

Pantheon Report

Generated at 2018-12-02 00:05:24 (UTC).
Data path: AWS India 1 on `ens5 (local)` → India cellular on `ppp0 (remote)`.
Repeated the test of 19 congestion control schemes 3 times.
Each test lasted for 30 seconds running 1 flow.
NTP offsets were measured against `nets.org.sg` and have been applied to correct the timestamps in logs.

System info:

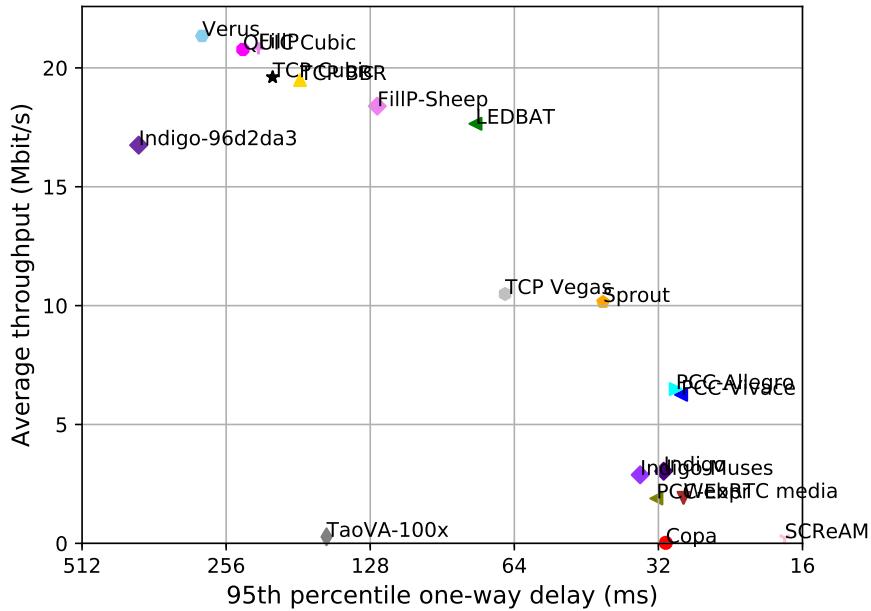
```
Linux 4.15.0-1027-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
```

Git summary:

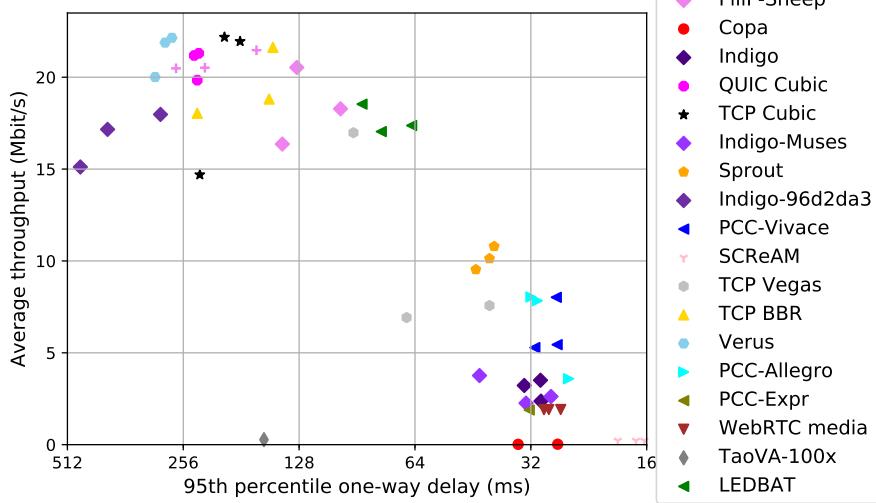
```
branch: muses @ 7b6dad87cde3ab65f7c4052140eb54098aa58e9d
third_party/fillp @ d6da1459332fce56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fc45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/indigo-96d2da3 @ 8413272d46f8aa0bcb967ed7048b6a8f994abb95
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ 65ac1b19bbefed0c6349ae986009b4fa8643c40a
third_party/pantheon-tunnel @ f866d3f58d27af942717625ee3a354cc2e802bd
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/pcc-experimental @ cd43e34e3f5f5613e8acd08fab92c4eb24f974ab
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream-reproduce @ f099118d1421aa3131bf11ff1964974e1da3bdb2
M src/ScreamClient
M src/ScreamServer
third_party/sprout @ 366e35c6178b01e31d4a46ad18c74f9415f19a26
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 @ 2baf86211435ae071a32f96b7d8c504587f5d7f4
third_party/webrtc @ 3f0cc2a9061a41b6f9dde4735770d143a1fa2851

test from AWS India 1 to India cellular, 3 runs of 30s each per scheme
(mean of all runs by scheme)



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



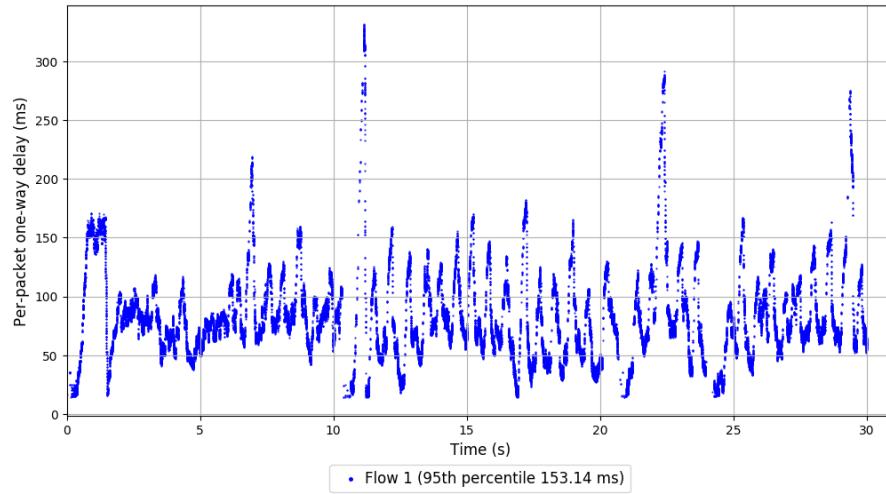
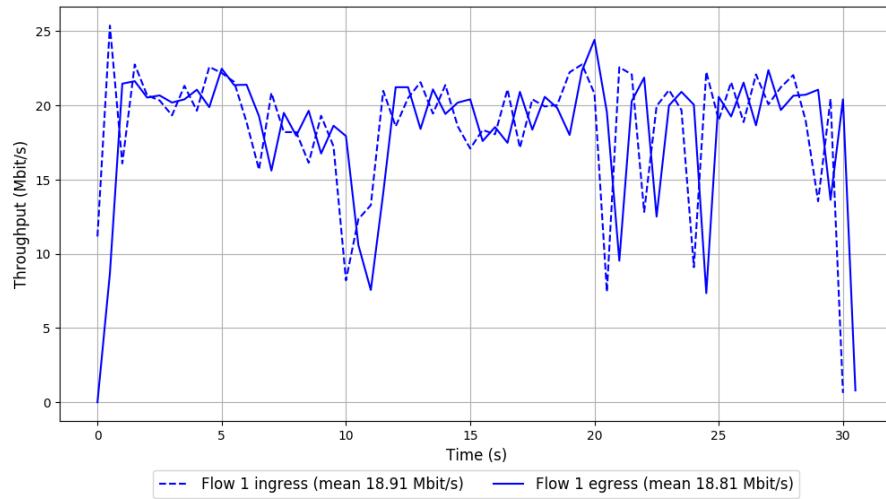
scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	19.49	179.44	0.50
Copa	2	0.02	30.89	84.78
TCP Cubic	3	19.61	204.70	0.63
FillP	3	20.82	219.14	0.83
FillP-Sheep	3	18.39	123.75	0.33
Indigo	3	3.03	31.20	0.12
Indigo-96d2da3	3	16.75	389.94	0.54
LEDBAT	3	17.65	77.16	0.40
Indigo-Muses	3	2.88	34.93	0.04
PCC-Allegro	3	6.49	29.43	0.05
PCC-Expr	1	1.89	32.32	70.74
QUIC Cubic	3	20.77	236.17	0.75
SCReAM	3	0.22	17.43	0.13
Sprout	3	10.15	41.77	0.13
TaoVA-100x	1	0.27	157.95	89.97
TCP Vegas	3	10.49	66.92	0.17
Verus	3	21.35	287.42	0.84
PCC-Vivace	3	6.25	28.69	0.17
WebRTC media	3	1.91	28.36	0.06

Run 1: Statistics of TCP BBR

```
Start at: 2018-12-01 23:18:04
End at: 2018-12-01 23:18:34
Local clock offset: 2.369 ms
Remote clock offset: -5.769 ms

# Below is generated by plot.py at 2018-12-02 00:04:14
# Datalink statistics
-- Total of 1 flow:
Average throughput: 18.81 Mbit/s
95th percentile per-packet one-way delay: 153.141 ms
Loss rate: 0.61%
-- Flow 1:
Average throughput: 18.81 Mbit/s
95th percentile per-packet one-way delay: 153.141 ms
Loss rate: 0.61%
```

Run 1: Report of TCP BBR — Data Link

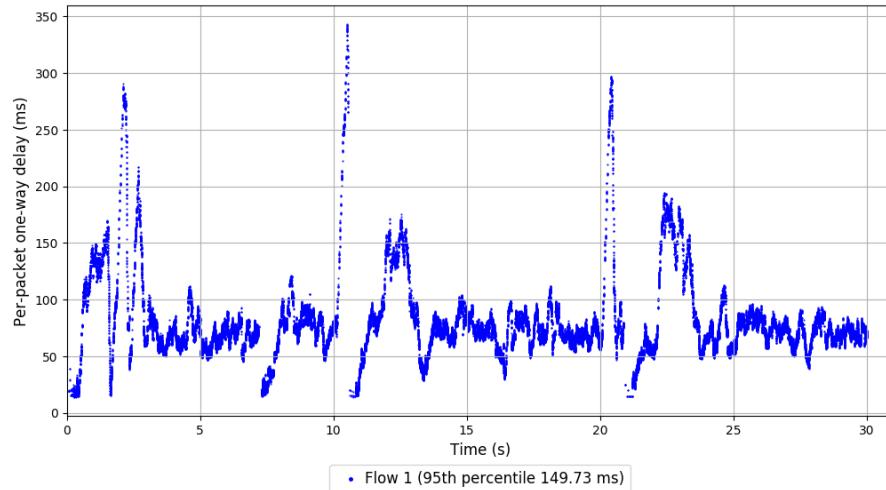
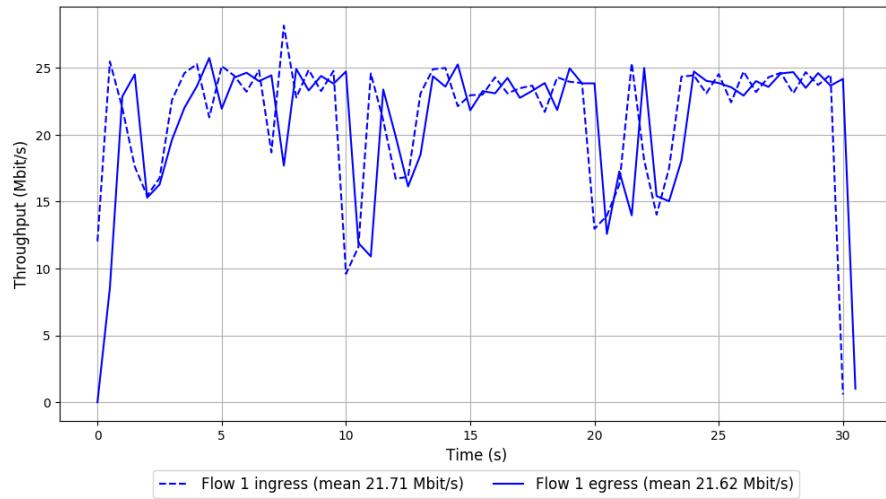


Run 2: Statistics of TCP BBR

```
Start at: 2018-12-01 23:39:00
End at: 2018-12-01 23:39:30
Local clock offset: 2.06 ms
Remote clock offset: -4.471 ms

# Below is generated by plot.py at 2018-12-02 00:04:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 21.62 Mbit/s
95th percentile per-packet one-way delay: 149.734 ms
Loss rate: 0.44%
-- Flow 1:
Average throughput: 21.62 Mbit/s
95th percentile per-packet one-way delay: 149.734 ms
Loss rate: 0.44%
```

Run 2: Report of TCP BBR — Data Link

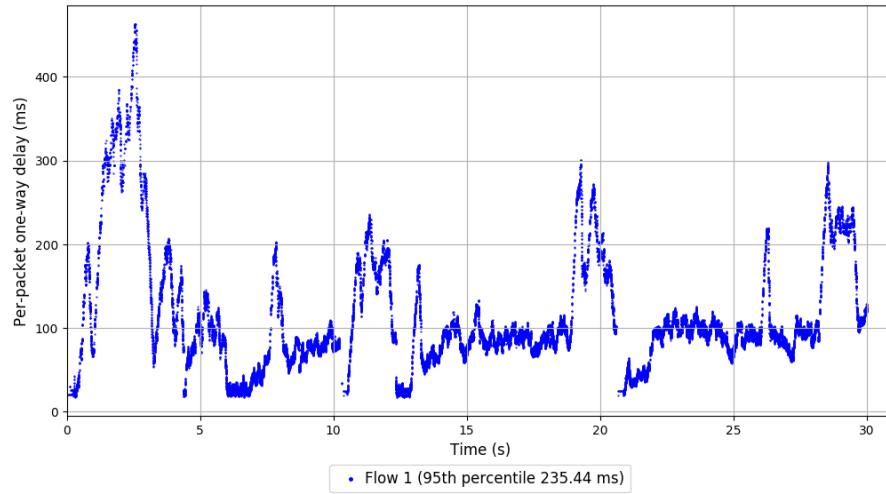
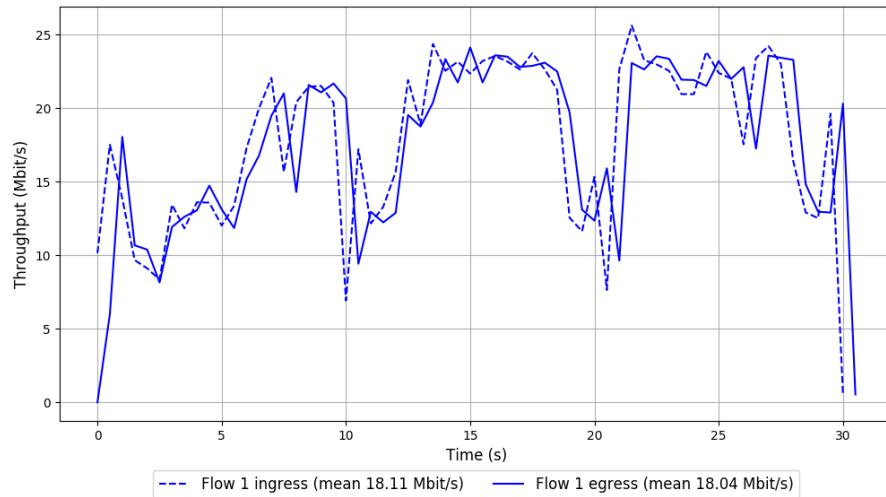


Run 3: Statistics of TCP BBR

```
Start at: 2018-12-01 23:59:55
End at: 2018-12-02 00:00:25
Local clock offset: 0.176 ms
Remote clock offset: -4.759 ms

# Below is generated by plot.py at 2018-12-02 00:04:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 18.04 Mbit/s
95th percentile per-packet one-way delay: 235.443 ms
Loss rate: 0.45%
-- Flow 1:
Average throughput: 18.04 Mbit/s
95th percentile per-packet one-way delay: 235.443 ms
Loss rate: 0.45%
```

Run 3: Report of TCP BBR — Data Link

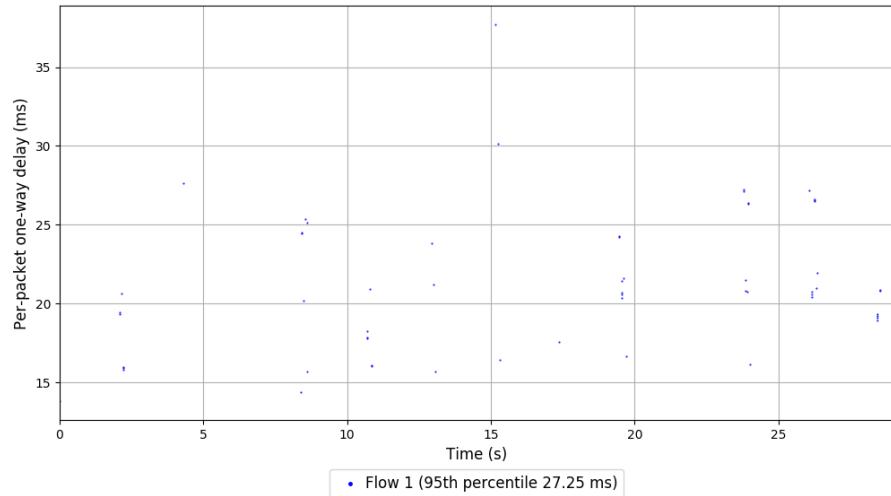
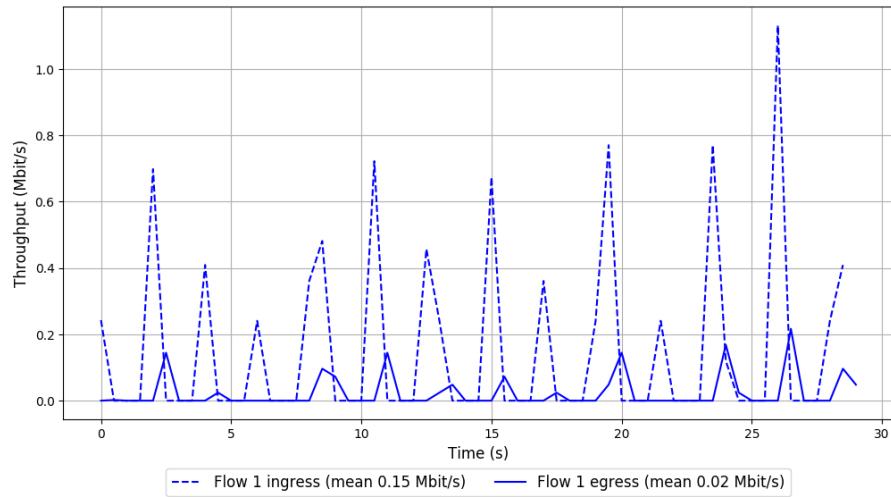


Run 1: Statistics of Copa

```
Start at: 2018-12-01 23:06:53
End at: 2018-12-01 23:07:23
Local clock offset: 3.778 ms
Remote clock offset: -5.897 ms

# Below is generated by plot.py at 2018-12-02 00:04:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 27.250 ms
Loss rate: 84.13%
-- Flow 1:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 27.250 ms
Loss rate: 84.13%
```

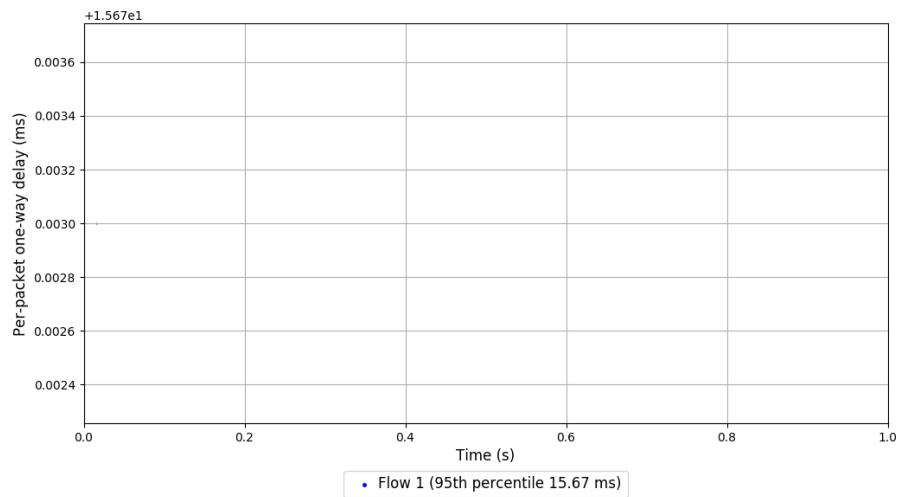
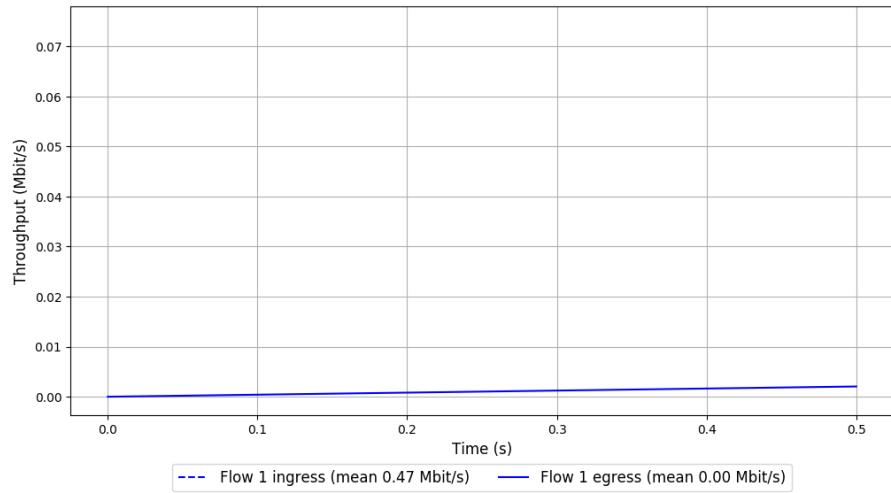
Run 1: Report of Copa — Data Link



Run 2: Statistics of Copa

Start at: 2018-12-01 23:28:00
End at: 2018-12-01 23:28:30
Local clock offset: 2.42 ms
Remote clock offset: -4.726 ms

Run 2: Report of Copa — Data Link

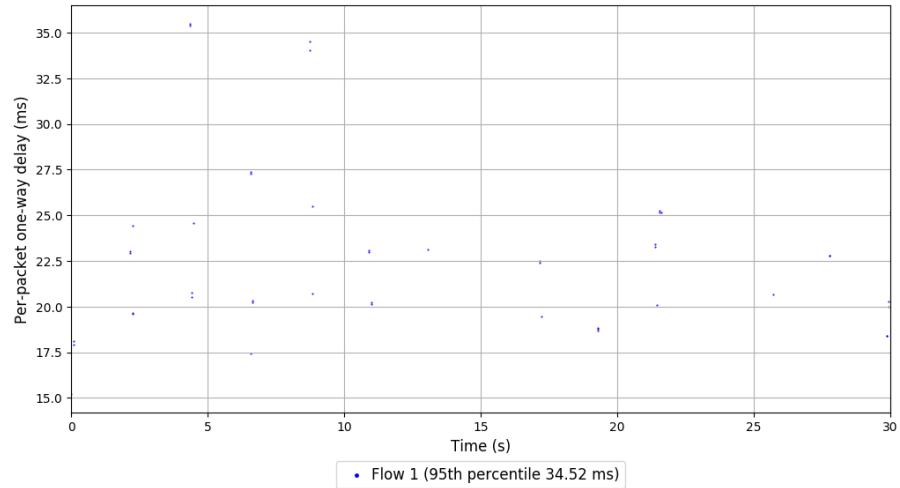
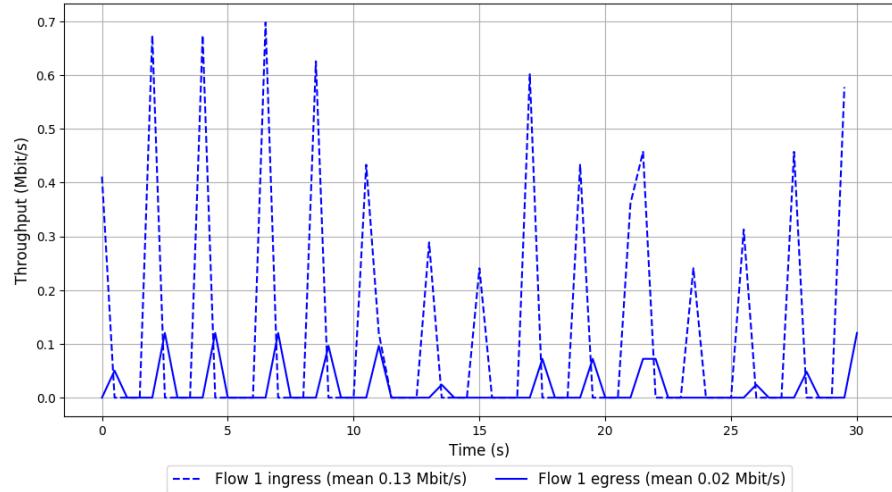


Run 3: Statistics of Copa

