

## Pantheon Report

Generated at 2017-12-20 19:34:46 (UTC).

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

Repeated the test of 14 congestion control schemes 3 times.

Each test lasted for 30 seconds running 3 flows with 10-second interval between two flows.

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

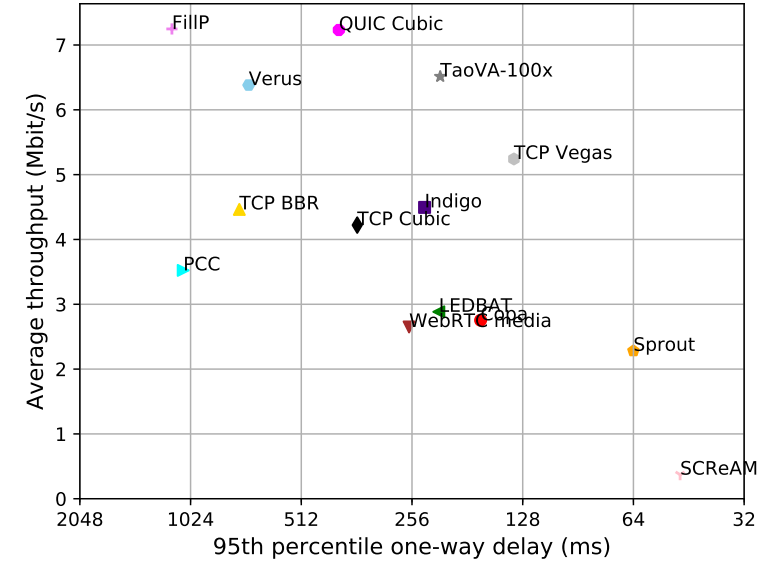
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo\_fast**).

