Pantheon Report

Generated at 2018-04-10 06:40:06 (UTC).

Data path: Colombia ppp0 (*remote*) →AWS Brazil 2 Ethernet (*local*).

Repeated the test of 17 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

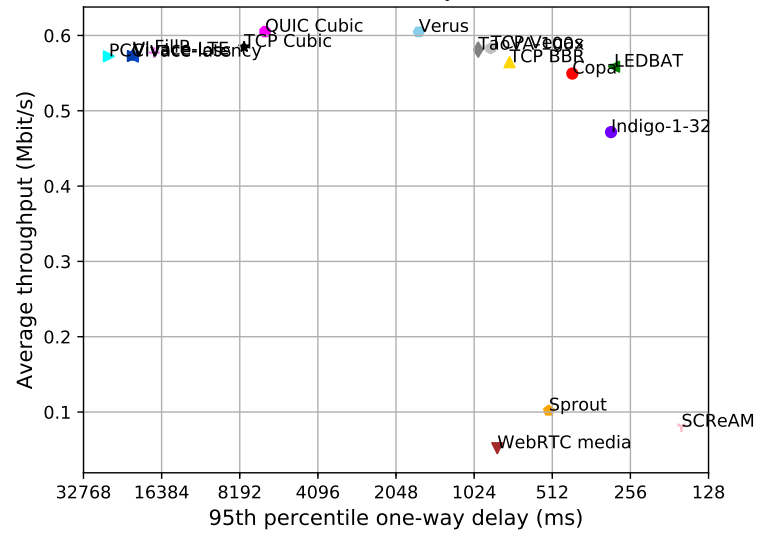Increased UDP receive buffer to 16 MB (default) and 32 MB (max).

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

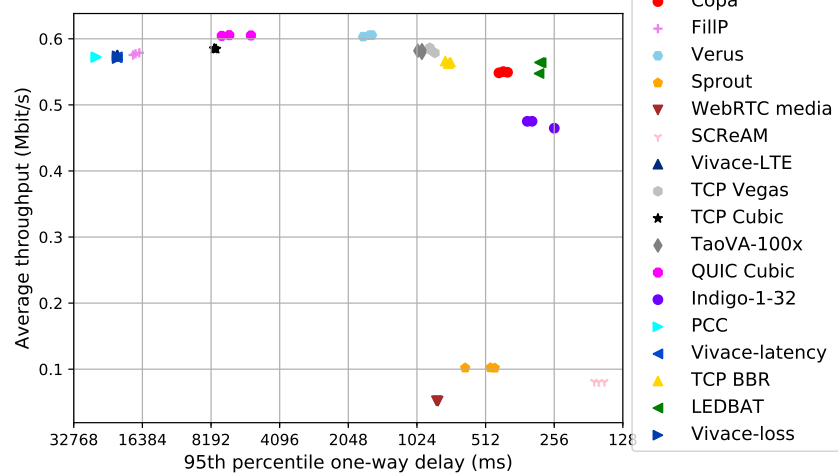NTP offsets were measured against `gps.ntp.br` and have been applied to correct the timestamps in logs.

```
Git summary:
branch: master @ eb420b5be9bafccd22cf68b99ff5a2000462fc59
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
 M datagrump/sender.cc
third_party/fillp @ 11f8c46a2bf1dc797253db7e8ca04076272b2a44
third_party/genericCC @ 9249eea3238475c4d8cca1443d28df70bff6c4a2
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 @ f271183af822eee5d0031620f4bebf38aedc5581
```

test from Colombia ppp0 to AWS Brazil 2 Ethernet, 3 runs of 30s each per scheme
(mean of all runs by scheme)

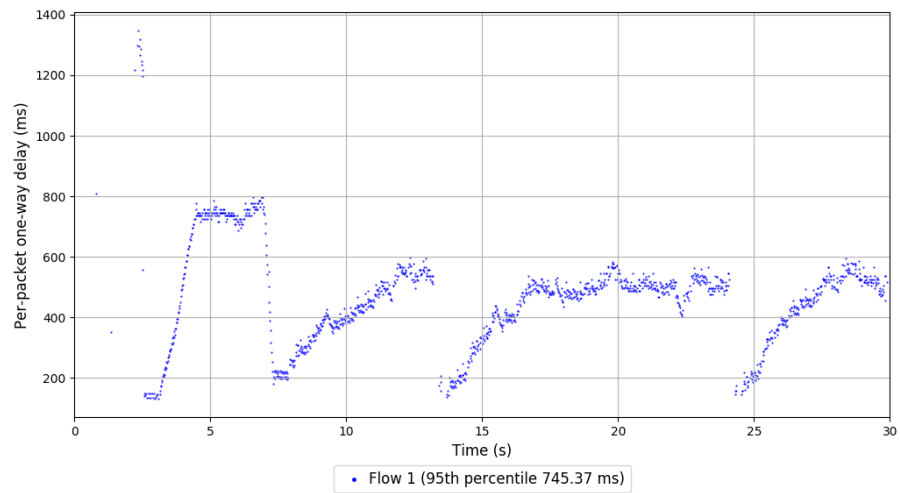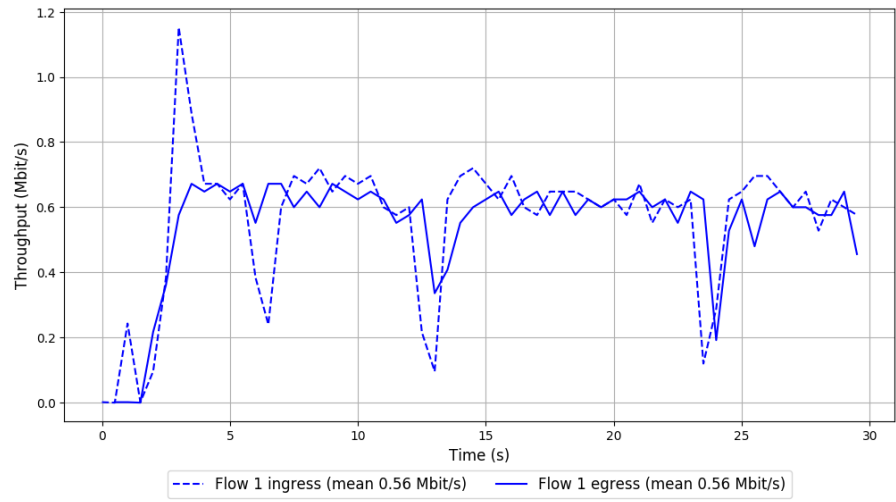## test from Colombia ppp0 to AWS Brazil 2 Ethernet, 3 runs of 30s each per scheme

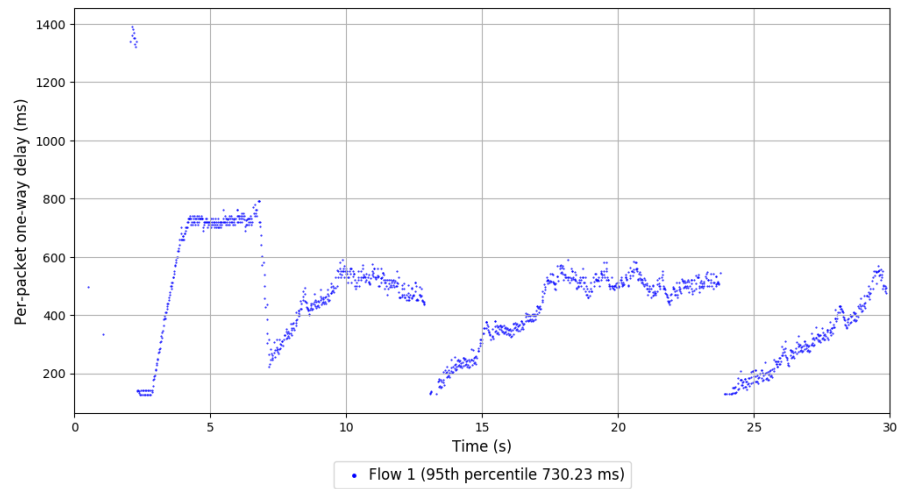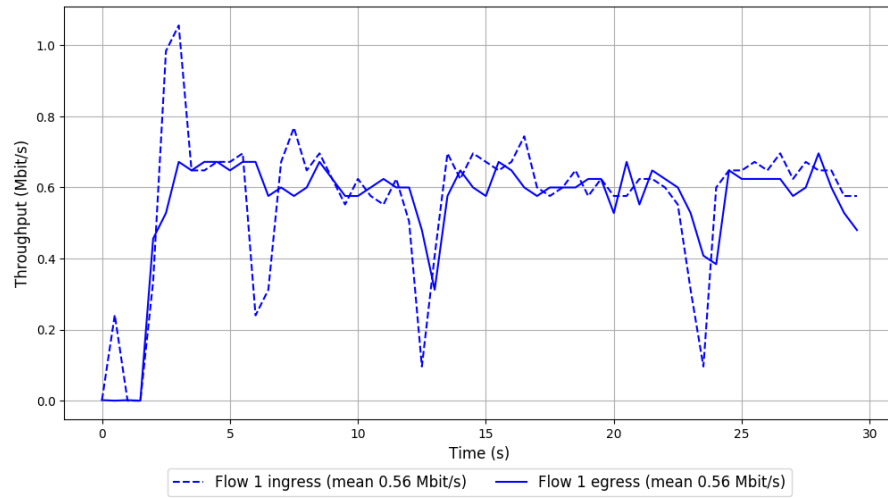| scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	0.56	748.30	2.11
TCP Cubic	3	0.58	7883.61	30.85
LEDBAT	3	0.56	295.94	1.45
PCC	3	0.57	26162.69	98.52
QUIC Cubic	3	0.61	6546.87	27.25
SCReAM	3	0.08	162.83	0.74
WebRTC media	3	0.05	834.03	0.03
Sprout	3	0.10	527.77	1.62
TaoVA-100x	3	0.58	987.72	2.62
TCP Vegas	3	0.58	884.12	1.15
Verus	3	0.61	1673.40	4.37
Copa	3	0.55	428.54	3.32
FillP	3	0.58	17480.23	41.16
Indigo-1-32	3	0.47	304.03	1.32
Vivace-latency	3	0.57	21153.56	70.65
Vivace-loss	3	0.57	21134.43	89.25
Vivace-LTE	3	0.57	21122.60	70.51

```
Run 1: Statistics of TCP BBR

Start at: 2018-04-10 04:49:16
End at: 2018-04-10 04:49:46
Local clock offset: -12.493 ms
Remote clock offset: 2.904 ms

# Below is generated by plot.py at 2018-04-10 06:39:31
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 745.369 ms
Loss rate: 2.22%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 745.369 ms
Loss rate: 2.22%
```

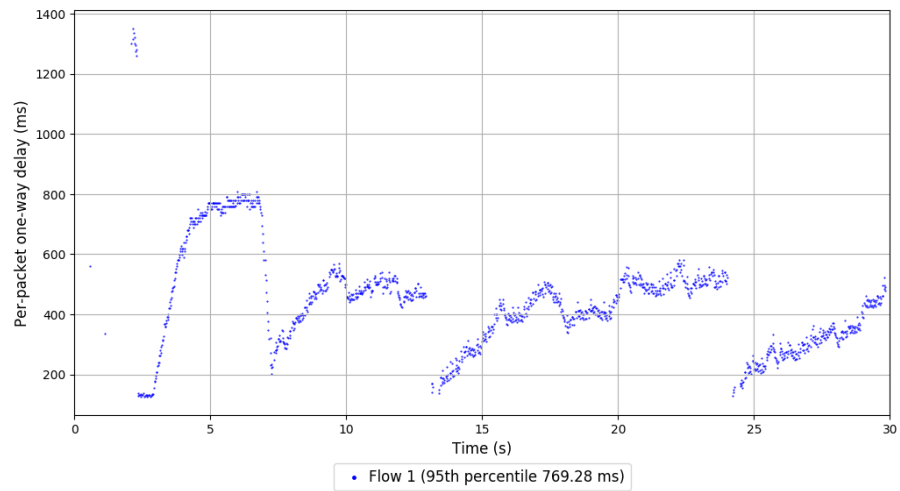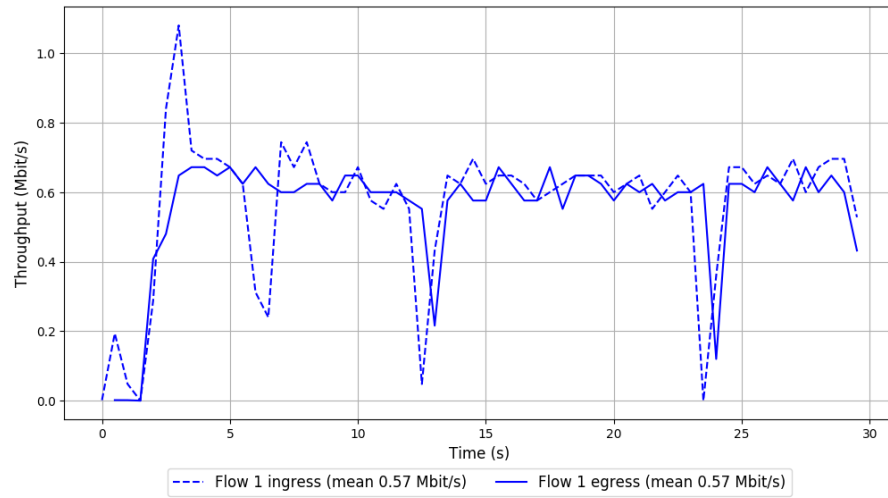Run 1: Report of TCP BBR — Data Link

```
Run 2: Statistics of TCP BBR

Start at: 2018-04-10 05:10:26
End at: 2018-04-10 05:10:56
Local clock offset: -14.457 ms
Remote clock offset: 8.822 ms


# Below is generated by plot.py at 2018-04-10 06:39:31
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 730.232 ms
Loss rate: 1.99%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 730.232 ms
Loss rate: 1.99%
```

Run 2: Report of TCP BBR — Data Link

```
Run 3: Statistics of TCP BBR

Start at: 2018-04-10 05:31:37
End at: 2018-04-10 05:32:07
Local clock offset: -20.707 ms
Remote clock offset: 10.328 ms


# Below is generated by plot.py at 2018-04-10 06:39:31
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 769.284 ms
Loss rate: 2.13%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 769.284 ms
Loss rate: 2.13%
```
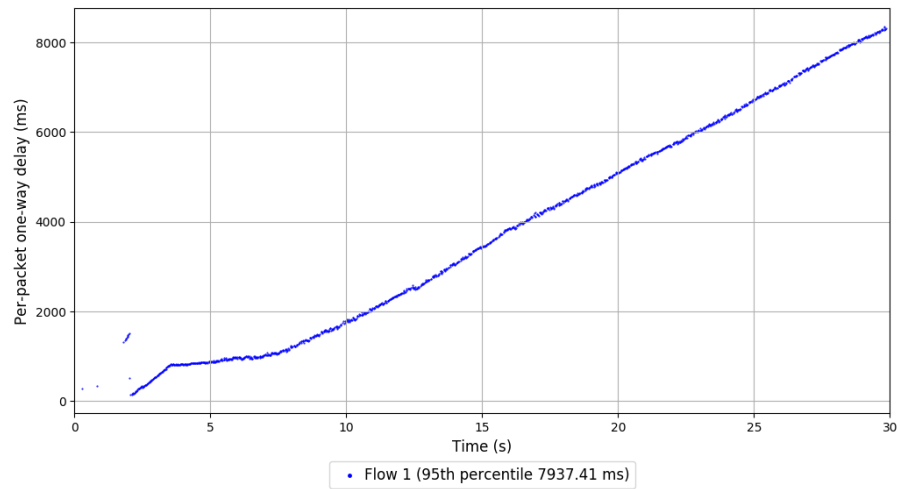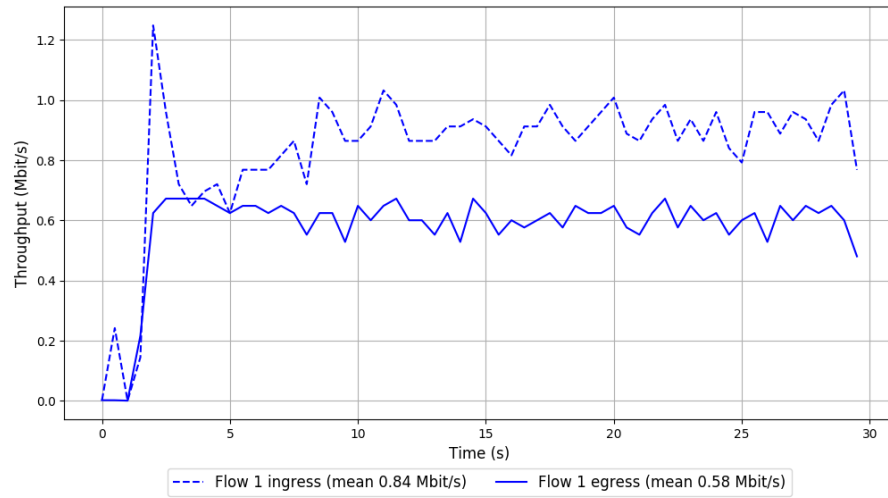
Run 3: Report of TCP BBR — Data Link

Flow 1 ingress (mean 0.57 Mbit/s) ----   Flow 1 egress (mean 0.57 Mbit/s) ——

Flow 1 (95th percentile 769.28 ms)

```
Run 1: Statistics of TCP Cubic

Start at: 2018-04-10 04:35:10
End at: 2018-04-10 04:35:40
Local clock offset: -9.618 ms
Remote clock offset: 2.562 ms


# Below is generated by plot.py at 2018-04-10 06:39:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 7937.412 ms
Loss rate: 30.85%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 7937.412 ms
Loss rate: 30.85%
```

Run 1: Report of TCP Cubic — Data Link

```
Run 2: Statistics of TCP Cubic

Start at: 2018-04-10 04:56:20
End at: 2018-04-10 04:56:50
Local clock offset: -14.19 ms
Remote clock offset: 2.966 ms


# Below is generated by plot.py at 2018-04-10 06:39:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 7929.065 ms
Loss rate: 30.99%
-- Flow 1:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 7929.065 ms
Loss rate: 30.99%
```
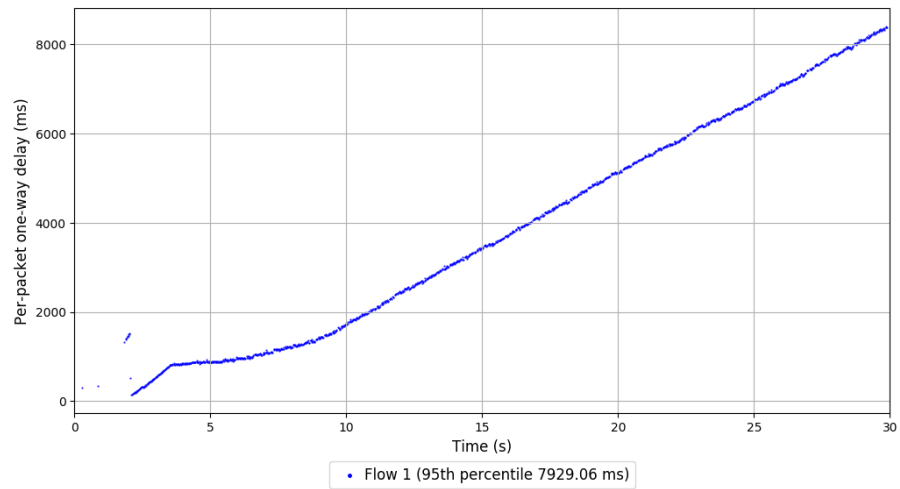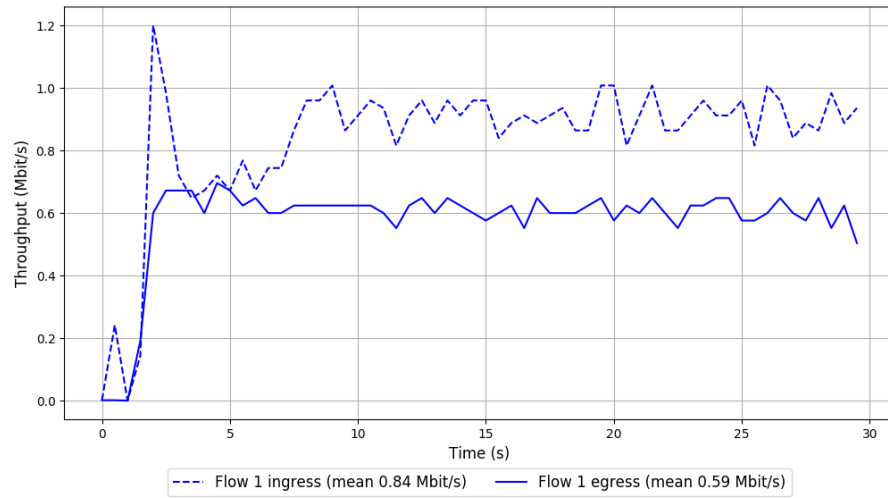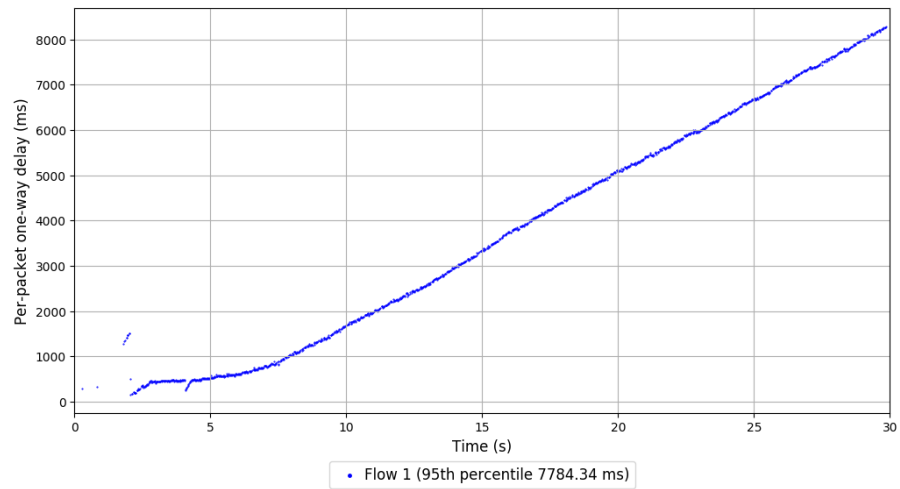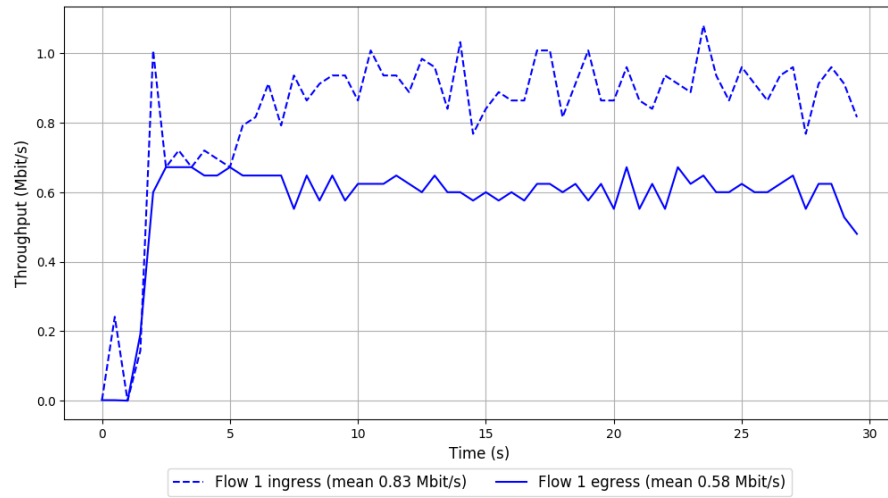
Run 2: Report of TCP Cubic — Data Link

```
Run 3: Statistics of TCP Cubic

Start at: 2018-04-10 05:17:31
End at: 2018-04-10 05:18:01
Local clock offset: -16.216 ms
Remote clock offset: 4.554 ms


# Below is generated by plot.py at 2018-04-10 06:39:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 7784.343 ms
Loss rate: 30.70%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 7784.343 ms
Loss rate: 30.70%
```

