

Pantheon Report

Generated at 2018-02-12 21:19:04 (UTC).

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

Repeated the test of 17 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

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

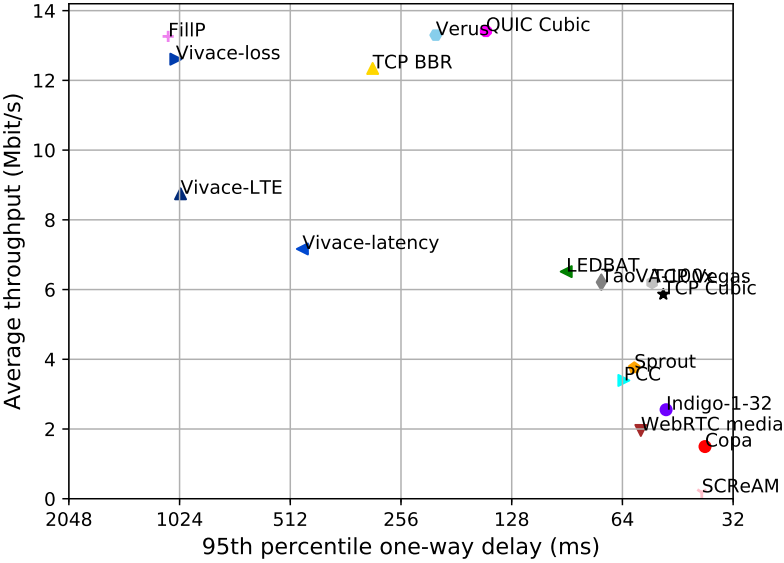
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

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

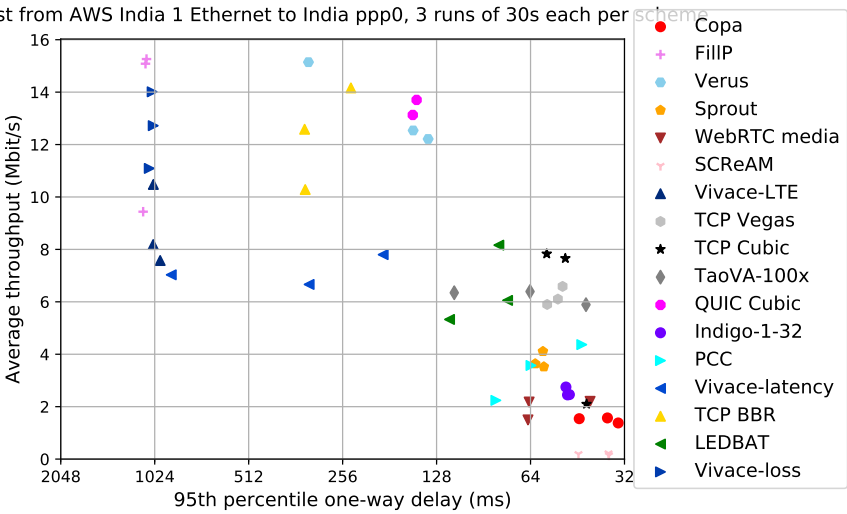
Git summary:

```
branch: master @ 2efdad57c2c56a9458b0d01ff33345e11732665
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/fillp @ 828bbf95fd4941149b5cec90f281d1c69ae1a5c6
third_party/genericCC @ 80b516c448f795fd6e9675f7177b69c622f07da8
third_party/indigo @ a9b2060d39e4da2e8987e893e3eca2a6c7cd0ab9
third_party/indigo-1-layer-128-unit @ 3ae9e4ef4230db7484501f82ce8b377695f2f66d
third_party/indigo-1-layer-32-unit @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/indigo-1-layer-32-unit-no-calib @ 1f3a7f75b41135ed5b540c0fd3505939528e2a5f
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
  M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ fb1053193c2861da659ba9013db26744ccfcf993
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
  M receiver/src/buffer.h
  M receiver/src/core.cpp
  M sender/src/buffer.h
  M sender/src/core.cpp
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ 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/vivace @ 7a4ba531e75b4a6f66f5c4580192120401784ce3
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

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



test from AWS India 1 Ethernet to India ppp0, 3 runs of 30s each per



scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	12.34	305.69	3.17
TCP Cubic	3	5.86	49.54	0.95
LEDBAT	3	6.51	91.01	0.80
PCC	3	3.39	63.42	0.29
QUIC Cubic	2	13.41	150.43	3.73
SCReAM	3	0.18	38.94	0.27
WebRTC media	3	1.96	57.04	0.23
Sprout	3	3.76	59.41	0.25
TaoVA-100x	3	6.21	73.03	0.61
TCP Vegas	3	6.20	53.15	0.18
Verus	3	13.30	205.91	3.99
Copa	3	1.50	38.16	0.16
FillP	3	13.26	1099.74	75.45
Indigo-1-32	3	2.55	48.69	0.19
Vivace-latency	3	7.16	474.74	1.53
Vivace-loss	3	12.61	1048.20	17.86
Vivace-LTE	3	8.75	1017.80	7.06

Run 1: Statistics of TCP BBR

Start at: 2018-02-12 20:36:50

End at: 2018-02-12 20:37:20

Local clock offset: 0.752 ms

Remote clock offset: -15.59 ms

Below is generated by plot.py at 2018-02-12 21:18:01

Datalink statistics

-- Total of 1 flow:

Average throughput: 10.28 Mbit/s

95th percentile per-packet one-way delay: 337.357 ms

Loss rate: 0.96%

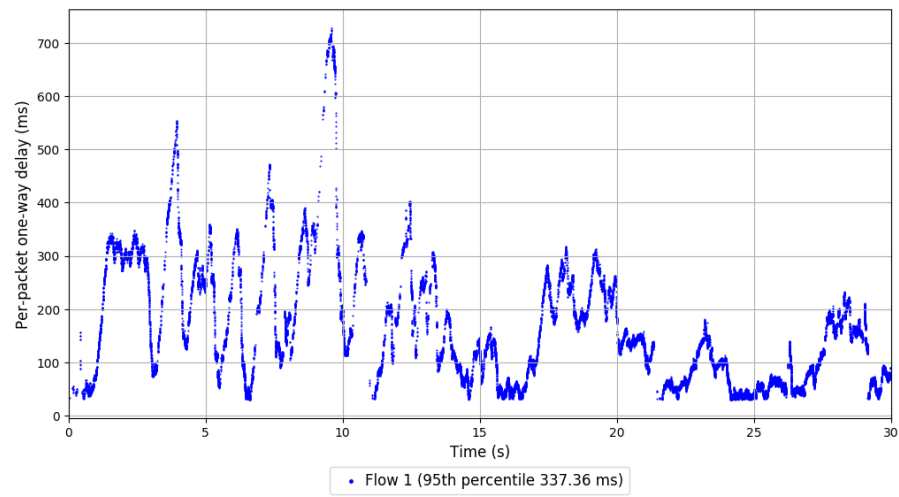
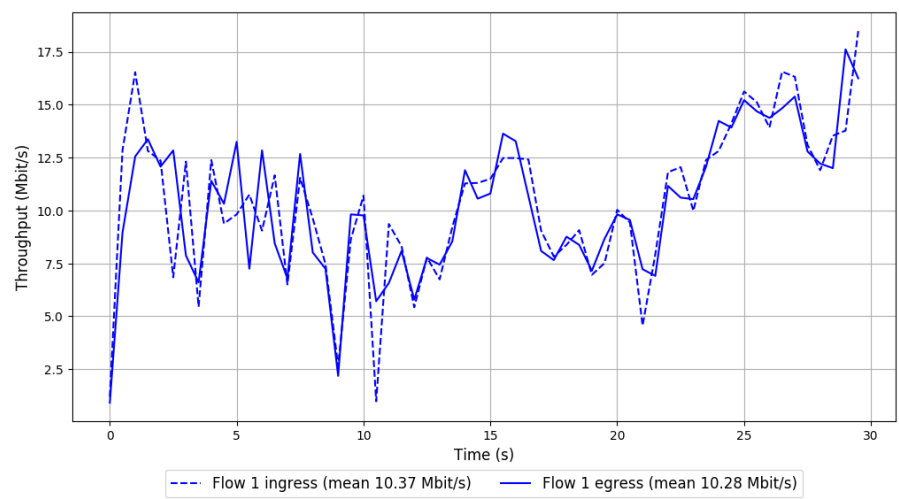
-- Flow 1:

Average throughput: 10.28 Mbit/s

95th percentile per-packet one-way delay: 337.357 ms

Loss rate: 0.96%

Run 1: Report of TCP BBR — Data Link

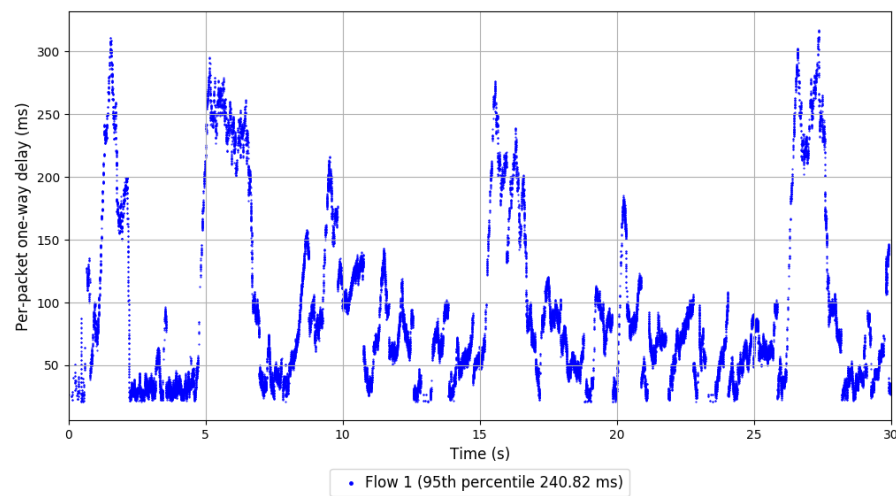
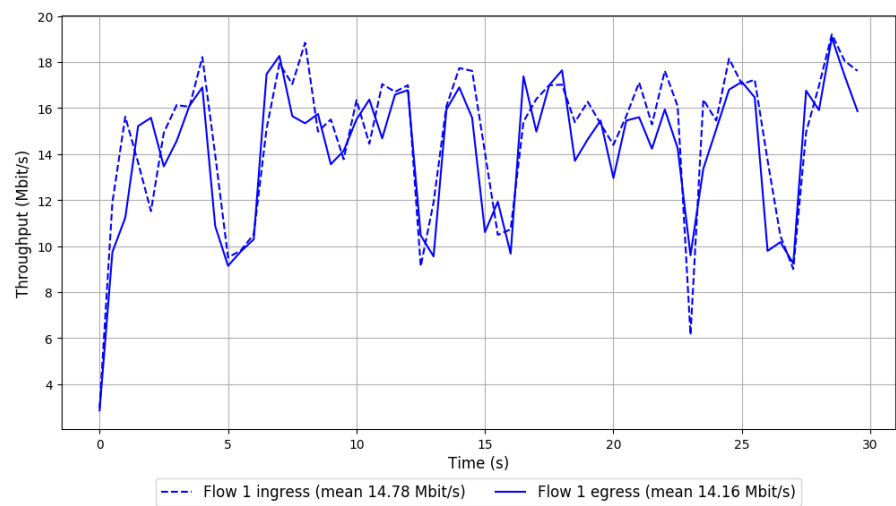


Run 2: Statistics of TCP BBR

Start at: 2018-02-12 20:56:31
End at: 2018-02-12 20:57:01
Local clock offset: -1.246 ms
Remote clock offset: -20.549 ms

Below is generated by plot.py at 2018-02-12 21:18:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 14.16 Mbit/s
95th percentile per-packet one-way delay: 240.819 ms
Loss rate: 4.30%
-- Flow 1:
Average throughput: 14.16 Mbit/s
95th percentile per-packet one-way delay: 240.819 ms
Loss rate: 4.30%

Run 2: Report of TCP BBR — Data Link

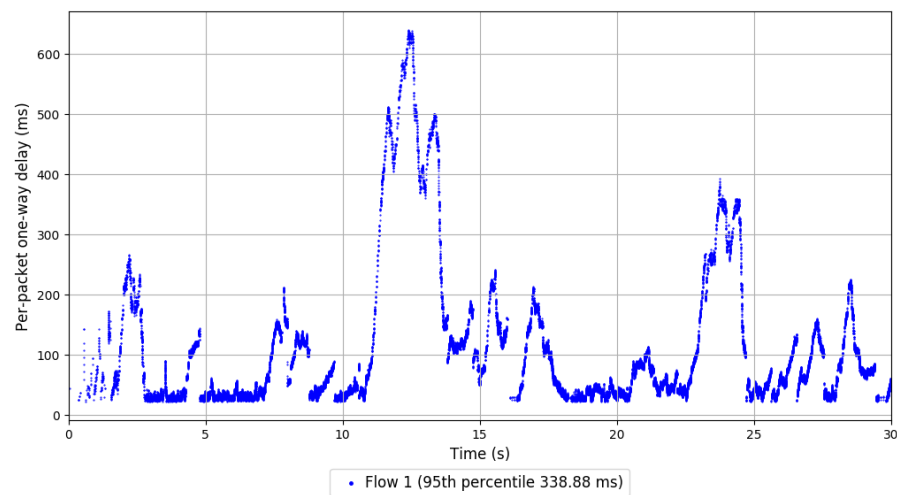
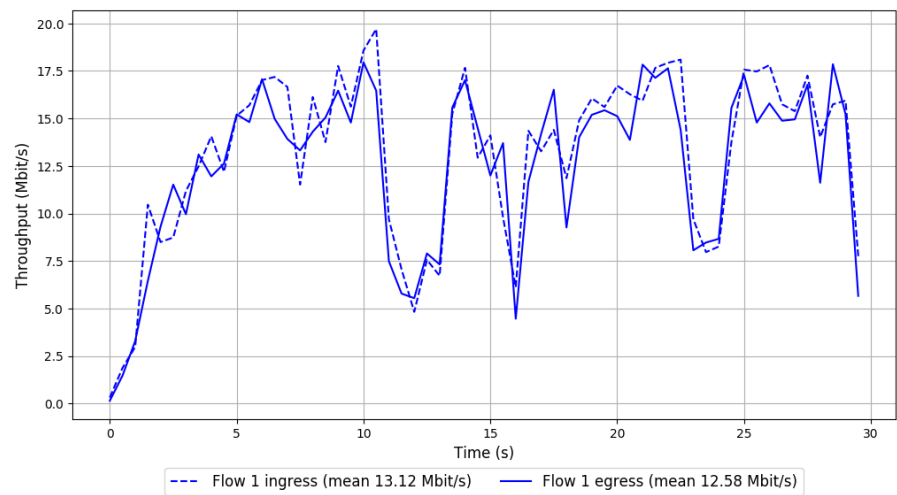


Run 3: Statistics of TCP BBR

Start at: 2018-02-12 21:16:11
End at: 2018-02-12 21:16:41
Local clock offset: 0.963 ms
Remote clock offset: -20.932 ms

Below is generated by plot.py at 2018-02-12 21:18:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 12.58 Mbit/s
95th percentile per-packet one-way delay: 338.882 ms
Loss rate: 4.25%
-- Flow 1:
Average throughput: 12.58 Mbit/s
95th percentile per-packet one-way delay: 338.882 ms
