Pantheon Report

Generated at 2017-09-22 09:25:57 (UTC).

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

Repeated the test of 13 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

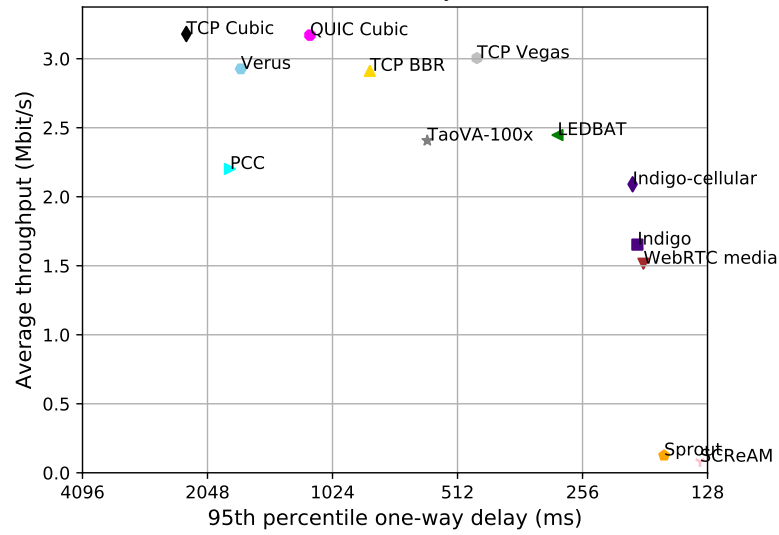Increased UDP receive buffer to 16 MB (default) and 32 MB (max).

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

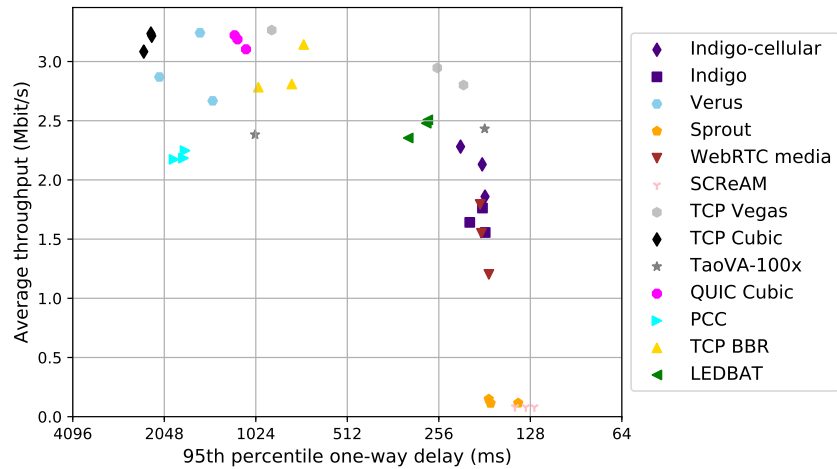NTP offsets were measured against `gps.ntp.br` and have been applied to correct the timestamps in logs.

```
Git summary:
branch: indigos @ 46c7c812d4acb71eea4f5fb0b03b3657cea3062f
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
 M datagrump/sender.cc
third_party/genericCC @ f7ca42f251bf49b432bb71de6d13fa903515c366
third_party/indigo @ b19f3730105f9aa95452552af924e3719b03cc55
third_party/indigo-cellular @ aee99e8eb842cb053f8c9a80e28cd256a930bbc2
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/indigo-no-cwnd @ 3e58442c04028a11d7b02456e137604633ba2d6c
third_party/indigo-no-delivery-rate @ 57caa40858b964906edff4876d5a7e5bfff666c5
third_party/indigo-no-queuing-delay @ 03455460fd1a8ffbdad86fabb936fdca204b80db
third_party/indigo-no-send-rate @ b39dfa6b2c5f19cb7cd89626cb4f5bb81f9fecda
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 Brazil 2 Ethernet to Colombia ppp0, 3 runs of 30s each per scheme
(mean of all runs by scheme)

test from AWS Brazil 2 Ethernet to Colombia 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	2.91	832.42	1.37
TCP Cubic	3	3.18	2303.42	9.42
LEDBAT	3	2.45	294.19	0.75
PCC	3	2.20	1807.88	41.32
QUIC Cubic	3	3.17	1160.37	4.13
SCReAM	3	0.08	133.47	0.09
WebRTC media	3	1.51	182.63	0.34
Sprout	3	0.13	162.87	0.12
TaoVA-100x	2	2.41	605.49	0.24
TCP Vegas	3	3.01	459.70	0.99
Verus	3	2.93	1702.53	4.04
Indigo	3	1.65	188.88	0.07
Indigo-cellular	3	2.09	193.94	0.12

```
Run 1: Statistics of TCP BBR

Start at: 2017-09-22 08:39:29
End at: 2017-09-22 08:39:59
Local clock offset: 0.097 ms
Remote clock offset: -7.035 ms

# Below is generated by plot.py at 2017-09-22 09:25:28
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.14 Mbit/s
95th percentile per-packet one-way delay: 712.508 ms
Loss rate: 1.33%
-- Flow 1:
Average throughput: 3.14 Mbit/s
95th percentile per-packet one-way delay: 712.508 ms
Loss rate: 1.33%
```
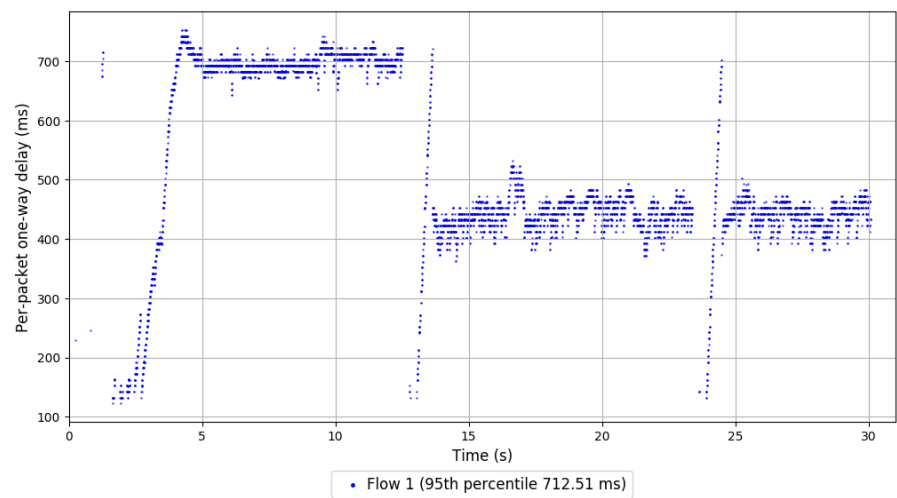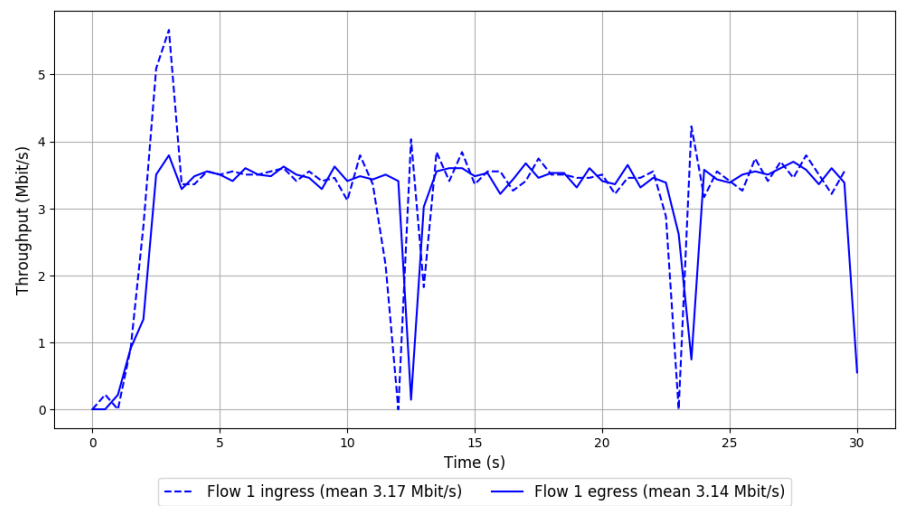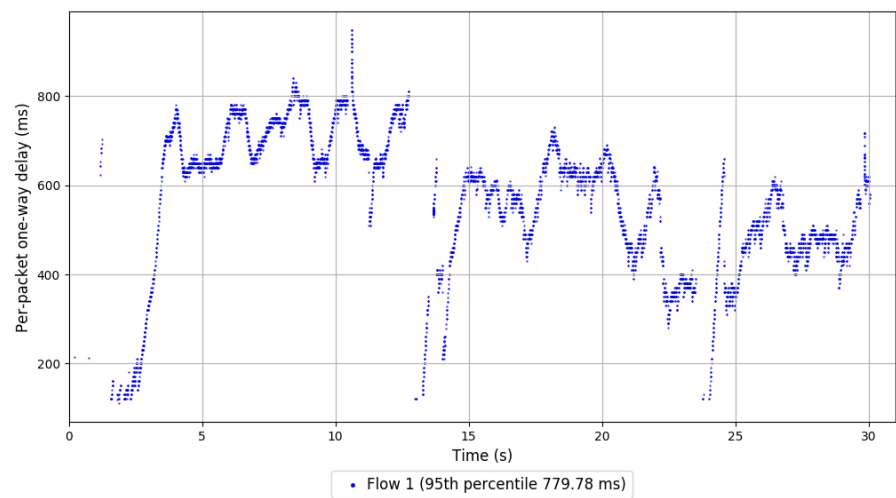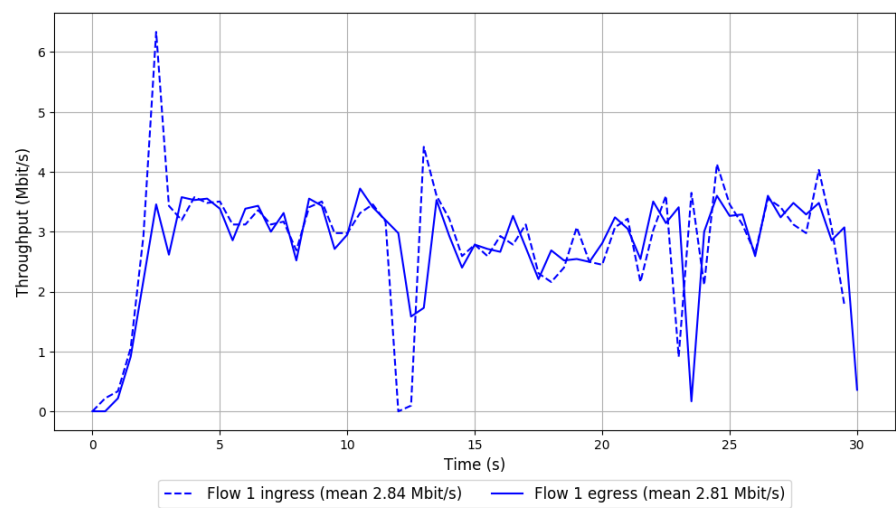
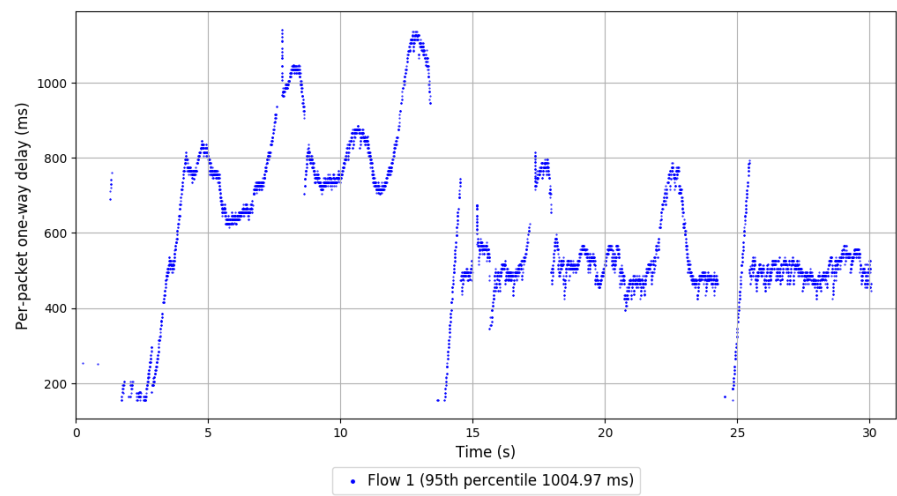Run 1: Report of TCP BBR — Data Link

```
Run 2: Statistics of TCP BBR

Start at: 2017-09-22 08:54:45
End at: 2017-09-22 08:55:15
Local clock offset: 0.151 ms
Remote clock offset: -2.484 ms


# Below is generated by plot.py at 2017-09-22 09:25:28
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.81 Mbit/s
95th percentile per-packet one-way delay: 779.780 ms
Loss rate: 1.08%
-- Flow 1:
Average throughput: 2.81 Mbit/s
95th percentile per-packet one-way delay: 779.780 ms
Loss rate: 1.08%
```

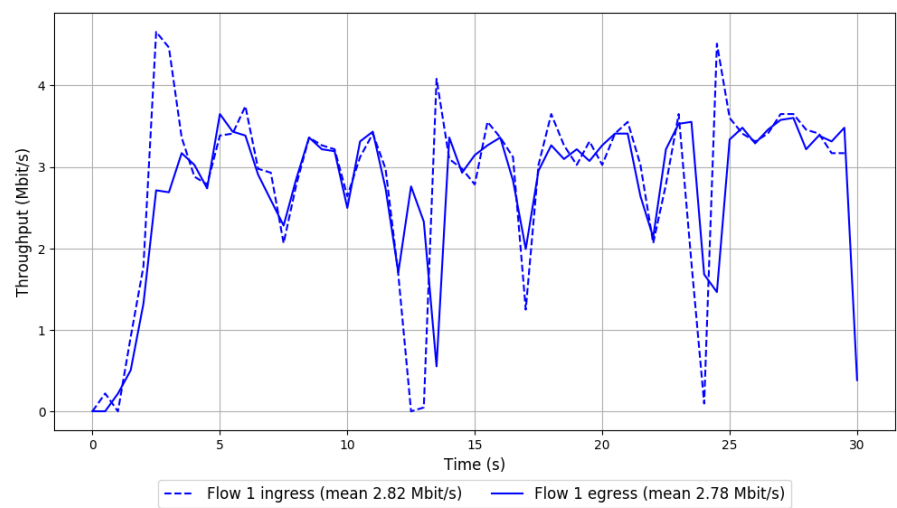Run 2: Report of TCP BBR — Data Link

```
Run 3: Statistics of TCP BBR

Start at: 2017-09-22 09:10:01
End at: 2017-09-22 09:10:31
Local clock offset: 0.167 ms
Remote clock offset: -2.797 ms


# Below is generated by plot.py at 2017-09-22 09:25:28
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.78 Mbit/s
95th percentile per-packet one-way delay: 1004.974 ms
Loss rate: 1.69%
-- Flow 1:
Average throughput: 2.78 Mbit/s
95th percentile per-packet one-way delay: 1004.974 ms
Loss rate: 1.69%
```

Run 3: Report of TCP BBR — Data Link

```
Run 1: Statistics of TCP Cubic

Start at: 2017-09-22 08:52:24
End at: 2017-09-22 08:52:54
Local clock offset: 0.069 ms
Remote clock offset: -7.417 ms


