Pantheon Report

Generated at 2017-12-20 17:44:58 (UTC).

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

Repeated the test of 14 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

Increased UDP receive buffer to 16 MB (default) and 32 MB (max).
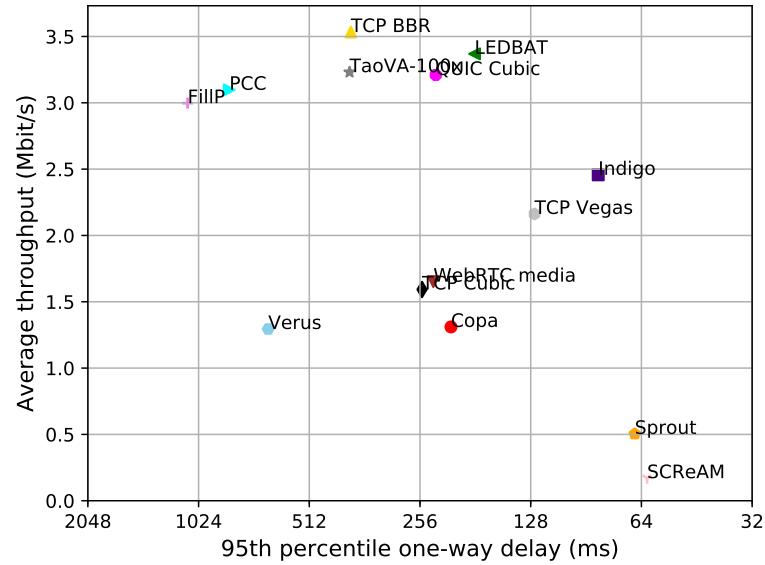
Tested BBR with qdisc of Fair Queuing (`fq`), and other schemes with the default Linux qdisc (`pfifo_fast`).

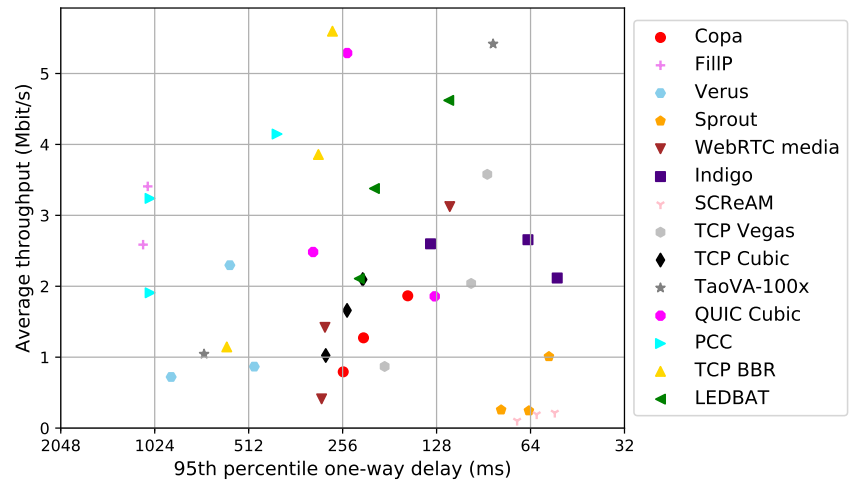NTP offsets were measured against `nets.org.sg` and have been applied to correct the timestamps in logs.

```
Git summary:
branch: master @ 904a5750834816b1e46a2c86405d707788d27c16
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
 M datagrump/sender.cc
third_party/fillp @ dcaef6b00654e660f73f7ed679d2eab61ce08639
third_party/genericCC @ 80b516c448f795fd6e9675f7177b69c622f07da8
third_party/indigo @ b19f3730105f9aa95452552af924e3719b03cc55
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 @ f1a14bffe749737437f61b1eaeeb30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
 M src/examples/cellsim.cc
 M src/examples/sproutbt2.cc
 M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
 M src/verus.hpp
 M tools/plot.py
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

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

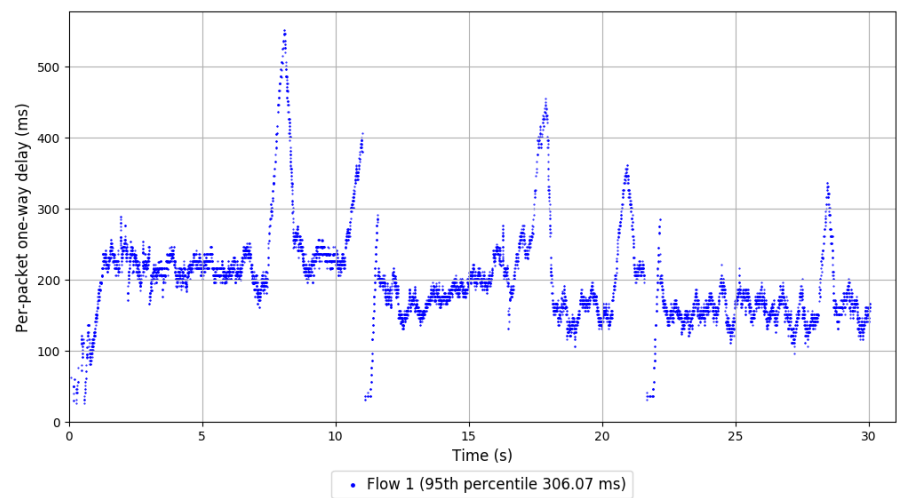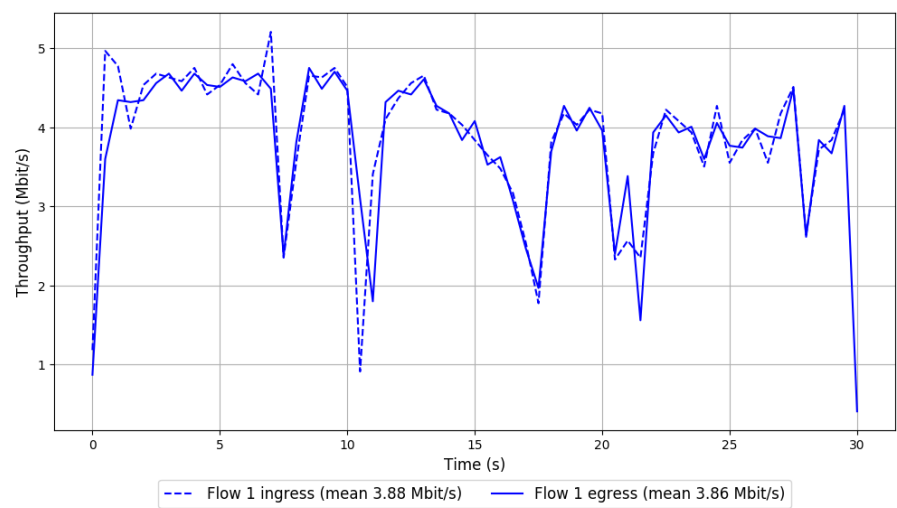test from AWS India 1 Ethernet to India ppp0, 3 runs of 30s each per scheme

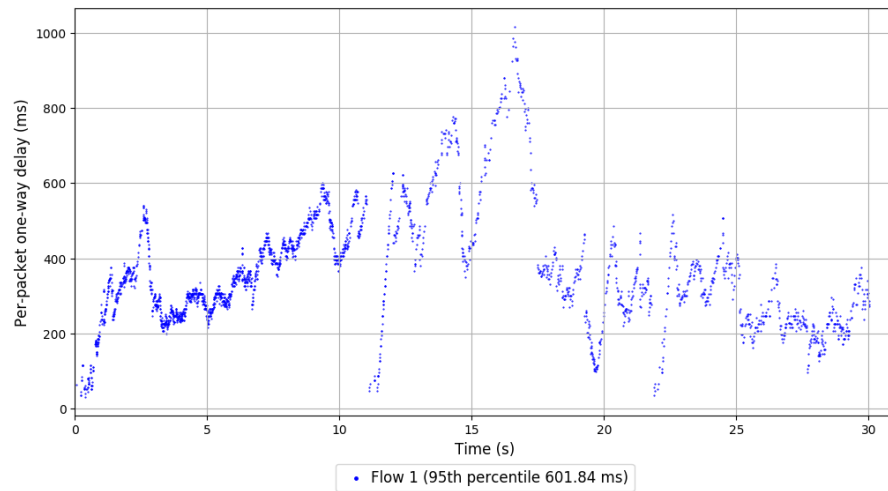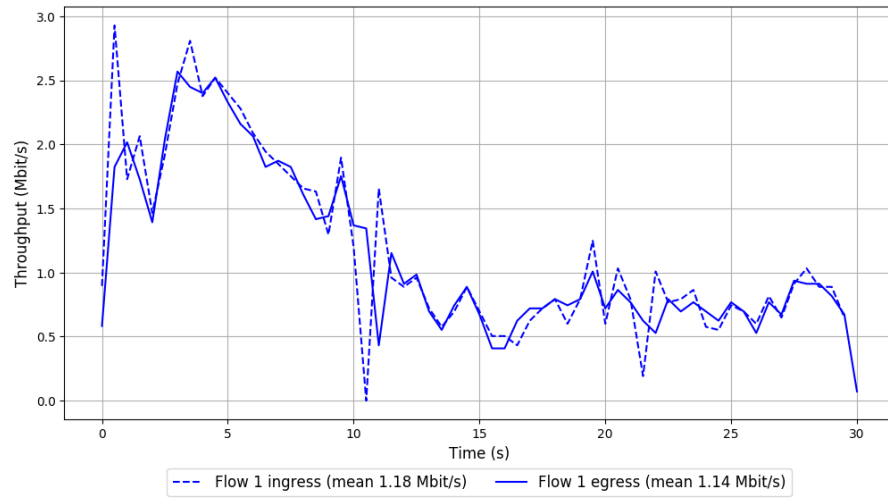| scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	3.53	394.61	1.39
TCP Cubic	3	1.59	252.78	0.78
LEDBAT	3	3.37	181.99	0.26
PCC	3	3.10	844.75	10.35
QUIC Cubic	3	3.21	231.87	1.34
SCReAM	3	0.17	61.78	0.64
WebRTC media	3	1.65	235.56	2.29
Sprout	3	0.50	66.72	0.31
TaoVA-100x	2	3.23	397.90	1.38
TCP Vegas	3	2.16	125.00	0.35
Verus	3	1.30	662.18	4.04
Copa	3	1.31	210.88	0.48
FillP	2	3.00	1096.82	83.88
Indigo	3	2.46	83.88	0.24

```
Run 1: Statistics of TCP BBR

Start at: 2017-12-20 17:02:55
End at: 2017-12-20 17:03:25
Local clock offset: 2.775 ms
Remote clock offset: -18.275 ms

# Below is generated by plot.py at 2017-12-20 17:44:29
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.86 Mbit/s
95th percentile per-packet one-way delay: 306.070 ms
Loss rate: 0.63%
-- Flow 1:
Average throughput: 3.86 Mbit/s
95th percentile per-packet one-way delay: 306.070 ms
Loss rate: 0.63%
```

Run 1: Report of TCP BBR — Data Link

Flow 1 ingress (mean 3.88 Mbit/s)   Flow 1 egress (mean 3.86 Mbit/s)
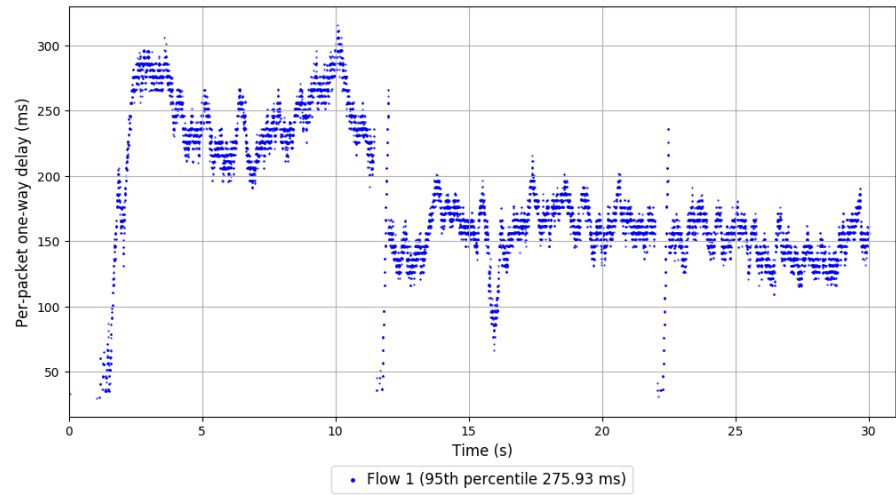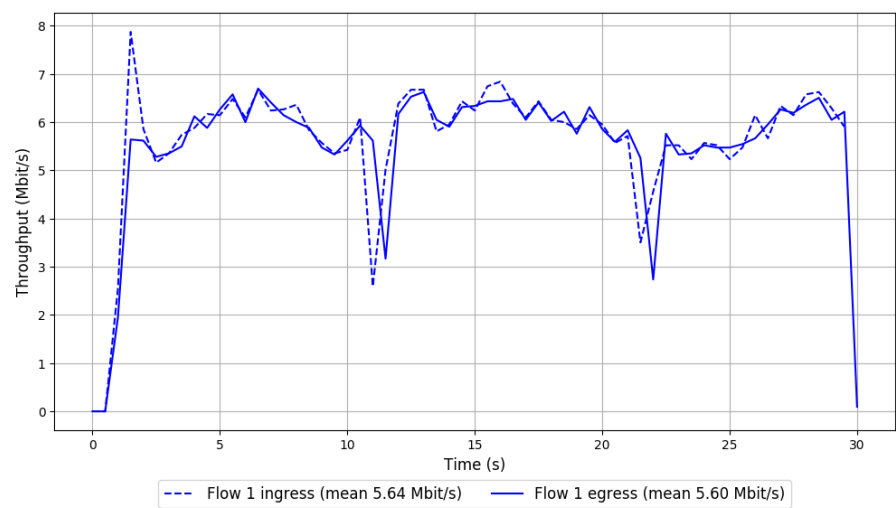

· Flow 1 (95th percentile 306.07 ms)

```
Run 2: Statistics of TCP BBR

Start at: 2017-12-20 17:19:49
End at: 2017-12-20 17:20:19
Local clock offset: 3.845 ms
Remote clock offset: -17.714 ms


# Below is generated by plot.py at 2017-12-20 17:44:29
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 601.844 ms
Loss rate: 2.66%
-- Flow 1:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 601.844 ms
Loss rate: 2.66%
```
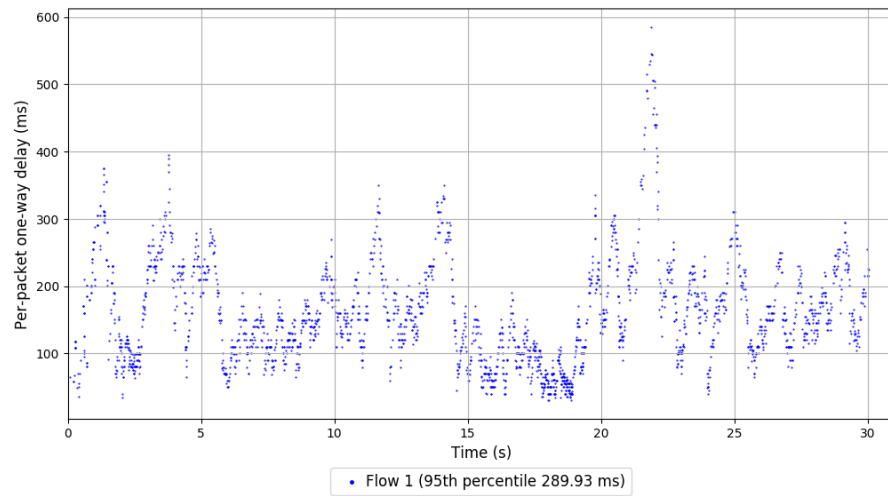
Run 2: Report of TCP BBR — Data Link

```
Run 3: Statistics of TCP BBR

Start at: 2017-12-20 17:36:27
End at: 2017-12-20 17:36:57
Local clock offset: 3.992 ms
Remote clock offset: -20.314 ms