```
Start at: 2018-12-01 23:48:52
End at: 2018-12-01 23:49:22
Local clock offset: 3.139 ms
Remote clock offset: -4.575 ms

# Below is generated by plot.py at 2018-12-02 00:04:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 34.523 ms
Loss rate: 85.42%
-- Flow 1:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 34.523 ms
Loss rate: 85.42%
```

Run 3: Report of Copa — Data Link

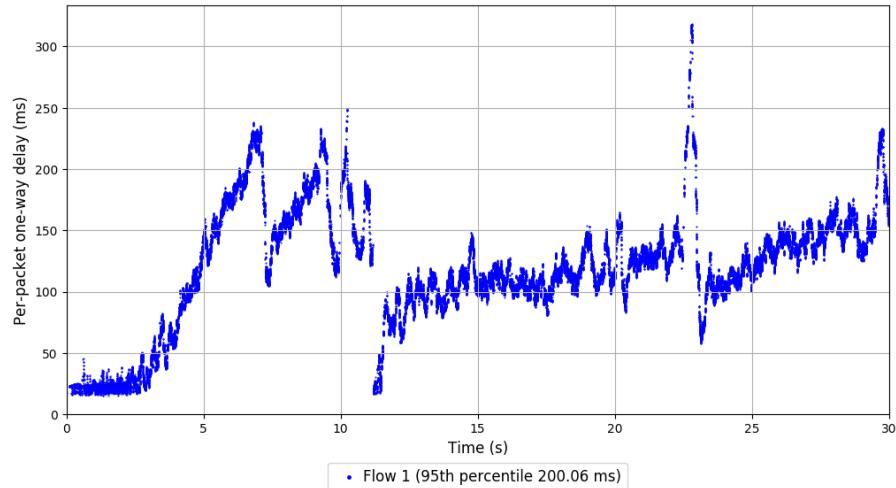
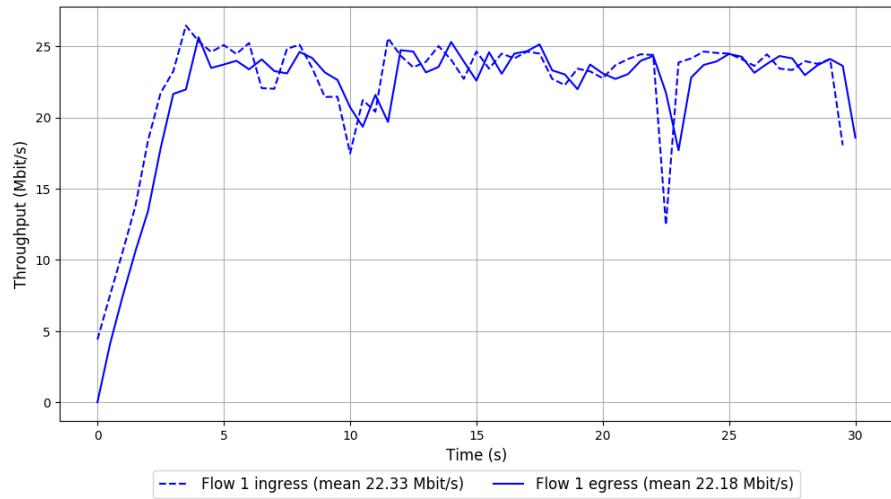


```
Run 1: Statistics of TCP Cubic
```

```
Start at: 2018-12-01 23:07:58
End at: 2018-12-01 23:08:28
Local clock offset: 1.766 ms
Remote clock offset: -6.182 ms

# Below is generated by plot.py at 2018-12-02 00:04:17
# Datalink statistics
-- Total of 1 flow:
Average throughput: 22.18 Mbit/s
95th percentile per-packet one-way delay: 200.059 ms
Loss rate: 0.72%
-- Flow 1:
Average throughput: 22.18 Mbit/s
95th percentile per-packet one-way delay: 200.059 ms
Loss rate: 0.72%
```

Run 1: Report of TCP Cubic — Data Link

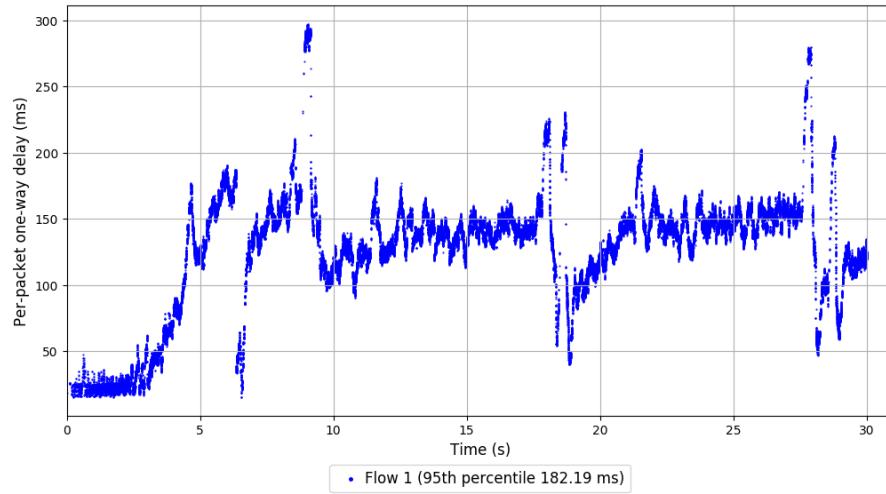
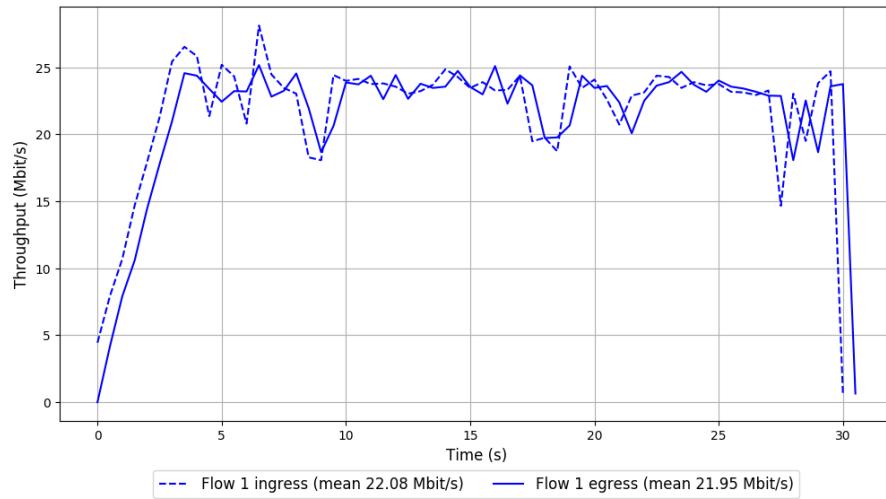


Run 2: Statistics of TCP Cubic

```
Start at: 2018-12-01 23:29:05
End at: 2018-12-01 23:29:35
Local clock offset: 0.342 ms
Remote clock offset: -5.43 ms

# Below is generated by plot.py at 2018-12-02 00:04:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 21.95 Mbit/s
95th percentile per-packet one-way delay: 182.195 ms
Loss rate: 0.68%
-- Flow 1:
Average throughput: 21.95 Mbit/s
95th percentile per-packet one-way delay: 182.195 ms
Loss rate: 0.68%
```

Run 2: Report of TCP Cubic — Data Link

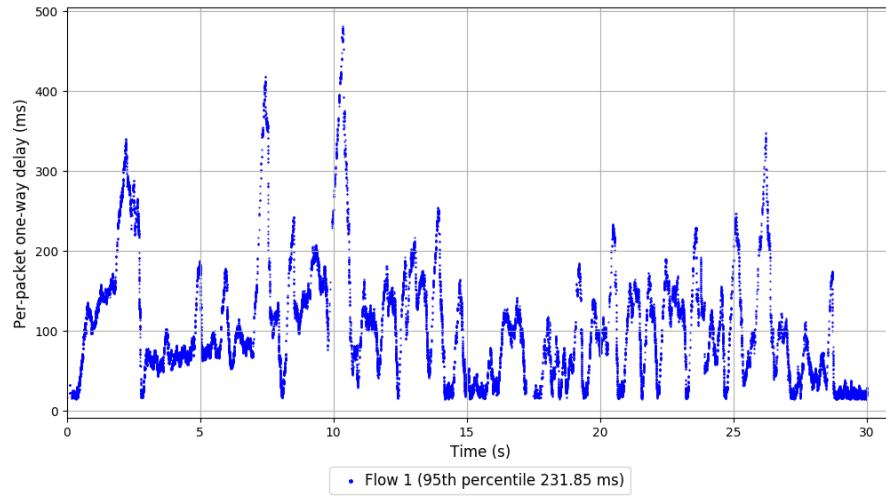
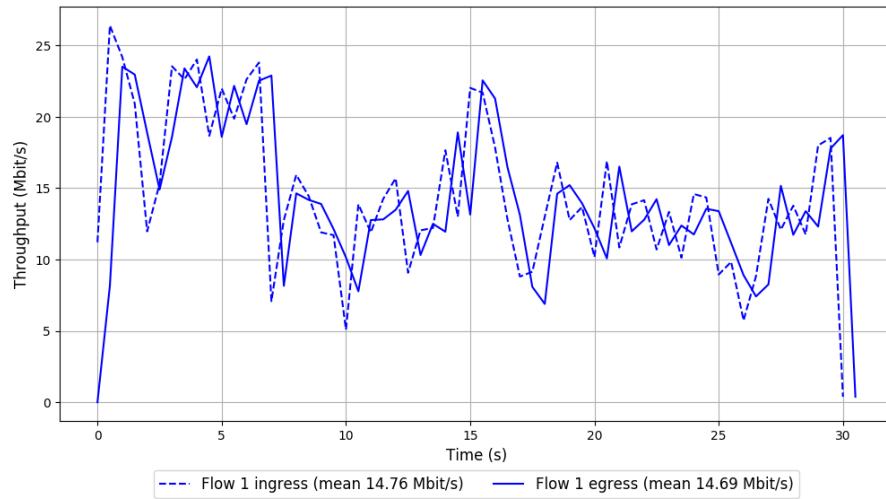


Run 3: Statistics of TCP Cubic

```
Start at: 2018-12-01 23:49:57
End at: 2018-12-01 23:50:27
Local clock offset: 3.028 ms
Remote clock offset: -4.825 ms

# Below is generated by plot.py at 2018-12-02 00:04:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 14.69 Mbit/s
95th percentile per-packet one-way delay: 231.852 ms
Loss rate: 0.48%
-- Flow 1:
Average throughput: 14.69 Mbit/s
95th percentile per-packet one-way delay: 231.852 ms
Loss rate: 0.48%
```

Run 3: Report of TCP Cubic — Data Link

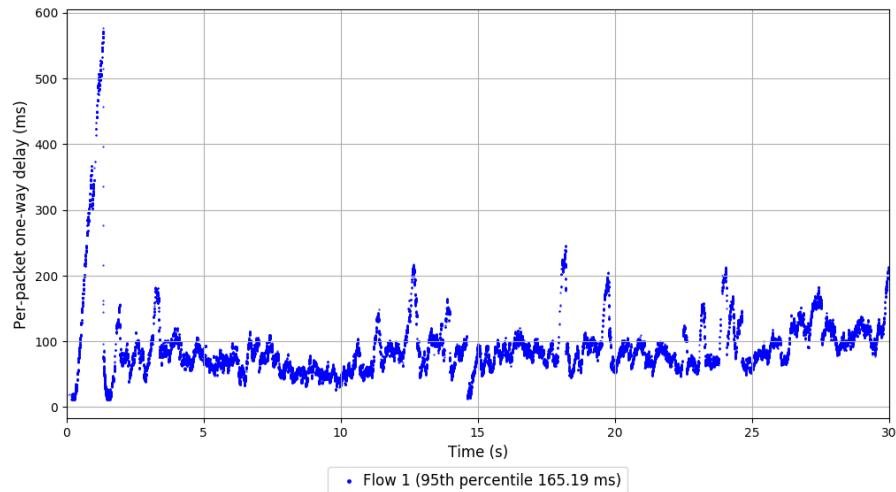
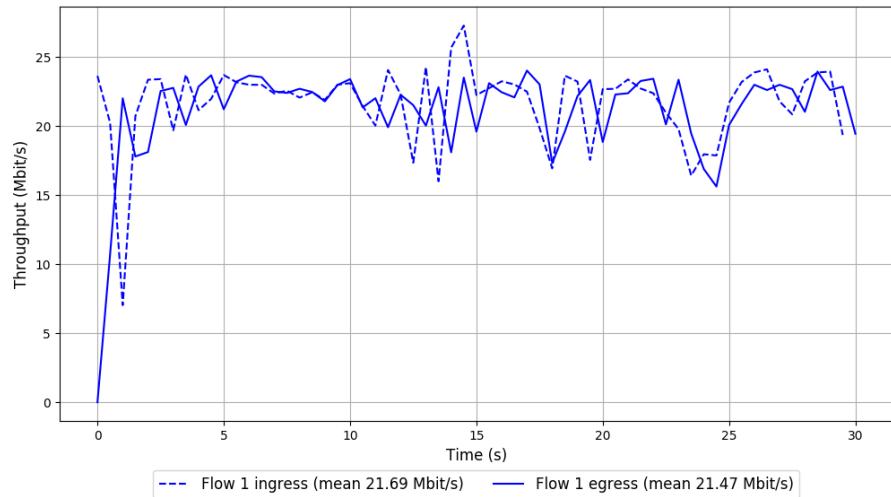


```
Run 1: Statistics of FillP
```

```
Start at: 2018-12-01 23:16:58
End at: 2018-12-01 23:17:28
Local clock offset: 2.412 ms
Remote clock offset: -6.354 ms

# Below is generated by plot.py at 2018-12-02 00:04:22
# Datalink statistics
-- Total of 1 flow:
Average throughput: 21.47 Mbit/s
95th percentile per-packet one-way delay: 165.187 ms
Loss rate: 1.09%
-- Flow 1:
Average throughput: 21.47 Mbit/s
95th percentile per-packet one-way delay: 165.187 ms
Loss rate: 1.09%
```

Run 1: Report of FillP — Data Link

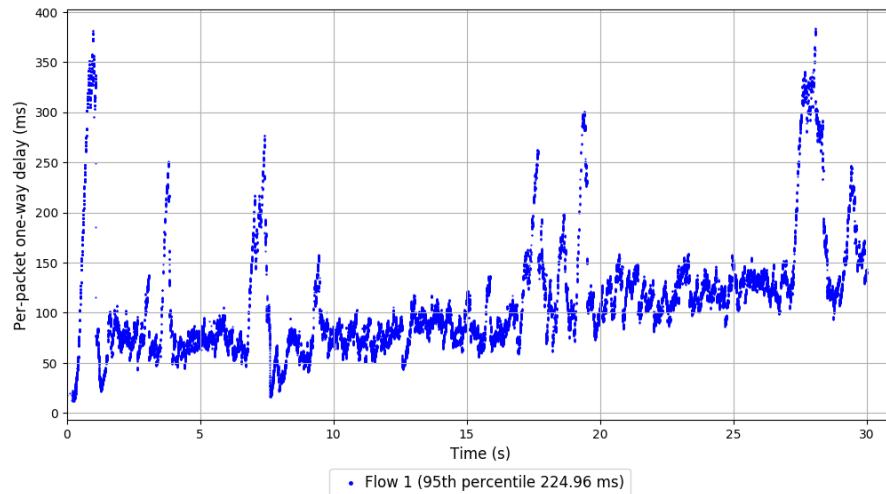
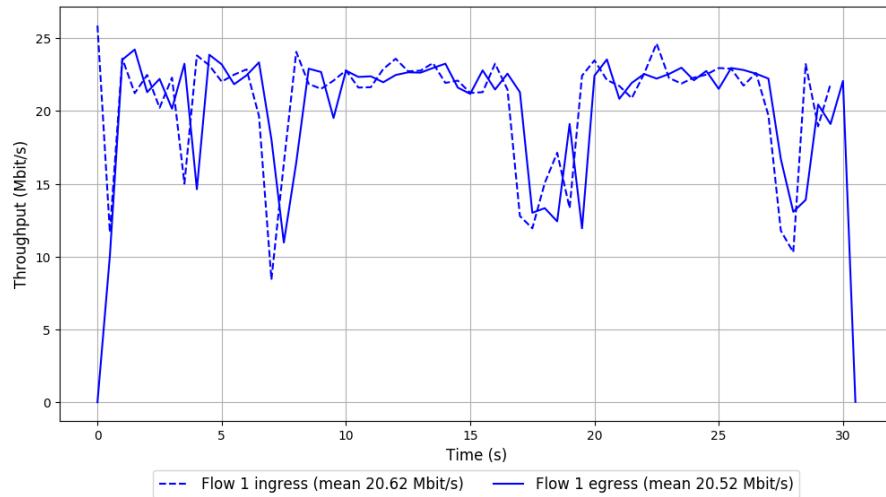


Run 2: Statistics of FillP

```
Start at: 2018-12-01 23:37:53
End at: 2018-12-01 23:38:23
Local clock offset: 3.336 ms
Remote clock offset: -5.599 ms

# Below is generated by plot.py at 2018-12-02 00:04:22
# Datalink statistics
-- Total of 1 flow:
Average throughput: 20.52 Mbit/s
95th percentile per-packet one-way delay: 224.958 ms
Loss rate: 0.51%
-- Flow 1:
Average throughput: 20.52 Mbit/s
95th percentile per-packet one-way delay: 224.958 ms
Loss rate: 0.51%
```

Run 2: Report of FillP — Data Link

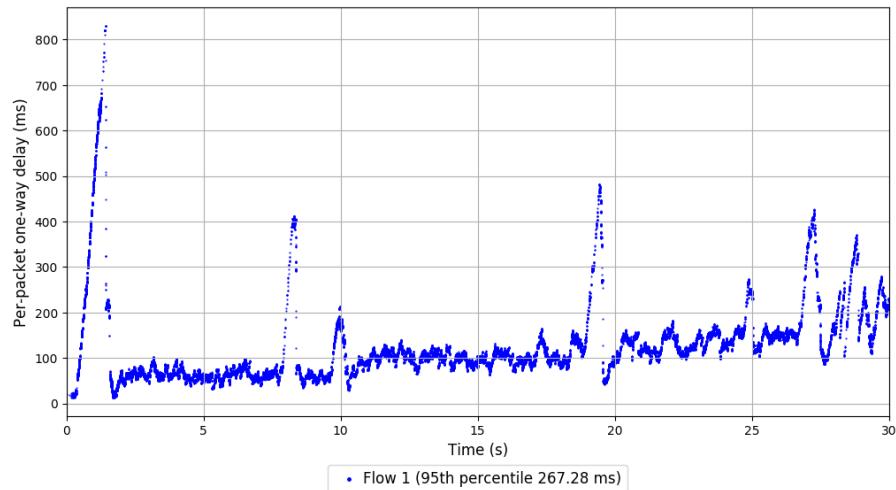
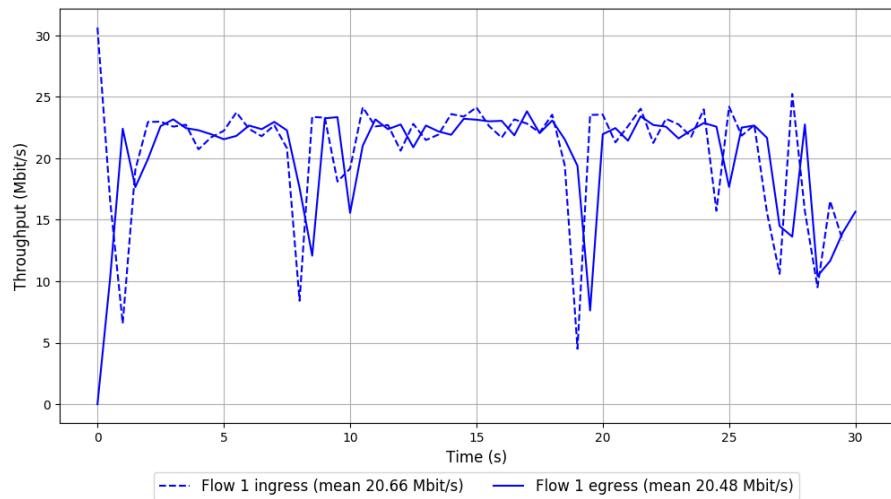


Run 3: Statistics of FillP

```
Start at: 2018-12-01 23:58:48
End at: 2018-12-01 23:59:18
Local clock offset: 0.716 ms
Remote clock offset: -4.85 ms

# Below is generated by plot.py at 2018-12-02 00:04:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 20.48 Mbit/s
95th percentile per-packet one-way delay: 267.276 ms
Loss rate: 0.88%
-- Flow 1:
Average throughput: 20.48 Mbit/s
95th percentile per-packet one-way delay: 267.276 ms
Loss rate: 0.88%
```

Run 3: Report of FillP — Data Link

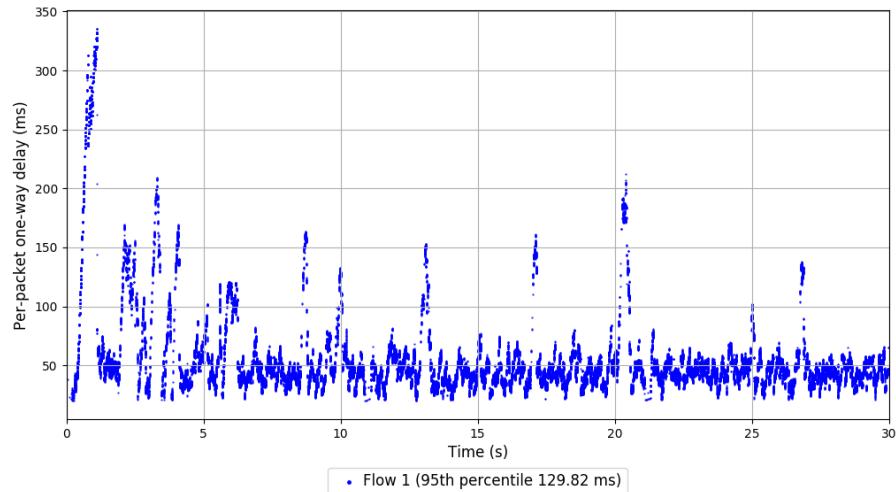
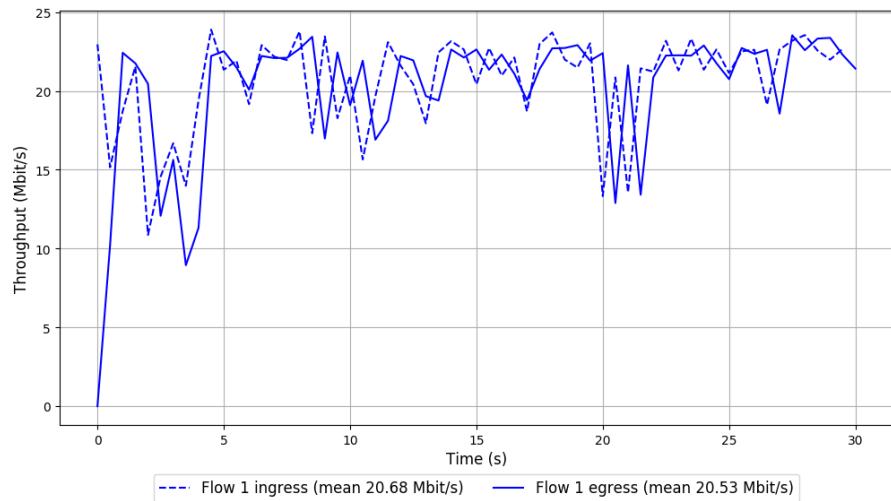


