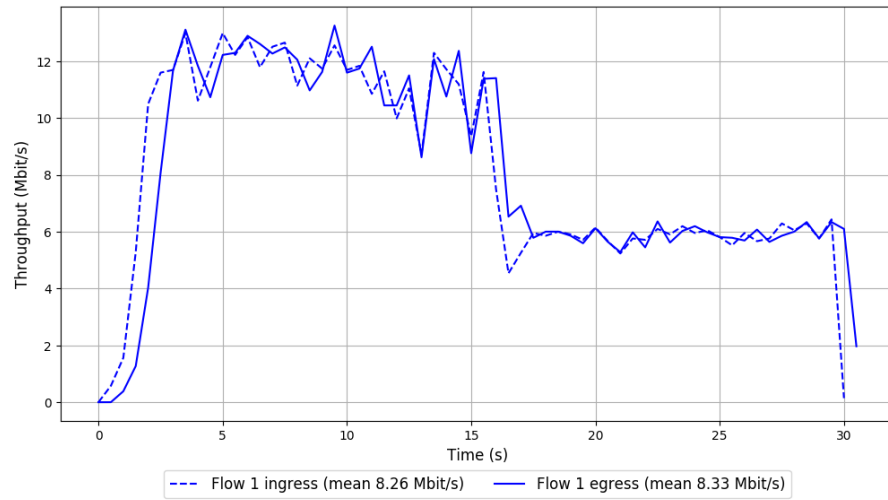


Run 1: Statistics of TCP Vegas

Start at: 2018-12-10 20:46:34
End at: 2018-12-10 20:47:04
Local clock offset: -11.679 ms
Remote clock offset: 0.665 ms

Below is generated by plot.py at 2018-12-10 21:52:53
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.33 Mbit/s
95th percentile per-packet one-way delay: 226.276 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 8.33 Mbit/s
95th percentile per-packet one-way delay: 226.276 ms
Loss rate: 0.03%

Run 1: Report of TCP Vegas — Data Link

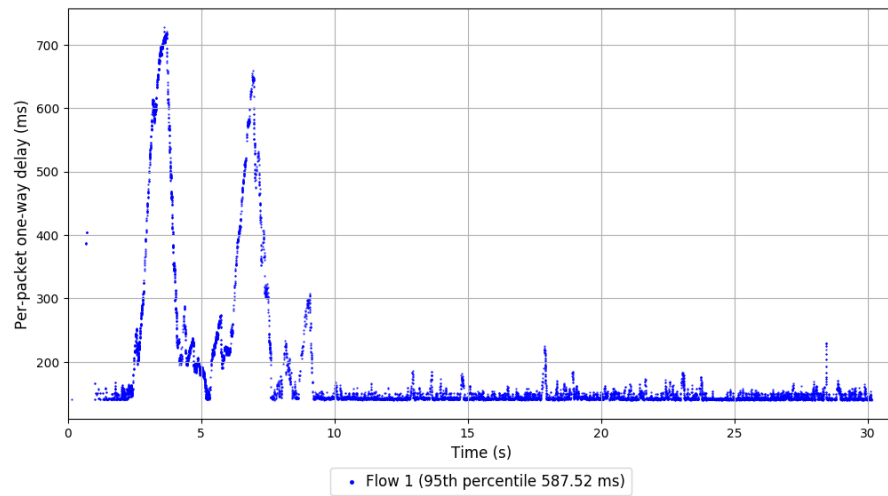
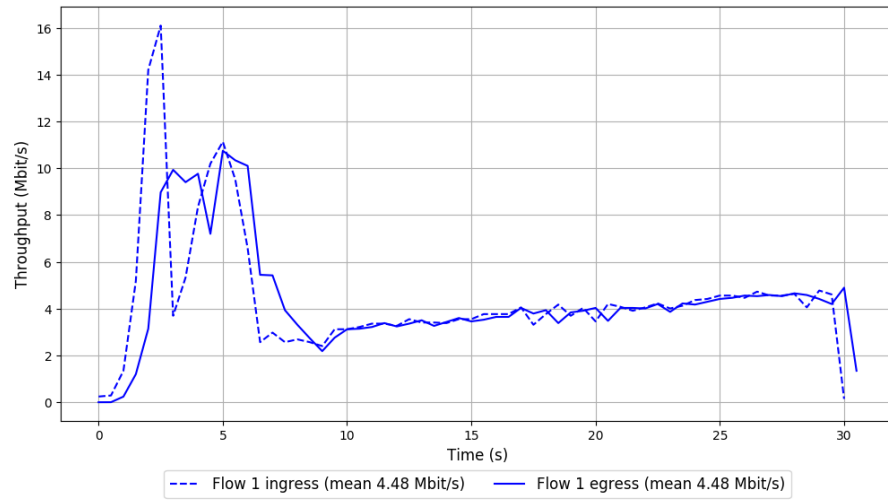


