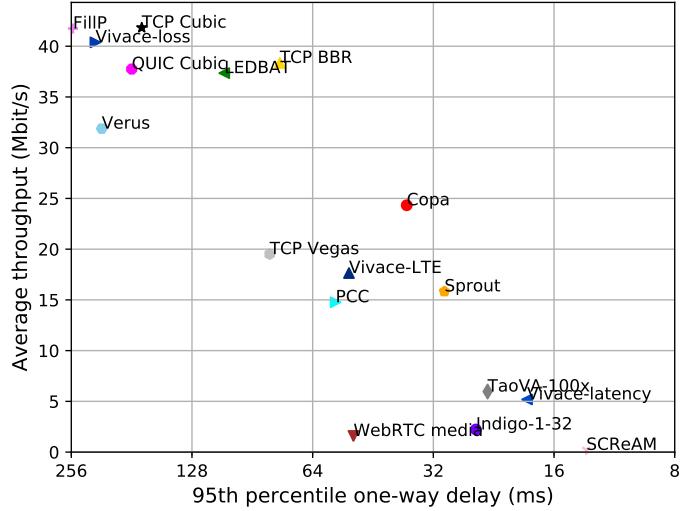


Pantheon Report

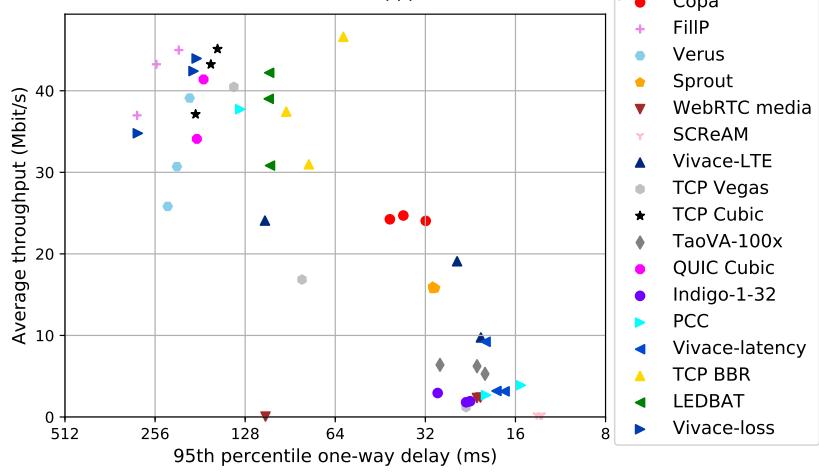
Generated at 2018-02-19 18:38:46 (UTC).
Data path: AWS California 1 Ethernet (*local*) →Stanford ppp0 (*remote*).
Repeated the test of 17 congestion control schemes 3 times.
Each test lasted for 30 seconds running 1 flow.
Increased UDP receive buffer to 16 MB (default) and 32 MB (max).
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).
NTP offsets were measured against `time.stanford.edu` and have been applied to correct the timestamps in logs.

```
Git summary:  
branch: master @ f12c42a2c63fdd9a862eefa0468859bf379b6623  
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50  
  M datagrump/sender.cc  
third_party/fillp @ 828bbf95fd4941149b5cec90f281d1c69ae1a5c6  
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 @ b3465b942e2826f2b179aab4a906ce6bb7cf3cf  
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 @ a488197ddd041ace68a42849b2540ad834825f42
```

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



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



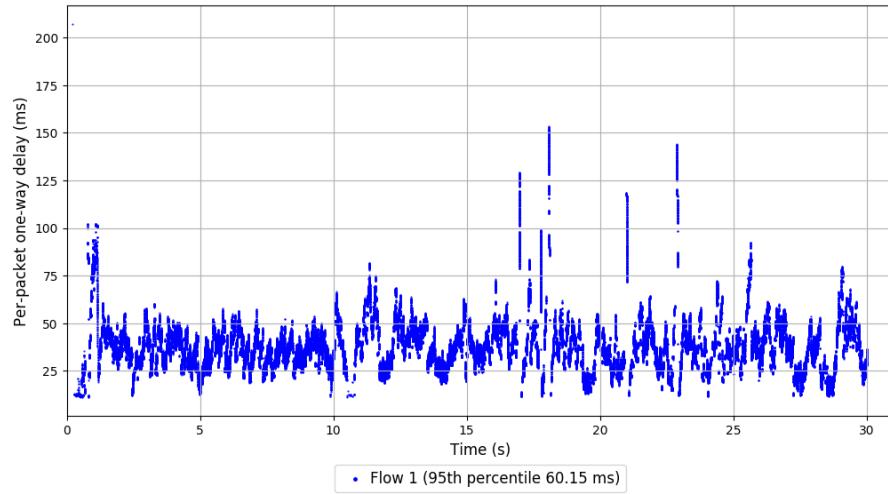
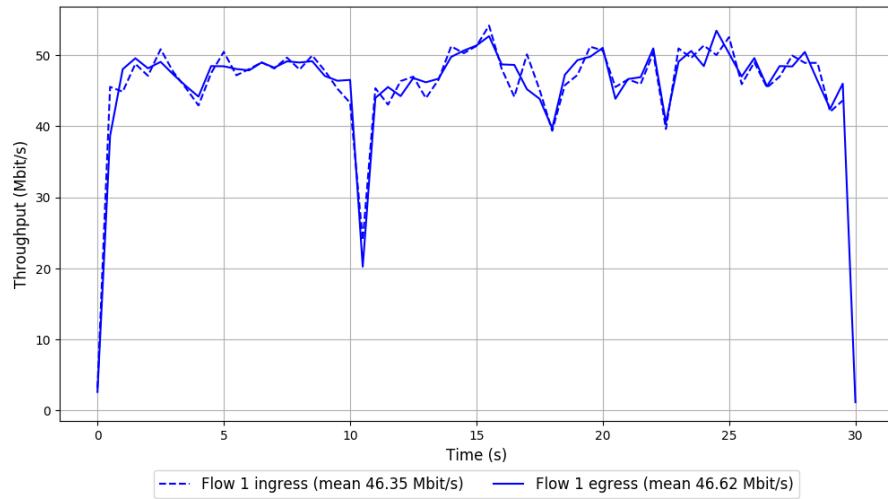
scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	38.35	77.29	0.08
TCP Cubic	3	41.83	170.80	0.43
LEDBAT	3	37.35	106.33	0.17
PCC	3	14.77	56.09	0.31
QUIC Cubic	2	37.75	180.94	0.41
SCReAM	3	0.22	13.29	0.00
WebRTC media	3	1.59	50.64	0.03
Sprout	3	15.83	30.03	0.00
TaoVA-100x	3	5.97	23.44	0.00
TCP Vegas	3	19.51	81.91	0.01
Verus	3	31.88	214.94	7.03
Copa	3	24.33	37.29	0.04
FillP	3	41.74	253.53	39.23
Indigo-1-32	3	2.23	25.06	0.00
Vivace-latency	3	5.18	18.68	0.00
Vivace-loss	3	40.38	222.86	16.27
Vivace-LTE	3	17.65	51.96	0.32

Run 1: Statistics of TCP BBR

```
Start at: 2018-02-19 17:35:57
End at: 2018-02-19 17:36:28
Local clock offset: -0.255 ms
Remote clock offset: -6.093 ms

# Below is generated by plot.py at 2018-02-19 18:36:53
# Datalink statistics
-- Total of 1 flow:
Average throughput: 46.62 Mbit/s
95th percentile per-packet one-way delay: 60.145 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 46.62 Mbit/s
95th percentile per-packet one-way delay: 60.145 ms
Loss rate: 0.01%
```

Run 1: Report of TCP BBR — Data Link

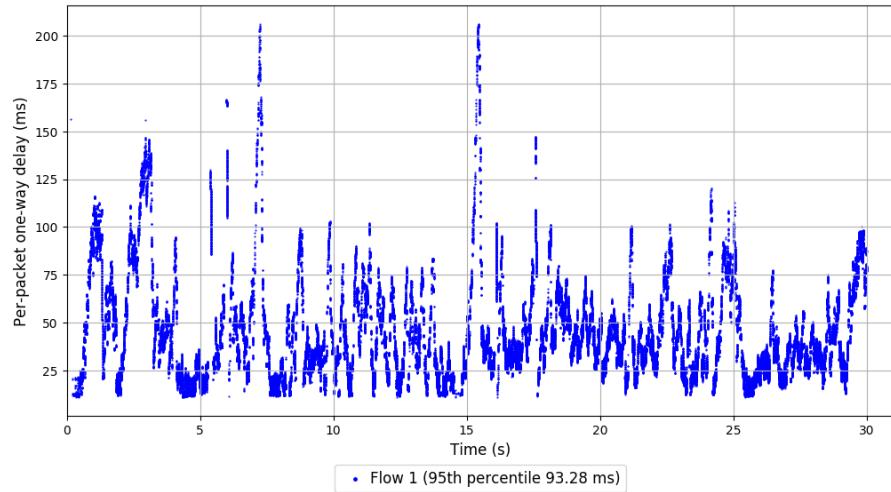
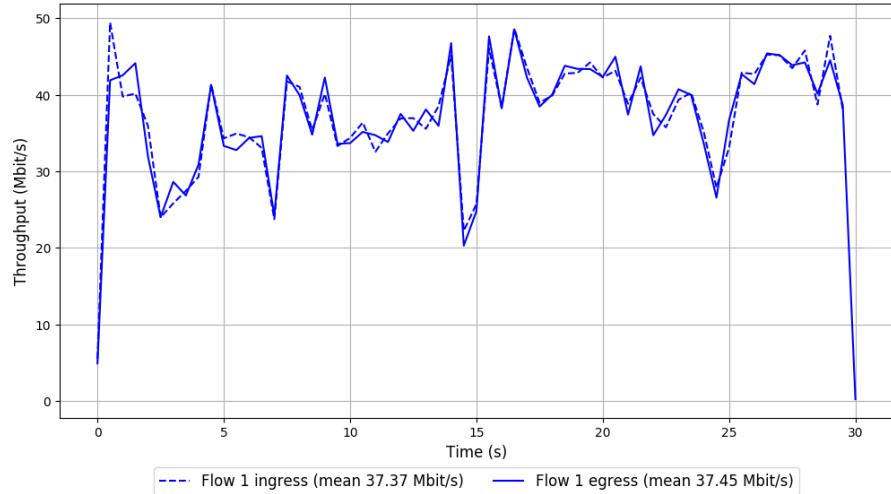


Run 2: Statistics of TCP BBR

```
Start at: 2018-02-19 17:59:44
End at: 2018-02-19 18:00:14
Local clock offset: 1.205 ms
Remote clock offset: -7.903 ms

# Below is generated by plot.py at 2018-02-19 18:36:53
# Datalink statistics
-- Total of 1 flow:
Average throughput: 37.45 Mbit/s
95th percentile per-packet one-way delay: 93.277 ms
Loss rate: 0.22%
-- Flow 1:
Average throughput: 37.45 Mbit/s
95th percentile per-packet one-way delay: 93.277 ms
Loss rate: 0.22%
```

Run 2: Report of TCP BBR — Data Link

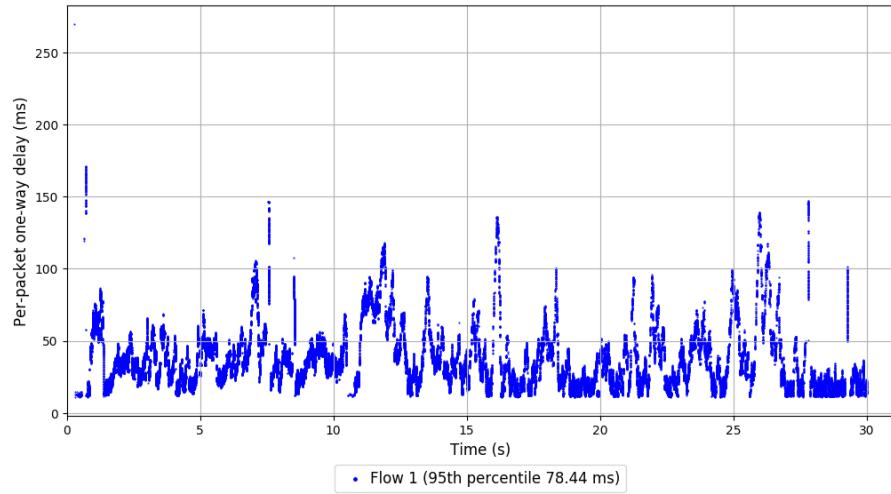
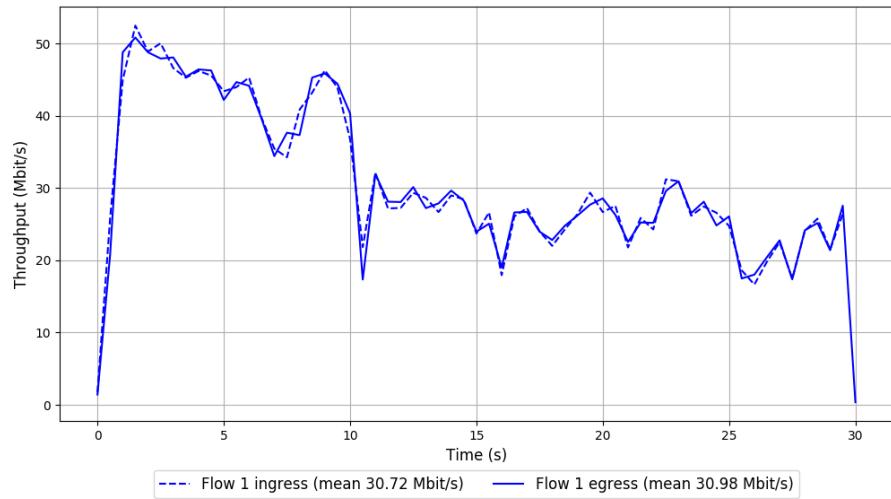


Run 3: Statistics of TCP BBR

```
Start at: 2018-02-19 18:23:29
End at: 2018-02-19 18:23:59
Local clock offset: 2.278 ms
Remote clock offset: -8.023 ms

# Below is generated by plot.py at 2018-02-19 18:36:53
# Datalink statistics
-- Total of 1 flow:
Average throughput: 30.98 Mbit/s
95th percentile per-packet one-way delay: 78.436 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 30.98 Mbit/s
95th percentile per-packet one-way delay: 78.436 ms
Loss rate: 0.00%
```

Run 3: Report of TCP BBR — Data Link

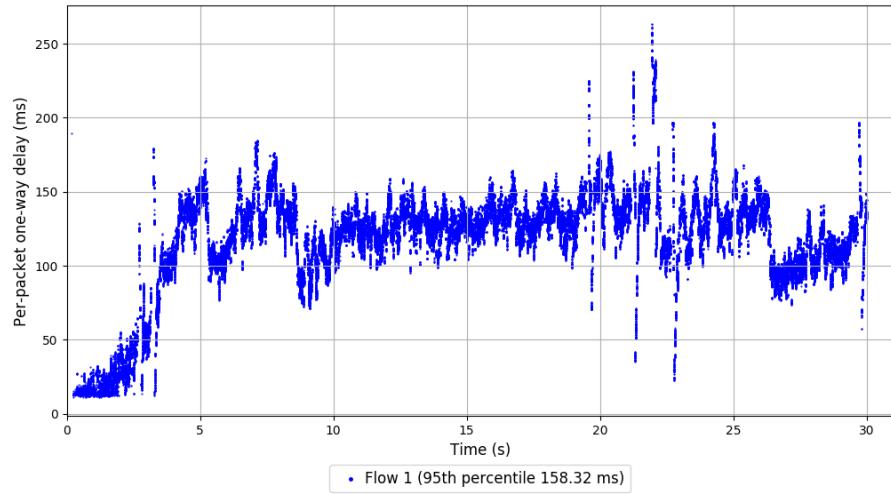
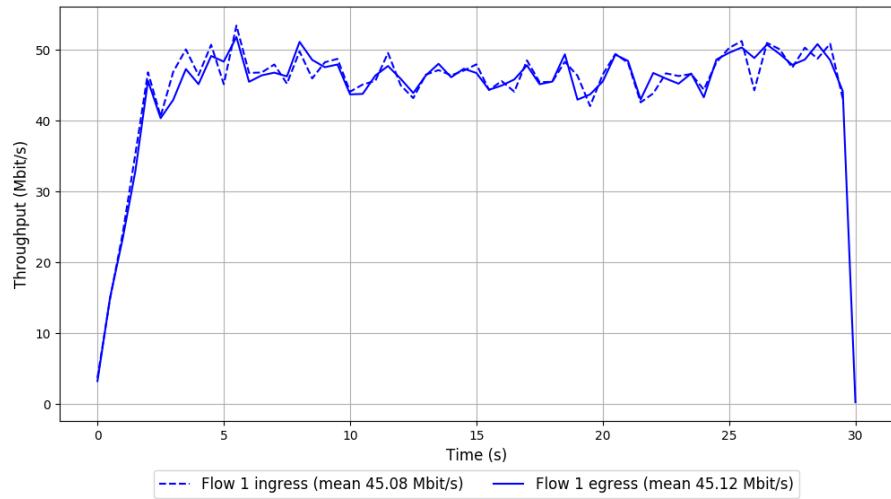


```
Run 1: Statistics of TCP Cubic
```

```
Start at: 2018-02-19 17:34:38
End at: 2018-02-19 17:35:08
Local clock offset: -0.09 ms
Remote clock offset: -5.731 ms

# Below is generated by plot.py at 2018-02-19 18:36:53
# Datalink statistics
-- Total of 1 flow:
Average throughput: 45.12 Mbit/s
95th percentile per-packet one-way delay: 158.318 ms
Loss rate: 0.46%
-- Flow 1:
Average throughput: 45.12 Mbit/s
95th percentile per-packet one-way delay: 158.318 ms
Loss rate: 0.46%
```

Run 1: Report of TCP Cubic — Data Link

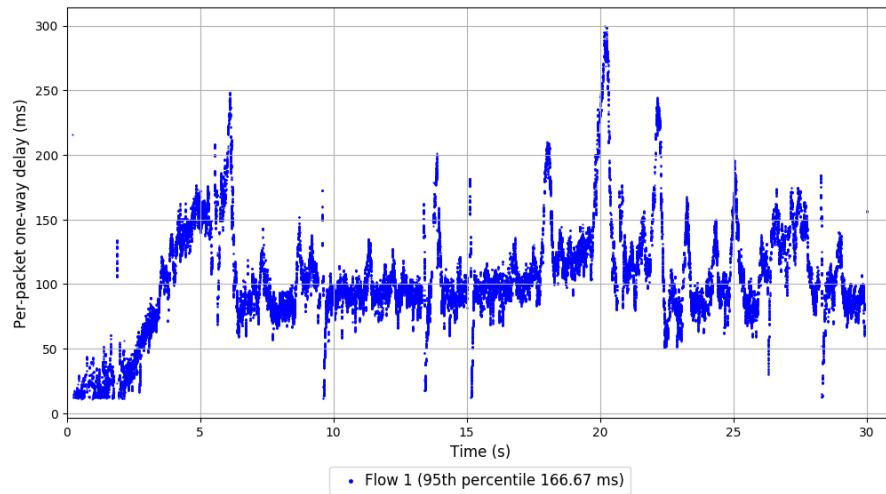
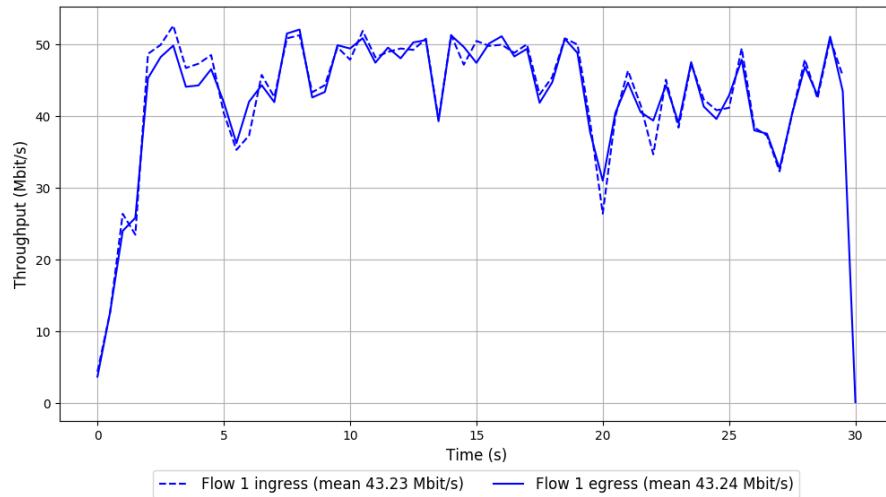


Run 2: Statistics of TCP Cubic

```
Start at: 2018-02-19 17:58:24
End at: 2018-02-19 17:58:54
Local clock offset: 1.119 ms
Remote clock offset: -7.859 ms

# Below is generated by plot.py at 2018-02-19 18:36:53
# Datalink statistics
-- Total of 1 flow:
Average throughput: 43.24 Mbit/s
95th percentile per-packet one-way delay: 166.672 ms
Loss rate: 0.50%
-- Flow 1:
Average throughput: 43.24 Mbit/s
95th percentile per-packet one-way delay: 166.672 ms
Loss rate: 0.50%
```