# Below is generated by plot.py at 2017-12-20 17:44:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.60 Mbit/s
95th percentile per-packet one-way delay: 275.928 ms
Loss rate: 0.88%
-- Flow 1:
Average throughput: 5.60 Mbit/s
95th percentile per-packet one-way delay: 275.928 ms
Loss rate: 0.88%
```

Run 3: Report of TCP BBR — Data Link

Flow 1 ingress (mean 5.64 Mbit/s) — — — Flow 1 egress (mean 5.60 Mbit/s)

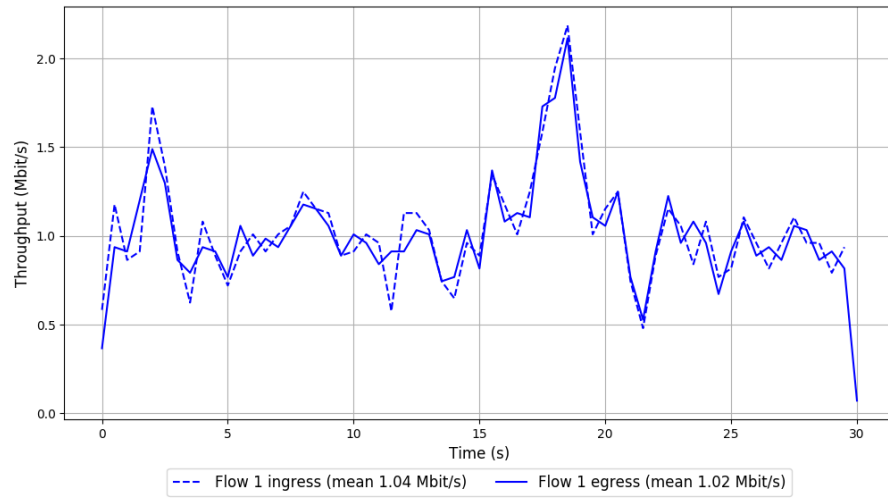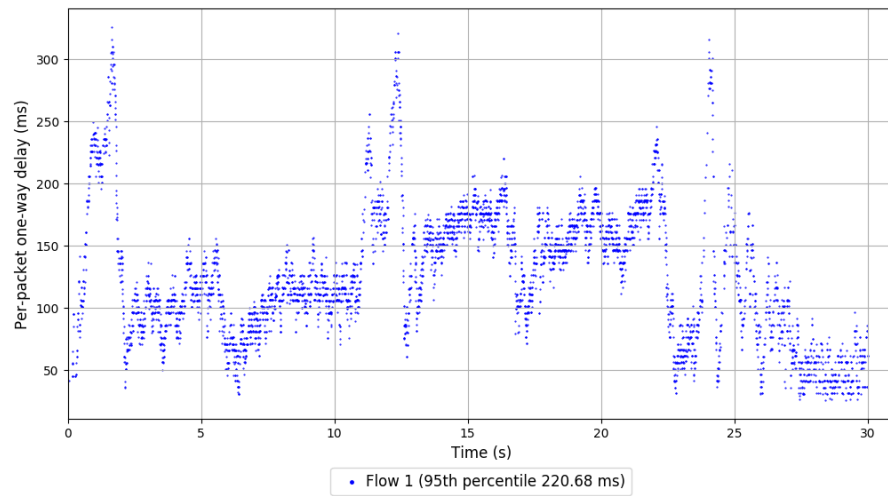• Flow 1 (95th percentile 275.93 ms)

```
Run 1: Statistics of TCP Cubic

Start at: 2017-12-20 17:09:41
End at: 2017-12-20 17:10:11
Local clock offset: 3.63 ms
Remote clock offset: -16.027 ms


# Below is generated by plot.py at 2017-12-20 17:44:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 289.927 ms
Loss rate: 1.16%
-- Flow 1:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 289.927 ms
Loss rate: 1.16%
```

Run 1: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 1.04 Mbit/s)   Flow 1 egress (mean 1.02 Mbit/s)

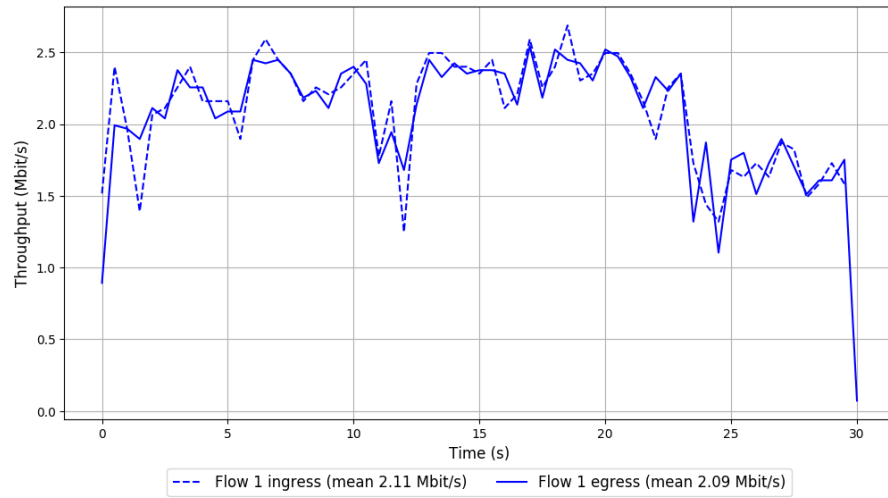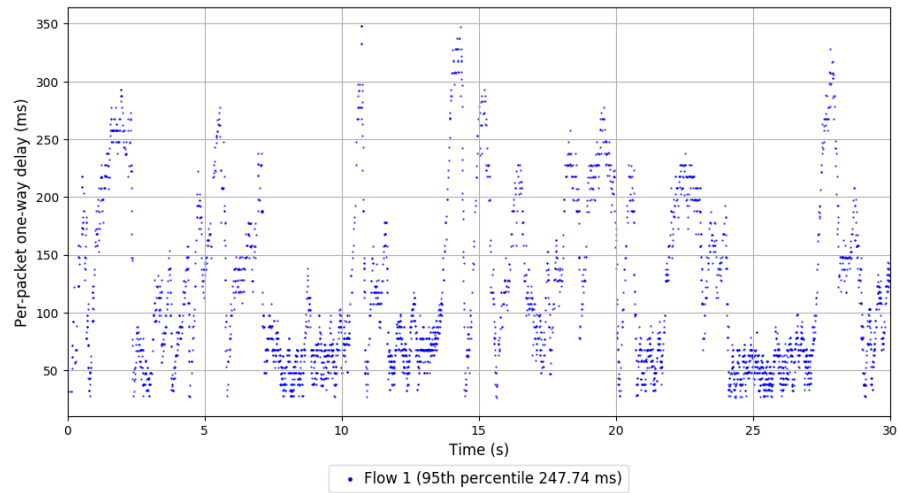Flow 1 (95th percentile 289.93 ms)

```
Run 2: Statistics of TCP Cubic

Start at: 2017-12-20 17:26:26
End at: 2017-12-20 17:26:56
Local clock offset: 5.032 ms
Remote clock offset: -19.573 ms


# Below is generated by plot.py at 2017-12-20 17:44:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 220.683 ms
Loss rate: 0.55%
-- Flow 1:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 220.683 ms
Loss rate: 0.55%
```

Run 2: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 2.11 Mbit/s)   Flow 1 egress (mean 2.09 Mbit/s)

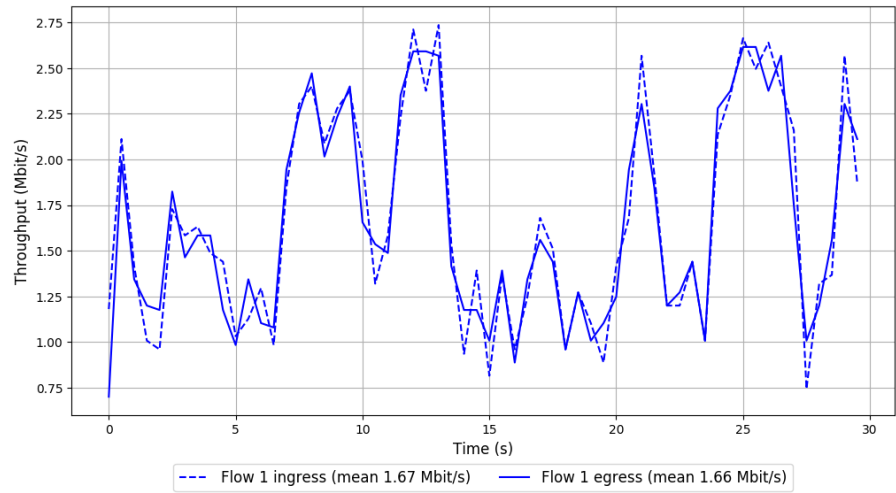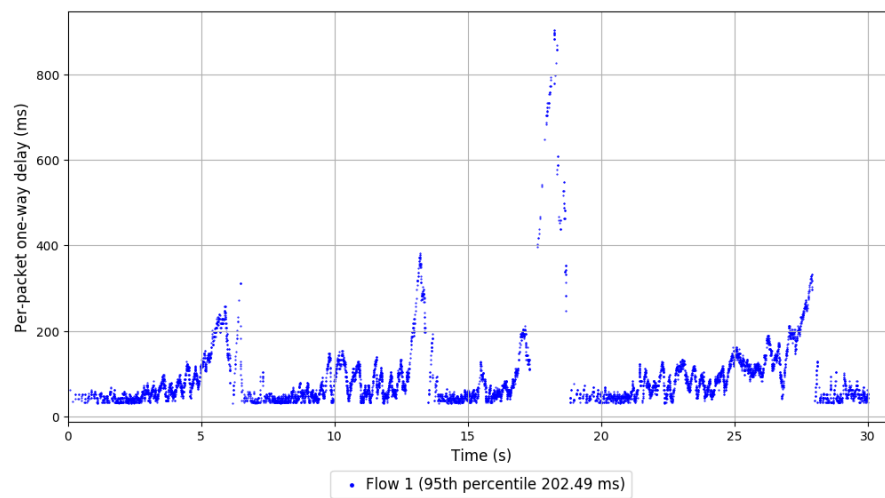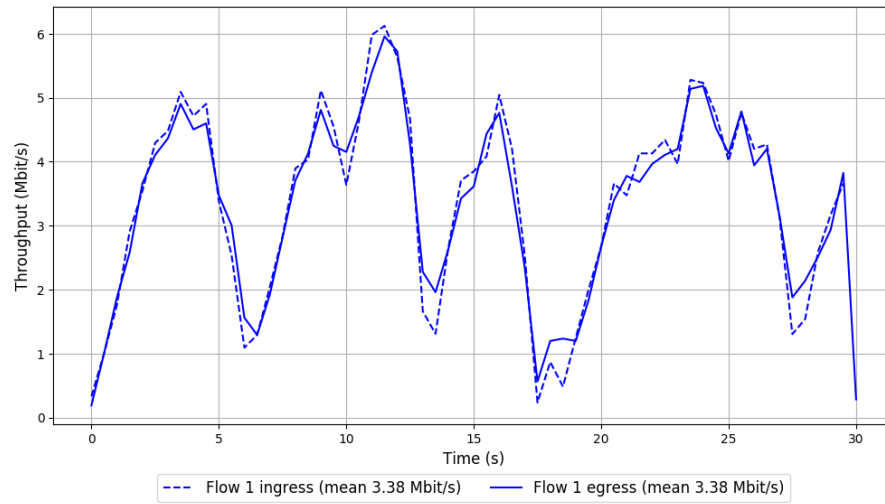Flow 1 (95th percentile 220.68 ms)

13

```
Run 3: Statistics of TCP Cubic

Start at: 2017-12-20 17:43:04
End at: 2017-12-20 17:43:34
Local clock offset: 5.982 ms
Remote clock offset: -19.29 ms


# Below is generated by plot.py at 2017-12-20 17:44:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.66 Mbit/s
95th percentile per-packet one-way delay: 247.736 ms
Loss rate: 0.62%
-- Flow 1:
Average throughput: 1.66 Mbit/s
95th percentile per-packet one-way delay: 247.736 ms
Loss rate: 0.62%
```

Run 3: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 1.67 Mbit/s)   Flow 1 egress (mean 1.66 Mbit/s)

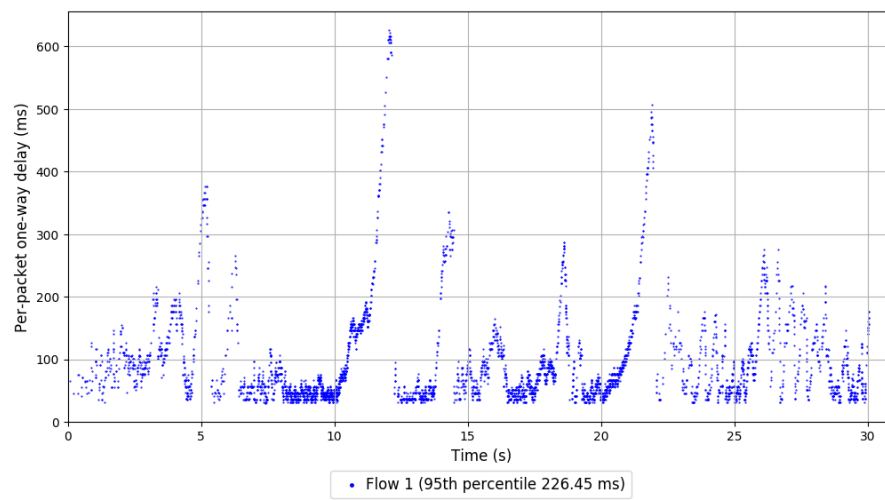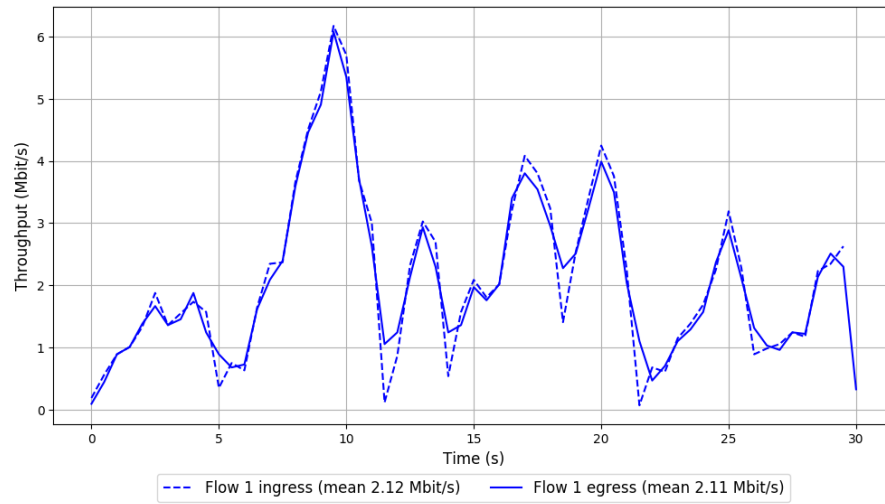Flow 1 (95th percentile 247.74 ms)

```
Run 1: Statistics of LEDBAT

Start at: 2017-12-20 16:57:56
End at: 2017-12-20 16:58:26
Local clock offset: 3.488 ms
Remote clock offset: -17.933 ms


# Below is generated by plot.py at 2017-12-20 17:44:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.38 Mbit/s
95th percentile per-packet one-way delay: 202.489 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 3.38 Mbit/s
95th percentile per-packet one-way delay: 202.489 ms
Loss rate: 0.06%
```

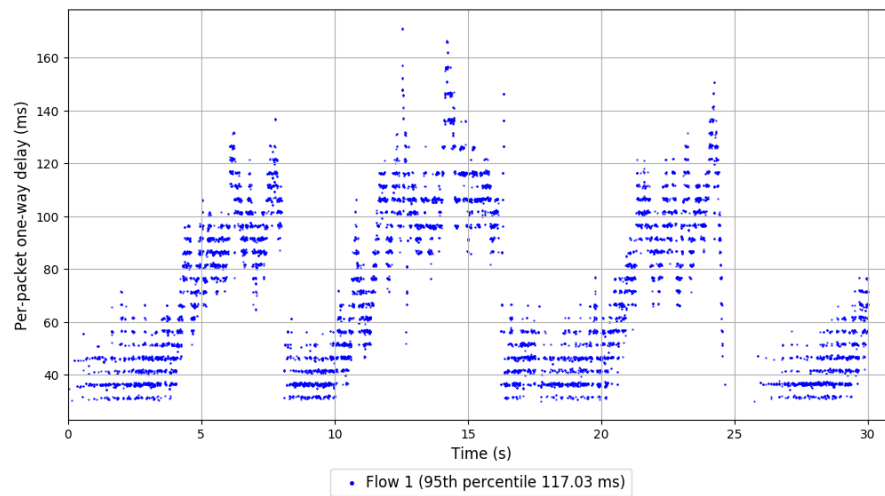Run 1: Report of LEDBAT — Data Link

```
Run 2: Statistics of LEDBAT

Start at: 2017-12-20 17:15:16
End at: 2017-12-20 17:15:46
Local clock offset: 3.849 ms
Remote clock offset: -16.408 ms


# Below is generated by plot.py at 2017-12-20 17:44:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 226.447 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 226.447 ms
Loss rate: 0.31%
```

Run 2: Report of LEDBAT — Data Link

Flow 1 ingress (mean 2.12 Mbit/s)   Flow 1 egress (mean 2.11 Mbit/s)

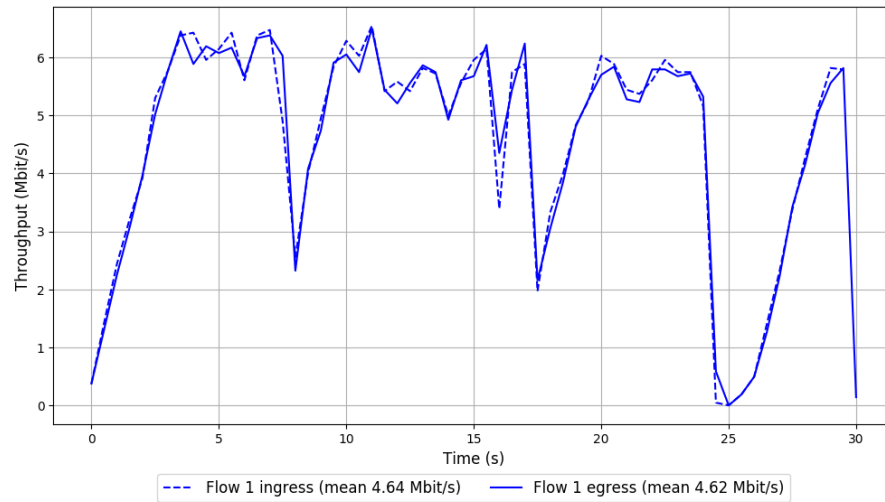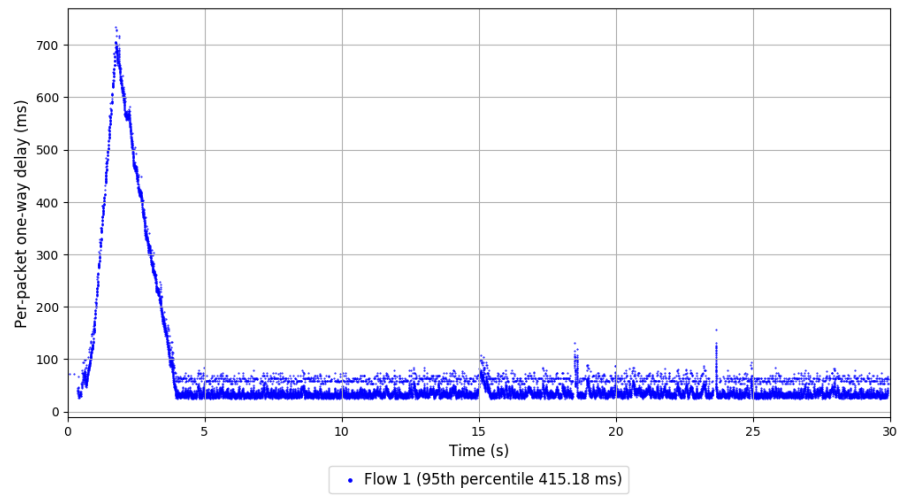Flow 1 (95th percentile 226.45 ms)

19