Run 2: Statistics of TCP Vegas

Start at: 2018-12-10 21:11:40
End at: 2018-12-10 21:12:11
Local clock offset: -24.829 ms
Remote clock offset: 0.739 ms

Below is generated by plot.py at 2018-12-10 21:52:53
Datalink statistics
-- Total of 1 flow:
Average throughput: 4.48 Mbit/s
95th percentile per-packet one-way delay: 587.520 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 4.48 Mbit/s
95th percentile per-packet one-way delay: 587.520 ms
Loss rate: 0.09%

Run 2: Report of TCP Vegas — Data Link

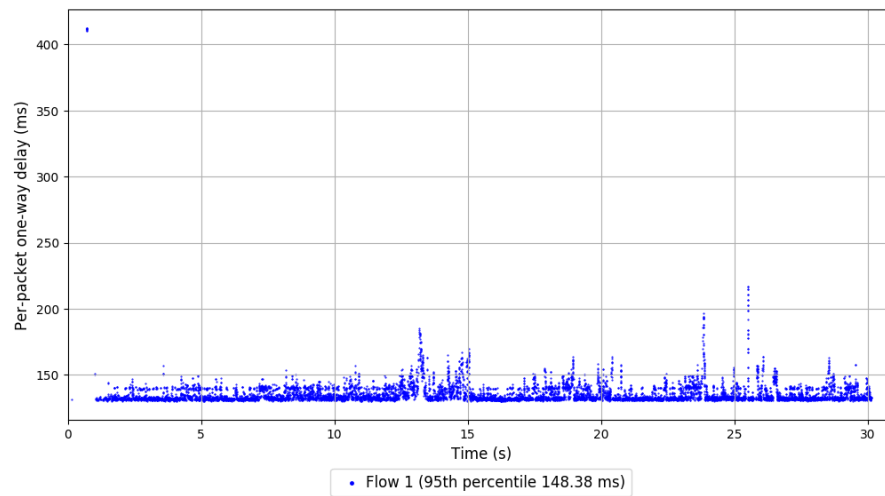
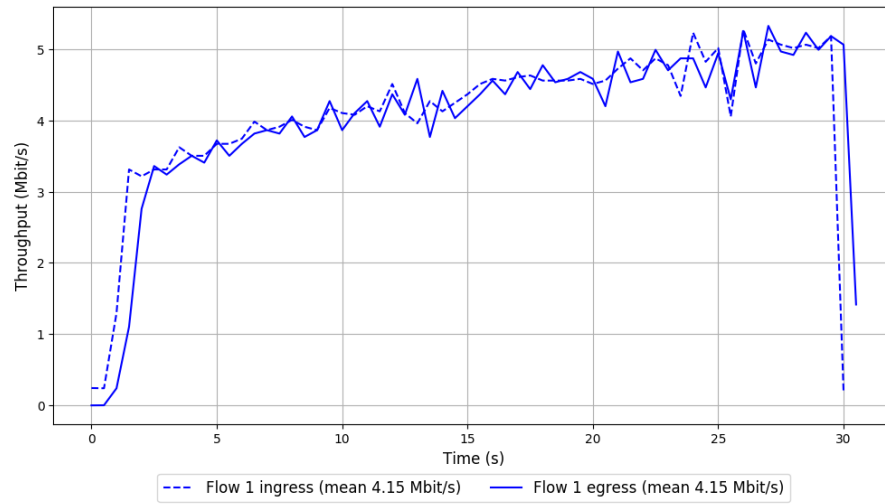


Run 3: Statistics of TCP Vegas

Start at: 2018-12-10 21:36:43
End at: 2018-12-10 21:37:13
Local clock offset: -15.468 ms
Remote clock offset: 0.164 ms

Below is generated by plot.py at 2018-12-10 21:52:53
Datalink statistics
-- Total of 1 flow:
Average throughput: 4.15 Mbit/s
95th percentile per-packet one-way delay: 148.376 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 4.15 Mbit/s
95th percentile per-packet one-way delay: 148.376 ms
Loss rate: 0.04%

