

Pantheon Report

Generated at 2018-03-12 22:20:15 (UTC).

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

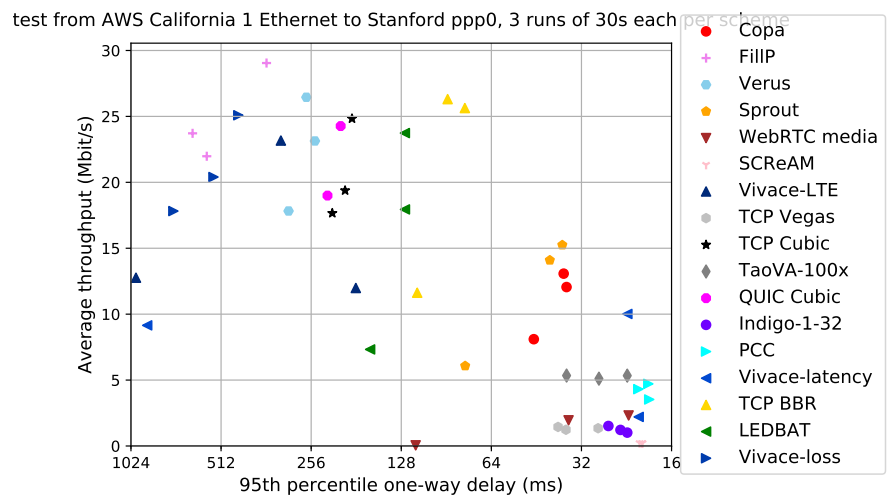
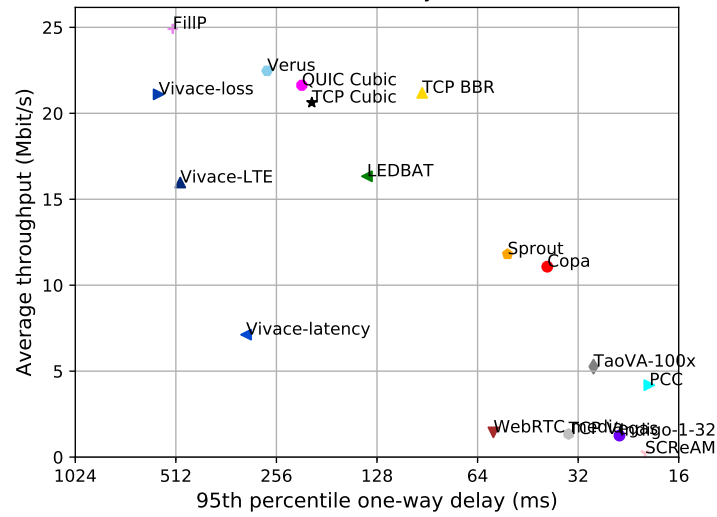
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

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

Git summary:

```
branch: master @ f12c42a2c63fdd9a862eefa0468859bf379b6623
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/fillp @ 828bbf95fd4941149b5cec90f281d1c69ae1a5c6
third_party/genericCC @ 9249eea3238475c4d8cca1443d28df70bff6c4a2
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 California 1 Ethernet to Stanford ppp0, 3 runs of 30s each per scheme
(mean of all runs by 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	21.19	93.76	0.15
TCP Cubic	3	20.62	200.59	0.29
LEDBAT	3	16.33	137.21	0.19
PCC	3	4.18	19.60	0.00
QUIC Cubic	2	21.63	214.89	0.29
SCReAM	3	0.22	20.19	0.00
WebRTC media	3	1.44	57.39	0.01
Sprout	3	11.81	52.06	0.00
TaoVA-100x	3	5.26	28.79	0.00
TCP Vegas	3	1.34	34.17	0.00
Verus	3	22.47	272.97	4.51
Copa	3	11.08	39.59	0.00
FillP	3	24.92	523.28	48.84
Indigo-1-32	3	1.25	24.07	0.00
Vivace-latency	3	7.13	315.67	1.10
Vivace-loss	3	21.10	576.55	25.21
Vivace-LTE	3	15.97	496.71	6.56

Run 1: Statistics of TCP BBR

Start at: 2018-03-12 21:14:59

End at: 2018-03-12 21:15:29

Local clock offset: 19.253 ms

Remote clock offset: -6.2 ms

Below is generated by plot.py at 2018-03-12 22:18:59

Datalink statistics

-- Total of 1 flow:

Average throughput: 25.63 Mbit/s

95th percentile per-packet one-way delay: 78.478 ms

Loss rate: 0.00%

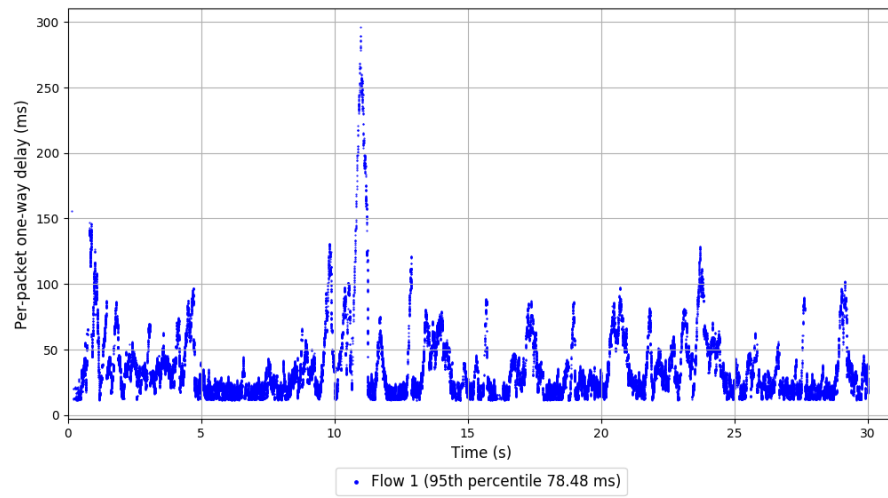
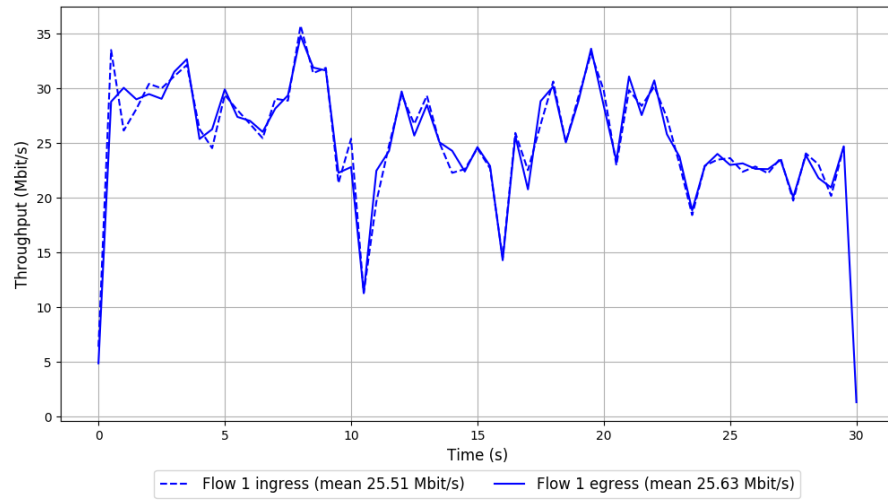
-- Flow 1:

Average throughput: 25.63 Mbit/s

95th percentile per-packet one-way delay: 78.478 ms

Loss rate: 0.00%

Run 1: Report of TCP BBR — Data Link

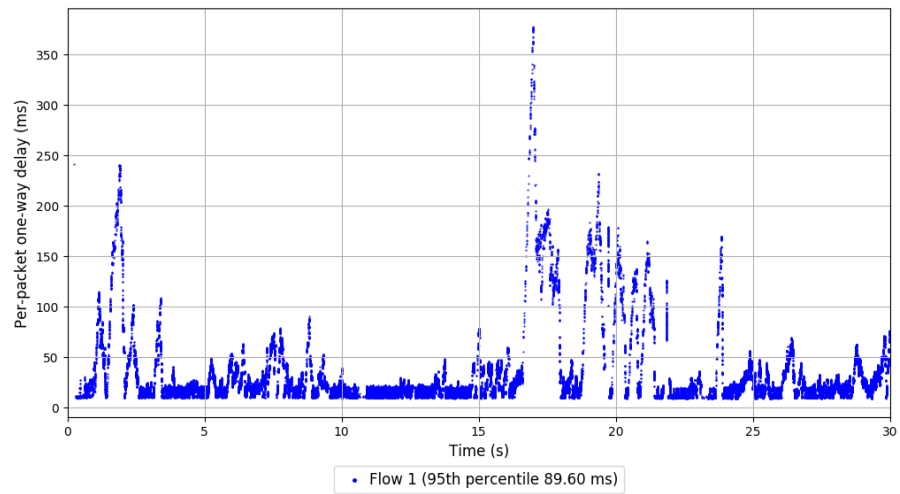
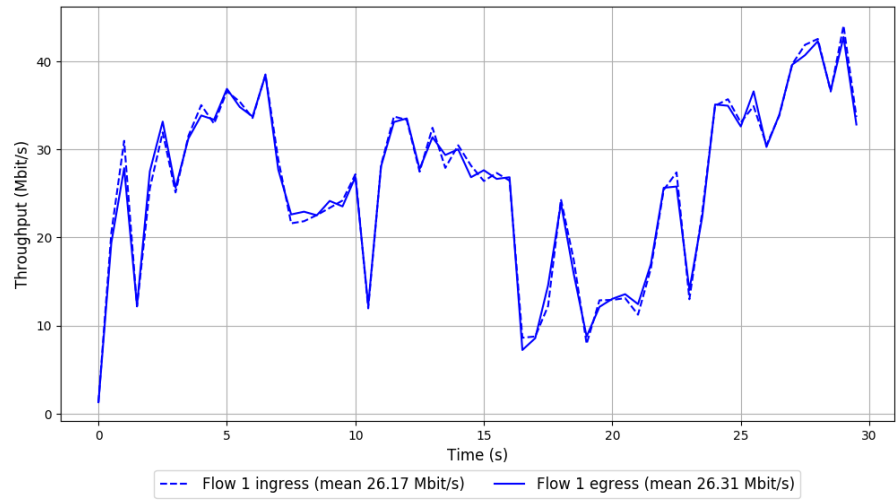


Run 2: Statistics of TCP BBR

Start at: 2018-03-12 21:38:39
End at: 2018-03-12 21:39:09
Local clock offset: 18.357 ms
Remote clock offset: -5.434 ms

Below is generated by plot.py at 2018-03-12 22:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 26.31 Mbit/s
95th percentile per-packet one-way delay: 89.599 ms
Loss rate: 0.27%
-- Flow 1:
Average throughput: 26.31 Mbit/s
95th percentile per-packet one-way delay: 89.599 ms
Loss rate: 0.27%

Run 2: Report of TCP BBR — Data Link

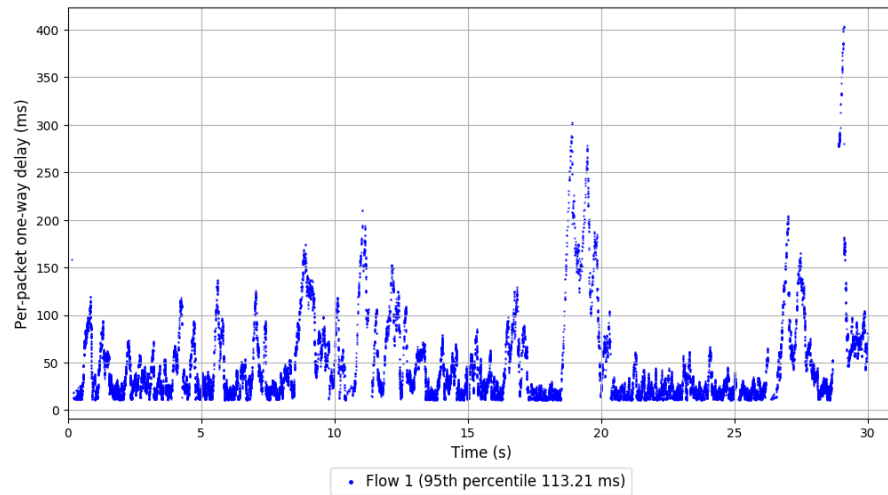
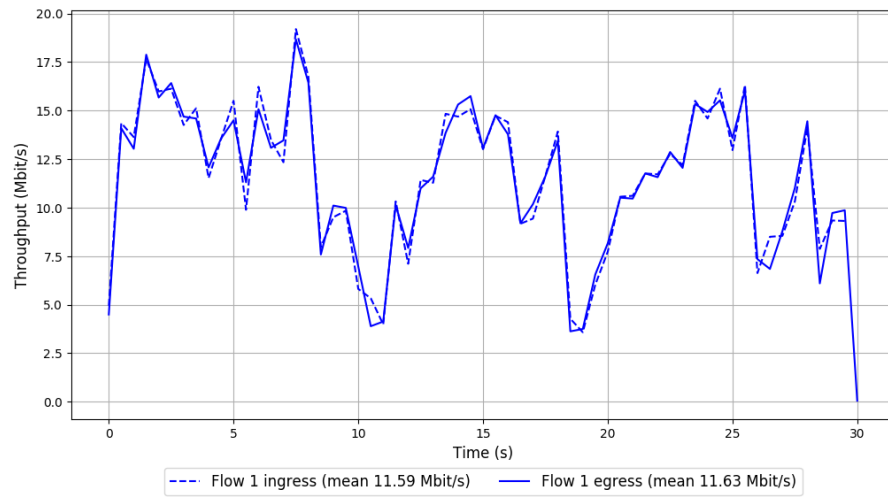


Run 3: Statistics of TCP BBR

Start at: 2018-03-12 22:02:19
End at: 2018-03-12 22:02:49
Local clock offset: -1.594 ms
Remote clock offset: -6.327 ms

Below is generated by plot.py at 2018-03-12 22:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 11.63 Mbit/s
95th percentile per-packet one-way delay: 113.211 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 11.63 Mbit/s
95th percentile per-packet one-way delay: 113.211 ms
Loss rate: 0.18%

Run 3: Report of TCP BBR — Data Link

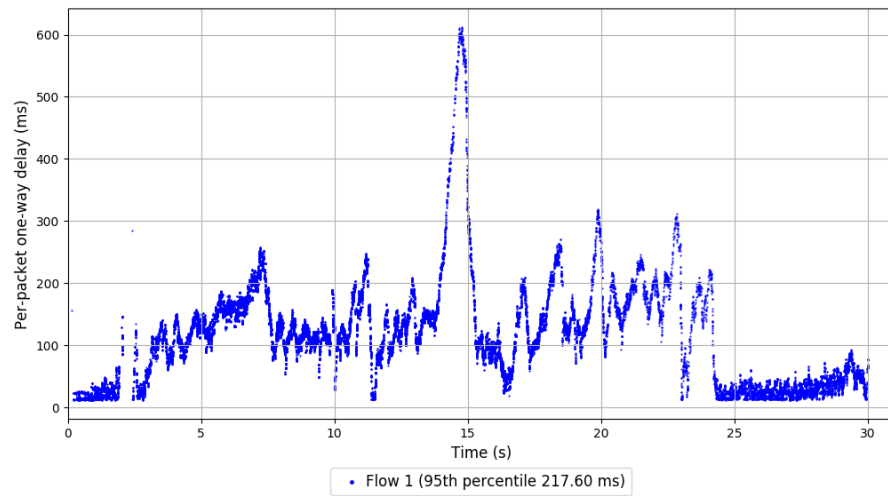
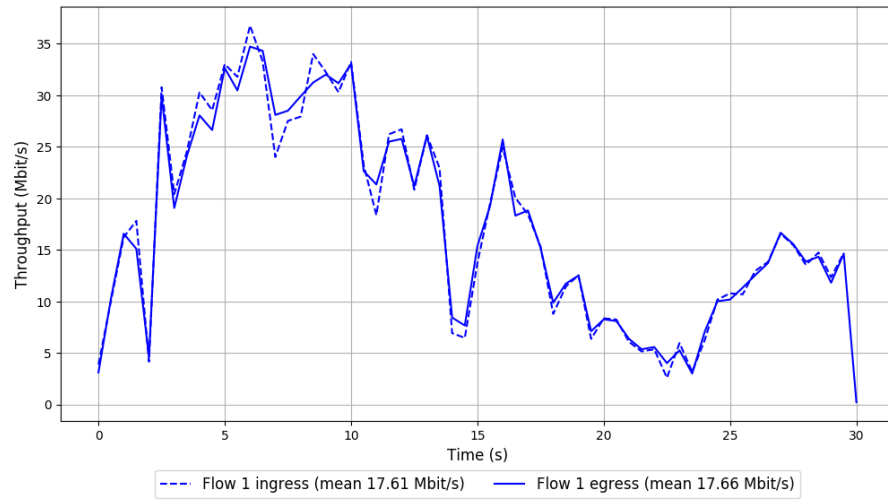


Run 1: Statistics of TCP Cubic

Start at: 2018-03-12 21:21:34
End at: 2018-03-12 21:22:04
Local clock offset: 21.137 ms
Remote clock offset: -5.641 ms

Below is generated by plot.py at 2018-03-12 22:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 17.66 Mbit/s
95th percentile per-packet one-way delay: 217.601 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 17.66 Mbit/s
95th percentile per-packet one-way delay: 217.601 ms
Loss rate: 0.15%

Run 1: Report of TCP Cubic — Data Link

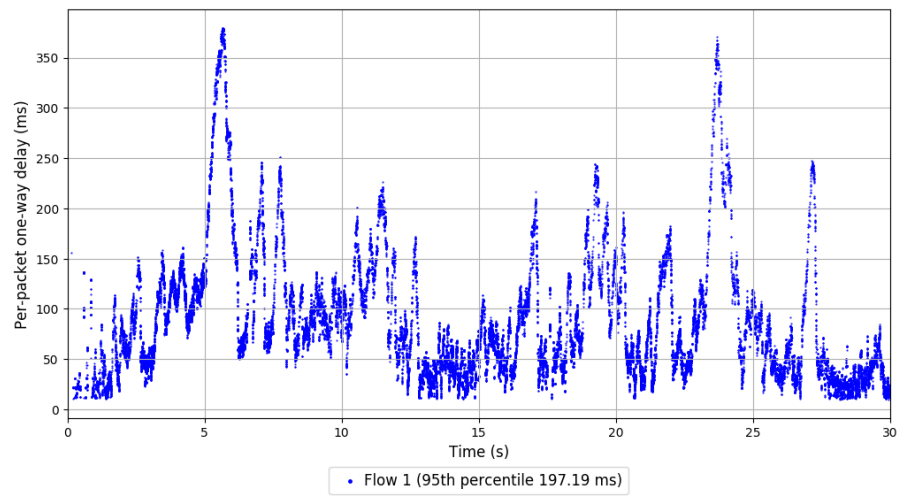
