Pantheon Report

Generated at 2019-01-02 23:40:42 (UTC).

Data path: AWS Brazil 2 on `ens5` (*local*) →Colombia cellular on `ppp0` (*remote*).

Repeated the test of 19 congestion control schemes 3 times.

Each test lasted for 30 seconds running 3 flows with 10-second interval between two flows.

NTP offsets were measured against `gps.ntp.br` and have been applied to correct the timestamps in logs.

```
System info:
Linux 4.15.0-1029-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912

Git summary:
branch: muses @ c654af0b7d59d4ef4b914cfac404e1fc2e96dc68
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfe58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ 65ac1b19bbefed0c6349ae986009b4fa8643c40a
third_party/muses-refactored @ 31f8f0ba8ef8b1da76c2bc0cd0a7850c33ff64fb
third_party/pantheon-tunnel @ f866d3f58d27afd942717625ee3a354cc2e802bd
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
 M receiver/src/buffer.h
 M receiver/src/core.cpp
 M sender/src/buffer.h
 M sender/src/core.cpp
third_party/pcc-experimental @ cd43e34e3f5f5613e8acd08fab92c4eb24f974ab
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream-reproduce @ f099118d1421aa3131bf11ff1964974e1da3bdb2
 M src/ScreamClient
 M src/ScreamServer
third_party/sprout @ 366e35c6178b01e31d4a46ad18c74f9415f19a26
 M src/examples/cellsim.cc
 M src/examples/sproutbt2.cc
 M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
```
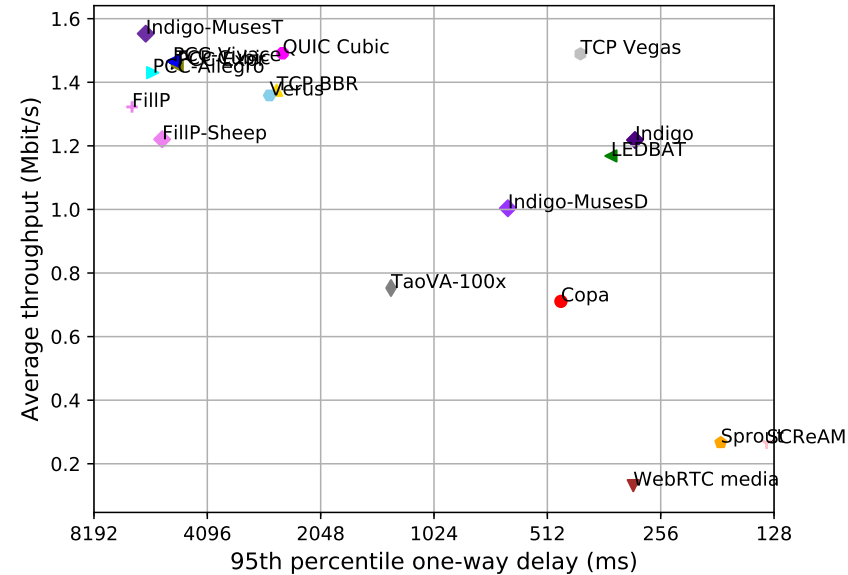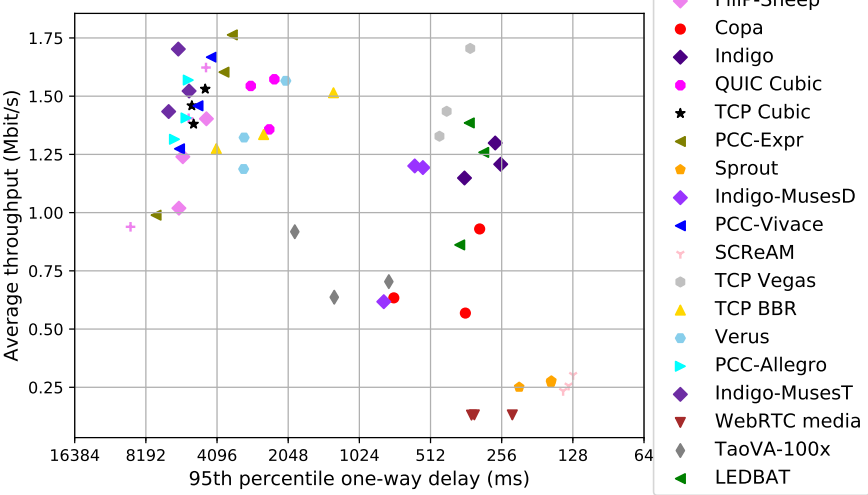
```
 M src/verus.hpp
 M tools/plot.py
third_party/vivace @ 2baf86211435ae071a32f96b7d8c504587f5d7f4
third_party/webrtc @ 3f0cc2a9061a41b6f9dde4735770d143a1fa2851
```

test from AWS Brazil 2 to Colombia cellular, 3 runs of 30s each per scheme
3 flows with 10s interval between flows (mean of all runs by scheme)

test from AWS Brazil 2 to Colombia cellular, 3 runs of 30s each per scheme
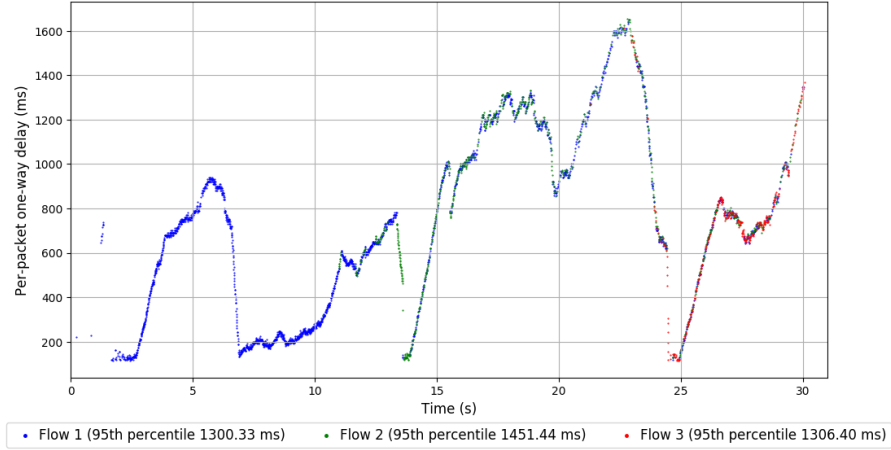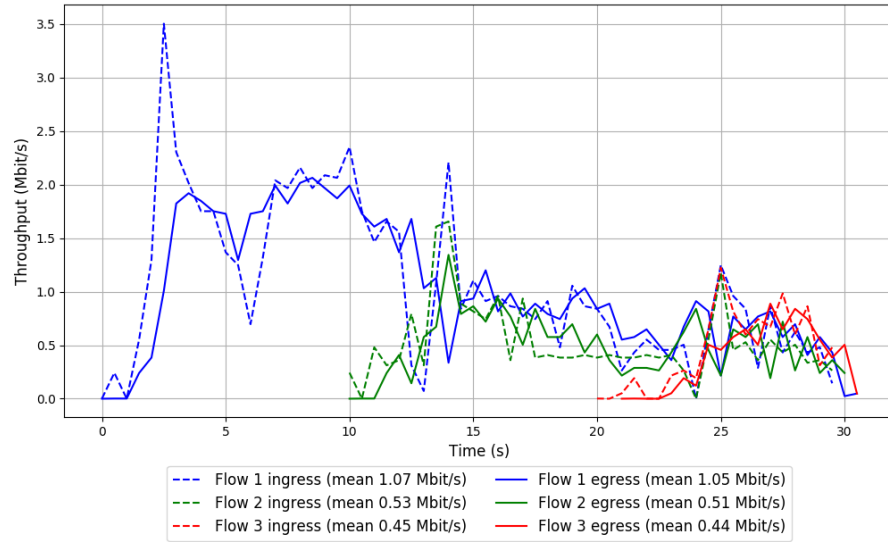3 flows with 10s interval between flows

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	0.91	0.53	0.37	2328.89	2737.02	2793.38	2.98	5.54	28.58
Copa	3	0.01	0.82	0.57	237.31	472.07	347.83	93.64	0.26	0.88
TCP Cubic	3	1.42	0.06	0.00	4991.40	5054.63	5207.93	19.76	30.67	52.66
FillP	3	0.91	0.66	0.00	5971.00	6603.39	6026.50	25.54	56.35	91.99
FillP-Sheep	3	0.75	0.55	0.37	4307.98	4954.31	5132.99	13.43	20.14	79.33
Indigo	3	0.65	0.54	0.65	274.08	270.68	357.47	0.07	0.03	0.16
Indigo-MusesD	3	0.51	0.47	0.54	675.26	654.99	646.82	0.47	0.68	1.62
Indigo-MusesT	3	1.03	0.72	0.67	5924.22	5998.68	5398.10	74.73	43.33	69.99
LEDBAT	3	0.86	0.31	0.32	356.58	361.44	362.65	0.44	0.51	2.62
PCC-Allegro	3	1.43	0.00	0.00	5721.14	5544.87	5211.20	81.14	4.84	38.89
PCC-Expr	3	1.45	0.00	0.00	4926.38	3867.39	4644.73	74.45	72.81	76.92
QUIC Cubic	3	1.14	0.47	0.12	2463.66	2660.49	2620.19	5.36	13.15	40.26
SCReAM	3	0.08	0.17	0.20	130.59	133.75	137.18	0.09	0.17	0.32
Sprout	3	0.12	0.14	0.16	187.64	160.53	170.96	0.19	0.01	1.85
TaoVA-100x	3	0.01	0.78	0.78	198.50	998.94	1373.28	89.84	1.69	3.49
TCP Vegas	3	0.93	0.48	0.75	395.32	421.02	449.03	0.26	0.40	2.37
Verus	3	1.25	0.16	0.06	2881.38	2596.42	1916.14	5.25	26.49	16.93
PCC-Vivace	3	0.84	0.95	0.00	5027.46	5070.43	4783.46	34.78	41.40	36.01
WebRTC media	3	0.04	0.04	0.04	317.15	285.22	279.14	0.03	0.03	0.00

```
Run 1: Statistics of TCP BBR

Start at: 2019-01-02 22:34:14
End at: 2019-01-02 22:34:44
Local clock offset: -2.776 ms
Remote clock offset: 36.654 ms


# Below is generated by plot.py at 2019-01-02 23:40:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 1317.592 ms
Loss rate: 3.19%
-- Flow 1:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 1300.334 ms
Loss rate: 1.55%
-- Flow 2:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 1451.442 ms
Loss rate: 3.78%
-- Flow 3:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 1306.400 ms
Loss rate: 13.54%
```
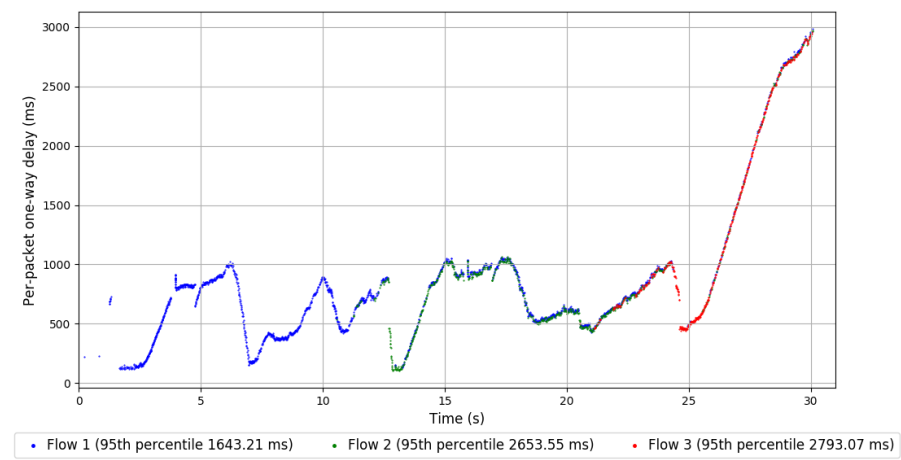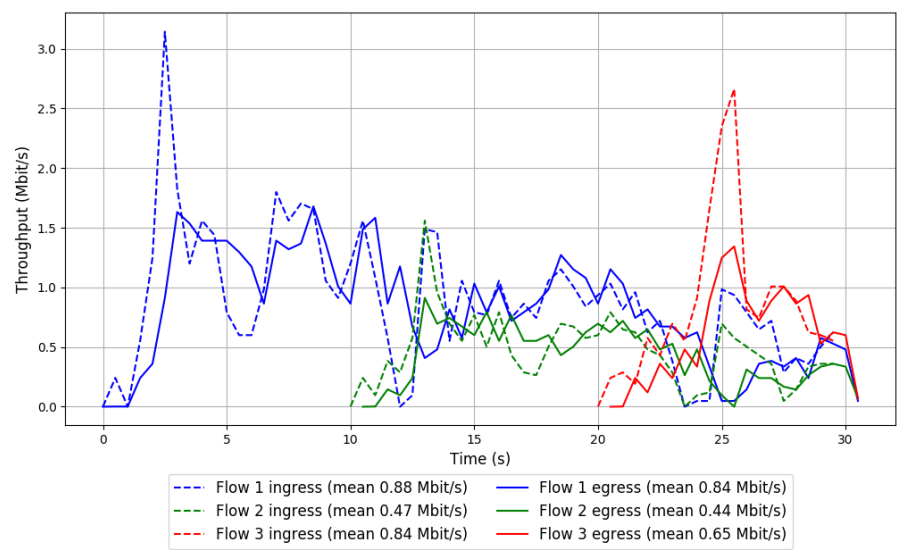
Run 1: Report of TCP BBR — Data Link

Flow 1 ingress (mean 1.07 Mbit/s)   Flow 1 egress (mean 1.05 Mbit/s)
Flow 2 ingress (mean 0.53 Mbit/s)   Flow 2 egress (mean 0.51 Mbit/s)
Flow 3 ingress (mean 0.45 Mbit/s)   Flow 3 egress (mean 0.44 Mbit/s)

• Flow 1 (95th percentile 1300.33 ms)   • Flow 2 (95th percentile 1451.44 ms)   • Flow 3 (95th percentile 1306.40 ms)
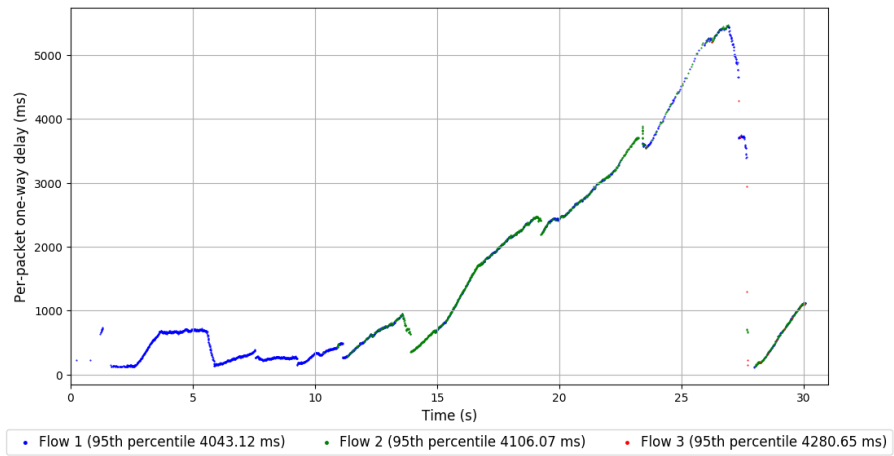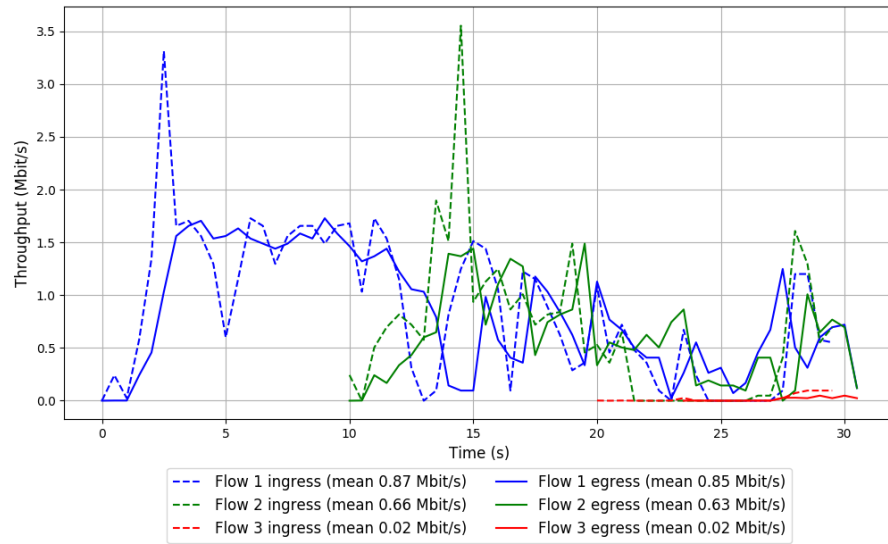
6

```
Run 2: Statistics of TCP BBR

Start at: 2019-01-02 22:57:34
End at: 2019-01-02 22:58:04
Local clock offset: -3.172 ms
Remote clock offset: 3.562 ms


# Below is generated by plot.py at 2019-01-02 23:40:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.34 Mbit/s
95th percentile per-packet one-way delay: 2602.301 ms
Loss rate: 9.78%
-- Flow 1:
Average throughput: 0.84 Mbit/s
95th percentile per-packet one-way delay: 1643.214 ms
Loss rate: 5.23%
-- Flow 2:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 2653.548 ms
Loss rate: 7.81%
-- Flow 3:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 2793.075 ms
Loss rate: 26.28%
```
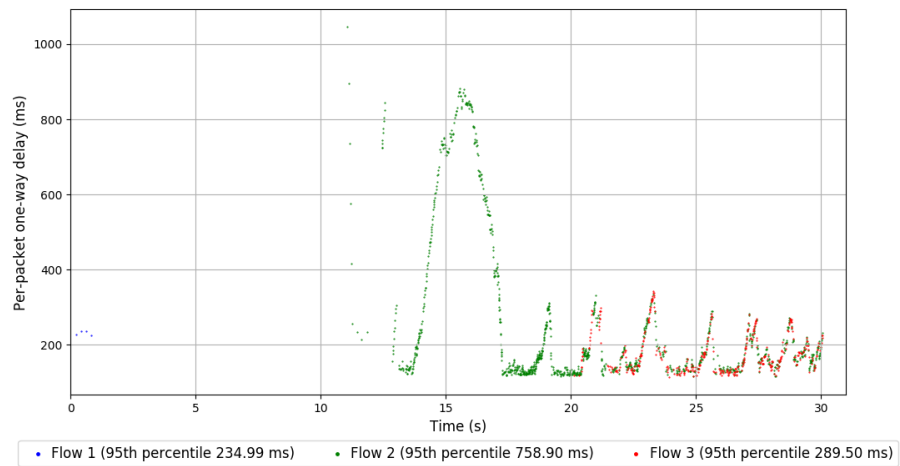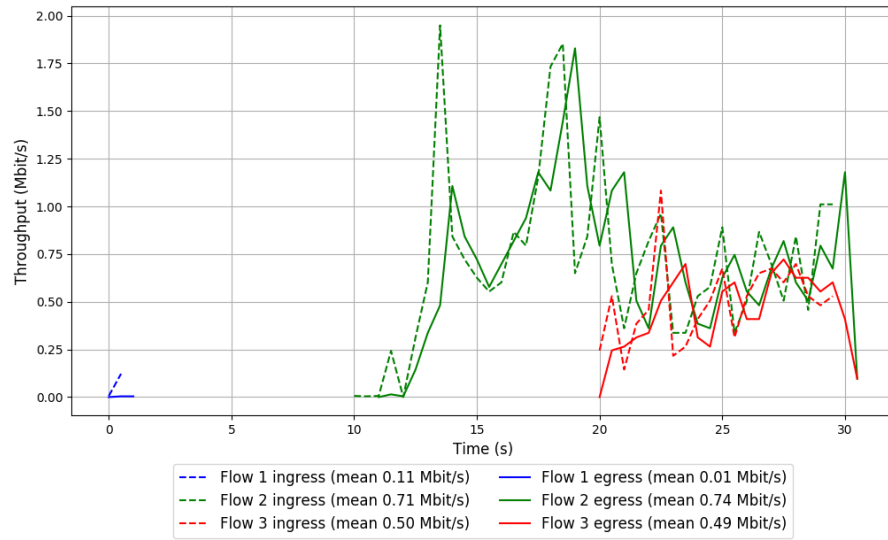
Run 2: Report of TCP BBR — Data Link

Flow 1 ingress (mean 0.88 Mbit/s) — — —   Flow 1 egress (mean 0.84 Mbit/s) ———
Flow 2 ingress (mean 0.47 Mbit/s) — — —   Flow 2 egress (mean 0.44 Mbit/s) ———
Flow 3 ingress (mean 0.84 Mbit/s) — — —   Flow 3 egress (mean 0.65 Mbit/s) ———

Flow 1 (95th percentile 1643.21 ms)   Flow 2 (95th percentile 2653.55 ms)   Flow 3 (95th percentile 2793.07 ms)

8

```
Run 3: Statistics of TCP BBR

Start at: 2019-01-02 23:20:55
End at: 2019-01-02 23:21:25
Local clock offset: -8.938 ms
Remote clock offset: -0.509 ms


# Below is generated by plot.py at 2019-01-02 23:40:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.28 Mbit/s
95th percentile per-packet one-way delay: 4123.404 ms
Loss rate: 3.35%
-- Flow 1:
Average throughput: 0.85 Mbit/s
95th percentile per-packet one-way delay: 4043.122 ms
Loss rate: 2.16%
-- Flow 2:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 4106.072 ms
Loss rate: 5.04%
-- Flow 3:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 4280.652 ms
Loss rate: 45.91%
```