Run 3: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 0.83 Mbit/s) — — — Flow 1 egress (mean 0.58 Mbit/s)
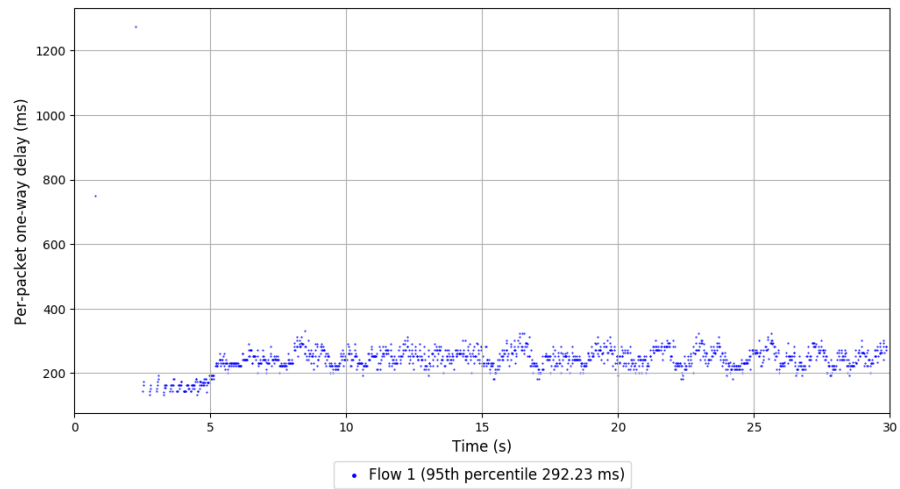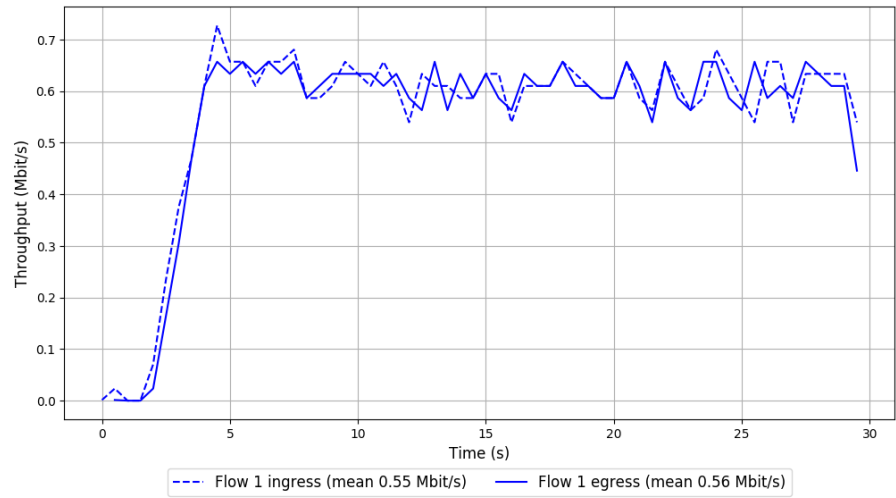

• Flow 1 (95th percentile 7784.34 ms)

```
Run 1: Statistics of LEDBAT

Start at: 2018-04-10 04:37:31
End at: 2018-04-10 04:38:01
Local clock offset: -10.239 ms
Remote clock offset: 8.221 ms

# Below is generated by plot.py at 2018-04-10 06:39:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 292.230 ms
Loss rate: 1.27%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 292.230 ms
Loss rate: 1.27%
```

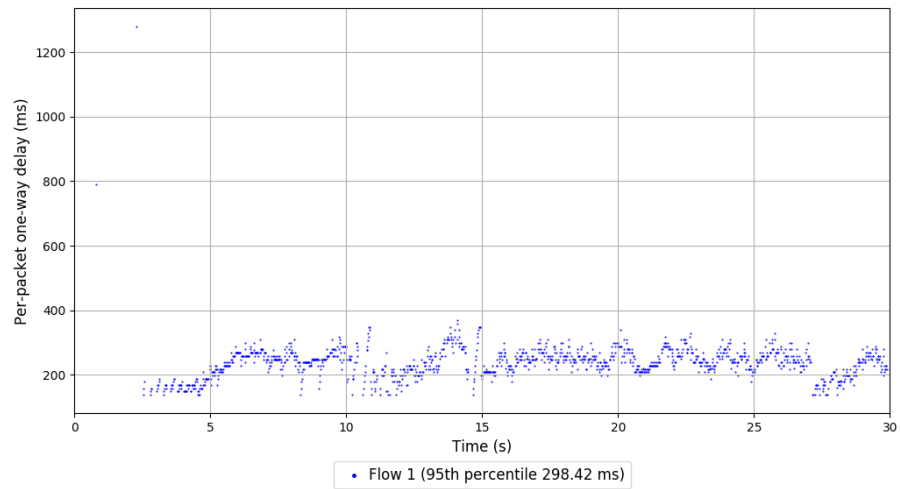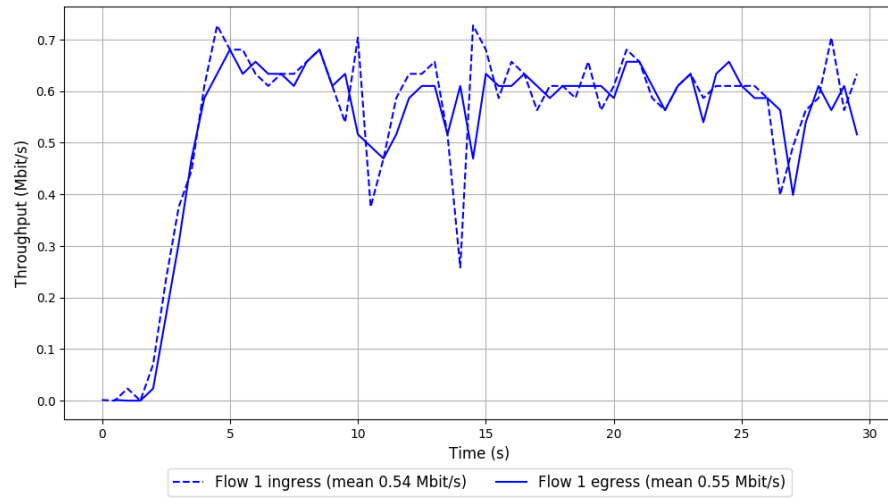# Run 1: Report of LEDBAT — Data Link

```
Run 2: Statistics of LEDBAT

Start at: 2018-04-10 04:58:41
End at: 2018-04-10 04:59:11
Local clock offset: -15.431 ms
Remote clock offset: 3.038 ms


# Below is generated by plot.py at 2018-04-10 06:39:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 298.417 ms
Loss rate: 1.81%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 298.417 ms
Loss rate: 1.81%
```

Run 2: Report of LEDBAT — Data Link

Flow 1 ingress (mean 0.54 Mbit/s)   Flow 1 egress (mean 0.55 Mbit/s)

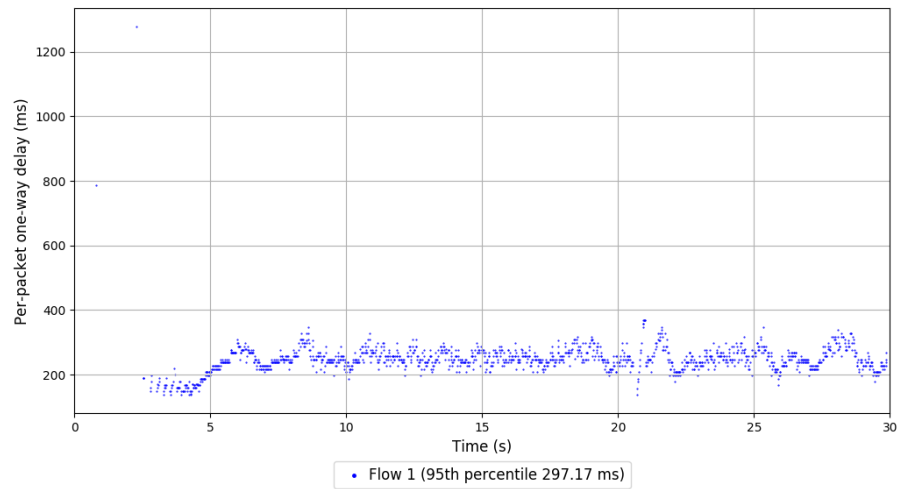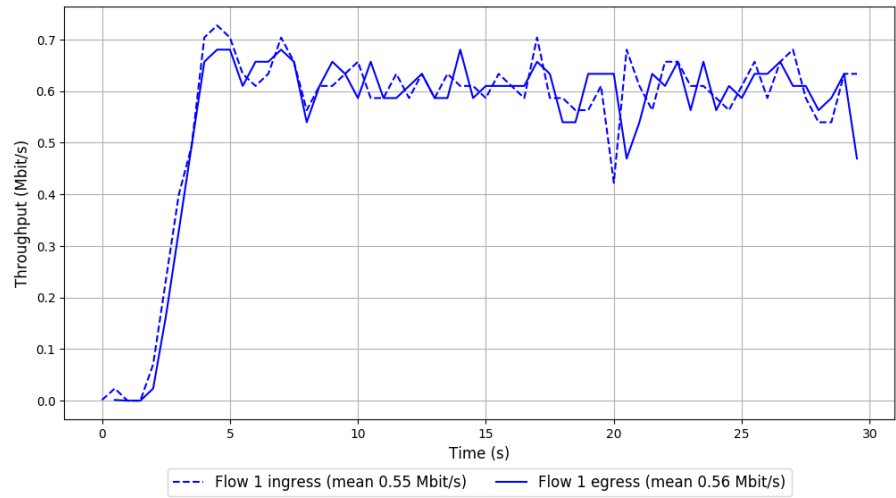Flow 1 (95th percentile 298.42 ms)

```
Run 3: Statistics of LEDBAT

Start at: 2018-04-10 05:19:52
End at: 2018-04-10 05:20:22
Local clock offset: -16.807 ms
Remote clock offset: 4.822 ms

# Below is generated by plot.py at 2018-04-10 06:39:34
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 297.168 ms
Loss rate: 1.27%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 297.168 ms
Loss rate: 1.27%
```

Run 3: Report of LEDBAT — Data Link

Flow 1 ingress (mean 0.55 Mbit/s) — Flow 1 egress (mean 0.56 Mbit/s)

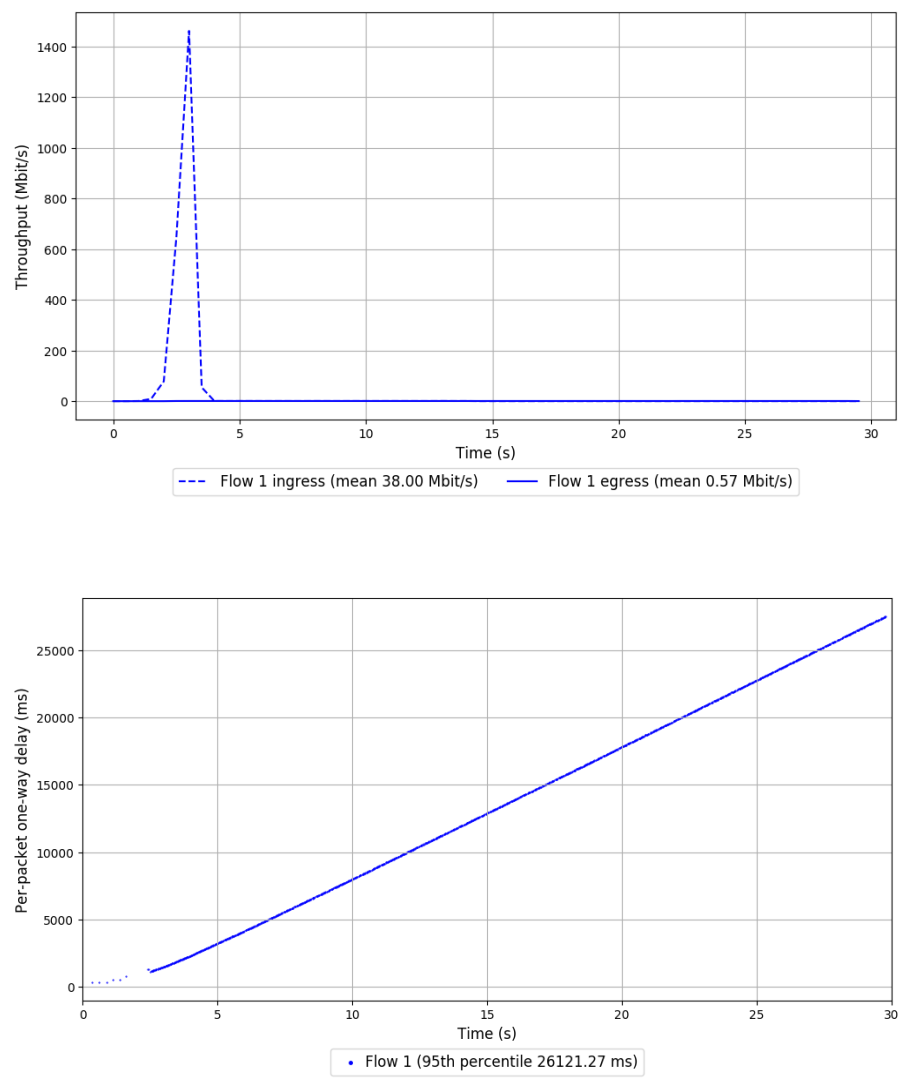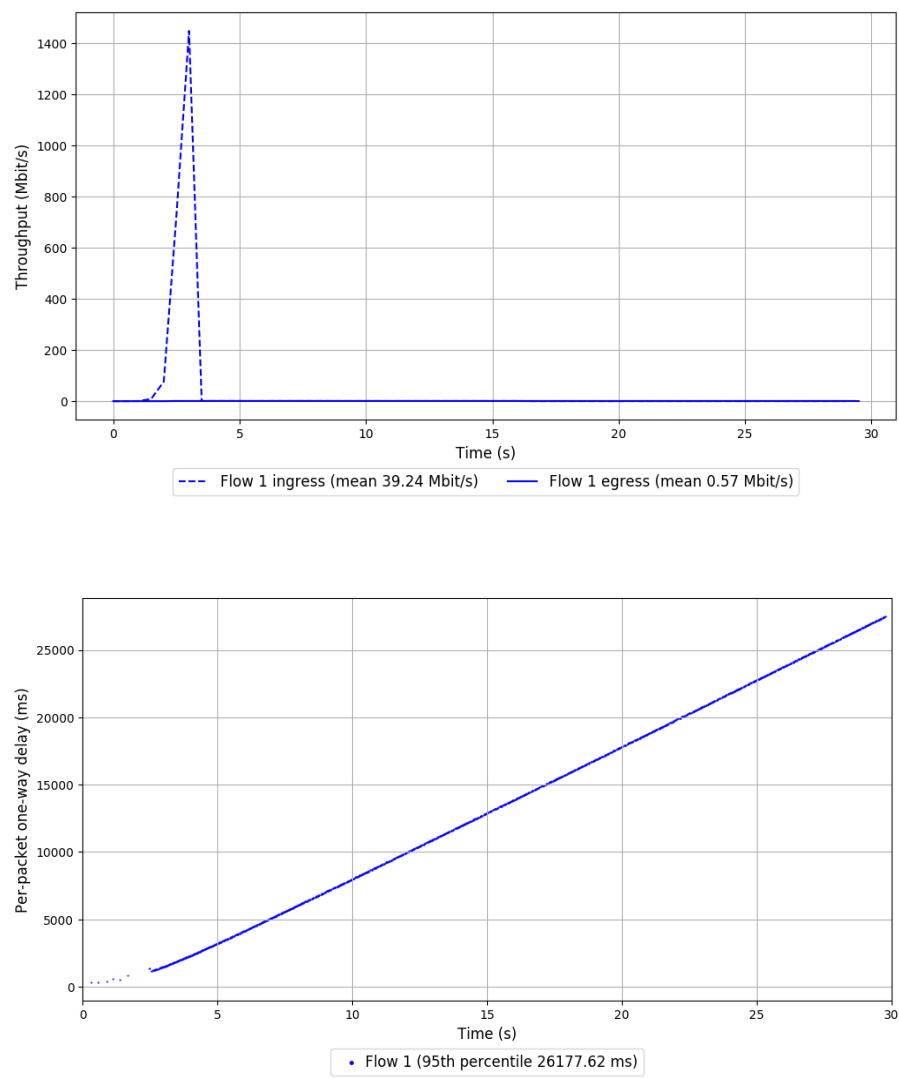Flow 1 (95th percentile 297.17 ms)

```
Run 1: Statistics of PCC

Start at: 2018-04-10 04:51:37
End at: 2018-04-10 04:52:07
Local clock offset: -12.086 ms
Remote clock offset: 8.642 ms


# Below is generated by plot.py at 2018-04-10 06:39:56
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 26121.272 ms
Loss rate: 98.51%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 26121.272 ms
Loss rate: 98.51%
```
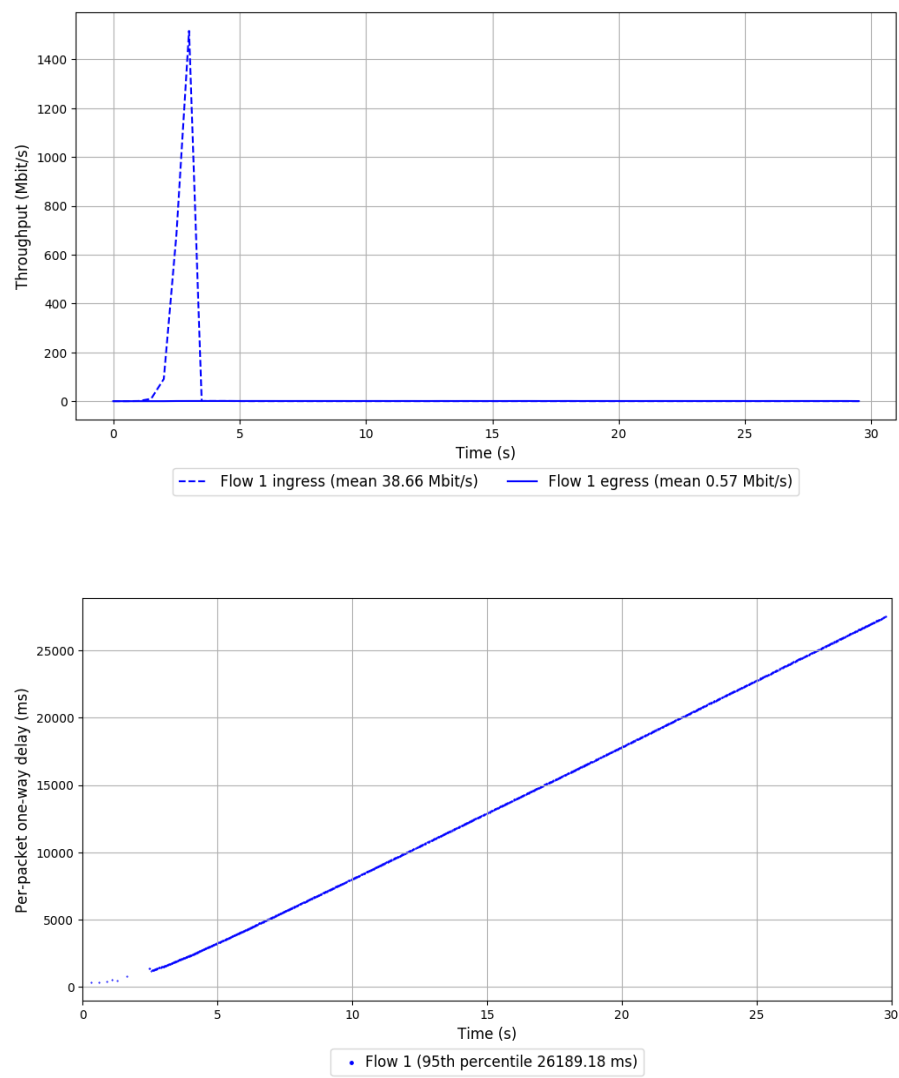
Run 1: Report of PCC — Data Link