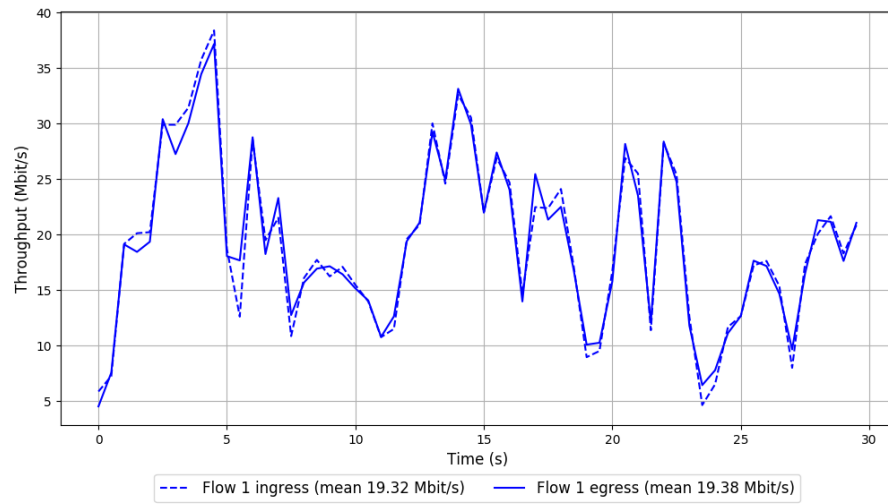


Run 2: Statistics of TCP Cubic

Start at: 2018-03-12 21:45:14
End at: 2018-03-12 21:45:44
Local clock offset: 7.929 ms
Remote clock offset: -5.459 ms

Below is generated by plot.py at 2018-03-12 22:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 19.38 Mbit/s
95th percentile per-packet one-way delay: 197.191 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 19.38 Mbit/s
95th percentile per-packet one-way delay: 197.191 ms
Loss rate: 0.13%

Run 2: Report of TCP Cubic — Data Link

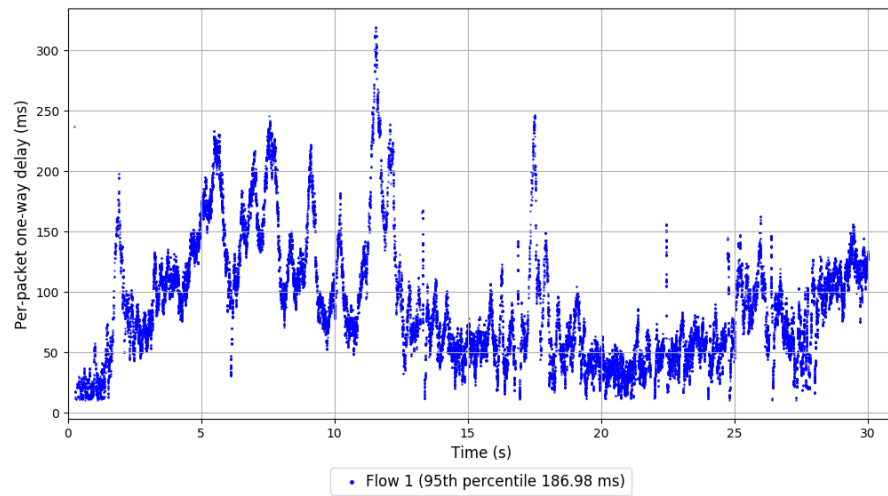
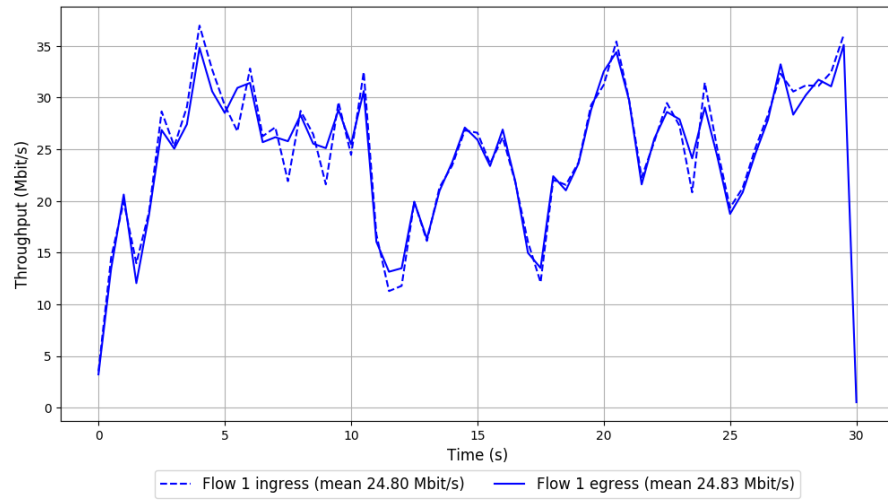


Run 3: Statistics of TCP Cubic

Start at: 2018-03-12 22:08:53
End at: 2018-03-12 22:09:23
Local clock offset: -3.276 ms
Remote clock offset: -6.425 ms

Below is generated by plot.py at 2018-03-12 22:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 24.83 Mbit/s
95th percentile per-packet one-way delay: 186.981 ms
Loss rate: 0.59%
-- Flow 1:
Average throughput: 24.83 Mbit/s
95th percentile per-packet one-way delay: 186.981 ms
Loss rate: 0.59%

Run 3: Report of TCP Cubic — Data Link

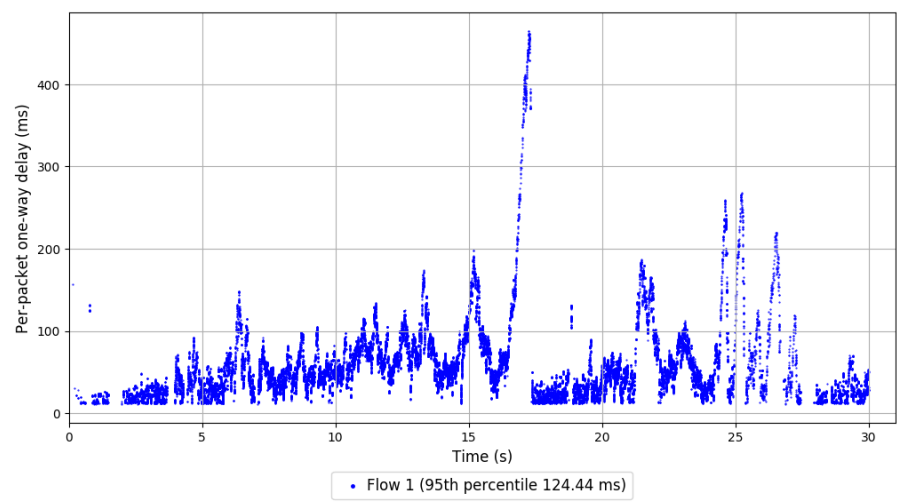
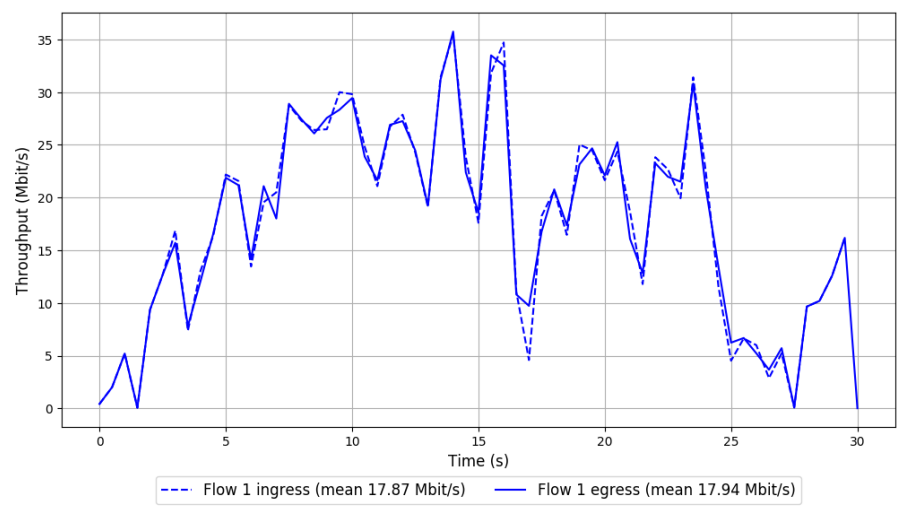


Run 1: Statistics of LEDBAT

Start at: 2018-03-12 21:25:31
End at: 2018-03-12 21:26:01
Local clock offset: 22.445 ms
Remote clock offset: -5.514 ms

Below is generated by plot.py at 2018-03-12 22:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 17.94 Mbit/s
95th percentile per-packet one-way delay: 124.439 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 17.94 Mbit/s
95th percentile per-packet one-way delay: 124.439 ms
Loss rate: 0.01%

Run 1: Report of LEDBAT — Data Link

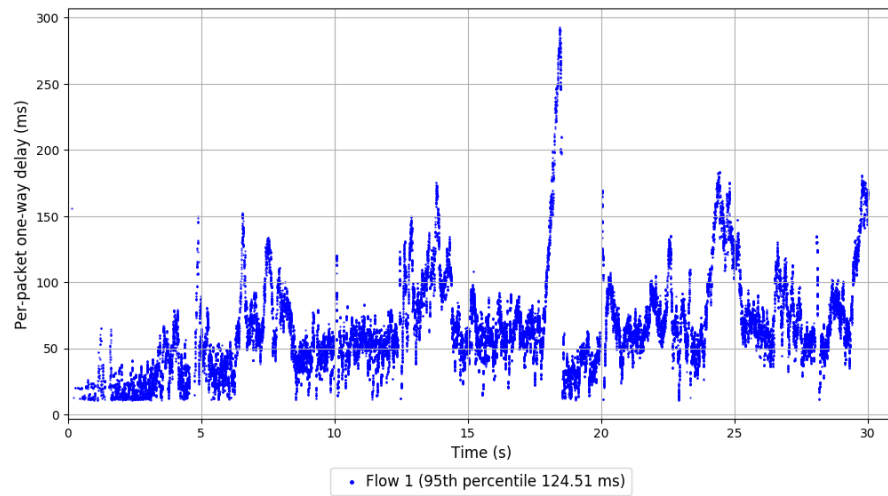
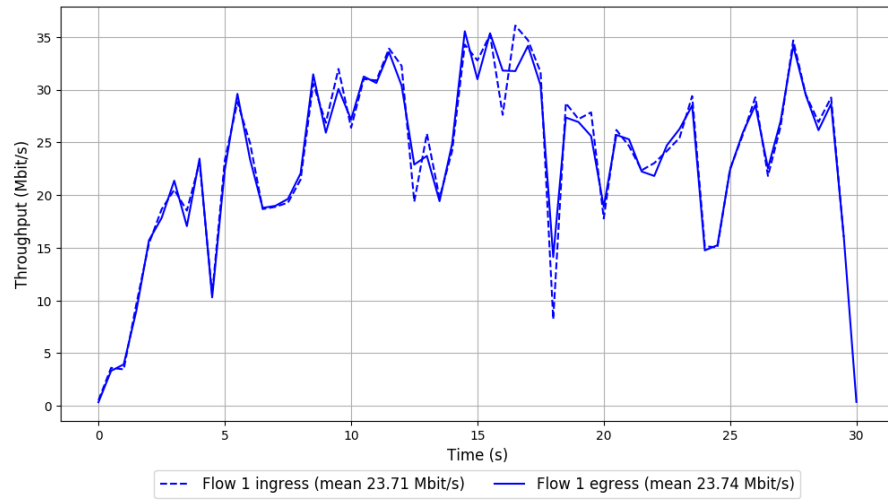


Run 2: Statistics of LEDBAT

Start at: 2018-03-12 21:49:12
End at: 2018-03-12 21:49:42
Local clock offset: 4.425 ms
Remote clock offset: -5.734 ms

Below is generated by plot.py at 2018-03-12 22:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 23.74 Mbit/s
95th percentile per-packet one-way delay: 124.508 ms
Loss rate: 0.34%
-- Flow 1:
Average throughput: 23.74 Mbit/s
95th percentile per-packet one-way delay: 124.508 ms
Loss rate: 0.34%

Run 2: Report of LEDBAT — Data Link

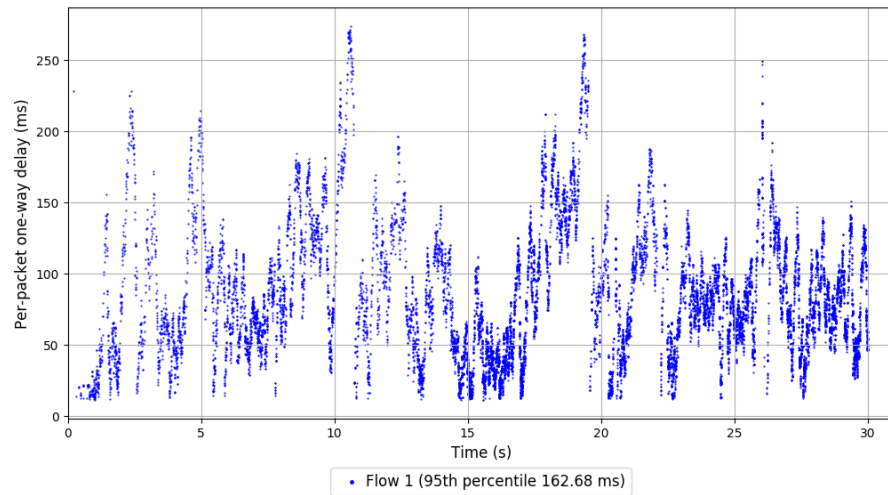
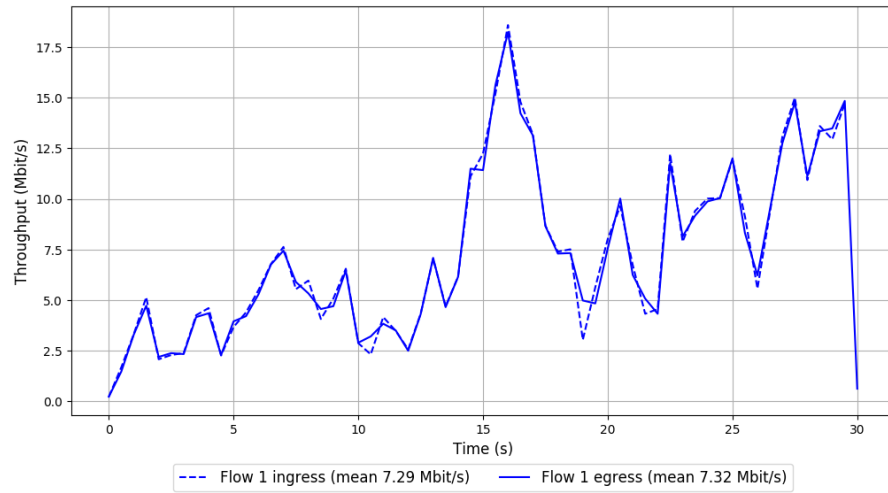


Run 3: Statistics of LEDBAT

Start at: 2018-03-12 22:12:51
End at: 2018-03-12 22:13:21
Local clock offset: -2.307 ms
Remote clock offset: -6.533 ms

Below is generated by plot.py at 2018-03-12 22:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.32 Mbit/s
95th percentile per-packet one-way delay: 162.675 ms
Loss rate: 0.22%
-- Flow 1:
Average throughput: 7.32 Mbit/s
95th percentile per-packet one-way delay: 162.675 ms
Loss rate: 0.22%

Run 3: Report of LEDBAT — Data Link

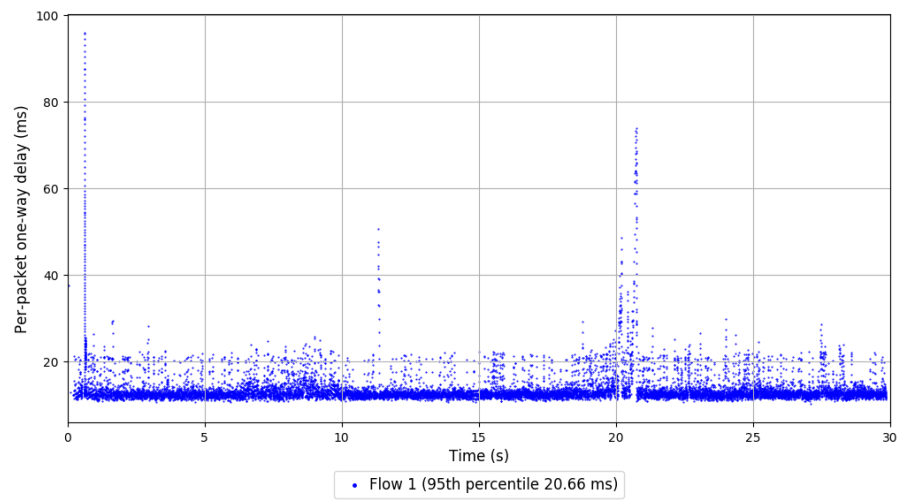
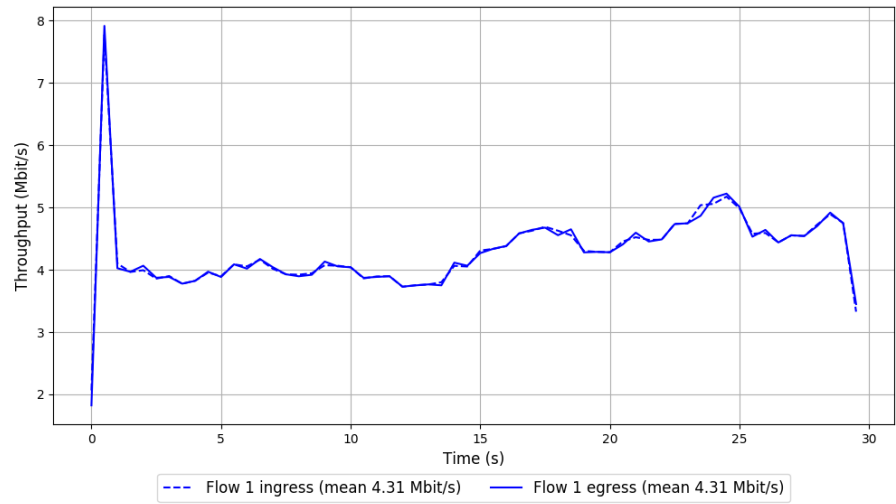


Run 1: Statistics of PCC

Start at: 2018-03-12 21:20:15
End at: 2018-03-12 21:20:45
Local clock offset: 20.832 ms
Remote clock offset: -5.811 ms

Below is generated by plot.py at 2018-03-12 22:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 4.31 Mbit/s
95th percentile per-packet one-way delay: 20.663 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 4.31 Mbit/s
95th percentile per-packet one-way delay: 20.663 ms
Loss rate: 0.00%

Run 1: Report of PCC — Data Link



Run 2: Statistics of PCC

Start at: 2018-03-12 21:43:56

End at: 2018-03-12 21:44:26

Local clock offset: 9.456 ms

Remote clock offset: -5.32 ms

Below is generated by plot.py at 2018-03-12 22:19:00

Datalink statistics

