

Pantheon Report

Generated at 2017-12-05 09:44:47 (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).

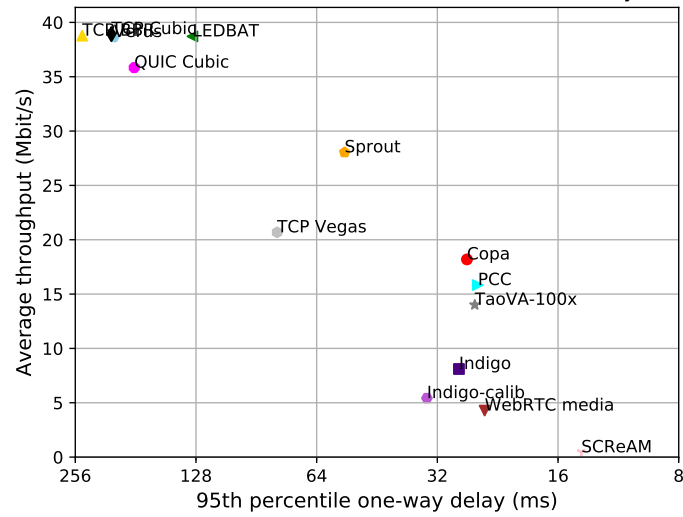
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

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

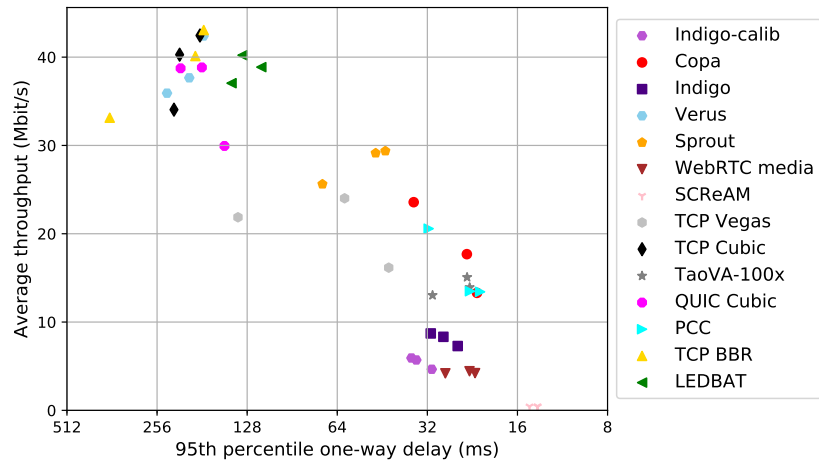
Git summary:

```
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 @ f1a14bffe749737437f61b1eae30b267cde681
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



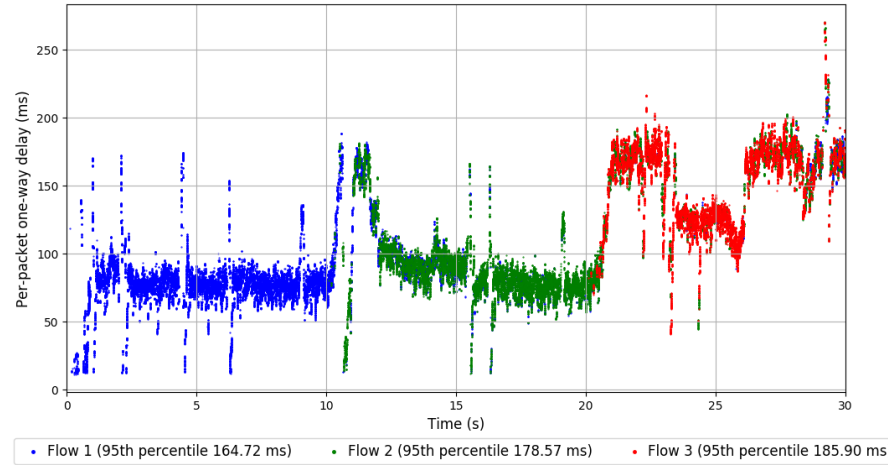
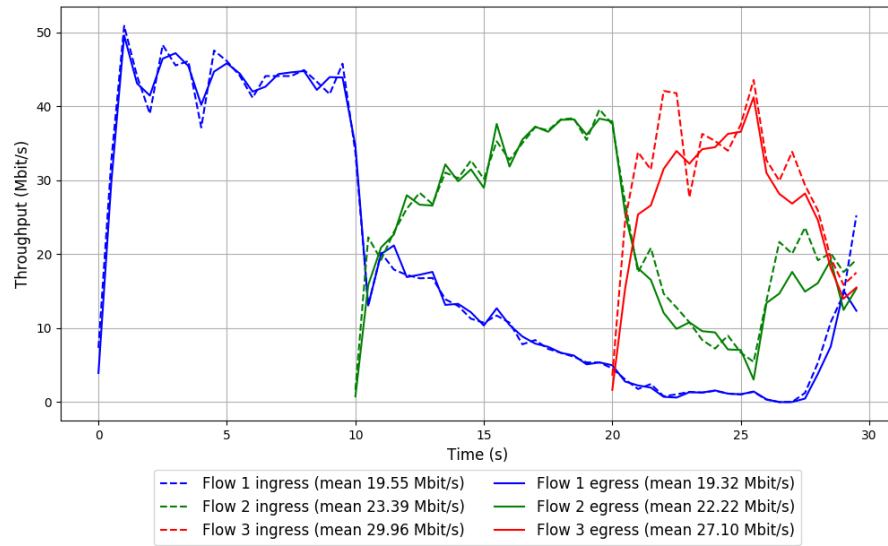
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	21.28	16.52	19.63	234.22	264.08	249.48	2.72	6.49	8.54
TCP Cubic	3	26.80	13.30	10.02	201.27	218.69	217.81	0.37	0.71	1.54
LEDBAT	3	30.29	10.58	4.09	124.88	146.98	162.88	0.25	0.39	1.23
PCC	3	8.33	7.70	7.13	22.50	26.79	31.05	0.00	0.00	0.00
QUIC Cubic	3	64.32	19.17	12.15	131.54	188.46	189.10	0.27	0.97	2.21
SCReAM	3	0.22	0.22	0.22	13.45	16.19	14.60	0.00	0.00	0.00
WebRTC media	3	2.18	1.54	0.57	24.09	24.75	25.70	0.00	0.02	0.00
Sprout	3	14.56	14.05	12.29	50.56	55.16	65.69	0.05	0.08	0.03
TaoVA-100x	3	5.87	8.45	9.32	26.97	22.77	30.17	0.00	0.00	0.00
TCP Vegas	3	9.73	8.03	16.72	65.85	57.71	70.27	0.01	0.03	0.55
Verus	3	24.93	14.20	14.76	201.10	216.14	203.51	17.16	29.37	22.90
Copa	3	14.38	4.39	5.62	25.90	24.46	29.78	0.01	0.00	0.03
Indigo	3	2.67	5.38	5.74	26.63	28.30	30.25	0.00	0.00	0.01
Indigo-calib	3	1.91	3.04	4.64	33.34	34.55	34.80	0.00	0.00	0.00

Run 1: Statistics of TCP BBR

Start at: 2017-12-05 09:06:39
End at: 2017-12-05 09:07:09
Local clock offset: 2.965 ms
Remote clock offset: -2.279 ms

Below is generated by plot.py at 2017-12-05 09:43:08
Datalink statistics
-- Total of 3 flows:
Average throughput: 43.07 Mbit/s
95th percentile per-packet one-way delay: 178.809 ms
Loss rate: 4.76%
-- Flow 1:
Average throughput: 19.32 Mbit/s
95th percentile per-packet one-way delay: 164.721 ms
Loss rate: 1.65%
-- Flow 2:
Average throughput: 22.22 Mbit/s
95th percentile per-packet one-way delay: 178.574 ms
Loss rate: 5.25%
-- Flow 3:
Average throughput: 27.10 Mbit/s
95th percentile per-packet one-way delay: 185.897 ms
Loss rate: 10.12%

Run 1: Report of TCP BBR — Data Link

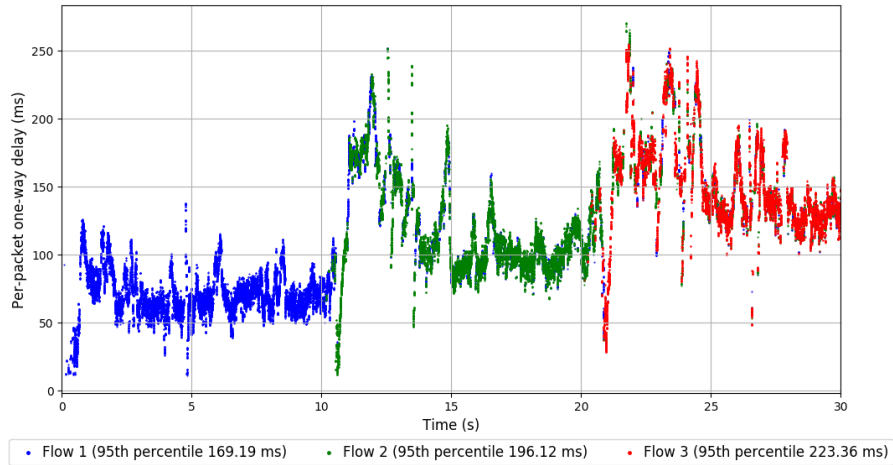
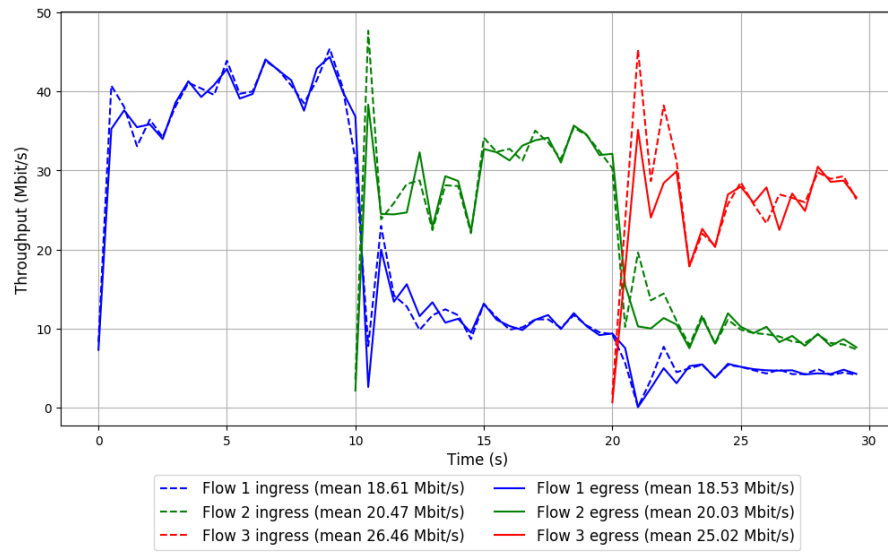


Run 2: Statistics of TCP BBR

Start at: 2017-12-05 09:23:28
End at: 2017-12-05 09:23:58
Local clock offset: 3.157 ms
Remote clock offset: -1.974 ms

Below is generated by plot.py at 2017-12-05 09:43:08
Datalink statistics
-- Total of 3 flows:
Average throughput: 40.12 Mbit/s
95th percentile per-packet one-way delay: 190.669 ms
Loss rate: 2.37%
-- Flow 1:
Average throughput: 18.53 Mbit/s
95th percentile per-packet one-way delay: 169.186 ms
Loss rate: 0.65%
-- Flow 2:
Average throughput: 20.03 Mbit/s
95th percentile per-packet one-way delay: 196.120 ms
Loss rate: 2.32%
-- Flow 3:
Average throughput: 25.02 Mbit/s
95th percentile per-packet one-way delay: 223.364 ms
Loss rate: 6.09%

Run 2: Report of TCP BBR — Data Link

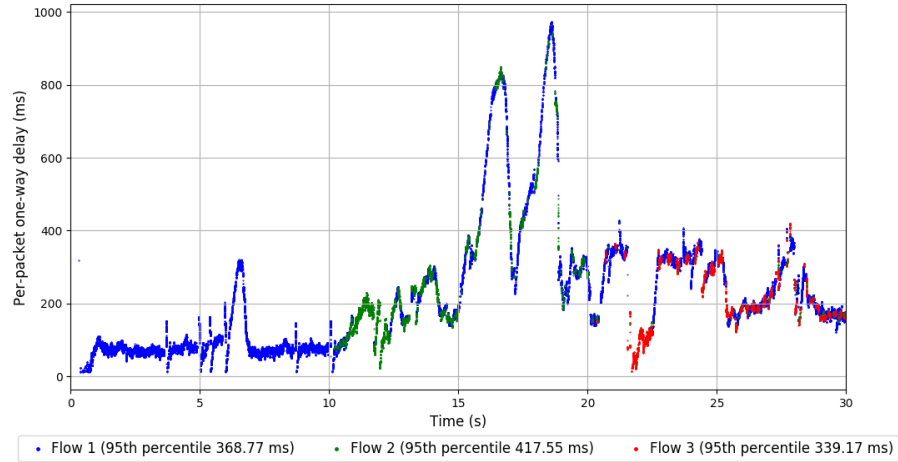
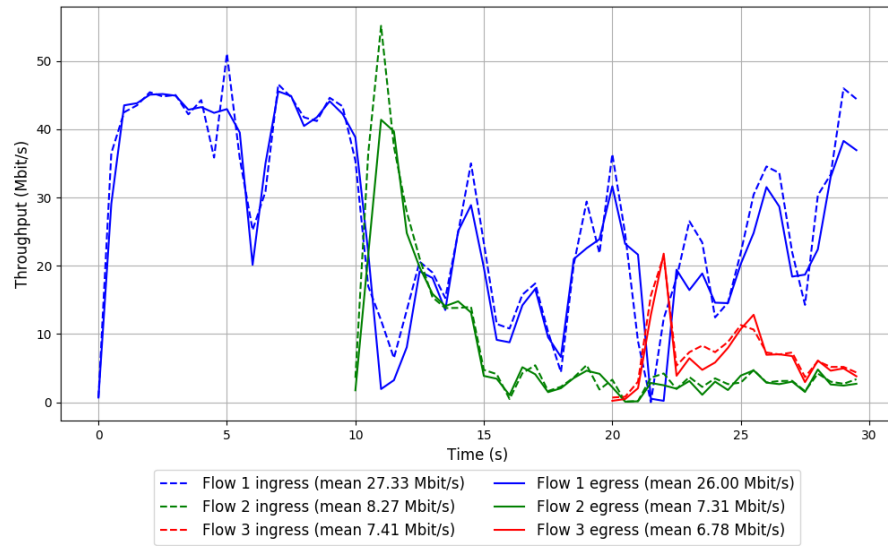


Run 3: Statistics of TCP BBR

Start at: 2017-12-05 09:40:17
End at: 2017-12-05 09:40:47
