Pantheon Report

Generated at 2018-02-17 02:44:12 (UTC).

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

Repeated the test of 17 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

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

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

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

```
Git summary:
branch: master @ 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-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/vivace @ 7a4ba531e75b4a6f66f5c4580192120401784ce3
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

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

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

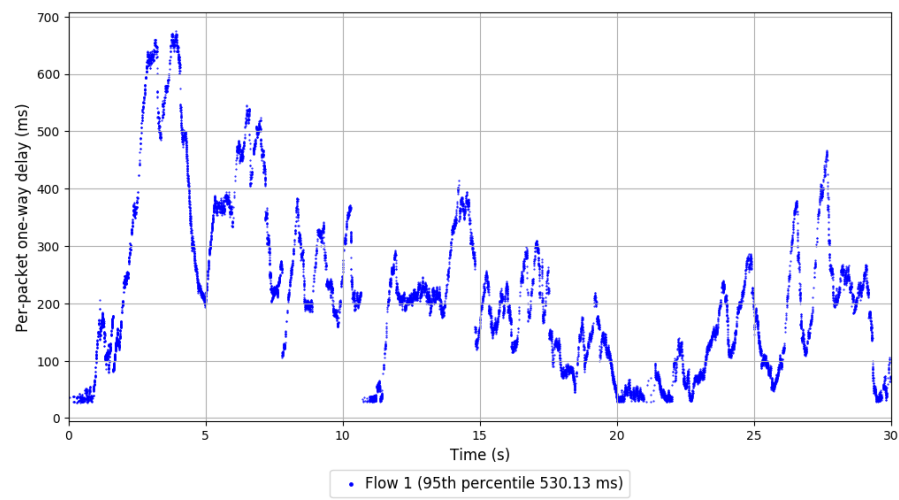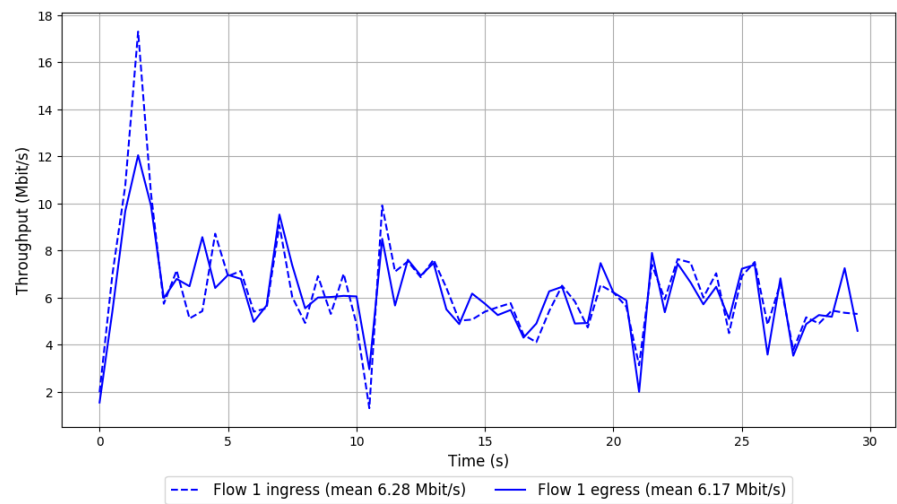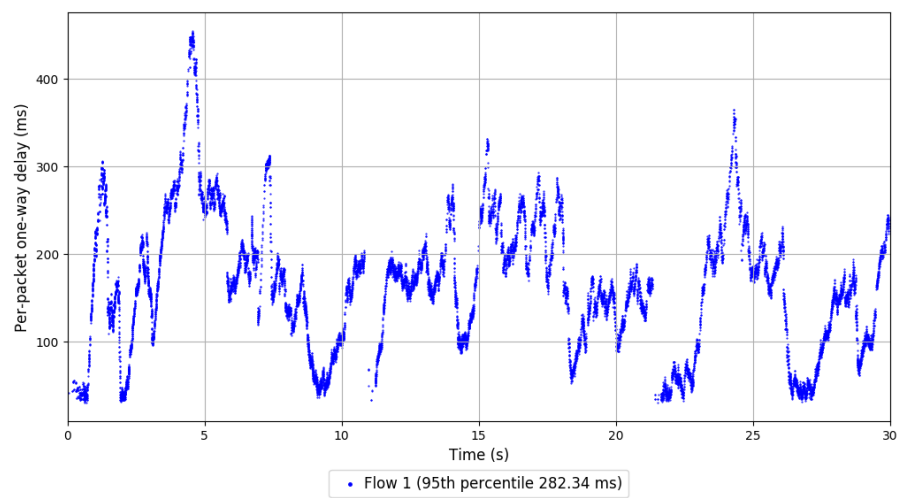| scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	7.04	449.62	1.20
TCP Cubic	3	6.25	213.67	0.55
LEDBAT	3	5.79	157.26	0.31
PCC	3	6.15	924.55	10.04
QUIC Cubic	3	5.00	244.54	0.86
SCReAM	3	0.22	43.04	0.13
WebRTC media	3	1.93	56.49	0.23
Sprout	3	1.23	73.61	0.76
TaoVA-100x	3	4.87	92.22	0.50
TCP Vegas	3	4.72	81.55	1.04
Verus	3	6.17	552.16	7.16
Copa	3	3.13	96.28	0.47
FillP	3	10.27	1096.74	77.19
Indigo-1-32	3	2.45	70.94	0.76
Vivace-latency	3	2.35	114.52	0.82
Vivace-loss	3	6.53	1082.25	32.43
Vivace-LTE	3	6.91	460.51	1.55

```
Run 1: Statistics of TCP BBR

Start at: 2018-02-17 01:58:41
End at: 2018-02-17 01:59:11
Local clock offset: -6.258 ms
Remote clock offset: -1.243 ms


# Below is generated by plot.py at 2018-02-17 02:43:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.19 Mbit/s
95th percentile per-packet one-way delay: 536.394 ms
Loss rate: 0.97%
-- Flow 1:
Average throughput: 8.19 Mbit/s
95th percentile per-packet one-way delay: 536.394 ms
Loss rate: 0.97%
```
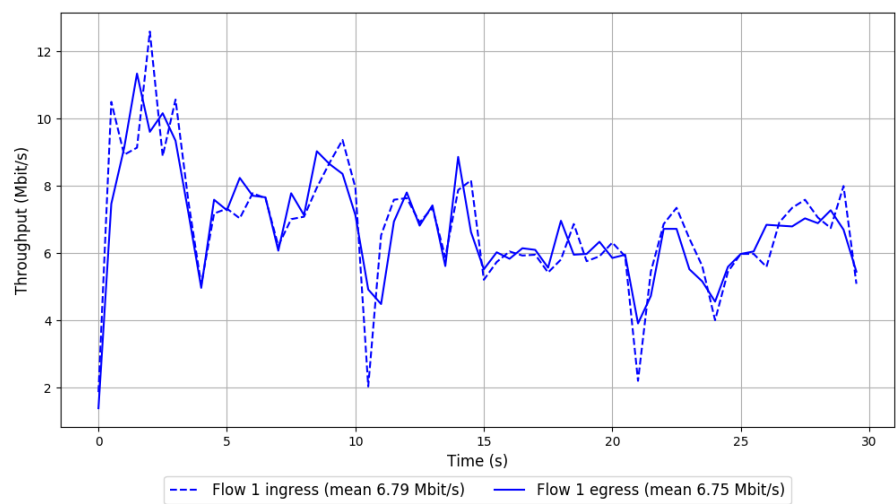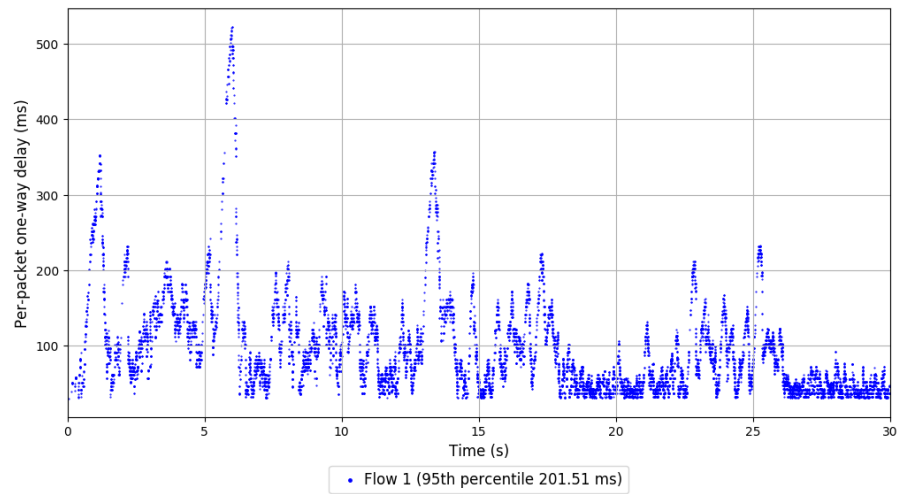
Run 1: Report of TCP BBR — Data Link

```
Run 2: Statistics of TCP BBR

Start at: 2018-02-17 02:18:27
End at: 2018-02-17 02:18:57
Local clock offset: -5.819 ms
Remote clock offset: -13.542 ms


# Below is generated by plot.py at 2018-02-17 02:43:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.17 Mbit/s
95th percentile per-packet one-way delay: 530.127 ms
Loss rate: 1.86%
-- Flow 1:
Average throughput: 6.17 Mbit/s
95th percentile per-packet one-way delay: 530.127 ms
Loss rate: 1.86%
```
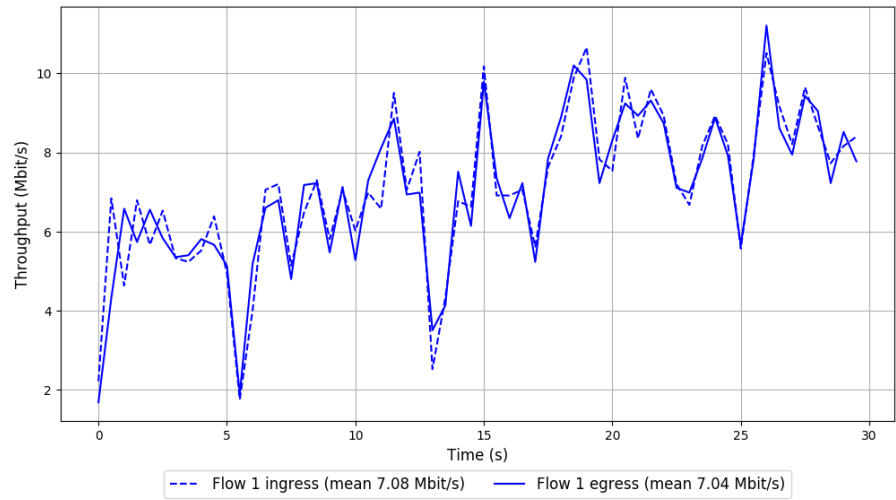
Run 2: Report of TCP BBR — Data Link

```
Run 3: Statistics of TCP BBR

Start at: 2018-02-17 02:38:06
End at: 2018-02-17 02:38:36
Local clock offset: -7.679 ms
Remote clock offset: -15.484 ms


# Below is generated by plot.py at 2018-02-17 02:43:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.75 Mbit/s
95th percentile per-packet one-way delay: 282.342 ms
Loss rate: 0.76%
-- Flow 1:
Average throughput: 6.75 Mbit/s
95th percentile per-packet one-way delay: 282.342 ms
Loss rate: 0.76%
```
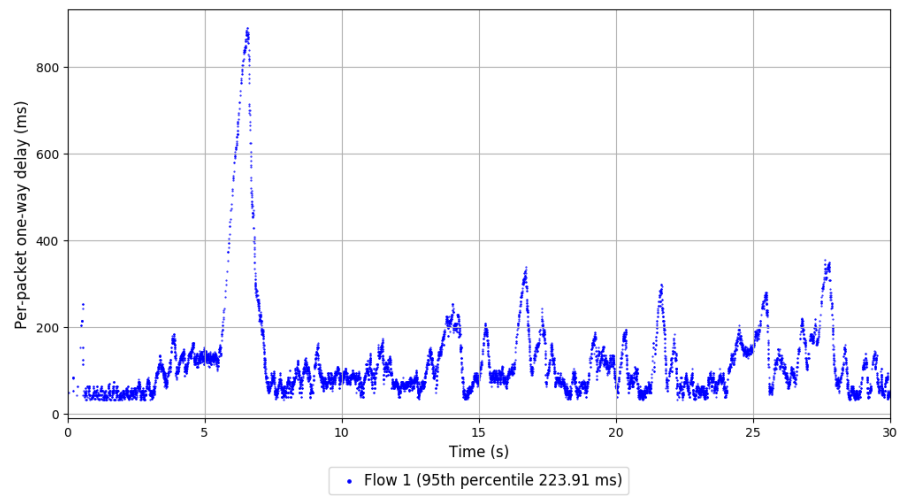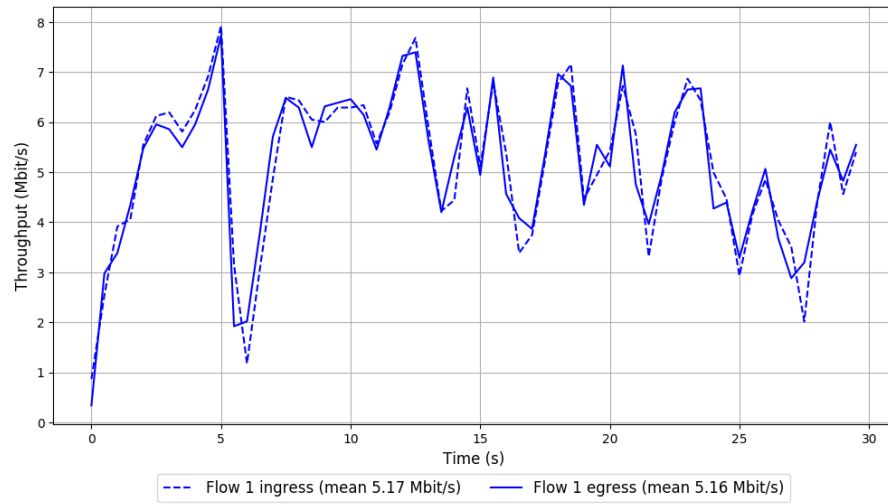
Run 3: Report of TCP BBR — Data Link

```
Run 1: Statistics of TCP Cubic

Start at: 2018-02-17 02:00:53
End at: 2018-02-17 02:01:23
Local clock offset: -6.927 ms
Remote clock offset: -5.822 ms


# Below is generated by plot.py at 2018-02-17 02:43:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.04 Mbit/s
95th percentile per-packet one-way delay: 201.508 ms
Loss rate: 0.77%
-- Flow 1:
Average throughput: 7.04 Mbit/s
95th percentile per-packet one-way delay: 201.508 ms
Loss rate: 0.77%
```
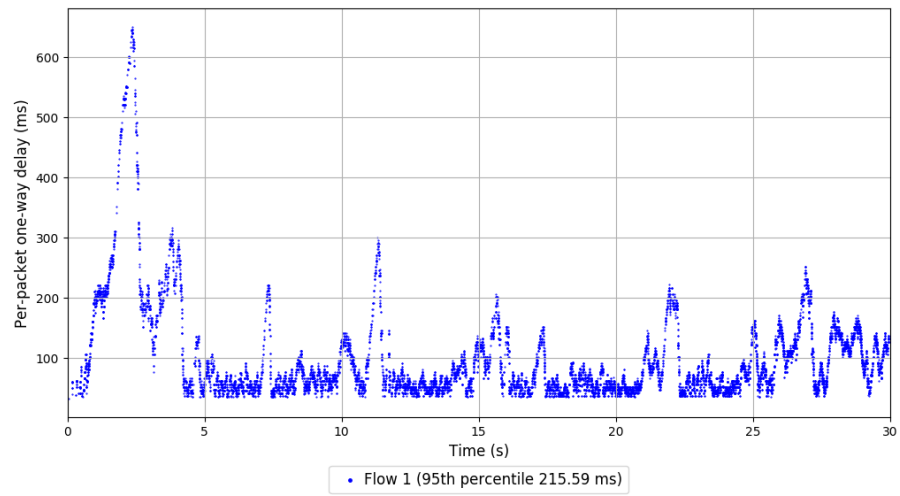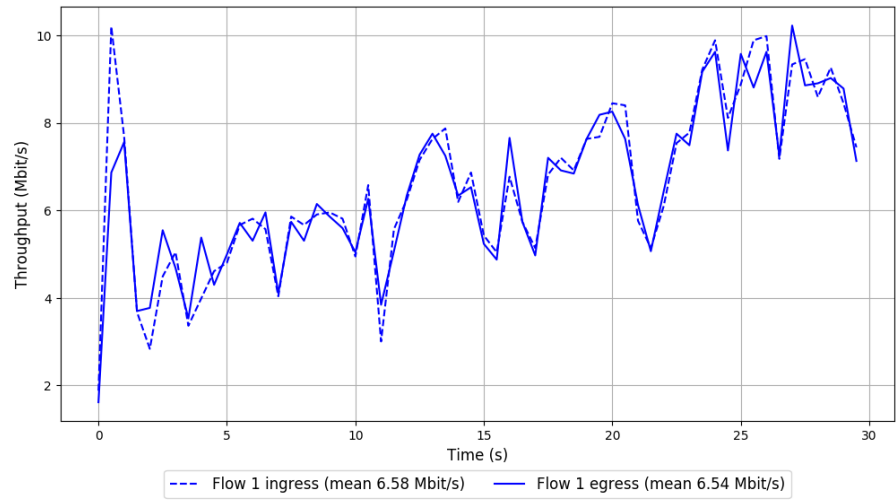
Run 1: Report of TCP Cubic — Data Link

```
Run 2: Statistics of TCP Cubic

Start at: 2018-02-17 02:20:39
End at: 2018-02-17 02:21:09
Local clock offset: -9.545 ms
Remote clock offset: -14.222 ms


# Below is generated by plot.py at 2018-02-17 02:43:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.16 Mbit/s
95th percentile per-packet one-way delay: 223.907 ms
Loss rate: 0.27%
-- Flow 1:
Average throughput: 5.16 Mbit/s
95th percentile per-packet one-way delay: 223.907 ms
Loss rate: 0.27%
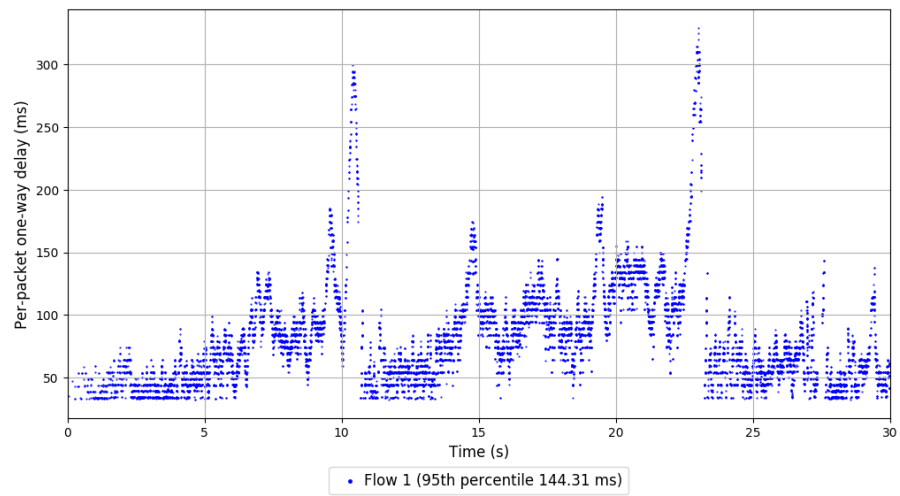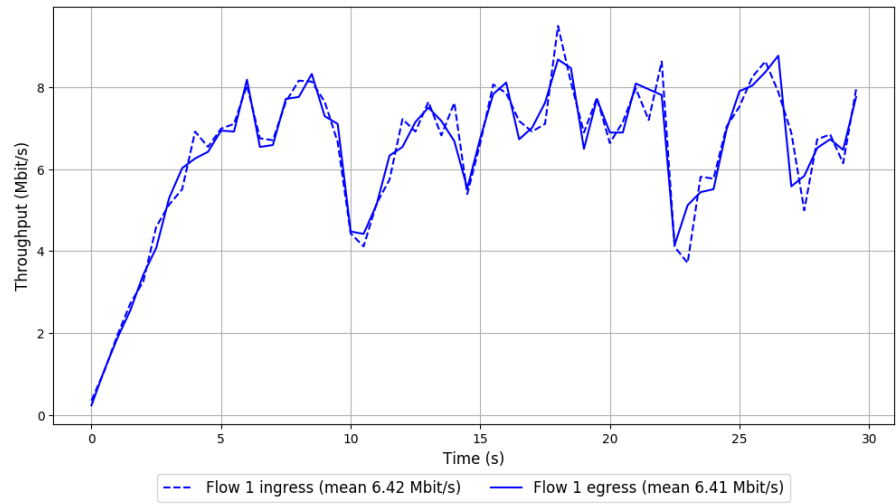```
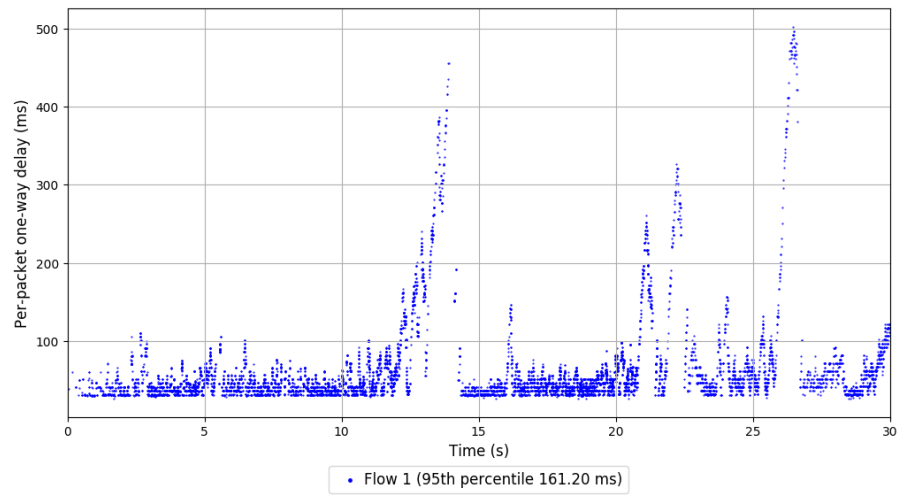
Run 2: Report of TCP Cubic — Data Link

```
Run 3: Statistics of TCP Cubic

Start at: 2018-02-17 02:40:18
End at: 2018-02-17 02:40:48
Local clock offset: -9.44 ms
Remote clock offset: -16.243 ms


# Below is generated by plot.py at 2018-02-17 02:43:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.54 Mbit/s
95th percentile per-packet one-way delay: 215.589 ms
Loss rate: 0.61%
-- Flow 1:
Average throughput: 6.54 Mbit/s
95th percentile per-packet one-way delay: 215.589 ms
Loss rate: 0.61%
```