-- Total of 1 flow:

Average throughput: 4.71 Mbit/s

95th percentile per-packet one-way delay: 19.128 ms

Loss rate: 0.00%

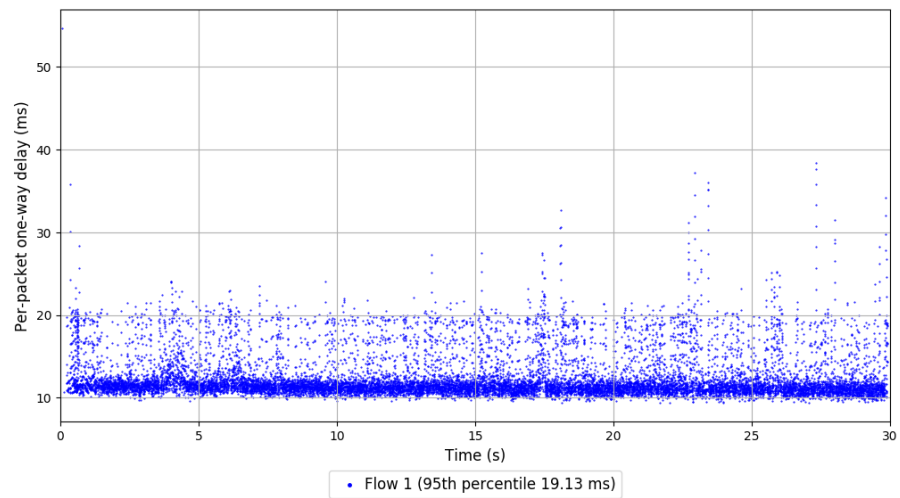
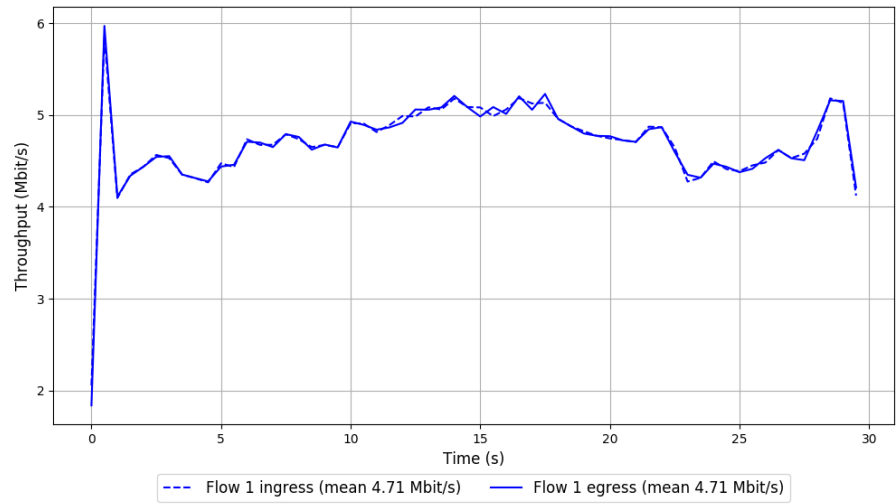
-- Flow 1:

Average throughput: 4.71 Mbit/s

95th percentile per-packet one-way delay: 19.128 ms

Loss rate: 0.00%

Run 2: Report of PCC — Data Link

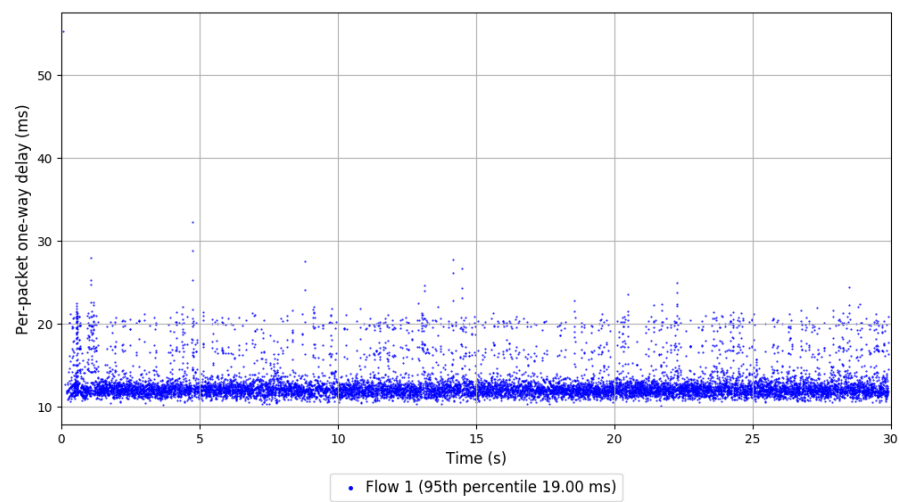
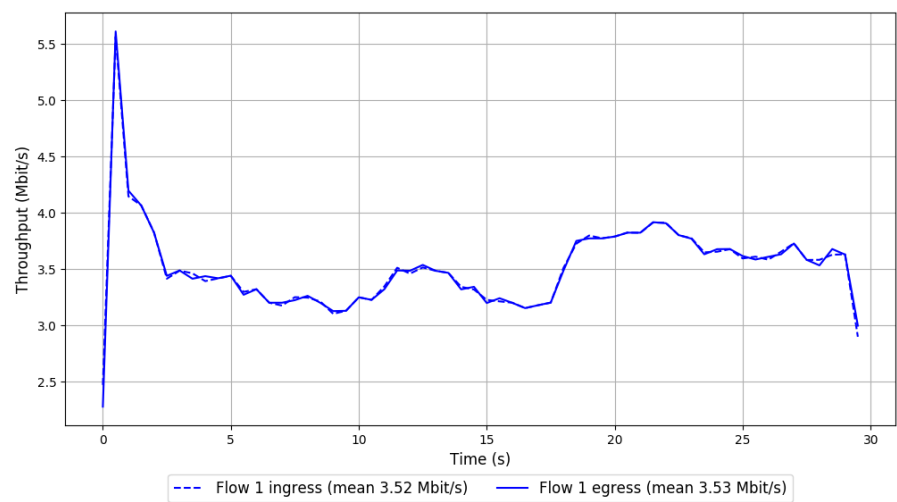


Run 3: Statistics of PCC

Start at: 2018-03-12 22:07:35
End at: 2018-03-12 22:08:05
Local clock offset: -2.978 ms
Remote clock offset: -6.372 ms

Below is generated by plot.py at 2018-03-12 22:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 3.53 Mbit/s
95th percentile per-packet one-way delay: 18.996 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 3.53 Mbit/s
95th percentile per-packet one-way delay: 18.996 ms
Loss rate: 0.00%

Run 3: Report of PCC — Data Link



Run 1: Statistics of QUIC Cubic

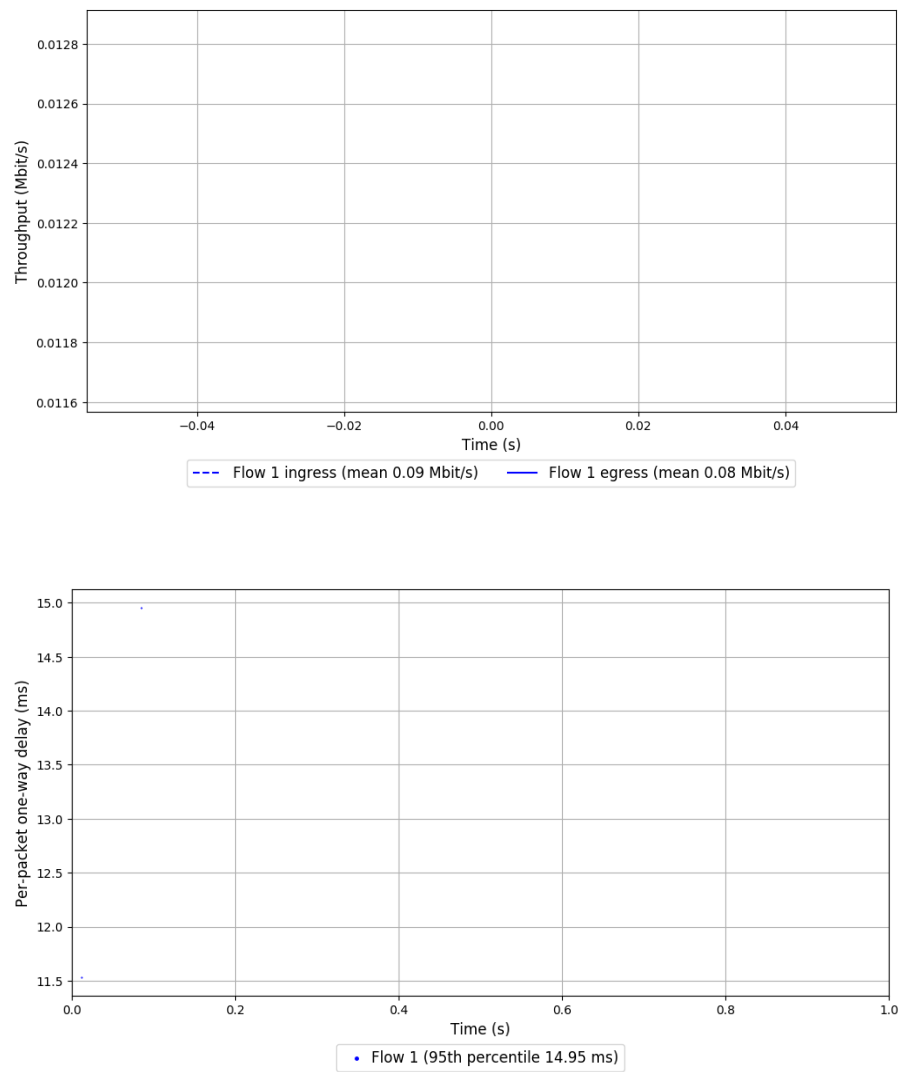
Start at: 2018-03-12 21:26:50

End at: 2018-03-12 21:27:20

Local clock offset: 22.806 ms

Remote clock offset: -5.511 ms

Run 1: Report of QUIC Cubic — Data Link

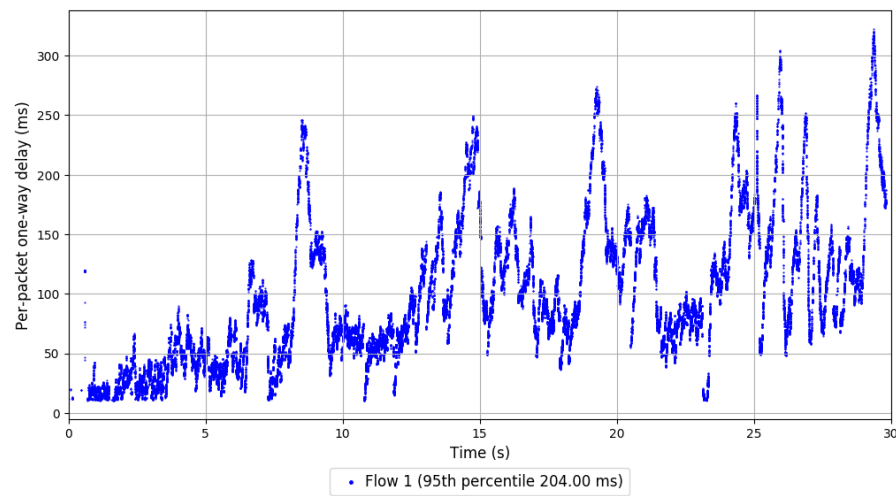
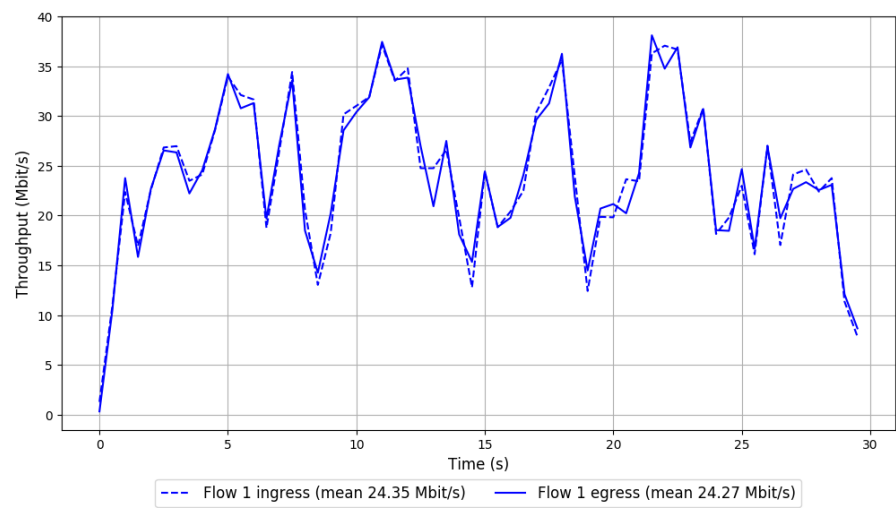


Run 2: Statistics of QUIC Cubic

Start at: 2018-03-12 21:50:31
End at: 2018-03-12 21:51:02
Local clock offset: 3.403 ms
Remote clock offset: -5.896 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 24.27 Mbit/s
95th percentile per-packet one-way delay: 204.001 ms
Loss rate: 0.33%
-- Flow 1:
Average throughput: 24.27 Mbit/s
95th percentile per-packet one-way delay: 204.001 ms
Loss rate: 0.33%

Run 2: Report of QUIC Cubic — Data Link

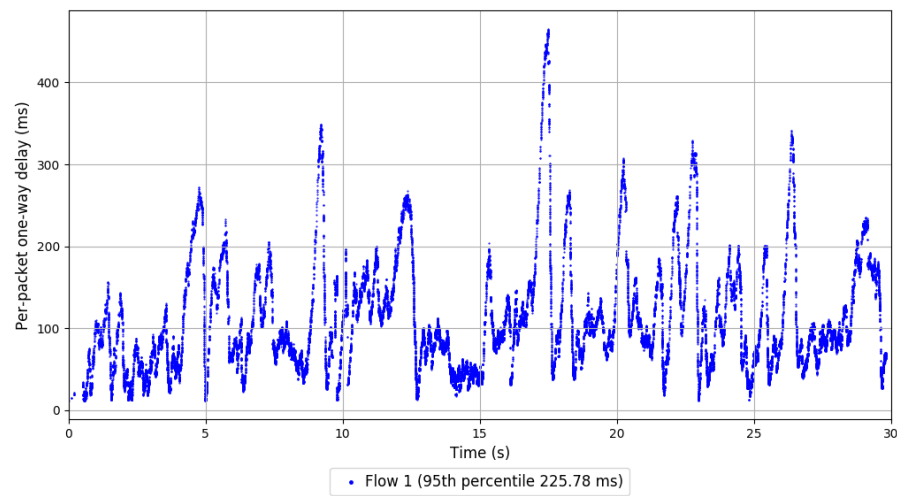
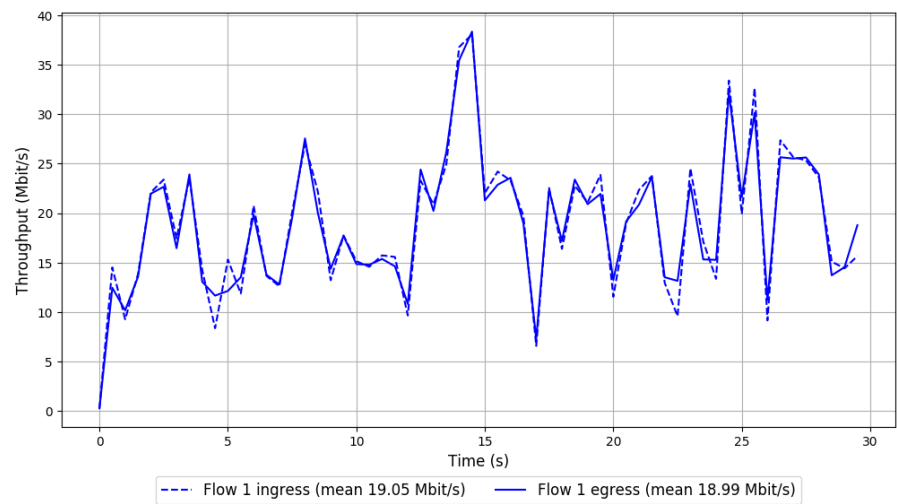


Run 3: Statistics of QUIC Cubic

Start at: 2018-03-12 22:14:09
End at: 2018-03-12 22:14:39
Local clock offset: -1.994 ms
Remote clock offset: -6.443 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 18.99 Mbit/s
95th percentile per-packet one-way delay: 225.781 ms
Loss rate: 0.24%
-- Flow 1:
Average throughput: 18.99 Mbit/s
95th percentile per-packet one-way delay: 225.781 ms
Loss rate: 0.24%

Run 3: Report of QUIC Cubic — Data Link

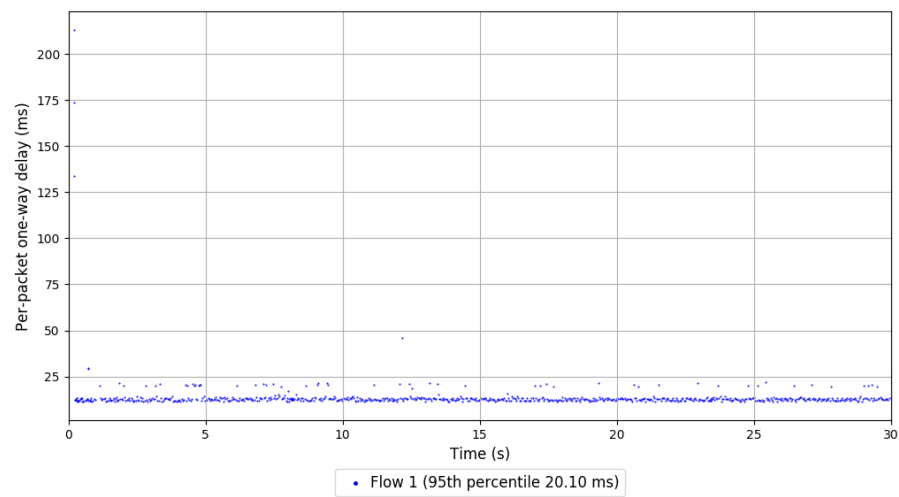
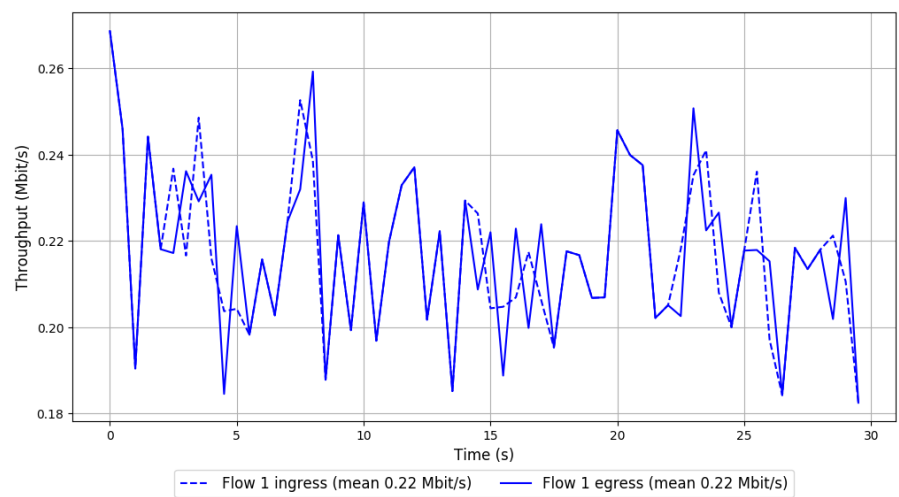


Run 1: Statistics of SCReAM

Start at: 2018-03-12 21:28:08
End at: 2018-03-12 21:28:38
Local clock offset: 23.213 ms
Remote clock offset: -5.446 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.096 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.096 ms
Loss rate: 0.00%

Run 1: Report of SReAM — Data Link

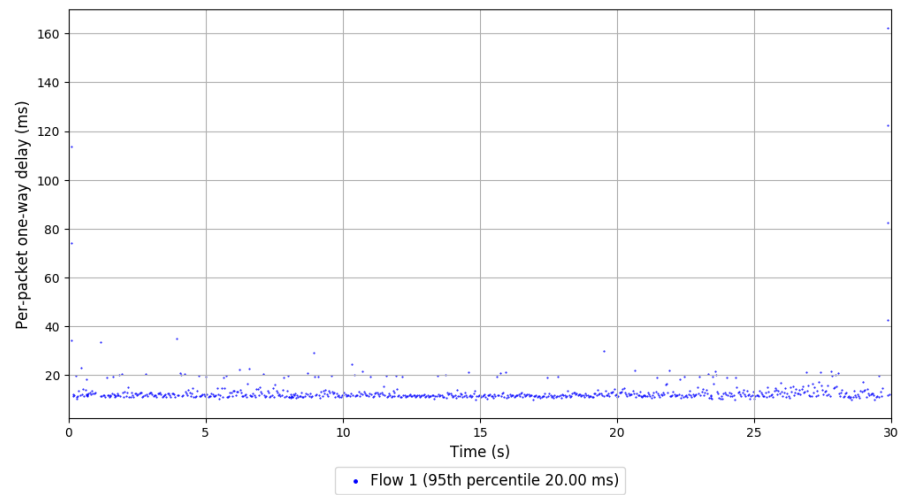
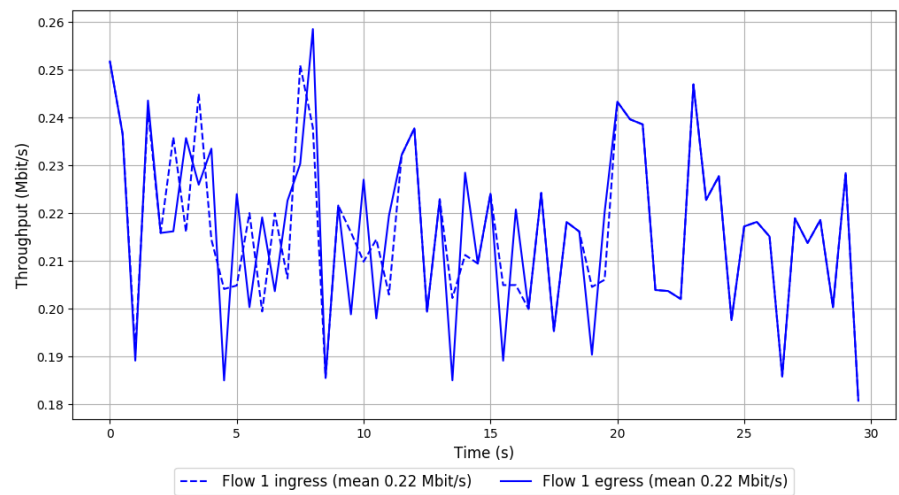


Run 2: Statistics of SCReAM

Start at: 2018-03-12 21:51:51
End at: 2018-03-12 21:52:21
Local clock offset: 2.668 ms
Remote clock offset: -5.946 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.002 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.002 ms
Loss rate: 0.00%

Run 2: Report of SReAM — Data Link

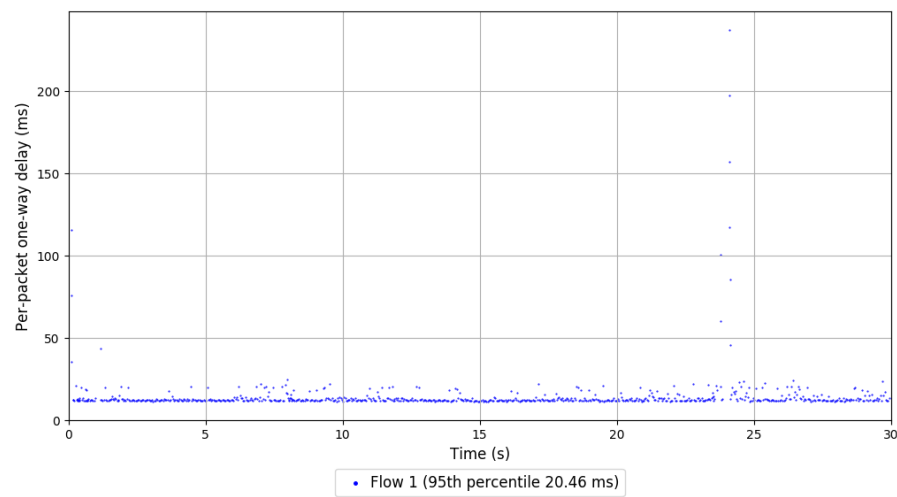
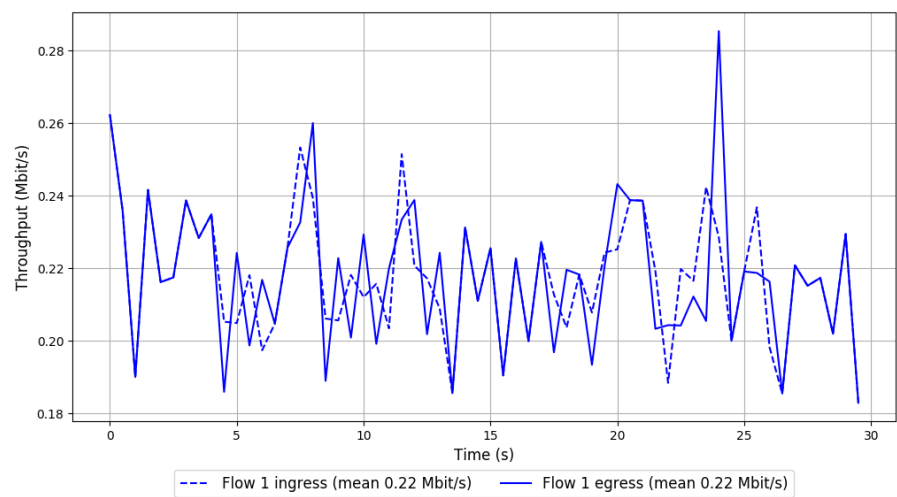


Run 3: Statistics of SCReAM

Start at: 2018-03-12 22:15:28
End at: 2018-03-12 22:15:58
Local clock offset: -1.793 ms
Remote clock offset: -6.564 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.462 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.462 ms
Loss rate: 0.00%

Run 3: Report of SReAM — Data Link

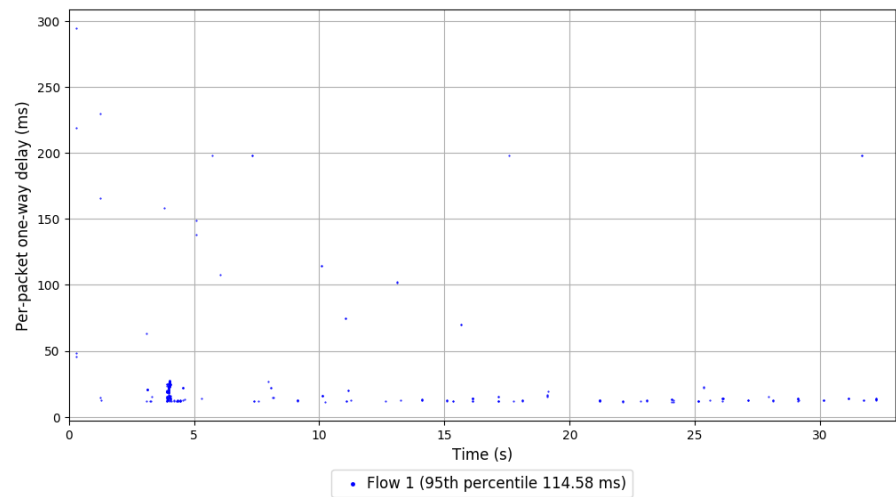
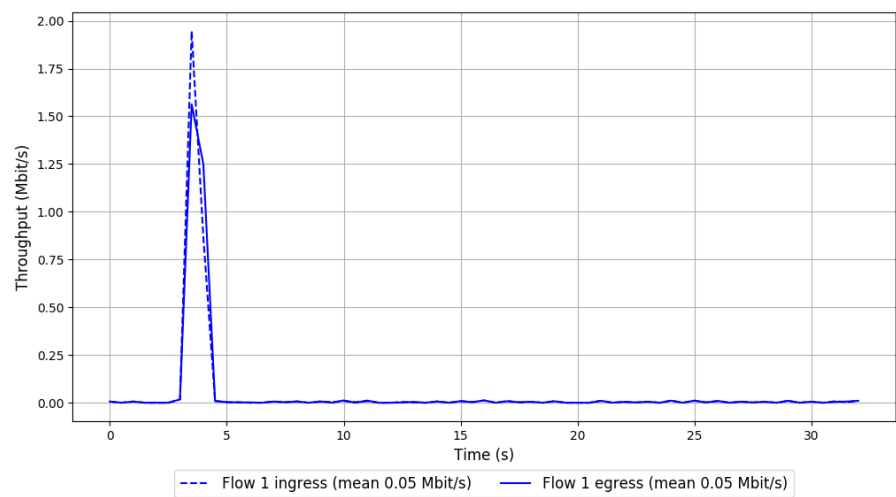


Run 1: Statistics of WebRTC media

Start at: 2018-03-12 21:09:43
End at: 2018-03-12 21:10:13