Local clock offset: 3.243 ms
Remote clock offset: -1.718 ms

Below is generated by plot.py at 2017-12-05 09:43:08
Datalink statistics
-- Total of 3 flows:
Average throughput: 33.14 Mbit/s
95th percentile per-packet one-way delay: 368.501 ms
Loss rate: 7.04%
-- Flow 1:
Average throughput: 26.00 Mbit/s
95th percentile per-packet one-way delay: 368.767 ms
Loss rate: 5.85%
-- Flow 2:
Average throughput: 7.31 Mbit/s
95th percentile per-packet one-way delay: 417.553 ms
Loss rate: 11.89%
-- Flow 3:
Average throughput: 6.78 Mbit/s
95th percentile per-packet one-way delay: 339.174 ms
Loss rate: 9.40%

Run 3: Report of TCP BBR — Data Link

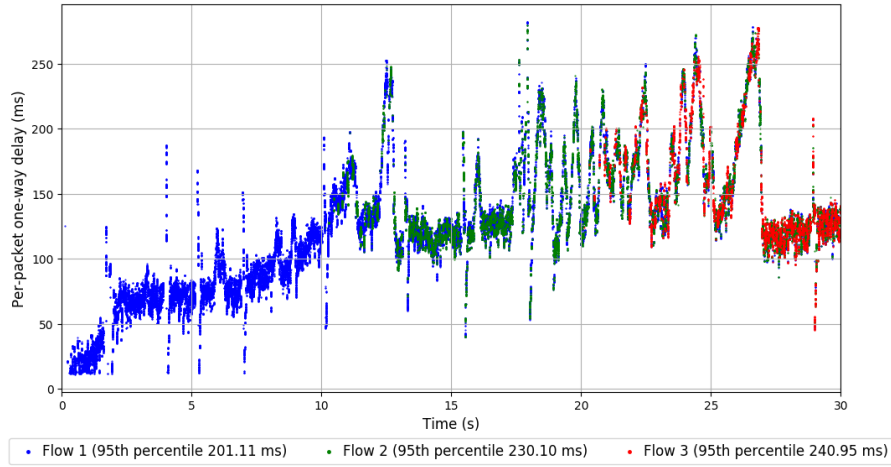
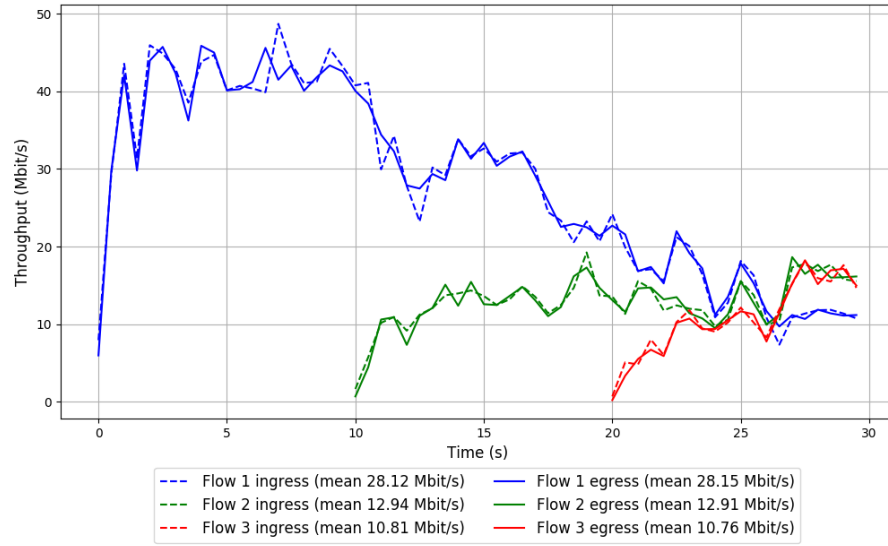


Run 1: Statistics of TCP Cubic

Start at: 2017-12-05 08:54:40
End at: 2017-12-05 08:55:10
Local clock offset: 3.164 ms
Remote clock offset: -2.648 ms

Below is generated by plot.py at 2017-12-05 09:43:08
Datalink statistics
-- Total of 3 flows:
Average throughput: 40.28 Mbit/s
95th percentile per-packet one-way delay: 215.210 ms
Loss rate: 0.48%
-- Flow 1:
Average throughput: 28.15 Mbit/s
95th percentile per-packet one-way delay: 201.109 ms
Loss rate: 0.25%
-- Flow 2:
Average throughput: 12.91 Mbit/s
95th percentile per-packet one-way delay: 230.101 ms
Loss rate: 0.79%
-- Flow 3:
Average throughput: 10.76 Mbit/s
95th percentile per-packet one-way delay: 240.947 ms
Loss rate: 1.55%

Run 1: Report of TCP Cubic — Data Link

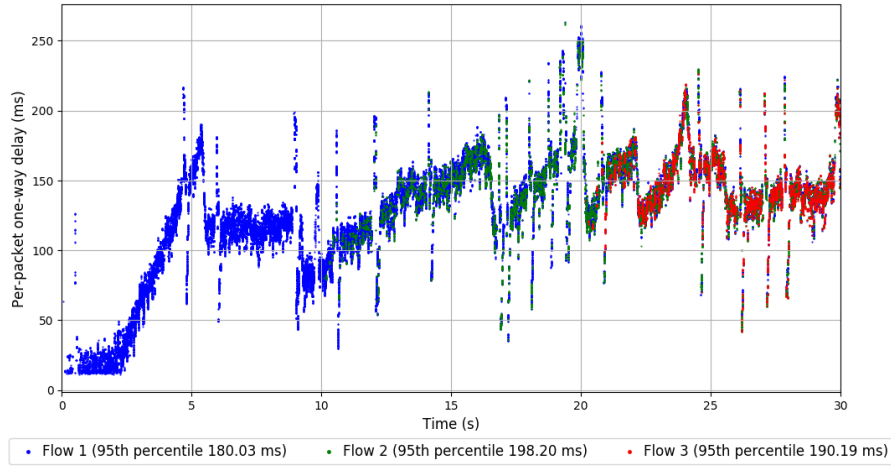
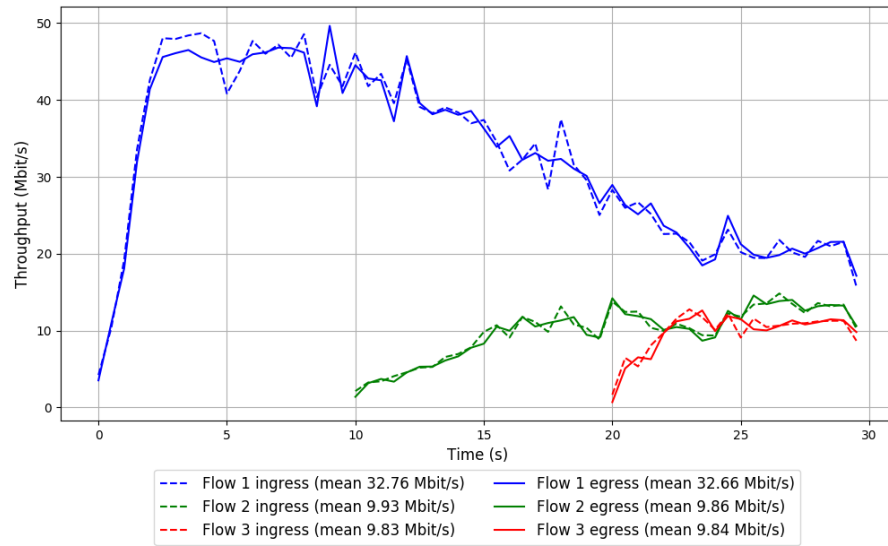


Run 2: Statistics of TCP Cubic

Start at: 2017-12-05 09:11:29
End at: 2017-12-05 09:11:59
Local clock offset: 3.074 ms
Remote clock offset: -2.212 ms

Below is generated by plot.py at 2017-12-05 09:43:08
Datalink statistics
-- Total of 3 flows:
Average throughput: 42.45 Mbit/s
95th percentile per-packet one-way delay: 184.055 ms
Loss rate: 0.52%
-- Flow 1:
Average throughput: 32.66 Mbit/s
95th percentile per-packet one-way delay: 180.035 ms
Loss rate: 0.39%
-- Flow 2:
Average throughput: 9.86 Mbit/s
95th percentile per-packet one-way delay: 198.200 ms
Loss rate: 0.89%
-- Flow 3:
Average throughput: 9.84 Mbit/s
95th percentile per-packet one-way delay: 190.194 ms
Loss rate: 1.08%

Run 2: Report of TCP Cubic — Data Link

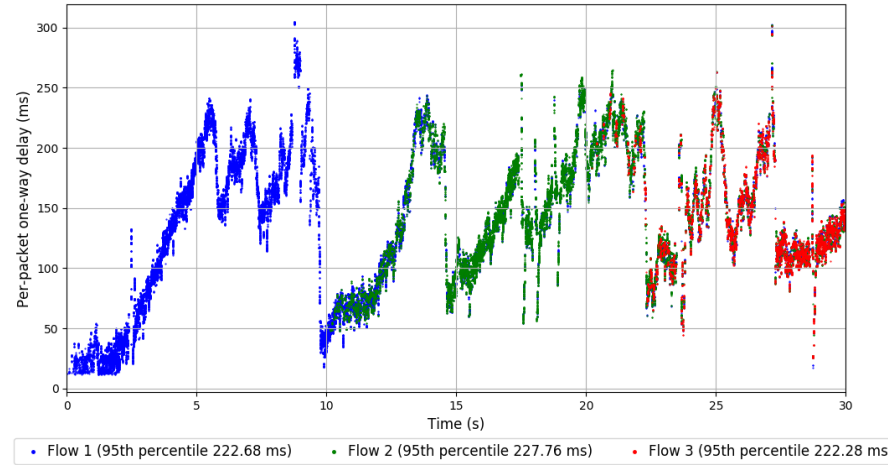
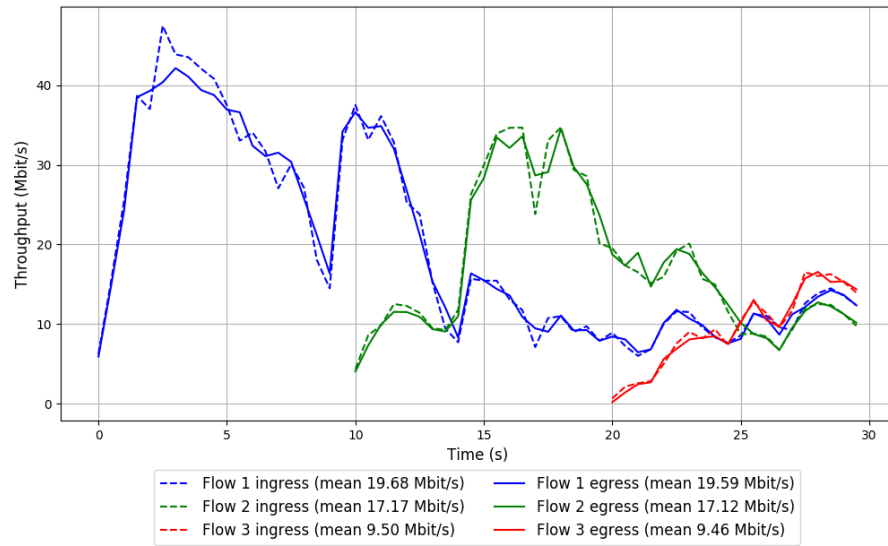


Run 3: Statistics of TCP Cubic

Start at: 2017-12-05 09:28:17
End at: 2017-12-05 09:28:48
Local clock offset: 3.068 ms
Remote clock offset: -1.895 ms

Below is generated by plot.py at 2017-12-05 09:43:08
Datalink statistics
-- Total of 3 flows:
Average throughput: 34.05 Mbit/s
95th percentile per-packet one-way delay: 224.768 ms
Loss rate: 0.60%
-- Flow 1:
Average throughput: 19.59 Mbit/s
95th percentile per-packet one-way delay: 222.676 ms
Loss rate: 0.46%
-- Flow 2:
Average throughput: 17.12 Mbit/s
95th percentile per-packet one-way delay: 227.757 ms
Loss rate: 0.45%
-- Flow 3:
Average throughput: 9.46 Mbit/s
95th percentile per-packet one-way delay: 222.278 ms
Loss rate: 2.00%

Run 3: Report of TCP Cubic — Data Link

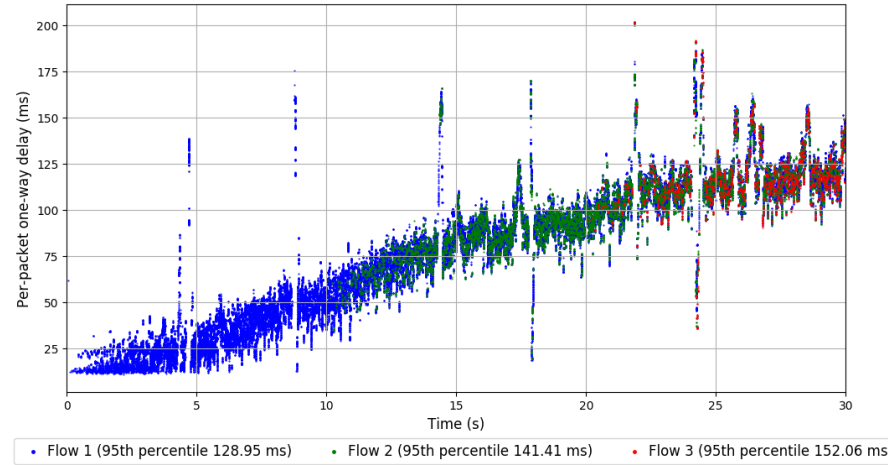
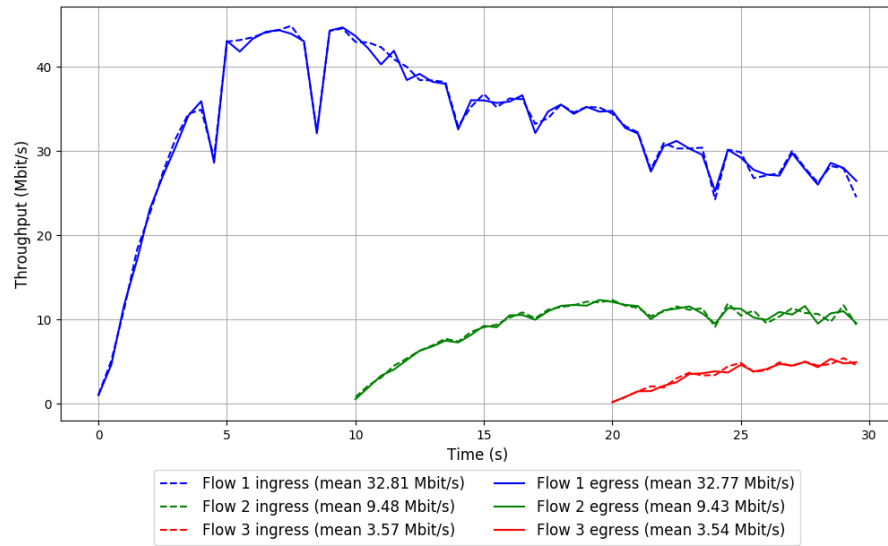


