

Pantheon Report

Generated at 2017-12-11 10:46:50 (UTC).

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

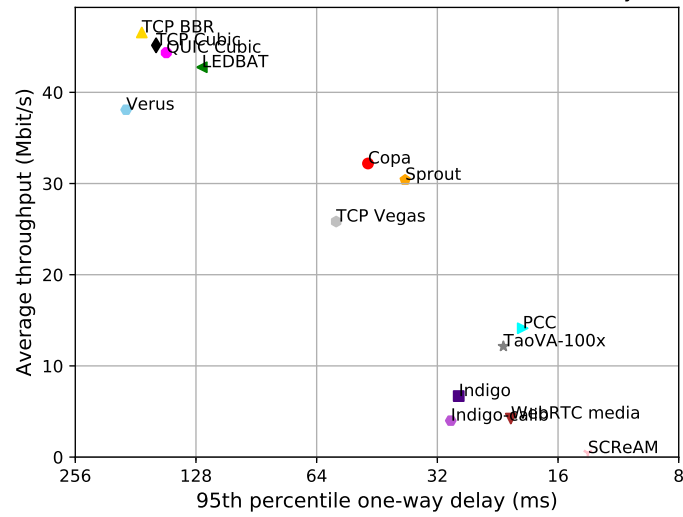
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