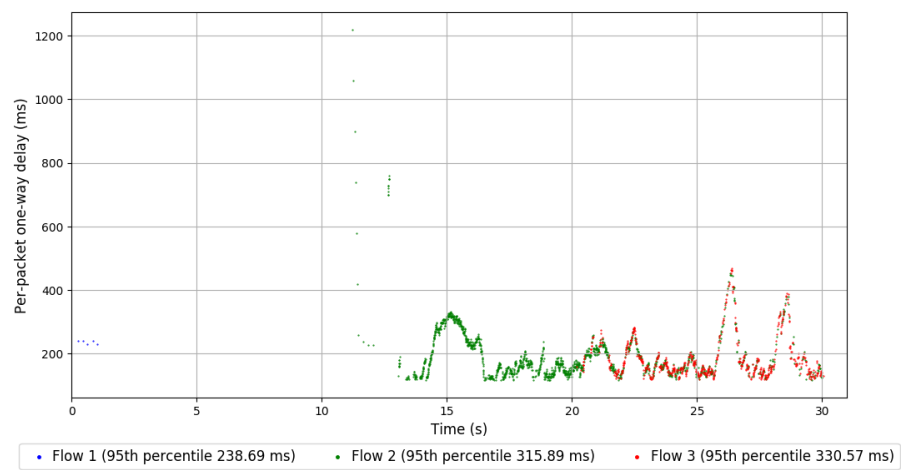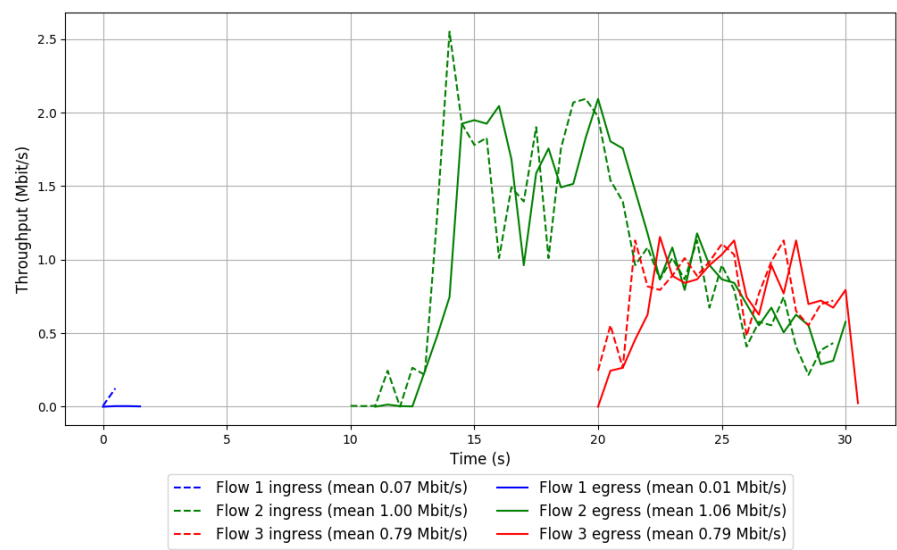# Run 3: Report of TCP BBR — Data Link

```
Run 1: Statistics of Copa

Start at: 2019-01-02 22:33:00
End at: 2019-01-02 22:33:30
Local clock offset: -2.771 ms
Remote clock offset: 31.551 ms


# Below is generated by plot.py at 2019-01-02 23:40:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 732.039 ms
Loss rate: 1.13%
-- Flow 1:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 234.986 ms
Loss rate: 93.63%
-- Flow 2:
Average throughput: 0.74 Mbit/s
95th percentile per-packet one-way delay: 758.897 ms
Loss rate: 0.68%
-- Flow 3:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 289.501 ms
Loss rate: 1.21%
```
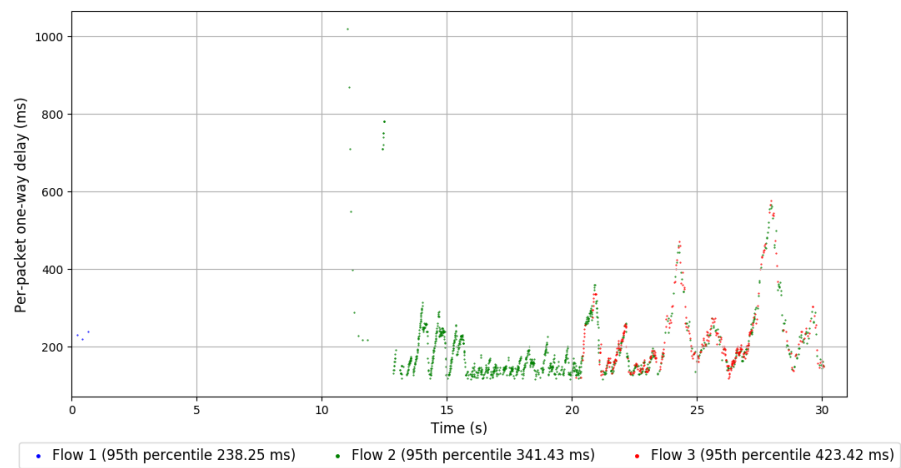
Run 1: Report of Copa — Data Link

```
Run 2: Statistics of Copa

Start at: 2019-01-02 22:56:20
End at: 2019-01-02 22:56:50
Local clock offset: -2.537 ms
Remote clock offset: 4.3 ms


# Below is generated by plot.py at 2019-01-02 23:40:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 317.262 ms
Loss rate: 0.39%
-- Flow 1:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 238.694 ms
Loss rate: 92.16%
-- Flow 2:
Average throughput: 1.06 Mbit/s
95th percentile per-packet one-way delay: 315.893 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 330.574 ms
Loss rate: 0.61%
```
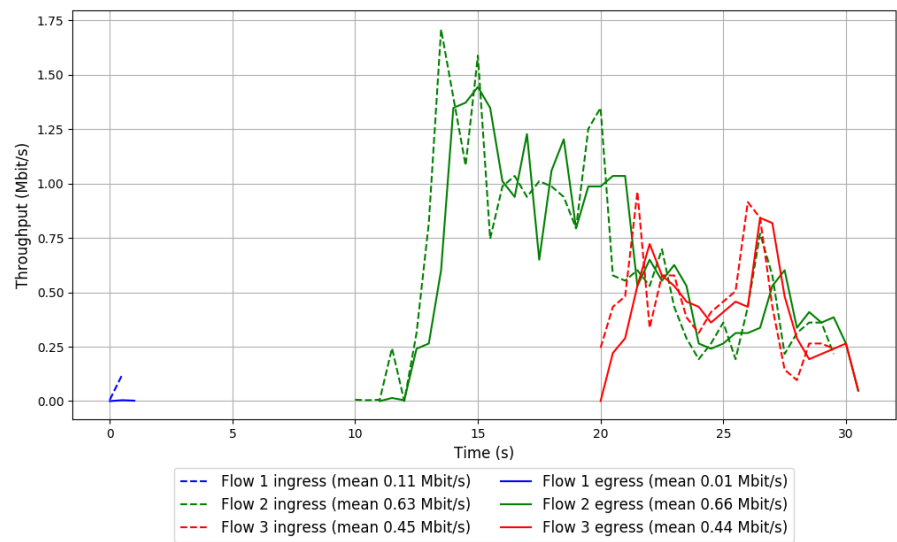
Run 2: Report of Copa — Data Link

```
Run 3: Statistics of Copa

Start at: 2019-01-02 23:19:41
End at: 2019-01-02 23:20:11
Local clock offset: -8.065 ms
Remote clock offset: -0.182 ms


# Below is generated by plot.py at 2019-01-02 23:40:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 364.631 ms
Loss rate: 0.63%
-- Flow 1:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 238.249 ms
Loss rate: 95.14%
-- Flow 2:
Average throughput: 0.66 Mbit/s
95th percentile per-packet one-way delay: 341.430 ms
Loss rate: 0.10%
-- Flow 3:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 423.421 ms
Loss rate: 0.81%
```
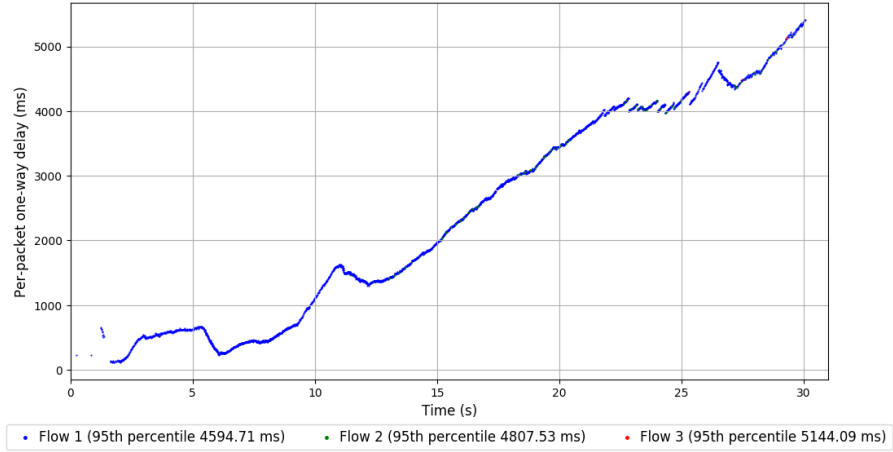
Run 3: Report of Copa — Data Link

```
Run 1: Statistics of TCP Cubic

Start at: 2019-01-02 22:37:55
End at: 2019-01-02 22:38:25
Local clock offset: -1.848 ms
Remote clock offset: 27.66 ms


# Below is generated by plot.py at 2019-01-02 23:40:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.53 Mbit/s
95th percentile per-packet one-way delay: 4594.890 ms
Loss rate: 20.54%
-- Flow 1:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 4594.711 ms
Loss rate: 20.28%
-- Flow 2:
Average throughput: 0.07 Mbit/s
95th percentile per-packet one-way delay: 4807.532 ms
Loss rate: 27.41%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5144.093 ms
Loss rate: 62.87%
```
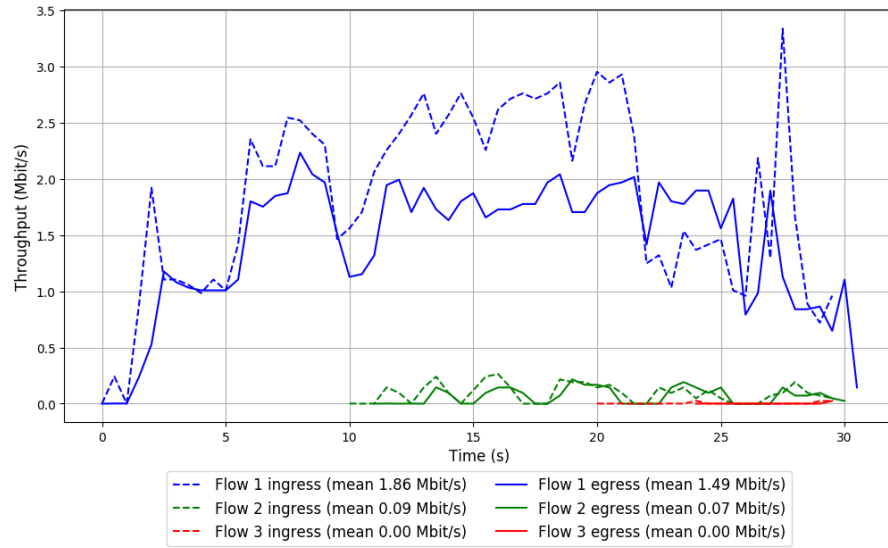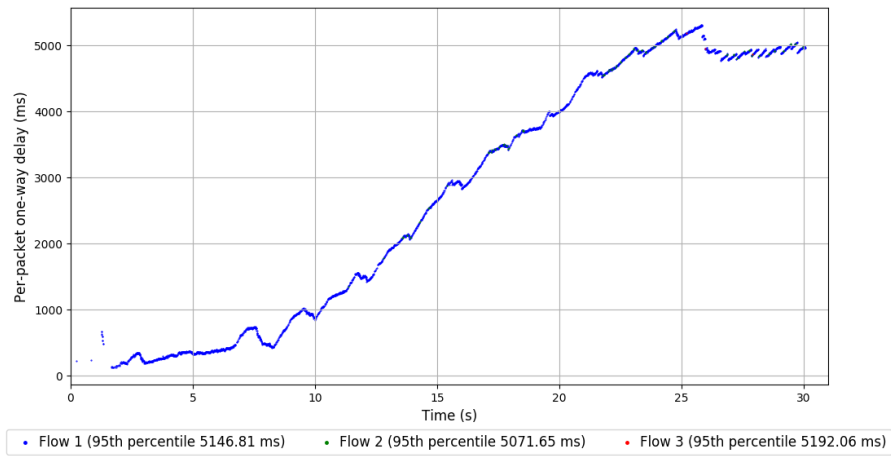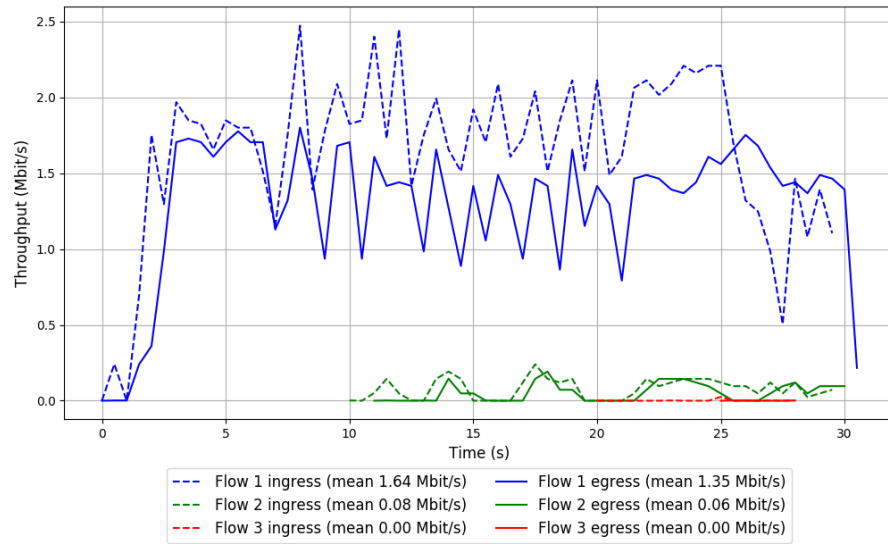
Run 1: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 1.86 Mbit/s)   Flow 1 egress (mean 1.49 Mbit/s)
Flow 2 ingress (mean 0.09 Mbit/s)   Flow 2 egress (mean 0.07 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s)   Flow 3 egress (mean 0.00 Mbit/s)

Flow 1 (95th percentile 4594.71 ms)   Flow 2 (95th percentile 4807.53 ms)   Flow 3 (95th percentile 5144.09 ms)

18

```
Run 2: Statistics of TCP Cubic

Start at: 2019-01-02 23:01:15
End at: 2019-01-02 23:01:45
Local clock offset: -5.48 ms
Remote clock offset: 2.61 ms


# Below is generated by plot.py at 2019-01-02 23:40:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.38 Mbit/s
95th percentile per-packet one-way delay: 5146.718 ms
Loss rate: 19.02%
-- Flow 1:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 5146.807 ms
Loss rate: 18.55%
-- Flow 2:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 5071.651 ms
Loss rate: 33.01%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5192.065 ms
Loss rate: 86.54%
```
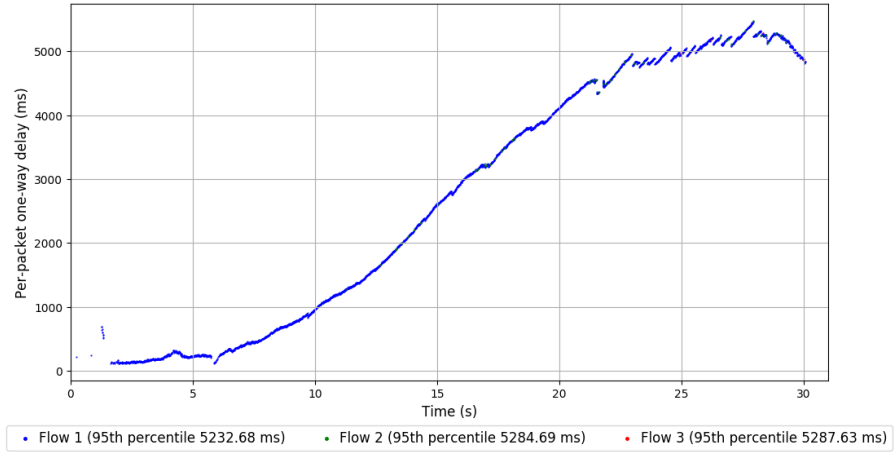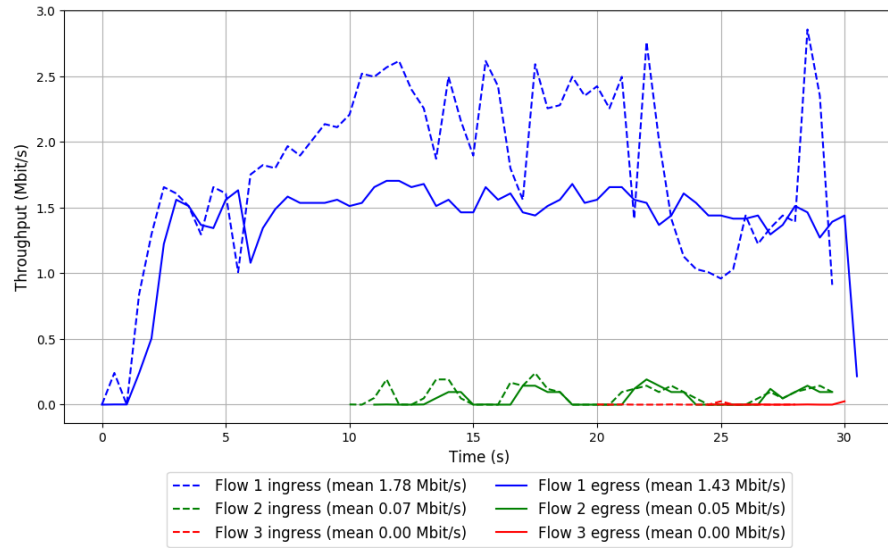
Run 2: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 1.64 Mbit/s)   Flow 1 egress (mean 1.35 Mbit/s)
Flow 2 ingress (mean 0.08 Mbit/s)   Flow 2 egress (mean 0.06 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s)   Flow 3 egress (mean 0.00 Mbit/s)

• Flow 1 (95th percentile 5146.81 ms)   • Flow 2 (95th percentile 5071.65 ms)   • Flow 3 (95th percentile 5192.06 ms)

```
Run 3: Statistics of TCP Cubic

Start at: 2019-01-02 23:24:35
End at: 2019-01-02 23:25:05
Local clock offset: -8.509 ms
Remote clock offset: -0.68 ms


# Below is generated by plot.py at 2019-01-02 23:40:07
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.46 Mbit/s
95th percentile per-packet one-way delay: 5235.375 ms
Loss rate: 20.75%
-- Flow 1:
Average throughput: 1.43 Mbit/s
95th percentile per-packet one-way delay: 5232.684 ms
Loss rate: 20.46%
-- Flow 2:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 5284.693 ms
Loss rate: 31.60%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5287.631 ms
Loss rate: 8.58%
```
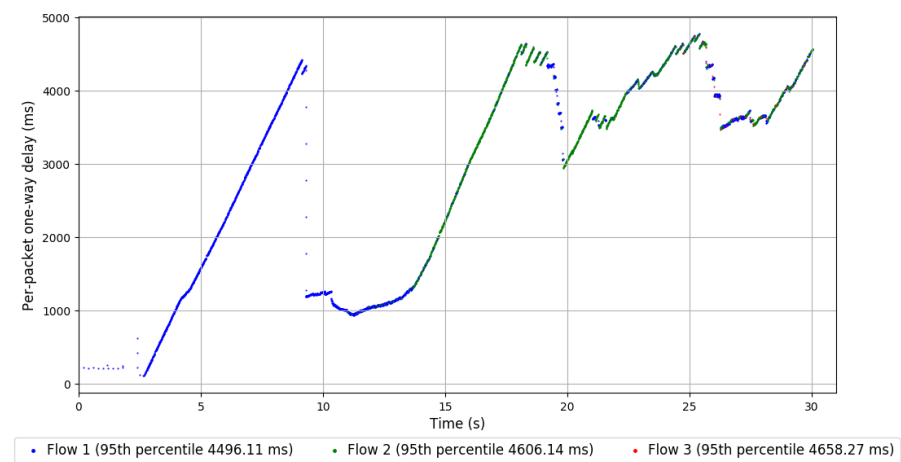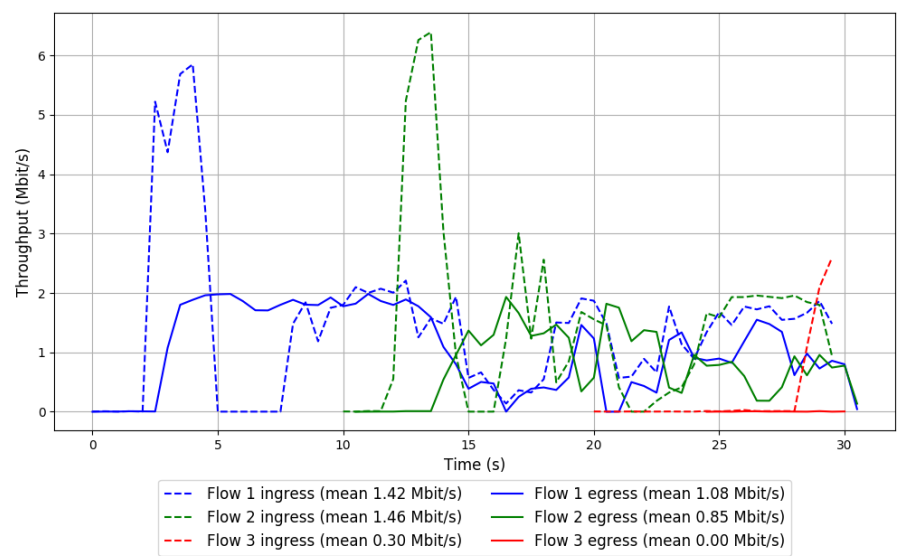
Run 3: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 1.78 Mbit/s) — — — Flow 1 egress (mean 1.43 Mbit/s) ———
Flow 2 ingress (mean 0.07 Mbit/s) — — — Flow 2 egress (mean 0.05 Mbit/s) ———
Flow 3 ingress (mean 0.00 Mbit/s) — — — Flow 3 egress (mean 0.00 Mbit/s) ———

Flow 1 (95th percentile 5232.68 ms)   •   Flow 2 (95th percentile 5284.69 ms)   •   Flow 3 (95th percentile 5287.63 ms)

```
Run 1: Statistics of FillP

Start at: 2019-01-02 22:48:58
End at: 2019-01-02 22:49:28
Local clock offset: -1.497 ms
Remote clock offset: 5.631 ms


# Below is generated by plot.py at 2019-01-02 23:40:10
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.62 Mbit/s
95th percentile per-packet one-way delay: 4560.093 ms
Loss rate: 34.97%
-- Flow 1:
Average throughput: 1.08 Mbit/s
95th percentile per-packet one-way delay: 4496.109 ms
Loss rate: 23.97%
-- Flow 2:
Average throughput: 0.85 Mbit/s
95th percentile per-packet one-way delay: 4606.141 ms
Loss rate: 44.50%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 4658.271 ms
Loss rate: 99.16%
```
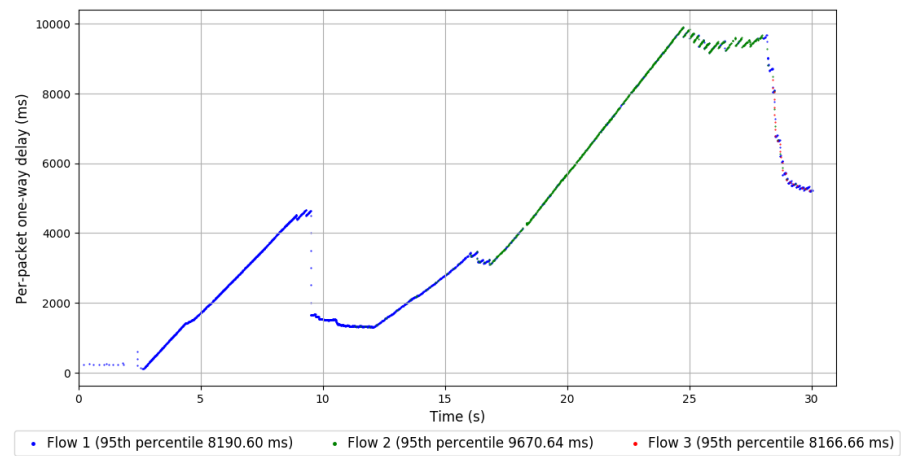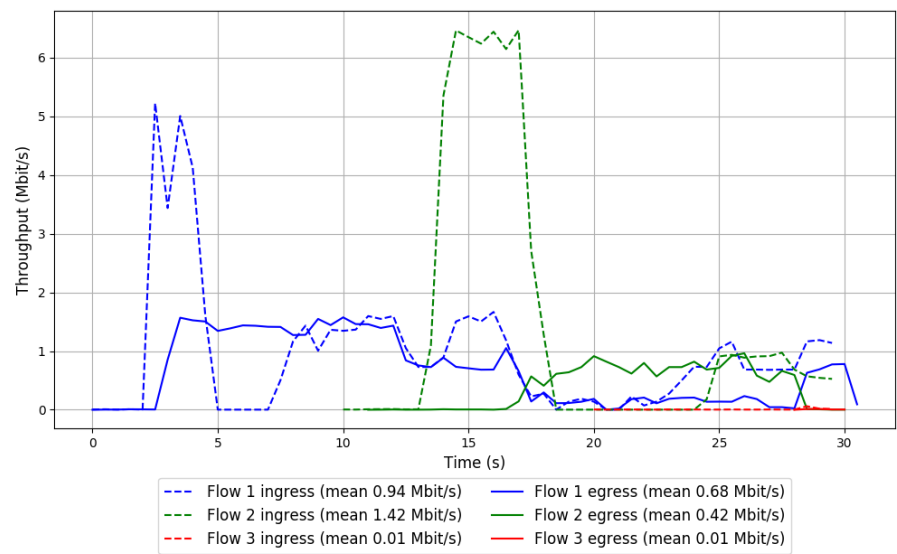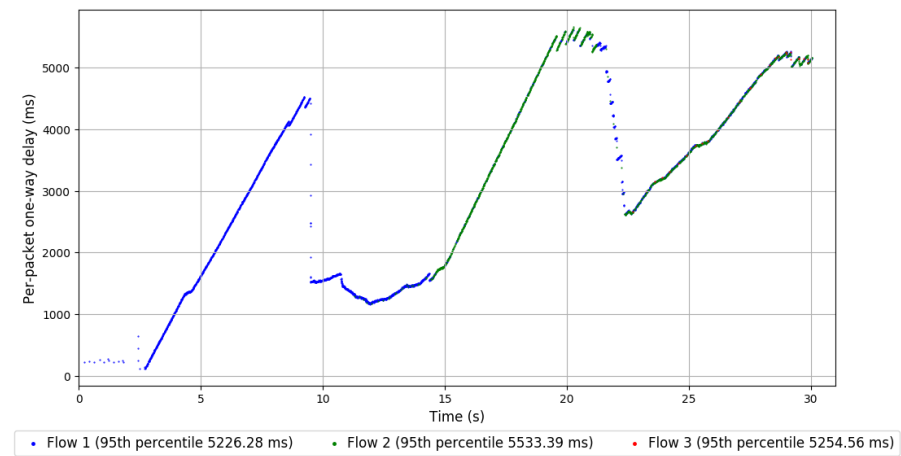
Run 1: Report of FillP — Data Link

