Pantheon Report

Generated at 2017-09-22 11:21:37 (UTC).

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

Repeated the test of 14 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

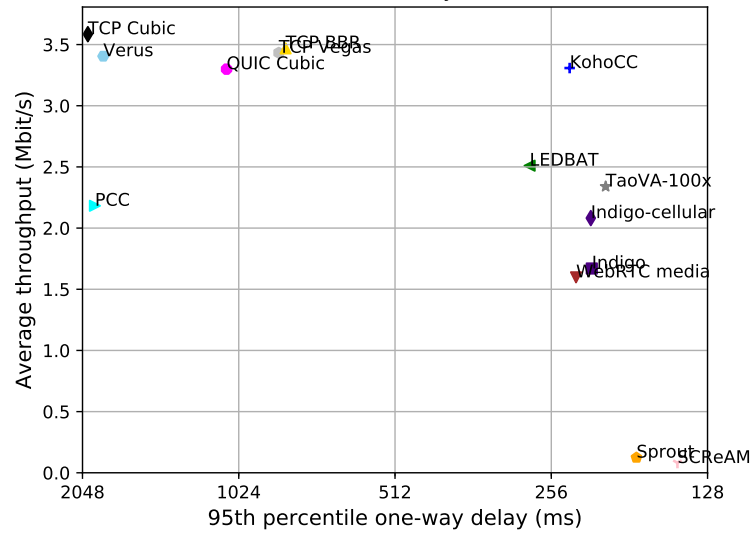Increased UDP receive buffer to 16 MB (default) and 32 MB (max).

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

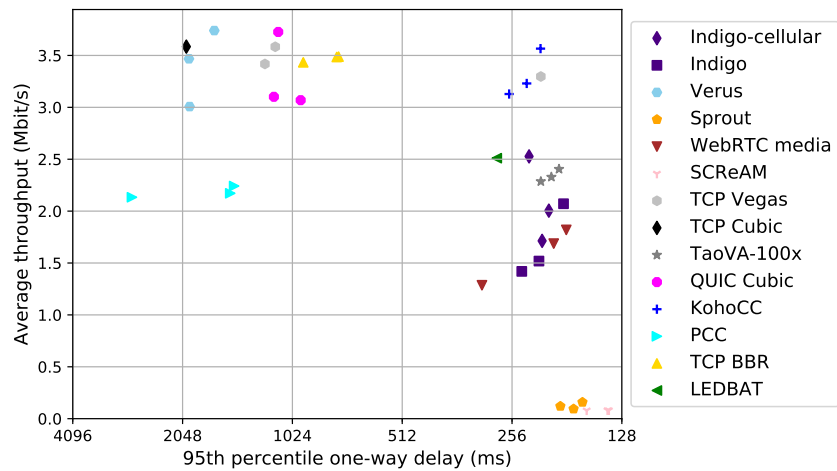NTP offsets were measured against `gps.ntp.br` and have been applied to correct the timestamps in logs.

```
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

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scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	3.47	831.78	1.34
TCP Cubic	1	3.58	1999.87	10.67
LEDBAT	1	2.51	281.89	0.73
PCC	3	2.18	1938.00	30.42
QUIC Cubic	3	3.30	1080.90	3.85
SCReAM	3	0.08	146.29	0.13
WebRTC media	3	1.60	229.37	0.33
Sprout	3	0.12	175.47	0.16
TaoVA-100x	3	2.34	201.16	0.35
TCP Vegas	3	3.43	857.49	1.93
Verus	3	3.41	1867.64	7.66
Indigo	3	1.67	213.90	0.17
Indigo-cellular	3	2.08	214.85	0.27
KohoCC	3	3.31	235.97	0.31

```
Run 1: Statistics of TCP BBR

Start at: 2017-09-22 10:31:24
End at: 2017-09-22 10:31:54
Local clock offset: 0.074 ms
Remote clock offset: 16.981 ms

# Below is generated by plot.py at 2017-09-22 11:21:06
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.49 Mbit/s
95th percentile per-packet one-way delay: 773.988 ms
Loss rate: 1.37%
-- Flow 1:
Average throughput: 3.49 Mbit/s
95th percentile per-packet one-way delay: 773.988 ms
Loss rate: 1.37%
```
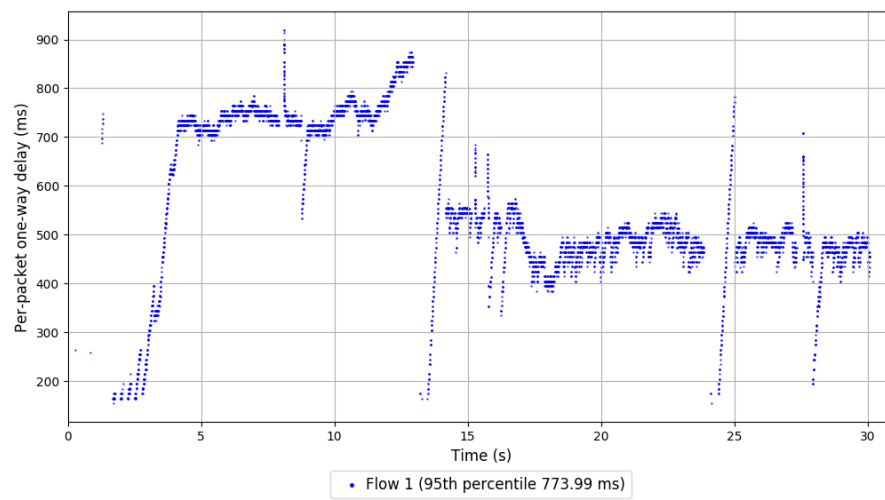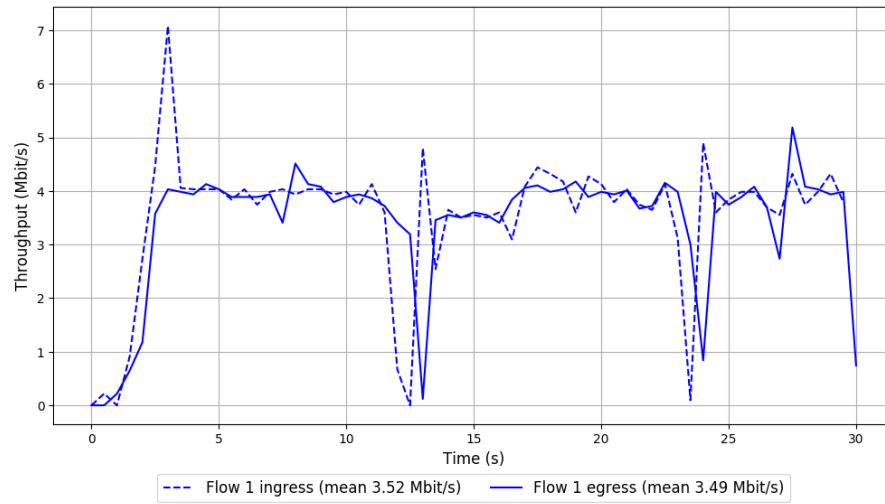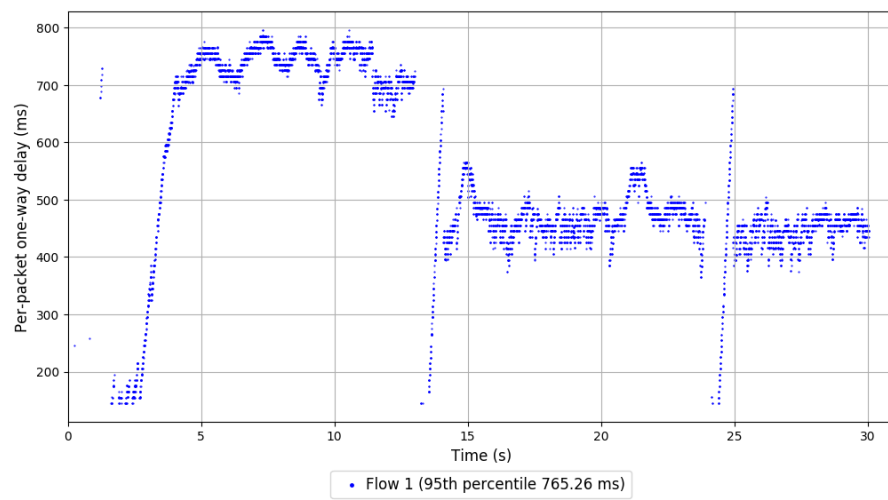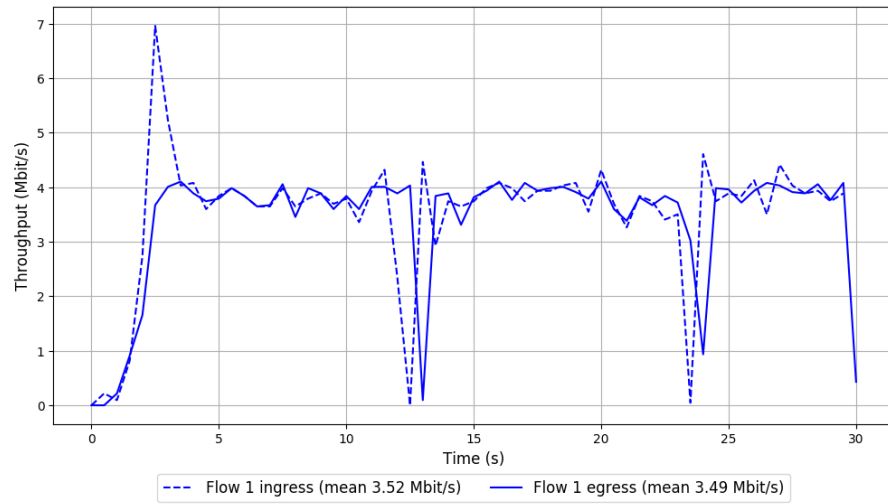
Run 1: Report of TCP BBR — Data Link

```
Run 2: Statistics of TCP BBR

Start at: 2017-09-22 10:47:57
End at: 2017-09-22 10:48:27
Local clock offset: 0.053 ms
Remote clock offset: 8.762 ms


# Below is generated by plot.py at 2017-09-22 11:21:06
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.49 Mbit/s
95th percentile per-packet one-way delay: 765.259 ms
Loss rate: 1.37%
-- Flow 1:
Average throughput: 3.49 Mbit/s
95th percentile per-packet one-way delay: 765.259 ms
Loss rate: 1.37%
```
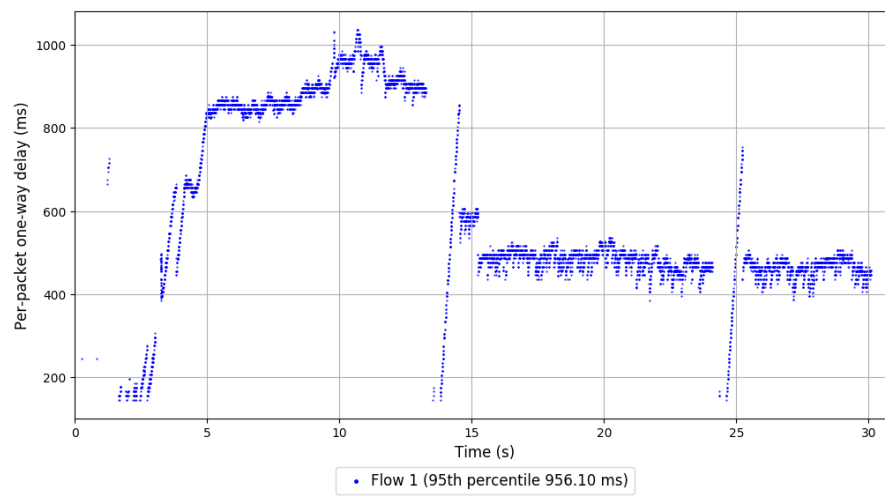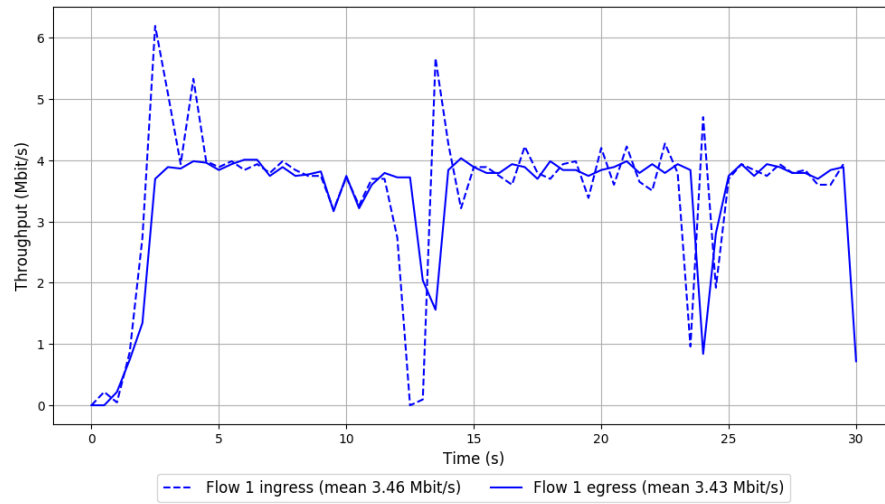
Run 2: Report of TCP BBR — Data Link

```
Run 3: Statistics of TCP BBR

Start at: 2017-09-22 11:04:24
End at: 2017-09-22 11:04:54
Local clock offset: -0.039 ms
Remote clock offset: 8.776 ms


# Below is generated by plot.py at 2017-09-22 11:21:06
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.43 Mbit/s
95th percentile per-packet one-way delay: 956.097 ms
Loss rate: 1.28%
-- Flow 1:
Average throughput: 3.43 Mbit/s
95th percentile per-packet one-way delay: 956.097 ms
Loss rate: 1.28%
```

Run 3: Report of TCP BBR — Data Link

```
Run 1: Statistics of TCP Cubic

Start at: 2017-09-22 10:33:45
End at: 2017-09-22 10:34:15
Local clock offset: 0.035 ms
Remote clock offset: 1.954 ms


