Pantheon Report

Generated at 2017-12-20 17:51:24 (UTC).

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

Repeated the test of 14 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

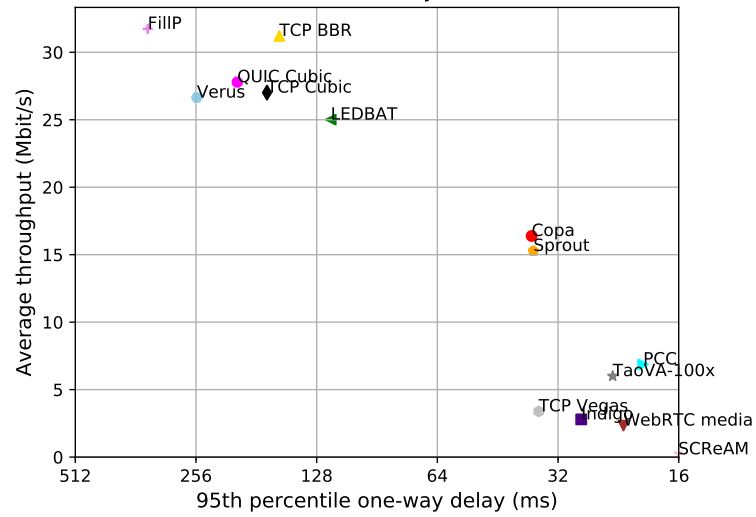Increased UDP receive buffer to 16 MB (default) and 32 MB (max).

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

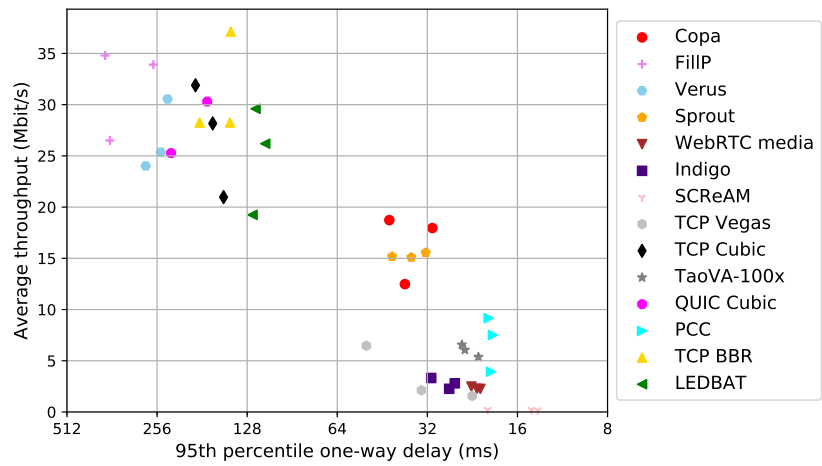NTP offsets were measured against `time.stanford.edu` and have been applied to correct the timestamps in logs.

```
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 California 1 Ethernet to Stanford ppp0, 3 runs of 30s each per scheme
(mean of all runs by scheme)

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

2

scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	31.21	158.60	0.29
TCP Cubic	3	27.01	170.25	0.24
LEDBAT	3	25.01	118.08	0.18
PCC	3	6.86	19.63	0.00
QUIC Cubic	2	27.79	201.98	0.36
SCReAM	3	0.21	16.05	0.00
WebRTC media	3	2.33	21.98	0.00
Sprout	3	15.28	36.86	0.01
TaoVA-100x	3	6.00	23.38	0.00
TCP Vegas	3	3.38	35.76	0.02
Verus	3	26.65	254.75	5.39
Copa	3	16.39	37.24	0.01
FillP	3	31.73	337.77	43.24
Indigo	3	2.79	28.01	0.00

```
Run 1: Statistics of TCP BBR

Start at: 2017-12-20 17:02:56
End at: 2017-12-20 17:03:26
Local clock offset: 0.193 ms
Remote clock offset: -2.443 ms

# Below is generated by plot.py at 2017-12-20 17:50:13
# Datalink statistics
-- Total of 1 flow:
Average throughput: 28.26 Mbit/s
95th percentile per-packet one-way delay: 146.112 ms
Loss rate: 0.33%
-- Flow 1:
Average throughput: 28.26 Mbit/s
95th percentile per-packet one-way delay: 146.112 ms
Loss rate: 0.33%
```
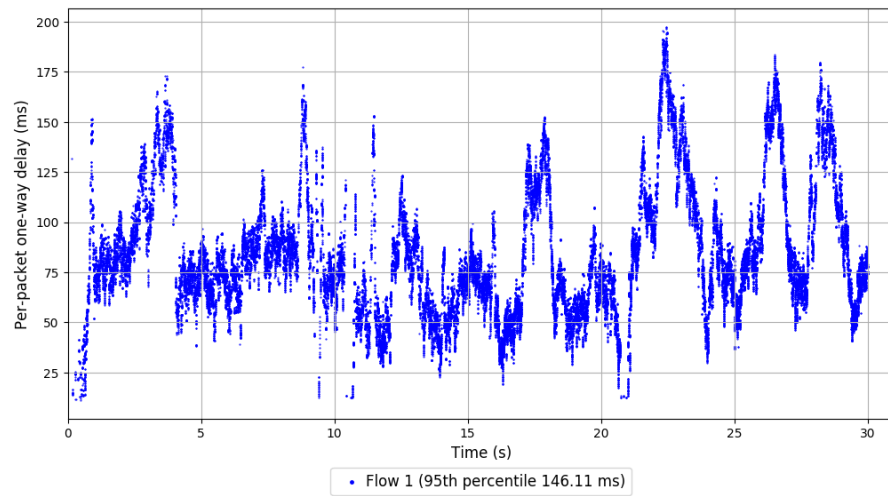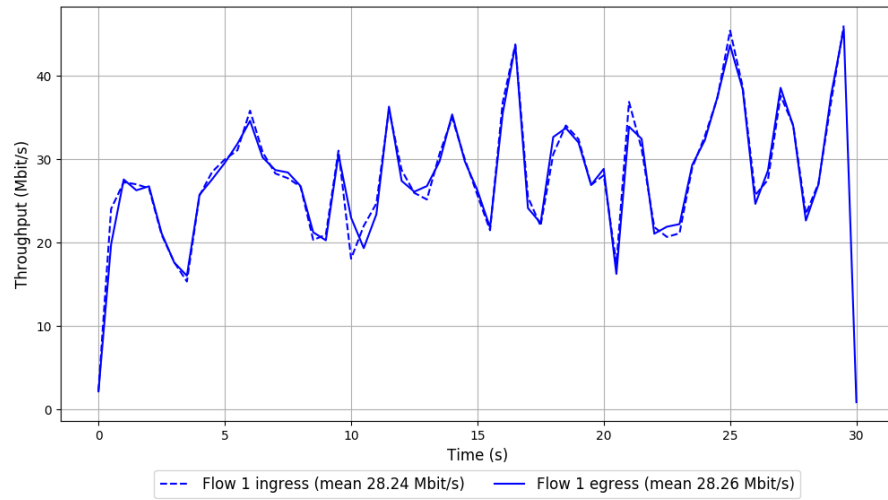
Run 1: Report of TCP BBR — Data Link

```
Run 2: Statistics of TCP BBR

Start at: 2017-12-20 17:20:39
End at: 2017-12-20 17:21:09
Local clock offset: 0.424 ms
Remote clock offset: -2.172 ms


# Below is generated by plot.py at 2017-12-20 17:50:24
# Datalink statistics
-- Total of 1 flow:
Average throughput: 37.13 Mbit/s
95th percentile per-packet one-way delay: 145.166 ms
Loss rate: 0.19%
-- Flow 1:
Average throughput: 37.13 Mbit/s
95th percentile per-packet one-way delay: 145.166 ms
Loss rate: 0.19%
```
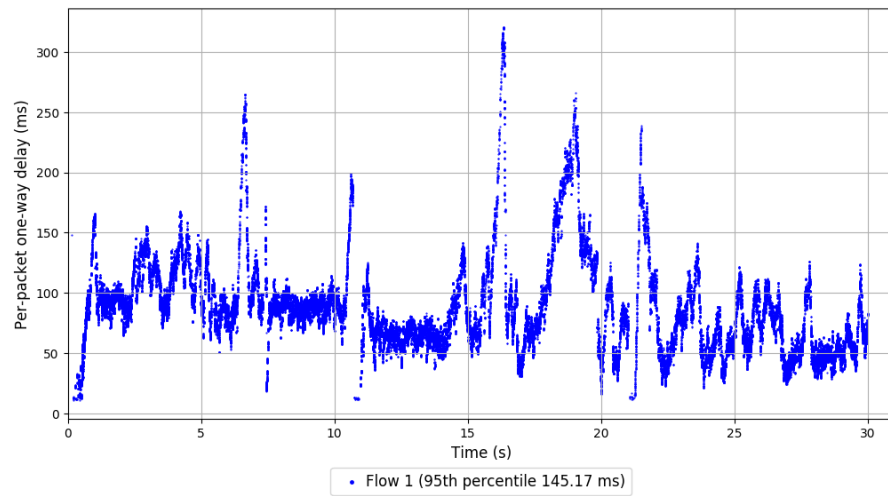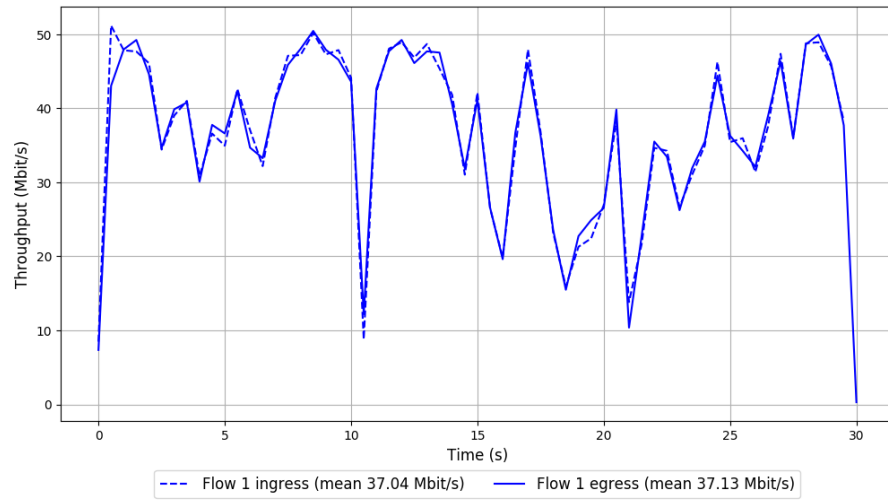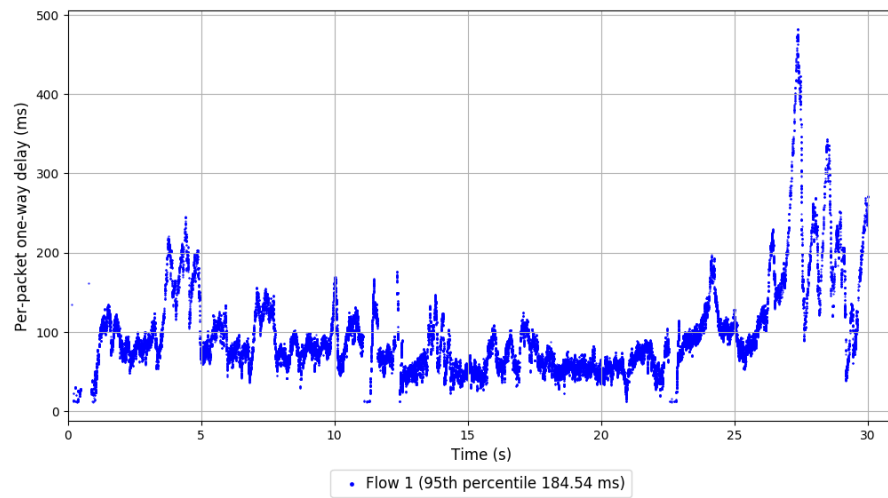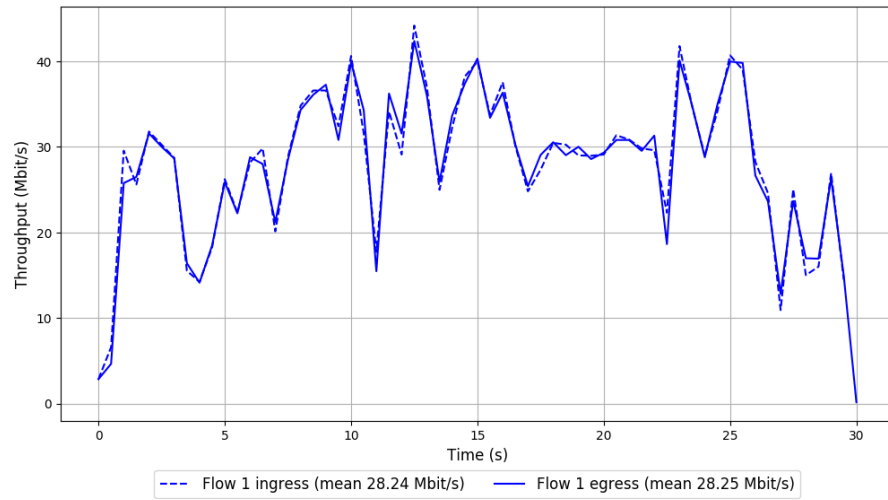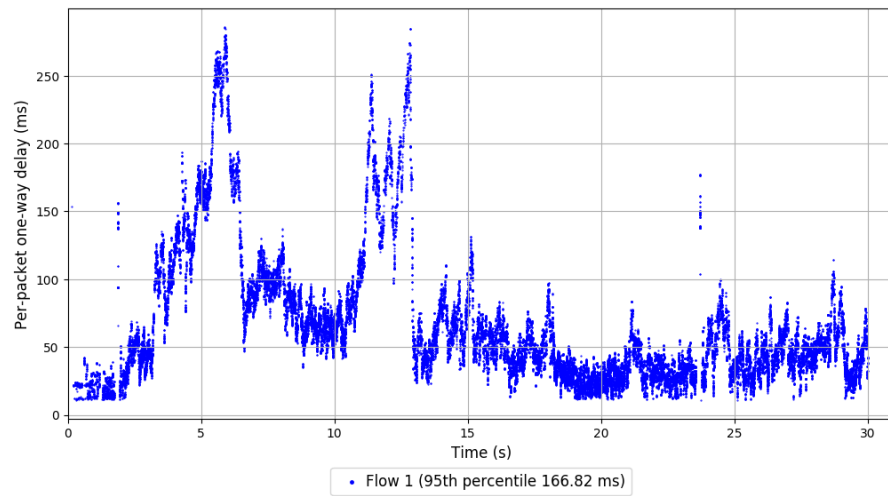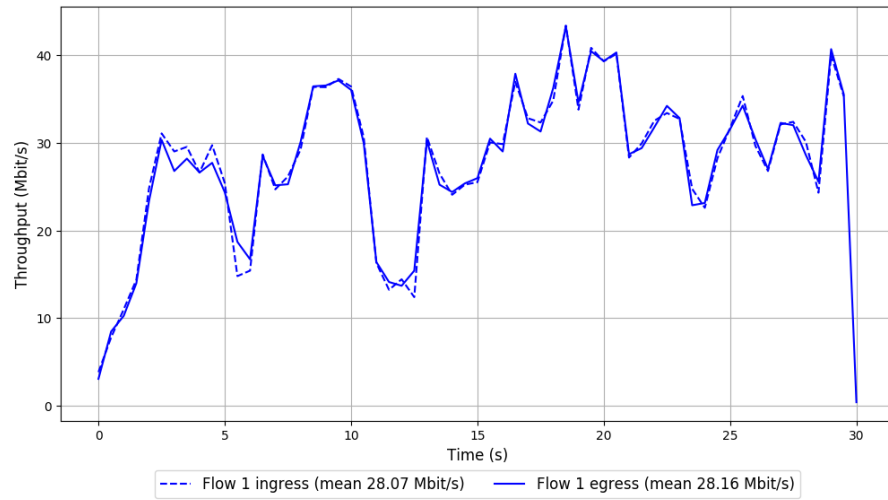
Run 2: Report of TCP BBR — Data Link

Flow 1 ingress (mean 37.04 Mbit/s) --- Flow 1 egress (mean 37.13 Mbit/s)

Flow 1 (95th percentile 145.17 ms)

```
Run 3: Statistics of TCP BBR

Start at: 2017-12-20 17:38:26
End at: 2017-12-20 17:38:56
Local clock offset: 0.549 ms
Remote clock offset: -2.305 ms


# Below is generated by plot.py at 2017-12-20 17:50:24
# Datalink statistics
-- Total of 1 flow:
Average throughput: 28.25 Mbit/s
95th percentile per-packet one-way delay: 184.536 ms
Loss rate: 0.36%
-- Flow 1:
Average throughput: 28.25 Mbit/s
95th percentile per-packet one-way delay: 184.536 ms
Loss rate: 0.36%
```
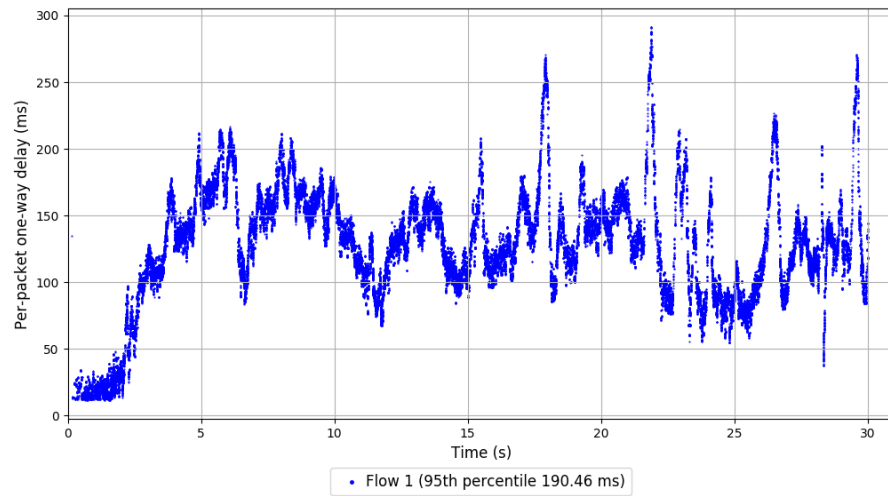
Run 3: Report of TCP BBR — Data Link