```
Run 3: Statistics of LEDBAT

Start at: 2017-12-20 17:32:02
End at: 2017-12-20 17:32:32
Local clock offset: 3.789 ms
Remote clock offset: -18.614 ms

# Below is generated by plot.py at 2017-12-20 17:44:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 4.62 Mbit/s
95th percentile per-packet one-way delay: 117.028 ms
Loss rate: 0.42%
-- Flow 1:
Average throughput: 4.62 Mbit/s
95th percentile per-packet one-way delay: 117.028 ms
Loss rate: 0.42%
```

Run 3: Report of LEDBAT — Data Link

Flow 1 ingress (mean 4.64 Mbit/s) --- Flow 1 egress (mean 4.62 Mbit/s)

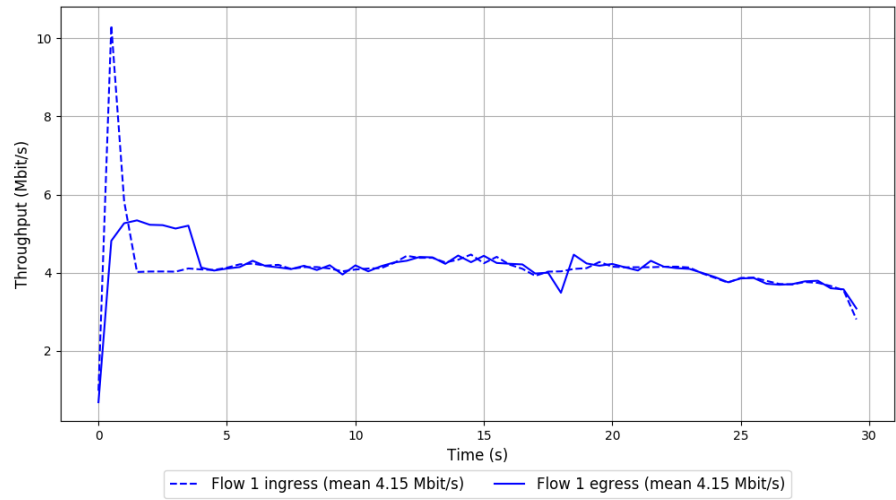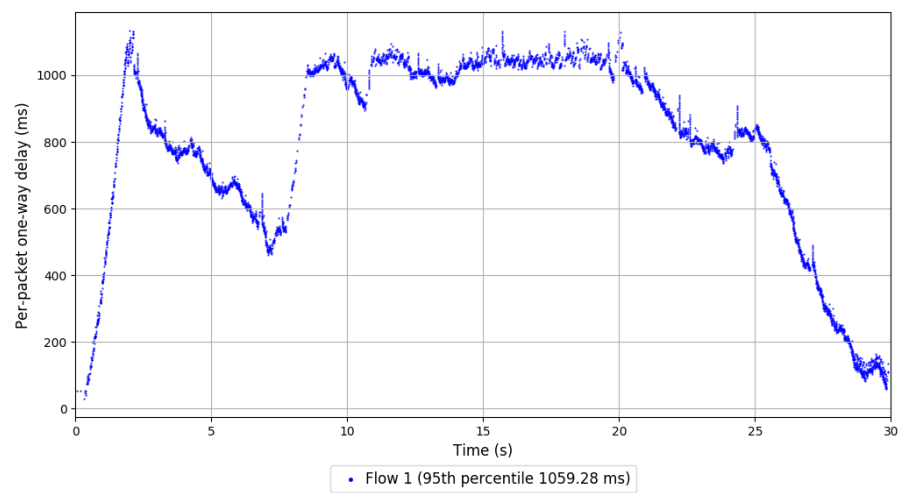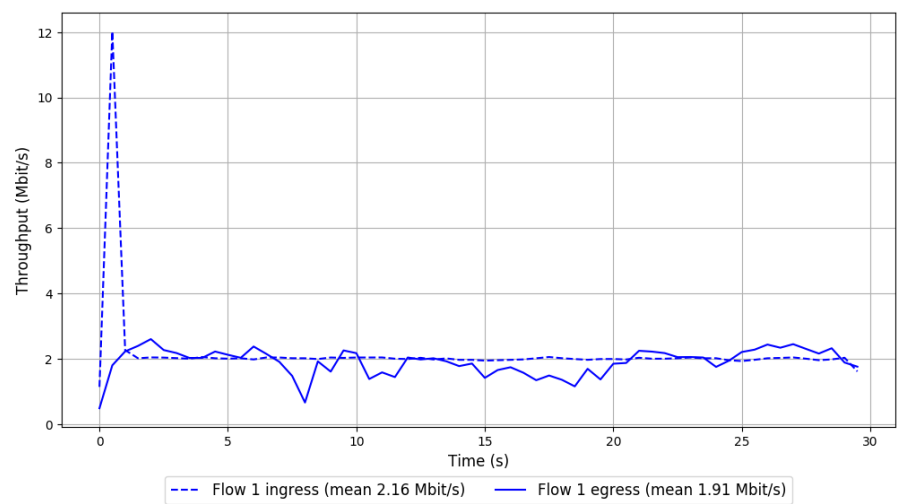Flow 1 (95th percentile 117.03 ms)

```
Run 1: Statistics of PCC

Start at: 2017-12-20 16:55:39
End at: 2017-12-20 16:56:09
Local clock offset: 2.636 ms
Remote clock offset: -17.615 ms

# Below is generated by plot.py at 2017-12-20 17:44:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 4.15 Mbit/s
95th percentile per-packet one-way delay: 415.184 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 4.15 Mbit/s
95th percentile per-packet one-way delay: 415.184 ms
Loss rate: 0.12%
```
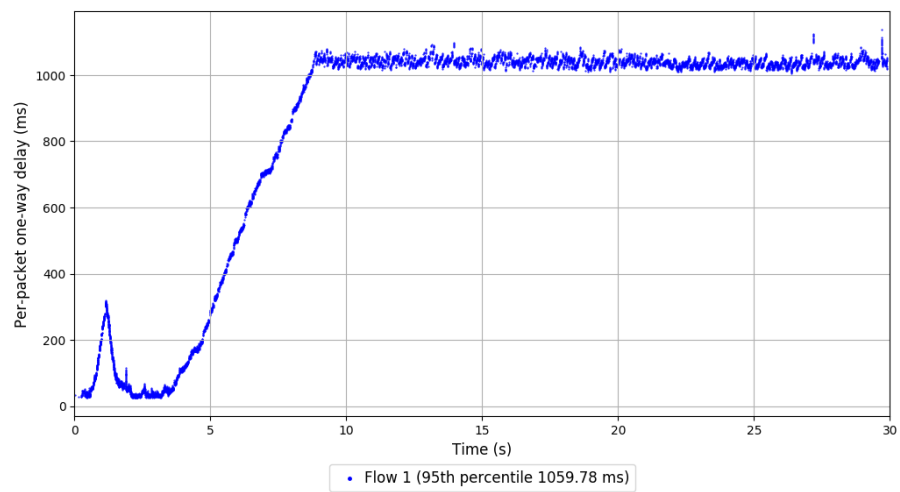
Run 1: Report of PCC — Data Link

```
Run 2: Statistics of PCC

Start at: 2017-12-20 17:13:03
End at: 2017-12-20 17:13:33
Local clock offset: 5.048 ms
Remote clock offset: -17.714 ms


# Below is generated by plot.py at 2017-12-20 17:44:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 1059.276 ms
Loss rate: 11.87%
-- Flow 1:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 1059.276 ms
Loss rate: 11.87%
```
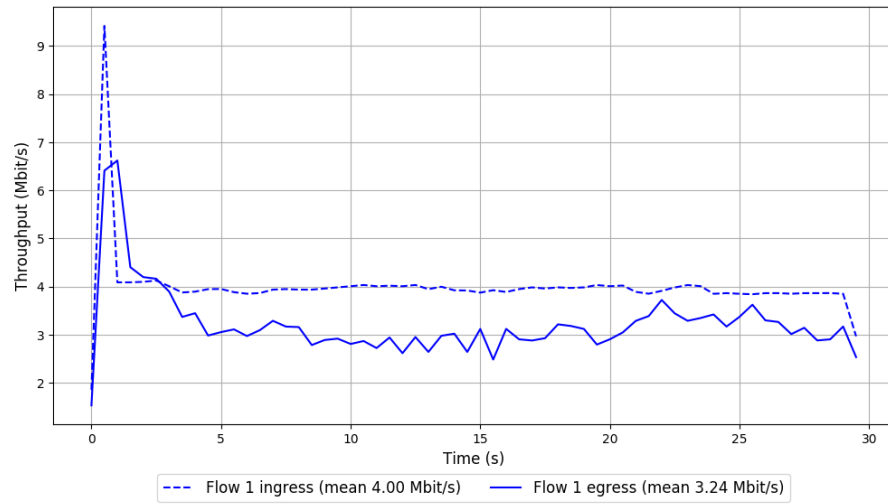
Run 2: Report of PCC — Data Link

```
Run 3: Statistics of PCC

Start at: 2017-12-20 17:29:47
End at: 2017-12-20 17:30:17
Local clock offset: 3.249 ms
Remote clock offset: -20.183 ms


# Below is generated by plot.py at 2017-12-20 17:44:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.24 Mbit/s
95th percentile per-packet one-way delay: 1059.783 ms
Loss rate: 19.06%
-- Flow 1:
Average throughput: 3.24 Mbit/s
95th percentile per-packet one-way delay: 1059.783 ms
Loss rate: 19.06%
```

Run 3: Report of PCC — Data Link

Flow 1 ingress (mean 4.00 Mbit/s)   Flow 1 egress (mean 3.24 Mbit/s)

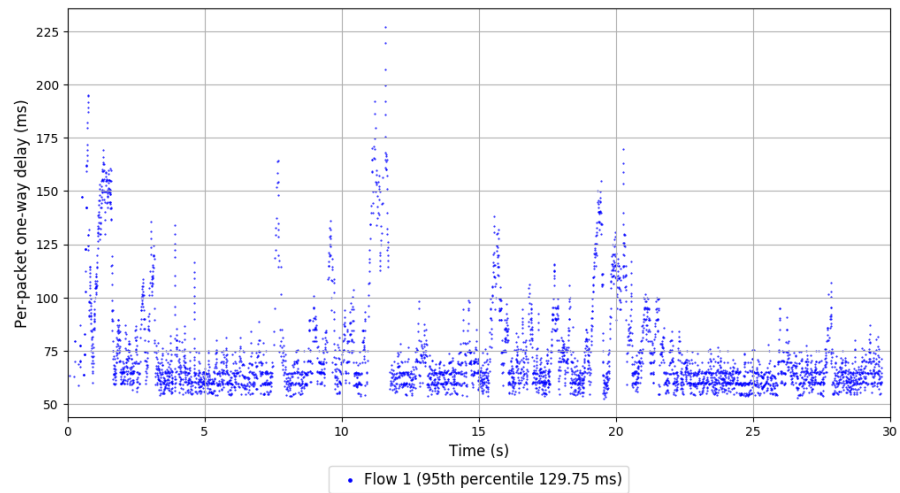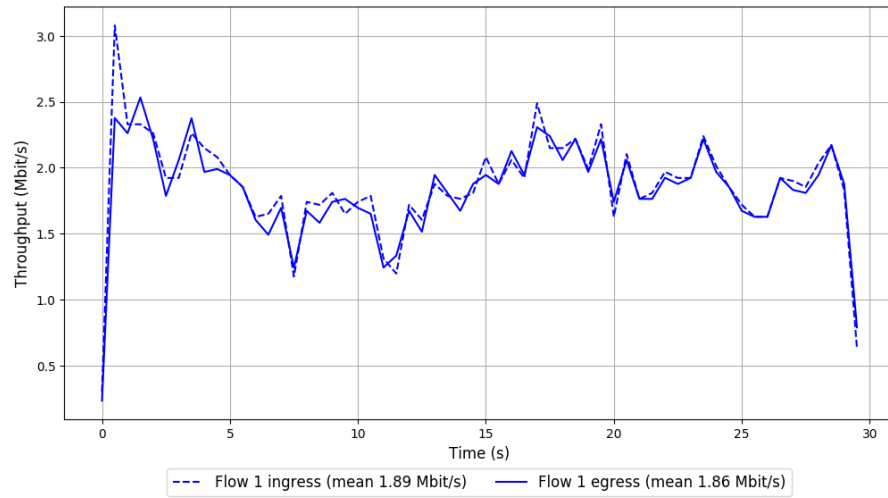Flow 1 (95th percentile 1059.78 ms)

27

```
Run 1: Statistics of QUIC Cubic

Start at: 2017-12-20 17:04:04
End at: 2017-12-20 17:04:34
Local clock offset: 3.068 ms
Remote clock offset: -18.865 ms


# Below is generated by plot.py at 2017-12-20 17:44:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.86 Mbit/s
95th percentile per-packet one-way delay: 129.747 ms
Loss rate: 1.72%
-- Flow 1:
Average throughput: 1.86 Mbit/s
95th percentile per-packet one-way delay: 129.747 ms
Loss rate: 1.72%
```

Run 1: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 1.89 Mbit/s)   Flow 1 egress (mean 1.86 Mbit/s)

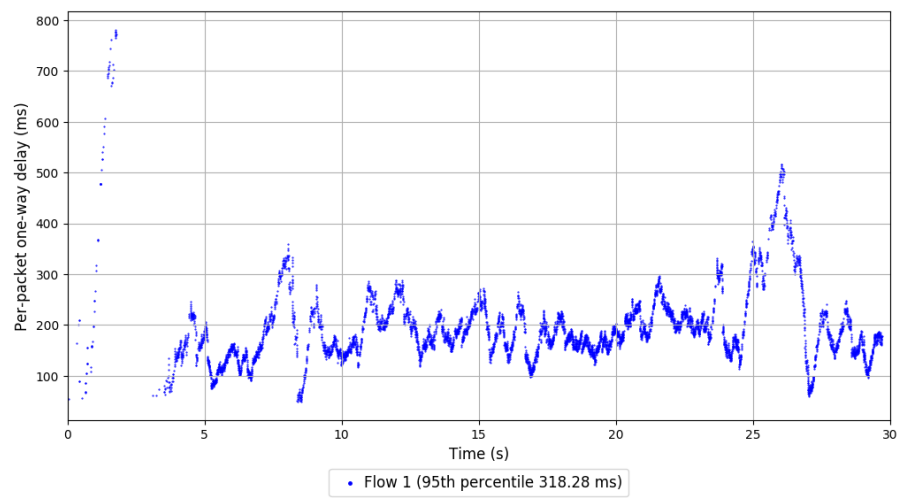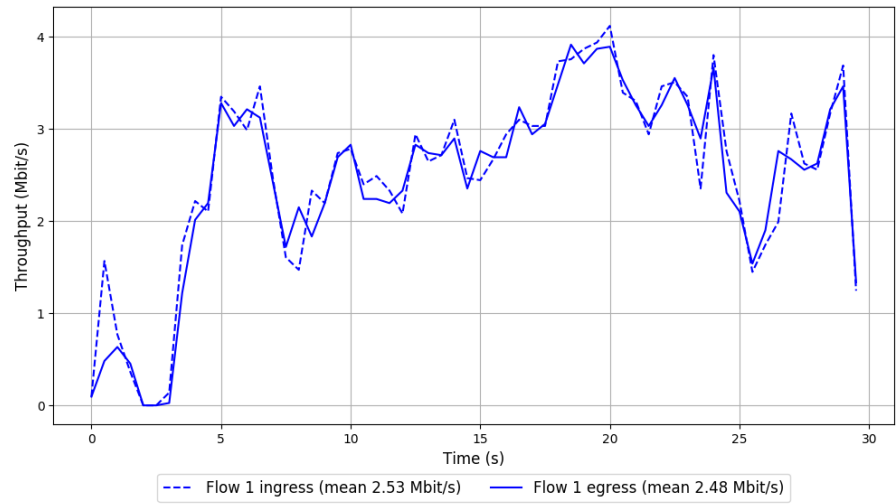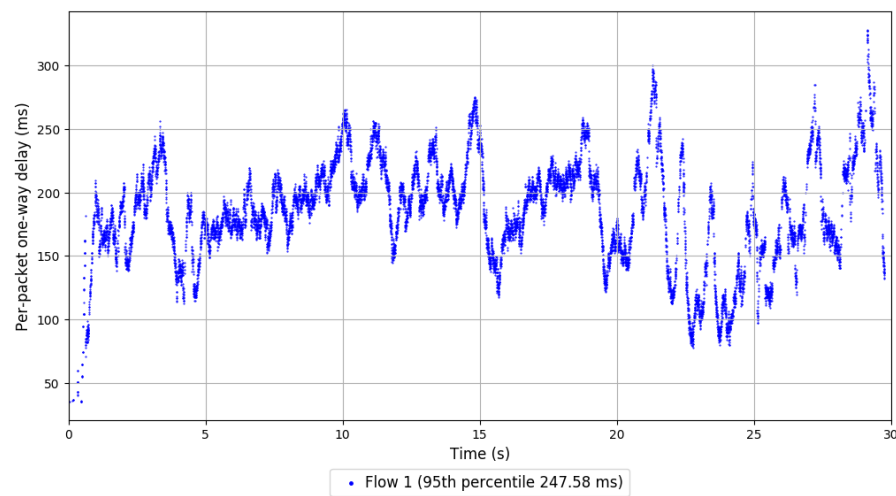Flow 1 (95th percentile 129.75 ms)