# Below is generated by plot.py at 2017-09-22 09:25:28
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.08 Mbit/s
95th percentile per-packet one-way delay: 2392.386 ms
Loss rate: 9.52%
-- Flow 1:
Average throughput: 3.08 Mbit/s
95th percentile per-packet one-way delay: 2392.386 ms
Loss rate: 9.52%
```
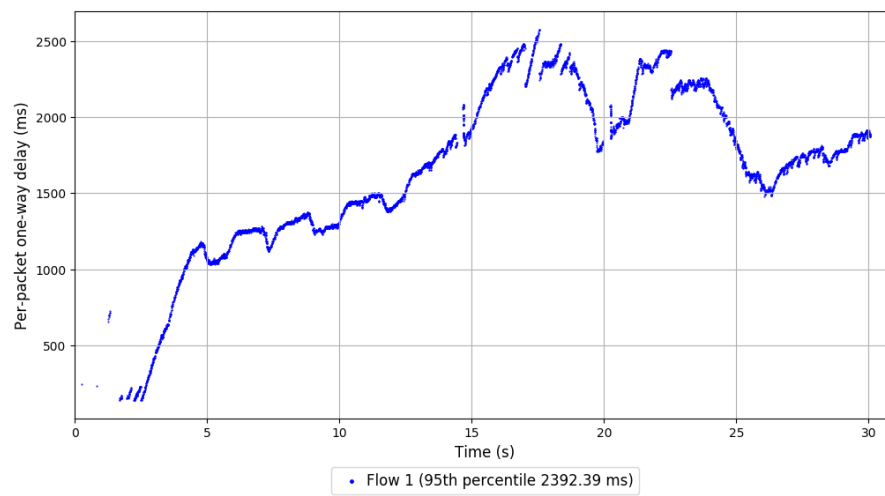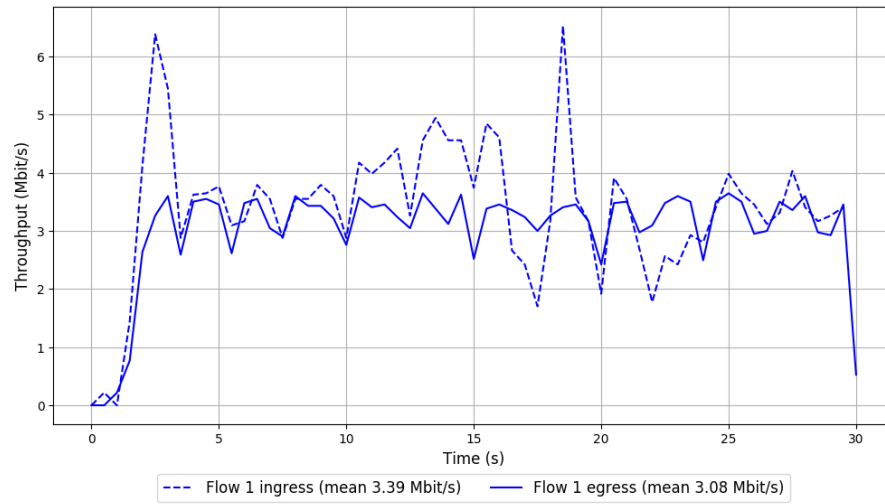
Run 1: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 3.39 Mbit/s) --- Flow 1 egress (mean 3.08 Mbit/s) ——
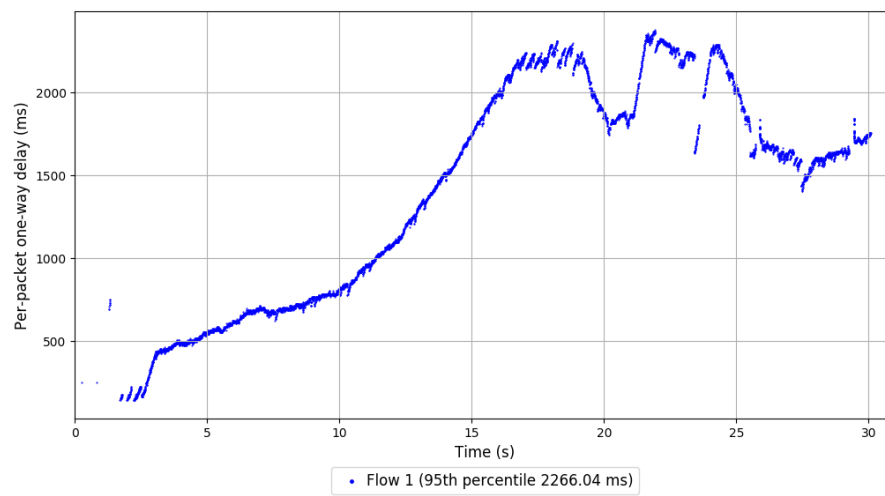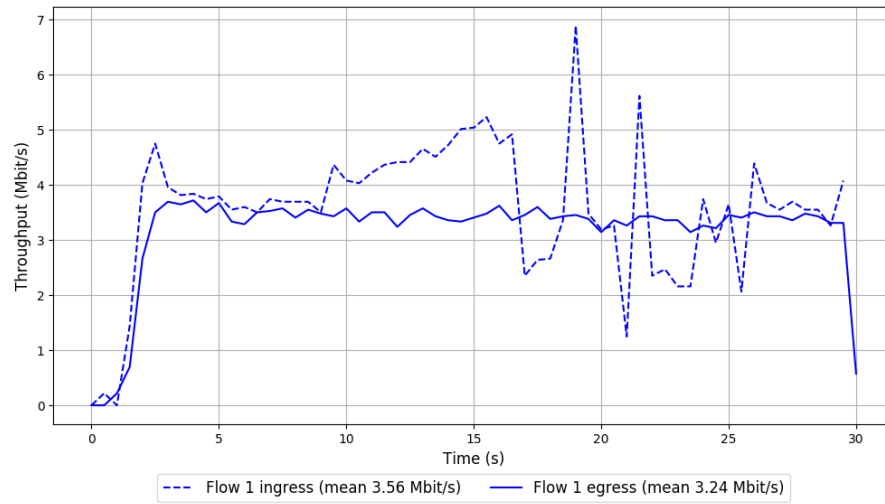

Flow 1 (95th percentile 2392.39 ms)

```
Run 2: Statistics of TCP Cubic

Start at: 2017-09-22 09:07:40
End at: 2017-09-22 09:08:10
Local clock offset: 0.084 ms
Remote clock offset: -2.825 ms


# Below is generated by plot.py at 2017-09-22 09:25:29
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.24 Mbit/s
95th percentile per-packet one-way delay: 2266.036 ms
Loss rate: 9.54%
-- Flow 1:
Average throughput: 3.24 Mbit/s
95th percentile per-packet one-way delay: 2266.036 ms
Loss rate: 9.54%
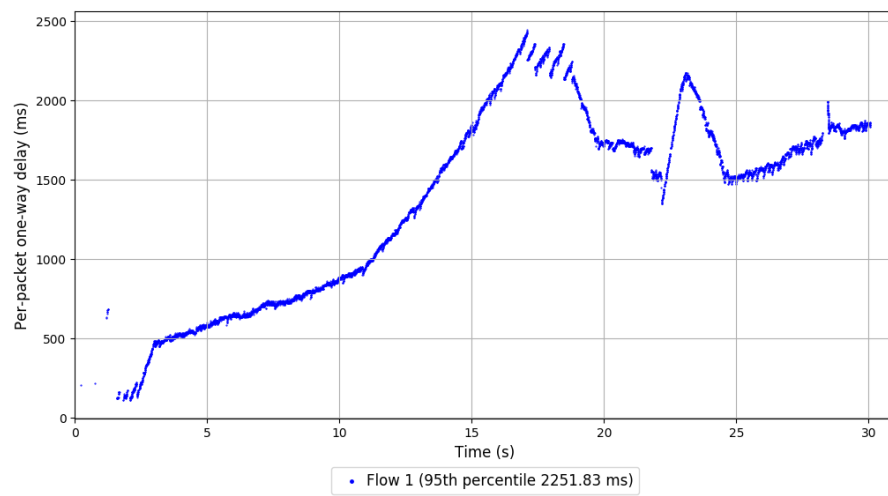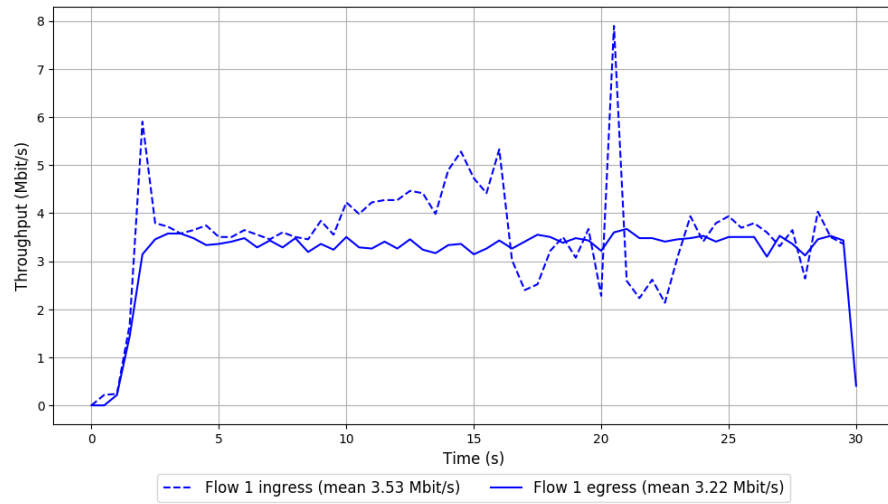```

Run 2: Report of TCP Cubic — Data Link

```
Run 3: Statistics of TCP Cubic

Start at: 2017-09-22 09:22:56
End at: 2017-09-22 09:23:26
Local clock offset: 0.182 ms
Remote clock offset: -7.947 ms

Below is generated by plot.py at 2017-09-22 09:25:29
Datalink statistics
-- Total of 1 flow:
Average throughput: 3.22 Mbit/s
95th percentile per-packet one-way delay: 2251.833 ms
Loss rate: 9.20%
-- Flow 1:
Average throughput: 3.22 Mbit/s
95th percentile per-packet one-way delay: 2251.833 ms
Loss rate: 9.20%
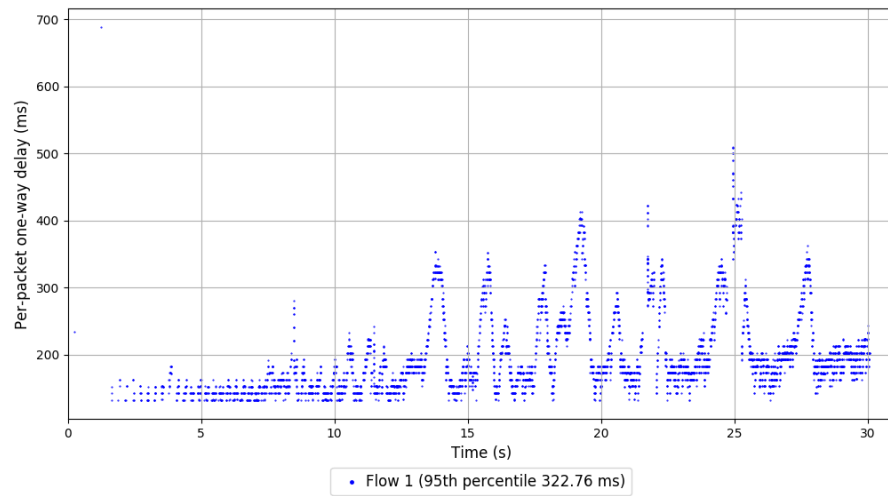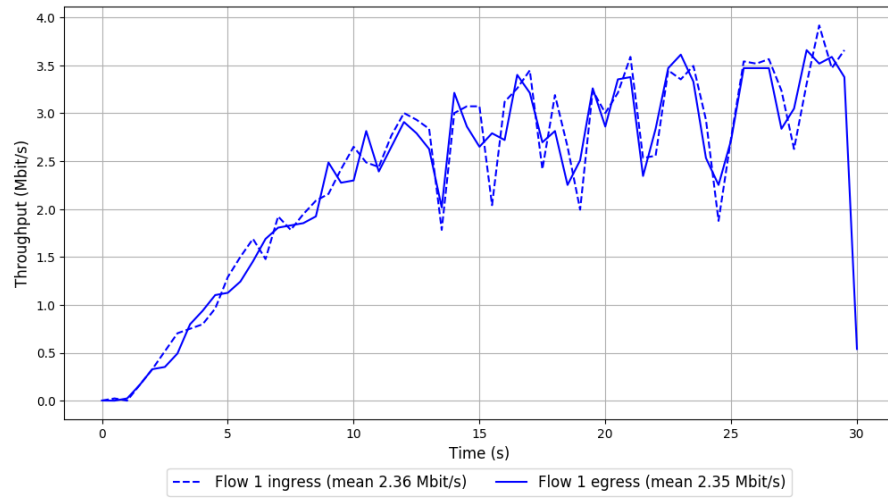```

Run 3: Report of TCP Cubic — Data Link

```
Run 1: Statistics of LEDBAT

Start at: 2017-09-22 08:50:03
End at: 2017-09-22 08:50:33
Local clock offset: 0.059 ms
Remote clock offset: -2.402 ms


# Below is generated by plot.py at 2017-09-22 09:25:29
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.35 Mbit/s
95th percentile per-packet one-way delay: 322.761 ms
Loss rate: 0.75%
-- Flow 1:
Average throughput: 2.35 Mbit/s
95th percentile per-packet one-way delay: 322.761 ms
Loss rate: 0.75%
```

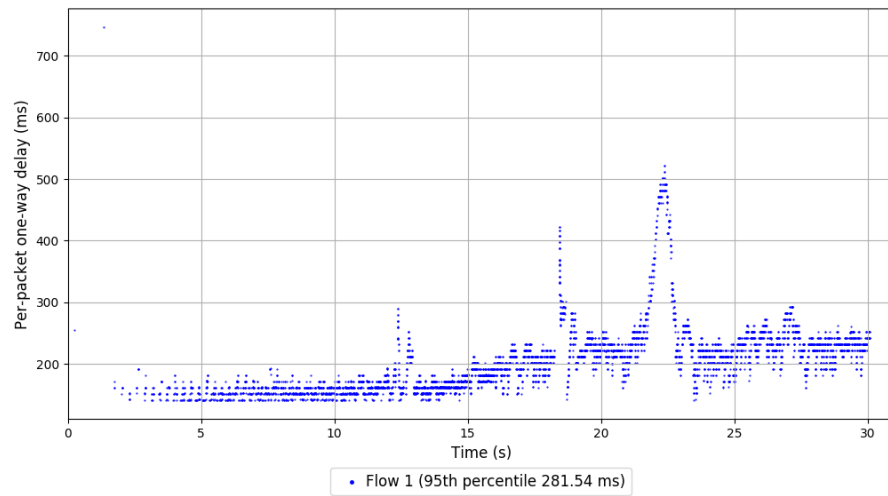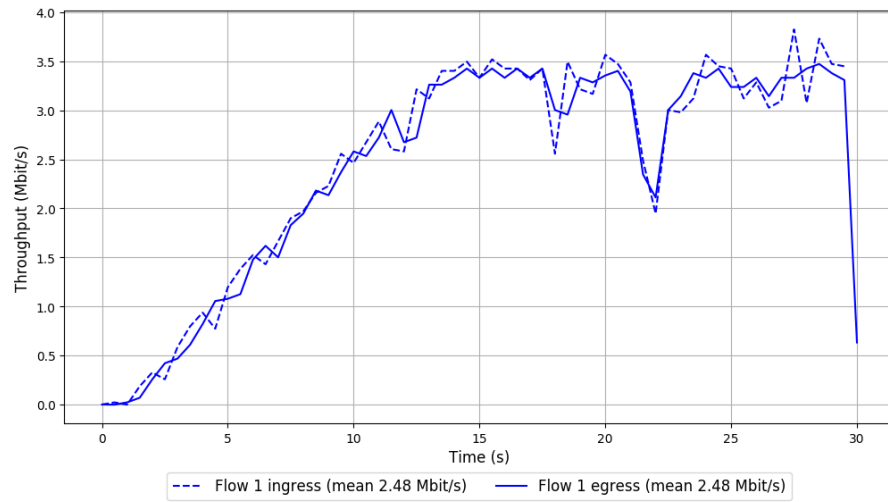Run 1: Report of LEDBAT — Data Link

Flow 1 ingress (mean 2.36 Mbit/s)   Flow 1 egress (mean 2.35 Mbit/s)

Flow 1 (95th percentile 322.76 ms)

```
Run 2: Statistics of LEDBAT

Start at: 2017-09-22 09:05:19
End at: 2017-09-22 09:05:49
Local clock offset: 0.146 ms
Remote clock offset: -2.653 ms

# Below is generated by plot.py at 2017-09-22 09:25:29
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.48 Mbit/s
95th percentile per-packet one-way delay: 281.540 ms
Loss rate: 0.76%
-- Flow 1:
Average throughput: 2.48 Mbit/s
95th percentile per-packet one-way delay: 281.540 ms
Loss rate: 0.76%
```

Run 2: Report of LEDBAT — Data Link

Flow 1 ingress (mean 2.48 Mbit/s)   Flow 1 egress (mean 2.48 Mbit/s)

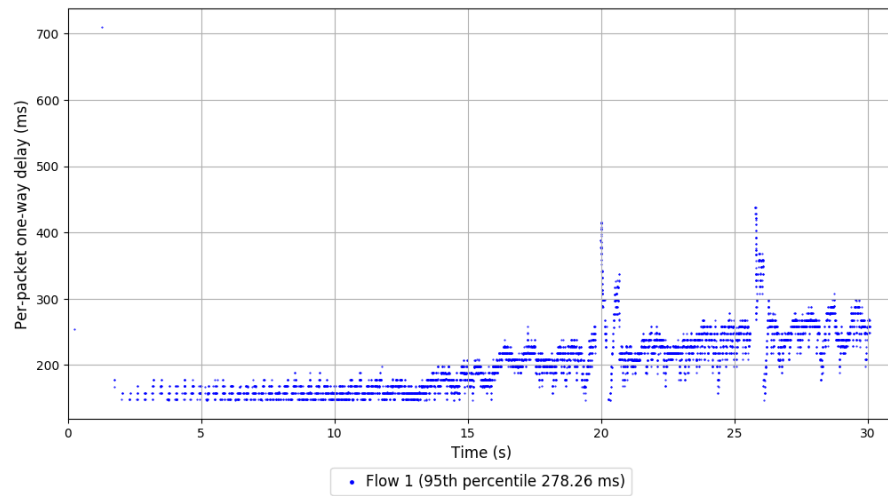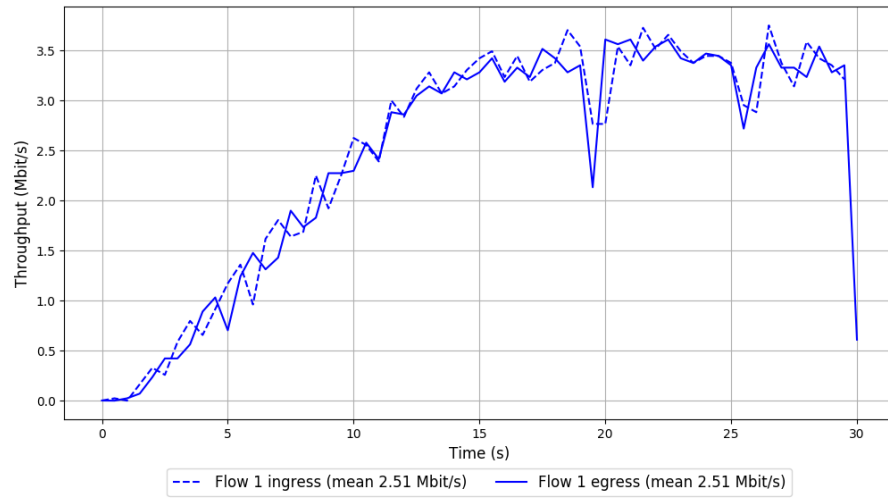Flow 1 (95th percentile 281.54 ms)

19

