Pantheon Report

Generated at 2017-09-17 23:20:18 (UTC).

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

Repeated the test of 15 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).
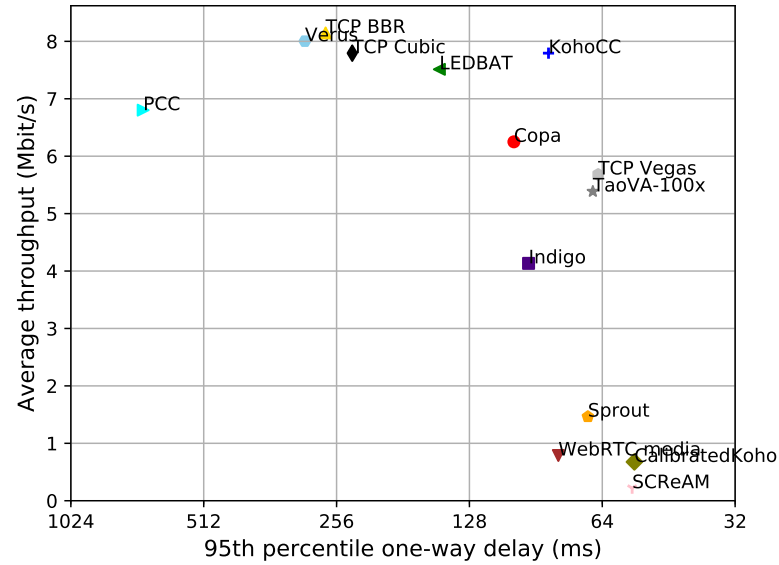
Tested BBR with qdisc of Fair Queuing (`fq`), and other schemes with the default Linux qdisc (`pfifo_fast`).

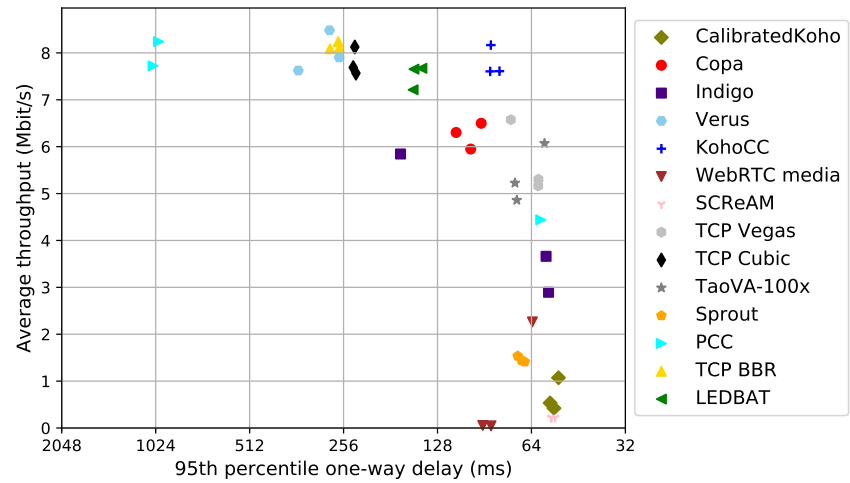NTP offsets were measured against `nets.org.sg` and have been applied to correct the timestamps in logs.

```
Git summary:
branch: master @ 57453dc11f8da93a2e03eea75289fea01b816298
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
 M datagrump/sender.cc
third_party/genericCC @ f7ca42f251bf49b432bb71de6d13fa903515c366
third_party/indigo @ b19f3730105f9aa95452552af924e3719b03cc55
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
 M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ baf443516dea3eeddeccaf9b916cc313273ca4f4
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
 M receiver/src/buffer.h
 M receiver/src/core.cpp
 M sender/src/buffer.h
 M sender/src/core.cpp
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ f1a14bffe749737437f61b1eaeeb30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
 M src/examples/cellsim.cc
 M src/examples/sproutbt2.cc
 M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
 M src/verus.hpp
 M tools/plot.py
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

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

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

scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	8.15	271.08	0.70
CalibratedKoho	3	0.67	54.13	0.09
Copa	3	6.25	101.49	0.15
TCP Cubic	3	7.80	235.89	0.54
Indigo	3	4.13	94.02	0.21
KohoCC	3	7.80	84.73	1.03
LEDBAT	3	7.51	149.74	0.41
PCC	3	6.80	702.15	2.17
QUIC Cubic	0	N/A	N/A	N/A
SCReAM	3	0.22	54.77	0.09
Sprout	3	1.46	69.00	0.05
TaoVA-100x	3	5.39	67.23	0.18
TCP Vegas	3	5.68	65.39	0.15
Verus	3	8.00	302.02	1.24
WebRTC media	3	0.79	80.49	0.05

```
Run 1: Statistics of TCP BBR

Start at: 2017-09-17 22:28:43
End at: 2017-09-17 22:29:13
Local clock offset: -0.784 ms
Remote clock offset: -2.777 ms


# Below is generated by plot.py at 2017-09-17 23:19:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.11 Mbit/s
95th percentile per-packet one-way delay: 264.041 ms
Loss rate: 0.65%
-- Flow 1:
Average throughput: 8.11 Mbit/s
95th percentile per-packet one-way delay: 264.041 ms
Loss rate: 0.65%
```
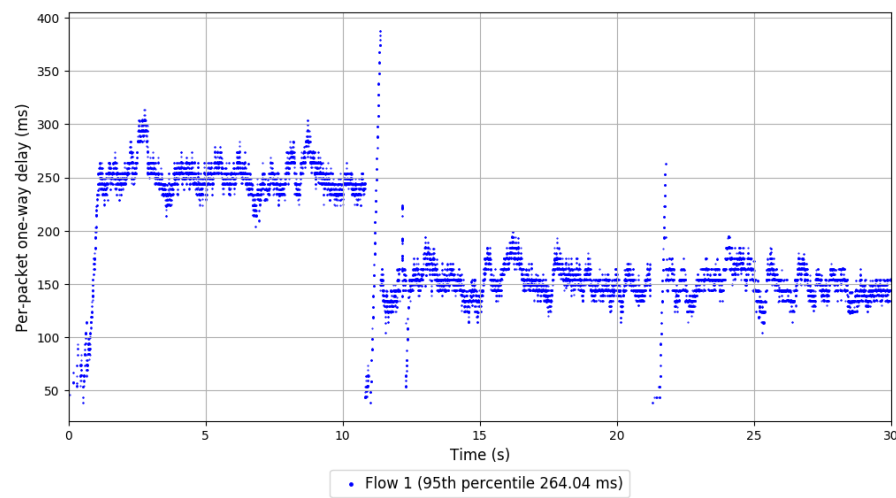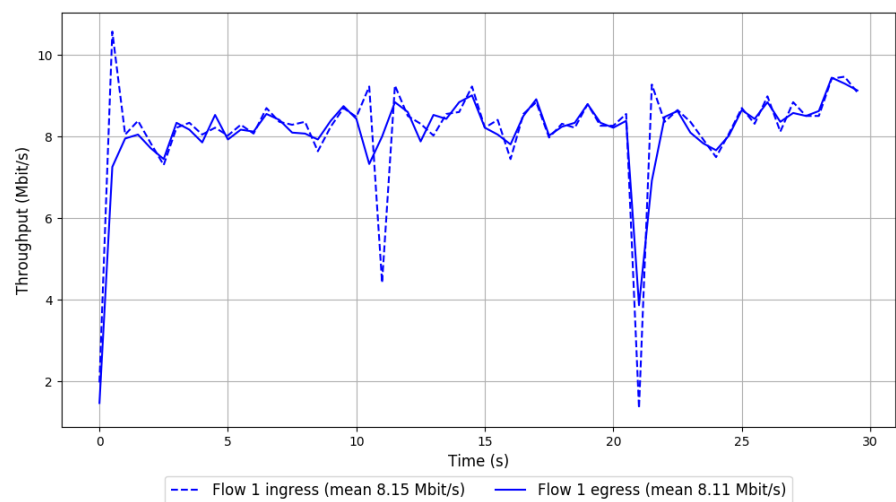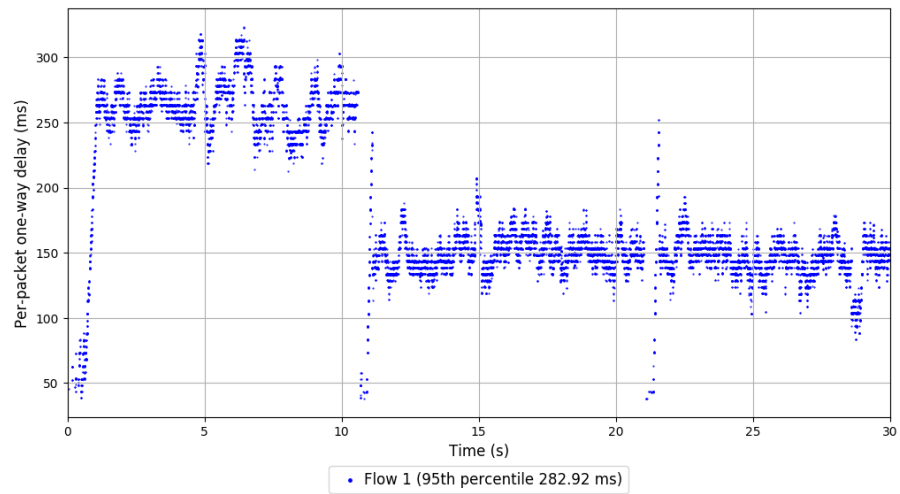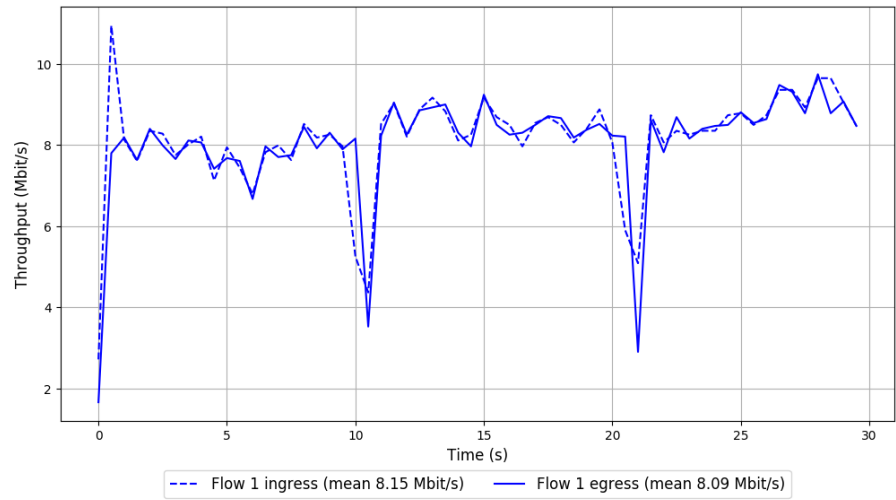
Run 1: Report of TCP BBR — Data Link

Flow 1 ingress (mean 8.15 Mbit/s)   ——— Flow 1 egress (mean 8.11 Mbit/s)

• Flow 1 (95th percentile 264.04 ms)

5

```
Run 2: Statistics of TCP BBR

Start at: 2017-09-17 22:45:35
End at: 2017-09-17 22:46:05
Local clock offset: -0.664 ms
Remote clock offset: -3.122 ms


# Below is generated by plot.py at 2017-09-17 23:19:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.09 Mbit/s
95th percentile per-packet one-way delay: 282.923 ms
Loss rate: 0.83%
-- Flow 1:
Average throughput: 8.09 Mbit/s
95th percentile per-packet one-way delay: 282.923 ms
Loss rate: 0.83%
```
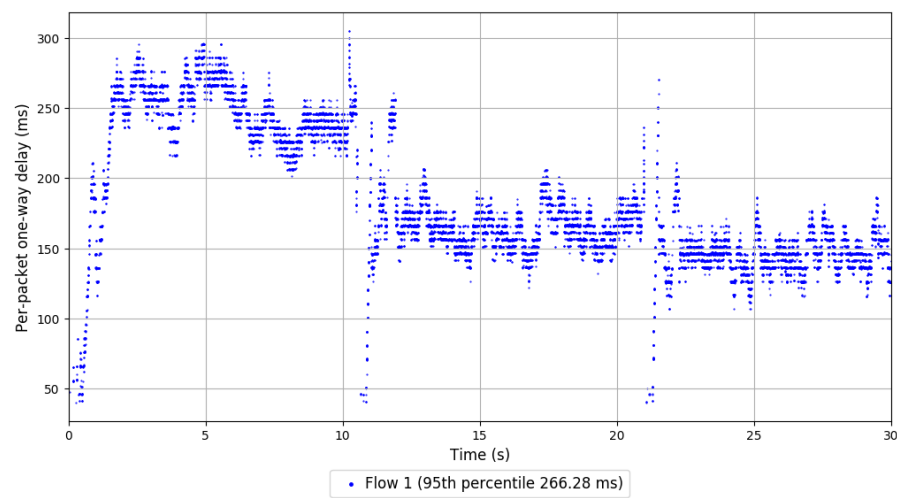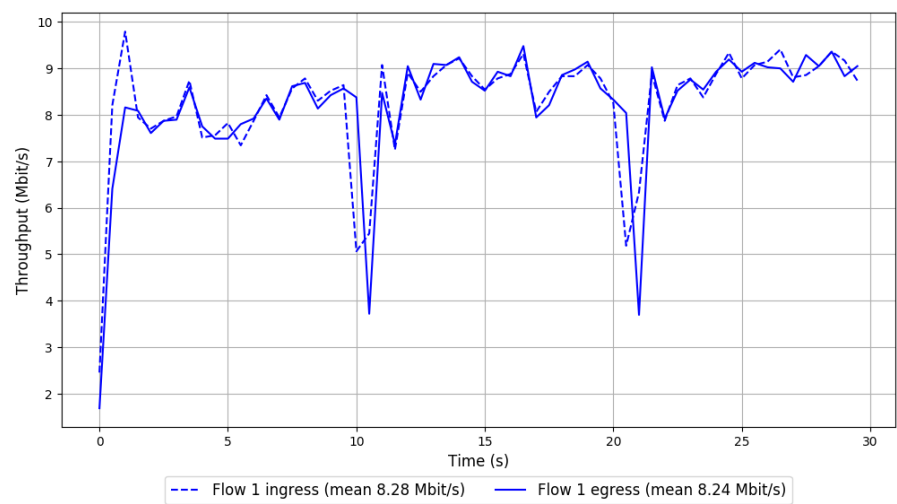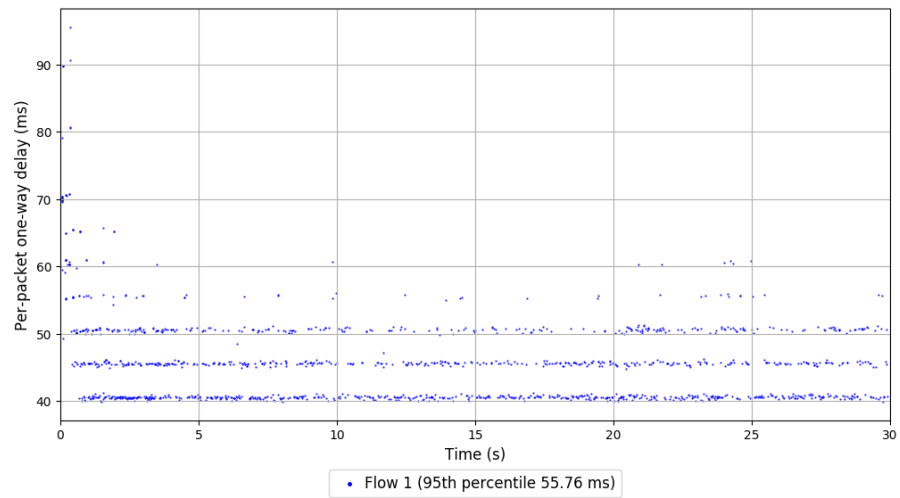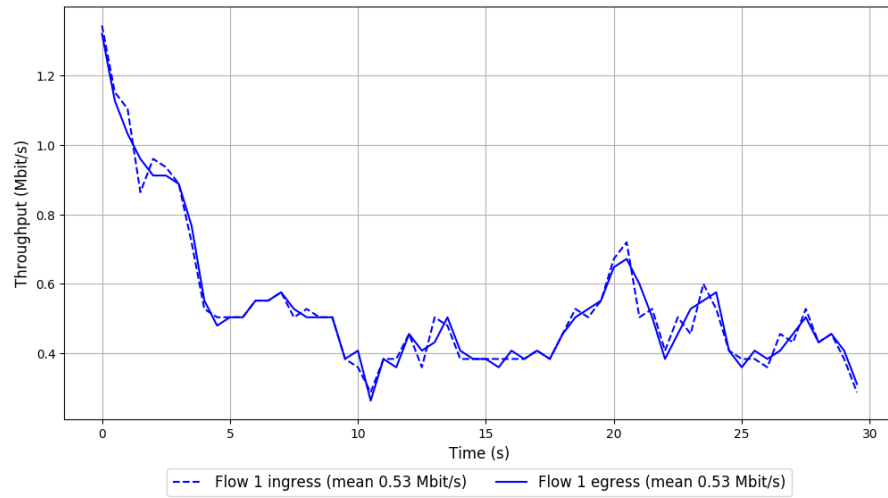
Run 2: Report of TCP BBR — Data Link

Flow 1 ingress (mean 8.15 Mbit/s)   Flow 1 egress (mean 8.09 Mbit/s)

• Flow 1 (95th percentile 282.92 ms)

```
Run 3: Statistics of TCP BBR

Start at: 2017-09-17 23:02:34
End at: 2017-09-17 23:03:04
Local clock offset: -2.55 ms
Remote clock offset: -3.268 ms


