Pantheon Report

Generated at 2018-03-13 00:48:00 (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 3 flows with 10-second interval between two flows.

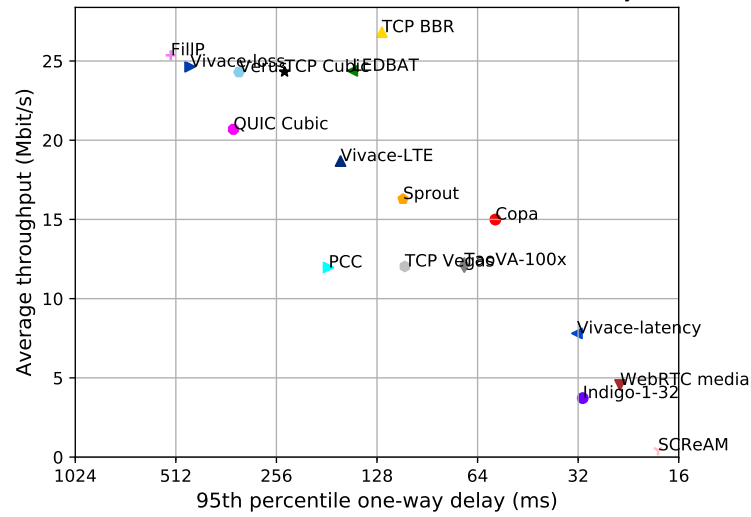Increased UDP receive buffer to 16 MB (default) and 32 MB (max).

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.
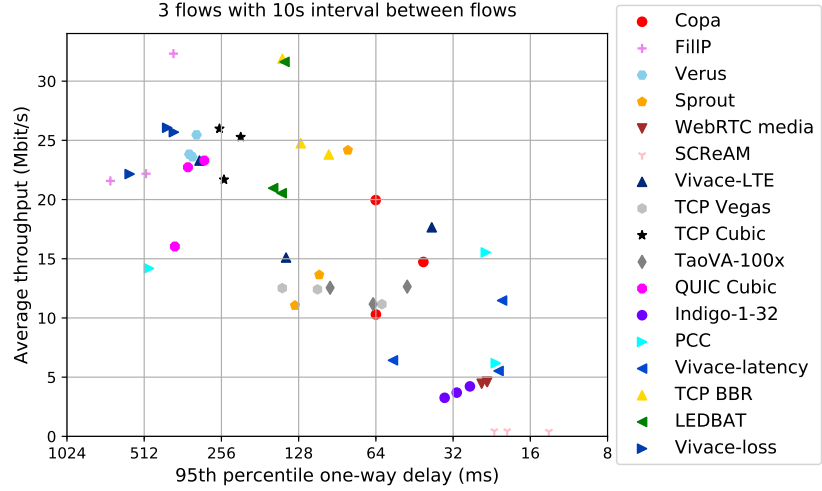
```
Git summary:
branch: master @ f12c42a2c63fdd9a862eefa0468859bf379b6623
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
 M datagrump/sender.cc
third_party/fillp @ 828bbf95fd4941149b5cec90f281d1c69ae1a5c6
third_party/genericCC @ 9249eea3238475c4d8cca1443d28df70bff6c4a2
third_party/indigo @ 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 @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ fb1053193c2861da659ba9013db26744ccfcf993
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
 M receiver/src/buffer.h
 M receiver/src/core.cpp
 M sender/src/buffer.h
 M sender/src/core.cpp
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ f1a14bffe749737437f61b1eaeeb30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
 M src/examples/cellsim.cc
 M src/examples/sproutbt2.cc
 M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
 M src/verus.hpp
 M tools/plot.py
third_party/vivace @ 7a4ba531e75b4a6f66f5c4580192120401784ce3
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

test from AWS California 1 Ethernet to Stanford ppp0, 3 runs of 30s each per scheme
3 flows with 10s interval between flows (mean of all runs by scheme)

test from AWS California 1 Ethernet to Stanford ppp0, 3 runs of 30s each per scheme
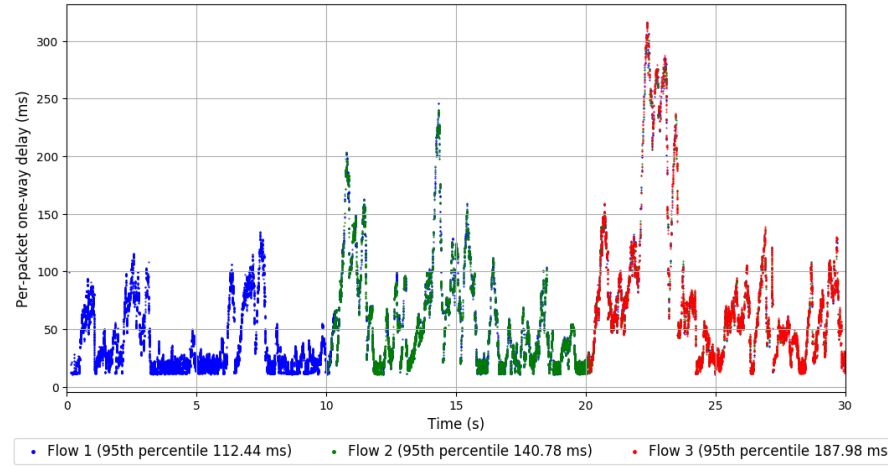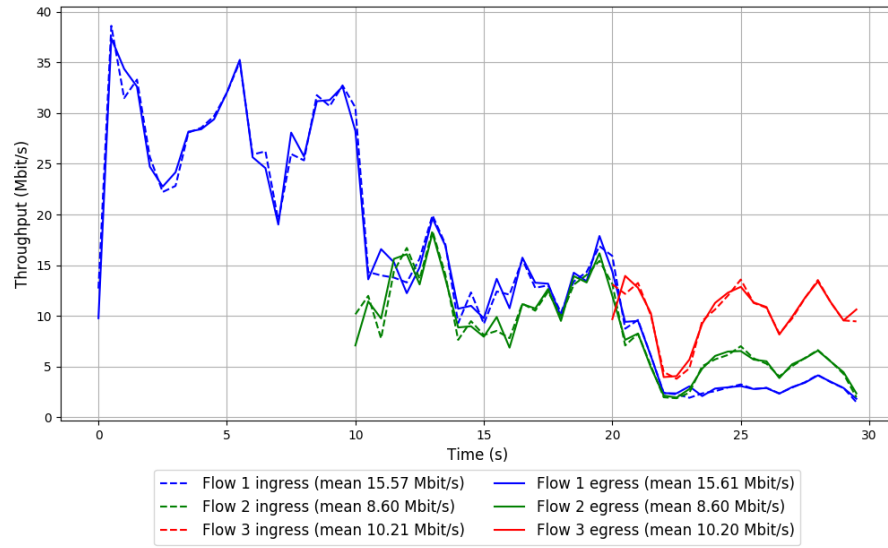3 flows with 10s interval between flows

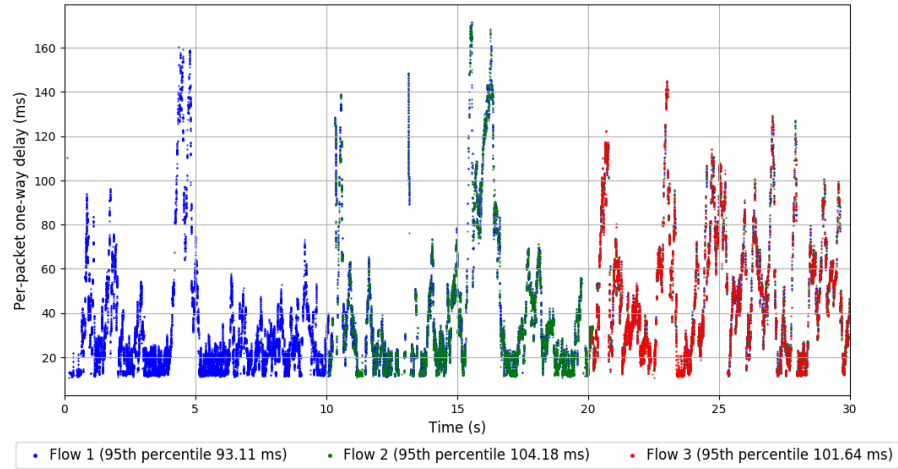| scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	16.31	9.03	13.39	108.93	127.88	157.62	0.03	0.08	0.15
TCP Cubic	3	16.73	8.14	6.64	236.75	255.30	248.19	0.16	0.65	1.72
LEDBAT	3	17.51	8.33	3.97	145.86	164.57	173.54	0.19	0.40	1.43
PCC	3	5.80	7.82	2.84	164.34	180.75	167.58	1.05	1.54	10.25
QUIC Cubic	3	14.00	7.43	5.50	319.03	377.41	387.04	0.45	1.01	2.40
SCReAM	3	0.20	0.22	0.22	18.69	18.47	15.89	0.00	0.00	0.00
WebRTC media	3	2.32	1.54	0.69	24.17	23.18	25.58	0.00	0.00	0.00
Sprout	3	9.15	7.61	6.14	96.66	111.13	133.85	0.15	0.11	0.28
TaoVA-100x	3	5.41	5.52	9.10	56.07	63.57	77.16	0.02	0.26	0.01
TCP Vegas	3	9.21	1.60	5.29	112.77	68.10	40.38	0.10	0.00	0.02
Verus	3	16.63	8.86	5.70	317.82	337.35	347.47	9.33	12.82	14.30
Copa	3	9.07	6.48	4.83	53.01	63.87	59.13	0.00	0.02	0.04
FillP	3	12.25	12.13	15.91	647.38	419.75	527.48	63.37	70.71	77.77
Indigo-1-32	3	1.67	1.91	2.43	30.56	33.91	28.18	0.00	0.00	0.00
Vivace-latency	3	4.53	3.45	2.92	24.04	28.93	36.70	0.14	0.07	0.11
Vivace-loss	3	17.25	7.12	8.24	494.78	437.30	359.72	23.81	22.23	19.26
Vivace-LTE	3	11.34	7.69	6.65	141.23	178.92	180.49	2.01	3.50	4.46

```
Run 1: Statistics of TCP BBR

Start at: 2018-03-12 23:44:58
End at: 2018-03-12 23:45:28
Local clock offset: 1.446 ms
Remote clock offset: -5.029 ms


# Below is generated by plot.py at 2018-03-13 00:46:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 24.75 Mbit/s
95th percentile per-packet one-way delay: 125.634 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 15.61 Mbit/s
95th percentile per-packet one-way delay: 112.439 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 8.60 Mbit/s
95th percentile per-packet one-way delay: 140.775 ms
Loss rate: 0.02%
-- Flow 3:
Average throughput: 10.20 Mbit/s
95th percentile per-packet one-way delay: 187.976 ms
Loss rate: 0.04%
```
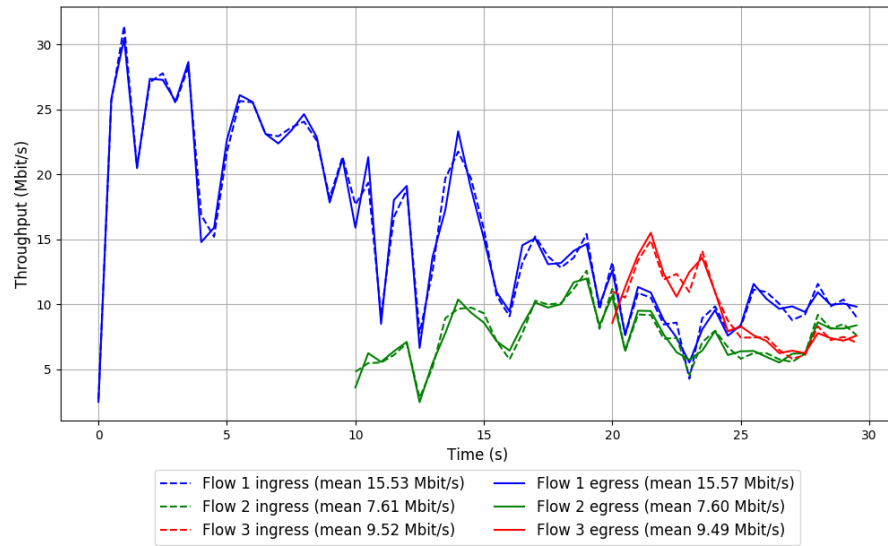
Run 1: Report of TCP BBR — Data Link

Flow 1 ingress (mean 15.57 Mbit/s)   Flow 1 egress (mean 15.61 Mbit/s)
Flow 2 ingress (mean 8.60 Mbit/s)   Flow 2 egress (mean 8.60 Mbit/s)
Flow 3 ingress (mean 10.21 Mbit/s)   Flow 3 egress (mean 10.20 Mbit/s)

Flow 1 (95th percentile 112.44 ms)   Flow 2 (95th percentile 140.78 ms)   Flow 3 (95th percentile 187.98 ms)
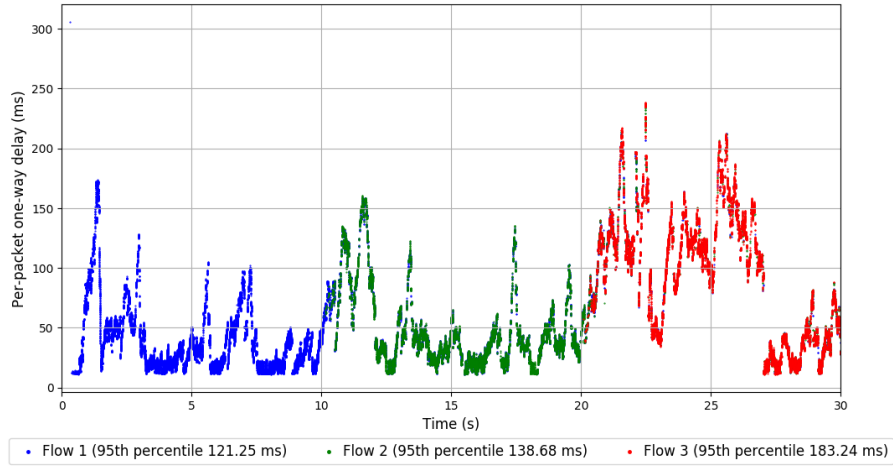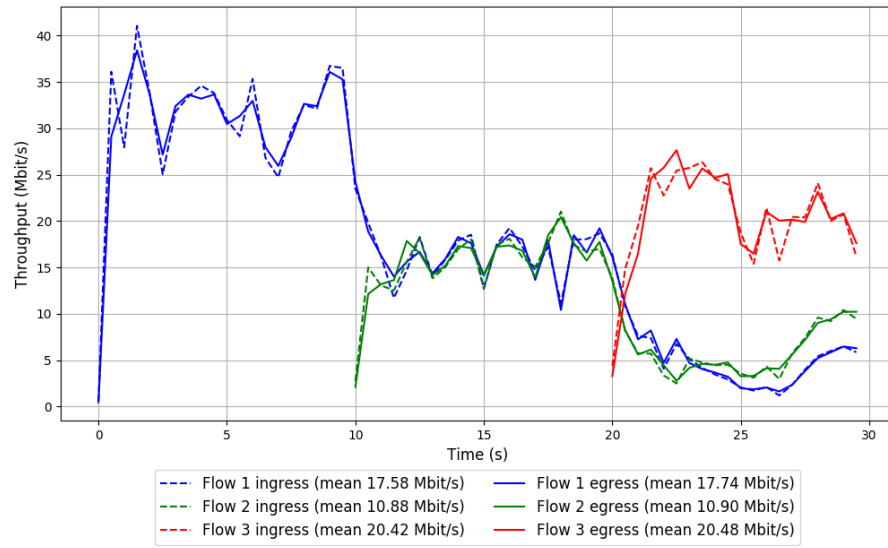
```
Run 2: Statistics of TCP BBR

Start at: 2018-03-13 00:08:54
End at: 2018-03-13 00:09:24
Local clock offset: 0.97 ms
Remote clock offset: -5.065 ms


# Below is generated by plot.py at 2018-03-13 00:46:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 23.80 Mbit/s
95th percentile per-packet one-way delay: 97.655 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 15.57 Mbit/s
95th percentile per-packet one-way delay: 93.106 ms
Loss rate: 0.07%
-- Flow 2:
Average throughput: 7.60 Mbit/s
95th percentile per-packet one-way delay: 104.180 ms
Loss rate: 0.18%
-- Flow 3:
Average throughput: 9.49 Mbit/s
95th percentile per-packet one-way delay: 101.641 ms
Loss rate: 0.28%
```
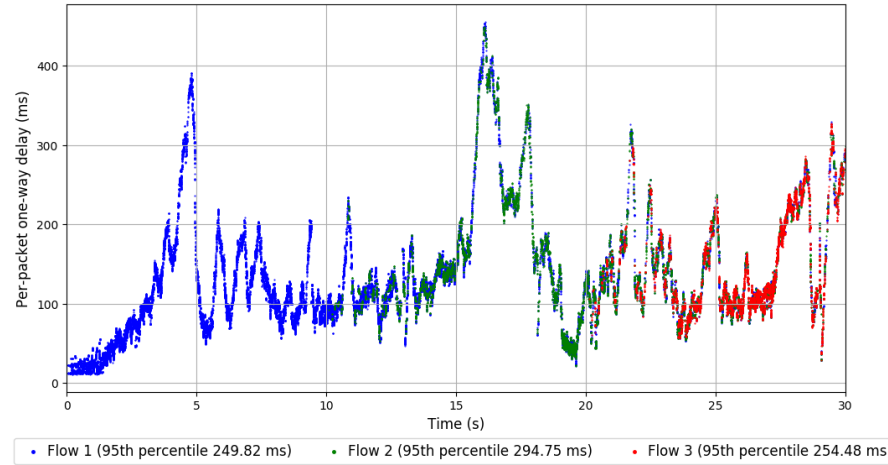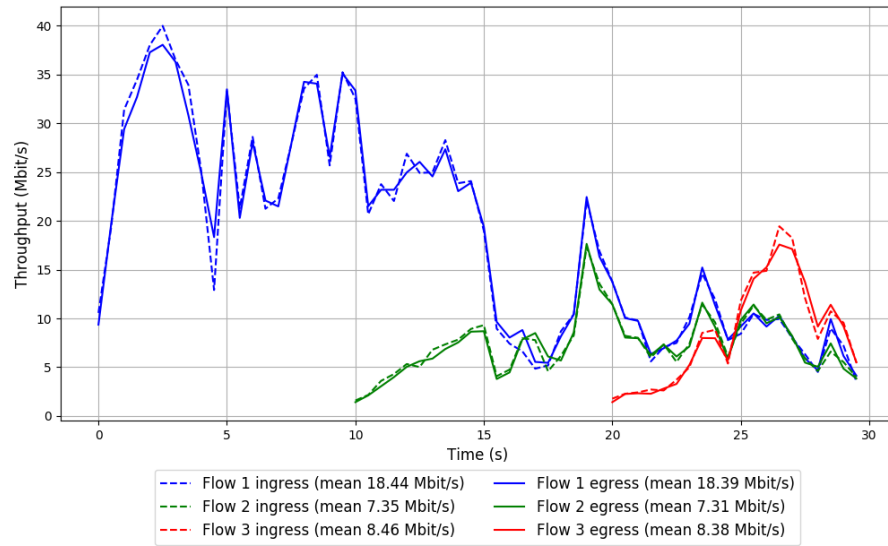
Run 2: Report of TCP BBR — Data Link

```
Run 3: Statistics of TCP BBR

Start at: 2018-03-13 00:32:53
End at: 2018-03-13 00:33:23
Local clock offset: 0.843 ms
Remote clock offset: -4.994 ms


# Below is generated by plot.py at 2018-03-13 00:46:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 31.89 Mbit/s
95th percentile per-packet one-way delay: 148.050 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 17.74 Mbit/s
95th percentile per-packet one-way delay: 121.253 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 10.90 Mbit/s
95th percentile per-packet one-way delay: 138.678 ms
Loss rate: 0.04%
-- Flow 3:
Average throughput: 20.48 Mbit/s
95th percentile per-packet one-way delay: 183.235 ms
Loss rate: 0.12%
```

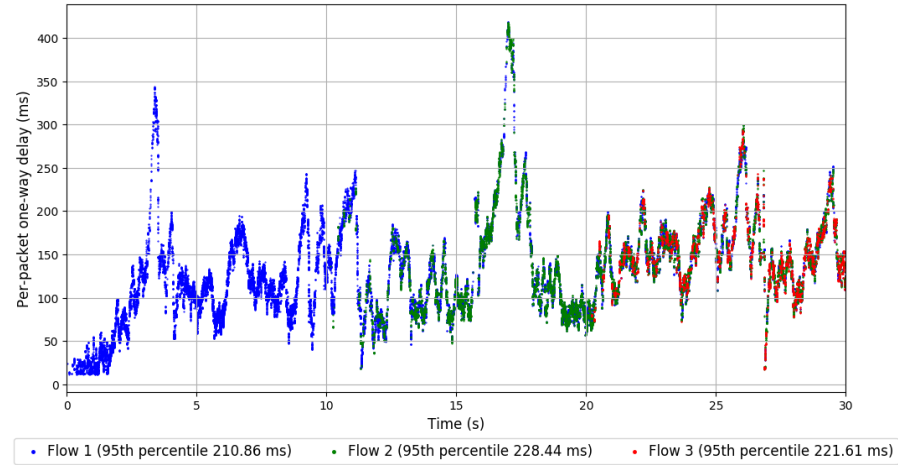Run 3: Report of TCP BBR — Data Link

```
Run 1: Statistics of TCP Cubic

Start at: 2018-03-12 23:39:40
End at: 2018-03-12 23:40:10
Local clock offset: 1.421 ms
Remote clock offset: -4.856 ms


# Below is generated by plot.py at 2018-03-13 00:46:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 25.98 Mbit/s
95th percentile per-packet one-way delay: 260.517 ms
Loss rate: 0.47%
-- Flow 1:
Average throughput: 18.39 Mbit/s
95th percentile per-packet one-way delay: 249.821 ms
Loss rate: 0.19%
-- Flow 2:
Average throughput: 7.31 Mbit/s
95th percentile per-packet one-way delay: 294.745 ms
Loss rate: 0.80%
-- Flow 3:
Average throughput: 8.38 Mbit/s
95th percentile per-packet one-way delay: 254.482 ms
Loss rate: 1.79%
```

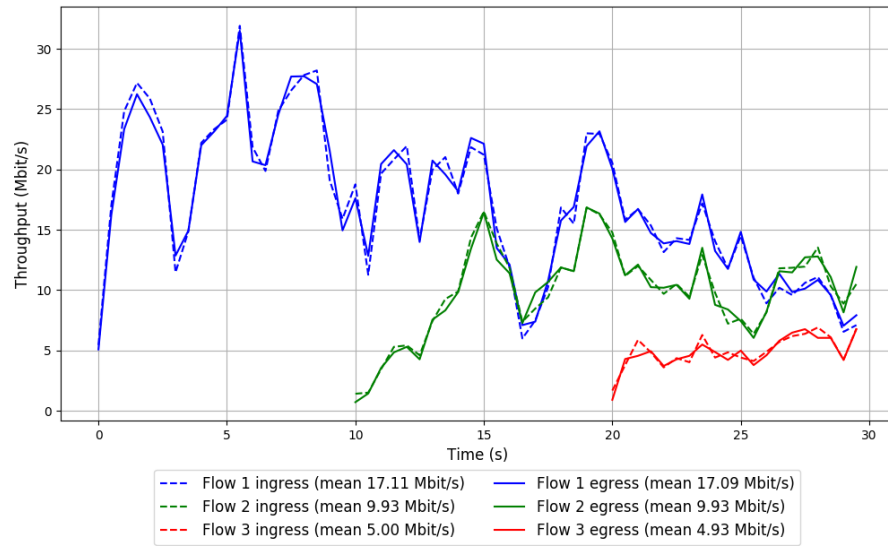Run 1: Report of TCP Cubic — Data Link

```
Run 2: Statistics of TCP Cubic

Start at: 2018-03-13 00:03:36
End at: 2018-03-13 00:04:06
Local clock offset: 1.163 ms
Remote clock offset: -4.965 ms


