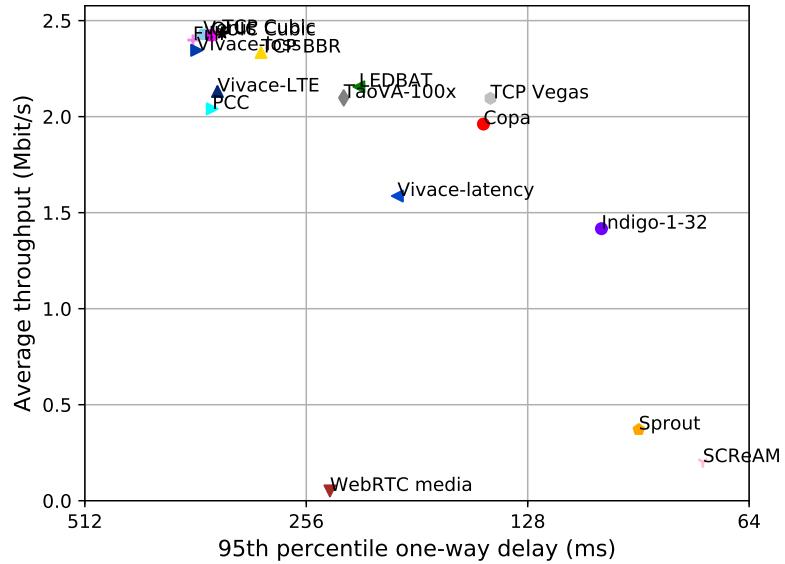


Pantheon Report

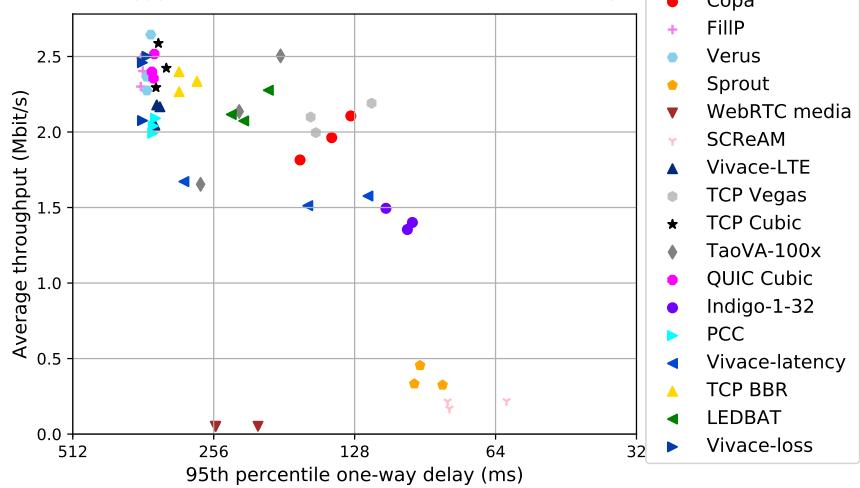
Generated at 2018-04-03 01:35:53 (UTC).
Data path: India ppp0 (*remote*) → AWS India 1 Ethernet (*local*).
Repeated the test of 17 congestion control schemes 3 times.
Each test lasted for 30 seconds running 1 flow.
Increased UDP receive buffer to 16 MB (default) and 32 MB (max).
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).
NTP offsets were measured against **nets.org.sg** and have been applied to correct the timestamps in logs.

Git summary:
branch: master @ eb420b5be9bafcc22cf68b99ff5a2000462fc59
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 India ppp0 to AWS India 1 Ethernet, 3 runs of 30s each per scheme
(mean of all runs by scheme)



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



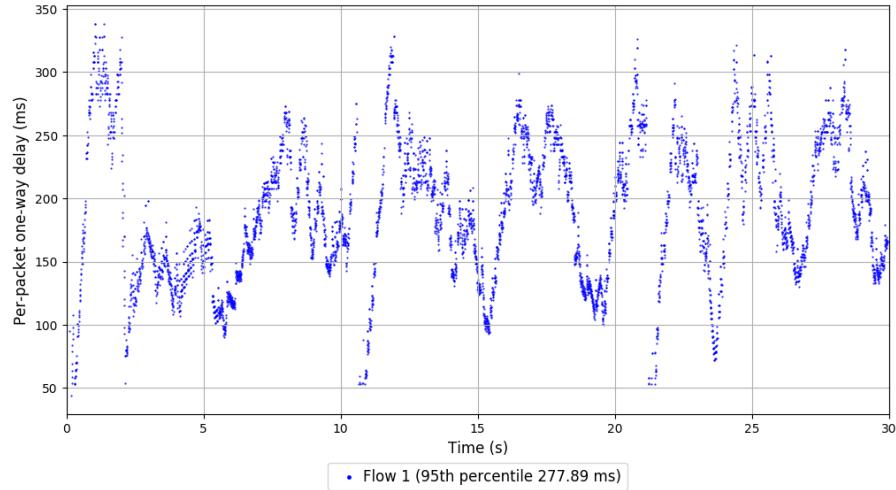
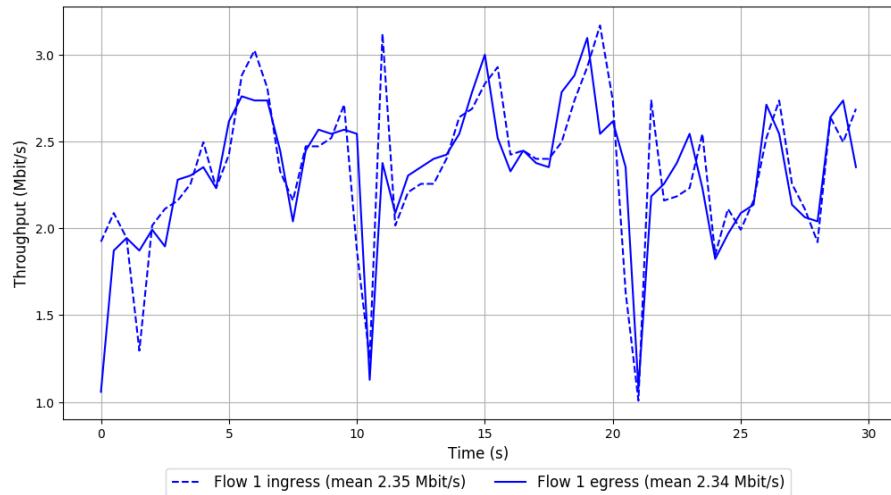
| scheme | # runs | mean avg tput (Mbit/s) flow 1 | mean 95th-%ile delay (ms) flow 1 | mean loss rate (%) flow 1 |
|----------------|--------|----------------------------------|-------------------------------------|------------------------------|
| TCP BBR | 3 | 2.34 | 294.95 | 0.98 |
| TCP Cubic | 3 | 2.43 | 333.07 | 1.65 |
| LEDBAT | 3 | 2.16 | 217.14 | 0.57 |
| PCC | 3 | 2.04 | 343.59 | 10.73 |
| QUIC Cubic | 3 | 2.43 | 344.64 | 3.03 |
| SCReAM | 3 | 0.20 | 73.99 | 0.20 |
| WebRTC media | 3 | 0.05 | 237.73 | 1.46 |
| Sprout | 3 | 0.37 | 90.42 | 0.39 |
| TaoVA-100x | 3 | 2.10 | 227.71 | 6.03 |
| TCP Vegas | 3 | 2.10 | 143.85 | 0.59 |
| Verus | 3 | 2.43 | 353.48 | 17.88 |
| Copa | 3 | 1.96 | 147.03 | 0.92 |
| FillP | 3 | 2.40 | 365.01 | 29.77 |
| Indigo-1-32 | 3 | 1.41 | 101.61 | 0.50 |
| Vivace-latency | 3 | 1.59 | 192.50 | 1.41 |
| Vivace-loss | 3 | 2.35 | 360.79 | 18.13 |
| Vivace-LTE | 3 | 2.13 | 338.05 | 2.01 |

Run 1: Statistics of TCP BBR

```
Start at: 2018-04-02 23:51:03
End at: 2018-04-02 23:51:33
Local clock offset: -4.449 ms
Remote clock offset: -2.204 ms

# Below is generated by plot.py at 2018-04-03 01:35:14
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.34 Mbit/s
95th percentile per-packet one-way delay: 277.895 ms
Loss rate: 0.77%
-- Flow 1:
Average throughput: 2.34 Mbit/s
95th percentile per-packet one-way delay: 277.895 ms
Loss rate: 0.77%
```

Run 1: Report of TCP BBR — Data Link

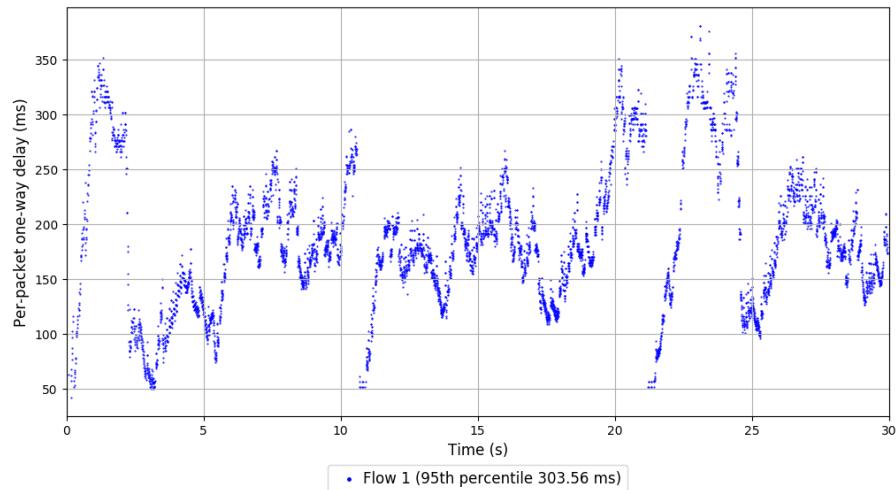
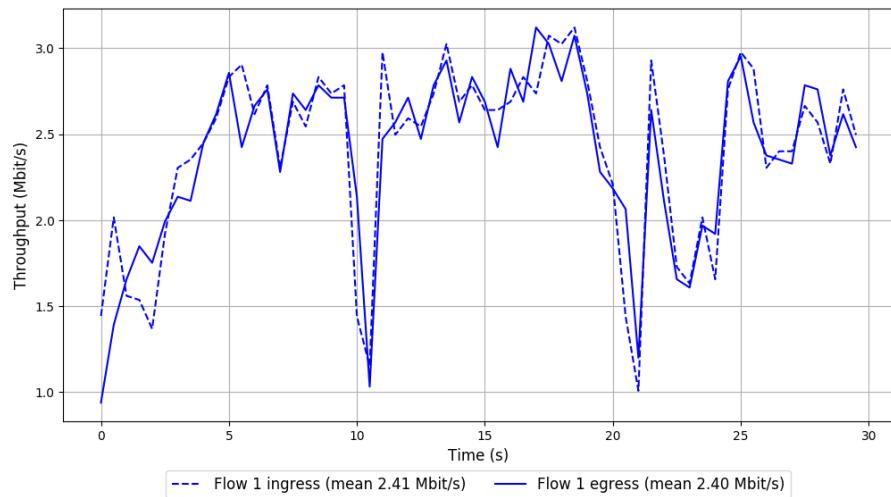


Run 2: Statistics of TCP BBR

```
Start at: 2018-04-03 00:10:35
End at: 2018-04-03 00:11:05
Local clock offset: -4.901 ms
Remote clock offset: -1.992 ms

# Below is generated by plot.py at 2018-04-03 01:35:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 303.558 ms
Loss rate: 0.78%
-- Flow 1:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 303.558 ms
Loss rate: 0.78%
```

Run 2: Report of TCP BBR — Data Link

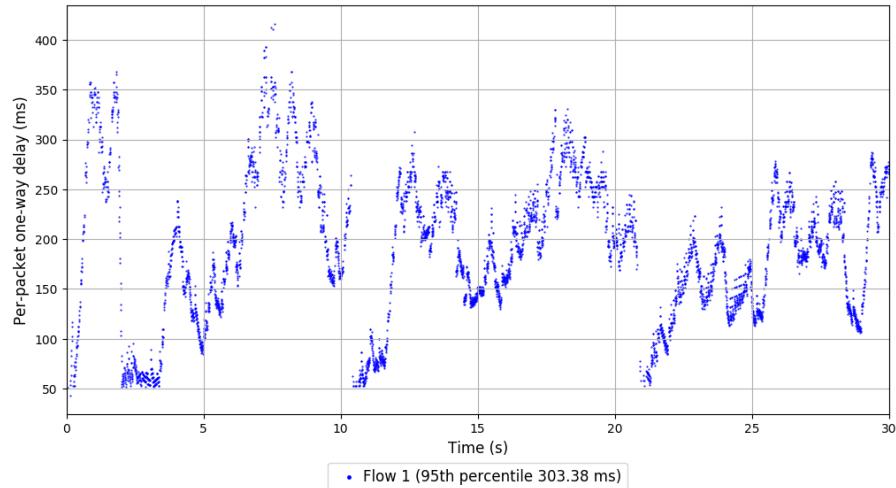
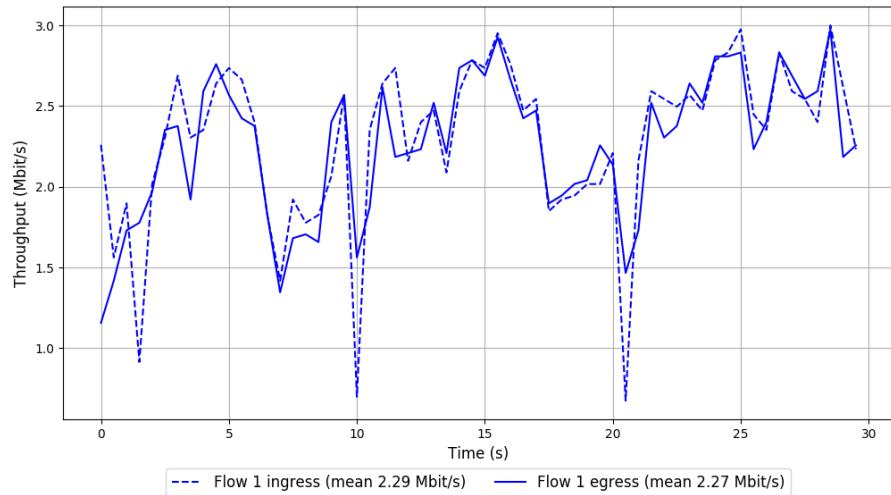


Run 3: Statistics of TCP BBR

```
Start at: 2018-04-03 00:30:06
End at: 2018-04-03 00:30:36
Local clock offset: -1.015 ms
Remote clock offset: -1.369 ms

# Below is generated by plot.py at 2018-04-03 01:35:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.27 Mbit/s
95th percentile per-packet one-way delay: 303.385 ms
Loss rate: 1.38%
-- Flow 1:
Average throughput: 2.27 Mbit/s
95th percentile per-packet one-way delay: 303.385 ms
Loss rate: 1.38%
```

Run 3: Report of TCP BBR — Data Link

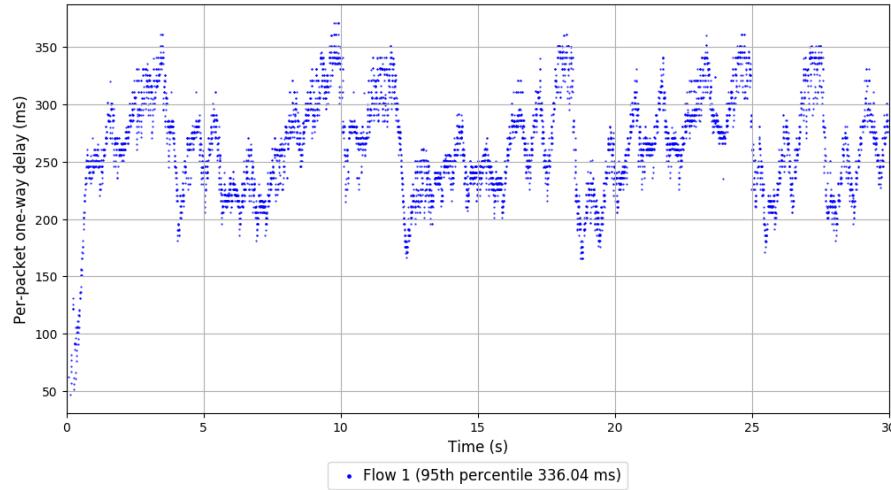
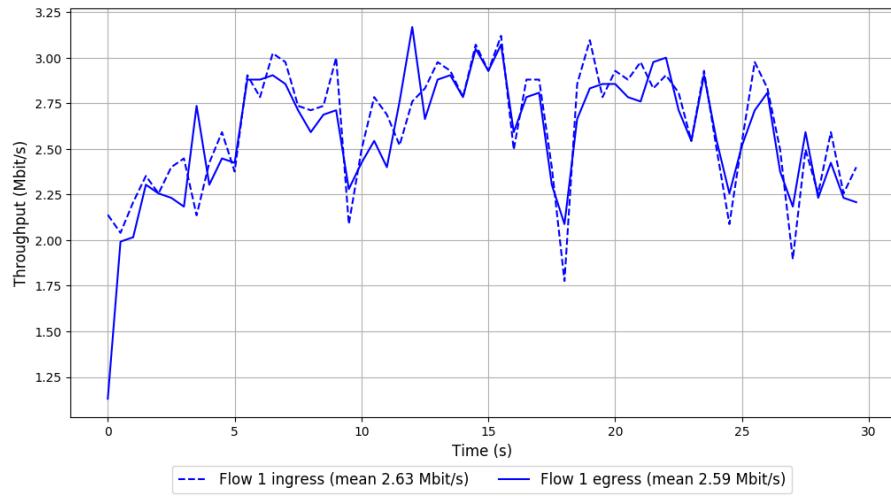


```
Run 1: Statistics of TCP Cubic
```

```
Start at: 2018-04-02 23:43:26
End at: 2018-04-02 23:43:56
Local clock offset: 1.701 ms
Remote clock offset: -0.303 ms

# Below is generated by plot.py at 2018-04-03 01:35:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.59 Mbit/s
95th percentile per-packet one-way delay: 336.040 ms
Loss rate: 1.81%
-- Flow 1:
Average throughput: 2.59 Mbit/s
95th percentile per-packet one-way delay: 336.040 ms
Loss rate: 1.81%
```

Run 1: Report of TCP Cubic — Data Link

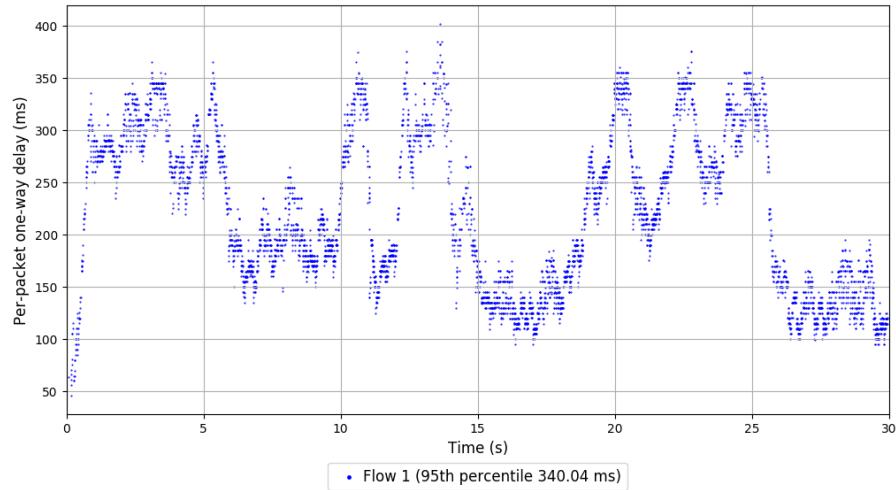
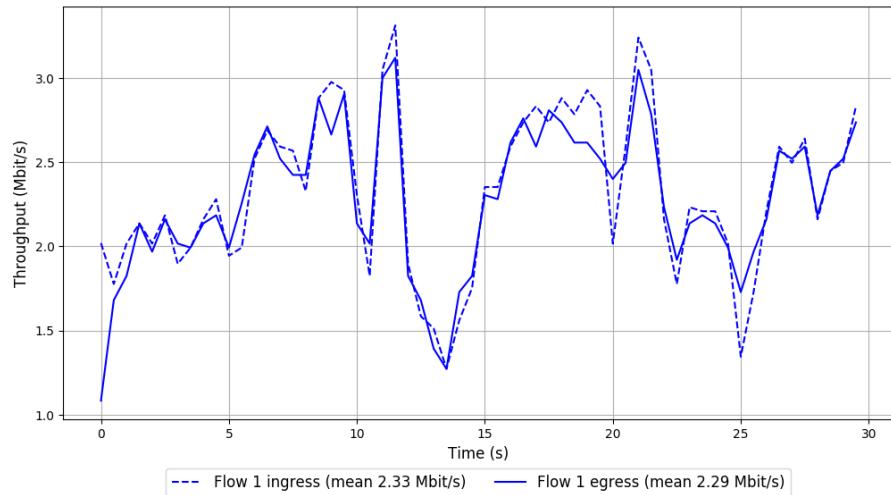