Run 3: Report of TCP Vegas — Data Link

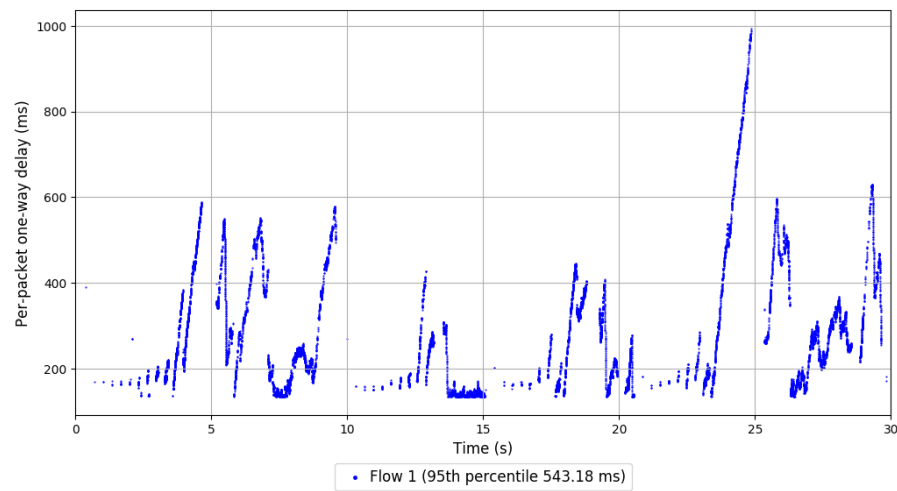
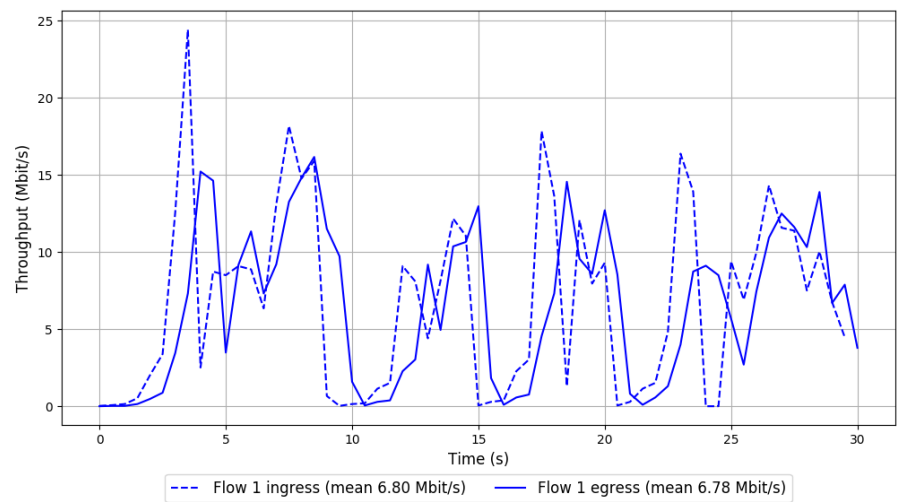


Run 1: Statistics of Verus

Start at: 2018-12-10 20:54:29
End at: 2018-12-10 20:54:59
Local clock offset: -16.658 ms
Remote clock offset: 0.537 ms

Below is generated by plot.py at 2018-12-10 21:52:54
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.78 Mbit/s
95th percentile per-packet one-way delay: 543.176 ms
Loss rate: 1.21%
-- Flow 1:
Average throughput: 6.78 Mbit/s
95th percentile per-packet one-way delay: 543.176 ms
Loss rate: 1.21%

Run 1: Report of Verus — Data Link

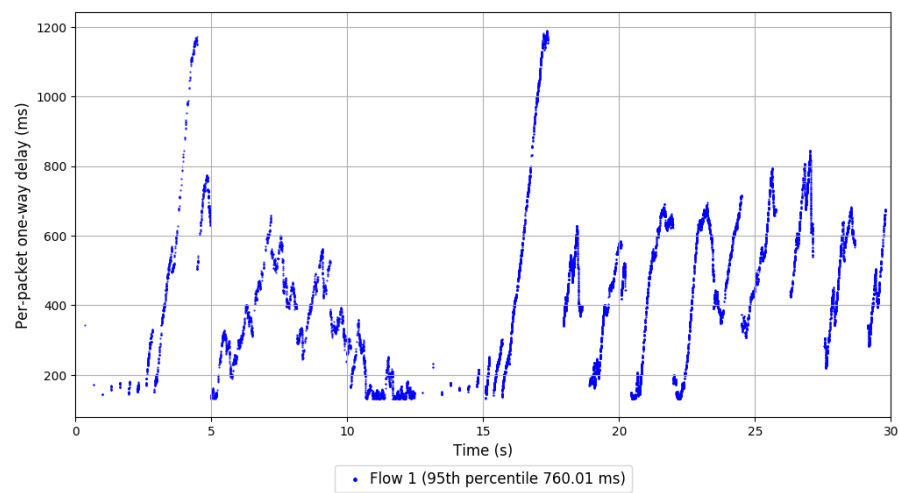
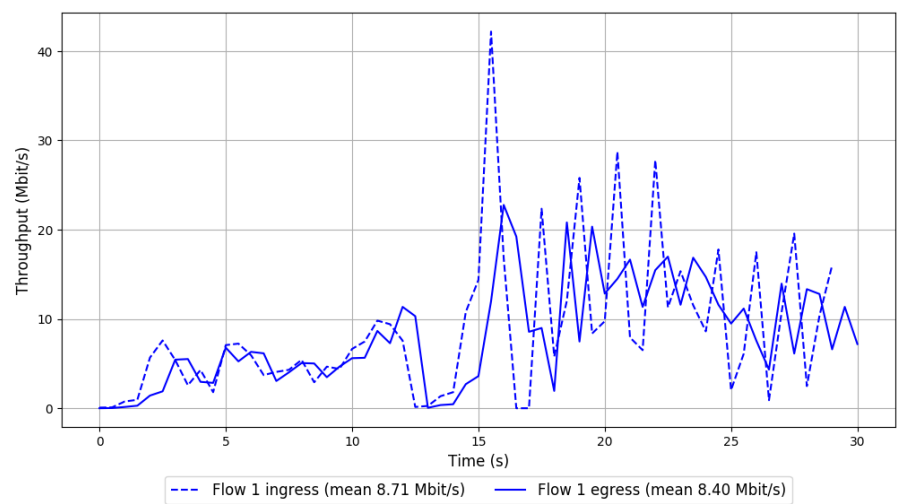


