

## Pantheon Report

Generated at 2018-08-01 00:01:00 (UTC).

Data path: AWS California 1 Ethernet (*local*) →Stanford ppp0 ppp0 (*remote*).

Repeated the test of 17 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

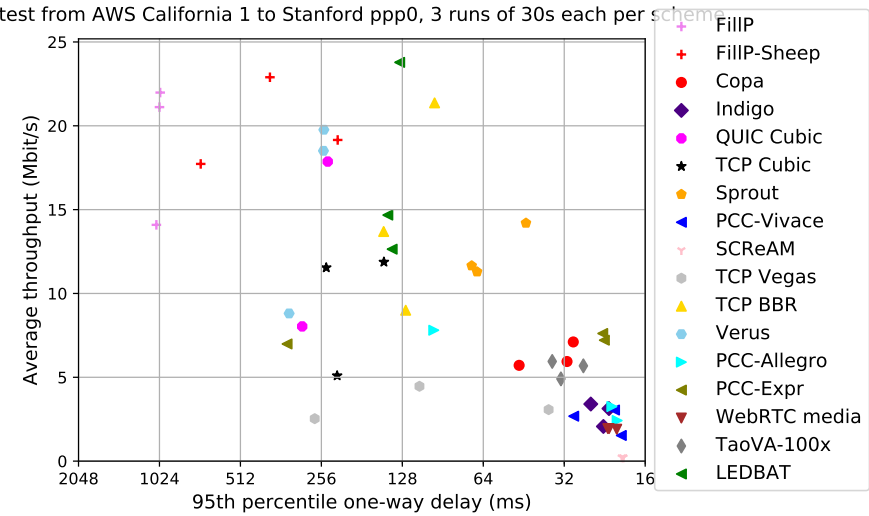
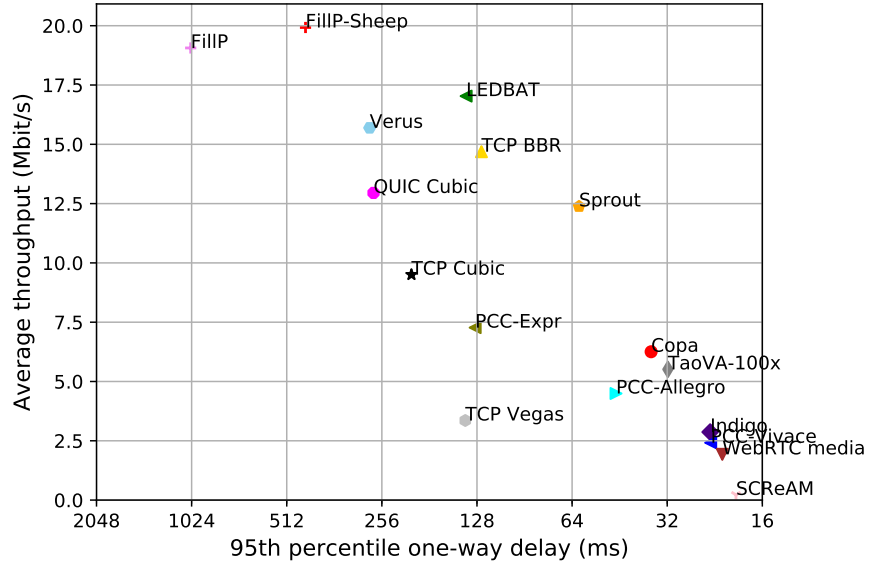
Increased UDP receive buffer to 16 MB (default) and 32 MB (max).

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

Git summary:

```
branch: master @ 640164b5b17c7c6561fff57729b3b5935d8596ce
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf5e58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ 6f038ed31259d366f9840f65b82cbe8f464b1b39
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
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
M src/verus.hpp
M tools/plot.py
third_party/vivace @ 2baf86211435ae071a32f96b7d8c504587f5d7f4
third_party/webRTC @ 3f0cc2a9061a41b6f9dde4735770d143a1fa2851
```

test from AWS California 1 to Stanford ppp0, 3 runs of 30s each per scheme  
(mean of all runs by scheme)



| scheme       | # runs | mean avg tput (Mbit/s)<br>flow 1 | mean 95th-%ile delay (ms)<br>flow 1 | mean loss rate (%)<br>flow 1 |
|--------------|--------|----------------------------------|-------------------------------------|------------------------------|
| TCP BBR      | 3      | 14.69                            | 123.89                              | 0.13                         |
| Copa         | 3      | 6.25                             | 35.98                               | 0.00                         |
| TCP Cubic    | 3      | 9.51                             | 206.36                              | 0.28                         |
| FillP        | 3      | 19.06                            | 1030.94                             | 44.32                        |
| FillP-Sheep  | 3      | 19.93                            | 446.53                              | 2.53                         |
| Indigo       | 3      | 2.87                             | 23.40                               | 0.00                         |
| LEDBAT       | 3      | 17.03                            | 138.55                              | 0.21                         |
| PCC-Allegro  | 3      | 4.50                             | 46.46                               | 0.00                         |
| PCC-Expr     | 3      | 7.27                             | 129.74                              | 0.00                         |
| QUIC Cubic   | 2      | 12.95                            | 272.06                              | 0.32                         |
| SCReAM       | 3      | 0.22                             | 19.39                               | 0.00                         |
| Sprout       | 3      | 12.38                            | 60.86                               | 0.02                         |
| TaoVA-100x   | 3      | 5.51                             | 31.85                               | 0.00                         |
| TCP Vegas    | 3      | 3.35                             | 139.38                              | 0.01                         |
| Verus        | 3      | 15.70                            | 279.83                              | 1.04                         |
| PCC-Vivace   | 3      | 2.42                             | 23.32                               | 0.00                         |
| WebRTC media | 3      | 1.93                             | 21.42                               | 0.00                         |

Run 1: Statistics of TCP BBR

Start at: 2018-07-31 23:06:49

End at: 2018-07-31 23:07:19

Local clock offset: -0.006 ms

Remote clock offset: -3.346 ms

# Below is generated by plot.py at 2018-07-31 23:59:53

# Datalink statistics

-- Total of 1 flow:

Average throughput: 9.00 Mbit/s

95th percentile per-packet one-way delay: 124.366 ms

Loss rate: 0.24%

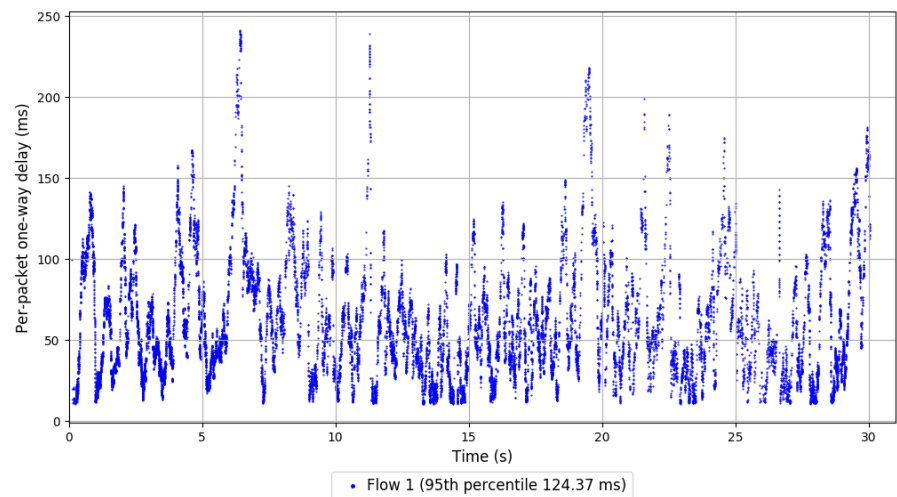
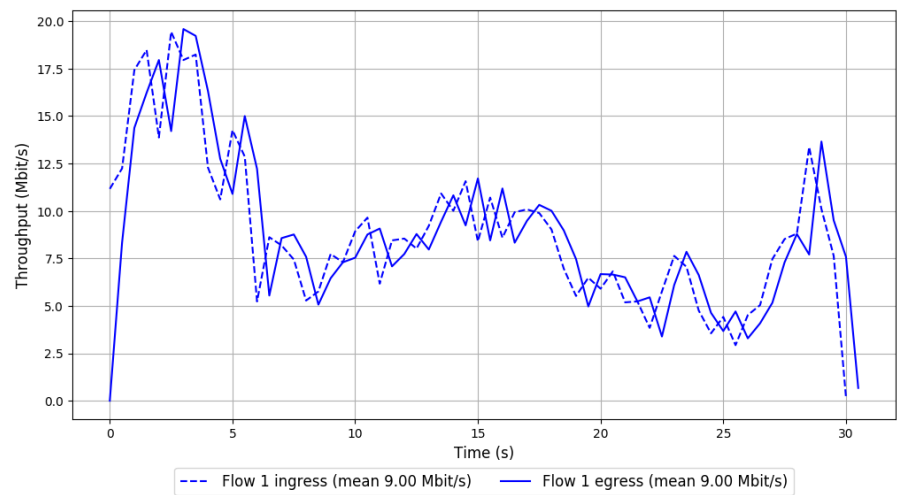
-- Flow 1:

Average throughput: 9.00 Mbit/s

95th percentile per-packet one-way delay: 124.366 ms

Loss rate: 0.24%

Run 1: Report of TCP BBR — Data Link

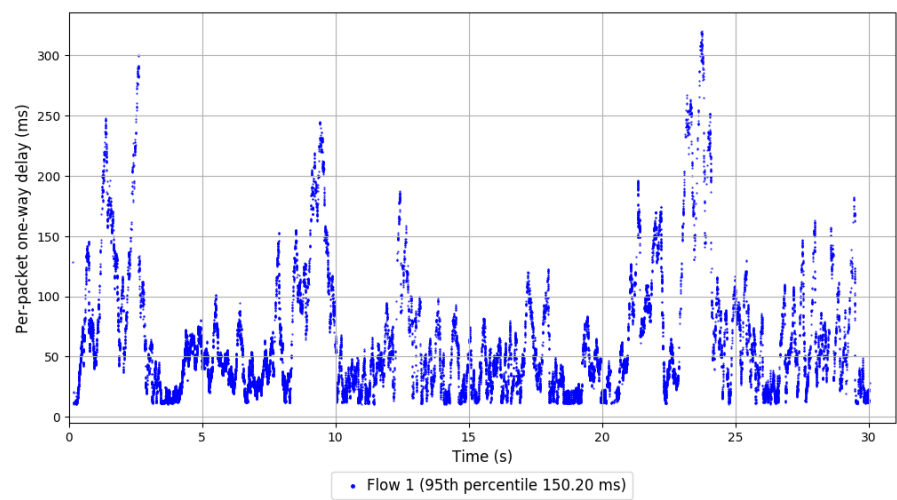
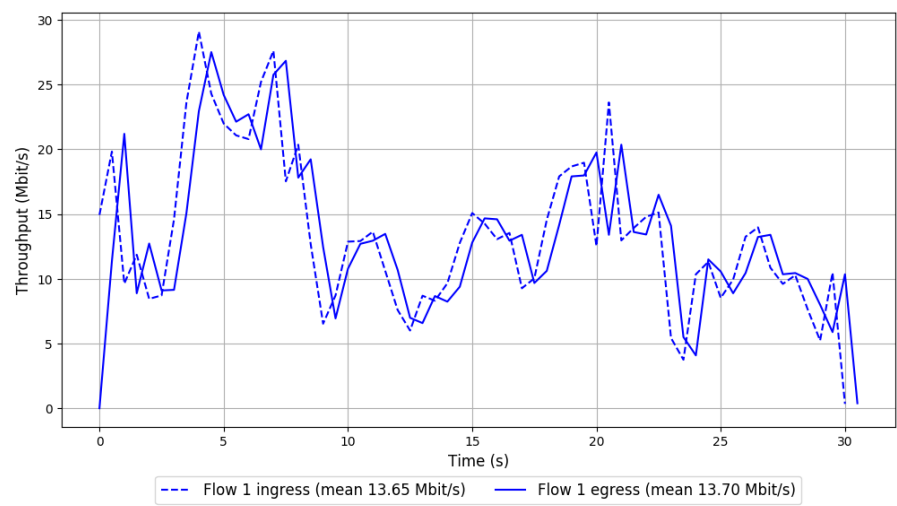


Run 2: Statistics of TCP BBR

Start at: 2018-07-31 23:29:01  
End at: 2018-07-31 23:29:32  
Local clock offset: -2.348 ms  
Remote clock offset: -4.298 ms

# Below is generated by plot.py at 2018-07-31 23:59:58  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 13.70 Mbit/s  
95th percentile per-packet one-way delay: 150.204 ms  
Loss rate: 0.06%  
-- Flow 1:  
Average throughput: 13.70 Mbit/s  
95th percentile per-packet one-way delay: 150.204 ms  
Loss rate: 0.06%

Run 2: Report of TCP BBR — Data Link

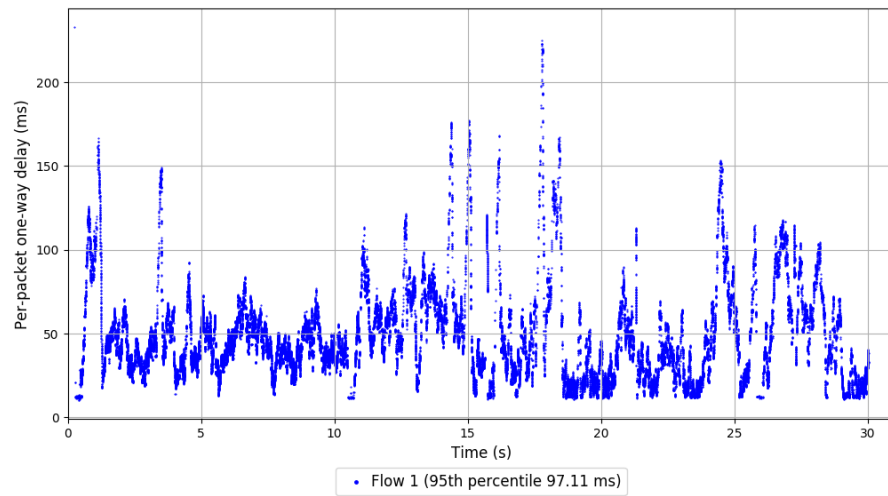
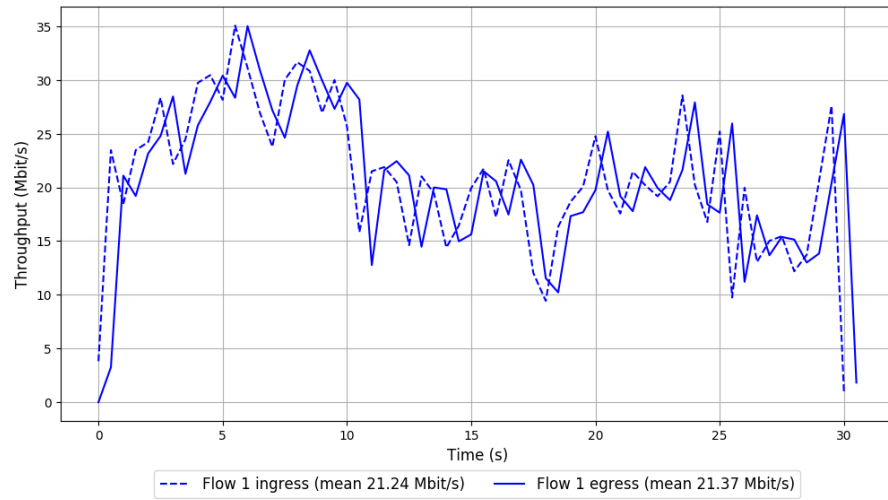


Run 3: Statistics of TCP BBR

Start at: 2018-07-31 23:51:16  
End at: 2018-07-31 23:51:46  
Local clock offset: -5.19 ms  
Remote clock offset: -5.076 ms

# Below is generated by plot.py at 2018-08-01 00:00:04  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 21.37 Mbit/s  
95th percentile per-packet one-way delay: 97.111 ms  
Loss rate: 0.08%  
-- Flow 1:  
Average throughput: 21.37 Mbit/s  
95th percentile per-packet one-way delay: 97.111 ms  
Loss rate: 0.08%

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



Run 1: Statistics of Copa

Start at: 2018-07-31 23:00:19

End at: 2018-07-31 23:00:49

Local clock offset: -0.244 ms

Remote clock offset: -2.73 ms

# Below is generated by plot.py at 2018-08-01 00:00:04

# Datalink statistics

-- Total of 1 flow:

Average throughput: 5.94 Mbit/s

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

Loss rate: 0.00%

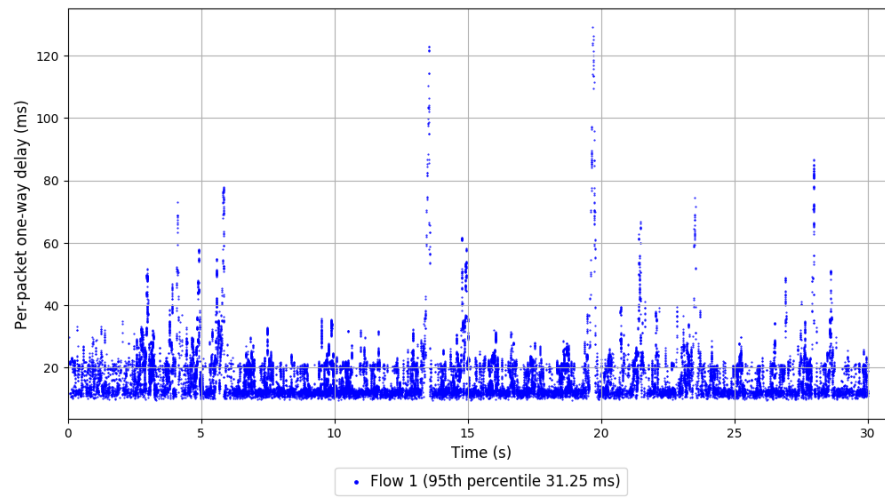
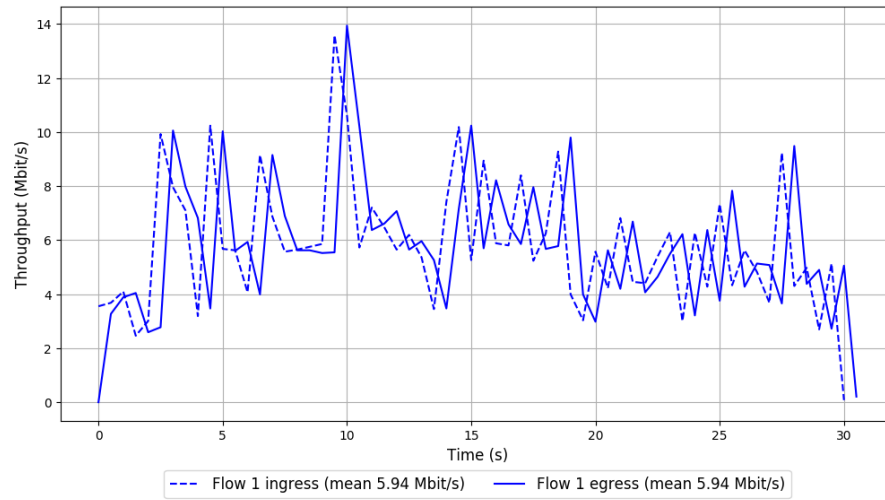
-- Flow 1:

Average throughput: 5.94 Mbit/s

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

Loss rate: 0.00%

# Run 1: Report of Copa — Data Link

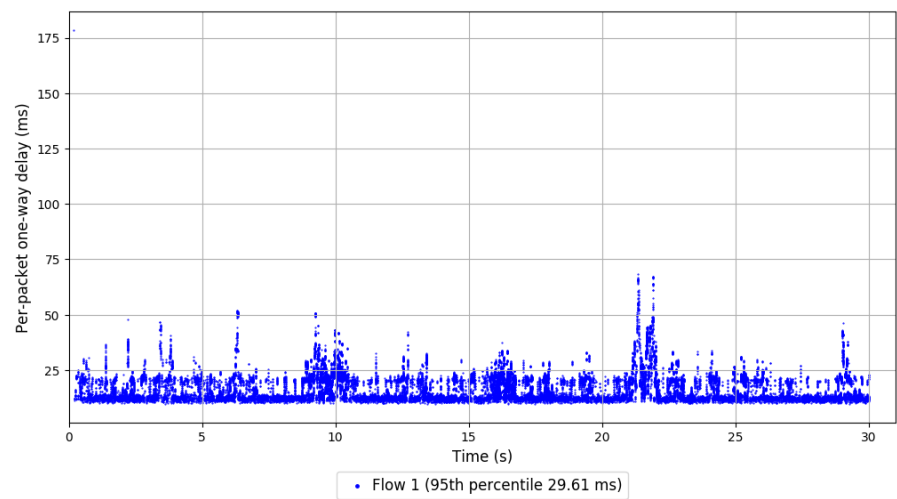
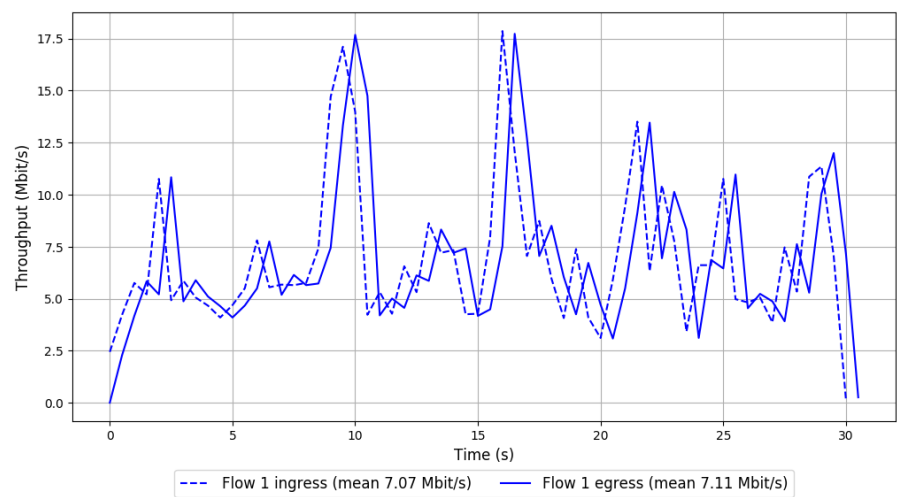