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

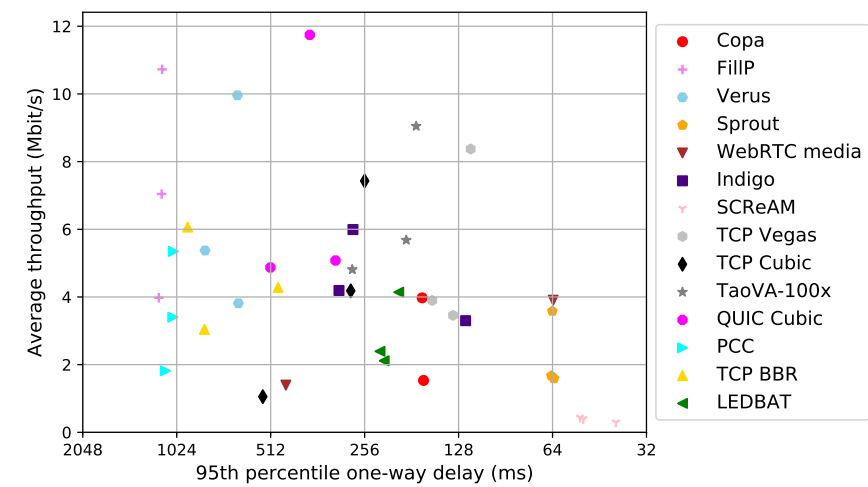
Git summary:

```
branch: master @ 904a5750834816b1e46a2c86405d707788d27c16
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/fillp @ dcaef6b00654e660f73f7ed679d2eab61ce08639
third_party/genericCC @ 80b516c448f795fd6e9675f7177b69c622f07da8
third_party/indigo @ b19f3730105f9aa95452552af924e3719b03cc55
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
  M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ fb1053193c2861da659ba9013db26744ccfcf993
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/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ f1a14bffe749737437f61b1eaaeb30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
  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/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

test from AWS India 1 Ethernet to India ppp0, 3 runs of 30s each per scheme  
 3 flows with 10s interval between flows (mean of all runs by scheme)



test from AWS India 1 Ethernet to India ppp0, 3 runs of 30s each per scheme  
 3 flows with 10s interval between flows



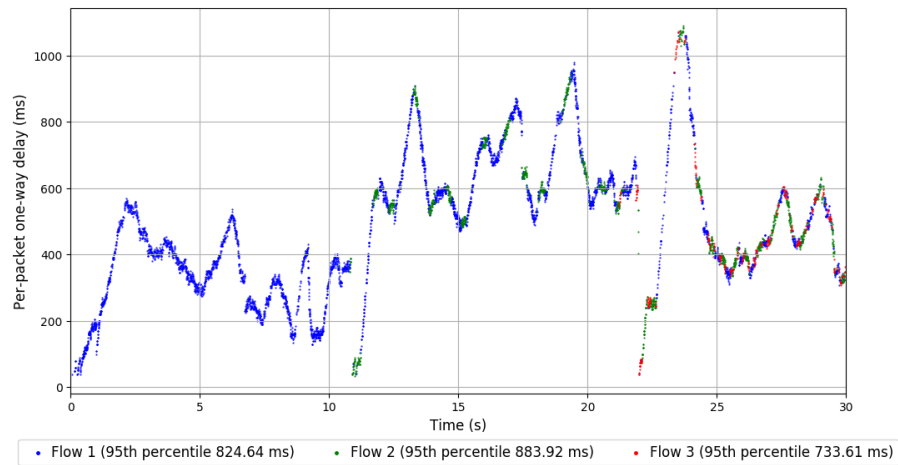
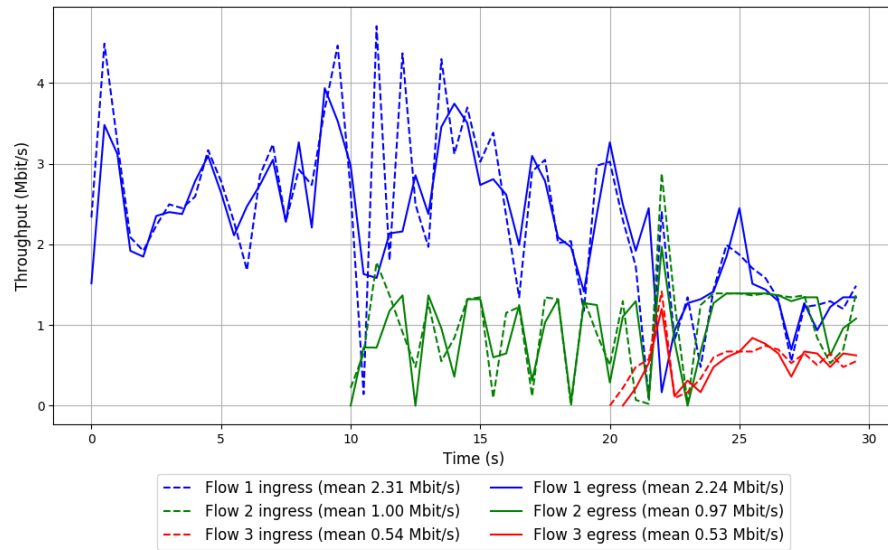
| scheme       | # runs | mean avg tput (Mbit/s) |        |        | mean 95th-%ile delay (ms) |         |         | mean loss rate (%) |        |        |
|--------------|--------|------------------------|--------|--------|---------------------------|---------|---------|--------------------|--------|--------|
|              |        | flow 1                 | flow 2 | flow 3 | flow 1                    | flow 2  | flow 3  | flow 1             | flow 2 | flow 3 |
| TCP BBR      | 3      | 2.87                   | 1.52   | 2.22   | 749.99                    | 791.25  | 530.03  | 2.66               | 4.91   | 6.07   |
| TCP Cubic    | 3      | 2.89                   | 1.64   | 0.78   | 286.14                    | 385.36  | 469.52  | 0.88               | 1.61   | 3.83   |
| LEDBAT       | 3      | 1.99                   | 0.93   | 0.89   | 212.93                    | 219.21  | 229.62  | 0.26               | 0.53   | 1.92   |
| PCC          | 3      | 2.13                   | 1.46   | 1.32   | 1063.42                   | 1073.54 | 1101.62 | 48.83              | 39.77  | 50.50  |
| QUIC Cubic   | 3      | 4.82                   | 2.57   | 2.19   | 377.30                    | 407.43  | 455.03  | 0.71               | 1.58   | 3.54   |
| SCReAM       | 3      | 0.15                   | 0.22   | 0.22   | 51.03                     | 49.46   | 46.47   | 0.16               | 0.14   | 0.35   |
| WebRTC media | 2      | 1.40                   | 0.95   | 0.32   | 264.55                    | 289.40  | 179.69  | 0.22               | 0.34   | 0.73   |
| Sprout       | 3      | 1.13                   | 1.05   | 1.40   | 65.29                     | 61.21   | 63.97   | 0.06               | 0.29   | 1.01   |
| TaoVA-100x   | 3      | 3.66                   | 3.24   | 2.74   | 179.22                    | 224.29  | 264.02  | 0.29               | 0.58   | 1.62   |
| TCP Vegas    | 3      | 6.23                   | 3.27   | 3.82   | 1053.44                   | 135.39  | 142.34  | 0.14               | 0.39   | 0.53   |
| Verus        | 3      | 4.38                   | 2.52   | 1.06   | 690.46                    | 819.65  | 721.85  | 2.94               | 27.68  | 14.70  |
| Copa         | 2      | 1.15                   | 2.23   | 0.93   | 96.81                     | 172.21  | 120.28  | 0.08               | 0.51   | 0.47   |
| FillP        | 3      | 4.68                   | 2.37   | 3.57   | 1100.20                   | 1165.52 | 1191.94 | 88.91              | 96.29  | 97.93  |
| Indigo       | 3      | 3.31                   | 1.12   | 1.37   | 220.67                    | 323.57  | 220.08  | 0.51               | 1.71   | 0.50   |

Run 1: Statistics of TCP BBR

Start at: 2017-12-20 18:51:48  
End at: 2017-12-20 18:52:18  
Local clock offset: 2.221 ms  
Remote clock offset: -20.296 ms

# Below is generated by plot.py at 2017-12-20 19:33:51  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.04 Mbit/s  
95th percentile per-packet one-way delay: 834.636 ms  
Loss rate: 3.78%  
-- Flow 1:  
Average throughput: 2.24 Mbit/s  
95th percentile per-packet one-way delay: 824.637 ms  
Loss rate: 3.29%  
-- Flow 2:  
Average throughput: 0.97 Mbit/s  
95th percentile per-packet one-way delay: 883.918 ms  
Loss rate: 4.68%  
-- Flow 3:  
Average throughput: 0.53 Mbit/s  
95th percentile per-packet one-way delay: 733.611 ms  
Loss rate: 6.72%

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

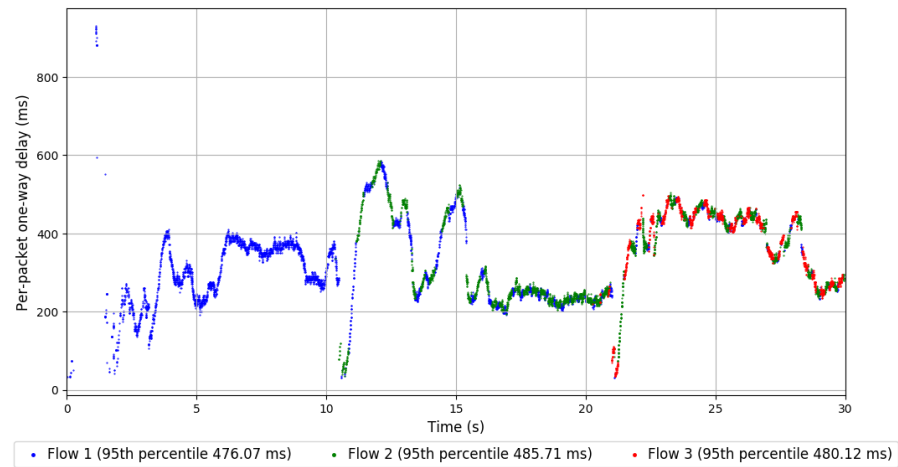
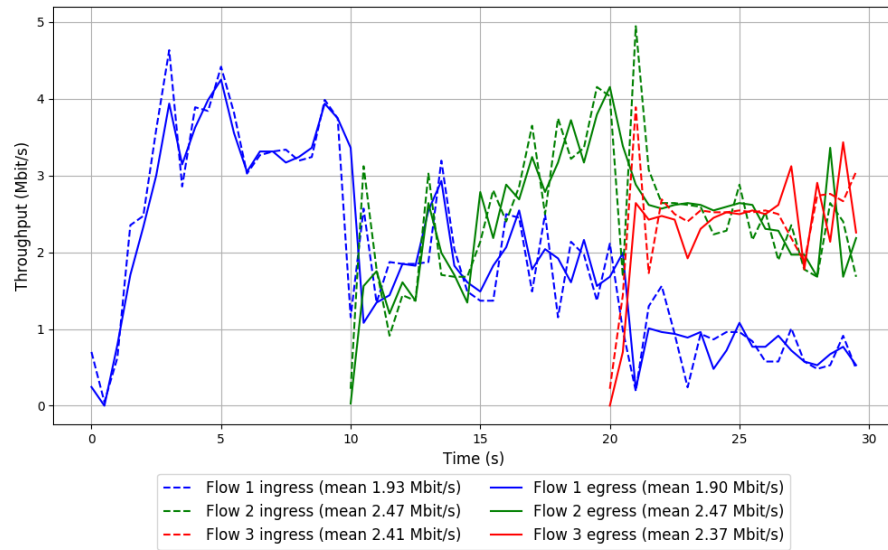


Run 2: Statistics of TCP BBR

Start at: 2017-12-20 19:08:36  
End at: 2017-12-20 19:09:06  
Local clock offset: 2.628 ms  
Remote clock offset: -20.67 ms

# Below is generated by plot.py at 2017-12-20 19:33:54  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.28 Mbit/s  
95th percentile per-packet one-way delay: 484.654 ms  
Loss rate: 1.91%  
-- Flow 1:  
Average throughput: 1.90 Mbit/s  
95th percentile per-packet one-way delay: 476.068 ms  
Loss rate: 1.09%  
-- Flow 2:  
Average throughput: 2.47 Mbit/s  
95th percentile per-packet one-way delay: 485.714 ms  
Loss rate: 1.58%  
-- Flow 3:  
Average throughput: 2.37 Mbit/s  
95th percentile per-packet one-way delay: 480.125 ms  
Loss rate: 4.57%

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



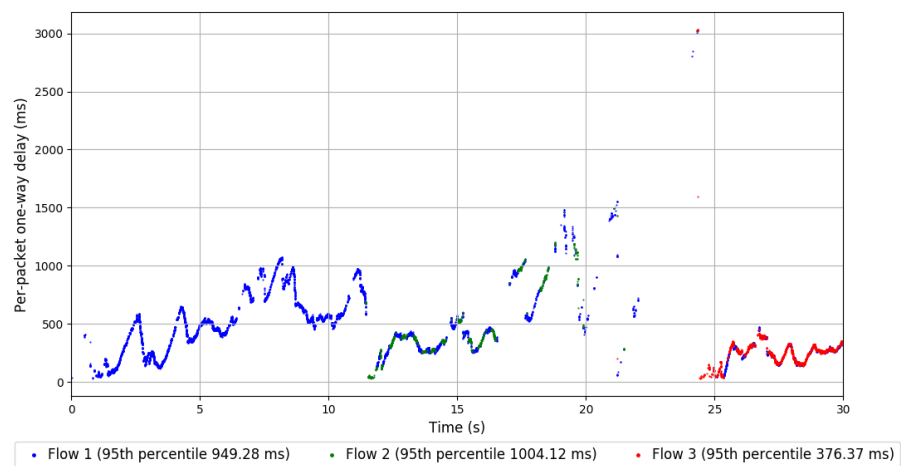
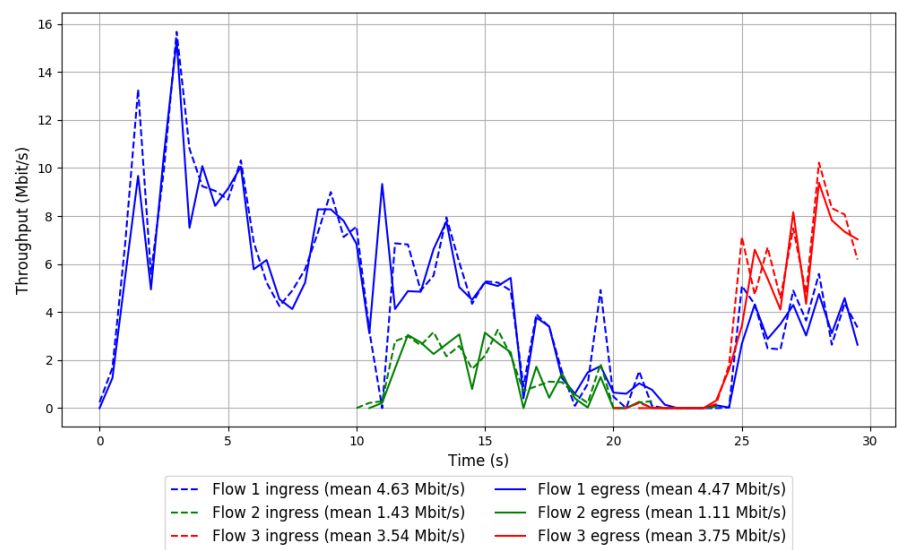
Run 3: Statistics of TCP BBR

Start at: 2017-12-20 19:25:24  
End at: 2017-12-20 19:25:54  
Local clock offset: 2.403 ms  
Remote clock offset: -20.807 ms

# Below is generated by plot.py at 2017-12-20 19:33:56  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 6.07 Mbit/s  
95th percentile per-packet one-way delay: 944.457 ms  
Loss rate: 4.63%  
-- Flow 1:  
Average throughput: 4.47 Mbit/s  
95th percentile per-packet one-way delay: 949.277 ms  
Loss rate: 3.59%  
-- Flow 2:  
Average throughput: 1.11 Mbit/s  
95th percentile per-packet one-way delay: 1004.122 ms  
Loss rate: 8.48%  
-- Flow 3:  
Average throughput: 3.75 Mbit/s  
95th percentile per-packet one-way delay: 376.368 ms  
Loss rate: 6.93%



Run 3: Report of TCP BBR — Data Link

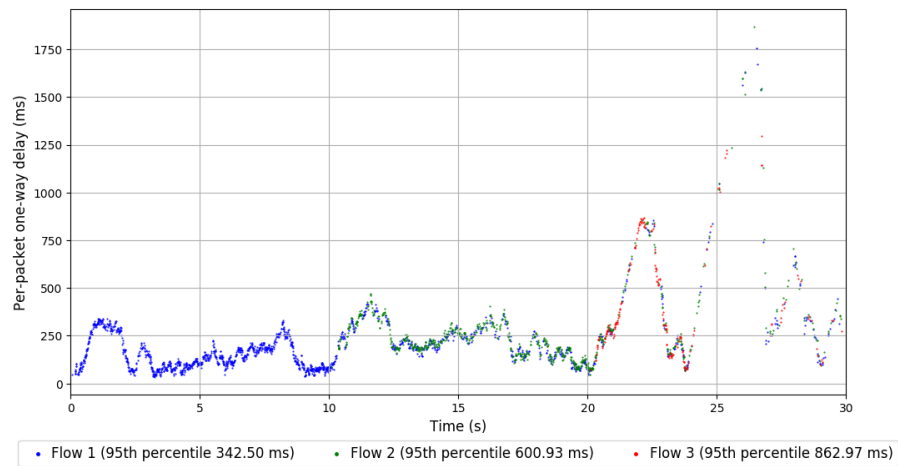
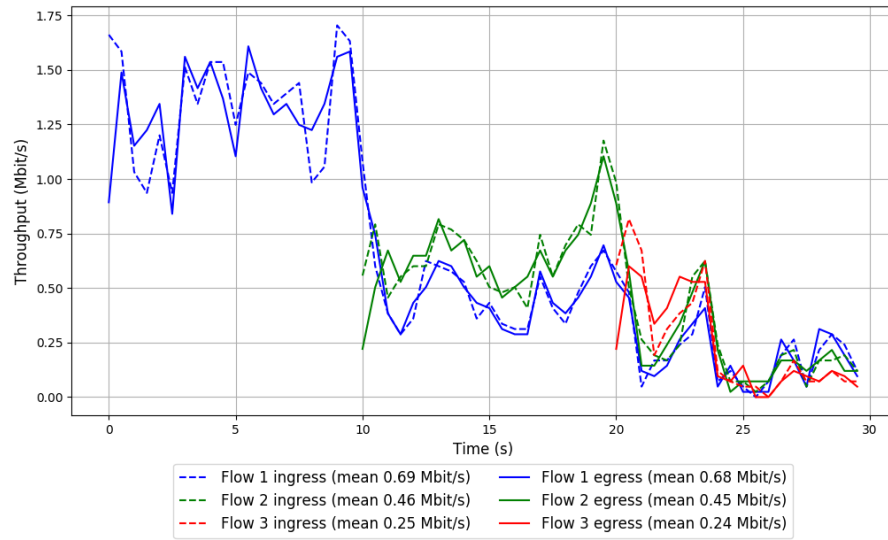


Run 1: Statistics of TCP Cubic

Start at: 2017-12-20 18:49:35  
End at: 2017-12-20 18:50:05  
Local clock offset: 3.148 ms  
Remote clock offset: -21.776 ms

# Below is generated by plot.py at 2017-12-20 19:33:56  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.05 Mbit/s  
95th percentile per-packet one-way delay: 542.561 ms  
Loss rate: 2.17%  
-- Flow 1:  
Average throughput: 0.68 Mbit/s  
95th percentile per-packet one-way delay: 342.501 ms  
Loss rate: 1.46%  
-- Flow 2:  
Average throughput: 0.45 Mbit/s  
95th percentile per-packet one-way delay: 600.932 ms  
Loss rate: 2.64%  
-- Flow 3:  
Average throughput: 0.24 Mbit/s  
95th percentile per-packet one-way delay: 862.969 ms  
Loss rate: 6.27%

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

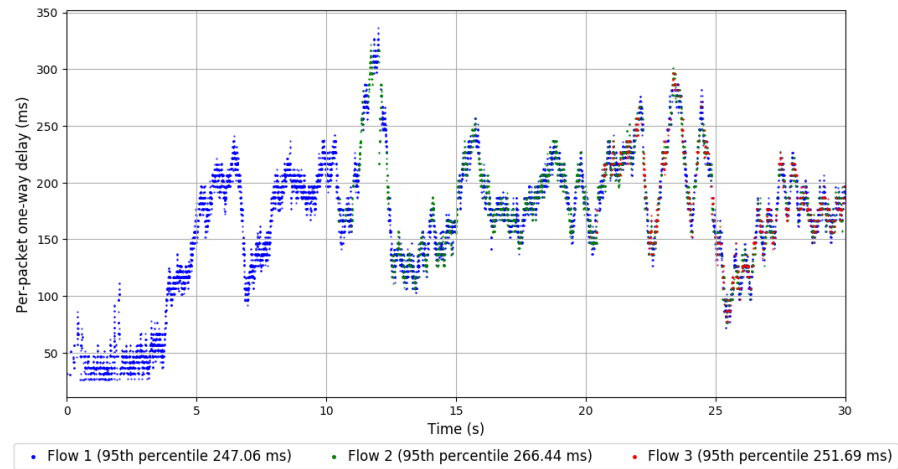
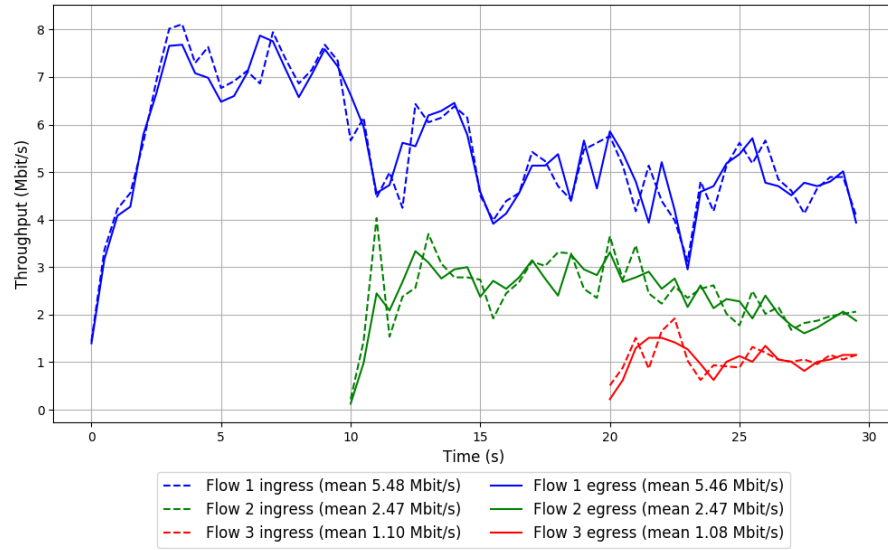


Run 2: Statistics of TCP Cubic

Start at: 2017-12-20 19:06:22  
End at: 2017-12-20 19:06:52  
Local clock offset: 6.262 ms  
Remote clock offset: -21.221 ms

# Below is generated by plot.py at 2017-12-20 19:33:58  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 7.43 Mbit/s  
95th percentile per-packet one-way delay: 255.947 ms  
Loss rate: 0.88%  
-- Flow 1:  
Average throughput: 5.46 Mbit/s  
95th percentile per-packet one-way delay: 247.065 ms  
Loss rate: 0.61%  
-- Flow 2:  
Average throughput: 2.47 Mbit/s  
95th percentile per-packet one-way delay: 266.436 ms  
Loss rate: 1.44%  
-- Flow 3:  
Average throughput: 1.08 Mbit/s  
95th percentile per-packet one-way delay: 251.692 ms  
Loss rate: 2.43%

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

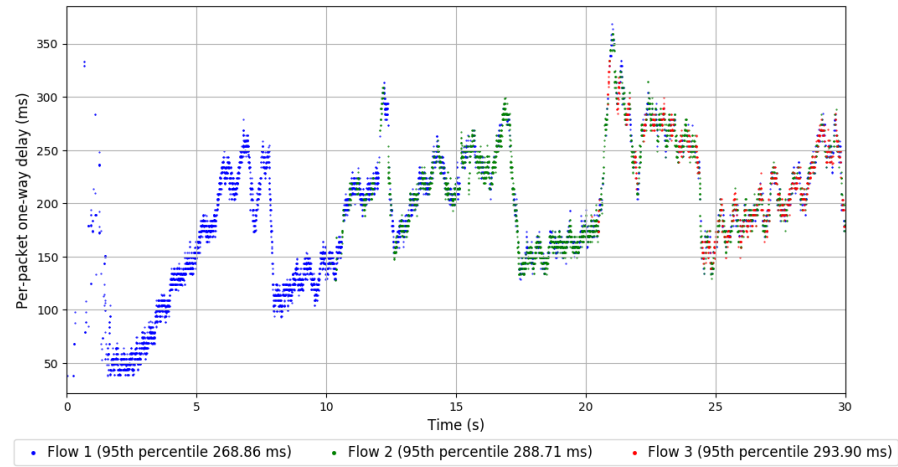
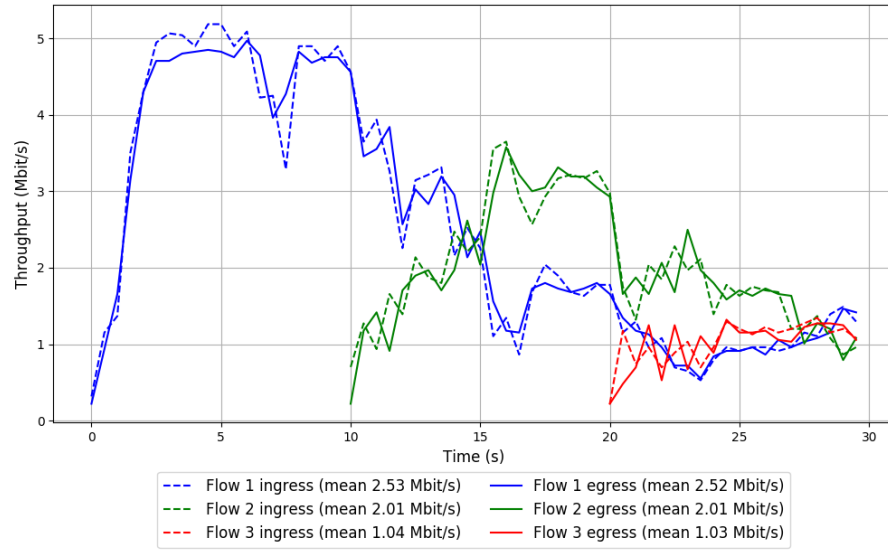


Run 3: Statistics of TCP Cubic

Start at: 2017-12-20 19:23:11  
End at: 2017-12-20 19:23:41  
Local clock offset: -0.034 ms  
Remote clock offset: -19.426 ms