Run 3: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 6.58 Mbit/s) — — —   Flow 1 egress (mean 6.54 Mbit/s) ———
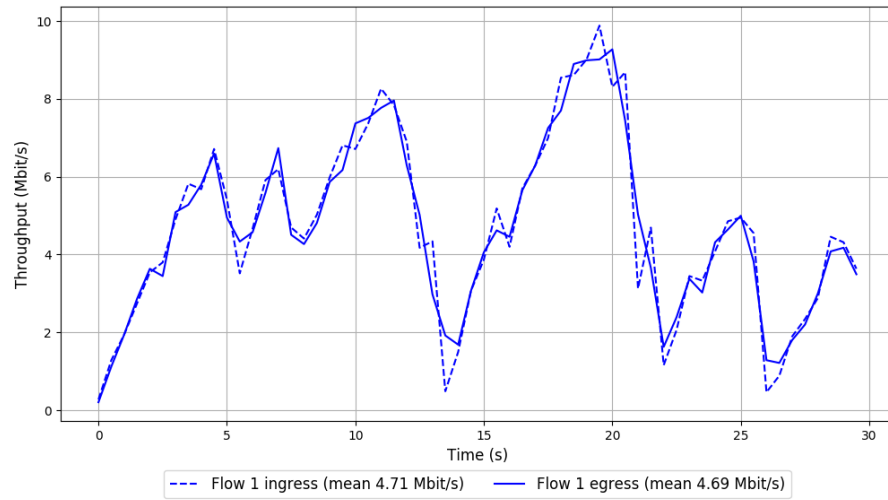

• Flow 1 (95th percentile 215.59 ms)

```
Run 1: Statistics of LEDBAT

Start at: 2018-02-17 01:45:30
End at: 2018-02-17 01:46:00
Local clock offset: -9.939 ms
Remote clock offset: -5.946 ms

# Below is generated by plot.py at 2018-02-17 02:43:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.41 Mbit/s
95th percentile per-packet one-way delay: 144.307 ms
Loss rate: 0.26%
-- Flow 1:
Average throughput: 6.41 Mbit/s
95th percentile per-packet one-way delay: 144.307 ms
Loss rate: 0.26%
```

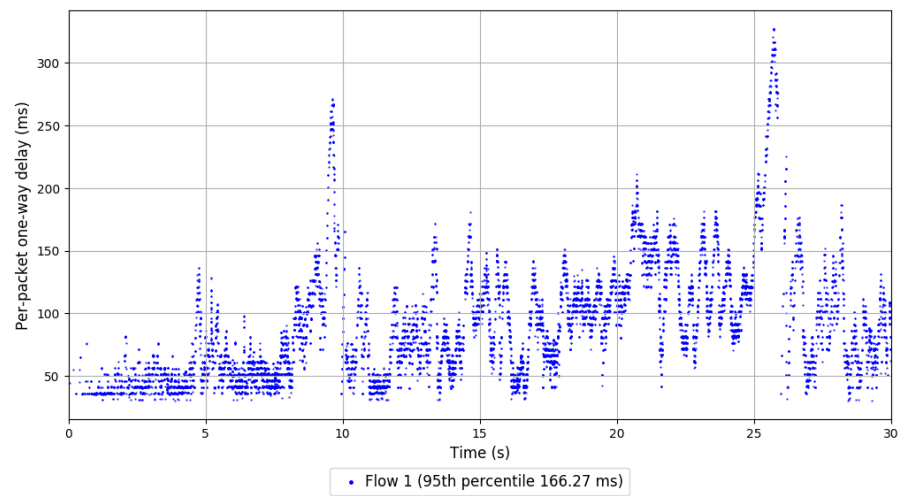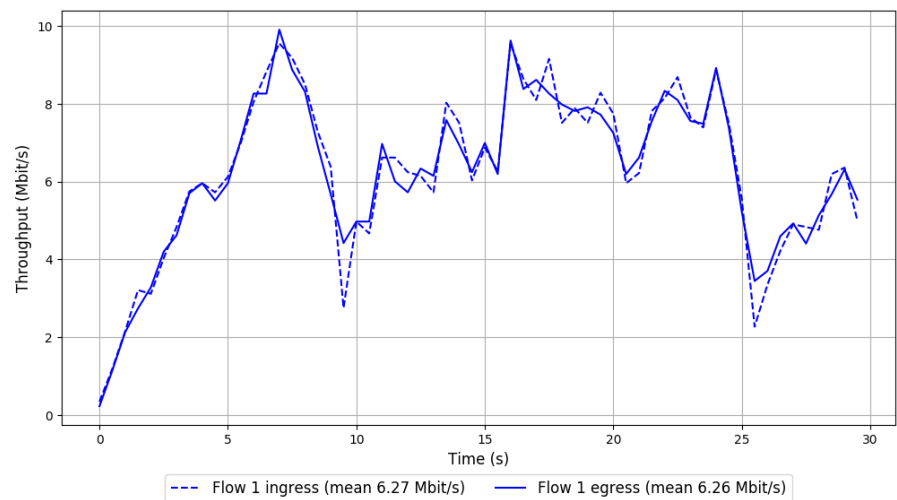Run 1: Report of LEDBAT — Data Link

Flow 1 ingress (mean 6.42 Mbit/s)   Flow 1 egress (mean 6.41 Mbit/s)

Flow 1 (95th percentile 144.31 ms)

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```
Run 2: Statistics of LEDBAT

Start at: 2018-02-17 02:05:18
End at: 2018-02-17 02:05:48
Local clock offset: -6.174 ms
Remote clock offset: -10.165 ms

# Below is generated by plot.py at 2018-02-17 02:43:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 4.69 Mbit/s
95th percentile per-packet one-way delay: 161.199 ms
Loss rate: 0.45%
-- Flow 1:
Average throughput: 4.69 Mbit/s
95th percentile per-packet one-way delay: 161.199 ms
Loss rate: 0.45%
```

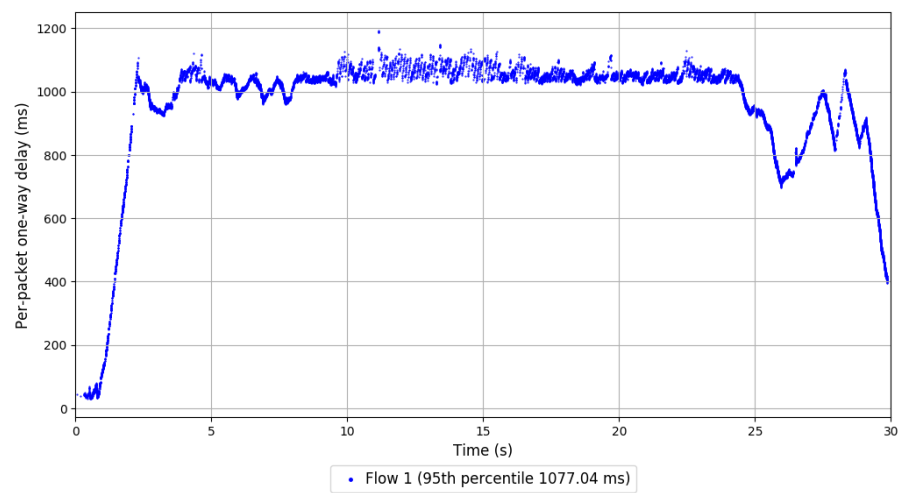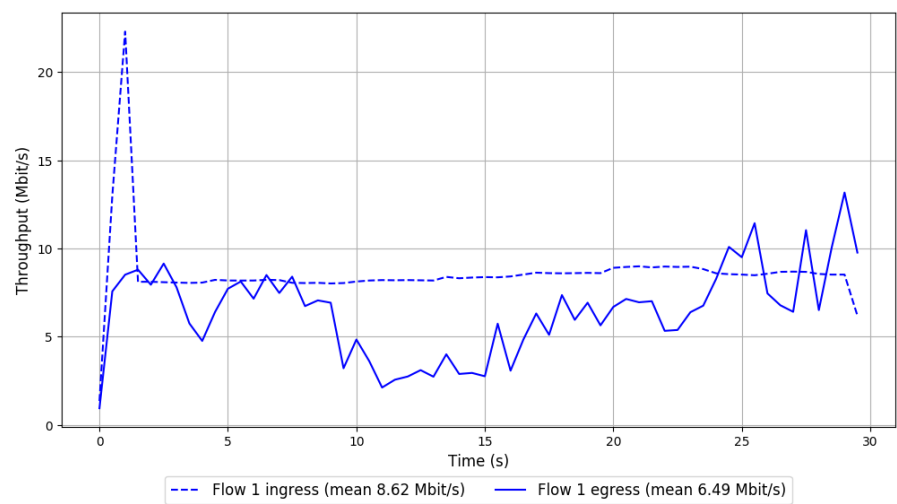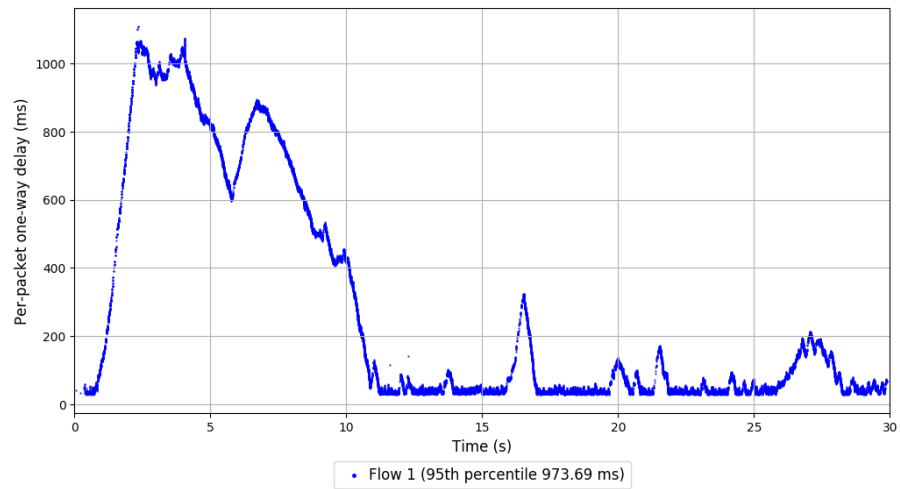Run 2: Report of LEDBAT — Data Link

```
Run 3: Statistics of LEDBAT

Start at: 2018-02-17 02:25:00
End at: 2018-02-17 02:25:30
Local clock offset: -9.507 ms
Remote clock offset: -13.244 ms

# Below is generated by plot.py at 2018-02-17 02:43:25
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.26 Mbit/s
95th percentile per-packet one-way delay: 166.274 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 6.26 Mbit/s
95th percentile per-packet one-way delay: 166.274 ms
Loss rate: 0.21%
```
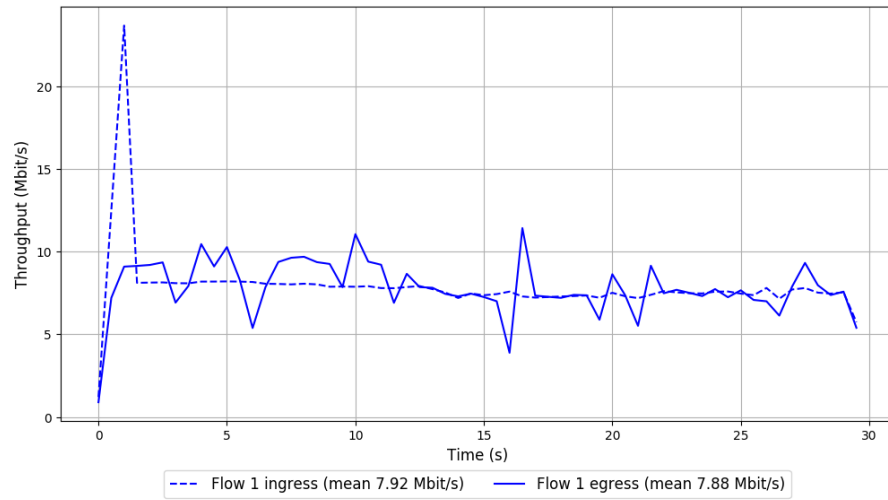
Run 3: Report of LEDBAT — Data Link

```
Run 1: Statistics of PCC

Start at: 2018-02-17 01:52:05
End at: 2018-02-17 01:52:35
Local clock offset: -7.361 ms
Remote clock offset: -3.311 ms


# Below is generated by plot.py at 2018-02-17 02:43:27
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.49 Mbit/s
95th percentile per-packet one-way delay: 1077.040 ms
Loss rate: 24.87%
-- Flow 1:
Average throughput: 6.49 Mbit/s
95th percentile per-packet one-way delay: 1077.040 ms
Loss rate: 24.87%
```

Run 1: Report of PCC — Data Link

Flow 1 ingress (mean 8.62 Mbit/s)   Flow 1 egress (mean 6.49 Mbit/s)

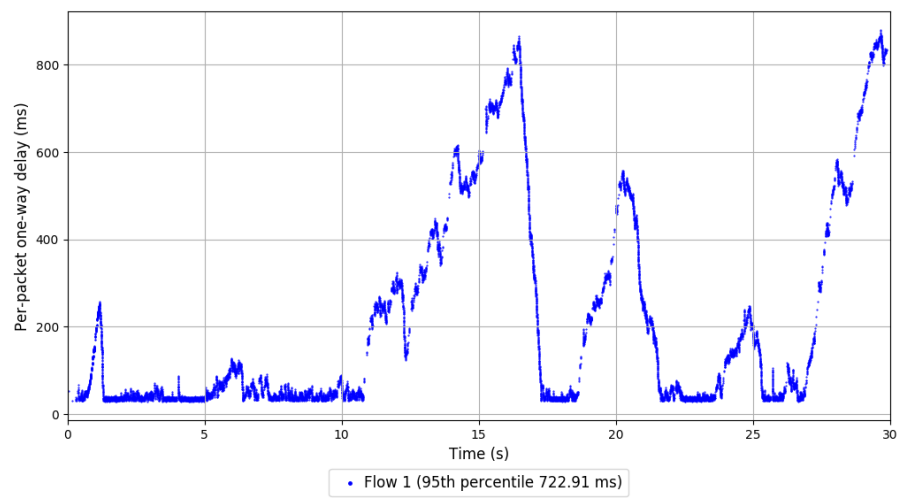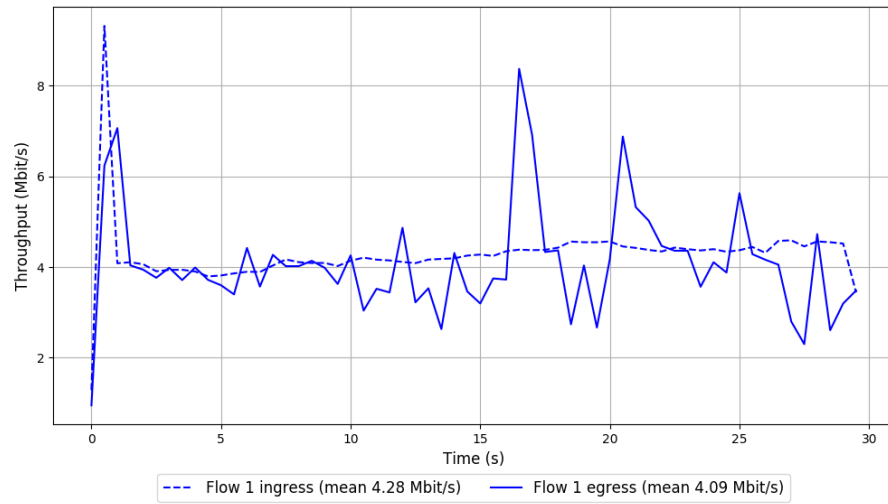• Flow 1 (95th percentile 1077.04 ms)

```
Run 2: Statistics of PCC

Start at: 2018-02-17 02:11:52
End at: 2018-02-17 02:12:22
Local clock offset: -6.747 ms
Remote clock offset: -11.219 ms


# Below is generated by plot.py at 2018-02-17 02:43:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.88 Mbit/s
95th percentile per-packet one-way delay: 973.687 ms
Loss rate: 0.64%
-- Flow 1:
Average throughput: 7.88 Mbit/s
95th percentile per-packet one-way delay: 973.687 ms
Loss rate: 0.64%
```
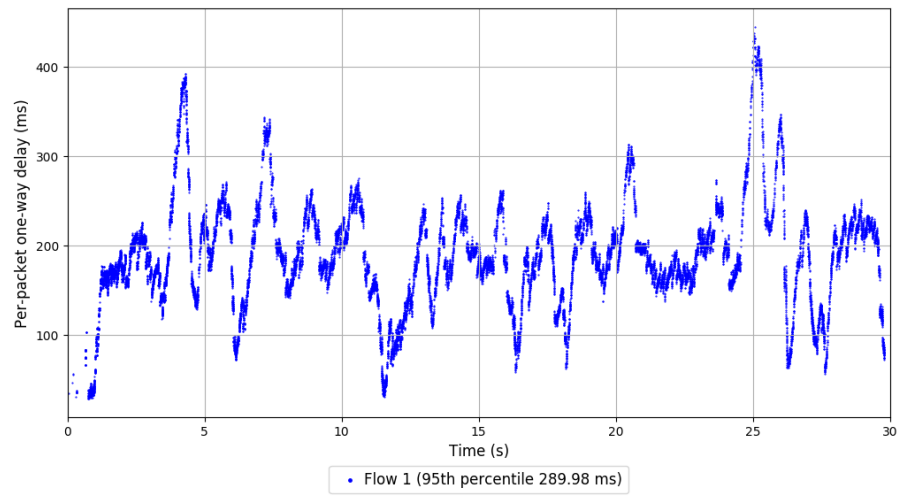
Run 2: Report of PCC — Data Link

Flow 1 ingress (mean 7.92 Mbit/s)   Flow 1 egress (mean 7.88 Mbit/s)

Flow 1 (95th percentile 973.69 ms)

25

```
Run 3: Statistics of PCC

Start at: 2018-02-17 02:31:32
End at: 2018-02-17 02:32:02
Local clock offset: -8.297 ms
Remote clock offset: -12.904 ms