```
Run 1: Statistics of LEDBAT

Start at: 2017-12-05 09:04:14
End at: 2017-12-05 09:04:44
Local clock offset: 2.946 ms
Remote clock offset: -2.339 ms

# Below is generated by plot.py at 2017-12-05 09:43:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 40.21 Mbit/s
95th percentile per-packet one-way delay: 132.705 ms
Loss rate: 0.34%
-- Flow 1:
Average throughput: 32.77 Mbit/s
95th percentile per-packet one-way delay: 128.954 ms
Loss rate: 0.24%
-- Flow 2:
Average throughput: 9.43 Mbit/s
95th percentile per-packet one-way delay: 141.405 ms
Loss rate: 0.69%
-- Flow 3:
Average throughput: 3.54 Mbit/s
95th percentile per-packet one-way delay: 152.060 ms
Loss rate: 1.45%
```


Run 1: Report of LEDBAT — Data Link

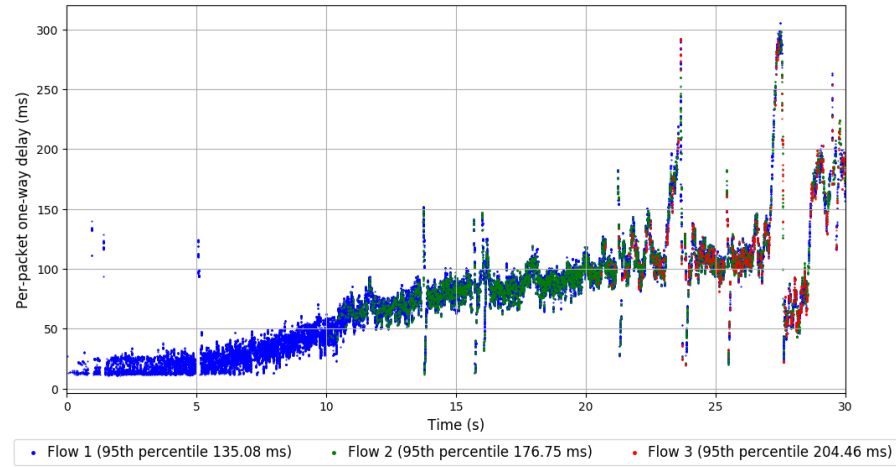
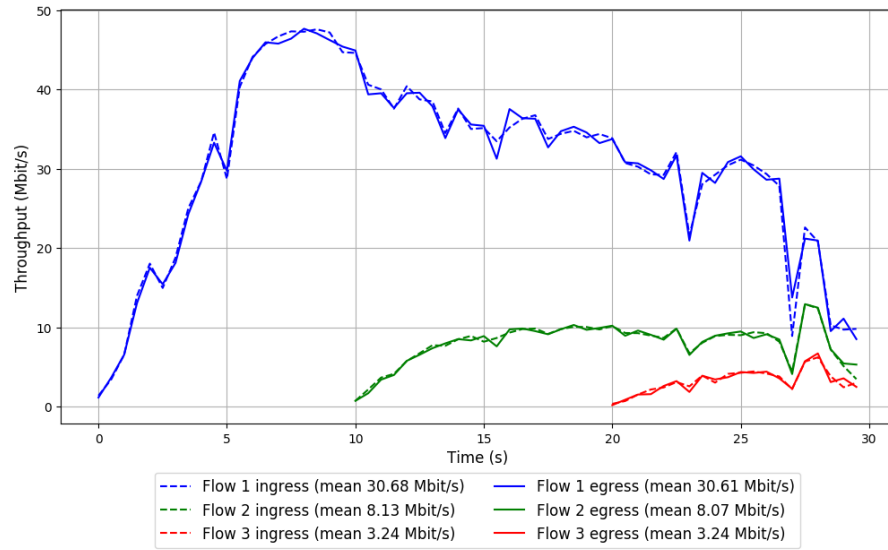


Run 2: Statistics of LEDBAT

Start at: 2017-12-05 09:21:03
End at: 2017-12-05 09:21:33
Local clock offset: 3.091 ms
Remote clock offset: -1.998 ms

Below is generated by plot.py at 2017-12-05 09:43:08
Datalink statistics
-- Total of 3 flows:
Average throughput: 37.05 Mbit/s
95th percentile per-packet one-way delay: 144.383 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 30.61 Mbit/s
95th percentile per-packet one-way delay: 135.083 ms
Loss rate: 0.21%
-- Flow 2:
Average throughput: 8.07 Mbit/s
95th percentile per-packet one-way delay: 176.753 ms
Loss rate: 0.01%
-- Flow 3:
Average throughput: 3.24 Mbit/s
95th percentile per-packet one-way delay: 204.456 ms
Loss rate: 1.02%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2017-12-05 09:37:51

End at: 2017-12-05 09:38:21

Local clock offset: 3.145 ms

Remote clock offset: -1.66 ms

Below is generated by plot.py at 2017-12-05 09:43:41

Datalink statistics

-- Total of 3 flows:

Average throughput: 38.87 Mbit/s

95th percentile per-packet one-way delay: 114.820 ms

Loss rate: 0.38%

-- Flow 1:

Average throughput: 27.49 Mbit/s

95th percentile per-packet one-way delay: 110.603 ms

Loss rate: 0.30%

-- Flow 2:

Average throughput: 14.25 Mbit/s

95th percentile per-packet one-way delay: 122.773 ms

Loss rate: 0.46%

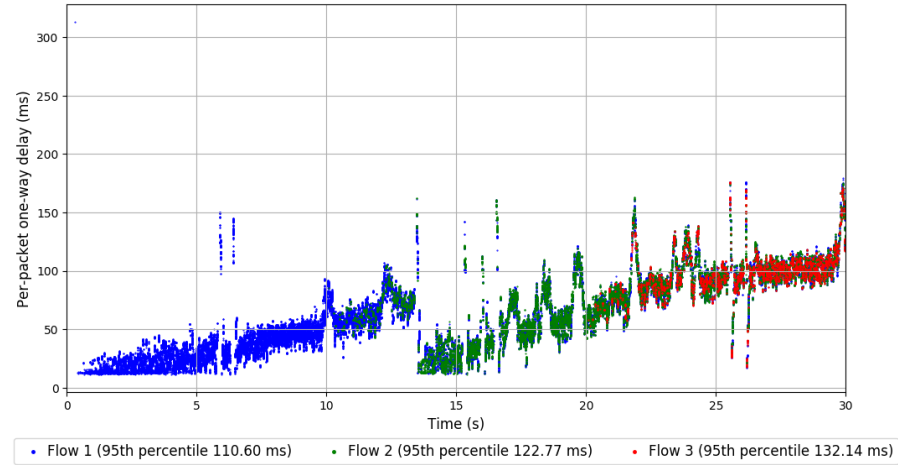
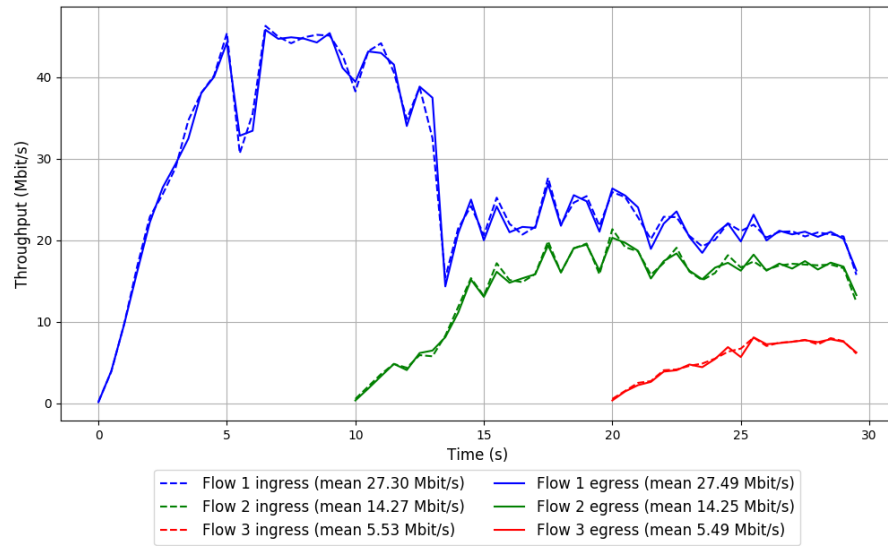
-- Flow 3:

Average throughput: 5.49 Mbit/s

95th percentile per-packet one-way delay: 132.139 ms

Loss rate: 1.22%

Run 3: Report of LEDBAT — Data Link

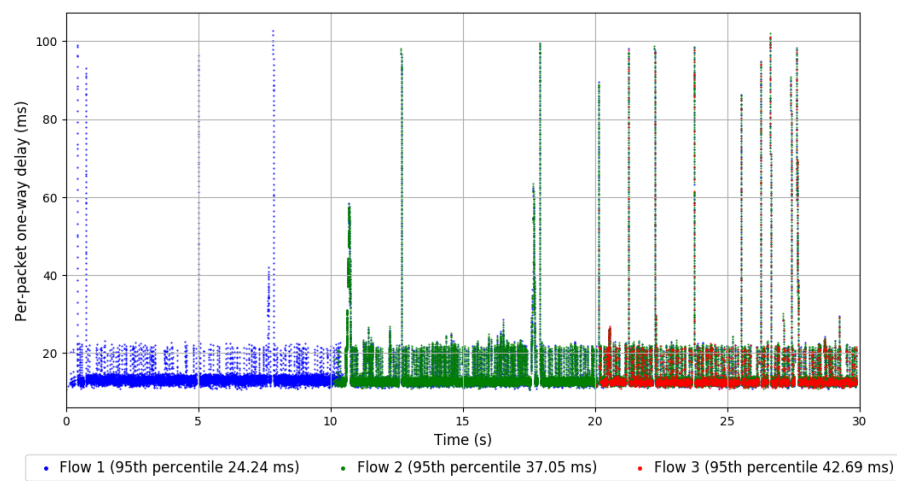
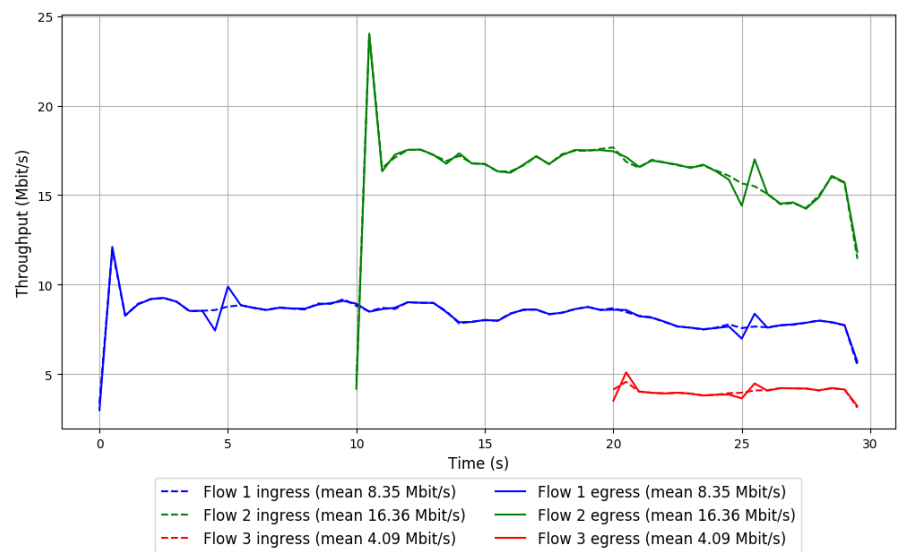


Run 1: Statistics of PCC

Start at: 2017-12-05 09:01:51
End at: 2017-12-05 09:02:21
Local clock offset: 3.045 ms
Remote clock offset: -2.464 ms

Below is generated by plot.py at 2017-12-05 09:43:41
Datalink statistics
-- Total of 3 flows:
Average throughput: 20.58 Mbit/s
95th percentile per-packet one-way delay: 31.674 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 8.35 Mbit/s
95th percentile per-packet one-way delay: 24.244 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 16.36 Mbit/s
95th percentile per-packet one-way delay: 37.046 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 4.09 Mbit/s
95th percentile per-packet one-way delay: 42.691 ms
Loss rate: 0.00%

Run 1: Report of PCC — Data Link



Run 2: Statistics of PCC

Start at: 2017-12-05 09:18:40

End at: 2017-12-05 09:19:10

Local clock offset: 3.158 ms

Remote clock offset: -1.95 ms

Below is generated by plot.py at 2017-12-05 09:43:41

Datalink statistics

-- Total of 3 flows:

Average throughput: 13.43 Mbit/s

95th percentile per-packet one-way delay: 21.328 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 9.47 Mbit/s

95th percentile per-packet one-way delay: 21.334 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 2.06 Mbit/s

