Pantheon Report

Generated at 2018-08-10 00:47:36 (UTC).

Data path: India ppp0 ppp0 (*remote*) →AWS India 1 Ethernet (*local*).

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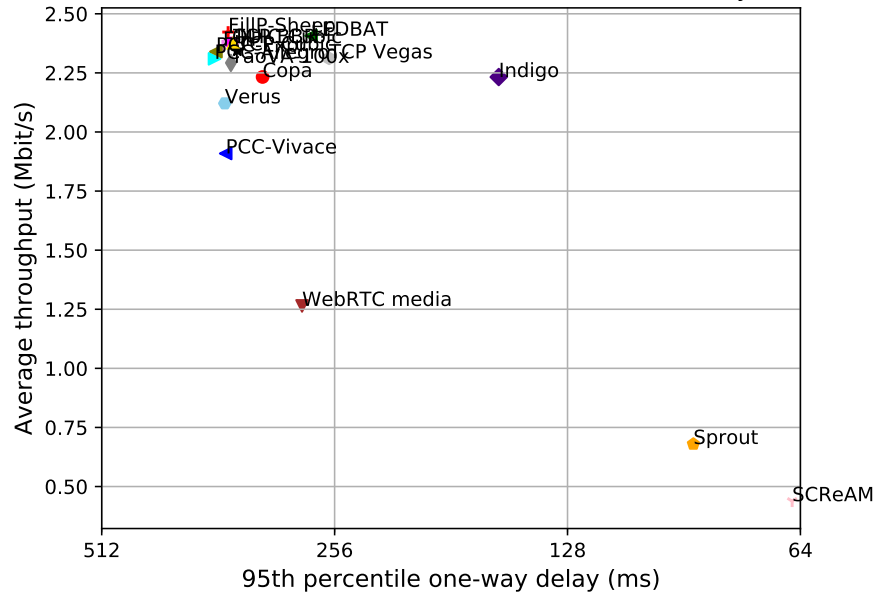
Increased UDP receive buffer to 16 MB (default) and 32 MB (max).

NTP offsets were measured against `nets.org.sg` and have been applied to correct the timestamps in logs.
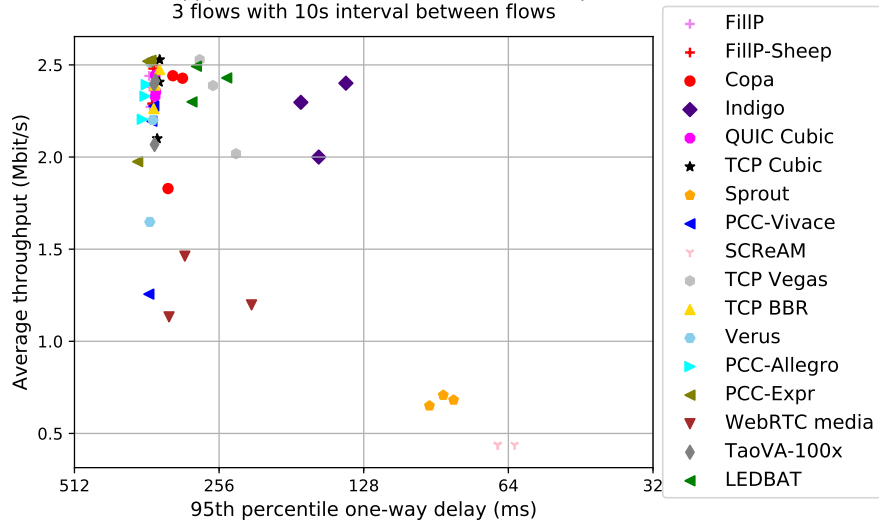
```
Git summary:
branch: master @ 7772df3413f4b07ba0096dfdd8e9d4c6dca623e3
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfe58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ 6f038ed31259d366f9840f65b82cbe8f464b1b39
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
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
 M src/verus.hpp
 M tools/plot.py
third_party/vivace @ 2baf86211435ae071a32f96b7d8c504587f5d7f4
third_party/webrtc @ 3f0cc2a9061a41b6f9dde4735770d143a1fa2851
```

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

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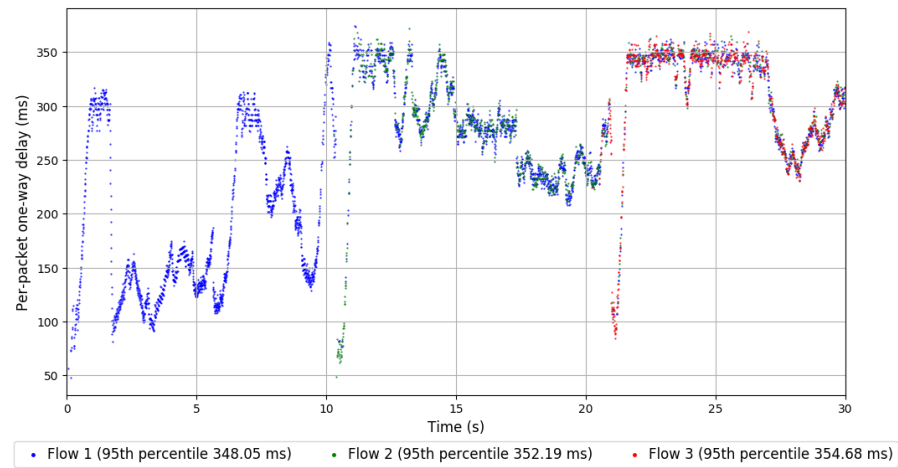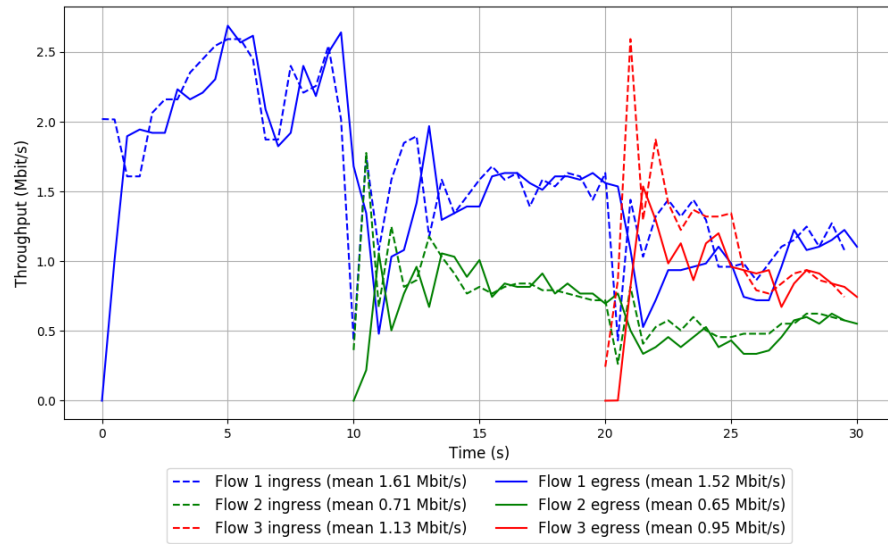3 flows with 10s interval between flows

2

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	1.53	0.83	0.91	344.33	347.77	349.53	5.23	8.02	18.88
Copa	3	1.42	0.95	0.56	299.73	325.49	336.46	0.79	1.32	4.80
TCP Cubic	3	1.59	0.88	0.54	338.94	342.51	343.22	1.70	3.95	7.34
FillP	3	1.68	0.67	0.79	358.14	355.18	353.98	39.27	34.85	31.55
FillP-Sheep	3	1.44	1.03	0.95	348.88	352.66	355.90	19.56	35.52	57.30
Indigo	3	1.17	1.08	1.07	148.47	160.90	178.34	1.38	0.74	1.57
LEDBAT	3	1.23	1.48	0.63	229.82	281.31	300.05	0.03	1.12	3.88
PCC-Allegro	3	1.37	0.96	0.94	356.06	361.36	793.00	37.91	57.31	81.87
PCC-Expr	3	1.31	1.31	0.64	357.66	392.78	384.77	59.85	69.41	85.24
QUIC Cubic	3	1.59	0.81	0.79	346.37	348.31	349.15	4.09	8.41	12.23
SCReAM	3	0.22	0.22	0.22	65.44	65.40	64.91	0.25	0.39	0.70
Sprout	3	0.34	0.36	0.31	84.62	95.33	102.78	0.09	0.70	0.42
TaoVA-100x	3	1.41	0.94	0.80	346.08	352.43	350.57	12.31	26.15	39.22
TCP Vegas	3	1.14	1.16	1.23	260.11	263.29	251.16	1.12	0.70	1.92
Verus	3	1.84	0.25	0.41	353.62	385.21	412.95	22.44	60.37	71.00
PCC-Vivace	3	1.08	0.86	0.80	351.64	354.23	358.53	24.69	36.29	51.09
WebRTC media	3	0.68	0.38	0.21	260.40	298.18	276.88	1.30	2.63	1.73

```
Run 1: Statistics of TCP BBR

Start at: 2018-08-09 23:54:52
End at: 2018-08-09 23:55:22
Local clock offset: 1.065 ms
Remote clock offset: -13.074 ms


# Below is generated by plot.py at 2018-08-10 00:46:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 350.246 ms
Loss rate: 8.22%
-- Flow 1:
Average throughput: 1.52 Mbit/s
95th percentile per-packet one-way delay: 348.052 ms
Loss rate: 5.69%
-- Flow 2:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 352.195 ms
Loss rate: 9.15%
-- Flow 3:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 354.683 ms
Loss rate: 17.93%
```
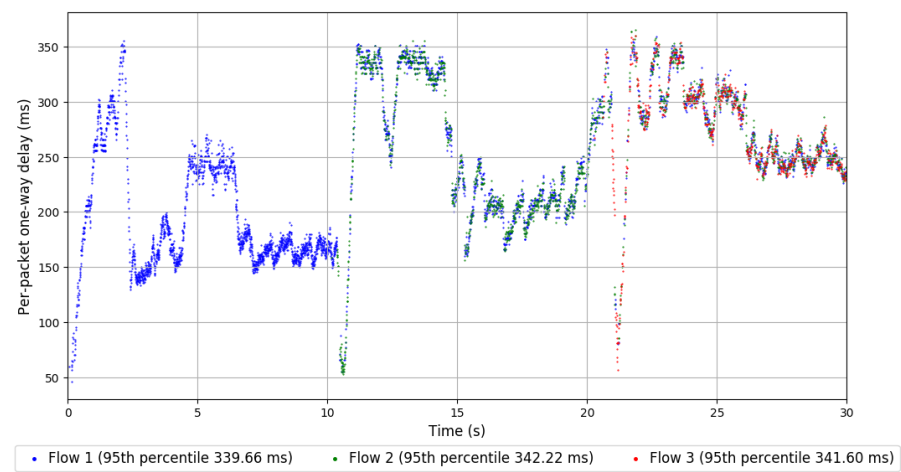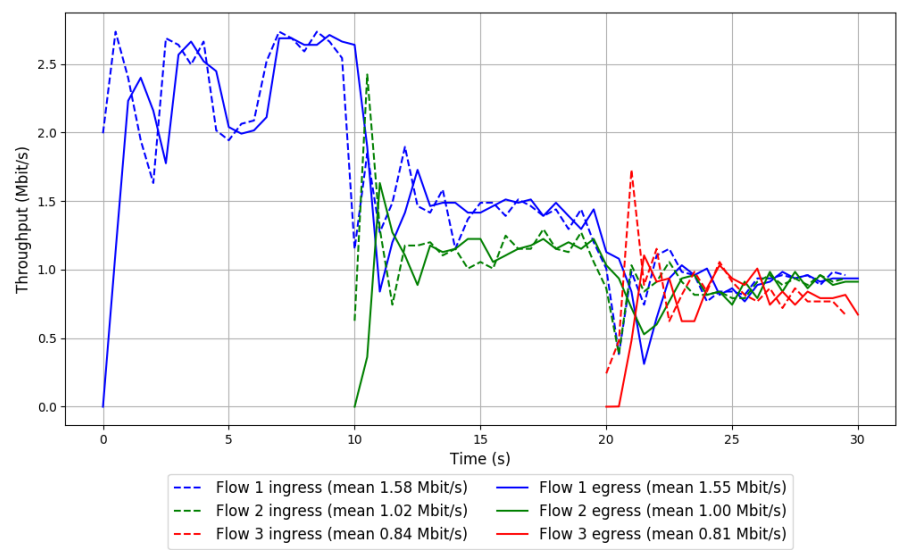
Run 1: Report of TCP BBR — Data Link

Flow 1 ingress (mean 1.61 Mbit/s)   Flow 1 egress (mean 1.52 Mbit/s)
Flow 2 ingress (mean 0.71 Mbit/s)   Flow 2 egress (mean 0.65 Mbit/s)
Flow 3 ingress (mean 1.13 Mbit/s)   Flow 3 egress (mean 0.95 Mbit/s)

Flow 1 (95th percentile 348.05 ms)   Flow 2 (95th percentile 352.19 ms)   Flow 3 (95th percentile 354.68 ms)

5

```
Run 2: Statistics of TCP BBR

Start at: 2018-08-10 00:13:27
End at: 2018-08-10 00:13:57
Local clock offset: -0.079 ms
Remote clock offset: -8.981 ms


# Below is generated by plot.py at 2018-08-10 00:46:56
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.47 Mbit/s
95th percentile per-packet one-way delay: 340.590 ms
Loss rate: 2.79%
-- Flow 1:
Average throughput: 1.55 Mbit/s
95th percentile per-packet one-way delay: 339.658 ms
Loss rate: 1.93%
-- Flow 2:
Average throughput: 1.00 Mbit/s
95th percentile per-packet one-way delay: 342.216 ms
Loss rate: 3.29%
-- Flow 3:
Average throughput: 0.81 Mbit/s
95th percentile per-packet one-way delay: 341.602 ms
Loss rate: 6.46%
```
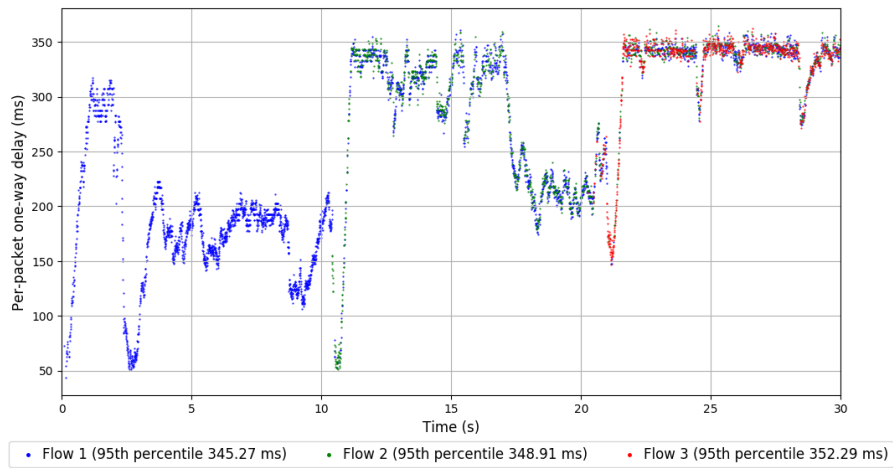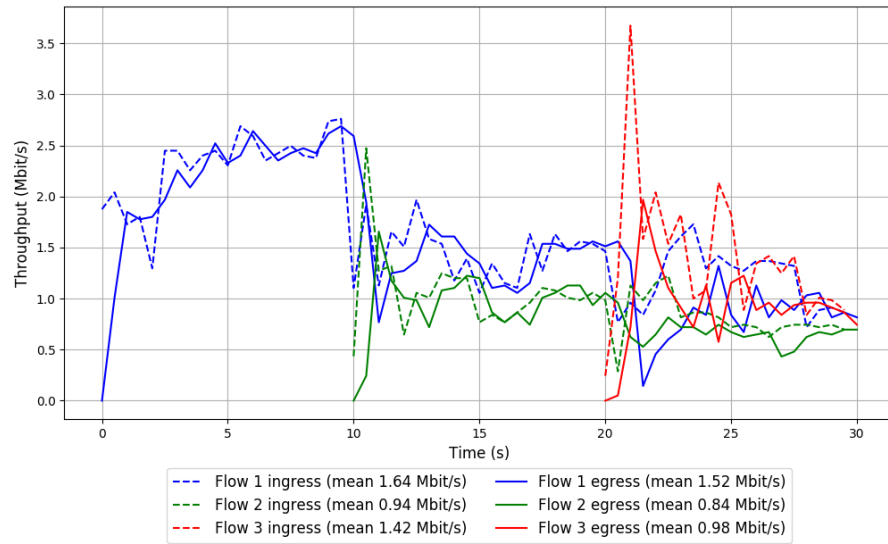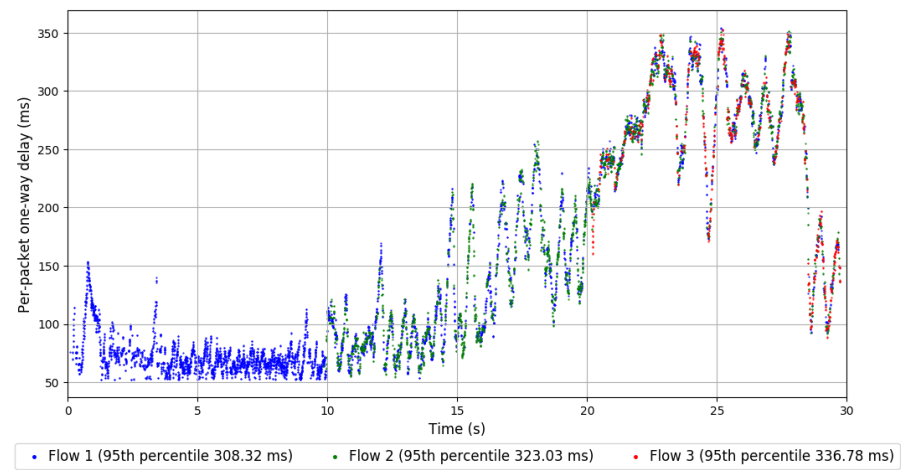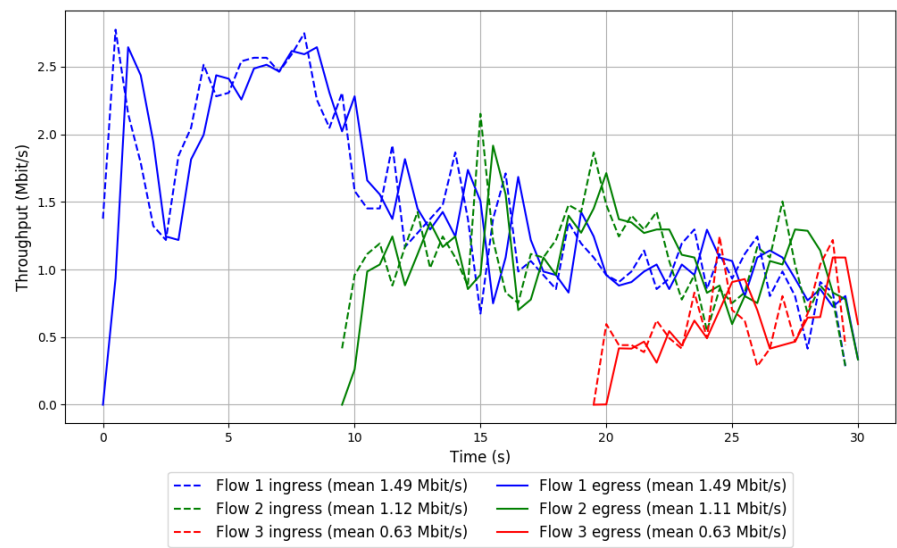
Run 2: Report of TCP BBR — Data Link

Flow 1 ingress (mean 1.58 Mbit/s)   Flow 1 egress (mean 1.55 Mbit/s)
Flow 2 ingress (mean 1.02 Mbit/s)   Flow 2 egress (mean 1.00 Mbit/s)
Flow 3 ingress (mean 0.84 Mbit/s)   Flow 3 egress (mean 0.81 Mbit/s)

Flow 1 (95th percentile 339.66 ms)   Flow 2 (95th percentile 342.22 ms)   Flow 3 (95th percentile 341.60 ms)
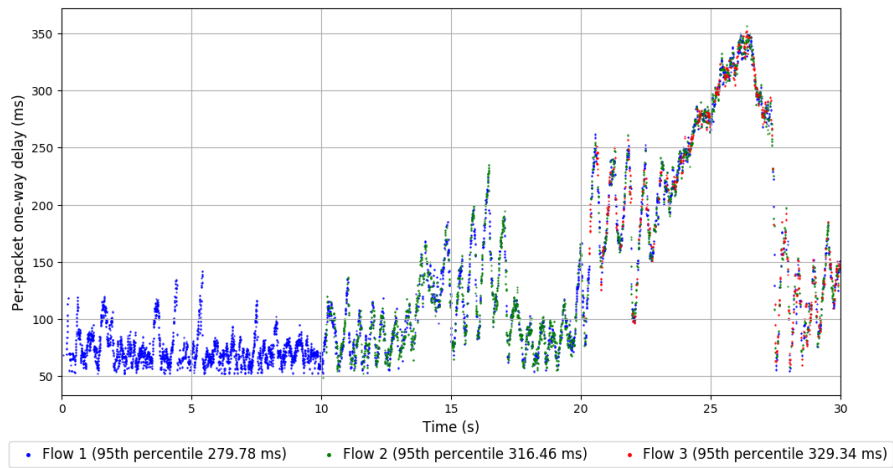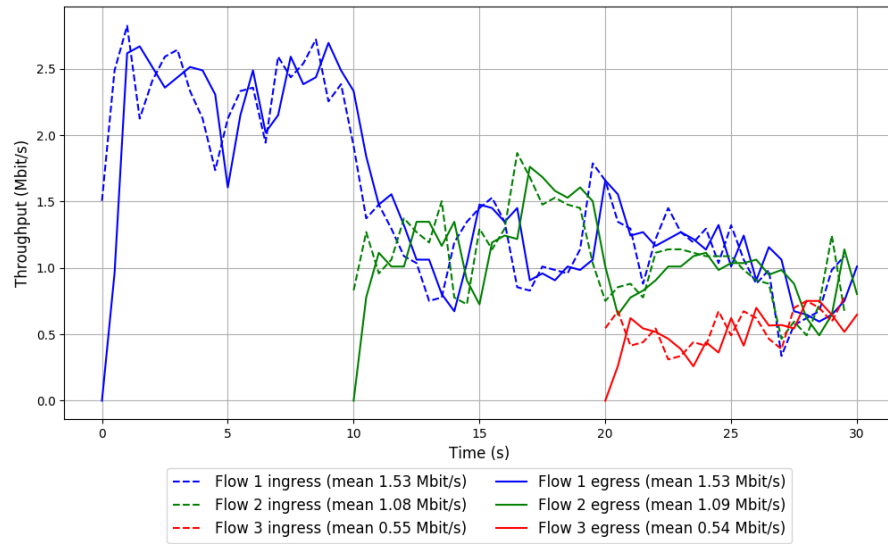
7

```
Run 3: Statistics of TCP BBR

Start at: 2018-08-10 00:32:01
End at: 2018-08-10 00:32:31
Local clock offset: -2.639 ms
Remote clock offset: -7.51 ms


# Below is generated by plot.py at 2018-08-10 00:46:57
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.39 Mbit/s
95th percentile per-packet one-way delay: 348.052 ms
Loss rate: 13.02%
-- Flow 1:
Average throughput: 1.52 Mbit/s
95th percentile per-packet one-way delay: 345.275 ms
Loss rate: 8.06%
-- Flow 2:
Average throughput: 0.84 Mbit/s
95th percentile per-packet one-way delay: 348.908 ms
Loss rate: 11.62%
-- Flow 3:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 352.293 ms
Loss rate: 32.26%
```

Run 3: Report of TCP BBR — Data Link

Legend:
- Flow 1 ingress (mean 1.64 Mbit/s)
- Flow 1 egress (mean 1.52 Mbit/s)
- Flow 2 ingress (mean 0.94 Mbit/s)
- Flow 2 egress (mean 0.84 Mbit/s)
- Flow 3 ingress (mean 1.42 Mbit/s)
- Flow 3 egress (mean 0.98 Mbit/s)