Local clock offset: 17.514 ms
Remote clock offset: -6.681 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 114.578 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 114.578 ms
Loss rate: 0.00%

Run 1: Report of WebRTC media — Data Link

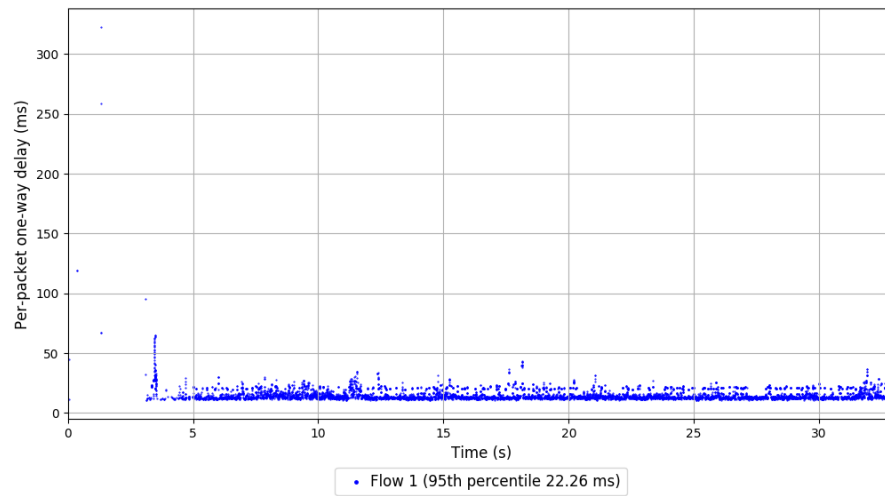
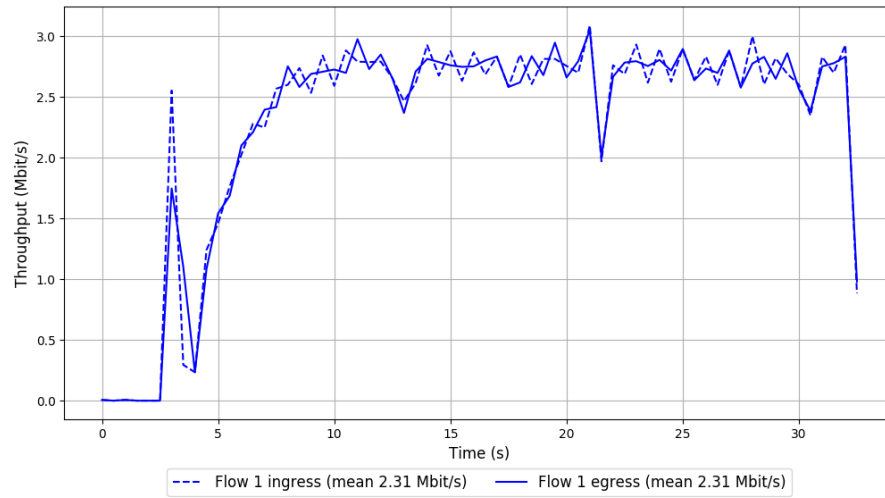


Run 2: Statistics of WebRTC media

Start at: 2018-03-12 21:33:22
End at: 2018-03-12 21:33:52
Local clock offset: 24.84 ms
Remote clock offset: -5.468 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.31 Mbit/s
95th percentile per-packet one-way delay: 22.263 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.31 Mbit/s
95th percentile per-packet one-way delay: 22.263 ms
Loss rate: 0.00%

Run 2: Report of WebRTC media — Data Link

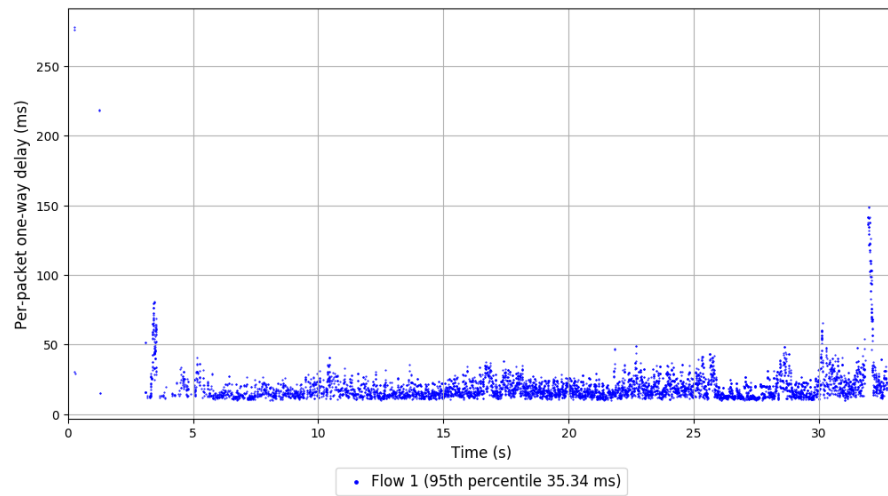
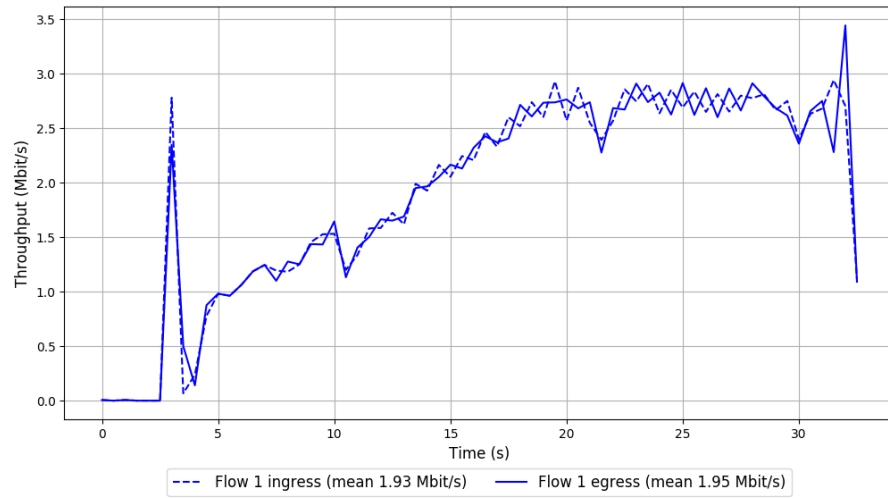


Run 3: Statistics of WebRTC media

Start at: 2018-03-12 21:57:04
End at: 2018-03-12 21:57:34
Local clock offset: 0.168 ms
Remote clock offset: -6.174 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.95 Mbit/s
95th percentile per-packet one-way delay: 35.337 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 1.95 Mbit/s
95th percentile per-packet one-way delay: 35.337 ms
Loss rate: 0.02%

Run 3: Report of WebRTC media — Data Link



Run 1: Statistics of Sprout

Start at: 2018-03-12 21:16:18

End at: 2018-03-12 21:16:48

Local clock offset: 19.667 ms

Remote clock offset: -6.01 ms

Below is generated by plot.py at 2018-03-12 22:19:24

Datalink statistics

-- Total of 1 flow:

Average throughput: 15.25 Mbit/s

95th percentile per-packet one-way delay: 37.081 ms

Loss rate: 0.01%

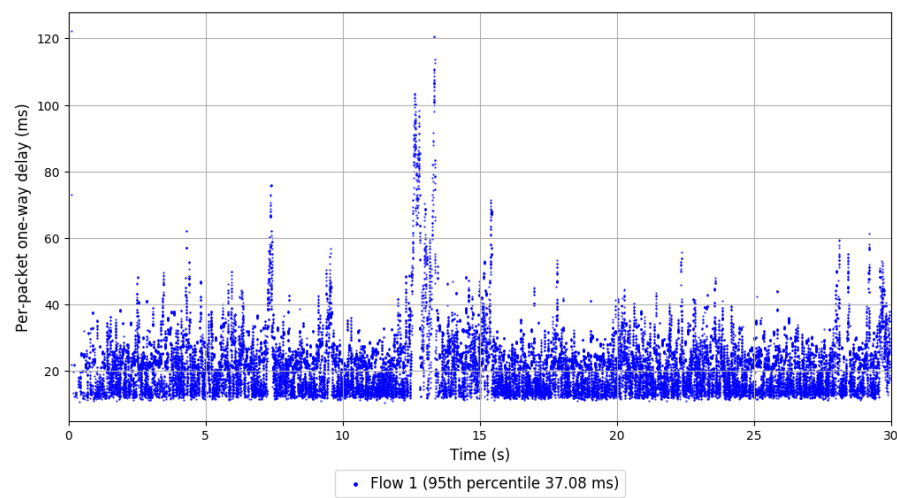
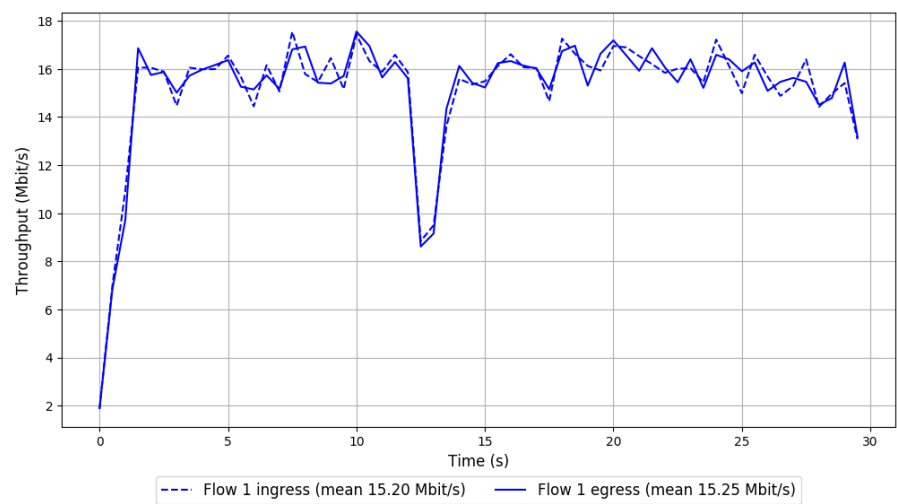
-- Flow 1:

Average throughput: 15.25 Mbit/s

95th percentile per-packet one-way delay: 37.081 ms

Loss rate: 0.01%

Run 1: Report of Sprout — Data Link

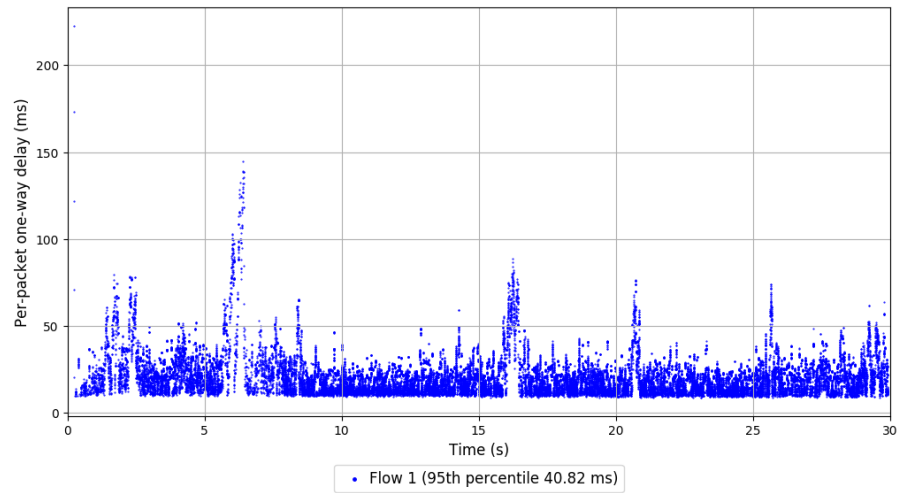
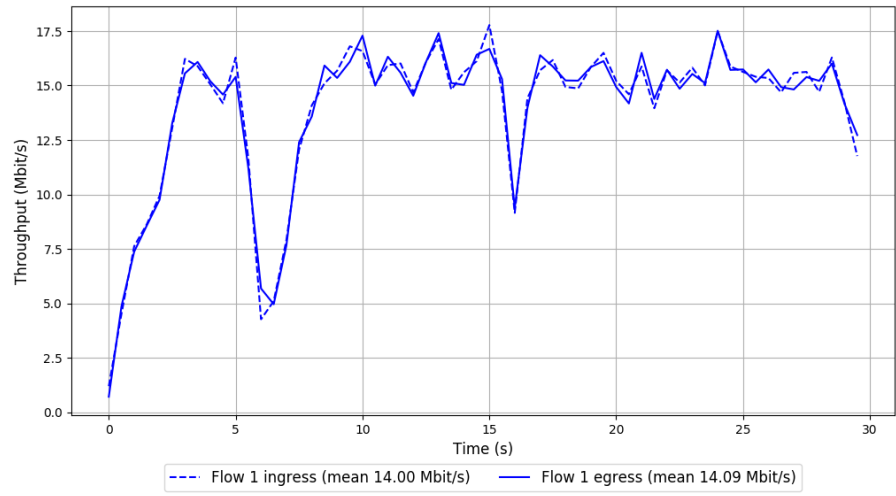


Run 2: Statistics of Sprout

Start at: 2018-03-12 21:39:59
End at: 2018-03-12 21:40:29
Local clock offset: 15.962 ms
Remote clock offset: -5.406 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 14.09 Mbit/s
95th percentile per-packet one-way delay: 40.819 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 14.09 Mbit/s
95th percentile per-packet one-way delay: 40.819 ms
Loss rate: 0.00%

Run 2: Report of Sprout — Data Link

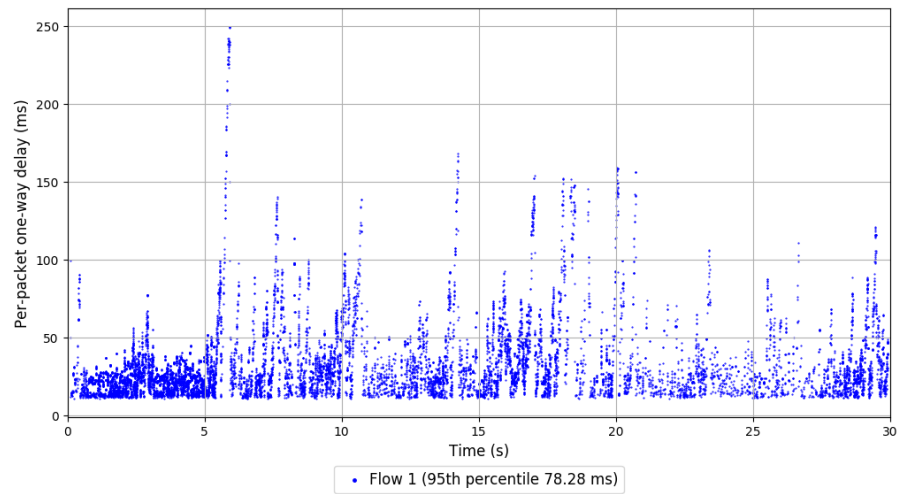
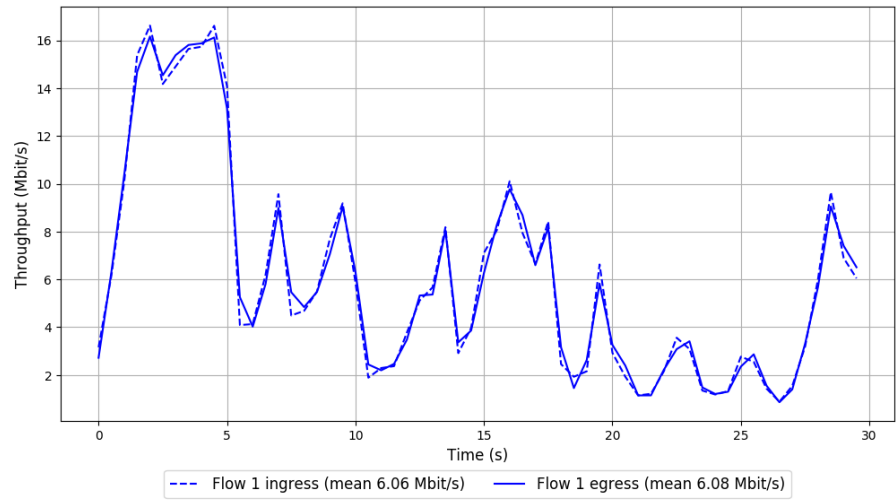


Run 3: Statistics of Sprout

Start at: 2018-03-12 22:03:38
End at: 2018-03-12 22:04:08
Local clock offset: -1.962 ms
Remote clock offset: -6.26 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 6.08 Mbit/s
95th percentile per-packet one-way delay: 78.280 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 6.08 Mbit/s
95th percentile per-packet one-way delay: 78.280 ms
Loss rate: 0.00%

Run 3: Report of Sprout — Data Link

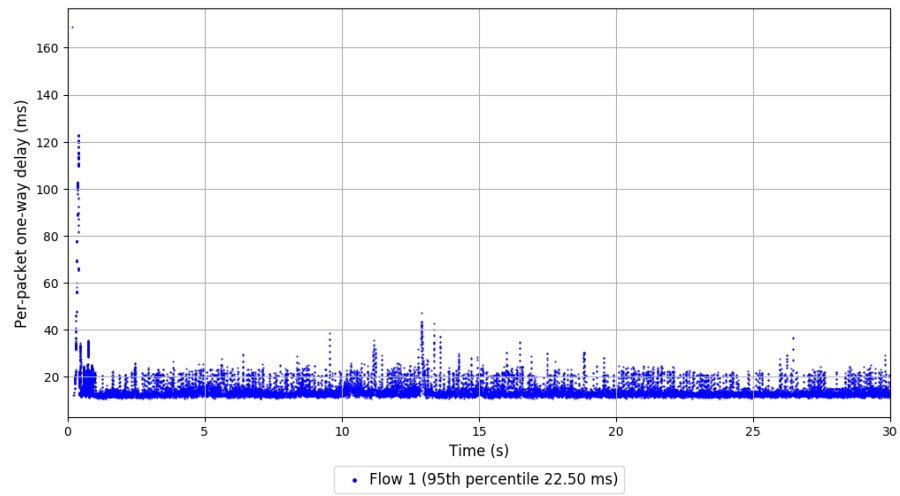
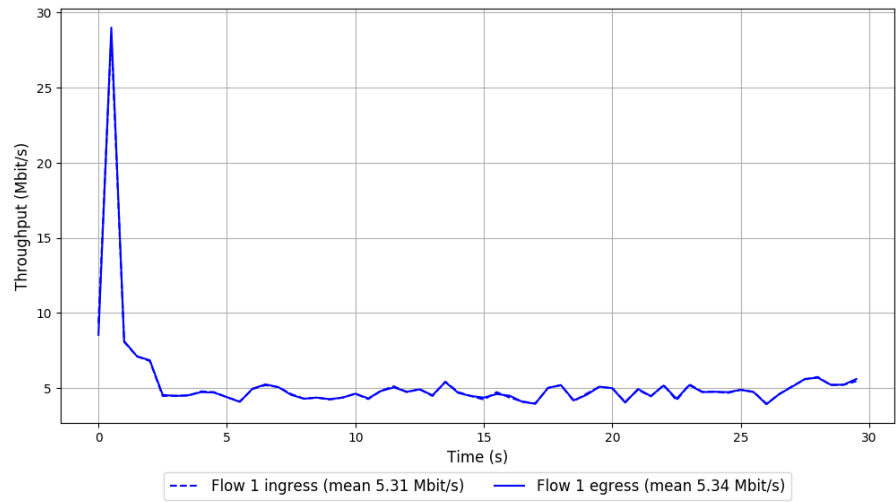


Run 1: Statistics of TaoVA-100x

Start at: 2018-03-12 21:29:27
End at: 2018-03-12 21:29:57
Local clock offset: 23.567 ms
Remote clock offset: -5.511 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 5.34 Mbit/s
95th percentile per-packet one-way delay: 22.497 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 5.34 Mbit/s
95th percentile per-packet one-way delay: 22.497 ms
Loss rate: 0.00%

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



Run 2: Statistics of TaoVA-100x

Start at: 2018-03-12 21:53:09

End at: 2018-03-12 21:53:39

Local clock offset: 1.903 ms