Run 2: Statistics of Copa

Start at: 2018-07-31 23:22:31  
End at: 2018-07-31 23:23:01  
Local clock offset: -0.767 ms  
Remote clock offset: -4.028 ms

# Below is generated by plot.py at 2018-08-01 00:00:04  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 7.11 Mbit/s  
95th percentile per-packet one-way delay: 29.615 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 7.11 Mbit/s  
95th percentile per-packet one-way delay: 29.615 ms  
Loss rate: 0.00%

Run 2: Report of Copa — Data Link

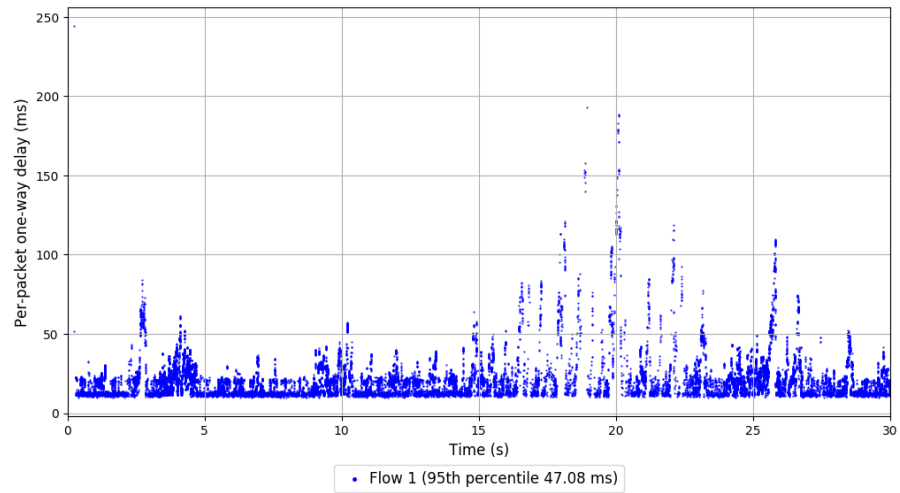
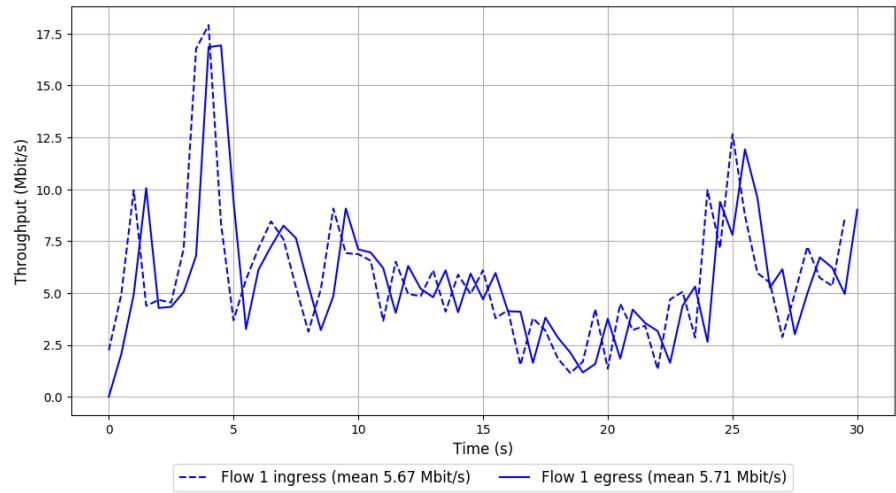


Run 3: Statistics of Copa

Start at: 2018-07-31 23:44:41  
End at: 2018-07-31 23:45:11  
Local clock offset: -4.517 ms  
Remote clock offset: -4.828 ms

# Below is generated by plot.py at 2018-08-01 00:00:04  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 5.71 Mbit/s  
95th percentile per-packet one-way delay: 47.083 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 5.71 Mbit/s  
95th percentile per-packet one-way delay: 47.083 ms  
Loss rate: 0.00%

### Run 3: Report of Copa — Data Link

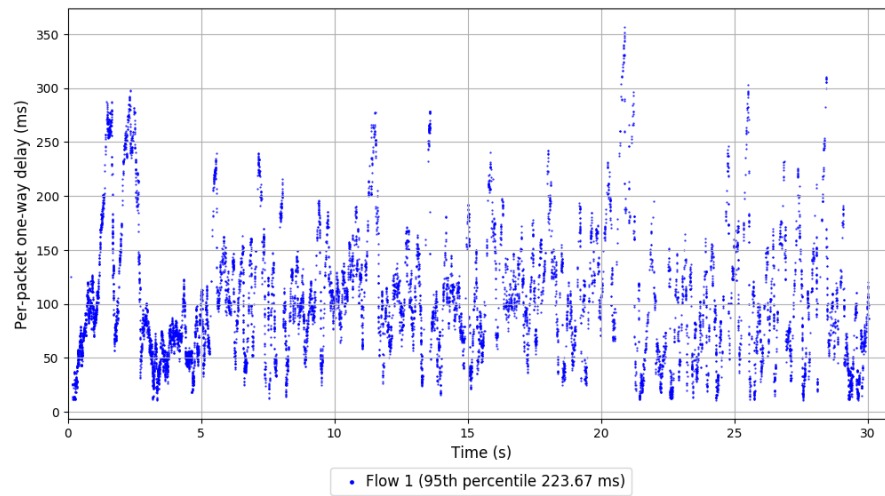
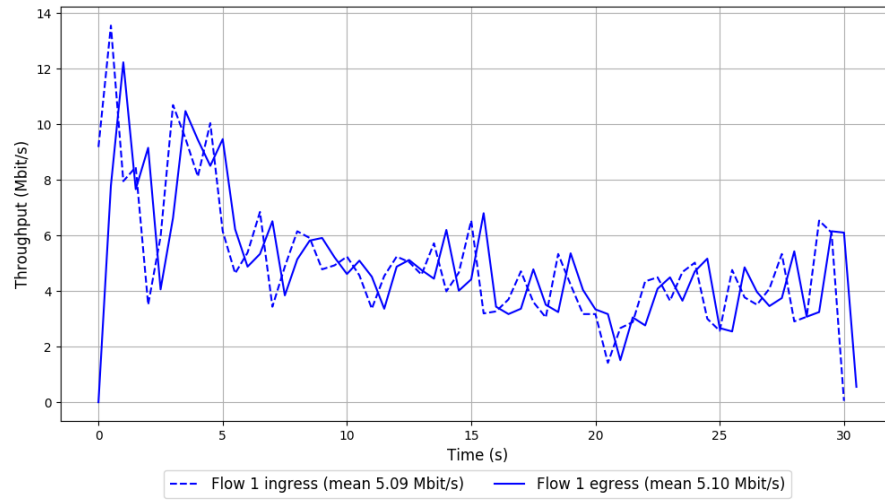


Run 1: Statistics of TCP Cubic

Start at: 2018-07-31 23:05:31  
End at: 2018-07-31 23:06:01  
Local clock offset: -0.045 ms  
Remote clock offset: -3.185 ms

# Below is generated by plot.py at 2018-08-01 00:00:04  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 5.10 Mbit/s  
95th percentile per-packet one-way delay: 223.666 ms  
Loss rate: 0.23%  
-- Flow 1:  
Average throughput: 5.10 Mbit/s  
95th percentile per-packet one-way delay: 223.666 ms  
Loss rate: 0.23%

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

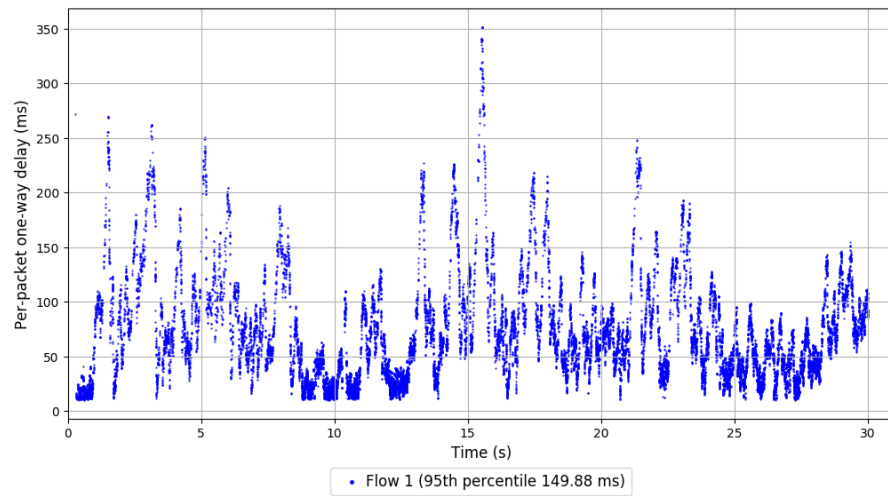
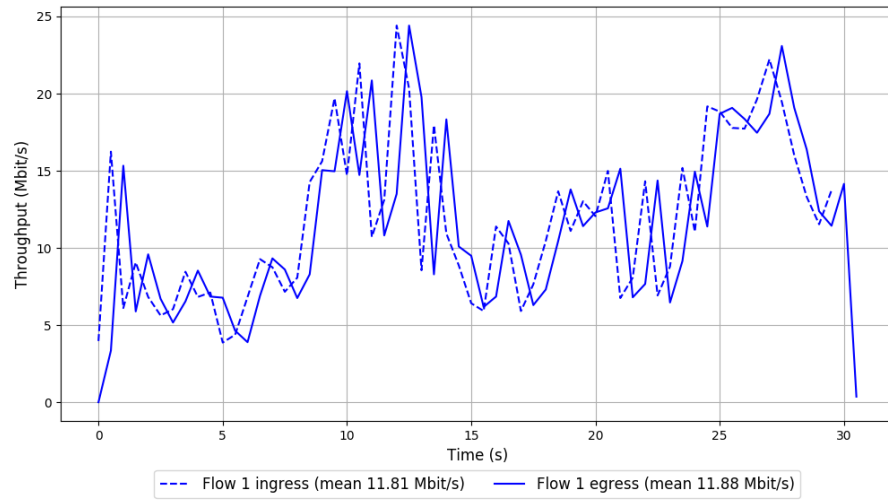


Run 2: Statistics of TCP Cubic

Start at: 2018-07-31 23:27:43  
End at: 2018-07-31 23:28:13  
Local clock offset: -1.956 ms  
Remote clock offset: -4.302 ms

# Below is generated by plot.py at 2018-08-01 00:00:04  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 11.88 Mbit/s  
95th percentile per-packet one-way delay: 149.880 ms  
Loss rate: 0.28%  
-- Flow 1:  
Average throughput: 11.88 Mbit/s  
95th percentile per-packet one-way delay: 149.880 ms  
Loss rate: 0.28%

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

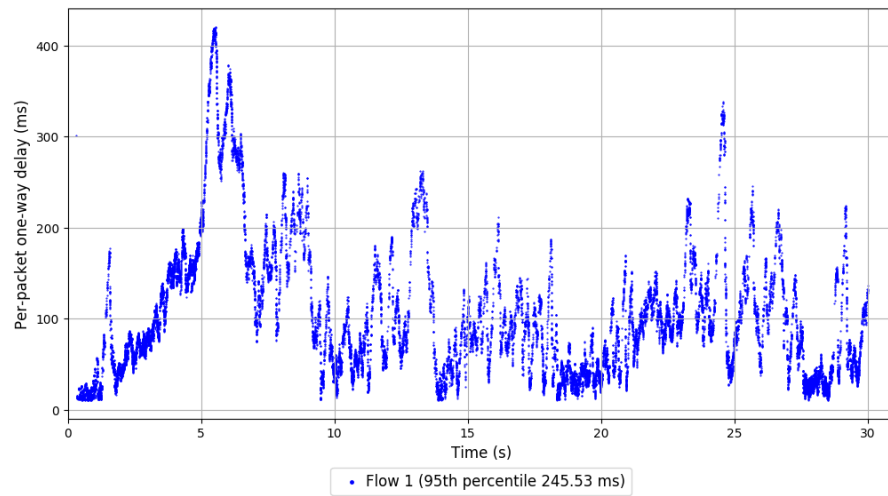
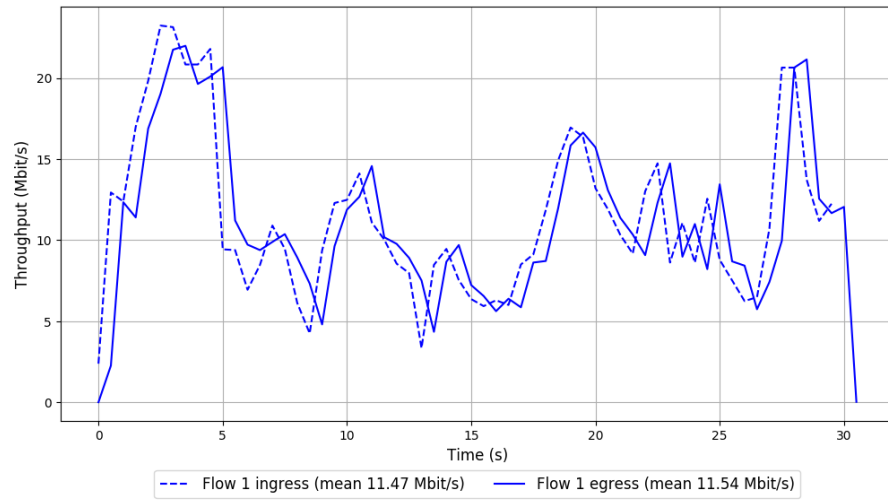


Run 3: Statistics of TCP Cubic

Start at: 2018-07-31 23:49:58  
End at: 2018-07-31 23:50:28  
Local clock offset: -4.99 ms  
Remote clock offset: -4.979 ms

# Below is generated by plot.py at 2018-08-01 00:00:04  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 11.54 Mbit/s  
95th percentile per-packet one-way delay: 245.531 ms  
Loss rate: 0.32%  
-- Flow 1:  
Average throughput: 11.54 Mbit/s  
95th percentile per-packet one-way delay: 245.531 ms  
Loss rate: 0.32%

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

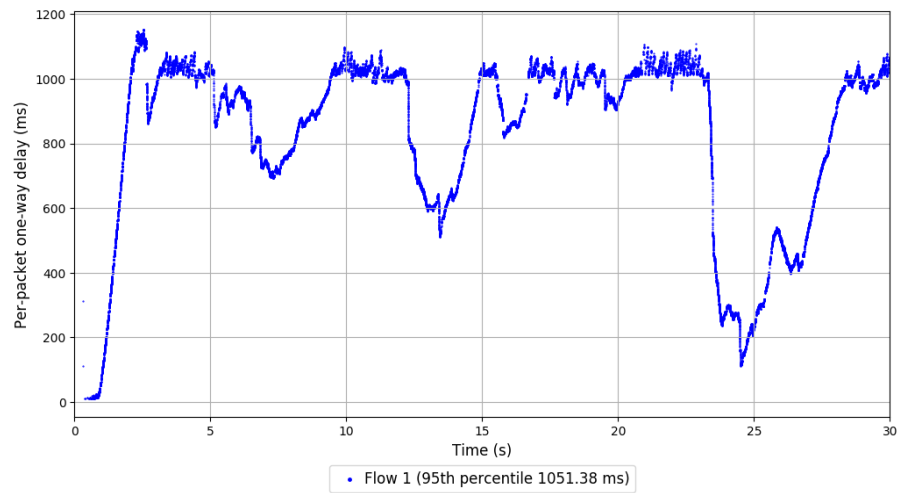
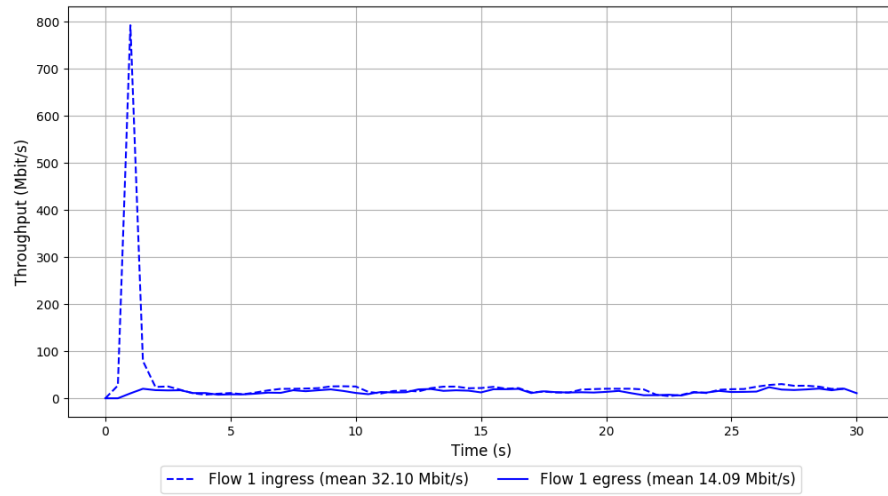


Run 1: Statistics of FillP

Start at: 2018-07-31 22:59:01  
End at: 2018-07-31 22:59:31  
Local clock offset: -0.209 ms  
Remote clock offset: -2.558 ms

# Below is generated by plot.py at 2018-08-01 00:00:15  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 14.09 Mbit/s  
95th percentile per-packet one-way delay: 1051.377 ms  
Loss rate: 56.53%  
-- Flow 1:  
Average throughput: 14.09 Mbit/s  
95th percentile per-packet one-way delay: 1051.377 ms  
Loss rate: 56.53%

### Run 1: Report of FillP — Data Link

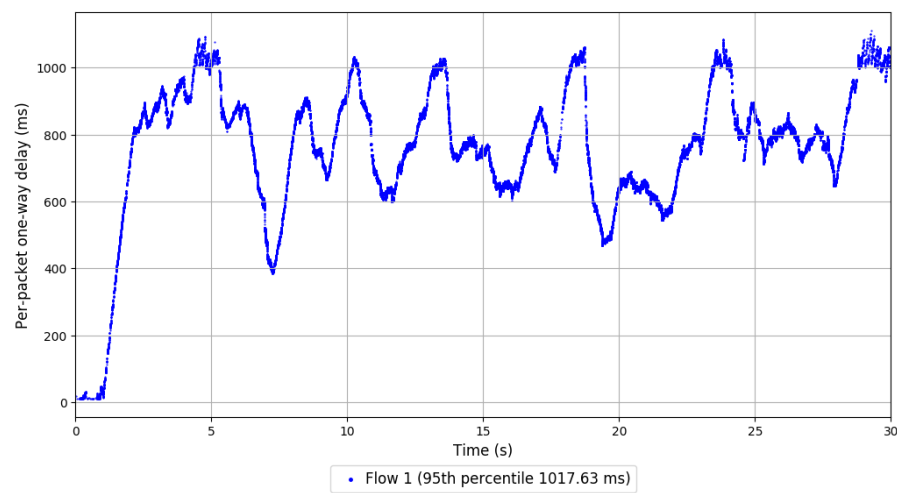
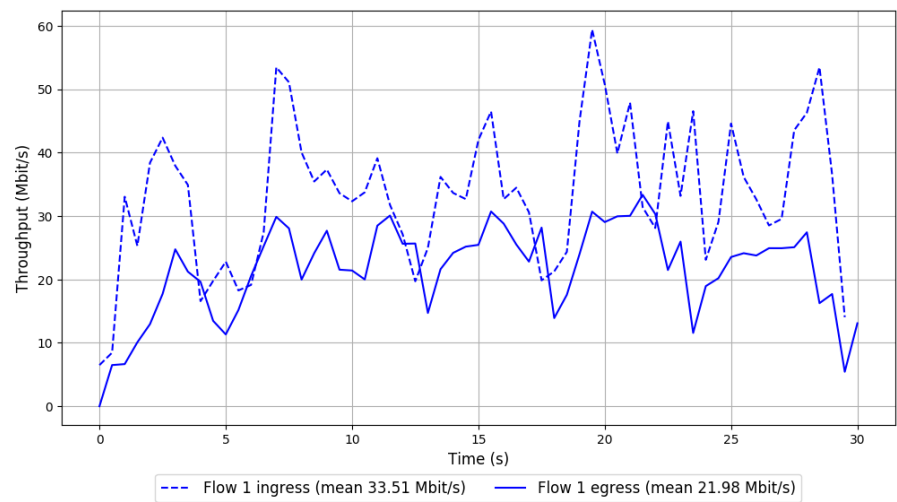


Run 2: Statistics of FillP

Start at: 2018-07-31 23:21:12  
End at: 2018-07-31 23:21:42  
Local clock offset: -0.684 ms  
Remote clock offset: -4.043 ms

# Below is generated by plot.py at 2018-08-01 00:00:24  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 21.98 Mbit/s  
95th percentile per-packet one-way delay: 1017.627 ms  
Loss rate: 34.39%  
-- Flow 1:  
Average throughput: 21.98 Mbit/s  
95th percentile per-packet one-way delay: 1017.627 ms  
Loss rate: 34.39%