```
Run 2: Statistics of QUIC Cubic

Start at: 2017-12-20 17:20:56
End at: 2017-12-20 17:21:26
Local clock offset: 4.527 ms
Remote clock offset: -17.525 ms


# Below is generated by plot.py at 2017-12-20 17:44:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.48 Mbit/s
95th percentile per-packet one-way delay: 318.276 ms
Loss rate: 1.85%
-- Flow 1:
Average throughput: 2.48 Mbit/s
95th percentile per-packet one-way delay: 318.276 ms
Loss rate: 1.85%
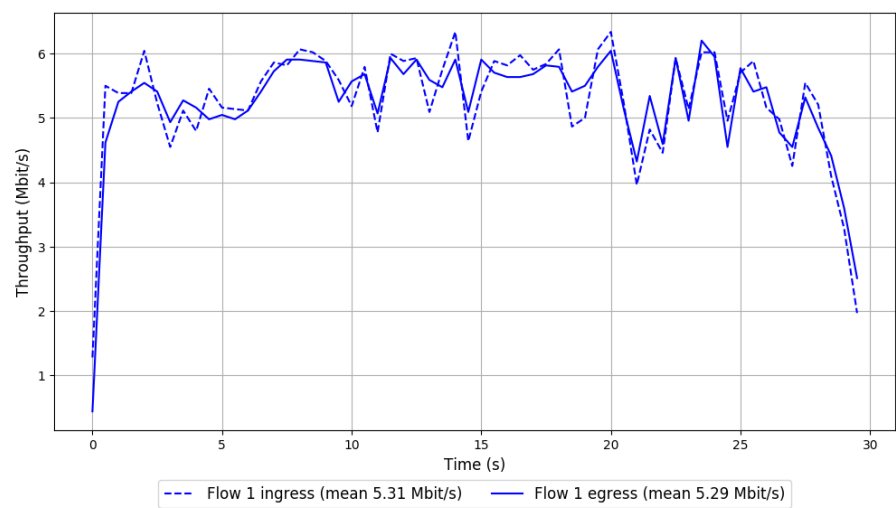```

Run 2: Report of QUIC Cubic — Data Link

```
Run 3: Statistics of QUIC Cubic

Start at: 2017-12-20 17:37:33
End at: 2017-12-20 17:38:03
Local clock offset: 4.182 ms
Remote clock offset: -19.744 ms


# Below is generated by plot.py at 2017-12-20 17:44:43
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.29 Mbit/s
95th percentile per-packet one-way delay: 247.577 ms
Loss rate: 0.44%
-- Flow 1:
Average throughput: 5.29 Mbit/s
95th percentile per-packet one-way delay: 247.577 ms
Loss rate: 0.44%
```

Run 3: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 5.31 Mbit/s)   Flow 1 egress (mean 5.29 Mbit/s)

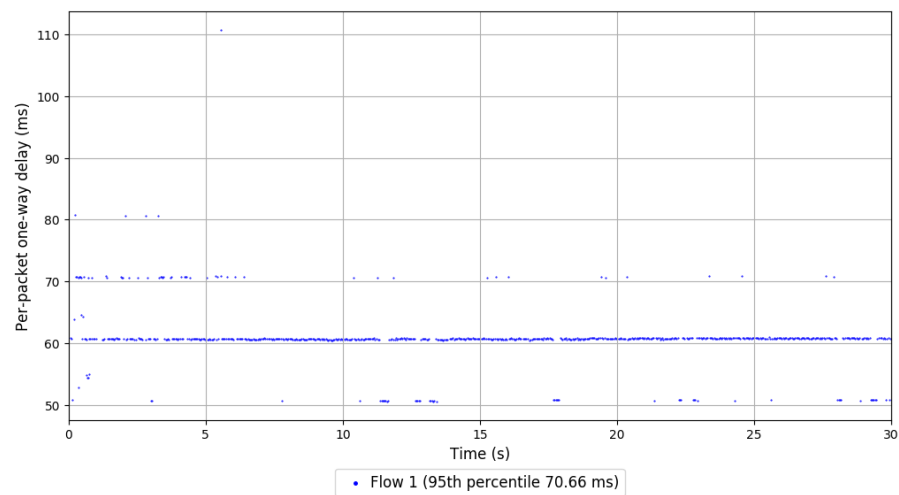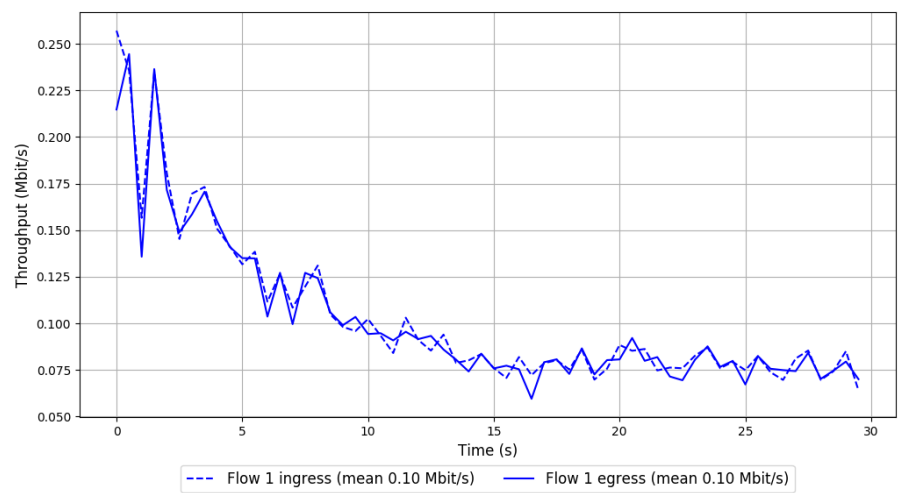Flow 1 (95th percentile 247.58 ms)

```
Run 1: Statistics of SCReAM

Start at: 2017-12-20 17:05:12
End at: 2017-12-20 17:05:42
Local clock offset: 5.363 ms
Remote clock offset: -17.577 ms


# Below is generated by plot.py at 2017-12-20 17:44:43
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 70.659 ms
Loss rate: 1.78%
-- Flow 1:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 70.659 ms
Loss rate: 1.78%
```

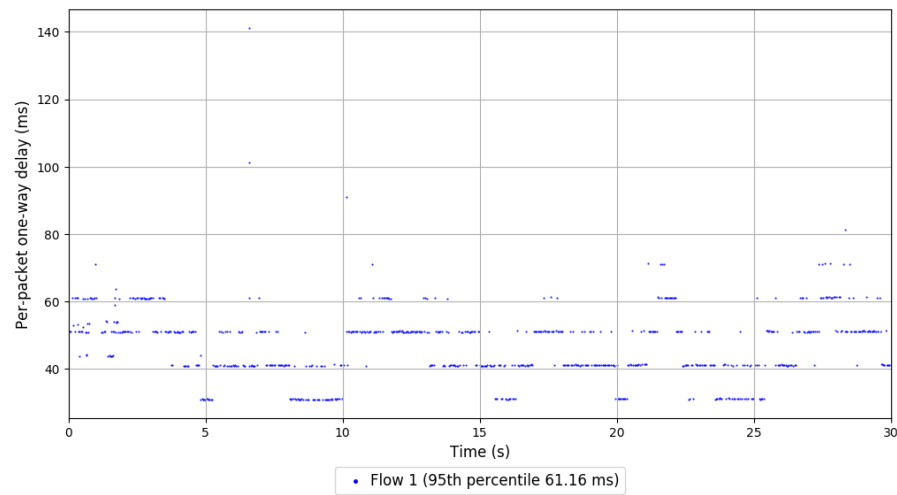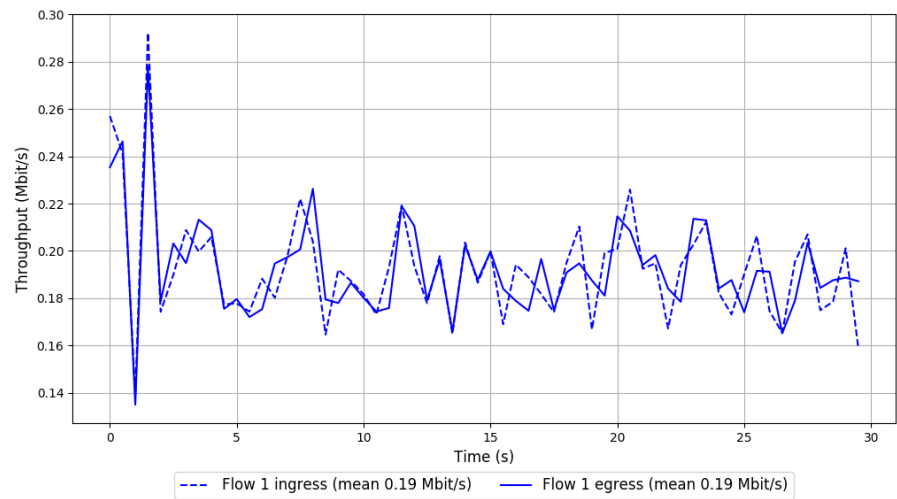## Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2017-12-20 17:22:02
End at: 2017-12-20 17:22:32
Local clock offset: 5.66 ms
Remote clock offset: -18.433 ms


# Below is generated by plot.py at 2017-12-20 17:44:43
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 61.163 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 61.163 ms
Loss rate: 0.00%
```

Run 2: Report of SCReAM — Data Link

Flow 1 ingress (mean 0.19 Mbit/s) --- Flow 1 egress (mean 0.19 Mbit/s)

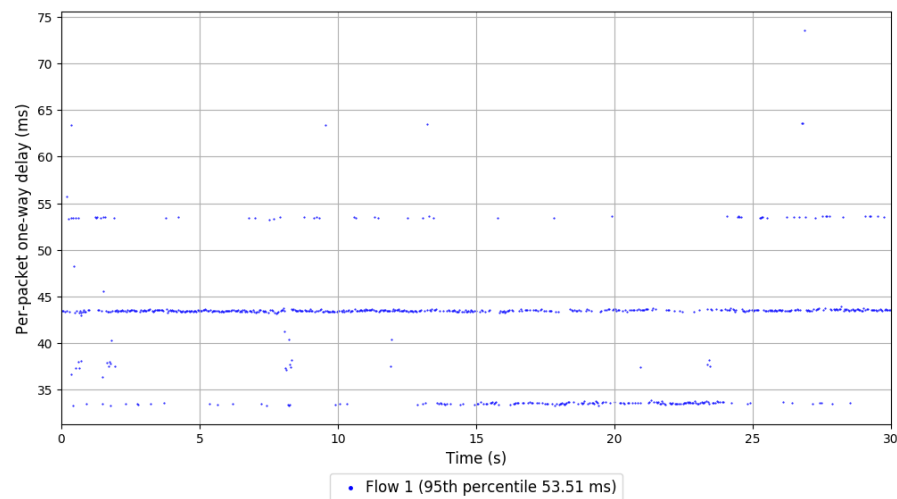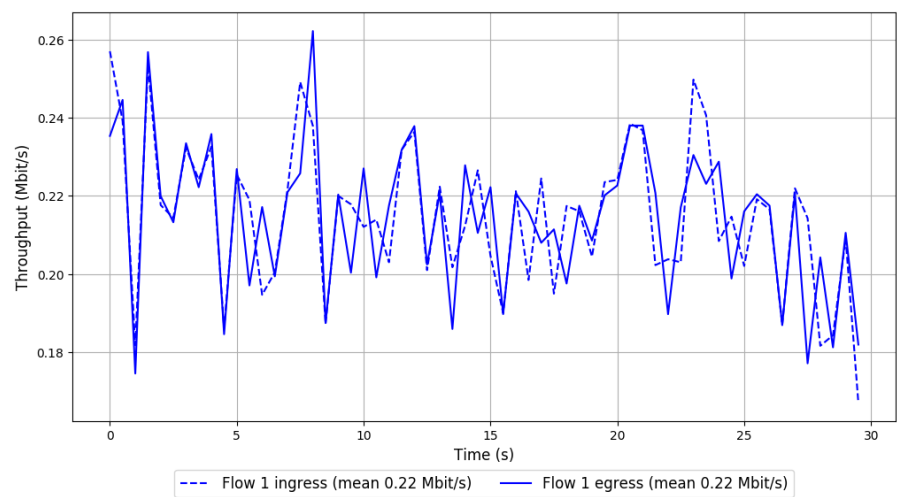Flow 1 (95th percentile 61.16 ms)

```
Run 3: Statistics of SCReAM

Start at: 2017-12-20 17:38:40
End at: 2017-12-20 17:39:10
Local clock offset: 4.366 ms
Remote clock offset: -19.381 ms


# Below is generated by plot.py at 2017-12-20 17:44:43
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 53.511 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 53.511 ms
Loss rate: 0.15%
```

Run 3: Report of SCReAM — Data Link

Flow 1 ingress (mean 0.22 Mbit/s) --- Flow 1 egress (mean 0.22 Mbit/s)

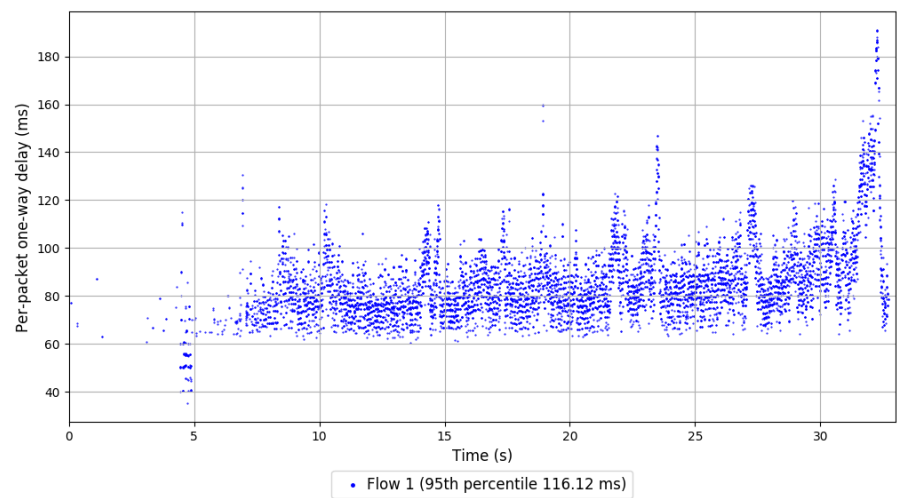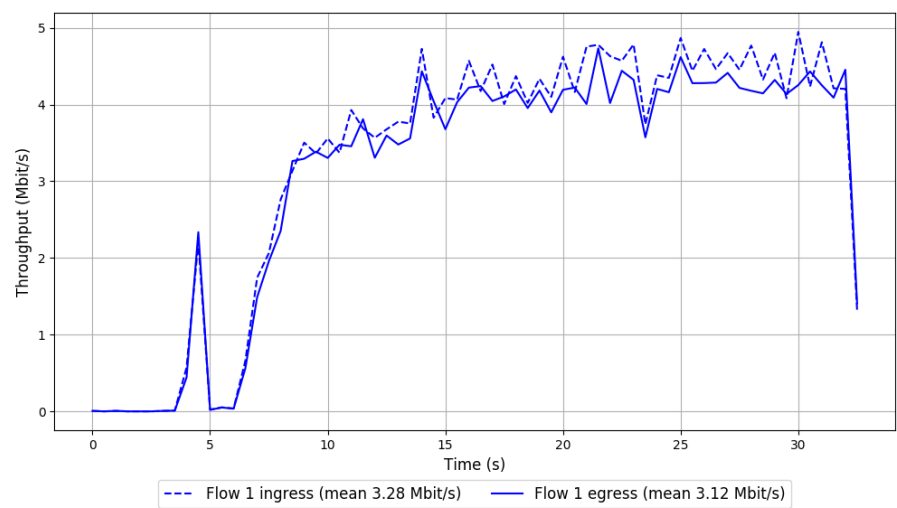• Flow 1 (95th percentile 53.51 ms)

```
Run 1: Statistics of WebRTC media

Start at: 2017-12-20 16:54:32
End at: 2017-12-20 16:55:02
Local clock offset: -2.482 ms
Remote clock offset: -14.949 ms


