

Pantheon Report

Generated at 2017-11-20 23:20:42 (UTC).

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

Repeated the test of 14 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

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

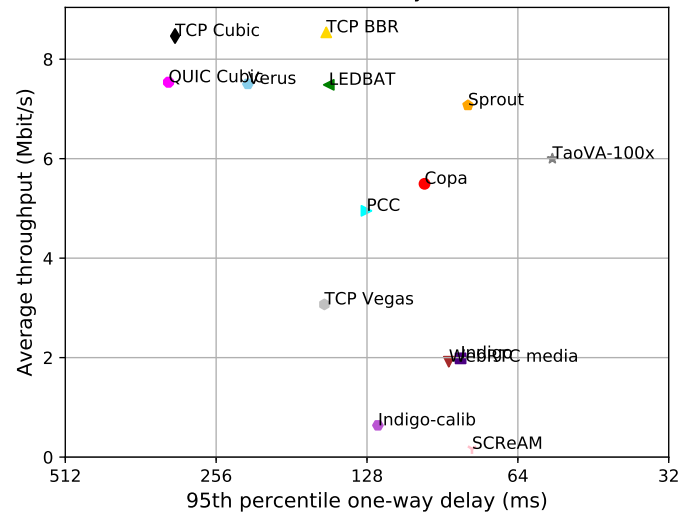
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

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

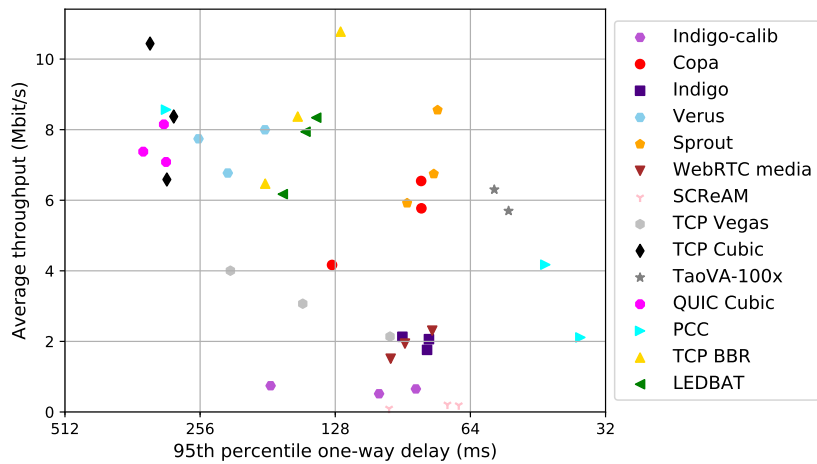
Git summary:

```
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 @ 03455460fd1a8ffbdad86fab936fdca204b80db
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 @ f1a14bffe749737437f61b1eaaeb30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
  M src/examples/cellsim.cc
  M src/examples/sproutbt2.cc
  M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
  M src/verus.hpp
  M tools/plot.py
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

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



test from Stanford ppp0 to AWS California 1 Ethernet, 3 runs of 30s each per scheme



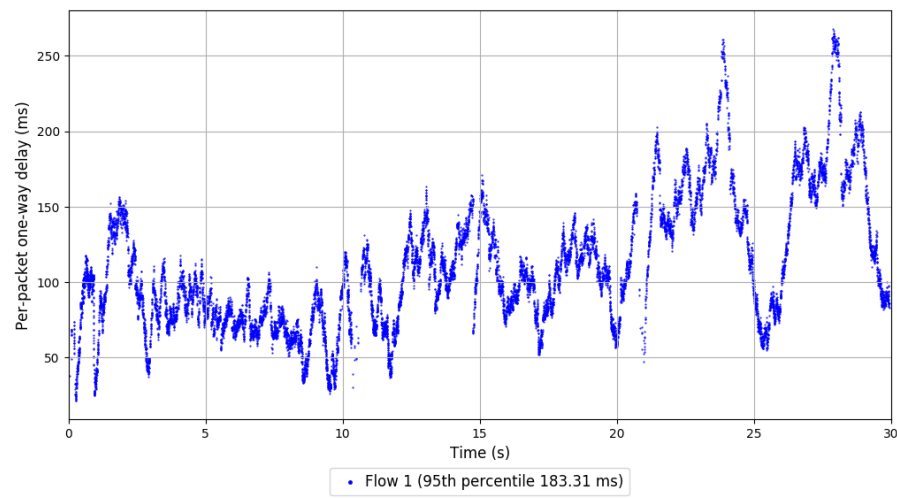
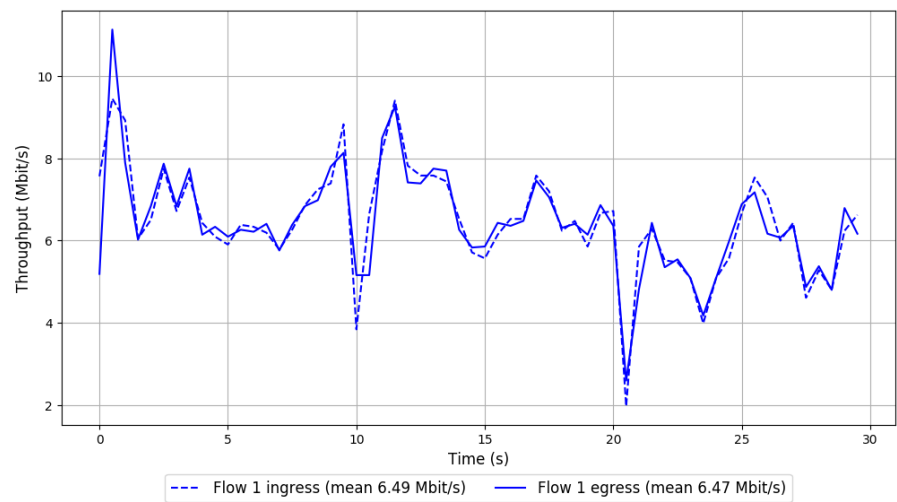
scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	8.54	154.35	0.48
TCP Cubic	3	8.47	309.20	1.14
LEDBAT	3	7.48	152.58	0.50
PCC	3	4.95	128.32	0.65
QUIC Cubic	3	7.54	318.61	2.28
SCReAM	3	0.17	79.02	0.46
WebRTC media	3	1.92	87.90	0.57
Sprout	3	7.08	80.50	0.98
TaoVA-100x	2	6.00	54.62	0.76
TCP Vegas	3	3.07	155.69	0.24
Verus	3	7.50	221.26	3.94
Copa	3	5.50	98.27	0.42
Indigo	3	1.98	83.27	0.21
Indigo-calib	3	0.64	121.74	0.29

Run 1: Statistics of TCP BBR

Start at: 2017-11-20 21:56:28
End at: 2017-11-20 21:56:58
Local clock offset: -2.902 ms
Remote clock offset: -3.024 ms

Below is generated by plot.py at 2017-11-20 23:19:56
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.47 Mbit/s
95th percentile per-packet one-way delay: 183.313 ms
Loss rate: 0.45%
-- Flow 1:
Average throughput: 6.47 Mbit/s
95th percentile per-packet one-way delay: 183.313 ms
Loss rate: 0.45%

Run 1: Report of TCP BBR — Data Link

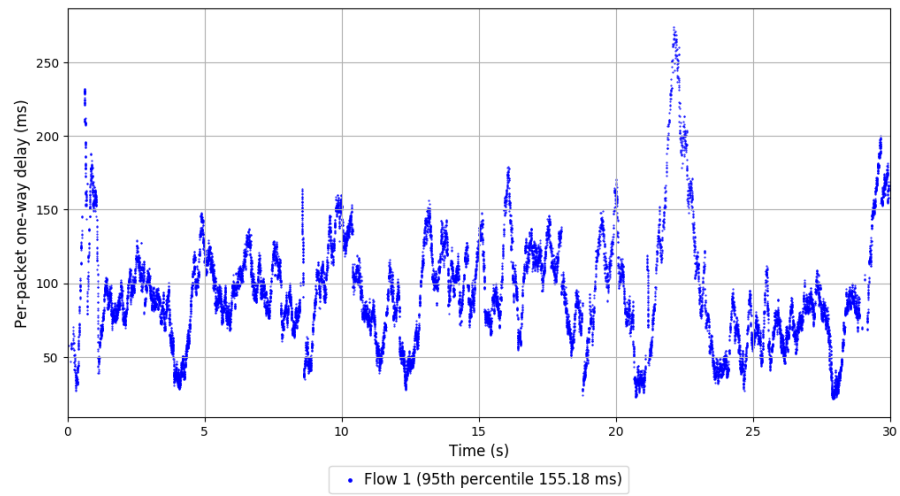
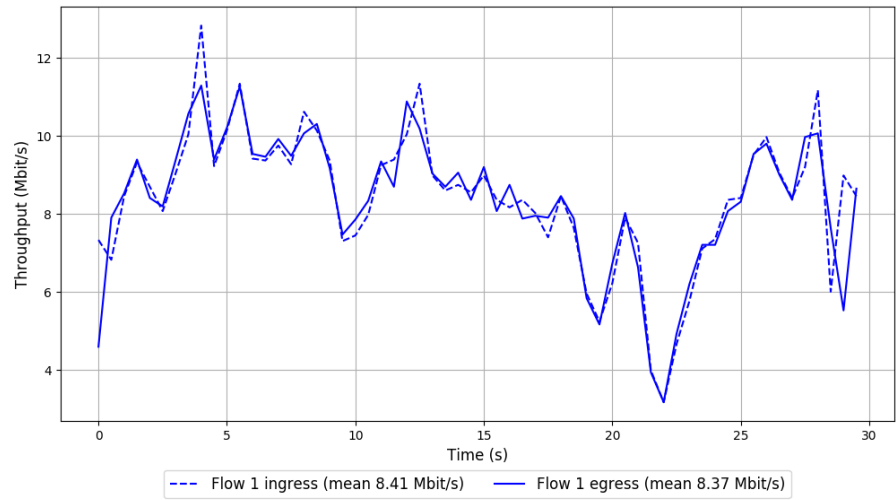


Run 2: Statistics of TCP BBR

Start at: 2017-11-20 22:12:57
End at: 2017-11-20 22:13:27
Local clock offset: -4.499 ms
Remote clock offset: -3.003 ms

Below is generated by plot.py at 2017-11-20 23:19:59
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.37 Mbit/s
95th percentile per-packet one-way delay: 155.183 ms
Loss rate: 0.67%
-- Flow 1:
Average throughput: 8.37 Mbit/s
95th percentile per-packet one-way delay: 155.183 ms
Loss rate: 0.67%

Run 2: Report of TCP BBR — Data Link

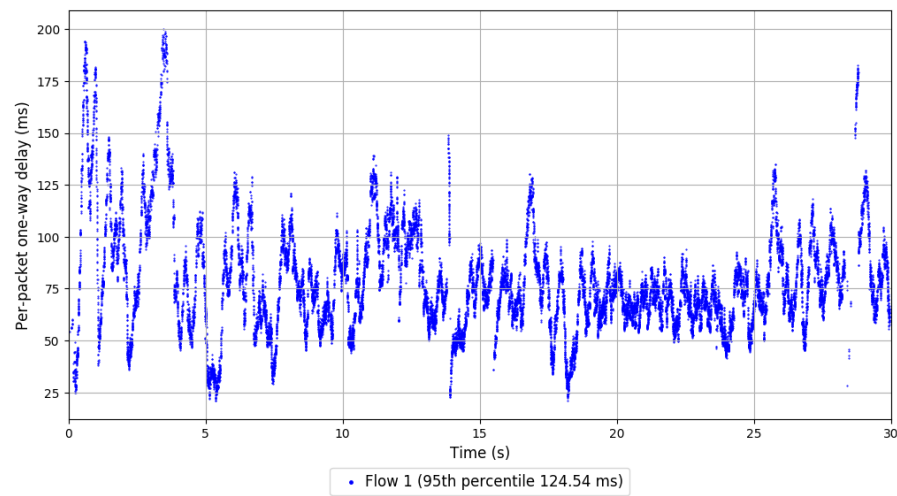
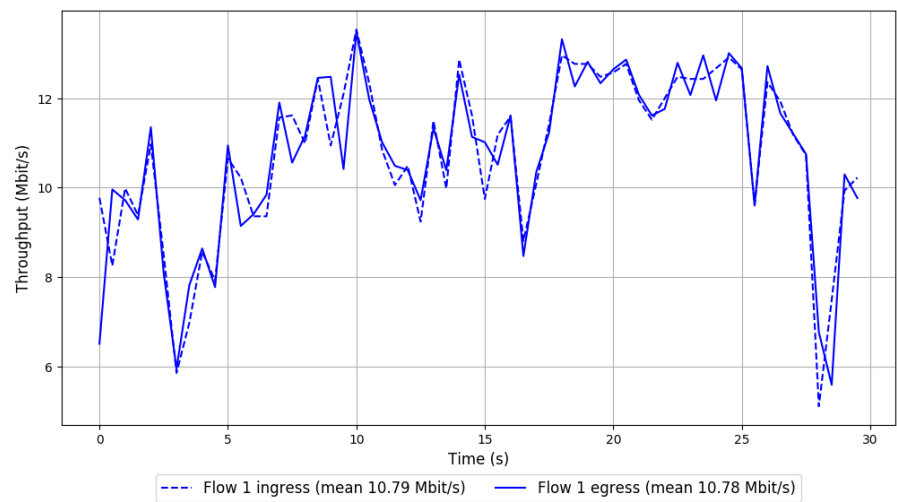


Run 3: Statistics of TCP BBR

Start at: 2017-11-20 22:29:25
End at: 2017-11-20 22:29:55
Local clock offset: -4.928 ms
Remote clock offset: -2.702 ms

Below is generated by plot.py at 2017-11-20 23:20:02
Datalink statistics
-- Total of 1 flow:
Average throughput: 10.78 Mbit/s
95th percentile per-packet one-way delay: 124.544 ms
Loss rate: 0.32%
-- Flow 1:
Average throughput: 10.78 Mbit/s
95th percentile per-packet one-way delay: 124.544 ms
Loss rate: 0.32%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2017-11-20 21:42:23

End at: 2017-11-20 21:42:53

Local clock offset: -5.5 ms

Remote clock offset: -3.27 ms

Below is generated by plot.py at 2017-11-20 23:20:02

Datalink statistics

-- Total of 1 flow:

Average throughput: 8.37 Mbit/s

95th percentile per-packet one-way delay: 293.090 ms

Loss rate: 0.83%

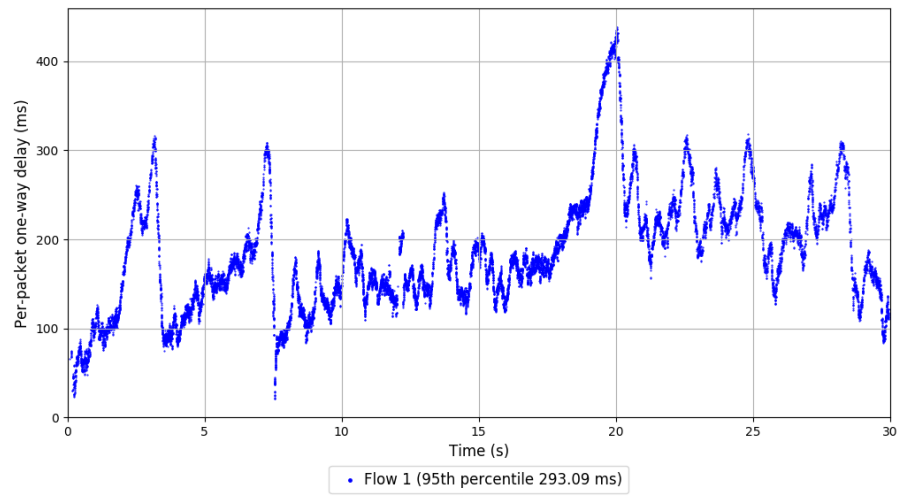
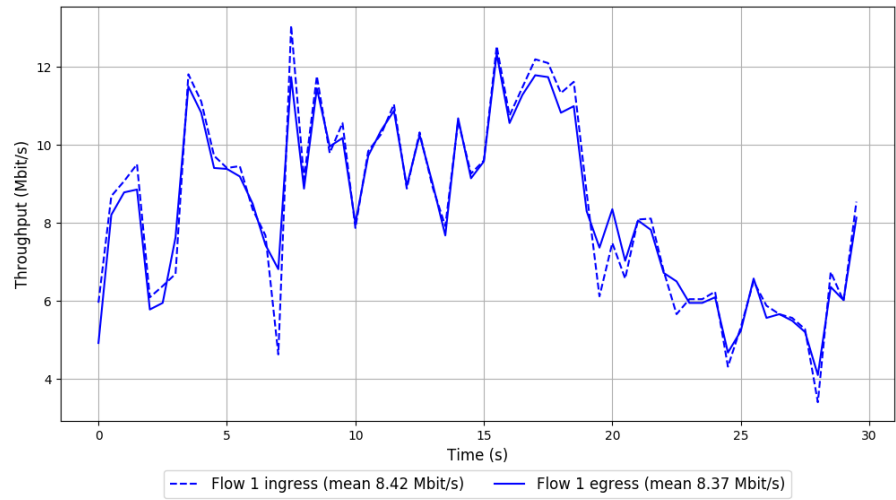
-- Flow 1:

Average throughput: 8.37 Mbit/s

95th percentile per-packet one-way delay: 293.090 ms

Loss rate: 0.83%

Run 1: Report of TCP Cubic — Data Link

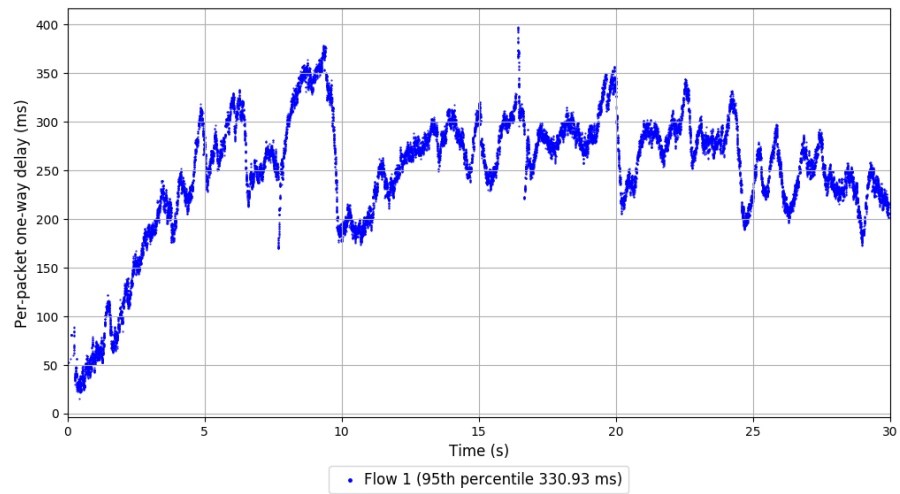
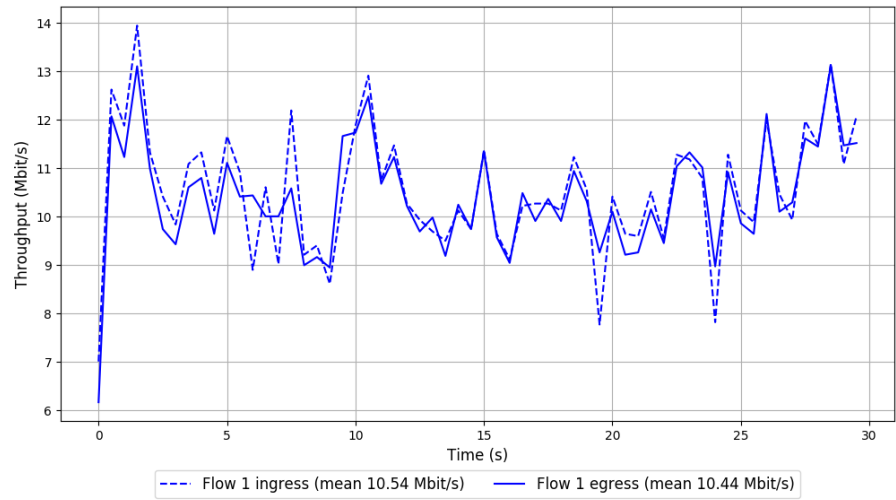


Run 2: Statistics of TCP Cubic

Start at: 2017-11-20 21:58:49
End at: 2017-11-20 21:59:19
Local clock offset: -2.76 ms
Remote clock offset: -3.042 ms

Below is generated by plot.py at 2017-11-20 23:20:03
Datalink statistics
-- Total of 1 flow:
Average throughput: 10.44 Mbit/s
95th percentile per-packet one-way delay: 330.928 ms
Loss rate: 1.20%
-- Flow 1:
Average throughput: 10.44 Mbit/s
95th percentile per-packet one-way delay: 330.928 ms
Loss rate: 1.20%

Run 2: Report of TCP Cubic — Data Link

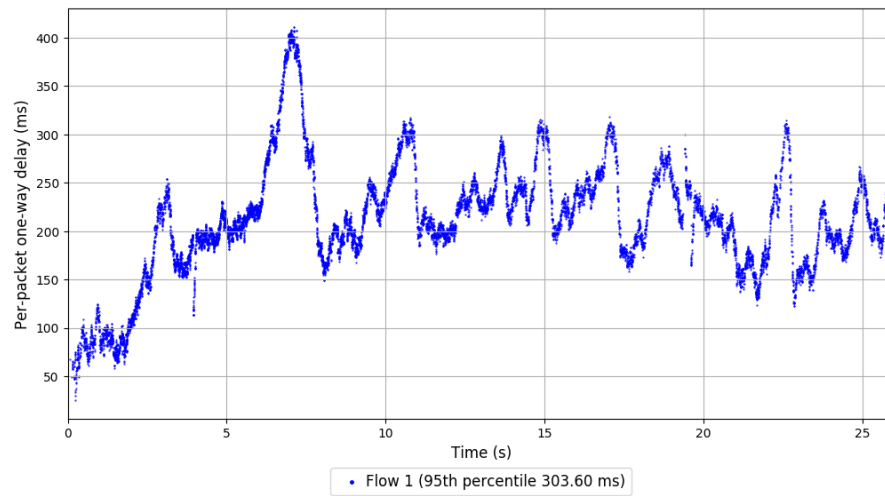
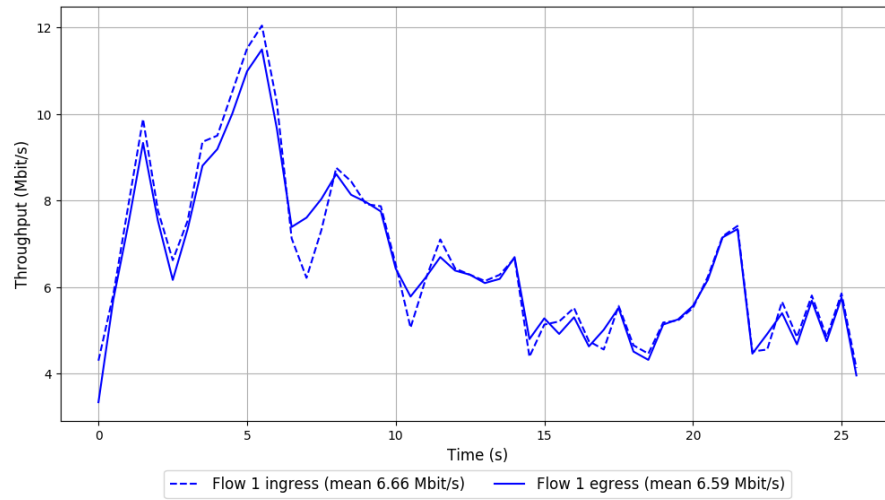


Run 3: Statistics of TCP Cubic

Start at: 2017-11-20 22:15:18
End at: 2017-11-20 22:15:48
Local clock offset: -4.441 ms
Remote clock offset: -3.024 ms

Below is generated by plot.py at 2017-11-20 23:20:03
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.59 Mbit/s
95th percentile per-packet one-way delay: 303.595 ms
Loss rate: 1.38%
-- Flow 1:
Average throughput: 6.59 Mbit/s
95th percentile per-packet one-way delay: 303.595 ms
Loss rate: 1.38%

Run 3: Report of TCP Cubic — Data Link

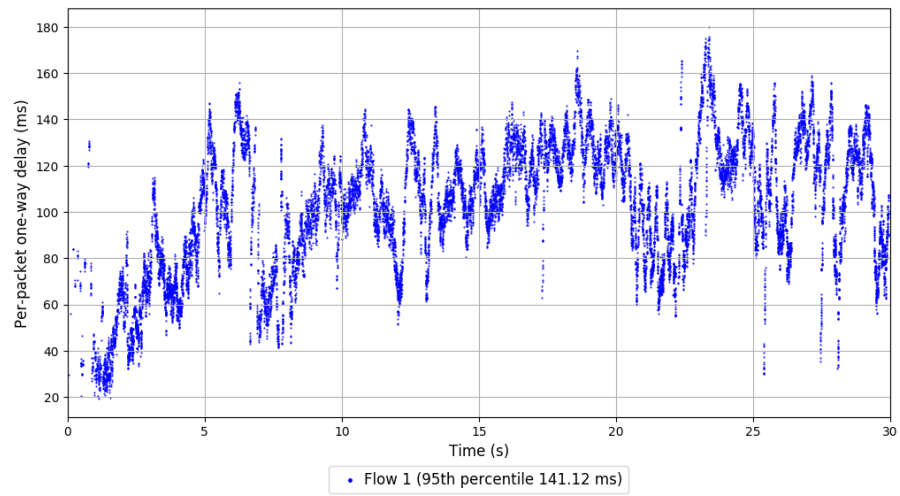
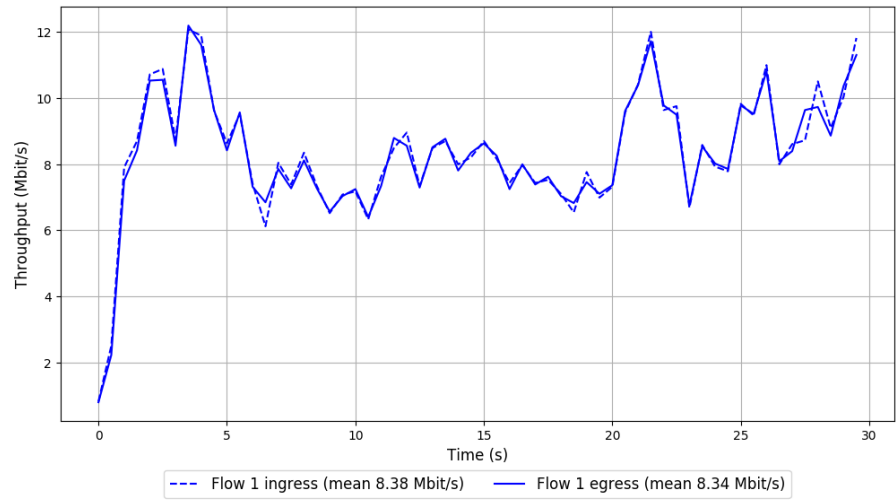