95th percentile per-packet one-way delay: 21.171 ms

Loss rate: 0.00%

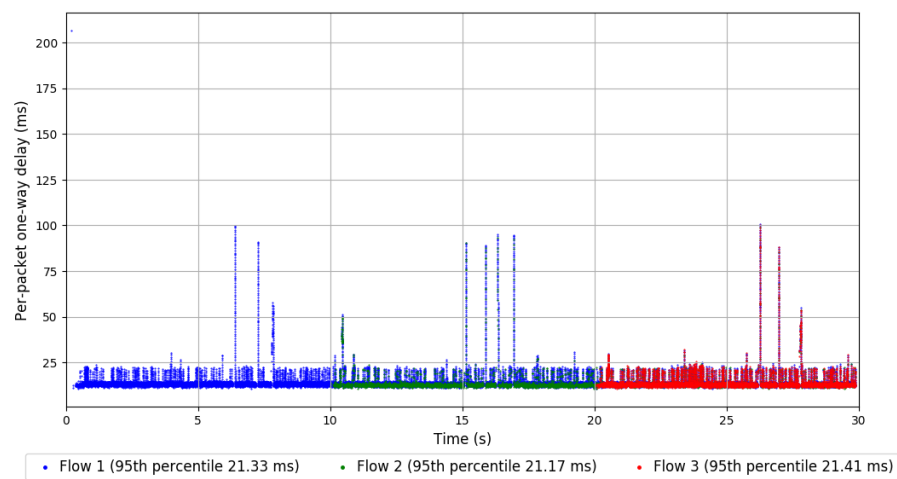
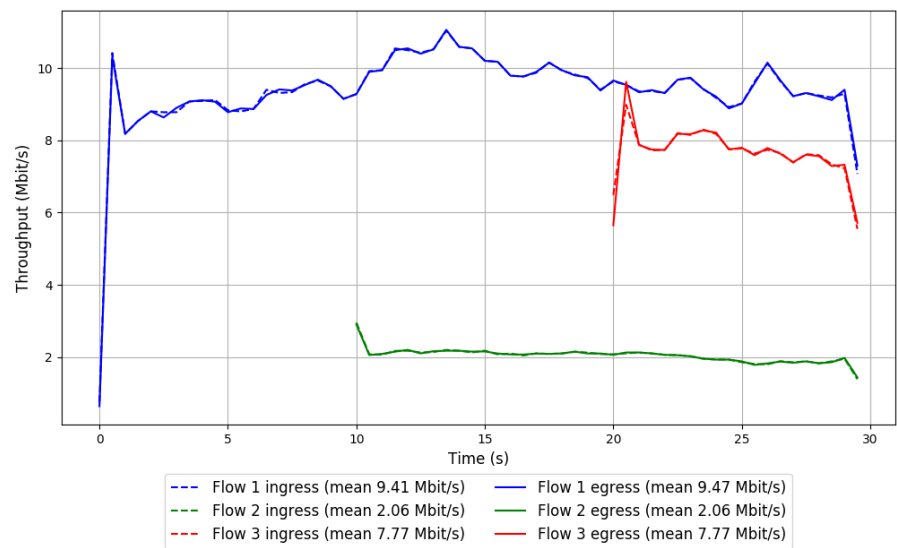
-- Flow 3:

Average throughput: 7.77 Mbit/s

95th percentile per-packet one-way delay: 21.405 ms

Loss rate: 0.00%

Run 2: Report of PCC — Data Link

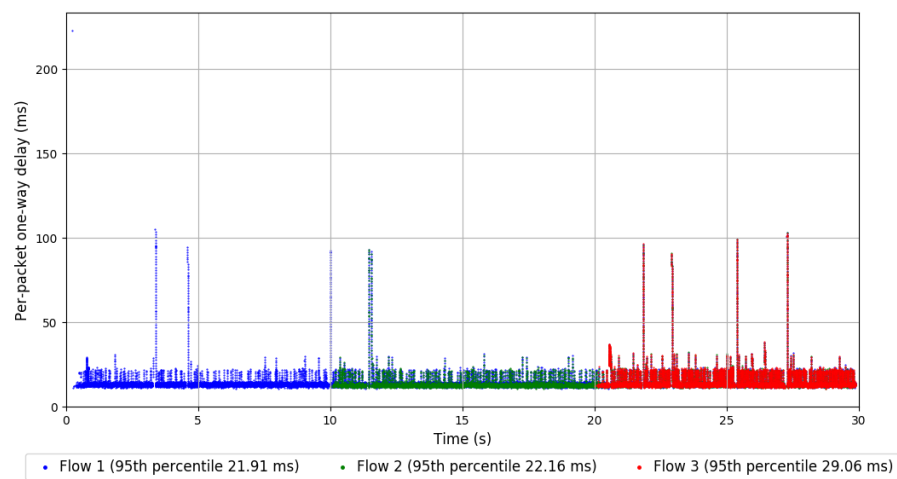
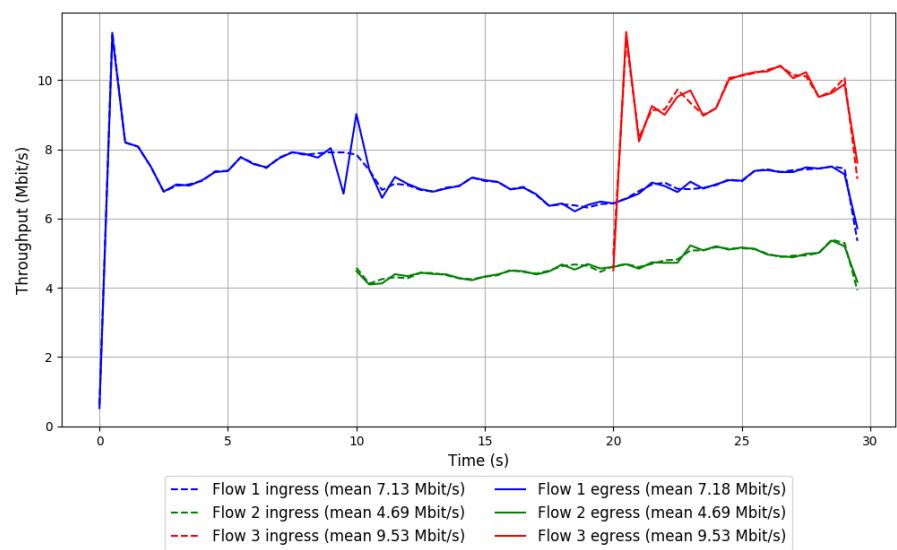


Run 3: Statistics of PCC

Start at: 2017-12-05 09:35:28
End at: 2017-12-05 09:35:58
Local clock offset: 3.157 ms
Remote clock offset: -1.762 ms

Below is generated by plot.py at 2017-12-05 09:43:41
Datalink statistics
-- Total of 3 flows:
Average throughput: 13.49 Mbit/s
95th percentile per-packet one-way delay: 23.061 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 7.18 Mbit/s
95th percentile per-packet one-way delay: 21.912 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 4.69 Mbit/s
95th percentile per-packet one-way delay: 22.155 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 9.53 Mbit/s
95th percentile per-packet one-way delay: 29.060 ms
Loss rate: 0.00%

Run 3: Report of PCC — Data Link

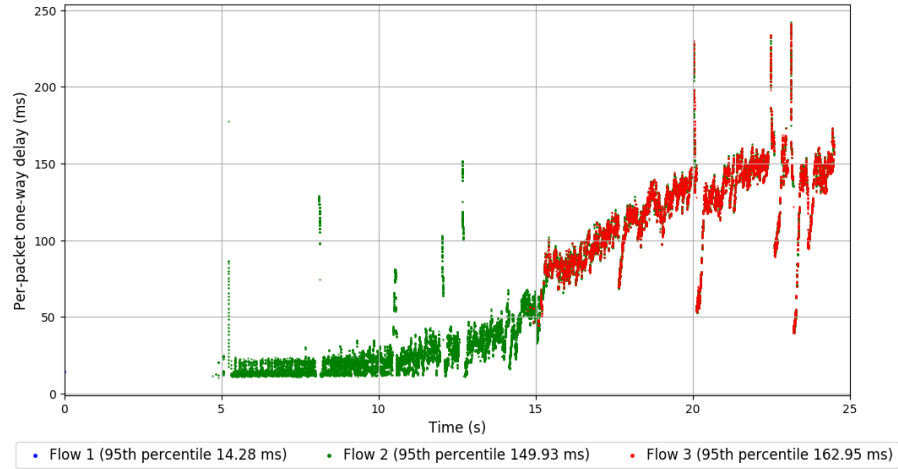
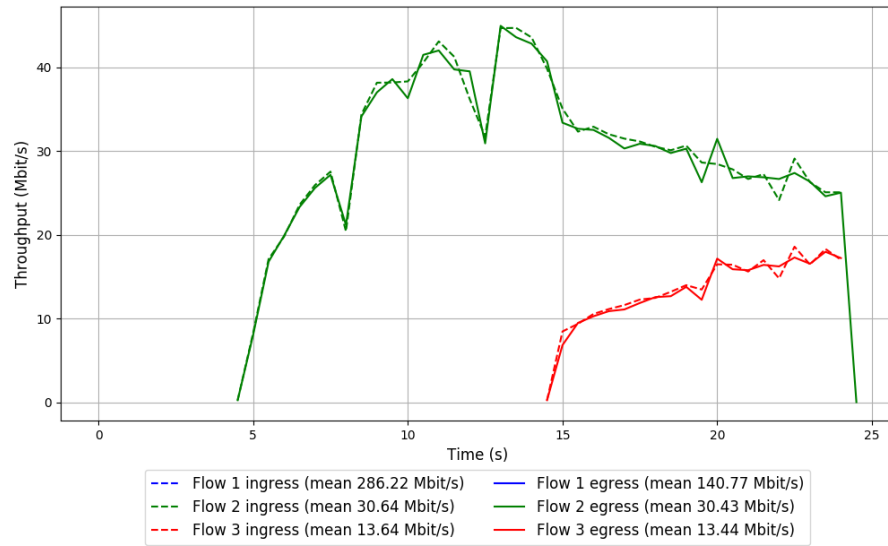


Run 1: Statistics of QUIC Cubic

Start at: 2017-12-05 08:57:04
End at: 2017-12-05 08:57:34
Local clock offset: 2.997 ms
Remote clock offset: -2.606 ms

Below is generated by plot.py at 2017-12-05 09:43:41
Datalink statistics
-- Total of 3 flows:
Average throughput: 29.94 Mbit/s
95th percentile per-packet one-way delay: 152.434 ms
Loss rate: 0.87%
-- Flow 1:
Average throughput: 140.77 Mbit/s
95th percentile per-packet one-way delay: 14.278 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 30.43 Mbit/s
95th percentile per-packet one-way delay: 149.925 ms
Loss rate: 0.65%
-- Flow 3:
Average throughput: 13.44 Mbit/s
95th percentile per-packet one-way delay: 162.952 ms
Loss rate: 1.87%

Run 1: Report of QUIC Cubic — Data Link

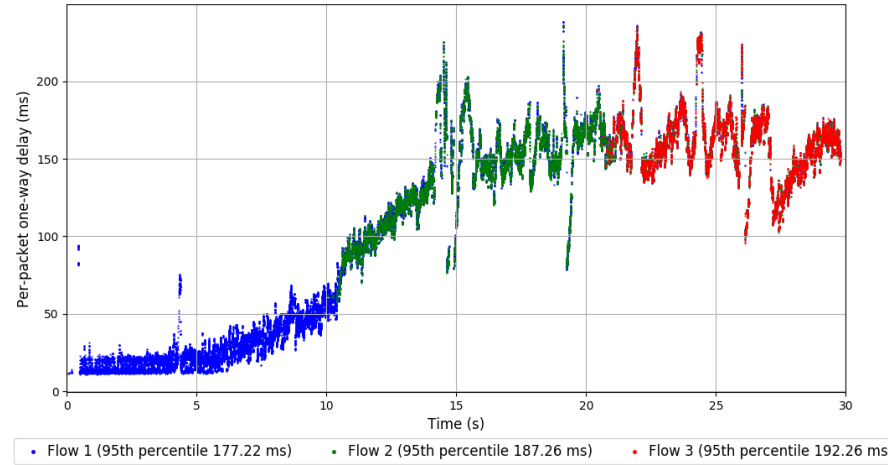
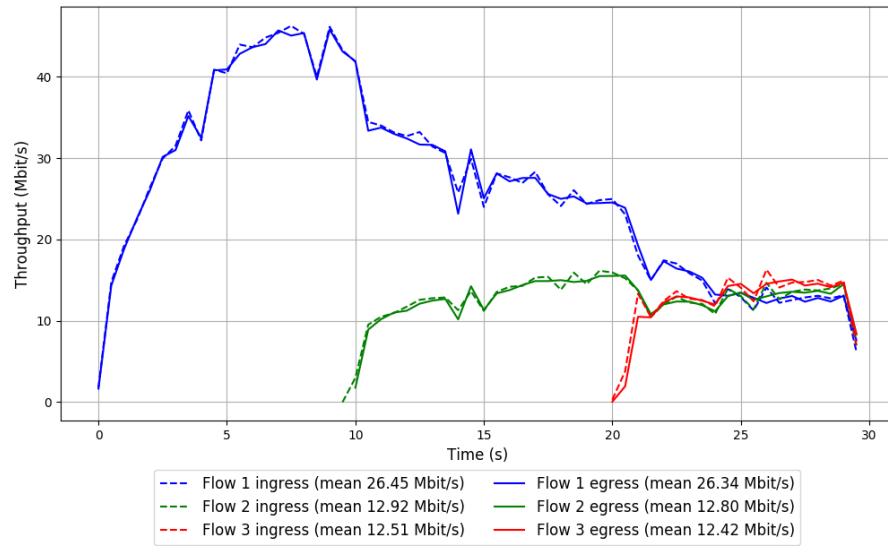


Run 2: Statistics of QUIC Cubic

Start at: 2017-12-05 09:13:54
End at: 2017-12-05 09:14:24
Local clock offset: 3.127 ms
Remote clock offset: -2.069 ms

Below is generated by plot.py at 2017-12-05 09:43:52
Datalink statistics
-- Total of 3 flows:
Average throughput: 38.84 Mbit/s
95th percentile per-packet one-way delay: 181.344 ms
Loss rate: 0.73%
-- Flow 1:
Average throughput: 26.34 Mbit/s
95th percentile per-packet one-way delay: 177.221 ms
Loss rate: 0.37%
-- Flow 2:
Average throughput: 12.80 Mbit/s
95th percentile per-packet one-way delay: 187.262 ms
Loss rate: 1.10%
-- Flow 3:
Average throughput: 12.42 Mbit/s
95th percentile per-packet one-way delay: 192.263 ms
Loss rate: 2.28%

Run 2: Report of QUIC Cubic — Data Link

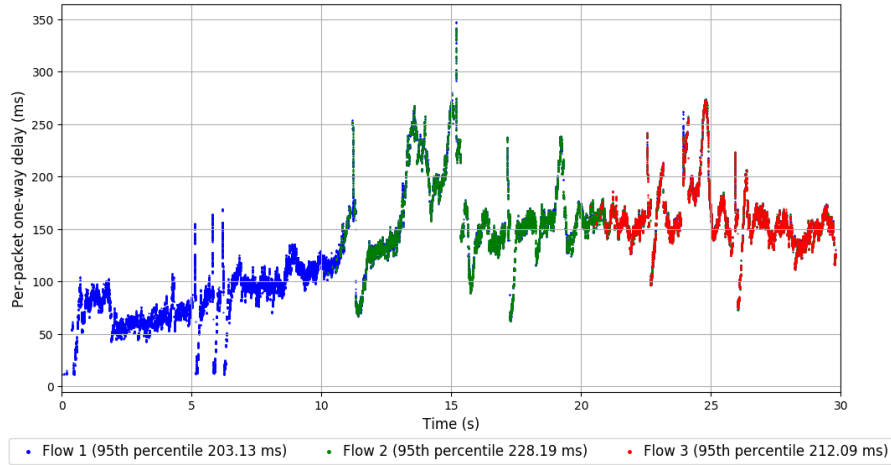
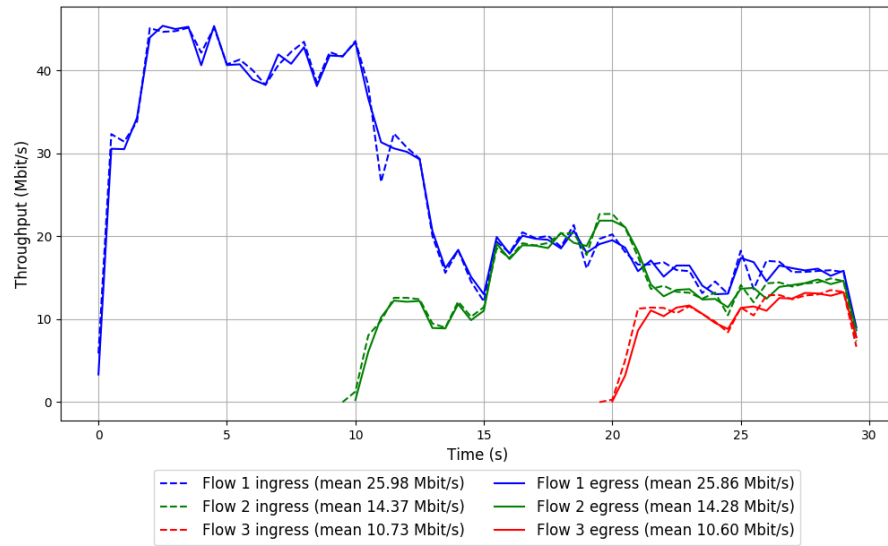


Run 3: Statistics of QUIC Cubic

Start at: 2017-12-05 09:30:42
End at: 2017-12-05 09:31:12
Local clock offset: 3.08 ms
Remote clock offset: -1.828 ms

Below is generated by plot.py at 2017-12-05 09:43:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 38.74 Mbit/s
95th percentile per-packet one-way delay: 213.632 ms
Loss rate: 0.80%
-- Flow 1:
Average throughput: 25.86 Mbit/s
95th percentile per-packet one-way delay: 203.132 ms
Loss rate: 0.44%
-- Flow 2:
Average throughput: 14.28 Mbit/s
95th percentile per-packet one-way delay: 228.192 ms
Loss rate: 1.15%
-- Flow 3:
Average throughput: 10.60 Mbit/s
95th percentile per-packet one-way delay: 212.091 ms
Loss rate: 2.47%

Run 3: Report of QUIC Cubic — Data Link

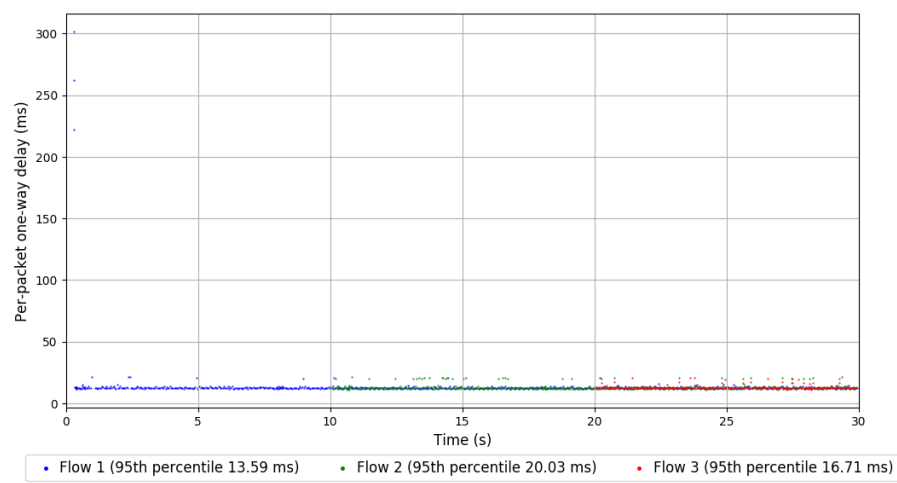
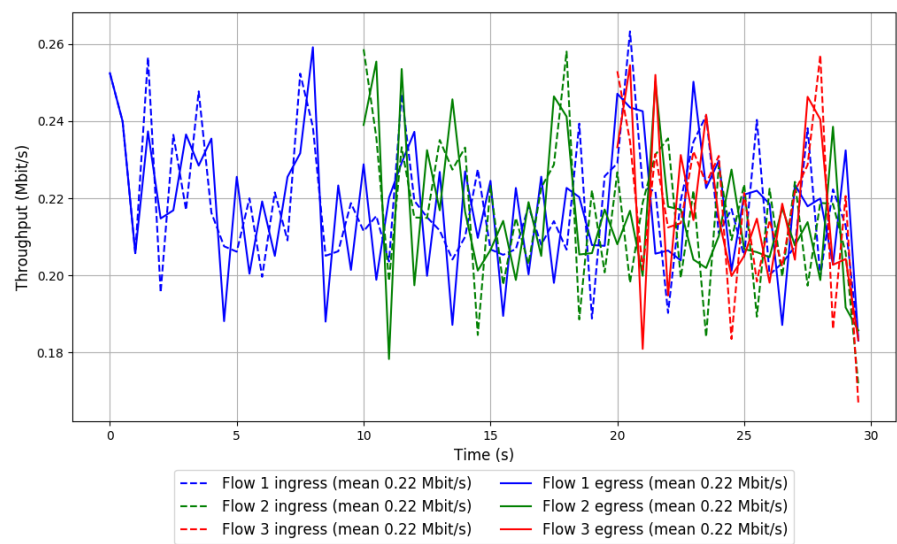