Run 2: Statistics of TCP Cubic

```
Start at: 2018-04-03 00:02:59
End at: 2018-04-03 00:03:29
Local clock offset: -3.367 ms
Remote clock offset: -2.008 ms

# Below is generated by plot.py at 2018-04-03 01:35:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.29 Mbit/s
95th percentile per-packet one-way delay: 340.041 ms
Loss rate: 1.67%
-- Flow 1:
Average throughput: 2.29 Mbit/s
95th percentile per-packet one-way delay: 340.041 ms
Loss rate: 1.67%
```

Run 2: Report of TCP Cubic — Data Link

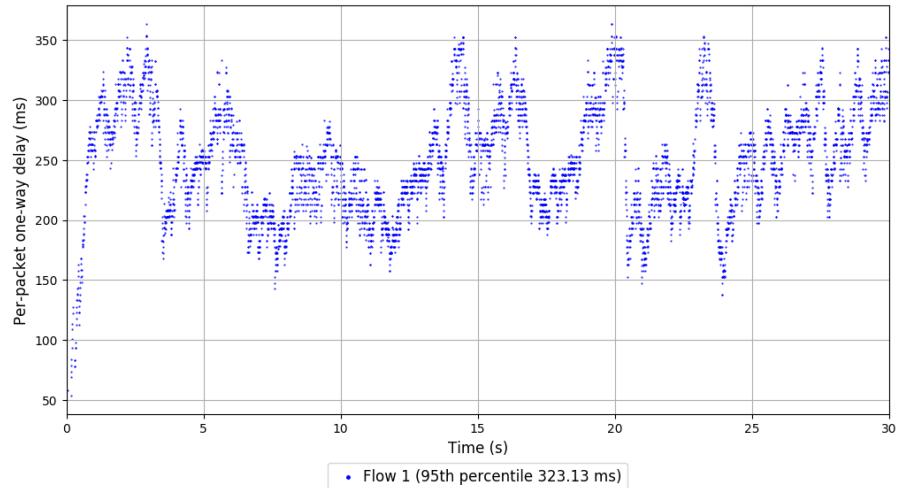
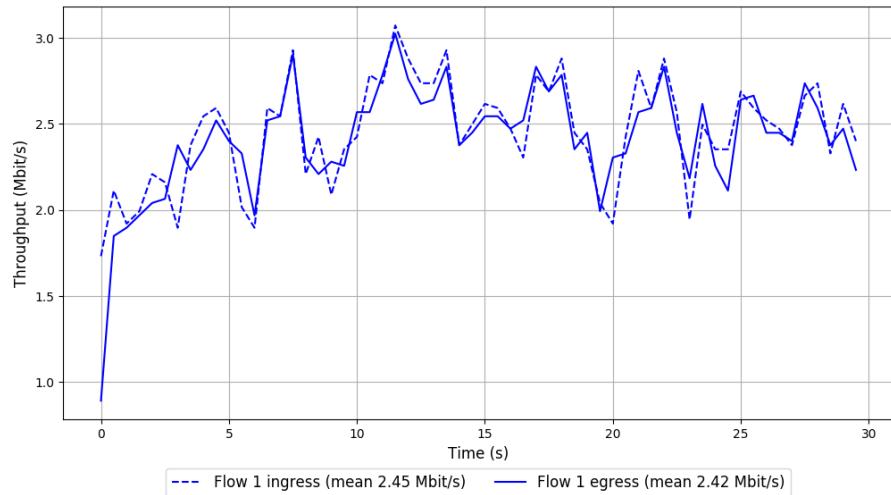


Run 3: Statistics of TCP Cubic

```
Start at: 2018-04-03 00:22:30
End at: 2018-04-03 00:23:00
Local clock offset: -1.744 ms
Remote clock offset: -1.268 ms

# Below is generated by plot.py at 2018-04-03 01:35:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.42 Mbit/s
95th percentile per-packet one-way delay: 323.130 ms
Loss rate: 1.47%
-- Flow 1:
Average throughput: 2.42 Mbit/s
95th percentile per-packet one-way delay: 323.130 ms
Loss rate: 1.47%
```

Run 3: Report of TCP Cubic — Data Link

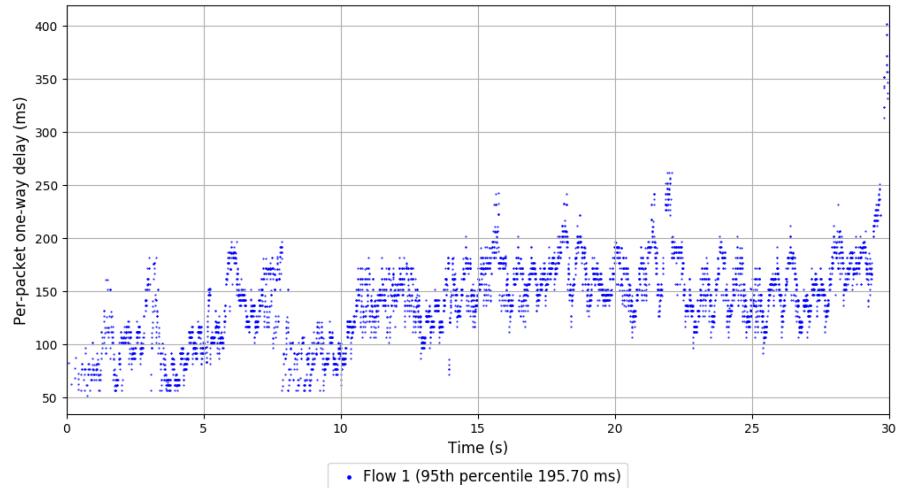
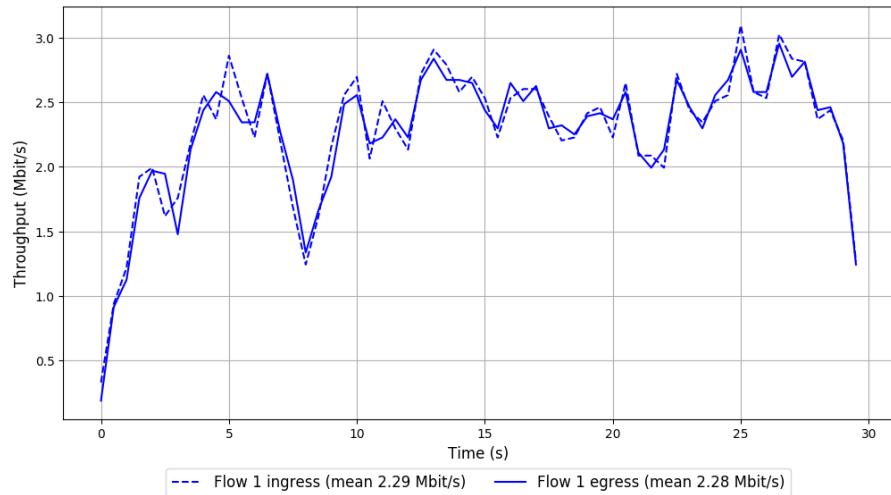


```
Run 1: Statistics of LEDBAT
```

```
Start at: 2018-04-02 23:46:42
End at: 2018-04-02 23:47:12
Local clock offset: 0.893 ms
Remote clock offset: -1.185 ms

# Below is generated by plot.py at 2018-04-03 01:35:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 195.700 ms
Loss rate: 0.77%
-- Flow 1:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 195.700 ms
Loss rate: 0.77%
```

Run 1: Report of LEDBAT — Data Link

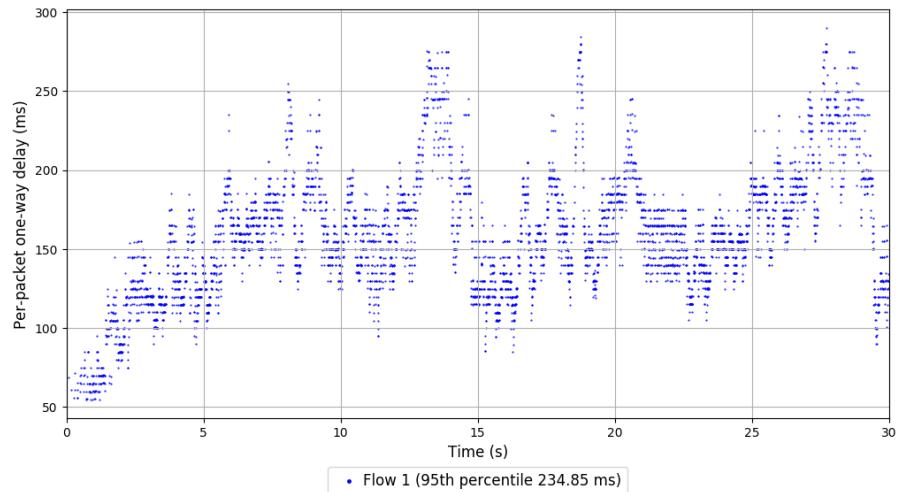
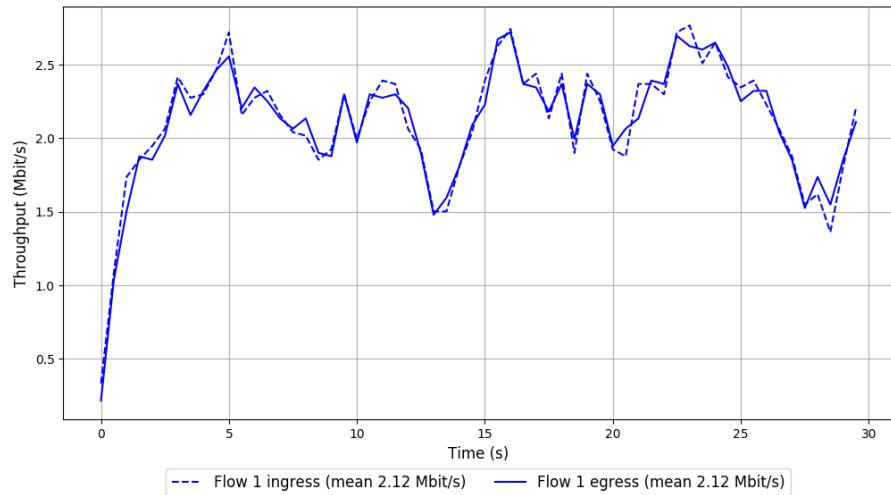


Run 2: Statistics of LEDBAT

```
Start at: 2018-04-03 00:06:14
End at: 2018-04-03 00:06:44
Local clock offset: -3.003 ms
Remote clock offset: -1.334 ms

# Below is generated by plot.py at 2018-04-03 01:35:15
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 234.850 ms
Loss rate: 0.46%
-- Flow 1:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 234.850 ms
Loss rate: 0.46%
```

Run 2: Report of LEDBAT — Data Link

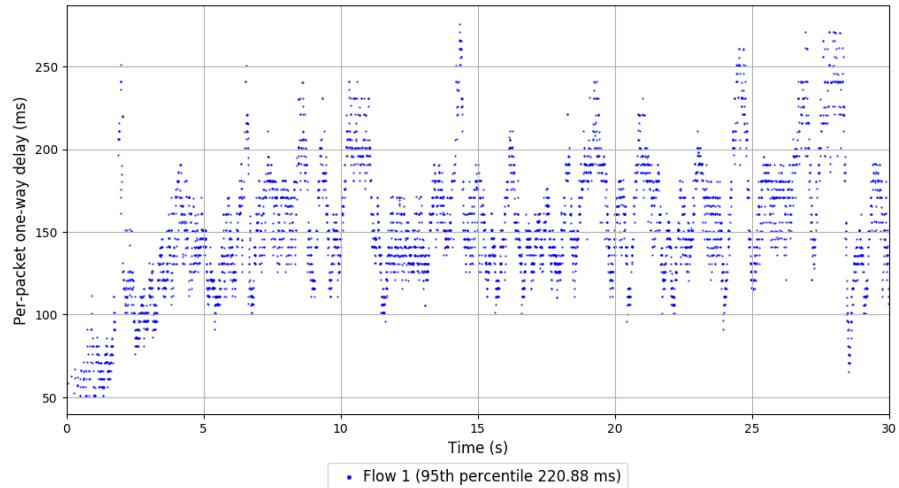
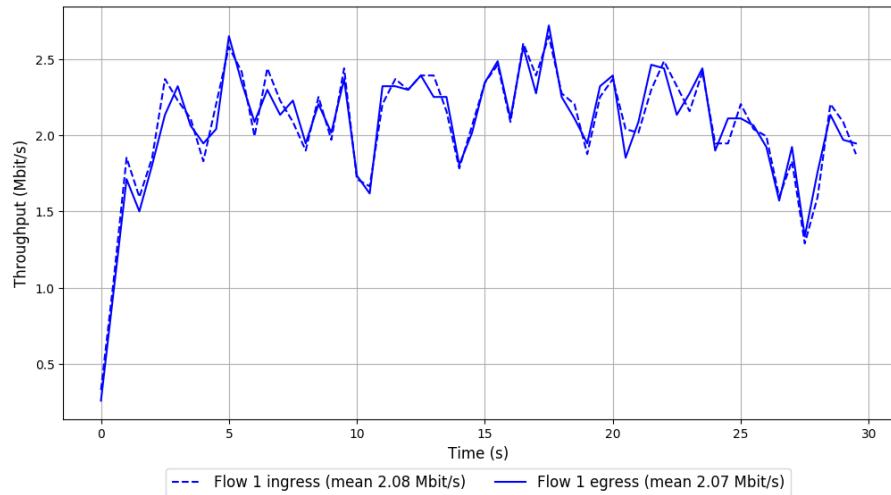


```
Run 3: Statistics of LEDBAT
```

```
Start at: 2018-04-03 00:25:46
End at: 2018-04-03 00:26:16
Local clock offset: -3.474 ms
Remote clock offset: -1.925 ms

# Below is generated by plot.py at 2018-04-03 01:35:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 220.879 ms
Loss rate: 0.47%
-- Flow 1:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 220.879 ms
Loss rate: 0.47%
```

Run 3: Report of LEDBAT — Data Link

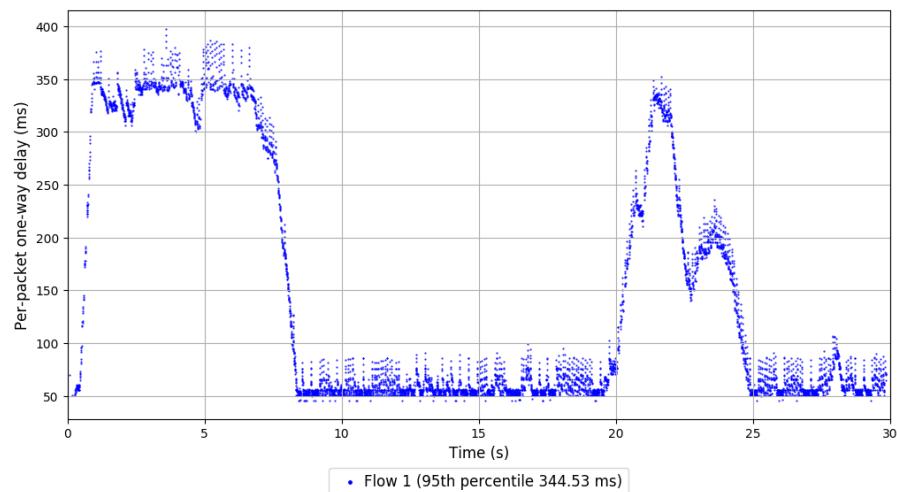
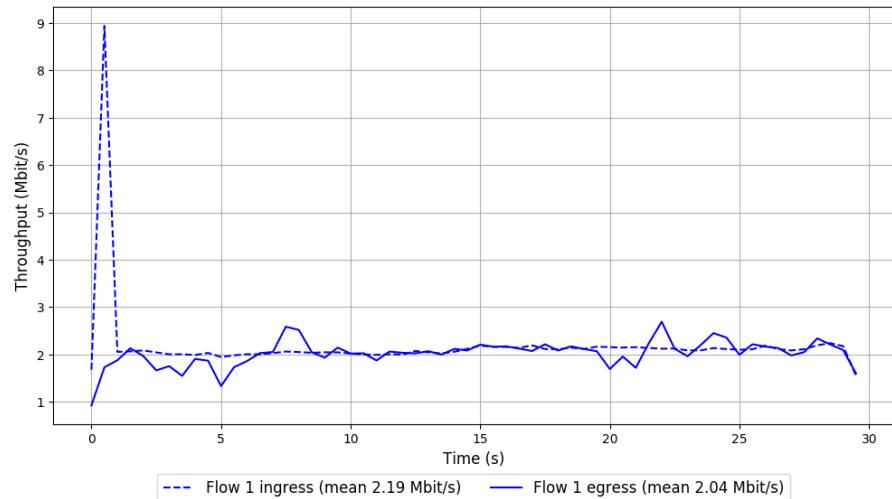


```
Run 1: Statistics of PCC
```

```
Start at: 2018-04-02 23:48:52
End at: 2018-04-02 23:49:22
Local clock offset: -1.128 ms
Remote clock offset: -1.675 ms

# Below is generated by plot.py at 2018-04-03 01:35:22
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.04 Mbit/s
95th percentile per-packet one-way delay: 344.526 ms
Loss rate: 7.31%
-- Flow 1:
Average throughput: 2.04 Mbit/s
95th percentile per-packet one-way delay: 344.526 ms
Loss rate: 7.31%
```

Run 1: Report of PCC — Data Link

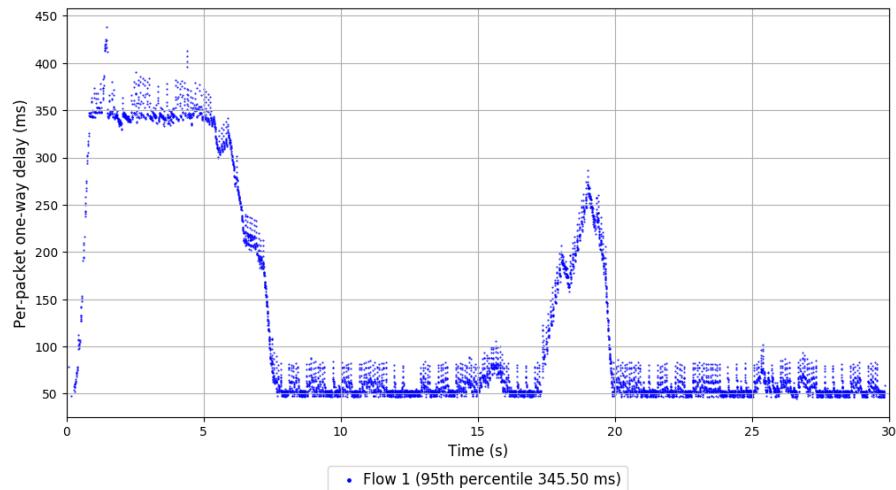
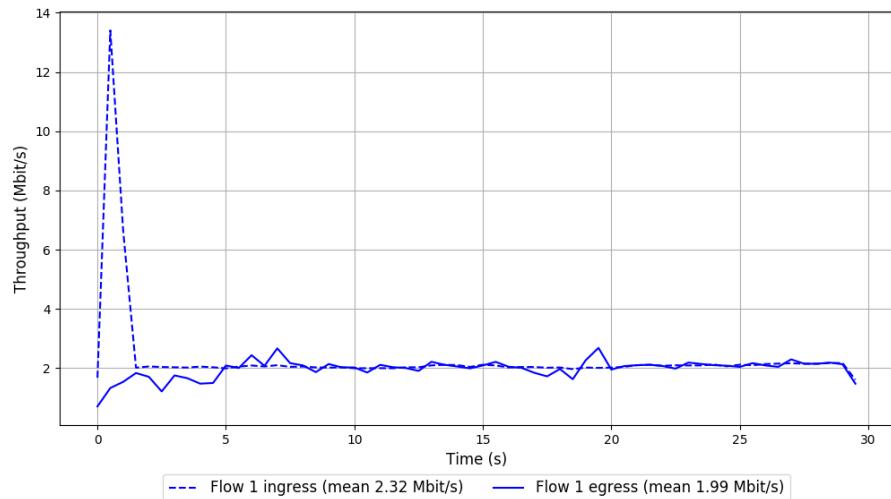


Run 2: Statistics of PCC

```
Start at: 2018-04-03 00:08:25
End at: 2018-04-03 00:08:55
Local clock offset: -6.909 ms
Remote clock offset: -2.583 ms

# Below is generated by plot.py at 2018-04-03 01:35:22
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.99 Mbit/s
95th percentile per-packet one-way delay: 345.504 ms
Loss rate: 14.62%
-- Flow 1:
Average throughput: 1.99 Mbit/s
95th percentile per-packet one-way delay: 345.504 ms
Loss rate: 14.62%
```