# Below is generated by plot.py at 2017-12-20 17:44:46
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.12 Mbit/s
95th percentile per-packet one-way delay: 116.123 ms
Loss rate: 4.85%
-- Flow 1:
Average throughput: 3.12 Mbit/s
95th percentile per-packet one-way delay: 116.123 ms
Loss rate: 4.85%
```

Run 1: Report of WebRTC media — Data Link

Flow 1 ingress (mean 3.28 Mbit/s)   Flow 1 egress (mean 3.12 Mbit/s)
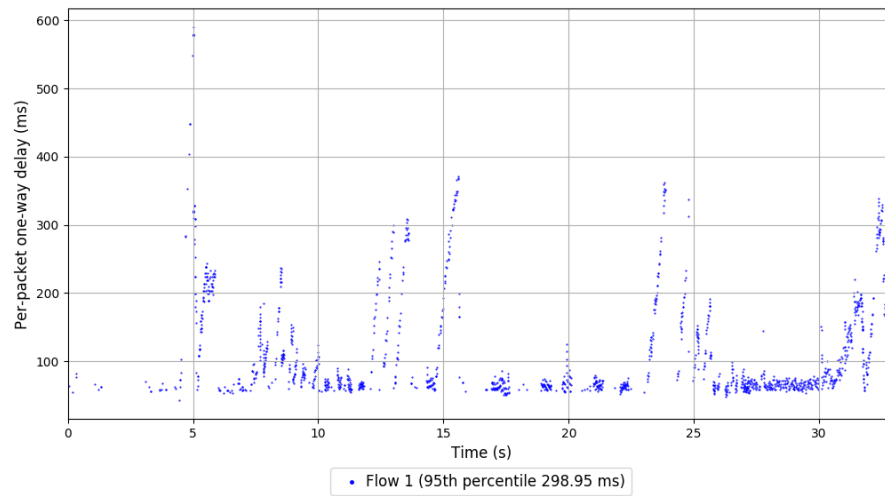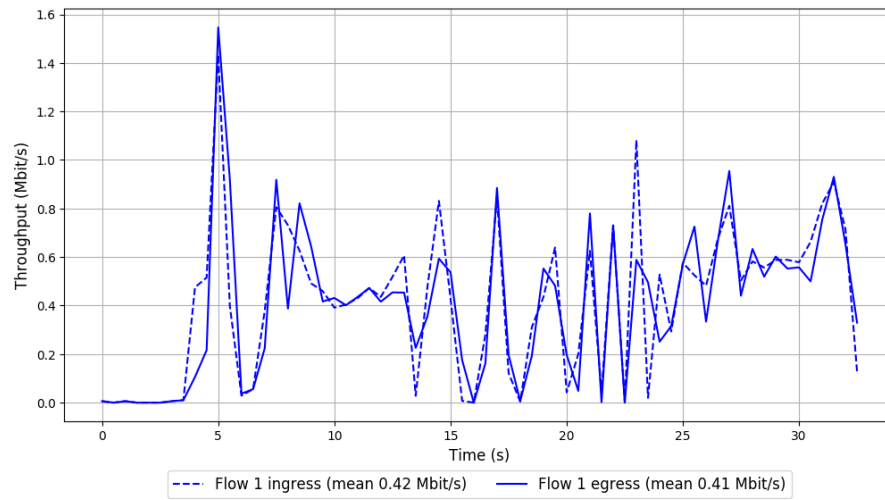

Flow 1 (95th percentile 116.12 ms)

```
Run 2: Statistics of WebRTC media

Start at: 2017-12-20 17:11:55
End at: 2017-12-20 17:12:25
Local clock offset: 3.926 ms
Remote clock offset: -17.431 ms


# Below is generated by plot.py at 2017-12-20 17:44:46
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 298.948 ms
Loss rate: 1.74%
-- Flow 1:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 298.948 ms
Loss rate: 1.74%
```

Run 2: Report of WebRTC media — Data Link

```
Run 3: Statistics of WebRTC media

Start at: 2017-12-20 17:28:41
End at: 2017-12-20 17:29:11
Local clock offset: 3.644 ms
Remote clock offset: -18.257 ms


# Below is generated by plot.py at 2017-12-20 17:44:46
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 291.595 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 291.595 ms
Loss rate: 0.29%
```
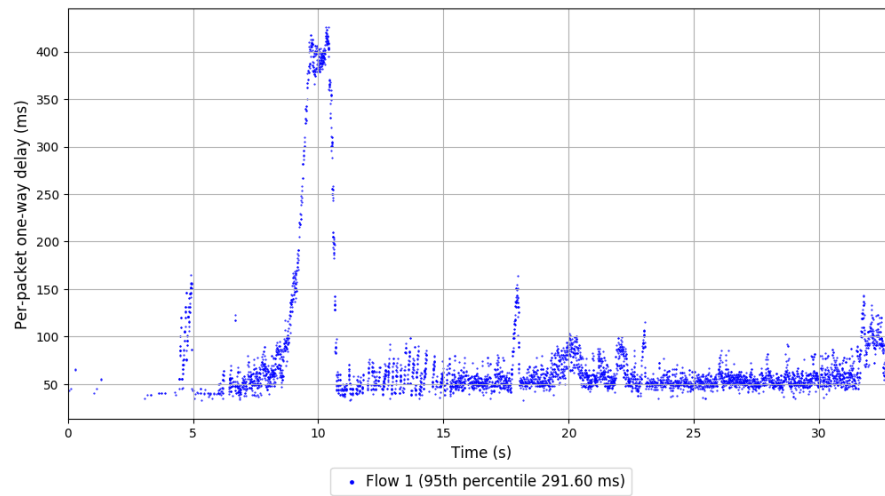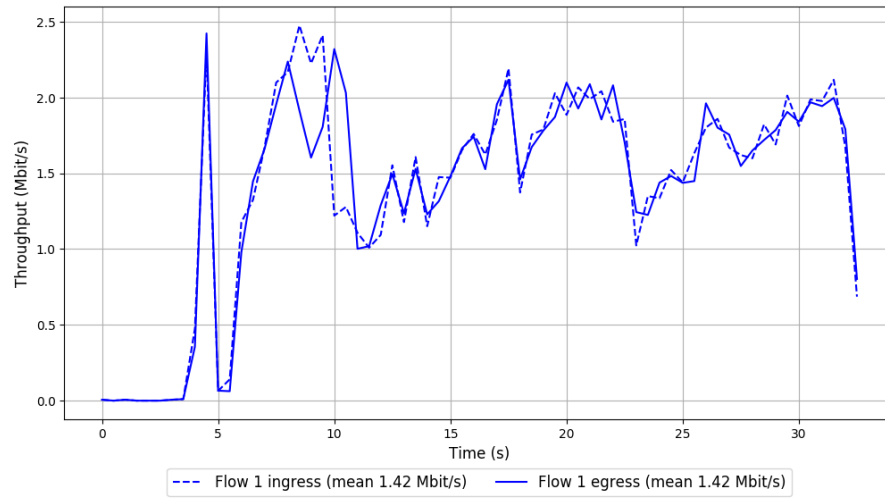
Run 3: Report of WebRTC media — Data Link

Flow 1 ingress (mean 1.42 Mbit/s) --- Flow 1 egress (mean 1.42 Mbit/s)
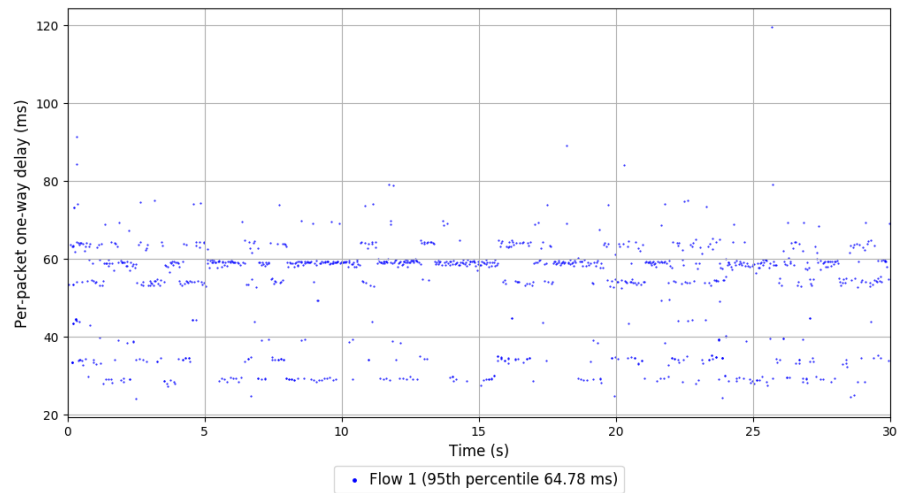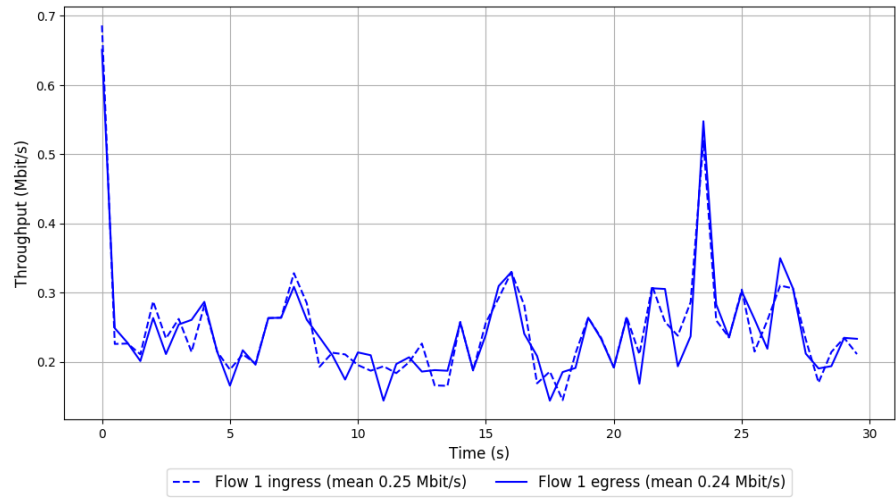

Flow 1 (95th percentile 291.60 ms)

```
Run 1: Statistics of Sprout

Start at: 2017-12-20 17:01:47
End at: 2017-12-20 17:02:17
Local clock offset: 5.214 ms
Remote clock offset: -16.374 ms


# Below is generated by plot.py at 2017-12-20 17:44:46
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 64.777 ms
Loss rate: 0.63%
-- Flow 1:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 64.777 ms
Loss rate: 0.63%
```

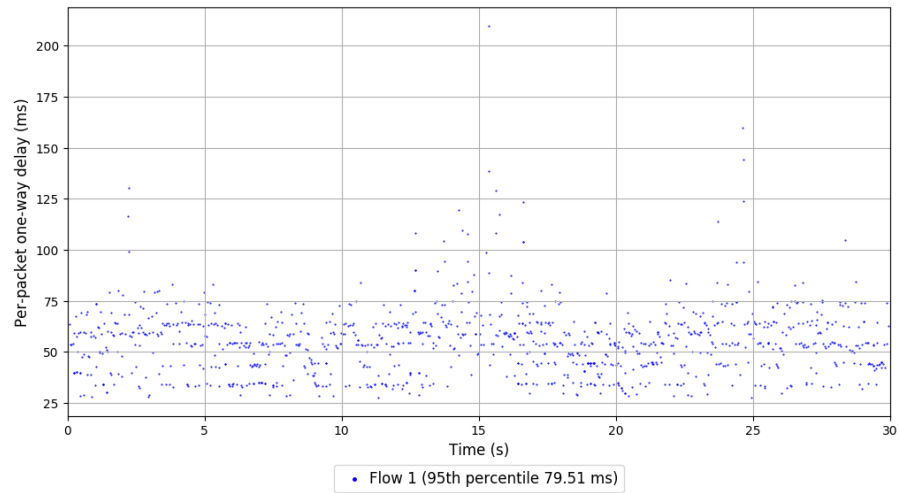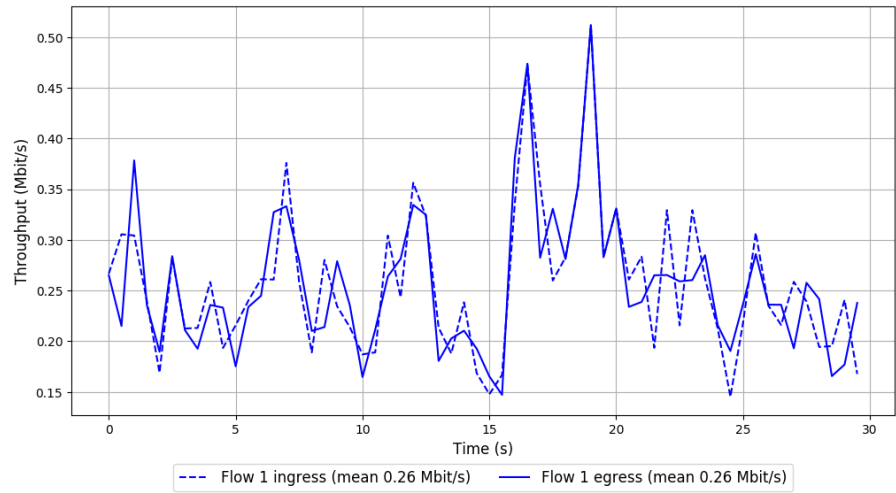Run 1: Report of Sprout — Data Link

```
Run 2: Statistics of Sprout

Start at: 2017-12-20 17:18:43
End at: 2017-12-20 17:19:13
Local clock offset: 5.017 ms
Remote clock offset: -18.225 ms


# Below is generated by plot.py at 2017-12-20 17:44:46
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 79.508 ms
Loss rate: 0.17%
-- Flow 1:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 79.508 ms
Loss rate: 0.17%
```

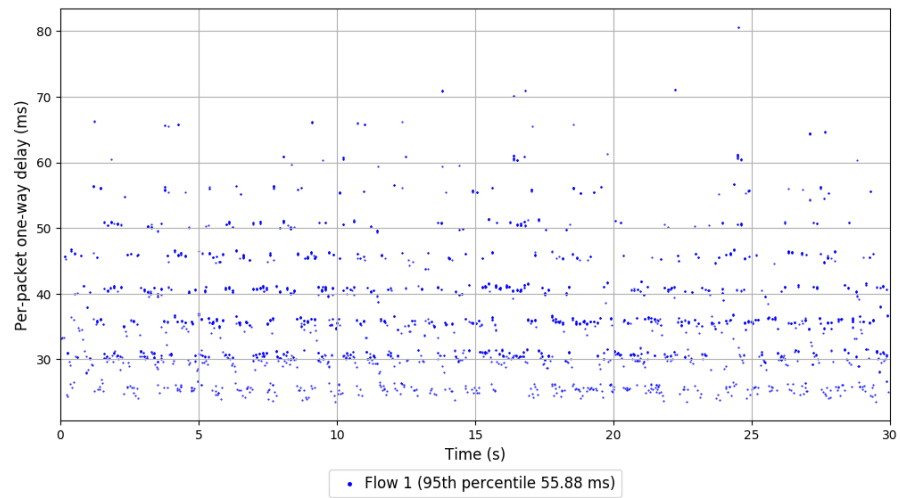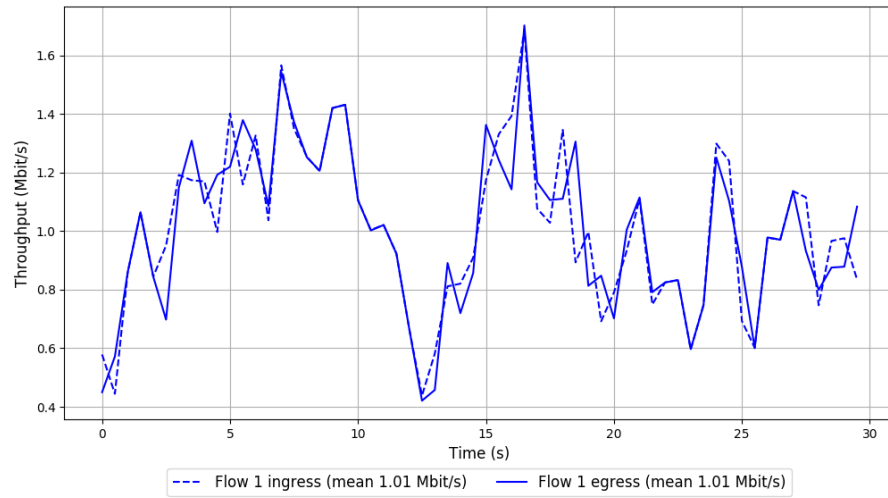Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2017-12-20 17:35:21
End at: 2017-12-20 17:35:51
Local clock offset: 5.254 ms
Remote clock offset: -19.322 ms


# Below is generated by plot.py at 2017-12-20 17:44:46
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 55.879 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 55.879 ms
Loss rate: 0.13%
```

Run 3: Report of Sprout — Data Link

Run 1: Statistics of TaoVA-100x

/home/ubuntu/pantheon_data/2017-12-20T16-52-AWS-India-1-to-India-ppp0-3-runs/taova_stats_run
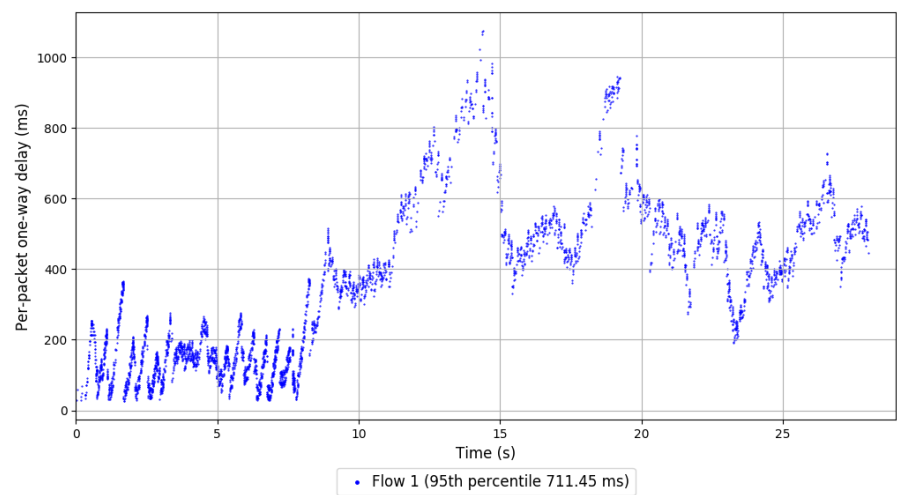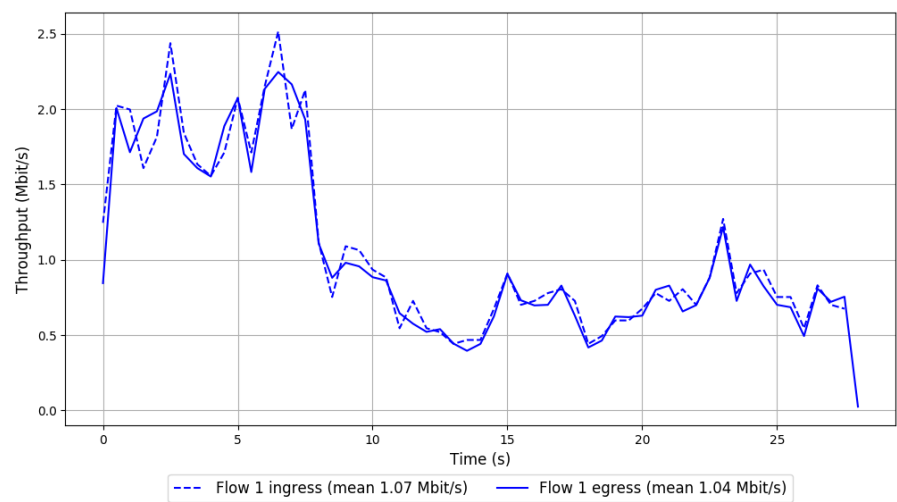
Run 1: Report of TaoVA-100x — Data Link