# Below is generated by plot.py at 2017-09-17 23:19:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.24 Mbit/s
95th percentile per-packet one-way delay: 266.282 ms
Loss rate: 0.61%
-- Flow 1:
Average throughput: 8.24 Mbit/s
95th percentile per-packet one-way delay: 266.282 ms
Loss rate: 0.61%
```

Run 3: Report of TCP BBR — Data Link

Flow 1 ingress (mean 8.28 Mbit/s) --- Flow 1 egress (mean 8.24 Mbit/s)
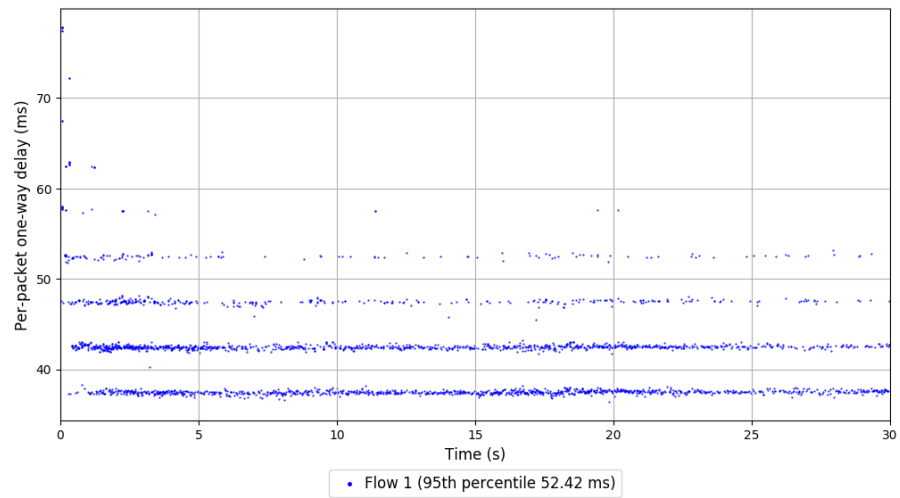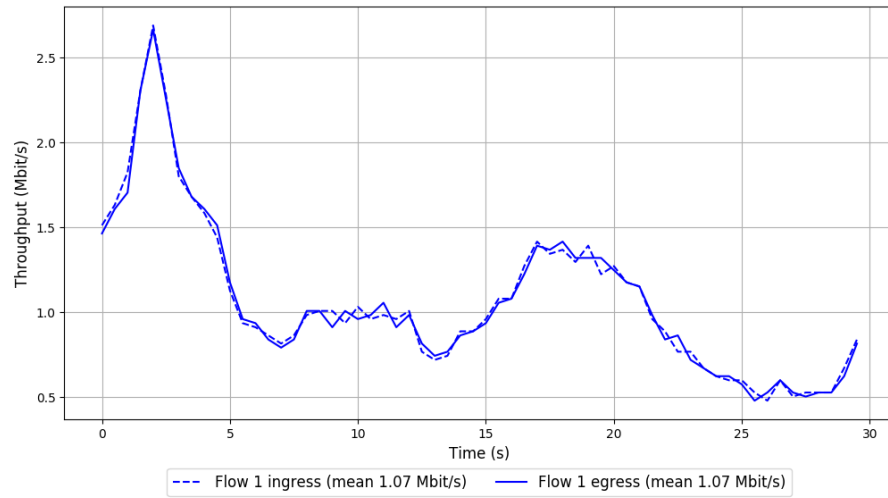

• Flow 1 (95th percentile 266.28 ms)

```
Run 1: Statistics of CalibratedKoho

Start at: 2017-09-17 22:38:48
End at: 2017-09-17 22:39:18
Local clock offset: -2.847 ms
Remote clock offset: -2.752 ms


# Below is generated by plot.py at 2017-09-17 23:19:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 55.764 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 55.764 ms
Loss rate: 0.00%
```
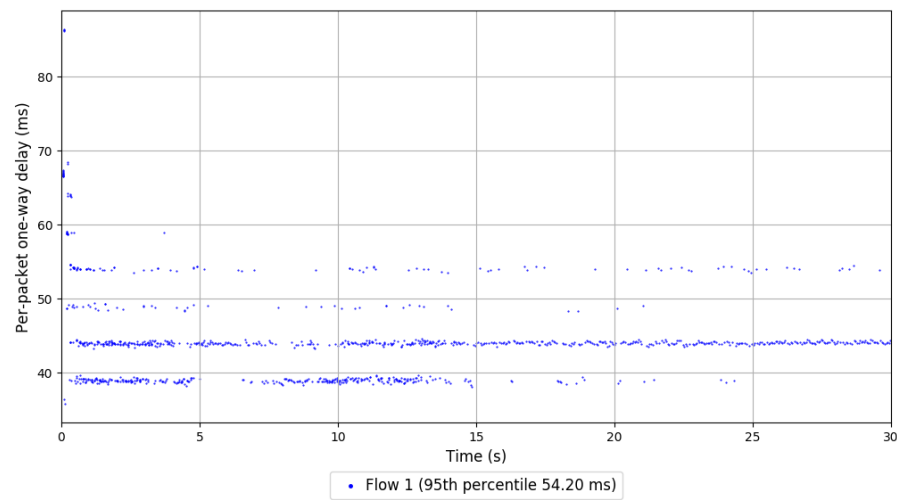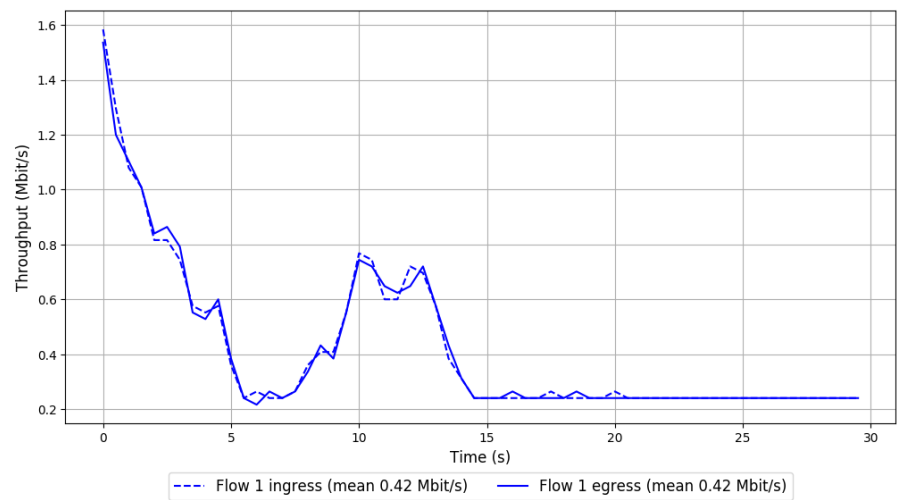
Run 1: Report of CalibratedKoho — Data Link

```
Run 2: Statistics of CalibratedKoho

Start at: 2017-09-17 22:55:43
End at: 2017-09-17 22:56:13
Local clock offset: -1.488 ms
Remote clock offset: -2.832 ms


# Below is generated by plot.py at 2017-09-17 23:19:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.07 Mbit/s
95th percentile per-packet one-way delay: 52.424 ms
Loss rate: 0.19%
-- Flow 1:
Average throughput: 1.07 Mbit/s
95th percentile per-packet one-way delay: 52.424 ms
Loss rate: 0.19%
```
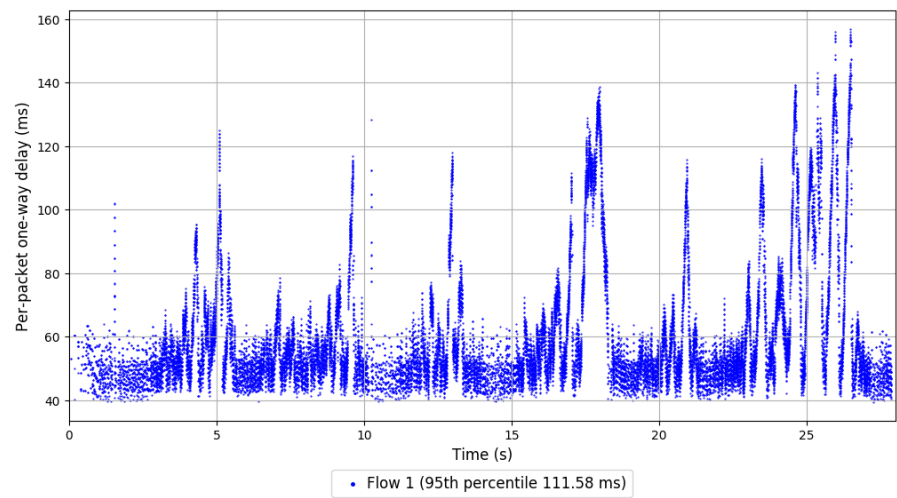
Run 2: Report of CalibratedKoho — Data Link

```
Run 3: Statistics of CalibratedKoho

Start at: 2017-09-17 23:14:11
End at: 2017-09-17 23:14:41
Local clock offset: -1.414 ms
Remote clock offset: -3.682 ms


# Below is generated by plot.py at 2017-09-17 23:19:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 54.198 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 54.198 ms
Loss rate: 0.09%
```
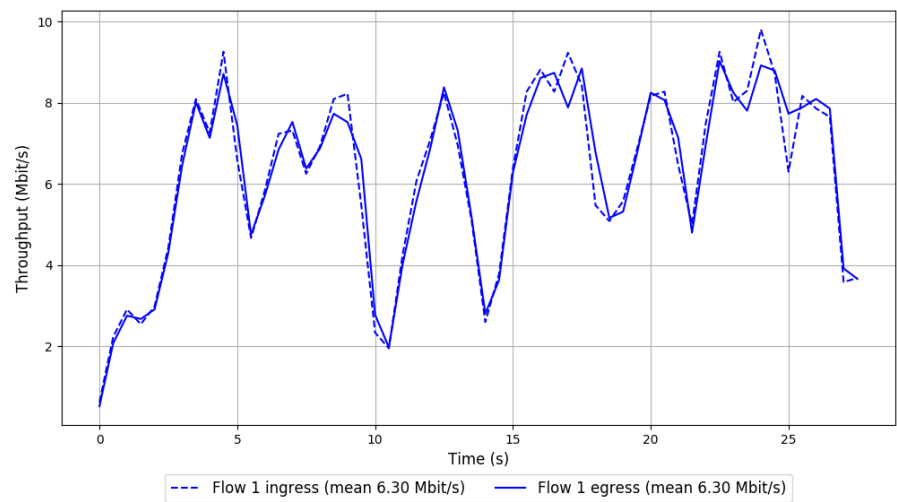
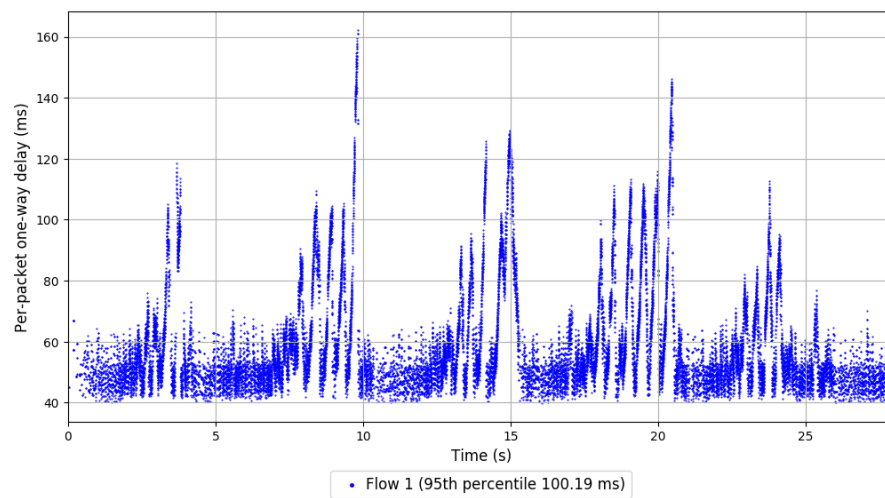Run 3: Report of CalibratedKoho — Data Link

```
Run 1: Statistics of Copa

Start at: 2017-09-17 22:36:33
End at: 2017-09-17 22:37:03
Local clock offset: -3.428 ms
Remote clock offset: -3.232 ms


# Below is generated by plot.py at 2017-09-17 23:19:39
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.30 Mbit/s
95th percentile per-packet one-way delay: 111.579 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 6.30 Mbit/s
95th percentile per-packet one-way delay: 111.579 ms
Loss rate: 0.15%
```

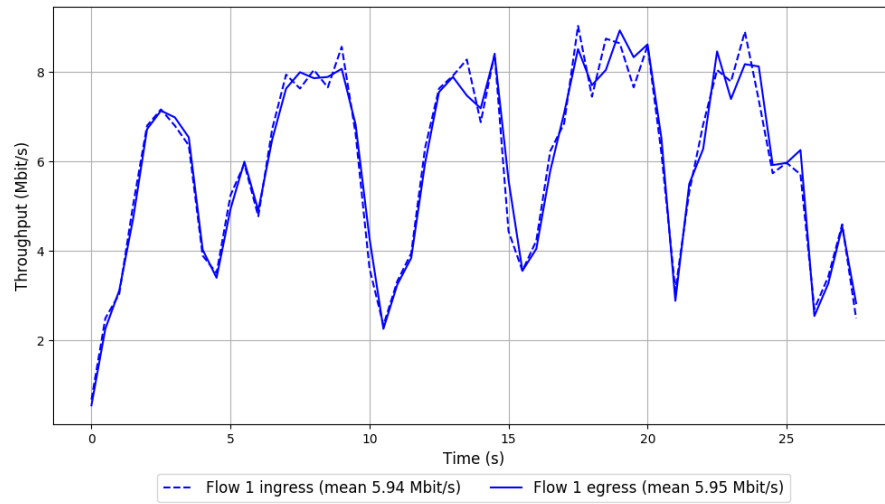Run 1: Report of Copa — Data Link

```
Run 2: Statistics of Copa

Start at: 2017-09-17 22:53:27
End at: 2017-09-17 22:53:57
Local clock offset: -4.064 ms
Remote clock offset: -2.956 ms


# Below is generated by plot.py at 2017-09-17 23:19:39
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.95 Mbit/s
95th percentile per-packet one-way delay: 100.187 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 5.95 Mbit/s
95th percentile per-packet one-way delay: 100.187 ms
Loss rate: 0.04%
```

Run 2: Report of Copa — Data Link

Flow 1 ingress (mean 5.94 Mbit/s)   Flow 1 egress (mean 5.95 Mbit/s)

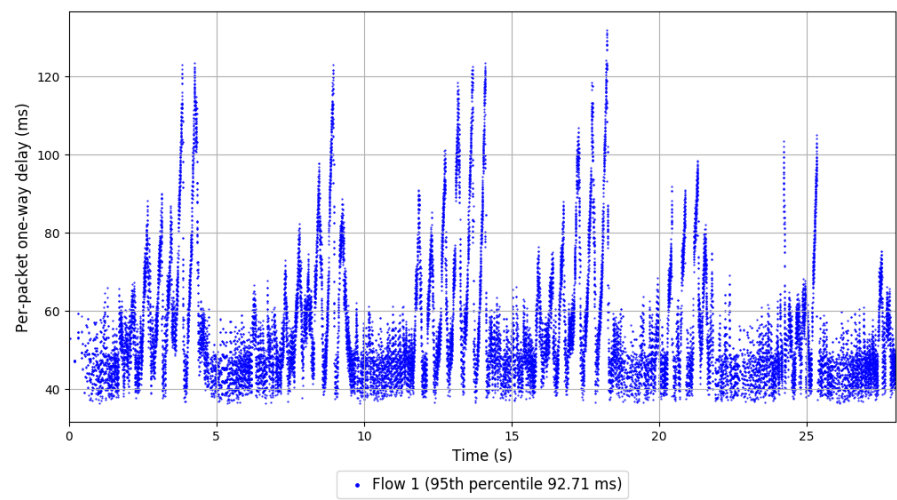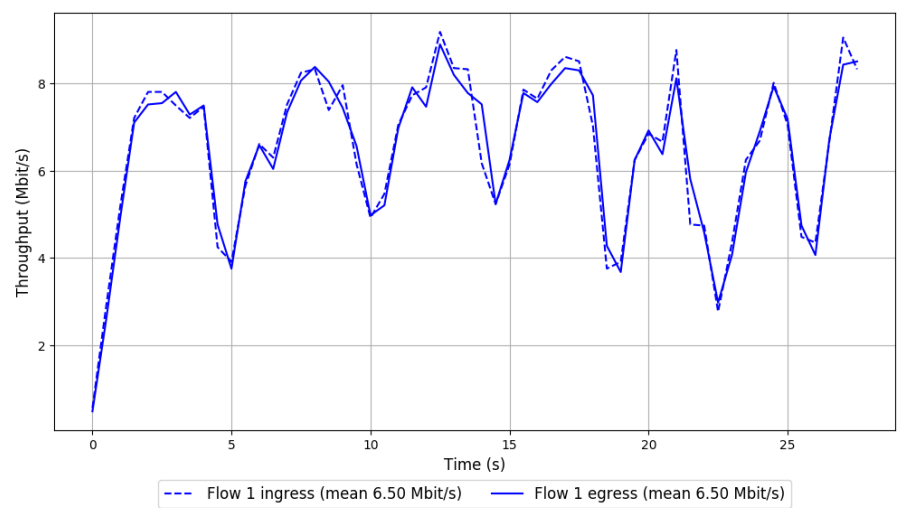• Flow 1 (95th percentile 100.19 ms)

```
Run 3: Statistics of Copa

Start at: 2017-09-17 23:10:29
End at: 2017-09-17 23:10:59
Local clock offset: -1.625 ms
Remote clock offset: -2.732 ms


# Below is generated by plot.py at 2017-09-17 23:19:42
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.50 Mbit/s
95th percentile per-packet one-way delay: 92.714 ms
Loss rate: 0.27%
-- Flow 1:
Average throughput: 6.50 Mbit/s
95th percentile per-packet one-way delay: 92.714 ms
Loss rate: 0.27%
```

Run 3: Report of Copa — Data Link

Flow 1 ingress (mean 6.50 Mbit/s)   Flow 1 egress (mean 6.50 Mbit/s)
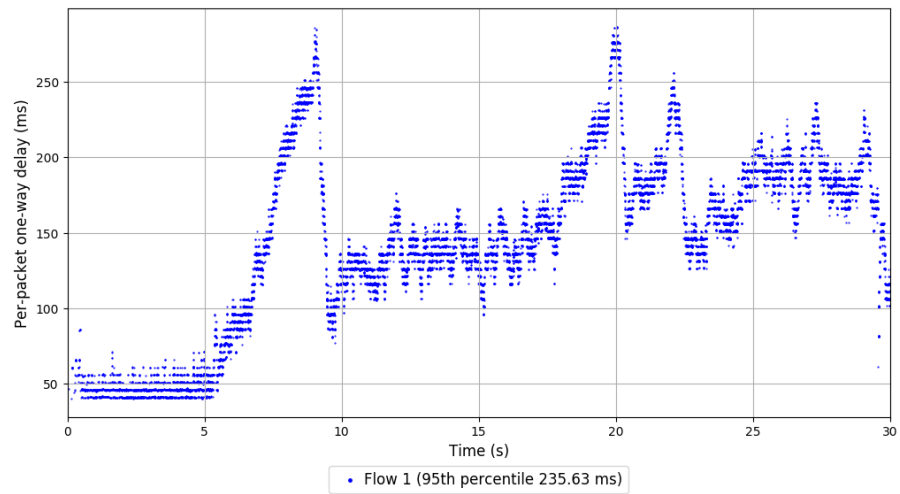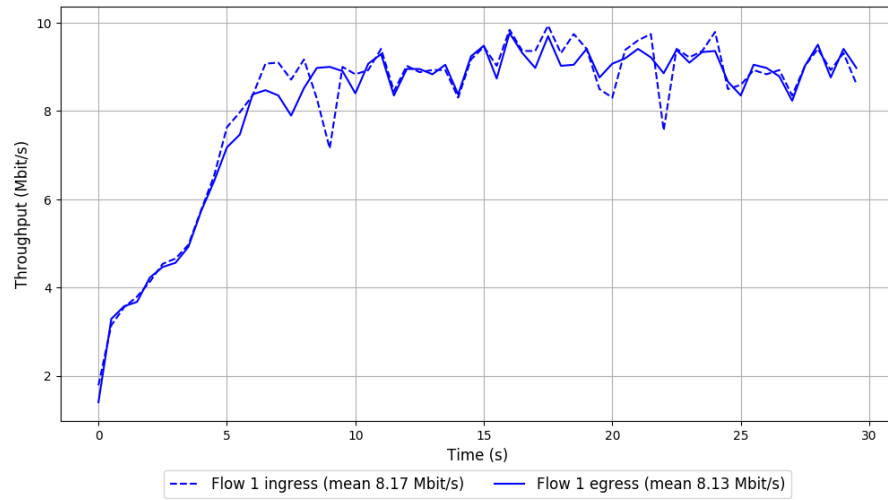

Flow 1 (95th percentile 92.71 ms)