# Below is generated by plot.py at 2017-09-22 11:21:07
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.58 Mbit/s
95th percentile per-packet one-way delay: 1999.873 ms
Loss rate: 10.67%
-- Flow 1:
Average throughput: 3.58 Mbit/s
95th percentile per-packet one-way delay: 1999.873 ms
Loss rate: 10.67%
```
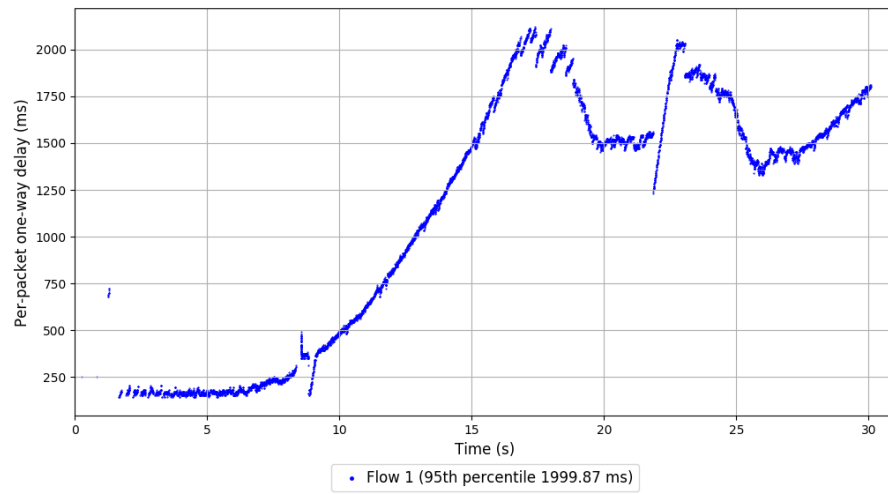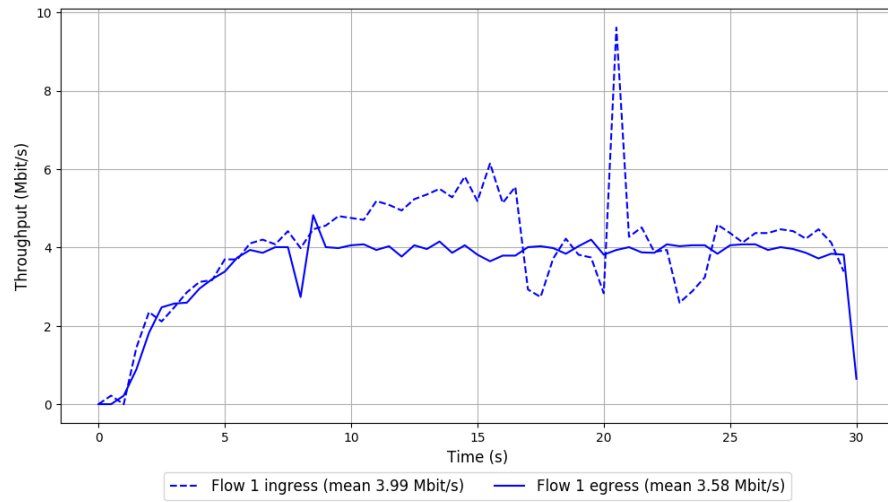
Run 1: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 3.99 Mbit/s)   Flow 1 egress (mean 3.58 Mbit/s)

Flow 1 (95th percentile 1999.87 ms)
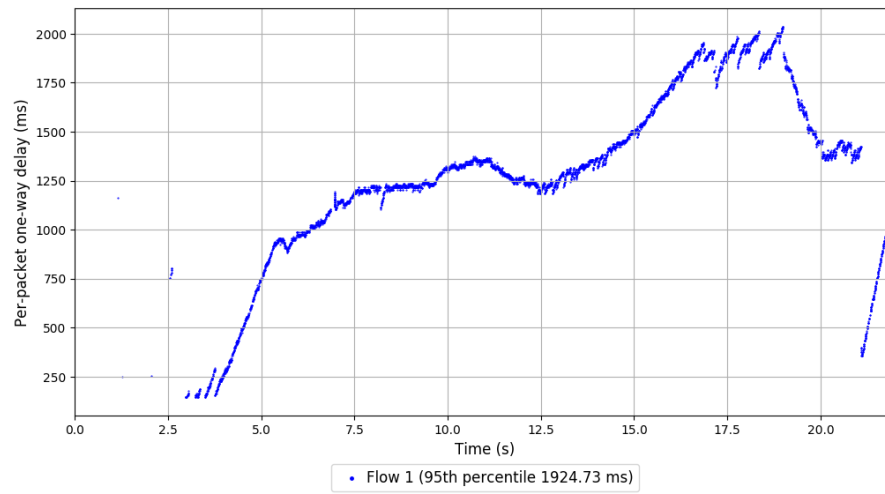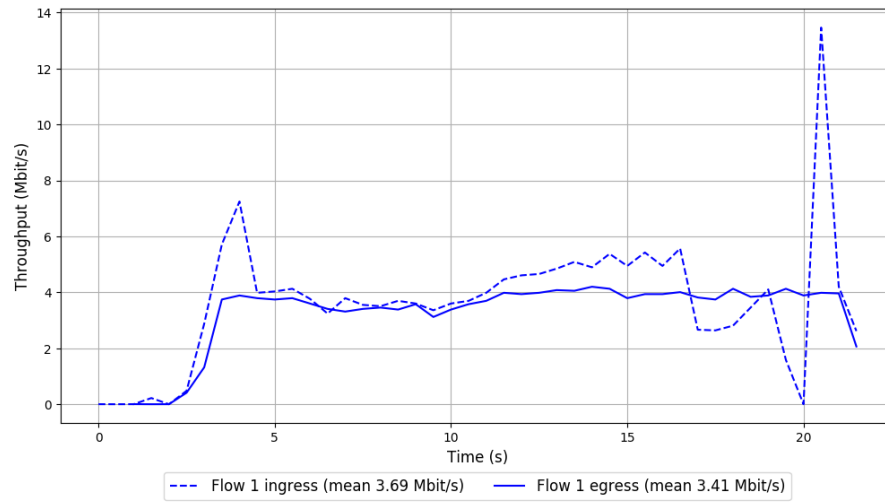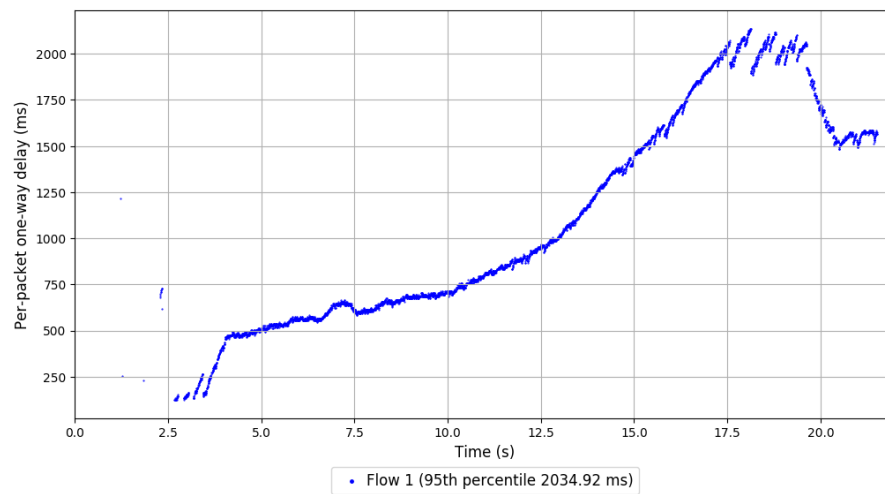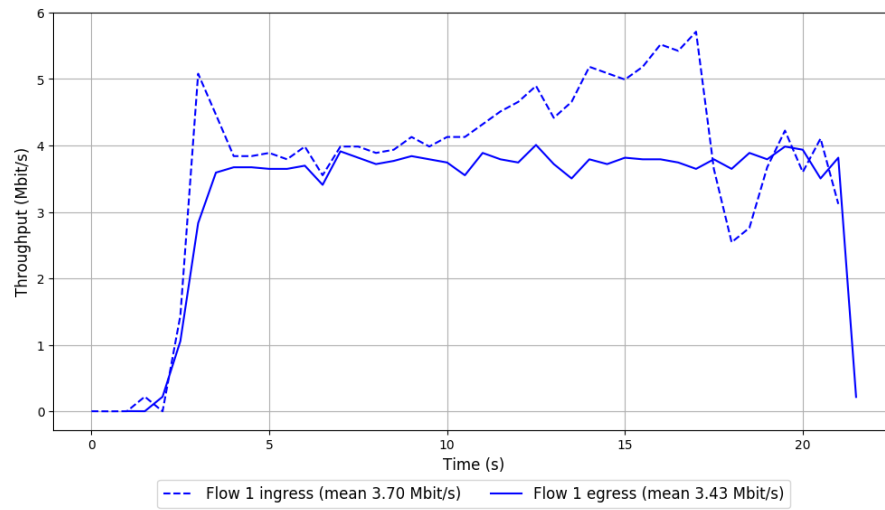
```
Run 2: Statistics of TCP Cubic

Start at: 2017-09-22 10:50:18
End at: 2017-09-22 10:50:48
Local clock offset: 0.051 ms
Remote clock offset: 3.777 ms
```

Run 2: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 3.69 Mbit/s)   Flow 1 egress (mean 3.41 Mbit/s)

Flow 1 (95th percentile 1924.73 ms)

```
Run 3: Statistics of TCP Cubic

Start at: 2017-09-22 11:06:44
End at: 2017-09-22 11:07:14
Local clock offset: 0.046 ms
Remote clock offset: 8.483 ms
```

Run 3: Report of TCP Cubic — Data Link
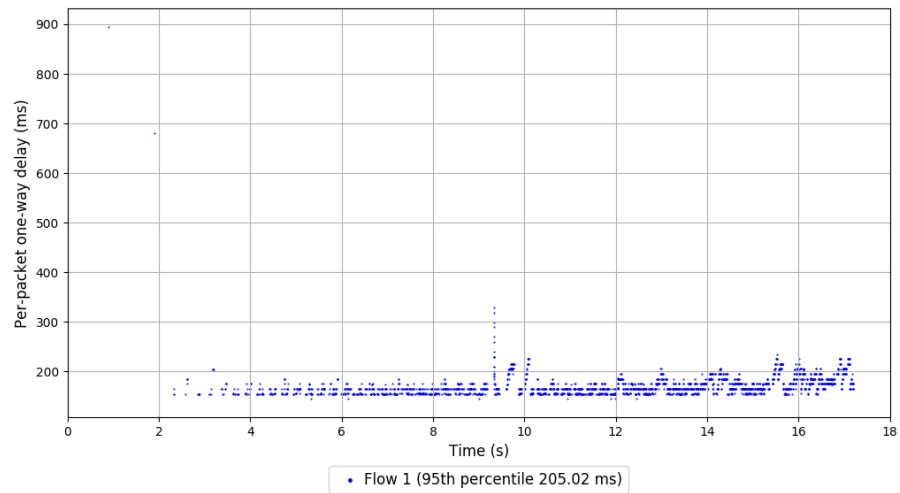
```
Run 1: Statistics of LEDBAT

Start at: 2017-09-22 10:43:11
End at: 2017-09-22 10:43:41
Local clock offset: -0.031 ms
Remote clock offset: 11.803 ms
```
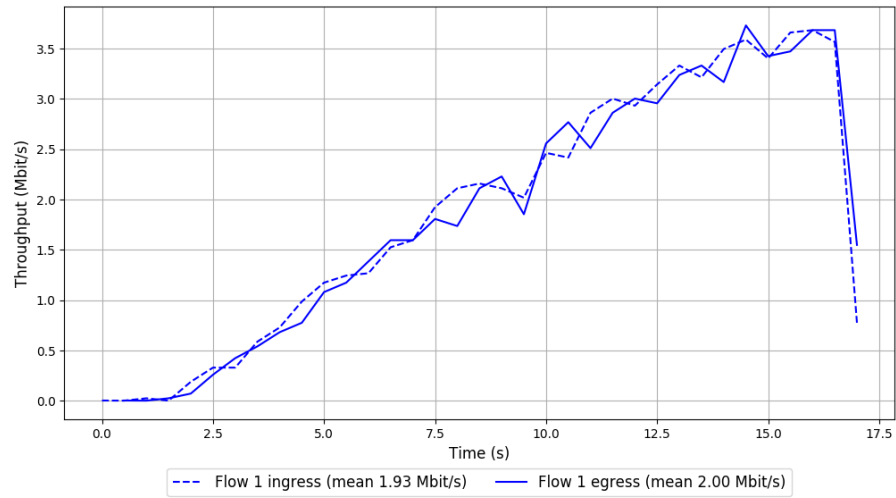
Run 1: Report of LEDBAT — Data Link

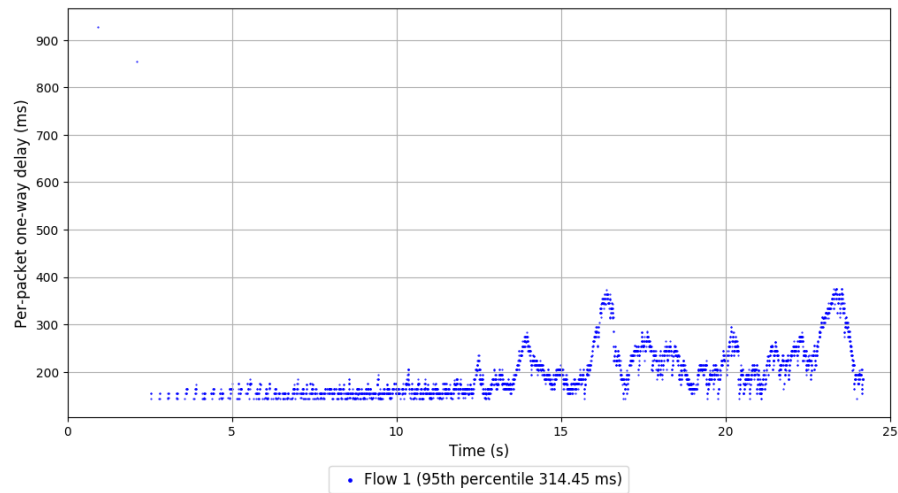Flow 1 ingress (mean 1.93 Mbit/s) --- Flow 1 egress (mean 2.00 Mbit/s)

• Flow 1 (95th percentile 205.02 ms)
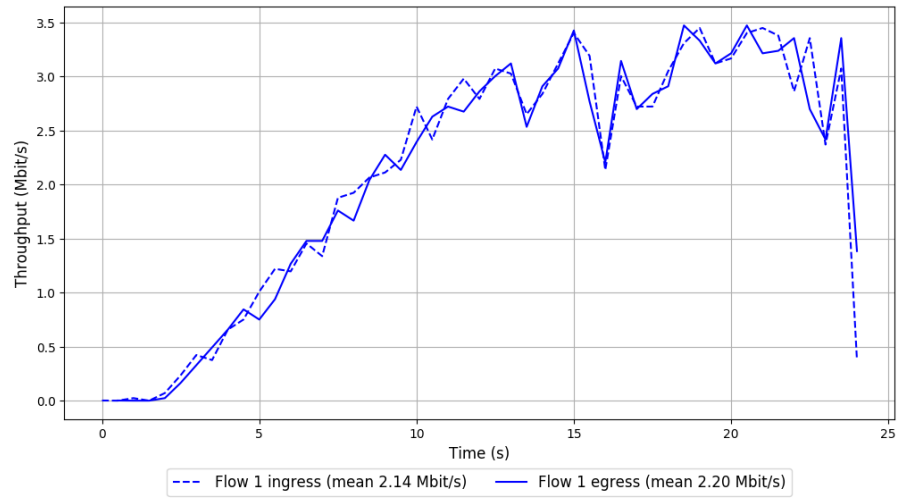
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```
Run 2: Statistics of LEDBAT

Start at: 2017-09-22 10:59:41
End at: 2017-09-22 11:00:11
Local clock offset: 0.023 ms
Remote clock offset: 8.575 ms
```

Run 2: Report of LEDBAT — Data Link

```
Run 3: Statistics of LEDBAT

Start at: 2017-09-22 11:16:08
End at: 2017-09-22 11:16:38
Local clock offset: 0.023 ms
Remote clock offset: 8.698 ms


# Below is generated by plot.py at 2017-09-22 11:21:07
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.51 Mbit/s
95th percentile per-packet one-way delay: 281.889 ms
Loss rate: 0.73%
-- Flow 1:
Average throughput: 2.51 Mbit/s
95th percentile per-packet one-way delay: 281.889 ms
Loss rate: 0.73%
```
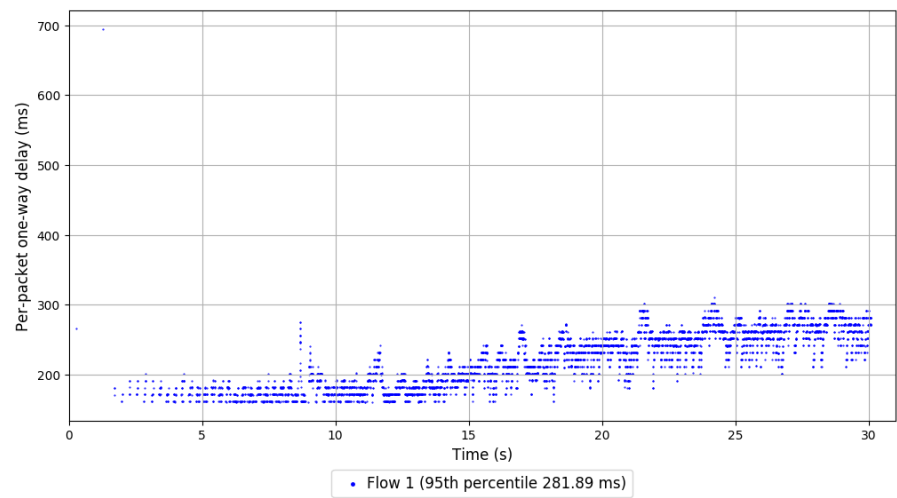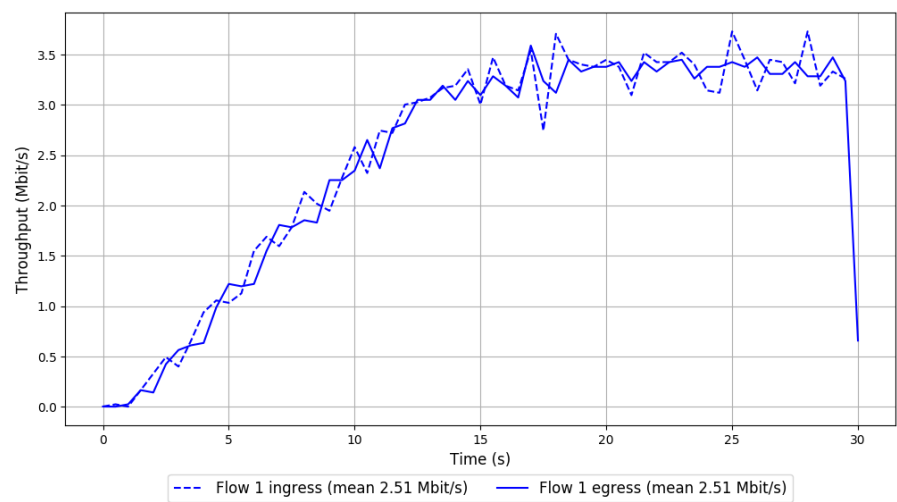
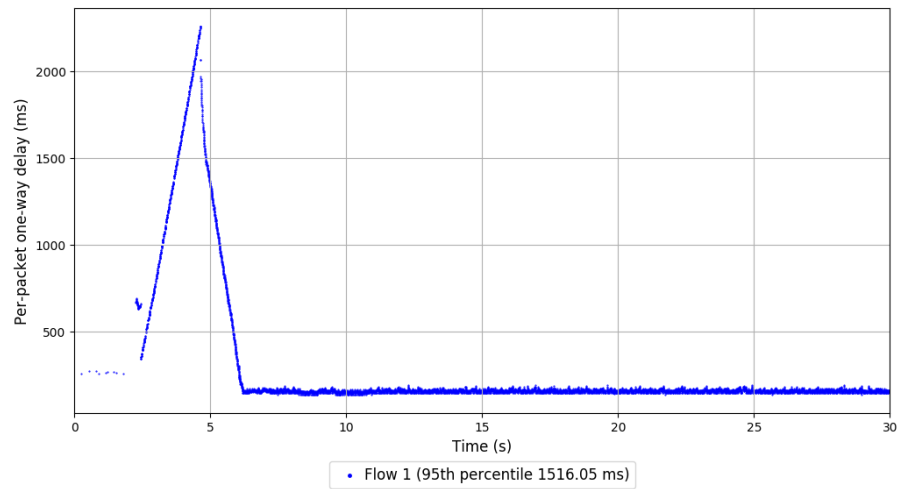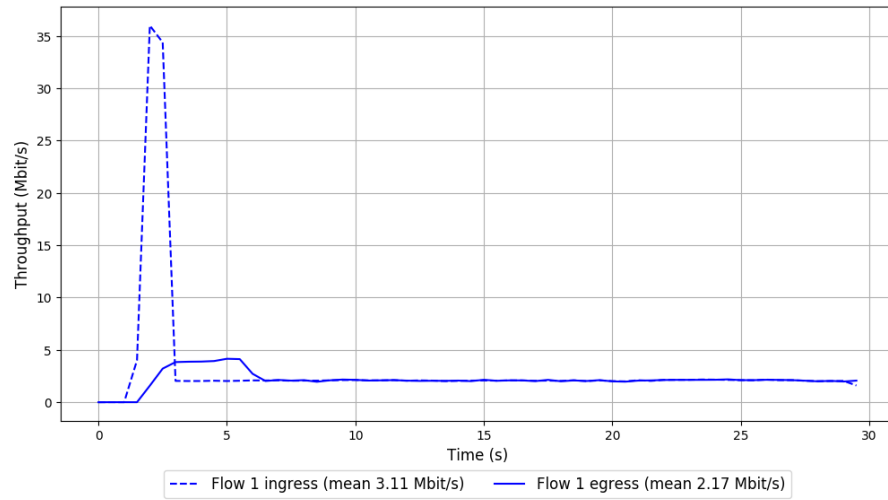Run 3: Report of LEDBAT — Data Link

```
Run 1: Statistics of PCC

Start at: 2017-09-22 10:42:01
End at: 2017-09-22 10:42:31
Local clock offset: 0.05 ms
Remote clock offset: 10.44 ms

# Below is generated by plot.py at 2017-09-22 11:21:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 1516.045 ms
Loss rate: 30.61%
-- Flow 1:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 1516.045 ms
Loss rate: 30.61%
```