```
Run 1: Statistics of TCP Cubic

Start at: 2017-12-20 17:04:07
End at: 2017-12-20 17:04:38
Local clock offset: 0.217 ms
Remote clock offset: -2.472 ms


# Below is generated by plot.py at 2017-12-20 17:50:24
# Datalink statistics
-- Total of 1 flow:
Average throughput: 28.16 Mbit/s
95th percentile per-packet one-way delay: 166.822 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 28.16 Mbit/s
95th percentile per-packet one-way delay: 166.822 ms
Loss rate: 0.12%
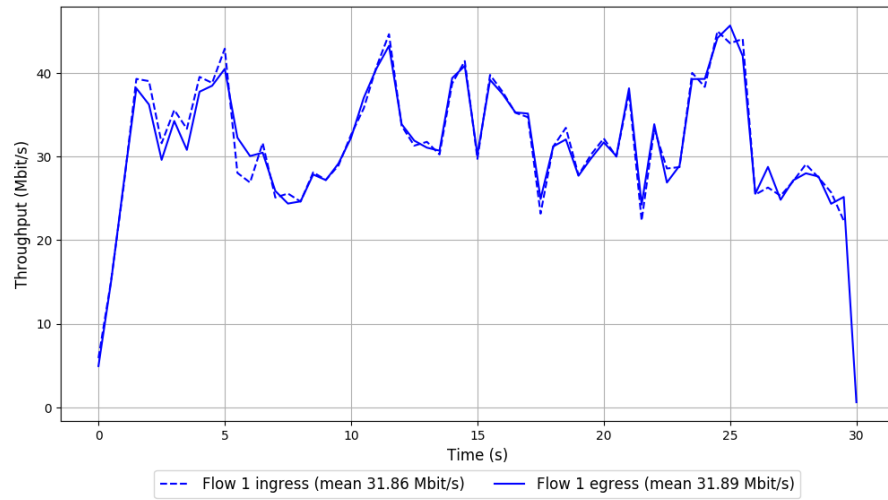```
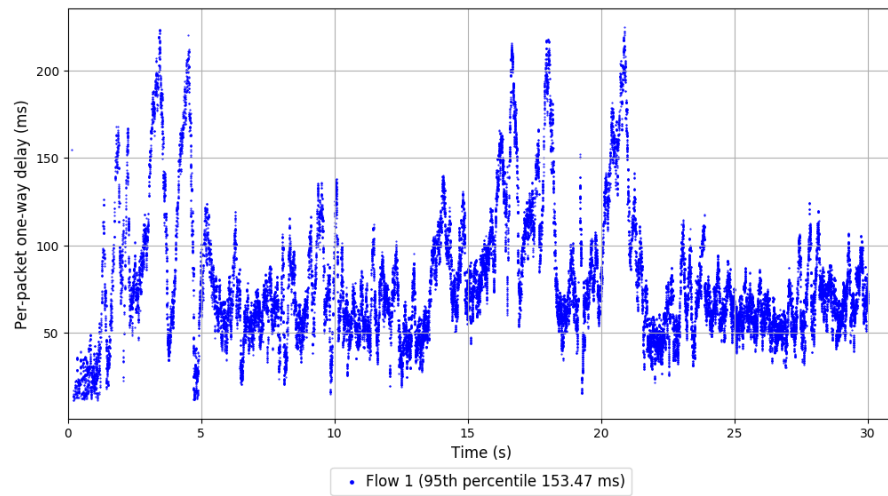
Run 1: Report of TCP Cubic — Data Link

```
Run 2: Statistics of TCP Cubic

Start at: 2017-12-20 17:21:51
End at: 2017-12-20 17:22:21
Local clock offset: 0.319 ms
Remote clock offset: -2.245 ms

Below is generated by plot.py at 2017-12-20 17:50:24
Datalink statistics
-- Total of 1 flow:
Average throughput: 31.89 Mbit/s
95th percentile per-packet one-way delay: 190.457 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 31.89 Mbit/s
95th percentile per-packet one-way delay: 190.457 ms
Loss rate: 0.29%
```
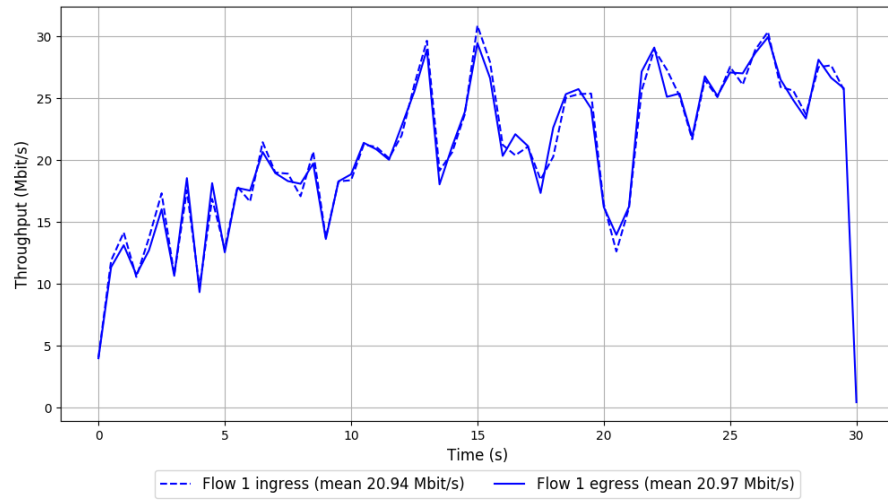
Run 2: Report of TCP Cubic — Data Link

```
Run 3: Statistics of TCP Cubic

Start at: 2017-12-20 17:39:38
End at: 2017-12-20 17:40:08
Local clock offset: 0.49 ms
Remote clock offset: -2.329 ms


# Below is generated by plot.py at 2017-12-20 17:50:24
# Datalink statistics
-- Total of 1 flow:
Average throughput: 20.97 Mbit/s
95th percentile per-packet one-way delay: 153.472 ms
Loss rate: 0.30%
-- Flow 1:
Average throughput: 20.97 Mbit/s
95th percentile per-packet one-way delay: 153.472 ms
Loss rate: 0.30%
```

Run 3: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 20.94 Mbit/s)   Flow 1 egress (mean 20.97 Mbit/s)

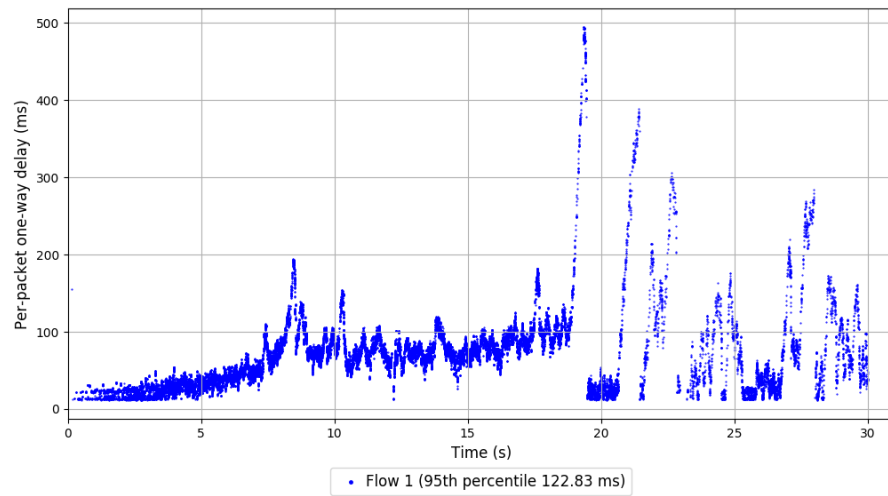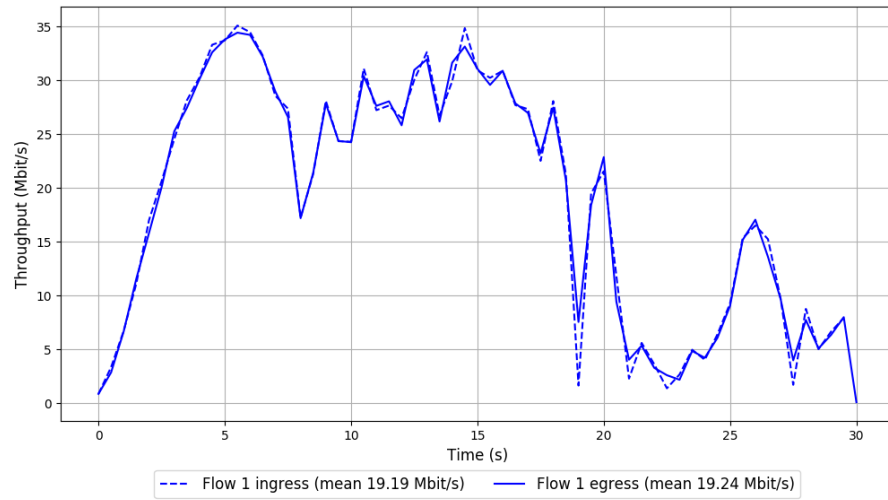

Flow 1 (95th percentile 153.47 ms)

```
Run 1: Statistics of LEDBAT

Start at: 2017-12-20 16:57:01
End at: 2017-12-20 16:57:31
Local clock offset: 0.175 ms
Remote clock offset: -2.572 ms

# Below is generated by plot.py at 2017-12-20 17:50:24
# Datalink statistics
-- Total of 1 flow:
Average throughput: 19.24 Mbit/s
95th percentile per-packet one-way delay: 122.834 ms
Loss rate: 0.11%
-- Flow 1:
Average throughput: 19.24 Mbit/s
95th percentile per-packet one-way delay: 122.834 ms
Loss rate: 0.11%
```

Run 1: Report of LEDBAT — Data Link

```
Run 2: Statistics of LEDBAT

Start at: 2017-12-20 17:14:44
End at: 2017-12-20 17:15:14
Local clock offset: 0.265 ms
Remote clock offset: -2.26 ms


# Below is generated by plot.py at 2017-12-20 17:50:24
# Datalink statistics
-- Total of 1 flow:
Average throughput: 26.19 Mbit/s
95th percentile per-packet one-way delay: 111.371 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 26.19 Mbit/s
95th percentile per-packet one-way delay: 111.371 ms
Loss rate: 0.16%
```
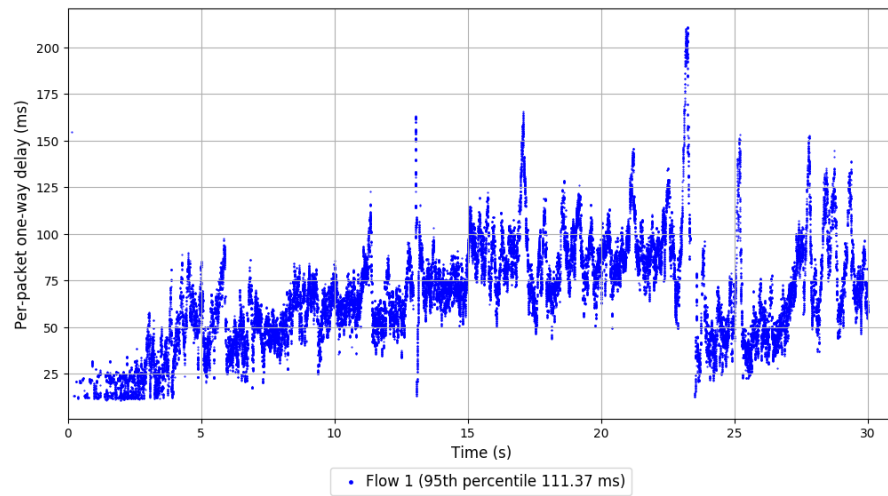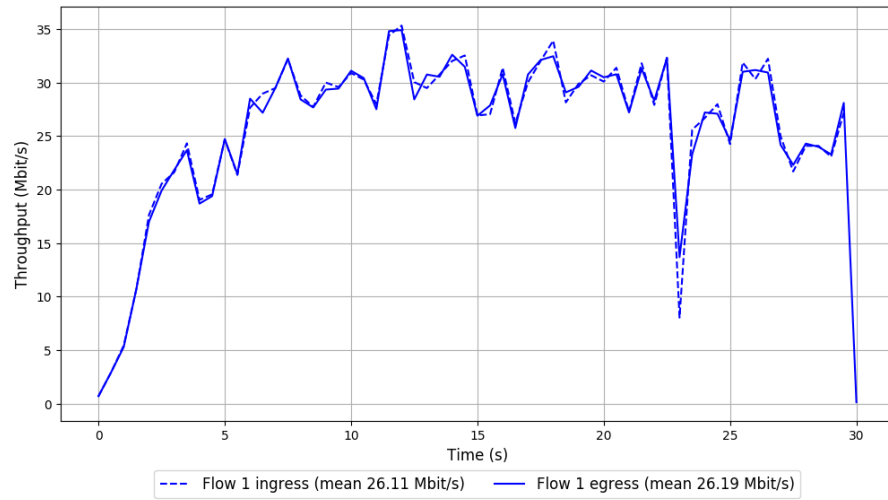
Run 2: Report of LEDBAT — Data Link

Flow 1 ingress (mean 26.11 Mbit/s)   Flow 1 egress (mean 26.19 Mbit/s)

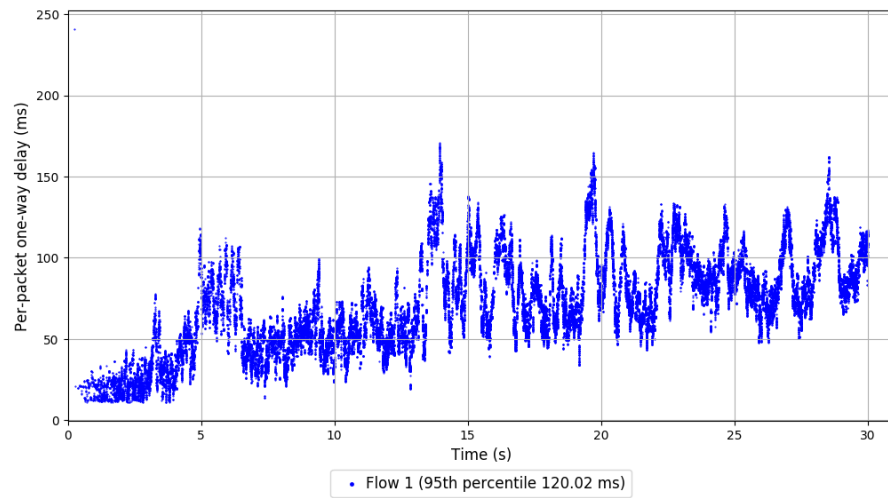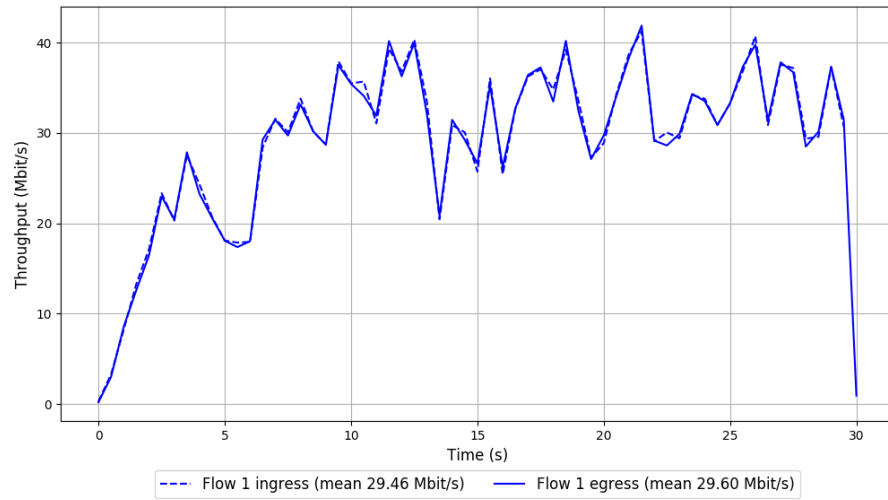Flow 1 (95th percentile 111.37 ms)

```
Run 3: Statistics of LEDBAT

Start at: 2017-12-20 17:32:31
End at: 2017-12-20 17:33:01
Local clock offset: 0.419 ms
Remote clock offset: -2.329 ms

# Below is generated by plot.py at 2017-12-20 17:50:39
# Datalink statistics
-- Total of 1 flow:
Average throughput: 29.60 Mbit/s
95th percentile per-packet one-way delay: 120.023 ms
Loss rate: 0.28%
-- Flow 1:
Average throughput: 29.60 Mbit/s
95th percentile per-packet one-way delay: 120.023 ms
Loss rate: 0.28%
```