```
Run 1: Statistics of TCP Cubic

Start at: 2017-09-17 22:29:51
End at: 2017-09-17 22:30:21
Local clock offset: -0.347 ms
Remote clock offset: -2.504 ms


# Below is generated by plot.py at 2017-09-17 23:19:42
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.13 Mbit/s
95th percentile per-packet one-way delay: 235.626 ms
Loss rate: 0.63%
-- Flow 1:
Average throughput: 8.13 Mbit/s
95th percentile per-packet one-way delay: 235.626 ms
Loss rate: 0.63%
```
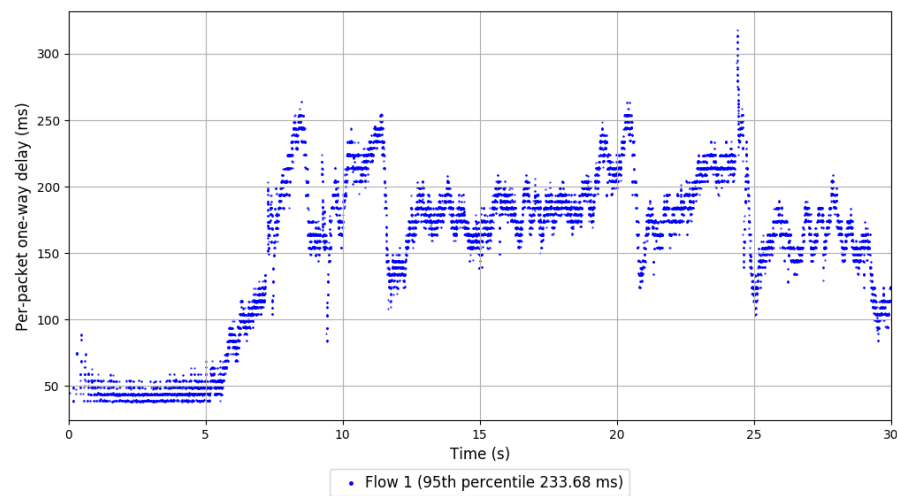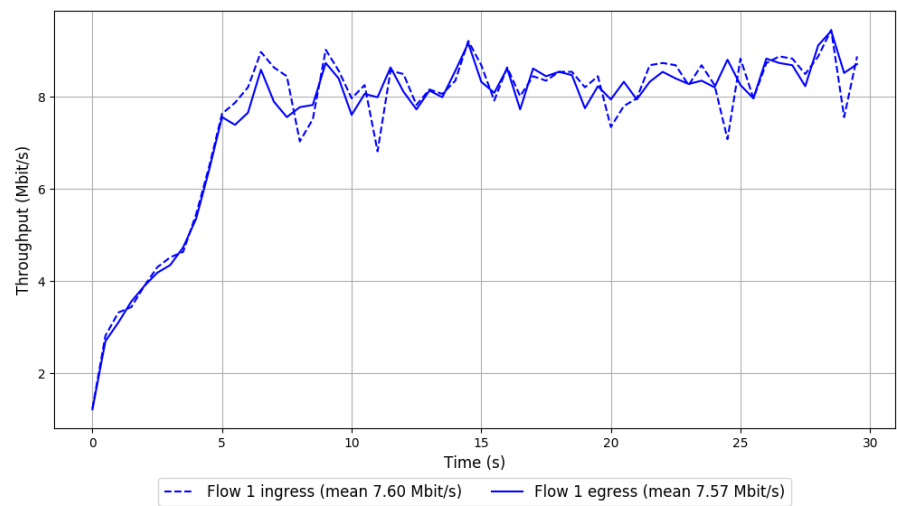
Run 1: Report of TCP Cubic — Data Link

```
Run 2: Statistics of TCP Cubic

Start at: 2017-09-17 22:46:46
End at: 2017-09-17 22:47:16
Local clock offset: -0.16 ms
Remote clock offset: -3.111 ms


# Below is generated by plot.py at 2017-09-17 23:19:42
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.57 Mbit/s
95th percentile per-packet one-way delay: 233.681 ms
Loss rate: 0.48%
-- Flow 1:
Average throughput: 7.57 Mbit/s
95th percentile per-packet one-way delay: 233.681 ms
Loss rate: 0.48%
```

Run 2: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 7.60 Mbit/s) — Flow 1 egress (mean 7.57 Mbit/s)

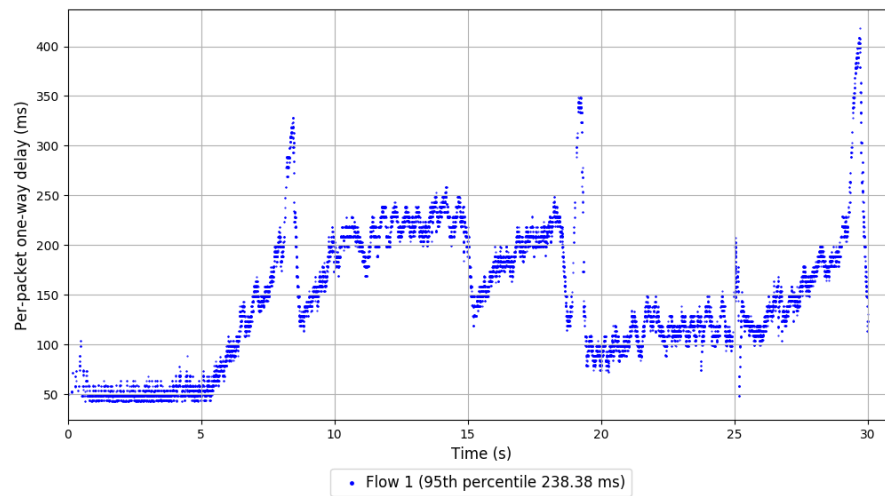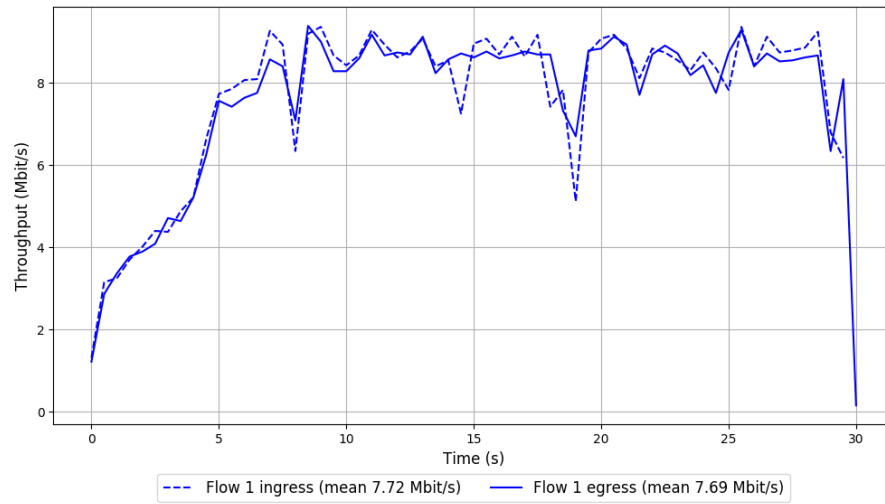• Flow 1 (95th percentile 233.68 ms)

```
Run 3: Statistics of TCP Cubic

Start at: 2017-09-17 23:03:42
End at: 2017-09-17 23:04:12
Local clock offset: -3.89 ms
Remote clock offset: -2.613 ms


# Below is generated by plot.py at 2017-09-17 23:19:46
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.69 Mbit/s
95th percentile per-packet one-way delay: 238.377 ms
Loss rate: 0.50%
-- Flow 1:
Average throughput: 7.69 Mbit/s
95th percentile per-packet one-way delay: 238.377 ms
Loss rate: 0.50%
```

Run 3: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 7.72 Mbit/s) --- Flow 1 egress (mean 7.69 Mbit/s)

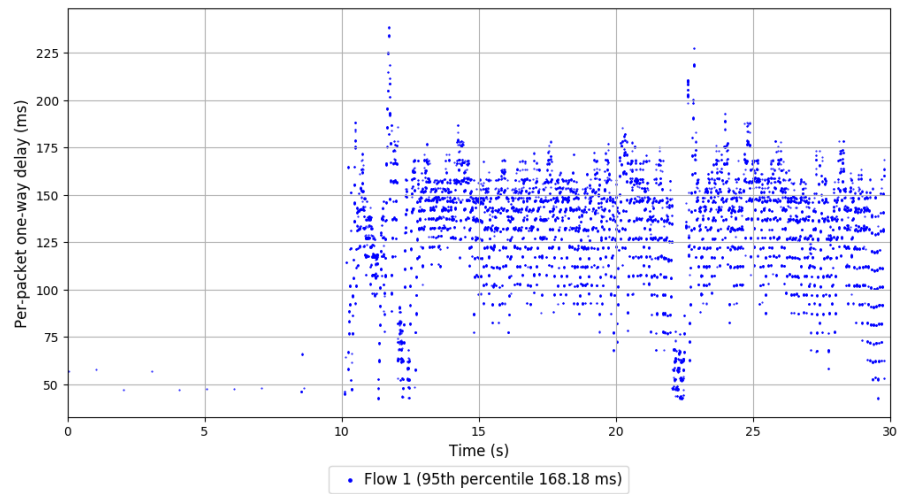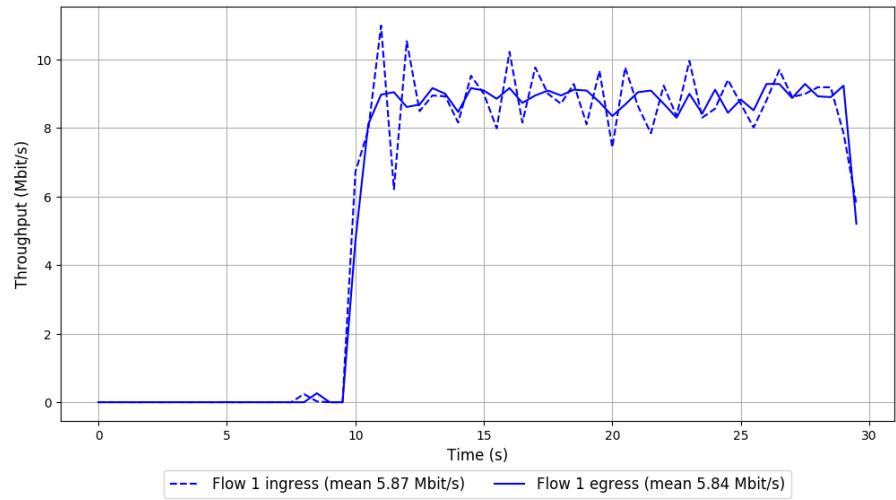
· Flow 1 (95th percentile 238.38 ms)

```
Run 1: Statistics of Indigo

Start at: 2017-09-17 22:32:05
End at: 2017-09-17 22:32:35
Local clock offset: -2.187 ms
Remote clock offset: -2.601 ms


# Below is generated by plot.py at 2017-09-17 23:19:46
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.84 Mbit/s
95th percentile per-packet one-way delay: 168.178 ms
Loss rate: 0.49%
-- Flow 1:
Average throughput: 5.84 Mbit/s
95th percentile per-packet one-way delay: 168.178 ms
Loss rate: 0.49%
```

Run 1: Report of Indigo — Data Link

Flow 1 ingress (mean 5.87 Mbit/s)   Flow 1 egress (mean 5.84 Mbit/s)

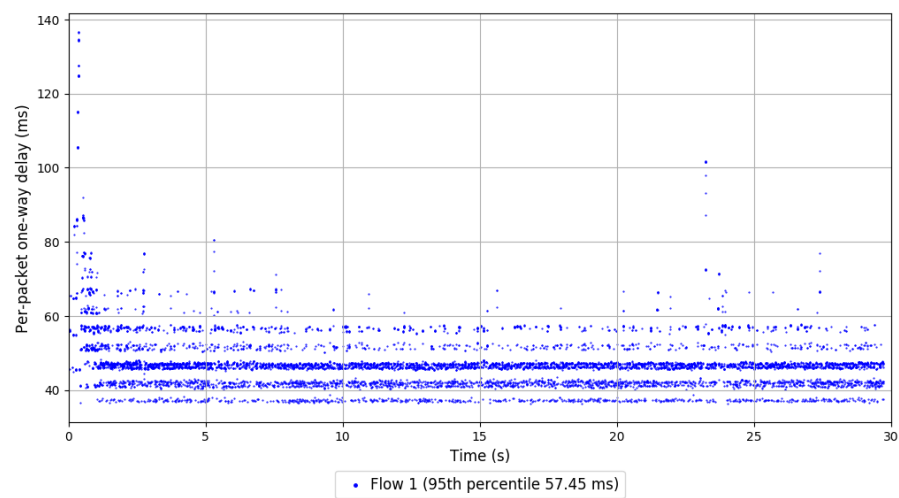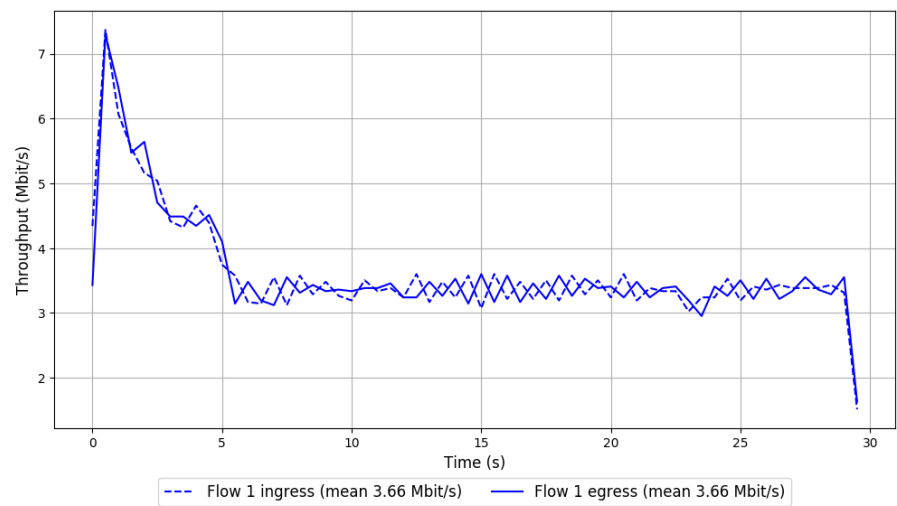Flow 1 (95th percentile 168.18 ms)

```
Run 2: Statistics of Indigo

Start at: 2017-09-17 22:49:00
End at: 2017-09-17 22:49:30
Local clock offset: -1.087 ms
Remote clock offset: -2.476 ms


# Below is generated by plot.py at 2017-09-17 23:19:46
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.66 Mbit/s
95th percentile per-packet one-way delay: 57.454 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 3.66 Mbit/s
95th percentile per-packet one-way delay: 57.454 ms
Loss rate: 0.03%
```

Run 2: Report of Indigo — Data Link

```
Run 3: Statistics of Indigo

Start at: 2017-09-17 23:06:00
End at: 2017-09-17 23:06:30
Local clock offset: -0.587 ms
Remote clock offset: -3.35 ms


# Below is generated by plot.py at 2017-09-17 23:19:46
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.89 Mbit/s
95th percentile per-packet one-way delay: 56.420 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 2.89 Mbit/s
95th percentile per-packet one-way delay: 56.420 ms
Loss rate: 0.10%
```
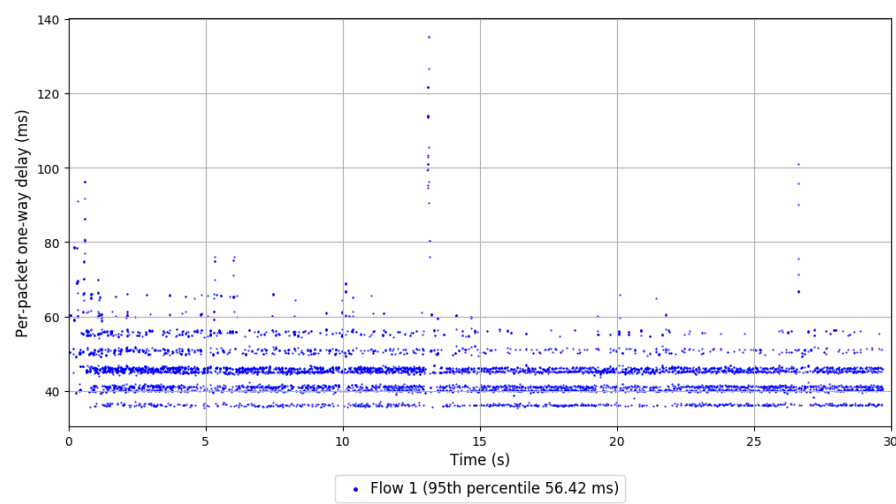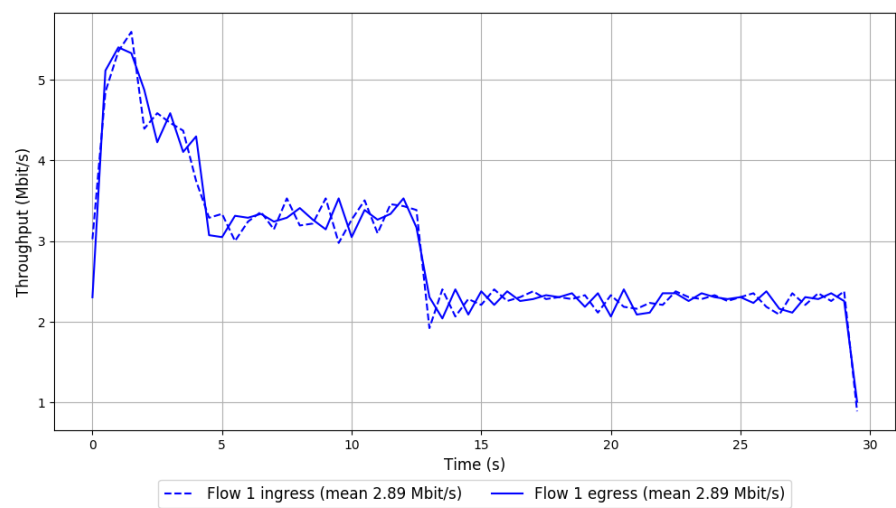
Run 3: Report of Indigo — Data Link

```
Run 1: Statistics of KohoCC

Start at: 2017-09-17 22:27:33
End at: 2017-09-17 22:28:03
Local clock offset: -1.71 ms
Remote clock offset: -3.043 ms