Legend:
- Flow 1 (95th percentile 345.27 ms)
- Flow 2 (95th percentile 348.91 ms)
- Flow 3 (95th percentile 352.29 ms)

```
Run 1: Statistics of Copa

Start at: 2018-08-09 23:59:15
End at: 2018-08-09 23:59:45
Local clock offset: 1.074 ms
Remote clock offset: -12.08 ms


# Below is generated by plot.py at 2018-08-10 00:46:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.44 Mbit/s
95th percentile per-packet one-way delay: 319.552 ms
Loss rate: 0.58%
-- Flow 1:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 308.321 ms
Loss rate: 0.36%
-- Flow 2:
Average throughput: 1.11 Mbit/s
95th percentile per-packet one-way delay: 323.033 ms
Loss rate: 0.51%
-- Flow 3:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 336.777 ms
Loss rate: 2.35%
```
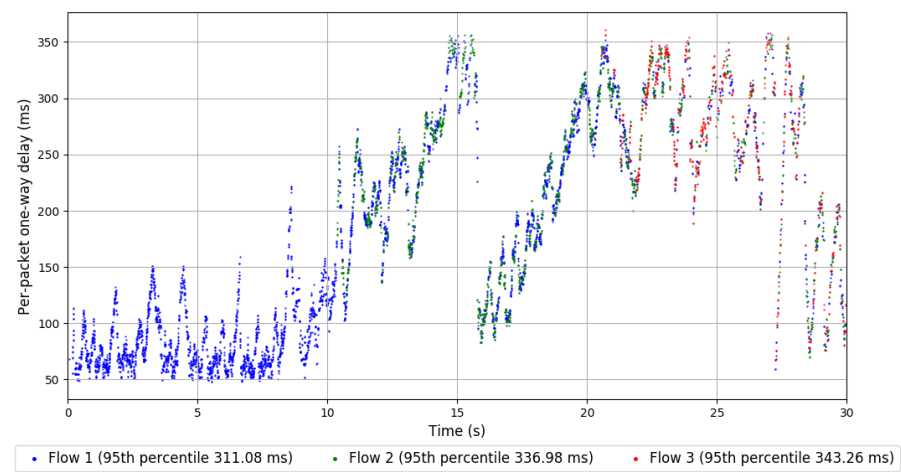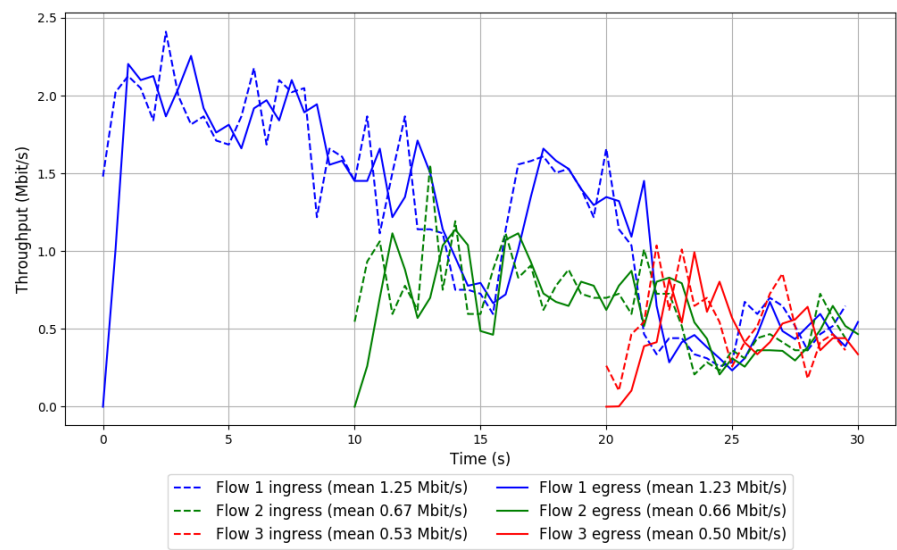
Run 1: Report of Copa — Data Link

Flow 1 ingress (mean 1.49 Mbit/s) --- Flow 1 egress (mean 1.49 Mbit/s)
Flow 2 ingress (mean 1.12 Mbit/s) --- Flow 2 egress (mean 1.11 Mbit/s)
Flow 3 ingress (mean 0.63 Mbit/s) --- Flow 3 egress (mean 0.63 Mbit/s)

Flow 1 (95th percentile 308.32 ms)   Flow 2 (95th percentile 323.03 ms)   Flow 3 (95th percentile 336.78 ms)

```
Run 2: Statistics of Copa

Start at: 2018-08-10 00:17:49
End at: 2018-08-10 00:18:19
Local clock offset: -0.89 ms
Remote clock offset: -10.282 ms


# Below is generated by plot.py at 2018-08-10 00:46:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.43 Mbit/s
95th percentile per-packet one-way delay: 305.078 ms
Loss rate: 0.62%
-- Flow 1:
Average throughput: 1.53 Mbit/s
95th percentile per-packet one-way delay: 279.776 ms
Loss rate: 0.46%
-- Flow 2:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 316.465 ms
Loss rate: 0.26%
-- Flow 3:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 329.343 ms
Loss rate: 3.35%
```
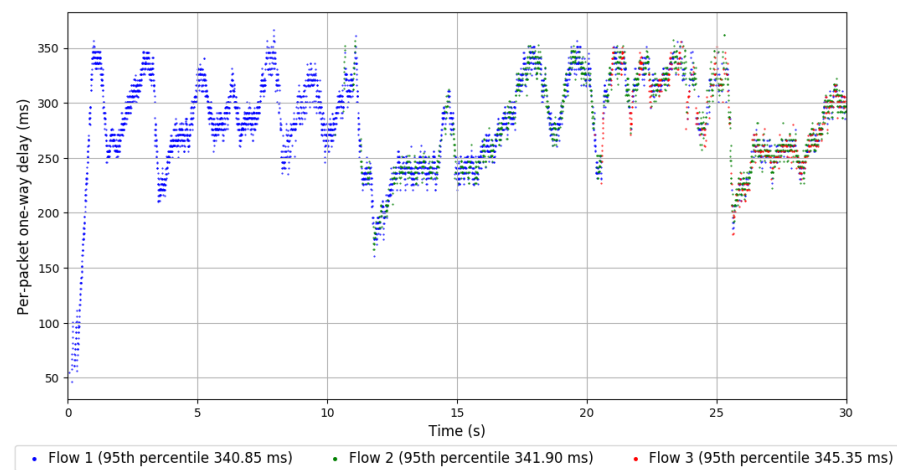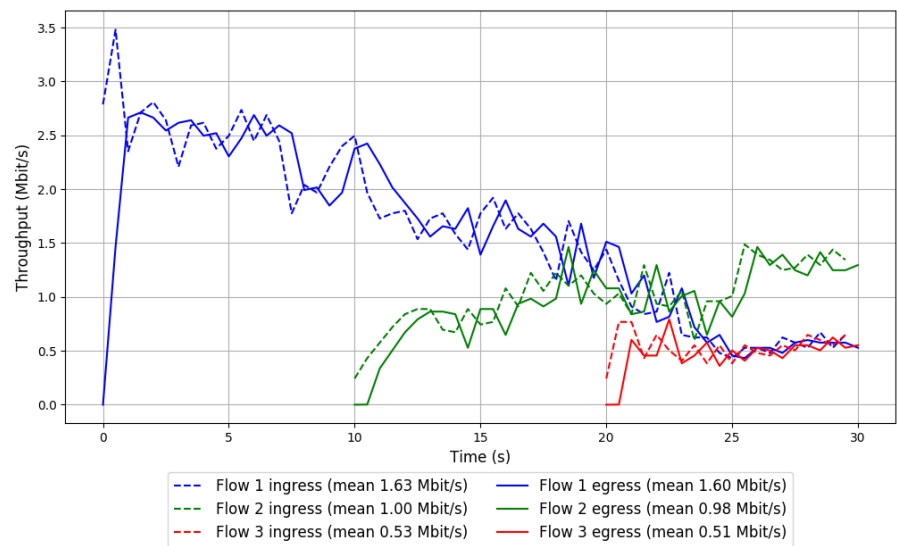
Run 2: Report of Copa — Data Link

Flow 1 ingress (mean 1.53 Mbit/s) --- Flow 1 egress (mean 1.53 Mbit/s) ——
Flow 2 ingress (mean 1.08 Mbit/s) --- Flow 2 egress (mean 1.09 Mbit/s) ——
Flow 3 ingress (mean 0.55 Mbit/s) --- Flow 3 egress (mean 0.54 Mbit/s) ——

• Flow 1 (95th percentile 279.78 ms) • Flow 2 (95th percentile 316.46 ms) • Flow 3 (95th percentile 329.34 ms)

13

```
Run 3: Statistics of Copa

Start at: 2018-08-10 00:36:24
End at: 2018-08-10 00:36:54
Local clock offset: -4.046 ms
Remote clock offset: -6.685 ms


# Below is generated by plot.py at 2018-08-10 00:46:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.83 Mbit/s
95th percentile per-packet one-way delay: 327.011 ms
Loss rate: 2.62%
-- Flow 1:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 311.082 ms
Loss rate: 1.55%
-- Flow 2:
Average throughput: 0.66 Mbit/s
95th percentile per-packet one-way delay: 336.983 ms
Loss rate: 3.18%
-- Flow 3:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 343.264 ms
Loss rate: 8.71%
```
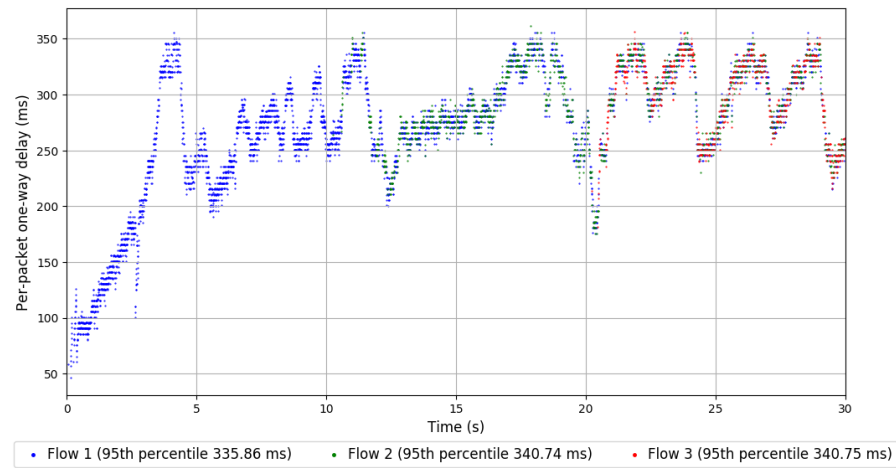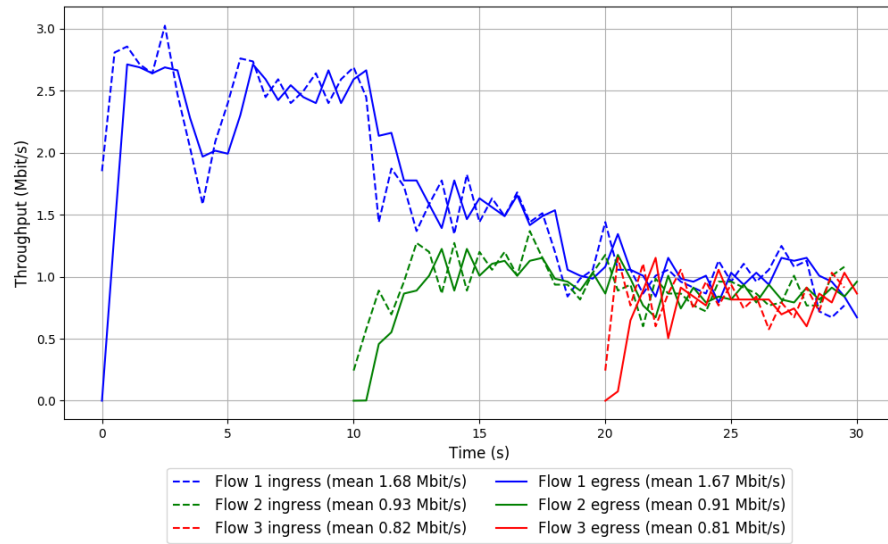
Run 3: Report of Copa — Data Link

Flow 1 ingress (mean 1.25 Mbit/s)   Flow 1 egress (mean 1.23 Mbit/s)
Flow 2 ingress (mean 0.67 Mbit/s)   Flow 2 egress (mean 0.66 Mbit/s)
Flow 3 ingress (mean 0.53 Mbit/s)   Flow 3 egress (mean 0.50 Mbit/s)

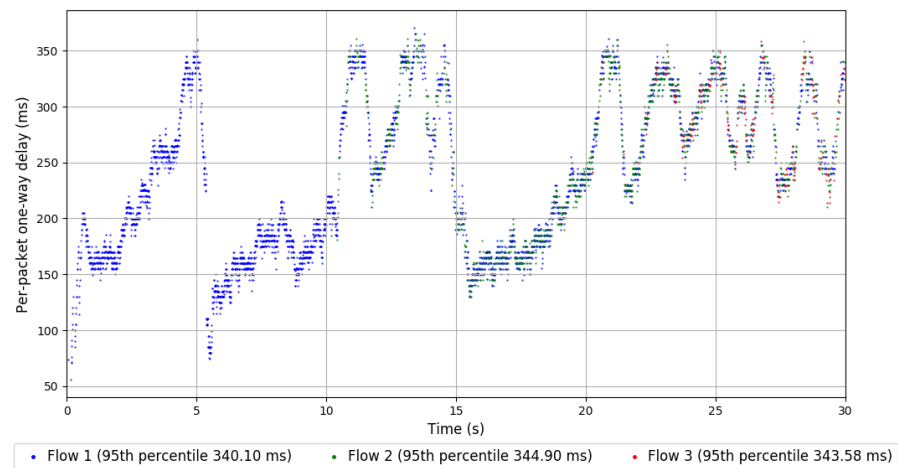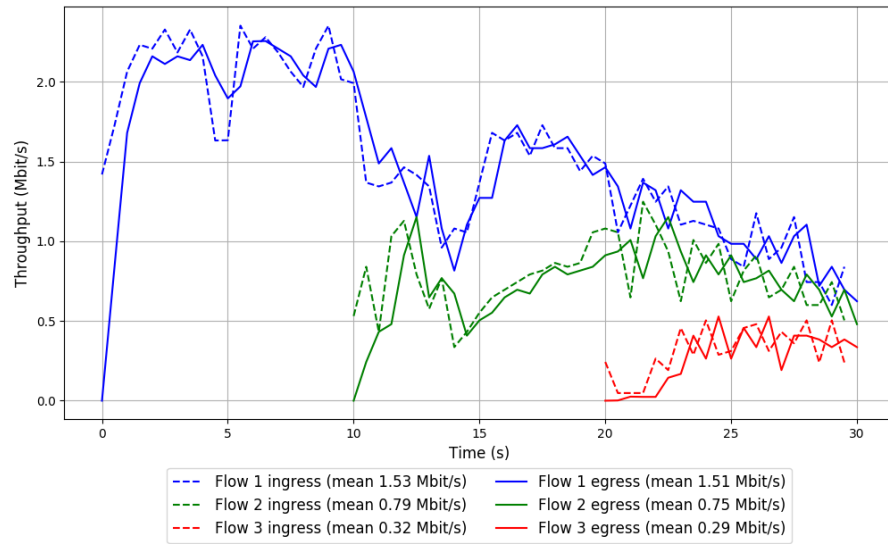Flow 1 (95th percentile 311.08 ms)   Flow 2 (95th percentile 336.98 ms)   Flow 3 (95th percentile 343.26 ms)

```
Run 1: Statistics of TCP Cubic

Start at: 2018-08-10 00:06:54
End at: 2018-08-10 00:07:24
Local clock offset: -0.557 ms
Remote clock offset: -10.636 ms


# Below is generated by plot.py at 2018-08-10 00:46:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.41 Mbit/s
95th percentile per-packet one-way delay: 341.039 ms
Loss rate: 2.87%
-- Flow 1:
Average throughput: 1.60 Mbit/s
95th percentile per-packet one-way delay: 340.854 ms
Loss rate: 2.14%
-- Flow 2:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 341.898 ms
Loss rate: 3.24%
-- Flow 3:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 345.348 ms
Loss rate: 8.12%
```
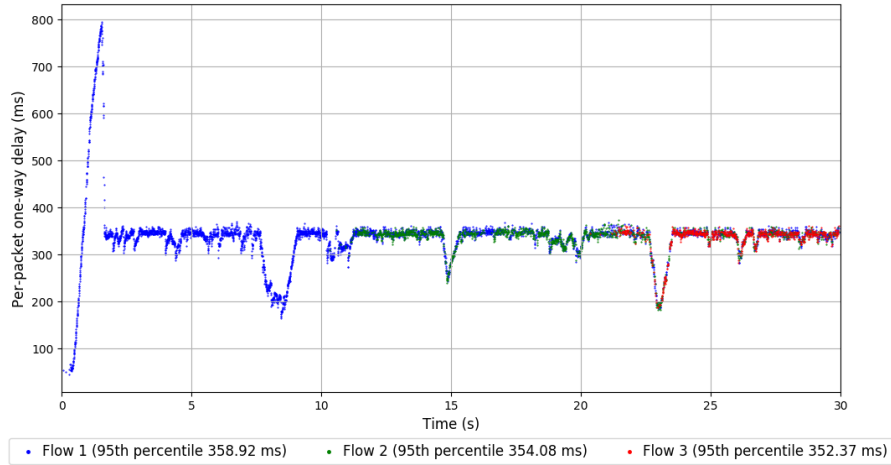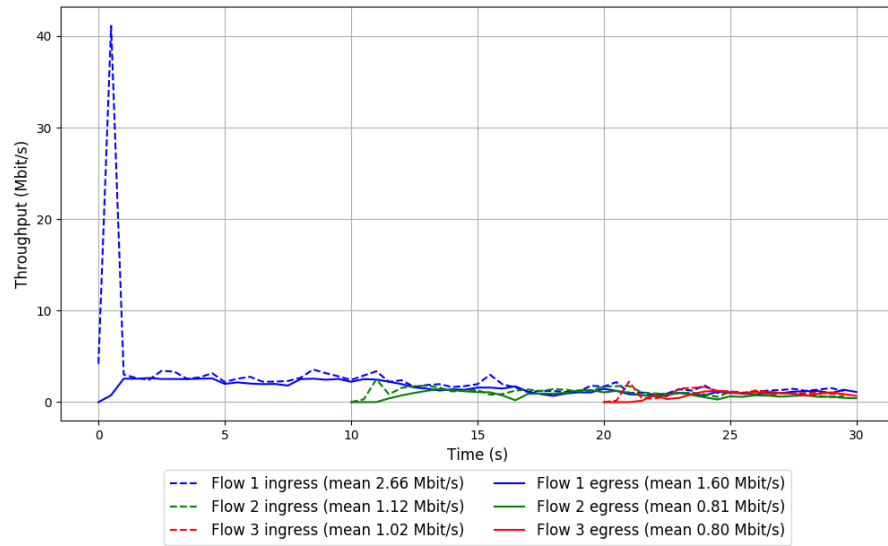
Run 1: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 1.63 Mbit/s) Flow 1 egress (mean 1.60 Mbit/s)
Flow 2 ingress (mean 1.00 Mbit/s) Flow 2 egress (mean 0.98 Mbit/s)
Flow 3 ingress (mean 0.53 Mbit/s) Flow 3 egress (mean 0.51 Mbit/s)

Flow 1 (95th percentile 340.85 ms)   Flow 2 (95th percentile 341.90 ms)   Flow 3 (95th percentile 345.35 ms)

17

```
Run 2: Statistics of TCP Cubic

Start at: 2018-08-10 00:25:28
End at: 2018-08-10 00:25:59
Local clock offset: -1.197 ms
Remote clock offset: -7.947 ms


# Below is generated by plot.py at 2018-08-10 00:46:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.53 Mbit/s
95th percentile per-packet one-way delay: 340.464 ms
Loss rate: 2.17%
-- Flow 1:
Average throughput: 1.67 Mbit/s
95th percentile per-packet one-way delay: 335.860 ms
Loss rate: 1.19%
-- Flow 2:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 340.742 ms
Loss rate: 3.93%
-- Flow 3:
Average throughput: 0.81 Mbit/s
95th percentile per-packet one-way delay: 340.749 ms
Loss rate: 4.25%
```
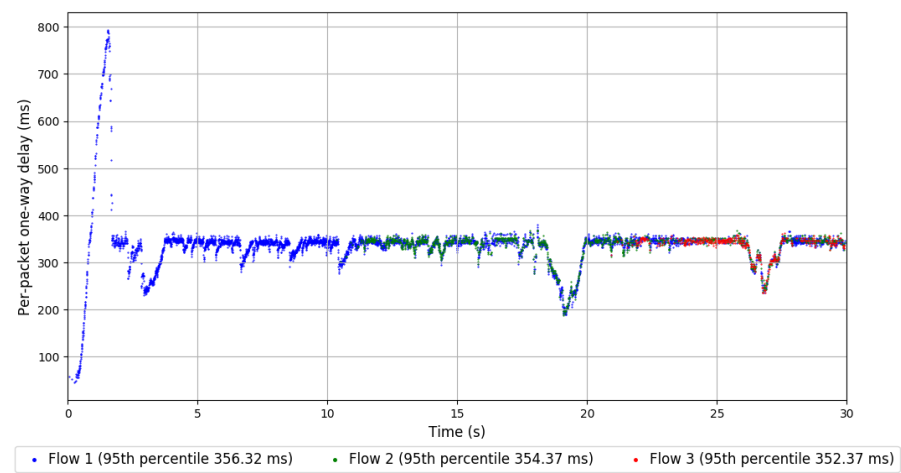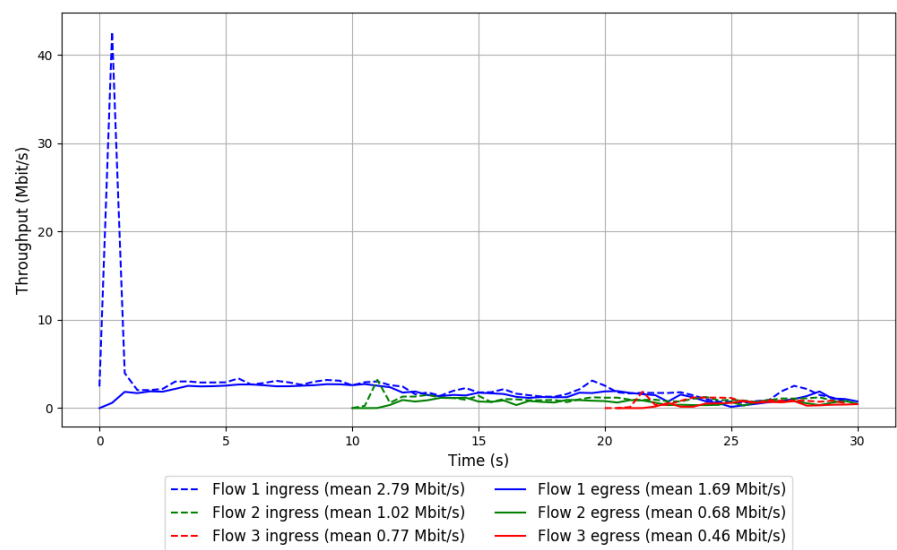
Run 2: Report of TCP Cubic — Data Link

```
Run 3: Statistics of TCP Cubic

Start at: 2018-08-10 00:44:04
End at: 2018-08-10 00:44:34
Local clock offset: -3.301 ms
Remote clock offset: -6.594 ms


# Below is generated by plot.py at 2018-08-10 00:46:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 344.354 ms
Loss rate: 2.86%
-- Flow 1:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 340.097 ms
Loss rate: 1.78%
-- Flow 2:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 344.896 ms
Loss rate: 4.68%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 343.576 ms
Loss rate: 9.65%
```