Run 2: Report of TCP Cubic — Data Link

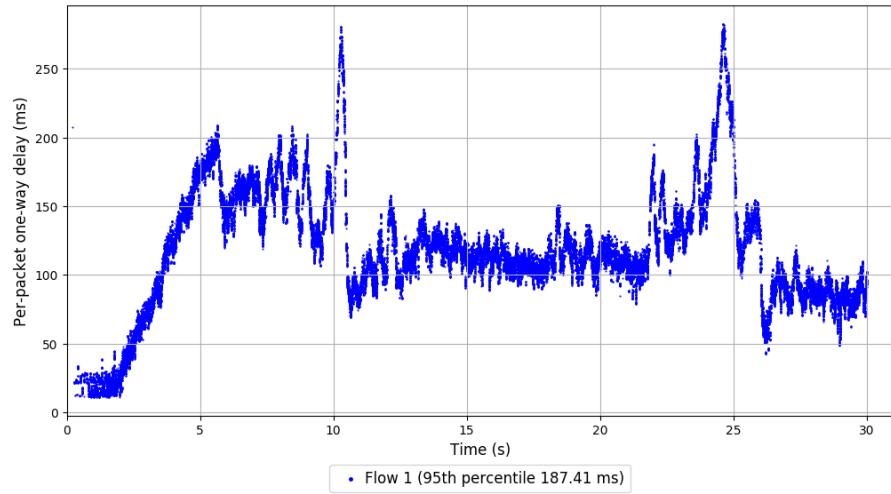
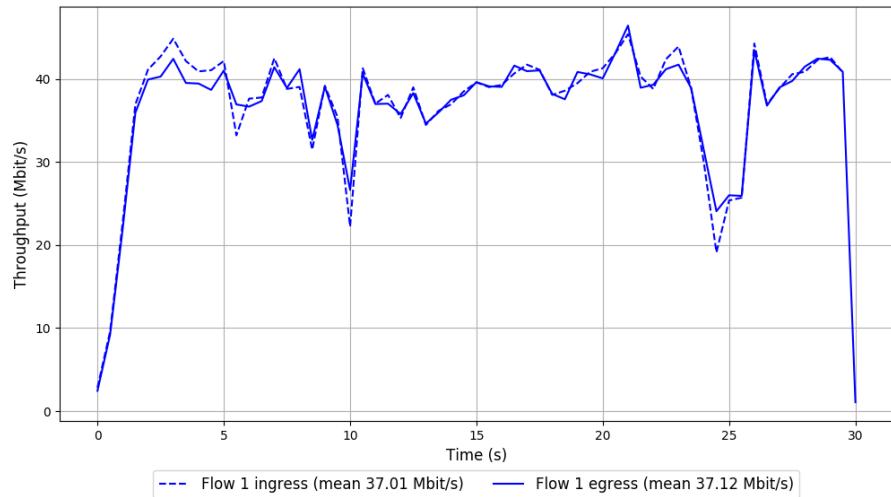


Run 3: Statistics of TCP Cubic

```
Start at: 2018-02-19 18:22:09
End at: 2018-02-19 18:22:39
Local clock offset: 2.321 ms
Remote clock offset: -8.024 ms

# Below is generated by plot.py at 2018-02-19 18:36:53
# Datalink statistics
-- Total of 1 flow:
Average throughput: 37.12 Mbit/s
95th percentile per-packet one-way delay: 187.411 ms
Loss rate: 0.33%
-- Flow 1:
Average throughput: 37.12 Mbit/s
95th percentile per-packet one-way delay: 187.411 ms
Loss rate: 0.33%
```

Run 3: Report of TCP Cubic — Data Link

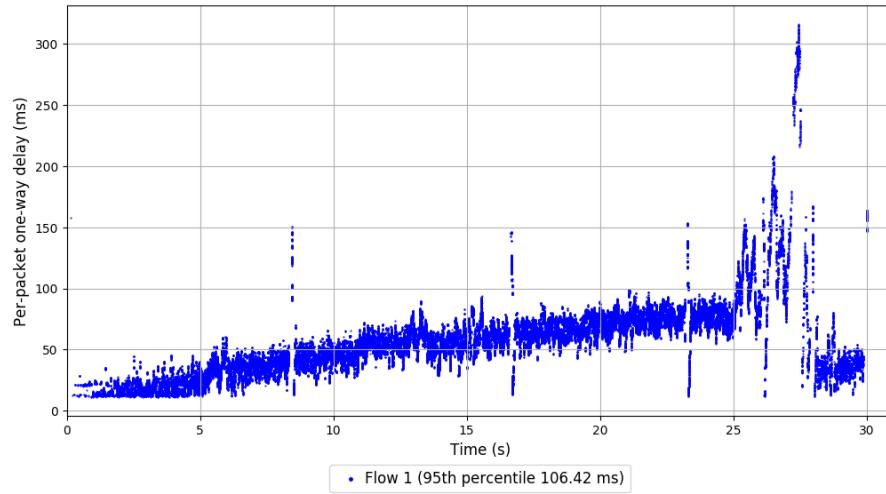
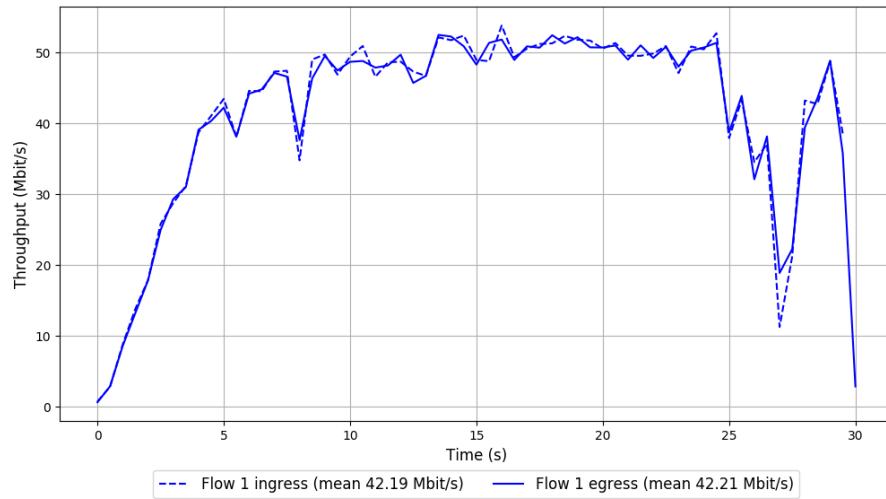


```
Run 1: Statistics of LEDBAT

Start at: 2018-02-19 17:41:13
End at: 2018-02-19 17:41:43
Local clock offset: -0.324 ms
Remote clock offset: -6.721 ms

# Below is generated by plot.py at 2018-02-19 18:36:53
# Datalink statistics
-- Total of 1 flow:
Average throughput: 42.21 Mbit/s
95th percentile per-packet one-way delay: 106.424 ms
Loss rate: 0.11%
-- Flow 1:
Average throughput: 42.21 Mbit/s
95th percentile per-packet one-way delay: 106.424 ms
Loss rate: 0.11%
```

Run 1: Report of LEDBAT — Data Link

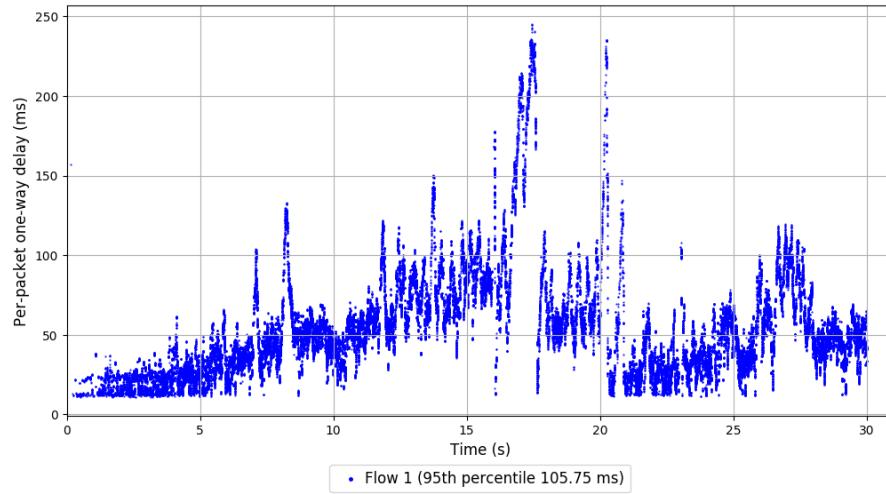
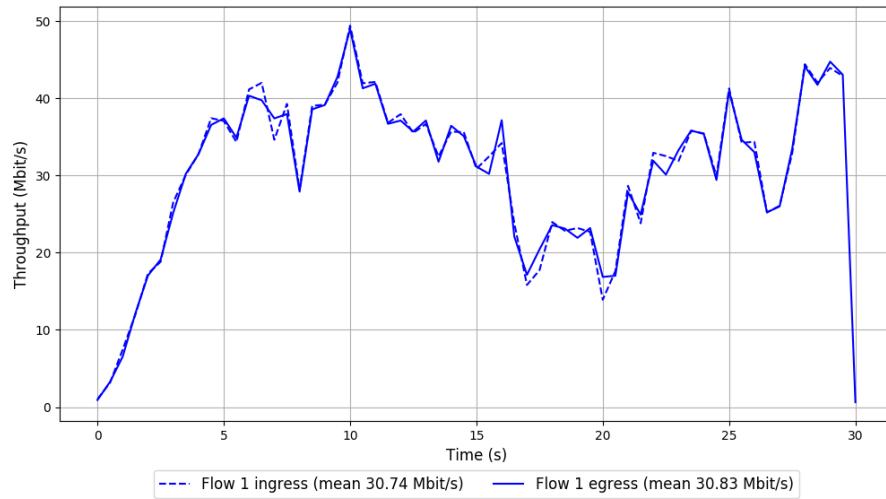


Run 2: Statistics of LEDBAT

```
Start at: 2018-02-19 18:05:00
End at: 2018-02-19 18:05:30
Local clock offset: 1.737 ms
Remote clock offset: -8.059 ms

# Below is generated by plot.py at 2018-02-19 18:36:53
# Datalink statistics
-- Total of 1 flow:
Average throughput: 30.83 Mbit/s
95th percentile per-packet one-way delay: 105.755 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 30.83 Mbit/s
95th percentile per-packet one-way delay: 105.755 ms
Loss rate: 0.16%
```

Run 2: Report of LEDBAT — Data Link

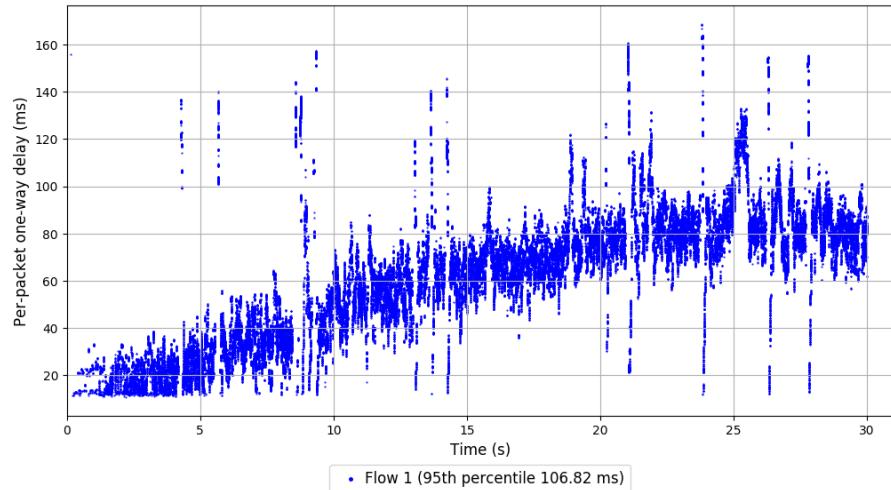
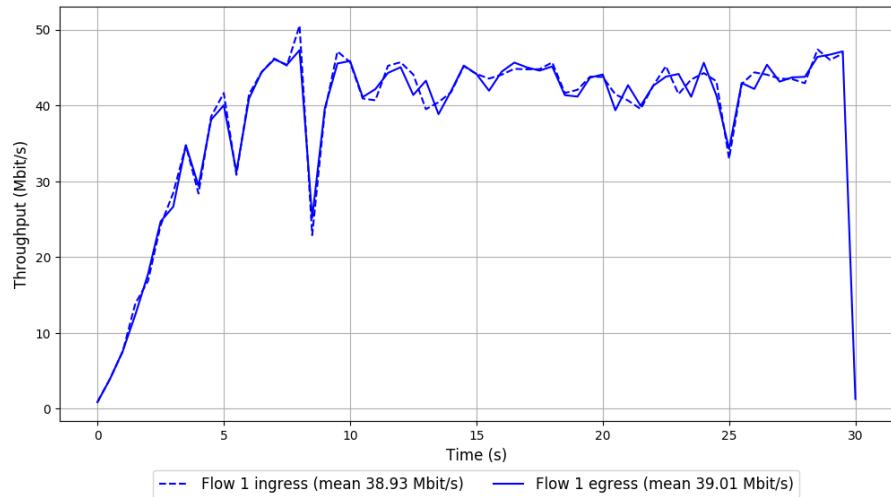


Run 3: Statistics of LEDBAT

```
Start at: 2018-02-19 18:28:43
End at: 2018-02-19 18:29:13
Local clock offset: 2.138 ms
Remote clock offset: -8.021 ms

# Below is generated by plot.py at 2018-02-19 18:37:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 39.01 Mbit/s
95th percentile per-packet one-way delay: 106.820 ms
Loss rate: 0.25%
-- Flow 1:
Average throughput: 39.01 Mbit/s
95th percentile per-packet one-way delay: 106.820 ms
Loss rate: 0.25%
```

Run 3: Report of LEDBAT — Data Link

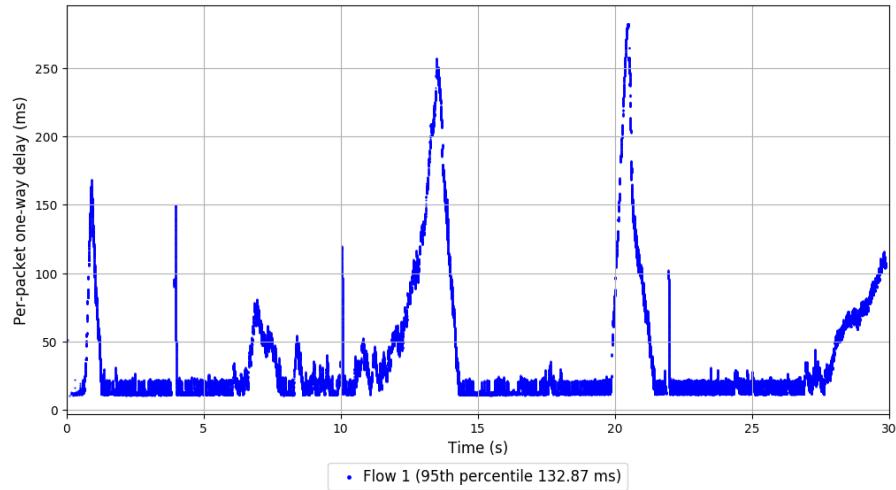
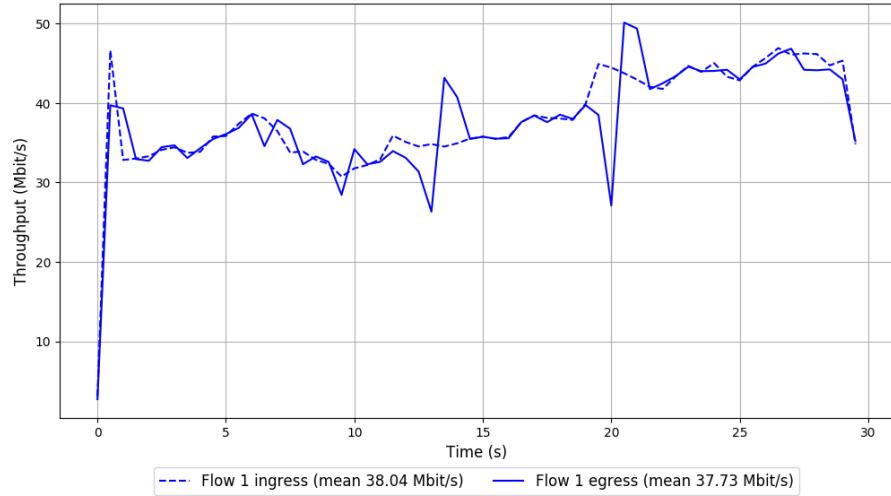


```
Run 1: Statistics of PCC
```

```
Start at: 2018-02-19 17:24:06
End at: 2018-02-19 17:24:36
Local clock offset: 0.567 ms
Remote clock offset: -5.465 ms

# Below is generated by plot.py at 2018-02-19 18:37:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 37.73 Mbit/s
95th percentile per-packet one-way delay: 132.867 ms
Loss rate: 0.92%
-- Flow 1:
Average throughput: 37.73 Mbit/s
95th percentile per-packet one-way delay: 132.867 ms
Loss rate: 0.92%
```

Run 1: Report of PCC — Data Link

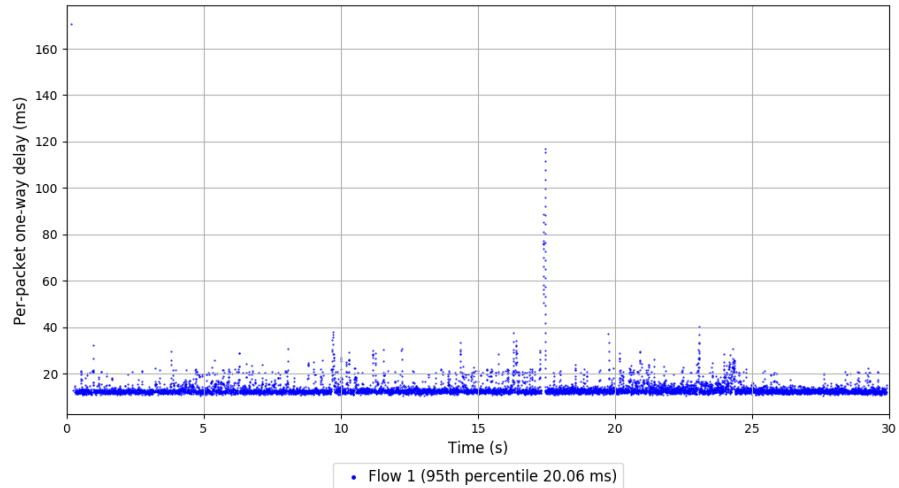
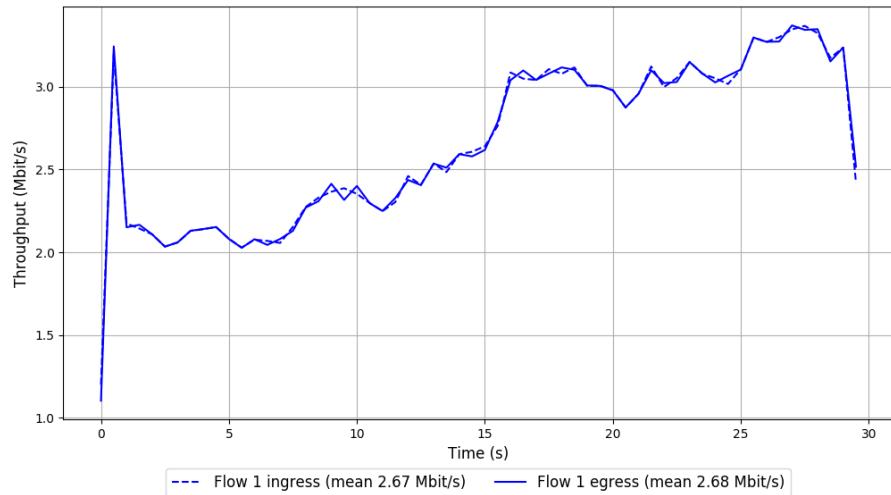


Run 2: Statistics of PCC

```
Start at: 2018-02-19 17:47:51
End at: 2018-02-19 17:48:21
Local clock offset: -0.628 ms
Remote clock offset: -7.303 ms

# Below is generated by plot.py at 2018-02-19 18:37:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.68 Mbit/s
95th percentile per-packet one-way delay: 20.064 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.68 Mbit/s
95th percentile per-packet one-way delay: 20.064 ms
Loss rate: 0.00%
```