Run 2: Report of PCC — Data Link

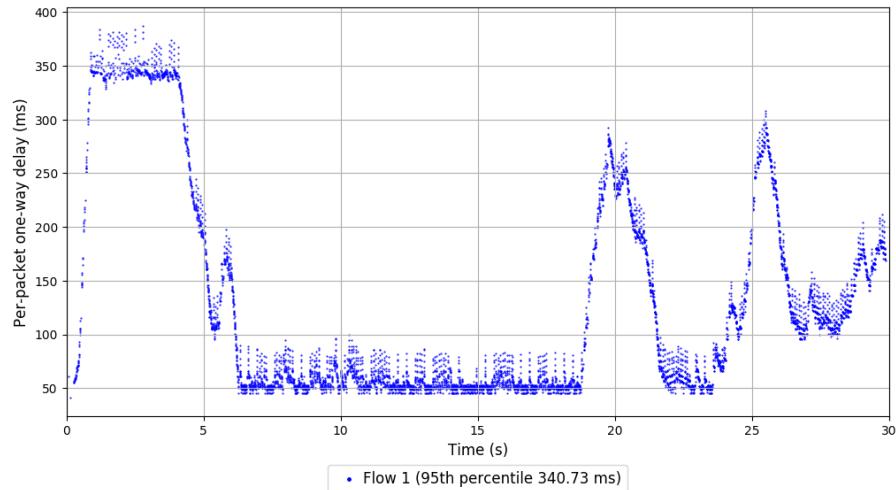
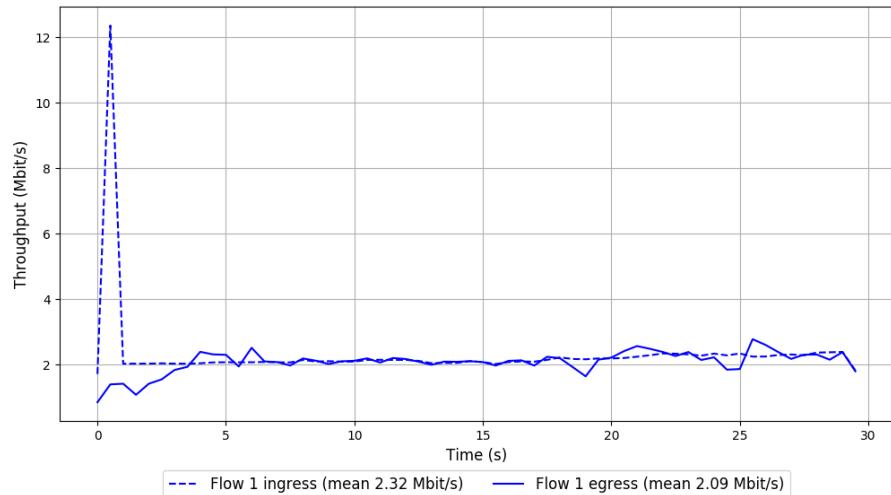


Run 3: Statistics of PCC

```
Start at: 2018-04-03 00:27:56
End at: 2018-04-03 00:28:26
Local clock offset: -4.057 ms
Remote clock offset: -2.099 ms

# Below is generated by plot.py at 2018-04-03 01:35:24
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 340.731 ms
Loss rate: 10.27%
-- Flow 1:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 340.731 ms
Loss rate: 10.27%
```

Run 3: Report of PCC — Data Link

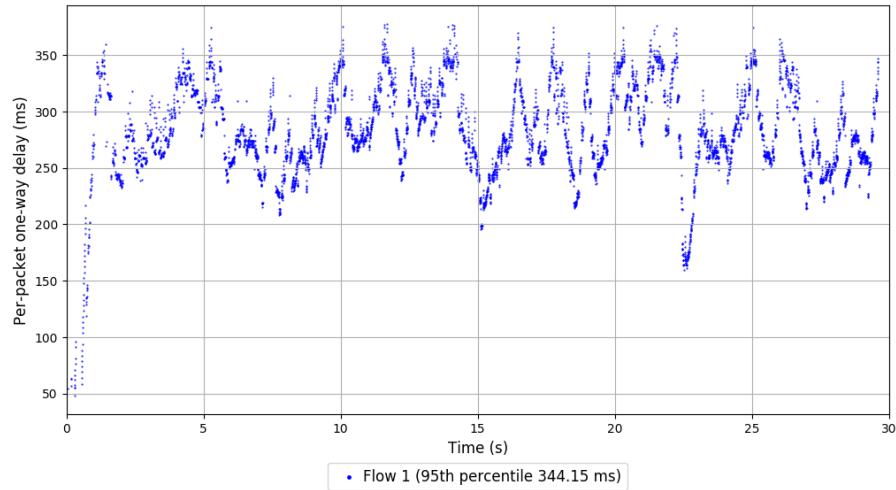
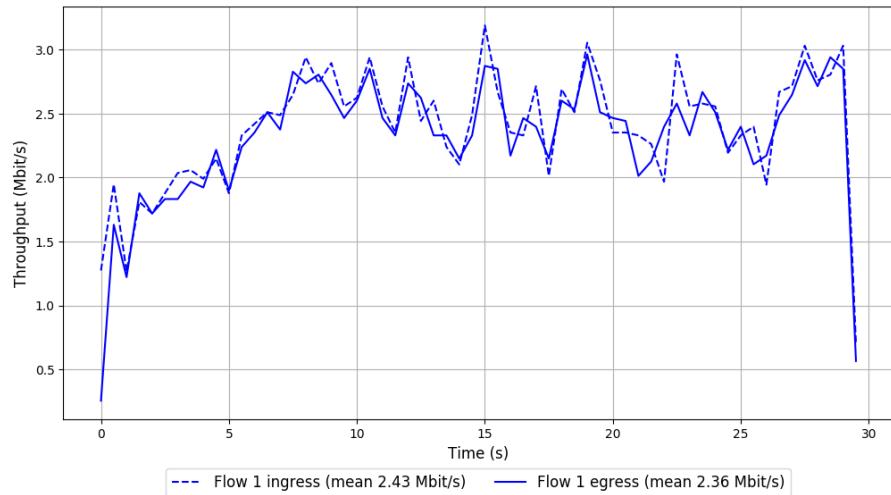


```
Run 1: Statistics of QUIC Cubic
```

```
Start at: 2018-04-02 23:53:14
End at: 2018-04-02 23:53:44
Local clock offset: -1.669 ms
Remote clock offset: -2.279 ms

# Below is generated by plot.py at 2018-04-03 01:35:24
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.36 Mbit/s
95th percentile per-packet one-way delay: 344.149 ms
Loss rate: 3.10%
-- Flow 1:
Average throughput: 2.36 Mbit/s
95th percentile per-packet one-way delay: 344.149 ms
Loss rate: 3.10%
```

Run 1: Report of QUIC Cubic — Data Link

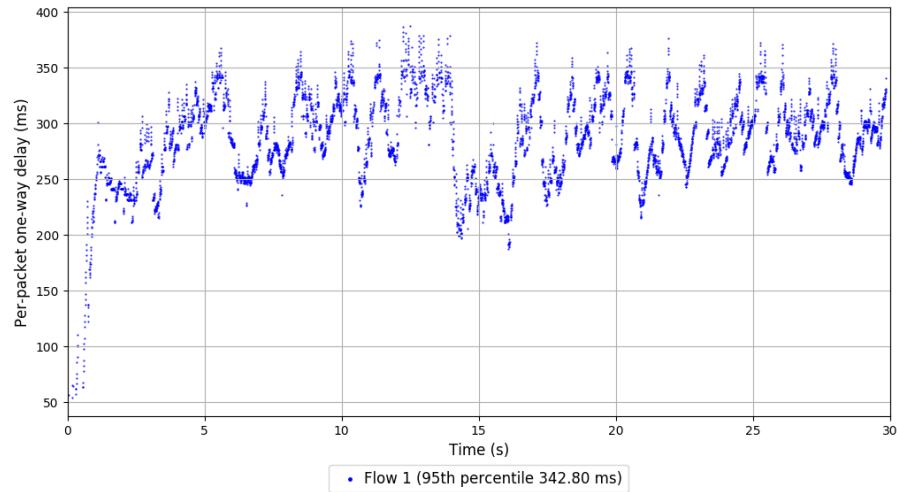
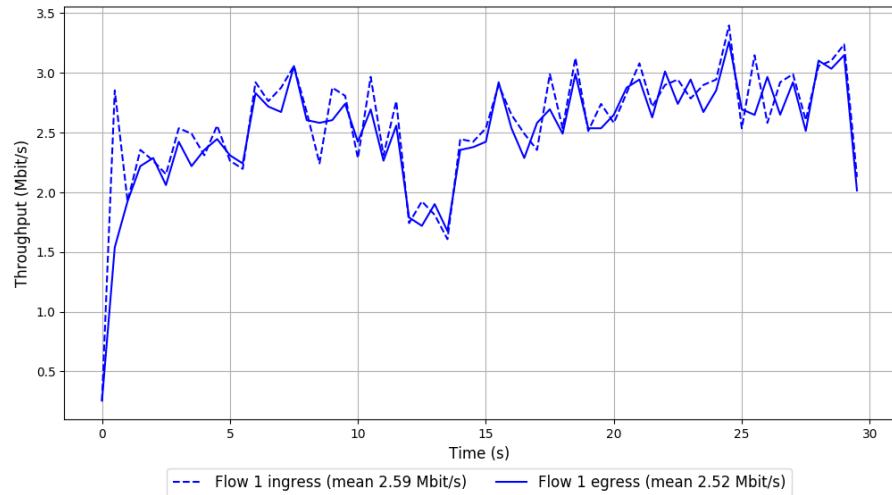


Run 2: Statistics of QUIC Cubic

```
Start at: 2018-04-03 00:12:45
End at: 2018-04-03 00:13:15
Local clock offset: -1.854 ms
Remote clock offset: -1.025 ms

# Below is generated by plot.py at 2018-04-03 01:35:25
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.52 Mbit/s
95th percentile per-packet one-way delay: 342.800 ms
Loss rate: 3.07%
-- Flow 1:
Average throughput: 2.52 Mbit/s
95th percentile per-packet one-way delay: 342.800 ms
Loss rate: 3.07%
```

Run 2: Report of QUIC Cubic — Data Link

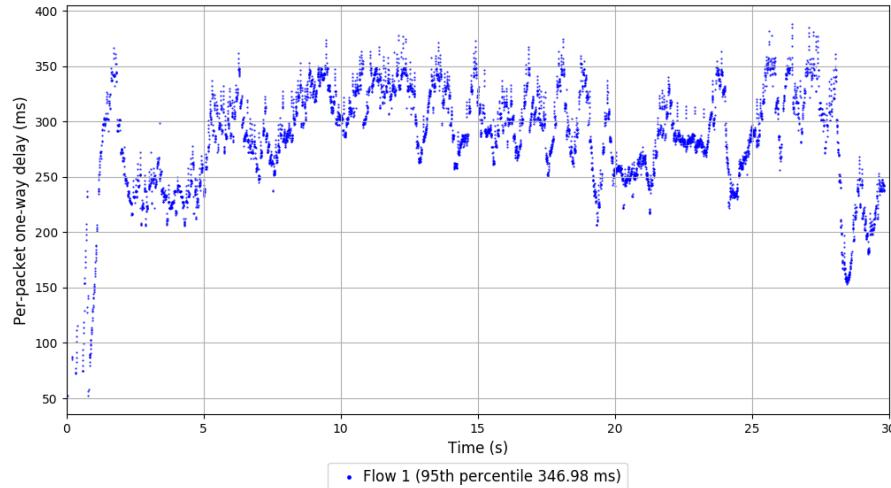
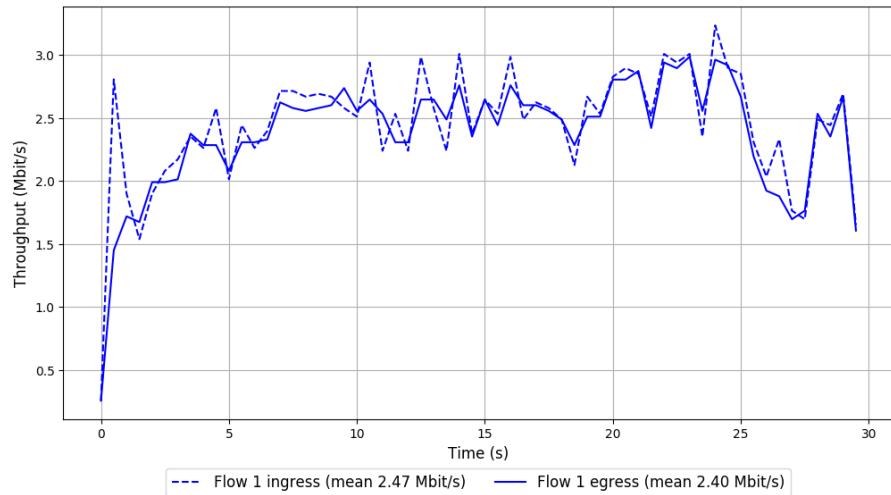


Run 3: Statistics of QUIC Cubic

```
Start at: 2018-04-03 00:32:16
End at: 2018-04-03 00:32:46
Local clock offset: -1.24 ms
Remote clock offset: -1.738 ms

# Below is generated by plot.py at 2018-04-03 01:35:25
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 346.975 ms
Loss rate: 2.91%
-- Flow 1:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 346.975 ms
Loss rate: 2.91%
```

Run 3: Report of QUIC Cubic — Data Link

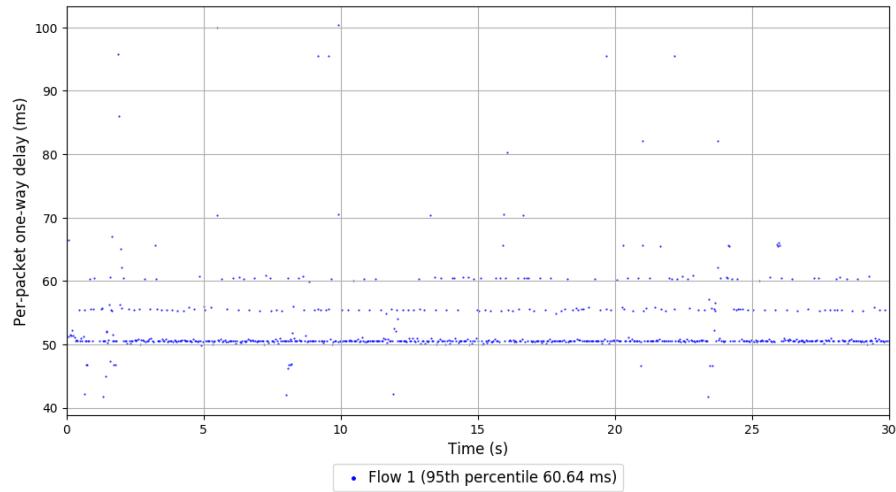
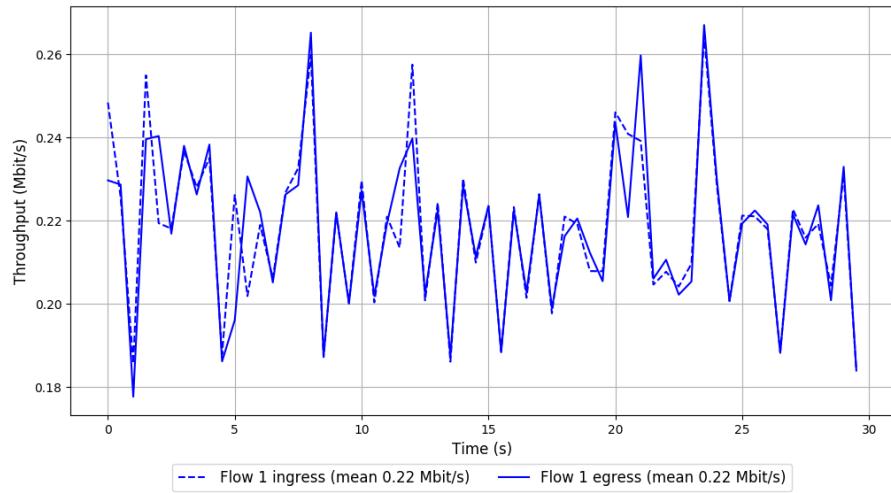


```
Run 1: Statistics of SCReAM
```

```
Start at: 2018-04-02 23:56:29
End at: 2018-04-02 23:56:59
Local clock offset: -2.573 ms
Remote clock offset: -2.581 ms

# Below is generated by plot.py at 2018-04-03 01:35:25
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 60.636 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 60.636 ms
Loss rate: 0.13%
```

Run 1: Report of SCReAM — Data Link

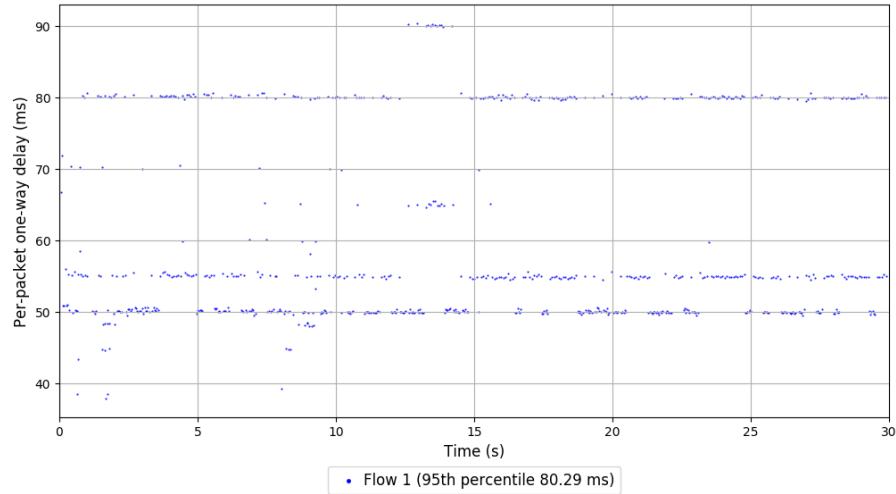
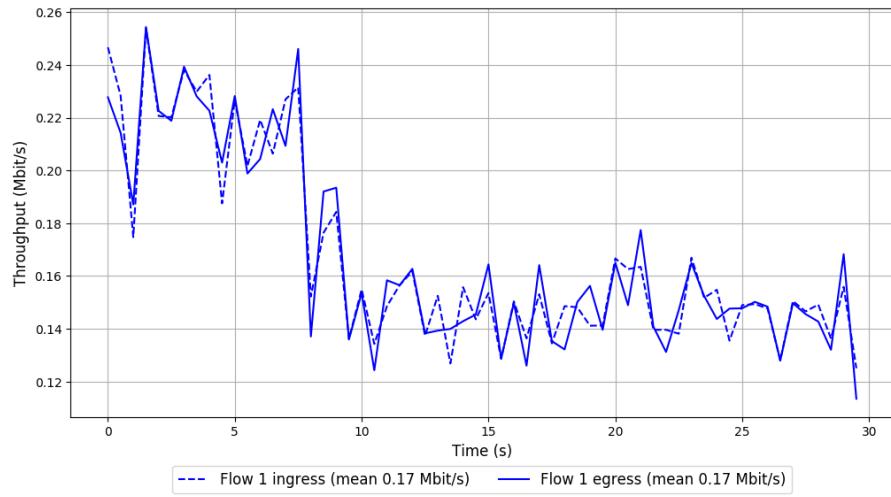


Run 2: Statistics of SCReAM

```
Start at: 2018-04-03 00:16:00
End at: 2018-04-03 00:16:30
Local clock offset: -4.251 ms
Remote clock offset: -1.903 ms

# Below is generated by plot.py at 2018-04-03 01:35:25
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 80.294 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 80.294 ms
Loss rate: 0.23%
```

Run 2: Report of SCReAM — Data Link

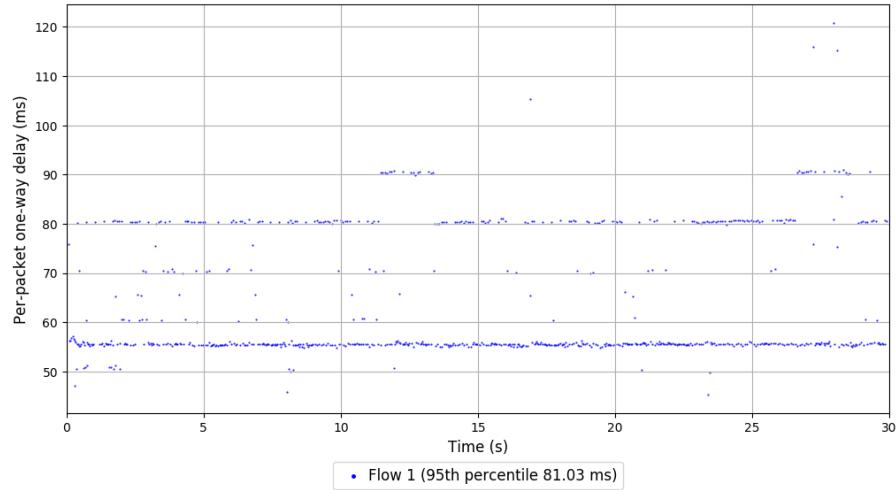
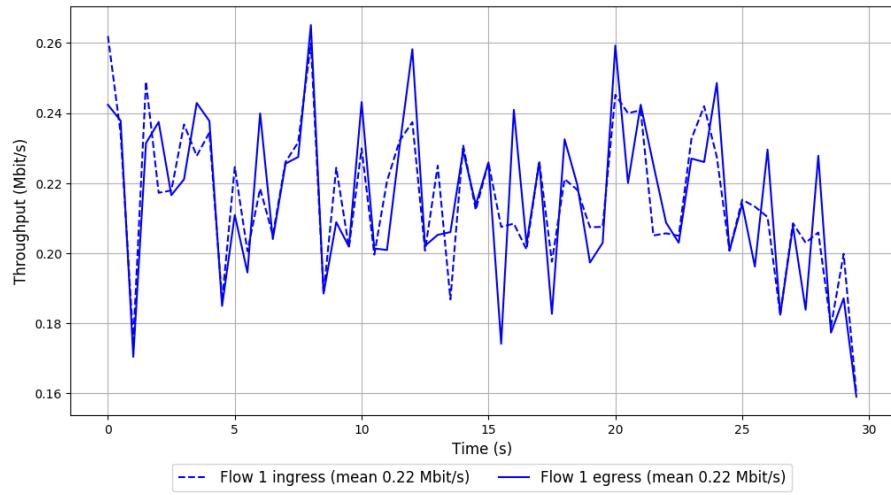