```
Run 1: Statistics of LEDBAT

Start at: 2017-11-20 21:55:17
End at: 2017-11-20 21:55:47
Local clock offset: -3.021 ms
Remote clock offset: -3.033 ms

# Below is generated by plot.py at 2017-11-20 23:20:03
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.34 Mbit/s
95th percentile per-packet one-way delay: 141.117 ms
Loss rate: 0.60%
-- Flow 1:
Average throughput: 8.34 Mbit/s
95th percentile per-packet one-way delay: 141.117 ms
Loss rate: 0.60%
```


Run 1: Report of LEDBAT — Data Link

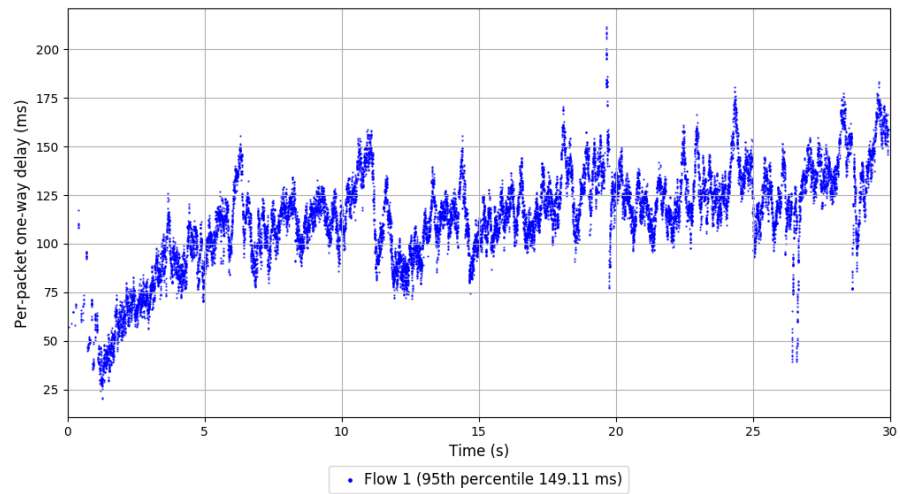
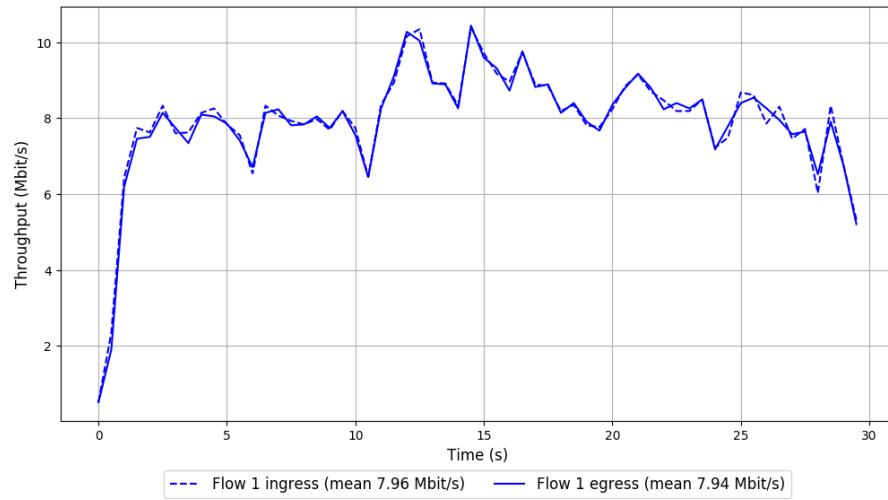


Run 2: Statistics of LEDBAT

Start at: 2017-11-20 22:11:46
End at: 2017-11-20 22:12:16
Local clock offset: -4.257 ms
Remote clock offset: -3.078 ms

Below is generated by plot.py at 2017-11-20 23:20:03
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.94 Mbit/s
95th percentile per-packet one-way delay: 149.107 ms
Loss rate: 0.43%
-- Flow 1:
Average throughput: 7.94 Mbit/s
95th percentile per-packet one-way delay: 149.107 ms
Loss rate: 0.43%

Run 2: Report of LEDBAT — Data Link

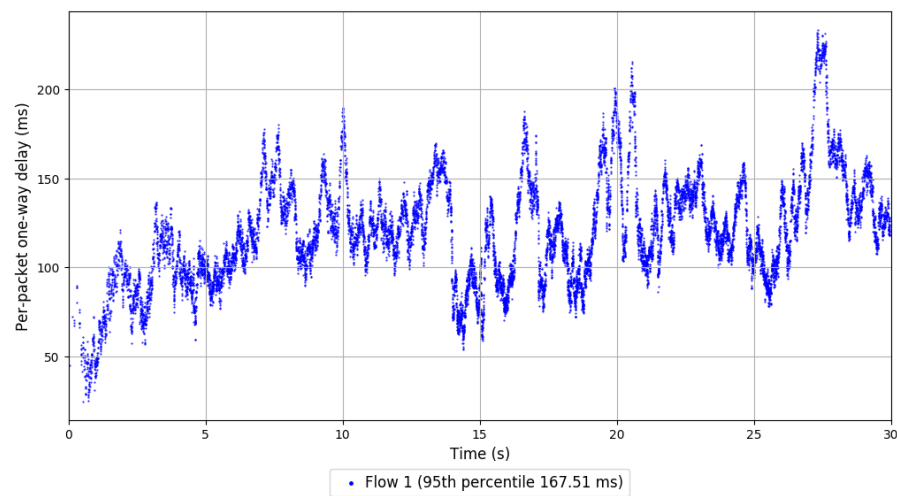
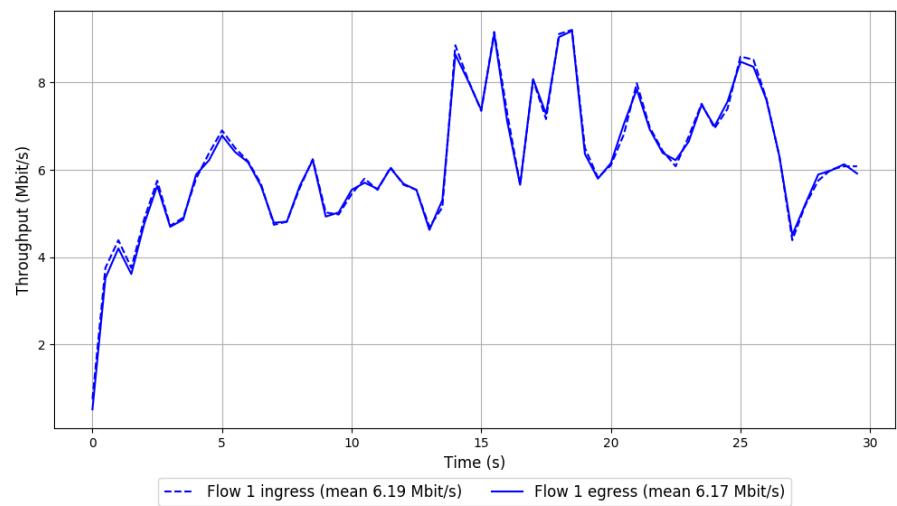


Run 3: Statistics of LEDBAT

Start at: 2017-11-20 22:28:14
End at: 2017-11-20 22:28:44
Local clock offset: -4.699 ms
Remote clock offset: -2.725 ms

Below is generated by plot.py at 2017-11-20 23:20:06
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.17 Mbit/s
95th percentile per-packet one-way delay: 167.510 ms
Loss rate: 0.48%
-- Flow 1:
Average throughput: 6.17 Mbit/s
95th percentile per-packet one-way delay: 167.510 ms
Loss rate: 0.48%

Run 3: Report of LEDBAT — Data Link

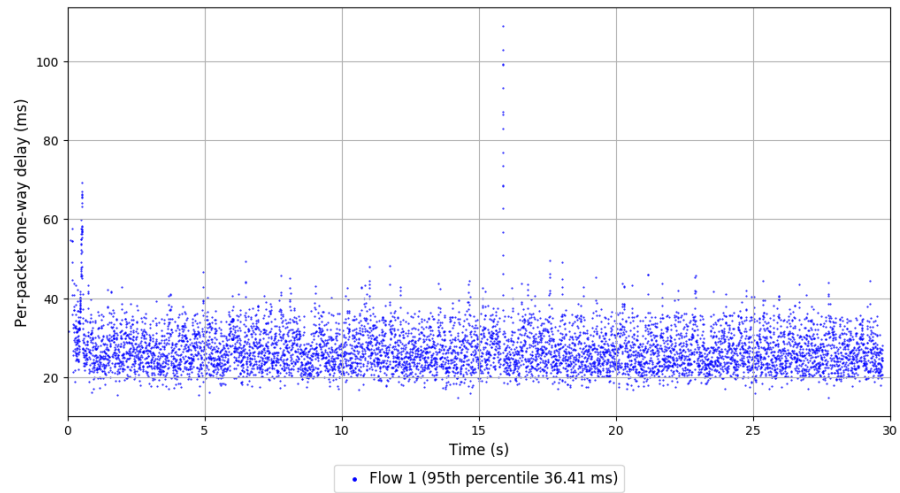
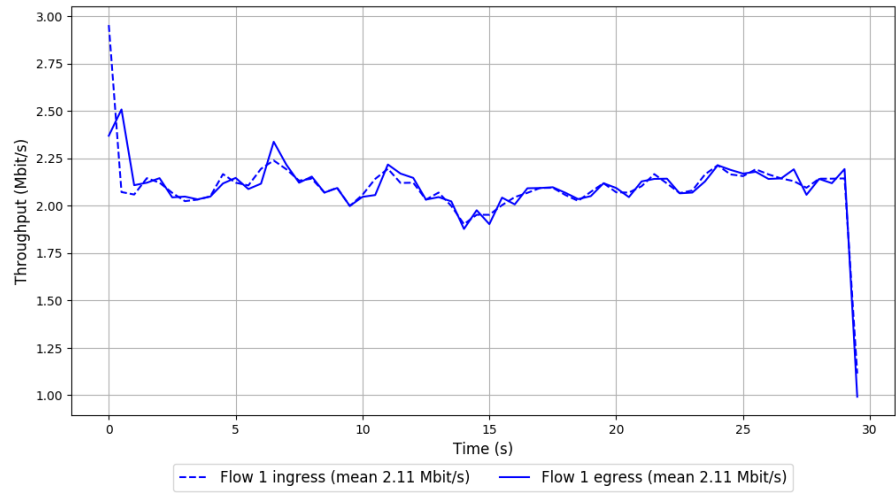