Flow 1 ingress (mean 38.00 Mbit/s)   Flow 1 egress (mean 0.57 Mbit/s)

Flow 1 (95th percentile 26121.27 ms)

```
Run 2: Statistics of PCC

Start at: 2018-04-10 05:12:47
End at: 2018-04-10 05:13:17
Local clock offset: -14.971 ms
Remote clock offset: 8.911 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 26177.620 ms
Loss rate: 98.52%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 26177.620 ms
Loss rate: 98.52%
```
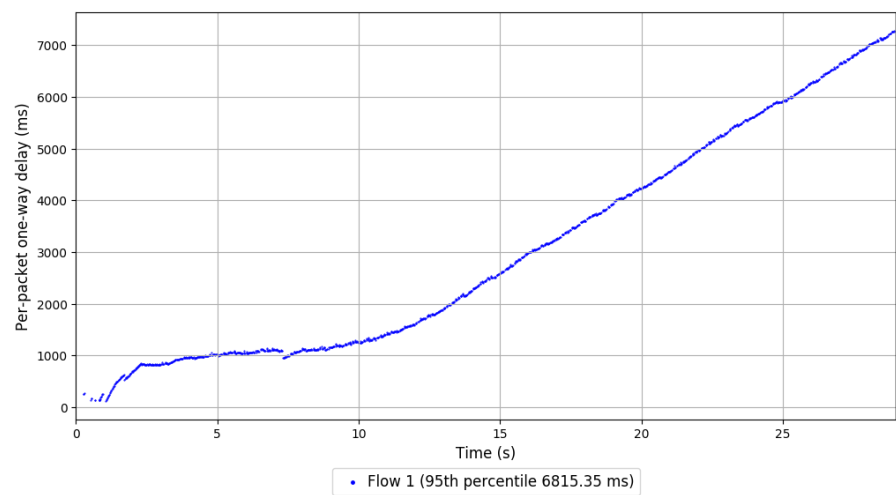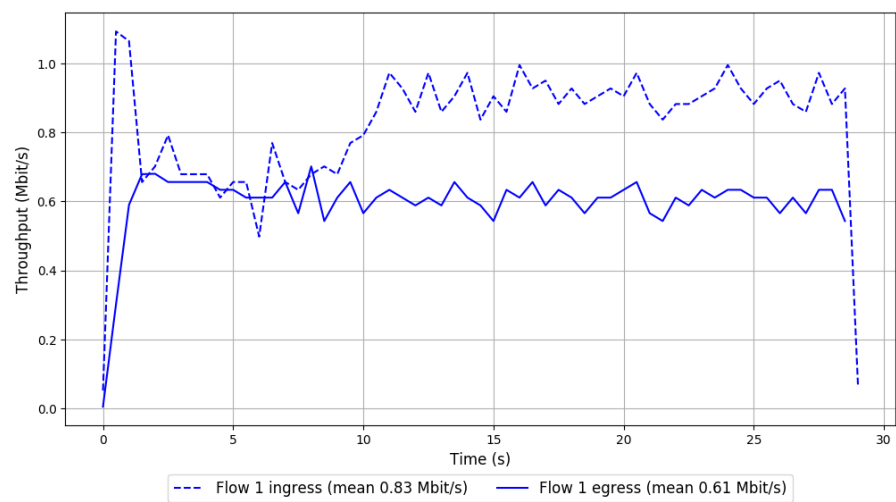
Run 2: Report of PCC — Data Link

Flow 1 ingress (mean 39.24 Mbit/s)   Flow 1 egress (mean 0.57 Mbit/s)

• Flow 1 (95th percentile 26177.62 ms)

```
Run 3: Statistics of PCC

Start at: 2018-04-10 05:33:58
End at: 2018-04-10 05:34:28
Local clock offset: -22.674 ms
Remote clock offset: 10.376 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 26189.178 ms
Loss rate: 98.54%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 26189.178 ms
Loss rate: 98.54%
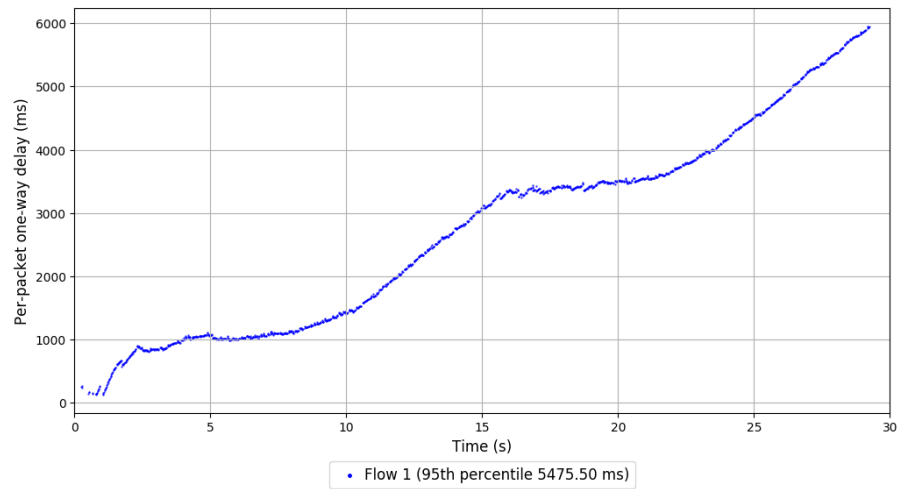```

# Run 3: Report of PCC — Data Link



Flow 1 ingress (mean 38.66 Mbit/s) --- Flow 1 egress (mean 0.57 Mbit/s)



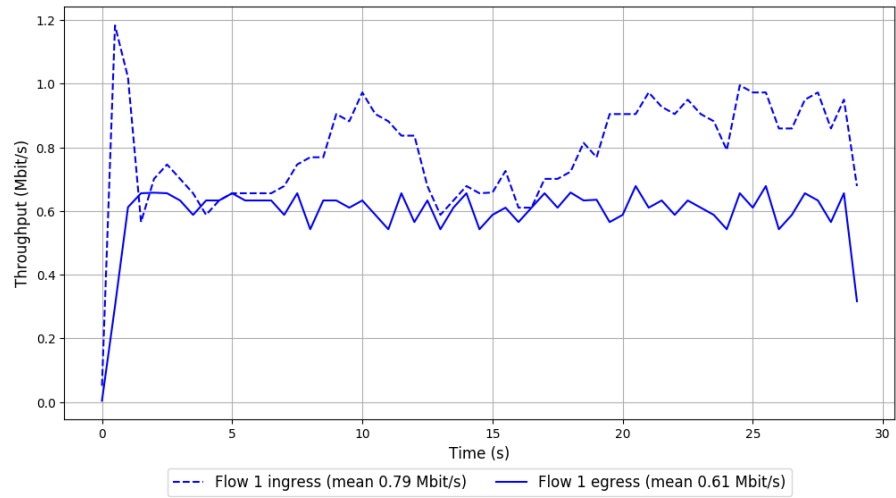• Flow 1 (95th percentile 26189.18 ms)

```
Run 1: Statistics of QUIC Cubic

Start at: 2018-04-10 04:45:44
End at: 2018-04-10 04:46:14
Local clock offset: -12.839 ms
Remote clock offset: 7.657 ms

Below is generated by plot.py at 2018-04-10 06:39:57
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 6815.348 ms
Loss rate: 28.11%
-- Flow 1:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 6815.348 ms
Loss rate: 28.11%
```
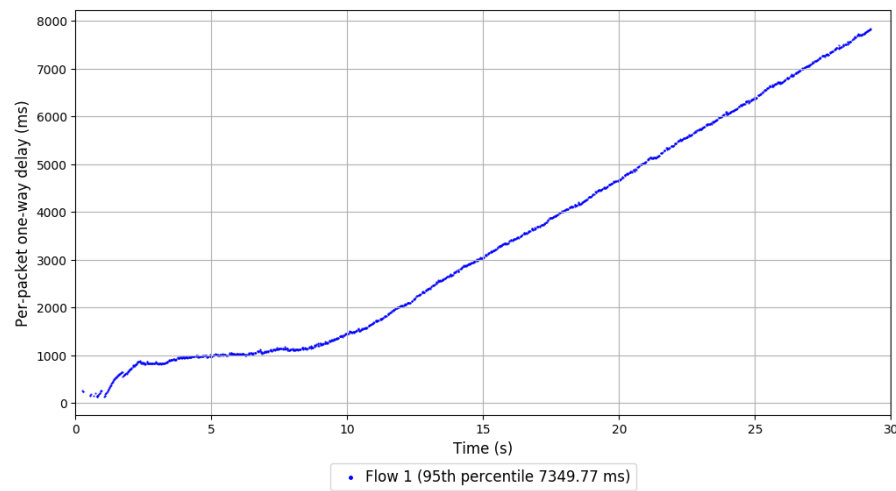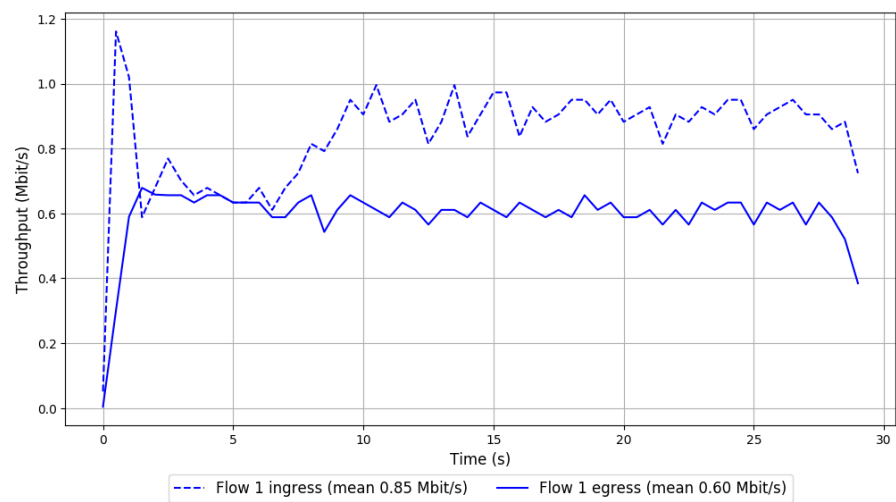
Run 1: Report of QUIC Cubic — Data Link



Flow 1 ingress (mean 0.83 Mbit/s)    Flow 1 egress (mean 0.61 Mbit/s)



Flow 1 (95th percentile 6815.35 ms)

```
Run 2: Statistics of QUIC Cubic

Start at: 2018-04-10 05:06:54
End at: 2018-04-10 05:07:24
Local clock offset: -17.263 ms
Remote clock offset: 3.923 ms

Below is generated by plot.py at 2018-04-10 06:39:57
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 5475.503 ms
Loss rate: 24.27%
-- Flow 1:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 5475.503 ms
Loss rate: 24.27%
```
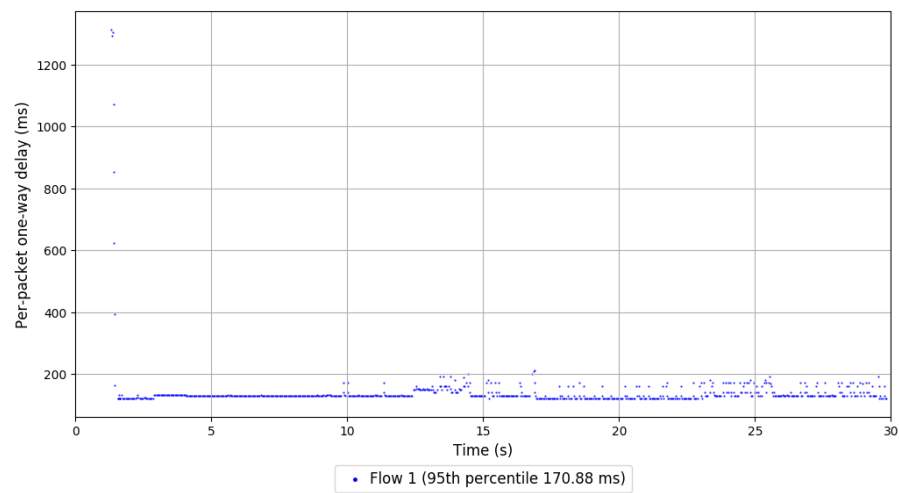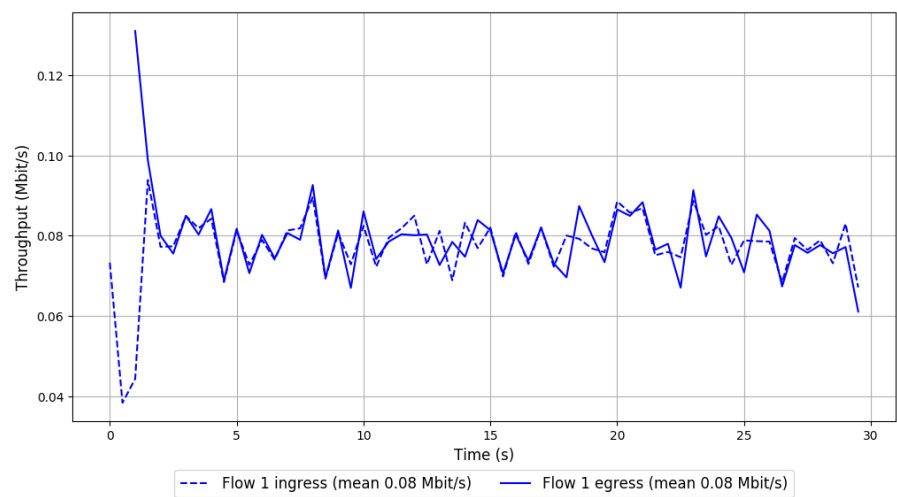
Run 2: Report of QUIC Cubic — Data Link

```
Run 3: Statistics of QUIC Cubic

Start at: 2018-04-10 05:28:05
End at: 2018-04-10 05:28:35
Local clock offset: -18.313 ms
Remote clock offset: 4.57 ms

Below is generated by plot.py at 2018-04-10 06:39:57
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 7349.770 ms
Loss rate: 29.36%
-- Flow 1:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 7349.770 ms
Loss rate: 29.36%
```
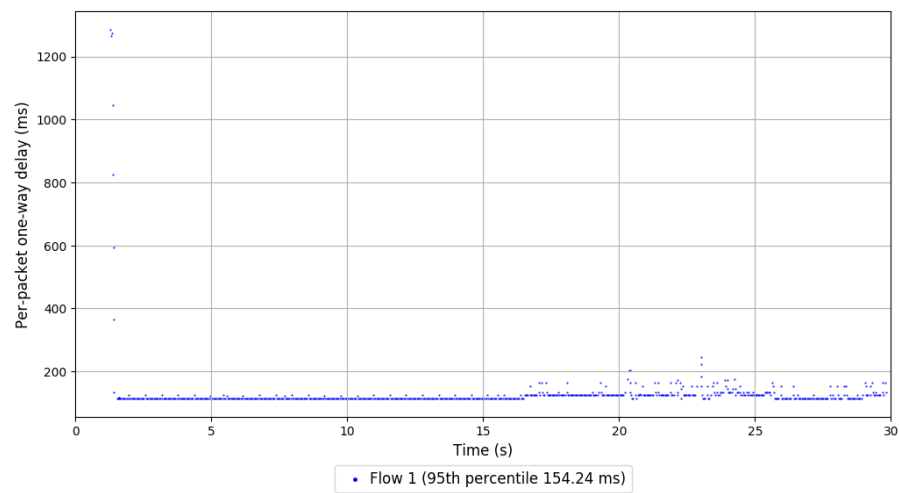
Run 3: Report of QUIC Cubic — Data Link



Flow 1 ingress (mean 0.85 Mbit/s)     Flow 1 egress (mean 0.60 Mbit/s)
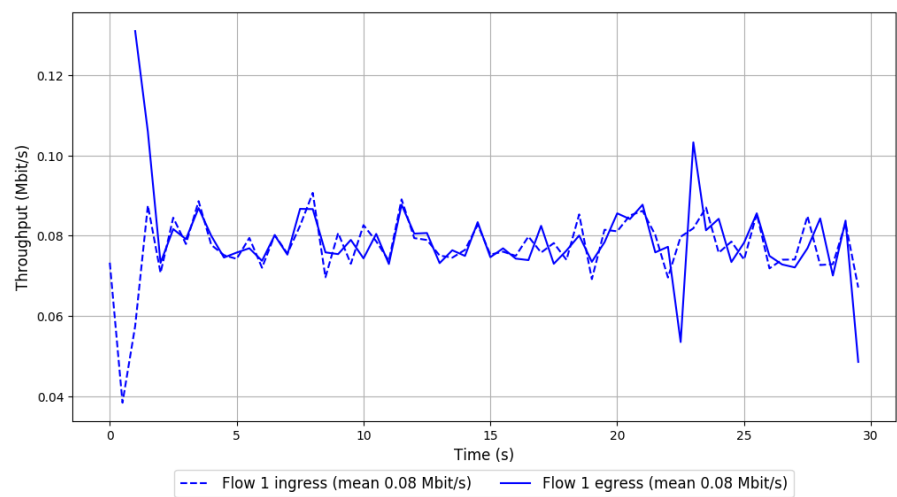


• Flow 1 (95th percentile 7349.77 ms)