Run 2: Statistics of Verus

Start at: 2018-12-10 21:19:35
End at: 2018-12-10 21:20:05
Local clock offset: -24.712 ms
Remote clock offset: 0.519 ms

Below is generated by plot.py at 2018-12-10 21:52:55
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.40 Mbit/s
95th percentile per-packet one-way delay: 760.010 ms
Loss rate: 3.52%
-- Flow 1:
Average throughput: 8.40 Mbit/s
95th percentile per-packet one-way delay: 760.010 ms
Loss rate: 3.52%

Run 2: Report of Verus — Data Link

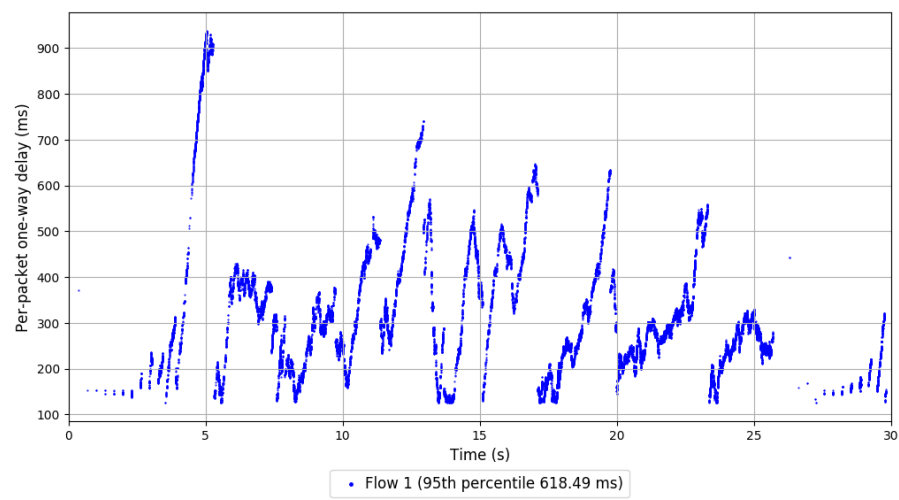
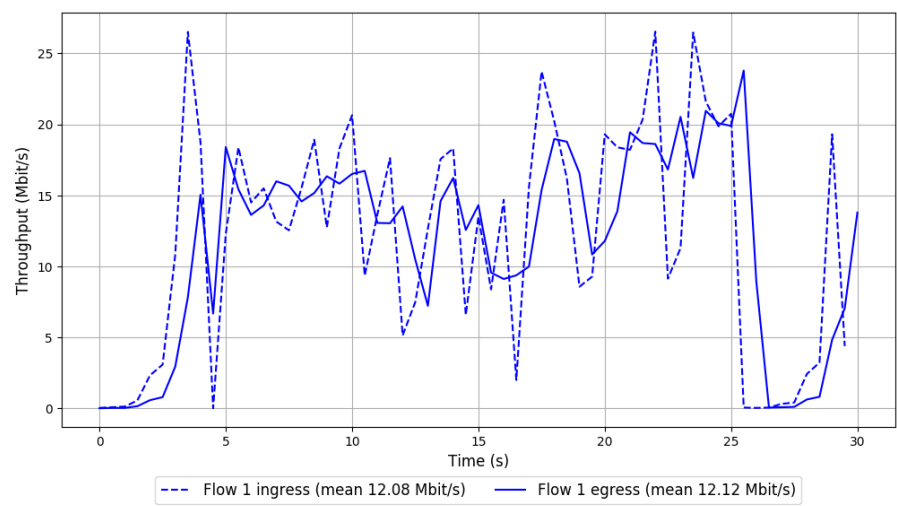