Run 2: Report of PCC — Data Link

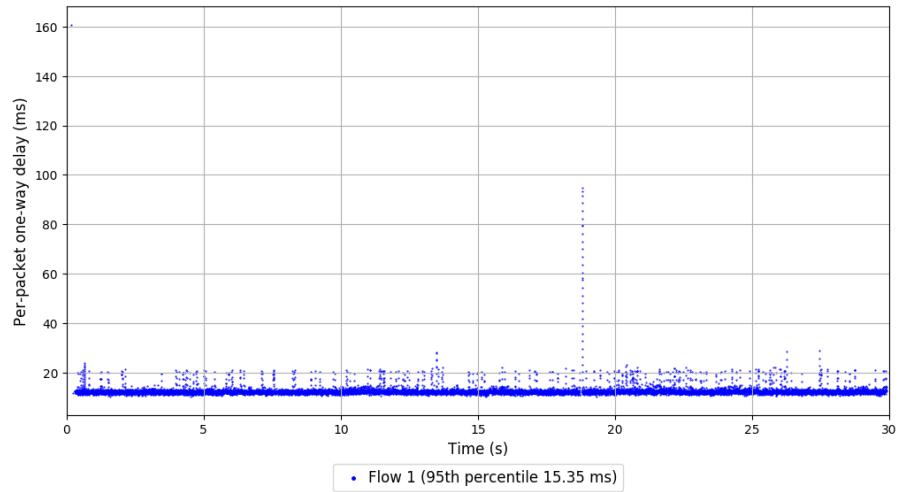
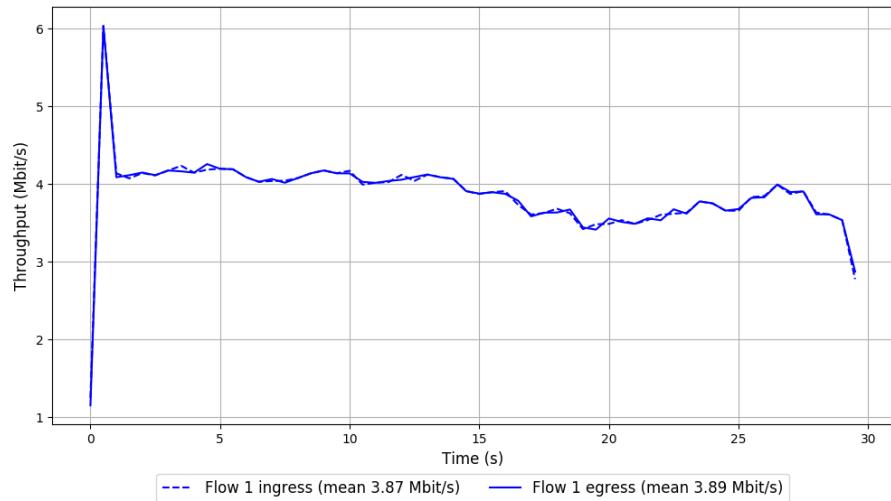


Run 3: Statistics of PCC

```
Start at: 2018-02-19 18:11:38
End at: 2018-02-19 18:12:08
Local clock offset: 1.962 ms
Remote clock offset: -8.029 ms

# Below is generated by plot.py at 2018-02-19 18:37:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.89 Mbit/s
95th percentile per-packet one-way delay: 15.352 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 3.89 Mbit/s
95th percentile per-packet one-way delay: 15.352 ms
Loss rate: 0.00%
```

Run 3: Report of PCC — Data Link



Run 1: Statistics of QUIC Cubic

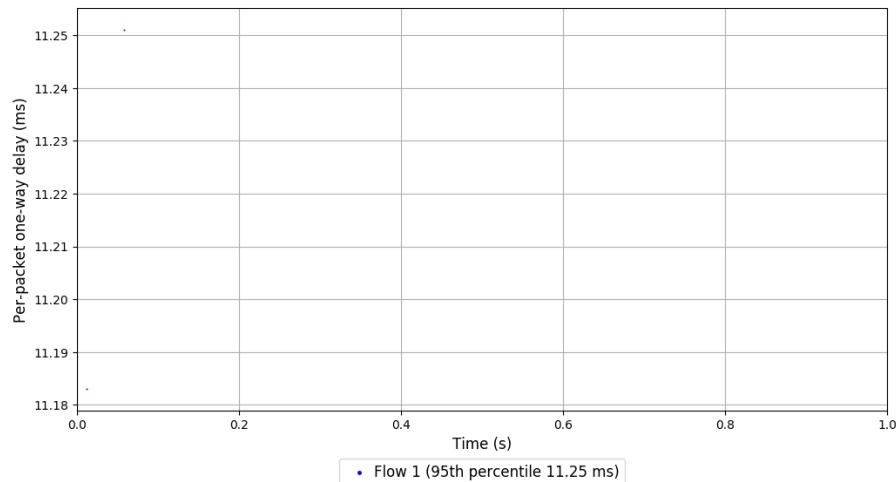
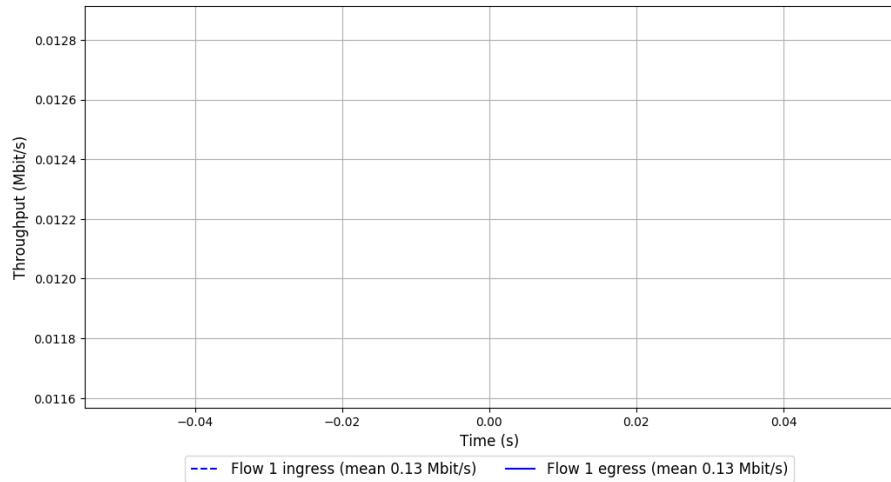
Start at: 2018-02-19 17:30:42

End at: 2018-02-19 17:31:12

Local clock offset: 0.095 ms

Remote clock offset: -5.44 ms

Run 1: Report of QUIC Cubic — Data Link

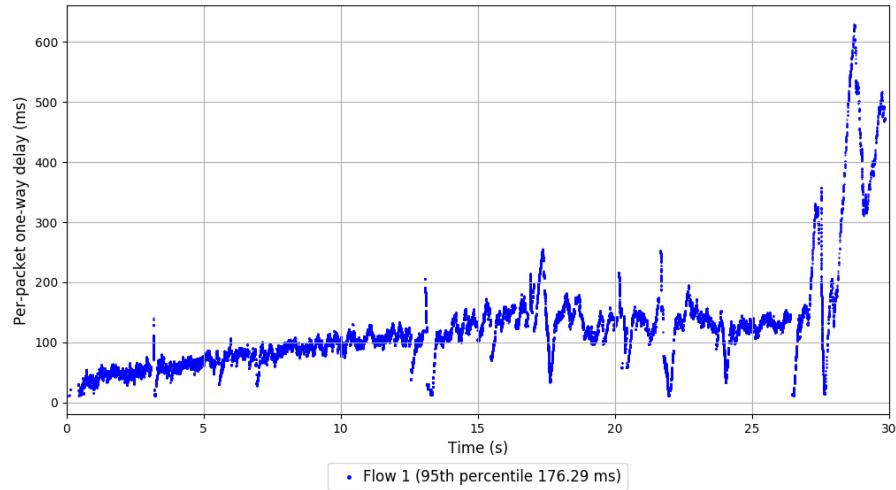
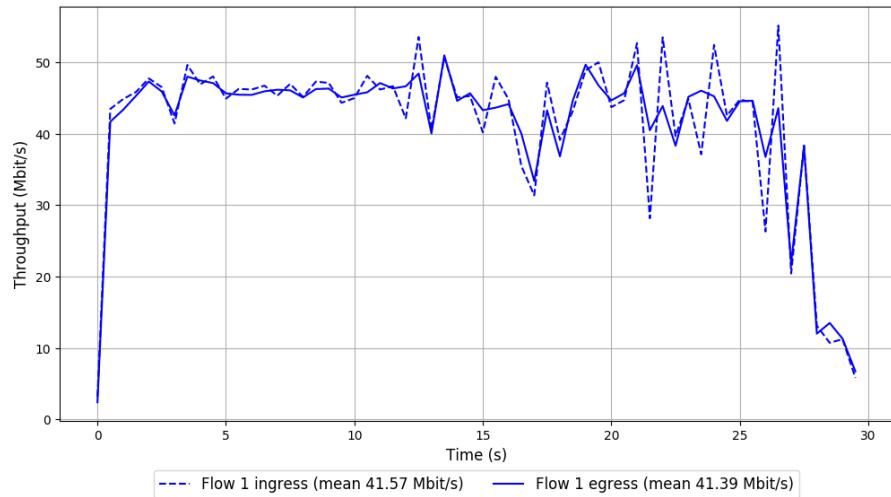


Run 2: Statistics of QUIC Cubic

```
Start at: 2018-02-19 17:54:26
End at: 2018-02-19 17:54:56
Local clock offset: 0.427 ms
Remote clock offset: -7.72 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 41.39 Mbit/s
95th percentile per-packet one-way delay: 176.286 ms
Loss rate: 0.39%
-- Flow 1:
Average throughput: 41.39 Mbit/s
95th percentile per-packet one-way delay: 176.286 ms
Loss rate: 0.39%
```

Run 2: Report of QUIC Cubic — Data Link

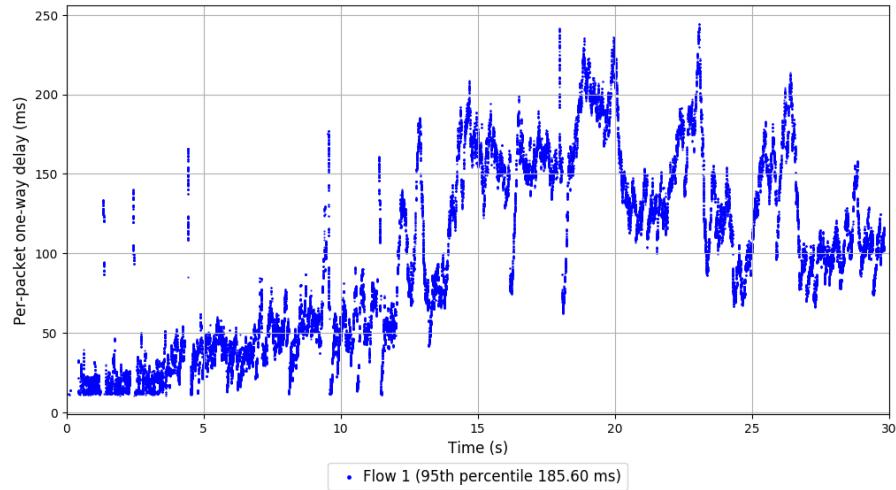
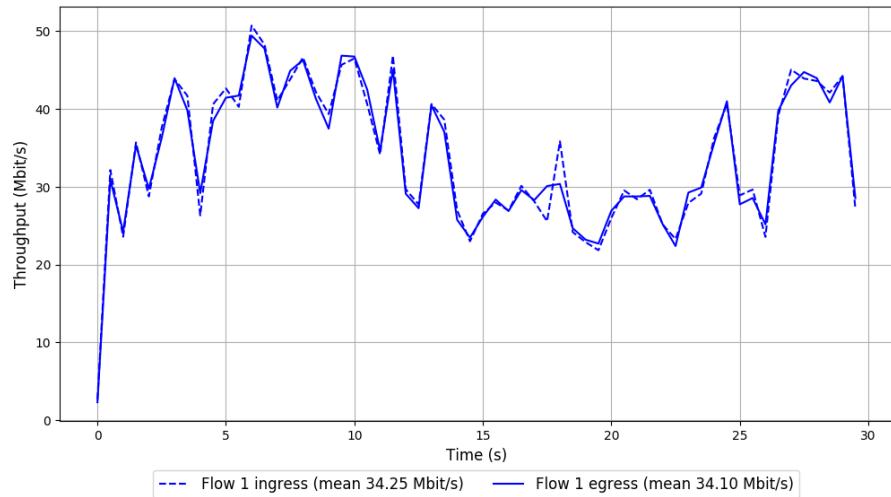


Run 3: Statistics of QUIC Cubic

```
Start at: 2018-02-19 18:18:13
End at: 2018-02-19 18:18:43
Local clock offset: 2.246 ms
Remote clock offset: -7.999 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 34.10 Mbit/s
95th percentile per-packet one-way delay: 185.597 ms
Loss rate: 0.42%
-- Flow 1:
Average throughput: 34.10 Mbit/s
95th percentile per-packet one-way delay: 185.597 ms
Loss rate: 0.42%
```

Run 3: Report of QUIC Cubic — Data Link

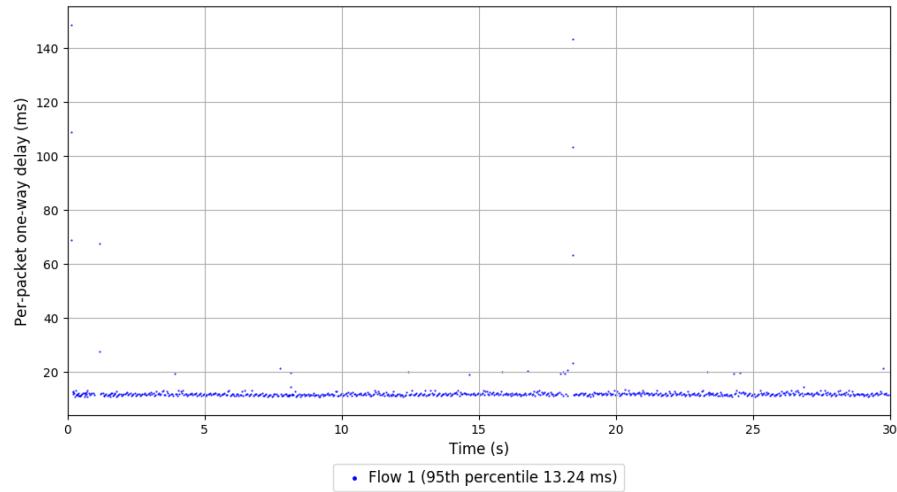
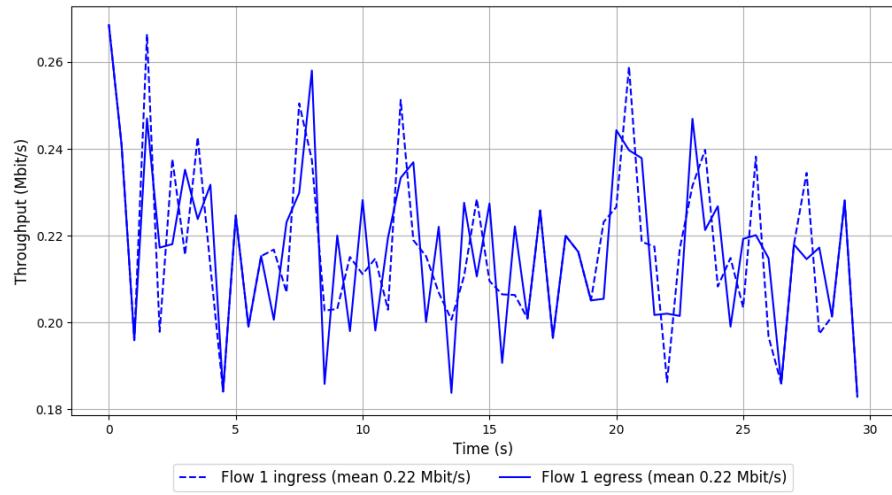


```
Run 1: Statistics of SCReAM
```

```
Start at: 2018-02-19 17:39:55
End at: 2018-02-19 17:40:25
Local clock offset: -0.297 ms
Remote clock offset: -6.697 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.237 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.237 ms
Loss rate: 0.00%
```

Run 1: Report of SCReAM — Data Link

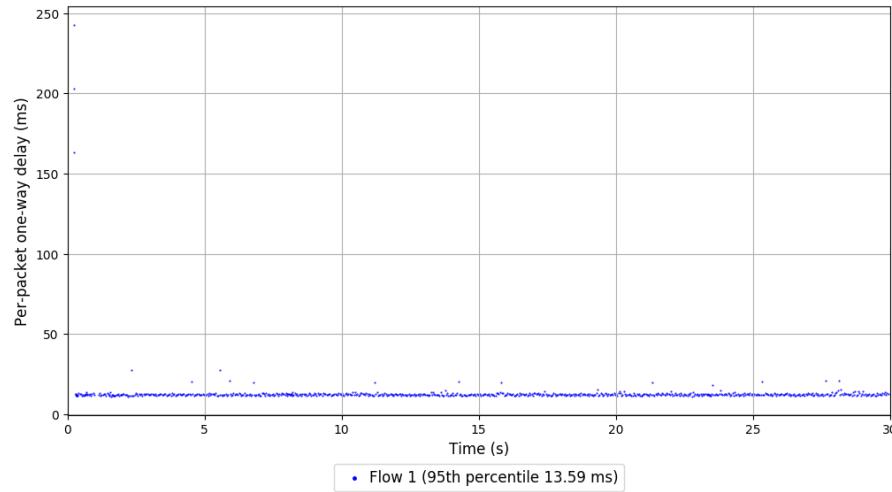
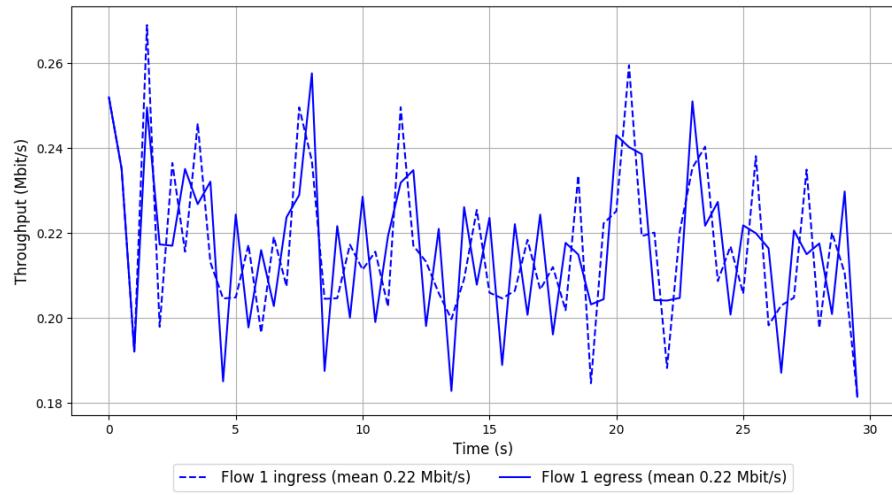


Run 2: Statistics of SCReAM

```
Start at: 2018-02-19 18:03:41
End at: 2018-02-19 18:04:11
Local clock offset: 1.557 ms
Remote clock offset: -7.926 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.592 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.592 ms
Loss rate: 0.00%
```

Run 2: Report of SCReAM — Data Link

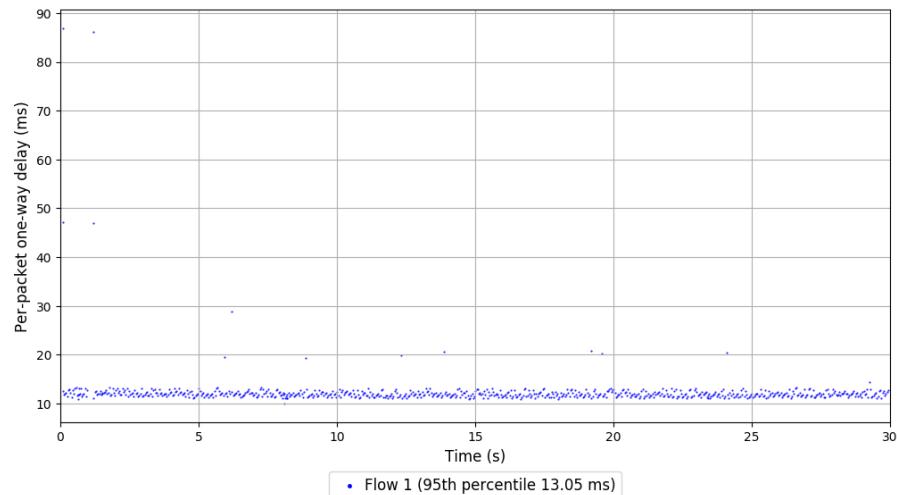
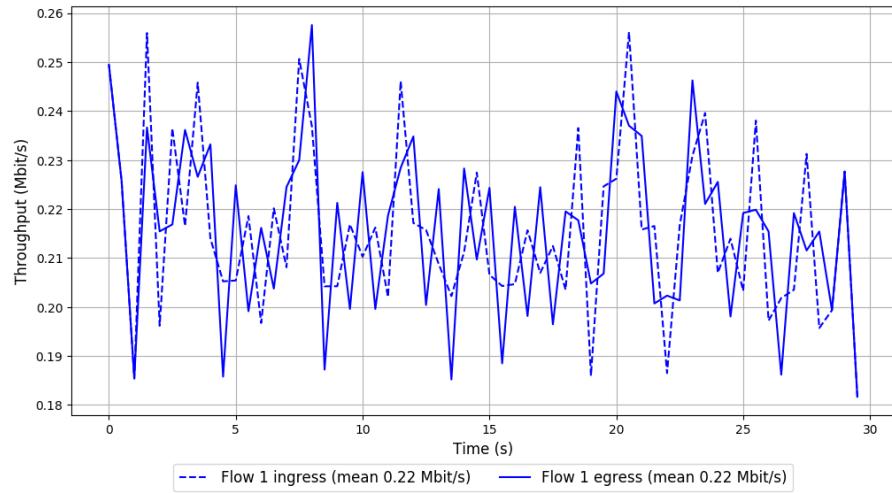