Run 1: Report of PCC — Data Link

Flow 1 ingress (mean 3.11 Mbit/s)   Flow 1 egress (mean 2.17 Mbit/s)

Flow 1 (95th percentile 1516.05 ms)

```
Run 2: Statistics of PCC

Start at: 2017-09-22 10:58:31
End at: 2017-09-22 10:59:01
Local clock offset: -0.008 ms
Remote clock offset: 8.39 ms


# Below is generated by plot.py at 2017-09-22 11:21:13
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.24 Mbit/s
95th percentile per-packet one-way delay: 1479.086 ms
Loss rate: 29.15%
-- Flow 1:
Average throughput: 2.24 Mbit/s
95th percentile per-packet one-way delay: 1479.086 ms
Loss rate: 29.15%
```
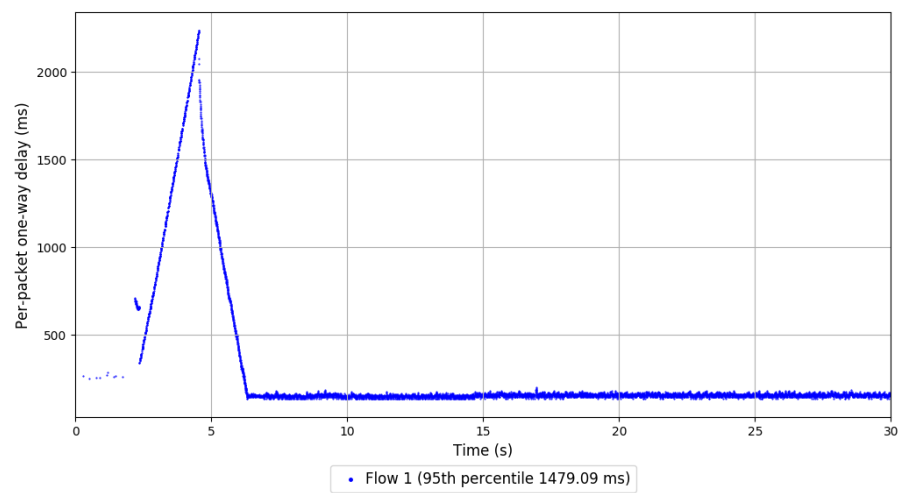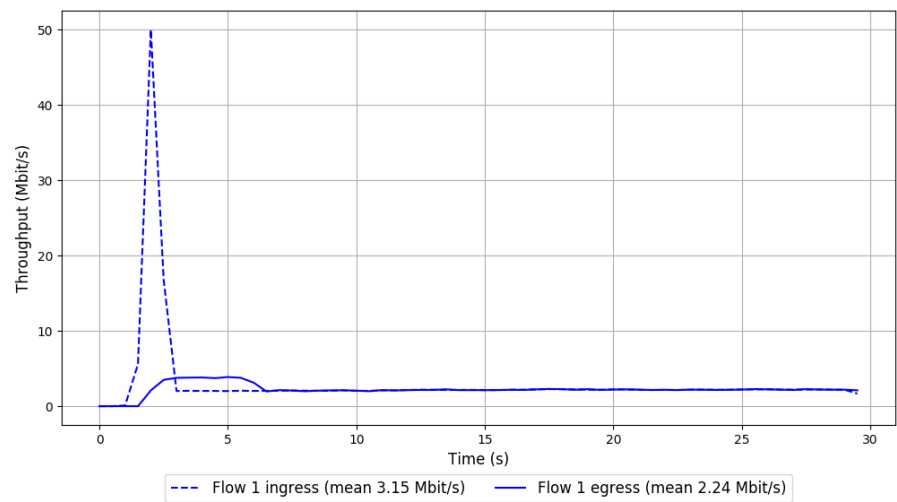
Run 2: Report of PCC — Data Link

Flow 1 ingress (mean 3.15 Mbit/s) --- Flow 1 egress (mean 2.24 Mbit/s)

• Flow 1 (95th percentile 1479.09 ms)

```
Run 3: Statistics of PCC

Start at: 2017-09-22 11:14:57
End at: 2017-09-22 11:15:27
Local clock offset: -0.03 ms
Remote clock offset: 3.588 ms


# Below is generated by plot.py at 2017-09-22 11:21:13
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 2818.865 ms
Loss rate: 31.50%
-- Flow 1:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 2818.865 ms
Loss rate: 31.50%
```
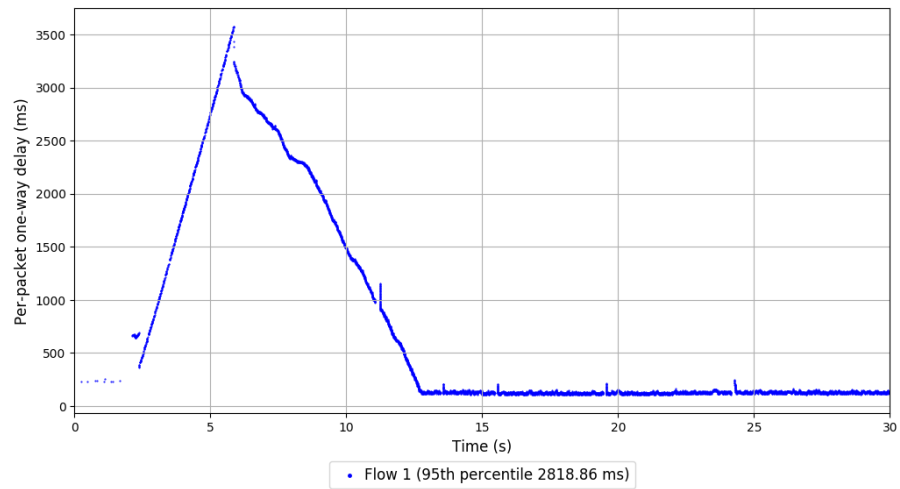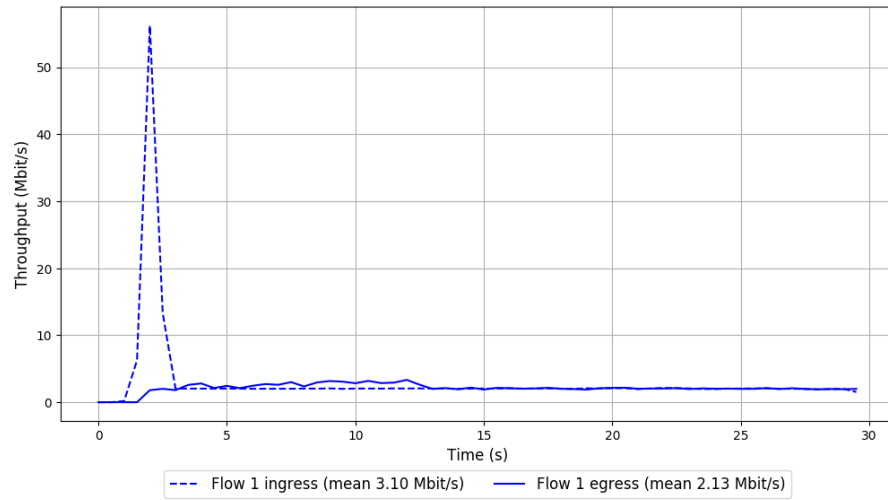
Run 3: Report of PCC — Data Link

Flow 1 ingress (mean 3.10 Mbit/s)   Flow 1 egress (mean 2.13 Mbit/s)

Flow 1 (95th percentile 2818.86 ms)

```
Run 1: Statistics of QUIC Cubic

Start at: 2017-09-22 10:44:22
End at: 2017-09-22 10:44:52
Local clock offset: 0.067 ms
Remote clock offset: 8.91 ms


# Below is generated by plot.py at 2017-09-22 11:21:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.73 Mbit/s
95th percentile per-packet one-way delay: 1119.868 ms
Loss rate: 4.05%
-- Flow 1:
Average throughput: 3.73 Mbit/s
95th percentile per-packet one-way delay: 1119.868 ms
Loss rate: 4.05%
```
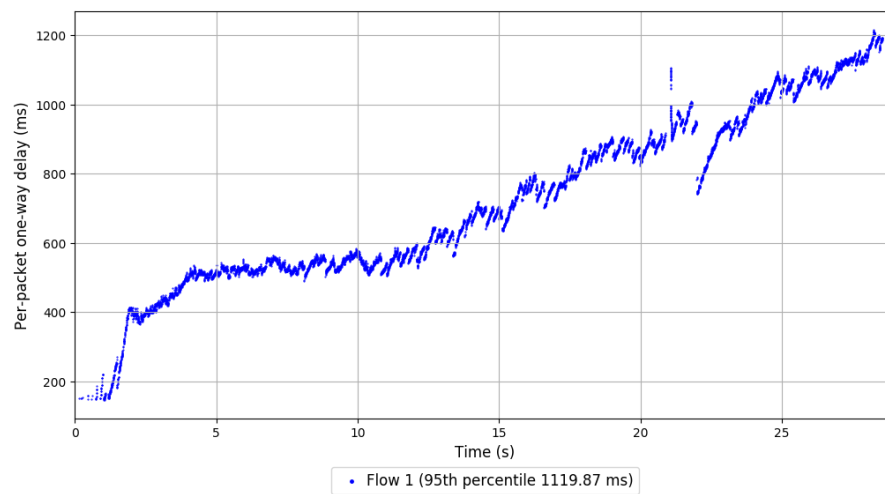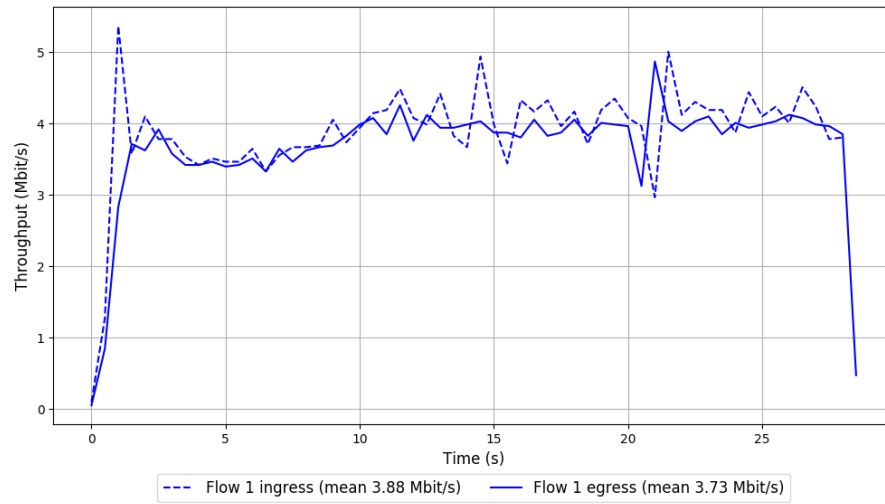
Run 1: Report of QUIC Cubic — Data Link

```
Run 2: Statistics of QUIC Cubic

Start at: 2017-09-22 11:00:52
End at: 2017-09-22 11:01:22
Local clock offset: 0.053 ms
Remote clock offset: 3.669 ms

# Below is generated by plot.py at 2017-09-22 11:21:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.07 Mbit/s
95th percentile per-packet one-way delay: 971.917 ms
Loss rate: 3.64%
-- Flow 1:
Average throughput: 3.07 Mbit/s
95th percentile per-packet one-way delay: 971.917 ms
Loss rate: 3.64%
```
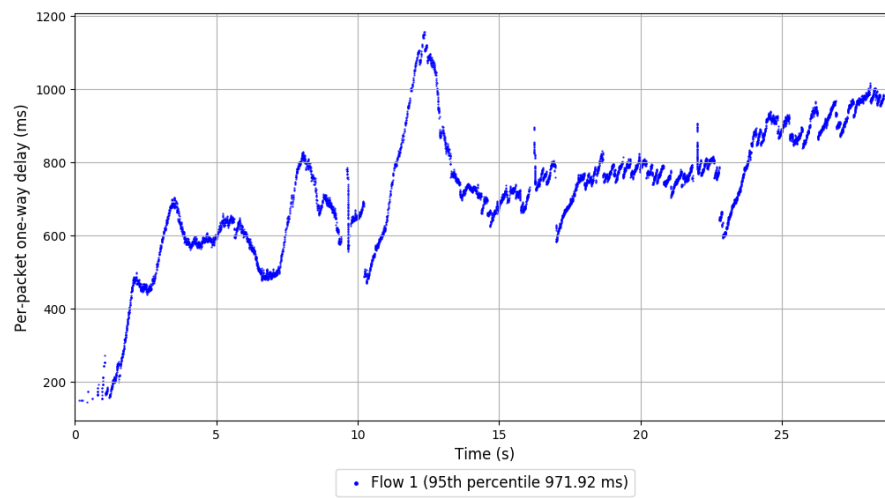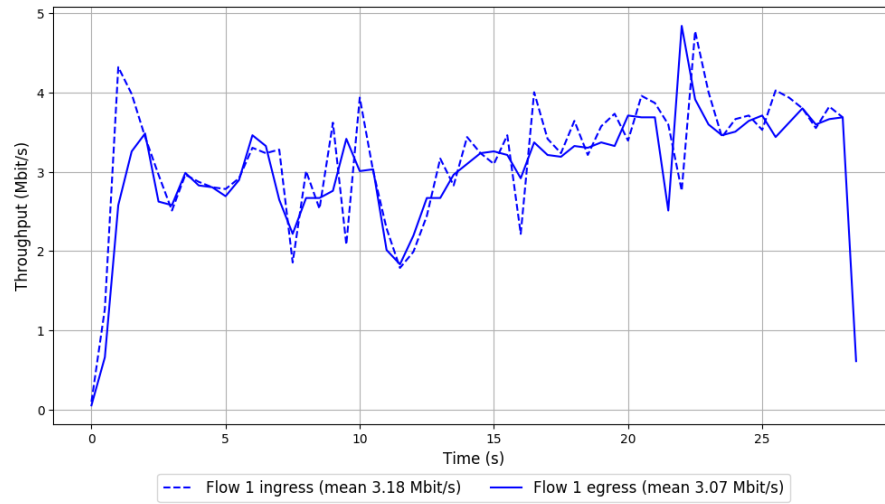
Run 2: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 3.18 Mbit/s) --- Flow 1 egress (mean 3.07 Mbit/s)

Flow 1 (95th percentile 971.92 ms)

```
Run 3: Statistics of QUIC Cubic

Start at: 2017-09-22 11:17:18
End at: 2017-09-22 11:17:48
Local clock offset: -0.038 ms
Remote clock offset: 3.637 ms


# Below is generated by plot.py at 2017-09-22 11:21:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.10 Mbit/s
95th percentile per-packet one-way delay: 1150.925 ms
Loss rate: 3.85%
-- Flow 1:
Average throughput: 3.10 Mbit/s
95th percentile per-packet one-way delay: 1150.925 ms
Loss rate: 3.85%
```
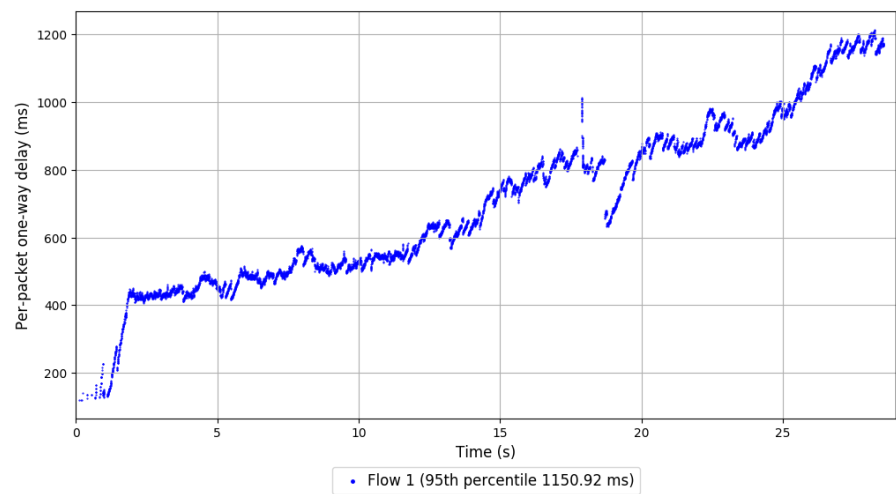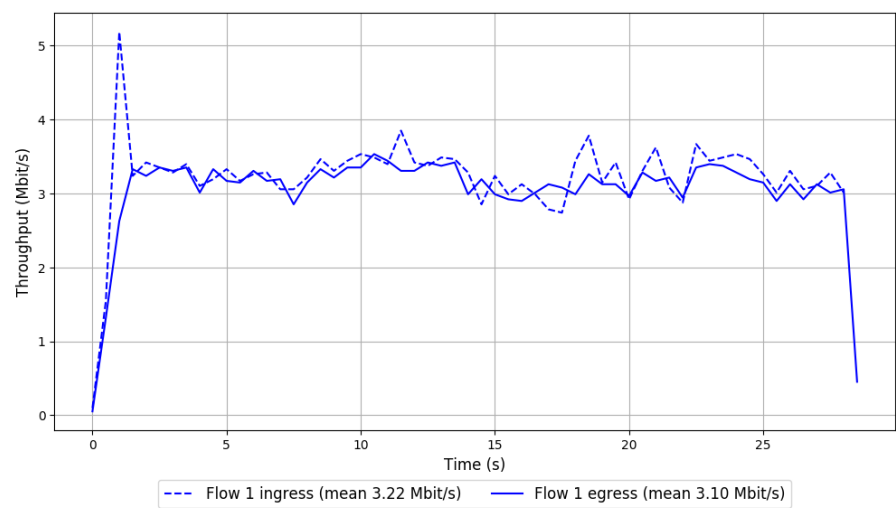
Run 3: Report of QUIC Cubic — Data Link