```
Run 1: Statistics of SReAM

Start at: 2017-12-05 09:00:40
End at: 2017-12-05 09:01:10
Local clock offset: 2.972 ms
Remote clock offset: -2.454 ms

# Below is generated by plot.py at 2017-12-05 09:43:53
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 14.583 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.590 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.027 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 16.715 ms
Loss rate: 0.00%
```

Run 1: Report of SReAM — Data Link



Run 2: Statistics of SReAM

Start at: 2017-12-05 09:17:30

End at: 2017-12-05 09:18:00

Local clock offset: 3.049 ms

Remote clock offset: -2.0 ms

Below is generated by plot.py at 2017-12-05 09:43:53

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.44 Mbit/s

95th percentile per-packet one-way delay: 13.741 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 13.484 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 14.379 ms

Loss rate: 0.00%

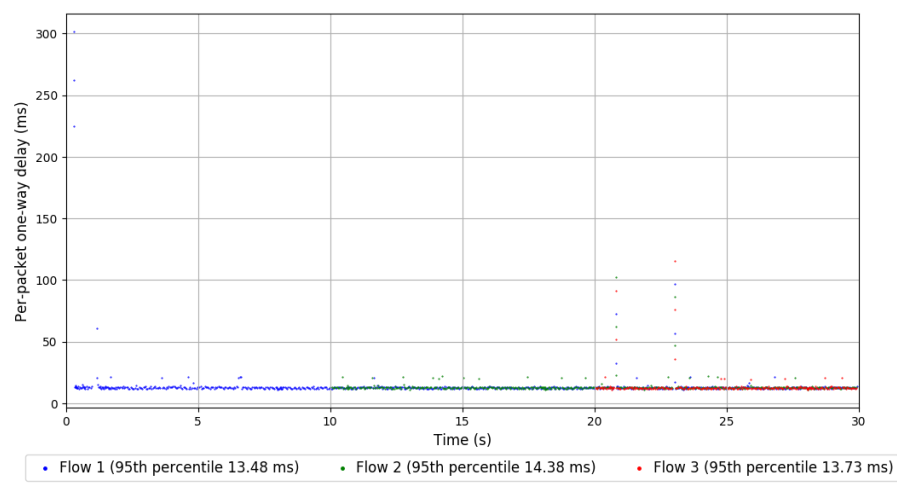
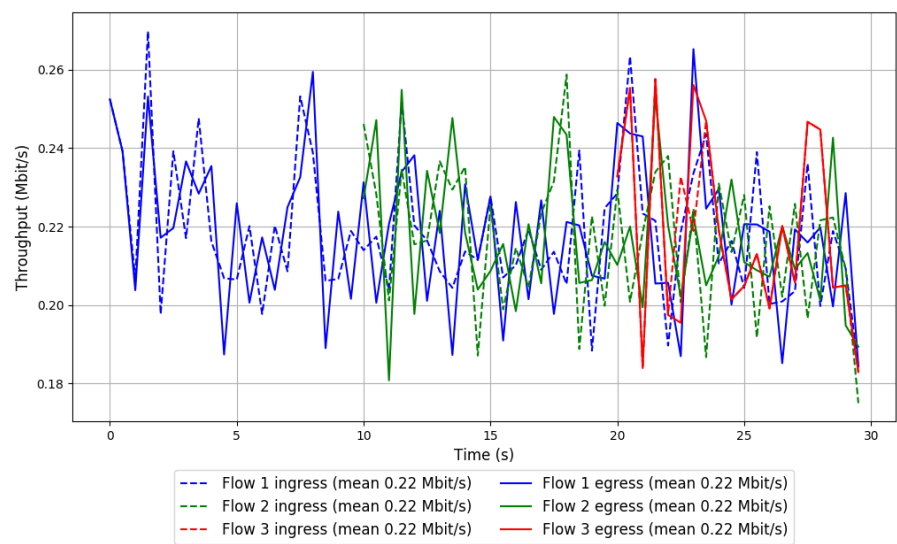
-- Flow 3:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 13.728 ms

Loss rate: 0.00%

Run 2: Report of SReAM — Data Link

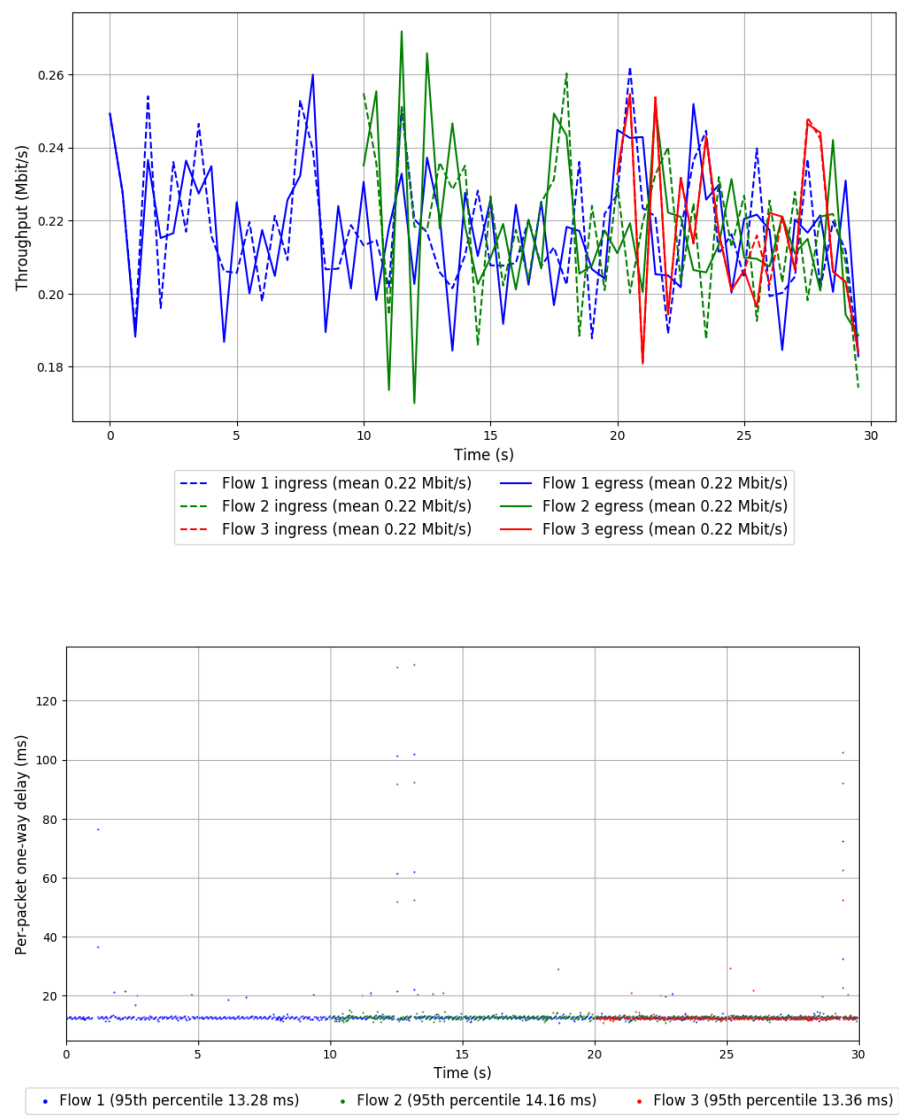


Run 3: Statistics of SReAM

Start at: 2017-12-05 09:34:17
End at: 2017-12-05 09:34:47
Local clock offset: 3.119 ms
Remote clock offset: -1.766 ms

Below is generated by plot.py at 2017-12-05 09:43:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 13.680 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.284 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 14.157 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.357 ms
Loss rate: 0.00%

Run 3: Report of SReAM — Data Link

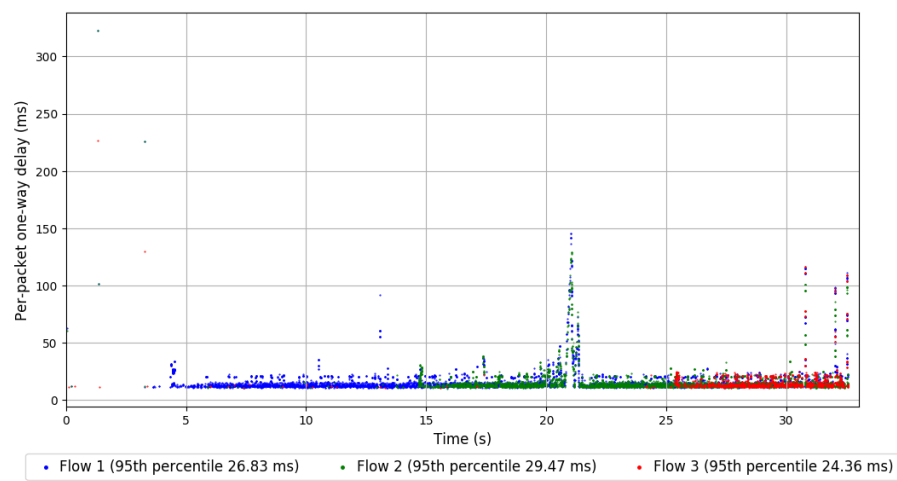
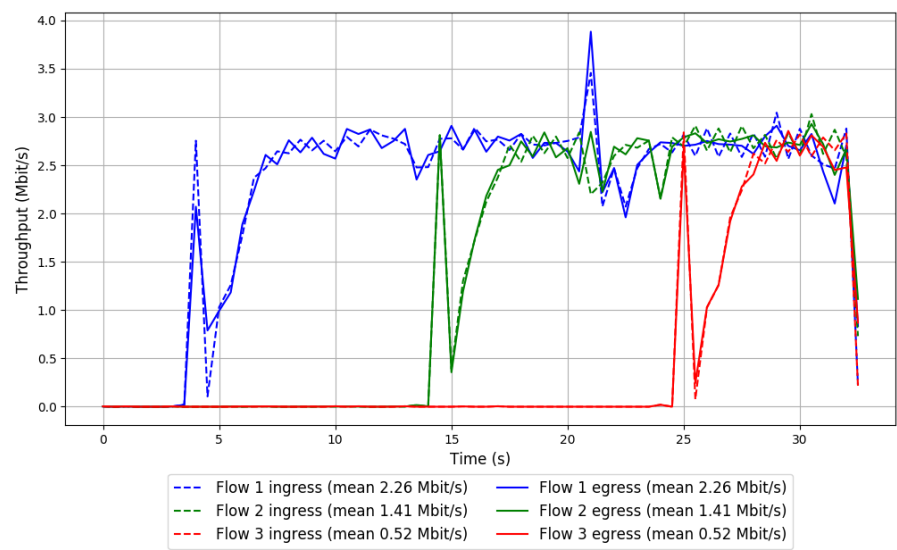


Run 1: Statistics of WebRTC media

Start at: 2017-12-05 08:52:16
End at: 2017-12-05 08:52:46
Local clock offset: 3.105 ms
Remote clock offset: -2.665 ms

Below is generated by plot.py at 2017-12-05 09:43:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.19 Mbit/s
95th percentile per-packet one-way delay: 27.863 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 26.832 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 29.473 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 24.356 ms
Loss rate: 0.00%

Run 1: Report of WebRTC media — Data Link

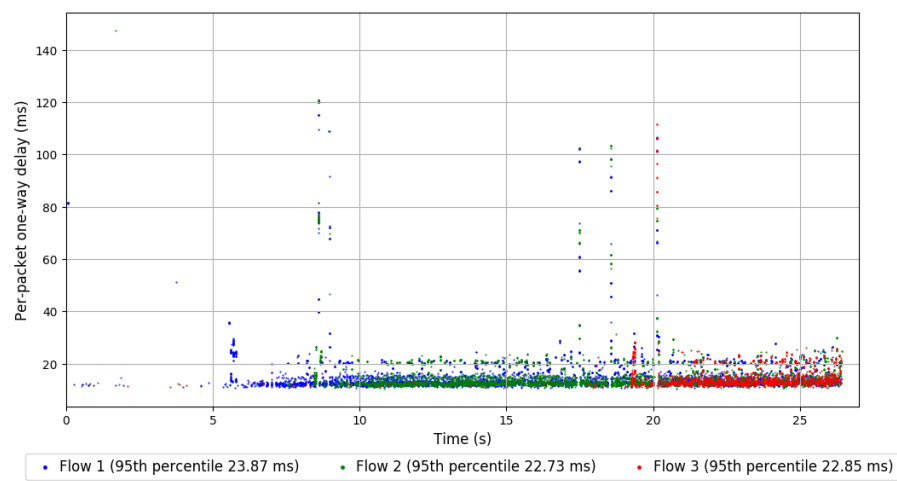
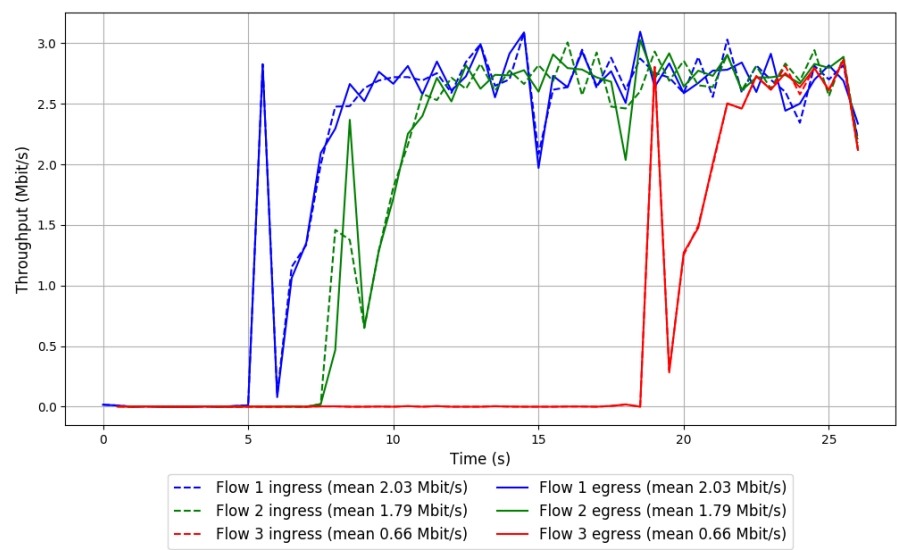


Run 2: Statistics of WebRTC media

Start at: 2017-12-05 09:09:05
End at: 2017-12-05 09:09:35
Local clock offset: 2.946 ms
Remote clock offset: -2.243 ms

Below is generated by plot.py at 2017-12-05 09:43:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.43 Mbit/s
95th percentile per-packet one-way delay: 23.137 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 2.03 Mbit/s
95th percentile per-packet one-way delay: 23.869 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.79 Mbit/s
95th percentile per-packet one-way delay: 22.729 ms
Loss rate: 0.06%
-- Flow 3:
Average throughput: 0.66 Mbit/s
95th percentile per-packet one-way delay: 22.854 ms
Loss rate: 0.00%

Run 2: Report of WebRTC media — Data Link

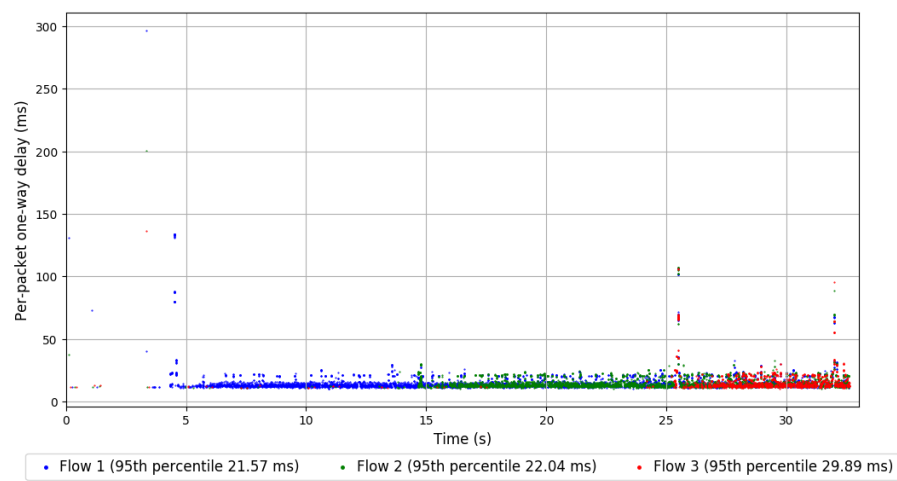
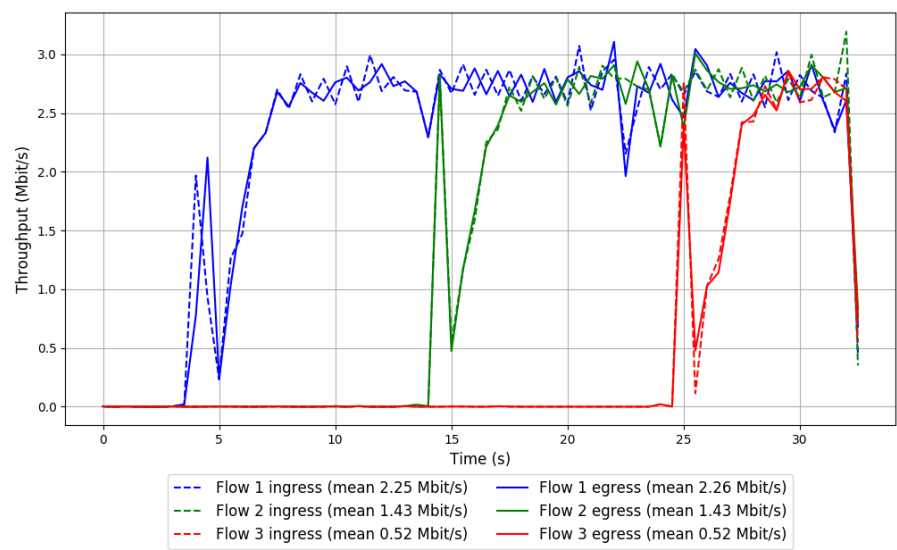


Run 3: Statistics of WebRTC media

Start at: 2017-12-05 09:25:55
End at: 2017-12-05 09:26:25
Local clock offset: 3.08 ms
Remote clock offset: -1.834 ms

Below is generated by plot.py at 2017-12-05 09:43:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.22 Mbit/s
95th percentile per-packet one-way delay: 22.169 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 21.574 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.43 Mbit/s
95th percentile per-packet one-way delay: 22.035 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 29.893 ms
Loss rate: 0.00%

Run 3: Report of WebRTC media — Data Link

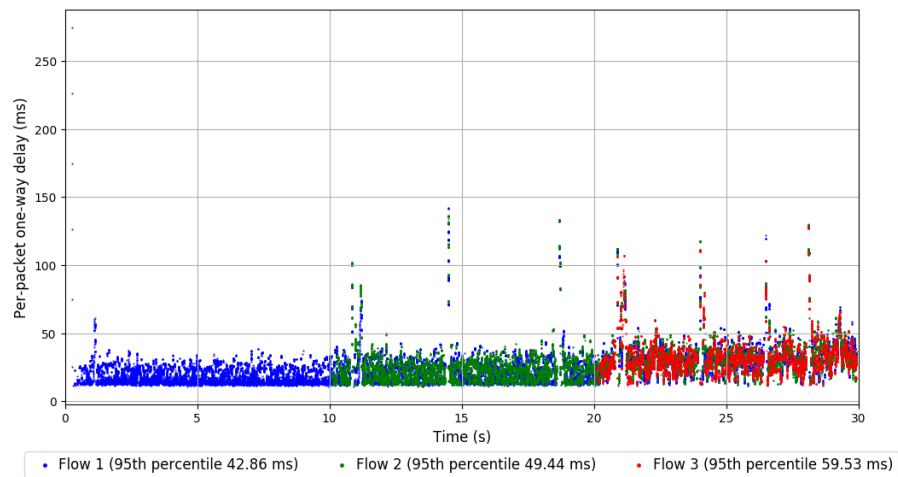
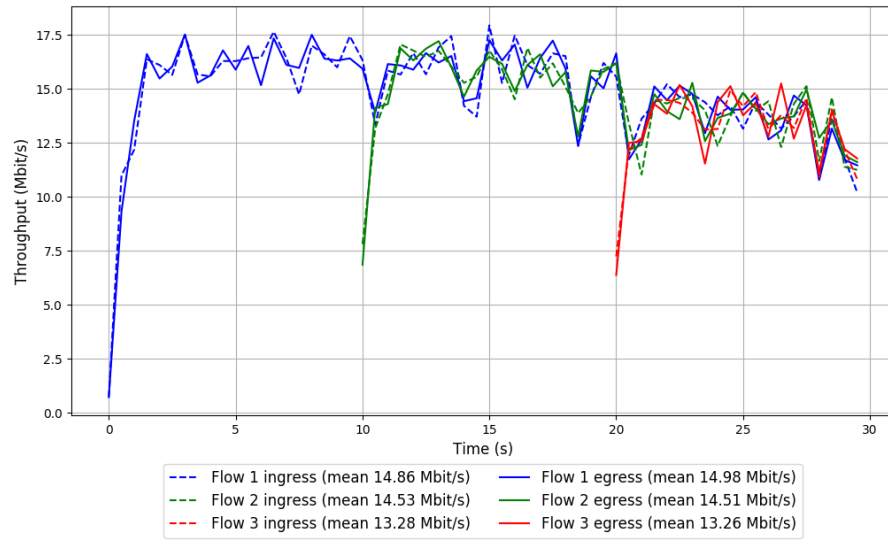


Run 1: Statistics of Sprout

Start at: 2017-12-05 09:05:27
End at: 2017-12-05 09:05:57
Local clock offset: 2.94 ms
Remote clock offset: -2.365 ms

Below is generated by plot.py at 2017-12-05 09:43:57
Datalink statistics
-- Total of 3 flows:
Average throughput: 29.14 Mbit/s
95th percentile per-packet one-way delay: 47.631 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 14.98 Mbit/s
95th percentile per-packet one-way delay: 42.863 ms
Loss rate: 0.02%
-- Flow 2:
Average throughput: 14.51 Mbit/s
95th percentile per-packet one-way delay: 49.440 ms
Loss rate: 0.03%
-- Flow 3:
Average throughput: 13.26 Mbit/s
95th percentile per-packet one-way delay: 59.526 ms
Loss rate: 0.00%

Run 1: Report of Sprout — Data Link



Run 2: Statistics of Sprout

Start at: 2017-12-05 09:22:16

End at: 2017-12-05 09:22:46

Local clock offset: 3.157 ms

Remote clock offset: -1.99 ms

Below is generated by plot.py at 2017-12-05 09:43:57

Datalink statistics

-- Total of 3 flows:

Average throughput: 25.62 Mbit/s

95th percentile per-packet one-way delay: 71.733 ms

Loss rate: 0.07%

-- Flow 1:

Average throughput: 13.53 Mbit/s

95th percentile per-packet one-way delay: 67.051 ms

Loss rate: 0.06%

-- Flow 2:

Average throughput: 12.83 Mbit/s

95th percentile per-packet one-way delay: 71.978 ms

Loss rate: 0.10%

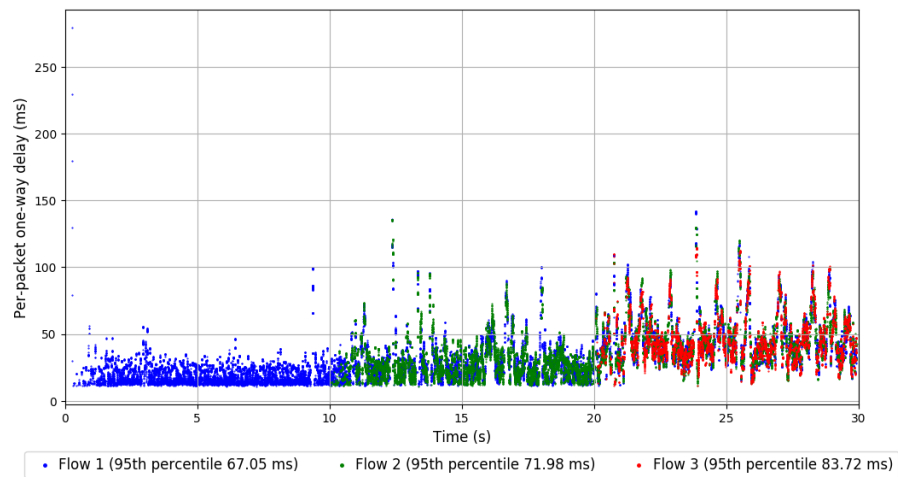
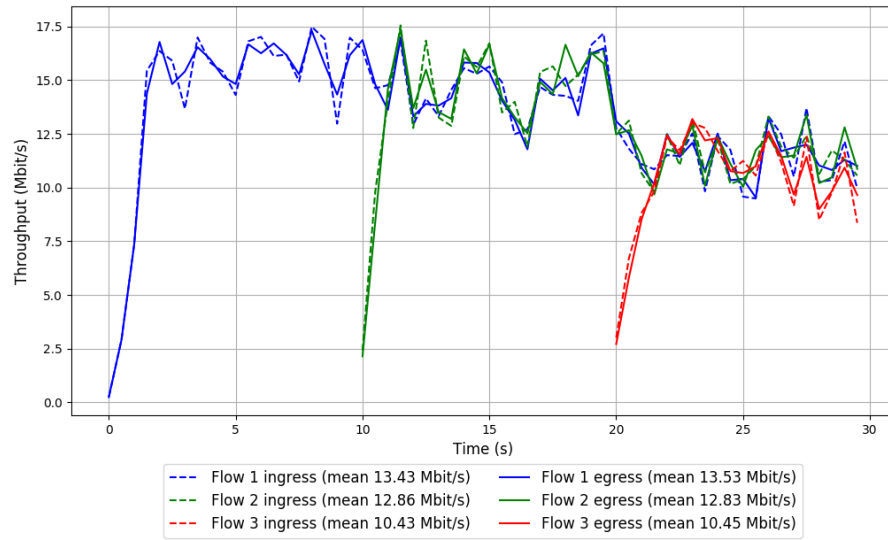
-- Flow 3:

Average throughput: 10.45 Mbit/s

95th percentile per-packet one-way delay: 83.716 ms

Loss rate: 0.02%

Run 2: Report of Sprout — Data Link

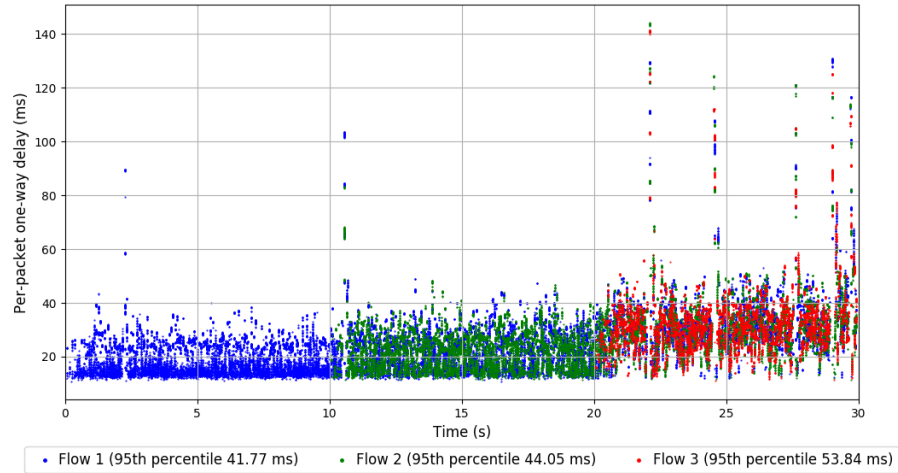
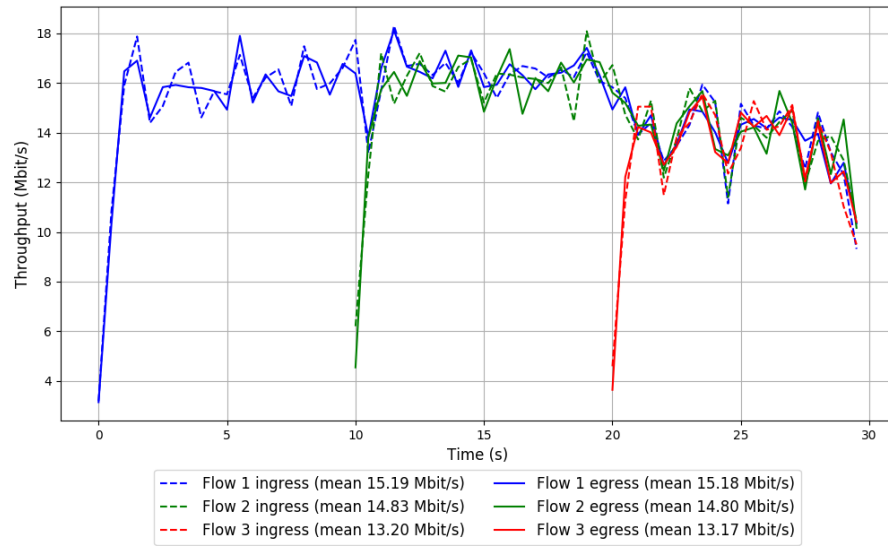


Run 3: Statistics of Sprout

Start at: 2017-12-05 09:39:05
End at: 2017-12-05 09:39:35
Local clock offset: 3.142 ms
Remote clock offset: -1.635 ms