```
Run 1: Statistics of FillP-Sheep
```

```
Start at: 2018-12-01 23:05:46
End at: 2018-12-01 23:06:16
Local clock offset: -4.749 ms
Remote clock offset: -6.152 ms

# Below is generated by plot.py at 2018-12-02 00:04:38
# Datalink statistics
-- Total of 1 flow:
Average throughput: 20.53 Mbit/s
95th percentile per-packet one-way delay: 129.818 ms
Loss rate: 0.83%
-- Flow 1:
Average throughput: 20.53 Mbit/s
95th percentile per-packet one-way delay: 129.818 ms
Loss rate: 0.83%
```

Run 1: Report of FillP-Sheep — Data Link

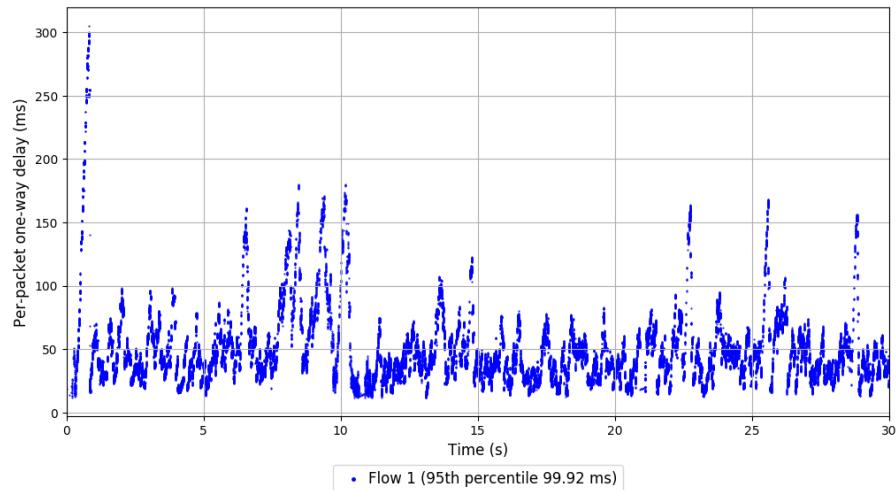
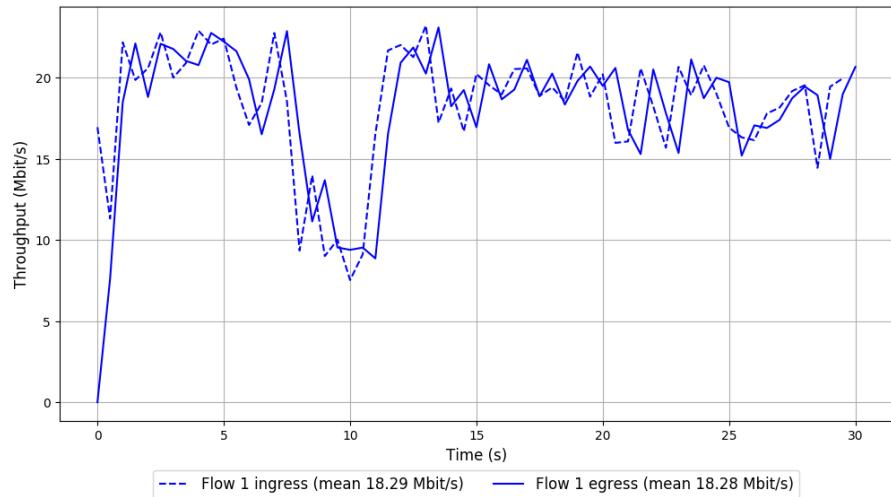


Run 2: Statistics of FillP-Sheep

```
Start at: 2018-12-01 23:26:54
End at: 2018-12-01 23:27:24
Local clock offset: 3.743 ms
Remote clock offset: -4.975 ms

# Below is generated by plot.py at 2018-12-02 00:04:38
# Datalink statistics
-- Total of 1 flow:
Average throughput: 18.28 Mbit/s
95th percentile per-packet one-way delay: 99.923 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 18.28 Mbit/s
95th percentile per-packet one-way delay: 99.923 ms
Loss rate: 0.09%
```

Run 2: Report of FillP-Sheep — Data Link

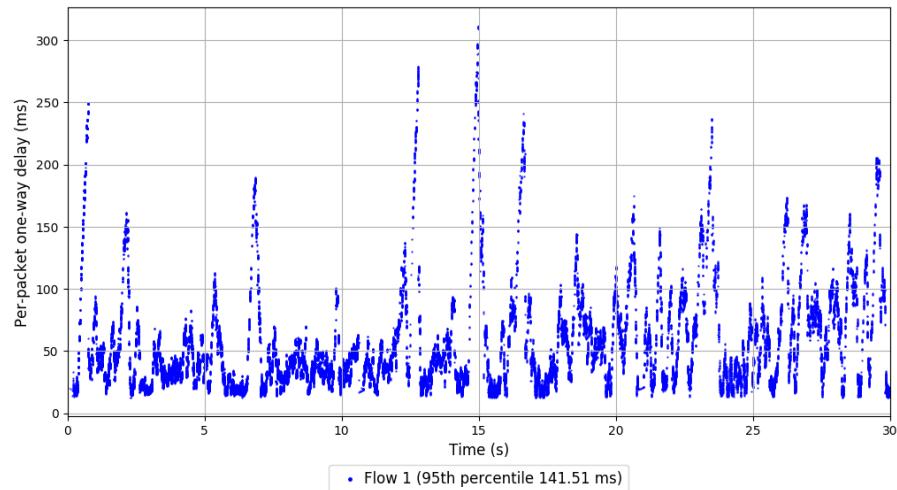
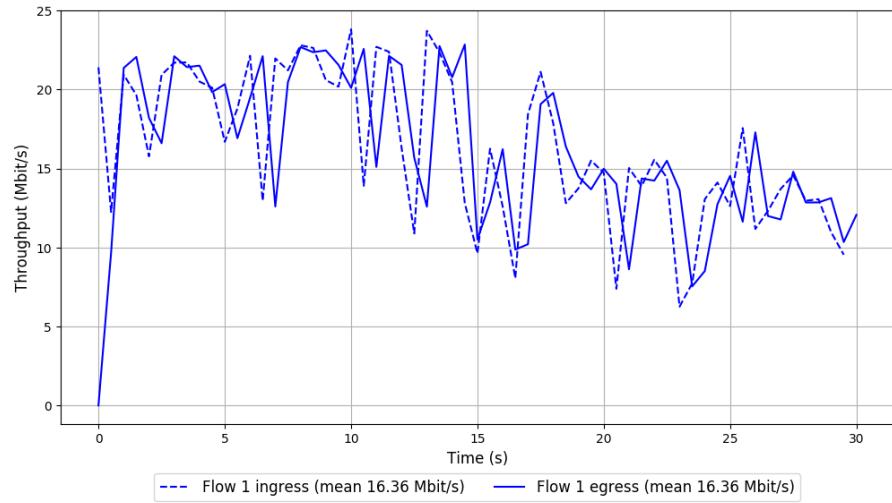


Run 3: Statistics of FillP-Sheep

```
Start at: 2018-12-01 23:47:46
End at: 2018-12-01 23:48:16
Local clock offset: 2.159 ms
Remote clock offset: -4.938 ms

# Below is generated by plot.py at 2018-12-02 00:04:38
# Datalink statistics
-- Total of 1 flow:
Average throughput: 16.36 Mbit/s
95th percentile per-packet one-way delay: 141.515 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 16.36 Mbit/s
95th percentile per-packet one-way delay: 141.515 ms
Loss rate: 0.06%
```

Run 3: Report of FillP-Sheep — Data Link

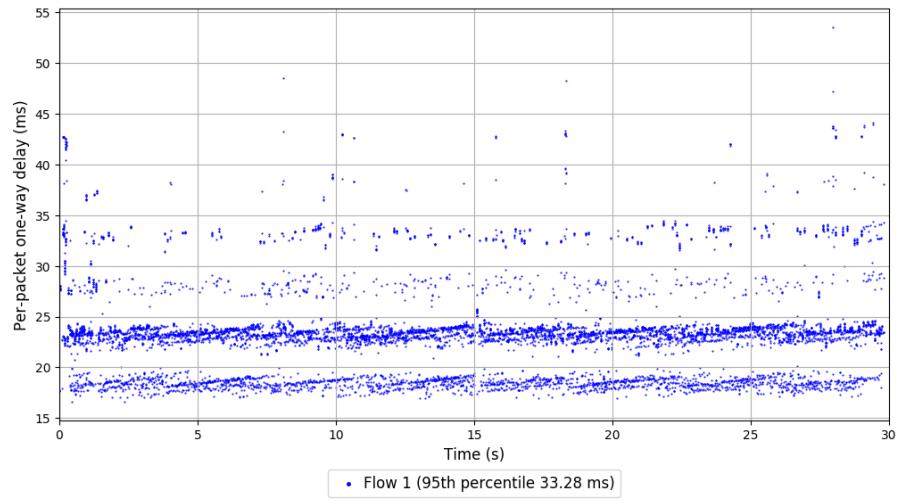
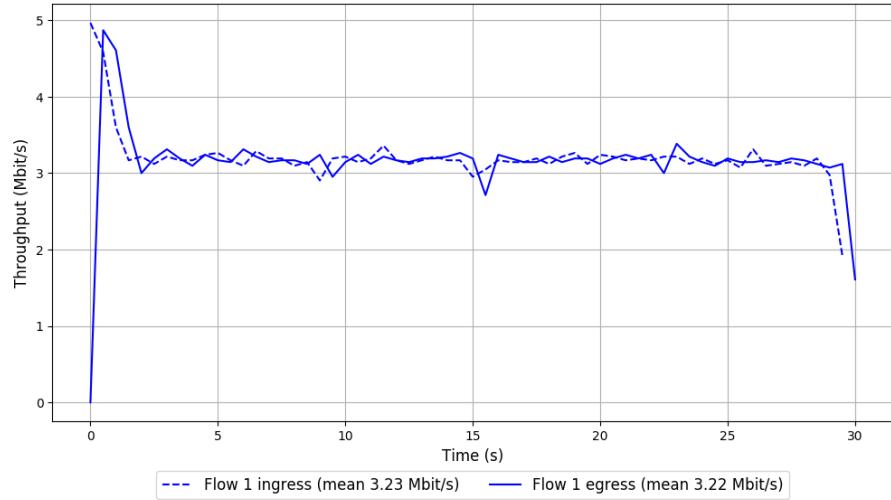


Run 1: Statistics of Indigo

```
Start at: 2018-12-01 23:13:40
End at: 2018-12-01 23:14:10
Local clock offset: 0.287 ms
Remote clock offset: -4.753 ms

# Below is generated by plot.py at 2018-12-02 00:04:38
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.22 Mbit/s
95th percentile per-packet one-way delay: 33.284 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 3.22 Mbit/s
95th percentile per-packet one-way delay: 33.284 ms
Loss rate: 0.16%
```

Run 1: Report of Indigo — Data Link

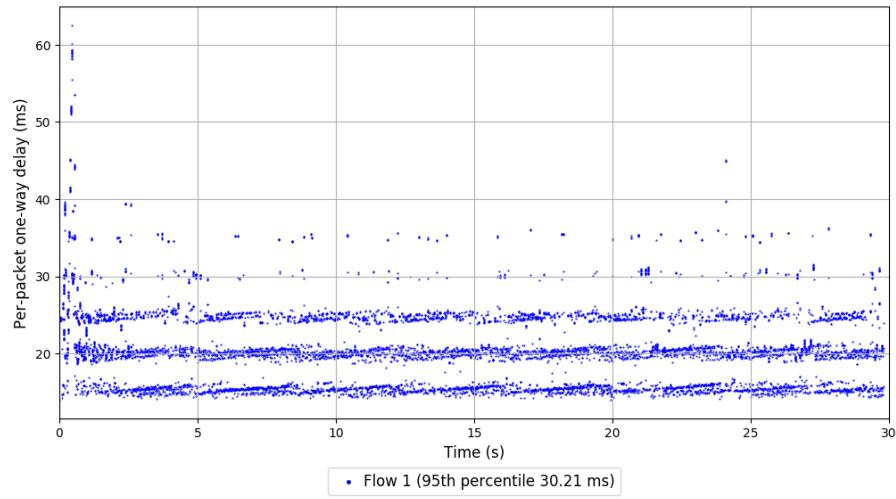
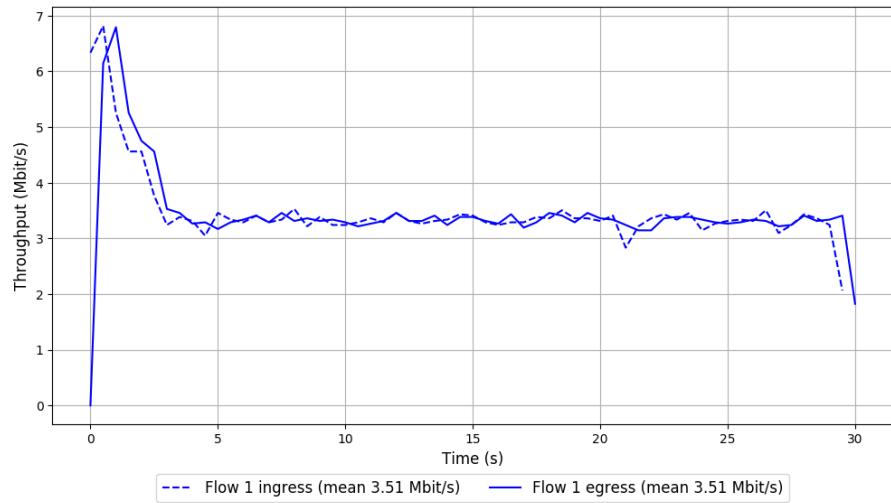


Run 2: Statistics of Indigo

```
Start at: 2018-12-01 23:34:35
End at: 2018-12-01 23:35:05
Local clock offset: 3.573 ms
Remote clock offset: -4.703 ms

# Below is generated by plot.py at 2018-12-02 00:04:38
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.51 Mbit/s
95th percentile per-packet one-way delay: 30.206 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 3.51 Mbit/s
95th percentile per-packet one-way delay: 30.206 ms
Loss rate: 0.14%
```

Run 2: Report of Indigo — Data Link

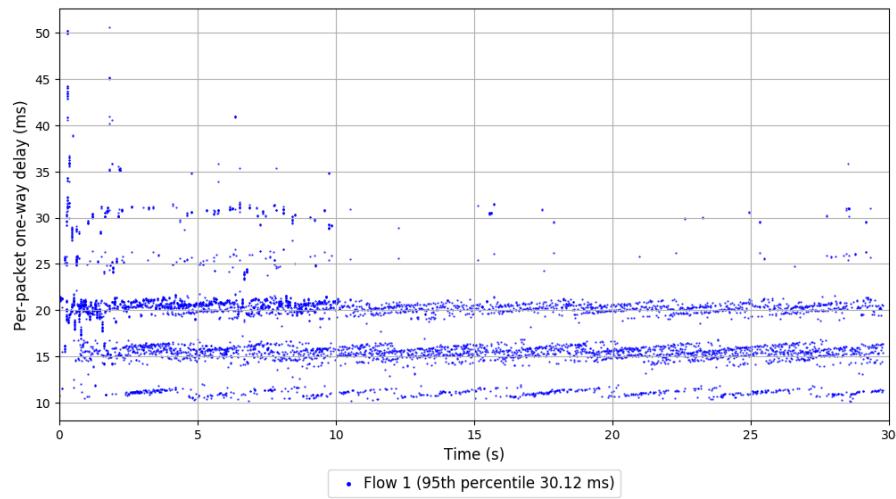
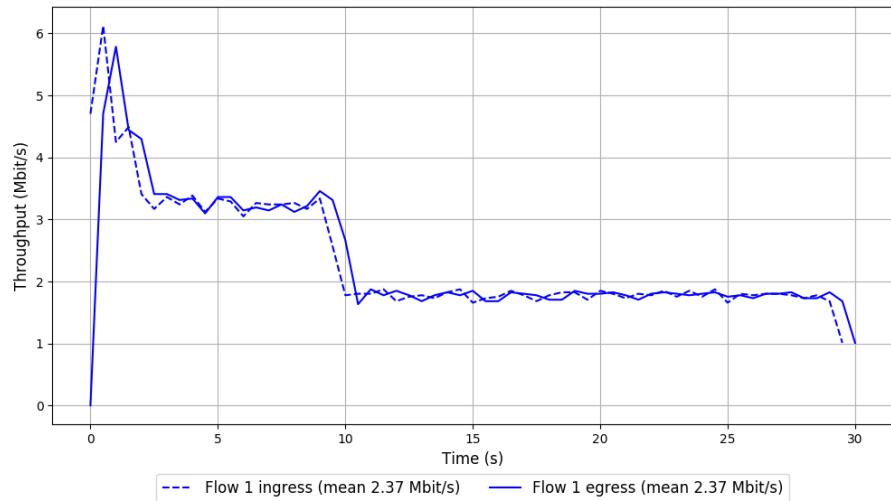


Run 3: Statistics of Indigo

```
Start at: 2018-12-01 23:55:29
End at: 2018-12-01 23:55:59
Local clock offset: 3.505 ms
Remote clock offset: -5.395 ms

# Below is generated by plot.py at 2018-12-02 00:04:38
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.37 Mbit/s
95th percentile per-packet one-way delay: 30.119 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 2.37 Mbit/s
95th percentile per-packet one-way delay: 30.119 ms
Loss rate: 0.05%
```

Run 3: Report of Indigo — Data Link

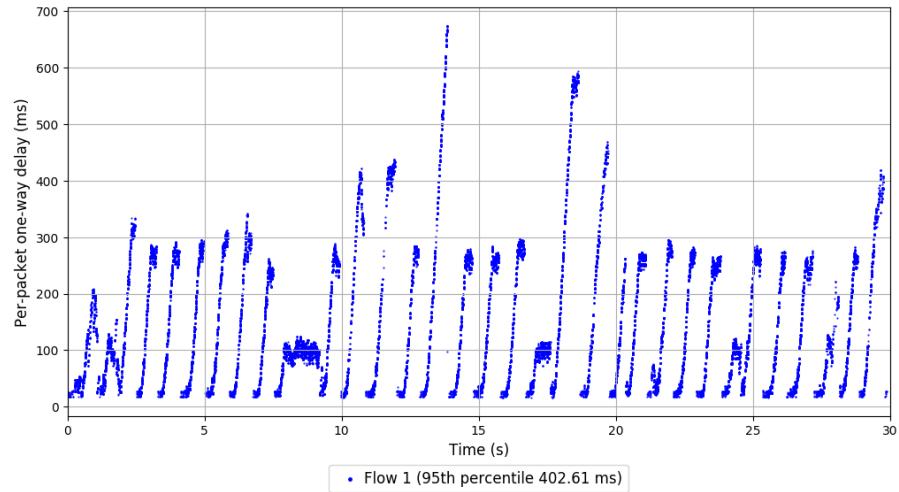
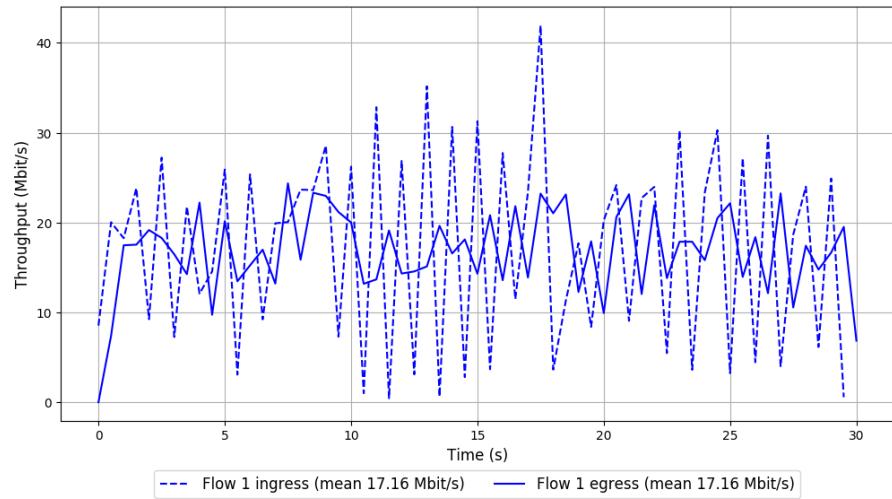


```
Run 1: Statistics of Indigo-96d2da3
```

```
Start at: 2018-12-01 23:19:11
End at: 2018-12-01 23:19:41
Local clock offset: 0.175 ms
Remote clock offset: -5.524 ms

# Below is generated by plot.py at 2018-12-02 00:04:38
# Datalink statistics
-- Total of 1 flow:
Average throughput: 17.16 Mbit/s
95th percentile per-packet one-way delay: 402.610 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 17.16 Mbit/s
95th percentile per-packet one-way delay: 402.610 ms
Loss rate: 0.10%
```

Run 1: Report of Indigo-96d2da3 — Data Link

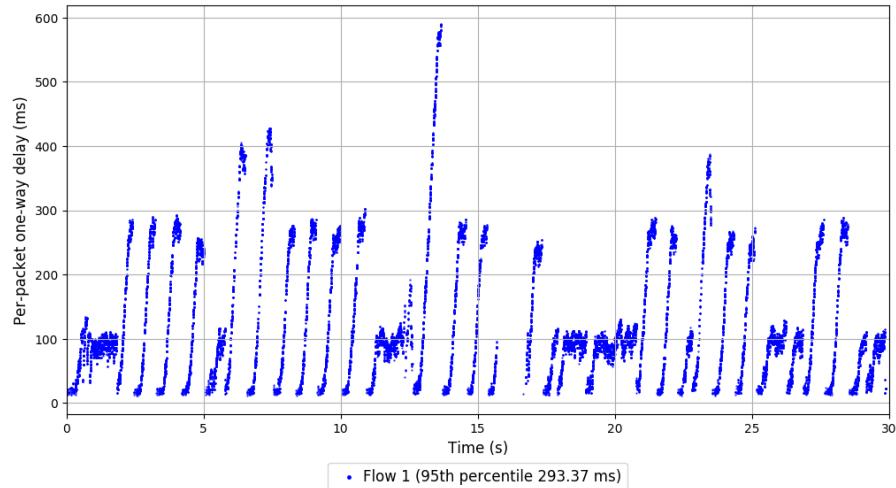
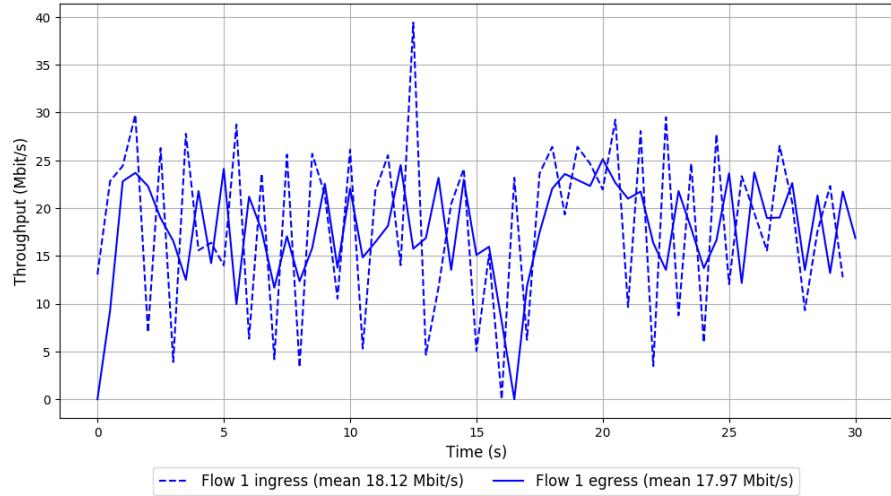


Run 2: Statistics of Indigo-96d2da3