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

• Flow 1 (95th percentile 1150.92 ms)

```
Run 1: Statistics of SCReAM

Start at: 2017-09-22 10:34:56
End at: 2017-09-22 10:35:26
Local clock offset: -0.004 ms
Remote clock offset: 2.965 ms


# Below is generated by plot.py at 2017-09-22 11:21:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 138.916 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 138.916 ms
Loss rate: 0.13%
```
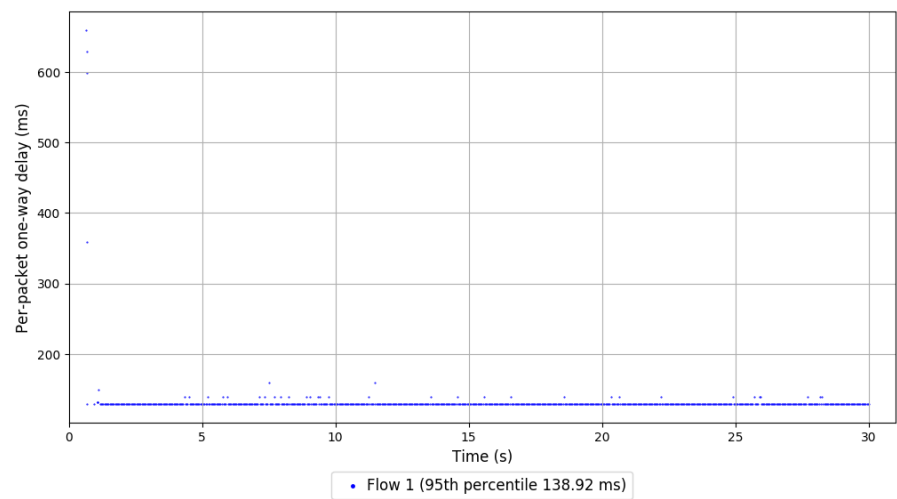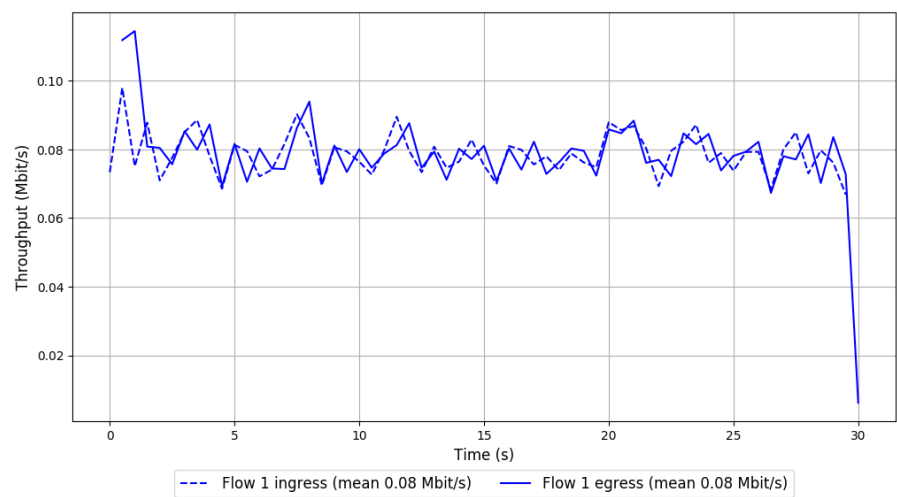
Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2017-09-22 10:51:28
End at: 2017-09-22 10:51:58
Local clock offset: 0.047 ms
Remote clock offset: 3.628 ms


# Below is generated by plot.py at 2017-09-22 11:21:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 159.814 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 159.814 ms
Loss rate: 0.13%
```
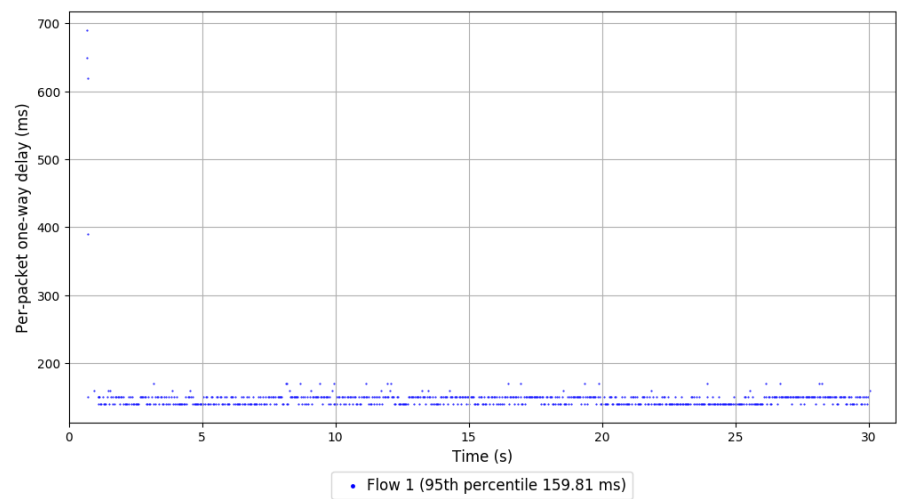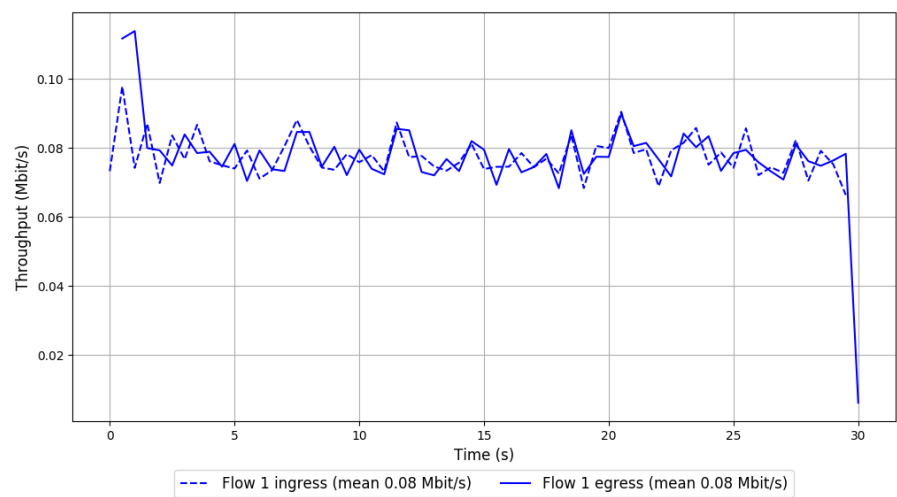
Run 2: Report of SCReAM — Data Link

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

Flow 1 (95th percentile 159.81 ms)

```
Run 3: Statistics of SCReAM

Start at: 2017-09-22 11:07:55
End at: 2017-09-22 11:08:25
Local clock offset: 0.021 ms
Remote clock offset: 3.588 ms

# Below is generated by plot.py at 2017-09-22 11:21:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 140.133 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 140.133 ms
Loss rate: 0.13%
```
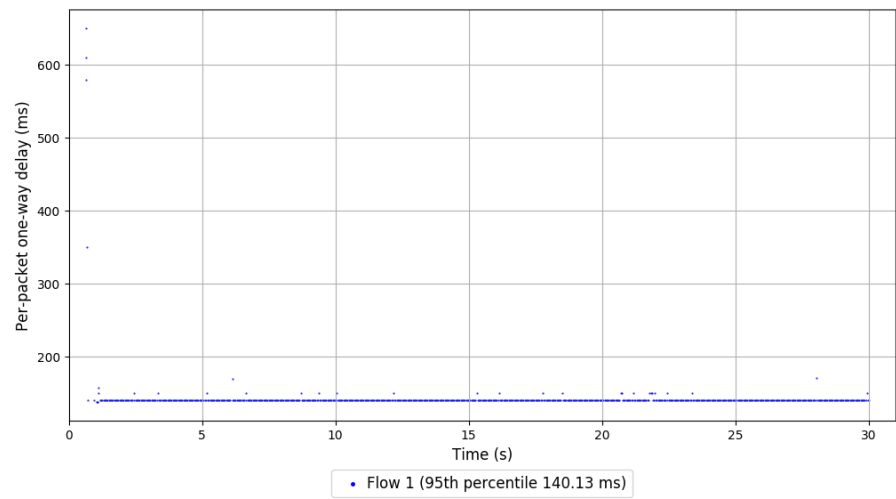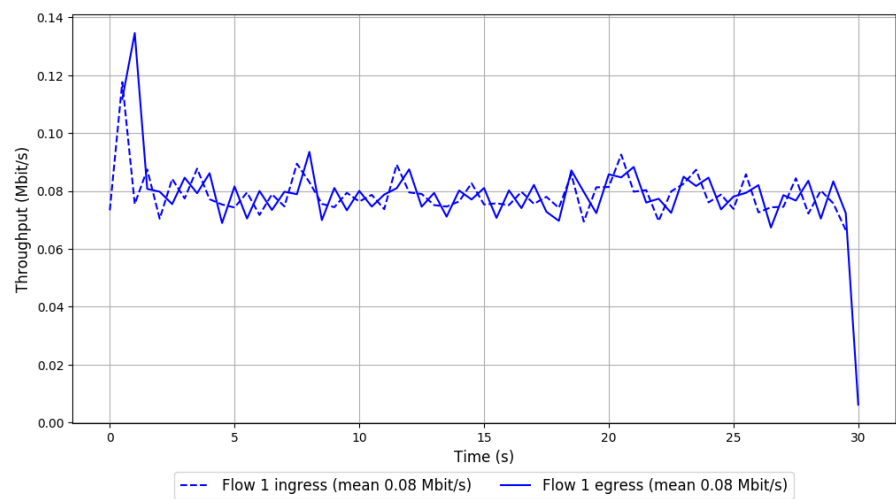
Run 3: Report of SCReAM — Data Link

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

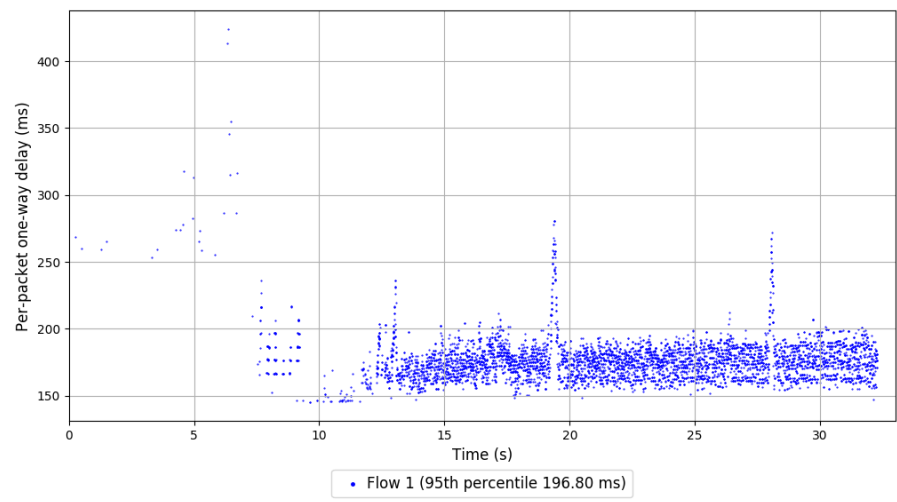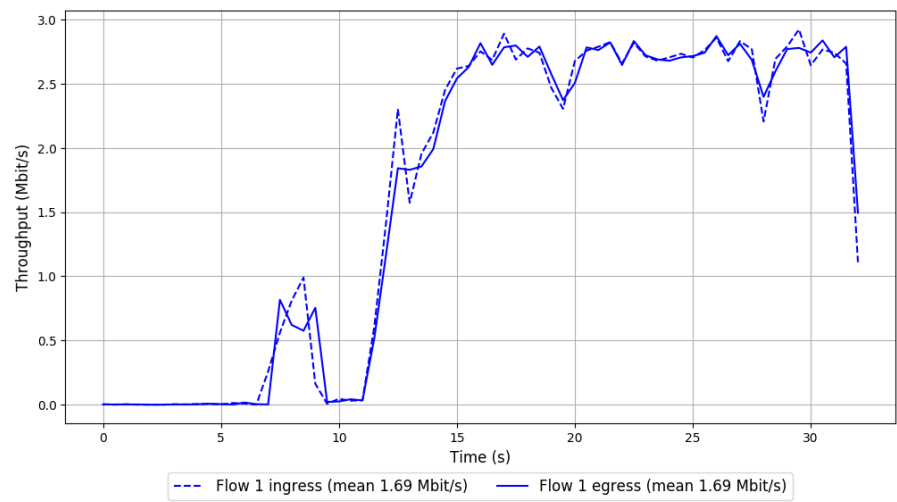Flow 1 (95th percentile 140.13 ms)

```
Run 1: Statistics of WebRTC media

Start at: 2017-09-22 10:46:45
End at: 2017-09-22 10:47:15
Local clock offset: -0.004 ms
Remote clock offset: 11.106 ms


# Below is generated by plot.py at 2017-09-22 11:21:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.69 Mbit/s
95th percentile per-packet one-way delay: 196.796 ms
Loss rate: 0.41%
-- Flow 1:
Average throughput: 1.69 Mbit/s
95th percentile per-packet one-way delay: 196.796 ms
Loss rate: 0.41%
```

Run 1: Report of WebRTC media — Data Link

```
Run 2: Statistics of WebRTC media

Start at: 2017-09-22 11:03:13
End at: 2017-09-22 11:03:43
Local clock offset: 0.065 ms
Remote clock offset: 3.609 ms


# Below is generated by plot.py at 2017-09-22 11:21:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.82 Mbit/s
95th percentile per-packet one-way delay: 181.780 ms
Loss rate: 0.28%
-- Flow 1:
Average throughput: 1.82 Mbit/s
95th percentile per-packet one-way delay: 181.780 ms
Loss rate: 0.28%
```
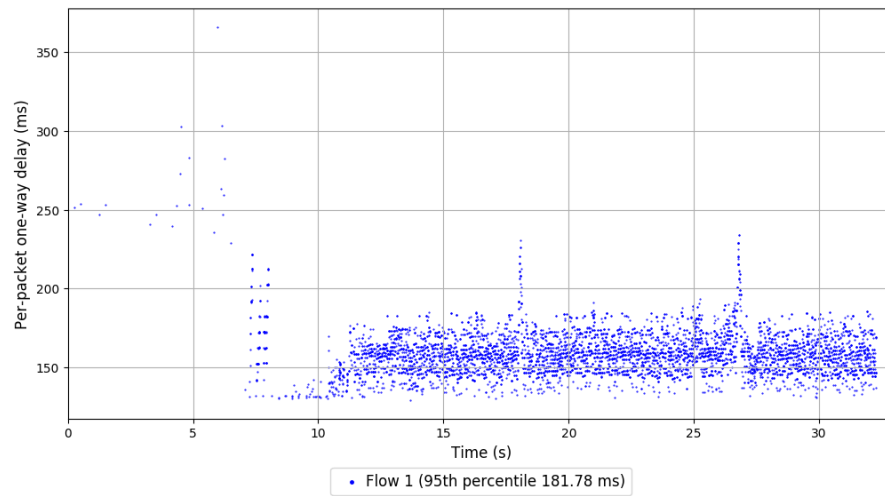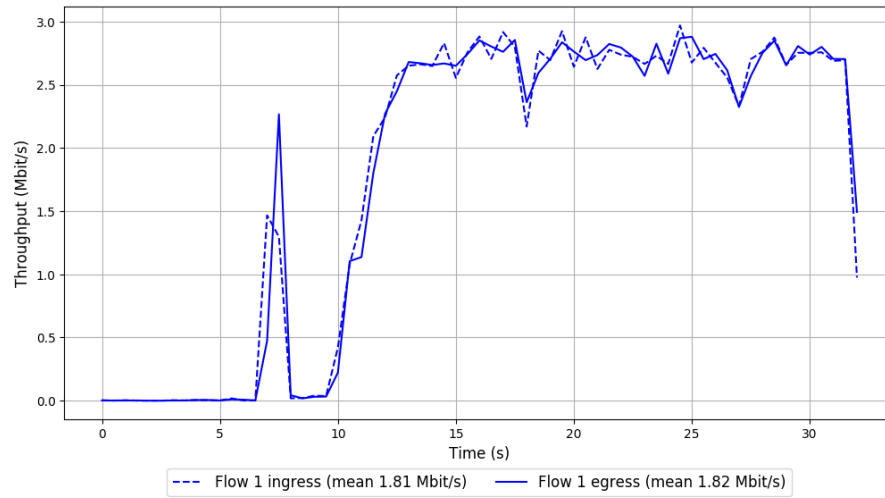
Run 2: Report of WebRTC media — Data Link

Flow 1 ingress (mean 1.81 Mbit/s) --- Flow 1 egress (mean 1.82 Mbit/s)

Flow 1 (95th percentile 181.78 ms)

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```
Run 3: Statistics of WebRTC media

Start at: 2017-09-22 11:19:39
End at: 2017-09-22 11:20:09
Local clock offset: 0.036 ms
Remote clock offset: 3.735 ms


# Below is generated by plot.py at 2017-09-22 11:21:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.29 Mbit/s
95th percentile per-packet one-way delay: 309.537 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 1.29 Mbit/s
95th percentile per-packet one-way delay: 309.537 ms
Loss rate: 0.29%
```
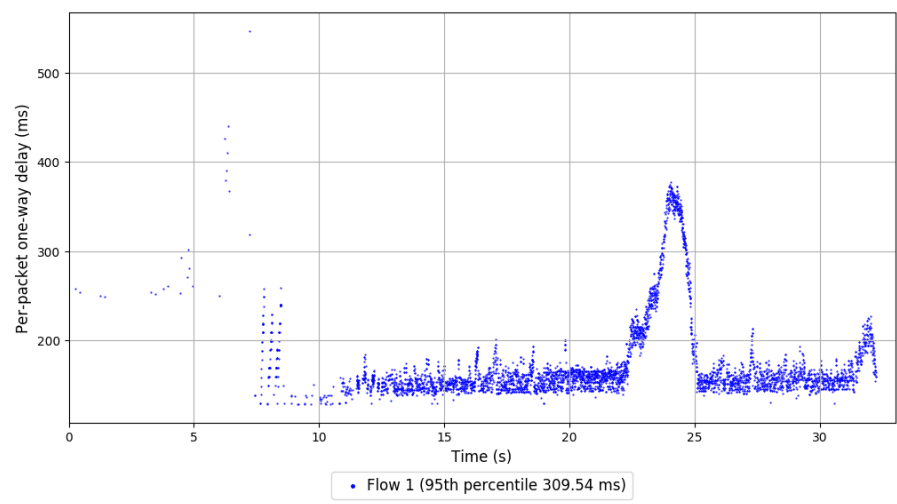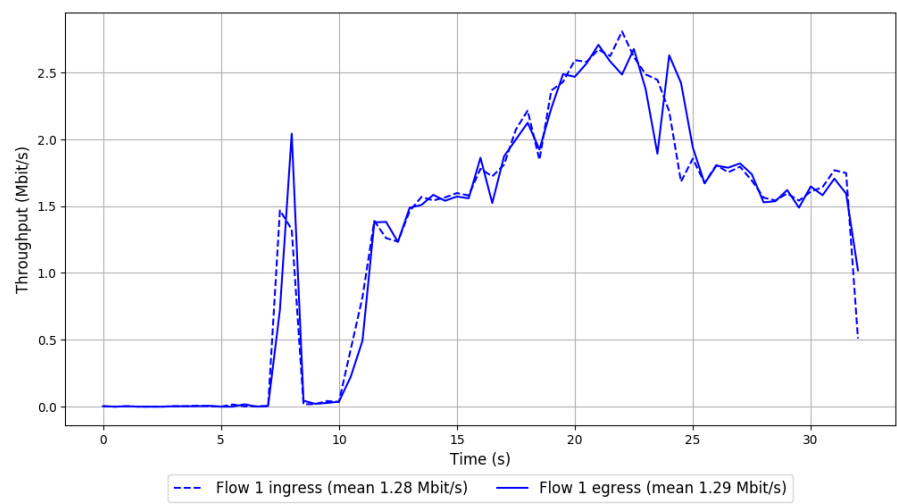
Run 3: Report of WebRTC media — Data Link