Run 3: Report of TCP Cubic — Data Link

```
Run 1: Statistics of FillP

Start at: 2018-08-09 23:52:41
End at: 2018-08-09 23:53:11
Local clock offset: 1.738 ms
Remote clock offset: -12.114 ms


# Below is generated by plot.py at 2018-08-10 00:47:02
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 357.045 ms
Loss rate: 36.51%
-- Flow 1:
Average throughput: 1.60 Mbit/s
95th percentile per-packet one-way delay: 358.915 ms
Loss rate: 40.21%
-- Flow 2:
Average throughput: 0.81 Mbit/s
95th percentile per-packet one-way delay: 354.081 ms
Loss rate: 28.72%
-- Flow 3:
Average throughput: 0.80 Mbit/s
95th percentile per-packet one-way delay: 352.372 ms
Loss rate: 24.42%
```
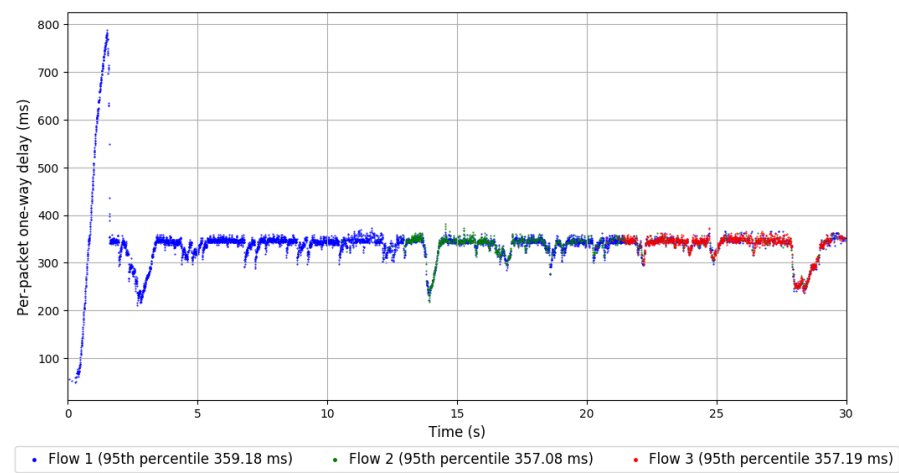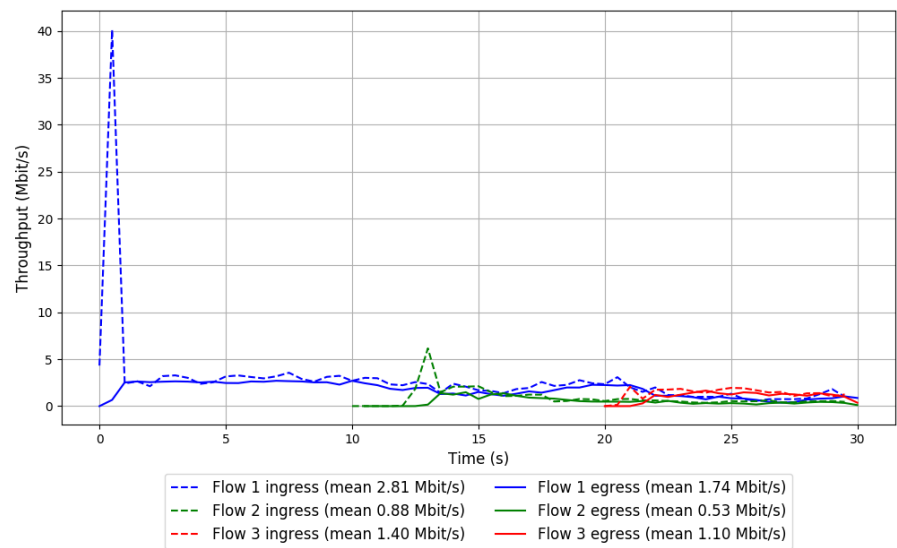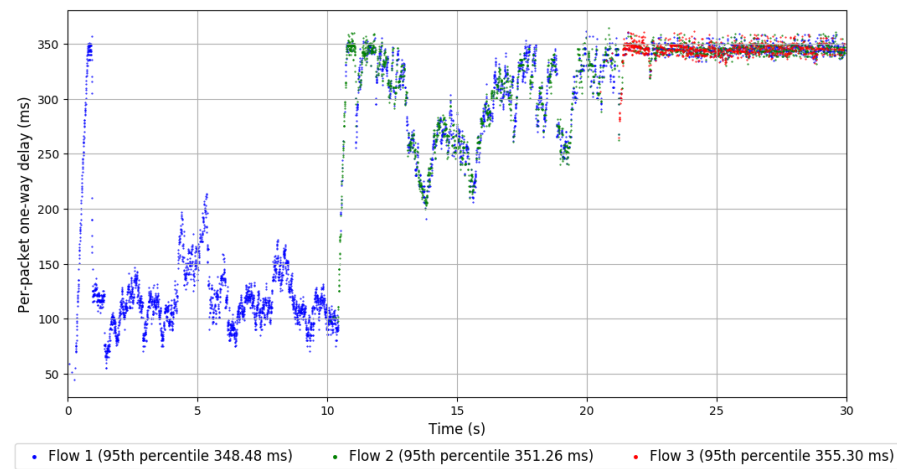
Run 1: Report of FillP — Data Link

```
Run 2: Statistics of FillP

Start at: 2018-08-10 00:11:16
End at: 2018-08-10 00:11:46
Local clock offset: 0.377 ms
Remote clock offset: -10.18 ms

# Below is generated by plot.py at 2018-08-10 00:47:03
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.27 Mbit/s
95th percentile per-packet one-way delay: 355.871 ms
Loss rate: 39.14%
-- Flow 1:
Average throughput: 1.69 Mbit/s
95th percentile per-packet one-way delay: 356.322 ms
Loss rate: 39.59%
-- Flow 2:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 354.365 ms
Loss rate: 34.67%
-- Flow 3:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 352.366 ms
Loss rate: 46.11%
```
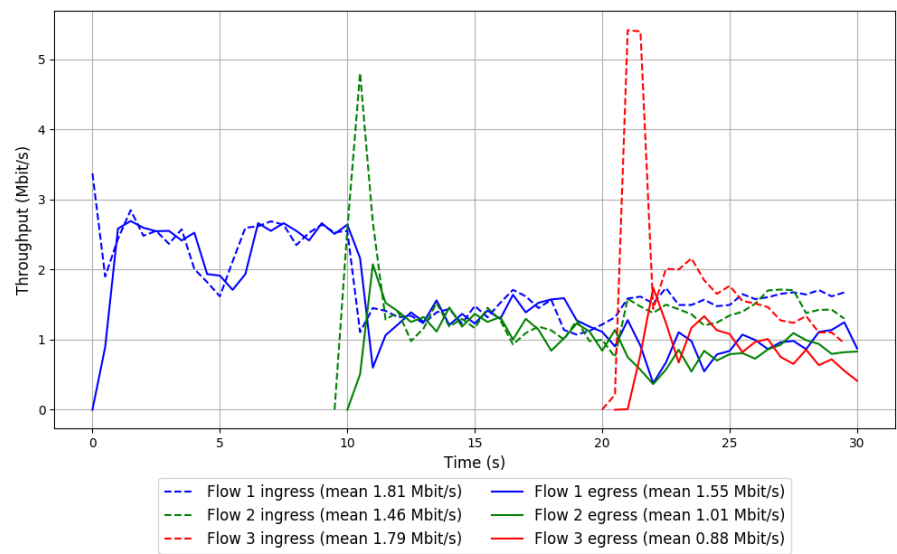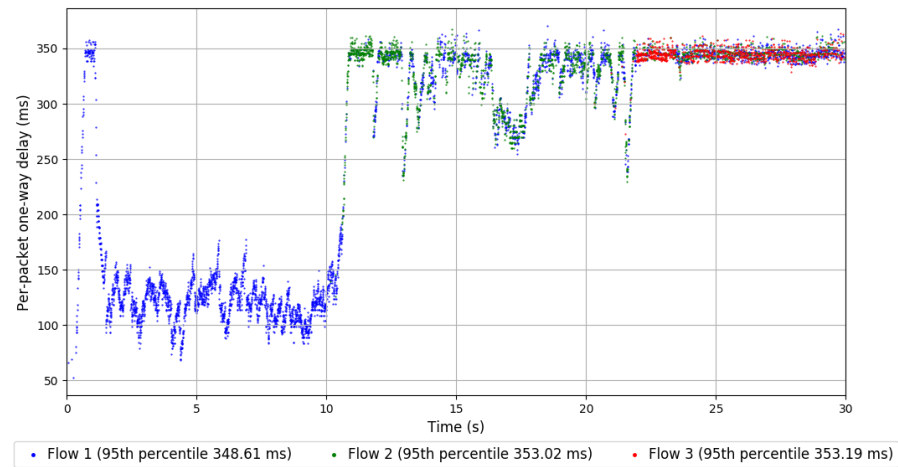
Run 2: Report of FillP — Data Link

- - - - Flow 1 ingress (mean 2.79 Mbit/s) ——— Flow 1 egress (mean 1.69 Mbit/s)
- - - - Flow 2 ingress (mean 1.02 Mbit/s) ——— Flow 2 egress (mean 0.68 Mbit/s)
- - - - Flow 3 ingress (mean 0.77 Mbit/s) ——— Flow 3 egress (mean 0.46 Mbit/s)

- Flow 1 (95th percentile 356.32 ms)   - Flow 2 (95th percentile 354.37 ms)   - Flow 3 (95th percentile 352.37 ms)

25

```
Run 3: Statistics of FillP

Start at: 2018-08-10 00:29:51
End at: 2018-08-10 00:30:21
Local clock offset: 0.097 ms
Remote clock offset: -8.38 ms


# Below is generated by plot.py at 2018-08-10 00:47:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.44 Mbit/s
95th percentile per-packet one-way delay: 357.875 ms
Loss rate: 36.82%
-- Flow 1:
Average throughput: 1.74 Mbit/s
95th percentile per-packet one-way delay: 359.181 ms
Loss rate: 38.02%
-- Flow 2:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 357.081 ms
Loss rate: 41.16%
-- Flow 3:
Average throughput: 1.10 Mbit/s
95th percentile per-packet one-way delay: 357.193 ms
Loss rate: 24.13%
```
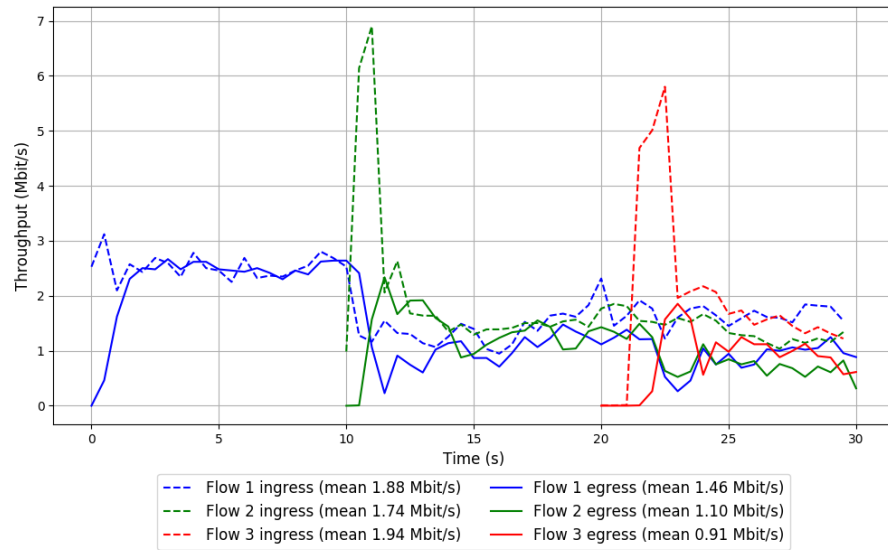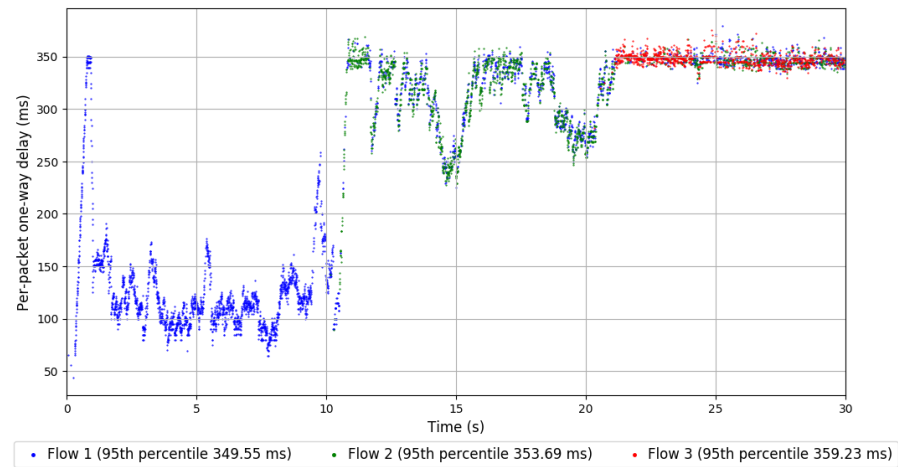
Run 3: Report of FillP — Data Link

```
Run 1: Statistics of FillP-Sheep

Start at: 2018-08-09 23:55:57
End at: 2018-08-09 23:56:27
Local clock offset: 0.655 ms
Remote clock offset: -11.945 ms


# Below is generated by plot.py at 2018-08-10 00:47:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.50 Mbit/s
95th percentile per-packet one-way delay: 350.286 ms
Loss rate: 26.14%
-- Flow 1:
Average throughput: 1.55 Mbit/s
95th percentile per-packet one-way delay: 348.481 ms
Loss rate: 14.70%
-- Flow 2:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 351.264 ms
Loss rate: 30.94%
-- Flow 3:
Average throughput: 0.88 Mbit/s
95th percentile per-packet one-way delay: 355.296 ms
Loss rate: 53.30%
```

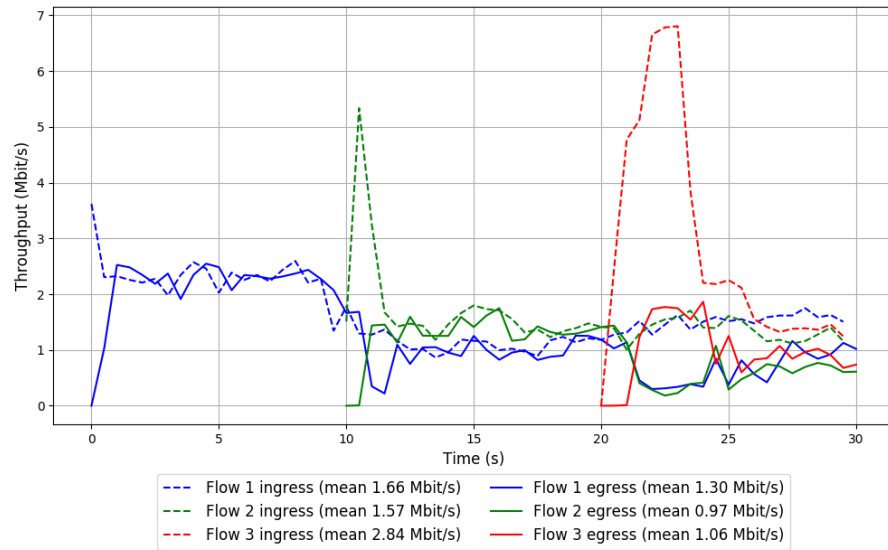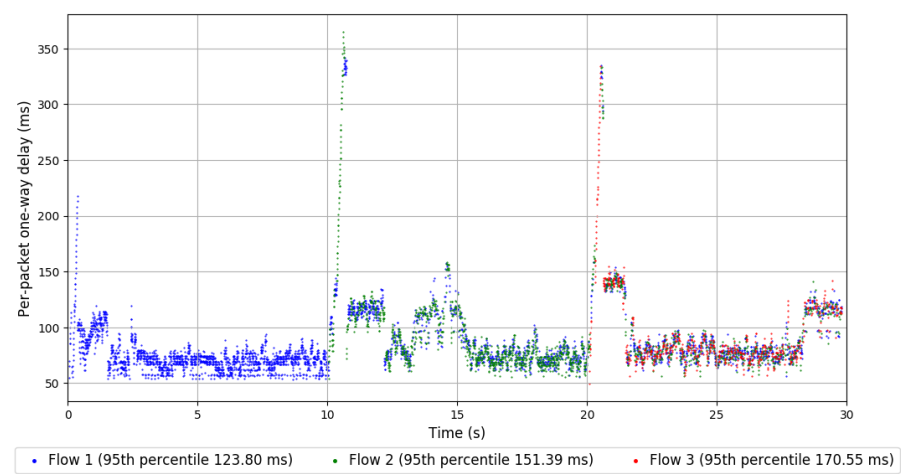Run 1: Report of FillP-Sheep — Data Link

Flow 1 ingress (mean 1.81 Mbit/s)	Flow 1 egress (mean 1.55 Mbit/s)
Flow 2 ingress (mean 1.46 Mbit/s)	Flow 2 egress (mean 1.01 Mbit/s)
Flow 3 ingress (mean 1.79 Mbit/s)	Flow 3 egress (mean 0.88 Mbit/s)

- Flow 1 (95th percentile 348.48 ms)   - Flow 2 (95th percentile 351.26 ms)   - Flow 3 (95th percentile 355.30 ms)

```
Run 2: Statistics of FillP-Sheep

Start at: 2018-08-10 00:14:33
End at: 2018-08-10 00:15:03
Local clock offset: -1.262 ms
Remote clock offset: -9.232 ms


# Below is generated by plot.py at 2018-08-10 00:47:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.48 Mbit/s
95th percentile per-packet one-way delay: 351.203 ms
Loss rate: 32.81%
-- Flow 1:
Average throughput: 1.46 Mbit/s
95th percentile per-packet one-way delay: 348.610 ms
Loss rate: 22.43%
-- Flow 2:
Average throughput: 1.10 Mbit/s
95th percentile per-packet one-way delay: 353.023 ms
Loss rate: 37.35%
-- Flow 3:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 353.190 ms
Loss rate: 54.86%
```

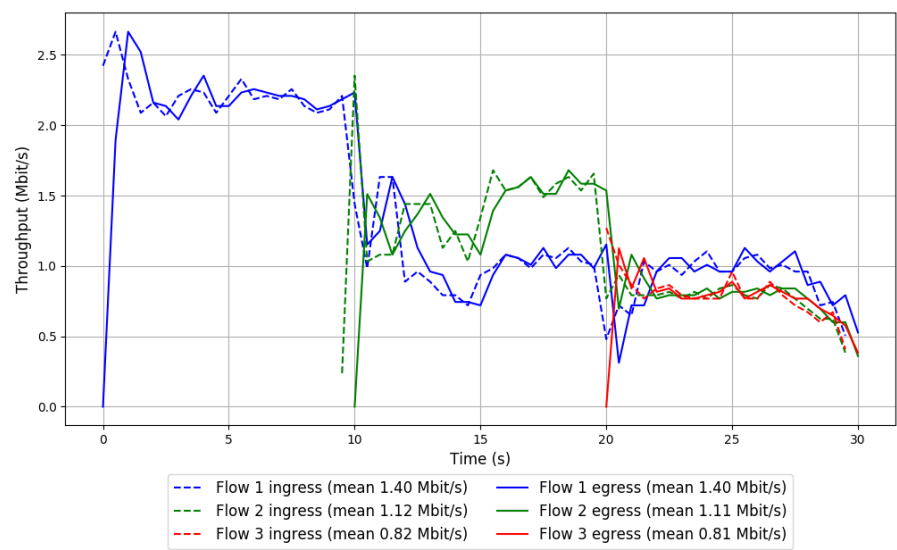Run 2: Report of FillP-Sheep — Data Link
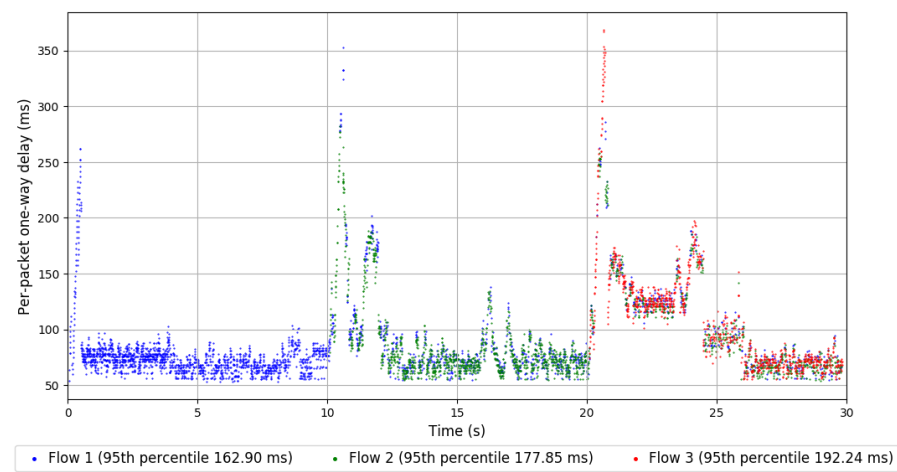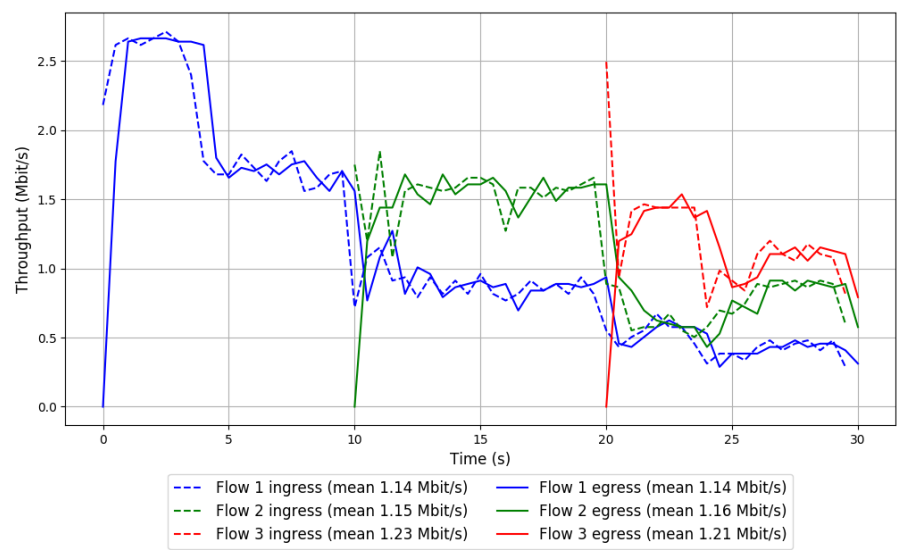
```
Run 3: Statistics of FillP-Sheep

Start at: 2018-08-10 00:33:07
End at: 2018-08-10 00:33:37
Local clock offset: -1.582 ms
Remote clock offset: -8.145 ms

# Below is generated by plot.py at 2018-08-10 00:47:07
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.29 Mbit/s
95th percentile per-packet one-way delay: 352.908 ms
Loss rate: 37.24%
-- Flow 1:
Average throughput: 1.30 Mbit/s
95th percentile per-packet one-way delay: 349.548 ms
Loss rate: 21.55%
-- Flow 2:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 353.694 ms
Loss rate: 38.28%
-- Flow 3:
Average throughput: 1.06 Mbit/s
95th percentile per-packet one-way delay: 359.227 ms
Loss rate: 63.75%
```

Run 3: Report of FillP-Sheep — Data Link

Flow 1 ingress (mean 1.66 Mbit/s)   Flow 1 egress (mean 1.30 Mbit/s)
Flow 2 ingress (mean 1.57 Mbit/s)   Flow 2 egress (mean 0.97 Mbit/s)
Flow 3 ingress (mean 2.84 Mbit/s)   Flow 3 egress (mean 1.06 Mbit/s)

Flow 1 (95th percentile 349.55 ms)   Flow 2 (95th percentile 353.69 ms)   Flow 3 (95th percentile 359.23 ms)
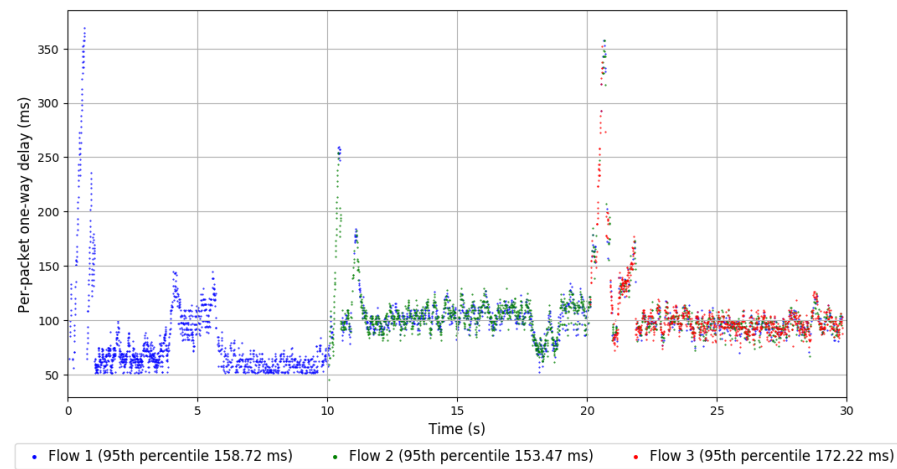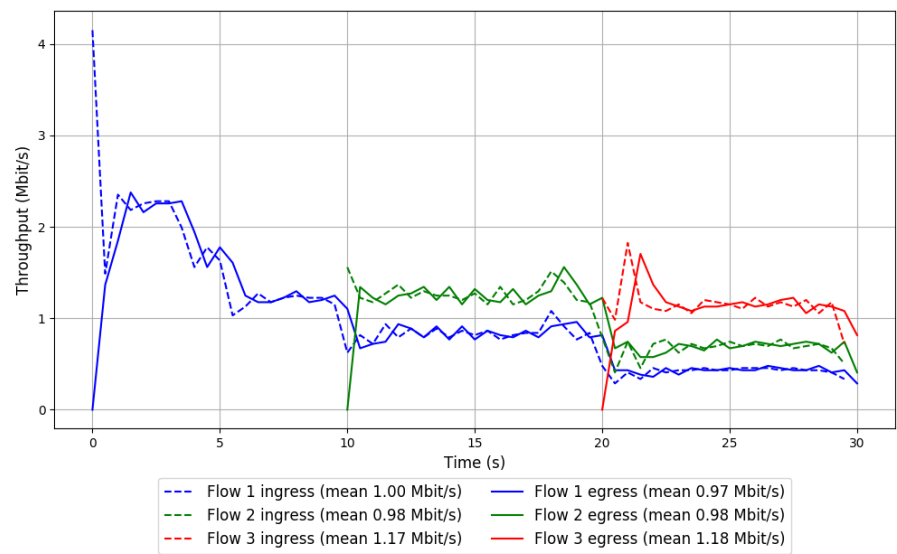
```
Run 1: Statistics of Indigo

Start at: 2018-08-10 00:05:48
End at: 2018-08-10 00:06:18
Local clock offset: 0.516 ms
Remote clock offset: -11.97 ms


# Below is generated by plot.py at 2018-08-10 00:47:07
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 139.413 ms
Loss rate: 0.63%
-- Flow 1:
Average throughput: 1.40 Mbit/s
95th percentile per-packet one-way delay: 123.799 ms
Loss rate: 0.20%
-- Flow 2:
Average throughput: 1.11 Mbit/s
95th percentile per-packet one-way delay: 151.388 ms
Loss rate: 1.35%
-- Flow 3:
Average throughput: 0.81 Mbit/s
95th percentile per-packet one-way delay: 170.552 ms
Loss rate: 0.90%
```