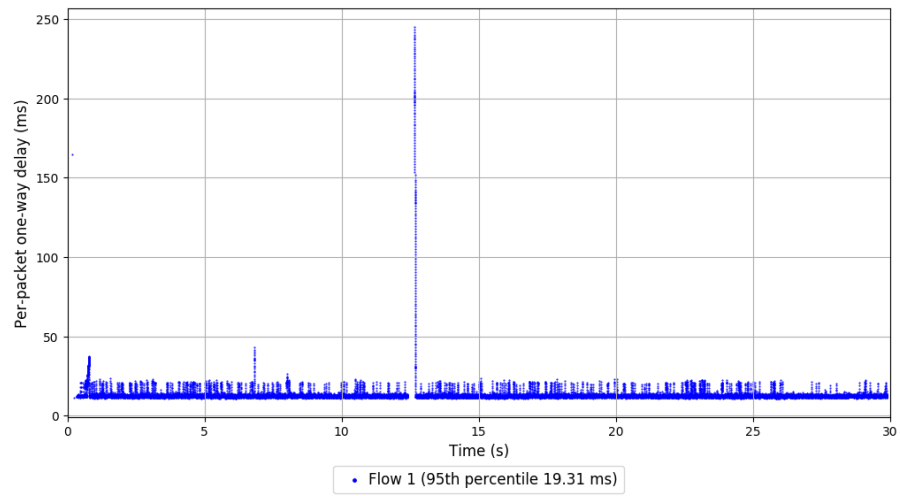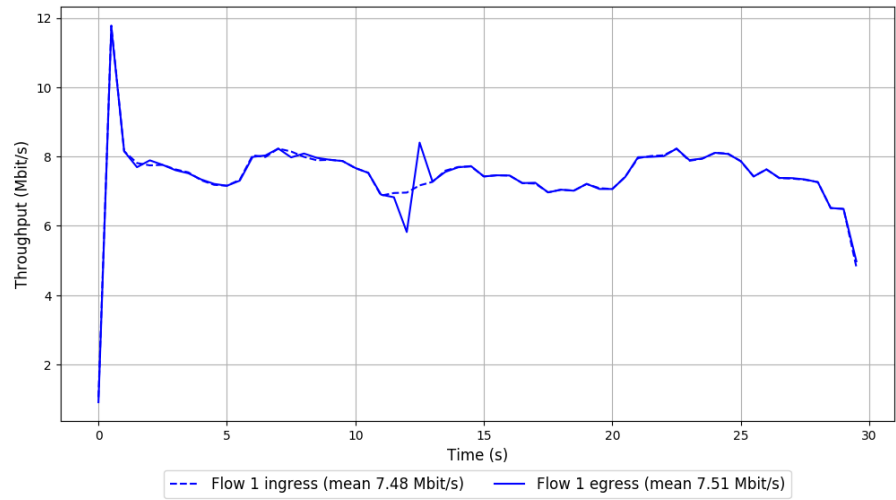Run 3: Report of LEDBAT — Data Link

```
Run 1: Statistics of PCC

Start at: 2017-12-20 16:59:25
End at: 2017-12-20 16:59:55
Local clock offset: 0.169 ms
Remote clock offset: -2.476 ms

# Below is generated by plot.py at 2017-12-20 17:50:39
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.51 Mbit/s
95th percentile per-packet one-way delay: 19.313 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 7.51 Mbit/s
95th percentile per-packet one-way delay: 19.313 ms
Loss rate: 0.01%
```
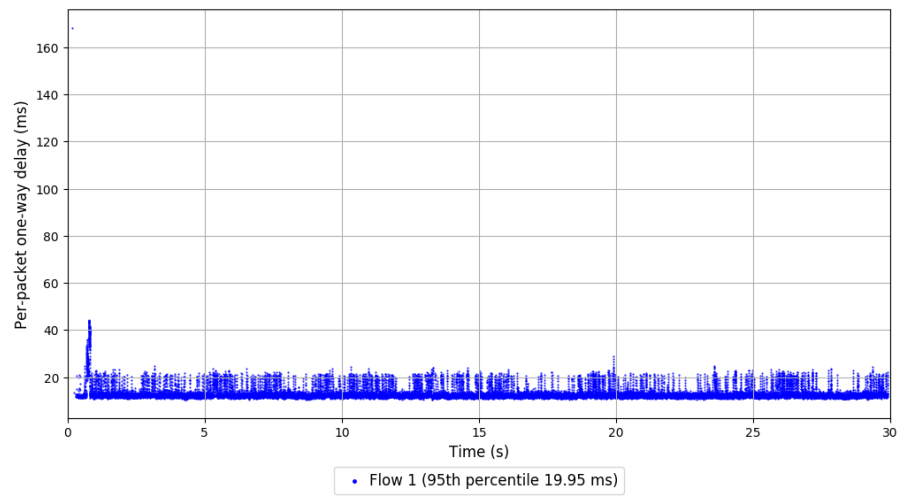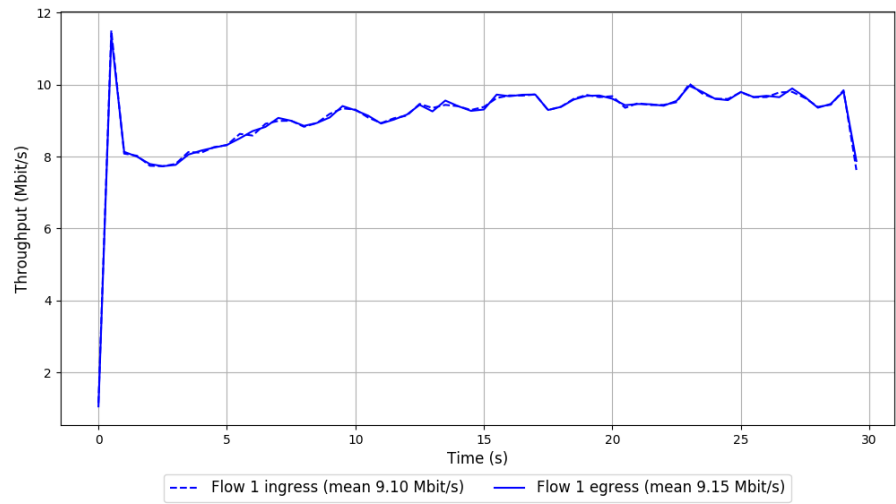
Run 1: Report of PCC — Data Link

```
Run 2: Statistics of PCC

Start at: 2017-12-20 17:17:07
End at: 2017-12-20 17:17:37
Local clock offset: 0.358 ms
Remote clock offset: -2.141 ms


# Below is generated by plot.py at 2017-12-20 17:50:39
# Datalink statistics
-- Total of 1 flow:
Average throughput: 9.15 Mbit/s
95th percentile per-packet one-way delay: 19.955 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 9.15 Mbit/s
95th percentile per-packet one-way delay: 19.955 ms
Loss rate: 0.00%
```

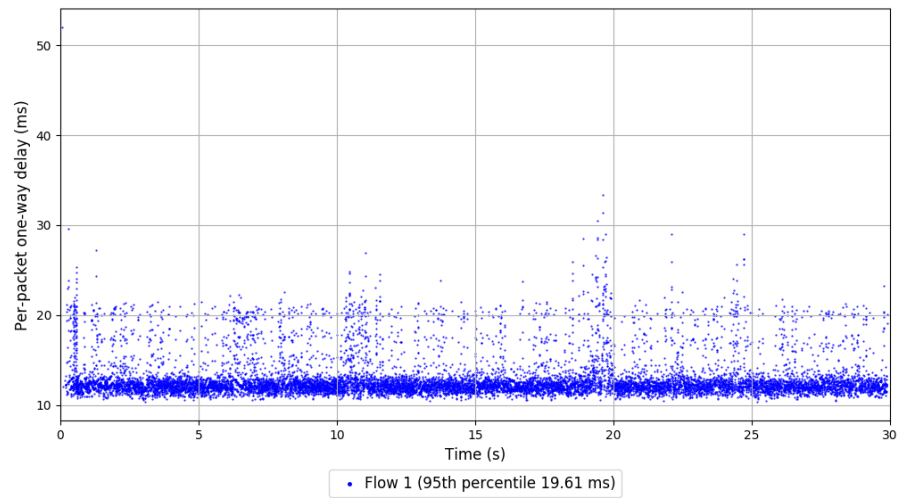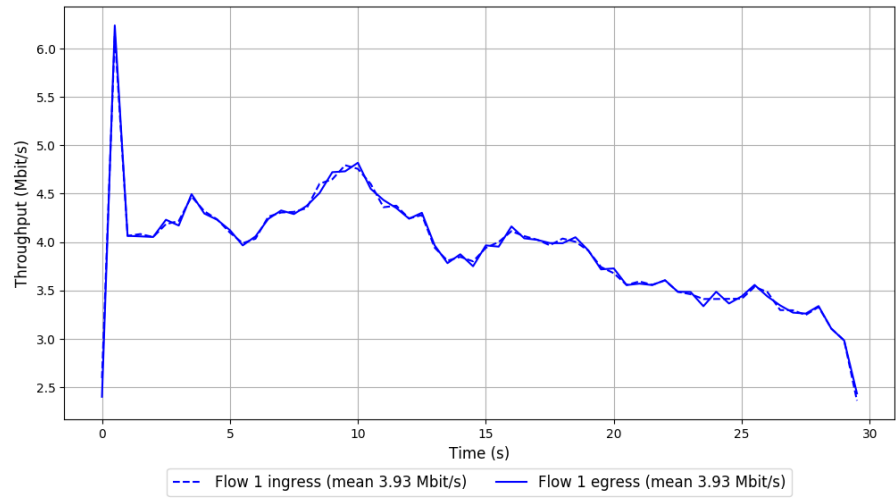Run 2: Report of PCC — Data Link

```
Run 3: Statistics of PCC

Start at: 2017-12-20 17:34:55
End at: 2017-12-20 17:35:25
Local clock offset: 0.521 ms
Remote clock offset: -2.319 ms


# Below is generated by plot.py at 2017-12-20 17:50:39
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.93 Mbit/s
95th percentile per-packet one-way delay: 19.609 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 3.93 Mbit/s
95th percentile per-packet one-way delay: 19.609 ms
Loss rate: 0.00%
```

Run 3: Report of PCC — Data Link

Flow 1 ingress (mean 3.93 Mbit/s)   Flow 1 egress (mean 3.93 Mbit/s)

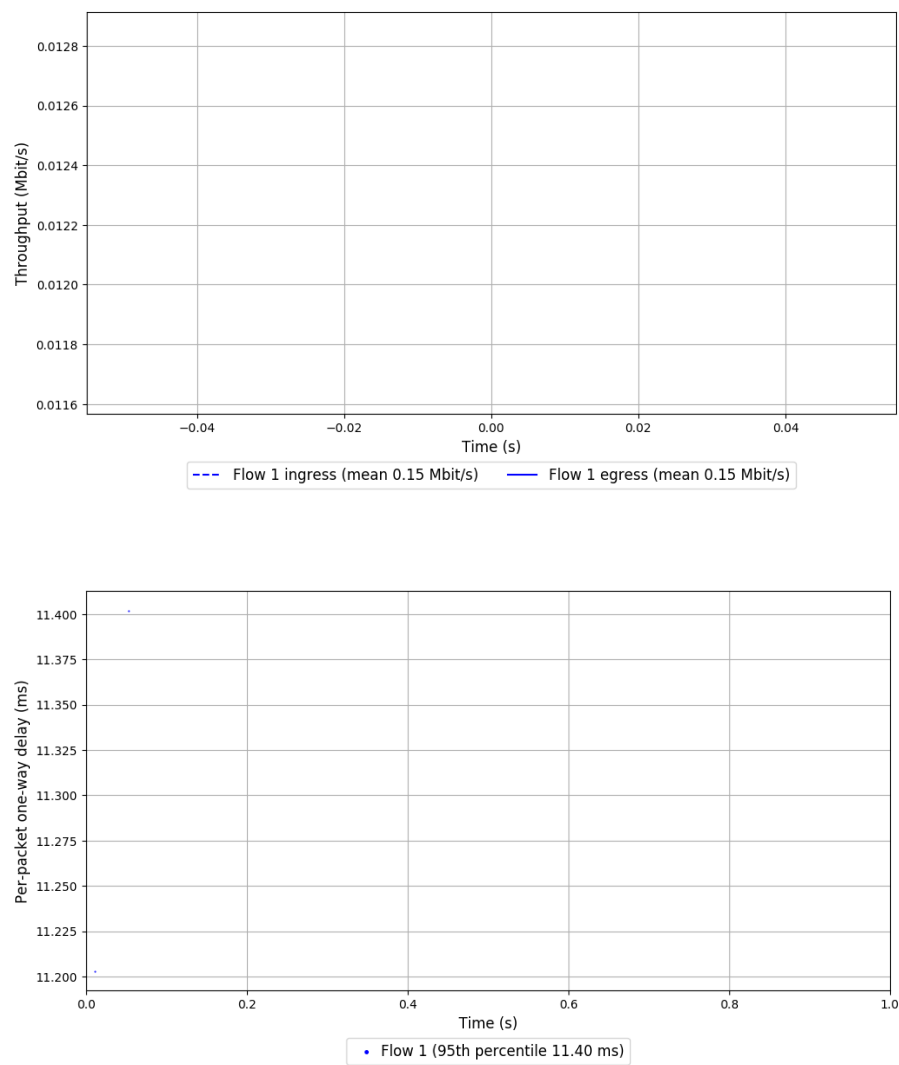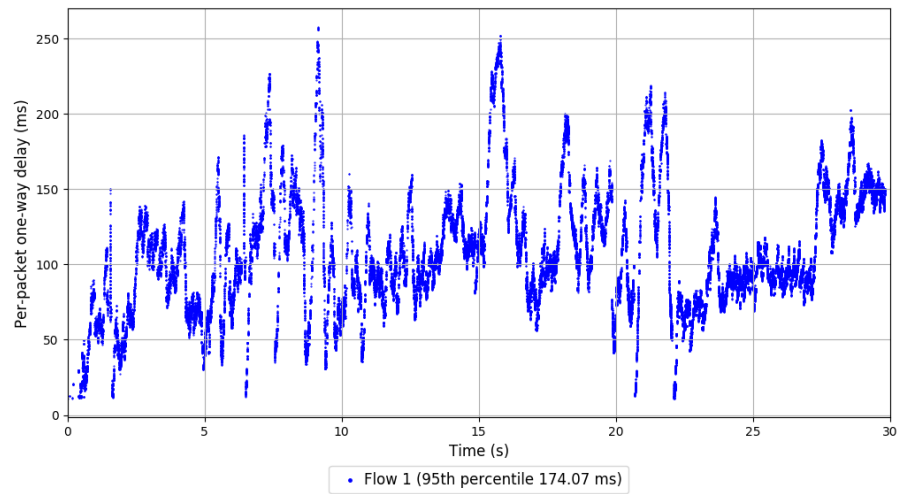• Flow 1 (95th percentile 19.61 ms)

```
Run 1: Statistics of QUIC Cubic

Start at: 2017-12-20 17:07:40
End at: 2017-12-20 17:08:10
Local clock offset: 0.23 ms
Remote clock offset: -2.387 ms
```

Run 1: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 0.15 Mbit/s)   Flow 1 egress (mean 0.15 Mbit/s)

Flow 1 (95th percentile 11.40 ms)

```
Run 2: Statistics of QUIC Cubic

Start at: 2017-12-20 17:25:25
End at: 2017-12-20 17:25:55
Local clock offset: 0.35 ms
Remote clock offset: -2.329 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 30.30 Mbit/s
95th percentile per-packet one-way delay: 174.069 ms
Loss rate: 0.58%
-- Flow 1:
Average throughput: 30.30 Mbit/s
95th percentile per-packet one-way delay: 174.069 ms
Loss rate: 0.58%
```
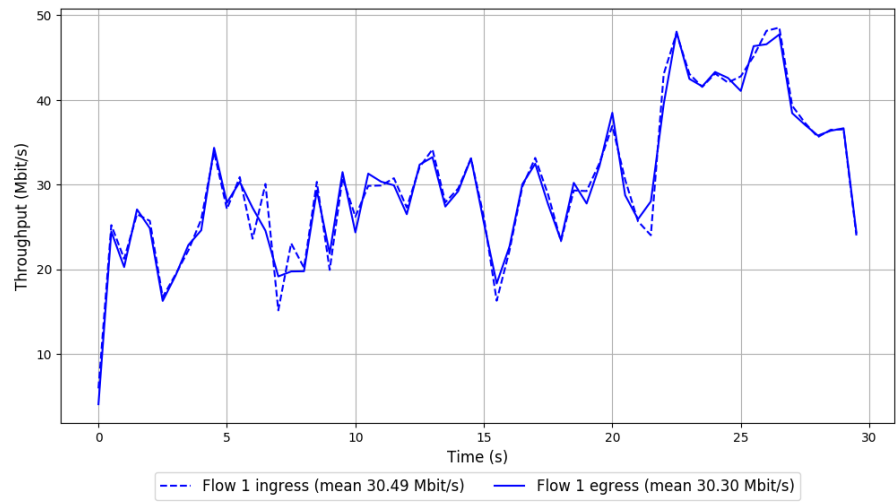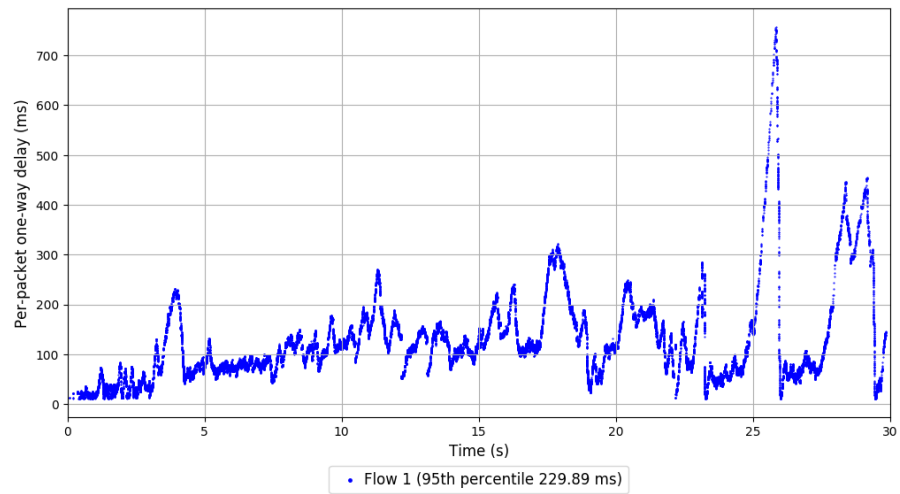
Run 2: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 30.49 Mbit/s) --- Flow 1 egress (mean 30.30 Mbit/s)