Run 2: Report of FillP — Data Link

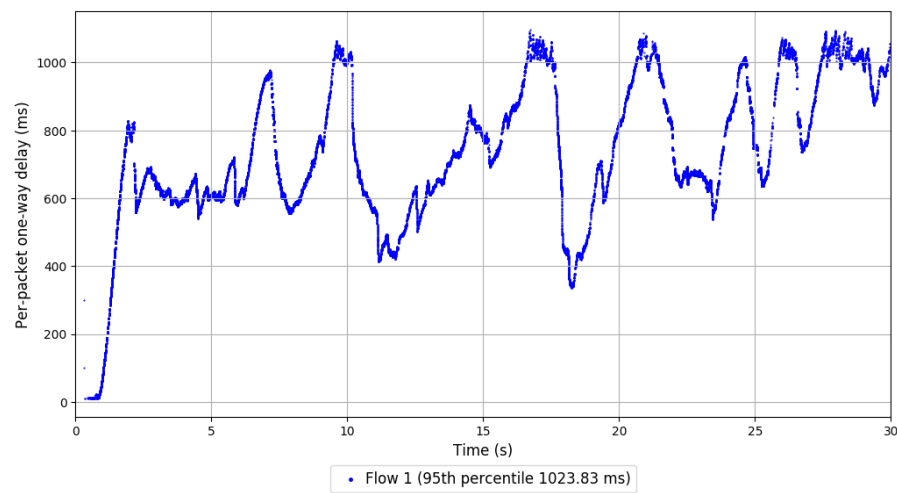
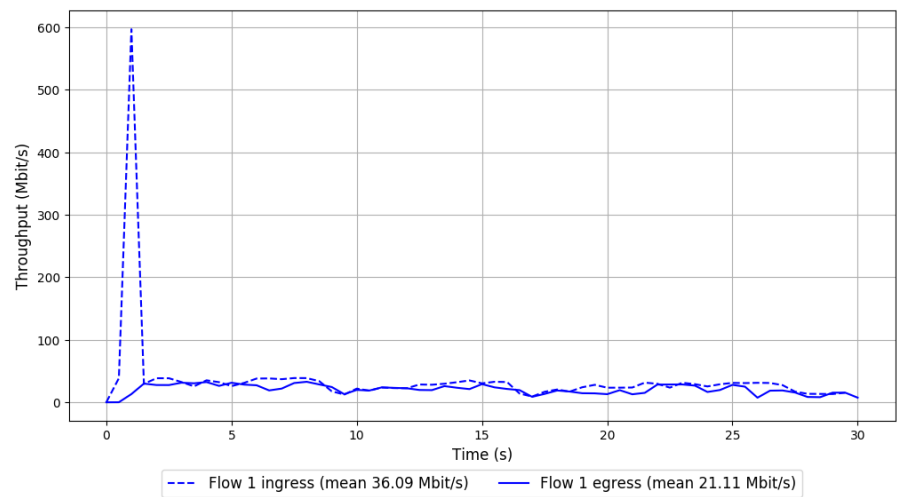


Run 3: Statistics of FillP

Start at: 2018-07-31 23:43:23  
End at: 2018-07-31 23:43:53  
Local clock offset: -4.282 ms  
Remote clock offset: -4.839 ms

# Below is generated by plot.py at 2018-08-01 00:00:25  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 21.11 Mbit/s  
95th percentile per-packet one-way delay: 1023.830 ms  
Loss rate: 42.04%  
-- Flow 1:  
Average throughput: 21.11 Mbit/s  
95th percentile per-packet one-way delay: 1023.830 ms  
Loss rate: 42.04%

Run 3: Report of FillP — Data Link

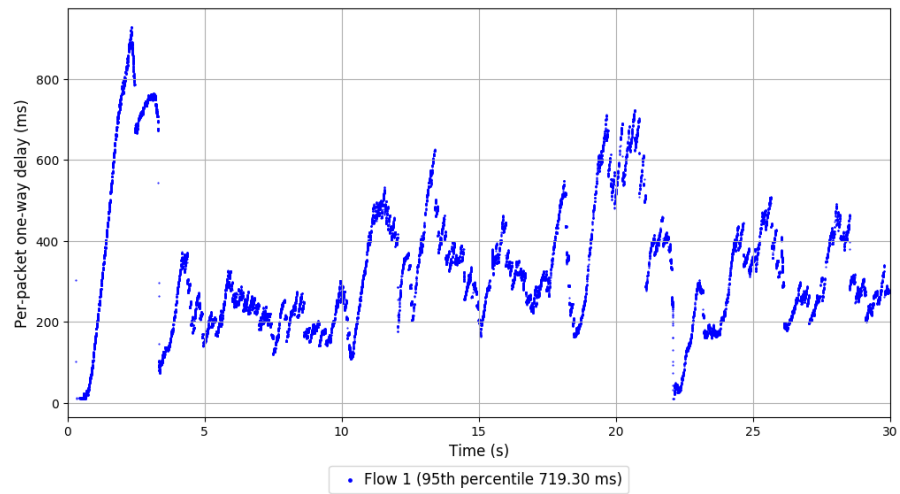
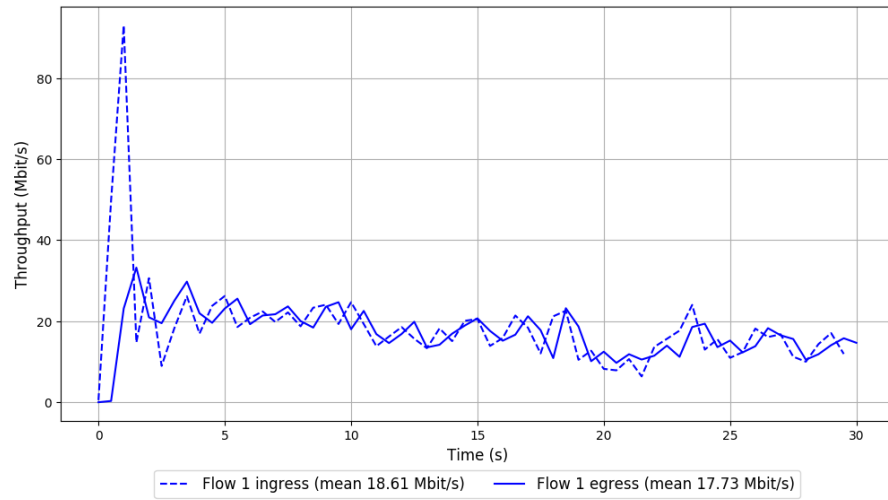


Run 1: Statistics of FillP-Sheep

Start at: 2018-07-31 23:12:01  
End at: 2018-07-31 23:12:31  
Local clock offset: -0.208 ms  
Remote clock offset: -3.707 ms

# Below is generated by plot.py at 2018-08-01 00:00:25  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 17.73 Mbit/s  
95th percentile per-packet one-way delay: 719.305 ms  
Loss rate: 5.67%  
-- Flow 1:  
Average throughput: 17.73 Mbit/s  
95th percentile per-packet one-way delay: 719.305 ms  
Loss rate: 5.67%

# Run 1: Report of FillP-Sheep — Data Link

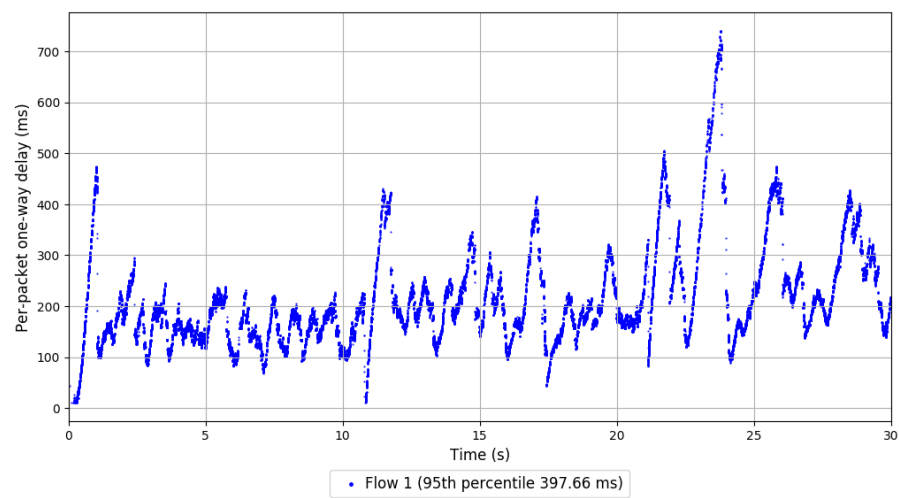
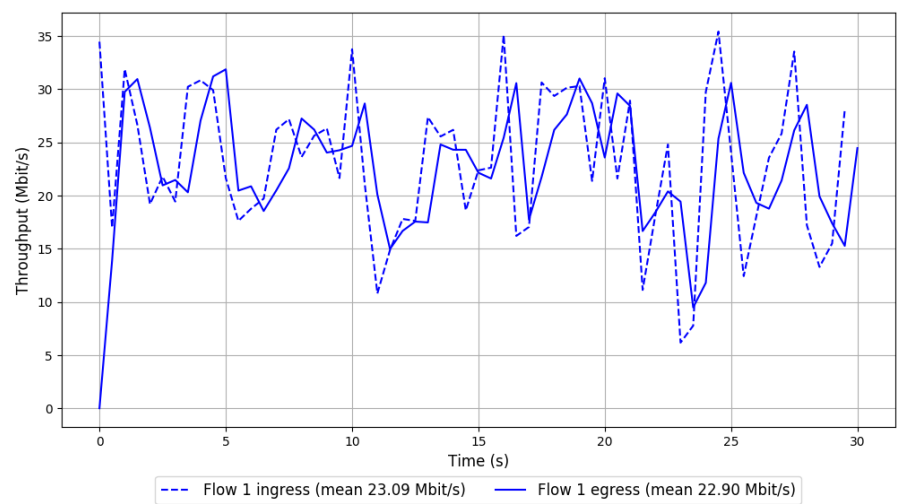


Run 2: Statistics of FillP-Sheep

Start at: 2018-07-31 23:34:15  
End at: 2018-07-31 23:34:45  
Local clock offset: -3.112 ms  
Remote clock offset: -4.485 ms

# Below is generated by plot.py at 2018-08-01 00:00:25  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 22.90 Mbit/s  
95th percentile per-packet one-way delay: 397.661 ms  
Loss rate: 0.93%  
-- Flow 1:  
Average throughput: 22.90 Mbit/s  
95th percentile per-packet one-way delay: 397.661 ms  
Loss rate: 0.93%

Run 2: Report of FillP-Sheep — Data Link

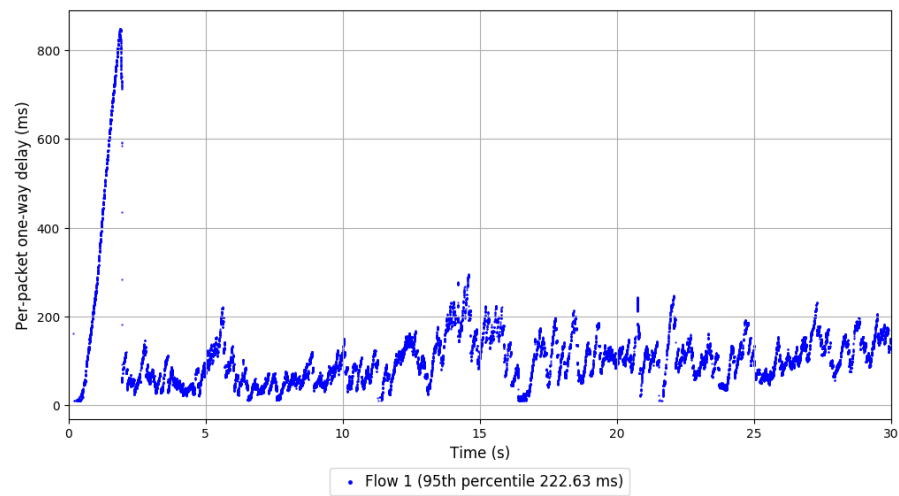
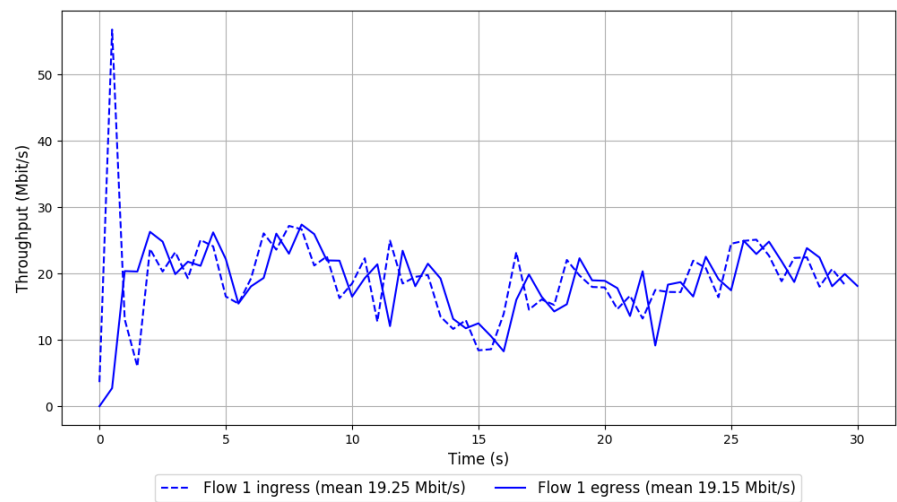


Run 3: Statistics of FillP-Sheep

Start at: 2018-07-31 23:56:30  
End at: 2018-07-31 23:57:00  
Local clock offset: -5.692 ms  
Remote clock offset: -5.063 ms

# Below is generated by plot.py at 2018-08-01 00:00:25  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 19.15 Mbit/s  
95th percentile per-packet one-way delay: 222.634 ms  
Loss rate: 0.99%  
-- Flow 1:  
Average throughput: 19.15 Mbit/s  
95th percentile per-packet one-way delay: 222.634 ms  
Loss rate: 0.99%

Run 3: Report of FillP-Sheep — Data Link

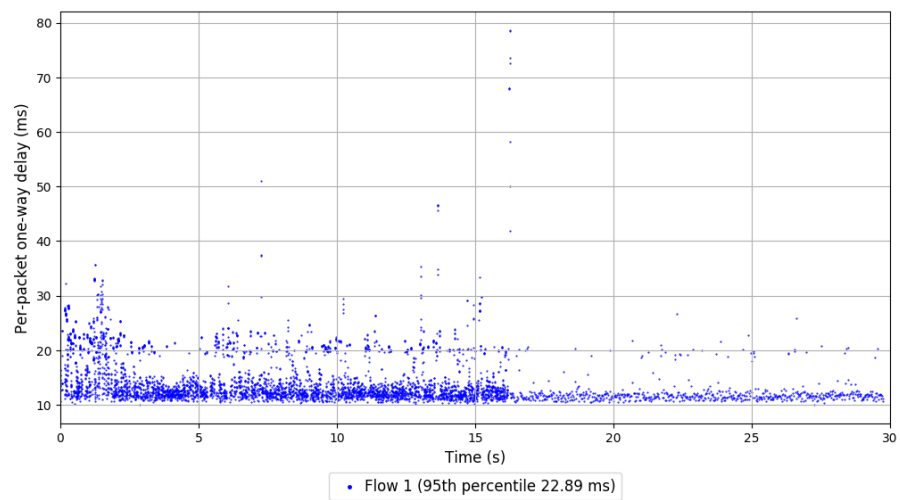
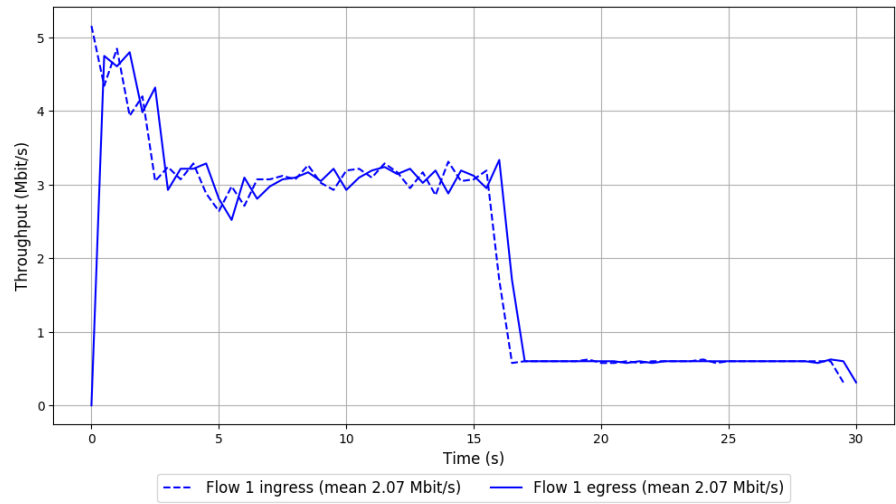


Run 1: Statistics of Indigo

Start at: 2018-07-31 23:08:07  
End at: 2018-07-31 23:08:37  
Local clock offset: -0.079 ms  
Remote clock offset: -3.416 ms

# Below is generated by plot.py at 2018-08-01 00:00:25  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 2.07 Mbit/s  
95th percentile per-packet one-way delay: 22.885 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 2.07 Mbit/s  
95th percentile per-packet one-way delay: 22.885 ms  
Loss rate: 0.00%

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

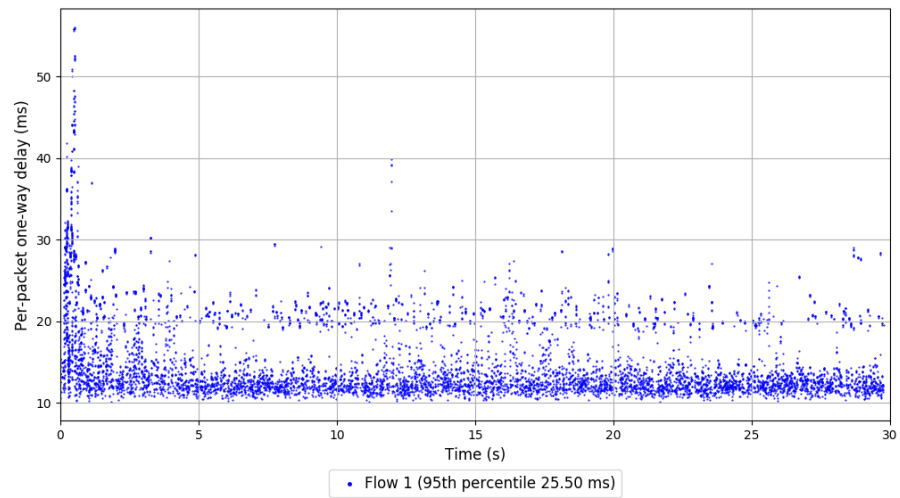
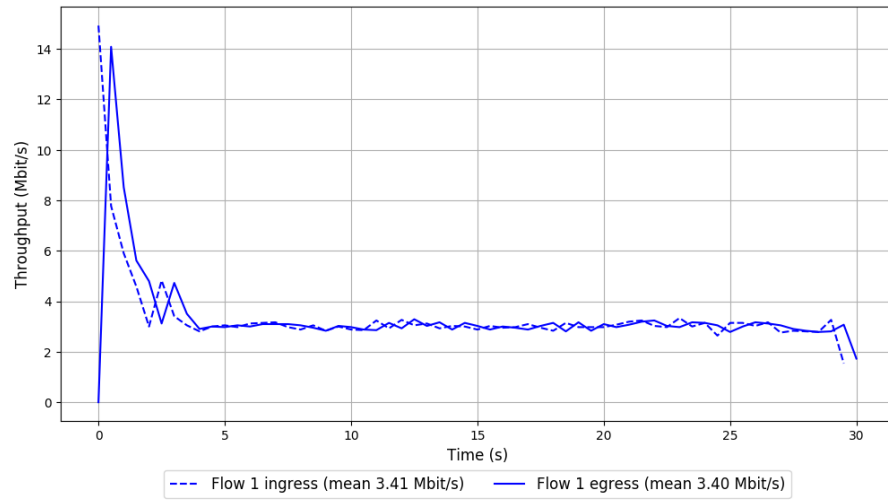


Run 2: Statistics of Indigo

Start at: 2018-07-31 23:30:20  
End at: 2018-07-31 23:30:50  
Local clock offset: -2.558 ms  
Remote clock offset: -4.338 ms

# Below is generated by plot.py at 2018-08-01 00:00:25  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 3.40 Mbit/s  
95th percentile per-packet one-way delay: 25.495 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 3.40 Mbit/s  
95th percentile per-packet one-way delay: 25.495 ms  
Loss rate: 0.00%

## Run 2: Report of Indigo — Data Link

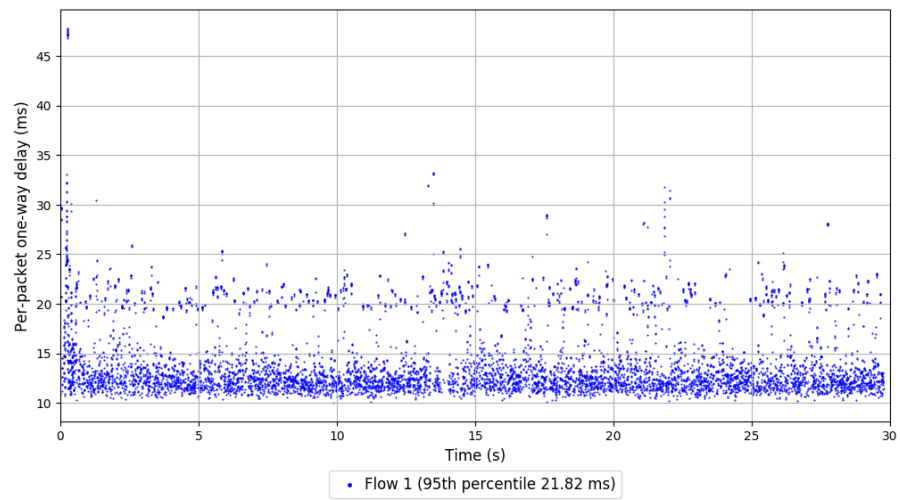
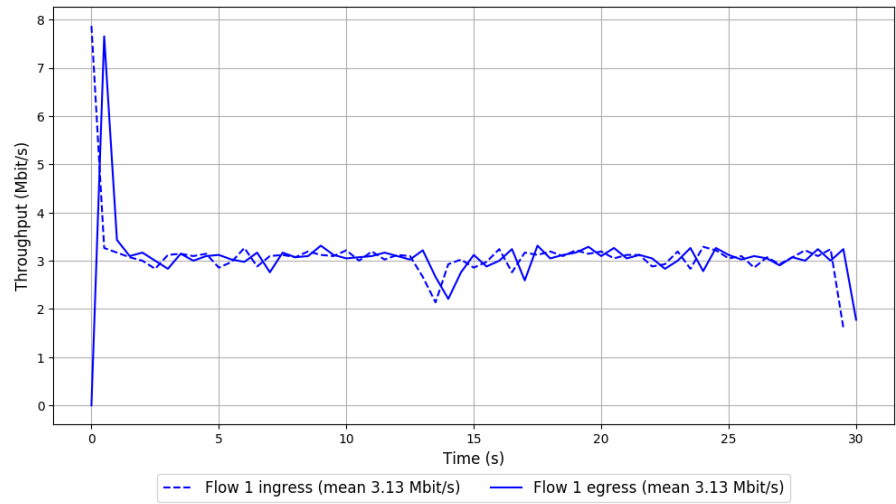