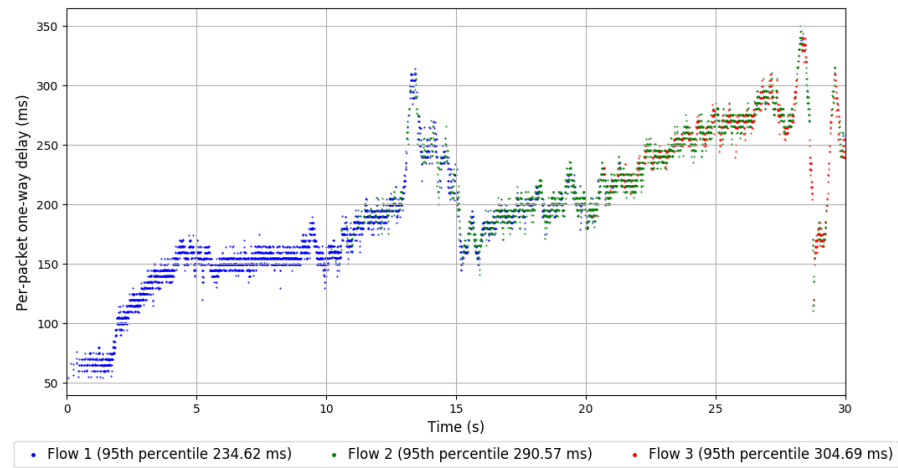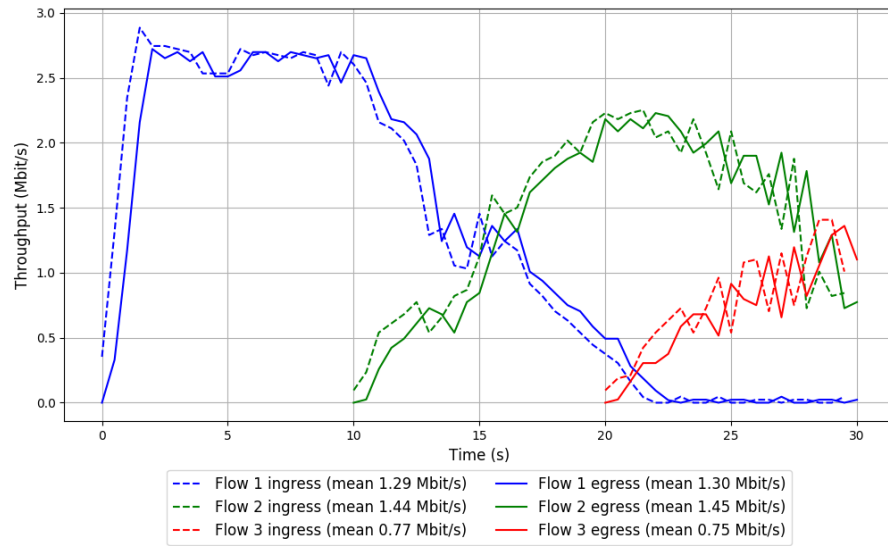## Run 1: Report of Indigo — Data Link

```
Run 2: Statistics of Indigo

Start at: 2018-08-10 00:24:23
End at: 2018-08-10 00:24:53
Local clock offset: 0.879 ms
Remote clock offset: -8.281 ms

# Below is generated by plot.py at 2018-08-10 00:47:07
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.30 Mbit/s
95th percentile per-packet one-way delay: 173.000 ms
Loss rate: 0.66%
-- Flow 1:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 162.901 ms
Loss rate: 0.11%
-- Flow 2:
Average throughput: 1.16 Mbit/s
95th percentile per-packet one-way delay: 177.852 ms
Loss rate: 0.37%
-- Flow 3:
Average throughput: 1.21 Mbit/s
95th percentile per-packet one-way delay: 192.242 ms
Loss rate: 2.78%
```

Run 2: Report of Indigo — Data Link

- - - Flow 1 ingress (mean 1.14 Mbit/s)   —— Flow 1 egress (mean 1.14 Mbit/s)
- - - Flow 2 ingress (mean 1.15 Mbit/s)   —— Flow 2 egress (mean 1.16 Mbit/s)
- - - Flow 3 ingress (mean 1.23 Mbit/s)   —— Flow 3 egress (mean 1.21 Mbit/s)

• Flow 1 (95th percentile 162.90 ms)   • Flow 2 (95th percentile 177.85 ms)   • Flow 3 (95th percentile 192.24 ms)

37

```
Run 3: Statistics of Indigo

Start at: 2018-08-10 00:42:58
End at: 2018-08-10 00:43:28
Local clock offset: -3.062 ms
Remote clock offset: -6.616 ms


# Below is generated by plot.py at 2018-08-10 00:47:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 158.823 ms
Loss rate: 2.23%
-- Flow 1:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 158.718 ms
Loss rate: 3.82%
-- Flow 2:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 153.473 ms
Loss rate: 0.49%
-- Flow 3:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 172.225 ms
Loss rate: 1.04%
```
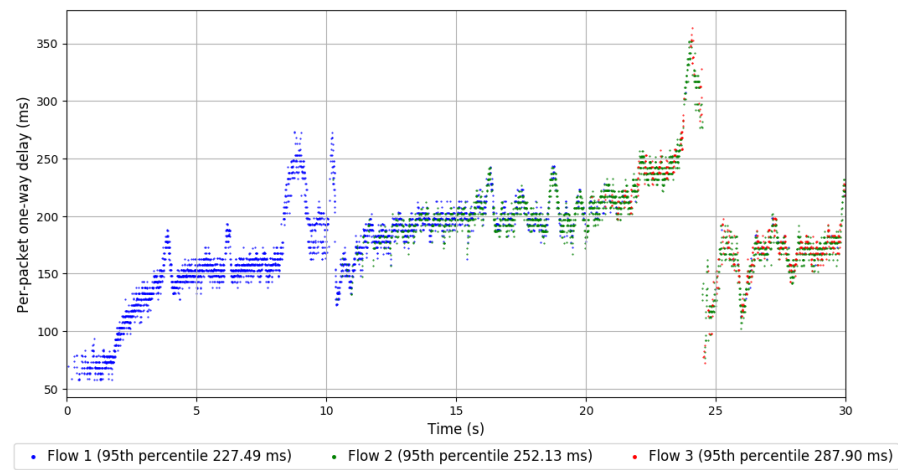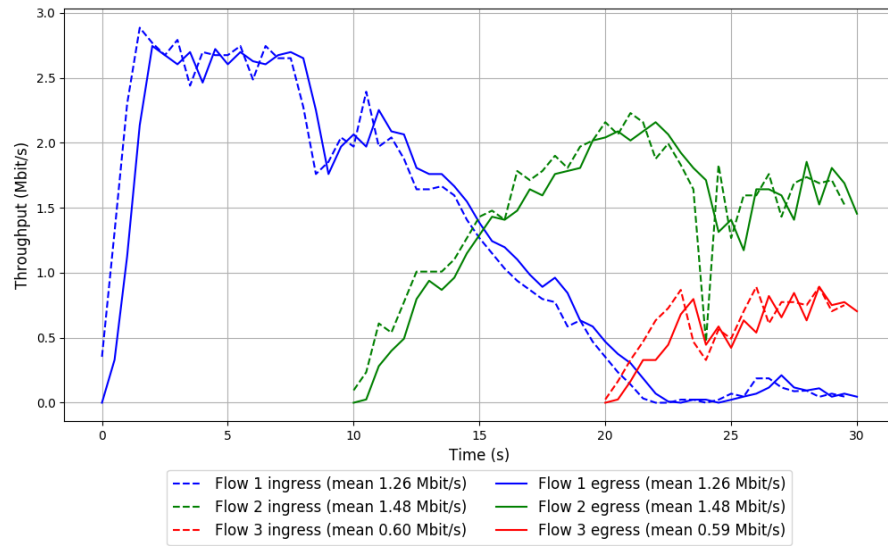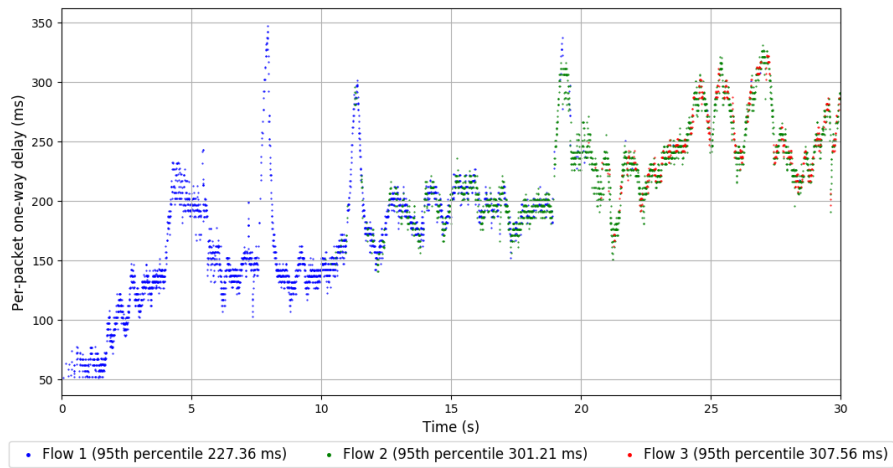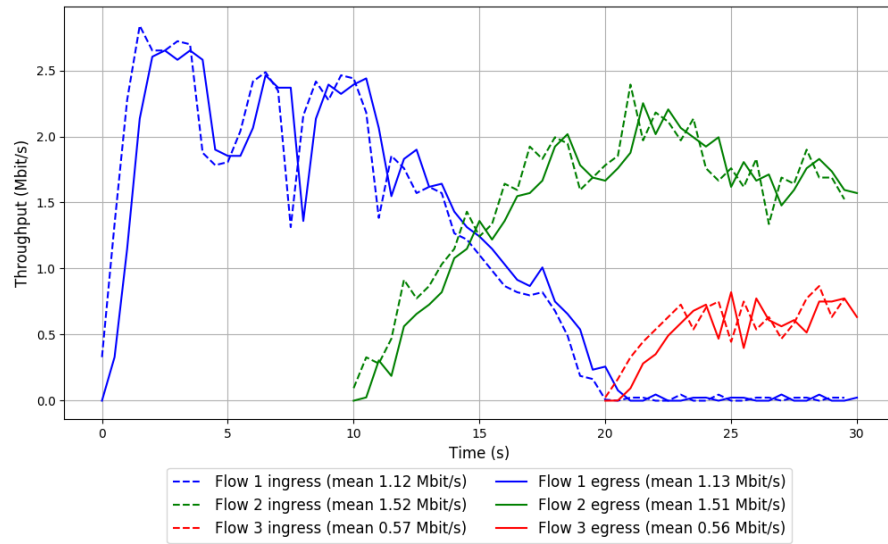
Run 3: Report of Indigo — Data Link

```
Run 1: Statistics of LEDBAT

Start at: 2018-08-09 23:57:03
End at: 2018-08-09 23:57:34
Local clock offset: -0.675 ms
Remote clock offset: -12.911 ms

# Below is generated by plot.py at 2018-08-10 00:47:09
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.49 Mbit/s
95th percentile per-packet one-way delay: 285.461 ms
Loss rate: 0.73%
-- Flow 1:
Average throughput: 1.30 Mbit/s
95th percentile per-packet one-way delay: 234.623 ms
Loss rate: 0.03%
-- Flow 2:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 290.571 ms
Loss rate: 0.82%
-- Flow 3:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 304.687 ms
Loss rate: 3.98%
```
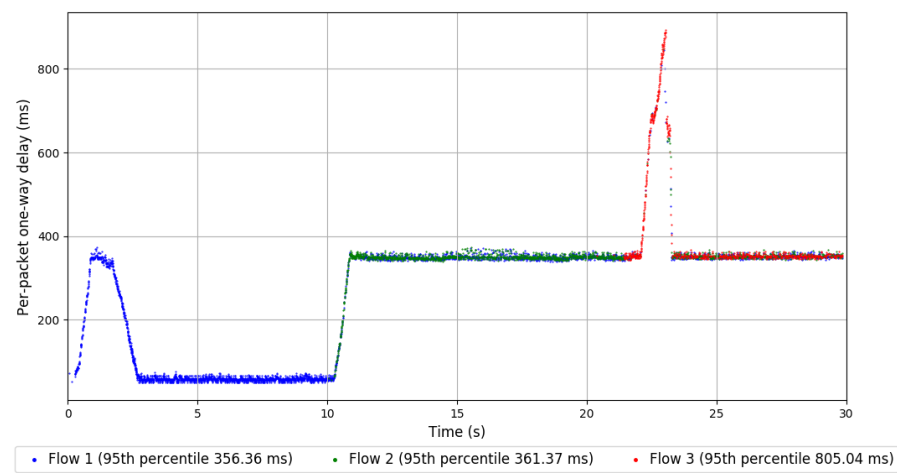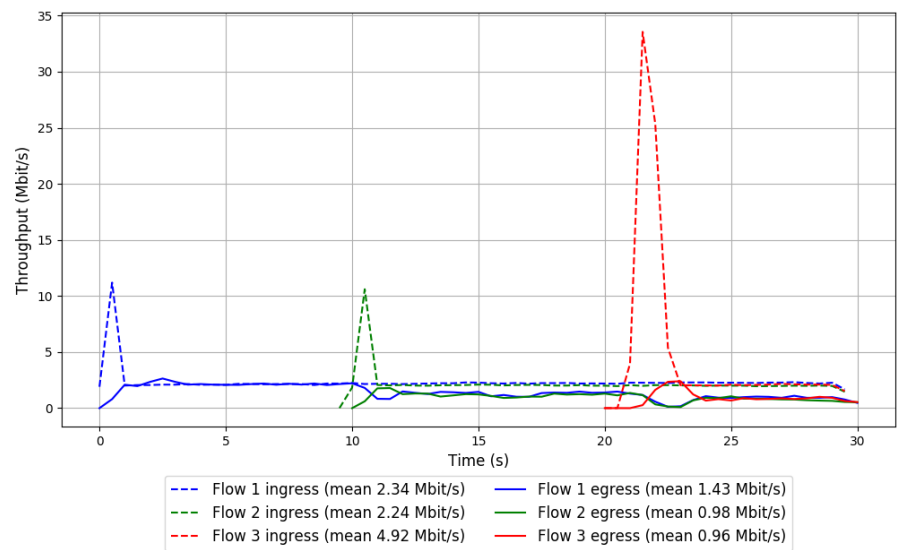
Run 1: Report of LEDBAT — Data Link

Flow 1 ingress (mean 1.29 Mbit/s)   Flow 1 egress (mean 1.30 Mbit/s)
Flow 2 ingress (mean 1.44 Mbit/s)   Flow 2 egress (mean 1.45 Mbit/s)
Flow 3 ingress (mean 0.77 Mbit/s)   Flow 3 egress (mean 0.75 Mbit/s)

Flow 1 (95th percentile 234.62 ms)   Flow 2 (95th percentile 290.57 ms)   Flow 3 (95th percentile 304.69 ms)

```
Run 2: Statistics of LEDBAT

Start at: 2018-08-10 00:15:38
End at: 2018-08-10 00:16:08
Local clock offset: 1.527 ms
Remote clock offset: -10.0 ms

# Below is generated by plot.py at 2018-08-10 00:47:10
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.43 Mbit/s
95th percentile per-packet one-way delay: 246.836 ms
Loss rate: 0.77%
-- Flow 1:
Average throughput: 1.26 Mbit/s
95th percentile per-packet one-way delay: 227.494 ms
Loss rate: 0.03%
-- Flow 2:
Average throughput: 1.48 Mbit/s
95th percentile per-packet one-way delay: 252.135 ms
Loss rate: 1.11%
-- Flow 3:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 287.905 ms
Loss rate: 3.74%
```
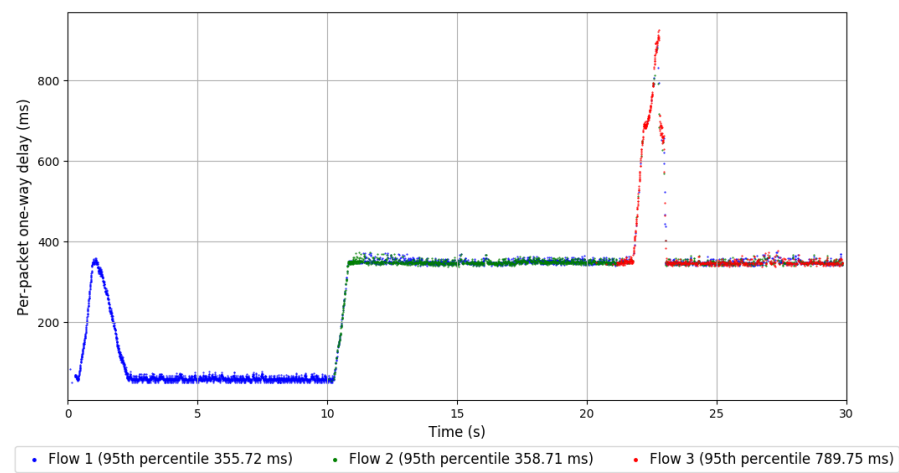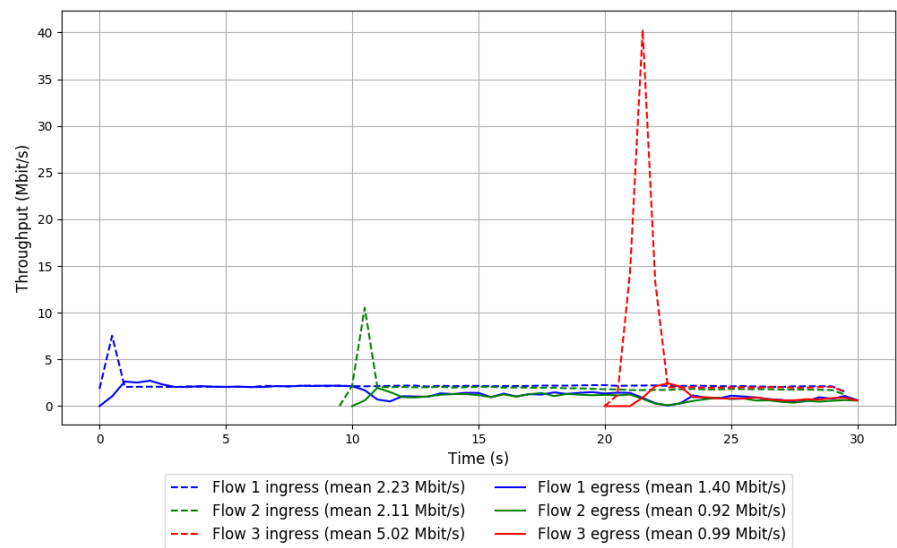
Run 2: Report of LEDBAT — Data Link

```
Run 3: Statistics of LEDBAT

Start at: 2018-08-10 00:34:13
End at: 2018-08-10 00:34:43
Local clock offset: -2.584 ms
Remote clock offset: -6.924 ms

# Below is generated by plot.py at 2018-08-10 00:47:10
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.30 Mbit/s
95th percentile per-packet one-way delay: 291.566 ms
Loss rate: 0.96%
-- Flow 1:
Average throughput: 1.13 Mbit/s
95th percentile per-packet one-way delay: 227.357 ms
Loss rate: 0.03%
-- Flow 2:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 301.210 ms
Loss rate: 1.43%
-- Flow 3:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 307.565 ms
Loss rate: 3.93%
```

Run 3: Report of LEDBAT — Data Link

- Flow 1 ingress (mean 1.12 Mbit/s)
- Flow 1 egress (mean 1.13 Mbit/s)
- Flow 2 ingress (mean 1.52 Mbit/s)
- Flow 2 egress (mean 1.51 Mbit/s)
- Flow 3 ingress (mean 0.57 Mbit/s)
- Flow 3 egress (mean 0.56 Mbit/s)

- Flow 1 (95th percentile 227.36 ms)
- Flow 2 (95th percentile 301.21 ms)
- Flow 3 (95th percentile 307.56 ms)

45

```
Run 1: Statistics of PCC-Allegro

Start at: 2018-08-10 00:02:32
End at: 2018-08-10 00:03:02
Local clock offset: 1.352 ms
Remote clock offset: -12.461 ms


# Below is generated by plot.py at 2018-08-10 00:47:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.39 Mbit/s
95th percentile per-packet one-way delay: 362.938 ms
Loss rate: 56.23%
-- Flow 1:
Average throughput: 1.43 Mbit/s
95th percentile per-packet one-way delay: 356.358 ms
Loss rate: 38.98%
-- Flow 2:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 361.371 ms
Loss rate: 56.23%
-- Flow 3:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 805.039 ms
Loss rate: 81.18%
```
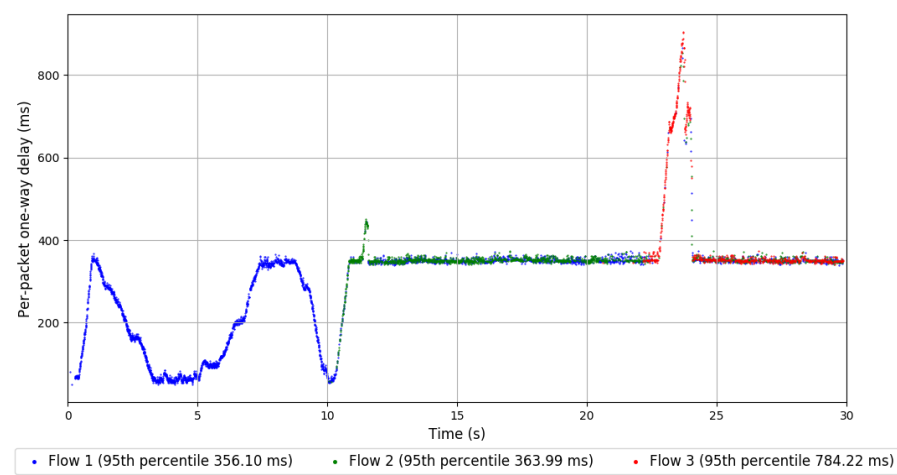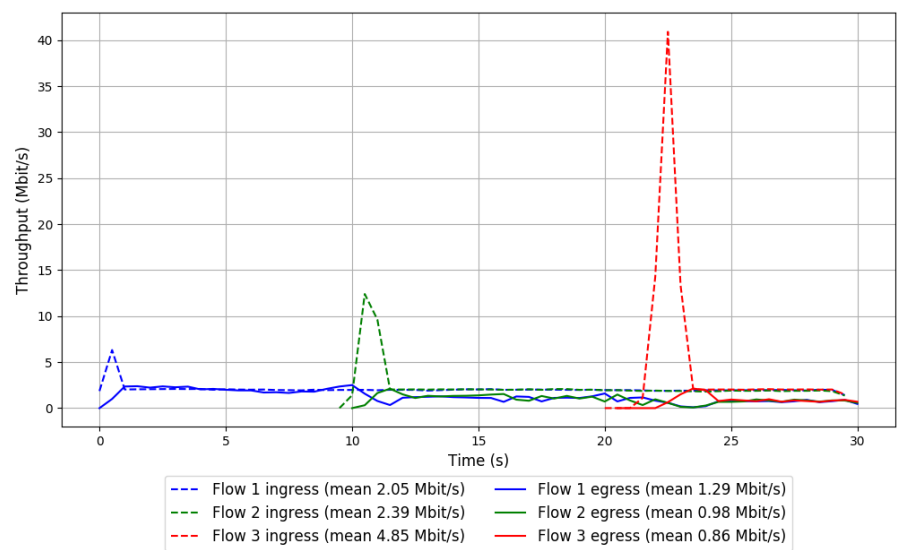
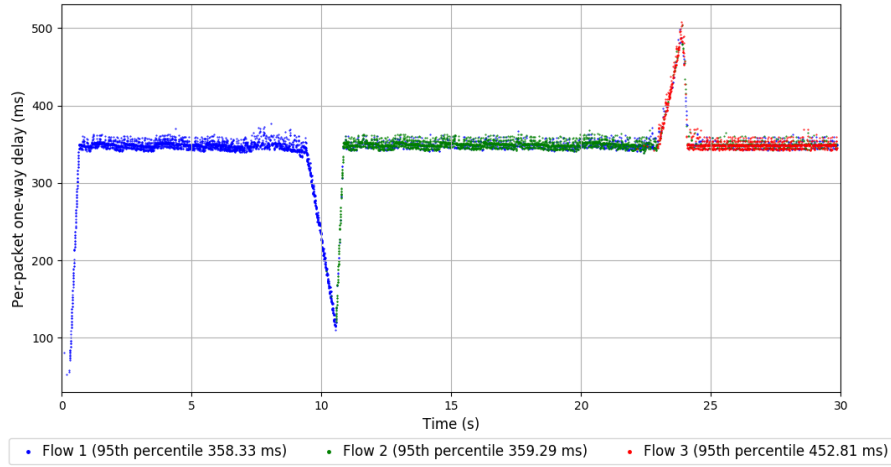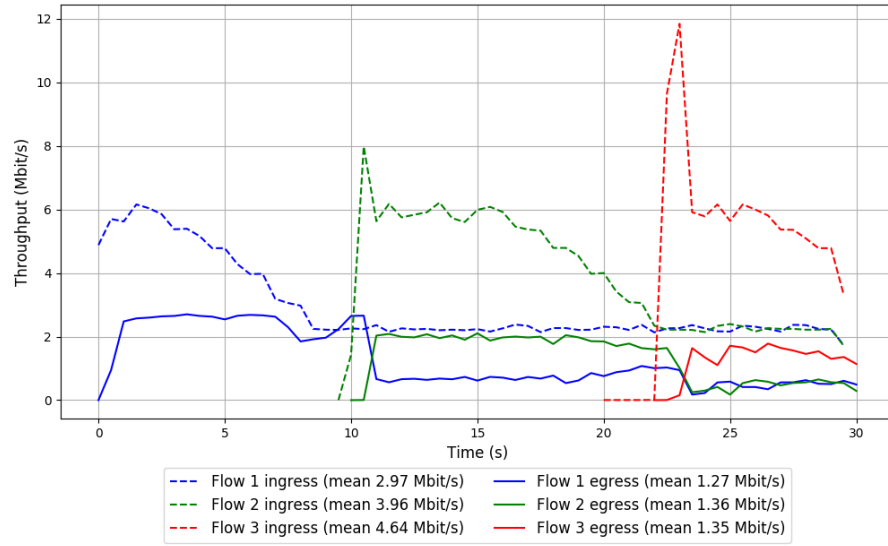Run 1: Report of PCC-Allegro — Data Link

```
Run 2: Statistics of PCC-Allegro

Start at: 2018-08-10 00:21:06
End at: 2018-08-10 00:21:36
Local clock offset: 0.119 ms
Remote clock offset: -8.977 ms


# Below is generated by plot.py at 2018-08-10 00:47:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 365.146 ms
Loss rate: 56.03%
-- Flow 1:
Average throughput: 1.40 Mbit/s
95th percentile per-packet one-way delay: 355.717 ms
Loss rate: 37.17%
-- Flow 2:
Average throughput: 0.92 Mbit/s
95th percentile per-packet one-way delay: 358.710 ms
Loss rate: 56.50%
-- Flow 3:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 789.754 ms
Loss rate: 81.07%
```