Remote clock offset: -5.915 ms

Below is generated by plot.py at 2018-03-12 22:19:24

Datalink statistics

-- Total of 1 flow:

Average throughput: 5.11 Mbit/s

95th percentile per-packet one-way delay: 27.977 ms

Loss rate: 0.00%

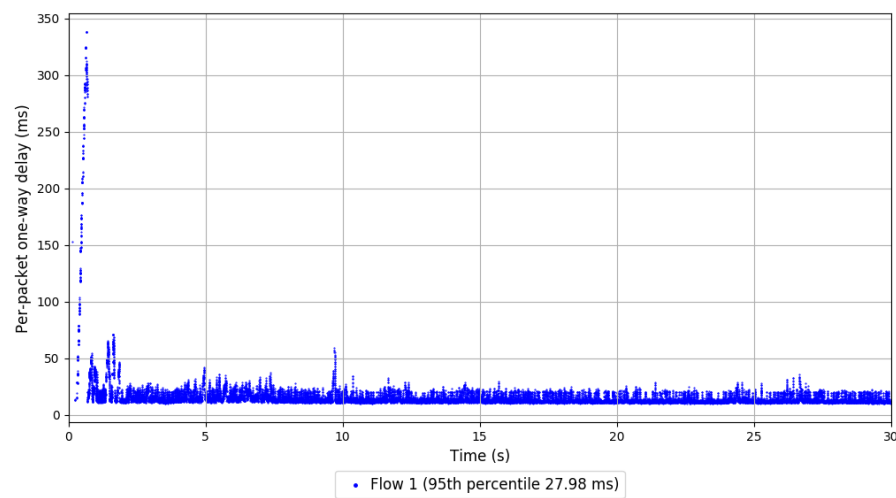
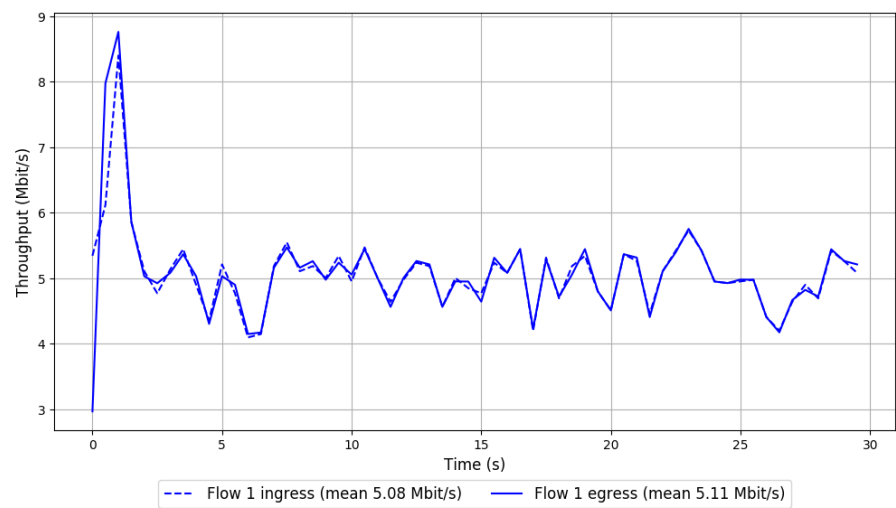
-- Flow 1:

Average throughput: 5.11 Mbit/s

95th percentile per-packet one-way delay: 27.977 ms

Loss rate: 0.00%

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

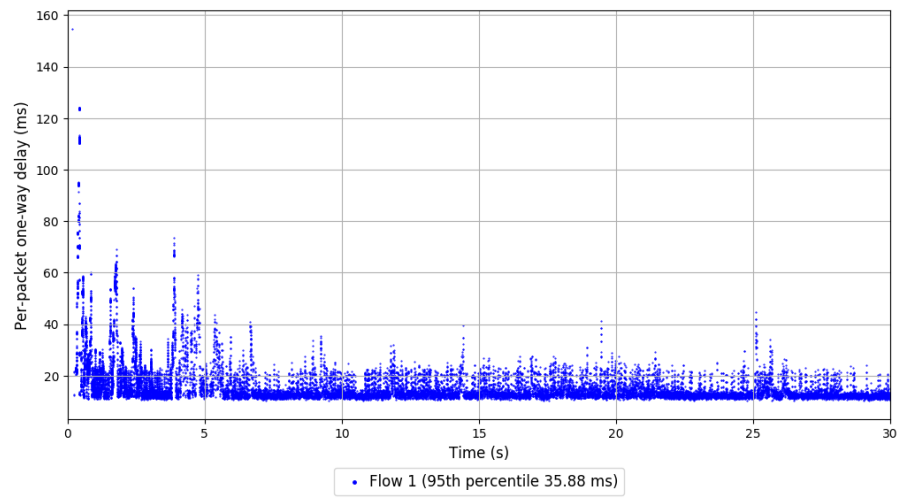
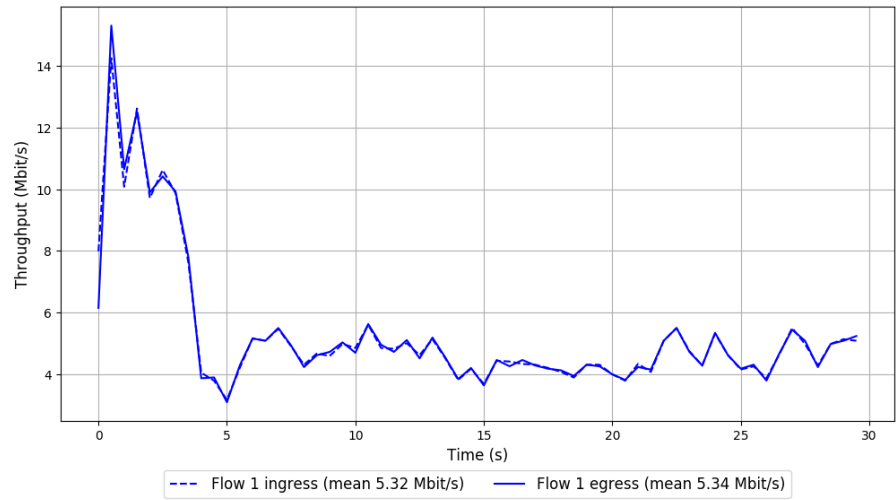


Run 3: Statistics of TaoVA-100x

Start at: 2018-03-12 22:16:46
End at: 2018-03-12 22:17:16
Local clock offset: -1.455 ms
Remote clock offset: -6.561 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 5.34 Mbit/s
95th percentile per-packet one-way delay: 35.882 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 5.34 Mbit/s
95th percentile per-packet one-way delay: 35.882 ms
Loss rate: 0.00%

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

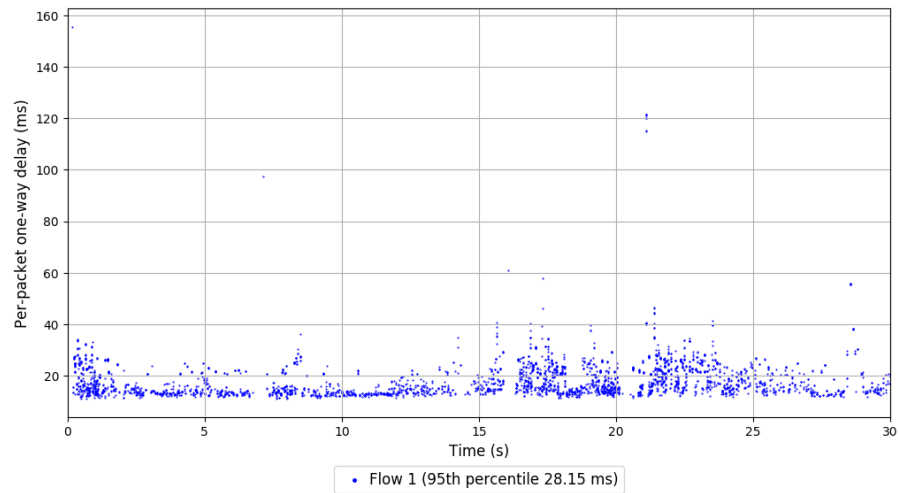
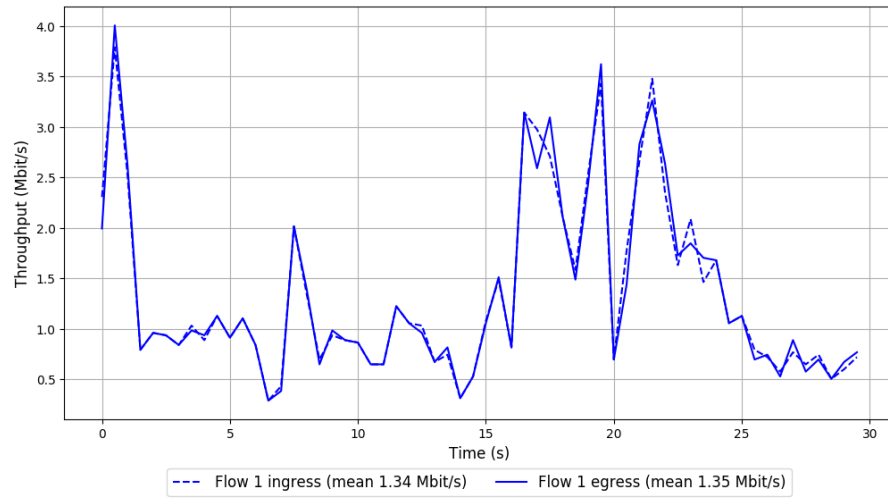


Run 1: Statistics of TCP Vegas

Start at: 2018-03-12 21:07:06
End at: 2018-03-12 21:07:36
Local clock offset: 16.839 ms
Remote clock offset: -6.733 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 28.153 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 28.153 ms
Loss rate: 0.00%

Run 1: Report of TCP Vegas — Data Link

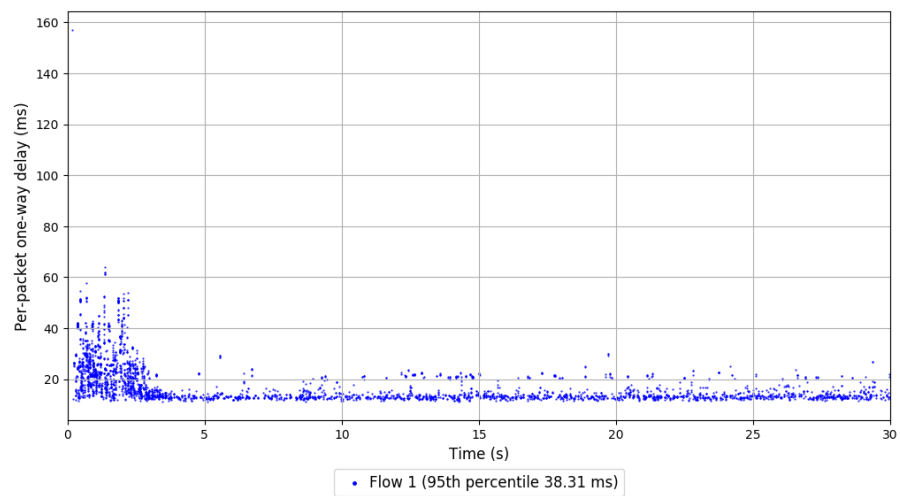
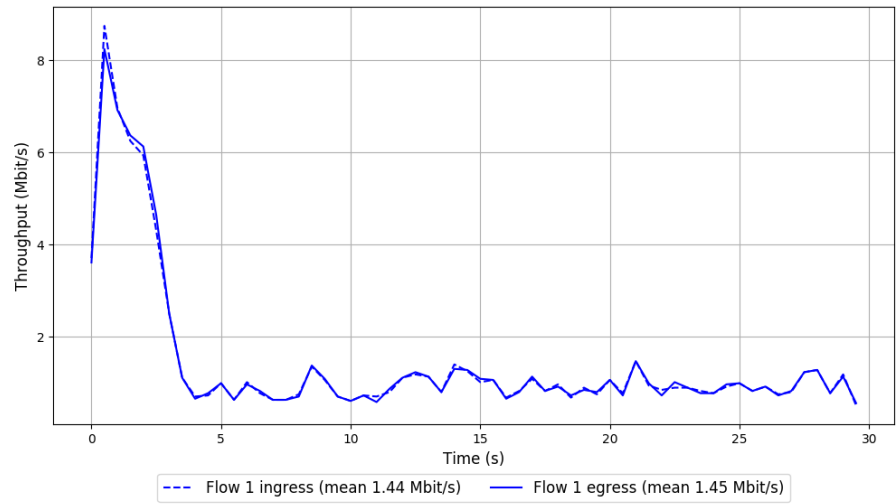


Run 2: Statistics of TCP Vegas

Start at: 2018-03-12 21:30:46
End at: 2018-03-12 21:31:16
Local clock offset: 24.078 ms
Remote clock offset: -5.397 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 38.315 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 38.315 ms
Loss rate: 0.00%

Run 2: Report of TCP Vegas — Data Link

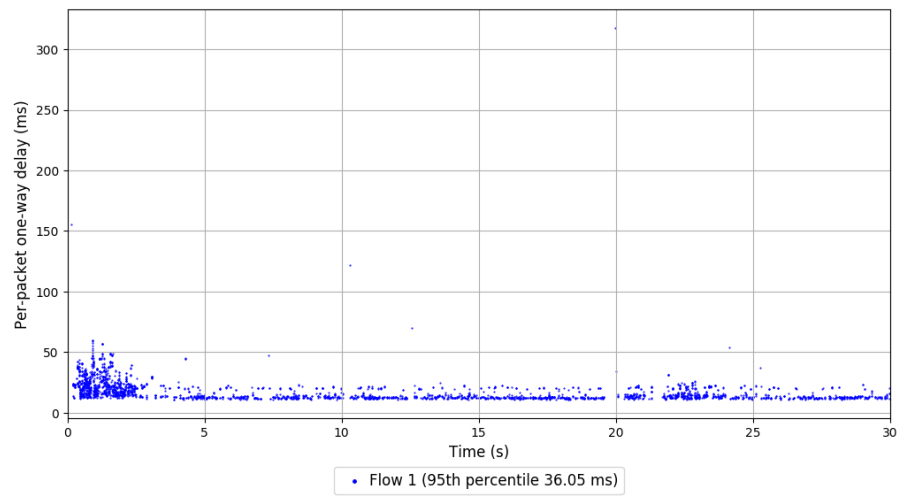
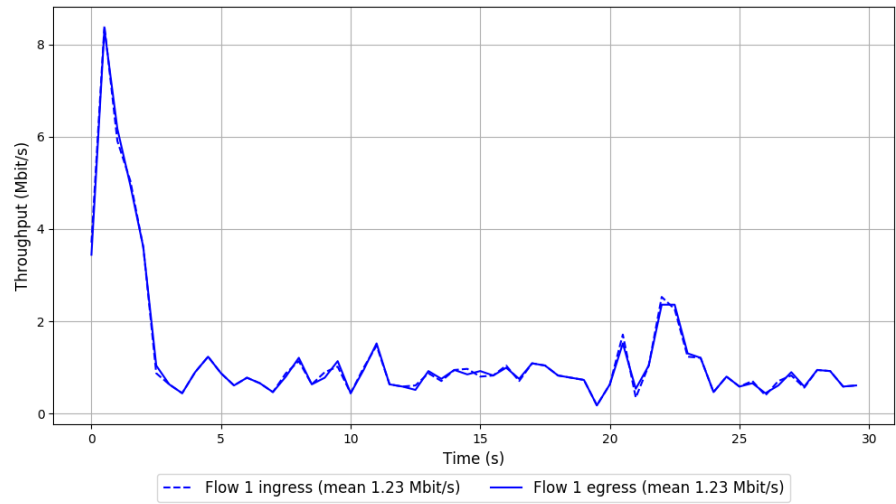


Run 3: Statistics of TCP Vegas

Start at: 2018-03-12 21:54:28
End at: 2018-03-12 21:54:58
Local clock offset: 1.303 ms
Remote clock offset: -5.982 ms

Below is generated by plot.py at 2018-03-12 22:19:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 36.051 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 36.051 ms
Loss rate: 0.00%

Run 3: Report of TCP Vegas — Data Link

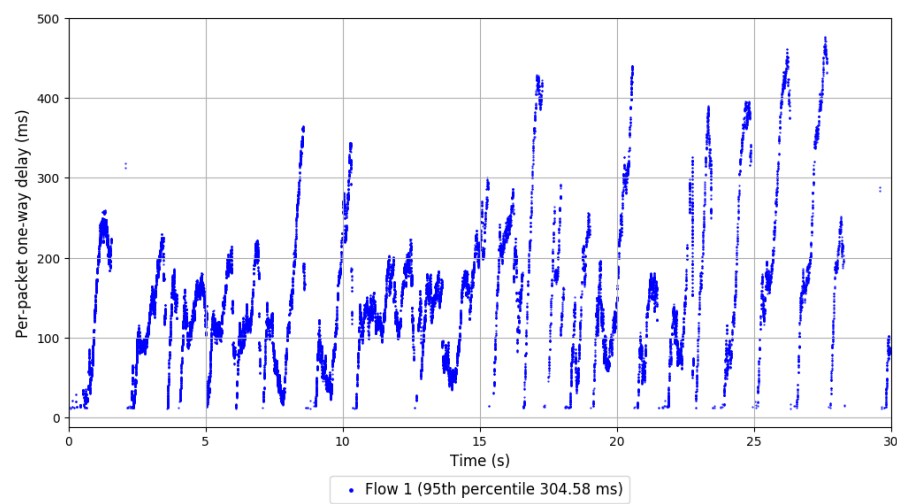
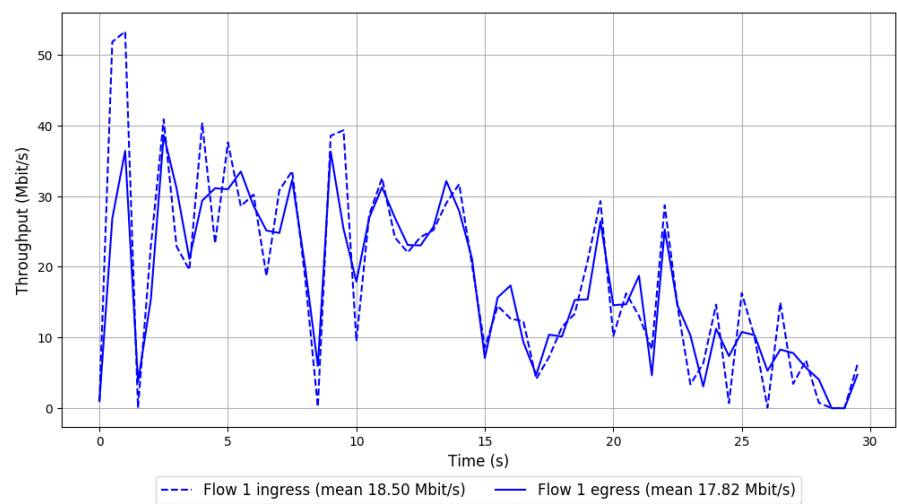


Run 1: Statistics of Verus

Start at: 2018-03-12 21:22:52
End at: 2018-03-12 21:23:22
Local clock offset: 21.648 ms
Remote clock offset: -5.699 ms

Below is generated by plot.py at 2018-03-12 22:19:33
Datalink statistics
-- Total of 1 flow:
Average throughput: 17.82 Mbit/s
95th percentile per-packet one-way delay: 304.583 ms
Loss rate: 3.62%
-- Flow 1:
Average throughput: 17.82 Mbit/s
95th percentile per-packet one-way delay: 304.583 ms
Loss rate: 3.62%

Run 1: Report of Verus — Data Link

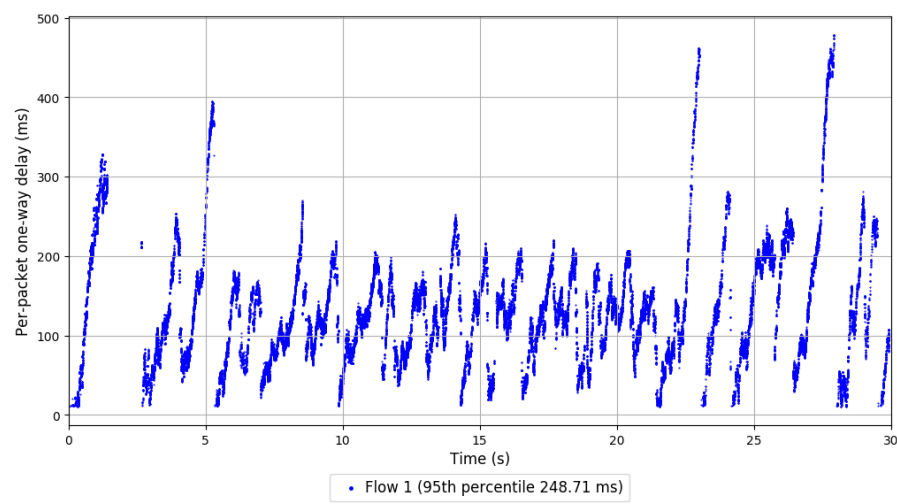
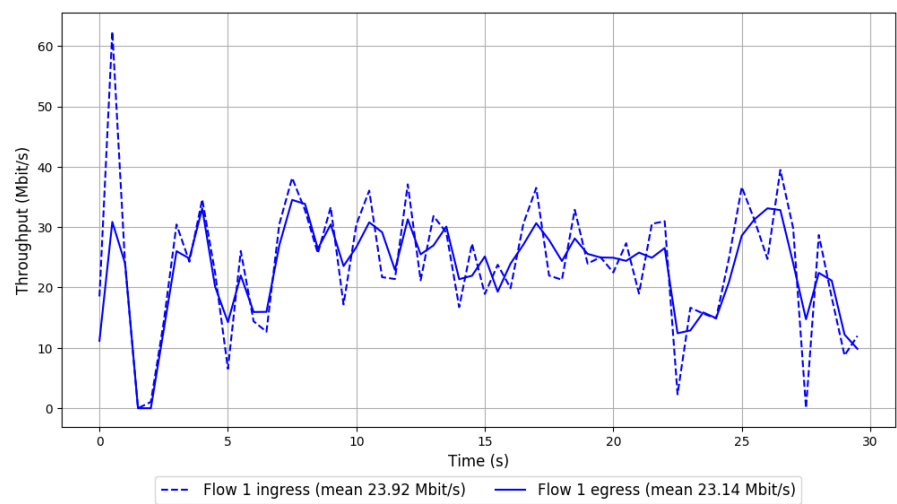


Run 2: Statistics of Verus

Start at: 2018-03-12 21:46:33
End at: 2018-03-12 21:47:03
Local clock offset: 6.647 ms
Remote clock offset: -5.626 ms

Below is generated by plot.py at 2018-03-12 22:19:43
Datalink statistics
-- Total of 1 flow:
Average throughput: 23.14 Mbit/s
95th percentile per-packet one-way delay: 248.707 ms
Loss rate: 3.23%
-- Flow 1:
Average throughput: 23.14 Mbit/s
95th percentile per-packet one-way delay: 248.707 ms
Loss rate: 3.23%

Run 2: Report of Verus — Data Link

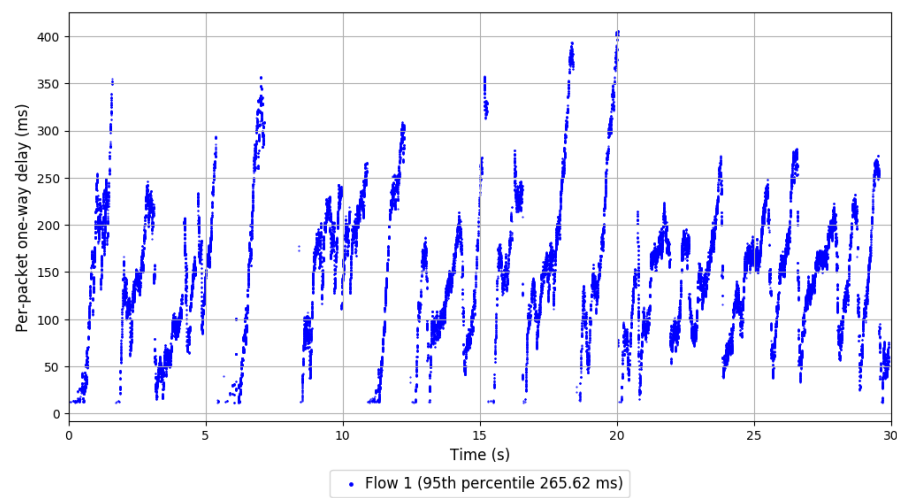
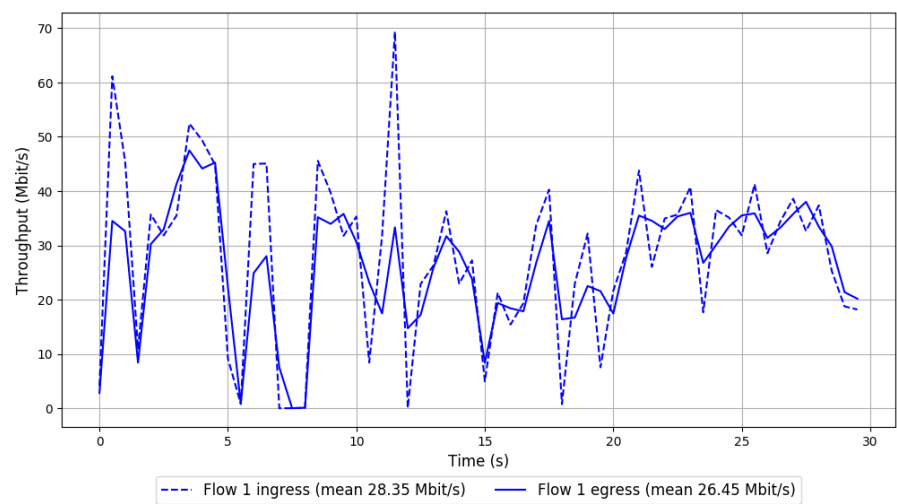


Run 3: Statistics of Verus