```
Run 3: Statistics of LEDBAT

Start at: 2017-09-22 09:20:35
End at: 2017-09-22 09:21:05
Local clock offset: 0.182 ms
Remote clock offset: -2.889 ms


# Below is generated by plot.py at 2017-09-22 09:25:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.51 Mbit/s
95th percentile per-packet one-way delay: 278.257 ms
Loss rate: 0.73%
-- Flow 1:
Average throughput: 2.51 Mbit/s
95th percentile per-packet one-way delay: 278.257 ms
Loss rate: 0.73%
```

Run 3: Report of LEDBAT — Data Link

Flow 1 ingress (mean 2.51 Mbit/s) --- Flow 1 egress (mean 2.51 Mbit/s)

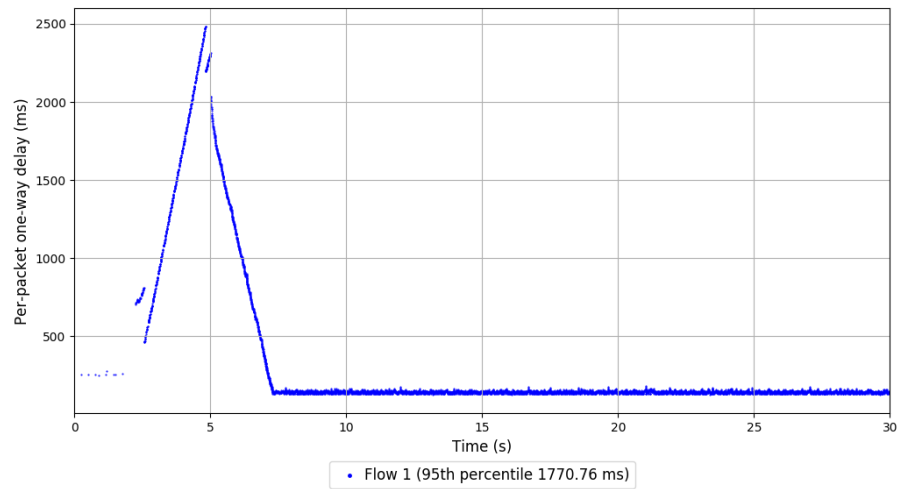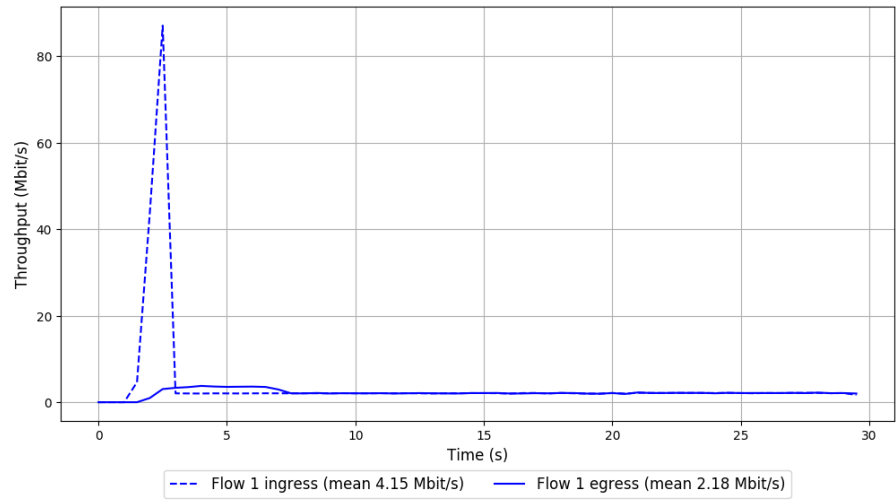Flow 1 (95th percentile 278.26 ms)

```
Run 1: Statistics of PCC

Start at: 2017-09-22 08:40:40
End at: 2017-09-22 08:41:10
Local clock offset: 0.092 ms
Remote clock offset: -7.239 ms


# Below is generated by plot.py at 2017-09-22 09:25:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.18 Mbit/s
95th percentile per-packet one-way delay: 1770.757 ms
Loss rate: 47.66%
-- Flow 1:
Average throughput: 2.18 Mbit/s
95th percentile per-packet one-way delay: 1770.757 ms
Loss rate: 47.66%
```

Run 1: Report of PCC — Data Link

Flow 1 ingress (mean 4.15 Mbit/s)   Flow 1 egress (mean 2.18 Mbit/s)

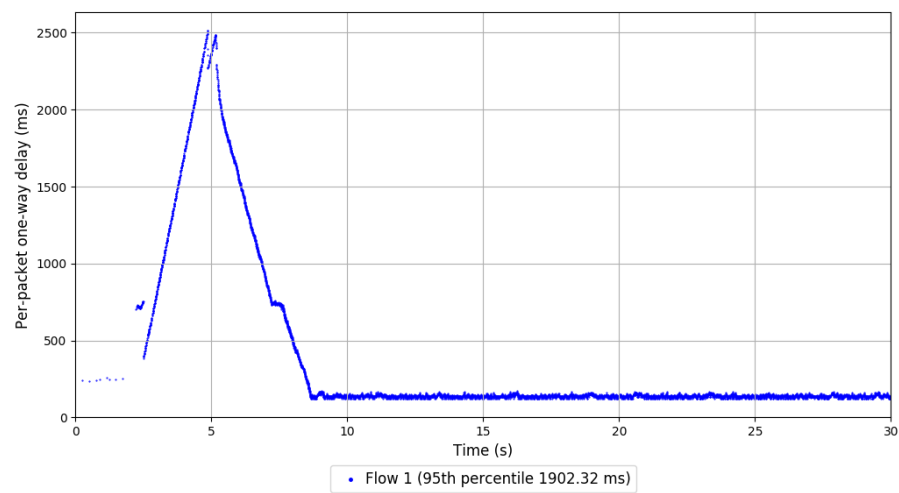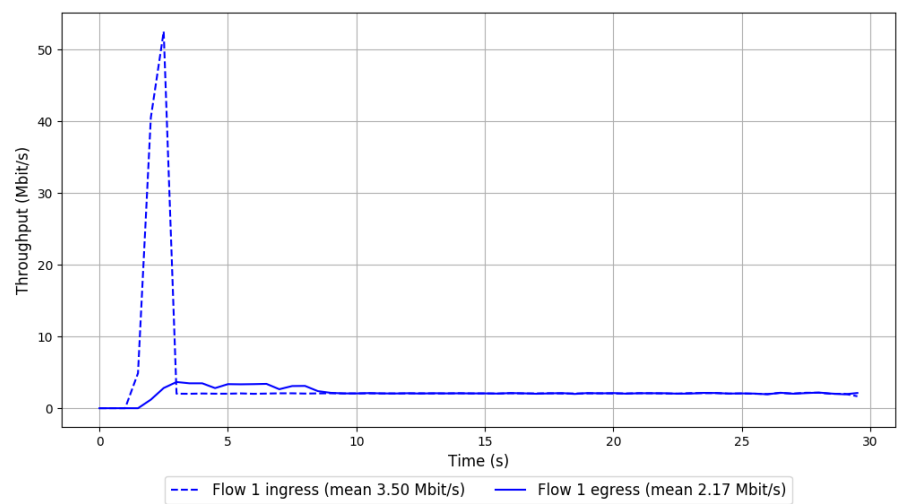• Flow 1 (95th percentile 1770.76 ms)

```
Run 2: Statistics of PCC

Start at: 2017-09-22 08:55:56
End at: 2017-09-22 08:56:26
Local clock offset: 0.164 ms
Remote clock offset: -2.633 ms


# Below is generated by plot.py at 2017-09-22 09:25:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 1902.322 ms
Loss rate: 38.20%
-- Flow 1:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 1902.322 ms
Loss rate: 38.20%
```

Run 2: Report of PCC — Data Link

Flow 1 ingress (mean 3.50 Mbit/s)   Flow 1 egress (mean 2.17 Mbit/s)

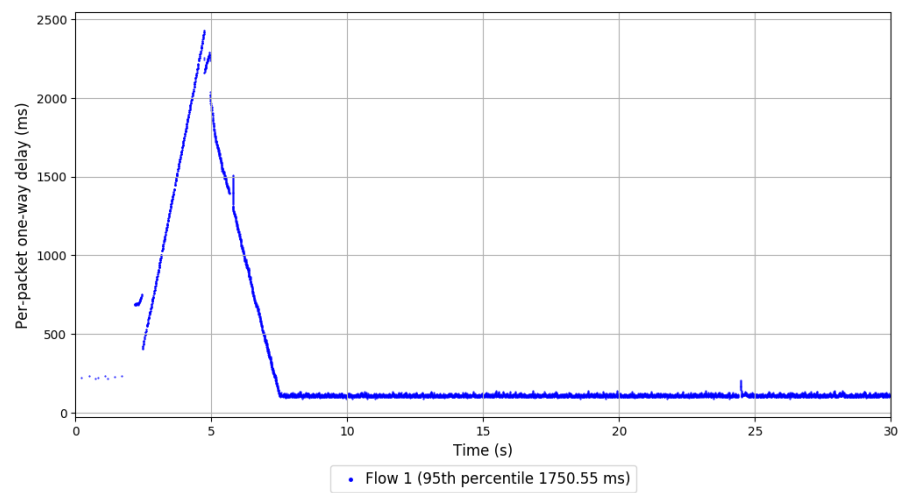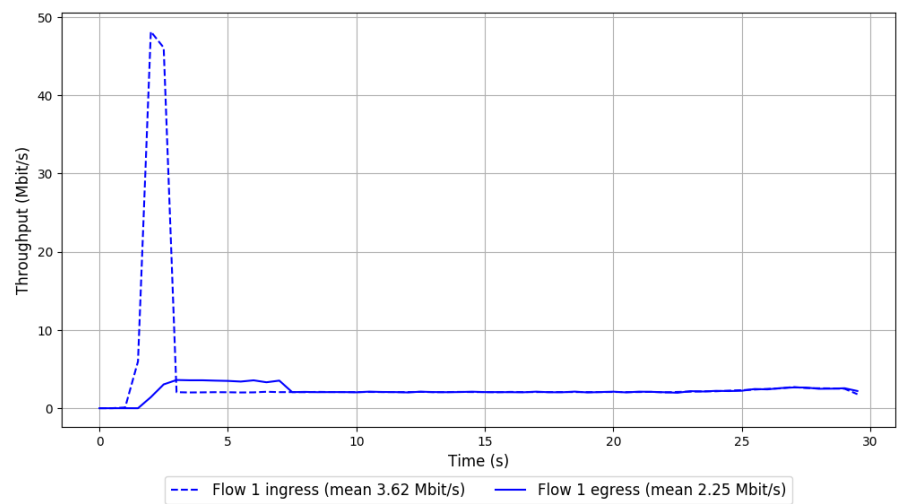Flow 1 (95th percentile 1902.32 ms)

```
Run 3: Statistics of PCC

Start at: 2017-09-22 09:11:12
End at: 2017-09-22 09:11:42
Local clock offset: 0.157 ms
Remote clock offset: -7.678 ms


# Below is generated by plot.py at 2017-09-22 09:25:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.25 Mbit/s
95th percentile per-packet one-way delay: 1750.551 ms
Loss rate: 38.11%
-- Flow 1:
Average throughput: 2.25 Mbit/s
95th percentile per-packet one-way delay: 1750.551 ms
Loss rate: 38.11%
```
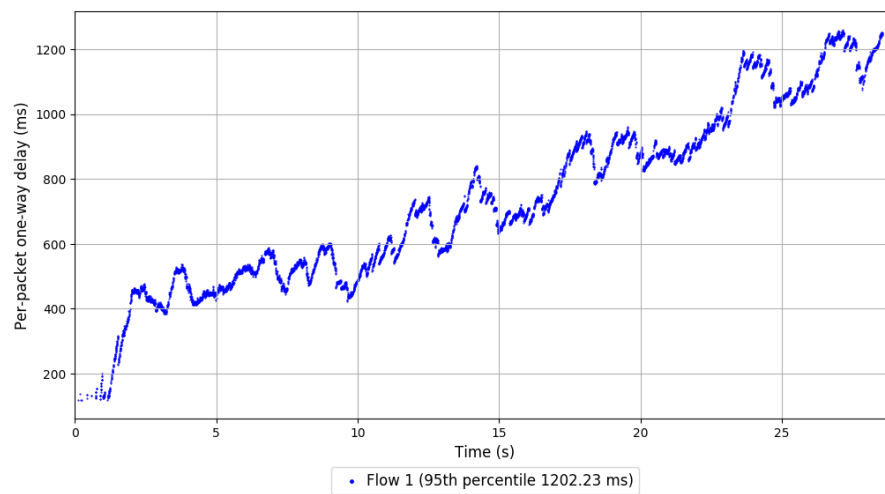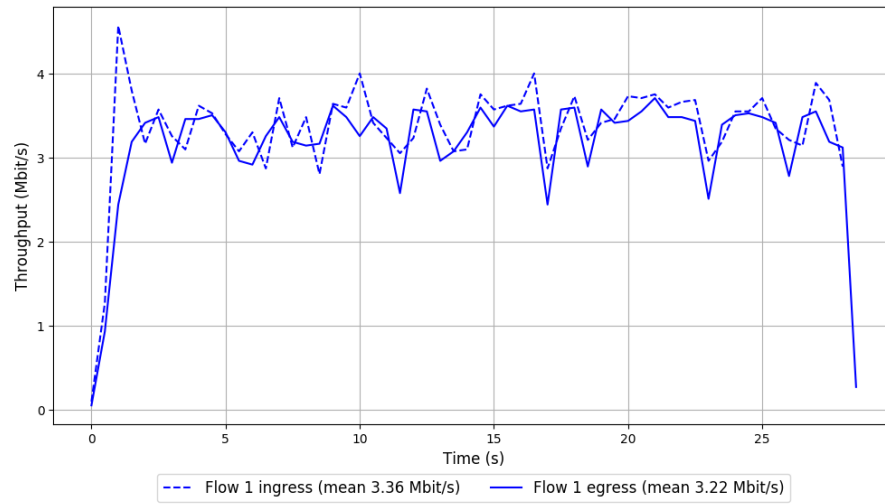
Run 3: Report of PCC — Data Link

Flow 1 ingress (mean 3.62 Mbit/s)   Flow 1 egress (mean 2.25 Mbit/s)

Flow 1 (95th percentile 1750.55 ms)

```
Run 1: Statistics of QUIC Cubic

Start at: 2017-09-22 08:44:11
End at: 2017-09-22 08:44:41
Local clock offset: 0.126 ms
Remote clock offset: -7.27 ms


# Below is generated by plot.py at 2017-09-22 09:25:37
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.22 Mbit/s
95th percentile per-packet one-way delay: 1202.235 ms
Loss rate: 4.20%
-- Flow 1:
Average throughput: 3.22 Mbit/s
95th percentile per-packet one-way delay: 1202.235 ms
Loss rate: 4.20%
```

Run 1: Report of QUIC Cubic — Data Link

```
Run 2: Statistics of QUIC Cubic

Start at: 2017-09-22 08:59:27
End at: 2017-09-22 08:59:57
Local clock offset: 0.153 ms
Remote clock offset: -7.486 ms