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

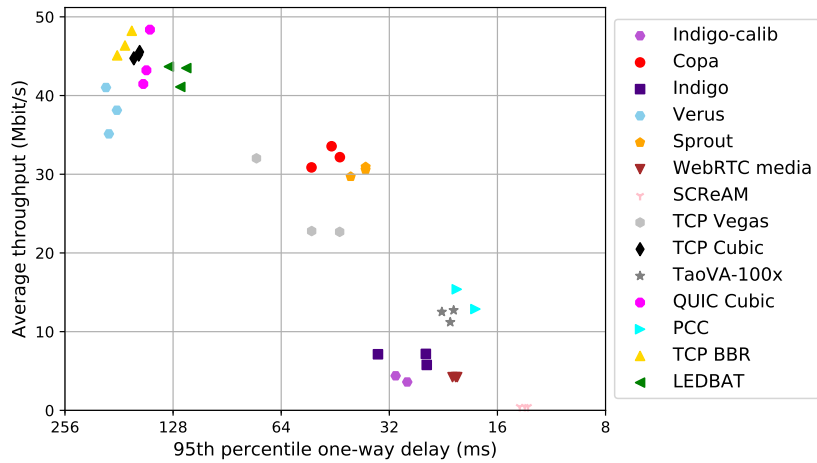
Git summary:

```
branch: indigos @ e3a57ad5ac5cfcaca0e3f983c8dd4cc3509e0262
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/genericCC @ b5b7c38e8391001927dc41c6cfa2627d03dde737
third_party/indigo @ b19f3730105f9aa95452552af924e3719b03cc55
third_party/indigo-cellular @ aee99e8eb842cb053f8c9a80e28cd256a930bbc2
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/indigo-no-cwnd @ 3e58442c04028a11d7b02456e137604633ba2d6c
third_party/indigo-no-delivery-rate @ 57caa40858b964906edff4876d5a7e5bfff666c5
third_party/indigo-no-queuing-delay @ 03455460fd1a8ffbdad86fabb936fdca204b80db
third_party/indigo-no-send-rate @ b39dfa6b2c5f19cb7cd89626cb4f5bb81f9fecda
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
  M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ baf443516dea3eeddeccaf9b916cc313273ca4f4
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 @ f1a14bffe749737437f61b1eaeeb30b267cde681
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 California 1 Ethernet to Stanford ppp0, 3 runs of 30s each per scheme
 3 flows with 10s interval between flows (mean of all runs by scheme)



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



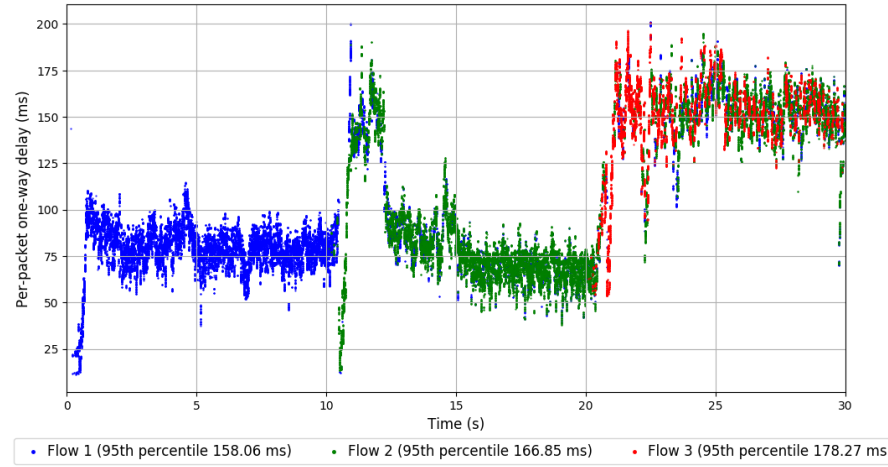
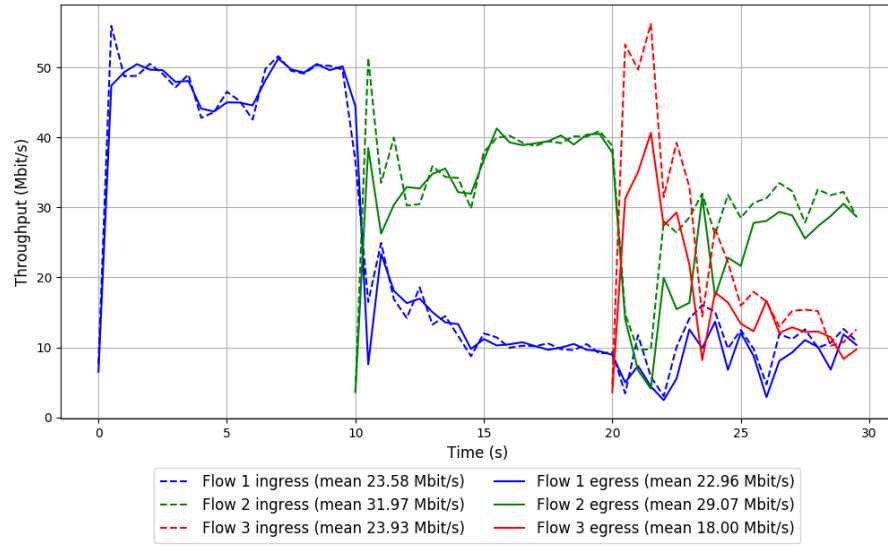
| scheme | # runs | mean avg tput (Mbit/s) | | | mean 95th-%ile delay (ms) | | | mean loss rate (%) | | |
|--------------|--------|------------------------|--------|--------|---------------------------|--------|--------|--------------------|--------|--------|
| | | flow 1 | flow 2 | flow 3 | flow 1 | flow 2 | flow 3 | flow 1 | flow 2 | flow 3 |
| TCP BBR | 3 | 22.15 | 26.94 | 19.71 | 159.76 | 174.90 | 185.91 | 2.51 | 7.30 | 20.66 |
| TCP Cubic | 3 | 33.58 | 9.85 | 15.13 | 158.42 | 160.16 | 166.15 | 0.44 | 0.98 | 1.80 |
| LEDBAT | 3 | 34.35 | 10.19 | 4.92 | 122.08 | 126.44 | 129.65 | 0.21 | 0.54 | 1.07 |
| PCC | 2 | 8.42 | 3.22 | 10.73 | 18.97 | 19.36 | 20.52 | 0.00 | 0.00 | 0.00 |
| QUIC Cubic | 3 | 28.28 | 16.87 | 15.06 | 148.48 | 153.89 | 156.58 | 0.51 | 1.09 | 2.39 |
| SCReAM | 3 | 0.22 | 0.22 | 0.22 | 13.97 | 12.75 | 13.13 | 0.00 | 0.00 | 0.00 |
| WebRTC media | 3 | 2.27 | 1.43 | 0.54 | 21.06 | 20.76 | 21.67 | 0.00 | 0.00 | 0.15 |
| Sprout | 3 | 15.38 | 15.35 | 14.31 | 36.96 | 38.46 | 41.44 | 0.03 | 0.04 | 0.06 |
| TaoVA-100x | 3 | 5.40 | 6.33 | 9.23 | 20.08 | 20.76 | 29.28 | 0.00 | 0.00 | 0.00 |
| TCP Vegas | 3 | 14.02 | 14.42 | 6.53 | 55.15 | 48.73 | 33.36 | 0.00 | 0.00 | 0.00 |
| Verus | 3 | 25.26 | 16.05 | 7.63 | 188.82 | 195.92 | 193.76 | 17.04 | 26.36 | 27.15 |
| Copa | 3 | 19.93 | 15.45 | 7.94 | 44.00 | 50.79 | 55.67 | 0.04 | 0.09 | 0.35 |
| Indigo | 3 | 2.77 | 3.49 | 3.93 | 25.81 | 26.35 | 33.43 | 0.00 | 0.00 | 0.00 |
| Indigo-calib | 2 | 1.12 | 2.02 | 4.35 | 29.43 | 27.98 | 30.14 | 0.00 | 0.00 | 0.00 |

Run 1: Statistics of TCP BBR

Start at: 2017-12-11 10:02:12
End at: 2017-12-11 10:02:42
Local clock offset: -5.586 ms
Remote clock offset: -1.202 ms

Below is generated by plot.py at 2017-12-11 10:45:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 48.23 Mbit/s
95th percentile per-packet one-way delay: 166.813 ms
Loss rate: 8.96%
-- Flow 1:
Average throughput: 22.96 Mbit/s
95th percentile per-packet one-way delay: 158.062 ms
Loss rate: 3.11%
-- Flow 2:
Average throughput: 29.07 Mbit/s
95th percentile per-packet one-way delay: 166.853 ms
Loss rate: 9.27%
-- Flow 3:
Average throughput: 18.00 Mbit/s
95th percentile per-packet one-way delay: 178.272 ms
Loss rate: 25.56%

Run 1: Report of TCP BBR — Data Link

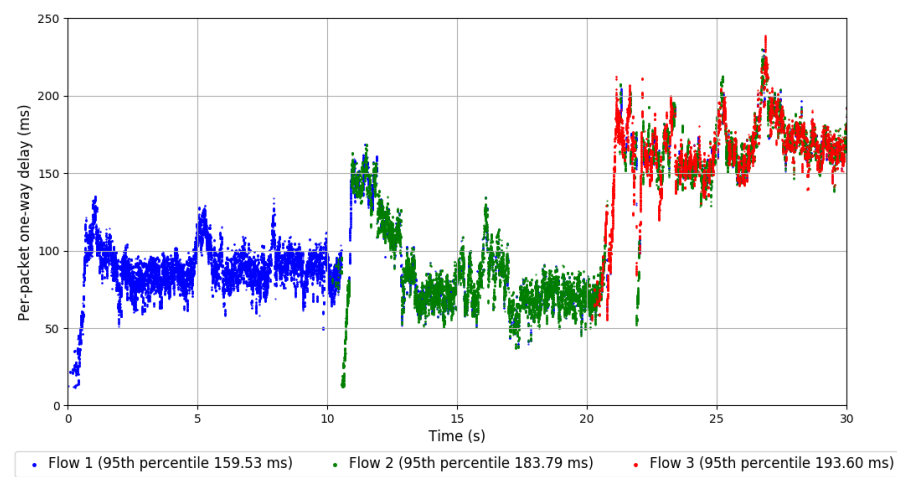
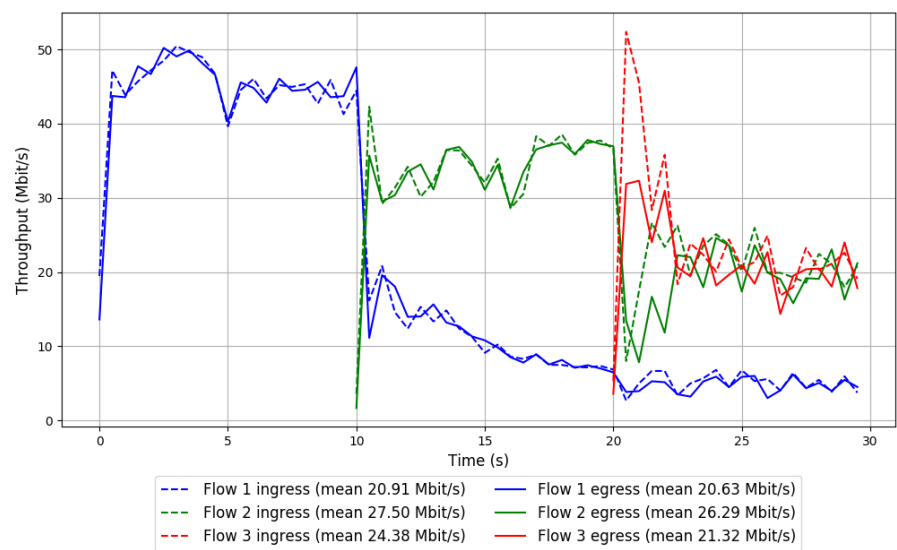


Run 2: Statistics of TCP BBR

Start at: 2017-12-11 10:19:03
End at: 2017-12-11 10:19:33
Local clock offset: -5.205 ms
Remote clock offset: -0.802 ms

Below is generated by plot.py at 2017-12-11 10:45:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 45.11 Mbit/s
95th percentile per-packet one-way delay: 183.135 ms
Loss rate: 4.46%
-- Flow 1:
Average throughput: 20.63 Mbit/s
95th percentile per-packet one-way delay: 159.527 ms
Loss rate: 0.97%
-- Flow 2:
Average throughput: 26.29 Mbit/s
95th percentile per-packet one-way delay: 183.790 ms
Loss rate: 4.70%
-- Flow 3:
Average throughput: 21.32 Mbit/s
95th percentile per-packet one-way delay: 193.601 ms
Loss rate: 12.90%

Run 2: Report of TCP BBR — Data Link

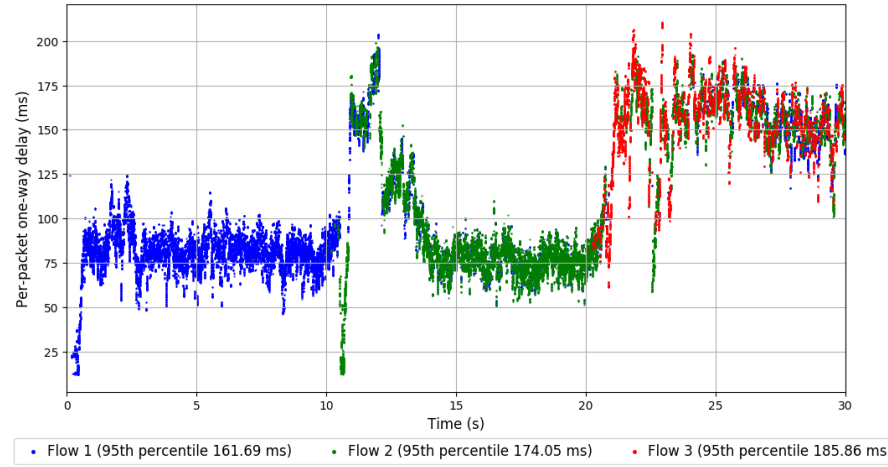
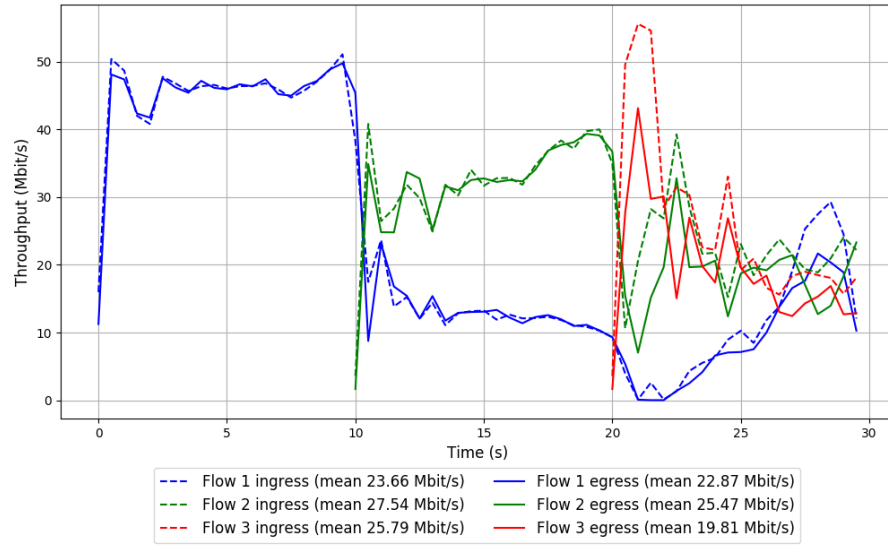


Run 3: Statistics of TCP BBR

Start at: 2017-12-11 10:35:55
End at: 2017-12-11 10:36:25
Local clock offset: -5.611 ms
Remote clock offset: -0.844 ms

Below is generated by plot.py at 2017-12-11 10:45:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 46.36 Mbit/s