# Below is generated by plot.py at 2018-02-17 02:43:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 4.09 Mbit/s
95th percentile per-packet one-way delay: 722.915 ms
Loss rate: 4.60%
-- Flow 1:
Average throughput: 4.09 Mbit/s
95th percentile per-packet one-way delay: 722.915 ms
Loss rate: 4.60%
```
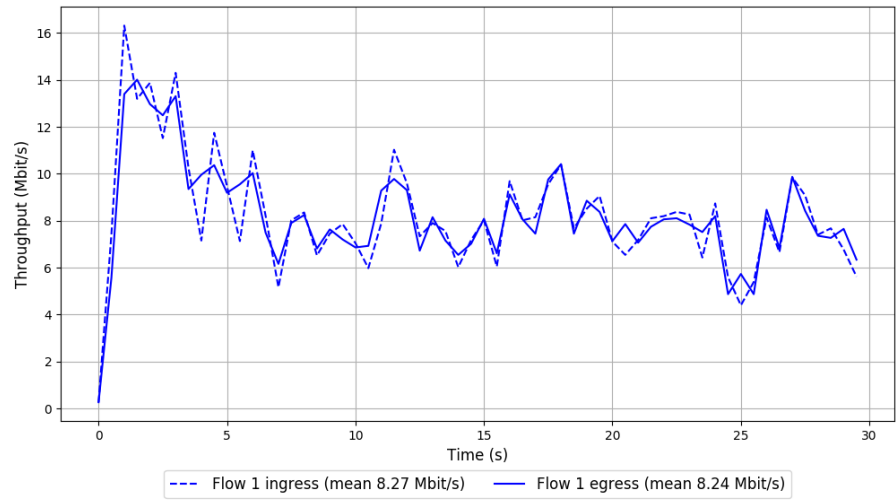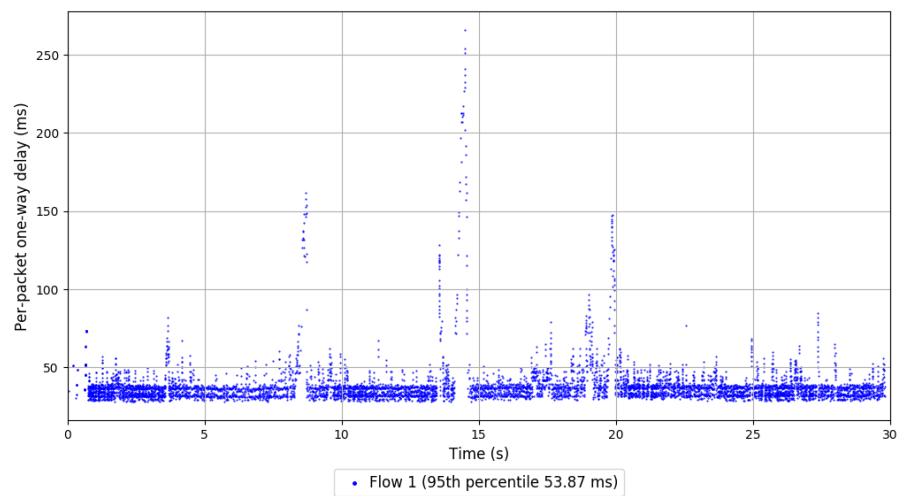
Run 3: Report of PCC — Data Link

Flow 1 ingress (mean 4.28 Mbit/s) --- Flow 1 egress (mean 4.09 Mbit/s)

Flow 1 (95th percentile 722.91 ms)

```
Run 1: Statistics of QUIC Cubic

Start at: 2018-02-17 01:44:23
End at: 2018-02-17 01:44:53
Local clock offset: -9.127 ms
Remote clock offset: -6.753 ms


# Below is generated by plot.py at 2018-02-17 02:43:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.24 Mbit/s
95th percentile per-packet one-way delay: 289.976 ms
Loss rate: 0.47%
-- Flow 1:
Average throughput: 8.24 Mbit/s
95th percentile per-packet one-way delay: 289.976 ms
Loss rate: 0.47%
```
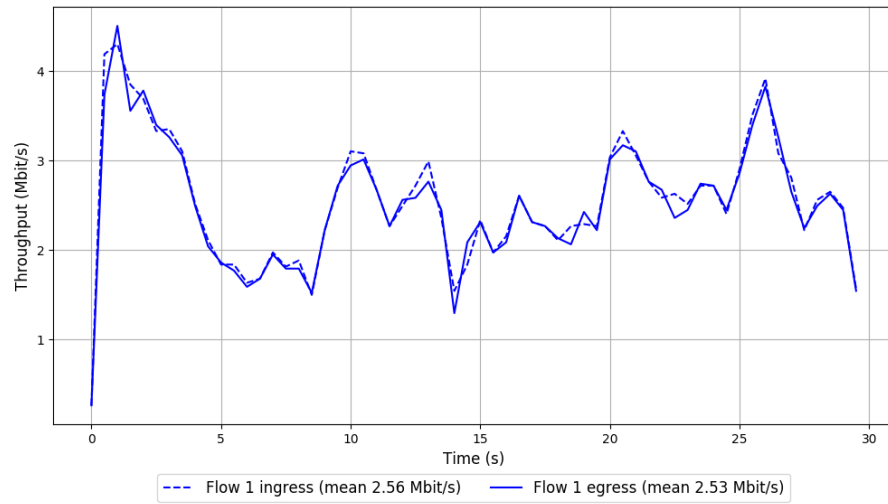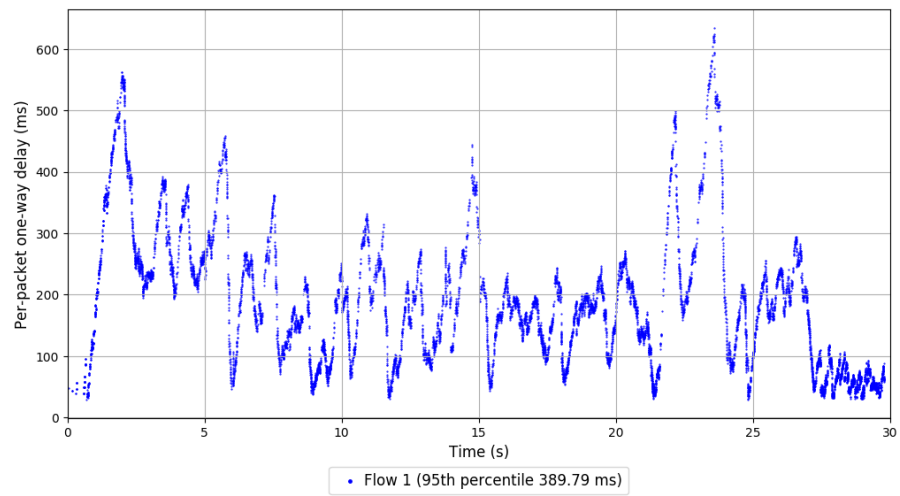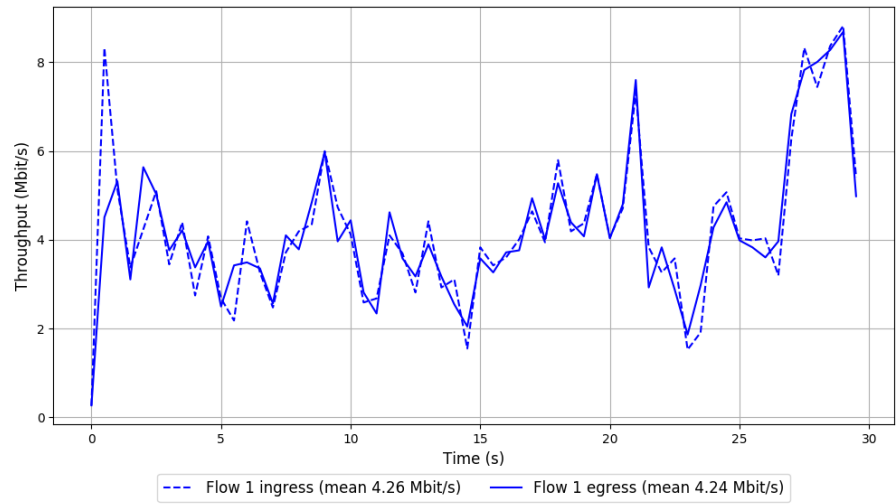
Run 1: Report of QUIC Cubic — Data Link

```
Run 2: Statistics of QUIC Cubic

Start at: 2018-02-17 02:04:13
End at: 2018-02-17 02:04:43
Local clock offset: -6.962 ms
Remote clock offset: -8.734 ms


# Below is generated by plot.py at 2018-02-17 02:43:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.53 Mbit/s
95th percentile per-packet one-way delay: 53.869 ms
Loss rate: 1.35%
-- Flow 1:
Average throughput: 2.53 Mbit/s
95th percentile per-packet one-way delay: 53.869 ms
Loss rate: 1.35%
```
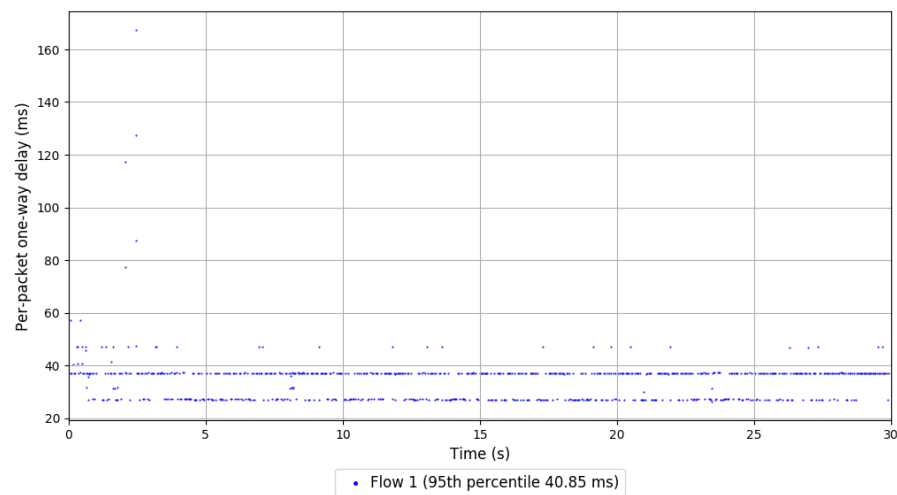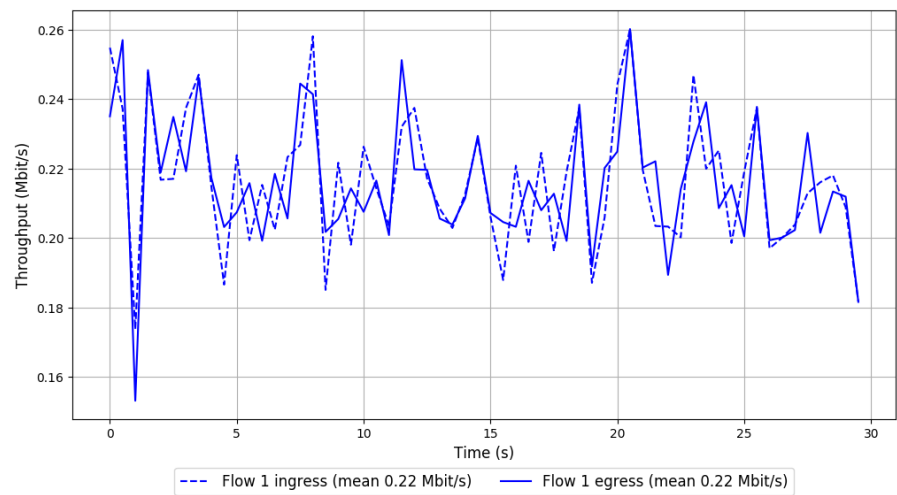
Run 2: Report of QUIC Cubic — Data Link

```
Run 3: Statistics of QUIC Cubic

Start at: 2018-02-17 02:23:55
End at: 2018-02-17 02:24:25
Local clock offset: -7.11 ms
Remote clock offset: -12.337 ms


# Below is generated by plot.py at 2018-02-17 02:43:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 4.24 Mbit/s
95th percentile per-packet one-way delay: 389.785 ms
Loss rate: 0.77%
-- Flow 1:
Average throughput: 4.24 Mbit/s
95th percentile per-packet one-way delay: 389.785 ms
Loss rate: 0.77%
```

Run 3: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 4.26 Mbit/s) ——— Flow 1 egress (mean 4.24 Mbit/s)
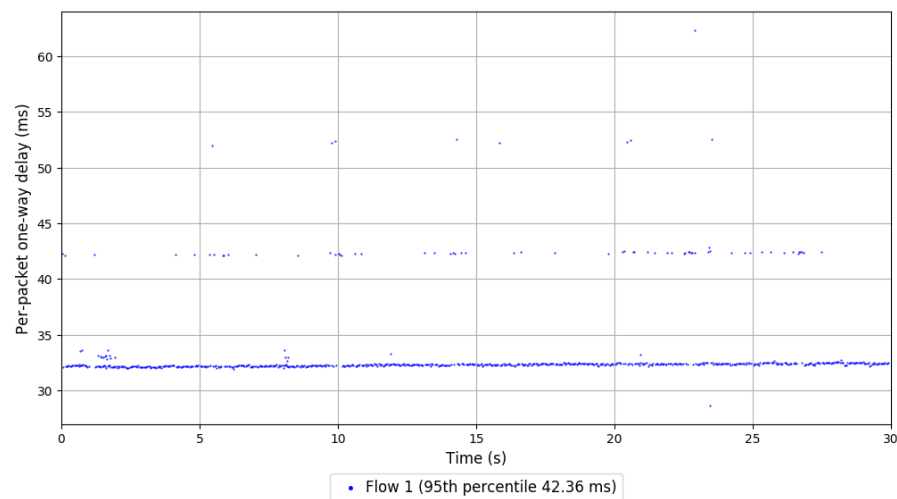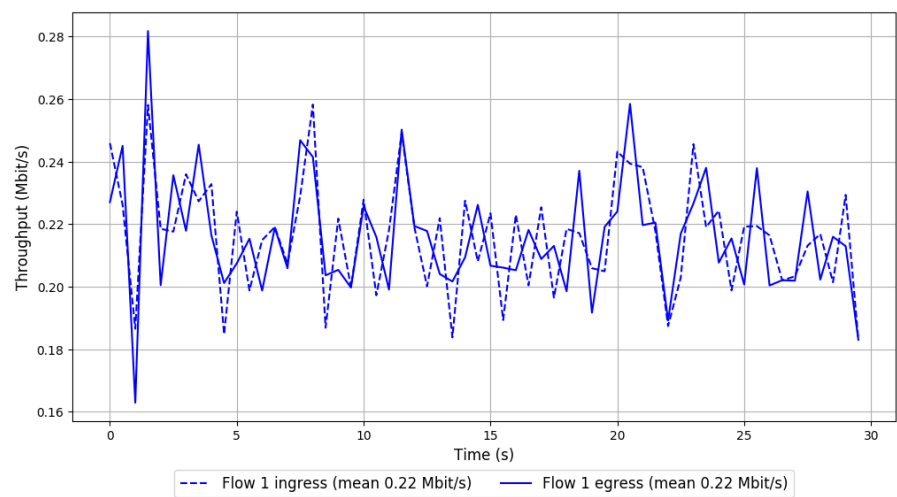

• Flow 1 (95th percentile 389.79 ms)

```
Run 1: Statistics of SCReAM

Start at: 2018-02-17 01:48:47
End at: 2018-02-17 01:49:17
Local clock offset: -6.899 ms
Remote clock offset: -5.886 ms

# Below is generated by plot.py at 2018-02-17 02:43:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 40.847 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 40.847 ms
Loss rate: 0.13%
```
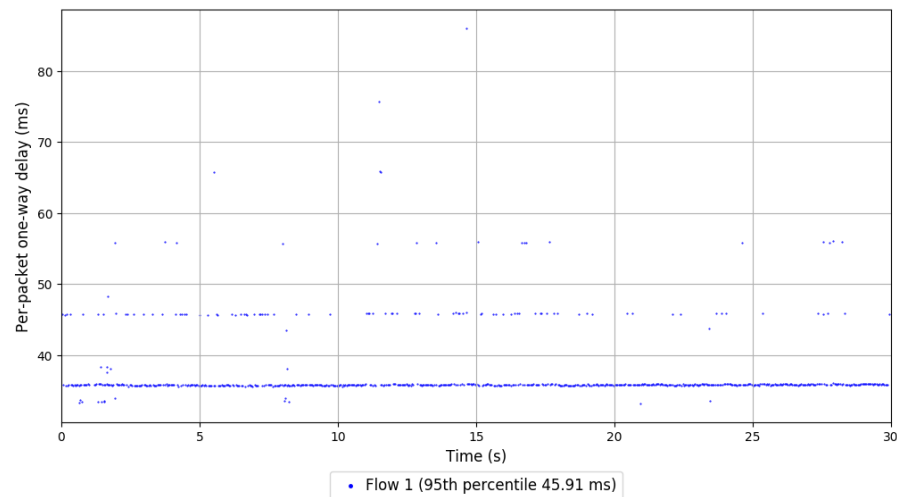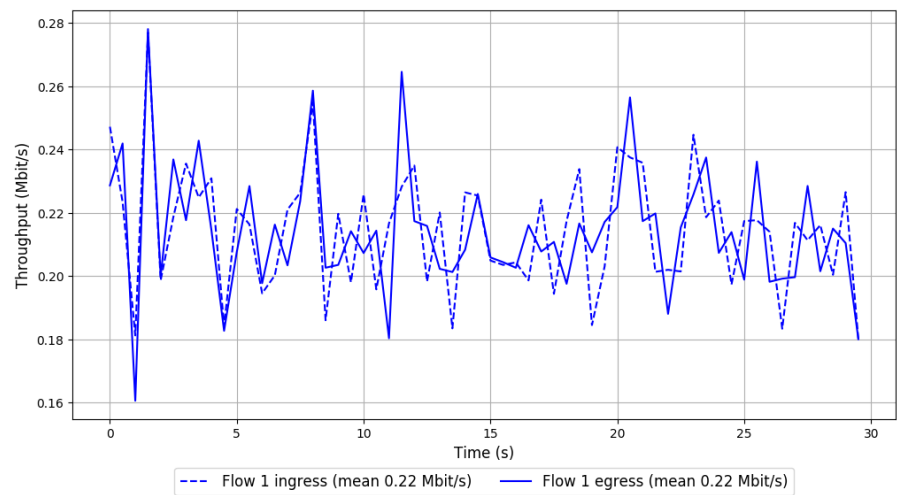
Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2018-02-17 02:08:34
End at: 2018-02-17 02:09:05
Local clock offset: -6.647 ms
Remote clock offset: -10.663 ms


# Below is generated by plot.py at 2018-02-17 02:43:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 42.362 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 42.362 ms
Loss rate: 0.13%
```
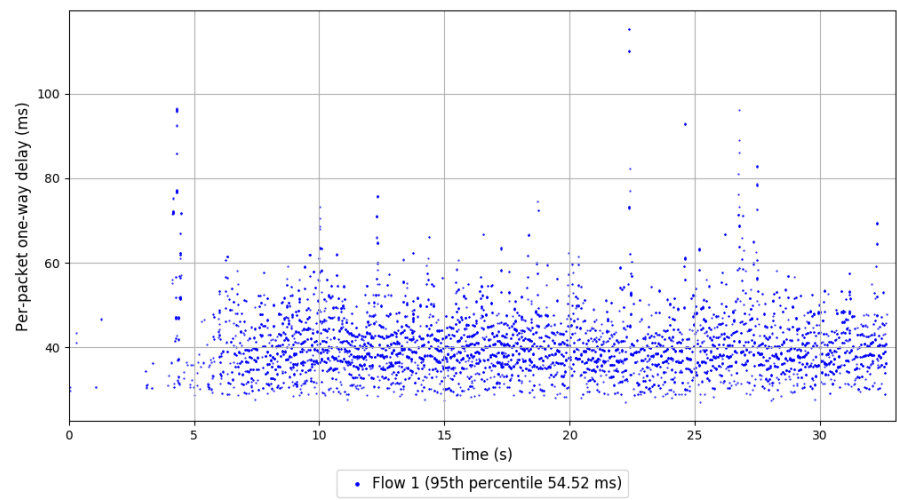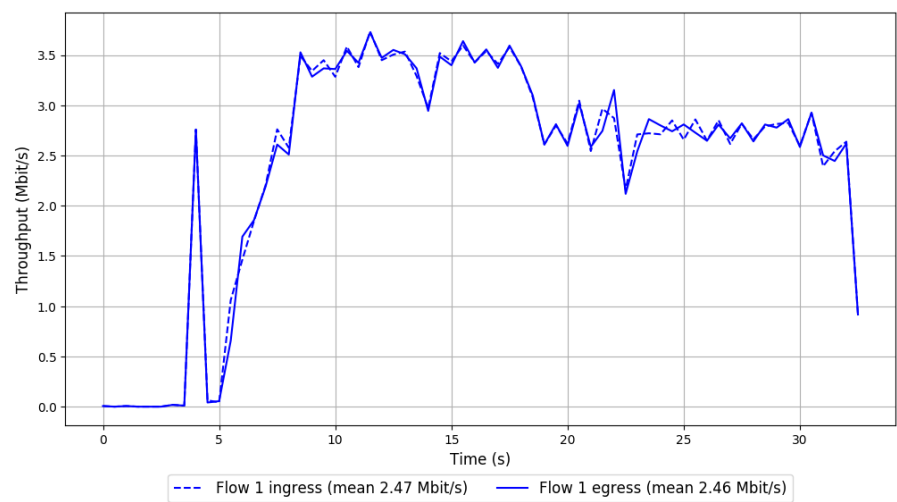
Run 2: Report of SCReAM — Data Link