Flow 1 ingress (mean 1.42 Mbit/s) --- Flow 1 egress (mean 1.08 Mbit/s)
Flow 2 ingress (mean 1.46 Mbit/s) --- Flow 2 egress (mean 0.85 Mbit/s)
Flow 3 ingress (mean 0.30 Mbit/s) --- Flow 3 egress (mean 0.00 Mbit/s)

Flow 1 (95th percentile 4496.11 ms)   Flow 2 (95th percentile 4606.14 ms)   Flow 3 (95th percentile 4658.27 ms)
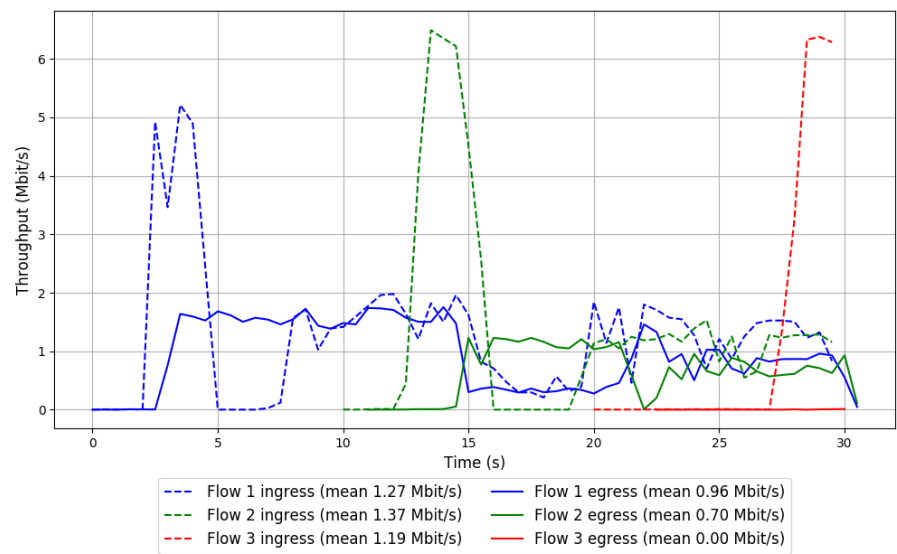
24

```
Run 2: Statistics of FillP

Start at: 2019-01-02 23:12:20
End at: 2019-01-02 23:12:50
Local clock offset: -7.183 ms
Remote clock offset: 0.716 ms


# Below is generated by plot.py at 2019-01-02 23:40:10
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 9512.273 ms
Loss rate: 50.60%
-- Flow 1:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 8190.601 ms
Loss rate: 28.43%
-- Flow 2:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 9670.644 ms
Loss rate: 72.68%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 8166.665 ms
Loss rate: 77.04%
```
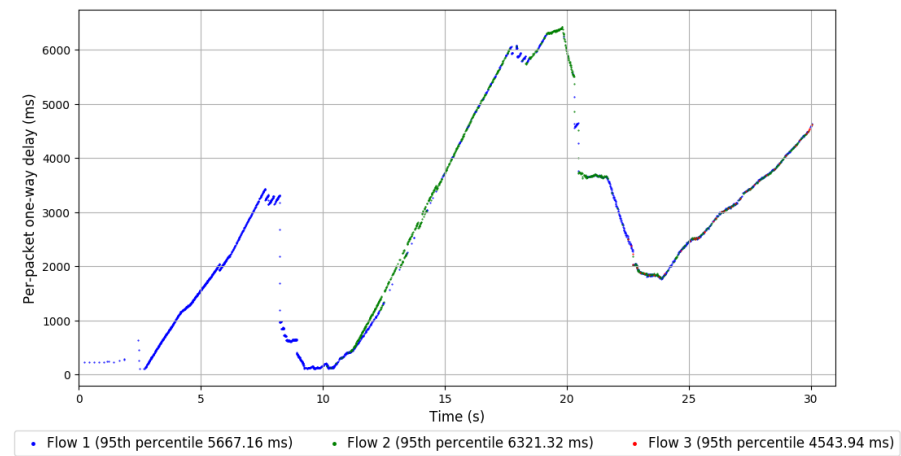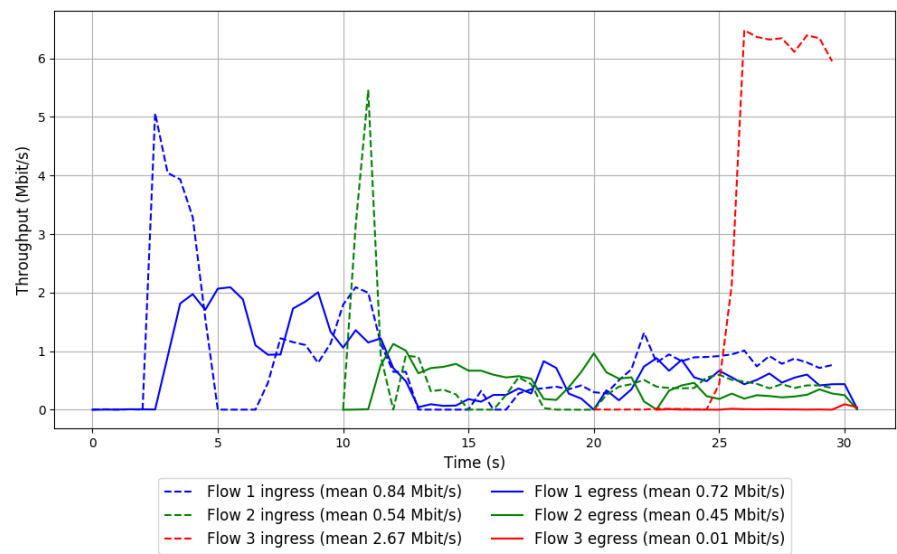
Run 2: Report of FillP — Data Link

```
Run 3: Statistics of FillP

Start at: 2019-01-02 23:35:38
End at: 2019-01-02 23:36:08
Local clock offset: -4.123 ms
Remote clock offset: -1.617 ms


# Below is generated by plot.py at 2019-01-02 23:40:11
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 5400.764 ms
Loss rate: 45.60%
-- Flow 1:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 5226.280 ms
Loss rate: 24.21%
-- Flow 2:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 5533.390 ms
Loss rate: 51.86%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5254.556 ms
Loss rate: 99.76%
```

Run 3: Report of FillP — Data Link

```
Run 1: Statistics of FillP-Sheep

Start at: 2019-01-02 22:36:41
End at: 2019-01-02 22:37:11
Local clock offset: -2.596 ms
Remote clock offset: 32.905 ms


# Below is generated by plot.py at 2019-01-02 23:40:11
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 5938.068 ms
Loss rate: 51.44%
-- Flow 1:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 5667.159 ms
Loss rate: 15.23%
-- Flow 2:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 6321.324 ms
Loss rate: 18.14%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 4543.942 ms
Loss rate: 99.58%
```
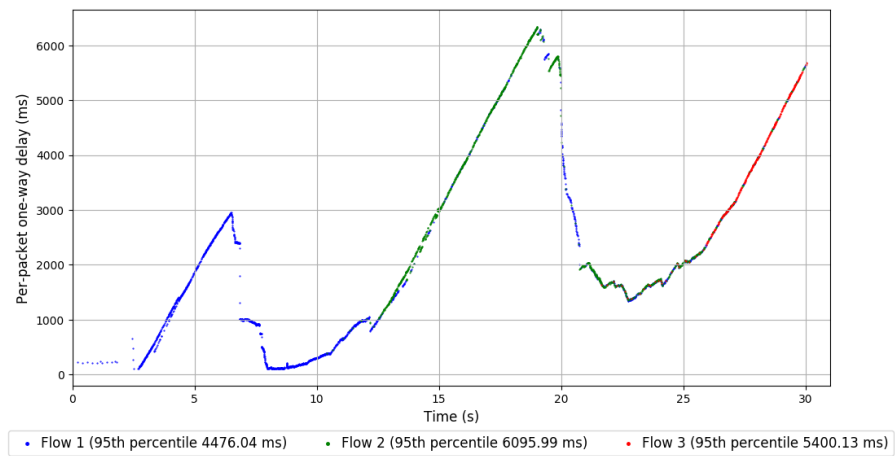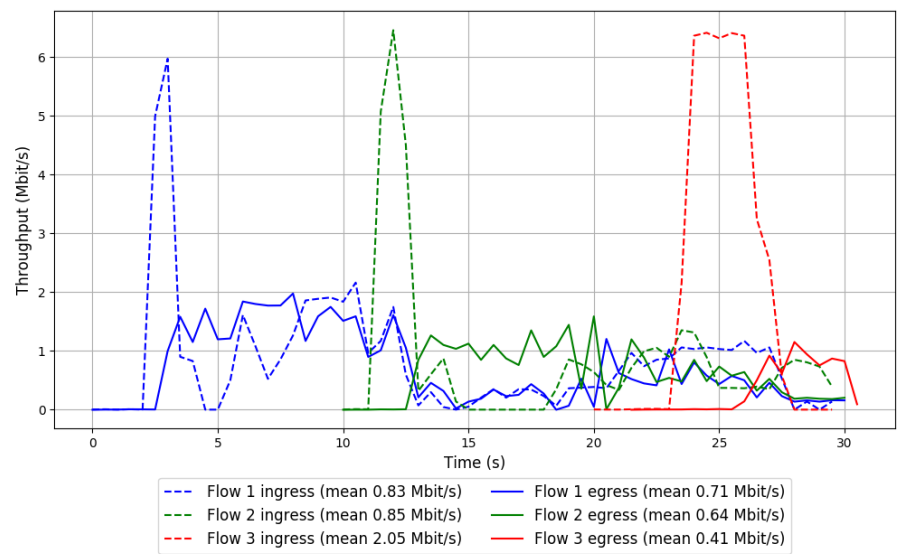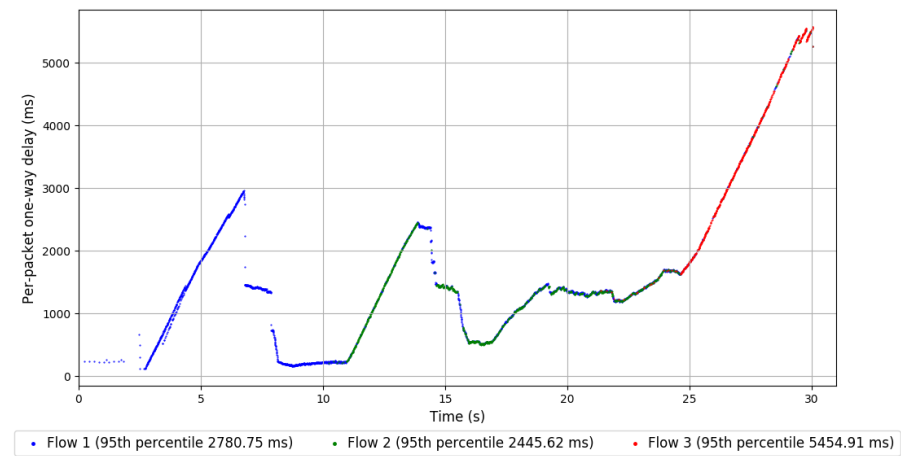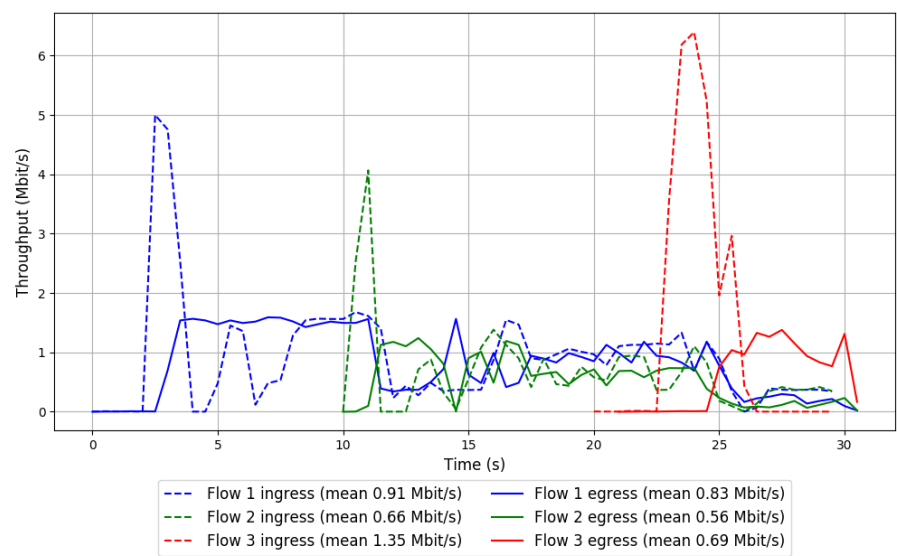
Run 1: Report of FillP-Sheep — Data Link

- - - - Flow 1 ingress (mean 0.84 Mbit/s) ——— Flow 1 egress (mean 0.72 Mbit/s)
- - - - Flow 2 ingress (mean 0.54 Mbit/s) ——— Flow 2 egress (mean 0.45 Mbit/s)
- - - - Flow 3 ingress (mean 2.67 Mbit/s) ——— Flow 3 egress (mean 0.01 Mbit/s)

• Flow 1 (95th percentile 5667.16 ms)   • Flow 2 (95th percentile 6321.32 ms)   • Flow 3 (95th percentile 4543.94 ms)

```
Run 2: Statistics of FillP-Sheep

Start at: 2019-01-02 23:00:01
End at: 2019-01-02 23:00:31
Local clock offset: -4.338 ms
Remote clock offset: -0.82 ms


# Below is generated by plot.py at 2019-01-02 23:40:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.24 Mbit/s
95th percentile per-packet one-way delay: 5715.776 ms
Loss rate: 40.44%
-- Flow 1:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 4476.042 ms
Loss rate: 15.58%
-- Flow 2:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 6095.992 ms
Loss rate: 26.17%
-- Flow 3:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 5400.132 ms
Loss rate: 82.99%
```

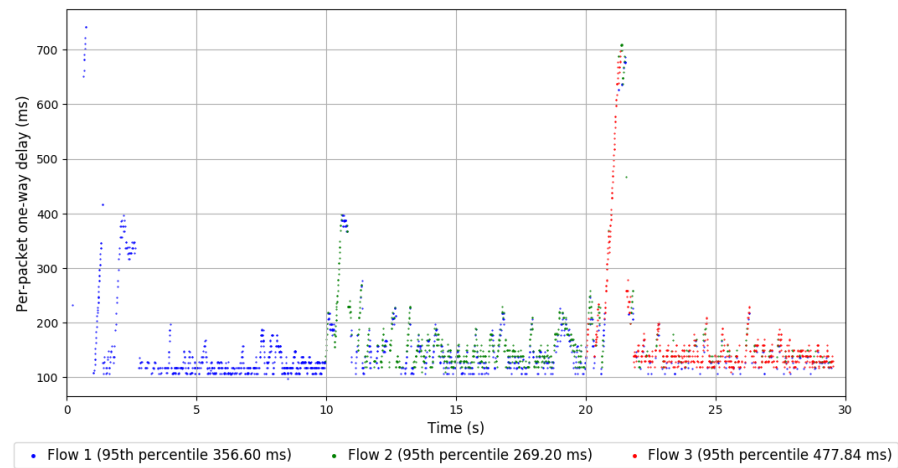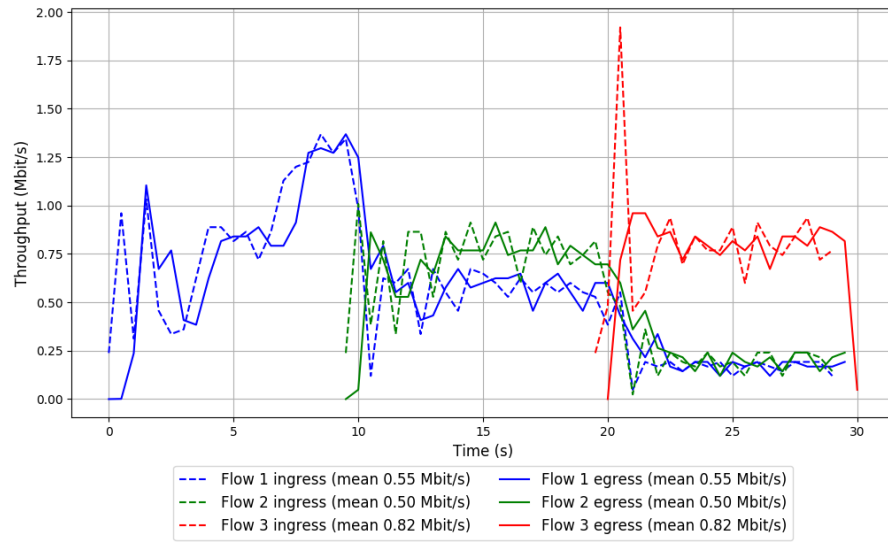## Run 2: Report of FillP-Sheep — Data Link

Flow 1 ingress (mean 0.83 Mbit/s)   Flow 1 egress (mean 0.71 Mbit/s)
Flow 2 ingress (mean 0.85 Mbit/s)   Flow 2 egress (mean 0.64 Mbit/s)
Flow 3 ingress (mean 2.05 Mbit/s)   Flow 3 egress (mean 0.41 Mbit/s)

Flow 1 (95th percentile 4476.04 ms)   Flow 2 (95th percentile 6095.99 ms)   Flow 3 (95th percentile 5400.13 ms)

```
Run 3: Statistics of FillP-Sheep

Start at: 2019-01-02 23:23:22
End at: 2019-01-02 23:23:52
Local clock offset: -9.179 ms
Remote clock offset: -0.571 ms


# Below is generated by plot.py at 2019-01-02 23:40:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.40 Mbit/s
95th percentile per-packet one-way delay: 4543.030 ms
Loss rate: 22.51%
-- Flow 1:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 2780.748 ms
Loss rate: 9.48%
-- Flow 2:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 2445.618 ms
Loss rate: 16.12%
-- Flow 3:
Average throughput: 0.69 Mbit/s
95th percentile per-packet one-way delay: 5454.906 ms
Loss rate: 55.41%
```

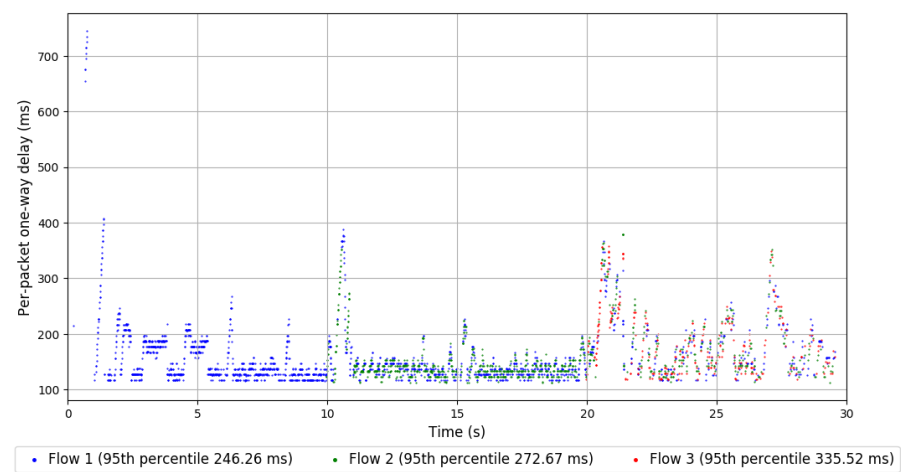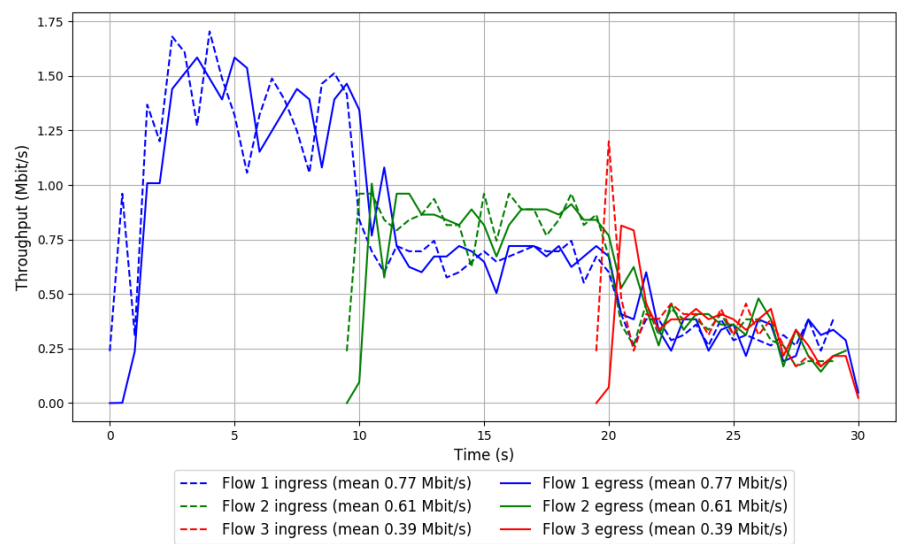## Run 3: Report of FillP-Sheep — Data Link

Flow 1 ingress (mean 0.91 Mbit/s) --- Flow 1 egress (mean 0.83 Mbit/s)
Flow 2 ingress (mean 0.66 Mbit/s) --- Flow 2 egress (mean 0.56 Mbit/s)
Flow 3 ingress (mean 1.35 Mbit/s) --- Flow 3 egress (mean 0.69 Mbit/s)

Flow 1 (95th percentile 2780.75 ms) • Flow 2 (95th percentile 2445.62 ms) • Flow 3 (95th percentile 5454.91 ms)
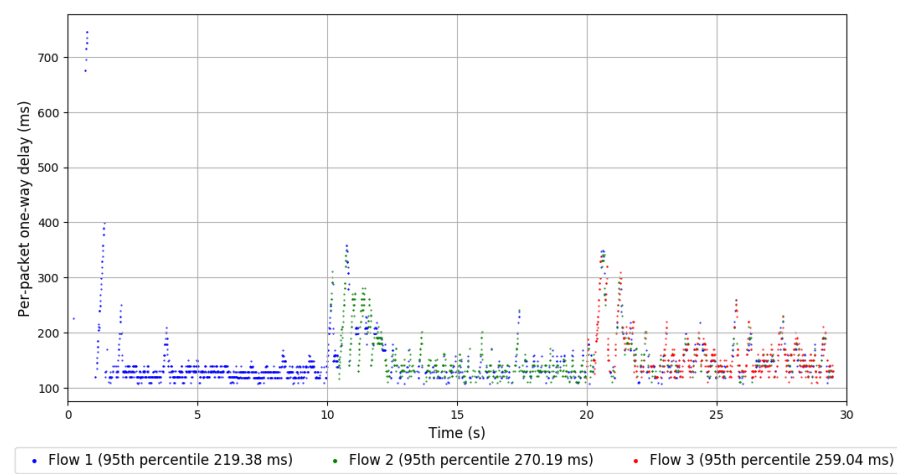
```
Run 1: Statistics of Indigo

Start at: 2019-01-02 22:35:28
End at: 2019-01-02 22:35:58
Local clock offset: -2.657 ms
Remote clock offset: 33.815 ms


# Below is generated by plot.py at 2019-01-02 23:40:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.15 Mbit/s
95th percentile per-packet one-way delay: 367.763 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 356.598 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 269.203 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 477.837 ms
Loss rate: 0.15%
```
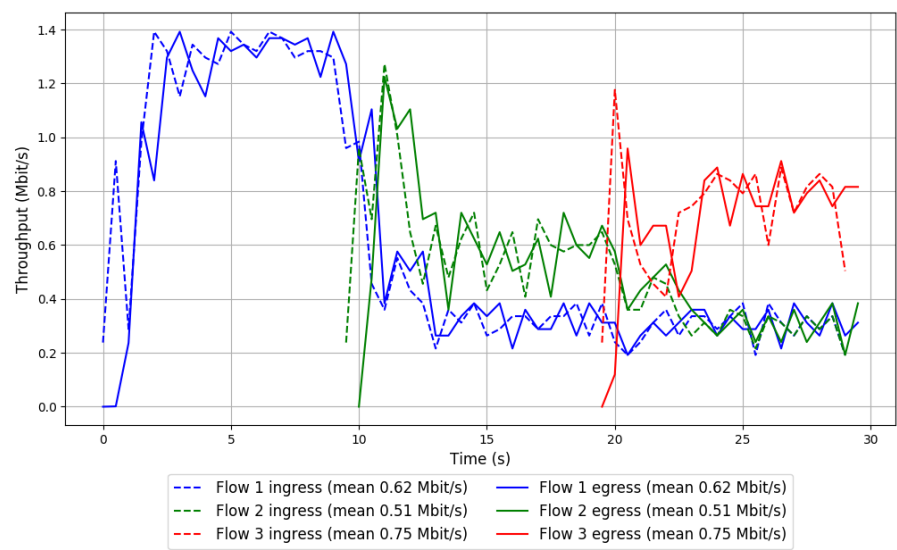
Run 1: Report of Indigo — Data Link

```
Run 2: Statistics of Indigo

Start at: 2019-01-02 22:58:47
End at: 2019-01-02 22:59:17
Local clock offset: -4.653 ms
Remote clock offset: -0.454 ms


# Below is generated by plot.py at 2019-01-02 23:40:13
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.30 Mbit/s
95th percentile per-packet one-way delay: 272.617 ms
Loss rate: 0.19%
-- Flow 1:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 246.261 ms
Loss rate: 0.21%
-- Flow 2:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 272.665 ms
Loss rate: 0.10%
-- Flow 3:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 335.522 ms
Loss rate: 0.32%
```