Loss rate: 4.25%

Run 3: Report of TCP BBR — Data Link

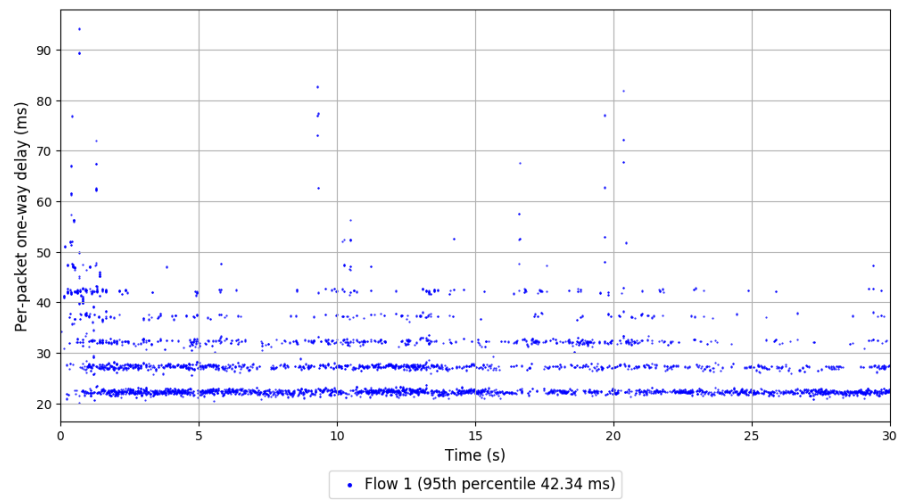
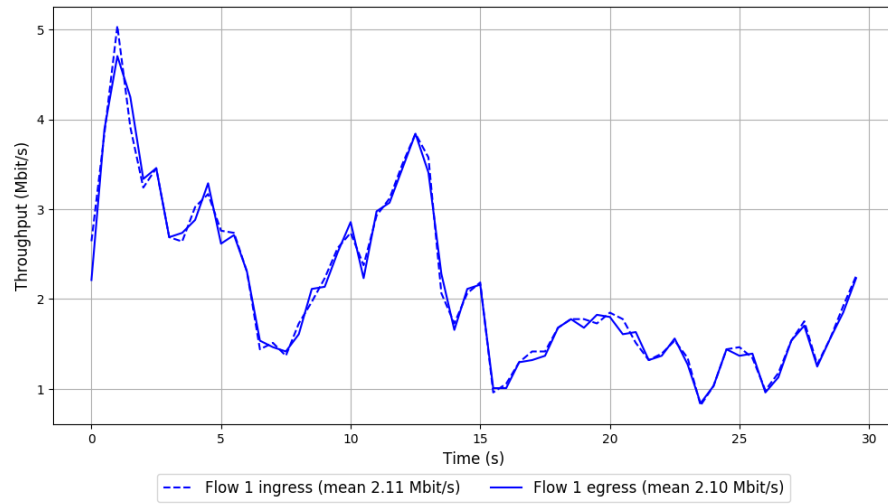


Run 1: Statistics of TCP Cubic

Start at: 2018-02-12 20:31:20
End at: 2018-02-12 20:31:50
Local clock offset: -0.725 ms
Remote clock offset: -15.955 ms

Below is generated by plot.py at 2018-02-12 21:18:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 42.336 ms
Loss rate: 0.83%
-- Flow 1:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 42.336 ms
Loss rate: 0.83%

Run 1: Report of TCP Cubic — Data Link

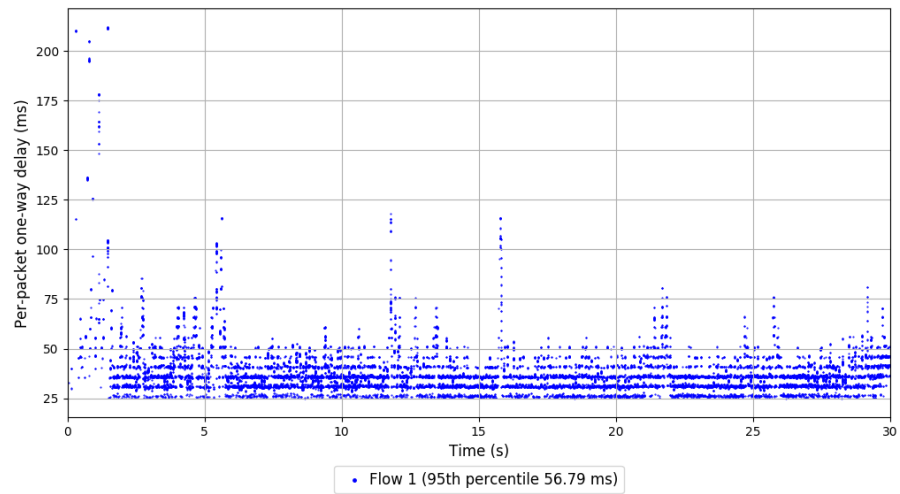
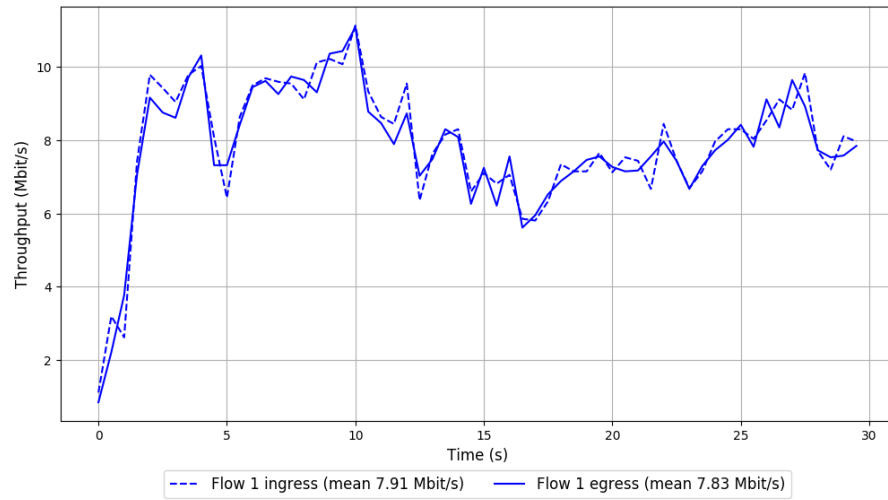


Run 2: Statistics of TCP Cubic

Start at: 2018-02-12 20:51:02
End at: 2018-02-12 20:51:33
Local clock offset: 0.287 ms
Remote clock offset: -20.853 ms

Below is generated by plot.py at 2018-02-12 21:18:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.83 Mbit/s
95th percentile per-packet one-way delay: 56.788 ms
Loss rate: 1.14%
-- Flow 1:
Average throughput: 7.83 Mbit/s
95th percentile per-packet one-way delay: 56.788 ms
Loss rate: 1.14%

Run 2: Report of TCP Cubic — Data Link

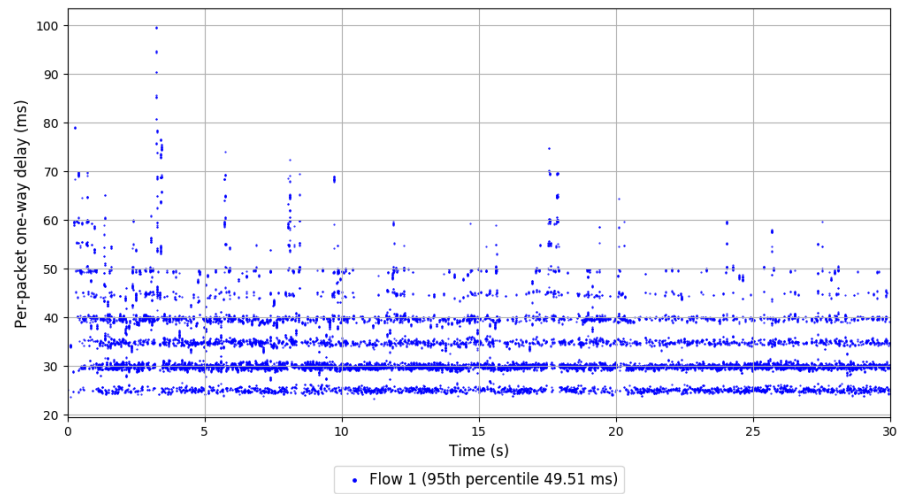
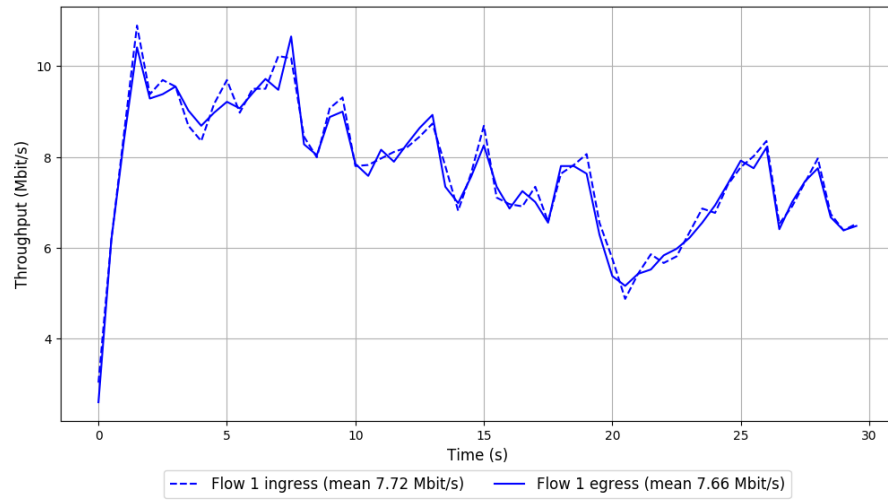


Run 3: Statistics of TCP Cubic

Start at: 2018-02-12 21:10:42
End at: 2018-02-12 21:11:12
Local clock offset: -1.581 ms
Remote clock offset: -22.846 ms

Below is generated by plot.py at 2018-02-12 21:18:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.66 Mbit/s
95th percentile per-packet one-way delay: 49.506 ms
Loss rate: 0.88%
-- Flow 1:
Average throughput: 7.66 Mbit/s
95th percentile per-packet one-way delay: 49.506 ms
Loss rate: 0.88%

Run 3: Report of TCP Cubic — Data Link

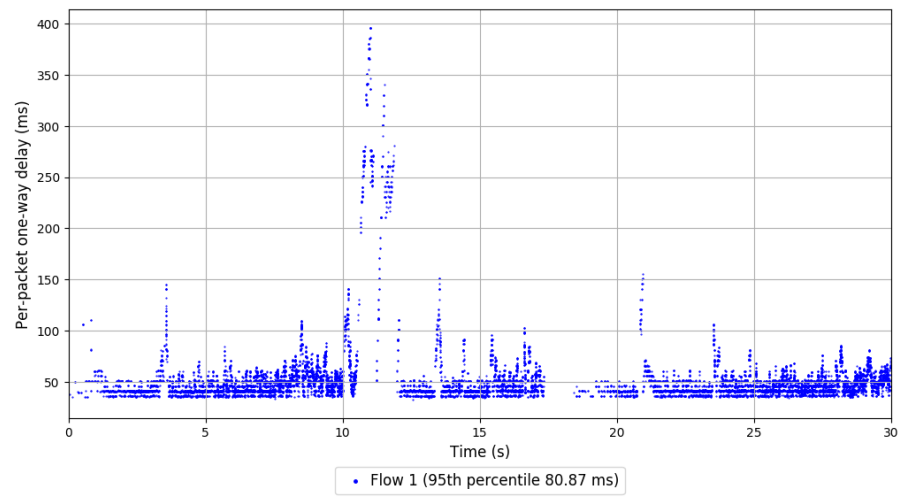
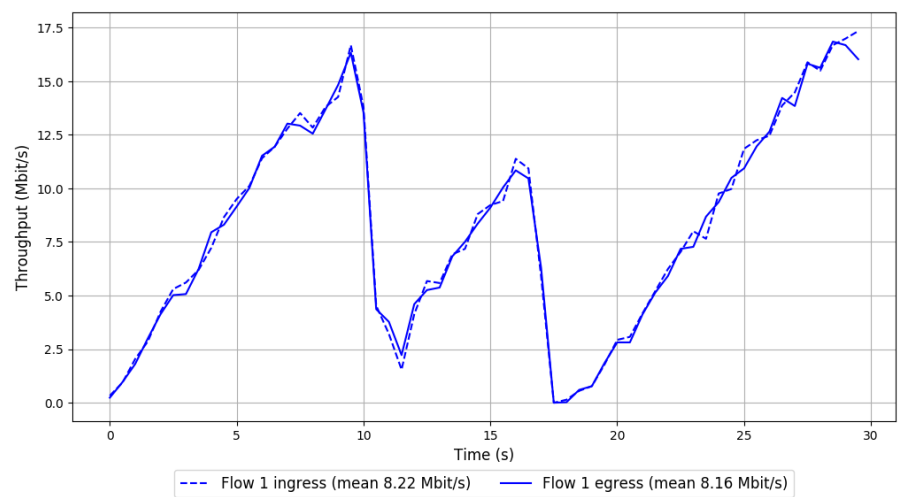


Run 1: Statistics of LEDBAT

Start at: 2018-02-12 20:23:39
End at: 2018-02-12 20:24:09
Local clock offset: -1.552 ms
Remote clock offset: -15.34 ms

Below is generated by plot.py at 2018-02-12 21:18:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.16 Mbit/s
95th percentile per-packet one-way delay: 80.868 ms
Loss rate: 0.84%
-- Flow 1:
Average throughput: 8.16 Mbit/s
95th percentile per-packet one-way delay: 80.868 ms
Loss rate: 0.84%

Run 1: Report of LEDBAT — Data Link

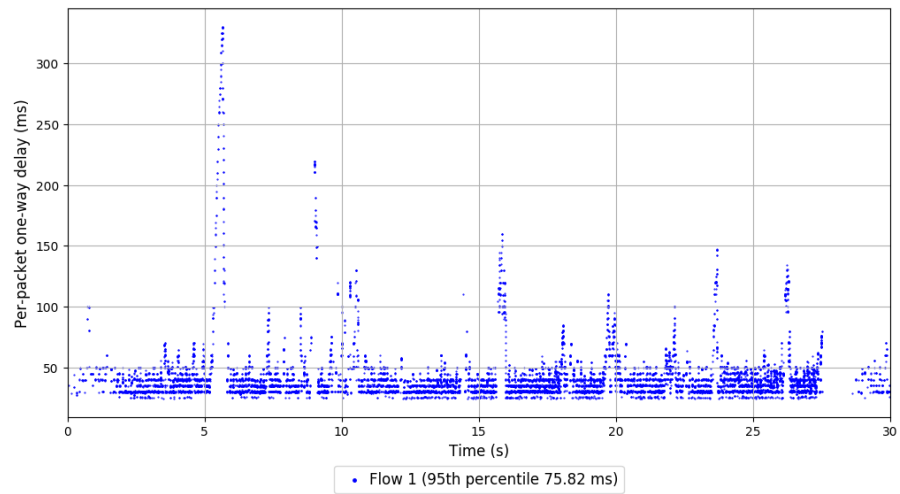
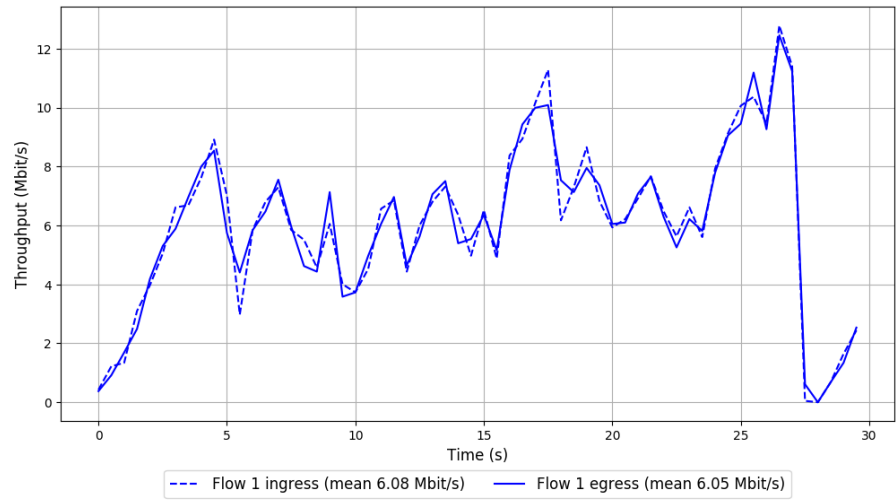


Run 2: Statistics of LEDBAT

Start at: 2018-02-12 20:43:25
End at: 2018-02-12 20:43:55
Local clock offset: -2.907 ms
Remote clock offset: -19.126 ms

Below is generated by plot.py at 2018-02-12 21:18:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.05 Mbit/s
95th percentile per-packet one-way delay: 75.824 ms
Loss rate: 0.54%
-- Flow 1:
Average throughput: 6.05 Mbit/s
95th percentile per-packet one-way delay: 75.824 ms
Loss rate: 0.54%

Run 2: Report of LEDBAT — Data Link

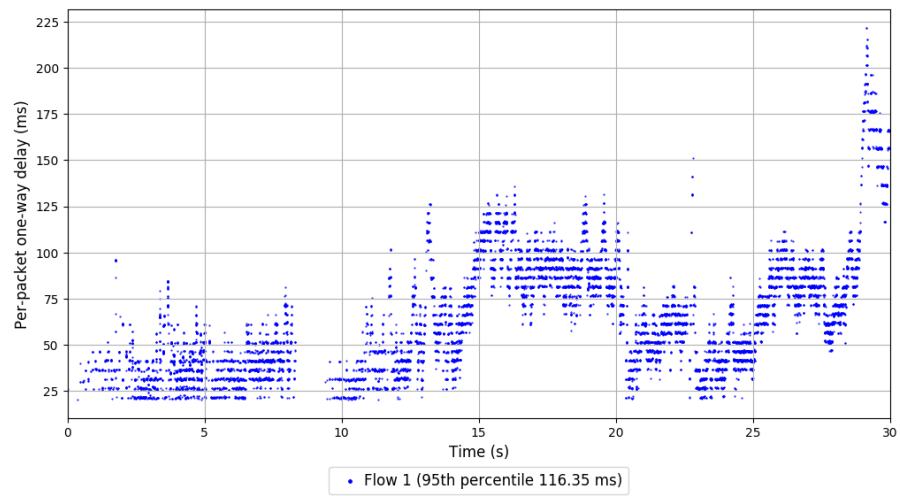
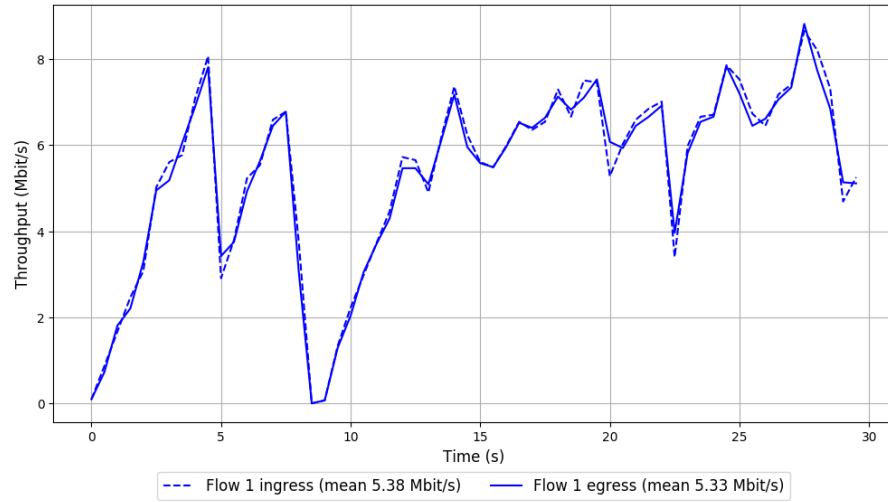


Run 3: Statistics of LEDBAT

Start at: 2018-02-12 21:03:05
End at: 2018-02-12 21:03:35
Local clock offset: 0.409 ms
Remote clock offset: -21.169 ms

Below is generated by plot.py at 2018-02-12 21:18:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 5.33 Mbit/s
95th percentile per-packet one-way delay: 116.351 ms
Loss rate: 1.03%
-- Flow 1:
Average throughput: 5.33 Mbit/s
95th percentile per-packet one-way delay: 116.351 ms
Loss rate: 1.03%

Run 3: Report of LEDBAT — Data Link

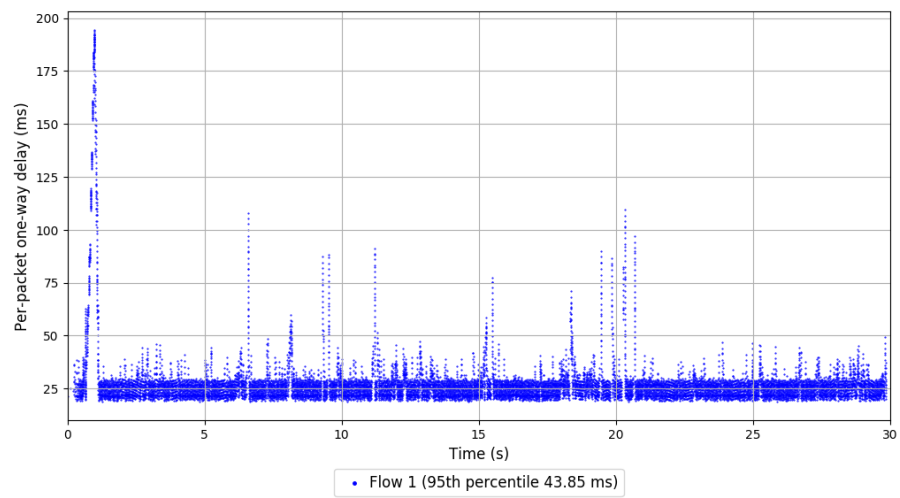
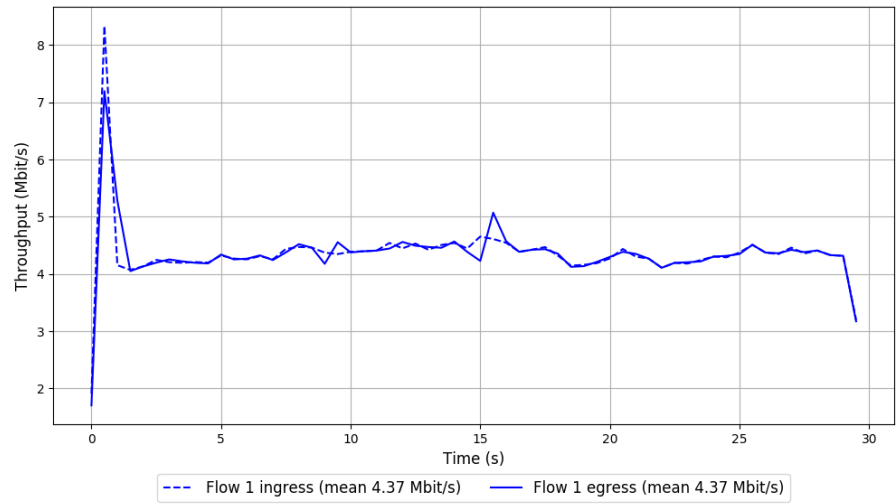


Run 1: Statistics of PCC

Start at: 2018-02-12 20:30:15
End at: 2018-02-12 20:30:45
Local clock offset: -0.933 ms
Remote clock offset: -16.264 ms

Below is generated by plot.py at 2018-02-12 21:18:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 4.37 Mbit/s
95th percentile per-packet one-way delay: 43.848 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 4.37 Mbit/s