```
Run 1: Statistics of SCReAM

Start at: 2018-04-10 04:39:52
End at: 2018-04-10 04:40:22
Local clock offset: -9.646 ms
Remote clock offset: 2.595 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 170.882 ms
Loss rate: 0.66%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 170.882 ms
Loss rate: 0.66%
```

Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2018-04-10 05:01:02
End at: 2018-04-10 05:01:32
Local clock offset: -16.154 ms
Remote clock offset: 8.717 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 154.239 ms
Loss rate: 0.79%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 154.239 ms
Loss rate: 0.79%
```
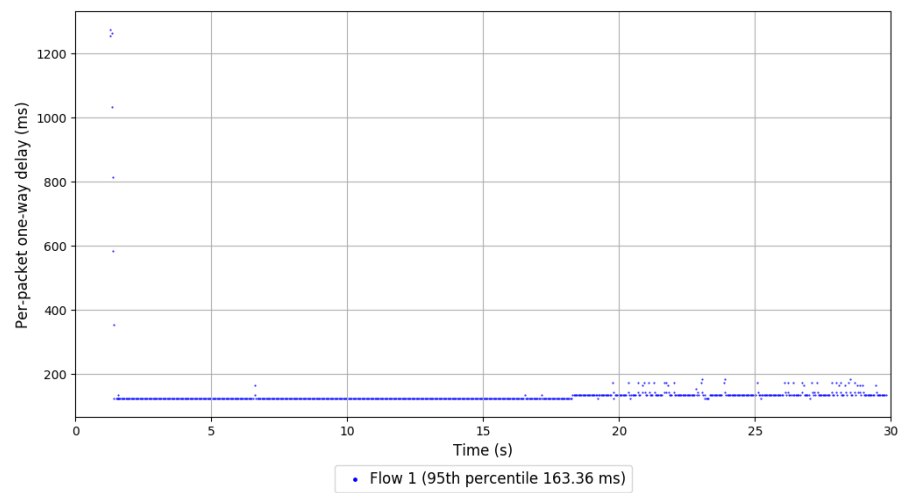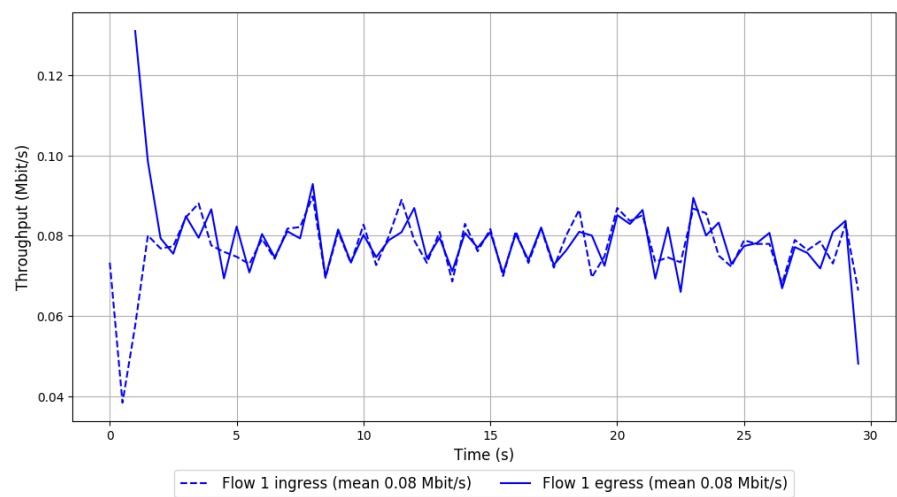
Run 2: Report of SCReAM — Data Link

```
Run 3: Statistics of SCReAM

Start at: 2018-04-10 05:22:13
End at: 2018-04-10 05:22:43
Local clock offset: -16.02 ms
Remote clock offset: 9.84 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 163.361 ms
Loss rate: 0.78%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 163.361 ms
Loss rate: 0.78%
```
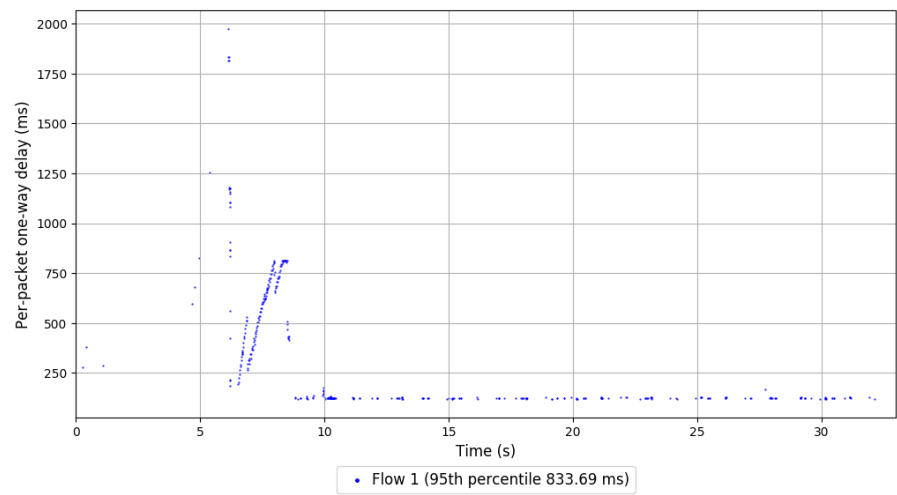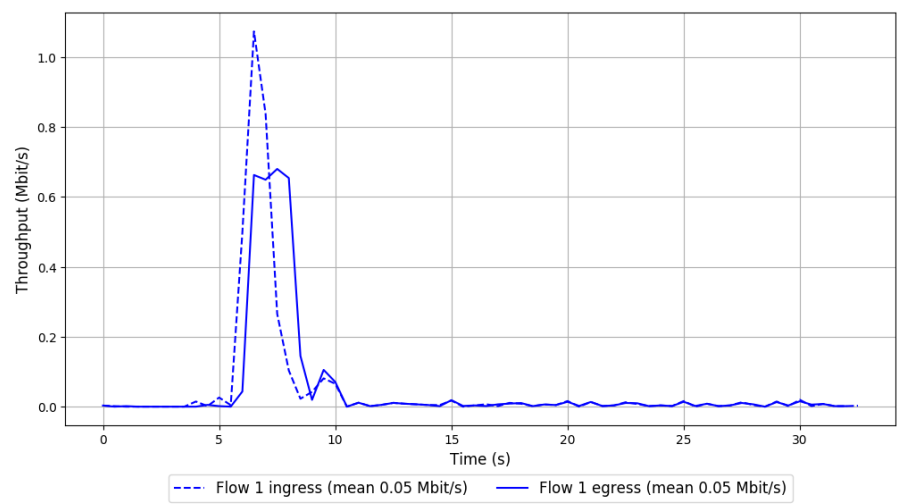
Run 3: Report of SCReAM — Data Link

Flow 1 ingress (mean 0.08 Mbit/s) --- Flow 1 egress (mean 0.08 Mbit/s)
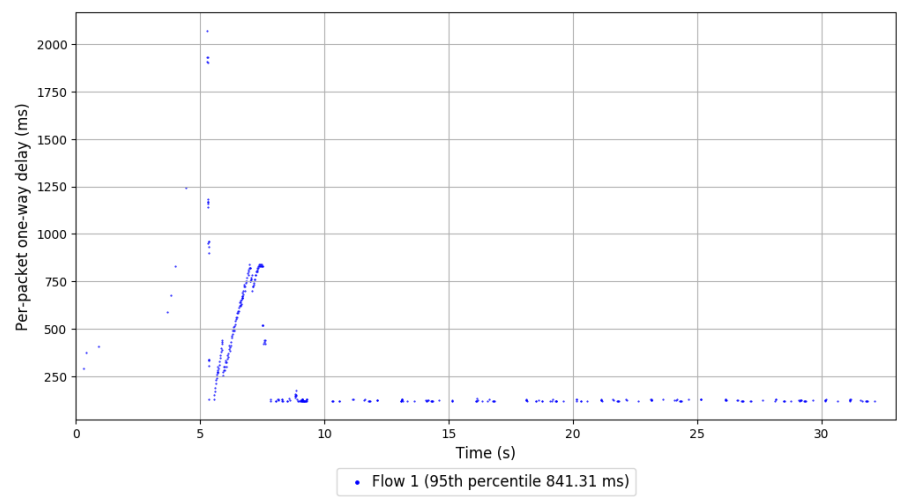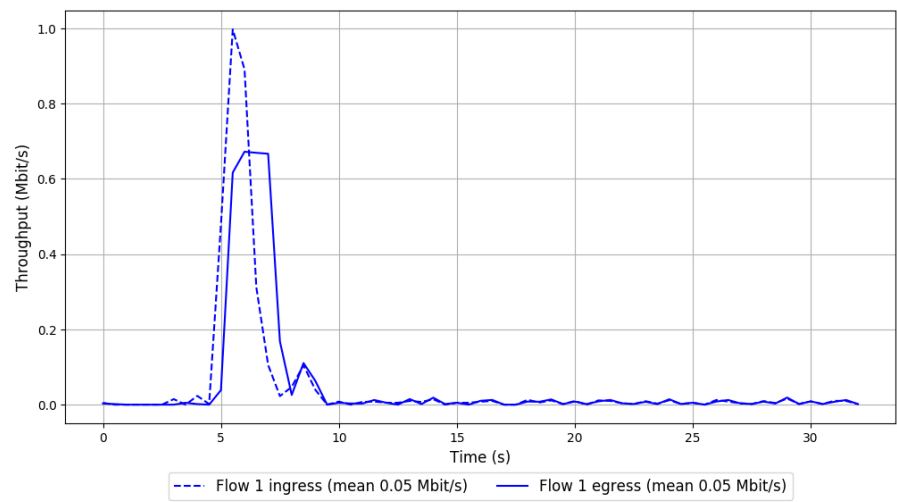

Flow 1 (95th percentile 163.36 ms)

```
Run 1: Statistics of WebRTC media

Start at: 2018-04-10 04:32:50
End at: 2018-04-10 04:33:20
Local clock offset: -8.398 ms
Remote clock offset: 2.508 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 833.692 ms
Loss rate: 0.08%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 833.692 ms
Loss rate: 0.08%
```
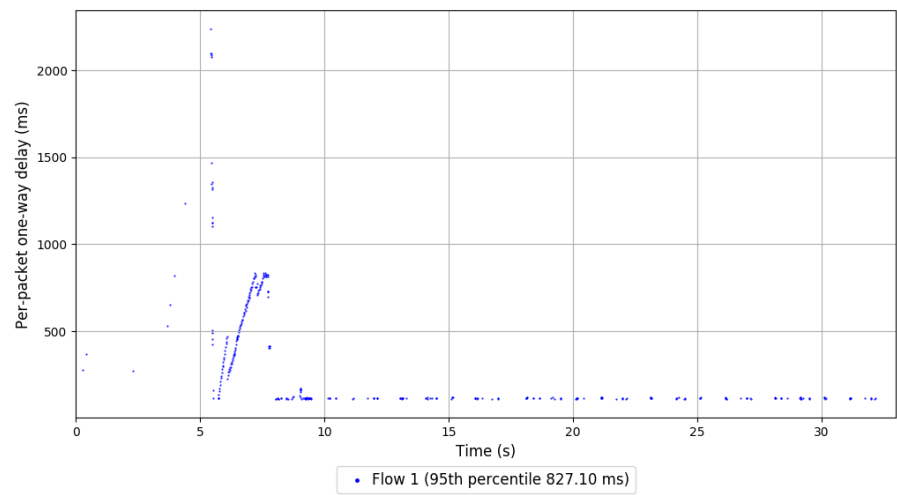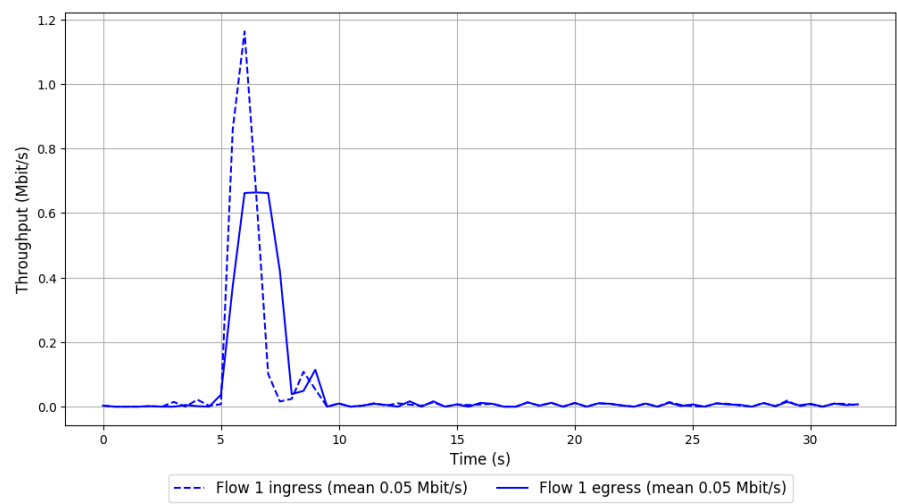
Run 1: Report of WebRTC media — Data Link

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

• Flow 1 (95th percentile 833.69 ms)

```
Run 2: Statistics of WebRTC media

Start at: 2018-04-10 04:54:00
End at: 2018-04-10 04:54:30
Local clock offset: -12.565 ms
Remote clock offset: 3.824 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 841.307 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 841.307 ms
Loss rate: 0.00%
```

Run 2: Report of WebRTC media — Data Link

```
Run 3: Statistics of WebRTC media

Start at: 2018-04-10 05:15:10
End at: 2018-04-10 05:15:40
Local clock offset: -15.892 ms
Remote clock offset: 9.189 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 827.097 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 827.097 ms
Loss rate: 0.00%
```
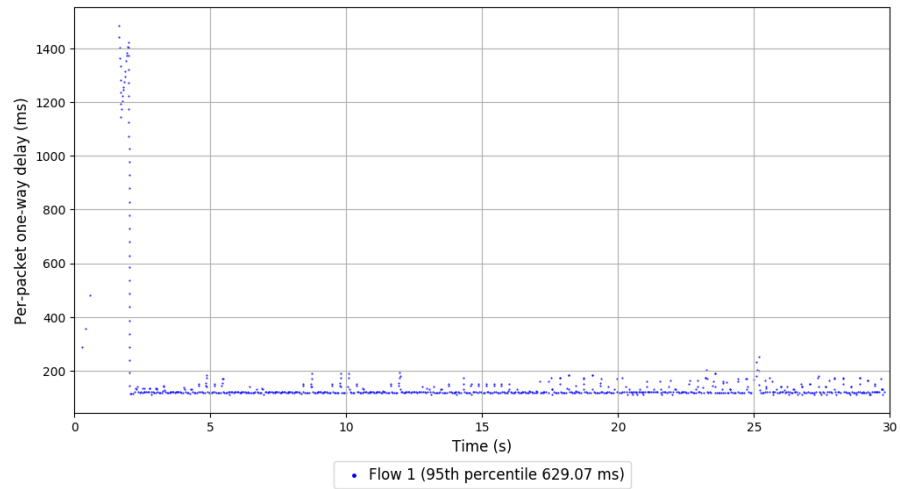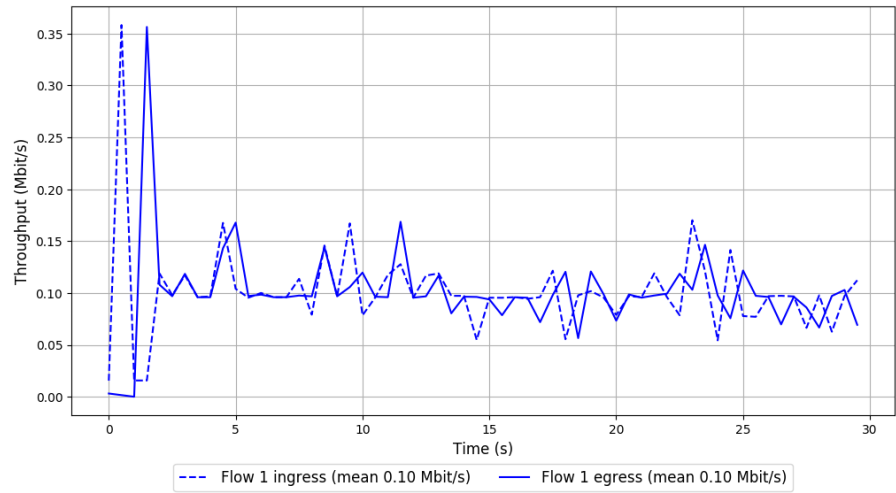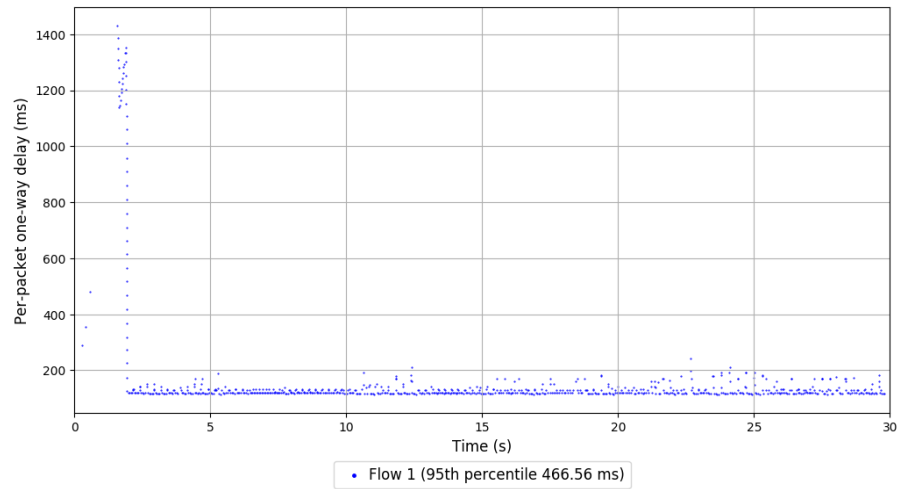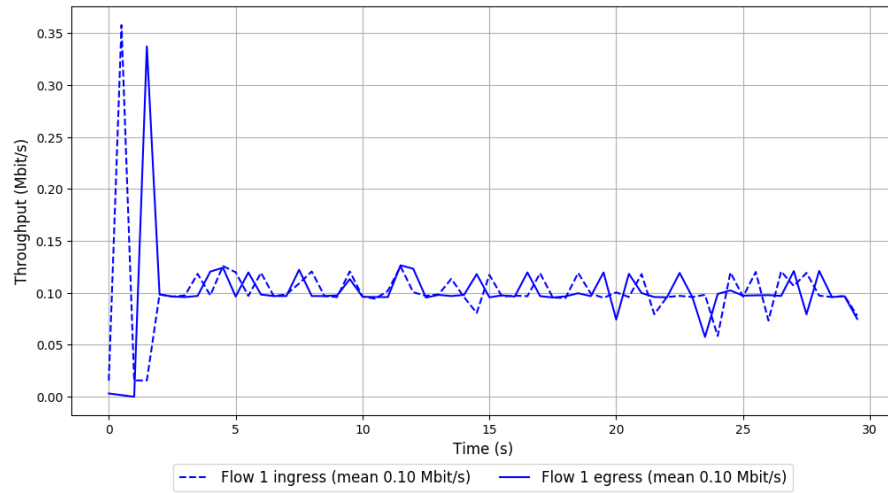
Run 3: Report of WebRTC media — Data Link

```
Run 1: Statistics of Sprout

Start at: 2018-04-10 04:38:42
End at: 2018-04-10 04:39:12
Local clock offset: -11.68 ms
Remote clock offset: 9.134 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 629.071 ms
Loss rate: 0.97%
-- Flow 1:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 629.071 ms
Loss rate: 0.97%
```

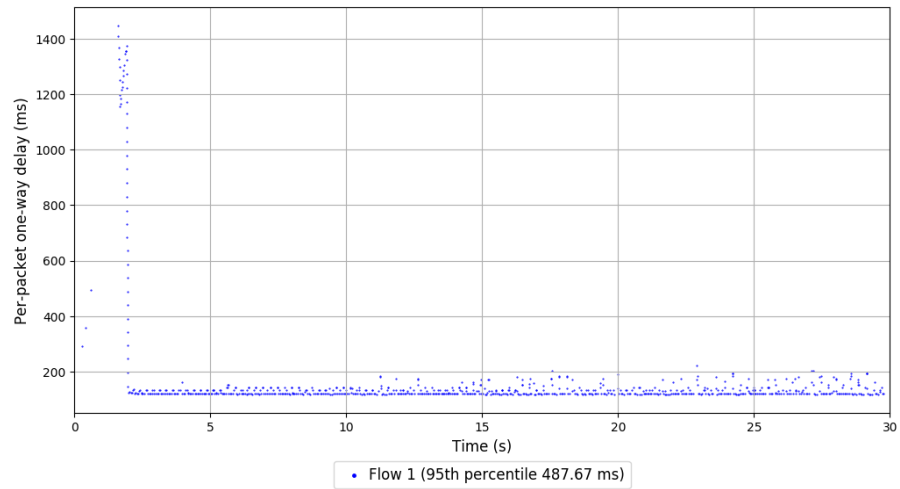Run 1: Report of Sprout — Data Link

```
Run 2: Statistics of Sprout

Start at: 2018-04-10 04:59:52
End at: 2018-04-10 05:00:22
Local clock offset: -15.48 ms
Remote clock offset: 8.688 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 466.562 ms
Loss rate: 1.76%
-- Flow 1:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 466.562 ms
Loss rate: 1.76%
```

Run 2: Report of Sprout — Data Link

Flow 1 ingress (mean 0.10 Mbit/s)   Flow 1 egress (mean 0.10 Mbit/s)

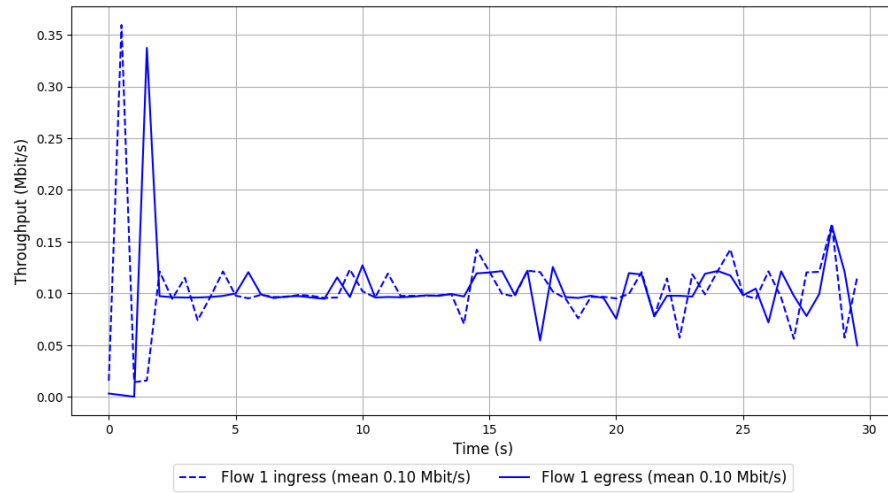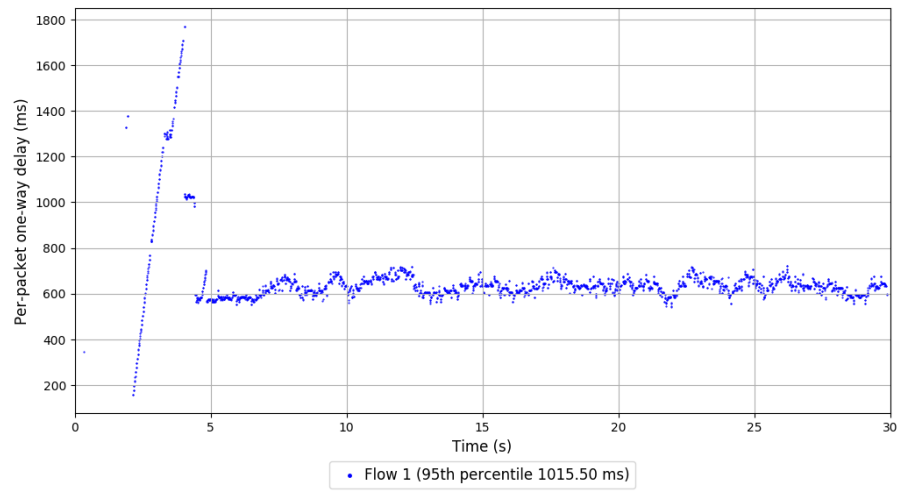Flow 1 (95th percentile 466.56 ms)