# Below is generated by plot.py at 2017-09-17 23:19:48
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.61 Mbit/s
95th percentile per-packet one-way delay: 81.036 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 7.61 Mbit/s
95th percentile per-packet one-way delay: 81.036 ms
Loss rate: 0.16%
```
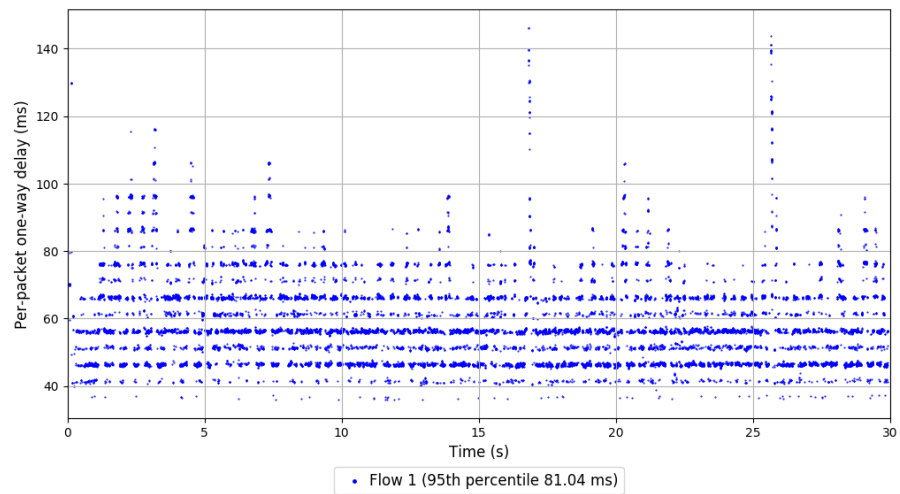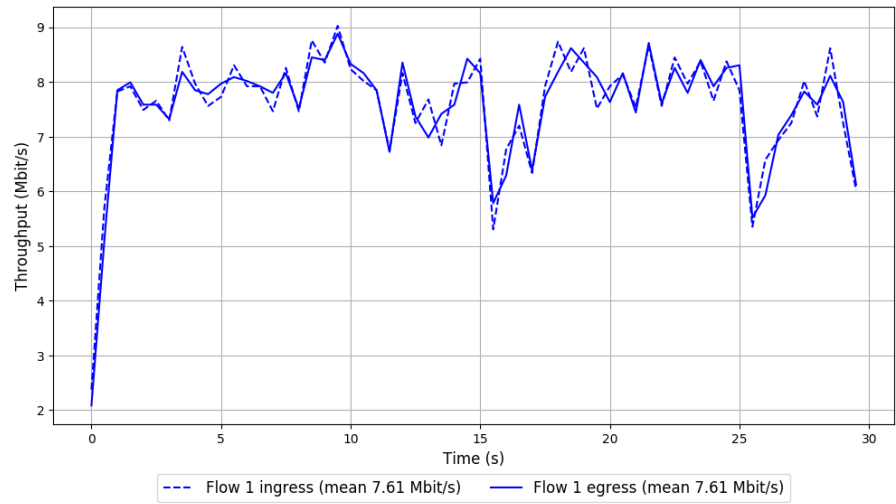
Run 1: Report of KohoCC — Data Link

Flow 1 ingress (mean 7.61 Mbit/s) --- Flow 1 egress (mean 7.61 Mbit/s)

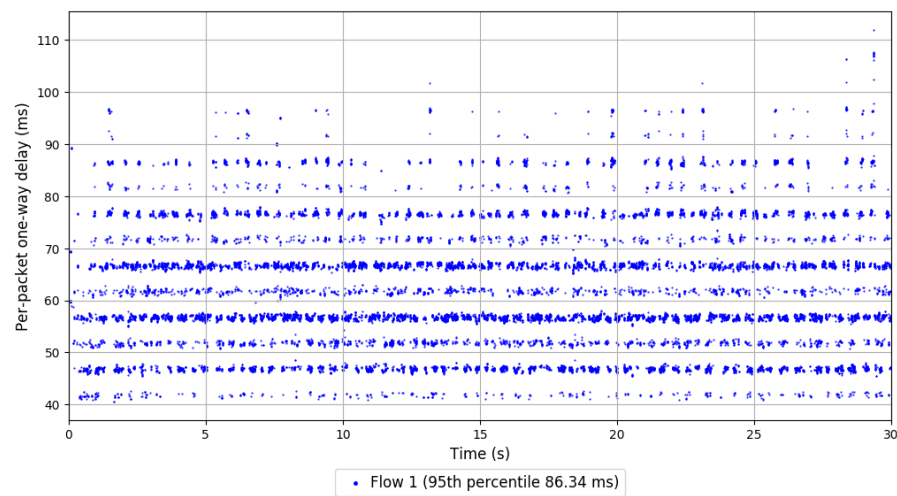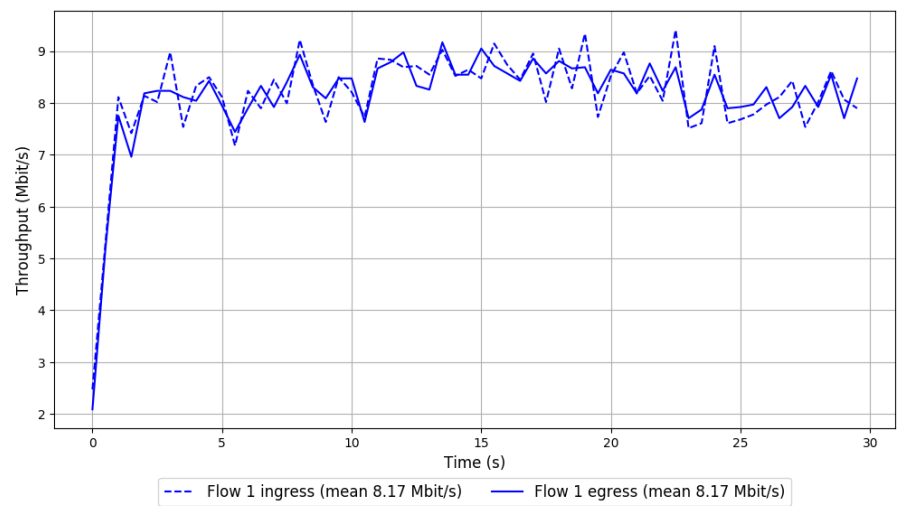Flow 1 (95th percentile 81.04 ms)

```
Run 2: Statistics of KohoCC

Start at: 2017-09-17 22:44:27
End at: 2017-09-17 22:44:57
Local clock offset: -2.525 ms
Remote clock offset: -1.822 ms


# Below is generated by plot.py at 2017-09-17 23:19:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.17 Mbit/s
95th percentile per-packet one-way delay: 86.345 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 8.17 Mbit/s
95th percentile per-packet one-way delay: 86.345 ms
Loss rate: 0.23%
```

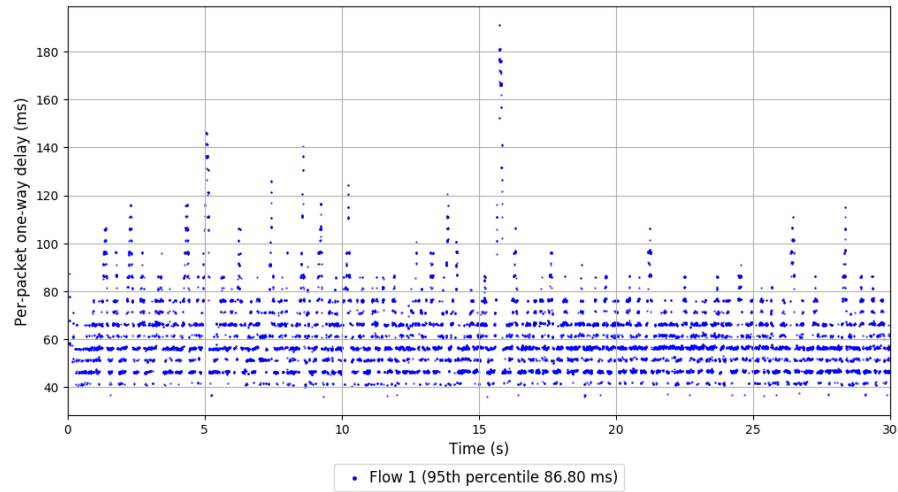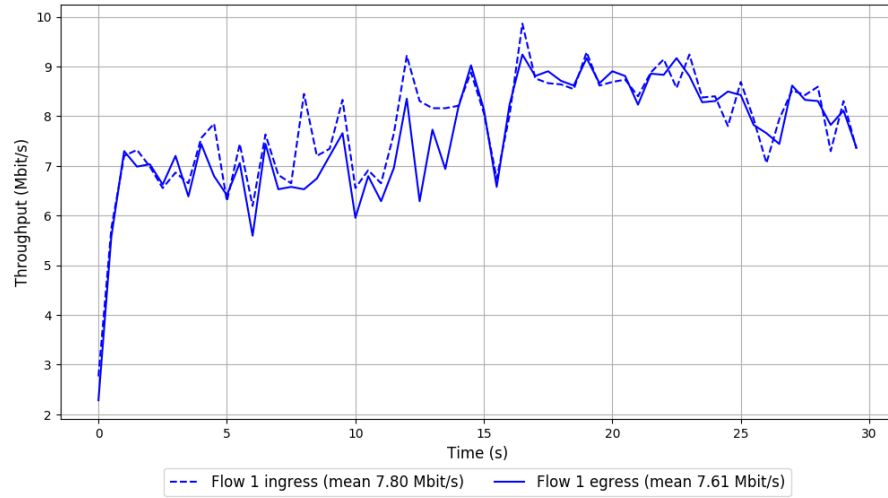Run 2: Report of KohoCC — Data Link

```
Run 3: Statistics of KohoCC

Start at: 2017-09-17 23:01:26
End at: 2017-09-17 23:01:56
Local clock offset: -1.408 ms
Remote clock offset: -2.854 ms


# Below is generated by plot.py at 2017-09-17 23:19:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.61 Mbit/s
95th percentile per-packet one-way delay: 86.799 ms
Loss rate: 2.69%
-- Flow 1:
Average throughput: 7.61 Mbit/s
95th percentile per-packet one-way delay: 86.799 ms
Loss rate: 2.69%
```

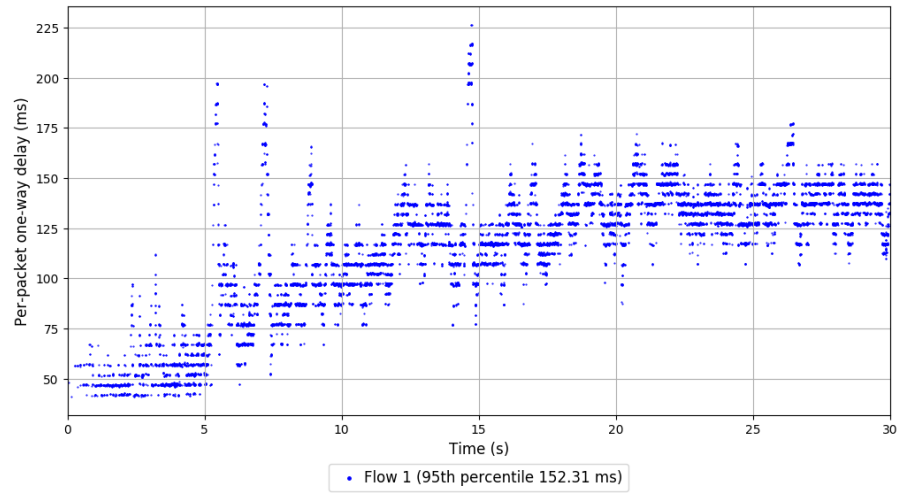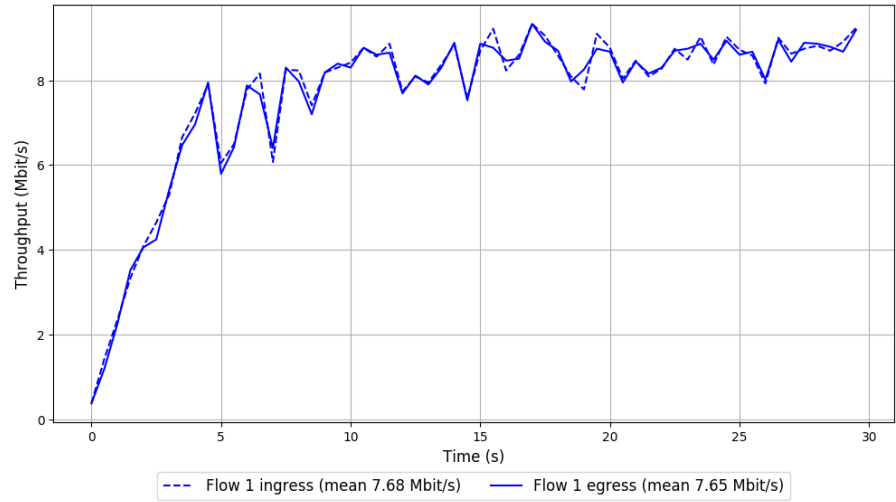# Run 3: Report of KohoCC — Data Link

```
Run 1: Statistics of LEDBAT

Start at: 2017-09-17 22:34:18
End at: 2017-09-17 22:34:48
Local clock offset: -1.121 ms
Remote clock offset: -2.37 ms


# Below is generated by plot.py at 2017-09-17 23:19:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.65 Mbit/s
95th percentile per-packet one-way delay: 152.310 ms
Loss rate: 0.51%
-- Flow 1:
Average throughput: 7.65 Mbit/s
95th percentile per-packet one-way delay: 152.310 ms
Loss rate: 0.51%
```

Run 1: Report of LEDBAT — Data Link

Flow 1 ingress (mean 7.68 Mbit/s)   Flow 1 egress (mean 7.65 Mbit/s)

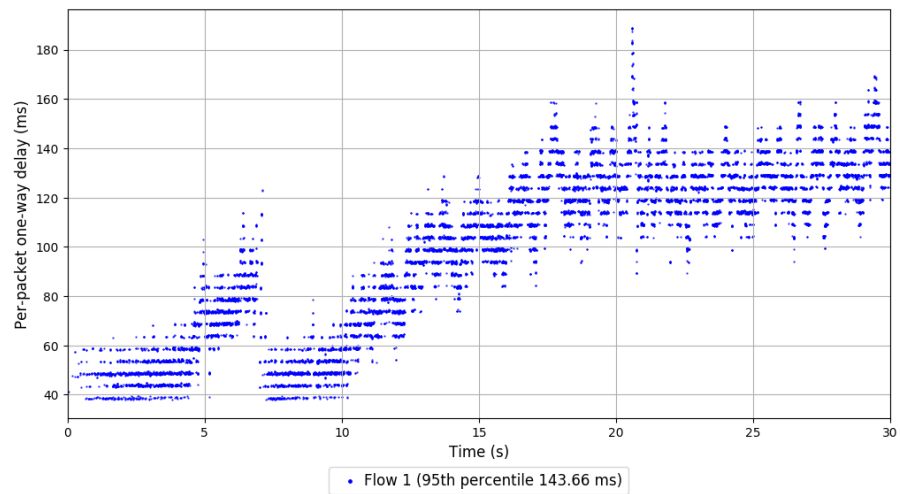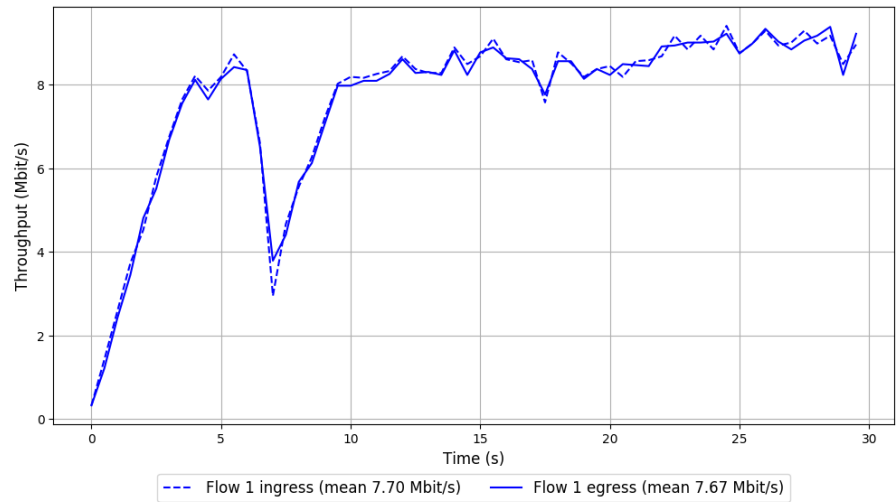Flow 1 (95th percentile 152.31 ms)

```
Run 2: Statistics of LEDBAT

Start at: 2017-09-17 22:51:14
End at: 2017-09-17 22:51:44
Local clock offset: -2.38 ms
Remote clock offset: -3.103 ms


# Below is generated by plot.py at 2017-09-17 23:19:58
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.67 Mbit/s
95th percentile per-packet one-way delay: 143.665 ms
Loss rate: 0.53%
-- Flow 1:
Average throughput: 7.67 Mbit/s
95th percentile per-packet one-way delay: 143.665 ms
Loss rate: 0.53%
```

Run 2: Report of LEDBAT — Data Link

Flow 1 ingress (mean 7.70 Mbit/s)   Flow 1 egress (mean 7.67 Mbit/s)

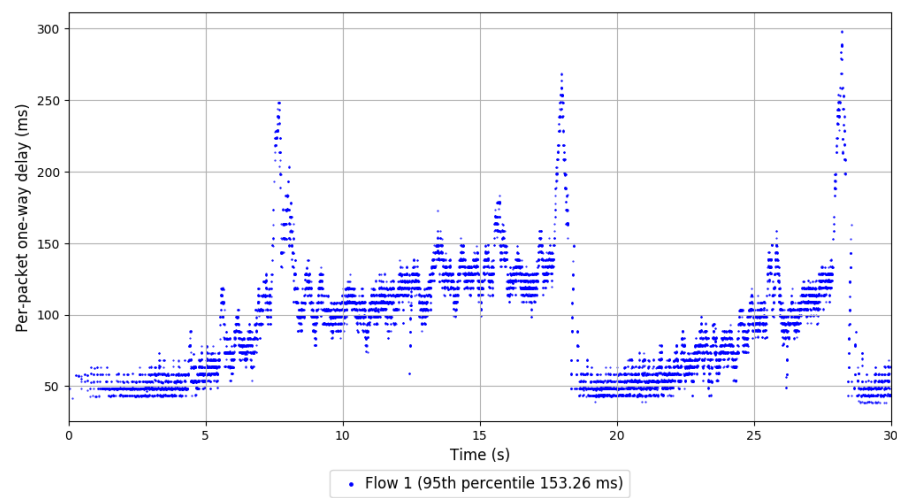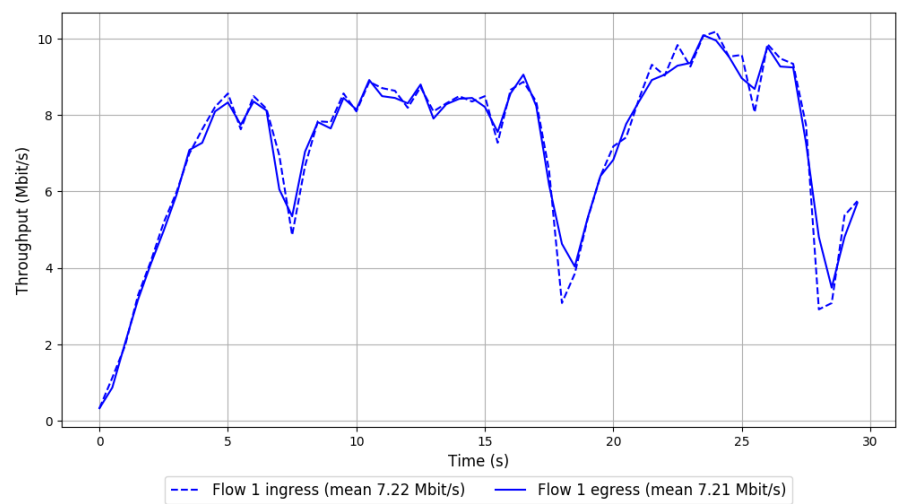• Flow 1 (95th percentile 143.66 ms)