# Below is generated by plot.py at 2018-03-13 00:46:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 25.28 Mbit/s
95th percentile per-packet one-way delay: 215.341 ms
Loss rate: 0.41%
-- Flow 1:
Average throughput: 17.09 Mbit/s
95th percentile per-packet one-way delay: 210.857 ms
Loss rate: 0.18%
-- Flow 2:
Average throughput: 9.93 Mbit/s
95th percentile per-packet one-way delay: 228.443 ms
Loss rate: 0.55%
-- Flow 3:
Average throughput: 4.93 Mbit/s
95th percentile per-packet one-way delay: 221.607 ms
Loss rate: 2.15%
```

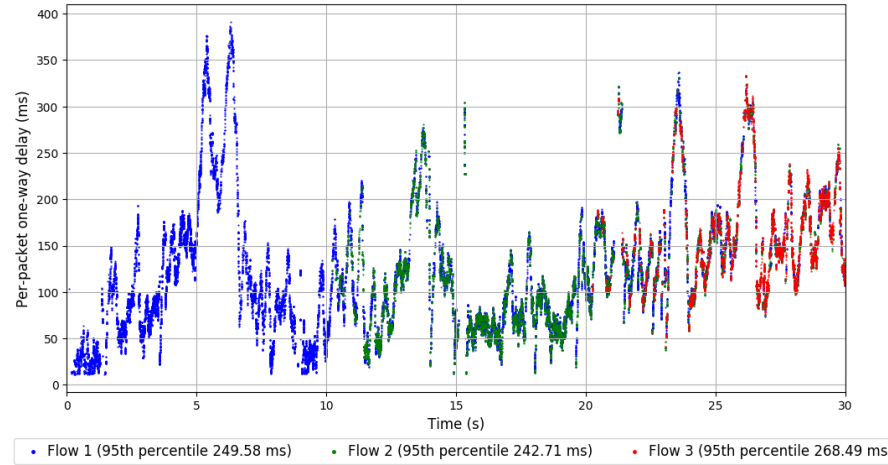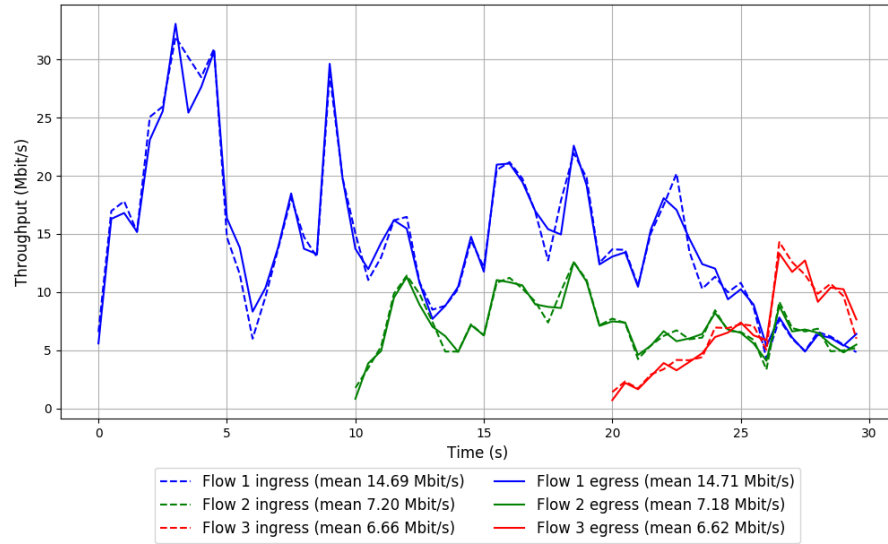Run 2: Report of TCP Cubic — Data Link

```
Run 3: Statistics of TCP Cubic

Start at: 2018-03-13 00:27:34
End at: 2018-03-13 00:28:04
Local clock offset: 0.896 ms
Remote clock offset: -5.004 ms


# Below is generated by plot.py at 2018-03-13 00:46:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 21.68 Mbit/s
95th percentile per-packet one-way delay: 250.216 ms
Loss rate: 0.33%
-- Flow 1:
Average throughput: 14.71 Mbit/s
95th percentile per-packet one-way delay: 249.581 ms
Loss rate: 0.11%
-- Flow 2:
Average throughput: 7.18 Mbit/s
95th percentile per-packet one-way delay: 242.707 ms
Loss rate: 0.61%
-- Flow 3:
Average throughput: 6.62 Mbit/s
95th percentile per-packet one-way delay: 268.487 ms
Loss rate: 1.21%
```
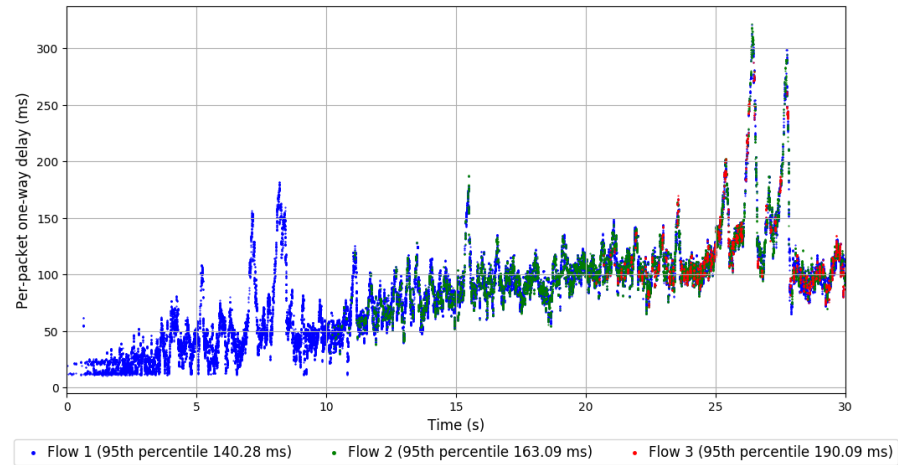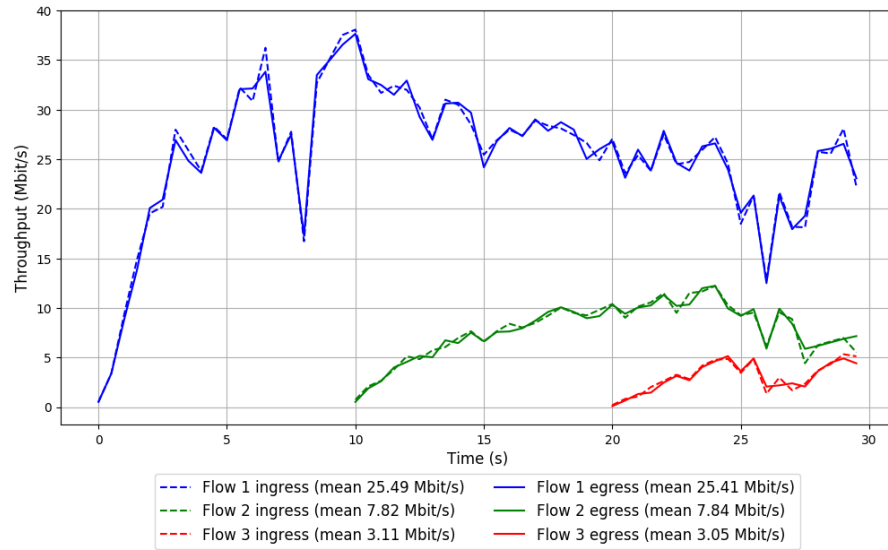
Run 3: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 14.69 Mbit/s)   Flow 1 egress (mean 14.71 Mbit/s)
Flow 2 ingress (mean 7.20 Mbit/s)   Flow 2 egress (mean 7.18 Mbit/s)
Flow 3 ingress (mean 6.66 Mbit/s)   Flow 3 egress (mean 6.62 Mbit/s)

Flow 1 (95th percentile 249.58 ms)   Flow 2 (95th percentile 242.71 ms)   Flow 3 (95th percentile 268.49 ms)
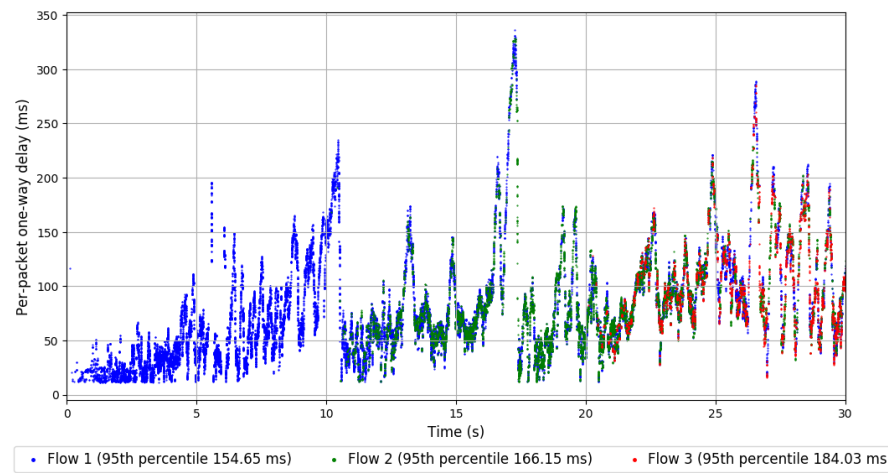
15

```
Run 1: Statistics of LEDBAT

Start at: 2018-03-12 23:38:20
End at: 2018-03-12 23:38:50
Local clock offset: 1.408 ms
Remote clock offset: -4.923 ms


# Below is generated by plot.py at 2018-03-13 00:46:09
# Datalink statistics
-- Total of 3 flows:
Average throughput: 31.63 Mbit/s
95th percentile per-packet one-way delay: 145.334 ms
Loss rate: 0.35%
-- Flow 1:
Average throughput: 25.41 Mbit/s
95th percentile per-packet one-way delay: 140.282 ms
Loss rate: 0.34%
-- Flow 2:
Average throughput: 7.84 Mbit/s
95th percentile per-packet one-way delay: 163.094 ms
Loss rate: 0.05%
-- Flow 3:
Average throughput: 3.05 Mbit/s
95th percentile per-packet one-way delay: 190.093 ms
Loss rate: 2.32%
```

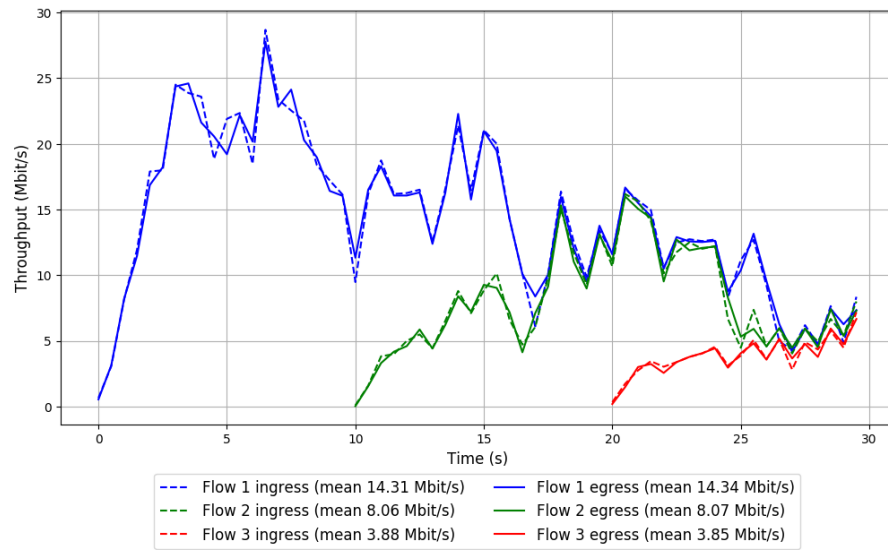Run 1: Report of LEDBAT — Data Link

```
Run 2: Statistics of LEDBAT

Start at: 2018-03-13 00:02:16
End at: 2018-03-13 00:02:46
Local clock offset: 1.068 ms
Remote clock offset: -4.896 ms


# Below is generated by plot.py at 2018-03-13 00:46:09
# Datalink statistics
-- Total of 3 flows:
Average throughput: 20.96 Mbit/s
95th percentile per-packet one-way delay: 160.921 ms
Loss rate: 0.30%
-- Flow 1:
Average throughput: 14.34 Mbit/s
95th percentile per-packet one-way delay: 154.648 ms
Loss rate: 0.14%
-- Flow 2:
Average throughput: 8.07 Mbit/s
95th percentile per-packet one-way delay: 166.153 ms
Loss rate: 0.47%
-- Flow 3:
Average throughput: 3.85 Mbit/s
95th percentile per-packet one-way delay: 184.031 ms
Loss rate: 1.40%
```
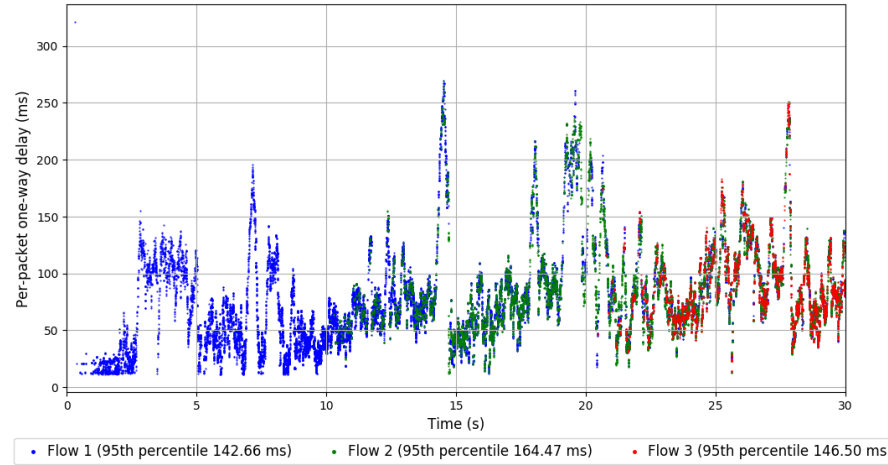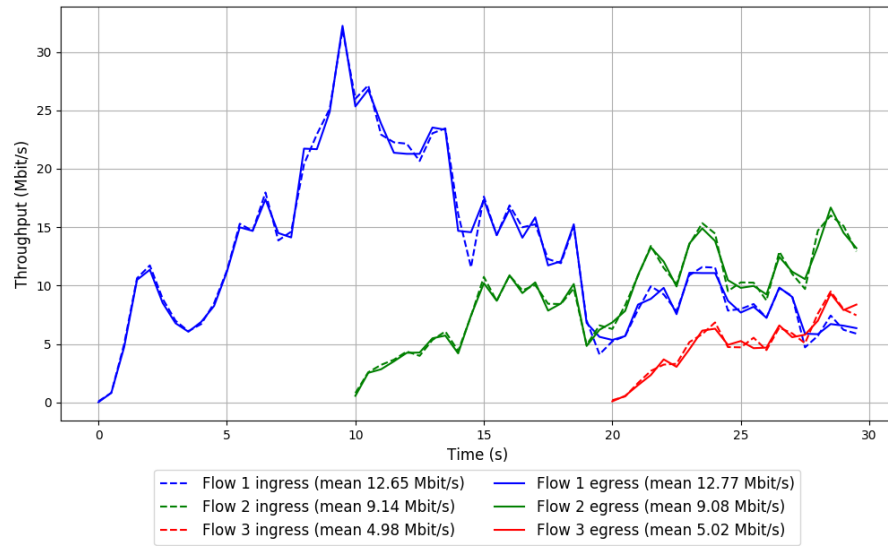
Run 2: Report of LEDBAT — Data Link

```
Run 3: Statistics of LEDBAT

Start at: 2018-03-13 00:26:14
End at: 2018-03-13 00:26:44
Local clock offset: 0.881 ms
Remote clock offset: -5.01 ms

# Below is generated by plot.py at 2018-03-13 00:46:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 20.53 Mbit/s
95th percentile per-packet one-way delay: 149.084 ms
Loss rate: 0.30%
-- Flow 1:
Average throughput: 12.77 Mbit/s
95th percentile per-packet one-way delay: 142.658 ms
Loss rate: 0.08%
-- Flow 2:
Average throughput: 9.08 Mbit/s
95th percentile per-packet one-way delay: 164.475 ms
Loss rate: 0.68%
-- Flow 3:
Average throughput: 5.02 Mbit/s
95th percentile per-packet one-way delay: 146.500 ms
Loss rate: 0.57%
```

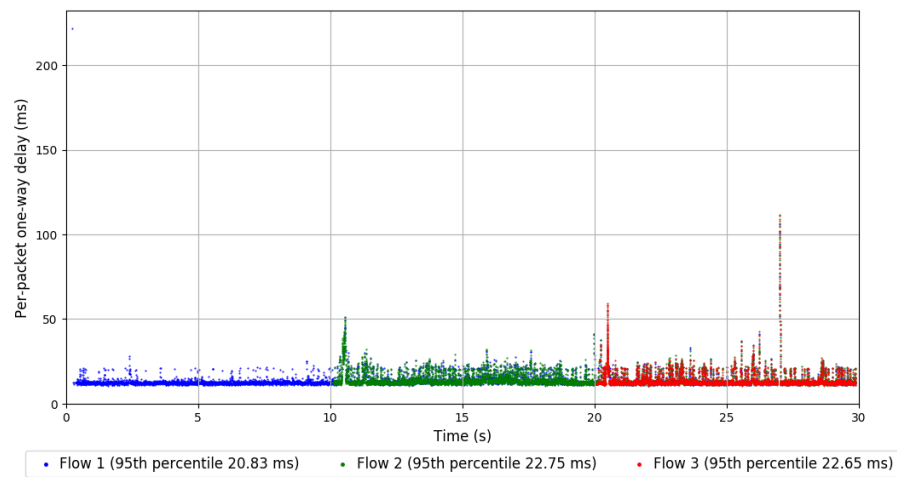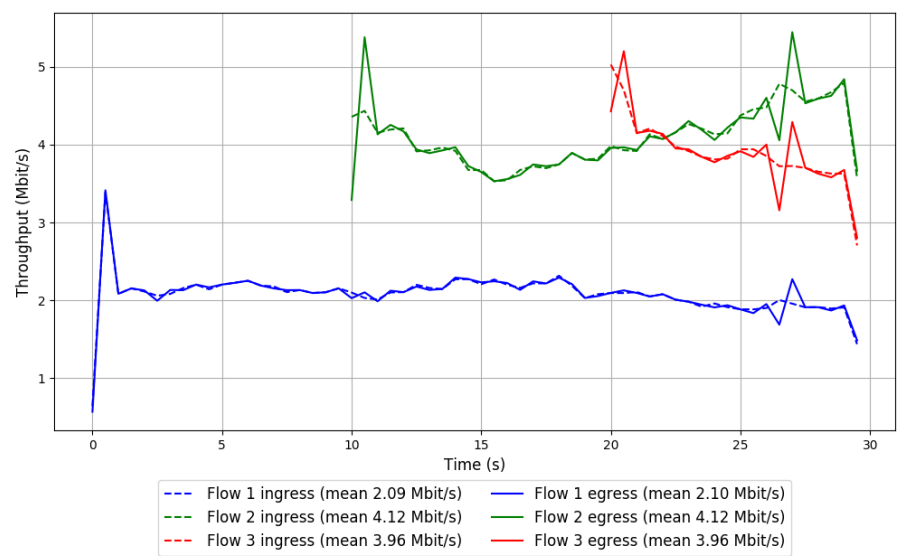Run 3: Report of LEDBAT — Data Link

```
Run 1: Statistics of PCC

Start at: 2018-03-12 23:42:19
End at: 2018-03-12 23:42:49
Local clock offset: 1.375 ms
Remote clock offset: -4.933 ms


# Below is generated by plot.py at 2018-03-13 00:46:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.18 Mbit/s
95th percentile per-packet one-way delay: 21.817 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 20.826 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 4.12 Mbit/s
95th percentile per-packet one-way delay: 22.750 ms
Loss rate: 0.01%
-- Flow 3:
Average throughput: 3.96 Mbit/s
95th percentile per-packet one-way delay: 22.651 ms
Loss rate: 0.00%
```
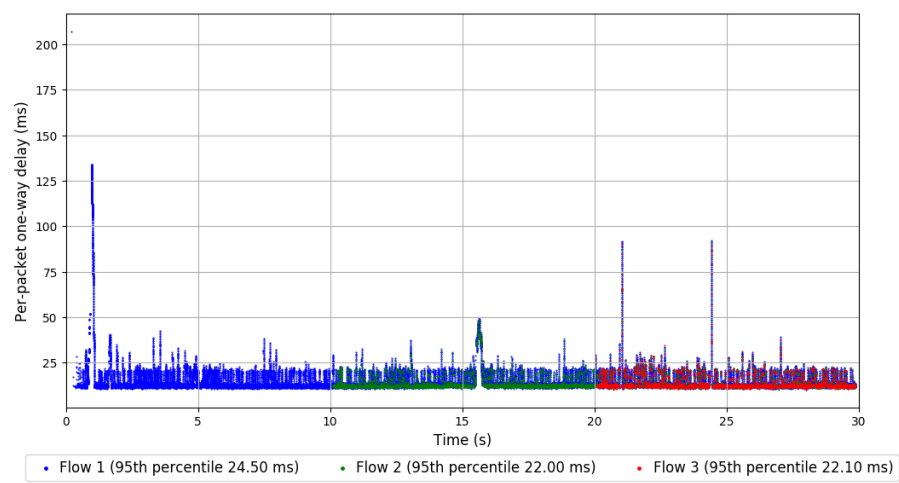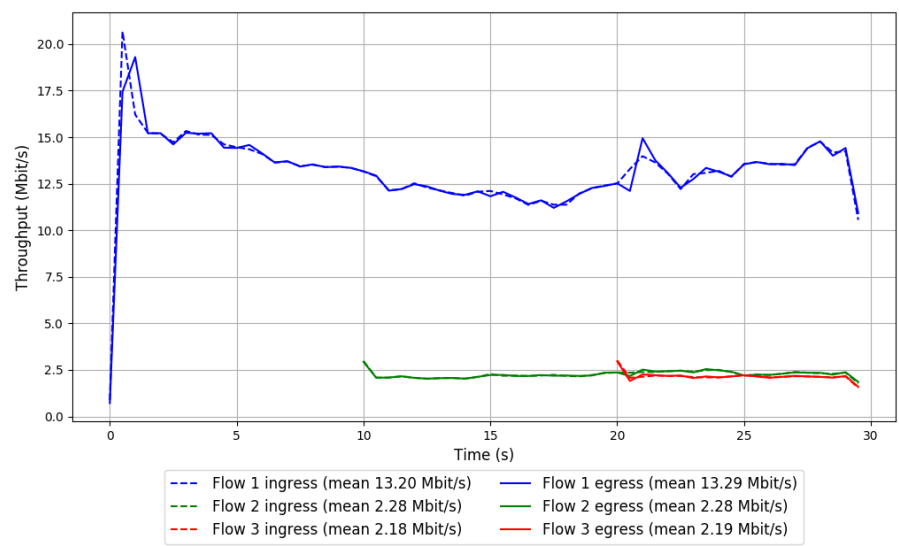
Run 1: Report of PCC — Data Link

```
Run 2: Statistics of PCC

Start at: 2018-03-13 00:06:15
End at: 2018-03-13 00:06:45
Local clock offset: 1.114 ms
Remote clock offset: -5.054 ms


# Below is generated by plot.py at 2018-03-13 00:46:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 15.53 Mbit/s
95th percentile per-packet one-way delay: 23.864 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 13.29 Mbit/s
95th percentile per-packet one-way delay: 24.500 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 21.995 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 22.100 ms
Loss rate: 0.00%
```
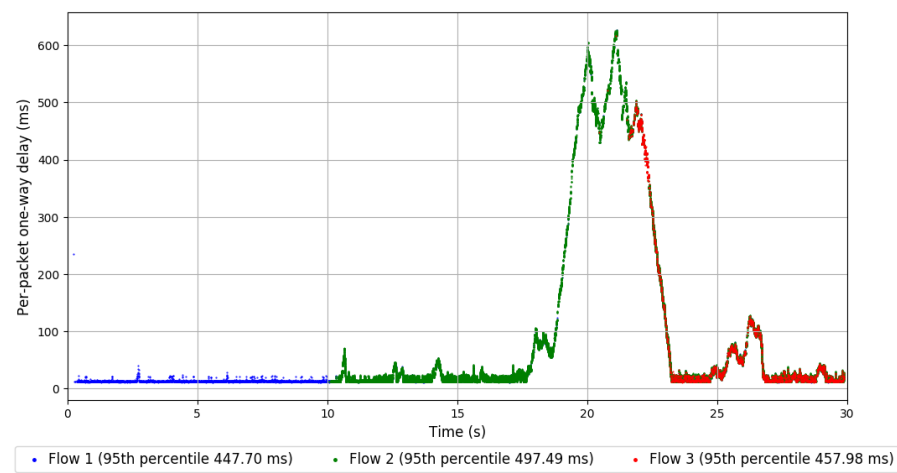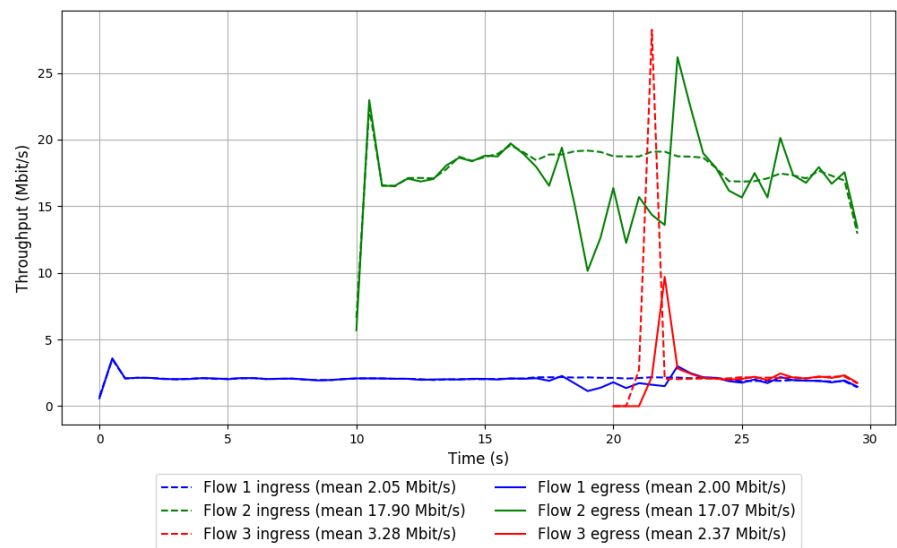
Run 2: Report of PCC — Data Link

Flow 1 ingress (mean 13.20 Mbit/s) --- Flow 1 egress (mean 13.29 Mbit/s) ---
Flow 2 ingress (mean 2.28 Mbit/s) --- Flow 2 egress (mean 2.28 Mbit/s) ---
Flow 3 ingress (mean 2.18 Mbit/s) --- Flow 3 egress (mean 2.19 Mbit/s)

Flow 1 (95th percentile 24.50 ms) • Flow 2 (95th percentile 22.00 ms) • Flow 3 (95th percentile 22.10 ms)

