

Pantheon Report

Generated at 2018-02-17 02:51:59 (UTC).

Data path: AWS Brazil 2 Ethernet (*local*) → Colombia 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).

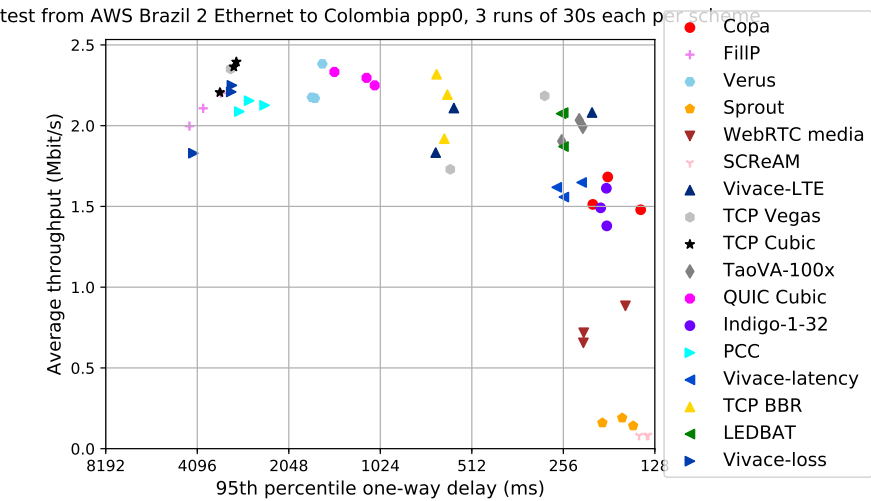
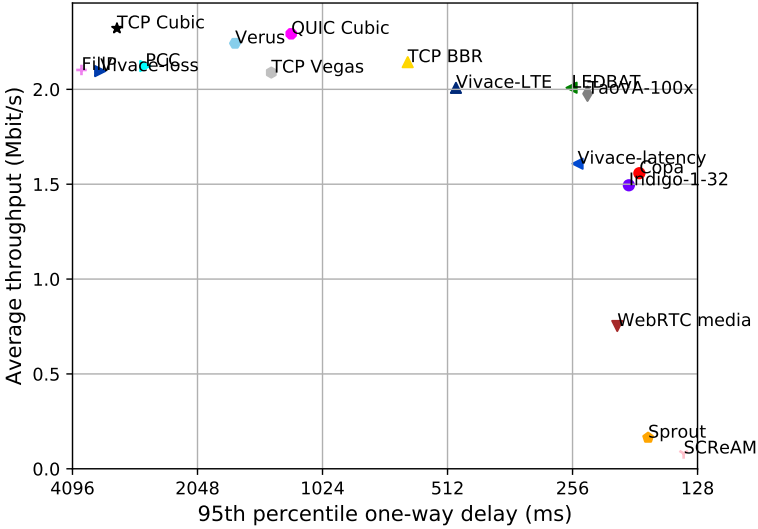
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

NTP offsets were measured against **gps.ntp.br** and have been applied to correct the timestamps in logs.

Git summary:

```
branch: master @ cccb2d77344969a7bac1df6edf6c0cfb6c77a6f8
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/fillp @ 828bbf95fd4941149b5cec90f281d1c69ae1a5c6
third_party/genericCC @ 8400b8926887fc4cf8c795a1d7ce2c8ac041ec72
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-quick @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ f1a14bffe749737437f61b1eaeab30b267cde681
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 Brazil 2 Ethernet to Colombia ppp0, 3 runs of 30s each per scheme
(mean of all runs by scheme)



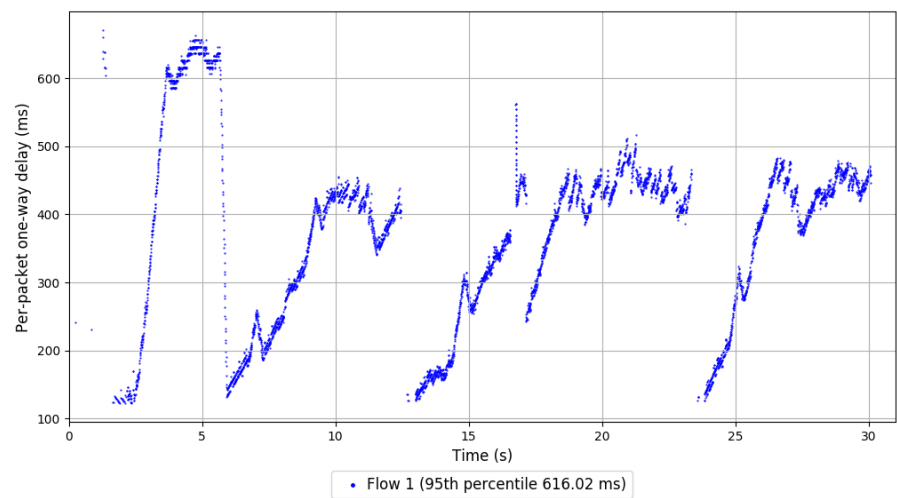
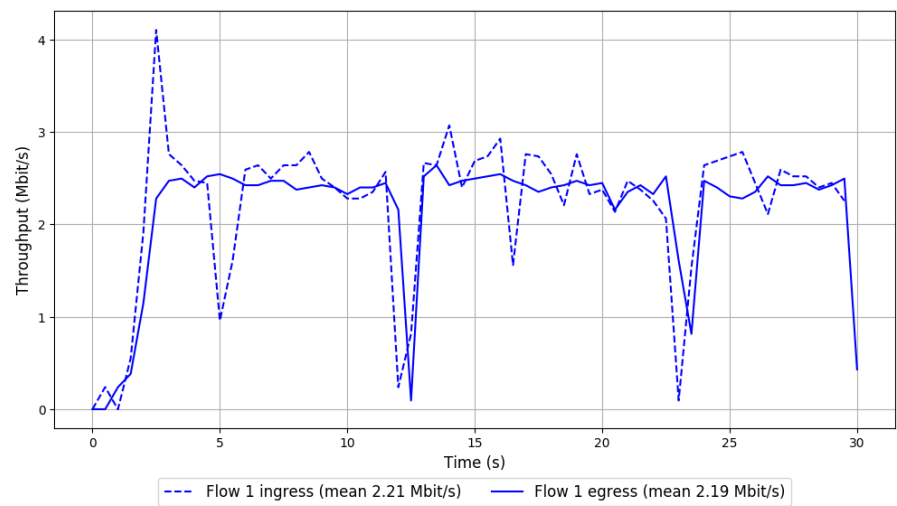
scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	2.14	638.49	1.11
TCP Cubic	3	2.32	3201.00	12.95
LEDBAT	3	2.01	257.43	0.63
PCC	3	2.12	2734.52	38.64
QUIC Cubic	3	2.29	1218.21	4.14
SCReAM	3	0.08	138.26	0.13
WebRTC media	3	0.75	199.77	0.30
Sprout	3	0.16	168.40	0.22
TaoVA-100x	3	1.97	235.63	0.29
TCP Vegas	3	2.09	1360.12	6.05
Verus	3	2.24	1663.01	3.82
Copa	3	1.56	176.73	0.15
FillP	3	2.10	3896.89	95.70
Indigo-1-32	3	1.49	187.33	0.20
Vivace-latency	3	1.61	249.03	1.00
Vivace-loss	3	2.10	3512.21	30.59
Vivace-LTE	3	2.01	488.61	0.81

Run 1: Statistics of TCP BBR

Start at: 2018-02-17 01:59:09
End at: 2018-02-17 01:59:39
Local clock offset: -6.686 ms
Remote clock offset: -2.319 ms

Below is generated by plot.py at 2018-02-17 02:51:19
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 616.018 ms
Loss rate: 1.21%
-- Flow 1:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 616.018 ms
Loss rate: 1.21%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-02-17 02:20:21

End at: 2018-02-17 02:20:51

Local clock offset: -6.35 ms

Remote clock offset: 1.371 ms

Below is generated by plot.py at 2018-02-17 02:51:19

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.32 Mbit/s

95th percentile per-packet one-way delay: 668.781 ms

Loss rate: 0.91%

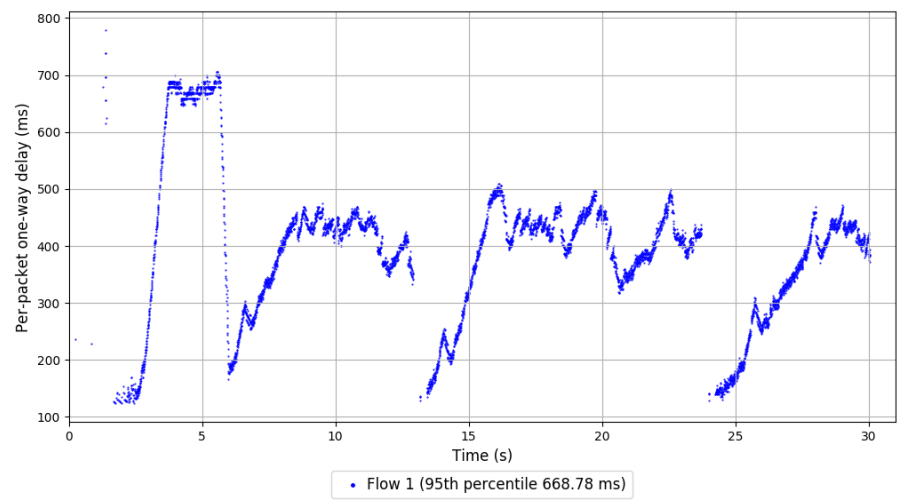
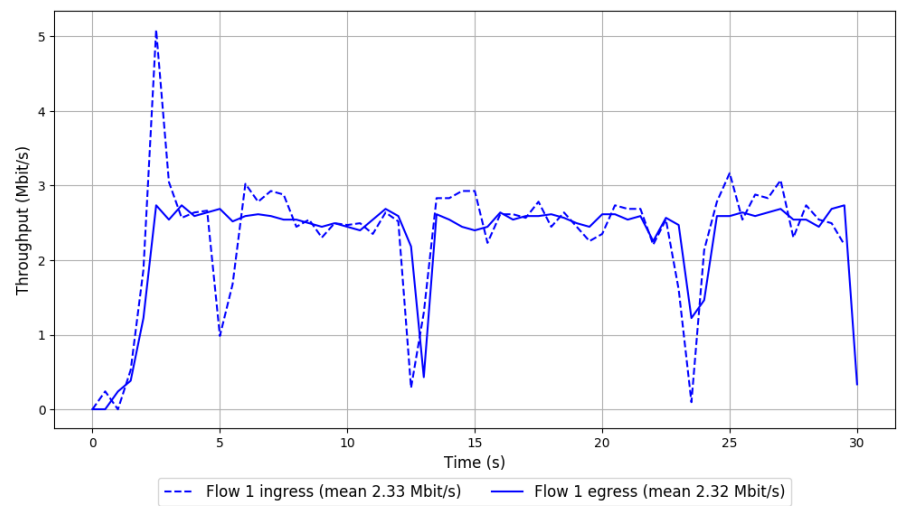
-- Flow 1:

Average throughput: 2.32 Mbit/s

95th percentile per-packet one-way delay: 668.781 ms

Loss rate: 0.91%

Run 2: Report of TCP BBR — Data Link

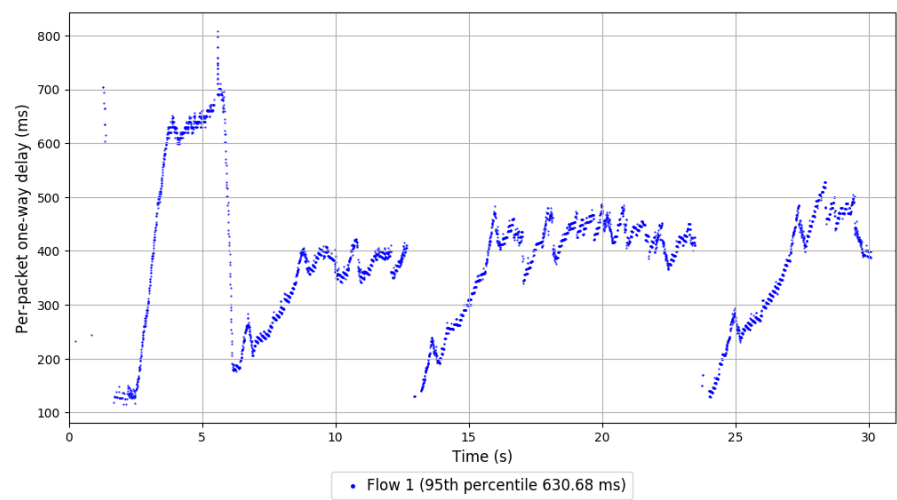
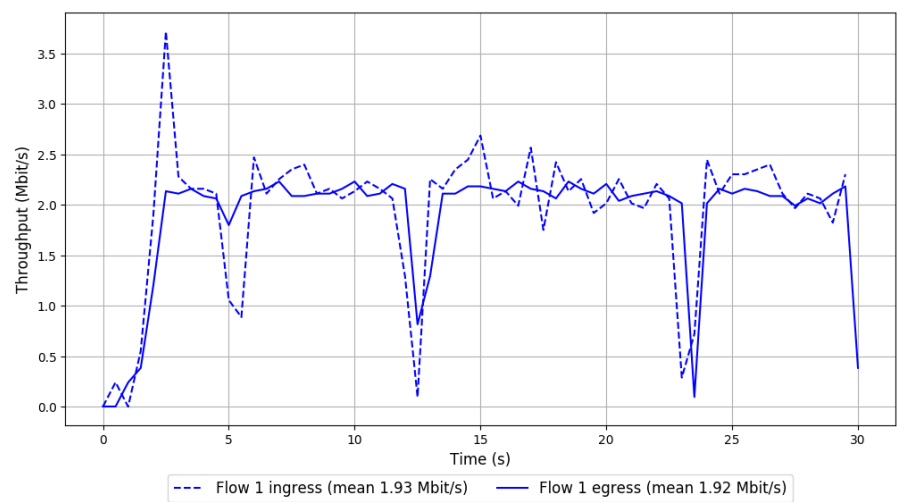


Run 3: Statistics of TCP BBR

Start at: 2018-02-17 02:41:32
End at: 2018-02-17 02:42:02
Local clock offset: -5.814 ms
Remote clock offset: -2.923 ms

Below is generated by plot.py at 2018-02-17 02:51:19
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.92 Mbit/s
95th percentile per-packet one-way delay: 630.683 ms
Loss rate: 1.22%
-- Flow 1:
Average throughput: 1.92 Mbit/s
95th percentile per-packet one-way delay: 630.683 ms
Loss rate: 1.22%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2018-02-17 02:06:12

End at: 2018-02-17 02:06:42

Local clock offset: -7.194 ms

Remote clock offset: -3.47 ms

Below is generated by plot.py at 2018-02-17 02:51:19

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.39 Mbit/s

95th percentile per-packet one-way delay: 3046.036 ms

Loss rate: 11.63%

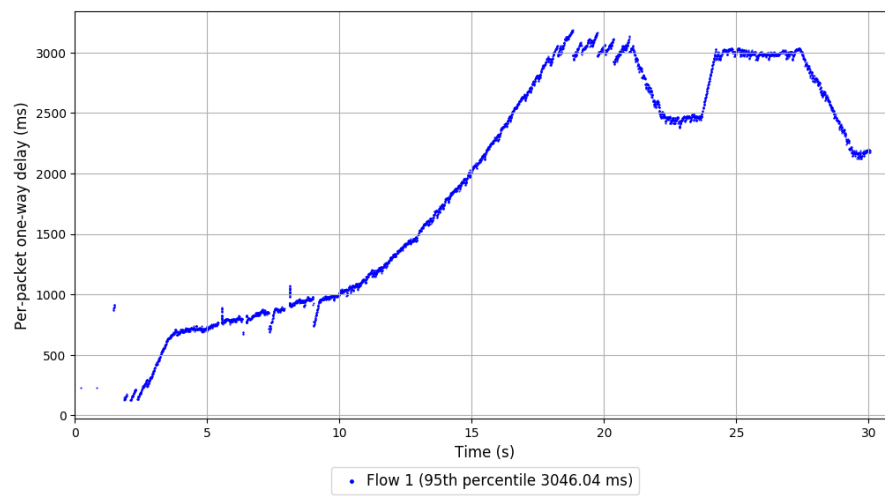
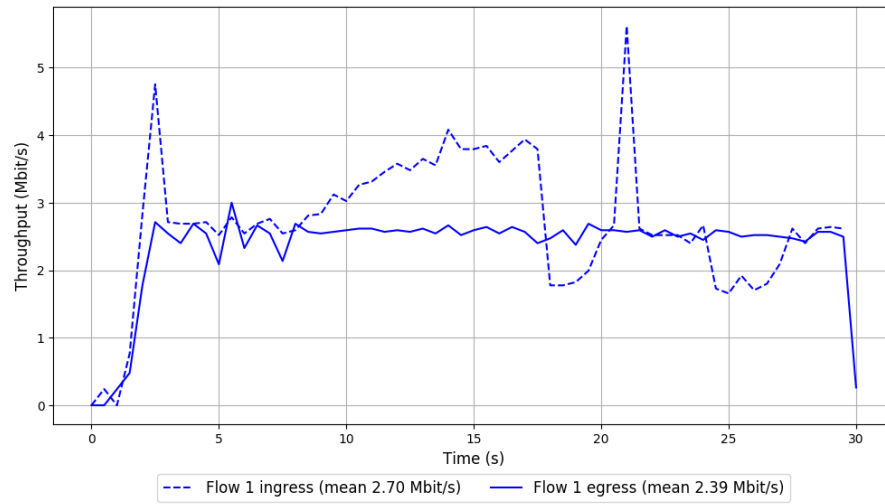
-- Flow 1:

Average throughput: 2.39 Mbit/s

95th percentile per-packet one-way delay: 3046.036 ms

Loss rate: 11.63%

Run 1: Report of TCP Cubic — Data Link

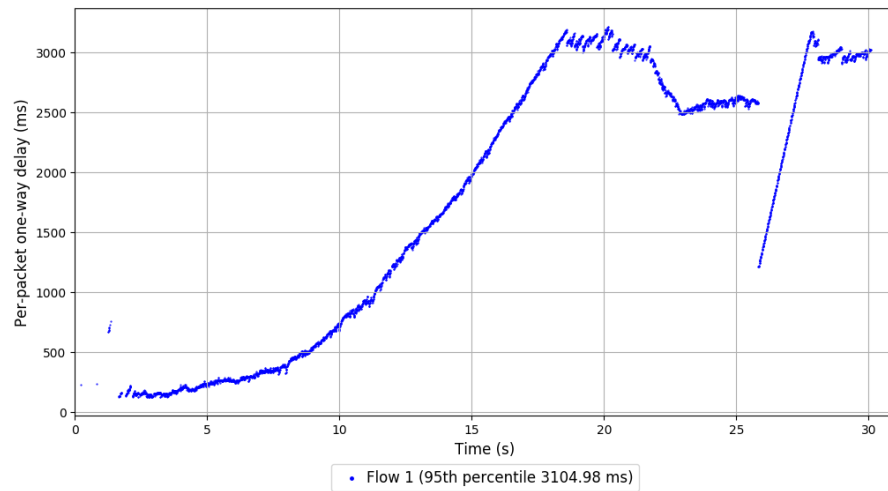
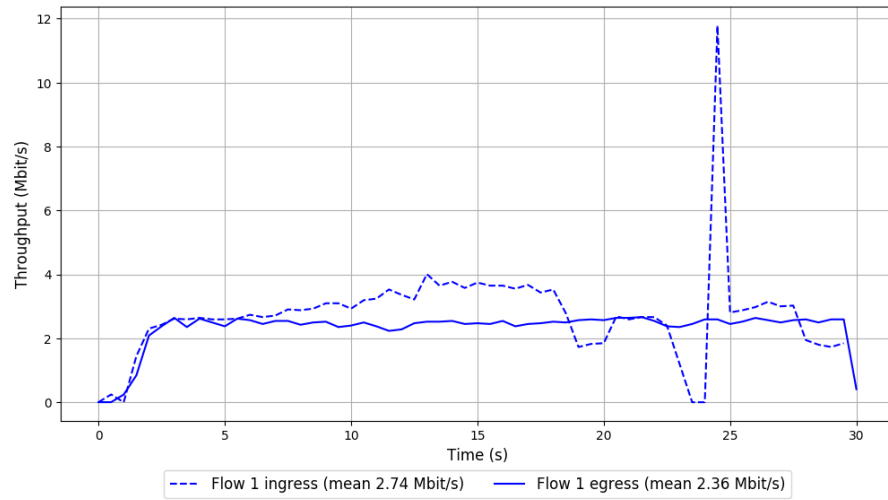


Run 2: Statistics of TCP Cubic

Start at: 2018-02-17 02:27:25
End at: 2018-02-17 02:27:55
Local clock offset: -5.961 ms
Remote clock offset: -4.446 ms

Below is generated by plot.py at 2018-02-17 02:51:19
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.36 Mbit/s
95th percentile per-packet one-way delay: 3104.983 ms
Loss rate: 14.01%
-- Flow 1:
Average throughput: 2.36 Mbit/s
95th percentile per-packet one-way delay: 3104.983 ms
Loss rate: 14.01%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2018-02-17 02:48:35

End at: 2018-02-17 02:49:05

Local clock offset: -5.199 ms

Remote clock offset: 2.067 ms

Below is generated by plot.py at 2018-02-17 02:51:19

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.21 Mbit/s

95th percentile per-packet one-way delay: 3451.969 ms

Loss rate: 13.20%

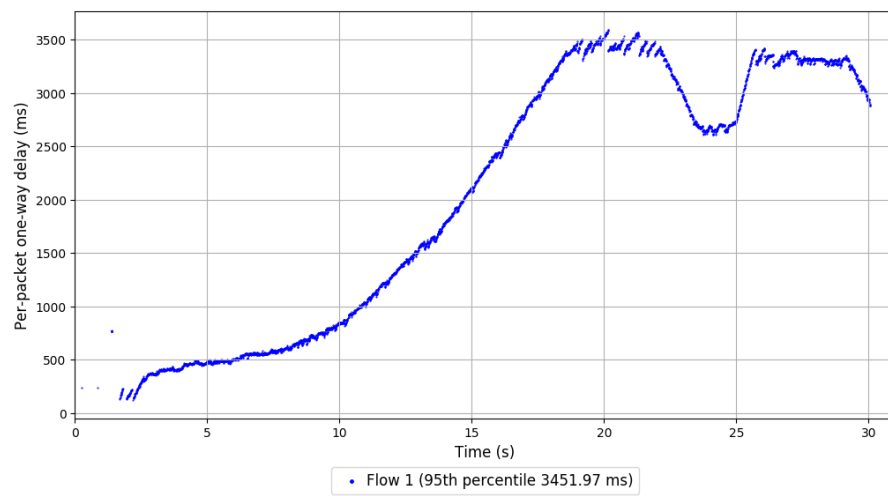
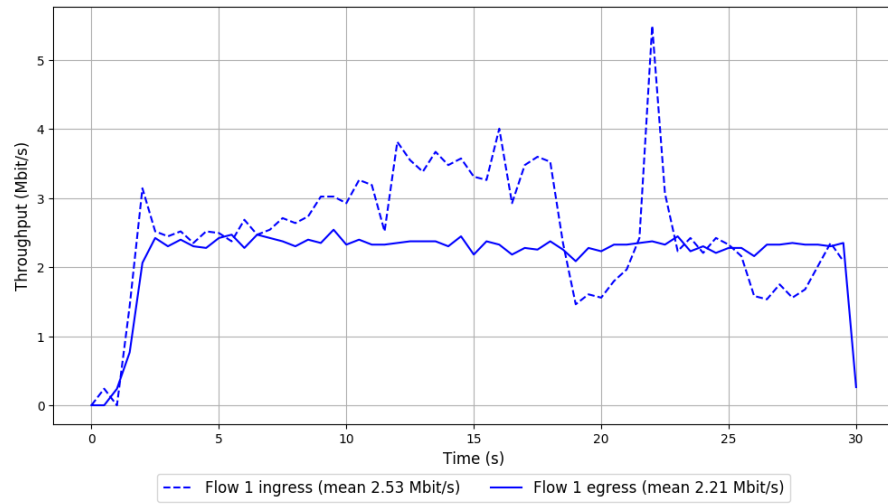
-- Flow 1:

Average throughput: 2.21 Mbit/s

95th percentile per-packet one-way delay: 3451.969 ms

Loss rate: 13.20%

Run 3: Report of TCP Cubic — Data Link

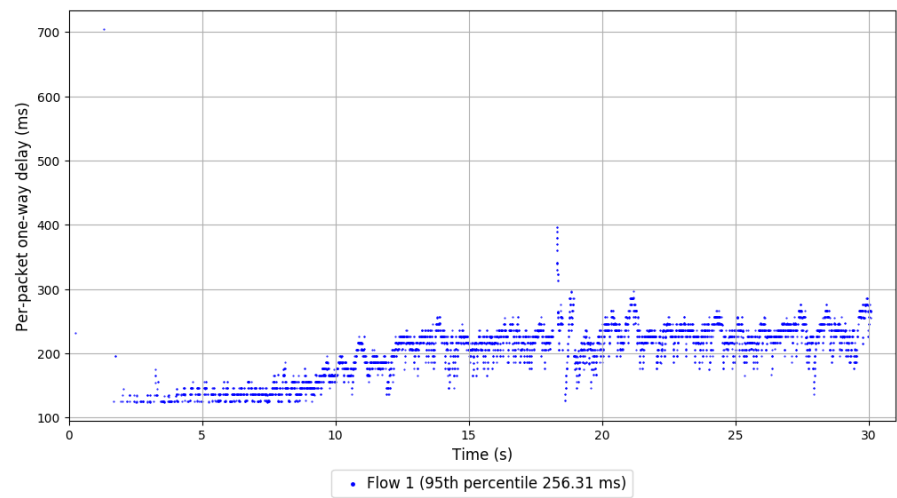
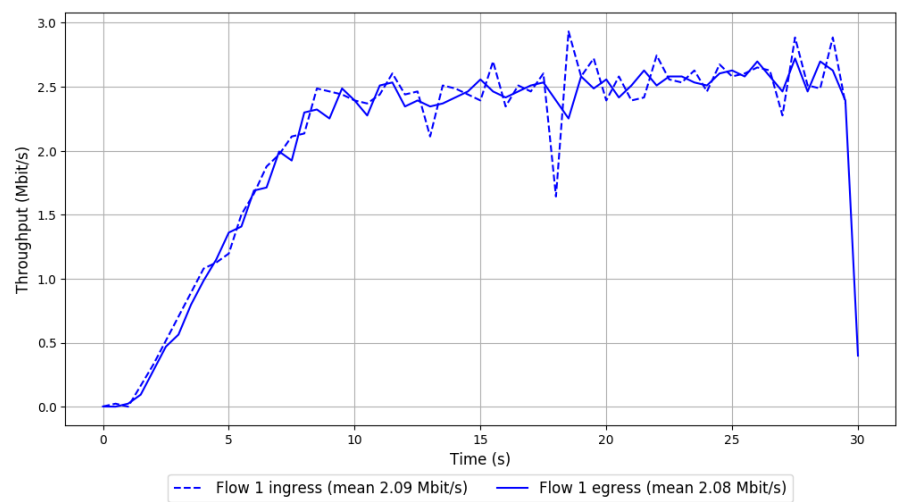