95th percentile per-packet one-way delay: 43.848 ms
Loss rate: 0.10%

Run 1: Report of PCC — Data Link

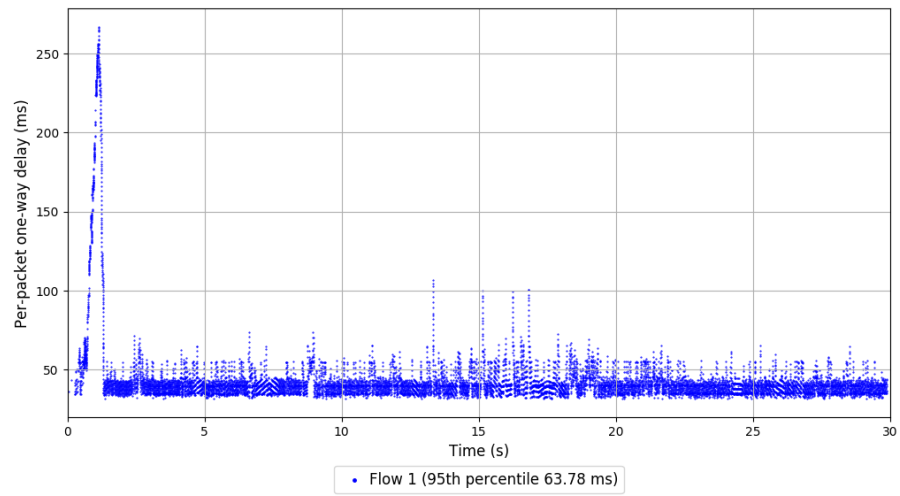
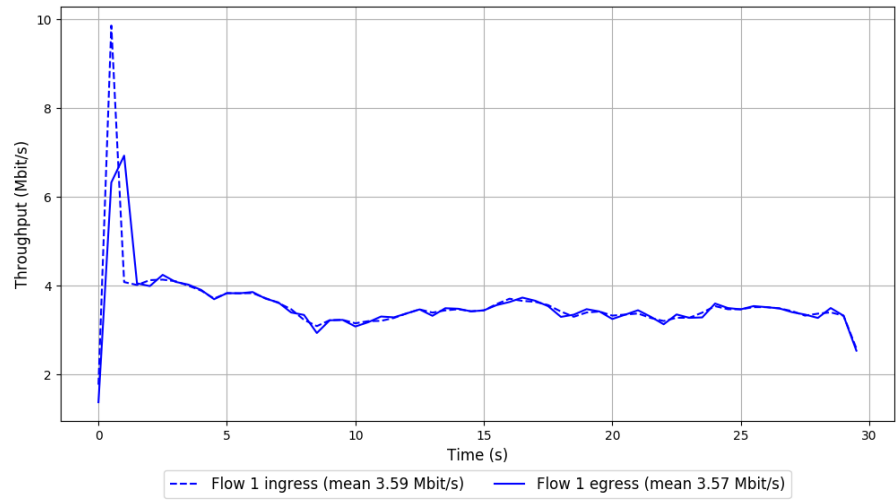


Run 2: Statistics of PCC

Start at: 2018-02-12 20:49:57
End at: 2018-02-12 20:50:27
Local clock offset: -2.637 ms
Remote clock offset: -19.461 ms

Below is generated by plot.py at 2018-02-12 21:18:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 3.57 Mbit/s
95th percentile per-packet one-way delay: 63.781 ms
Loss rate: 0.56%
-- Flow 1:
Average throughput: 3.57 Mbit/s
95th percentile per-packet one-way delay: 63.781 ms
Loss rate: 0.56%

Run 2: Report of PCC — Data Link

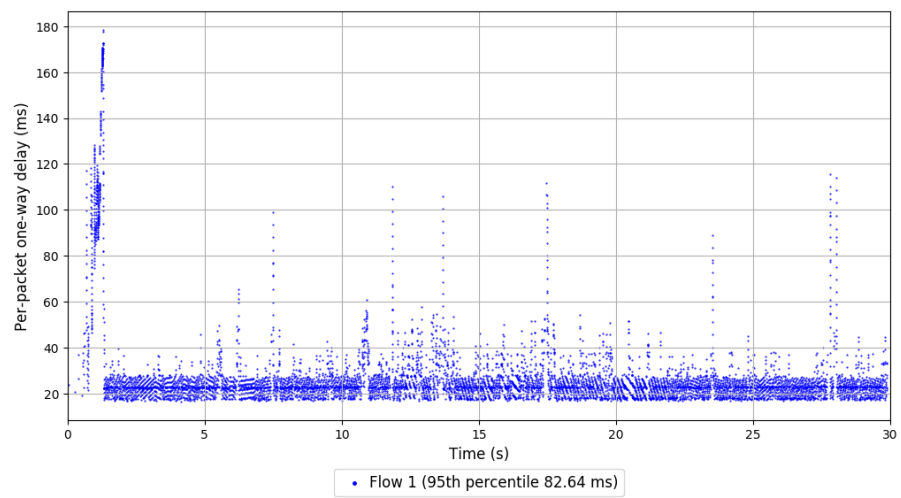
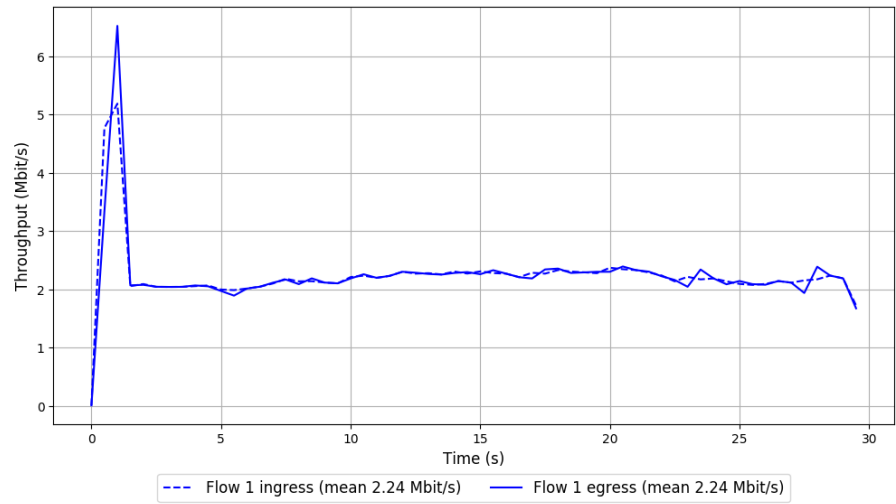


Run 3: Statistics of PCC

Start at: 2018-02-12 21:09:37
End at: 2018-02-12 21:10:07
Local clock offset: 0.556 ms
Remote clock offset: -22.229 ms

Below is generated by plot.py at 2018-02-12 21:18:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.24 Mbit/s
95th percentile per-packet one-way delay: 82.636 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 2.24 Mbit/s
95th percentile per-packet one-way delay: 82.636 ms
Loss rate: 0.20%

Run 3: Report of PCC — Data Link



Run 1: Statistics of QUIC Cubic

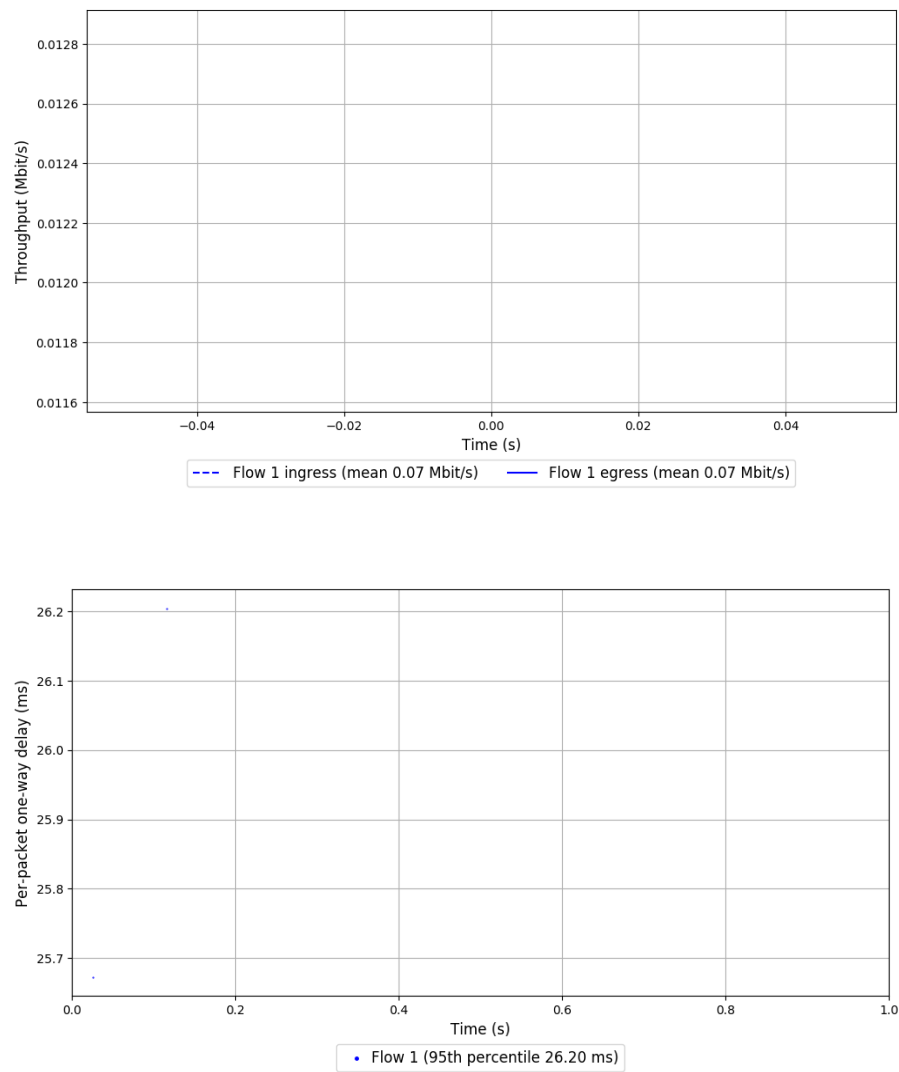
Start at: 2018-02-12 20:28:05

End at: 2018-02-12 20:28:35

Local clock offset: -2.142 ms

Remote clock offset: -16.491 ms

Run 1: Report of QUIC Cubic — Data Link

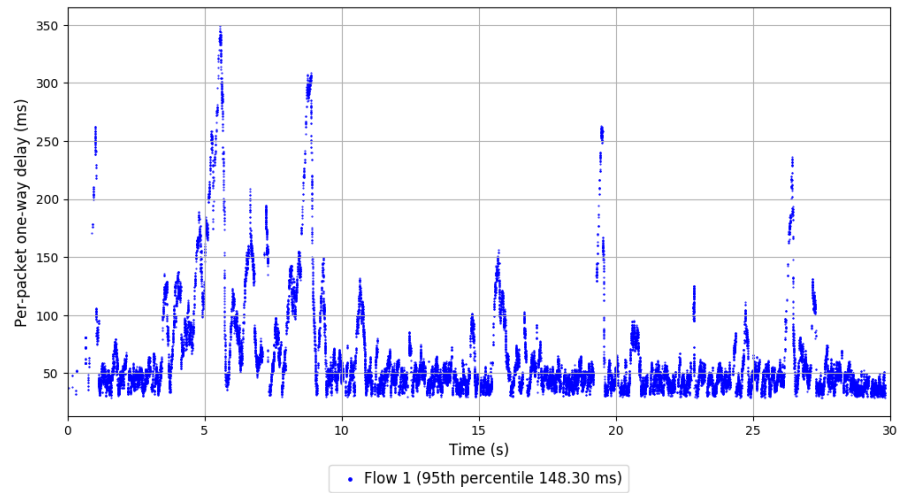
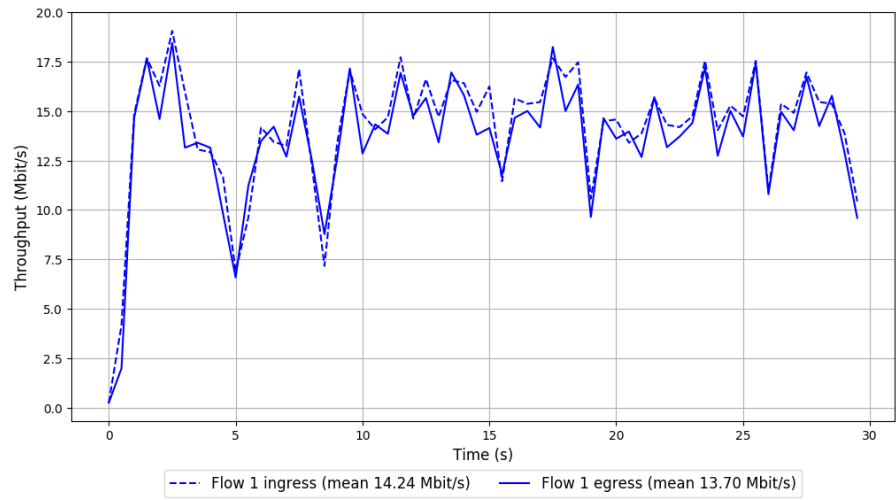


Run 2: Statistics of QUIC Cubic

Start at: 2018-02-12 20:47:46
End at: 2018-02-12 20:48:16
Local clock offset: -3.574 ms
Remote clock offset: -18.667 ms

Below is generated by plot.py at 2018-02-12 21:18:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 13.70 Mbit/s
95th percentile per-packet one-way delay: 148.300 ms
Loss rate: 3.92%
-- Flow 1:
Average throughput: 13.70 Mbit/s
95th percentile per-packet one-way delay: 148.300 ms
Loss rate: 3.92%

Run 2: Report of QUIC Cubic — Data Link

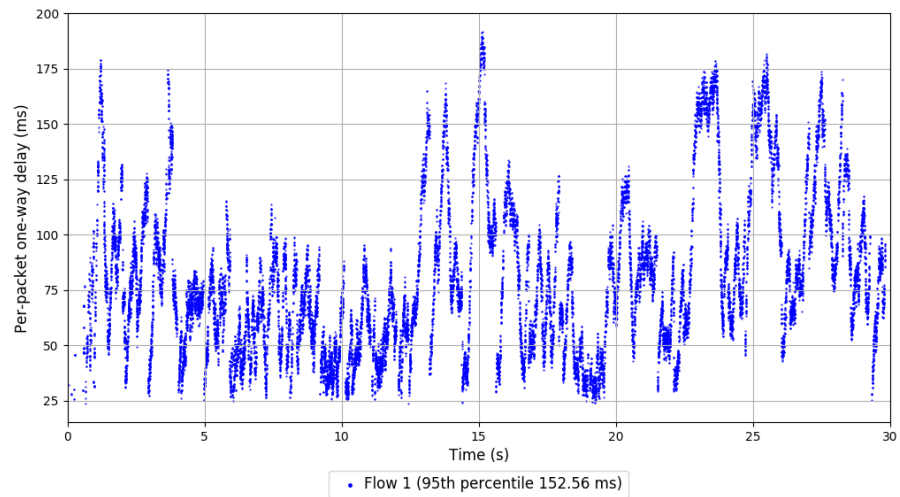
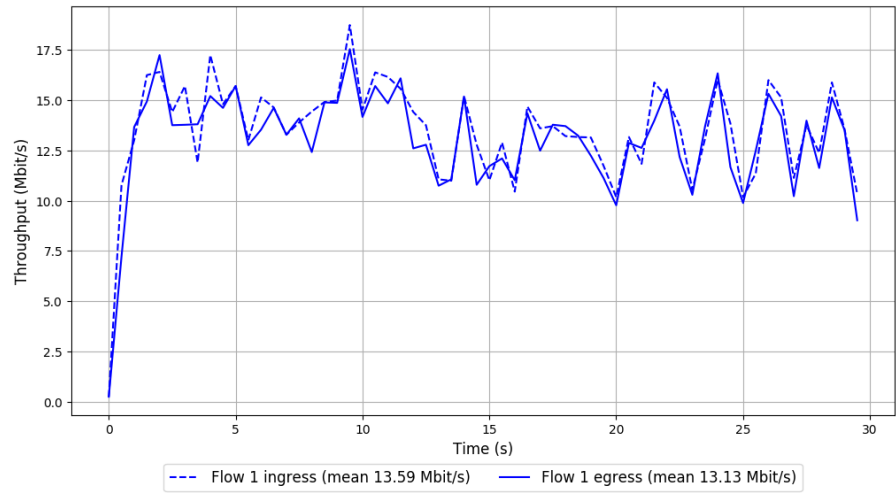


Run 3: Statistics of QUIC Cubic

Start at: 2018-02-12 21:07:26
End at: 2018-02-12 21:07:56
Local clock offset: -1.495 ms
Remote clock offset: -21.356 ms

Below is generated by plot.py at 2018-02-12 21:18:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 13.13 Mbit/s
95th percentile per-packet one-way delay: 152.564 ms
Loss rate: 3.54%
-- Flow 1:
Average throughput: 13.13 Mbit/s
95th percentile per-packet one-way delay: 152.564 ms
Loss rate: 3.54%

Run 3: Report of QUIC Cubic — Data Link

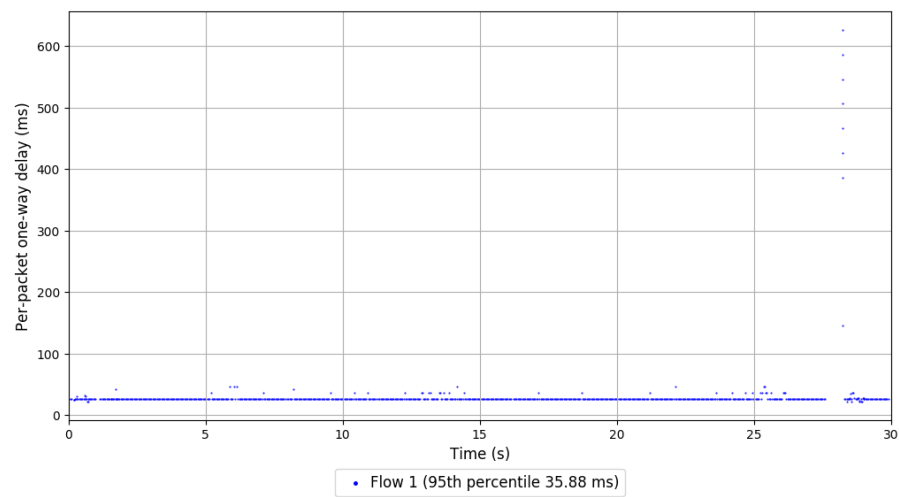
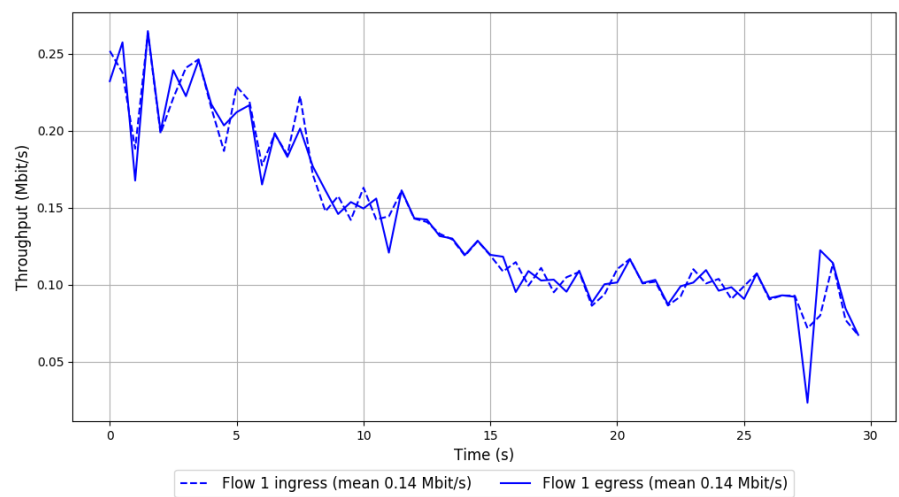


Run 1: Statistics of SCReAM

Start at: 2018-02-12 20:22:34
End at: 2018-02-12 20:23:04
Local clock offset: -3.857 ms
Remote clock offset: -15.755 ms

Below is generated by plot.py at 2018-02-12 21:18:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 35.884 ms
Loss rate: 0.74%
-- Flow 1:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 35.884 ms
Loss rate: 0.74%

Run 1: Report of SReAM — Data Link

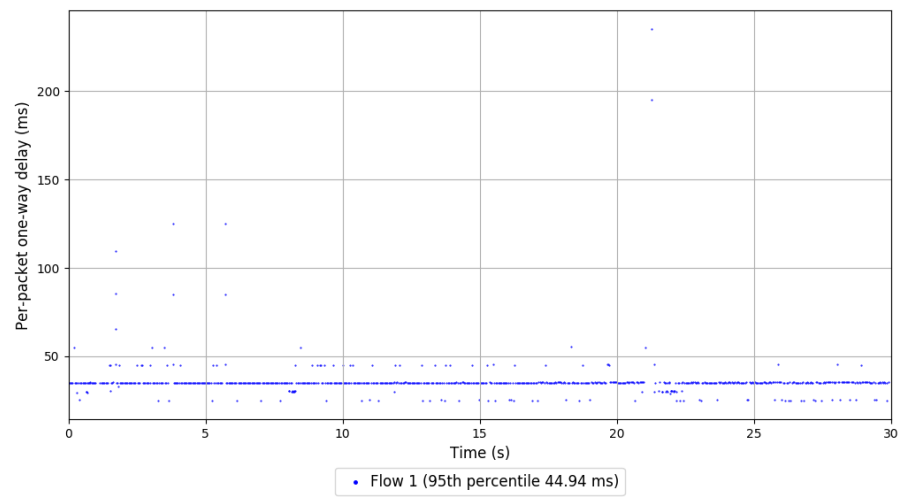
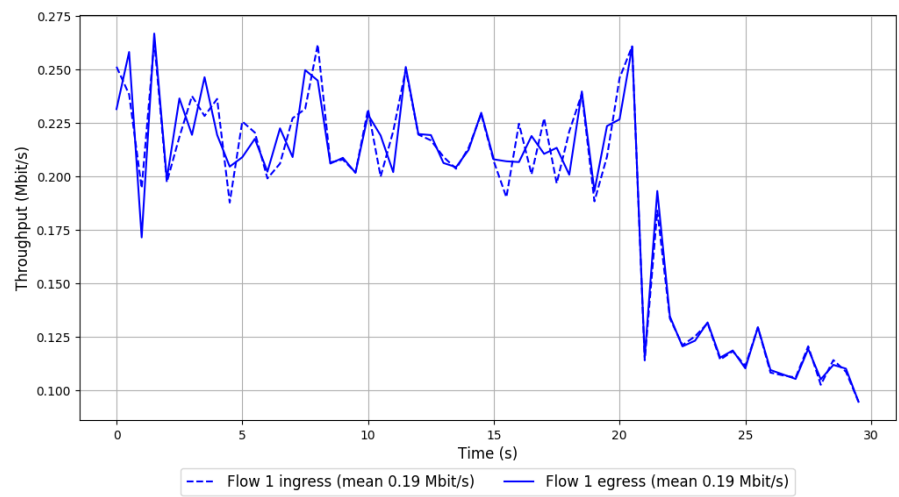


Run 2: Statistics of SCReAM

Start at: 2018-02-12 20:42:20
End at: 2018-02-12 20:42:50
Local clock offset: 0.21 ms
Remote clock offset: -15.017 ms

Below is generated by plot.py at 2018-02-12 21:18:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 44.935 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 44.935 ms
Loss rate: 0.07%

Run 2: Report of SReAM — Data Link

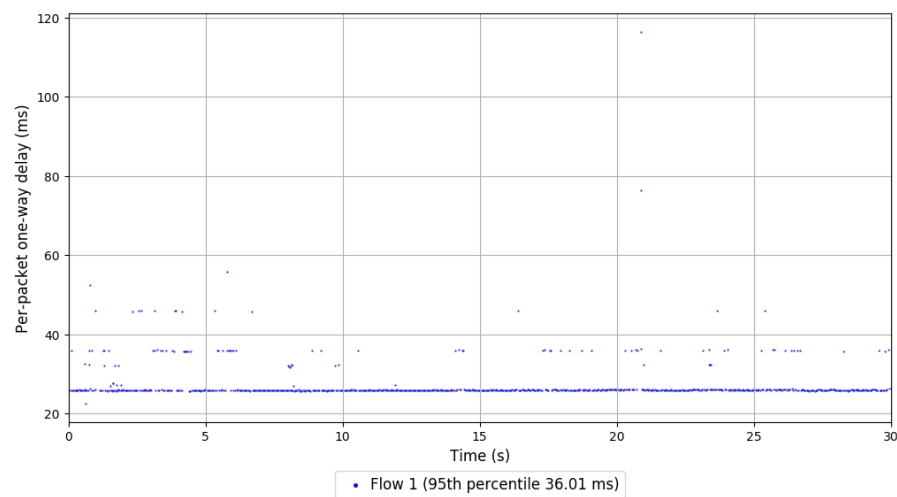
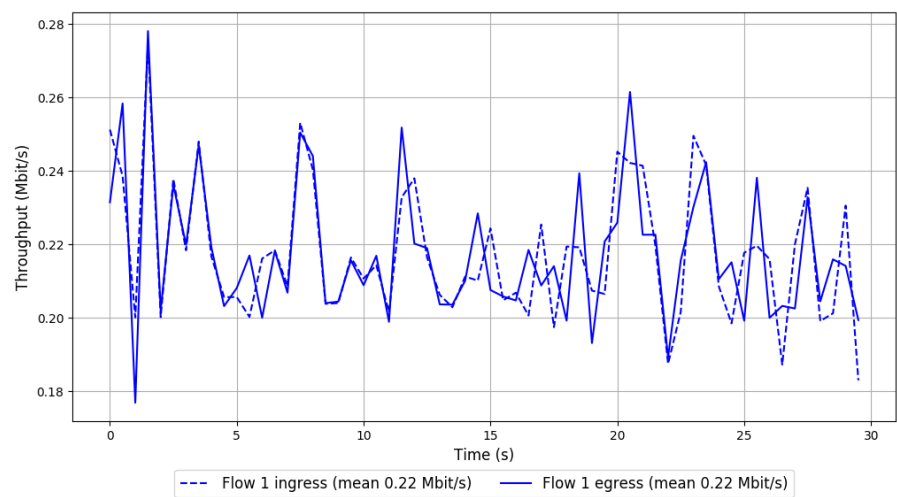


Run 3: Statistics of SCReAM

Start at: 2018-02-12 21:02:00
End at: 2018-02-12 21:02:30
Local clock offset: -0.866 ms