Run 3: Statistics of SCReAM

```
Start at: 2018-04-03 00:35:31
End at: 2018-04-03 00:36:01
Local clock offset: -2.168 ms
Remote clock offset: -1.671 ms

# Below is generated by plot.py at 2018-04-03 01:35:25
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 81.032 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 81.032 ms
Loss rate: 0.23%
```

Run 3: Report of SCReAM — Data Link

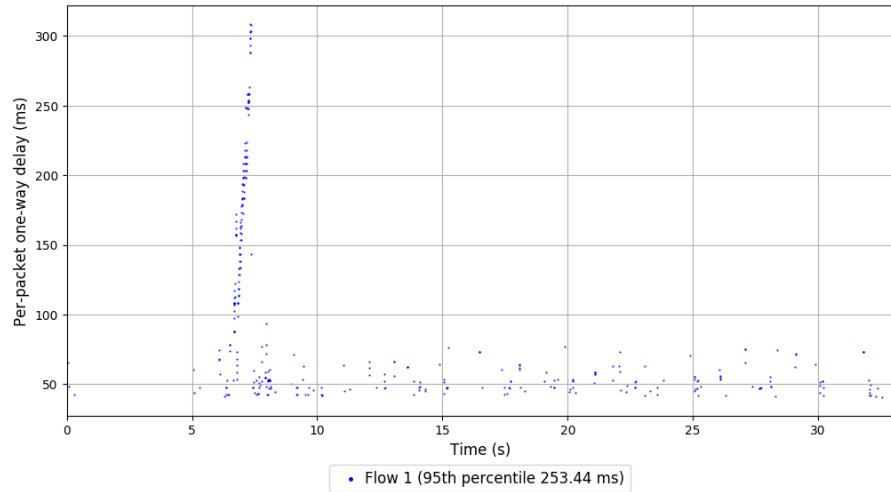
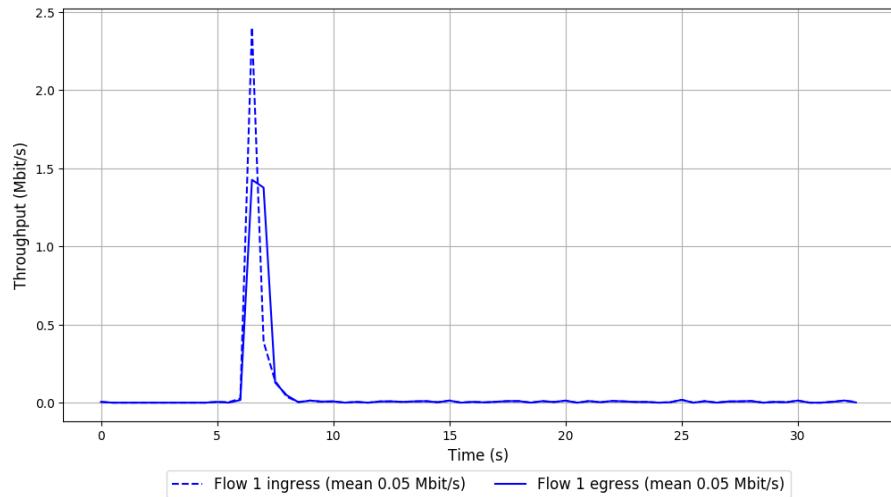


```
Run 1: Statistics of WebRTC media
```

```
Start at: 2018-04-02 23:55:24
End at: 2018-04-02 23:55:54
Local clock offset: -1.033 ms
Remote clock offset: -1.565 ms

# Below is generated by plot.py at 2018-04-03 01:35:25
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 253.439 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 253.439 ms
Loss rate: 0.12%
```

Run 1: Report of WebRTC media — Data Link

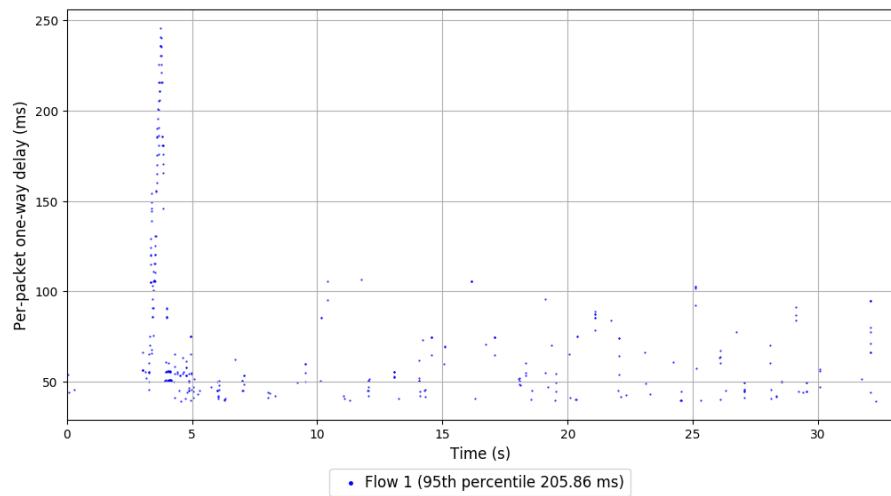
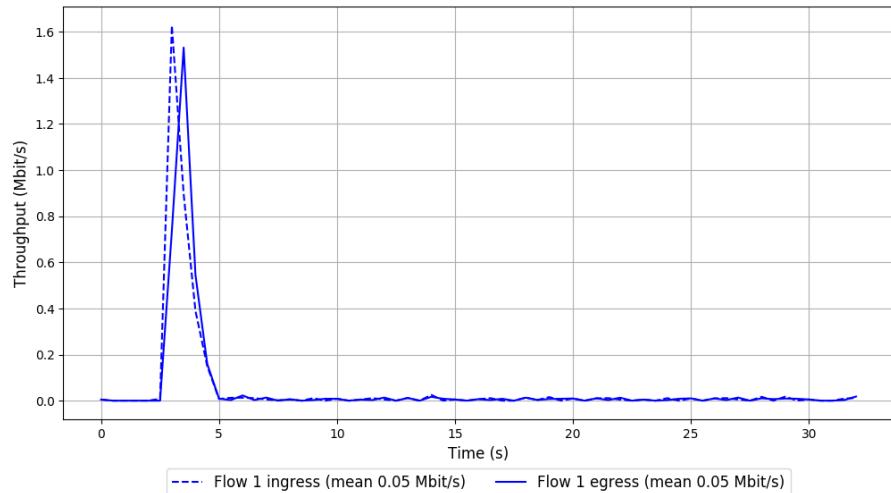


Run 2: Statistics of WebRTC media

```
Start at: 2018-04-03 00:14:55
End at: 2018-04-03 00:15:25
Local clock offset: -1.689 ms
Remote clock offset: -1.019 ms

# Below is generated by plot.py at 2018-04-03 01:35:26
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 205.856 ms
Loss rate: 2.82%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 205.856 ms
Loss rate: 2.82%
```

Run 2: Report of WebRTC media — Data Link

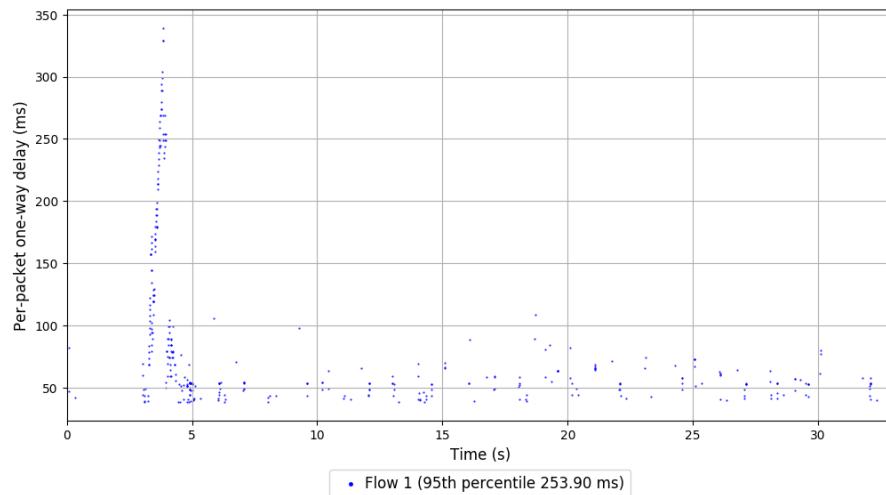
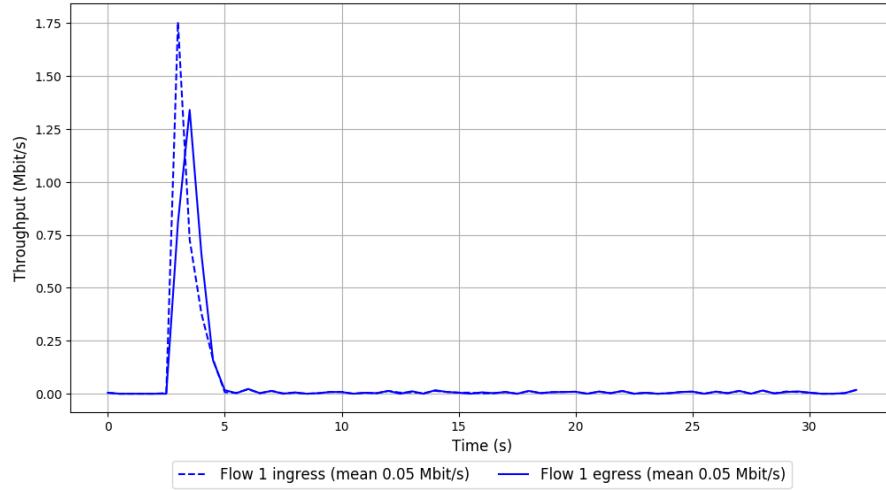


Run 3: Statistics of WebRTC media

```
Start at: 2018-04-03 00:34:26
End at: 2018-04-03 00:34:56
Local clock offset: -3.386 ms
Remote clock offset: -0.766 ms

# Below is generated by plot.py at 2018-04-03 01:35:26
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 253.898 ms
Loss rate: 1.43%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 253.898 ms
Loss rate: 1.43%
```

Run 3: Report of WebRTC media — Data Link

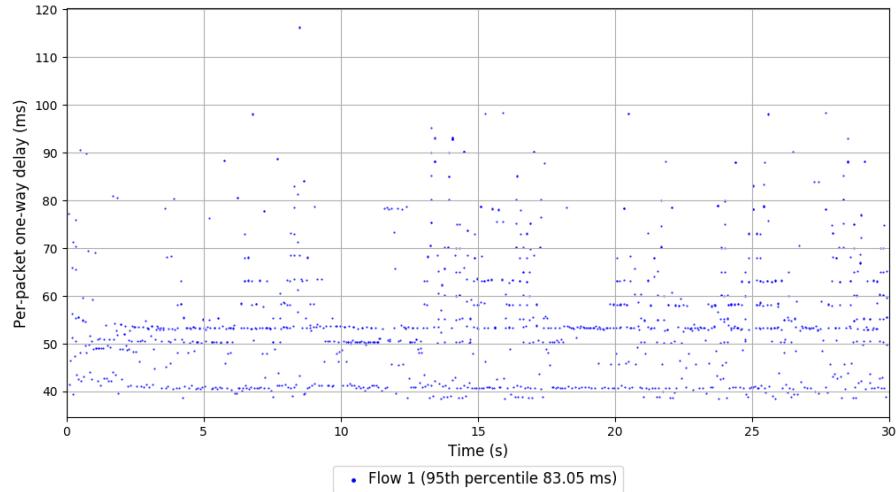
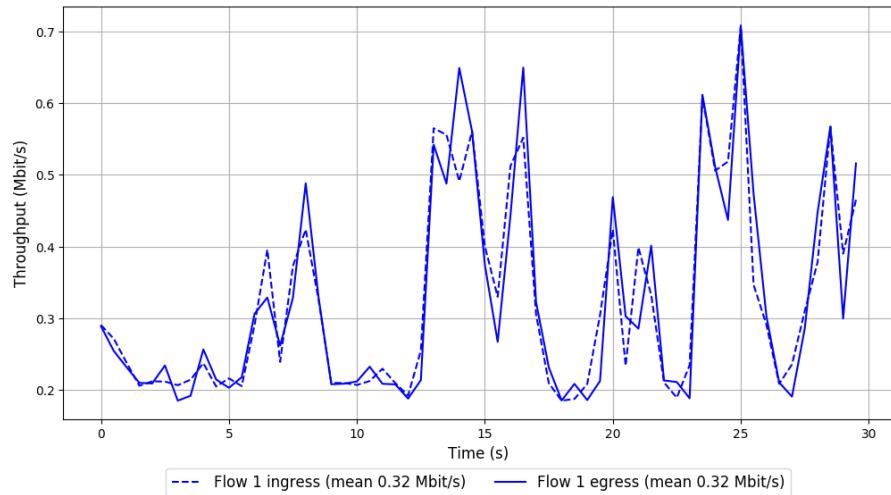


Run 1: Statistics of Sprout

```
Start at: 2018-04-02 23:41:16
End at: 2018-04-02 23:41:46
Local clock offset: 0.511 ms
Remote clock offset: -1.261 ms

# Below is generated by plot.py at 2018-04-03 01:35:26
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 83.046 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 83.046 ms
Loss rate: 0.21%
```

Run 1: Report of Sprout — Data Link

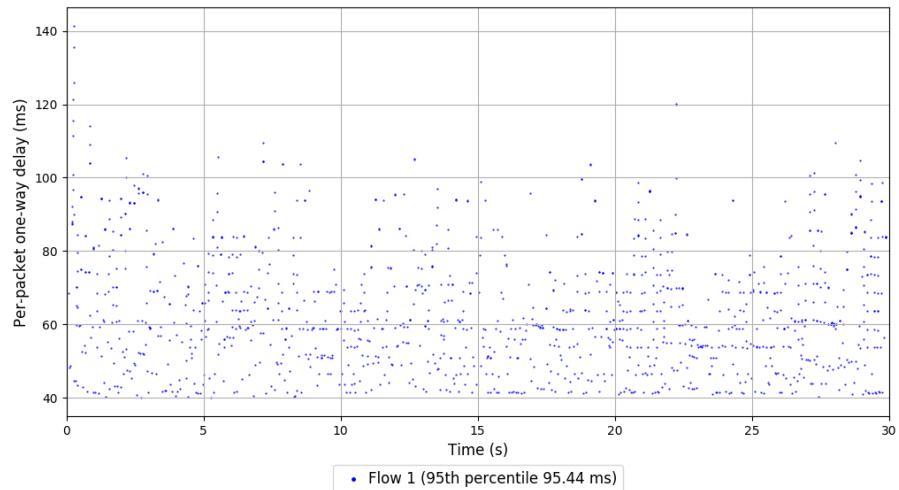
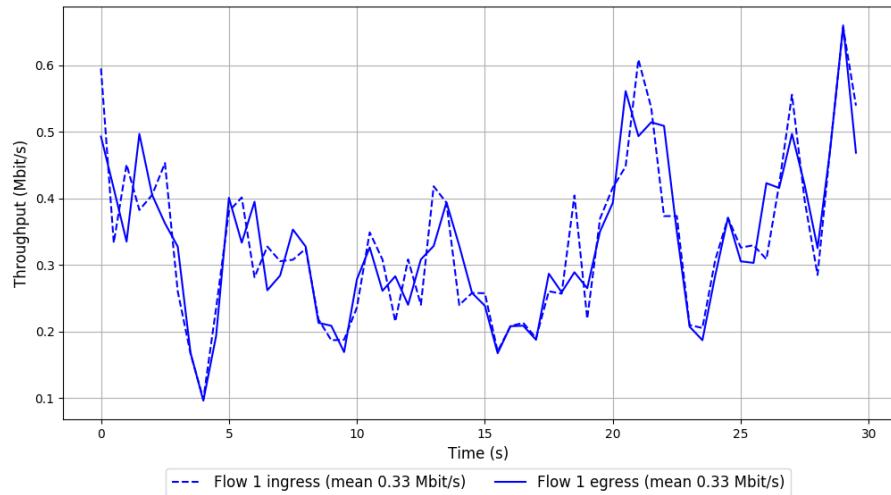


Run 2: Statistics of Sprout

```
Start at: 2018-04-03 00:00:49
End at: 2018-04-03 00:01:19
Local clock offset: -2.012 ms
Remote clock offset: -1.582 ms

# Below is generated by plot.py at 2018-04-03 01:35:27
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 95.438 ms
Loss rate: 0.46%
-- Flow 1:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 95.438 ms
Loss rate: 0.46%
```

Run 2: Report of Sprout — Data Link

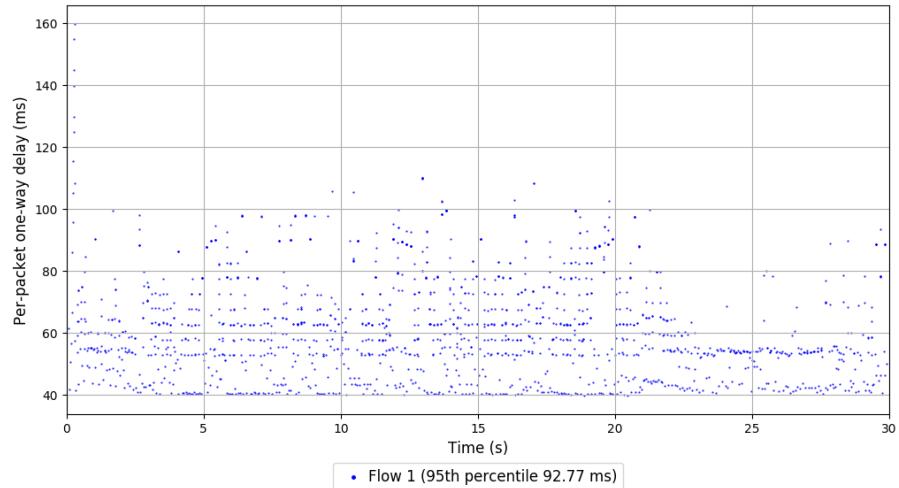
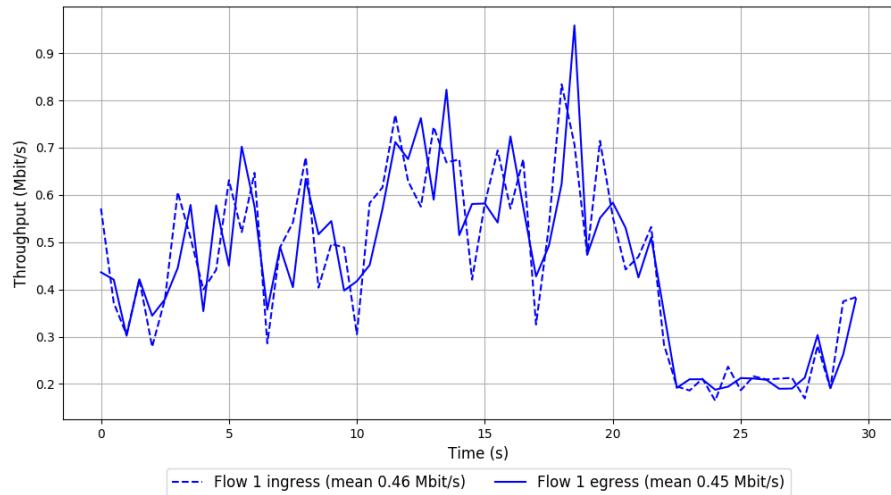


Run 3: Statistics of Sprout

```
Start at: 2018-04-03 00:20:20
End at: 2018-04-03 00:20:50
Local clock offset: -1.228 ms
Remote clock offset: -2.225 ms

# Below is generated by plot.py at 2018-04-03 01:35:27
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 92.773 ms
Loss rate: 0.51%
-- Flow 1:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 92.773 ms
Loss rate: 0.51%
```

Run 3: Report of Sprout — Data Link

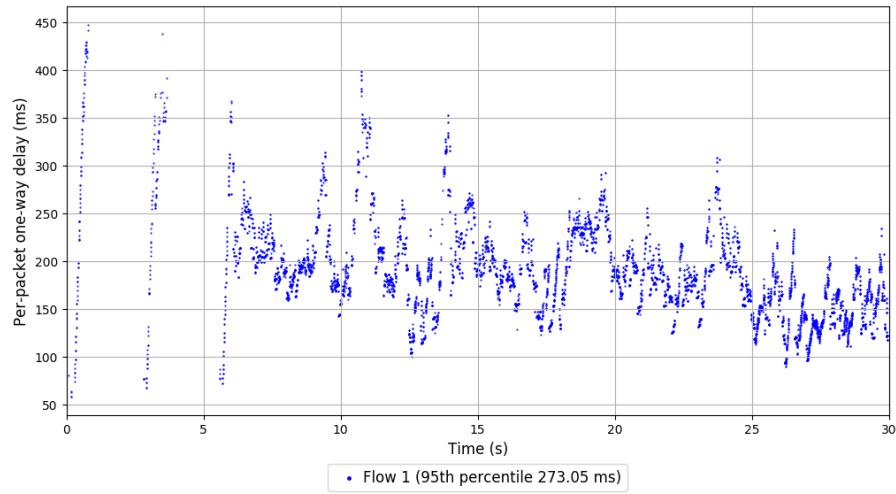
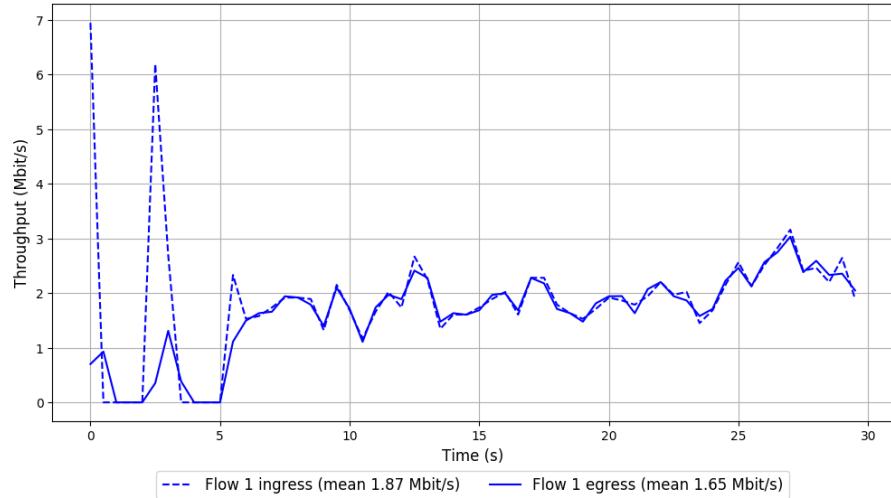