```
Run 3: Statistics of LEDBAT

Start at: 2017-09-17 23:08:15
End at: 2017-09-17 23:08:45
Local clock offset: -3.051 ms
Remote clock offset: -3.045 ms


# Below is generated by plot.py at 2017-09-17 23:19:58
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.21 Mbit/s
95th percentile per-packet one-way delay: 153.257 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 7.21 Mbit/s
95th percentile per-packet one-way delay: 153.257 ms
Loss rate: 0.20%
```

Run 3: Report of LEDBAT — Data Link

Flow 1 ingress (mean 7.22 Mbit/s)   Flow 1 egress (mean 7.21 Mbit/s)

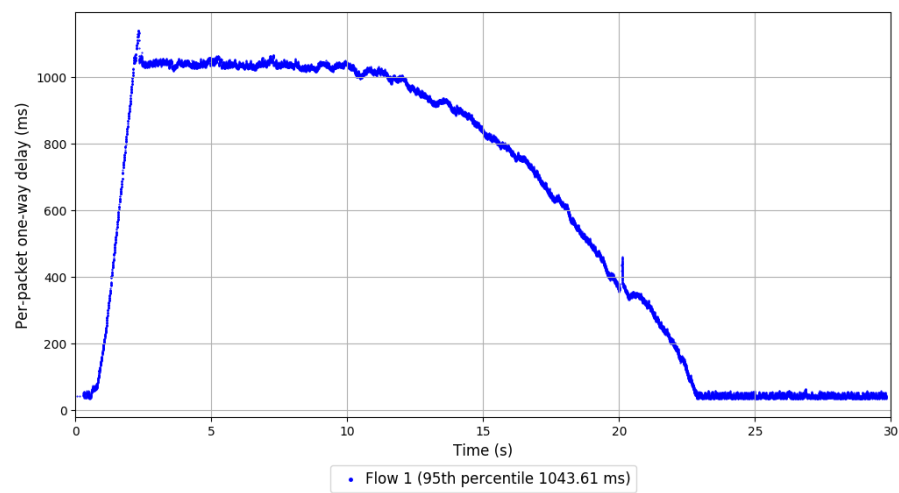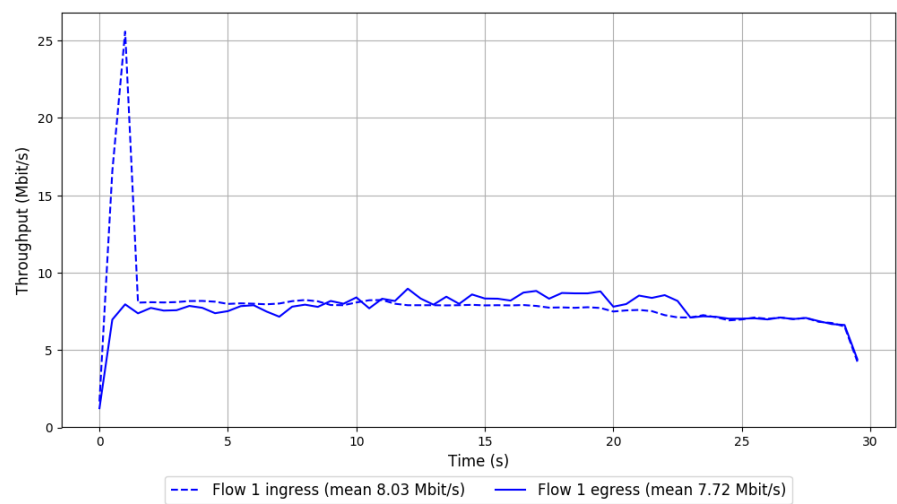Flow 1 (95th percentile 153.26 ms)

```
Run 1: Statistics of PCC

Start at: 2017-09-17 22:25:20
End at: 2017-09-17 22:25:50
Local clock offset: -0.098 ms
Remote clock offset: -2.843 ms


# Below is generated by plot.py at 2017-09-17 23:20:01
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.72 Mbit/s
95th percentile per-packet one-way delay: 1043.610 ms
Loss rate: 3.89%
-- Flow 1:
Average throughput: 7.72 Mbit/s
95th percentile per-packet one-way delay: 1043.610 ms
Loss rate: 3.89%
```

Run 1: Report of PCC — Data Link

Flow 1 ingress (mean 8.03 Mbit/s)   Flow 1 egress (mean 7.72 Mbit/s)

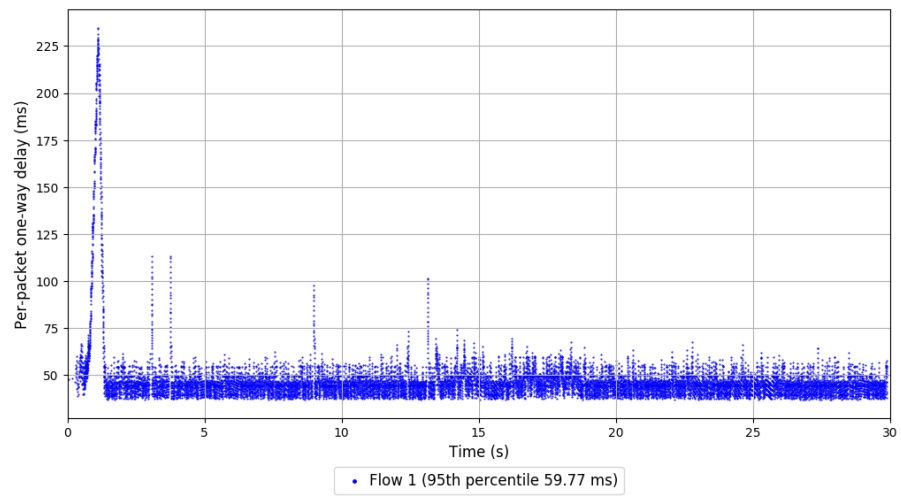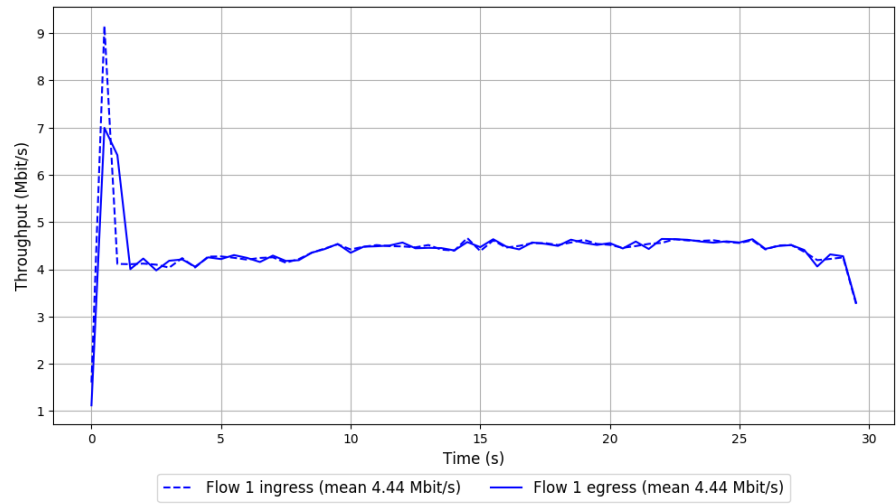• Flow 1 (95th percentile 1043.61 ms)

```
Run 2: Statistics of PCC

Start at: 2017-09-17 22:42:12
End at: 2017-09-17 22:42:42
Local clock offset: -1.59 ms
Remote clock offset: -1.813 ms


# Below is generated by plot.py at 2017-09-17 23:20:01
# Datalink statistics
-- Total of 1 flow:
Average throughput: 4.44 Mbit/s
95th percentile per-packet one-way delay: 59.768 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 4.44 Mbit/s
95th percentile per-packet one-way delay: 59.768 ms
Loss rate: 0.12%
```

Run 2: Report of PCC — Data Link

Flow 1 ingress (mean 4.44 Mbit/s) --- Flow 1 egress (mean 4.44 Mbit/s)
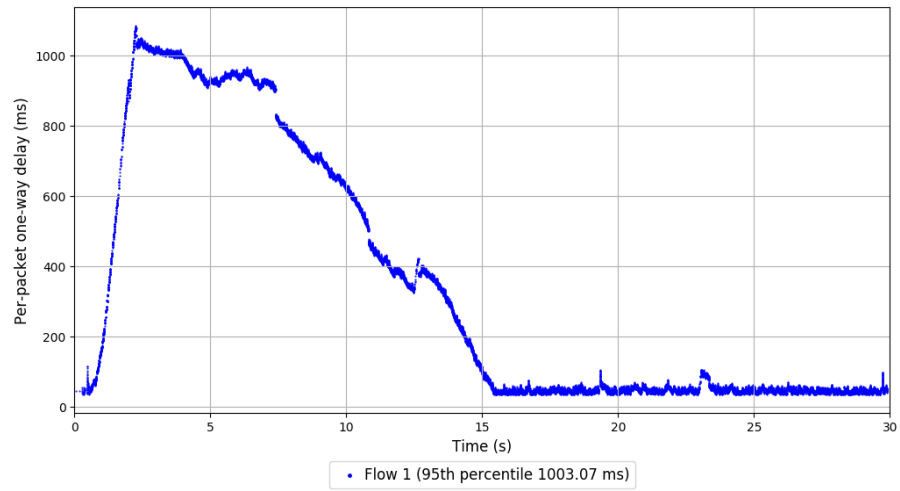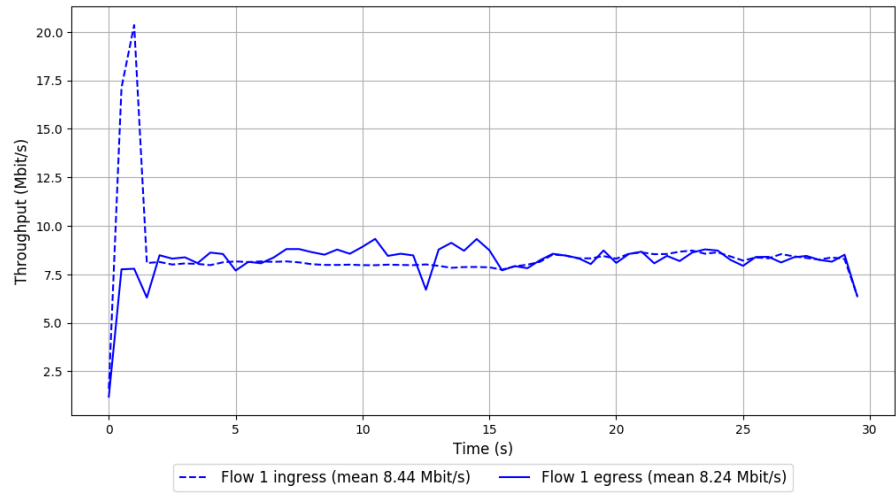

Flow 1 (95th percentile 59.77 ms)

```
Run 3: Statistics of PCC

Start at: 2017-09-17 22:59:10
End at: 2017-09-17 22:59:41
Local clock offset: -0.173 ms
Remote clock offset: -1.659 ms


# Below is generated by plot.py at 2017-09-17 23:20:04
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.24 Mbit/s
95th percentile per-packet one-way delay: 1003.071 ms
Loss rate: 2.49%
-- Flow 1:
Average throughput: 8.24 Mbit/s
95th percentile per-packet one-way delay: 1003.071 ms
Loss rate: 2.49%
```

Run 3: Report of PCC — Data Link

Flow 1 ingress (mean 8.44 Mbit/s)   Flow 1 egress (mean 8.24 Mbit/s)

Flow 1 (95th percentile 1003.07 ms)

```
Run 1: Statistics of QUIC Cubic

Start at: 2017-09-17 22:33:13
End at: 2017-09-17 22:33:43
Local clock offset: 0.122 ms
Remote clock offset: -2.935 ms
```
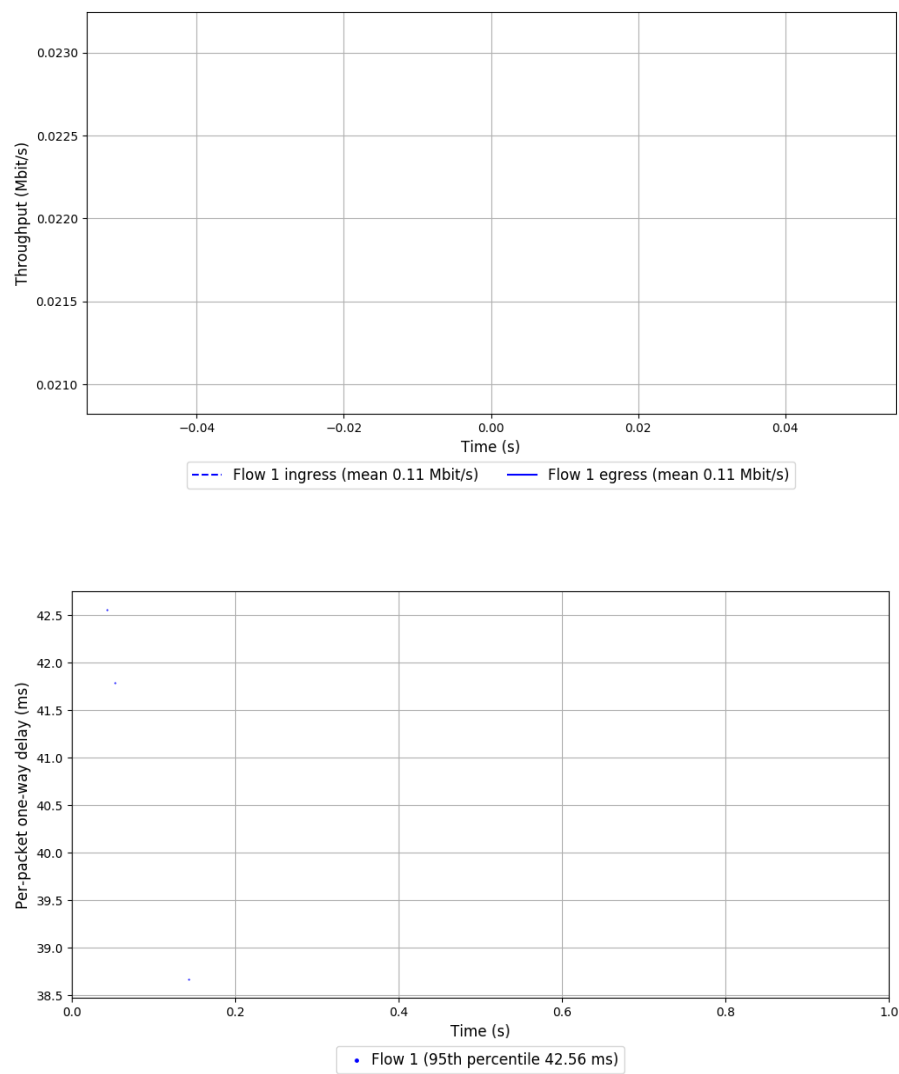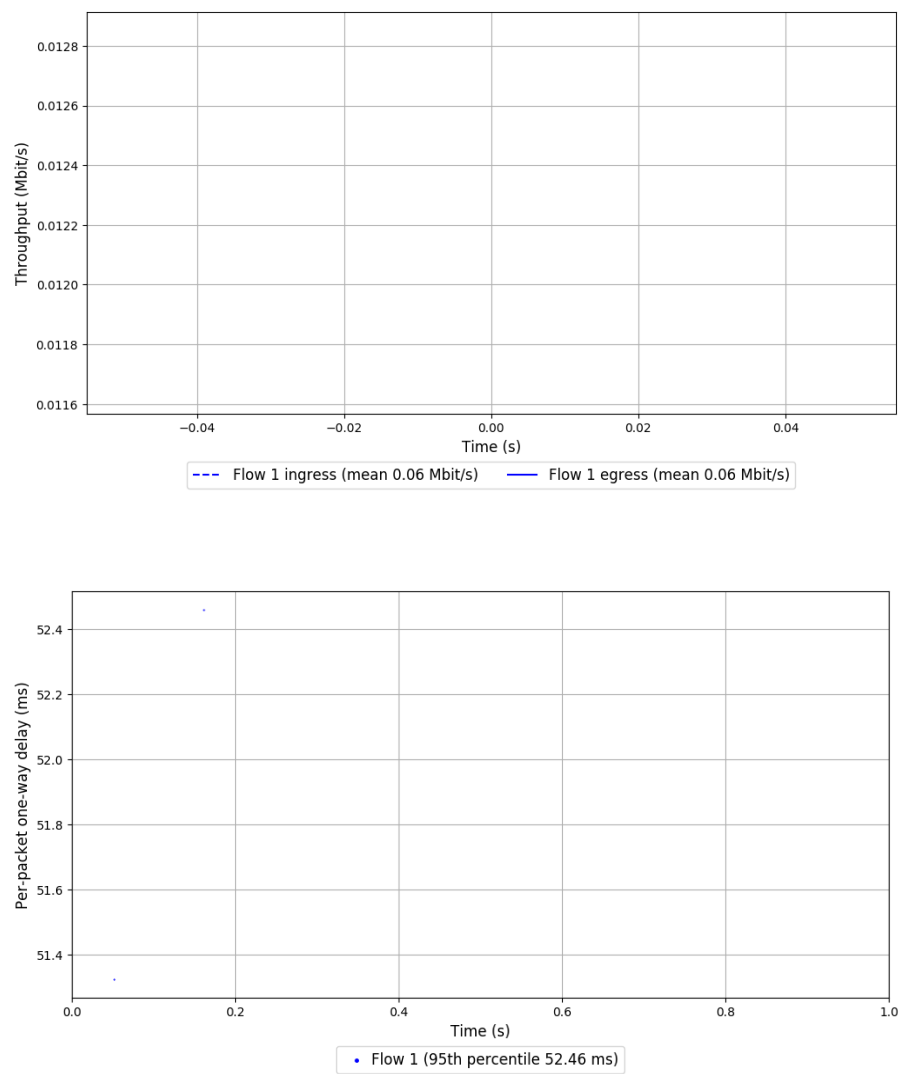
Run 1: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 0.11 Mbit/s)   Flow 1 egress (mean 0.11 Mbit/s)

Flow 1 (95th percentile 42.56 ms)

Run 2: Statistics of QUIC Cubic

Start at: 2017-09-17 22:50:08
End at: 2017-09-17 22:50:38
Local clock offset: -3.407 ms
Remote clock offset: -2.646 ms
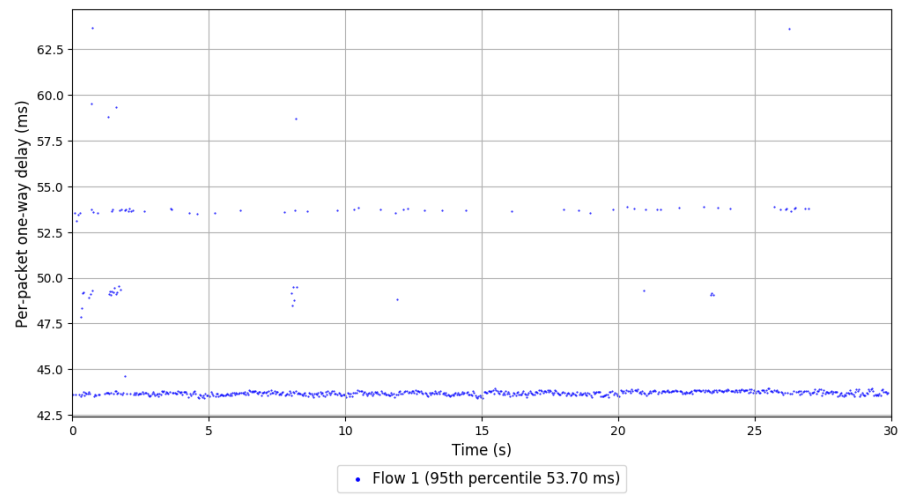
Run 2: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 0.06 Mbit/s) — — — Flow 1 egress (mean 0.06 Mbit/s)

Flow 1 (95th percentile 52.46 ms)