```
# Below is generated by plot.py at 2017-12-05 09:44:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 29.37 Mbit/s
95th percentile per-packet one-way delay: 44.210 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 15.18 Mbit/s
95th percentile per-packet one-way delay: 41.771 ms
Loss rate: 0.08%
-- Flow 2:
Average throughput: 14.80 Mbit/s
95th percentile per-packet one-way delay: 44.050 ms
Loss rate: 0.11%
-- Flow 3:
Average throughput: 13.17 Mbit/s
95th percentile per-packet one-way delay: 53.835 ms
Loss rate: 0.06%
```

Run 3: Report of Sprout — Data Link

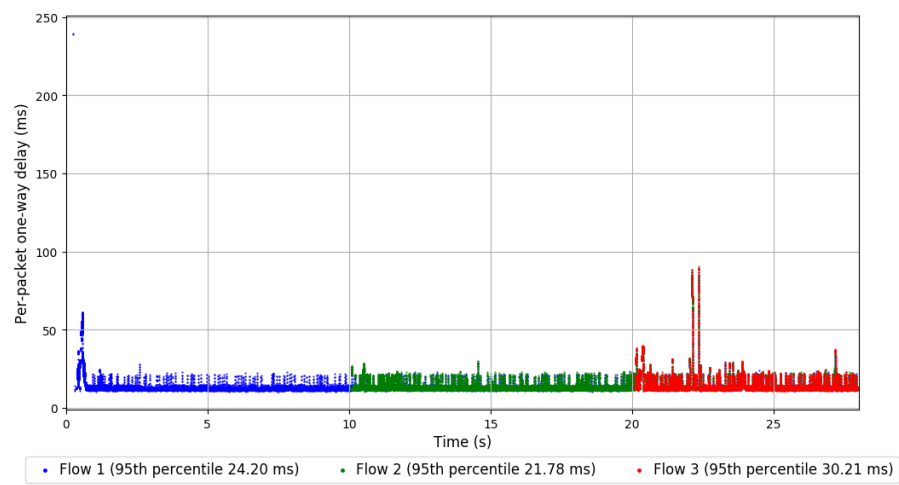
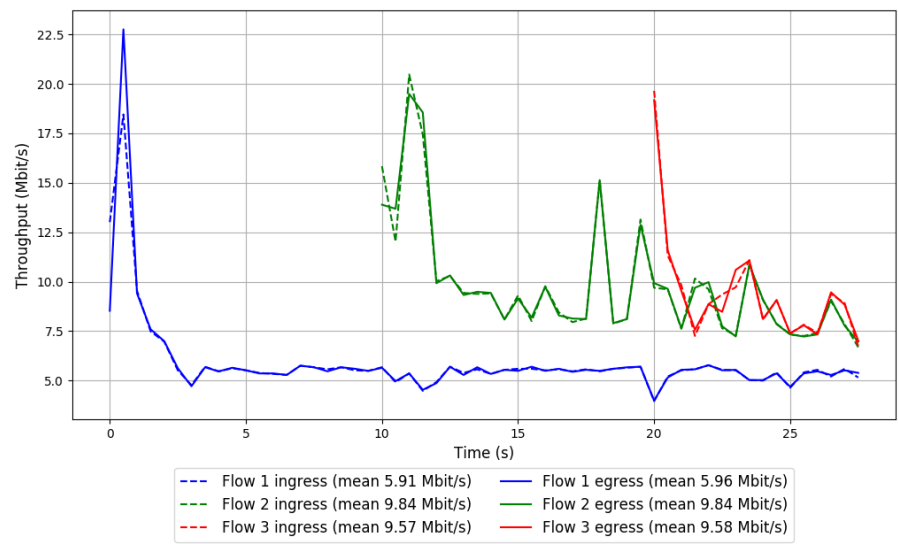


Run 1: Statistics of TaoVA-100x

Start at: 2017-12-05 08:58:16
End at: 2017-12-05 08:58:46
Local clock offset: 3.077 ms
Remote clock offset: -2.517 ms

Below is generated by plot.py at 2017-12-05 09:44:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 15.07 Mbit/s
95th percentile per-packet one-way delay: 23.572 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 5.96 Mbit/s
95th percentile per-packet one-way delay: 24.197 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 9.84 Mbit/s
95th percentile per-packet one-way delay: 21.778 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 9.58 Mbit/s
95th percentile per-packet one-way delay: 30.215 ms
Loss rate: 0.00%

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



Run 2: Statistics of TaoVA-100x

Start at: 2017-12-05 09:15:07

End at: 2017-12-05 09:15:37

Local clock offset: 3.019 ms

Remote clock offset: -2.12 ms

Below is generated by plot.py at 2017-12-05 09:44:01

Datalink statistics

-- Total of 3 flows:

Average throughput: 13.03 Mbit/s

95th percentile per-packet one-way delay: 30.749 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 6.38 Mbit/s

95th percentile per-packet one-way delay: 34.478 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 6.67 Mbit/s

95th percentile per-packet one-way delay: 23.730 ms

Loss rate: 0.00%

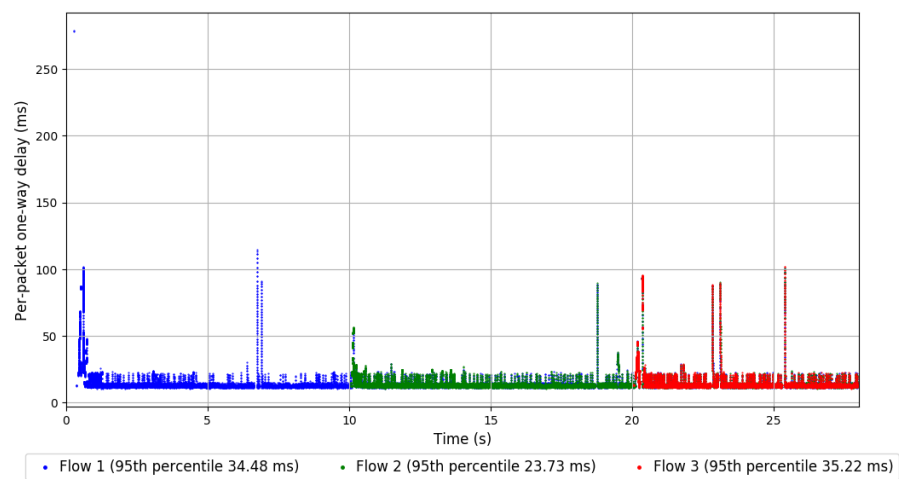
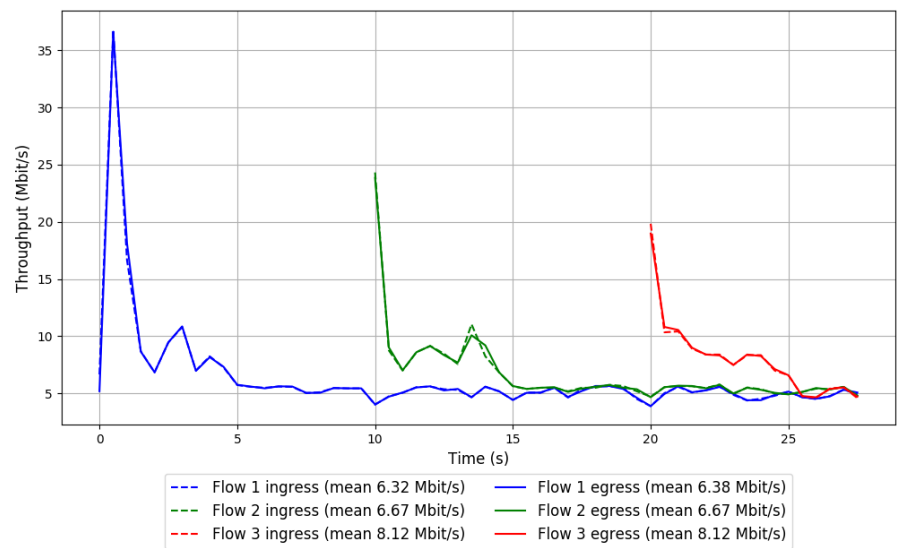
-- Flow 3:

Average throughput: 8.12 Mbit/s

95th percentile per-packet one-way delay: 35.221 ms

Loss rate: 0.00%

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

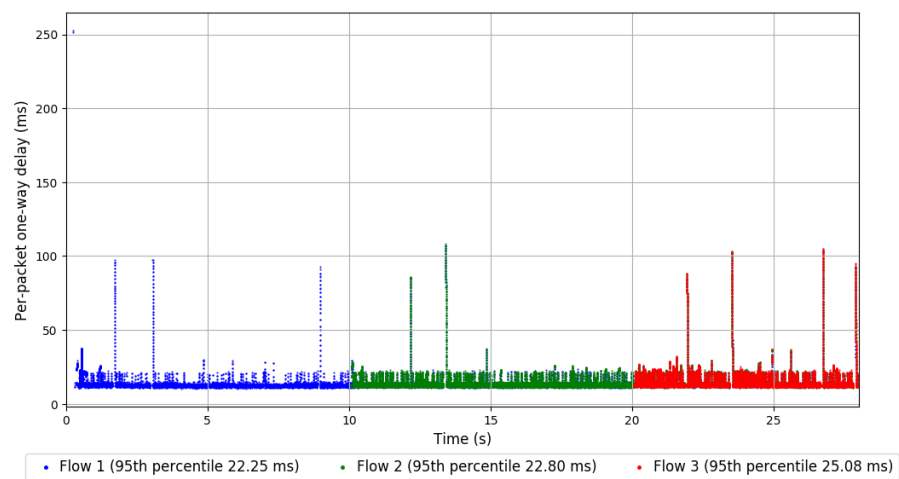
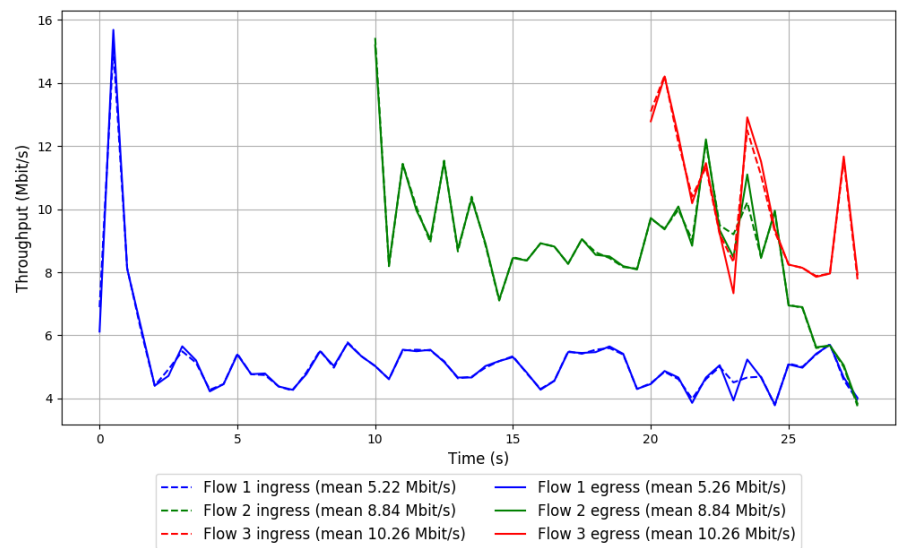


Run 3: Statistics of TaoVA-100x

Start at: 2017-12-05 09:31:54
End at: 2017-12-05 09:32:24
Local clock offset: 3.168 ms
Remote clock offset: -1.804 ms

Below is generated by plot.py at 2017-12-05 09:44:08
Datalink statistics
-- Total of 3 flows:
Average throughput: 13.92 Mbit/s
95th percentile per-packet one-way delay: 23.117 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 5.26 Mbit/s
95th percentile per-packet one-way delay: 22.248 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 8.84 Mbit/s
95th percentile per-packet one-way delay: 22.805 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 10.26 Mbit/s
95th percentile per-packet one-way delay: 25.077 ms
Loss rate: 0.00%

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

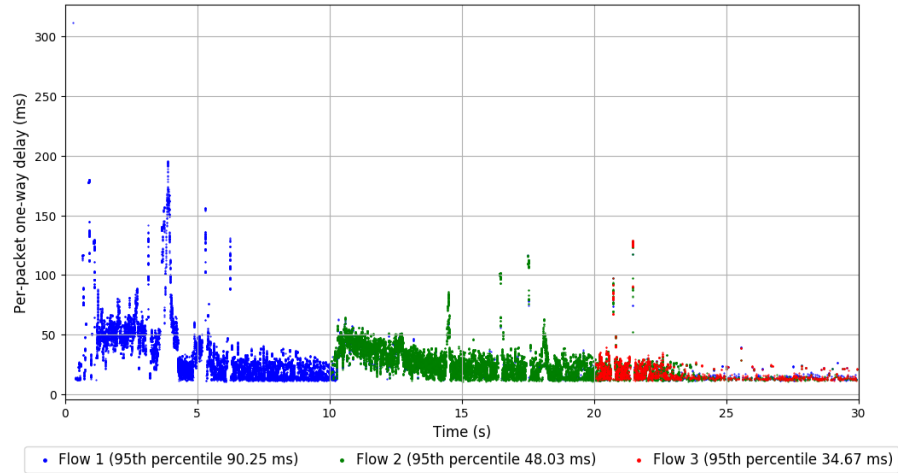
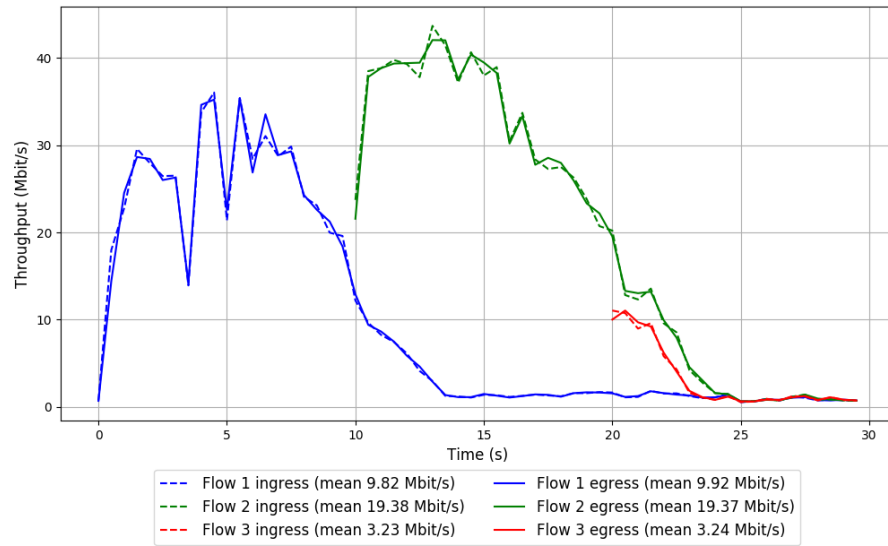


Run 1: Statistics of TCP Vegas

Start at: 2017-12-05 08:53:27
End at: 2017-12-05 08:53:57
Local clock offset: 3.187 ms
Remote clock offset: -2.659 ms

Below is generated by plot.py at 2017-12-05 09:44:17
Datalink statistics
-- Total of 3 flows:
Average throughput: 24.01 Mbit/s
95th percentile per-packet one-way delay: 60.492 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 9.92 Mbit/s
95th percentile per-packet one-way delay: 90.245 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 19.37 Mbit/s
95th percentile per-packet one-way delay: 48.033 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 3.24 Mbit/s
95th percentile per-packet one-way delay: 34.675 ms
Loss rate: 0.00%

Run 1: Report of TCP Vegas — Data Link

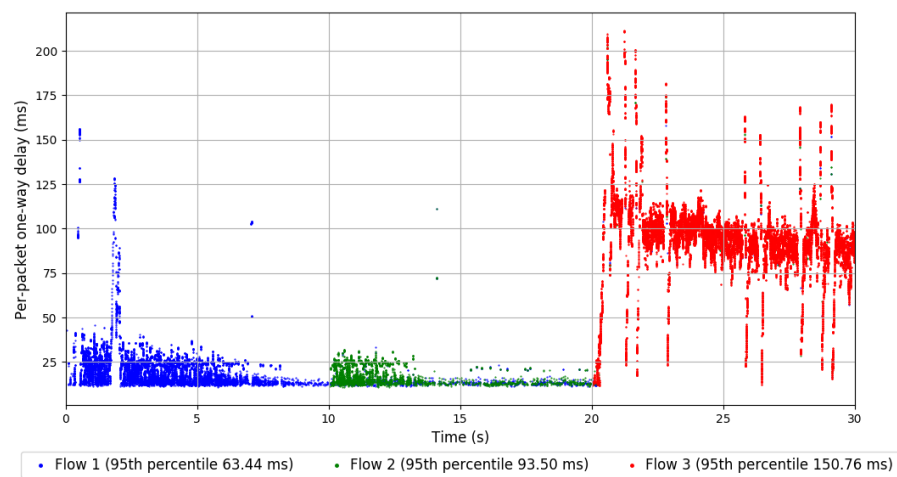
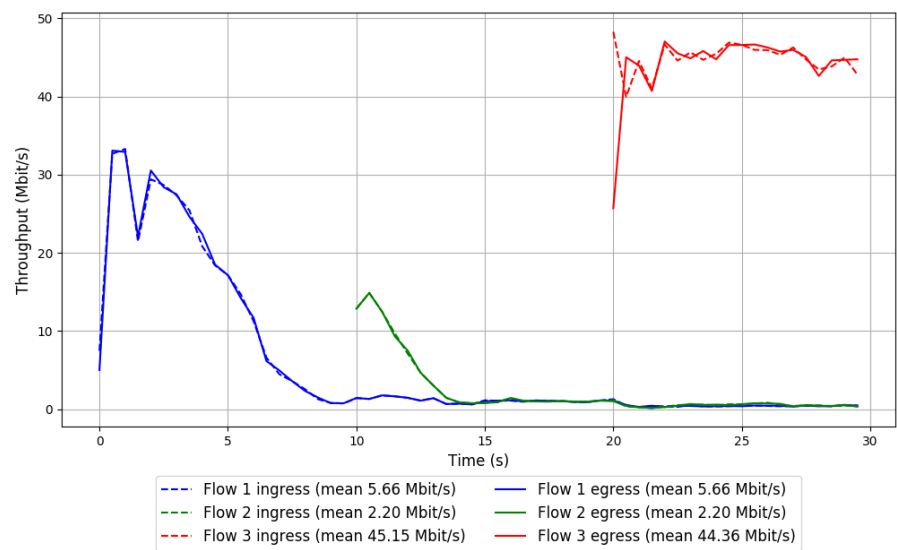


Run 2: Statistics of TCP Vegas

Start at: 2017-12-05 09:10:17
End at: 2017-12-05 09:10:47
Local clock offset: 3.062 ms
Remote clock offset: -2.254 ms

Below is generated by plot.py at 2017-12-05 09:44:17
Datalink statistics
-- Total of 3 flows:
Average throughput: 21.86 Mbit/s
95th percentile per-packet one-way delay: 137.378 ms
Loss rate: 1.13%
-- Flow 1:
Average throughput: 5.66 Mbit/s
95th percentile per-packet one-way delay: 63.439 ms
Loss rate: 0.02%
-- Flow 2:
Average throughput: 2.20 Mbit/s
95th percentile per-packet one-way delay: 93.496 ms
Loss rate: 0.08%
-- Flow 3:
Average throughput: 44.36 Mbit/s
95th percentile per-packet one-way delay: 150.760 ms
Loss rate: 1.64%

Run 2: Report of TCP Vegas — Data Link

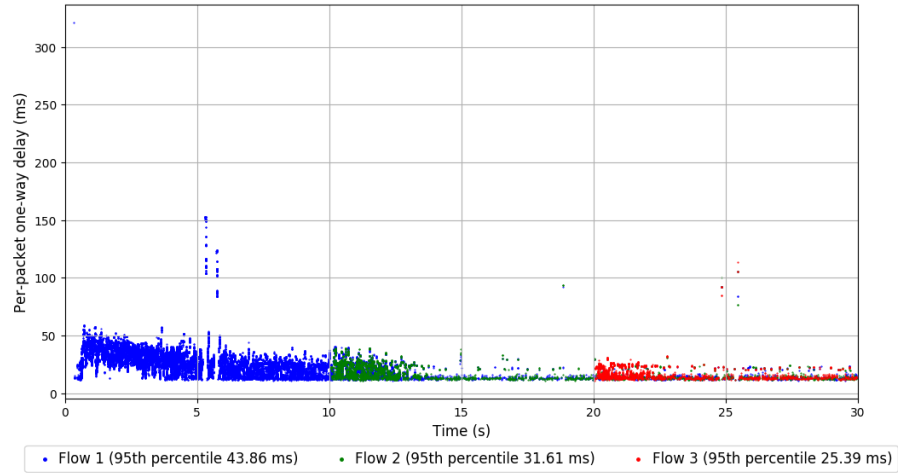
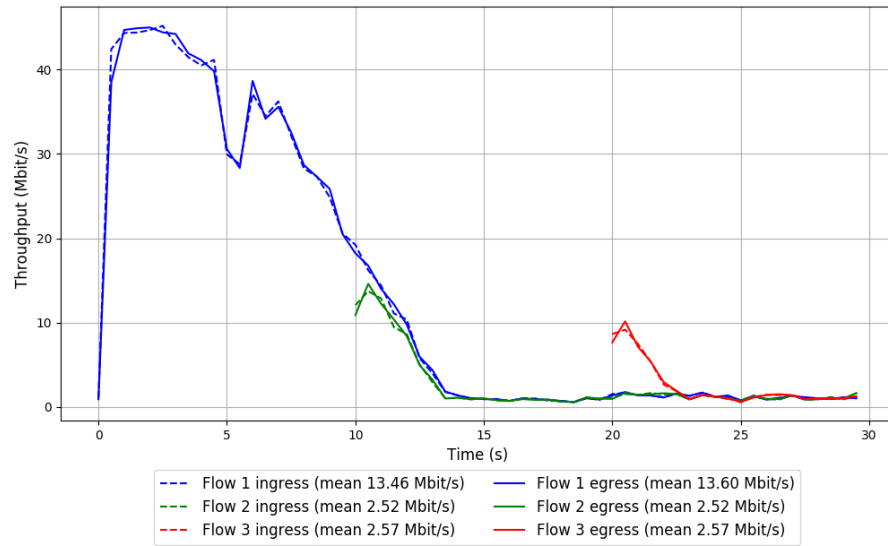


Run 3: Statistics of TCP Vegas

Start at: 2017-12-05 09:27:06
End at: 2017-12-05 09:27:36
Local clock offset: 3.151 ms
Remote clock offset: -1.801 ms

Below is generated by plot.py at 2017-12-05 09:44:17
Datalink statistics
-- Total of 3 flows:
Average throughput: 16.16 Mbit/s
95th percentile per-packet one-way delay: 43.078 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 13.60 Mbit/s