```
Run 1: Statistics of PCC

Start at: 2017-11-20 21:45:55
End at: 2017-11-20 21:46:25
Local clock offset: -5.222 ms
Remote clock offset: -3.358 ms

# Below is generated by plot.py at 2017-11-20 23:20:06
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 36.412 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 36.412 ms
Loss rate: 0.18%
```

Run 1: Report of PCC — Data Link



Run 2: Statistics of PCC

Start at: 2017-11-20 22:02:21

End at: 2017-11-20 22:02:51

Local clock offset: -3.14 ms

Remote clock offset: -2.98 ms

Below is generated by plot.py at 2017-11-20 23:20:15

Datalink statistics

-- Total of 1 flow:

Average throughput: 8.57 Mbit/s

95th percentile per-packet one-way delay: 304.958 ms

Loss rate: 1.50%

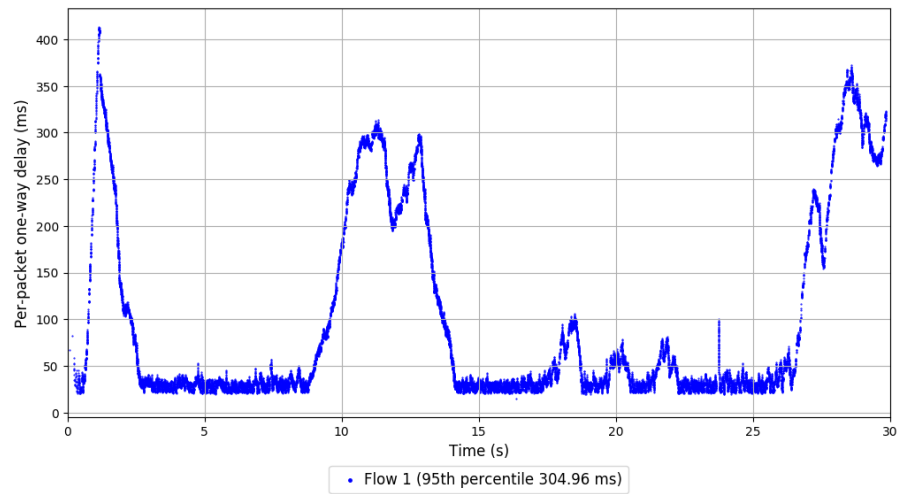
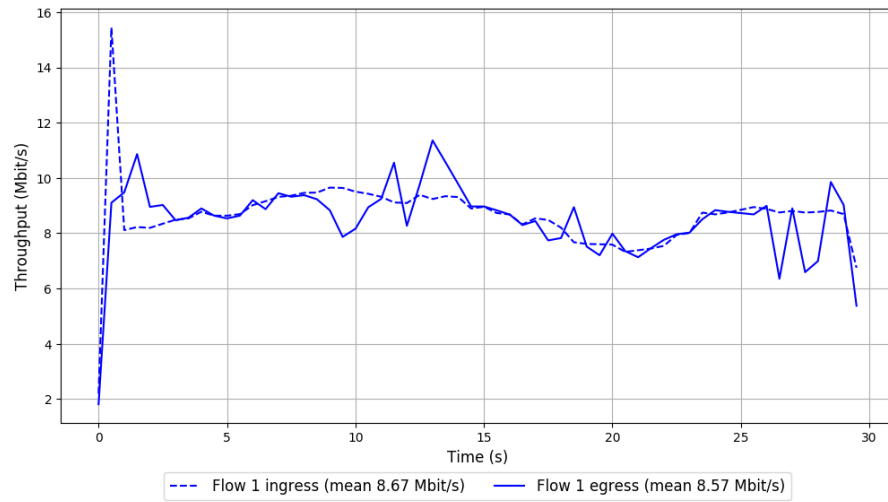
-- Flow 1:

Average throughput: 8.57 Mbit/s

95th percentile per-packet one-way delay: 304.958 ms

Loss rate: 1.50%

Run 2: Report of PCC — Data Link

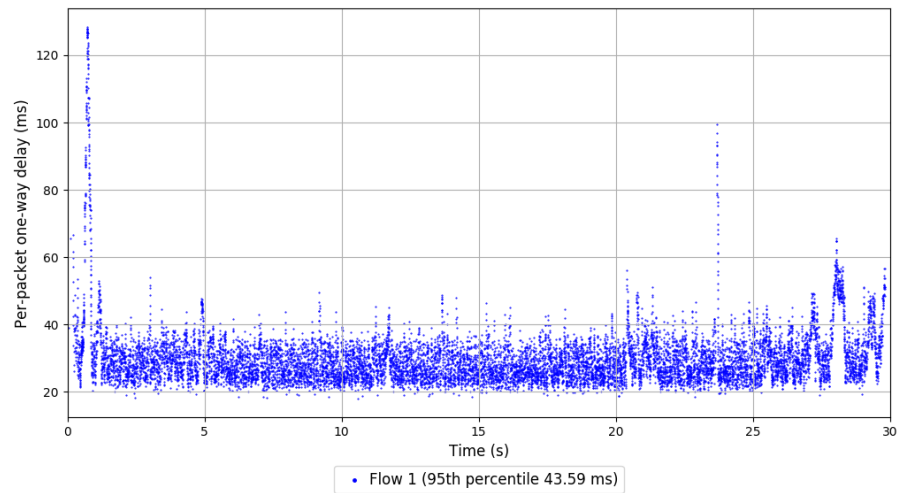
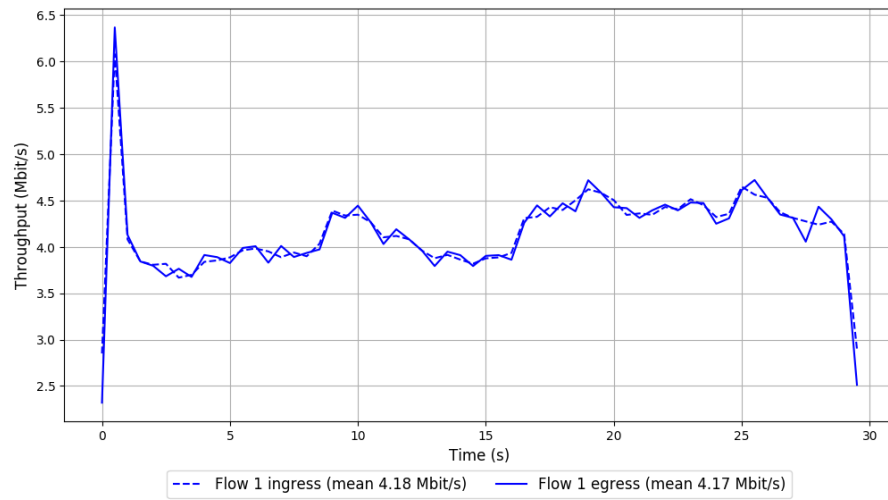


Run 3: Statistics of PCC

Start at: 2017-11-20 22:18:50
End at: 2017-11-20 22:19:20
Local clock offset: -4.112 ms
Remote clock offset: -2.884 ms

Below is generated by plot.py at 2017-11-20 23:20:15
Datalink statistics
-- Total of 1 flow:
Average throughput: 4.17 Mbit/s
95th percentile per-packet one-way delay: 43.591 ms
Loss rate: 0.26%
-- Flow 1:
Average throughput: 4.17 Mbit/s
95th percentile per-packet one-way delay: 43.591 ms
Loss rate: 0.26%

Run 3: Report of PCC — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2017-11-20 21:43:33

End at: 2017-11-20 21:44:03

Local clock offset: -6.025 ms

Remote clock offset: -3.421 ms

Below is generated by plot.py at 2017-11-20 23:20:15

Datalink statistics

-- Total of 1 flow:

Average throughput: 7.08 Mbit/s

95th percentile per-packet one-way delay: 304.835 ms

Loss rate: 2.51%

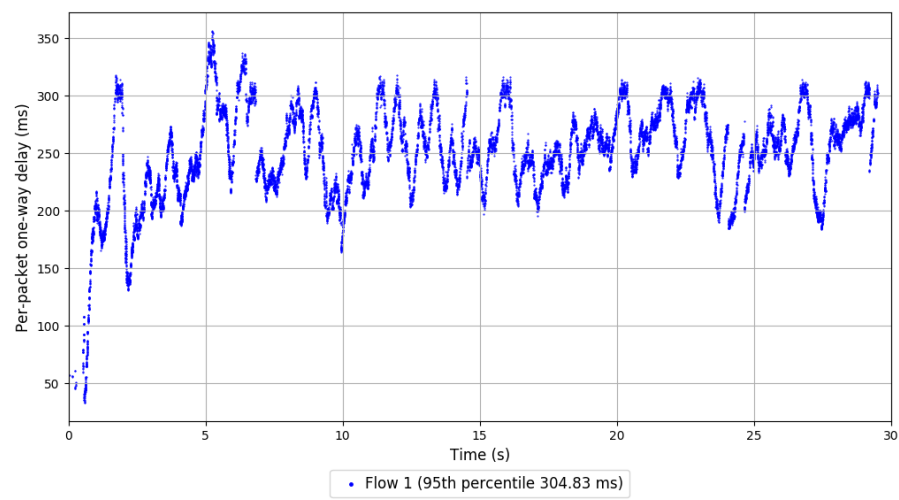
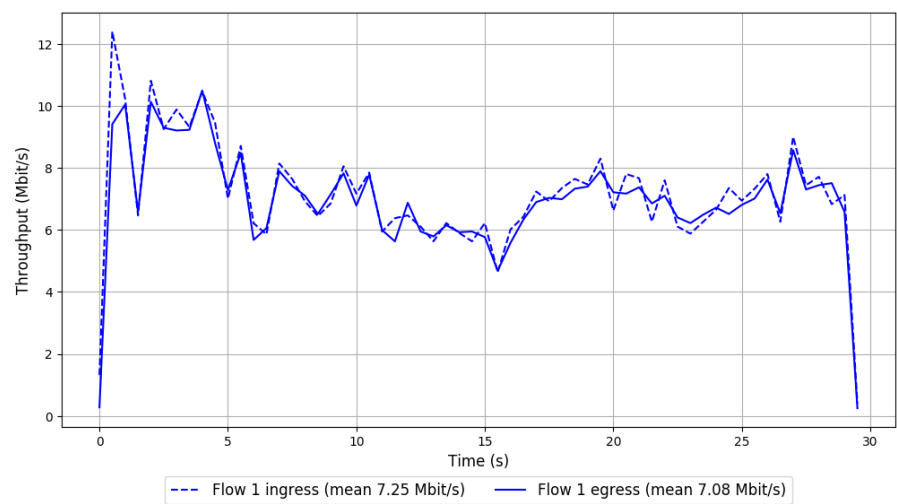
-- Flow 1:

Average throughput: 7.08 Mbit/s

95th percentile per-packet one-way delay: 304.835 ms

Loss rate: 2.51%

Run 1: Report of QUIC Cubic — Data Link

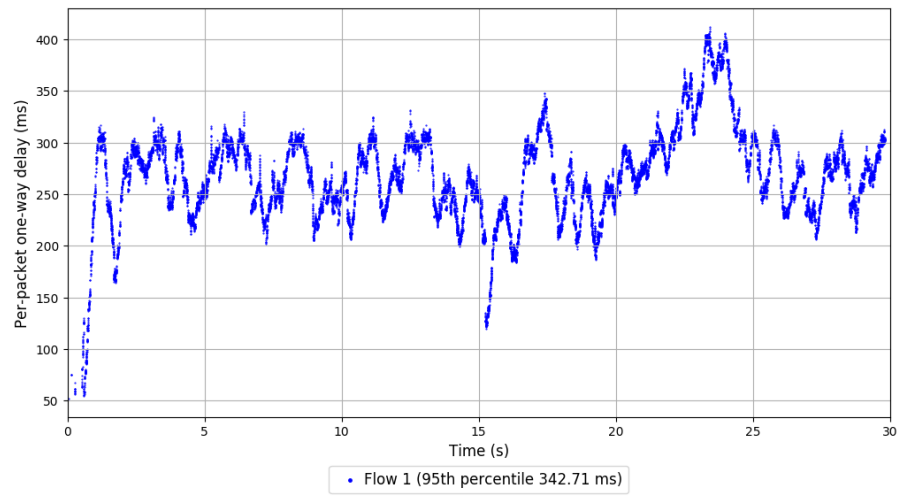
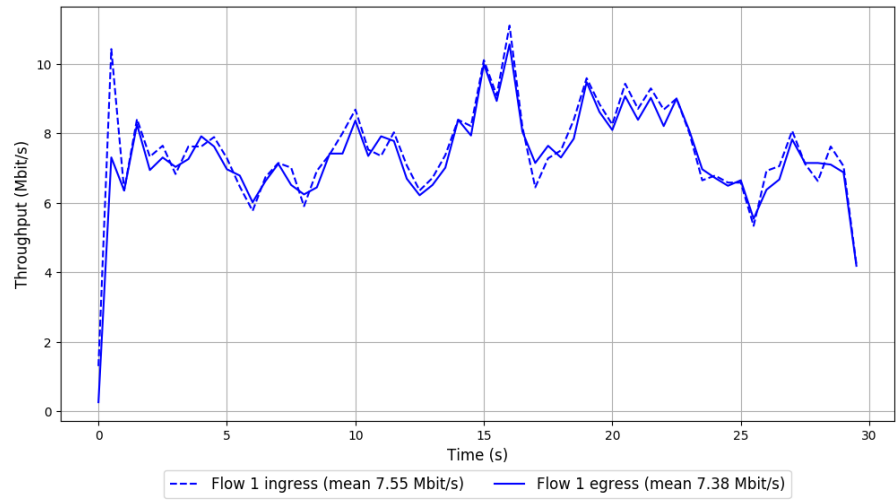


Run 2: Statistics of QUIC Cubic

Start at: 2017-11-20 22:00:00
End at: 2017-11-20 22:00:30
Local clock offset: -2.843 ms
Remote clock offset: -3.054 ms

Below is generated by plot.py at 2017-11-20 23:20:15
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.38 Mbit/s
95th percentile per-packet one-way delay: 342.715 ms
Loss rate: 2.50%
-- Flow 1:
Average throughput: 7.38 Mbit/s
95th percentile per-packet one-way delay: 342.715 ms
Loss rate: 2.50%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2017-11-20 22:16:29

End at: 2017-11-20 22:16:59

Local clock offset: -4.24 ms

Remote clock offset: -2.986 ms

Below is generated by plot.py at 2017-11-20 23:20:16

Datalink statistics

-- Total of 1 flow:

Average throughput: 8.15 Mbit/s

95th percentile per-packet one-way delay: 308.290 ms

Loss rate: 1.83%

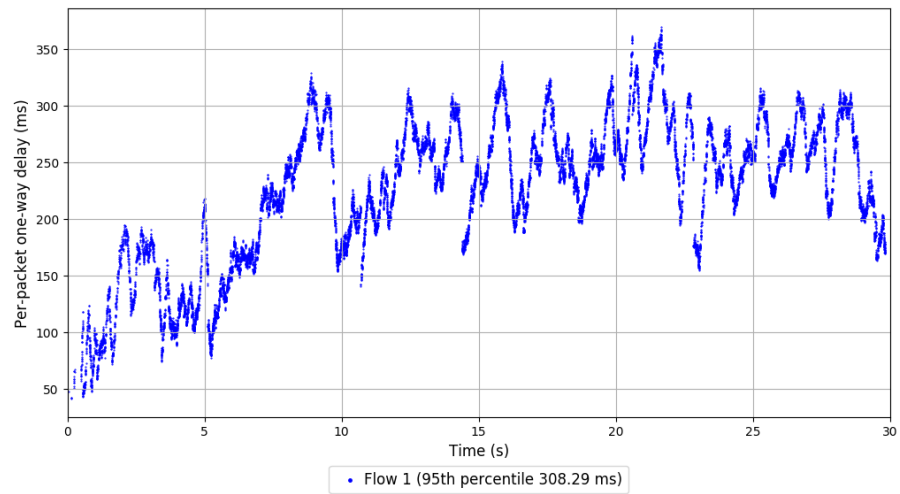
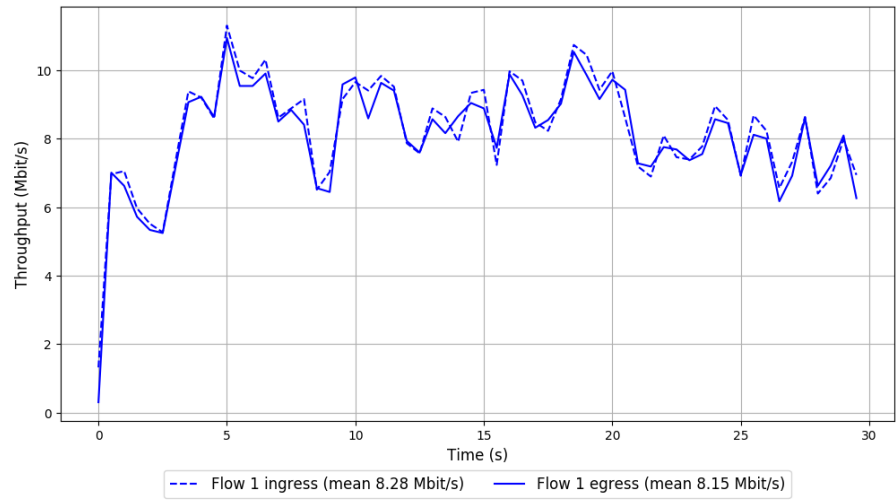
-- Flow 1:

Average throughput: 8.15 Mbit/s

95th percentile per-packet one-way delay: 308.290 ms

Loss rate: 1.83%

Run 3: Report of QUIC Cubic — Data Link

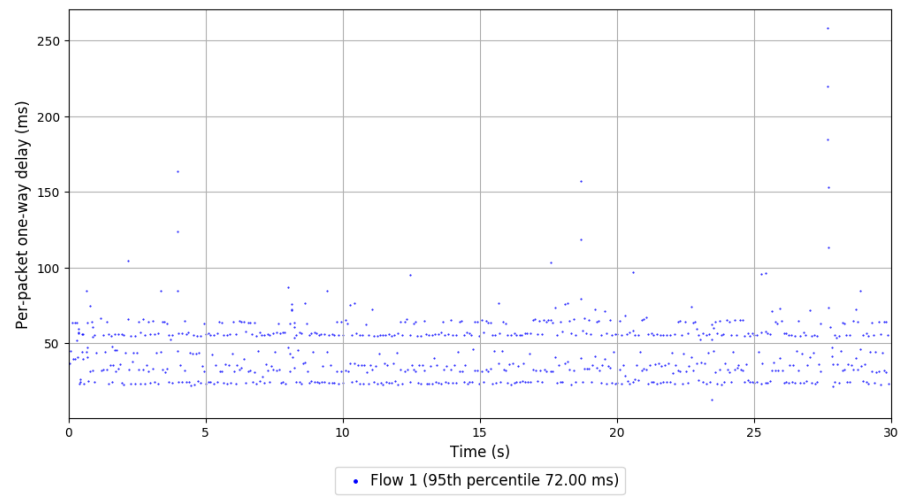
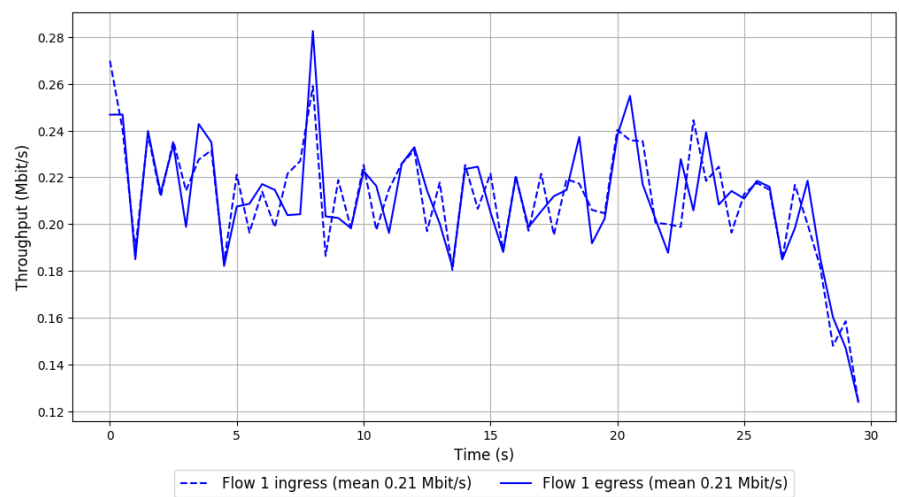


Run 1: Statistics of SCReAM

Start at: 2017-11-20 21:47:05
End at: 2017-11-20 21:47:35
Local clock offset: -4.949 ms
Remote clock offset: -3.237 ms

Below is generated by plot.py at 2017-11-20 23:20:16
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 71.998 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 71.998 ms
Loss rate: 0.09%

Run 1: Report of SReAM — Data Link

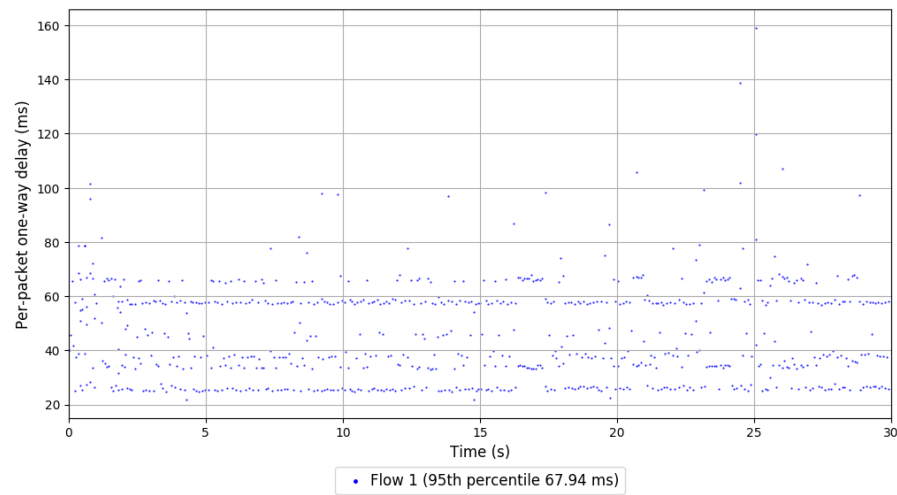
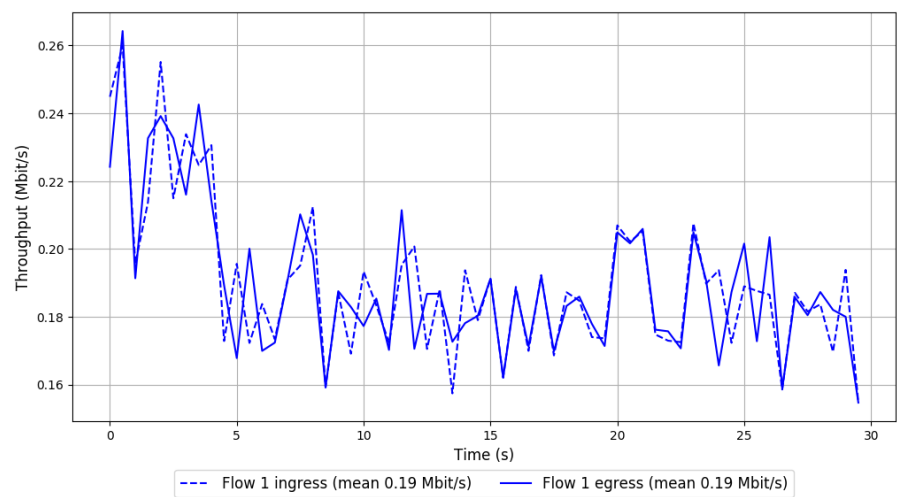


Run 2: Statistics of SCReAM

Start at: 2017-11-20 22:03:32
End at: 2017-11-20 22:04:02
Local clock offset: -3.232 ms
Remote clock offset: -3.003 ms

Below is generated by plot.py at 2017-11-20 23:20:16
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 67.940 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 67.940 ms
Loss rate: 0.12%

Run 2: Report of SReAM — Data Link

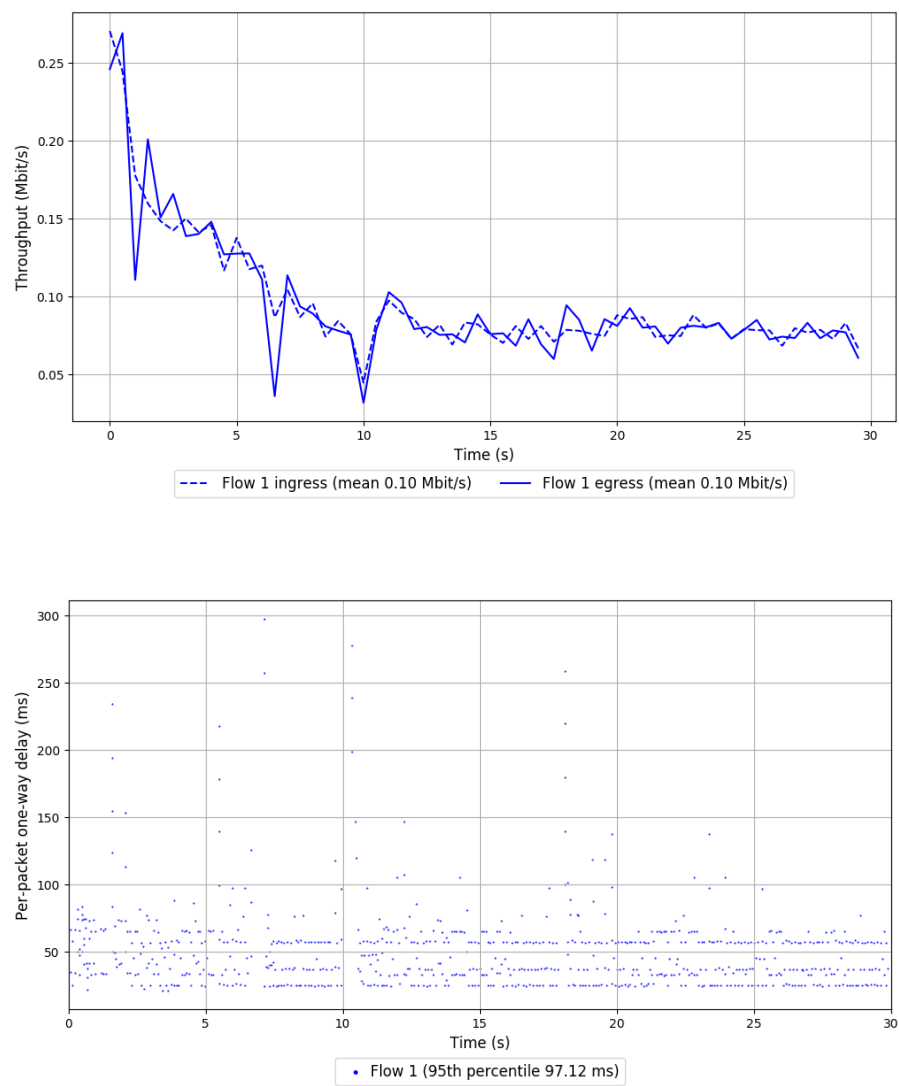


Run 3: Statistics of SCReAM

Start at: 2017-11-20 22:20:01
End at: 2017-11-20 22:20:31
Local clock offset: -4.23 ms
Remote clock offset: -2.864 ms

Below is generated by plot.py at 2017-11-20 23:20:16
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 97.124 ms
Loss rate: 1.18%
-- Flow 1:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 97.124 ms
Loss rate: 1.18%

Run 3: Report of SReAM — Data Link

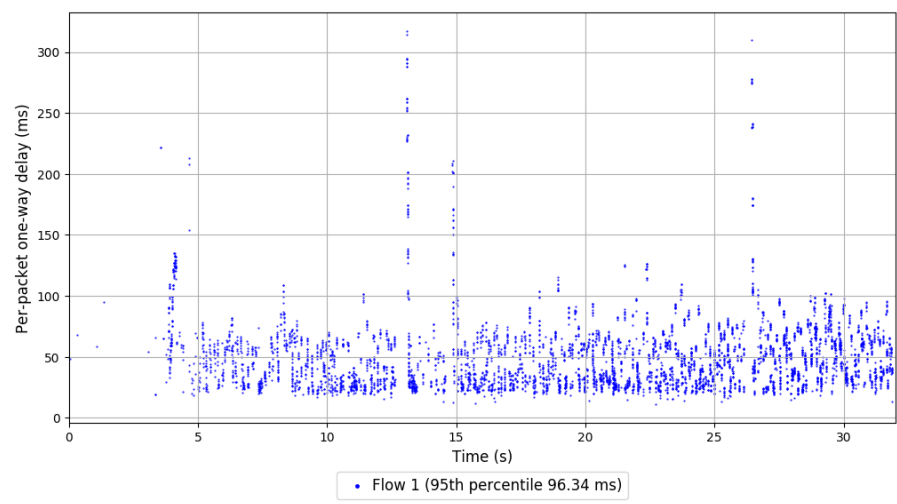
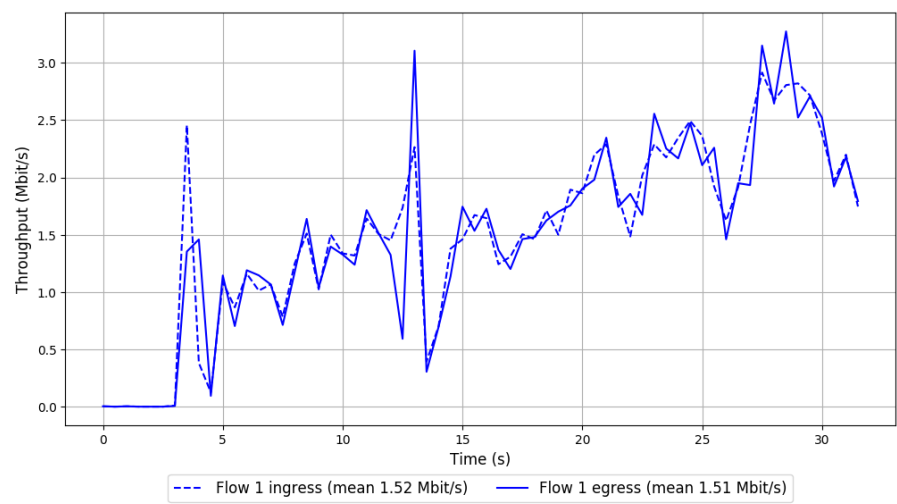


Run 1: Statistics of WebRTC media

Start at: 2017-11-20 21:51:46
End at: 2017-11-20 21:52:16
Local clock offset: -4.455 ms
Remote clock offset: -3.167 ms

Below is generated by plot.py at 2017-11-20 23:20:16
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 96.337 ms
Loss rate: 0.83%
-- Flow 1:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 96.337 ms
Loss rate: 0.83%

Run 1: Report of WebRTC media — Data Link

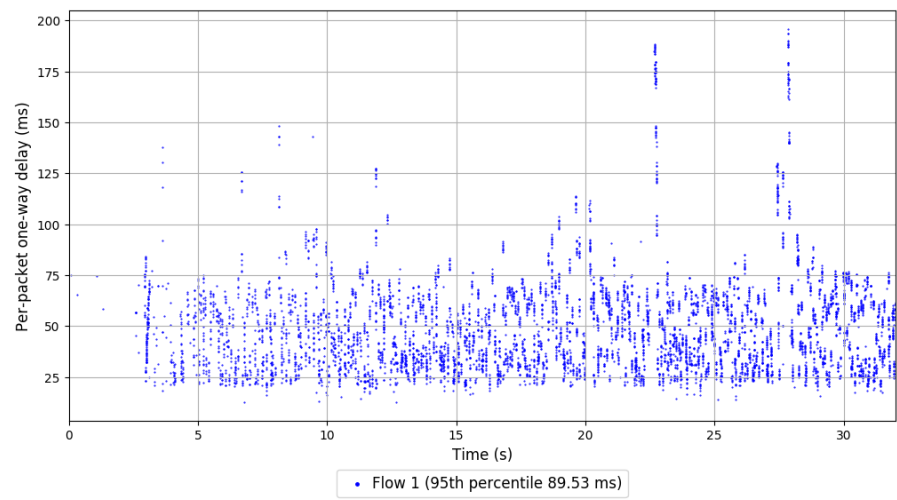
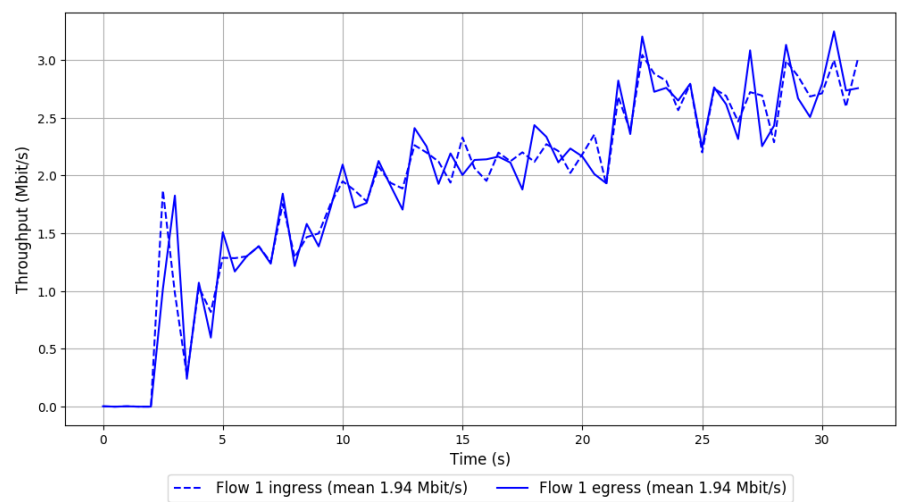


Run 2: Statistics of WebRTC media

Start at: 2017-11-20 22:08:15
End at: 2017-11-20 22:08:45
Local clock offset: -3.668 ms
Remote clock offset: -3.077 ms

Below is generated by plot.py at 2017-11-20 23:20:16
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.94 Mbit/s
95th percentile per-packet one-way delay: 89.529 ms
Loss rate: 0.27%
-- Flow 1:
Average throughput: 1.94 Mbit/s
95th percentile per-packet one-way delay: 89.529 ms
Loss rate: 0.27%

Run 2: Report of WebRTC media — Data Link

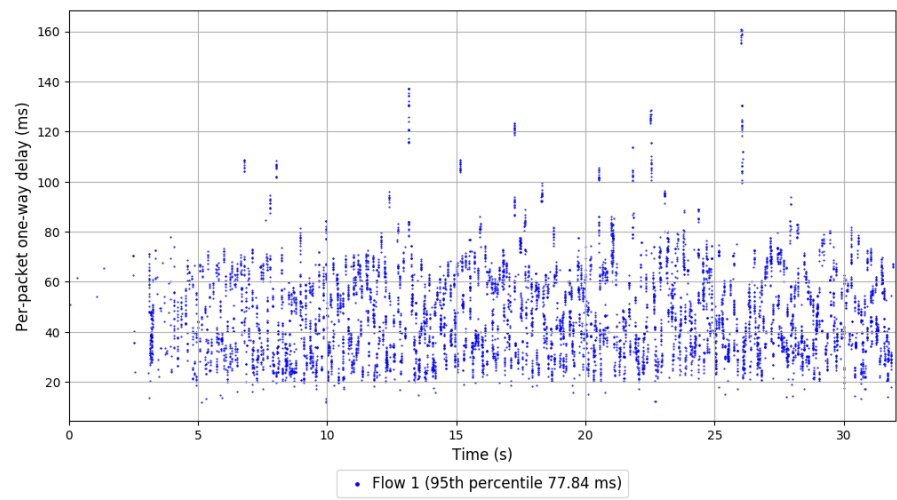
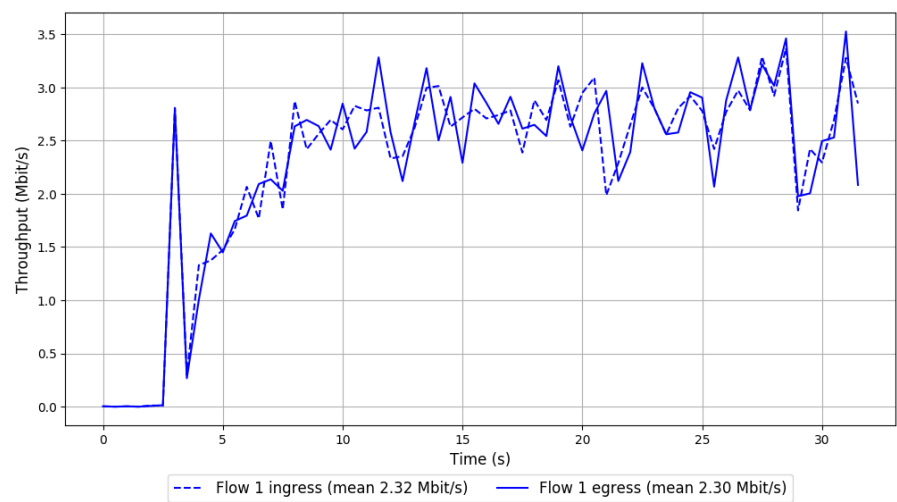


Run 3: Statistics of WebRTC media

Start at: 2017-11-20 22:24:42