```
Start at: 2018-12-01 23:40:07
End at: 2018-12-01 23:40:37
Local clock offset: 2.438 ms
Remote clock offset: -5.416 ms

# Below is generated by plot.py at 2018-12-02 00:04:40
# Datalink statistics
-- Total of 1 flow:
Average throughput: 17.97 Mbit/s
95th percentile per-packet one-way delay: 293.367 ms
Loss rate: 0.85%
-- Flow 1:
Average throughput: 17.97 Mbit/s
95th percentile per-packet one-way delay: 293.367 ms
Loss rate: 0.85%
```

Run 2: Report of Indigo-96d2da3 — Data Link

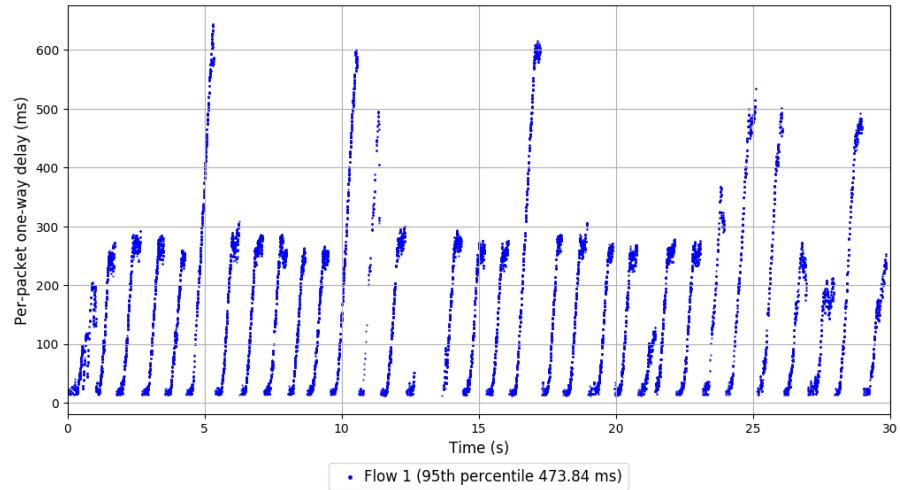
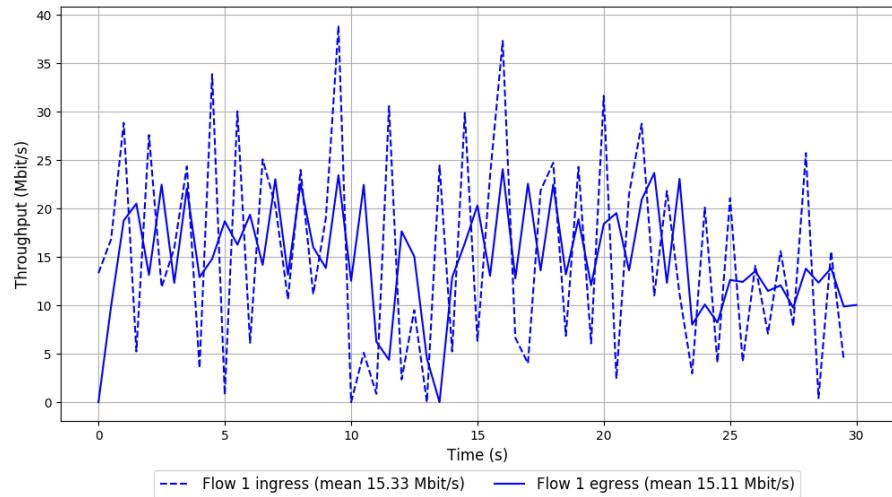


Run 3: Statistics of Indigo-96d2da3

```
Start at: 2018-12-02 00:01:02
End at: 2018-12-02 00:01:33
Local clock offset: 0.282 ms
Remote clock offset: -5.751 ms

# Below is generated by plot.py at 2018-12-02 00:04:40
# Datalink statistics
-- Total of 1 flow:
Average throughput: 15.11 Mbit/s
95th percentile per-packet one-way delay: 473.841 ms
Loss rate: 0.67%
-- Flow 1:
Average throughput: 15.11 Mbit/s
95th percentile per-packet one-way delay: 473.841 ms
Loss rate: 0.67%
```

Run 3: Report of Indigo-96d2da3 — Data Link

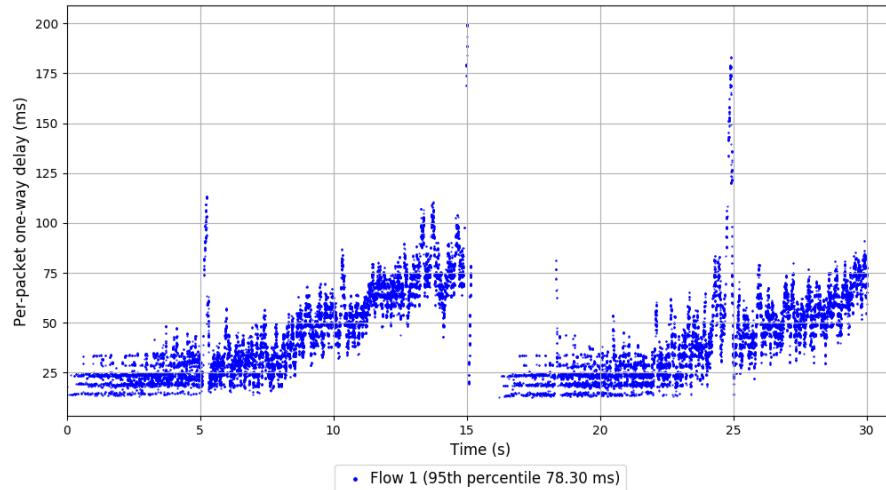
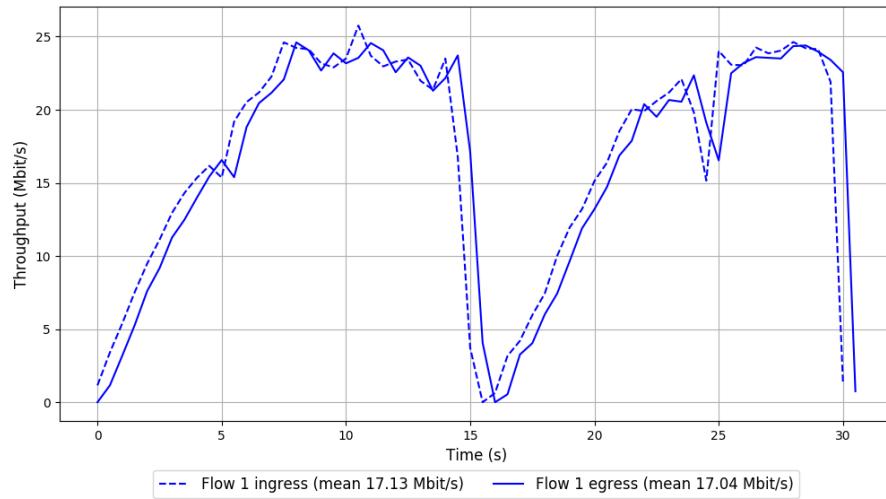


```
Run 1: Statistics of LEDBAT
```

```
Start at: 2018-12-01 23:11:27
End at: 2018-12-01 23:11:58
Local clock offset: 1.791 ms
Remote clock offset: -6.342 ms

# Below is generated by plot.py at 2018-12-02 00:04:43
# Datalink statistics
-- Total of 1 flow:
Average throughput: 17.04 Mbit/s
95th percentile per-packet one-way delay: 78.302 ms
Loss rate: 0.57%
-- Flow 1:
Average throughput: 17.04 Mbit/s
95th percentile per-packet one-way delay: 78.302 ms
Loss rate: 0.57%
```

Run 1: Report of LEDBAT — Data Link

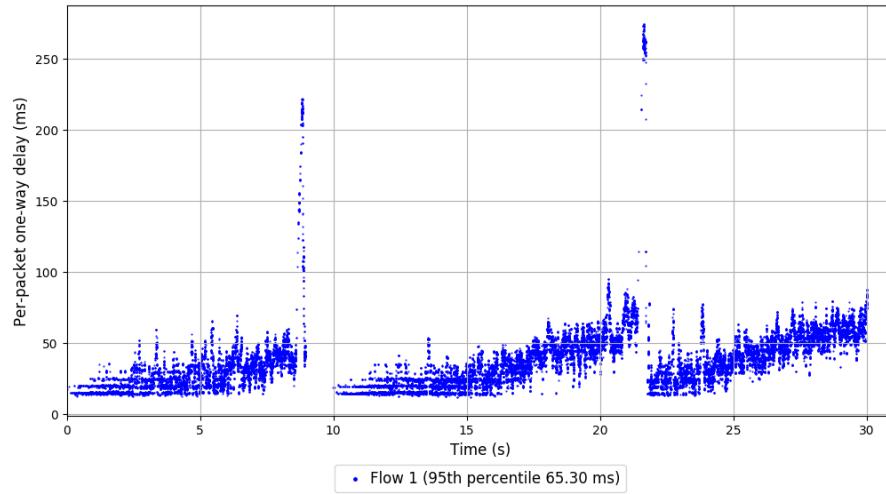
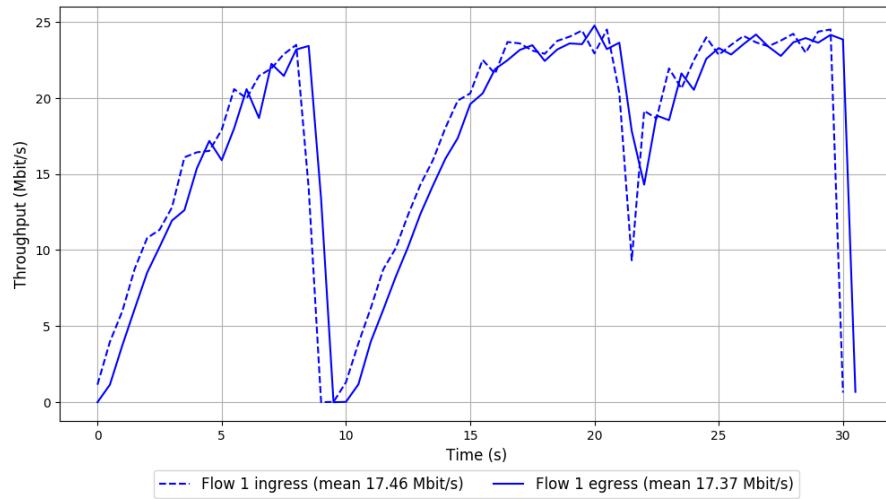


Run 2: Statistics of LEDBAT

```
Start at: 2018-12-01 23:32:23
End at: 2018-12-01 23:32:53
Local clock offset: 2.998 ms
Remote clock offset: -5.317 ms

# Below is generated by plot.py at 2018-12-02 00:04:55
# Datalink statistics
-- Total of 1 flow:
Average throughput: 17.37 Mbit/s
95th percentile per-packet one-way delay: 65.304 ms
Loss rate: 0.55%
-- Flow 1:
Average throughput: 17.37 Mbit/s
95th percentile per-packet one-way delay: 65.304 ms
Loss rate: 0.55%
```

Run 2: Report of LEDBAT — Data Link

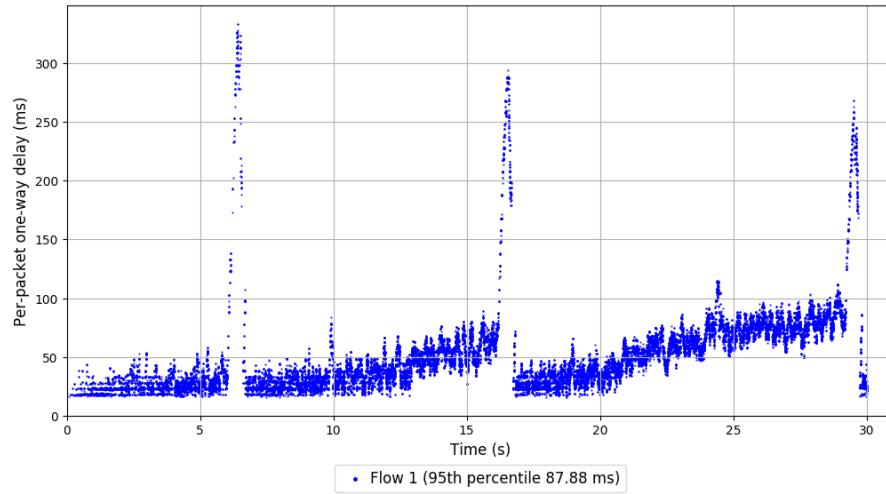
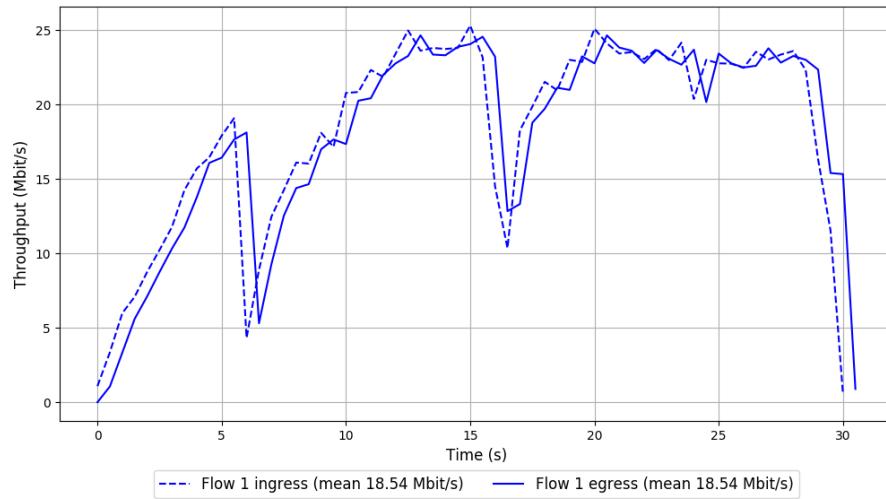


Run 3: Statistics of LEDBAT

```
Start at: 2018-12-01 23:53:16
End at: 2018-12-01 23:53:46
Local clock offset: 0.981 ms
Remote clock offset: -5.024 ms

# Below is generated by plot.py at 2018-12-02 00:04:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 18.54 Mbit/s
95th percentile per-packet one-way delay: 87.880 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 18.54 Mbit/s
95th percentile per-packet one-way delay: 87.880 ms
Loss rate: 0.07%
```

Run 3: Report of LEDBAT — Data Link

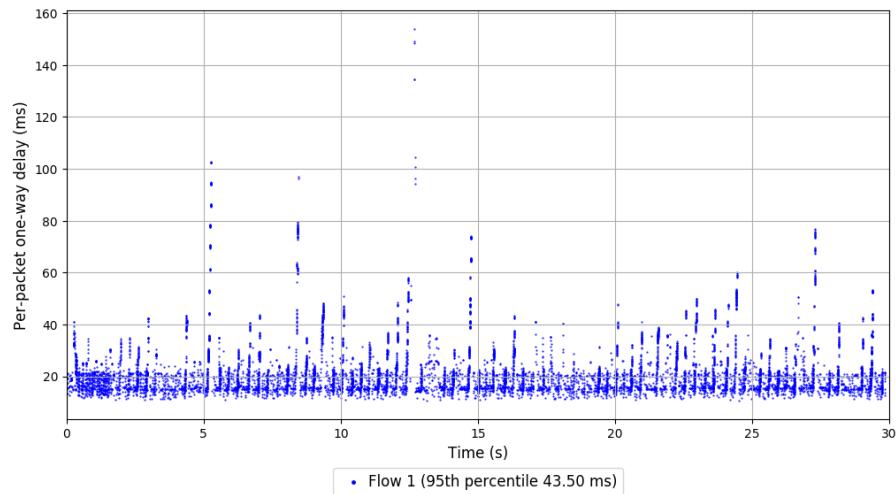
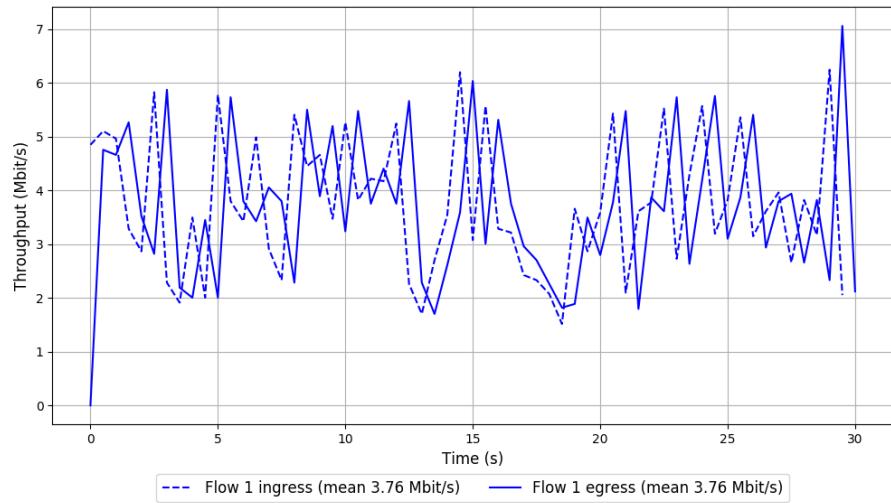


Run 1: Statistics of Indigo-Muses

```
Start at: 2018-12-01 23:21:25
End at: 2018-12-01 23:21:55
Local clock offset: 2.234 ms
Remote clock offset: -5.885 ms

# Below is generated by plot.py at 2018-12-02 00:04:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.76 Mbit/s
95th percentile per-packet one-way delay: 43.501 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 3.76 Mbit/s
95th percentile per-packet one-way delay: 43.501 ms
Loss rate: 0.00%
```

Run 1: Report of Indigo-Muses — Data Link

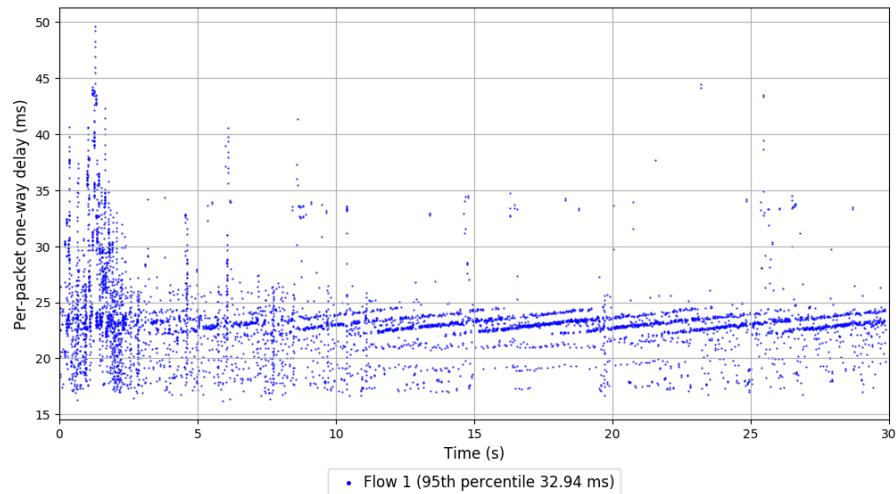
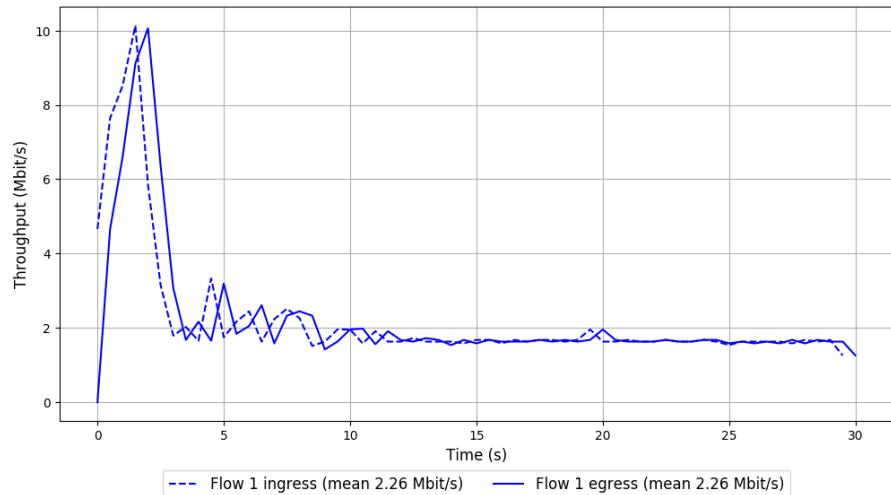


Run 2: Statistics of Indigo-Muses

```
Start at: 2018-12-01 23:42:19
End at: 2018-12-01 23:42:49
Local clock offset: 0.176 ms
Remote clock offset: -5.588 ms

# Below is generated by plot.py at 2018-12-02 00:04:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 32.936 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 32.936 ms
Loss rate: 0.07%
```

Run 2: Report of Indigo-Muses — Data Link

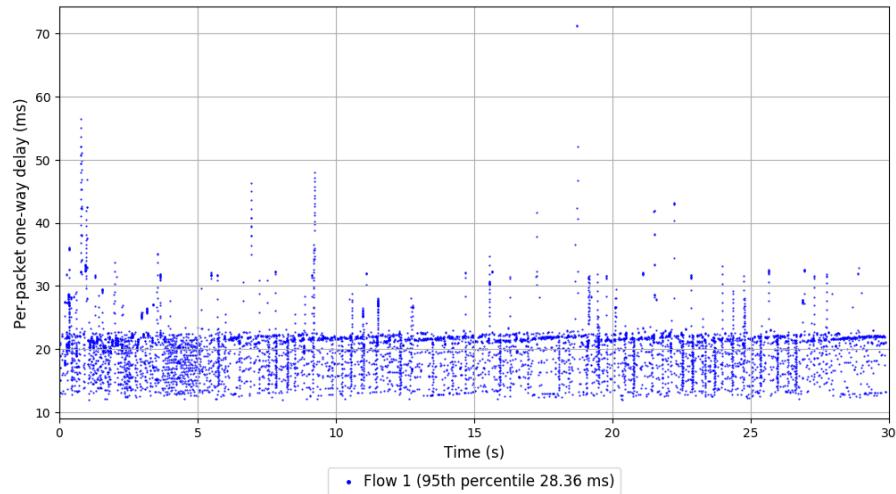
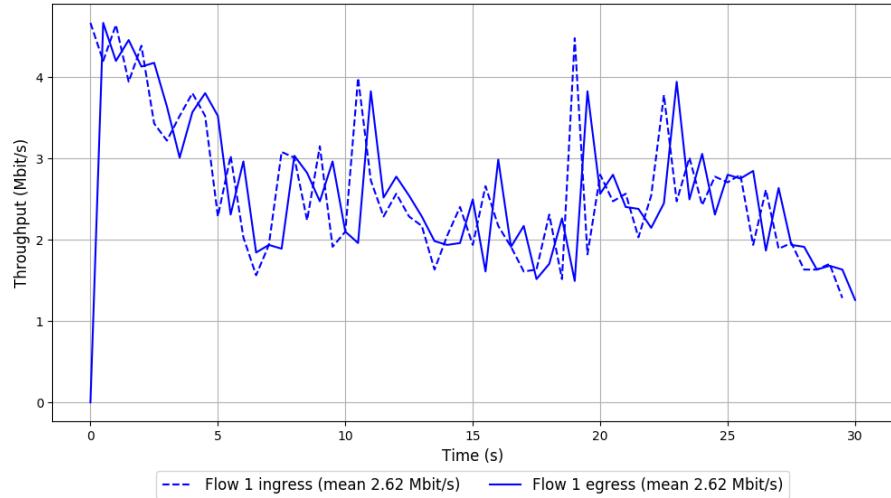


Run 3: Statistics of Indigo-Muses

```
Start at: 2018-12-02 00:03:15
End at: 2018-12-02 00:03:45
Local clock offset: 3.002 ms
Remote clock offset: -5.323 ms