Run 2: Report of PCC-Allegro — Data Link

```
Run 3: Statistics of PCC-Allegro

Start at: 2018-08-10 00:39:41
End at: 2018-08-10 00:40:11
Local clock offset: 0.746 ms
Remote clock offset: -7.04 ms


# Below is generated by plot.py at 2018-08-10 00:47:13
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.20 Mbit/s
95th percentile per-packet one-way delay: 369.914 ms
Loss rate: 58.10%
-- Flow 1:
Average throughput: 1.29 Mbit/s
95th percentile per-packet one-way delay: 356.104 ms
Loss rate: 37.57%
-- Flow 2:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 363.990 ms
Loss rate: 59.21%
-- Flow 3:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 784.220 ms
Loss rate: 83.37%
```
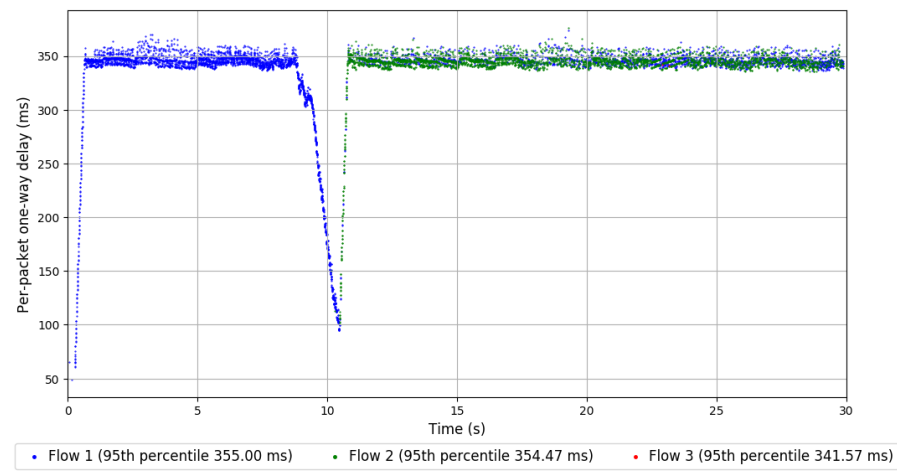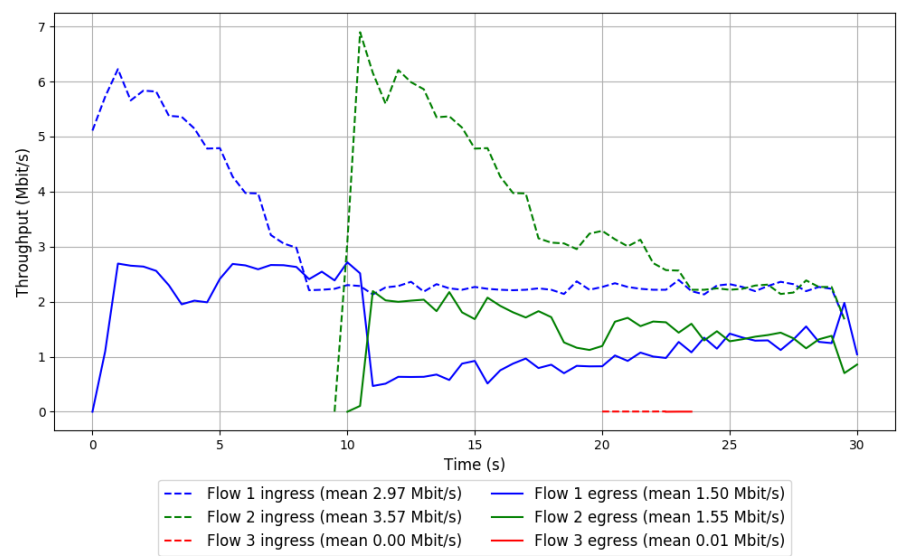
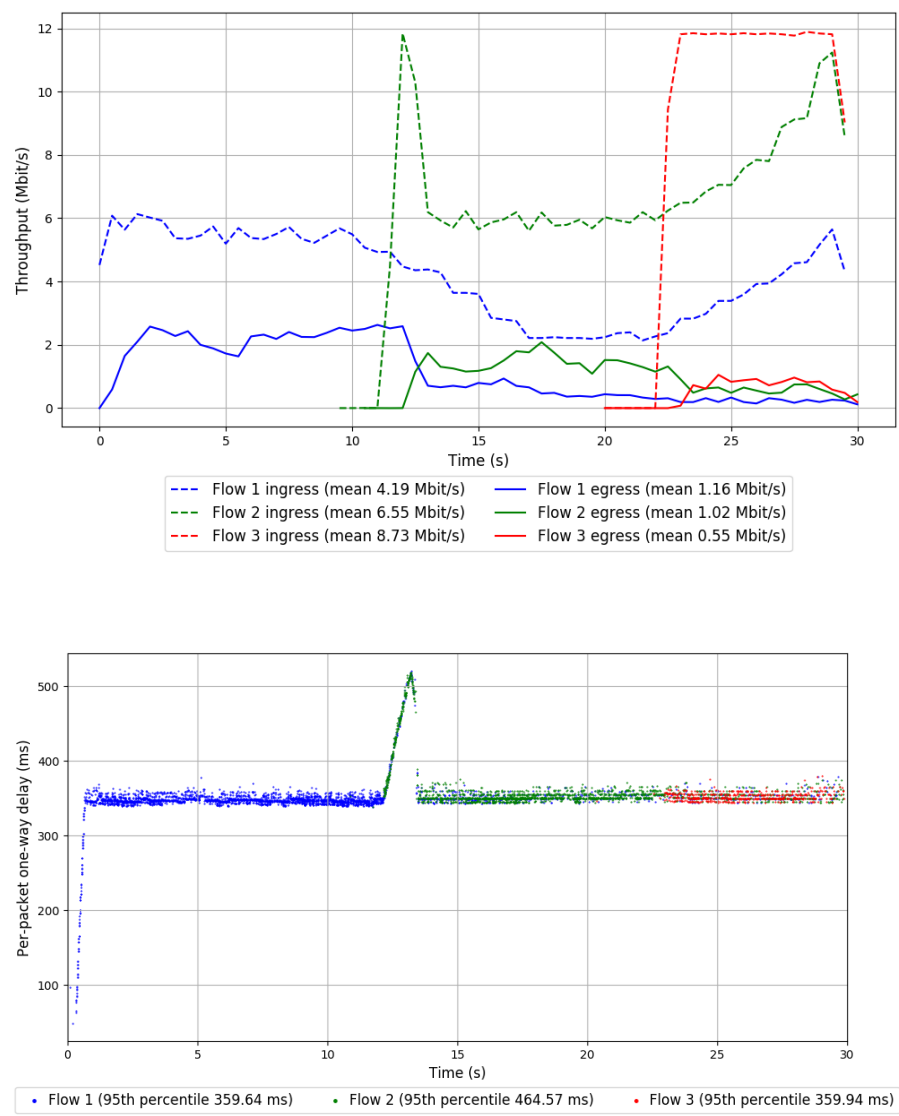Run 3: Report of PCC-Allegro — Data Link

```
Run 1: Statistics of PCC-Expr

Start at: 2018-08-09 23:58:09
End at: 2018-08-09 23:58:39
Local clock offset: 1.055 ms
Remote clock offset: -12.815 ms

# Below is generated by plot.py at 2018-08-10 00:47:21
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.52 Mbit/s
95th percentile per-packet one-way delay: 360.312 ms
Loss rate: 64.81%
-- Flow 1:
Average throughput: 1.27 Mbit/s
95th percentile per-packet one-way delay: 358.328 ms
Loss rate: 57.20%
-- Flow 2:
Average throughput: 1.36 Mbit/s
95th percentile per-packet one-way delay: 359.294 ms
Loss rate: 66.15%
-- Flow 3:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 452.807 ms
Loss rate: 77.22%
```

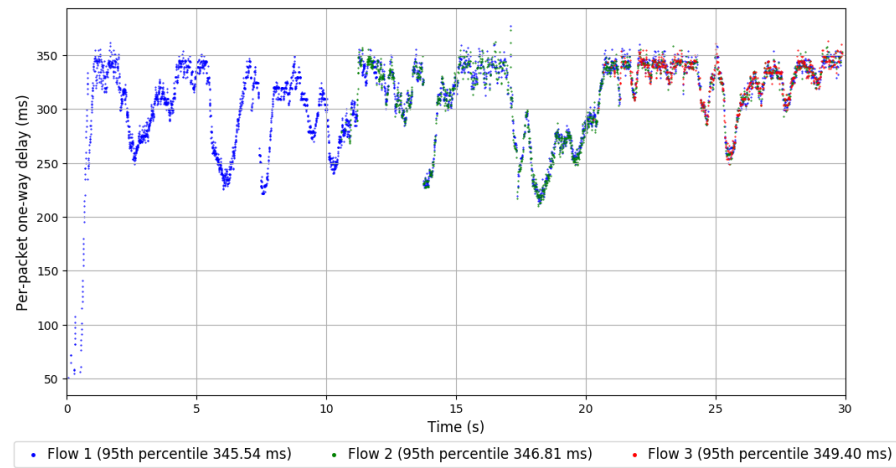Run 1: Report of PCC-Expr — Data Link

```
Run 2: Statistics of PCC-Expr

Start at: 2018-08-10 00:16:44
End at: 2018-08-10 00:17:14
Local clock offset: -2.765 ms
Remote clock offset: -9.53 ms


# Below is generated by plot.py at 2018-08-10 00:47:21
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.53 Mbit/s
95th percentile per-packet one-way delay: 354.854 ms
Loss rate: 52.88%
-- Flow 1:
Average throughput: 1.50 Mbit/s
95th percentile per-packet one-way delay: 355.002 ms
Loss rate: 49.65%
-- Flow 2:
Average throughput: 1.55 Mbit/s
95th percentile per-packet one-way delay: 354.472 ms
Loss rate: 56.91%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 341.574 ms
Loss rate: 84.62%
```
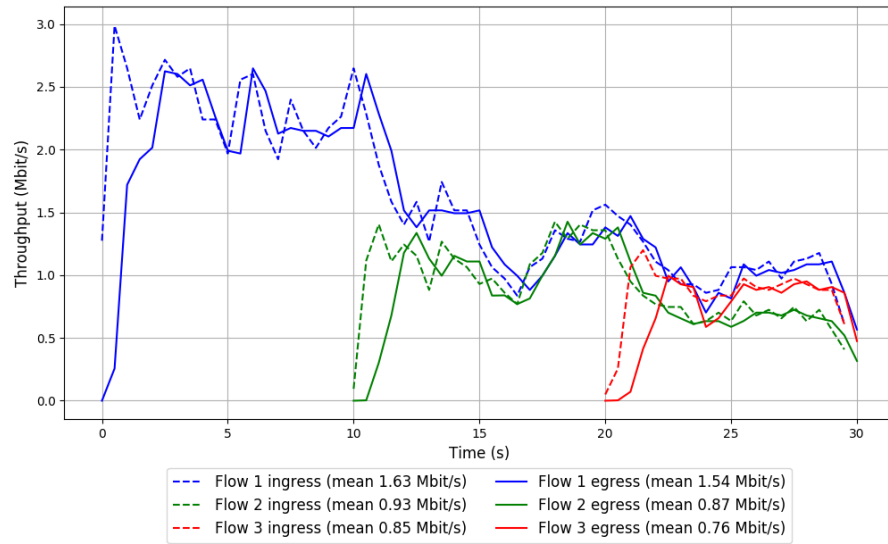
Run 2: Report of PCC-Expr — Data Link

```
Run 3: Statistics of PCC-Expr

Start at: 2018-08-10 00:35:18
End at: 2018-08-10 00:35:48
Local clock offset: -1.385 ms
Remote clock offset: -7.074 ms


# Below is generated by plot.py at 2018-08-10 00:47:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.97 Mbit/s
95th percentile per-packet one-way delay: 378.223 ms
Loss rate: 82.79%
-- Flow 1:
Average throughput: 1.16 Mbit/s
95th percentile per-packet one-way delay: 359.644 ms
Loss rate: 72.71%
-- Flow 2:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 464.567 ms
Loss rate: 85.16%
-- Flow 3:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 359.940 ms
Loss rate: 93.88%
```
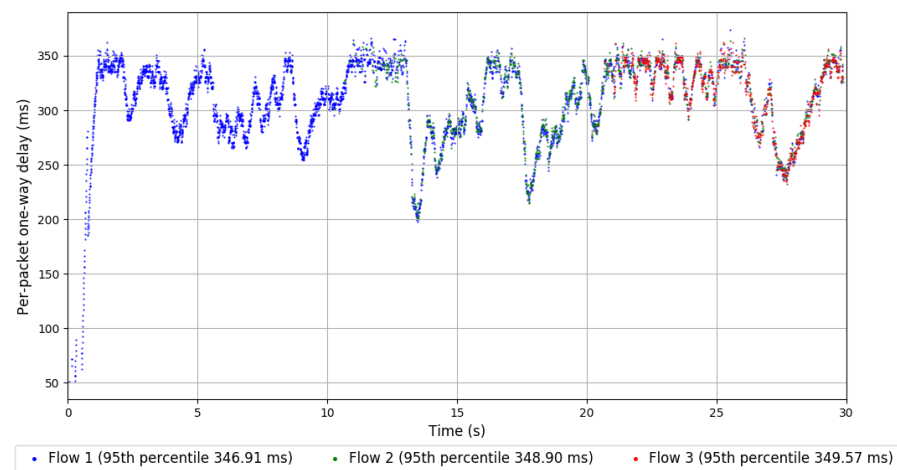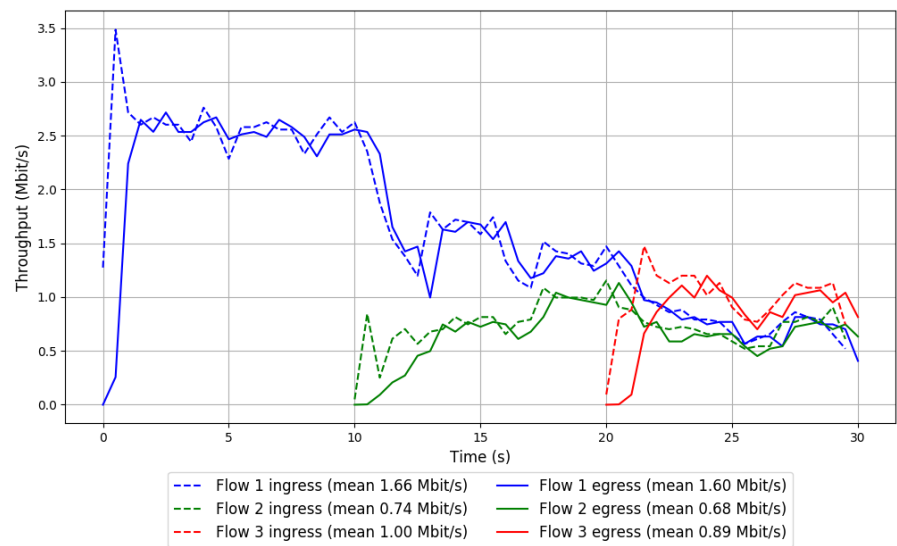
Run 3: Report of PCC-Expr — Data Link

```
Run 1: Statistics of QUIC Cubic

Start at: 2018-08-09 23:53:46
End at: 2018-08-09 23:54:16
Local clock offset: -1.589 ms
Remote clock offset: -12.783 ms


# Below is generated by plot.py at 2018-08-10 00:47:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.36 Mbit/s
95th percentile per-packet one-way delay: 346.638 ms
Loss rate: 6.77%
-- Flow 1:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 345.541 ms
Loss rate: 5.34%
-- Flow 2:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 346.813 ms
Loss rate: 7.69%
-- Flow 3:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 349.402 ms
Loss rate: 13.08%
```