95th percentile per-packet one-way delay: 174.225 ms
Loss rate: 8.47%
-- Flow 1:
Average throughput: 22.87 Mbit/s
95th percentile per-packet one-way delay: 161.687 ms
Loss rate: 3.45%
-- Flow 2:
Average throughput: 25.47 Mbit/s
95th percentile per-packet one-way delay: 174.054 ms
Loss rate: 7.92%
-- Flow 3:
Average throughput: 19.81 Mbit/s
95th percentile per-packet one-way delay: 185.856 ms
Loss rate: 23.53%

Run 3: Report of TCP BBR — Data Link

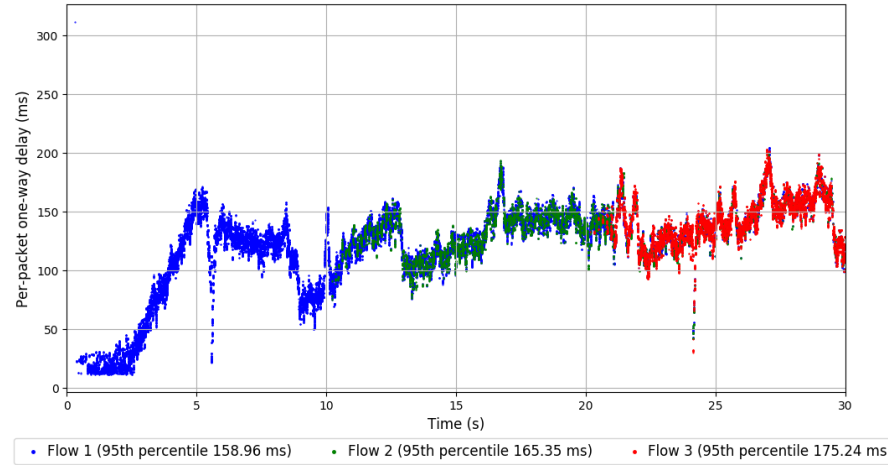
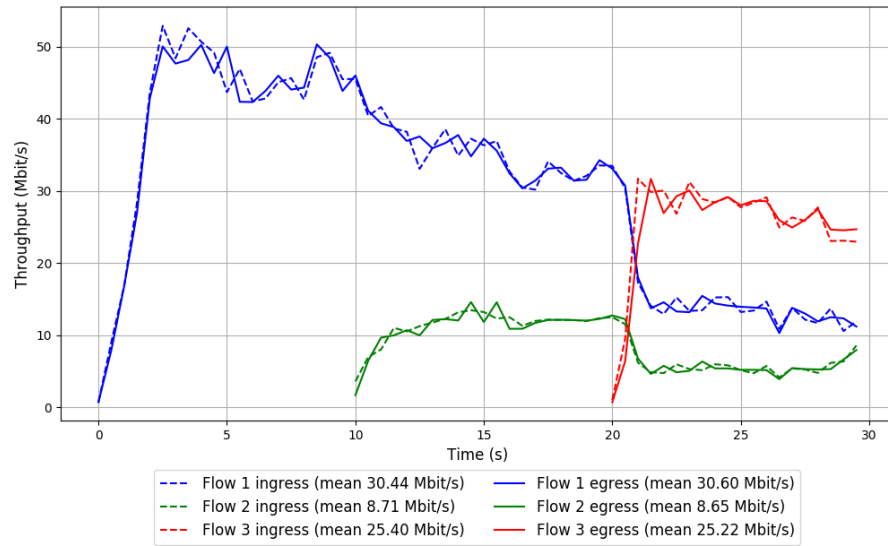


Run 1: Statistics of TCP Cubic

Start at: 2017-12-11 10:08:12
End at: 2017-12-11 10:08:42
Local clock offset: -5.894 ms
Remote clock offset: -1.043 ms

Below is generated by plot.py at 2017-12-11 10:45:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 44.73 Mbit/s
95th percentile per-packet one-way delay: 164.643 ms
Loss rate: 0.87%
-- Flow 1:
Average throughput: 30.60 Mbit/s
95th percentile per-packet one-way delay: 158.961 ms
Loss rate: 0.54%
-- Flow 2:
Average throughput: 8.65 Mbit/s
95th percentile per-packet one-way delay: 165.354 ms
Loss rate: 1.12%
-- Flow 3:
Average throughput: 25.22 Mbit/s
95th percentile per-packet one-way delay: 175.239 ms
Loss rate: 1.91%

Run 1: Report of TCP Cubic — Data Link

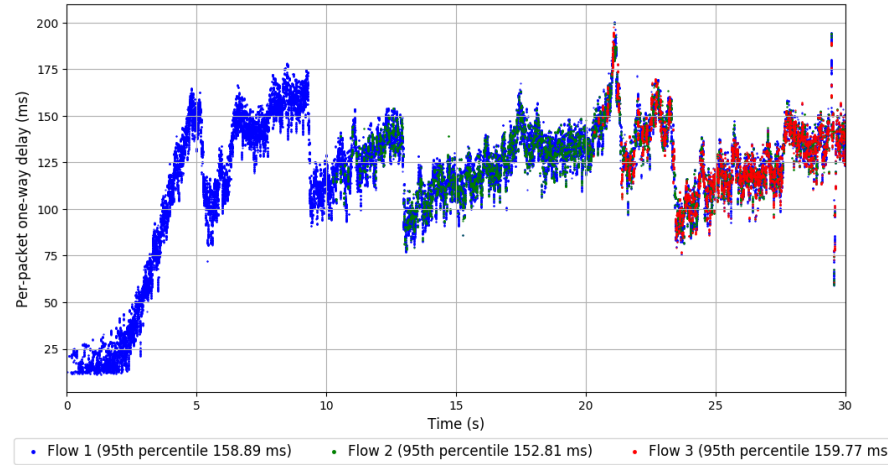
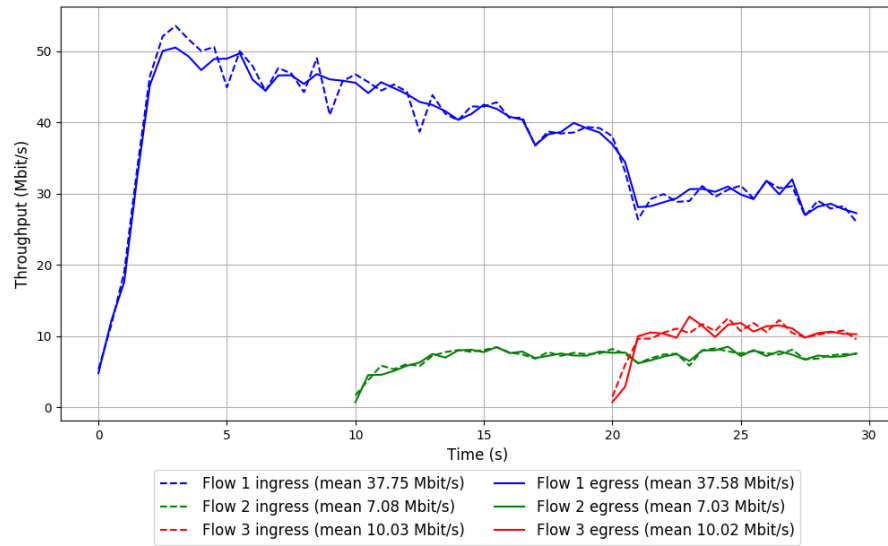


Run 2: Statistics of TCP Cubic

Start at: 2017-12-11 10:25:03
End at: 2017-12-11 10:25:33
Local clock offset: -5.25 ms
Remote clock offset: -0.759 ms

Below is generated by plot.py at 2017-12-11 10:45:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 45.53 Mbit/s
95th percentile per-packet one-way delay: 158.603 ms
Loss rate: 0.56%
-- Flow 1:
Average throughput: 37.58 Mbit/s
95th percentile per-packet one-way delay: 158.888 ms
Loss rate: 0.43%
-- Flow 2:
Average throughput: 7.03 Mbit/s
95th percentile per-packet one-way delay: 152.807 ms
Loss rate: 1.07%
-- Flow 3:
Average throughput: 10.02 Mbit/s
95th percentile per-packet one-way delay: 159.770 ms
Loss rate: 1.30%

Run 2: Report of TCP Cubic — Data Link

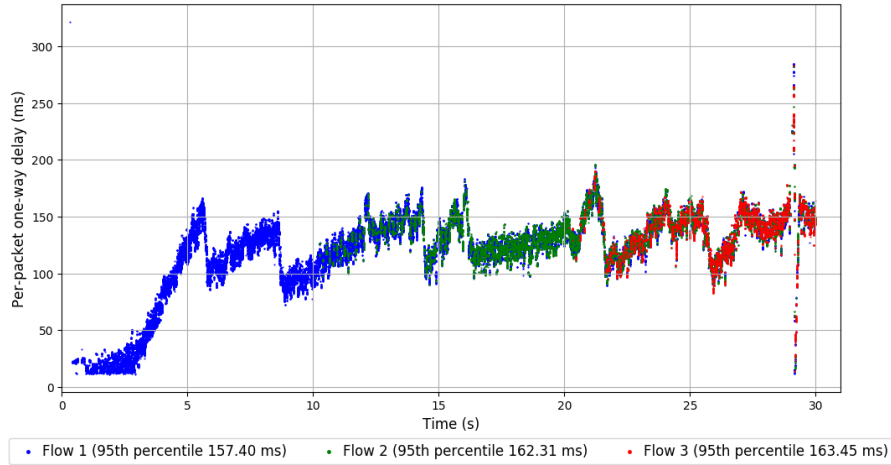
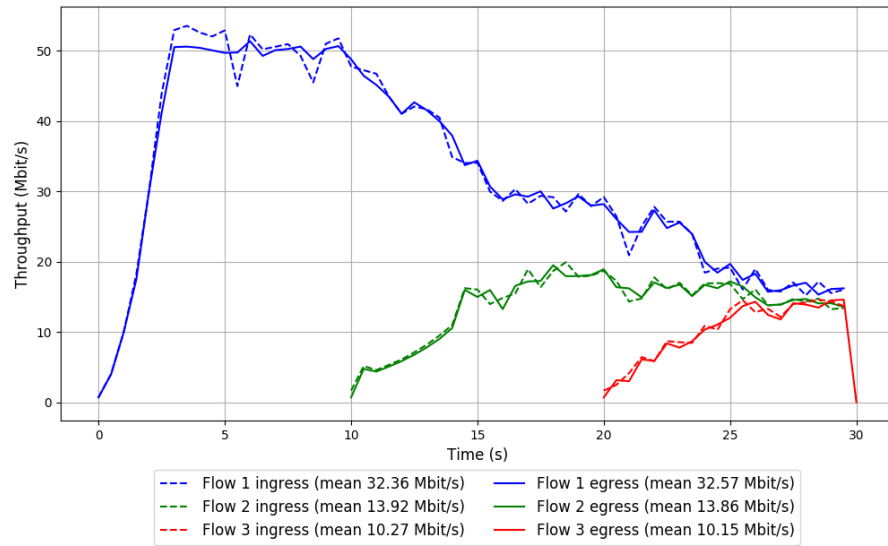


Run 3: Statistics of TCP Cubic

Start at: 2017-12-11 10:41:55
End at: 2017-12-11 10:42:25
Local clock offset: -5.981 ms
Remote clock offset: -0.708 ms

Below is generated by plot.py at 2017-12-11 10:45:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 45.20 Mbit/s
95th percentile per-packet one-way delay: 159.577 ms
Loss rate: 0.58%
-- Flow 1:
Average throughput: 32.57 Mbit/s
95th percentile per-packet one-way delay: 157.398 ms
Loss rate: 0.36%
-- Flow 2:
Average throughput: 13.86 Mbit/s
95th percentile per-packet one-way delay: 162.312 ms
Loss rate: 0.76%
-- Flow 3:
Average throughput: 10.15 Mbit/s
95th percentile per-packet one-way delay: 163.448 ms
Loss rate: 2.19%

Run 3: Report of TCP Cubic — Data Link

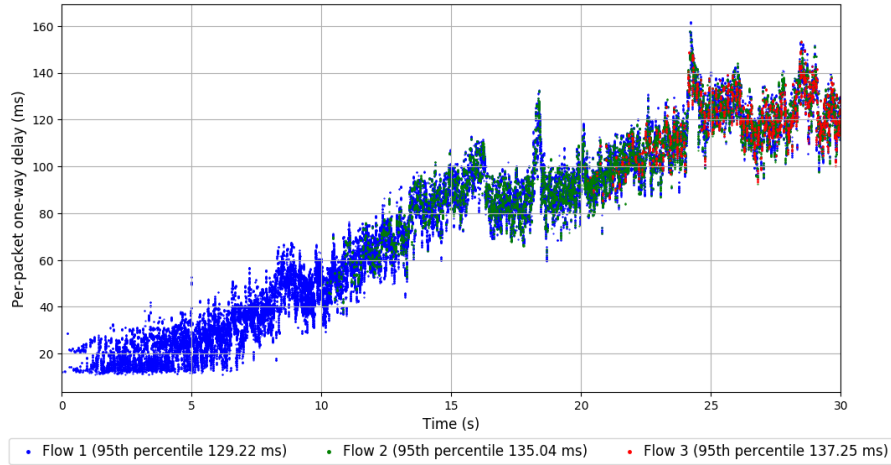
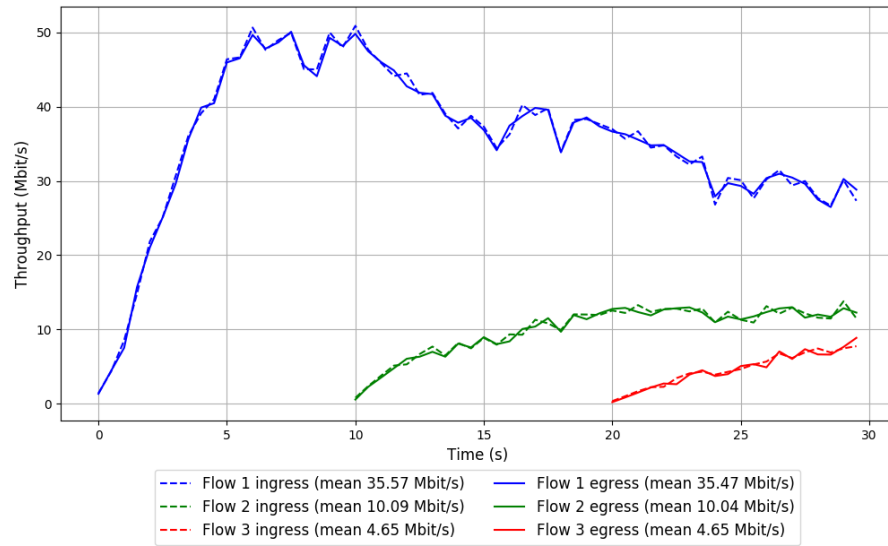


Run 1: Statistics of LEDBAT

Start at: 2017-12-11 10:00:58
End at: 2017-12-11 10:01:28
Local clock offset: -5.583 ms
Remote clock offset: -1.146 ms

Below is generated by plot.py at 2017-12-11 10:45:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 43.67 Mbit/s
95th percentile per-packet one-way delay: 131.494 ms
Loss rate: 0.35%
-- Flow 1:
Average throughput: 35.47 Mbit/s
95th percentile per-packet one-way delay: 129.216 ms
Loss rate: 0.27%
-- Flow 2:
Average throughput: 10.04 Mbit/s
95th percentile per-packet one-way delay: 135.043 ms
Loss rate: 0.68%
-- Flow 3:
Average throughput: 4.65 Mbit/s
95th percentile per-packet one-way delay: 137.252 ms
Loss rate: 0.99%

Run 1: Report of LEDBAT — Data Link

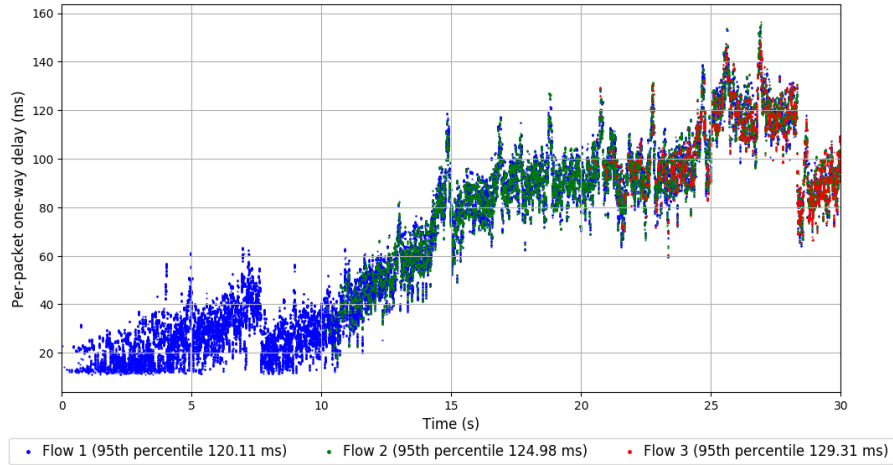
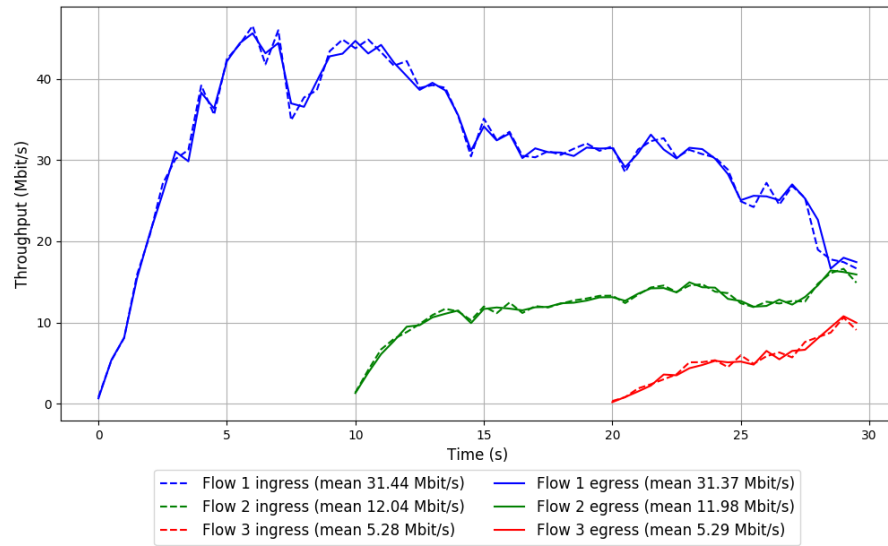


Run 2: Statistics of LEDBAT

Start at: 2017-12-11 10:17:50
End at: 2017-12-11 10:18:20
Local clock offset: -5.101 ms
Remote clock offset: -0.767 ms

Below is generated by plot.py at 2017-12-11 10:45:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 41.09 Mbit/s
95th percentile per-packet one-way delay: 122.234 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 31.37 Mbit/s
95th percentile per-packet one-way delay: 120.109 ms
Loss rate: 0.11%
-- Flow 2:
Average throughput: 11.98 Mbit/s
95th percentile per-packet one-way delay: 124.982 ms
Loss rate: 0.41%
-- Flow 3:
Average throughput: 5.29 Mbit/s
95th percentile per-packet one-way delay: 129.306 ms
Loss rate: 0.38%

Run 2: Report of LEDBAT — Data Link

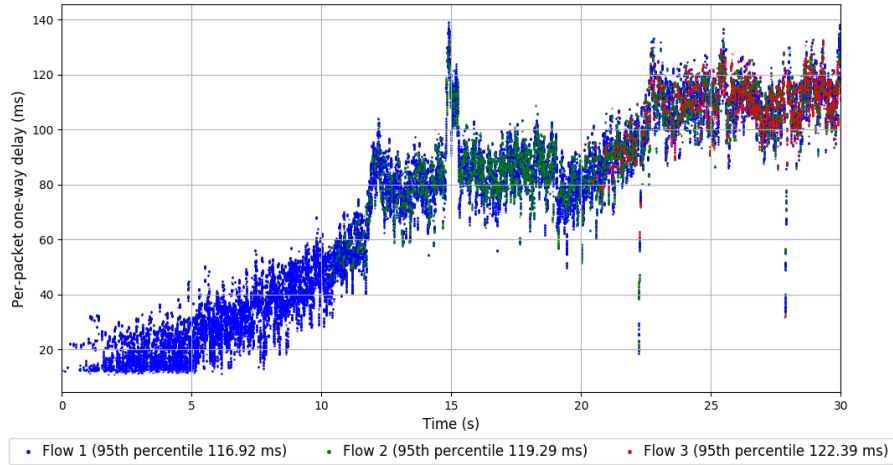
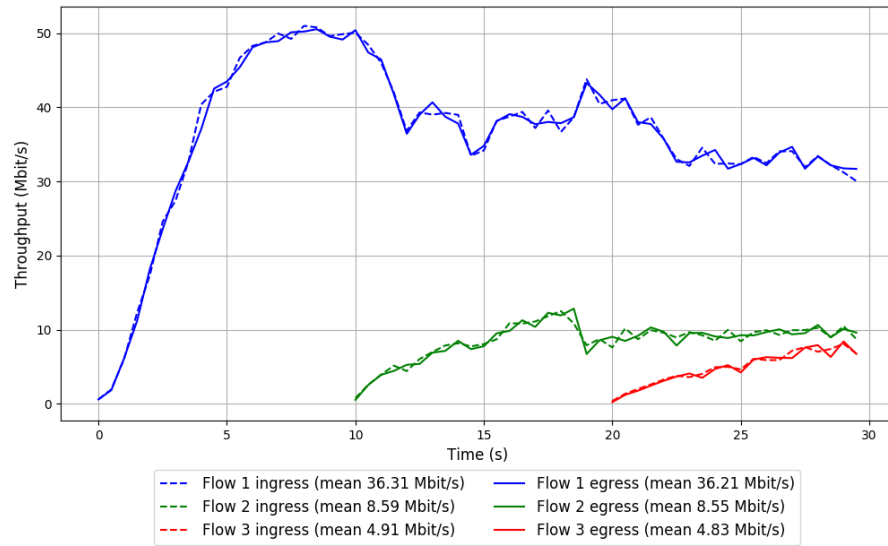


Run 3: Statistics of LEDBAT

Start at: 2017-12-11 10:34:41
End at: 2017-12-11 10:35:11
Local clock offset: -5.434 ms
Remote clock offset: -0.726 ms

Below is generated by plot.py at 2017-12-11 10:45:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 43.49 Mbit/s