End at: 2017-11-20 22:25:12
Local clock offset: -4.394 ms
Remote clock offset: -2.723 ms

Below is generated by plot.py at 2017-11-20 23:20:16
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.30 Mbit/s
95th percentile per-packet one-way delay: 77.836 ms
Loss rate: 0.61%
-- Flow 1:
Average throughput: 2.30 Mbit/s
95th percentile per-packet one-way delay: 77.836 ms
Loss rate: 0.61%

Run 3: Report of WebRTC media — Data Link

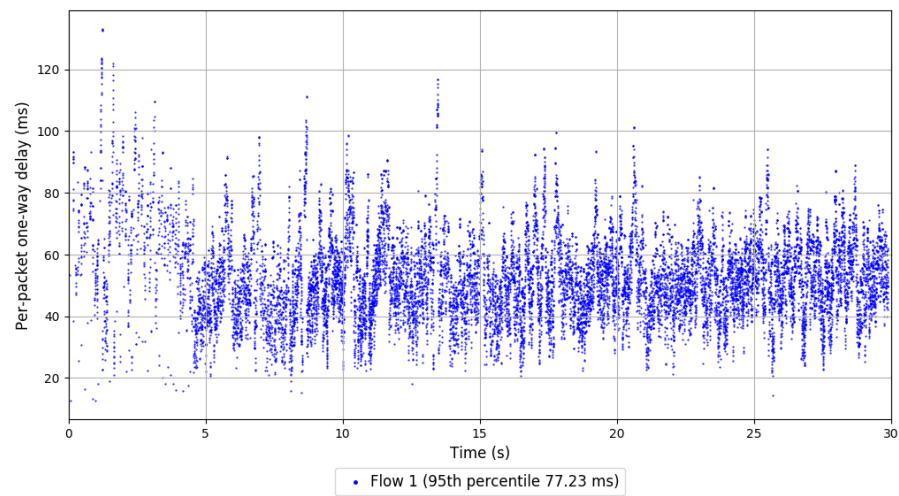
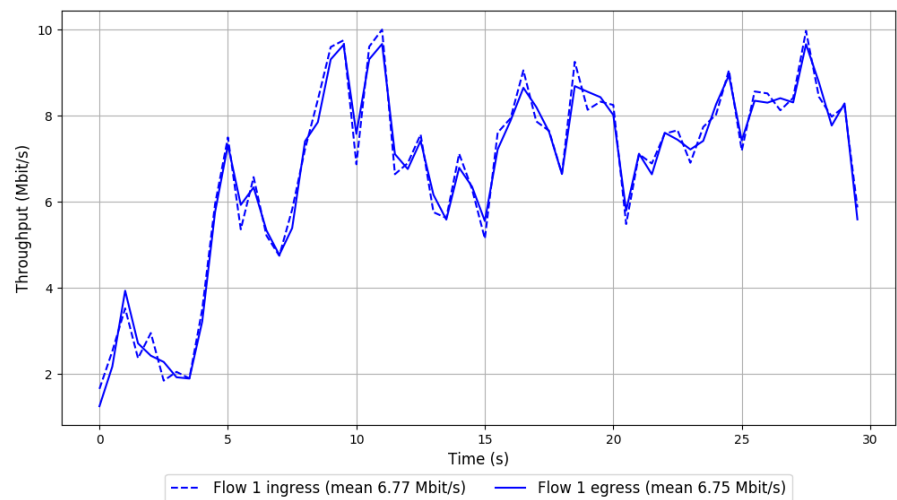


Run 1: Statistics of Sprout

Start at: 2017-11-20 21:49:26
End at: 2017-11-20 21:49:56
Local clock offset: -4.962 ms
Remote clock offset: -3.237 ms

Below is generated by plot.py at 2017-11-20 23:20:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.75 Mbit/s
95th percentile per-packet one-way delay: 77.230 ms
Loss rate: 0.51%
-- Flow 1:
Average throughput: 6.75 Mbit/s
95th percentile per-packet one-way delay: 77.230 ms
Loss rate: 0.51%

Run 1: Report of Sprout — Data Link

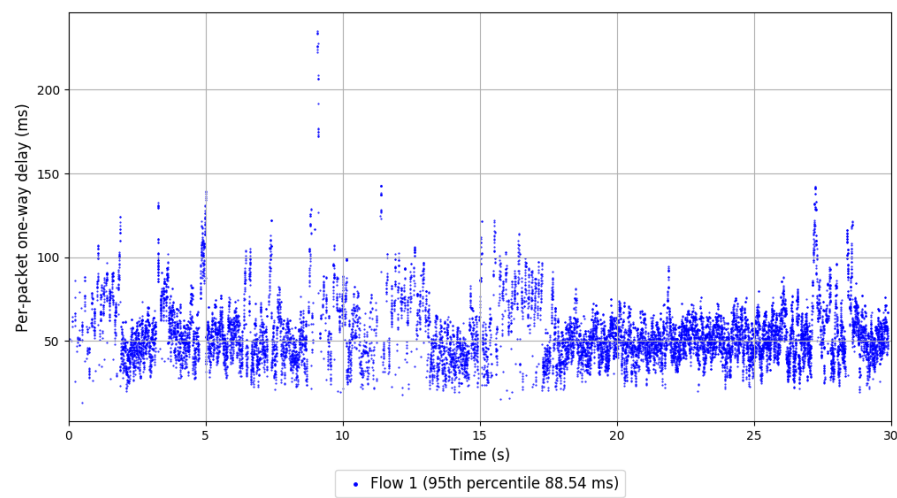
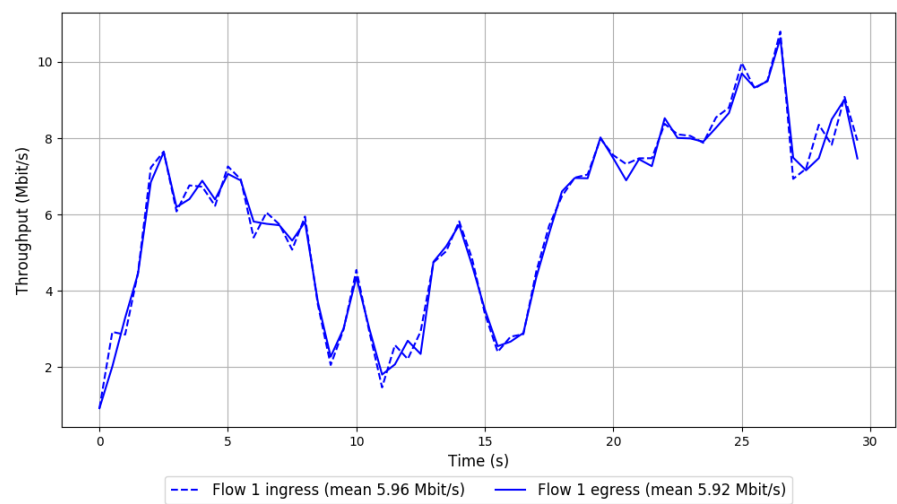


Run 2: Statistics of Sprout

Start at: 2017-11-20 22:05:53
End at: 2017-11-20 22:06:23
Local clock offset: -3.356 ms
Remote clock offset: -2.949 ms

Below is generated by plot.py at 2017-11-20 23:20:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 5.92 Mbit/s
95th percentile per-packet one-way delay: 88.542 ms
Loss rate: 0.84%
-- Flow 1:
Average throughput: 5.92 Mbit/s
95th percentile per-packet one-way delay: 88.542 ms
Loss rate: 0.84%

Run 2: Report of Sprout — Data Link

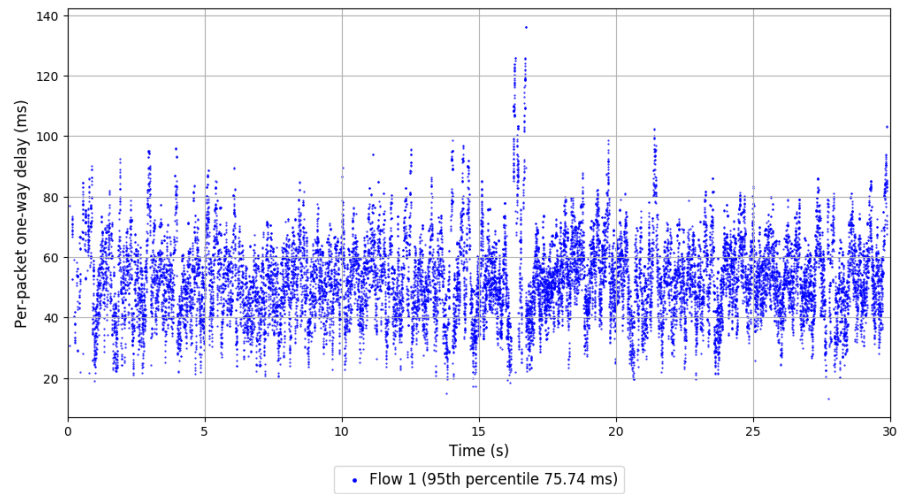
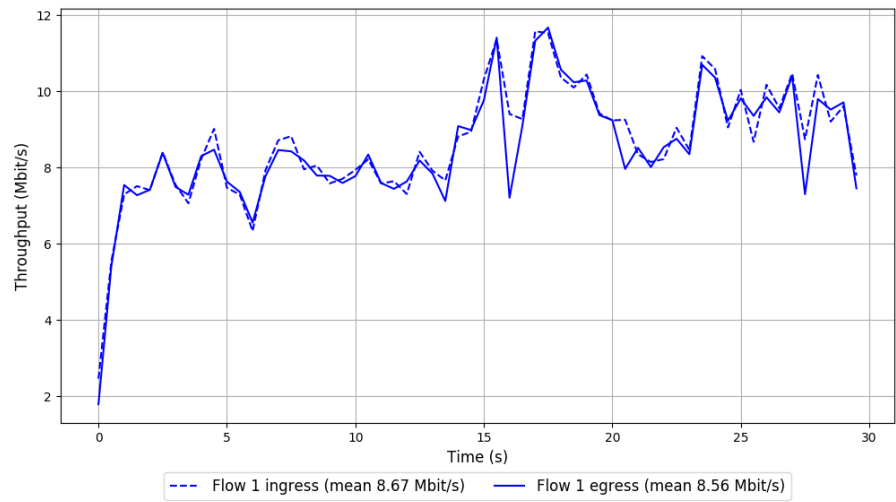


Run 3: Statistics of Sprout

Start at: 2017-11-20 22:22:21
End at: 2017-11-20 22:22:51
Local clock offset: -4.359 ms
Remote clock offset: -2.874 ms

Below is generated by plot.py at 2017-11-20 23:20:26
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.56 Mbit/s
95th percentile per-packet one-way delay: 75.738 ms
Loss rate: 1.60%
-- Flow 1:
Average throughput: 8.56 Mbit/s
95th percentile per-packet one-way delay: 75.738 ms
Loss rate: 1.60%

Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

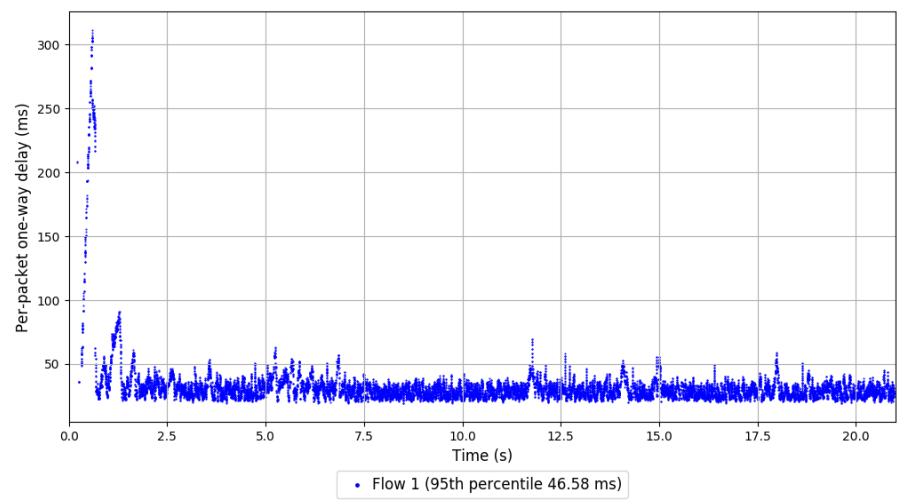
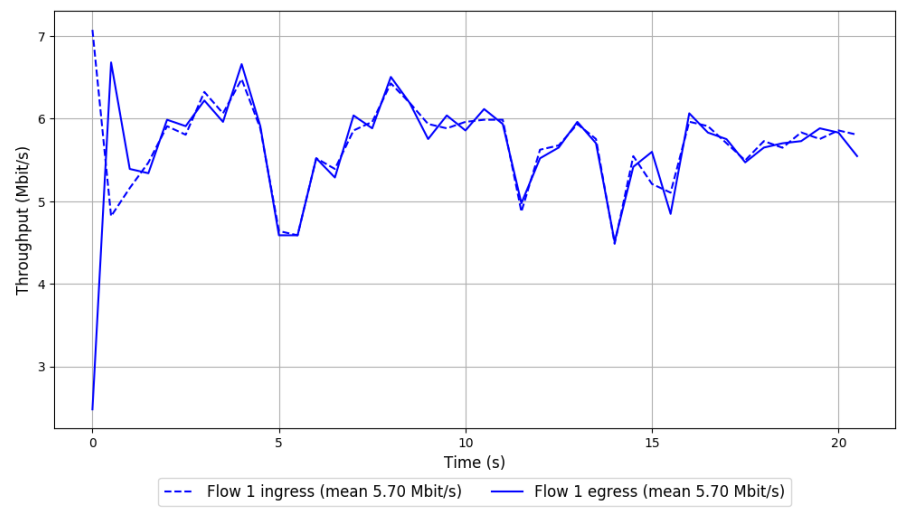
Start at: 2017-11-20 21:44:44

End at: 2017-11-20 21:45:14

Local clock offset: -5.64 ms

Remote clock offset: -3.39 ms

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



Run 2: Statistics of TaoVA-100x

Start at: 2017-11-20 22:01:11

End at: 2017-11-20 22:01:41

Local clock offset: -3.008 ms

Remote clock offset: -3.03 ms

Below is generated by plot.py at 2017-11-20 23:20:29

Datalink statistics

-- Total of 1 flow:

Average throughput: 6.30 Mbit/s

95th percentile per-packet one-way delay: 56.612 ms

Loss rate: 0.83%

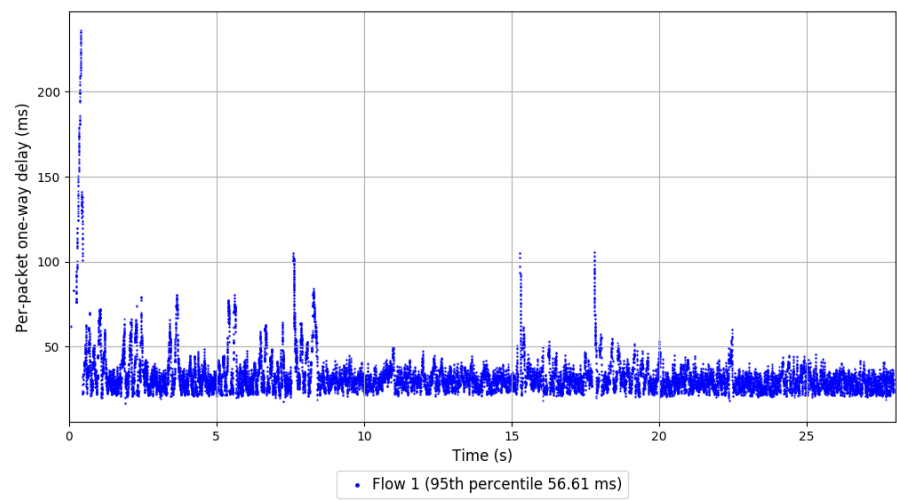
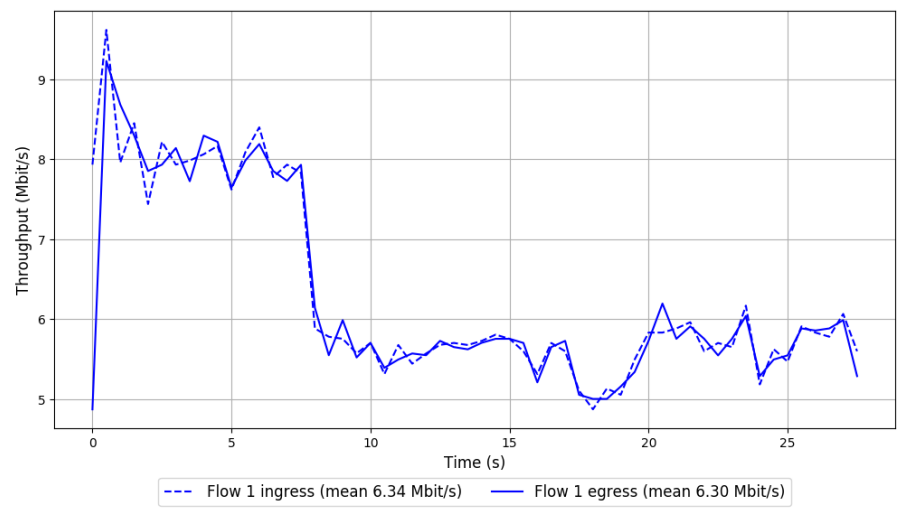
-- Flow 1:

Average throughput: 6.30 Mbit/s

95th percentile per-packet one-way delay: 56.612 ms