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

Flow 1 (95th percentile 42.36 ms)

```
Run 3: Statistics of SCReAM

Start at: 2018-02-17 02:28:16
End at: 2018-02-17 02:28:46
Local clock offset: -9.39 ms
Remote clock offset: -11.497 ms

# Below is generated by plot.py at 2018-02-17 02:43:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 45.905 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 45.905 ms
Loss rate: 0.13%
```
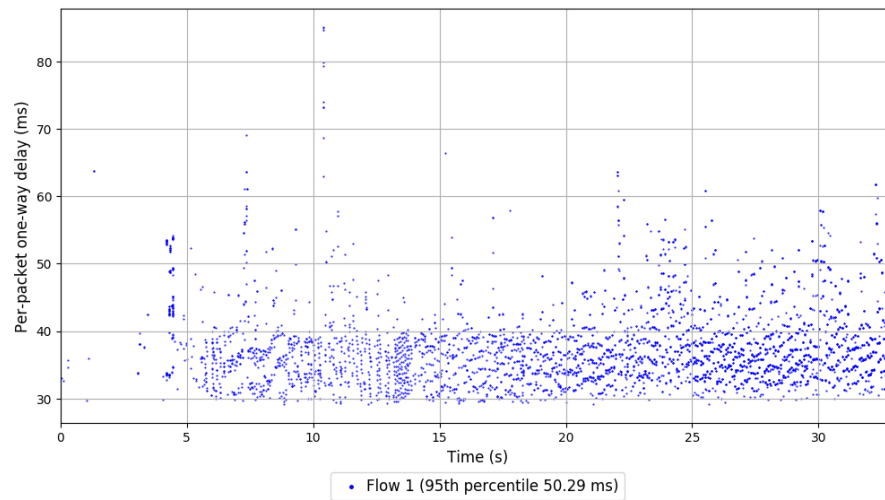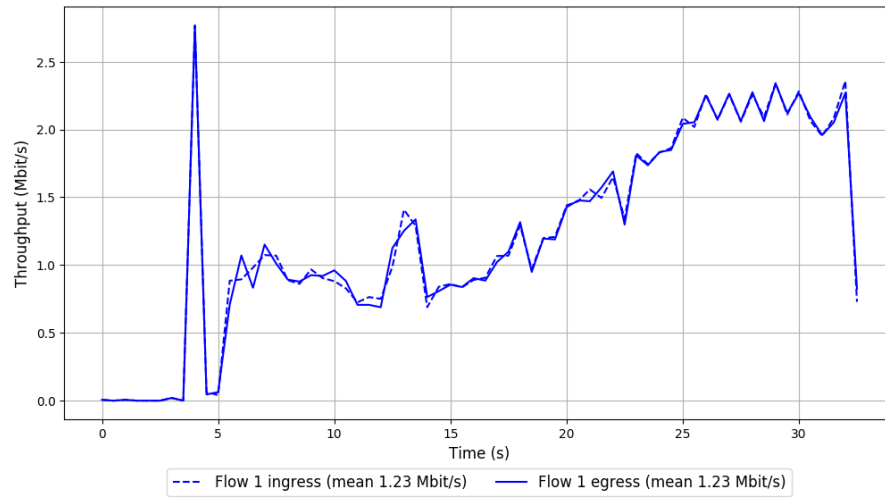
Run 3: Report of SCReAM — Data Link

```
Run 1: Statistics of WebRTC media

Start at: 2018-02-17 01:43:17
End at: 2018-02-17 01:43:47
Local clock offset: -8.363 ms
Remote clock offset: -6.129 ms


# Below is generated by plot.py at 2018-02-17 02:43:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.46 Mbit/s
95th percentile per-packet one-way delay: 54.515 ms
Loss rate: 0.24%
-- Flow 1:
Average throughput: 2.46 Mbit/s
95th percentile per-packet one-way delay: 54.515 ms
Loss rate: 0.24%
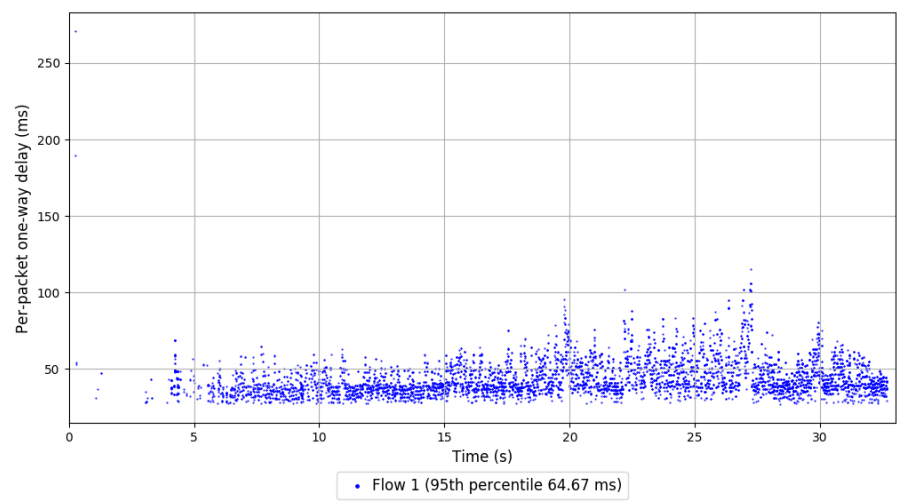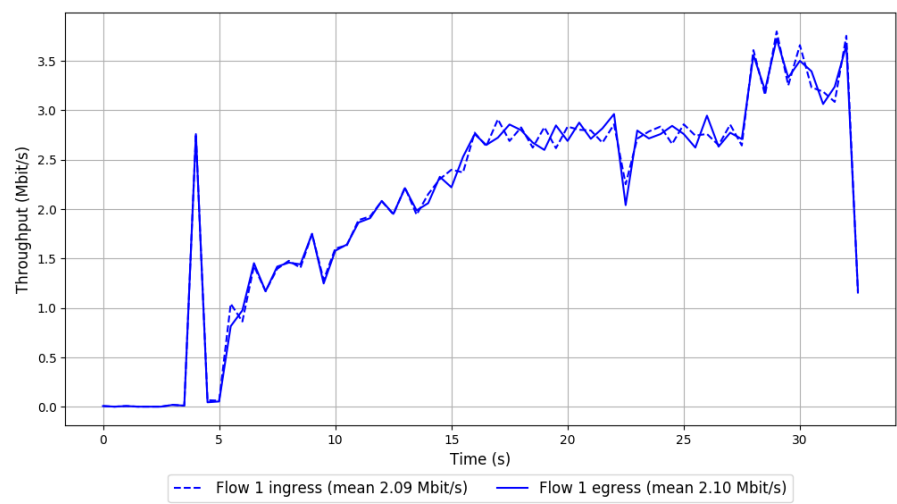```

Run 1: Report of WebRTC media — Data Link



Flow 1 ingress (mean 2.47 Mbit/s)    Flow 1 egress (mean 2.46 Mbit/s)



Flow 1 (95th percentile 54.52 ms)

41

```
Run 2: Statistics of WebRTC media

Start at: 2018-02-17 02:03:06
End at: 2018-02-17 02:03:36
Local clock offset: -8.591 ms
Remote clock offset: -7.875 ms

Below is generated by plot.py at 2018-02-17 02:43:33
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 50.286 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 50.286 ms
Loss rate: 0.21%
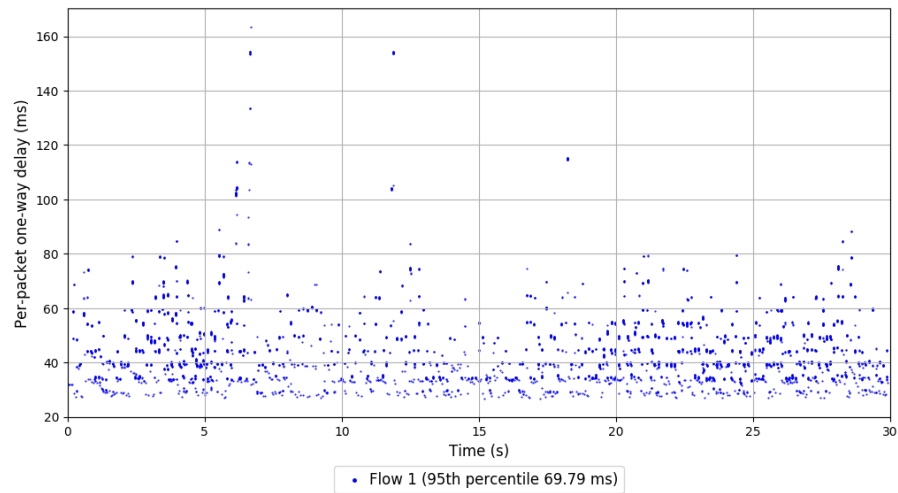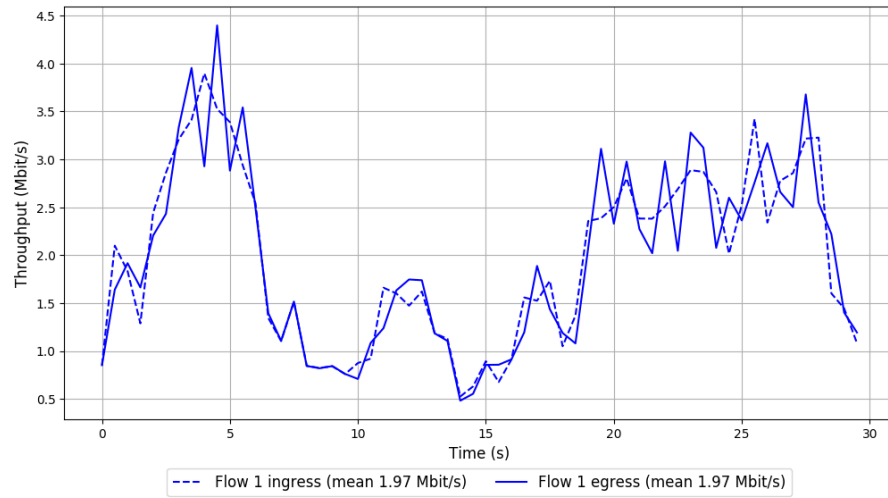```

Run 2: Report of WebRTC media — Data Link

```
Run 3: Statistics of WebRTC media

Start at: 2018-02-17 02:22:50
End at: 2018-02-17 02:23:20
Local clock offset: -5.907 ms
Remote clock offset: -11.733 ms


# Below is generated by plot.py at 2018-02-17 02:43:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 64.665 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 64.665 ms
Loss rate: 0.23%
```
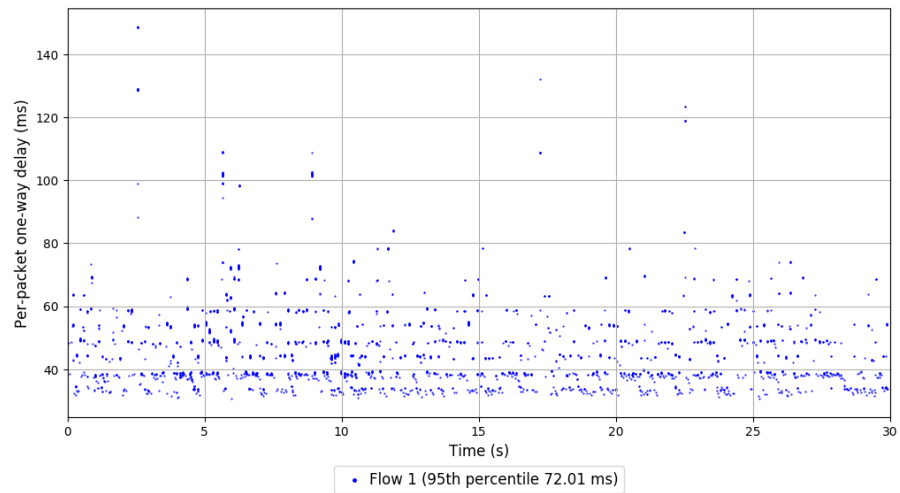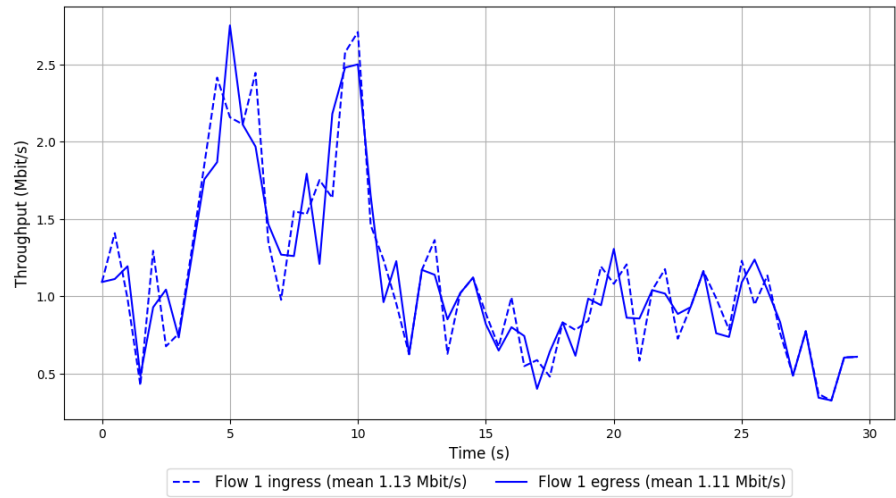
Run 3: Report of WebRTC media — Data Link

```
Run 1: Statistics of Sprout

Start at: 2018-02-17 01:54:17
End at: 2018-02-17 01:54:48
Local clock offset: -7.322 ms
Remote clock offset: -3.955 ms


# Below is generated by plot.py at 2018-02-17 02:43:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.97 Mbit/s
95th percentile per-packet one-way delay: 69.793 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.97 Mbit/s
95th percentile per-packet one-way delay: 69.793 ms
Loss rate: 0.00%
```

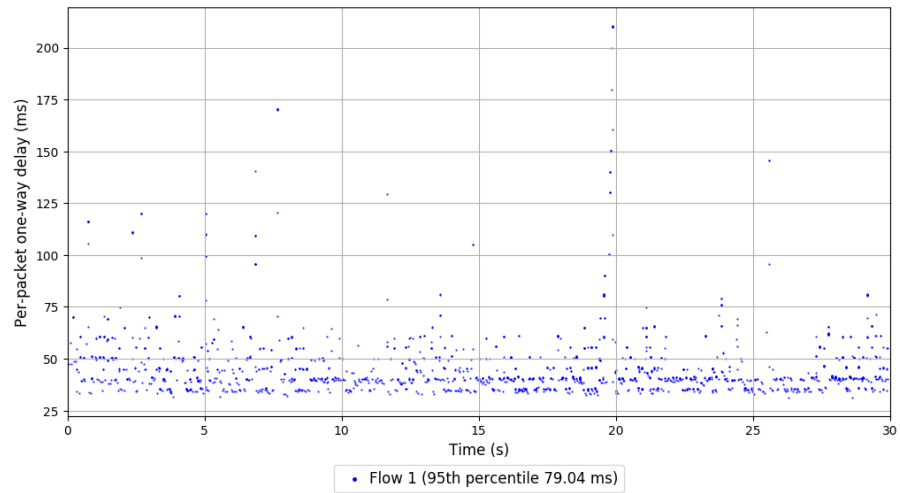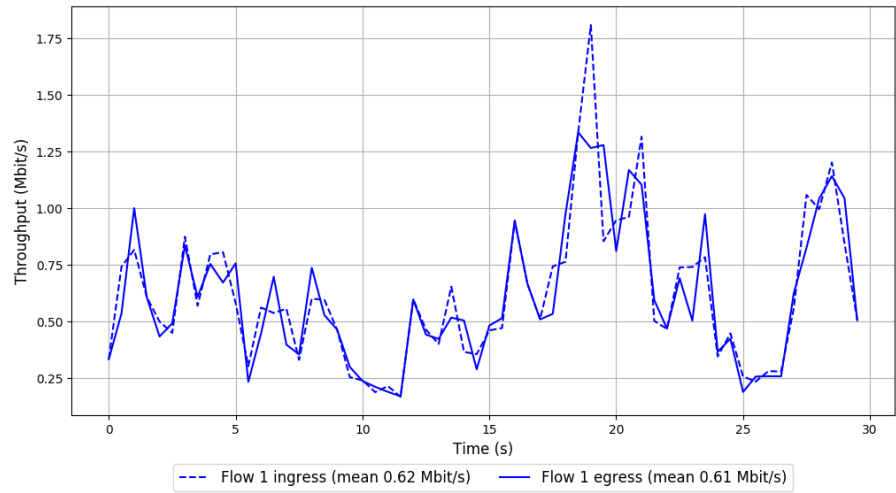Run 1: Report of Sprout — Data Link

```
Run 2: Statistics of Sprout

Start at: 2018-02-17 02:14:05
End at: 2018-02-17 02:14:35
Local clock offset: -8.715 ms
Remote clock offset: -10.742 ms


# Below is generated by plot.py at 2018-02-17 02:43:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.11 Mbit/s
95th percentile per-packet one-way delay: 72.008 ms
Loss rate: 1.13%
-- Flow 1:
Average throughput: 1.11 Mbit/s
95th percentile per-packet one-way delay: 72.008 ms
Loss rate: 1.13%
```

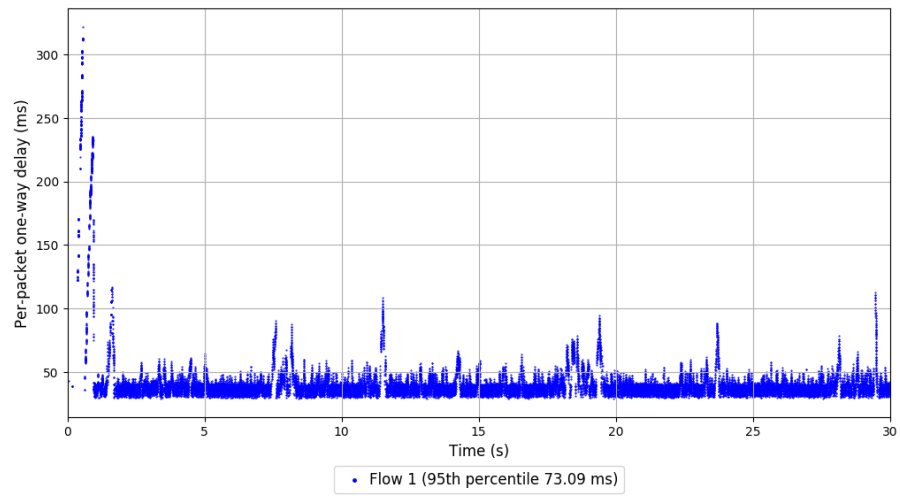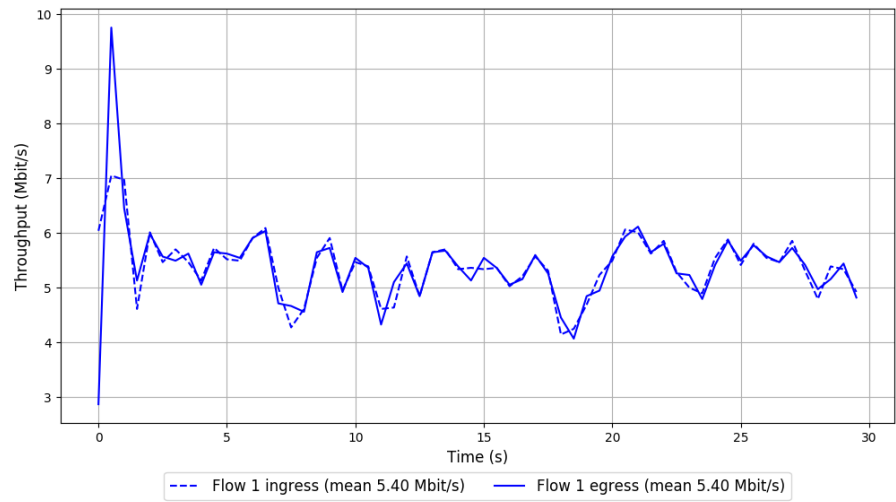Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2018-02-17 02:33:43
End at: 2018-02-17 02:34:13
Local clock offset: -9.844 ms
Remote clock offset: -12.709 ms