Run 1: Statistics of TaoVA-100x

```
Start at: 2018-04-02 23:44:31
End at: 2018-04-02 23:45:01
Local clock offset: 1.456 ms
Remote clock offset: -1.913 ms

# Below is generated by plot.py at 2018-04-03 01:35:31
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.65 Mbit/s
95th percentile per-packet one-way delay: 273.053 ms
Loss rate: 12.02%
-- Flow 1:
Average throughput: 1.65 Mbit/s
95th percentile per-packet one-way delay: 273.053 ms
Loss rate: 12.02%
```

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

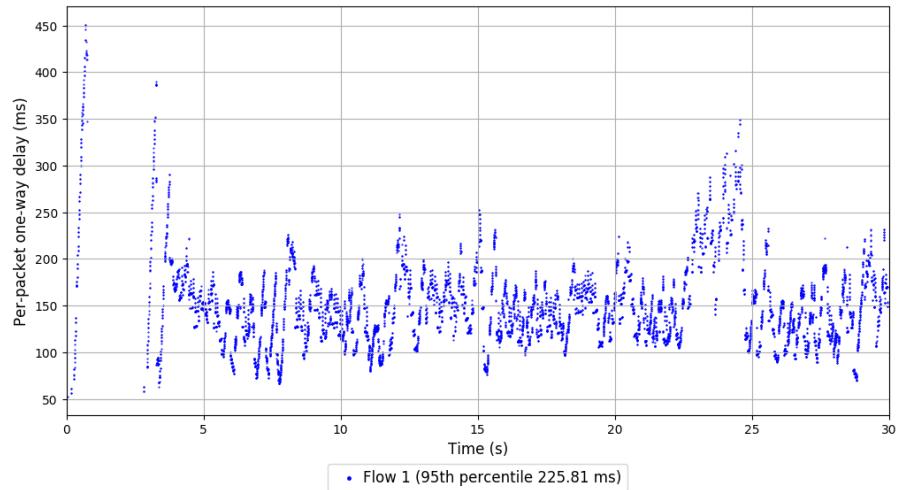
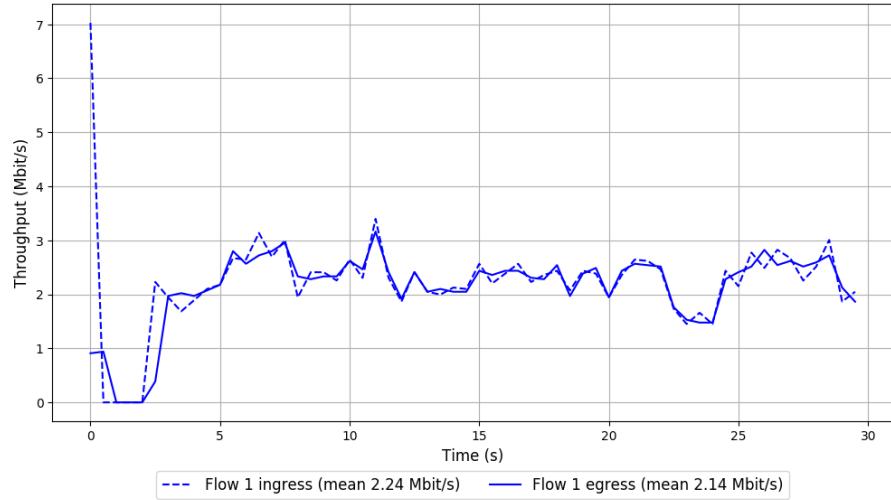


Run 2: Statistics of TaoVA-100x

```
Start at: 2018-04-03 00:04:04
End at: 2018-04-03 00:04:34
Local clock offset: -2.555 ms
Remote clock offset: -1.343 ms

# Below is generated by plot.py at 2018-04-03 01:35:34
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.14 Mbit/s
95th percentile per-packet one-way delay: 225.814 ms
Loss rate: 5.01%
-- Flow 1:
Average throughput: 2.14 Mbit/s
95th percentile per-packet one-way delay: 225.814 ms
Loss rate: 5.01%
```

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

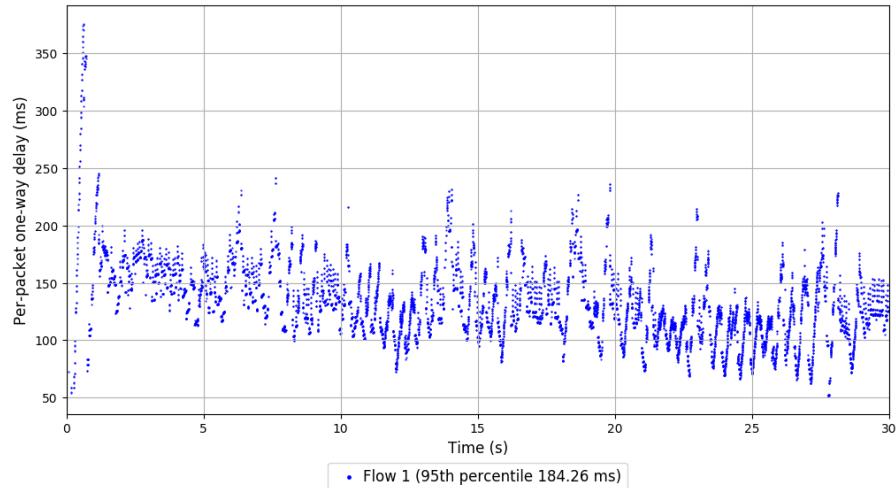
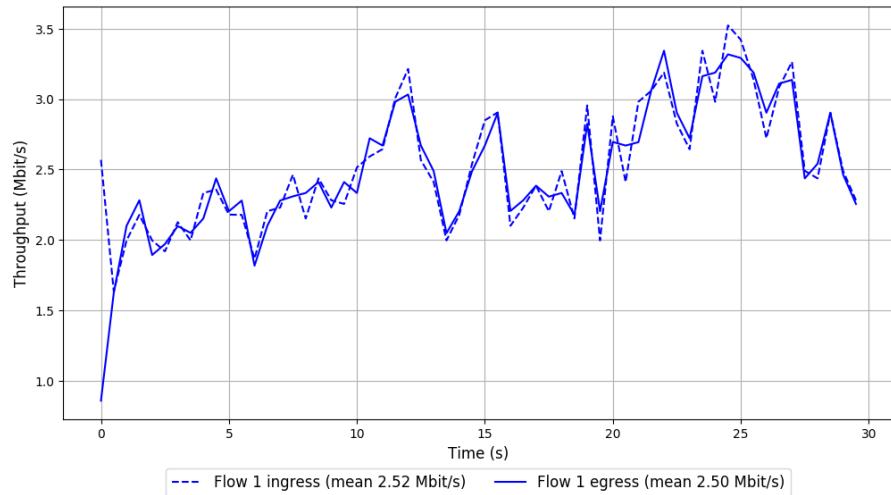


Run 3: Statistics of TaoVA-100x

```
Start at: 2018-04-03 00:23:35
End at: 2018-04-03 00:24:05
Local clock offset: -2.418 ms
Remote clock offset: -1.95 ms

# Below is generated by plot.py at 2018-04-03 01:35:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.50 Mbit/s
95th percentile per-packet one-way delay: 184.264 ms
Loss rate: 1.05%
-- Flow 1:
Average throughput: 2.50 Mbit/s
95th percentile per-packet one-way delay: 184.264 ms
Loss rate: 1.05%
```

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

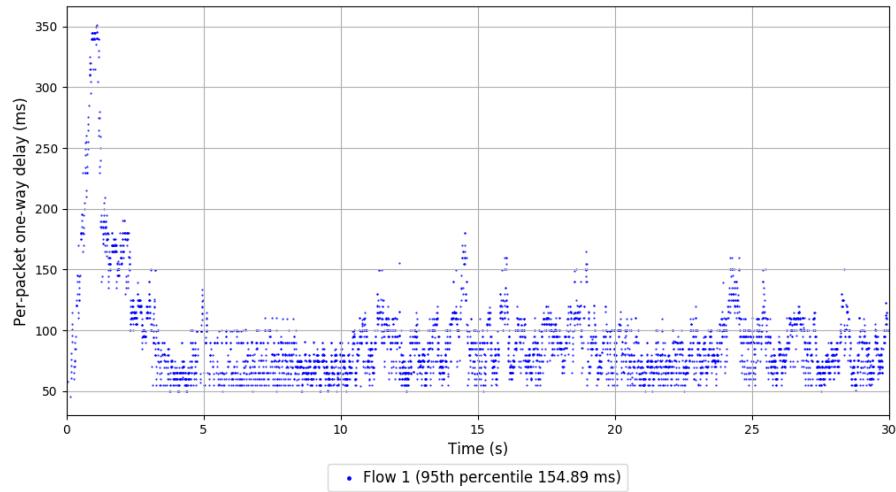
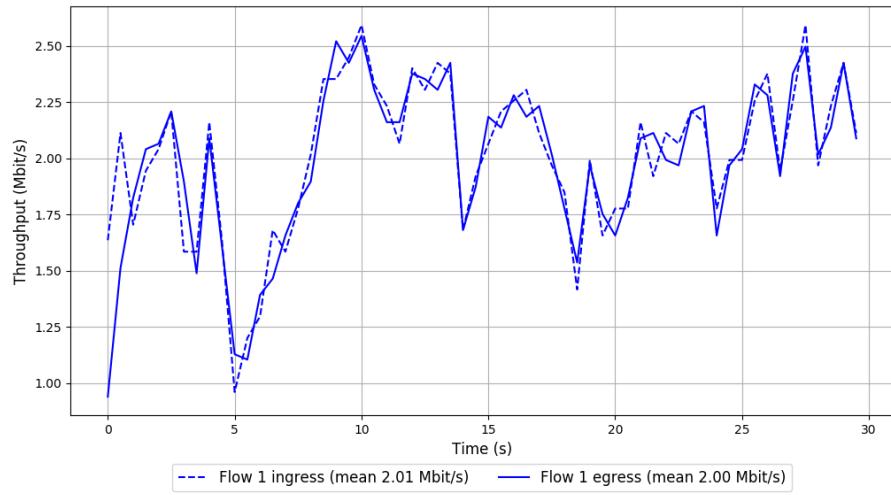


Run 1: Statistics of TCP Vegas

```
Start at: 2018-04-02 23:45:36
End at: 2018-04-02 23:46:06
Local clock offset: -1.437 ms
Remote clock offset: -1.911 ms

# Below is generated by plot.py at 2018-04-03 01:35:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 154.886 ms
Loss rate: 0.96%
-- Flow 1:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 154.886 ms
Loss rate: 0.96%
```

Run 1: Report of TCP Vegas — Data Link

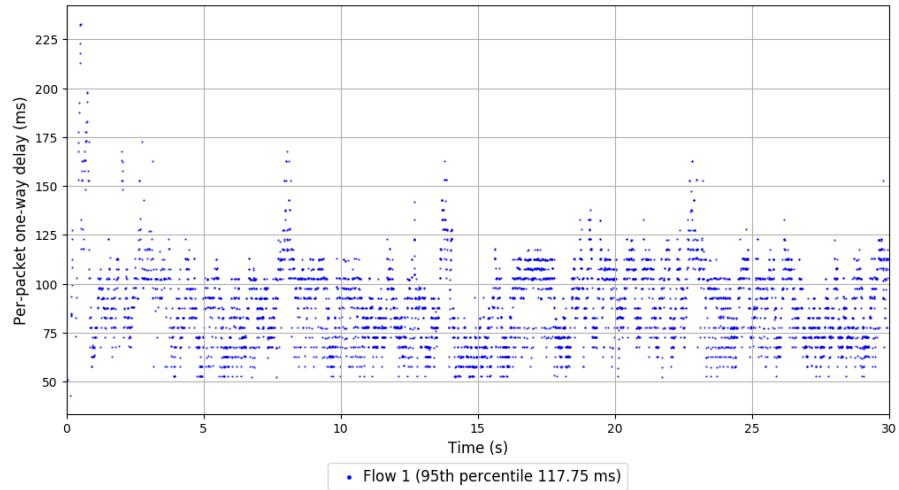
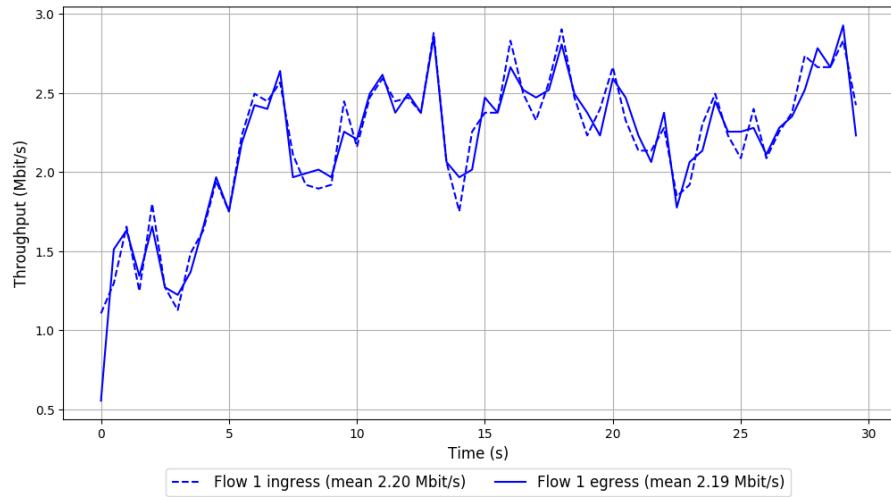


Run 2: Statistics of TCP Vegas

```
Start at: 2018-04-03 00:05:09
End at: 2018-04-03 00:05:39
Local clock offset: -4.974 ms
Remote clock offset: -1.209 ms

# Below is generated by plot.py at 2018-04-03 01:35:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 117.752 ms
Loss rate: 0.51%
-- Flow 1:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 117.752 ms
Loss rate: 0.51%
```

Run 2: Report of TCP Vegas — Data Link

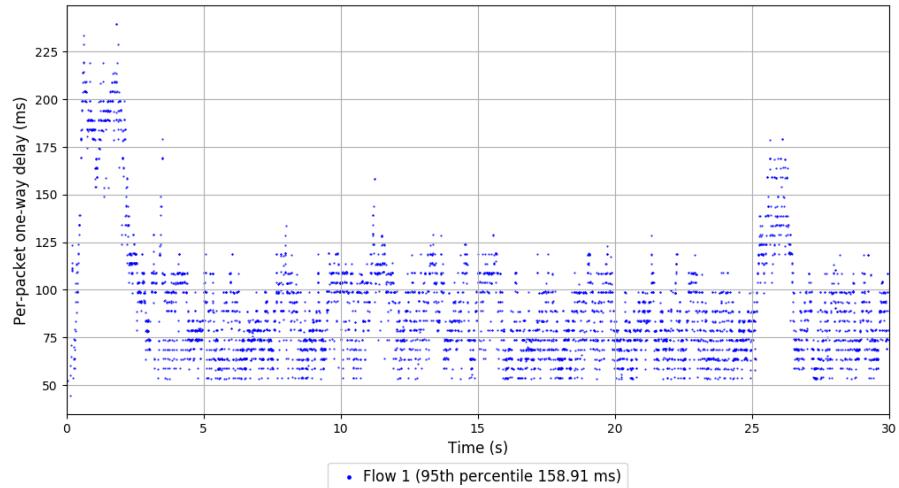
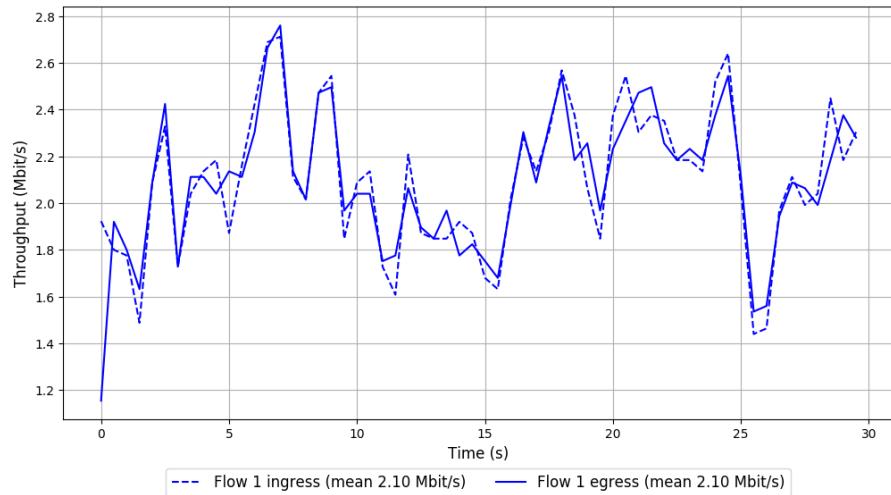


Run 3: Statistics of TCP Vegas

```
Start at: 2018-04-03 00:24:41
End at: 2018-04-03 00:25:11
Local clock offset: -0.654 ms
Remote clock offset: -1.764 ms

# Below is generated by plot.py at 2018-04-03 01:35:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 158.907 ms
Loss rate: 0.30%
-- Flow 1:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 158.907 ms
Loss rate: 0.30%
```

Run 3: Report of TCP Vegas — Data Link

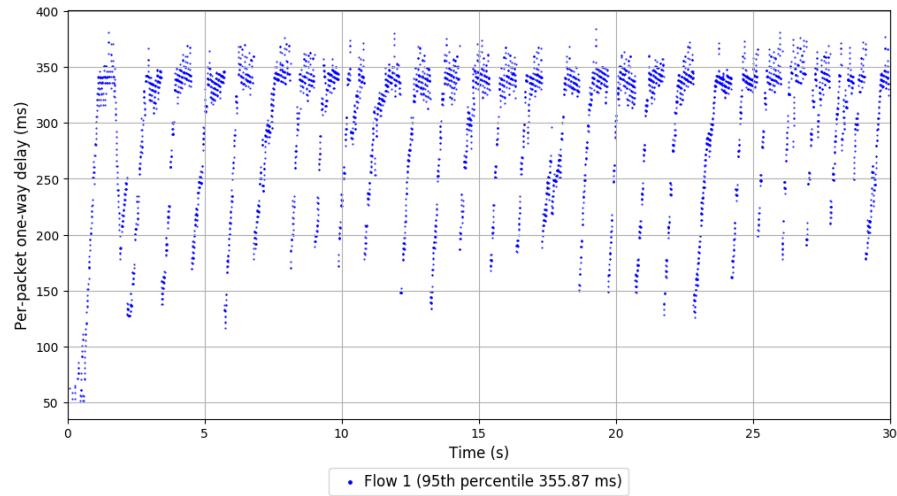
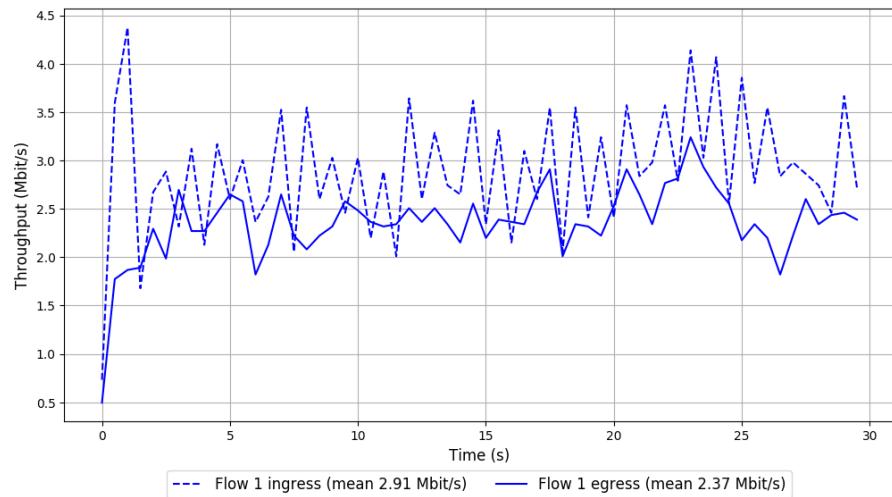