Run 2: Report of Indigo — Data Link

```
Run 3: Statistics of Indigo

Start at: 2019-01-02 23:22:08
End at: 2019-01-02 23:22:38
Local clock offset: -8.299 ms
Remote clock offset: -4.255 ms


# Below is generated by plot.py at 2019-01-02 23:40:14
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.21 Mbit/s
95th percentile per-packet one-way delay: 258.438 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 219.377 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 270.186 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 259.038 ms
Loss rate: 0.00%
```
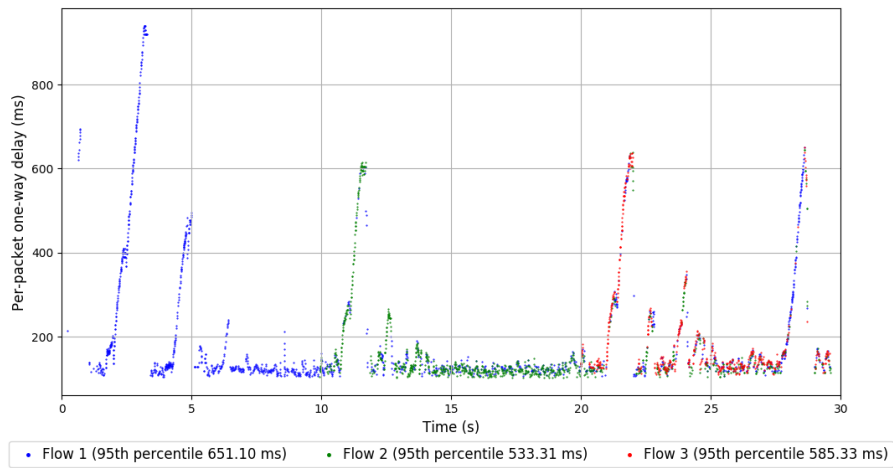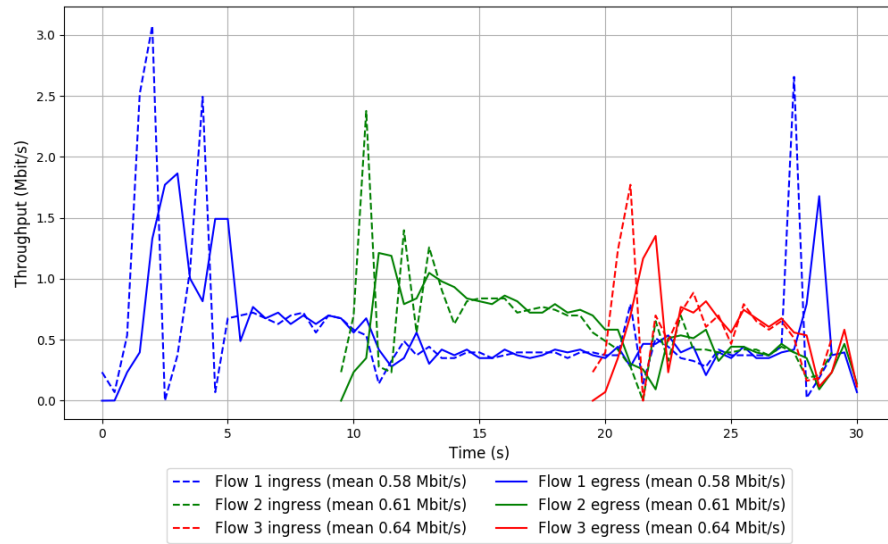
Run 3: Report of Indigo — Data Link

- Flow 1 ingress (mean 0.62 Mbit/s)
- Flow 1 egress (mean 0.62 Mbit/s)
- Flow 2 ingress (mean 0.51 Mbit/s)
- Flow 2 egress (mean 0.51 Mbit/s)
- Flow 3 ingress (mean 0.75 Mbit/s)
- Flow 3 egress (mean 0.75 Mbit/s)

- Flow 1 (95th percentile 219.38 ms)
- Flow 2 (95th percentile 270.19 ms)
- Flow 3 (95th percentile 259.04 ms)

40

```
Run 1: Statistics of Indigo-MusesD

Start at: 2019-01-02 22:46:31
End at: 2019-01-02 22:47:01
Local clock offset: -1.6 ms
Remote clock offset: 8.535 ms

# Below is generated by plot.py at 2019-01-02 23:40:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.20 Mbit/s
95th percentile per-packet one-way delay: 597.161 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 651.096 ms
Loss rate: 0.14%
-- Flow 2:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 533.313 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 585.326 ms
Loss rate: 0.00%
```
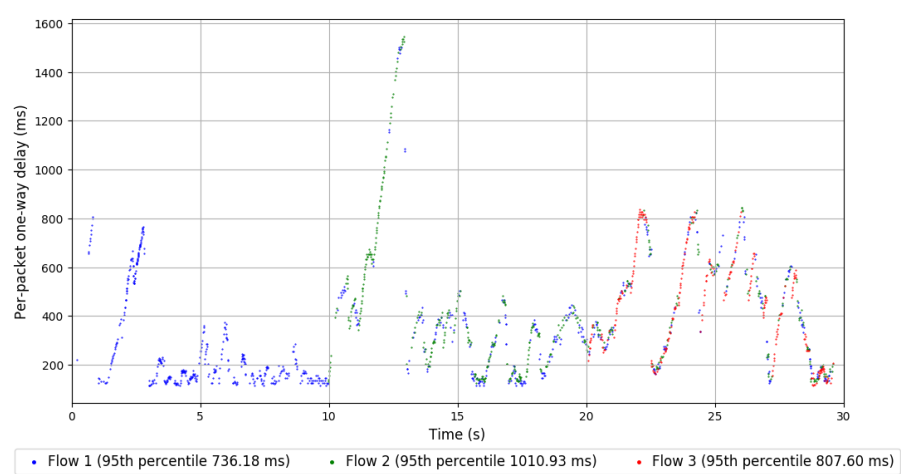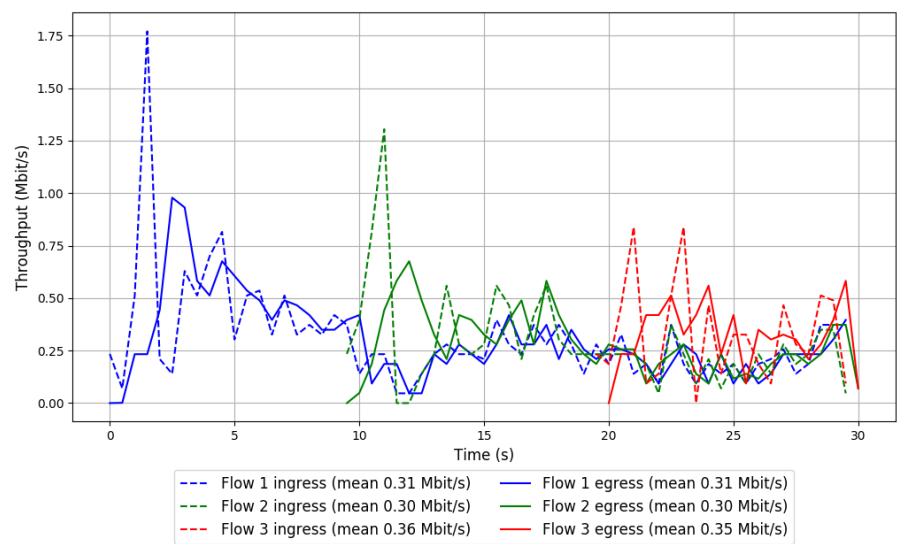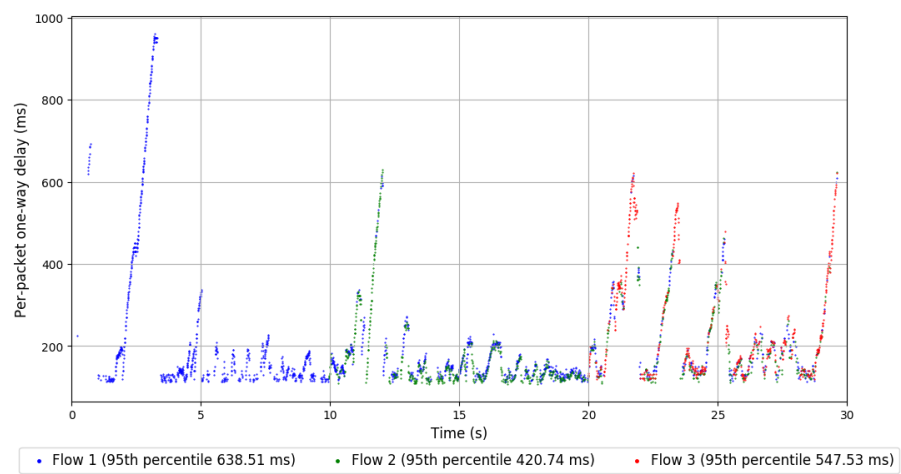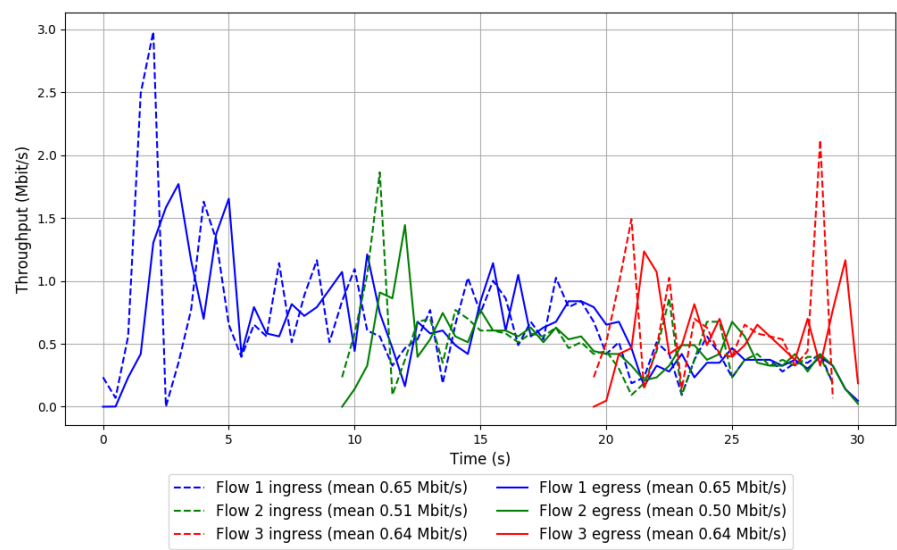
Run 1: Report of Indigo-MusesD — Data Link

```
Run 2: Statistics of Indigo-MusesD

Start at: 2019-01-02 23:09:51
End at: 2019-01-02 23:10:21
Local clock offset: -7.573 ms
Remote clock offset: 0.725 ms


# Below is generated by plot.py at 2019-01-02 23:40:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 807.215 ms
Loss rate: 1.33%
-- Flow 1:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 736.176 ms
Loss rate: 0.77%
-- Flow 2:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 1010.930 ms
Loss rate: 1.00%
-- Flow 3:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 807.599 ms
Loss rate: 3.37%
```

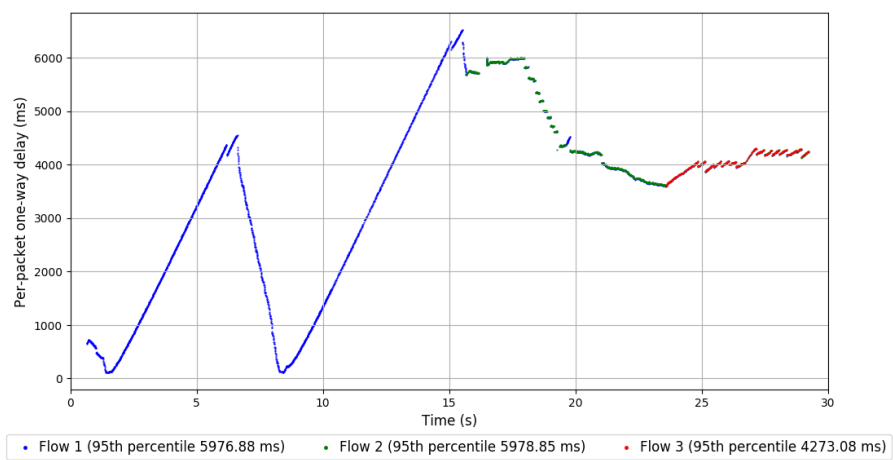Run 2: Report of Indigo-MusesD — Data Link

```
Run 3: Statistics of Indigo-MusesD

Start at: 2019-01-02 23:33:10
End at: 2019-01-02 23:33:40
Local clock offset: -4.804 ms
Remote clock offset: -1.501 ms


# Below is generated by plot.py at 2019-01-02 23:40:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.19 Mbit/s
95th percentile per-packet one-way delay: 551.458 ms
Loss rate: 0.82%
-- Flow 1:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 638.506 ms
Loss rate: 0.49%
-- Flow 2:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 420.737 ms
Loss rate: 1.05%
-- Flow 3:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 547.528 ms
Loss rate: 1.50%
```

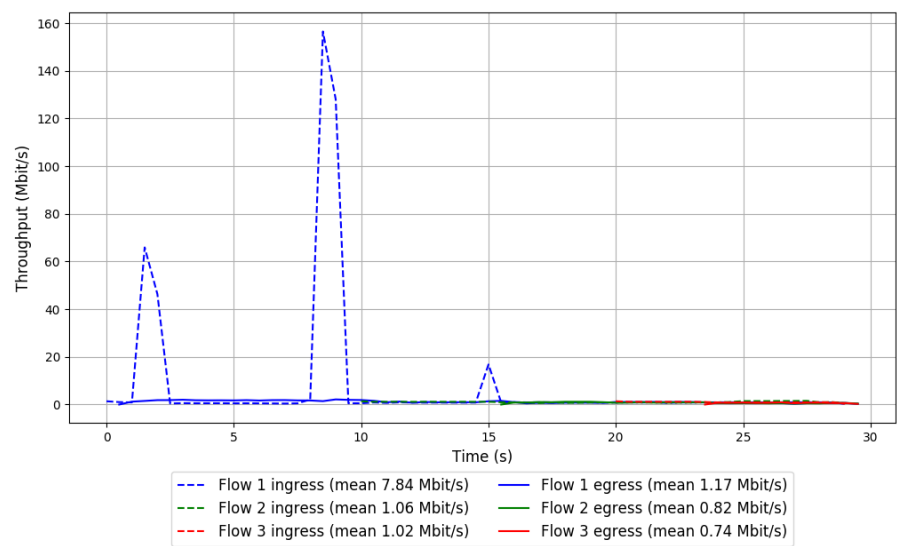# Run 3: Report of Indigo-MusesD — Data Link

```
Run 1: Statistics of Indigo-MusesT

Start at: 2019-01-02 22:39:09
End at: 2019-01-02 22:39:39
Local clock offset: -2.49 ms
Remote clock offset: 23.892 ms


# Below is generated by plot.py at 2019-01-02 23:40:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.70 Mbit/s
95th percentile per-packet one-way delay: 5972.030 ms
Loss rate: 81.16%
-- Flow 1:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 5976.884 ms
Loss rate: 85.38%
-- Flow 2:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 5978.846 ms
Loss rate: 45.32%
-- Flow 3:
Average throughput: 0.74 Mbit/s
95th percentile per-packet one-way delay: 4273.082 ms
Loss rate: 55.32%
```
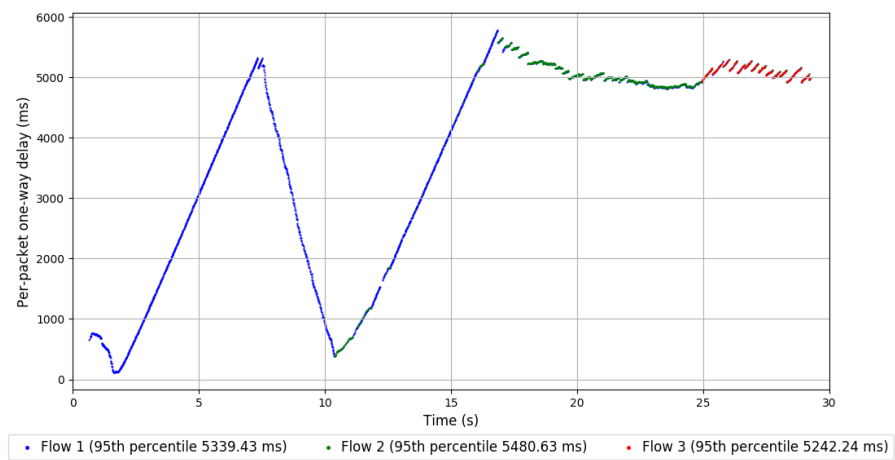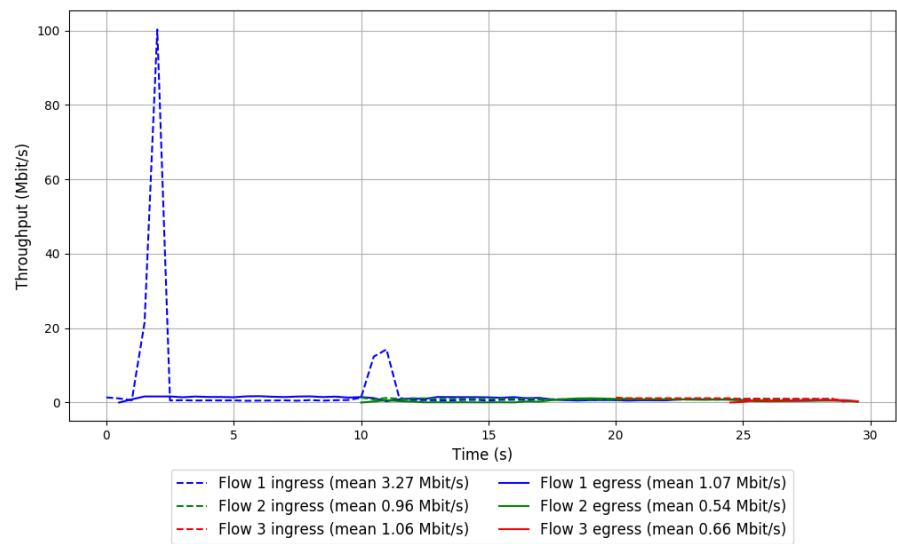
Run 1: Report of Indigo-MusesT — Data Link

```
Run 2: Statistics of Indigo-MusesT

Start at: 2019-01-02 23:02:29
End at: 2019-01-02 23:02:59
Local clock offset: -5.94 ms
Remote clock offset: -1.6 ms


# Below is generated by plot.py at 2019-01-02 23:40:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.52 Mbit/s
95th percentile per-packet one-way delay: 5377.544 ms
Loss rate: 64.79%
-- Flow 1:
Average throughput: 1.07 Mbit/s
95th percentile per-packet one-way delay: 5339.427 ms
Loss rate: 68.07%
-- Flow 2:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 5480.629 ms
Loss rate: 44.58%
-- Flow 3:
Average throughput: 0.66 Mbit/s
95th percentile per-packet one-way delay: 5242.237 ms
Loss rate: 70.91%
```

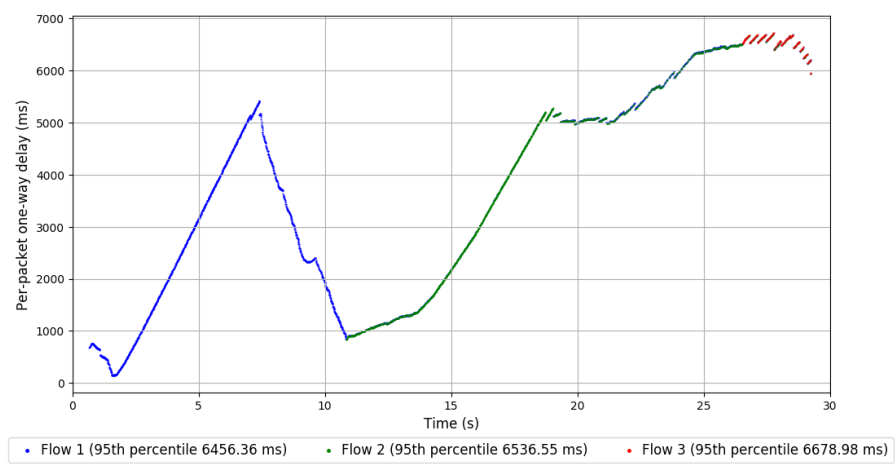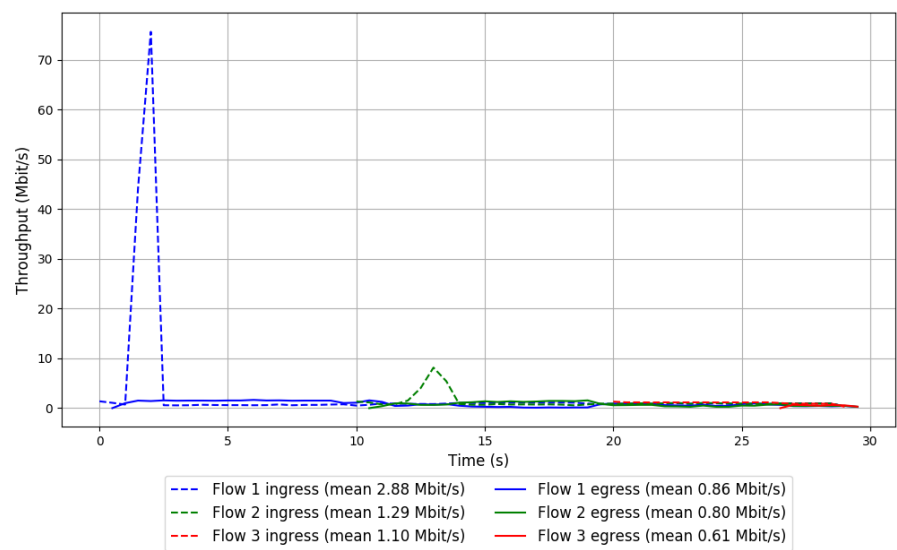Run 2: Report of Indigo-MusesT — Data Link

```
Run 3: Statistics of Indigo-MusesT

Start at: 2019-01-02 23:25:49
End at: 2019-01-02 23:26:19
Local clock offset: -8.245 ms
Remote clock offset: -4.517 ms


# Below is generated by plot.py at 2019-01-02 23:40:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.43 Mbit/s
95th percentile per-packet one-way delay: 6560.387 ms
Loss rate: 65.47%
-- Flow 1:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 6456.360 ms
Loss rate: 70.74%
-- Flow 2:
Average throughput: 0.80 Mbit/s
95th percentile per-packet one-way delay: 6536.554 ms
Loss rate: 40.08%
-- Flow 3:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 6678.978 ms
Loss rate: 83.74%
```
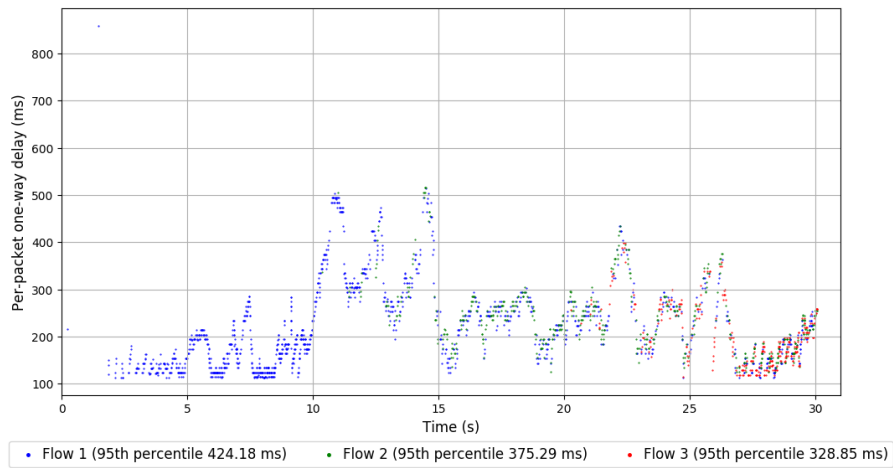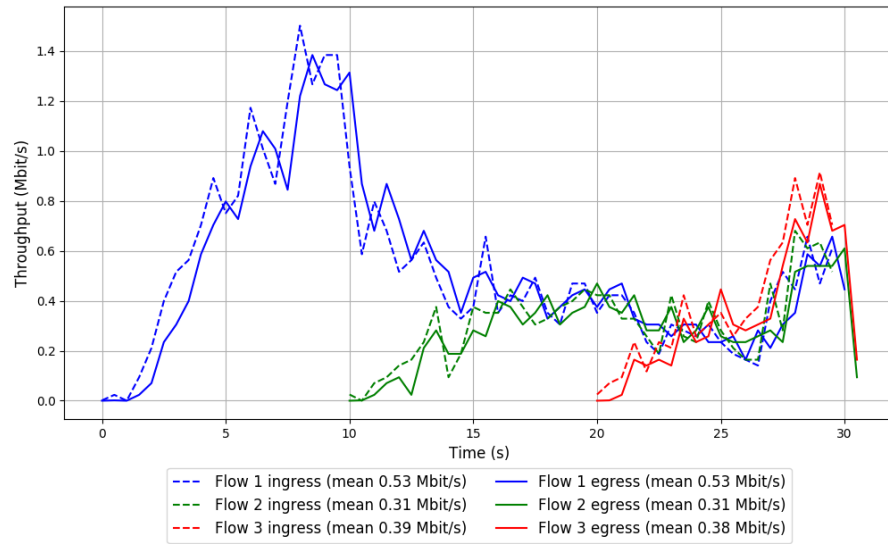
Run 3: Report of Indigo-MusesT — Data Link