# Below is generated by plot.py at 2017-09-22 09:25:39
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.19 Mbit/s
95th percentile per-packet one-way delay: 1176.152 ms
Loss rate: 4.27%
-- Flow 1:
Average throughput: 3.19 Mbit/s
95th percentile per-packet one-way delay: 1176.152 ms
Loss rate: 4.27%
```
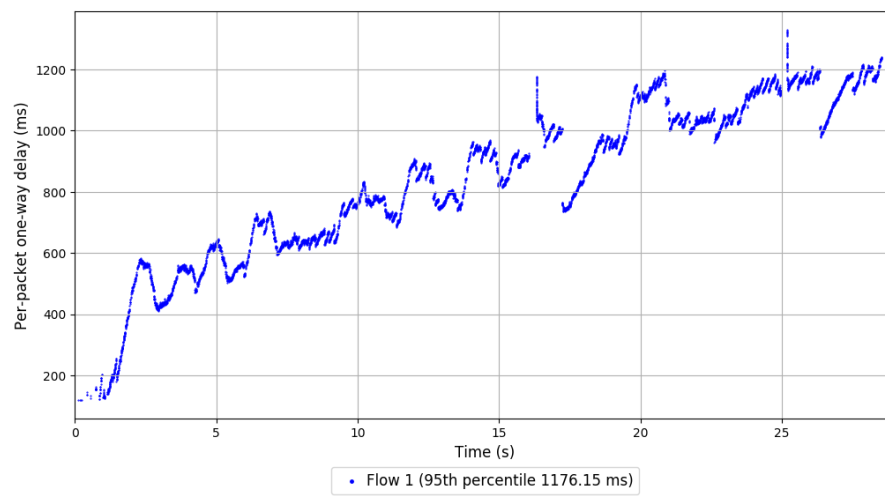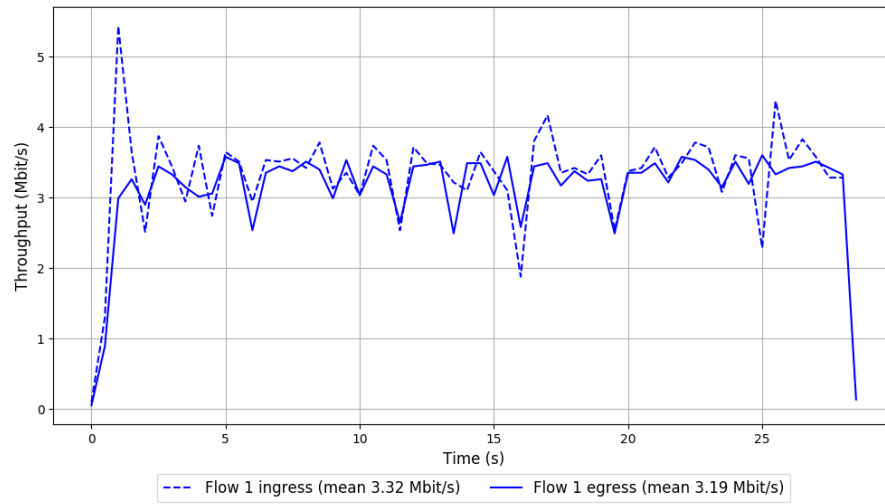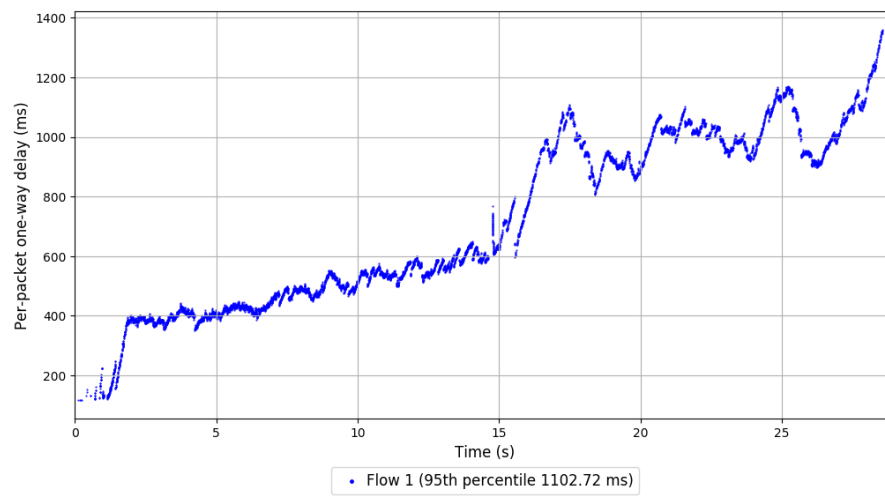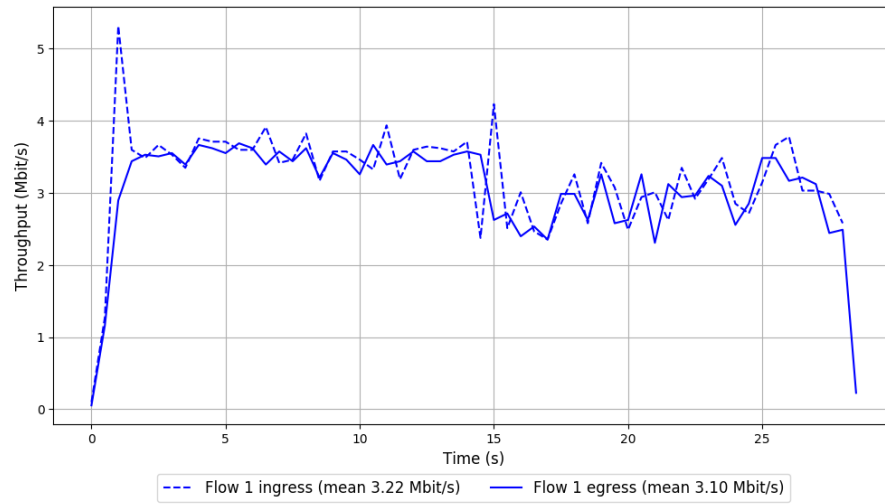
Run 2: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 3.32 Mbit/s) ——— Flow 1 egress (mean 3.19 Mbit/s)

• Flow 1 (95th percentile 1176.15 ms)

```
Run 3: Statistics of QUIC Cubic

Start at: 2017-09-22 09:14:43
End at: 2017-09-22 09:15:13
Local clock offset: 0.178 ms
Remote clock offset: -7.72 ms


# Below is generated by plot.py at 2017-09-22 09:25:39
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.10 Mbit/s
95th percentile per-packet one-way delay: 1102.723 ms
Loss rate: 3.91%
-- Flow 1:
Average throughput: 3.10 Mbit/s
95th percentile per-packet one-way delay: 1102.723 ms
Loss rate: 3.91%
```

Run 3: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 3.22 Mbit/s)   Flow 1 egress (mean 3.10 Mbit/s)

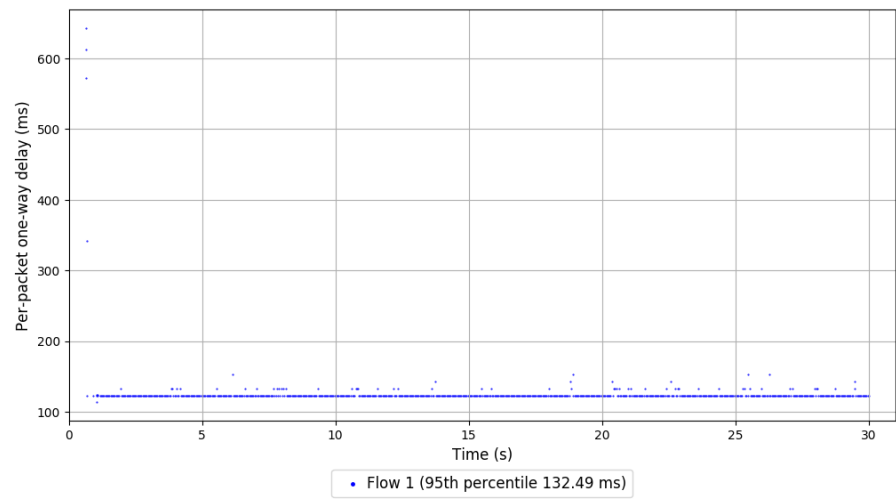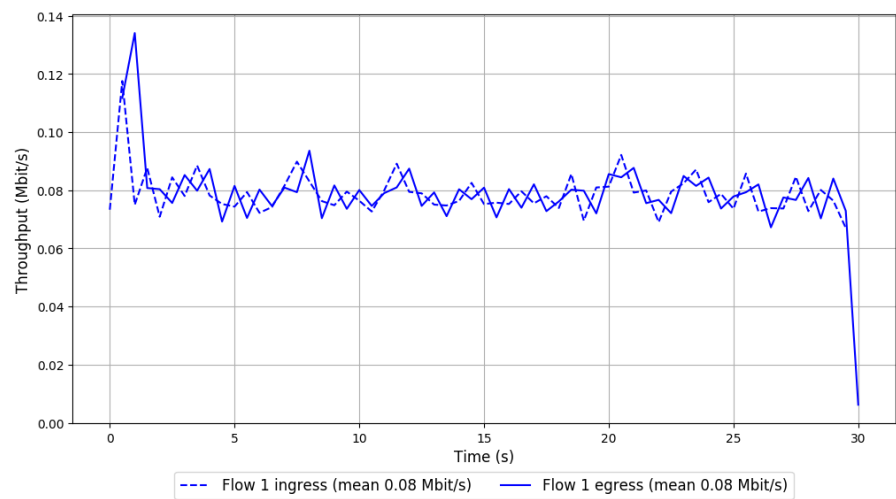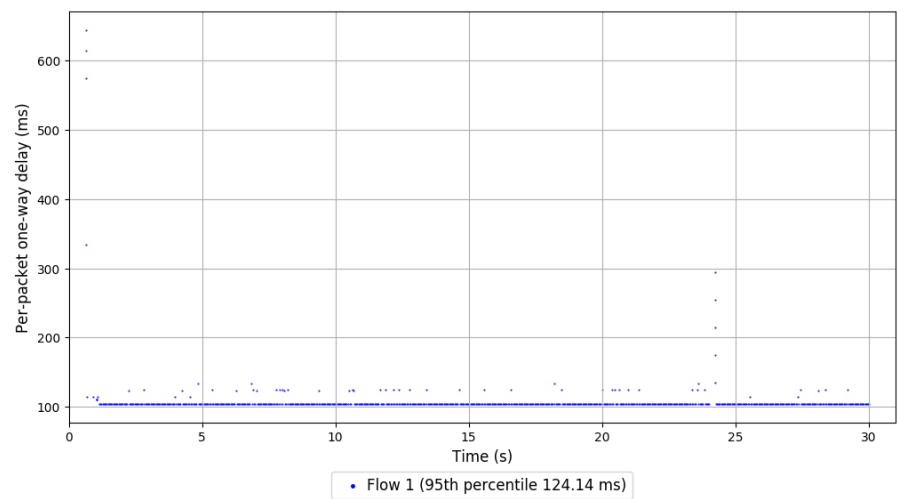• Flow 1 (95th percentile 1102.72 ms)

```
Run 1: Statistics of SCReAM

Start at: 2017-09-22 08:53:35
End at: 2017-09-22 08:54:05
Local clock offset: 0.153 ms
Remote clock offset: -2.472 ms


# Below is generated by plot.py at 2017-09-22 09:25:39
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 132.487 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 132.487 ms
Loss rate: 0.13%
```

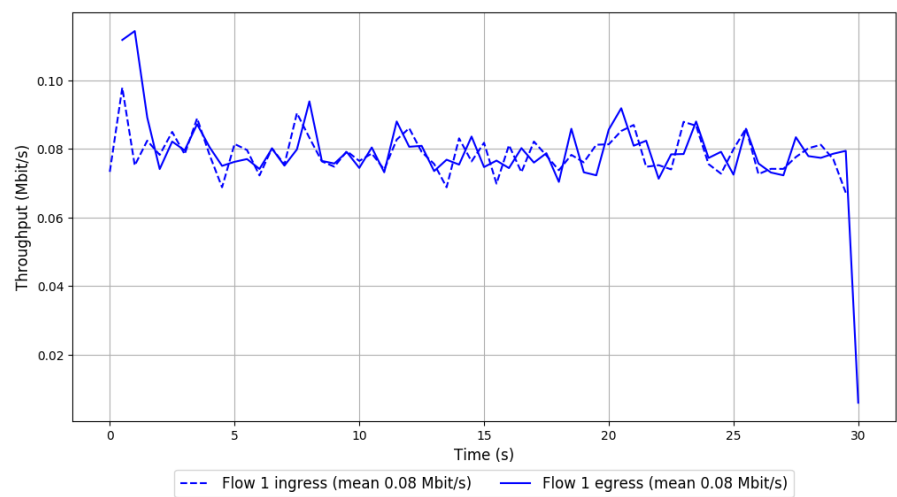Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2017-09-22 09:08:50
End at: 2017-09-22 09:09:20
Local clock offset: 0.091 ms
Remote clock offset: -2.687 ms


# Below is generated by plot.py at 2017-09-22 09:25:39
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 124.141 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 124.141 ms
Loss rate: 0.00%
```

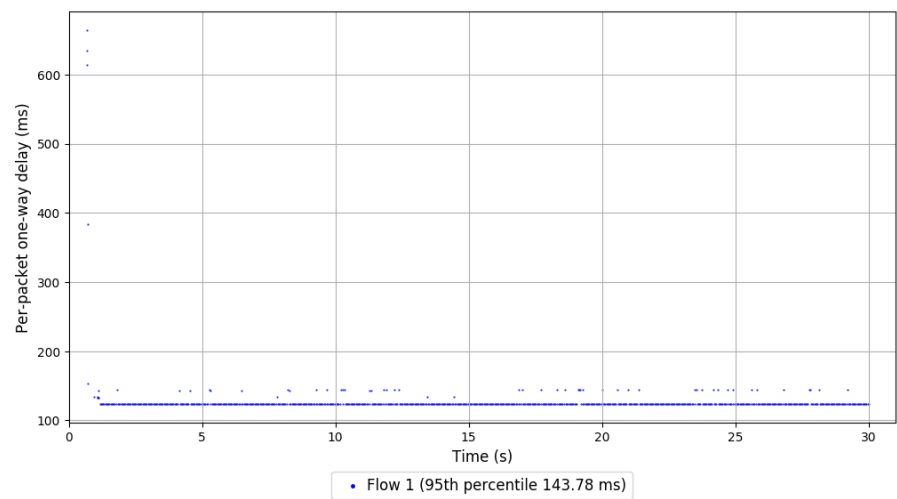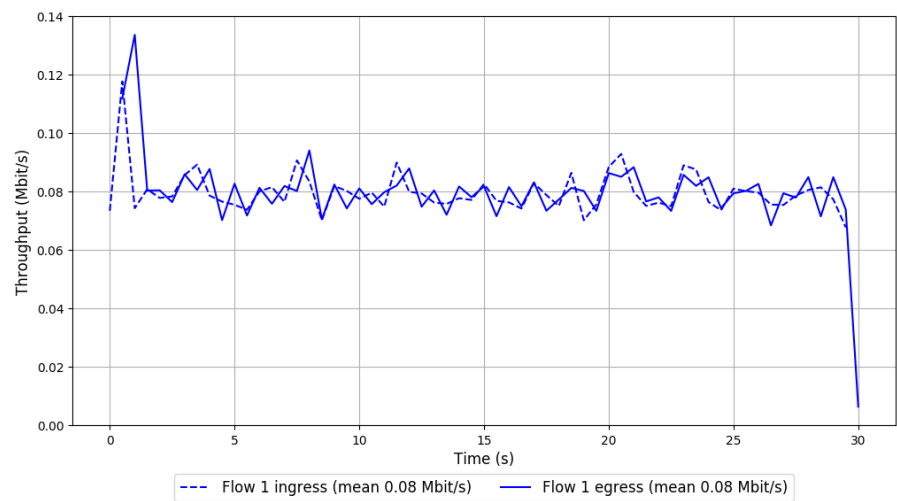Run 2: Report of SCReAM — Data Link

```
Run 3: Statistics of SCReAM

Start at: 2017-09-22 09:24:07
End at: 2017-09-22 09:24:37
Local clock offset: 0.158 ms
Remote clock offset: -2.879 ms


# Below is generated by plot.py at 2017-09-22 09:25:39
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 143.780 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 143.780 ms
Loss rate: 0.13%
```