```
Run 3: Statistics of PCC

Start at: 2018-03-13 00:30:13
End at: 2018-03-13 00:30:43
Local clock offset: 0.847 ms
Remote clock offset: -4.991 ms


# Below is generated by plot.py at 2018-03-13 00:46:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 14.19 Mbit/s
95th percentile per-packet one-way delay: 490.473 ms
Loss rate: 6.29%
-- Flow 1:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 447.698 ms
Loss rate: 3.16%
-- Flow 2:
Average throughput: 17.07 Mbit/s
95th percentile per-packet one-way delay: 497.490 ms
Loss rate: 4.61%
-- Flow 3:
Average throughput: 2.37 Mbit/s
95th percentile per-packet one-way delay: 457.975 ms
Loss rate: 30.75%
```
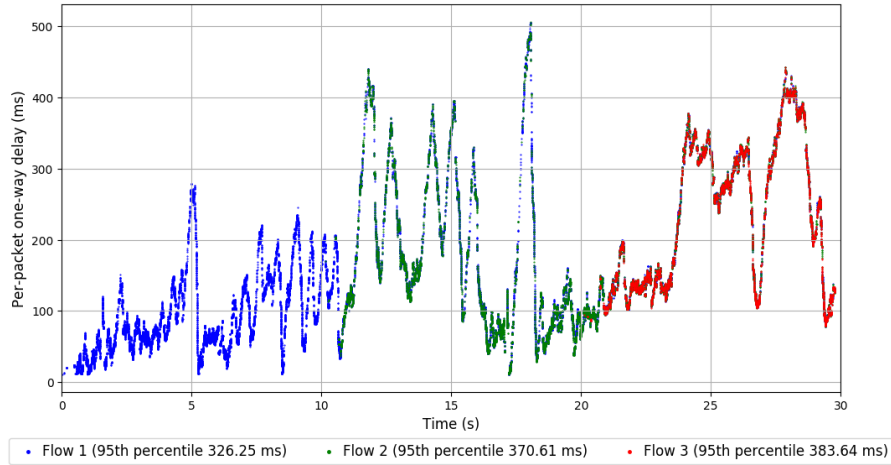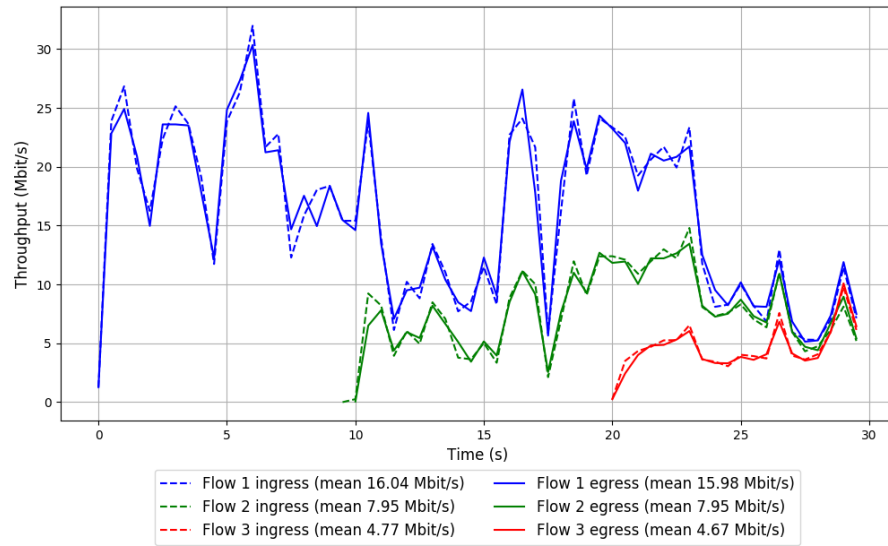
Run 3: Report of PCC — Data Link

Legend:
- Flow 1 ingress (mean 2.05 Mbit/s) — Flow 1 egress (mean 2.00 Mbit/s)
- Flow 2 ingress (mean 17.90 Mbit/s) — Flow 2 egress (mean 17.07 Mbit/s)
- Flow 3 ingress (mean 3.28 Mbit/s) — Flow 3 egress (mean 2.37 Mbit/s)

Legend:
- Flow 1 (95th percentile 447.70 ms)
- Flow 2 (95th percentile 497.49 ms)
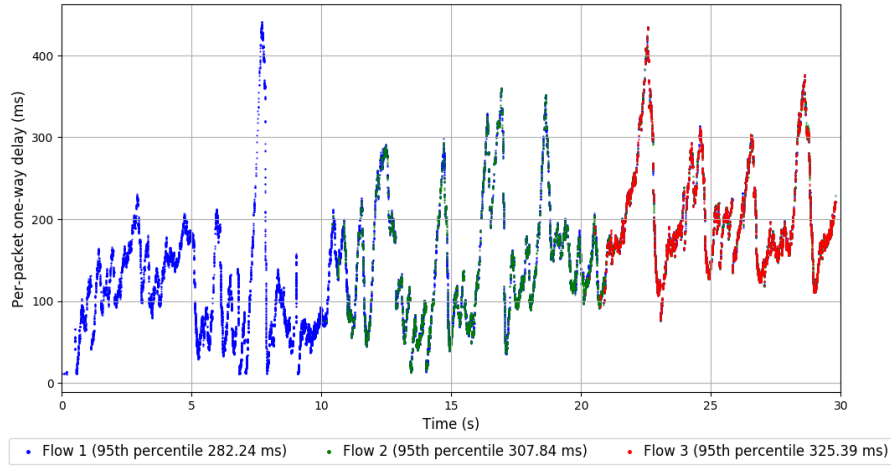- Flow 3 (95th percentile 457.98 ms)

```
Run 1: Statistics of QUIC Cubic

Start at: 2018-03-12 23:48:58
End at: 2018-03-12 23:49:28
Local clock offset: 1.438 ms
Remote clock offset: -4.993 ms


# Below is generated by plot.py at 2018-03-13 00:46:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 22.73 Mbit/s
95th percentile per-packet one-way delay: 345.717 ms
Loss rate: 0.58%
-- Flow 1:
Average throughput: 15.98 Mbit/s
95th percentile per-packet one-way delay: 326.250 ms
Loss rate: 0.32%
-- Flow 2:
Average throughput: 7.95 Mbit/s
95th percentile per-packet one-way delay: 370.612 ms
Loss rate: 0.74%
-- Flow 3:
Average throughput: 4.67 Mbit/s
95th percentile per-packet one-way delay: 383.640 ms
Loss rate: 2.59%
```

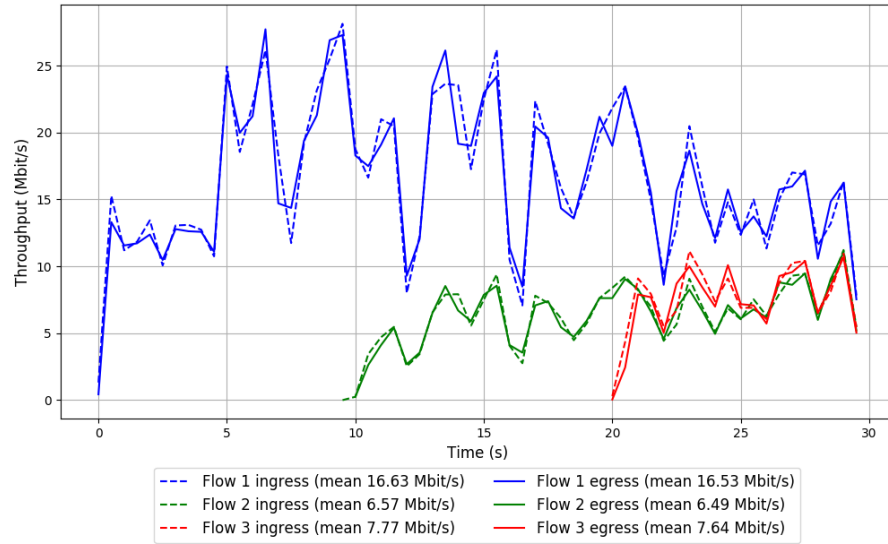Run 1: Report of QUIC Cubic — Data Link

```
Run 2: Statistics of QUIC Cubic

Start at: 2018-03-13 00:12:56
End at: 2018-03-13 00:13:26
Local clock offset: 1.016 ms
Remote clock offset: -4.979 ms


# Below is generated by plot.py at 2018-03-13 00:46:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 23.30 Mbit/s
95th percentile per-packet one-way delay: 298.467 ms
Loss rate: 0.98%
-- Flow 1:
Average throughput: 16.53 Mbit/s
95th percentile per-packet one-way delay: 282.244 ms
Loss rate: 0.58%
-- Flow 2:
Average throughput: 6.49 Mbit/s
95th percentile per-packet one-way delay: 307.843 ms
Loss rate: 1.53%
-- Flow 3:
Average throughput: 7.64 Mbit/s
95th percentile per-packet one-way delay: 325.386 ms
Loss rate: 2.62%
```

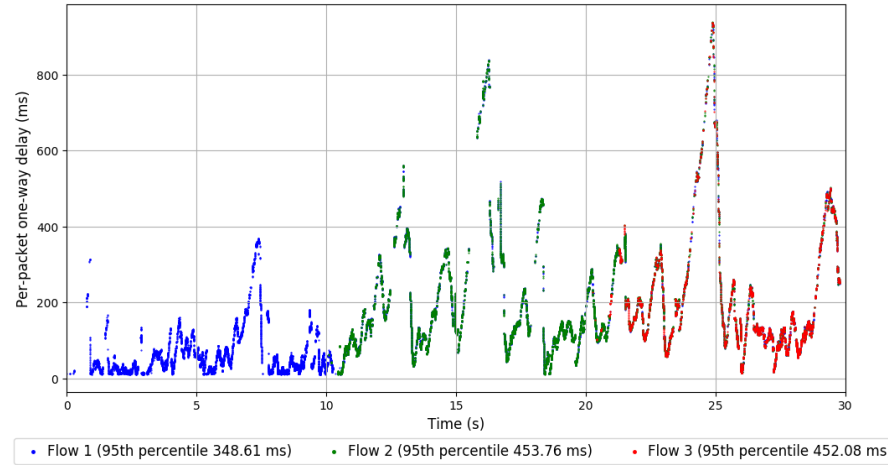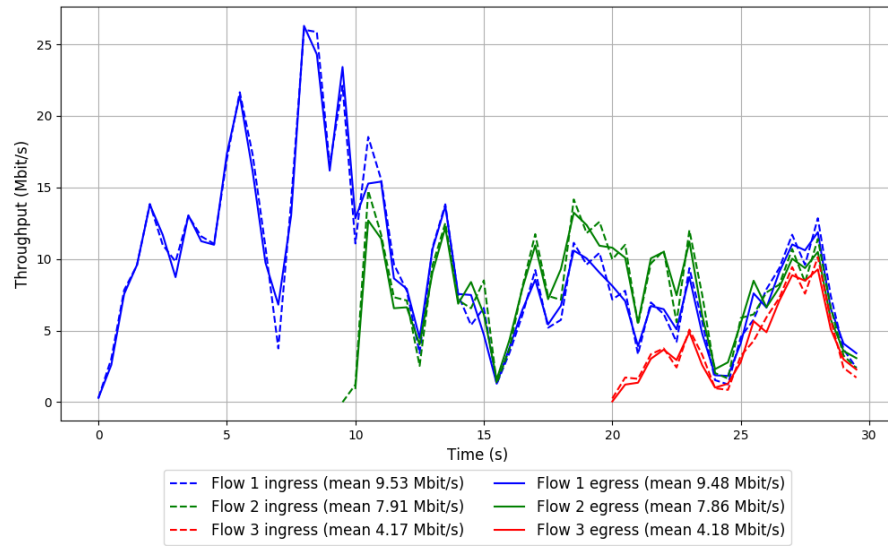Run 2: Report of QUIC Cubic — Data Link

```
Run 3: Statistics of QUIC Cubic

Start at: 2018-03-13 00:36:53
End at: 2018-03-13 00:37:23
Local clock offset: 0.958 ms
Remote clock offset: -4.984 ms


# Below is generated by plot.py at 2018-03-13 00:46:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 16.03 Mbit/s
95th percentile per-packet one-way delay: 388.746 ms
Loss rate: 0.68%
-- Flow 1:
Average throughput: 9.48 Mbit/s
95th percentile per-packet one-way delay: 348.610 ms
Loss rate: 0.44%
-- Flow 2:
Average throughput: 7.86 Mbit/s
95th percentile per-packet one-way delay: 453.765 ms
Loss rate: 0.77%
-- Flow 3:
Average throughput: 4.18 Mbit/s
95th percentile per-packet one-way delay: 452.083 ms
Loss rate: 1.98%
```

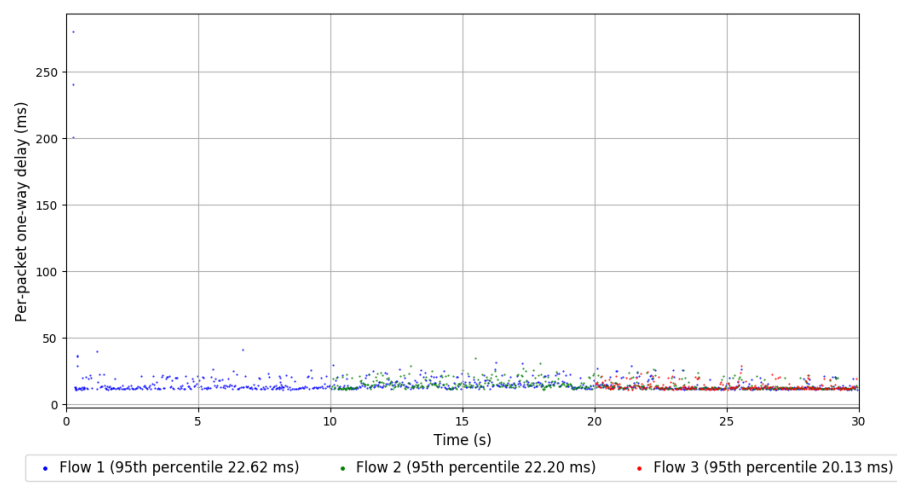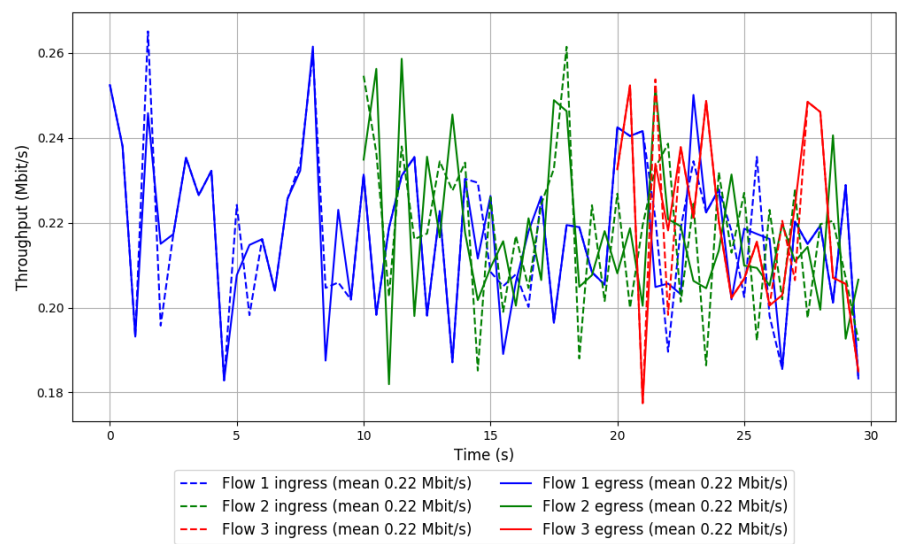Run 3: Report of QUIC Cubic — Data Link

```
Run 1: Statistics of SCReAM

Start at: 2018-03-12 23:41:00
End at: 2018-03-12 23:41:30
Local clock offset: 1.461 ms
Remote clock offset: -4.969 ms

# Below is generated by plot.py at 2018-03-13 00:46:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 22.109 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 22.624 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 22.197 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.133 ms
Loss rate: 0.00%
```
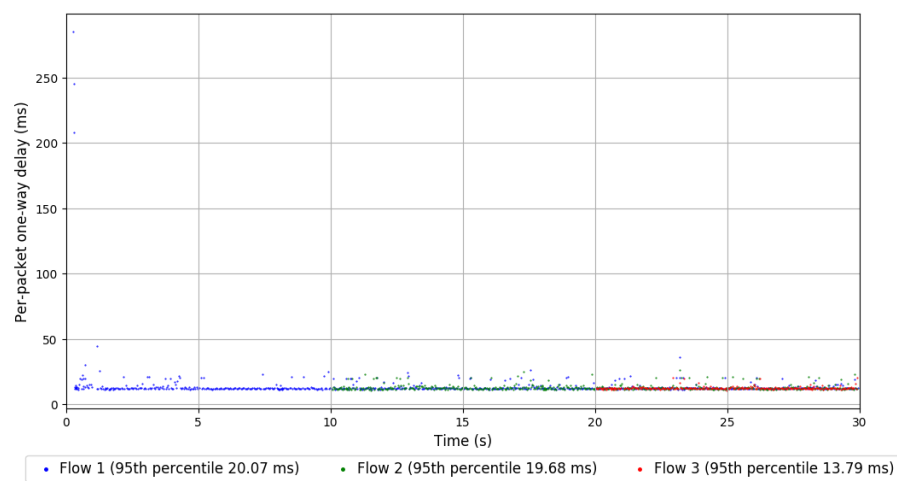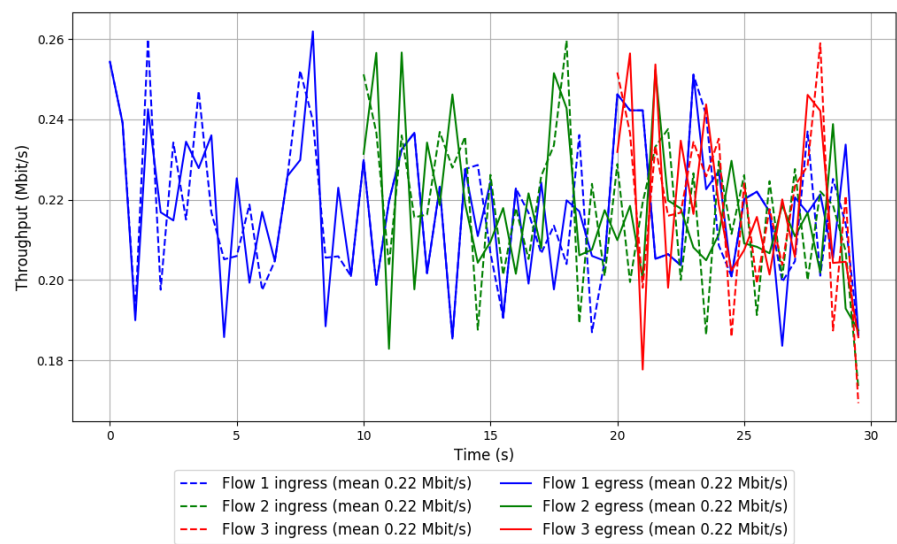
Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2018-03-13 00:04:56
End at: 2018-03-13 00:05:26
Local clock offset: 1.134 ms
Remote clock offset: -4.955 ms


# Below is generated by plot.py at 2018-03-13 00:46:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 19.699 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.065 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 19.678 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.792 ms
Loss rate: 0.00%
```
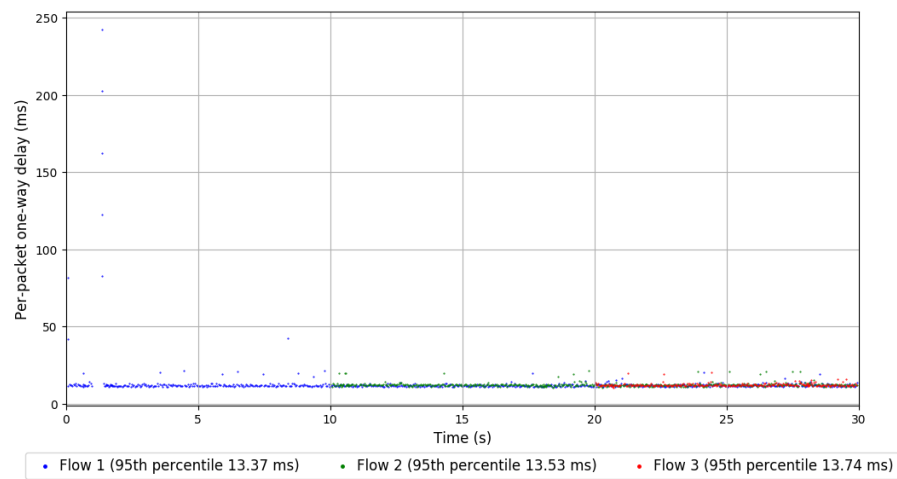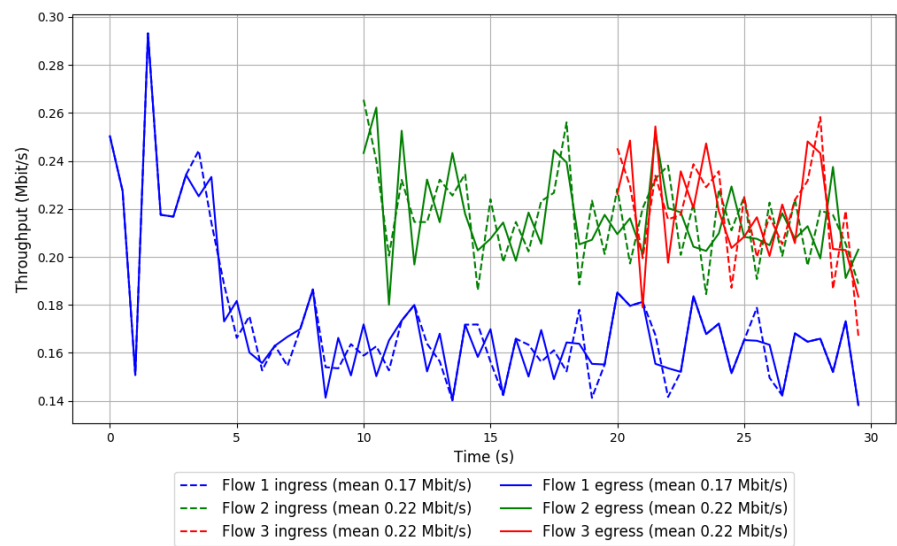
Run 2: Report of SCReAM — Data Link

```
Run 3: Statistics of SCReAM

Start at: 2018-03-13 00:28:54
End at: 2018-03-13 00:29:24
Local clock offset: 0.916 ms
Remote clock offset: -5.014 ms


# Below is generated by plot.py at 2018-03-13 00:46:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 13.547 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 13.367 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.534 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.743 ms
Loss rate: 0.00%
```
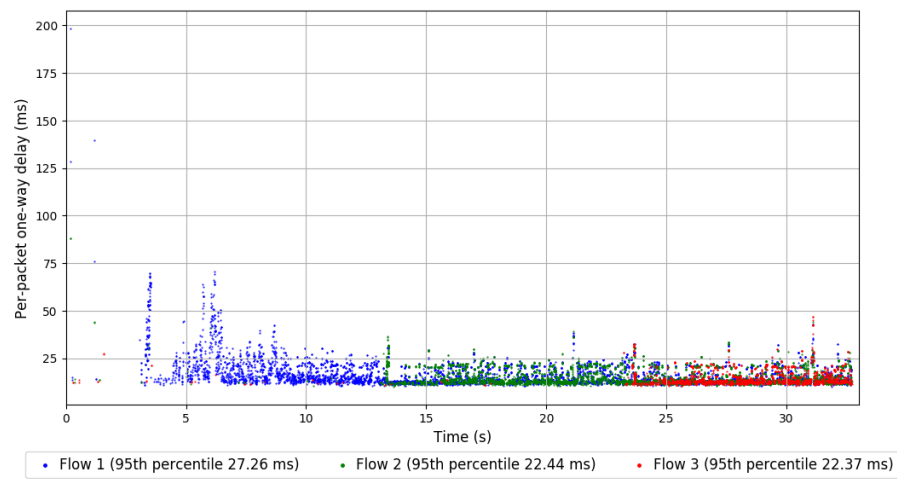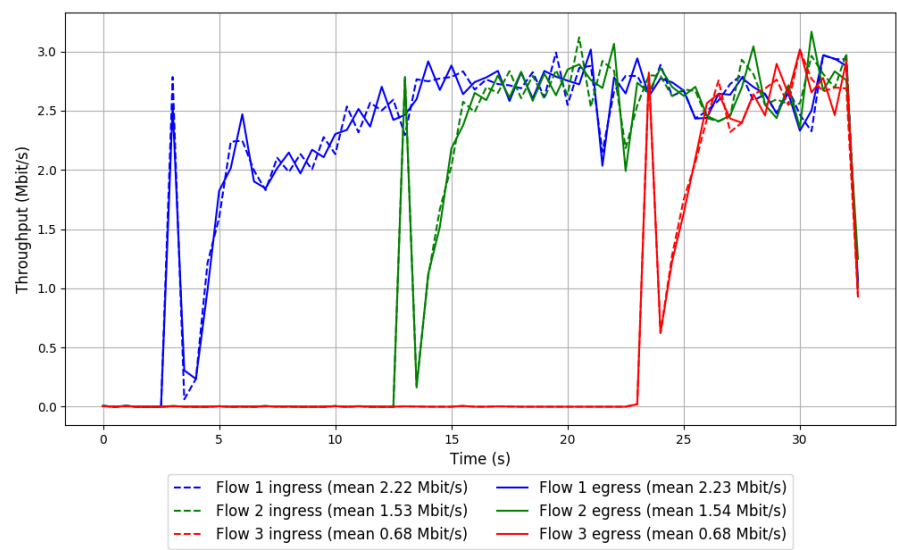
Run 3: Report of SCReAM — Data Link

```
Run 1: Statistics of WebRTC media

Start at: 2018-03-12 23:34:20
End at: 2018-03-12 23:34:50
Local clock offset: 1.39 ms
Remote clock offset: -4.785 ms


# Below is generated by plot.py at 2018-03-13 00:46:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.44 Mbit/s
95th percentile per-packet one-way delay: 24.764 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.23 Mbit/s
95th percentile per-packet one-way delay: 27.259 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 22.440 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 22.369 ms
Loss rate: 0.00%
```