Flow 1 ingress (mean 2.88 Mbit/s) --- Flow 1 egress (mean 0.86 Mbit/s)
Flow 2 ingress (mean 1.29 Mbit/s) --- Flow 2 egress (mean 0.80 Mbit/s)
Flow 3 ingress (mean 1.10 Mbit/s) --- Flow 3 egress (mean 0.61 Mbit/s)

• Flow 1 (95th percentile 6456.36 ms)   • Flow 2 (95th percentile 6536.55 ms)   • Flow 3 (95th percentile 6678.98 ms)

```
Run 1: Statistics of LEDBAT

Start at: 2019-01-02 22:30:32
End at: 2019-01-02 22:31:02
Local clock offset: -2.182 ms
Remote clock offset: 29.422 ms

# Below is generated by plot.py at 2019-01-02 23:40:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 385.318 ms
Loss rate: 1.13%
-- Flow 1:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 424.178 ms
Loss rate: 0.66%
-- Flow 2:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 375.289 ms
Loss rate: 0.95%
-- Flow 3:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 328.853 ms
Loss rate: 3.35%
```
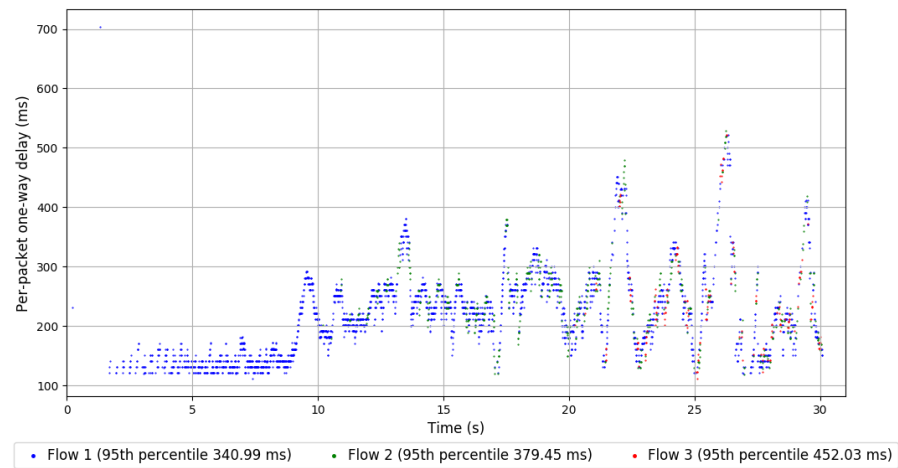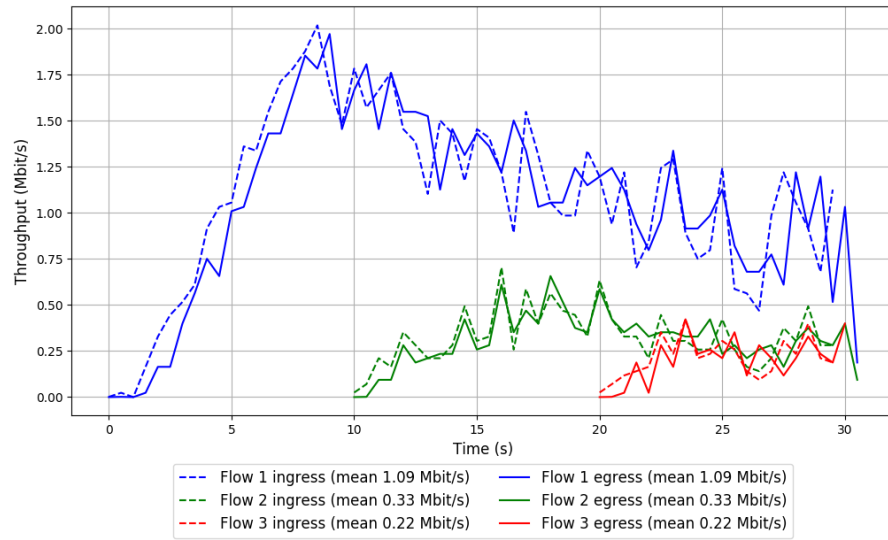
Run 1: Report of LEDBAT — Data Link

```
Run 2: Statistics of LEDBAT

Start at: 2019-01-02 22:53:53
End at: 2019-01-02 22:54:23
Local clock offset: -2.218 ms
Remote clock offset: 5.383 ms


# Below is generated by plot.py at 2019-01-02 23:40:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.39 Mbit/s
95th percentile per-packet one-way delay: 351.081 ms
Loss rate: 0.40%
-- Flow 1:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 340.985 ms
Loss rate: 0.46%
-- Flow 2:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 379.454 ms
Loss rate: 0.18%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 452.031 ms
Loss rate: 0.00%
```

Run 2: Report of LEDBAT — Data Link

```
Run 3: Statistics of LEDBAT

Start at: 2019-01-02 23:17:14
End at: 2019-01-02 23:17:44
Local clock offset: -8.57 ms
Remote clock offset: 0.006 ms


# Below is generated by plot.py at 2019-01-02 23:40:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.26 Mbit/s
95th percentile per-packet one-way delay: 304.988 ms
Loss rate: 0.65%
-- Flow 1:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 304.577 ms
Loss rate: 0.21%
-- Flow 2:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 329.573 ms
Loss rate: 0.41%
-- Flow 3:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 307.053 ms
Loss rate: 4.52%
```
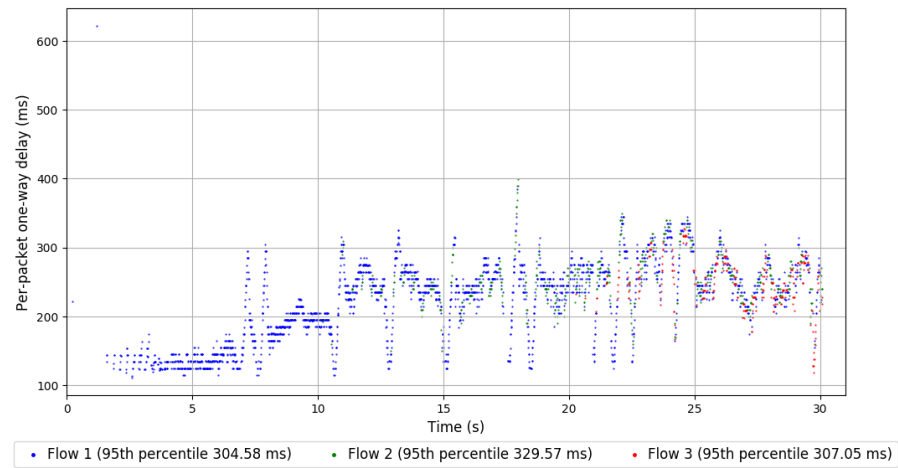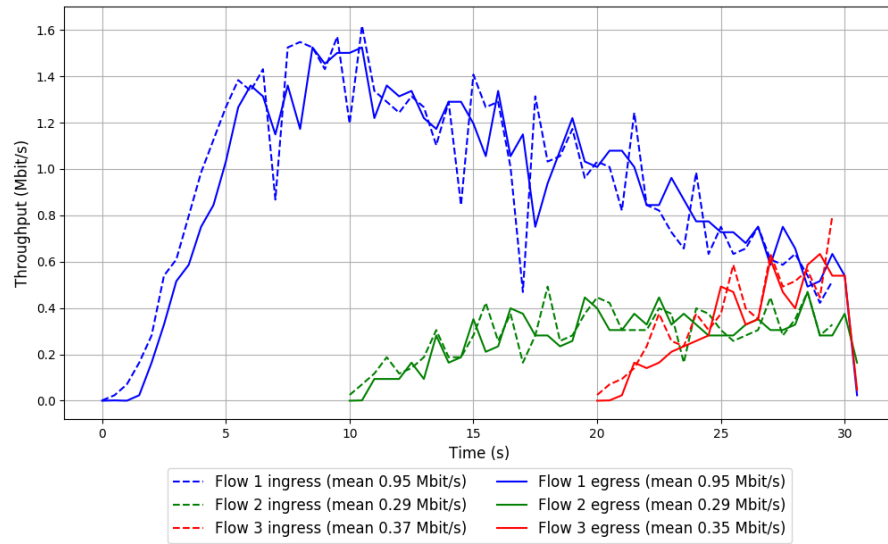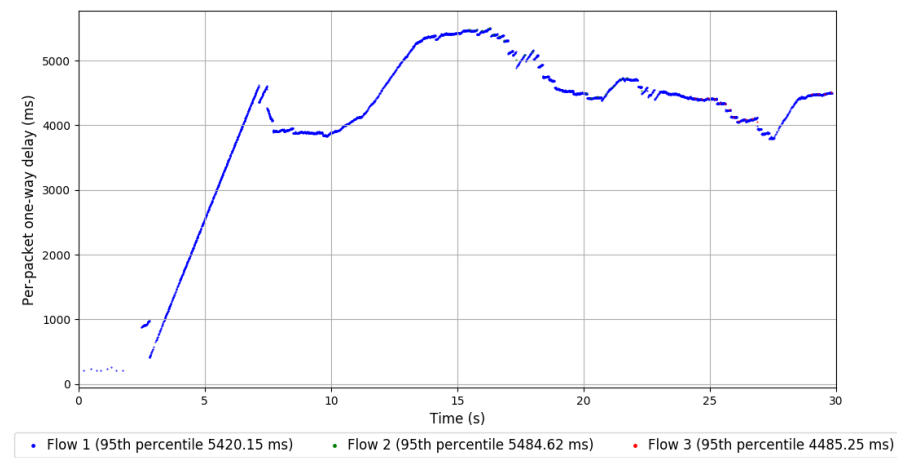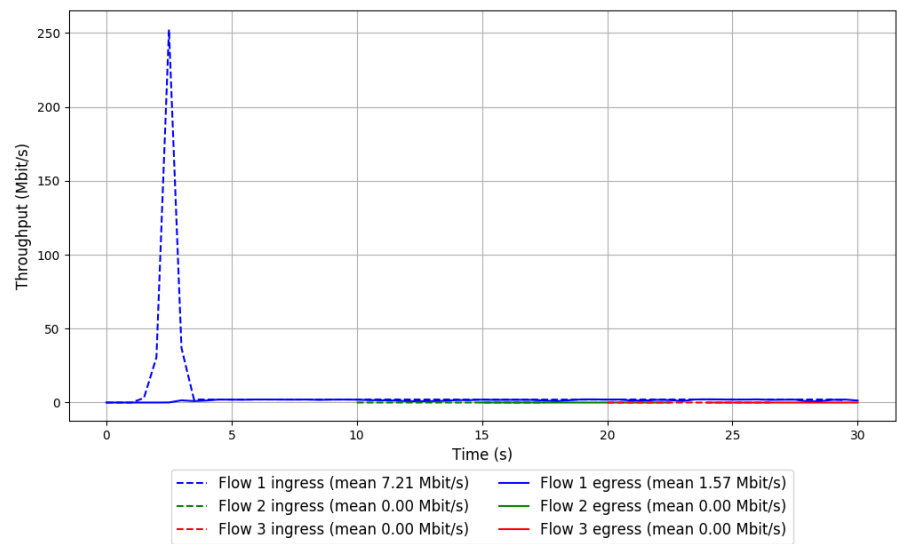
Run 3: Report of LEDBAT — Data Link

Flow 1 ingress (mean 0.95 Mbit/s) — — — — Flow 1 egress (mean 0.95 Mbit/s)
Flow 2 ingress (mean 0.29 Mbit/s) — — — — Flow 2 egress (mean 0.29 Mbit/s)
Flow 3 ingress (mean 0.37 Mbit/s) — — — — Flow 3 egress (mean 0.35 Mbit/s)

Flow 1 (95th percentile 304.58 ms)   Flow 2 (95th percentile 329.57 ms)   Flow 3 (95th percentile 307.05 ms)

58

```
Run 1: Statistics of PCC-Allegro

Start at: 2019-01-02 22:42:50
End at: 2019-01-02 22:43:20
Local clock offset: -1.698 ms
Remote clock offset: 14.309 ms


# Below is generated by plot.py at 2019-01-02 23:40:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.57 Mbit/s
95th percentile per-packet one-way delay: 5420.572 ms
Loss rate: 78.42%
-- Flow 1:
Average throughput: 1.57 Mbit/s
95th percentile per-packet one-way delay: 5420.146 ms
Loss rate: 78.43%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5484.625 ms
Loss rate: 9.20%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 4485.253 ms
Loss rate: 22.41%
```
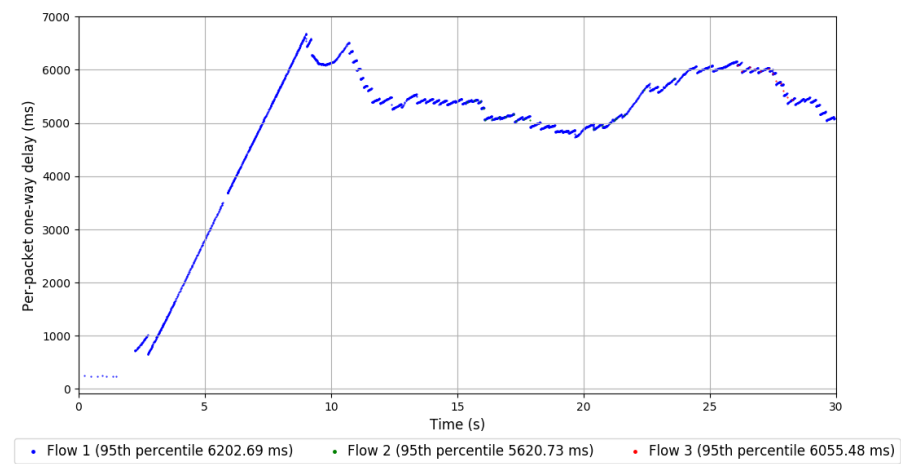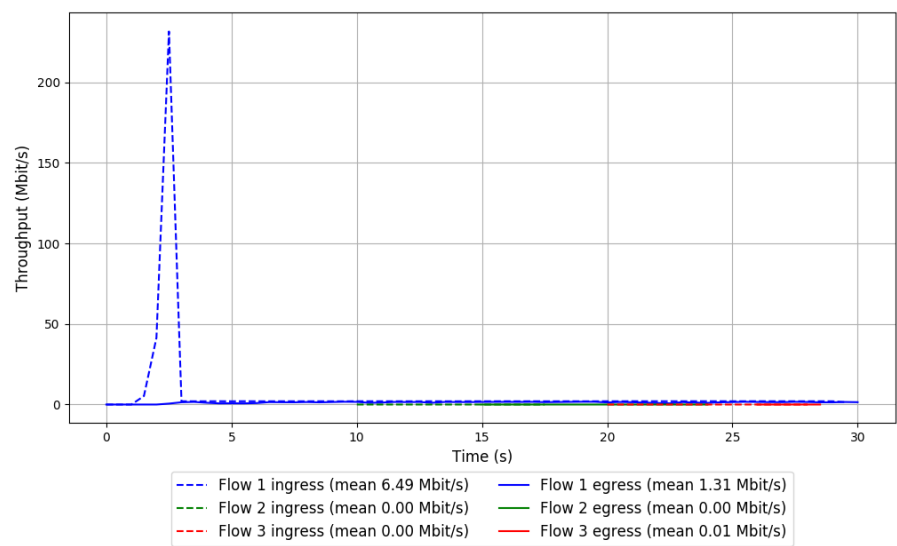
Run 1: Report of PCC-Allegro — Data Link

Flow 1 ingress (mean 7.21 Mbit/s)   Flow 1 egress (mean 1.57 Mbit/s)
Flow 2 ingress (mean 0.00 Mbit/s)   Flow 2 egress (mean 0.00 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s)   Flow 3 egress (mean 0.00 Mbit/s)

• Flow 1 (95th percentile 5420.15 ms)   • Flow 2 (95th percentile 5484.62 ms)   • Flow 3 (95th percentile 4485.25 ms)

```
Run 2: Statistics of PCC-Allegro

Start at: 2019-01-02 23:06:10
End at: 2019-01-02 23:06:40
Local clock offset: -6.173 ms
Remote clock offset: 1.355 ms


# Below is generated by plot.py at 2019-01-02 23:40:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 6200.671 ms
Loss rate: 79.87%
-- Flow 1:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 6202.694 ms
Loss rate: 79.88%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5620.731 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 6055.479 ms
Loss rate: 44.83%
```

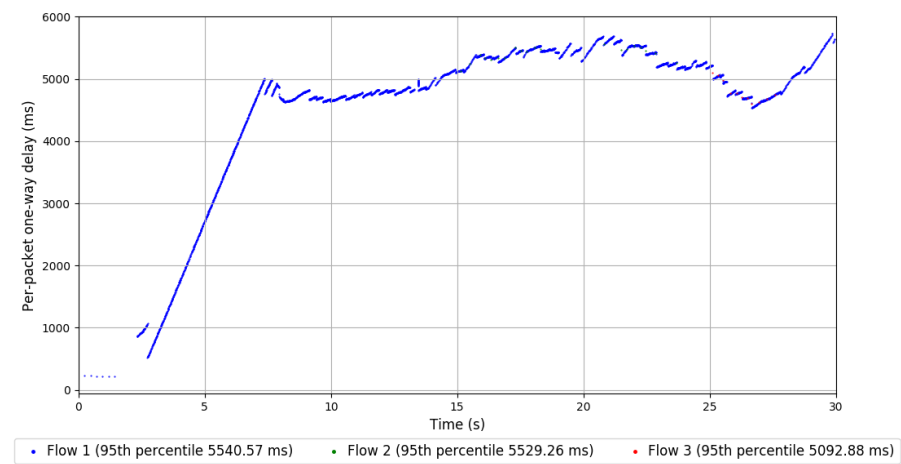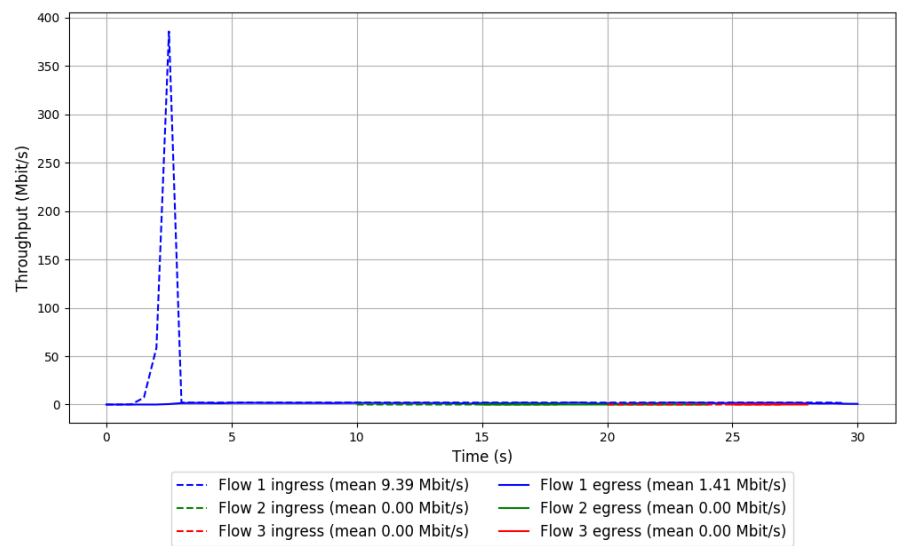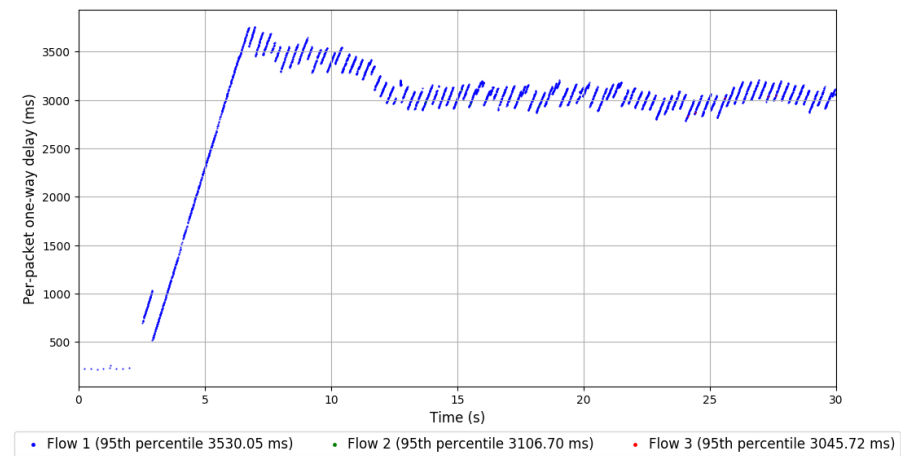Run 2: Report of PCC-Allegro — Data Link

- - - Flow 1 ingress (mean 6.49 Mbit/s) ——— Flow 1 egress (mean 1.31 Mbit/s)
- - - Flow 2 ingress (mean 0.00 Mbit/s) ——— Flow 2 egress (mean 0.00 Mbit/s)
- - - Flow 3 ingress (mean 0.00 Mbit/s) ——— Flow 3 egress (mean 0.01 Mbit/s)

• Flow 1 (95th percentile 6202.69 ms)　　• Flow 2 (95th percentile 5620.73 ms)　　• Flow 3 (95th percentile 6055.48 ms)

```
Run 3: Statistics of PCC-Allegro

Start at: 2019-01-02 23:29:30
End at: 2019-01-02 23:30:00
Local clock offset: -6.163 ms
Remote clock offset: -4.689 ms


# Below is generated by plot.py at 2019-01-02 23:40:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 5540.566 ms
Loss rate: 85.09%
-- Flow 1:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 5540.566 ms
Loss rate: 85.10%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5529.260 ms
Loss rate: 5.31%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5092.878 ms
Loss rate: 49.43%
```