Run 3: Report of SCReAM — Data Link

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

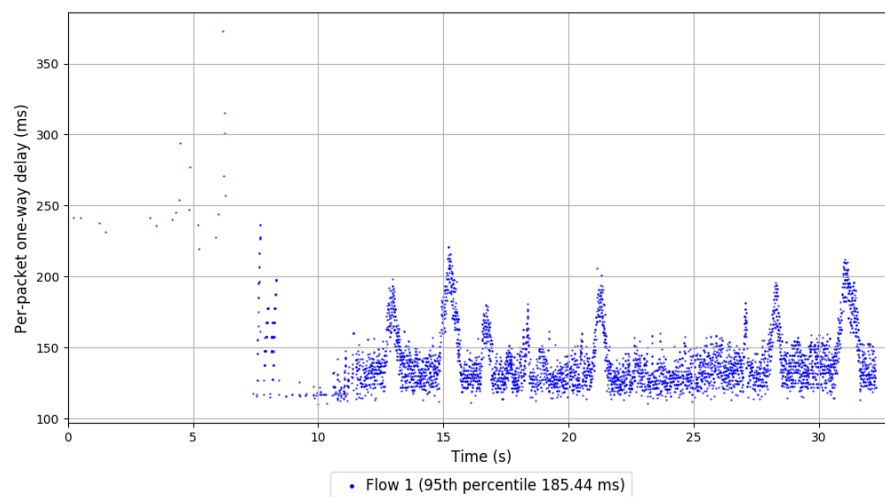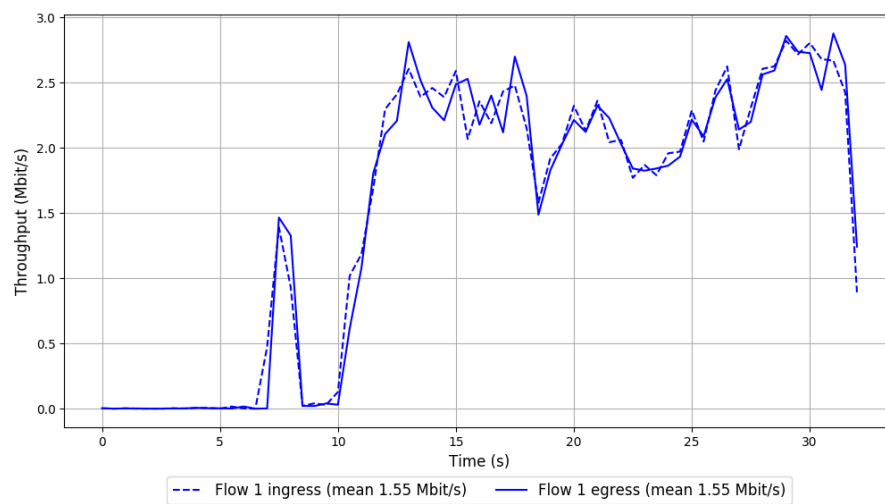Flow 1 (95th percentile 143.78 ms)

```
Run 1: Statistics of WebRTC media

Start at: 2017-09-22 08:48:53
End at: 2017-09-22 08:49:23
Local clock offset: 0.144 ms
Remote clock offset: -7.202 ms


# Below is generated by plot.py at 2017-09-22 09:25:41
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.55 Mbit/s
95th percentile per-packet one-way delay: 185.445 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 1.55 Mbit/s
95th percentile per-packet one-way delay: 185.445 ms
Loss rate: 0.29%
```
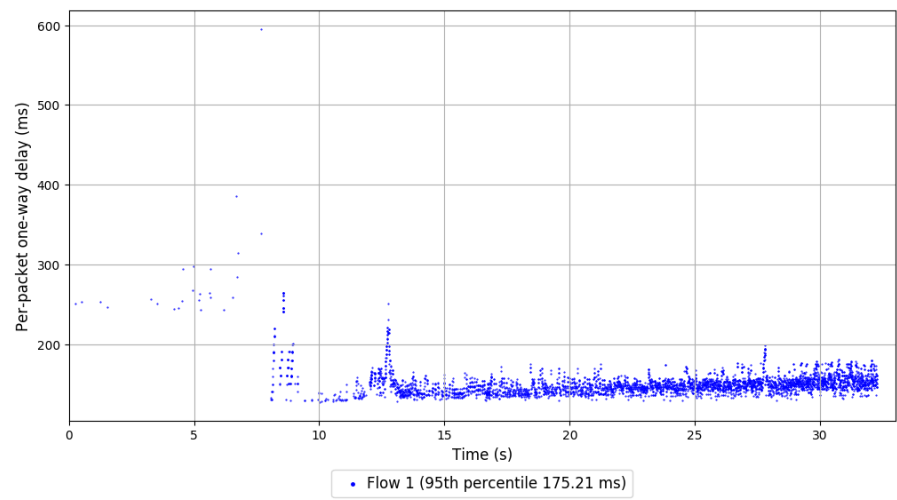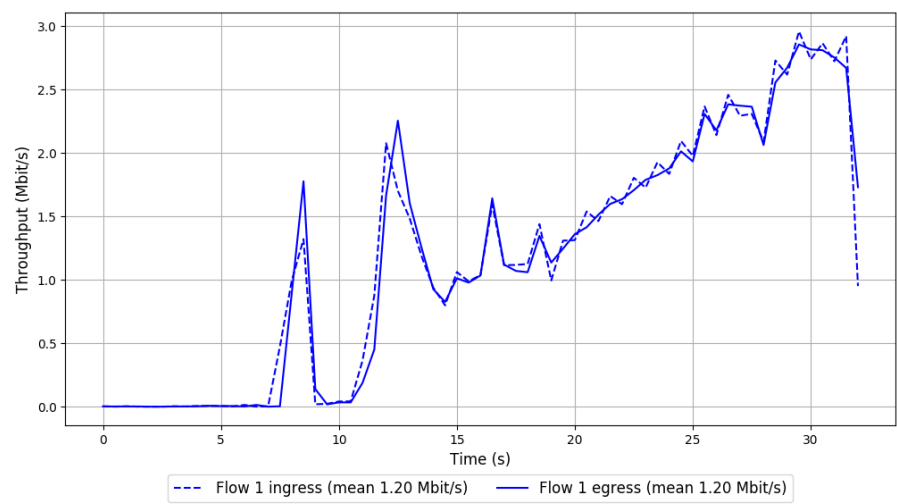
Run 1: Report of WebRTC media — Data Link

```
Run 2: Statistics of WebRTC media

Start at: 2017-09-22 09:04:09
End at: 2017-09-22 09:04:39
Local clock offset: 0.164 ms
Remote clock offset: -2.755 ms


# Below is generated by plot.py at 2017-09-22 09:25:42
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.20 Mbit/s
95th percentile per-packet one-way delay: 175.209 ms
Loss rate: 0.40%
-- Flow 1:
Average throughput: 1.20 Mbit/s
95th percentile per-packet one-way delay: 175.209 ms
Loss rate: 0.40%
```

Run 2: Report of WebRTC media — Data Link

Flow 1 ingress (mean 1.20 Mbit/s)   Flow 1 egress (mean 1.20 Mbit/s)
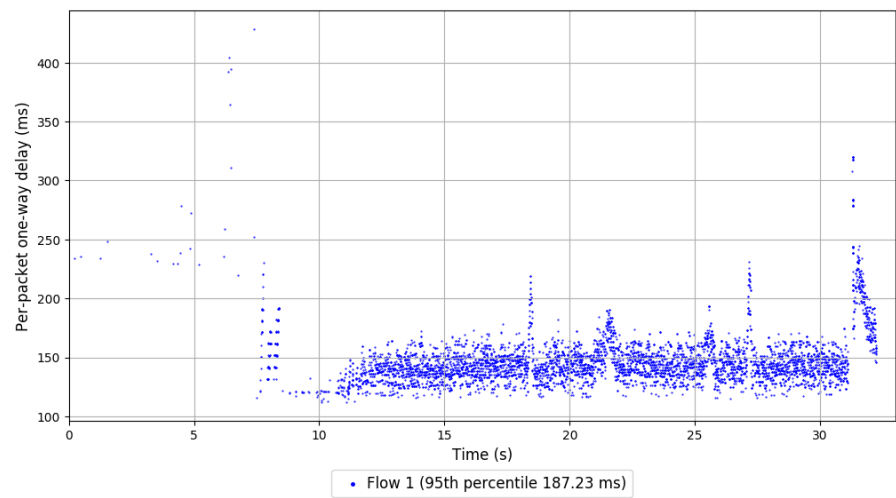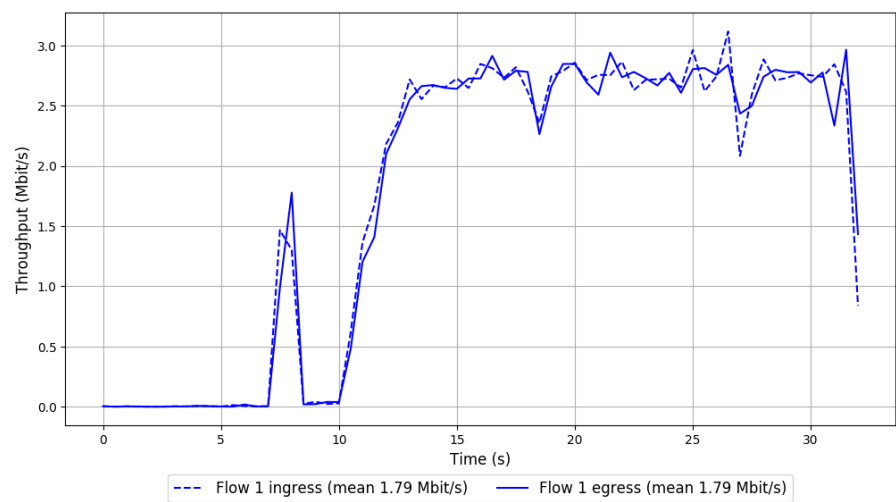

Flow 1 (95th percentile 175.21 ms)

```
Run 3: Statistics of WebRTC media

Start at: 2017-09-22 09:19:25
End at: 2017-09-22 09:19:55
Local clock offset: 0.18 ms
Remote clock offset: -2.933 ms


# Below is generated by plot.py at 2017-09-22 09:25:42
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.79 Mbit/s
95th percentile per-packet one-way delay: 187.232 ms
Loss rate: 0.32%
-- Flow 1:
Average throughput: 1.79 Mbit/s
95th percentile per-packet one-way delay: 187.232 ms
Loss rate: 0.32%
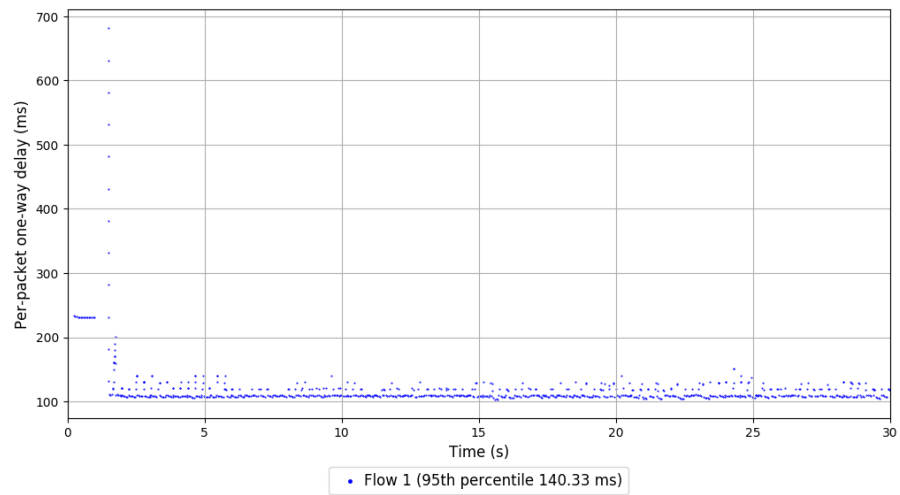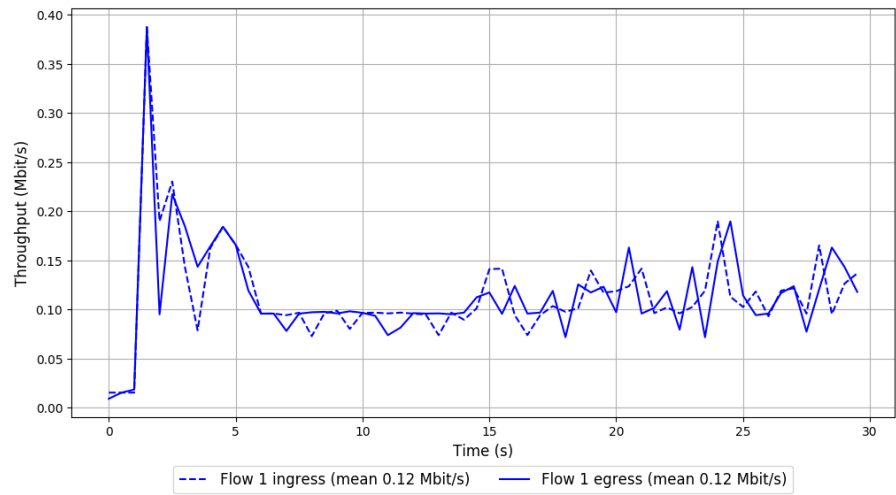```

Run 3: Report of WebRTC media — Data Link

```
Run 1: Statistics of Sprout

Start at: 2017-09-22 08:43:01
End at: 2017-09-22 08:43:31
Local clock offset: 0.056 ms
Remote clock offset: -2.137 ms


# Below is generated by plot.py at 2017-09-22 09:25:42
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 140.328 ms
Loss rate: 0.32%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 140.328 ms
Loss rate: 0.32%
```

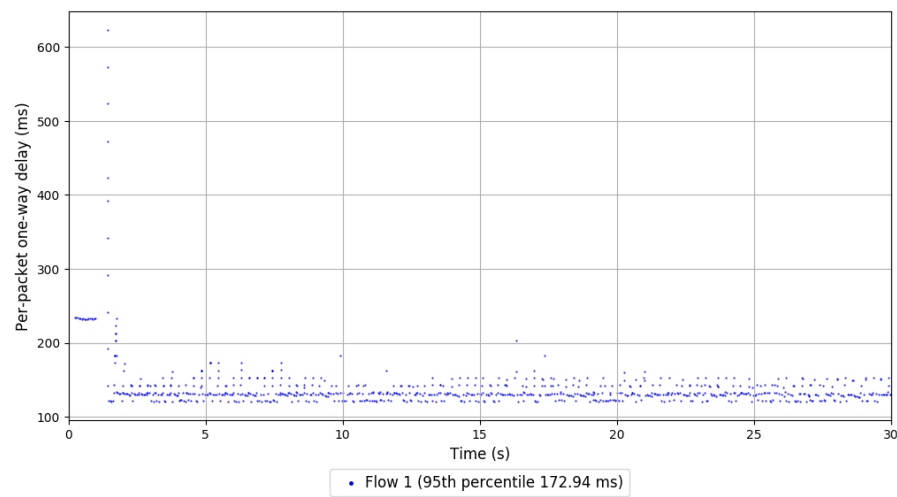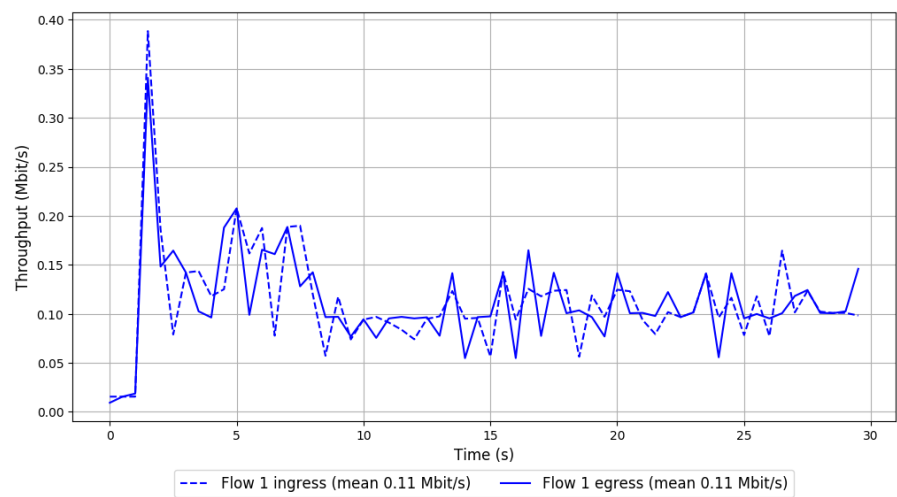Run 1: Report of Sprout — Data Link

```
Run 2: Statistics of Sprout

Start at: 2017-09-22 08:58:17
End at: 2017-09-22 08:58:47
Local clock offset: 0.084 ms
Remote clock offset: -2.694 ms