Run 3: Statistics of Indigo

Start at: 2018-07-31 23:52:34  
End at: 2018-07-31 23:53:05  
Local clock offset: -5.319 ms  
Remote clock offset: -5.118 ms

# Below is generated by plot.py at 2018-08-01 00:00:25  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 3.13 Mbit/s  
95th percentile per-packet one-way delay: 21.820 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 3.13 Mbit/s  
95th percentile per-packet one-way delay: 21.820 ms  
Loss rate: 0.00%

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

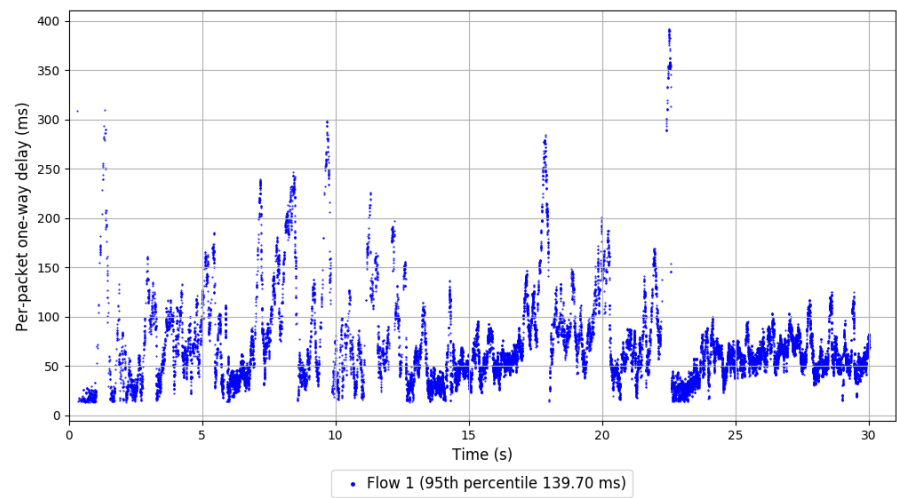
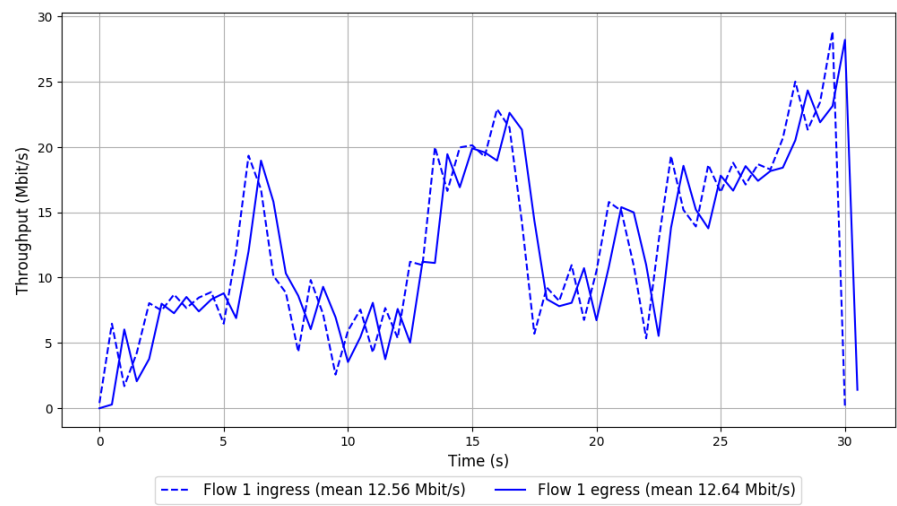


```
Run 1: Statistics of LEDBAT

Start at: 2018-07-31 22:53:48
End at: 2018-07-31 22:54:18
Local clock offset: -2.743 ms
Remote clock offset: -1.74 ms

# Below is generated by plot.py at 2018-08-01 00:00:25
# Datalink statistics
-- Total of 1 flow:
Average throughput: 12.64 Mbit/s
95th percentile per-packet one-way delay: 139.696 ms
Loss rate: 0.35%
-- Flow 1:
Average throughput: 12.64 Mbit/s
95th percentile per-packet one-way delay: 139.696 ms
Loss rate: 0.35%
```

Run 1: Report of LEDBAT — Data Link

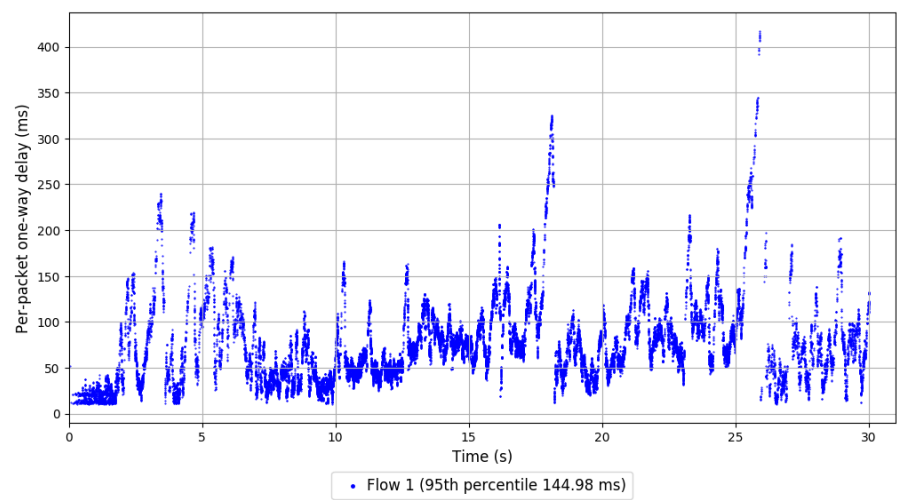
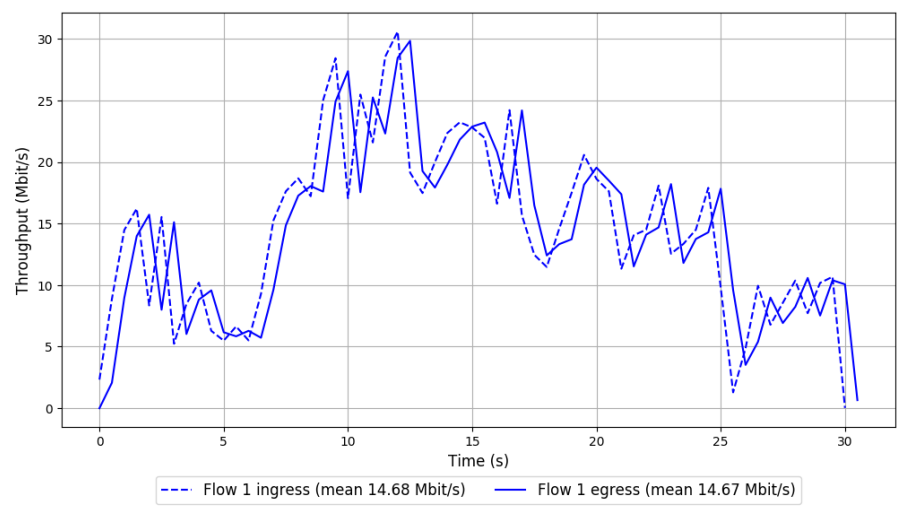


Run 2: Statistics of LEDBAT

Start at: 2018-07-31 23:15:55  
End at: 2018-07-31 23:16:25  
Local clock offset: -0.323 ms  
Remote clock offset: -3.854 ms

# Below is generated by plot.py at 2018-08-01 00:00:25  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 14.67 Mbit/s  
95th percentile per-packet one-way delay: 144.981 ms  
Loss rate: 0.15%  
-- Flow 1:  
Average throughput: 14.67 Mbit/s  
95th percentile per-packet one-way delay: 144.981 ms  
Loss rate: 0.15%

Run 2: Report of LEDBAT — Data Link

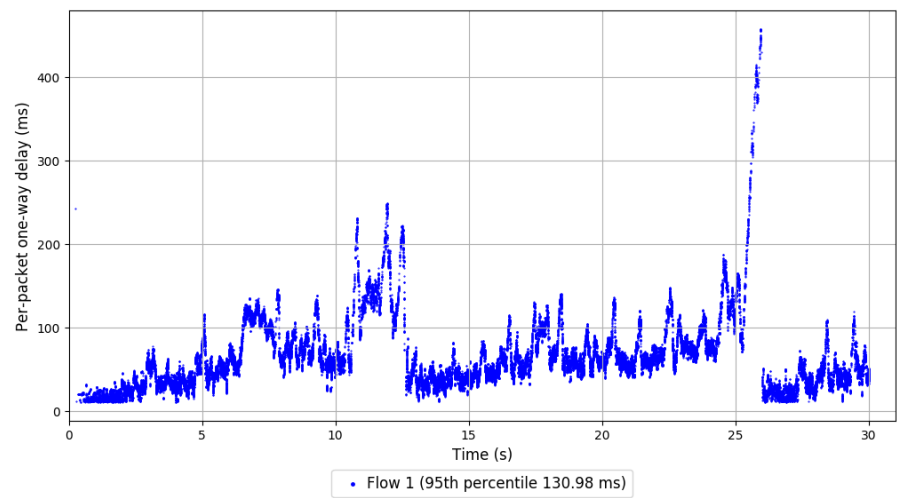
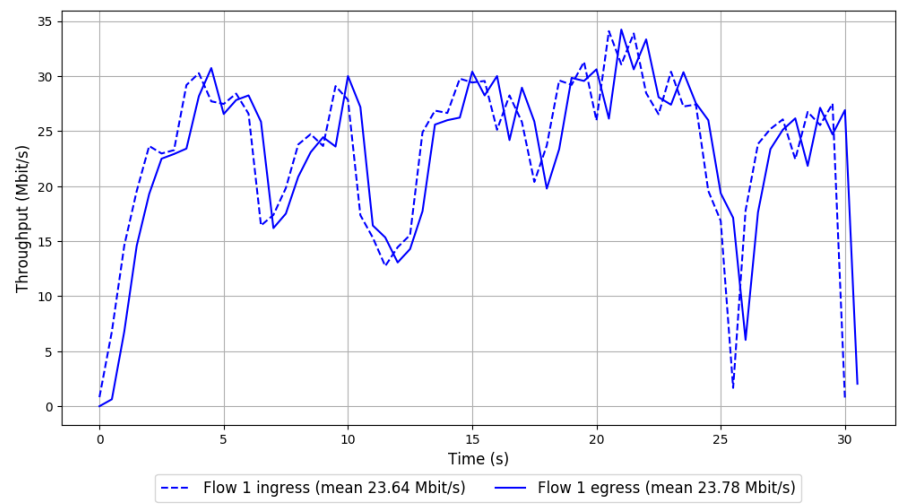


Run 3: Statistics of LEDBAT

Start at: 2018-07-31 23:38:09  
End at: 2018-07-31 23:38:39  
Local clock offset: -3.751 ms  
Remote clock offset: -4.582 ms

# Below is generated by plot.py at 2018-08-01 00:00:41  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 23.78 Mbit/s  
95th percentile per-packet one-way delay: 130.976 ms  
Loss rate: 0.13%  
-- Flow 1:  
Average throughput: 23.78 Mbit/s  
95th percentile per-packet one-way delay: 130.976 ms  
Loss rate: 0.13%

Run 3: Report of LEDBAT — Data Link

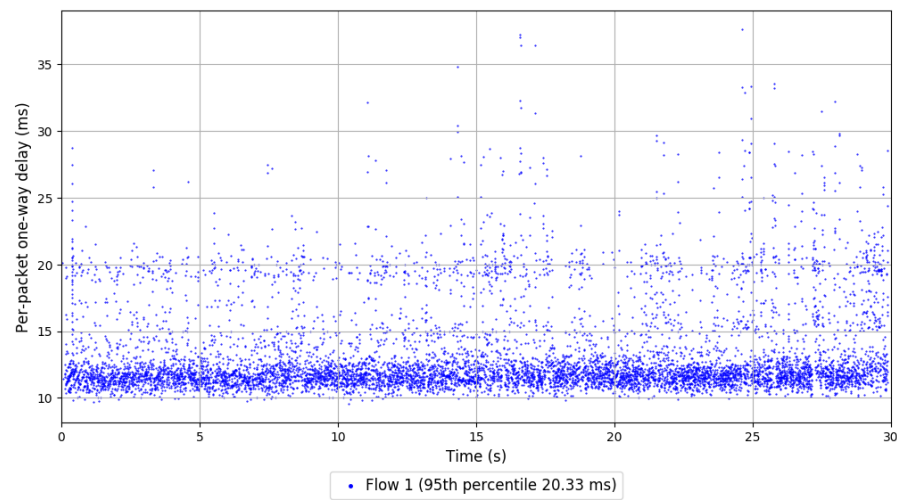
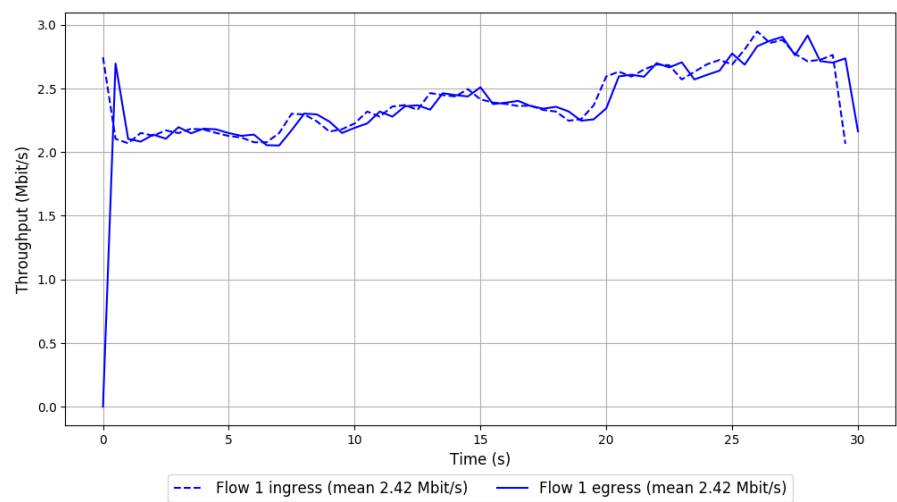


```
Run 1: Statistics of PCC-Allegro

Start at: 2018-07-31 22:56:24
End at: 2018-07-31 22:56:54
Local clock offset: -0.106 ms
Remote clock offset: -2.232 ms

# Below is generated by plot.py at 2018-08-01 00:00:41
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.42 Mbit/s
95th percentile per-packet one-way delay: 20.334 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.42 Mbit/s
95th percentile per-packet one-way delay: 20.334 ms
Loss rate: 0.00%
```

Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

Start at: 2018-07-31 23:18:36

End at: 2018-07-31 23:19:06

Local clock offset: -0.462 ms

Remote clock offset: -3.923 ms

# Below is generated by plot.py at 2018-08-01 00:00:41

# Datalink statistics

-- Total of 1 flow:

Average throughput: 3.26 Mbit/s

95th percentile per-packet one-way delay: 21.281 ms

Loss rate: 0.00%

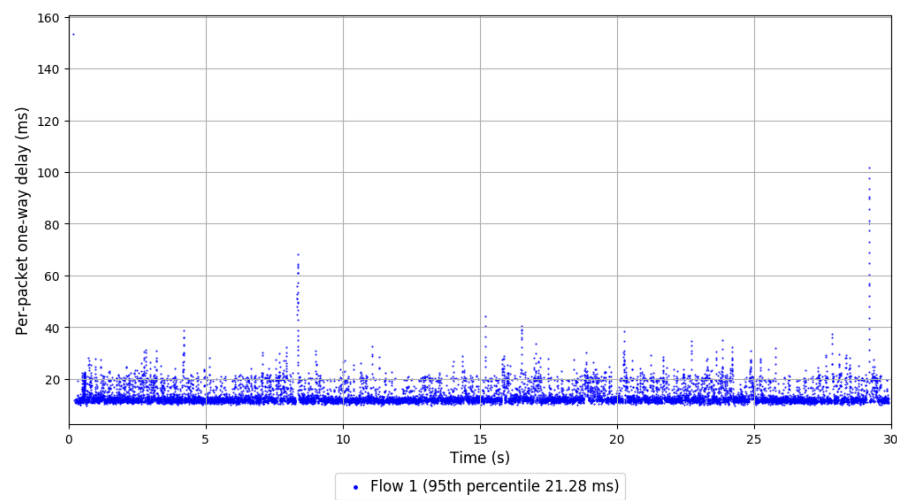
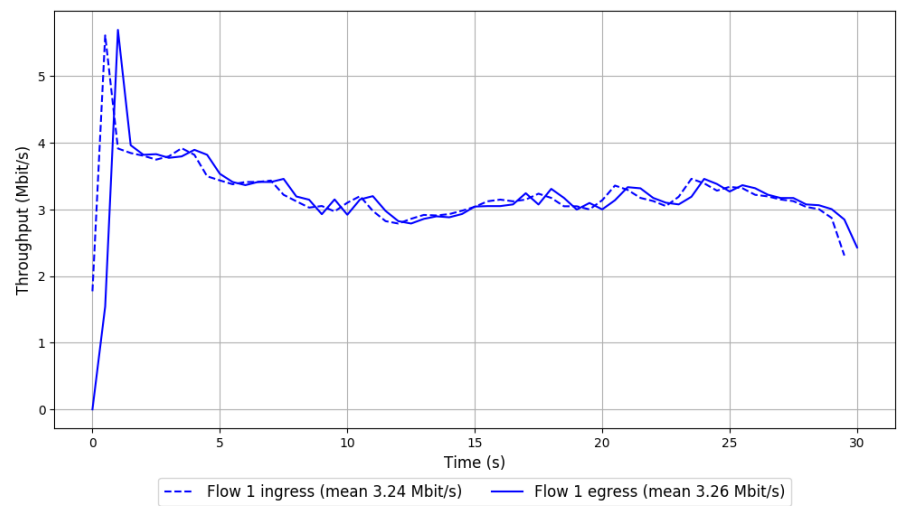
-- Flow 1:

Average throughput: 3.26 Mbit/s

95th percentile per-packet one-way delay: 21.281 ms

Loss rate: 0.00%

Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

Start at: 2018-07-31 23:40:46

End at: 2018-07-31 23:41:16

Local clock offset: -4.077 ms

Remote clock offset: -4.798 ms

# Below is generated by plot.py at 2018-08-01 00:00:41

# Datalink statistics

-- Total of 1 flow:

Average throughput: 7.81 Mbit/s

95th percentile per-packet one-way delay: 97.772 ms

Loss rate: 0.01%

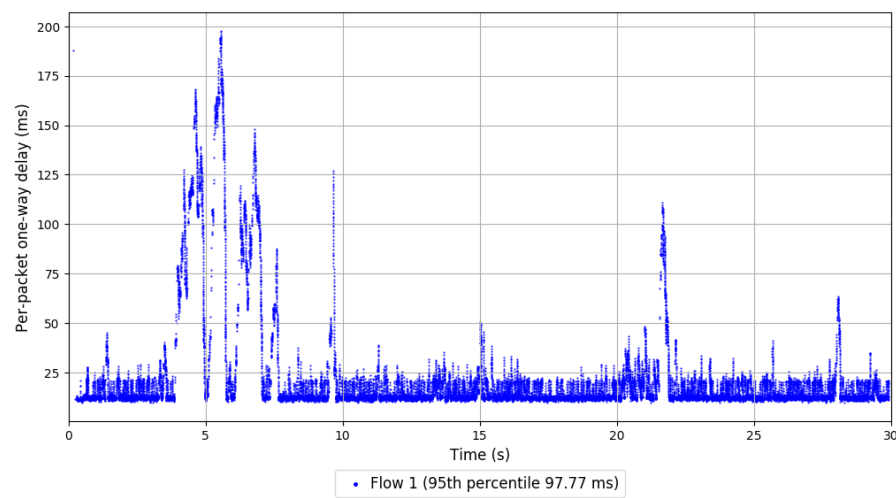
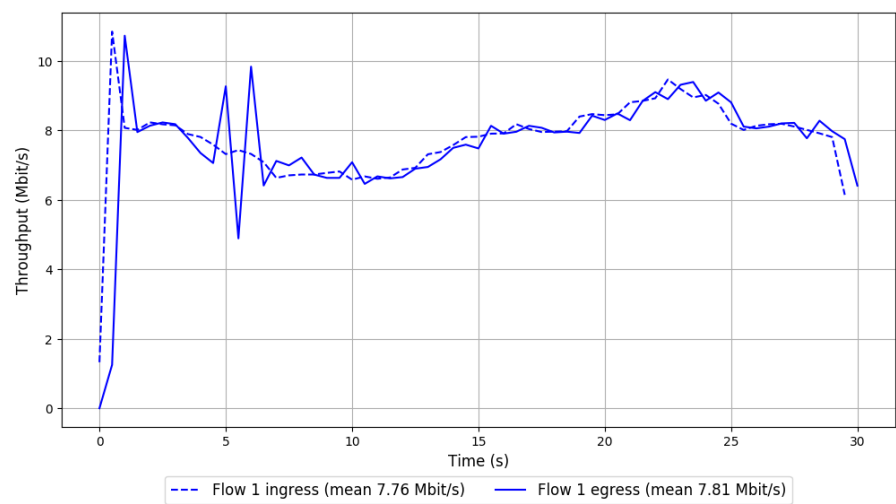
-- Flow 1:

Average throughput: 7.81 Mbit/s

95th percentile per-packet one-way delay: 97.772 ms

Loss rate: 0.01%

Run 3: Report of PCC-Allegro — Data Link

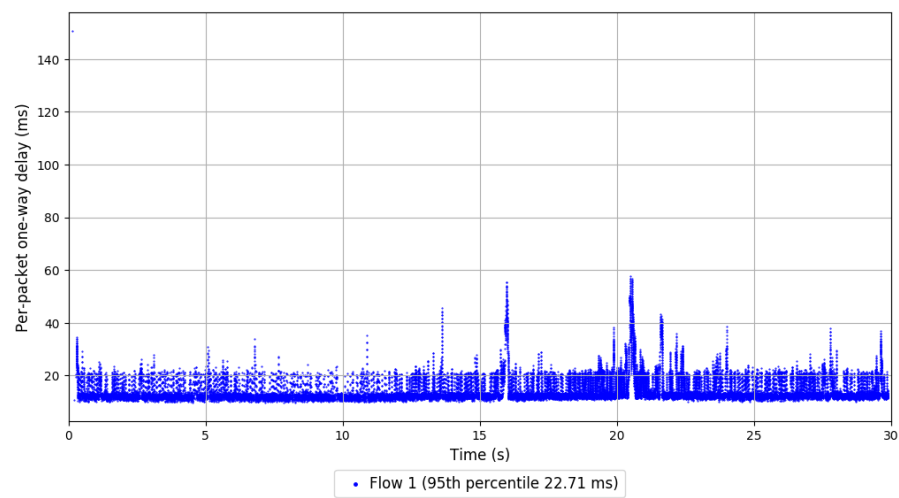
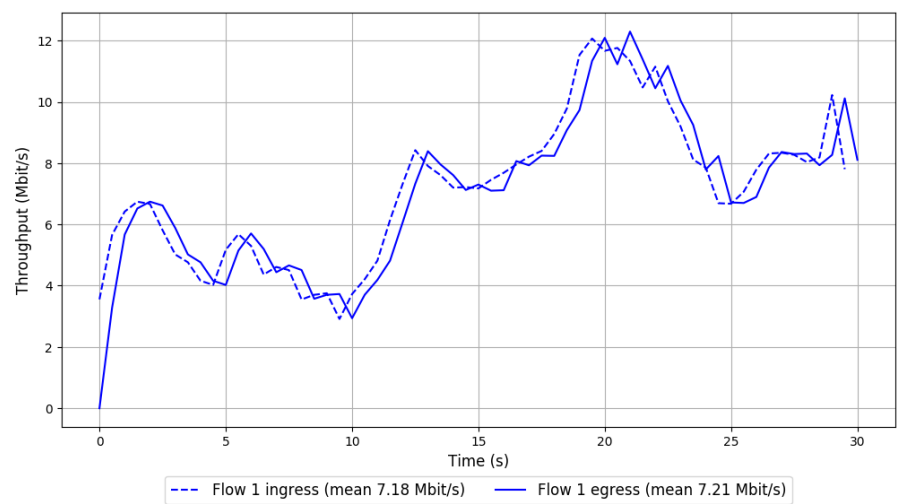


Run 1: Statistics of PCC-Expr

Start at: 2018-07-31 23:09:25  
End at: 2018-07-31 23:09:55  
Local clock offset: -0.242 ms  
Remote clock offset: -3.462 ms

# Below is generated by plot.py at 2018-08-01 00:00:41  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 7.21 Mbit/s  
95th percentile per-packet one-way delay: 22.706 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 7.21 Mbit/s  
95th percentile per-packet one-way delay: 22.706 ms  
Loss rate: 0.00%

Run 1: Report of PCC-Expr — Data Link



Run 2: Statistics of PCC-Expr

Start at: 2018-07-31 23:31:38

End at: 2018-07-31 23:32:08

Local clock offset: -2.707 ms

Remote clock offset: -4.47 ms

# Below is generated by plot.py at 2018-08-01 00:00:41

# Datalink statistics

-- Total of 1 flow:

Average throughput: 6.99 Mbit/s

95th percentile per-packet one-way delay: 343.500 ms

Loss rate: 0.00%

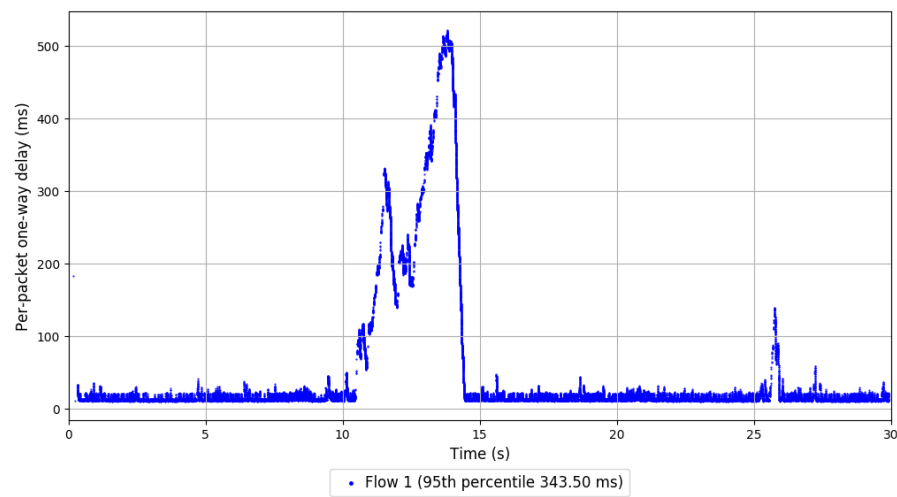
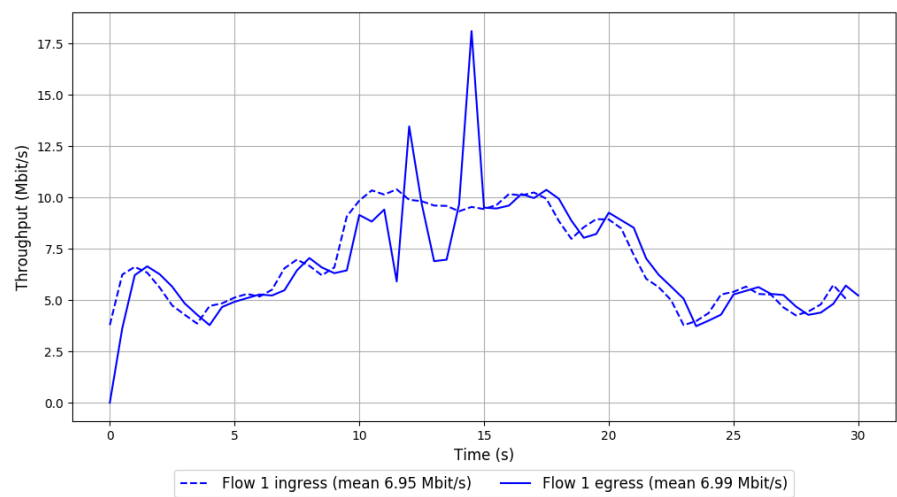
-- Flow 1:

Average throughput: 6.99 Mbit/s

95th percentile per-packet one-way delay: 343.500 ms

Loss rate: 0.00%

Run 2: Report of PCC-Expr — Data Link

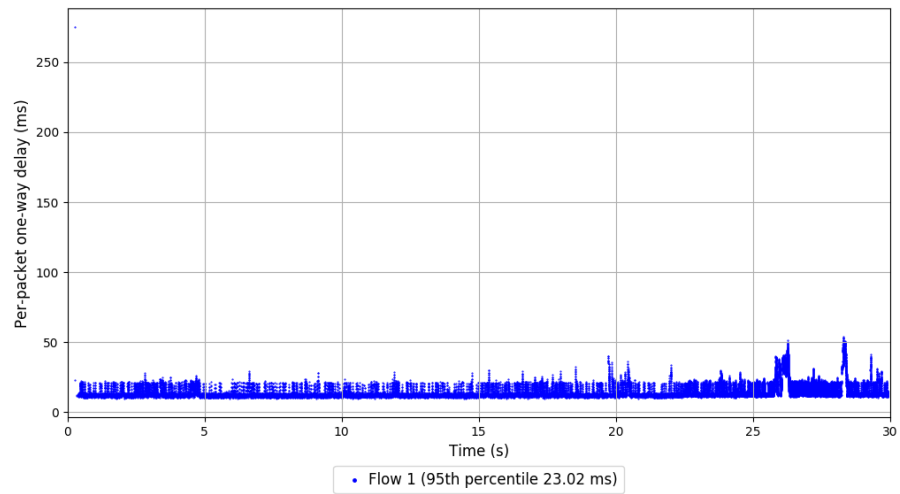
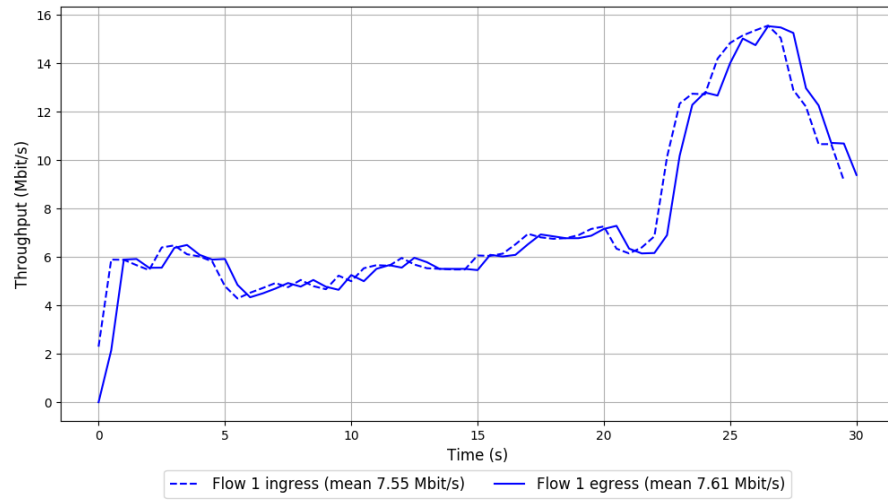


Run 3: Statistics of PCC-Expr

Start at: 2018-07-31 23:53:52  
End at: 2018-07-31 23:54:22  
Local clock offset: -5.358 ms  
Remote clock offset: -5.151 ms

# Below is generated by plot.py at 2018-08-01 00:00:41  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 7.61 Mbit/s  
95th percentile per-packet one-way delay: 23.021 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 7.61 Mbit/s  
95th percentile per-packet one-way delay: 23.021 ms  
Loss rate: 0.00%

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



Run 1: Statistics of QUIC Cubic

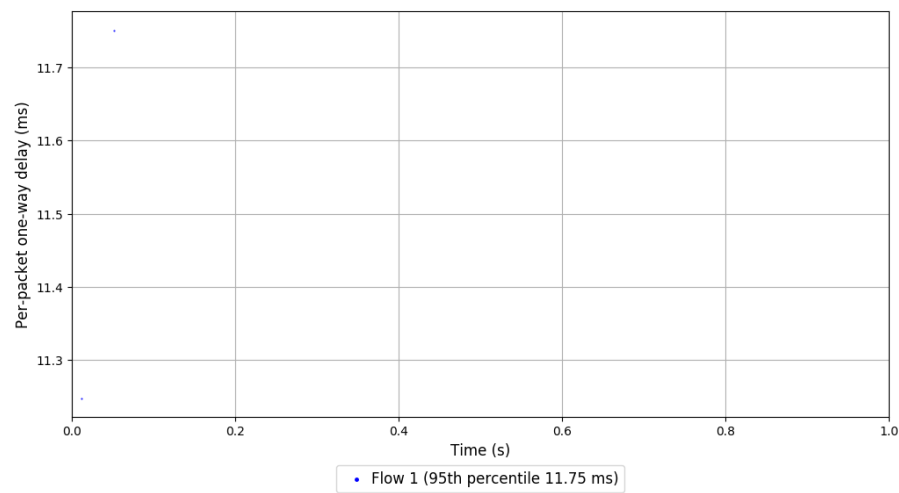
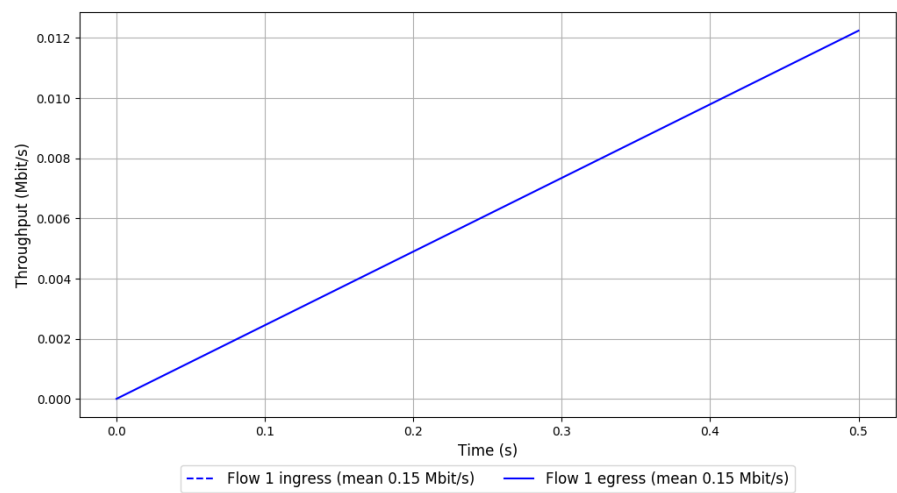
Start at: 2018-07-31 23:14:37

End at: 2018-07-31 23:15:07

Local clock offset: -0.288 ms

Remote clock offset: -3.726 ms

Run 1: Report of QUIC Cubic — Data Link

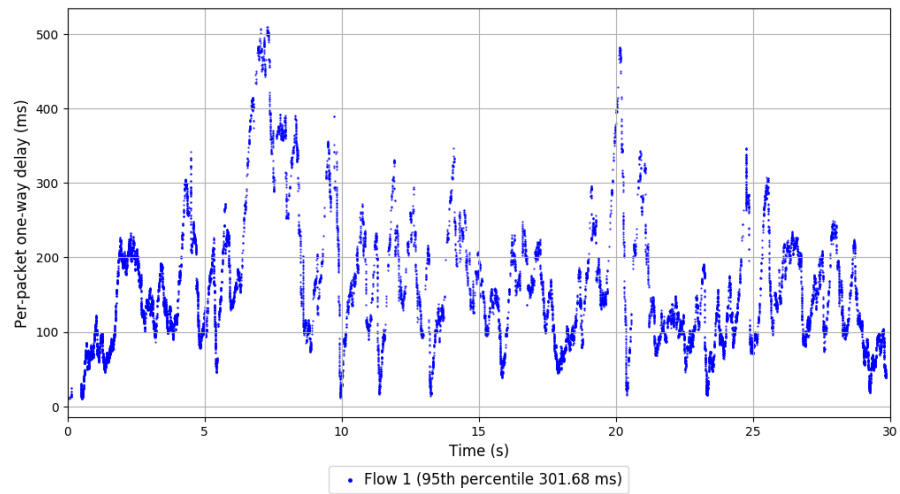
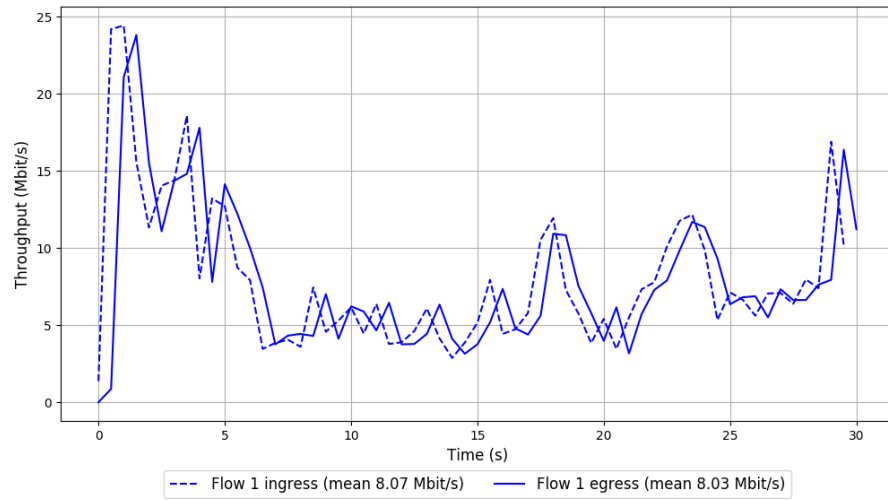


Run 2: Statistics of QUIC Cubic

Start at: 2018-07-31 23:36:51  
End at: 2018-07-31 23:37:21  
Local clock offset: -3.481 ms  
Remote clock offset: -4.648 ms

# Below is generated by plot.py at 2018-08-01 00:00:41  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 8.03 Mbit/s  
95th percentile per-packet one-way delay: 301.677 ms  
Loss rate: 0.41%  
-- Flow 1:  
Average throughput: 8.03 Mbit/s  
95th percentile per-packet one-way delay: 301.677 ms  
Loss rate: 0.41%

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



Run 3: Statistics of QUIC Cubic

Start at: 2018-07-31 23:59:06

End at: 2018-07-31 23:59:36

Local clock offset: -5.954 ms

Remote clock offset: -4.519 ms

# Below is generated by plot.py at 2018-08-01 00:00:44

# Datalink statistics

-- Total of 1 flow:

Average throughput: 17.87 Mbit/s

95th percentile per-packet one-way delay: 242.441 ms

Loss rate: 0.23%

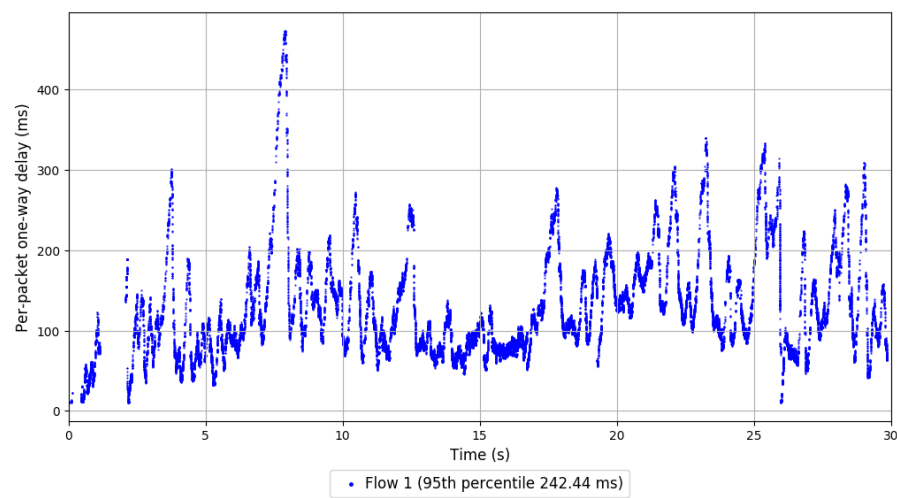
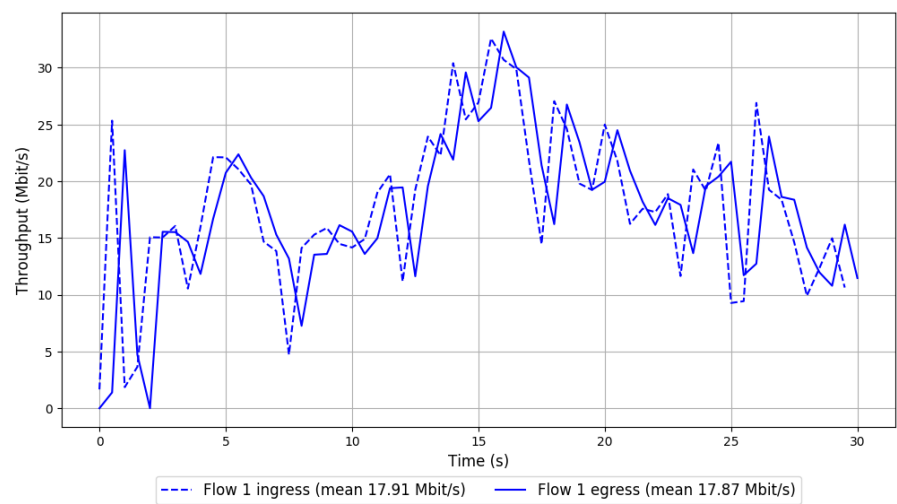
-- Flow 1:

Average throughput: 17.87 Mbit/s

95th percentile per-packet one-way delay: 242.441 ms

Loss rate: 0.23%

Run 3: Report of QUIC Cubic — Data Link

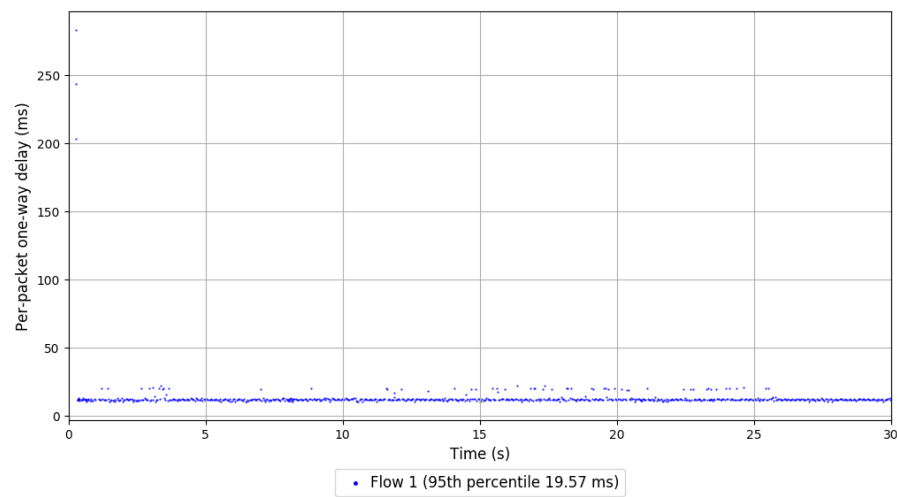
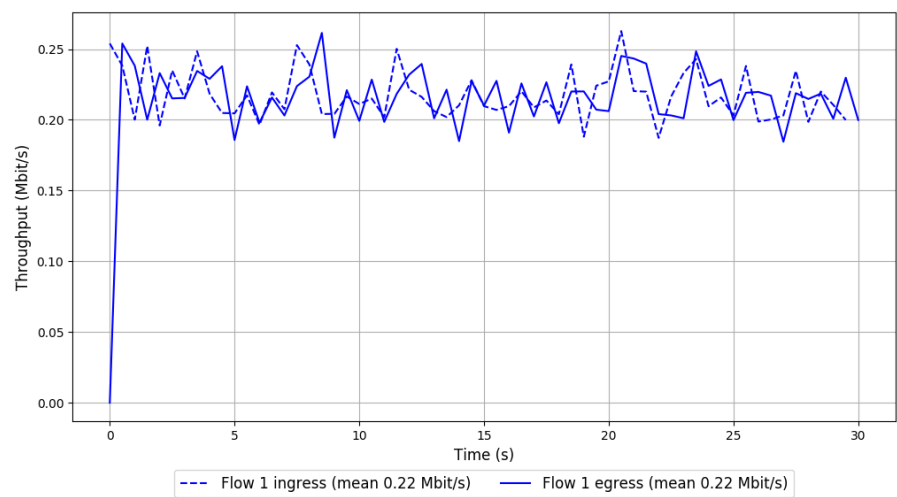