Flow 1 ingress (mean 1.28 Mbit/s)   Flow 1 egress (mean 1.29 Mbit/s)

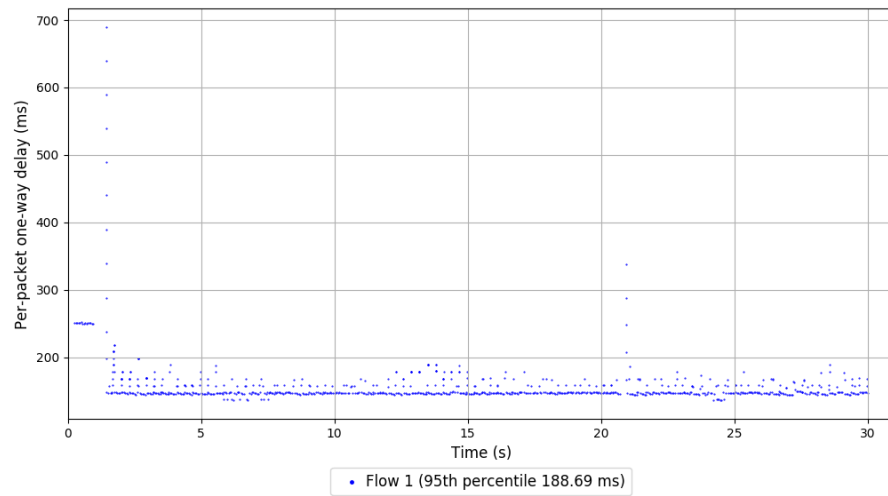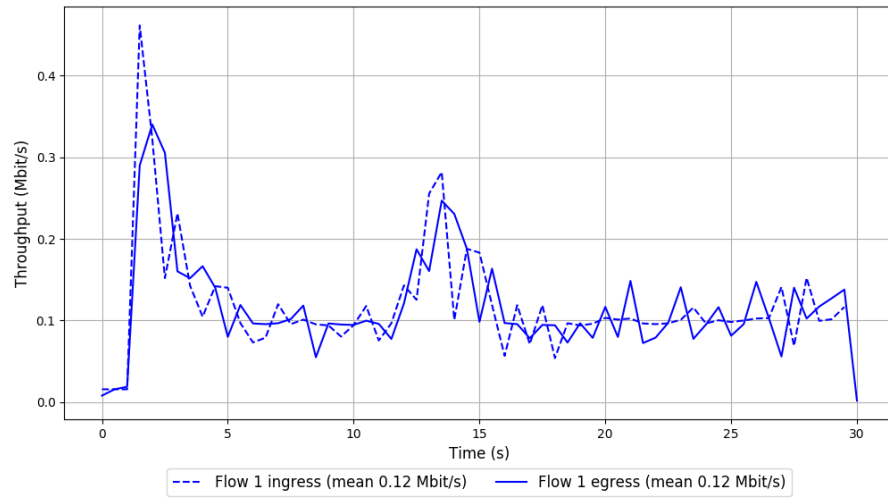

Flow 1 (95th percentile 309.54 ms)

```
Run 1: Statistics of Sprout

Start at: 2017-09-22 10:32:35
End at: 2017-09-22 10:33:05
Local clock offset: -0.023 ms
Remote clock offset: 12.901 ms


# Below is generated by plot.py at 2017-09-22 11:21:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 188.686 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 188.686 ms
Loss rate: 0.03%
```

Run 1: Report of Sprout — Data Link

```
Run 2: Statistics of Sprout

Start at: 2017-09-22 10:49:08
End at: 2017-09-22 10:49:38
Local clock offset: 0.071 ms
Remote clock offset: 9.926 ms


# Below is generated by plot.py at 2017-09-22 11:21:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 164.135 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 164.135 ms
Loss rate: 0.02%
```
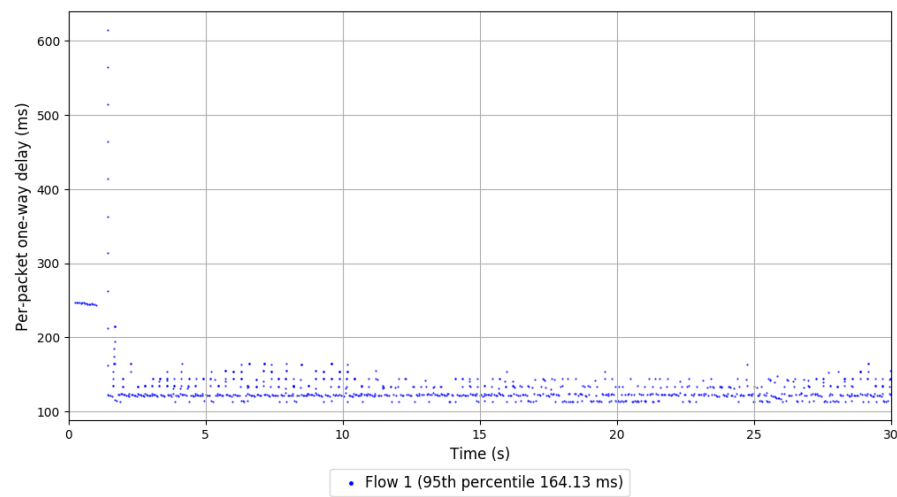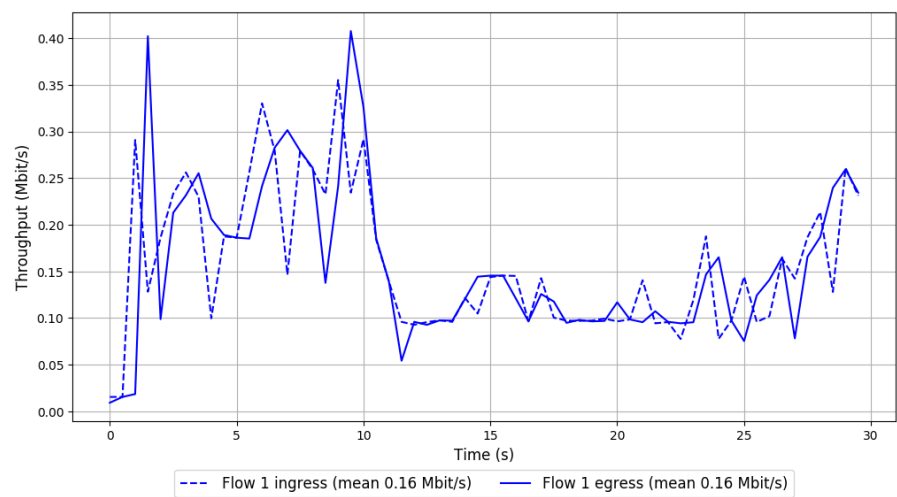
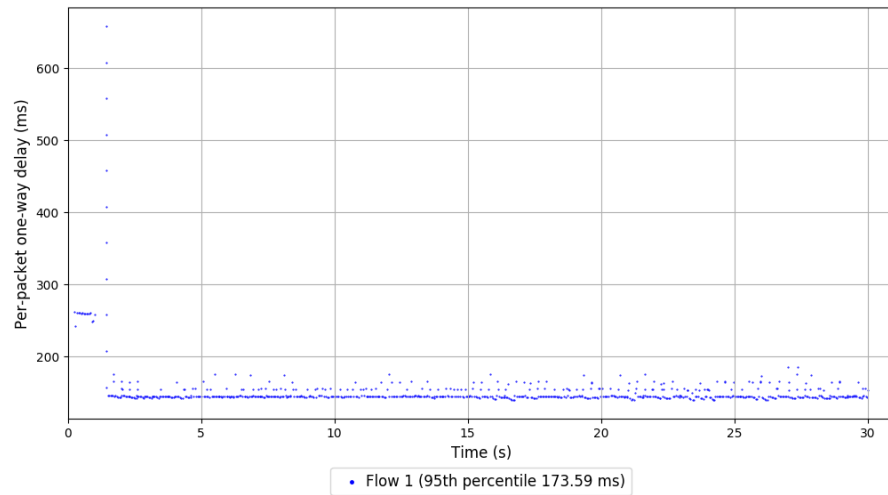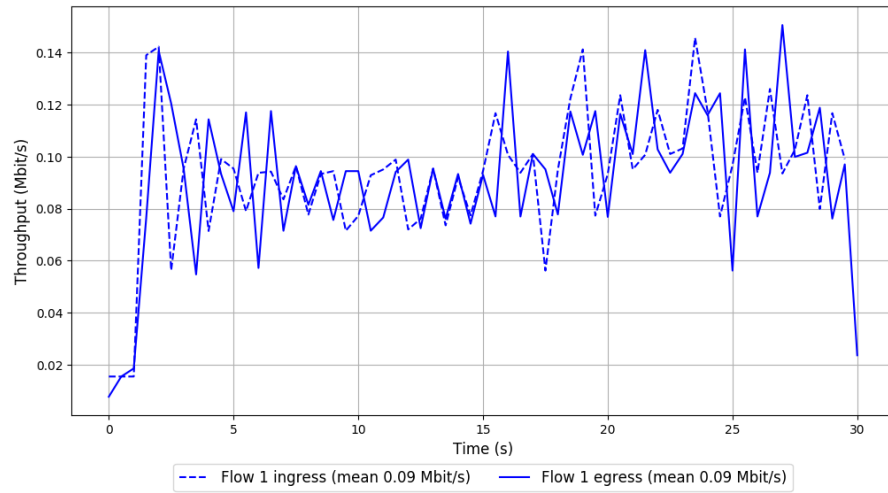Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2017-09-22 11:05:34
End at: 2017-09-22 11:06:04
Local clock offset: 0.043 ms
Remote clock offset: 3.579 ms


# Below is generated by plot.py at 2017-09-22 11:21:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 173.593 ms
Loss rate: 0.42%
-- Flow 1:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 173.593 ms
Loss rate: 0.42%
```

Run 3: Report of Sprout — Data Link

Flow 1 ingress (mean 0.09 Mbit/s) --- Flow 1 egress (mean 0.09 Mbit/s)

Flow 1 (95th percentile 173.59 ms)

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

Start at: 2017-09-22 10:45:33
End at: 2017-09-22 10:46:03
Local clock offset: 0.057 ms
Remote clock offset: 7.794 ms


# Below is generated by plot.py at 2017-09-22 11:21:24
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 190.307 ms
Loss rate: 0.63%
-- Flow 1:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 190.307 ms
Loss rate: 0.63%
```
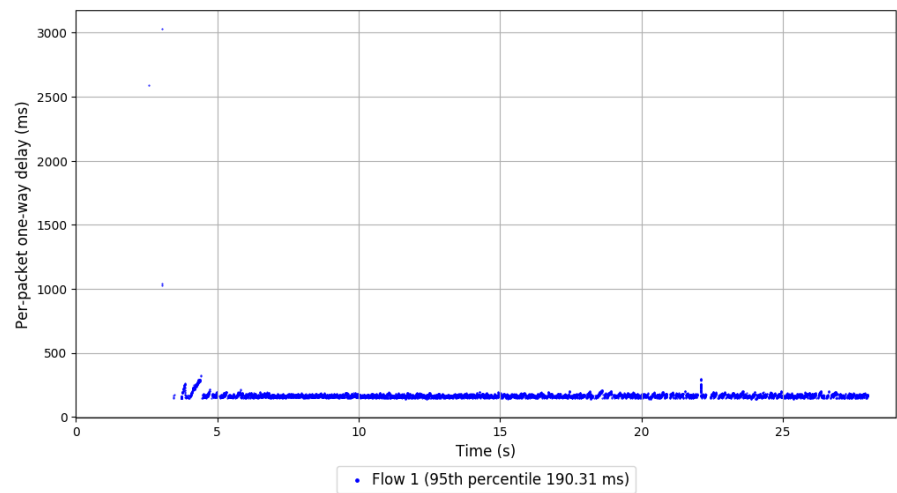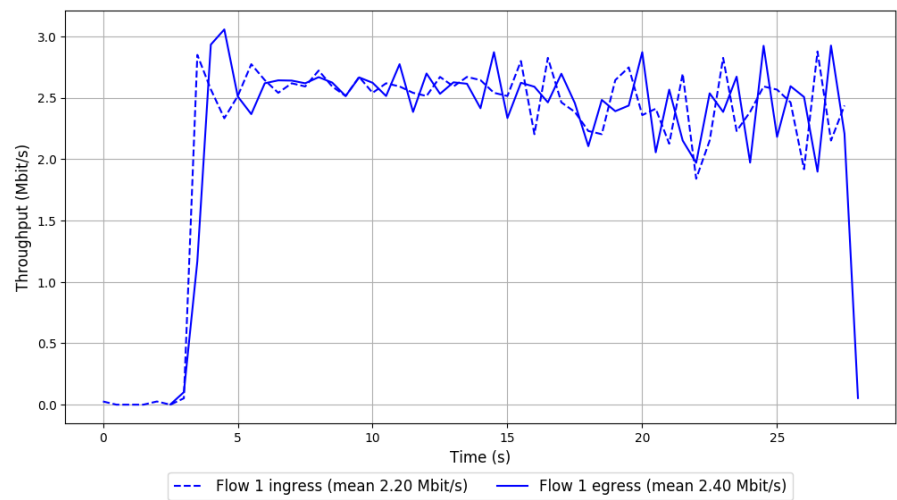
Run 1: Report of TaoVA-100x — Data Link

Flow 1 ingress (mean 2.20 Mbit/s) --- Flow 1 egress (mean 2.40 Mbit/s)

Flow 1 (95th percentile 190.31 ms)

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

Start at: 2017-09-22 11:02:02
End at: 2017-09-22 11:02:32
Local clock offset: -0.038 ms
Remote clock offset: 3.782 ms