```
Run 3: Statistics of QUIC Cubic

Start at: 2017-09-17 23:07:09
End at: 2017-09-17 23:07:39
Local clock offset: 0.304 ms
Remote clock offset: -3.185 ms
```

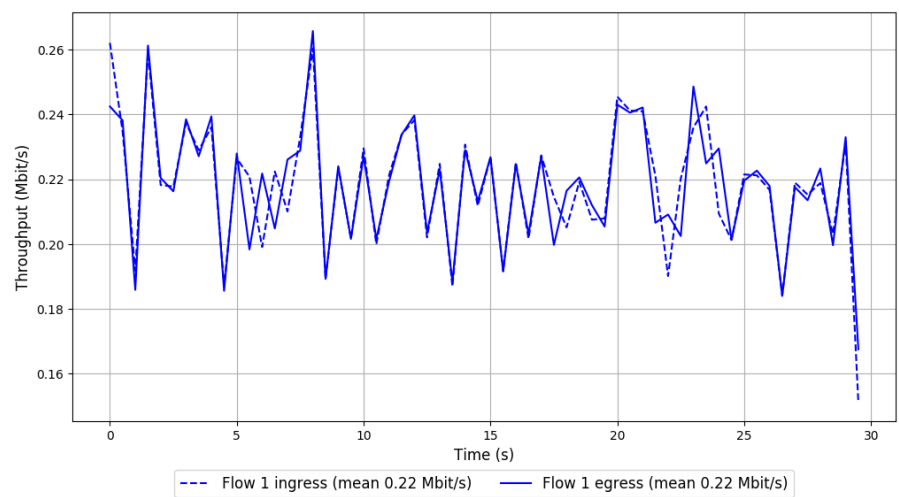# Run 3: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 0.06 Mbit/s) --- Flow 1 egress (mean 0.06 Mbit/s)
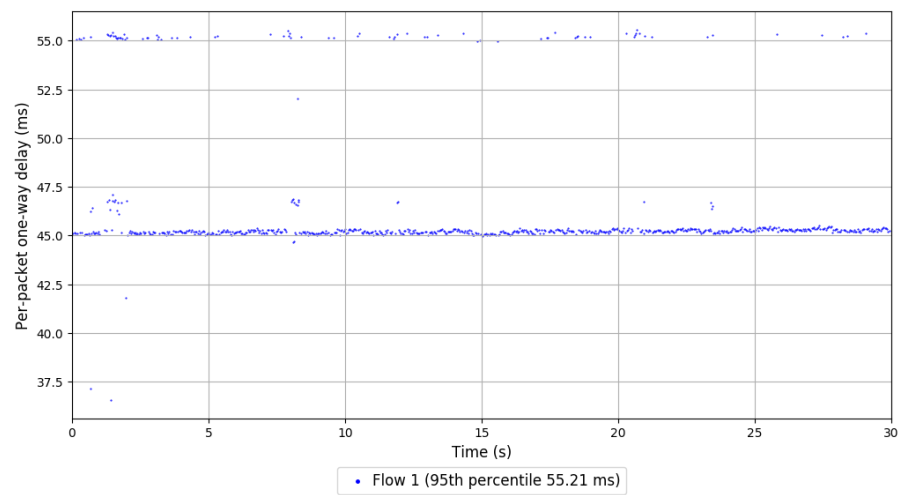

Flow 1 (95th percentile 47.43 ms)

```
Run 1: Statistics of SCReAM

Start at: 2017-09-17 22:35:27
End at: 2017-09-17 22:35:57
Local clock offset: -2.013 ms
Remote clock offset: -2.346 ms


# Below is generated by plot.py at 2017-09-17 23:20:04
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 53.703 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 53.703 ms
Loss rate: 0.00%
```

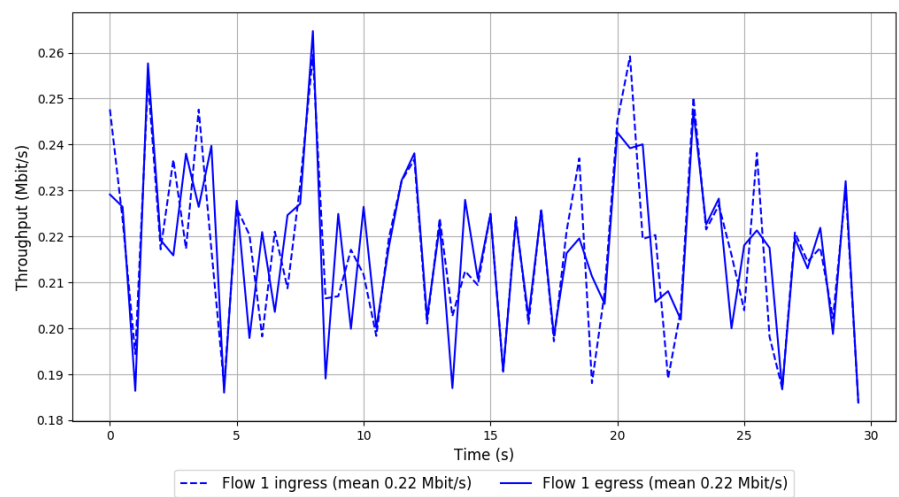# Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2017-09-17 22:52:22
End at: 2017-09-17 22:52:52
Local clock offset: -0.553 ms
Remote clock offset: -3.261 ms

# Below is generated by plot.py at 2017-09-17 23:20:04
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 55.207 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 55.207 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)

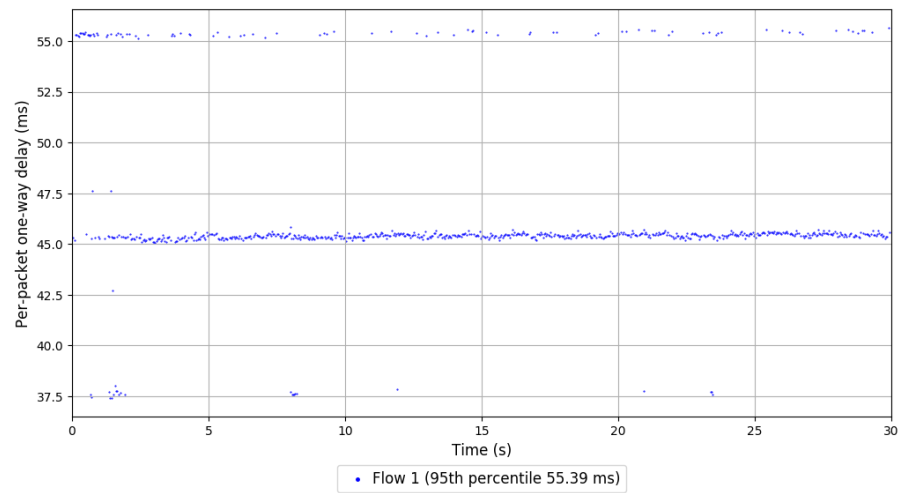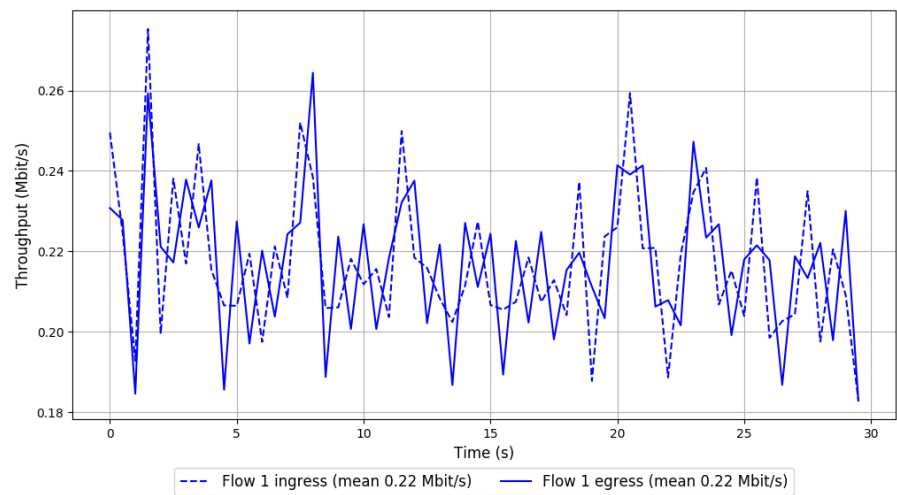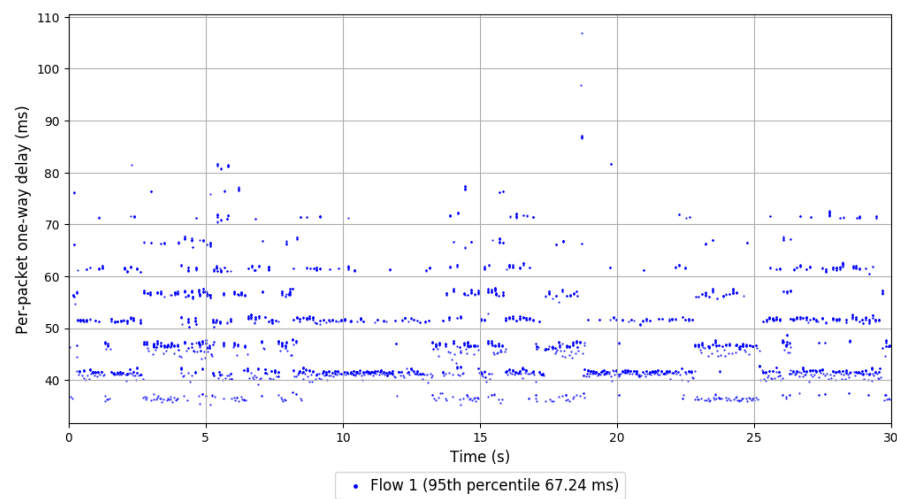• Flow 1 (95th percentile 55.21 ms)

61

```
Run 3: Statistics of SCReAM

Start at: 2017-09-17 23:09:23
End at: 2017-09-17 23:09:53
Local clock offset: -1.741 ms
Remote clock offset: -3.684 ms


# Below is generated by plot.py at 2017-09-17 23:20:04
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 55.386 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 55.386 ms
Loss rate: 0.13%
```

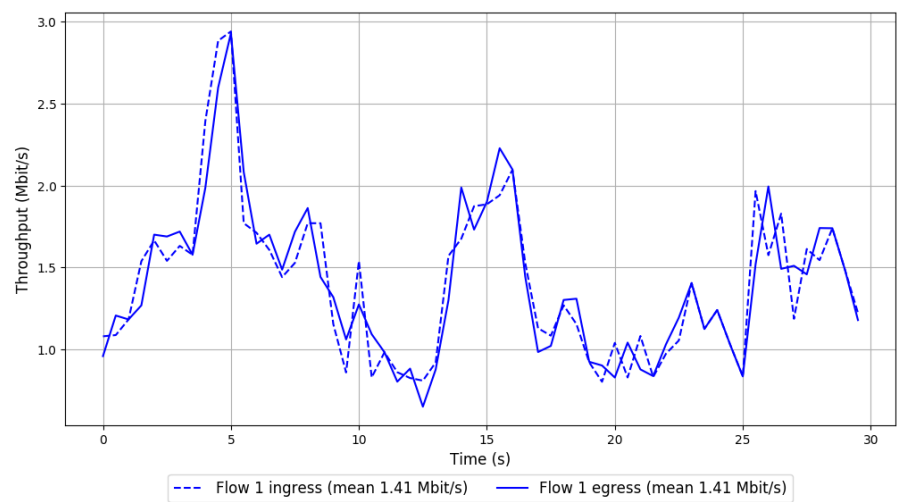Run 3: Report of SCReAM — Data Link

```
Run 1: Statistics of Sprout

Start at: 2017-09-17 22:37:42
End at: 2017-09-17 22:38:12
Local clock offset: 0.396 ms
Remote clock offset: -2.889 ms


# Below is generated by plot.py at 2017-09-17 23:20:04
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 67.243 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 67.243 ms
Loss rate: 0.05%
```

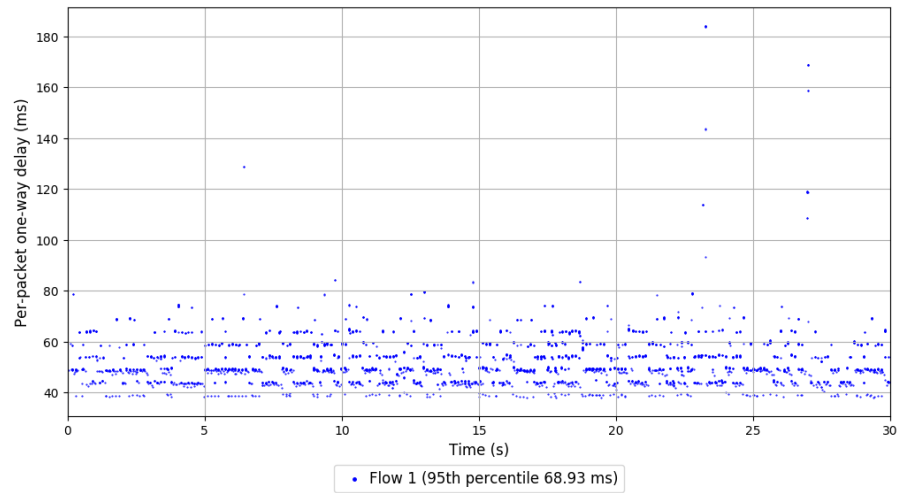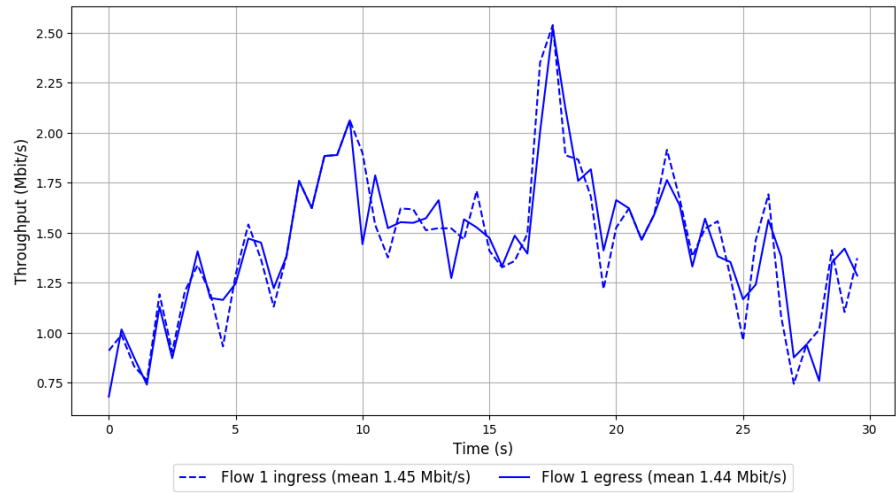Run 1: Report of Sprout — Data Link

```
Run 2: Statistics of Sprout

Start at: 2017-09-17 22:54:36
End at: 2017-09-17 22:55:06
Local clock offset: -0.861 ms
Remote clock offset: -1.695 ms


# Below is generated by plot.py at 2017-09-17 23:20:04
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.44 Mbit/s
95th percentile per-packet one-way delay: 68.934 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 1.44 Mbit/s
95th percentile per-packet one-way delay: 68.934 ms
Loss rate: 0.10%
```

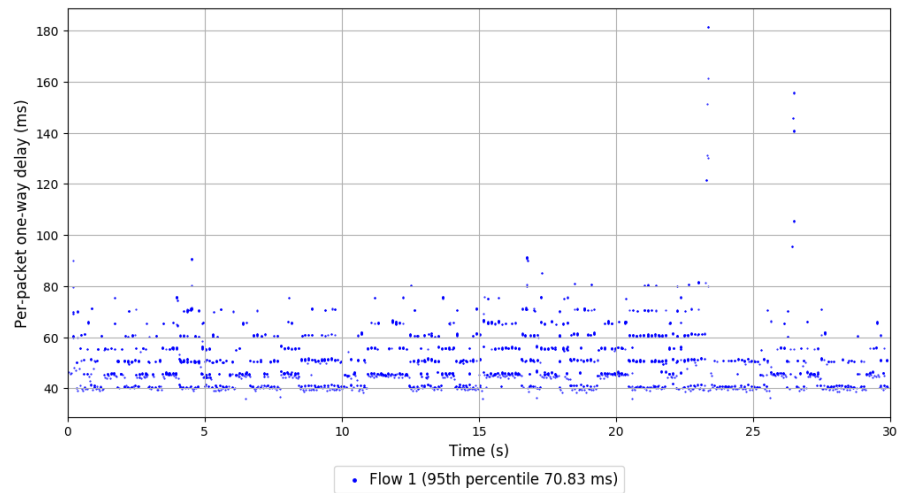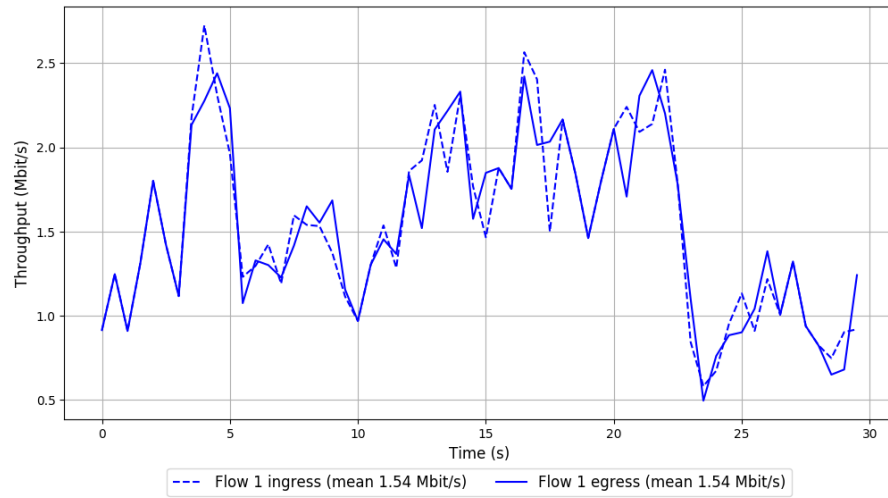Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2017-09-17 23:12:19
End at: 2017-09-17 23:12:49
Local clock offset: -0.817 ms
Remote clock offset: -3.545 ms


# Below is generated by plot.py at 2017-09-17 23:20:04
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 70.831 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 70.831 ms
Loss rate: 0.00%
```