Remote clock offset: -20.674 ms

Below is generated by plot.py at 2018-02-12 21:18:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 36.005 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 36.005 ms
Loss rate: 0.00%

Run 3: Report of SReAM — Data Link

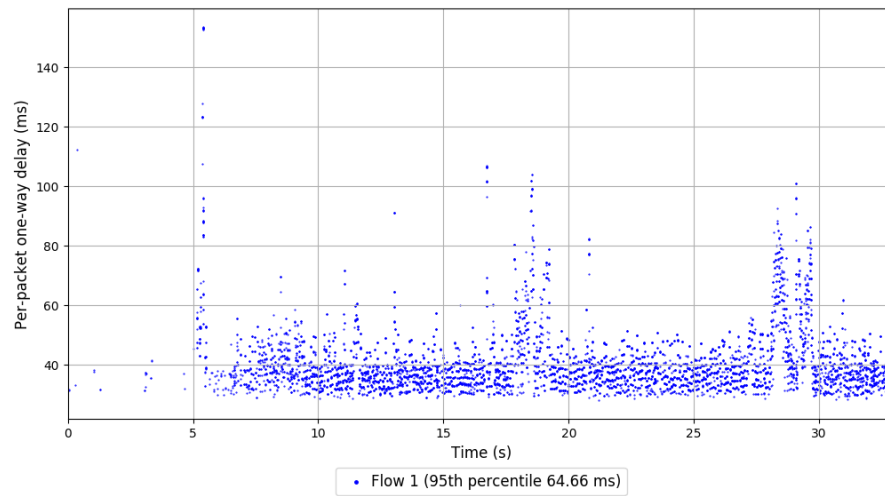
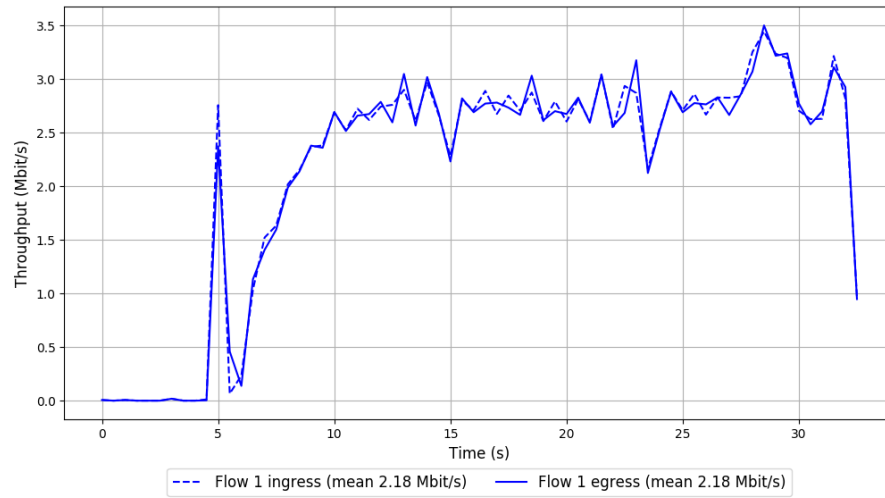


Run 1: Statistics of WebRTC media

Start at: 2018-02-12 20:24:46
End at: 2018-02-12 20:25:16
Local clock offset: -2.906 ms
Remote clock offset: -15.796 ms

Below is generated by plot.py at 2018-02-12 21:18:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.18 Mbit/s
95th percentile per-packet one-way delay: 64.655 ms
Loss rate: 0.28%
-- Flow 1:
Average throughput: 2.18 Mbit/s
95th percentile per-packet one-way delay: 64.655 ms
Loss rate: 0.28%

Run 1: Report of WebRTC media — Data Link

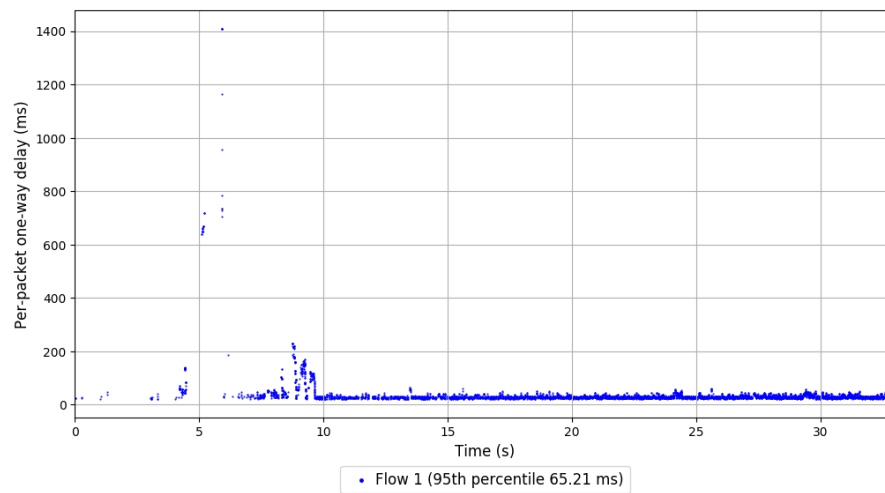
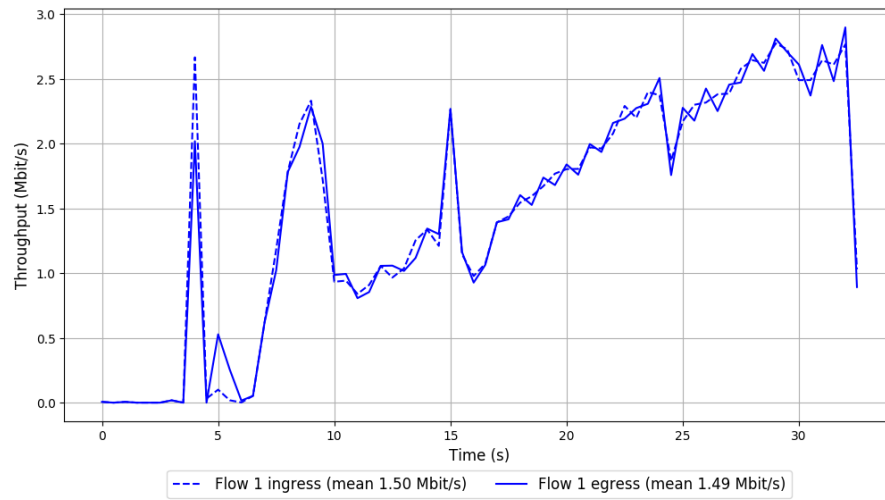


Run 2: Statistics of WebRTC media

Start at: 2018-02-12 20:44:30
End at: 2018-02-12 20:45:00
Local clock offset: -3.143 ms
Remote clock offset: -16.919 ms

Below is generated by plot.py at 2018-02-12 21:18:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 65.212 ms
Loss rate: 0.26%
-- Flow 1:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 65.212 ms
Loss rate: 0.26%

Run 2: Report of WebRTC media — Data Link

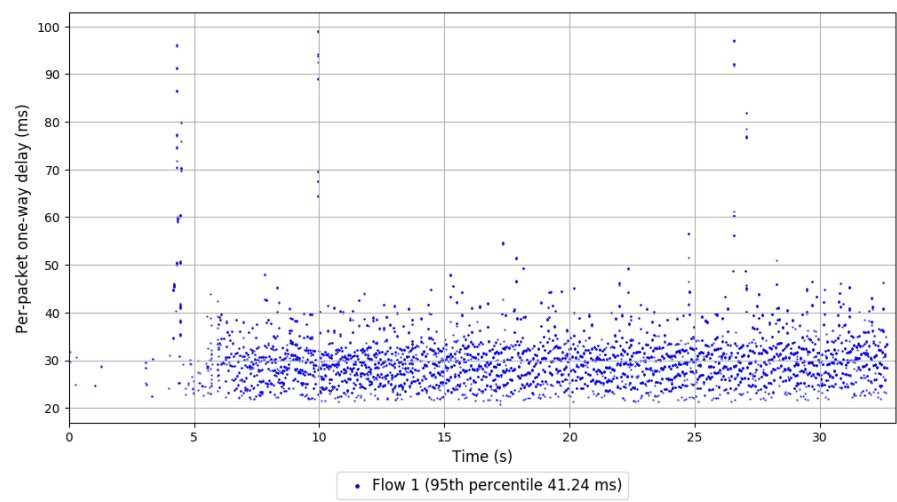
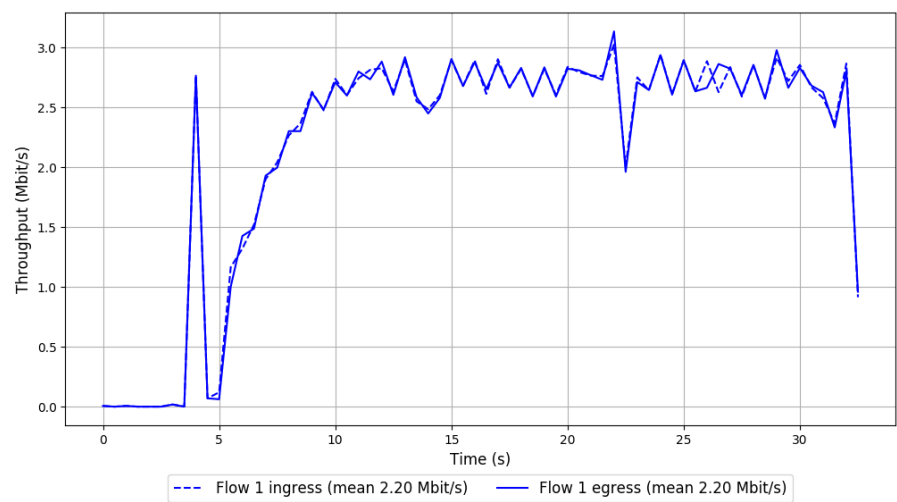


Run 3: Statistics of WebRTC media

Start at: 2018-02-12 21:04:11
End at: 2018-02-12 21:04:41
Local clock offset: 0.576 ms
Remote clock offset: -22.273 ms

Below is generated by plot.py at 2018-02-12 21:18:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.20 Mbit/s
95th percentile per-packet one-way delay: 41.241 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 2.20 Mbit/s
95th percentile per-packet one-way delay: 41.241 ms
Loss rate: 0.15%

Run 3: Report of WebRTC media — Data Link

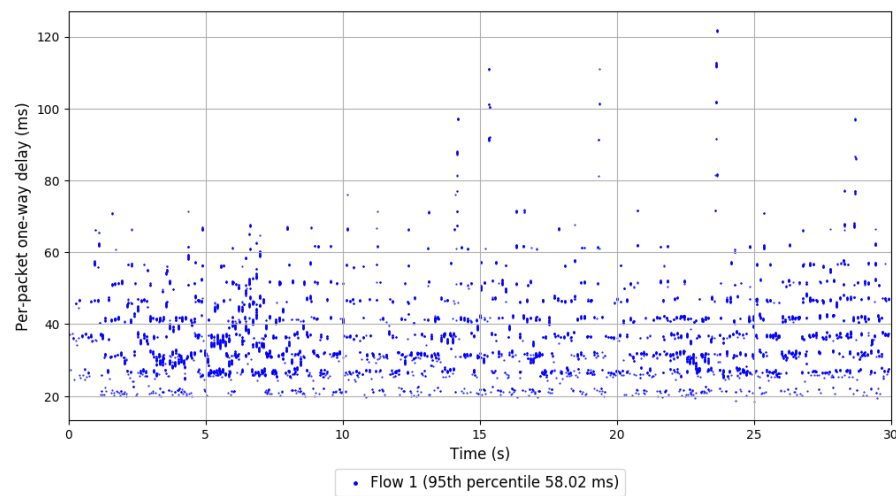
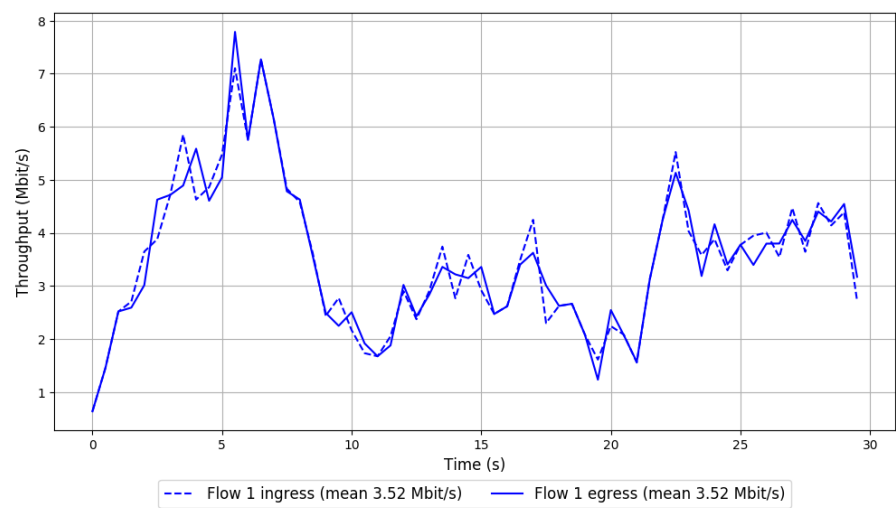


Run 1: Statistics of Sprout

Start at: 2018-02-12 20:33:33
End at: 2018-02-12 20:34:03
Local clock offset: -1.004 ms
Remote clock offset: -16.492 ms

Below is generated by plot.py at 2018-02-12 21:18:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 3.52 Mbit/s
95th percentile per-packet one-way delay: 58.017 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 3.52 Mbit/s
95th percentile per-packet one-way delay: 58.017 ms
Loss rate: 0.04%

Run 1: Report of Sprout — Data Link

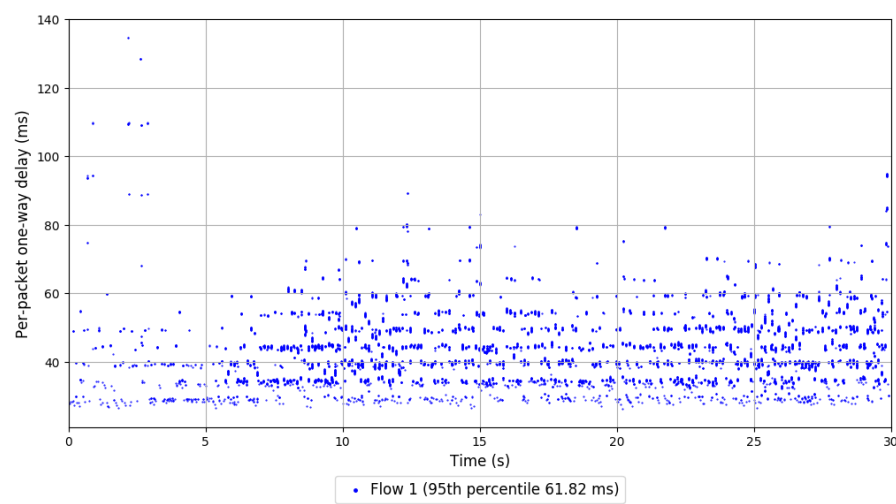
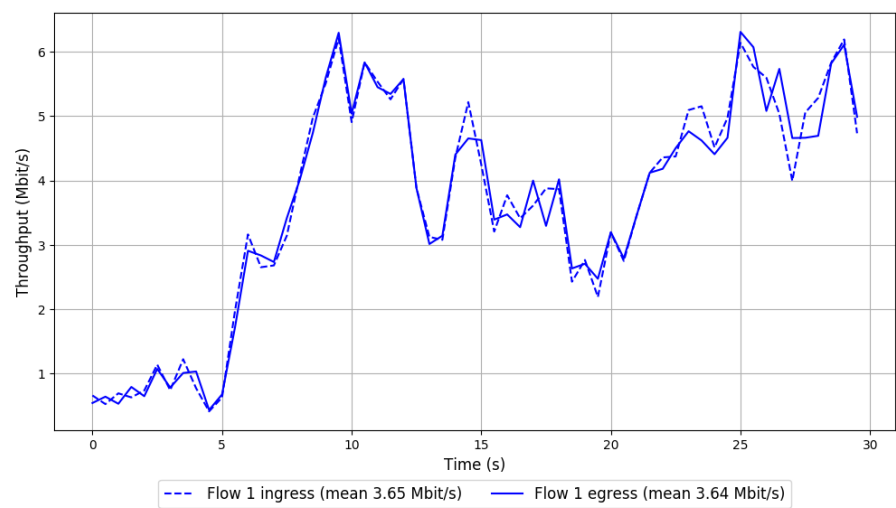


Run 2: Statistics of Sprout

Start at: 2018-02-12 20:53:14
End at: 2018-02-12 20:53:44
Local clock offset: 0.137 ms
Remote clock offset: -18.722 ms

Below is generated by plot.py at 2018-02-12 21:18:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 3.64 Mbit/s
95th percentile per-packet one-way delay: 61.816 ms
Loss rate: 0.38%
-- Flow 1:
Average throughput: 3.64 Mbit/s
95th percentile per-packet one-way delay: 61.816 ms
Loss rate: 0.38%

Run 2: Report of Sprout — Data Link

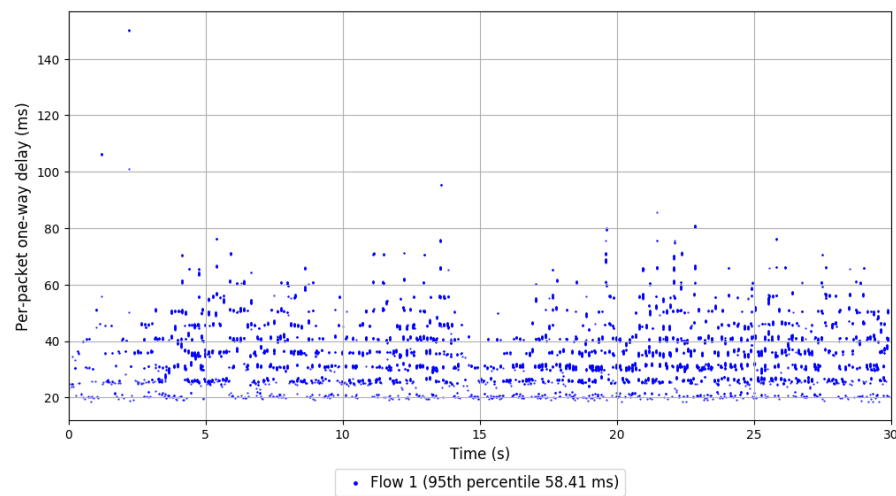
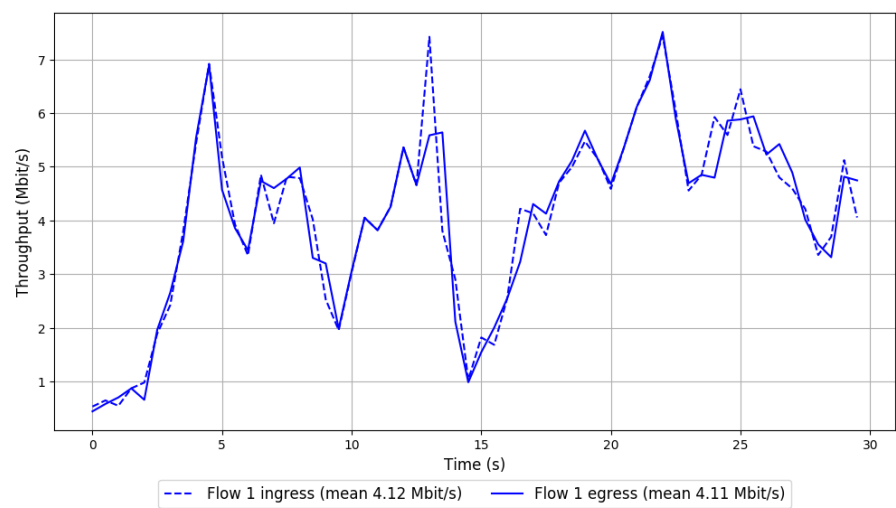


Run 3: Statistics of Sprout

Start at: 2018-02-12 21:12:54
End at: 2018-02-12 21:13:24
Local clock offset: 1.06 ms
Remote clock offset: -23.809 ms

Below is generated by plot.py at 2018-02-12 21:18:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 4.11 Mbit/s
95th percentile per-packet one-way delay: 58.412 ms
Loss rate: 0.32%
-- Flow 1:
Average throughput: 4.11 Mbit/s
95th percentile per-packet one-way delay: 58.412 ms
Loss rate: 0.32%

Run 3: Report of Sprout — Data Link

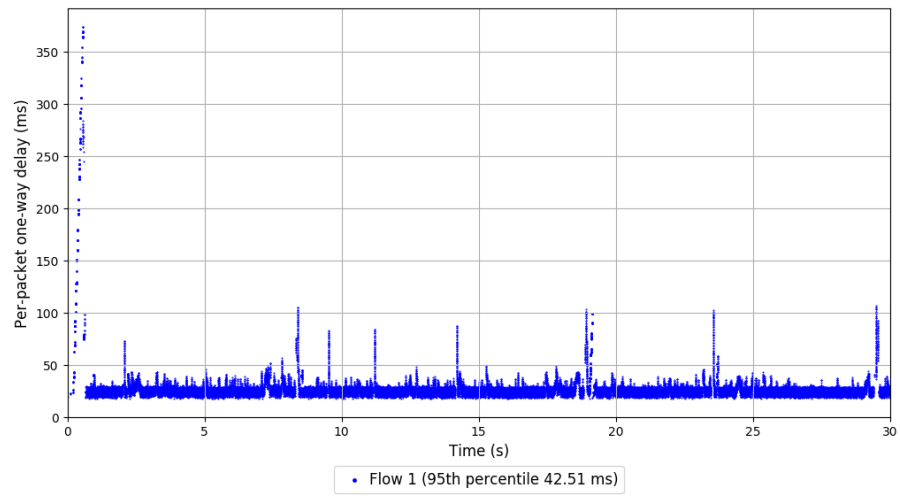
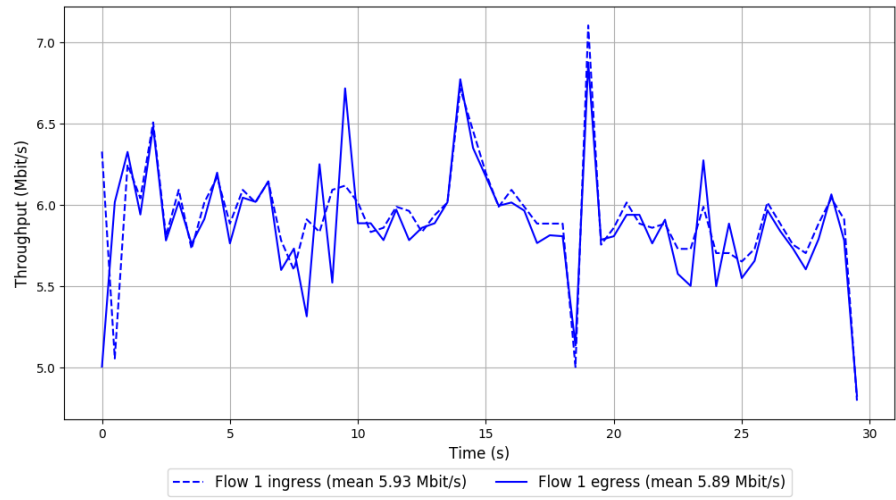


```
Run 1: Statistics of TaoVA-100x

Start at: 2018-02-12 20:21:27
End at: 2018-02-12 20:21:57
Local clock offset: -4.484 ms