# Below is generated by plot.py at 2017-09-22 11:21:24
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 199.723 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 199.723 ms
Loss rate: 0.13%
```
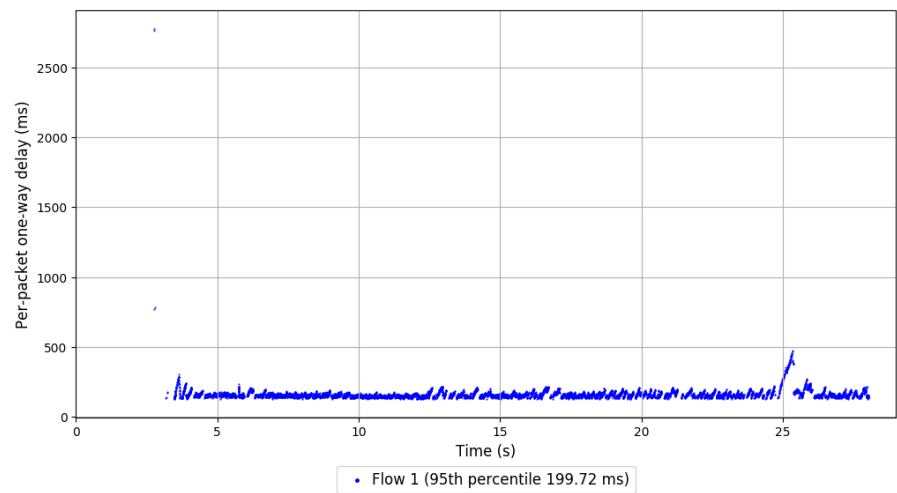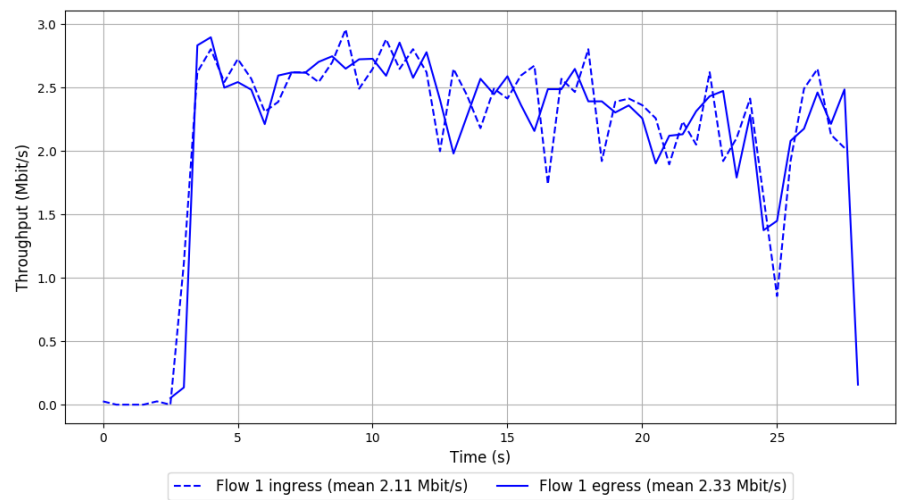
Run 2: Report of TaoVA-100x — Data Link

Flow 1 ingress (mean 2.11 Mbit/s) --- Flow 1 egress (mean 2.33 Mbit/s)

Flow 1 (95th percentile 199.72 ms)

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

Start at: 2017-09-22 11:18:29
End at: 2017-09-22 11:18:59
Local clock offset: 0.026 ms
Remote clock offset: 8.605 ms


# Below is generated by plot.py at 2017-09-22 11:21:25
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.29 Mbit/s
95th percentile per-packet one-way delay: 213.447 ms
Loss rate: 0.30%
-- Flow 1:
Average throughput: 2.29 Mbit/s
95th percentile per-packet one-way delay: 213.447 ms
Loss rate: 0.30%
```
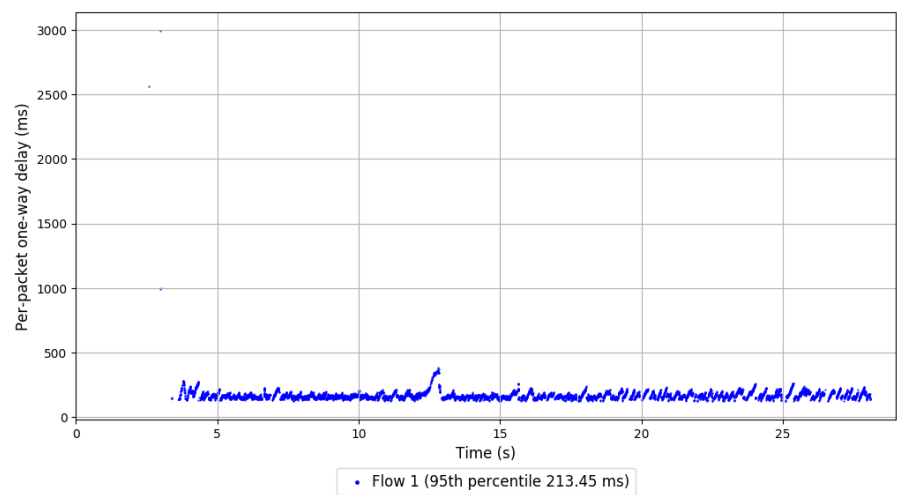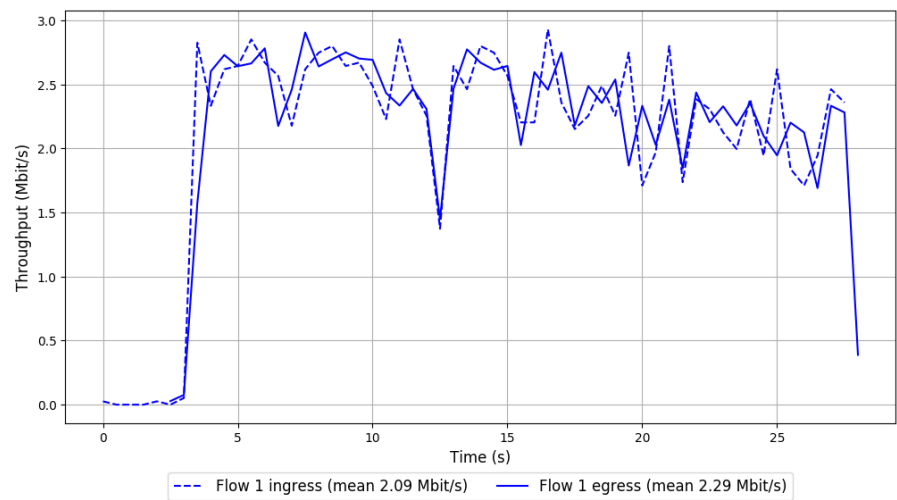
Run 3: Report of TaoVA-100x — Data Link

Flow 1 ingress (mean 2.09 Mbit/s)   Flow 1 egress (mean 2.29 Mbit/s)

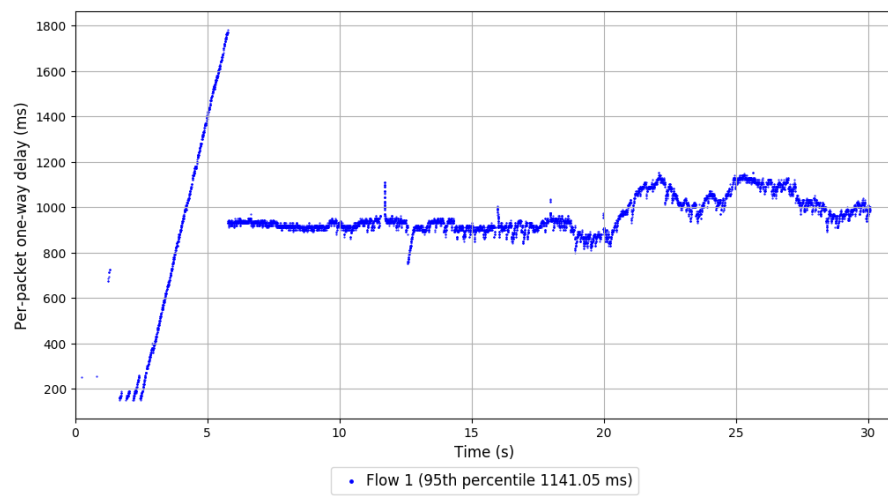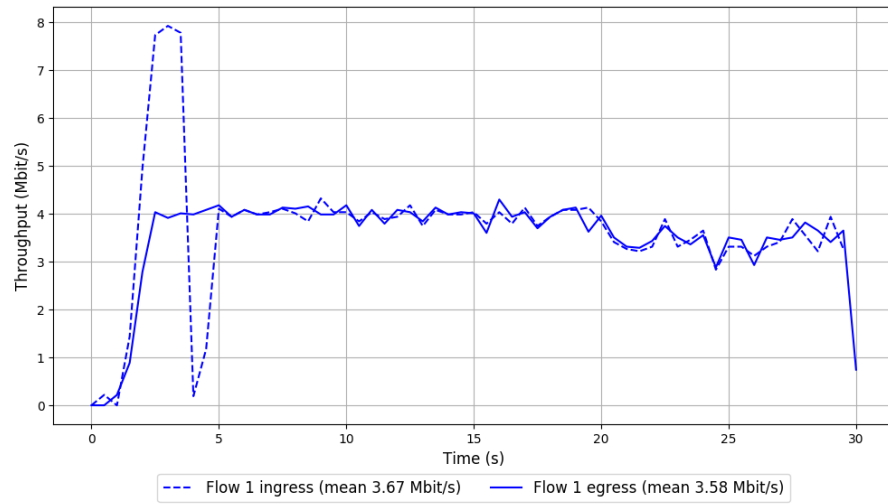Flow 1 (95th percentile 213.45 ms)

```
Run 1: Statistics of TCP Vegas

Start at: 2017-09-22 10:39:39
End at: 2017-09-22 10:40:09
Local clock offset: -0.029 ms
Remote clock offset: 15.279 ms


# Below is generated by plot.py at 2017-09-22 11:21:26
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.58 Mbit/s
95th percentile per-packet one-way delay: 1141.053 ms
Loss rate: 2.72%
-- Flow 1:
Average throughput: 3.58 Mbit/s
95th percentile per-packet one-way delay: 1141.053 ms
Loss rate: 2.72%
```

Run 1: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 3.67 Mbit/s) — — — Flow 1 egress (mean 3.58 Mbit/s)

• Flow 1 (95th percentile 1141.05 ms)

```
Run 2: Statistics of TCP Vegas

Start at: 2017-09-22 10:56:10
End at: 2017-09-22 10:56:40
Local clock offset: 0.009 ms
Remote clock offset: 3.768 ms


# Below is generated by plot.py at 2017-09-22 11:21:26
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.42 Mbit/s
95th percentile per-packet one-way delay: 1217.962 ms
Loss rate: 2.92%
-- Flow 1:
Average throughput: 3.42 Mbit/s
95th percentile per-packet one-way delay: 1217.962 ms
Loss rate: 2.92%
```
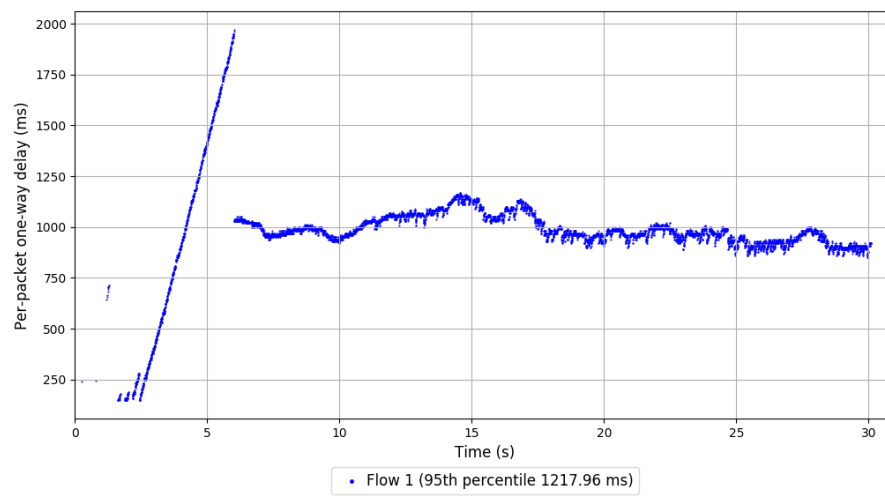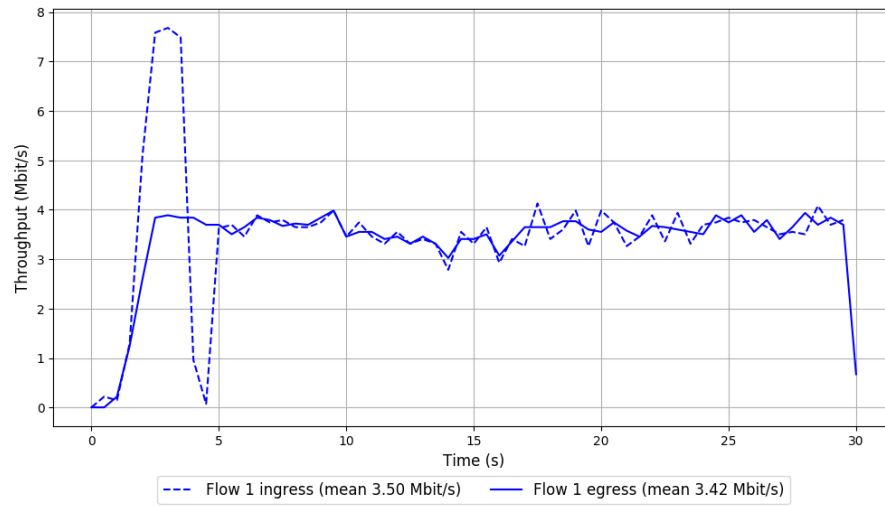
Run 2: Report of TCP Vegas — Data Link

```
Run 3: Statistics of TCP Vegas

Start at: 2017-09-22 11:12:36
End at: 2017-09-22 11:13:06
Local clock offset: 0.043 ms
Remote clock offset: 3.73 ms


# Below is generated by plot.py at 2017-09-22 11:21:26
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.30 Mbit/s
95th percentile per-packet one-way delay: 213.443 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 3.30 Mbit/s
95th percentile per-packet one-way delay: 213.443 ms
Loss rate: 0.15%
```
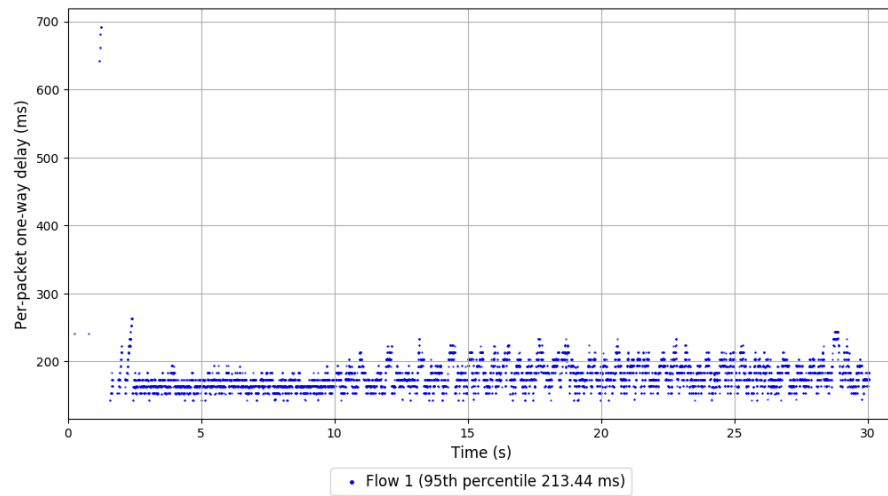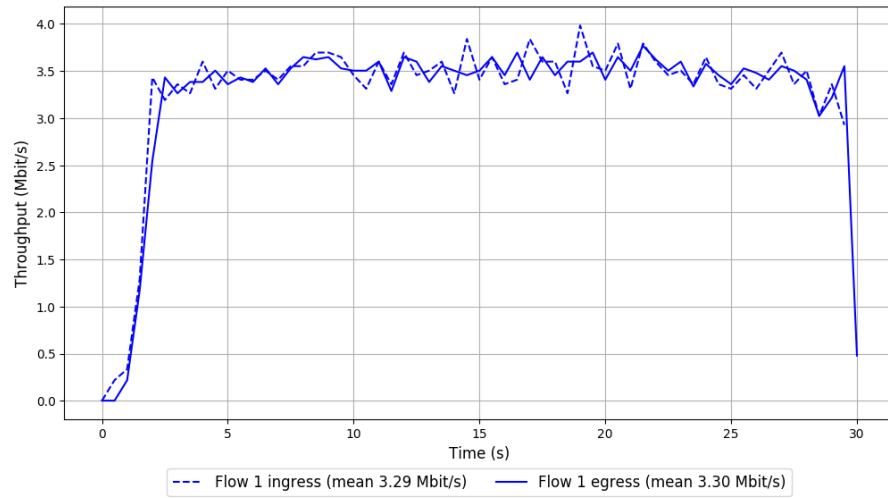
Run 3: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 3.29 Mbit/s)   Flow 1 egress (mean 3.30 Mbit/s)

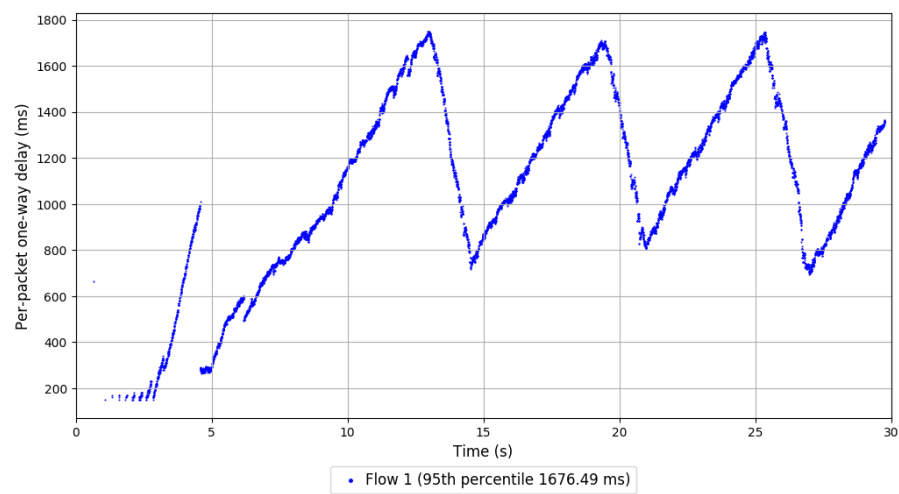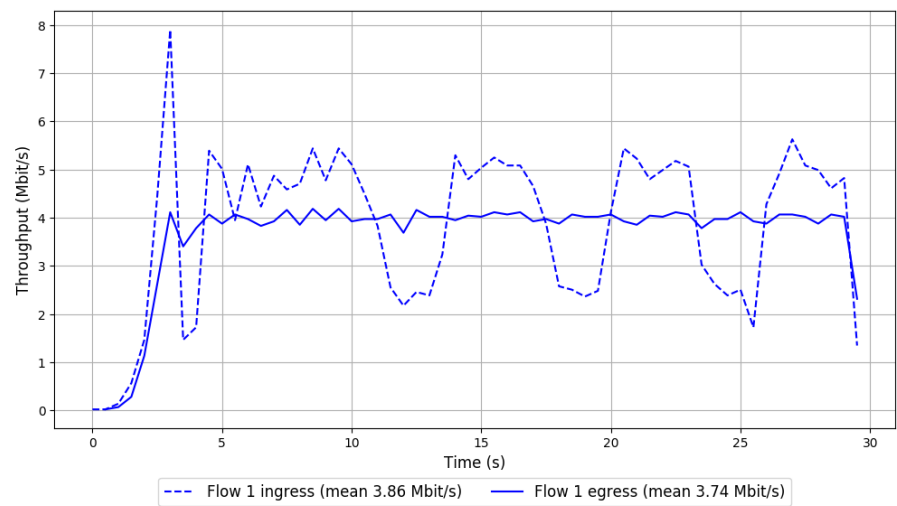• Flow 1 (95th percentile 213.44 ms)