95th percentile per-packet one-way delay: 117.613 ms
Loss rate: 0.34%
-- Flow 1:
Average throughput: 36.21 Mbit/s
95th percentile per-packet one-way delay: 116.916 ms
Loss rate: 0.24%
-- Flow 2:
Average throughput: 8.55 Mbit/s
95th percentile per-packet one-way delay: 119.287 ms
Loss rate: 0.54%
-- Flow 3:
Average throughput: 4.83 Mbit/s
95th percentile per-packet one-way delay: 122.386 ms
Loss rate: 1.85%

Run 3: Report of LEDBAT — Data Link

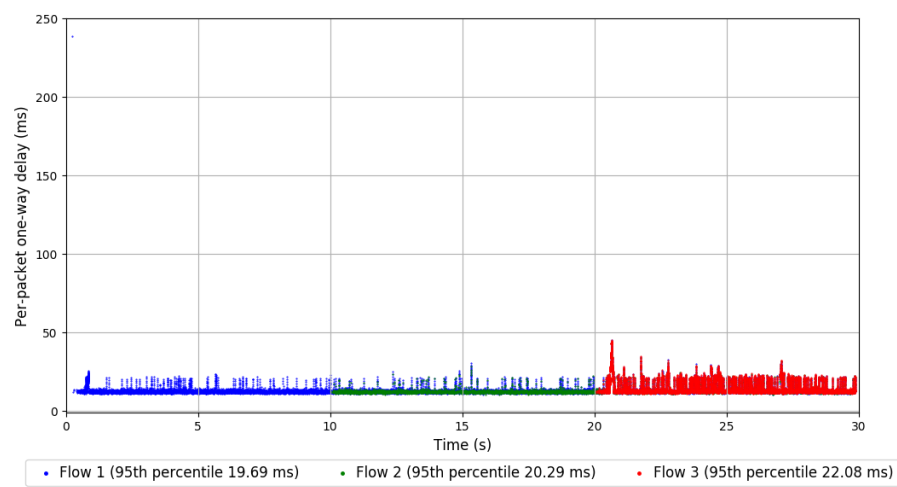
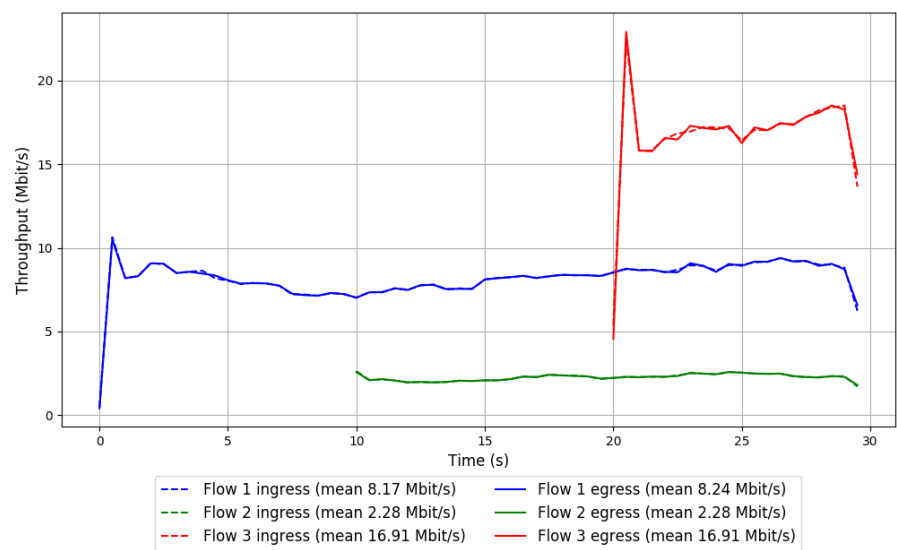


Run 1: Statistics of PCC

Start at: 2017-12-11 09:54:57
End at: 2017-12-11 09:55:27
Local clock offset: -5.775 ms
Remote clock offset: -1.396 ms

Below is generated by plot.py at 2017-12-11 10:45:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 15.38 Mbit/s
95th percentile per-packet one-way delay: 20.768 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 8.24 Mbit/s
95th percentile per-packet one-way delay: 19.687 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 20.286 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 16.91 Mbit/s
95th percentile per-packet one-way delay: 22.082 ms
Loss rate: 0.00%

Run 1: Report of PCC — Data Link



Run 2: Statistics of PCC

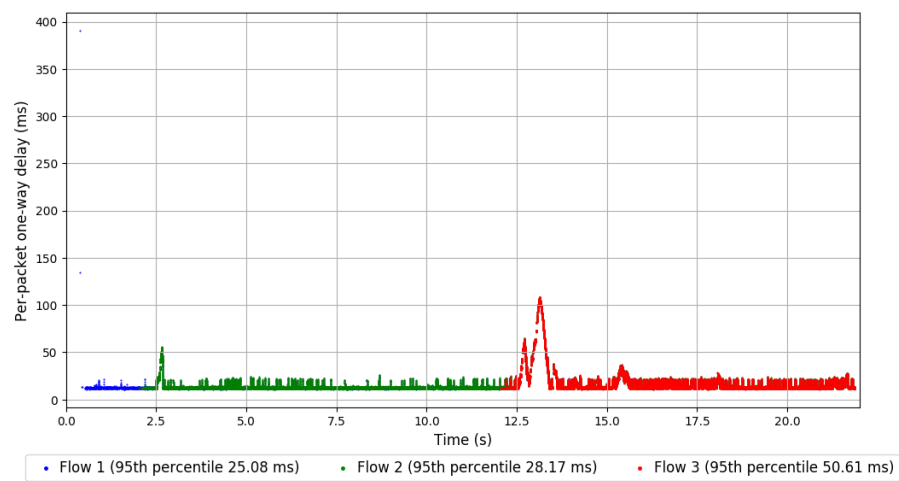
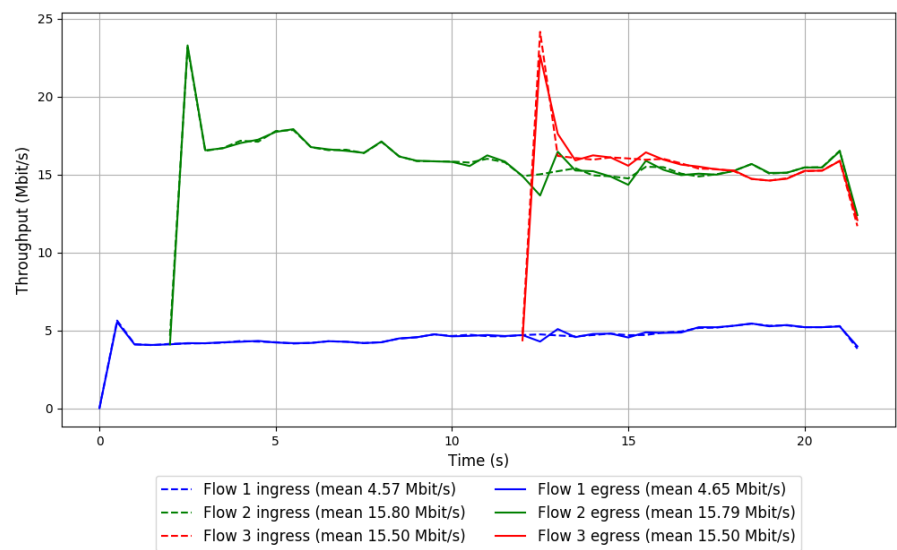
Start at: 2017-12-11 10:11:49

End at: 2017-12-11 10:12:19

Local clock offset: -5.513 ms

Remote clock offset: -0.941 ms

Run 2: Report of PCC — Data Link

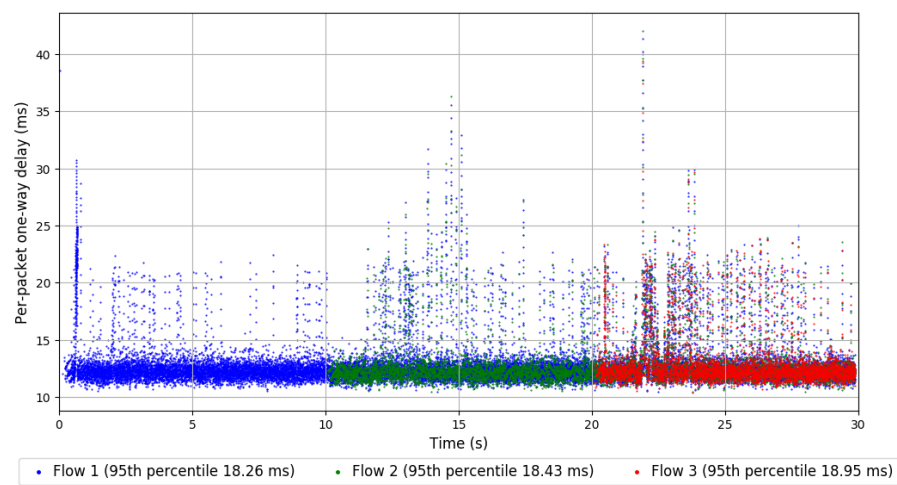
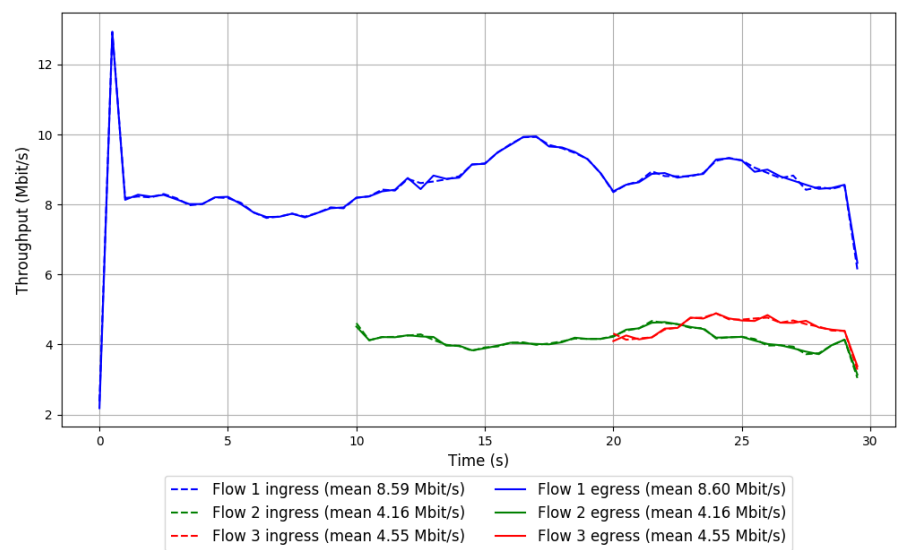


Run 3: Statistics of PCC

Start at: 2017-12-11 10:28:40
End at: 2017-12-11 10:29:10
Local clock offset: -5.216 ms
Remote clock offset: -0.848 ms

Below is generated by plot.py at 2017-12-11 10:45:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 12.87 Mbit/s
95th percentile per-packet one-way delay: 18.429 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 8.60 Mbit/s
95th percentile per-packet one-way delay: 18.260 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 4.16 Mbit/s
95th percentile per-packet one-way delay: 18.433 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 4.55 Mbit/s
95th percentile per-packet one-way delay: 18.955 ms
Loss rate: 0.00%

Run 3: Report of PCC — Data Link

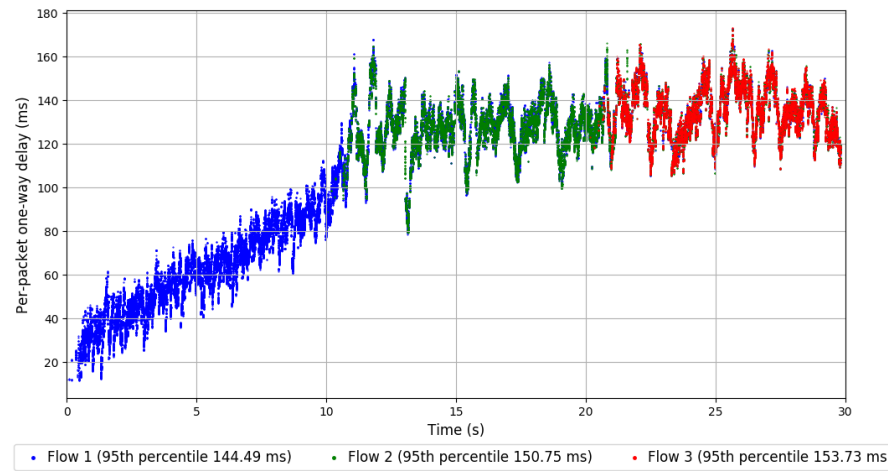
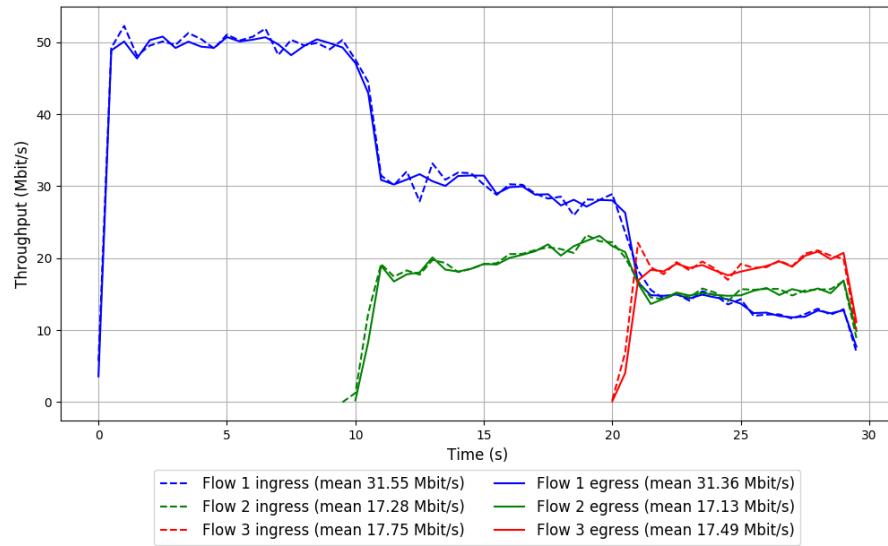


Run 1: Statistics of QUIC Cubic

Start at: 2017-12-11 10:03:25
End at: 2017-12-11 10:03:55
Local clock offset: -5.557 ms
Remote clock offset: -1.128 ms

Below is generated by plot.py at 2017-12-11 10:45:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 48.37 Mbit/s
95th percentile per-packet one-way delay: 148.476 ms
Loss rate: 0.97%
-- Flow 1:
Average throughput: 31.36 Mbit/s
95th percentile per-packet one-way delay: 144.494 ms
Loss rate: 0.61%
-- Flow 2:
Average throughput: 17.13 Mbit/s
95th percentile per-packet one-way delay: 150.752 ms
Loss rate: 1.23%
-- Flow 3:
Average throughput: 17.49 Mbit/s
95th percentile per-packet one-way delay: 153.732 ms
Loss rate: 2.48%

Run 1: Report of QUIC Cubic — Data Link

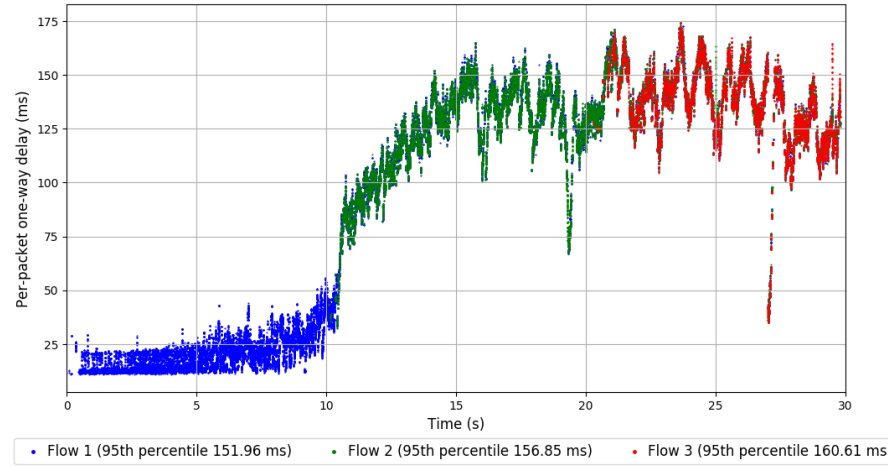
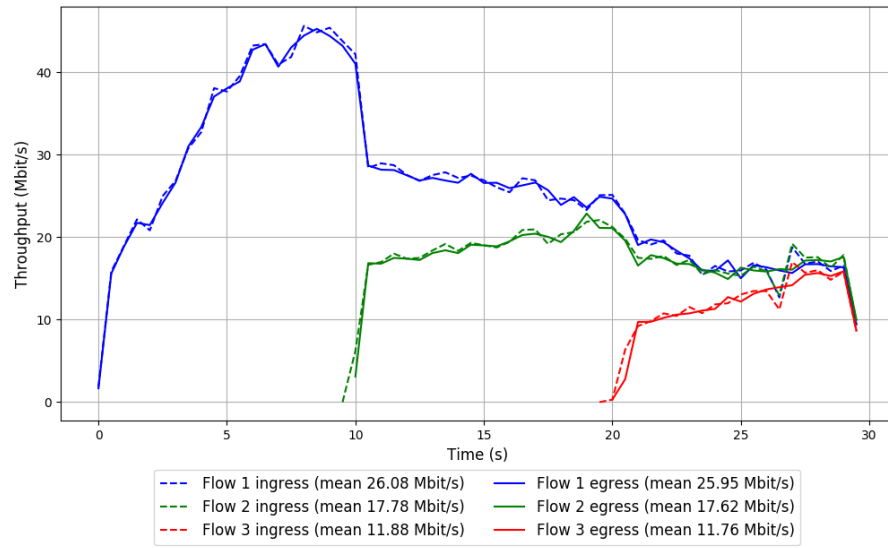


Run 2: Statistics of QUIC Cubic

Start at: 2017-12-11 10:20:17
End at: 2017-12-11 10:20:47
Local clock offset: -5.113 ms
Remote clock offset: -0.709 ms

Below is generated by plot.py at 2017-12-11 10:45:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 41.47 Mbit/s
95th percentile per-packet one-way delay: 154.951 ms
Loss rate: 0.80%
-- Flow 1:
Average throughput: 25.95 Mbit/s
95th percentile per-packet one-way delay: 151.957 ms
Loss rate: 0.47%
-- Flow 2:
Average throughput: 17.62 Mbit/s
95th percentile per-packet one-way delay: 156.852 ms
Loss rate: 1.08%
-- Flow 3:
Average throughput: 11.76 Mbit/s
95th percentile per-packet one-way delay: 160.612 ms
Loss rate: 2.10%

Run 2: Report of QUIC Cubic — Data Link

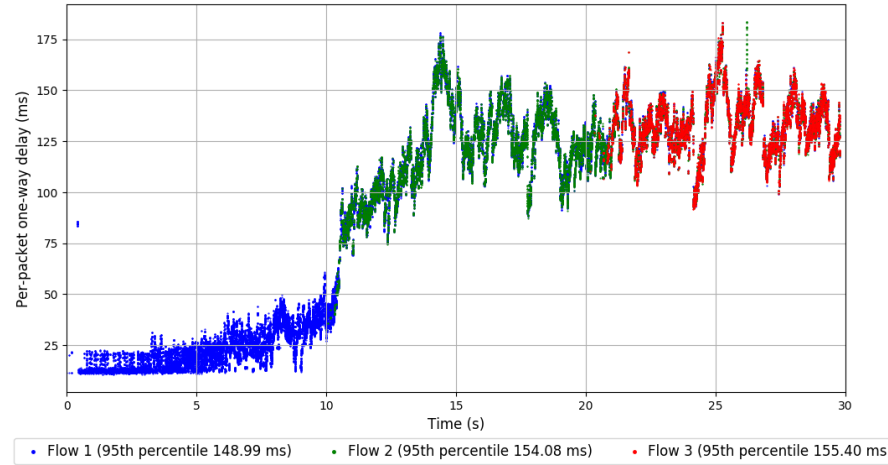
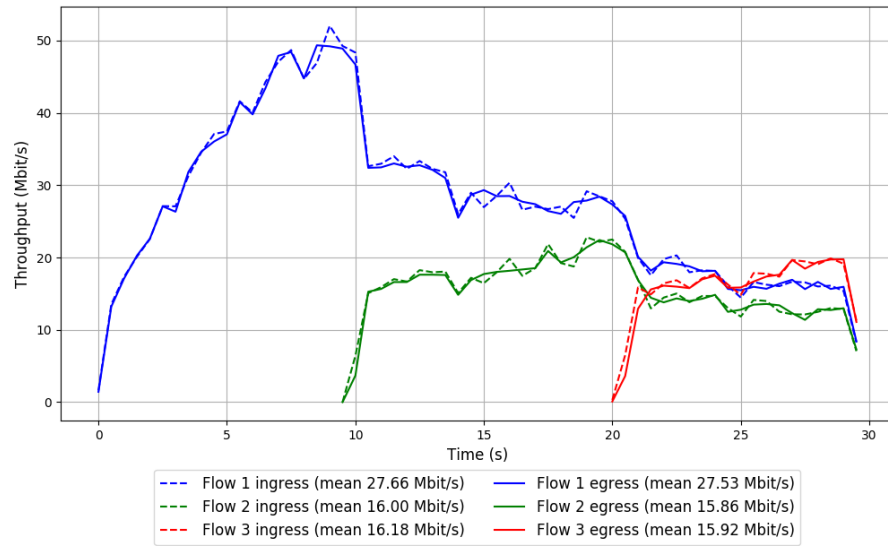


Run 3: Statistics of QUIC Cubic

Start at: 2017-12-11 10:37:08
End at: 2017-12-11 10:37:38
Local clock offset: -5.562 ms
Remote clock offset: -0.818 ms

Below is generated by plot.py at 2017-12-11 10:45:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 43.21 Mbit/s
95th percentile per-packet one-way delay: 151.872 ms
Loss rate: 0.84%
-- Flow 1:
Average throughput: 27.53 Mbit/s
95th percentile per-packet one-way delay: 148.991 ms
Loss rate: 0.46%
-- Flow 2:
Average throughput: 15.86 Mbit/s
95th percentile per-packet one-way delay: 154.079 ms
Loss rate: 0.96%
-- Flow 3:
Average throughput: 15.92 Mbit/s
95th percentile per-packet one-way delay: 155.402 ms
Loss rate: 2.58%

Run 3: Report of QUIC Cubic — Data Link

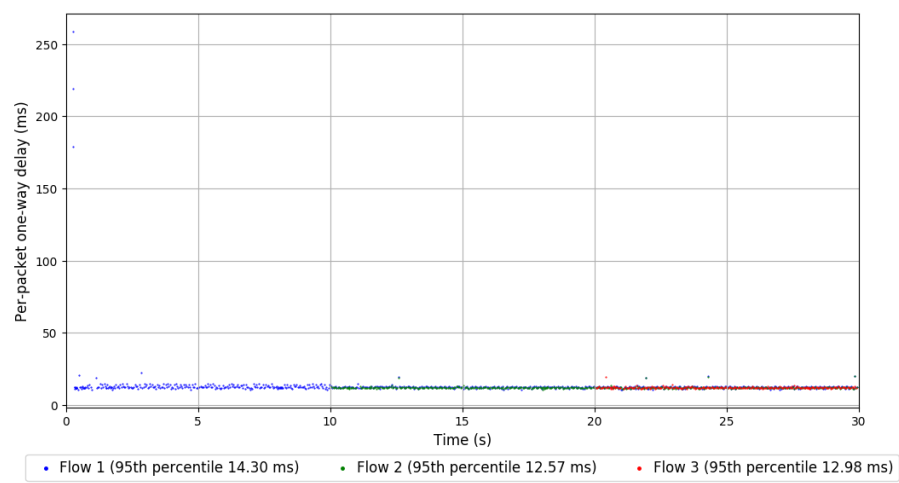
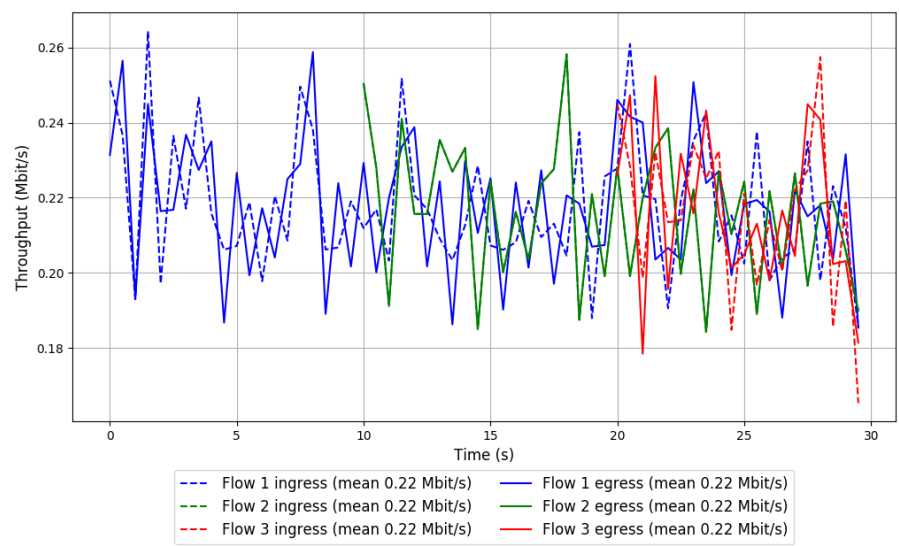