```
Run 1: Statistics of LEDBAT

Start at: 2018-02-17 02:03:51
End at: 2018-02-17 02:04:21
Local clock offset: -7.034 ms
Remote clock offset: -3.203 ms

# Below is generated by plot.py at 2018-02-17 02:51:19
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.08 Mbit/s
95th percentile per-packet one-way delay: 256.307 ms
Loss rate: 0.71%
-- Flow 1:
Average throughput: 2.08 Mbit/s
95th percentile per-packet one-way delay: 256.307 ms
Loss rate: 0.71%
```

Run 1: Report of LEDBAT — Data Link

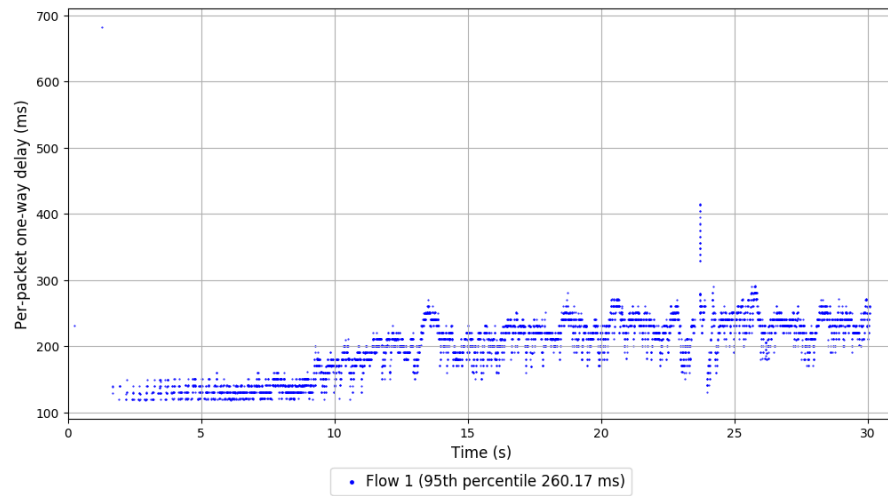
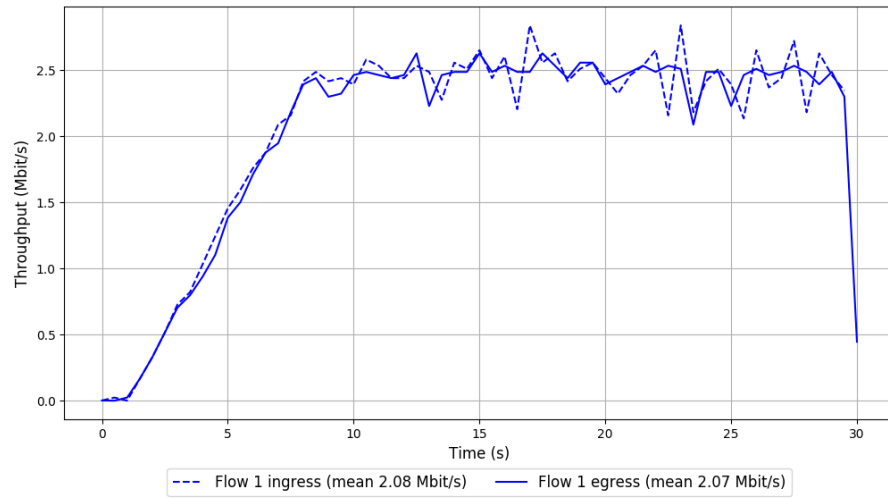


Run 2: Statistics of LEDBAT

Start at: 2018-02-17 02:25:04
End at: 2018-02-17 02:25:34
Local clock offset: -6.046 ms
Remote clock offset: -4.398 ms

Below is generated by plot.py at 2018-02-17 02:51:19
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 260.168 ms
Loss rate: 0.58%
-- Flow 1:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 260.168 ms
Loss rate: 0.58%

Run 2: Report of LEDBAT — Data Link

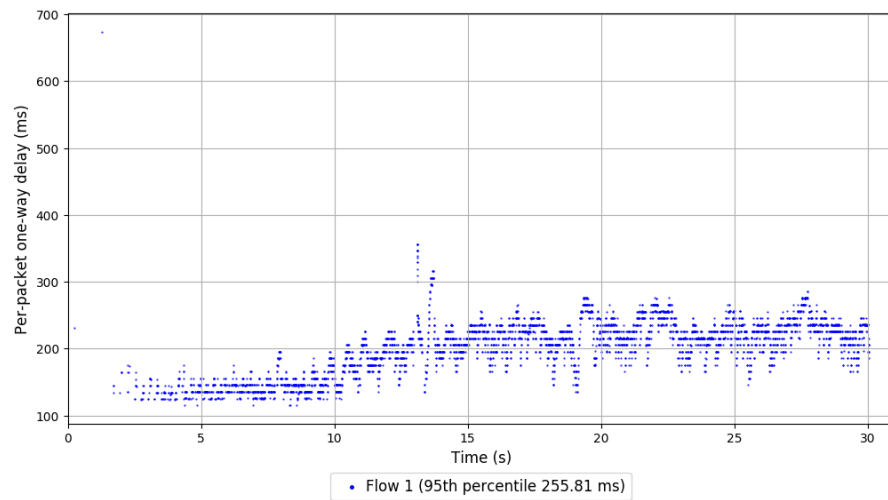
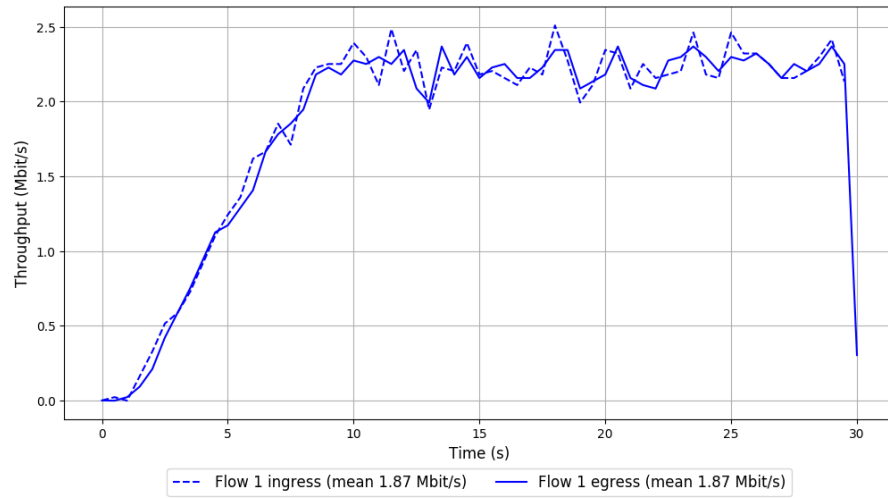


Run 3: Statistics of LEDBAT

Start at: 2018-02-17 02:46:14
End at: 2018-02-17 02:46:44
Local clock offset: -5.834 ms
Remote clock offset: -3.613 ms

Below is generated by plot.py at 2018-02-17 02:51:21
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.87 Mbit/s
95th percentile per-packet one-way delay: 255.812 ms
Loss rate: 0.61%
-- Flow 1:
Average throughput: 1.87 Mbit/s
95th percentile per-packet one-way delay: 255.812 ms
Loss rate: 0.61%

Run 3: Report of LEDBAT — Data Link

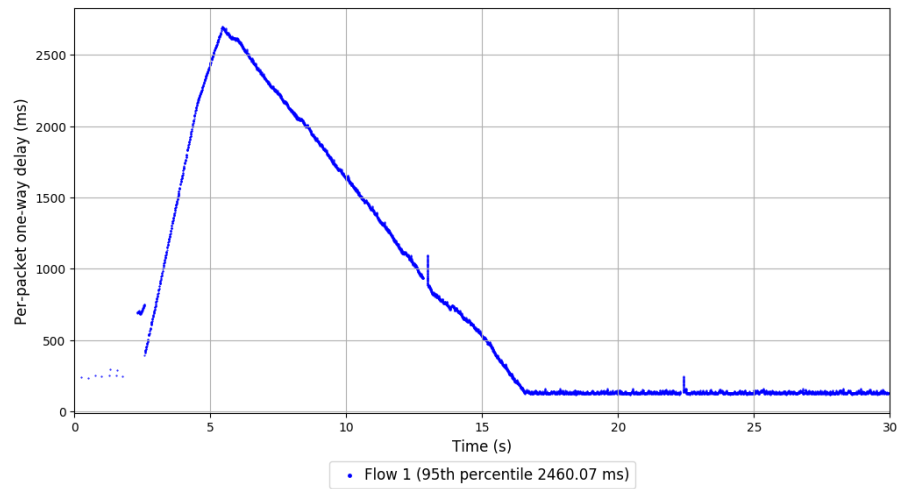
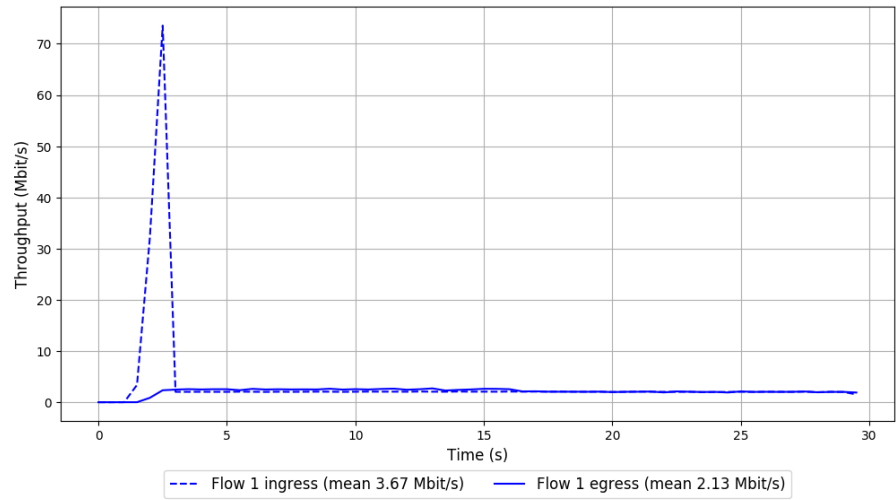


Run 1: Statistics of PCC

Start at: 2018-02-17 02:05:02
End at: 2018-02-17 02:05:32
Local clock offset: -7.115 ms
Remote clock offset: -3.268 ms

Below is generated by plot.py at 2018-02-17 02:51:25
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 2460.066 ms
Loss rate: 42.32%
-- Flow 1:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 2460.066 ms
Loss rate: 42.32%

Run 1: Report of PCC — Data Link



Run 2: Statistics of PCC

Start at: 2018-02-17 02:26:14

End at: 2018-02-17 02:26:44

Local clock offset: -6.074 ms

Remote clock offset: 1.25 ms

Below is generated by plot.py at 2018-02-17 02:51:27

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.15 Mbit/s

95th percentile per-packet one-way delay: 2765.459 ms

Loss rate: 37.60%

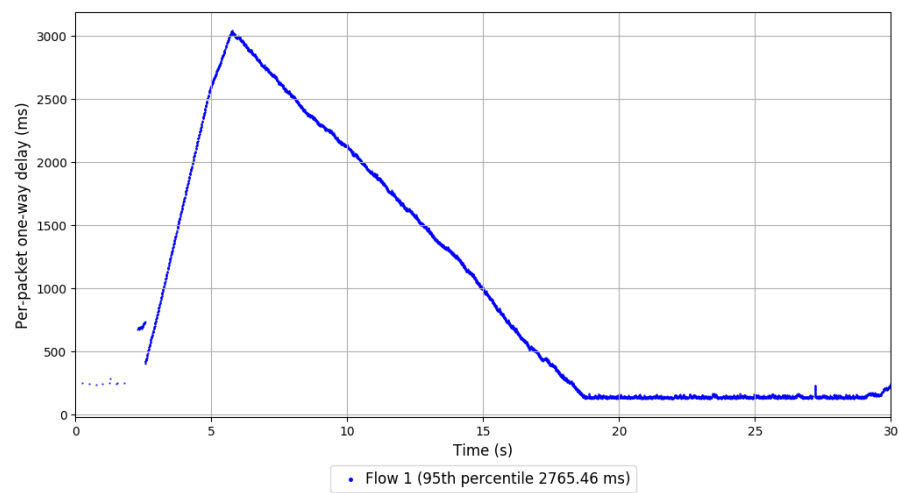