Remote clock offset: -19.555 ms

# Below is generated by plot.py at 2018-02-12 21:18:26
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.89 Mbit/s
95th percentile per-packet one-way delay: 42.513 ms
Loss rate: 0.74%
-- Flow 1:
Average throughput: 5.89 Mbit/s
95th percentile per-packet one-way delay: 42.513 ms
Loss rate: 0.74%
```

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

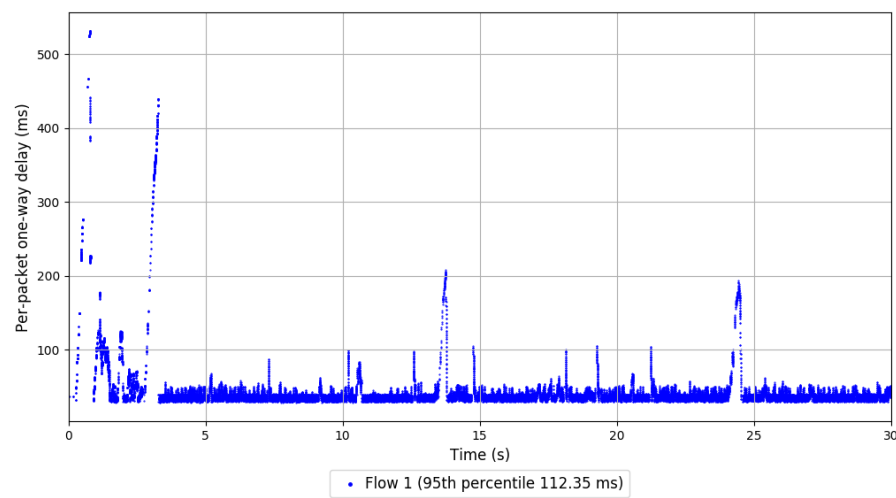
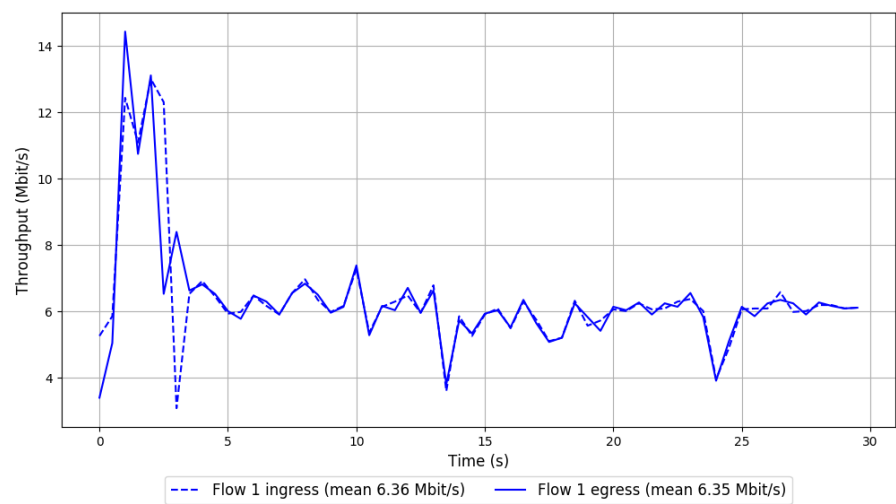


Run 2: Statistics of TaoVA-100x

Start at: 2018-02-12 20:41:14
End at: 2018-02-12 20:41:44
Local clock offset: -3.646 ms
Remote clock offset: -15.414 ms

Below is generated by plot.py at 2018-02-12 21:18:27
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.35 Mbit/s
95th percentile per-packet one-way delay: 112.353 ms
Loss rate: 0.37%
-- Flow 1:
Average throughput: 6.35 Mbit/s
95th percentile per-packet one-way delay: 112.353 ms
Loss rate: 0.37%

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

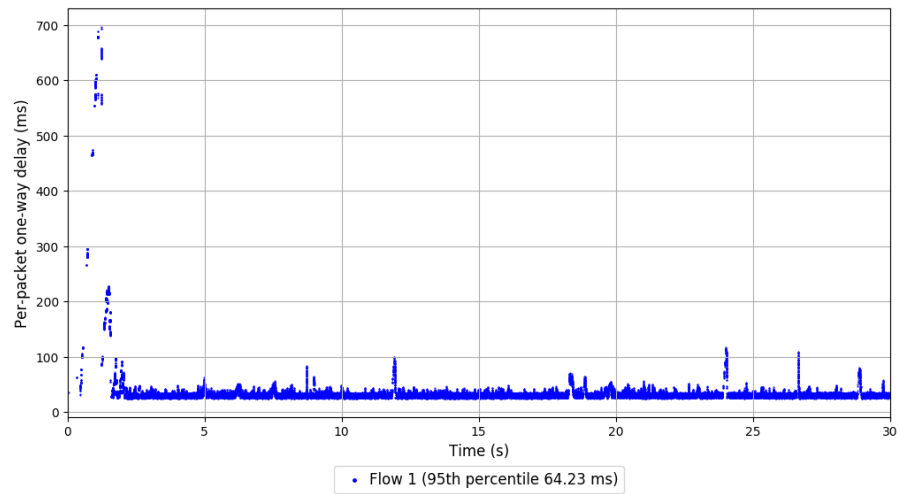
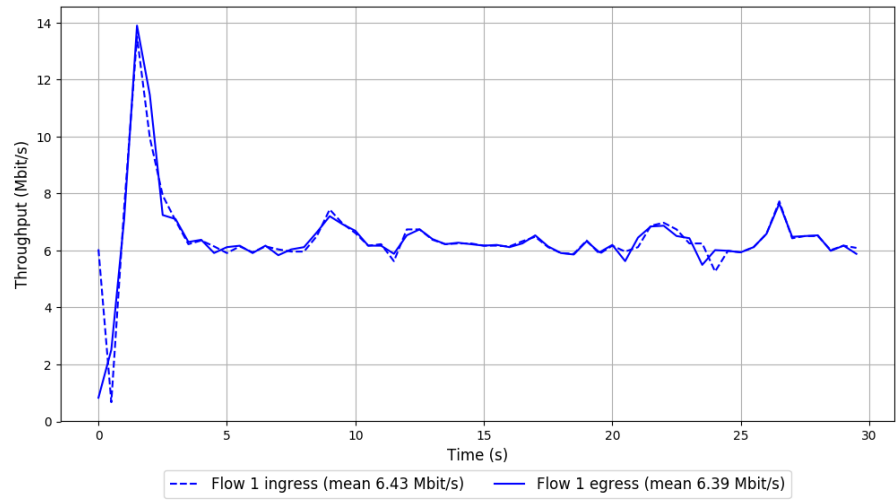


Run 3: Statistics of TaoVA-100x

Start at: 2018-02-12 21:00:55
End at: 2018-02-12 21:01:25
Local clock offset: -2.085 ms
Remote clock offset: -20.713 ms

Below is generated by plot.py at 2018-02-12 21:18:28
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.39 Mbit/s
95th percentile per-packet one-way delay: 64.232 ms
Loss rate: 0.72%
-- Flow 1:
Average throughput: 6.39 Mbit/s
95th percentile per-packet one-way delay: 64.232 ms
Loss rate: 0.72%

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

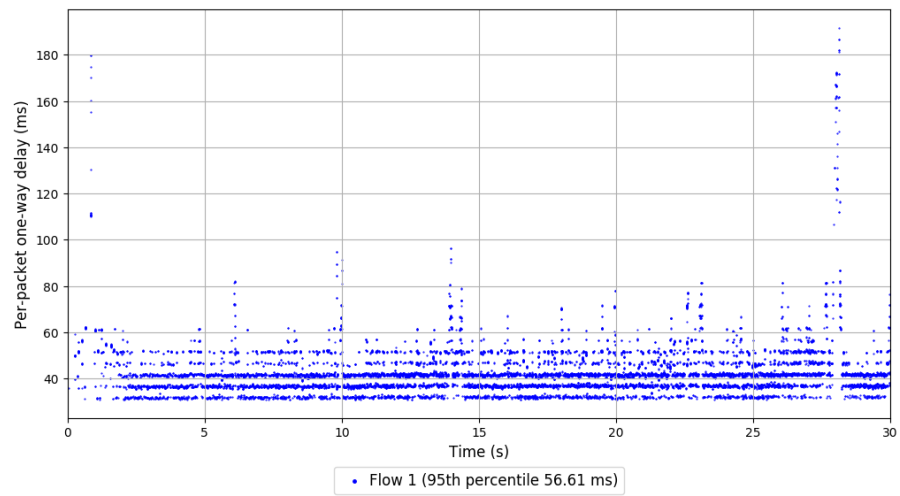
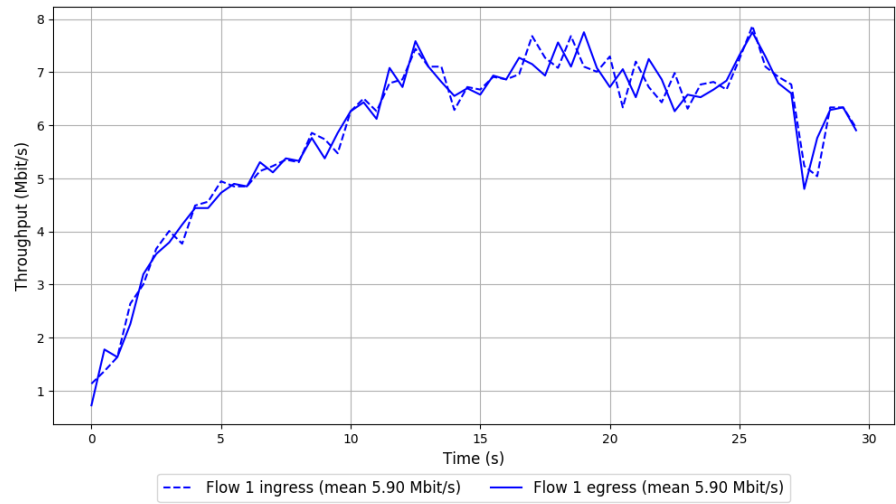


Run 1: Statistics of TCP Vegas

Start at: 2018-02-12 20:26:58
End at: 2018-02-12 20:27:29
Local clock offset: -1.836 ms
Remote clock offset: -16.755 ms

Below is generated by plot.py at 2018-02-12 21:18:28
Datalink statistics
-- Total of 1 flow:
Average throughput: 5.90 Mbit/s
95th percentile per-packet one-way delay: 56.612 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 5.90 Mbit/s
95th percentile per-packet one-way delay: 56.612 ms
Loss rate: 0.18%

Run 1: Report of TCP Vegas — Data Link

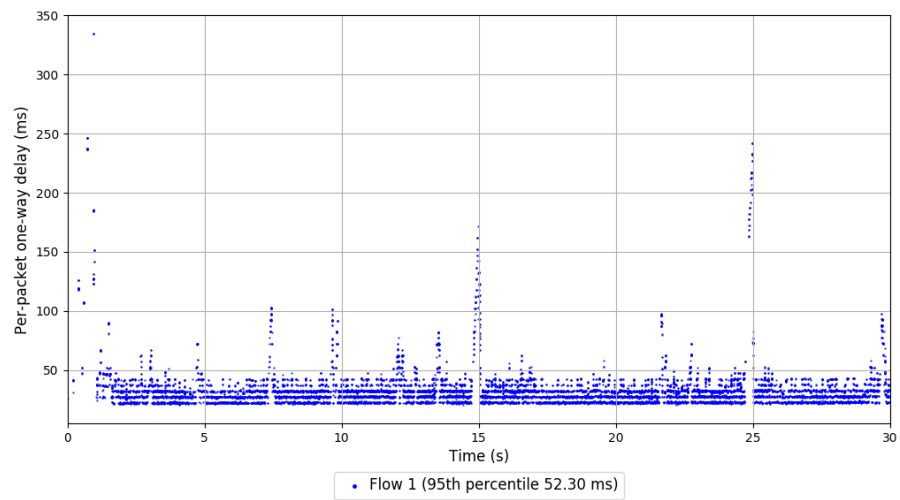
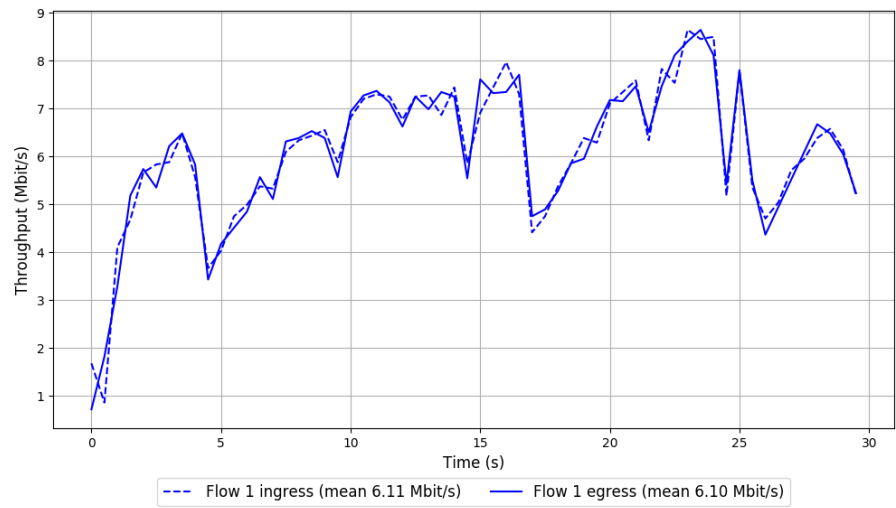


Run 2: Statistics of TCP Vegas

Start at: 2018-02-12 20:46:40
End at: 2018-02-12 20:47:10
Local clock offset: -3.286 ms
Remote clock offset: -19.377 ms

Below is generated by plot.py at 2018-02-12 21:18:28
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.10 Mbit/s
95th percentile per-packet one-way delay: 52.302 ms
Loss rate: 0.17%
-- Flow 1:
Average throughput: 6.10 Mbit/s
95th percentile per-packet one-way delay: 52.302 ms
Loss rate: 0.17%

Run 2: Report of TCP Vegas — Data Link

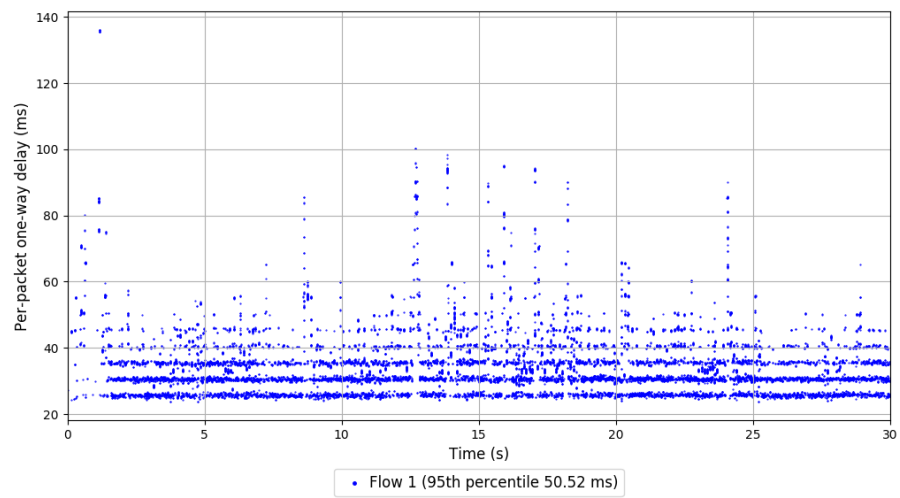
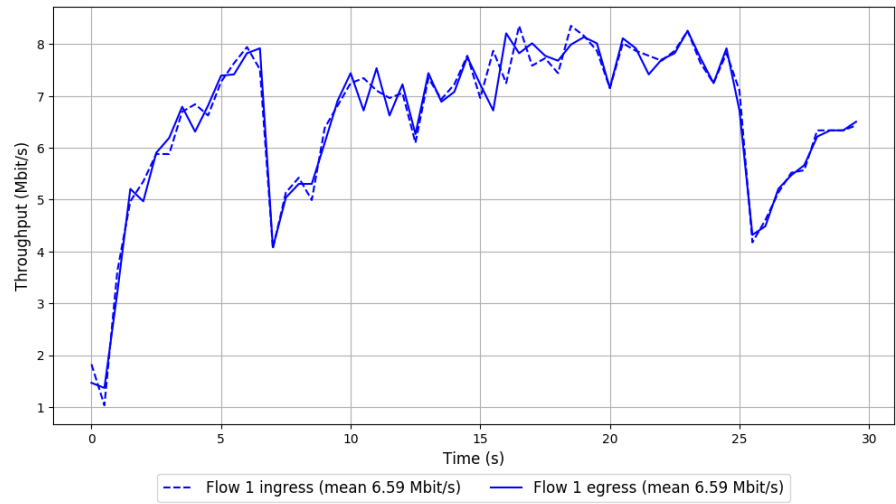


Run 3: Statistics of TCP Vegas

Start at: 2018-02-12 21:06:21
End at: 2018-02-12 21:06:51
Local clock offset: -1.798 ms
Remote clock offset: -20.333 ms

Below is generated by plot.py at 2018-02-12 21:18:28
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.59 Mbit/s
95th percentile per-packet one-way delay: 50.522 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 6.59 Mbit/s
95th percentile per-packet one-way delay: 50.522 ms
Loss rate: 0.20%

Run 3: Report of TCP Vegas — Data Link

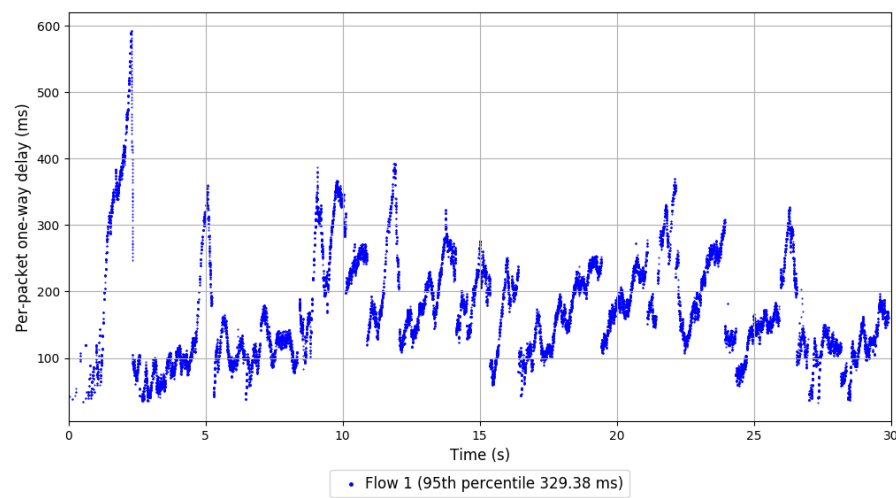
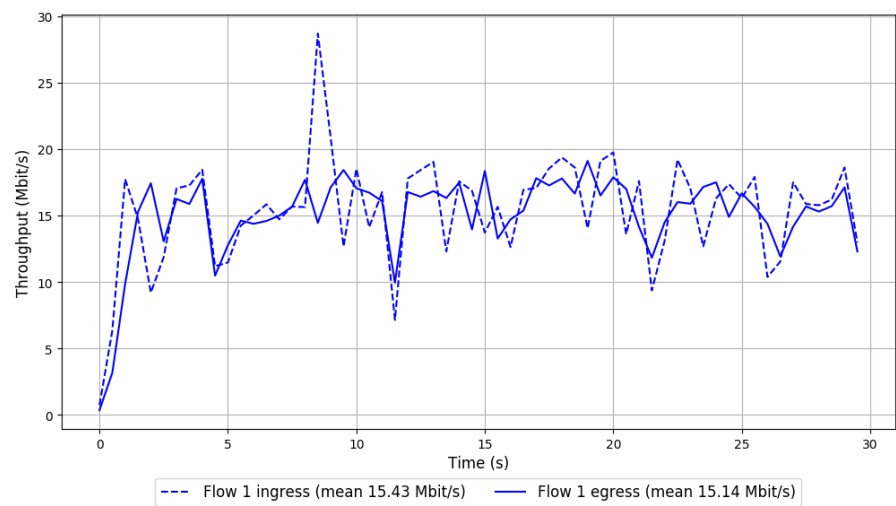


Run 1: Statistics of Verus

Start at: 2018-02-12 20:32:27
End at: 2018-02-12 20:32:57
Local clock offset: -2.025 ms
Remote clock offset: -15.67 ms

Below is generated by plot.py at 2018-02-12 21:18:40
Datalink statistics
-- Total of 1 flow:
Average throughput: 15.14 Mbit/s
95th percentile per-packet one-way delay: 329.381 ms
Loss rate: 1.99%
-- Flow 1:
Average throughput: 15.14 Mbit/s
95th percentile per-packet one-way delay: 329.381 ms