95th percentile per-packet one-way delay: 43.864 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.52 Mbit/s
95th percentile per-packet one-way delay: 31.615 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 2.57 Mbit/s
95th percentile per-packet one-way delay: 25.387 ms
Loss rate: 0.00%

Run 3: Report of TCP Vegas — Data Link

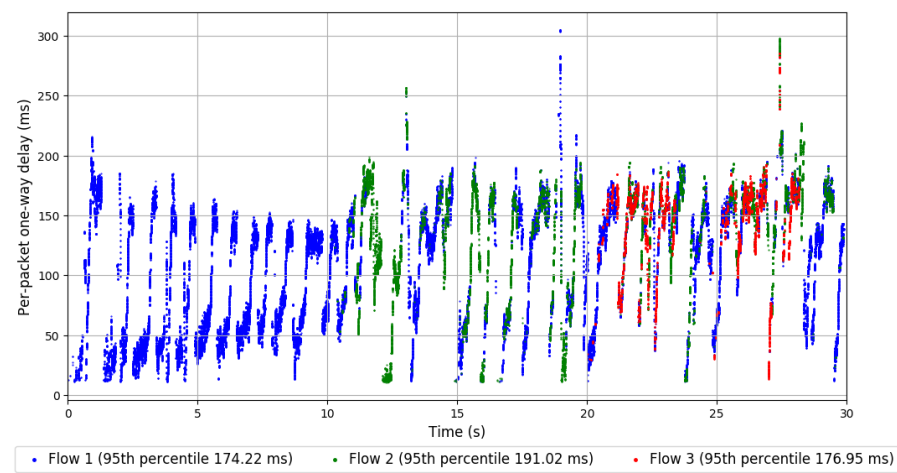
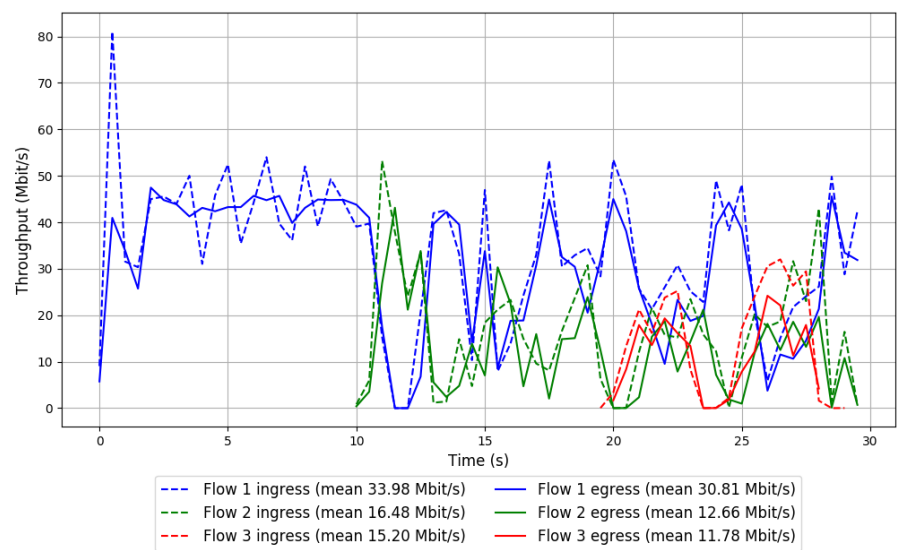


Run 1: Statistics of Verus

Start at: 2017-12-05 08:51:03
End at: 2017-12-05 08:51:33
Local clock offset: 3.236 ms
Remote clock offset: -2.662 ms

Below is generated by plot.py at 2017-12-05 09:44:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 42.40 Mbit/s
95th percentile per-packet one-way delay: 179.017 ms
Loss rate: 14.28%
-- Flow 1:
Average throughput: 30.81 Mbit/s
95th percentile per-packet one-way delay: 174.222 ms
Loss rate: 9.28%
-- Flow 2:
Average throughput: 12.66 Mbit/s
95th percentile per-packet one-way delay: 191.019 ms
Loss rate: 23.16%
-- Flow 3:
Average throughput: 11.78 Mbit/s
95th percentile per-packet one-way delay: 176.954 ms
Loss rate: 30.18%

Run 1: Report of Verus — Data Link

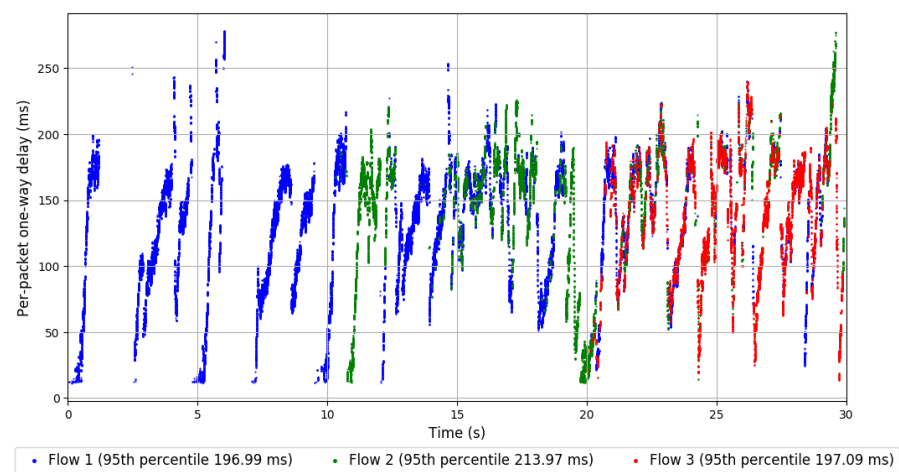
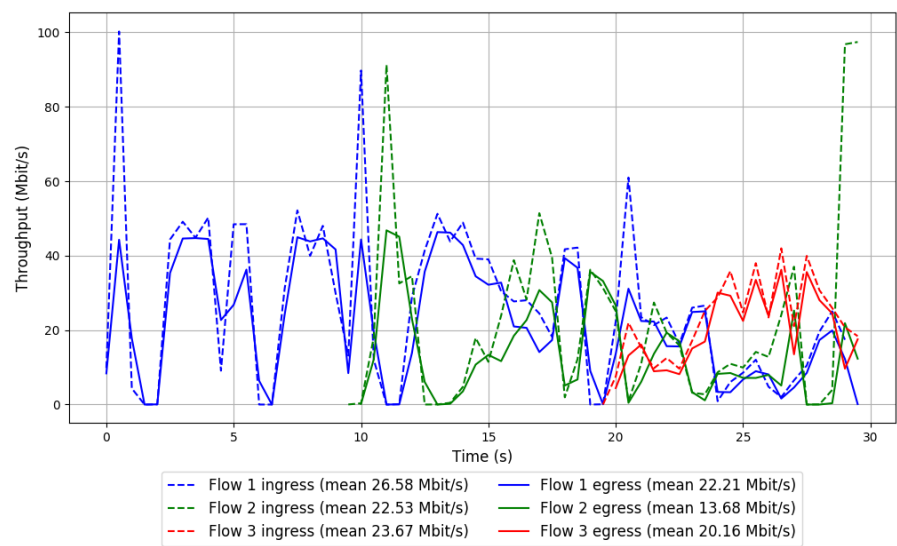


Run 2: Statistics of Verus

Start at: 2017-12-05 09:07:52
End at: 2017-12-05 09:08:22
Local clock offset: 2.997 ms
Remote clock offset: -2.284 ms

Below is generated by plot.py at 2017-12-05 09:44:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 37.66 Mbit/s
95th percentile per-packet one-way delay: 199.812 ms
Loss rate: 23.12%
-- Flow 1:
Average throughput: 22.21 Mbit/s
95th percentile per-packet one-way delay: 196.991 ms
Loss rate: 16.17%
-- Flow 2:
Average throughput: 13.68 Mbit/s
95th percentile per-packet one-way delay: 213.973 ms
Loss rate: 39.27%
-- Flow 3:
Average throughput: 20.16 Mbit/s
95th percentile per-packet one-way delay: 197.095 ms
Loss rate: 15.44%

Run 2: Report of Verus — Data Link

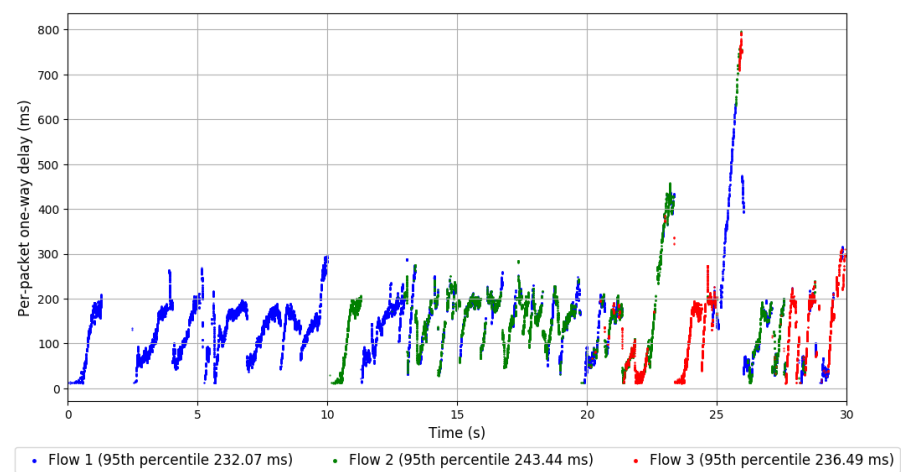
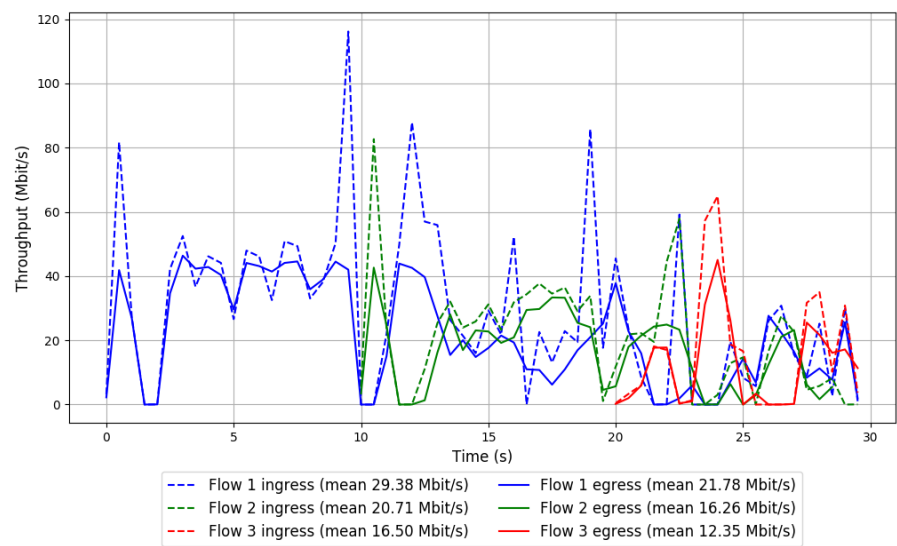


Run 3: Statistics of Verus

Start at: 2017-12-05 09:24:41
End at: 2017-12-05 09:25:11
Local clock offset: 3.061 ms
Remote clock offset: -1.945 ms

Below is generated by plot.py at 2017-12-05 09:44:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 35.92 Mbit/s
95th percentile per-packet one-way delay: 237.098 ms
Loss rate: 25.61%
-- Flow 1:
Average throughput: 21.78 Mbit/s
95th percentile per-packet one-way delay: 232.073 ms
Loss rate: 26.02%
-- Flow 2:
Average throughput: 16.26 Mbit/s
95th percentile per-packet one-way delay: 243.438 ms
Loss rate: 25.69%
-- Flow 3:
Average throughput: 12.35 Mbit/s
95th percentile per-packet one-way delay: 236.487 ms
Loss rate: 23.07%

Run 3: Report of Verus — Data Link

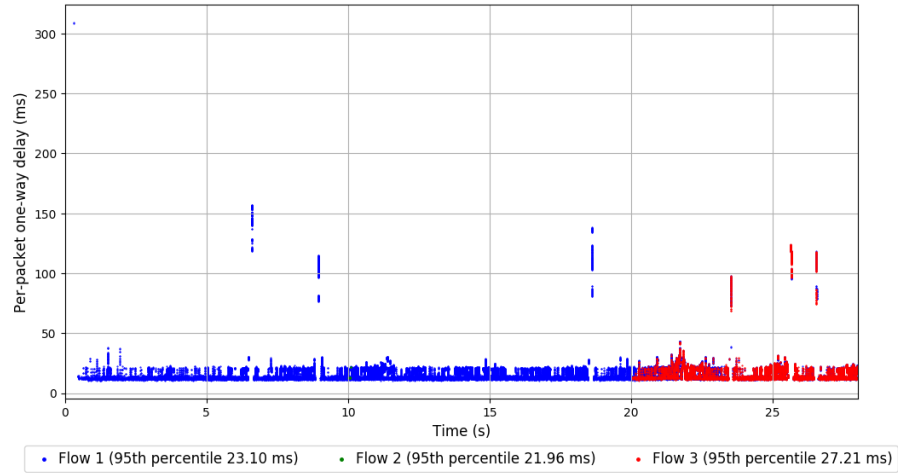
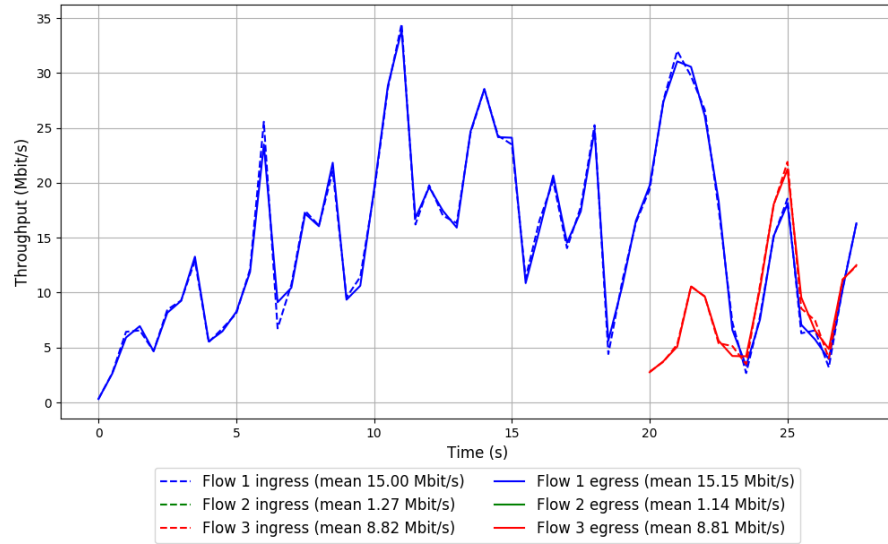


Run 1: Statistics of Copa

Start at: 2017-12-05 08:55:52
End at: 2017-12-05 08:56:22
Local clock offset: 3.097 ms
Remote clock offset: -2.657 ms

Below is generated by plot.py at 2017-12-05 09:44:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 17.69 Mbit/s
95th percentile per-packet one-way delay: 23.615 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 15.15 Mbit/s
95th percentile per-packet one-way delay: 23.103 ms
Loss rate: 0.02%
-- Flow 2:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 21.963 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 8.81 Mbit/s
95th percentile per-packet one-way delay: 27.210 ms
Loss rate: 0.09%

Run 1: Report of Copa — Data Link

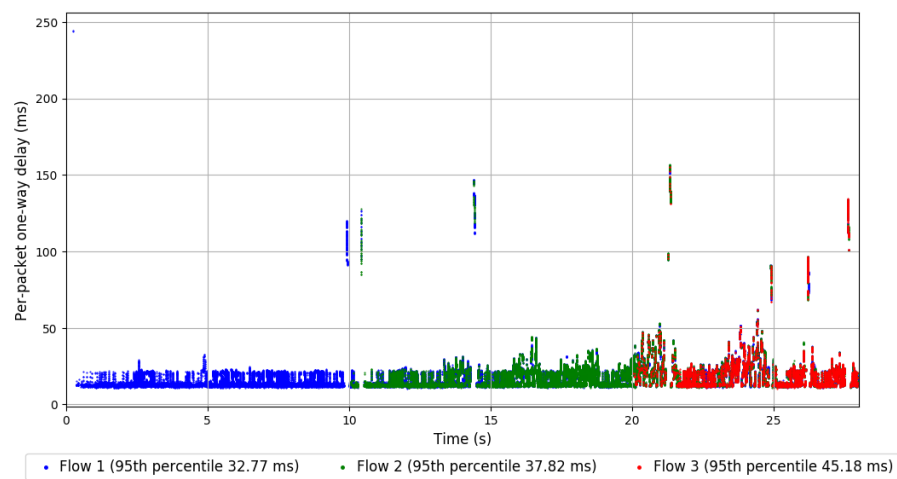
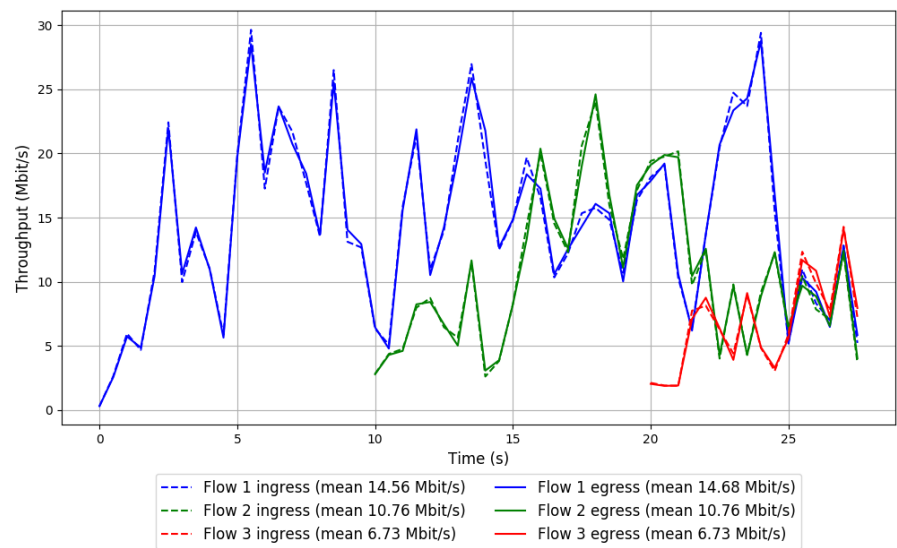


Run 2: Statistics of Copa

Start at: 2017-12-05 09:12:41
End at: 2017-12-05 09:13:11
Local clock offset: 3.02 ms
Remote clock offset: -2.084 ms

Below is generated by plot.py at 2017-12-05 09:44:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 23.57 Mbit/s
95th percentile per-packet one-way delay: 35.548 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 14.68 Mbit/s
95th percentile per-packet one-way delay: 32.765 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 10.76 Mbit/s
95th percentile per-packet one-way delay: 37.818 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 6.73 Mbit/s
95th percentile per-packet one-way delay: 45.180 ms
Loss rate: 0.00%

Run 2: Report of Copa — Data Link

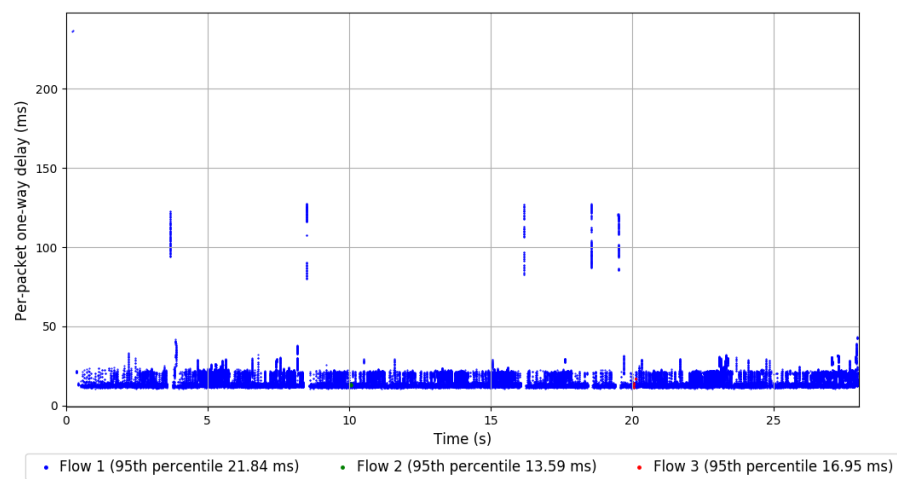
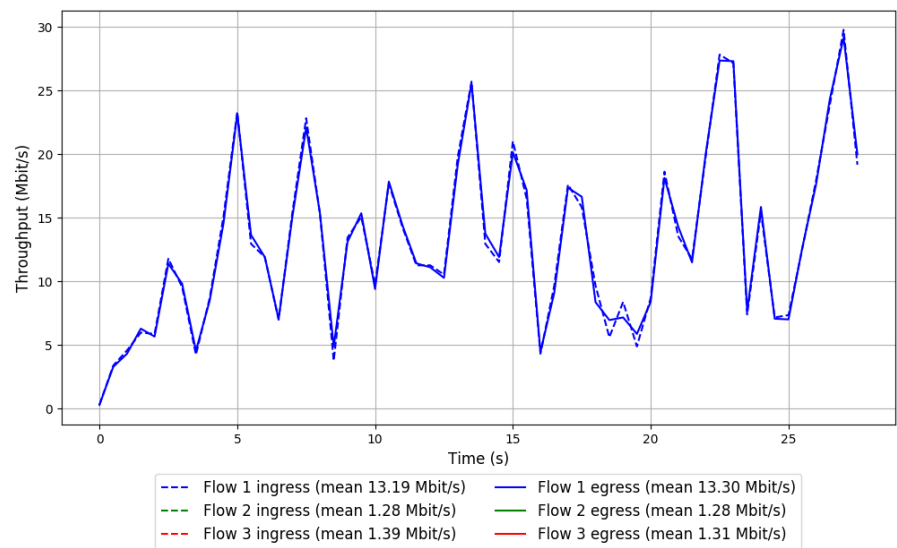


Run 3: Statistics of Copa

Start at: 2017-12-05 09:29:30
End at: 2017-12-05 09:30:00
Local clock offset: 3.157 ms
Remote clock offset: -1.768 ms

Below is generated by plot.py at 2017-12-05 09:44:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 13.30 Mbit/s
95th percentile per-packet one-way delay: 21.840 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 13.30 Mbit/s
95th percentile per-packet one-way delay: 21.841 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.28 Mbit/s
95th percentile per-packet one-way delay: 13.592 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 16.953 ms
Loss rate: 0.00%

Run 3: Report of Copa — Data Link

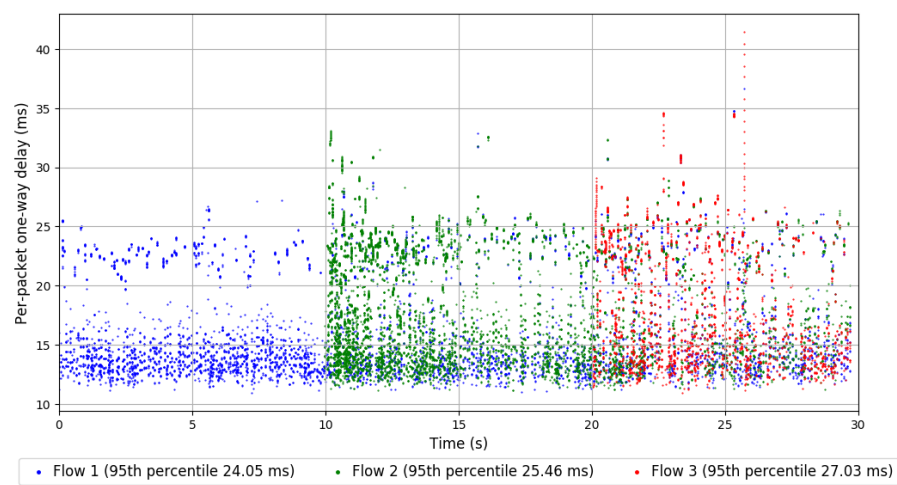
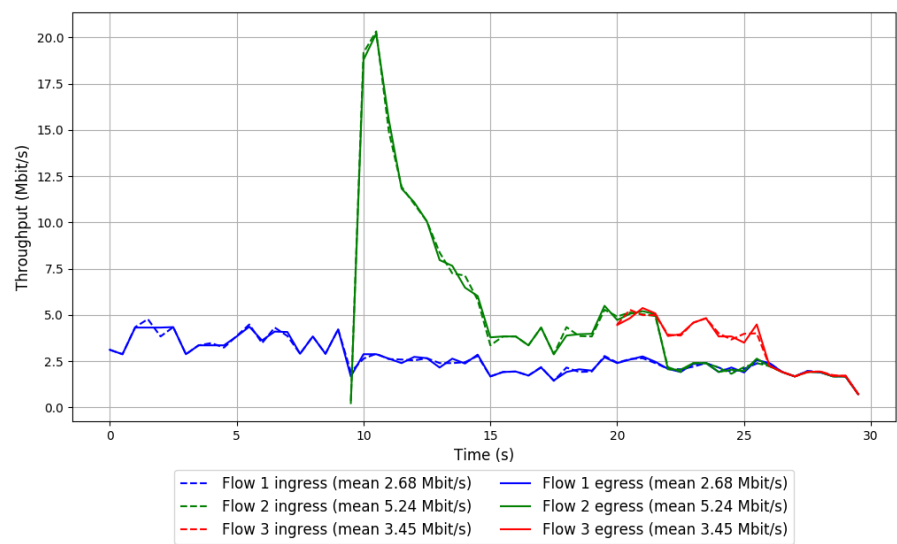