Run 1: Statistics of SCReAM

Start at: 2018-07-31 23:02:55  
End at: 2018-07-31 23:03:25  
Local clock offset: -0.101 ms  
Remote clock offset: -2.949 ms

# Below is generated by plot.py at 2018-08-01 00:00:44  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 19.570 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 19.570 ms  
Loss rate: 0.00%

Run 1: Report of SReAM — Data Link

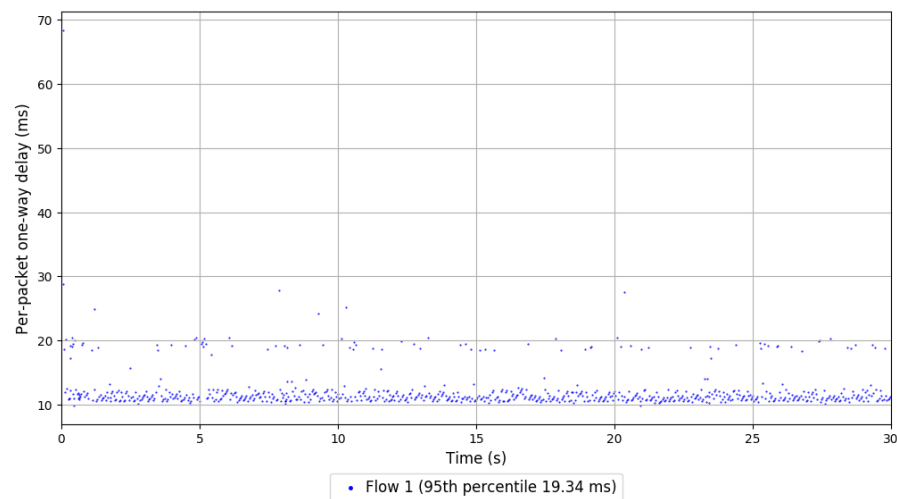
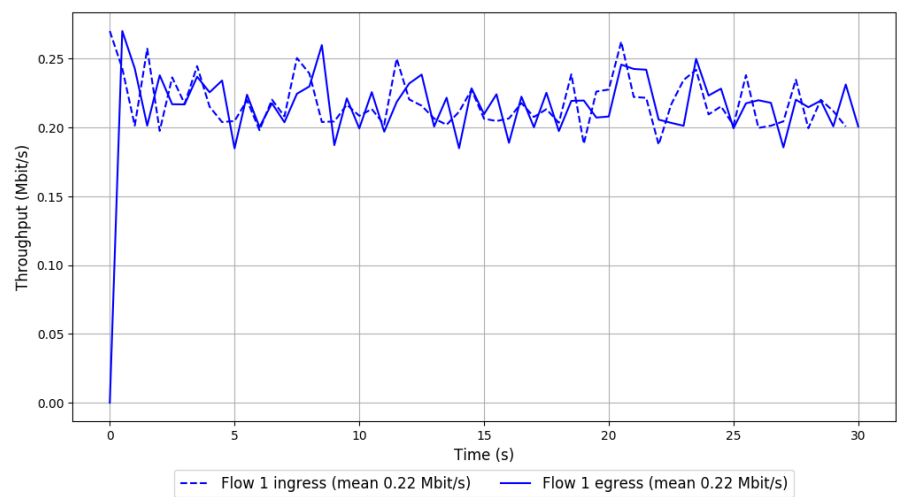


Run 2: Statistics of SCReAM

Start at: 2018-07-31 23:25:08  
End at: 2018-07-31 23:25:38  
Local clock offset: -1.412 ms  
Remote clock offset: -4.272 ms

# Below is generated by plot.py at 2018-08-01 00:00:44  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 19.339 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 19.339 ms  
Loss rate: 0.00%

Run 2: Report of SReAM — Data Link

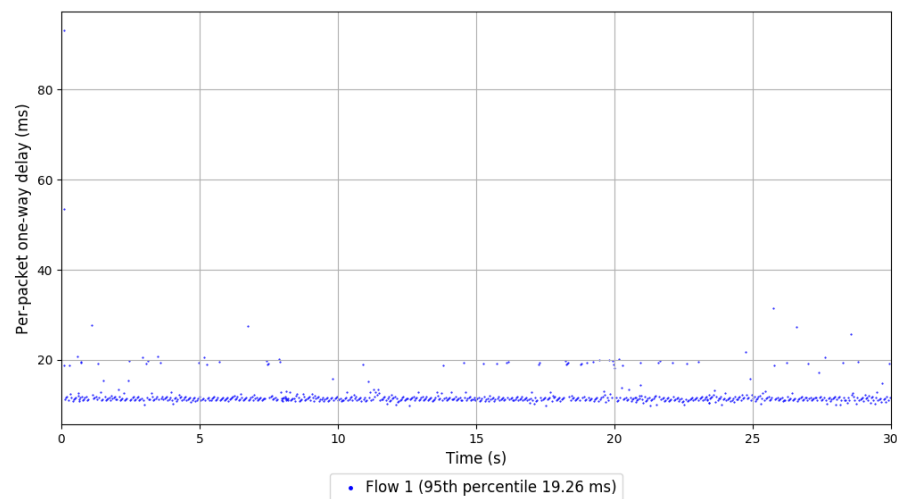
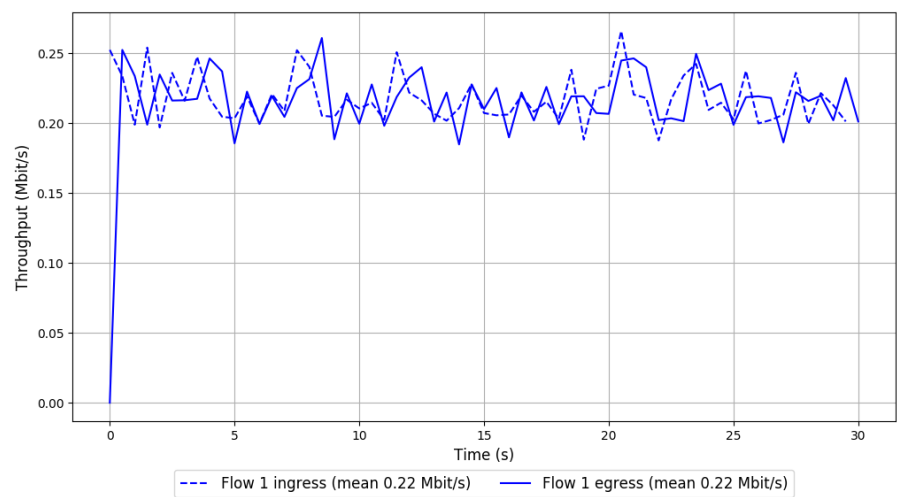


Run 3: Statistics of SCReAM

Start at: 2018-07-31 23:47:18  
End at: 2018-07-31 23:47:48  
Local clock offset: -4.696 ms  
Remote clock offset: -4.917 ms

# Below is generated by plot.py at 2018-08-01 00:00:44  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 19.261 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 19.261 ms  
Loss rate: 0.00%

Run 3: Report of SReAM — Data Link

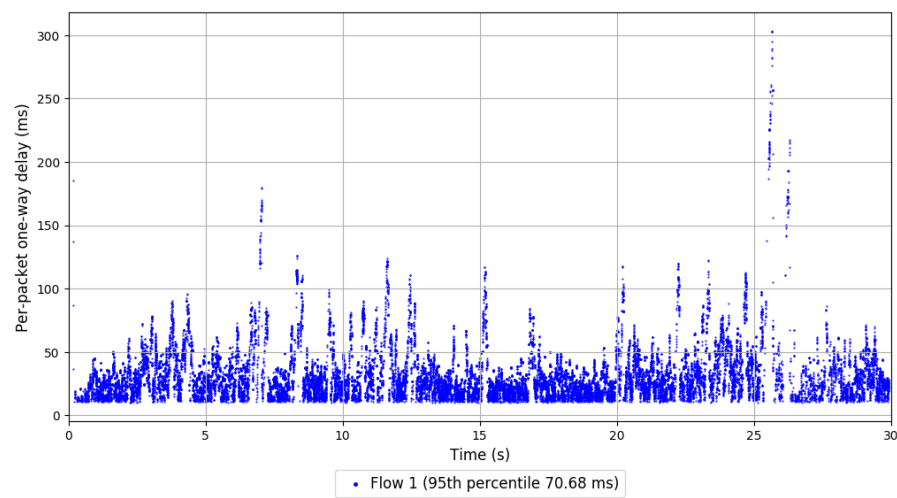
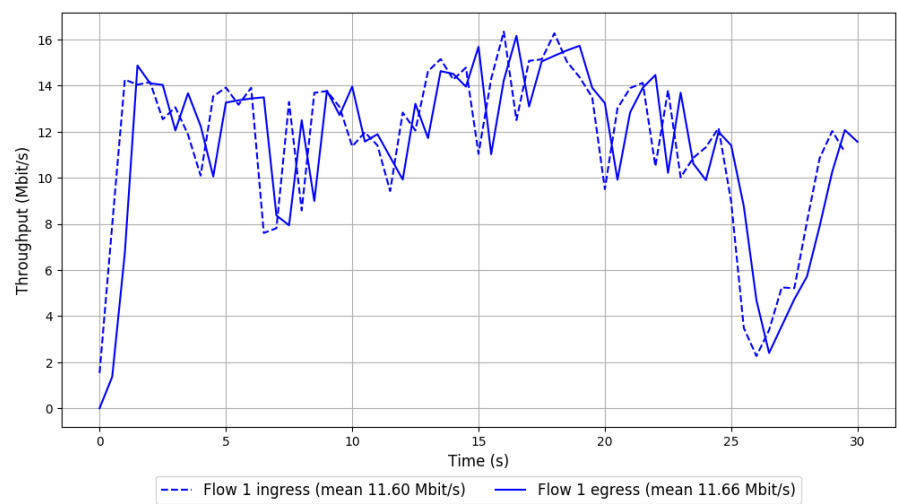


Run 1: Statistics of Sprout

Start at: 2018-07-31 22:57:42  
End at: 2018-07-31 22:58:12  
Local clock offset: -0.188 ms  
Remote clock offset: -2.407 ms

# Below is generated by plot.py at 2018-08-01 00:00:44  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 11.66 Mbit/s  
95th percentile per-packet one-way delay: 70.679 ms  
Loss rate: 0.05%  
-- Flow 1:  
Average throughput: 11.66 Mbit/s  
95th percentile per-packet one-way delay: 70.679 ms  
Loss rate: 0.05%

Run 1: Report of Sprout — Data Link

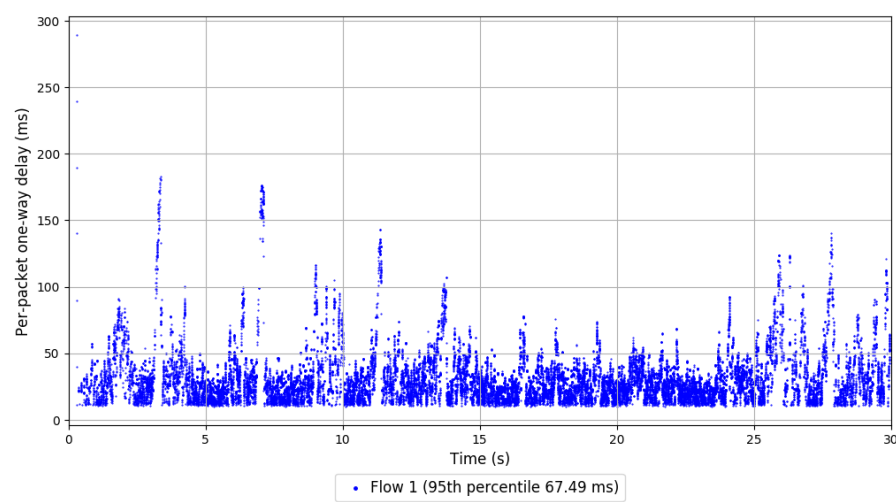
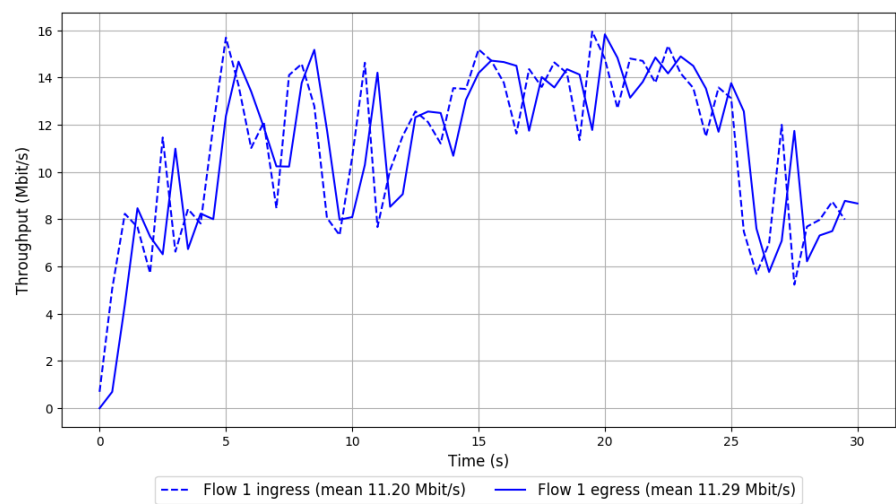


Run 2: Statistics of Sprout

Start at: 2018-07-31 23:19:54  
End at: 2018-07-31 23:20:24  
Local clock offset: -0.524 ms  
Remote clock offset: -3.95 ms

# Below is generated by plot.py at 2018-08-01 00:00:44  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 11.29 Mbit/s  
95th percentile per-packet one-way delay: 67.488 ms  
Loss rate: 0.02%  
-- Flow 1:  
Average throughput: 11.29 Mbit/s  
95th percentile per-packet one-way delay: 67.488 ms  
Loss rate: 0.02%

Run 2: Report of Sprout — Data Link

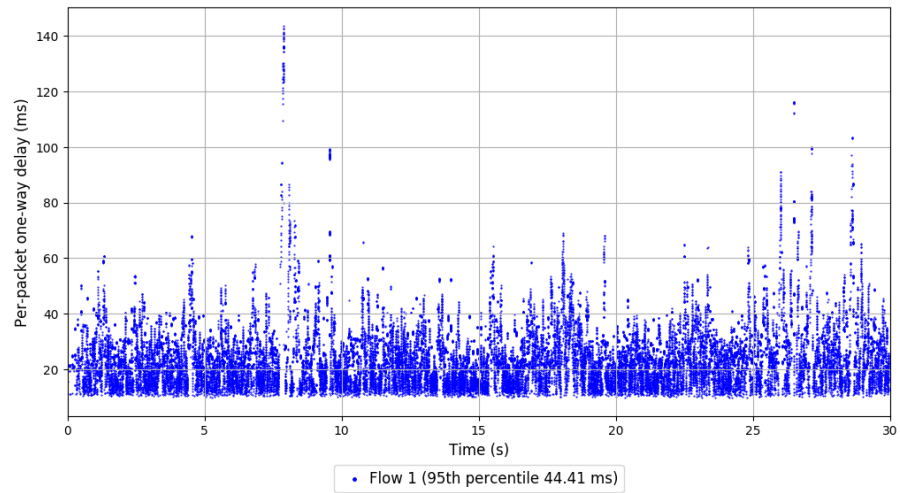
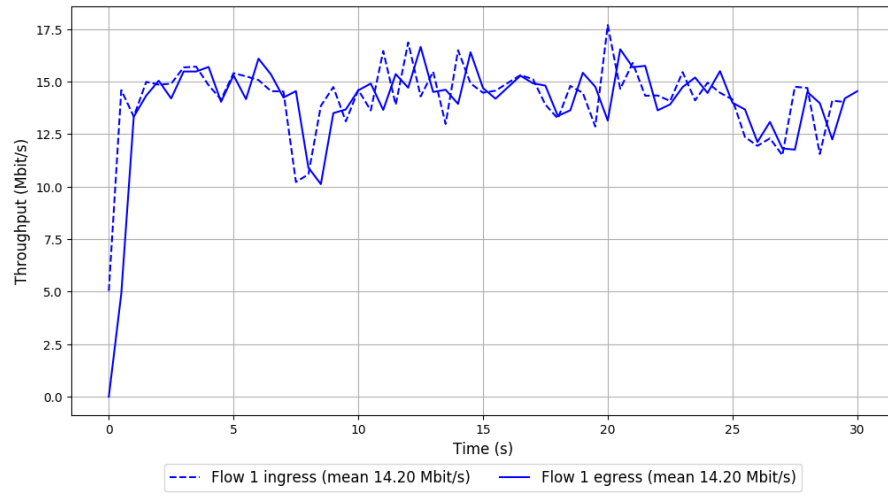


Run 3: Statistics of Sprout

Start at: 2018-07-31 23:42:04  
End at: 2018-07-31 23:42:34  
Local clock offset: -4.146 ms  
Remote clock offset: -4.734 ms

# Below is generated by plot.py at 2018-08-01 00:00:51  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 14.20 Mbit/s  
95th percentile per-packet one-way delay: 44.409 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 14.20 Mbit/s  
95th percentile per-packet one-way delay: 44.409 ms  
Loss rate: 0.00%

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



Run 1: Statistics of TaoVA-100x

Start at: 2018-07-31 23:01:37

End at: 2018-07-31 23:02:07

Local clock offset: -0.317 ms

Remote clock offset: -2.898 ms

# Below is generated by plot.py at 2018-08-01 00:00:51

# Datalink statistics

-- Total of 1 flow:

Average throughput: 4.91 Mbit/s

95th percentile per-packet one-way delay: 32.921 ms

Loss rate: 0.00%

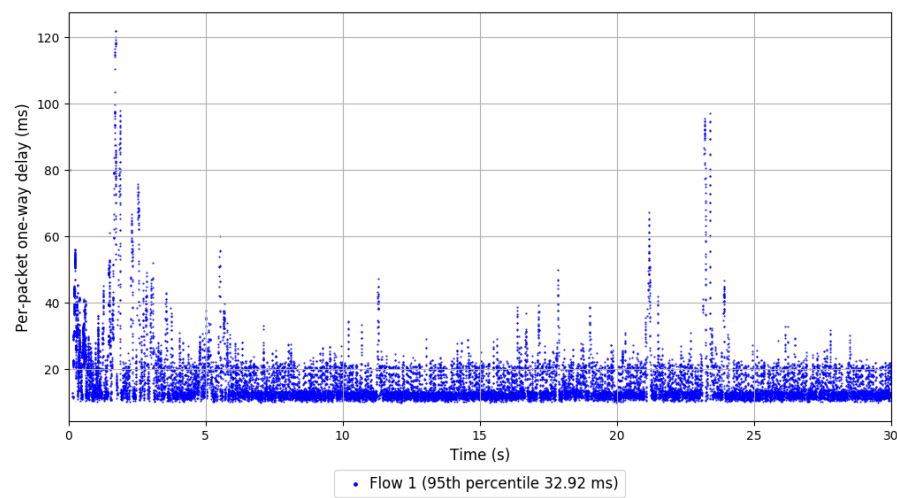
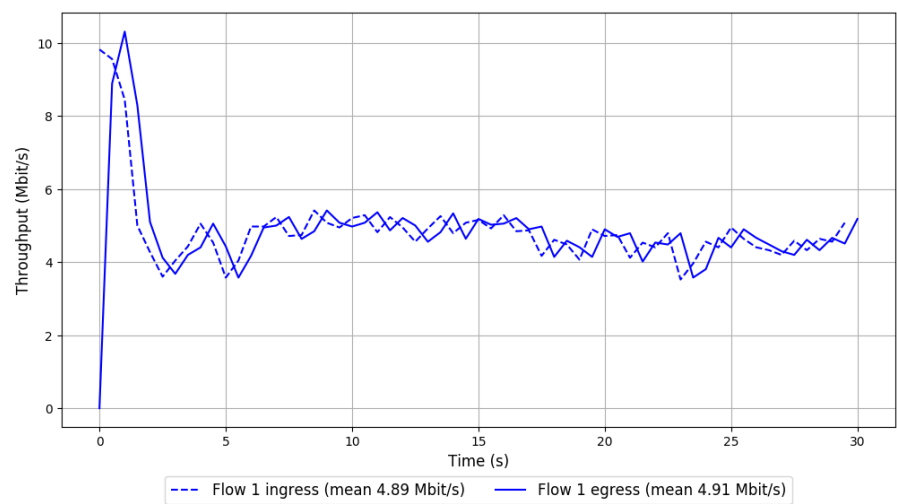
-- Flow 1:

Average throughput: 4.91 Mbit/s

95th percentile per-packet one-way delay: 32.921 ms

Loss rate: 0.00%

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

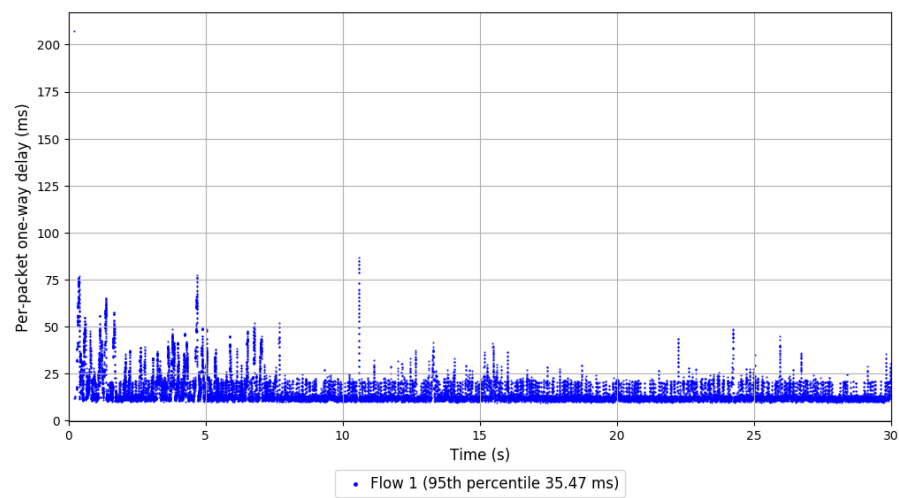
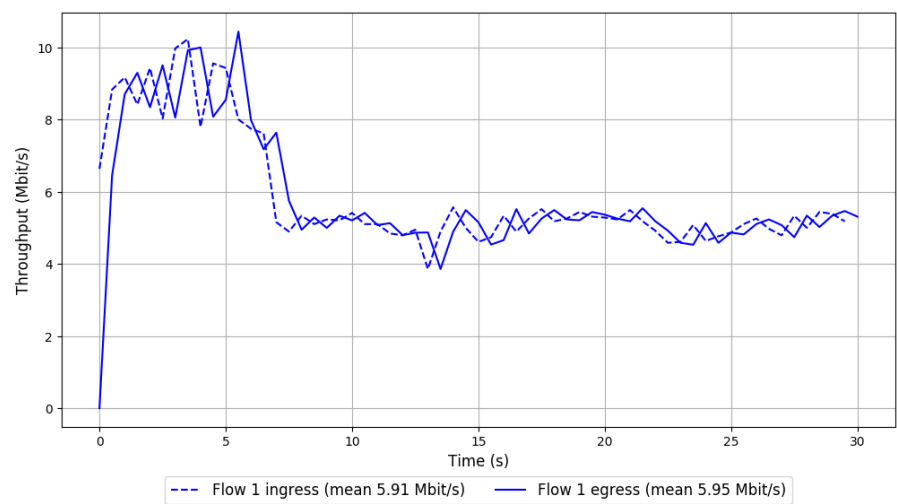


Run 2: Statistics of TaoVA-100x

Start at: 2018-07-31 23:23:49  
End at: 2018-07-31 23:24:19  
Local clock offset: -0.988 ms  
Remote clock offset: -4.147 ms

# Below is generated by plot.py at 2018-08-01 00:00:51  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 5.95 Mbit/s  
95th percentile per-packet one-way delay: 35.467 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 5.95 Mbit/s  
95th percentile per-packet one-way delay: 35.467 ms  
Loss rate: 0.00%

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

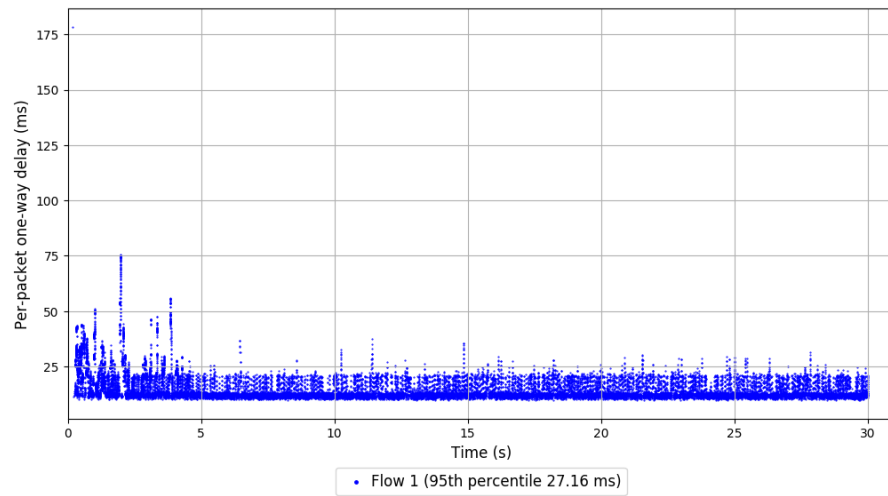
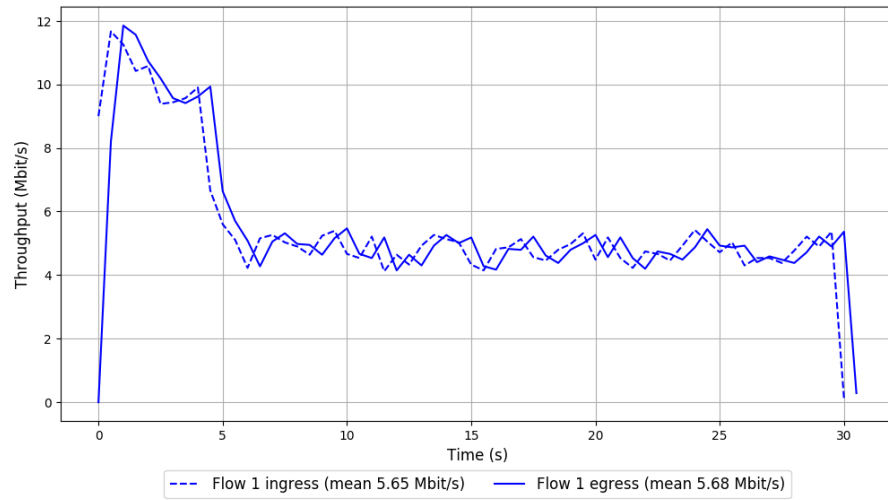


Run 3: Statistics of TaoVA-100x

Start at: 2018-07-31 23:45:59  
End at: 2018-07-31 23:46:29  
Local clock offset: -4.658 ms  
Remote clock offset: -4.904 ms

# Below is generated by plot.py at 2018-08-01 00:00:53  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 5.68 Mbit/s  
95th percentile per-packet one-way delay: 27.162 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 5.68 Mbit/s  
95th percentile per-packet one-way delay: 27.162 ms  
Loss rate: 0.00%

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



Run 1: Statistics of TCP Vegas

Start at: 2018-07-31 23:04:13

End at: 2018-07-31 23:04:43

Local clock offset: 0.036 ms

Remote clock offset: -3.15 ms

# Below is generated by plot.py at 2018-08-01 00:00:53

# Datalink statistics

-- Total of 1 flow:

Average throughput: 2.53 Mbit/s

95th percentile per-packet one-way delay: 271.011 ms

Loss rate: 0.03%

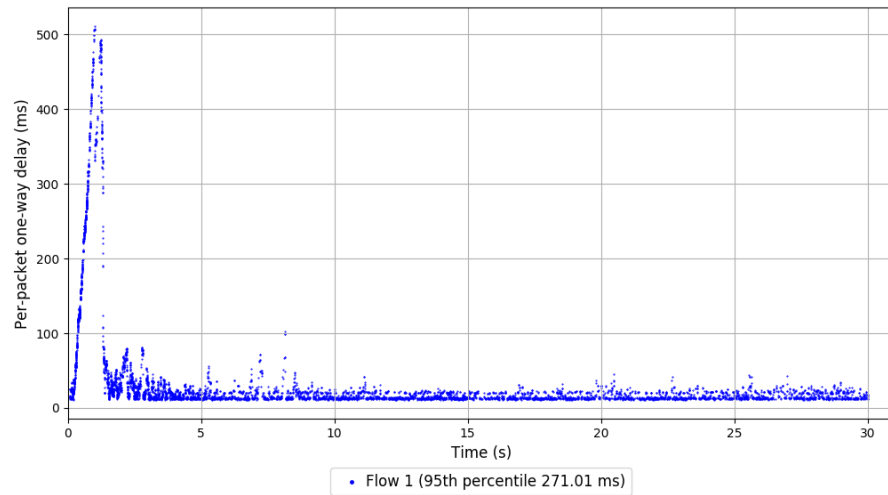
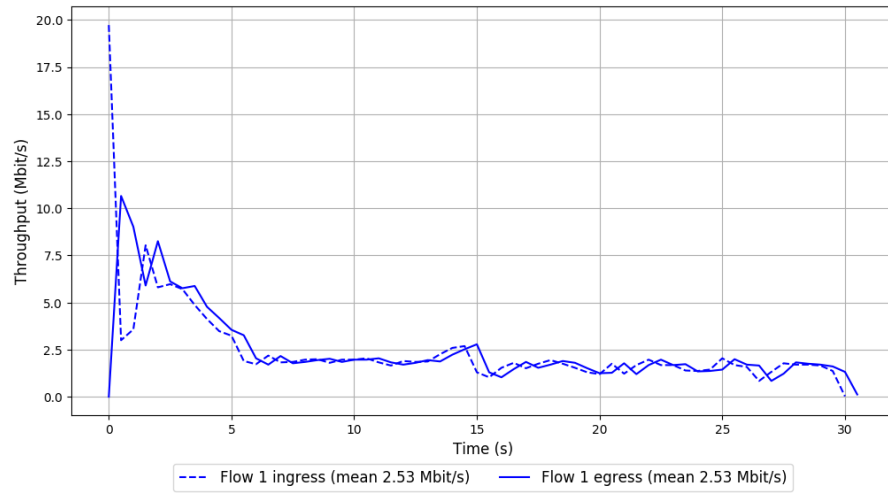
-- Flow 1:

Average throughput: 2.53 Mbit/s

95th percentile per-packet one-way delay: 271.011 ms

Loss rate: 0.03%

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

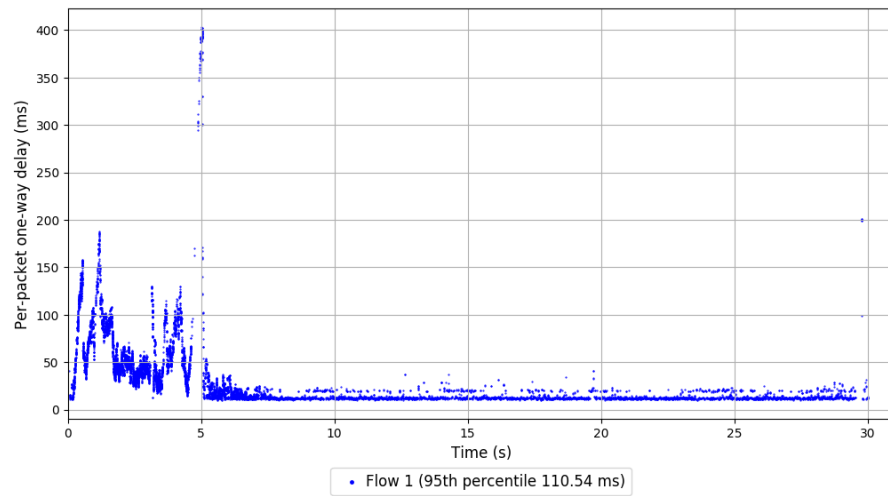
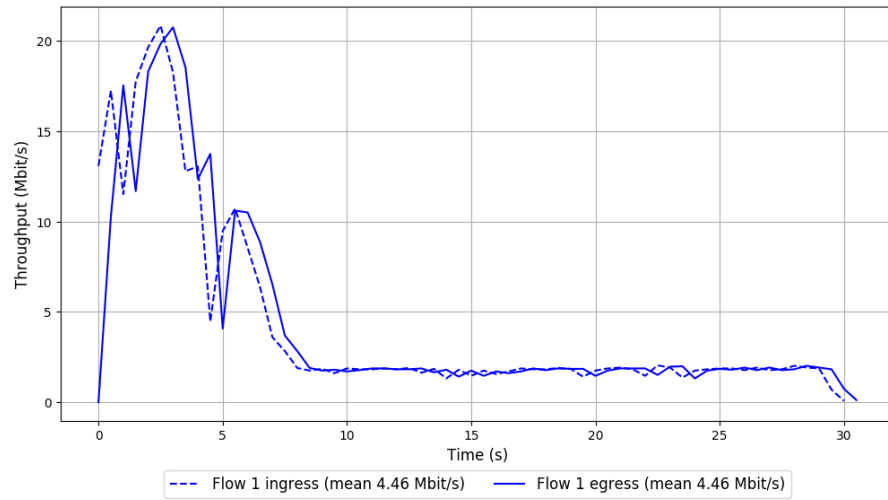


Run 2: Statistics of TCP Vegas

Start at: 2018-07-31 23:26:25  
End at: 2018-07-31 23:26:55  
Local clock offset: -1.672 ms  
Remote clock offset: -4.249 ms

# Below is generated by plot.py at 2018-08-01 00:00:53  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 4.46 Mbit/s  
95th percentile per-packet one-way delay: 110.540 ms  
Loss rate: 0.01%  
-- Flow 1:  
Average throughput: 4.46 Mbit/s  
95th percentile per-packet one-way delay: 110.540 ms  
Loss rate: 0.01%

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

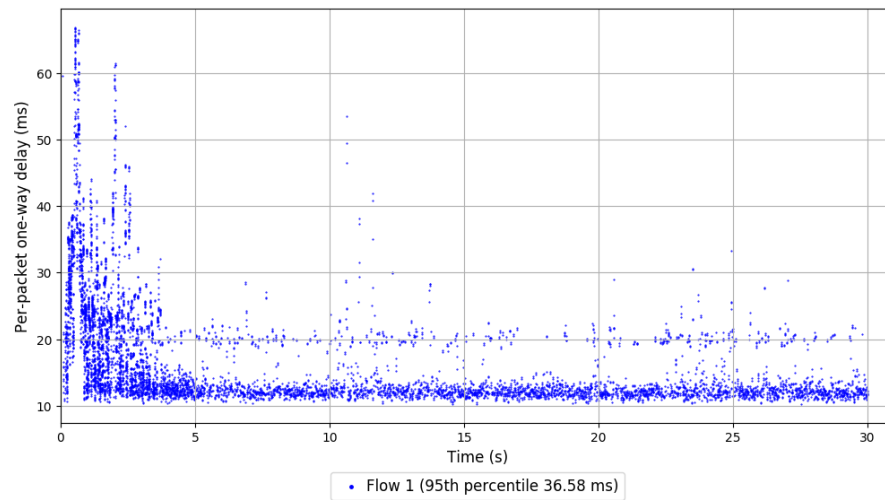
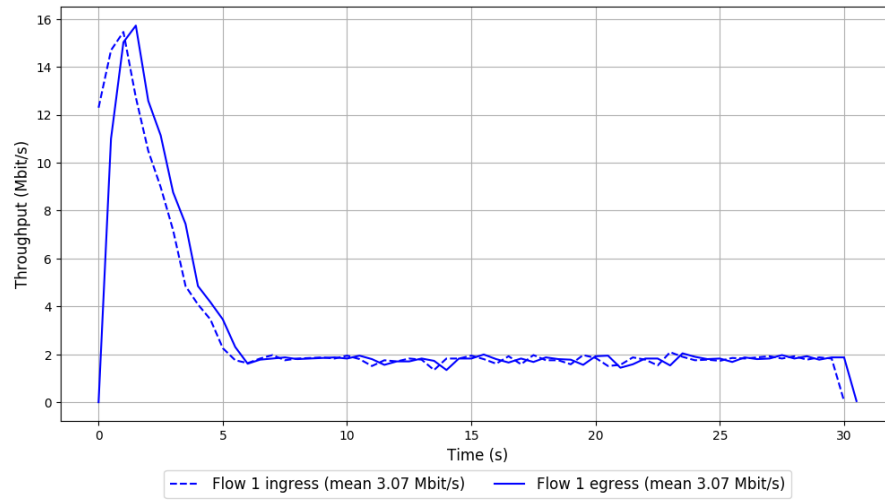


Run 3: Statistics of TCP Vegas

Start at: 2018-07-31 23:48:35  
End at: 2018-07-31 23:49:05  
Local clock offset: -4.923 ms  
Remote clock offset: -4.918 ms

# Below is generated by plot.py at 2018-08-01 00:00:53  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 3.07 Mbit/s  
95th percentile per-packet one-way delay: 36.576 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 3.07 Mbit/s  
95th percentile per-packet one-way delay: 36.576 ms  
Loss rate: 0.00%

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

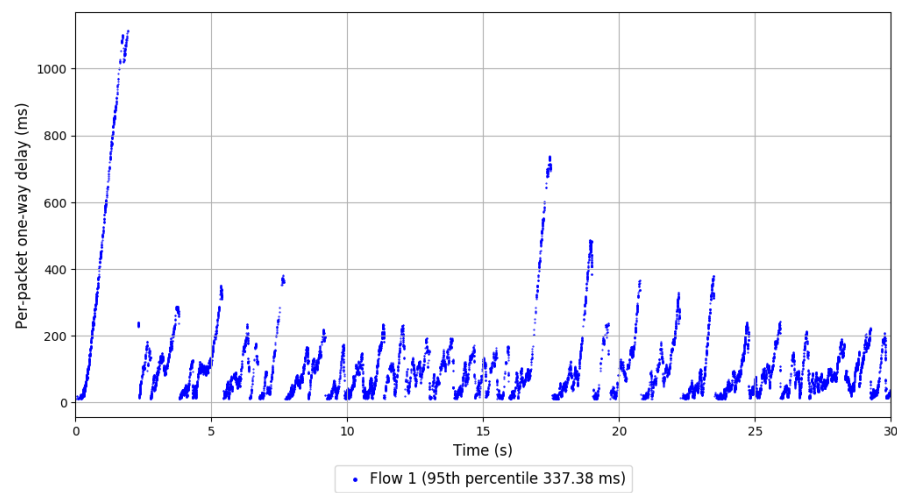
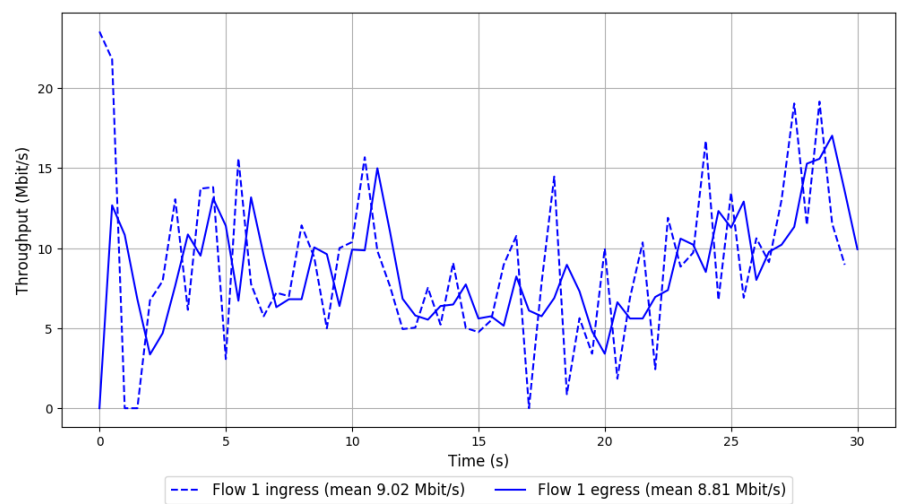


Run 1: Statistics of Verus

Start at: 2018-07-31 23:10:43  
End at: 2018-07-31 23:11:13  
Local clock offset: -0.287 ms  
Remote clock offset: -3.569 ms

# Below is generated by plot.py at 2018-08-01 00:00:56  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 8.81 Mbit/s  
95th percentile per-packet one-way delay: 337.385 ms  
Loss rate: 2.35%  
-- Flow 1:  
Average throughput: 8.81 Mbit/s  
95th percentile per-packet one-way delay: 337.385 ms  
Loss rate: 2.35%

Run 1: Report of Verus — Data Link

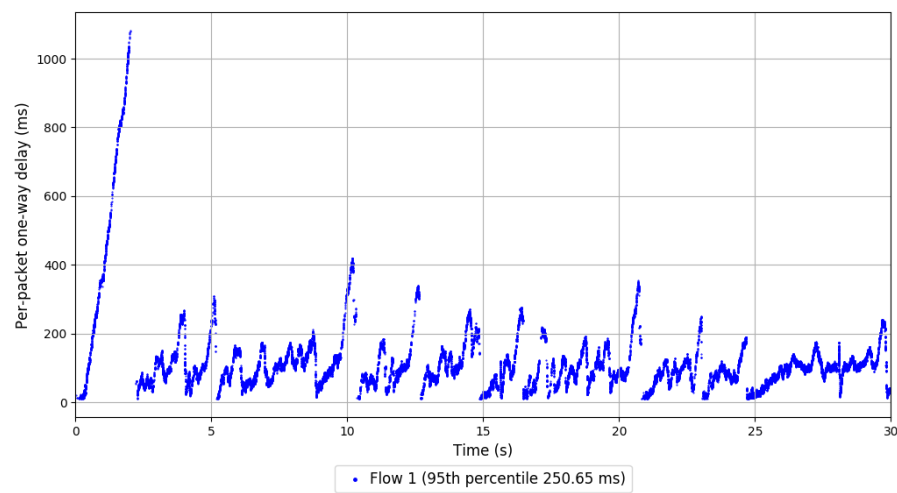
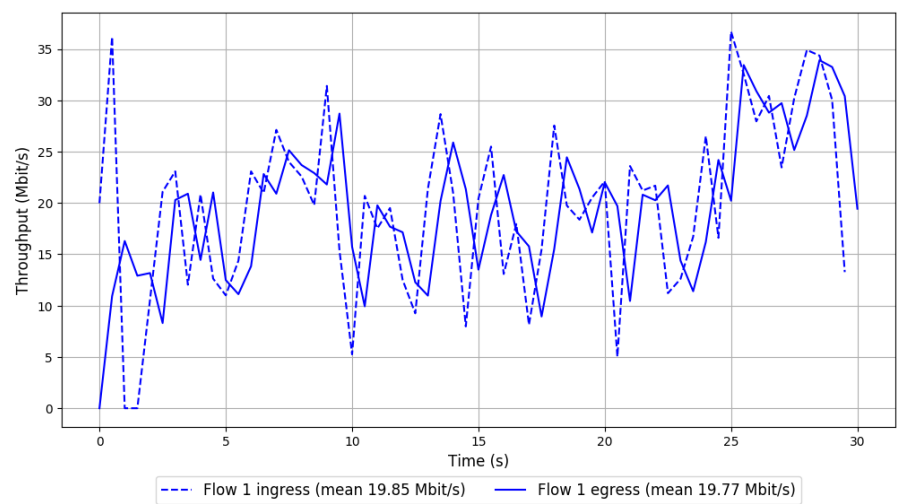