# Below is generated by plot.py at 2017-12-20 19:33:58  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.18 Mbit/s  
95th percentile per-packet one-way delay: 283.589 ms  
Loss rate: 0.81%  
-- Flow 1:  
Average throughput: 2.52 Mbit/s  
95th percentile per-packet one-way delay: 268.861 ms  
Loss rate: 0.57%  
-- Flow 2:  
Average throughput: 2.01 Mbit/s  
95th percentile per-packet one-way delay: 288.710 ms  
Loss rate: 0.75%  
-- Flow 3:  
Average throughput: 1.03 Mbit/s  
95th percentile per-packet one-way delay: 293.899 ms  
Loss rate: 2.79%

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



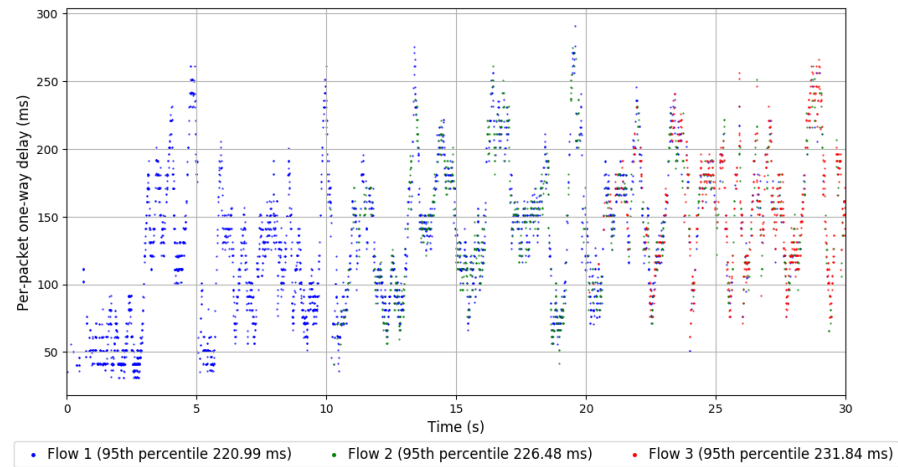
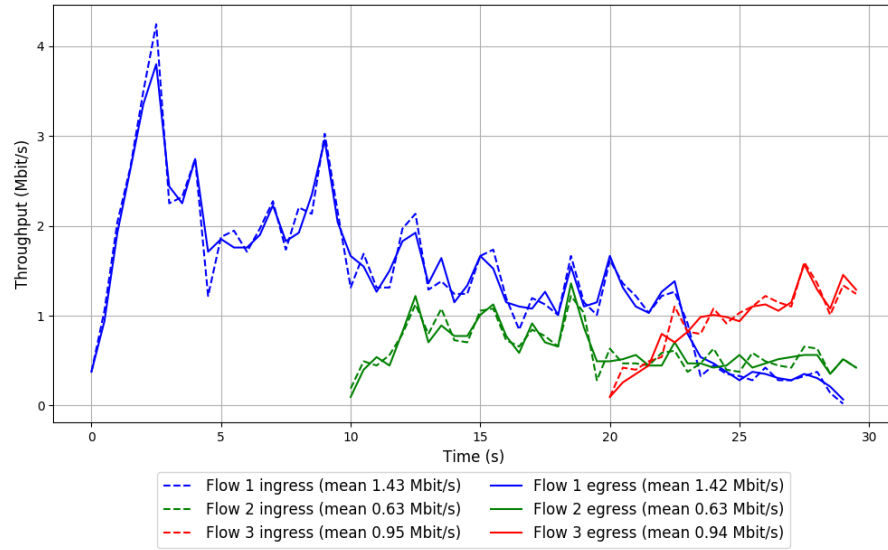
Run 1: Statistics of LEDBAT

Start at: 2017-12-20 18:50:41  
End at: 2017-12-20 18:51:11  
Local clock offset: 2.84 ms  
Remote clock offset: -22.094 ms

# Below is generated by plot.py at 2017-12-20 19:33:58  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 2.12 Mbit/s  
95th percentile per-packet one-way delay: 221.688 ms  
Loss rate: 0.46%  
-- Flow 1:  
Average throughput: 1.42 Mbit/s  
95th percentile per-packet one-way delay: 220.987 ms  
Loss rate: 0.11%  
-- Flow 2:  
Average throughput: 0.63 Mbit/s  
95th percentile per-packet one-way delay: 226.483 ms  
Loss rate: 0.74%  
-- Flow 3:  
Average throughput: 0.94 Mbit/s  
95th percentile per-packet one-way delay: 231.835 ms  
Loss rate: 1.62%



## Run 1: Report of LEDBAT — Data Link

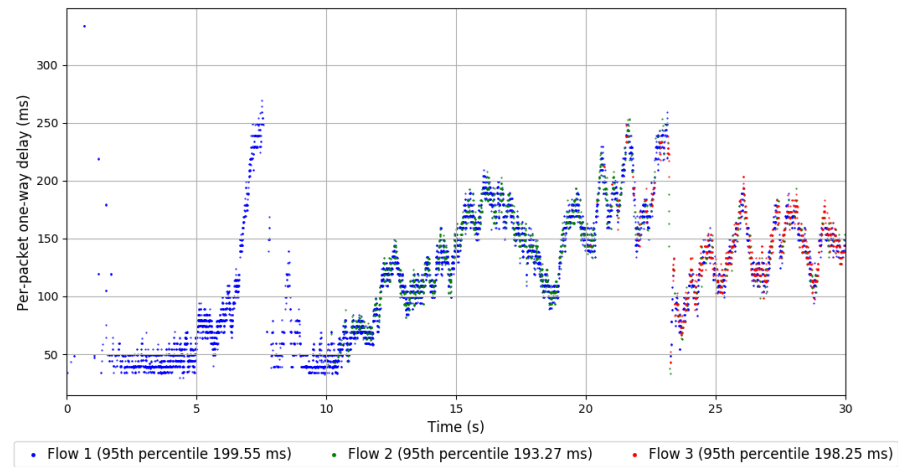
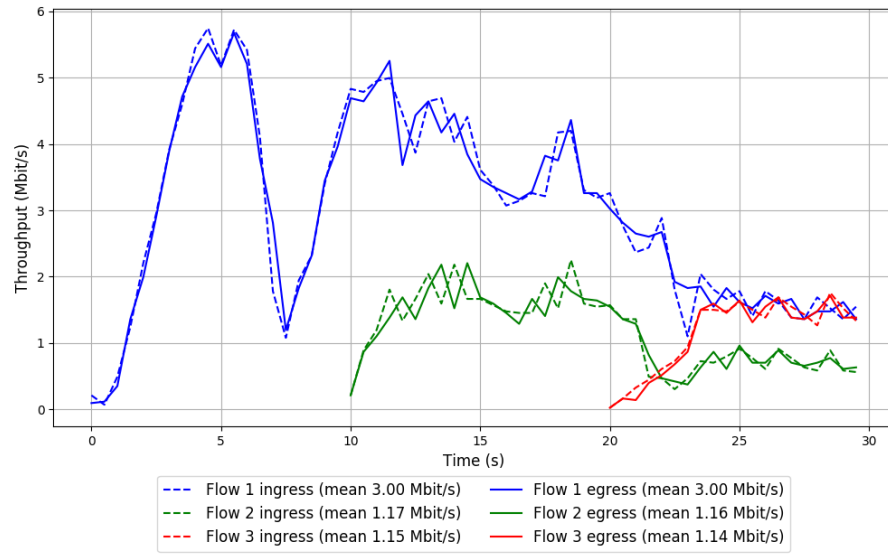


Run 2: Statistics of LEDBAT

Start at: 2017-12-20 19:07:29  
End at: 2017-12-20 19:07:59  
Local clock offset: 4.57 ms  
Remote clock offset: -20.623 ms

# Below is generated by plot.py at 2017-12-20 19:33:58  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.14 Mbit/s  
95th percentile per-packet one-way delay: 199.138 ms  
Loss rate: 0.50%  
-- Flow 1:  
Average throughput: 3.00 Mbit/s  
95th percentile per-packet one-way delay: 199.546 ms  
Loss rate: 0.25%  
-- Flow 2:  
Average throughput: 1.16 Mbit/s  
95th percentile per-packet one-way delay: 193.268 ms  
Loss rate: 0.55%  
-- Flow 3:  
Average throughput: 1.14 Mbit/s  
95th percentile per-packet one-way delay: 198.255 ms  
Loss rate: 2.37%

## Run 2: Report of LEDBAT — Data Link

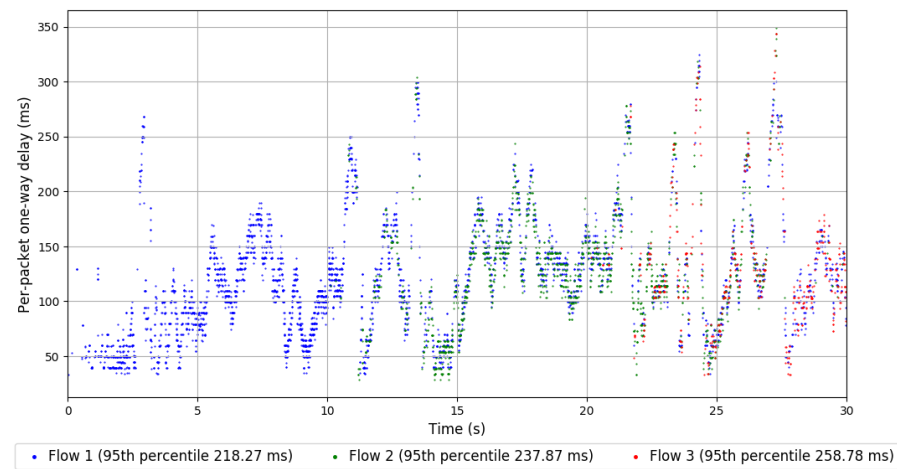
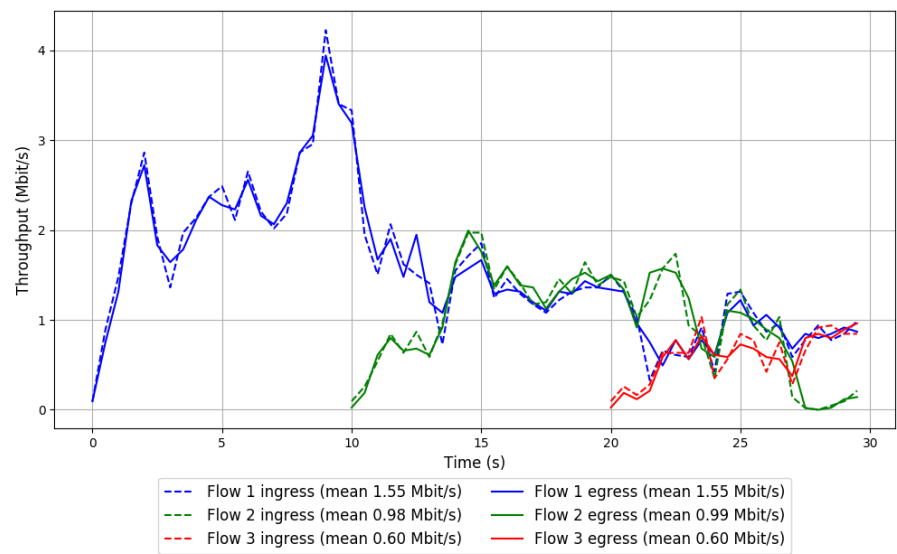


Run 3: Statistics of LEDBAT

Start at: 2017-12-20 19:24:17  
End at: 2017-12-20 19:24:47  
Local clock offset: 4.508 ms  
Remote clock offset: -19.497 ms

# Below is generated by plot.py at 2017-12-20 19:33:58  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 2.39 Mbit/s  
95th percentile per-packet one-way delay: 228.601 ms  
Loss rate: 0.50%  
-- Flow 1:  
Average throughput: 1.55 Mbit/s  
95th percentile per-packet one-way delay: 218.270 ms  
Loss rate: 0.43%  
-- Flow 2:  
Average throughput: 0.99 Mbit/s  
95th percentile per-packet one-way delay: 237.867 ms  
Loss rate: 0.30%  
-- Flow 3:  
Average throughput: 0.60 Mbit/s  
95th percentile per-packet one-way delay: 258.784 ms  
Loss rate: 1.77%

Run 3: Report of LEDBAT — Data Link

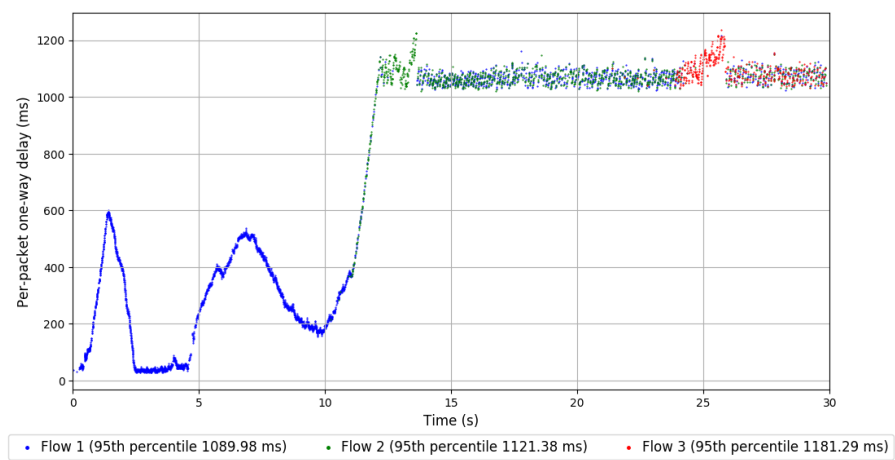
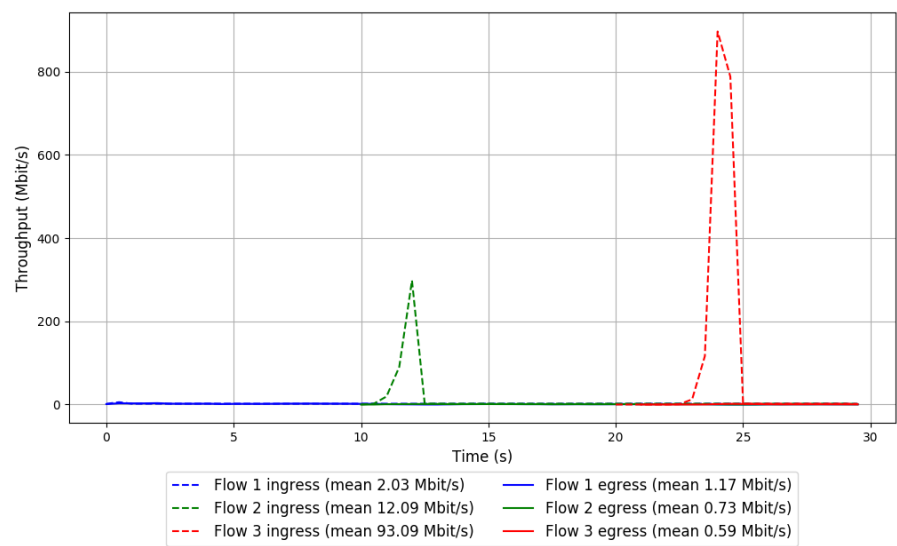


Run 1: Statistics of PCC

Start at: 2017-12-20 18:48:28  
End at: 2017-12-20 18:48:58  
Local clock offset: 2.937 ms  
Remote clock offset: -21.183 ms

# Below is generated by plot.py at 2017-12-20 19:34:14  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.82 Mbit/s  
95th percentile per-packet one-way delay: 1113.082 ms  
Loss rate: 95.55%  
-- Flow 1:  
Average throughput: 1.17 Mbit/s  
95th percentile per-packet one-way delay: 1089.976 ms  
Loss rate: 42.67%  
-- Flow 2:  
Average throughput: 0.73 Mbit/s  
95th percentile per-packet one-way delay: 1121.379 ms  
Loss rate: 94.01%  
-- Flow 3:  
Average throughput: 0.59 Mbit/s  
95th percentile per-packet one-way delay: 1181.287 ms  
Loss rate: 99.45%

Run 1: Report of PCC — Data Link



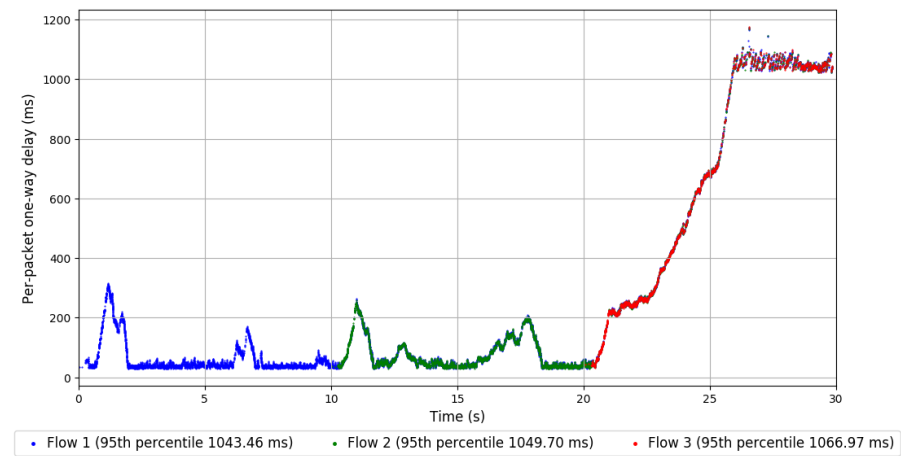
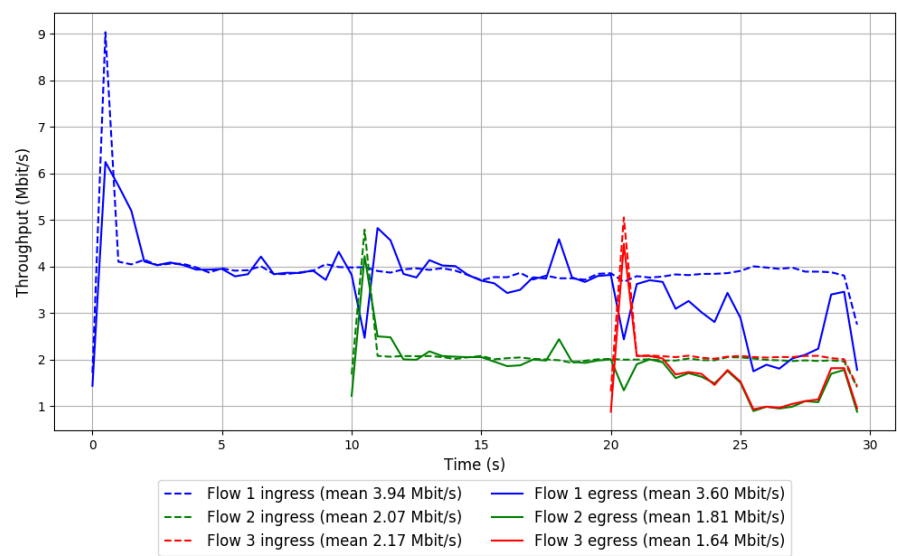
Run 2: Statistics of PCC

Start at: 2017-12-20 19:05:14  
End at: 2017-12-20 19:05:44  
Local clock offset: 1.909 ms  
Remote clock offset: -20.247 ms

# Below is generated by plot.py at 2017-12-20 19:34:14  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.35 Mbit/s  
95th percentile per-packet one-way delay: 1049.228 ms  
Loss rate: 11.45%  
-- Flow 1:  
Average throughput: 3.60 Mbit/s  
95th percentile per-packet one-way delay: 1043.460 ms  
Loss rate: 8.62%  
-- Flow 2:  
Average throughput: 1.81 Mbit/s  
95th percentile per-packet one-way delay: 1049.705 ms  
Loss rate: 12.57%  
-- Flow 3:  
Average throughput: 1.64 Mbit/s  
95th percentile per-packet one-way delay: 1066.967 ms  
Loss rate: 24.84%



Run 2: Report of PCC — Data Link

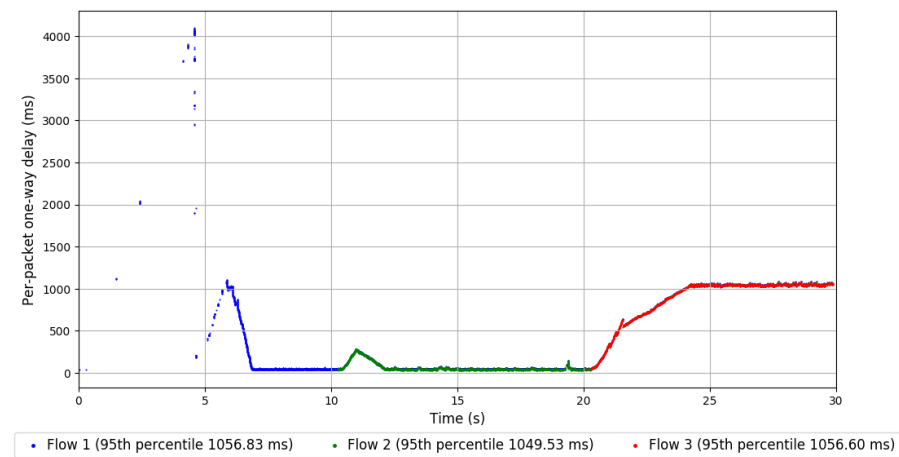
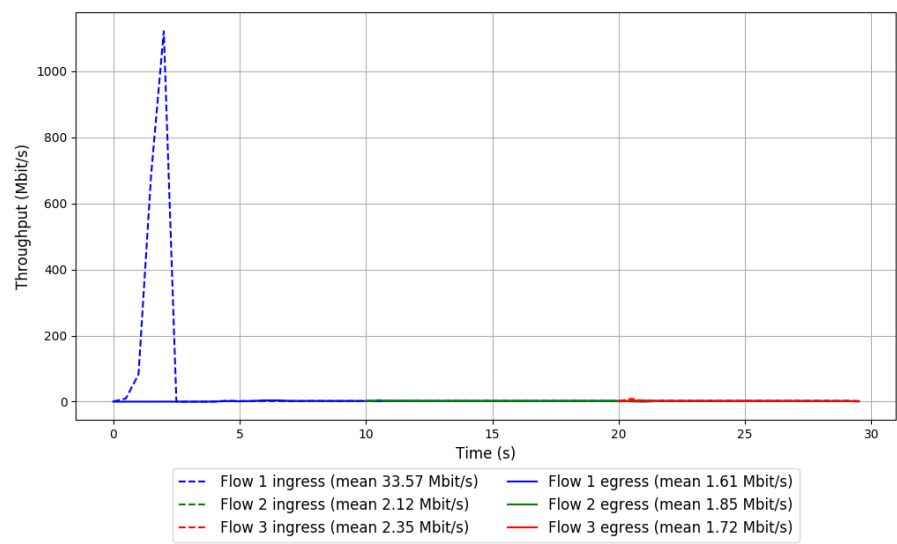


Run 3: Statistics of PCC

Start at: 2017-12-20 19:22:03  
End at: 2017-12-20 19:22:33  
Local clock offset: 0.593 ms  
Remote clock offset: -22.551 ms

# Below is generated by plot.py at 2017-12-20 19:34:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.40 Mbit/s  
95th percentile per-packet one-way delay: 1054.105 ms  
Loss rate: 90.49%  
-- Flow 1:  
Average throughput: 1.61 Mbit/s  
95th percentile per-packet one-way delay: 1056.825 ms  
Loss rate: 95.21%  
-- Flow 2:  
Average throughput: 1.85 Mbit/s  
95th percentile per-packet one-way delay: 1049.534 ms  
Loss rate: 12.73%  
-- Flow 3:  
Average throughput: 1.72 Mbit/s  
95th percentile per-packet one-way delay: 1056.596 ms  
Loss rate: 27.22%

Run 3: Report of PCC — Data Link

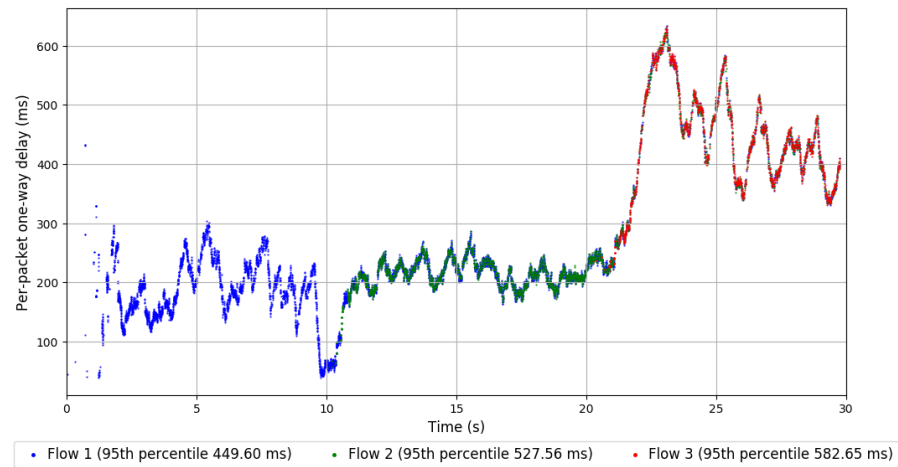
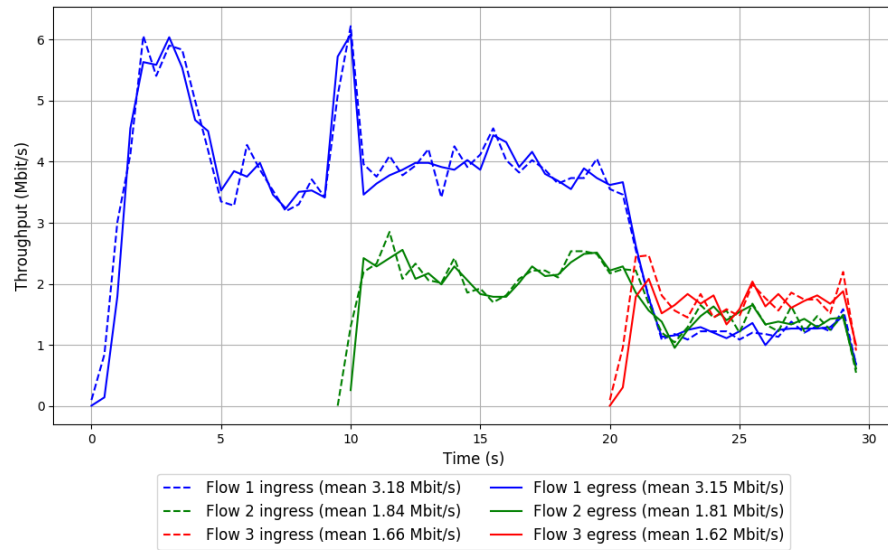


Run 1: Statistics of QUIC Cubic

Start at: 2017-12-20 18:54:01  
End at: 2017-12-20 18:54:31  
Local clock offset: 6.276 ms  
Remote clock offset: -21.186 ms

# Below is generated by plot.py at 2017-12-20 19:34:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.87 Mbit/s  
95th percentile per-packet one-way delay: 513.045 ms  
Loss rate: 1.54%  
-- Flow 1:  
Average throughput: 3.15 Mbit/s  
95th percentile per-packet one-way delay: 449.595 ms  
Loss rate: 0.86%  
-- Flow 2:  
Average throughput: 1.81 Mbit/s  
95th percentile per-packet one-way delay: 527.559 ms  
Loss rate: 1.75%  
-- Flow 3:  
Average throughput: 1.62 Mbit/s  
95th percentile per-packet one-way delay: 582.654 ms  
Loss rate: 5.03%

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

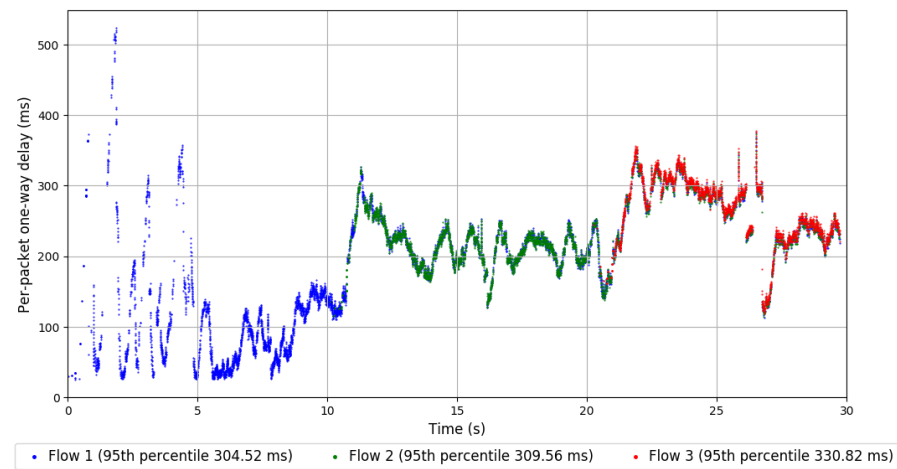
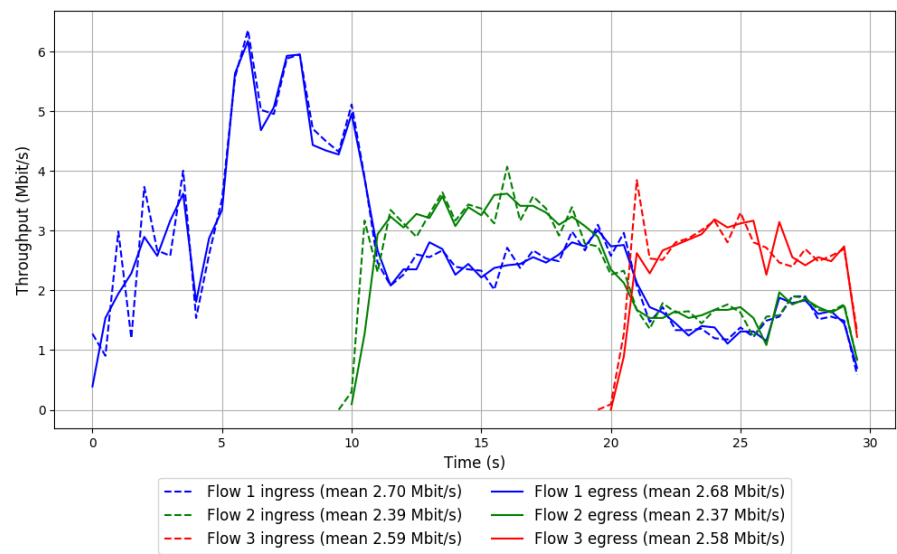


Run 2: Statistics of QUIC Cubic

Start at: 2017-12-20 19:10:49  
End at: 2017-12-20 19:11:19  
Local clock offset: 5.859 ms  
Remote clock offset: -21.922 ms

# Below is generated by plot.py at 2017-12-20 19:34:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.08 Mbit/s  
95th percentile per-packet one-way delay: 317.396 ms  
Loss rate: 1.22%  
-- Flow 1:  
Average throughput: 2.68 Mbit/s  
95th percentile per-packet one-way delay: 304.517 ms  
Loss rate: 0.68%  
-- Flow 2:  
Average throughput: 2.37 Mbit/s  
95th percentile per-packet one-way delay: 309.563 ms  
Loss rate: 1.27%  
-- Flow 3:  
Average throughput: 2.58 Mbit/s  
95th percentile per-packet one-way delay: 330.818 ms  
Loss rate: 2.83%

Run 2: Report of QUIC Cubic — Data Link



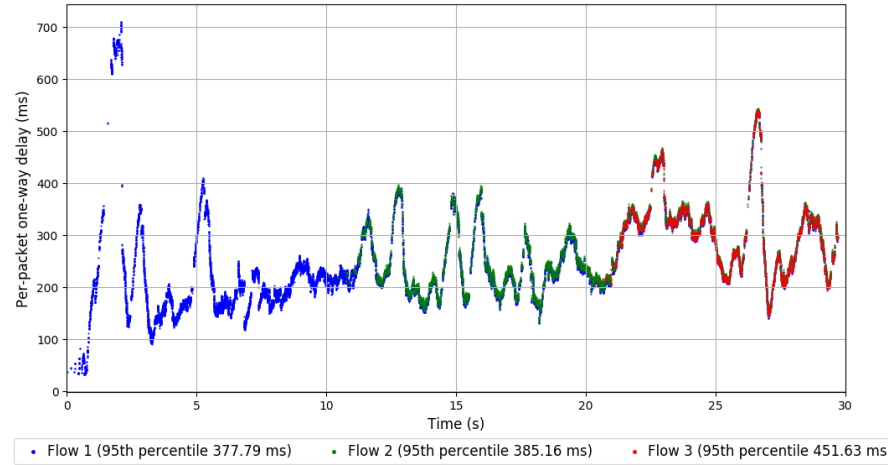
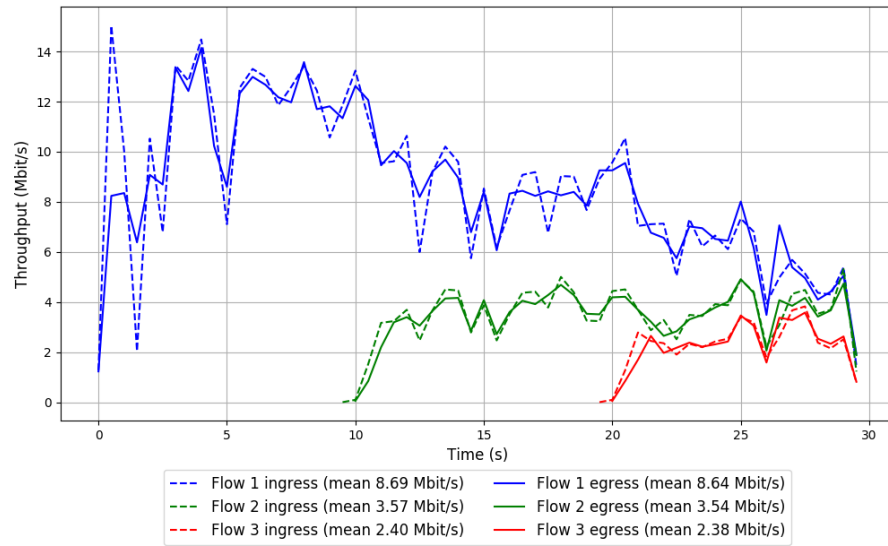
Run 3: Statistics of QUIC Cubic

Start at: 2017-12-20 19:27:38  
End at: 2017-12-20 19:28:08  
Local clock offset: 3.704 ms  
Remote clock offset: -20.088 ms

# Below is generated by plot.py at 2017-12-20 19:34:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 11.75 Mbit/s  
95th percentile per-packet one-way delay: 383.701 ms  
Loss rate: 0.96%  
-- Flow 1:  
Average throughput: 8.64 Mbit/s  
95th percentile per-packet one-way delay: 377.791 ms  
Loss rate: 0.60%  
-- Flow 2:  
Average throughput: 3.54 Mbit/s  
95th percentile per-packet one-way delay: 385.156 ms  
Loss rate: 1.72%  
-- Flow 3:  
Average throughput: 2.38 Mbit/s  
95th percentile per-packet one-way delay: 451.631 ms  
Loss rate: 2.77%



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

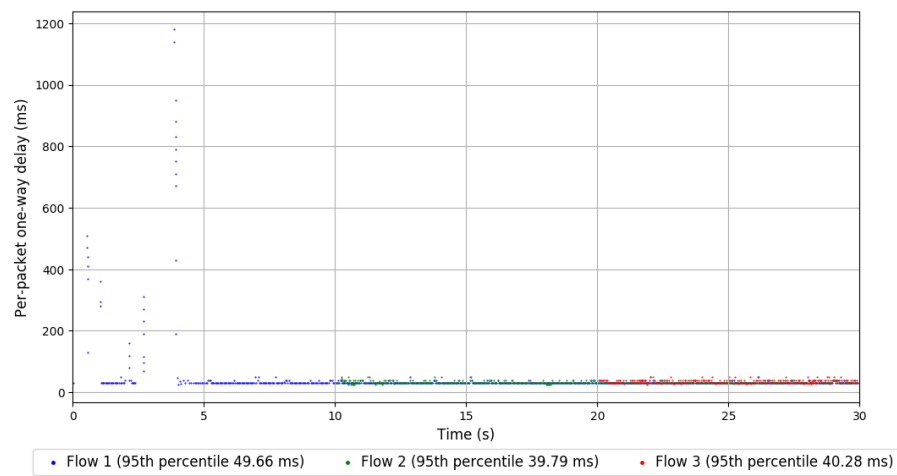
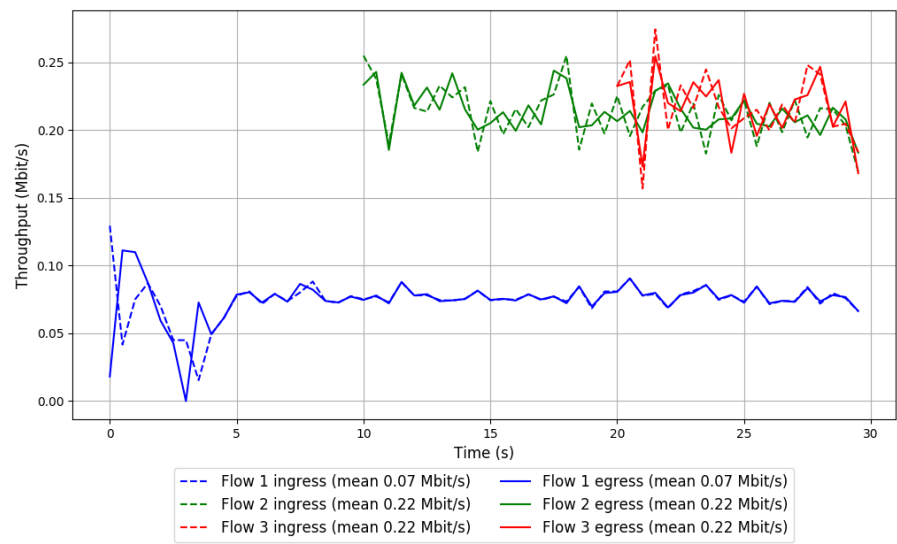