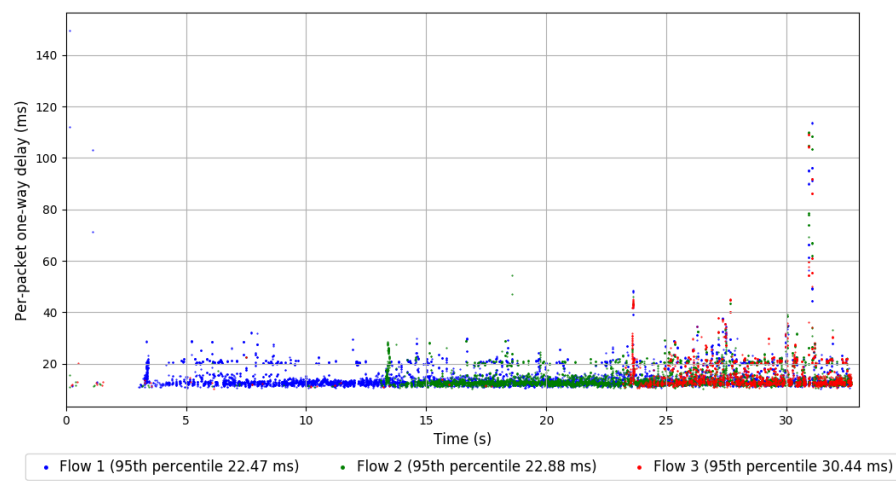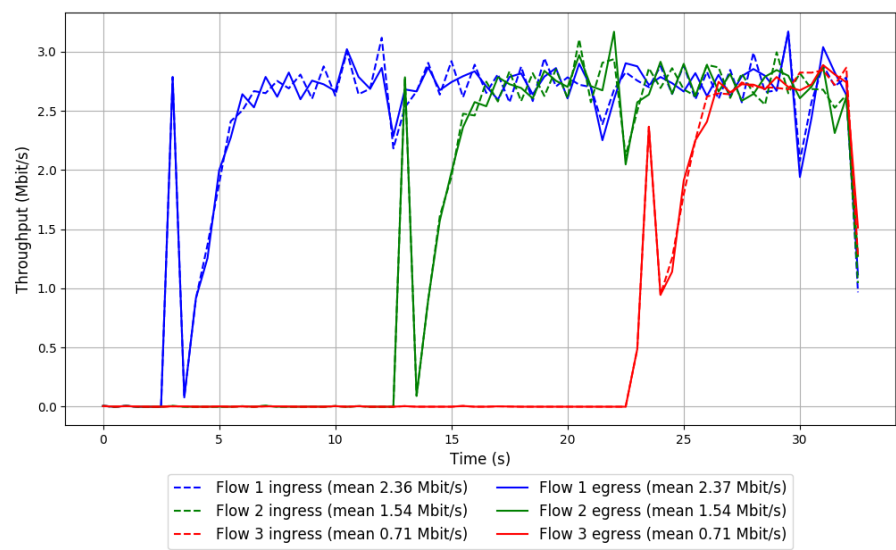Run 1: Report of WebRTC media — Data Link

```
Run 2: Statistics of WebRTC media

Start at: 2018-03-12 23:58:16
End at: 2018-03-12 23:58:46
Local clock offset: 1.145 ms
Remote clock offset: -4.964 ms


# Below is generated by plot.py at 2018-03-13 00:46:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.62 Mbit/s
95th percentile per-packet one-way delay: 23.638 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.37 Mbit/s
95th percentile per-packet one-way delay: 22.468 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 22.883 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 30.438 ms
Loss rate: 0.00%
```

Run 2: Report of WebRTC media — Data Link

```
Run 3: Statistics of WebRTC media

Start at: 2018-03-13 00:22:14
End at: 2018-03-13 00:22:44
Local clock offset: 0.925 ms
Remote clock offset: -4.94 ms


# Below is generated by plot.py at 2018-03-13 00:46:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.59 Mbit/s
95th percentile per-packet one-way delay: 23.544 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.35 Mbit/s
95th percentile per-packet one-way delay: 22.784 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.55 Mbit/s
95th percentile per-packet one-way delay: 24.221 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.69 Mbit/s
95th percentile per-packet one-way delay: 23.930 ms
Loss rate: 0.00%
```
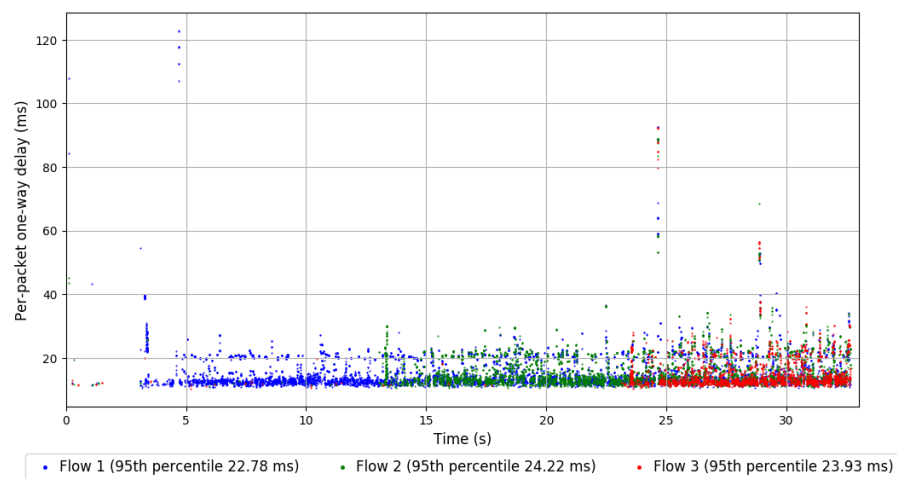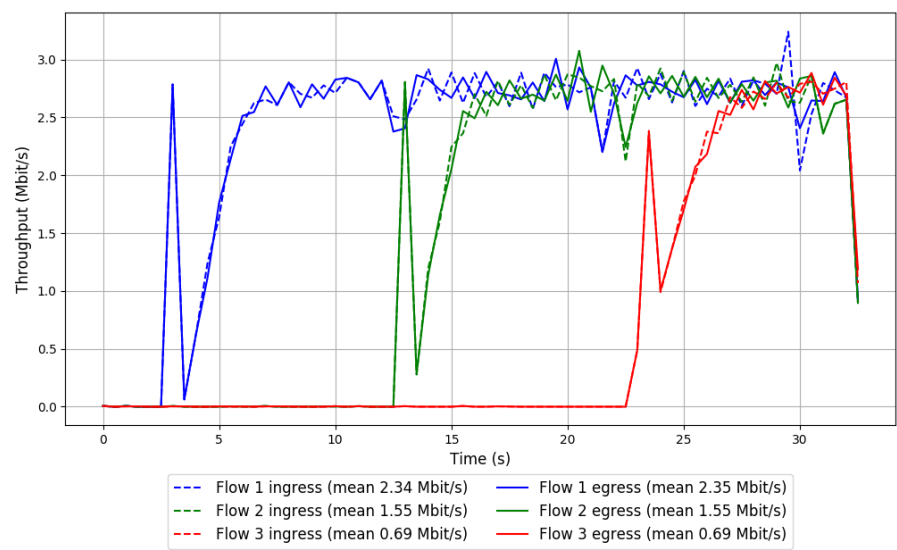
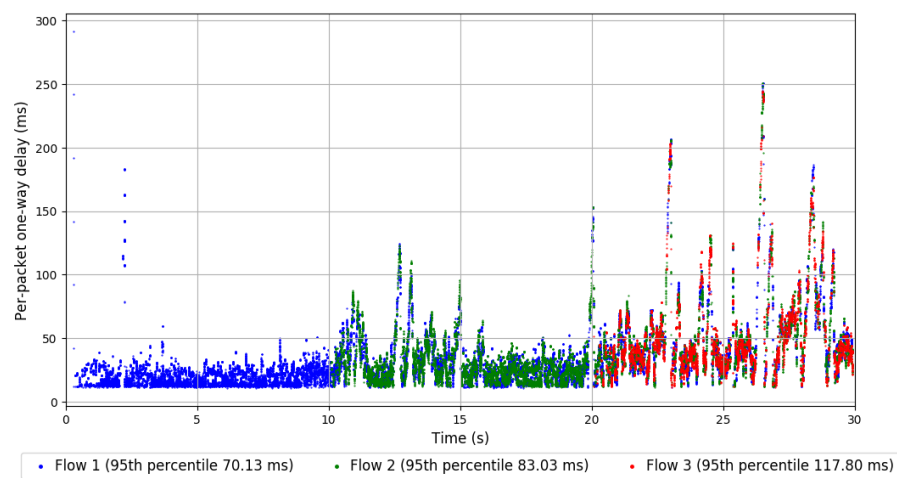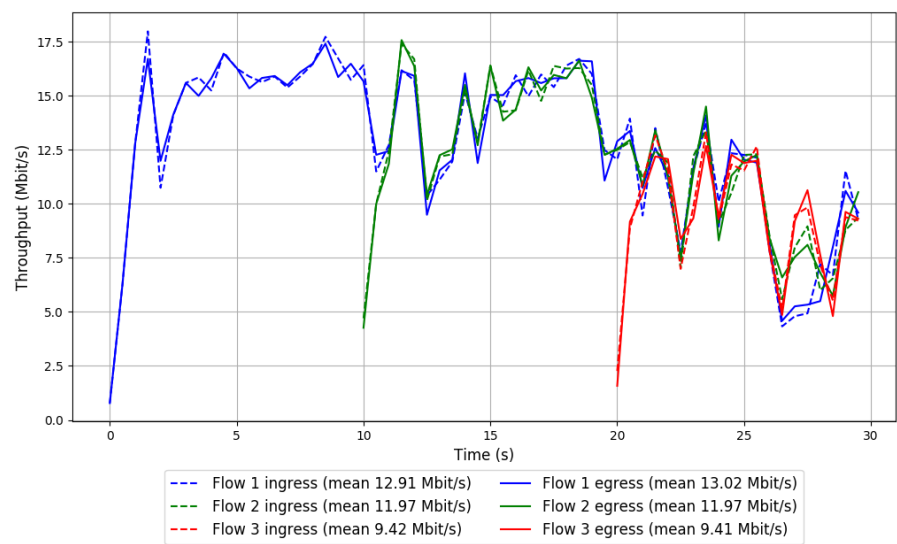Run 3: Report of WebRTC media — Data Link

```
Run 1: Statistics of Sprout

Start at: 2018-03-12 23:52:57
End at: 2018-03-12 23:53:27
Local clock offset: 1.42 ms
Remote clock offset: -5.031 ms


# Below is generated by plot.py at 2018-03-13 00:46:51
# Datalink statistics
-- Total of 3 flows:
Average throughput: 24.17 Mbit/s
95th percentile per-packet one-way delay: 82.302 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 13.02 Mbit/s
95th percentile per-packet one-way delay: 70.130 ms
Loss rate: 0.14%
-- Flow 2:
Average throughput: 11.97 Mbit/s
95th percentile per-packet one-way delay: 83.033 ms
Loss rate: 0.02%
-- Flow 3:
Average throughput: 9.41 Mbit/s
95th percentile per-packet one-way delay: 117.796 ms
Loss rate: 0.38%
```

Run 1: Report of Sprout — Data Link

Legend:
- Flow 1 ingress (mean 12.91 Mbit/s) — Flow 1 egress (mean 13.02 Mbit/s)
- Flow 2 ingress (mean 11.97 Mbit/s) — Flow 2 egress (mean 11.97 Mbit/s)
- Flow 3 ingress (mean 9.42 Mbit/s) — Flow 3 egress (mean 9.41 Mbit/s)

Legend:
- Flow 1 (95th percentile 70.13 ms)
- Flow 2 (95th percentile 83.03 ms)
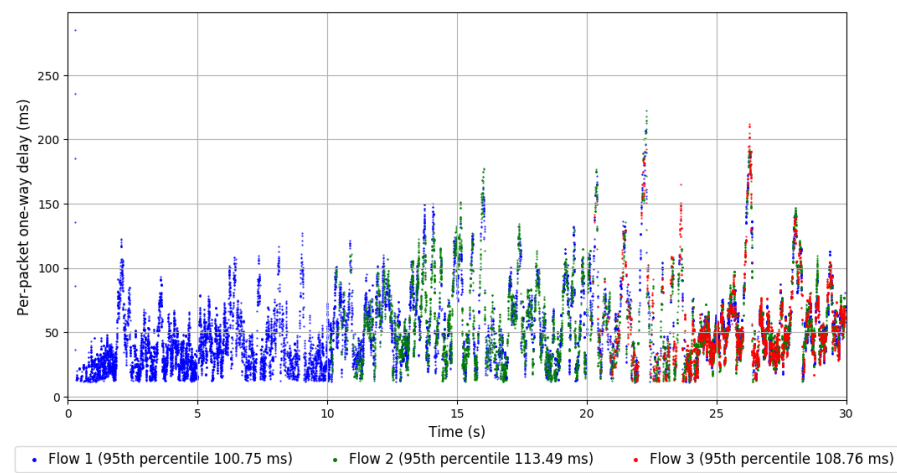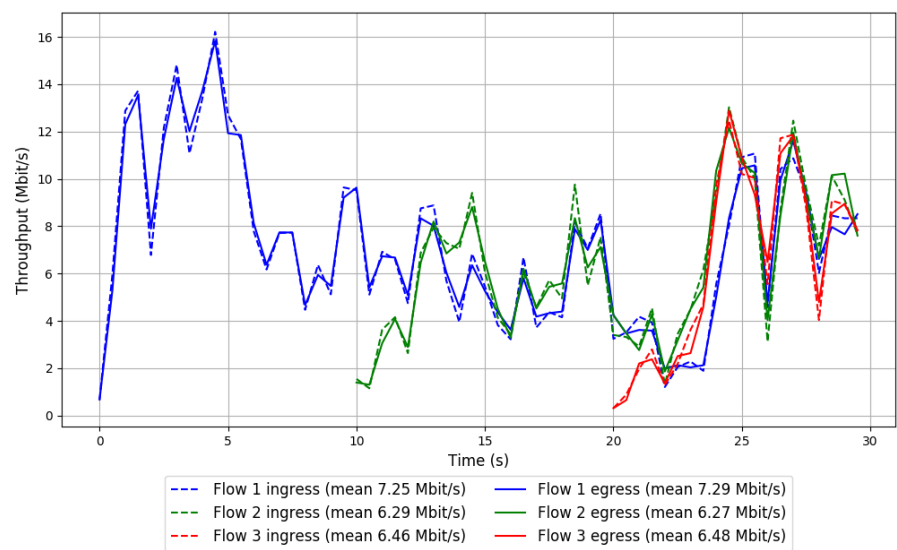- Flow 3 (95th percentile 117.80 ms)

47

```
Run 2: Statistics of Sprout

Start at: 2018-03-13 00:16:56
End at: 2018-03-13 00:17:26
Local clock offset: 0.87 ms
Remote clock offset: -4.964 ms


# Below is generated by plot.py at 2018-03-13 00:46:51
# Datalink statistics
-- Total of 3 flows:
Average throughput: 13.64 Mbit/s
95th percentile per-packet one-way delay: 106.372 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 7.29 Mbit/s
95th percentile per-packet one-way delay: 100.752 ms
Loss rate: 0.28%
-- Flow 2:
Average throughput: 6.27 Mbit/s
95th percentile per-packet one-way delay: 113.493 ms
Loss rate: 0.27%
-- Flow 3:
Average throughput: 6.48 Mbit/s
95th percentile per-packet one-way delay: 108.764 ms
Loss rate: 0.46%
```
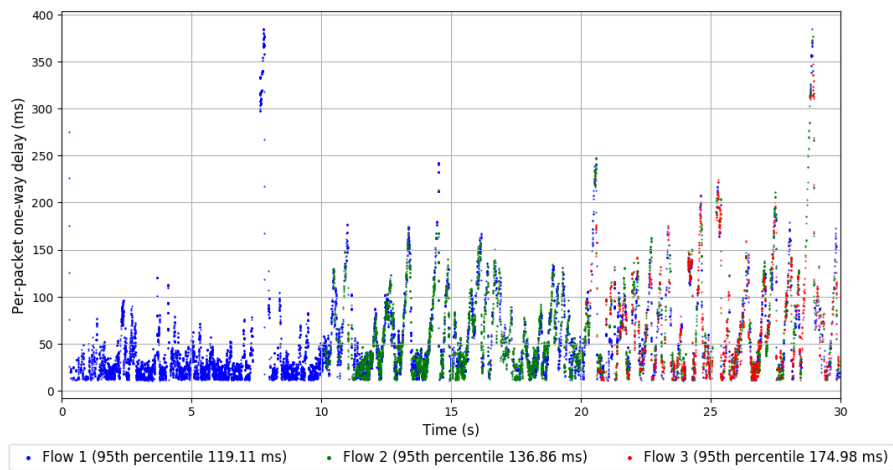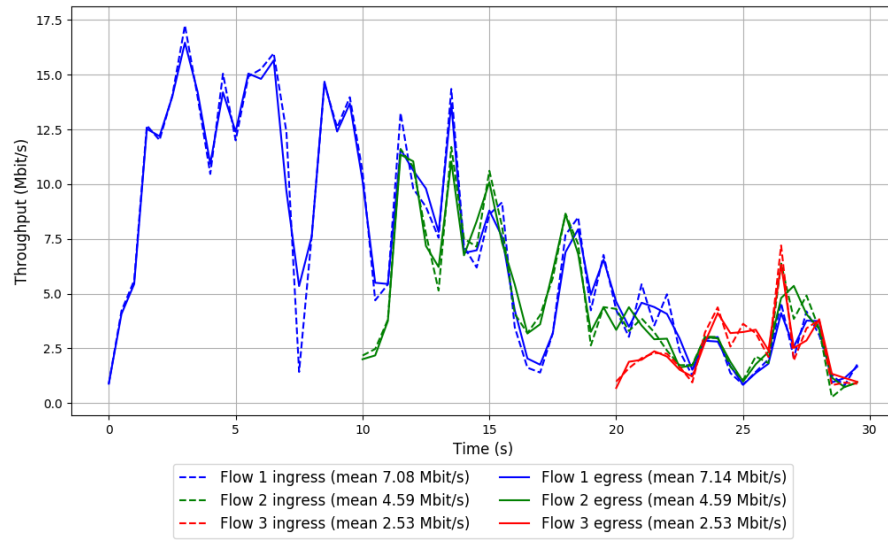
Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2018-03-13 00:40:53
End at: 2018-03-13 00:41:23
Local clock offset: 0.868 ms
Remote clock offset: -5.146 ms


# Below is generated by plot.py at 2018-03-13 00:46:51
# Datalink statistics
-- Total of 3 flows:
Average throughput: 11.06 Mbit/s
95th percentile per-packet one-way delay: 132.256 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 7.14 Mbit/s
95th percentile per-packet one-way delay: 119.109 ms
Loss rate: 0.04%
-- Flow 2:
Average throughput: 4.59 Mbit/s
95th percentile per-packet one-way delay: 136.861 ms
Loss rate: 0.03%
-- Flow 3:
Average throughput: 2.53 Mbit/s
95th percentile per-packet one-way delay: 174.976 ms
Loss rate: 0.00%
```
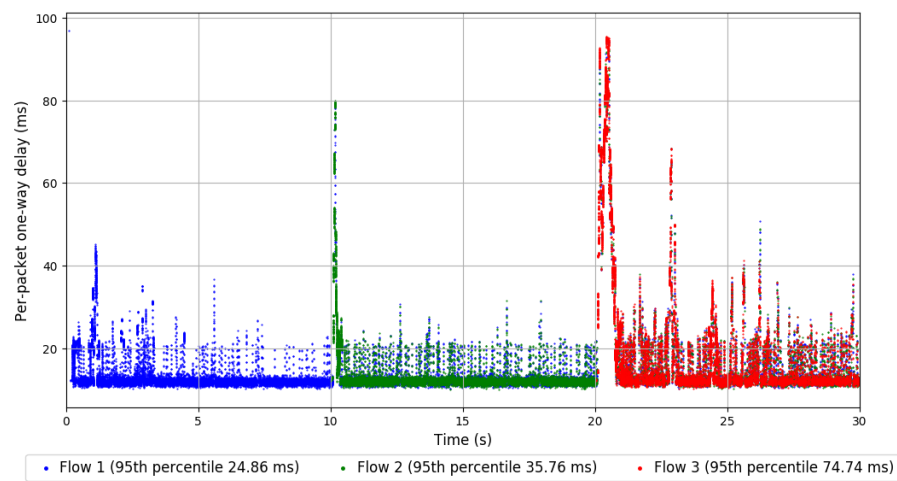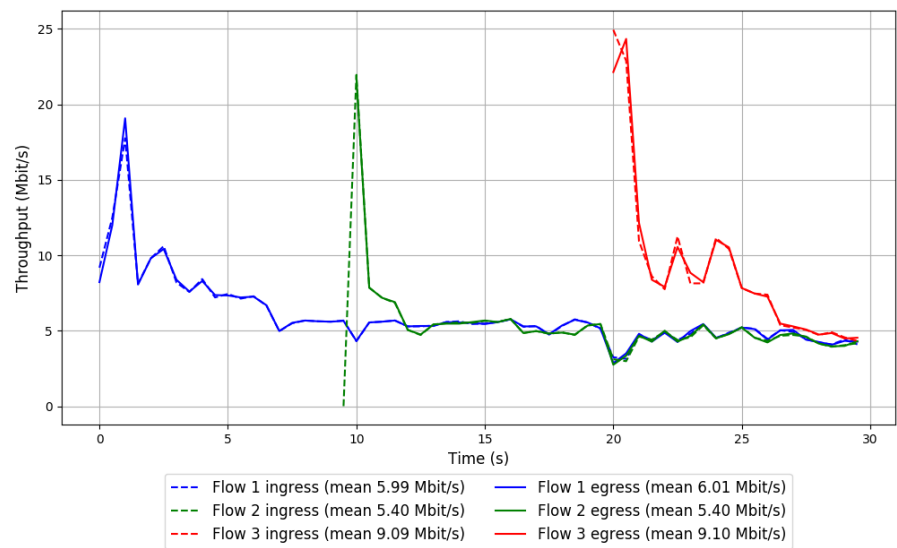
Run 3: Report of Sprout — Data Link

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

Start at: 2018-03-12 23:46:18
End at: 2018-03-12 23:46:48
Local clock offset: 1.449 ms
Remote clock offset: -5.037 ms


# Below is generated by plot.py at 2018-03-13 00:46:52
# Datalink statistics
-- Total of 3 flows:
Average throughput: 12.64 Mbit/s
95th percentile per-packet one-way delay: 48.297 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 6.01 Mbit/s
95th percentile per-packet one-way delay: 24.864 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 5.40 Mbit/s
95th percentile per-packet one-way delay: 35.760 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 9.10 Mbit/s
95th percentile per-packet one-way delay: 74.738 ms
Loss rate: 0.00%
```