Loss rate: 1.99%

Run 1: Report of Verus — Data Link

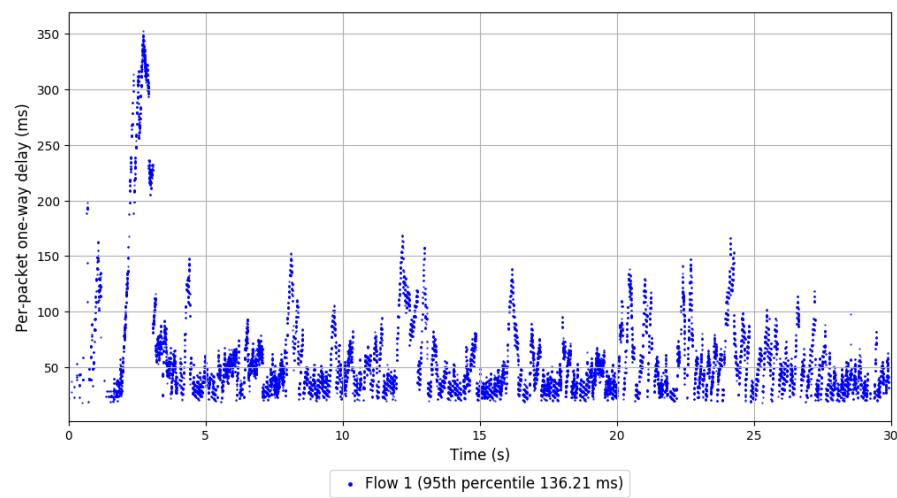
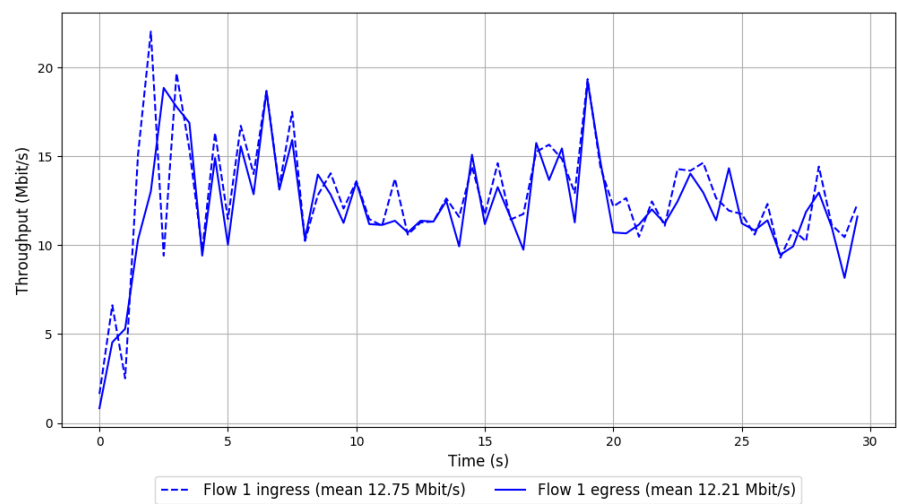


Run 2: Statistics of Verus

Start at: 2018-02-12 20:52:08
End at: 2018-02-12 20:52:38
Local clock offset: -0.358 ms
Remote clock offset: -19.338 ms

Below is generated by plot.py at 2018-02-12 21:18:40
Datalink statistics
-- Total of 1 flow:
Average throughput: 12.21 Mbit/s
95th percentile per-packet one-way delay: 136.214 ms
Loss rate: 4.33%
-- Flow 1:
Average throughput: 12.21 Mbit/s
95th percentile per-packet one-way delay: 136.214 ms
Loss rate: 4.33%

Run 2: Report of Verus — Data Link

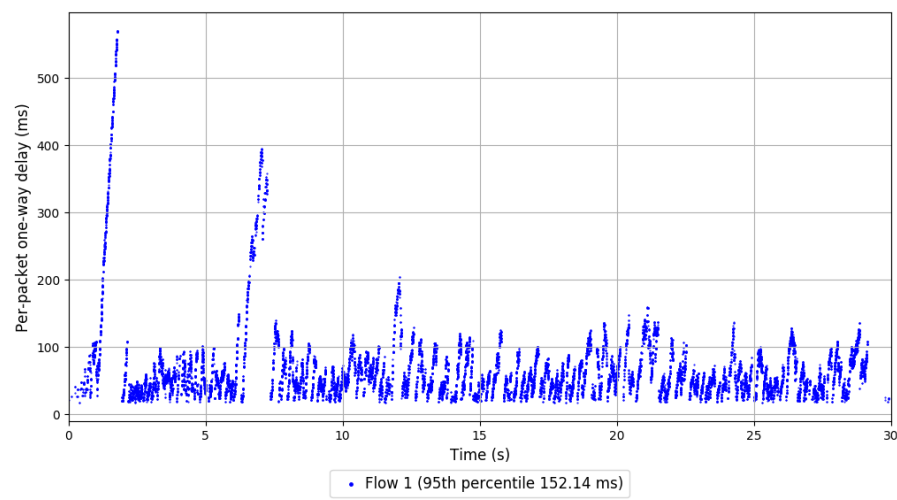
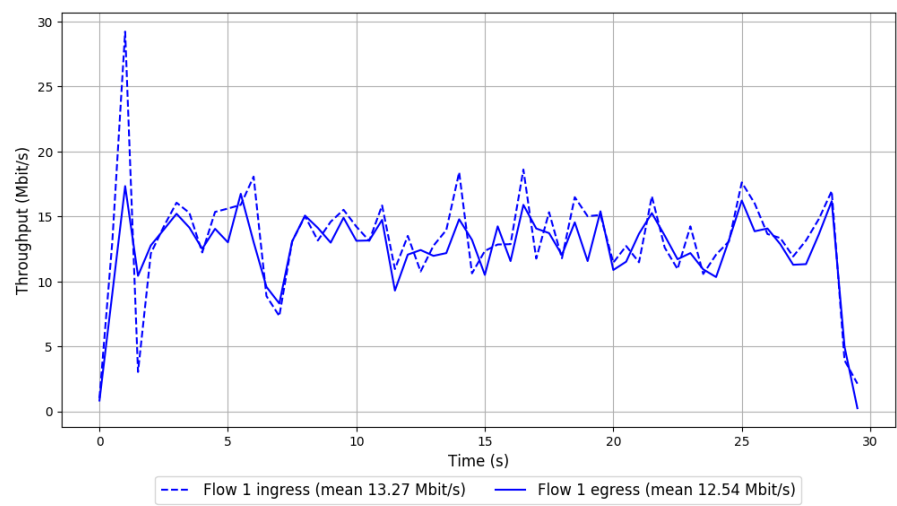


Run 3: Statistics of Verus

Start at: 2018-02-12 21:11:48
End at: 2018-02-12 21:12:18
Local clock offset: -0.048 ms
Remote clock offset: -23.321 ms

Below is generated by plot.py at 2018-02-12 21:18:40
Datalink statistics
-- Total of 1 flow:
Average throughput: 12.54 Mbit/s
95th percentile per-packet one-way delay: 152.141 ms
Loss rate: 5.65%
-- Flow 1:
Average throughput: 12.54 Mbit/s
95th percentile per-packet one-way delay: 152.141 ms
Loss rate: 5.65%

Run 3: Report of Verus — Data Link

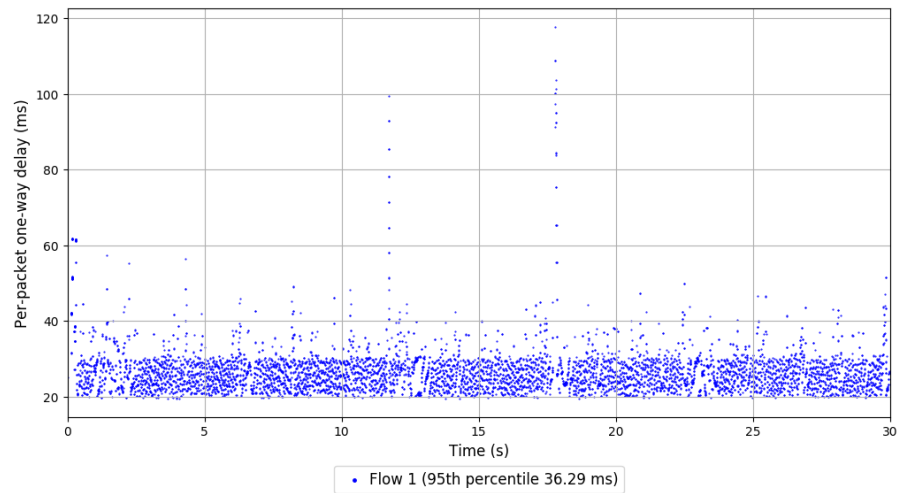
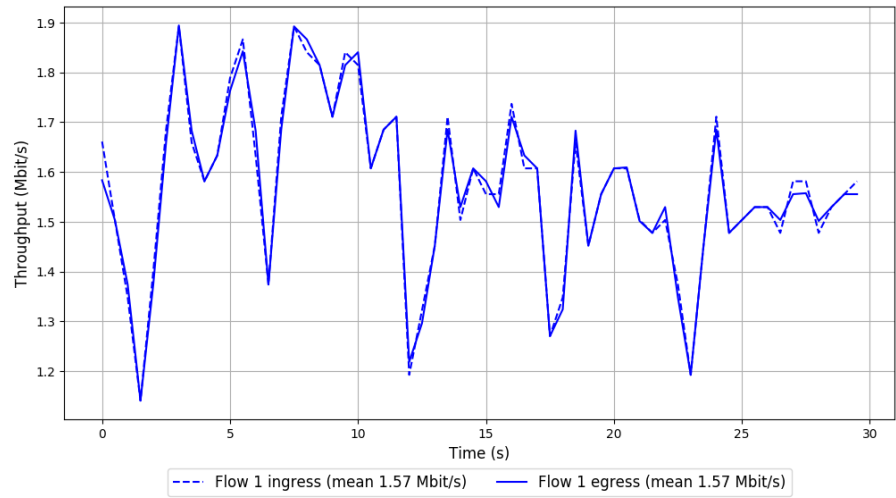


Run 1: Statistics of Copa

Start at: 2018-02-12 20:29:10
End at: 2018-02-12 20:29:40
Local clock offset: -2.446 ms
Remote clock offset: -16.525 ms

Below is generated by plot.py at 2018-02-12 21:18:40
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.57 Mbit/s
95th percentile per-packet one-way delay: 36.290 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 1.57 Mbit/s
95th percentile per-packet one-way delay: 36.290 ms
Loss rate: 0.14%

Run 1: Report of Copa — Data Link

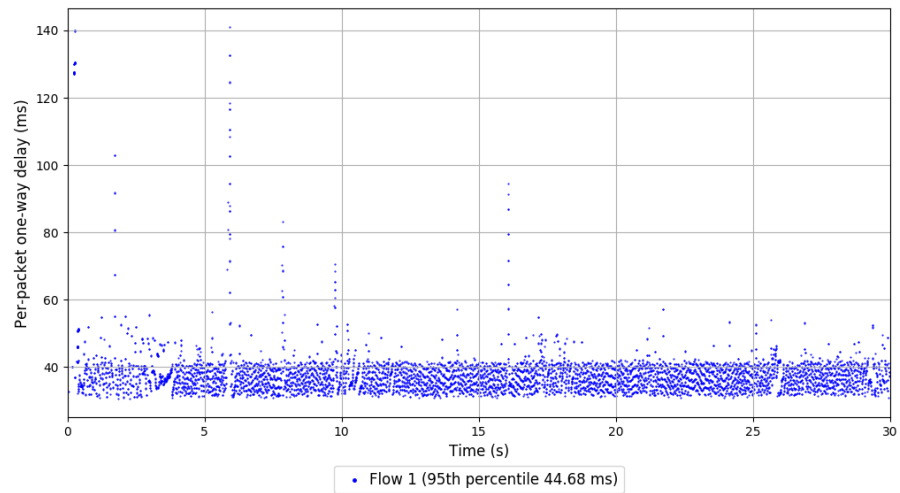
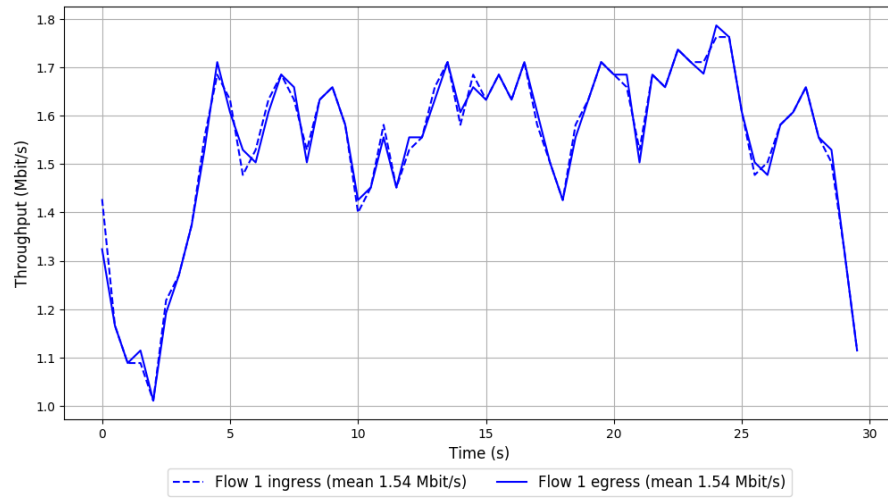


Run 2: Statistics of Copa

Start at: 2018-02-12 20:48:52
End at: 2018-02-12 20:49:22
Local clock offset: -2.829 ms
Remote clock offset: -20.78 ms

Below is generated by plot.py at 2018-02-12 21:18:40
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 44.682 ms
Loss rate: 0.11%
-- Flow 1:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 44.682 ms
Loss rate: 0.11%

Run 2: Report of Copa — Data Link

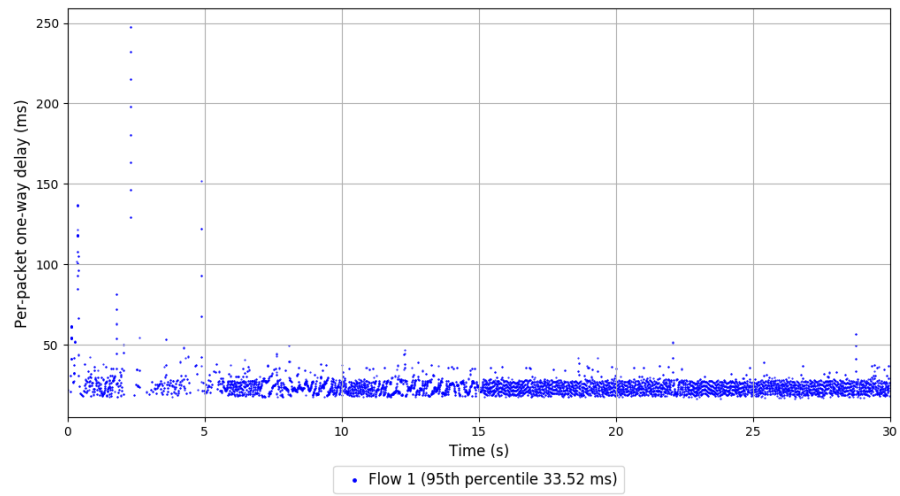
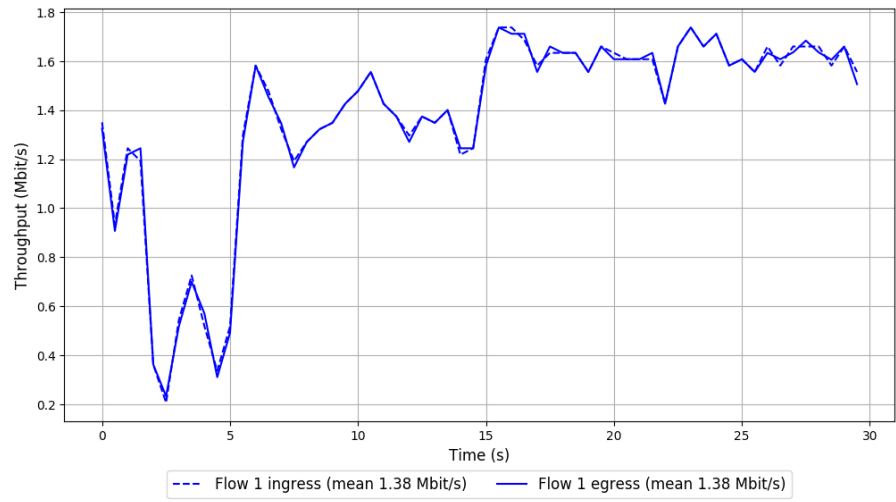


Run 3: Statistics of Copa

Start at: 2018-02-12 21:08:32
End at: 2018-02-12 21:09:02
Local clock offset: 0.789 ms
Remote clock offset: -21.873 ms

Below is generated by plot.py at 2018-02-12 21:18:40
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.38 Mbit/s
95th percentile per-packet one-way delay: 33.517 ms
Loss rate: 0.22%
-- Flow 1:
Average throughput: 1.38 Mbit/s
95th percentile per-packet one-way delay: 33.517 ms
Loss rate: 0.22%

Run 3: Report of Copa — Data Link

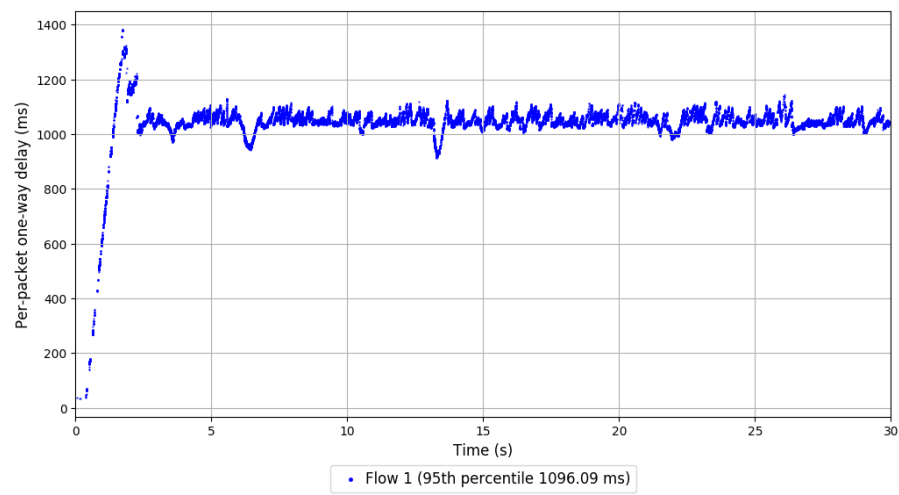
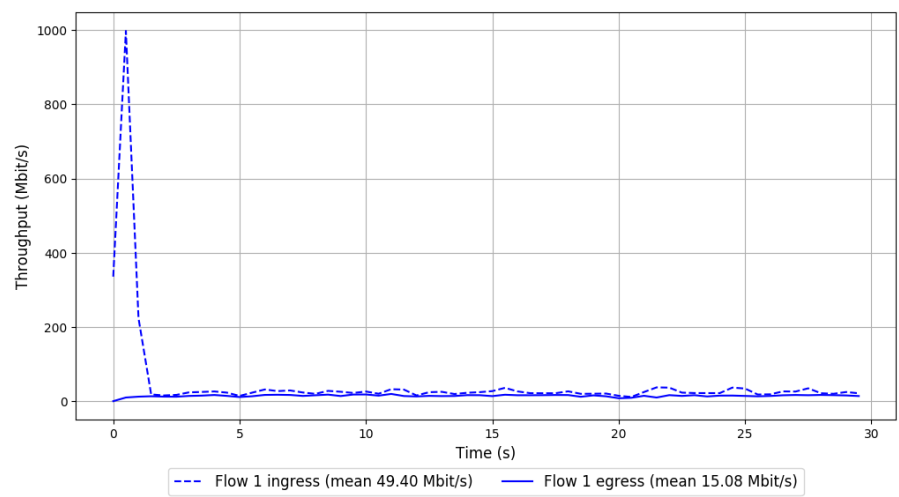


Run 1: Statistics of FillP

Start at: 2018-02-12 20:20:20
End at: 2018-02-12 20:20:50
Local clock offset: -2.037 ms
Remote clock offset: -17.495 ms

Below is generated by plot.py at 2018-02-12 21:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 15.08 Mbit/s
95th percentile per-packet one-way delay: 1096.090 ms
Loss rate: 69.52%
-- Flow 1:
Average throughput: 15.08 Mbit/s
95th percentile per-packet one-way delay: 1096.090 ms
Loss rate: 69.52%

Run 1: Report of FillP — Data Link

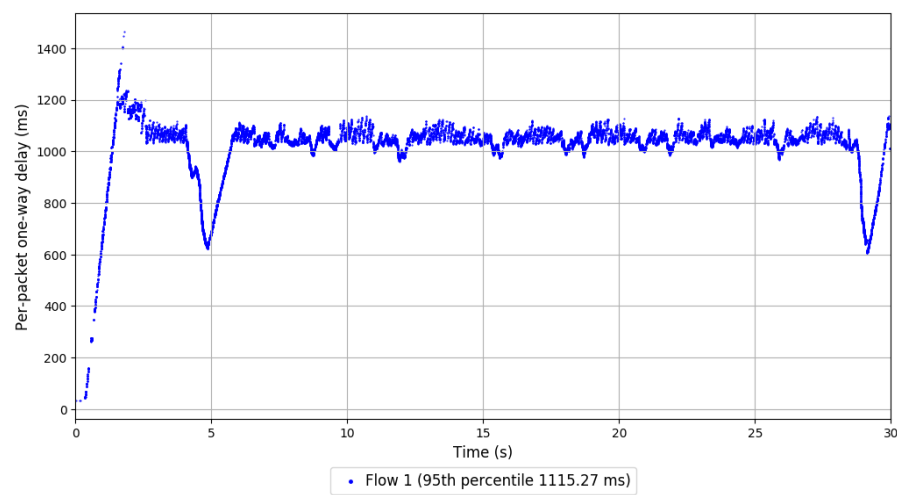
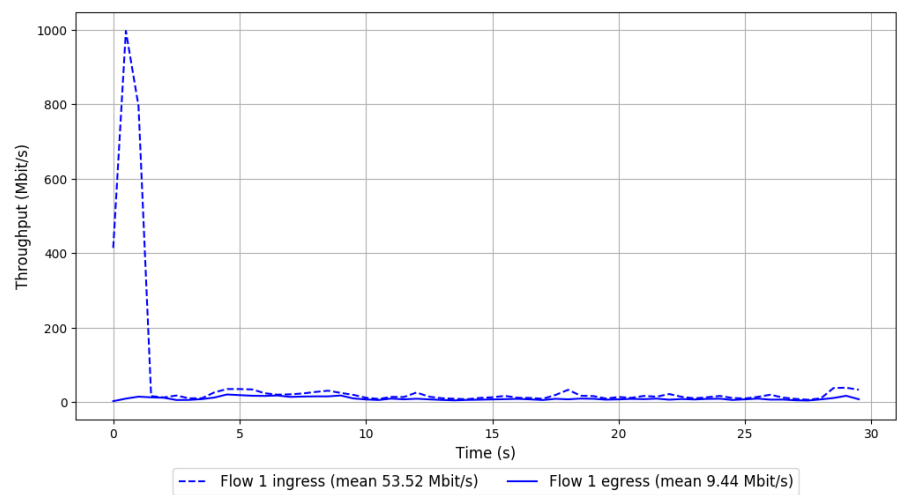


Run 2: Statistics of FillP

Start at: 2018-02-12 20:40:07
End at: 2018-02-12 20:40:37
Local clock offset: -3.041 ms
Remote clock offset: -15.947 ms

Below is generated by plot.py at 2018-02-12 21:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 9.44 Mbit/s
95th percentile per-packet one-way delay: 1115.268 ms