```
Run 1: Statistics of SReAM

Start at: 2017-12-11 10:07:01
End at: 2017-12-11 10:07:31
Local clock offset: -5.795 ms
Remote clock offset: -1.079 ms

# Below is generated by plot.py at 2017-12-11 10:45:55
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 13.865 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 14.304 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 12.566 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 12.980 ms
Loss rate: 0.00%
```

Run 1: Report of SReAM — Data Link

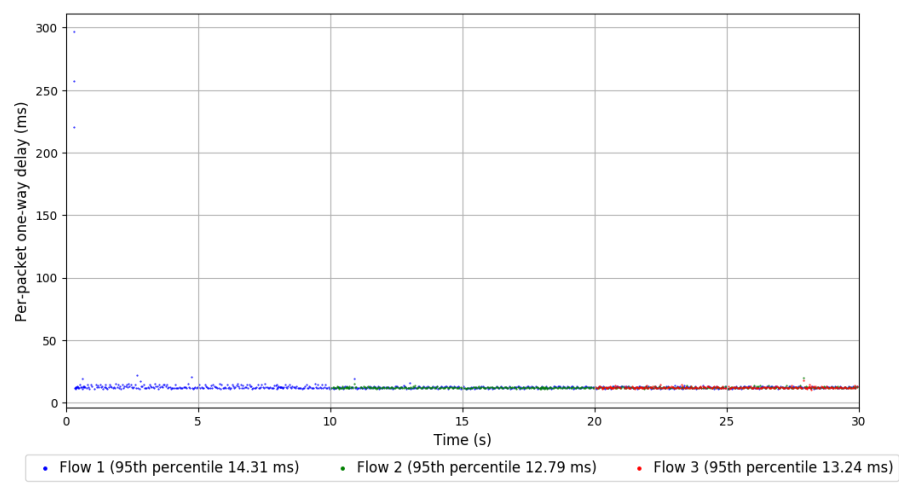
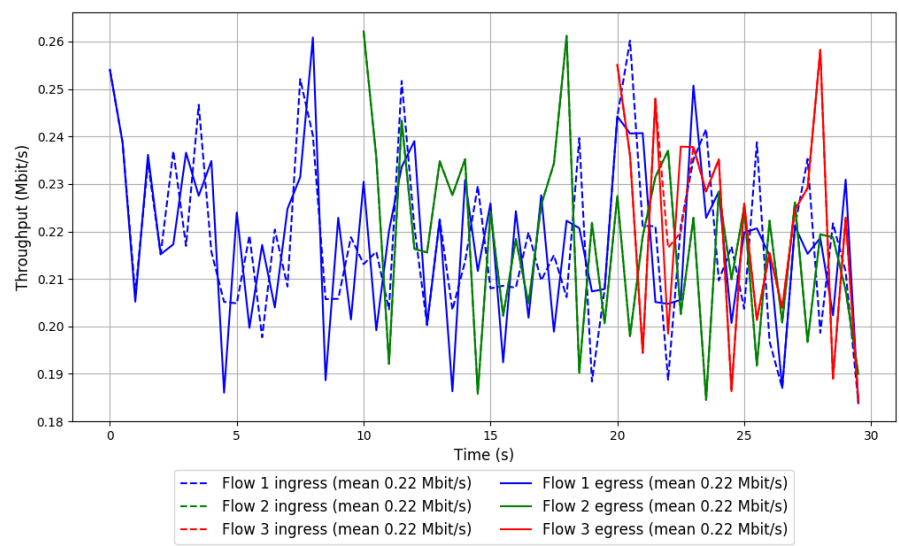


Run 2: Statistics of SReAM

Start at: 2017-12-11 10:23:52
End at: 2017-12-11 10:24:22
Local clock offset: -5.134 ms
Remote clock offset: -0.777 ms

Below is generated by plot.py at 2017-12-11 10:45:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 13.426 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 14.311 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 12.794 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.244 ms
Loss rate: 0.00%

Run 2: Report of SReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2017-12-11 10:40:44

End at: 2017-12-11 10:41:14

Local clock offset: -5.805 ms

Remote clock offset: -0.73 ms

Below is generated by plot.py at 2017-12-11 10:45:55

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.44 Mbit/s

95th percentile per-packet one-way delay: 13.156 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 13.283 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 12.899 ms

Loss rate: 0.00%

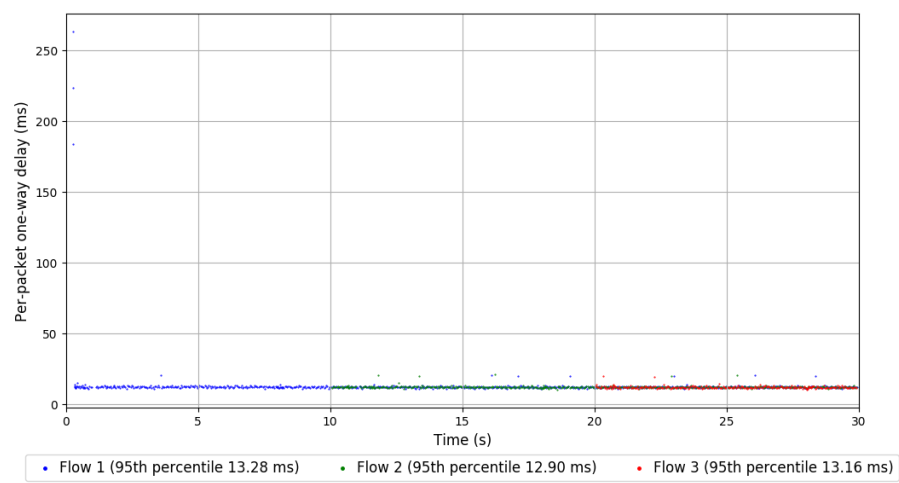
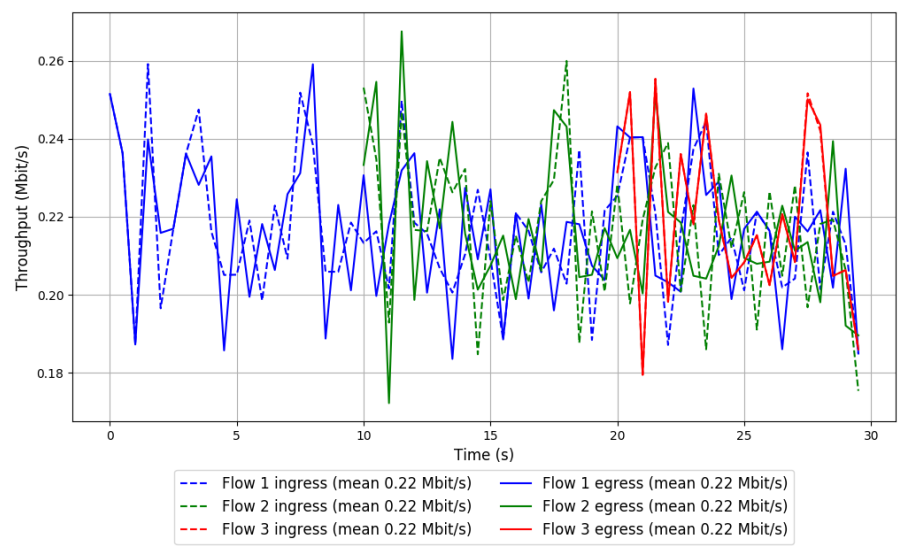
-- Flow 3:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 13.156 ms

Loss rate: 0.00%

Run 3: Report of SReAM — Data Link

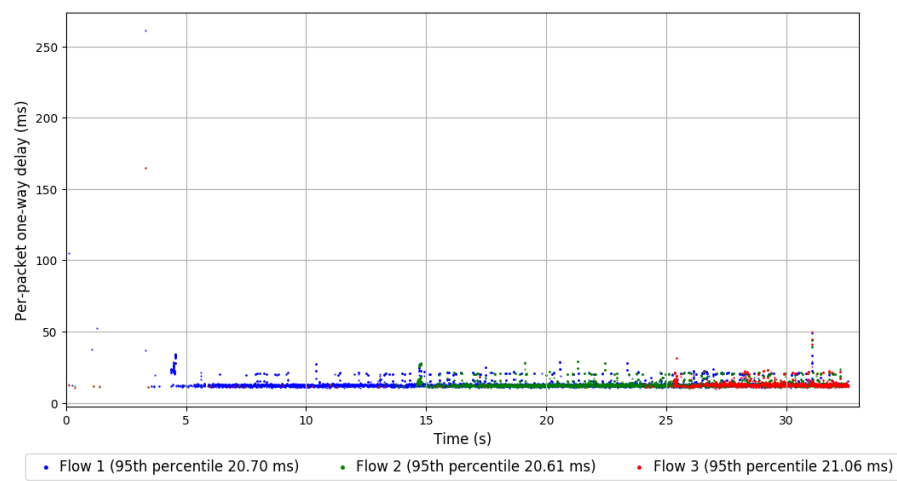
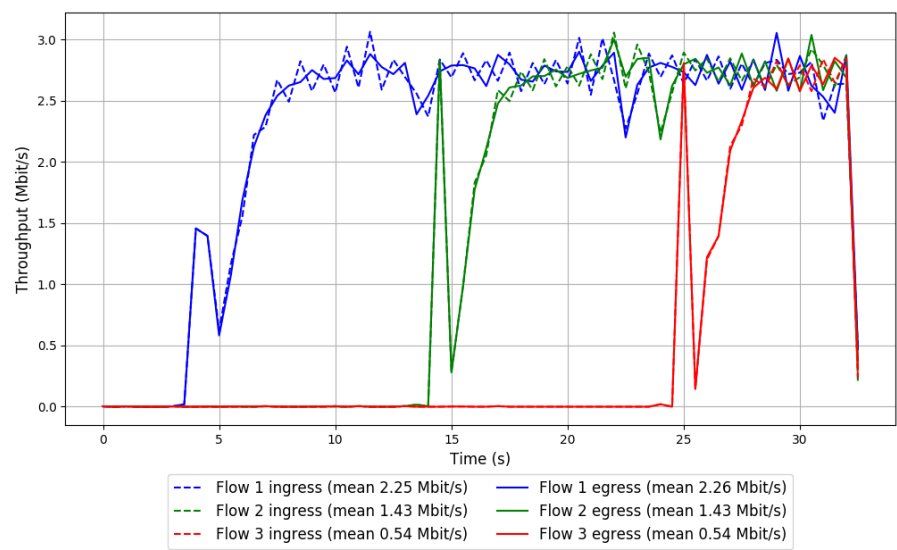


Run 1: Statistics of WebRTC media

Start at: 2017-12-11 10:05:50
End at: 2017-12-11 10:06:20
Local clock offset: -5.738 ms
Remote clock offset: -1.113 ms

Below is generated by plot.py at 2017-12-11 10:45:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.22 Mbit/s
95th percentile per-packet one-way delay: 20.707 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 20.702 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.43 Mbit/s
95th percentile per-packet one-way delay: 20.615 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 21.056 ms
Loss rate: 0.00%

Run 1: Report of WebRTC media — Data Link

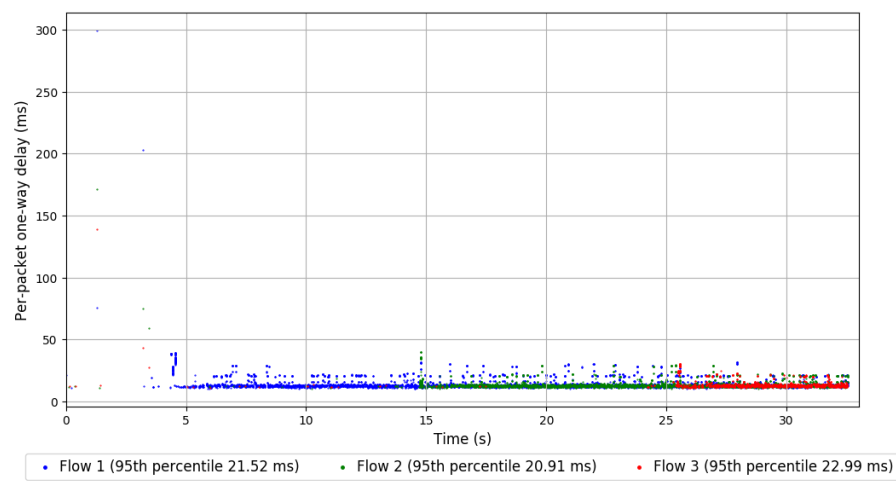
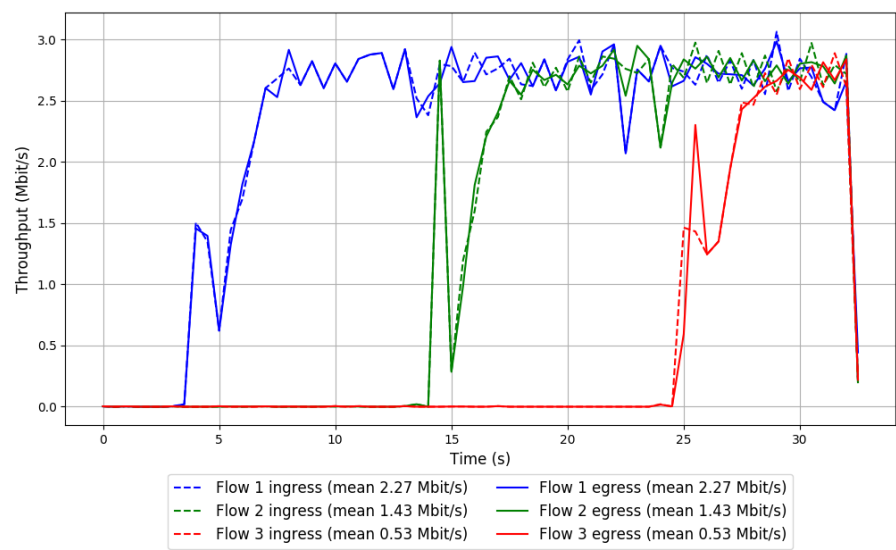


Run 2: Statistics of WebRTC media

Start at: 2017-12-11 10:22:41
End at: 2017-12-11 10:23:11
Local clock offset: -5.233 ms
Remote clock offset: -0.739 ms

Below is generated by plot.py at 2017-12-11 10:45:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.22 Mbit/s
95th percentile per-packet one-way delay: 21.339 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.27 Mbit/s
95th percentile per-packet one-way delay: 21.523 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.43 Mbit/s
95th percentile per-packet one-way delay: 20.905 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 22.993 ms
Loss rate: 0.00%

Run 2: Report of WebRTC media — Data Link

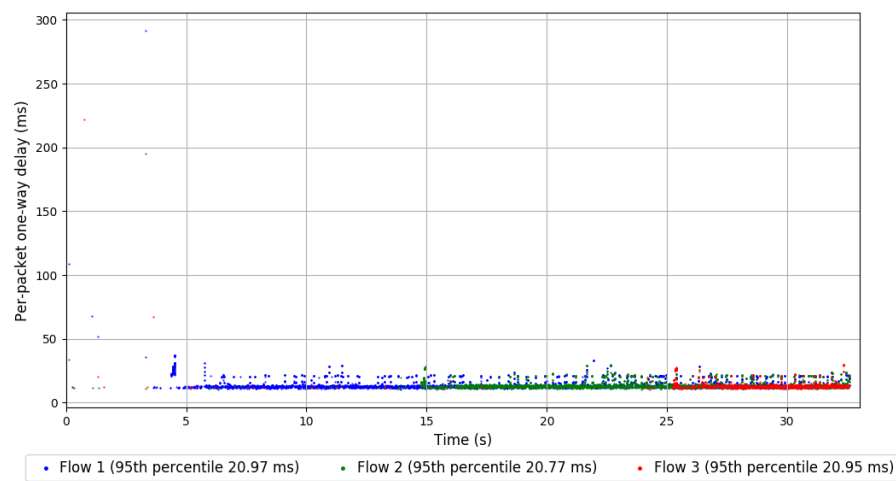
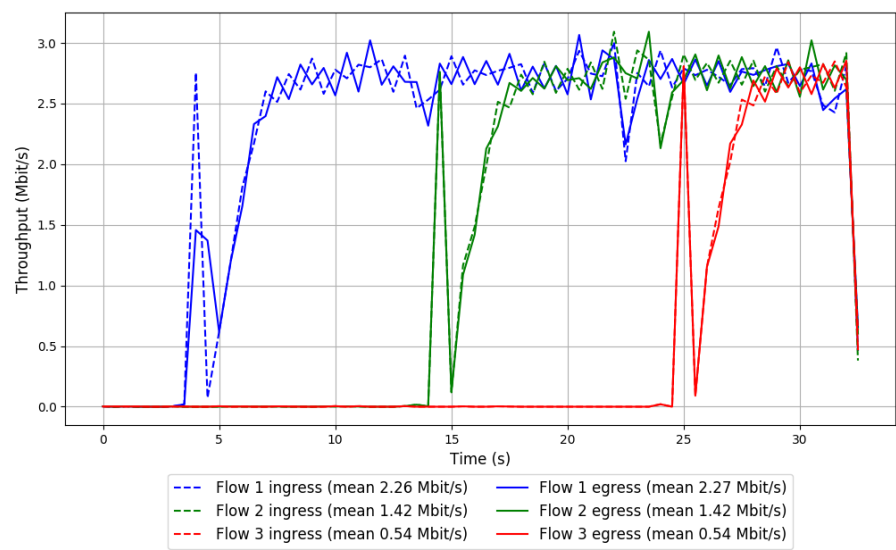


Run 3: Statistics of WebRTC media

Start at: 2017-12-11 10:39:33
End at: 2017-12-11 10:40:03
Local clock offset: -5.715 ms
Remote clock offset: -0.697 ms

Below is generated by plot.py at 2017-12-11 10:45:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.23 Mbit/s
95th percentile per-packet one-way delay: 20.913 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 2.27 Mbit/s
95th percentile per-packet one-way delay: 20.968 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 20.765 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 20.953 ms
Loss rate: 0.45%

Run 3: Report of WebRTC media — Data Link

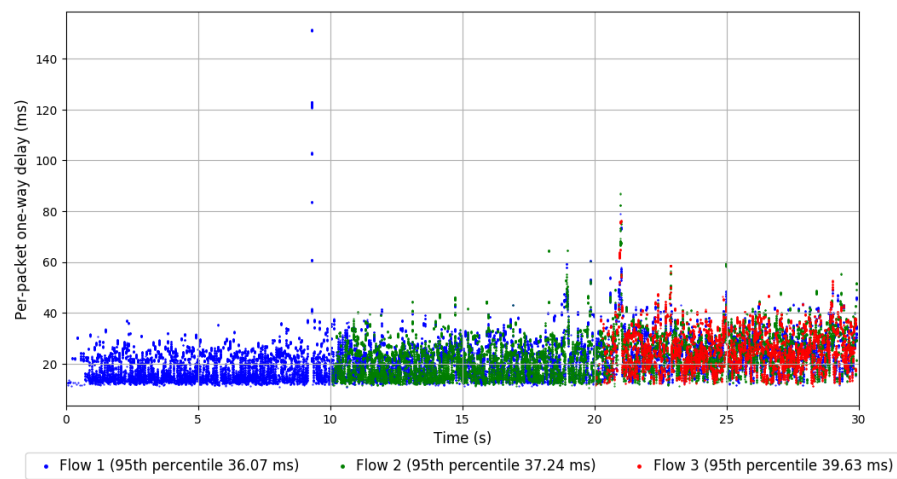
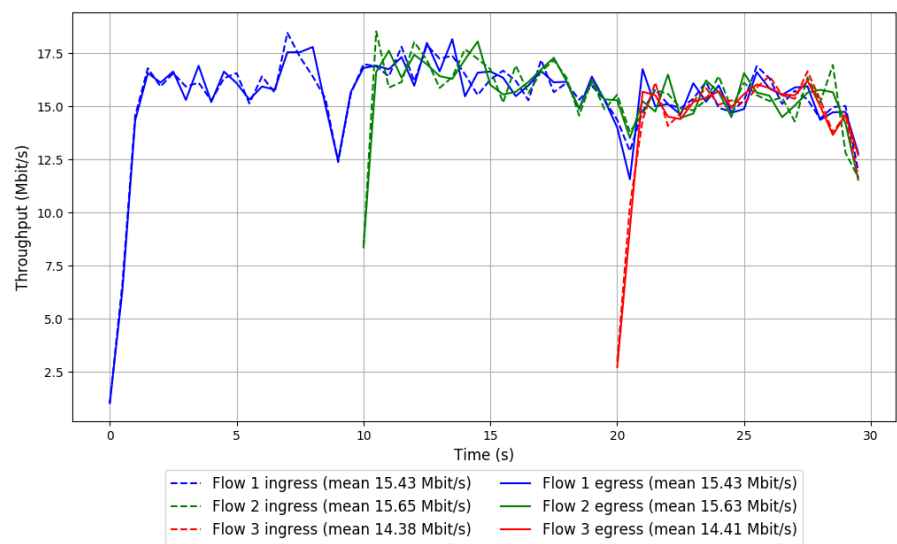


Run 1: Statistics of Sprout

Start at: 2017-12-11 09:57:22
End at: 2017-12-11 09:57:52
Local clock offset: -5.615 ms
Remote clock offset: -1.335 ms

Below is generated by plot.py at 2017-12-11 10:45:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 30.57 Mbit/s
95th percentile per-packet one-way delay: 37.262 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 15.43 Mbit/s
95th percentile per-packet one-way delay: 36.071 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 15.63 Mbit/s
95th percentile per-packet one-way delay: 37.236 ms
Loss rate: 0.11%
-- Flow 3:
Average throughput: 14.41 Mbit/s
95th percentile per-packet one-way delay: 39.626 ms
Loss rate: 0.06%

Run 1: Report of Sprout — Data Link

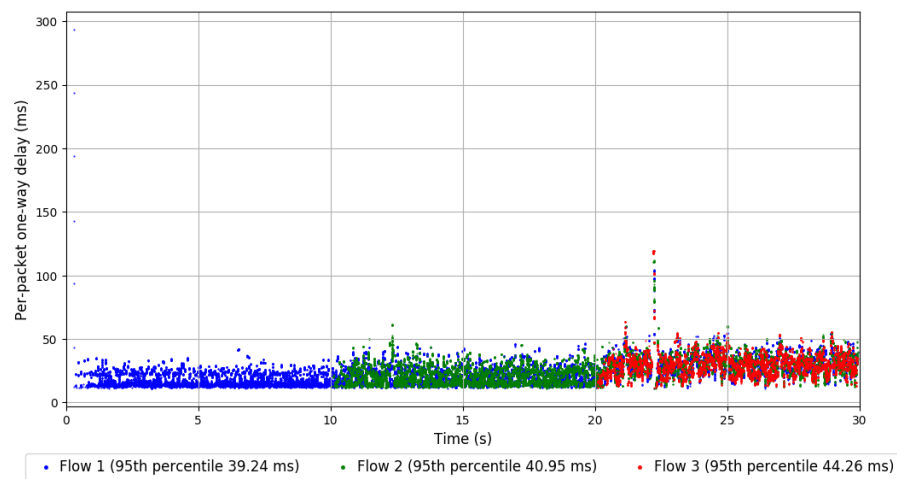
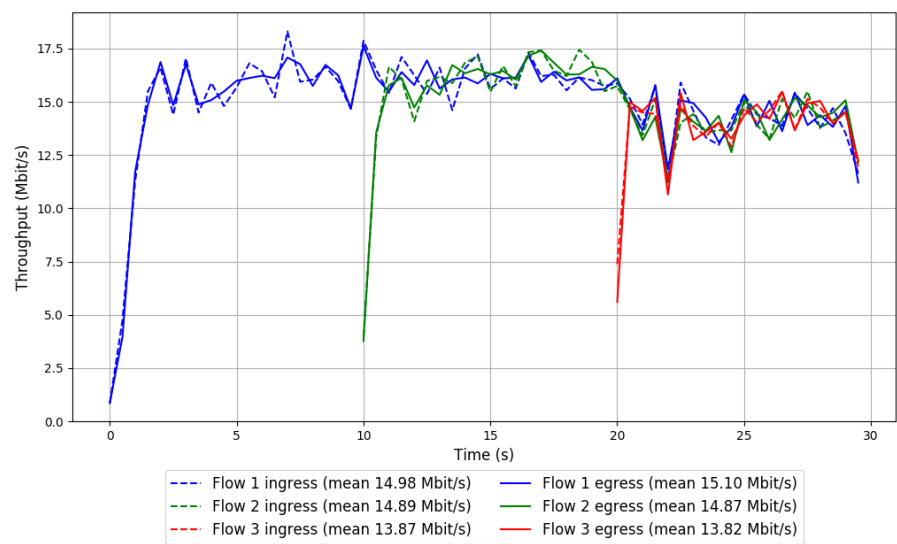


Run 2: Statistics of Sprout

Start at: 2017-12-11 10:14:14
End at: 2017-12-11 10:14:44
Local clock offset: -5.286 ms
Remote clock offset: -0.827 ms

Below is generated by plot.py at 2017-12-11 10:45:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 29.70 Mbit/s
95th percentile per-packet one-way delay: 41.000 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 15.10 Mbit/s
95th percentile per-packet one-way delay: 39.242 ms
Loss rate: 0.09%
-- Flow 2:
Average throughput: 14.87 Mbit/s
95th percentile per-packet one-way delay: 40.954 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 13.82 Mbit/s
95th percentile per-packet one-way delay: 44.257 ms
Loss rate: 0.13%

Run 2: Report of Sprout — Data Link

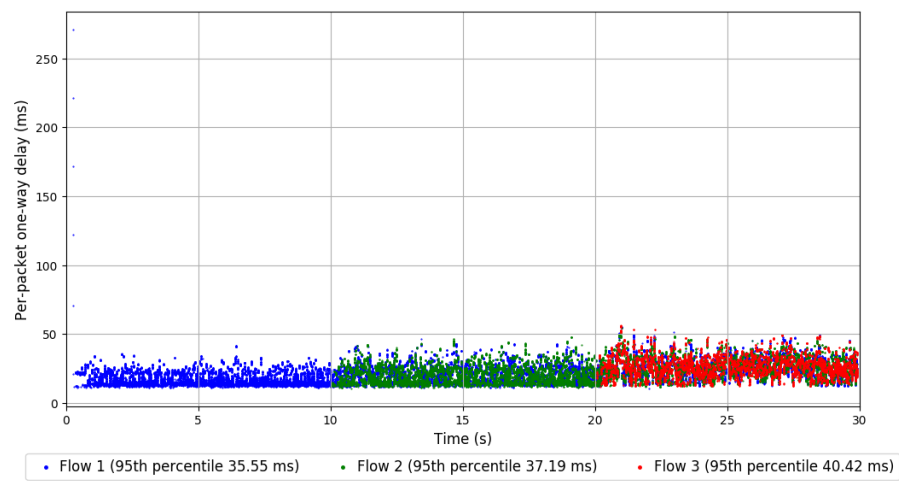
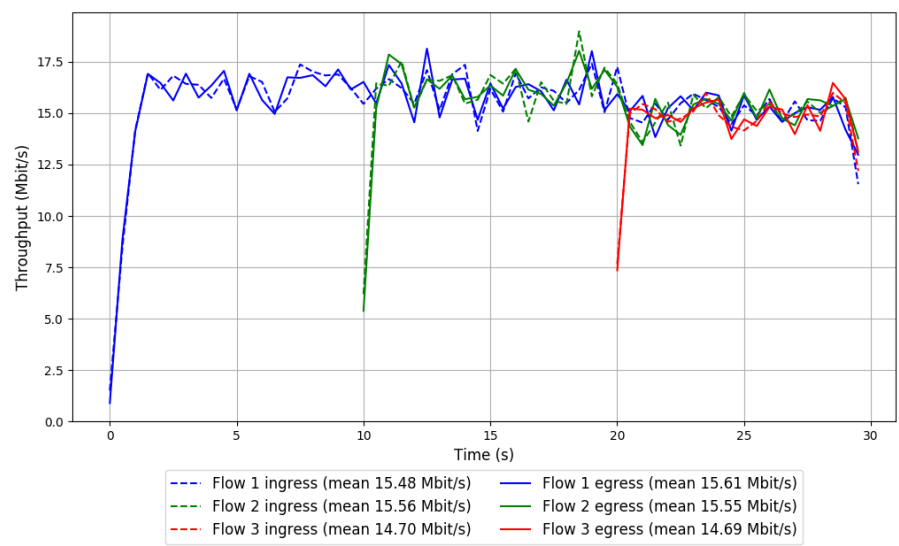


Run 3: Statistics of Sprout

Start at: 2017-12-11 10:31:05
End at: 2017-12-11 10:31:35
Local clock offset: -5.313 ms
Remote clock offset: -0.857 ms

```
# Below is generated by plot.py at 2017-12-11 10:45:56
# Datalink statistics
-- Total of 3 flows:
Average throughput: 30.94 Mbit/s
95th percentile per-packet one-way delay: 37.245 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 15.61 Mbit/s
95th percentile per-packet one-way delay: 35.554 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 15.55 Mbit/s
95th percentile per-packet one-way delay: 37.188 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 14.69 Mbit/s
95th percentile per-packet one-way delay: 40.425 ms
Loss rate: 0.00%
```

Run 3: Report of Sprout — Data Link

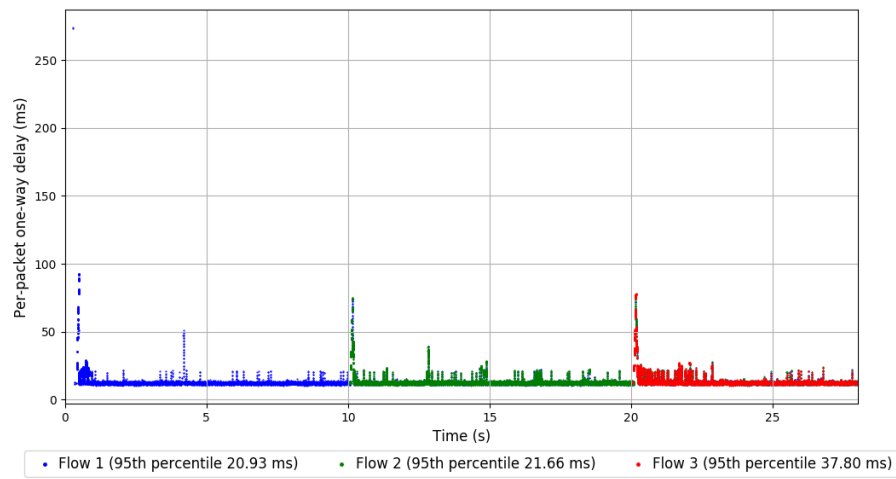
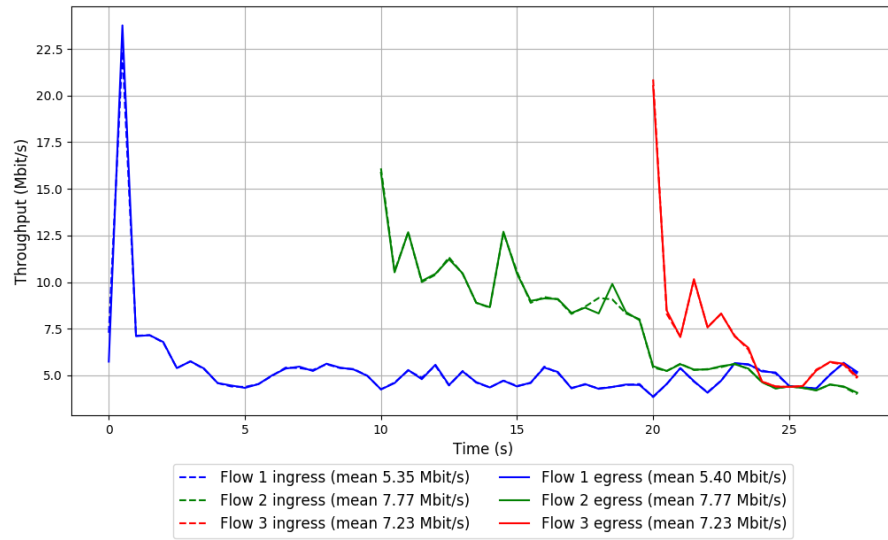


```
Run 1: Statistics of TaoVA-100x

Start at: 2017-12-11 09:58:34
End at: 2017-12-11 09:59:04
Local clock offset: -5.561 ms
Remote clock offset: -1.292 ms