Run 3: Statistics of Verus

Start at: 2018-12-10 21:44:38
End at: 2018-12-10 21:45:08
Local clock offset: -10.152 ms
Remote clock offset: 0.205 ms

Below is generated by plot.py at 2018-12-10 21:52:58
Datalink statistics
-- Total of 1 flow:
Average throughput: 12.12 Mbit/s
95th percentile per-packet one-way delay: 618.487 ms
Loss rate: 0.49%
-- Flow 1:
Average throughput: 12.12 Mbit/s
95th percentile per-packet one-way delay: 618.487 ms
Loss rate: 0.49%

Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

Start at: 2018-12-10 20:42:37

End at: 2018-12-10 20:43:07

Local clock offset: -4.916 ms

Remote clock offset: 0.987 ms

Below is generated by plot.py at 2018-12-10 21:52:58

Datalink statistics

-- Total of 1 flow:

Average throughput: 6.79 Mbit/s

95th percentile per-packet one-way delay: 1129.845 ms

Loss rate: 9.28%

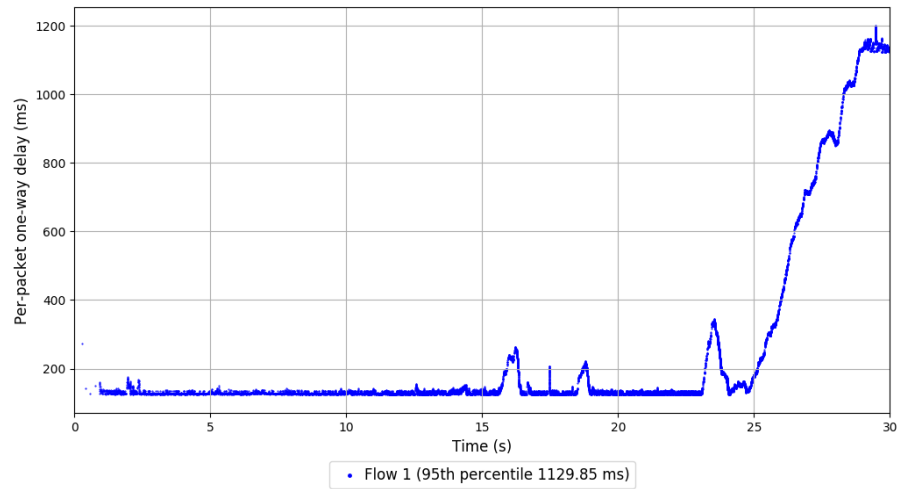
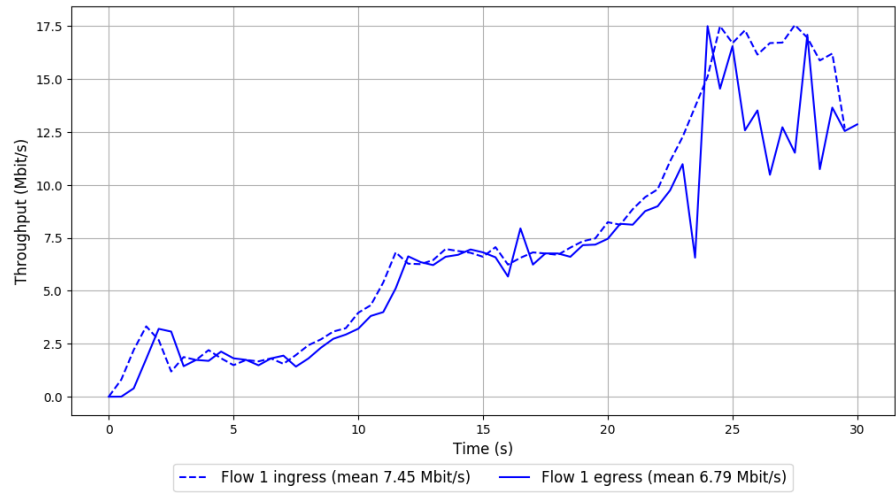
-- Flow 1:

Average throughput: 6.79 Mbit/s

95th percentile per-packet one-way delay: 1129.845 ms

Loss rate: 9.28%

Run 1: Report of PCC-Vivace — Data Link

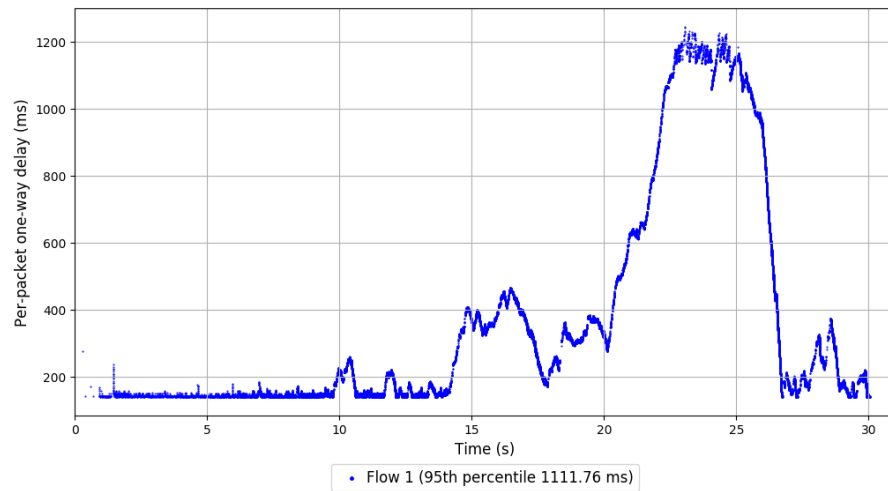
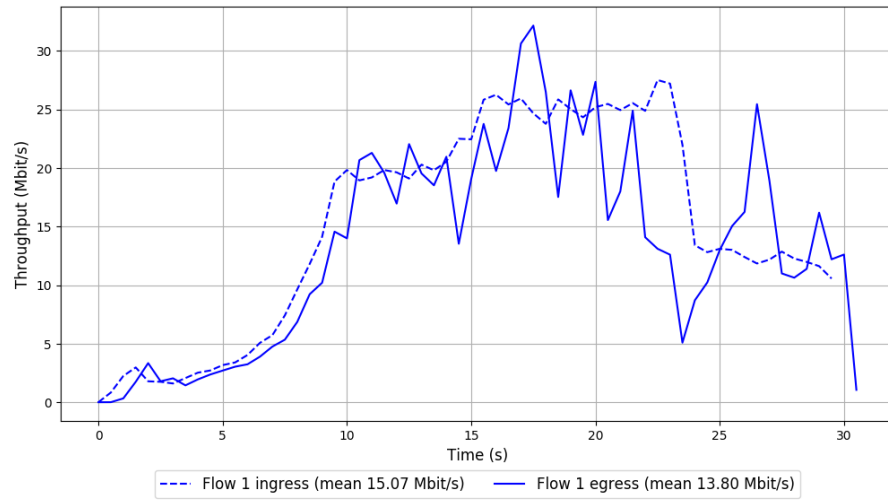


Run 2: Statistics of PCC-Vivace

Start at: 2018-12-10 21:07:43
End at: 2018-12-10 21:08:13
Local clock offset: -23.796 ms
Remote clock offset: 0.613 ms

Below is generated by plot.py at 2018-12-10 21:52:59
Datalink statistics
-- Total of 1 flow:
Average throughput: 13.80 Mbit/s
95th percentile per-packet one-way delay: 1111.761 ms
Loss rate: 8.89%
-- Flow 1:
Average throughput: 13.80 Mbit/s
95th percentile per-packet one-way delay: 1111.761 ms
Loss rate: 8.89%

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

Start at: 2018-12-10 21:32:46

End at: 2018-12-10 21:33:16

Local clock offset: -21.62 ms

Remote clock offset: 0.101 ms

Below is generated by plot.py at 2018-12-10 21:52:59

Datalink statistics

-- Total of 1 flow:

Average throughput: 8.16 Mbit/s

95th percentile per-packet one-way delay: 433.525 ms

Loss rate: 0.63%

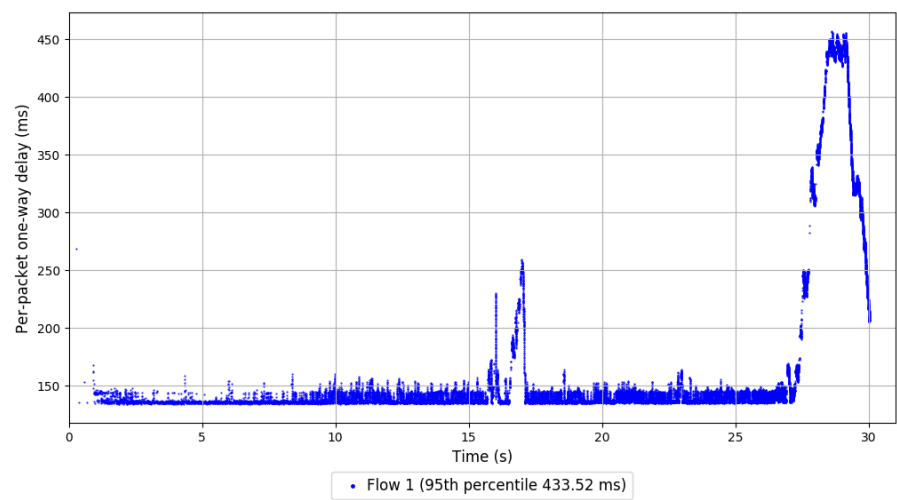
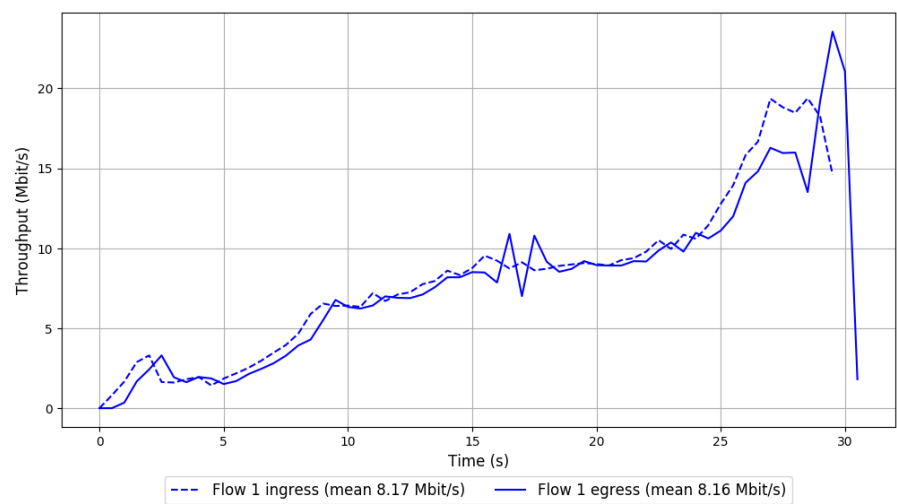
-- Flow 1:

Average throughput: 8.16 Mbit/s

95th percentile per-packet one-way delay: 433.525 ms

Loss rate: 0.63%

Run 3: Report of PCC-Vivace — Data Link

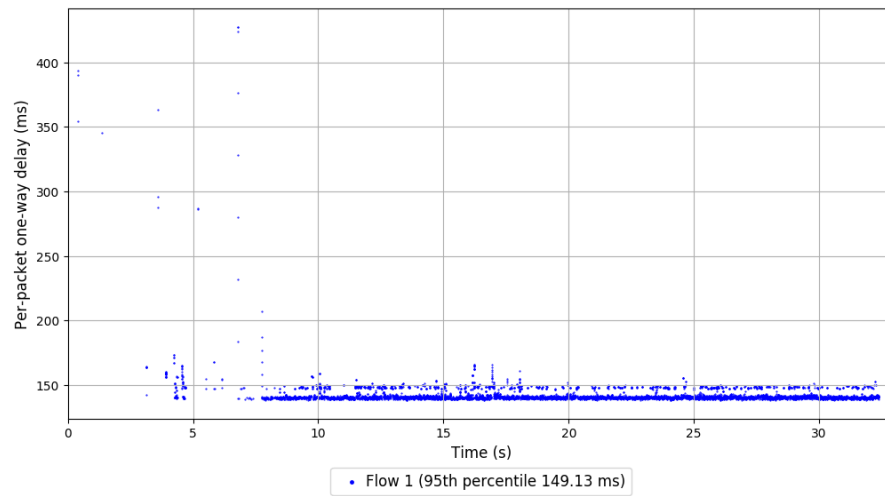
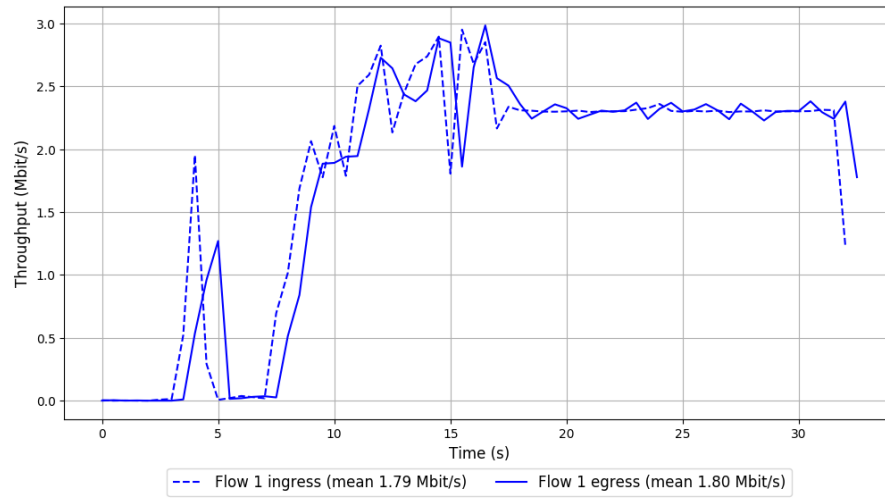



```
Run 1: Statistics of WebRTC media

Start at: 2018-12-10 20:37:15
End at: 2018-12-10 20:37:45
Local clock offset: -9.328 ms
Remote clock offset: 0.901 ms

# Below is generated by plot.py at 2018-12-10 21:52:59
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.80 Mbit/s
95th percentile per-packet one-way delay: 149.130 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 1.80 Mbit/s
95th percentile per-packet one-way delay: 149.130 ms
Loss rate: 0.07%
```