# Below is generated by plot.py at 2018-12-02 00:04:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 2.62 Mbit/s
95th percentile per-packet one-way delay: 28.364 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 2.62 Mbit/s
95th percentile per-packet one-way delay: 28.364 ms
Loss rate: 0.06%
```

Run 3: Report of Indigo-Muses — Data Link

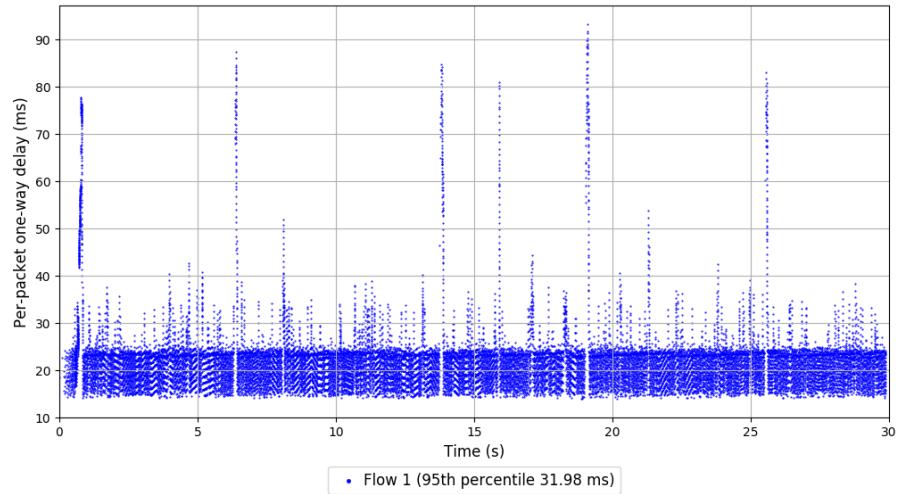
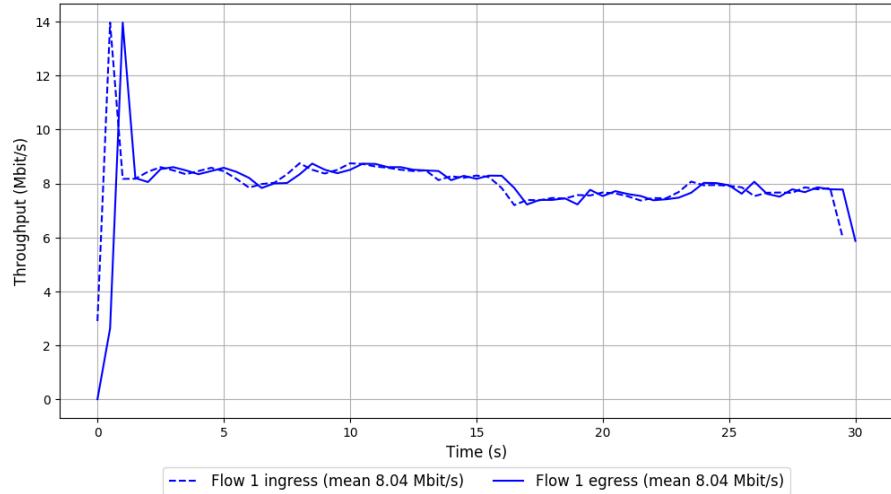


```
Run 1: Statistics of PCC-Allegro
```

```
Start at: 2018-12-01 23:09:10
End at: 2018-12-01 23:09:40
Local clock offset: 0.412 ms
Remote clock offset: -6.756 ms

# Below is generated by plot.py at 2018-12-02 00:04:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.04 Mbit/s
95th percentile per-packet one-way delay: 31.977 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 8.04 Mbit/s
95th percentile per-packet one-way delay: 31.977 ms
Loss rate: 0.09%
```

Run 1: Report of PCC-Allegro — Data Link

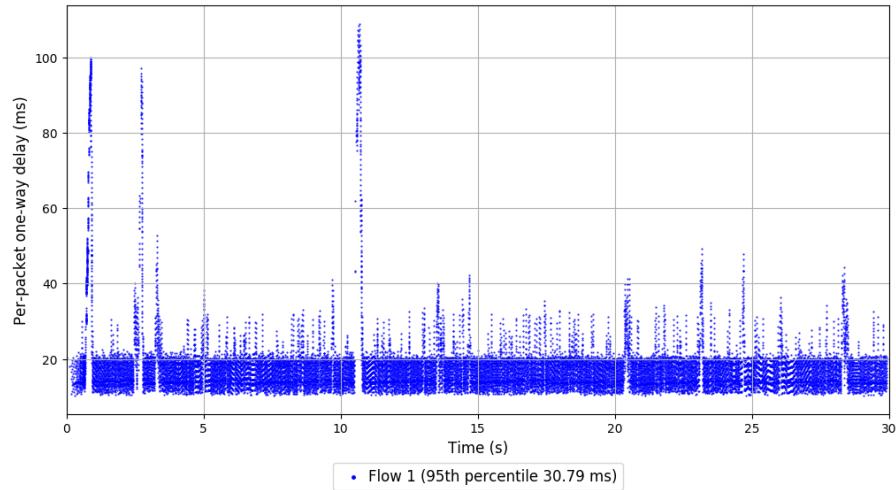
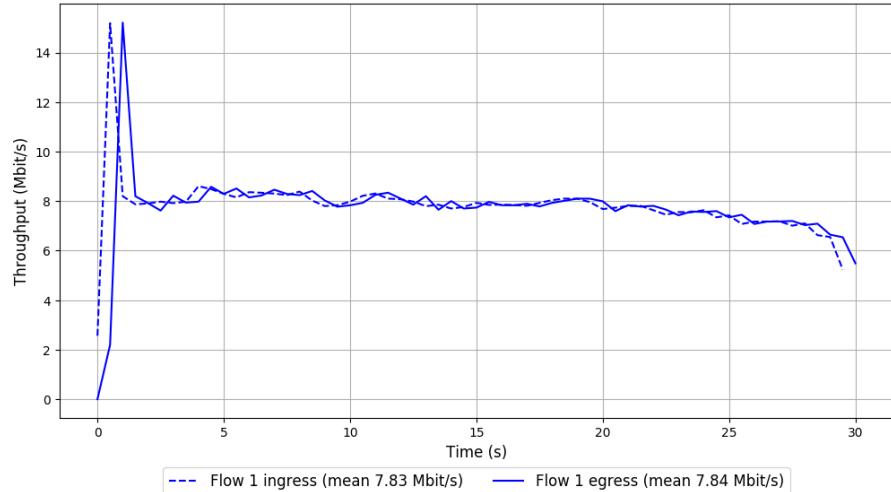


Run 2: Statistics of PCC-Allegro

```
Start at: 2018-12-01 23:30:11
End at: 2018-12-01 23:30:41
Local clock offset: 3.14 ms
Remote clock offset: -5.354 ms

# Below is generated by plot.py at 2018-12-02 00:04:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.84 Mbit/s
95th percentile per-packet one-way delay: 30.789 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 7.84 Mbit/s
95th percentile per-packet one-way delay: 30.789 ms
Loss rate: 0.00%
```

Run 2: Report of PCC-Allegro — Data Link

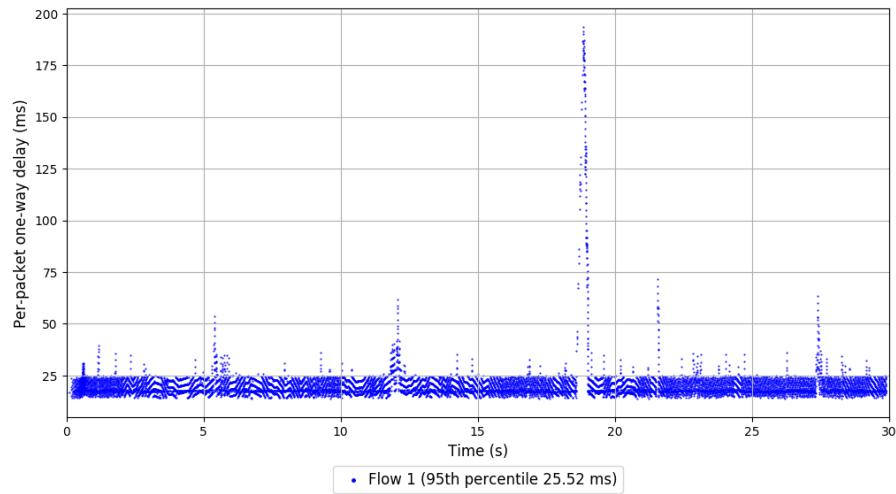
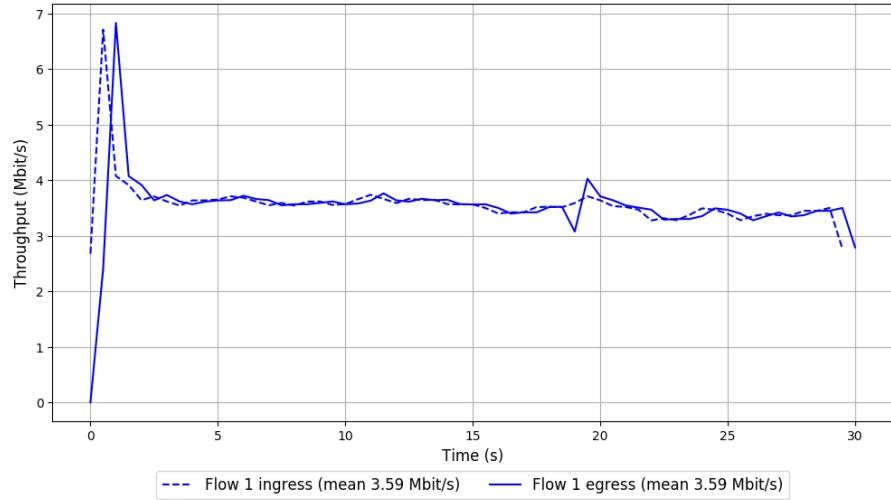


Run 3: Statistics of PCC-Allegro

```
Start at: 2018-12-01 23:51:04
End at: 2018-12-01 23:51:34
Local clock offset: 1.946 ms
Remote clock offset: -4.171 ms

# Below is generated by plot.py at 2018-12-02 00:04:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 3.59 Mbit/s
95th percentile per-packet one-way delay: 25.520 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 3.59 Mbit/s
95th percentile per-packet one-way delay: 25.520 ms
Loss rate: 0.05%
```

Run 3: Report of PCC-Allegro — Data Link



Run 1: Statistics of PCC-Expr

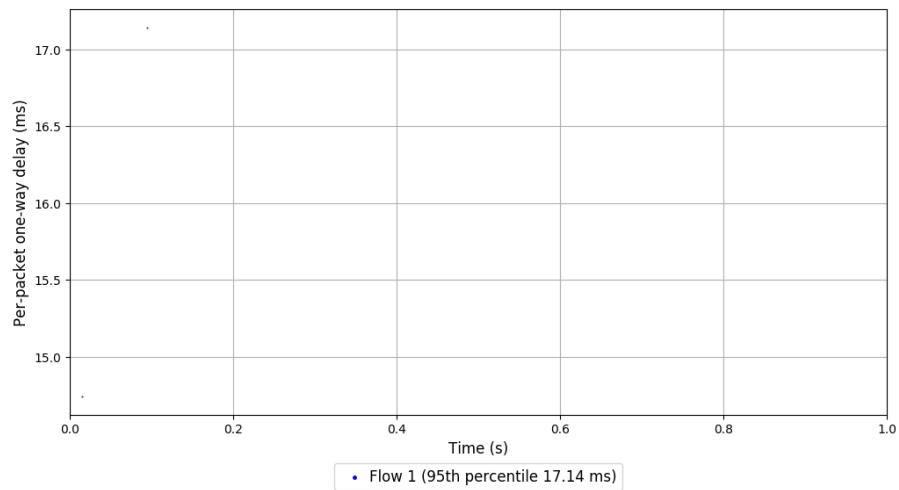
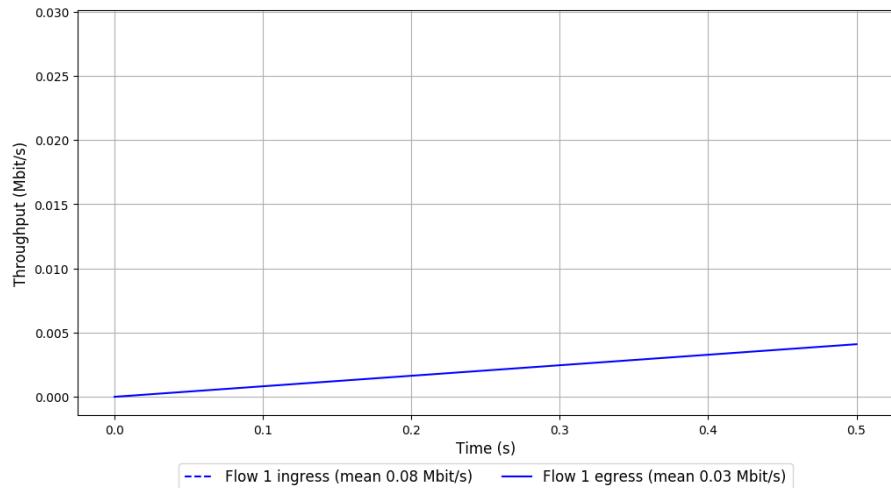
Start at: 2018-12-01 23:02:30

End at: 2018-12-01 23:03:00

Local clock offset: 2.447 ms

Remote clock offset: -6.513 ms

Run 1: Report of PCC-Expr — Data Link

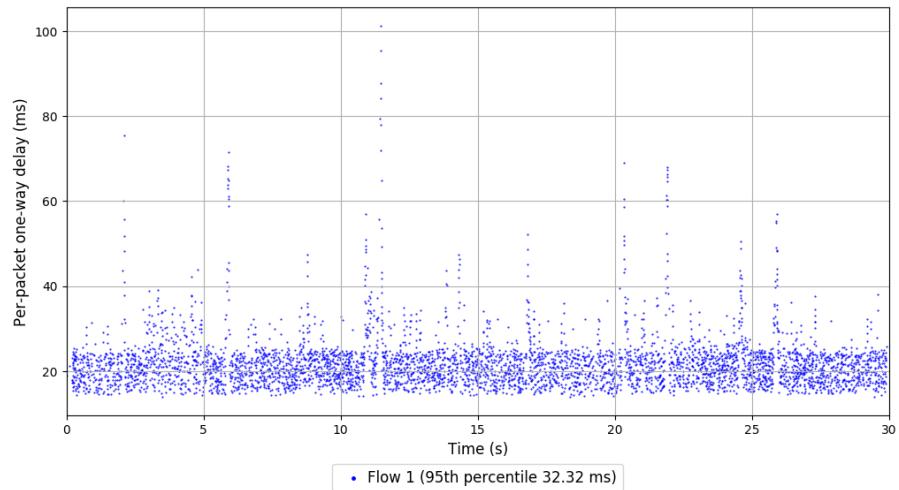
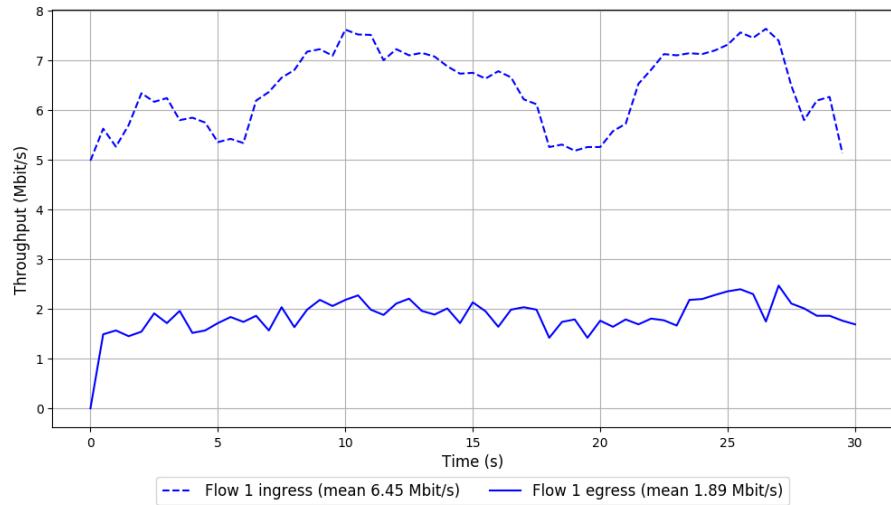


Run 2: Statistics of PCC-Expr

```
Start at: 2018-12-01 23:23:36
End at: 2018-12-01 23:24:06
Local clock offset: 1.404 ms
Remote clock offset: -5.573 ms

# Below is generated by plot.py at 2018-12-02 00:04:57
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.89 Mbit/s
95th percentile per-packet one-way delay: 32.318 ms
Loss rate: 70.74%
-- Flow 1:
Average throughput: 1.89 Mbit/s
95th percentile per-packet one-way delay: 32.318 ms
Loss rate: 70.74%
```

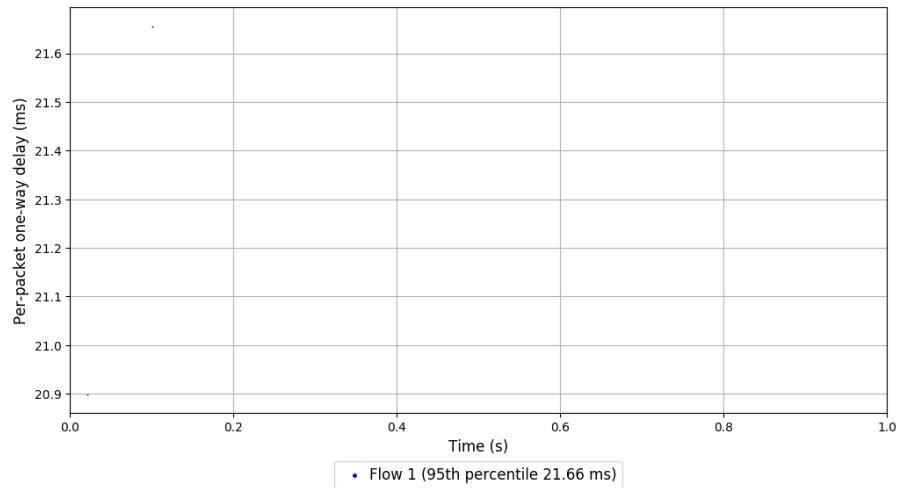
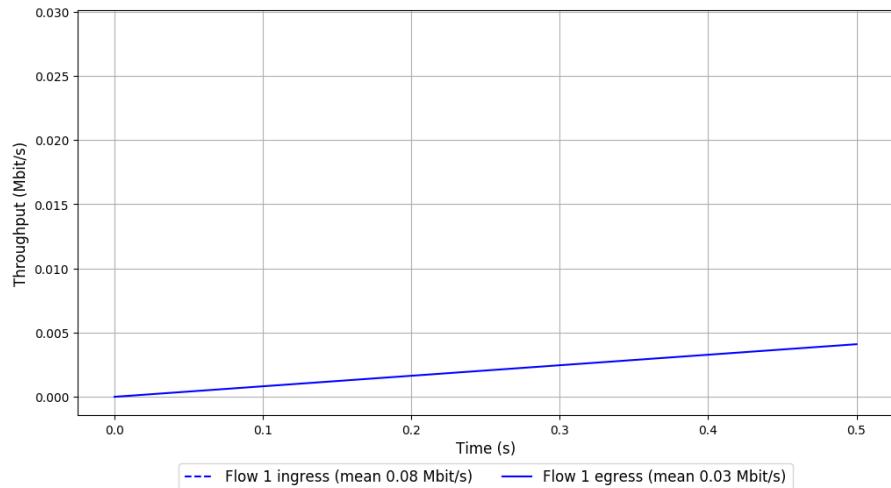
Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

Start at: 2018-12-01 23:44:30
End at: 2018-12-01 23:45:00
Local clock offset: 0.558 ms
Remote clock offset: -4.495 ms

Run 3: Report of PCC-Expr — Data Link

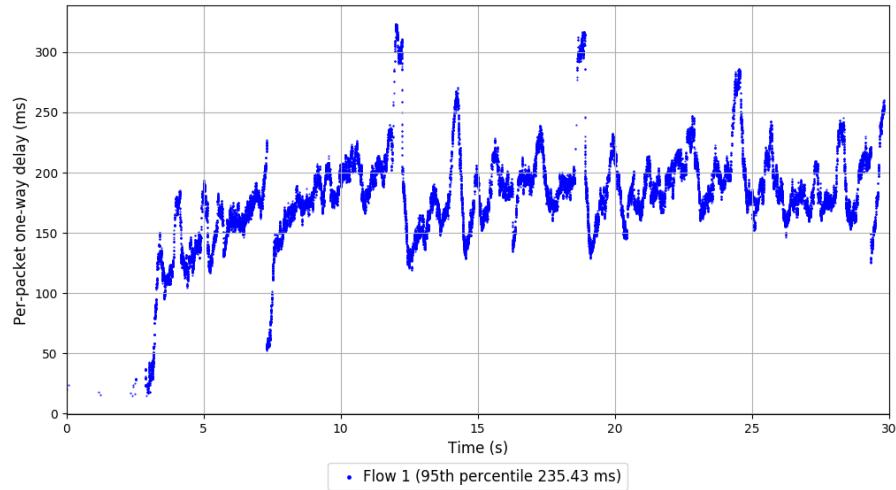
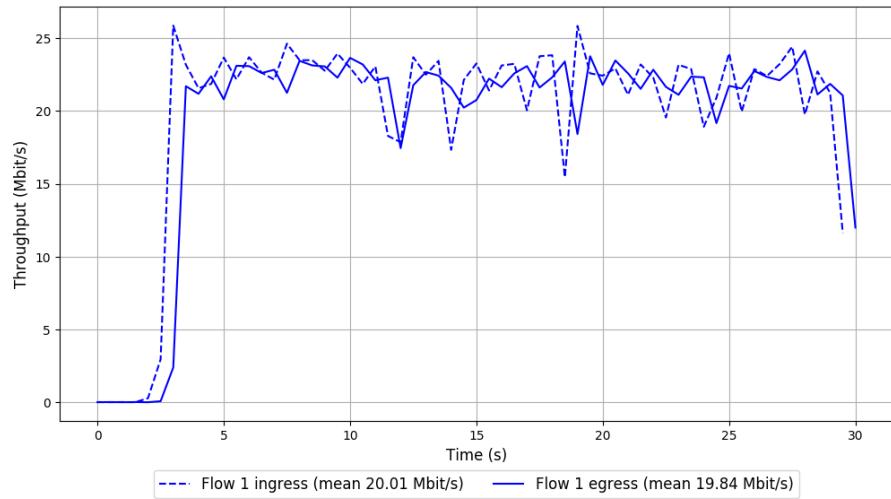


```
Run 1: Statistics of QUIC Cubic
```

```
Start at: 2018-12-01 23:10:15
End at: 2018-12-01 23:10:45
Local clock offset: 0.761 ms
Remote clock offset: -5.503 ms