# Below is generated by plot.py at 2018-02-17 02:43:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 79.041 ms
Loss rate: 1.16%
-- Flow 1:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 79.041 ms
Loss rate: 1.16%
```
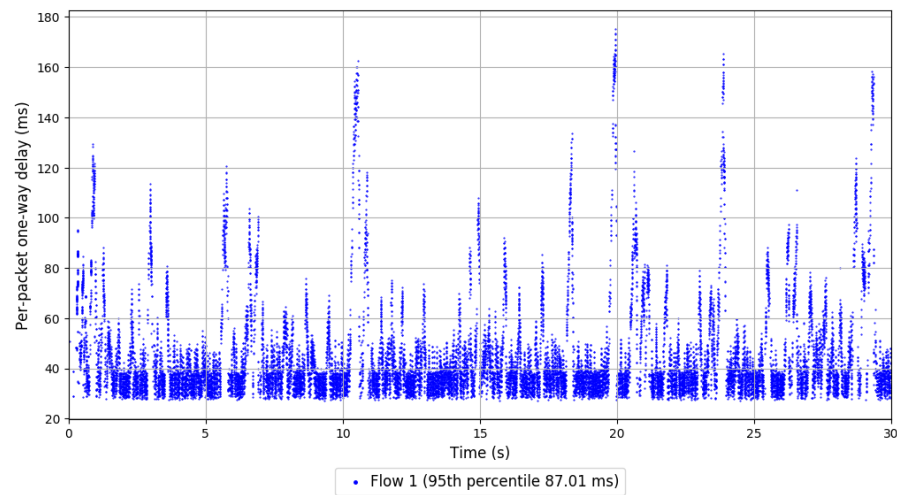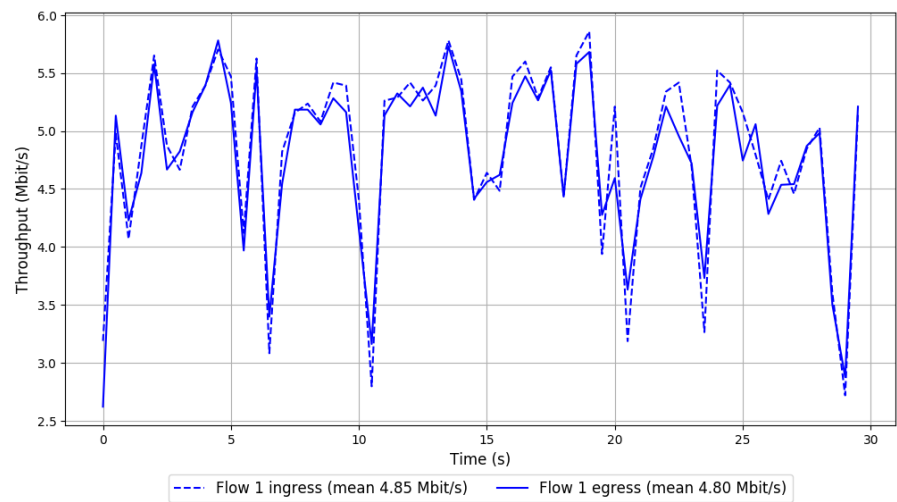
Run 3: Report of Sprout — Data Link

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

Start at: 2018-02-17 01:53:11
End at: 2018-02-17 01:53:41
Local clock offset: -9.063 ms
Remote clock offset: -3.548 ms


# Below is generated by plot.py at 2018-02-17 02:43:45
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.40 Mbit/s
95th percentile per-packet one-way delay: 73.088 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 5.40 Mbit/s
95th percentile per-packet one-way delay: 73.088 ms
Loss rate: 0.16%
```
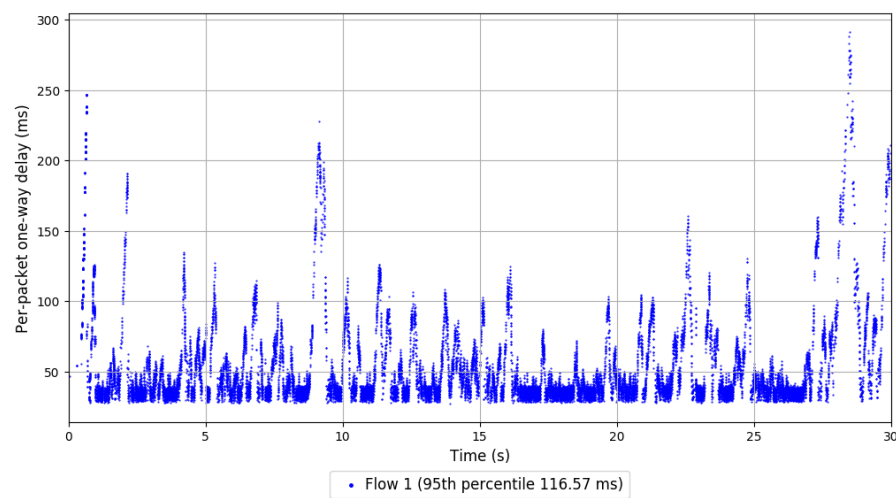
Run 1: Report of TaoVA-100x — Data Link

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

Start at: 2018-02-17 02:12:59
End at: 2018-02-17 02:13:29
Local clock offset: -5.929 ms
Remote clock offset: -11.057 ms


# Below is generated by plot.py at 2018-02-17 02:43:45
# Datalink statistics
-- Total of 1 flow:
Average throughput: 4.80 Mbit/s
95th percentile per-packet one-way delay: 87.010 ms
Loss rate: 1.11%
-- Flow 1:
Average throughput: 4.80 Mbit/s
95th percentile per-packet one-way delay: 87.010 ms
Loss rate: 1.11%
```
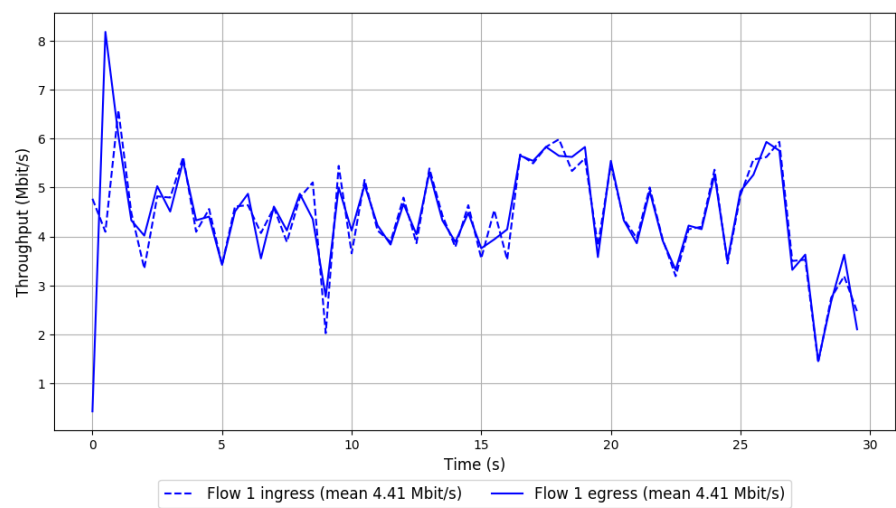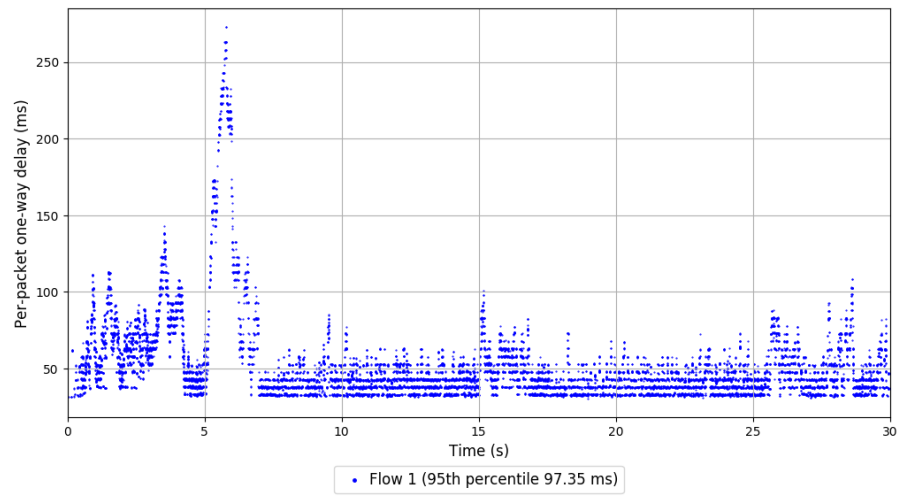
Run 2: Report of TaoVA-100x — Data Link

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

Start at: 2018-02-17 02:32:38
End at: 2018-02-17 02:33:08
Local clock offset: -8.945 ms
Remote clock offset: -14.581 ms


# Below is generated by plot.py at 2018-02-17 02:43:45
# Datalink statistics
-- Total of 1 flow:
Average throughput: 4.41 Mbit/s
95th percentile per-packet one-way delay: 116.569 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 4.41 Mbit/s
95th percentile per-packet one-way delay: 116.569 ms
Loss rate: 0.23%
```

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

Flow 1 ingress (mean 4.41 Mbit/s)   Flow 1 egress (mean 4.41 Mbit/s)

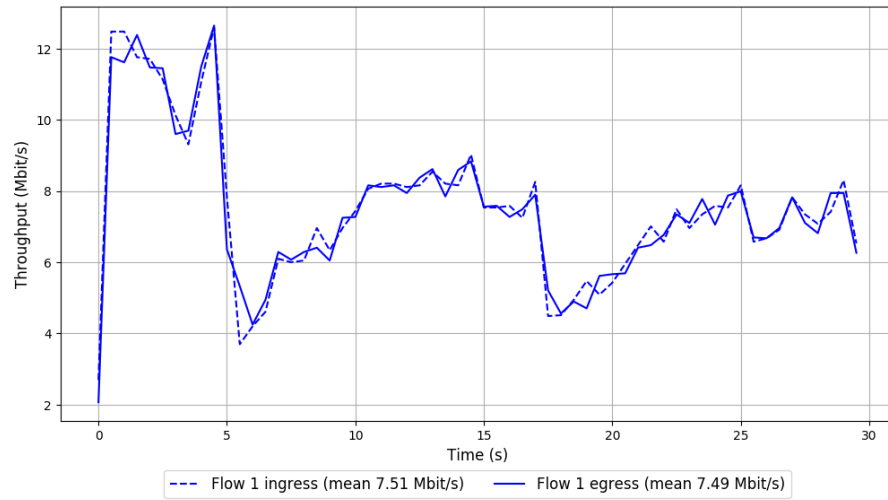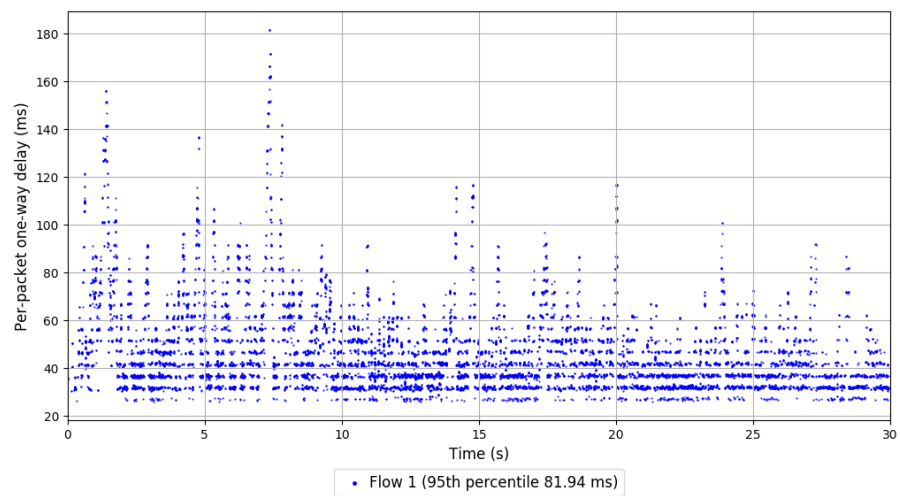
Flow 1 (95th percentile 116.57 ms)

```
Run 1: Statistics of TCP Vegas

Start at: 2018-02-17 01:46:36
End at: 2018-02-17 01:47:06
Local clock offset: -7.365 ms
Remote clock offset: -4.799 ms


# Below is generated by plot.py at 2018-02-17 02:43:45
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.49 Mbit/s
95th percentile per-packet one-way delay: 97.353 ms
Loss rate: 0.35%
-- Flow 1:
Average throughput: 7.49 Mbit/s
95th percentile per-packet one-way delay: 97.353 ms
Loss rate: 0.35%
```
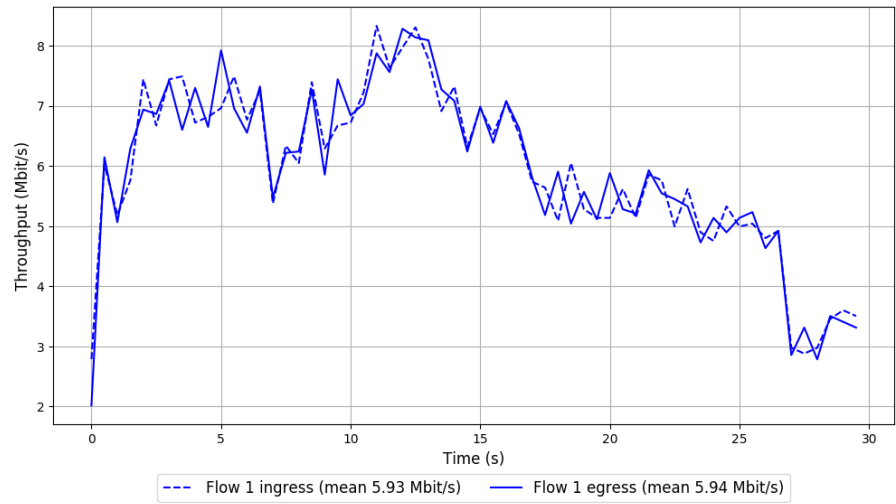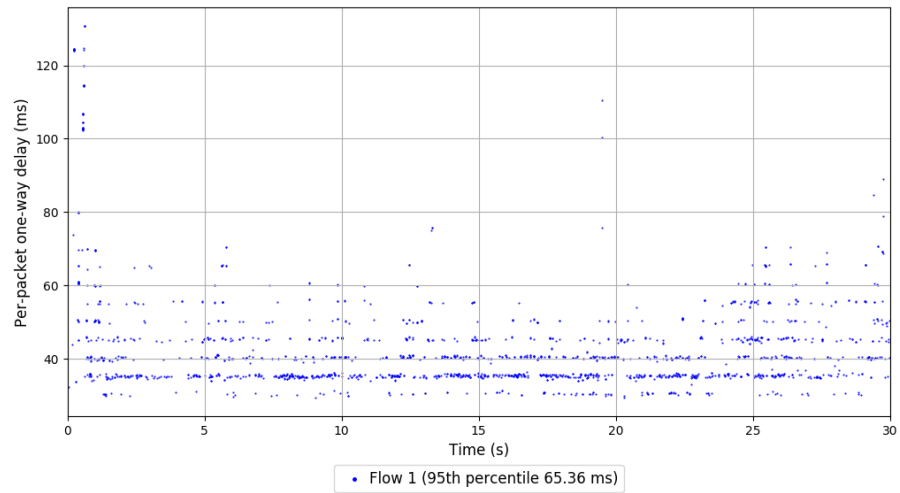
Run 1: Report of TCP Vegas — Data Link

```
Run 2: Statistics of TCP Vegas

Start at: 2018-02-17 02:06:24
End at: 2018-02-17 02:06:54
Local clock offset: -6.273 ms
Remote clock offset: -10.896 ms


# Below is generated by plot.py at 2018-02-17 02:43:45
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.94 Mbit/s
95th percentile per-packet one-way delay: 81.942 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 5.94 Mbit/s
95th percentile per-packet one-way delay: 81.942 ms
Loss rate: 0.16%
```
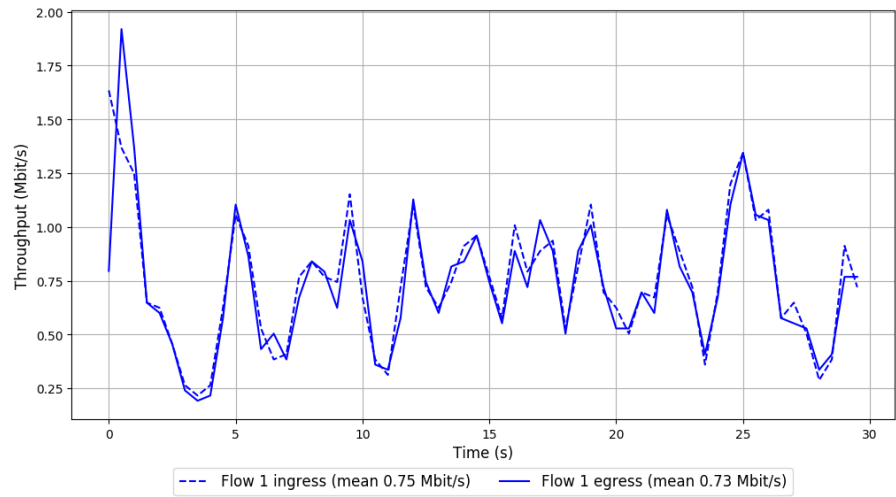
Run 2: Report of TCP Vegas — Data Link

```
Run 3: Statistics of TCP Vegas

Start at: 2018-02-17 02:26:05
End at: 2018-02-17 02:26:35
Local clock offset: -7.639 ms
Remote clock offset: -13.056 ms


# Below is generated by plot.py at 2018-02-17 02:43:45
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 65.356 ms
Loss rate: 2.61%
-- Flow 1:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 65.356 ms
Loss rate: 2.61%
```
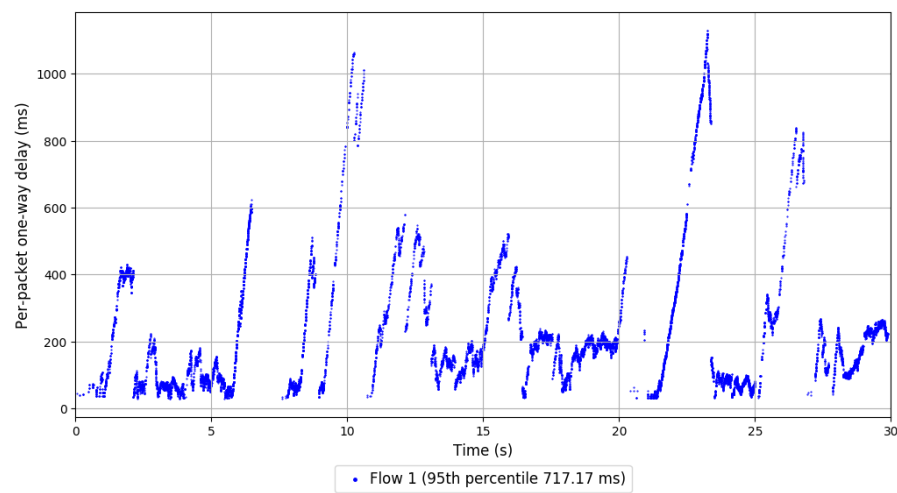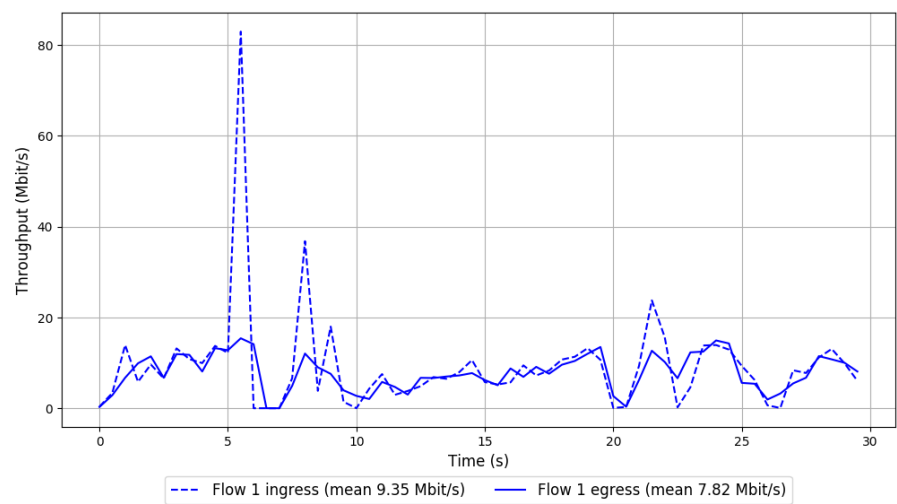
Run 3: Report of TCP Vegas — Data Link

```
Run 1: Statistics of Verus

Start at: 2018-02-17 02:02:00
End at: 2018-02-17 02:02:30
Local clock offset: -5.945 ms
Remote clock offset: -5.557 ms


# Below is generated by plot.py at 2018-02-17 02:43:45
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.82 Mbit/s
95th percentile per-packet one-way delay: 717.166 ms
Loss rate: 16.52%
-- Flow 1:
Average throughput: 7.82 Mbit/s
95th percentile per-packet one-way delay: 717.166 ms
Loss rate: 16.52%
```
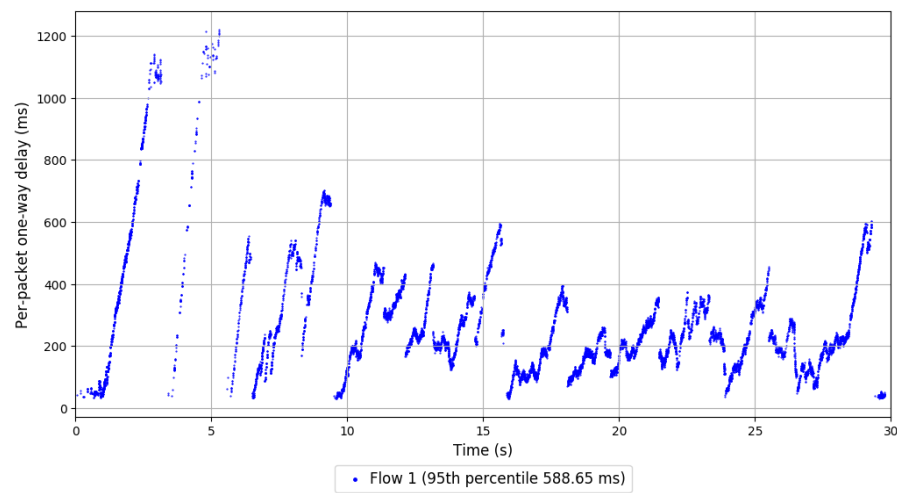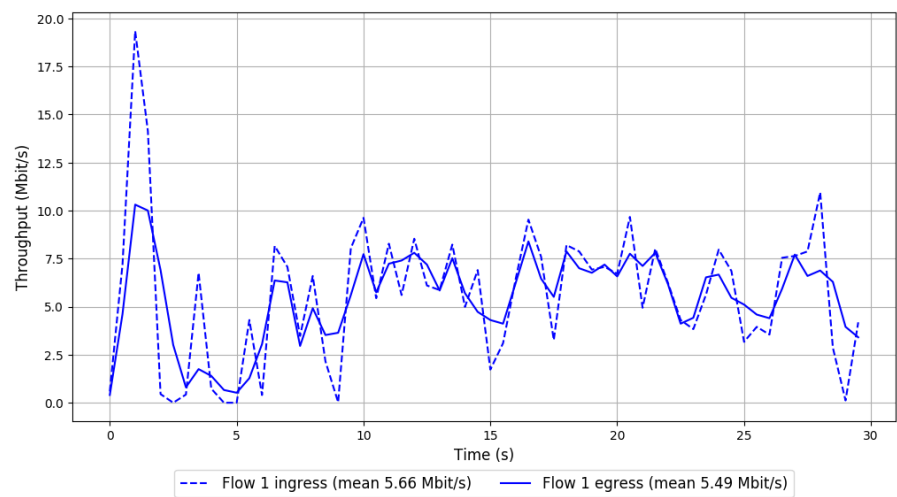
Run 1: Report of Verus — Data Link

```
Run 2: Statistics of Verus

Start at: 2018-02-17 02:21:44
End at: 2018-02-17 02:22:14
Local clock offset: -9.739 ms
Remote clock offset: -14.262 ms


# Below is generated by plot.py at 2018-02-17 02:43:45
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.49 Mbit/s
95th percentile per-packet one-way delay: 588.651 ms
Loss rate: 3.26%
-- Flow 1:
Average throughput: 5.49 Mbit/s
95th percentile per-packet one-way delay: 588.651 ms
Loss rate: 3.26%
```