```
Run 1: Statistics of SReAM

Start at: 2017-12-20 18:55:08
End at: 2017-12-20 18:55:38
Local clock offset: 6.198 ms
Remote clock offset: -23.377 ms

# Below is generated by plot.py at 2017-12-20 19:34:18
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 40.083 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 0.07 Mbit/s
95th percentile per-packet one-way delay: 49.656 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 39.788 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 40.282 ms
Loss rate: 0.36%
```

Run 1: Report of SReAM — Data Link

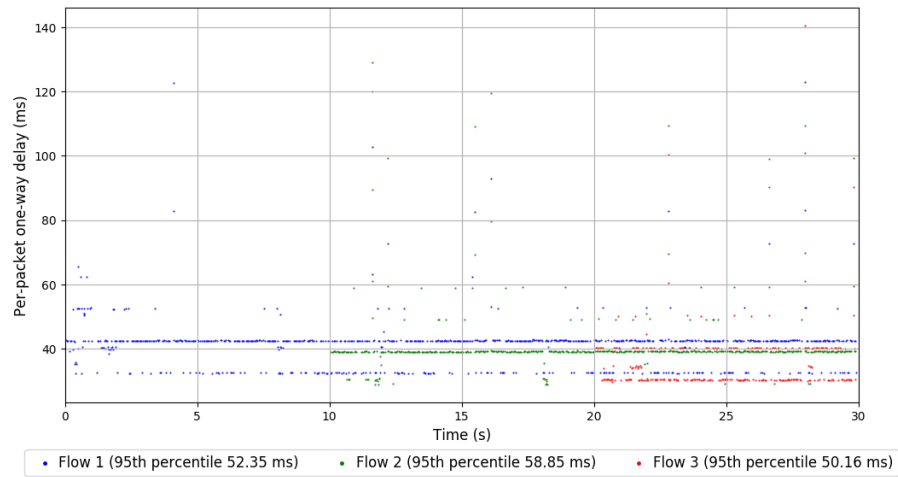
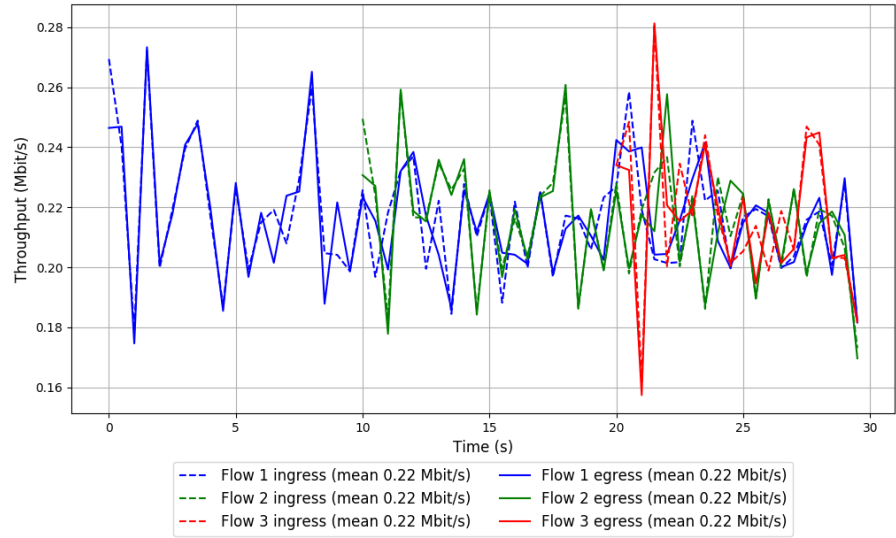


Run 2: Statistics of SReAM

Start at: 2017-12-20 19:11:56  
End at: 2017-12-20 19:12:26  
Local clock offset: 4.938 ms  
Remote clock offset: -19.708 ms

# Below is generated by plot.py at 2017-12-20 19:34:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.43 Mbit/s  
95th percentile per-packet one-way delay: 52.272 ms  
Loss rate: 0.19%  
-- Flow 1:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 52.347 ms  
Loss rate: 0.12%  
-- Flow 2:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 58.851 ms  
Loss rate: 0.21%  
-- Flow 3:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 50.162 ms  
Loss rate: 0.35%

## Run 2: Report of SReAM — Data Link

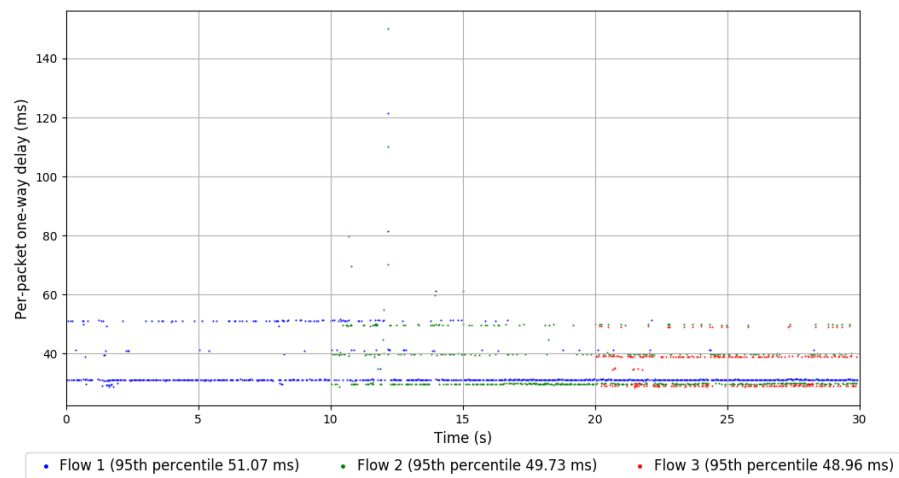
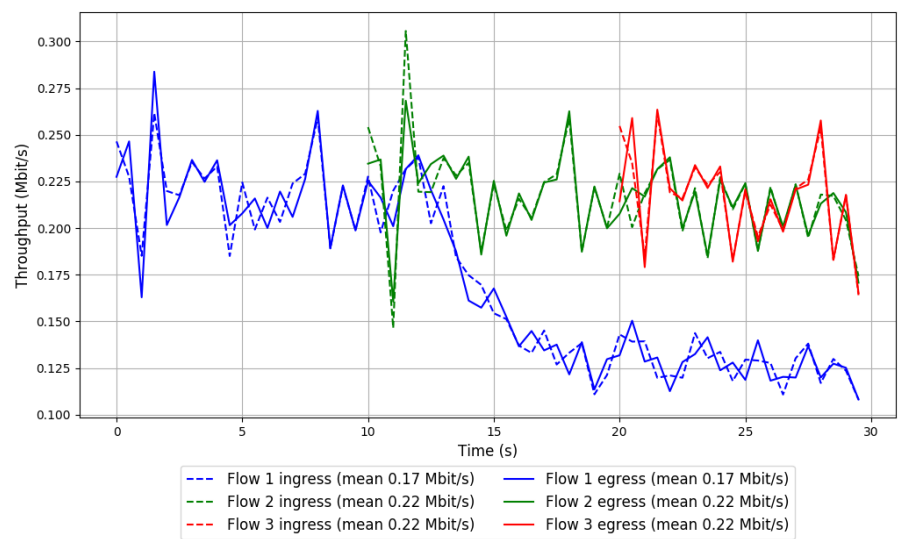


Run 3: Statistics of SReAM

Start at: 2017-12-20 19:28:45  
End at: 2017-12-20 19:29:15  
Local clock offset: 4.26 ms  
Remote clock offset: -20.942 ms

# Below is generated by plot.py at 2017-12-20 19:34:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.39 Mbit/s  
95th percentile per-packet one-way delay: 50.994 ms  
Loss rate: 0.25%  
-- Flow 1:  
Average throughput: 0.17 Mbit/s  
95th percentile per-packet one-way delay: 51.073 ms  
Loss rate: 0.24%  
-- Flow 2:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 49.727 ms  
Loss rate: 0.21%  
-- Flow 3:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 48.961 ms  
Loss rate: 0.35%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of WebRTC media

Start at: 2017-12-20 18:52:54

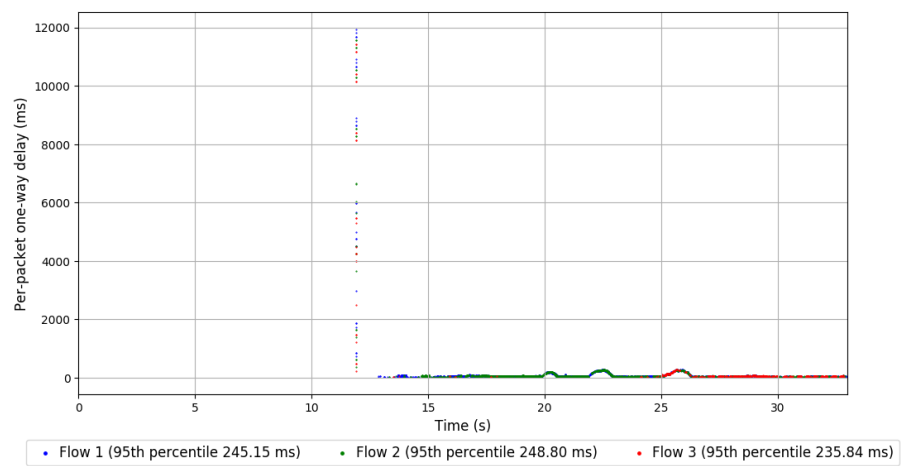
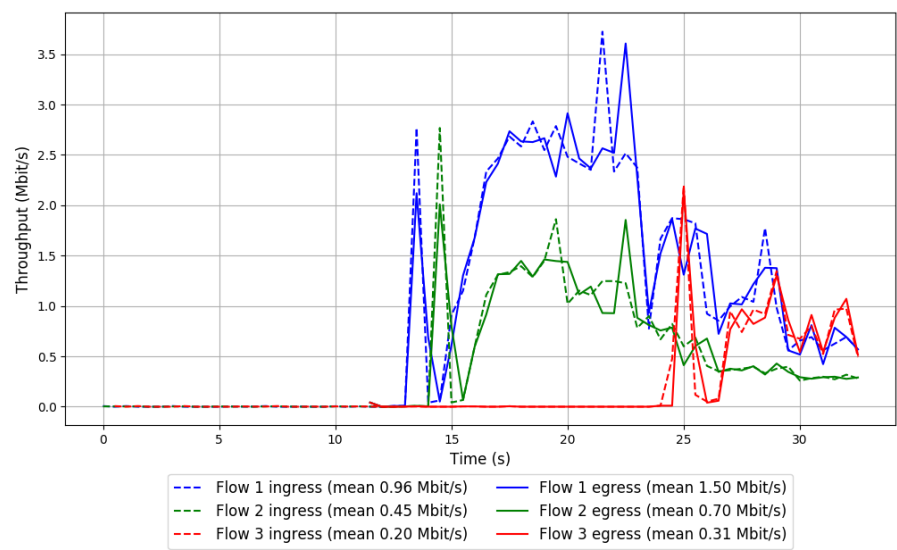
End at: 2017-12-20 18:53:24

Local clock offset: 2.059 ms

Remote clock offset: -21.665 ms



Run 1: Report of WebRTC media — Data Link

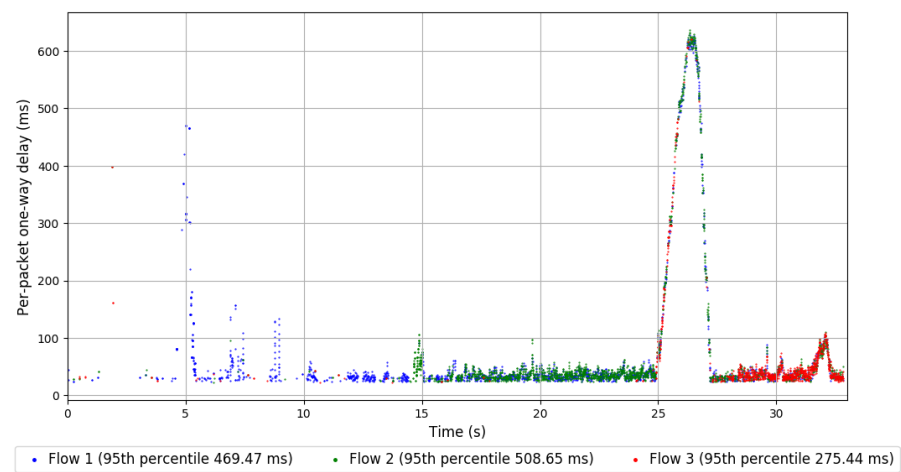
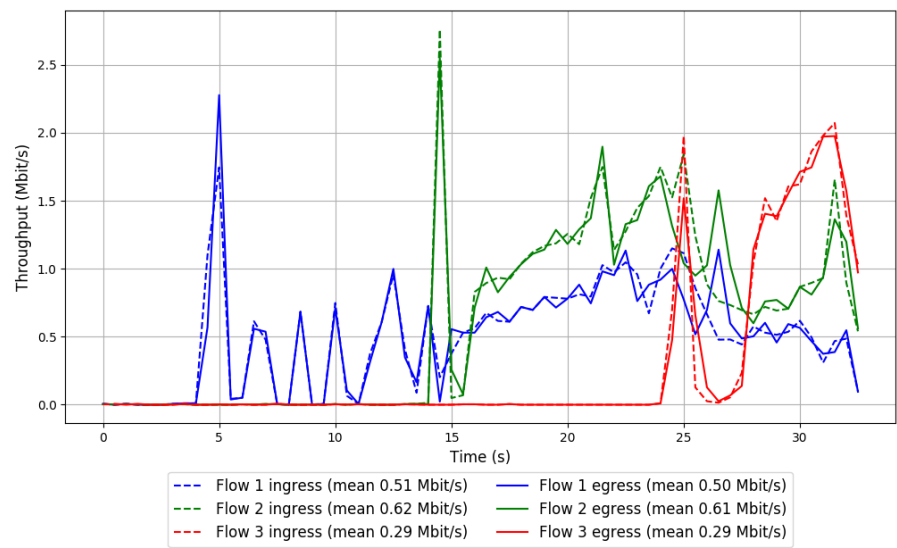


Run 2: Statistics of WebRTC media

Start at: 2017-12-20 19:09:43  
End at: 2017-12-20 19:10:13  
Local clock offset: 6.625 ms  
Remote clock offset: -22.177 ms

# Below is generated by plot.py at 2017-12-20 19:34:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.39 Mbit/s  
95th percentile per-packet one-way delay: 457.739 ms  
Loss rate: 0.49%  
-- Flow 1:  
Average throughput: 0.50 Mbit/s  
95th percentile per-packet one-way delay: 469.472 ms  
Loss rate: 0.33%  
-- Flow 2:  
Average throughput: 0.61 Mbit/s  
95th percentile per-packet one-way delay: 508.649 ms  
Loss rate: 0.45%  
-- Flow 3:  
Average throughput: 0.29 Mbit/s  
95th percentile per-packet one-way delay: 275.439 ms  
Loss rate: 0.86%

Run 2: Report of WebRTC media — Data Link

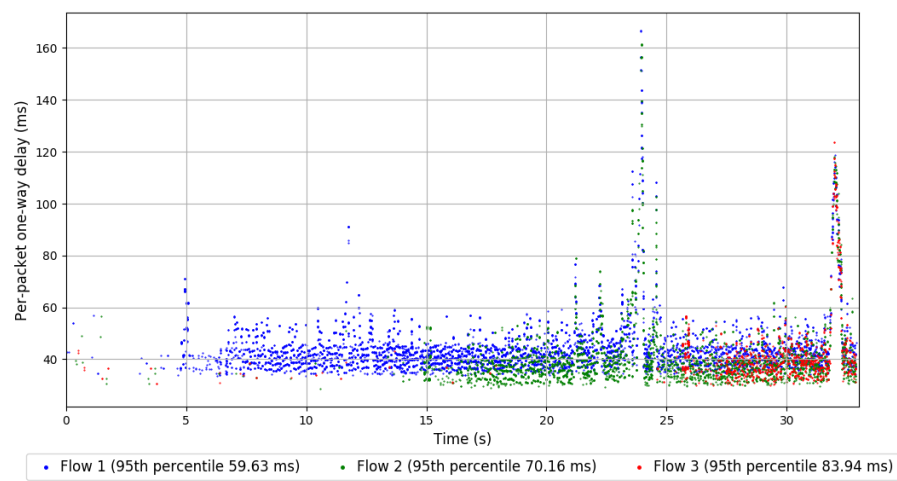
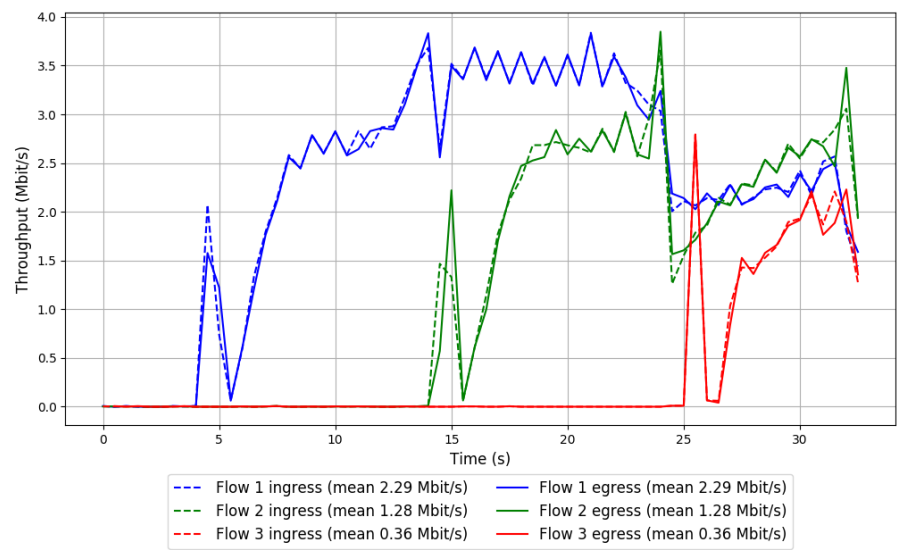


Run 3: Statistics of WebRTC media

Start at: 2017-12-20 19:26:31  
End at: 2017-12-20 19:27:01  
Local clock offset: 1.882 ms  
Remote clock offset: -20.373 ms

# Below is generated by plot.py at 2017-12-20 19:34:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.90 Mbit/s  
95th percentile per-packet one-way delay: 63.705 ms  
Loss rate: 0.20%  
-- Flow 1:  
Average throughput: 2.29 Mbit/s  
95th percentile per-packet one-way delay: 59.629 ms  
Loss rate: 0.11%  
-- Flow 2:  
Average throughput: 1.28 Mbit/s  
95th percentile per-packet one-way delay: 70.161 ms  
Loss rate: 0.23%  
-- Flow 3:  
Average throughput: 0.36 Mbit/s  
95th percentile per-packet one-way delay: 83.943 ms  
Loss rate: 0.61%

Run 3: Report of WebRTC media — Data Link

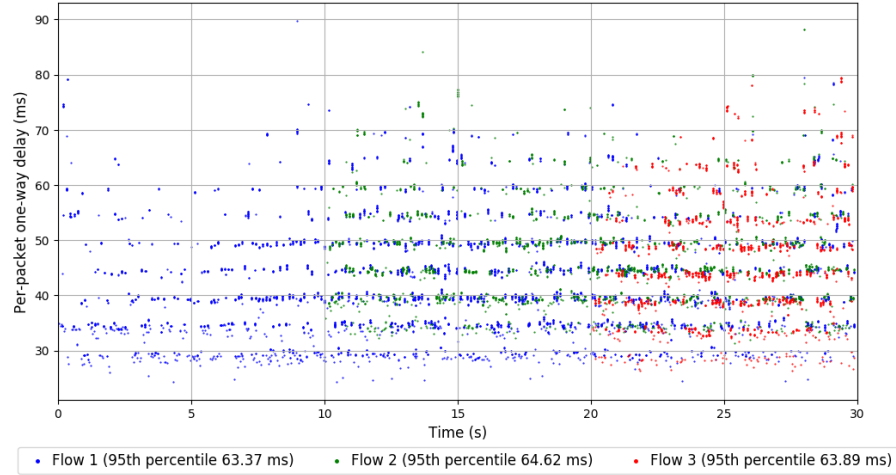
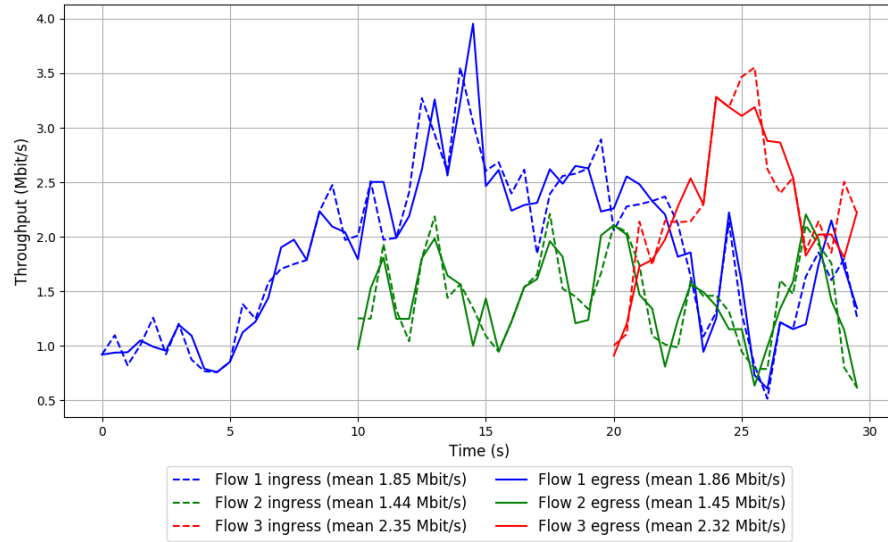


Run 1: Statistics of Sprout

Start at: 2017-12-20 18:42:52  
End at: 2017-12-20 18:43:22  
Local clock offset: 4.56 ms  
Remote clock offset: -20.867 ms

# Below is generated by plot.py at 2017-12-20 19:34:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.58 Mbit/s  
95th percentile per-packet one-way delay: 64.114 ms  
Loss rate: 0.35%  
-- Flow 1:  
Average throughput: 1.86 Mbit/s  
95th percentile per-packet one-way delay: 63.365 ms  
Loss rate: 0.07%  
-- Flow 2:  
Average throughput: 1.45 Mbit/s  