Run 2: Statistics of Verus

Start at: 2018-07-31 23:32:56  
End at: 2018-07-31 23:33:26  
Local clock offset: -2.94 ms  
Remote clock offset: -4.415 ms

# Below is generated by plot.py at 2018-08-01 00:00:59  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 19.77 Mbit/s  
95th percentile per-packet one-way delay: 250.648 ms  
Loss rate: 0.40%  
-- Flow 1:  
Average throughput: 19.77 Mbit/s  
95th percentile per-packet one-way delay: 250.648 ms  
Loss rate: 0.40%

Run 2: Report of Verus — Data Link

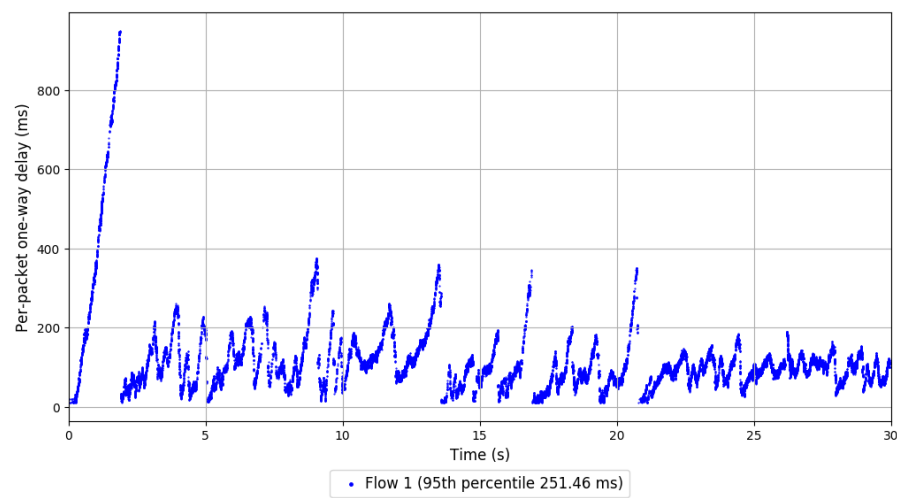
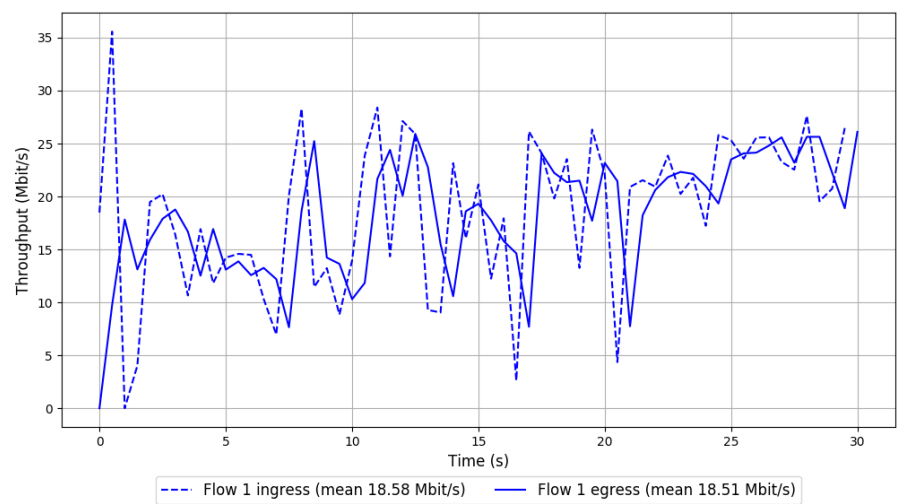


Run 3: Statistics of Verus

Start at: 2018-07-31 23:55:11  
End at: 2018-07-31 23:55:41  
Local clock offset: -5.586 ms  
Remote clock offset: -5.184 ms

# Below is generated by plot.py at 2018-08-01 00:00:59  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 18.51 Mbit/s  
95th percentile per-packet one-way delay: 251.464 ms  
Loss rate: 0.37%  
-- Flow 1:  
Average throughput: 18.51 Mbit/s  
95th percentile per-packet one-way delay: 251.464 ms  
Loss rate: 0.37%

Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

Start at: 2018-07-31 22:55:06

End at: 2018-07-31 22:55:36

Local clock offset: 0.375 ms

Remote clock offset: -1.959 ms

# Below is generated by plot.py at 2018-08-01 00:00:59

# Datalink statistics

-- Total of 1 flow:

Average throughput: 2.68 Mbit/s

95th percentile per-packet one-way delay: 29.510 ms

Loss rate: 0.00%

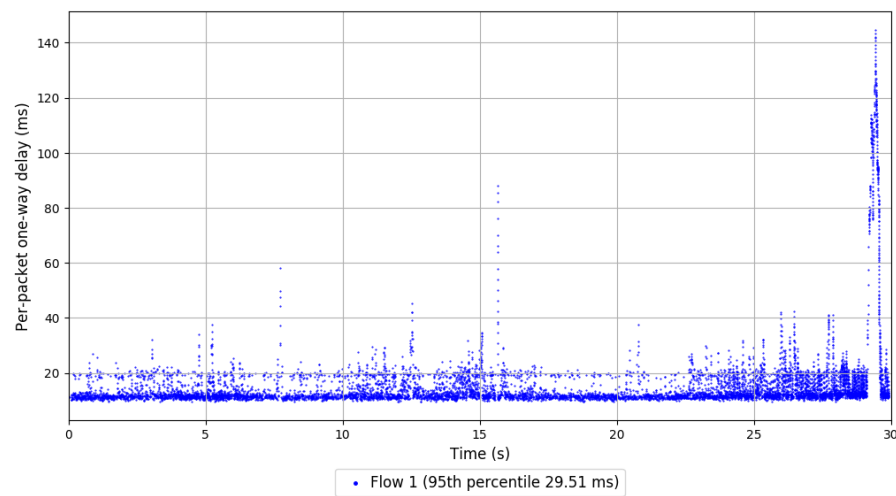
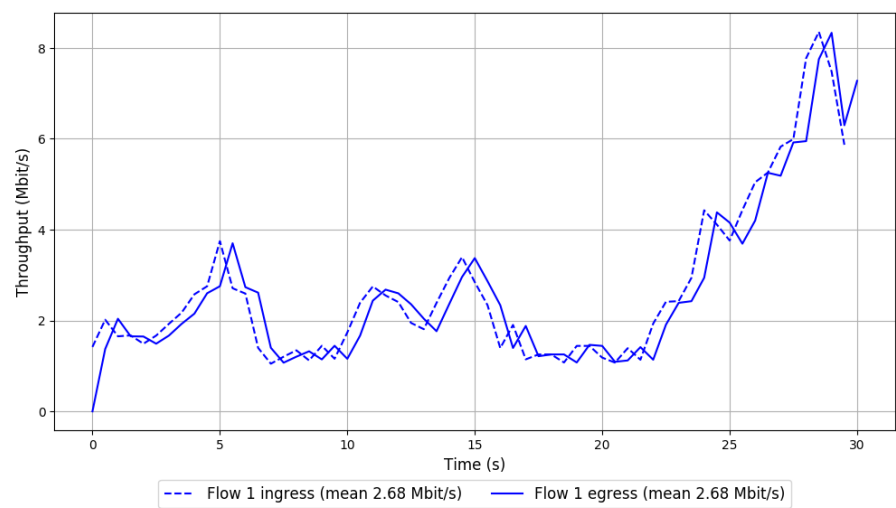
-- Flow 1:

Average throughput: 2.68 Mbit/s

95th percentile per-packet one-way delay: 29.510 ms

Loss rate: 0.00%

Run 1: Report of PCC-Vivace — Data Link

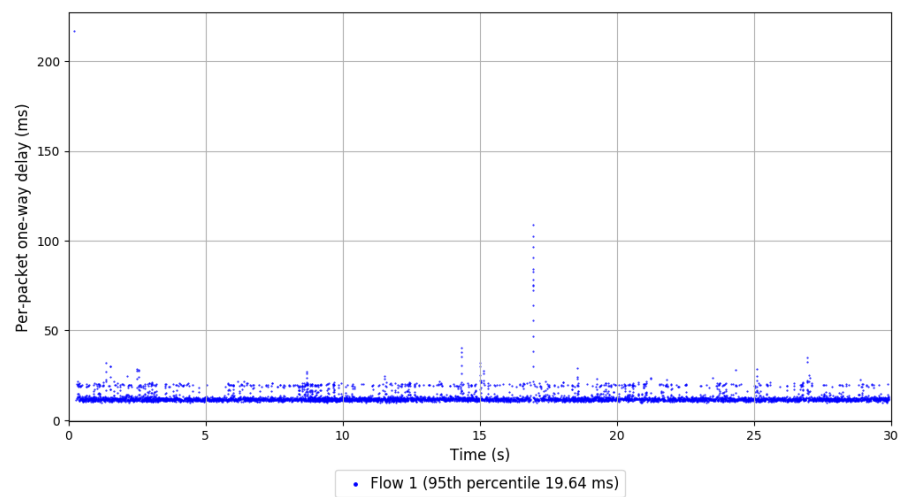
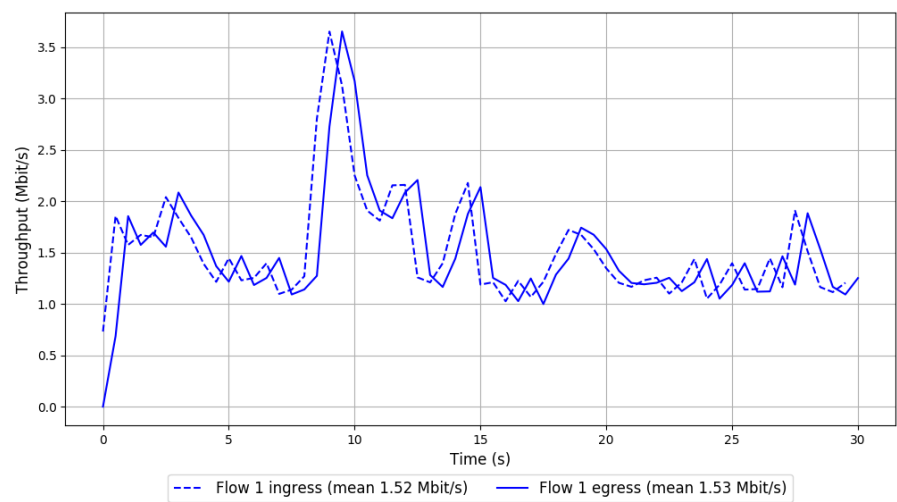


Run 2: Statistics of PCC-Vivace

Start at: 2018-07-31 23:17:14  
End at: 2018-07-31 23:17:44  
Local clock offset: -0.465 ms  
Remote clock offset: -3.858 ms

# Below is generated by plot.py at 2018-08-01 00:00:59  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 1.53 Mbit/s  
95th percentile per-packet one-way delay: 19.636 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 1.53 Mbit/s  
95th percentile per-packet one-way delay: 19.636 ms  
Loss rate: 0.00%

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

Start at: 2018-07-31 23:39:28

End at: 2018-07-31 23:39:58

Local clock offset: -3.905 ms

Remote clock offset: -4.75 ms

# Below is generated by plot.py at 2018-08-01 00:00:59

# Datalink statistics

-- Total of 1 flow:

Average throughput: 3.05 Mbit/s

95th percentile per-packet one-way delay: 20.808 ms

Loss rate: 0.00%

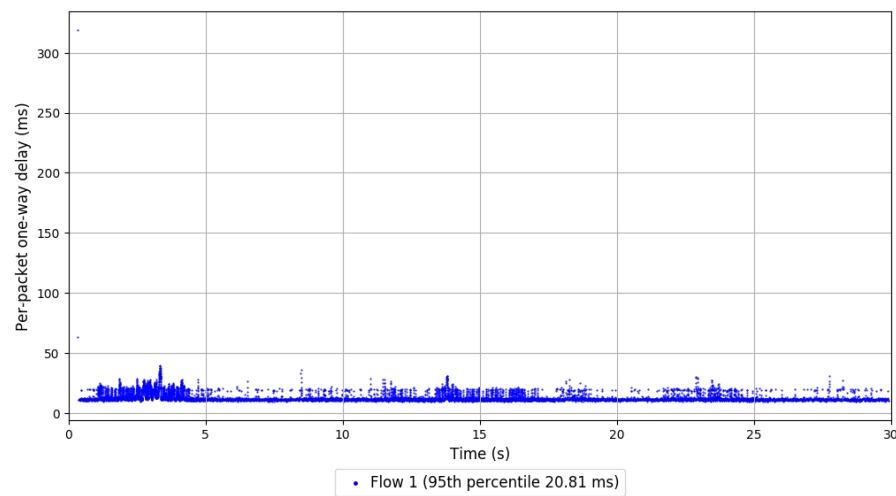
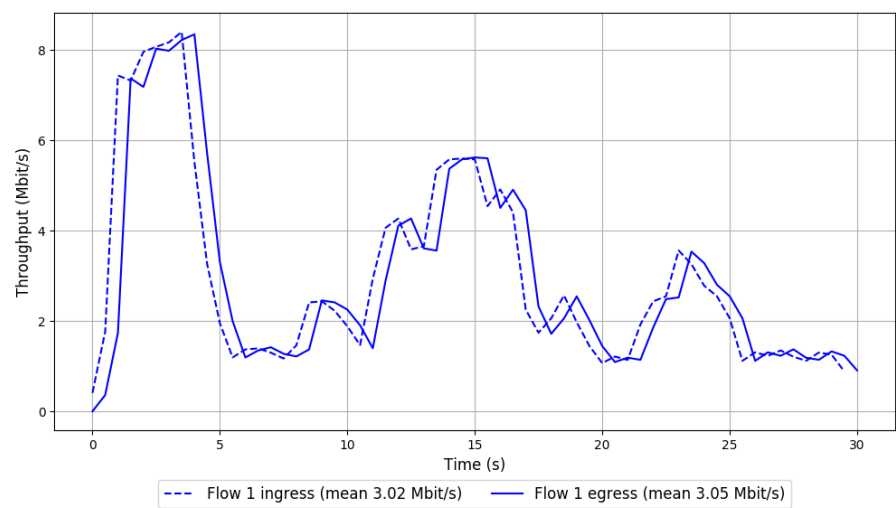
-- Flow 1:

Average throughput: 3.05 Mbit/s

95th percentile per-packet one-way delay: 20.808 ms

Loss rate: 0.00%

Run 3: Report of PCC-Vivace — Data Link

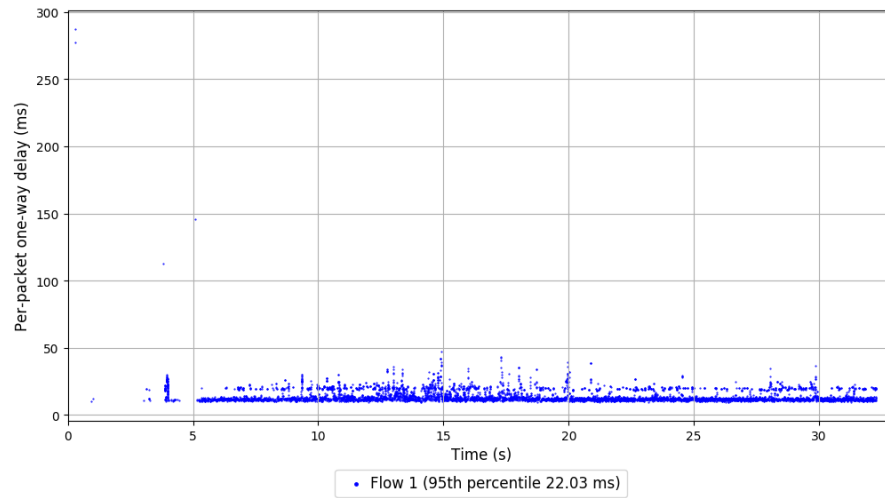
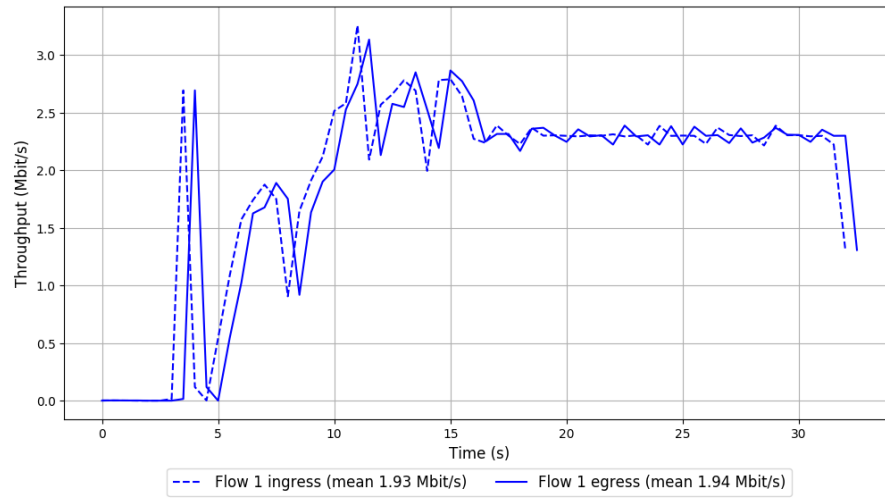


Run 1: Statistics of WebRTC media

Start at: 2018-07-31 23:13:19  
End at: 2018-07-31 23:13:49  
Local clock offset: -0.227 ms  
Remote clock offset: -3.687 ms

# Below is generated by plot.py at 2018-08-01 00:00:59  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 1.94 Mbit/s  
95th percentile per-packet one-way delay: 22.032 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 1.94 Mbit/s  
95th percentile per-packet one-way delay: 22.032 ms  
Loss rate: 0.00%

# Run 1: Report of WebRTC media — Data Link

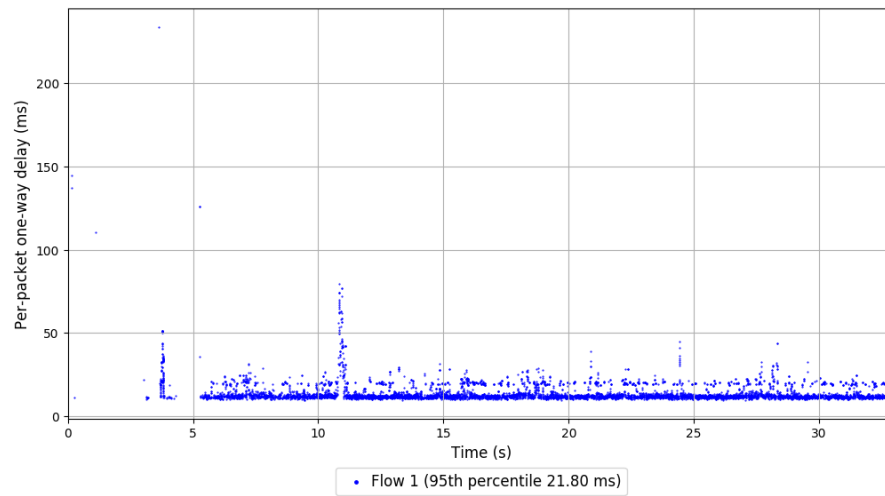
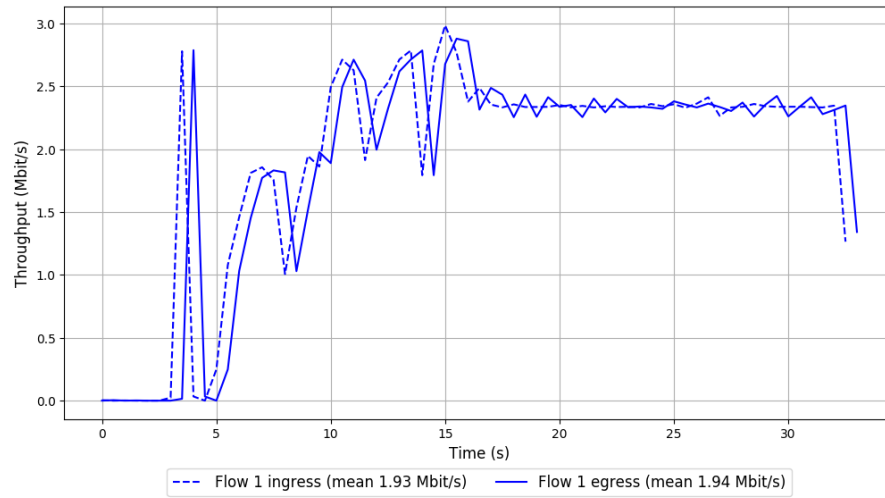


Run 2: Statistics of WebRTC media

Start at: 2018-07-31 23:35:33  
End at: 2018-07-31 23:36:03  
Local clock offset: -3.326 ms  
Remote clock offset: -4.535 ms

# Below is generated by plot.py at 2018-08-01 00:00:59  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 1.94 Mbit/s  
95th percentile per-packet one-way delay: 21.800 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 1.94 Mbit/s  
95th percentile per-packet one-way delay: 21.800 ms  
Loss rate: 0.00%

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



Run 3: Statistics of WebRTC media

Start at: 2018-07-31 23:57:48  
End at: 2018-07-31 23:58:18  
Local clock offset: -5.834 ms  
Remote clock offset: -4.759 ms

# Below is generated by plot.py at 2018-08-01 00:00:59  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 1.90 Mbit/s  
95th percentile per-packet one-way delay: 20.423 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 1.90 Mbit/s  
95th percentile per-packet one-way delay: 20.423 ms  
Loss rate: 0.00%

Run 3: Report of WebRTC media — Data Link