Start at: 2018-03-12 22:10:12
End at: 2018-03-12 22:10:42
Local clock offset: -3.407 ms
Remote clock offset: -6.445 ms

Below is generated by plot.py at 2018-03-12 22:19:46
Datalink statistics
-- Total of 1 flow:
Average throughput: 26.45 Mbit/s
95th percentile per-packet one-way delay: 265.618 ms
Loss rate: 6.67%
-- Flow 1:
Average throughput: 26.45 Mbit/s
95th percentile per-packet one-way delay: 265.618 ms
Loss rate: 6.67%

Run 3: Report of Verus — Data Link

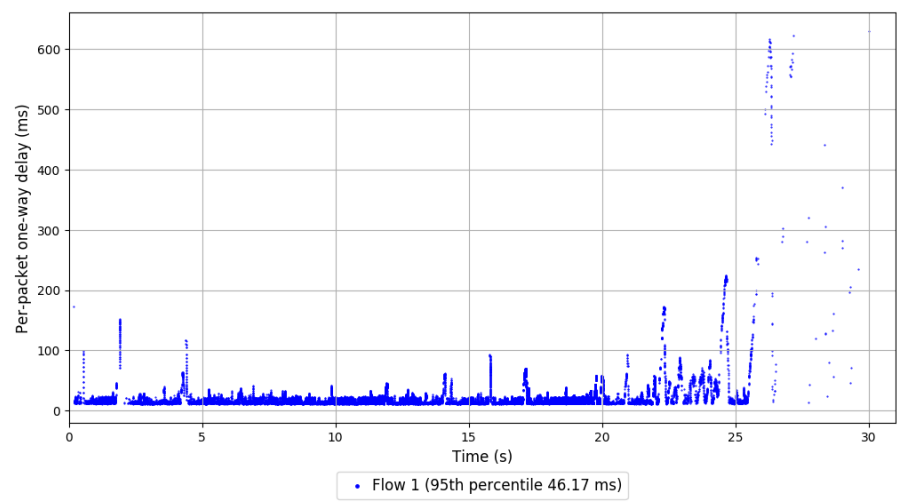
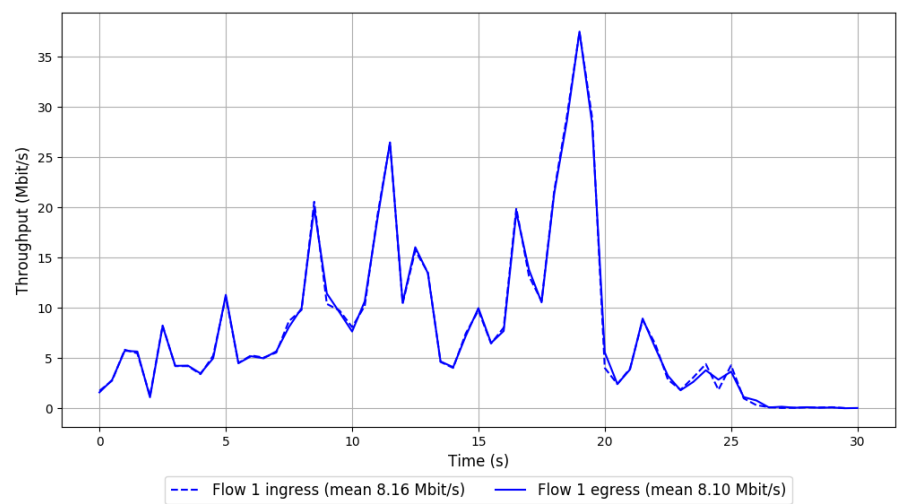


Run 1: Statistics of Copa

Start at: 2018-03-12 21:17:37
End at: 2018-03-12 21:18:07
Local clock offset: 20.087 ms
Remote clock offset: -5.899 ms

Below is generated by plot.py at 2018-03-12 22:19:46
Datalink statistics
-- Total of 1 flow:
Average throughput: 8.10 Mbit/s
95th percentile per-packet one-way delay: 46.172 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 8.10 Mbit/s
95th percentile per-packet one-way delay: 46.172 ms
Loss rate: 0.01%

Run 1: Report of Copa — Data Link

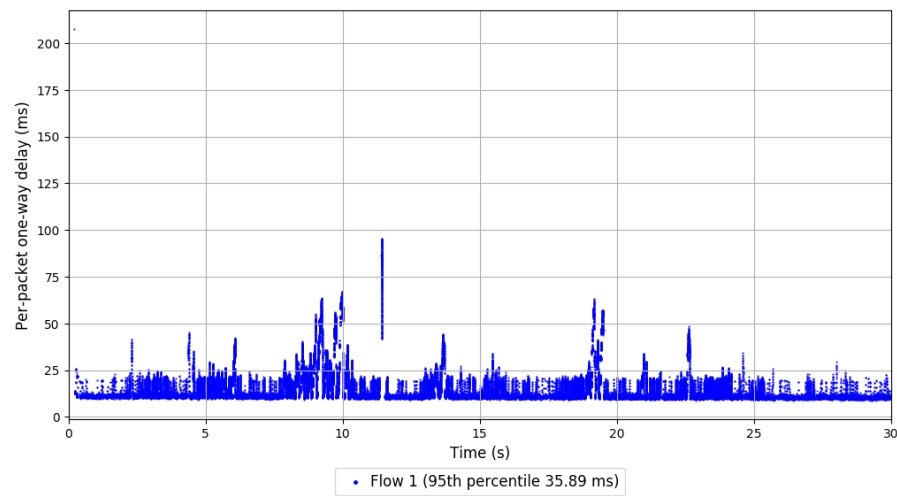
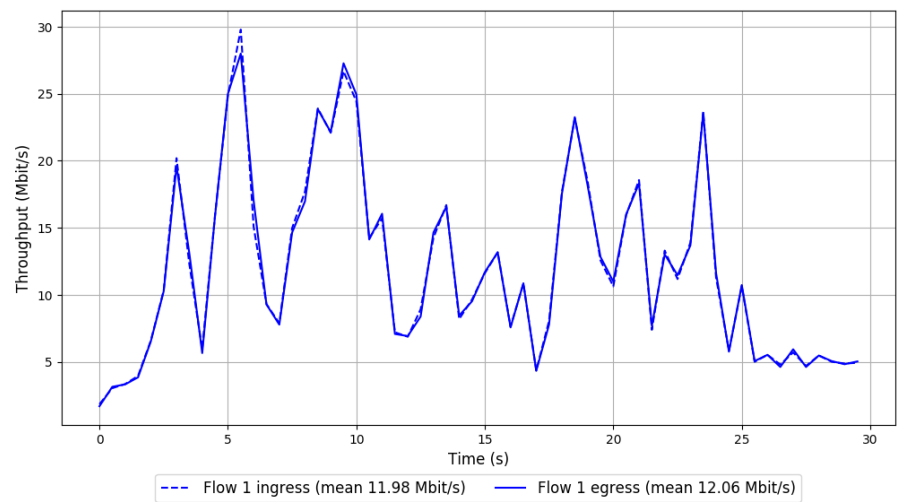


Run 2: Statistics of Copa

Start at: 2018-03-12 21:41:17
End at: 2018-03-12 21:41:47
Local clock offset: 13.26 ms
Remote clock offset: -5.423 ms

Below is generated by plot.py at 2018-03-12 22:19:46
Datalink statistics
-- Total of 1 flow:
Average throughput: 12.06 Mbit/s
95th percentile per-packet one-way delay: 35.894 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 12.06 Mbit/s
95th percentile per-packet one-way delay: 35.894 ms
Loss rate: 0.00%

Run 2: Report of Copa — Data Link

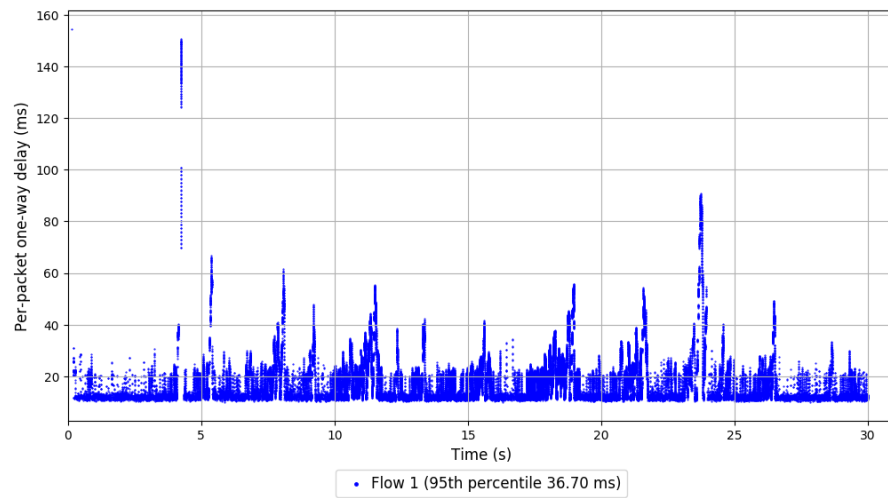
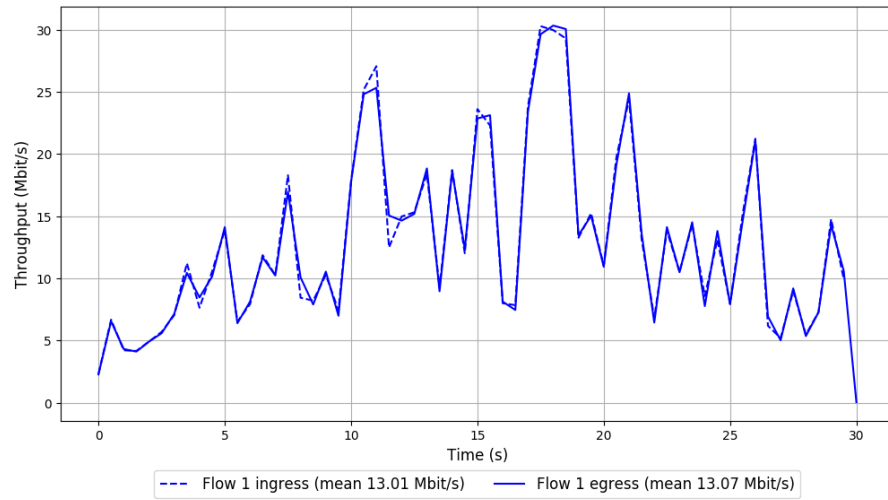


Run 3: Statistics of Copa

Start at: 2018-03-12 22:04:56
End at: 2018-03-12 22:05:26
Local clock offset: -2.267 ms
Remote clock offset: -6.277 ms

Below is generated by plot.py at 2018-03-12 22:19:46
Datalink statistics
-- Total of 1 flow:
Average throughput: 13.07 Mbit/s
95th percentile per-packet one-way delay: 36.696 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 13.07 Mbit/s
95th percentile per-packet one-way delay: 36.696 ms
Loss rate: 0.00%

Run 3: Report of Copa — Data Link

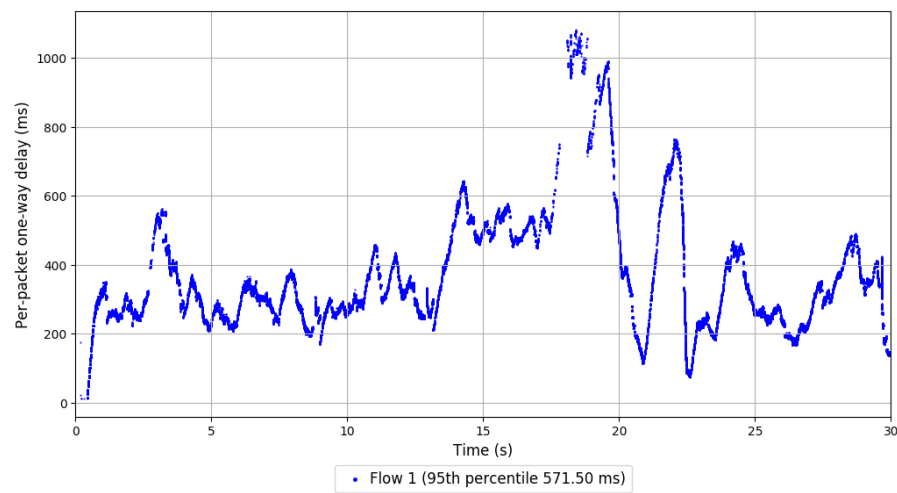
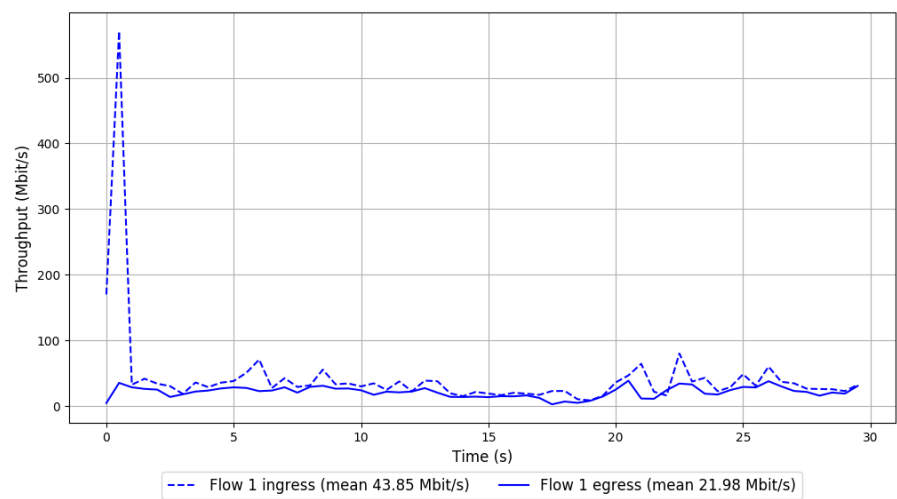


Run 1: Statistics of FillP

Start at: 2018-03-12 21:13:39
End at: 2018-03-12 21:14:09
Local clock offset: 18.838 ms
Remote clock offset: -6.328 ms

Below is generated by plot.py at 2018-03-12 22:19:56
Datalink statistics
-- Total of 1 flow:
Average throughput: 21.98 Mbit/s
95th percentile per-packet one-way delay: 571.498 ms
Loss rate: 50.14%
-- Flow 1:
Average throughput: 21.98 Mbit/s
95th percentile per-packet one-way delay: 571.498 ms
Loss rate: 50.14%

Run 1: Report of FillP — Data Link



Run 2: Statistics of FillP

Start at: 2018-03-12 21:37:19

End at: 2018-03-12 21:37:49

Local clock offset: 21.741 ms

Remote clock offset: -5.45 ms

Below is generated by plot.py at 2018-03-12 22:19:59

Datalink statistics

-- Total of 1 flow:

Average throughput: 23.72 Mbit/s

95th percentile per-packet one-way delay: 637.442 ms

Loss rate: 51.01%

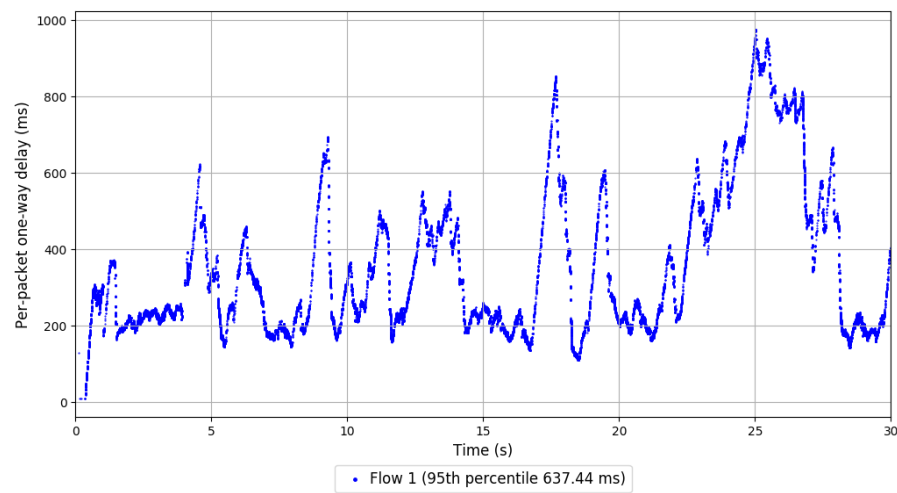
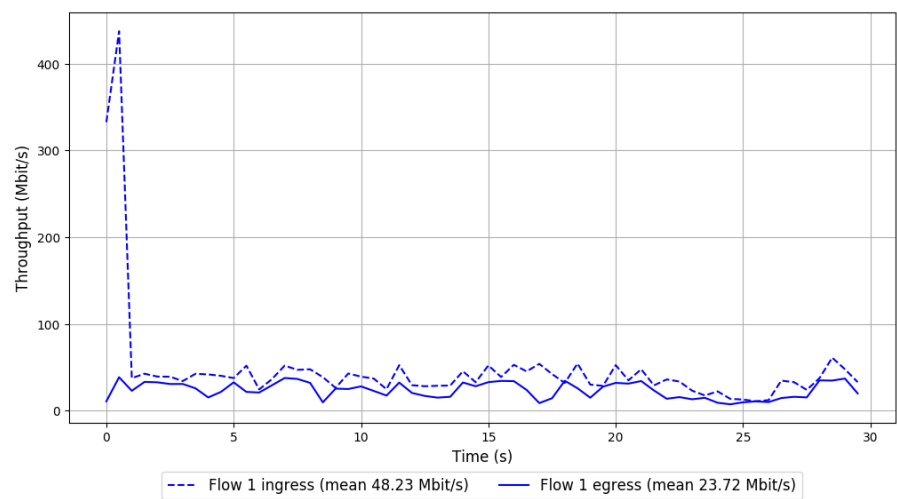
-- Flow 1:

Average throughput: 23.72 Mbit/s

95th percentile per-packet one-way delay: 637.442 ms

Loss rate: 51.01%

Run 2: Report of FillP — Data Link

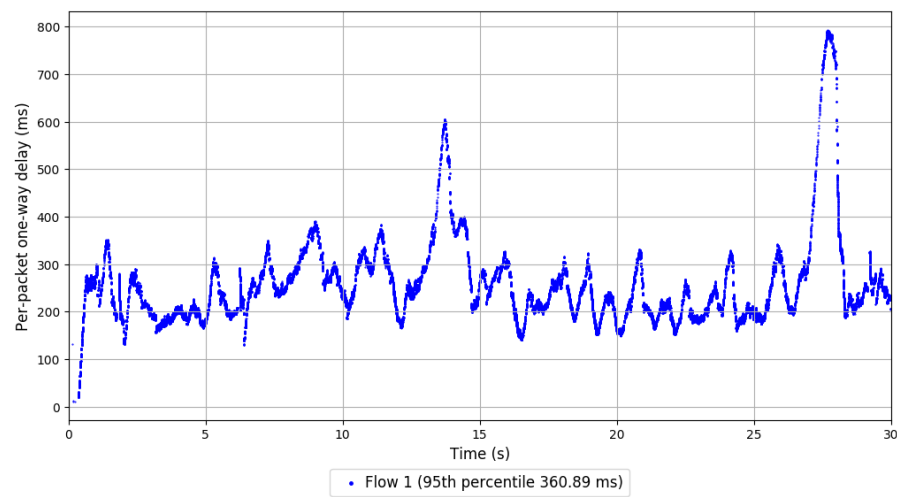
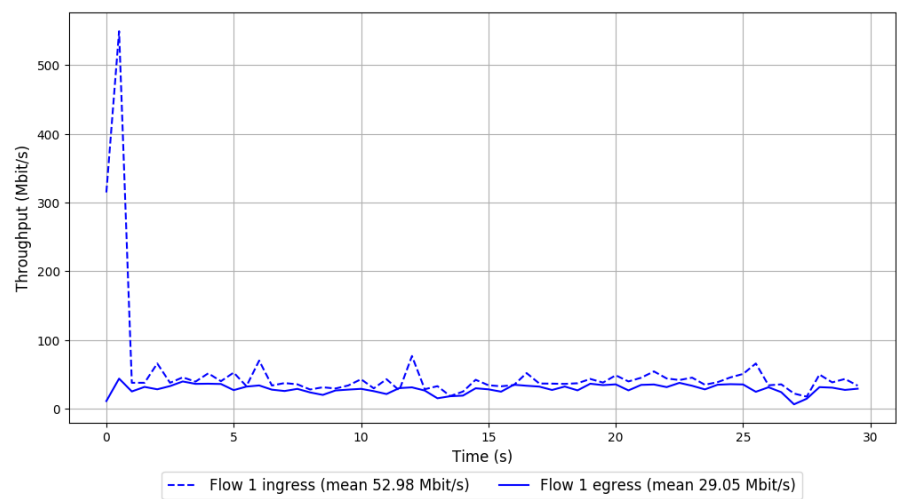


Run 3: Statistics of FillP

Start at: 2018-03-12 22:00:59
End at: 2018-03-12 22:01:30
Local clock offset: -1.255 ms