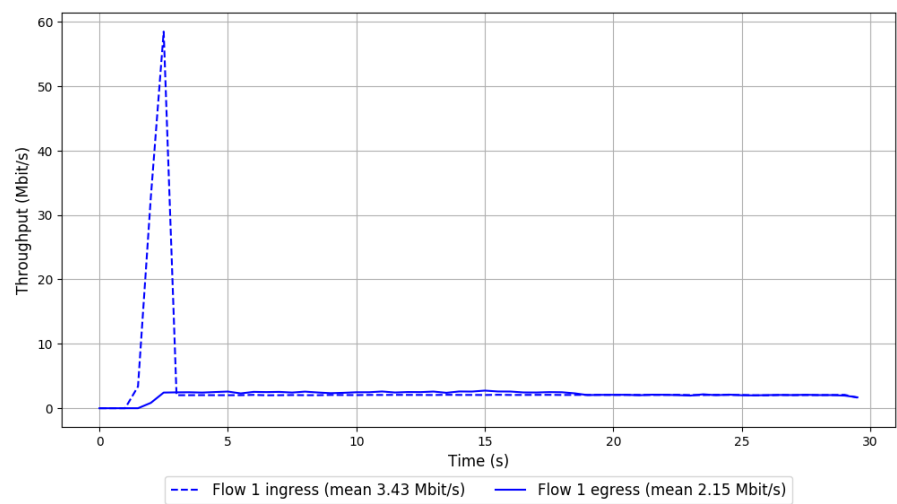
-- Flow 1:

Average throughput: 2.15 Mbit/s

95th percentile per-packet one-way delay: 2765.459 ms

Loss rate: 37.60%

Run 2: Report of PCC — Data Link

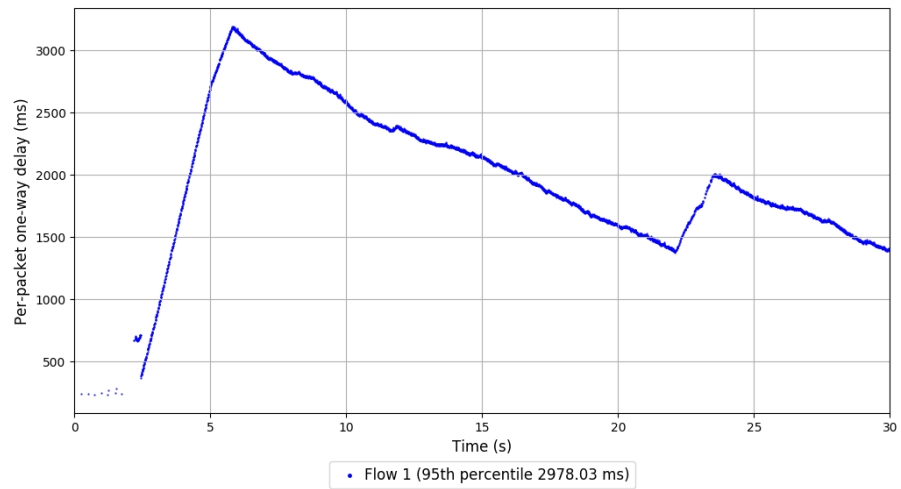
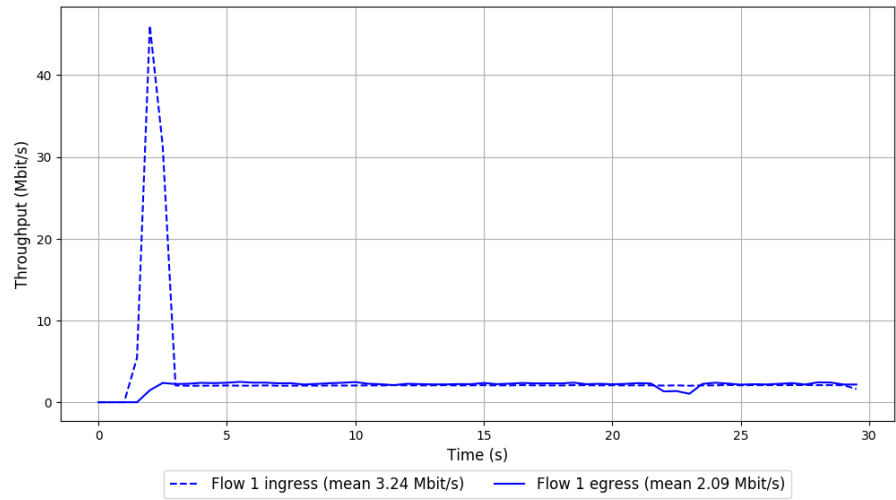


Run 3: Statistics of PCC

Start at: 2018-02-17 02:47:25
End at: 2018-02-17 02:47:55
Local clock offset: -5.573 ms
Remote clock offset: -3.682 ms

Below is generated by plot.py at 2018-02-17 02:51:28
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 2978.032 ms
Loss rate: 35.99%
-- Flow 1:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 2978.032 ms
Loss rate: 35.99%

Run 3: Report of PCC — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2018-02-17 01:53:15

End at: 2018-02-17 01:53:45

Local clock offset: -6.163 ms

Remote clock offset: 3.396 ms

Below is generated by plot.py at 2018-02-17 02:51:28

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.33 Mbit/s

95th percentile per-packet one-way delay: 1449.755 ms

Loss rate: 4.89%

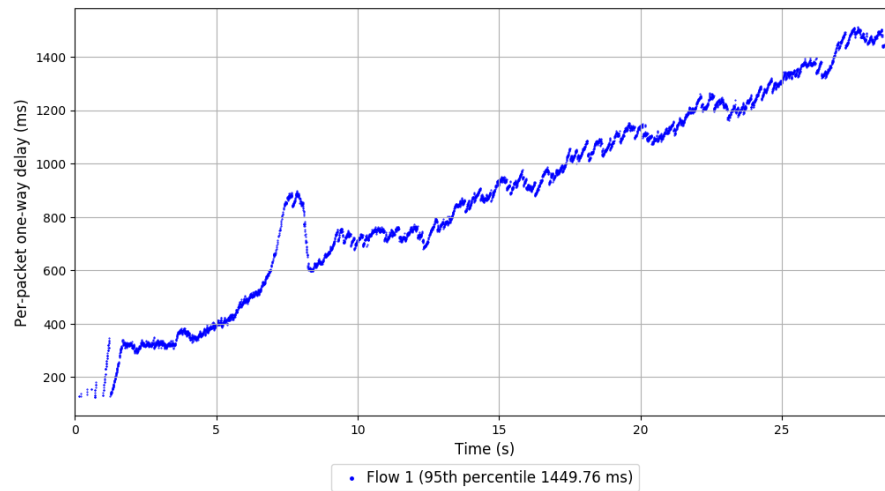
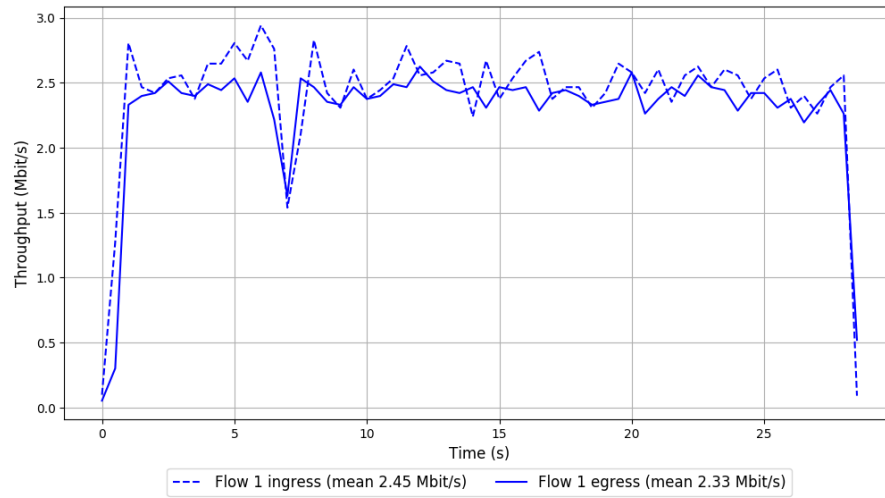
-- Flow 1:

Average throughput: 2.33 Mbit/s

95th percentile per-packet one-way delay: 1449.755 ms

Loss rate: 4.89%

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2018-02-17 02:14:28

End at: 2018-02-17 02:14:58

Local clock offset: -7.08 ms

Remote clock offset: -3.175 ms

Below is generated by plot.py at 2018-02-17 02:51:28

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.25 Mbit/s

95th percentile per-packet one-way delay: 1068.288 ms

Loss rate: 3.48%

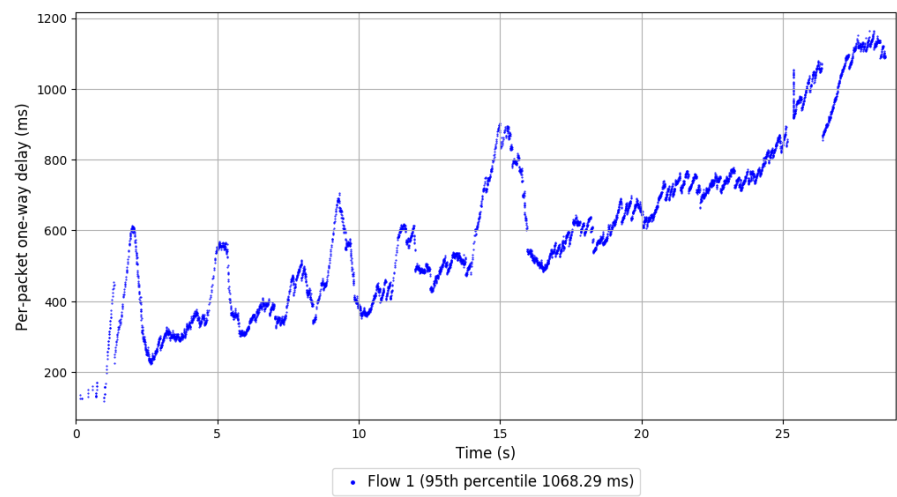
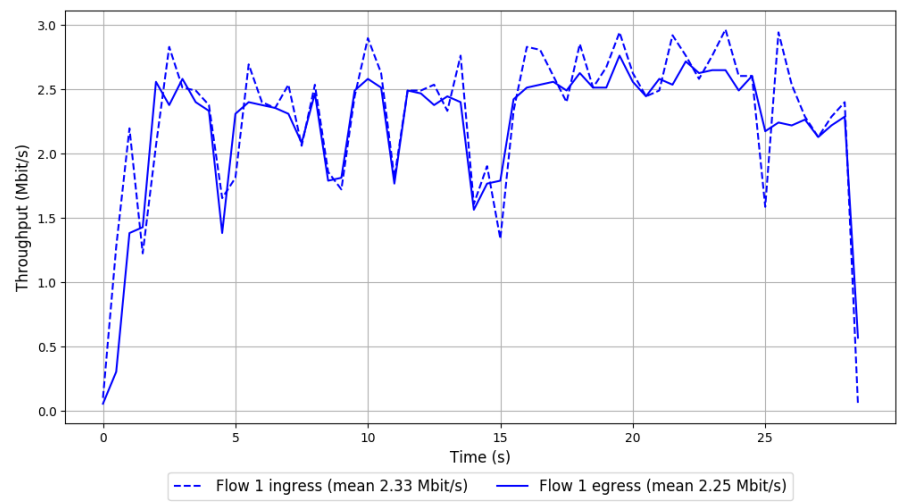
-- Flow 1:

Average throughput: 2.25 Mbit/s

95th percentile per-packet one-way delay: 1068.288 ms

Loss rate: 3.48%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2018-02-17 02:35:40

End at: 2018-02-17 02:36:10

Local clock offset: -5.813 ms

Remote clock offset: -3.098 ms

Below is generated by plot.py at 2018-02-17 02:51:28

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.30 Mbit/s

95th percentile per-packet one-way delay: 1136.596 ms

Loss rate: 4.06%

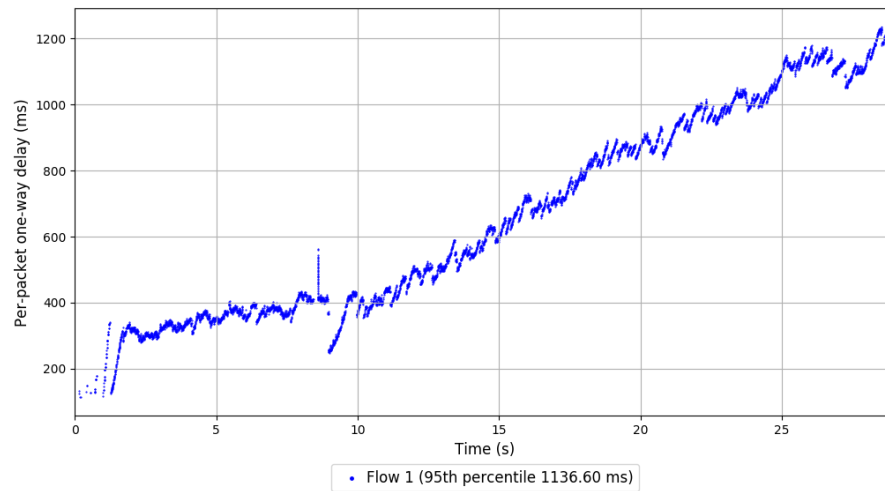
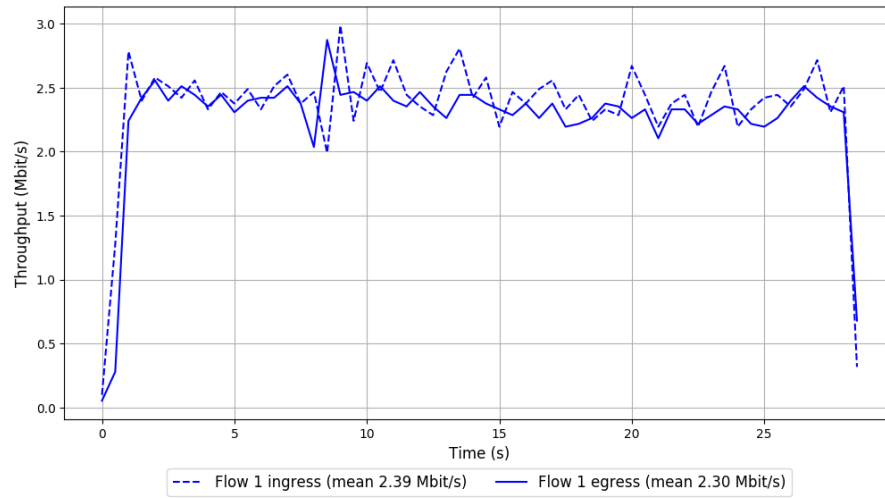
-- Flow 1:

Average throughput: 2.30 Mbit/s

95th percentile per-packet one-way delay: 1136.596 ms

Loss rate: 4.06%

Run 3: Report of QUIC Cubic — Data Link

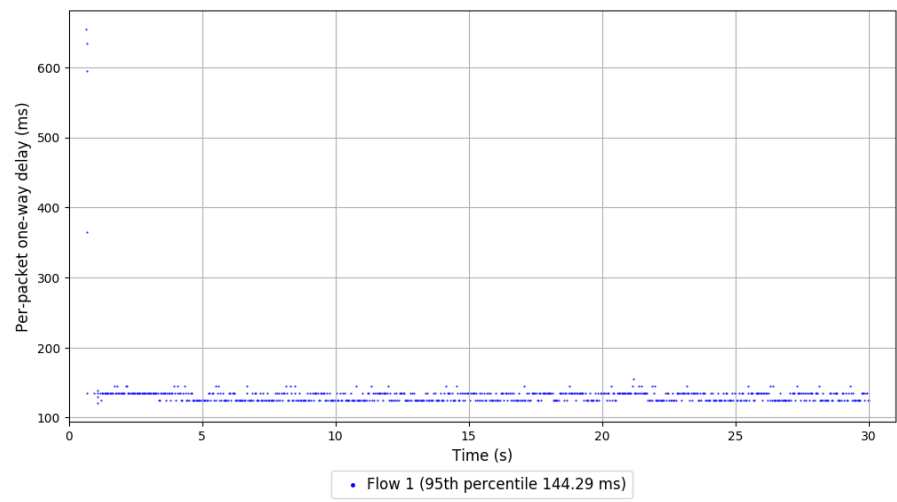
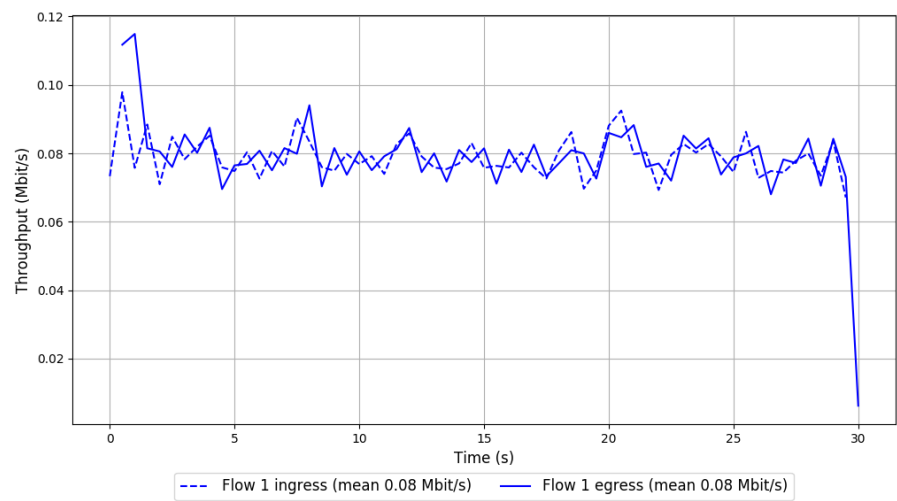