Figure is missing

Figure is missing

```
Run 2: Statistics of TaoVA-100x

Start at: 2017-12-20 17:17:36
End at: 2017-12-20 17:18:06
Local clock offset: 4.094 ms
Remote clock offset: -18.207 ms


# Below is generated by plot.py at 2017-12-20 17:44:46
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.04 Mbit/s
95th percentile per-packet one-way delay: 711.452 ms
Loss rate: 2.57%
-- Flow 1:
Average throughput: 1.04 Mbit/s
95th percentile per-packet one-way delay: 711.452 ms
Loss rate: 2.57%
```

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

Flow 1 ingress (mean 1.07 Mbit/s) ---   Flow 1 egress (mean 1.04 Mbit/s) ——
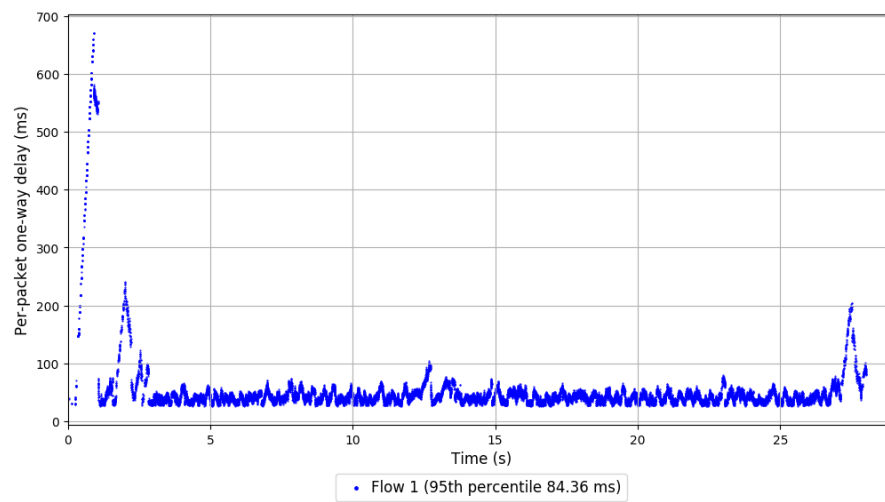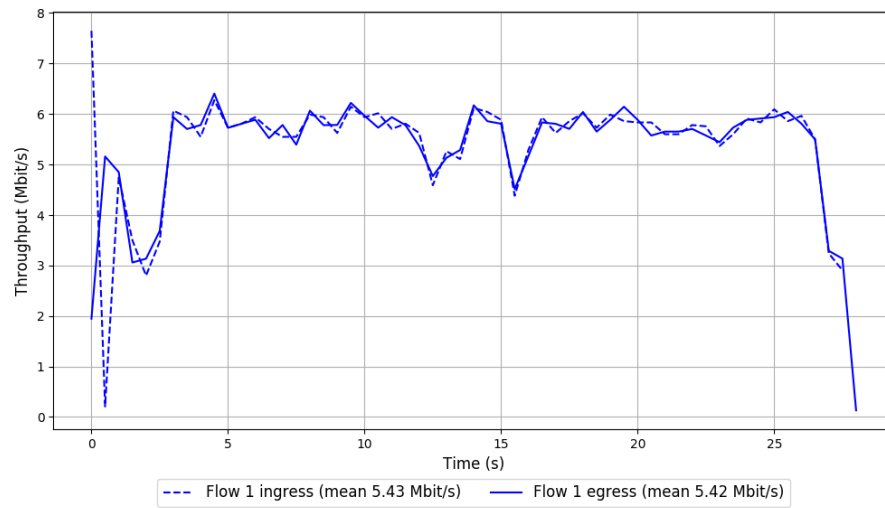

Flow 1 (95th percentile 711.45 ms)

```
Run 3: Statistics of TaoVA-100x

Start at: 2017-12-20 17:34:14
End at: 2017-12-20 17:34:44
Local clock offset: 4.147 ms
Remote clock offset: -18.406 ms


# Below is generated by plot.py at 2017-12-20 17:44:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.42 Mbit/s
95th percentile per-packet one-way delay: 84.355 ms
Loss rate: 0.19%
-- Flow 1:
Average throughput: 5.42 Mbit/s
95th percentile per-packet one-way delay: 84.355 ms
Loss rate: 0.19%
```

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

Flow 1 ingress (mean 5.43 Mbit/s)   Flow 1 egress (mean 5.42 Mbit/s)

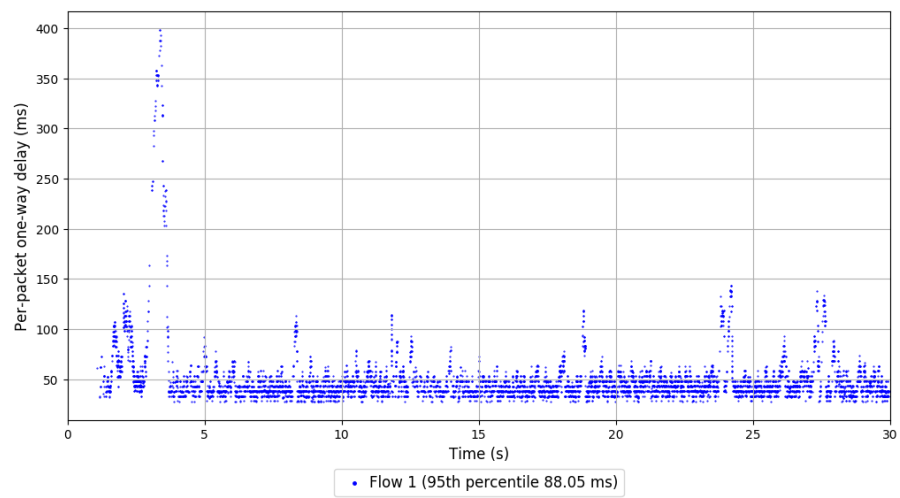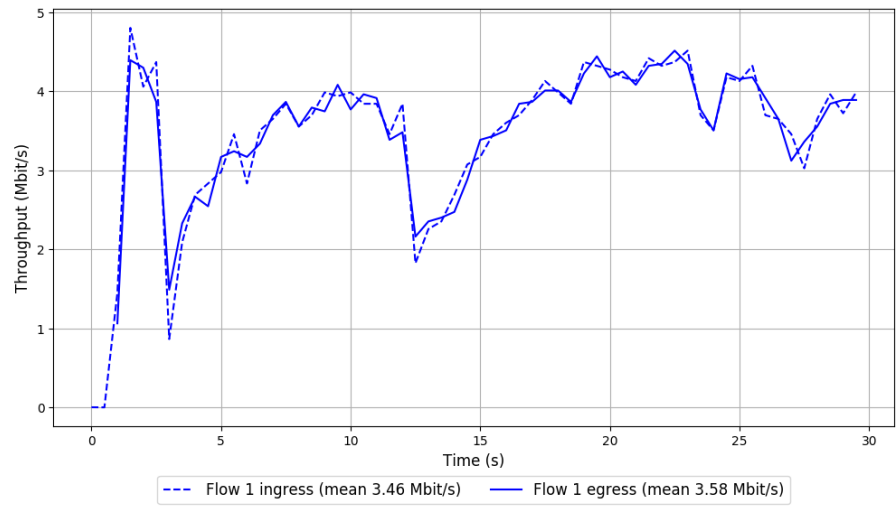Flow 1 (95th percentile 84.36 ms)

```
Run 1: Statistics of TCP Vegas

Start at: 2017-12-20 16:53:26
End at: 2017-12-20 16:53:56
Local clock offset: 3.355 ms
Remote clock offset: -16.844 ms


# Below is generated by plot.py at 2017-12-20 17:44:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.58 Mbit/s
95th percentile per-packet one-way delay: 88.054 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 3.58 Mbit/s
95th percentile per-packet one-way delay: 88.054 ms
Loss rate: 0.31%
```
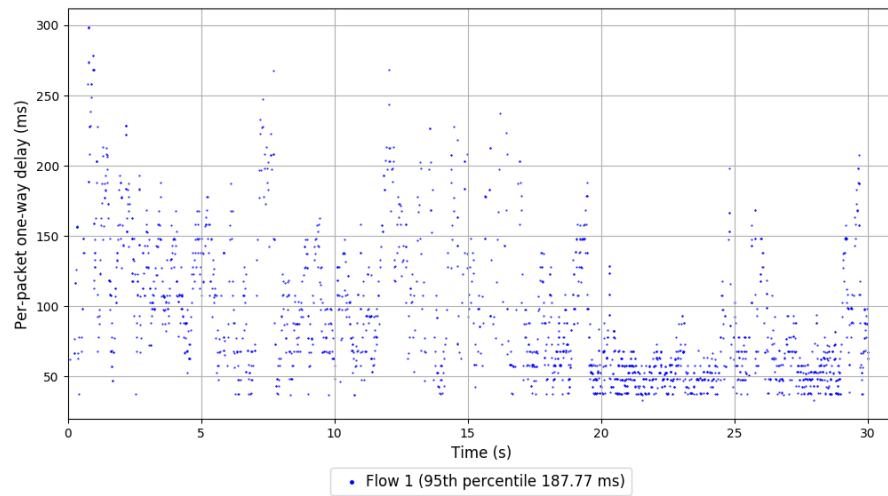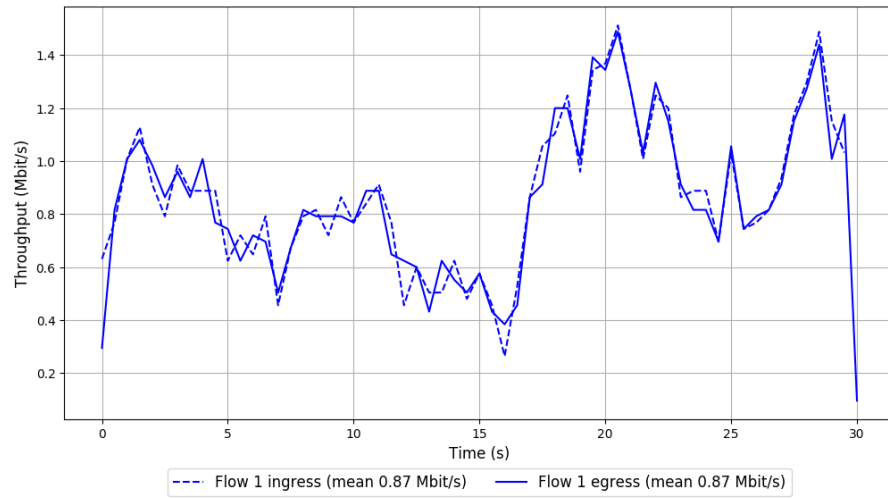
Run 1: Report of TCP Vegas — Data Link

```
Run 2: Statistics of TCP Vegas

Start at: 2017-12-20 17:10:48
End at: 2017-12-20 17:11:18
Local clock offset: 4.731 ms
Remote clock offset: -16.982 ms

# Below is generated by plot.py at 2017-12-20 17:44:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 187.771 ms
Loss rate: 0.37%
-- Flow 1:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 187.771 ms
Loss rate: 0.37%
```

Run 2: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 0.87 Mbit/s) --- Flow 1 egress (mean 0.87 Mbit/s)

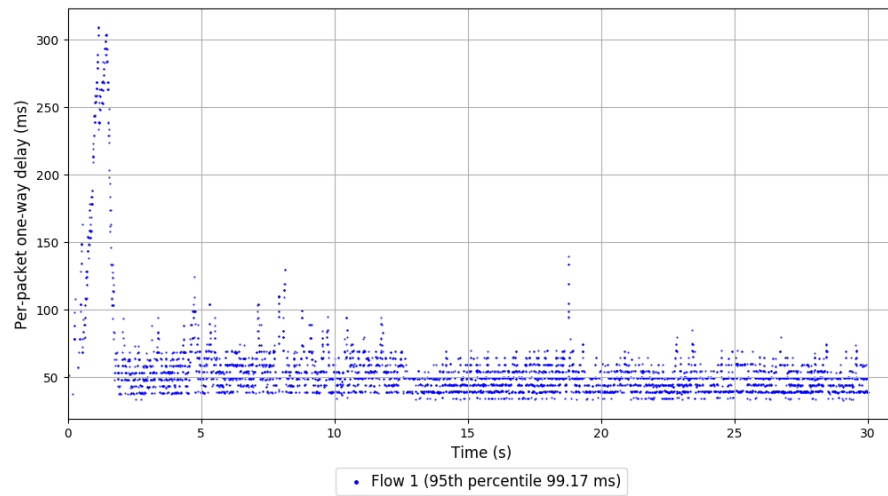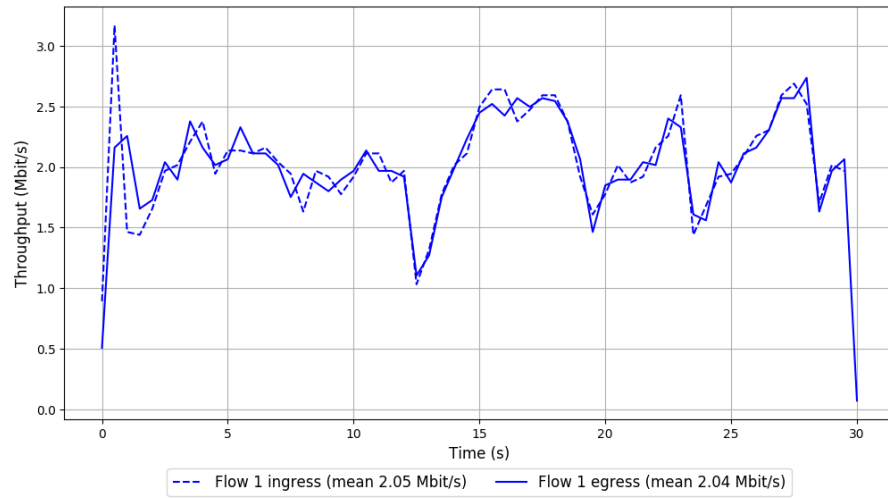Flow 1 (95th percentile 187.77 ms)

```
Run 3: Statistics of TCP Vegas

Start at: 2017-12-20 17:27:34
End at: 2017-12-20 17:28:04
Local clock offset: 4.928 ms
Remote clock offset: -18.212 ms


# Below is generated by plot.py at 2017-12-20 17:44:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.04 Mbit/s
95th percentile per-packet one-way delay: 99.173 ms
Loss rate: 0.37%
-- Flow 1:
Average throughput: 2.04 Mbit/s
95th percentile per-packet one-way delay: 99.173 ms
Loss rate: 0.37%
```

Run 3: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 2.05 Mbit/s)   Flow 1 egress (mean 2.04 Mbit/s)

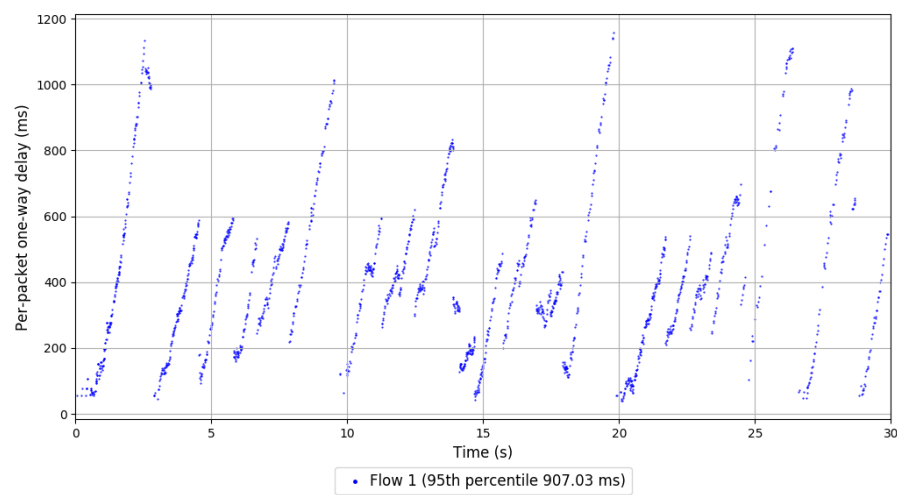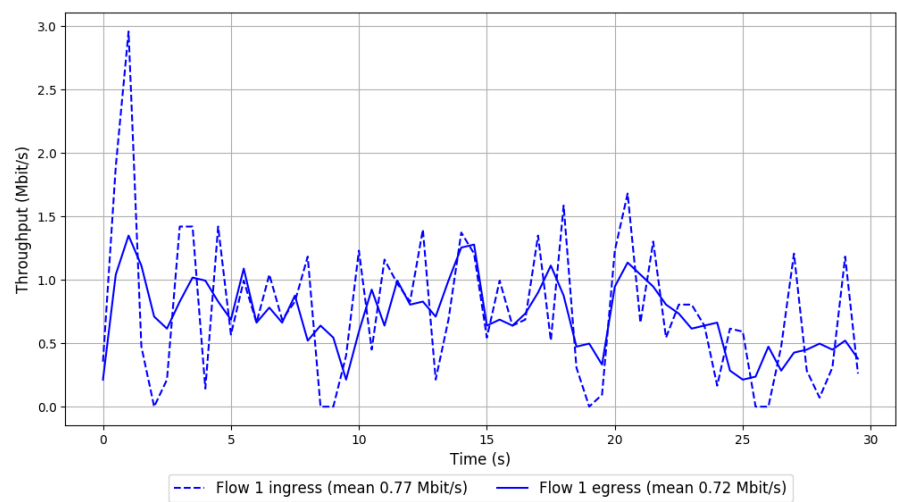Flow 1 (95th percentile 99.17 ms)

```
Run 1: Statistics of Verus

Start at: 2017-12-20 17:07:26
End at: 2017-12-20 17:07:56
Local clock offset: 5.029 ms
Remote clock offset: -16.236 ms


# Below is generated by plot.py at 2017-12-20 17:44:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 907.029 ms
Loss rate: 5.90%
-- Flow 1:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 907.029 ms
Loss rate: 5.90%
```