# Below is generated by plot.py at 2017-12-11 10:45:56
# Datalink statistics
-- Total of 3 flows:
Average throughput: 12.51 Mbit/s
95th percentile per-packet one-way delay: 22.850 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 5.40 Mbit/s
95th percentile per-packet one-way delay: 20.933 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 7.77 Mbit/s
95th percentile per-packet one-way delay: 21.661 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 7.23 Mbit/s
95th percentile per-packet one-way delay: 37.800 ms
Loss rate: 0.00%
```

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

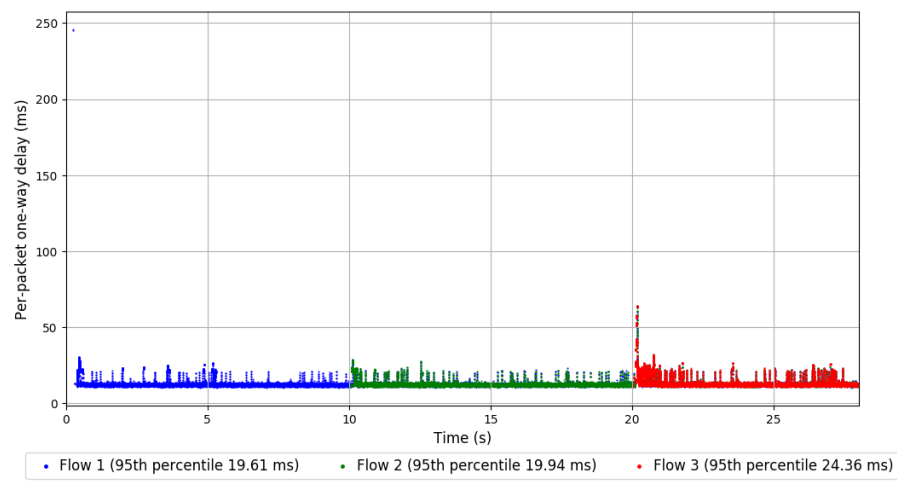
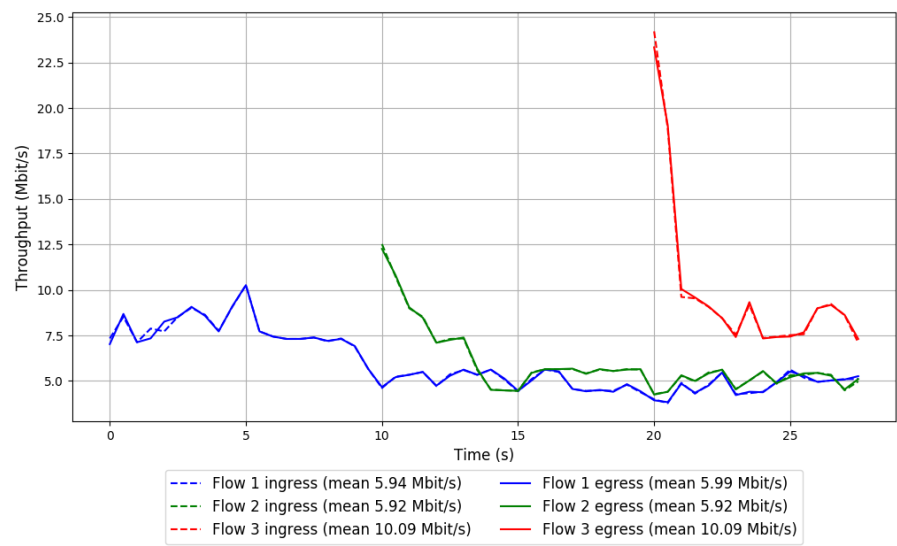


Run 2: Statistics of TaoVA-100x

Start at: 2017-12-11 10:15:26
End at: 2017-12-11 10:15:56
Local clock offset: -5.295 ms
Remote clock offset: -0.804 ms

Below is generated by plot.py at 2017-12-11 10:46:06
Datalink statistics
-- Total of 3 flows:
Average throughput: 12.72 Mbit/s
95th percentile per-packet one-way delay: 21.188 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 5.99 Mbit/s
95th percentile per-packet one-way delay: 19.612 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 5.92 Mbit/s
95th percentile per-packet one-way delay: 19.936 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 10.09 Mbit/s
95th percentile per-packet one-way delay: 24.364 ms
Loss rate: 0.00%

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

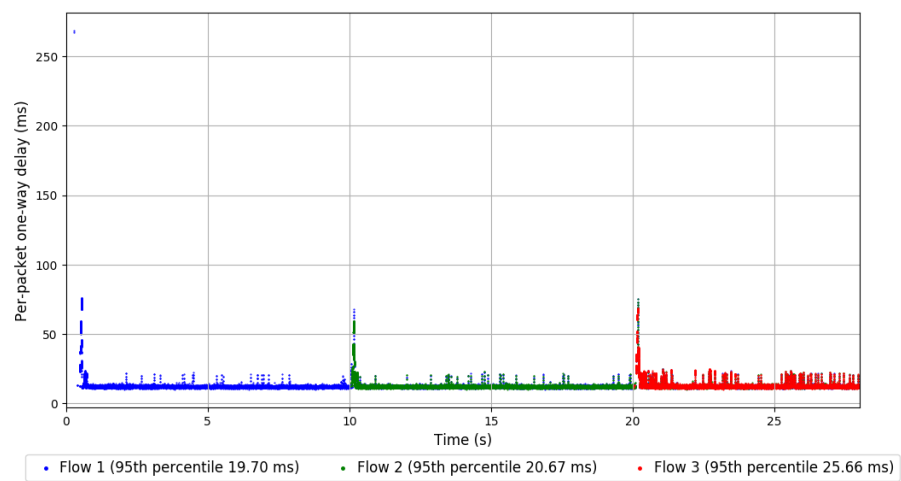
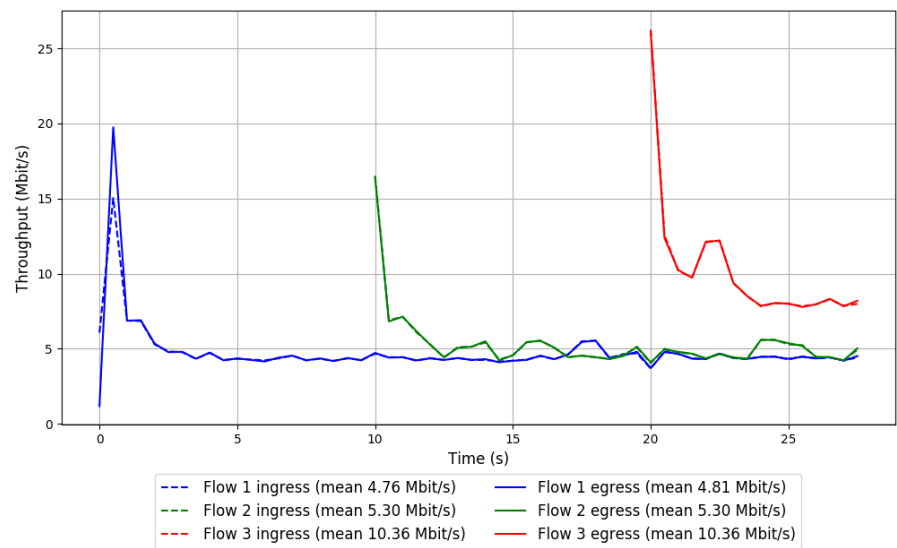


Run 3: Statistics of TaoVA-100x

Start at: 2017-12-11 10:32:17
End at: 2017-12-11 10:32:47
Local clock offset: -5.335 ms
Remote clock offset: -0.863 ms

Below is generated by plot.py at 2017-12-11 10:46:06
Datalink statistics
-- Total of 3 flows:
Average throughput: 11.21 Mbit/s
95th percentile per-packet one-way delay: 21.653 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 4.81 Mbit/s
95th percentile per-packet one-way delay: 19.705 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 5.30 Mbit/s
95th percentile per-packet one-way delay: 20.673 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 10.36 Mbit/s
95th percentile per-packet one-way delay: 25.665 ms
Loss rate: 0.00%

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

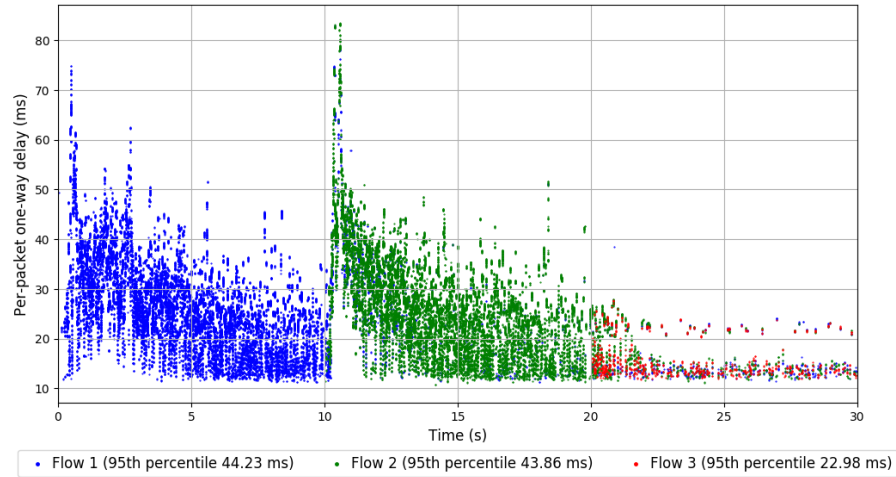
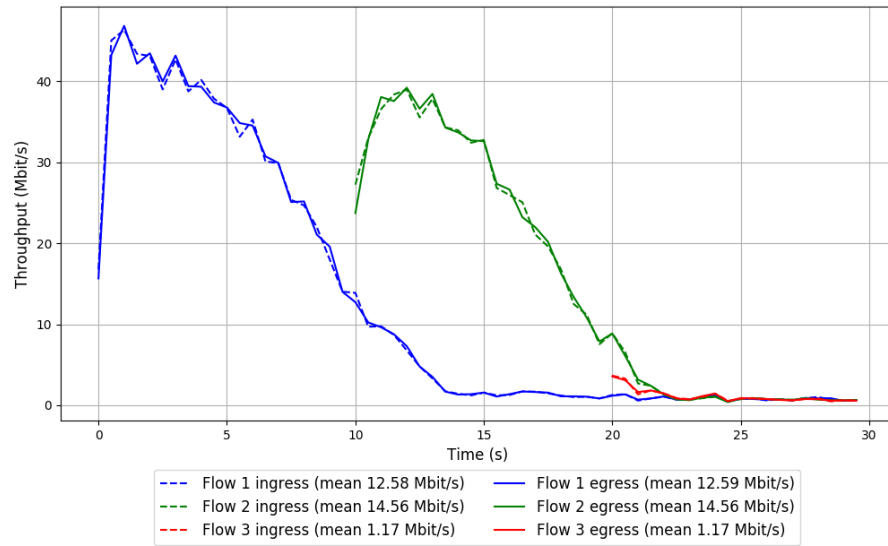


Run 1: Statistics of TCP Vegas

Start at: 2017-12-11 09:59:46
End at: 2017-12-11 10:00:16
Local clock offset: -5.504 ms
Remote clock offset: -1.177 ms

Below is generated by plot.py at 2017-12-11 10:46:10
Datalink statistics
-- Total of 3 flows:
Average throughput: 22.68 Mbit/s
95th percentile per-packet one-way delay: 43.999 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 12.59 Mbit/s
95th percentile per-packet one-way delay: 44.228 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 14.56 Mbit/s
95th percentile per-packet one-way delay: 43.862 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 22.984 ms
Loss rate: 0.00%

Run 1: Report of TCP Vegas — Data Link

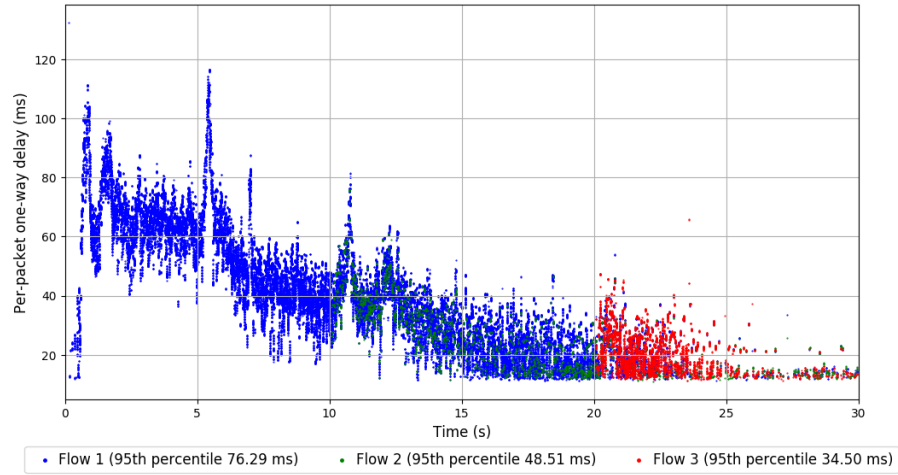
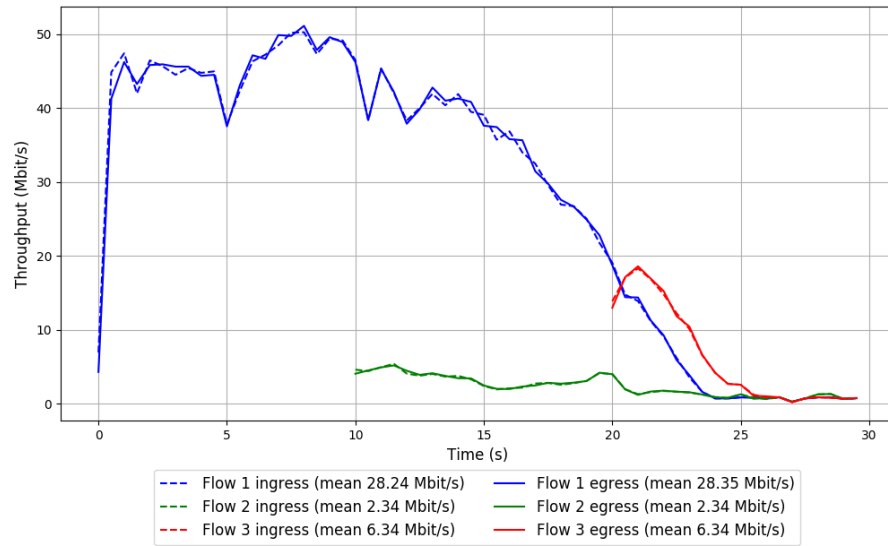


Run 2: Statistics of TCP Vegas

Start at: 2017-12-11 10:16:38
End at: 2017-12-11 10:17:08
Local clock offset: -5.162 ms
Remote clock offset: -0.791 ms

Below is generated by plot.py at 2017-12-11 10:46:21
Datalink statistics
-- Total of 3 flows:
Average throughput: 32.02 Mbit/s
95th percentile per-packet one-way delay: 75.002 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 28.35 Mbit/s
95th percentile per-packet one-way delay: 76.293 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.34 Mbit/s
95th percentile per-packet one-way delay: 48.513 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 6.34 Mbit/s
95th percentile per-packet one-way delay: 34.502 ms
Loss rate: 0.00%

Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2017-12-11 10:33:29

End at: 2017-12-11 10:33:59

Local clock offset: -5.403 ms

Remote clock offset: -0.86 ms

Below is generated by plot.py at 2017-12-11 10:46:21

Datalink statistics

-- Total of 3 flows:

Average throughput: 22.78 Mbit/s

95th percentile per-packet one-way delay: 52.653 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 1.12 Mbit/s

95th percentile per-packet one-way delay: 44.931 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 26.37 Mbit/s

95th percentile per-packet one-way delay: 53.828 ms

Loss rate: 0.00%

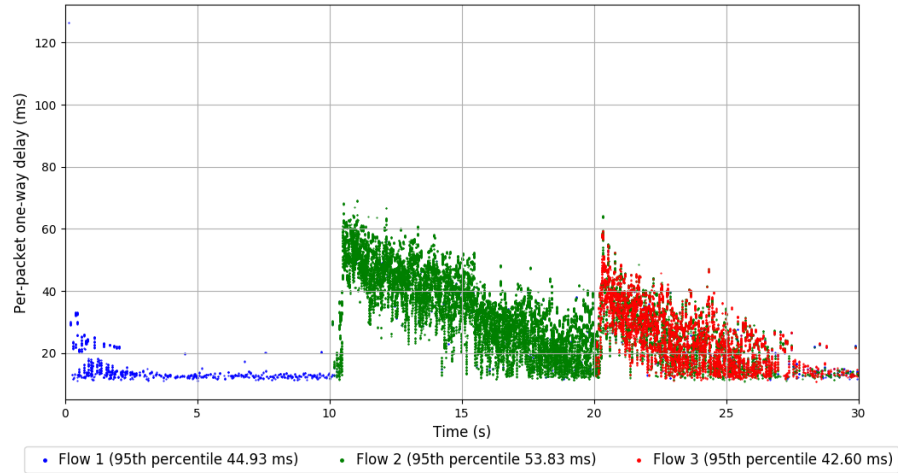
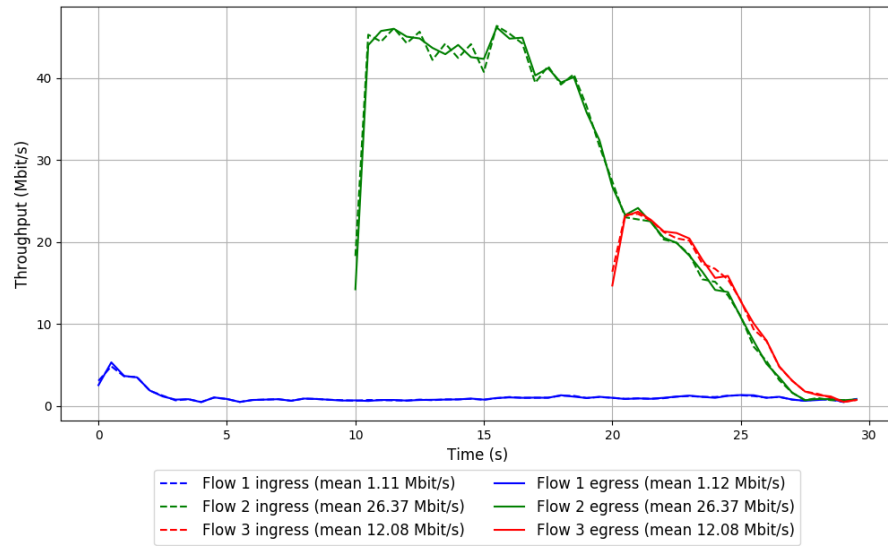
-- Flow 3:

Average throughput: 12.08 Mbit/s

95th percentile per-packet one-way delay: 42.596 ms

Loss rate: 0.00%

Run 3: Report of TCP Vegas — Data Link

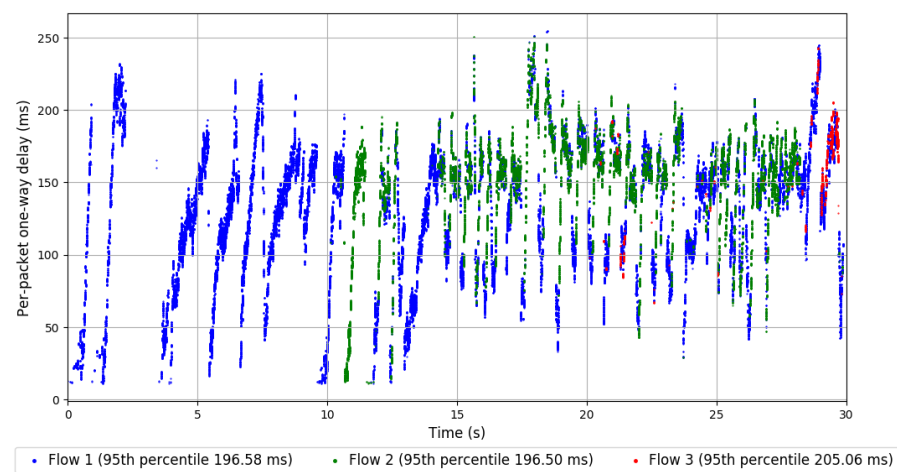
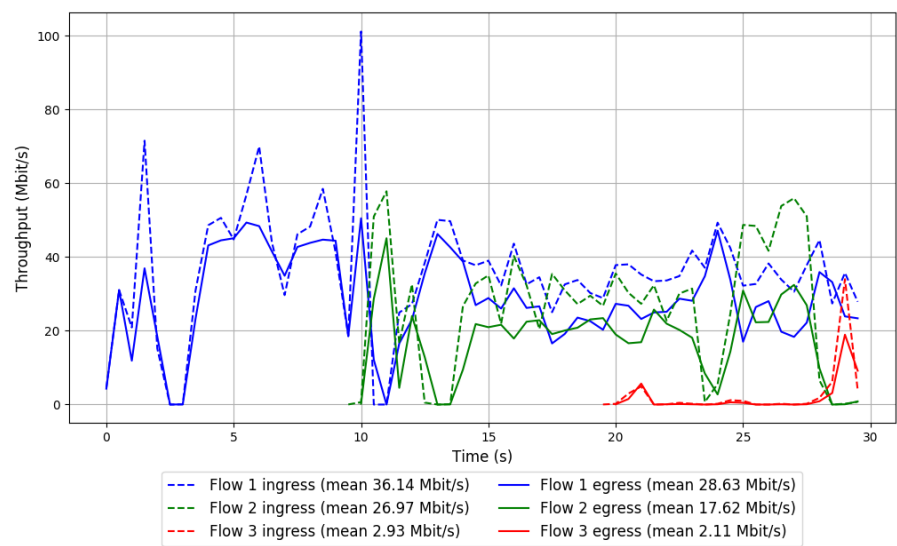


Run 1: Statistics of Verus

Start at: 2017-12-11 09:56:09