```
Run 1: Statistics of SCReAM

Start at: 2018-02-17 01:56:47
End at: 2018-02-17 01:57:17
Local clock offset: -6.485 ms
Remote clock offset: 3.093 ms

# Below is generated by plot.py at 2018-02-17 02:51:28
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 144.288 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 144.288 ms
Loss rate: 0.13%
```

Run 1: Report of SReAM — Data Link



Run 2: Statistics of SCReAM

Start at: 2018-02-17 02:18:00

End at: 2018-02-17 02:18:30

Local clock offset: -6.584 ms

Remote clock offset: 1.458 ms

Below is generated by plot.py at 2018-02-17 02:51:28

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 135.916 ms

Loss rate: 0.13%

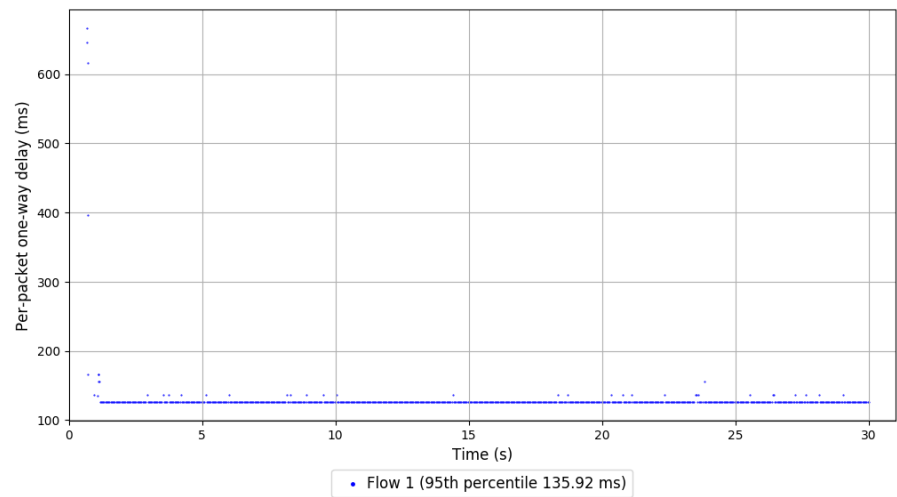
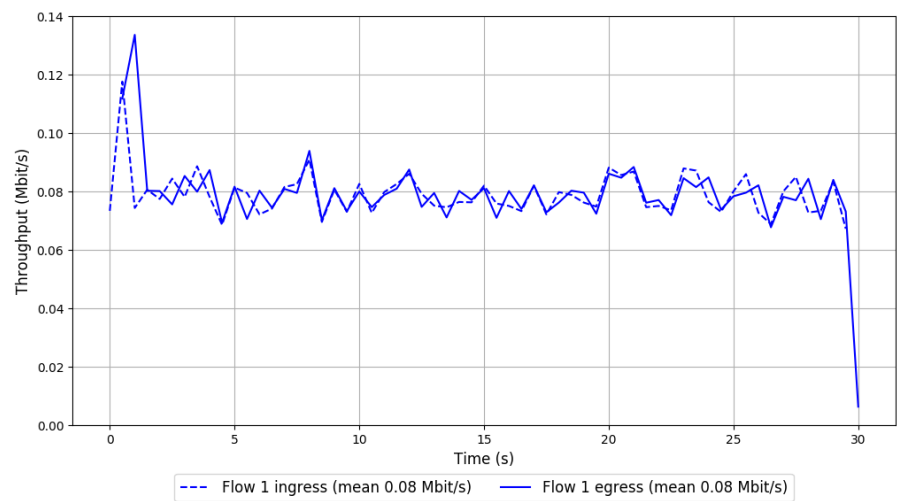
-- Flow 1:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 135.916 ms

Loss rate: 0.13%

Run 2: Report of SReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2018-02-17 02:39:11

End at: 2018-02-17 02:39:41

Local clock offset: -5.822 ms

Remote clock offset: 0.951 ms

Below is generated by plot.py at 2018-02-17 02:51:28

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 134.565 ms

Loss rate: 0.13%

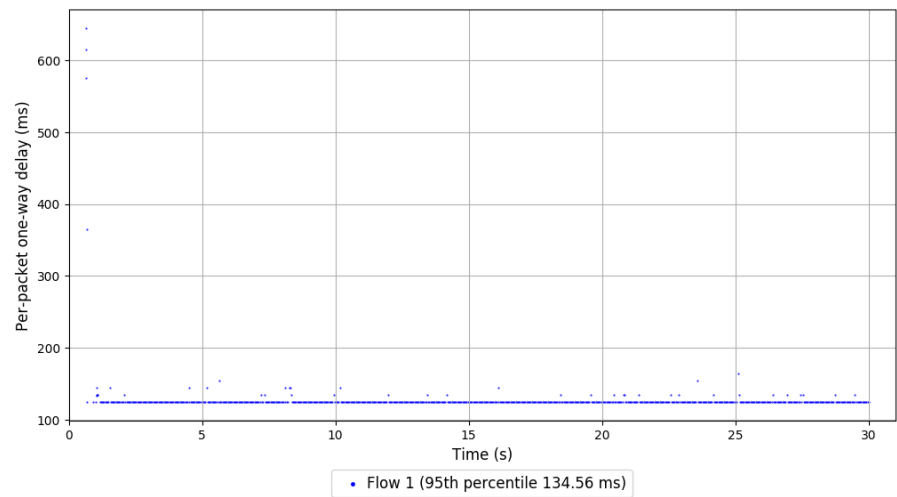
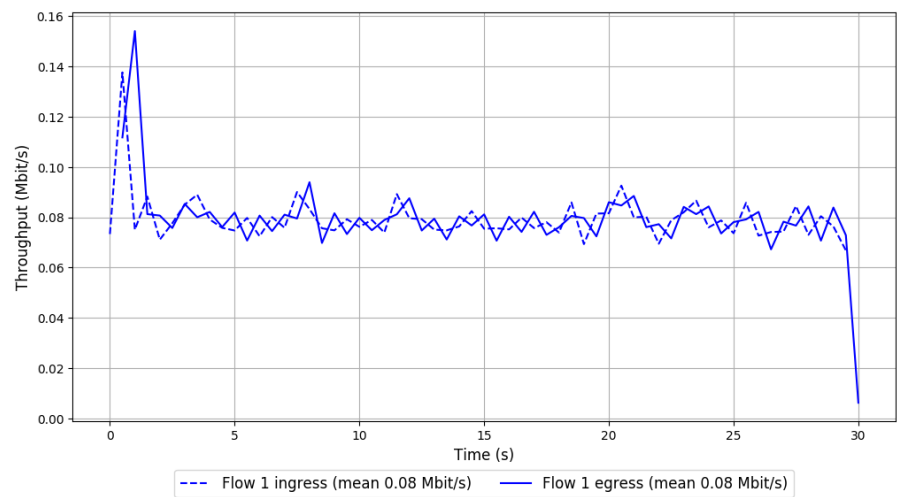
-- Flow 1:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 134.565 ms

Loss rate: 0.13%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of WebRTC media

Start at: 2018-02-17 02:07:23

End at: 2018-02-17 02:07:53

Local clock offset: -7.326 ms

Remote clock offset: 2.004 ms

Below is generated by plot.py at 2018-02-17 02:51:30

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.66 Mbit/s

95th percentile per-packet one-way delay: 219.933 ms

Loss rate: 0.26%

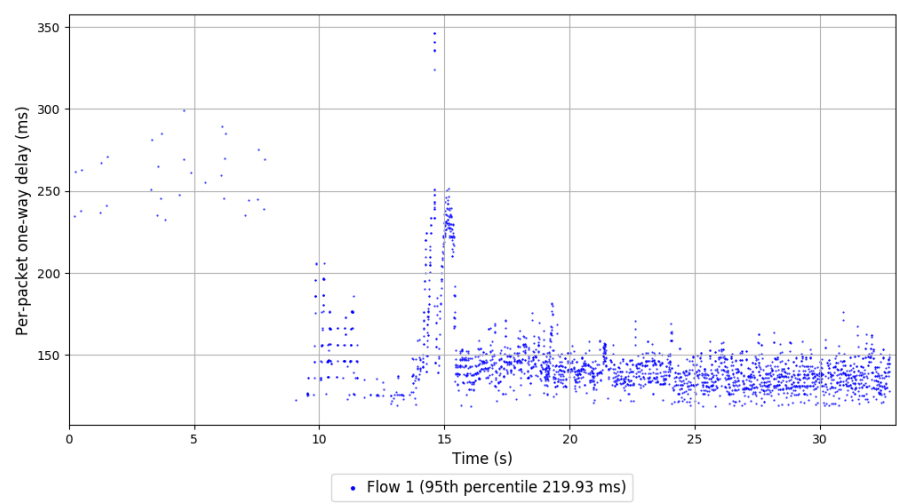
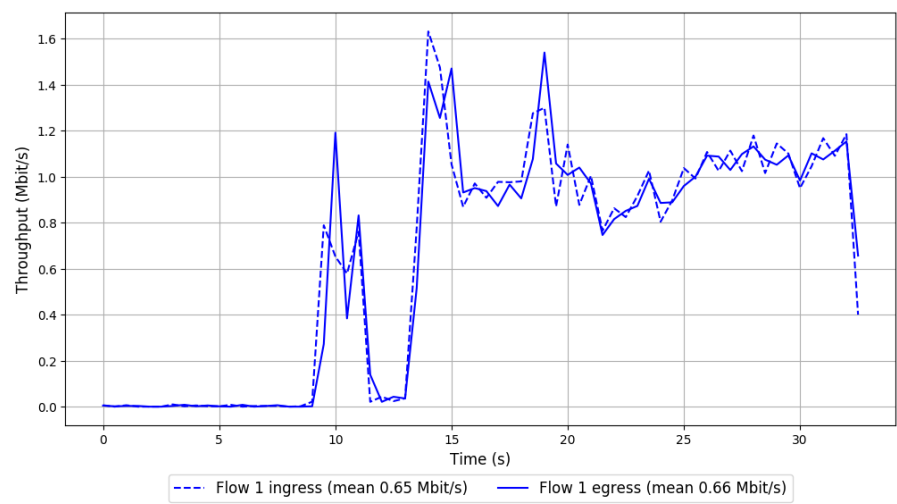
-- Flow 1:

Average throughput: 0.66 Mbit/s

95th percentile per-packet one-way delay: 219.933 ms

Loss rate: 0.26%

Run 1: Report of WebRTC media — Data Link

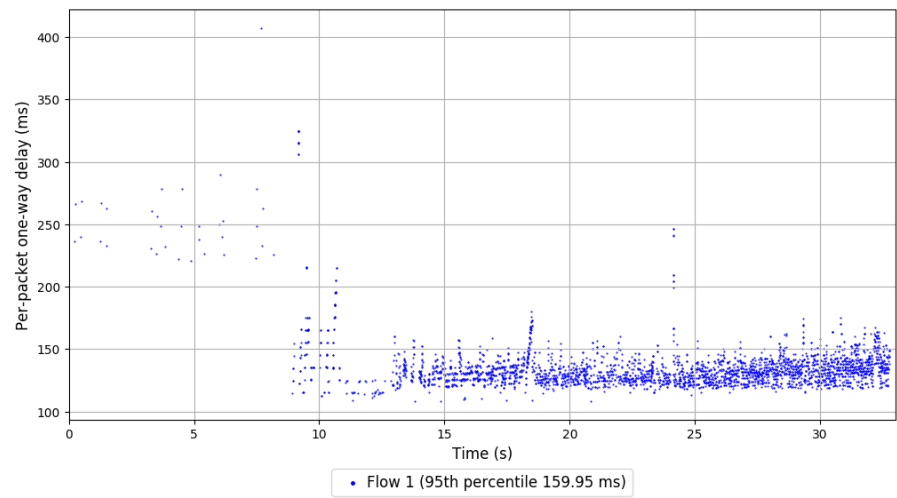
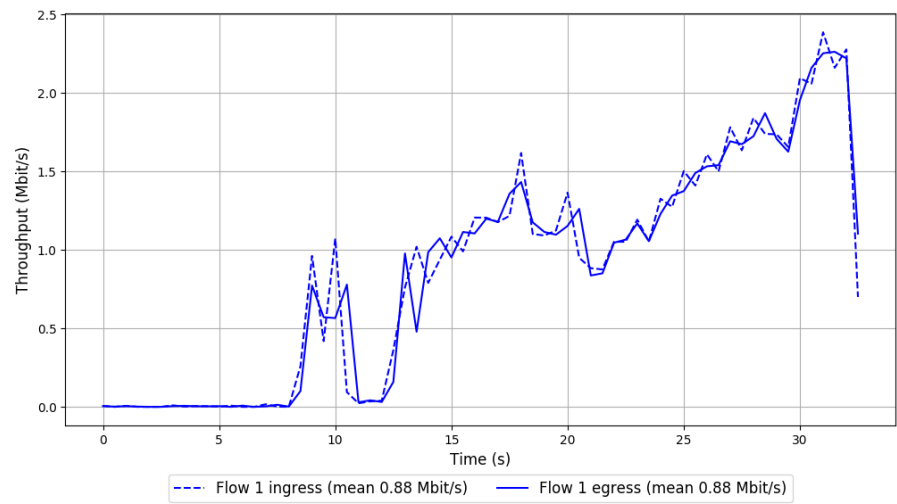


Run 2: Statistics of WebRTC media

Start at: 2018-02-17 02:28:36
End at: 2018-02-17 02:29:06
Local clock offset: -5.982 ms
Remote clock offset: -4.472 ms

Below is generated by plot.py at 2018-02-17 02:51:31
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.88 Mbit/s
95th percentile per-packet one-way delay: 159.946 ms
Loss rate: 0.37%
-- Flow 1:
Average throughput: 0.88 Mbit/s
95th percentile per-packet one-way delay: 159.946 ms
Loss rate: 0.37%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2018-02-17 02:49:46

End at: 2018-02-17 02:50:16

Local clock offset: -4.81 ms

Remote clock offset: 1.302 ms

Below is generated by plot.py at 2018-02-17 02:51:31

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.72 Mbit/s

95th percentile per-packet one-way delay: 219.433 ms

Loss rate: 0.28%

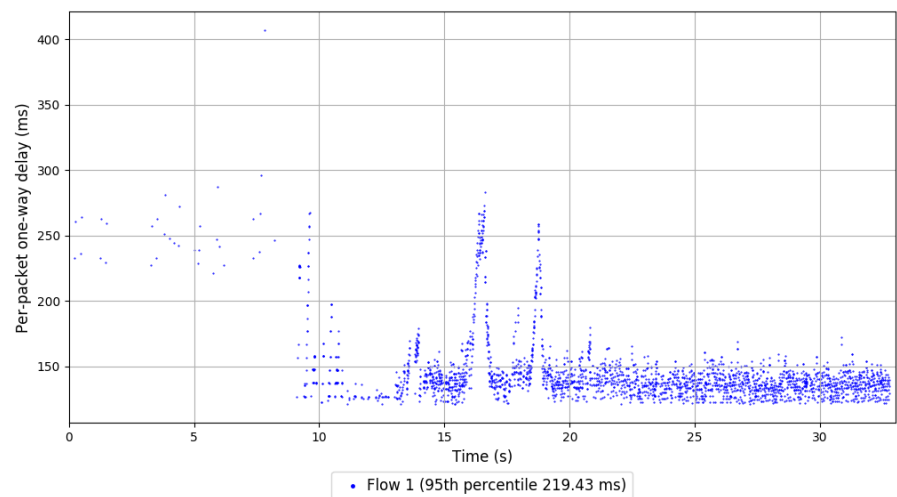
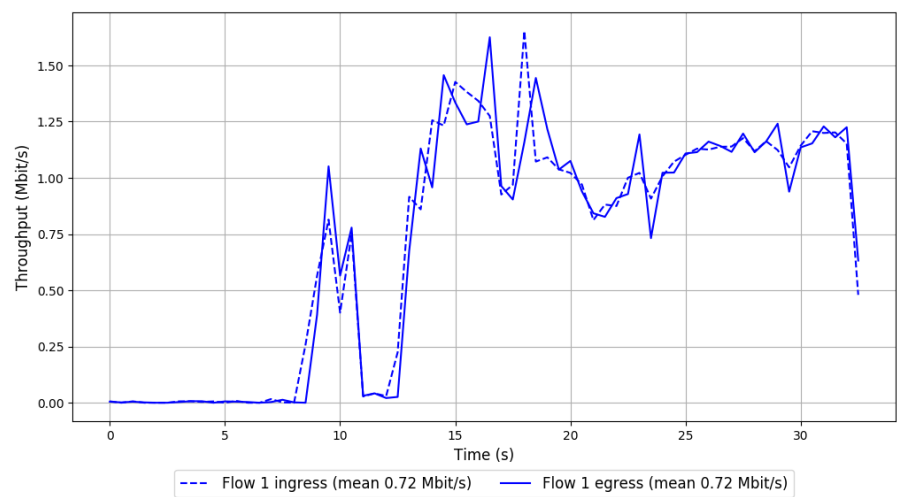
-- Flow 1:

Average throughput: 0.72 Mbit/s

95th percentile per-packet one-way delay: 219.433 ms

Loss rate: 0.28%

Run 3: Report of WebRTC media — Data Link



Run 1: Statistics of Sprout

Start at: 2018-02-17 01:49:44

End at: 2018-02-17 01:50:14

Local clock offset: -5.665 ms

Remote clock offset: 4.15 ms

Below is generated by plot.py at 2018-02-17 02:51:31

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.16 Mbit/s

95th percentile per-packet one-way delay: 190.460 ms

Loss rate: 0.66%

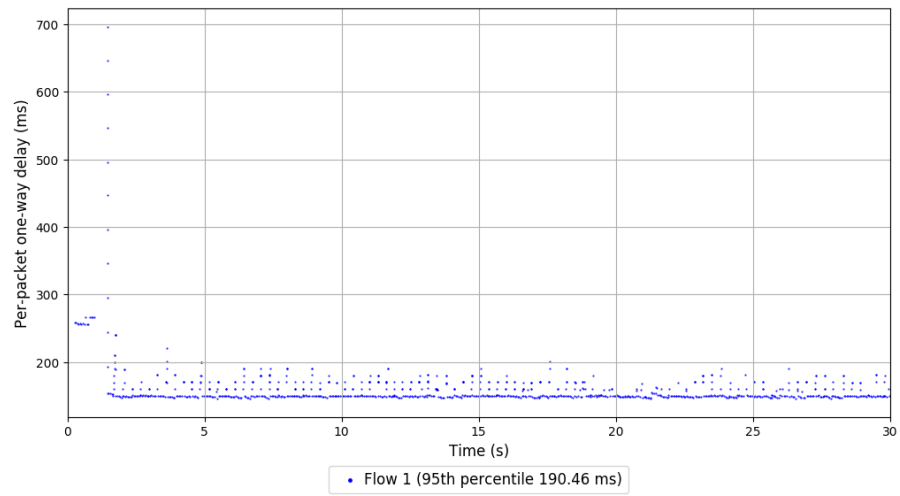
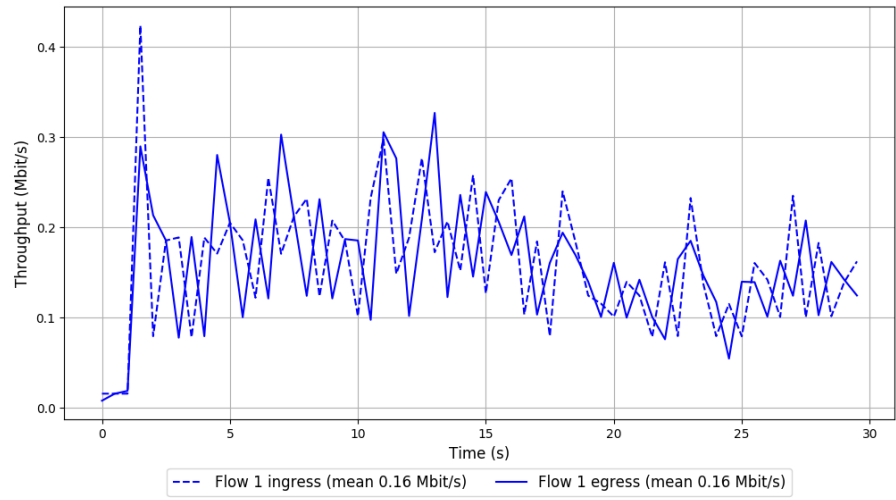
-- Flow 1:

Average throughput: 0.16 Mbit/s

95th percentile per-packet one-way delay: 190.460 ms

Loss rate: 0.66%

Run 1: Report of Sprout — Data Link

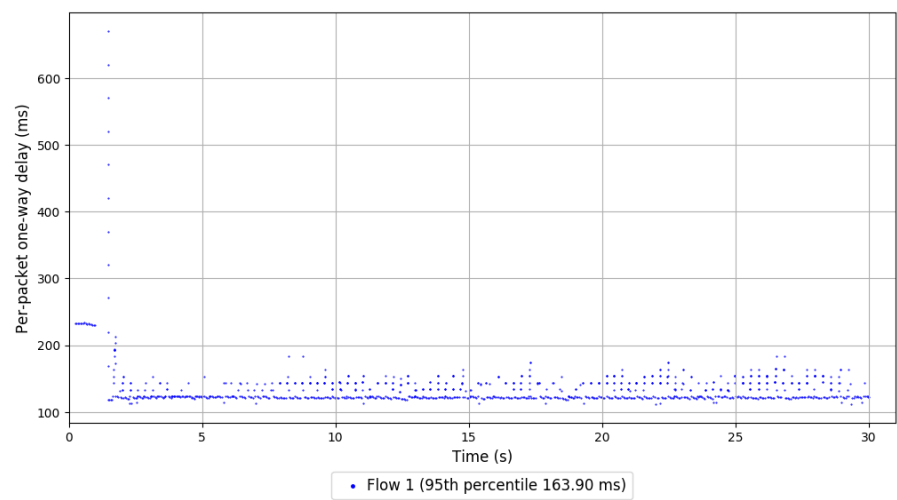
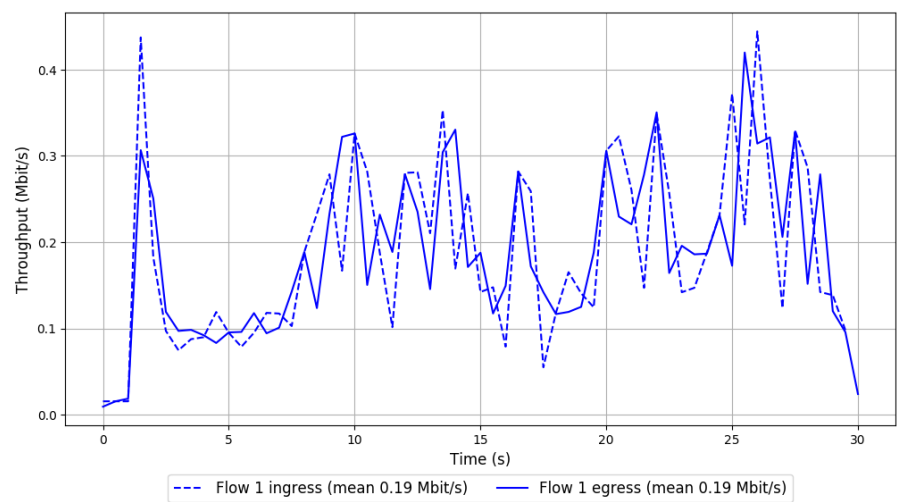


Run 2: Statistics of Sprout

Start at: 2018-02-17 02:10:56
End at: 2018-02-17 02:11:26
Local clock offset: -7.45 ms
Remote clock offset: -3.897 ms

Below is generated by plot.py at 2018-02-17 02:51:31
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 163.895 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 163.895 ms
Loss rate: 0.00%

Run 2: Report of Sprout — Data Link

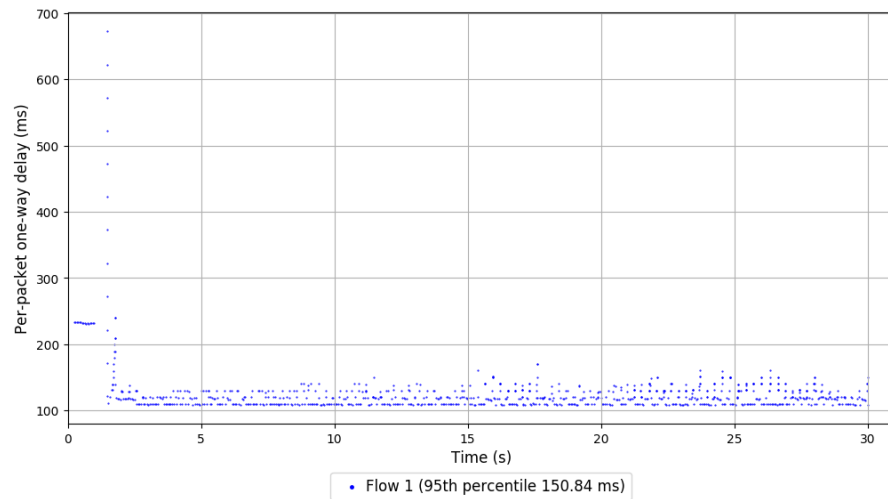
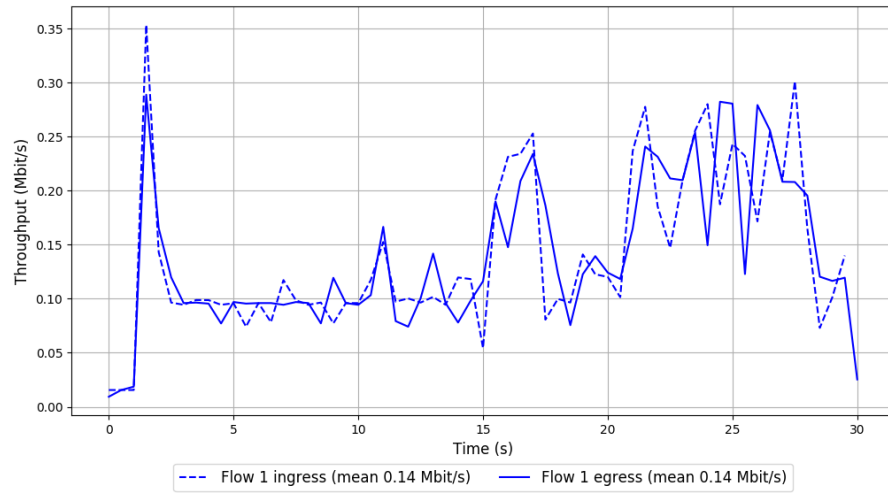


Run 3: Statistics of Sprout

Start at: 2018-02-17 02:32:08
End at: 2018-02-17 02:32:38
Local clock offset: -5.853 ms
Remote clock offset: -4.361 ms

```
# Below is generated by plot.py at 2018-02-17 02:51:31
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 150.835 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 150.835 ms
Loss rate: 0.00%
```

Run 3: Report of Sprout — Data Link

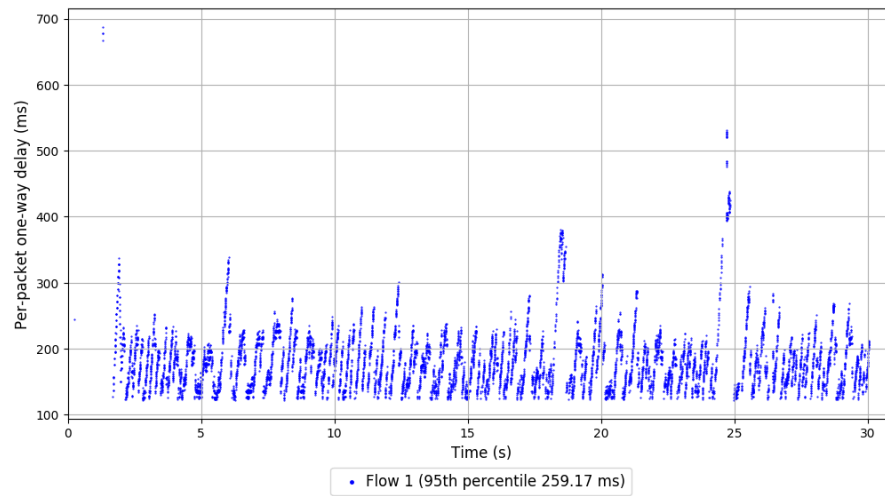
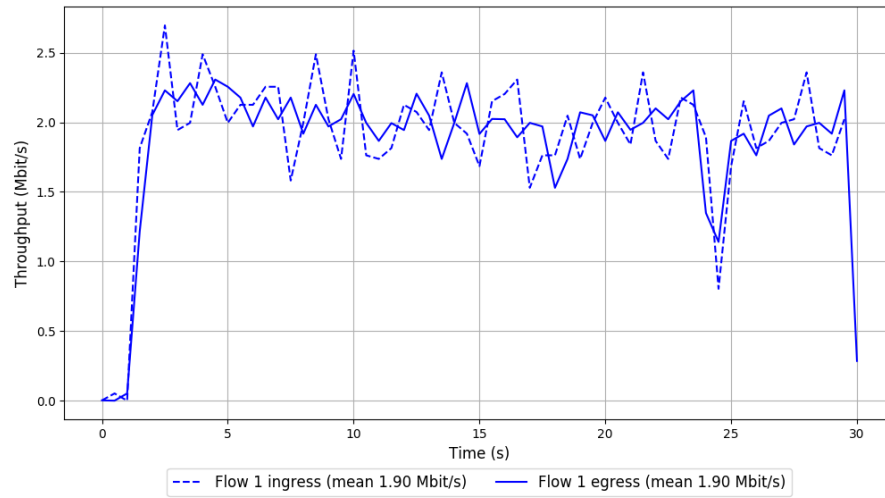