Remote clock offset: -6.294 ms

Below is generated by plot.py at 2018-03-12 22:20:13
Datalink statistics
-- Total of 1 flow:
Average throughput: 29.05 Mbit/s
95th percentile per-packet one-way delay: 360.895 ms
Loss rate: 45.37%
-- Flow 1:
Average throughput: 29.05 Mbit/s
95th percentile per-packet one-way delay: 360.895 ms
Loss rate: 45.37%

Run 3: Report of FillP — Data Link

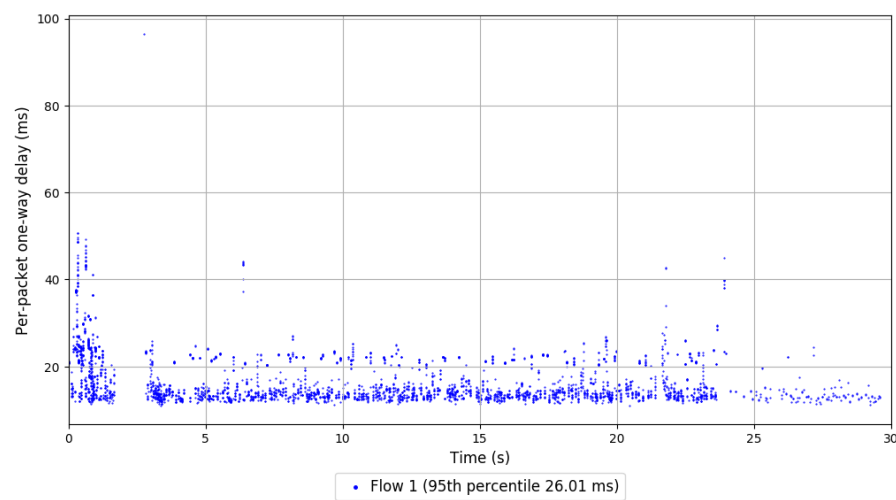
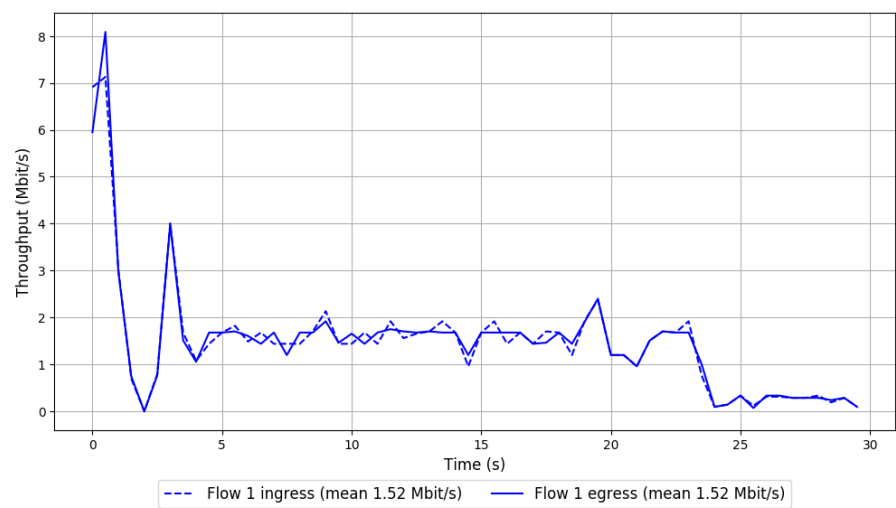


```
Run 1: Statistics of Indigo-1-32

Start at: 2018-03-12 21:11:02
End at: 2018-03-12 21:11:32
Local clock offset: 17.945 ms
Remote clock offset: -6.703 ms

# Below is generated by plot.py at 2018-03-12 22:20:13
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.52 Mbit/s
95th percentile per-packet one-way delay: 26.011 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.52 Mbit/s
95th percentile per-packet one-way delay: 26.011 ms
Loss rate: 0.00%
```

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

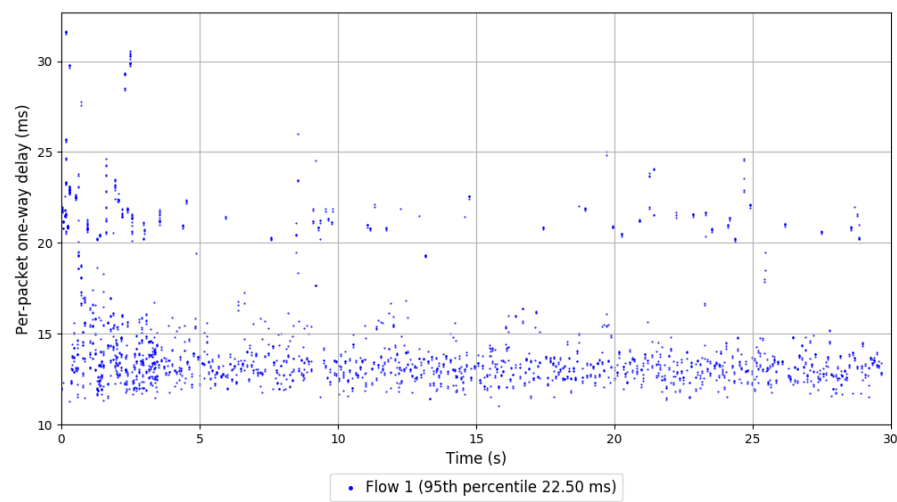
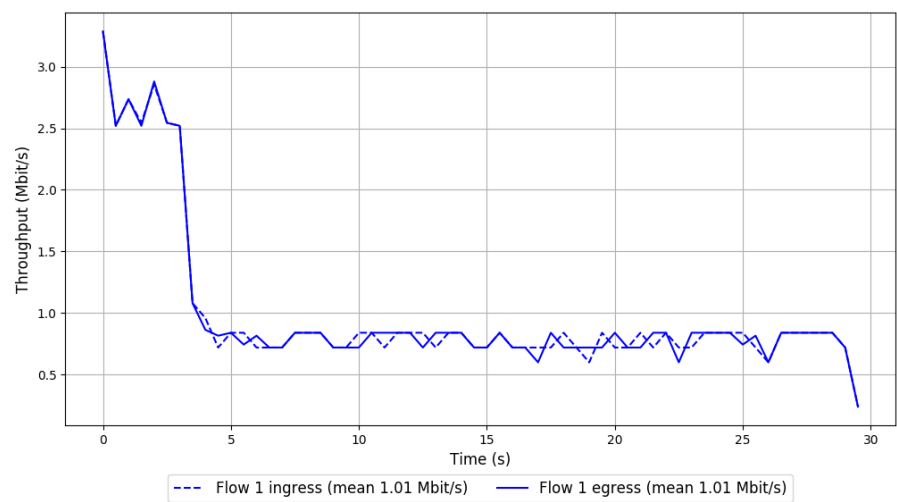


Run 2: Statistics of Indigo-1-32

Start at: 2018-03-12 21:34:41
End at: 2018-03-12 21:35:11
Local clock offset: 25.232 ms
Remote clock offset: -5.451 ms

Below is generated by plot.py at 2018-03-12 22:20:13
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 22.497 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 22.497 ms
Loss rate: 0.00%

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

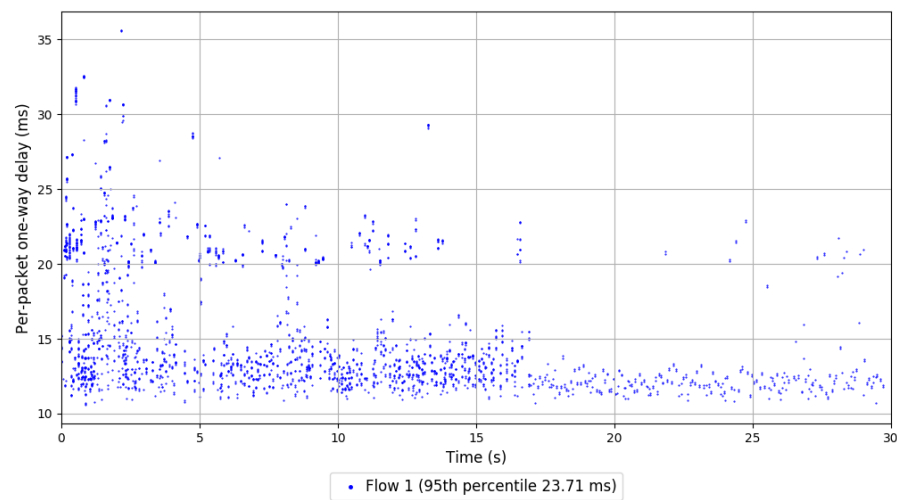
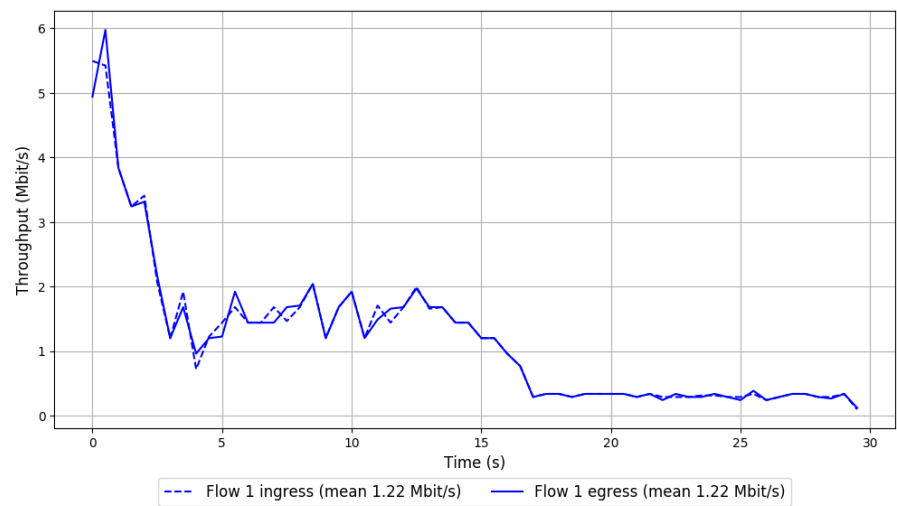


Run 3: Statistics of Indigo-1-32

Start at: 2018-03-12 21:58:22
End at: 2018-03-12 21:58:52
Local clock offset: -0.328 ms
Remote clock offset: -6.223 ms

Below is generated by plot.py at 2018-03-12 22:20:13
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 23.706 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 23.706 ms
Loss rate: 0.00%

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

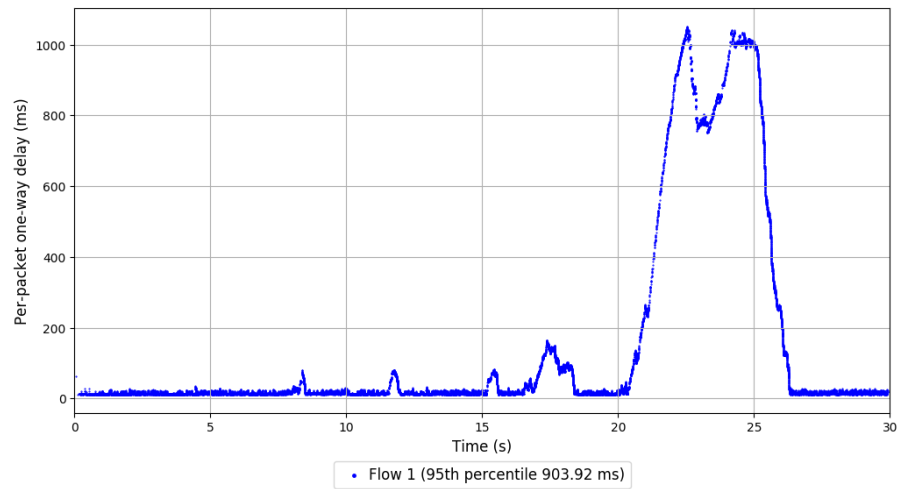
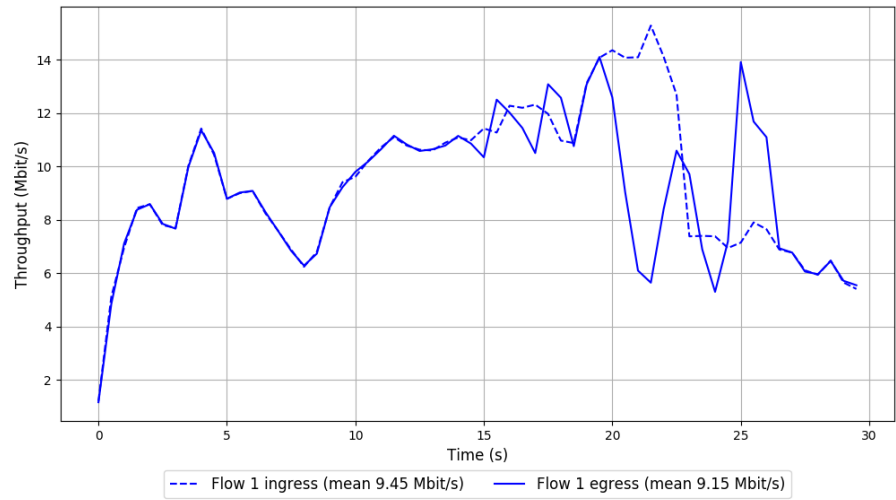


Run 1: Statistics of Vivace-latency

Start at: 2018-03-12 21:24:12
End at: 2018-03-12 21:24:42
Local clock offset: 21.99 ms
Remote clock offset: -5.651 ms

Below is generated by plot.py at 2018-03-12 22:20:13
Datalink statistics
-- Total of 1 flow:
Average throughput: 9.15 Mbit/s
95th percentile per-packet one-way delay: 903.924 ms
Loss rate: 3.29%
-- Flow 1:
Average throughput: 9.15 Mbit/s
95th percentile per-packet one-way delay: 903.924 ms
Loss rate: 3.29%

Run 1: Report of Vivace-latency — Data Link



Run 2: Statistics of Vivace-latency

Start at: 2018-03-12 21:47:53

End at: 2018-03-12 21:48:23

Local clock offset: 5.368 ms

Remote clock offset: -5.64 ms

Below is generated by plot.py at 2018-03-12 22:20:13

Datalink statistics

-- Total of 1 flow:

Average throughput: 10.02 Mbit/s

95th percentile per-packet one-way delay: 22.484 ms

Loss rate: 0.00%

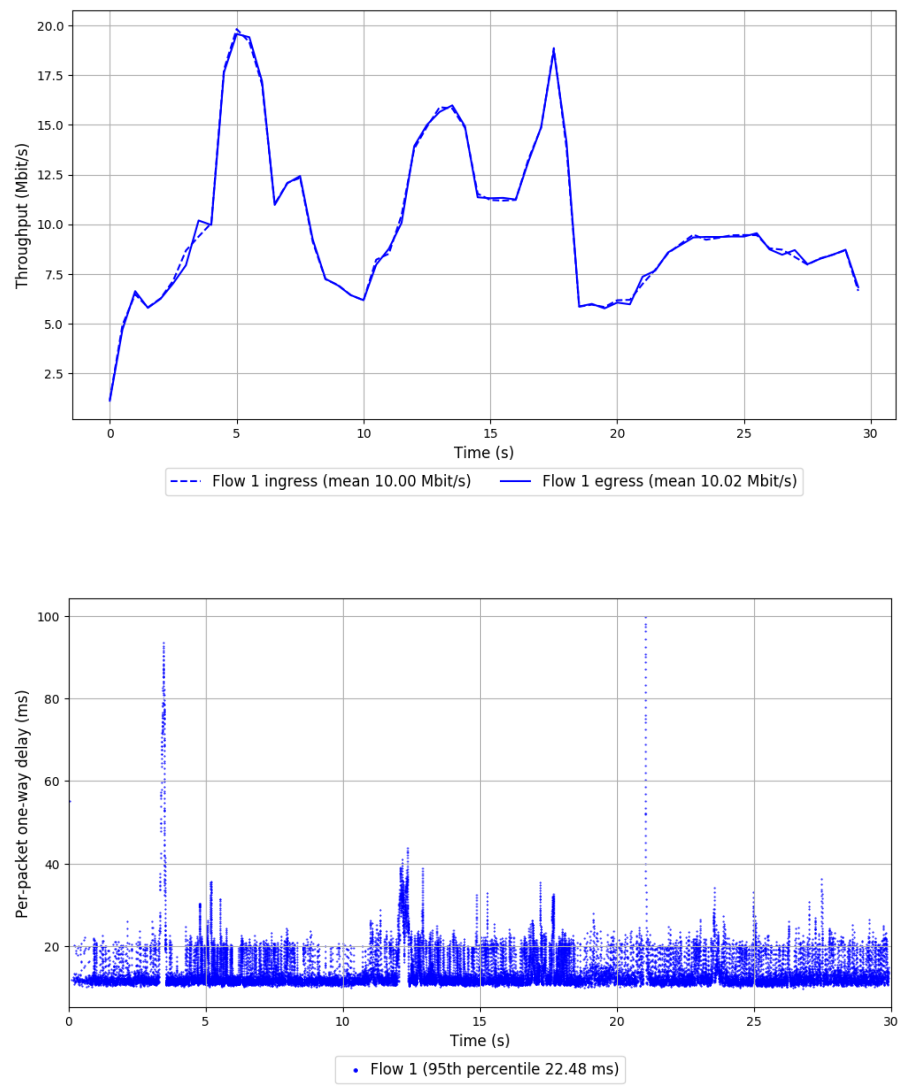
-- Flow 1:

Average throughput: 10.02 Mbit/s

95th percentile per-packet one-way delay: 22.484 ms

Loss rate: 0.00%

Run 2: Report of Vivace-latency — Data Link

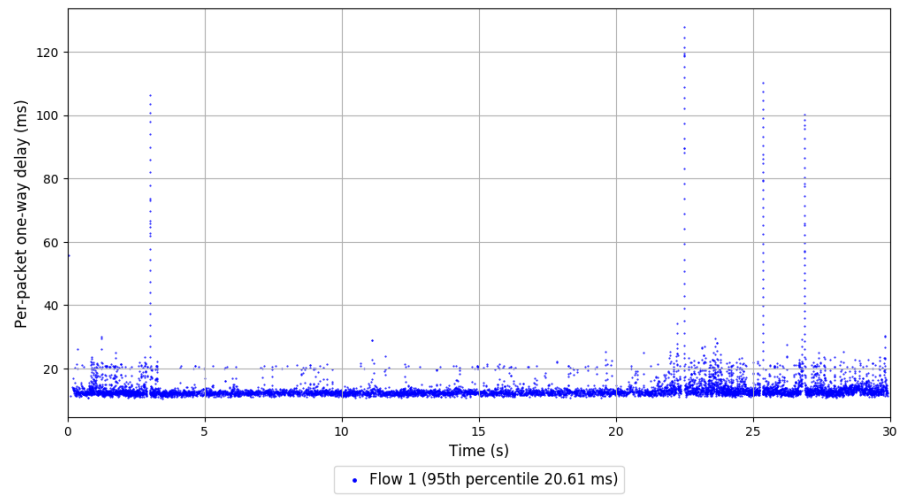
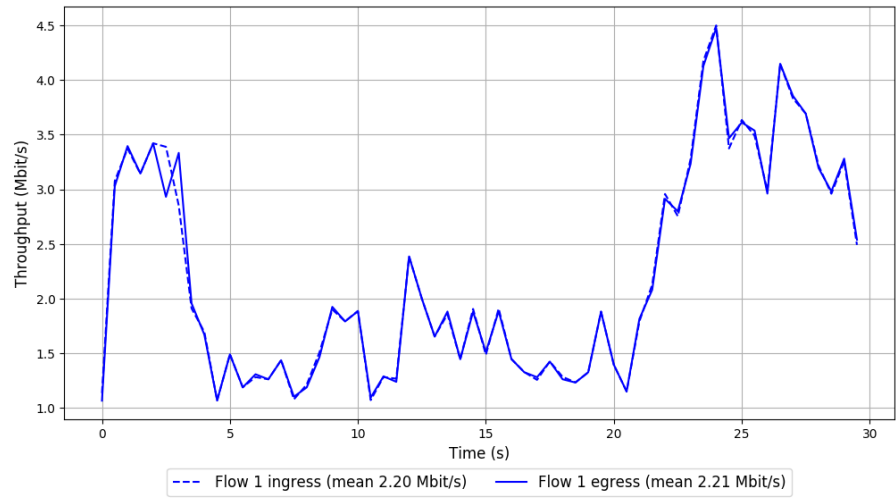


Run 3: Statistics of Vivace-latency

Start at: 2018-03-12 22:11:32
End at: 2018-03-12 22:12:02
Local clock offset: -2.78 ms
Remote clock offset: -6.411 ms

Below is generated by plot.py at 2018-03-12 22:20:13
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.21 Mbit/s
95th percentile per-packet one-way delay: 20.610 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.21 Mbit/s