End at: 2017-12-11 09:56:39
Local clock offset: -5.665 ms
Remote clock offset: -1.357 ms

Below is generated by plot.py at 2017-12-11 10:46:39
Datalink statistics
-- Total of 3 flows:
Average throughput: 41.02 Mbit/s
95th percentile per-packet one-way delay: 196.807 ms
Loss rate: 25.37%
-- Flow 1:
Average throughput: 28.63 Mbit/s
95th percentile per-packet one-way delay: 196.576 ms
Loss rate: 20.76%
-- Flow 2:
Average throughput: 17.62 Mbit/s
95th percentile per-packet one-way delay: 196.496 ms
Loss rate: 34.50%
-- Flow 3:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 205.064 ms
Loss rate: 28.98%

Run 1: Report of Verus — Data Link

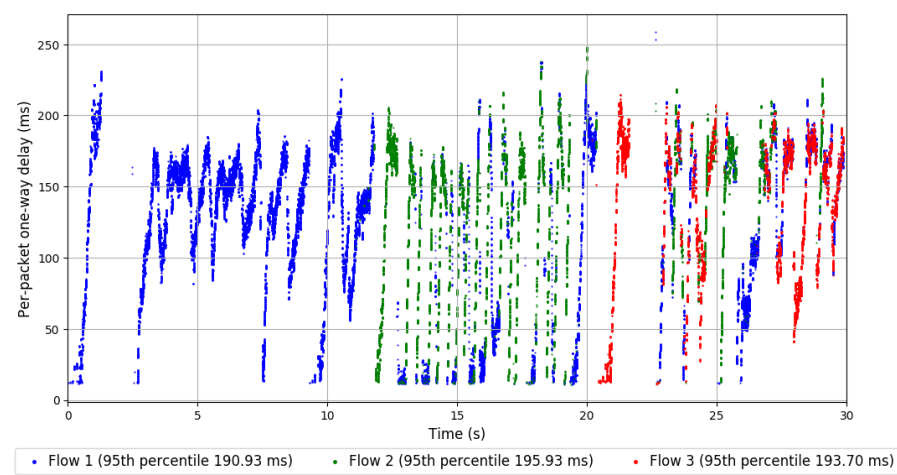
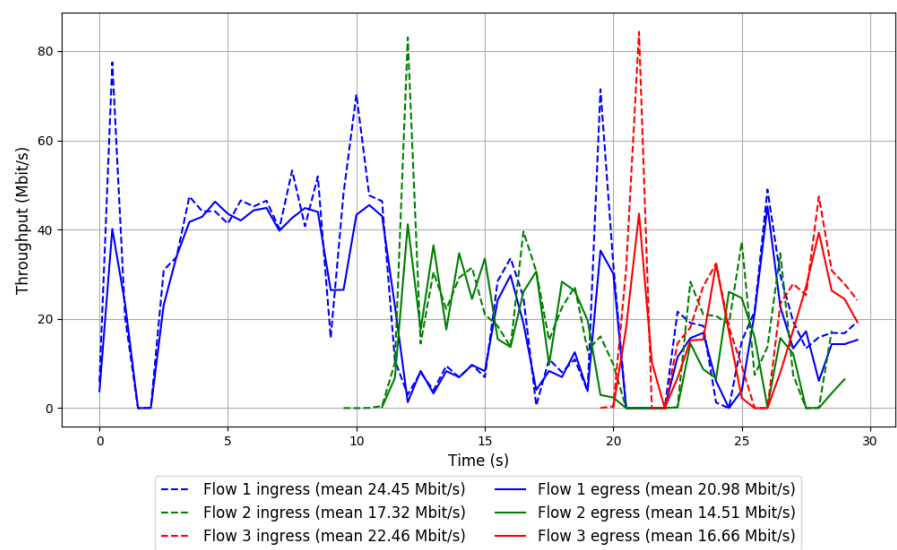


Run 2: Statistics of Verus

Start at: 2017-12-11 10:13:01
End at: 2017-12-11 10:13:31
Local clock offset: -5.485 ms
Remote clock offset: -0.811 ms

Below is generated by plot.py at 2017-12-11 10:46:39
Datalink statistics
-- Total of 3 flows:
Average throughput: 35.13 Mbit/s
95th percentile per-packet one-way delay: 193.184 ms
Loss rate: 17.95%
-- Flow 1:
Average throughput: 20.98 Mbit/s
95th percentile per-packet one-way delay: 190.931 ms
Loss rate: 14.13%
-- Flow 2:
Average throughput: 14.51 Mbit/s
95th percentile per-packet one-way delay: 195.929 ms
Loss rate: 20.33%
-- Flow 3:
Average throughput: 16.66 Mbit/s
95th percentile per-packet one-way delay: 193.699 ms
Loss rate: 26.99%

Run 2: Report of Verus — Data Link

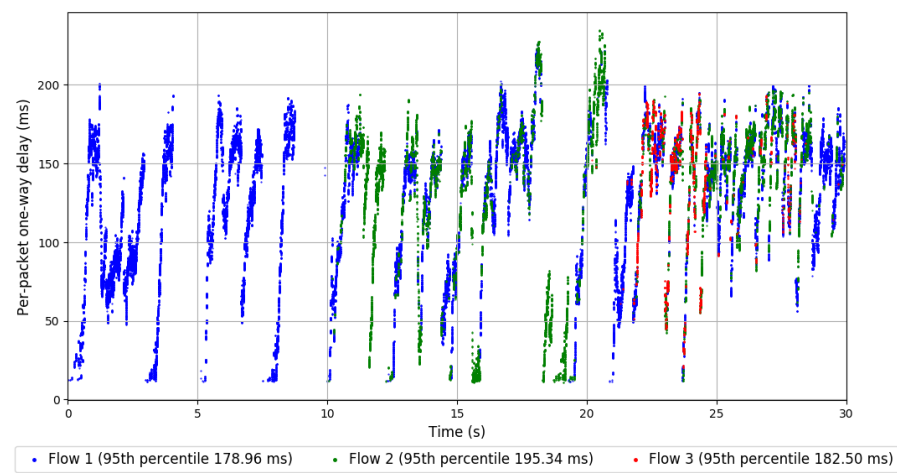
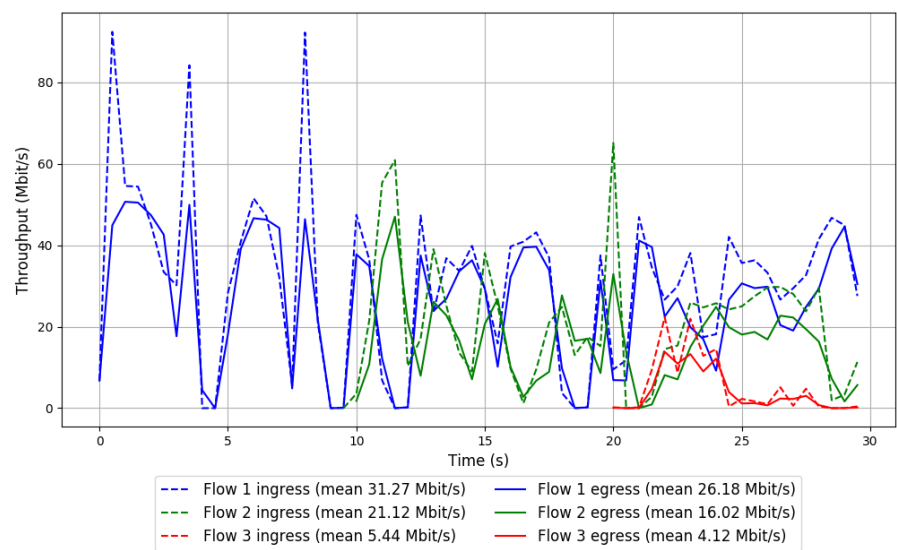


Run 3: Statistics of Verus

Start at: 2017-12-11 10:29:52
End at: 2017-12-11 10:30:22
Local clock offset: -5.354 ms
Remote clock offset: -0.903 ms

Below is generated by plot.py at 2017-12-11 10:46:39
Datalink statistics
-- Total of 3 flows:
Average throughput: 38.13 Mbit/s
95th percentile per-packet one-way delay: 183.506 ms
Loss rate: 18.97%
-- Flow 1:
Average throughput: 26.18 Mbit/s
95th percentile per-packet one-way delay: 178.957 ms
Loss rate: 16.23%
-- Flow 2:
Average throughput: 16.02 Mbit/s
95th percentile per-packet one-way delay: 195.337 ms
Loss rate: 24.26%
-- Flow 3:
Average throughput: 4.12 Mbit/s
95th percentile per-packet one-way delay: 182.502 ms
Loss rate: 25.47%

Run 3: Report of Verus — Data Link



Run 1: Statistics of Copa

Start at: 2017-12-11 09:52:32

End at: 2017-12-11 09:53:02

Local clock offset: -5.988 ms

Remote clock offset: -1.36 ms

Below is generated by plot.py at 2017-12-11 10:46:48

Datalink statistics

-- Total of 3 flows:

Average throughput: 33.56 Mbit/s

95th percentile per-packet one-way delay: 46.337 ms

Loss rate: 0.14%

-- Flow 1:

Average throughput: 20.09 Mbit/s

95th percentile per-packet one-way delay: 43.553 ms

Loss rate: 0.09%

-- Flow 2:

Average throughput: 18.51 Mbit/s

95th percentile per-packet one-way delay: 49.835 ms

Loss rate: 0.16%

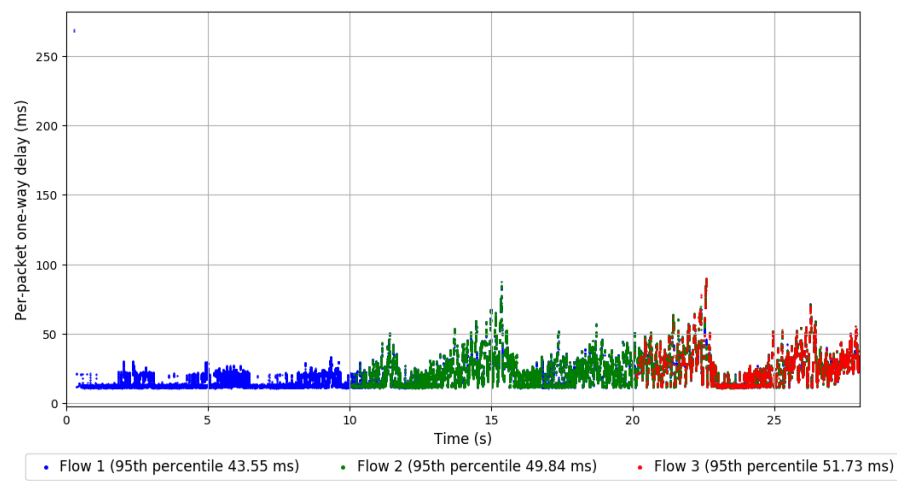
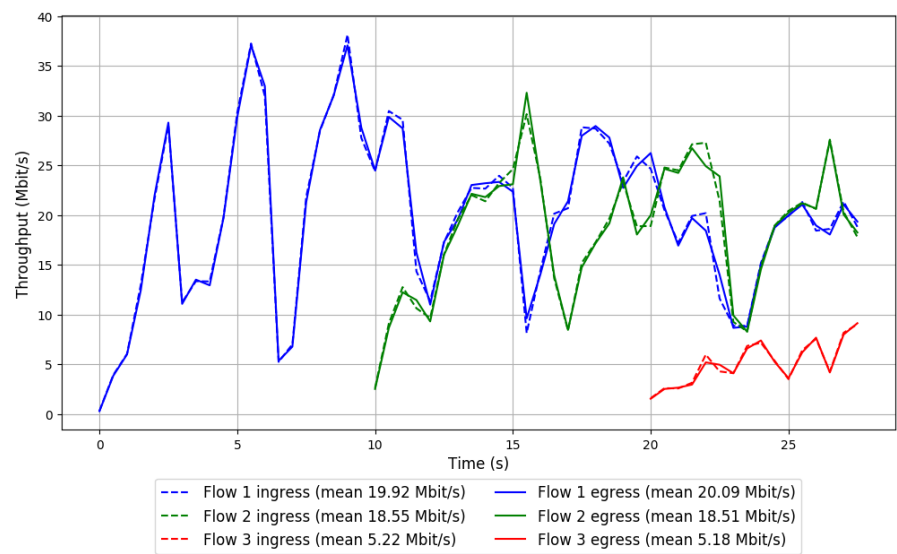
-- Flow 3:

Average throughput: 5.18 Mbit/s

95th percentile per-packet one-way delay: 51.726 ms

Loss rate: 0.75%

Run 1: Report of Copa — Data Link



Run 2: Statistics of Copa

Start at: 2017-12-11 10:09:25

End at: 2017-12-11 10:09:55

Local clock offset: -5.824 ms

Remote clock offset: -0.9 ms

Below is generated by plot.py at 2017-12-11 10:46:48

Datalink statistics

-- Total of 3 flows:

Average throughput: 32.17 Mbit/s

95th percentile per-packet one-way delay: 43.938 ms

Loss rate: 0.09%

-- Flow 1:

Average throughput: 19.95 Mbit/s

95th percentile per-packet one-way delay: 38.980 ms

Loss rate: 0.03%

-- Flow 2:

Average throughput: 12.69 Mbit/s

95th percentile per-packet one-way delay: 45.000 ms

Loss rate: 0.11%

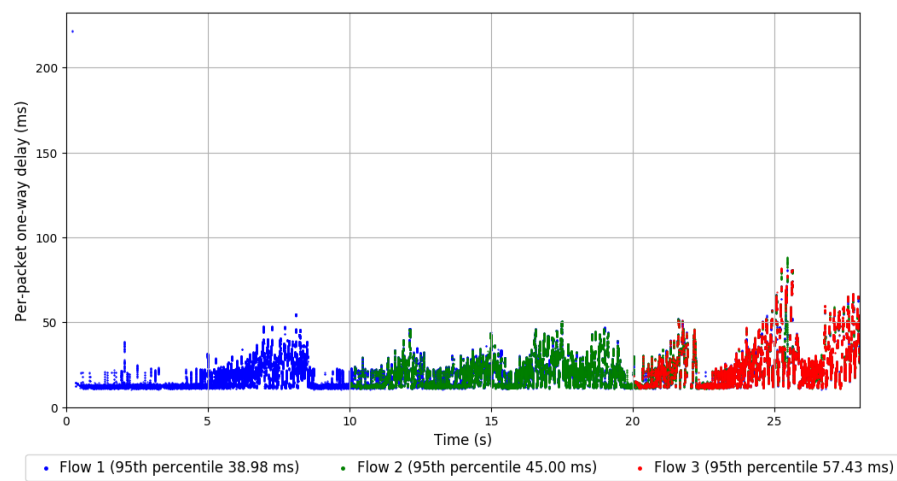
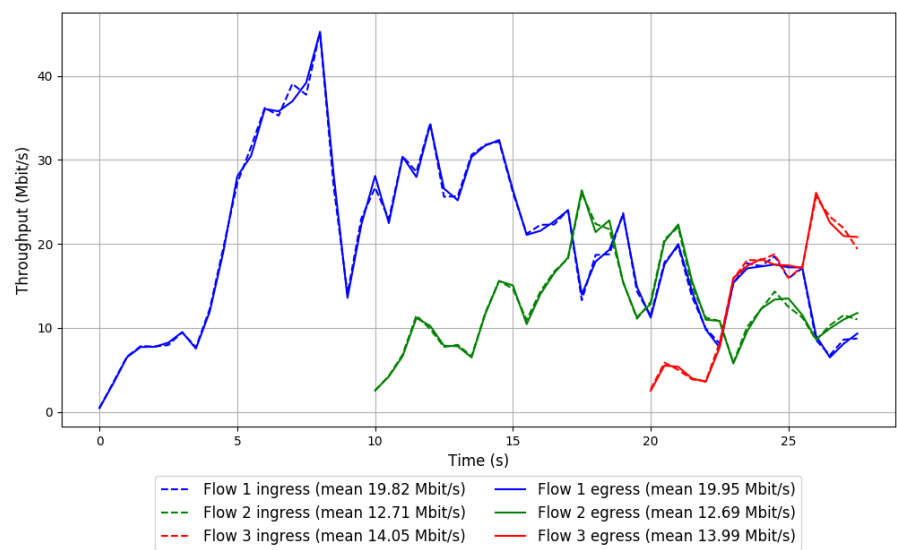
-- Flow 3:

Average throughput: 13.99 Mbit/s

95th percentile per-packet one-way delay: 57.426 ms

Loss rate: 0.31%

Run 2: Report of Copa — Data Link

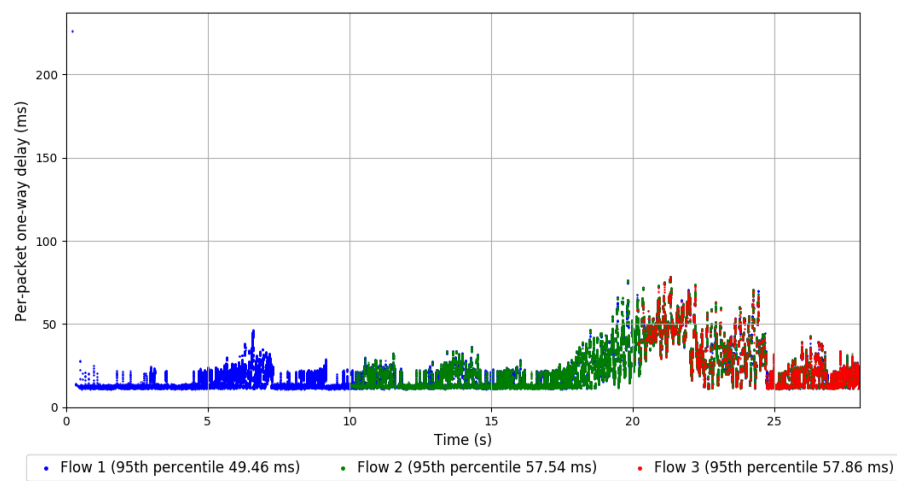
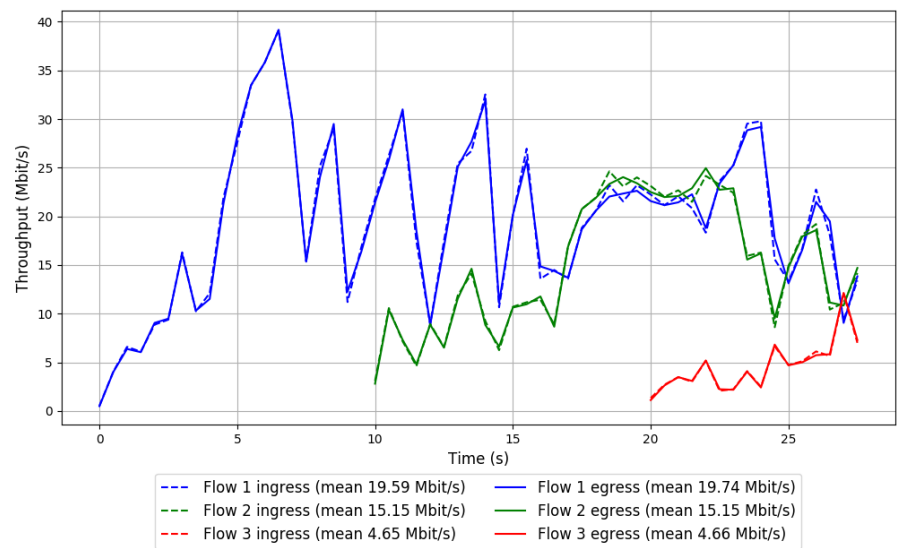


Run 3: Statistics of Copa

Start at: 2017-12-11 10:26:16
End at: 2017-12-11 10:26:46
Local clock offset: -5.261 ms
Remote clock offset: -0.764 ms

Below is generated by plot.py at 2017-12-11 10:46:48
Datalink statistics
-- Total of 3 flows:
Average throughput: 30.87 Mbit/s
95th percentile per-packet one-way delay: 52.699 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 19.74 Mbit/s
95th percentile per-packet one-way delay: 49.456 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 15.15 Mbit/s
95th percentile per-packet one-way delay: 57.540 ms
Loss rate: 0.01%
-- Flow 3:
Average throughput: 4.66 Mbit/s
95th percentile per-packet one-way delay: 57.864 ms
Loss rate: 0.00%

Run 3: Report of Copa — Data Link

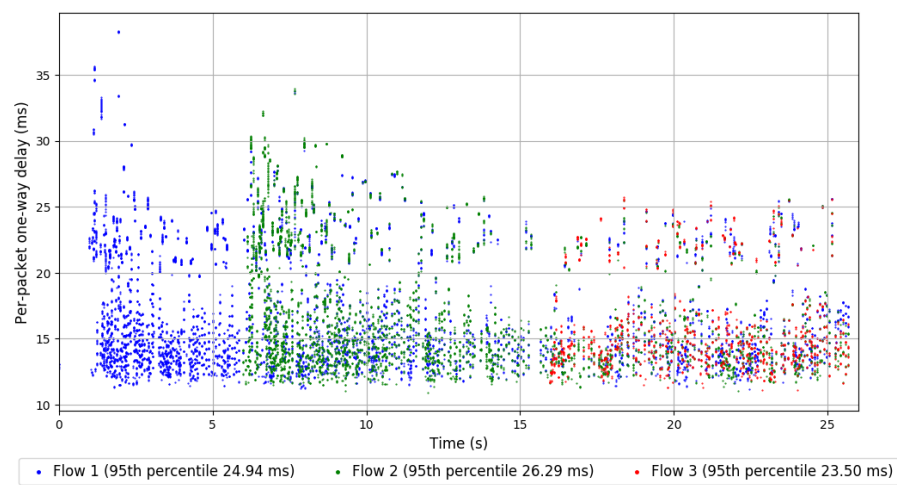
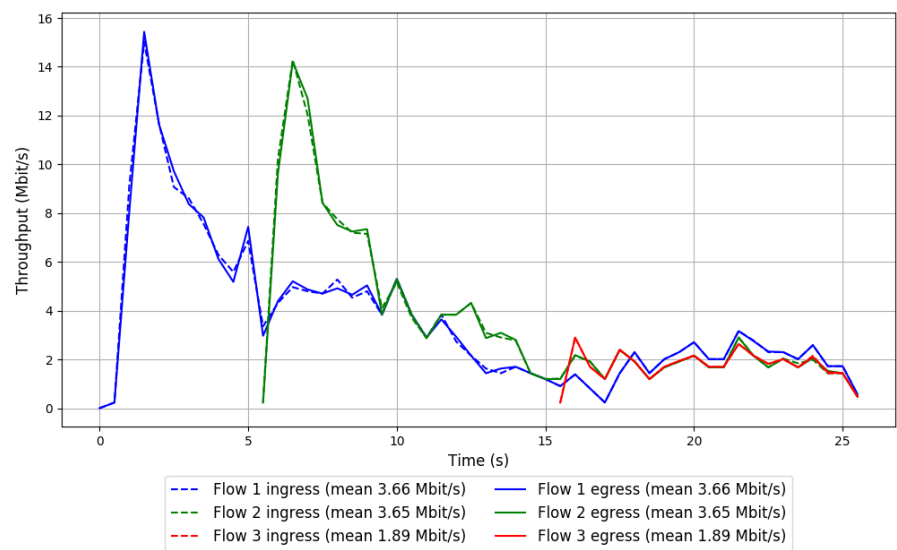