Run 1: Report of QUIC Cubic — Data Link

```
Run 2: Statistics of QUIC Cubic

Start at: 2018-08-10 00:12:22
End at: 2018-08-10 00:12:52
Local clock offset: 0.21 ms
Remote clock offset: -9.746 ms


# Below is generated by plot.py at 2018-08-10 00:47:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 347.784 ms
Loss rate: 6.57%
-- Flow 1:
Average throughput: 1.60 Mbit/s
95th percentile per-packet one-way delay: 346.908 ms
Loss rate: 4.35%
-- Flow 2:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 348.904 ms
Loss rate: 9.74%
-- Flow 3:
Average throughput: 0.89 Mbit/s
95th percentile per-packet one-way delay: 349.573 ms
Loss rate: 13.00%
```
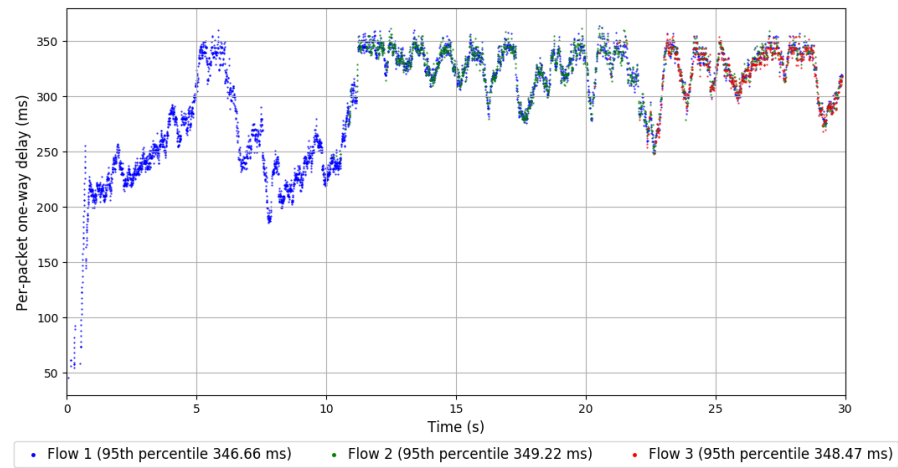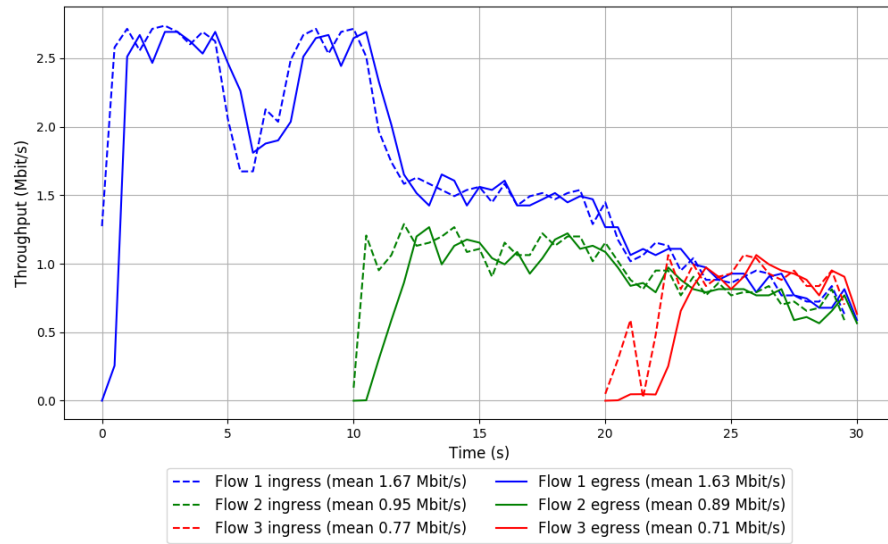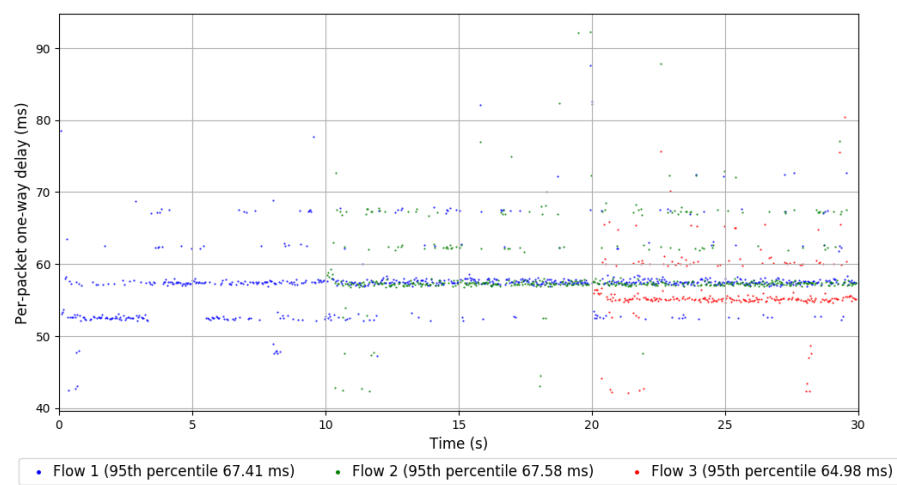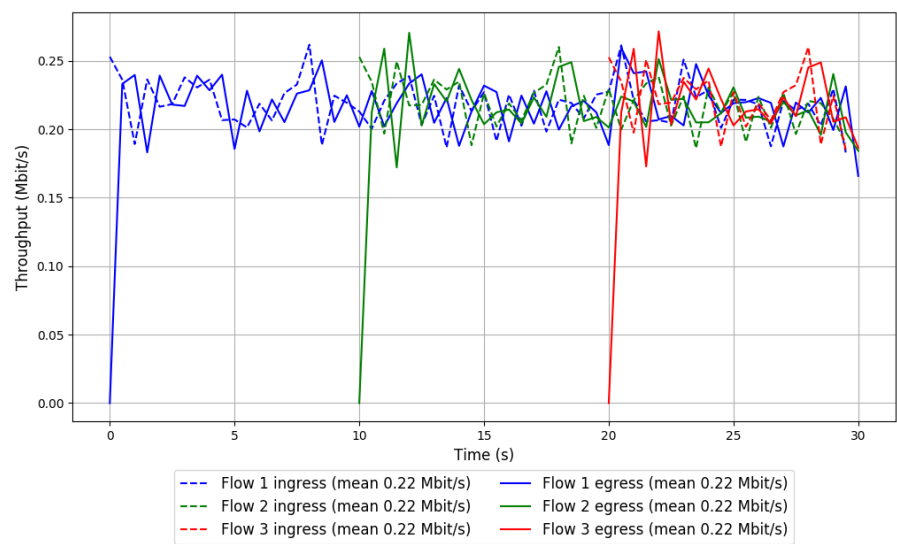
Run 2: Report of QUIC Cubic — Data Link

```
Run 3: Statistics of QUIC Cubic

Start at: 2018-08-10 00:30:56
End at: 2018-08-10 00:31:26
Local clock offset: -1.065 ms
Remote clock offset: -7.5 ms


# Below is generated by plot.py at 2018-08-10 00:47:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.44 Mbit/s
95th percentile per-packet one-way delay: 347.794 ms
Loss rate: 4.68%
-- Flow 1:
Average throughput: 1.63 Mbit/s
95th percentile per-packet one-way delay: 346.663 ms
Loss rate: 2.58%
-- Flow 2:
Average throughput: 0.89 Mbit/s
95th percentile per-packet one-way delay: 349.217 ms
Loss rate: 7.81%
-- Flow 3:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 348.467 ms
Loss rate: 10.61%
```
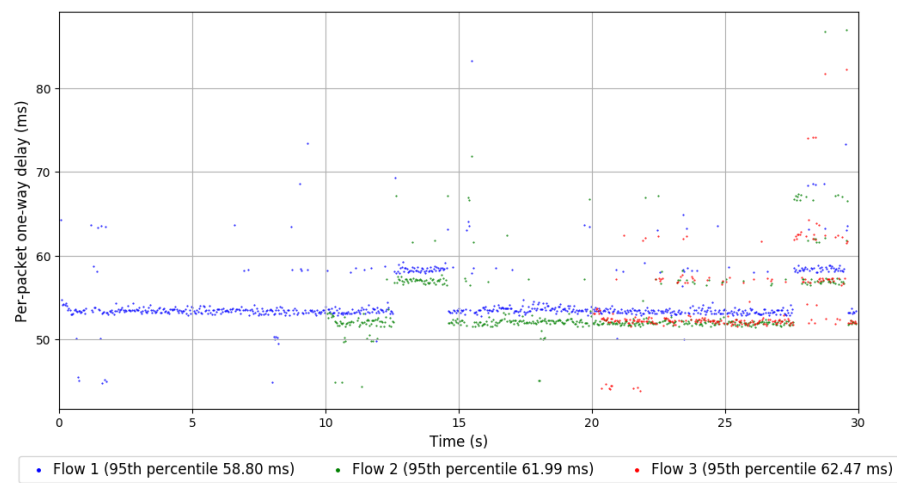
Run 3: Report of QUIC Cubic — Data Link

```
Run 1: Statistics of SCReAM

Start at: 2018-08-10 00:07:59
End at: 2018-08-10 00:08:29
Local clock offset: 0.809 ms
Remote clock offset: -11.184 ms


# Below is generated by plot.py at 2018-08-10 00:47:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 67.410 ms
Loss rate: 0.38%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 67.410 ms
Loss rate: 0.25%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 67.584 ms
Loss rate: 0.39%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 64.985 ms
Loss rate: 0.70%
```
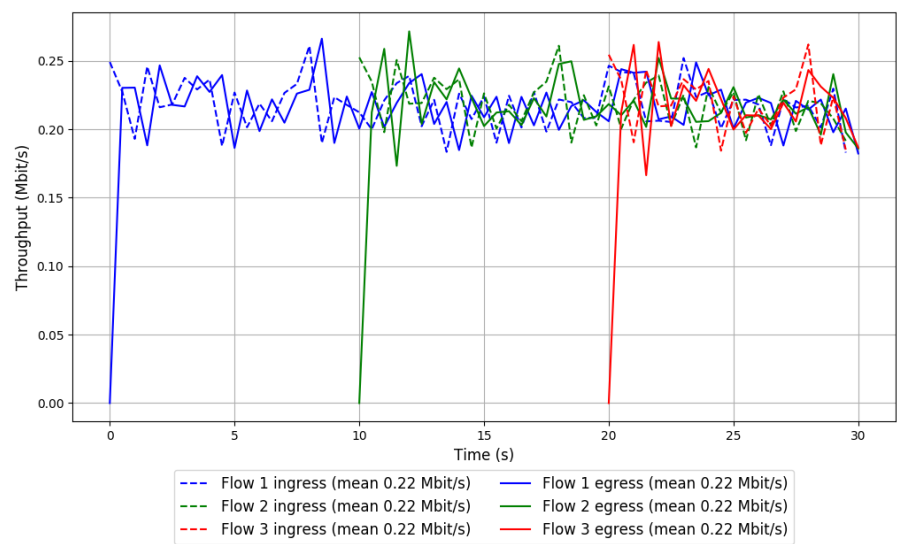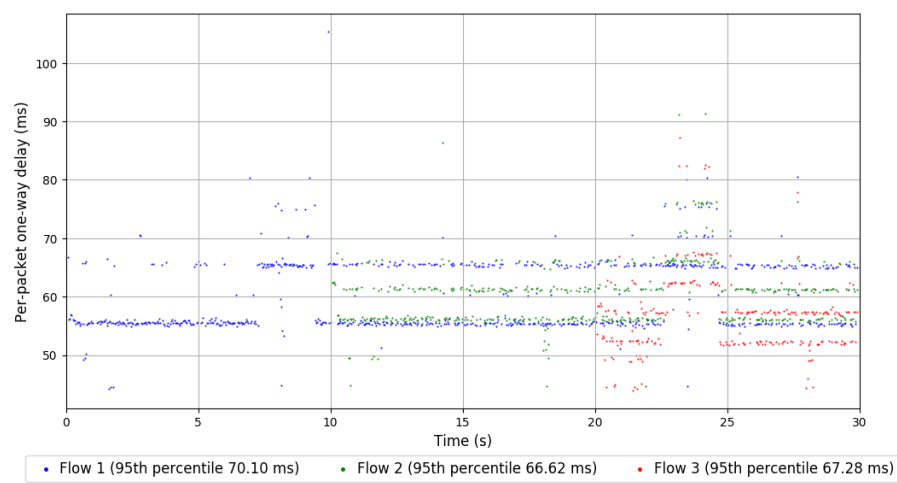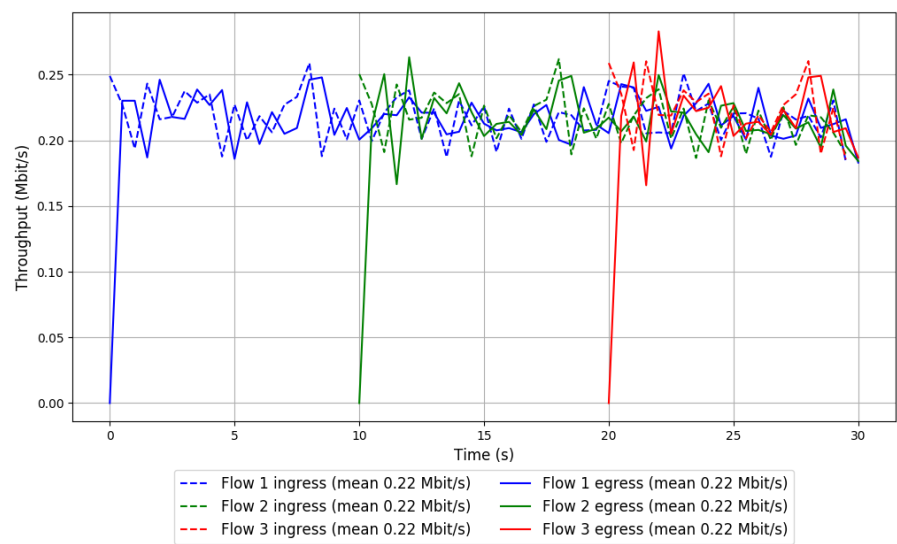
Run 1: Report of SCReAM — Data Link

Flow 1 ingress (mean 0.22 Mbit/s)   Flow 1 egress (mean 0.22 Mbit/s)
Flow 2 ingress (mean 0.22 Mbit/s)   Flow 2 egress (mean 0.22 Mbit/s)
Flow 3 ingress (mean 0.22 Mbit/s)   Flow 3 egress (mean 0.22 Mbit/s)

Flow 1 (95th percentile 67.41 ms)   Flow 2 (95th percentile 67.58 ms)   Flow 3 (95th percentile 64.98 ms)

```
Run 2: Statistics of SCReAM

Start at: 2018-08-10 00:26:34
End at: 2018-08-10 00:27:04
Local clock offset: -2.089 ms
Remote clock offset: -7.971 ms


# Below is generated by plot.py at 2018-08-10 00:47:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 62.110 ms
Loss rate: 0.38%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 58.795 ms
Loss rate: 0.25%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 61.995 ms
Loss rate: 0.39%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 62.468 ms
Loss rate: 0.70%
```
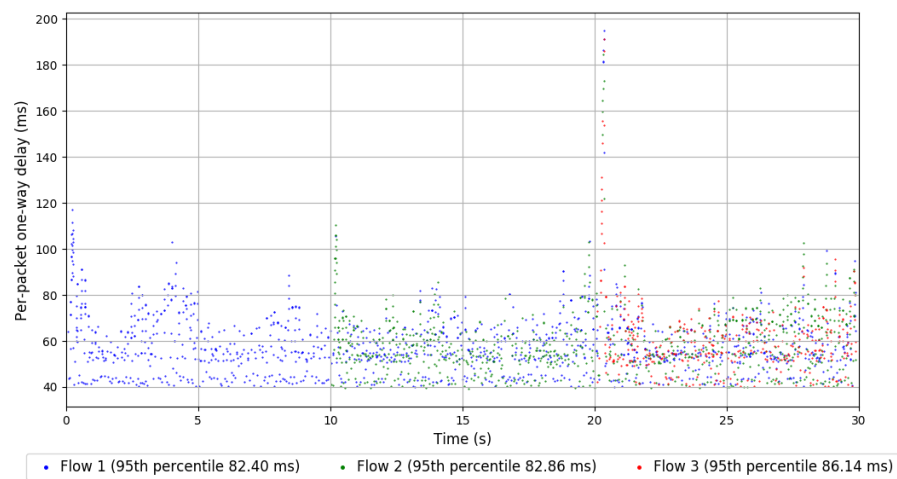
Run 2: Report of SCReAM — Data Link

```
Run 3: Statistics of SCReAM

Start at: 2018-08-10 00:45:09
End at: 2018-08-10 00:45:39
Local clock offset: -2.321 ms
Remote clock offset: -5.975 ms


# Below is generated by plot.py at 2018-08-10 00:47:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 67.265 ms
Loss rate: 0.38%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 70.104 ms
Loss rate: 0.26%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 66.616 ms
Loss rate: 0.40%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 67.283 ms
Loss rate: 0.70%
```
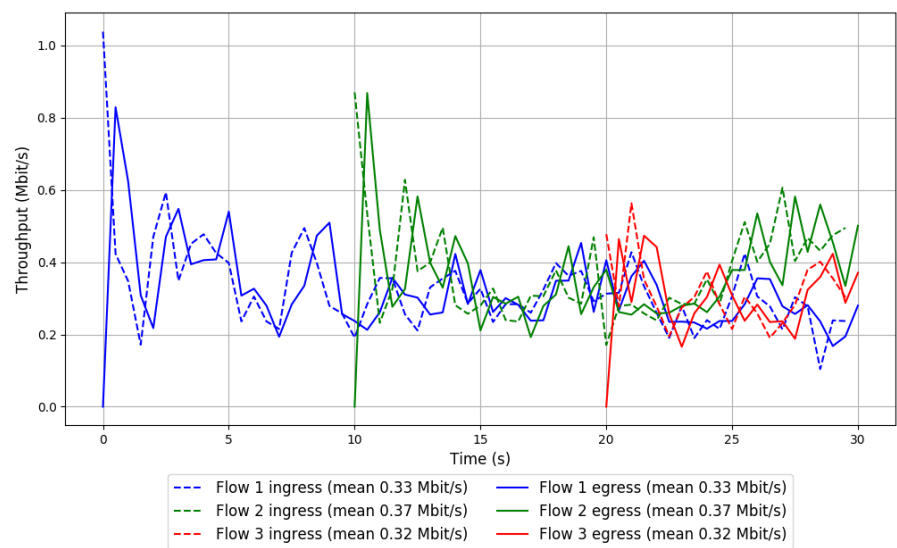
Run 3: Report of SCReAM — Data Link

```
Run 1: Statistics of Sprout

Start at: 2018-08-10 00:04:43
End at: 2018-08-10 00:05:13
Local clock offset: -1.617 ms
Remote clock offset: -11.399 ms


# Below is generated by plot.py at 2018-08-10 00:47:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 83.216 ms
Loss rate: 0.34%
-- Flow 1:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 82.396 ms
Loss rate: 0.02%
-- Flow 2:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 82.863 ms
Loss rate: 0.90%
-- Flow 3:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 86.141 ms
Loss rate: 0.03%
```
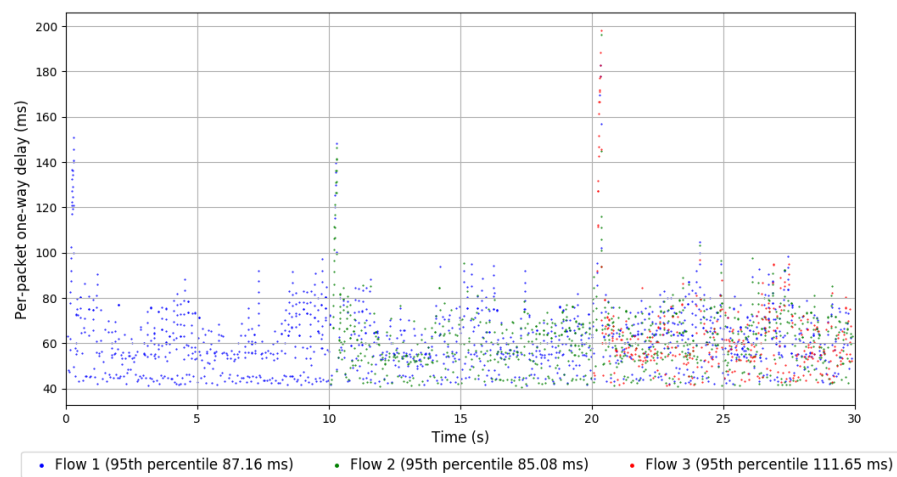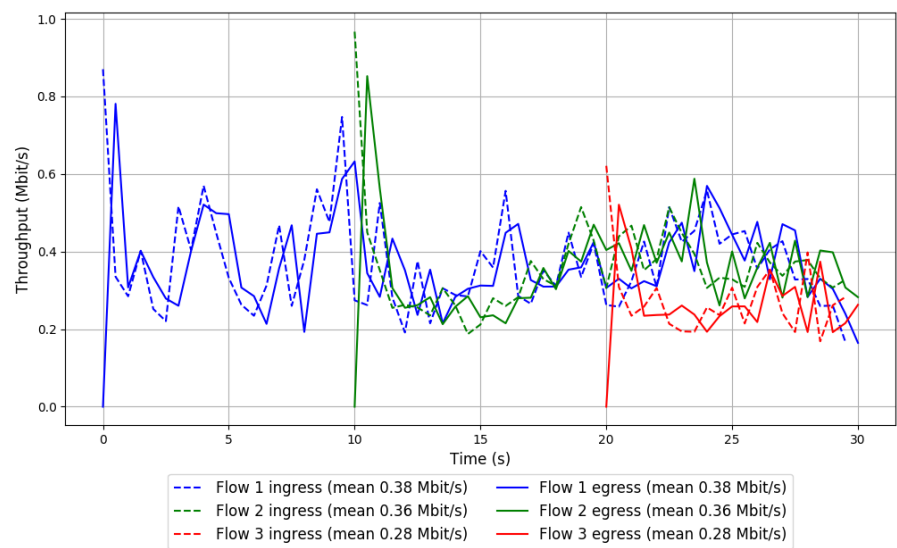
Run 1: Report of Sprout — Data Link

```
Run 2: Statistics of Sprout

Start at: 2018-08-10 00:23:17
End at: 2018-08-10 00:23:47
Local clock offset: -0.93 ms
Remote clock offset: -8.134 ms


# Below is generated by plot.py at 2018-08-10 00:47:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 87.416 ms
Loss rate: 0.33%
-- Flow 1:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 87.163 ms
Loss rate: 0.11%
-- Flow 2:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 85.079 ms
Loss rate: 0.32%
-- Flow 3:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 111.647 ms
Loss rate: 1.22%
```
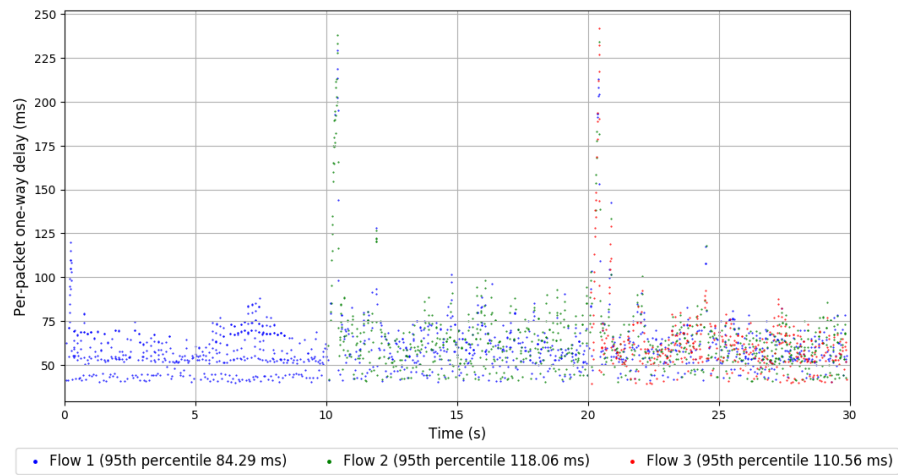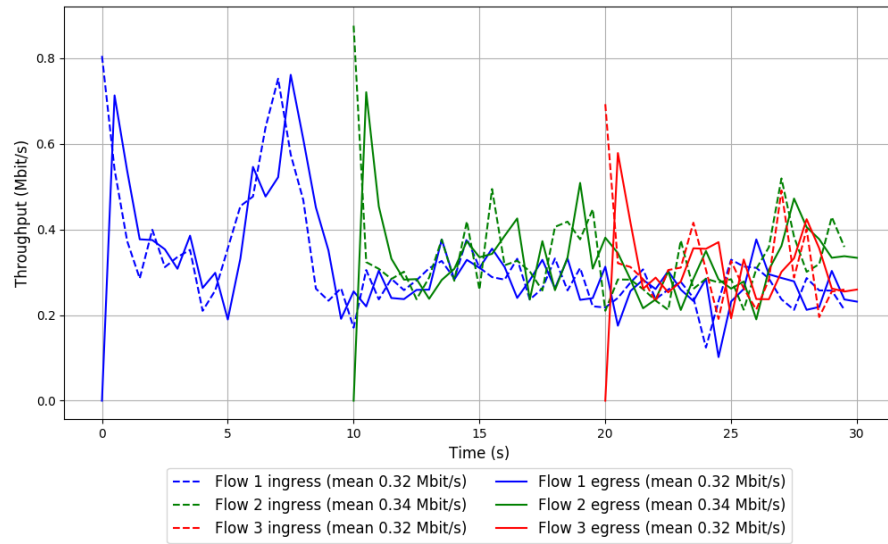
Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2018-08-10 00:41:52
End at: 2018-08-10 00:42:22
Local clock offset: -2.347 ms
Remote clock offset: -5.903 ms


# Below is generated by plot.py at 2018-08-10 00:47:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 93.413 ms
Loss rate: 0.37%
-- Flow 1:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 84.287 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 118.058 ms
Loss rate: 0.88%
-- Flow 3:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 110.559 ms
Loss rate: 0.02%
```
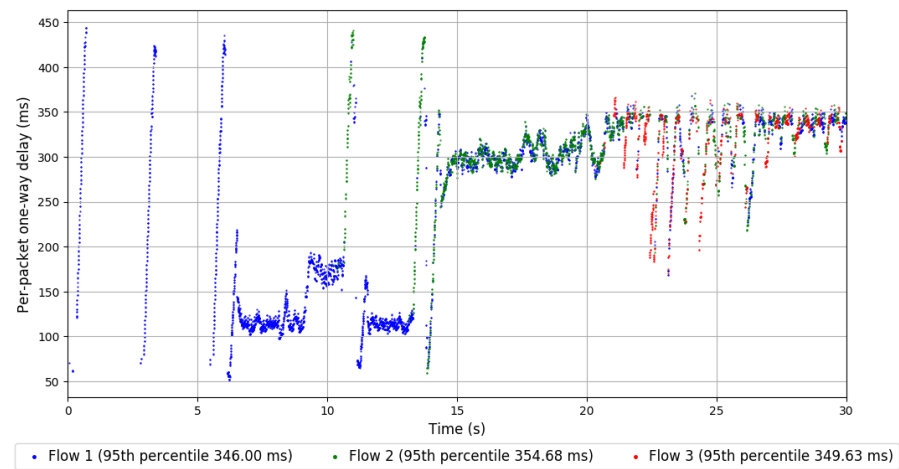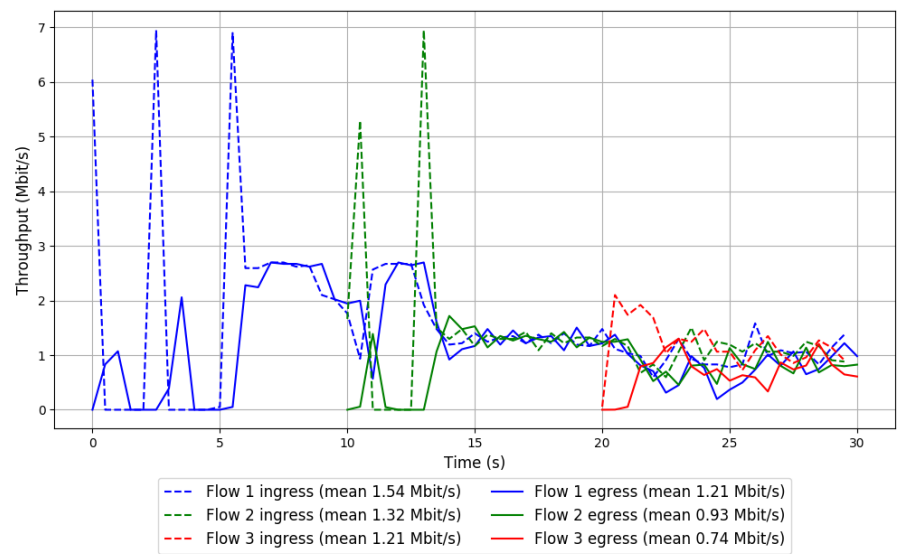
Run 3: Report of Sprout — Data Link

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

Start at: 2018-08-10 00:03:38
End at: 2018-08-10 00:04:08
Local clock offset: -2.425 ms
Remote clock offset: -11.481 ms

# Below is generated by plot.py at 2018-08-10 00:47:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 348.815 ms
Loss rate: 26.78%
-- Flow 1:
Average throughput: 1.21 Mbit/s
95th percentile per-packet one-way delay: 345.998 ms
Loss rate: 21.61%
-- Flow 2:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 354.679 ms
Loss rate: 29.33%
-- Flow 3:
Average throughput: 0.74 Mbit/s
95th percentile per-packet one-way delay: 349.631 ms
Loss rate: 41.13%
```