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```
Run 1: Statistics of Verus

Start at: 2017-09-22 10:36:06
End at: 2017-09-22 10:36:36
Local clock offset: 0.033 ms
Remote clock offset: 16.618 ms


# Below is generated by plot.py at 2017-09-22 11:21:27
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.74 Mbit/s
95th percentile per-packet one-way delay: 1676.493 ms
Loss rate: 5.05%
-- Flow 1:
Average throughput: 3.74 Mbit/s
95th percentile per-packet one-way delay: 1676.493 ms
Loss rate: 5.05%
```

Run 1: Report of Verus — Data Link

```
Run 2: Statistics of Verus

Start at: 2017-09-22 10:52:38
End at: 2017-09-22 10:53:08
Local clock offset: -0.033 ms
Remote clock offset: 8.481 ms


# Below is generated by plot.py at 2017-09-22 11:21:27
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.01 Mbit/s
95th percentile per-packet one-way delay: 1958.962 ms
Loss rate: 3.80%
-- Flow 1:
Average throughput: 3.01 Mbit/s
95th percentile per-packet one-way delay: 1958.962 ms
Loss rate: 3.80%
```
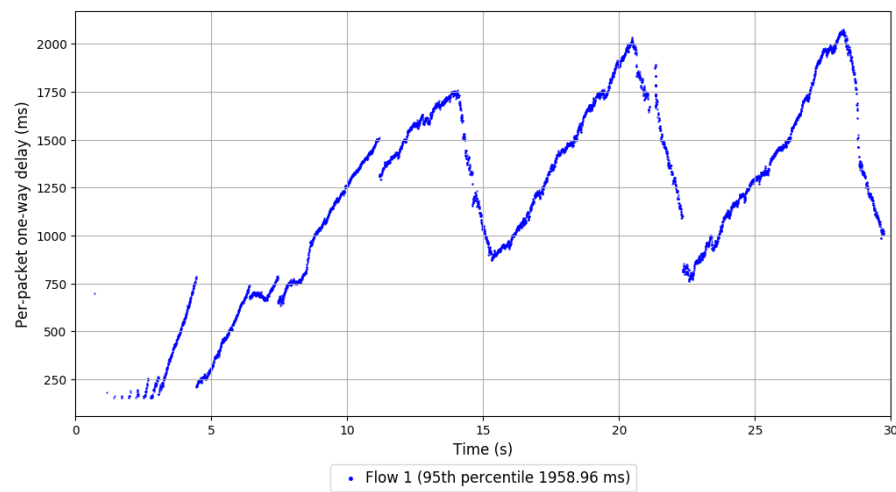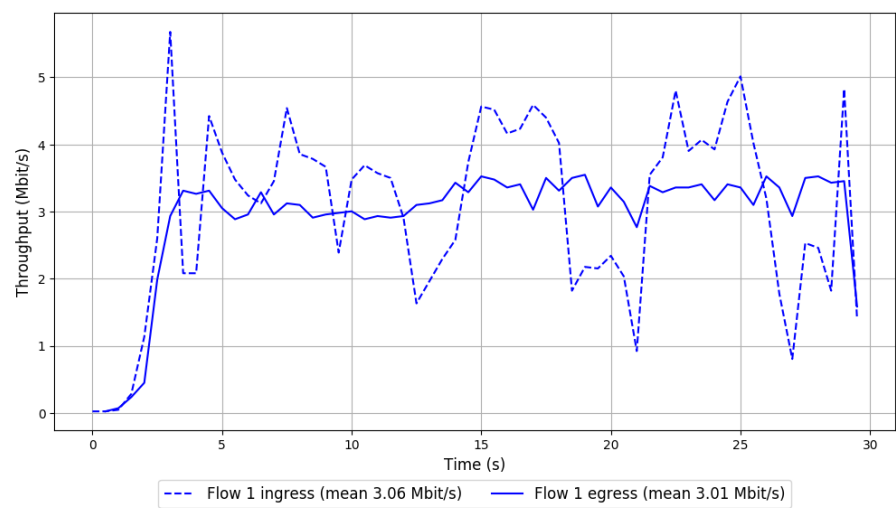
Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2017-09-22 11:09:05
End at: 2017-09-22 11:09:35
Local clock offset: 0.02 ms
Remote clock offset: 8.599 ms


# Below is generated by plot.py at 2017-09-22 11:21:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.47 Mbit/s
95th percentile per-packet one-way delay: 1967.454 ms
Loss rate: 14.12%
-- Flow 1:
Average throughput: 3.47 Mbit/s
95th percentile per-packet one-way delay: 1967.454 ms
Loss rate: 14.12%
```
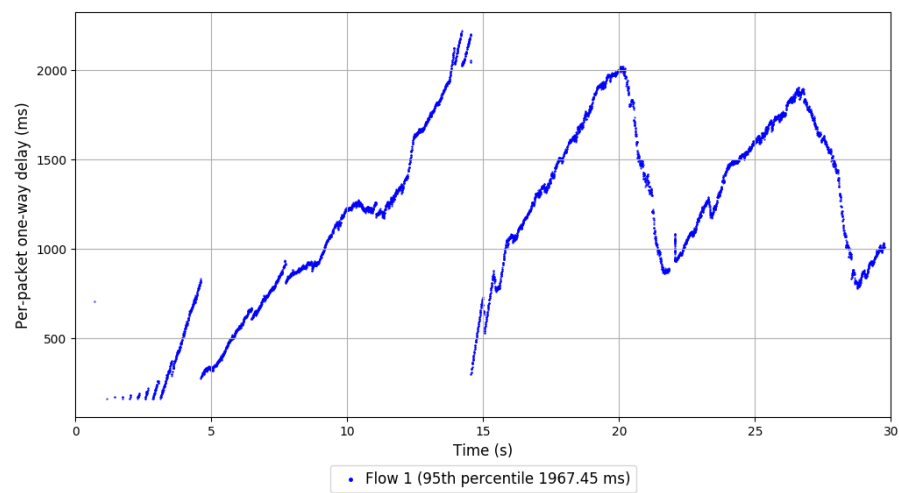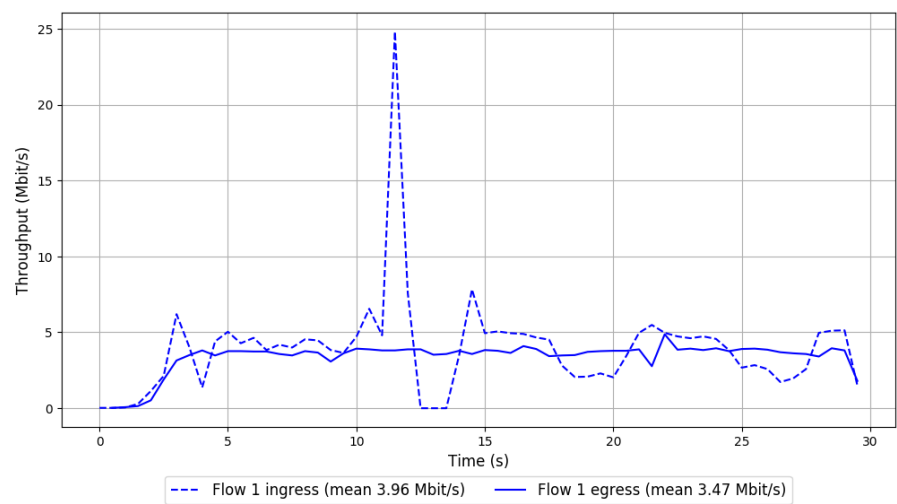
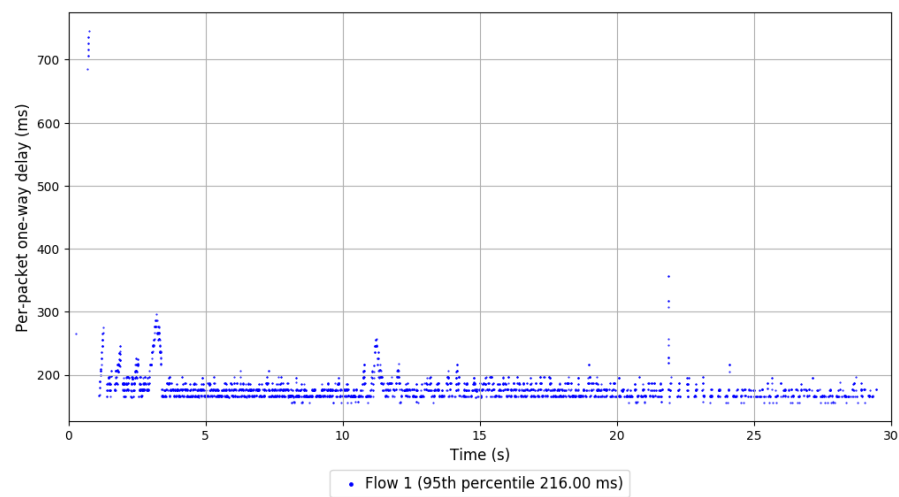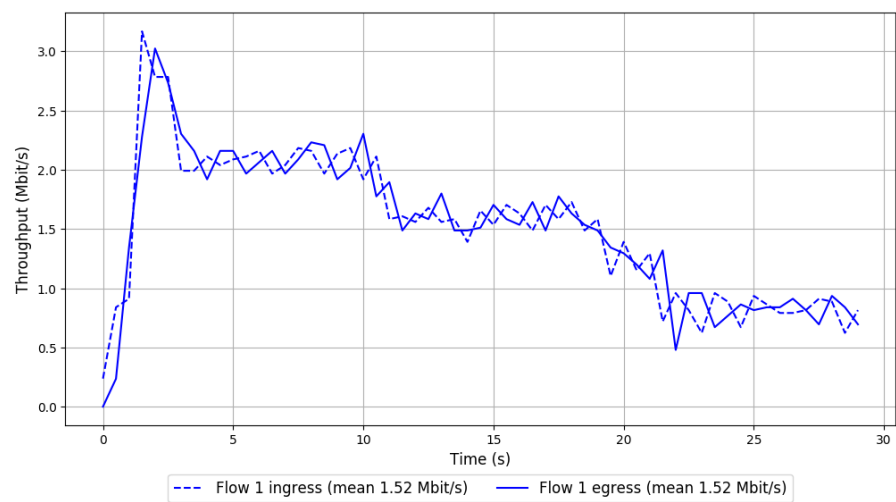Run 3: Report of Verus — Data Link

```
Run 1: Statistics of Indigo

Start at: 2017-09-22 10:38:28
End at: 2017-09-22 10:38:58
Local clock offset: 0.03 ms
Remote clock offset: 16.023 ms


# Below is generated by plot.py at 2017-09-22 11:21:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.52 Mbit/s
95th percentile per-packet one-way delay: 216.001 ms
Loss rate: 0.30%
-- Flow 1:
Average throughput: 1.52 Mbit/s
95th percentile per-packet one-way delay: 216.001 ms
Loss rate: 0.30%
```
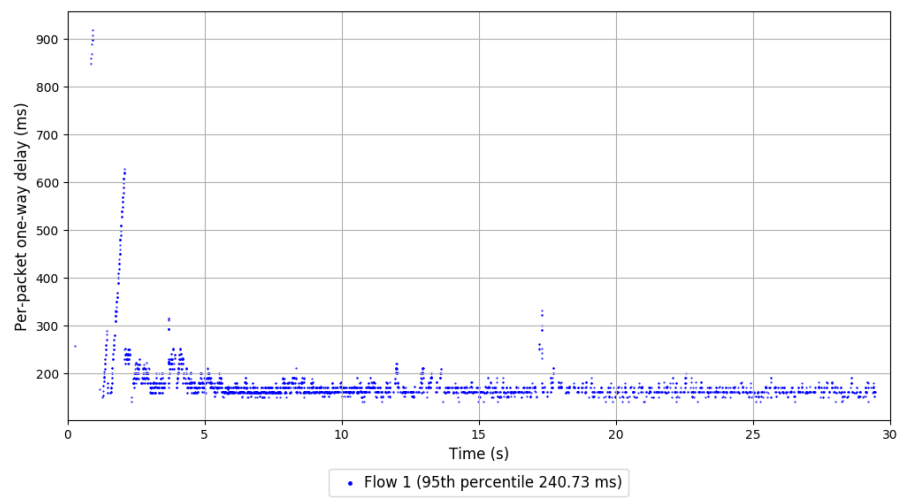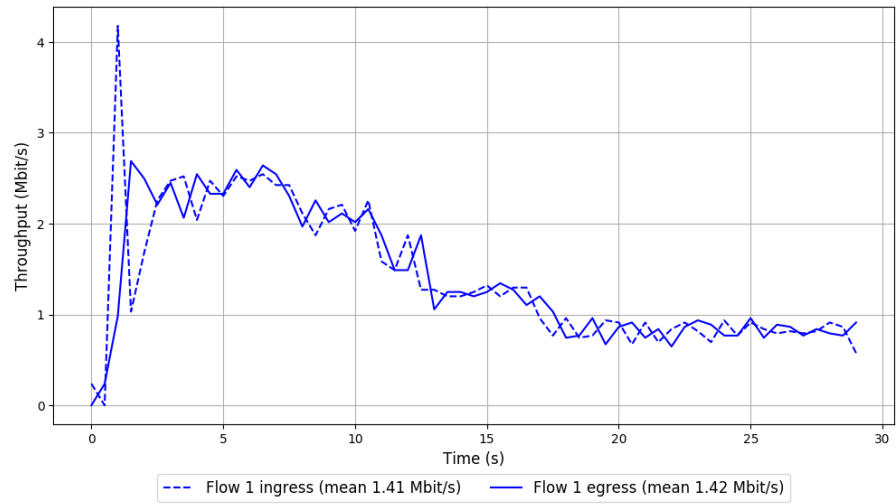
Run 1: Report of Indigo — Data Link

```
Run 2: Statistics of Indigo

Start at: 2017-09-22 10:55:00
End at: 2017-09-22 10:55:30
Local clock offset: 0.031 ms
Remote clock offset: 3.705 ms


# Below is generated by plot.py at 2017-09-22 11:21:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 240.730 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 240.730 ms
Loss rate: 0.06%
```