Loss rate: 0.83%

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

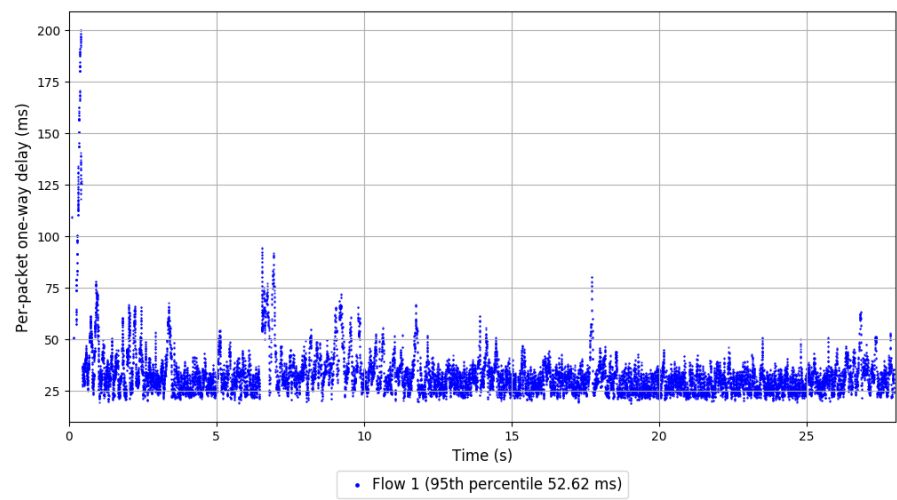
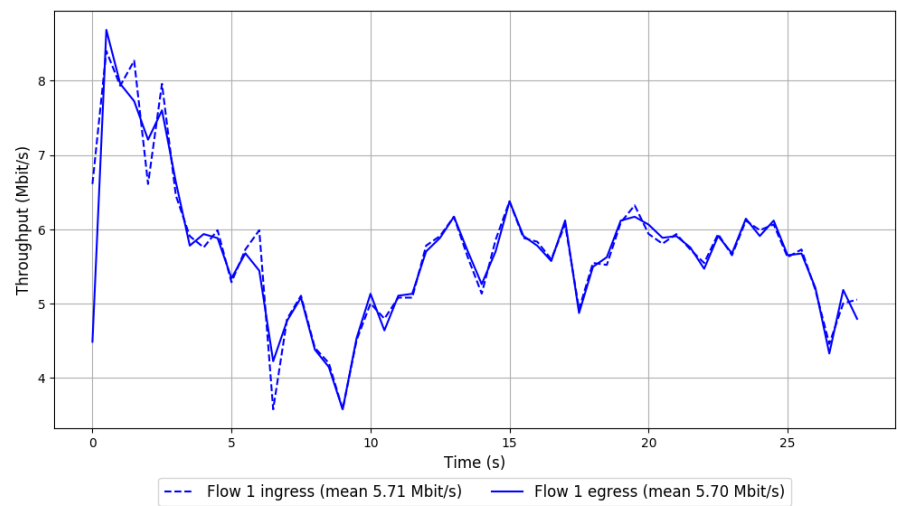


Run 3: Statistics of TaoVA-100x

Start at: 2017-11-20 22:17:39
End at: 2017-11-20 22:18:09
Local clock offset: -4.241 ms
Remote clock offset: -2.859 ms

Below is generated by plot.py at 2017-11-20 23:20:29
Datalink statistics
-- Total of 1 flow:
Average throughput: 5.70 Mbit/s
95th percentile per-packet one-way delay: 52.623 ms
Loss rate: 0.69%
-- Flow 1:
Average throughput: 5.70 Mbit/s
95th percentile per-packet one-way delay: 52.623 ms
Loss rate: 0.69%

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

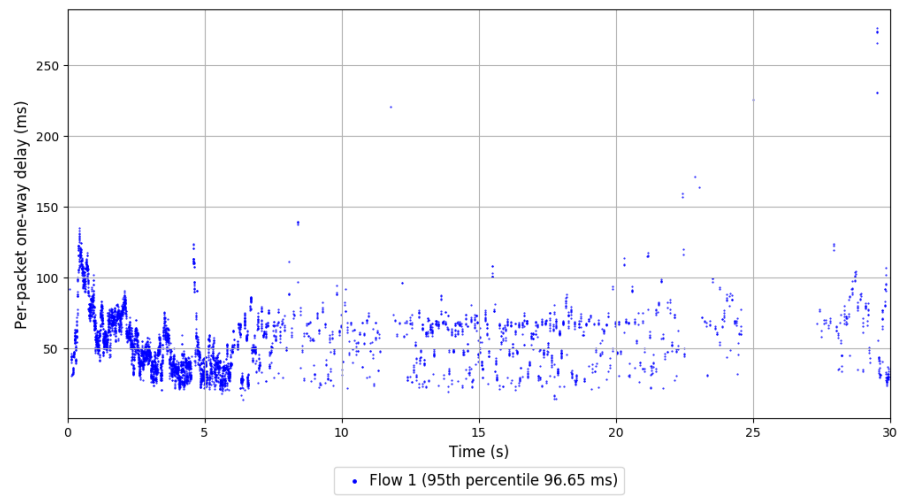
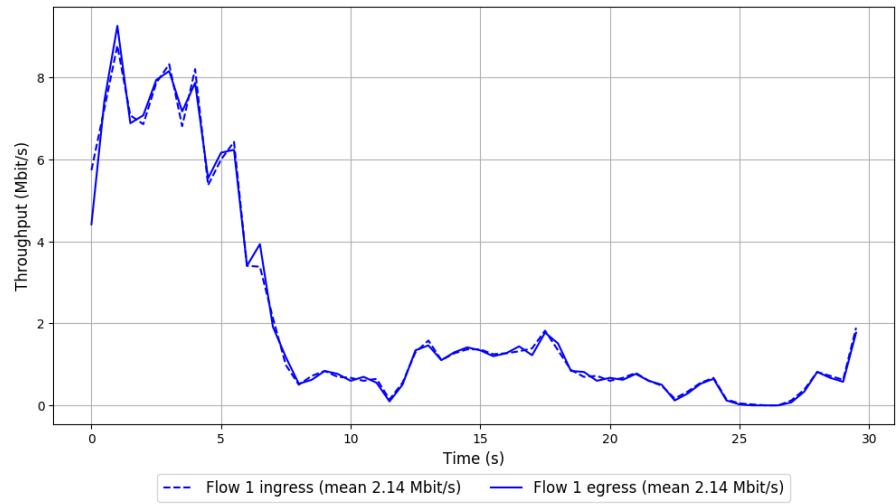


Run 1: Statistics of TCP Vegas

Start at: 2017-11-20 21:41:12
End at: 2017-11-20 21:41:42
Local clock offset: -4.893 ms
Remote clock offset: -3.307 ms

Below is generated by plot.py at 2017-11-20 23:20:29
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.14 Mbit/s
95th percentile per-packet one-way delay: 96.654 ms
Loss rate: 0.56%
-- Flow 1:
Average throughput: 2.14 Mbit/s
95th percentile per-packet one-way delay: 96.654 ms
Loss rate: 0.56%

Run 1: Report of TCP Vegas — Data Link

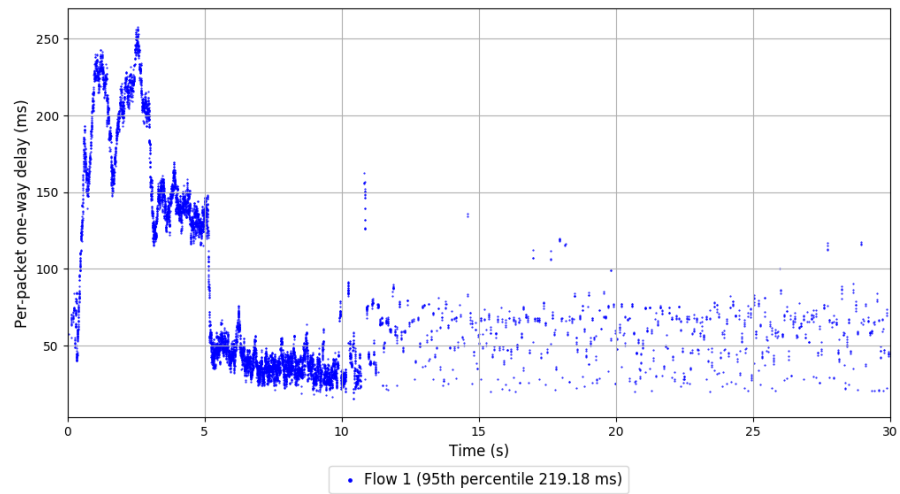
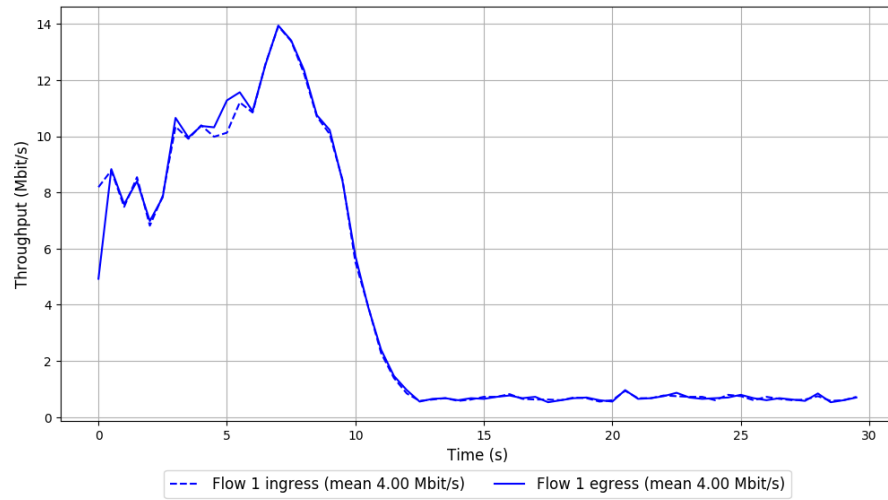


Run 2: Statistics of TCP Vegas

Start at: 2017-11-20 21:57:39
End at: 2017-11-20 21:58:09
Local clock offset: -2.836 ms
Remote clock offset: -2.934 ms

Below is generated by plot.py at 2017-11-20 23:20:29
Datalink statistics
-- Total of 1 flow:
Average throughput: 4.00 Mbit/s
95th percentile per-packet one-way delay: 219.184 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 4.00 Mbit/s
95th percentile per-packet one-way delay: 219.184 ms
Loss rate: 0.06%

Run 2: Report of TCP Vegas — Data Link

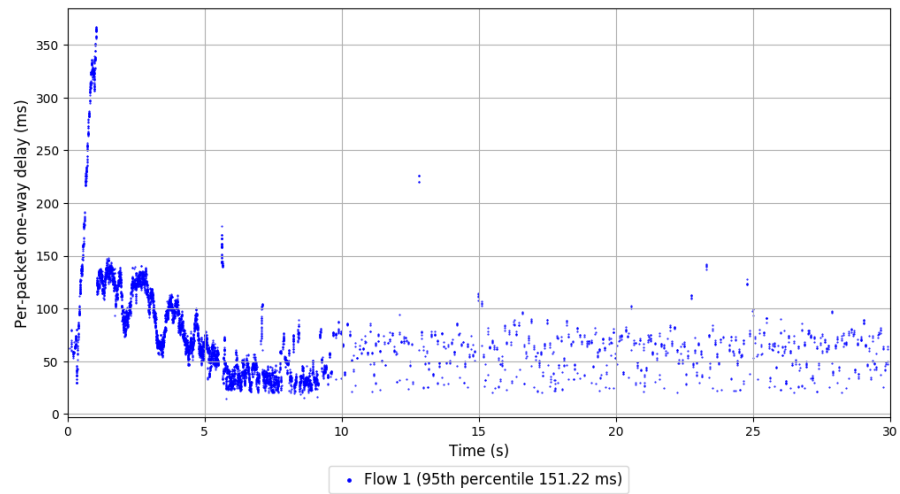
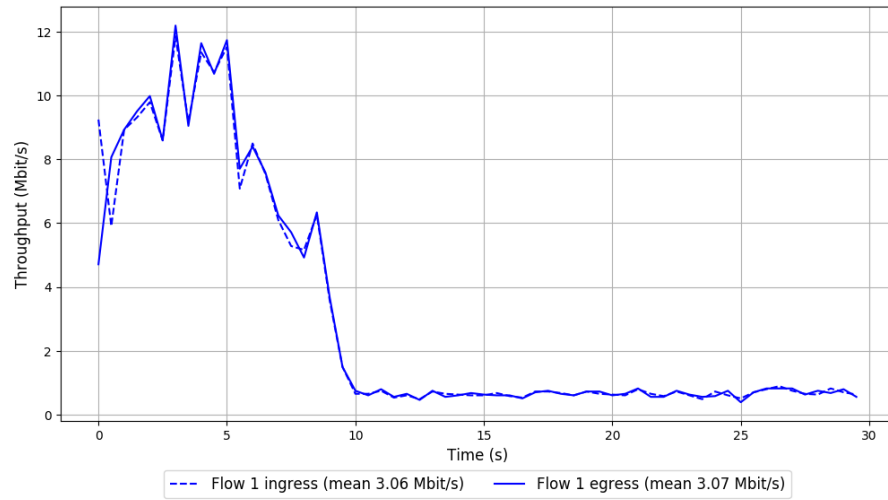


Run 3: Statistics of TCP Vegas

Start at: 2017-11-20 22:14:08
End at: 2017-11-20 22:14:38
Local clock offset: -4.553 ms
Remote clock offset: -2.984 ms

Below is generated by plot.py at 2017-11-20 23:20:29
Datalink statistics
-- Total of 1 flow:
Average throughput: 3.07 Mbit/s
95th percentile per-packet one-way delay: 151.222 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 3.07 Mbit/s
95th percentile per-packet one-way delay: 151.222 ms
Loss rate: 0.10%

Run 3: Report of TCP Vegas — Data Link

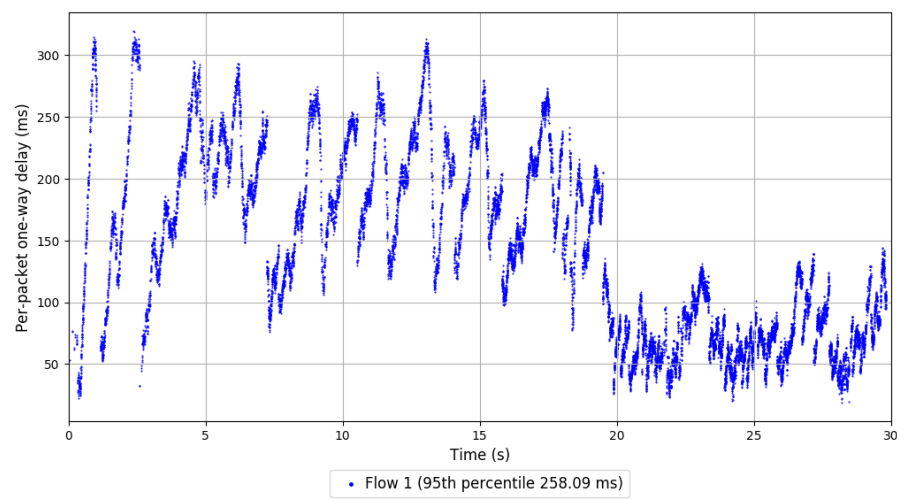
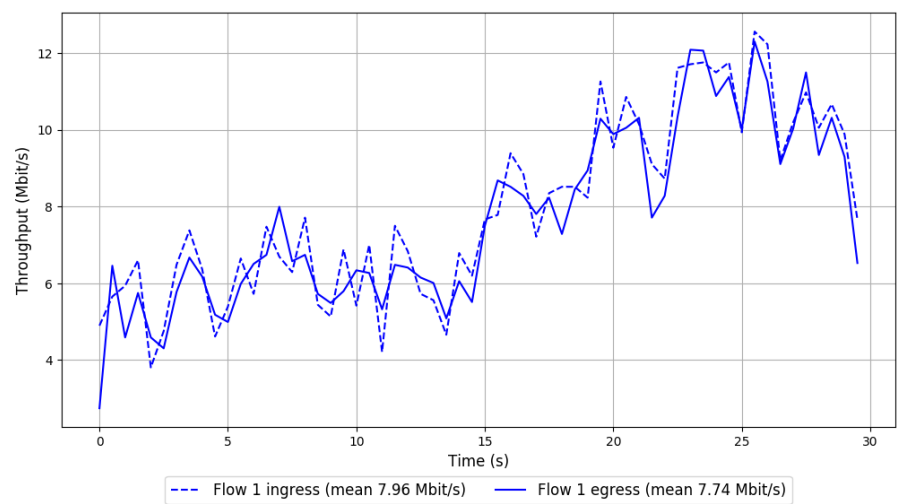


Run 1: Statistics of Verus

Start at: 2017-11-20 21:52:56
End at: 2017-11-20 21:53:26
Local clock offset: -3.742 ms
Remote clock offset: -3.124 ms

Below is generated by plot.py at 2017-11-20 23:20:32
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.74 Mbit/s
95th percentile per-packet one-way delay: 258.088 ms
Loss rate: 3.06%
-- Flow 1:
Average throughput: 7.74 Mbit/s
95th percentile per-packet one-way delay: 258.088 ms