95th percentile per-packet one-way delay: 64.625 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 2.32 Mbit/s  
95th percentile per-packet one-way delay: 63.894 ms  
Loss rate: 1.48%

## Run 1: Report of Sprout — Data Link



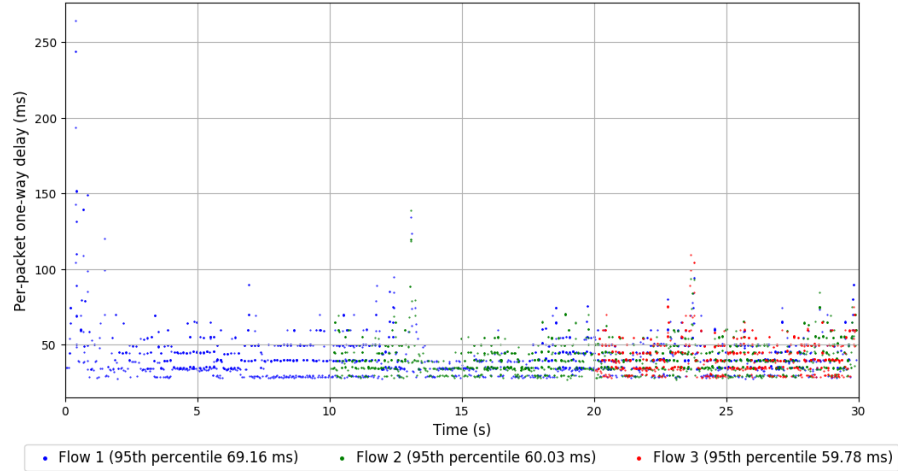
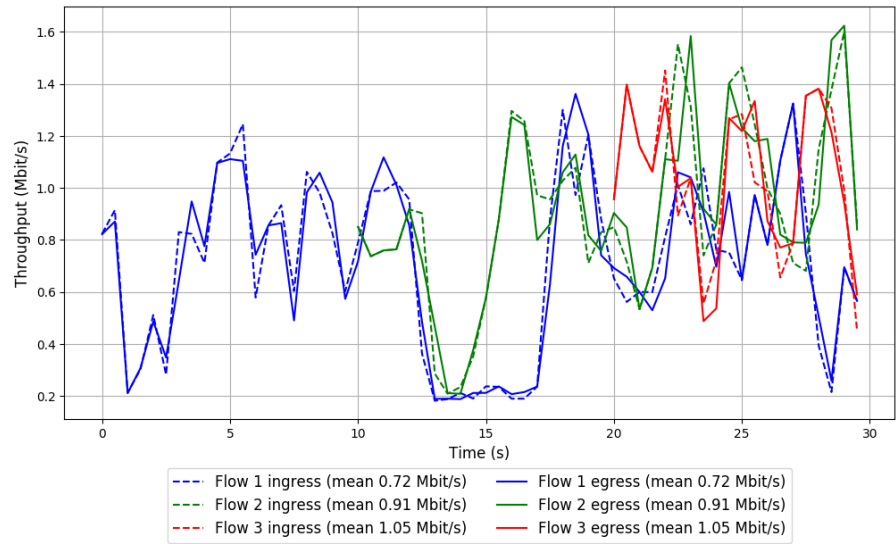
Run 2: Statistics of Sprout

Start at: 2017-12-20 18:59:38  
End at: 2017-12-20 19:00:08  
Local clock offset: 5.354 ms  
Remote clock offset: -20.771 ms

# Below is generated by plot.py at 2017-12-20 19:34:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.67 Mbit/s  
95th percentile per-packet one-way delay: 64.596 ms  
Loss rate: 0.02%  
-- Flow 1:  
Average throughput: 0.72 Mbit/s  
95th percentile per-packet one-way delay: 69.159 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.91 Mbit/s  
95th percentile per-packet one-way delay: 60.030 ms  
Loss rate: 0.06%  
-- Flow 3:  
Average throughput: 1.05 Mbit/s  
95th percentile per-packet one-way delay: 59.783 ms  
Loss rate: 0.01%



## Run 2: Report of Sprout — Data Link

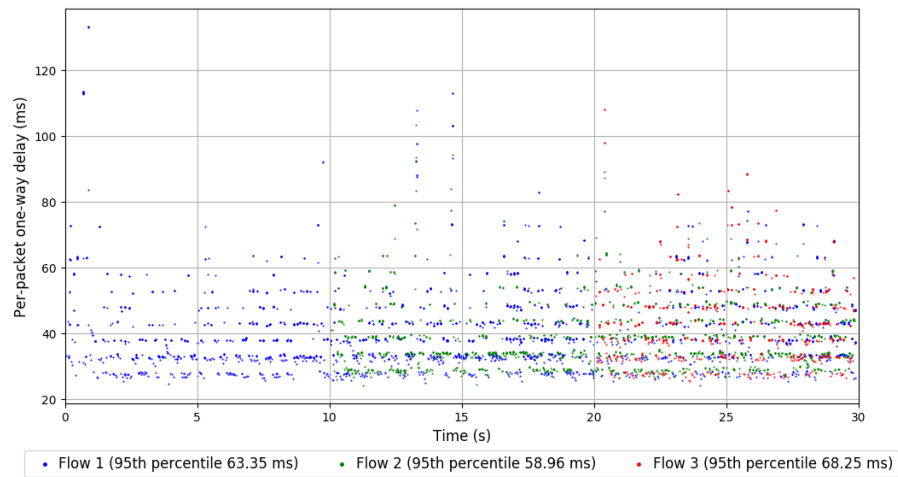
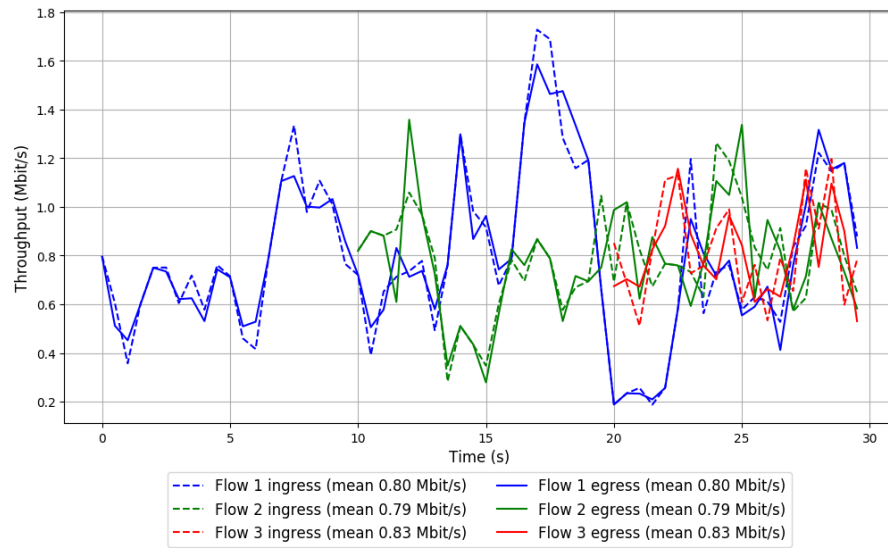


Run 3: Statistics of Sprout

Start at: 2017-12-20 19:16:27  
End at: 2017-12-20 19:16:57  
Local clock offset: 5.431 ms  
Remote clock offset: -21.344 ms

# Below is generated by plot.py at 2017-12-20 19:34:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.59 Mbit/s  
95th percentile per-packet one-way delay: 63.312 ms  
Loss rate: 0.58%  
-- Flow 1:  
Average throughput: 0.80 Mbit/s  
95th percentile per-packet one-way delay: 63.347 ms  
Loss rate: 0.10%  
-- Flow 2:  
Average throughput: 0.79 Mbit/s  
95th percentile per-packet one-way delay: 58.962 ms  
Loss rate: 0.81%  
-- Flow 3:  
Average throughput: 0.83 Mbit/s  
95th percentile per-packet one-way delay: 68.246 ms  
Loss rate: 1.54%

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

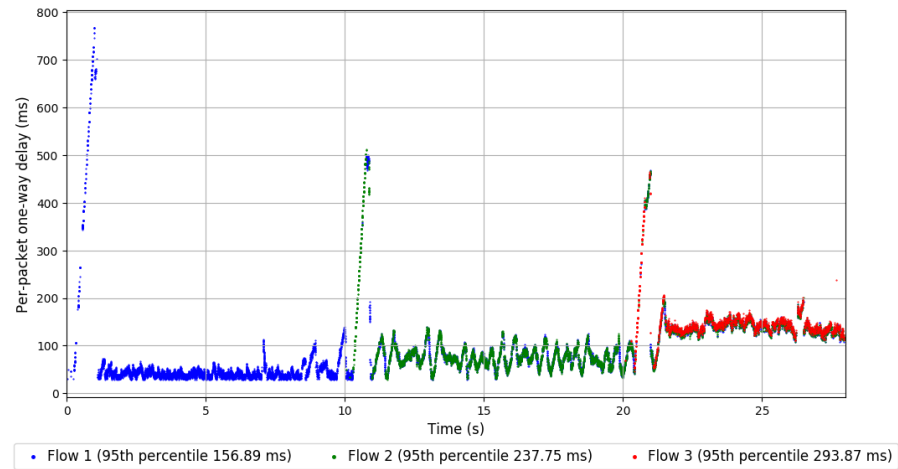
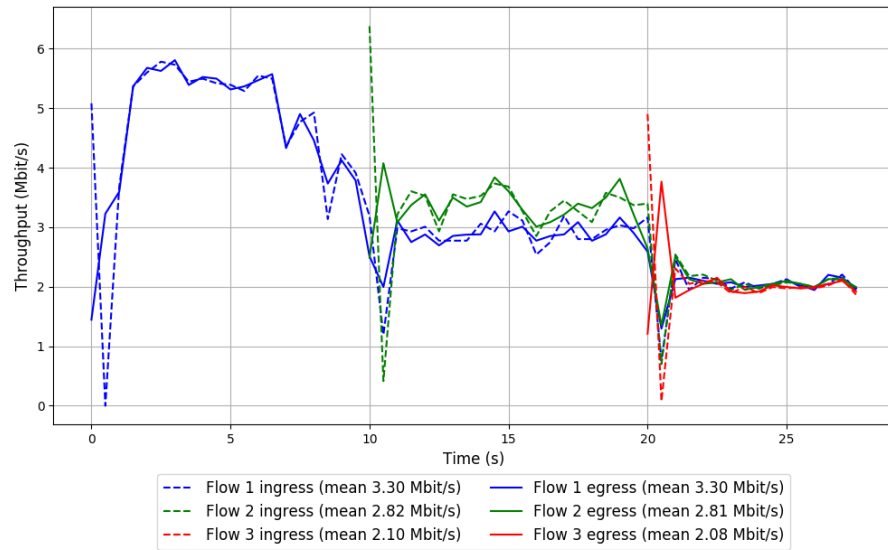


Run 1: Statistics of TaoVA-100x

Start at: 2017-12-20 18:56:14  
End at: 2017-12-20 18:56:44  
Local clock offset: 4.755 ms  
Remote clock offset: -20.492 ms

# Below is generated by plot.py at 2017-12-20 19:34:21  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.68 Mbit/s  
95th percentile per-packet one-way delay: 188.295 ms  
Loss rate: 0.52%  
-- Flow 1:  
Average throughput: 3.30 Mbit/s  
95th percentile per-packet one-way delay: 156.890 ms  
Loss rate: 0.30%  
-- Flow 2:  
Average throughput: 2.81 Mbit/s  
95th percentile per-packet one-way delay: 237.747 ms  
Loss rate: 0.59%  
-- Flow 3:  
Average throughput: 2.08 Mbit/s  
95th percentile per-packet one-way delay: 293.870 ms  
Loss rate: 1.57%

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

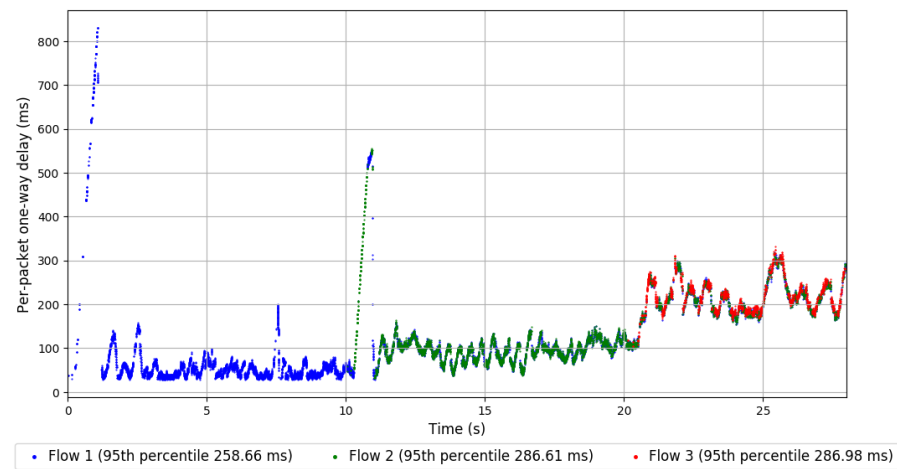
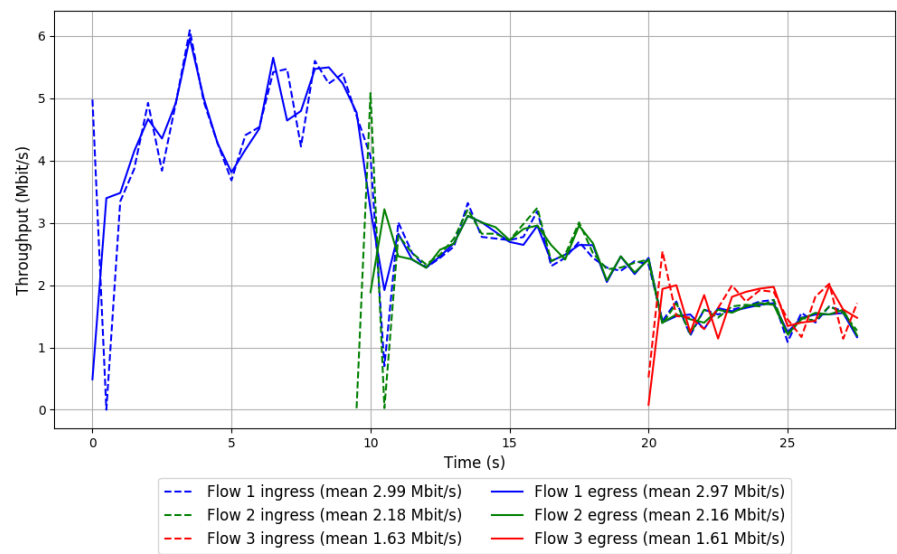


Run 2: Statistics of TaoVA-100x

Start at: 2017-12-20 19:13:03  
End at: 2017-12-20 19:13:33  
Local clock offset: 4.251 ms  
Remote clock offset: -20.193 ms

# Below is generated by plot.py at 2017-12-20 19:34:22  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.81 Mbit/s  
95th percentile per-packet one-way delay: 280.338 ms  
Loss rate: 0.83%  
-- Flow 1:  
Average throughput: 2.97 Mbit/s  
95th percentile per-packet one-way delay: 258.658 ms  
Loss rate: 0.47%  
-- Flow 2:  
Average throughput: 2.16 Mbit/s  
95th percentile per-packet one-way delay: 286.606 ms  
Loss rate: 0.97%  
-- Flow 3:  
Average throughput: 1.61 Mbit/s  
95th percentile per-packet one-way delay: 286.983 ms  
Loss rate: 2.73%

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



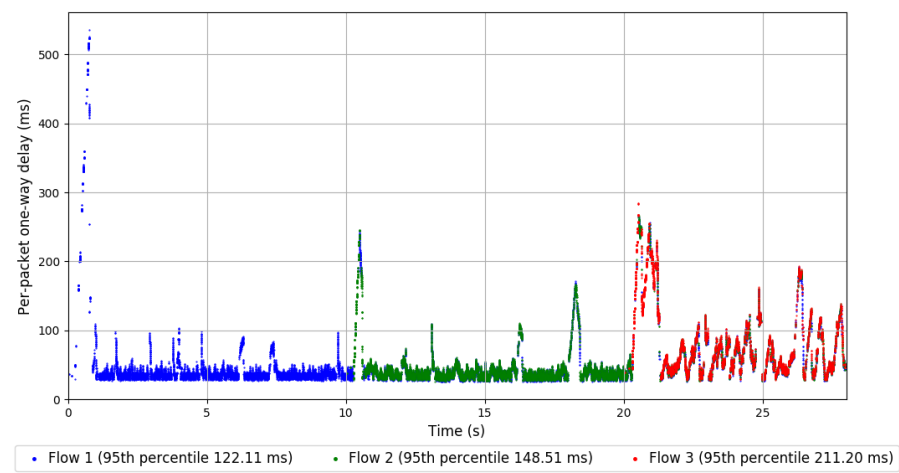
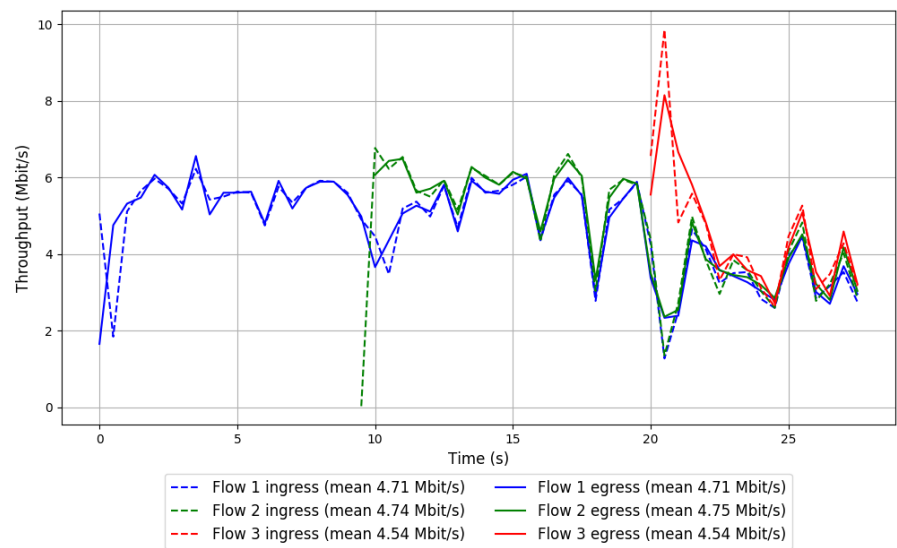
Run 3: Statistics of TaoVA-100x

Start at: 2017-12-20 19:29:52  
End at: 2017-12-20 19:30:22  
Local clock offset: 4.547 ms  
Remote clock offset: -20.361 ms

# Below is generated by plot.py at 2017-12-20 19:34:33  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 9.05 Mbit/s  
95th percentile per-packet one-way delay: 175.016 ms  
Loss rate: 0.19%  
-- Flow 1:  
Average throughput: 4.71 Mbit/s  
95th percentile per-packet one-way delay: 122.110 ms  
Loss rate: 0.11%  
-- Flow 2:  
Average throughput: 4.75 Mbit/s  
95th percentile per-packet one-way delay: 148.511 ms  
Loss rate: 0.17%  
-- Flow 3:  
Average throughput: 4.54 Mbit/s  
95th percentile per-packet one-way delay: 211.198 ms  
Loss rate: 0.57%



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

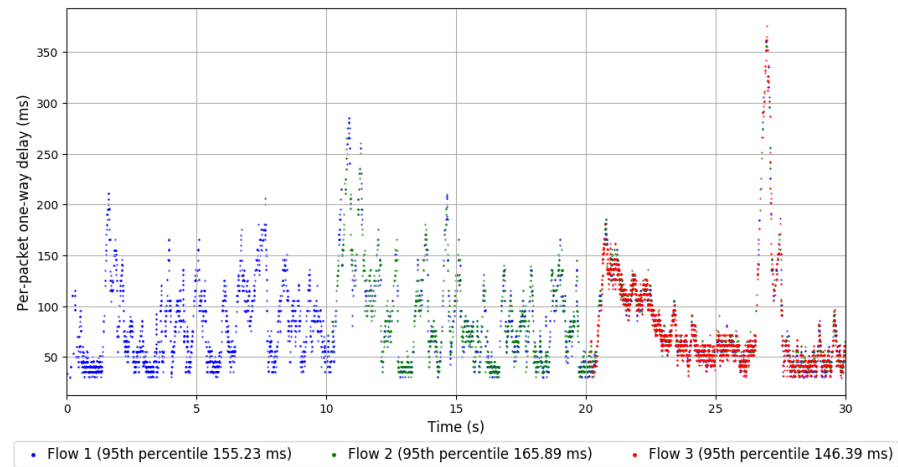
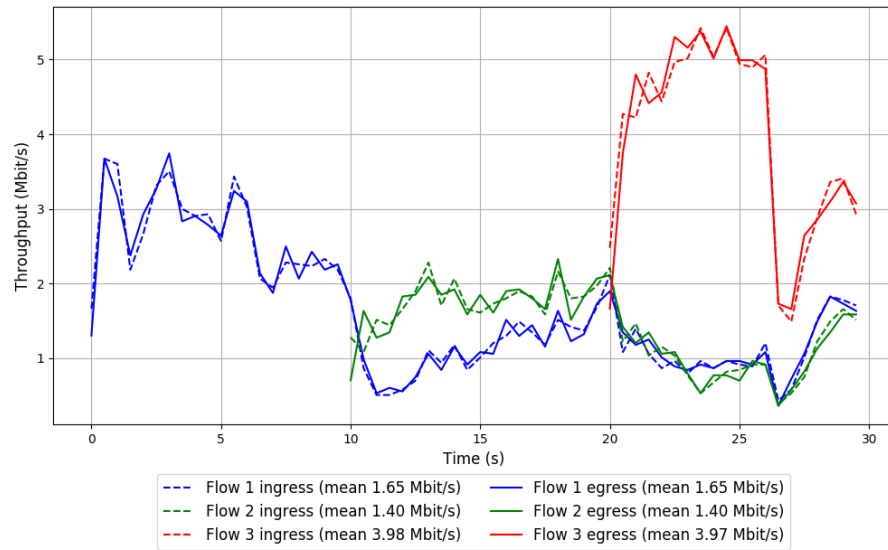


Run 1: Statistics of TCP Vegas

Start at: 2017-12-20 18:58:31  
End at: 2017-12-20 18:59:01  
Local clock offset: 4.642 ms  
Remote clock offset: -20.91 ms