• Flow 1 (95th percentile 174.07 ms)

```
Run 3: Statistics of QUIC Cubic

Start at: 2017-12-20 17:43:10
End at: 2017-12-20 17:43:41
Local clock offset: 0.49 ms
Remote clock offset: -2.352 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 25.27 Mbit/s
95th percentile per-packet one-way delay: 229.890 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 25.27 Mbit/s
95th percentile per-packet one-way delay: 229.890 ms
Loss rate: 0.15%
```
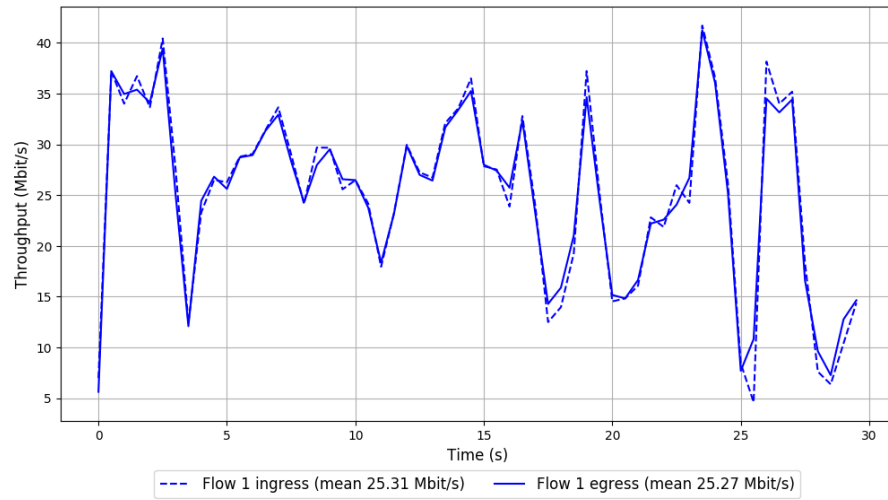
Run 3: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 25.31 Mbit/s) --- Flow 1 egress (mean 25.27 Mbit/s)
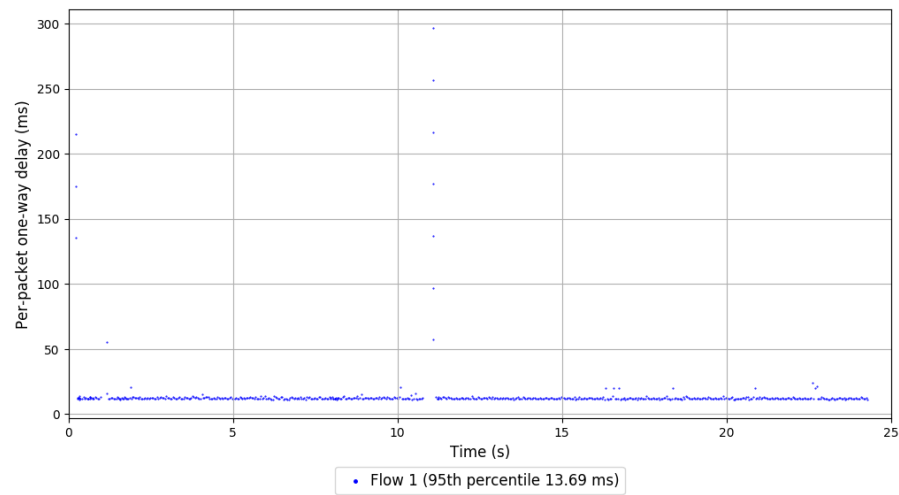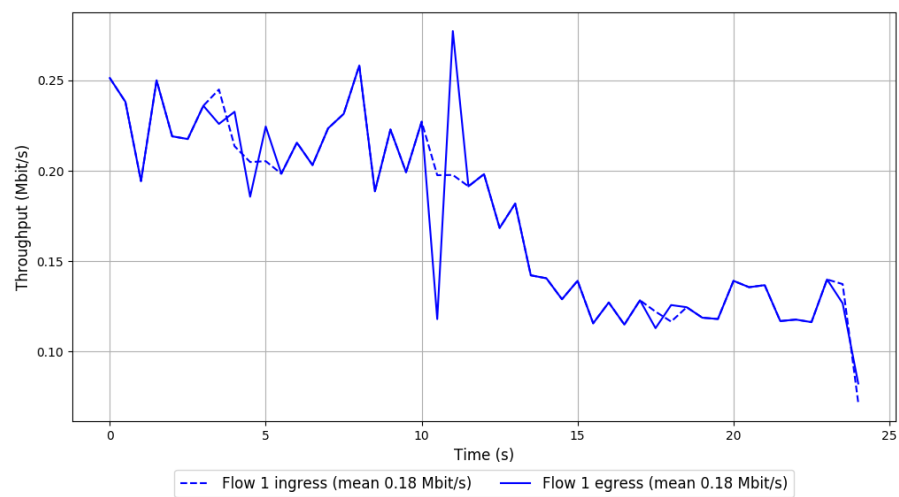

Flow 1 (95th percentile 229.89 ms)

```
Run 1: Statistics of SCReAM

Start at: 2017-12-20 17:06:30
End at: 2017-12-20 17:07:00
Local clock offset: 0.23 ms
Remote clock offset: -2.417 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 13.687 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 13.687 ms
Loss rate: 0.00%
```

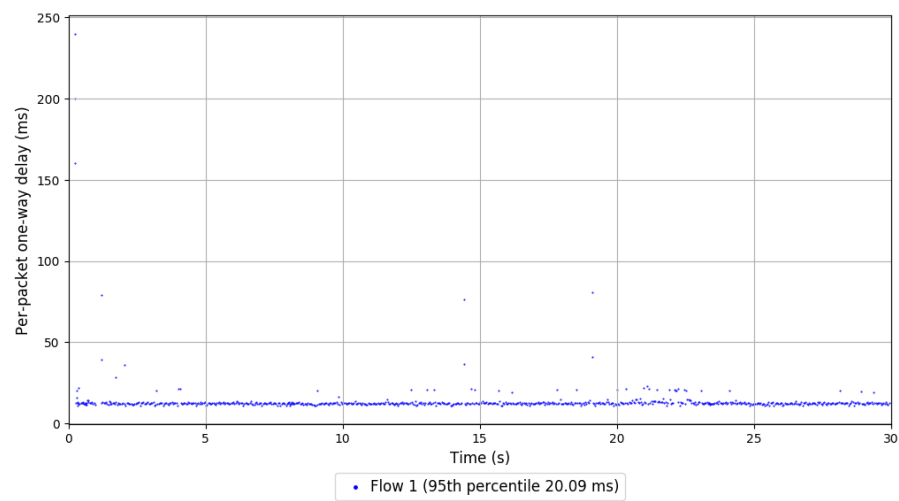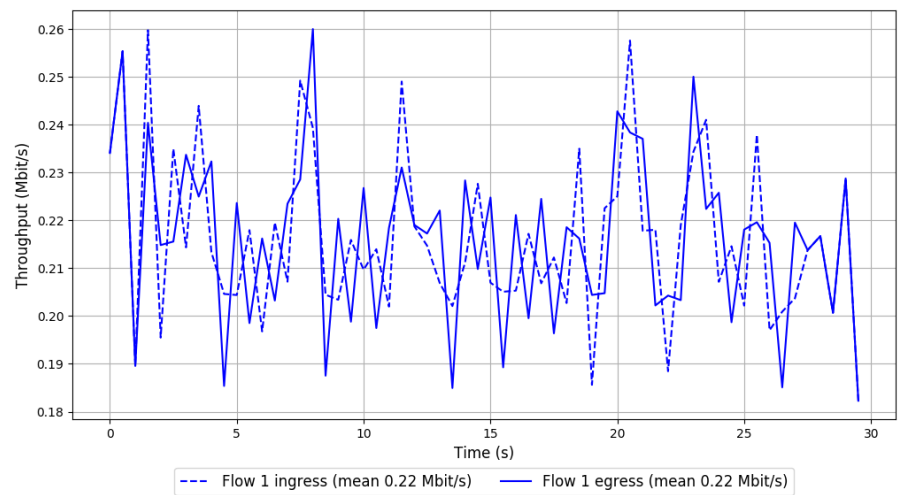Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2017-12-20 17:24:15
End at: 2017-12-20 17:24:45
Local clock offset: 0.427 ms
Remote clock offset: -2.243 ms

# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.089 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.089 ms
Loss rate: 0.00%
```

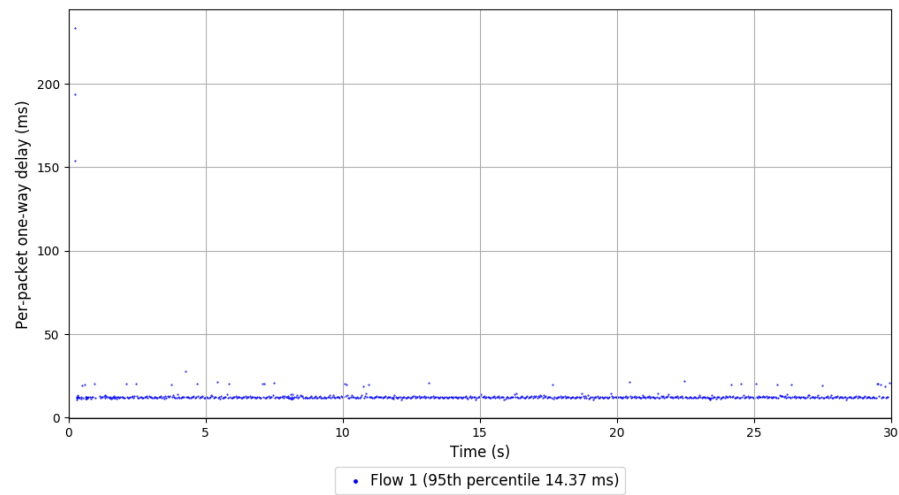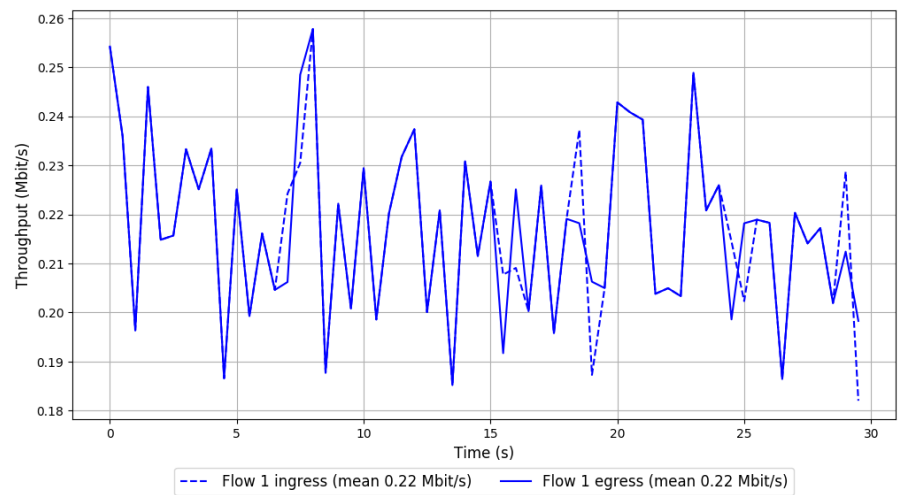Run 2: Report of SCReAM — Data Link

```
Run 3: Statistics of SCReAM

Start at: 2017-12-20 17:42:00
End at: 2017-12-20 17:42:30
Local clock offset: 0.51 ms
Remote clock offset: -2.266 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 14.368 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 14.368 ms
Loss rate: 0.00%
```

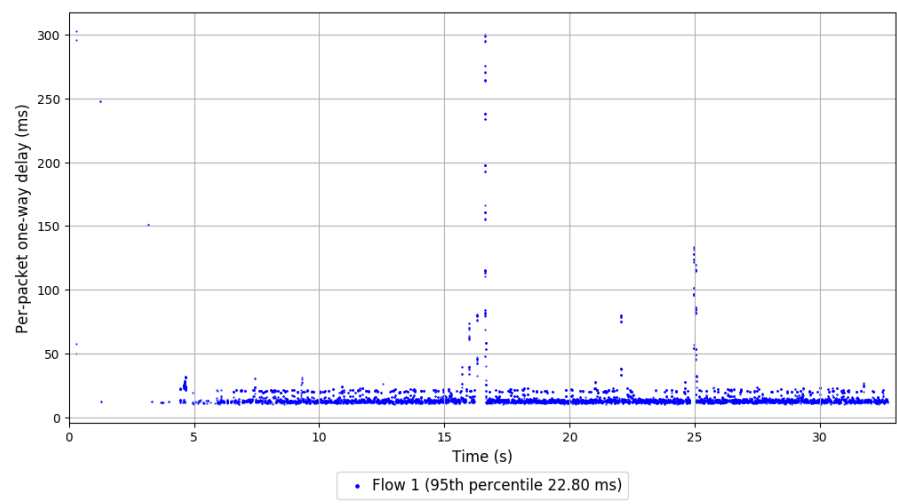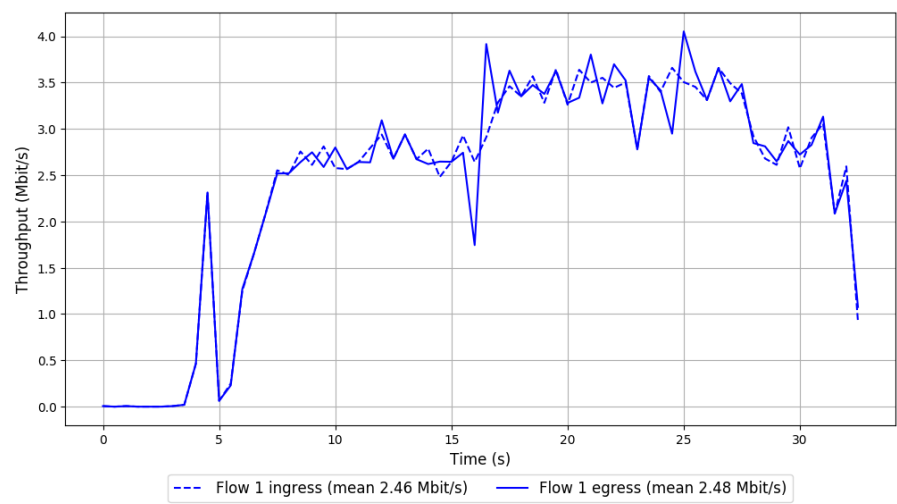Run 3: Report of SCReAM — Data Link

```
Run 1: Statistics of WebRTC media

Start at: 2017-12-20 17:11:11
End at: 2017-12-20 17:11:41
Local clock offset: 0.332 ms
Remote clock offset: -2.236 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.48 Mbit/s
95th percentile per-packet one-way delay: 22.803 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 2.48 Mbit/s
95th percentile per-packet one-way delay: 22.803 ms
Loss rate: 0.01%
```
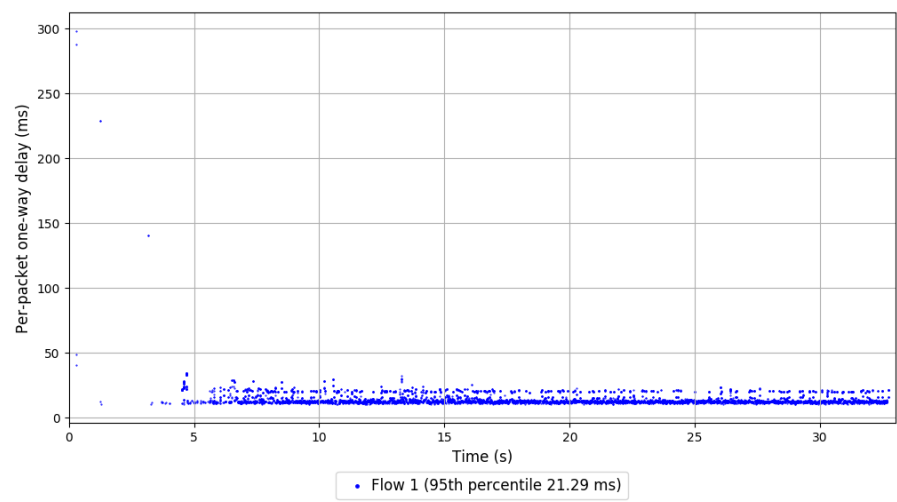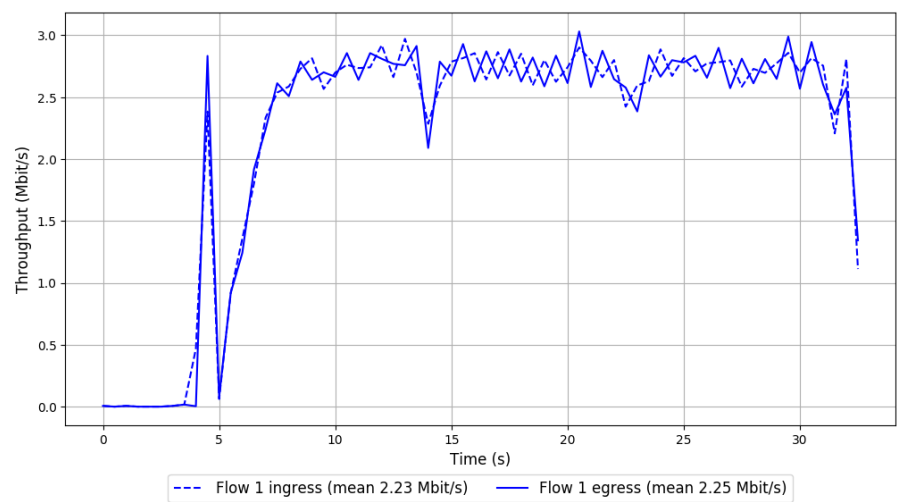
Run 1: Report of WebRTC media — Data Link