Run 2: Report of Indigo — Data Link

Flow 1 ingress (mean 1.41 Mbit/s) ---- Flow 1 egress (mean 1.42 Mbit/s) ——

Flow 1 (95th percentile 240.73 ms)

```
Run 3: Statistics of Indigo

Start at: 2017-09-22 11:11:26
End at: 2017-09-22 11:11:56
Local clock offset: -0.047 ms
Remote clock offset: 3.753 ms


# Below is generated by plot.py at 2017-09-22 11:21:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 184.967 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 184.967 ms
Loss rate: 0.16%
```
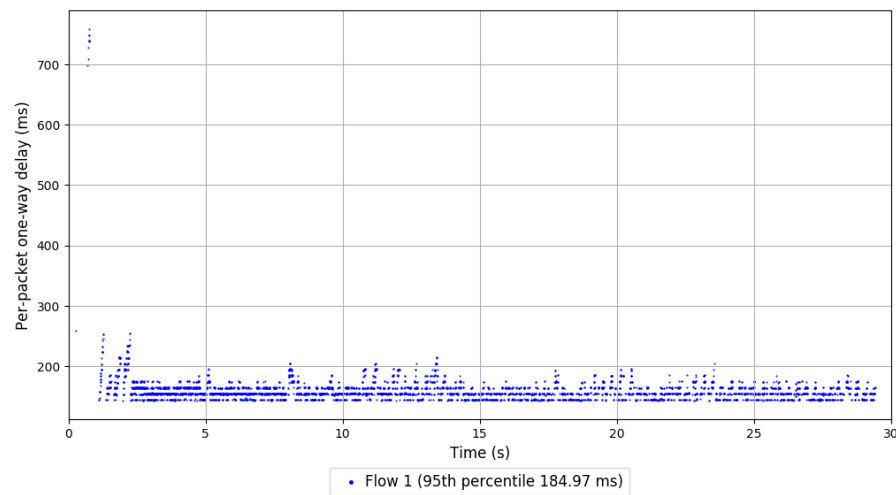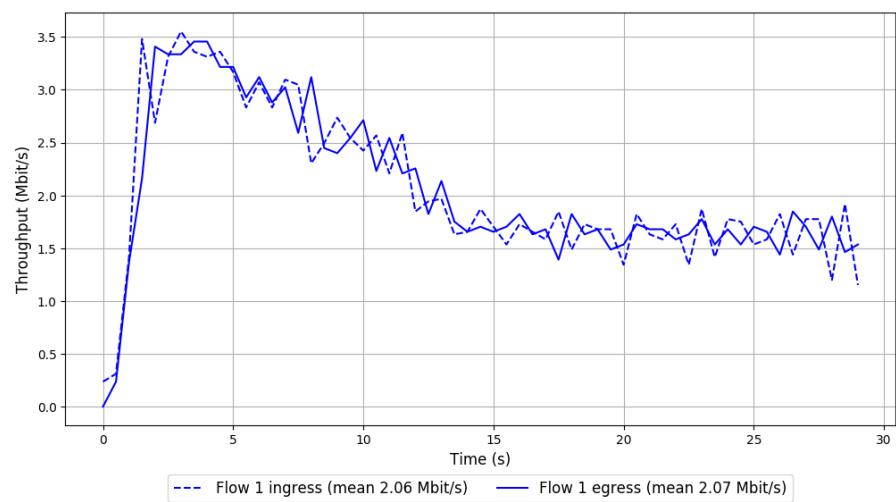
Run 3: Report of Indigo — Data Link

```
Run 1: Statistics of Indigo-cellular

Start at: 2017-09-22 10:37:17
End at: 2017-09-22 10:37:47
Local clock offset: 0.024 ms
Remote clock offset: 10.5 ms

# Below is generated by plot.py at 2017-09-22 11:21:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 202.932 ms
Loss rate: 0.37%
-- Flow 1:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 202.932 ms
Loss rate: 0.37%
```
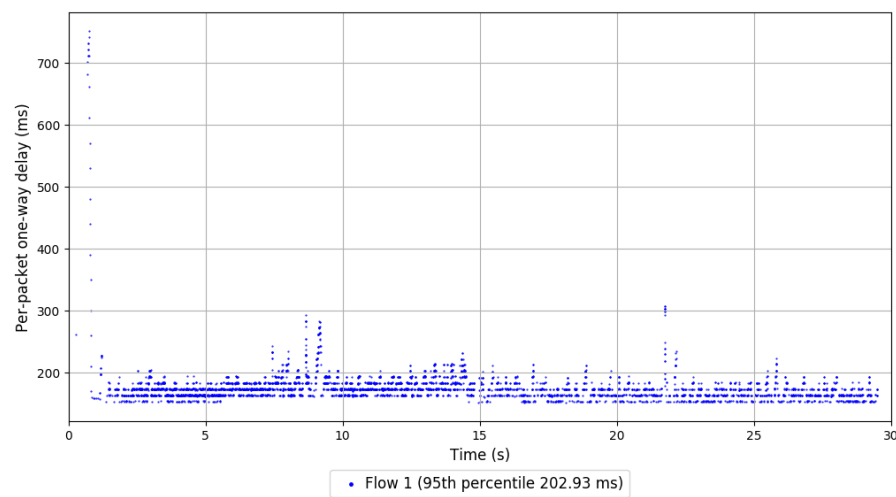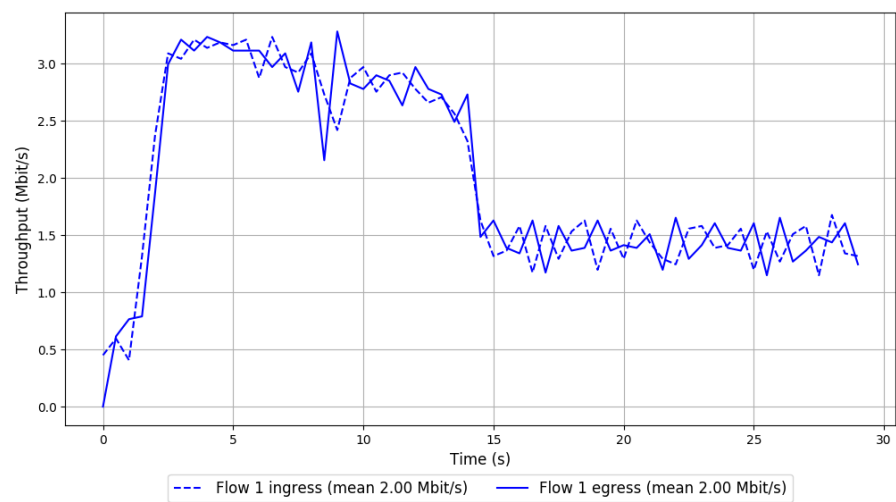
Run 1: Report of Indigo-cellular — Data Link

```
Run 2: Statistics of Indigo-cellular

Start at: 2017-09-22 10:53:49
End at: 2017-09-22 10:54:19
Local clock offset: -0.009 ms
Remote clock offset: 8.731 ms

# Below is generated by plot.py at 2017-09-22 11:21:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.53 Mbit/s
95th percentile per-packet one-way delay: 229.899 ms
Loss rate: 0.27%
-- Flow 1:
Average throughput: 2.53 Mbit/s
95th percentile per-packet one-way delay: 229.899 ms
Loss rate: 0.27%
```
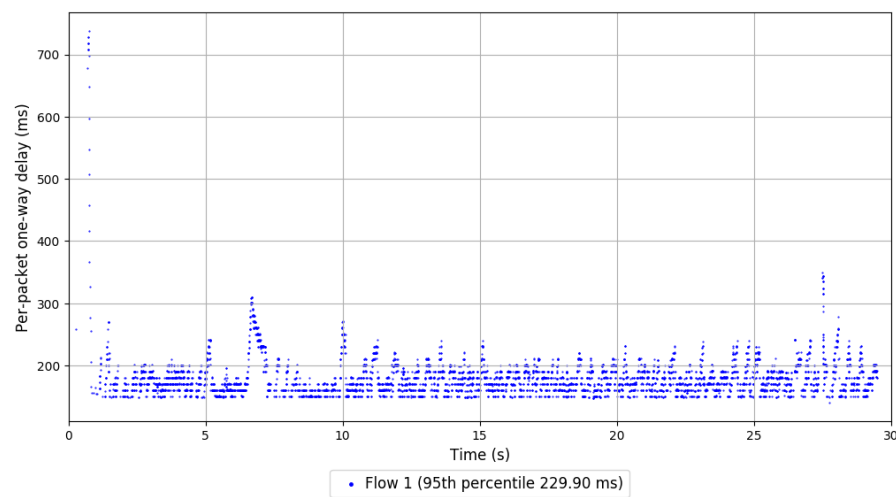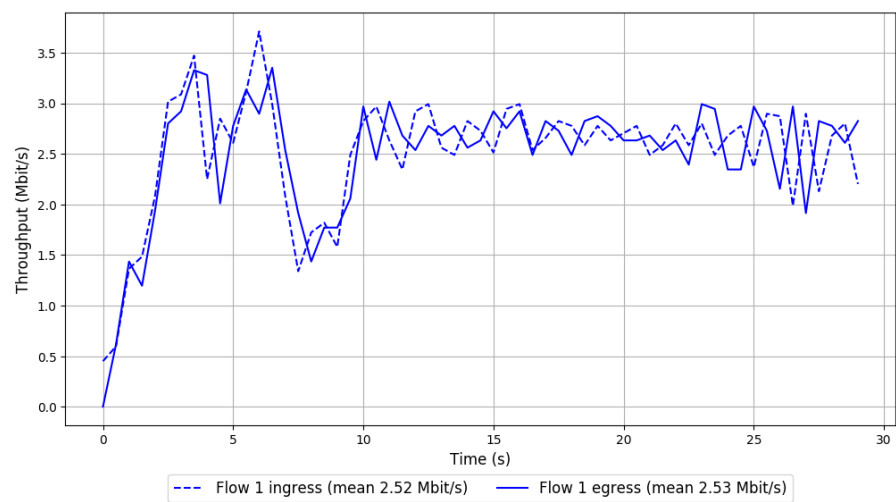
Run 2: Report of Indigo-cellular — Data Link

- - - Flow 1 ingress (mean 2.52 Mbit/s) —— Flow 1 egress (mean 2.53 Mbit/s)

• Flow 1 (95th percentile 229.90 ms)

```
Run 3: Statistics of Indigo-cellular

Start at: 2017-09-22 11:10:16
End at: 2017-09-22 11:10:46
Local clock offset: 0.049 ms
Remote clock offset: 3.633 ms

# Below is generated by plot.py at 2017-09-22 11:21:33
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.71 Mbit/s
95th percentile per-packet one-way delay: 211.714 ms
Loss rate: 0.17%
-- Flow 1:
Average throughput: 1.71 Mbit/s
95th percentile per-packet one-way delay: 211.714 ms
Loss rate: 0.17%
```
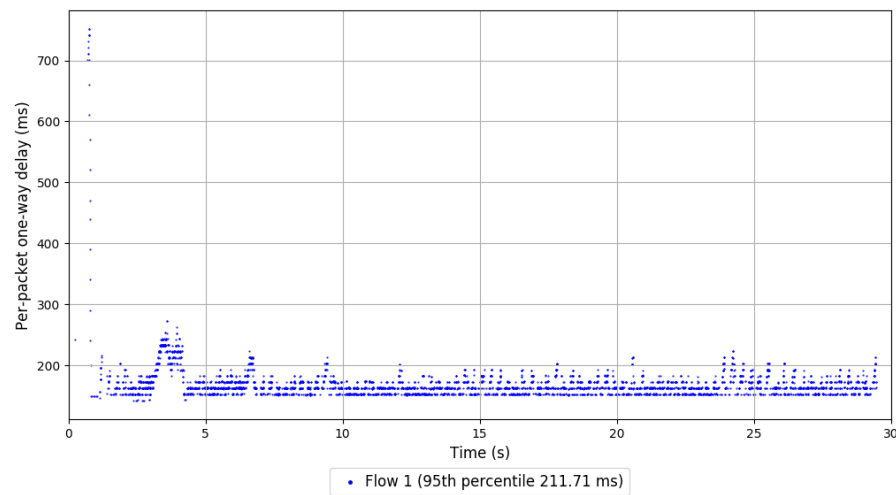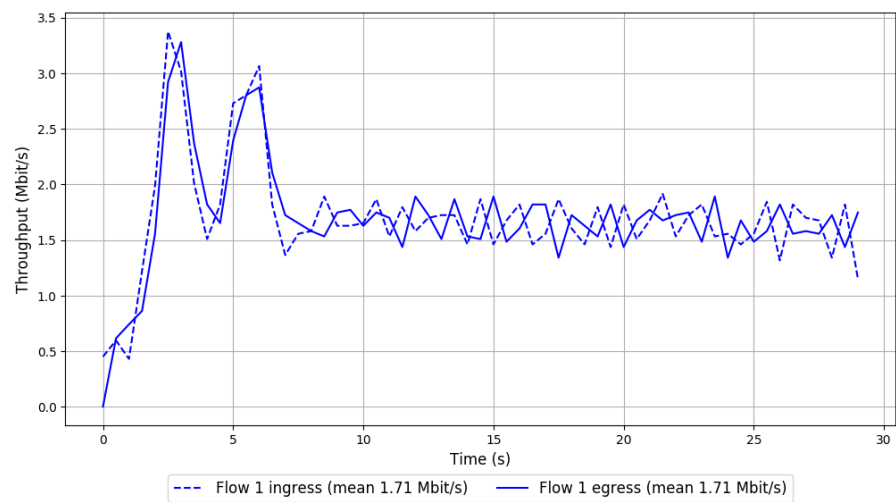
Run 3: Report of Indigo-cellular — Data Link

Flow 1 ingress (mean 1.71 Mbit/s)   Flow 1 egress (mean 1.71 Mbit/s)
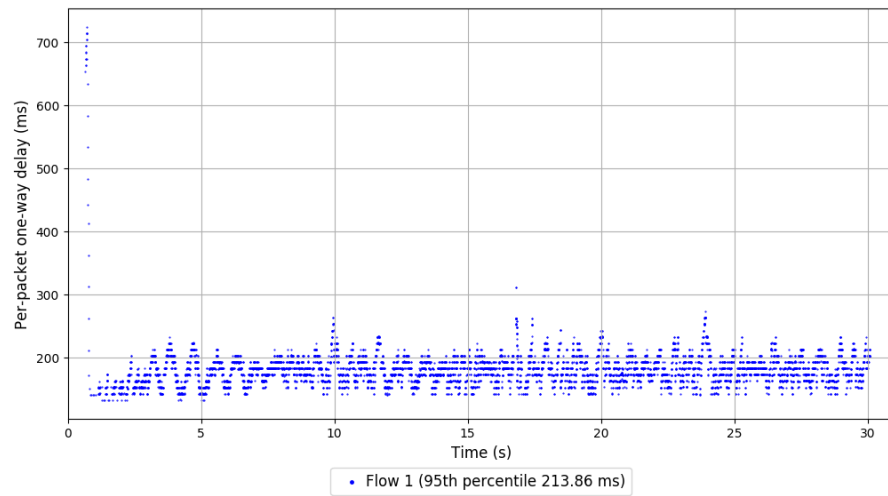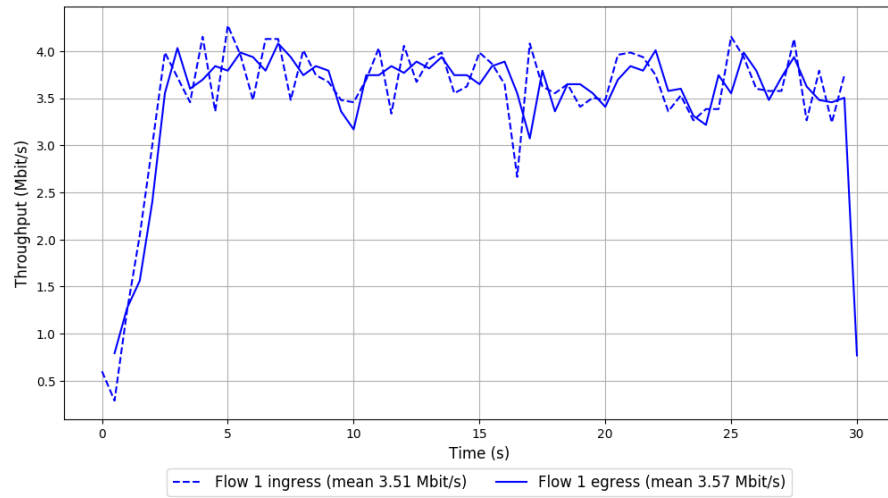

Flow 1 (95th percentile 211.71 ms)

```
Run 1: Statistics of KohoCC

Start at: 2017-09-22 10:40:50
End at: 2017-09-22 10:41:20
Local clock offset: 0.028 ms
Remote clock offset: 7.427 ms


# Below is generated by plot.py at 2017-09-22 11:21:34
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.57 Mbit/s
95th percentile per-packet one-way delay: 213.856 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 3.57 Mbit/s
95th percentile per-packet one-way delay: 213.856 ms
Loss rate: 0.31%
```

Run 1: Report of KohoCC — Data Link

```
Run 2: Statistics of KohoCC

Start at: 2017-09-22 10:57:20
End at: 2017-09-22 10:57:50
Local clock offset: 0.024 ms
Remote clock offset: 3.633 ms


# Below is generated by plot.py at 2017-09-22 11:21:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.23 Mbit/s
95th percentile per-packet one-way delay: 233.342 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 3.23 Mbit/s
95th percentile per-packet one-way delay: 233.342 ms
Loss rate: 0.23%
```
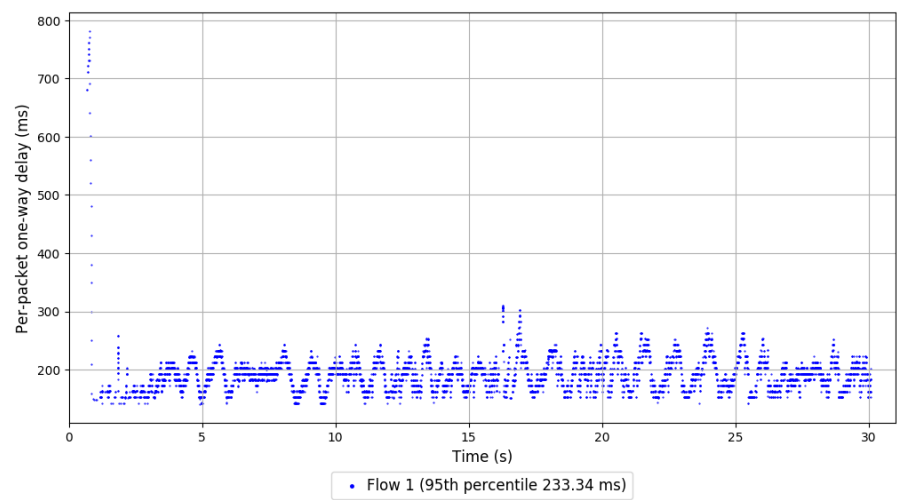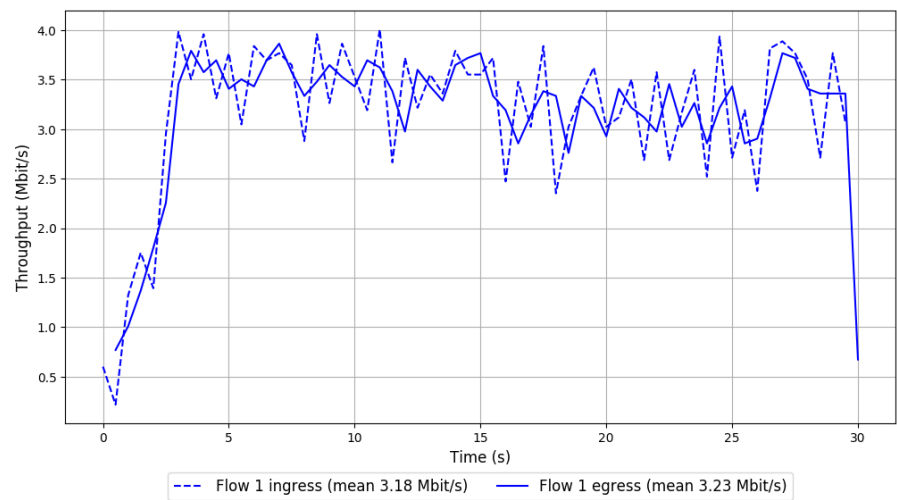
Run 2: Report of KohoCC — Data Link

```
Run 3: Statistics of KohoCC

Start at: 2017-09-22 11:13:47
End at: 2017-09-22 11:14:17
Local clock offset: 0.064 ms
Remote clock offset: 8.772 ms


# Below is generated by plot.py at 2017-09-22 11:21:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.13 Mbit/s
95th percentile per-packet one-way delay: 260.726 ms
Loss rate: 0.39%
-- Flow 1:
Average throughput: 3.13 Mbit/s
95th percentile per-packet one-way delay: 260.726 ms
Loss rate: 0.39%
```

Run 3: Report of KohoCC — Data Link