Run 3: Statistics of SCReAM

```
Start at: 2018-02-19 18:27:25
End at: 2018-02-19 18:27:55
Local clock offset: 2.187 ms
Remote clock offset: -7.999 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.050 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.050 ms
Loss rate: 0.00%
```

Run 3: Report of SCReAM — Data Link

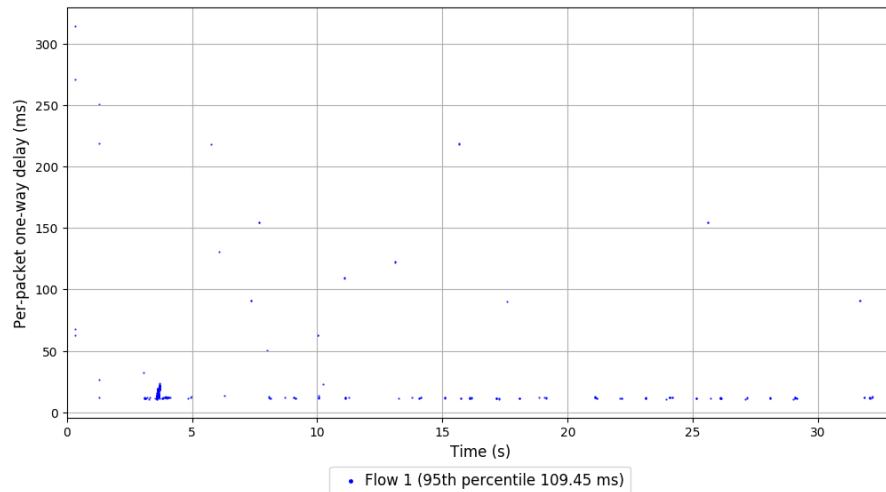
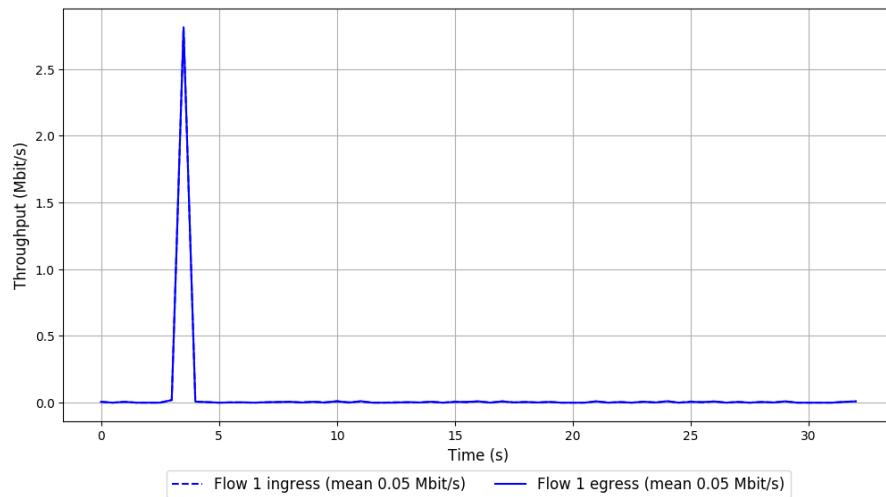


```
Run 1: Statistics of WebRTC media

Start at: 2018-02-19 17:37:18
End at: 2018-02-19 17:37:48
Local clock offset: -0.197 ms
Remote clock offset: -6.257 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 109.455 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 109.455 ms
Loss rate: 0.00%
```

Run 1: Report of WebRTC media — Data Link

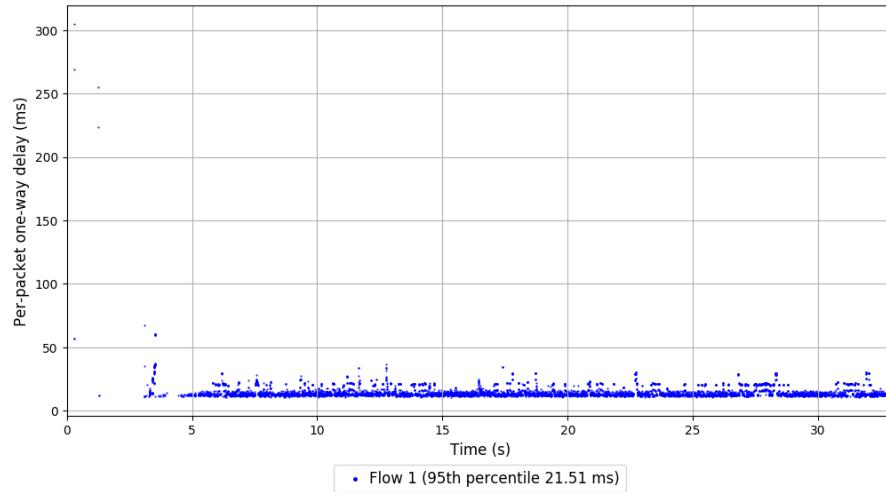
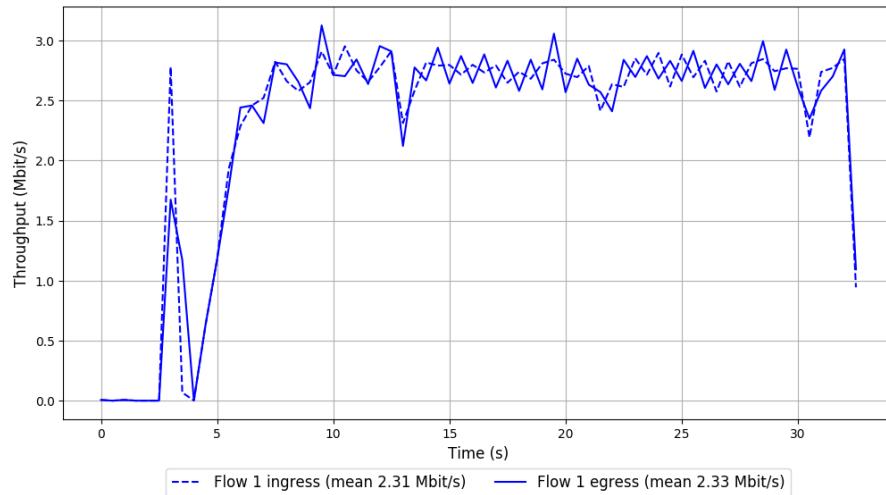


Run 2: Statistics of WebRTC media

```
Start at: 2018-02-19 18:01:04
End at: 2018-02-19 18:01:34
Local clock offset: 1.342 ms
Remote clock offset: -7.9 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 21.510 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 21.510 ms
Loss rate: 0.00%
```

Run 2: Report of WebRTC media — Data Link

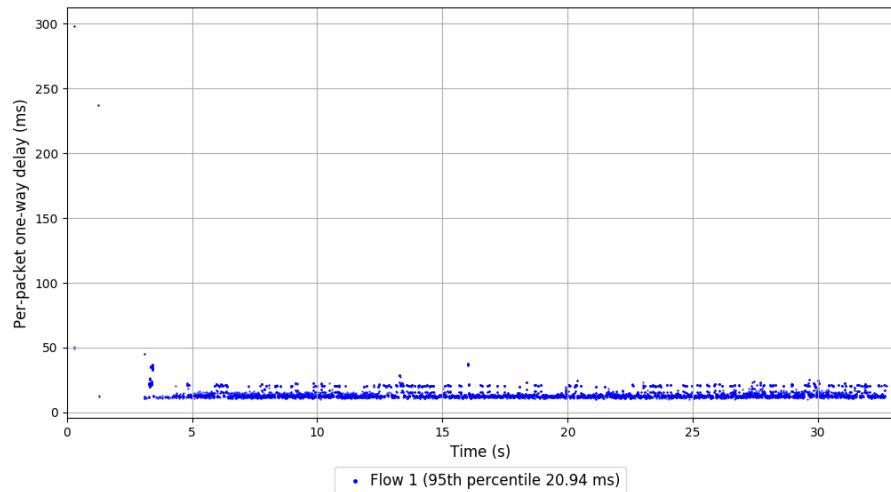
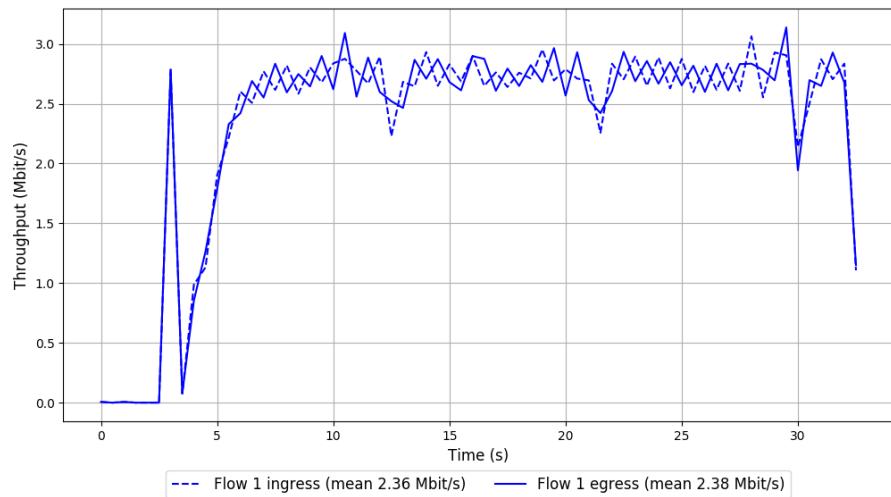


```
Run 3: Statistics of WebRTC media

Start at: 2018-02-19 18:24:48
End at: 2018-02-19 18:25:18
Local clock offset: 2.328 ms
Remote clock offset: -8.046 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 20.944 ms
Loss rate: 0.08%
-- Flow 1:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 20.944 ms
Loss rate: 0.08%
```

Run 3: Report of WebRTC media — Data Link

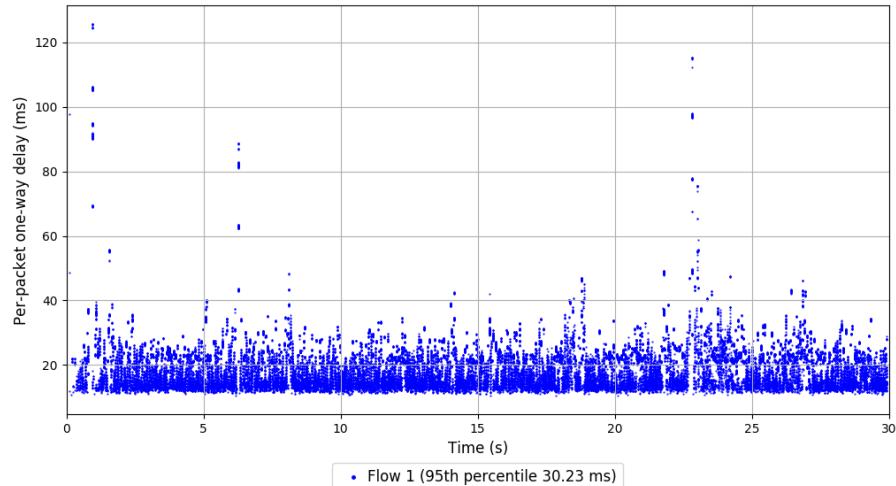
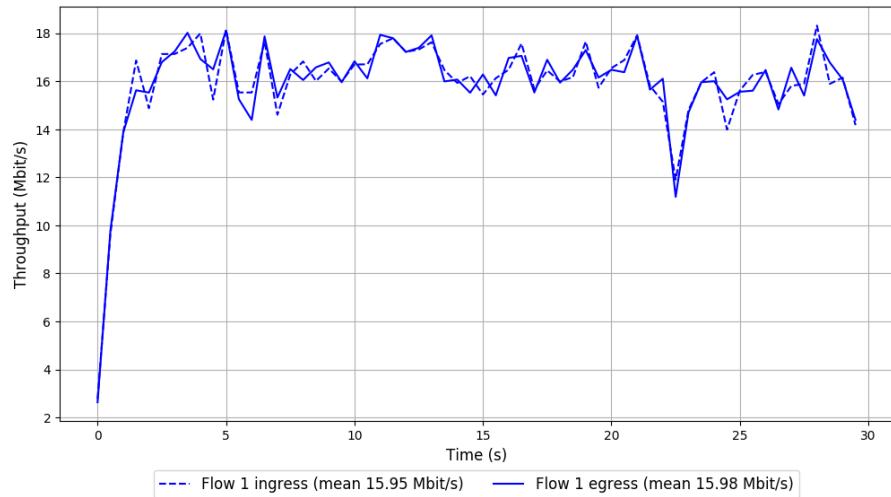


Run 1: Statistics of Sprout

```
Start at: 2018-02-19 17:26:46
End at: 2018-02-19 17:27:16
Local clock offset: 0.355 ms
Remote clock offset: -5.47 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 15.98 Mbit/s
95th percentile per-packet one-way delay: 30.231 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 15.98 Mbit/s
95th percentile per-packet one-way delay: 30.231 ms
Loss rate: 0.01%
```

Run 1: Report of Sprout — Data Link

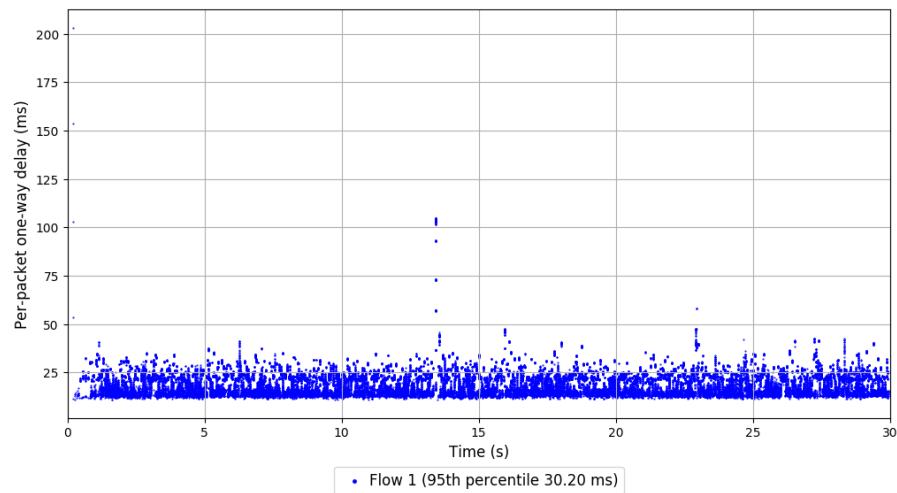
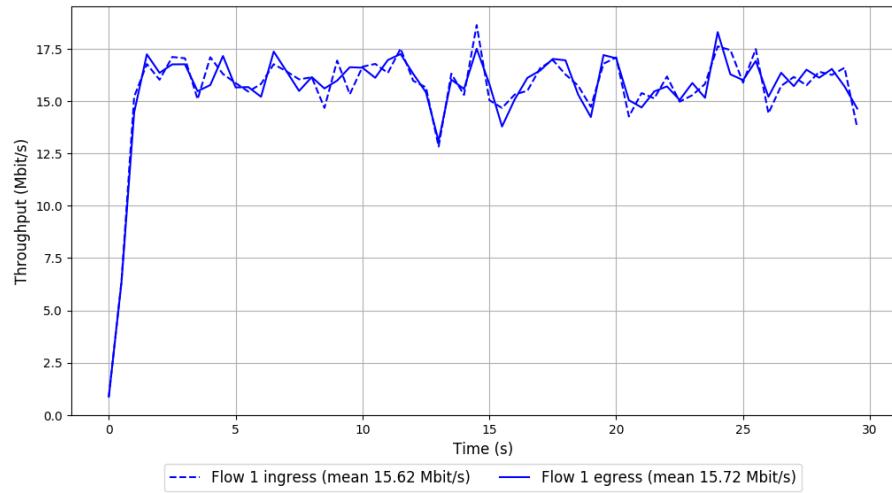


Run 2: Statistics of Sprout

```
Start at: 2018-02-19 17:50:29
End at: 2018-02-19 17:50:59
Local clock offset: -0.511 ms
Remote clock offset: -7.487 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 15.72 Mbit/s
95th percentile per-packet one-way delay: 30.205 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 15.72 Mbit/s
95th percentile per-packet one-way delay: 30.205 ms
Loss rate: 0.00%
```

Run 2: Report of Sprout — Data Link

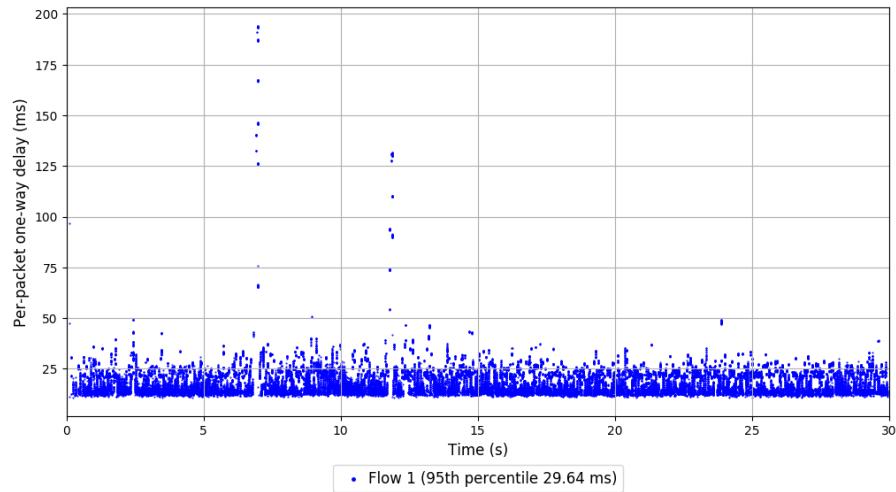
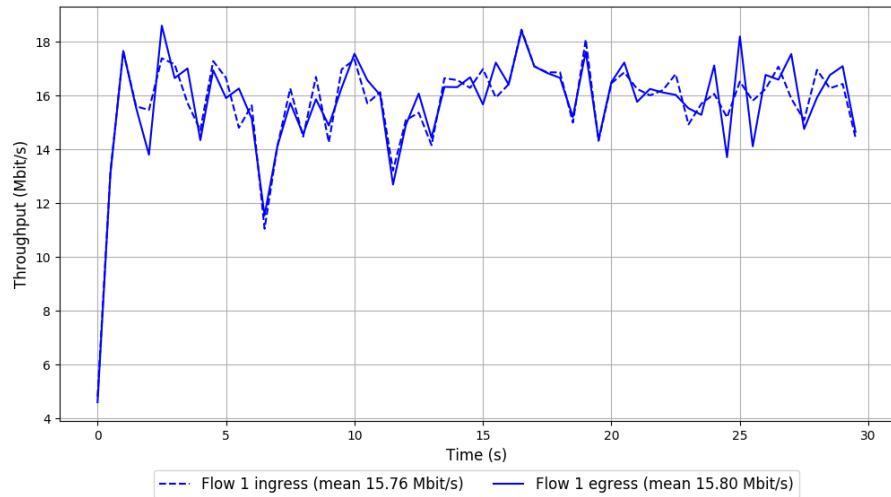


Run 3: Statistics of Sprout

```
Start at: 2018-02-19 18:14:17
End at: 2018-02-19 18:14:47
Local clock offset: 2.136 ms
Remote clock offset: -8.014 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 15.80 Mbit/s
95th percentile per-packet one-way delay: 29.645 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 15.80 Mbit/s
95th percentile per-packet one-way delay: 29.645 ms
Loss rate: 0.00%
```

Run 3: Report of Sprout — Data Link

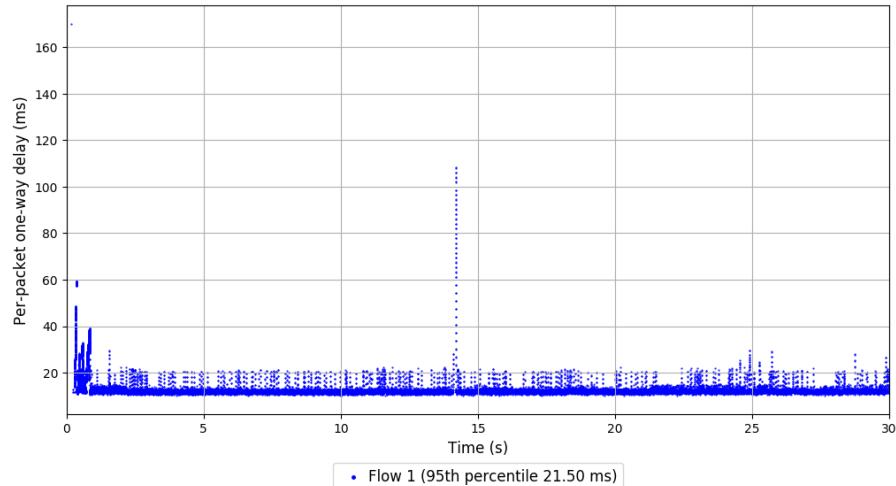
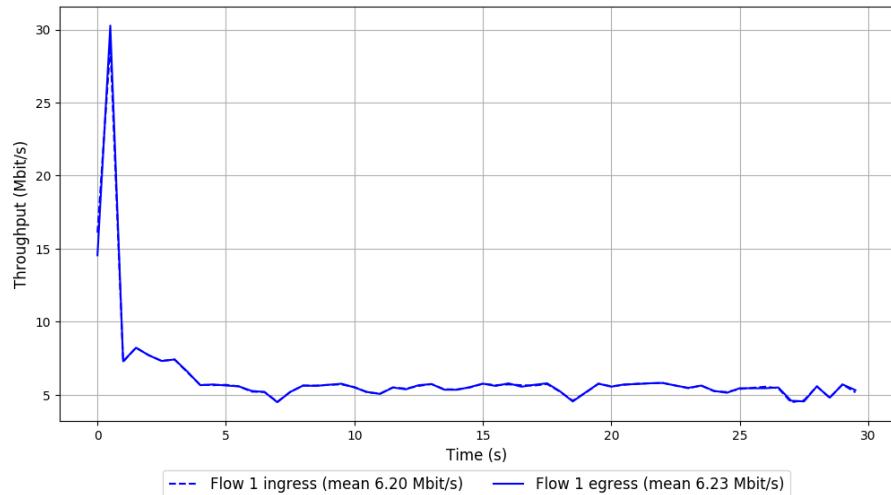