```
Run 1: Statistics of TaoVA-100x

Start at: 2018-02-17 01:50:54
End at: 2018-02-17 01:51:24
Local clock offset: -5.79 ms
Remote clock offset: 5.028 ms

# Below is generated by plot.py at 2018-02-17 02:51:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.90 Mbit/s
95th percentile per-packet one-way delay: 259.167 ms
Loss rate: 0.25%
-- Flow 1:
Average throughput: 1.90 Mbit/s
95th percentile per-packet one-way delay: 259.167 ms
Loss rate: 0.25%
```

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



Run 2: Statistics of TaoVA-100x

Start at: 2018-02-17 02:12:06

End at: 2018-02-17 02:12:36

Local clock offset: -7.499 ms

Remote clock offset: 0.848 ms

Below is generated by plot.py at 2018-02-17 02:51:37

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.03 Mbit/s

95th percentile per-packet one-way delay: 226.877 ms

Loss rate: 0.13%

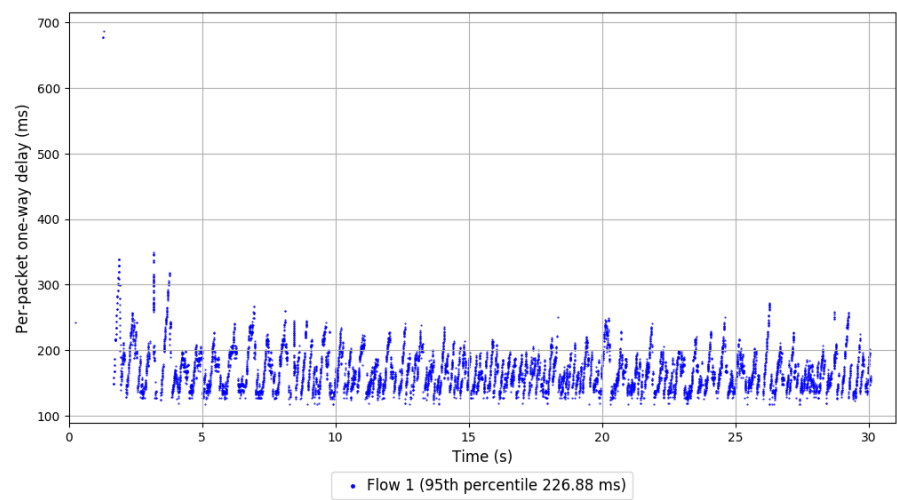
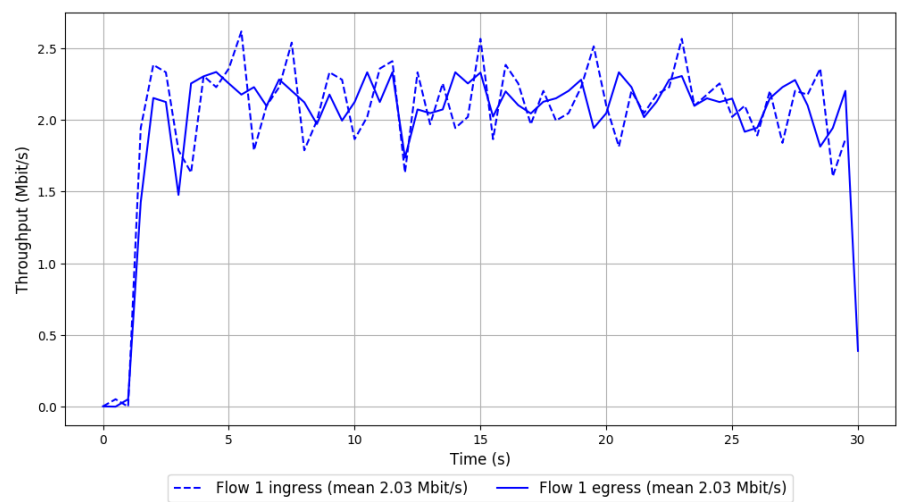
-- Flow 1:

Average throughput: 2.03 Mbit/s

95th percentile per-packet one-way delay: 226.877 ms

Loss rate: 0.13%

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

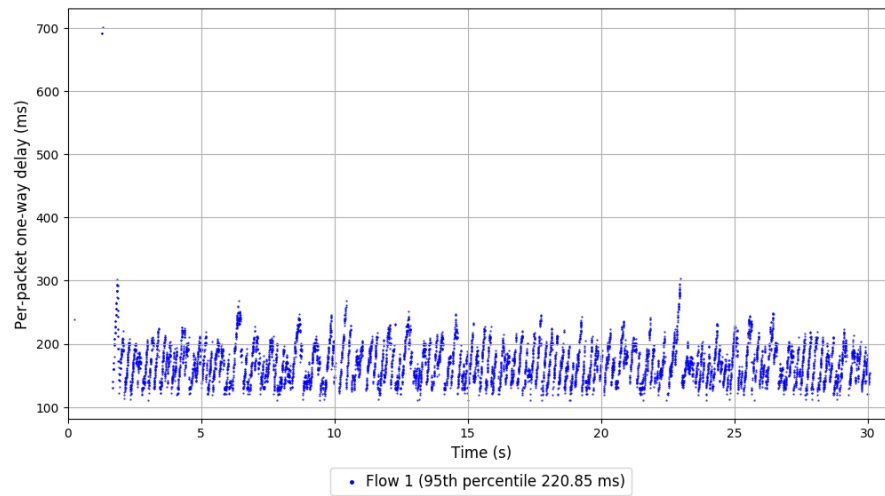
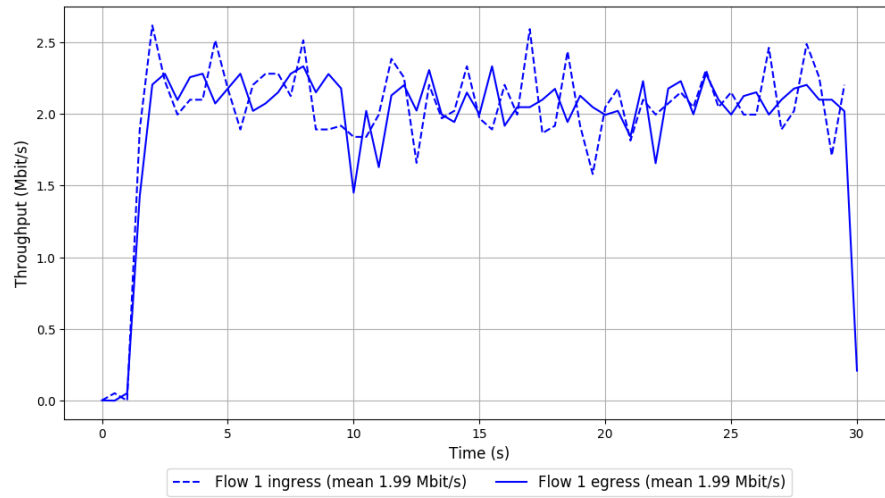


Run 3: Statistics of TaoVA-100x

Start at: 2018-02-17 02:33:18
End at: 2018-02-17 02:33:48
Local clock offset: -5.846 ms
Remote clock offset: -4.203 ms

Below is generated by plot.py at 2018-02-17 02:51:38
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.99 Mbit/s
95th percentile per-packet one-way delay: 220.847 ms
Loss rate: 0.50%
-- Flow 1:
Average throughput: 1.99 Mbit/s
95th percentile per-packet one-way delay: 220.847 ms
Loss rate: 0.50%

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



Run 1: Statistics of TCP Vegas

Start at: 2018-02-17 02:01:30

End at: 2018-02-17 02:02:00

Local clock offset: -6.875 ms

Remote clock offset: 2.817 ms

Below is generated by plot.py at 2018-02-17 02:51:38

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.18 Mbit/s

95th percentile per-packet one-way delay: 294.924 ms

Loss rate: 0.31%

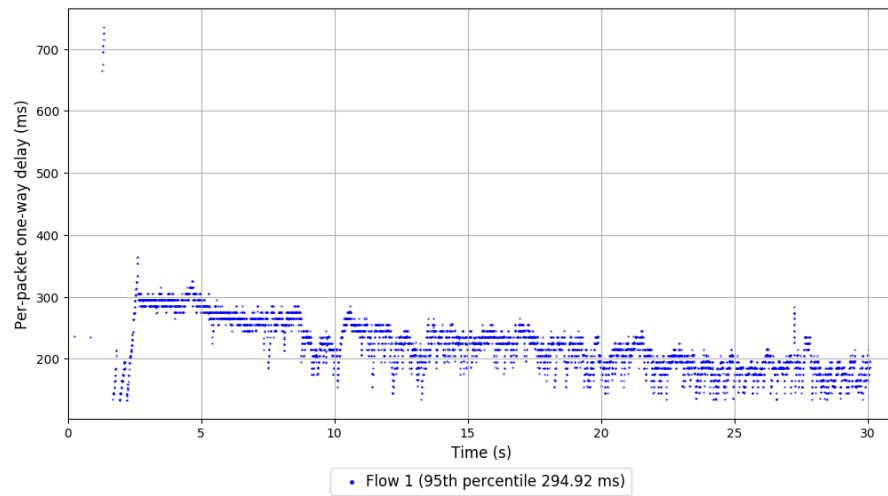
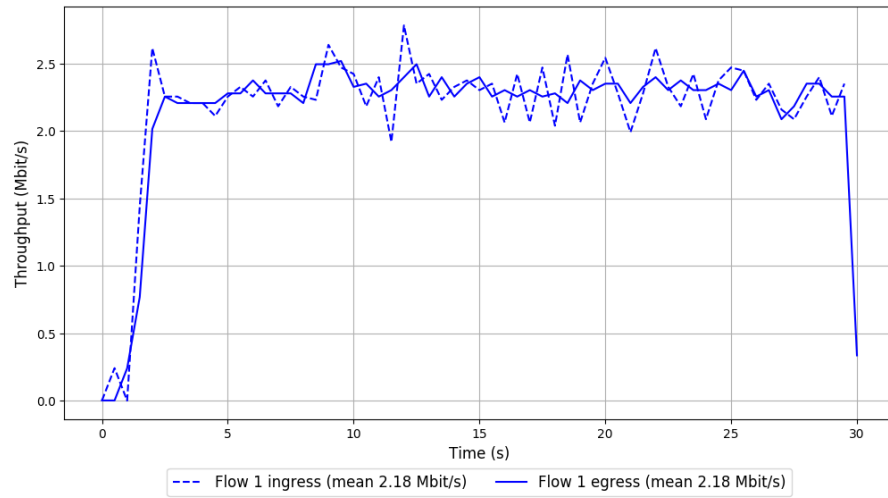
-- Flow 1:

Average throughput: 2.18 Mbit/s

95th percentile per-packet one-way delay: 294.924 ms

Loss rate: 0.31%

Run 1: Report of TCP Vegas — Data Link



Run 2: Statistics of TCP Vegas

Start at: 2018-02-17 02:22:42

End at: 2018-02-17 02:23:12

Local clock offset: -6.162 ms

Remote clock offset: 0.501 ms

Below is generated by plot.py at 2018-02-17 02:51:38

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.35 Mbit/s

95th percentile per-packet one-way delay: 3182.633 ms

Loss rate: 17.38%

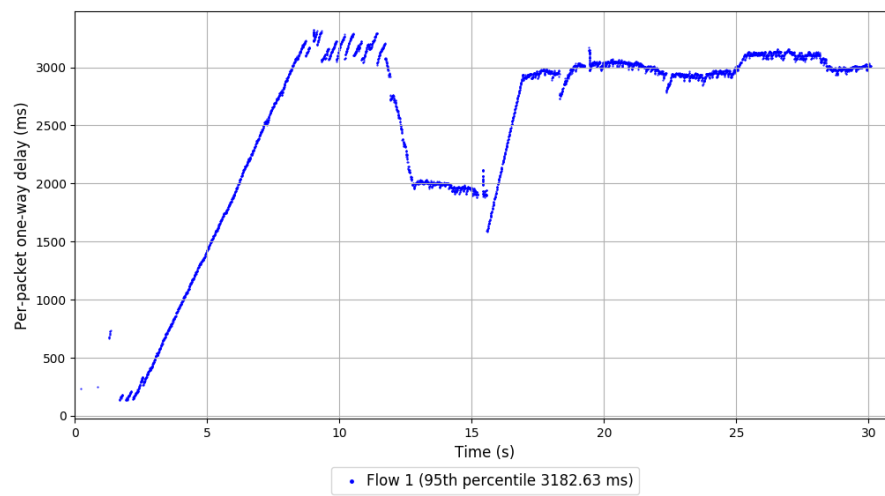
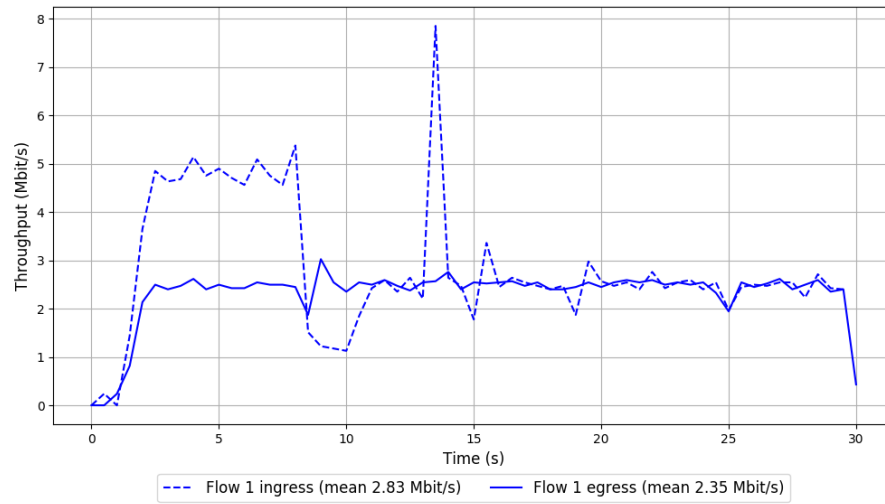
-- Flow 1:

Average throughput: 2.35 Mbit/s

95th percentile per-packet one-way delay: 3182.633 ms

Loss rate: 17.38%

Run 2: Report of TCP Vegas — Data Link

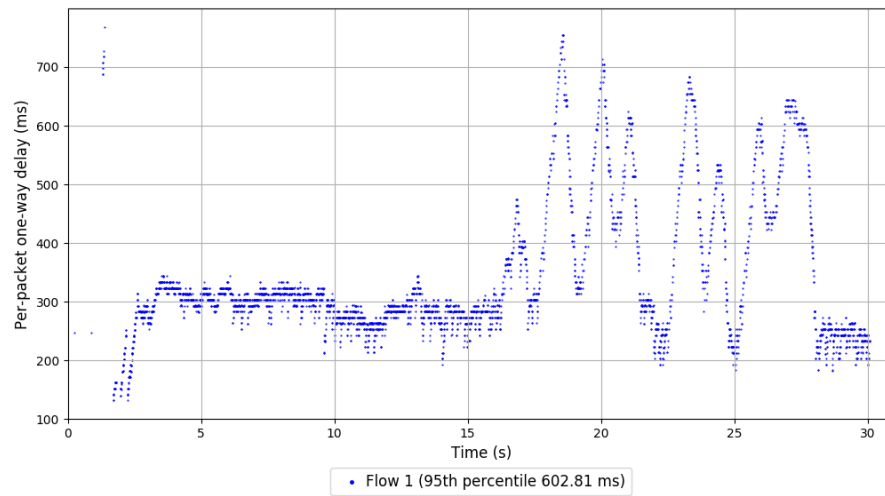
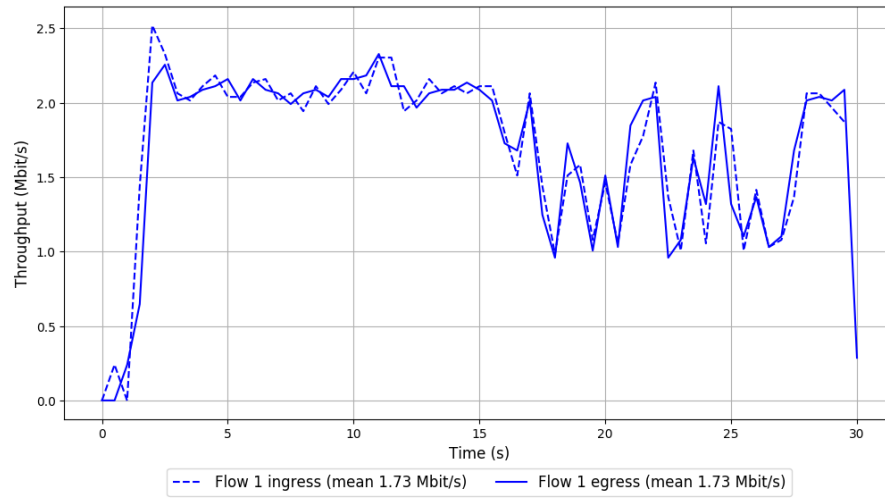


Run 3: Statistics of TCP Vegas

Start at: 2018-02-17 02:43:53
End at: 2018-02-17 02:44:23
Local clock offset: -5.825 ms
Remote clock offset: -2.828 ms

Below is generated by plot.py at 2018-02-17 02:51:38
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 602.808 ms
Loss rate: 0.46%
-- Flow 1:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 602.808 ms
Loss rate: 0.46%

Run 3: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2018-02-17 01:55:36

End at: 2018-02-17 01:56:06

Local clock offset: -6.371 ms

Remote clock offset: -0.45 ms

Below is generated by plot.py at 2018-02-17 02:51:38

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.17 Mbit/s

95th percentile per-packet one-way delay: 1681.355 ms

Loss rate: 5.01%

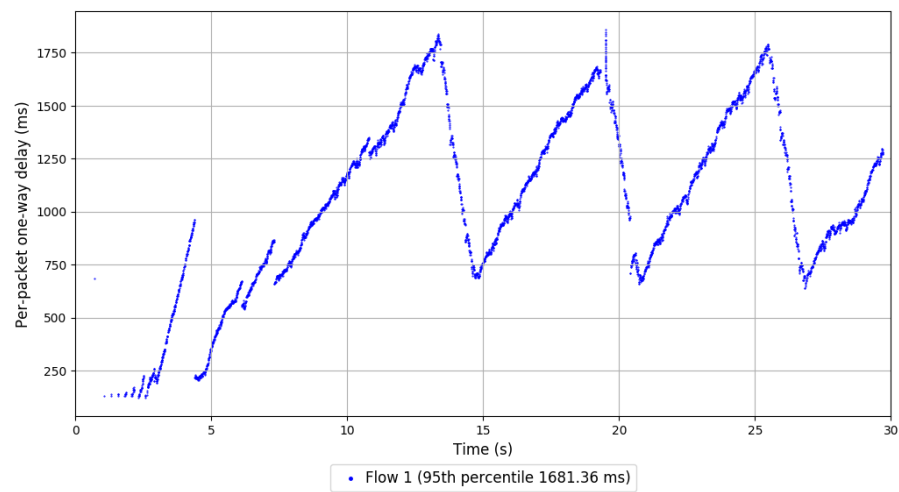
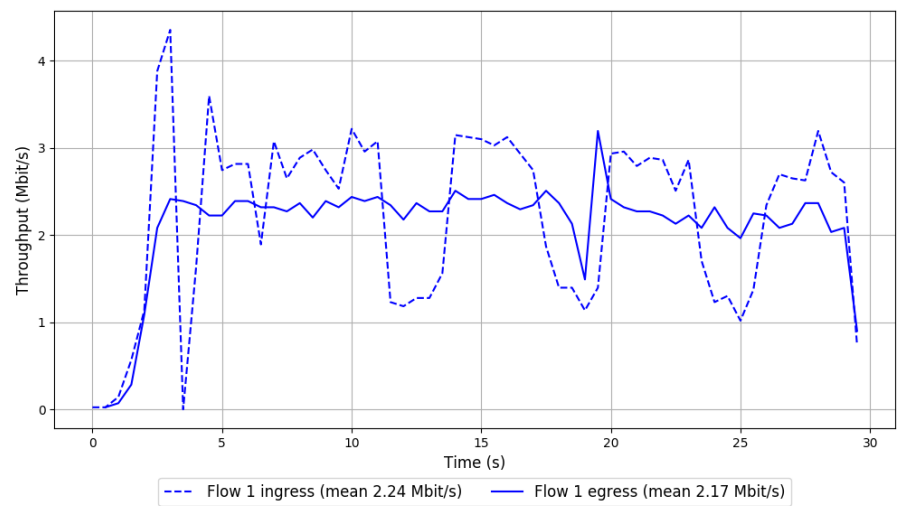
-- Flow 1:

Average throughput: 2.17 Mbit/s

95th percentile per-packet one-way delay: 1681.355 ms

Loss rate: 5.01%

Run 1: Report of Verus — Data Link

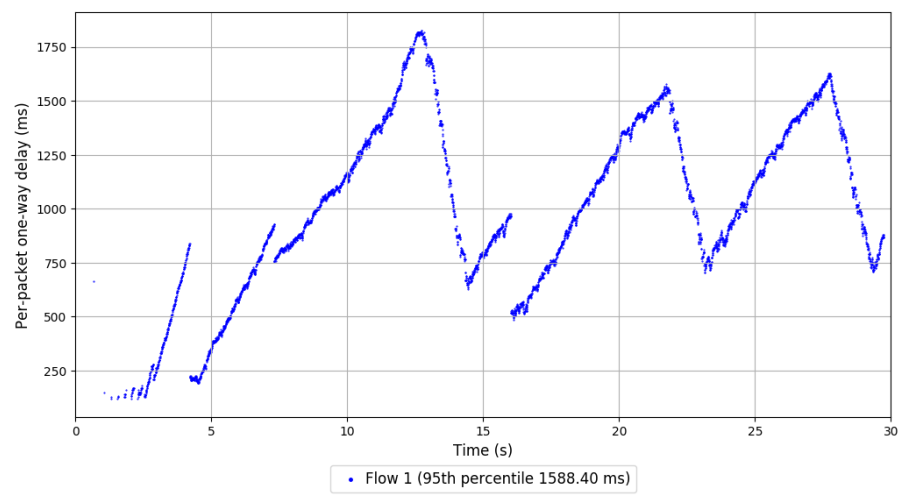
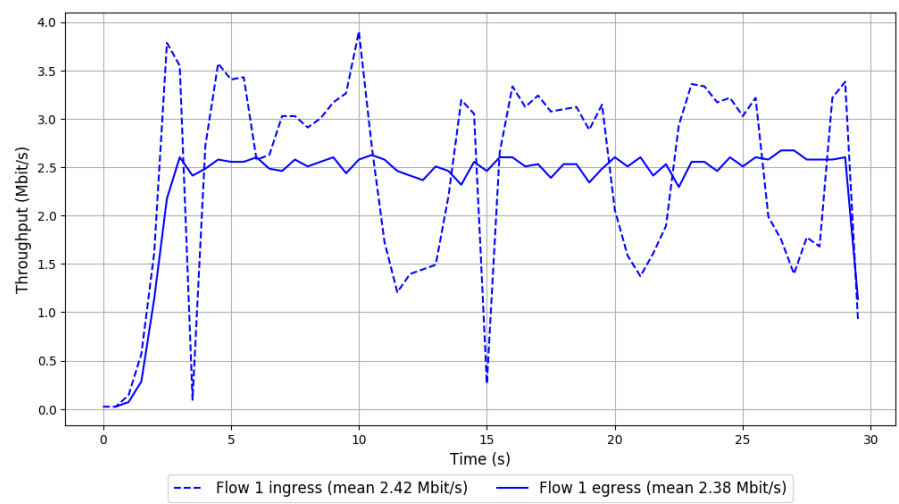


Run 2: Statistics of Verus

Start at: 2018-02-17 02:16:49
End at: 2018-02-17 02:17:19
Local clock offset: -6.728 ms
Remote clock offset: -4.193 ms