# Below is generated by plot.py at 2017-12-20 19:34:33  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.90 Mbit/s  
95th percentile per-packet one-way delay: 155.396 ms  
Loss rate: 0.39%  
-- Flow 1:  
Average throughput: 1.65 Mbit/s  
95th percentile per-packet one-way delay: 155.232 ms  
Loss rate: 0.24%  
-- Flow 2:  
Average throughput: 1.40 Mbit/s  
95th percentile per-packet one-way delay: 165.893 ms  
Loss rate: 0.56%  
-- Flow 3:  
Average throughput: 3.97 Mbit/s  
95th percentile per-packet one-way delay: 146.389 ms  
Loss rate: 0.46%

# Run 1: Report of TCP Vegas — Data Link

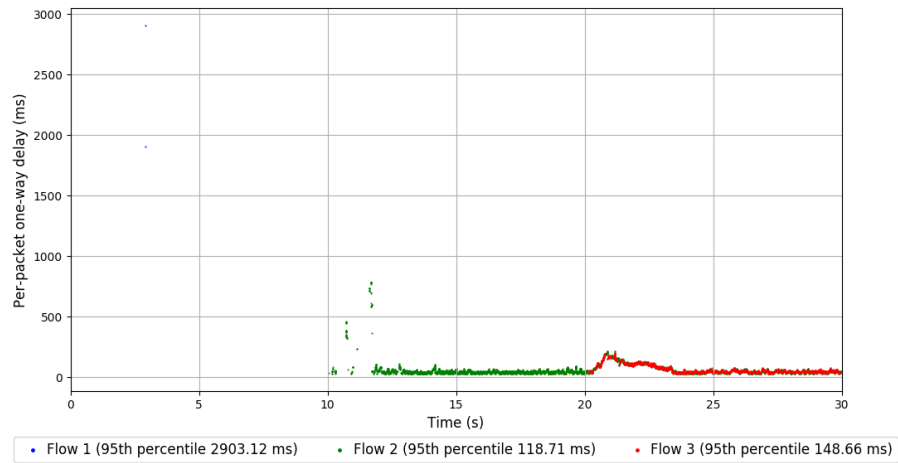
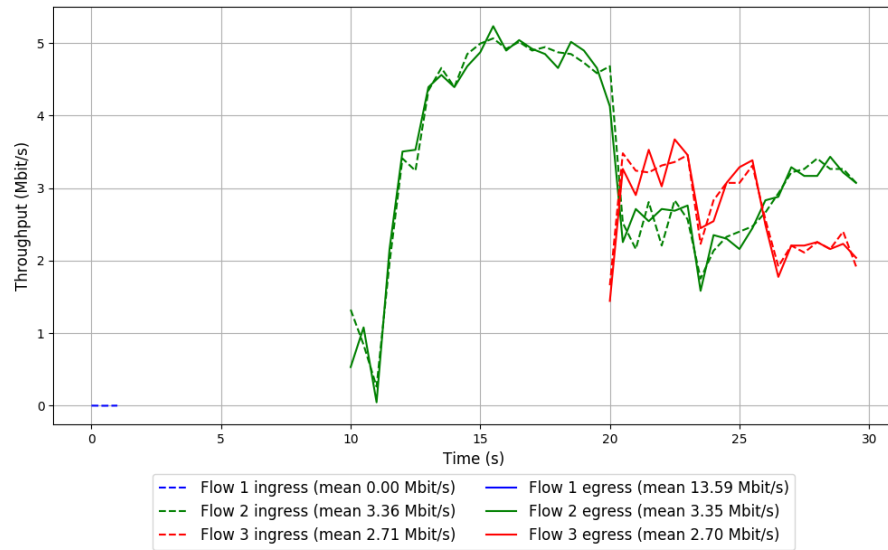


Run 2: Statistics of TCP Vegas

Start at: 2017-12-20 19:15:20  
End at: 2017-12-20 19:15:50  
Local clock offset: 5.957 ms  
Remote clock offset: -21.087 ms

# Below is generated by plot.py at 2017-12-20 19:34:33  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.46 Mbit/s  
95th percentile per-packet one-way delay: 133.309 ms  
Loss rate: 0.46%  
-- Flow 1:  
Average throughput: 13.59 Mbit/s  
95th percentile per-packet one-way delay: 2903.119 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 3.35 Mbit/s  
95th percentile per-packet one-way delay: 118.712 ms  
Loss rate: 0.36%  
-- Flow 3:  
Average throughput: 2.70 Mbit/s  
95th percentile per-packet one-way delay: 148.658 ms  
Loss rate: 0.71%

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

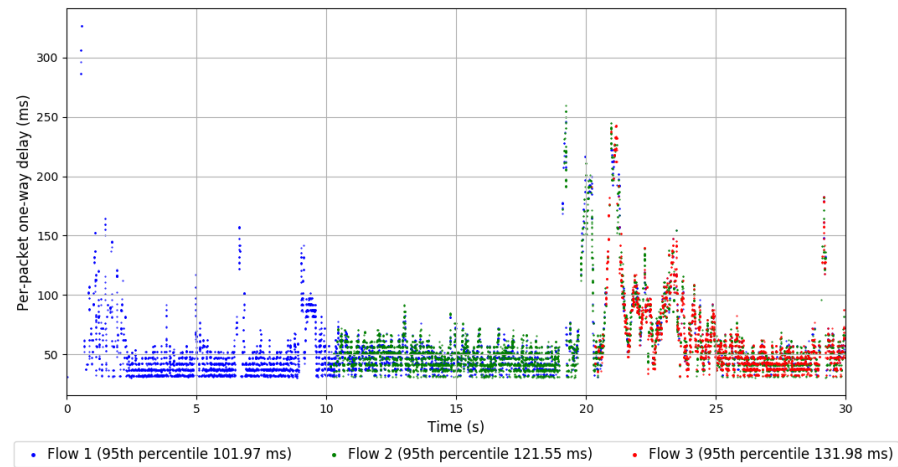
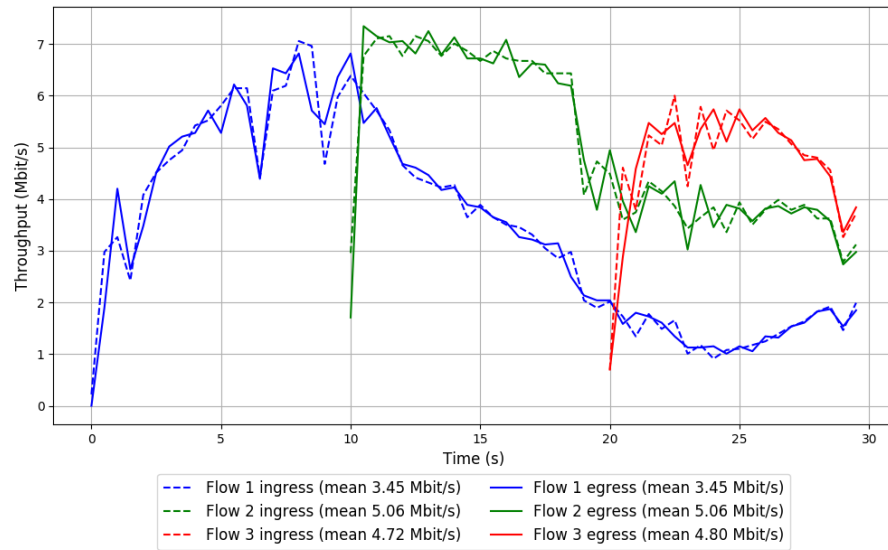


Run 3: Statistics of TCP Vegas

Start at: 2017-12-20 19:32:12  
End at: 2017-12-20 19:32:42  
Local clock offset: 4.249 ms  
Remote clock offset: -19.85 ms

# Below is generated by plot.py at 2017-12-20 19:34:33  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 8.37 Mbit/s  
95th percentile per-packet one-way delay: 117.020 ms  
Loss rate: 0.26%  
-- Flow 1:  
Average throughput: 3.45 Mbit/s  
95th percentile per-packet one-way delay: 101.968 ms  
Loss rate: 0.19%  
-- Flow 2:  
Average throughput: 5.06 Mbit/s  
95th percentile per-packet one-way delay: 121.552 ms  
Loss rate: 0.26%  
-- Flow 3:  
Average throughput: 4.80 Mbit/s  
95th percentile per-packet one-way delay: 131.976 ms  
Loss rate: 0.43%

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



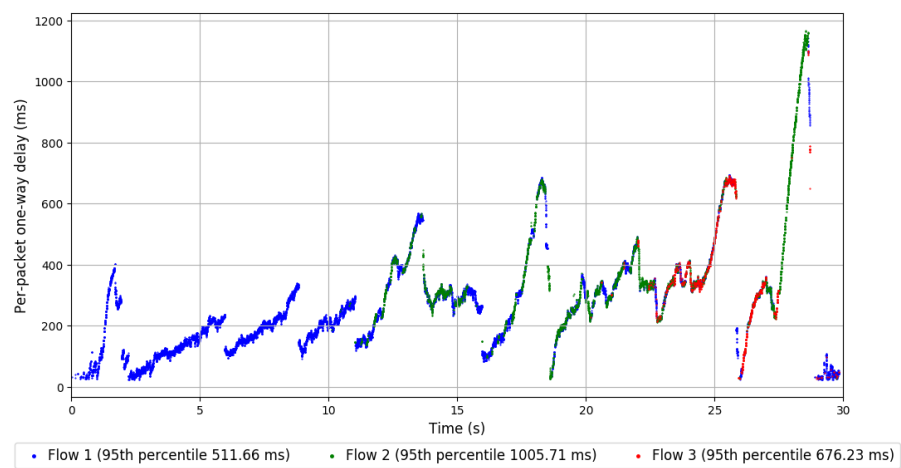
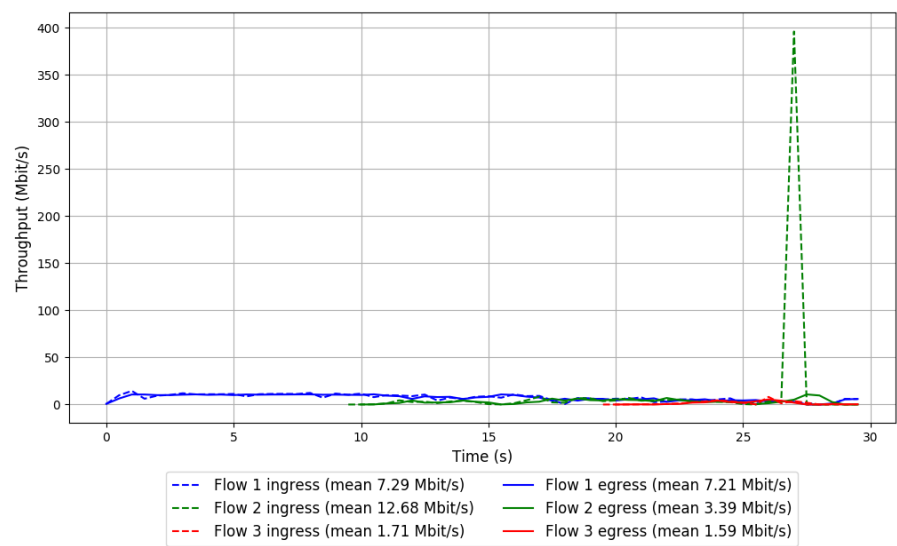
Run 1: Statistics of Verus

Start at: 2017-12-20 18:45:07  
End at: 2017-12-20 18:45:37  
Local clock offset: 3.87 ms  
Remote clock offset: -24.158 ms

# Below is generated by plot.py at 2017-12-20 19:34:33  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 9.96 Mbit/s  
95th percentile per-packet one-way delay: 654.106 ms  
Loss rate: 39.03%  
-- Flow 1:  
Average throughput: 7.21 Mbit/s  
95th percentile per-packet one-way delay: 511.662 ms  
Loss rate: 1.20%  
-- Flow 2:  
Average throughput: 3.39 Mbit/s  
95th percentile per-packet one-way delay: 1005.708 ms  
Loss rate: 73.63%  
-- Flow 3:  
Average throughput: 1.59 Mbit/s  
95th percentile per-packet one-way delay: 676.231 ms  
Loss rate: 9.24%



Run 1: Report of Verus — Data Link

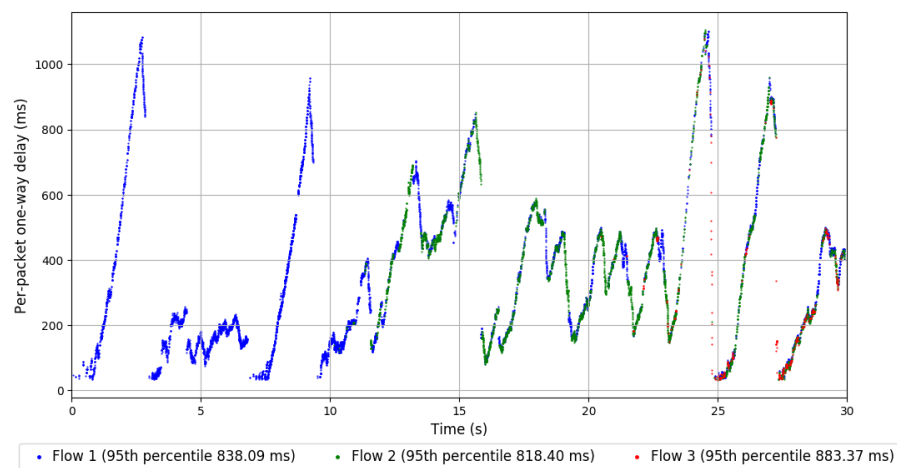
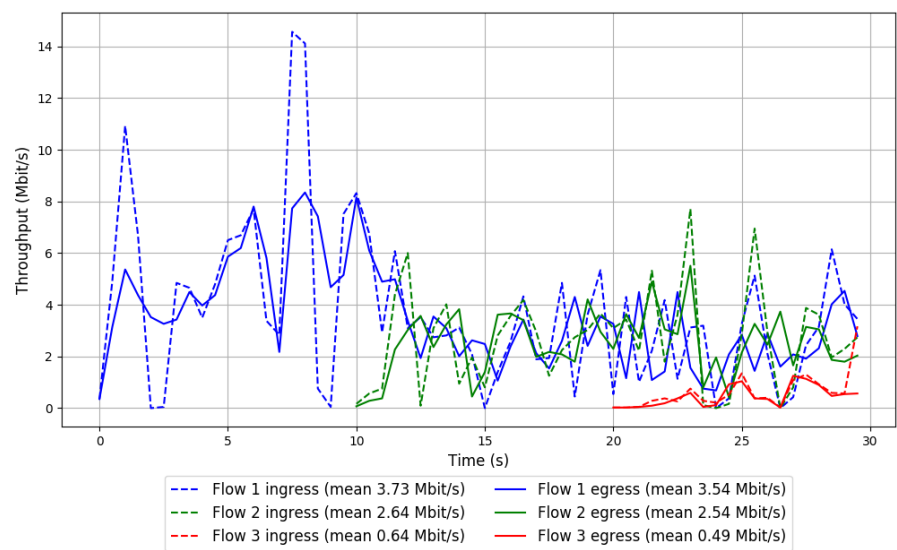


Run 2: Statistics of Verus

Start at: 2017-12-20 19:01:52  
End at: 2017-12-20 19:02:22  
Local clock offset: 3.975 ms  
Remote clock offset: -20.471 ms

# Below is generated by plot.py at 2017-12-20 19:34:33  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.37 Mbit/s  
95th percentile per-packet one-way delay: 830.879 ms  
Loss rate: 5.75%  
-- Flow 1:  
Average throughput: 3.54 Mbit/s  
95th percentile per-packet one-way delay: 838.089 ms  
Loss rate: 5.11%  
-- Flow 2:  
Average throughput: 2.54 Mbit/s  
95th percentile per-packet one-way delay: 818.404 ms  
Loss rate: 4.49%  
-- Flow 3:  
Average throughput: 0.49 Mbit/s  
95th percentile per-packet one-way delay: 883.371 ms  
Loss rate: 27.63%

Run 2: Report of Verus — Data Link

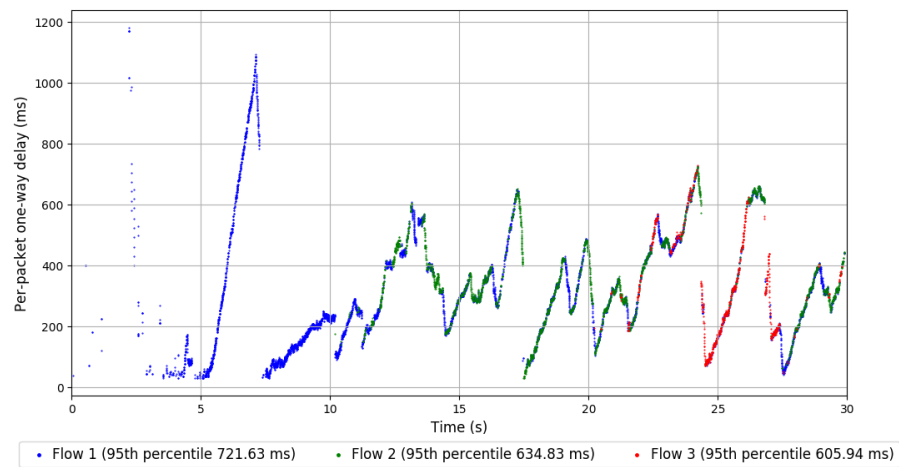
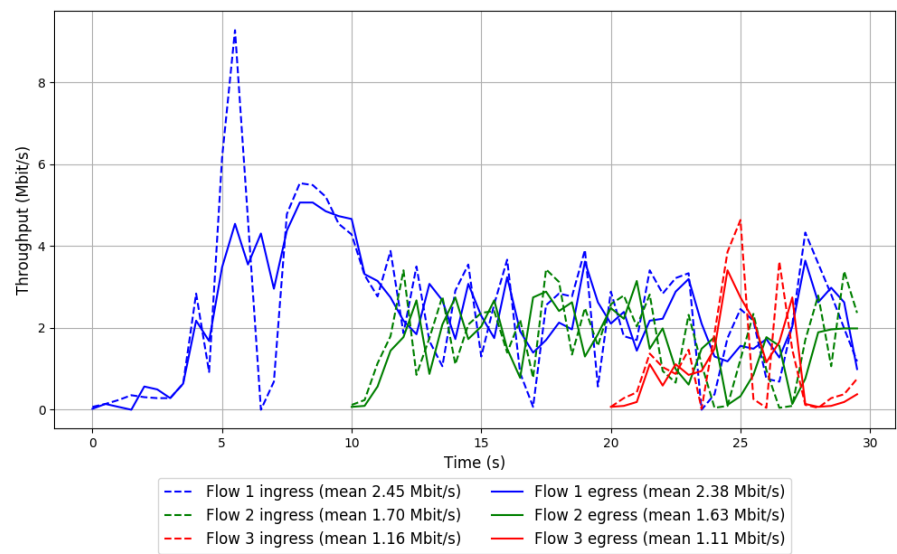


Run 3: Statistics of Verus

Start at: 2017-12-20 19:18:41  
End at: 2017-12-20 19:19:12  
Local clock offset: 3.557 ms  
Remote clock offset: -20.576 ms

# Below is generated by plot.py at 2017-12-20 19:34:33  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.81 Mbit/s  
95th percentile per-packet one-way delay: 649.738 ms  
Loss rate: 3.65%  
-- Flow 1:  
Average throughput: 2.38 Mbit/s  
95th percentile per-packet one-way delay: 721.630 ms  
Loss rate: 2.50%  
-- Flow 2:  
Average throughput: 1.63 Mbit/s  
95th percentile per-packet one-way delay: 634.827 ms  
Loss rate: 4.92%  