Run 3: Report of Sprout — Data Link

Flow 1 ingress (mean 1.54 Mbit/s)   Flow 1 egress (mean 1.54 Mbit/s)

Flow 1 (95th percentile 70.83 ms)

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

Start at: 2017-09-17 22:39:54
End at: 2017-09-17 22:40:24
Local clock offset: -0.386 ms
Remote clock offset: -2.038 ms


# Below is generated by plot.py at 2017-09-17 23:20:11
# Datalink statistics
-- Total of 1 flow:
Average throughput: 4.86 Mbit/s
95th percentile per-packet one-way delay: 71.302 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 4.86 Mbit/s
95th percentile per-packet one-way delay: 71.302 ms
Loss rate: 0.18%
```
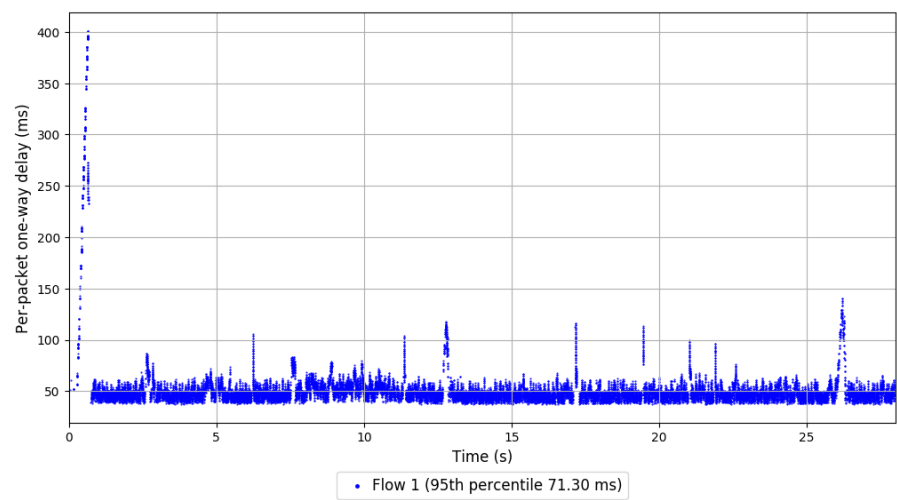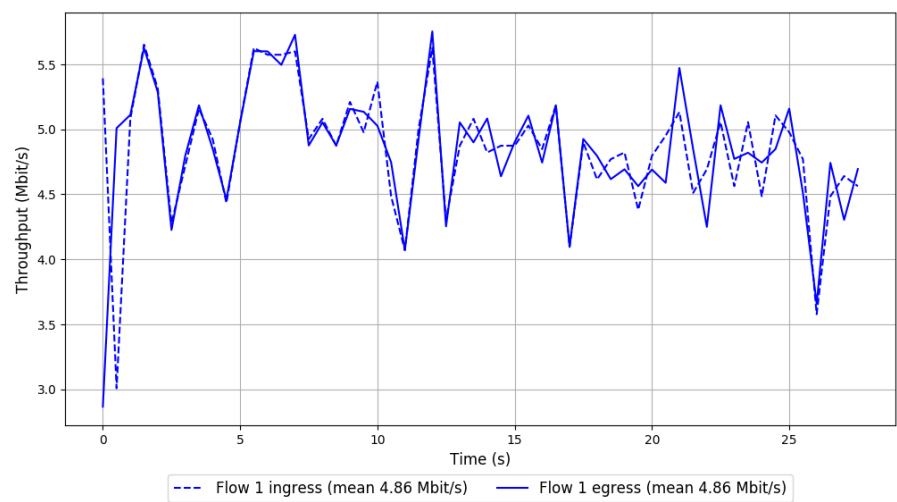
Run 1: Report of TaoVA-100x — Data Link

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

Start at: 2017-09-17 22:56:50
End at: 2017-09-17 22:57:20
Local clock offset: -1.889 ms
Remote clock offset: -2.765 ms


# Below is generated by plot.py at 2017-09-17 23:20:13
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.23 Mbit/s
95th percentile per-packet one-way delay: 72.276 ms
Loss rate: 0.22%
-- Flow 1:
Average throughput: 5.23 Mbit/s
95th percentile per-packet one-way delay: 72.276 ms
Loss rate: 0.22%
```
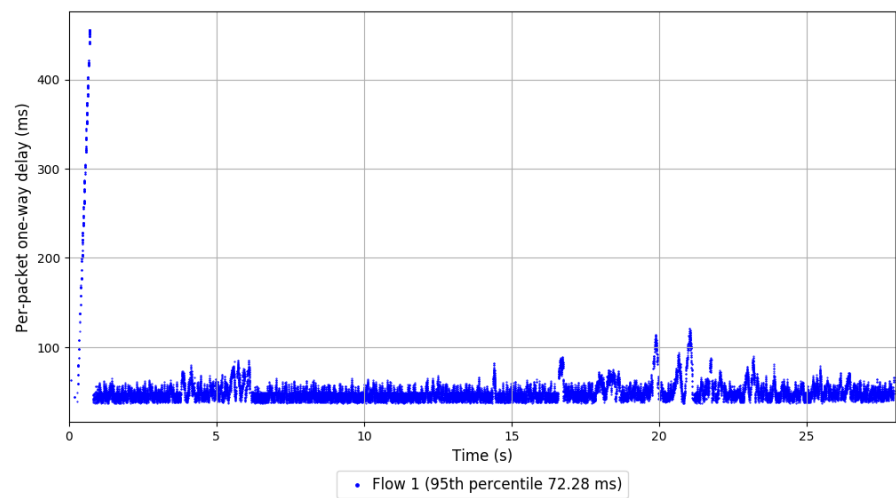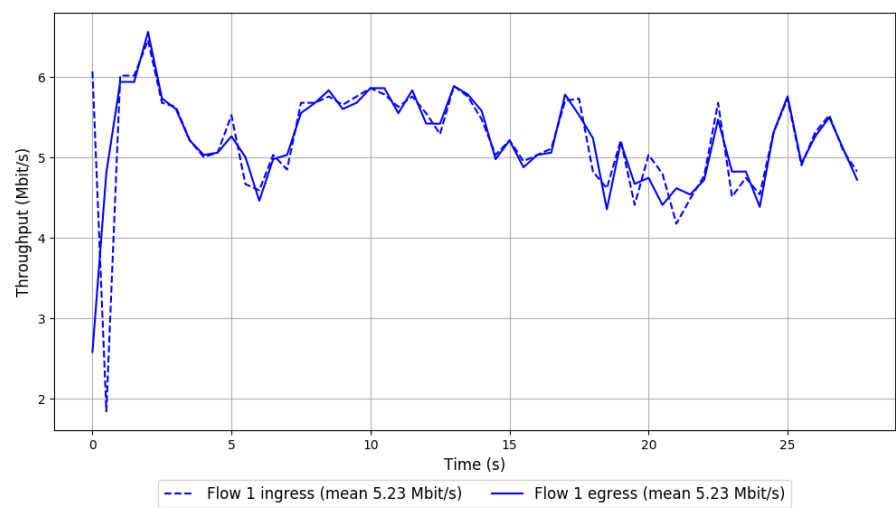
Run 2: Report of TaoVA-100x — Data Link

Flow 1 ingress (mean 5.23 Mbit/s)   Flow 1 egress (mean 5.23 Mbit/s)

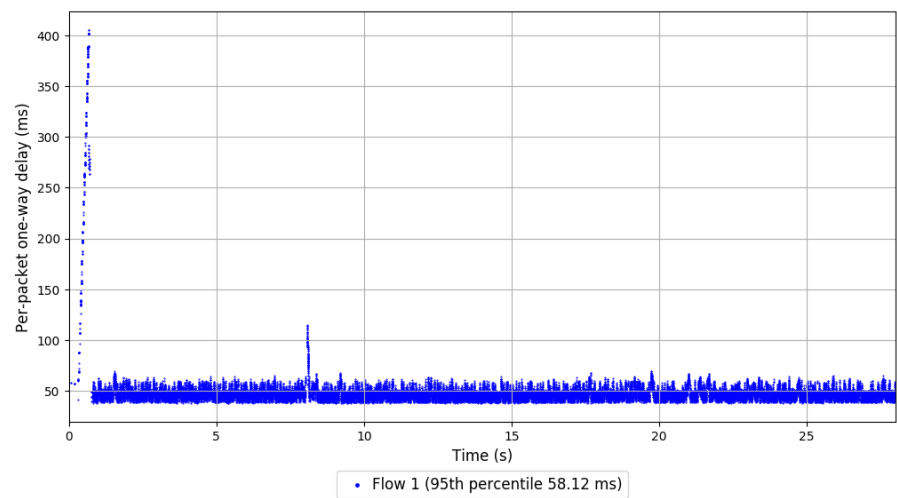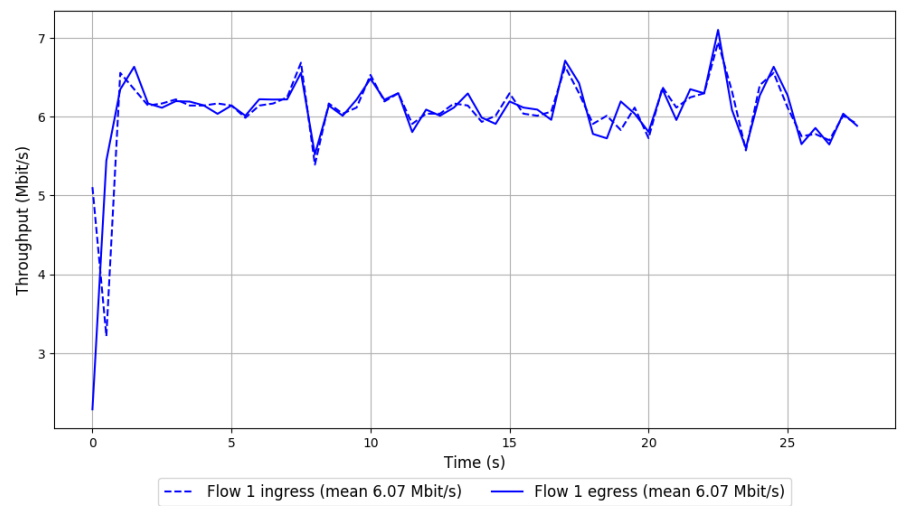Flow 1 (95th percentile 72.28 ms)

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

Start at: 2017-09-17 23:15:46
End at: 2017-09-17 23:16:16
Local clock offset: -3.595 ms
Remote clock offset: -2.215 ms


# Below is generated by plot.py at 2017-09-17 23:20:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.07 Mbit/s
95th percentile per-packet one-way delay: 58.115 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 6.07 Mbit/s
95th percentile per-packet one-way delay: 58.115 ms
Loss rate: 0.15%
```

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

75

```
Run 1: Statistics of TCP Vegas

Start at: 2017-09-17 22:26:27
End at: 2017-09-17 22:26:57
Local clock offset: -2.062 ms
Remote clock offset: -2.31 ms


# Below is generated by plot.py at 2017-09-17 23:20:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.16 Mbit/s
95th percentile per-packet one-way delay: 60.868 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 5.16 Mbit/s
95th percentile per-packet one-way delay: 60.868 ms
Loss rate: 0.09%
```
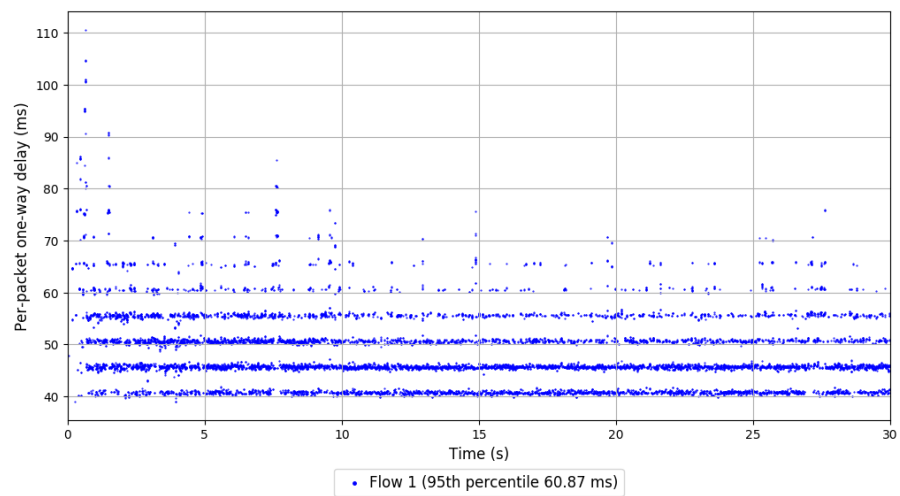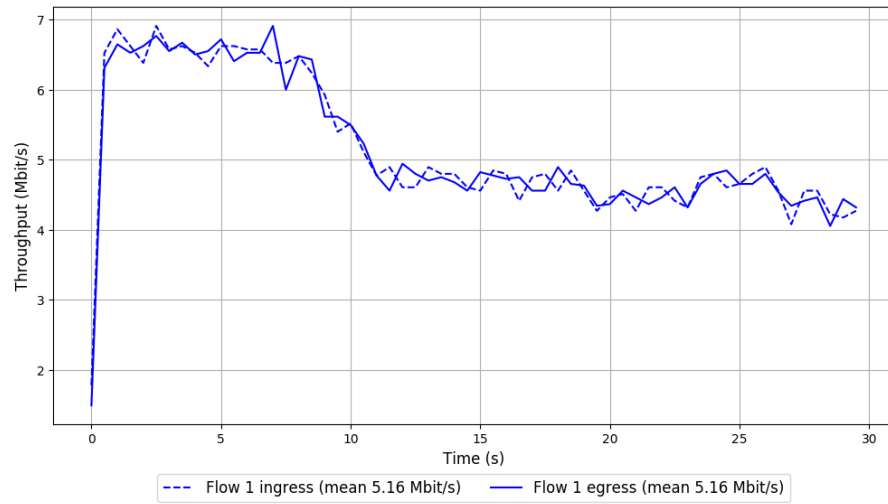
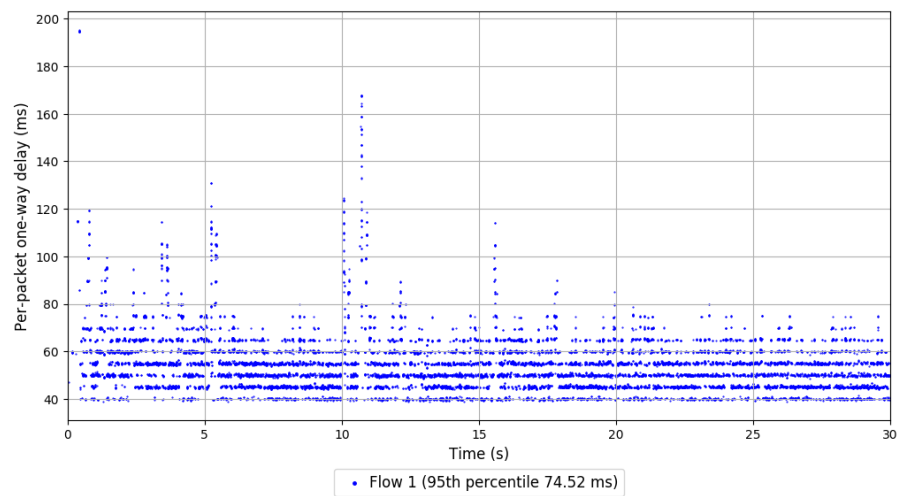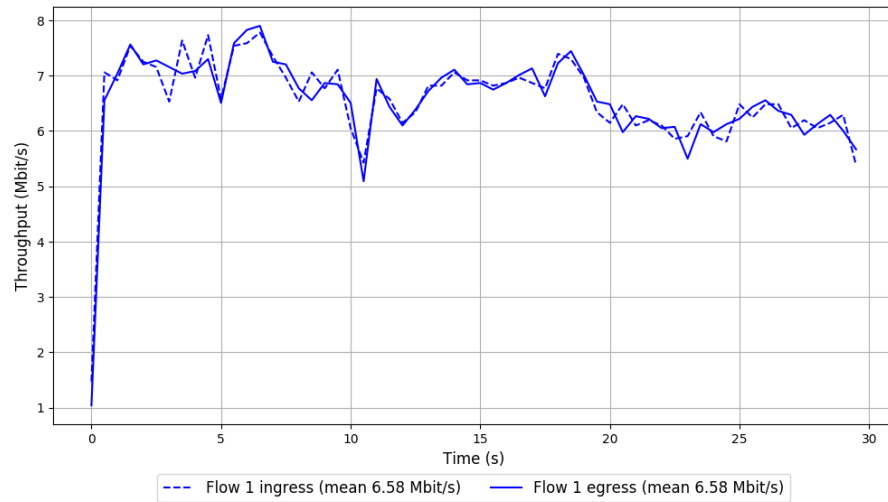Run 1: Report of TCP Vegas — Data Link

```
Run 2: Statistics of TCP Vegas

Start at: 2017-09-17 22:43:18
End at: 2017-09-17 22:43:48
Local clock offset: -0.746 ms
Remote clock offset: -1.602 ms


# Below is generated by plot.py at 2017-09-17 23:20:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.58 Mbit/s
95th percentile per-packet one-way delay: 74.522 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 6.58 Mbit/s
95th percentile per-packet one-way delay: 74.522 ms
Loss rate: 0.13%
```
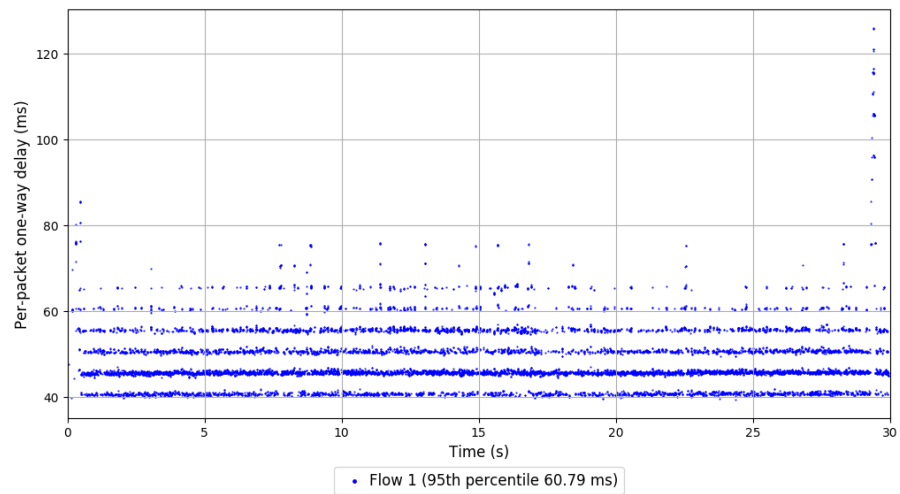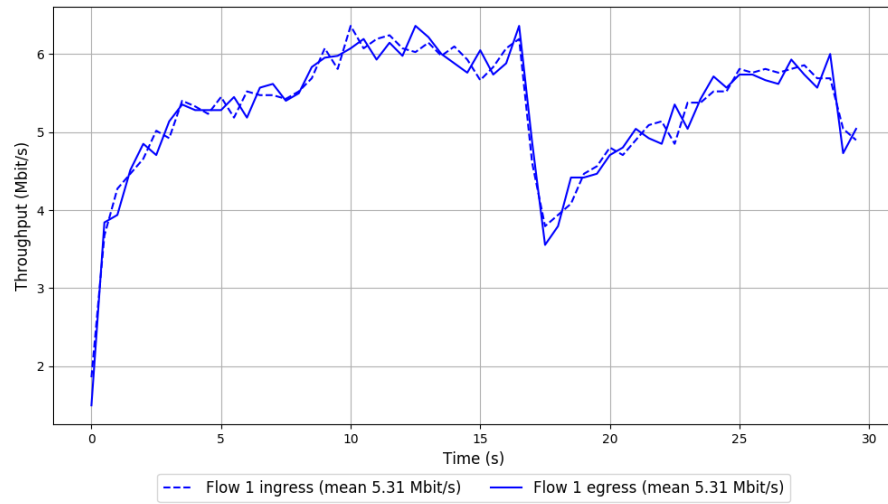
Run 2: Report of TCP Vegas — Data Link