49

```
Run 3: Statistics of Sprout

Start at: 2018-04-10 05:21:03
End at: 2018-04-10 05:21:33
Local clock offset: -17.113 ms
Remote clock offset: 4.93 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 487.673 ms
Loss rate: 2.12%
-- Flow 1:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 487.673 ms
Loss rate: 2.12%
```

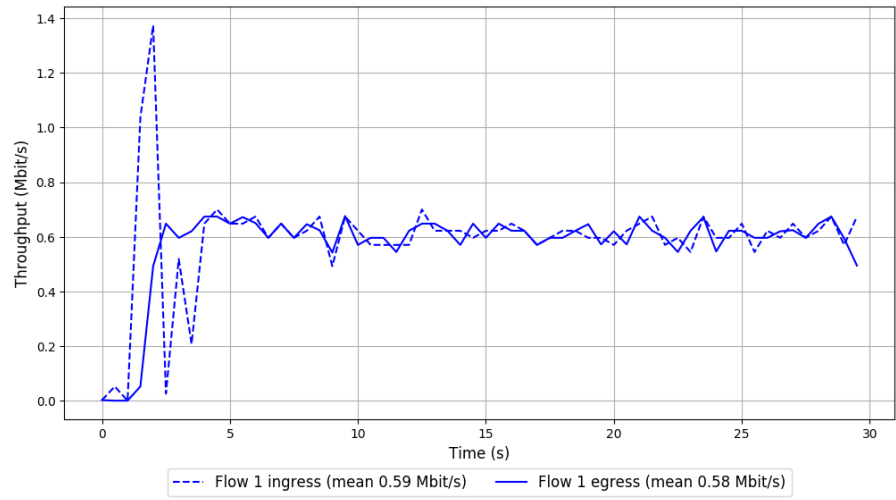# Run 3: Report of Sprout — Data Link

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

Start at: 2018-04-10 04:44:34
End at: 2018-04-10 04:45:04
Local clock offset: -12.688 ms
Remote clock offset: 8.478 ms

# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 1015.497 ms
Loss rate: 2.65%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 1015.497 ms
Loss rate: 2.65%
```
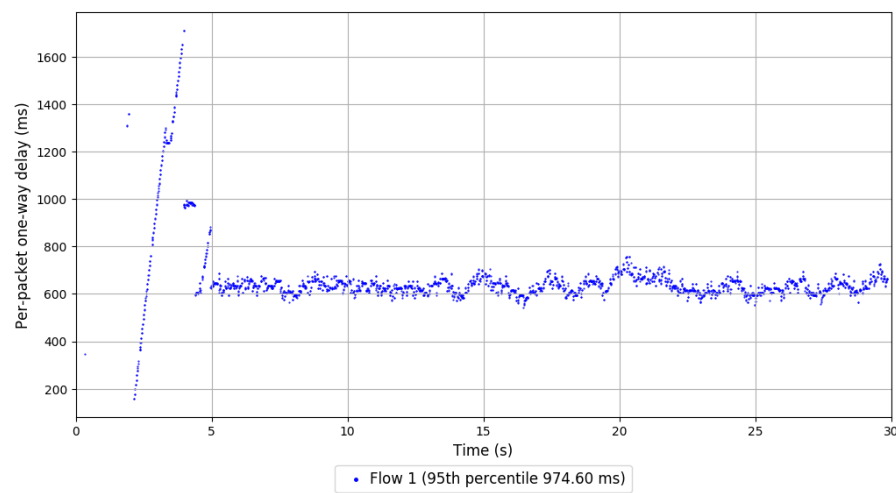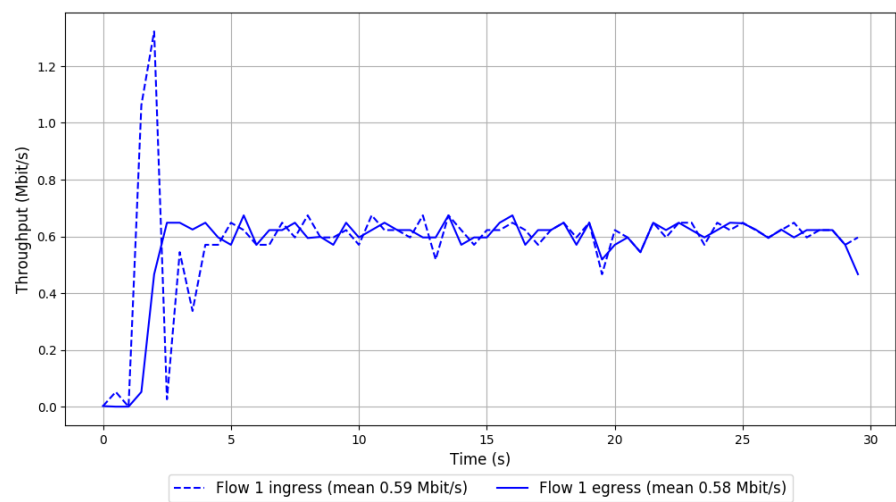
Run 1: Report of TaoVA-100x — Data Link

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

Start at: 2018-04-10 05:05:44
End at: 2018-04-10 05:06:14
Local clock offset: -17.315 ms
Remote clock offset: 8.744 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 974.597 ms
Loss rate: 2.72%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 974.597 ms
Loss rate: 2.72%
```

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

Flow 1 ingress (mean 0.59 Mbit/s) Flow 1 egress (mean 0.58 Mbit/s)

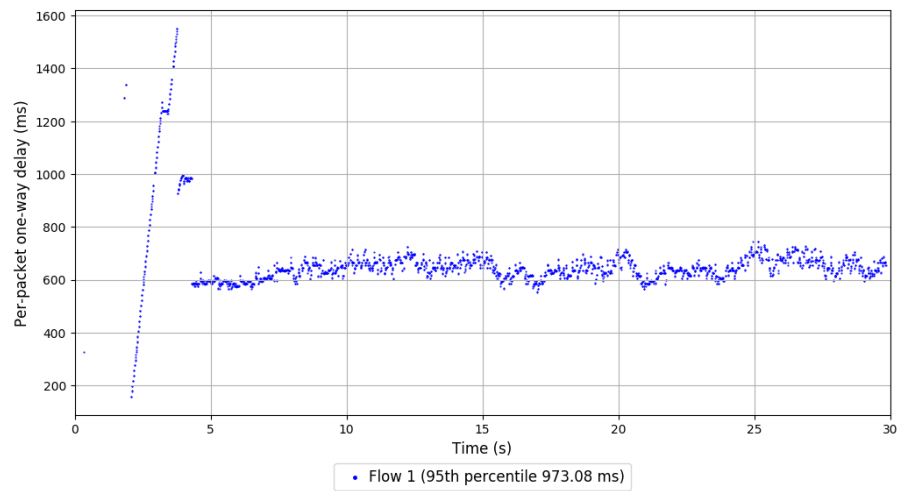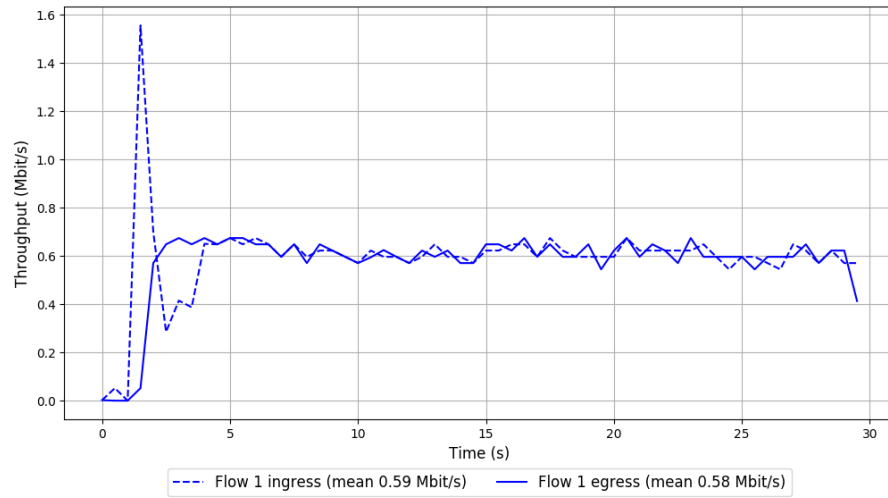Flow 1 (95th percentile 974.60 ms)

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

Start at: 2018-04-10 05:26:55
End at: 2018-04-10 05:27:25
Local clock offset: -18.568 ms
Remote clock offset: 4.472 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 973.079 ms
Loss rate: 2.50%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 973.079 ms
Loss rate: 2.50%
```
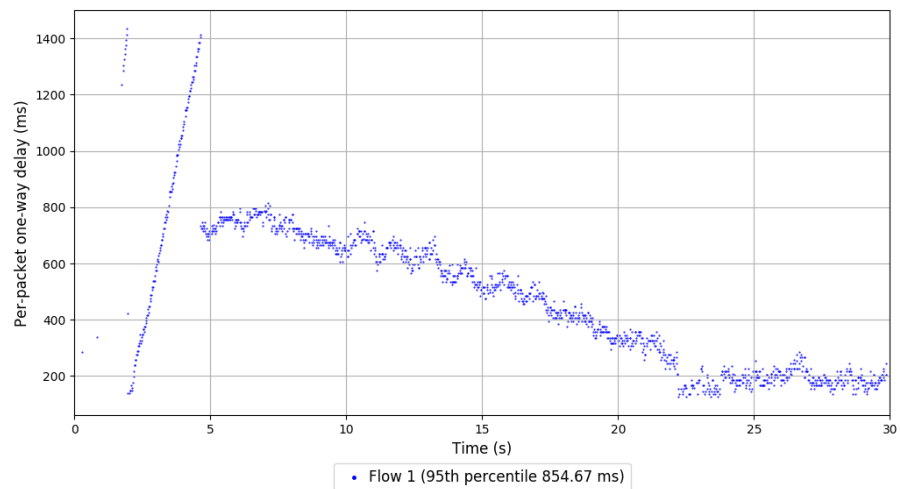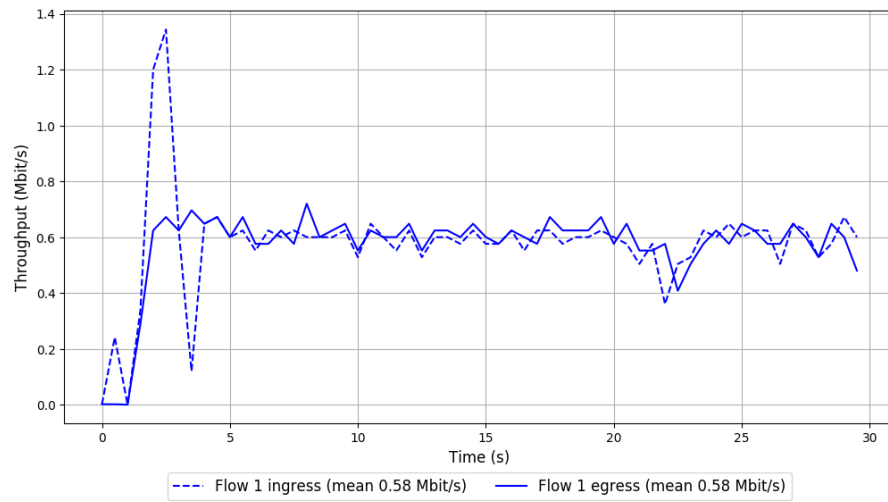
Run 3: Report of TaoVA-100x — Data Link

Flow 1 ingress (mean 0.59 Mbit/s) ----   Flow 1 egress (mean 0.58 Mbit/s) ——

Flow 1 (95th percentile 973.08 ms) •

```
Run 1: Statistics of TCP Vegas

Start at: 2018-04-10 04:34:00
End at: 2018-04-10 04:34:30
Local clock offset: -8.636 ms
Remote clock offset: 9.072 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 854.670 ms
Loss rate: 1.11%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 854.670 ms
Loss rate: 1.11%
```

Run 1: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 0.58 Mbit/s) — — — —   Flow 1 egress (mean 0.58 Mbit/s) ————
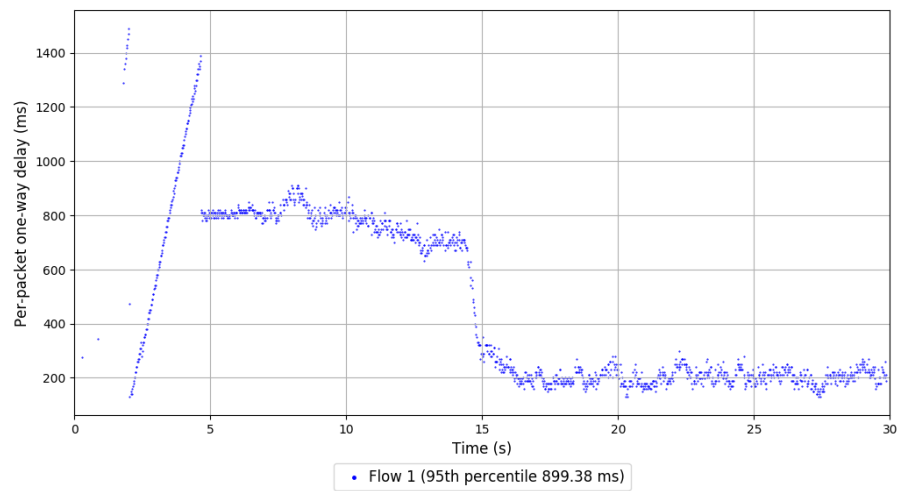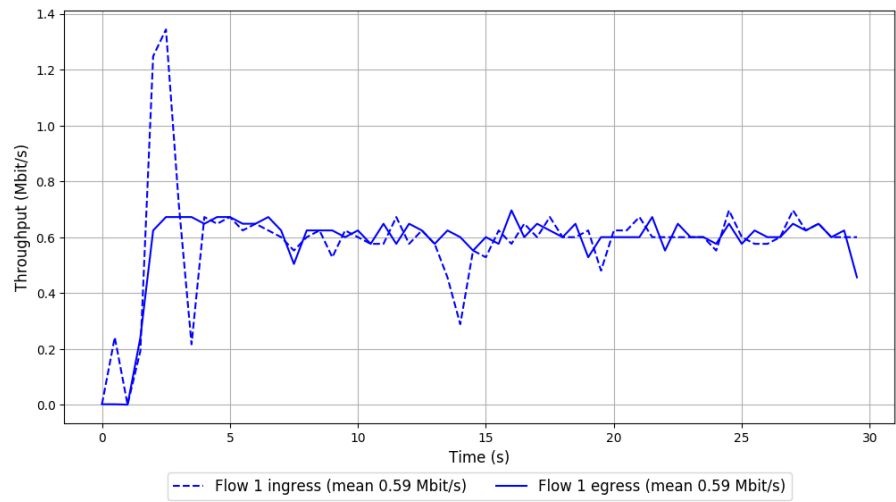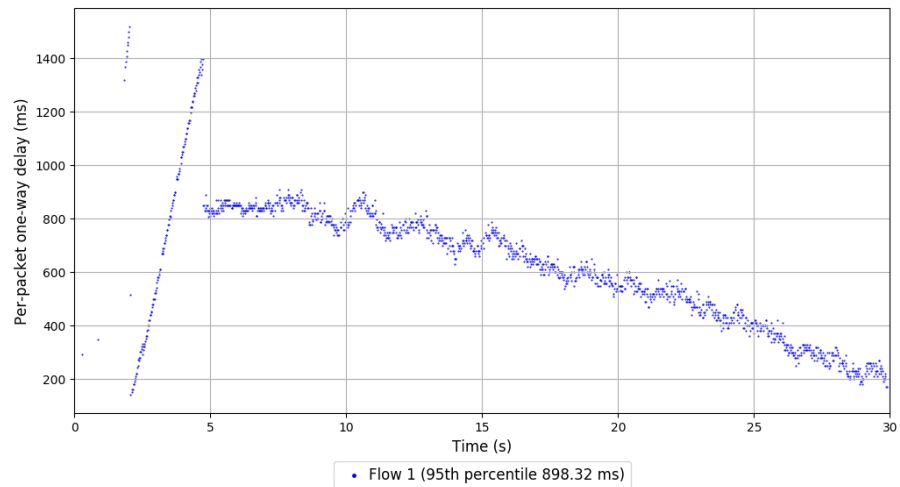

Flow 1 (95th percentile 854.67 ms)

```
Run 2: Statistics of TCP Vegas

Start at: 2018-04-10 04:55:10
End at: 2018-04-10 04:55:40
Local clock offset: -13.781 ms
Remote clock offset: 8.68 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 899.375 ms
Loss rate: 1.16%
-- Flow 1:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 899.375 ms
Loss rate: 1.16%
```
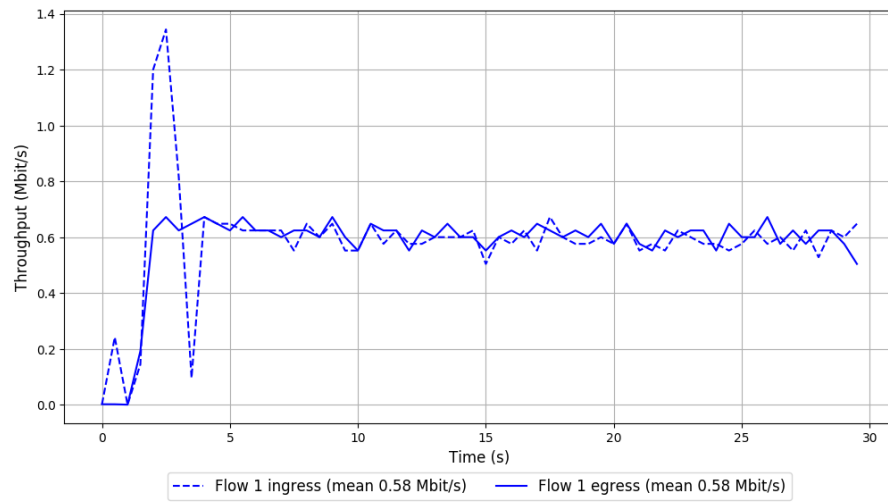
Run 2: Report of TCP Vegas — Data Link

```
Run 3: Statistics of TCP Vegas

Start at: 2018-04-10 05:16:21
End at: 2018-04-10 05:16:51
Local clock offset: -15.98 ms
Remote clock offset: 3.666 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 898.324 ms
Loss rate: 1.17%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 898.324 ms
Loss rate: 1.17%
```
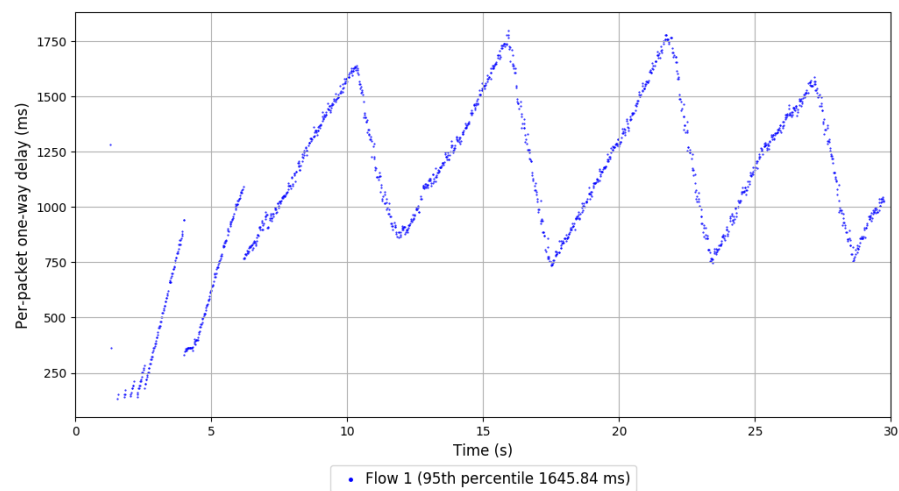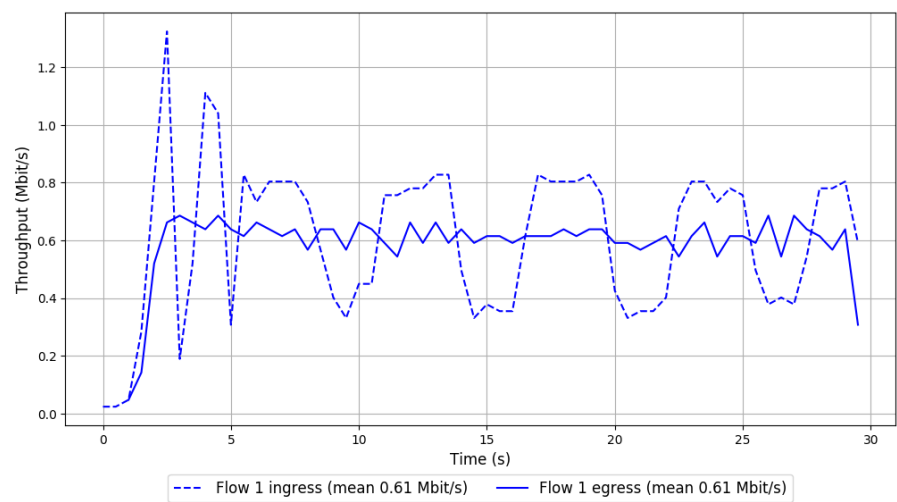
Run 3: Report of TCP Vegas — Data Link