-- Flow 3:  
Average throughput: 1.11 Mbit/s  
95th percentile per-packet one-way delay: 605.943 ms  
Loss rate: 7.23%

Run 3: Report of Verus — Data Link



Run 1: Statistics of Copa

Start at: 2017-12-20 18:46:16

End at: 2017-12-20 18:46:46

Local clock offset: 4.374 ms

Remote clock offset: -21.717 ms

Run 1: Report of Copa — Data Link

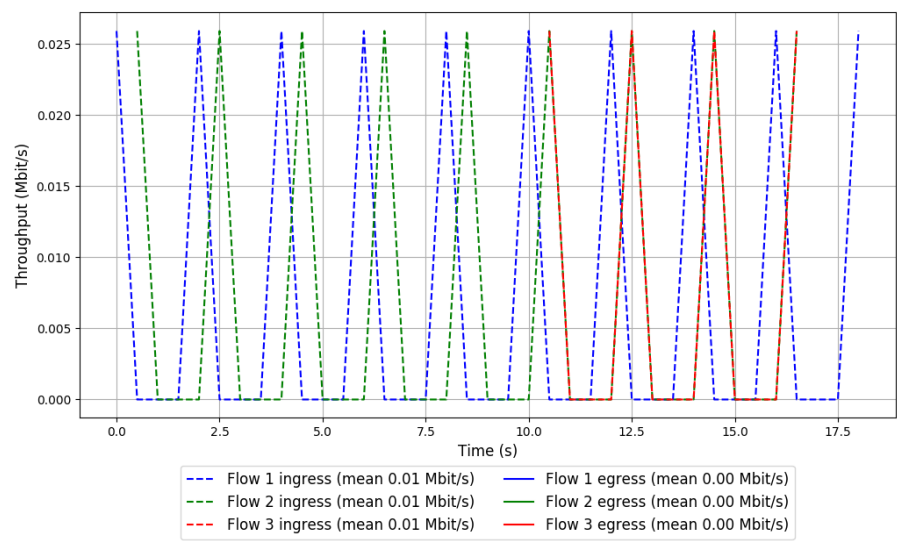


Figure is missing

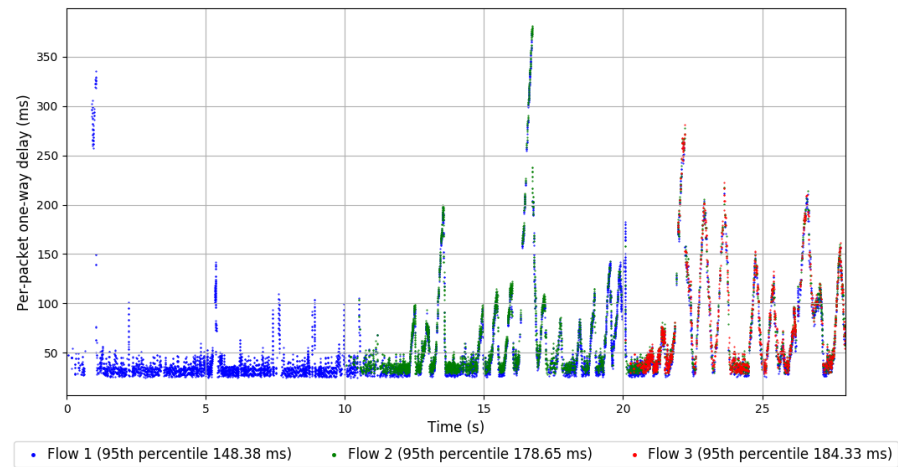
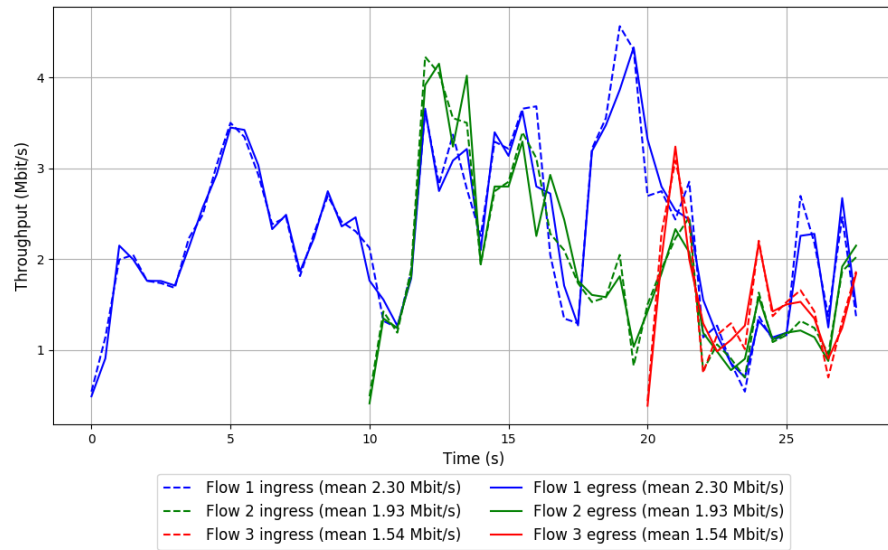
Run 2: Statistics of Copa

Start at: 2017-12-20 19:02:59  
End at: 2017-12-20 19:03:29  
Local clock offset: 4.504 ms  
Remote clock offset: -22.963 ms

# Below is generated by plot.py at 2017-12-20 19:34:33  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.97 Mbit/s  
95th percentile per-packet one-way delay: 167.470 ms  
Loss rate: 0.28%  
-- Flow 1:  
Average throughput: 2.30 Mbit/s  
95th percentile per-packet one-way delay: 148.384 ms  
Loss rate: 0.16%  
-- Flow 2:  
Average throughput: 1.93 Mbit/s  
95th percentile per-packet one-way delay: 178.646 ms  
Loss rate: 0.26%  
-- Flow 3:  
Average throughput: 1.54 Mbit/s  
95th percentile per-packet one-way delay: 184.329 ms  
Loss rate: 0.94%



## Run 2: Report of Copa — Data Link

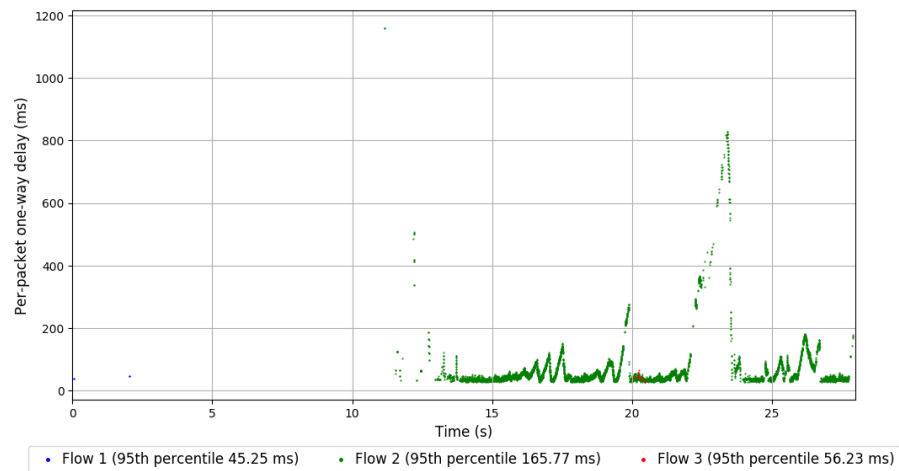
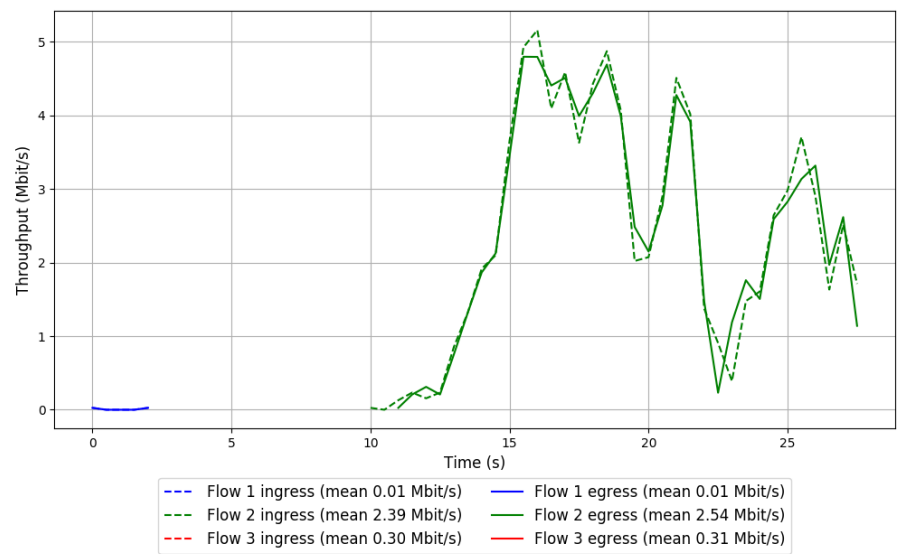


Run 3: Statistics of Copa

Start at: 2017-12-20 19:19:50  
End at: 2017-12-20 19:20:20  
Local clock offset: 4.709 ms  
Remote clock offset: -19.654 ms

# Below is generated by plot.py at 2017-12-20 19:34:33  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.53 Mbit/s  
95th percentile per-packet one-way delay: 165.752 ms  
Loss rate: 0.76%  
-- Flow 1:  
Average throughput: 0.01 Mbit/s  
95th percentile per-packet one-way delay: 45.246 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 2.54 Mbit/s  
95th percentile per-packet one-way delay: 165.772 ms  
Loss rate: 0.76%  
-- Flow 3:  
Average throughput: 0.31 Mbit/s  
95th percentile per-packet one-way delay: 56.235 ms  
Loss rate: 0.00%

Run 3: Report of Copa — Data Link

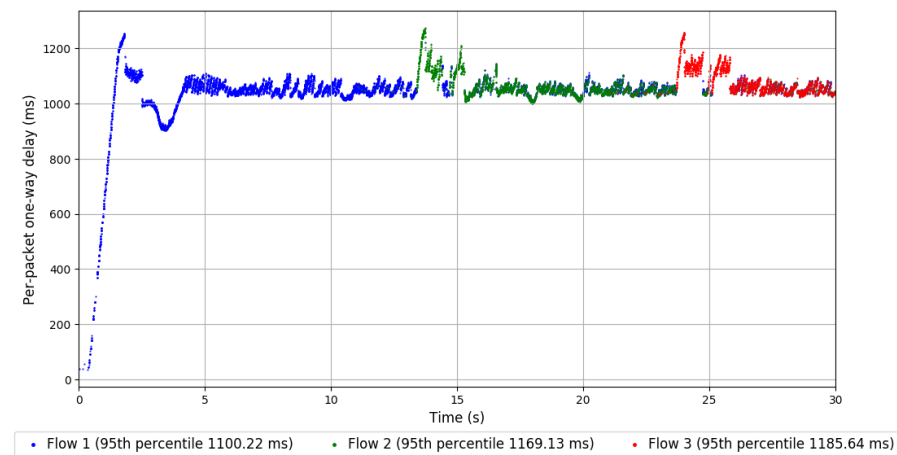
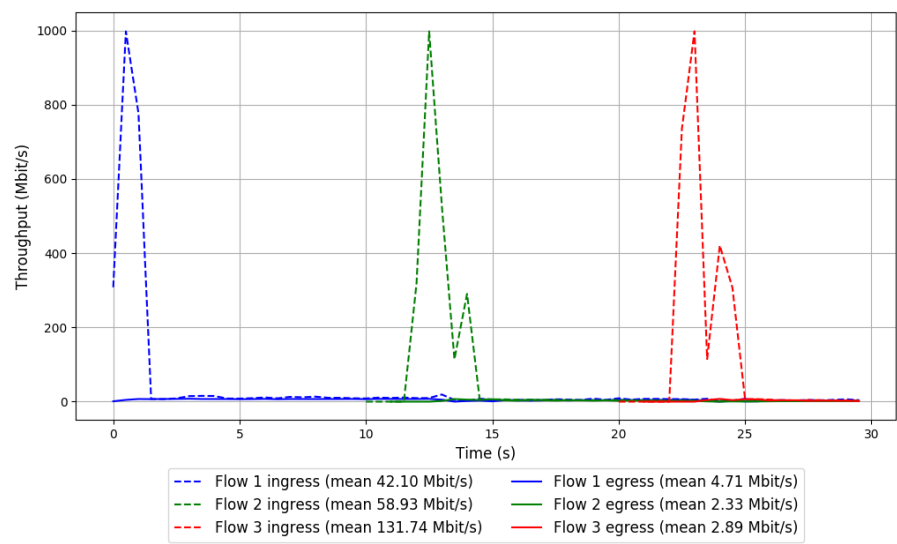


Run 1: Statistics of FillP

Start at: 2017-12-20 18:57:21  
End at: 2017-12-20 18:57:51  
Local clock offset: 3.193 ms  
Remote clock offset: -20.188 ms

# Below is generated by plot.py at 2017-12-20 19:34:42  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 7.04 Mbit/s  
95th percentile per-packet one-way delay: 1144.470 ms  
Loss rate: 94.37%  
-- Flow 1:  
Average throughput: 4.71 Mbit/s  
95th percentile per-packet one-way delay: 1100.224 ms  
Loss rate: 88.82%  
-- Flow 2:  
Average throughput: 2.33 Mbit/s  
95th percentile per-packet one-way delay: 1169.133 ms  
Loss rate: 96.26%  
-- Flow 3:  
Average throughput: 2.89 Mbit/s  
95th percentile per-packet one-way delay: 1185.640 ms  
Loss rate: 98.04%

Run 1: Report of FillP — Data Link

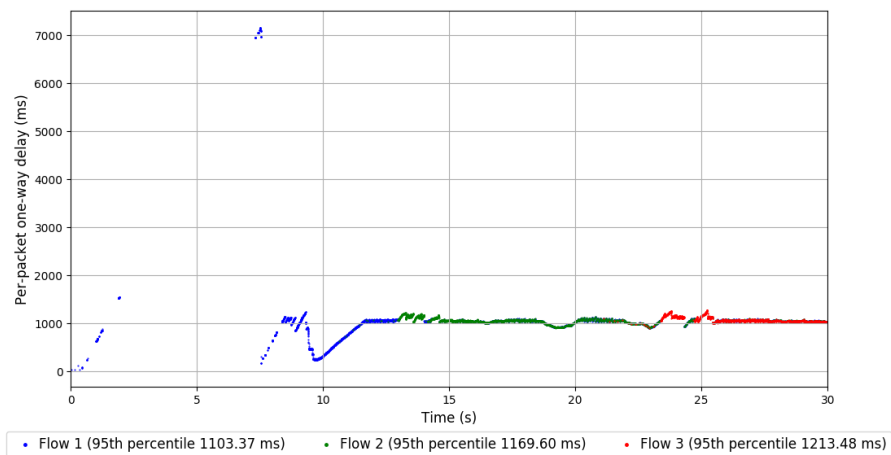
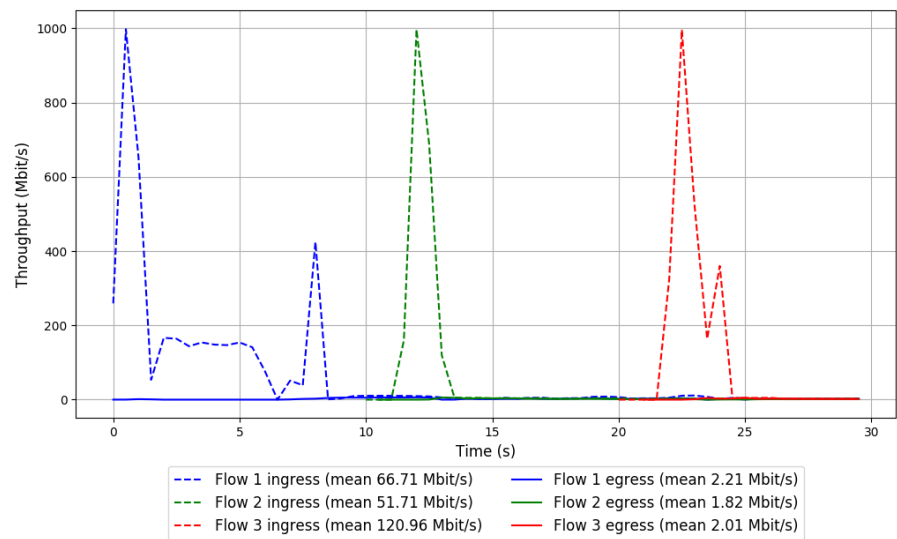


Run 2: Statistics of FillP

Start at: 2017-12-20 19:14:11  
End at: 2017-12-20 19:14:41  
Local clock offset: 2.715 ms  
Remote clock offset: -19.434 ms

# Below is generated by plot.py at 2017-12-20 19:34:43  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.98 Mbit/s  
95th percentile per-packet one-way delay: 1167.959 ms  
Loss rate: 97.19%  
-- Flow 1:  
Average throughput: 2.21 Mbit/s  
95th percentile per-packet one-way delay: 1103.369 ms  
Loss rate: 96.69%  
-- Flow 2:  
Average throughput: 1.82 Mbit/s  
95th percentile per-packet one-way delay: 1169.598 ms  
Loss rate: 96.60%  
-- Flow 3:  
Average throughput: 2.01 Mbit/s  
95th percentile per-packet one-way delay: 1213.485 ms  
Loss rate: 98.52%

Run 2: Report of FillP — Data Link



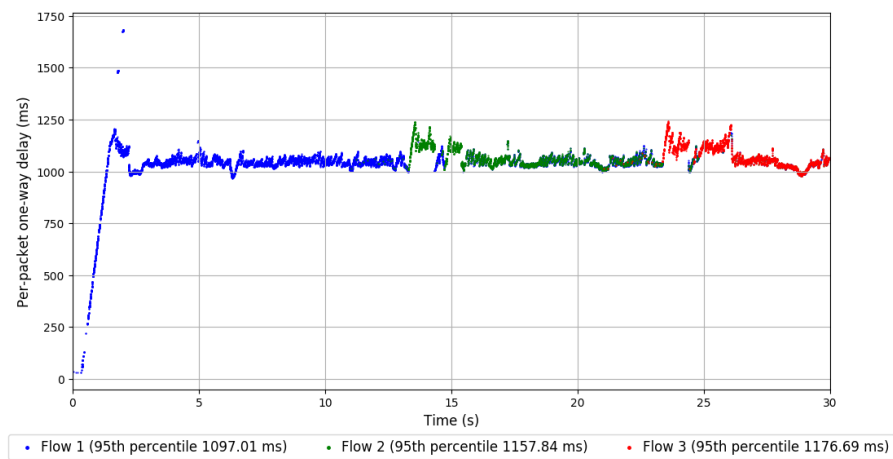
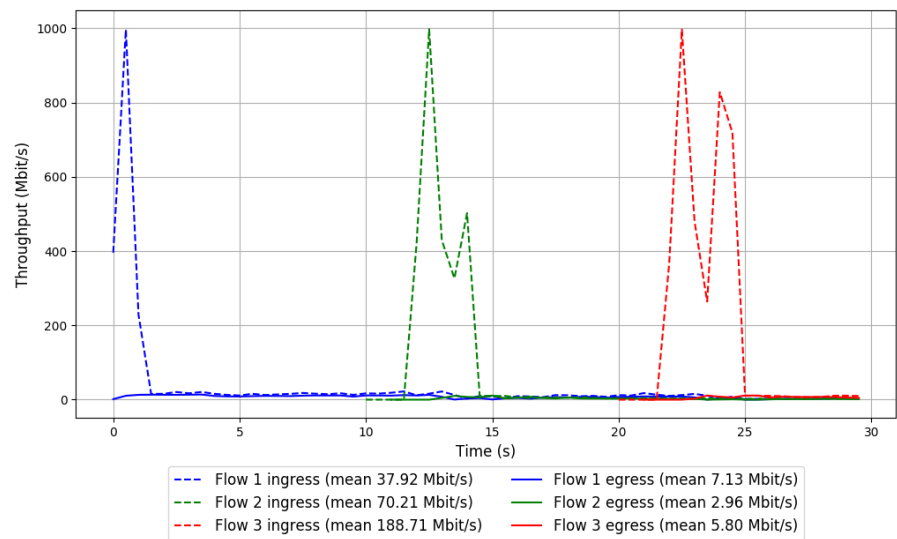
Run 3: Statistics of FillP

Start at: 2017-12-20 19:31:01  
End at: 2017-12-20 19:31:31  
Local clock offset: 5.832 ms  
Remote clock offset: -20.804 ms

# Below is generated by plot.py at 2017-12-20 19:34:44  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 10.73 Mbit/s  
95th percentile per-packet one-way delay: 1140.065 ms  
Loss rate: 92.73%  
-- Flow 1:  
Average throughput: 7.13 Mbit/s  
95th percentile per-packet one-way delay: 1097.012 ms  
Loss rate: 81.23%  
-- Flow 2:  
Average throughput: 2.96 Mbit/s  
95th percentile per-packet one-way delay: 1157.841 ms  
Loss rate: 96.00%  
-- Flow 3:  
Average throughput: 5.80 Mbit/s  
95th percentile per-packet one-way delay: 1176.695 ms  
Loss rate: 97.24%



Run 3: Report of FillP — Data Link

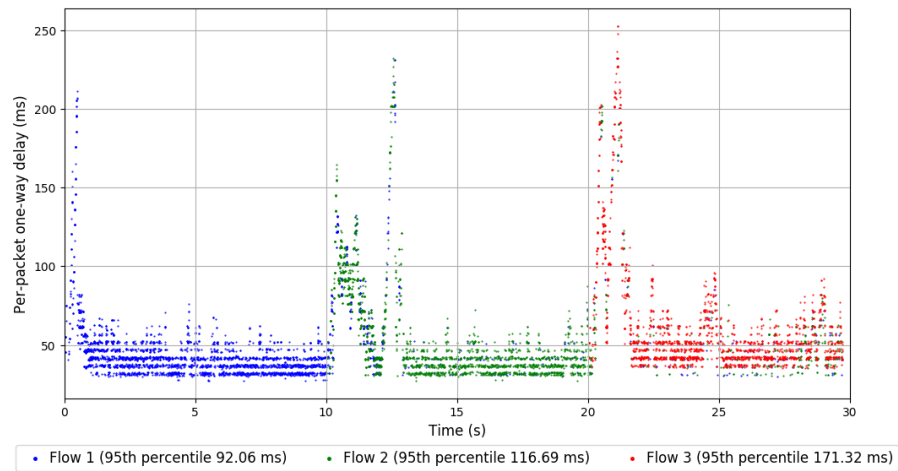
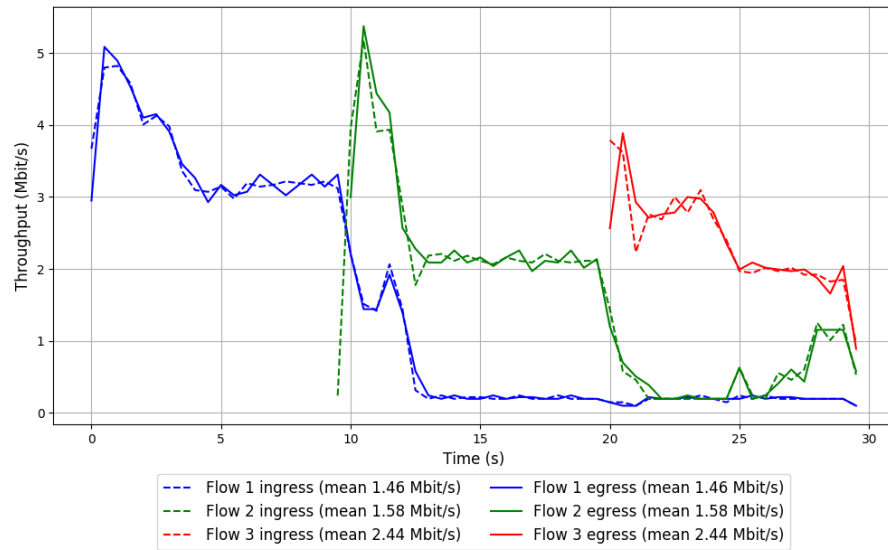