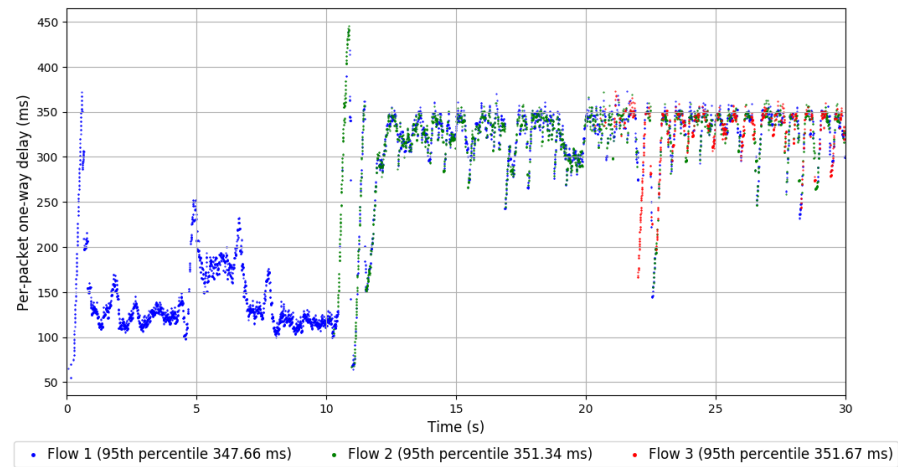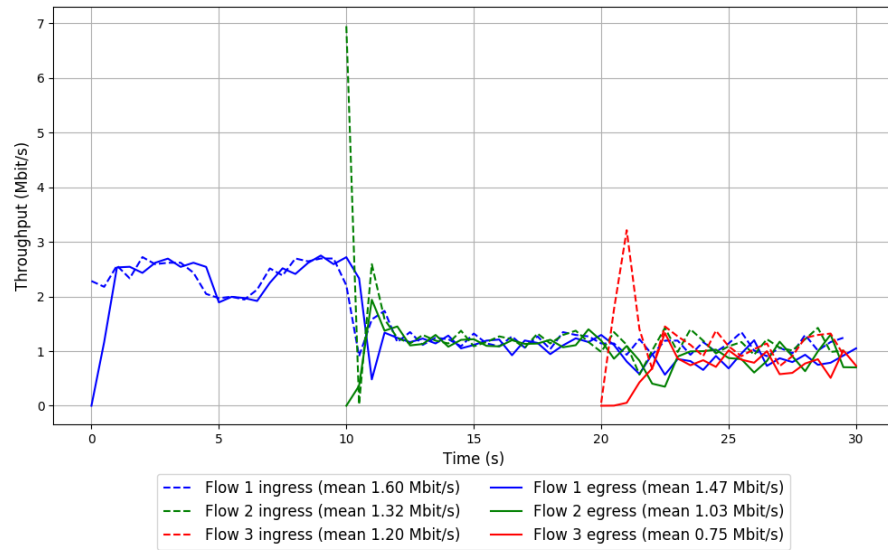Run 1: Report of TaoVA-100x — Data Link

Flow 1 ingress (mean 1.54 Mbit/s)   Flow 1 egress (mean 1.21 Mbit/s)
Flow 2 ingress (mean 1.32 Mbit/s)   Flow 2 egress (mean 0.93 Mbit/s)
Flow 3 ingress (mean 1.21 Mbit/s)   Flow 3 egress (mean 0.74 Mbit/s)

Flow 1 (95th percentile 346.00 ms)   Flow 2 (95th percentile 354.68 ms)   Flow 3 (95th percentile 349.63 ms)

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

Start at: 2018-08-10 00:22:12
End at: 2018-08-10 00:22:42
Local clock offset: 0.089 ms
Remote clock offset: -8.531 ms


# Below is generated by plot.py at 2018-08-10 00:47:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 349.537 ms
Loss rate: 16.87%
-- Flow 1:
Average throughput: 1.47 Mbit/s
95th percentile per-packet one-way delay: 347.658 ms
Loss rate: 8.03%
-- Flow 2:
Average throughput: 1.03 Mbit/s
95th percentile per-packet one-way delay: 351.336 ms
Loss rate: 22.60%
-- Flow 3:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 351.667 ms
Loss rate: 39.74%
```
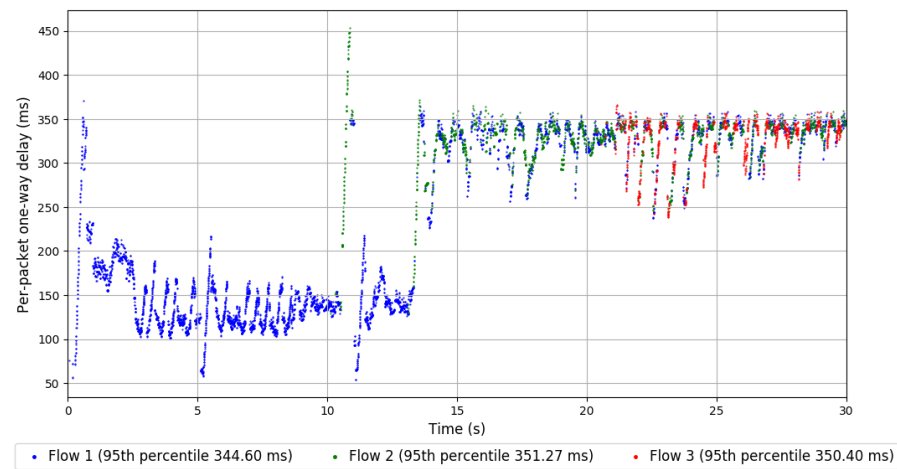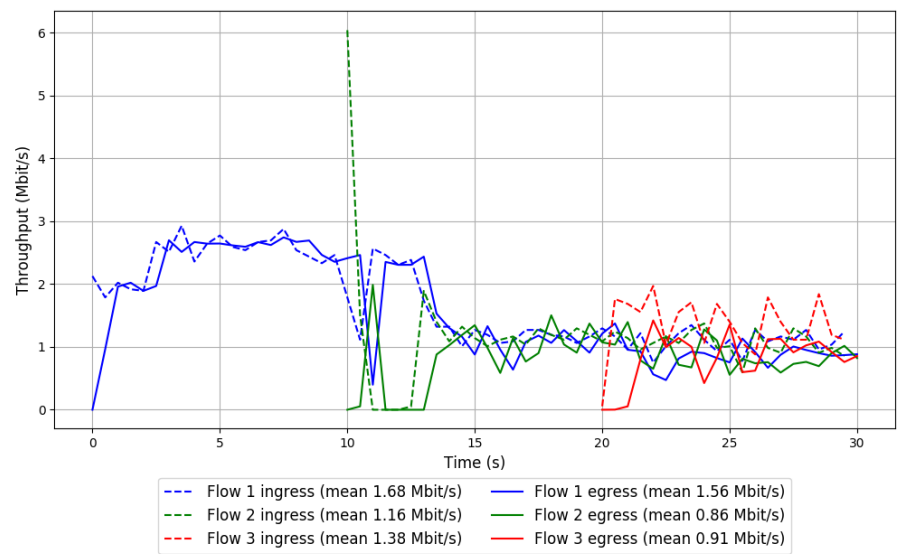
Run 2: Report of TaoVA-100x — Data Link

Flow 1 ingress (mean 1.60 Mbit/s)   Flow 1 egress (mean 1.47 Mbit/s)
Flow 2 ingress (mean 1.32 Mbit/s)   Flow 2 egress (mean 1.03 Mbit/s)
Flow 3 ingress (mean 1.20 Mbit/s)   Flow 3 egress (mean 0.75 Mbit/s)

Flow 1 (95th percentile 347.66 ms)   Flow 2 (95th percentile 351.34 ms)   Flow 3 (95th percentile 351.67 ms)

79

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

Start at: 2018-08-10 00:40:46
End at: 2018-08-10 00:41:16
Local clock offset: -2.358 ms
Remote clock offset: -6.16 ms


# Below is generated by plot.py at 2018-08-10 00:47:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.41 Mbit/s
95th percentile per-packet one-way delay: 347.413 ms
Loss rate: 16.98%
-- Flow 1:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 344.595 ms
Loss rate: 7.29%
-- Flow 2:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 351.269 ms
Loss rate: 26.52%
-- Flow 3:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 350.402 ms
Loss rate: 36.79%
```

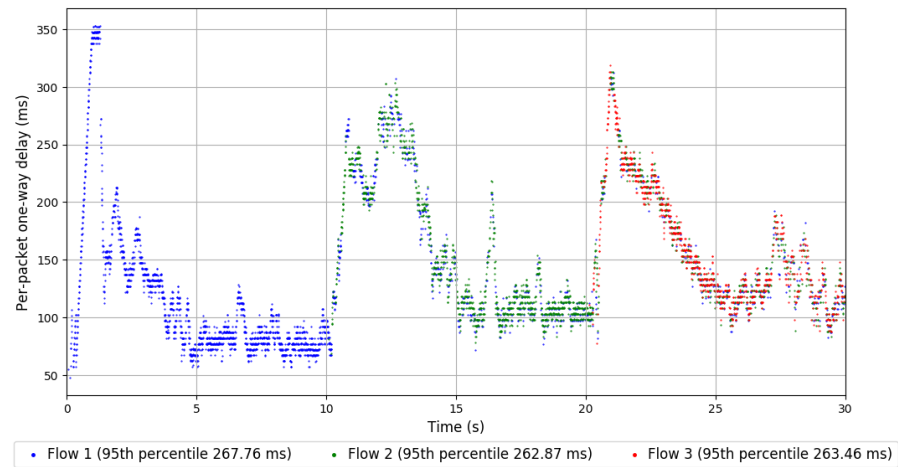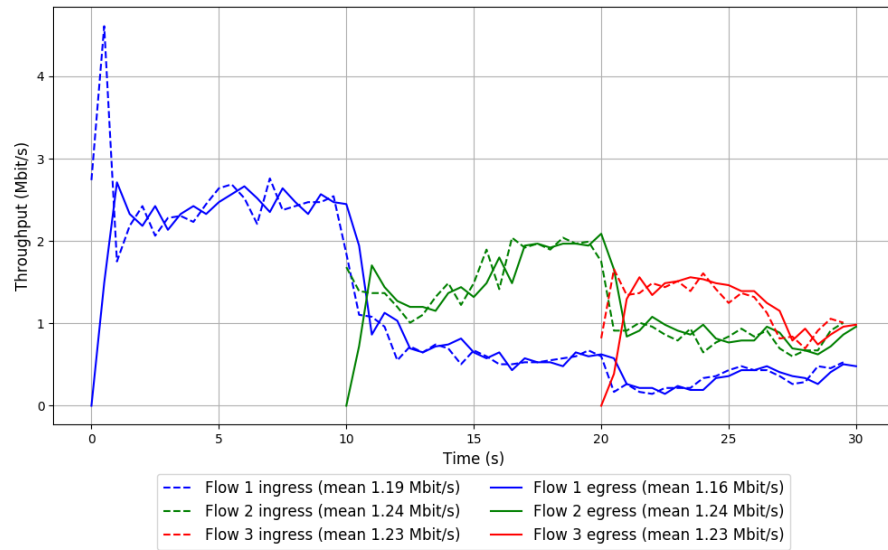Run 3: Report of TaoVA-100x — Data Link

```
Run 1: Statistics of TCP Vegas

Start at: 2018-08-10 00:09:05
End at: 2018-08-10 00:09:35
Local clock offset: 1.576 ms
Remote clock offset: -9.682 ms


# Below is generated by plot.py at 2018-08-10 00:47:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.39 Mbit/s
95th percentile per-packet one-way delay: 263.646 ms
Loss rate: 1.77%
-- Flow 1:
Average throughput: 1.16 Mbit/s
95th percentile per-packet one-way delay: 267.759 ms
Loss rate: 2.78%
-- Flow 2:
Average throughput: 1.24 Mbit/s
95th percentile per-packet one-way delay: 262.869 ms
Loss rate: 0.49%
-- Flow 3:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 263.465 ms
Loss rate: 1.38%
```

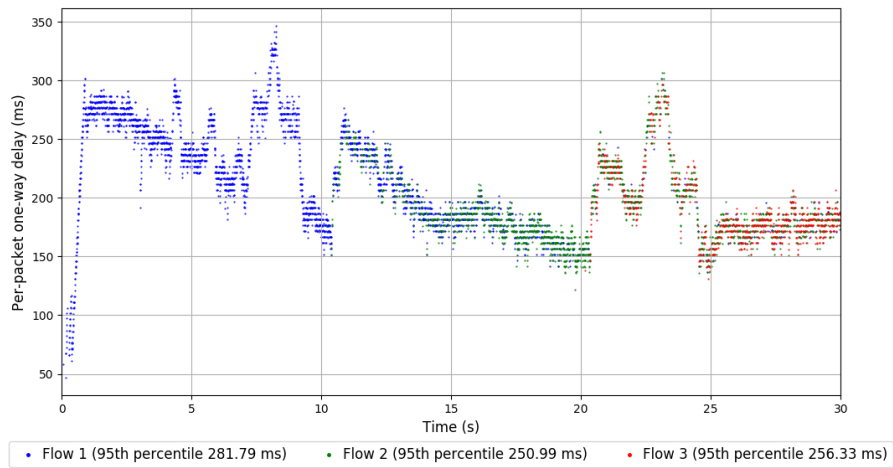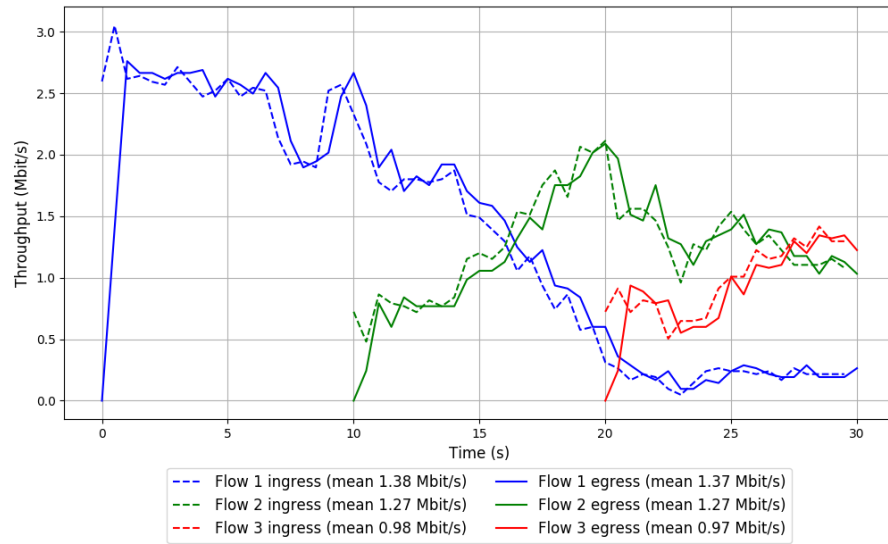Run 1: Report of TCP Vegas — Data Link

```
Run 2: Statistics of TCP Vegas

Start at: 2018-08-10 00:27:39
End at: 2018-08-10 00:28:09
Local clock offset: -0.848 ms
Remote clock offset: -8.791 ms


# Below is generated by plot.py at 2018-08-10 00:47:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.53 Mbit/s
95th percentile per-packet one-way delay: 280.965 ms
Loss rate: 0.66%
-- Flow 1:
Average throughput: 1.37 Mbit/s
95th percentile per-packet one-way delay: 281.787 ms
Loss rate: 0.09%
-- Flow 2:
Average throughput: 1.27 Mbit/s
95th percentile per-packet one-way delay: 250.986 ms
Loss rate: 0.86%
-- Flow 3:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 256.332 ms
Loss rate: 2.59%
```

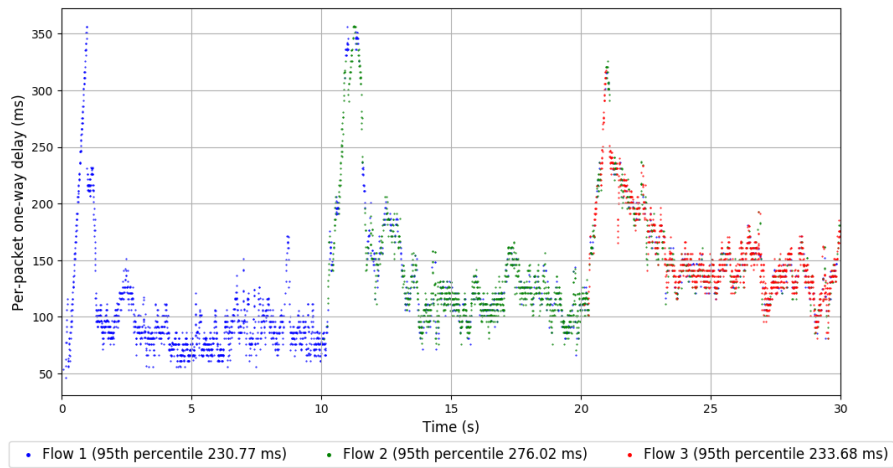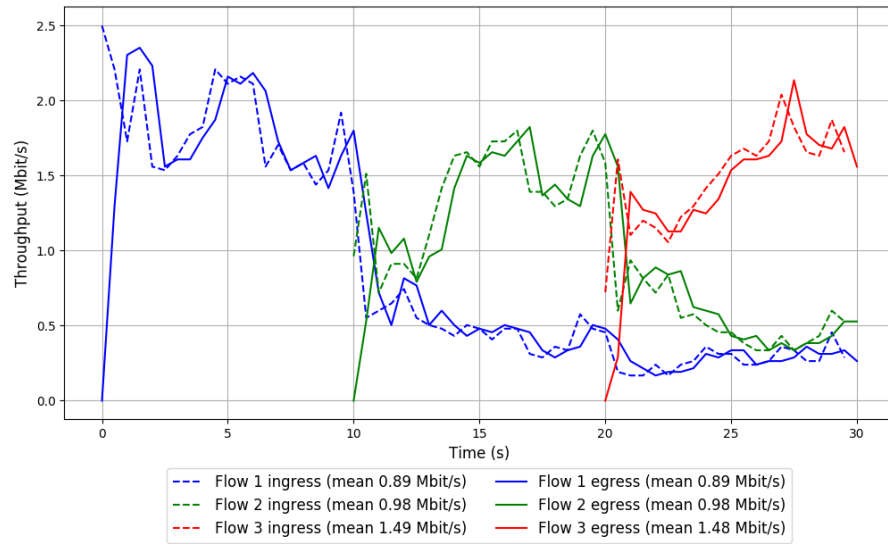Run 2: Report of TCP Vegas — Data Link

```
Run 3: Statistics of TCP Vegas

Start at: 2018-08-10 00:46:14
End at: 2018-08-10 00:46:45
Local clock offset: -0.268 ms
Remote clock offset: -5.467 ms


# Below is generated by plot.py at 2018-08-10 00:47:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.02 Mbit/s
95th percentile per-packet one-way delay: 236.038 ms
Loss rate: 0.89%
-- Flow 1:
Average throughput: 0.89 Mbit/s
95th percentile per-packet one-way delay: 230.769 ms
Loss rate: 0.50%
-- Flow 2:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 276.023 ms
Loss rate: 0.74%
-- Flow 3:
Average throughput: 1.48 Mbit/s
95th percentile per-packet one-way delay: 233.684 ms
Loss rate: 1.78%
```

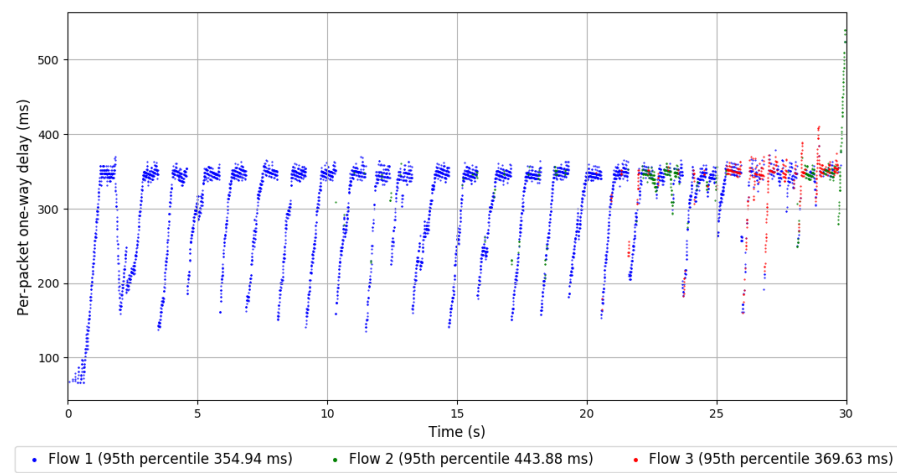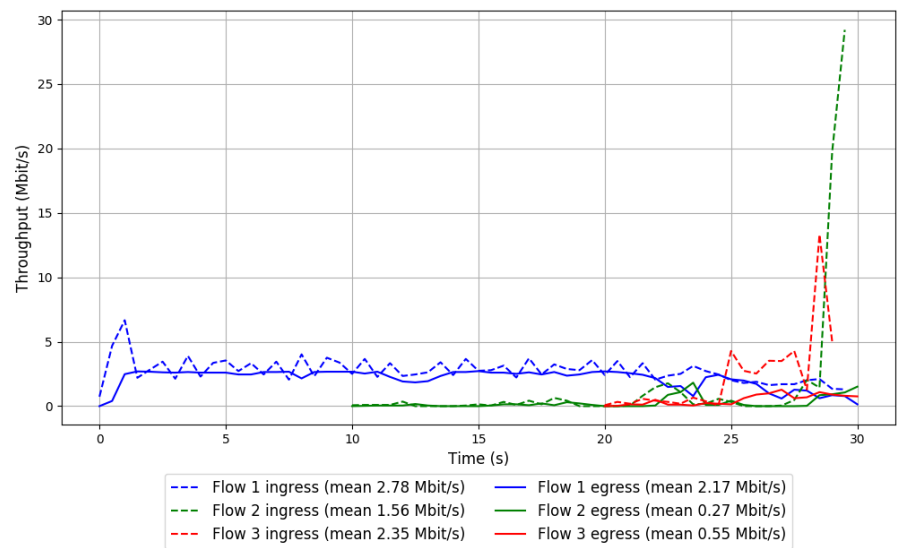Run 3: Report of TCP Vegas — Data Link

```
Run 1: Statistics of Verus

Start at: 2018-08-10 00:00:20
End at: 2018-08-10 00:00:50
Local clock offset: 2.485 ms
Remote clock offset: -10.869 ms

# Below is generated by plot.py at 2018-08-10 00:47:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.51 Mbit/s
95th percentile per-packet one-way delay: 356.416 ms
Loss rate: 44.73%
-- Flow 1:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 354.935 ms
Loss rate: 21.97%
-- Flow 2:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 443.876 ms
Loss rate: 83.00%
-- Flow 3:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 369.628 ms
Loss rate: 76.50%
```
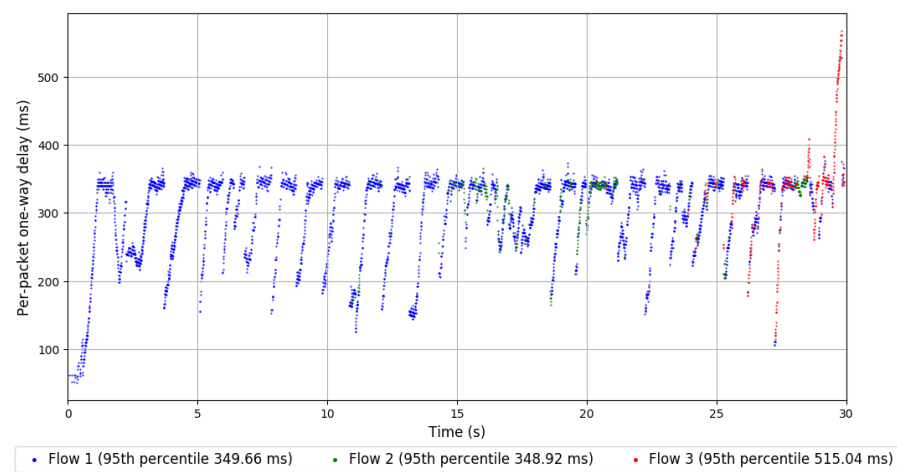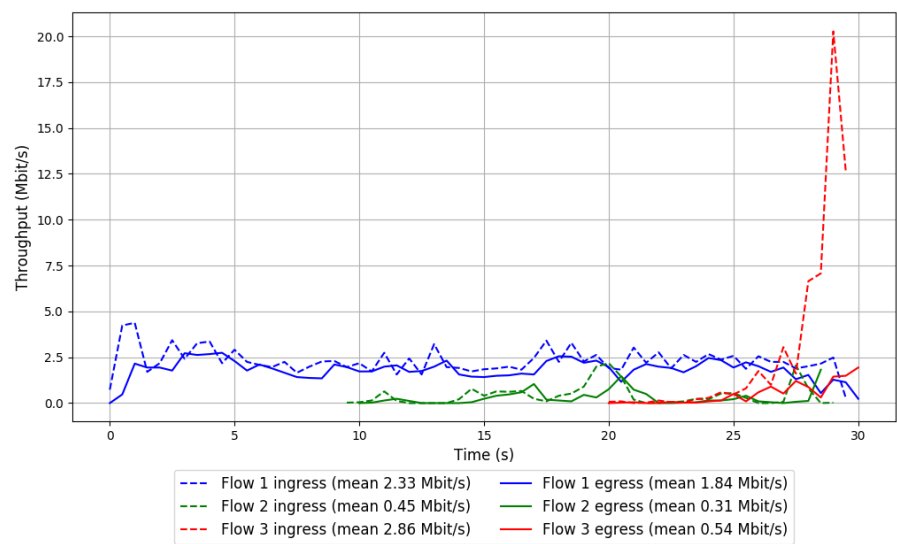
Run 1: Report of Verus — Data Link

```
Run 2: Statistics of Verus

Start at: 2018-08-10 00:18:55
End at: 2018-08-10 00:19:25
Local clock offset: -7.719 ms
Remote clock offset: -11.423 ms


# Below is generated by plot.py at 2018-08-10 00:47:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.20 Mbit/s
95th percentile per-packet one-way delay: 351.620 ms
Loss rate: 38.07%
-- Flow 1:
Average throughput: 1.84 Mbit/s
95th percentile per-packet one-way delay: 349.657 ms
Loss rate: 20.38%
-- Flow 2:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 348.922 ms
Loss rate: 35.45%
-- Flow 3:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 515.040 ms
Loss rate: 81.89%
```
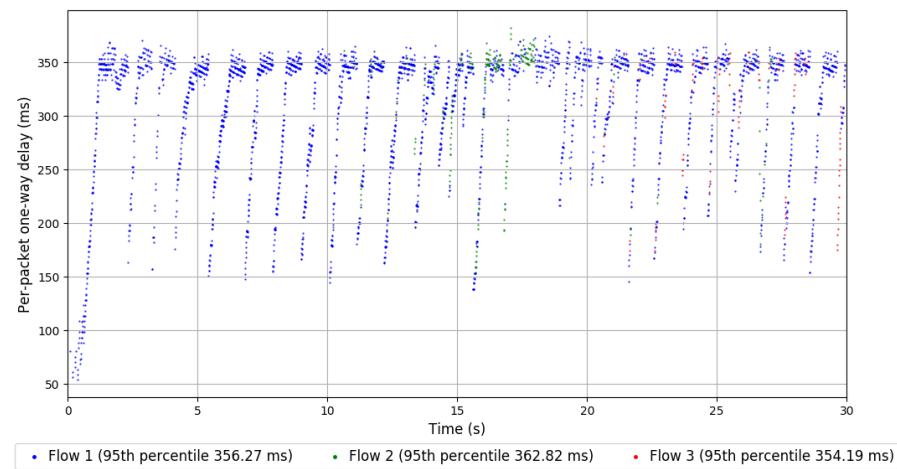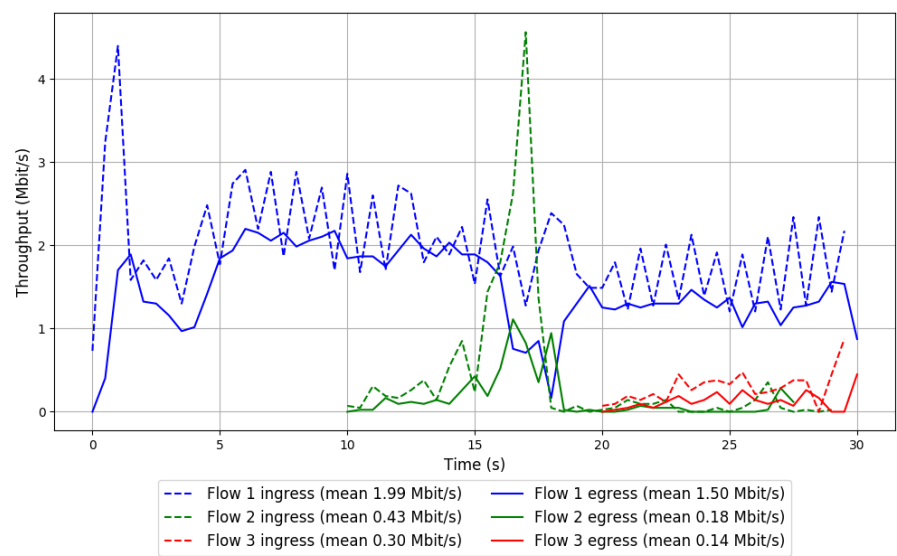
Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2018-08-10 00:37:30
End at: 2018-08-10 00:38:00
Local clock offset: -0.825 ms
Remote clock offset: -7.029 ms