# Below is generated by plot.py at 2018-12-02 00:05:07
# Datalink statistics
-- Total of 1 flow:
Average throughput: 19.84 Mbit/s
95th percentile per-packet one-way delay: 235.434 ms
Loss rate: 0.90%
-- Flow 1:
Average throughput: 19.84 Mbit/s
95th percentile per-packet one-way delay: 235.434 ms
Loss rate: 0.90%
```

Run 1: Report of QUIC Cubic — Data Link

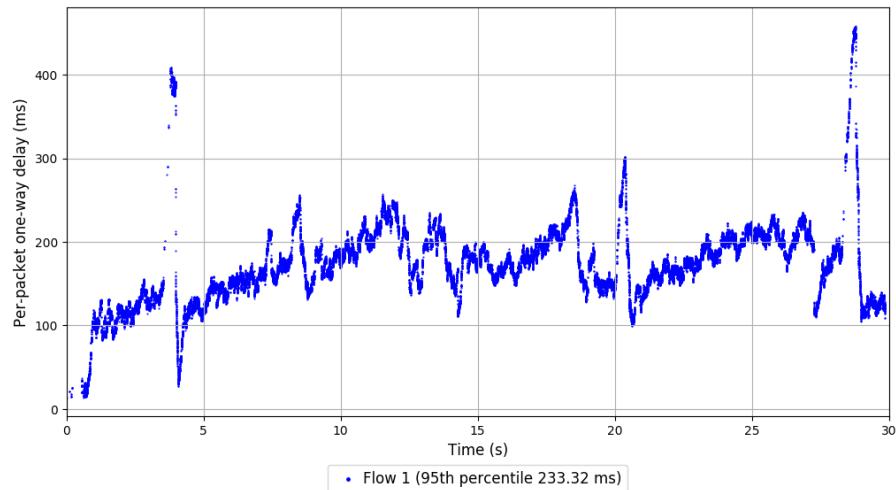
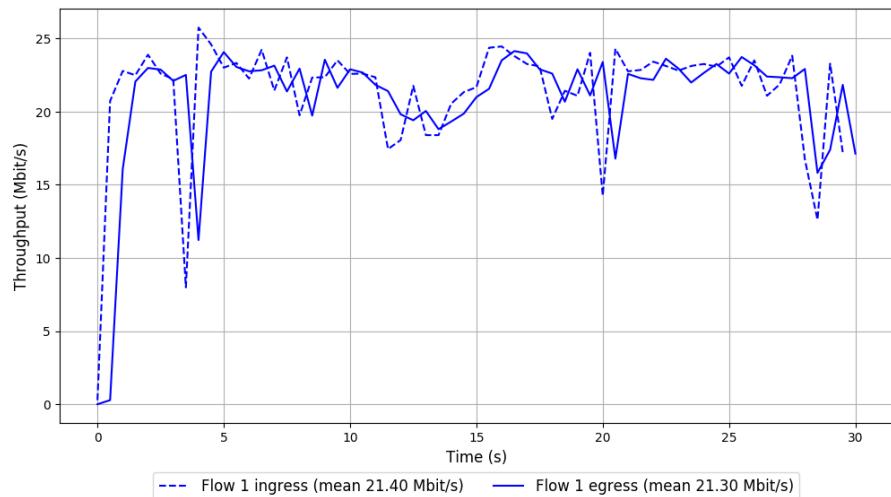


Run 2: Statistics of QUIC Cubic

```
Start at: 2018-12-01 23:31:17
End at: 2018-12-01 23:31:47
Local clock offset: 1.861 ms
Remote clock offset: -5.516 ms

# Below is generated by plot.py at 2018-12-02 00:05:08
# Datalink statistics
-- Total of 1 flow:
Average throughput: 21.30 Mbit/s
95th percentile per-packet one-way delay: 233.319 ms
Loss rate: 0.49%
-- Flow 1:
Average throughput: 21.30 Mbit/s
95th percentile per-packet one-way delay: 233.319 ms
Loss rate: 0.49%
```

Run 2: Report of QUIC Cubic — Data Link

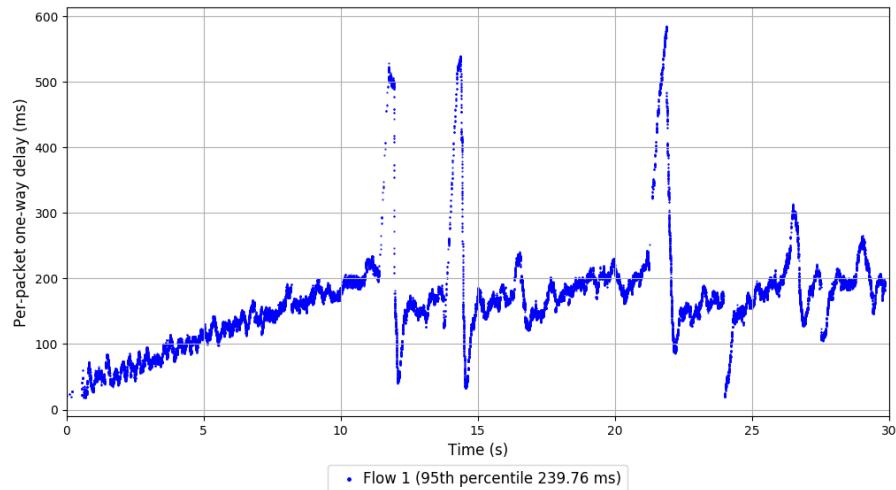
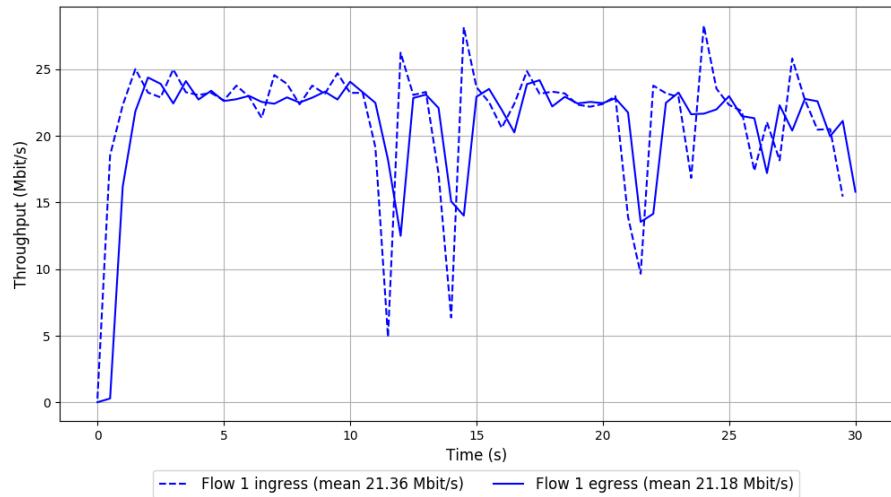


Run 3: Statistics of QUIC Cubic

```
Start at: 2018-12-01 23:52:10
End at: 2018-12-01 23:52:40
Local clock offset: 0.497 ms
Remote clock offset: -4.647 ms

# Below is generated by plot.py at 2018-12-02 00:05:11
# Datalink statistics
-- Total of 1 flow:
Average throughput: 21.18 Mbit/s
95th percentile per-packet one-way delay: 239.764 ms
Loss rate: 0.87%
-- Flow 1:
Average throughput: 21.18 Mbit/s
95th percentile per-packet one-way delay: 239.764 ms
Loss rate: 0.87%
```

Run 3: Report of QUIC Cubic — Data Link

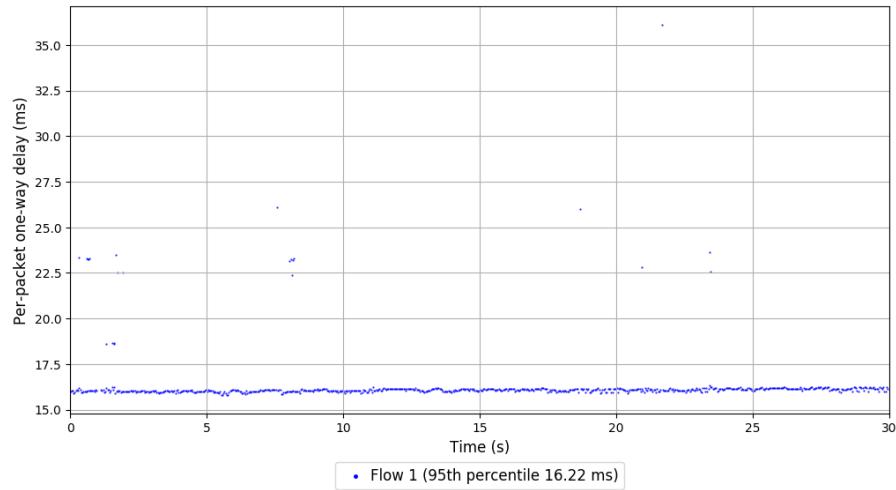
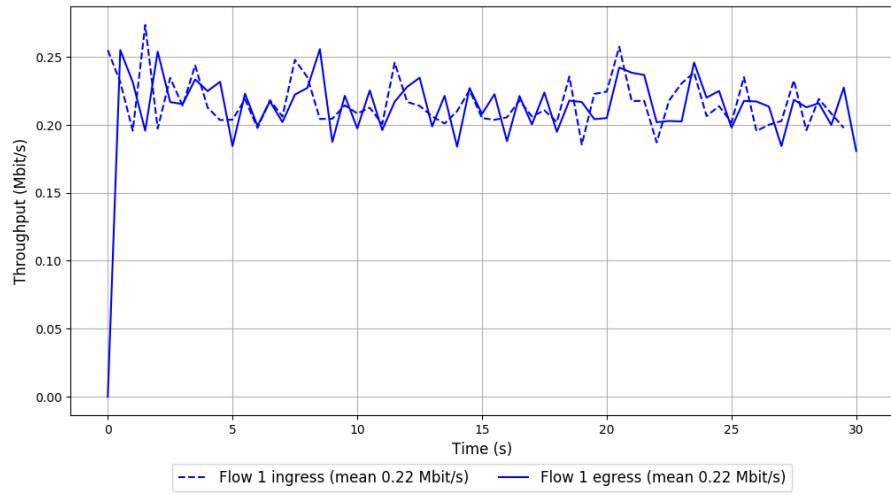


Run 1: Statistics of SCReAM

```
Start at: 2018-12-01 23:01:25
End at: 2018-12-01 23:01:55
Local clock offset: 3.367 ms
Remote clock offset: -6.068 ms

# Below is generated by plot.py at 2018-12-02 00:05:11
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 16.224 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 16.224 ms
Loss rate: 0.13%
```

Run 1: Report of SCReAM — Data Link

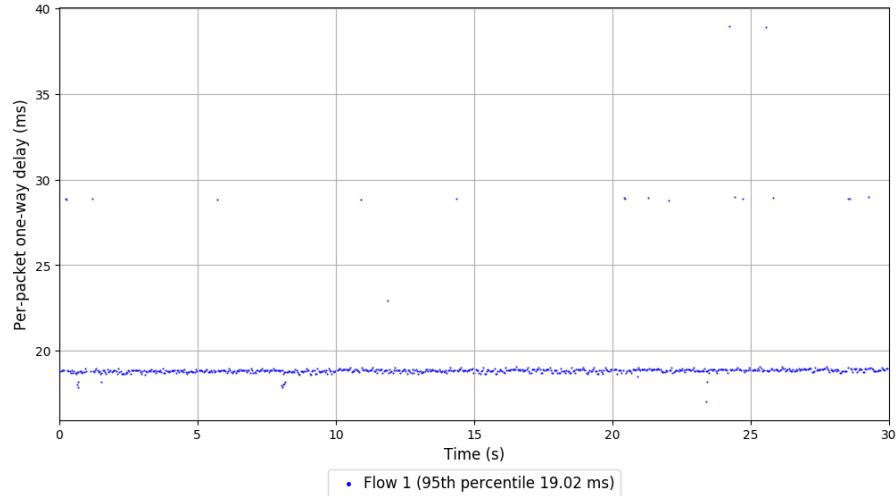
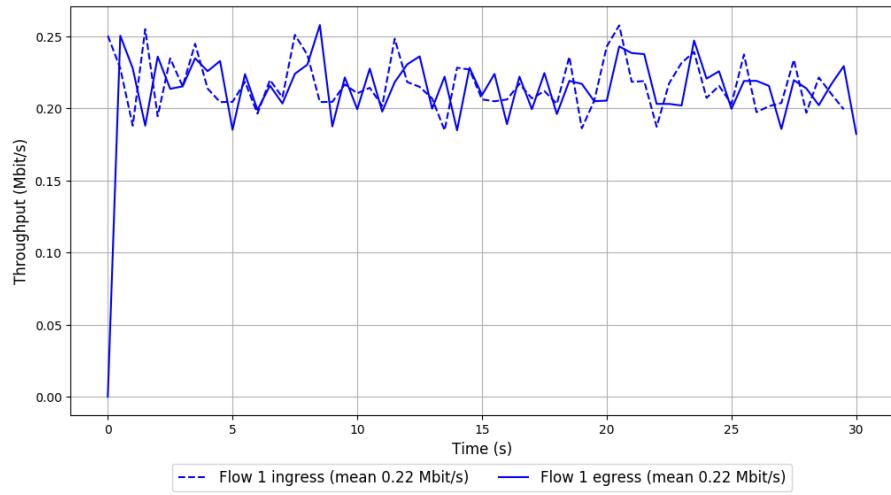


Run 2: Statistics of SCReAM

```
Start at: 2018-12-01 23:22:31
End at: 2018-12-01 23:23:01
Local clock offset: 1.198 ms
Remote clock offset: -4.923 ms

# Below is generated by plot.py at 2018-12-02 00:05:11
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 19.017 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 19.017 ms
Loss rate: 0.13%
```

Run 2: Report of SCReAM — Data Link

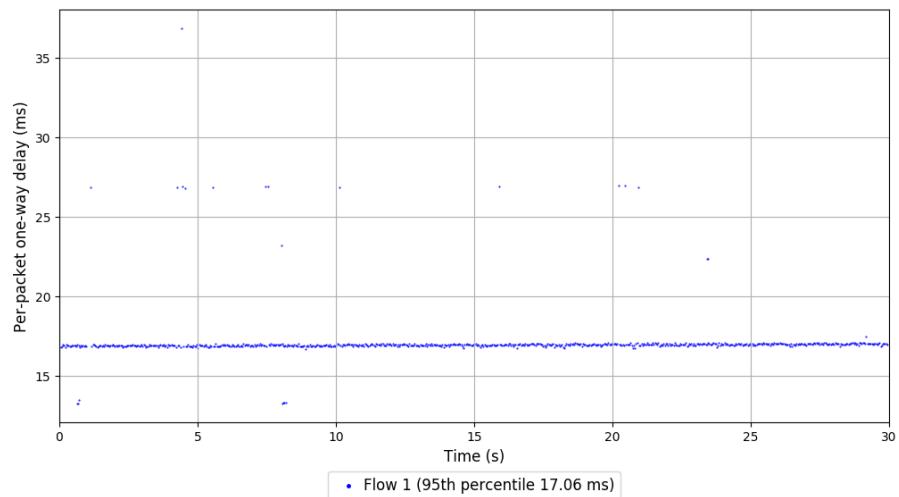
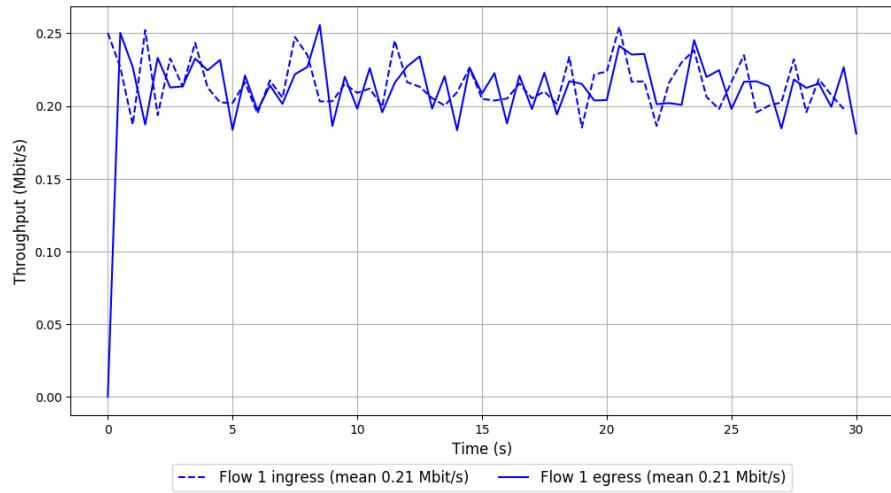


Run 3: Statistics of SCReAM

```
Start at: 2018-12-01 23:43:25
End at: 2018-12-01 23:43:55
Local clock offset: 3.12 ms
Remote clock offset: -4.868 ms

# Below is generated by plot.py at 2018-12-02 00:05:11
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 17.057 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 17.057 ms
Loss rate: 0.13%
```

Run 3: Report of SCReAM — Data Link

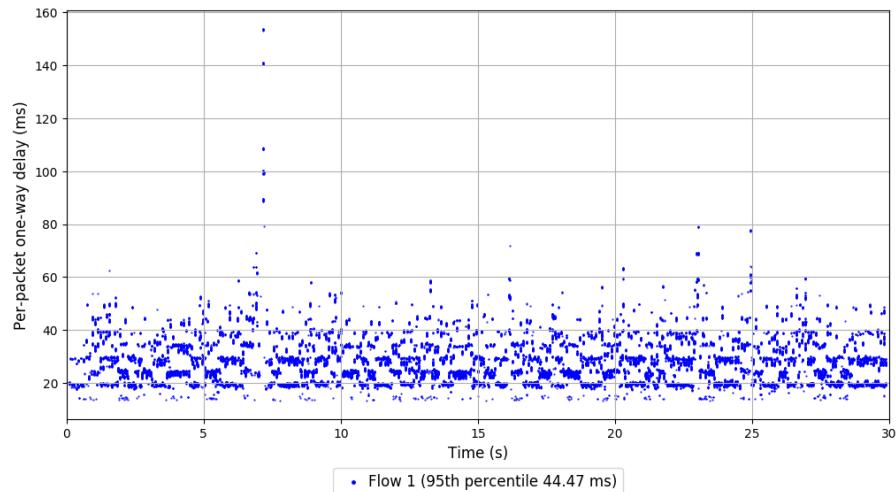
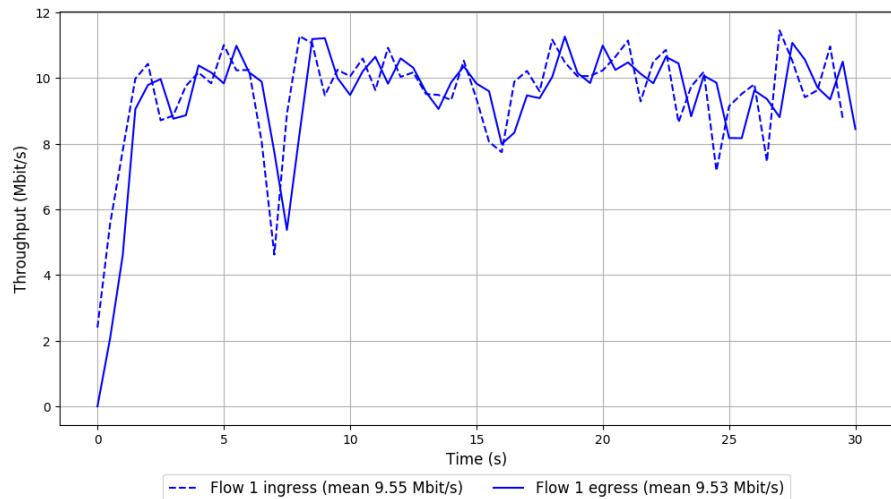


Run 1: Statistics of Sprout

```
Start at: 2018-12-01 23:12:34
End at: 2018-12-01 23:13:04
Local clock offset: 3.554 ms
Remote clock offset: -5.337 ms

# Below is generated by plot.py at 2018-12-02 00:05:11
# Datalink statistics
-- Total of 1 flow:
Average throughput: 9.53 Mbit/s
95th percentile per-packet one-way delay: 44.469 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 9.53 Mbit/s
95th percentile per-packet one-way delay: 44.469 ms
Loss rate: 0.20%
```

Run 1: Report of Sprout — Data Link

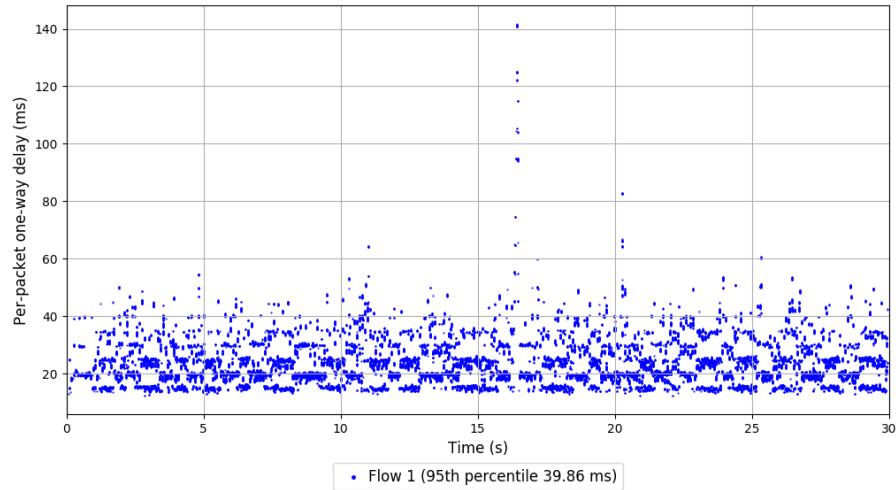
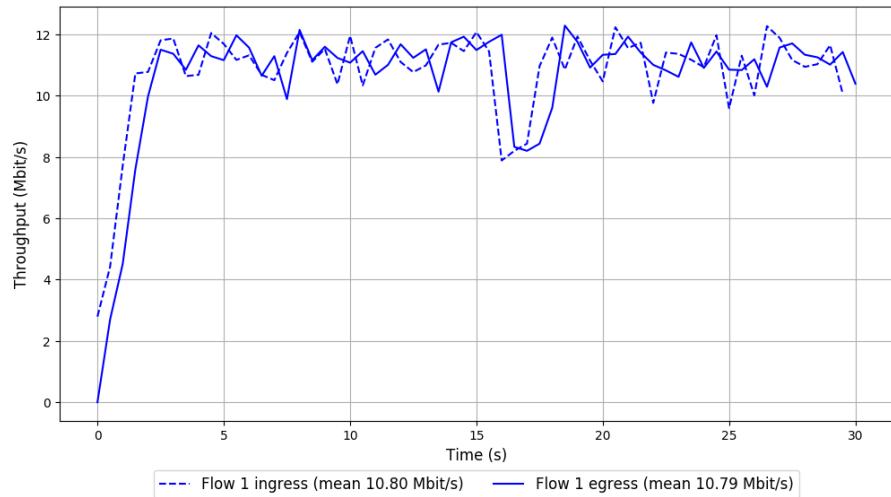


Run 2: Statistics of Sprout

```
Start at: 2018-12-01 23:33:30
End at: 2018-12-01 23:34:00
Local clock offset: 2.584 ms
Remote clock offset: -5.436 ms

# Below is generated by plot.py at 2018-12-02 00:05:11
# Datalink statistics
-- Total of 1 flow:
Average throughput: 10.79 Mbit/s
95th percentile per-packet one-way delay: 39.857 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 10.79 Mbit/s
95th percentile per-packet one-way delay: 39.857 ms
Loss rate: 0.05%
```

Run 2: Report of Sprout — Data Link

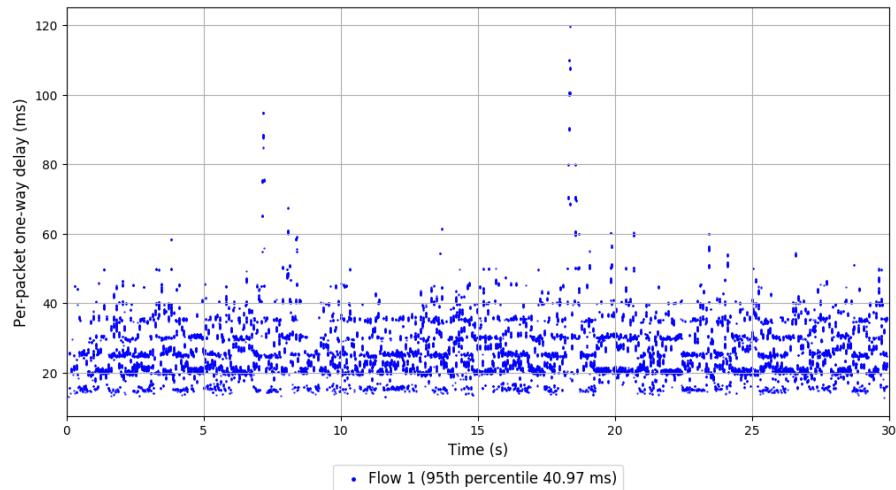
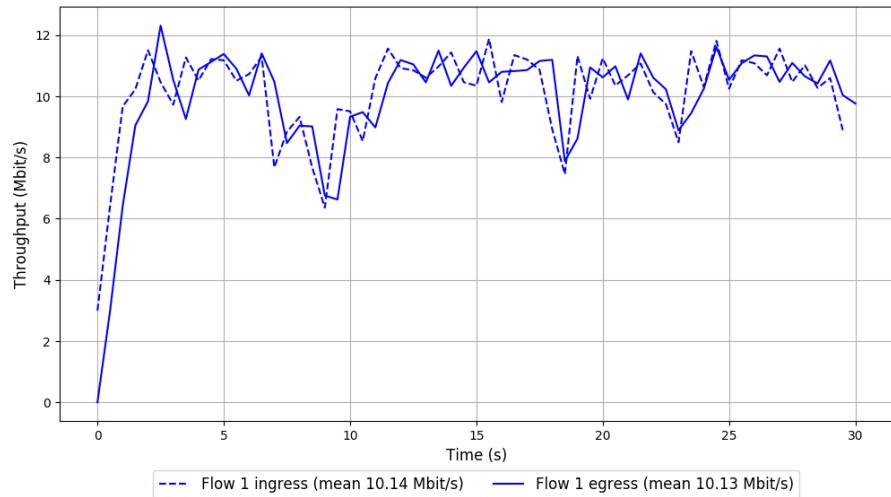


Run 3: Statistics of Sprout