# Below is generated by plot.py at 2017-09-22 09:25:42
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 172.943 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 172.943 ms
Loss rate: 0.02%
```

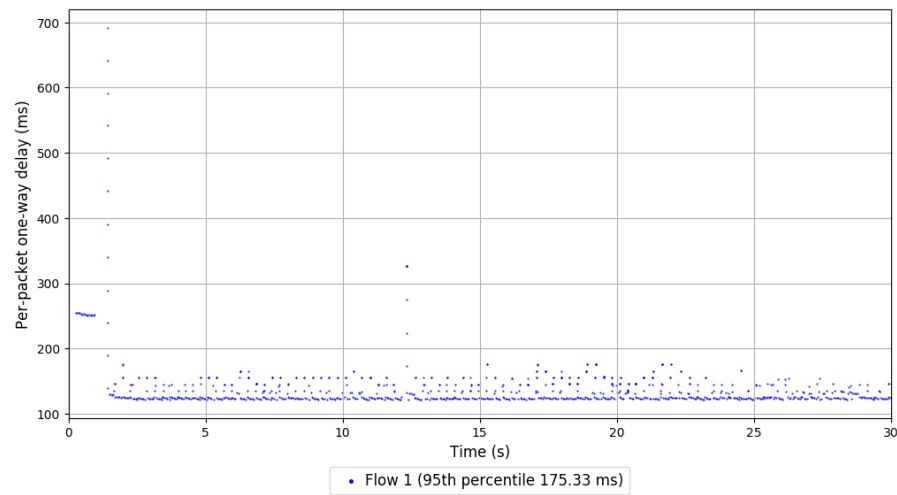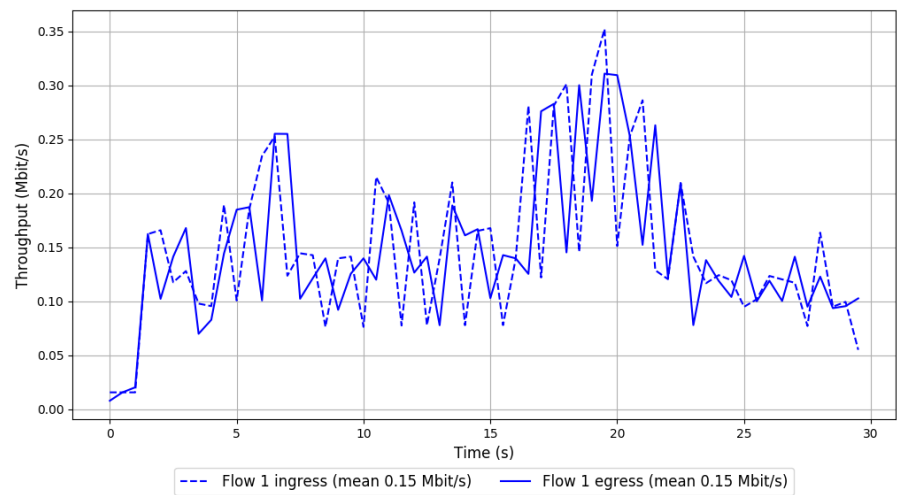Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2017-09-22 09:13:33
End at: 2017-09-22 09:14:03
Local clock offset: 0.178 ms
Remote clock offset: -2.948 ms


# Below is generated by plot.py at 2017-09-22 09:25:42
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 175.333 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 175.333 ms
Loss rate: 0.02%
```

Run 3: Report of Sprout — Data Link
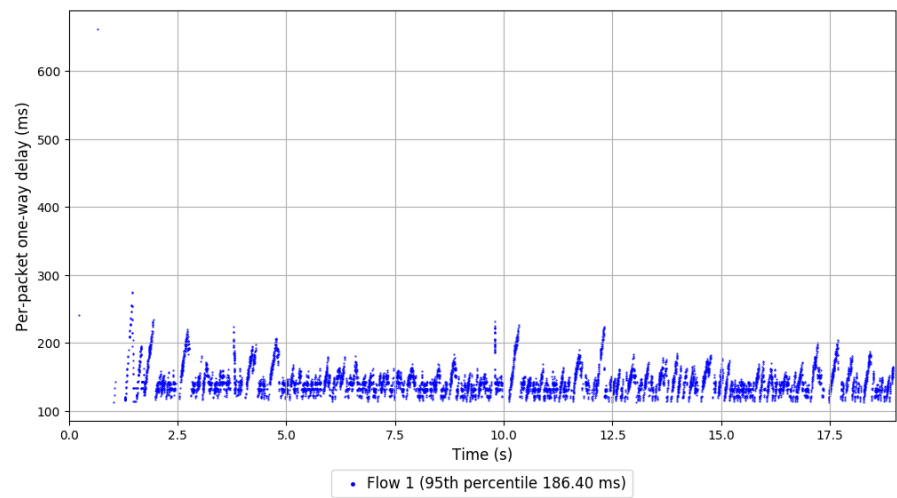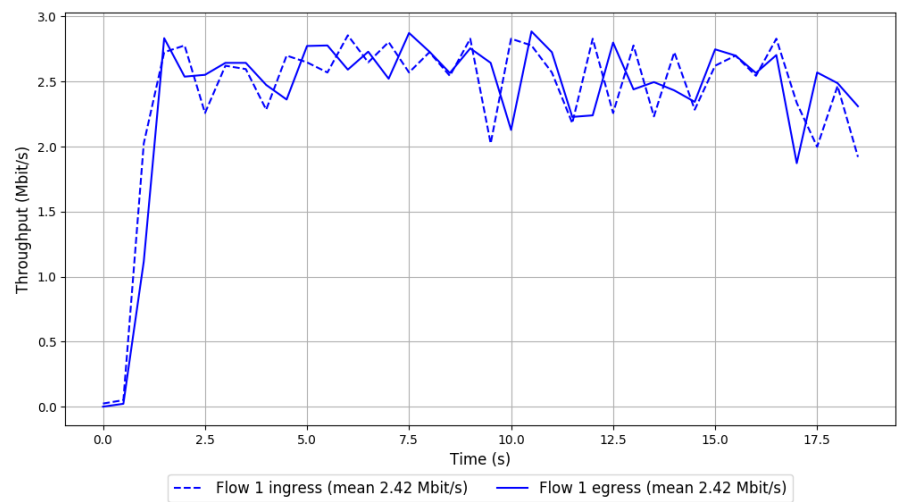
```
Run 1: Statistics of TaoVA-100x

Start at: 2017-09-22 08:41:50
End at: 2017-09-22 08:42:20
Local clock offset: 0.084 ms
Remote clock offset: -2.405 ms
```

Run 1: Report of TaoVA-100x — Data Link

53

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

Start at: 2017-09-22 08:57:06
End at: 2017-09-22 08:57:36
Local clock offset: 0.091 ms
Remote clock offset: -7.527 ms


# Below is generated by plot.py at 2017-09-22 09:25:48
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 1030.121 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 1030.121 ms
Loss rate: 0.31%
```
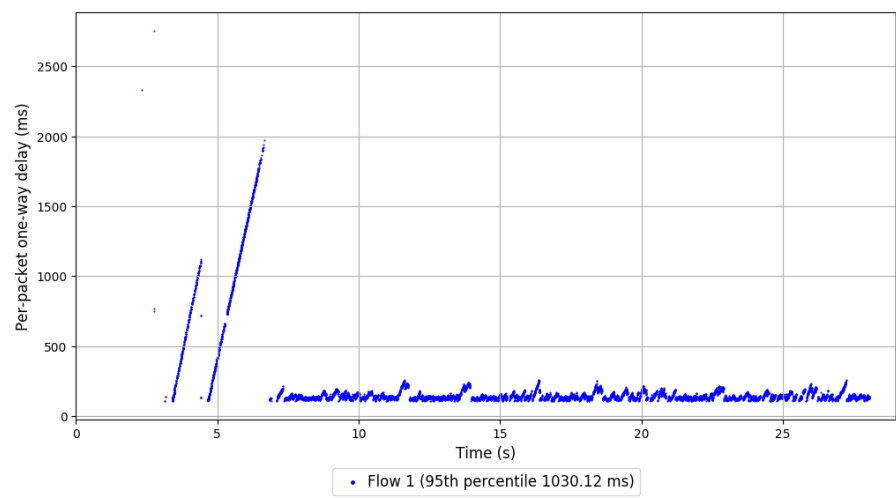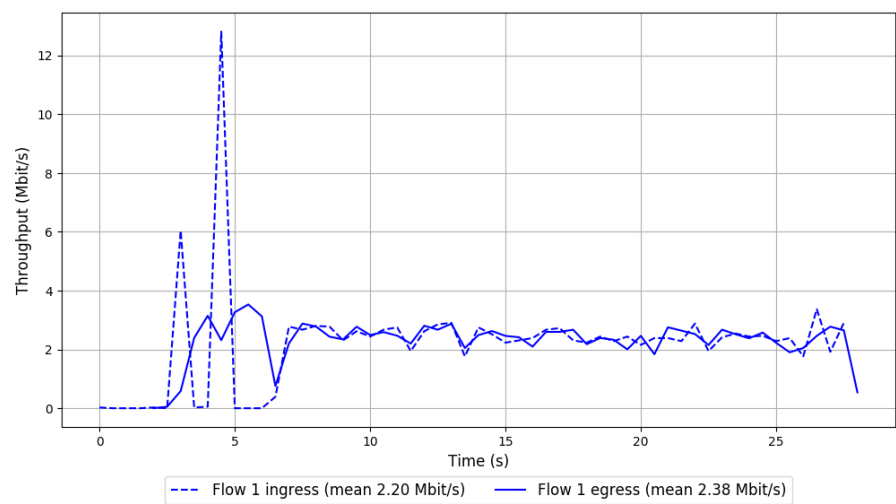
Run 2: Report of TaoVA-100x — Data Link

Flow 1 ingress (mean 2.20 Mbit/s) --- Flow 1 egress (mean 2.38 Mbit/s)

Flow 1 (95th percentile 1030.12 ms)

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

Start at: 2017-09-22 09:12:22
End at: 2017-09-22 09:12:52
Local clock offset: 0.133 ms
Remote clock offset: -3.024 ms


# Below is generated by plot.py at 2017-09-22 09:25:49
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.43 Mbit/s
95th percentile per-packet one-way delay: 180.860 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 2.43 Mbit/s
95th percentile per-packet one-way delay: 180.860 ms
Loss rate: 0.18%
```
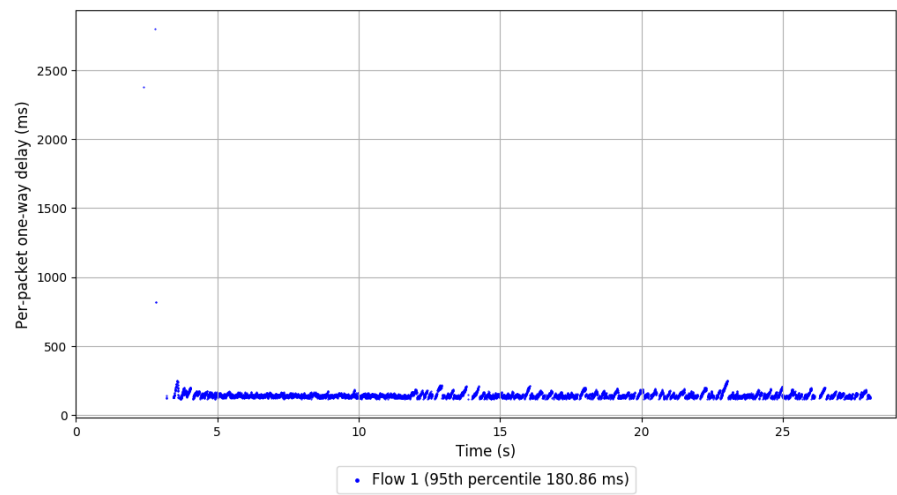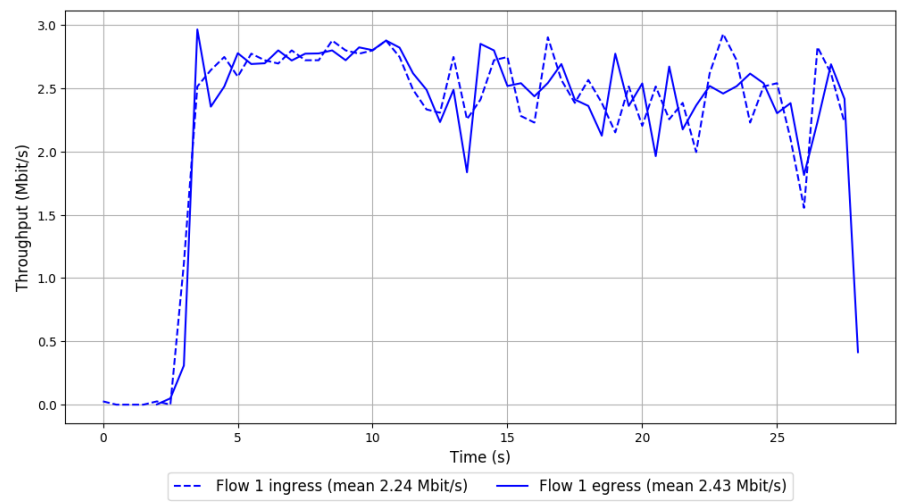
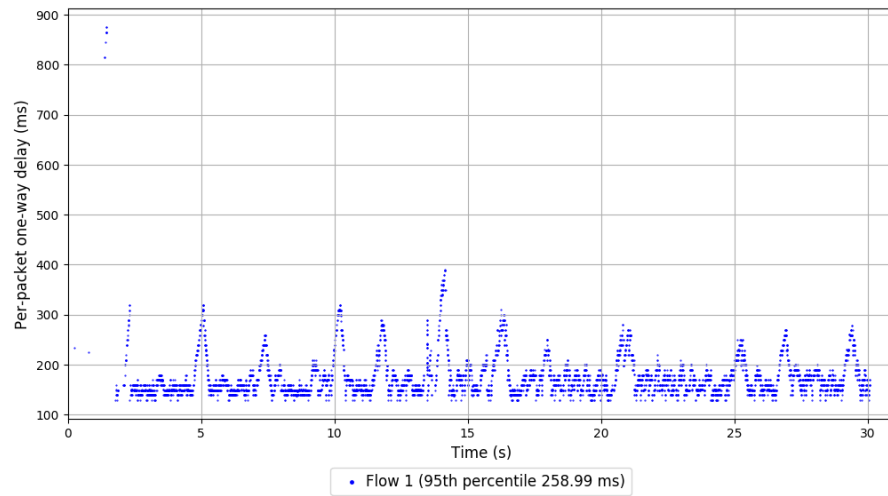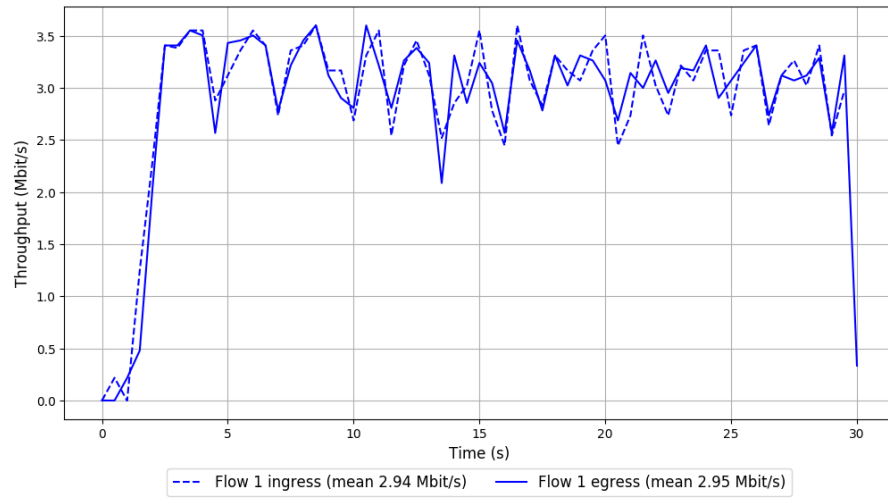Run 3: Report of TaoVA-100x — Data Link

```
Run 1: Statistics of TCP Vegas

Start at: 2017-09-22 08:51:14
End at: 2017-09-22 08:51:44
Local clock offset: 0.146 ms
Remote clock offset: -2.421 ms


# Below is generated by plot.py at 2017-09-22 09:25:49
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.95 Mbit/s
95th percentile per-packet one-way delay: 258.994 ms
Loss rate: 0.27%
-- Flow 1:
Average throughput: 2.95 Mbit/s
95th percentile per-packet one-way delay: 258.994 ms
Loss rate: 0.27%
```