Run 1: Statistics of Verus

```
Start at: 2018-04-02 23:52:09
End at: 2018-04-02 23:52:39
Local clock offset: -4.736 ms
Remote clock offset: -1.077 ms

# Below is generated by plot.py at 2018-04-03 01:35:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.37 Mbit/s
95th percentile per-packet one-way delay: 355.872 ms
Loss rate: 18.66%
-- Flow 1:
Average throughput: 2.37 Mbit/s
95th percentile per-packet one-way delay: 355.872 ms
Loss rate: 18.66%
```

Run 1: Report of Verus — Data Link

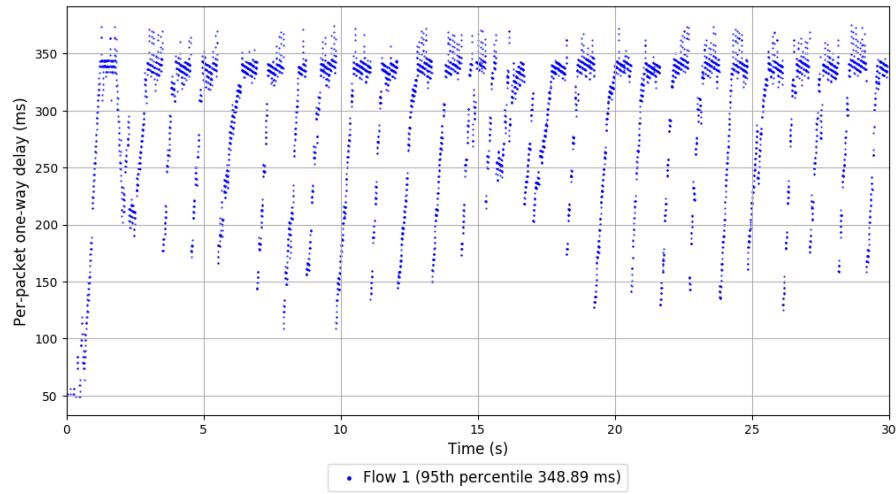
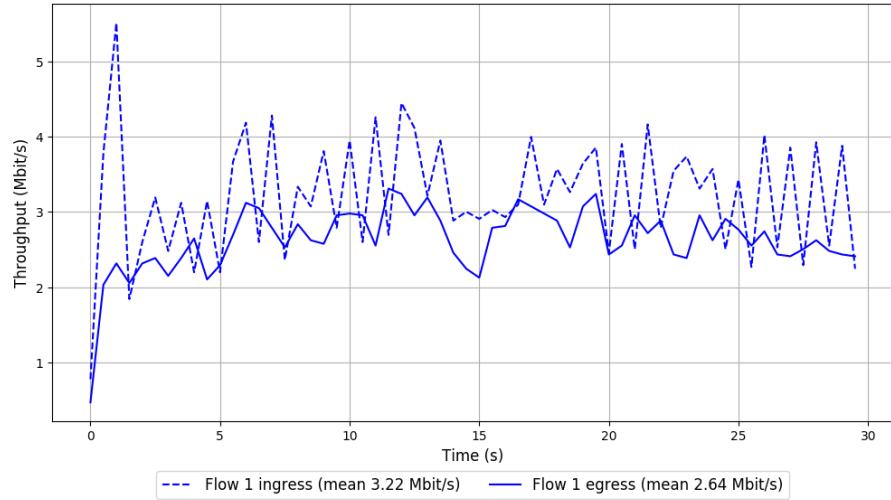


Run 2: Statistics of Verus

```
Start at: 2018-04-03 00:11:40
End at: 2018-04-03 00:12:10
Local clock offset: -5.568 ms
Remote clock offset: -0.727 ms

# Below is generated by plot.py at 2018-04-03 01:35:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.64 Mbit/s
95th percentile per-packet one-way delay: 348.886 ms
Loss rate: 18.09%
-- Flow 1:
Average throughput: 2.64 Mbit/s
95th percentile per-packet one-way delay: 348.886 ms
Loss rate: 18.09%
```

Run 2: Report of Verus — Data Link

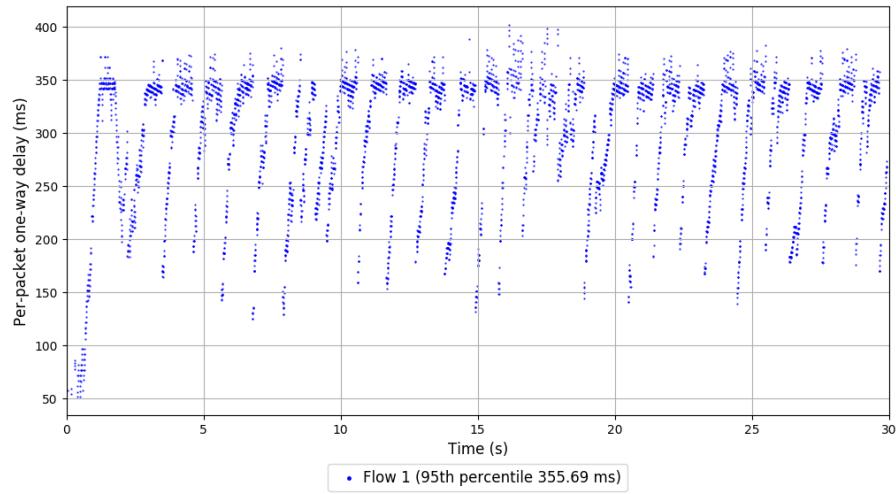
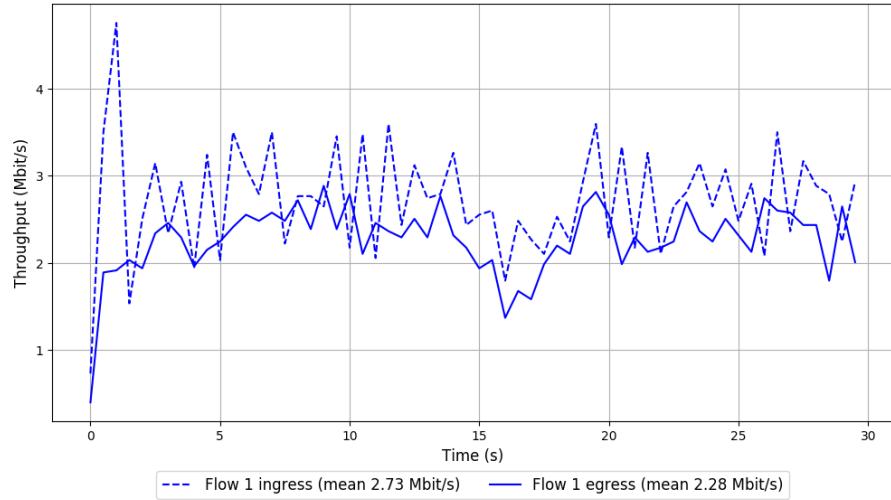


Run 3: Statistics of Verus

```
Start at: 2018-04-03 00:31:11
End at: 2018-04-03 00:31:41
Local clock offset: -1.155 ms
Remote clock offset: -0.536 ms

# Below is generated by plot.py at 2018-04-03 01:35:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 355.689 ms
Loss rate: 16.90%
-- Flow 1:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 355.689 ms
Loss rate: 16.90%
```

Run 3: Report of Verus — Data Link

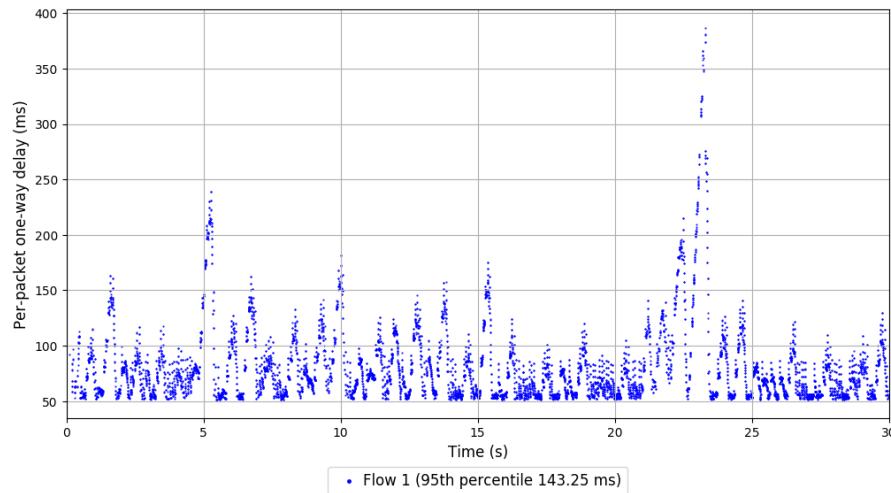
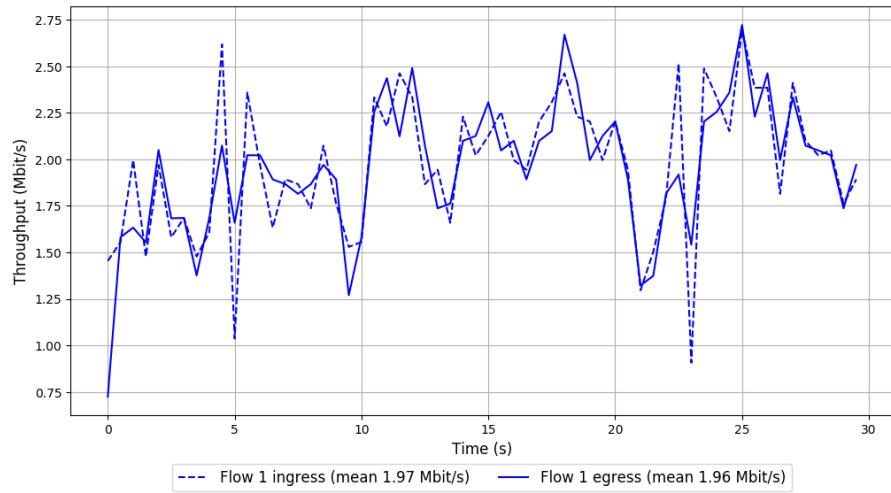


Run 1: Statistics of Copa

```
Start at: 2018-04-02 23:42:21
End at: 2018-04-02 23:42:51
Local clock offset: 3.155 ms
Remote clock offset: -0.622 ms

# Below is generated by plot.py at 2018-04-03 01:35:40
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.96 Mbit/s
95th percentile per-packet one-way delay: 143.245 ms
Loss rate: 0.80%
-- Flow 1:
Average throughput: 1.96 Mbit/s
95th percentile per-packet one-way delay: 143.245 ms
Loss rate: 0.80%
```

Run 1: Report of Copa — Data Link

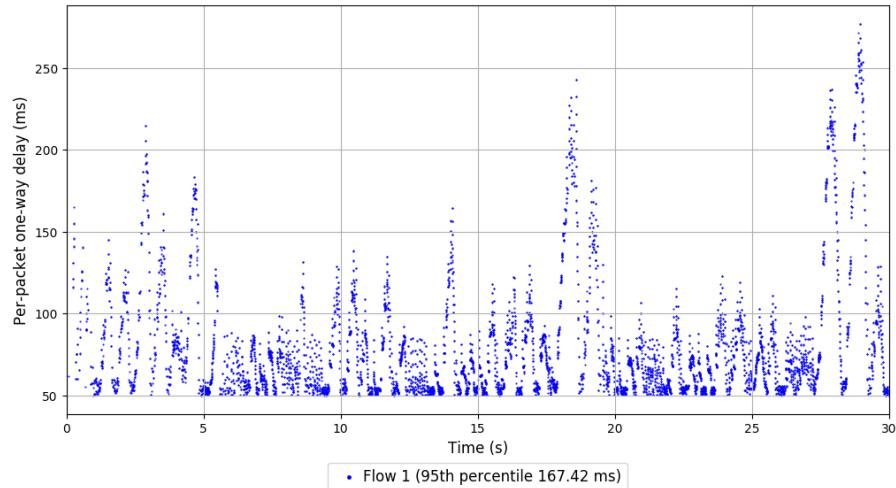
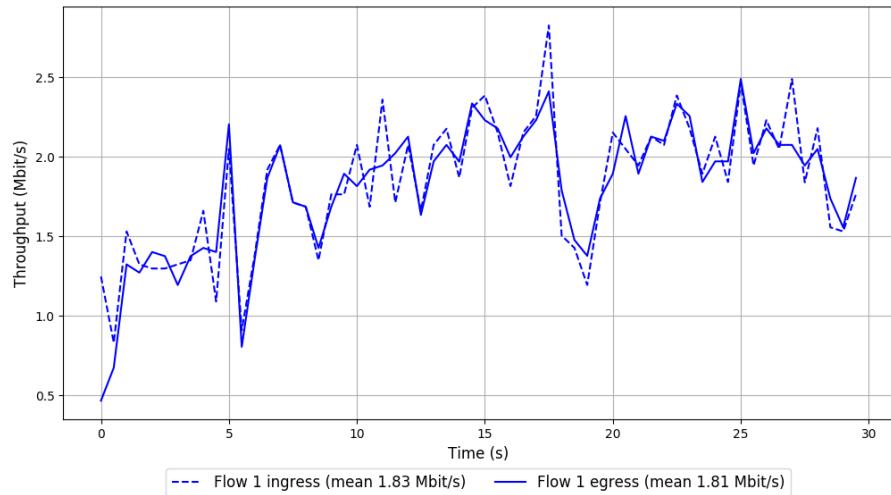


Run 2: Statistics of Copa

```
Start at: 2018-04-03 00:01:54
End at: 2018-04-03 00:02:24
Local clock offset: -2.761 ms
Remote clock offset: -1.556 ms

# Below is generated by plot.py at 2018-04-03 01:35:41
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.81 Mbit/s
95th percentile per-packet one-way delay: 167.421 ms
Loss rate: 1.07%
-- Flow 1:
Average throughput: 1.81 Mbit/s
95th percentile per-packet one-way delay: 167.421 ms
Loss rate: 1.07%
```

Run 2: Report of Copa — Data Link

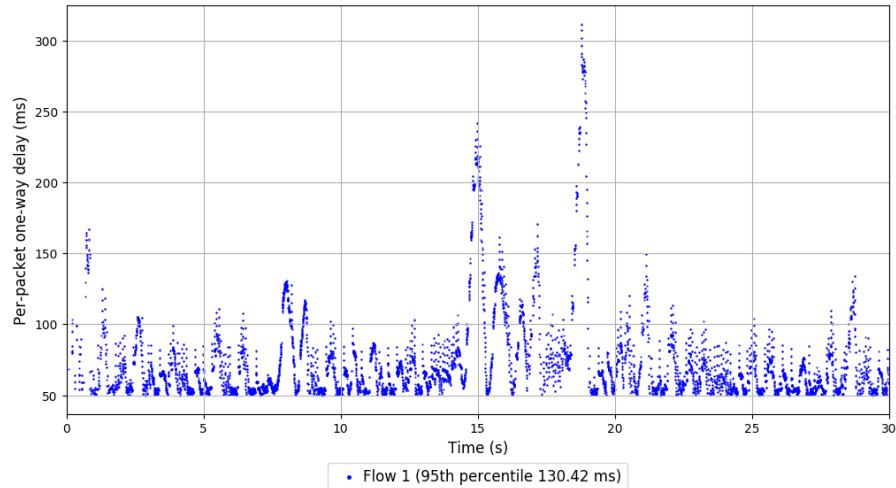
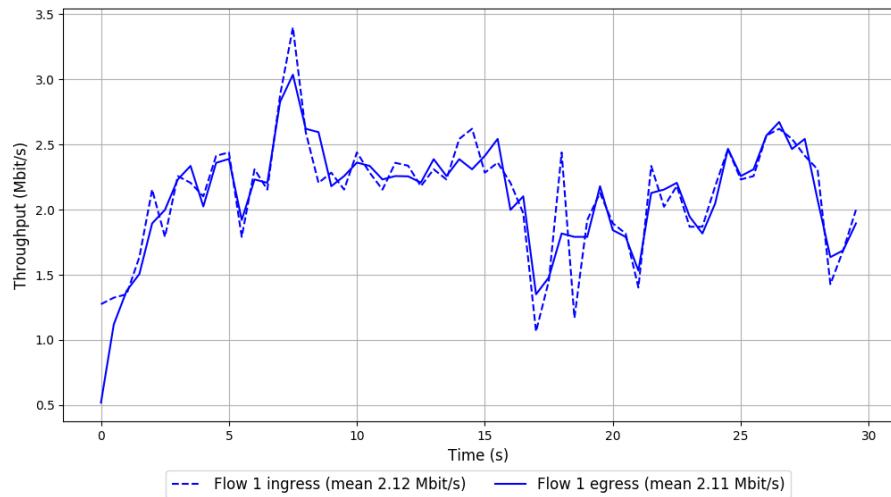


Run 3: Statistics of Copa

```
Start at: 2018-04-03 00:21:25
End at: 2018-04-03 00:21:55
Local clock offset: -0.612 ms
Remote clock offset: -0.856 ms

# Below is generated by plot.py at 2018-04-03 01:35:42
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 130.420 ms
Loss rate: 0.90%
-- Flow 1:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 130.420 ms
Loss rate: 0.90%
```

Run 3: Report of Copa — Data Link

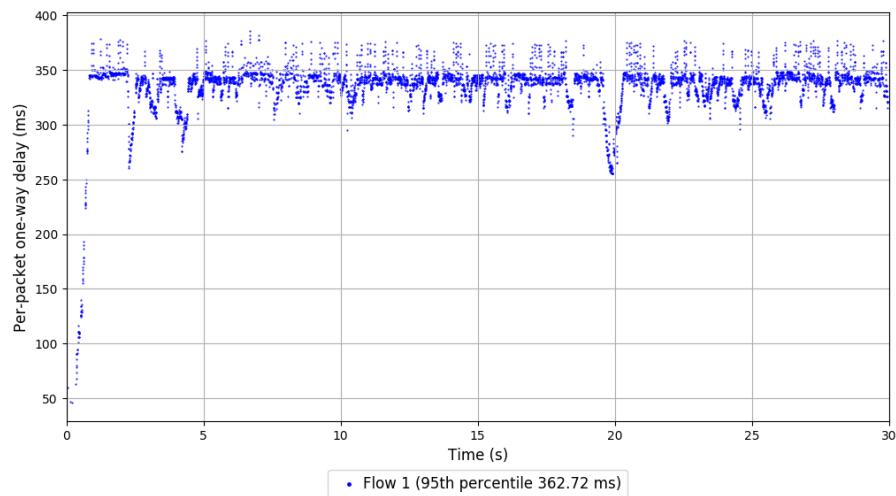
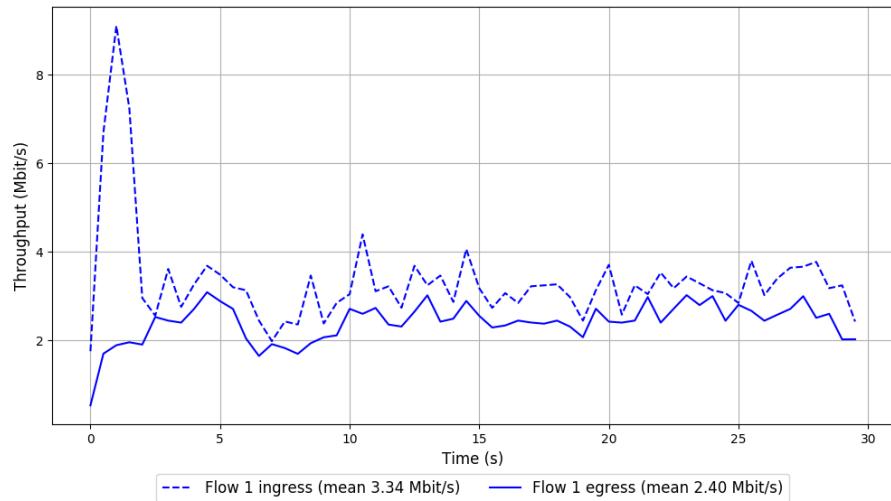


```
Run 1: Statistics of FillP
```

```
Start at: 2018-04-02 23:39:06
End at: 2018-04-02 23:39:36
Local clock offset: 2.079 ms
Remote clock offset: -0.561 ms

# Below is generated by plot.py at 2018-04-03 01:35:42
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 362.720 ms
Loss rate: 28.22%
-- Flow 1:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 362.720 ms
Loss rate: 28.22%
```