Loss rate: 3.06%

Run 1: Report of Verus — Data Link

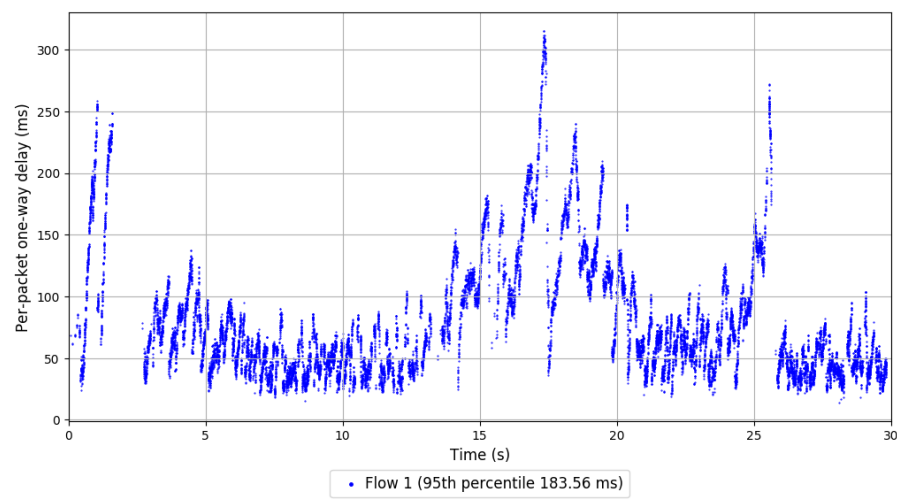
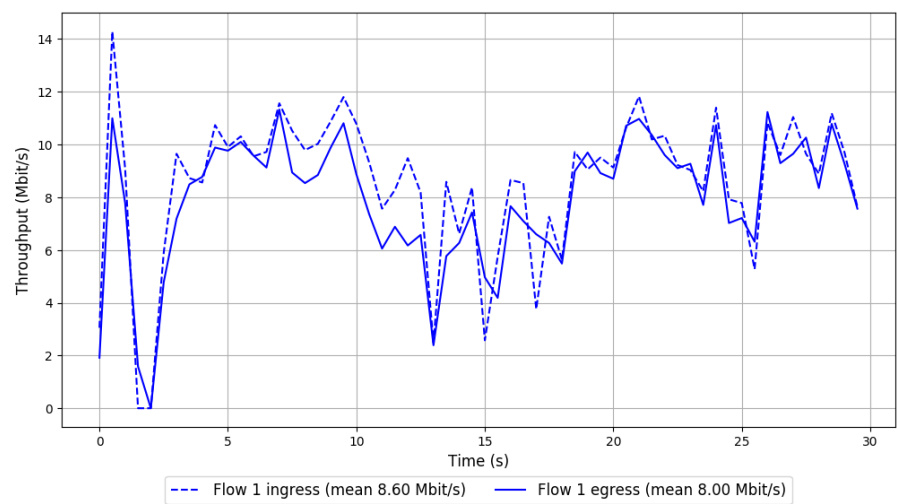


Run 2: Statistics of Verus

Start at: 2017-11-20 22:09:25
End at: 2017-11-20 22:09:55
Local clock offset: -3.743 ms
Remote clock offset: -3.089 ms

Below is generated by plot.py at 2017-11-20 23:20:34
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.00 Mbit/s
95th percentile per-packet one-way delay: 183.565 ms
Loss rate: 7.33%
-- Flow 1:
Average throughput: 8.00 Mbit/s
95th percentile per-packet one-way delay: 183.565 ms
Loss rate: 7.33%

Run 2: Report of Verus — Data Link

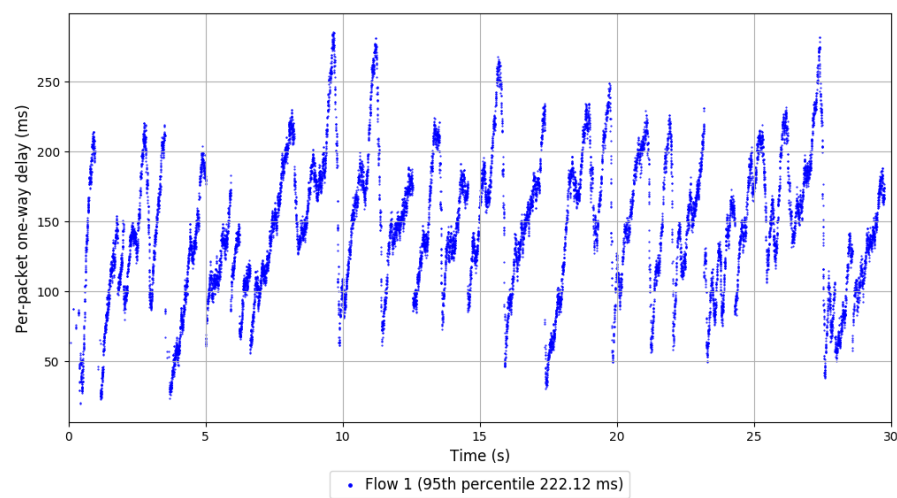
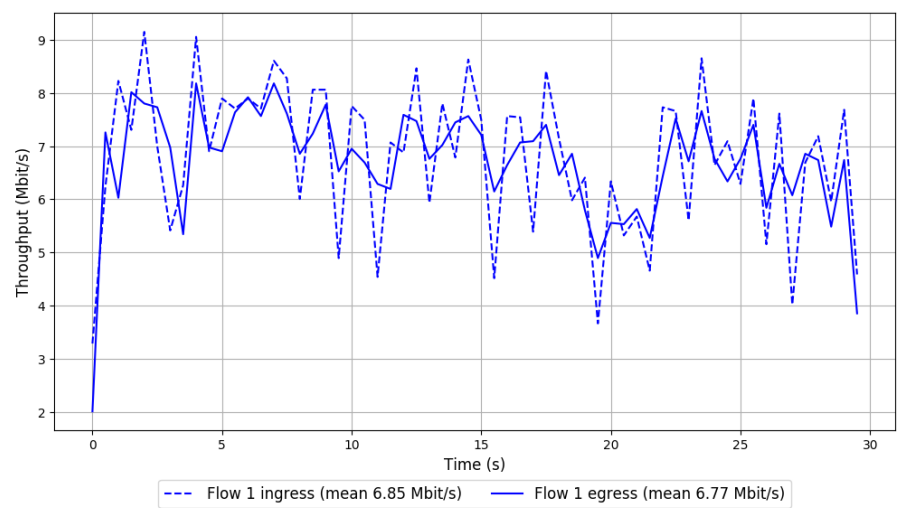


Run 3: Statistics of Verus

Start at: 2017-11-20 22:25:53
End at: 2017-11-20 22:26:23
Local clock offset: -4.5 ms
Remote clock offset: -2.695 ms

Below is generated by plot.py at 2017-11-20 23:20:34
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.77 Mbit/s
95th percentile per-packet one-way delay: 222.118 ms
Loss rate: 1.42%
-- Flow 1:
Average throughput: 6.77 Mbit/s
95th percentile per-packet one-way delay: 222.118 ms
Loss rate: 1.42%

Run 3: Report of Verus — Data Link

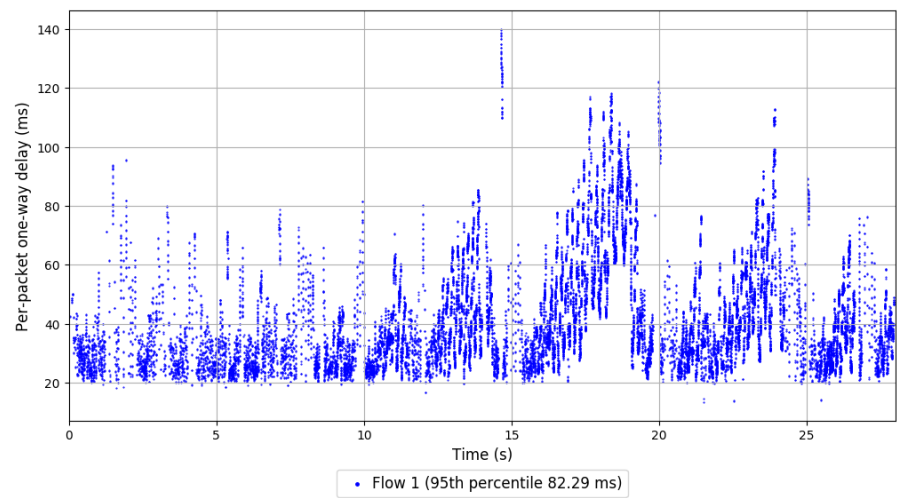
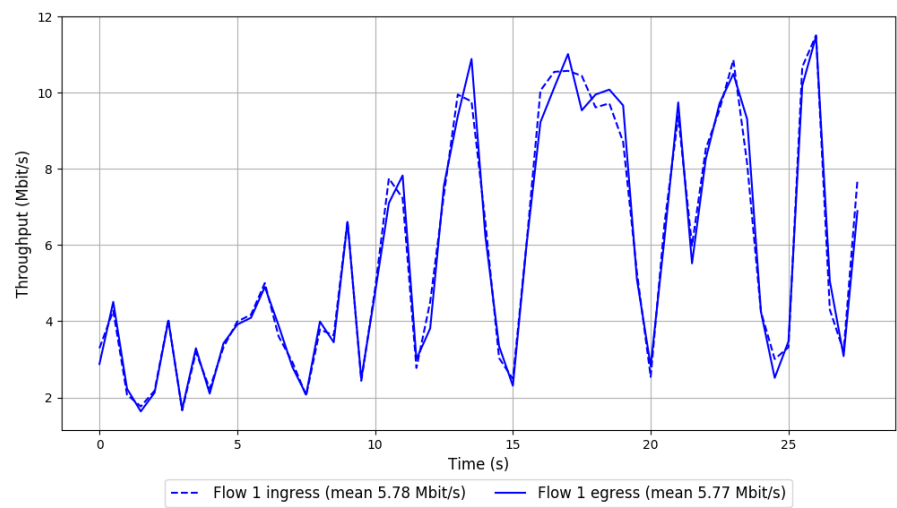


Run 1: Statistics of Copa

Start at: 2017-11-20 21:54:07
End at: 2017-11-20 21:54:37
Local clock offset: -3.227 ms
Remote clock offset: -3.061 ms

Below is generated by plot.py at 2017-11-20 23:20:40
Datalink statistics
-- Total of 1 flow:
Average throughput: 5.77 Mbit/s
95th percentile per-packet one-way delay: 82.289 ms
Loss rate: 0.32%
-- Flow 1:
Average throughput: 5.77 Mbit/s
95th percentile per-packet one-way delay: 82.289 ms
Loss rate: 0.32%

Run 1: Report of Copa — Data Link

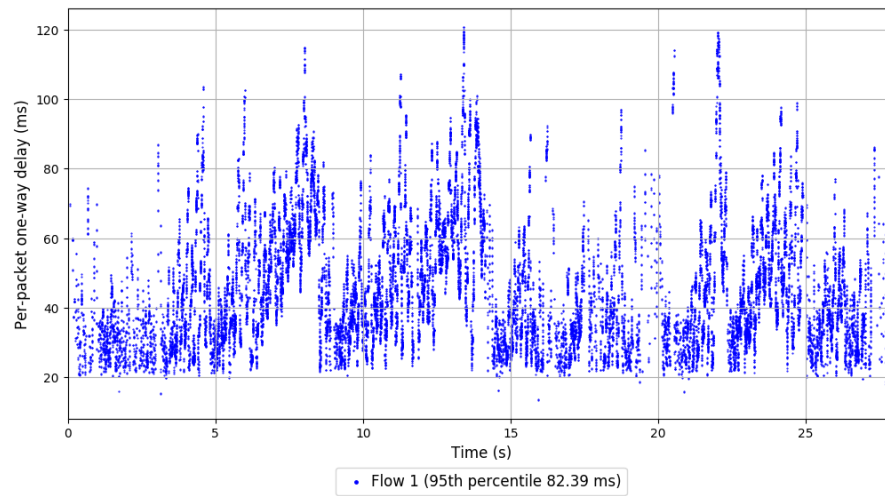
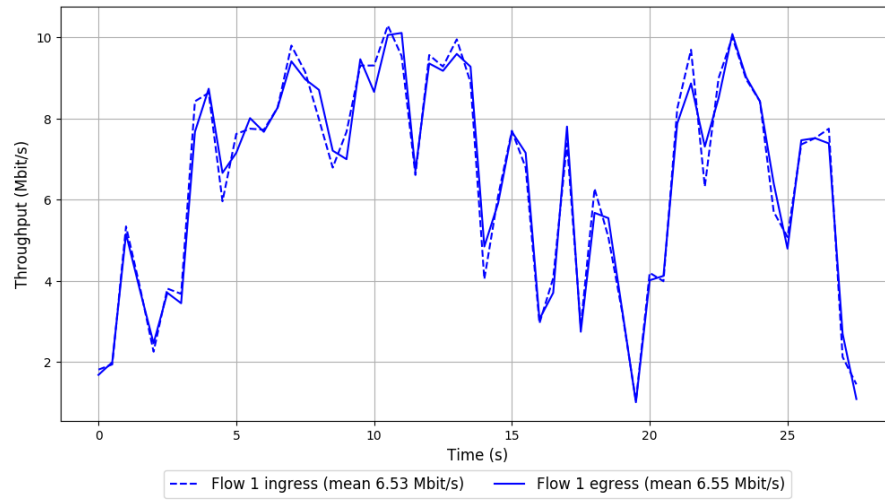


Run 2: Statistics of Copa

Start at: 2017-11-20 22:10:36
End at: 2017-11-20 22:11:06
Local clock offset: -4.044 ms
Remote clock offset: -3.077 ms

Below is generated by plot.py at 2017-11-20 23:20:40
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.55 Mbit/s
95th percentile per-packet one-way delay: 82.391 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 6.55 Mbit/s
95th percentile per-packet one-way delay: 82.391 ms
Loss rate: 0.14%

Run 2: Report of Copa — Data Link

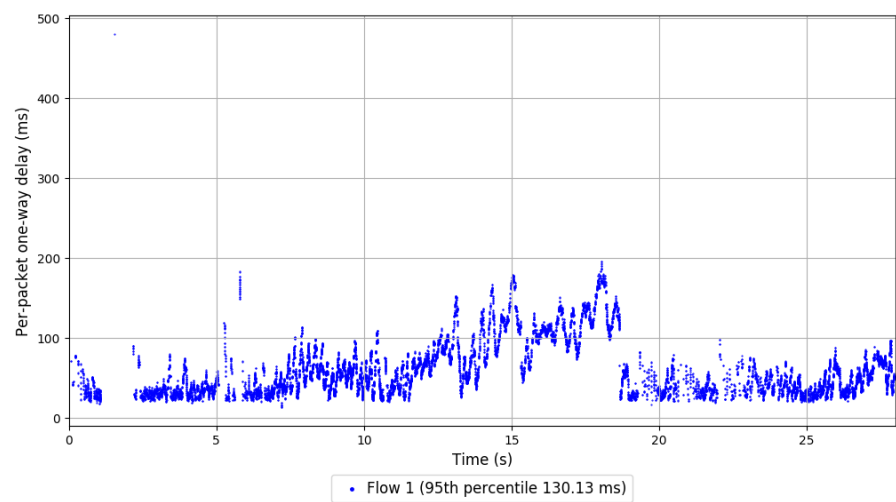
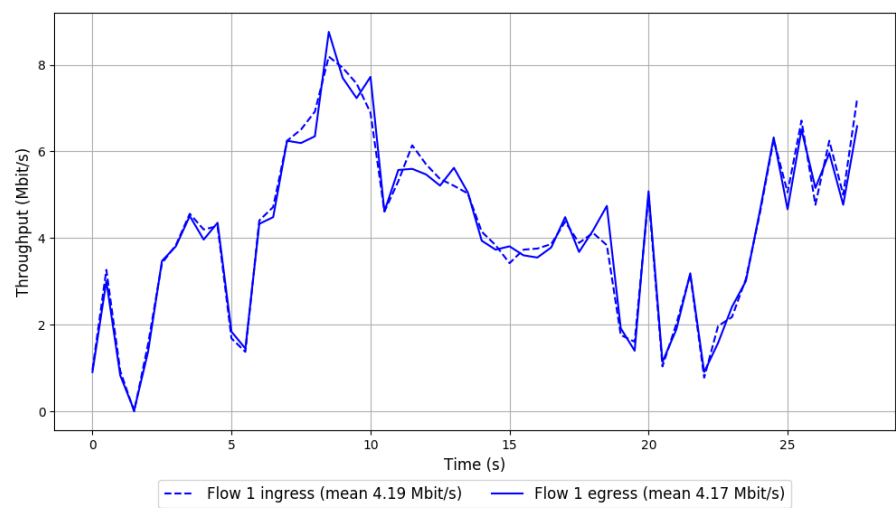


Run 3: Statistics of Copa

Start at: 2017-11-20 22:27:03
End at: 2017-11-20 22:27:33
Local clock offset: -4.655 ms
Remote clock offset: -2.752 ms

Below is generated by plot.py at 2017-11-20 23:20:40
Datalink statistics
-- Total of 1 flow:
Average throughput: 4.17 Mbit/s
95th percentile per-packet one-way delay: 130.131 ms
Loss rate: 0.80%
-- Flow 1:
Average throughput: 4.17 Mbit/s
95th percentile per-packet one-way delay: 130.131 ms
Loss rate: 0.80%

Run 3: Report of Copa — Data Link

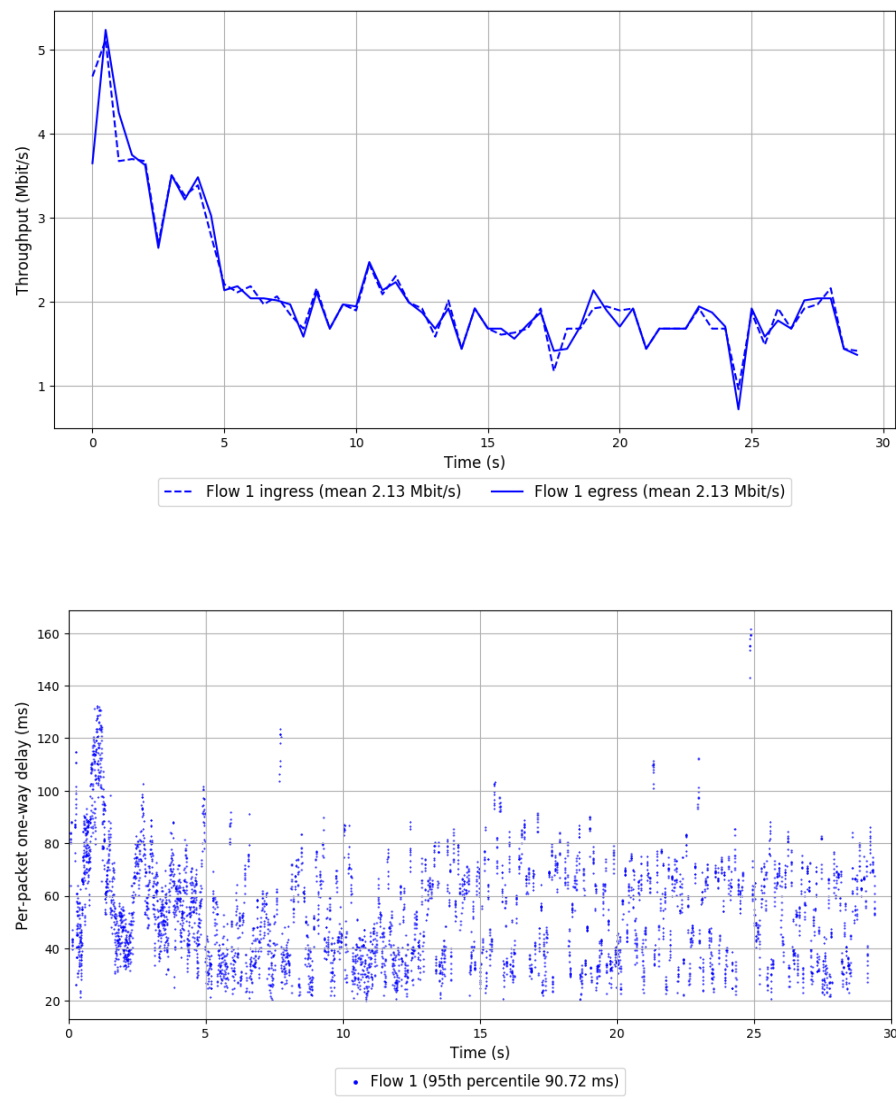