Run 1: Statistics of TaoVA-100x

```
Start at: 2018-02-19 17:38:36
End at: 2018-02-19 17:39:06
Local clock offset: -0.242 ms
Remote clock offset: -6.507 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.23 Mbit/s
95th percentile per-packet one-way delay: 21.502 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 6.23 Mbit/s
95th percentile per-packet one-way delay: 21.502 ms
Loss rate: 0.00%
```

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

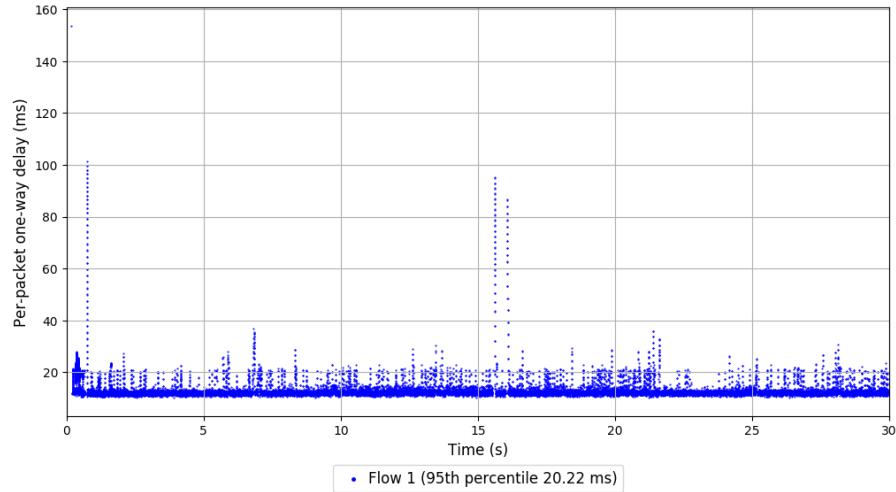
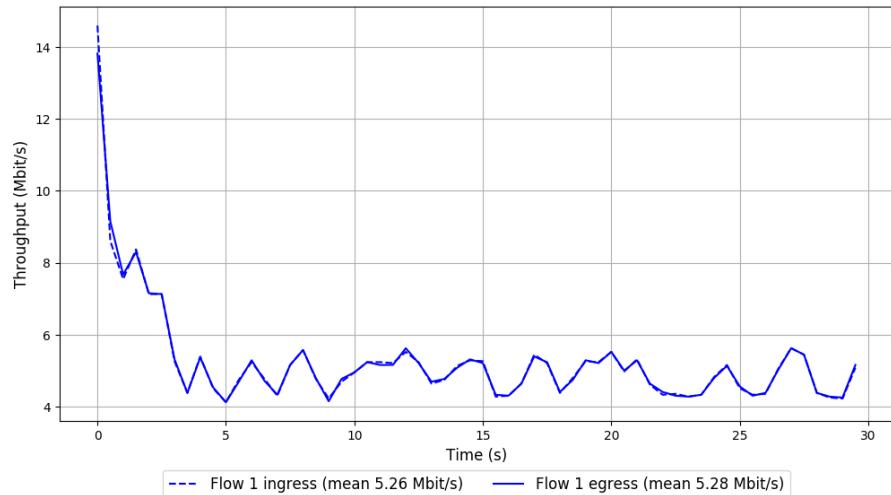


Run 2: Statistics of TaoVA-100x

```
Start at: 2018-02-19 18:02:22
End at: 2018-02-19 18:02:53
Local clock offset: 1.551 ms
Remote clock offset: -7.884 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.28 Mbit/s
95th percentile per-packet one-way delay: 20.218 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 5.28 Mbit/s
95th percentile per-packet one-way delay: 20.218 ms
Loss rate: 0.00%
```

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

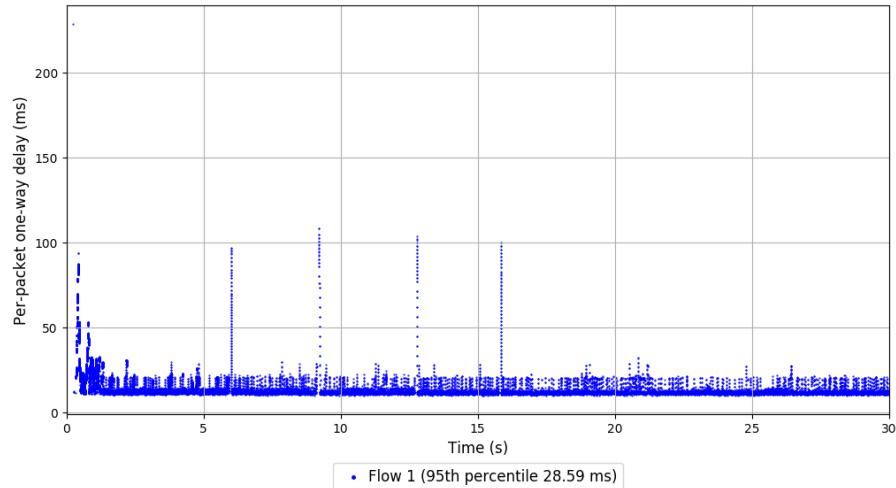
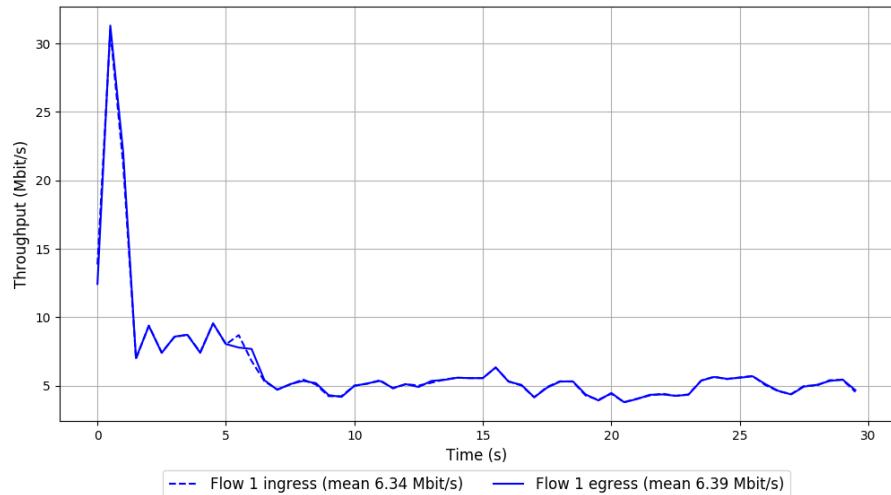


Run 3: Statistics of TaoVA-100x

```
Start at: 2018-02-19 18:26:06
End at: 2018-02-19 18:26:36
Local clock offset: 2.262 ms
Remote clock offset: -8.073 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.39 Mbit/s
95th percentile per-packet one-way delay: 28.593 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 6.39 Mbit/s
95th percentile per-packet one-way delay: 28.593 ms
Loss rate: 0.00%
```

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

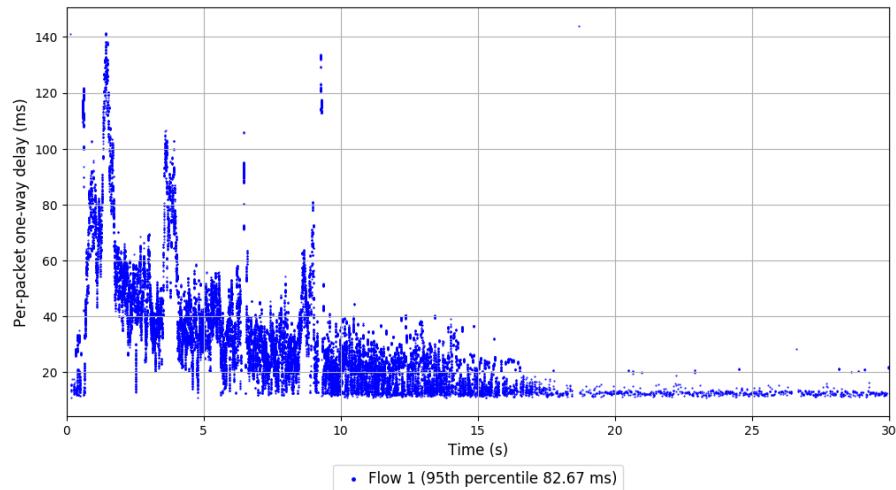
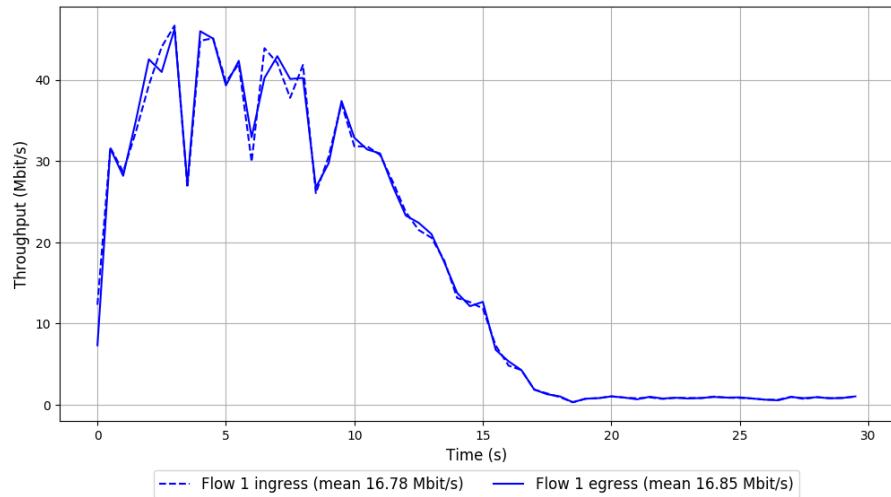


Run 1: Statistics of TCP Vegas

```
Start at: 2018-02-19 17:32:00
End at: 2018-02-19 17:32:30
Local clock offset: -0.063 ms
Remote clock offset: -5.461 ms

# Below is generated by plot.py at 2018-02-19 18:37:32
# Datalink statistics
-- Total of 1 flow:
Average throughput: 16.85 Mbit/s
95th percentile per-packet one-way delay: 82.669 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 16.85 Mbit/s
95th percentile per-packet one-way delay: 82.669 ms
Loss rate: 0.00%
```

Run 1: Report of TCP Vegas — Data Link

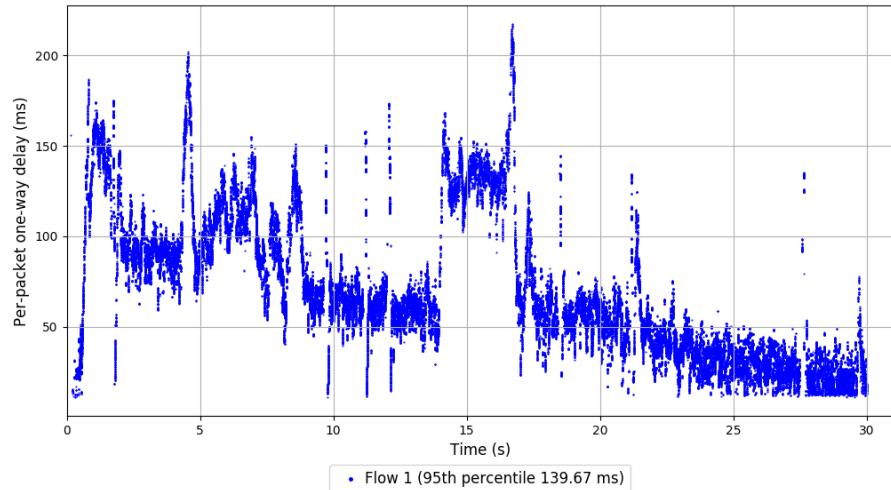
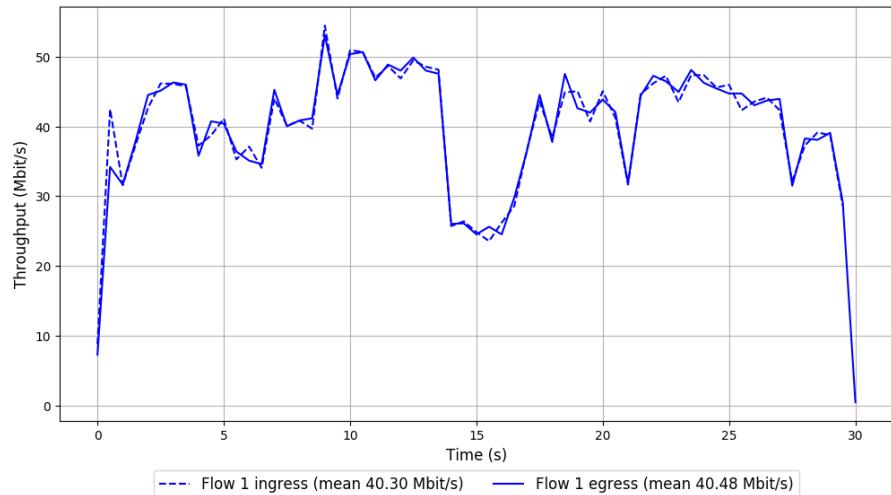


Run 2: Statistics of TCP Vegas

```
Start at: 2018-02-19 17:55:46
End at: 2018-02-19 17:56:16
Local clock offset: 0.776 ms
Remote clock offset: -7.709 ms

# Below is generated by plot.py at 2018-02-19 18:37:50
# Datalink statistics
-- Total of 1 flow:
Average throughput: 40.48 Mbit/s
95th percentile per-packet one-way delay: 139.674 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 40.48 Mbit/s
95th percentile per-packet one-way delay: 139.674 ms
Loss rate: 0.03%
```

Run 2: Report of TCP Vegas — Data Link

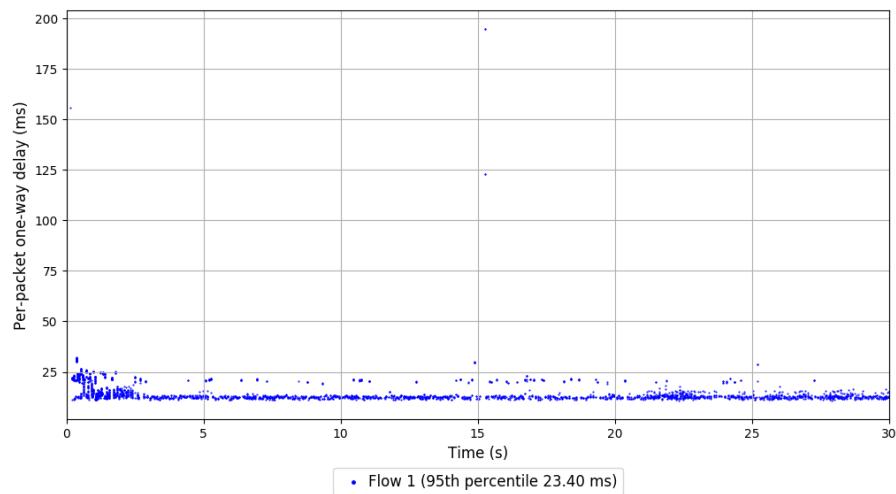
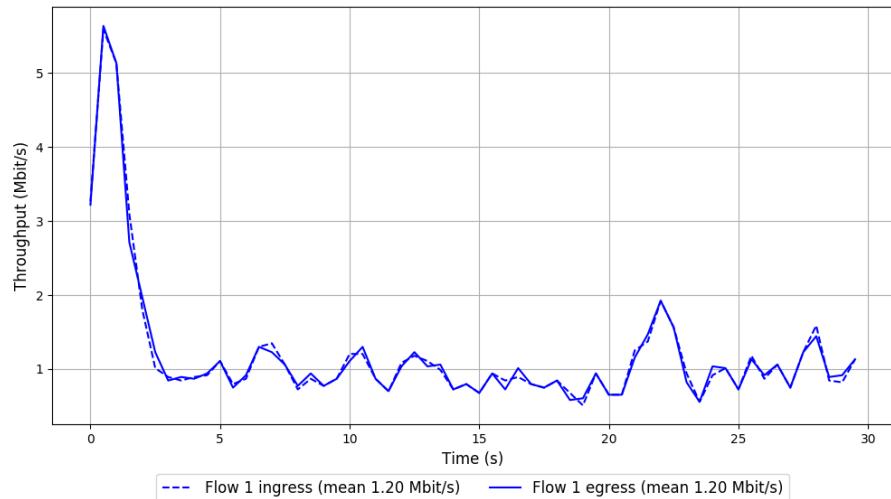


Run 3: Statistics of TCP Vegas

```
Start at: 2018-02-19 18:19:32
End at: 2018-02-19 18:20:02
Local clock offset: 2.26 ms
Remote clock offset: -7.953 ms

# Below is generated by plot.py at 2018-02-19 18:37:50
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.20 Mbit/s
95th percentile per-packet one-way delay: 23.398 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.20 Mbit/s
95th percentile per-packet one-way delay: 23.398 ms
Loss rate: 0.00%
```

Run 3: Report of TCP Vegas — Data Link

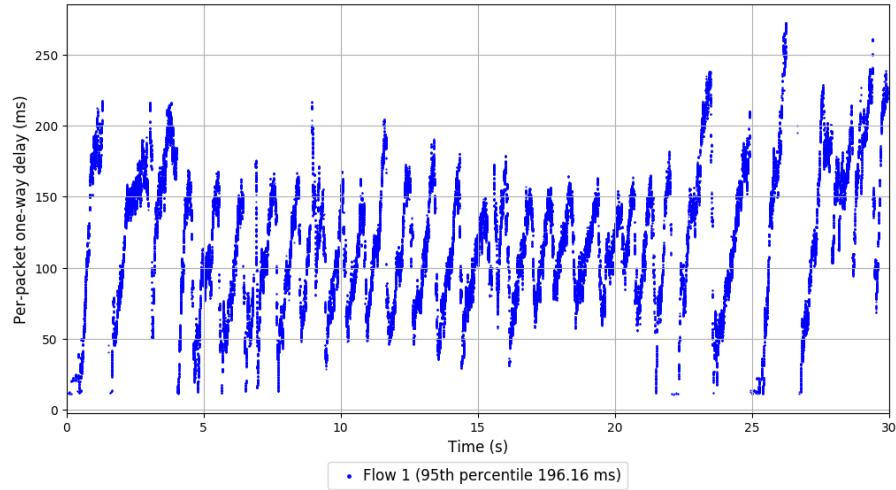
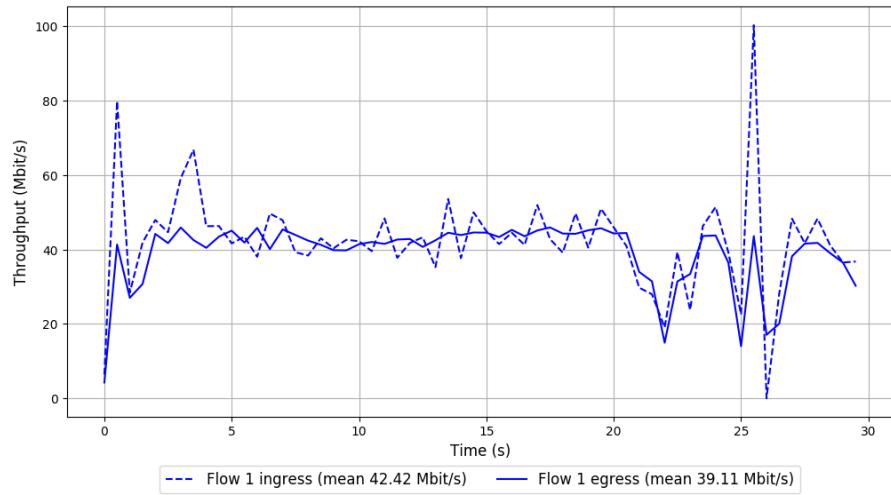


Run 1: Statistics of Verus

```
Start at: 2018-02-19 17:25:25
End at: 2018-02-19 17:25:55
Local clock offset: 0.442 ms
Remote clock offset: -5.534 ms

# Below is generated by plot.py at 2018-02-19 18:37:56
# Datalink statistics
-- Total of 1 flow:
Average throughput: 39.11 Mbit/s
95th percentile per-packet one-way delay: 196.158 ms
Loss rate: 7.70%
-- Flow 1:
Average throughput: 39.11 Mbit/s
95th percentile per-packet one-way delay: 196.158 ms
Loss rate: 7.70%
```