Run 1: Report of FillP — Data Link

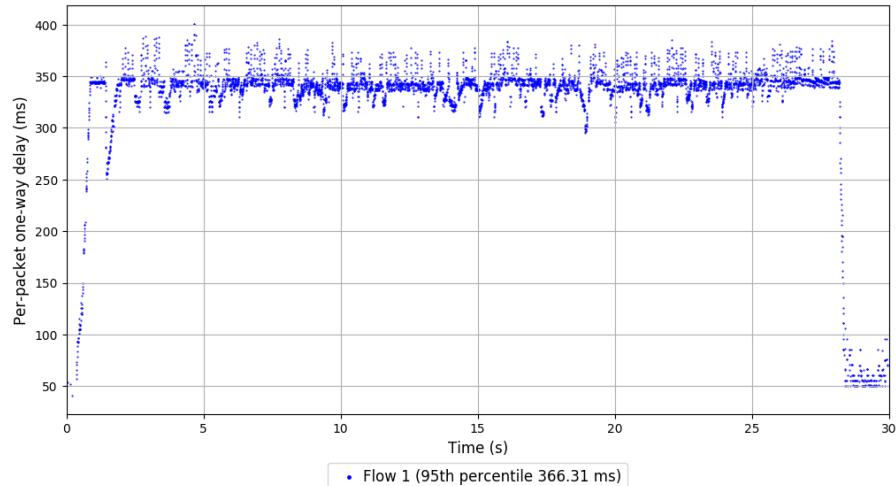
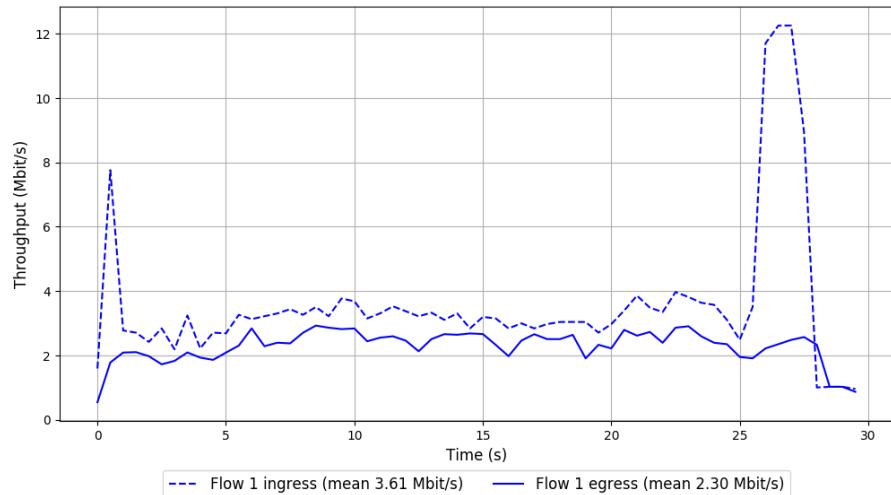


Run 2: Statistics of FillP

```
Start at: 2018-04-02 23:58:39
End at: 2018-04-02 23:59:09
Local clock offset: -2.185 ms
Remote clock offset: -1.235 ms

# Below is generated by plot.py at 2018-04-03 01:35:42
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.30 Mbit/s
95th percentile per-packet one-way delay: 366.308 ms
Loss rate: 36.38%
-- Flow 1:
Average throughput: 2.30 Mbit/s
95th percentile per-packet one-way delay: 366.308 ms
Loss rate: 36.38%
```

Run 2: Report of FillP — Data Link

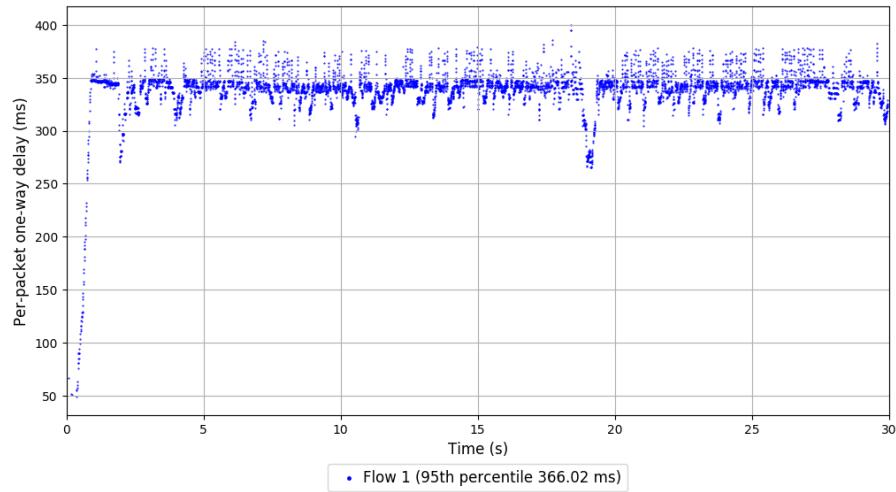
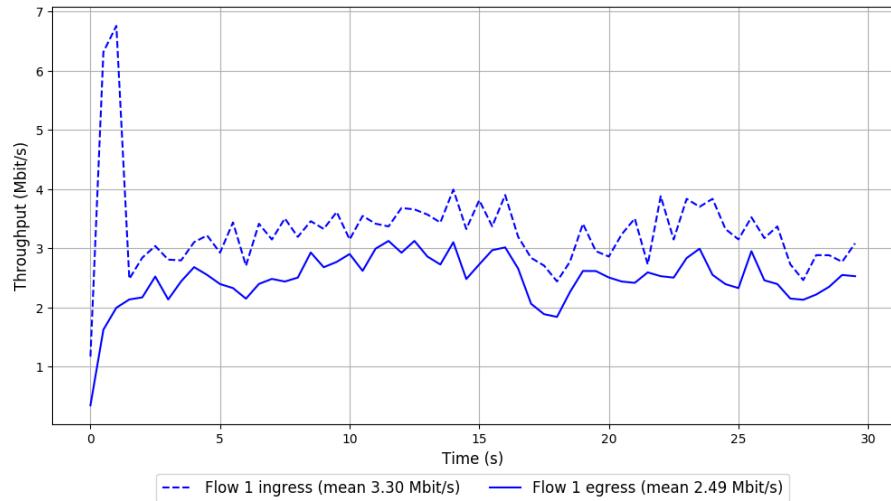


Run 3: Statistics of FillP

```
Start at: 2018-04-03 00:18:10
End at: 2018-04-03 00:18:40
Local clock offset: -0.419 ms
Remote clock offset: -1.055 ms

# Below is generated by plot.py at 2018-04-03 01:35:43
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.49 Mbit/s
95th percentile per-packet one-way delay: 366.016 ms
Loss rate: 24.72%
-- Flow 1:
Average throughput: 2.49 Mbit/s
95th percentile per-packet one-way delay: 366.016 ms
Loss rate: 24.72%
```

Run 3: Report of FillP — Data Link

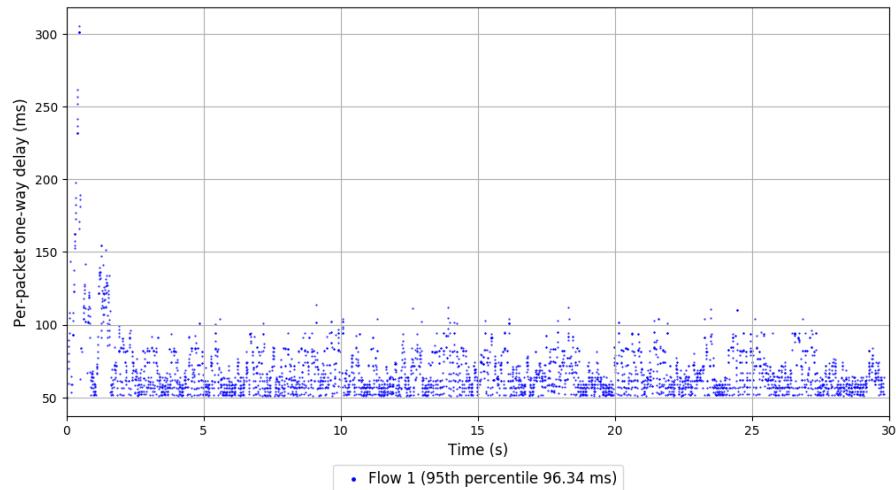
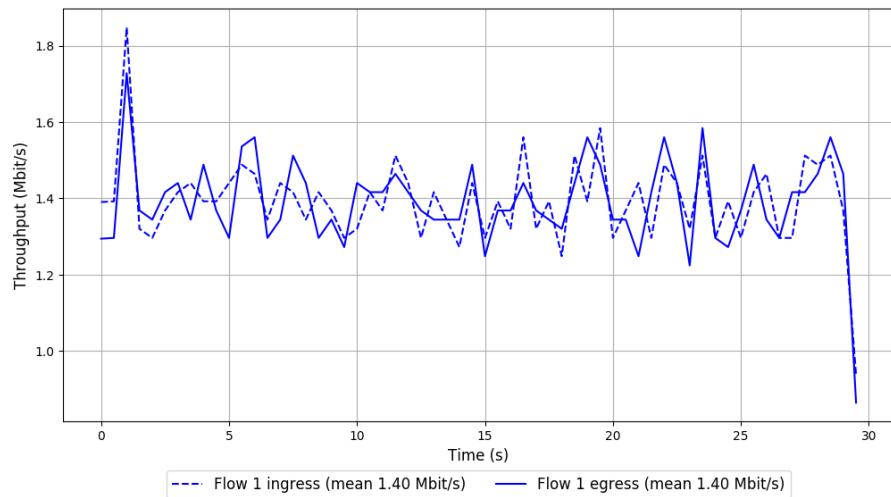


Run 1: Statistics of Indigo-1-32

```
Start at: 2018-04-02 23:47:47
End at: 2018-04-02 23:48:17
Local clock offset: -1.498 ms
Remote clock offset: -1.192 ms

# Below is generated by plot.py at 2018-04-03 01:35:43
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.40 Mbit/s
95th percentile per-packet one-way delay: 96.342 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 1.40 Mbit/s
95th percentile per-packet one-way delay: 96.342 ms
Loss rate: 0.20%
```

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

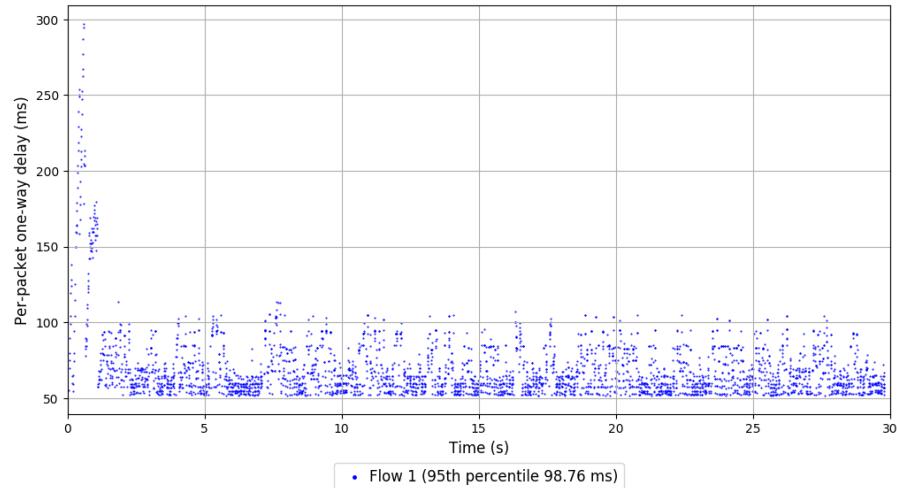
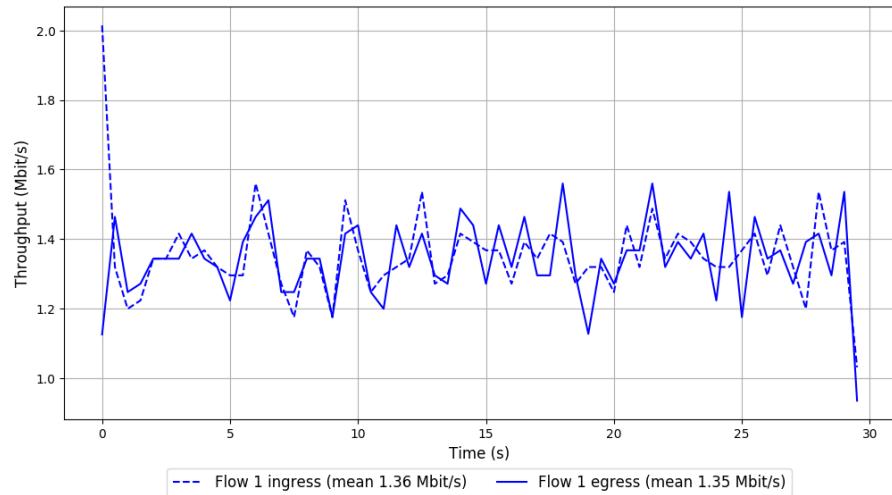


Run 2: Statistics of Indigo-1-32

```
Start at: 2018-04-03 00:07:19
End at: 2018-04-03 00:07:49
Local clock offset: -4.047 ms
Remote clock offset: -2.113 ms

# Below is generated by plot.py at 2018-04-03 01:35:43
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 98.756 ms
Loss rate: 0.83%
-- Flow 1:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 98.756 ms
Loss rate: 0.83%
```

Run 2: Report of Indigo-1-32 — Data Link

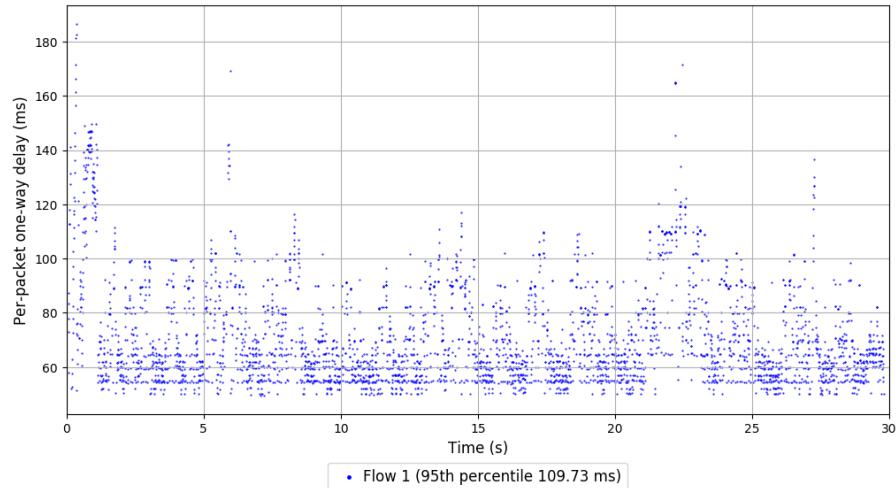
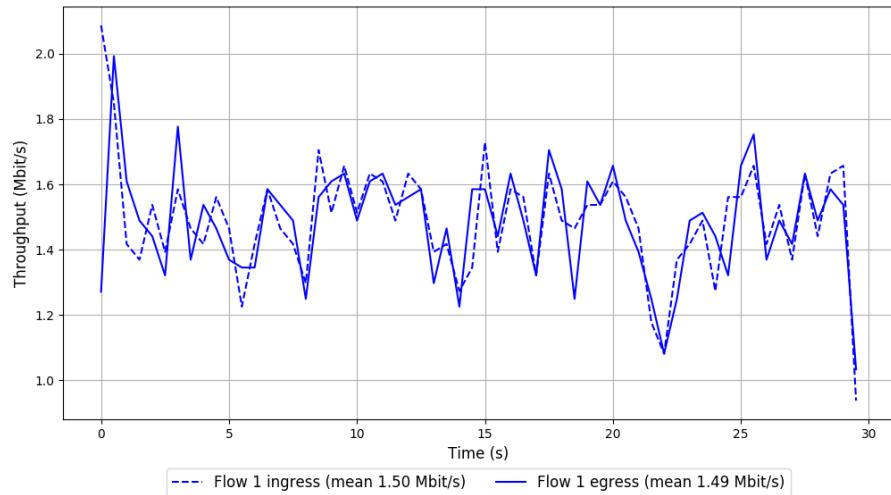


Run 3: Statistics of Indigo-1-32

```
Start at: 2018-04-03 00:26:51
End at: 2018-04-03 00:27:21
Local clock offset: -2.31 ms
Remote clock offset: -1.988 ms

# Below is generated by plot.py at 2018-04-03 01:35:45
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 109.734 ms
Loss rate: 0.48%
-- Flow 1:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 109.734 ms
Loss rate: 0.48%
```

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

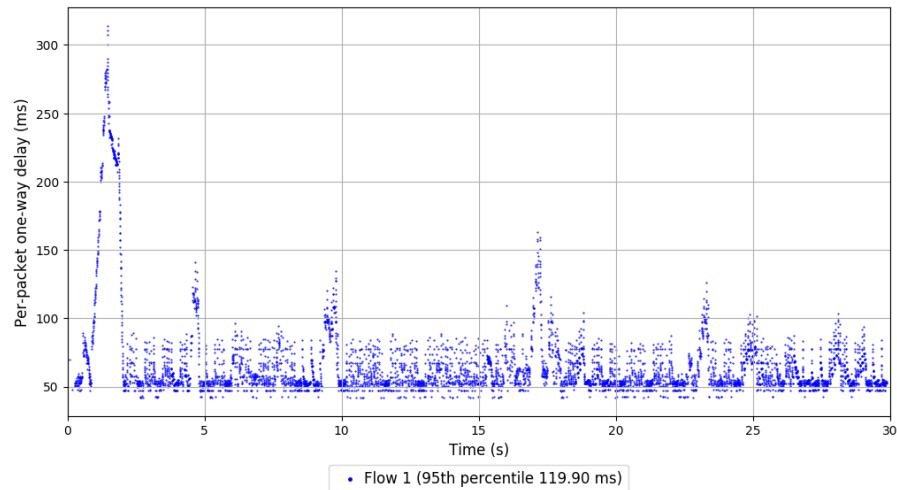
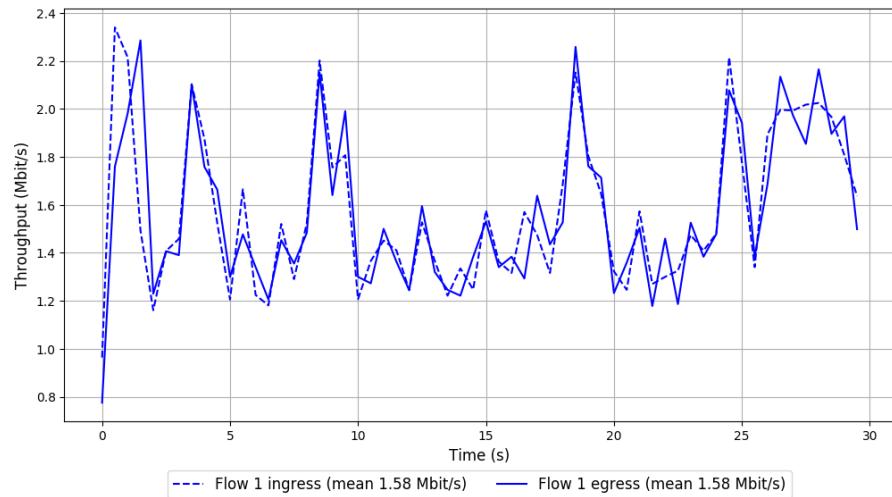


Run 1: Statistics of Vivace-latency

```
Start at: 2018-04-02 23:40:11
End at: 2018-04-02 23:40:41
Local clock offset: 2.595 ms
Remote clock offset: -0.808 ms

# Below is generated by plot.py at 2018-04-03 01:35:46
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.58 Mbit/s
95th percentile per-packet one-way delay: 119.896 ms
Loss rate: 0.32%
-- Flow 1:
Average throughput: 1.58 Mbit/s
95th percentile per-packet one-way delay: 119.896 ms
Loss rate: 0.32%
```

Run 1: Report of Vivace-latency — Data Link

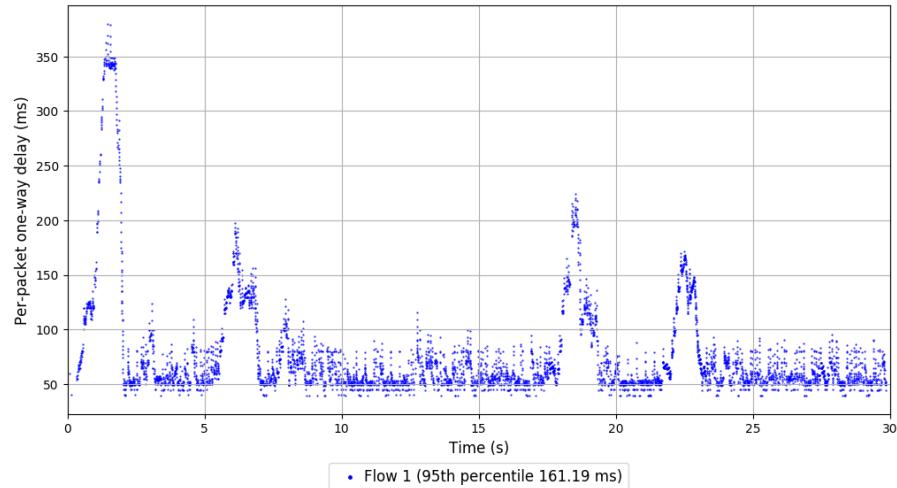
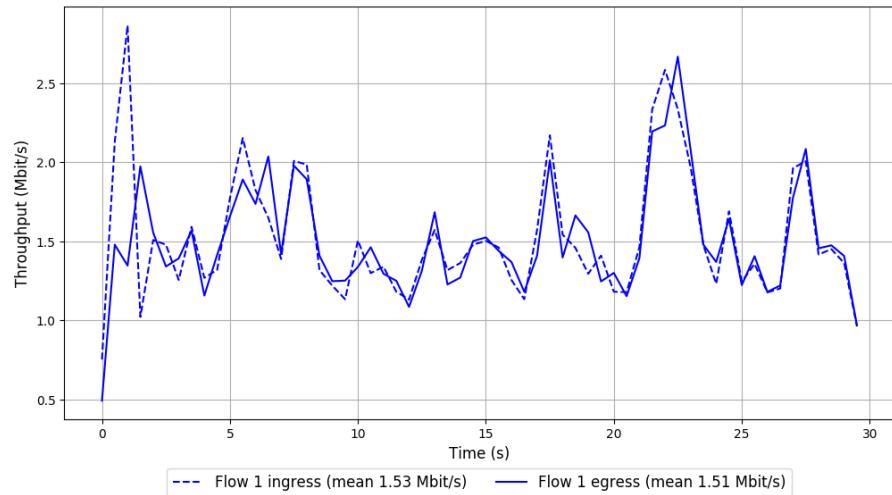