Run 1: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 2.94 Mbit/s) --- Flow 1 egress (mean 2.95 Mbit/s)
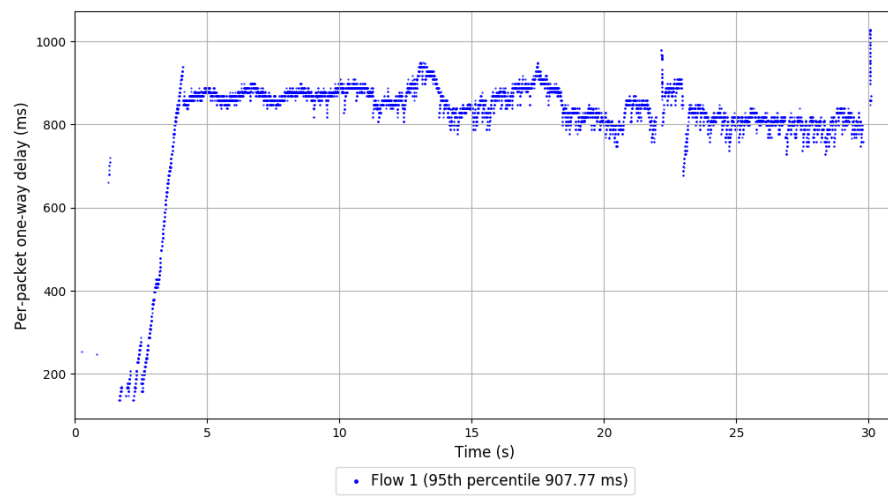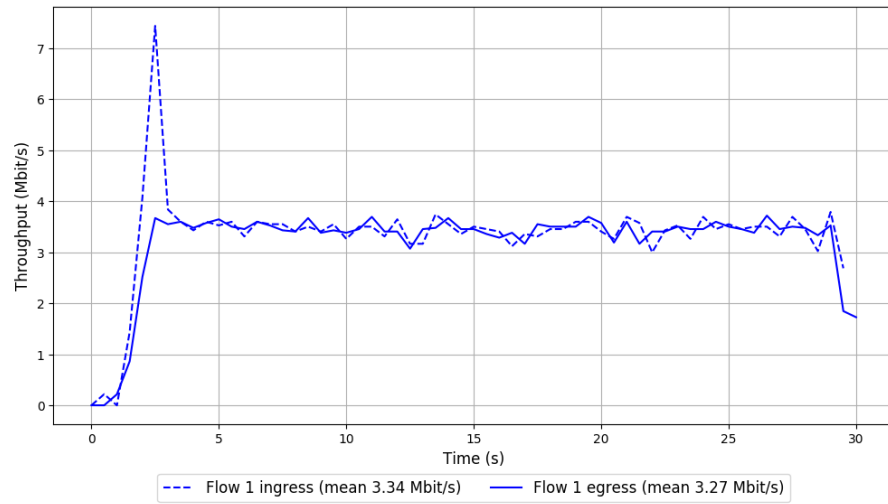

Flow 1 (95th percentile 258.99 ms)

```
Run 2: Statistics of TCP Vegas

Start at: 2017-09-22 09:06:30
End at: 2017-09-22 09:07:00
Local clock offset: 0.157 ms
Remote clock offset: -2.713 ms


# Below is generated by plot.py at 2017-09-22 09:25:49
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.27 Mbit/s
95th percentile per-packet one-way delay: 907.774 ms
Loss rate: 2.36%
-- Flow 1:
Average throughput: 3.27 Mbit/s
95th percentile per-packet one-way delay: 907.774 ms
Loss rate: 2.36%
```

Run 2: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 3.34 Mbit/s) --- Flow 1 egress (mean 3.27 Mbit/s)

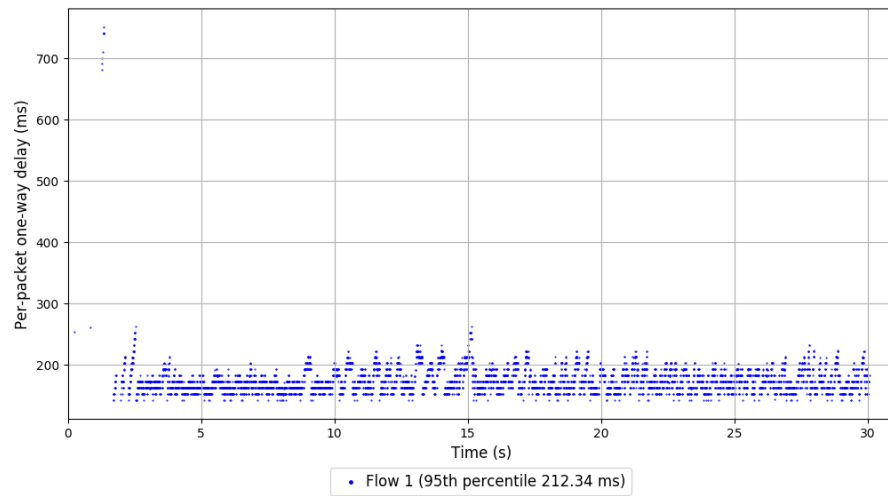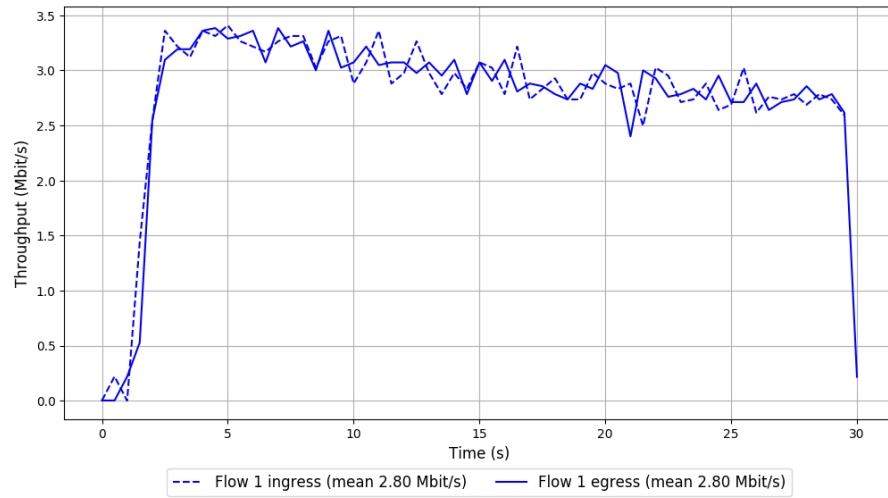
• Flow 1 (95th percentile 907.77 ms)

```
Run 3: Statistics of TCP Vegas

Start at: 2017-09-22 09:21:46
End at: 2017-09-22 09:22:16
Local clock offset: 0.168 ms
Remote clock offset: -2.752 ms


# Below is generated by plot.py at 2017-09-22 09:25:49
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.80 Mbit/s
95th percentile per-packet one-way delay: 212.342 ms
Loss rate: 0.34%
-- Flow 1:
Average throughput: 2.80 Mbit/s
95th percentile per-packet one-way delay: 212.342 ms
Loss rate: 0.34%
```

Run 3: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 2.80 Mbit/s)   Flow 1 egress (mean 2.80 Mbit/s)
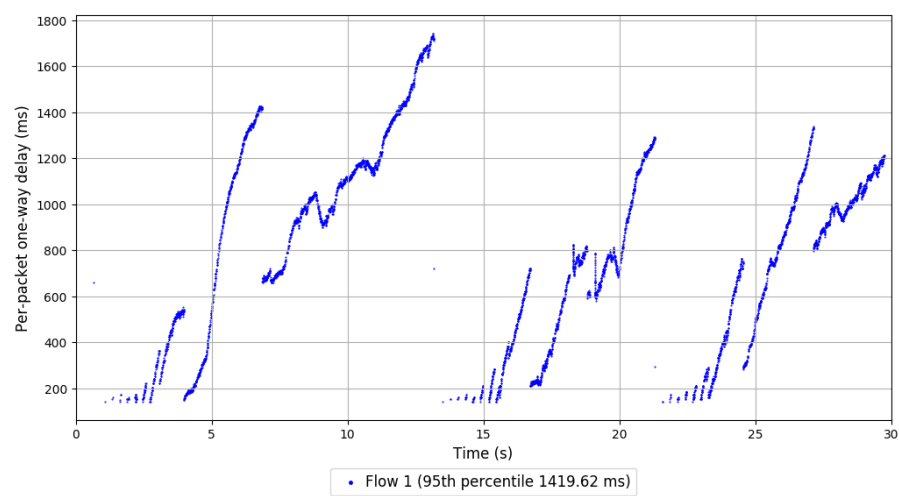

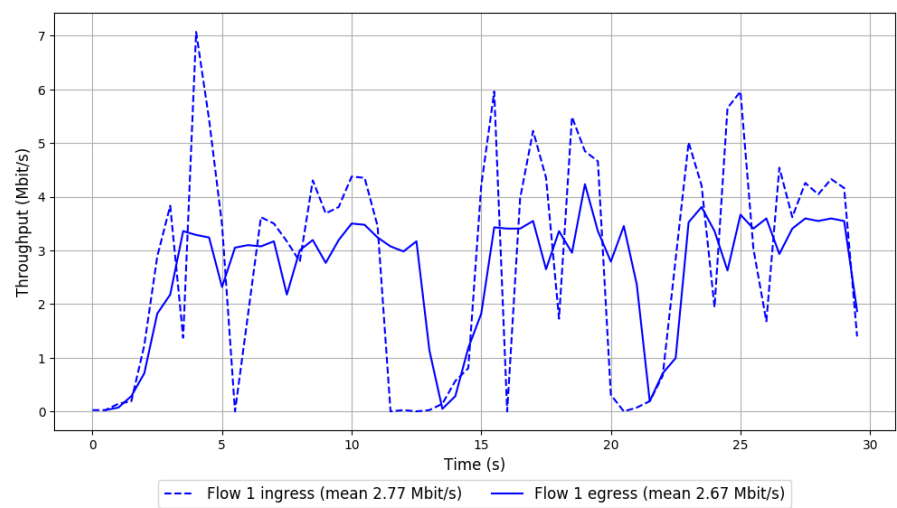• Flow 1 (95th percentile 212.34 ms)

63

```
Run 1: Statistics of Verus

Start at: 2017-09-22 08:45:21
End at: 2017-09-22 08:45:51
Local clock offset: 0.119 ms
Remote clock offset: -2.208 ms


# Below is generated by plot.py at 2017-09-22 09:25:49
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.67 Mbit/s
95th percentile per-packet one-way delay: 1419.625 ms
Loss rate: 5.59%
-- Flow 1:
Average throughput: 2.67 Mbit/s
95th percentile per-packet one-way delay: 1419.625 ms
Loss rate: 5.59%
```

Run 1: Report of Verus — Data Link

Flow 1 ingress (mean 2.77 Mbit/s) Flow 1 egress (mean 2.67 Mbit/s)

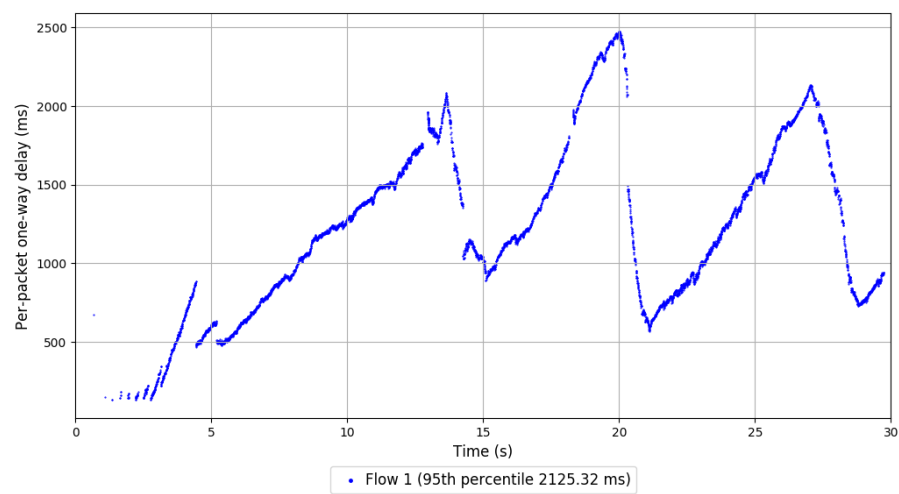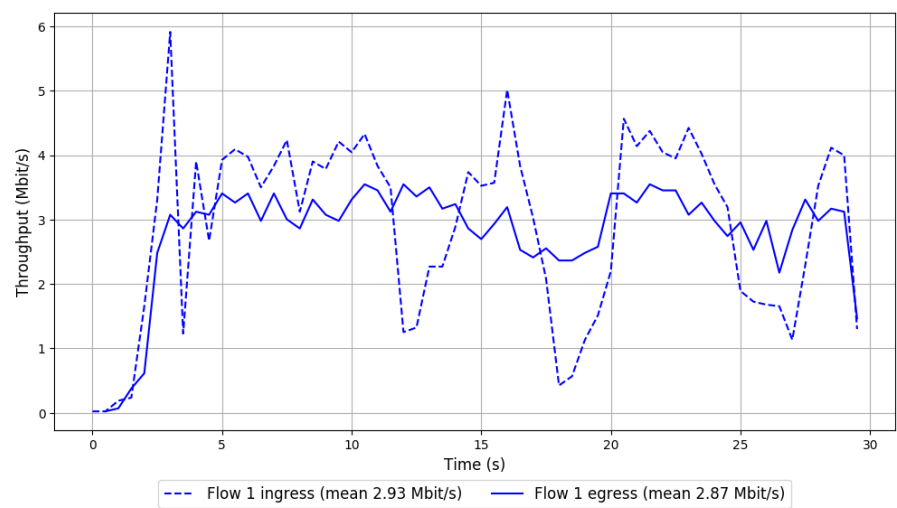Flow 1 (95th percentile 1419.62 ms)

```
Run 2: Statistics of Verus

Start at: 2017-09-22 09:00:38
End at: 2017-09-22 09:01:08
Local clock offset: 0.047 ms
Remote clock offset: -7.506 ms


# Below is generated by plot.py at 2017-09-22 09:25:50
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.87 Mbit/s
95th percentile per-packet one-way delay: 2125.316 ms
Loss rate: 3.98%
-- Flow 1:
Average throughput: 2.87 Mbit/s
95th percentile per-packet one-way delay: 2125.316 ms
Loss rate: 3.98%
```
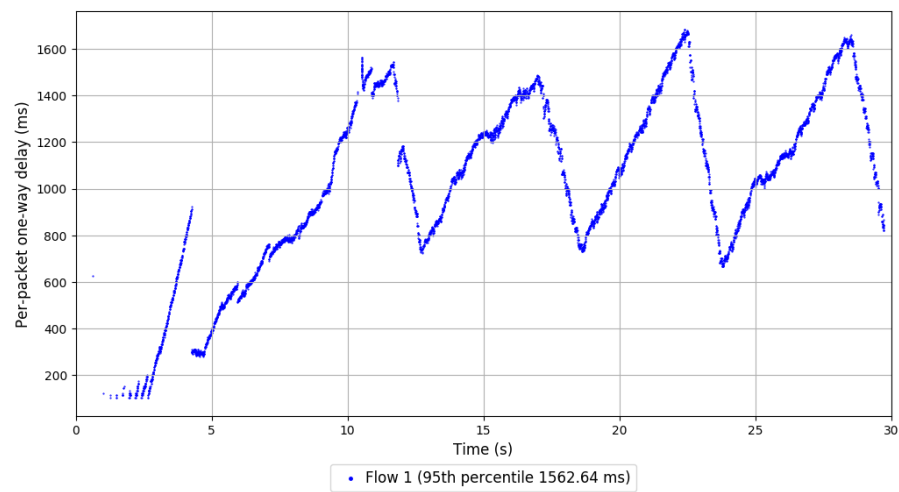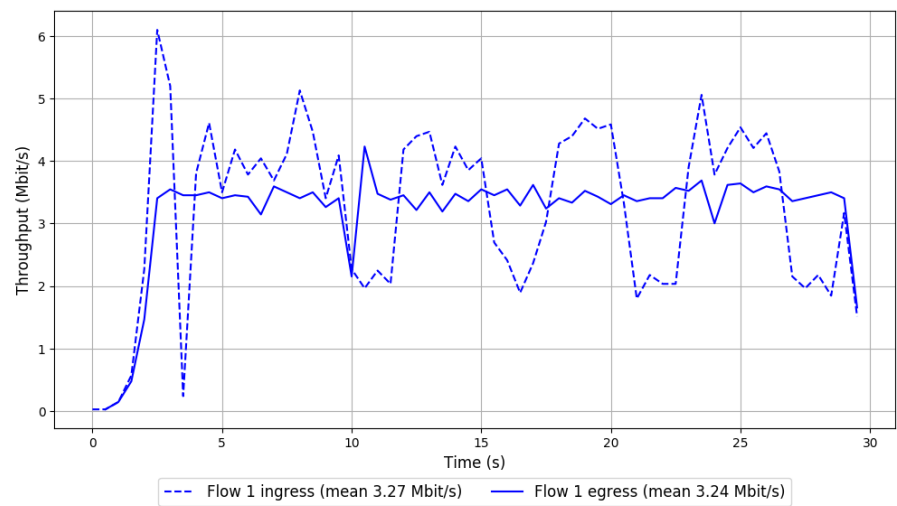
Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2017-09-22 09:15:53
End at: 2017-09-22 09:16:23
Local clock offset: 0.165 ms
Remote clock offset: -7.901 ms


# Below is generated by plot.py at 2017-09-22 09:25:54
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.24 Mbit/s
95th percentile per-packet one-way delay: 1562.642 ms
Loss rate: 2.56%
-- Flow 1:
Average throughput: 3.24 Mbit/s
95th percentile per-packet one-way delay: 1562.642 ms
Loss rate: 2.56%
```

Run 3: Report of Verus — Data Link

```
Run 1: Statistics of Indigo

Start at: 2017-09-22 08:47:43
End at: 2017-09-22 08:48:13
Local clock offset: 0.134 ms
Remote clock offset: -2.372 ms