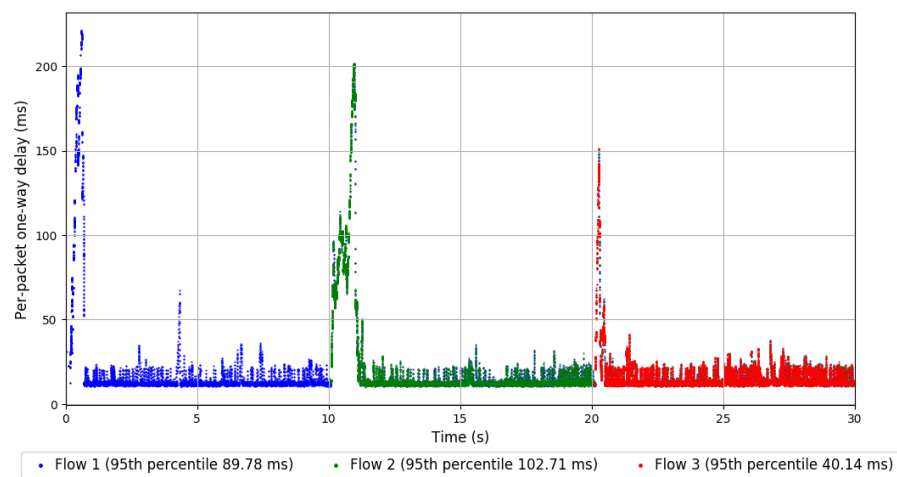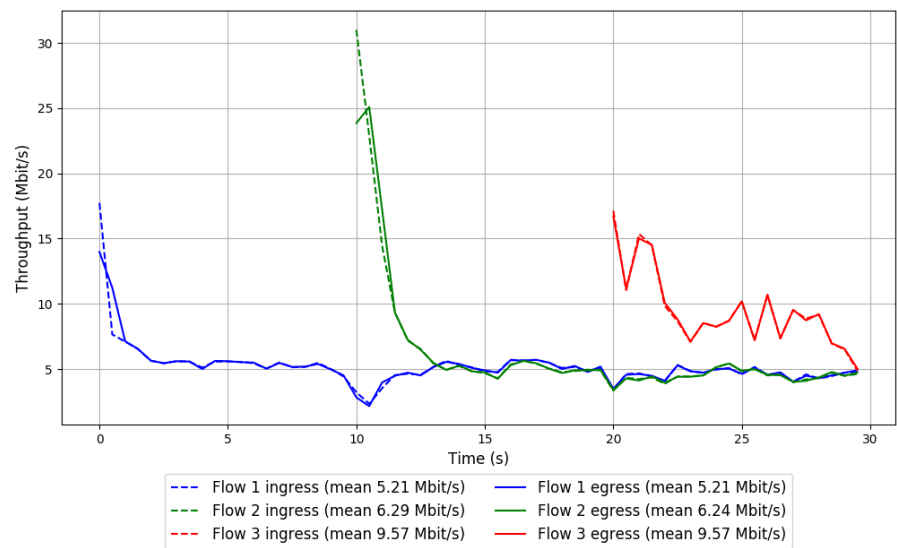Run 1: Report of TaoVA-100x — Data Link

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

Start at: 2018-03-13 00:10:14
End at: 2018-03-13 00:10:44
Local clock offset: 0.944 ms
Remote clock offset: -5.083 ms


# Below is generated by plot.py at 2018-03-13 00:46:56
# Datalink statistics
-- Total of 3 flows:
Average throughput: 12.55 Mbit/s
95th percentile per-packet one-way delay: 96.517 ms
Loss rate: 0.28%
-- Flow 1:
Average throughput: 5.21 Mbit/s
95th percentile per-packet one-way delay: 89.779 ms
Loss rate: 0.05%
-- Flow 2:
Average throughput: 6.24 Mbit/s
95th percentile per-packet one-way delay: 102.710 ms
Loss rate: 0.79%
-- Flow 3:
Average throughput: 9.57 Mbit/s
95th percentile per-packet one-way delay: 40.143 ms
Loss rate: 0.00%
```

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

- Flow 1 ingress (mean 5.21 Mbit/s)
- Flow 1 egress (mean 5.21 Mbit/s)
- Flow 2 ingress (mean 6.29 Mbit/s)
- Flow 2 egress (mean 6.24 Mbit/s)
- Flow 3 ingress (mean 9.57 Mbit/s)
- Flow 3 egress (mean 9.57 Mbit/s)

- Flow 1 (95th percentile 89.78 ms)
- Flow 2 (95th percentile 102.71 ms)
- Flow 3 (95th percentile 40.14 ms)

55

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

Start at: 2018-03-13 00:34:14
End at: 2018-03-13 00:34:44
Local clock offset: 0.861 ms
Remote clock offset: -4.99 ms


# Below is generated by plot.py at 2018-03-13 00:46:56
# Datalink statistics
-- Total of 3 flows:
Average throughput: 11.16 Mbit/s
95th percentile per-packet one-way delay: 65.603 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 5.01 Mbit/s
95th percentile per-packet one-way delay: 53.563 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 4.91 Mbit/s
95th percentile per-packet one-way delay: 52.245 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 8.63 Mbit/s
95th percentile per-packet one-way delay: 116.587 ms
Loss rate: 0.02%
```
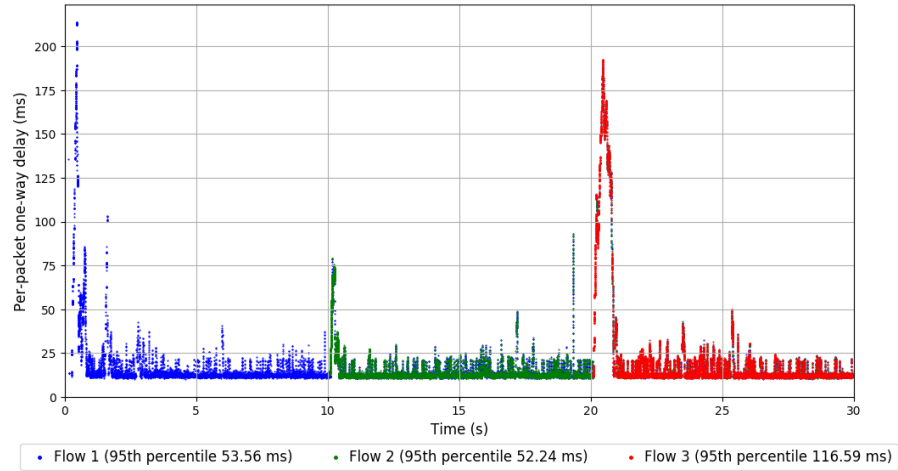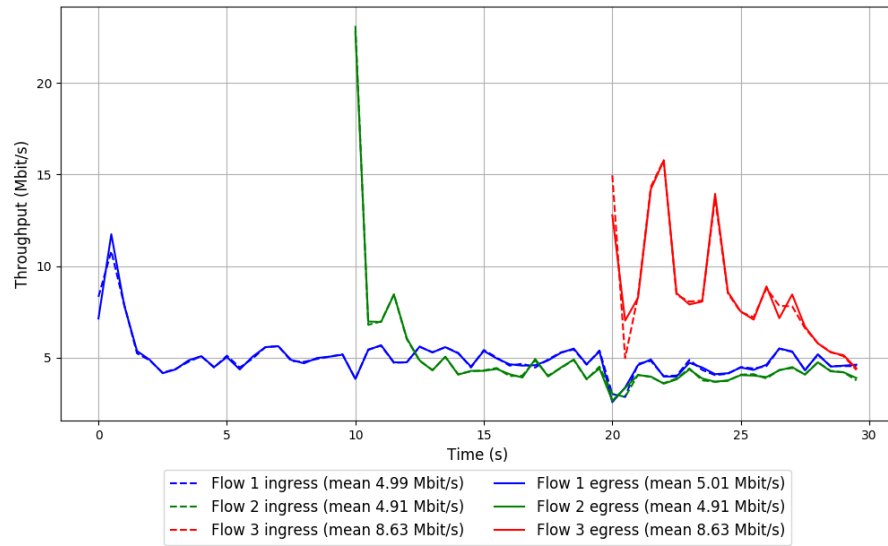
Run 3: Report of TaoVA-100x — Data Link

Flow 1 ingress (mean 4.99 Mbit/s) — Flow 1 egress (mean 5.01 Mbit/s)
Flow 2 ingress (mean 4.91 Mbit/s) — Flow 2 egress (mean 4.91 Mbit/s)
Flow 3 ingress (mean 8.63 Mbit/s) — Flow 3 egress (mean 8.63 Mbit/s)

• Flow 1 (95th percentile 53.56 ms)　　• Flow 2 (95th percentile 52.24 ms)　　• Flow 3 (95th percentile 116.59 ms)
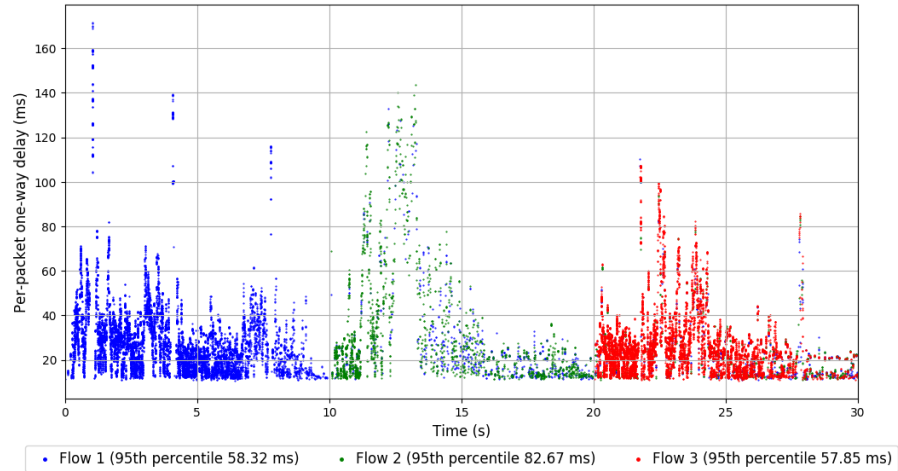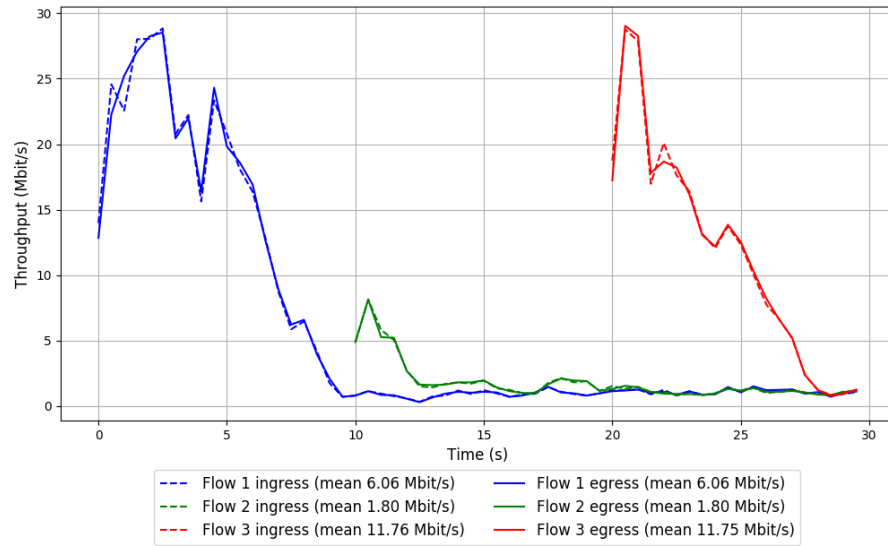
57

```
Run 1: Statistics of TCP Vegas

Start at: 2018-03-12 23:33:00
End at: 2018-03-12 23:33:30
Local clock offset: 1.348 ms
Remote clock offset: -4.695 ms


# Below is generated by plot.py at 2018-03-13 00:46:56
# Datalink statistics
-- Total of 3 flows:
Average throughput: 11.16 Mbit/s
95th percentile per-packet one-way delay: 60.612 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 6.06 Mbit/s
95th percentile per-packet one-way delay: 58.324 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.80 Mbit/s
95th percentile per-packet one-way delay: 82.665 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 11.75 Mbit/s
95th percentile per-packet one-way delay: 57.852 ms
Loss rate: 0.00%
```

Run 1: Report of TCP Vegas — Data Link

```
Run 2: Statistics of TCP Vegas

Start at: 2018-03-12 23:56:56
End at: 2018-03-12 23:57:26
Local clock offset: 1.29 ms
Remote clock offset: -4.92 ms


# Below is generated by plot.py at 2018-03-13 00:46:56
# Datalink statistics
-- Total of 3 flows:
Average throughput: 12.52 Mbit/s
95th percentile per-packet one-way delay: 148.271 ms
Loss rate: 0.28%
-- Flow 1:
Average throughput: 11.07 Mbit/s
95th percentile per-packet one-way delay: 168.562 ms
Loss rate: 0.31%
-- Flow 2:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 24.470 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 2.01 Mbit/s
95th percentile per-packet one-way delay: 35.649 ms
Loss rate: 0.06%
```
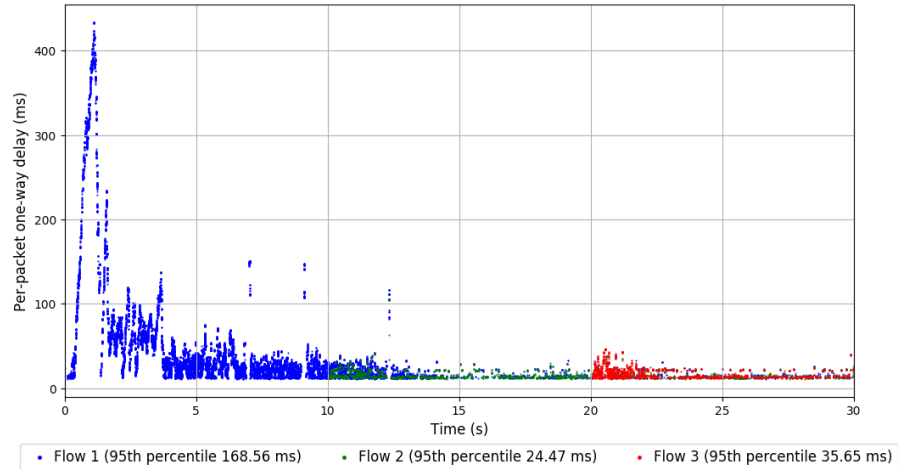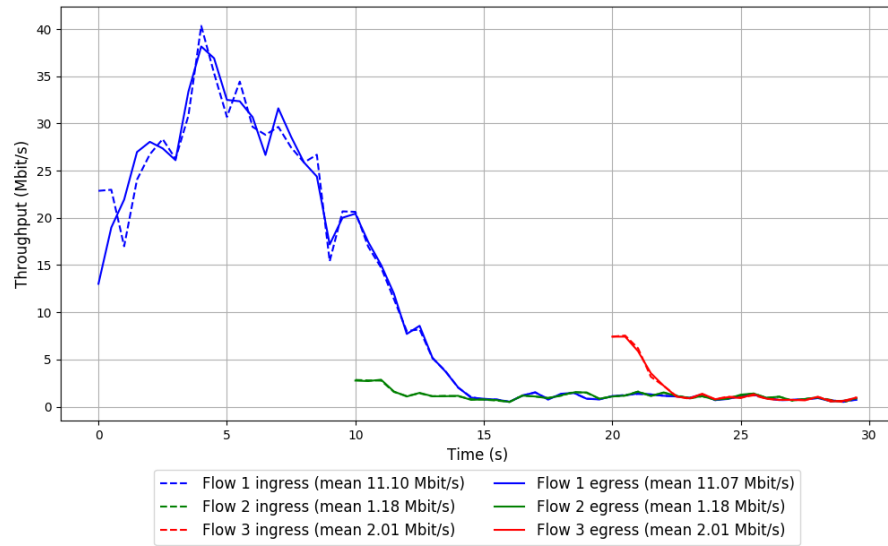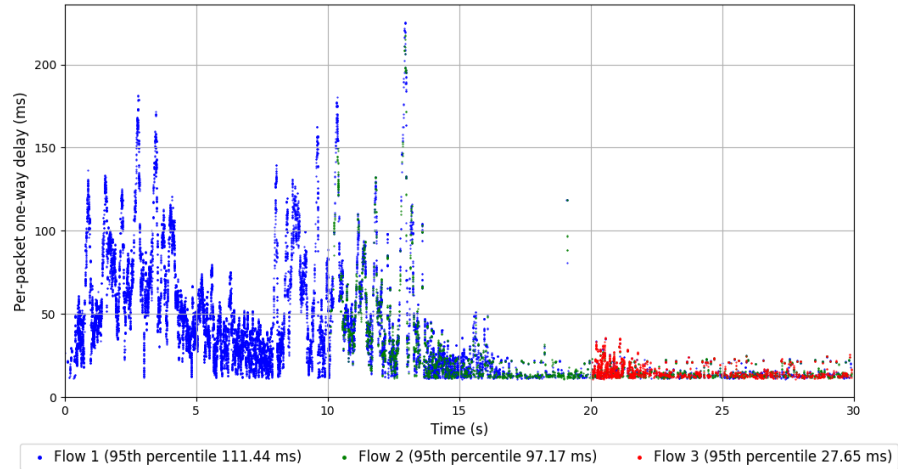
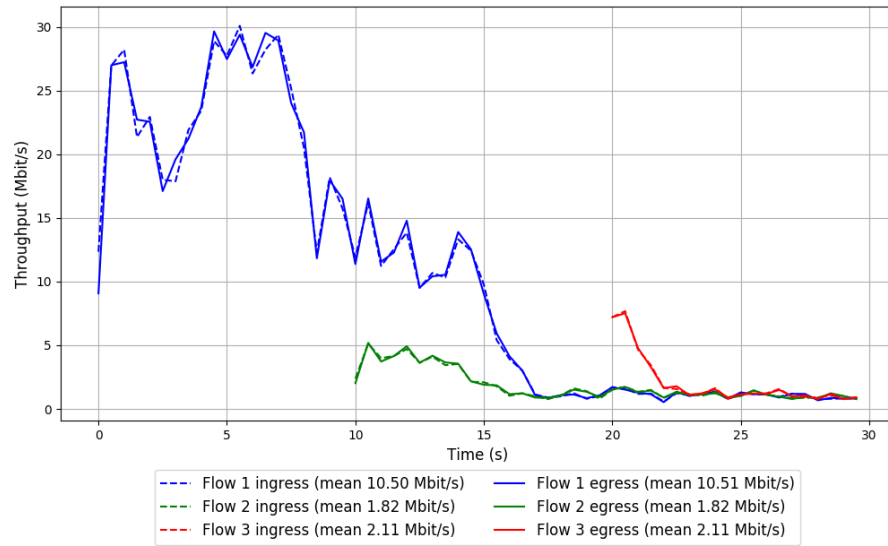Run 2: Report of TCP Vegas — Data Link

```
Run 3: Statistics of TCP Vegas

Start at: 2018-03-13 00:20:55
End at: 2018-03-13 00:21:25
Local clock offset: 0.918 ms
Remote clock offset: -5.067 ms


# Below is generated by plot.py at 2018-03-13 00:46:56
# Datalink statistics
-- Total of 3 flows:
Average throughput: 12.41 Mbit/s
95th percentile per-packet one-way delay: 108.066 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 10.51 Mbit/s
95th percentile per-packet one-way delay: 111.437 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.82 Mbit/s
95th percentile per-packet one-way delay: 97.175 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 27.649 ms
Loss rate: 0.00%
```