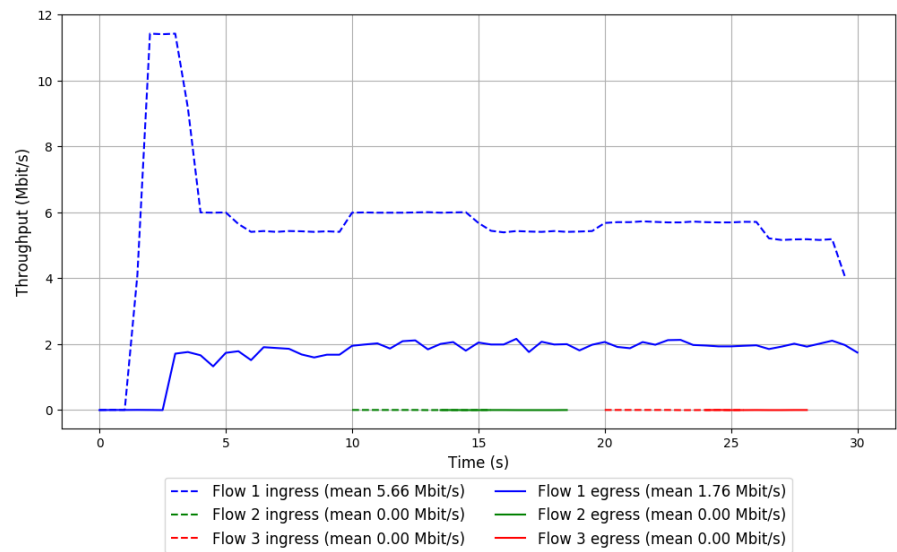## Run 3: Report of PCC-Allegro — Data Link

```
Run 1: Statistics of PCC-Expr

Start at: 2019-01-02 22:51:26
End at: 2019-01-02 22:51:56
Local clock offset: -1.455 ms
Remote clock offset: 3.642 ms


# Below is generated by plot.py at 2019-01-02 23:40:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.76 Mbit/s
95th percentile per-packet one-way delay: 3530.045 ms
Loss rate: 69.01%
-- Flow 1:
Average throughput: 1.76 Mbit/s
95th percentile per-packet one-way delay: 3530.045 ms
Loss rate: 69.01%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 3106.703 ms
Loss rate: 73.05%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 3045.724 ms
Loss rate: 65.27%
```
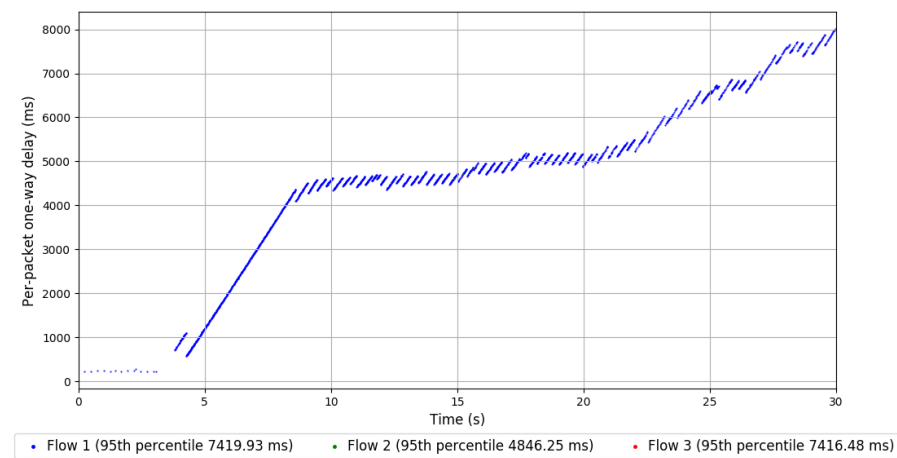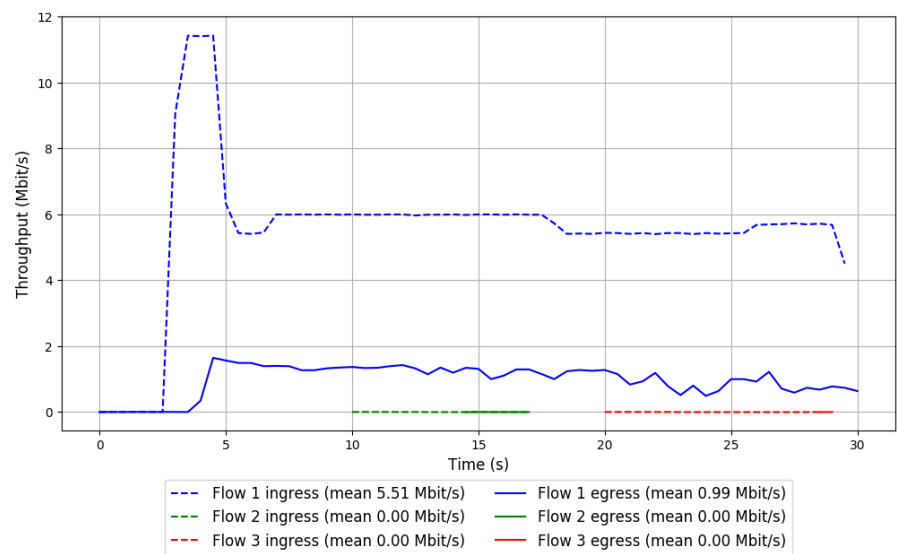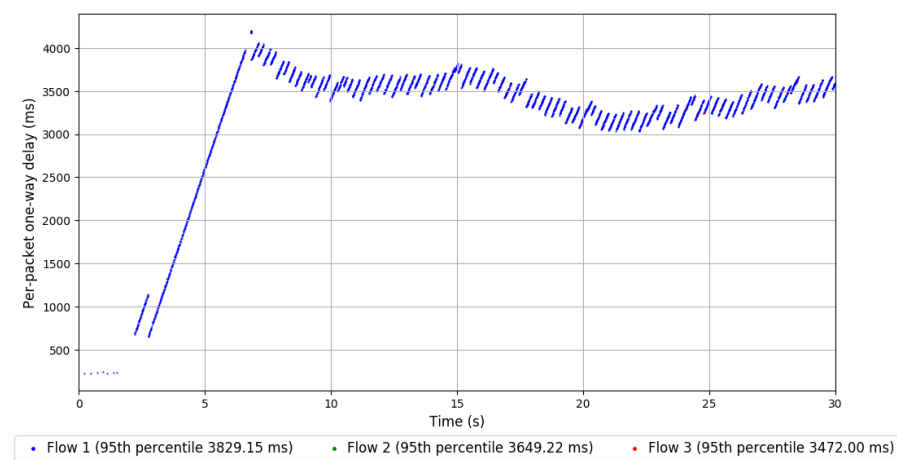
Run 1: Report of PCC-Expr — Data Link

Flow 1 ingress (mean 5.66 Mbit/s)   Flow 1 egress (mean 1.76 Mbit/s)
Flow 2 ingress (mean 0.00 Mbit/s)   Flow 2 egress (mean 0.00 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s)   Flow 3 egress (mean 0.00 Mbit/s)

• Flow 1 (95th percentile 3530.05 ms)   • Flow 2 (95th percentile 3106.70 ms)   • Flow 3 (95th percentile 3045.72 ms)

```
Run 2: Statistics of PCC-Expr

Start at: 2019-01-02 23:14:47
End at: 2019-01-02 23:15:17
Local clock offset: -8.281 ms
Remote clock offset: 0.18 ms


# Below is generated by plot.py at 2019-01-02 23:40:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 7419.932 ms
Loss rate: 82.14%
-- Flow 1:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 7419.932 ms
Loss rate: 82.14%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 4846.251 ms
Loss rate: 76.30%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 7416.476 ms
Loss rate: 92.43%
```
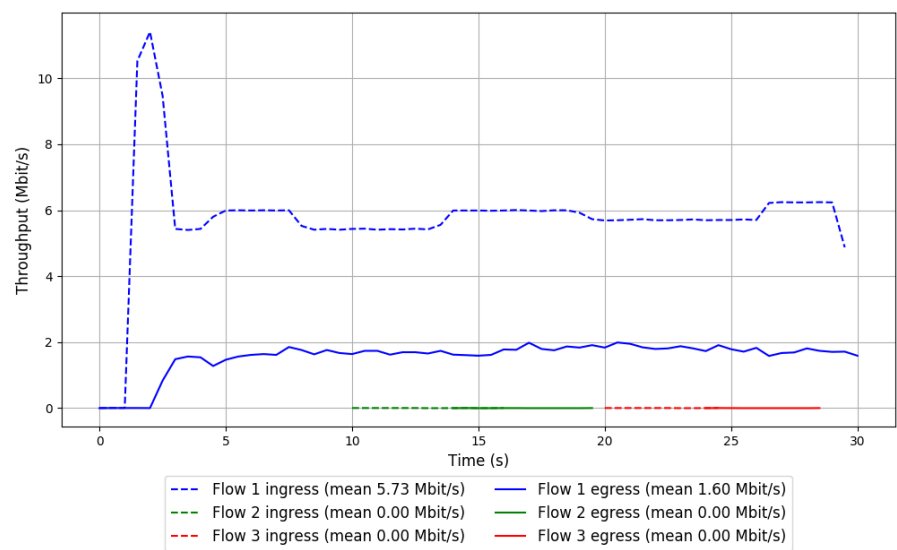
Run 2: Report of PCC-Expr — Data Link

Flow 1 ingress (mean 5.51 Mbit/s)   Flow 1 egress (mean 0.99 Mbit/s)
Flow 2 ingress (mean 0.00 Mbit/s)   Flow 2 egress (mean 0.00 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s)   Flow 3 egress (mean 0.00 Mbit/s)

Flow 1 (95th percentile 7419.93 ms)   Flow 2 (95th percentile 4846.25 ms)   Flow 3 (95th percentile 7416.48 ms)

```
Run 3: Statistics of PCC-Expr

Start at: 2019-01-02 23:38:05
End at: 2019-01-02 23:38:35
Local clock offset: -3.663 ms
Remote clock offset: -5.377 ms


# Below is generated by plot.py at 2019-01-02 23:40:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.60 Mbit/s
95th percentile per-packet one-way delay: 3828.533 ms
Loss rate: 72.19%
-- Flow 1:
Average throughput: 1.60 Mbit/s
95th percentile per-packet one-way delay: 3829.150 ms
Loss rate: 72.19%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 3649.216 ms
Loss rate: 69.07%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 3471.999 ms
Loss rate: 73.05%
```
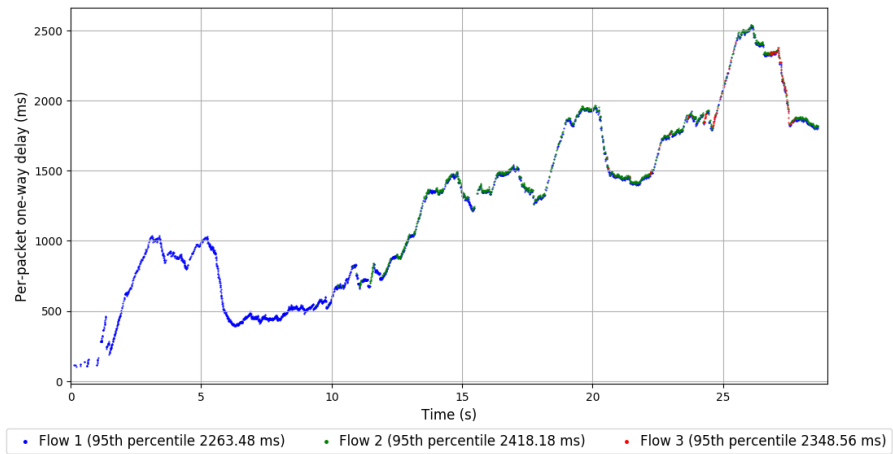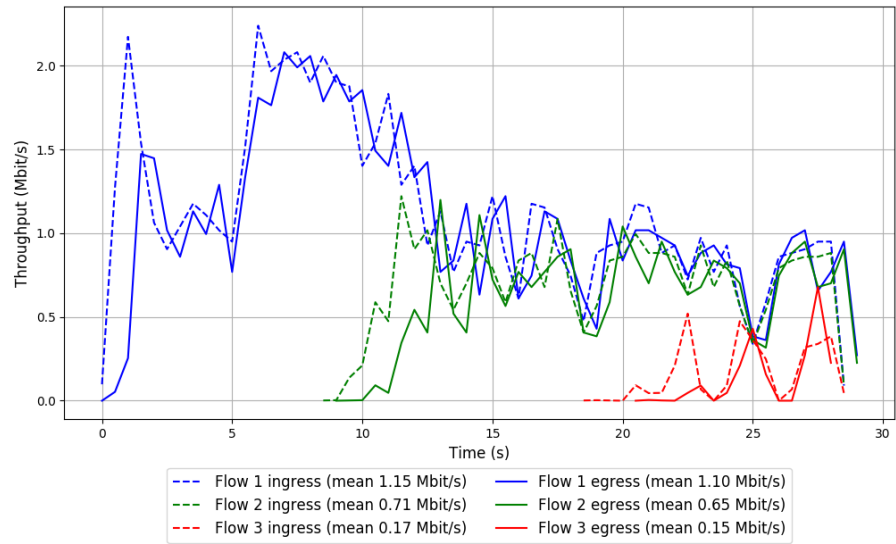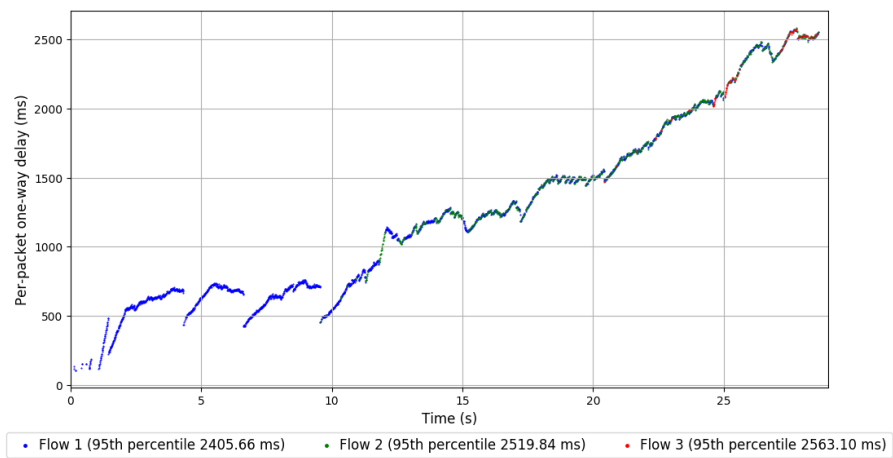
Run 3: Report of PCC-Expr — Data Link

Flow 1 ingress (mean 5.73 Mbit/s) --- Flow 1 egress (mean 1.60 Mbit/s)
Flow 2 ingress (mean 0.00 Mbit/s) --- Flow 2 egress (mean 0.00 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s) --- Flow 3 egress (mean 0.00 Mbit/s)

Flow 1 (95th percentile 3829.15 ms)   Flow 2 (95th percentile 3649.22 ms)   Flow 3 (95th percentile 3472.00 ms)
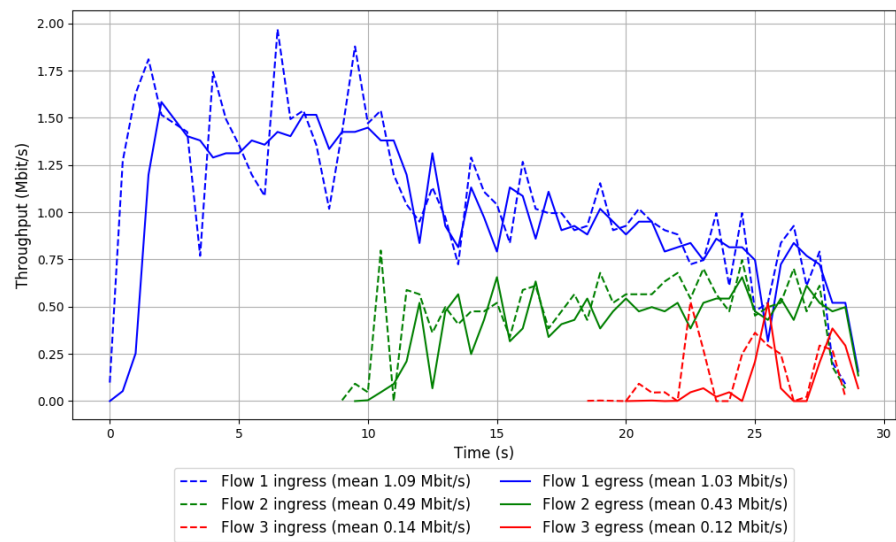
```
Run 1: Statistics of QUIC Cubic

Start at: 2019-01-02 22:50:12
End at: 2019-01-02 22:50:42
Local clock offset: -2.224 ms
Remote clock offset: 8.378 ms


# Below is generated by plot.py at 2019-01-02 23:40:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.57 Mbit/s
95th percentile per-packet one-way delay: 2343.274 ms
Loss rate: 7.56%
-- Flow 1:
Average throughput: 1.10 Mbit/s
95th percentile per-packet one-way delay: 2263.478 ms
Loss rate: 4.86%
-- Flow 2:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 2418.179 ms
Loss rate: 10.65%
-- Flow 3:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 2348.560 ms
Loss rate: 34.81%
```

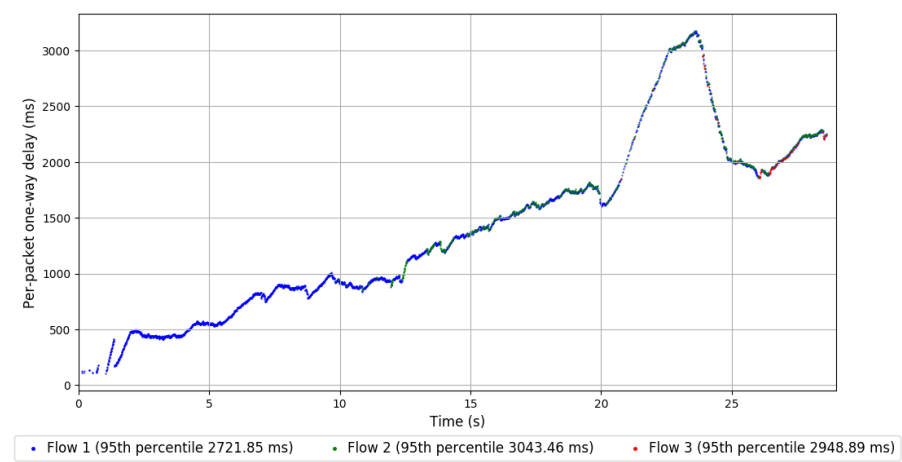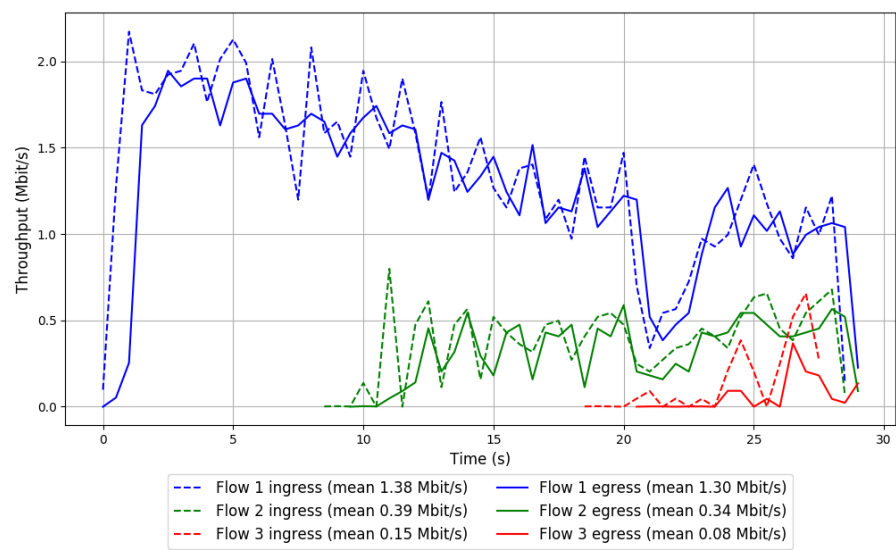# Run 1: Report of QUIC Cubic — Data Link

```
Run 2: Statistics of QUIC Cubic

Start at: 2019-01-02 23:13:33
End at: 2019-01-02 23:14:04
Local clock offset: -7.362 ms
Remote clock offset: -3.372 ms

# Below is generated by plot.py at 2019-01-02 23:40:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.36 Mbit/s
95th percentile per-packet one-way delay: 2462.782 ms
Loss rate: 7.87%
-- Flow 1:
Average throughput: 1.03 Mbit/s
95th percentile per-packet one-way delay: 2405.660 ms
Loss rate: 5.34%
-- Flow 2:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 2519.842 ms
Loss rate: 13.00%
-- Flow 3:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 2563.103 ms
Loss rate: 29.60%
```

Run 2: Report of QUIC Cubic — Data Link

```
Run 3: Statistics of QUIC Cubic

Start at: 2019-01-02 23:36:52
End at: 2019-01-02 23:37:22
Local clock offset: -3.912 ms
Remote clock offset: -1.734 ms


# Below is generated by plot.py at 2019-01-02 23:40:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 2948.895 ms
Loss rate: 8.88%
-- Flow 1:
Average throughput: 1.30 Mbit/s
95th percentile per-packet one-way delay: 2721.850 ms
Loss rate: 5.88%
-- Flow 2:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 3043.458 ms
Loss rate: 15.79%
-- Flow 3:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 2948.895 ms
Loss rate: 56.37%
```
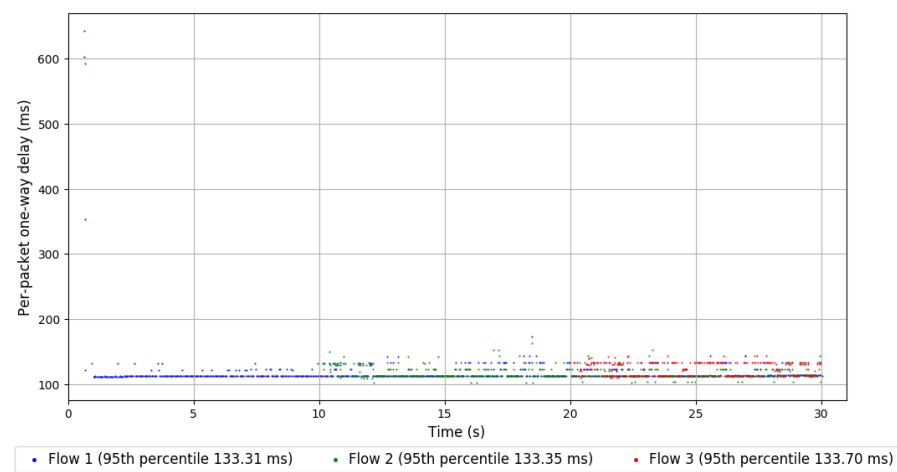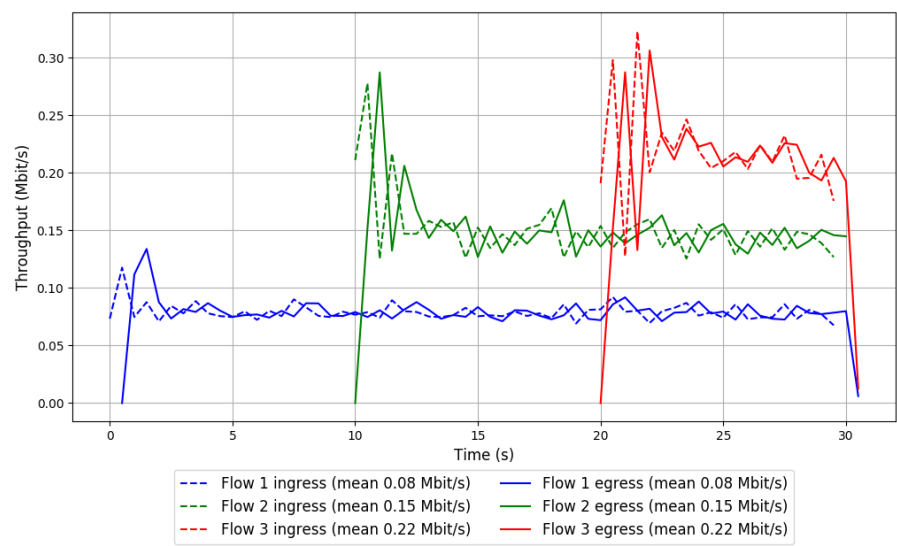
Run 3: Report of QUIC Cubic — Data Link