Run 1: Report of Verus — Data Link

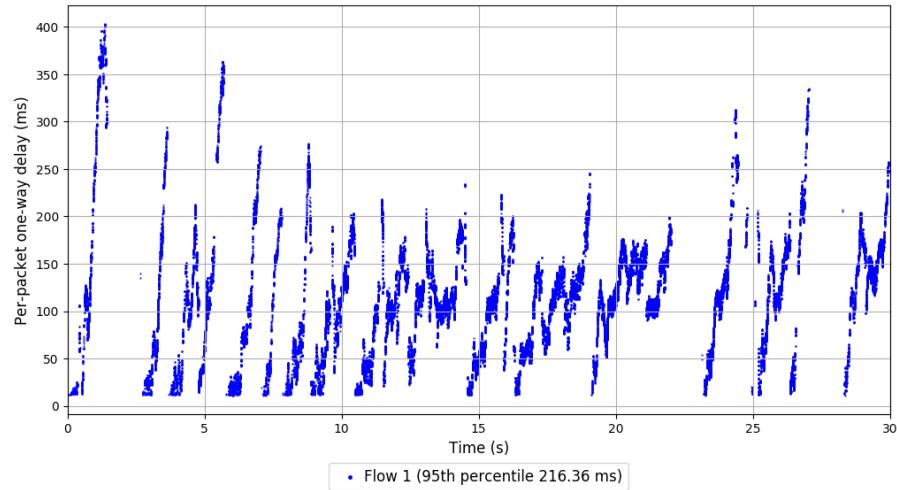
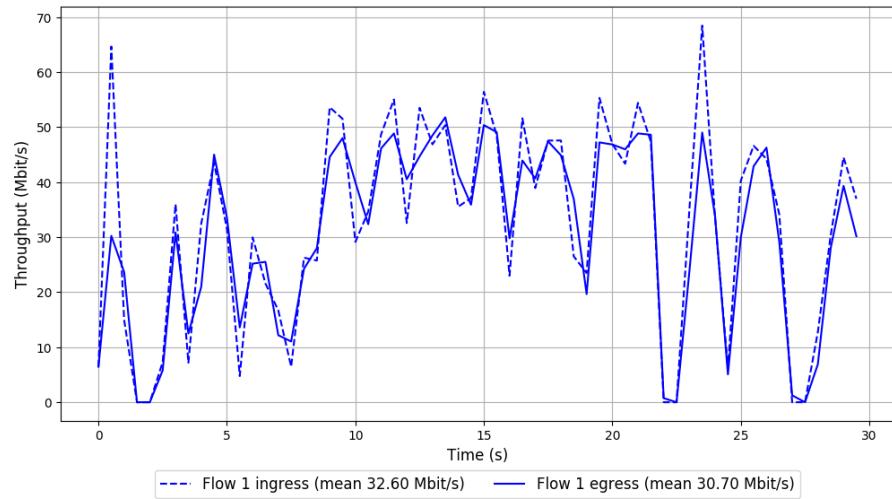


Run 2: Statistics of Verus

```
Start at: 2018-02-19 17:49:09
End at: 2018-02-19 17:49:39
Local clock offset: -0.671 ms
Remote clock offset: -7.482 ms

# Below is generated by plot.py at 2018-02-19 18:37:56
# Datalink statistics
-- Total of 1 flow:
Average throughput: 30.70 Mbit/s
95th percentile per-packet one-way delay: 216.363 ms
Loss rate: 5.64%
-- Flow 1:
Average throughput: 30.70 Mbit/s
95th percentile per-packet one-way delay: 216.363 ms
Loss rate: 5.64%
```

Run 2: Report of Verus — Data Link

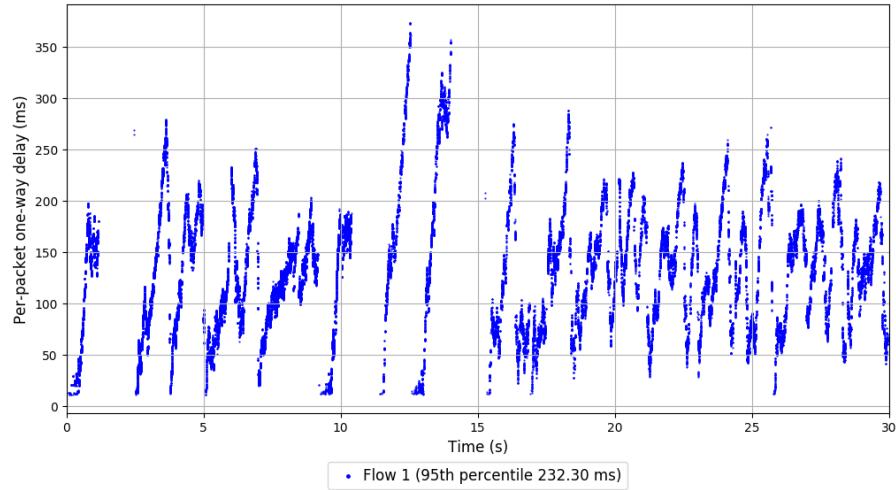
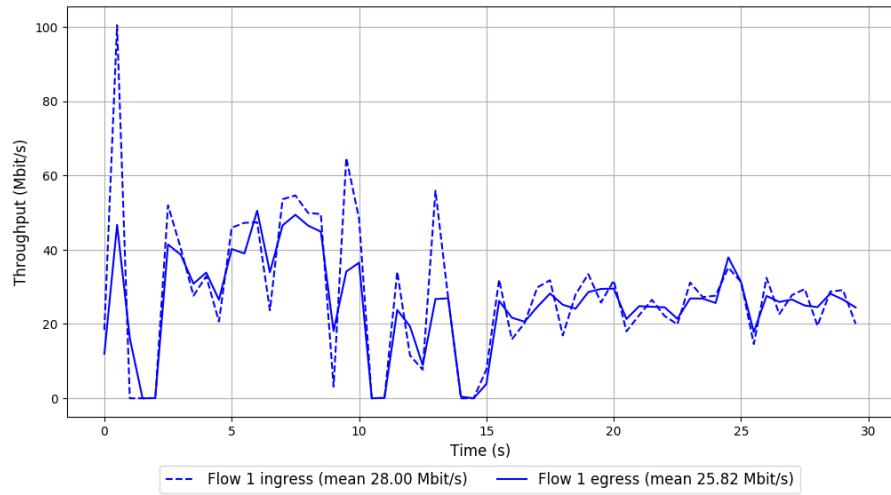


Run 3: Statistics of Verus

```
Start at: 2018-02-19 18:12:57
End at: 2018-02-19 18:13:27
Local clock offset: 2.095 ms
Remote clock offset: -8.02 ms

# Below is generated by plot.py at 2018-02-19 18:37:56
# Datalink statistics
-- Total of 1 flow:
Average throughput: 25.82 Mbit/s
95th percentile per-packet one-way delay: 232.304 ms
Loss rate: 7.74%
-- Flow 1:
Average throughput: 25.82 Mbit/s
95th percentile per-packet one-way delay: 232.304 ms
Loss rate: 7.74%
```

Run 3: Report of Verus — Data Link

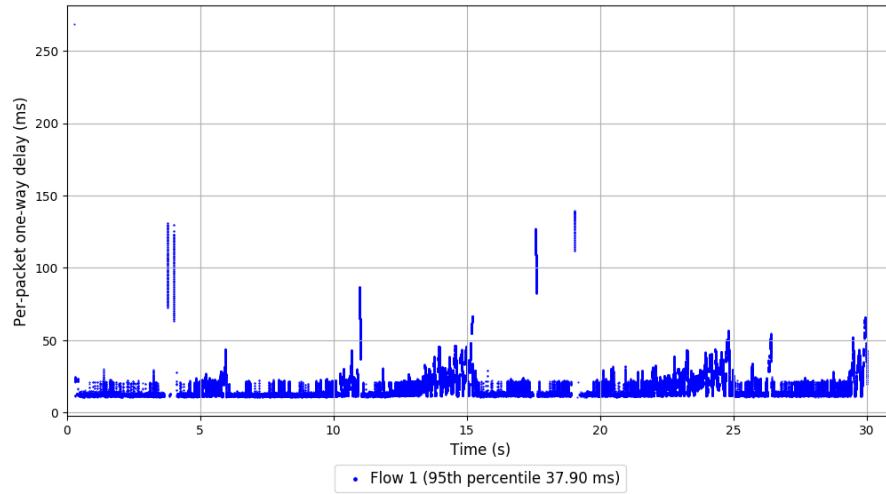
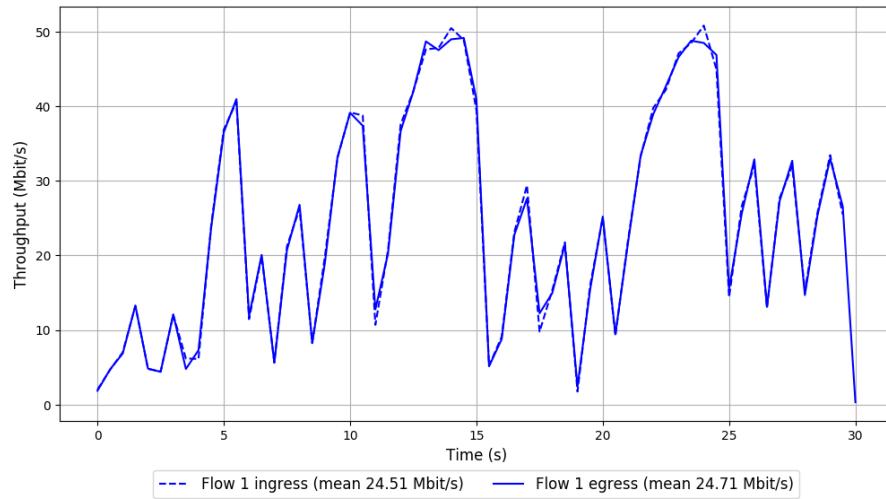


Run 1: Statistics of Copa

```
Start at: 2018-02-19 17:43:52
End at: 2018-02-19 17:44:22
Local clock offset: -0.515 ms
Remote clock offset: -7.096 ms

# Below is generated by plot.py at 2018-02-19 18:38:06
# Datalink statistics
-- Total of 1 flow:
Average throughput: 24.71 Mbit/s
95th percentile per-packet one-way delay: 37.904 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 24.71 Mbit/s
95th percentile per-packet one-way delay: 37.904 ms
Loss rate: 0.05%
```

Run 1: Report of Copa — Data Link

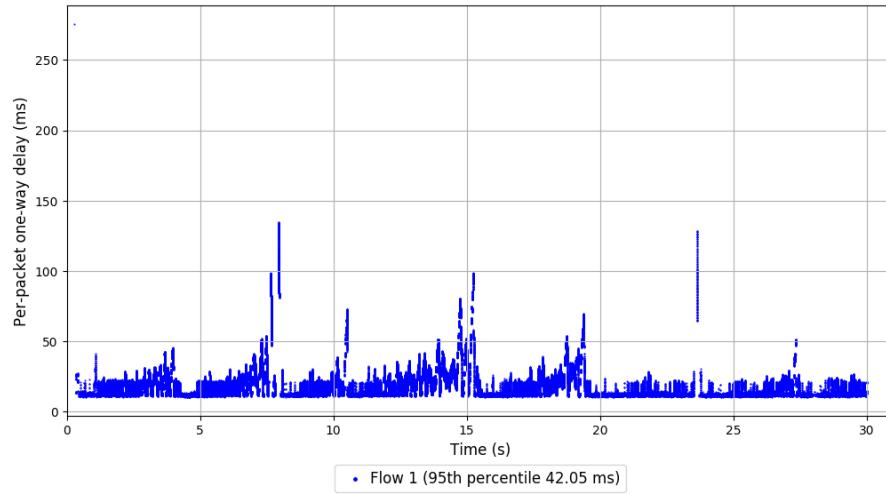
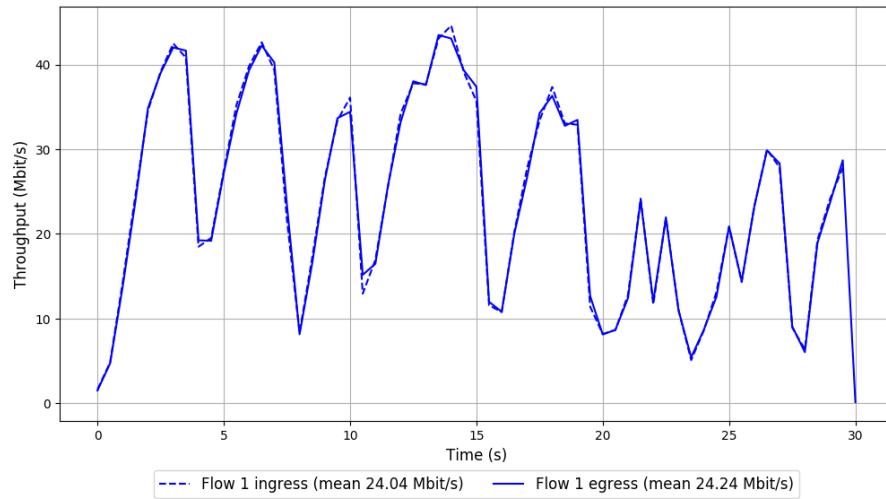


Run 2: Statistics of Copa

```
Start at: 2018-02-19 18:07:39
End at: 2018-02-19 18:08:09
Local clock offset: 1.871 ms
Remote clock offset: -8.08 ms

# Below is generated by plot.py at 2018-02-19 18:38:10
# Datalink statistics
-- Total of 1 flow:
Average throughput: 24.24 Mbit/s
95th percentile per-packet one-way delay: 42.053 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 24.24 Mbit/s
95th percentile per-packet one-way delay: 42.053 ms
Loss rate: 0.01%
```

Run 2: Report of Copa — Data Link

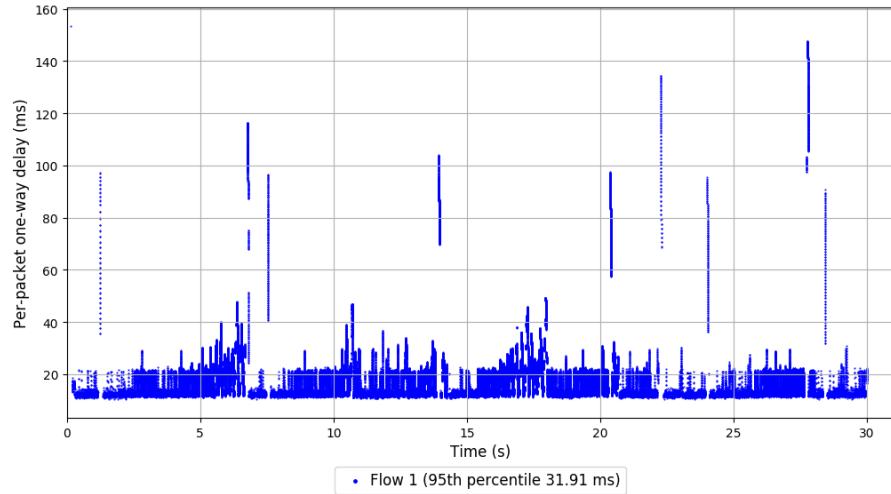
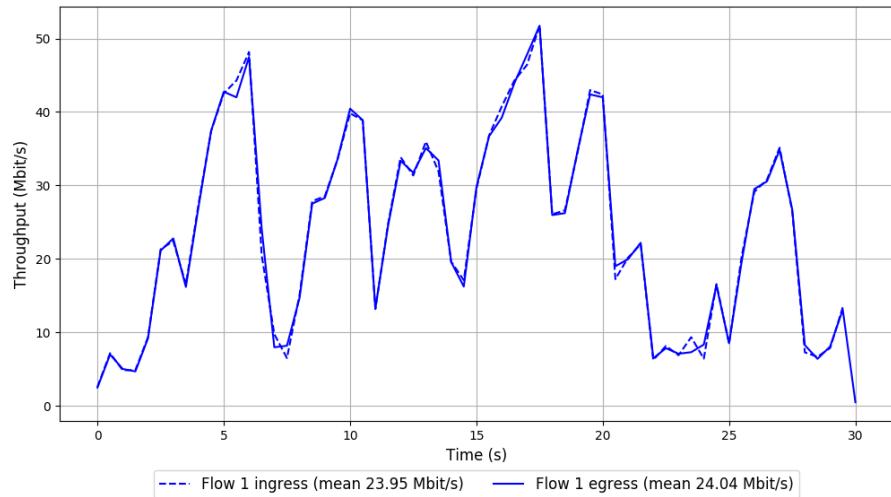


Run 3: Statistics of Copa

```
Start at: 2018-02-19 18:31:23
End at: 2018-02-19 18:31:53
Local clock offset: 1.972 ms
Remote clock offset: -8.089 ms

# Below is generated by plot.py at 2018-02-19 18:38:11
# Datalink statistics
-- Total of 1 flow:
Average throughput: 24.04 Mbit/s
95th percentile per-packet one-way delay: 31.905 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 24.04 Mbit/s
95th percentile per-packet one-way delay: 31.905 ms
Loss rate: 0.05%
```

Run 3: Report of Copa — Data Link

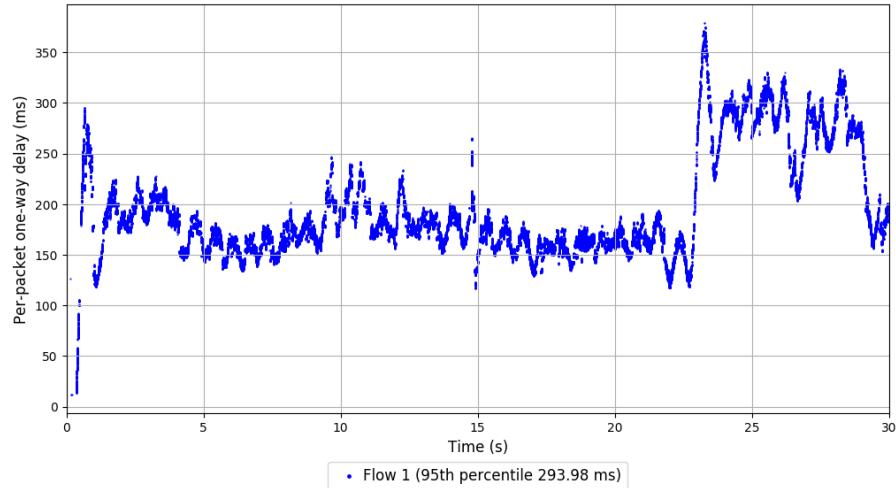
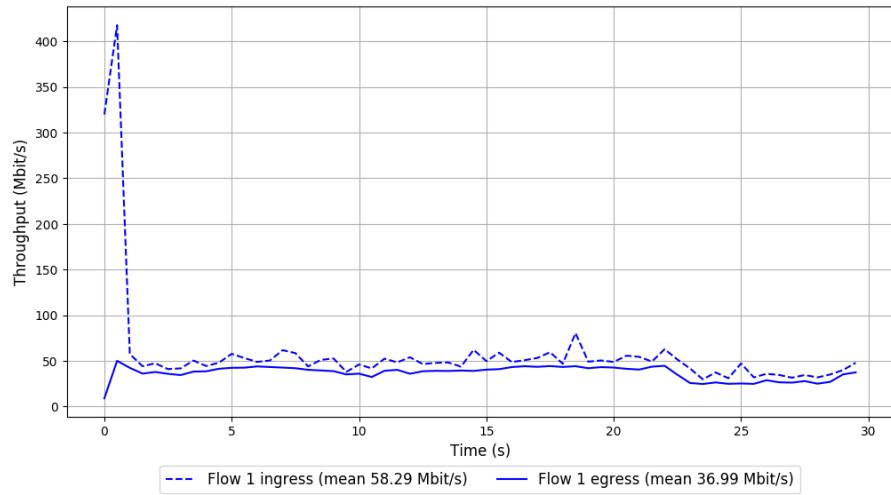


```
Run 1: Statistics of FillP
```

```
Start at: 2018-02-19 17:29:23
End at: 2018-02-19 17:29:53
Local clock offset: 0.072 ms
Remote clock offset: -5.41 ms

# Below is generated by plot.py at 2018-02-19 18:38:19
# Datalink statistics
-- Total of 1 flow:
Average throughput: 36.99 Mbit/s
95th percentile per-packet one-way delay: 293.983 ms
Loss rate: 36.77%
-- Flow 1:
Average throughput: 36.99 Mbit/s
95th percentile per-packet one-way delay: 293.983 ms
Loss rate: 36.77%
```