```
Run 2: Statistics of WebRTC media

Start at: 2017-12-20 17:28:58
End at: 2017-12-20 17:29:28
Local clock offset: 0.403 ms
Remote clock offset: -2.235 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.25 Mbit/s
95th percentile per-packet one-way delay: 21.285 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.25 Mbit/s
95th percentile per-packet one-way delay: 21.285 ms
Loss rate: 0.00%
```

Run 2: Report of WebRTC media — Data Link

Flow 1 ingress (mean 2.23 Mbit/s) --- Flow 1 egress (mean 2.25 Mbit/s)

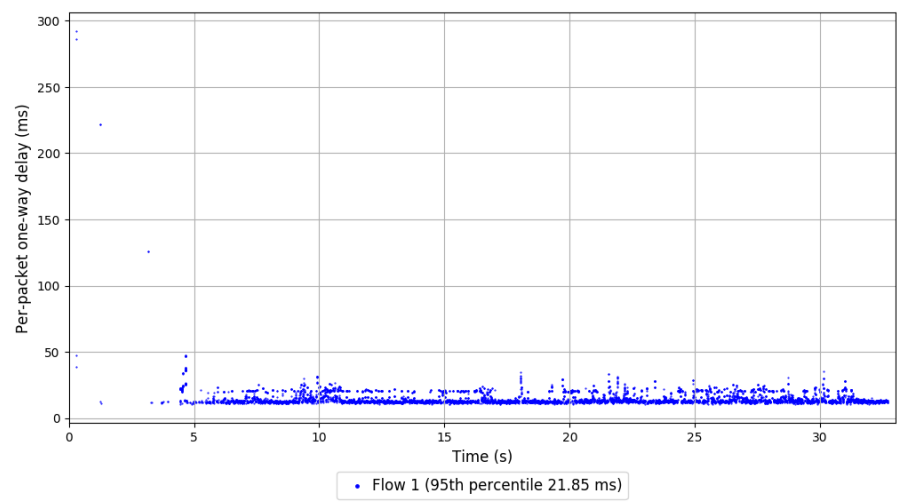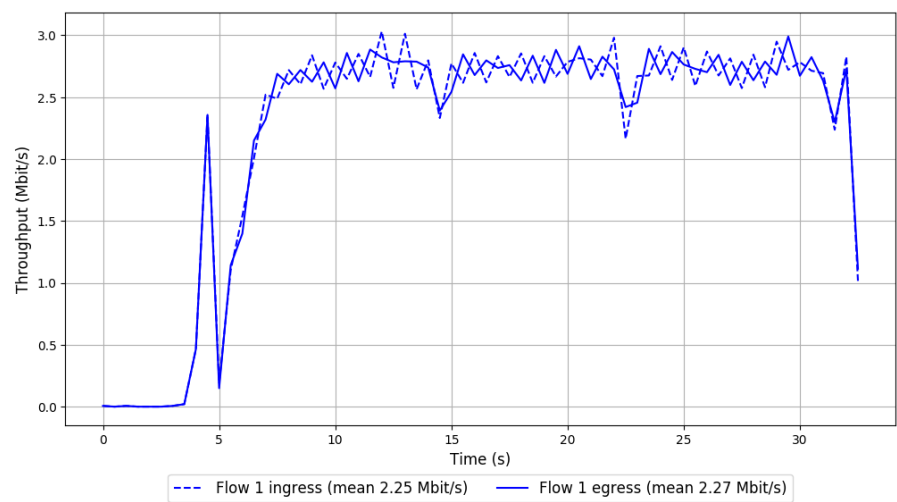

• Flow 1 (95th percentile 21.29 ms)

```
Run 3: Statistics of WebRTC media

Start at: 2017-12-20 17:46:43
End at: 2017-12-20 17:47:13
Local clock offset: 0.627 ms
Remote clock offset: -2.335 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.27 Mbit/s
95th percentile per-packet one-way delay: 21.852 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.27 Mbit/s
95th percentile per-packet one-way delay: 21.852 ms
Loss rate: 0.00%
```
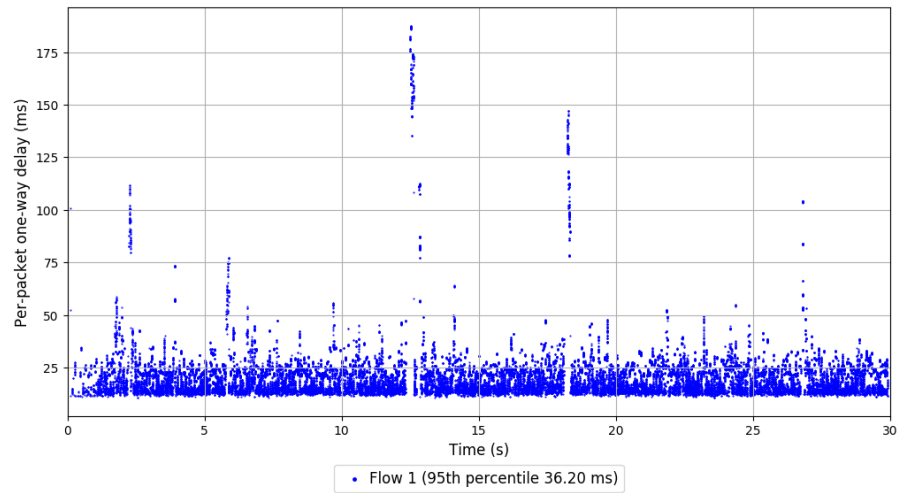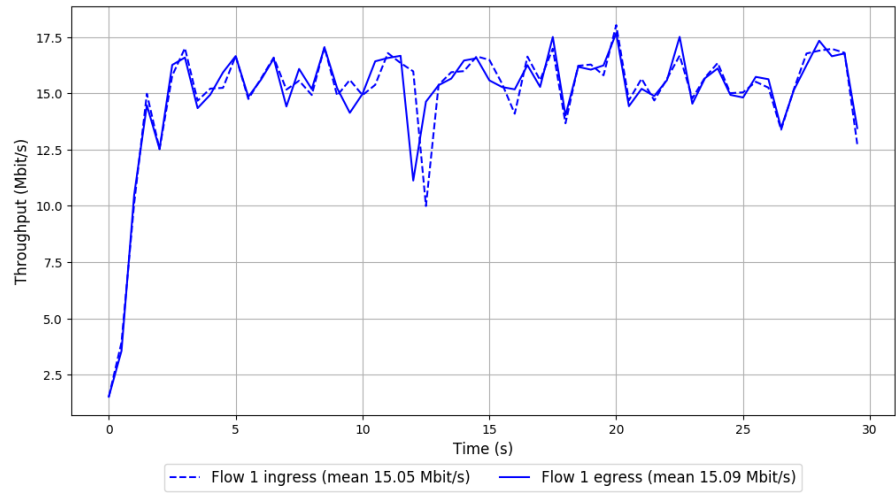
Run 3: Report of WebRTC media — Data Link

```
Run 1: Statistics of Sprout

Start at: 2017-12-20 17:12:21
End at: 2017-12-20 17:12:51
Local clock offset: 0.356 ms
Remote clock offset: -2.208 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 15.09 Mbit/s
95th percentile per-packet one-way delay: 36.202 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 15.09 Mbit/s
95th percentile per-packet one-way delay: 36.202 ms
Loss rate: 0.00%
```

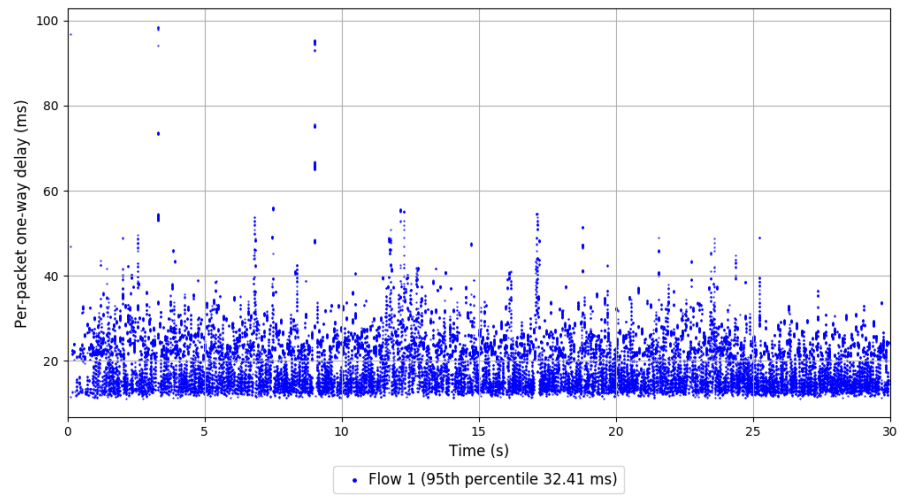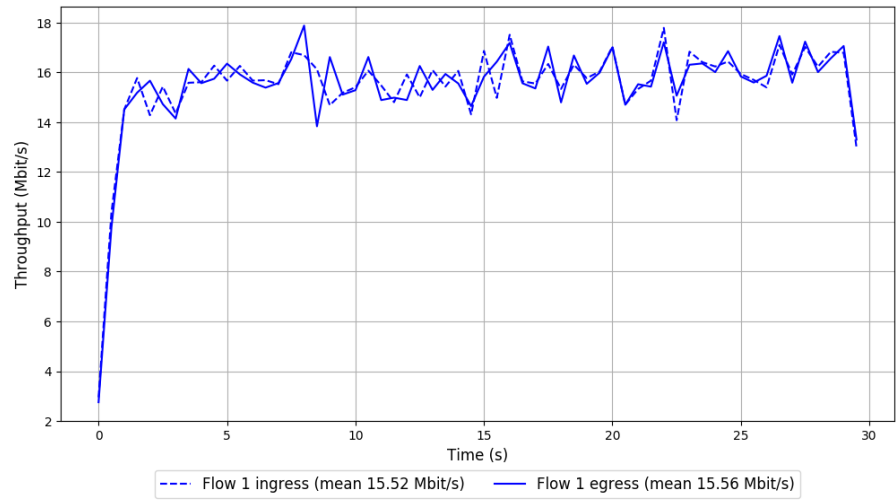Run 1: Report of Sprout — Data Link

```
Run 2: Statistics of Sprout

Start at: 2017-12-20 17:30:08
End at: 2017-12-20 17:30:38
Local clock offset: 0.495 ms
Remote clock offset: -2.242 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 15.56 Mbit/s
95th percentile per-packet one-way delay: 32.412 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 15.56 Mbit/s
95th percentile per-packet one-way delay: 32.412 ms
Loss rate: 0.00%
```

Run 2: Report of Sprout — Data Link

Flow 1 ingress (mean 15.52 Mbit/s) ----- Flow 1 egress (mean 15.56 Mbit/s)

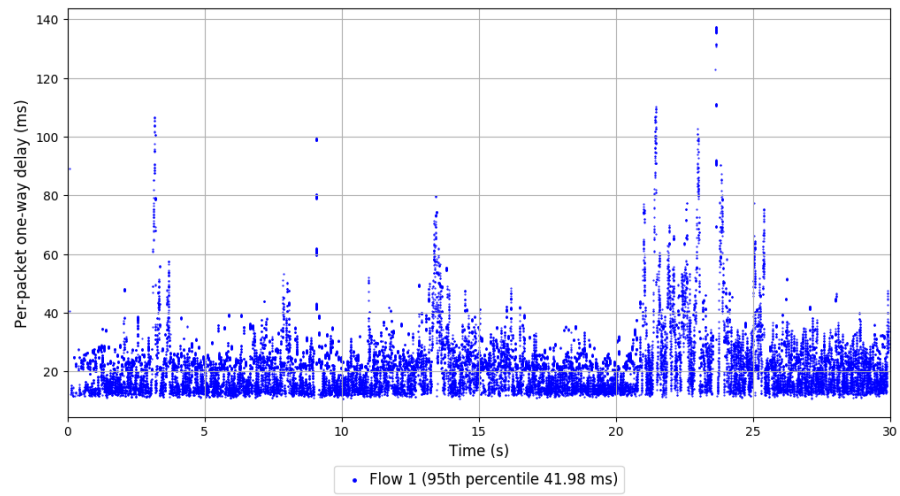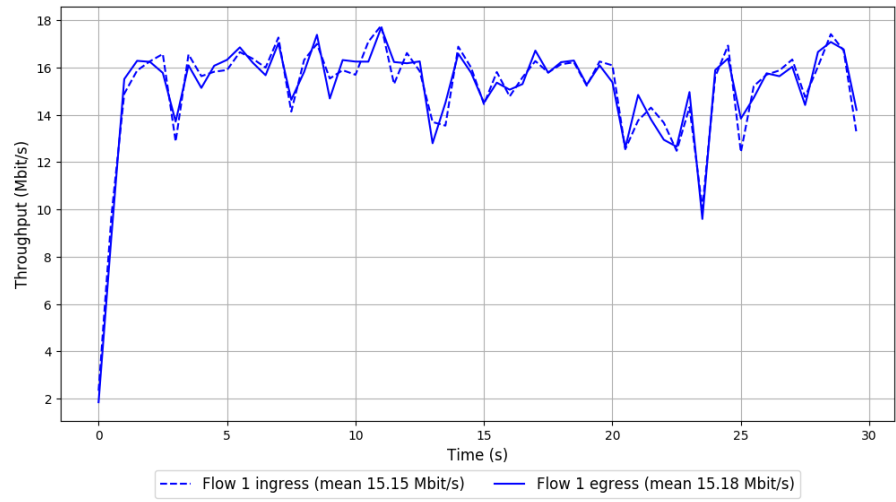· Flow 1 (95th percentile 32.41 ms)

```
Run 3: Statistics of Sprout

Start at: 2017-12-20 17:47:53
End at: 2017-12-20 17:48:23
Local clock offset: 0.566 ms
Remote clock offset: -2.345 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 15.18 Mbit/s
95th percentile per-packet one-way delay: 41.976 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 15.18 Mbit/s
95th percentile per-packet one-way delay: 41.976 ms
Loss rate: 0.03%
```

Run 3: Report of Sprout — Data Link

Flow 1 ingress (mean 15.15 Mbit/s) --- Flow 1 egress (mean 15.18 Mbit/s)

Flow 1 (95th percentile 41.98 ms)

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

Start at: 2017-12-20 17:08:50
End at: 2017-12-20 17:09:20
Local clock offset: 0.242 ms
Remote clock offset: -2.377 ms

# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.57 Mbit/s
95th percentile per-packet one-way delay: 24.540 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 6.57 Mbit/s
95th percentile per-packet one-way delay: 24.540 ms
Loss rate: 0.00%
```
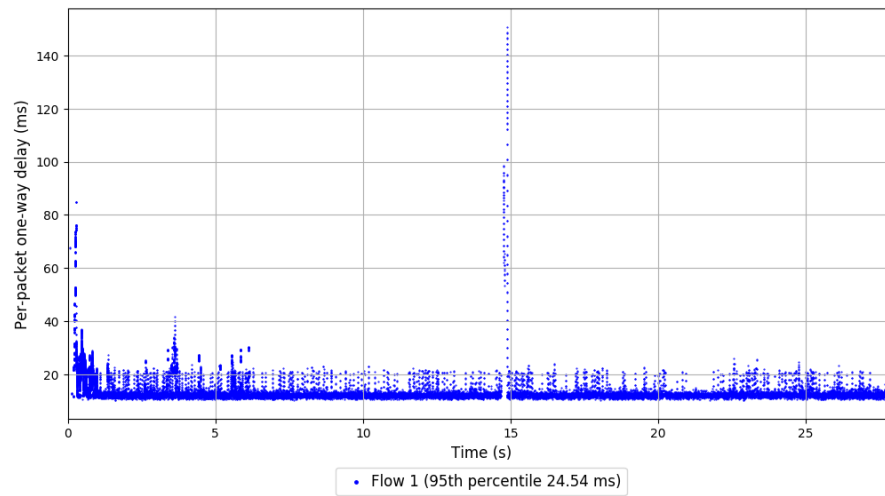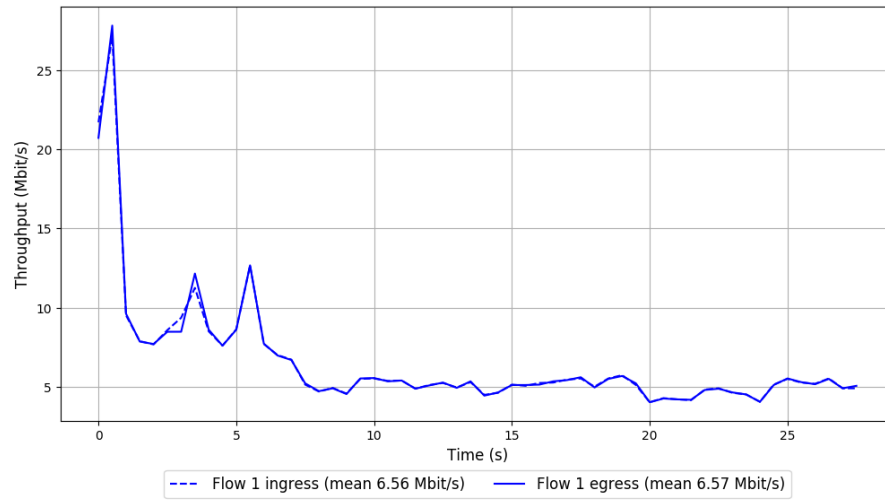
Run 1: Report of TaoVA-100x — Data Link