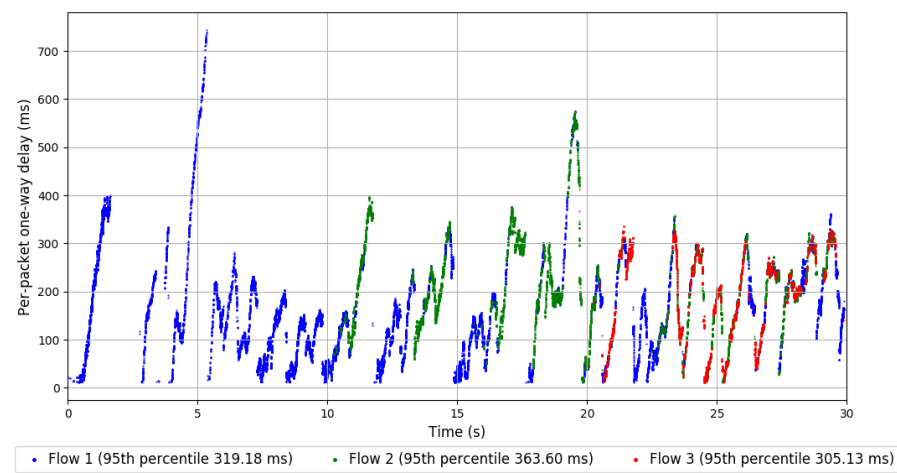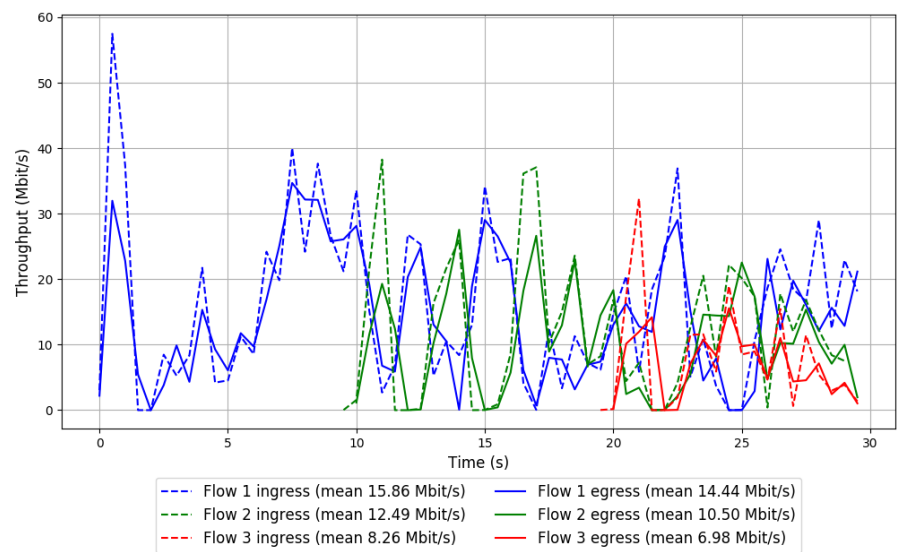Run 3: Report of TCP Vegas — Data Link

```
Run 1: Statistics of Verus

Start at: 2018-03-12 23:35:39
End at: 2018-03-12 23:36:09
Local clock offset: 1.384 ms
Remote clock offset: -4.855 ms

# Below is generated by plot.py at 2018-03-13 00:47:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 23.61 Mbit/s
95th percentile per-packet one-way delay: 332.444 ms
Loss rate: 11.38%
-- Flow 1:
Average throughput: 14.44 Mbit/s
95th percentile per-packet one-way delay: 319.183 ms
Loss rate: 8.91%
-- Flow 2:
Average throughput: 10.50 Mbit/s
95th percentile per-packet one-way delay: 363.596 ms
Loss rate: 14.82%
-- Flow 3:
Average throughput: 6.98 Mbit/s
95th percentile per-packet one-way delay: 305.134 ms
Loss rate: 15.60%
```
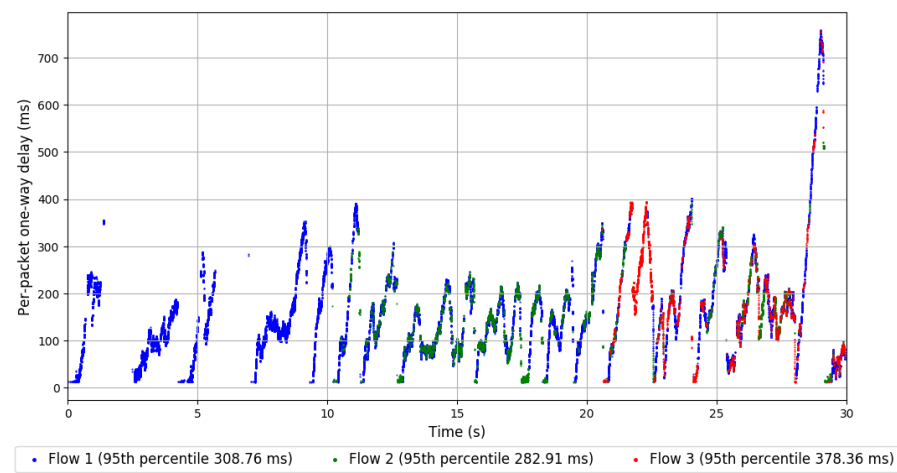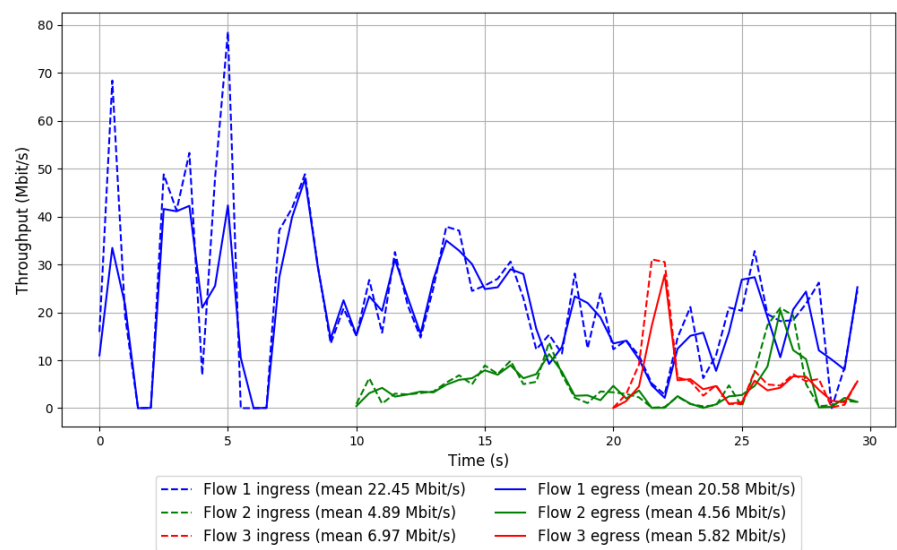
Run 1: Report of Verus — Data Link

```
Run 2: Statistics of Verus

Start at: 2018-03-12 23:59:35
End at: 2018-03-13 00:00:05
Local clock offset: 1.226 ms
Remote clock offset: -4.939 ms


# Below is generated by plot.py at 2018-03-13 00:47:13
# Datalink statistics
-- Total of 3 flows:
Average throughput: 25.46 Mbit/s
95th percentile per-packet one-way delay: 320.023 ms
Loss rate: 9.02%
-- Flow 1:
Average throughput: 20.58 Mbit/s
95th percentile per-packet one-way delay: 308.765 ms
Loss rate: 8.33%
-- Flow 2:
Average throughput: 4.56 Mbit/s
95th percentile per-packet one-way delay: 282.907 ms
Loss rate: 7.31%
-- Flow 3:
Average throughput: 5.82 Mbit/s
95th percentile per-packet one-way delay: 378.357 ms
Loss rate: 18.11%
```
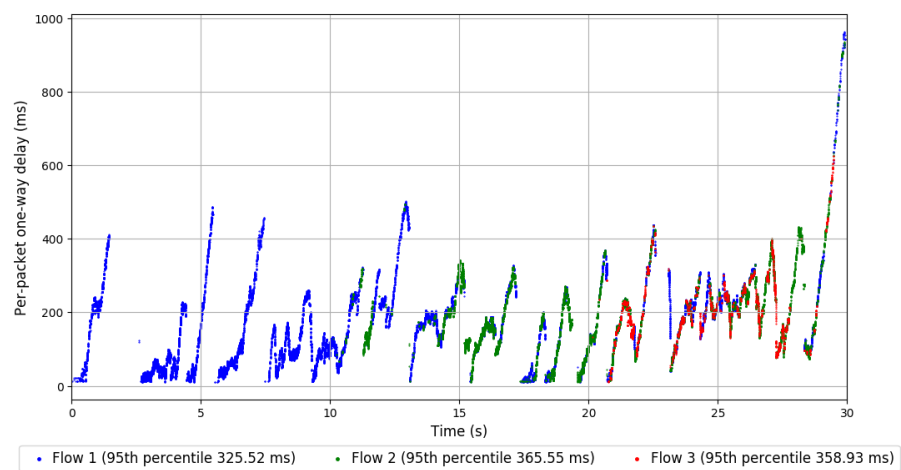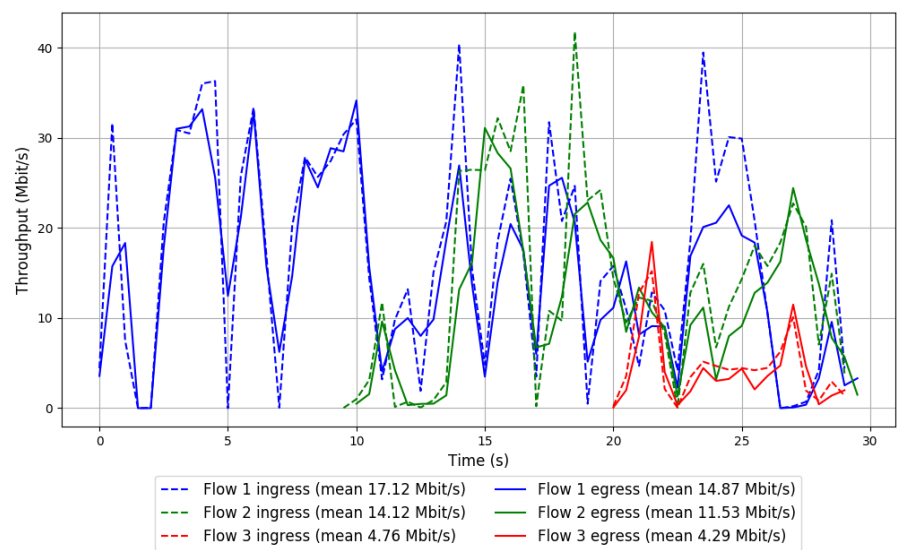
Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2018-03-13 00:23:33
End at: 2018-03-13 00:24:03
Local clock offset: 0.877 ms
Remote clock offset: -4.951 ms


# Below is generated by plot.py at 2018-03-13 00:47:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 23.83 Mbit/s
95th percentile per-packet one-way delay: 341.560 ms
Loss rate: 12.53%
-- Flow 1:
Average throughput: 14.87 Mbit/s
95th percentile per-packet one-way delay: 325.523 ms
Loss rate: 10.76%
-- Flow 2:
Average throughput: 11.53 Mbit/s
95th percentile per-packet one-way delay: 365.553 ms
Loss rate: 16.32%
-- Flow 3:
Average throughput: 4.29 Mbit/s
95th percentile per-packet one-way delay: 358.927 ms
Loss rate: 9.18%
```

Run 3: Report of Verus — Data Link

- Flow 1 ingress (mean 17.12 Mbit/s) — Flow 1 egress (mean 14.87 Mbit/s)
- Flow 2 ingress (mean 14.12 Mbit/s) — Flow 2 egress (mean 11.53 Mbit/s)
- Flow 3 ingress (mean 4.76 Mbit/s) — Flow 3 egress (mean 4.29 Mbit/s)

- Flow 1 (95th percentile 325.52 ms) • Flow 2 (95th percentile 365.55 ms) • Flow 3 (95th percentile 358.93 ms)
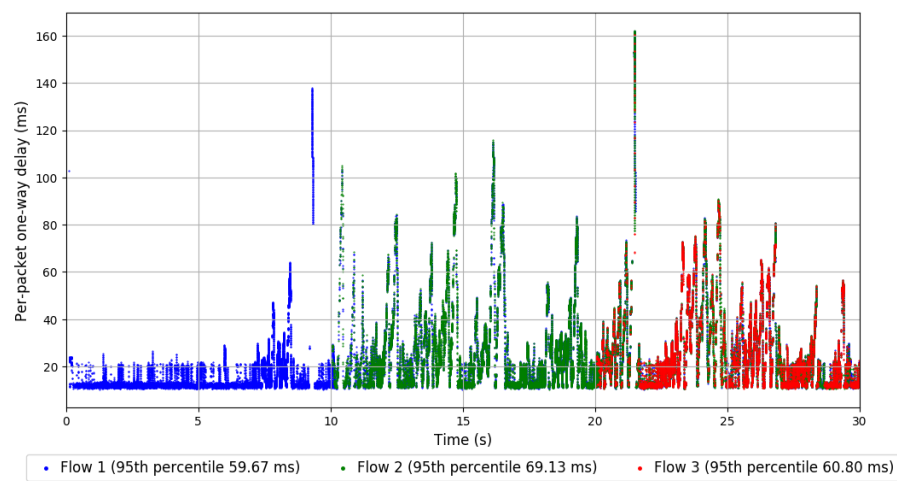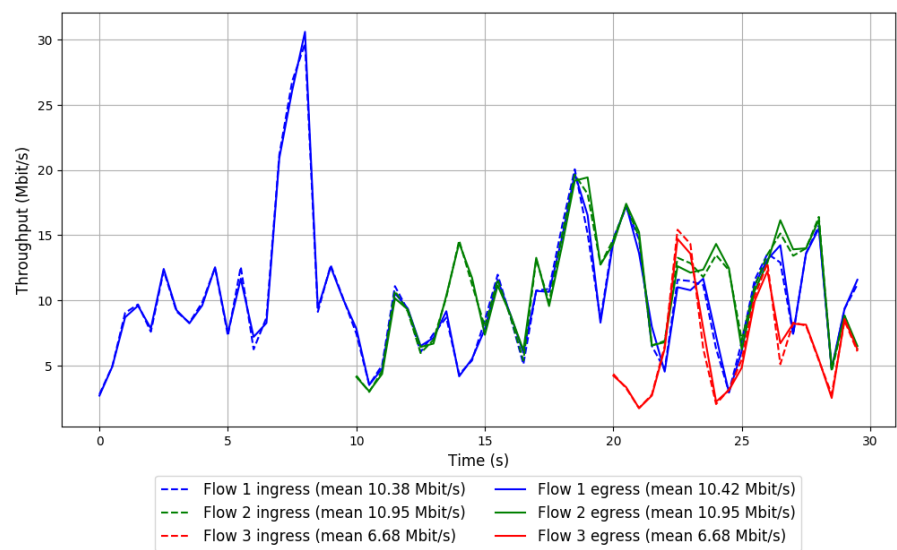
```
Run 1: Statistics of Copa

Start at: 2018-03-12 23:47:37
End at: 2018-03-12 23:48:07
Local clock offset: 1.437 ms
Remote clock offset: -4.991 ms


# Below is generated by plot.py at 2018-03-13 00:47:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 19.95 Mbit/s
95th percentile per-packet one-way delay: 64.098 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 10.42 Mbit/s
95th percentile per-packet one-way delay: 59.666 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 10.95 Mbit/s
95th percentile per-packet one-way delay: 69.129 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 6.68 Mbit/s
95th percentile per-packet one-way delay: 60.797 ms
Loss rate: 0.00%
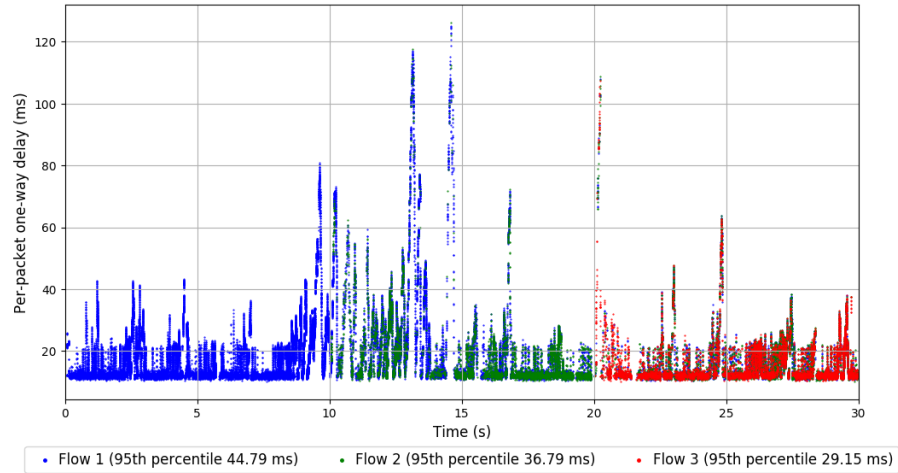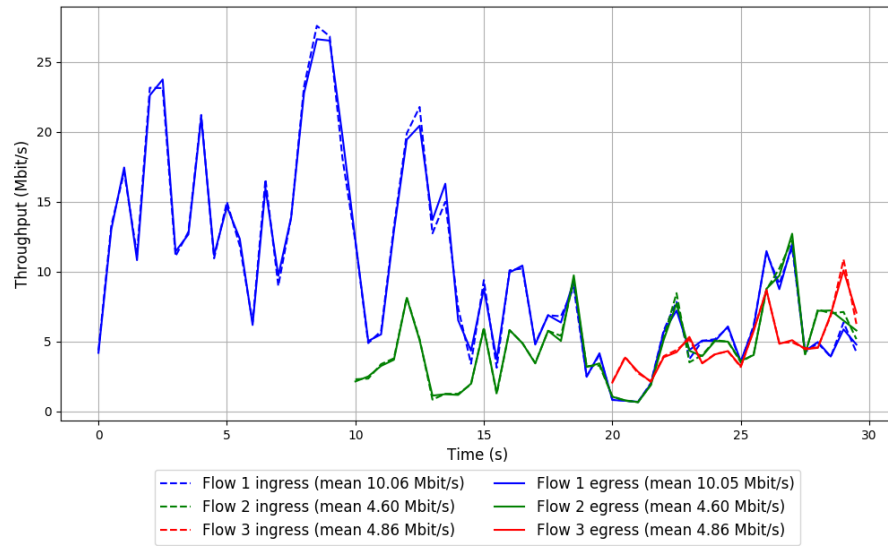```

Run 1: Report of Copa — Data Link

```
Run 2: Statistics of Copa

Start at: 2018-03-13 00:11:35
End at: 2018-03-13 00:12:05
Local clock offset: 1.054 ms
Remote clock offset: -5.017 ms

Below is generated by plot.py at 2018-03-13 00:47:29
Datalink statistics
-- Total of 3 flows:
Average throughput: 14.73 Mbit/s
95th percentile per-packet one-way delay: 41.789 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 10.05 Mbit/s
95th percentile per-packet one-way delay: 44.794 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 4.60 Mbit/s
95th percentile per-packet one-way delay: 36.787 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 4.86 Mbit/s
95th percentile per-packet one-way delay: 29.150 ms
Loss rate: 0.00%
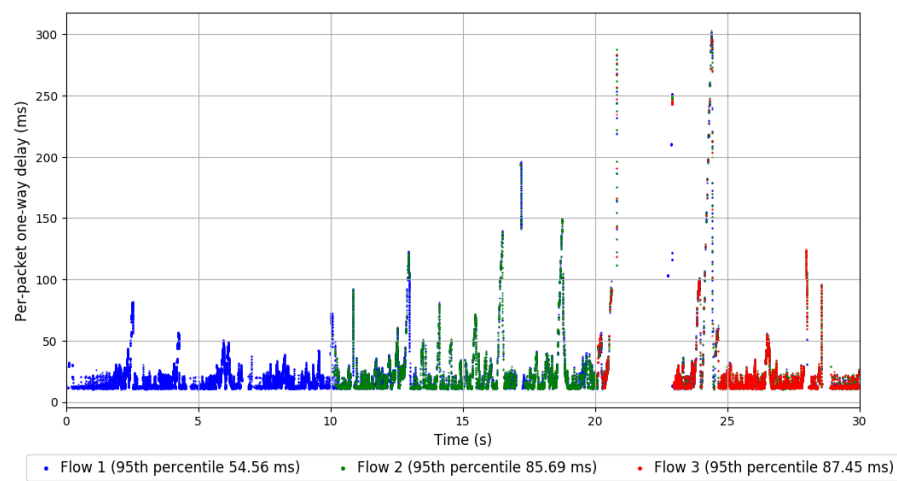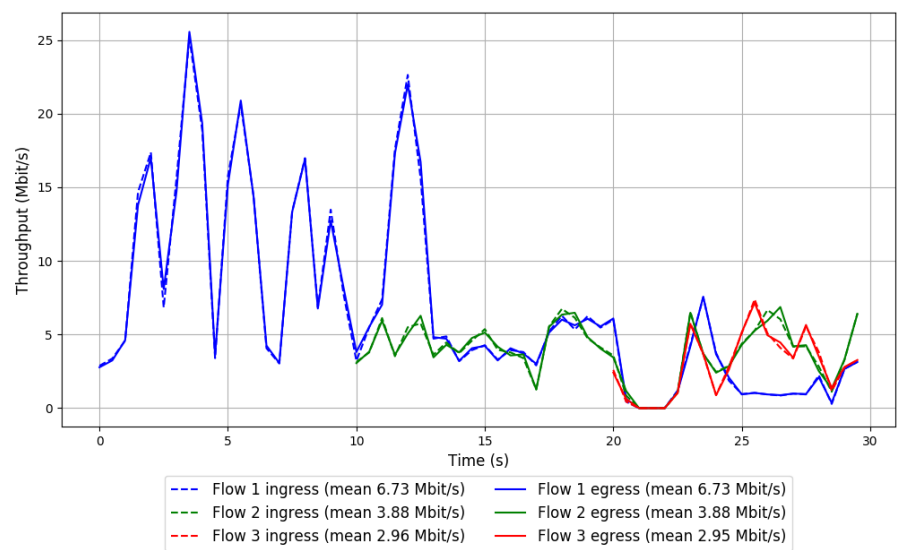```

Run 2: Report of Copa — Data Link

```
Run 3: Statistics of Copa

Start at: 2018-03-13 00:35:34
End at: 2018-03-13 00:36:04
Local clock offset: 0.948 ms
Remote clock offset: -5.006 ms


# Below is generated by plot.py at 2018-03-13 00:47:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 10.29 Mbit/s
95th percentile per-packet one-way delay: 63.981 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 6.73 Mbit/s
95th percentile per-packet one-way delay: 54.562 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 3.88 Mbit/s
95th percentile per-packet one-way delay: 85.690 ms
Loss rate: 0.07%
-- Flow 3:
Average throughput: 2.95 Mbit/s
95th percentile per-packet one-way delay: 87.450 ms
Loss rate: 0.13%
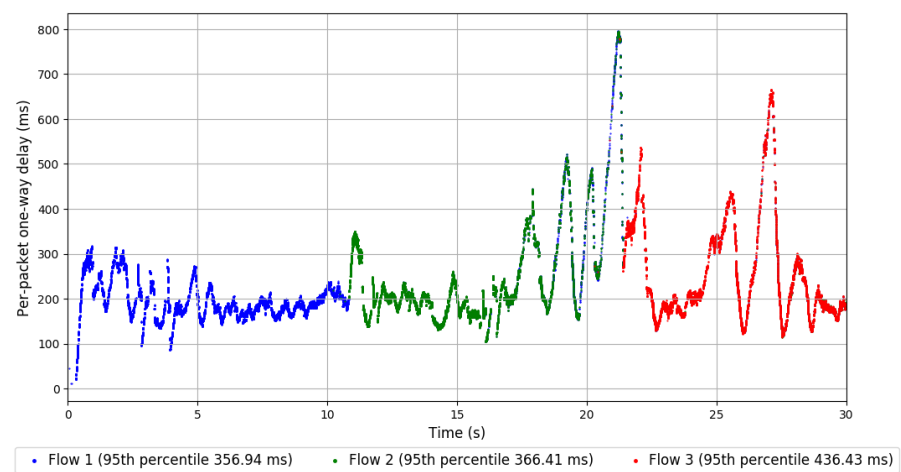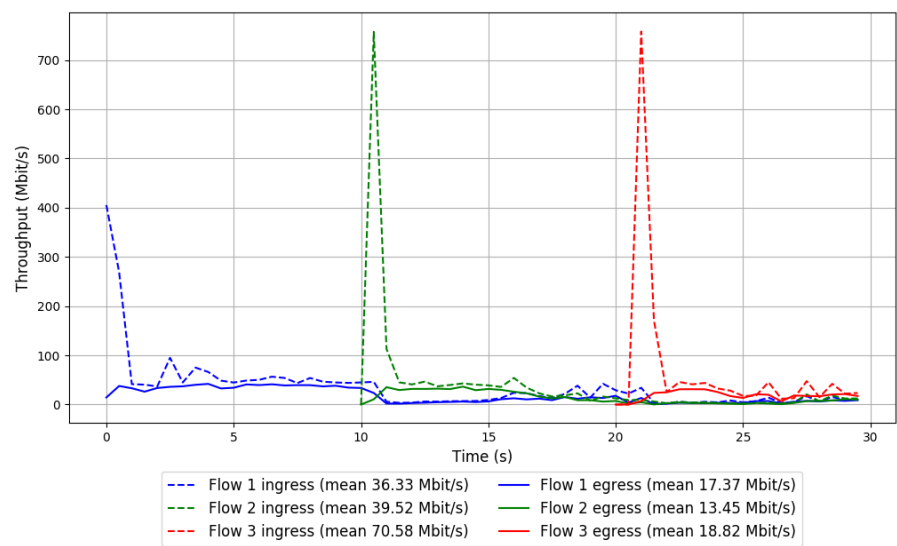```

Run 3: Report of Copa — Data Link

```
Run 1: Statistics of FillP

Start at: 2018-03-12 23:51:37
End at: 2018-03-12 23:52:07
Local clock offset: 1.433 ms
Remote clock offset: -4.945 ms


# Below is generated by plot.py at 2018-03-13 00:47:51
# Datalink statistics
-- Total of 3 flows:
Average throughput: 32.32 Mbit/s
95th percentile per-packet one-way delay: 393.762 ms
Loss rate: 62.46%
-- Flow 1:
Average throughput: 17.37 Mbit/s
95th percentile per-packet one-way delay: 356.944 ms
Loss rate: 52.23%
-- Flow 2:
Average throughput: 13.45 Mbit/s
95th percentile per-packet one-way delay: 366.413 ms
Loss rate: 66.30%
-- Flow 3:
Average throughput: 18.82 Mbit/s
95th percentile per-packet one-way delay: 436.429 ms
Loss rate: 74.01%
```

Run 1: Report of FillP — Data Link

Legend:
- Flow 1 ingress (mean 36.33 Mbit/s) — Flow 1 egress (mean 17.37 Mbit/s)
- Flow 2 ingress (mean 39.52 Mbit/s) — Flow 2 egress (mean 13.45 Mbit/s)
- Flow 3 ingress (mean 70.58 Mbit/s) — Flow 3 egress (mean 18.82 Mbit/s)