- - - Flow 1 ingress (mean 1.38 Mbit/s) —— Flow 1 egress (mean 1.30 Mbit/s)
- - - Flow 2 ingress (mean 0.39 Mbit/s) —— Flow 2 egress (mean 0.34 Mbit/s)
- - - Flow 3 ingress (mean 0.15 Mbit/s) —— Flow 3 egress (mean 0.08 Mbit/s)

• Flow 1 (95th percentile 2721.85 ms)   • Flow 2 (95th percentile 3043.46 ms)   • Flow 3 (95th percentile 2948.89 ms)
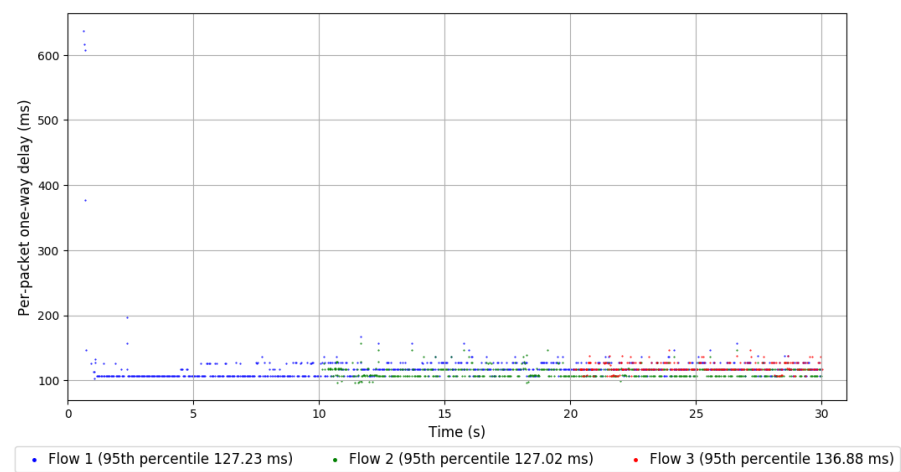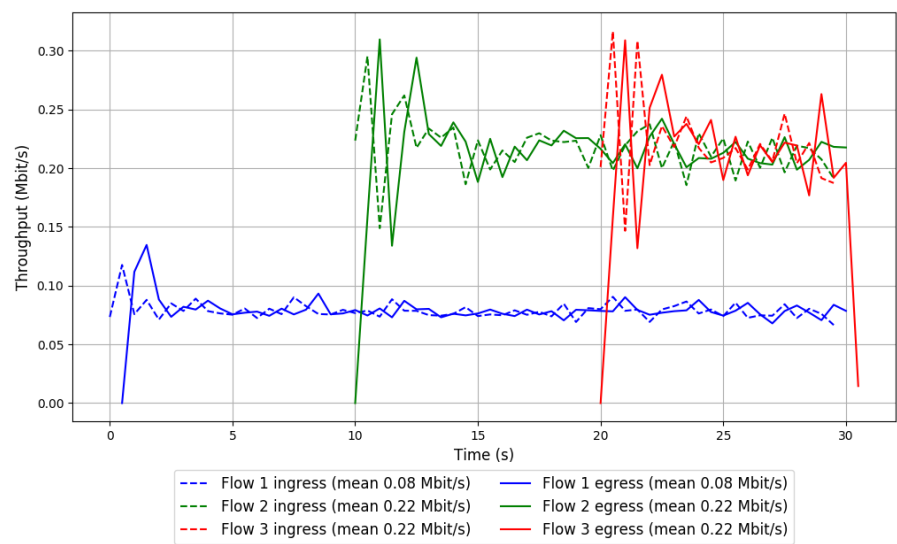
```
Run 1: Statistics of SCReAM

Start at: 2019-01-02 22:40:23
End at: 2019-01-02 22:40:53
Local clock offset: -2.513 ms
Remote clock offset: 24.09 ms


# Below is generated by plot.py at 2019-01-02 23:40:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 133.452 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 133.310 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 133.351 ms
Loss rate: 0.18%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 133.704 ms
Loss rate: 0.29%
```

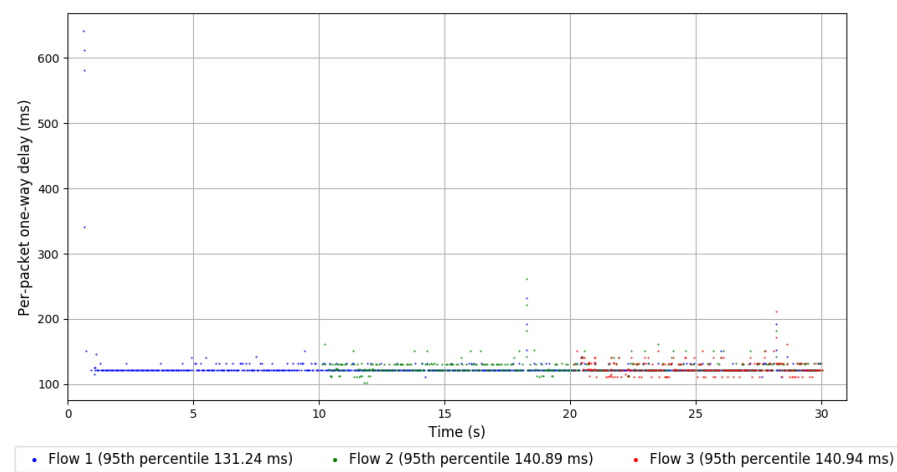Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2019-01-02 23:03:43
End at: 2019-01-02 23:04:13
Local clock offset: -5.514 ms
Remote clock offset: -1.914 ms


# Below is generated by plot.py at 2019-01-02 23:40:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 127.678 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 127.233 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 127.023 ms
Loss rate: 0.19%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 136.885 ms
Loss rate: 0.33%
```

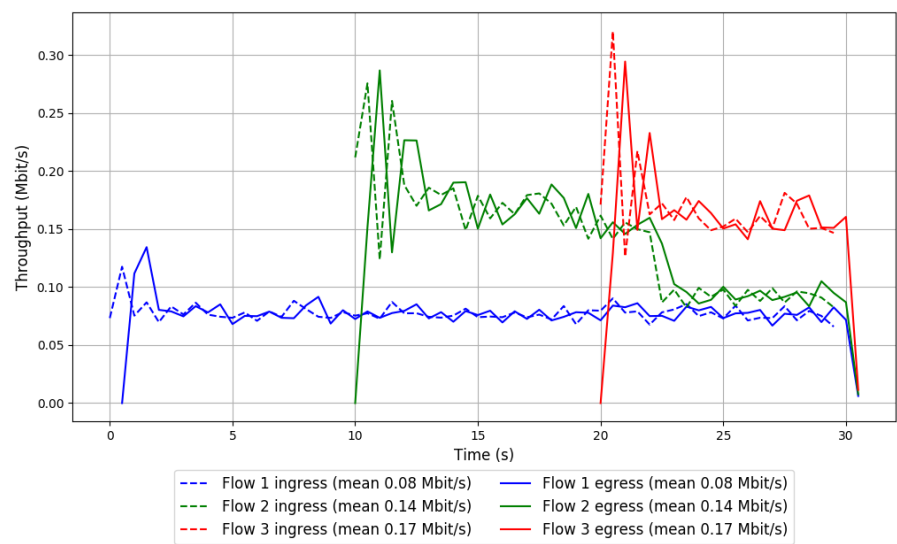# Run 2: Report of SCReAM — Data Link

```
Run 3: Statistics of SCReAM

Start at: 2019-01-02 23:27:03
End at: 2019-01-02 23:27:33
Local clock offset: -6.751 ms
Remote clock offset: -0.941 ms


# Below is generated by plot.py at 2019-01-02 23:40:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 140.728 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 131.240 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 140.891 ms
Loss rate: 0.13%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 140.944 ms
Loss rate: 0.34%
```

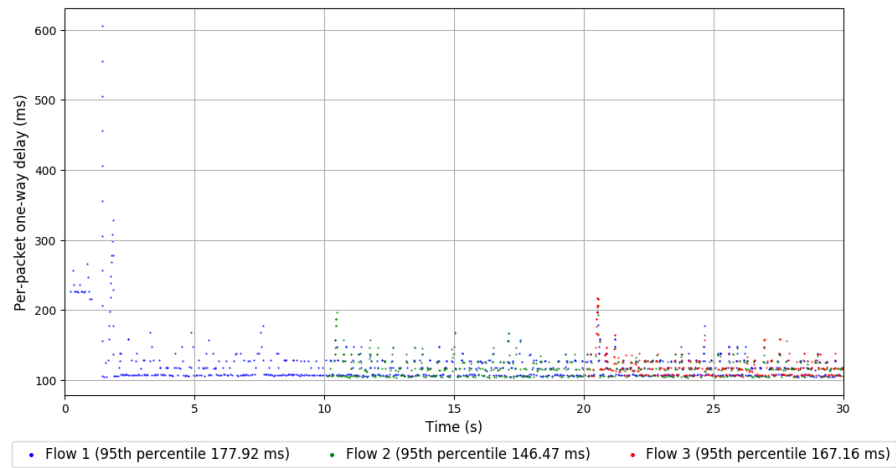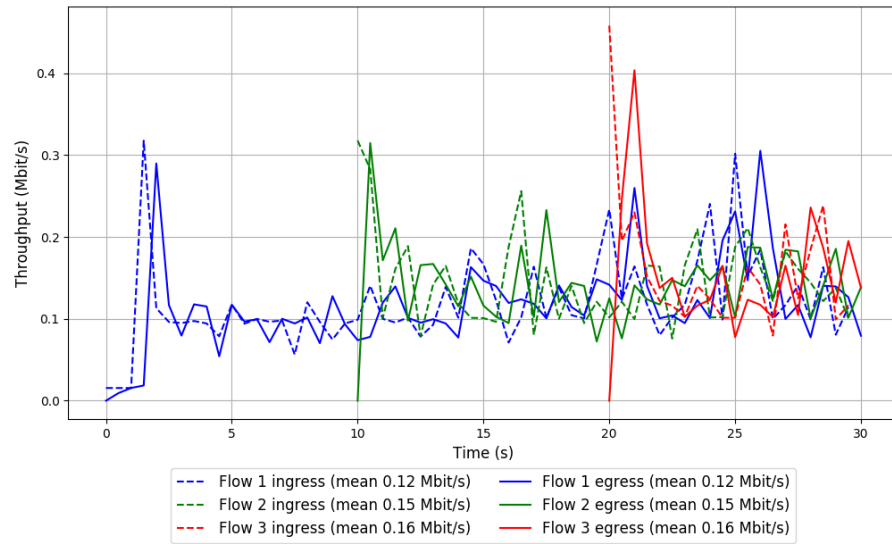Run 3: Report of SCReAM — Data Link

```
Run 1: Statistics of Sprout

Start at: 2019-01-02 22:31:47
End at: 2019-01-02 22:32:17
Local clock offset: -2.093 ms
Remote clock offset: 34.359 ms


# Below is generated by plot.py at 2019-01-02 23:40:31
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 158.359 ms
Loss rate: 0.27%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 177.916 ms
Loss rate: 0.53%
-- Flow 2:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 146.468 ms
Loss rate: 0.03%
-- Flow 3:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 167.164 ms
Loss rate: 0.13%
```

Run 1: Report of Sprout — Data Link

```
Run 2: Statistics of Sprout

Start at: 2019-01-02 22:55:07
End at: 2019-01-02 22:55:37
Local clock offset: -1.901 ms
Remote clock offset: 4.735 ms


# Below is generated by plot.py at 2019-01-02 23:40:31
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 157.817 ms
Loss rate: 0.39%
-- Flow 1:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 168.158 ms
Loss rate: 0.02%
-- Flow 2:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 157.317 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 159.737 ms
Loss rate: 2.25%
```
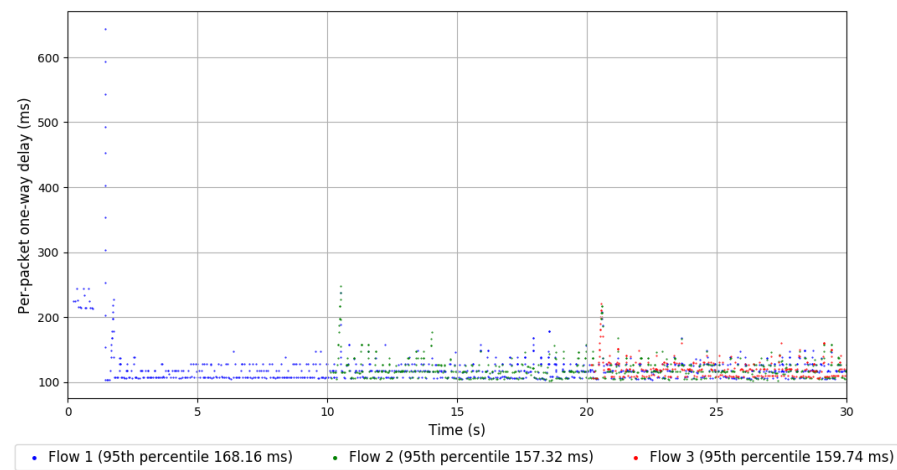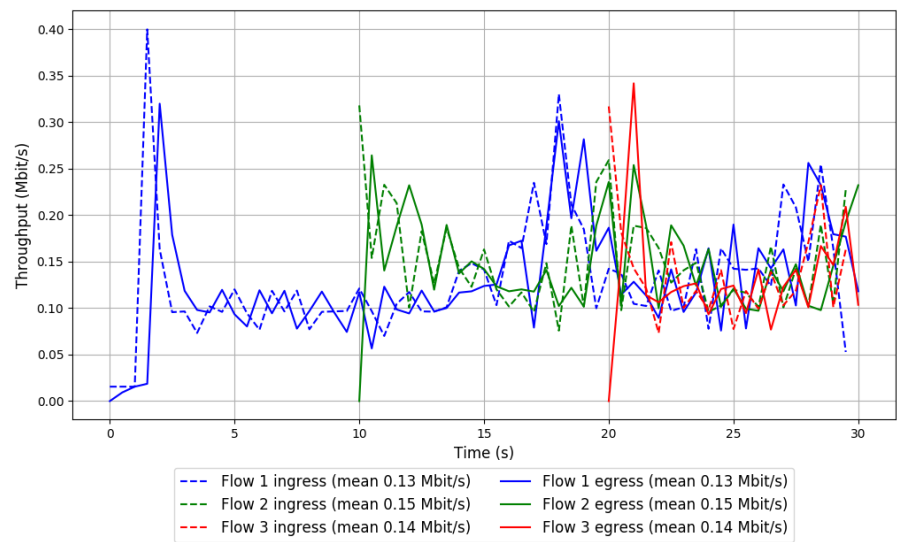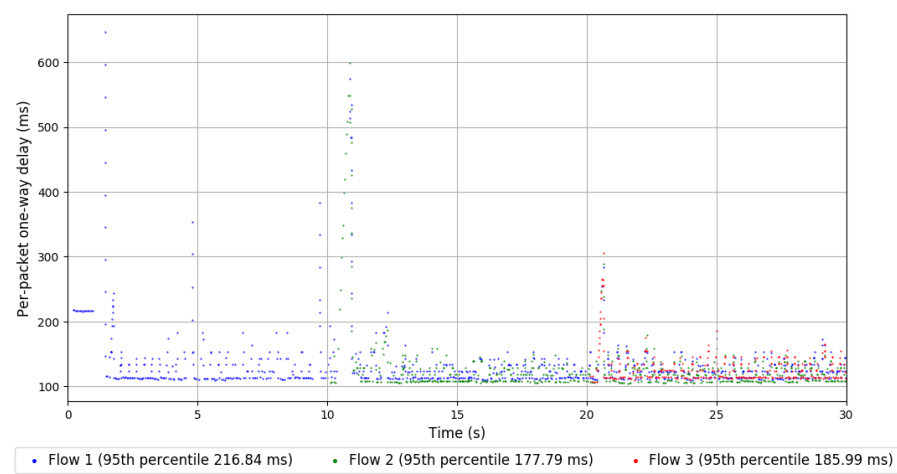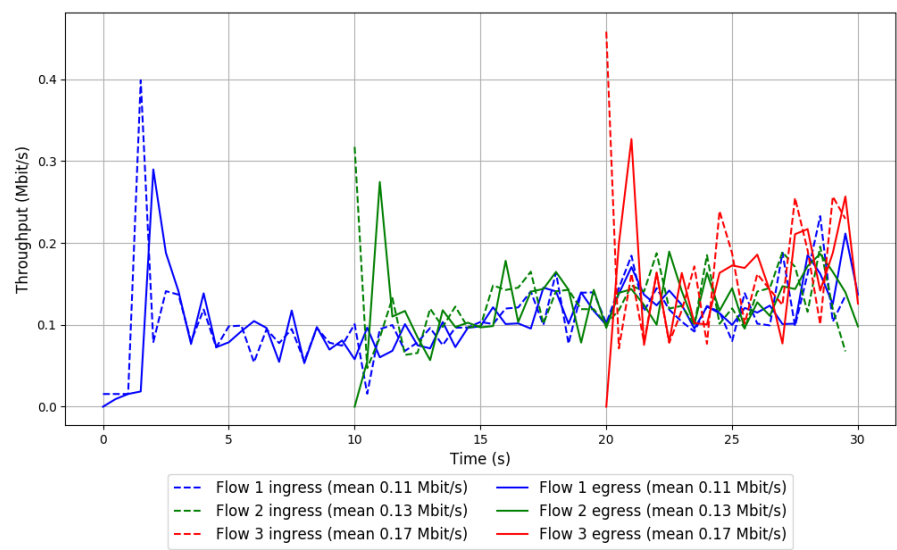
Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2019-01-02 23:18:28
End at: 2019-01-02 23:18:58
Local clock offset: -7.919 ms
Remote clock offset: -0.036 ms


# Below is generated by plot.py at 2019-01-02 23:40:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 215.881 ms
Loss rate: 0.72%
-- Flow 1:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 216.840 ms
Loss rate: 0.02%
-- Flow 2:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 177.794 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 185.993 ms
Loss rate: 3.17%
```
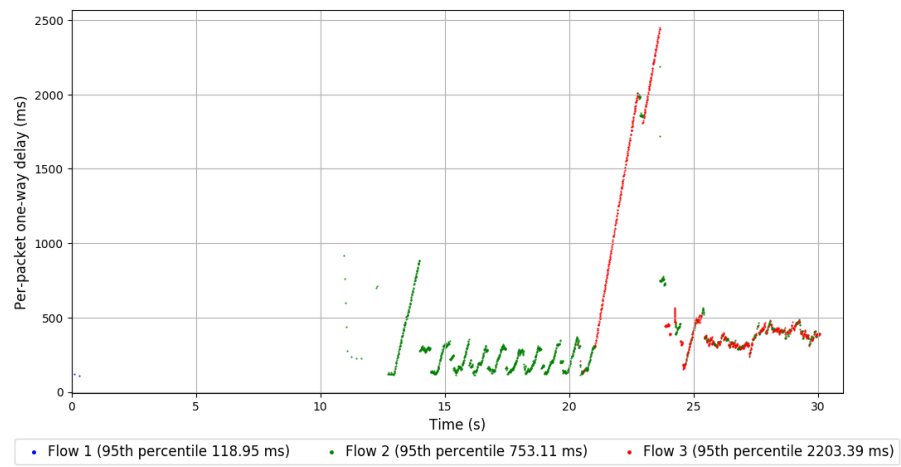
Run 3: Report of Sprout — Data Link

Flow 1 ingress (mean 0.11 Mbit/s)   Flow 1 egress (mean 0.11 Mbit/s)
Flow 2 ingress (mean 0.13 Mbit/s)   Flow 2 egress (mean 0.13 Mbit/s)
Flow 3 ingress (mean 0.17 Mbit/s)   Flow 3 egress (mean 0.17 Mbit/s)

Flow 1 (95th percentile 216.84 ms)   Flow 2 (95th percentile 177.79 ms)   Flow 3 (95th percentile 185.99 ms)
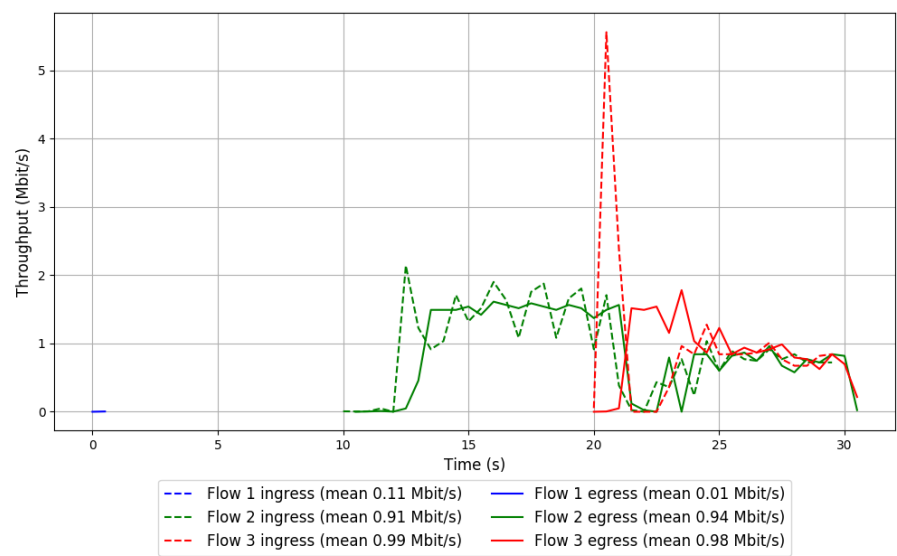
```
Run 1: Statistics of TaoVA-100x

Start at: 2019-01-02 22:45:17
End at: 2019-01-02 22:45:47
Local clock offset: -1.554 ms
Remote clock offset: 14.125 ms


# Below is generated by plot.py at 2019-01-02 23:40:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.92 Mbit/s
95th percentile per-packet one-way delay: 1920.507 ms
Loss rate: 1.76%
-- Flow 1:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 118.947 ms
Loss rate: 92.16%
-- Flow 2:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 753.107 ms
Loss rate: 1.33%
-- Flow 3:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 2203.385 ms
Loss rate: 2.33%
```

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

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

Start at: 2019-01-02 23:08:37
End at: 2019-01-02 23:09:07
Local clock offset: -6.642 ms
Remote clock offset: 1.023 ms