```
Run 1: Statistics of Indigo

Start at: 2017-12-11 10:04:38
End at: 2017-12-11 10:05:08
Local clock offset: -5.678 ms
Remote clock offset: -1.139 ms

# Below is generated by plot.py at 2017-12-11 10:46:48
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.17 Mbit/s
95th percentile per-packet one-way delay: 25.319 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 3.66 Mbit/s
95th percentile per-packet one-way delay: 24.938 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 3.65 Mbit/s
95th percentile per-packet one-way delay: 26.287 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 1.89 Mbit/s
95th percentile per-packet one-way delay: 23.500 ms
Loss rate: 0.00%
```

Run 1: Report of Indigo — Data Link

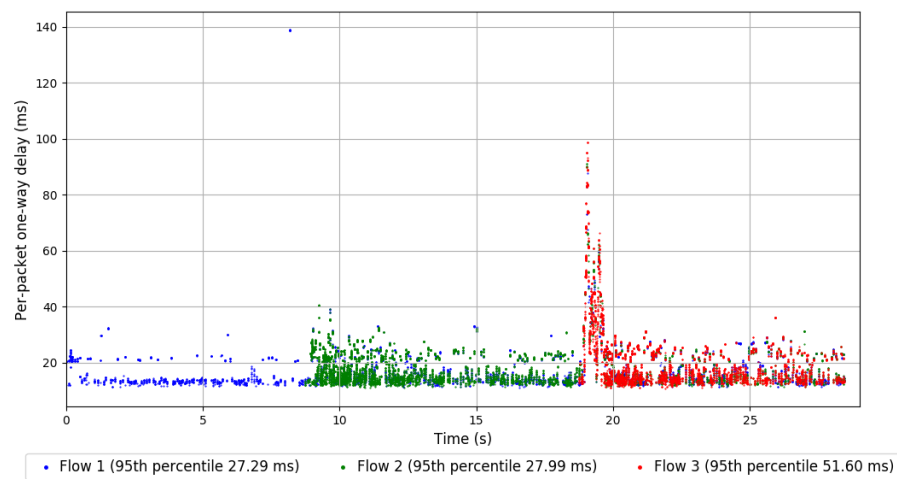
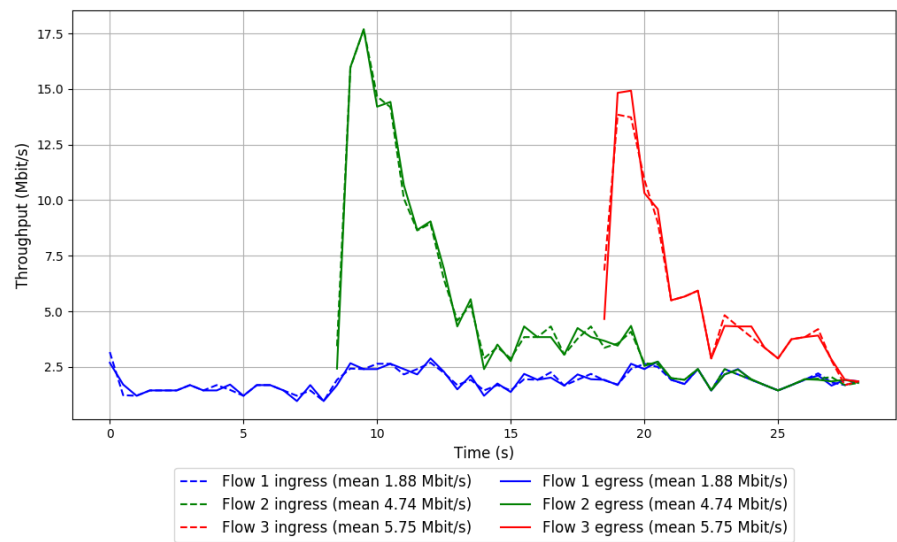


Run 2: Statistics of Indigo

Start at: 2017-12-11 10:21:30
End at: 2017-12-11 10:22:00
Local clock offset: -5.126 ms
Remote clock offset: -0.741 ms

Below is generated by plot.py at 2017-12-11 10:46:48
Datalink statistics
-- Total of 3 flows:
Average throughput: 7.13 Mbit/s
95th percentile per-packet one-way delay: 34.417 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.88 Mbit/s
95th percentile per-packet one-way delay: 27.291 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 4.74 Mbit/s
95th percentile per-packet one-way delay: 27.994 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 5.75 Mbit/s
95th percentile per-packet one-way delay: 51.604 ms
Loss rate: 0.00%

Run 2: Report of Indigo — Data Link

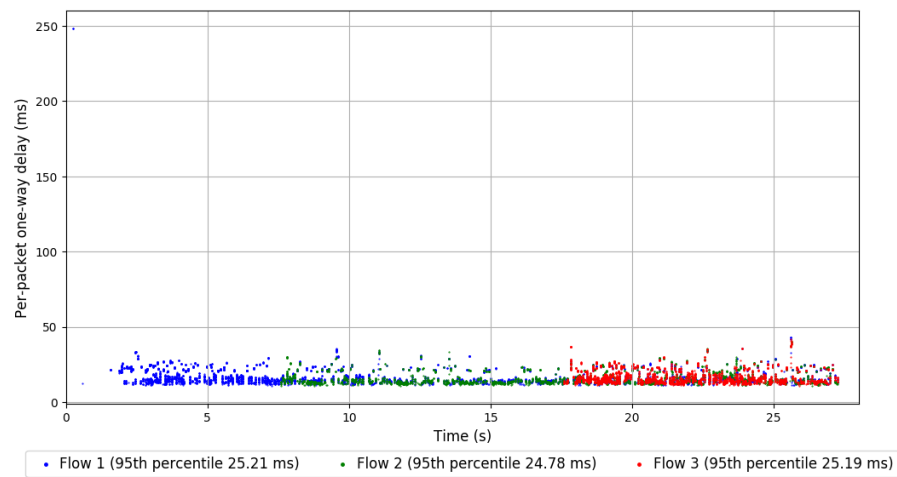
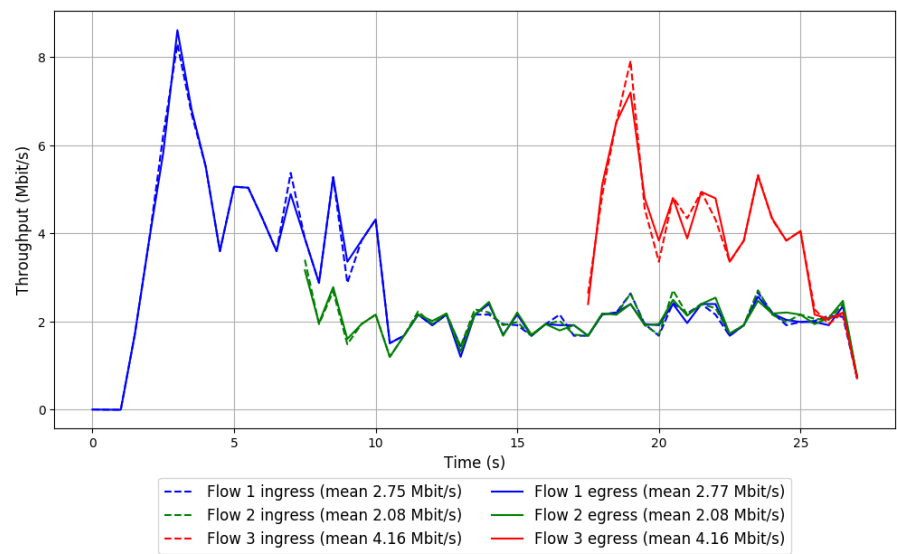


Run 3: Statistics of Indigo

Start at: 2017-12-11 10:38:21
End at: 2017-12-11 10:38:51
Local clock offset: -5.647 ms
Remote clock offset: -0.805 ms

Below is generated by plot.py at 2017-12-11 10:46:48
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.77 Mbit/s
95th percentile per-packet one-way delay: 25.175 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.77 Mbit/s
95th percentile per-packet one-way delay: 25.208 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.08 Mbit/s
95th percentile per-packet one-way delay: 24.777 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 4.16 Mbit/s
95th percentile per-packet one-way delay: 25.194 ms
Loss rate: 0.00%

Run 3: Report of Indigo — Data Link

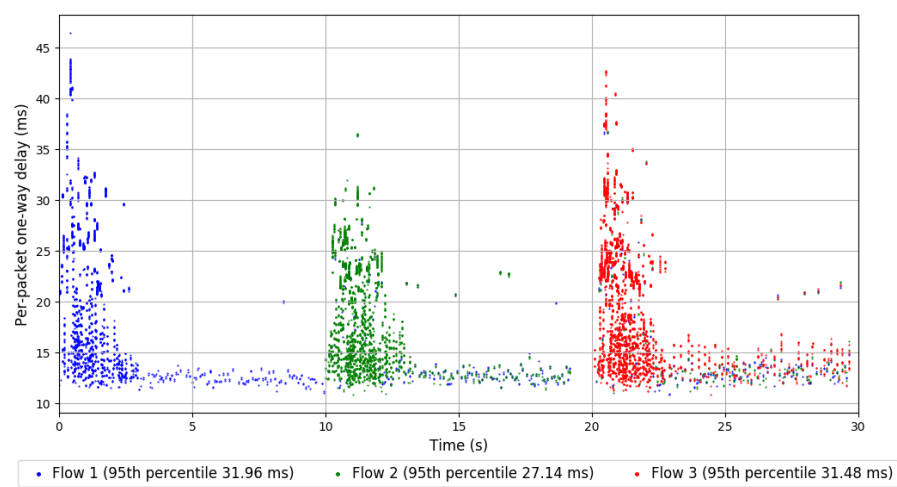
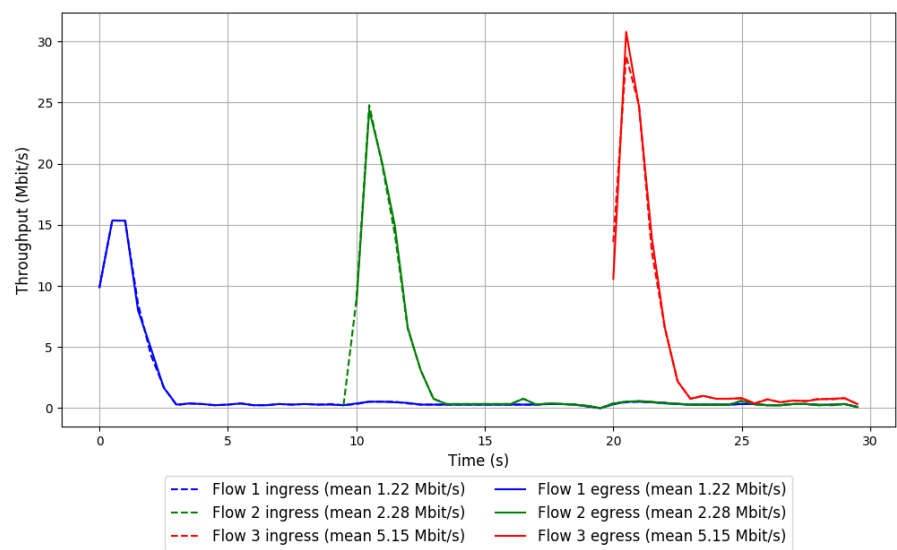


```
Run 1: Statistics of Indigo-calib

Start at: 2017-12-11 09:53:46
End at: 2017-12-11 09:54:16
Local clock offset: -5.733 ms
Remote clock offset: -1.322 ms

# Below is generated by plot.py at 2017-12-11 10:46:48
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.39 Mbit/s
95th percentile per-packet one-way delay: 30.727 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 31.965 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 27.138 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 5.15 Mbit/s
95th percentile per-packet one-way delay: 31.478 ms
Loss rate: 0.00%
```

Run 1: Report of Indigo-calib — Data Link

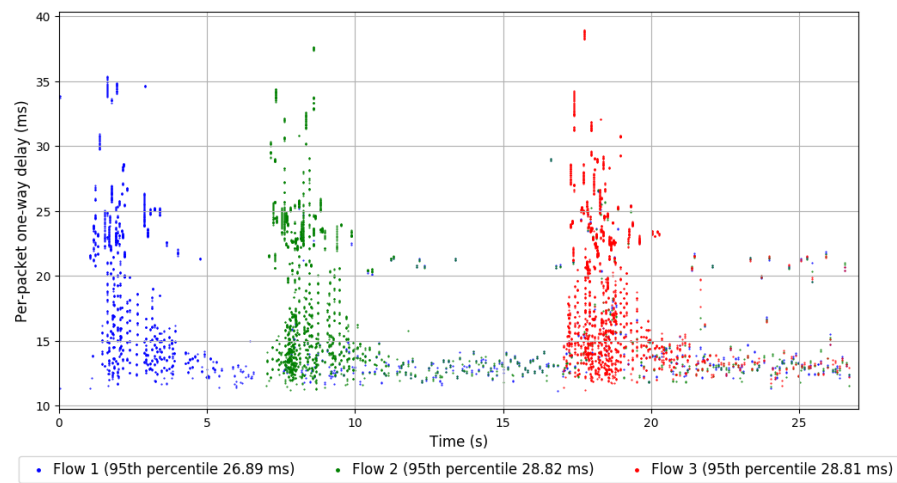
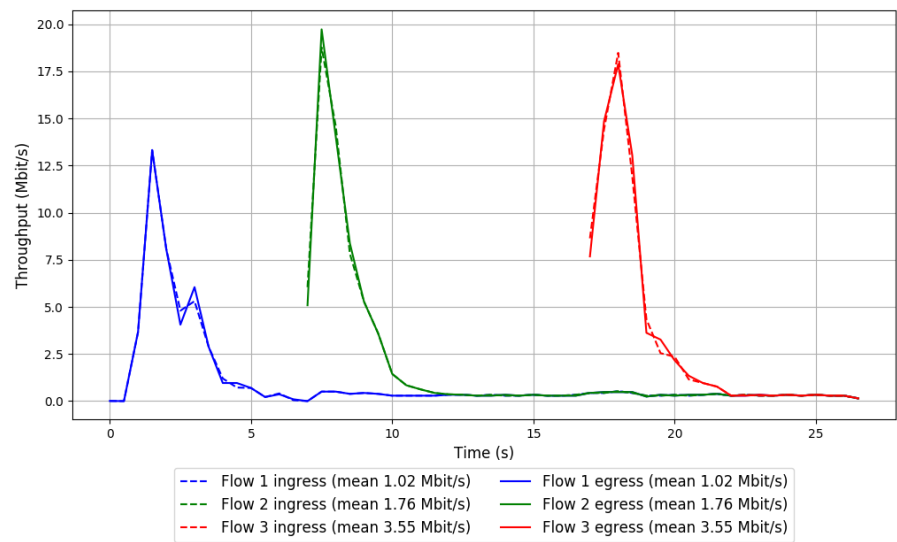


```
Run 2: Statistics of Indigo-calib

Start at: 2017-12-11 10:10:38
End at: 2017-12-11 10:11:08
Local clock offset: -5.717 ms
Remote clock offset: -0.968 ms

# Below is generated by plot.py at 2017-12-11 10:46:48
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.60 Mbit/s
95th percentile per-packet one-way delay: 28.525 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 26.893 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.76 Mbit/s
95th percentile per-packet one-way delay: 28.821 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 3.55 Mbit/s
95th percentile per-packet one-way delay: 28.807 ms
Loss rate: 0.00%
```

Run 2: Report of Indigo-calib — Data Link



Run 3: Statistics of Indigo-calib

Start at: 2017-12-11 10:27:29

End at: 2017-12-11 10:27:59

Local clock offset: -5.309 ms

Remote clock offset: -0.873 ms

Run 3: Report of Indigo-calib — Data Link