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

Start at: 2017-12-20 17:26:36
End at: 2017-12-20 17:27:07
Local clock offset: 0.329 ms
Remote clock offset: -2.352 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.06 Mbit/s
95th percentile per-packet one-way delay: 23.983 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 6.06 Mbit/s
95th percentile per-packet one-way delay: 23.983 ms
Loss rate: 0.01%
```
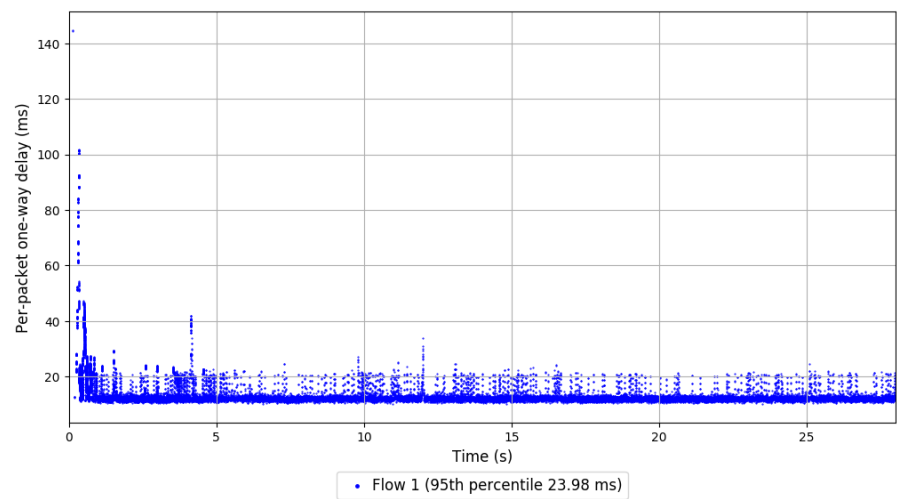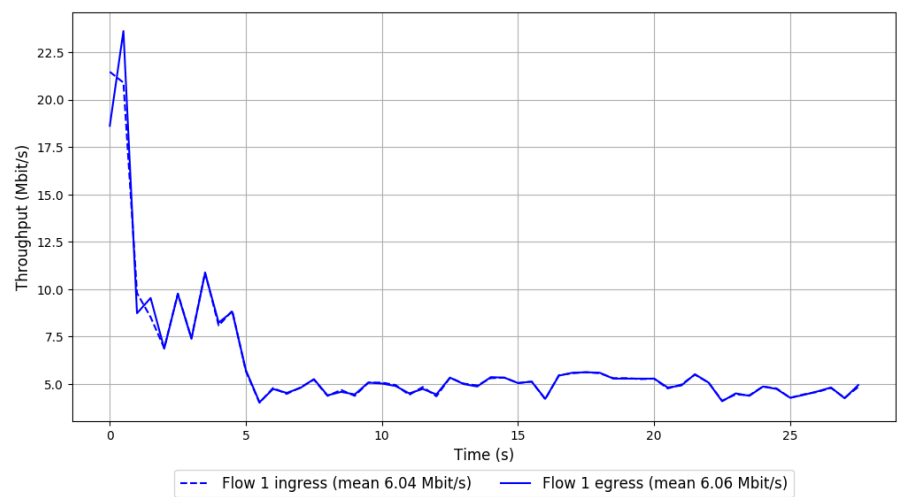
Run 2: Report of TaoVA-100x — Data Link

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

Start at: 2017-12-20 17:44:22
End at: 2017-12-20 17:44:52
Local clock offset: 0.496 ms
Remote clock offset: -2.4 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.37 Mbit/s
95th percentile per-packet one-way delay: 21.610 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 5.37 Mbit/s
95th percentile per-packet one-way delay: 21.610 ms
Loss rate: 0.00%
```
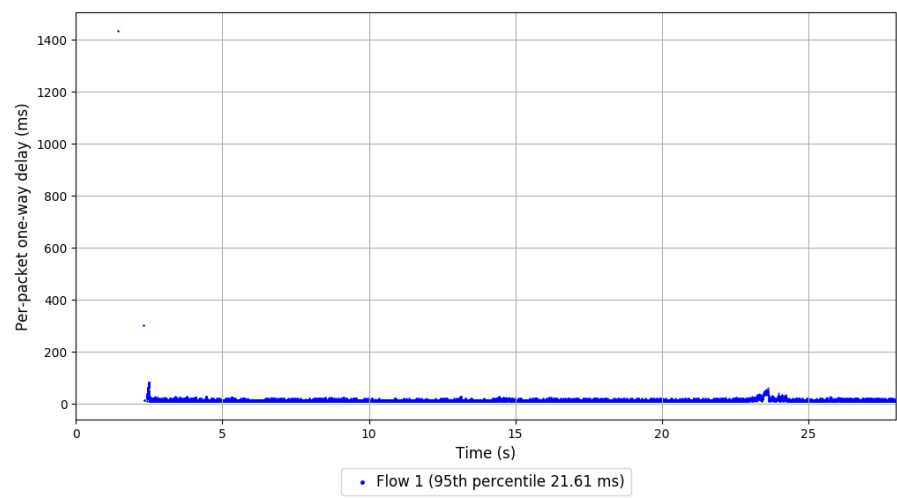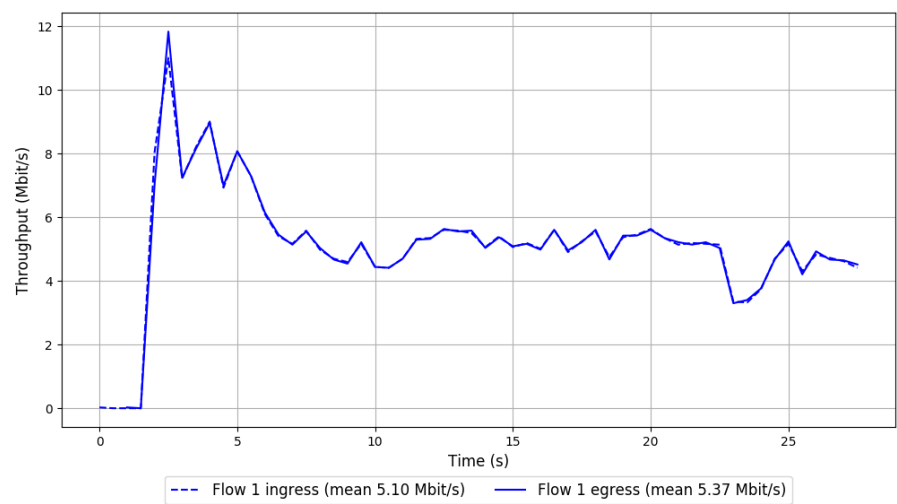
Run 3: Report of TaoVA-100x — Data Link

```
Run 1: Statistics of TCP Vegas

Start at: 2017-12-20 17:00:35
End at: 2017-12-20 17:01:05
Local clock offset: 0.162 ms
Remote clock offset: -2.49 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.57 Mbit/s
95th percentile per-packet one-way delay: 22.656 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.57 Mbit/s
95th percentile per-packet one-way delay: 22.656 ms
Loss rate: 0.00%
```
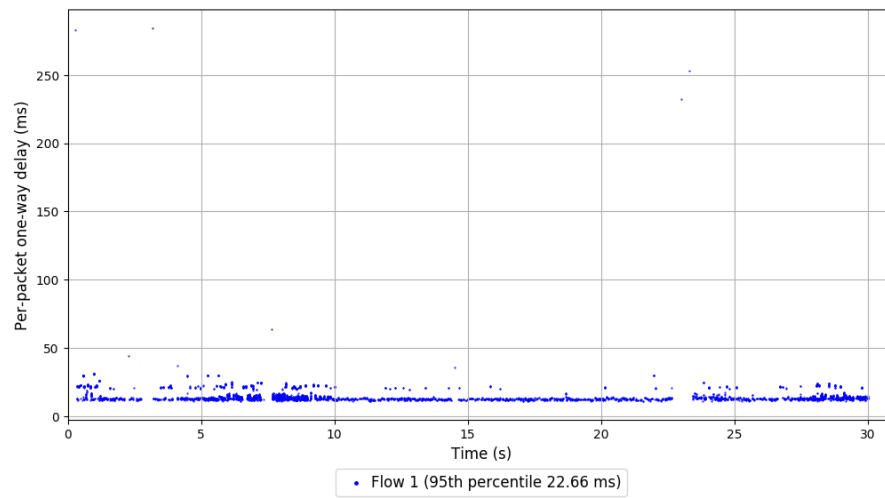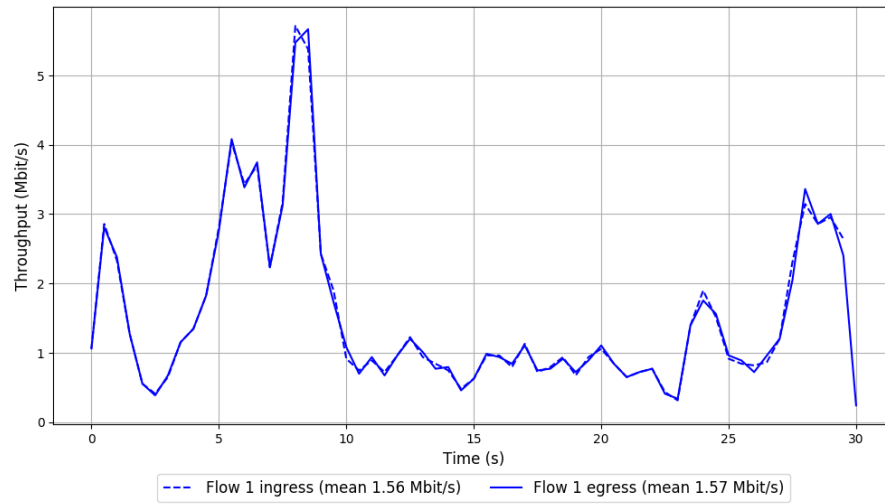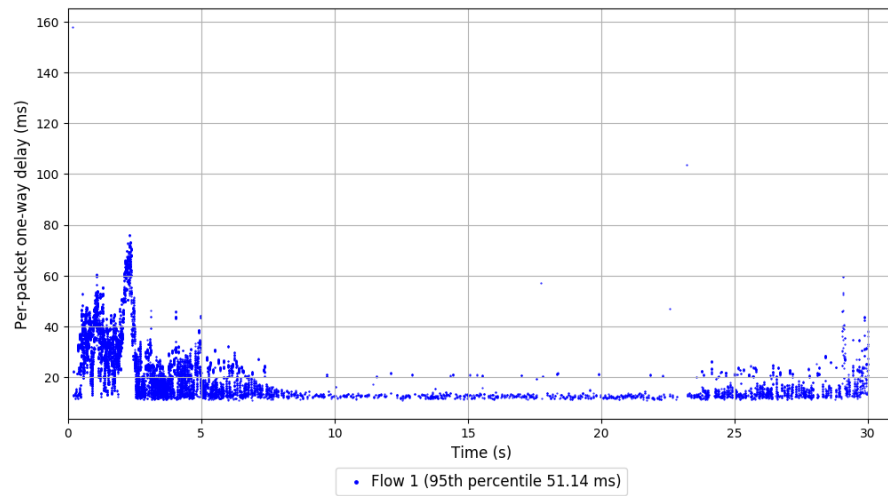
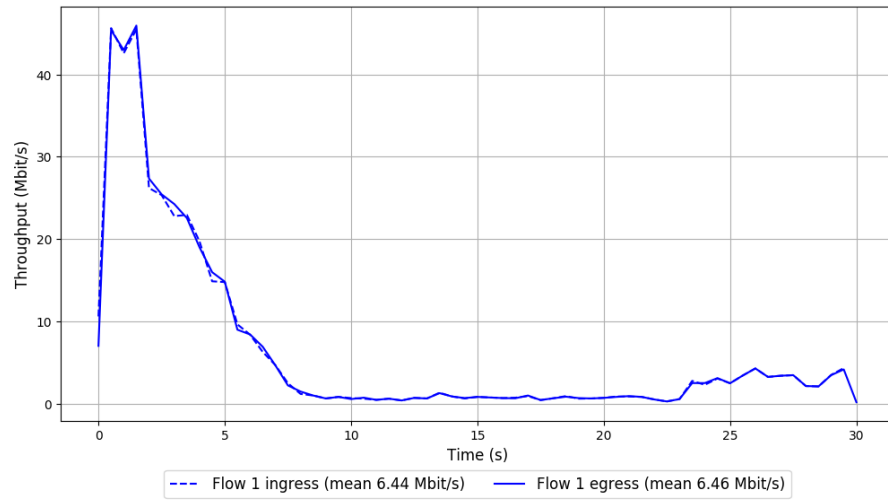Run 1: Report of TCP Vegas — Data Link

```
Run 2: Statistics of TCP Vegas

Start at: 2017-12-20 17:18:18
End at: 2017-12-20 17:18:48
Local clock offset: 0.358 ms
Remote clock offset: -2.158 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.46 Mbit/s
95th percentile per-packet one-way delay: 51.142 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 6.46 Mbit/s
95th percentile per-packet one-way delay: 51.142 ms
Loss rate: 0.06%
```

Run 2: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 6.44 Mbit/s)   Flow 1 egress (mean 6.46 Mbit/s)
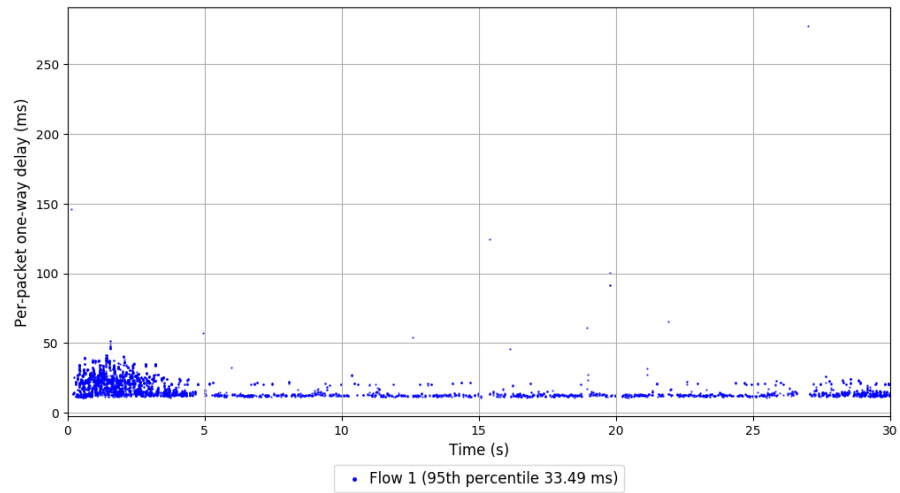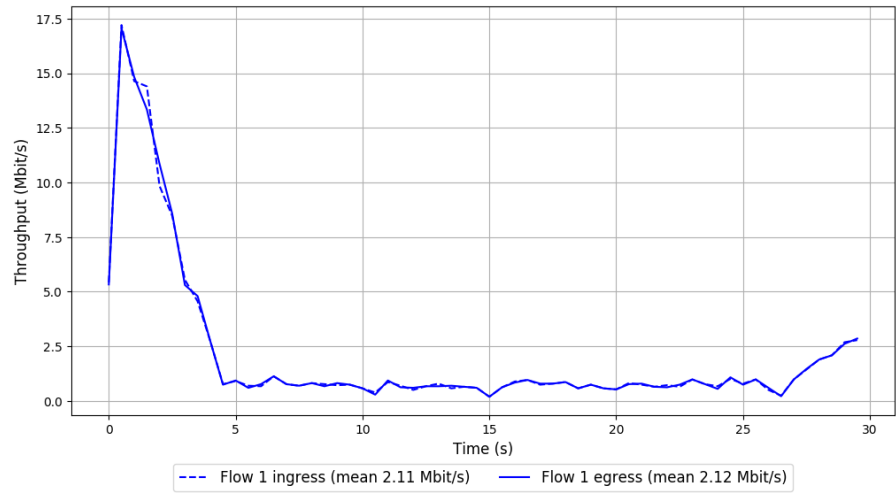