Below is generated by plot.py at 2018-02-17 02:51:38
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 1588.397 ms
Loss rate: 3.56%
-- Flow 1:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 1588.397 ms
Loss rate: 3.56%

Run 2: Report of Verus — Data Link



Run 3: Statistics of Verus

Start at: 2018-02-17 02:38:01

End at: 2018-02-17 02:38:31

Local clock offset: -5.816 ms

Remote clock offset: 2.57 ms

Below is generated by plot.py at 2018-02-17 02:51:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.18 Mbit/s

95th percentile per-packet one-way delay: 1719.276 ms

Loss rate: 2.89%

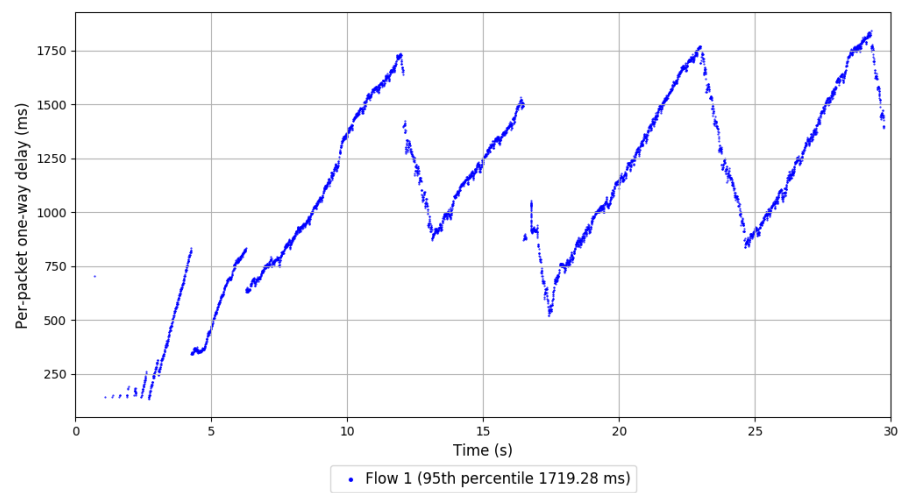
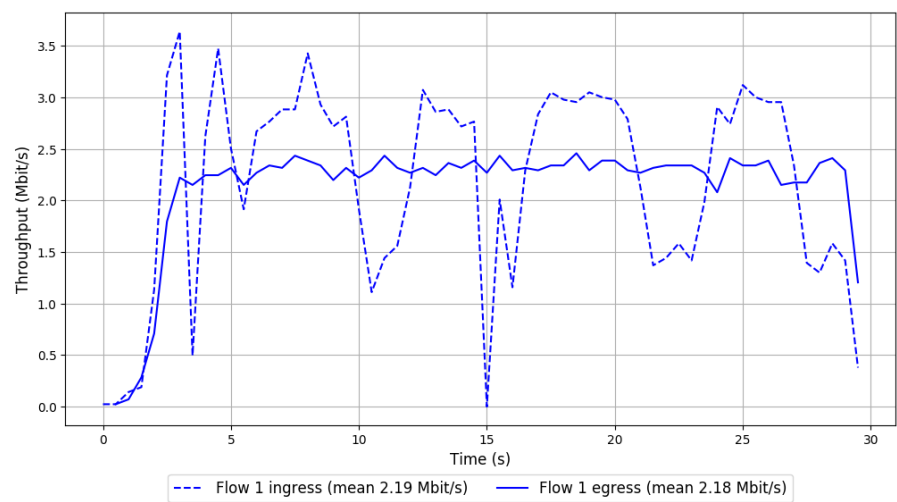
-- Flow 1:

Average throughput: 2.18 Mbit/s

95th percentile per-packet one-way delay: 1719.276 ms

Loss rate: 2.89%

Run 3: Report of Verus — Data Link



Run 1: Statistics of Copa

Start at: 2018-02-17 01:48:33

End at: 2018-02-17 01:49:03

Local clock offset: -5.393 ms

Remote clock offset: 3.199 ms

Below is generated by plot.py at 2018-02-17 02:51:42

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.51 Mbit/s

95th percentile per-packet one-way delay: 204.785 ms

Loss rate: 0.14%

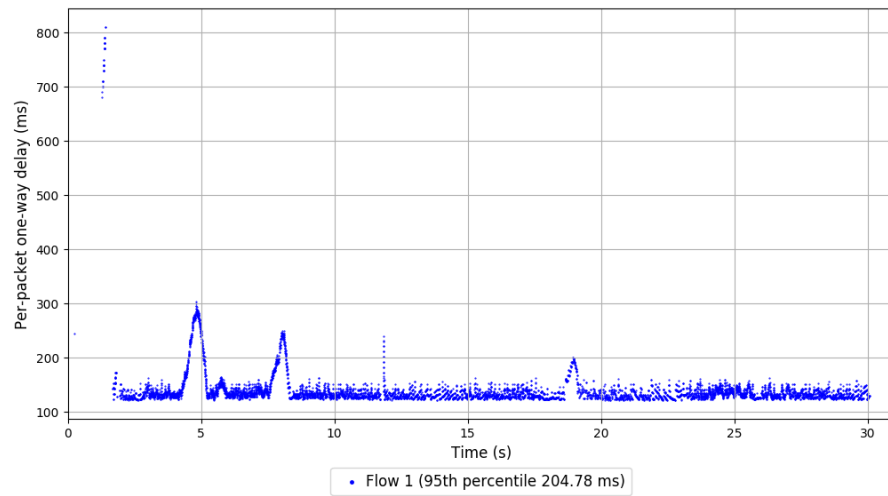
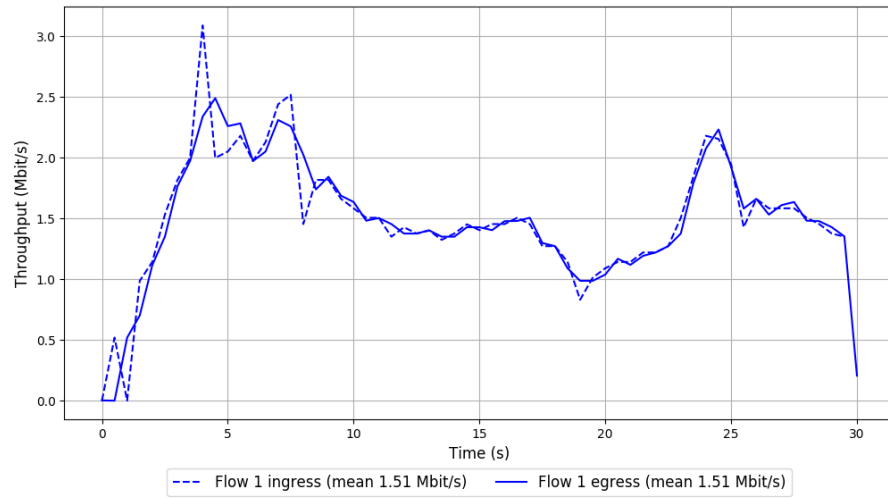
-- Flow 1:

Average throughput: 1.51 Mbit/s

95th percentile per-packet one-way delay: 204.785 ms

Loss rate: 0.14%

Run 1: Report of Copa — Data Link

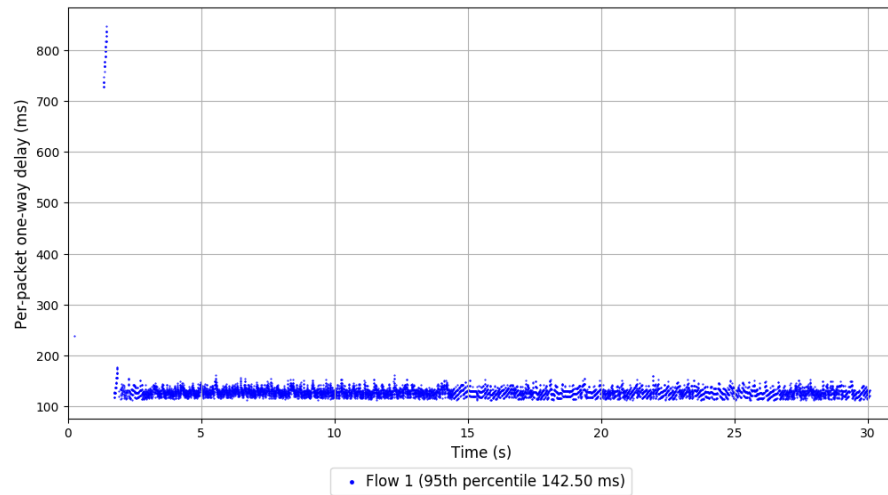
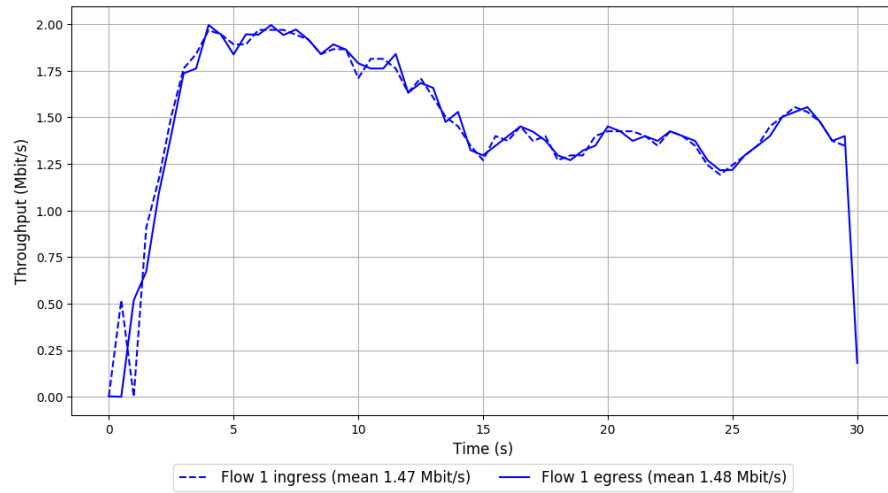


Run 2: Statistics of Copa

Start at: 2018-02-17 02:09:45
End at: 2018-02-17 02:10:15
Local clock offset: -7.375 ms
Remote clock offset: -3.835 ms

Below is generated by plot.py at 2018-02-17 02:51:43
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.48 Mbit/s
95th percentile per-packet one-way delay: 142.498 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 1.48 Mbit/s
95th percentile per-packet one-way delay: 142.498 ms
Loss rate: 0.14%

Run 2: Report of Copa — Data Link



Run 3: Statistics of Copa

Start at: 2018-02-17 02:30:57

End at: 2018-02-17 02:31:27

Local clock offset: -5.862 ms

Remote clock offset: 1.308 ms

Below is generated by plot.py at 2018-02-17 02:51:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.68 Mbit/s

95th percentile per-packet one-way delay: 182.896 ms

Loss rate: 0.18%

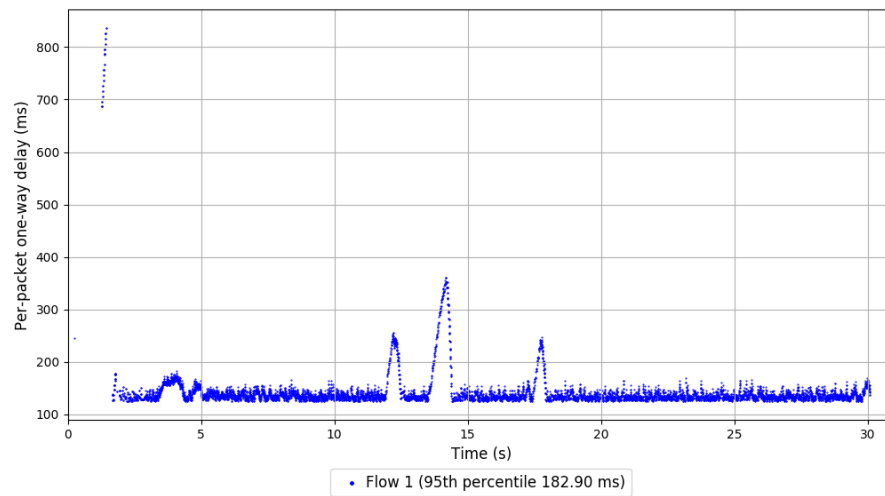
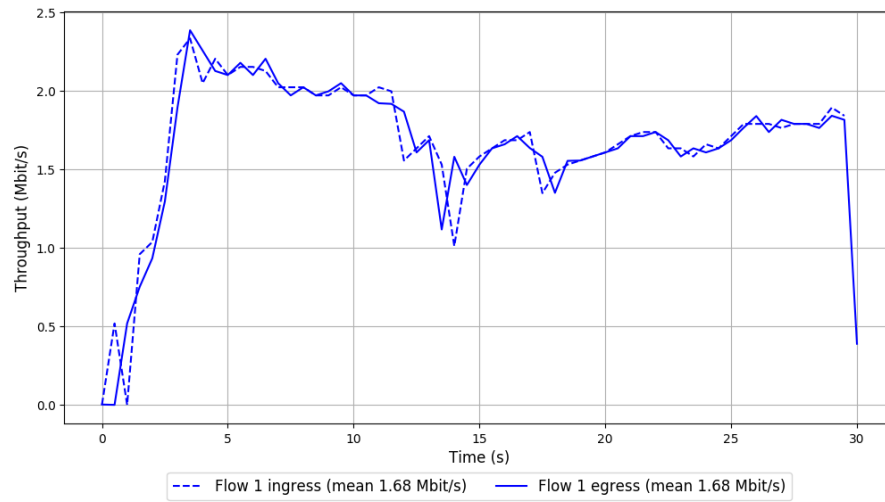
-- Flow 1:

Average throughput: 1.68 Mbit/s

95th percentile per-packet one-way delay: 182.896 ms

Loss rate: 0.18%

Run 3: Report of Copa — Data Link

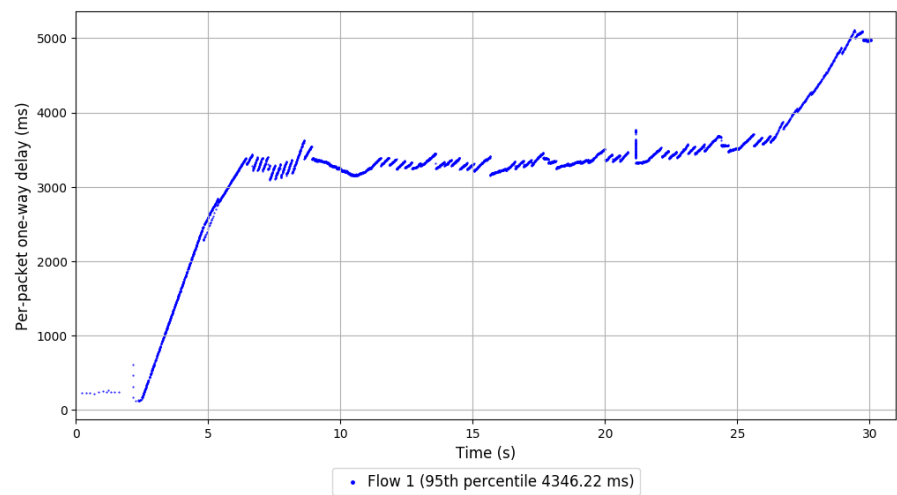
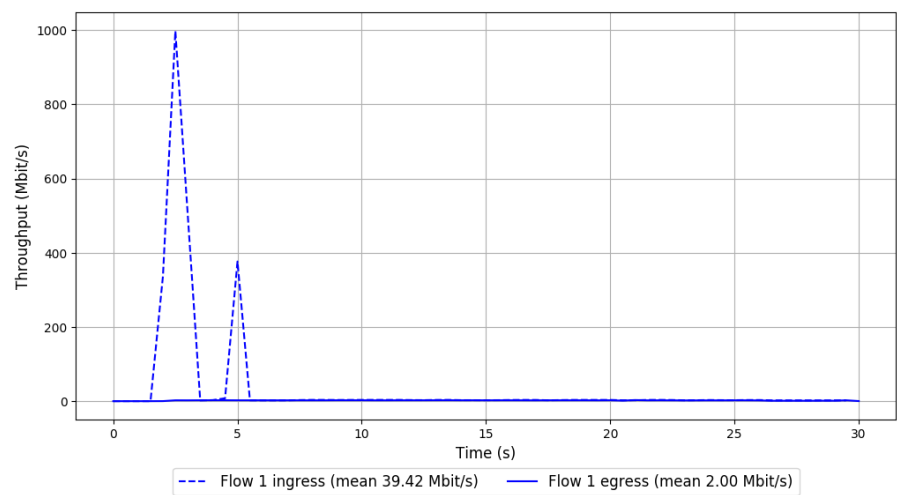


Run 1: Statistics of FillP

Start at: 2018-02-17 01:47:22
End at: 2018-02-17 01:47:52
Local clock offset: -5.196 ms
Remote clock offset: -0.897 ms

Below is generated by plot.py at 2018-02-17 02:51:56
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 4346.224 ms
Loss rate: 94.96%
-- Flow 1:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 4346.224 ms
Loss rate: 94.96%

Run 1: Report of FillP — Data Link

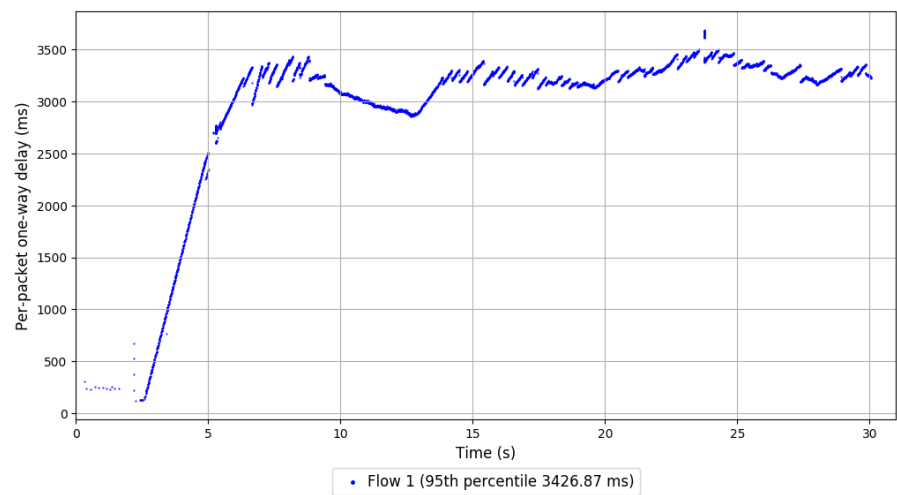
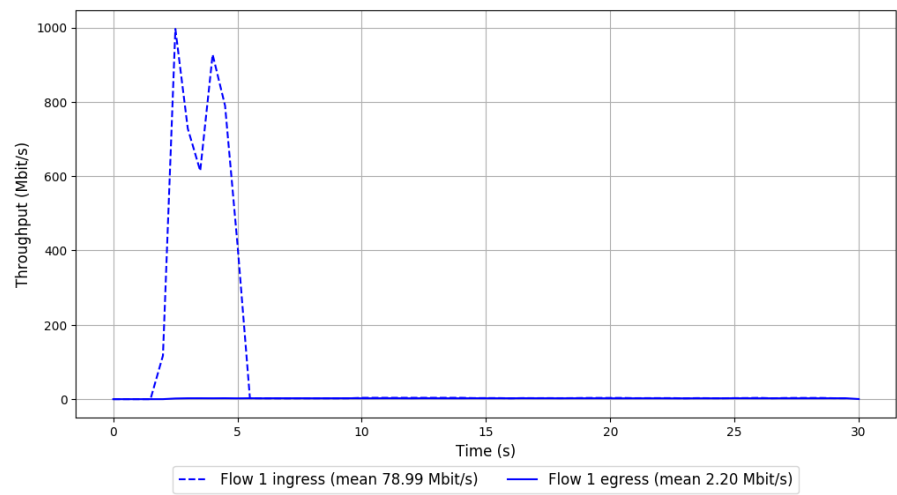


Run 2: Statistics of FillP

Start at: 2018-02-17 02:08:34
End at: 2018-02-17 02:09:04
Local clock offset: -7.328 ms
Remote clock offset: -3.784 ms

Below is generated by plot.py at 2018-02-17 02:51:57
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.20 Mbit/s
95th percentile per-packet one-way delay: 3426.869 ms
Loss rate: 97.23%
-- Flow 1:
Average throughput: 2.20 Mbit/s
95th percentile per-packet one-way delay: 3426.869 ms
Loss rate: 97.23%

Run 2: Report of FillP — Data Link

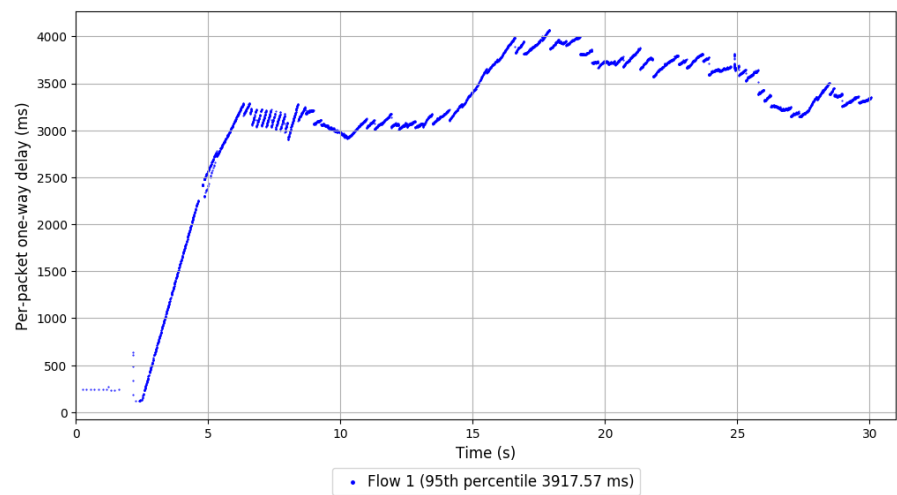
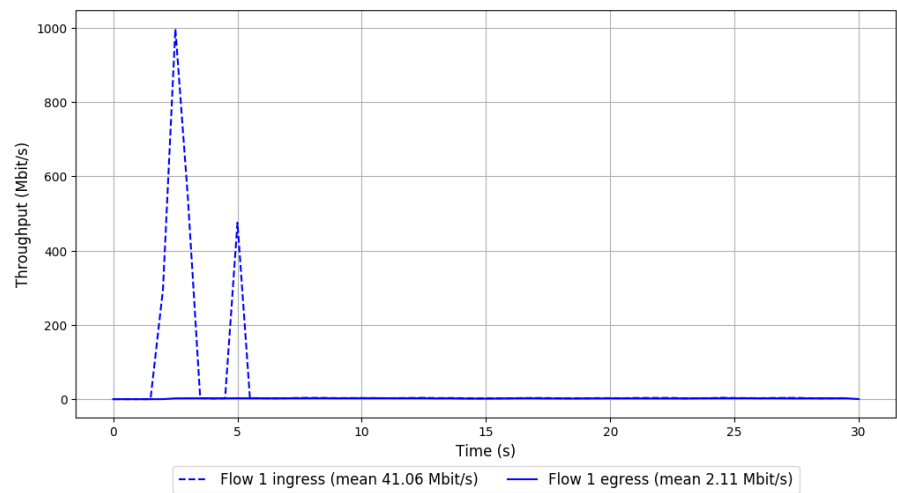


Run 3: Statistics of FillP

Start at: 2018-02-17 02:29:46
End at: 2018-02-17 02:30:16
Local clock offset: -5.903 ms
Remote clock offset: -4.457 ms

Below is generated by plot.py at 2018-02-17 02:51:57
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 3917.575 ms
Loss rate: 94.90%
-- Flow 1:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 3917.575 ms
Loss rate: 94.90%

Run 3: Report of FillP — Data Link

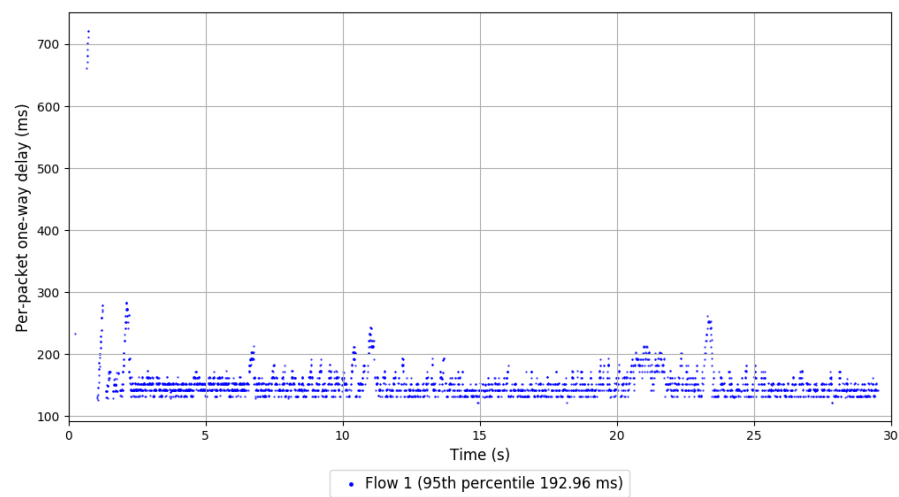
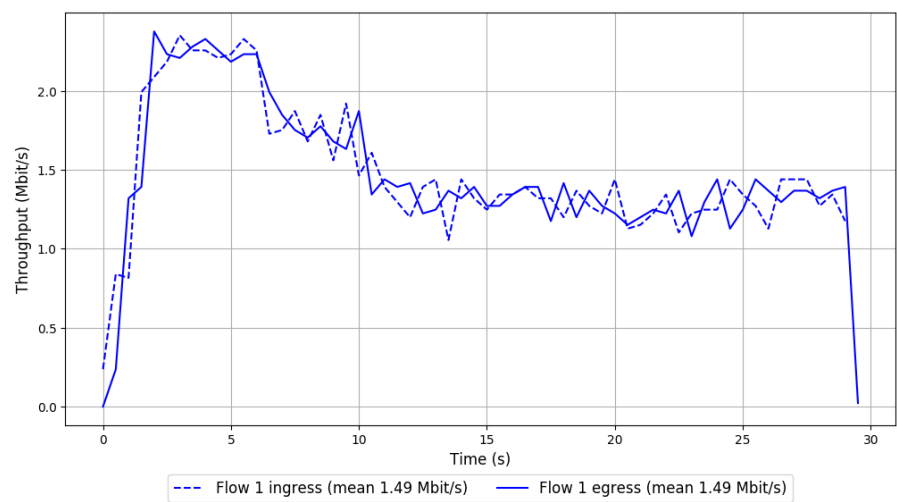