Loss rate: 82.39%
-- Flow 1:
Average throughput: 9.44 Mbit/s
95th percentile per-packet one-way delay: 1115.268 ms
Loss rate: 82.39%

Run 2: Report of FillP — Data Link

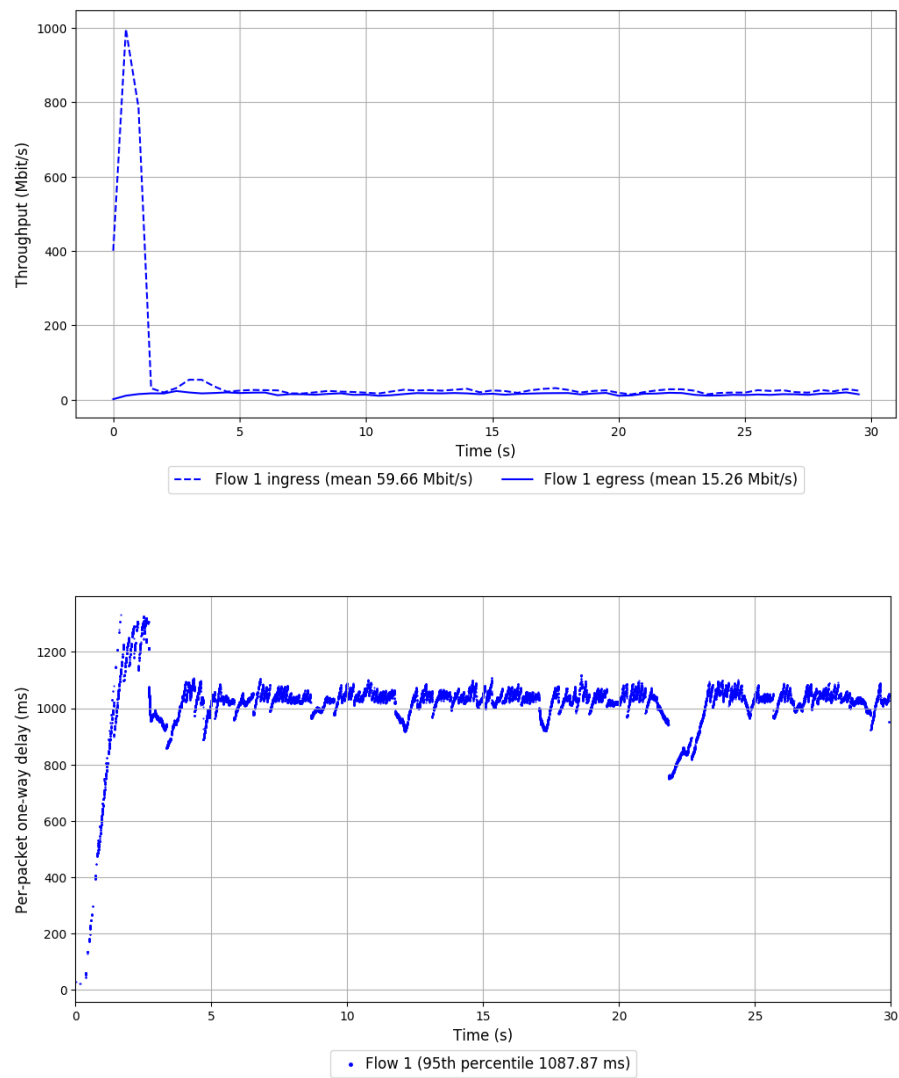


Run 3: Statistics of FillP

Start at: 2018-02-12 20:59:48
End at: 2018-02-12 21:00:18
Local clock offset: 0.429 ms
Remote clock offset: -22.683 ms

Below is generated by plot.py at 2018-02-12 21:19:02
Datalink statistics
-- Total of 1 flow:
Average throughput: 15.26 Mbit/s
95th percentile per-packet one-way delay: 1087.871 ms
Loss rate: 74.45%
-- Flow 1:
Average throughput: 15.26 Mbit/s
95th percentile per-packet one-way delay: 1087.871 ms
Loss rate: 74.45%

Run 3: Report of FillP — Data Link

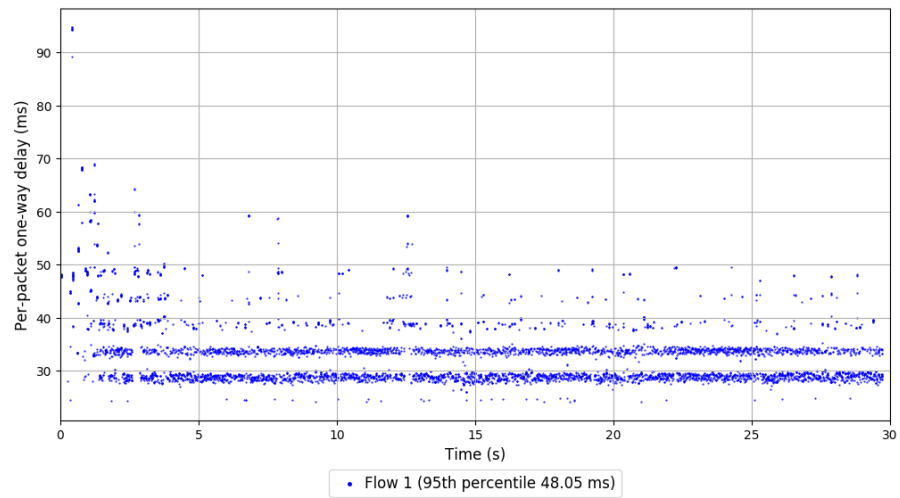
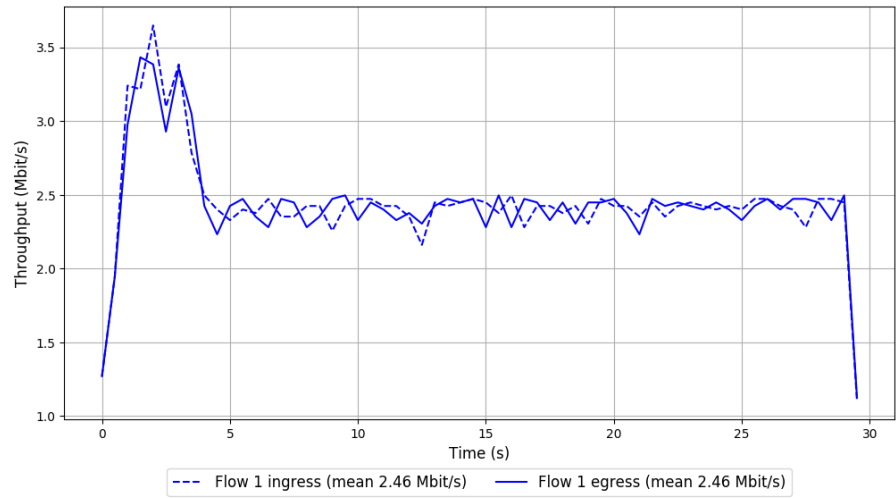


Run 1: Statistics of Indigo-1-32

Start at: 2018-02-12 20:25:52
End at: 2018-02-12 20:26:22
Local clock offset: 0.179 ms
Remote clock offset: -16.659 ms

Below is generated by plot.py at 2018-02-12 21:19:02
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.46 Mbit/s
95th percentile per-packet one-way delay: 48.053 ms
Loss rate: 0.28%
-- Flow 1:
Average throughput: 2.46 Mbit/s
95th percentile per-packet one-way delay: 48.053 ms
Loss rate: 0.28%

Run 1: Report of Indigo-1-32 — Data Link

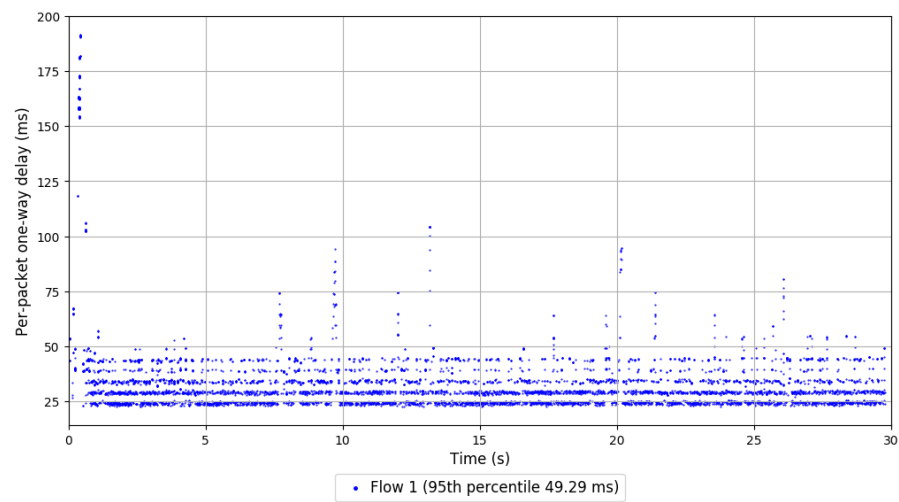
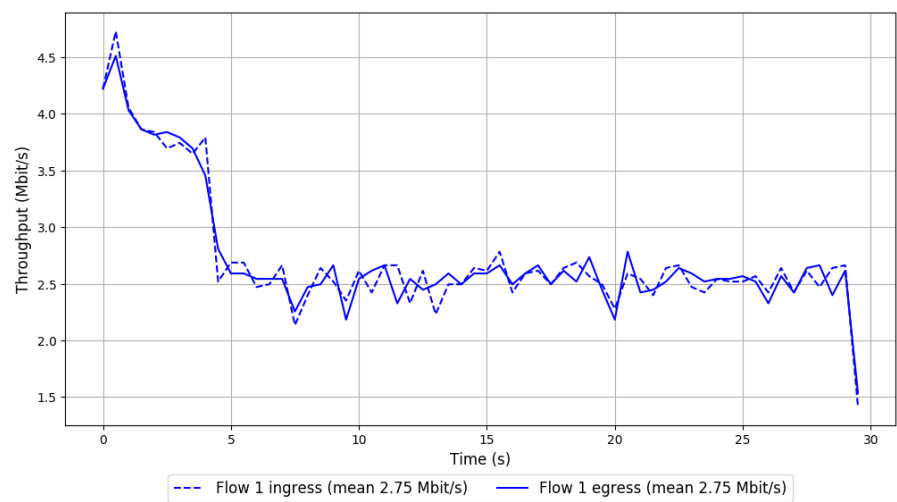


Run 2: Statistics of Indigo-1-32

Start at: 2018-02-12 20:45:35
End at: 2018-02-12 20:46:05
Local clock offset: -3.576 ms
Remote clock offset: -16.98 ms

Below is generated by plot.py at 2018-02-12 21:19:02
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.75 Mbit/s
95th percentile per-packet one-way delay: 49.294 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 2.75 Mbit/s
95th percentile per-packet one-way delay: 49.294 ms
Loss rate: 0.12%

Run 2: Report of Indigo-1-32 — Data Link

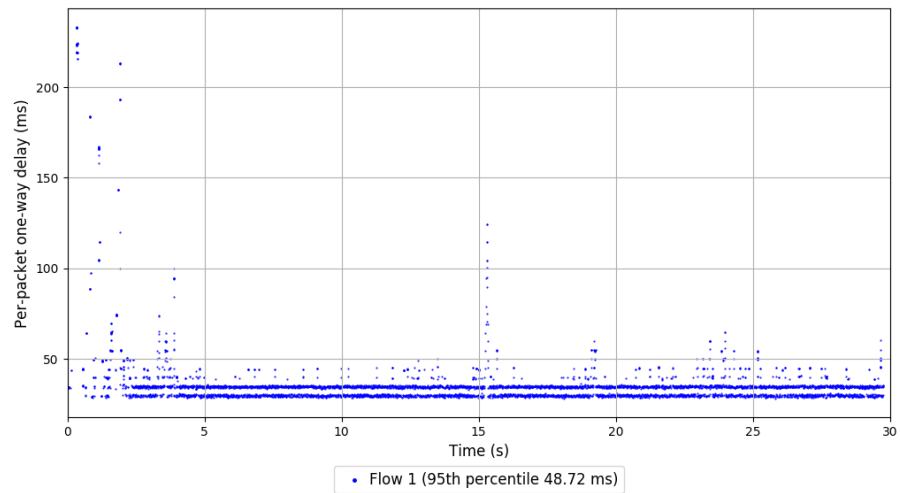
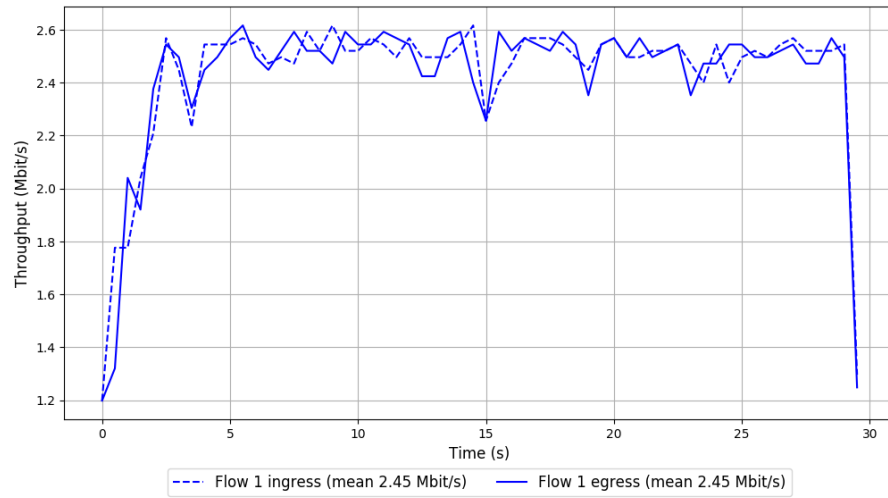


Run 3: Statistics of Indigo-1-32

Start at: 2018-02-12 21:05:16
End at: 2018-02-12 21:05:46
Local clock offset: -0.359 ms
Remote clock offset: -19.629 ms

Below is generated by plot.py at 2018-02-12 21:19:02
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.45 Mbit/s
95th percentile per-packet one-way delay: 48.720 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 2.45 Mbit/s
95th percentile per-packet one-way delay: 48.720 ms
Loss rate: 0.18%

Run 3: Report of Indigo-1-32 — Data Link

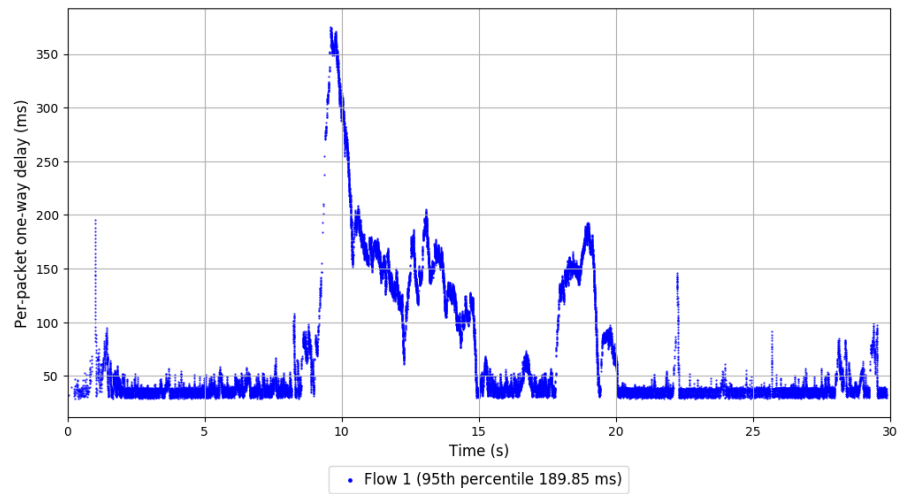
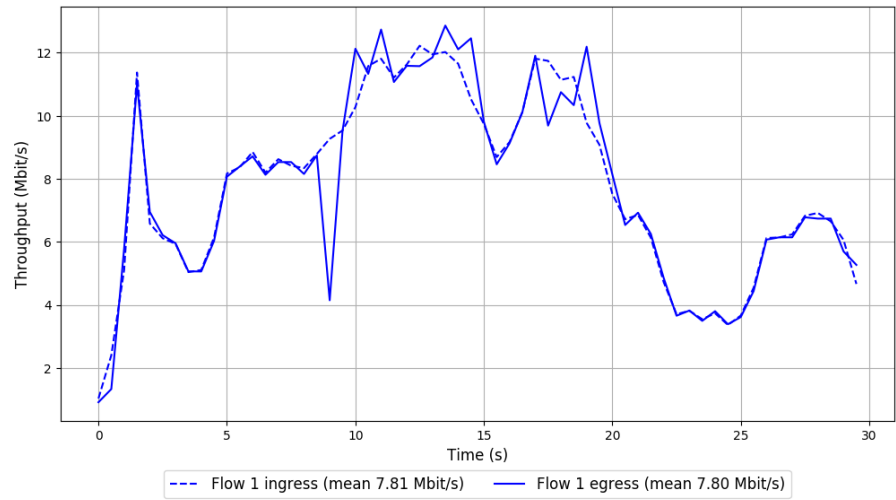


Run 1: Statistics of Vivace-latency

Start at: 2018-02-12 20:19:14
End at: 2018-02-12 20:19:44
Local clock offset: -5.16 ms
Remote clock offset: -15.996 ms

Below is generated by plot.py at 2018-02-12 21:19:02
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.80 Mbit/s
95th percentile per-packet one-way delay: 189.852 ms
Loss rate: 0.24%
-- Flow 1:
Average throughput: 7.80 Mbit/s
95th percentile per-packet one-way delay: 189.852 ms
Loss rate: 0.24%

Run 1: Report of Vivace-latency — Data Link

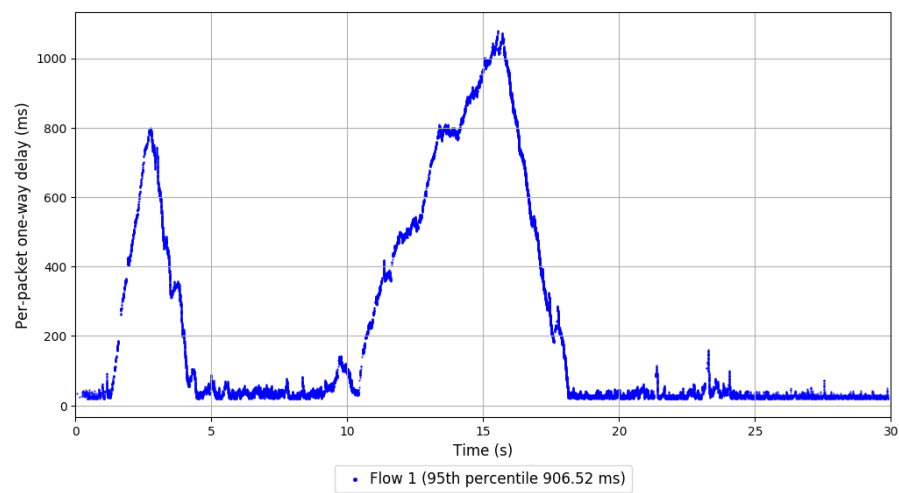
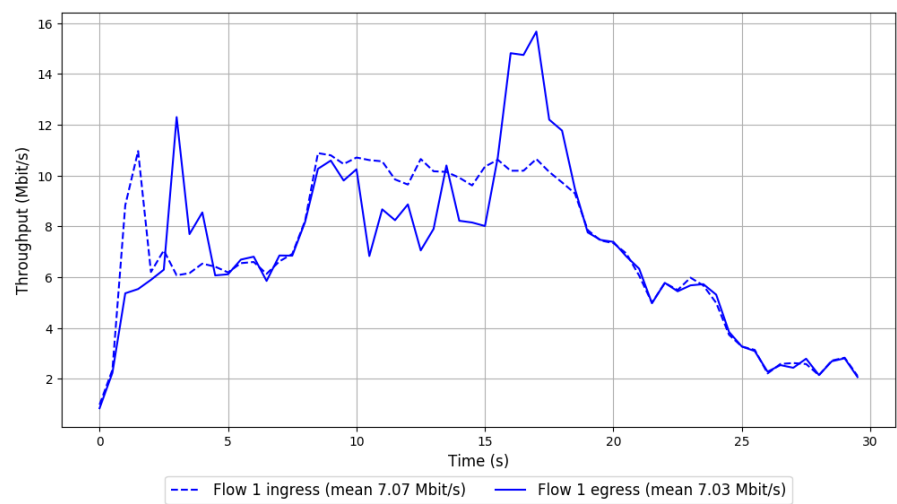


Run 2: Statistics of Vivace-latency

Start at: 2018-02-12 20:39:02
End at: 2018-02-12 20:39:32
Local clock offset: -1.716 ms
Remote clock offset: -16.109 ms

Below is generated by plot.py at 2018-02-12 21:19:02
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.03 Mbit/s
95th percentile per-packet one-way delay: 906.524 ms
Loss rate: 0.72%
-- Flow 1:
Average throughput: 7.03 Mbit/s
95th percentile per-packet one-way delay: 906.524 ms
Loss rate: 0.72%

Run 2: Report of Vivace-latency — Data Link

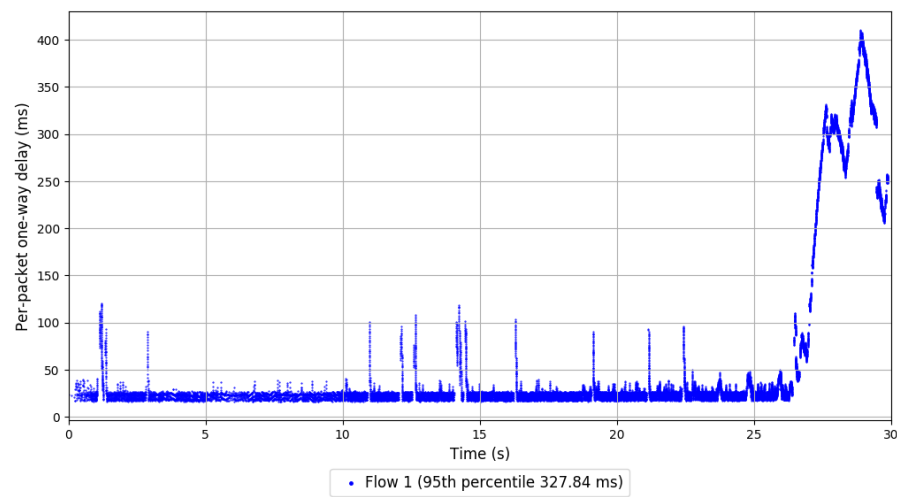
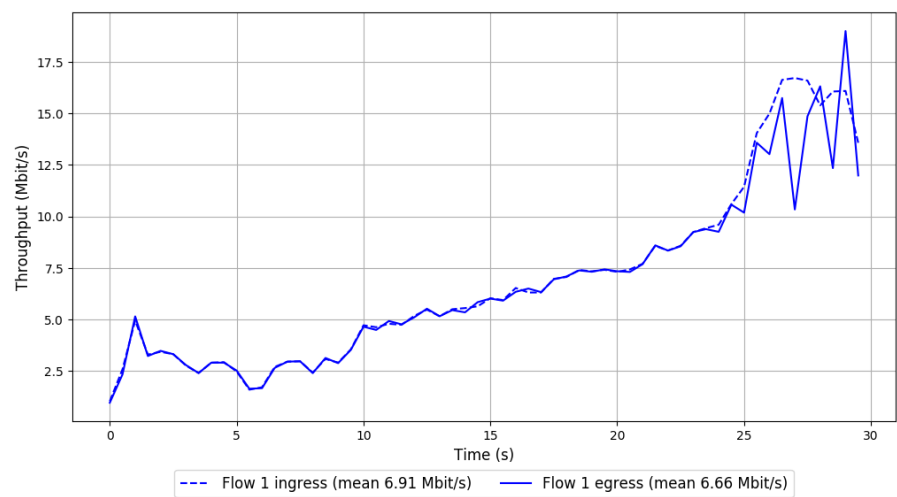


Run 3: Statistics of Vivace-latency

Start at: 2018-02-12 20:58:43
End at: 2018-02-12 20:59:13
Local clock offset: 1.006 ms