Flow 1 (95th percentile 51.14 ms)

```
Run 3: Statistics of TCP Vegas

Start at: 2017-12-20 17:36:05
End at: 2017-12-20 17:36:35
Local clock offset: 0.428 ms
Remote clock offset: -2.313 ms


# Below is generated by plot.py at 2017-12-20 17:50:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 33.486 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 33.486 ms
Loss rate: 0.00%
```
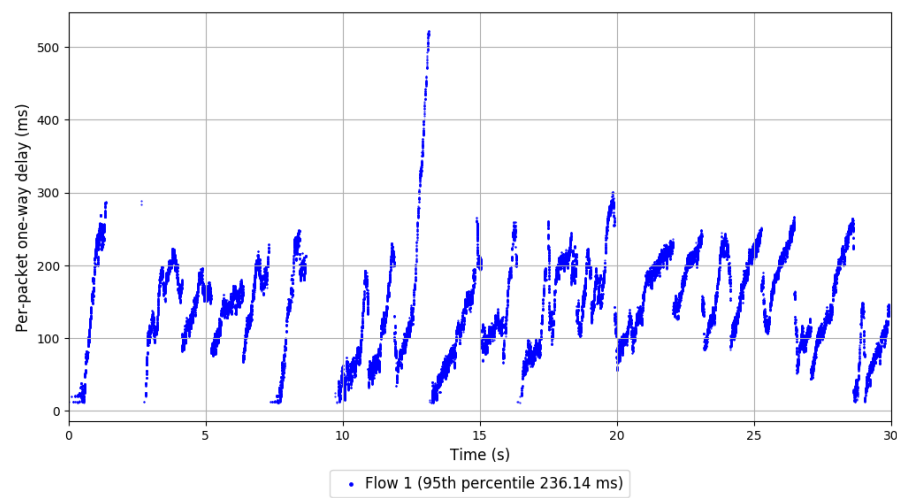
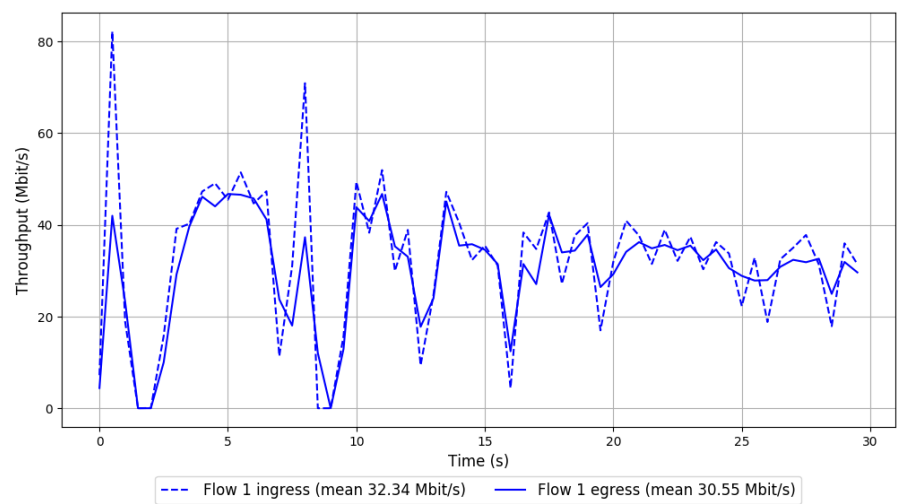Run 3: Report of TCP Vegas — Data Link

```
Run 1: Statistics of Verus

Start at: 2017-12-20 16:55:49
End at: 2017-12-20 16:56:19
Local clock offset: 0.173 ms
Remote clock offset: -2.557 ms


# Below is generated by plot.py at 2017-12-20 17:51:14
# Datalink statistics
-- Total of 1 flow:
Average throughput: 30.55 Mbit/s
95th percentile per-packet one-way delay: 236.141 ms
Loss rate: 5.52%
-- Flow 1:
Average throughput: 30.55 Mbit/s
95th percentile per-packet one-way delay: 236.141 ms
Loss rate: 5.52%
```
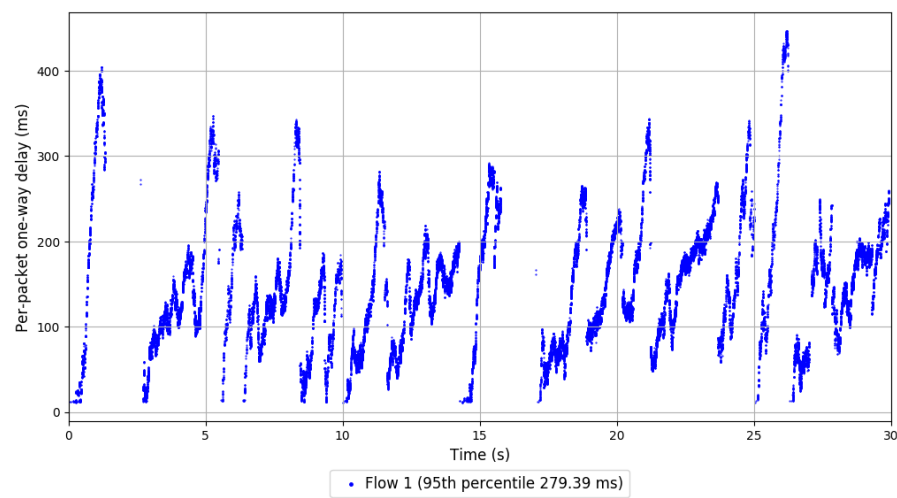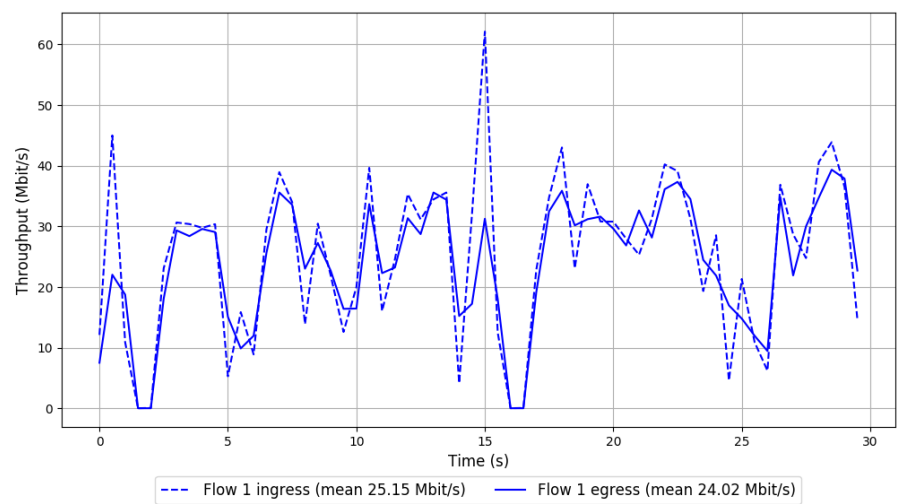
Run 1: Report of Verus — Data Link

```
Run 2: Statistics of Verus

Start at: 2017-12-20 17:13:32
End at: 2017-12-20 17:14:02
Local clock offset: 0.332 ms
Remote clock offset: -2.219 ms


# Below is generated by plot.py at 2017-12-20 17:51:14
# Datalink statistics
-- Total of 1 flow:
Average throughput: 24.02 Mbit/s
95th percentile per-packet one-way delay: 279.389 ms
Loss rate: 4.49%
-- Flow 1:
Average throughput: 24.02 Mbit/s
95th percentile per-packet one-way delay: 279.389 ms
Loss rate: 4.49%
```
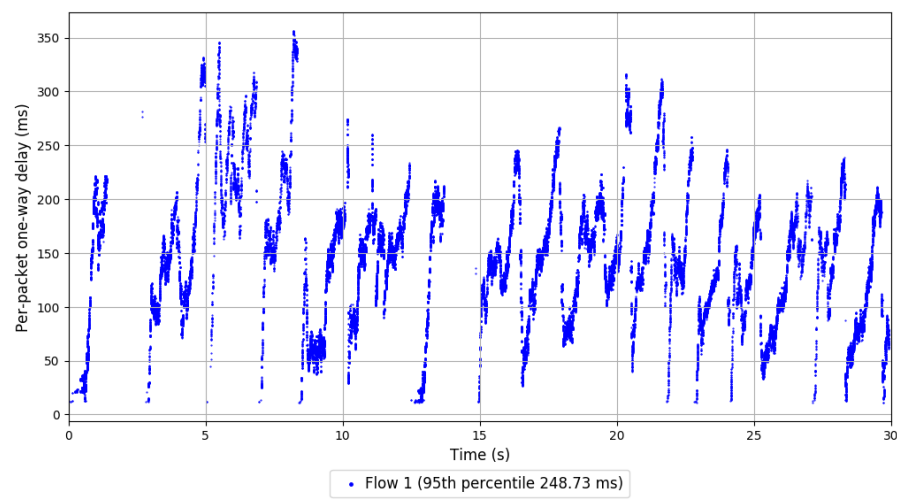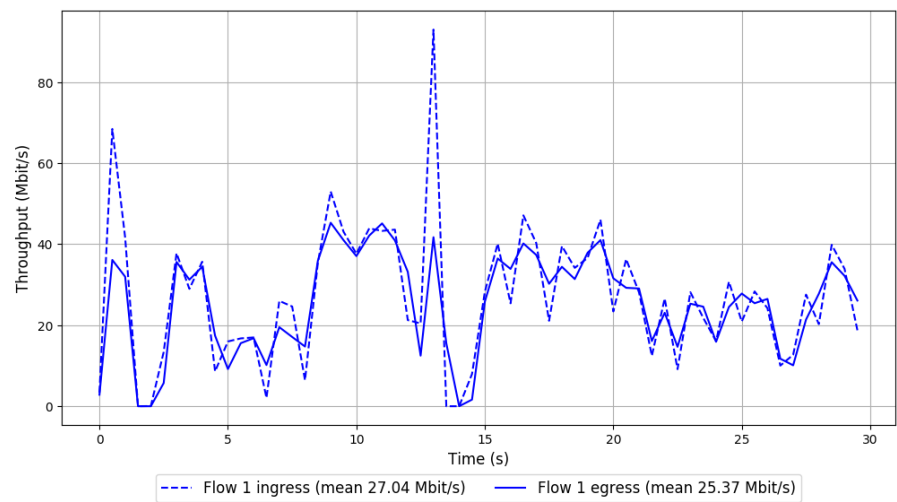
Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2017-12-20 17:31:19
End at: 2017-12-20 17:31:49
Local clock offset: 0.431 ms
Remote clock offset: -2.256 ms


# Below is generated by plot.py at 2017-12-20 17:51:14
# Datalink statistics
-- Total of 1 flow:
Average throughput: 25.37 Mbit/s
95th percentile per-packet one-way delay: 248.726 ms
Loss rate: 6.15%
-- Flow 1:
Average throughput: 25.37 Mbit/s
95th percentile per-packet one-way delay: 248.726 ms
Loss rate: 6.15%
```

Run 3: Report of Verus — Data Link

Flow 1 ingress (mean 27.04 Mbit/s)   Flow 1 egress (mean 25.37 Mbit/s)

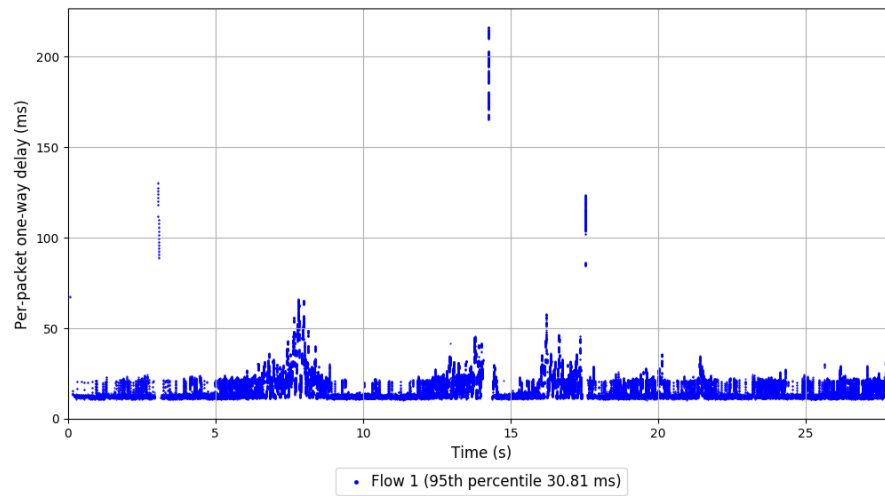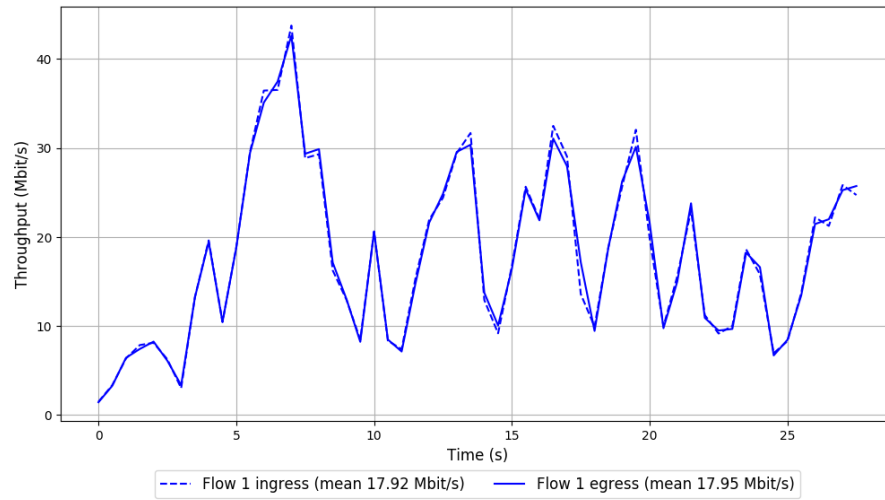
• Flow 1 (95th percentile 248.73 ms)

```
Run 1: Statistics of Copa

Start at: 2017-12-20 17:05:19
End at: 2017-12-20 17:05:49
Local clock offset: 0.218 ms
Remote clock offset: -2.453 ms


# Below is generated by plot.py at 2017-12-20 17:51:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 17.95 Mbit/s
95th percentile per-packet one-way delay: 30.806 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 17.95 Mbit/s
95th percentile per-packet one-way delay: 30.806 ms
Loss rate: 0.00%
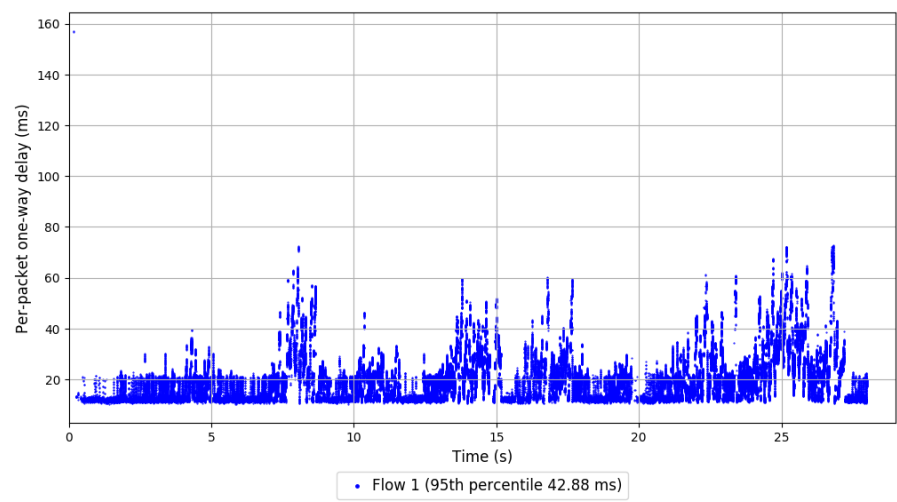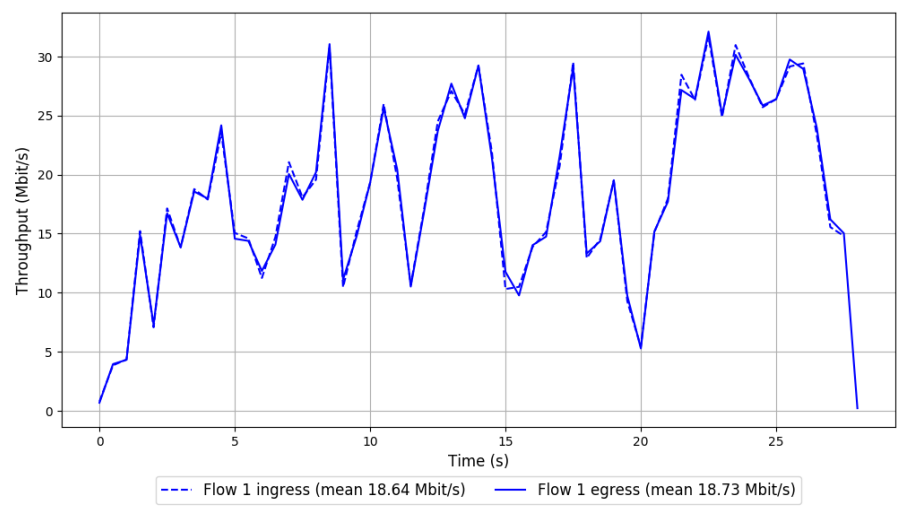```

Run 1: Report of Copa — Data Link

```
Run 2: Statistics of Copa

Start at: 2017-12-20 17:23:03
End at: 2017-12-20 17:23:33
Local clock offset: 0.391 ms
Remote clock offset: -2.306 ms


# Below is generated by plot.py at 2017-12-20 17:51:16
# Datalink statistics
-- Total of 1 flow:
Average throughput: 18.73 Mbit/s
95th percentile per-packet one-way delay: 42.883 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 18.73 Mbit/s
95th percentile per-packet one-way delay: 42.883 ms
Loss rate: 0.02%
```

Run 2: Report of Copa — Data Link

```
Run 3: Statistics of Copa

Start at: 2017-12-20 17:40:49
End at: 2017-12-20 17:41:19
Local clock offset: 0.555 ms
Remote clock offset: -2.22 ms


# Below is generated by plot.py at 2017-12-20 17:51:16
# Datalink statistics
-- Total of 1 flow:
Average throughput: 12.48 Mbit/s
95th percentile per-packet one-way delay: 38.035 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 12.48 Mbit/s
95th percentile per-packet one-way delay: 38.035 ms
Loss rate: 0.00%
```
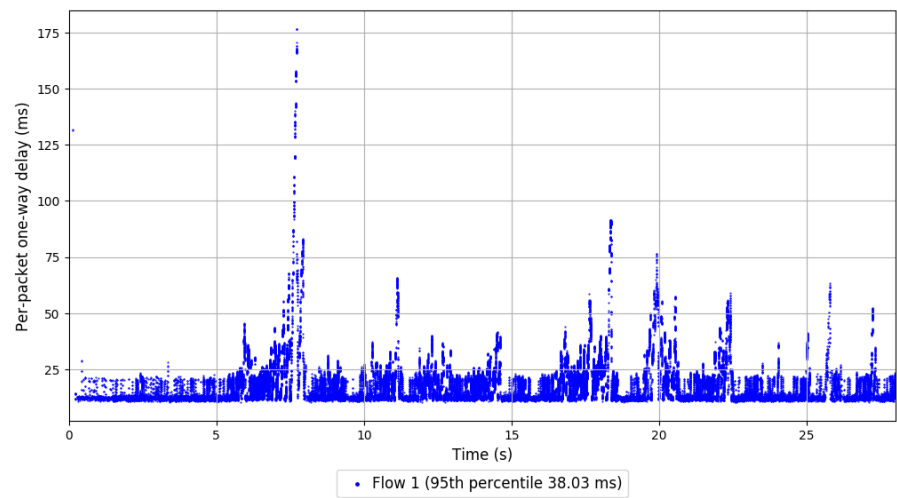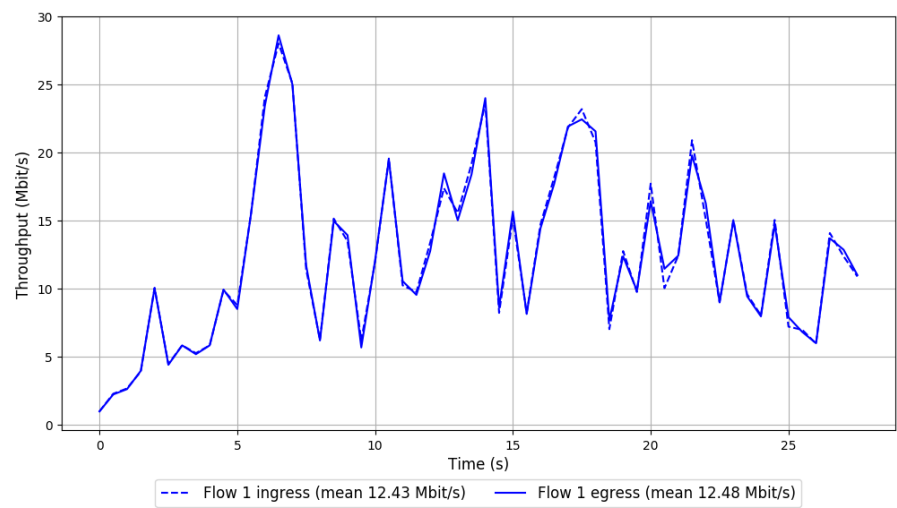
Run 3: Report of Copa — Data Link