```
Run 1: Statistics of Indigo-1-32

Start at: 2018-02-17 01:54:26
End at: 2018-02-17 01:54:56
Local clock offset: -6.225 ms
Remote clock offset: 4.232 ms

# Below is generated by plot.py at 2018-02-17 02:51:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 192.956 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 192.956 ms
Loss rate: 0.14%
```

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



Run 2: Statistics of Indigo-1-32

Start at: 2018-02-17 02:15:39

End at: 2018-02-17 02:16:09

Local clock offset: -6.871 ms

Remote clock offset: -3.28 ms

Below is generated by plot.py at 2018-02-17 02:51:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.38 Mbit/s

95th percentile per-packet one-way delay: 184.233 ms

Loss rate: 0.27%

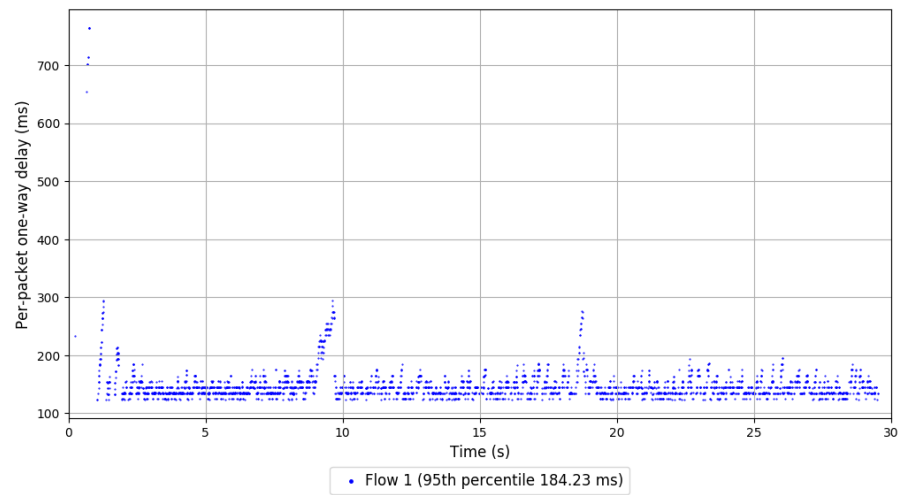
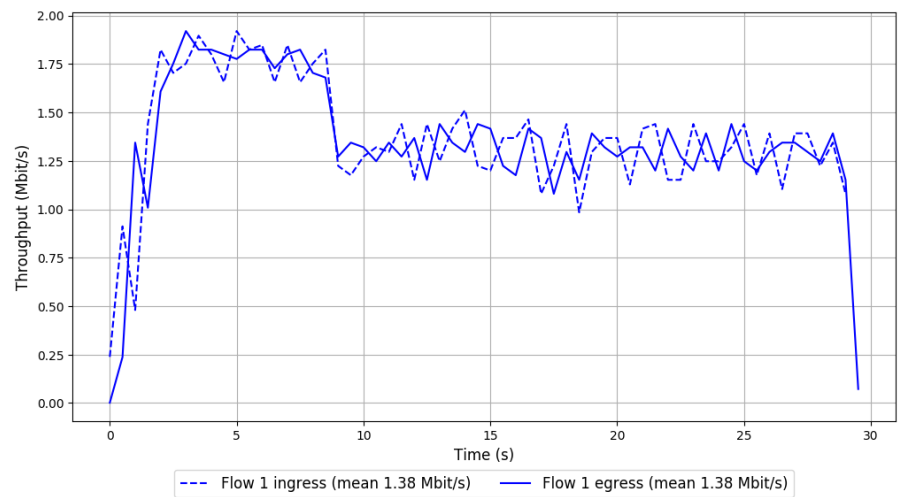
-- Flow 1:

Average throughput: 1.38 Mbit/s

95th percentile per-packet one-way delay: 184.233 ms

Loss rate: 0.27%

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

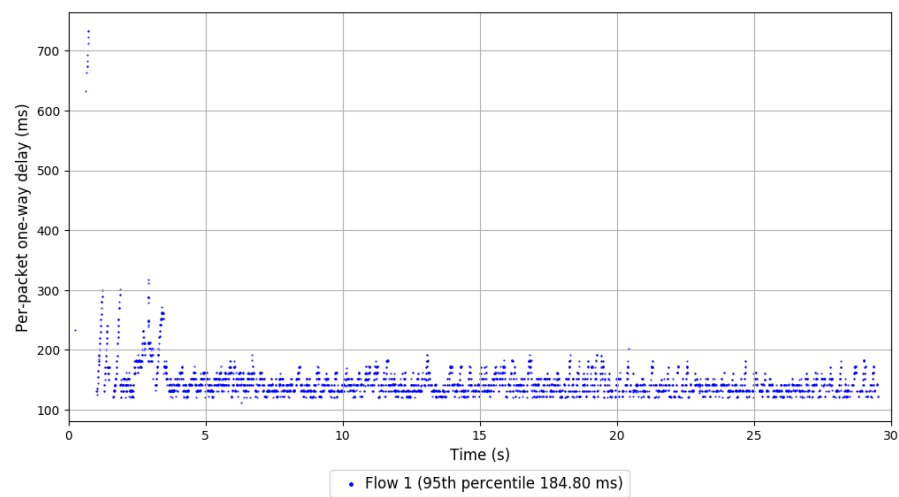
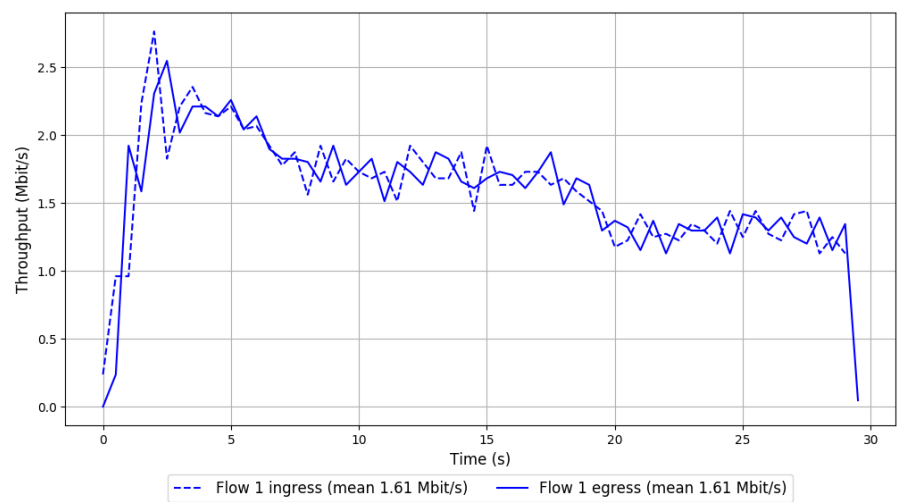


Run 3: Statistics of Indigo-1-32

Start at: 2018-02-17 02:36:50
End at: 2018-02-17 02:37:20
Local clock offset: -5.818 ms
Remote clock offset: -3.917 ms

Below is generated by plot.py at 2018-02-17 02:51:57
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.61 Mbit/s
95th percentile per-packet one-way delay: 184.803 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 1.61 Mbit/s
95th percentile per-packet one-way delay: 184.803 ms
Loss rate: 0.18%

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

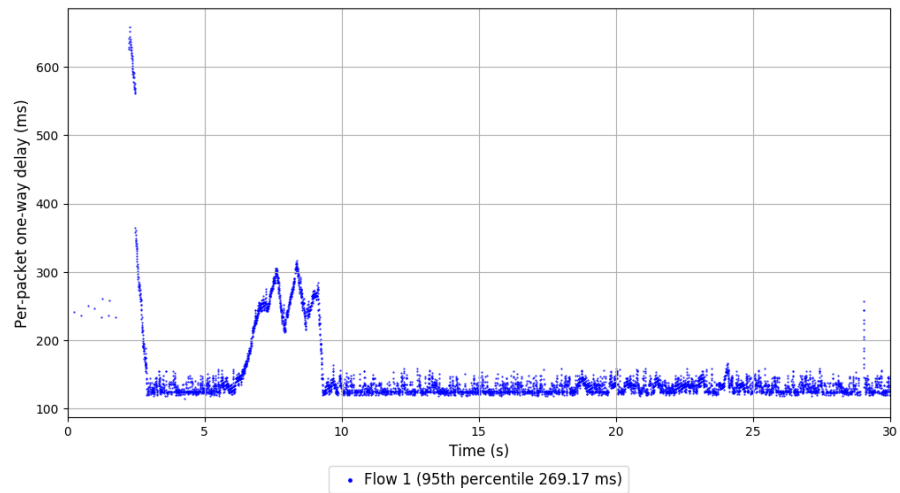
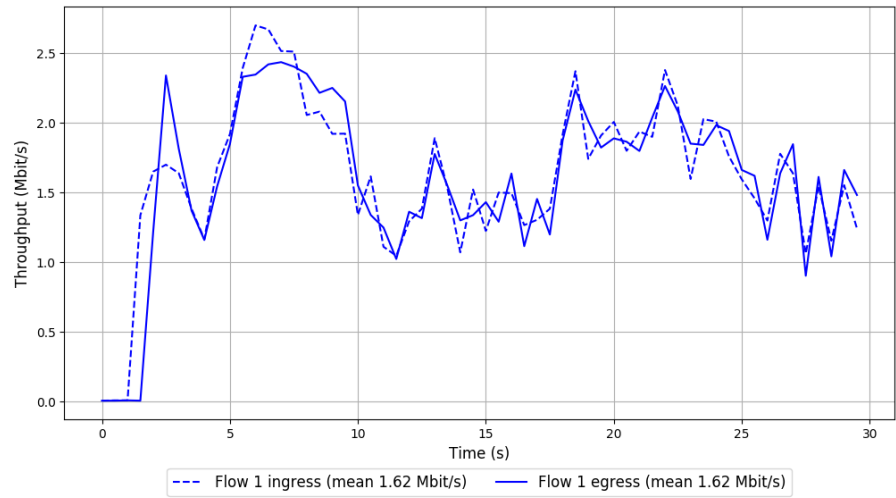


Run 1: Statistics of Vivace-latency

Start at: 2018-02-17 01:52:04
End at: 2018-02-17 01:52:34
Local clock offset: -5.928 ms
Remote clock offset: -0.678 ms

Below is generated by plot.py at 2018-02-17 02:51:57
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.62 Mbit/s
95th percentile per-packet one-way delay: 269.169 ms
Loss rate: 0.78%
-- Flow 1:
Average throughput: 1.62 Mbit/s
95th percentile per-packet one-way delay: 269.169 ms
Loss rate: 0.78%

Run 1: Report of Vivace-latency — Data Link



Run 2: Statistics of Vivace-latency

Start at: 2018-02-17 02:13:17

End at: 2018-02-17 02:13:47

Local clock offset: -7.315 ms

Remote clock offset: 1.556 ms

Below is generated by plot.py at 2018-02-17 02:51:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.65 Mbit/s

95th percentile per-packet one-way delay: 222.918 ms

Loss rate: 0.86%

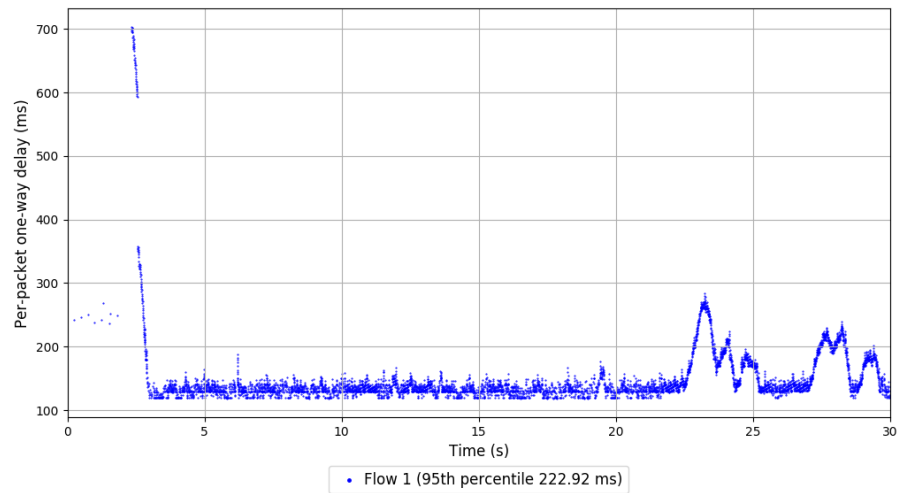
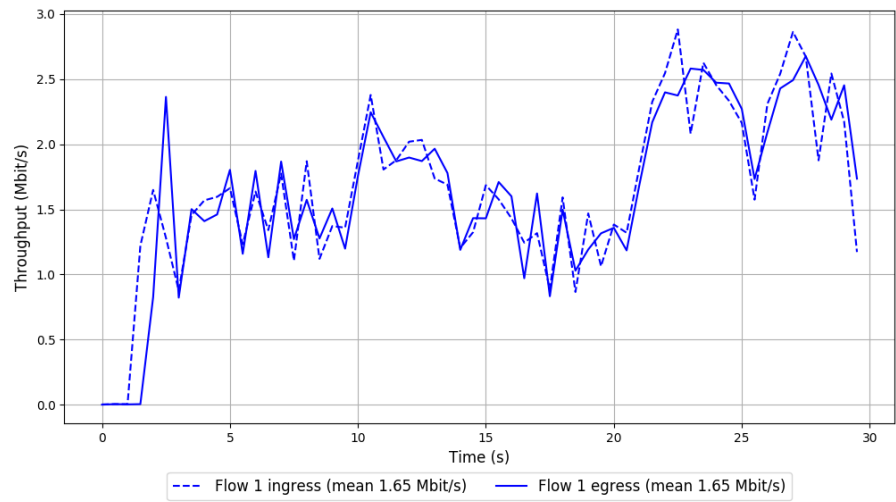
-- Flow 1:

Average throughput: 1.65 Mbit/s

95th percentile per-packet one-way delay: 222.918 ms

Loss rate: 0.86%

Run 2: Report of Vivace-latency — Data Link



Run 3: Statistics of Vivace-latency

Start at: 2018-02-17 02:34:29

End at: 2018-02-17 02:34:59

Local clock offset: -5.82 ms

Remote clock offset: 2.383 ms

Below is generated by plot.py at 2018-02-17 02:51:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.56 Mbit/s

95th percentile per-packet one-way delay: 255.000 ms

Loss rate: 1.35%

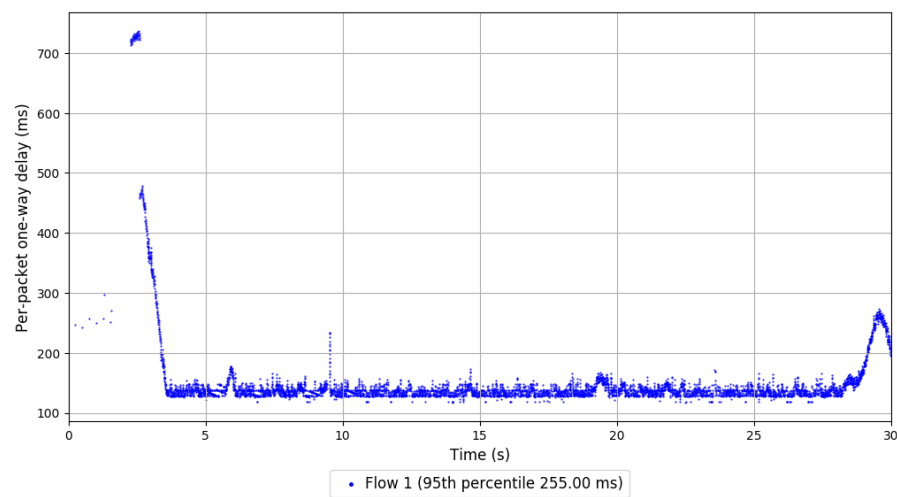
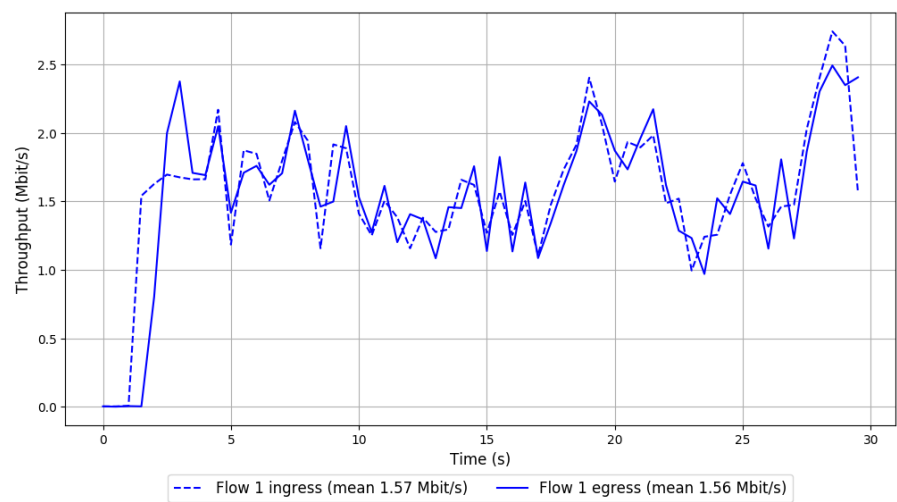
-- Flow 1:

Average throughput: 1.56 Mbit/s

95th percentile per-packet one-way delay: 255.000 ms

Loss rate: 1.35%

Run 3: Report of Vivace-latency — Data Link