Run 2: Statistics of Vivace-latency

```
Start at: 2018-04-02 23:59:44
End at: 2018-04-03 00:00:14
Local clock offset: -3.9 ms
Remote clock offset: -1.627 ms

# Below is generated by plot.py at 2018-04-03 01:35:47
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 161.186 ms
Loss rate: 1.56%
-- Flow 1:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 161.186 ms
Loss rate: 1.56%
```

Run 2: Report of Vivace-latency — Data Link

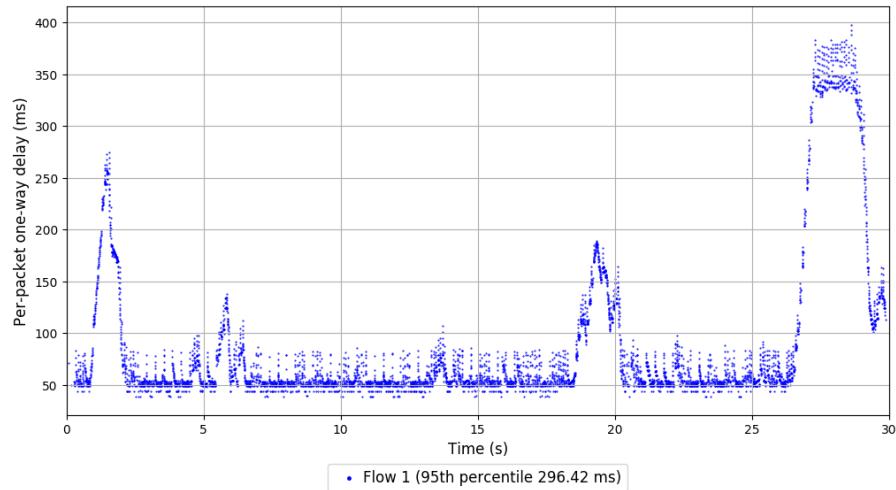
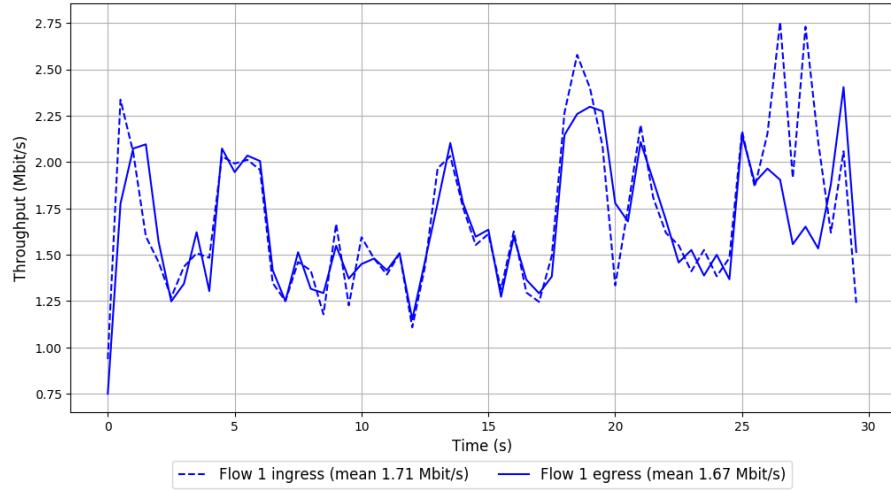


Run 3: Statistics of Vivace-latency

```
Start at: 2018-04-03 00:19:15
End at: 2018-04-03 00:19:45
Local clock offset: -2.073 ms
Remote clock offset: -0.965 ms

# Below is generated by plot.py at 2018-04-03 01:35:48
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.67 Mbit/s
95th percentile per-packet one-way delay: 296.422 ms
Loss rate: 2.35%
-- Flow 1:
Average throughput: 1.67 Mbit/s
95th percentile per-packet one-way delay: 296.422 ms
Loss rate: 2.35%
```

Run 3: Report of Vivace-latency — Data Link

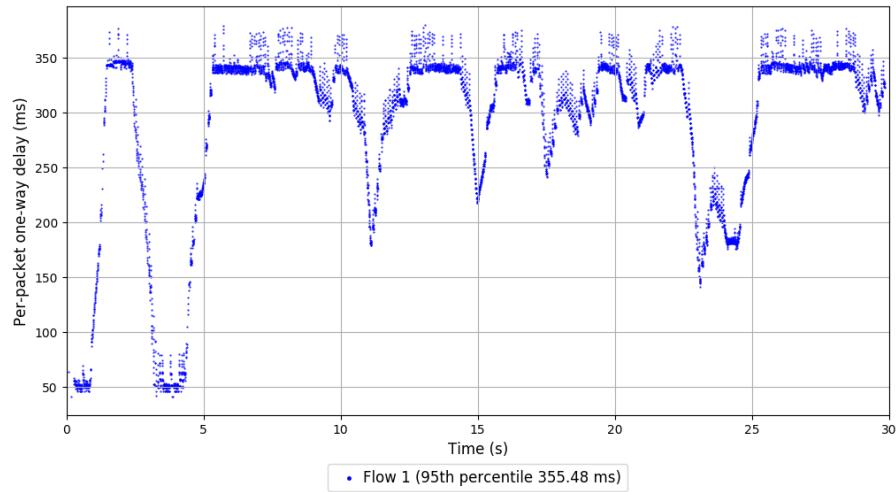
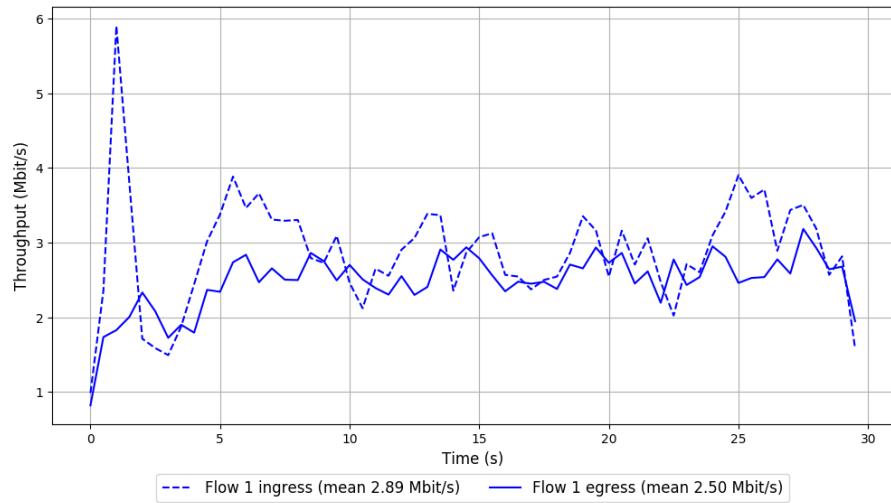


```
Run 1: Statistics of Vivace-loss
```

```
Start at: 2018-04-02 23:54:19
End at: 2018-04-02 23:54:49
Local clock offset: -4.395 ms
Remote clock offset: -1.653 ms

# Below is generated by plot.py at 2018-04-03 01:35:49
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.50 Mbit/s
95th percentile per-packet one-way delay: 355.480 ms
Loss rate: 13.88%
-- Flow 1:
Average throughput: 2.50 Mbit/s
95th percentile per-packet one-way delay: 355.480 ms
Loss rate: 13.88%
```

Run 1: Report of Vivace-loss — Data Link

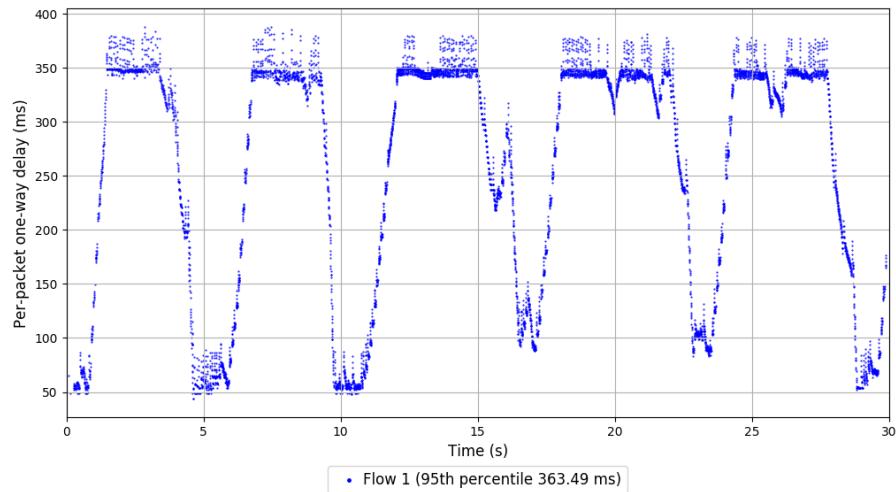
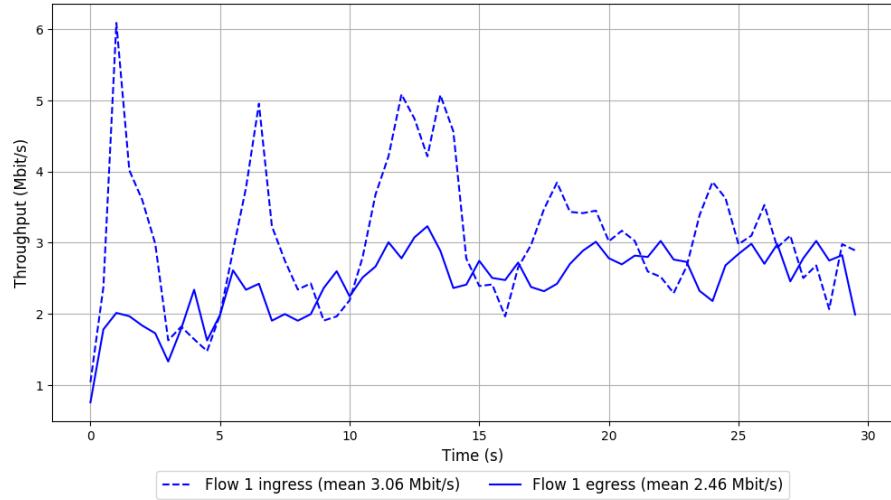


Run 2: Statistics of Vivace-loss

```
Start at: 2018-04-03 00:13:50
End at: 2018-04-03 00:14:20
Local clock offset: -0.892 ms
Remote clock offset: -2.424 ms

# Below is generated by plot.py at 2018-04-03 01:35:50
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.46 Mbit/s
95th percentile per-packet one-way delay: 363.493 ms
Loss rate: 19.89%
-- Flow 1:
Average throughput: 2.46 Mbit/s
95th percentile per-packet one-way delay: 363.493 ms
Loss rate: 19.89%
```

Run 2: Report of Vivace-loss — Data Link

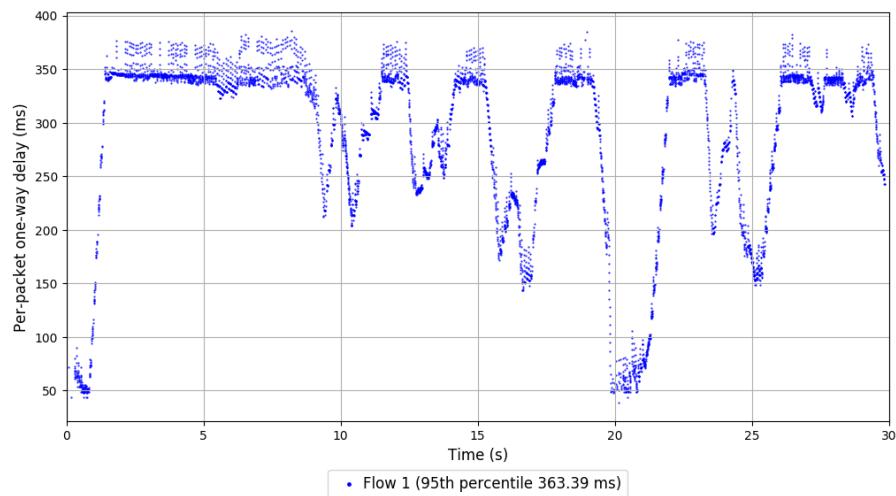
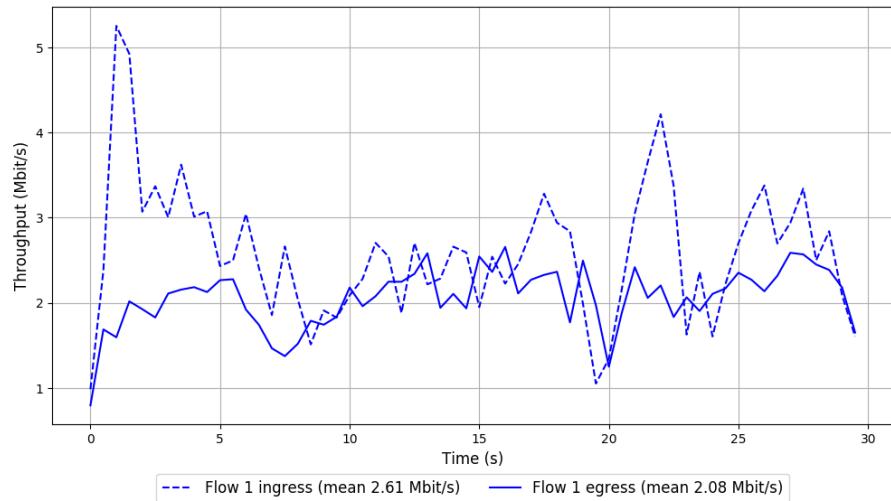


Run 3: Statistics of Vivace-loss

```
Start at: 2018-04-03 00:33:21
End at: 2018-04-03 00:33:51
Local clock offset: -4.543 ms
Remote clock offset: -1.132 ms

# Below is generated by plot.py at 2018-04-03 01:35:50
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.08 Mbit/s
95th percentile per-packet one-way delay: 363.394 ms
Loss rate: 20.62%
-- Flow 1:
Average throughput: 2.08 Mbit/s
95th percentile per-packet one-way delay: 363.394 ms
Loss rate: 20.62%
```

Run 3: Report of Vivace-loss — Data Link

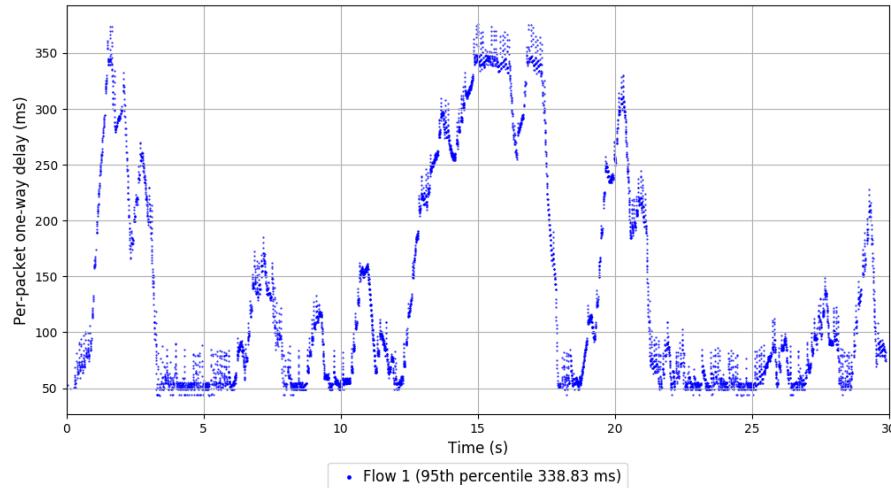
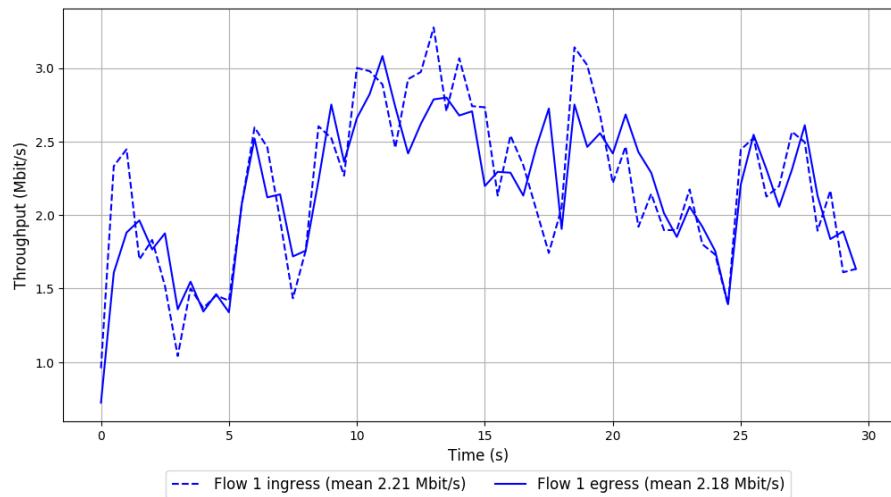


Run 1: Statistics of Vivace-LTE

```
Start at: 2018-04-02 23:49:58
End at: 2018-04-02 23:50:28
Local clock offset: -3.125 ms
Remote clock offset: -1.799 ms

# Below is generated by plot.py at 2018-04-03 01:35:50
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.18 Mbit/s
95th percentile per-packet one-way delay: 338.830 ms
Loss rate: 1.52%
-- Flow 1:
Average throughput: 2.18 Mbit/s
95th percentile per-packet one-way delay: 338.830 ms
Loss rate: 1.52%
```

Run 1: Report of Vivace-LTE — Data Link

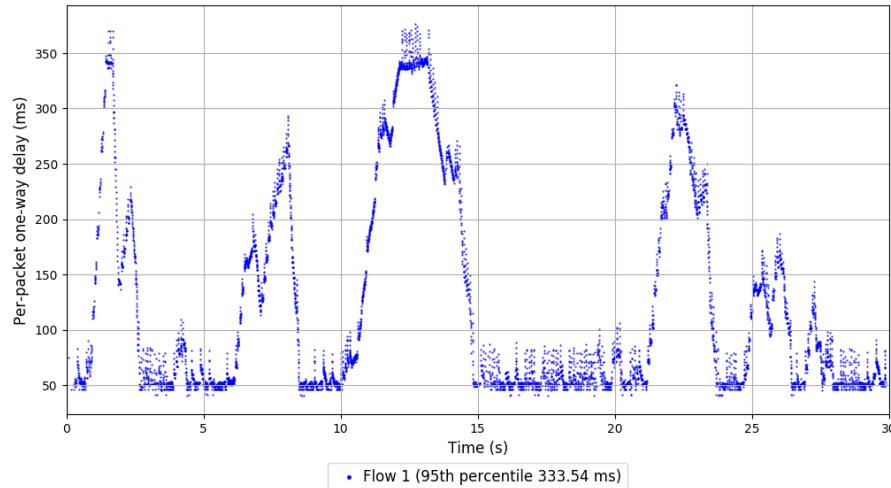
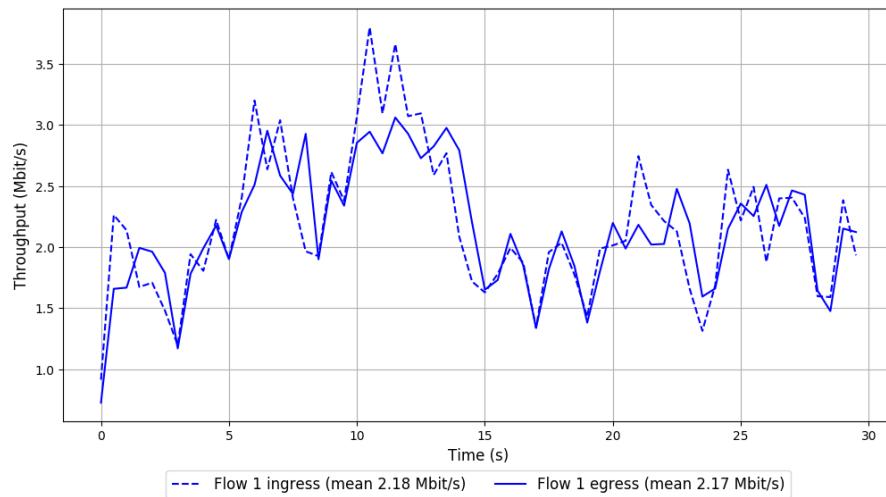


Run 2: Statistics of Vivace-LTE

```
Start at: 2018-04-03 00:09:30
End at: 2018-04-03 00:10:00
Local clock offset: -5.887 ms
Remote clock offset: -1.498 ms

# Below is generated by plot.py at 2018-04-03 01:35:50
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 333.537 ms
Loss rate: 1.07%
-- Flow 1:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 333.537 ms
Loss rate: 1.07%
```

Run 2: Report of Vivace-LTE — Data Link



Run 3: Statistics of Vivace-LTE

```
Start at: 2018-04-03 00:29:01
End at: 2018-04-03 00:29:31
Local clock offset: -7.7 ms
Remote clock offset: -6.433 ms

# Below is generated by plot.py at 2018-04-03 01:35:51
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.05 Mbit/s
95th percentile per-packet one-way delay: 341.796 ms
Loss rate: 3.44%
-- Flow 1:
Average throughput: 2.05 Mbit/s
95th percentile per-packet one-way delay: 341.796 ms
Loss rate: 3.44%
```

Run 3: Report of Vivace-LTE — Data Link