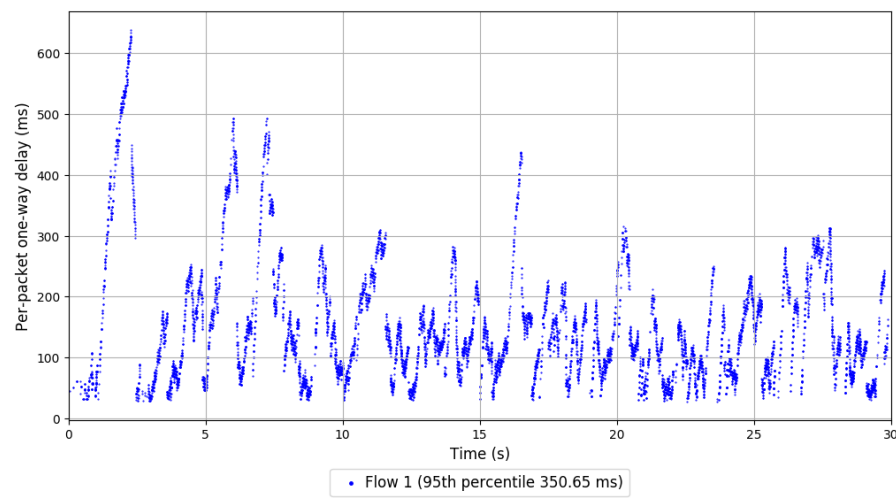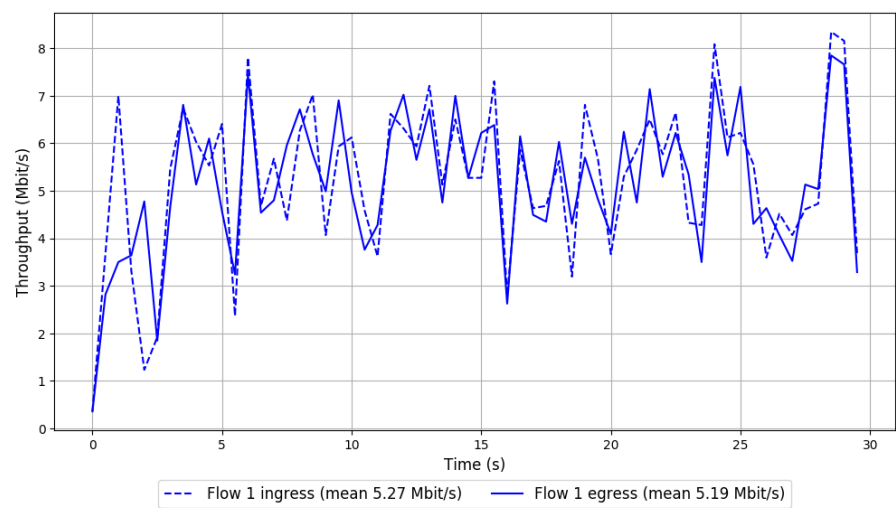Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2018-02-17 02:41:24
End at: 2018-02-17 02:41:54
Local clock offset: -6.98 ms
Remote clock offset: -17.883 ms


# Below is generated by plot.py at 2018-02-17 02:43:45
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.19 Mbit/s
95th percentile per-packet one-way delay: 350.653 ms
Loss rate: 1.70%
-- Flow 1:
Average throughput: 5.19 Mbit/s
95th percentile per-packet one-way delay: 350.653 ms
Loss rate: 1.70%
```

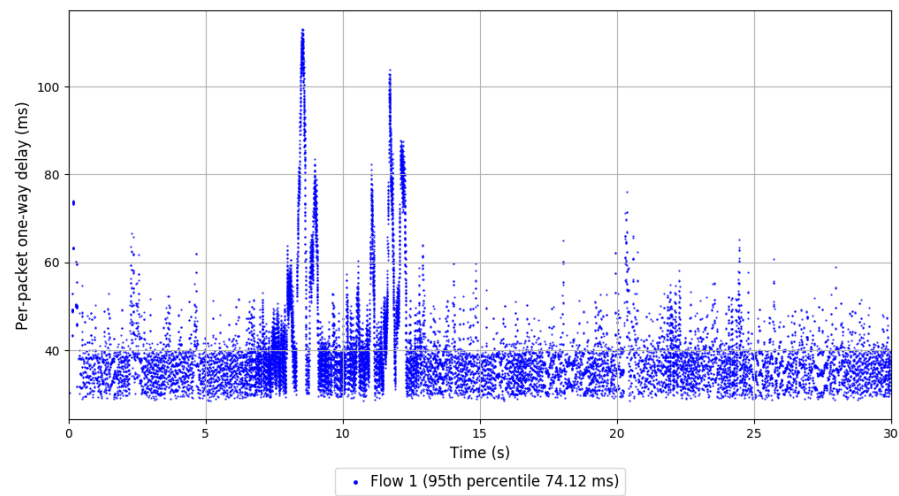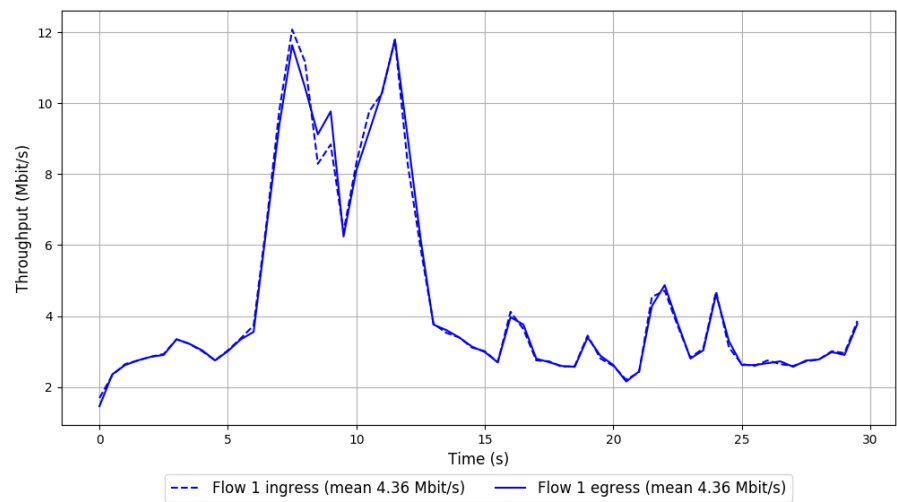Run 3: Report of Verus — Data Link

```
Run 1: Statistics of Copa

Start at: 2018-02-17 01:50:59
End at: 2018-02-17 01:51:29
Local clock offset: -8.831 ms
Remote clock offset: -4.894 ms


# Below is generated by plot.py at 2018-02-17 02:43:54
# Datalink statistics
-- Total of 1 flow:
Average throughput: 4.36 Mbit/s
95th percentile per-packet one-way delay: 74.124 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 4.36 Mbit/s
95th percentile per-packet one-way delay: 74.124 ms
Loss rate: 0.14%
```

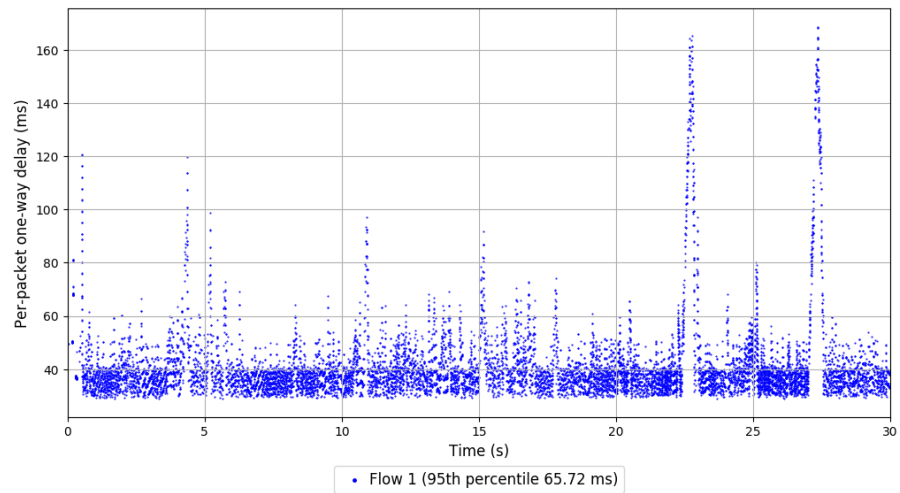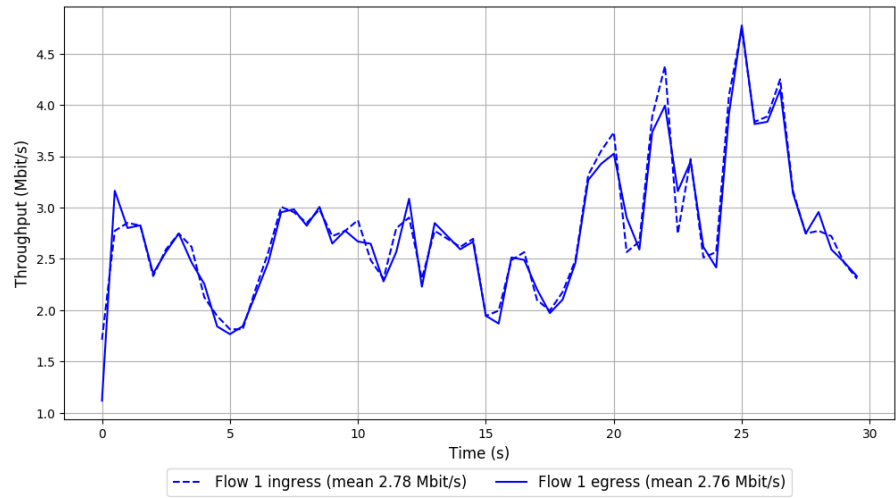Run 1: Report of Copa — Data Link

```
Run 2: Statistics of Copa

Start at: 2018-02-17 02:10:47
End at: 2018-02-17 02:11:17
Local clock offset: -8.964 ms
Remote clock offset: -11.502 ms

# Below is generated by plot.py at 2018-02-17 02:43:54
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.76 Mbit/s
95th percentile per-packet one-way delay: 65.721 ms
Loss rate: 0.94%
-- Flow 1:
Average throughput: 2.76 Mbit/s
95th percentile per-packet one-way delay: 65.721 ms
Loss rate: 0.94%
```

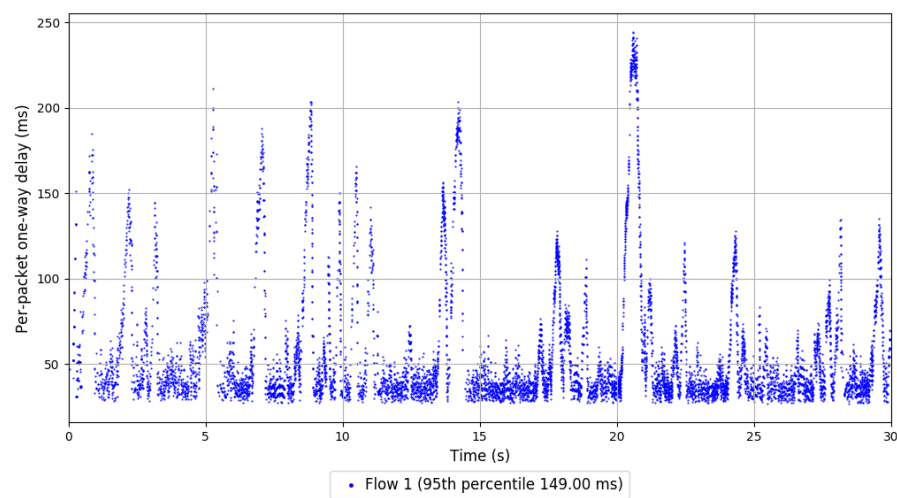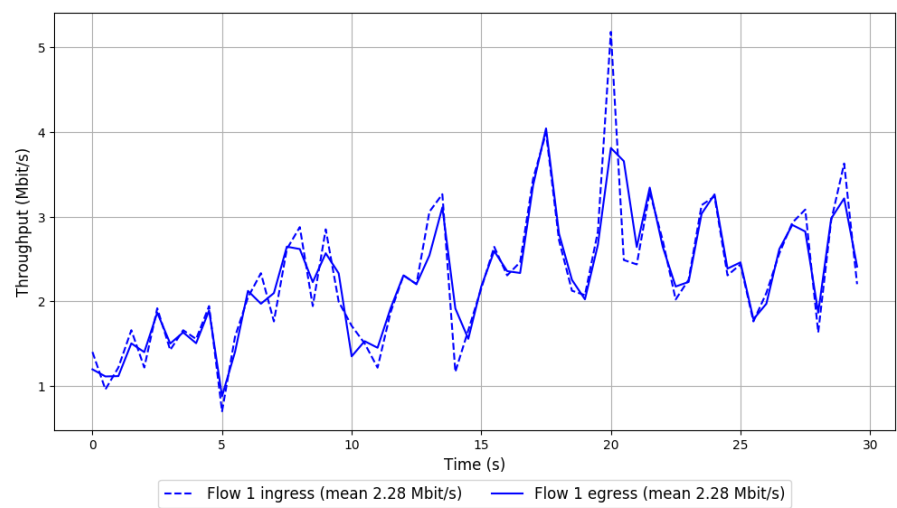Run 2: Report of Copa — Data Link

```
Run 3: Statistics of Copa

Start at: 2018-02-17 02:30:27
End at: 2018-02-17 02:30:57
Local clock offset: -9.649 ms
Remote clock offset: -15.394 ms


# Below is generated by plot.py at 2018-02-17 02:43:54
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 148.996 ms
Loss rate: 0.32%
-- Flow 1:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 148.996 ms
Loss rate: 0.32%
```

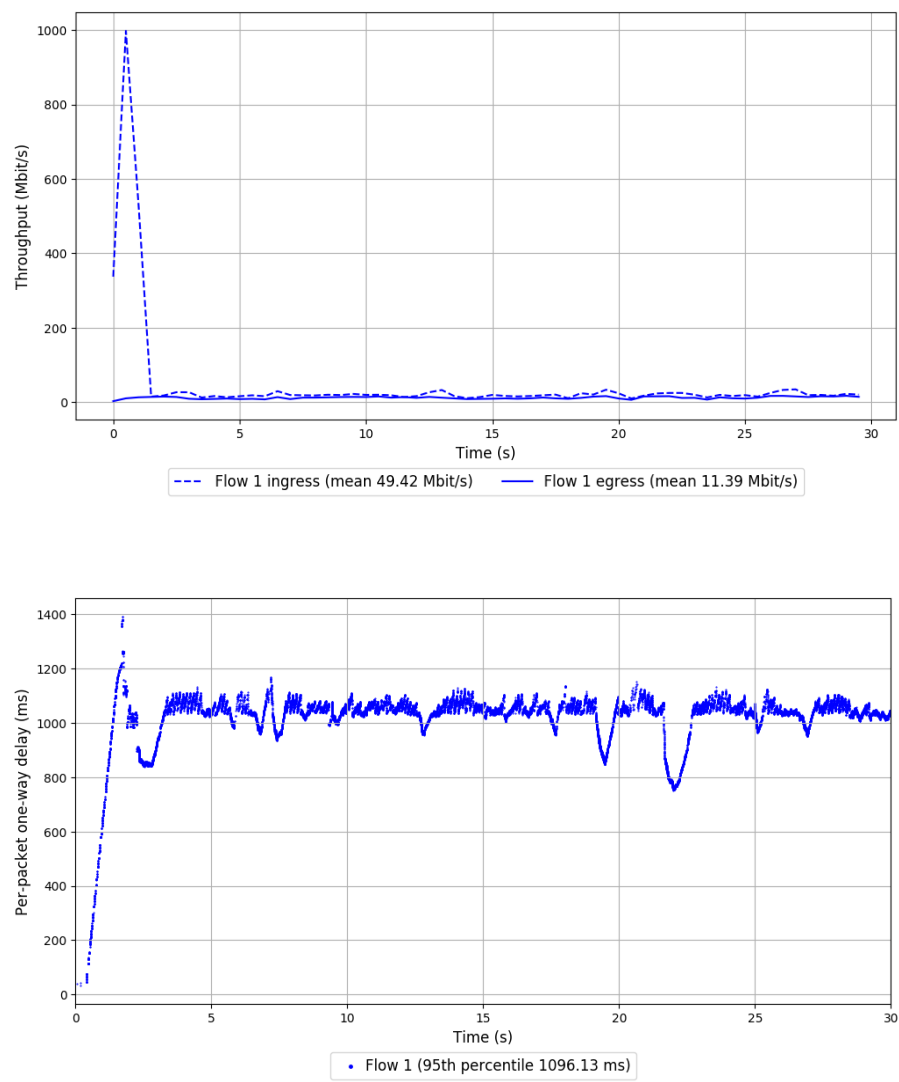Run 3: Report of Copa — Data Link

```
Run 1: Statistics of FillP

Start at: 2018-02-17 01:49:52
End at: 2018-02-17 01:50:22
Local clock offset: -8.047 ms
Remote clock offset: -3.604 ms


# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 11.39 Mbit/s
95th percentile per-packet one-way delay: 1096.131 ms
Loss rate: 76.98%
-- Flow 1:
Average throughput: 11.39 Mbit/s
95th percentile per-packet one-way delay: 1096.131 ms
Loss rate: 76.98%
```

Run 1: Report of FillP — Data Link

Flow 1 ingress (mean 49.42 Mbit/s) --- Flow 1 egress (mean 11.39 Mbit/s)

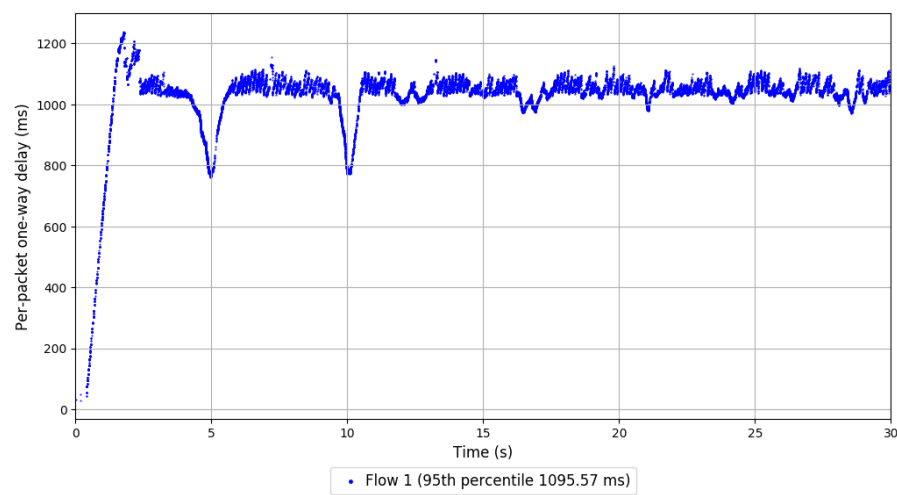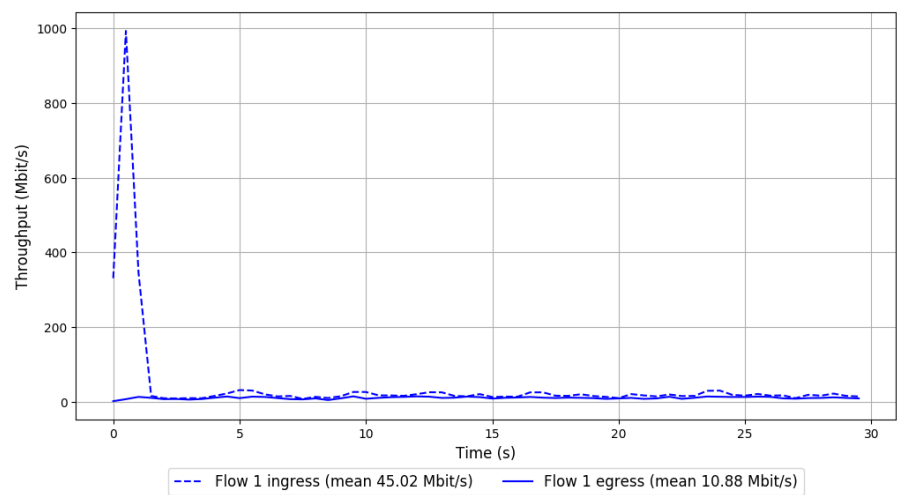• Flow 1 (95th percentile 1096.13 ms)