Flow 1 ingress (mean 12.43 Mbit/s) --- Flow 1 egress (mean 12.48 Mbit/s)
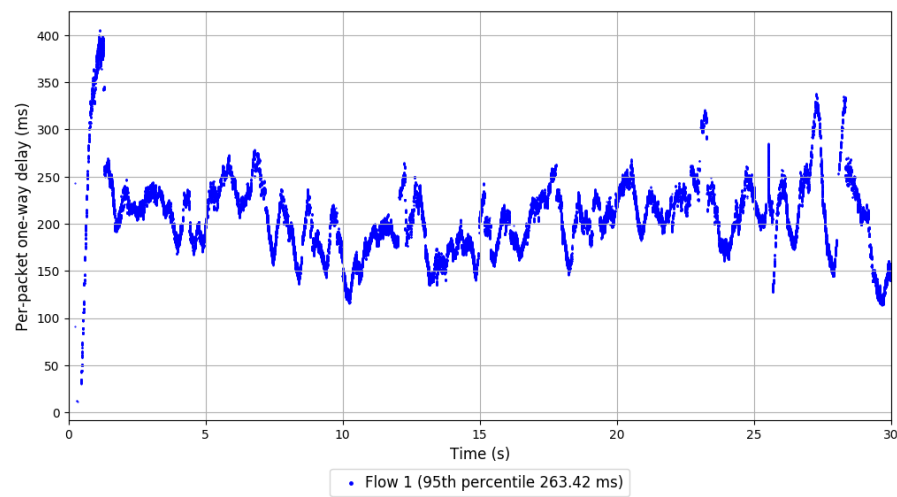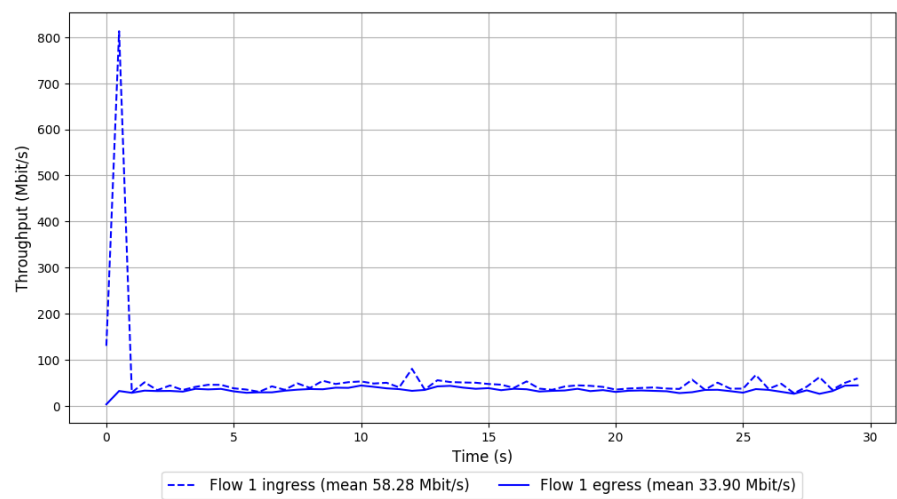

Flow 1 (95th percentile 38.03 ms)

```
Run 1: Statistics of FillP

Start at: 2017-12-20 16:58:13
End at: 2017-12-20 16:58:43
Local clock offset: 0.264 ms
Remote clock offset: -2.526 ms

# Below is generated by plot.py at 2017-12-20 17:51:20
# Datalink statistics
-- Total of 1 flow:
Average throughput: 33.90 Mbit/s
95th percentile per-packet one-way delay: 263.424 ms
Loss rate: 42.26%
-- Flow 1:
Average throughput: 33.90 Mbit/s
95th percentile per-packet one-way delay: 263.424 ms
Loss rate: 42.26%
```
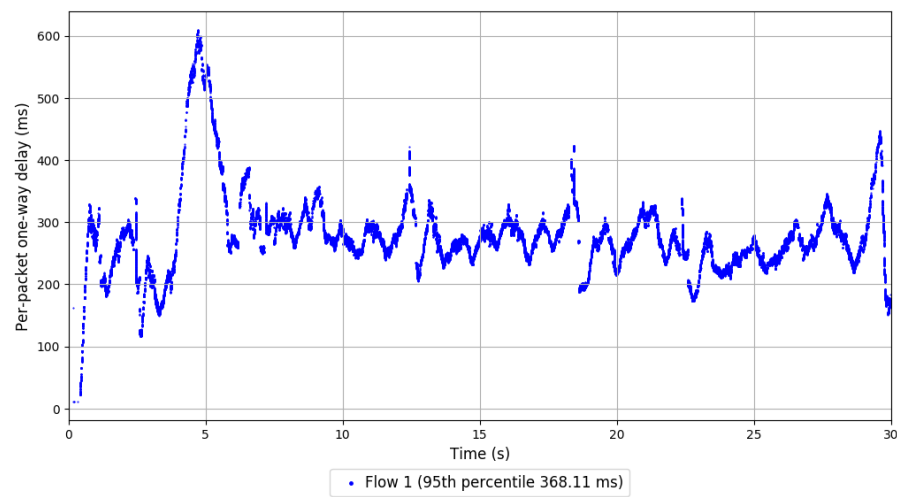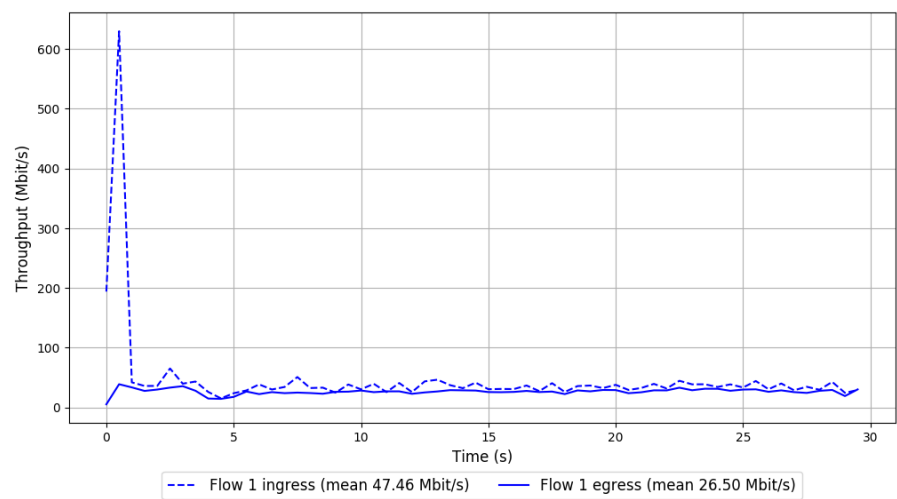
Run 1: Report of FillP — Data Link

```
Run 2: Statistics of FillP

Start at: 2017-12-20 17:15:56
End at: 2017-12-20 17:16:26
Local clock offset: 0.293 ms
Remote clock offset: -2.241 ms

# Below is generated by plot.py at 2017-12-20 17:51:20
# Datalink statistics
-- Total of 1 flow:
Average throughput: 26.50 Mbit/s
95th percentile per-packet one-way delay: 368.114 ms
Loss rate: 44.41%
-- Flow 1:
Average throughput: 26.50 Mbit/s
95th percentile per-packet one-way delay: 368.114 ms
Loss rate: 44.41%
```

Run 2: Report of FillP — Data Link

Flow 1 ingress (mean 47.46 Mbit/s) Flow 1 egress (mean 26.50 Mbit/s)
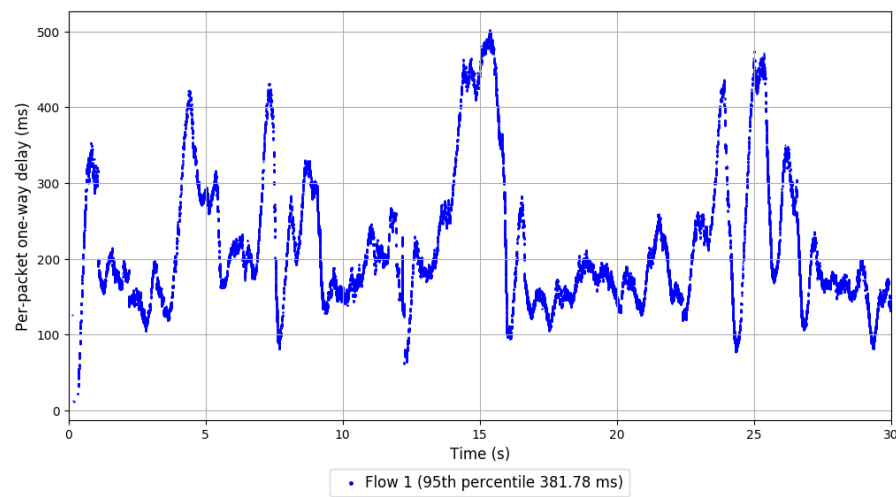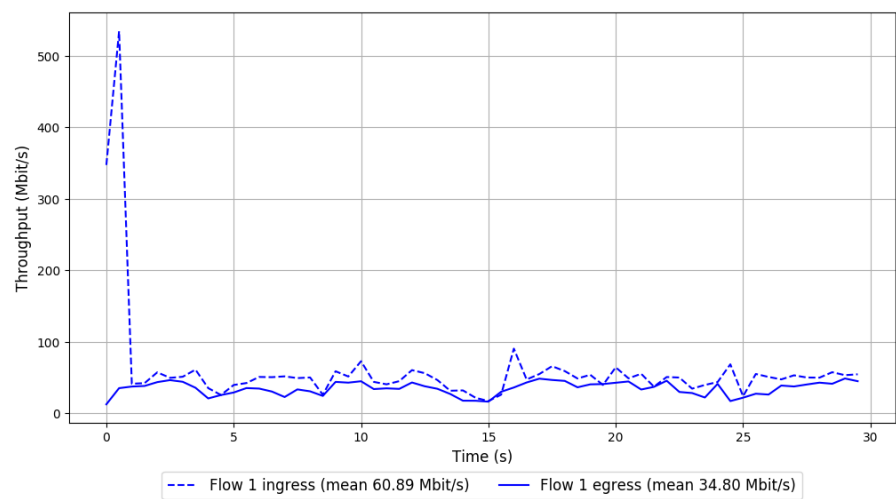

Flow 1 (95th percentile 368.11 ms)

```
Run 3: Statistics of FillP

Start at: 2017-12-20 17:33:43
End at: 2017-12-20 17:34:13
Local clock offset: 0.406 ms
Remote clock offset: -2.322 ms


# Below is generated by plot.py at 2017-12-20 17:51:22
# Datalink statistics
-- Total of 1 flow:
Average throughput: 34.80 Mbit/s
95th percentile per-packet one-way delay: 381.777 ms
Loss rate: 43.05%
-- Flow 1:
Average throughput: 34.80 Mbit/s
95th percentile per-packet one-way delay: 381.777 ms
Loss rate: 43.05%
```

Run 3: Report of FillP — Data Link

Flow 1 ingress (mean 60.89 Mbit/s) — — —   Flow 1 egress (mean 34.80 Mbit/s) ———

Flow 1 (95th percentile 381.78 ms)

```
Run 1: Statistics of Indigo

Start at: 2017-12-20 17:01:46
End at: 2017-12-20 17:02:16
Local clock offset: 0.276 ms
Remote clock offset: -2.424 ms


# Below is generated by plot.py at 2017-12-20 17:51:22
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 27.057 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 27.057 ms
Loss rate: 0.00%
```
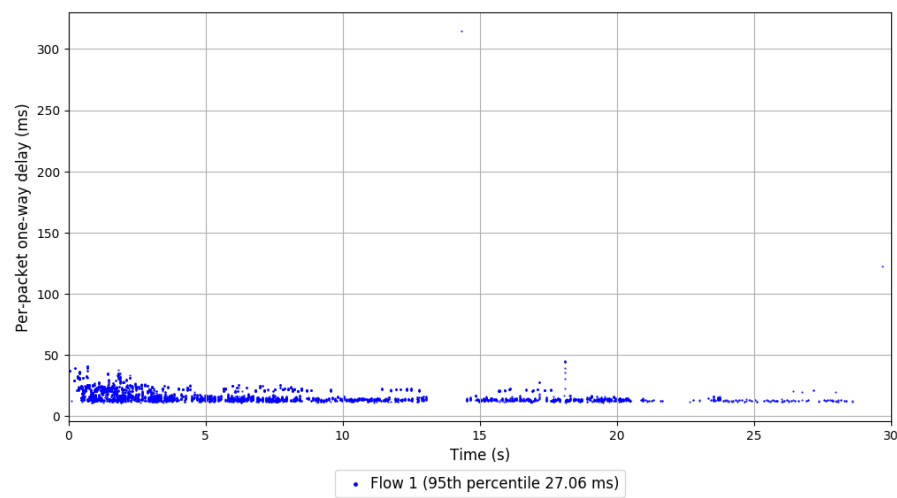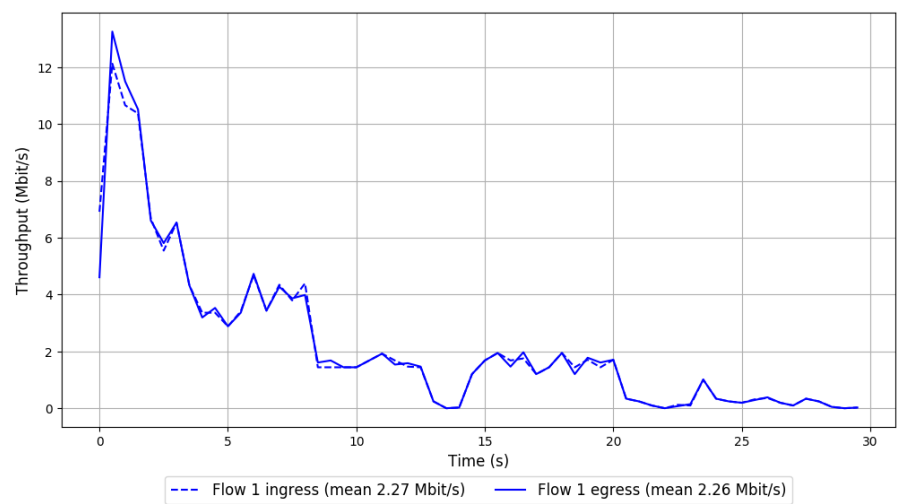
Run 1: Report of Indigo — Data Link

Flow 1 ingress (mean 2.27 Mbit/s)　　Flow 1 egress (mean 2.26 Mbit/s)

Flow 1 (95th percentile 27.06 ms)

```
Run 2: Statistics of Indigo

Start at: 2017-12-20 17:19:29
End at: 2017-12-20 17:19:59
Local clock offset: 0.4 ms
Remote clock offset: -2.234 ms


# Below is generated by plot.py at 2017-12-20 17:51:22
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.32 Mbit/s
95th percentile per-packet one-way delay: 31.068 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 3.32 Mbit/s
95th percentile per-packet one-way delay: 31.068 ms
Loss rate: 0.00%
```
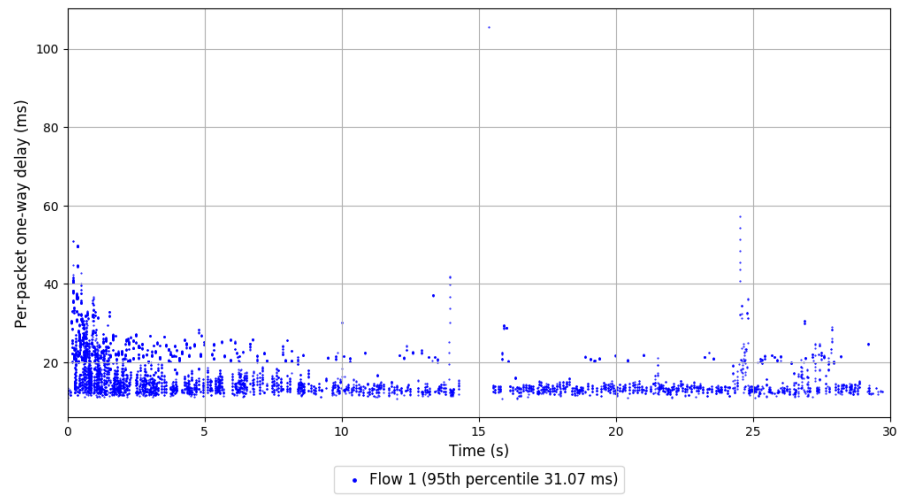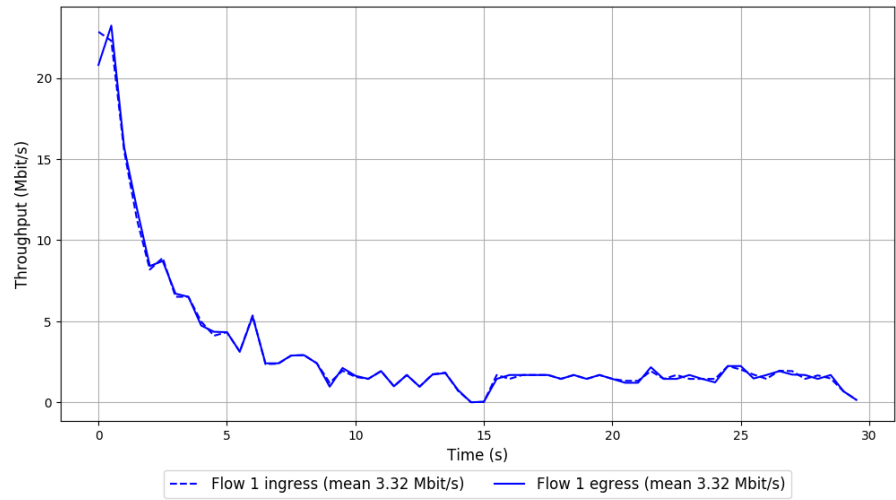
Run 2: Report of Indigo — Data Link

```
Run 3: Statistics of Indigo

Start at: 2017-12-20 17:37:16
End at: 2017-12-20 17:37:46
Local clock offset: 0.456 ms
Remote clock offset: -2.256 ms


# Below is generated by plot.py at 2017-12-20 17:51:22
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.80 Mbit/s
95th percentile per-packet one-way delay: 25.910 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.80 Mbit/s
95th percentile per-packet one-way delay: 25.910 ms
Loss rate: 0.00%
```

Run 3: Report of Indigo — Data Link