Run 1: Report of WebRTC media — Data Link

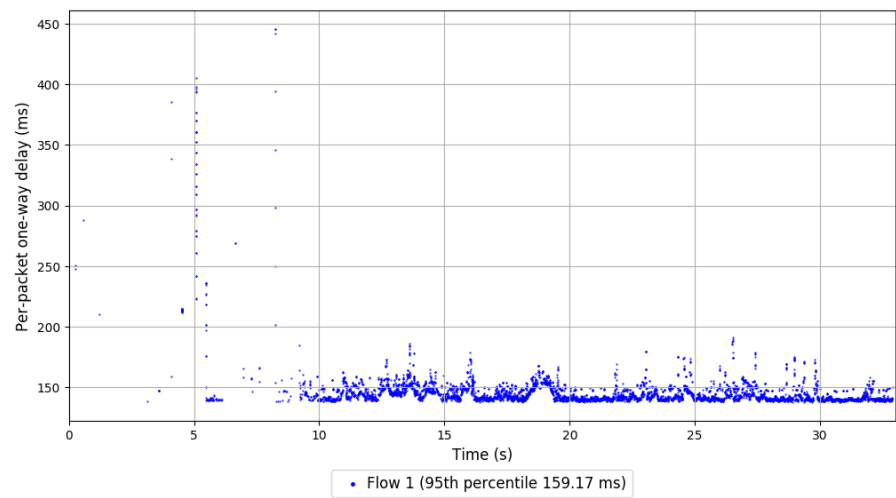
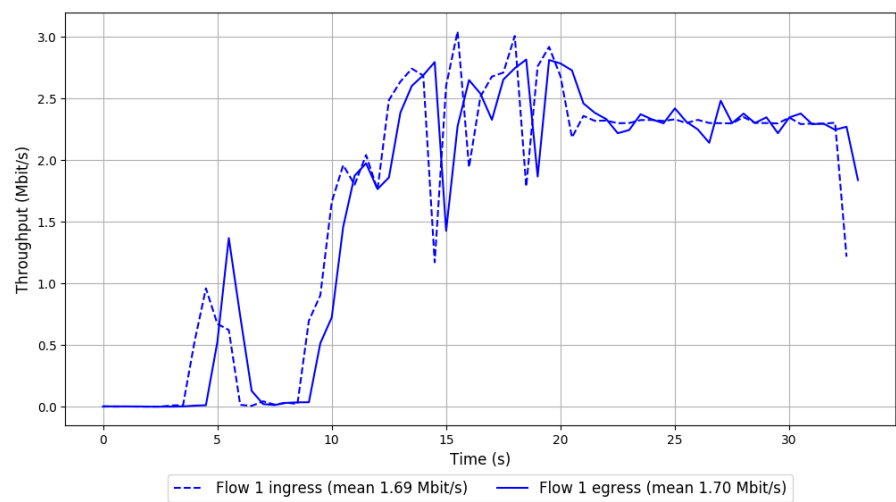


Run 2: Statistics of WebRTC media

Start at: 2018-12-10 21:02:22
End at: 2018-12-10 21:02:52
Local clock offset: -20.199 ms
Remote clock offset: 0.544 ms

Below is generated by plot.py at 2018-12-10 21:52:59
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.70 Mbit/s
95th percentile per-packet one-way delay: 159.171 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 1.70 Mbit/s
95th percentile per-packet one-way delay: 159.171 ms
Loss rate: 0.09%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2018-12-10 21:27:29
End at: 2018-12-10 21:27:59
Local clock offset: -30.842 ms
Remote clock offset: 0.216 ms

Below is generated by plot.py at 2018-12-10 21:52:59
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 141.433 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 141.433 ms
Loss rate: 0.02%

Run 3: Report of WebRTC media — Data Link