```
Start at: 2018-12-01 23:54:23
End at: 2018-12-01 23:54:53
Local clock offset: 3.262 ms
Remote clock offset: -4.799 ms

# Below is generated by plot.py at 2018-12-02 00:05:11
# Datalink statistics
-- Total of 1 flow:
Average throughput: 10.13 Mbit/s
95th percentile per-packet one-way delay: 40.974 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 10.13 Mbit/s
95th percentile per-packet one-way delay: 40.974 ms
Loss rate: 0.14%
```

Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

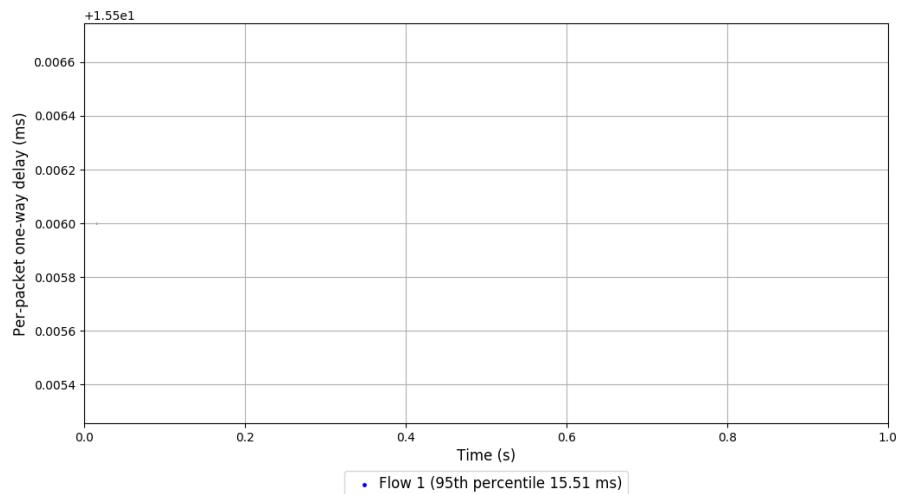
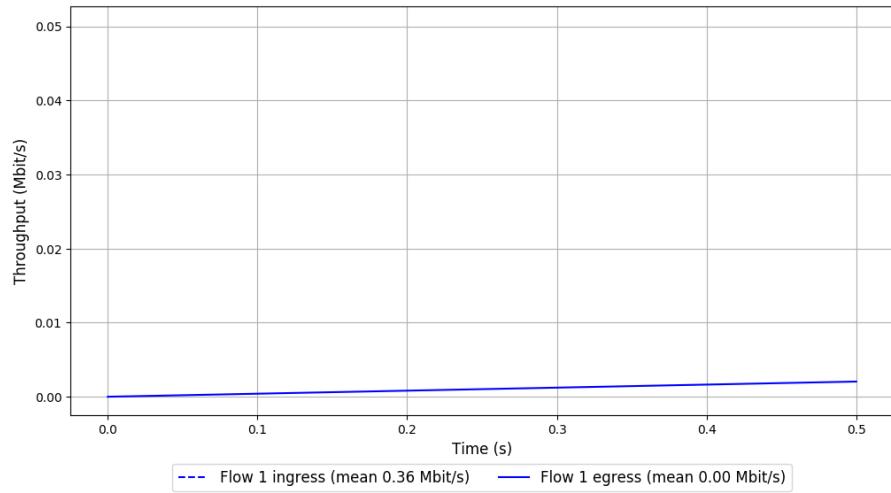
Start at: 2018-12-01 23:15:53

End at: 2018-12-01 23:16:23

Local clock offset: 0.528 ms

Remote clock offset: -5.91 ms

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

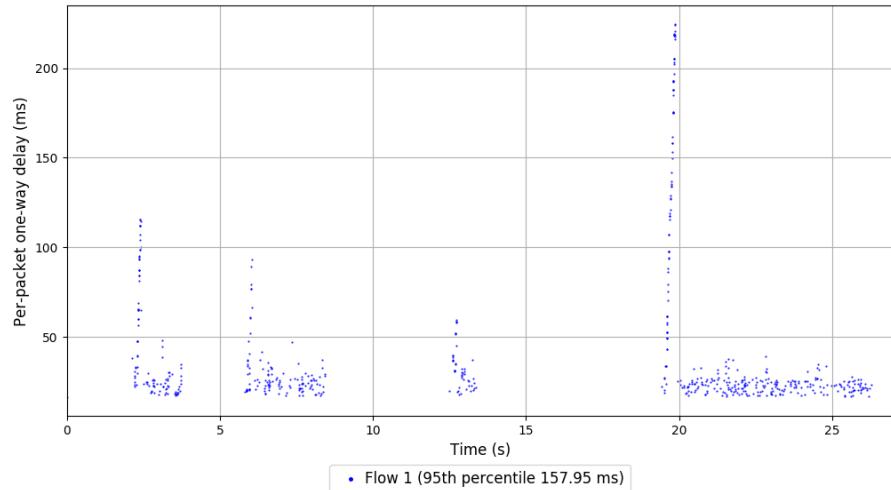
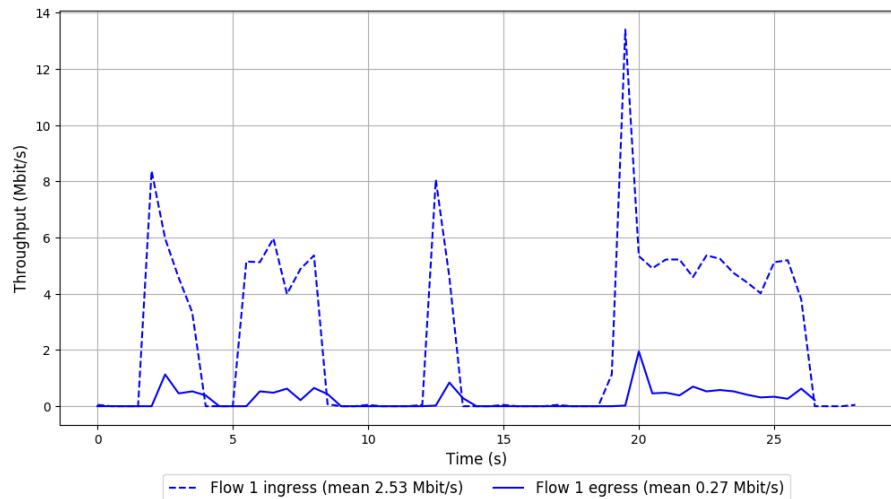


Run 2: Statistics of TaoVA-100x

```
Start at: 2018-12-01 23:36:48
End at: 2018-12-01 23:37:18
Local clock offset: 1.206 ms
Remote clock offset: -5.324 ms

# Below is generated by plot.py at 2018-12-02 00:05:11
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 157.952 ms
Loss rate: 89.97%
-- Flow 1:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 157.952 ms
Loss rate: 89.97%
```

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



Run 3: Statistics of TaoVA-100x

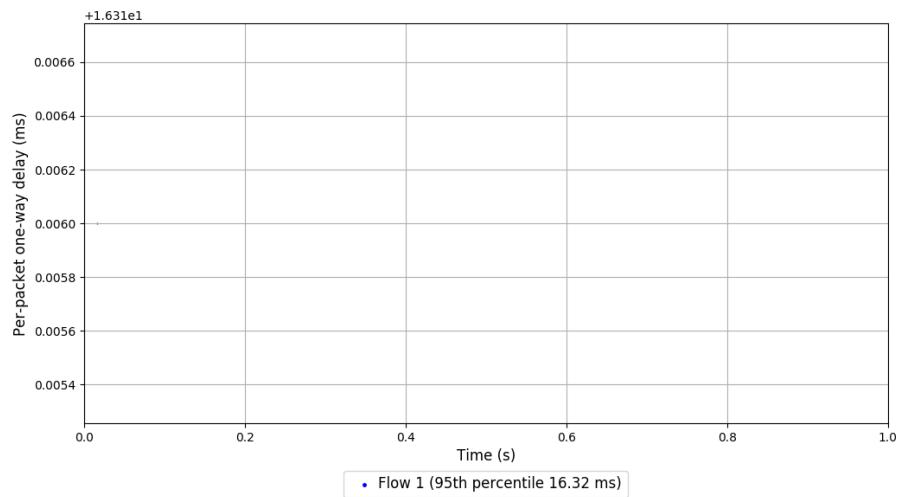
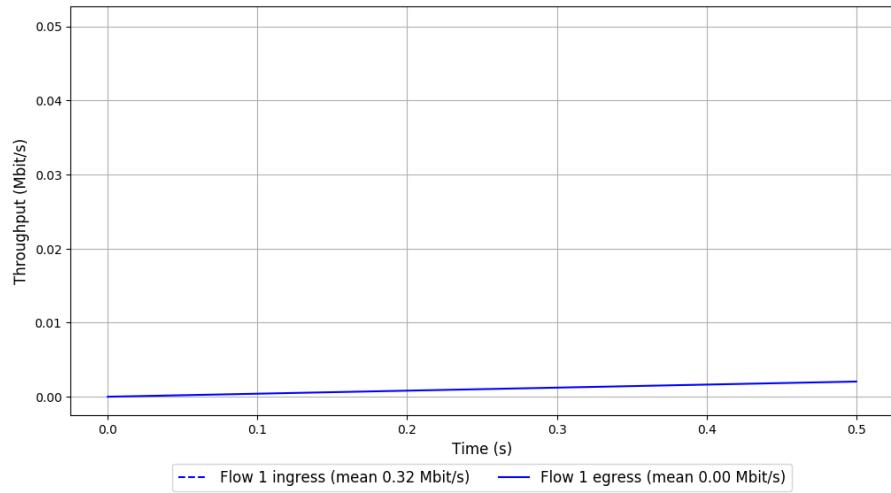
Start at: 2018-12-01 23:57:43

End at: 2018-12-01 23:58:13

Local clock offset: 1.205 ms

Remote clock offset: -4.582 ms

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

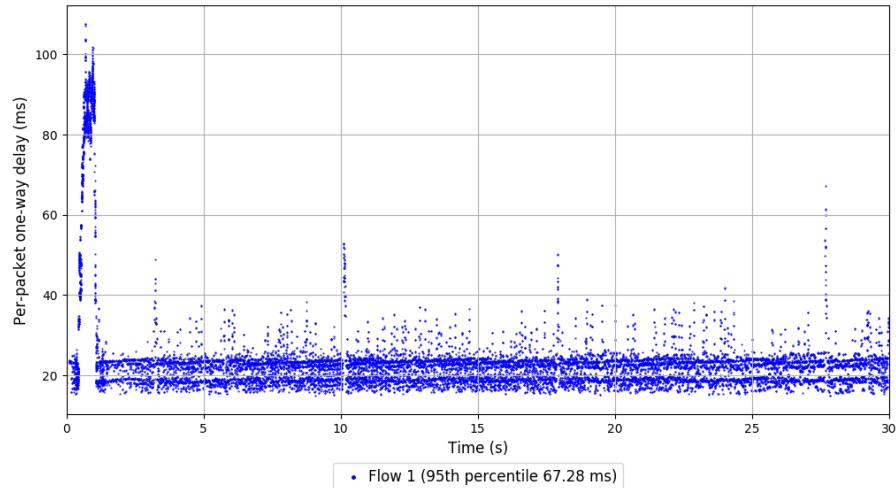
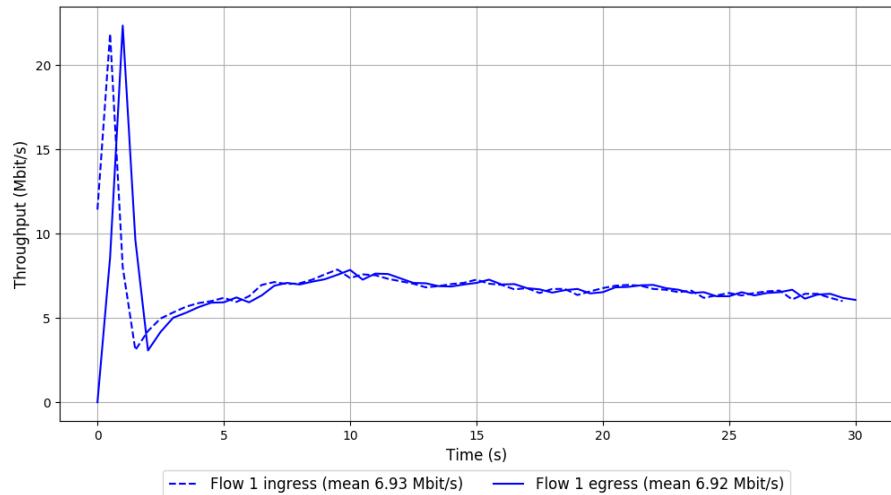


Run 1: Statistics of TCP Vegas

```
Start at: 2018-12-01 23:03:35
End at: 2018-12-01 23:04:05
Local clock offset: 2.047 ms
Remote clock offset: -5.821 ms

# Below is generated by plot.py at 2018-12-02 00:05:11
# Datalink statistics
-- Total of 1 flow:
Average throughput: 6.92 Mbit/s
95th percentile per-packet one-way delay: 67.277 ms
Loss rate: 0.19%
-- Flow 1:
Average throughput: 6.92 Mbit/s
95th percentile per-packet one-way delay: 67.277 ms
Loss rate: 0.19%
```

Run 1: Report of TCP Vegas — Data Link

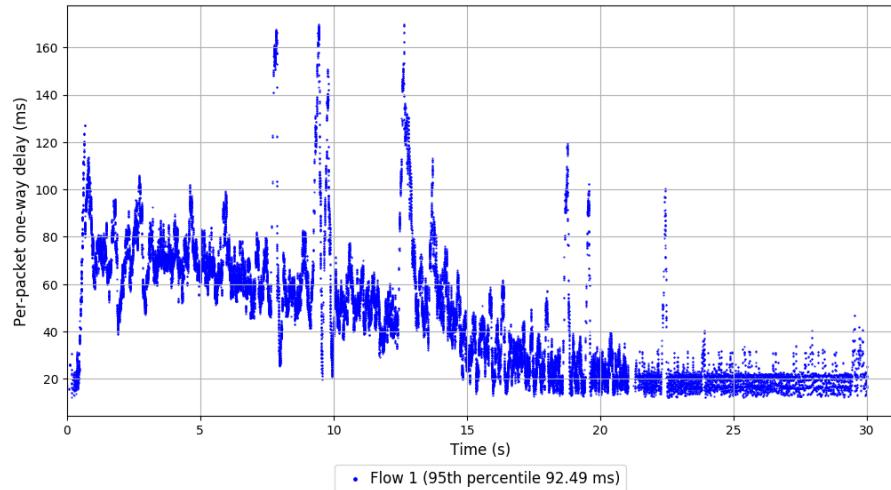
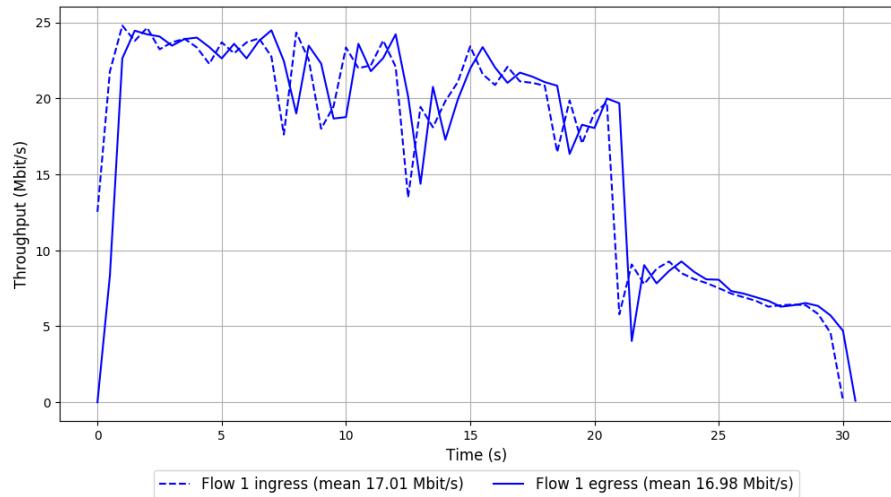


Run 2: Statistics of TCP Vegas

```
Start at: 2018-12-01 23:24:42
End at: 2018-12-01 23:25:12
Local clock offset: 1.945 ms
Remote clock offset: -5.741 ms

# Below is generated by plot.py at 2018-12-02 00:05:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 16.98 Mbit/s
95th percentile per-packet one-way delay: 92.489 ms
Loss rate: 0.24%
-- Flow 1:
Average throughput: 16.98 Mbit/s
95th percentile per-packet one-way delay: 92.489 ms
Loss rate: 0.24%
```

Run 2: Report of TCP Vegas — Data Link

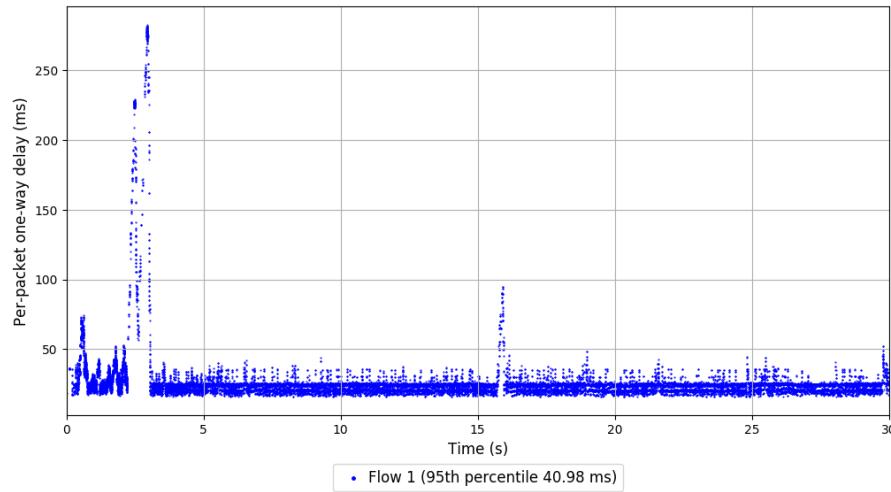
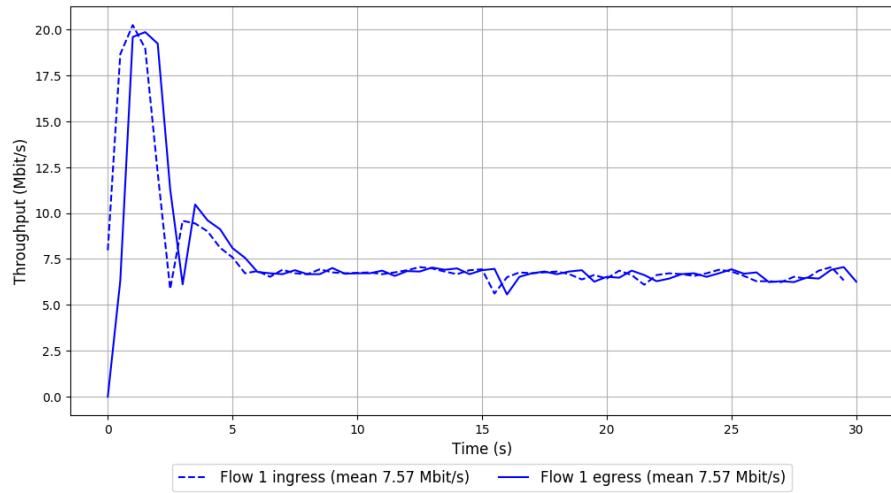


Run 3: Statistics of TCP Vegas

```
Start at: 2018-12-01 23:45:35
End at: 2018-12-01 23:46:05
Local clock offset: 0.756 ms
Remote clock offset: -5.541 ms

# Below is generated by plot.py at 2018-12-02 00:05:18
# Datalink statistics
-- Total of 1 flow:
Average throughput: 7.57 Mbit/s
95th percentile per-packet one-way delay: 40.981 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 7.57 Mbit/s
95th percentile per-packet one-way delay: 40.981 ms
Loss rate: 0.07%
```

Run 3: Report of TCP Vegas — Data Link

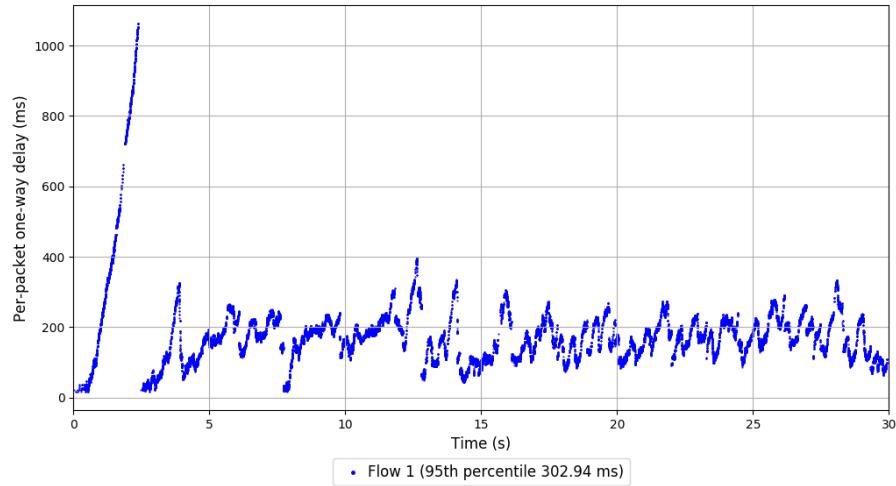
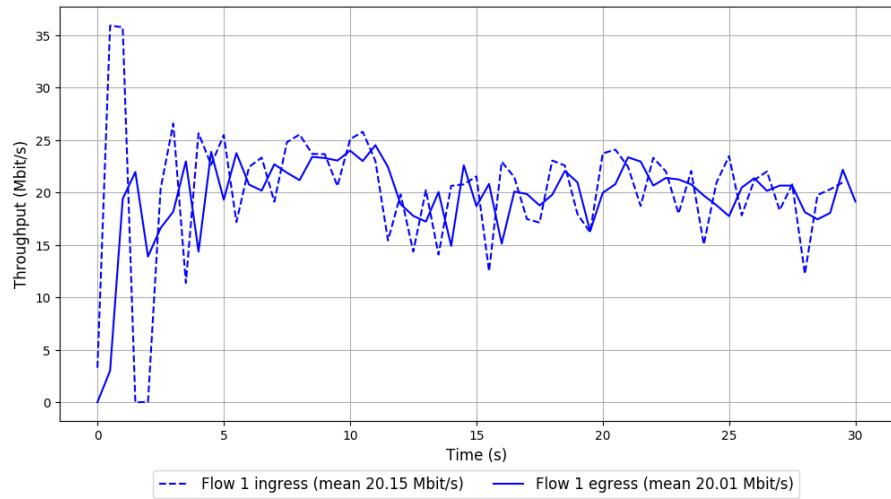


Run 1: Statistics of Verus

```
Start at: 2018-12-01 23:14:46
End at: 2018-12-01 23:15:16
Local clock offset: 0.133 ms
Remote clock offset: -5.552 ms