Run 1: Report of FillP — Data Link

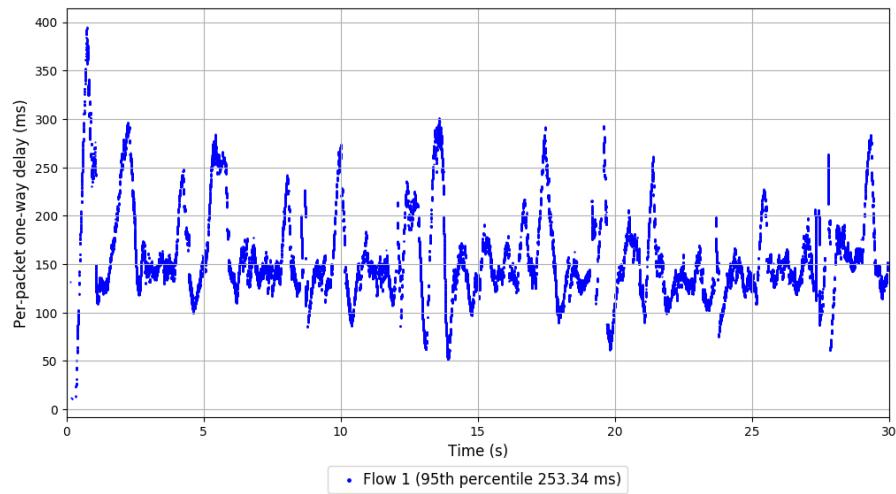
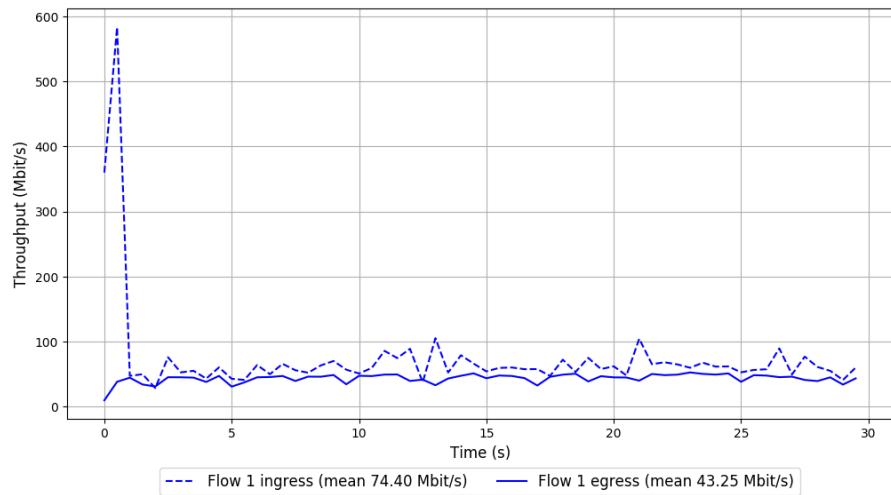


Run 2: Statistics of FillP

```
Start at: 2018-02-19 17:53:06
End at: 2018-02-19 17:53:36
Local clock offset: 0.225 ms
Remote clock offset: -7.673 ms

# Below is generated by plot.py at 2018-02-19 18:38:42
# Datalink statistics
-- Total of 1 flow:
Average throughput: 43.25 Mbit/s
95th percentile per-packet one-way delay: 253.337 ms
Loss rate: 42.09%
-- Flow 1:
Average throughput: 43.25 Mbit/s
95th percentile per-packet one-way delay: 253.337 ms
Loss rate: 42.09%
```

Run 2: Report of FillP — Data Link

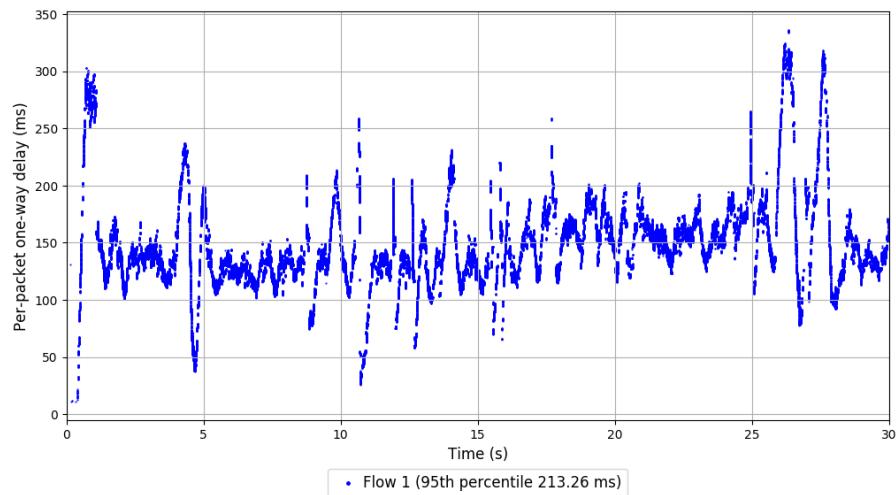
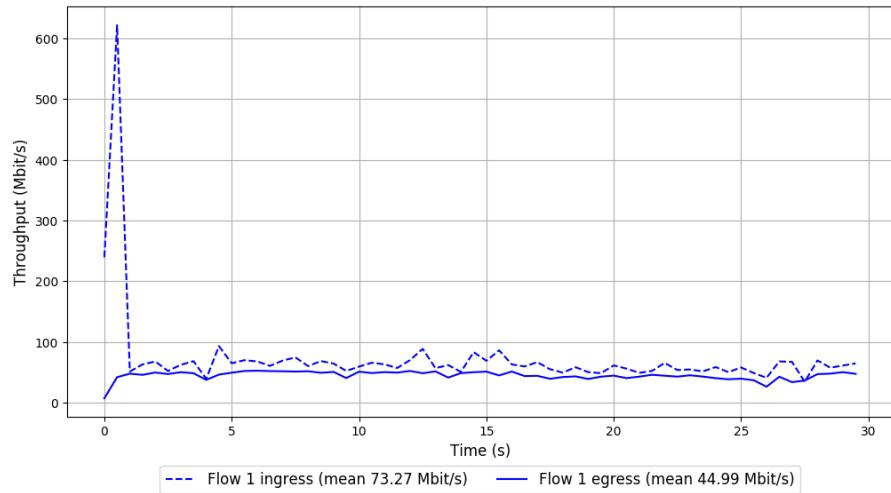


Run 3: Statistics of FillP

```
Start at: 2018-02-19 18:16:53
End at: 2018-02-19 18:17:23
Local clock offset: 2.222 ms
Remote clock offset: -7.989 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 44.99 Mbit/s
95th percentile per-packet one-way delay: 213.262 ms
Loss rate: 38.83%
-- Flow 1:
Average throughput: 44.99 Mbit/s
95th percentile per-packet one-way delay: 213.262 ms
Loss rate: 38.83%
```

Run 3: Report of FillP — Data Link

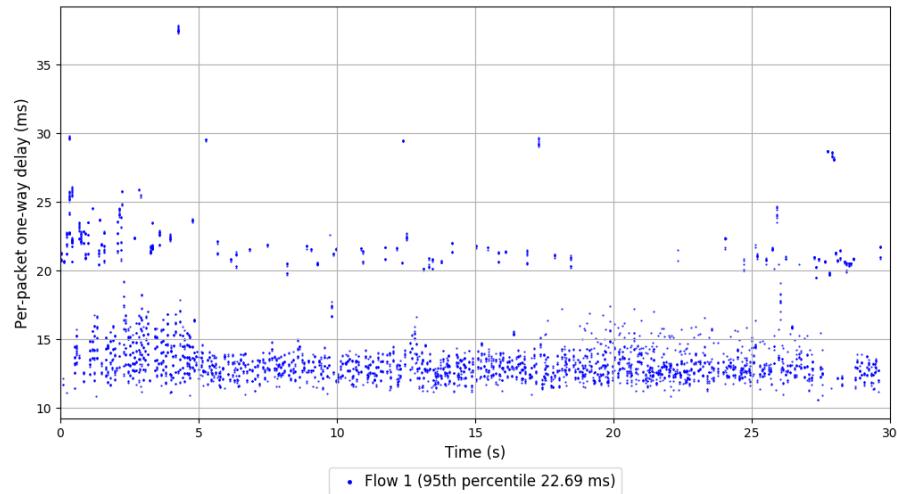
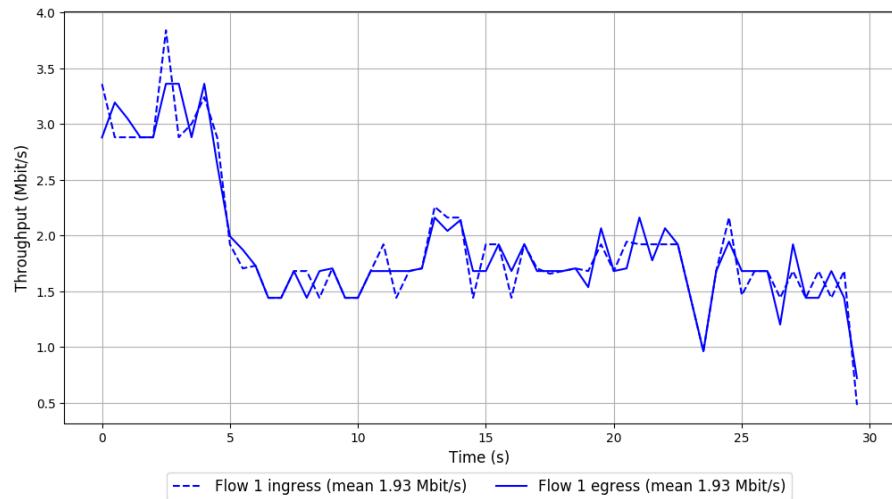


Run 1: Statistics of Indigo-1-32

```
Start at: 2018-02-19 17:28:05
End at: 2018-02-19 17:28:35
Local clock offset: 0.275 ms
Remote clock offset: -5.495 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.93 Mbit/s
95th percentile per-packet one-way delay: 22.688 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.93 Mbit/s
95th percentile per-packet one-way delay: 22.688 ms
Loss rate: 0.00%
```

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

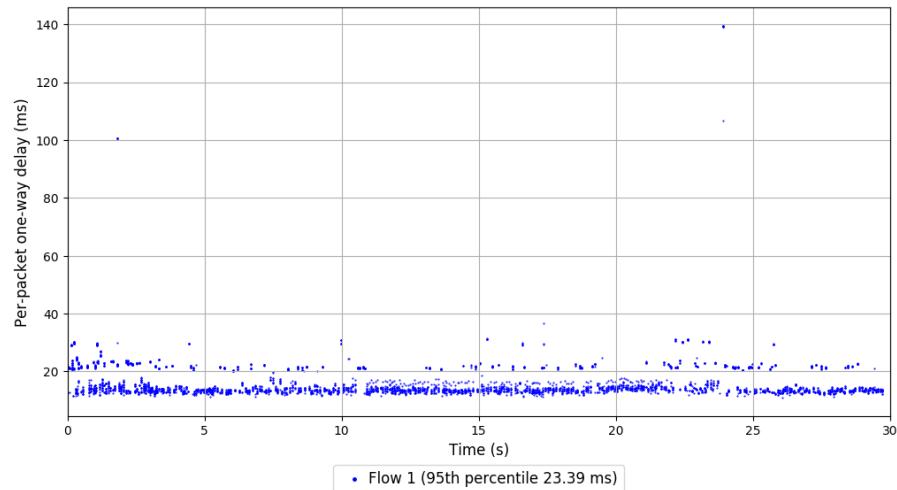
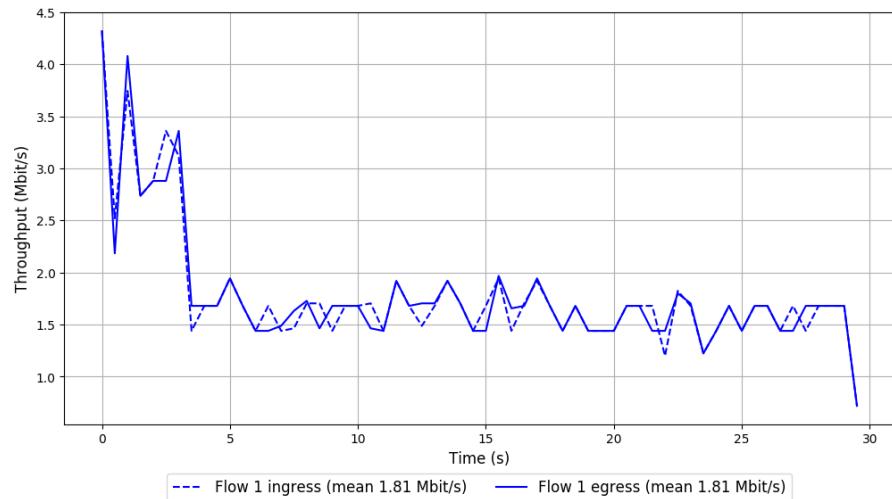


Run 2: Statistics of Indigo-1-32

```
Start at: 2018-02-19 17:51:48
End at: 2018-02-19 17:52:18
Local clock offset: -0.1 ms
Remote clock offset: -7.507 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.81 Mbit/s
95th percentile per-packet one-way delay: 23.388 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.81 Mbit/s
95th percentile per-packet one-way delay: 23.388 ms
Loss rate: 0.00%
```

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

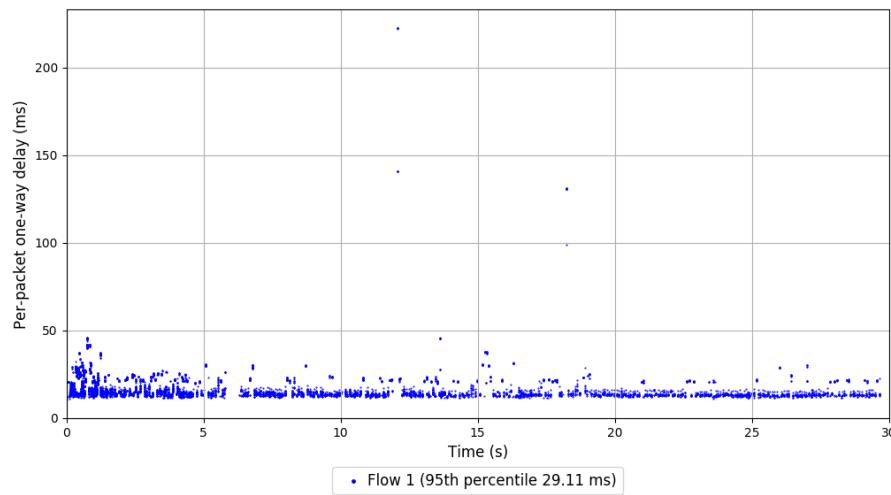
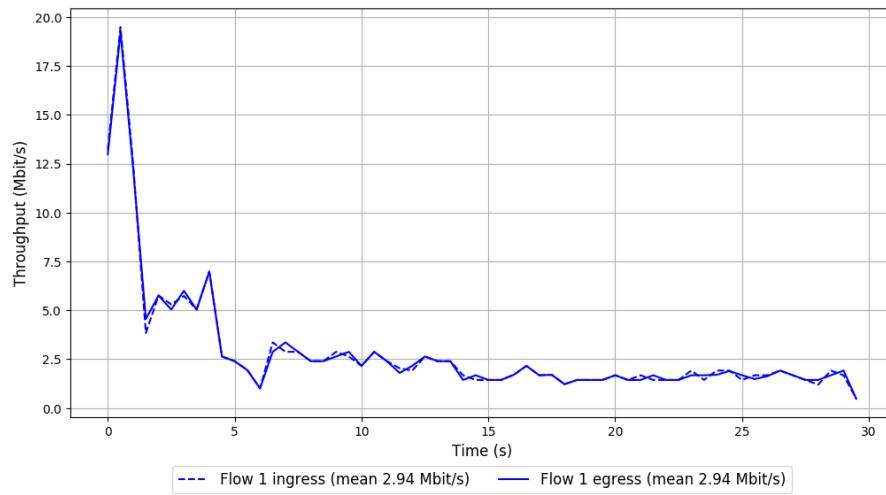


Run 3: Statistics of Indigo-1-32

```
Start at: 2018-02-19 18:15:35
End at: 2018-02-19 18:16:05
Local clock offset: 2.095 ms
Remote clock offset: -7.991 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.94 Mbit/s
95th percentile per-packet one-way delay: 29.110 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.94 Mbit/s
95th percentile per-packet one-way delay: 29.110 ms
Loss rate: 0.00%
```

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

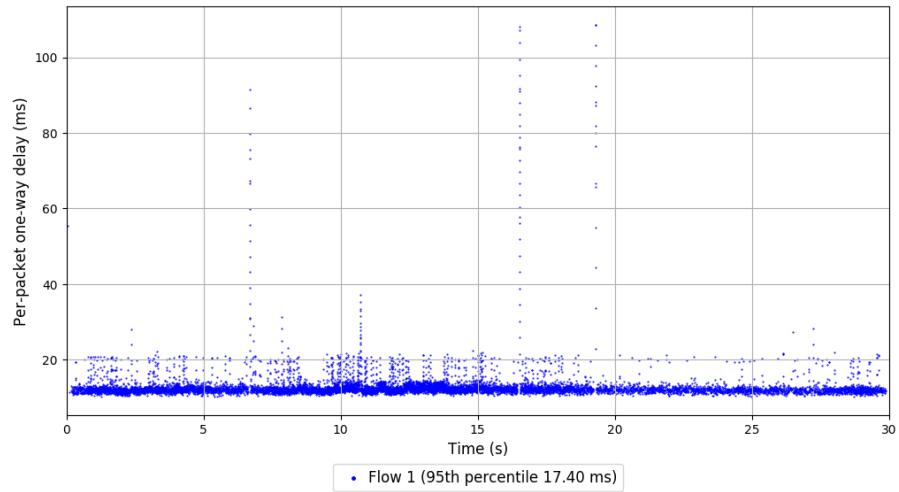
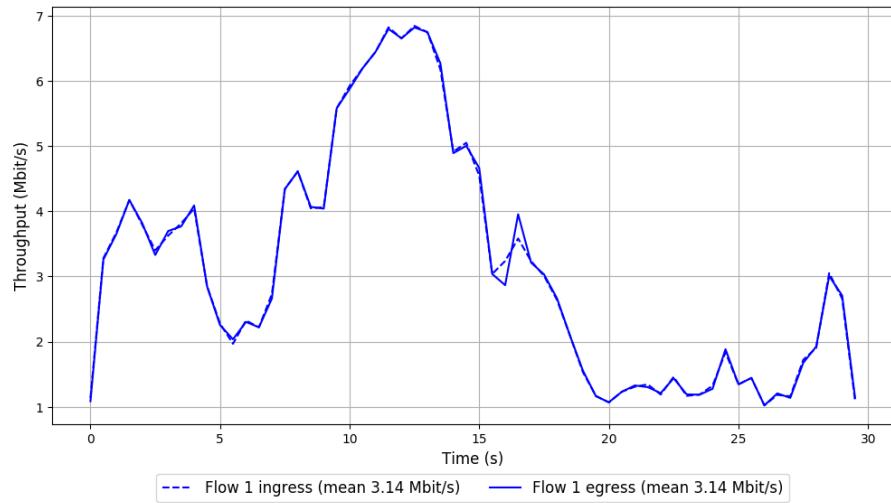


```
Run 1: Statistics of Vivace-latency
```

```
Start at: 2018-02-19 17:45:12
End at: 2018-02-19 17:45:42
Local clock offset: -0.453 ms
Remote clock offset: -7.23 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.14 Mbit/s
95th percentile per-packet one-way delay: 17.397 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 3.14 Mbit/s
95th percentile per-packet one-way delay: 17.397 ms
Loss rate: 0.00%
```

Run 1: Report of Vivace-latency — Data Link

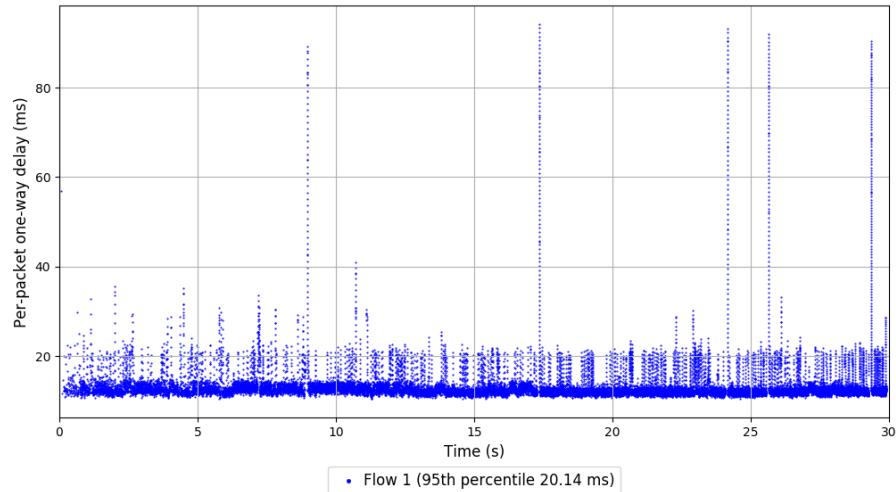
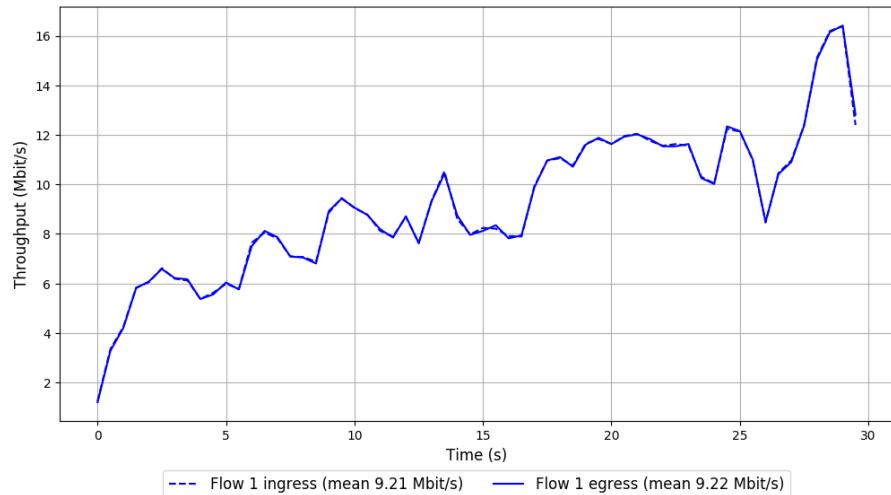