# Below is generated by plot.py at 2018-08-10 00:47:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.65 Mbit/s
95th percentile per-packet one-way delay: 356.827 ms
Loss rate: 30.54%
-- Flow 1:
Average throughput: 1.50 Mbit/s
95th percentile per-packet one-way delay: 356.268 ms
Loss rate: 24.96%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 362.818 ms
Loss rate: 62.66%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 354.193 ms
Loss rate: 54.62%
```
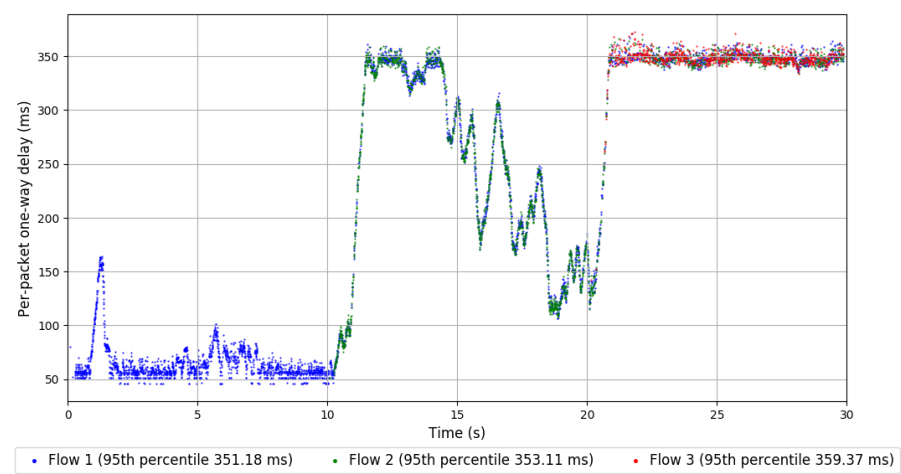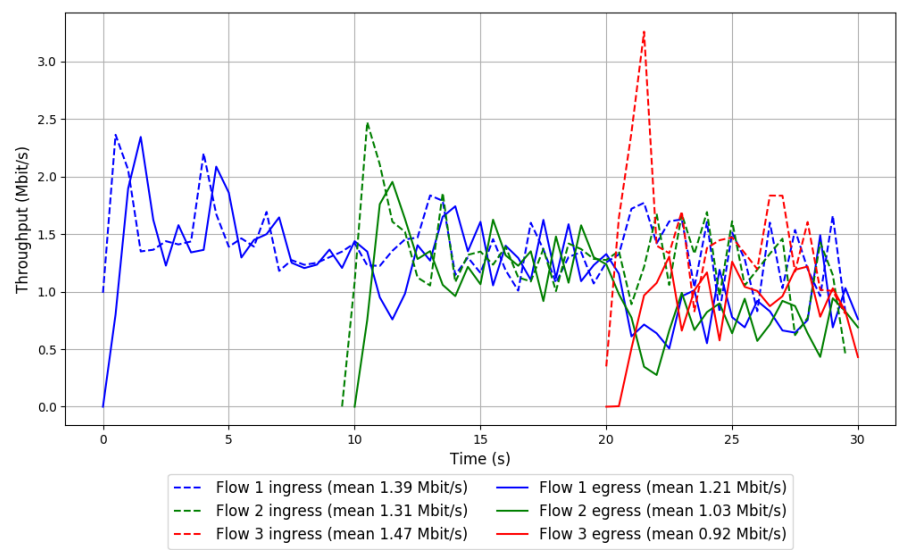
Run 3: Report of Verus — Data Link

```
Run 1: Statistics of PCC-Vivace

Start at: 2018-08-10 00:01:26
End at: 2018-08-10 00:01:56
Local clock offset: 0.729 ms
Remote clock offset: -12.531 ms


# Below is generated by plot.py at 2018-08-10 00:47:34
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 353.385 ms
Loss rate: 20.37%
-- Flow 1:
Average throughput: 1.21 Mbit/s
95th percentile per-packet one-way delay: 351.183 ms
Loss rate: 13.27%
-- Flow 2:
Average throughput: 1.03 Mbit/s
95th percentile per-packet one-way delay: 353.107 ms
Loss rate: 21.73%
-- Flow 3:
Average throughput: 0.92 Mbit/s
95th percentile per-packet one-way delay: 359.367 ms
Loss rate: 38.29%
```

Run 1: Report of PCC-Vivace — Data Link

Flow 1 ingress (mean 1.39 Mbit/s) — — — Flow 1 egress (mean 1.21 Mbit/s)
Flow 2 ingress (mean 1.31 Mbit/s) — — — Flow 2 egress (mean 1.03 Mbit/s)
Flow 3 ingress (mean 1.47 Mbit/s) — — — Flow 3 egress (mean 0.92 Mbit/s)

Flow 1 (95th percentile 351.18 ms) · Flow 2 (95th percentile 353.11 ms) · Flow 3 (95th percentile 359.37 ms)

```
Run 2: Statistics of PCC-Vivace

Start at: 2018-08-10 00:20:00
End at: 2018-08-10 00:20:30
Local clock offset: -1.491 ms
Remote clock offset: -7.9 ms


# Below is generated by plot.py at 2018-08-10 00:47:34
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 350.177 ms
Loss rate: 24.90%
-- Flow 1:
Average throughput: 1.27 Mbit/s
95th percentile per-packet one-way delay: 347.568 ms
Loss rate: 15.48%
-- Flow 2:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 350.478 ms
Loss rate: 25.22%
-- Flow 3:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 354.414 ms
Loss rate: 47.22%
```
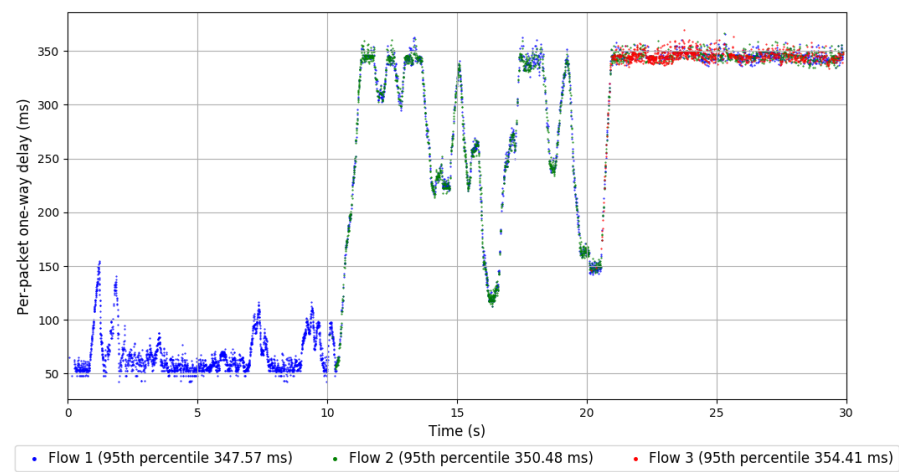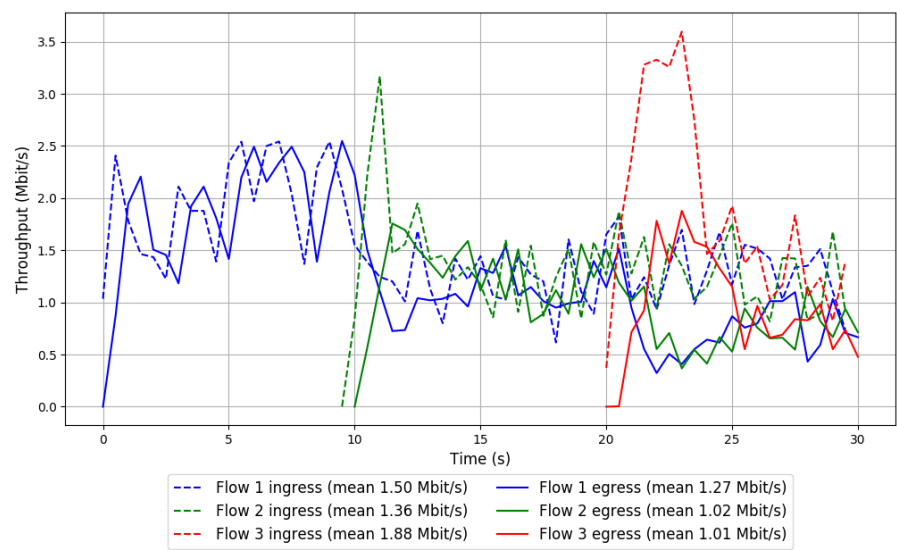
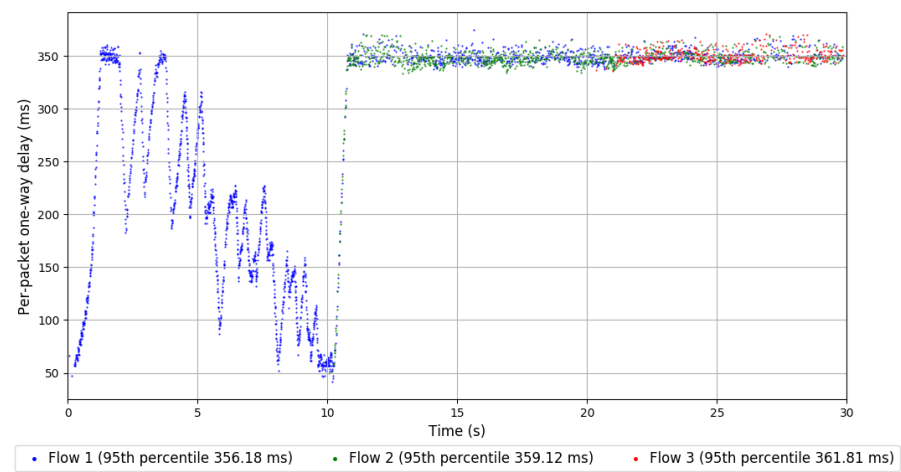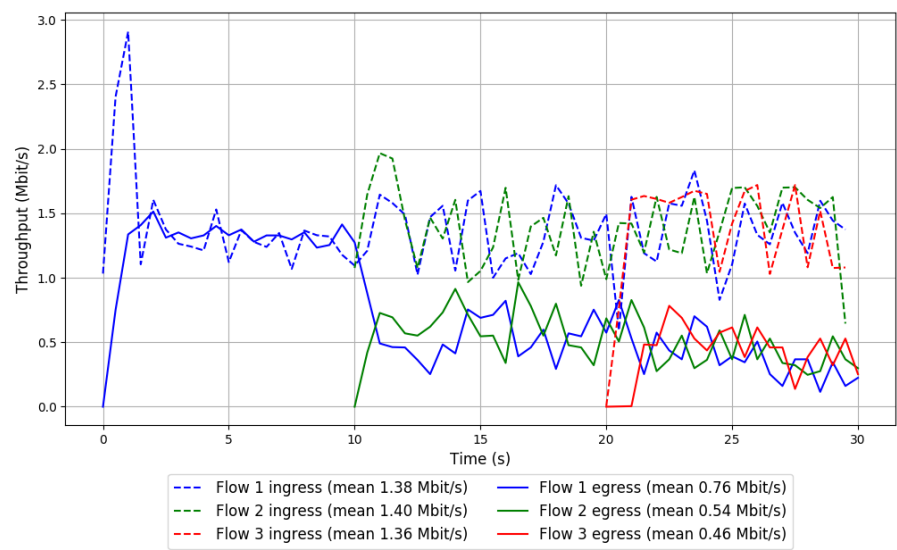## Run 2: Report of PCC-Vivace — Data Link

```
Run 3: Statistics of PCC-Vivace

Start at: 2018-08-10 00:38:35
End at: 2018-08-10 00:39:05
Local clock offset: -2.616 ms
Remote clock offset: -7.111 ms


# Below is generated by plot.py at 2018-08-10 00:47:34
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.26 Mbit/s
95th percentile per-packet one-way delay: 358.522 ms
Loss rate: 54.59%
-- Flow 1:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 356.180 ms
Loss rate: 45.33%
-- Flow 2:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 359.115 ms
Loss rate: 61.91%
-- Flow 3:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 361.807 ms
Loss rate: 67.77%
```

Run 3: Report of PCC-Vivace — Data Link

Flow 1 ingress (mean 1.38 Mbit/s)   Flow 1 egress (mean 0.76 Mbit/s)
Flow 2 ingress (mean 1.40 Mbit/s)   Flow 2 egress (mean 0.54 Mbit/s)
Flow 3 ingress (mean 1.36 Mbit/s)   Flow 3 egress (mean 0.46 Mbit/s)

Flow 1 (95th percentile 356.18 ms)   Flow 2 (95th percentile 359.12 ms)   Flow 3 (95th percentile 361.81 ms)
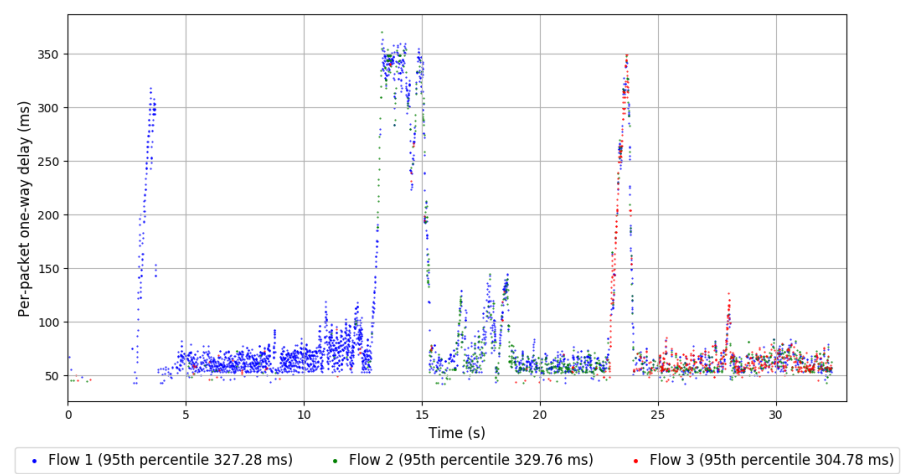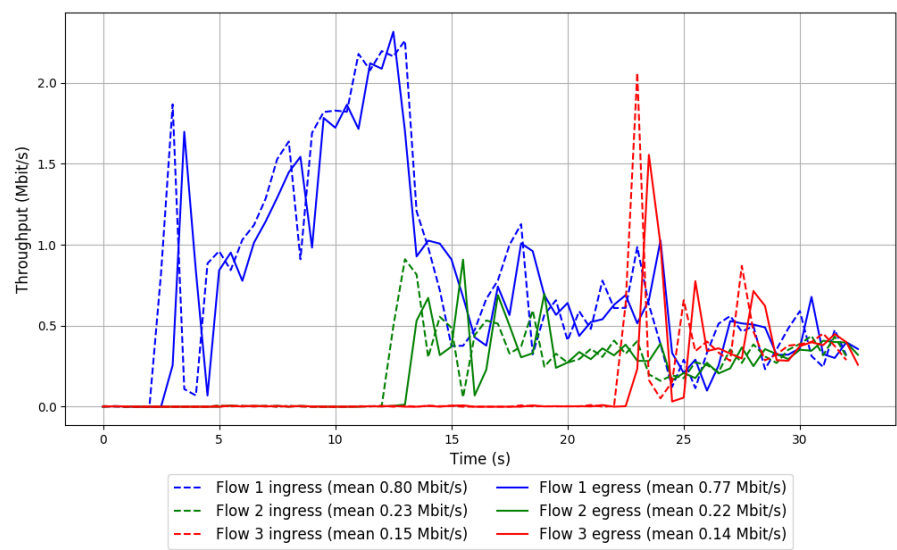
```
Run 1: Statistics of WebRTC media

Start at: 2018-08-09 23:51:35
End at: 2018-08-09 23:52:05
Local clock offset: 2.181 ms
Remote clock offset: -12.826 ms


# Below is generated by plot.py at 2018-08-10 00:47:34
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.13 Mbit/s
95th percentile per-packet one-way delay: 325.380 ms
Loss rate: 3.56%
-- Flow 1:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 327.283 ms
Loss rate: 3.39%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 329.763 ms
Loss rate: 5.37%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 304.776 ms
Loss rate: 1.70%
```

Run 1: Report of WebRTC media — Data Link

Flow 1 ingress (mean 0.80 Mbit/s) --- Flow 1 egress (mean 0.77 Mbit/s)
Flow 2 ingress (mean 0.23 Mbit/s) --- Flow 2 egress (mean 0.22 Mbit/s)
Flow 3 ingress (mean 0.15 Mbit/s) --- Flow 3 egress (mean 0.14 Mbit/s)

Flow 1 (95th percentile 327.28 ms) • Flow 2 (95th percentile 329.76 ms) • Flow 3 (95th percentile 304.78 ms)
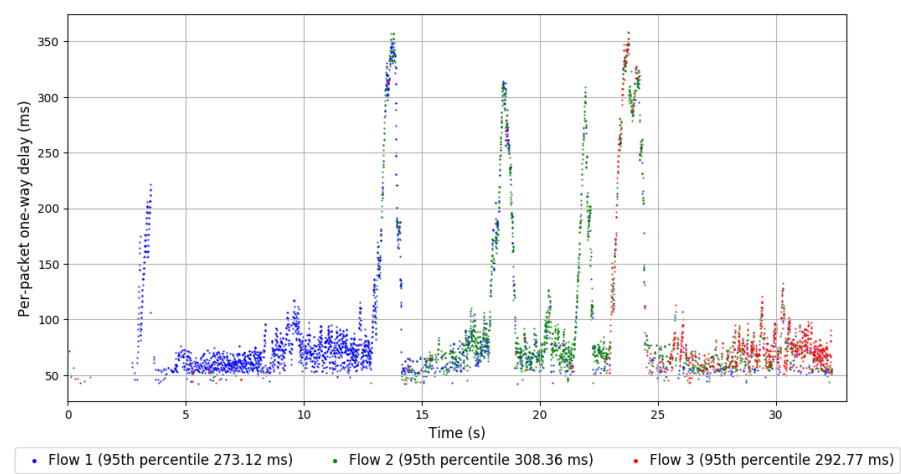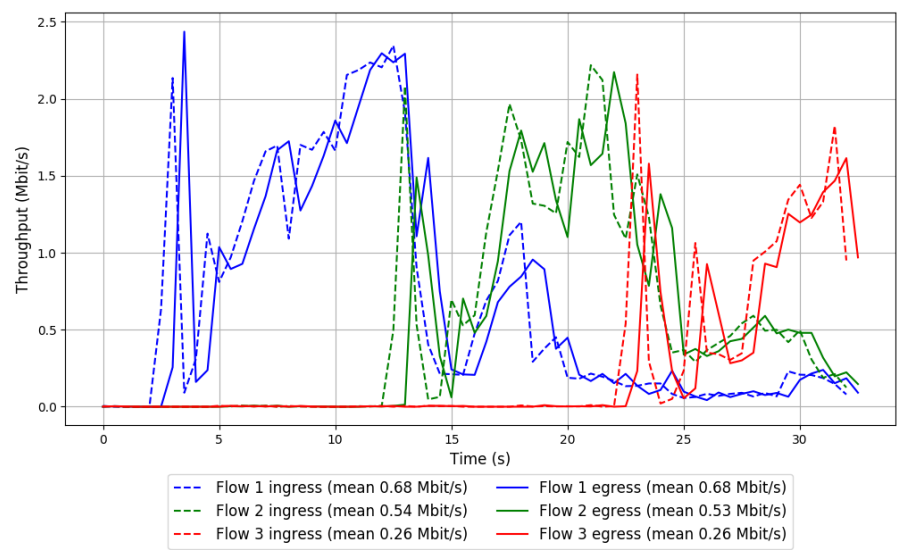
101

```
Run 2: Statistics of WebRTC media

Start at: 2018-08-10 00:10:10
End at: 2018-08-10 00:10:40
Local clock offset: -0.554 ms
Remote clock offset: -11.184 ms


# Below is generated by plot.py at 2018-08-10 00:47:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.46 Mbit/s
95th percentile per-packet one-way delay: 301.658 ms
Loss rate: 1.18%
-- Flow 1:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 273.118 ms
Loss rate: 0.28%
-- Flow 2:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 308.355 ms
Loss rate: 1.61%
-- Flow 3:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 292.767 ms
Loss rate: 2.63%
```

Run 2: Report of WebRTC media — Data Link

```
Run 3: Statistics of WebRTC media

Start at: 2018-08-10 00:28:45
End at: 2018-08-10 00:29:15
Local clock offset: -2.839 ms
Remote clock offset: -7.905 ms


# Below is generated by plot.py at 2018-08-10 00:47:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.20 Mbit/s
95th percentile per-packet one-way delay: 219.135 ms
Loss rate: 0.57%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 180.786 ms
Loss rate: 0.22%
-- Flow 2:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 256.418 ms
Loss rate: 0.92%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 233.089 ms
Loss rate: 0.87%
```

Run 3: Report of WebRTC media — Data Link