Remote clock offset: -21.976 ms

Below is generated by plot.py at 2018-02-12 21:19:02
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.66 Mbit/s
95th percentile per-packet one-way delay: 327.837 ms
Loss rate: 3.63%
-- Flow 1:
Average throughput: 6.66 Mbit/s
95th percentile per-packet one-way delay: 327.837 ms
Loss rate: 3.63%

Run 3: Report of Vivace-latency — Data Link

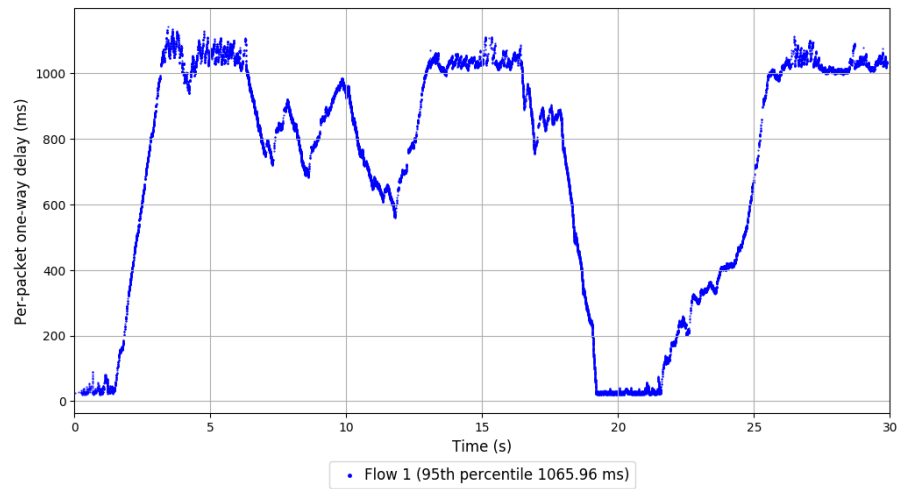
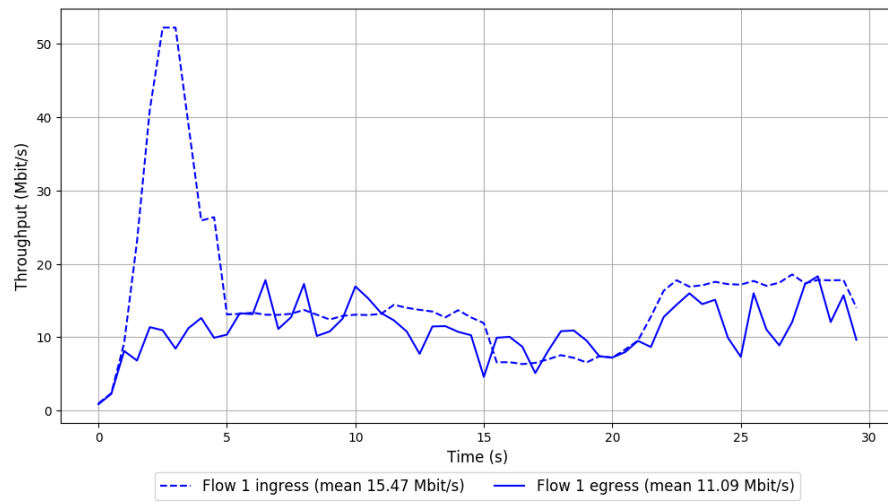


```
Run 1: Statistics of Vivace-loss

Start at: 2018-02-12 20:34:38
End at: 2018-02-12 20:35:08
Local clock offset: -1.716 ms
Remote clock offset: -15.883 ms

# Below is generated by plot.py at 2018-02-12 21:19:02
# Datalink statistics
-- Total of 1 flow:
Average throughput: 11.09 Mbit/s
95th percentile per-packet one-way delay: 1065.957 ms
Loss rate: 28.43%
-- Flow 1:
Average throughput: 11.09 Mbit/s
95th percentile per-packet one-way delay: 1065.957 ms
Loss rate: 28.43%
```

Run 1: Report of Vivace-loss — Data Link

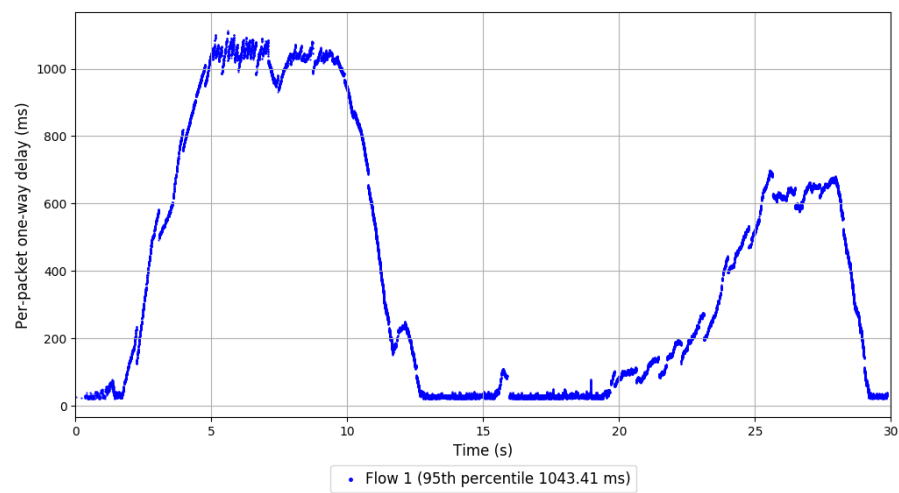
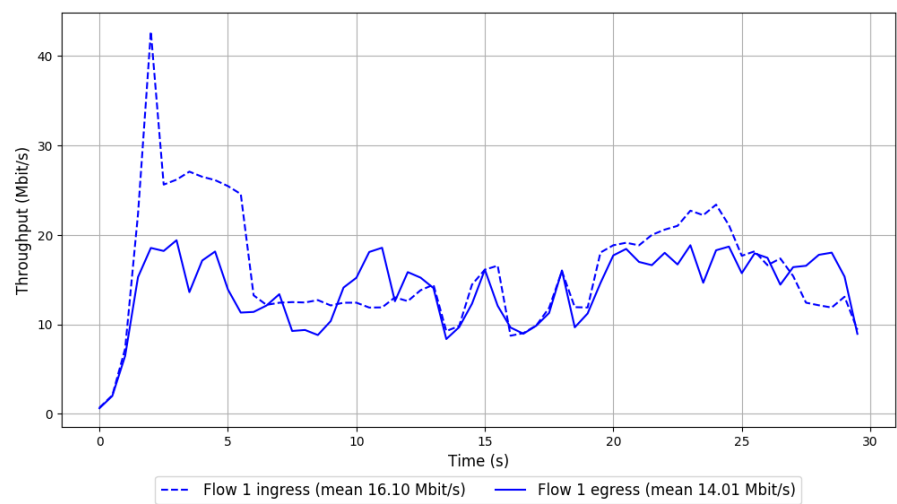


Run 2: Statistics of Vivace-loss

Start at: 2018-02-12 20:54:20
End at: 2018-02-12 20:54:50
Local clock offset: -1.87 ms
Remote clock offset: -19.84 ms

Below is generated by plot.py at 2018-02-12 21:19:02
Datalink statistics
-- Total of 1 flow:
Average throughput: 14.01 Mbit/s
95th percentile per-packet one-way delay: 1043.412 ms
Loss rate: 13.09%
-- Flow 1:
Average throughput: 14.01 Mbit/s
95th percentile per-packet one-way delay: 1043.412 ms
Loss rate: 13.09%

Run 2: Report of Vivace-loss — Data Link



Run 3: Statistics of Vivace-loss

Start at: 2018-02-12 21:13:59

End at: 2018-02-12 21:14:29

Local clock offset: 0.634 ms

Remote clock offset: -23.293 ms

Below is generated by plot.py at 2018-02-12 21:19:02

Datalink statistics

-- Total of 1 flow:

Average throughput: 12.72 Mbit/s

95th percentile per-packet one-way delay: 1035.241 ms

Loss rate: 12.06%

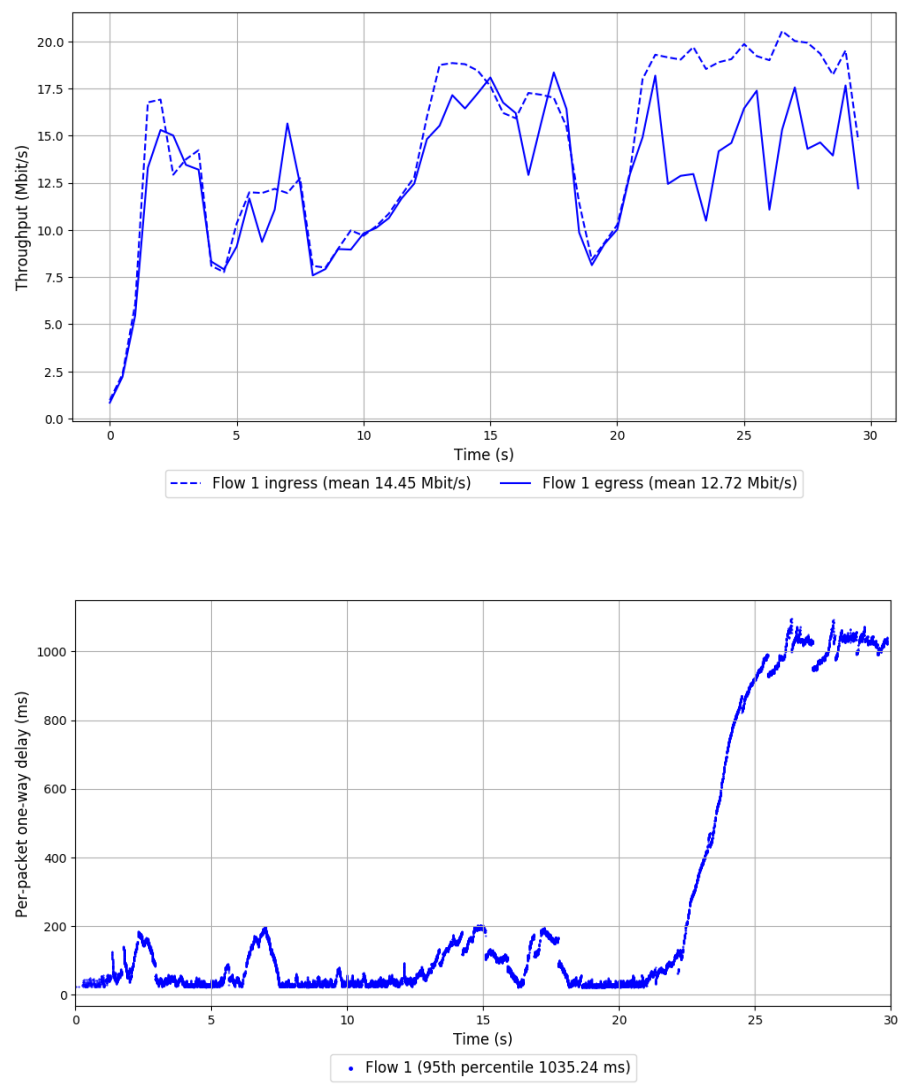
-- Flow 1:

Average throughput: 12.72 Mbit/s

95th percentile per-packet one-way delay: 1035.241 ms

Loss rate: 12.06%

Run 3: Report of Vivace-loss — Data Link

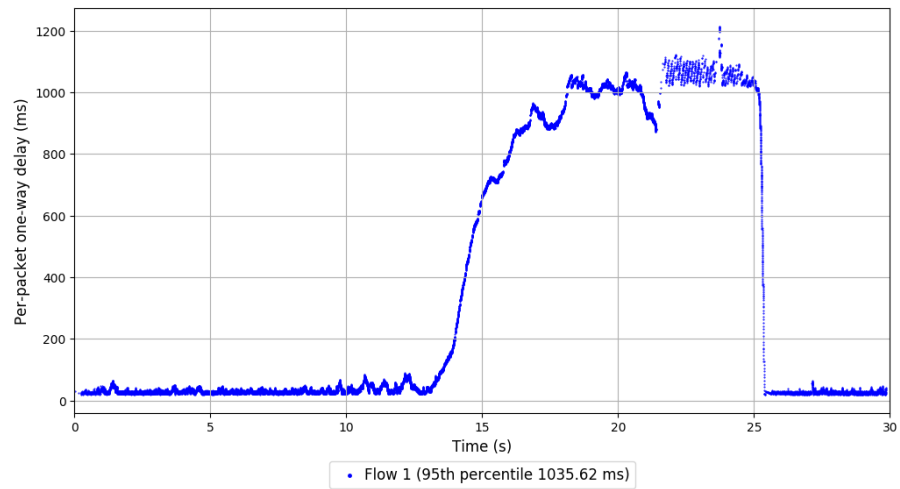
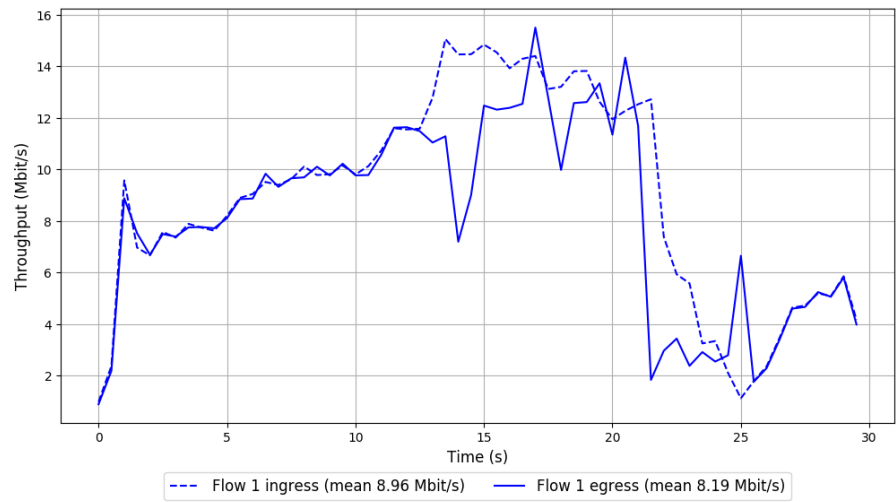


Run 1: Statistics of Vivace-LTE

Start at: 2018-02-12 20:18:08
End at: 2018-02-12 20:18:38
Local clock offset: -3.385 ms
Remote clock offset: -16.455 ms

Below is generated by plot.py at 2018-02-12 21:19:02
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.19 Mbit/s
95th percentile per-packet one-way delay: 1035.616 ms
Loss rate: 8.80%
-- Flow 1:
Average throughput: 8.19 Mbit/s
95th percentile per-packet one-way delay: 1035.616 ms
Loss rate: 8.80%

Run 1: Report of Vivace-LTE — Data Link



Run 2: Statistics of Vivace-LTE

Start at: 2018-02-12 20:37:56

End at: 2018-02-12 20:38:26

Local clock offset: -1.94 ms

Remote clock offset: -15.51 ms

Below is generated by plot.py at 2018-02-12 21:19:02

Datalink statistics

-- Total of 1 flow:

Average throughput: 10.48 Mbit/s

95th percentile per-packet one-way delay: 1034.225 ms

Loss rate: 7.30%

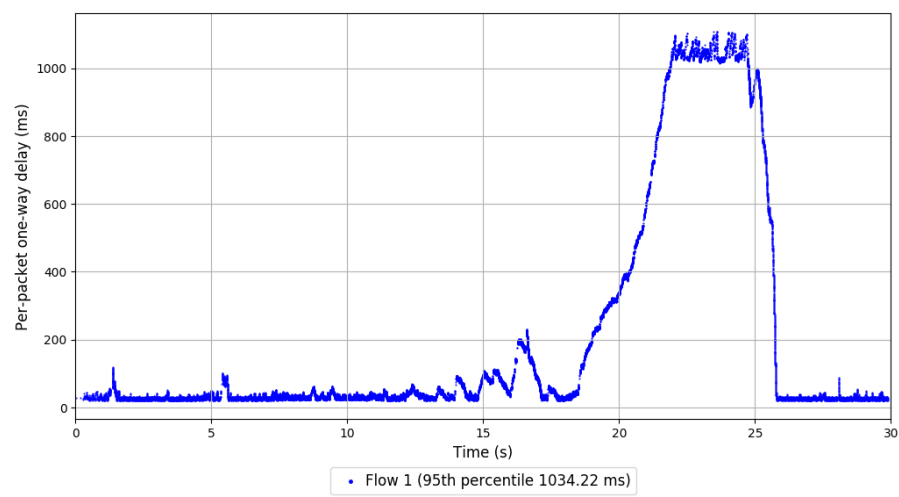
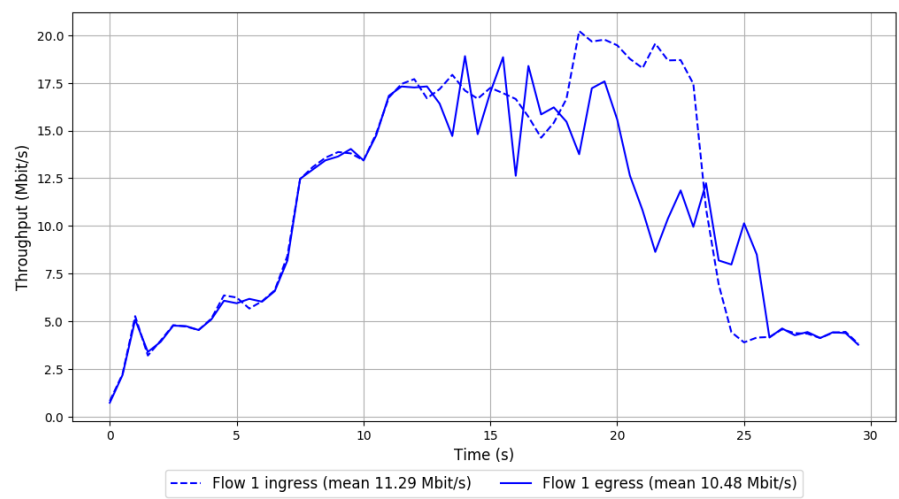
-- Flow 1:

Average throughput: 10.48 Mbit/s

95th percentile per-packet one-way delay: 1034.225 ms

Loss rate: 7.30%

Run 2: Report of Vivace-LTE — Data Link



Run 3: Statistics of Vivace-LTE

Start at: 2018-02-12 20:57:37
End at: 2018-02-12 20:58:07
Local clock offset: 0.098 ms
Remote clock offset: -19.621 ms

Below is generated by plot.py at 2018-02-12 21:19:02
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.58 Mbit/s
95th percentile per-packet one-way delay: 983.572 ms
Loss rate: 5.07%
-- Flow 1:
Average throughput: 7.58 Mbit/s
95th percentile per-packet one-way delay: 983.572 ms
Loss rate: 5.07%

Run 3: Report of Vivace-LTE — Data Link