```
Run 2: Statistics of FillP

Start at: 2018-02-17 02:09:40
End at: 2018-02-17 02:10:10
Local clock offset: -7.616 ms
Remote clock offset: -10.98 ms


# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 10.88 Mbit/s
95th percentile per-packet one-way delay: 1095.566 ms
Loss rate: 75.87%
-- Flow 1:
Average throughput: 10.88 Mbit/s
95th percentile per-packet one-way delay: 1095.566 ms
Loss rate: 75.87%
```
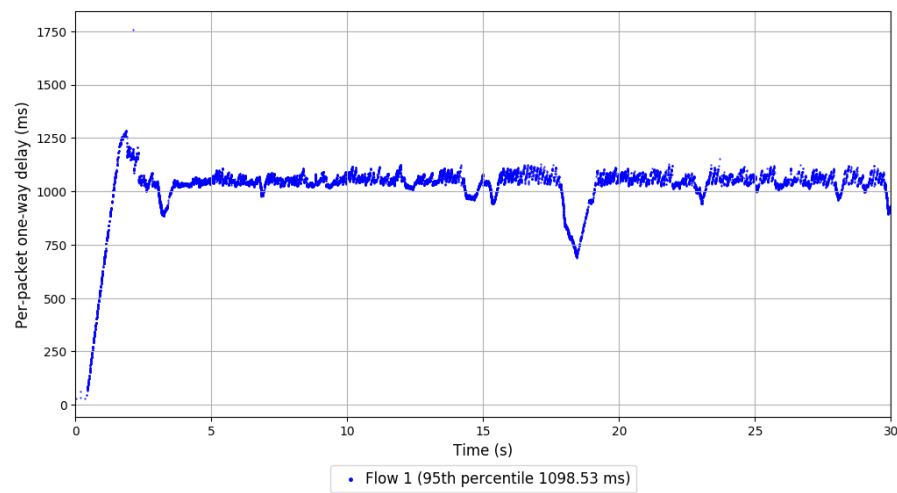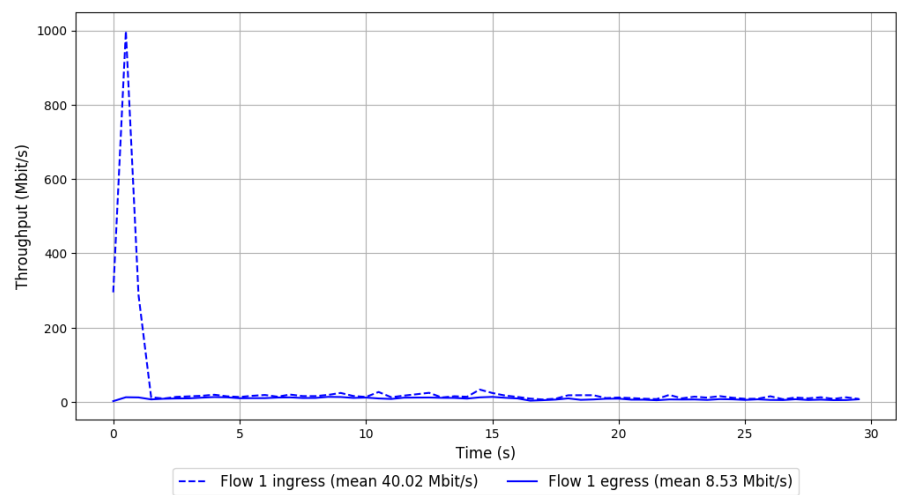
Run 2: Report of FillP — Data Link

```
Run 3: Statistics of FillP

Start at: 2018-02-17 02:29:21
End at: 2018-02-17 02:29:51
Local clock offset: -6.801 ms
Remote clock offset: -12.608 ms


# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.53 Mbit/s
95th percentile per-packet one-way delay: 1098.531 ms
Loss rate: 78.71%
-- Flow 1:
Average throughput: 8.53 Mbit/s
95th percentile per-packet one-way delay: 1098.531 ms
Loss rate: 78.71%
```

Run 3: Report of FillP — Data Link

Flow 1 ingress (mean 40.02 Mbit/s)   Flow 1 egress (mean 8.53 Mbit/s)

Flow 1 (95th percentile 1098.53 ms)

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

Start at: 2018-02-17 01:55:23
End at: 2018-02-17 01:55:54
Local clock offset: -8.977 ms
Remote clock offset: -2.38 ms


# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.05 Mbit/s
95th percentile per-packet one-way delay: 62.832 ms
Loss rate: 2.02%
-- Flow 1:
Average throughput: 2.05 Mbit/s
95th percentile per-packet one-way delay: 62.832 ms
Loss rate: 2.02%
```
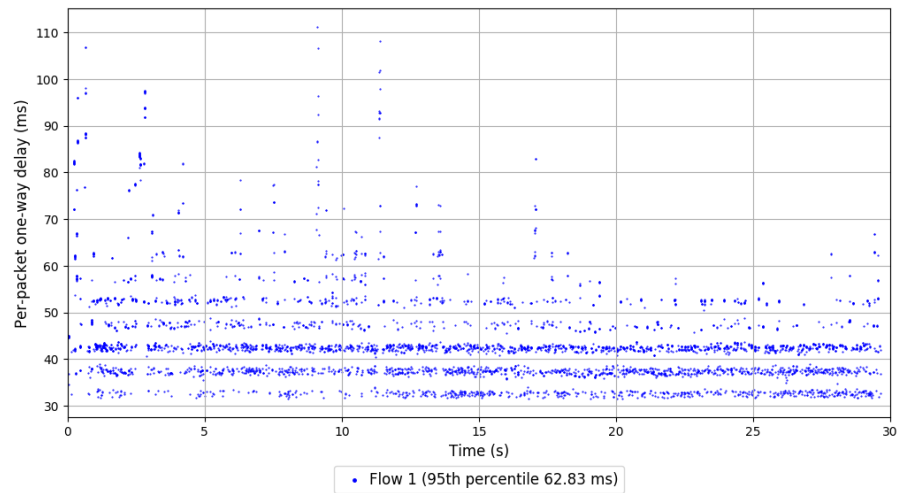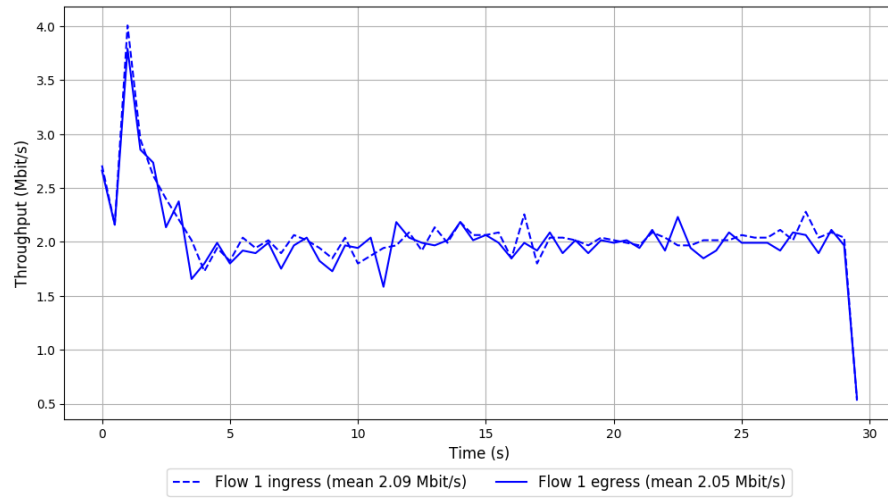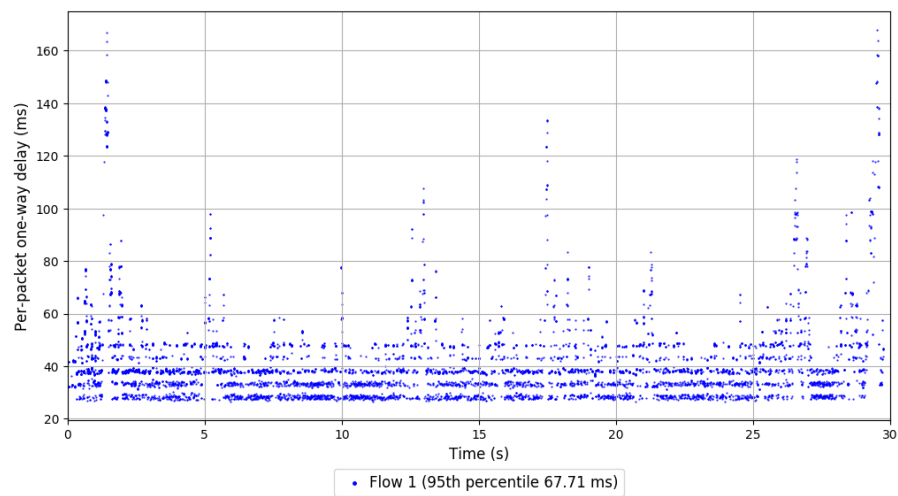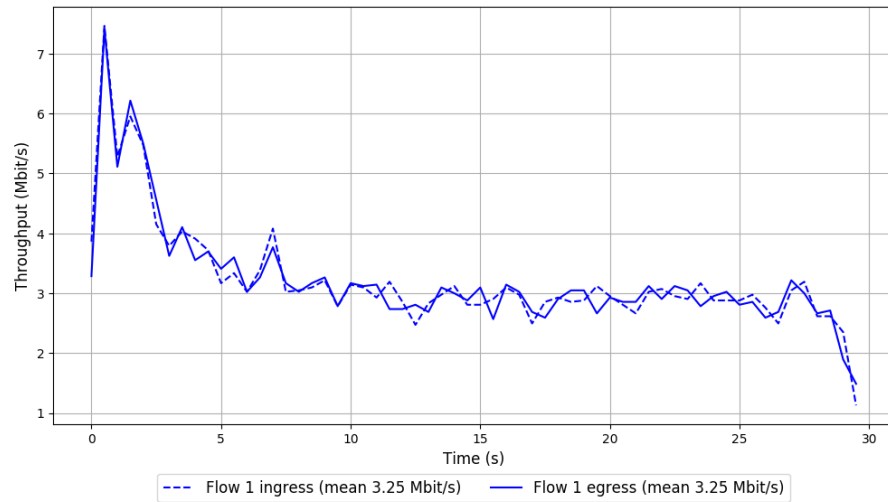
Run 1: Report of Indigo-1-32 — Data Link

```
Run 2: Statistics of Indigo-1-32

Start at: 2018-02-17 02:15:10
End at: 2018-02-17 02:15:40
Local clock offset: -4.805 ms
Remote clock offset: -12.56 ms


# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.25 Mbit/s
95th percentile per-packet one-way delay: 67.711 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 3.25 Mbit/s
95th percentile per-packet one-way delay: 67.711 ms
Loss rate: 0.16%
```

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

```
Run 3: Statistics of Indigo-1-32

Start at: 2018-02-17 02:34:49
End at: 2018-02-17 02:35:19
Local clock offset: -6.496 ms
Remote clock offset: -13.598 ms

# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.06 Mbit/s
95th percentile per-packet one-way delay: 82.291 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 2.06 Mbit/s
95th percentile per-packet one-way delay: 82.291 ms
Loss rate: 0.10%
```
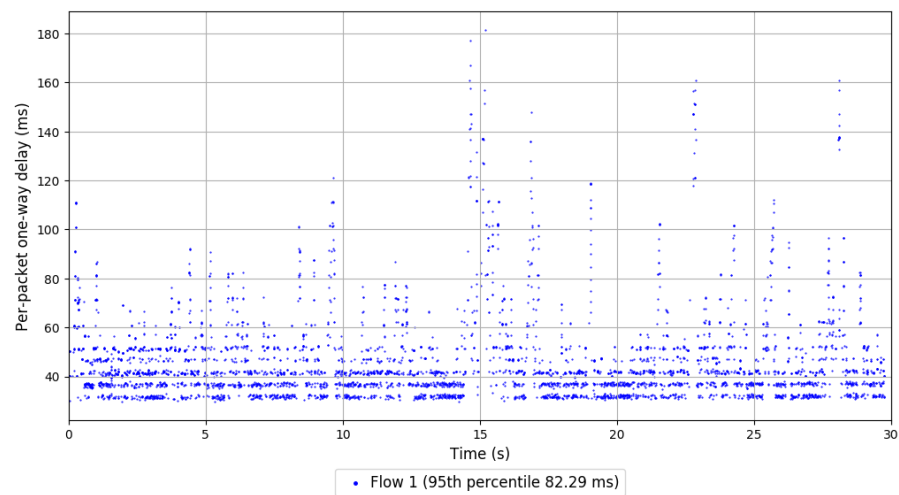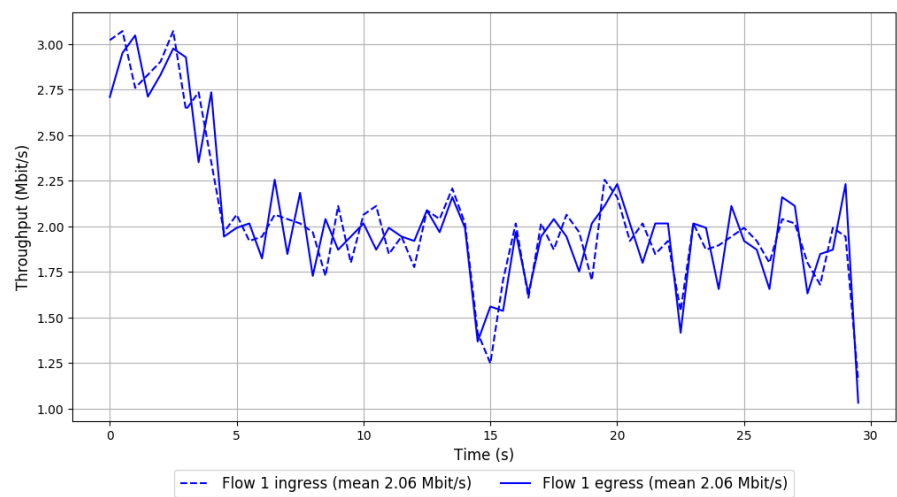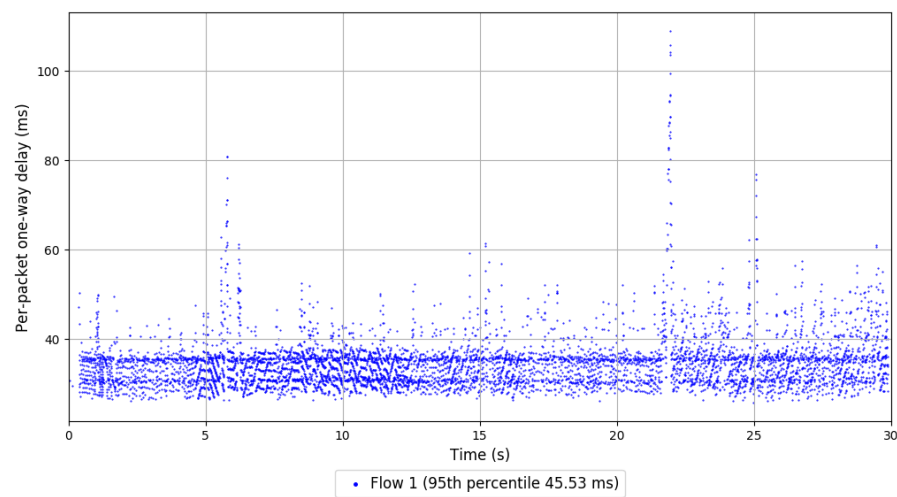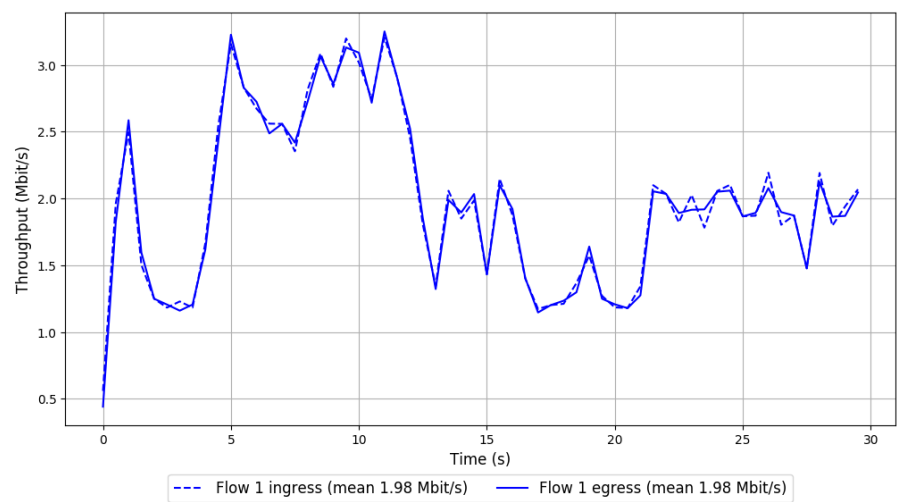
Run 3: Report of Indigo-1-32 — Data Link

```
Run 1: Statistics of Vivace-latency

Start at: 2018-02-17 01:47:41
End at: 2018-02-17 01:48:12
Local clock offset: -6.67 ms
Remote clock offset: -6.362 ms


# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.98 Mbit/s
95th percentile per-packet one-way delay: 45.531 ms
Loss rate: 0.22%
-- Flow 1:
Average throughput: 1.98 Mbit/s
95th percentile per-packet one-way delay: 45.531 ms
Loss rate: 0.22%
```
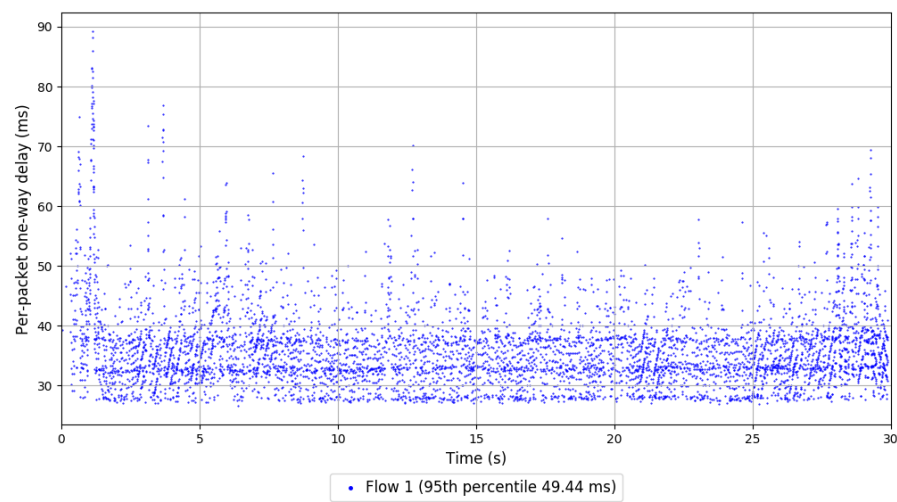
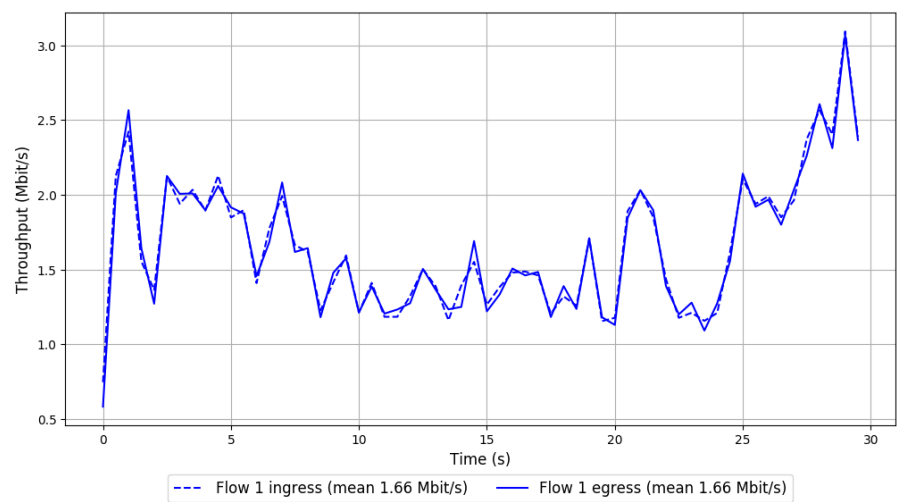Run 1: Report of Vivace-latency — Data Link

```
Run 2: Statistics of Vivace-latency

Start at: 2018-02-17 02:07:29
End at: 2018-02-17 02:07:59
Local clock offset: -6.84 ms
Remote clock offset: -10.896 ms


# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.66 Mbit/s
95th percentile per-packet one-way delay: 49.436 ms
Loss rate: 0.33%
-- Flow 1:
Average throughput: 1.66 Mbit/s
95th percentile per-packet one-way delay: 49.436 ms
Loss rate: 0.33%
```
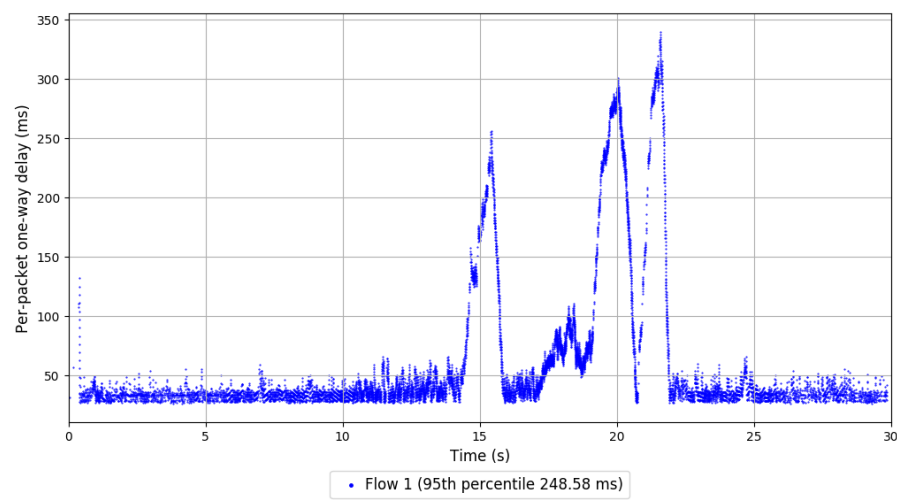
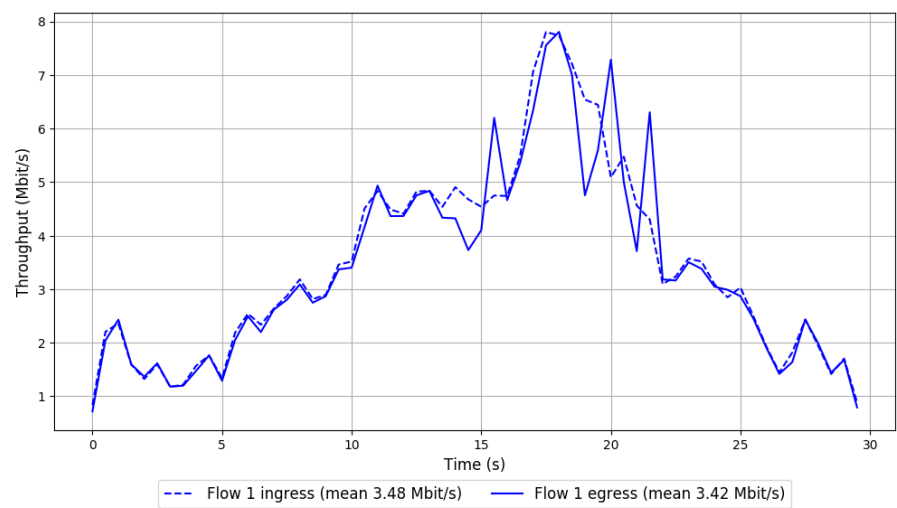Run 2: Report of Vivace-latency — Data Link

```
Run 3: Statistics of Vivace-latency

Start at: 2018-02-17 02:27:11
End at: 2018-02-17 02:27:41
Local clock offset: -7.404 ms
Remote clock offset: -14.465 ms

# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.42 Mbit/s
95th percentile per-packet one-way delay: 248.579 ms
Loss rate: 1.91%
-- Flow 1:
Average throughput: 3.42 Mbit/s
95th percentile per-packet one-way delay: 248.579 ms
Loss rate: 1.91%
```