95th percentile per-packet one-way delay: 20.610 ms
Loss rate: 0.00%

Run 3: Report of Vivace-latency — Data Link



Run 1: Statistics of Vivace-loss

Start at: 2018-03-12 21:18:56

End at: 2018-03-12 21:19:26

Local clock offset: 20.365 ms

Remote clock offset: -5.867 ms

Below is generated by plot.py at 2018-03-12 22:20:13

Datalink statistics

-- Total of 1 flow:

Average throughput: 17.82 Mbit/s

95th percentile per-packet one-way delay: 738.722 ms

Loss rate: 26.32%

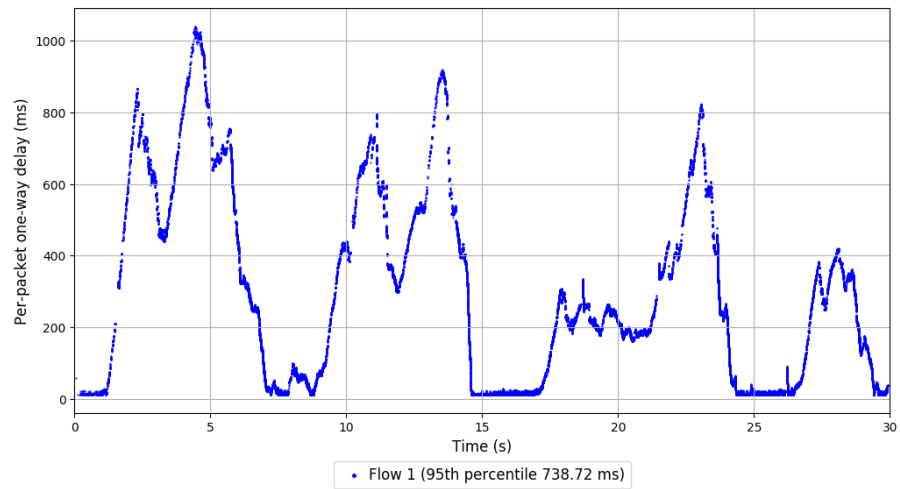
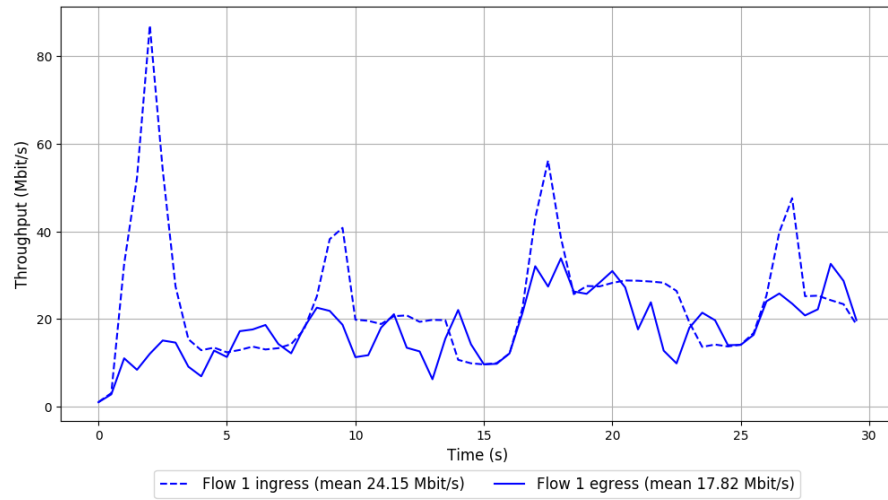
-- Flow 1:

Average throughput: 17.82 Mbit/s

95th percentile per-packet one-way delay: 738.722 ms

Loss rate: 26.32%

Run 1: Report of Vivace-loss — Data Link

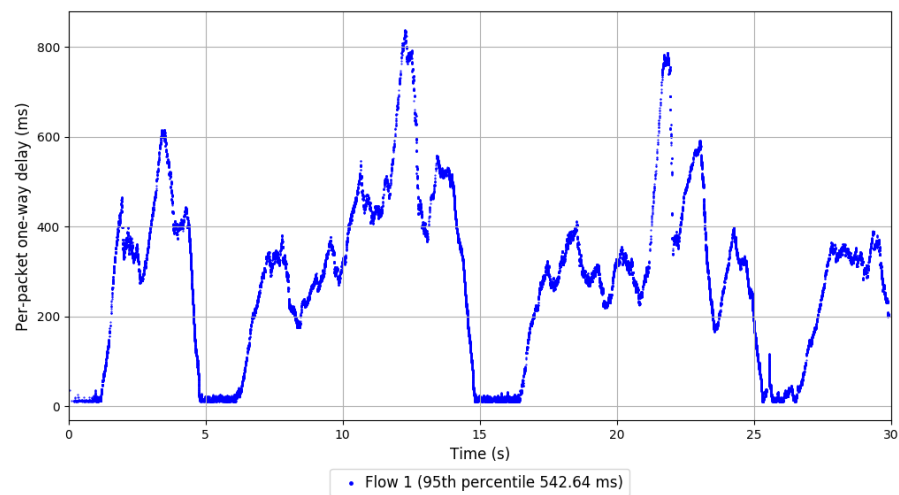
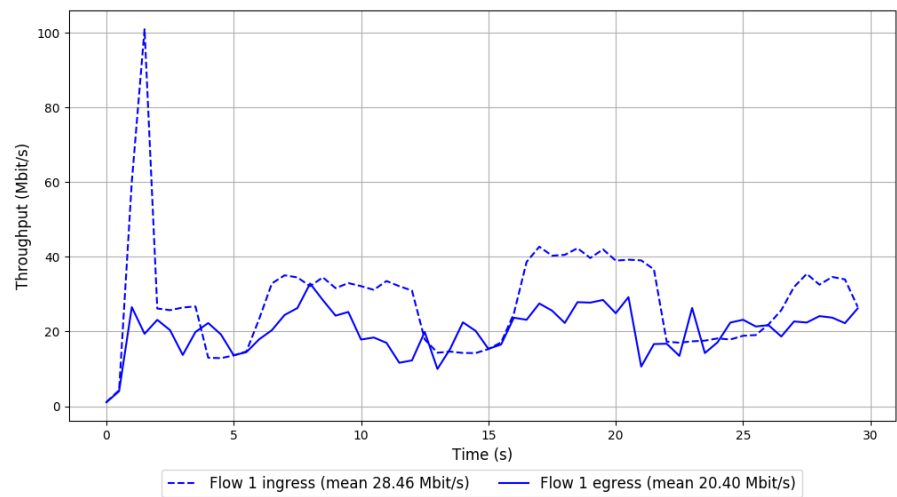


Run 2: Statistics of Vivace-loss

Start at: 2018-03-12 21:42:36
End at: 2018-03-12 21:43:06
Local clock offset: 11.245 ms
Remote clock offset: -5.415 ms

Below is generated by plot.py at 2018-03-12 22:20:13
Datalink statistics
-- Total of 1 flow:
Average throughput: 20.40 Mbit/s
95th percentile per-packet one-way delay: 542.645 ms
Loss rate: 28.36%
-- Flow 1:
Average throughput: 20.40 Mbit/s
95th percentile per-packet one-way delay: 542.645 ms
Loss rate: 28.36%

Run 2: Report of Vivace-loss — Data Link

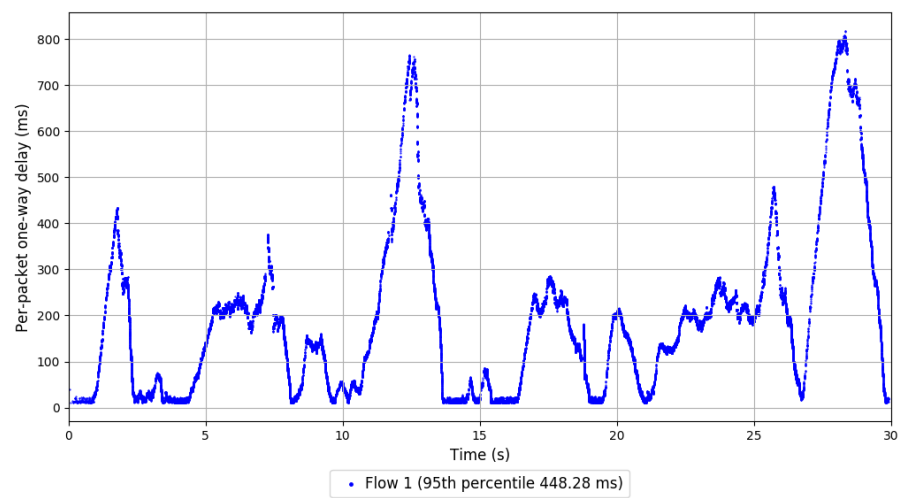
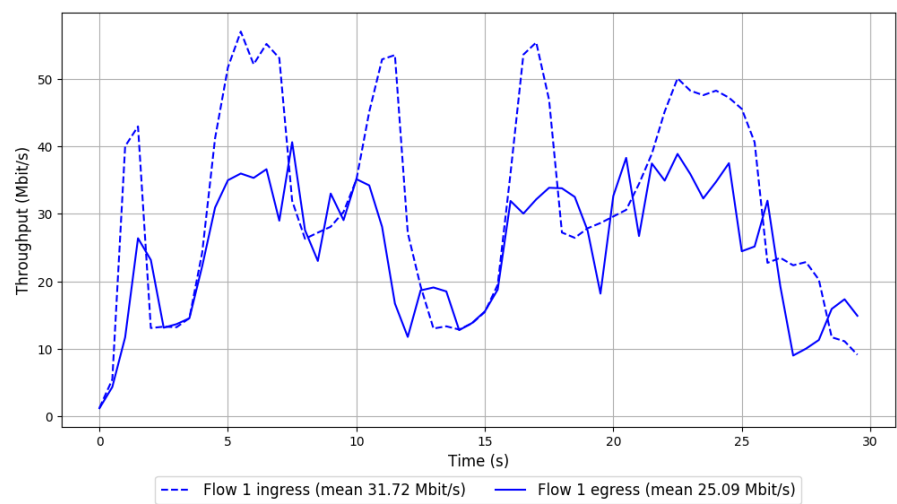


Run 3: Statistics of Vivace-loss

Start at: 2018-03-12 22:06:15
End at: 2018-03-12 22:06:45
Local clock offset: -2.693 ms
Remote clock offset: -6.423 ms

Below is generated by plot.py at 2018-03-12 22:20:13
Datalink statistics
-- Total of 1 flow:
Average throughput: 25.09 Mbit/s
95th percentile per-packet one-way delay: 448.280 ms
Loss rate: 20.96%
-- Flow 1:
Average throughput: 25.09 Mbit/s
95th percentile per-packet one-way delay: 448.280 ms
Loss rate: 20.96%

Run 3: Report of Vivace-loss — Data Link

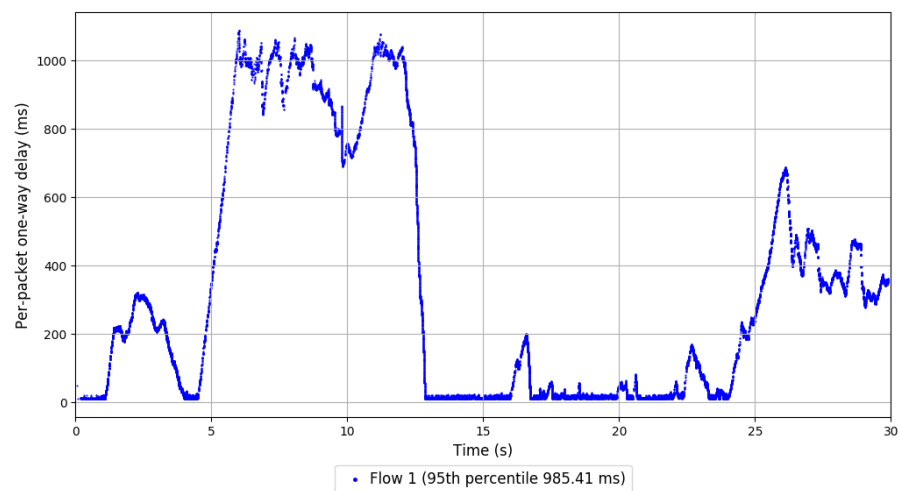
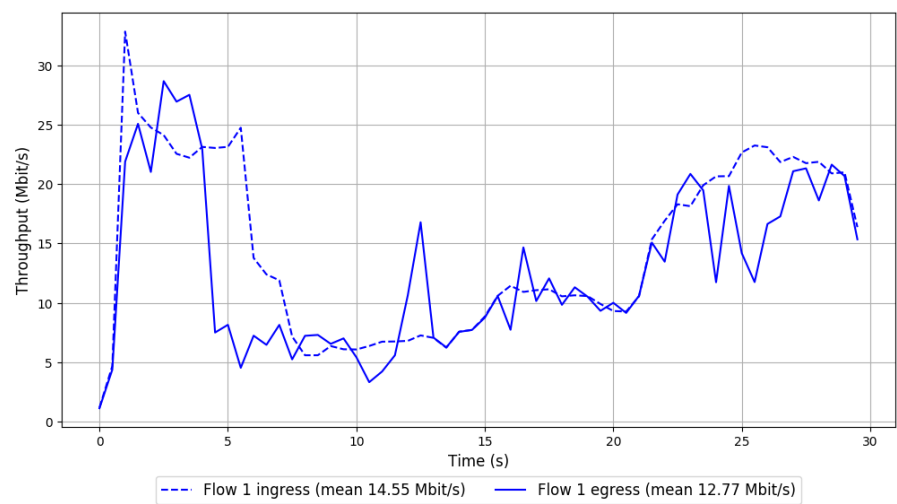


Run 1: Statistics of Vivace-LTE

Start at: 2018-03-12 21:12:20
End at: 2018-03-12 21:12:50
Local clock offset: 18.331 ms
Remote clock offset: -6.513 ms

Below is generated by plot.py at 2018-03-12 22:20:13
Datalink statistics
-- Total of 1 flow:
Average throughput: 12.77 Mbit/s
95th percentile per-packet one-way delay: 985.407 ms
Loss rate: 12.34%
-- Flow 1:
Average throughput: 12.77 Mbit/s
95th percentile per-packet one-way delay: 985.407 ms
Loss rate: 12.34%

Run 1: Report of Vivace-LTE — Data Link

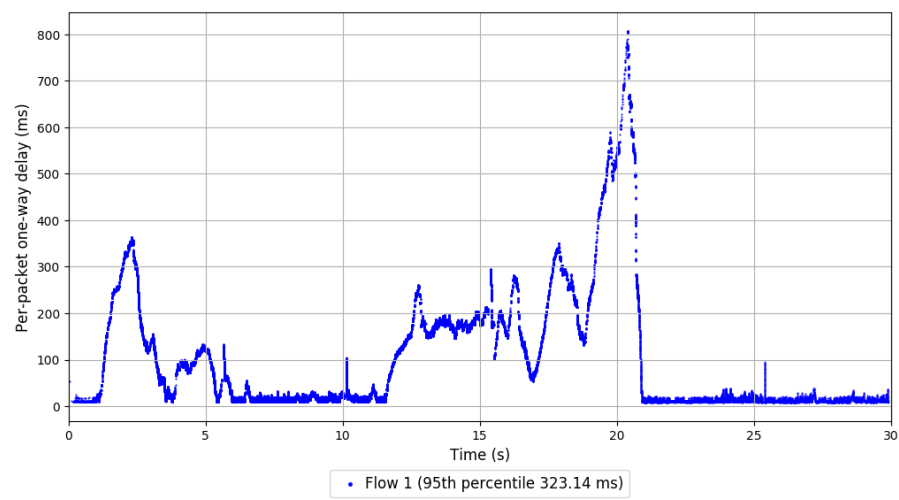
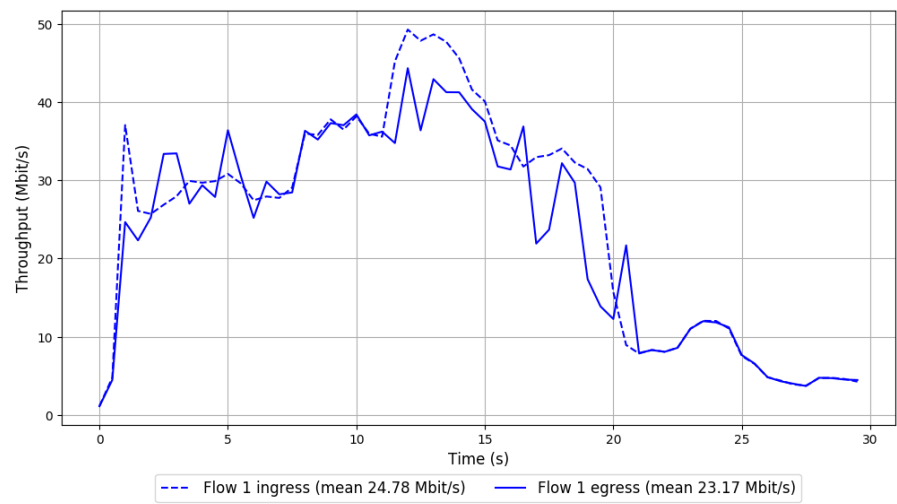


Run 2: Statistics of Vivace-LTE

Start at: 2018-03-12 21:35:59
End at: 2018-03-12 21:36:29
Local clock offset: 25.528 ms
Remote clock offset: -5.447 ms

Below is generated by plot.py at 2018-03-12 22:20:13
Datalink statistics
-- Total of 1 flow:
Average throughput: 23.17 Mbit/s
95th percentile per-packet one-way delay: 323.136 ms
Loss rate: 6.63%
-- Flow 1:
Average throughput: 23.17 Mbit/s
95th percentile per-packet one-way delay: 323.136 ms
Loss rate: 6.63%

Run 2: Report of Vivace-LTE — Data Link



Run 3: Statistics of Vivace-LTE

Start at: 2018-03-12 21:59:40
End at: 2018-03-12 22:00:10
Local clock offset: -0.881 ms
Remote clock offset: -6.248 ms

Below is generated by plot.py at 2018-03-12 22:20:13
Datalink statistics
-- Total of 1 flow:
Average throughput: 11.98 Mbit/s
95th percentile per-packet one-way delay: 181.577 ms
Loss rate: 0.72%
-- Flow 1:
Average throughput: 11.98 Mbit/s
95th percentile per-packet one-way delay: 181.577 ms
Loss rate: 0.72%

Run 3: Report of Vivace-LTE — Data Link