```
Run 1: Statistics of Indigo

Start at: 2017-12-20 18:47:22
End at: 2017-12-20 18:47:52
Local clock offset: 2.757 ms
Remote clock offset: -21.843 ms

# Below is generated by plot.py at 2017-12-20 19:34:44
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.30 Mbit/s
95th percentile per-packet one-way delay: 121.529 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 1.46 Mbit/s
95th percentile per-packet one-way delay: 92.062 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.58 Mbit/s
95th percentile per-packet one-way delay: 116.691 ms
Loss rate: 0.27%
-- Flow 3:
Average throughput: 2.44 Mbit/s
95th percentile per-packet one-way delay: 171.319 ms
Loss rate: 0.40%
```

# Run 1: Report of Indigo — Data Link

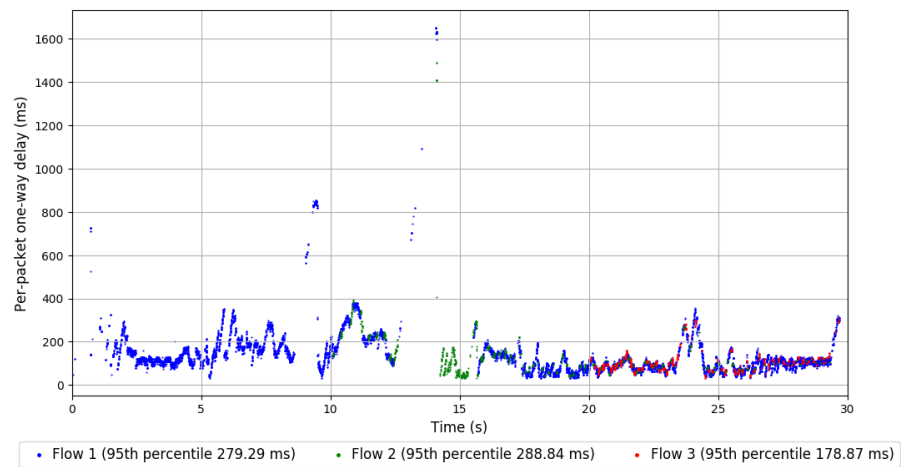
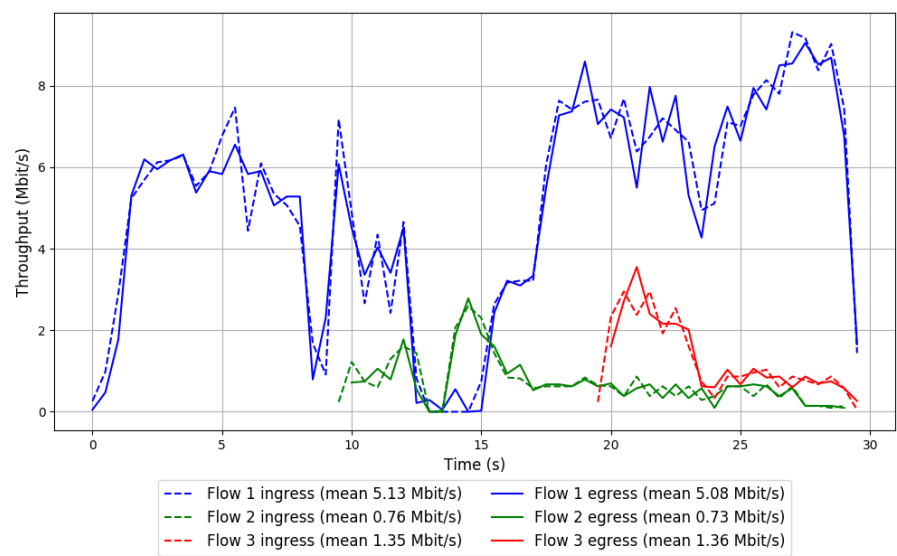


Run 2: Statistics of Indigo

Start at: 2017-12-20 19:04:07  
End at: 2017-12-20 19:04:37  
Local clock offset: 2.712 ms  
Remote clock offset: -20.52 ms

# Below is generated by plot.py at 2017-12-20 19:34:44  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.99 Mbit/s  
95th percentile per-packet one-way delay: 279.013 ms  
Loss rate: 1.40%  
-- Flow 1:  
Average throughput: 5.08 Mbit/s  
95th percentile per-packet one-way delay: 279.289 ms  
Loss rate: 1.19%  
-- Flow 2:  
Average throughput: 0.73 Mbit/s  
95th percentile per-packet one-way delay: 288.841 ms  
Loss rate: 4.55%  
-- Flow 3:  
Average throughput: 1.36 Mbit/s  
95th percentile per-packet one-way delay: 178.874 ms  
Loss rate: 0.28%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2017-12-20 19:20:56  
End at: 2017-12-20 19:21:26  
Local clock offset: 2.597 ms  
Remote clock offset: -18.595 ms

# Below is generated by plot.py at 2017-12-20 19:34:44  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.19 Mbit/s  
95th percentile per-packet one-way delay: 309.300 ms  
Loss rate: 0.35%  
-- Flow 1:  
Average throughput: 3.40 Mbit/s  
95th percentile per-packet one-way delay: 290.672 ms  
Loss rate: 0.35%  
-- Flow 2:  
Average throughput: 1.04 Mbit/s  
95th percentile per-packet one-way delay: 565.175 ms  
Loss rate: 0.30%  
-- Flow 3:  
Average throughput: 0.30 Mbit/s  
95th percentile per-packet one-way delay: 310.059 ms  
Loss rate: 0.83%

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