Legend:
- Flow 1 (95th percentile 356.94 ms)
- Flow 2 (95th percentile 366.41 ms)
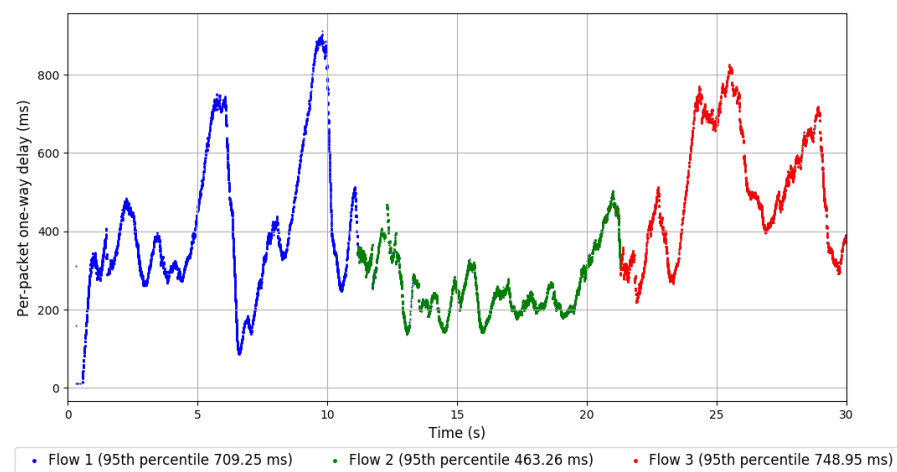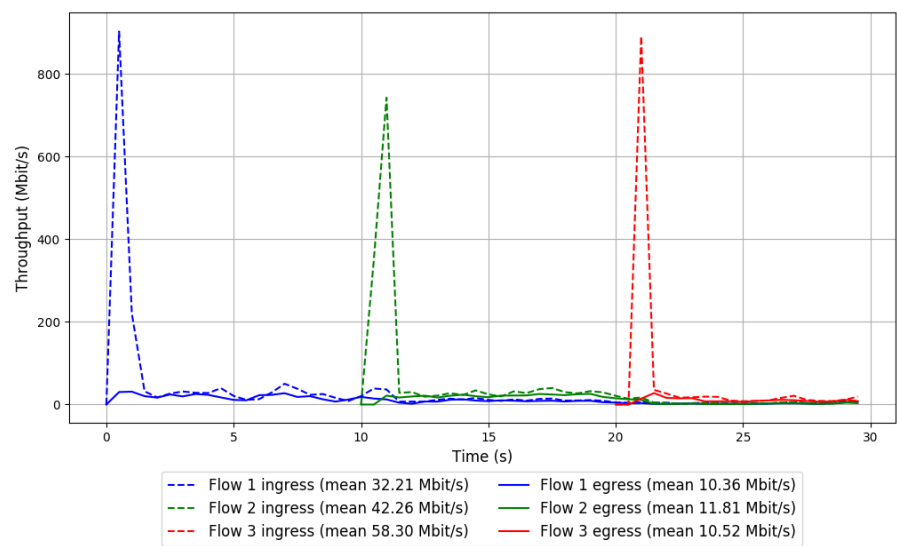- Flow 3 (95th percentile 436.43 ms)

```
Run 2: Statistics of FillP

Start at: 2018-03-13 00:15:35
End at: 2018-03-13 00:16:05
Local clock offset: 0.9 ms
Remote clock offset: -5.009 ms


# Below is generated by plot.py at 2018-03-13 00:47:51
# Datalink statistics
-- Total of 3 flows:
Average throughput: 21.58 Mbit/s
95th percentile per-packet one-way delay: 693.469 ms
Loss rate: 73.19%
-- Flow 1:
Average throughput: 10.36 Mbit/s
95th percentile per-packet one-way delay: 709.250 ms
Loss rate: 68.15%
-- Flow 2:
Average throughput: 11.81 Mbit/s
95th percentile per-packet one-way delay: 463.257 ms
Loss rate: 72.50%
-- Flow 3:
Average throughput: 10.52 Mbit/s
95th percentile per-packet one-way delay: 748.949 ms
Loss rate: 82.60%
```
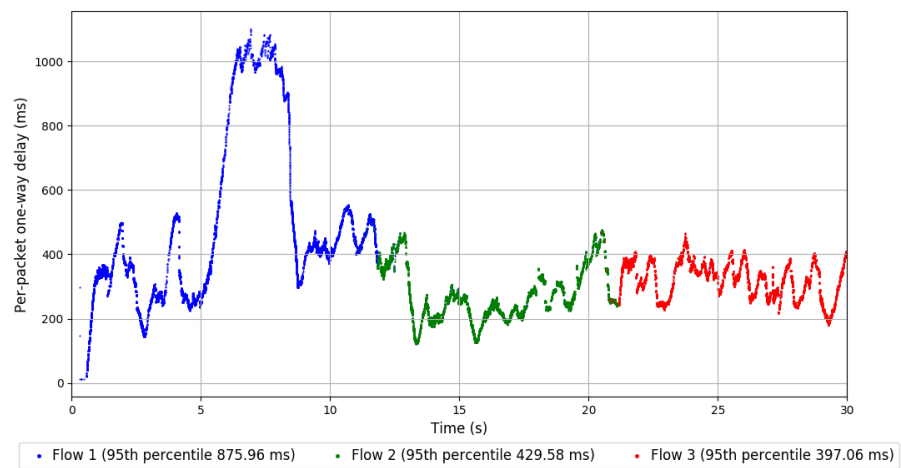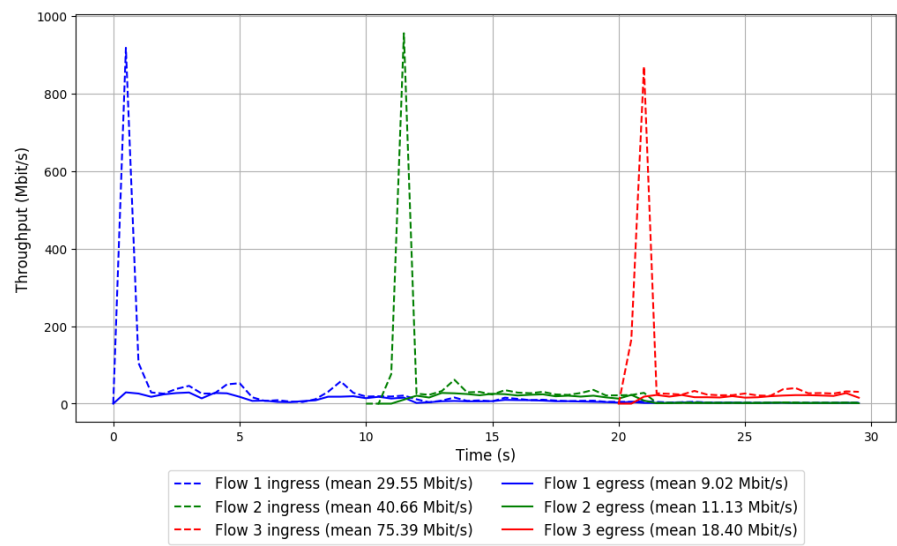
Run 2: Report of FillP — Data Link

```
Run 3: Statistics of FillP

Start at: 2018-03-13 00:39:32
End at: 2018-03-13 00:40:02
Local clock offset: 0.953 ms
Remote clock offset: -5.081 ms


# Below is generated by plot.py at 2018-03-13 00:47:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 22.18 Mbit/s
95th percentile per-packet one-way delay: 503.555 ms
Loss rate: 73.06%
-- Flow 1:
Average throughput: 9.02 Mbit/s
95th percentile per-packet one-way delay: 875.957 ms
Loss rate: 69.73%
-- Flow 2:
Average throughput: 11.13 Mbit/s
95th percentile per-packet one-way delay: 429.579 ms
Loss rate: 73.33%
-- Flow 3:
Average throughput: 18.40 Mbit/s
95th percentile per-packet one-way delay: 397.061 ms
Loss rate: 76.71%
```
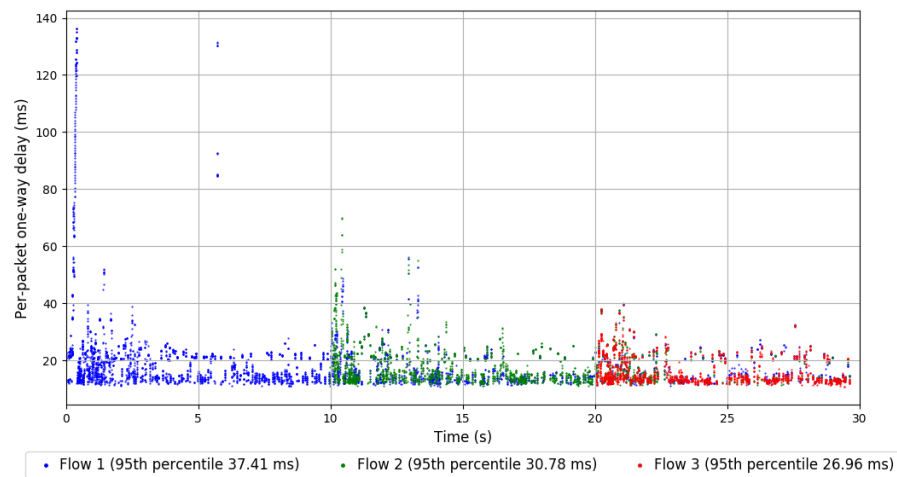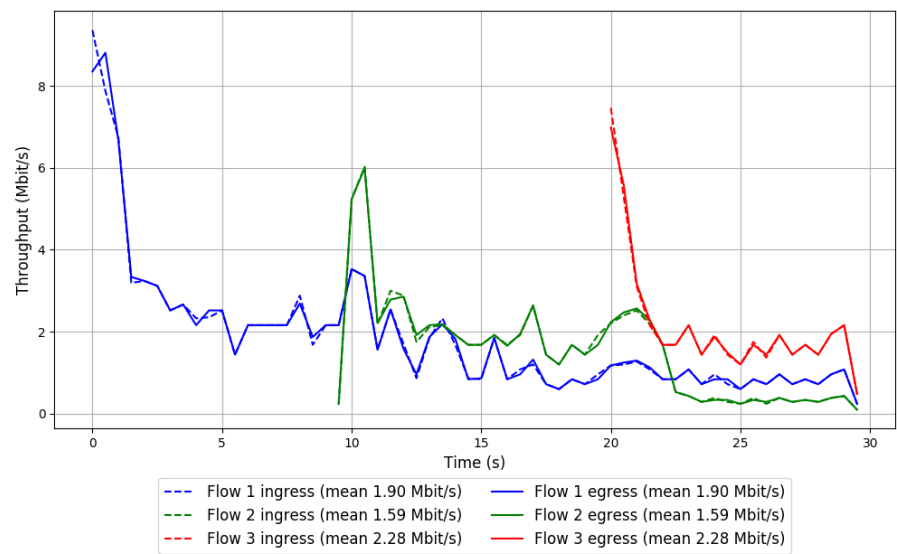
Run 3: Report of FillP — Data Link

```
Run 1: Statistics of Indigo-1-32

Start at: 2018-03-12 23:50:17
End at: 2018-03-12 23:50:47
Local clock offset: 1.413 ms
Remote clock offset: -5.041 ms


# Below is generated by plot.py at 2018-03-13 00:47:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.69 Mbit/s
95th percentile per-packet one-way delay: 30.972 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.90 Mbit/s
95th percentile per-packet one-way delay: 37.407 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.59 Mbit/s
95th percentile per-packet one-way delay: 30.784 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 26.961 ms
Loss rate: 0.00%
```

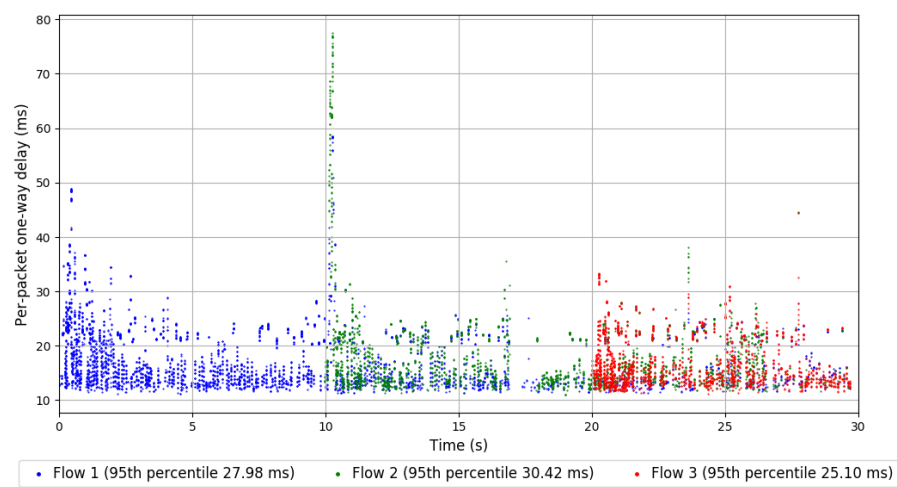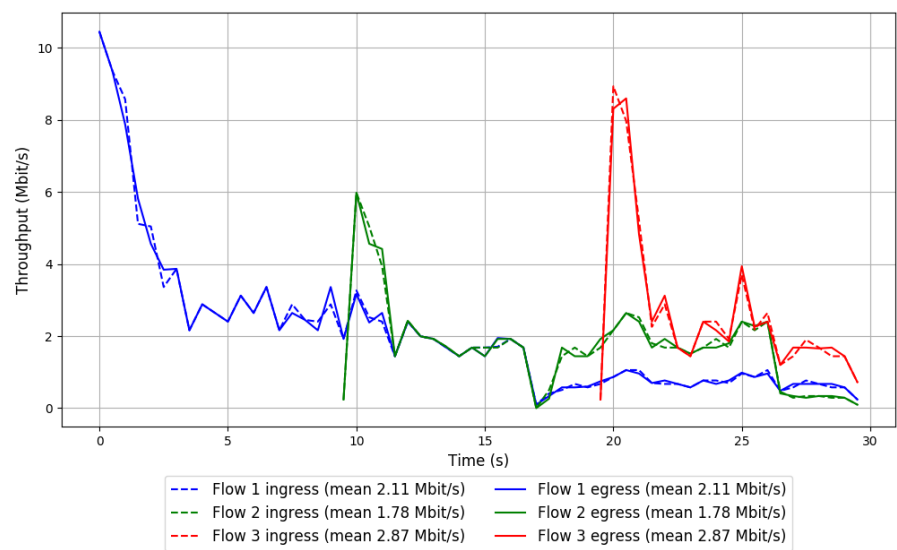Run 1: Report of Indigo-1-32 — Data Link

```
Run 2: Statistics of Indigo-1-32

Start at: 2018-03-13 00:14:16
End at: 2018-03-13 00:14:46
Local clock offset: 0.964 ms
Remote clock offset: -4.977 ms


# Below is generated by plot.py at 2018-03-13 00:47:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.22 Mbit/s
95th percentile per-packet one-way delay: 27.513 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 27.981 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.78 Mbit/s
95th percentile per-packet one-way delay: 30.419 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 2.87 Mbit/s
95th percentile per-packet one-way delay: 25.102 ms
Loss rate: 0.00%
```

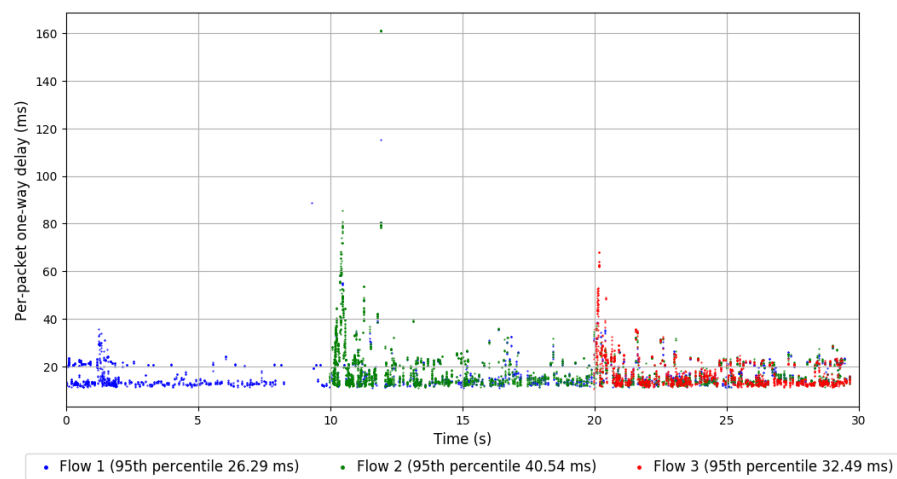Run 2: Report of Indigo-1-32 — Data Link

```
Run 3: Statistics of Indigo-1-32

Start at: 2018-03-13 00:38:13
End at: 2018-03-13 00:38:43
Local clock offset: 0.886 ms
Remote clock offset: -5.032 ms


# Below is generated by plot.py at 2018-03-13 00:47:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.26 Mbit/s
95th percentile per-packet one-way delay: 34.528 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 26.294 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.36 Mbit/s
95th percentile per-packet one-way delay: 40.539 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 2.14 Mbit/s
95th percentile per-packet one-way delay: 32.487 ms
Loss rate: 0.00%
```

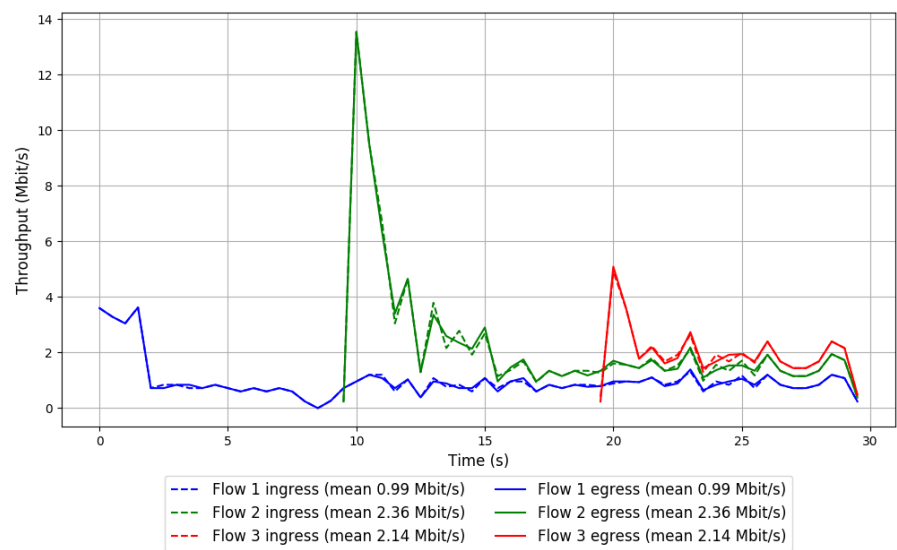Run 3: Report of Indigo-1-32 — Data Link

```
Run 1: Statistics of Vivace-latency

Start at: 2018-03-12 23:43:38
End at: 2018-03-12 23:44:08
Local clock offset: 1.384 ms
Remote clock offset: -5.017 ms


# Below is generated by plot.py at 2018-03-13 00:47:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 5.52 Mbit/s
95th percentile per-packet one-way delay: 21.282 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 3.64 Mbit/s
95th percentile per-packet one-way delay: 21.030 ms
Loss rate: 0.34%
-- Flow 2:
Average throughput: 1.89 Mbit/s
95th percentile per-packet one-way delay: 21.549 ms
Loss rate: 0.12%
-- Flow 3:
Average throughput: 1.90 Mbit/s
95th percentile per-packet one-way delay: 22.633 ms
Loss rate: 0.31%
```

Run 1: Report of Vivace-latency — Data Link

```
Run 2: Statistics of Vivace-latency

Start at: 2018-03-13 00:07:35
End at: 2018-03-13 00:08:05
Local clock offset: 1.067 ms
Remote clock offset: -5.059 ms


# Below is generated by plot.py at 2018-03-13 00:47:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.42 Mbit/s
95th percentile per-packet one-way delay: 54.909 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 1.74 Mbit/s
95th percentile per-packet one-way delay: 30.613 ms
Loss rate: 0.09%
-- Flow 2:
Average throughput: 4.53 Mbit/s
95th percentile per-packet one-way delay: 44.373 ms
Loss rate: 0.08%
-- Flow 3:
Average throughput: 4.96 Mbit/s
95th percentile per-packet one-way delay: 66.181 ms
Loss rate: 0.02%
```
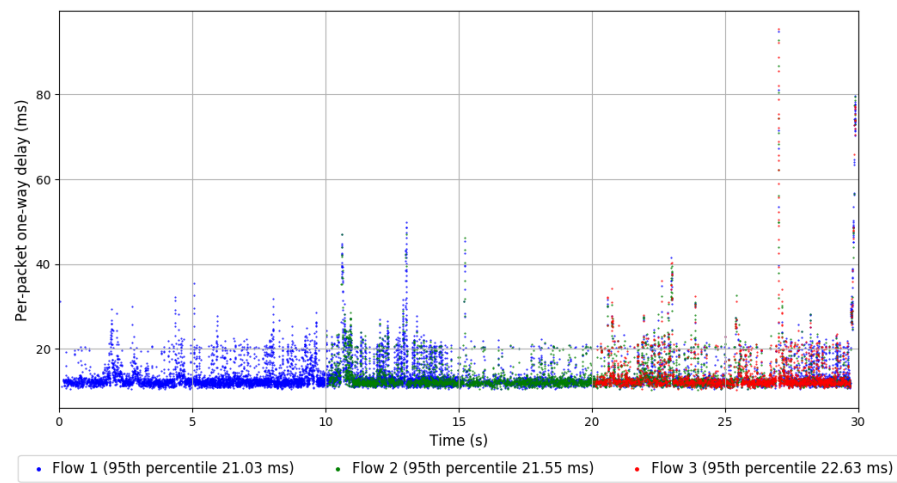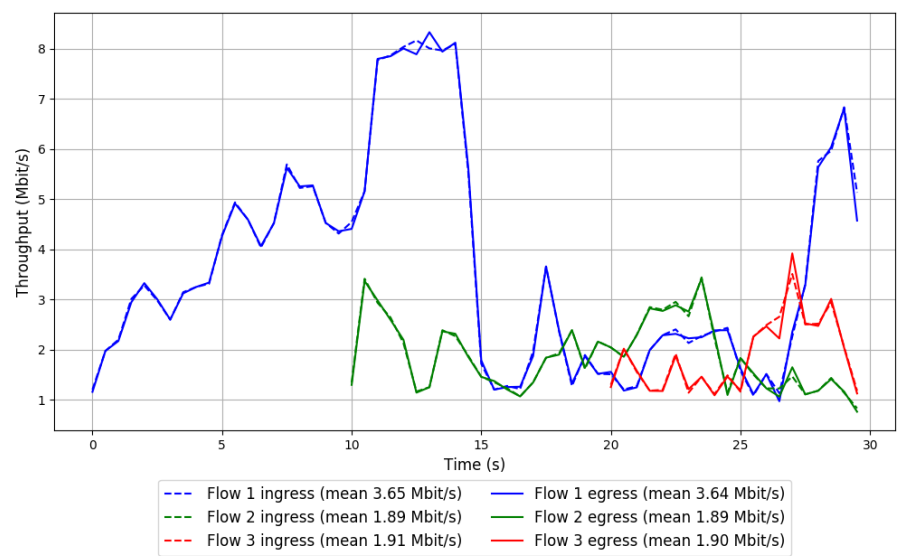
Run 2: Report of Vivace-latency — Data Link

91

Run 3: Statistics of Vivace-latency

Start at: 2018-03-13 00:31:33
End at: 2018-03-13 00:32:03
Local clock offset: 0.94 ms
Remote clock offset: -4.915 ms

Below is generated by plot.py at 2018-03-13 00:47:54
Datalink statistics
-- Total of 3 flows:
Average throughput: 11.47 Mbit/s
95th percentile per-packet one-way delay: 20.620 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 8.21 Mbit/s
95th percentile per-packet one-way delay: 20.475 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 3.93 Mbit/s
95th percentile per-packet one-way delay: 20.855 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 1.89 Mbit/s
95th percentile per-packet one-way delay: 21.281 ms
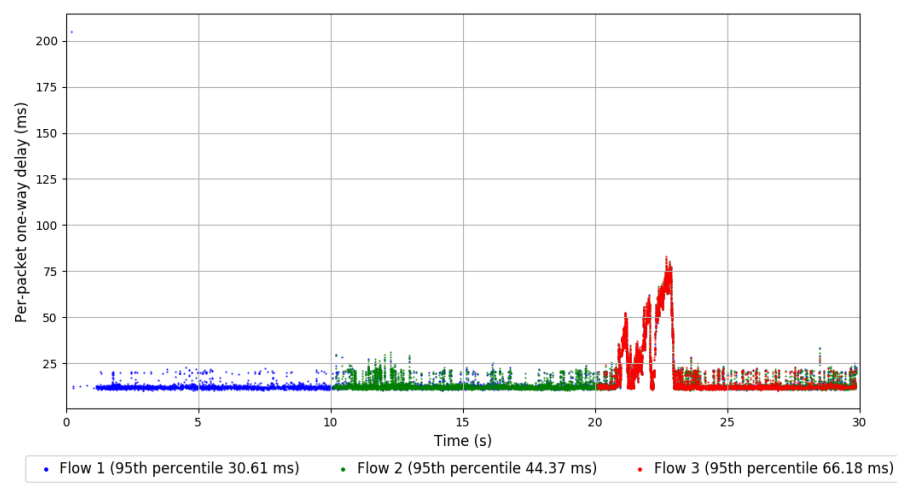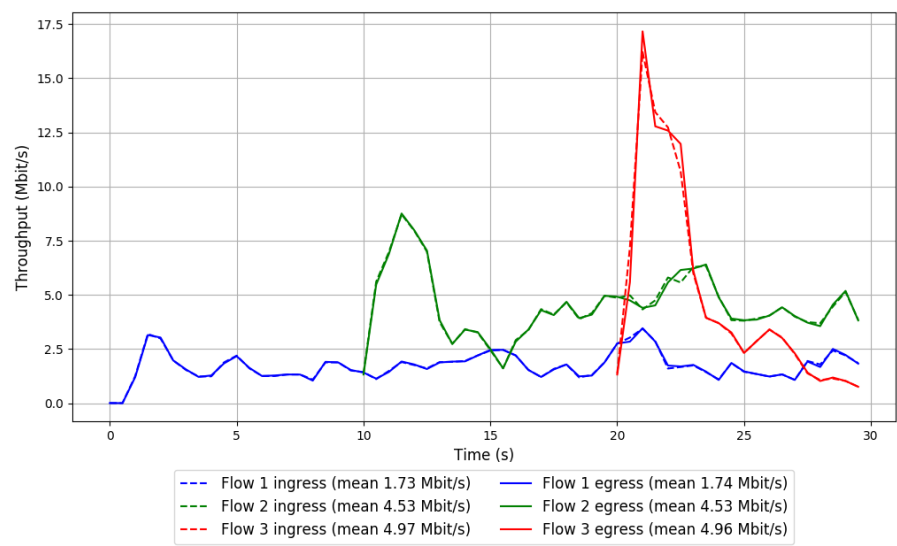Loss rate: 0.00%
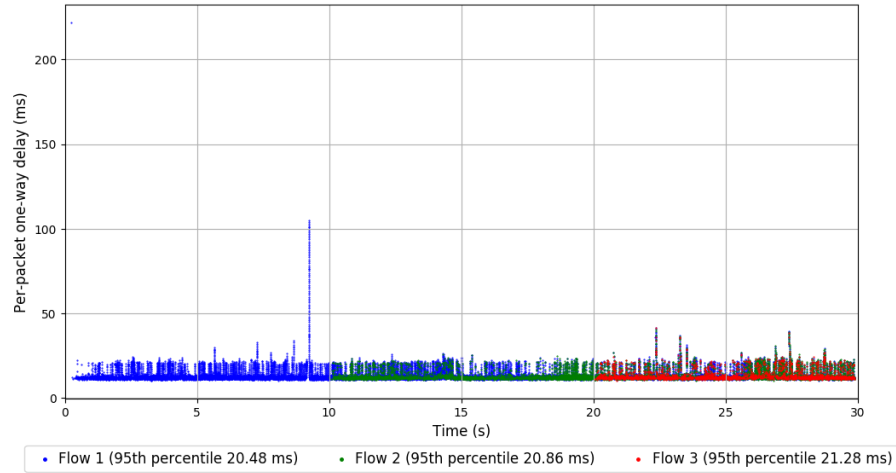
Run 3: Report of Vivace-latency — Data Link