```
Run 1: Statistics of Verus

Start at: 2018-04-10 04:41:03
End at: 2018-04-10 04:41:33
Local clock offset: -10.143 ms
Remote clock offset: 3.457 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 1645.843 ms
Loss rate: 5.02%
-- Flow 1:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 1645.843 ms
Loss rate: 5.02%
```
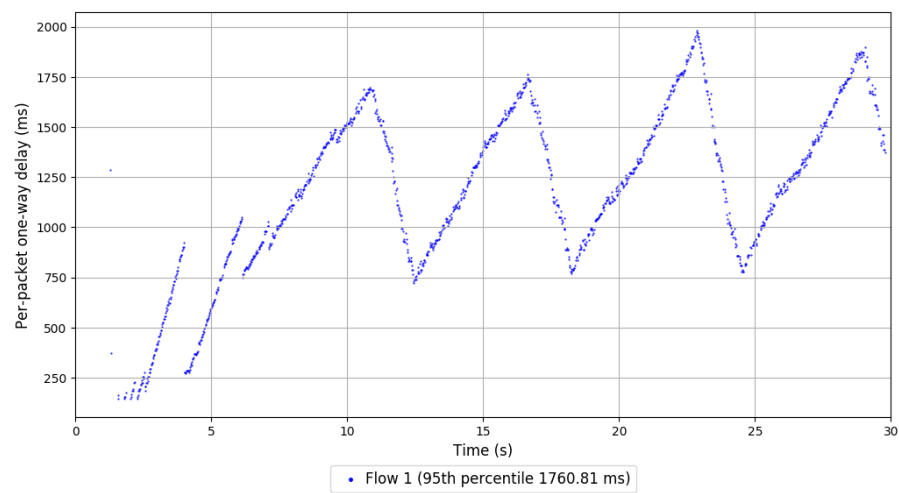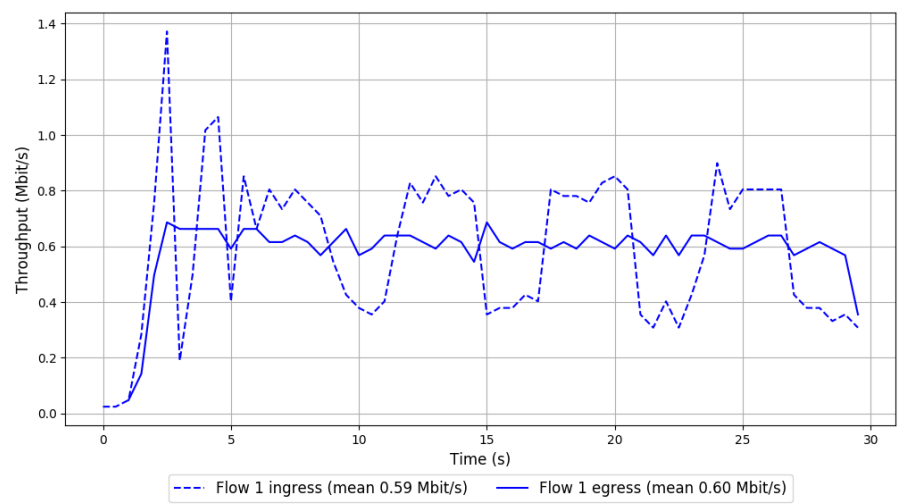
Run 1: Report of Verus — Data Link

```
Run 2: Statistics of Verus

Start at: 2018-04-10 05:02:13
End at: 2018-04-10 05:02:43
Local clock offset: -16.827 ms
Remote clock offset: 3.912 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 1760.810 ms
Loss rate: 3.00%
-- Flow 1:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 1760.810 ms
Loss rate: 3.00%
```

Run 2: Report of Verus — Data Link

Flow 1 ingress (mean 0.59 Mbit/s)   Flow 1 egress (mean 0.60 Mbit/s)

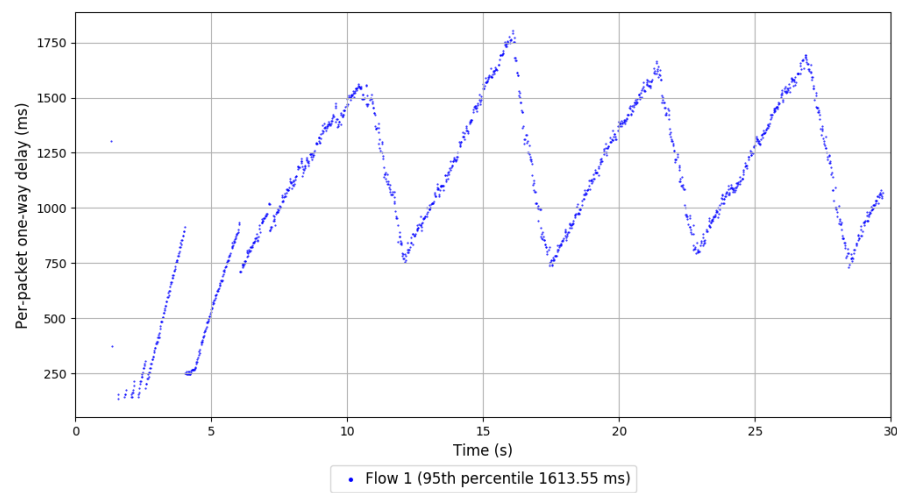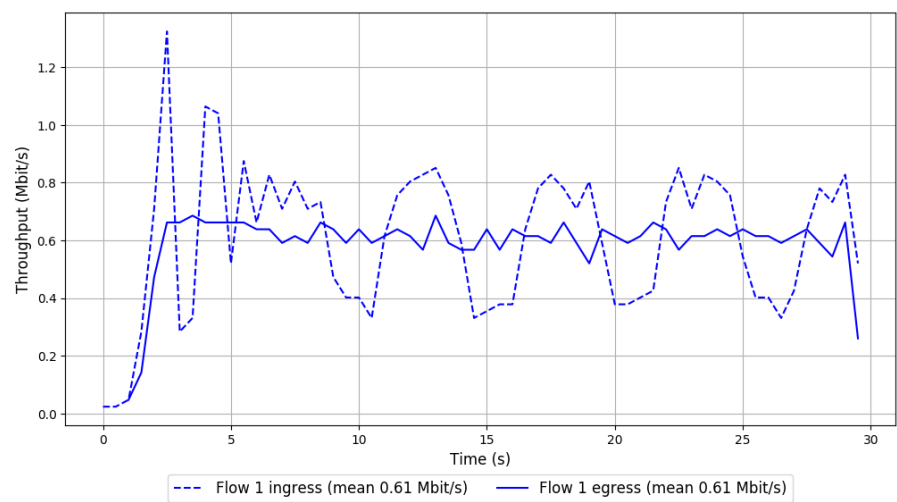• Flow 1 (95th percentile 1760.81 ms)

```
Run 3: Statistics of Verus

Start at: 2018-04-10 05:23:24
End at: 2018-04-10 05:23:54
Local clock offset: -17.286 ms
Remote clock offset: 9.071 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 1613.546 ms
Loss rate: 5.09%
-- Flow 1:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 1613.546 ms
Loss rate: 5.09%
```
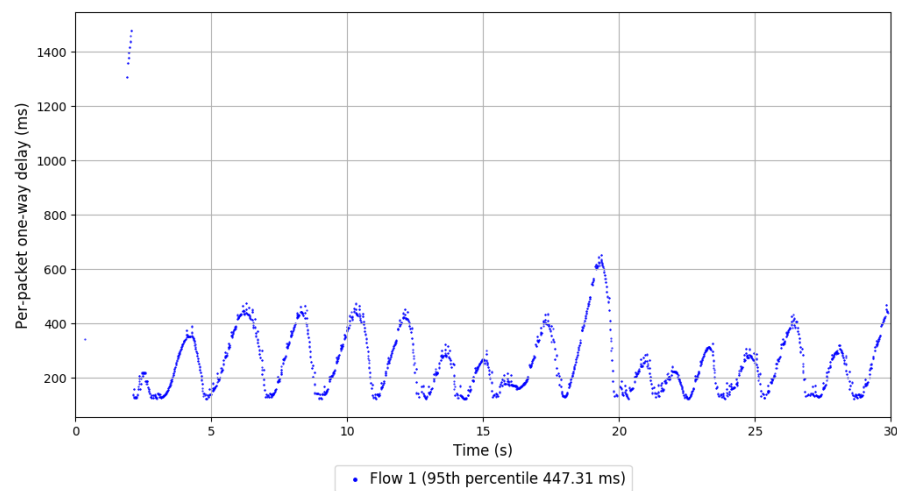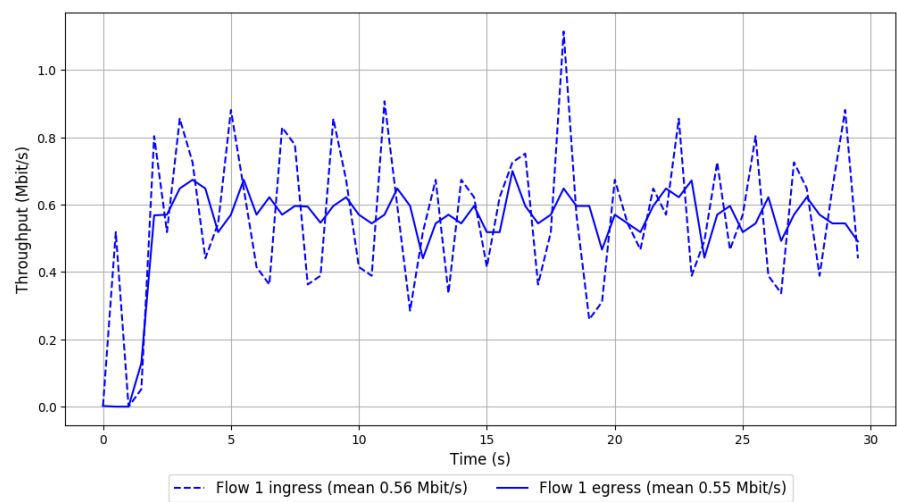
Run 3: Report of Verus — Data Link

```
Run 1: Statistics of Copa

Start at: 2018-04-10 04:46:55
End at: 2018-04-10 04:47:25
Local clock offset: -14.545 ms
Remote clock offset: 7.632 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 447.309 ms
Loss rate: 2.96%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 447.309 ms
Loss rate: 2.96%
```

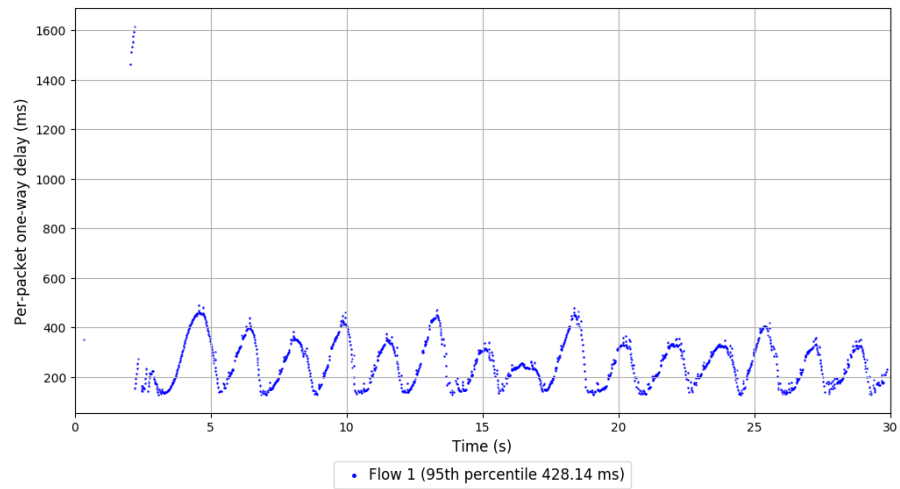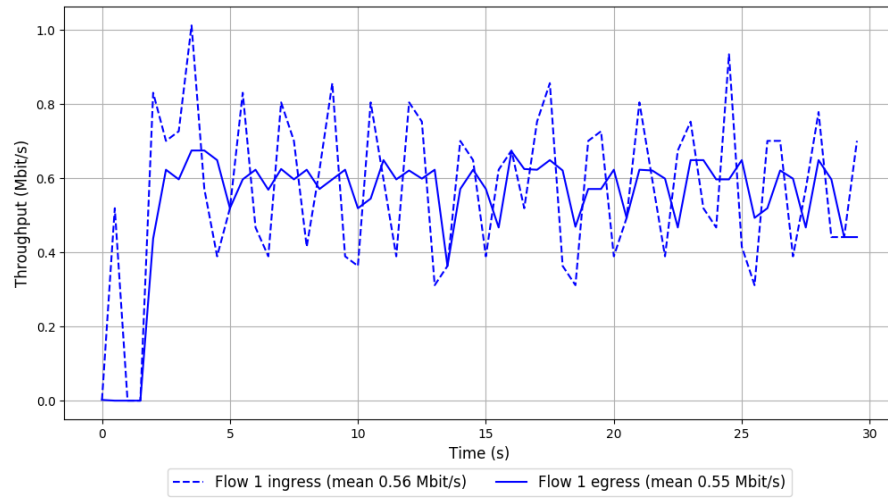Run 1: Report of Copa — Data Link

```
Run 2: Statistics of Copa

Start at: 2018-04-10 05:08:05
End at: 2018-04-10 05:08:35
Local clock offset: -15.972 ms
Remote clock offset: 3.096 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 428.144 ms
Loss rate: 3.92%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 428.144 ms
Loss rate: 3.92%
```

Run 2: Report of Copa — Data Link

Run 3: Statistics of Copa

Start at: 2018-04-10 05:29:16
End at: 2018-04-10 05:29:46
Local clock offset: -20.45 ms
Remote clock offset: 9.381 ms

Below is generated by plot.py at 2018-04-10 06:39:57
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.55 Mbit/s
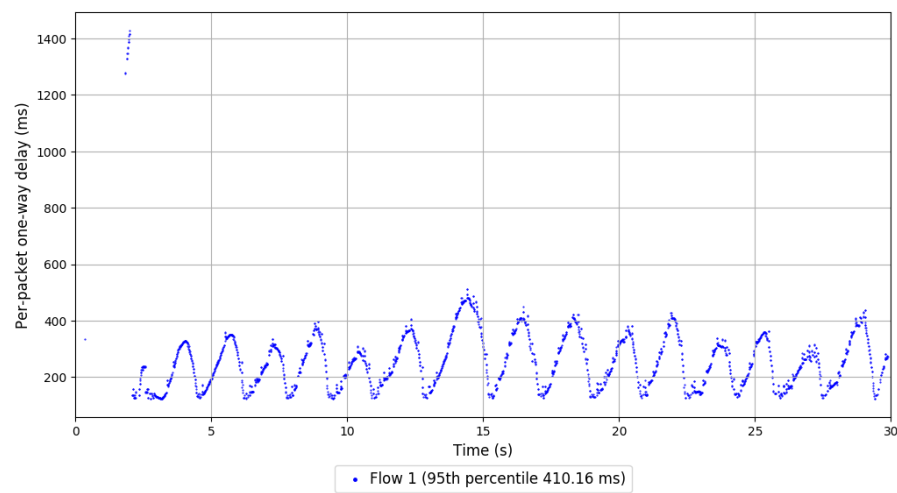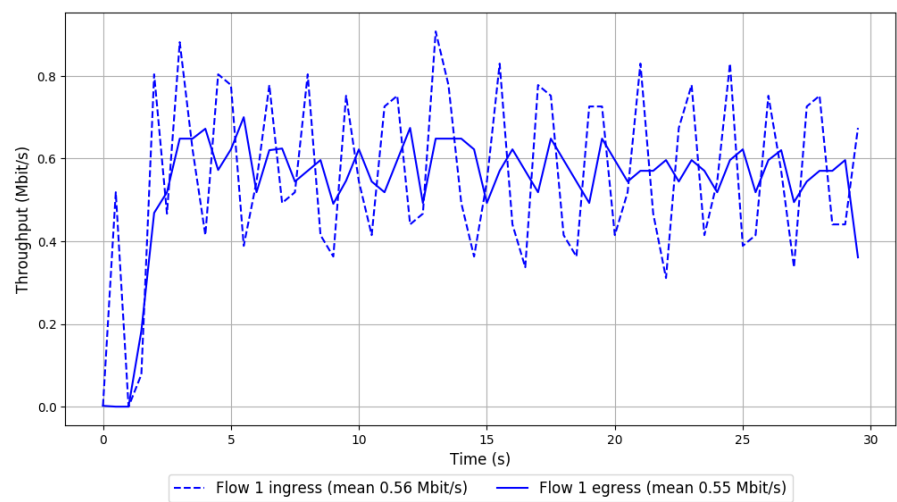95th percentile per-packet one-way delay: 410.163 ms
Loss rate: 3.09%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 410.163 ms
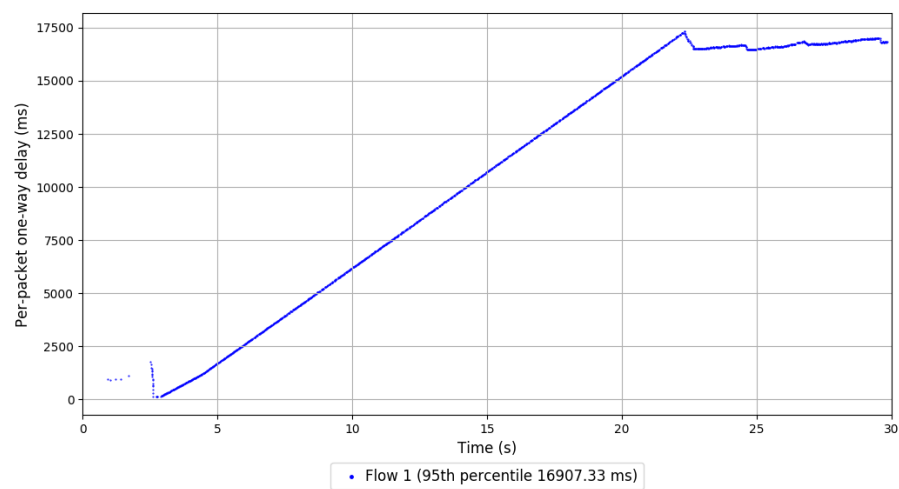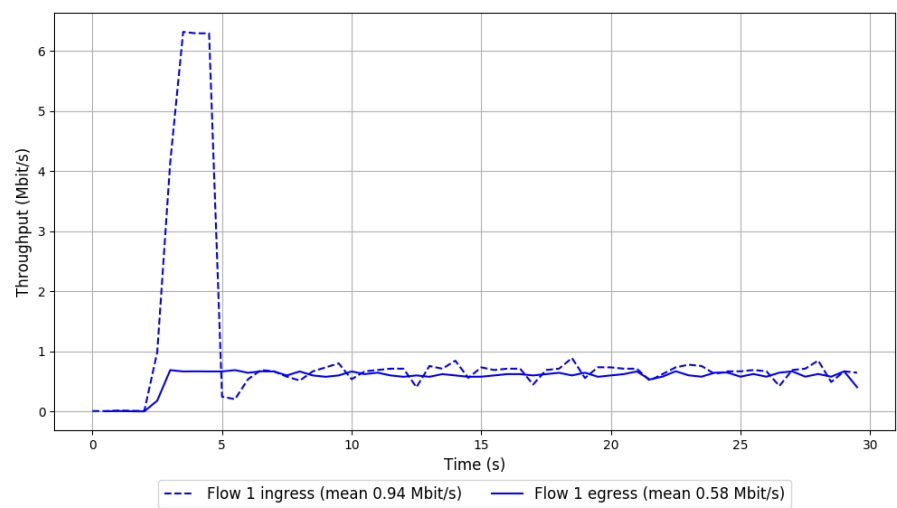Loss rate: 3.09%

Run 3: Report of Copa — Data Link

```
Run 1: Statistics of FillP

Start at: 2018-04-10 04:43:23
End at: 2018-04-10 04:43:53
Local clock offset: -11.089 ms
Remote clock offset: 9.272 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 16907.329 ms
Loss rate: 40.76%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 16907.329 ms
Loss rate: 40.76%
```
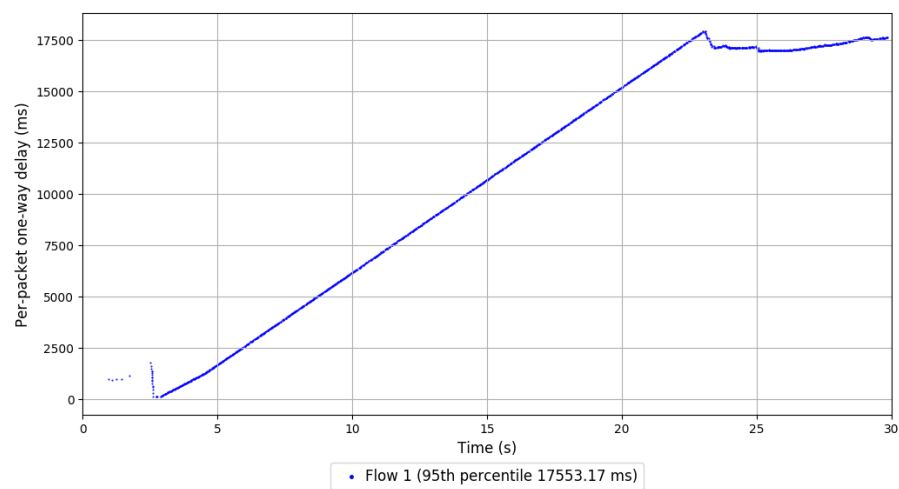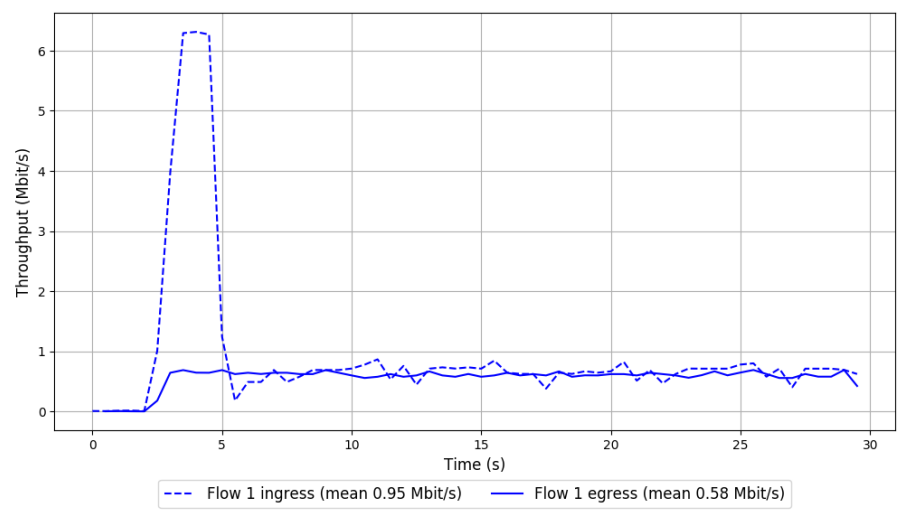
Run 1: Report of FillP — Data Link