```
Run 1: Statistics of Indigo

Start at: 2017-12-05 09:03:02
End at: 2017-12-05 09:03:32
Local clock offset: 2.981 ms
Remote clock offset: -2.443 ms

# Below is generated by plot.py at 2017-12-05 09:44:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.28 Mbit/s
95th percentile per-packet one-way delay: 25.337 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.68 Mbit/s
95th percentile per-packet one-way delay: 24.048 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 5.24 Mbit/s
95th percentile per-packet one-way delay: 25.465 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 3.45 Mbit/s
95th percentile per-packet one-way delay: 27.034 ms
Loss rate: 0.00%
```

Run 1: Report of Indigo — Data Link

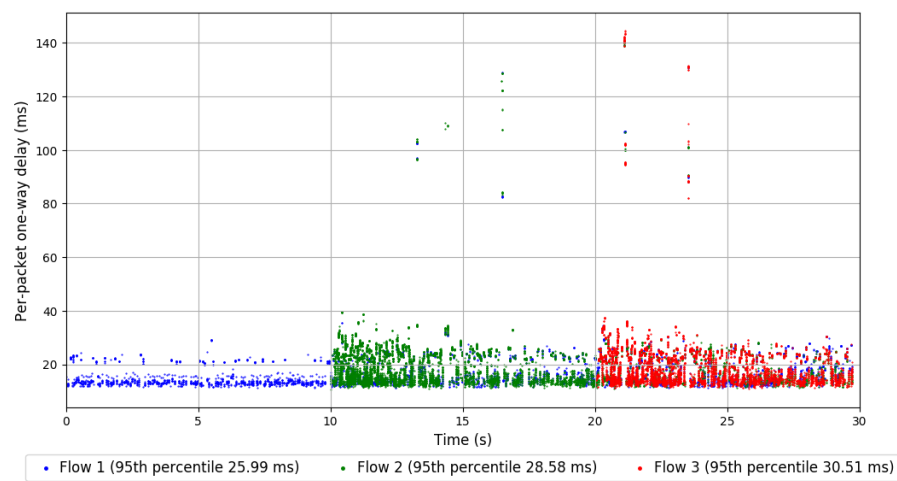
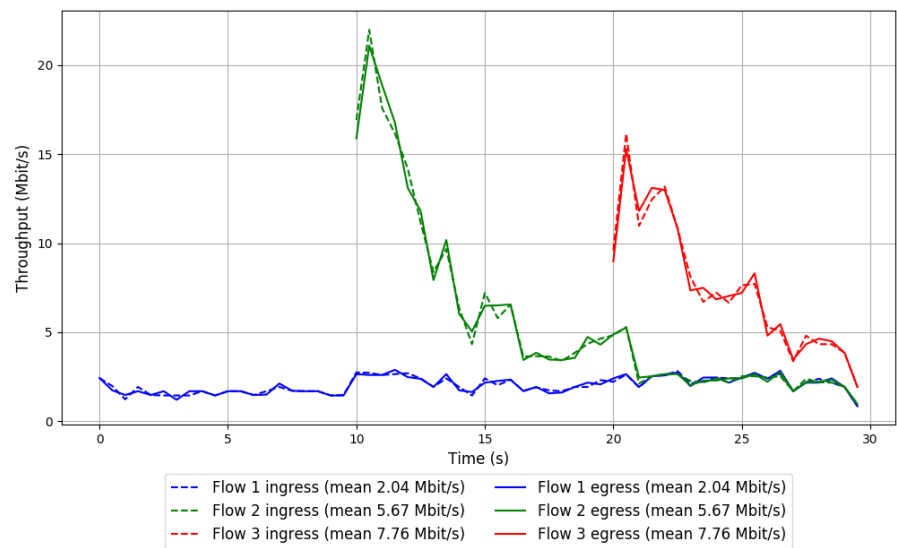


Run 2: Statistics of Indigo

Start at: 2017-12-05 09:19:52
End at: 2017-12-05 09:20:22
Local clock offset: 3.148 ms
Remote clock offset: -2.007 ms

Below is generated by plot.py at 2017-12-05 09:44:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 8.33 Mbit/s
95th percentile per-packet one-way delay: 28.289 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.04 Mbit/s
95th percentile per-packet one-way delay: 25.994 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 5.67 Mbit/s
95th percentile per-packet one-way delay: 28.584 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 7.76 Mbit/s
95th percentile per-packet one-way delay: 30.510 ms
Loss rate: 0.00%

Run 2: Report of Indigo — Data Link

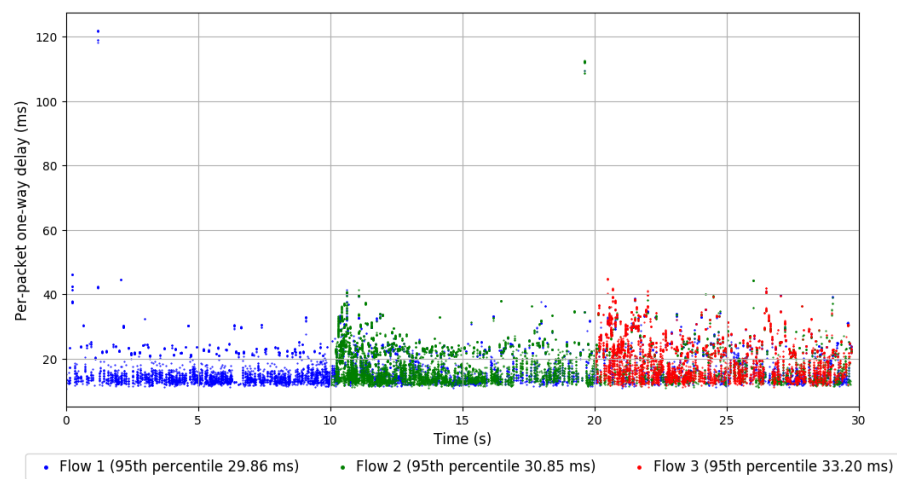
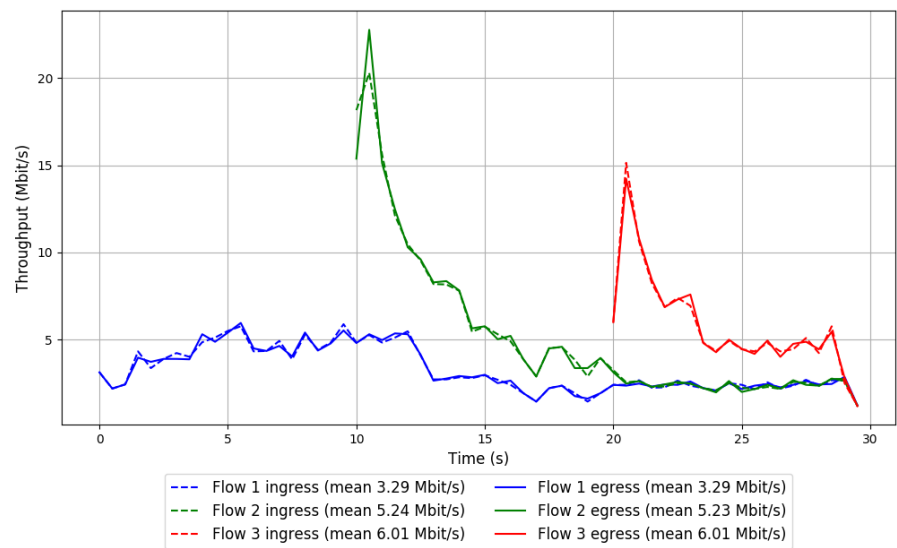


Run 3: Statistics of Indigo

Start at: 2017-12-05 09:36:40
End at: 2017-12-05 09:37:10
Local clock offset: 3.136 ms
Remote clock offset: -1.718 ms

Below is generated by plot.py at 2017-12-05 09:44:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 8.71 Mbit/s
95th percentile per-packet one-way delay: 31.177 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 3.29 Mbit/s
95th percentile per-packet one-way delay: 29.857 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 5.23 Mbit/s
95th percentile per-packet one-way delay: 30.848 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 6.01 Mbit/s
95th percentile per-packet one-way delay: 33.197 ms
Loss rate: 0.02%

Run 3: Report of Indigo — Data Link

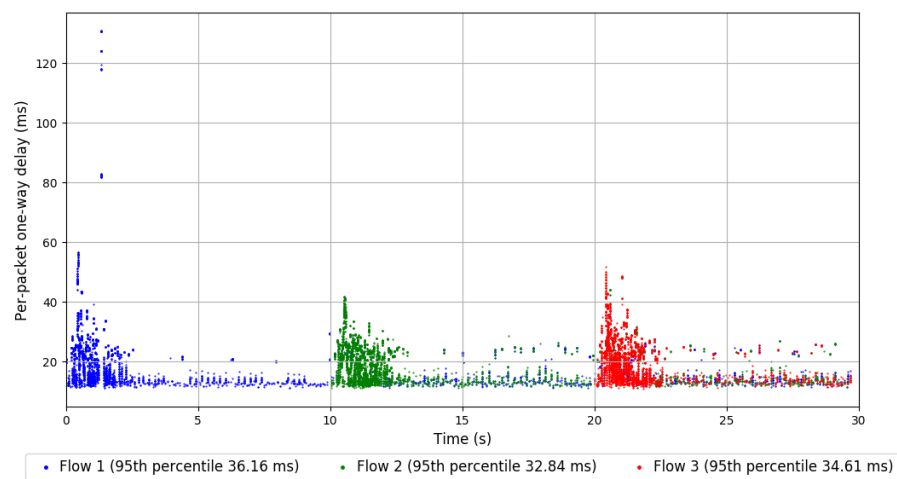
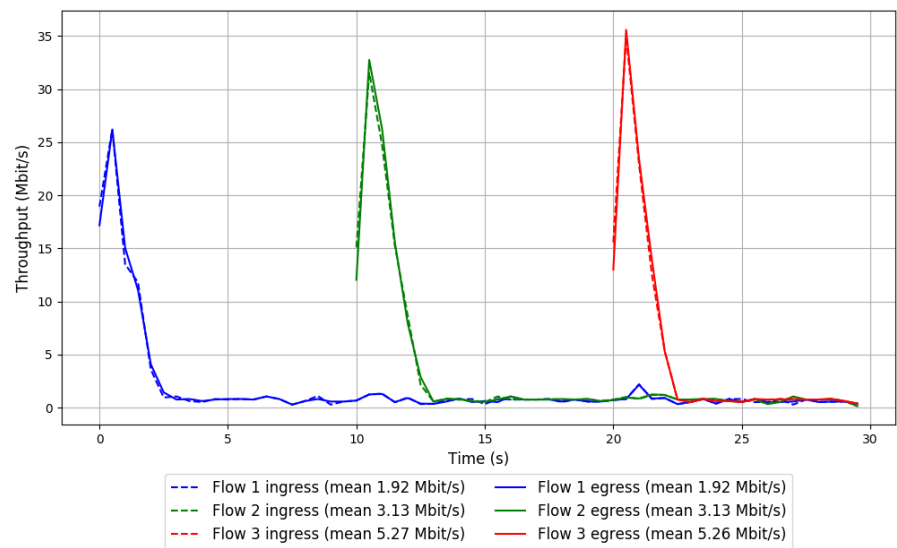


```
Run 1: Statistics of Indigo-calib

Start at: 2017-12-05 08:59:28
End at: 2017-12-05 08:59:58
Local clock offset: 3.08 ms
Remote clock offset: -2.541 ms

# Below is generated by plot.py at 2017-12-05 09:44:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 5.71 Mbit/s
95th percentile per-packet one-way delay: 34.832 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.92 Mbit/s
95th percentile per-packet one-way delay: 36.157 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 3.13 Mbit/s
95th percentile per-packet one-way delay: 32.840 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 5.26 Mbit/s
95th percentile per-packet one-way delay: 34.611 ms
Loss rate: 0.00%
```

Run 1: Report of Indigo-calib — Data Link

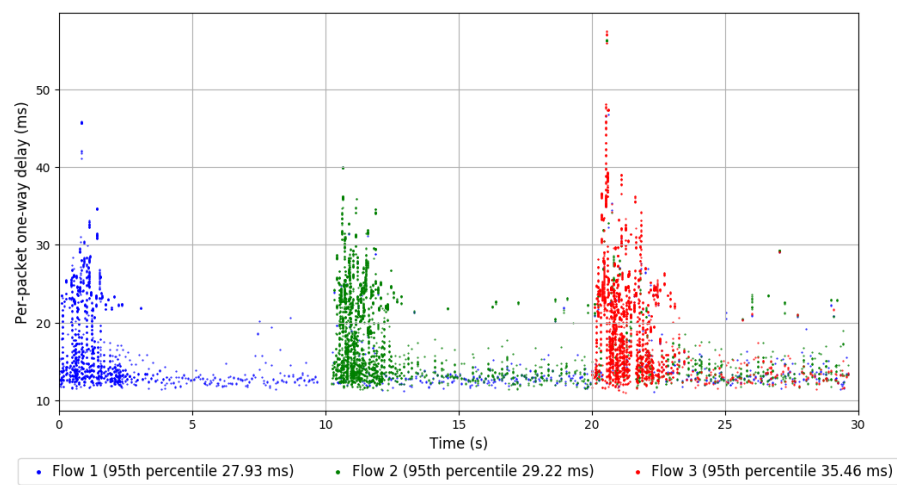
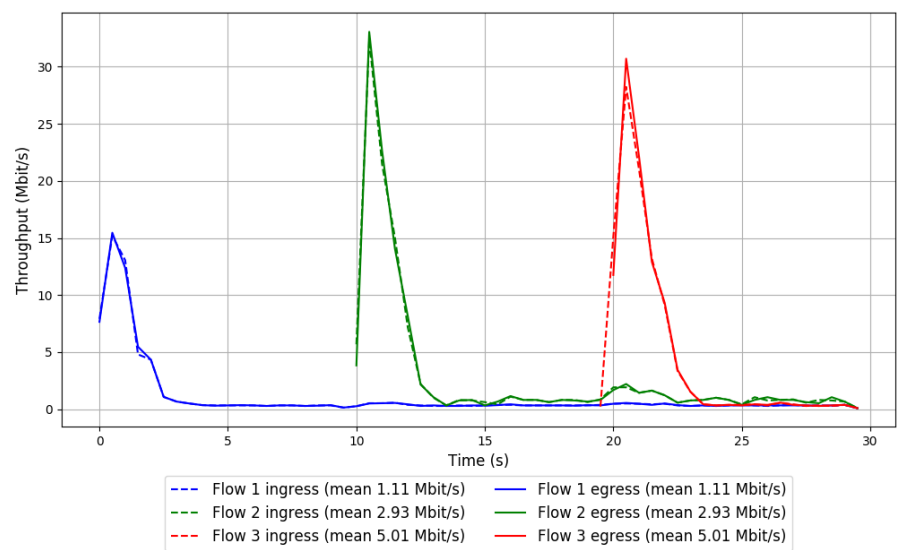


```
Run 2: Statistics of Indigo-calib

Start at: 2017-12-05 09:16:19
End at: 2017-12-05 09:16:49
Local clock offset: 3.138 ms
Remote clock offset: -1.966 ms

# Below is generated by plot.py at 2017-12-05 09:44:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.65 Mbit/s
95th percentile per-packet one-way delay: 30.929 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.11 Mbit/s
95th percentile per-packet one-way delay: 27.933 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.93 Mbit/s
95th percentile per-packet one-way delay: 29.220 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 5.01 Mbit/s
95th percentile per-packet one-way delay: 35.464 ms
Loss rate: 0.00%
```

Run 2: Report of Indigo-calib — Data Link



Run 3: Statistics of Indigo-calib

Start at: 2017-12-05 09:33:06
End at: 2017-12-05 09:33:36
Local clock offset: 3.11 ms
Remote clock offset: -1.668 ms

Below is generated by plot.py at 2017-12-05 09:44:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.93 Mbit/s
95th percentile per-packet one-way delay: 36.182 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.70 Mbit/s
95th percentile per-packet one-way delay: 35.917 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 3.07 Mbit/s
95th percentile per-packet one-way delay: 41.591 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 3.66 Mbit/s
95th percentile per-packet one-way delay: 34.334 ms
Loss rate: 0.00%

Run 3: Report of Indigo-calib — Data Link