Flow 1 ingress (mean 8.16 Mbit/s) --- Flow 1 egress (mean 8.21 Mbit/s)
Flow 2 ingress (mean 3.93 Mbit/s) --- Flow 2 egress (mean 3.93 Mbit/s)
Flow 3 ingress (mean 1.89 Mbit/s) --- Flow 3 egress (mean 1.89 Mbit/s)

Flow 1 (95th percentile 20.48 ms) • Flow 2 (95th percentile 20.86 ms) • Flow 3 (95th percentile 21.28 ms)

93

```
Run 1: Statistics of Vivace-loss

Start at: 2018-03-12 23:36:59
End at: 2018-03-12 23:37:29
Local clock offset: 1.408 ms
Remote clock offset: -4.819 ms


# Below is generated by plot.py at 2018-03-13 00:47:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 22.15 Mbit/s
95th percentile per-packet one-way delay: 583.388 ms
Loss rate: 23.62%
-- Flow 1:
Average throughput: 16.35 Mbit/s
95th percentile per-packet one-way delay: 612.423 ms
Loss rate: 24.72%
-- Flow 2:
Average throughput: 6.14 Mbit/s
95th percentile per-packet one-way delay: 490.942 ms
Loss rate: 19.24%
-- Flow 3:
Average throughput: 5.67 Mbit/s
95th percentile per-packet one-way delay: 372.848 ms
Loss rate: 22.62%
```

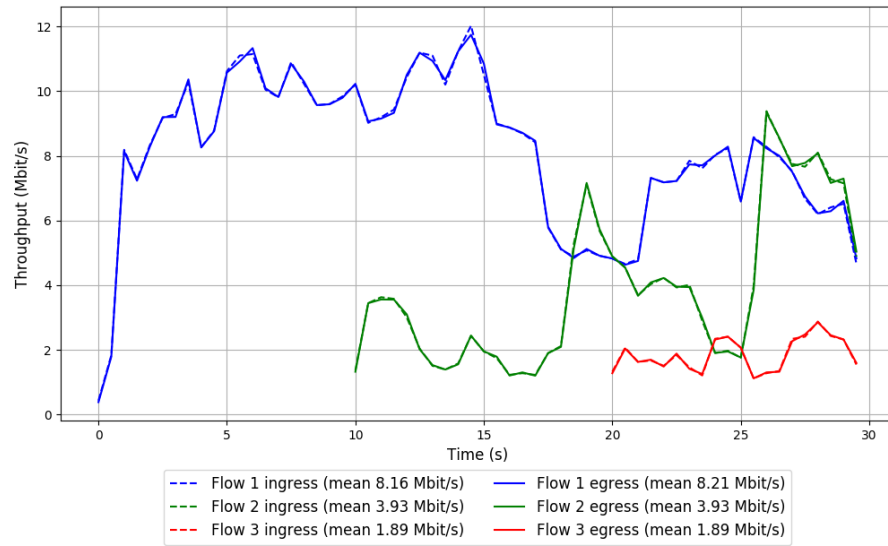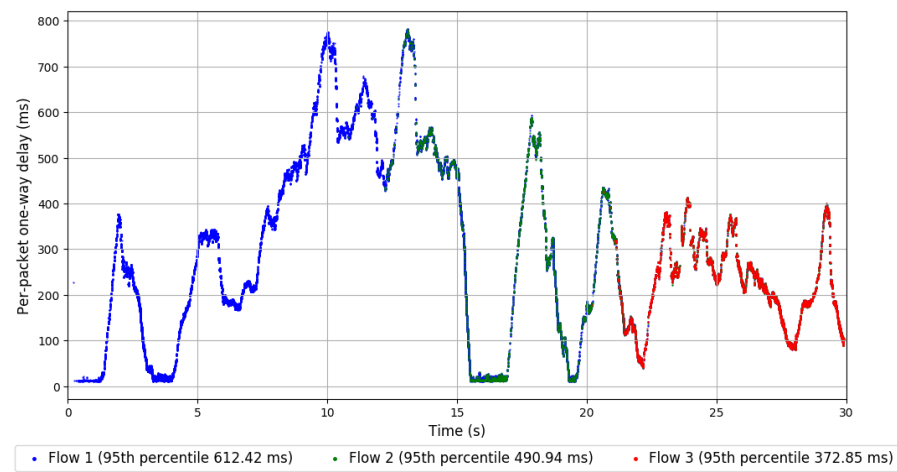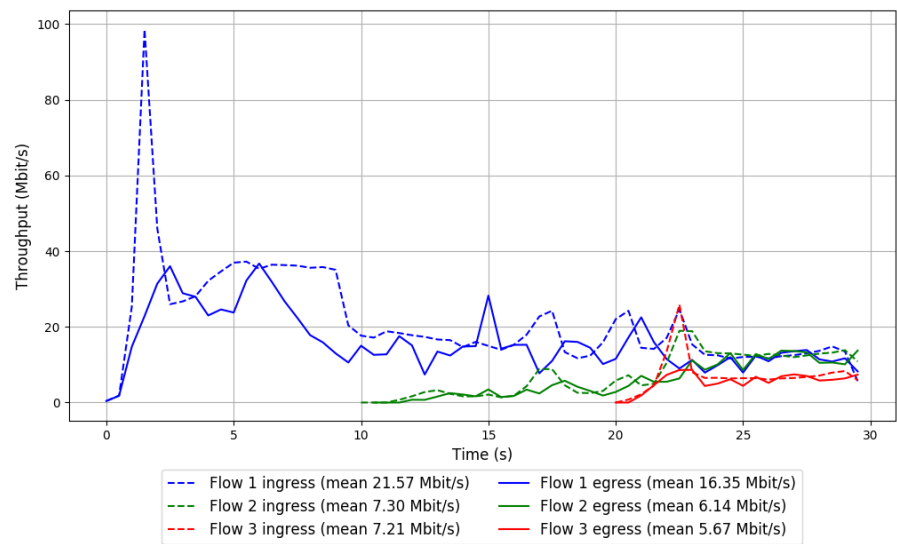Run 1: Report of Vivace-loss — Data Link

```
Run 2: Statistics of Vivace-loss

Start at: 2018-03-13 00:00:55
End at: 2018-03-13 00:01:25
Local clock offset: 1.096 ms
Remote clock offset: -4.925 ms


# Below is generated by plot.py at 2018-03-13 00:47:55
# Datalink statistics
-- Total of 3 flows:
Average throughput: 25.69 Mbit/s
95th percentile per-packet one-way delay: 392.243 ms
Loss rate: 22.93%
-- Flow 1:
Average throughput: 21.30 Mbit/s
95th percentile per-packet one-way delay: 368.989 ms
Loss rate: 23.06%
-- Flow 2:
Average throughput: 6.01 Mbit/s
95th percentile per-packet one-way delay: 440.845 ms
Loss rate: 22.71%
-- Flow 3:
Average throughput: 1.32 Mbit/s
95th percentile per-packet one-way delay: 340.098 ms
Loss rate: 18.35%
```

Run 2: Report of Vivace-loss — Data Link

Flow 1 ingress (mean 27.50 Mbit/s) --- Flow 1 egress (mean 21.30 Mbit/s)
Flow 2 ingress (mean 7.67 Mbit/s) --- Flow 2 egress (mean 6.01 Mbit/s)
Flow 3 ingress (mean 1.58 Mbit/s) --- Flow 3 egress (mean 1.32 Mbit/s)

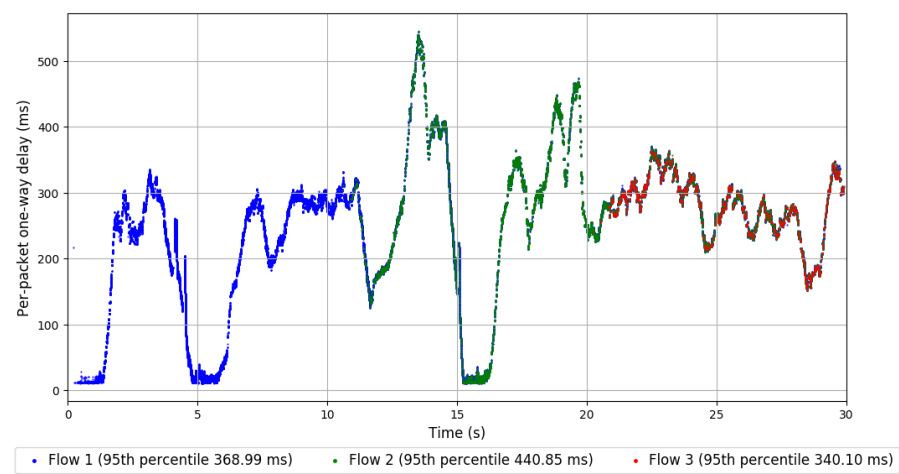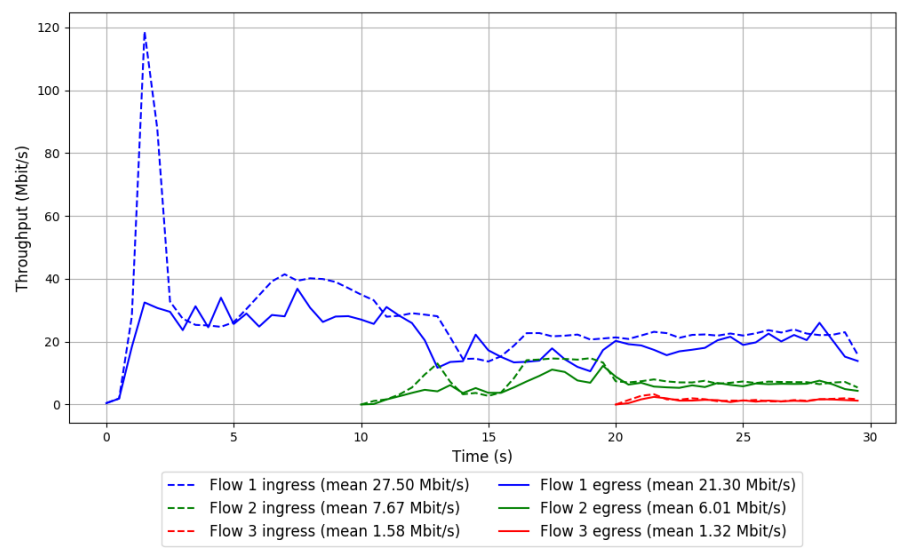Flow 1 (95th percentile 368.99 ms) • Flow 2 (95th percentile 440.85 ms) • Flow 3 (95th percentile 340.10 ms)
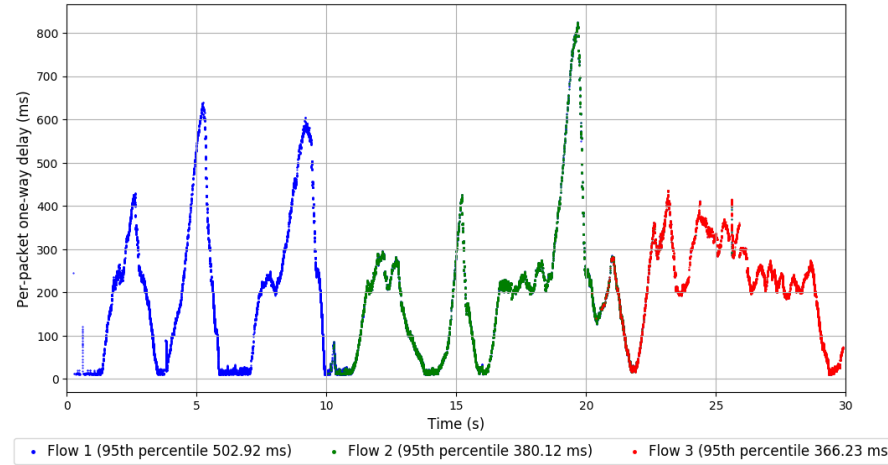
```
Run 3: Statistics of Vivace-loss

Start at: 2018-03-13 00:24:54
End at: 2018-03-13 00:25:24
Local clock offset: 0.925 ms
Remote clock offset: -5.033 ms

# Below is generated by plot.py at 2018-03-13 00:47:57
# Datalink statistics
-- Total of 3 flows:
Average throughput: 26.06 Mbit/s
95th percentile per-packet one-way delay: 416.552 ms
Loss rate: 22.49%
-- Flow 1:
Average throughput: 14.10 Mbit/s
95th percentile per-packet one-way delay: 502.924 ms
Loss rate: 23.64%
-- Flow 2:
Average throughput: 9.22 Mbit/s
95th percentile per-packet one-way delay: 380.117 ms
Loss rate: 24.74%
-- Flow 3:
Average throughput: 17.74 Mbit/s
95th percentile per-packet one-way delay: 366.227 ms
Loss rate: 16.81%
```

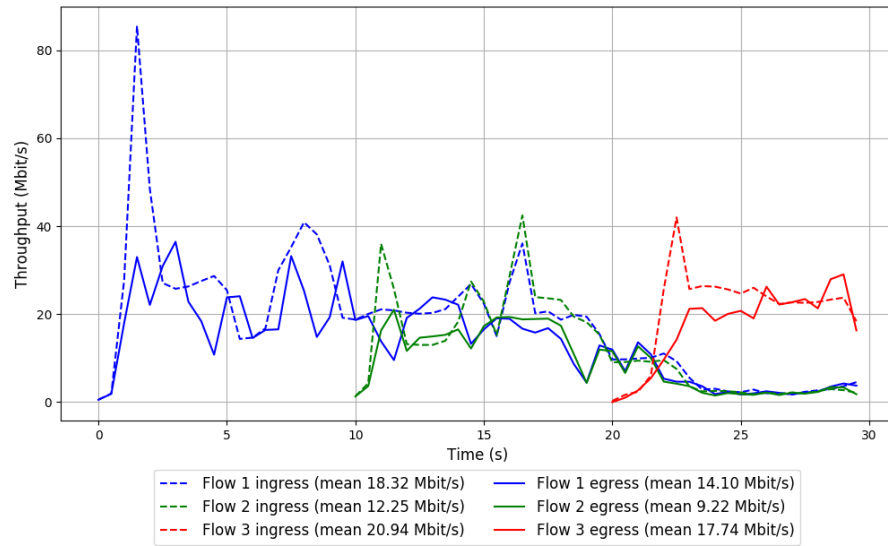Run 3: Report of Vivace-loss — Data Link

```
Run 1: Statistics of Vivace-LTE

Start at: 2018-03-12 23:54:17
End at: 2018-03-12 23:54:47
Local clock offset: 1.286 ms
Remote clock offset: -5.031 ms


# Below is generated by plot.py at 2018-03-13 00:47:57
# Datalink statistics
-- Total of 3 flows:
Average throughput: 17.66 Mbit/s
95th percentile per-packet one-way delay: 38.760 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 12.83 Mbit/s
95th percentile per-packet one-way delay: 36.272 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 4.05 Mbit/s
95th percentile per-packet one-way delay: 39.429 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 6.34 Mbit/s
95th percentile per-packet one-way delay: 58.764 ms
Loss rate: 0.00%
```
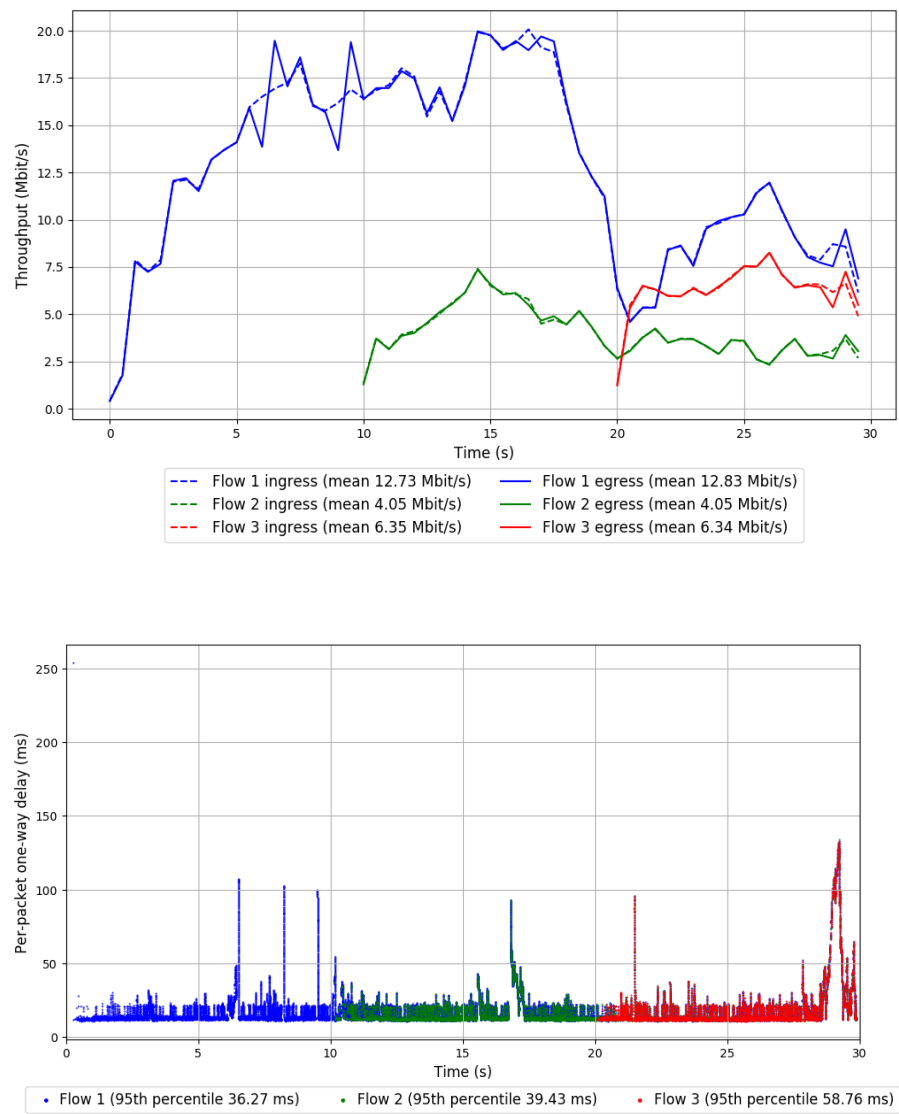
Run 1: Report of Vivace-LTE — Data Link

Flow 1 ingress (mean 12.73 Mbit/s) --- Flow 1 egress (mean 12.83 Mbit/s)
Flow 2 ingress (mean 4.05 Mbit/s) --- Flow 2 egress (mean 4.05 Mbit/s)
Flow 3 ingress (mean 6.35 Mbit/s) --- Flow 3 egress (mean 6.34 Mbit/s)

Flow 1 (95th percentile 36.27 ms) • Flow 2 (95th percentile 39.43 ms) • Flow 3 (95th percentile 58.76 ms)
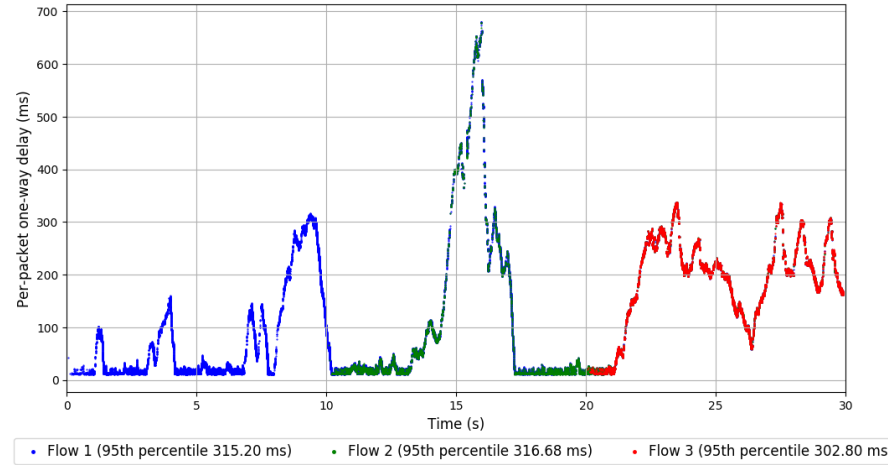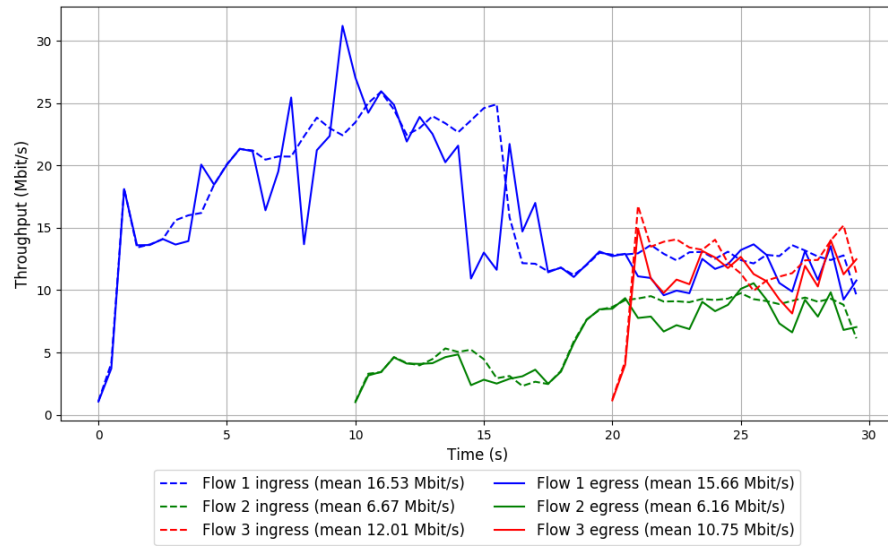
```
Run 2: Statistics of Vivace-LTE

Start at: 2018-03-13 00:18:15
End at: 2018-03-13 00:18:45
Local clock offset: 0.974 ms
Remote clock offset: -5.013 ms


# Below is generated by plot.py at 2018-03-13 00:47:57
# Datalink statistics
-- Total of 3 flows:
Average throughput: 23.29 Mbit/s
95th percentile per-packet one-way delay: 311.667 ms
Loss rate: 6.61%
-- Flow 1:
Average throughput: 15.66 Mbit/s
95th percentile per-packet one-way delay: 315.202 ms
Loss rate: 5.39%
-- Flow 2:
Average throughput: 6.16 Mbit/s
95th percentile per-packet one-way delay: 316.682 ms
Loss rate: 7.74%
-- Flow 3:
Average throughput: 10.75 Mbit/s
95th percentile per-packet one-way delay: 302.798 ms
Loss rate: 10.46%
```

Run 2: Report of Vivace-LTE — Data Link

```
Run 3: Statistics of Vivace-LTE

Start at: 2018-03-13 00:42:12
End at: 2018-03-13 00:42:42
Local clock offset: 0.87 ms
Remote clock offset: -5.172 ms


# Below is generated by plot.py at 2018-03-13 00:47:57
# Datalink statistics
-- Total of 3 flows:
Average throughput: 15.10 Mbit/s
95th percentile per-packet one-way delay: 143.309 ms
Loss rate: 2.01%
-- Flow 1:
Average throughput: 5.54 Mbit/s
95th percentile per-packet one-way delay: 72.206 ms
Loss rate: 0.64%
-- Flow 2:
Average throughput: 12.85 Mbit/s
95th percentile per-packet one-way delay: 180.657 ms
Loss rate: 2.77%
-- Flow 3:
Average throughput: 2.86 Mbit/s
95th percentile per-packet one-way delay: 179.899 ms
Loss rate: 2.93%
```

Run 3: Report of Vivace-LTE — Data Link

Legend:
- Flow 1 ingress (mean 5.54 Mbit/s)
- Flow 1 egress (mean 5.54 Mbit/s)
- Flow 2 ingress (mean 13.22 Mbit/s)
- Flow 2 egress (mean 12.85 Mbit/s)
- Flow 3 ingress (mean 2.94 Mbit/s)
- Flow 3 egress (mean 2.86 Mbit/s)

Legend:
- Flow 1 (95th percentile 72.21 ms)
- Flow 2 (95th percentile 180.66 ms)
- Flow 3 (95th percentile 179.90 ms)