```
Run 3: Statistics of TCP Vegas

Start at: 2017-09-17 23:00:19
End at: 2017-09-17 23:00:49
Local clock offset: -3.056 ms
Remote clock offset: -3.437 ms


# Below is generated by plot.py at 2017-09-17 23:20:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.31 Mbit/s
95th percentile per-packet one-way delay: 60.794 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 5.31 Mbit/s
95th percentile per-packet one-way delay: 60.794 ms
Loss rate: 0.23%
```
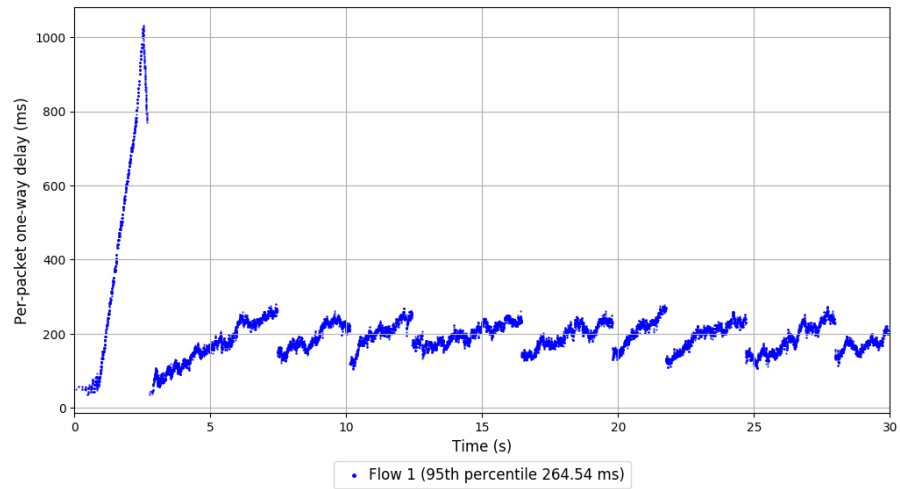
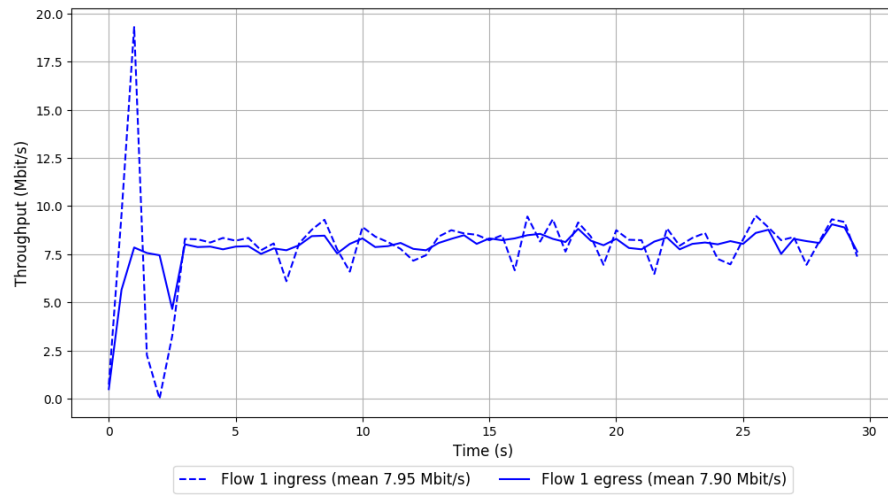Run 3: Report of TCP Vegas — Data Link

```
Run 1: Statistics of Verus

Start at: 2017-09-17 22:24:12
End at: 2017-09-17 22:24:42
Local clock offset: -0.861 ms
Remote clock offset: -3.269 ms

# Below is generated by plot.py at 2017-09-17 23:20:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.90 Mbit/s
95th percentile per-packet one-way delay: 264.539 ms
Loss rate: 0.74%
-- Flow 1:
Average throughput: 7.90 Mbit/s
95th percentile per-packet one-way delay: 264.539 ms
Loss rate: 0.74%
```

Run 1: Report of Verus — Data Link

Flow 1 ingress (mean 7.95 Mbit/s)   Flow 1 egress (mean 7.90 Mbit/s)

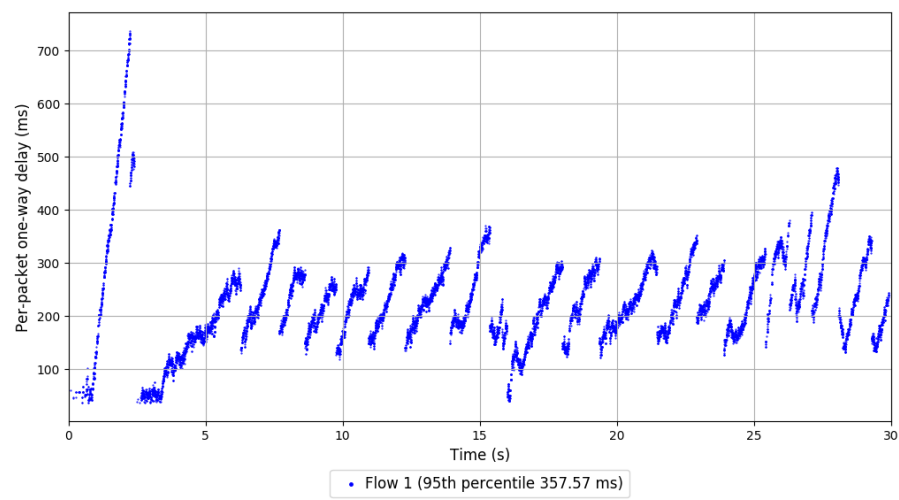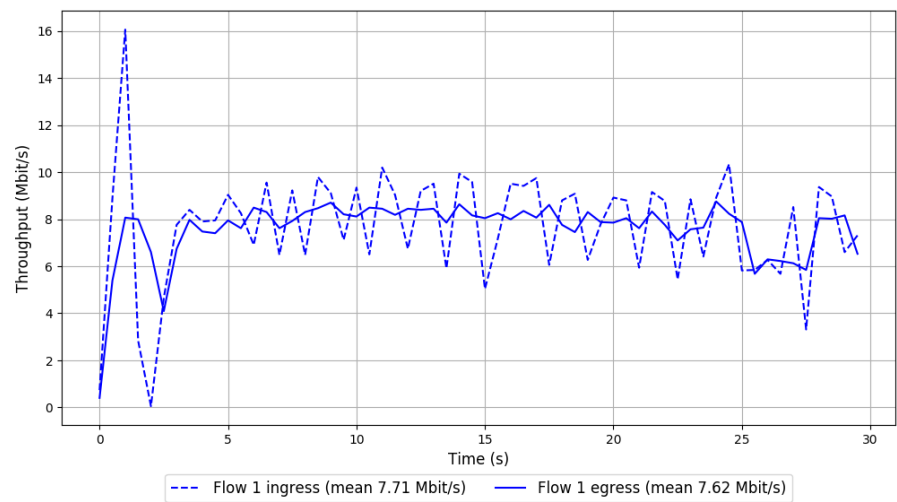Flow 1 (95th percentile 264.54 ms)

```
Run 2: Statistics of Verus

Start at: 2017-09-17 22:41:03
End at: 2017-09-17 22:41:33
Local clock offset: -0.684 ms
Remote clock offset: -3.183 ms


# Below is generated by plot.py at 2017-09-17 23:20:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.62 Mbit/s
95th percentile per-packet one-way delay: 357.570 ms
Loss rate: 1.29%
-- Flow 1:
Average throughput: 7.62 Mbit/s
95th percentile per-packet one-way delay: 357.570 ms
Loss rate: 1.29%
```
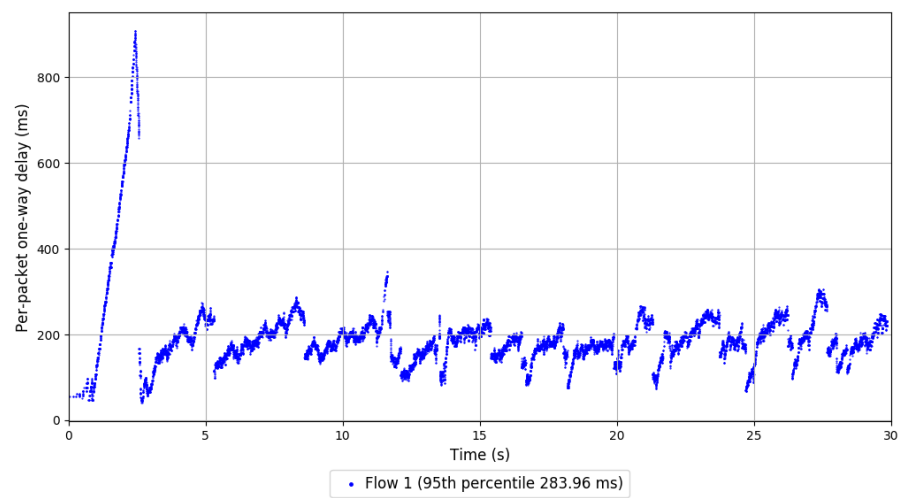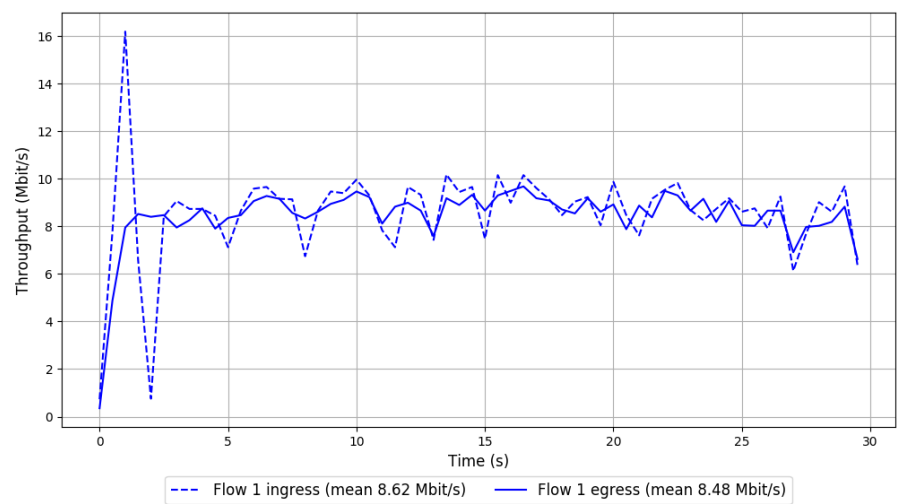
Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2017-09-17 22:57:57
End at: 2017-09-17 22:58:27
Local clock offset: -2.234 ms
Remote clock offset: -2.162 ms


# Below is generated by plot.py at 2017-09-17 23:20:16
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.48 Mbit/s
95th percentile per-packet one-way delay: 283.958 ms
Loss rate: 1.68%
-- Flow 1:
Average throughput: 8.48 Mbit/s
95th percentile per-packet one-way delay: 283.958 ms
Loss rate: 1.68%
```
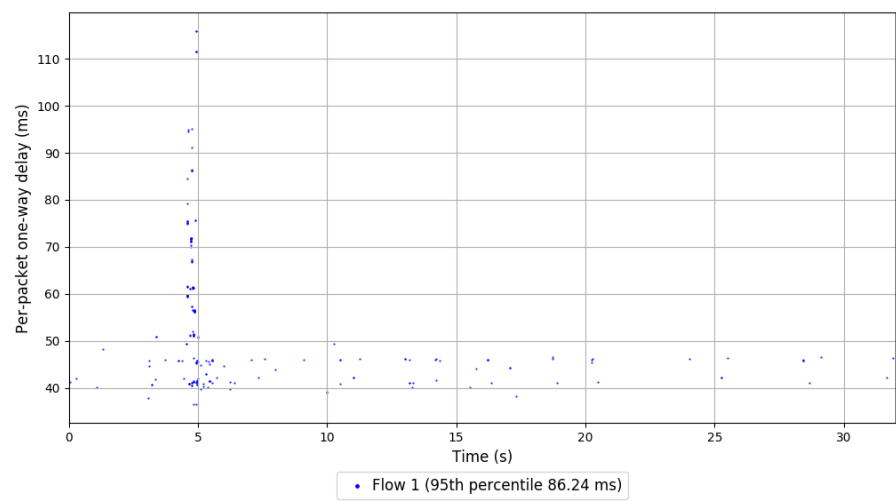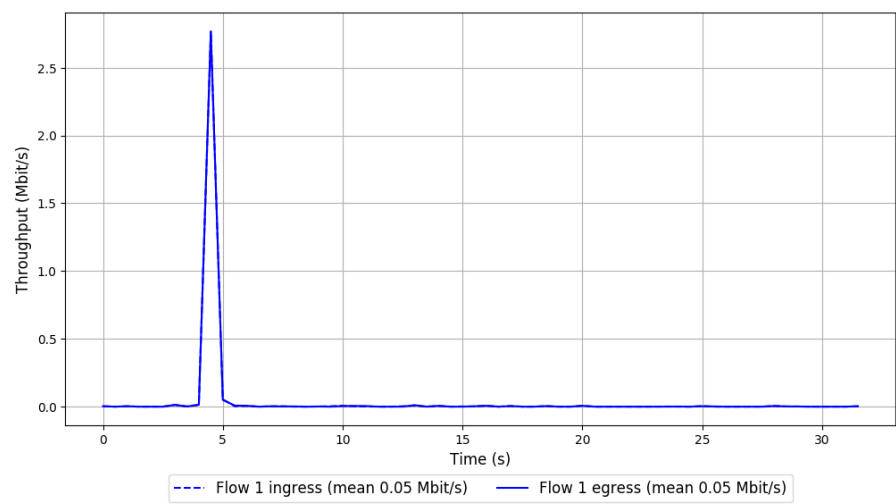
Run 3: Report of Verus — Data Link

```
Run 1: Statistics of WebRTC media

Start at: 2017-09-17 22:31:00
End at: 2017-09-17 22:31:30
Local clock offset: 0.226 ms
Remote clock offset: -2.053 ms


# Below is generated by plot.py at 2017-09-17 23:20:16
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 86.236 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 86.236 ms
Loss rate: 0.00%
```

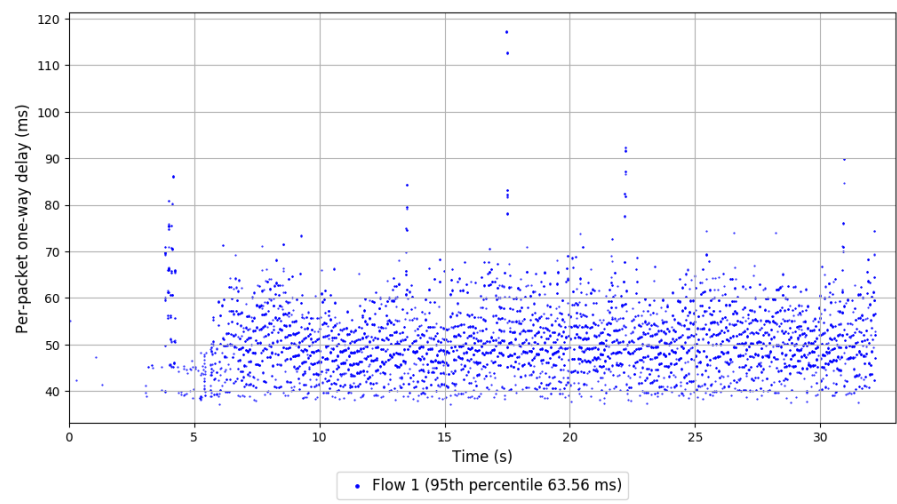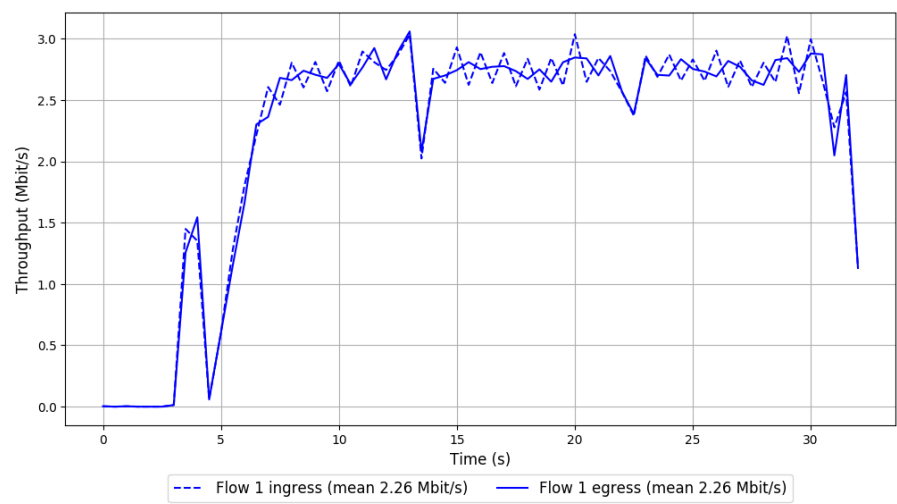Run 1: Report of WebRTC media — Data Link

```
Run 2: Statistics of WebRTC media

Start at: 2017-09-17 22:47:54
End at: 2017-09-17 22:48:24
Local clock offset: -0.095 ms
Remote clock offset: -2.433 ms


# Below is generated by plot.py at 2017-09-17 23:20:16
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 63.559 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 63.559 ms
Loss rate: 0.15%
```

Run 2: Report of WebRTC media — Data Link

```
Run 3: Statistics of WebRTC media

Start at: 2017-09-17 23:04:54
End at: 2017-09-17 23:05:24
Local clock offset: -1.621 ms
Remote clock offset: -2.956 ms

# Below is generated by plot.py at 2017-09-17 23:20:16
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 91.672 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 91.672 ms
Loss rate: 0.00%
```

Run 3: Report of WebRTC media — Data Link

Flow 1 ingress (mean 0.05 Mbit/s) — Flow 1 egress (mean 0.05 Mbit/s)

Flow 1 (95th percentile 91.67 ms)