```
Run 2: Statistics of FillP

Start at: 2018-04-10 05:04:33
End at: 2018-04-10 05:05:03
Local clock offset: -18.787 ms
Remote clock offset: 3.92 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 17553.166 ms
Loss rate: 41.30%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 17553.166 ms
Loss rate: 41.30%
```
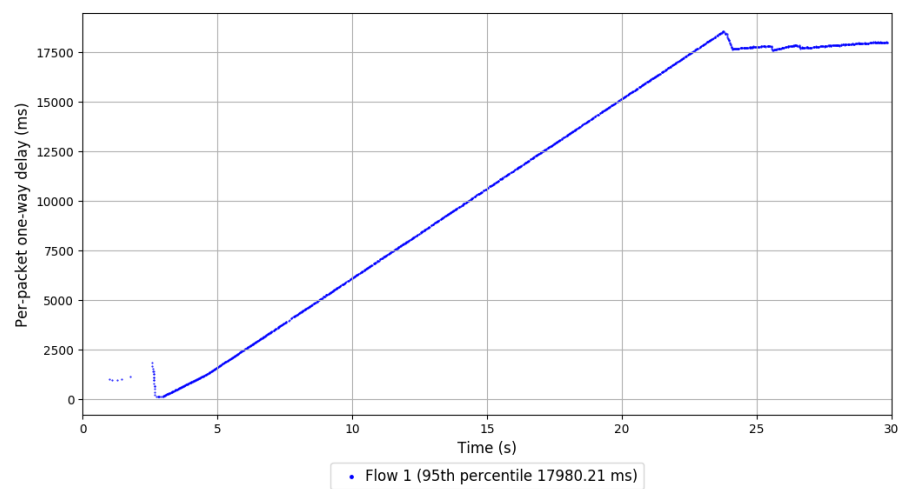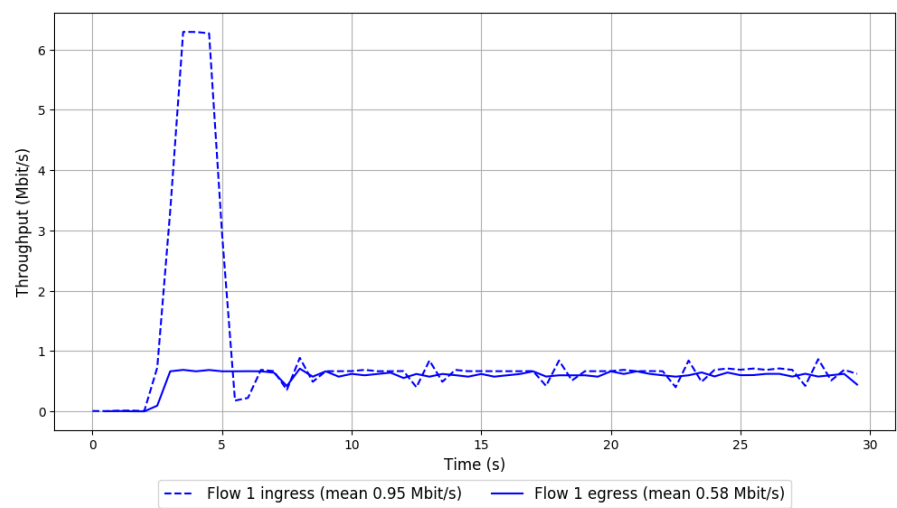
Run 2: Report of FillP — Data Link

```
Run 3: Statistics of FillP

Start at: 2018-04-10 05:25:44
End at: 2018-04-10 05:26:14
Local clock offset: -18.129 ms
Remote clock offset: 9.211 ms


# Below is generated by plot.py at 2018-04-10 06:39:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 17980.206 ms
Loss rate: 41.43%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 17980.206 ms
Loss rate: 41.43%
```

Run 3: Report of FillP — Data Link

Flow 1 ingress (mean 0.95 Mbit/s)   Flow 1 egress (mean 0.58 Mbit/s)

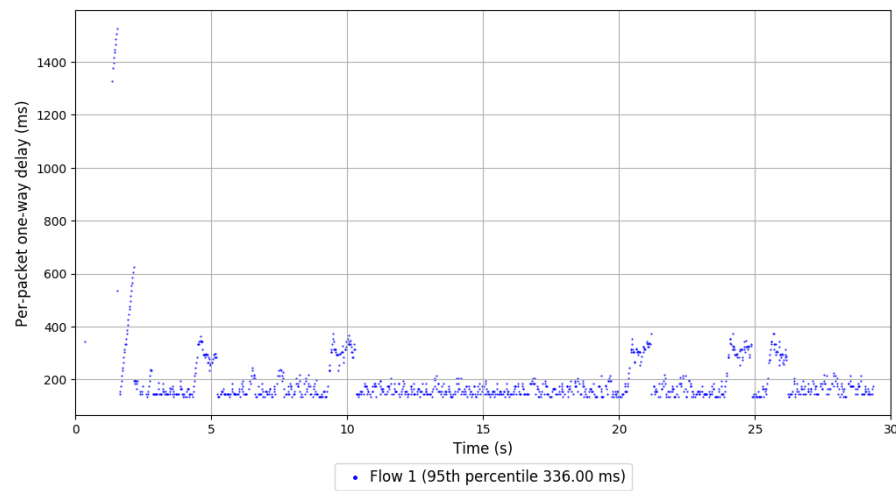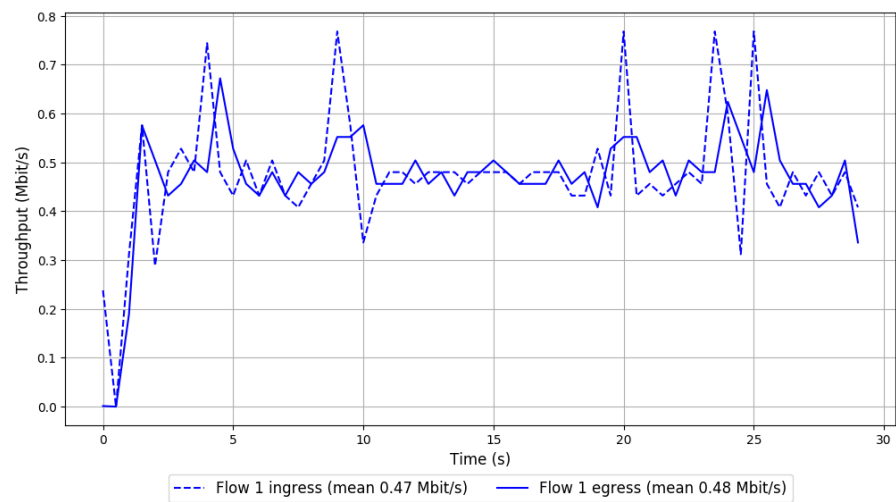
Flow 1 (95th percentile 17980.21 ms)

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

Start at: 2018-04-10 04:50:27
End at: 2018-04-10 04:50:57
Local clock offset: -11.431 ms
Remote clock offset: 2.975 ms


# Below is generated by plot.py at 2018-04-10 06:39:58
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 335.996 ms
Loss rate: 1.20%
-- Flow 1:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 335.996 ms
Loss rate: 1.20%
```

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

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

Start at: 2018-04-10 05:11:36
End at: 2018-04-10 05:12:06
Local clock offset: -15.02 ms
Remote clock offset: 4.011 ms

# Below is generated by plot.py at 2018-04-10 06:39:59
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 320.264 ms
Loss rate: 1.44%
-- Flow 1:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 320.264 ms
Loss rate: 1.44%
```
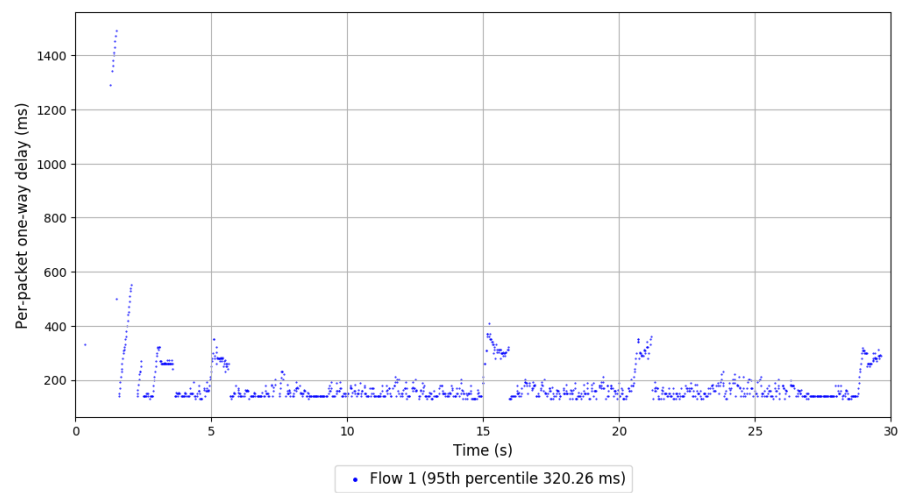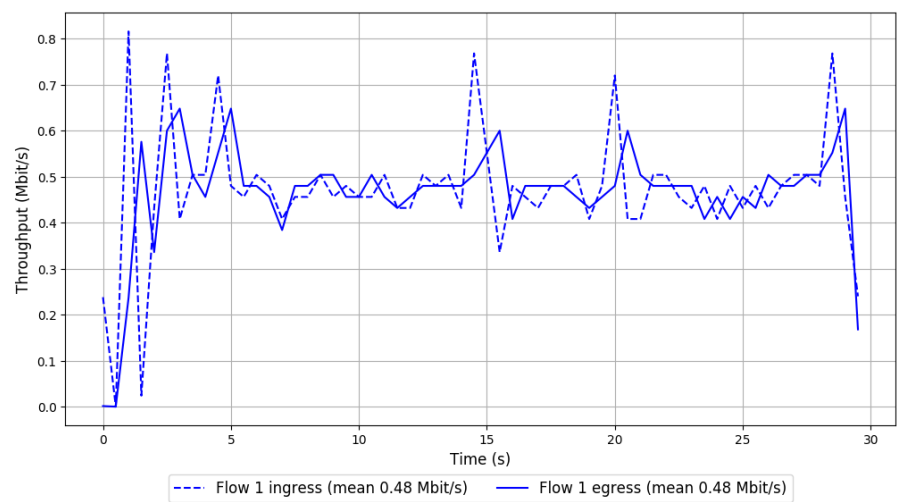
Run 2: Report of Indigo-1-32 — Data Link

Flow 1 ingress (mean 0.48 Mbit/s) ---- Flow 1 egress (mean 0.48 Mbit/s) ——
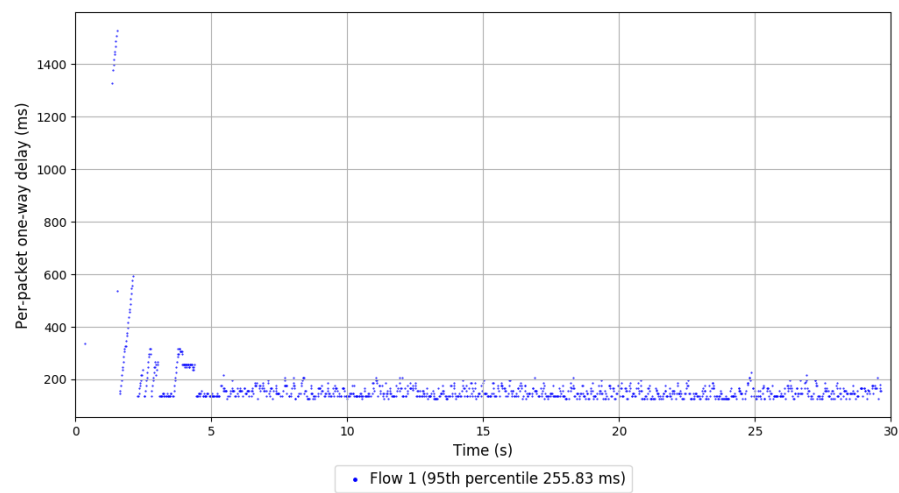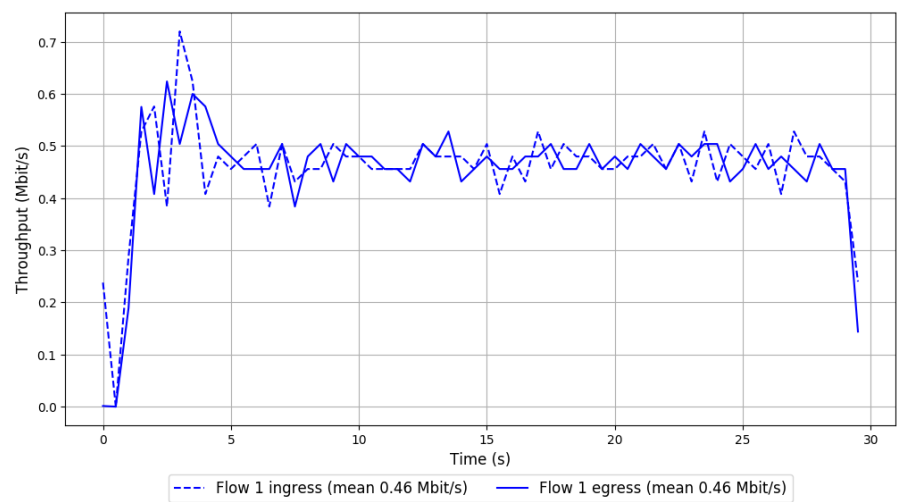

Flow 1 (95th percentile 320.26 ms)

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

Start at: 2018-04-10 05:32:47
End at: 2018-04-10 05:33:17
Local clock offset: -21.177 ms
Remote clock offset: 10.382 ms


# Below is generated by plot.py at 2018-04-10 06:39:59
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 255.828 ms
Loss rate: 1.31%
-- Flow 1:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 255.828 ms
Loss rate: 1.31%
```

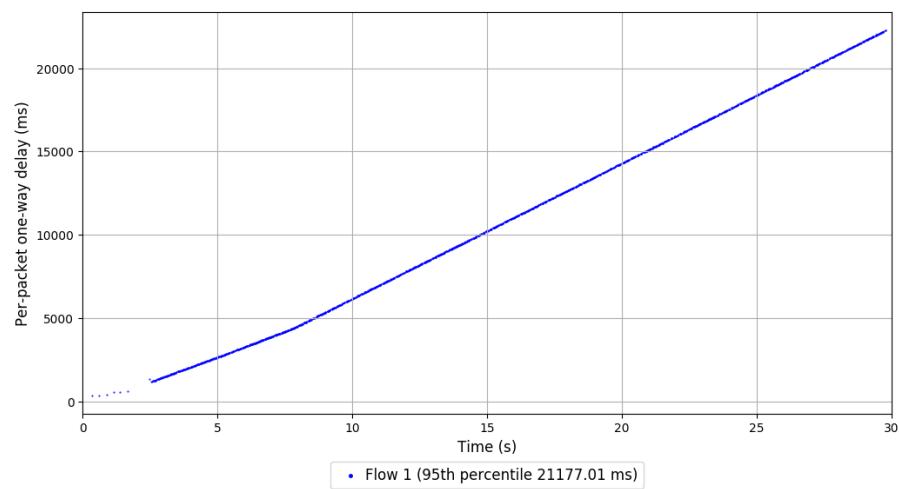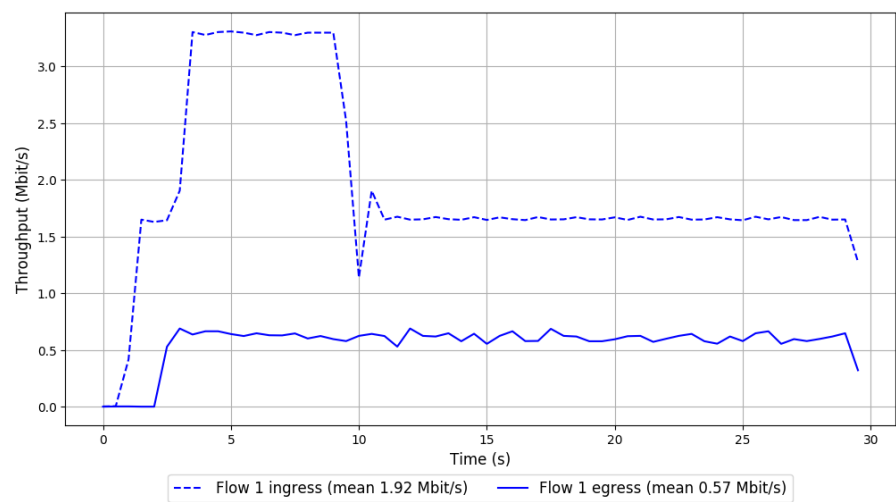Run 3: Report of Indigo-1-32 — Data Link

```
Run 1: Statistics of Vivace-latency

Start at: 2018-04-10 04:48:06
End at: 2018-04-10 04:48:36
Local clock offset: -13.435 ms
Remote clock offset: 3.705 ms


# Below is generated by plot.py at 2018-04-10 06:40:00
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21177.015 ms
Loss rate: 70.76%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21177.015 ms
Loss rate: 70.76%
```

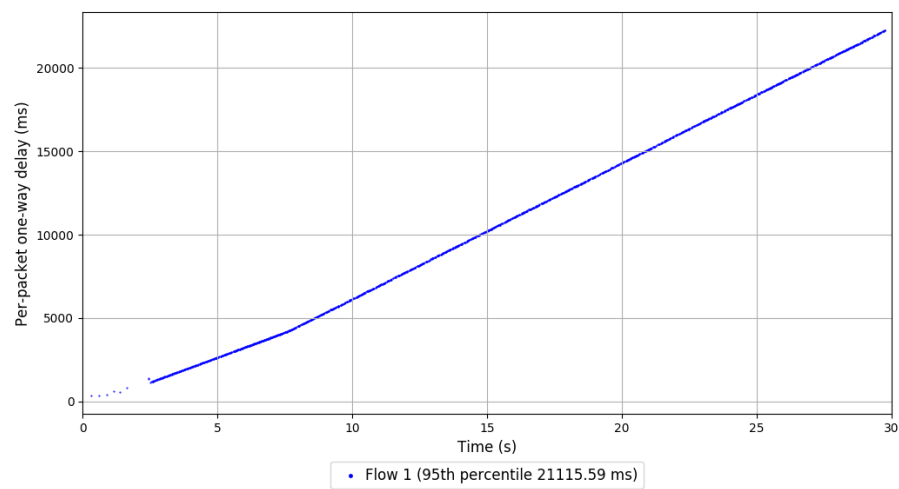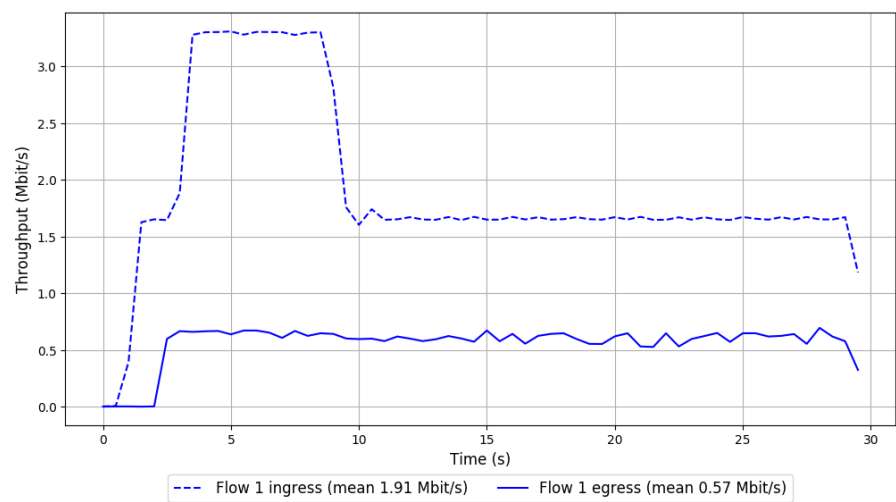Run 1: Report of Vivace-latency — Data Link

Run 2: Statistics of Vivace-latency

Start at: 2018-04-10 05:09:15
End at: 2018-04-10 05:09:46
Local clock offset: -15.485 ms
Remote clock offset: 9.591 ms

Below is generated by plot.py at 2018-04-10 06:40:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21115.593 ms
Loss rate: 70.44%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21115.593 ms
Loss rate: 70.44%

Run 2: Report of Vivace-latency — Data Link

Flow 1 ingress (mean 1.91 Mbit/s) --- Flow 1 egress (mean 0.57 Mbit/s)