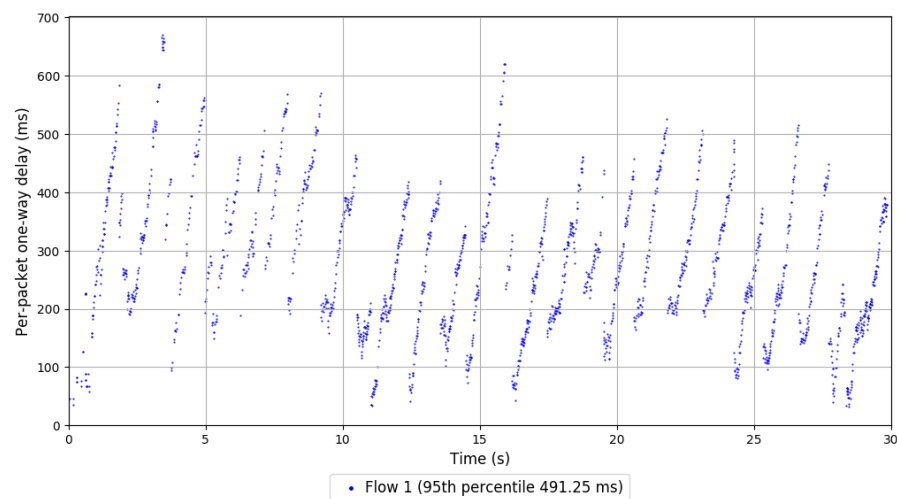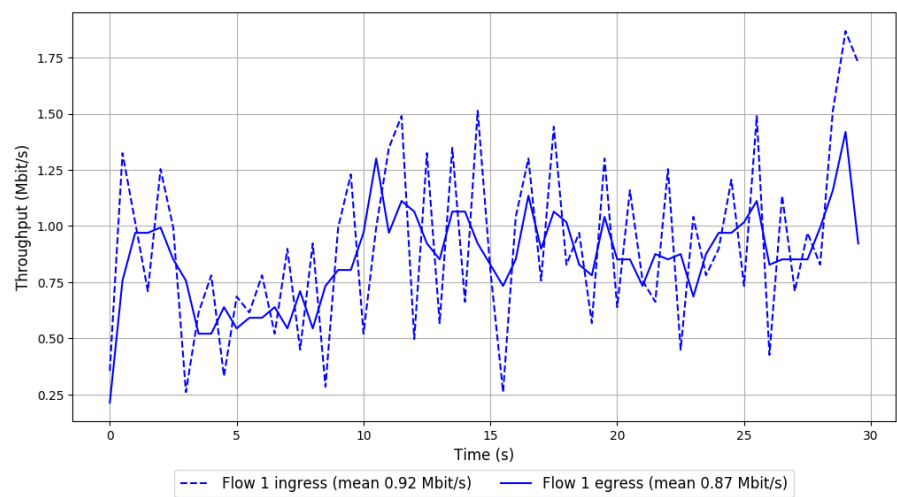Run 1: Report of Verus — Data Link

```
Run 2: Statistics of Verus

Start at: 2017-12-20 17:24:14
End at: 2017-12-20 17:24:44
Local clock offset: 3.813 ms
Remote clock offset: -18.399 ms


# Below is generated by plot.py at 2017-12-20 17:44:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 491.250 ms
Loss rate: 5.74%
-- Flow 1:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 491.250 ms
Loss rate: 5.74%
```

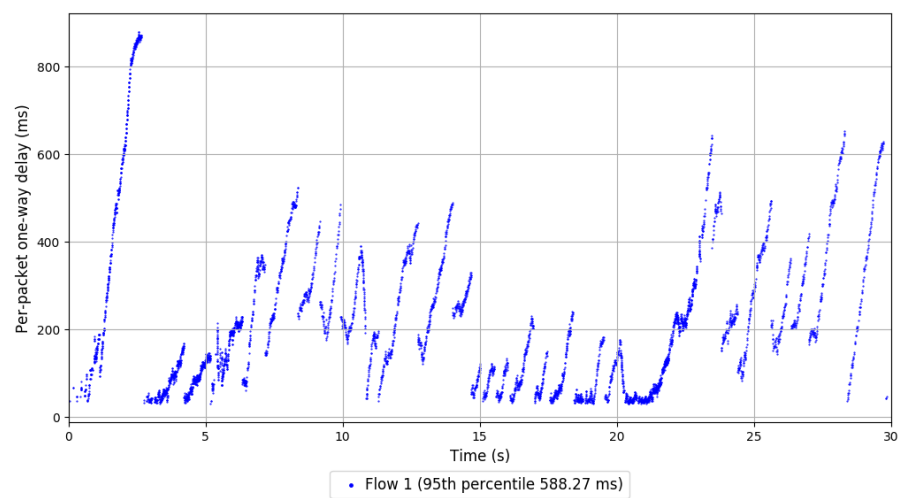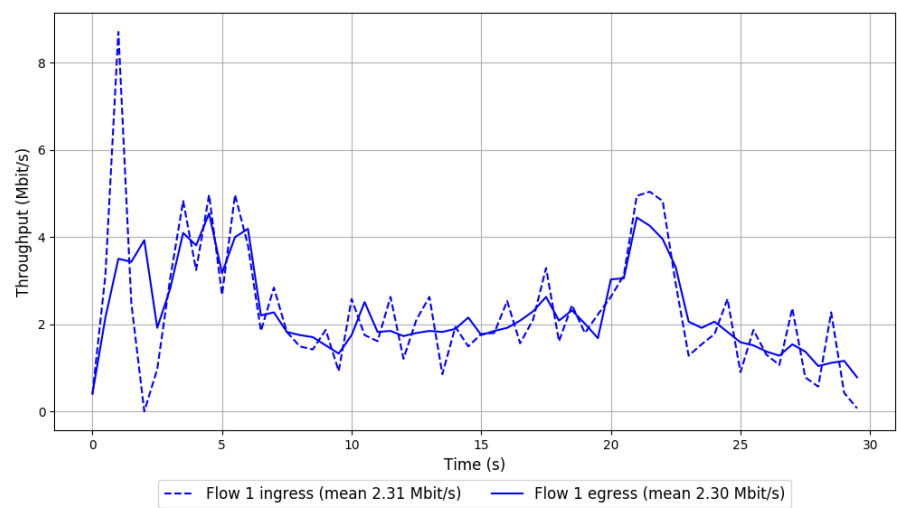Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2017-12-20 17:40:51
End at: 2017-12-20 17:41:21
Local clock offset: 4.198 ms
Remote clock offset: -19.917 ms


# Below is generated by plot.py at 2017-12-20 17:44:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.30 Mbit/s
95th percentile per-packet one-way delay: 588.266 ms
Loss rate: 0.48%
-- Flow 1:
Average throughput: 2.30 Mbit/s
95th percentile per-packet one-way delay: 588.266 ms
Loss rate: 0.48%
```

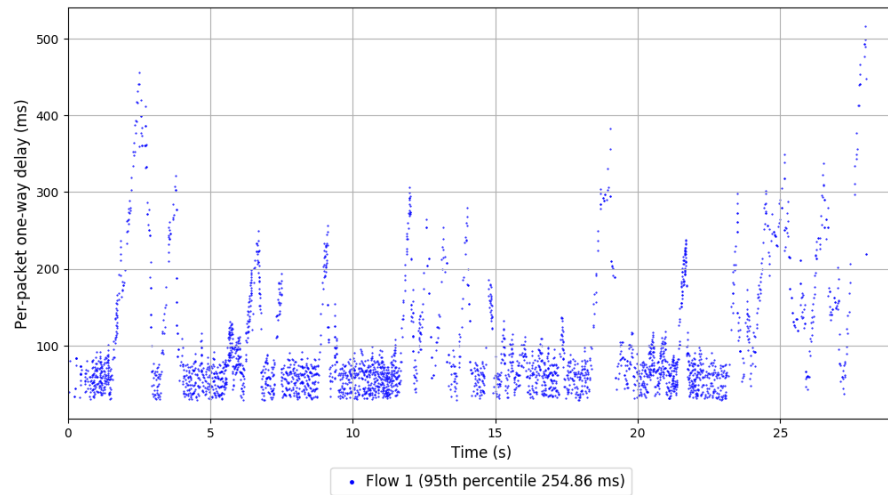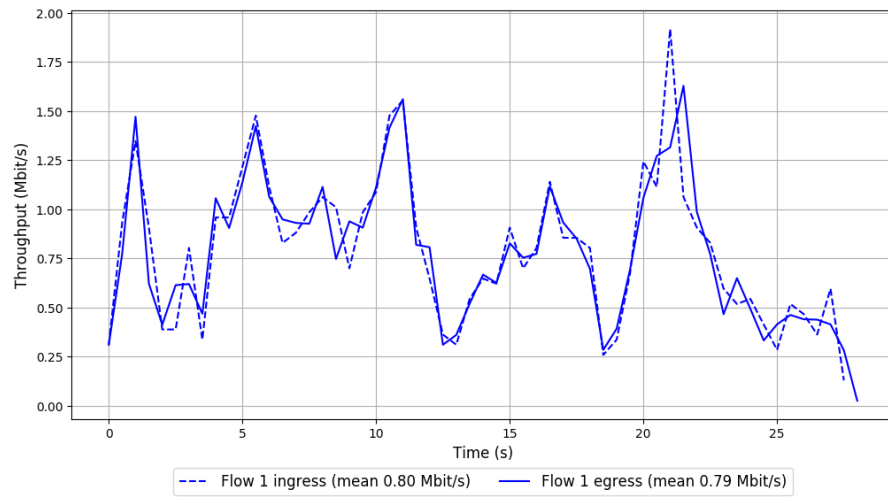Run 3: Report of Verus — Data Link

```
Run 1: Statistics of Copa

Start at: 2017-12-20 17:08:34
End at: 2017-12-20 17:09:04
Local clock offset: 2.991 ms
Remote clock offset: -16.696 ms


# Below is generated by plot.py at 2017-12-20 17:44:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 254.858 ms
Loss rate: 0.50%
-- Flow 1:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 254.858 ms
Loss rate: 0.50%
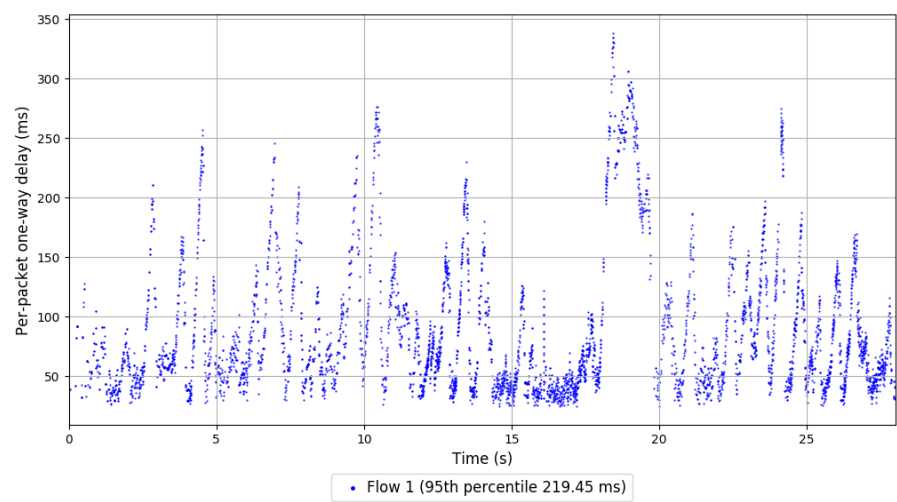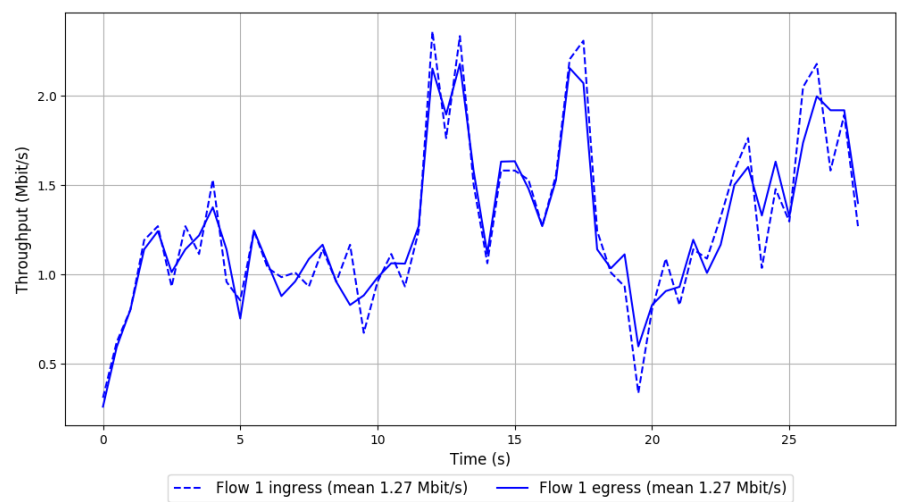```

Run 1: Report of Copa — Data Link

```
Run 2: Statistics of Copa

Start at: 2017-12-20 17:25:20
End at: 2017-12-20 17:25:50
Local clock offset: 3.456 ms
Remote clock offset: -19.798 ms

Below is generated by plot.py at 2017-12-20 17:44:55
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.27 Mbit/s
95th percentile per-packet one-way delay: 219.451 ms
Loss rate: 0.19%
-- Flow 1:
Average throughput: 1.27 Mbit/s
95th percentile per-packet one-way delay: 219.451 ms
Loss rate: 0.19%
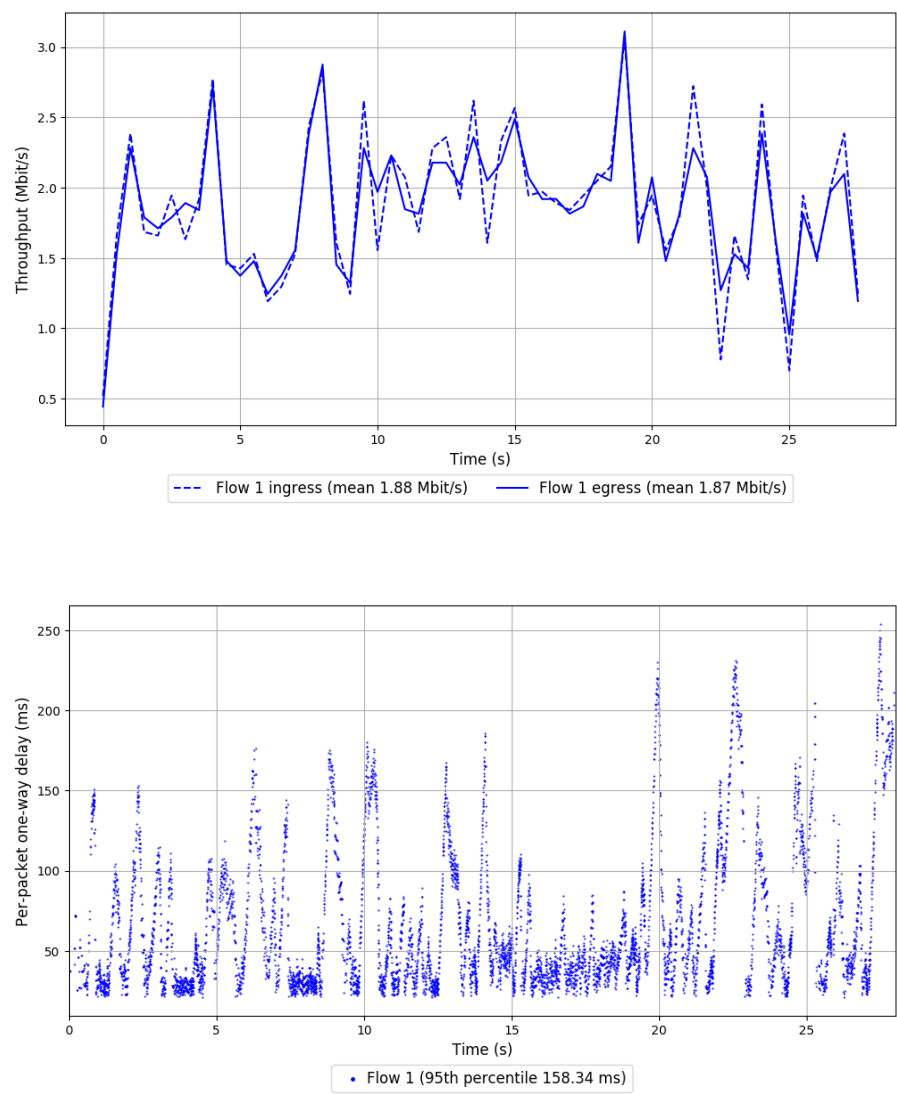```

Run 2: Report of Copa — Data Link