# Below is generated by plot.py at 2017-09-22 09:25:54
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.64 Mbit/s
95th percentile per-packet one-way delay: 202.527 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 1.64 Mbit/s
95th percentile per-packet one-way delay: 202.527 ms
Loss rate: 0.10%
```
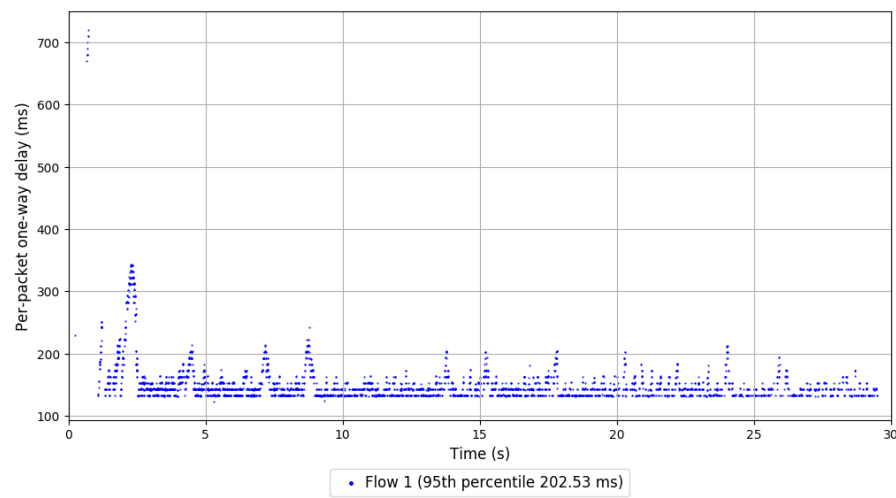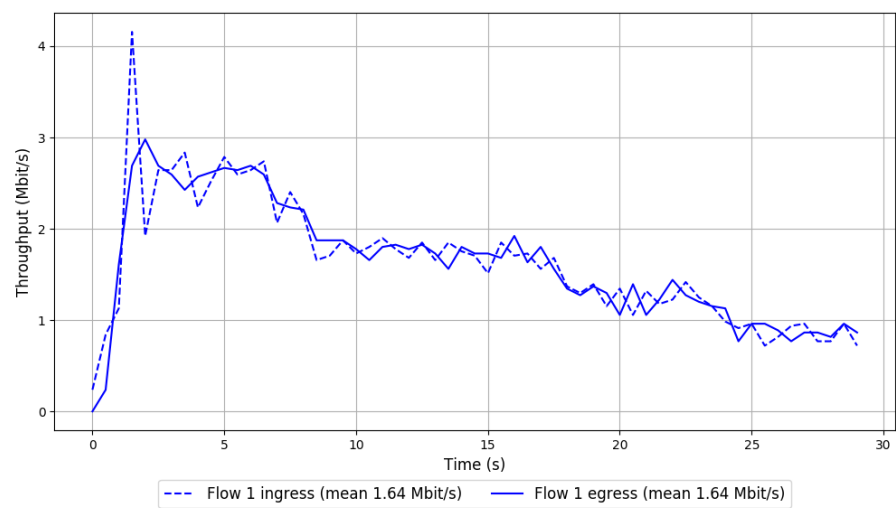
Run 1: Report of Indigo — Data Link

Flow 1 ingress (mean 1.64 Mbit/s)   Flow 1 egress (mean 1.64 Mbit/s)

Flow 1 (95th percentile 202.53 ms)

```
Run 2: Statistics of Indigo

Start at: 2017-09-22 09:02:59
End at: 2017-09-22 09:03:29
Local clock offset: 0.171 ms
Remote clock offset: -2.615 ms


# Below is generated by plot.py at 2017-09-22 09:25:54
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 180.163 ms
Loss rate: 0.08%
-- Flow 1:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 180.163 ms
Loss rate: 0.08%
```
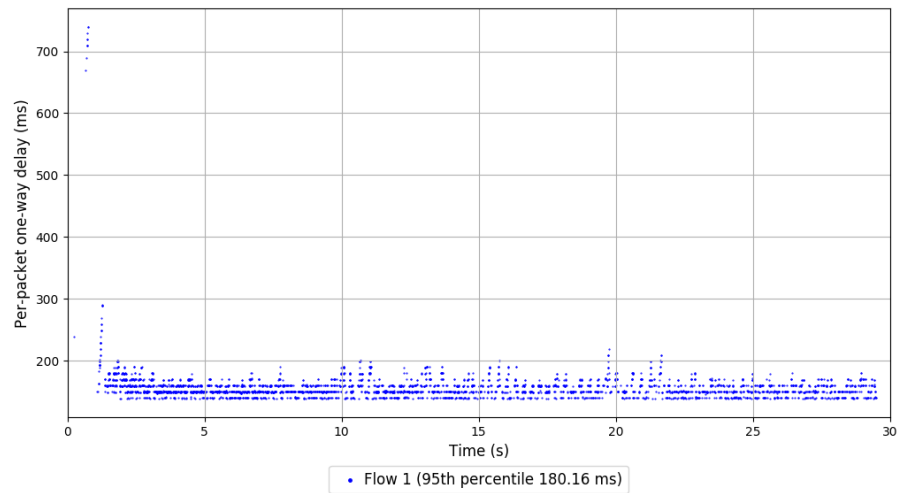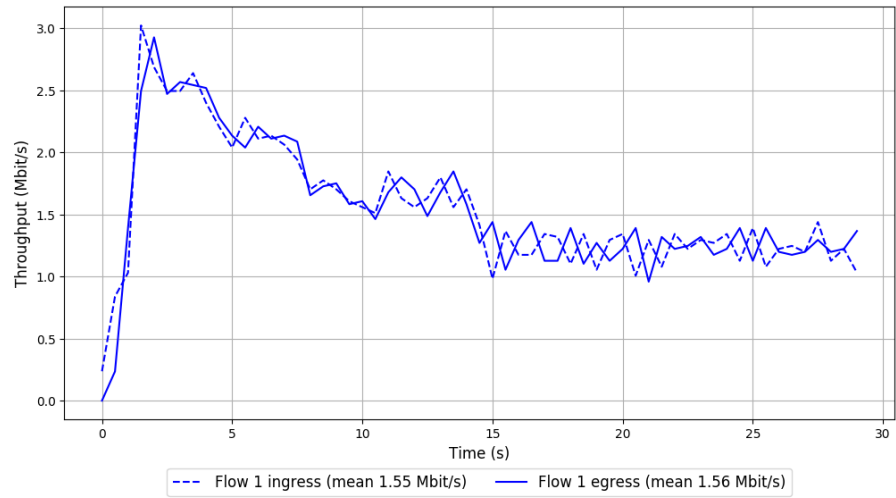
Run 2: Report of Indigo — Data Link

```
Run 3: Statistics of Indigo

Start at: 2017-09-22 09:18:14
End at: 2017-09-22 09:18:44
Local clock offset: 0.098 ms
Remote clock offset: -2.796 ms


# Below is generated by plot.py at 2017-09-22 09:25:54
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.76 Mbit/s
95th percentile per-packet one-way delay: 183.942 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 1.76 Mbit/s
95th percentile per-packet one-way delay: 183.942 ms
Loss rate: 0.02%
```
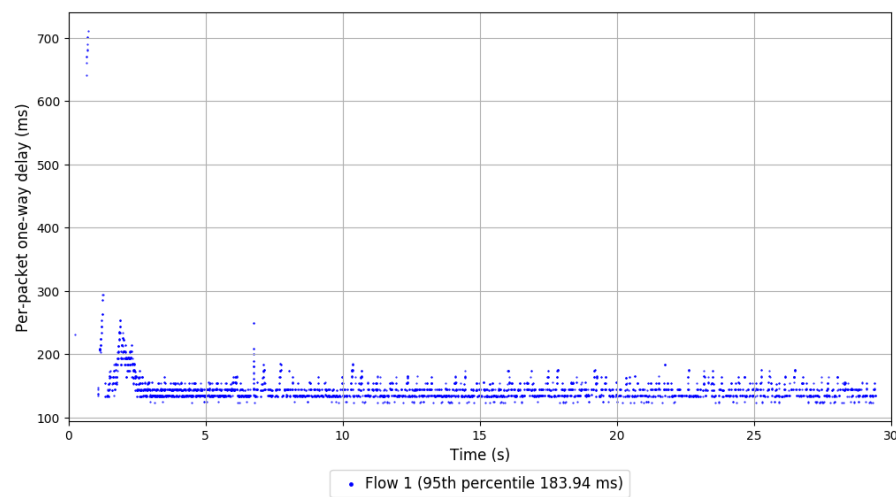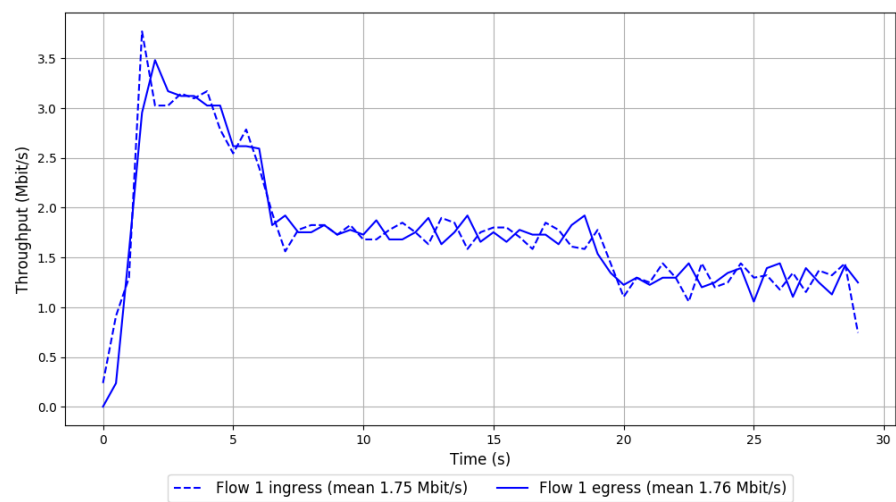
Run 3: Report of Indigo — Data Link

Flow 1 ingress (mean 1.75 Mbit/s) —— Flow 1 egress (mean 1.76 Mbit/s)

• Flow 1 (95th percentile 183.94 ms)

```
Run 1: Statistics of Indigo-cellular

Start at: 2017-09-22 08:46:32
End at: 2017-09-22 08:47:02
Local clock offset: 0.039 ms
Remote clock offset: -7.21 ms


# Below is generated by plot.py at 2017-09-22 09:25:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 217.141 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 217.141 ms
Loss rate: 0.05%
```
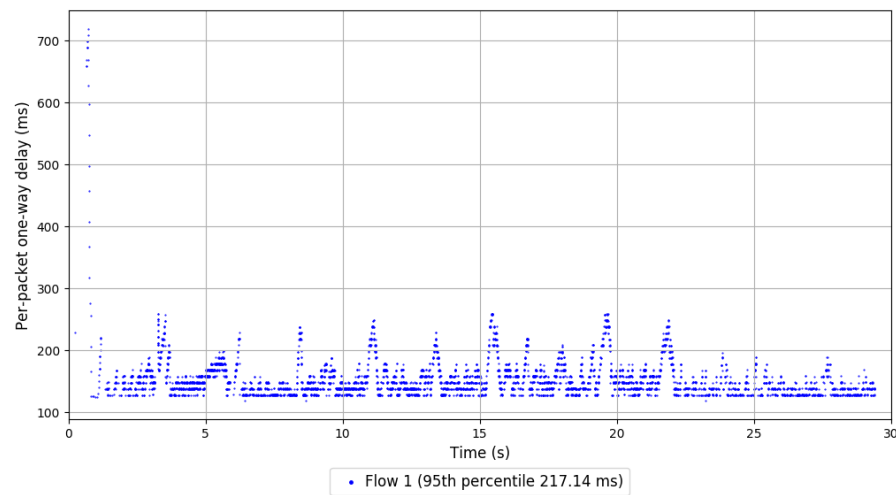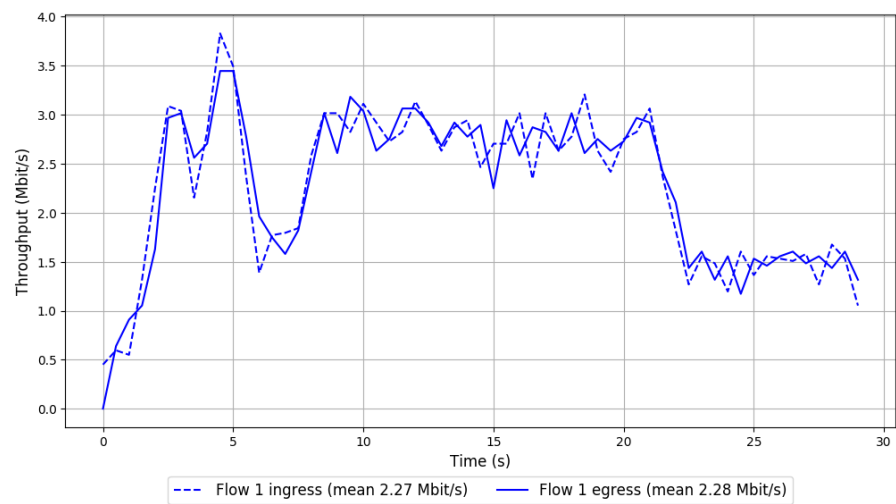
Run 1: Report of Indigo-cellular — Data Link

```
Run 2: Statistics of Indigo-cellular

Start at: 2017-09-22 09:01:48
End at: 2017-09-22 09:02:18
Local clock offset: 0.152 ms
Remote clock offset: -7.621 ms


# Below is generated by plot.py at 2017-09-22 09:25:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 184.273 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 184.273 ms
Loss rate: 0.12%
```
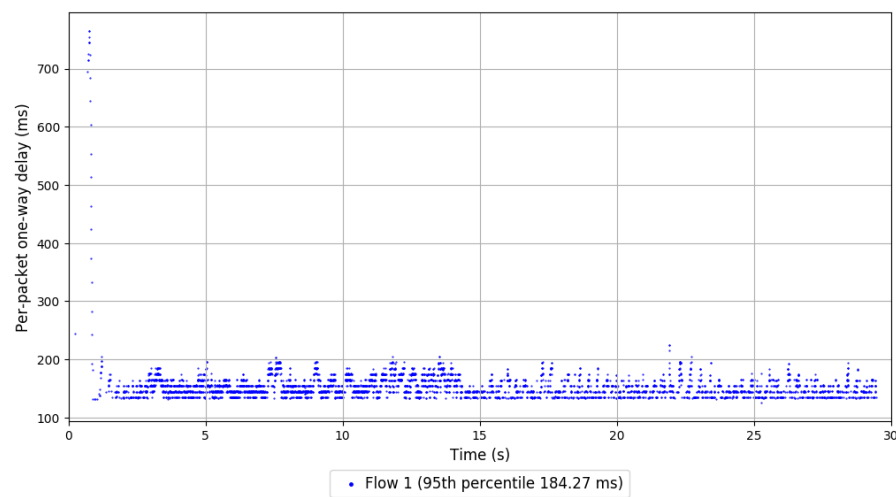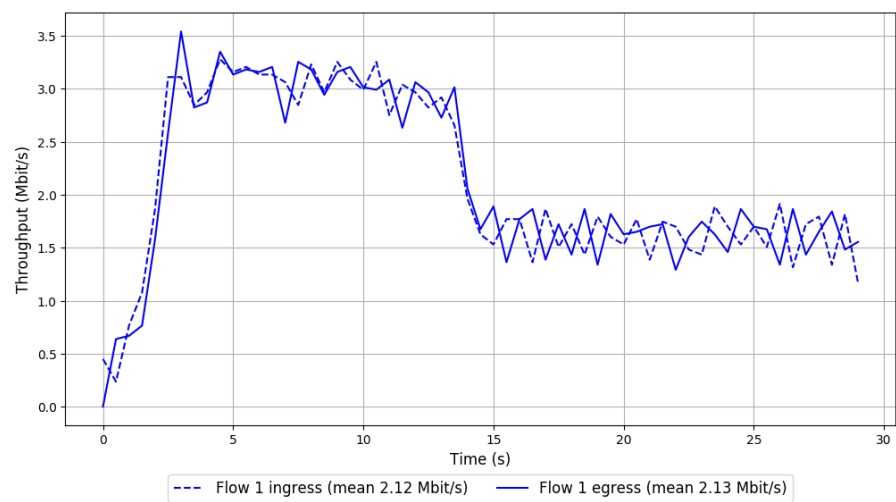
Run 2: Report of Indigo-cellular — Data Link

Flow 1 ingress (mean 2.12 Mbit/s) ---- Flow 1 egress (mean 2.13 Mbit/s) ——

• Flow 1 (95th percentile 184.27 ms)

```
Run 3: Statistics of Indigo-cellular

Start at: 2017-09-22 09:17:04
End at: 2017-09-22 09:17:34
Local clock offset: 0.19 ms
Remote clock offset: -2.981 ms


# Below is generated by plot.py at 2017-09-22 09:25:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.86 Mbit/s
95th percentile per-packet one-way delay: 180.406 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 1.86 Mbit/s
95th percentile per-packet one-way delay: 180.406 ms
Loss rate: 0.20%
```

Run 3: Report of Indigo-cellular — Data Link