# Below is generated by plot.py at 2018-12-02 00:05:22
# Datalink statistics
-- Total of 1 flow:
Average throughput: 20.01 Mbit/s
95th percentile per-packet one-way delay: 302.935 ms
Loss rate: 0.78%
-- Flow 1:
Average throughput: 20.01 Mbit/s
95th percentile per-packet one-way delay: 302.935 ms
Loss rate: 0.78%
```

Run 1: Report of Verus — Data Link

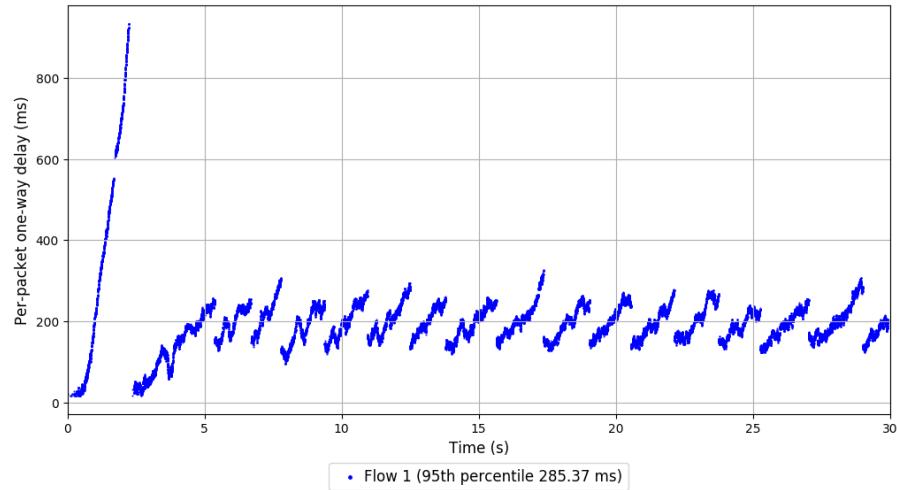
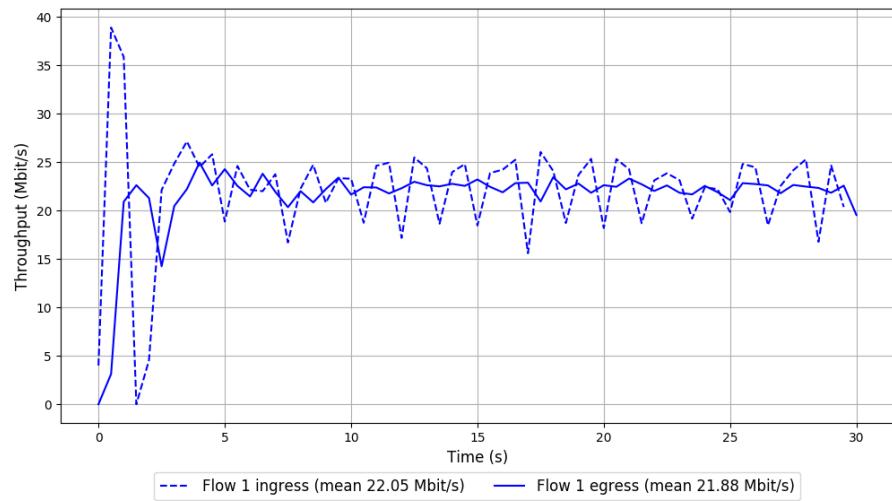


Run 2: Statistics of Verus

```
Start at: 2018-12-01 23:35:41
End at: 2018-12-01 23:36:11
Local clock offset: 0.438 ms
Remote clock offset: -5.34 ms

# Below is generated by plot.py at 2018-12-02 00:05:23
# Datalink statistics
-- Total of 1 flow:
Average throughput: 21.88 Mbit/s
95th percentile per-packet one-way delay: 285.374 ms
Loss rate: 0.77%
-- Flow 1:
Average throughput: 21.88 Mbit/s
95th percentile per-packet one-way delay: 285.374 ms
Loss rate: 0.77%
```

Run 2: Report of Verus — Data Link

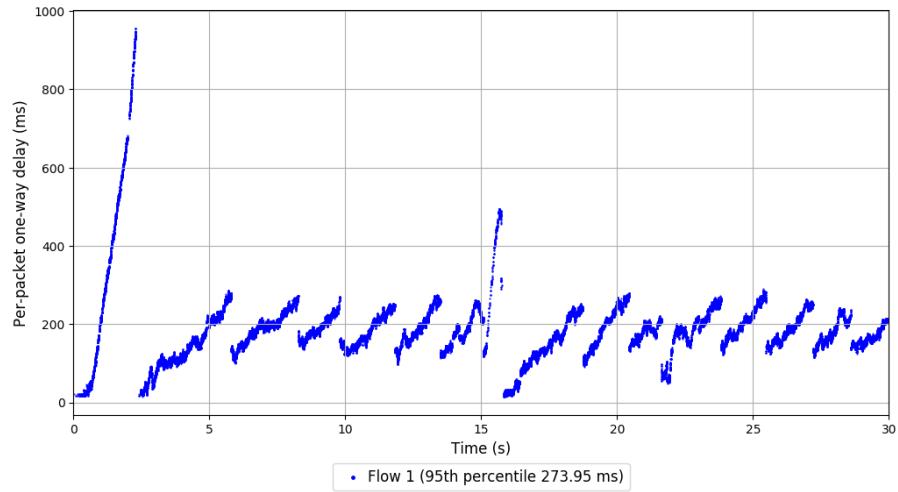
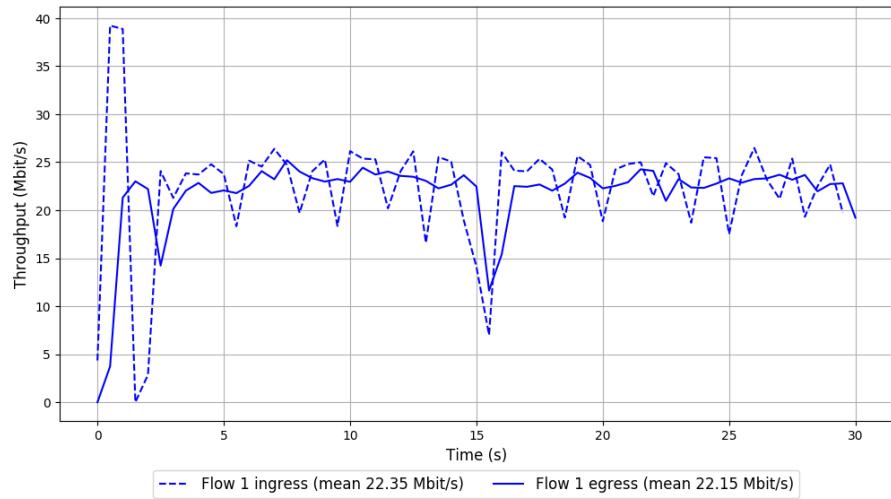


Run 3: Statistics of Verus

```
Start at: 2018-12-01 23:56:34
End at: 2018-12-01 23:57:04
Local clock offset: 2.495 ms
Remote clock offset: -4.403 ms

# Below is generated by plot.py at 2018-12-02 00:05:23
# Datalink statistics
-- Total of 1 flow:
Average throughput: 22.15 Mbit/s
95th percentile per-packet one-way delay: 273.947 ms
Loss rate: 0.97%
-- Flow 1:
Average throughput: 22.15 Mbit/s
95th percentile per-packet one-way delay: 273.947 ms
Loss rate: 0.97%
```

Run 3: Report of Verus — Data Link

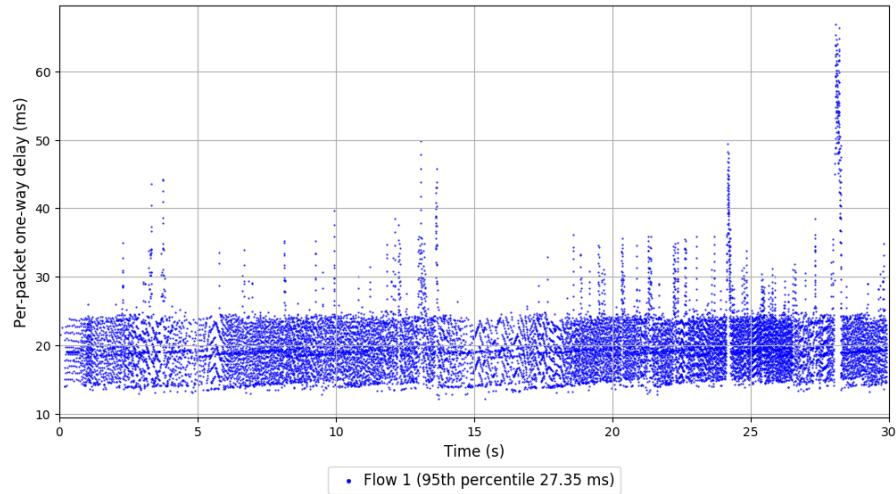
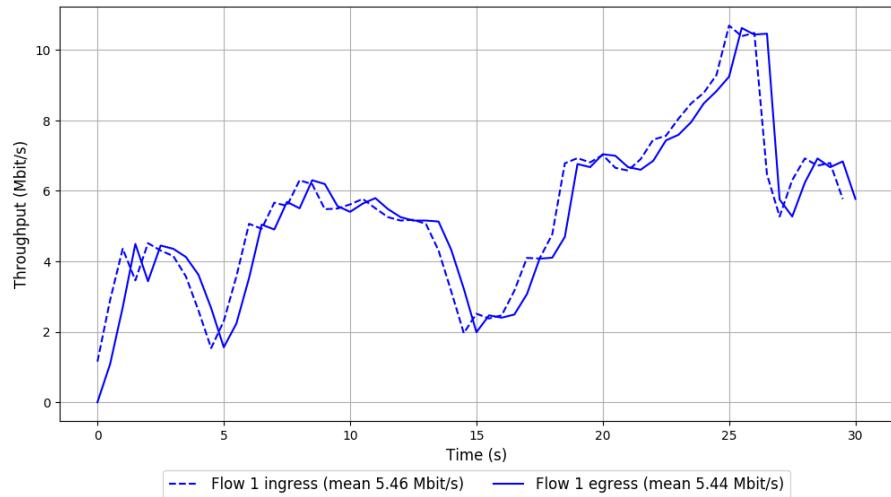


Run 1: Statistics of PCC-Vivace

```
Start at: 2018-12-01 23:20:18
End at: 2018-12-01 23:20:48
Local clock offset: 3.17 ms
Remote clock offset: -5.676 ms

# Below is generated by plot.py at 2018-12-02 00:05:23
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.44 Mbit/s
95th percentile per-packet one-way delay: 27.346 ms
Loss rate: 0.38%
-- Flow 1:
Average throughput: 5.44 Mbit/s
95th percentile per-packet one-way delay: 27.346 ms
Loss rate: 0.38%
```

Run 1: Report of PCC-Vivace — Data Link

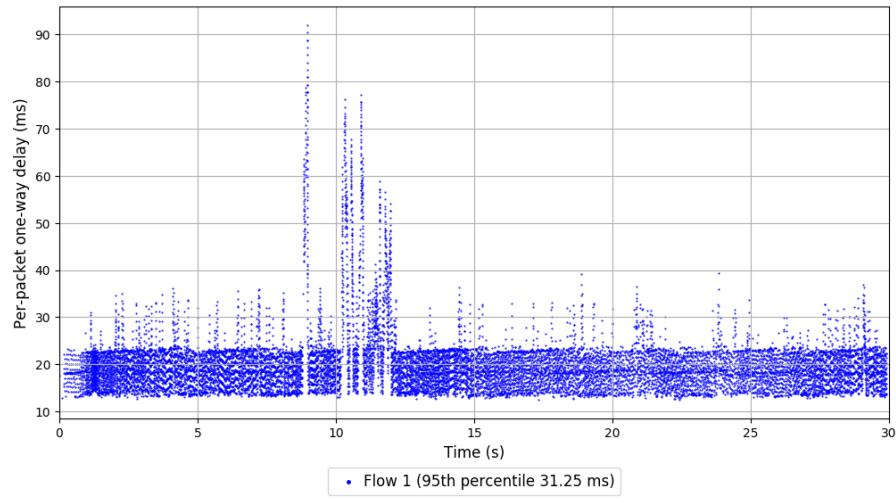
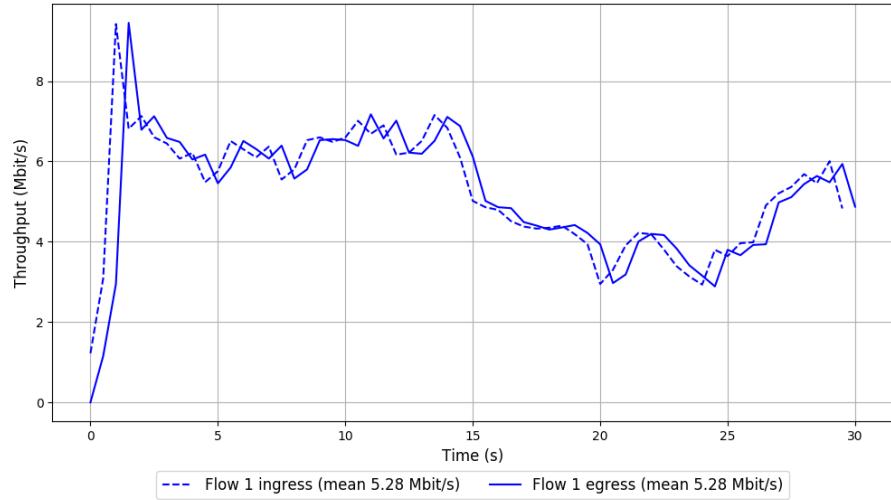


Run 2: Statistics of PCC-Vivace

```
Start at: 2018-12-01 23:41:13
End at: 2018-12-01 23:41:43
Local clock offset: 1.924 ms
Remote clock offset: -5.554 ms

# Below is generated by plot.py at 2018-12-02 00:05:23
# Datalink statistics
-- Total of 1 flow:
Average throughput: 5.28 Mbit/s
95th percentile per-packet one-way delay: 31.248 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 5.28 Mbit/s
95th percentile per-packet one-way delay: 31.248 ms
Loss rate: 0.06%
```

Run 2: Report of PCC-Vivace — Data Link

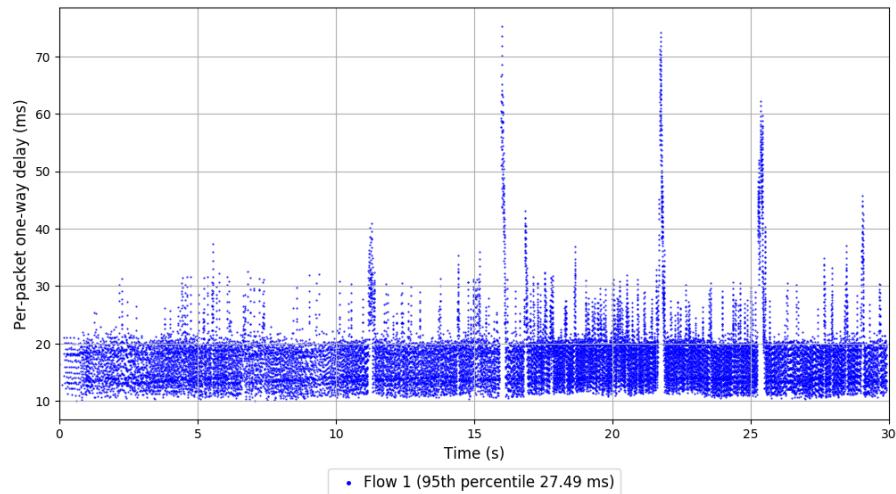
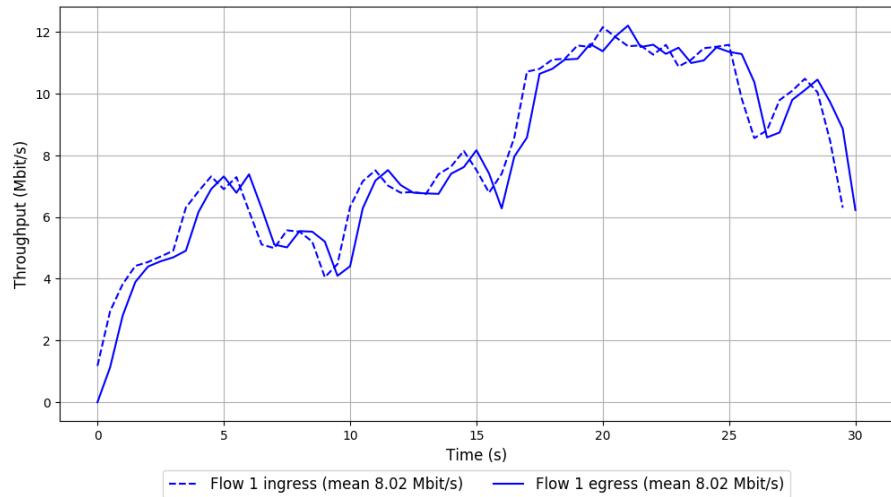


Run 3: Statistics of PCC-Vivace

```
Start at: 2018-12-02 00:02:09
End at: 2018-12-02 00:02:39
Local clock offset: 3.186 ms
Remote clock offset: -4.868 ms

# Below is generated by plot.py at 2018-12-02 00:05:23
# Datalink statistics
-- Total of 1 flow:
Average throughput: 8.02 Mbit/s
95th percentile per-packet one-way delay: 27.486 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 8.02 Mbit/s
95th percentile per-packet one-way delay: 27.486 ms
Loss rate: 0.06%
```

Run 3: Report of PCC-Vivace — Data Link

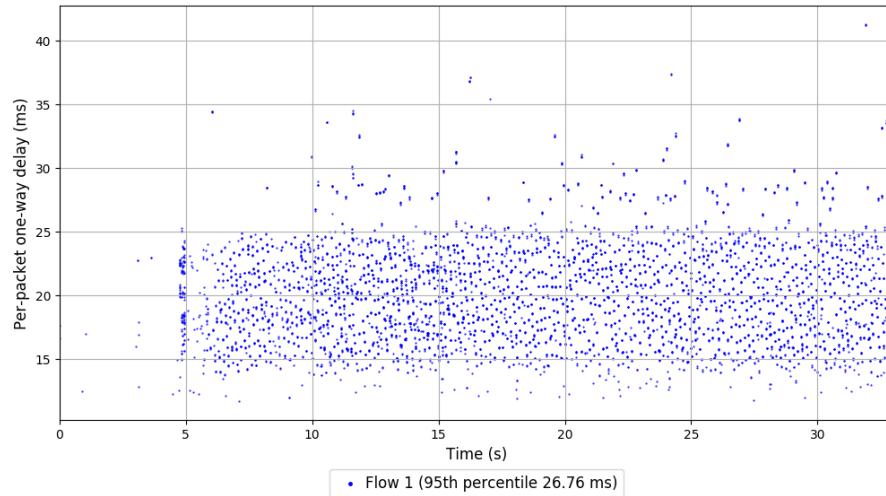
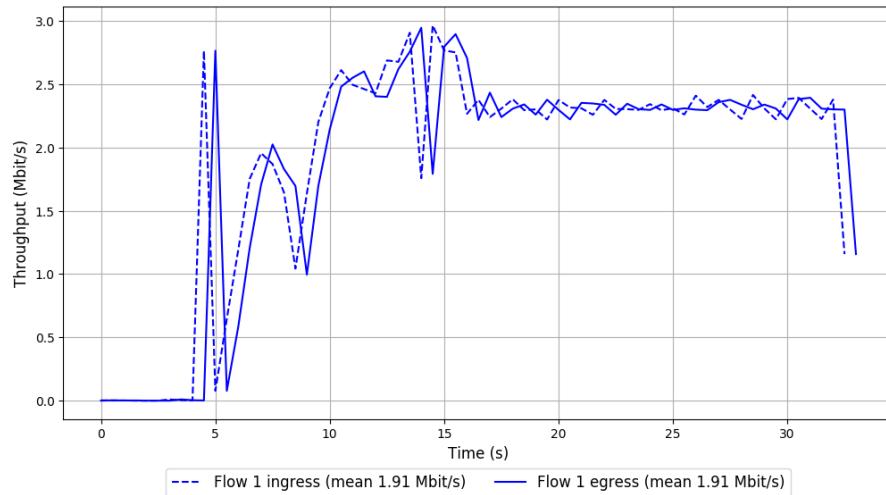


```
Run 1: Statistics of WebRTC media

Start at: 2018-12-01 23:04:41
End at: 2018-12-01 23:05:11
Local clock offset: 1.055 ms
Remote clock offset: -9.78 ms

# Below is generated by plot.py at 2018-12-02 00:05:23
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 26.763 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 26.763 ms
Loss rate: 0.06%
```

Run 1: Report of WebRTC media — Data Link

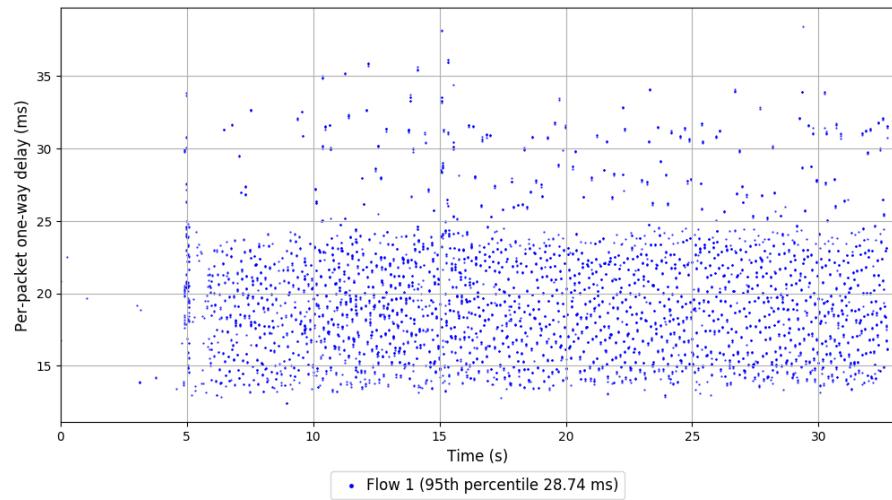
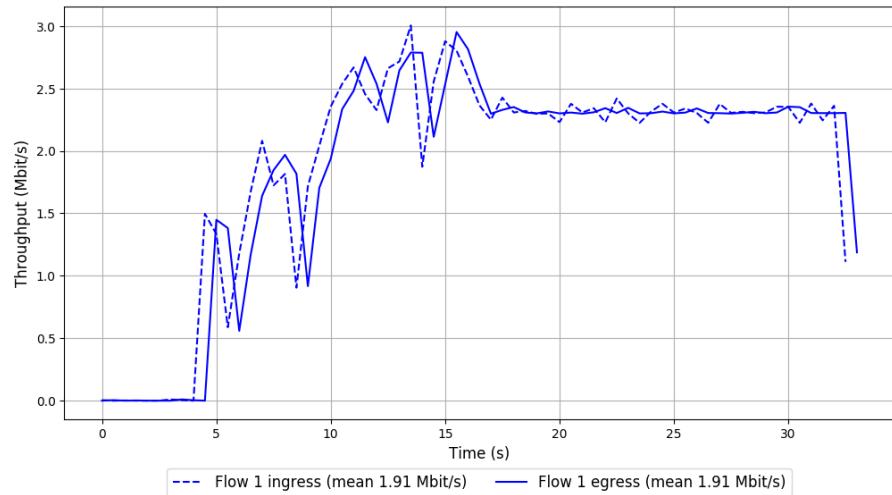


Run 2: Statistics of WebRTC media

```
Start at: 2018-12-01 23:25:48
End at: 2018-12-01 23:26:18
Local clock offset: 1.498 ms
Remote clock offset: -5.097 ms

# Below is generated by plot.py at 2018-12-02 00:05:23
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 28.736 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 28.736 ms
Loss rate: 0.06%
```

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

```
Start at: 2018-12-01 23:46:41
End at: 2018-12-01 23:47:11
Local clock offset: 5.415 ms
Remote clock offset: -4.564 ms

# Below is generated by plot.py at 2018-12-02 00:05:23
# Datalink statistics
-- Total of 1 flow:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 29.578 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 29.578 ms
Loss rate: 0.06%
```

Run 3: Report of WebRTC media — Data Link