Run 1: Statistics of Vivace-loss

Start at: 2018-02-17 02:02:40

End at: 2018-02-17 02:03:10

Local clock offset: -6.961 ms

Remote clock offset: 3.481 ms

Below is generated by plot.py at 2018-02-17 02:51:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.25 Mbit/s

95th percentile per-packet one-way delay: 3150.035 ms

Loss rate: 35.93%

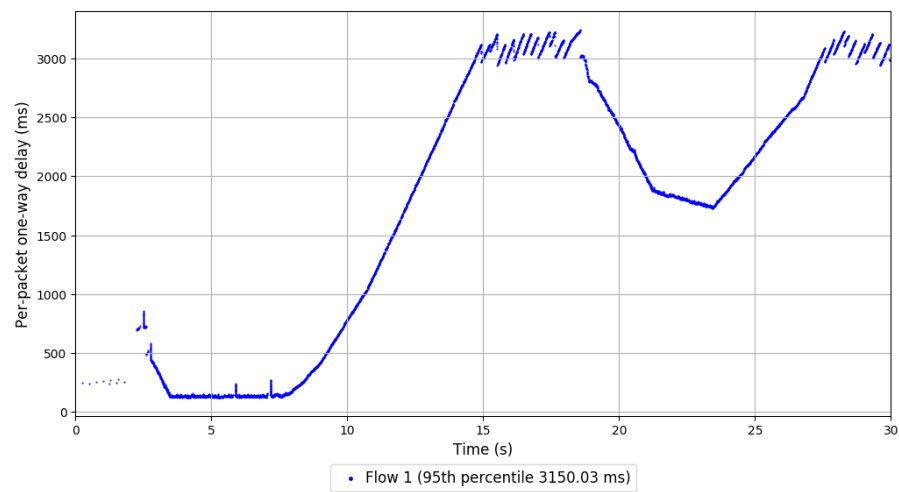
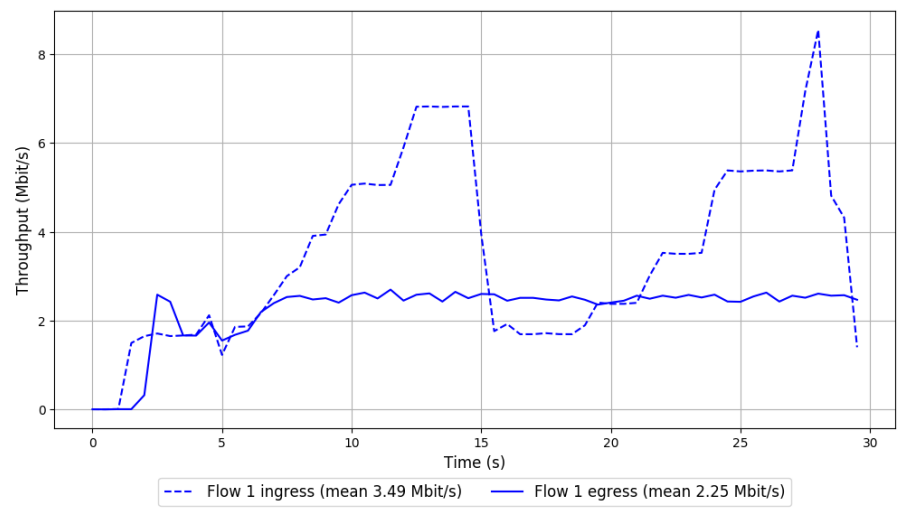
-- Flow 1:

Average throughput: 2.25 Mbit/s

95th percentile per-packet one-way delay: 3150.035 ms

Loss rate: 35.93%

Run 1: Report of Vivace-loss — Data Link



Run 2: Statistics of Vivace-loss

Start at: 2018-02-17 02:23:53

End at: 2018-02-17 02:24:23

Local clock offset: -6.095 ms

Remote clock offset: 1.361 ms

Below is generated by plot.py at 2018-02-17 02:51:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.21 Mbit/s

95th percentile per-packet one-way delay: 3166.930 ms

Loss rate: 29.59%

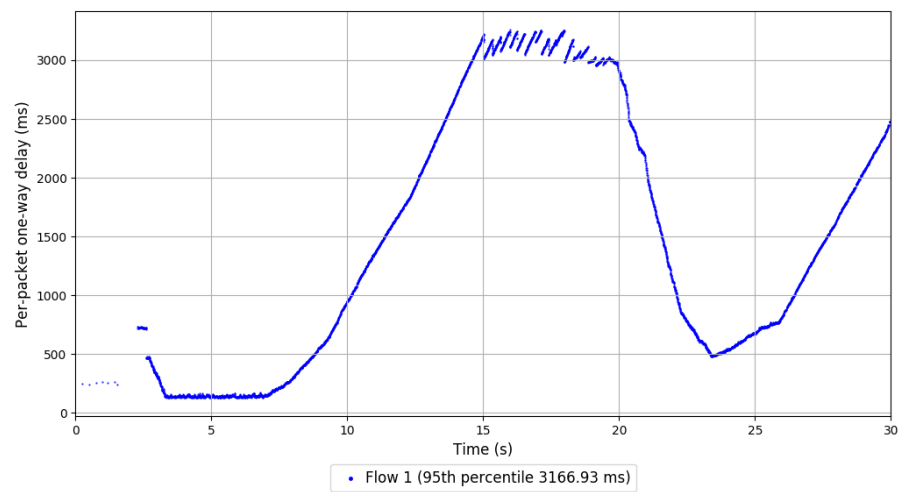
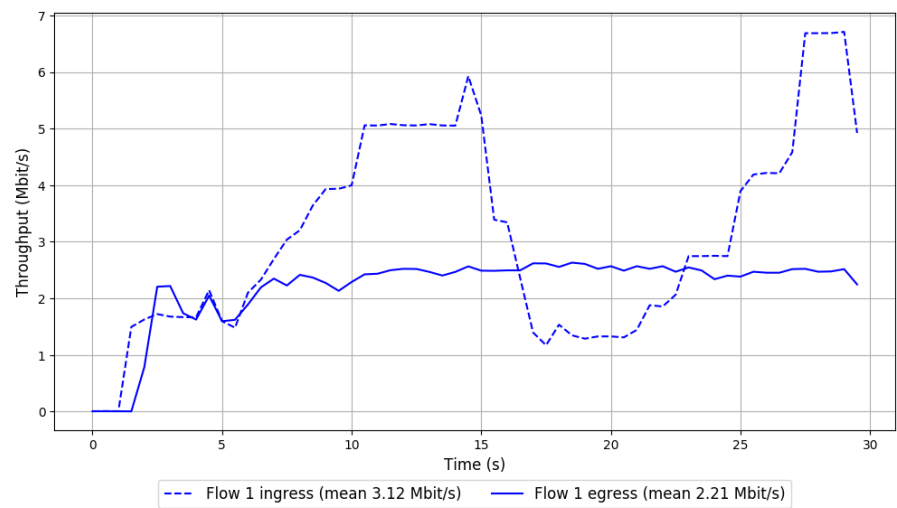
-- Flow 1:

Average throughput: 2.21 Mbit/s

95th percentile per-packet one-way delay: 3166.930 ms

Loss rate: 29.59%

Run 2: Report of Vivace-loss — Data Link



Run 3: Statistics of Vivace-loss

Start at: 2018-02-17 02:45:04

End at: 2018-02-17 02:45:34

Local clock offset: -5.879 ms

Remote clock offset: -3.739 ms

Below is generated by plot.py at 2018-02-17 02:51:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.83 Mbit/s

95th percentile per-packet one-way delay: 4219.652 ms

Loss rate: 26.26%

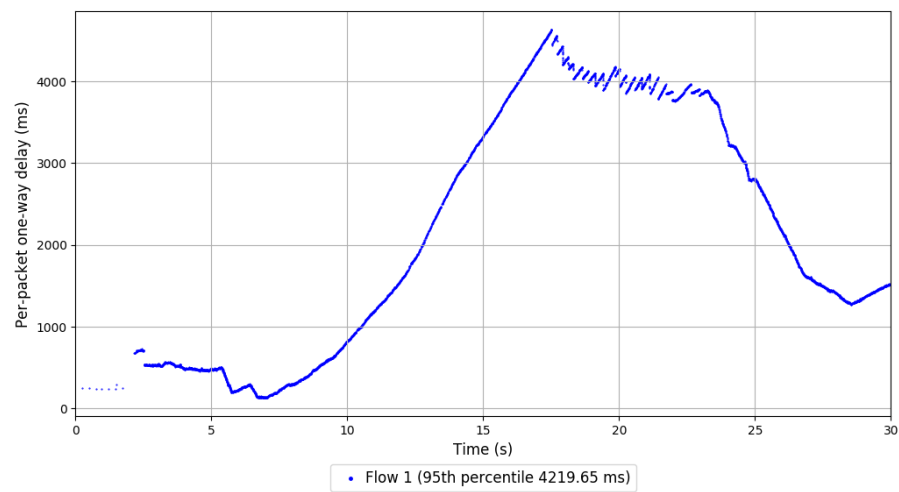
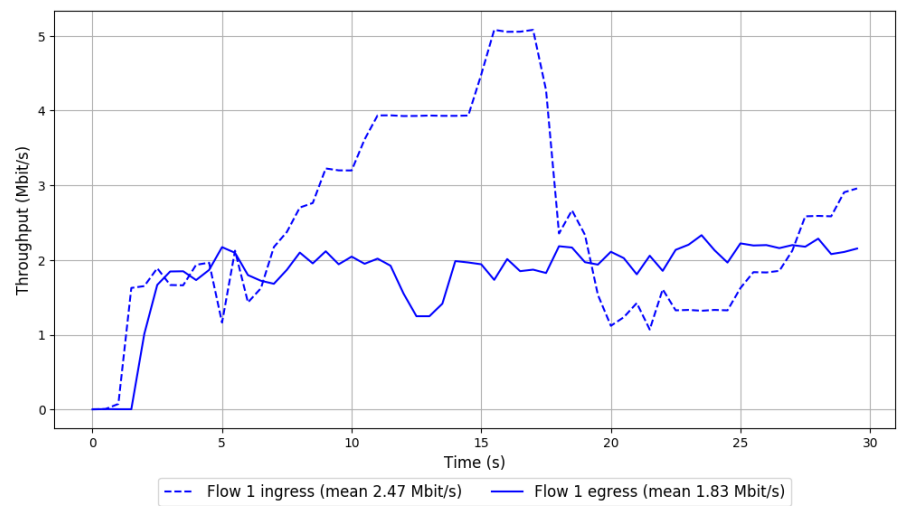
-- Flow 1:

Average throughput: 1.83 Mbit/s

95th percentile per-packet one-way delay: 4219.652 ms

Loss rate: 26.26%

Run 3: Report of Vivace-loss — Data Link

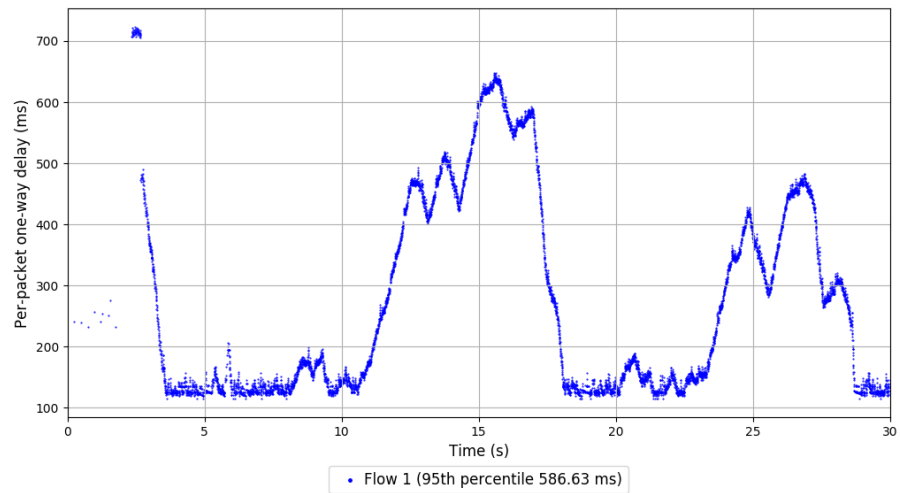
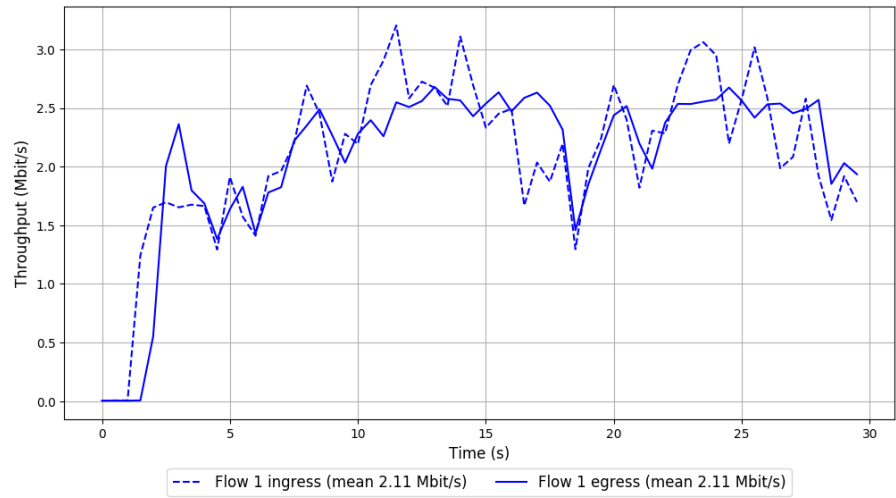


Run 1: Statistics of Vivace-LTE

Start at: 2018-02-17 01:57:57
End at: 2018-02-17 01:58:27
Local clock offset: -6.591 ms
Remote clock offset: -1.187 ms

Below is generated by plot.py at 2018-02-17 02:51:57
Datalink statistics
-- Total of 1 flow:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 586.635 ms
Loss rate: 0.76%
-- Flow 1:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 586.635 ms
Loss rate: 0.76%

Run 1: Report of Vivace-LTE — Data Link



Run 2: Statistics of Vivace-LTE

Start at: 2018-02-17 02:19:10

End at: 2018-02-17 02:19:40

Local clock offset: -6.47 ms

Remote clock offset: -3.461 ms

Below is generated by plot.py at 2018-02-17 02:51:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.08 Mbit/s

95th percentile per-packet one-way delay: 205.993 ms

Loss rate: 0.92%

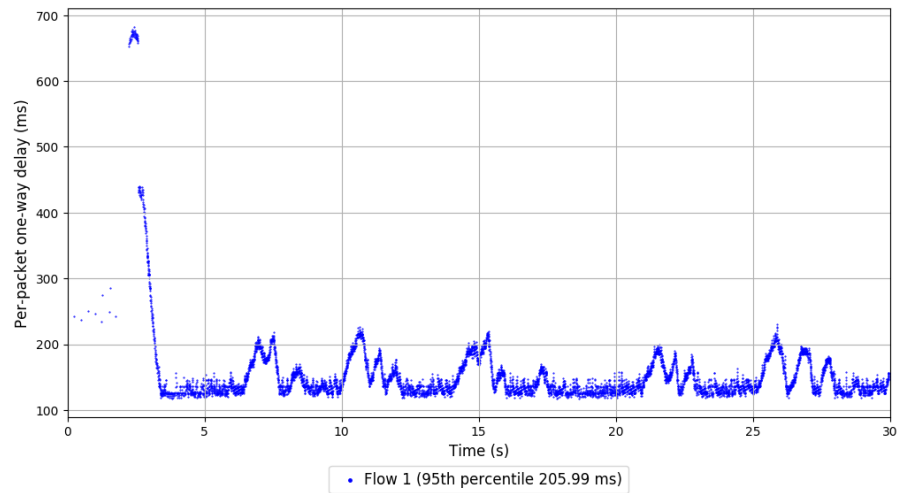
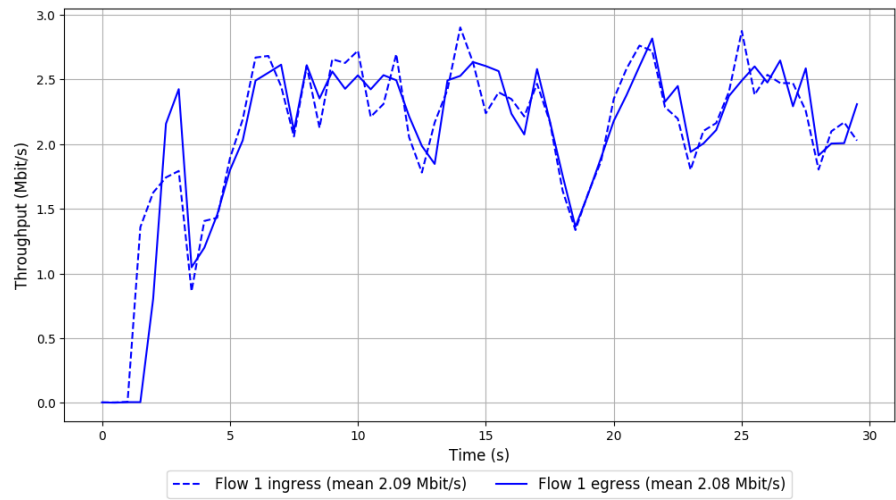
-- Flow 1:

Average throughput: 2.08 Mbit/s

95th percentile per-packet one-way delay: 205.993 ms

Loss rate: 0.92%

Run 2: Report of Vivace-LTE — Data Link



Run 3: Statistics of Vivace-LTE

Start at: 2018-02-17 02:40:21

End at: 2018-02-17 02:40:51

Local clock offset: -5.802 ms

Remote clock offset: 1.101 ms

Below is generated by plot.py at 2018-02-17 02:51:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.83 Mbit/s

95th percentile per-packet one-way delay: 673.209 ms

Loss rate: 0.75%

-- Flow 1:

Average throughput: 1.83 Mbit/s

95th percentile per-packet one-way delay: 673.209 ms

Loss rate: 0.75%

Run 3: Report of Vivace-LTE — Data Link