Run 2: Statistics of Vivace-latency

```
Start at: 2018-02-19 18:08:59
End at: 2018-02-19 18:09:29
Local clock offset: 1.945 ms
Remote clock offset: -8.038 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 9.22 Mbit/s
95th percentile per-packet one-way delay: 20.137 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 9.22 Mbit/s
95th percentile per-packet one-way delay: 20.137 ms
Loss rate: 0.00%
```

Run 2: Report of Vivace-latency — Data Link

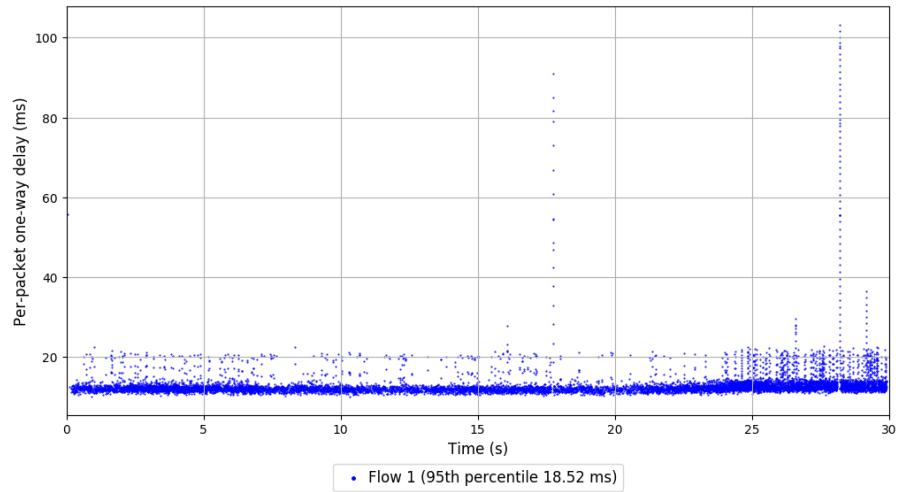
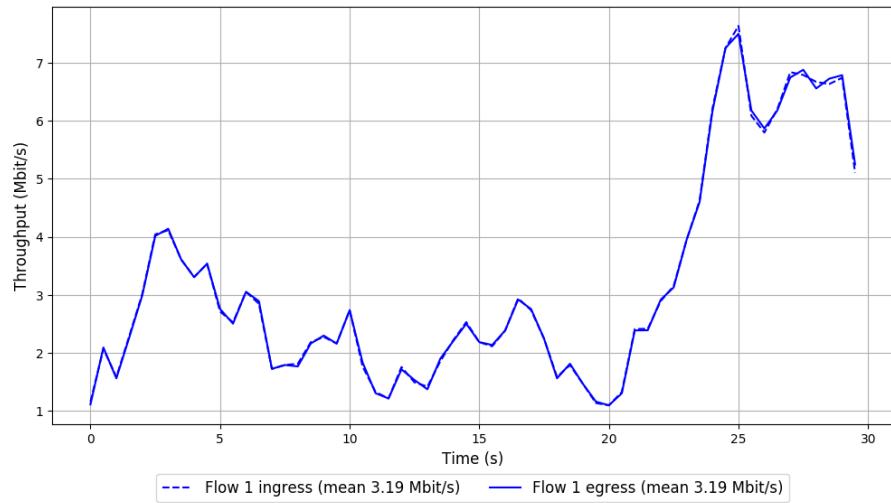


Run 3: Statistics of Vivace-latency

```
Start at: 2018-02-19 18:32:43
End at: 2018-02-19 18:33:13
Local clock offset: 2.002 ms
Remote clock offset: -8.145 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.19 Mbit/s
95th percentile per-packet one-way delay: 18.519 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 3.19 Mbit/s
95th percentile per-packet one-way delay: 18.519 ms
Loss rate: 0.00%
```

Run 3: Report of Vivace-latency — Data Link

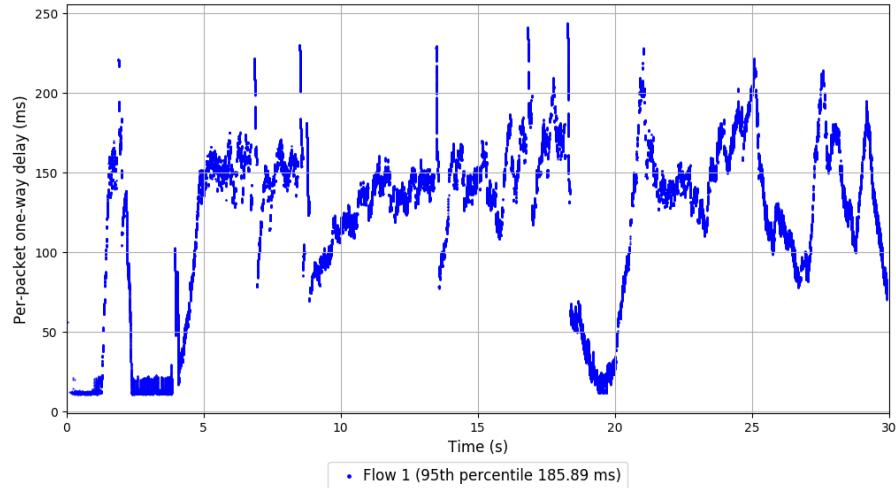
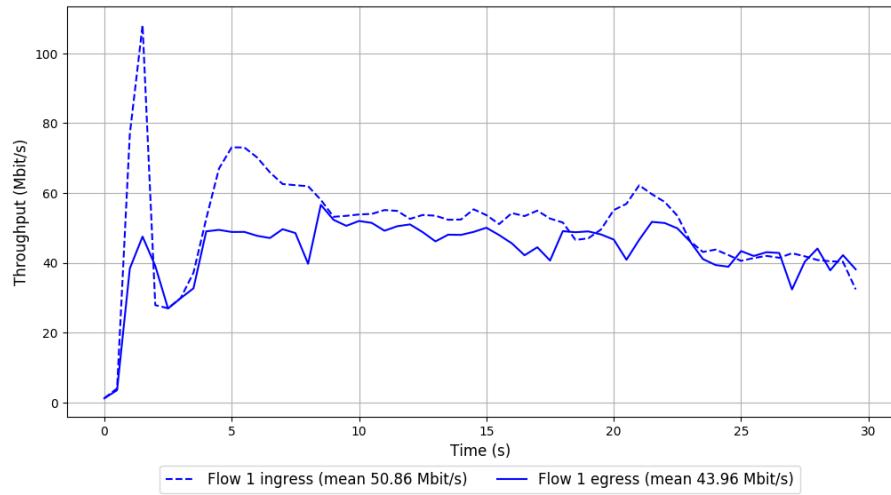


```
Run 1: Statistics of Vivace-loss
```

```
Start at: 2018-02-19 17:46:30
End at: 2018-02-19 17:47:00
Local clock offset: -0.492 ms
Remote clock offset: -7.256 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 43.96 Mbit/s
95th percentile per-packet one-way delay: 185.891 ms
Loss rate: 13.68%
-- Flow 1:
Average throughput: 43.96 Mbit/s
95th percentile per-packet one-way delay: 185.891 ms
Loss rate: 13.68%
```

Run 1: Report of Vivace-loss — Data Link

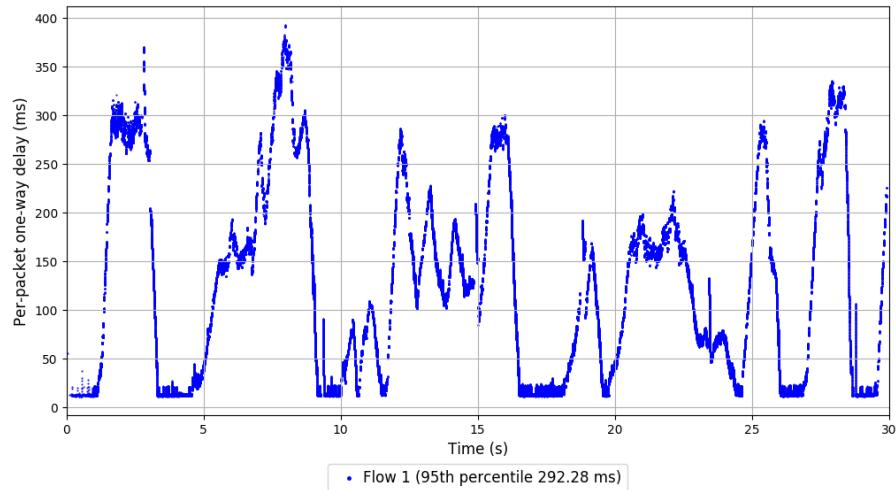
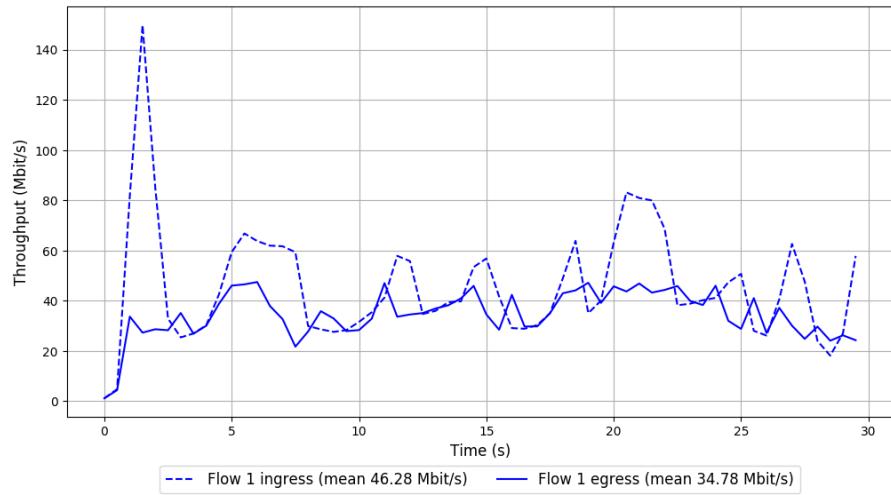


Run 2: Statistics of Vivace-loss

```
Start at: 2018-02-19 18:10:18
End at: 2018-02-19 18:10:48
Local clock offset: 2.008 ms
Remote clock offset: -8.041 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 34.78 Mbit/s
95th percentile per-packet one-way delay: 292.283 ms
Loss rate: 24.93%
-- Flow 1:
Average throughput: 34.78 Mbit/s
95th percentile per-packet one-way delay: 292.283 ms
Loss rate: 24.93%
```

Run 2: Report of Vivace-loss — Data Link

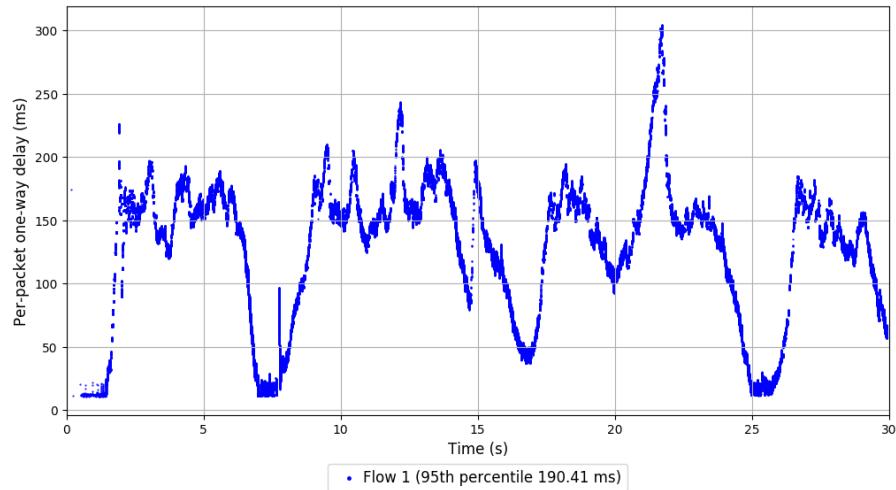
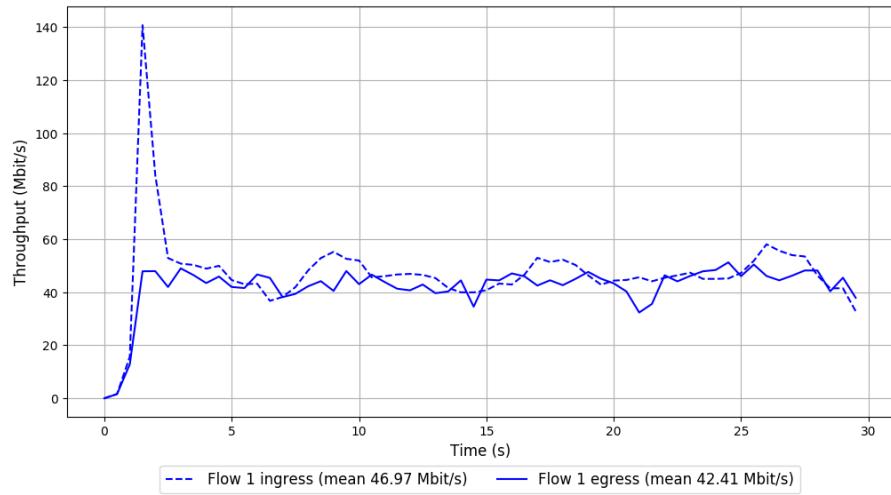


Run 3: Statistics of Vivace-loss

```
Start at: 2018-02-19 18:34:01
End at: 2018-02-19 18:34:31
Local clock offset: 1.989 ms
Remote clock offset: -8.172 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 42.41 Mbit/s
95th percentile per-packet one-way delay: 190.415 ms
Loss rate: 10.19%
-- Flow 1:
Average throughput: 42.41 Mbit/s
95th percentile per-packet one-way delay: 190.415 ms
Loss rate: 10.19%
```

Run 3: Report of Vivace-loss — Data Link

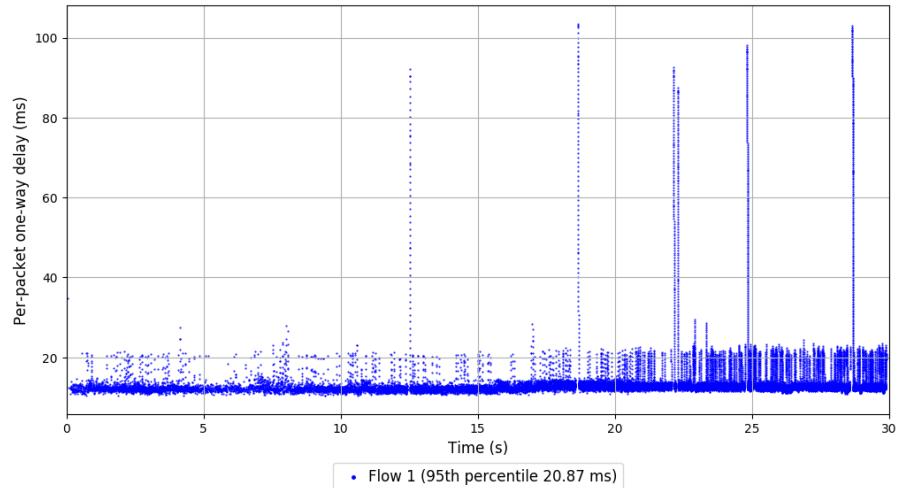
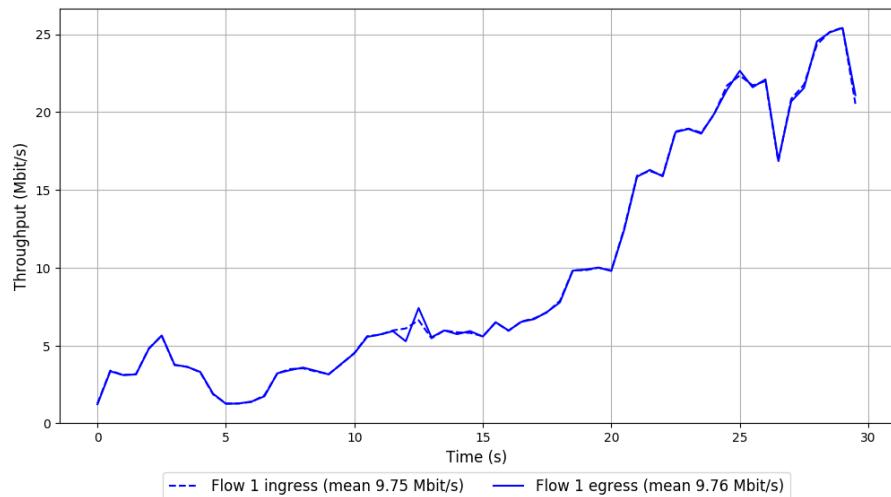


Run 1: Statistics of Vivace-LTE

```
Start at: 2018-02-19 17:42:33
End at: 2018-02-19 17:43:03
Local clock offset: -0.386 ms
Remote clock offset: -6.952 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 9.76 Mbit/s
95th percentile per-packet one-way delay: 20.874 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 9.76 Mbit/s
95th percentile per-packet one-way delay: 20.874 ms
Loss rate: 0.01%
```

Run 1: Report of Vivace-LTE — Data Link

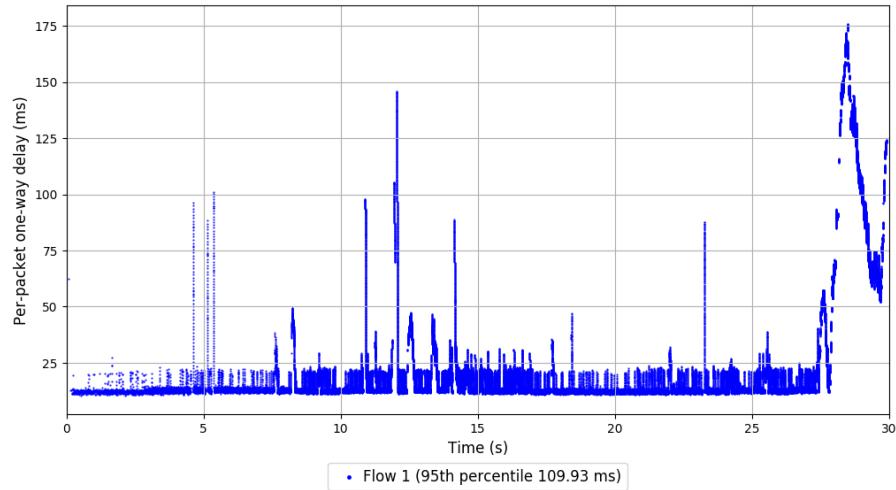
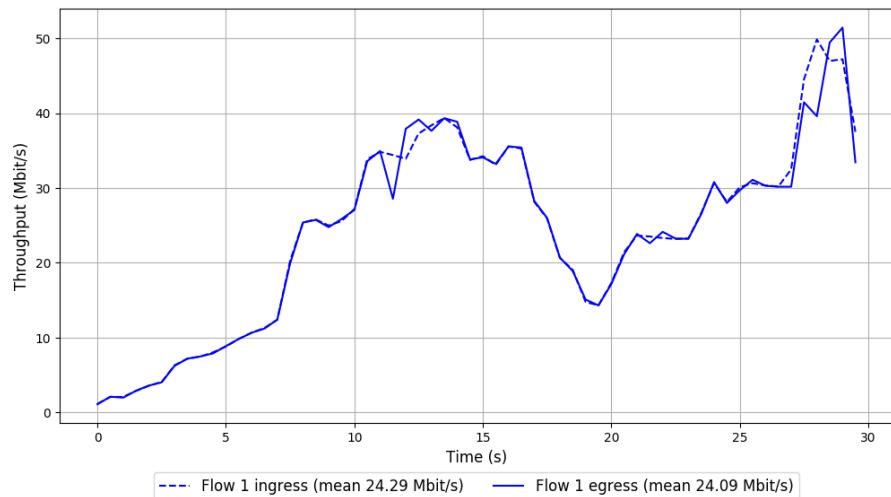


Run 2: Statistics of Vivace-LTE

```
Start at: 2018-02-19 18:06:20
End at: 2018-02-19 18:06:50
Local clock offset: 1.736 ms
Remote clock offset: -8.096 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 24.09 Mbit/s
95th percentile per-packet one-way delay: 109.927 ms
Loss rate: 0.95%
-- Flow 1:
Average throughput: 24.09 Mbit/s
95th percentile per-packet one-way delay: 109.927 ms
Loss rate: 0.95%
```

Run 2: Report of Vivace-LTE — Data Link



Run 3: Statistics of Vivace-LTE

```
Start at: 2018-02-19 18:30:04
End at: 2018-02-19 18:30:34
Local clock offset: 2.002 ms
Remote clock offset: -8.121 ms

# Below is generated by plot.py at 2018-02-19 18:38:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 19.10 Mbit/s
95th percentile per-packet one-way delay: 25.067 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 19.10 Mbit/s
95th percentile per-packet one-way delay: 25.067 ms
Loss rate: 0.00%
```

Run 3: Report of Vivace-LTE — Data Link