```
Run 3: Statistics of Copa

Start at: 2017-12-20 17:41:58
End at: 2017-12-20 17:42:28
Local clock offset: 6.168 ms
Remote clock offset: -19.538 ms


# Below is generated by plot.py at 2017-12-20 17:44:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.87 Mbit/s
95th percentile per-packet one-way delay: 158.342 ms
Loss rate: 0.75%
-- Flow 1:
Average throughput: 1.87 Mbit/s
95th percentile per-packet one-way delay: 158.342 ms
Loss rate: 0.75%
```

Run 3: Report of Copa — Data Link

```
Run 1: Statistics of FillP

Start at: 2017-12-20 16:56:48
End at: 2017-12-20 16:57:18
Local clock offset: 4.312 ms
Remote clock offset: -17.599 ms
```
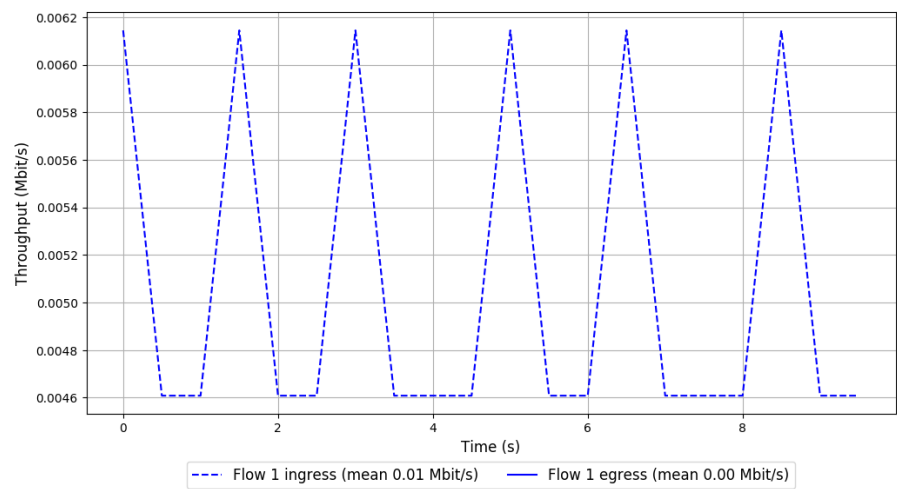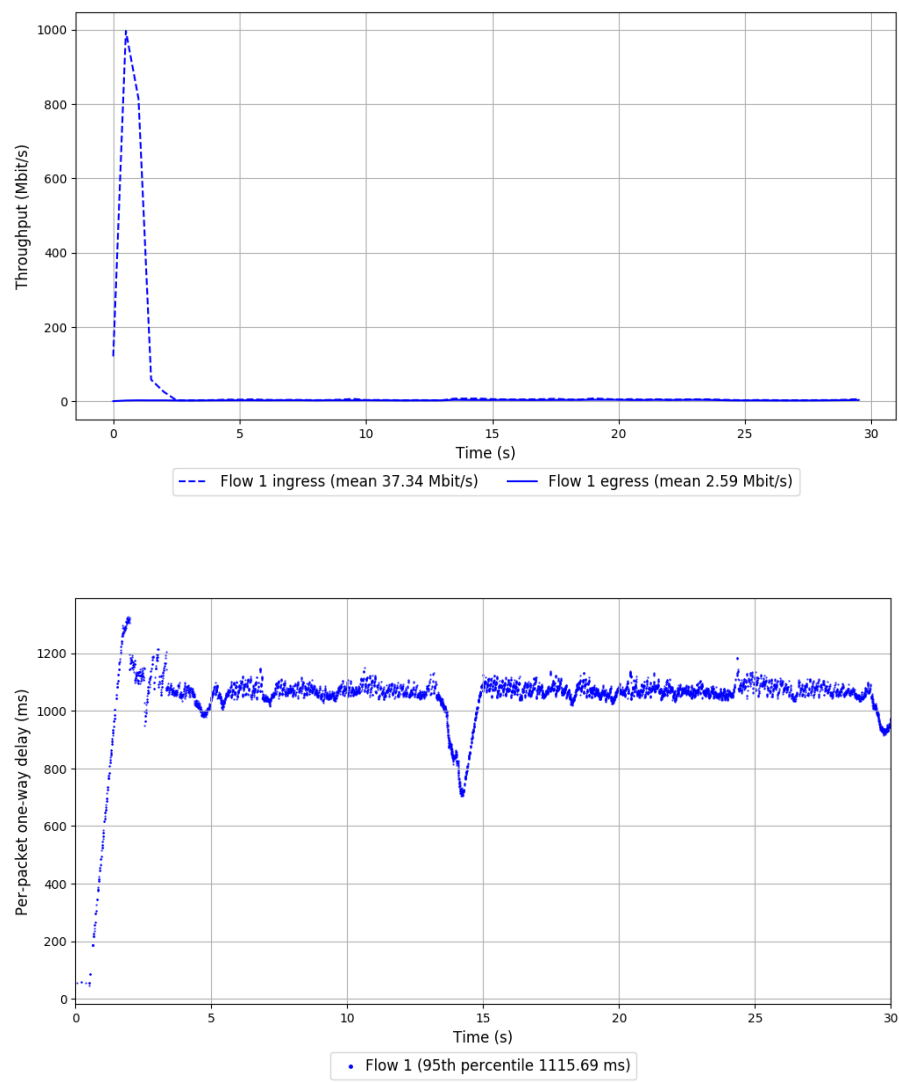
Run 1: Report of FillP — Data Link

Figure is missing

```
Run 2: Statistics of FillP

Start at: 2017-12-20 17:14:09
End at: 2017-12-20 17:14:39
Local clock offset: 4.351 ms
Remote clock offset: -17.905 ms


# Below is generated by plot.py at 2017-12-20 17:44:56
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.59 Mbit/s
95th percentile per-packet one-way delay: 1115.694 ms
Loss rate: 93.08%
-- Flow 1:
Average throughput: 2.59 Mbit/s
95th percentile per-packet one-way delay: 1115.694 ms
Loss rate: 93.08%
```
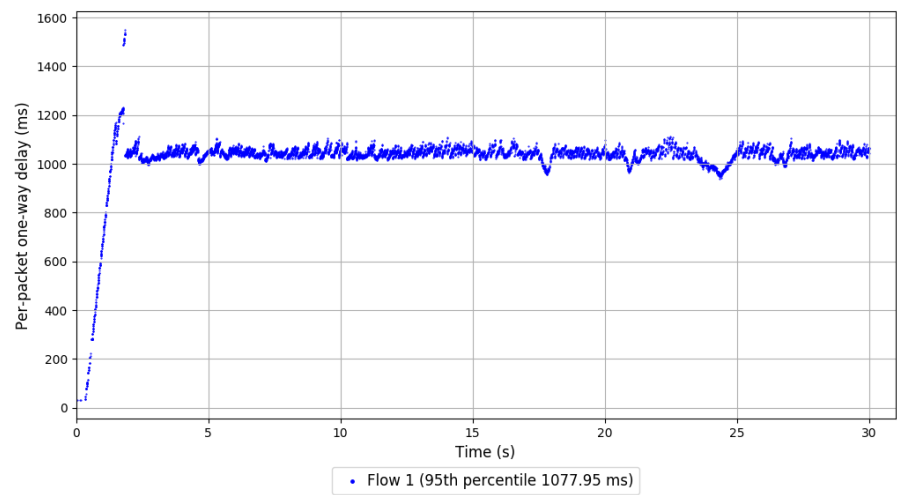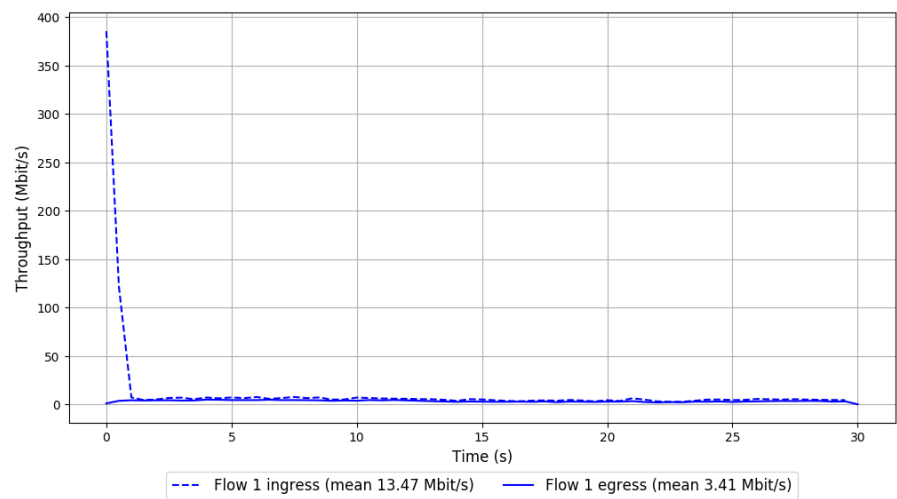
Run 2: Report of FillP — Data Link

```
Run 3: Statistics of FillP

Start at: 2017-12-20 17:30:55
End at: 2017-12-20 17:31:25
Local clock offset: 6.059 ms
Remote clock offset: -19.997 ms


# Below is generated by plot.py at 2017-12-20 17:44:56
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.41 Mbit/s
95th percentile per-packet one-way delay: 1077.954 ms
Loss rate: 74.69%
-- Flow 1:
Average throughput: 3.41 Mbit/s
95th percentile per-packet one-way delay: 1077.954 ms
Loss rate: 74.69%
```
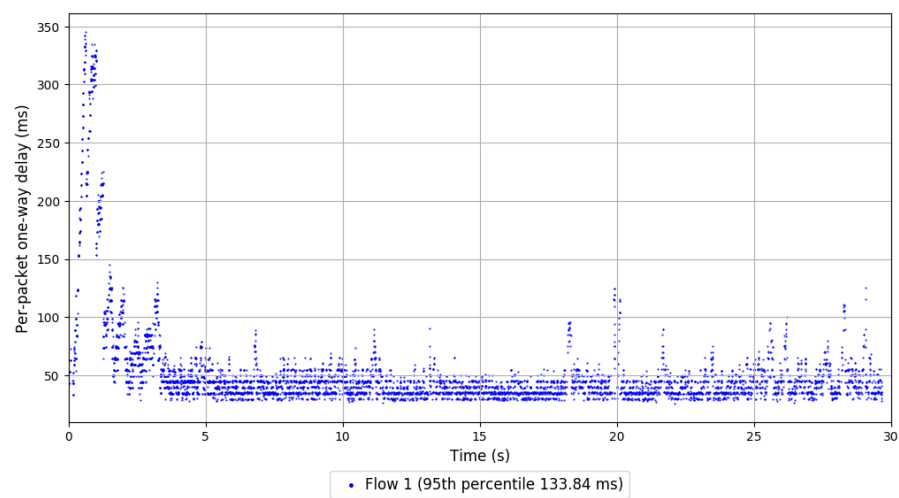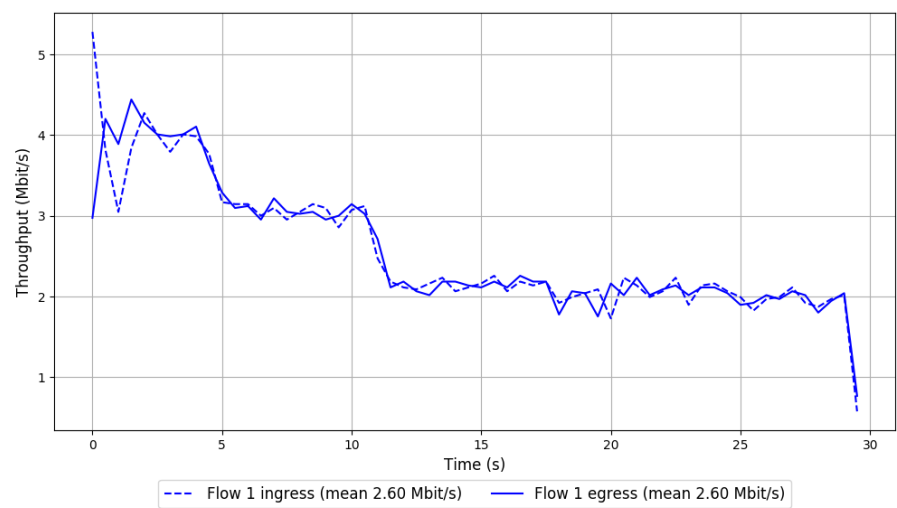
Run 3: Report of FillP — Data Link

```
Run 1: Statistics of Indigo

Start at: 2017-12-20 16:59:06
End at: 2017-12-20 16:59:36
Local clock offset: 2.342 ms
Remote clock offset: -17.563 ms


# Below is generated by plot.py at 2017-12-20 17:44:56
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.60 Mbit/s
95th percentile per-packet one-way delay: 133.838 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 2.60 Mbit/s
95th percentile per-packet one-way delay: 133.838 ms
Loss rate: 0.03%
```

Run 1: Report of Indigo — Data Link

Flow 1 ingress (mean 2.60 Mbit/s) — Flow 1 egress (mean 2.60 Mbit/s)

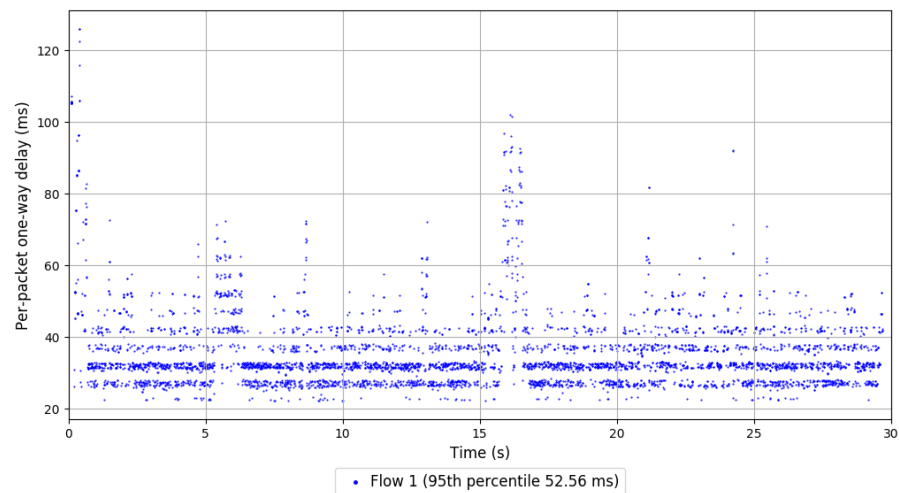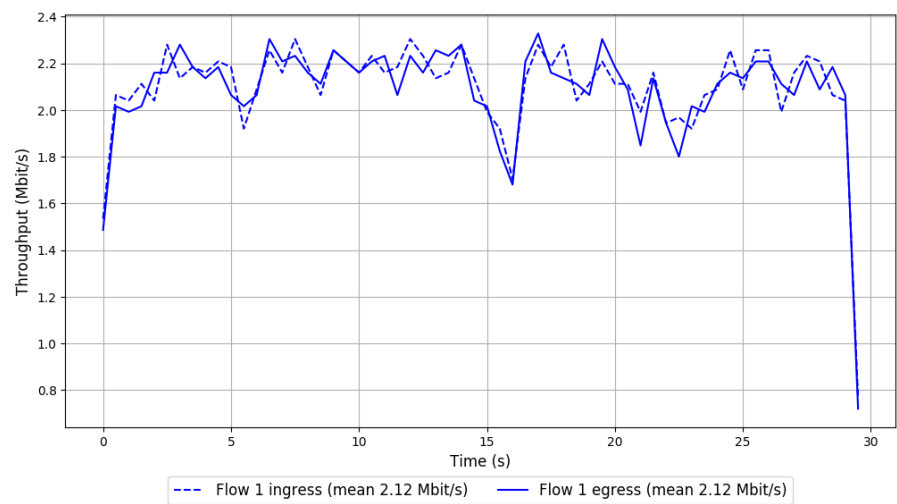
• Flow 1 (95th percentile 133.84 ms)

```
Run 2: Statistics of Indigo

Start at: 2017-12-20 17:16:25
End at: 2017-12-20 17:16:55
Local clock offset: 5.377 ms
Remote clock offset: -19.423 ms

# Below is generated by plot.py at 2017-12-20 17:44:56
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 52.564 ms
Loss rate: 0.55%
-- Flow 1:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 52.564 ms
Loss rate: 0.55%
```

Run 2: Report of Indigo — Data Link

Flow 1 ingress (mean 2.12 Mbit/s) --- Flow 1 egress (mean 2.12 Mbit/s)

Flow 1 (95th percentile 52.56 ms)

```
Run 3: Statistics of Indigo

Start at: 2017-12-20 17:33:08
End at: 2017-12-20 17:33:38
Local clock offset: 3.283 ms
Remote clock offset: -20.047 ms


# Below is generated by plot.py at 2017-12-20 17:44:56
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.66 Mbit/s
95th percentile per-packet one-way delay: 65.224 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 2.66 Mbit/s
95th percentile per-packet one-way delay: 65.224 ms
Loss rate: 0.14%
```

Run 3: Report of Indigo — Data Link