Run 3: Report of Vivace-latency — Data Link

```
Run 1: Statistics of Vivace-loss

Start at: 2018-02-17 01:59:46
End at: 2018-02-17 02:00:17
Local clock offset: -5.325 ms
Remote clock offset: -3.446 ms

# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.80 Mbit/s
95th percentile per-packet one-way delay: 1077.695 ms
Loss rate: 26.96%
-- Flow 1:
Average throughput: 8.80 Mbit/s
95th percentile per-packet one-way delay: 1077.695 ms
Loss rate: 26.96%
```
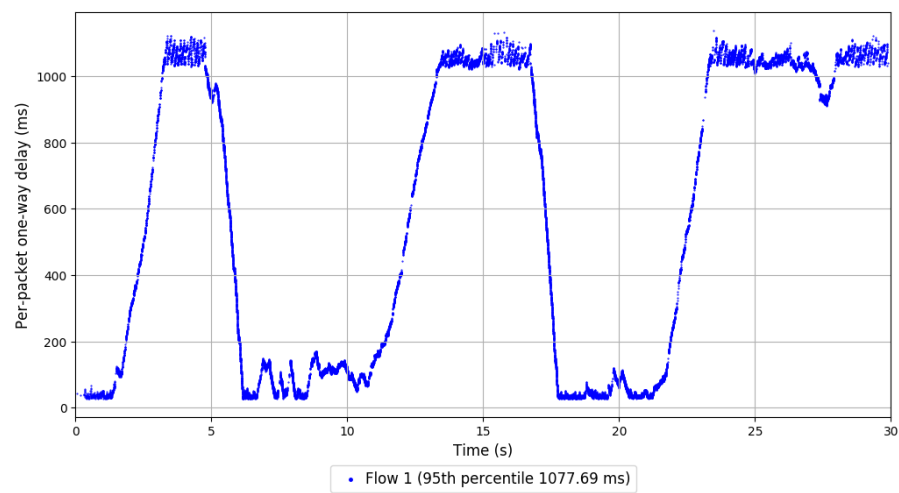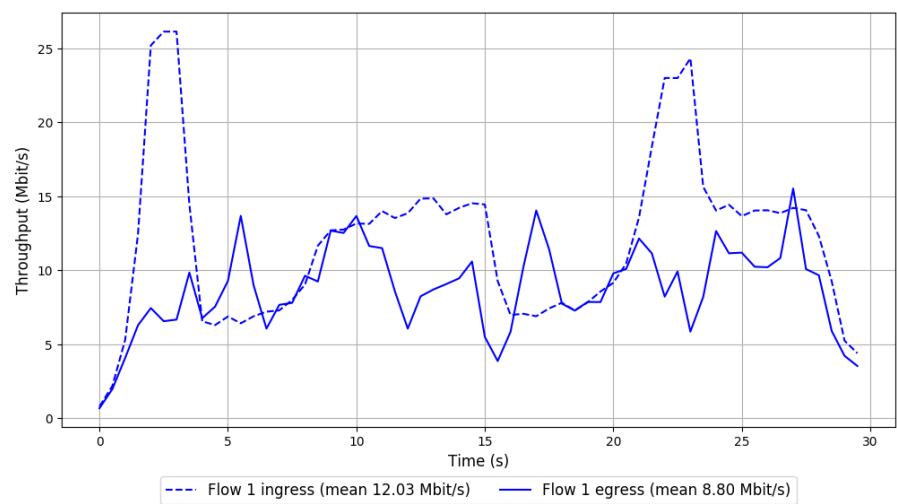
Run 1: Report of Vivace-loss — Data Link

```
Run 2: Statistics of Vivace-loss

Start at: 2018-02-17 02:19:33
End at: 2018-02-17 02:20:03
Local clock offset: -6.577 ms
Remote clock offset: -13.482 ms


# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.40 Mbit/s
95th percentile per-packet one-way delay: 1093.932 ms
Loss rate: 46.32%
-- Flow 1:
Average throughput: 3.40 Mbit/s
95th percentile per-packet one-way delay: 1093.932 ms
Loss rate: 46.32%
```
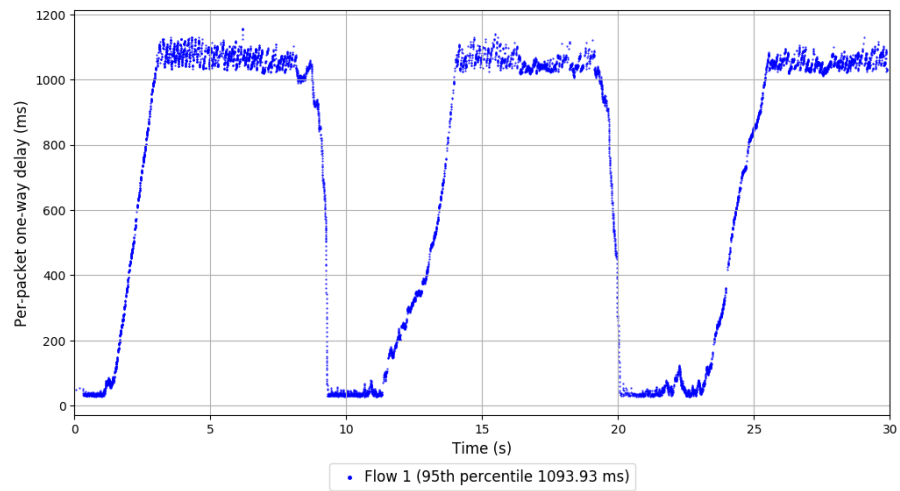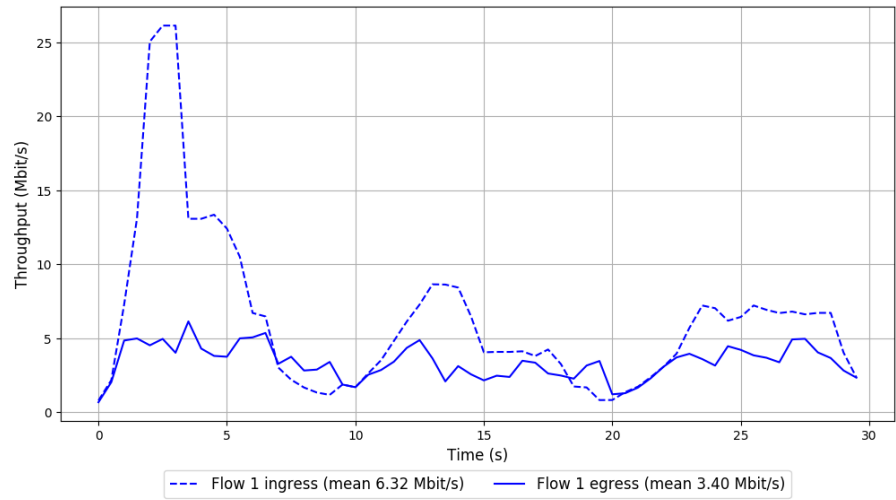
Run 2: Report of Vivace-loss — Data Link

```
Run 3: Statistics of Vivace-loss

Start at: 2018-02-17 02:39:11
End at: 2018-02-17 02:39:41
Local clock offset: -9.38 ms
Remote clock offset: -16.291 ms


# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.40 Mbit/s
95th percentile per-packet one-way delay: 1075.130 ms
Loss rate: 24.00%
-- Flow 1:
Average throughput: 7.40 Mbit/s
95th percentile per-packet one-way delay: 1075.130 ms
Loss rate: 24.00%
```
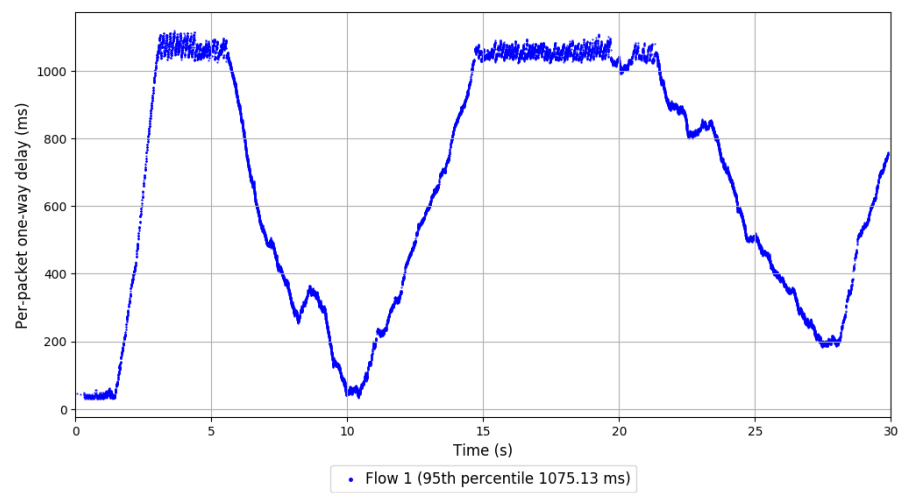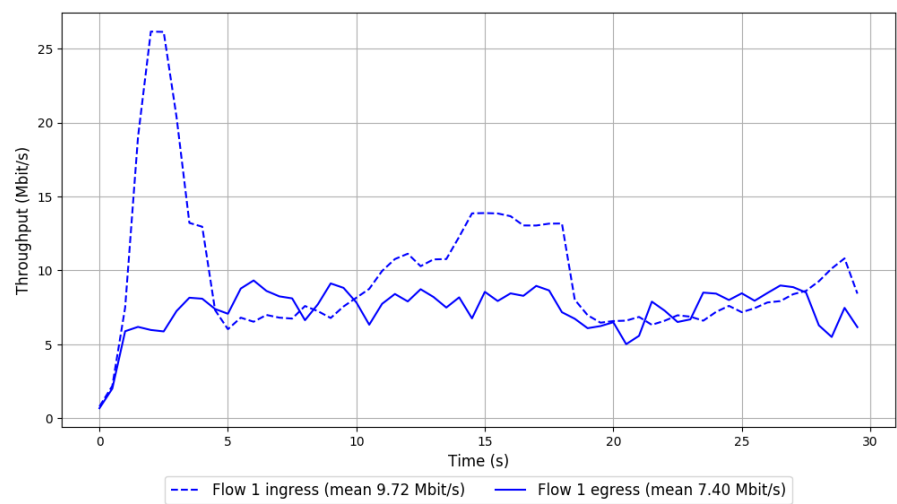
Run 3: Report of Vivace-loss — Data Link

Flow 1 ingress (mean 9.72 Mbit/s) --- Flow 1 egress (mean 7.40 Mbit/s)

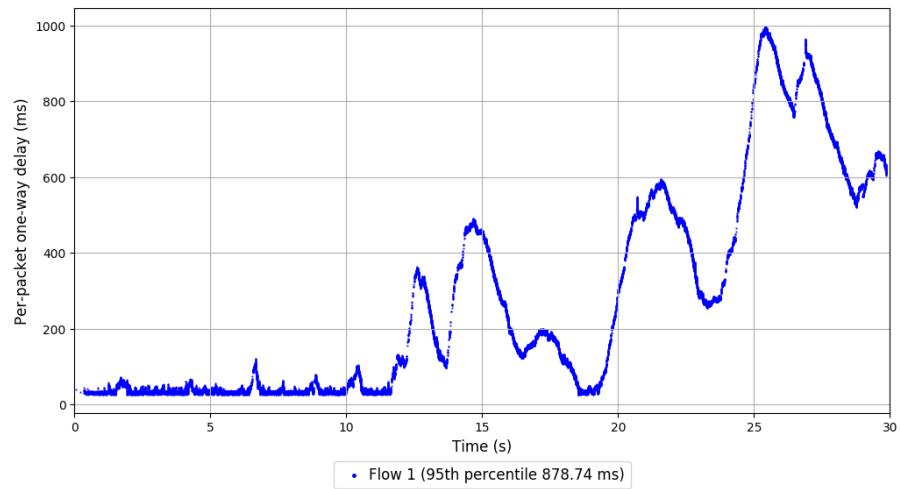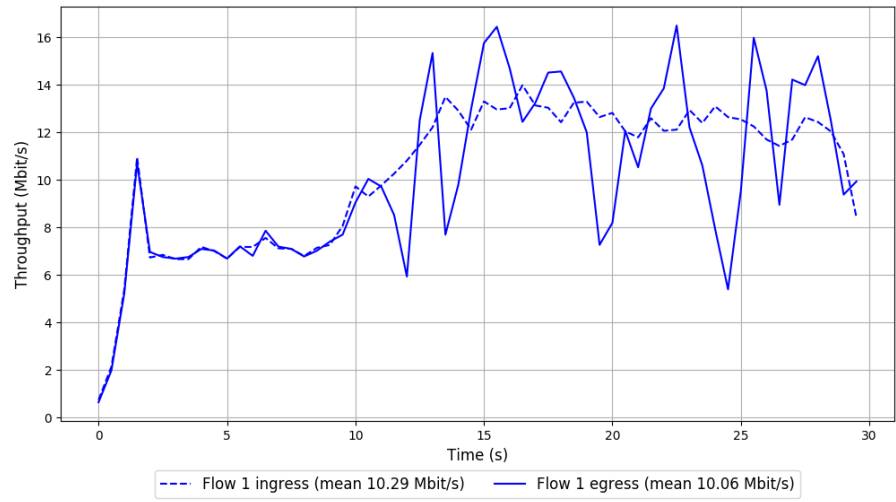

Flow 1 (95th percentile 1075.13 ms)

```
Run 1: Statistics of Vivace-LTE

Start at: 2018-02-17 01:56:29
End at: 2018-02-17 01:56:59
Local clock offset: -5.235 ms
Remote clock offset: -3.406 ms

# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 10.06 Mbit/s
95th percentile per-packet one-way delay: 878.744 ms
Loss rate: 2.42%
-- Flow 1:
Average throughput: 10.06 Mbit/s
95th percentile per-packet one-way delay: 878.744 ms
Loss rate: 2.42%
```

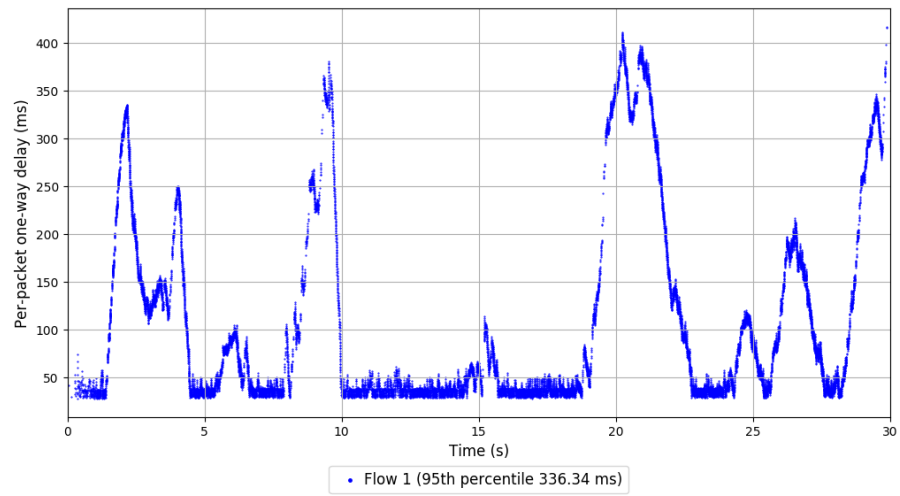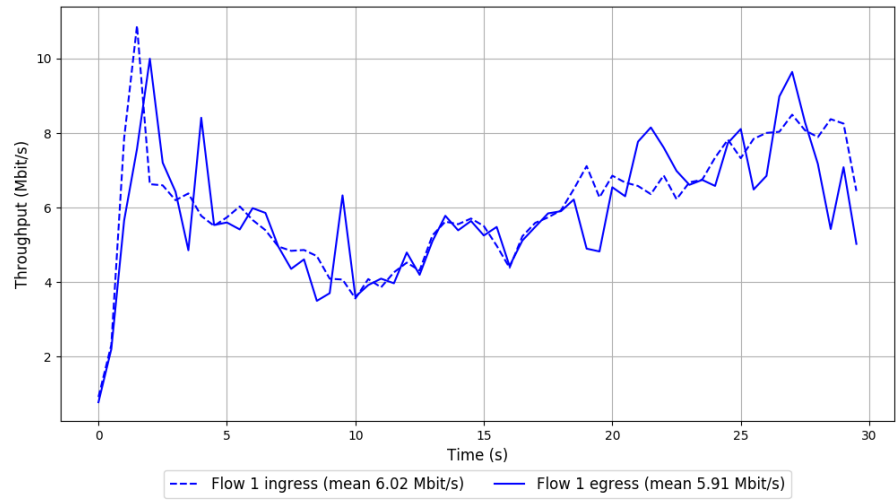# Run 1: Report of Vivace-LTE — Data Link

```
Run 2: Statistics of Vivace-LTE

Start at: 2018-02-17 02:16:16
End at: 2018-02-17 02:16:46
Local clock offset: -9.084 ms
Remote clock offset: -14.662 ms


# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.91 Mbit/s
95th percentile per-packet one-way delay: 336.337 ms
Loss rate: 2.03%
-- Flow 1:
Average throughput: 5.91 Mbit/s
95th percentile per-packet one-way delay: 336.337 ms
Loss rate: 2.03%
```

Run 2: Report of Vivace-LTE — Data Link

```
Run 3: Statistics of Vivace-LTE

Start at: 2018-02-17 02:35:54
End at: 2018-02-17 02:36:24
Local clock offset: -7.45 ms
Remote clock offset: -14.757 ms


# Below is generated by plot.py at 2018-02-17 02:44:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 4.76 Mbit/s
95th percentile per-packet one-way delay: 166.443 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 4.76 Mbit/s
95th percentile per-packet one-way delay: 166.443 ms
Loss rate: 0.21%
```

Run 3: Report of Vivace-LTE — Data Link