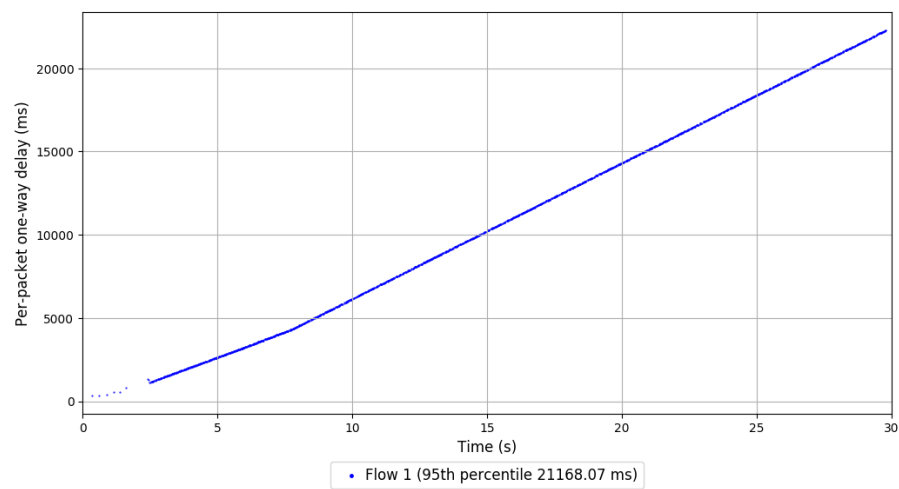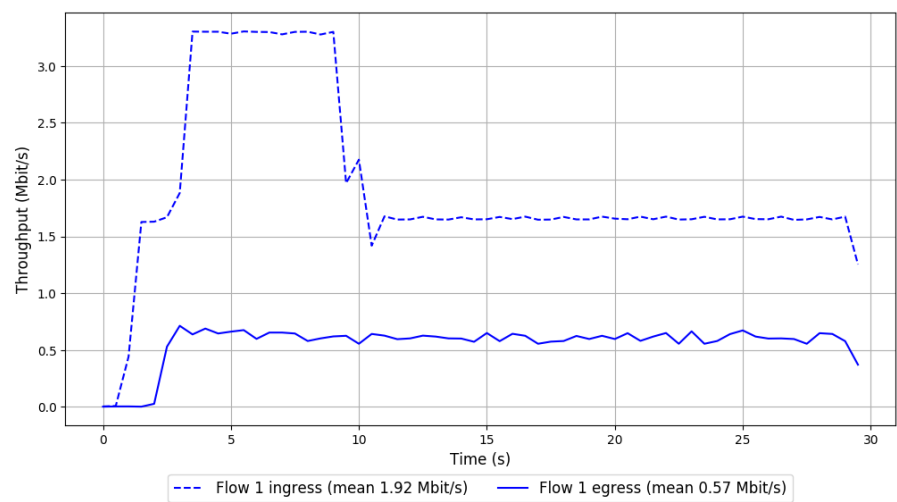• Flow 1 (95th percentile 21115.59 ms)

```
Run 3: Statistics of Vivace-latency

Start at: 2018-04-10 05:30:26
End at: 2018-04-10 05:30:56
Local clock offset: -19.422 ms
Remote clock offset: 9.448 ms


# Below is generated by plot.py at 2018-04-10 06:40:00
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21168.073 ms
Loss rate: 70.74%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21168.073 ms
Loss rate: 70.74%
```

Run 3: Report of Vivace-latency — Data Link

Flow 1 ingress (mean 1.92 Mbit/s)   Flow 1 egress (mean 0.57 Mbit/s)

• Flow 1 (95th percentile 21168.07 ms)

```
Run 1: Statistics of Vivace-loss

Start at: 2018-04-10 04:36:21
End at: 2018-04-10 04:36:51
Local clock offset: -9.243 ms
Remote clock offset: 8.25 ms


# Below is generated by plot.py at 2018-04-10 06:40:03
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21145.552 ms
Loss rate: 89.27%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21145.552 ms
Loss rate: 89.27%
```
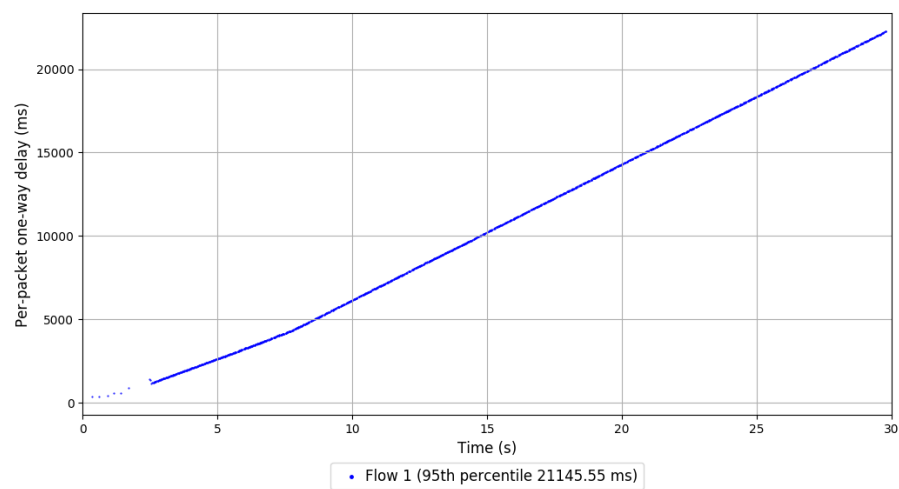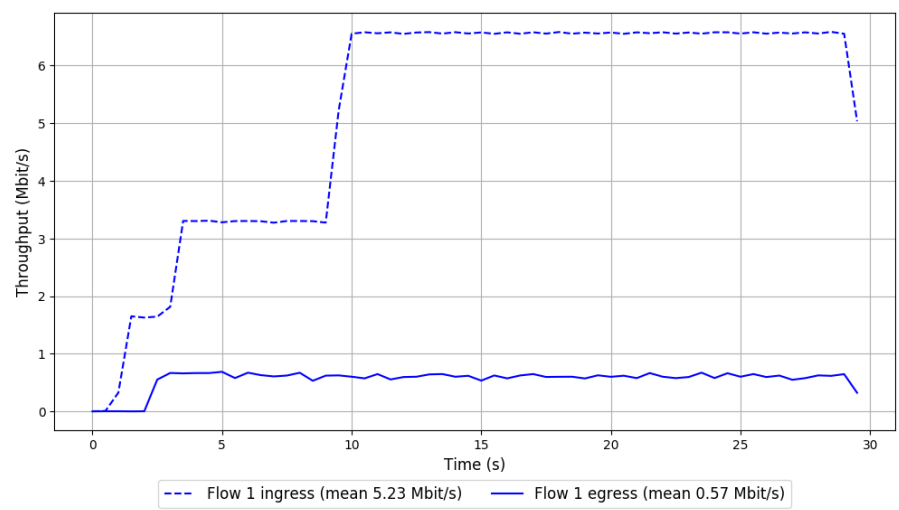
Run 1: Report of Vivace-loss — Data Link

Flow 1 ingress (mean 5.23 Mbit/s)   Flow 1 egress (mean 0.57 Mbit/s)

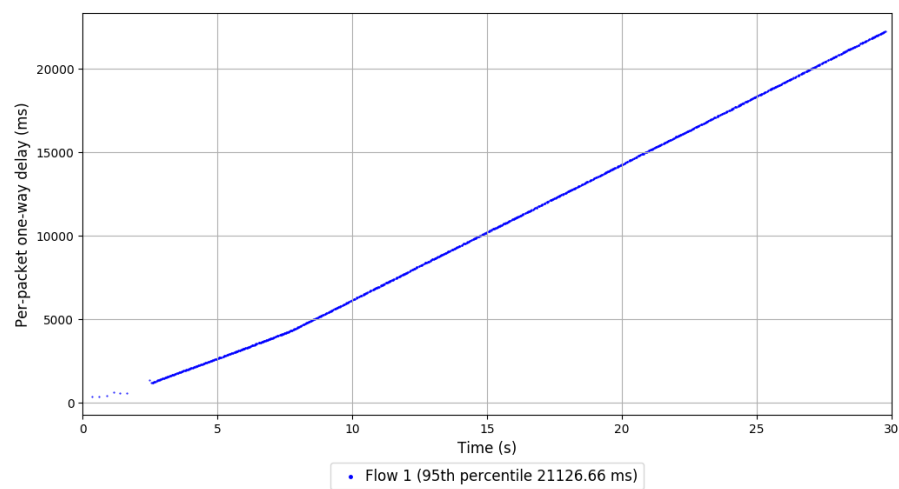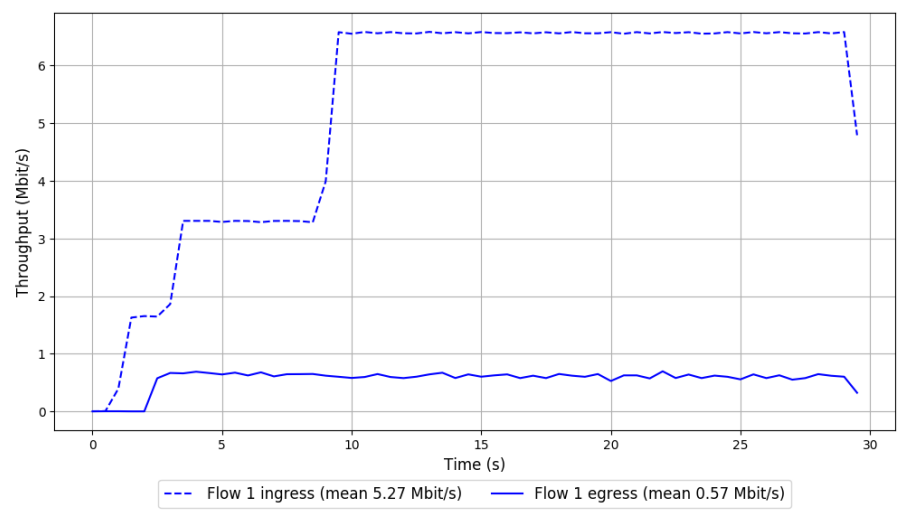
Flow 1 (95th percentile 21145.55 ms)

```
Run 2: Statistics of Vivace-loss

Start at: 2018-04-10 04:57:31
End at: 2018-04-10 04:58:01
Local clock offset: -14.818 ms
Remote clock offset: 8.713 ms


# Below is generated by plot.py at 2018-04-10 06:40:04
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21126.662 ms
Loss rate: 89.27%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21126.662 ms
Loss rate: 89.27%
```

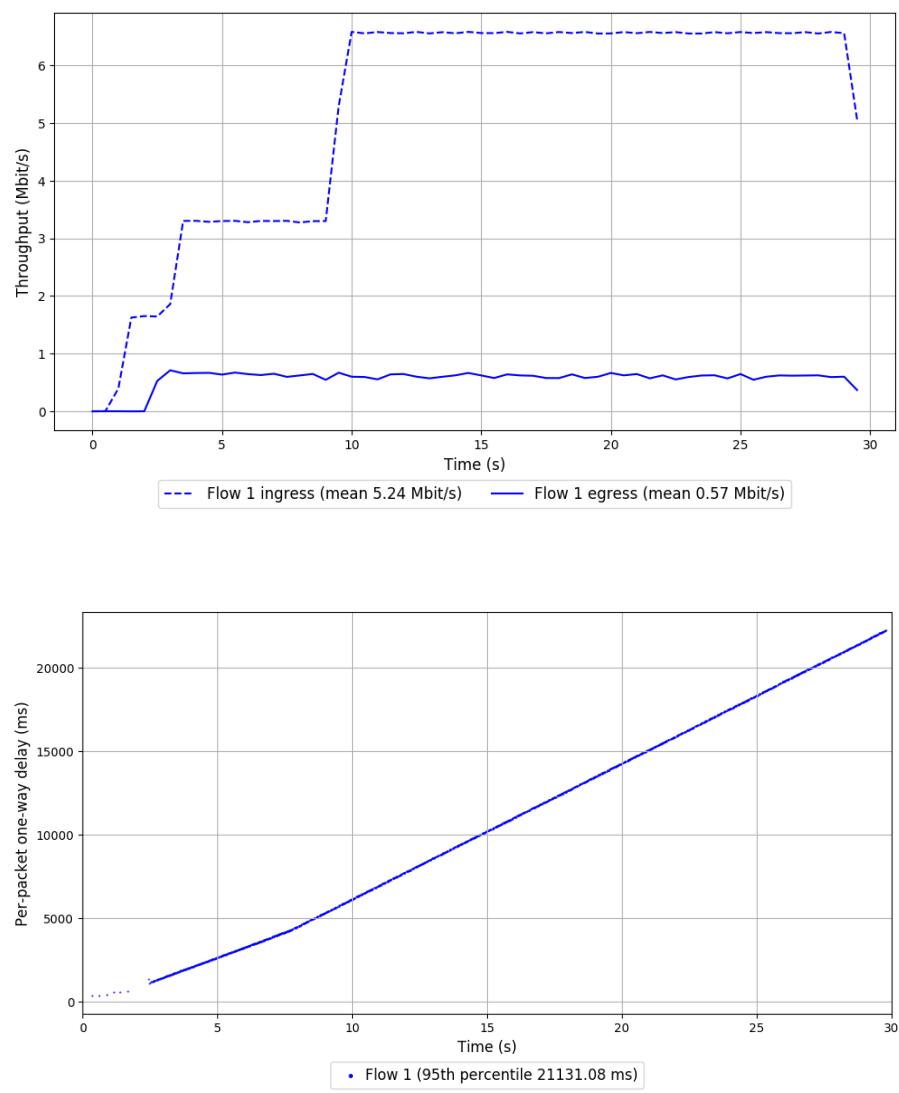Run 2: Report of Vivace-loss — Data Link

```
Run 3: Statistics of Vivace-loss

Start at: 2018-04-10 05:18:42
End at: 2018-04-10 05:19:12
Local clock offset: -15.729 ms
Remote clock offset: 4.761 ms


# Below is generated by plot.py at 2018-04-10 06:40:04
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21131.079 ms
Loss rate: 89.21%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21131.079 ms
Loss rate: 89.21%
```

Run 3: Report of Vivace-loss — Data Link

Flow 1 ingress (mean 5.24 Mbit/s)   Flow 1 egress (mean 0.57 Mbit/s)

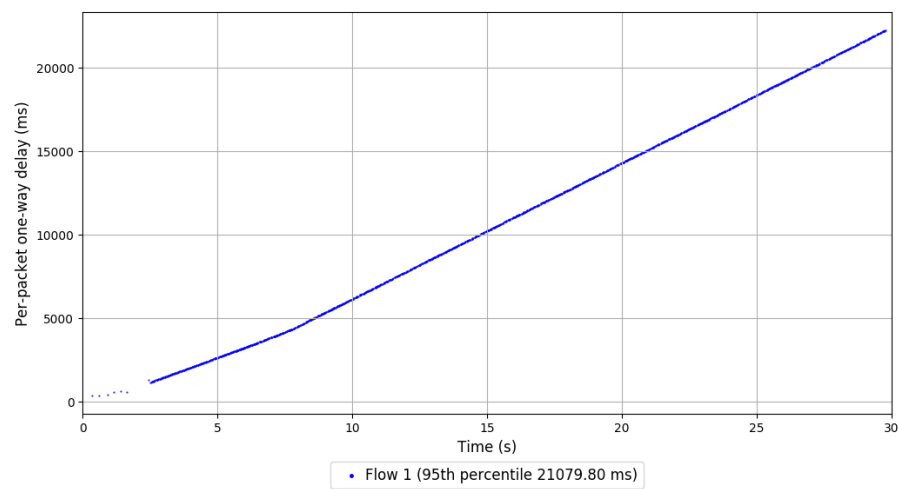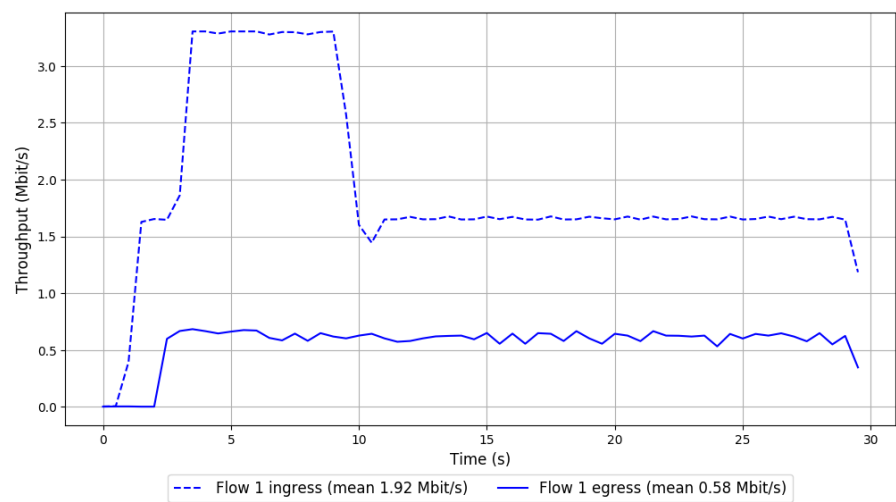
Flow 1 (95th percentile 21131.08 ms)

```
Run 1: Statistics of Vivace-LTE

Start at: 2018-04-10 04:42:13
End at: 2018-04-10 04:42:43
Local clock offset: -10.356 ms
Remote clock offset: 3.556 ms


# Below is generated by plot.py at 2018-04-10 06:40:04
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 21079.804 ms
Loss rate: 70.55%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 21079.804 ms
Loss rate: 70.55%
```

Run 1: Report of Vivace-LTE — Data Link

Flow 1 ingress (mean 1.92 Mbit/s) --- Flow 1 egress (mean 0.58 Mbit/s)

• Flow 1 (95th percentile 21079.80 ms)

```
Run 2: Statistics of Vivace-LTE

Start at: 2018-04-10 05:03:23
End at: 2018-04-10 05:03:53
Local clock offset: -18.52 ms
Remote clock offset: 7.849 ms


# Below is generated by plot.py at 2018-04-10 06:40:04
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21124.917 ms
Loss rate: 70.63%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21124.917 ms
Loss rate: 70.63%
```
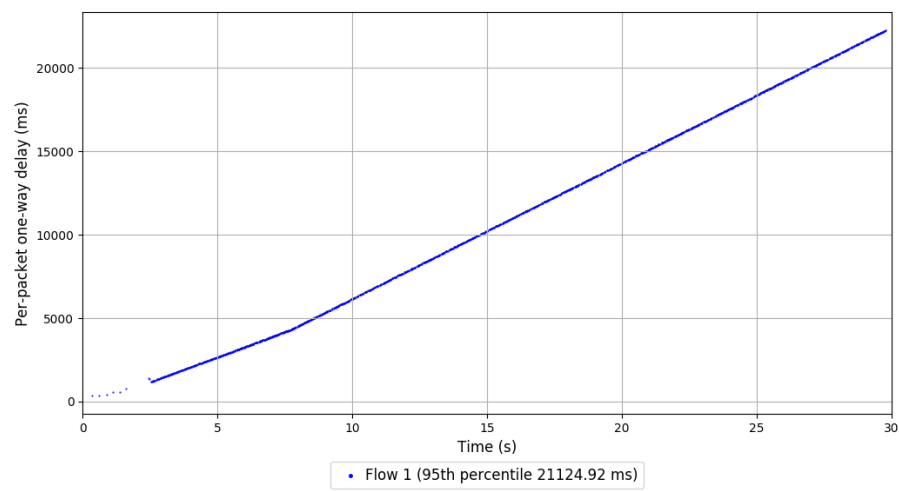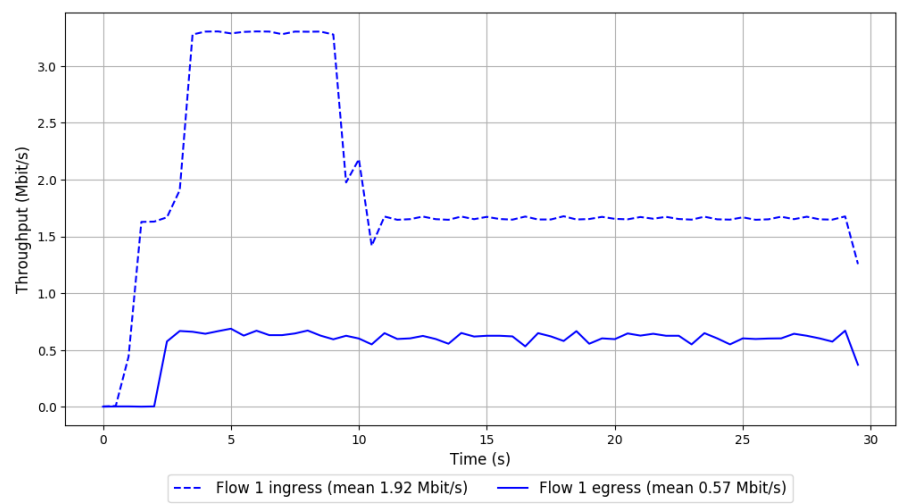
Run 2: Report of Vivace-LTE — Data Link

```
Run 3: Statistics of Vivace-LTE

Start at: 2018-04-10 05:24:34
End at: 2018-04-10 05:25:04
Local clock offset: -18.427 ms
Remote clock offset: 5.154 ms


# Below is generated by plot.py at 2018-04-10 06:40:04
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21163.083 ms
Loss rate: 70.34%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21163.083 ms
Loss rate: 70.34%
```

Run 3: Report of Vivace-LTE — Data Link