```
Run 1: Statistics of Indigo

Start at: 2017-11-20 21:48:15
End at: 2017-11-20 21:48:45
Local clock offset: -4.782 ms
Remote clock offset: -3.179 ms

# Below is generated by plot.py at 2017-11-20 23:20:40
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 90.719 ms
Loss rate: 0.19%
-- Flow 1:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 90.719 ms
Loss rate: 0.19%
```

Run 1: Report of Indigo — Data Link

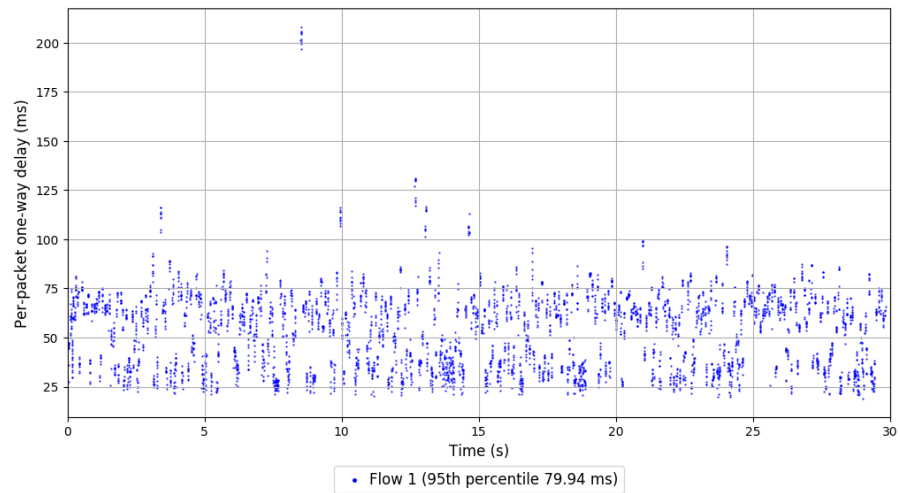
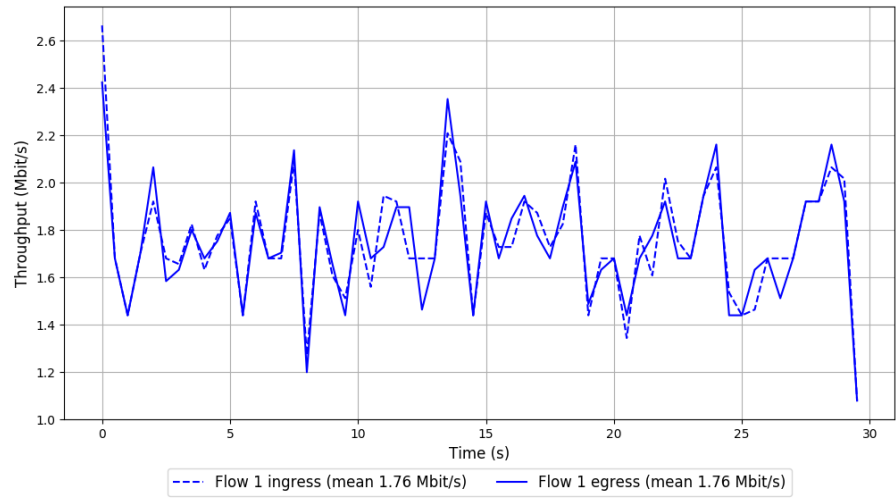


Run 2: Statistics of Indigo

Start at: 2017-11-20 22:04:43
End at: 2017-11-20 22:05:13
Local clock offset: -3.289 ms
Remote clock offset: -3.064 ms

Below is generated by plot.py at 2017-11-20 23:20:40
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.76 Mbit/s
95th percentile per-packet one-way delay: 79.936 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 1.76 Mbit/s
95th percentile per-packet one-way delay: 79.936 ms
Loss rate: 0.23%

Run 2: Report of Indigo — Data Link

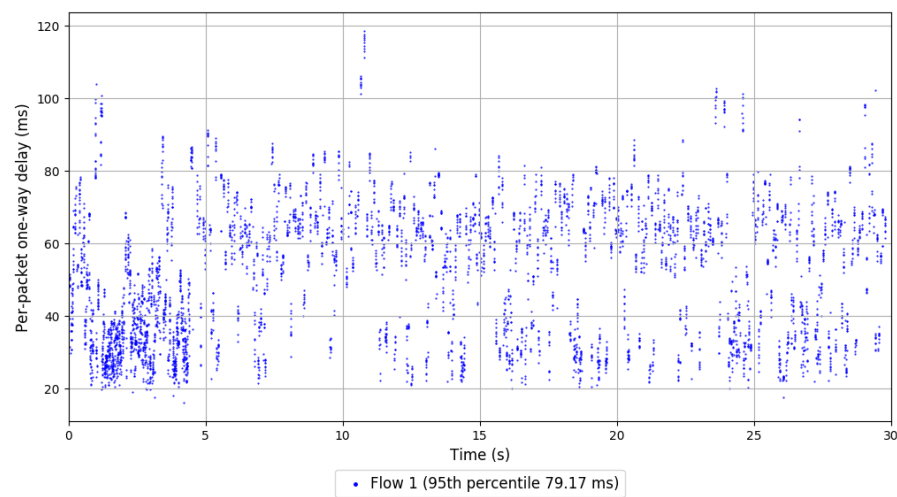
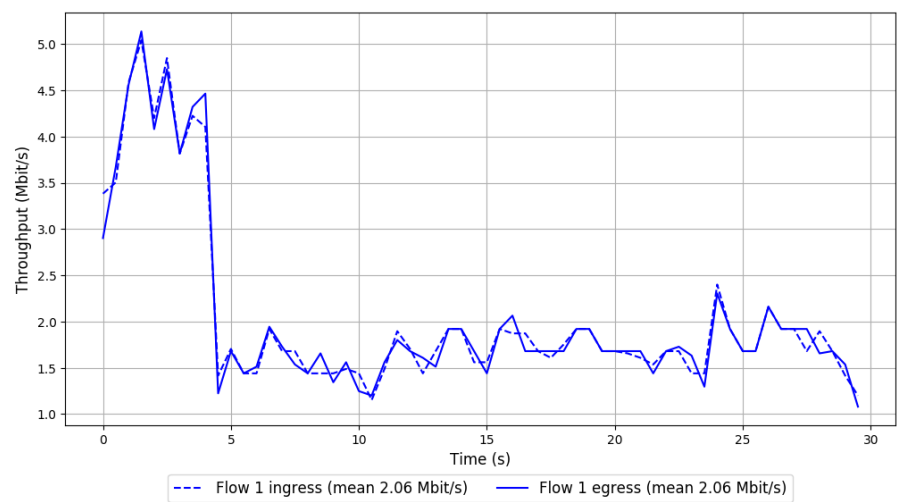


Run 3: Statistics of Indigo

Start at: 2017-11-20 22:21:11
End at: 2017-11-20 22:21:41
Local clock offset: -4.168 ms
Remote clock offset: -2.894 ms

Below is generated by plot.py at 2017-11-20 23:20:40
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.06 Mbit/s
95th percentile per-packet one-way delay: 79.167 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 2.06 Mbit/s
95th percentile per-packet one-way delay: 79.167 ms
Loss rate: 0.20%

Run 3: Report of Indigo — Data Link

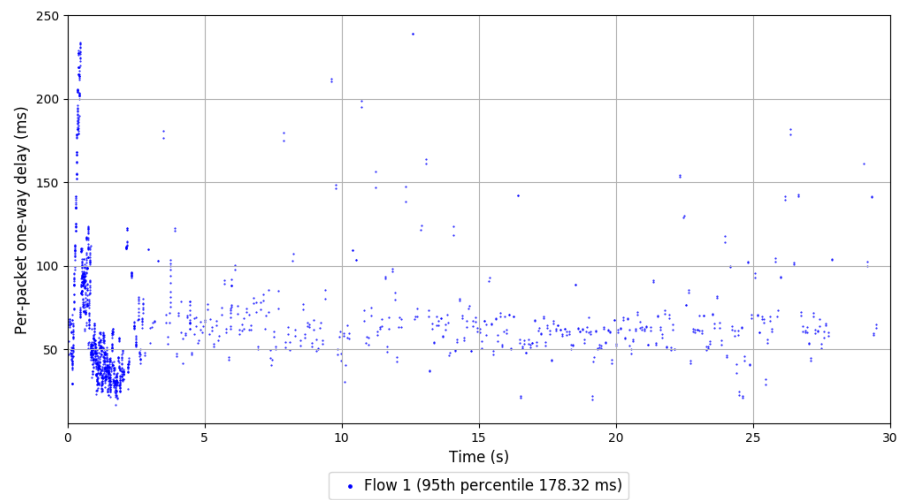
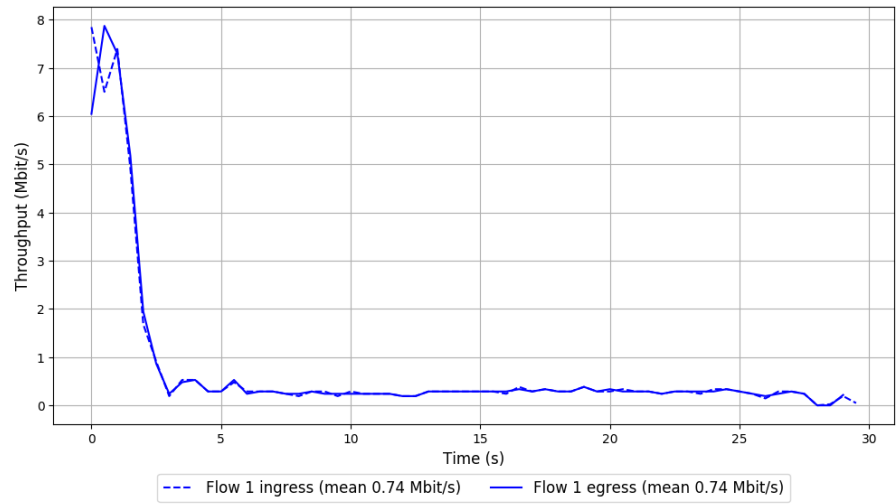


```
Run 1: Statistics of Indigo-calib

Start at: 2017-11-20 21:50:36
End at: 2017-11-20 21:51:06
Local clock offset: -5.191 ms
Remote clock offset: -3.159 ms

# Below is generated by plot.py at 2017-11-20 23:20:40
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.74 Mbit/s
95th percentile per-packet one-way delay: 178.324 ms
Loss rate: 0.22%
-- Flow 1:
Average throughput: 0.74 Mbit/s
95th percentile per-packet one-way delay: 178.324 ms
Loss rate: 0.22%
```

Run 1: Report of Indigo-calib — Data Link



Run 2: Statistics of Indigo-calib

Start at: 2017-11-20 22:07:04

End at: 2017-11-20 22:07:34

Local clock offset: -3.492 ms

Remote clock offset: -2.998 ms

Below is generated by plot.py at 2017-11-20 23:20:40

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.52 Mbit/s

95th percentile per-packet one-way delay: 102.236 ms

Loss rate: 0.16%

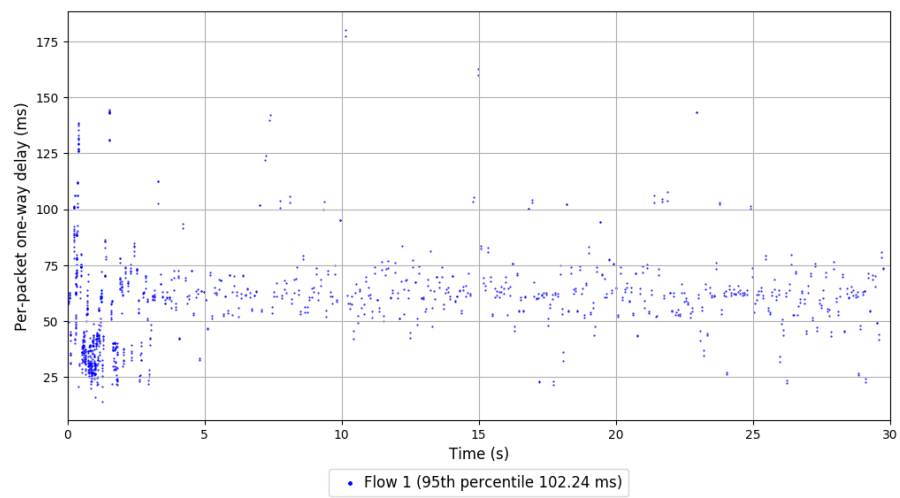
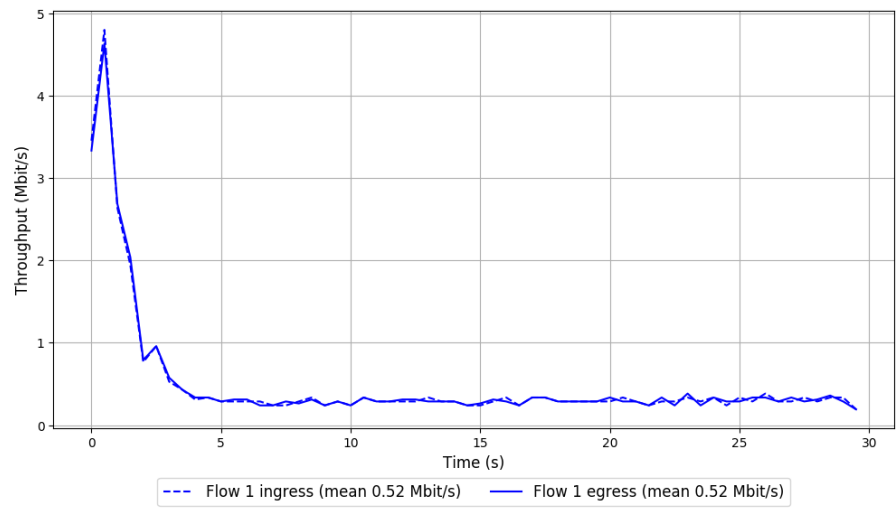
-- Flow 1:

Average throughput: 0.52 Mbit/s

95th percentile per-packet one-way delay: 102.236 ms

Loss rate: 0.16%

Run 2: Report of Indigo-calib — Data Link



Run 3: Statistics of Indigo-calib

Start at: 2017-11-20 22:23:32

End at: 2017-11-20 22:24:02

Local clock offset: -4.342 ms

Remote clock offset: -2.797 ms

Below is generated by plot.py at 2017-11-20 23:20:40

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.65 Mbit/s

95th percentile per-packet one-way delay: 84.649 ms

Loss rate: 0.49%

-- Flow 1:

Average throughput: 0.65 Mbit/s

95th percentile per-packet one-way delay: 84.649 ms

Loss rate: 0.49%

Run 3: Report of Indigo-calib — Data Link