# Below is generated by plot.py at 2019-01-02 23:40:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 768.423 ms
Loss rate: 2.84%
-- Flow 1:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 238.169 ms
Loss rate: 88.68%
-- Flow 2:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 816.425 ms
Loss rate: 2.37%
-- Flow 3:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 709.725 ms
Loss rate: 3.44%
```
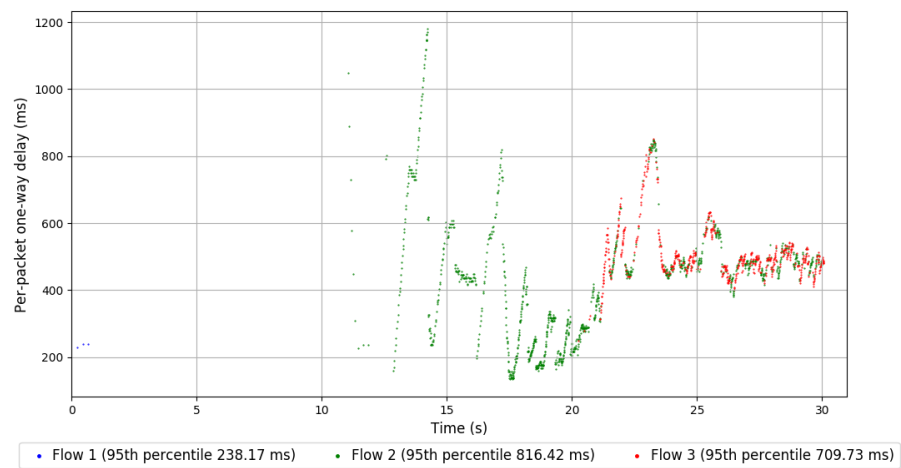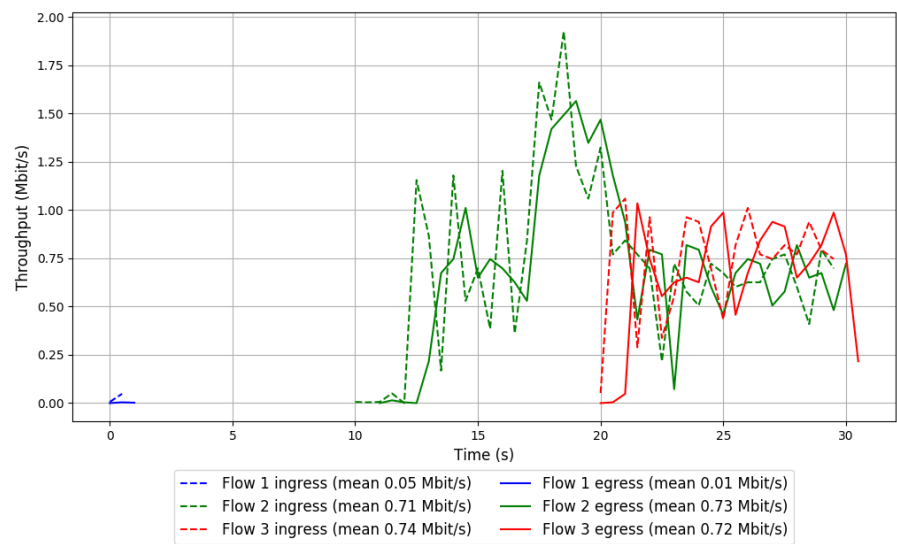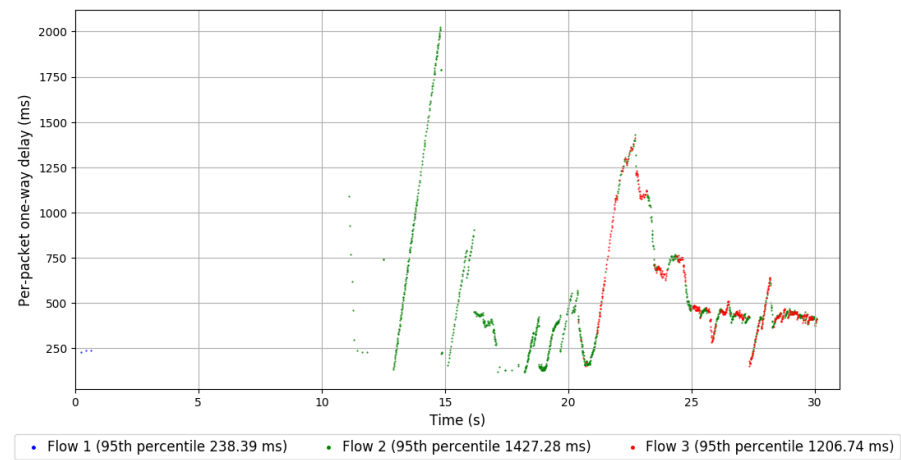
Run 2: Report of TaoVA-100x — Data Link

Flow 1 ingress (mean 0.05 Mbit/s) --- Flow 1 egress (mean 0.01 Mbit/s)
Flow 2 ingress (mean 0.71 Mbit/s) --- Flow 2 egress (mean 0.73 Mbit/s)
Flow 3 ingress (mean 0.74 Mbit/s) --- Flow 3 egress (mean 0.72 Mbit/s)

• Flow 1 (95th percentile 238.17 ms)   • Flow 2 (95th percentile 816.42 ms)   • Flow 3 (95th percentile 709.73 ms)
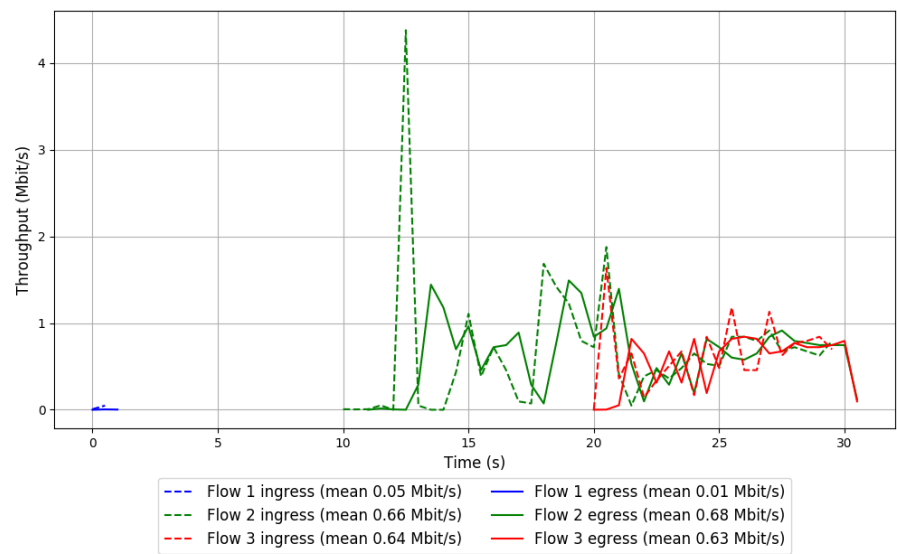
```
Run 3: Statistics of TaoVA-100x

Start at: 2019-01-02 23:31:57
End at: 2019-01-02 23:32:27
Local clock offset: -4.502 ms
Remote clock offset: -1.322 ms


# Below is generated by plot.py at 2019-01-02 23:40:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 1307.479 ms
Loss rate: 2.59%
-- Flow 1:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 238.392 ms
Loss rate: 88.68%
-- Flow 2:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 1427.280 ms
Loss rate: 1.38%
-- Flow 3:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 1206.742 ms
Loss rate: 4.71%
```

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

94

```
Run 1: Statistics of TCP Vegas

Start at: 2019-01-02 22:52:40
End at: 2019-01-02 22:53:10
Local clock offset: -1.411 ms
Remote clock offset: 2.572 ms


# Below is generated by plot.py at 2019-01-02 23:40:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.71 Mbit/s
95th percentile per-packet one-way delay: 347.762 ms
Loss rate: 0.80%
-- Flow 1:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 317.413 ms
Loss rate: 0.24%
-- Flow 2:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 350.822 ms
Loss rate: 0.56%
-- Flow 3:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 375.831 ms
Loss rate: 3.12%
```
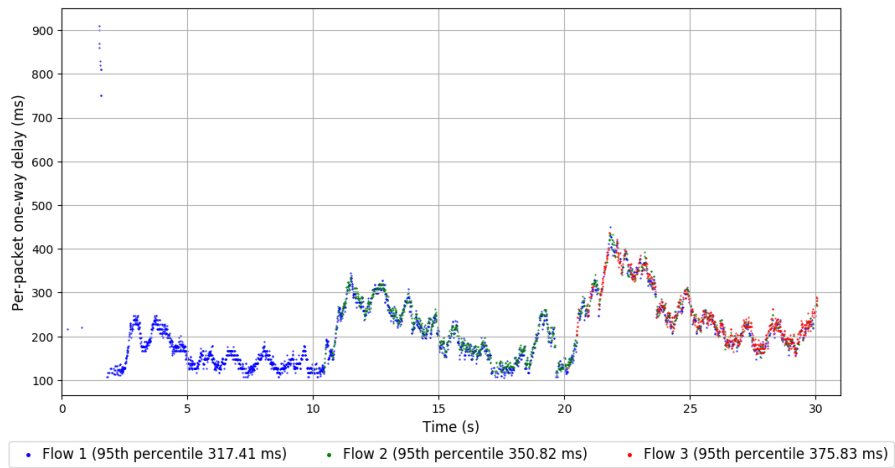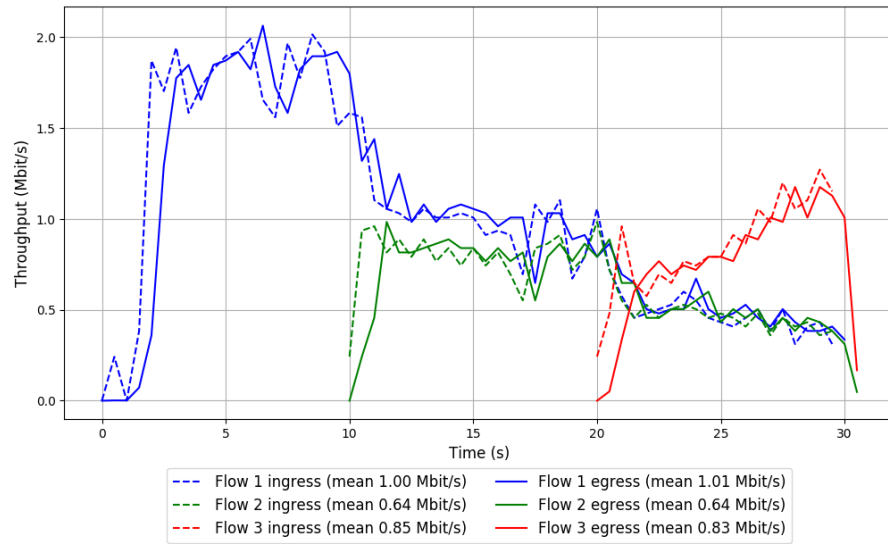
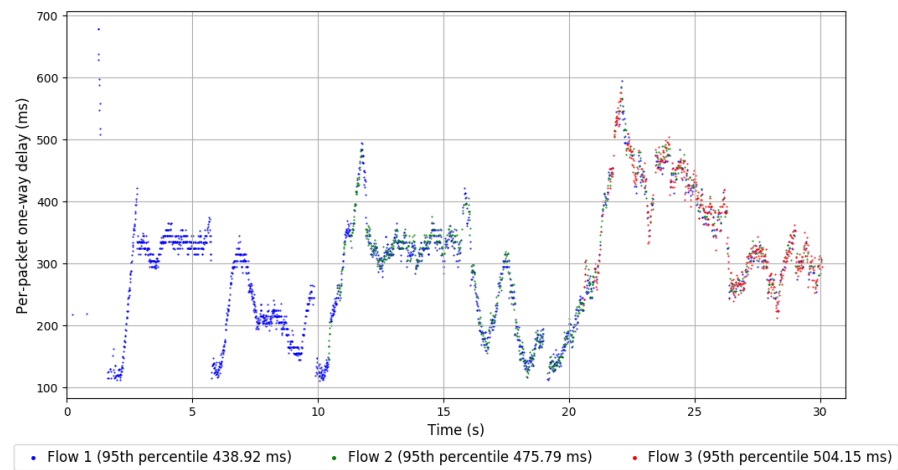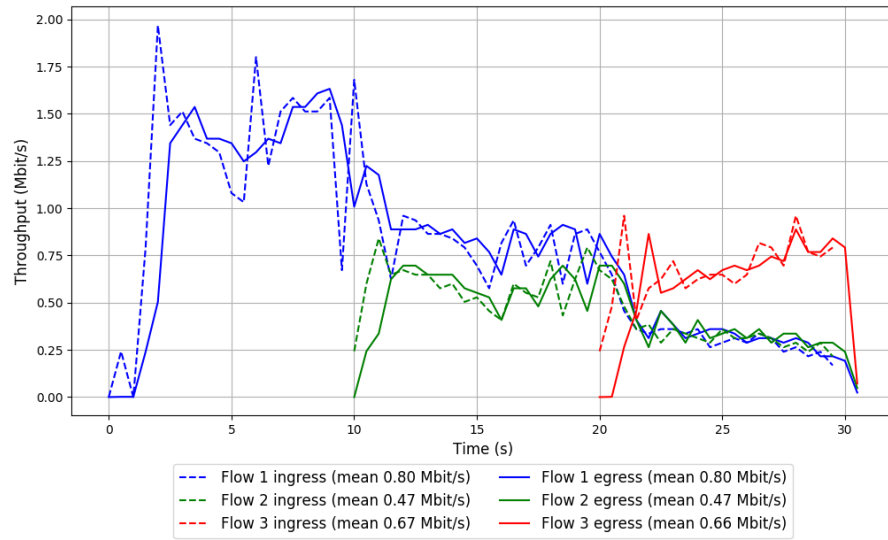Run 1: Report of TCP Vegas — Data Link

```
Run 2: Statistics of TCP Vegas

Start at: 2019-01-02 23:16:01
End at: 2019-01-02 23:16:31
Local clock offset: -8.474 ms
Remote clock offset: -3.677 ms


# Below is generated by plot.py at 2019-01-02 23:40:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.33 Mbit/s
95th percentile per-packet one-way delay: 469.343 ms
Loss rate: 0.63%
-- Flow 1:
Average throughput: 0.80 Mbit/s
95th percentile per-packet one-way delay: 438.920 ms
Loss rate: 0.20%
-- Flow 2:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 475.794 ms
Loss rate: 0.26%
-- Flow 3:
Average throughput: 0.66 Mbit/s
95th percentile per-packet one-way delay: 504.150 ms
Loss rate: 2.70%
```

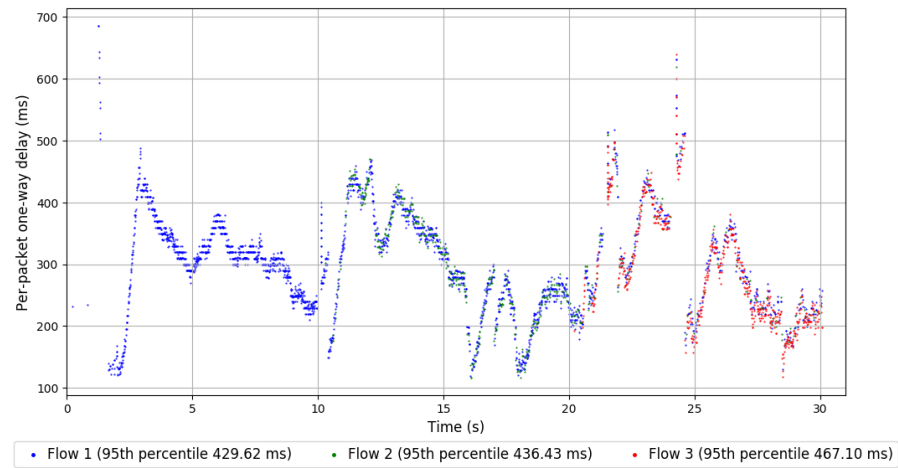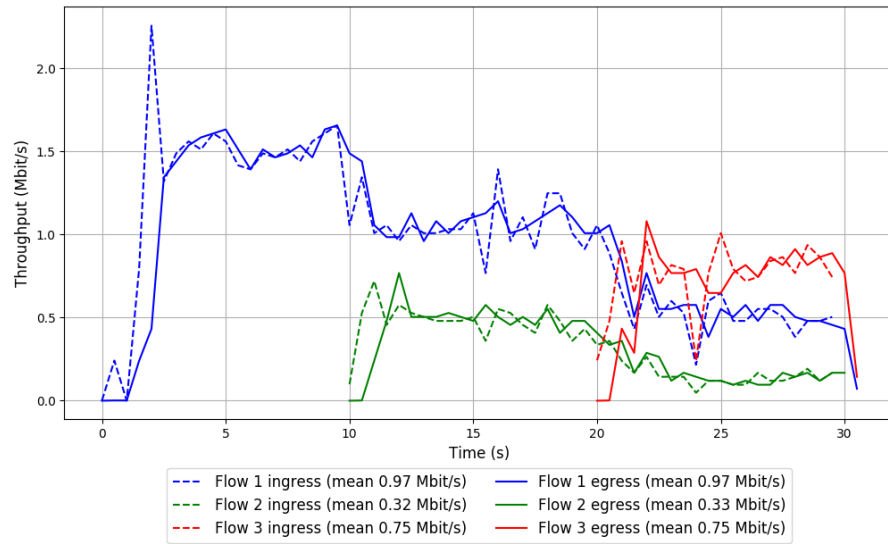Run 2: Report of TCP Vegas — Data Link

```
Run 3: Statistics of TCP Vegas

Start at: 2019-01-02 23:39:19
End at: 2019-01-02 23:39:49
Local clock offset: -3.409 ms
Remote clock offset: -1.741 ms


# Below is generated by plot.py at 2019-01-02 23:40:36
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.44 Mbit/s
95th percentile per-packet one-way delay: 437.504 ms
Loss rate: 0.50%
-- Flow 1:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 429.616 ms
Loss rate: 0.33%
-- Flow 2:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 436.432 ms
Loss rate: 0.37%
-- Flow 3:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 467.103 ms
Loss rate: 1.29%
```

Run 3: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 0.97 Mbit/s)   Flow 1 egress (mean 0.97 Mbit/s)
Flow 2 ingress (mean 0.32 Mbit/s)   Flow 2 egress (mean 0.33 Mbit/s)
Flow 3 ingress (mean 0.75 Mbit/s)   Flow 3 egress (mean 0.75 Mbit/s)

Flow 1 (95th percentile 429.62 ms)   Flow 2 (95th percentile 436.43 ms)   Flow 3 (95th percentile 467.10 ms)

```
Run 1: Statistics of Verus

Start at: 2019-01-02 22:41:36
End at: 2019-01-02 22:42:06
Local clock offset: -1.656 ms
Remote clock offset: 17.08 ms


# Below is generated by plot.py at 2019-01-02 23:40:36
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.57 Mbit/s
95th percentile per-packet one-way delay: 2096.287 ms
Loss rate: 2.63%
-- Flow 1:
Average throughput: 1.55 Mbit/s
95th percentile per-packet one-way delay: 2096.001 ms
Loss rate: 2.58%
-- Flow 2:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 2134.330 ms
Loss rate: 7.69%
-- Flow 3:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 2325.739 ms
Loss rate: 9.09%
```
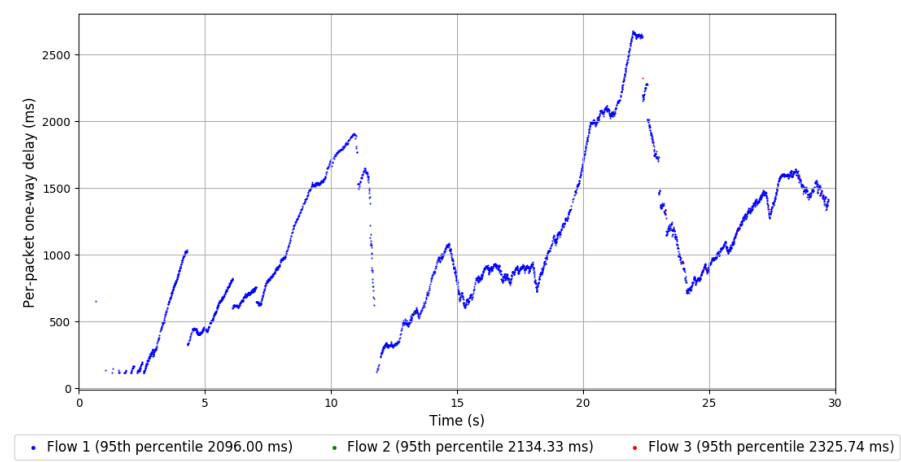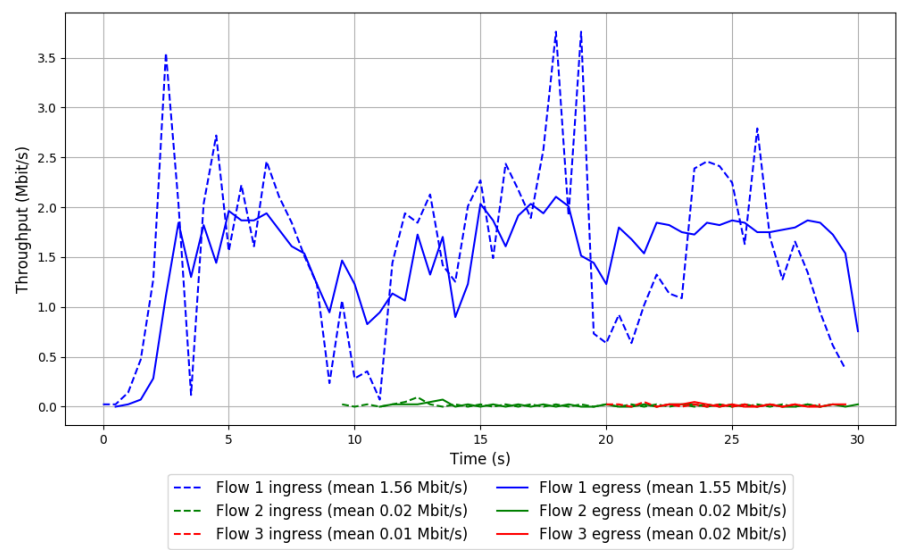
Run 1: Report of Verus — Data Link

- Flow 1 ingress (mean 1.56 Mbit/s) — — — Flow 1 egress (mean 1.55 Mbit/s)
- Flow 2 ingress (mean 0.02 Mbit/s) — — — Flow 2 egress (mean 0.02 Mbit/s)
- Flow 3 ingress (mean 0.01 Mbit/s) — — — Flow 3 egress (mean 0.02 Mbit/s)

- Flow 1 (95th percentile 2096.00 ms)　　• Flow 2 (95th percentile 2134.33 ms)　　• Flow 3 (95th percentile 2325.74 ms)
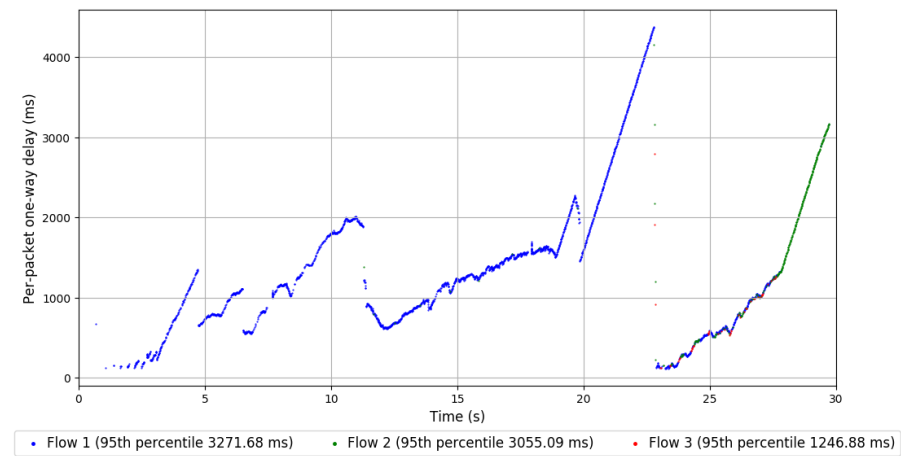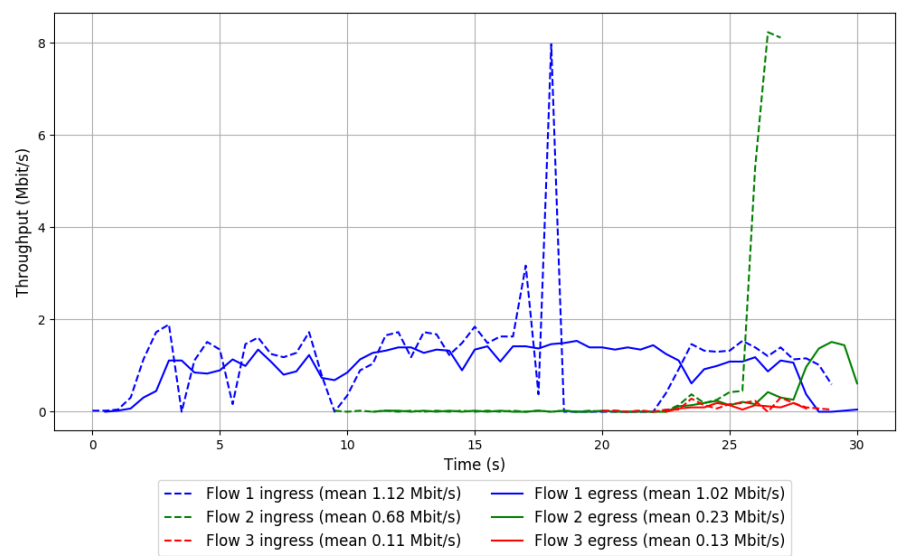
```
Run 2: Statistics of Verus

Start at: 2019-01-02 23:04:57
End at: 2019-01-02 23:05:27
Local clock offset: -6.645 ms
Remote clock offset: -2.072 ms


# Below is generated by plot.py at 2019-01-02 23:40:38
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.19 Mbit/s
95th percentile per-packet one-way delay: 3159.842 ms
Loss rate: 24.72%
-- Flow 1:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 3271.678 ms
Loss rate: 9.80%
-- Flow 2:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 3055.088 ms
Loss rate: 65.04%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 1246.880 ms
Loss rate: 36.14%
```

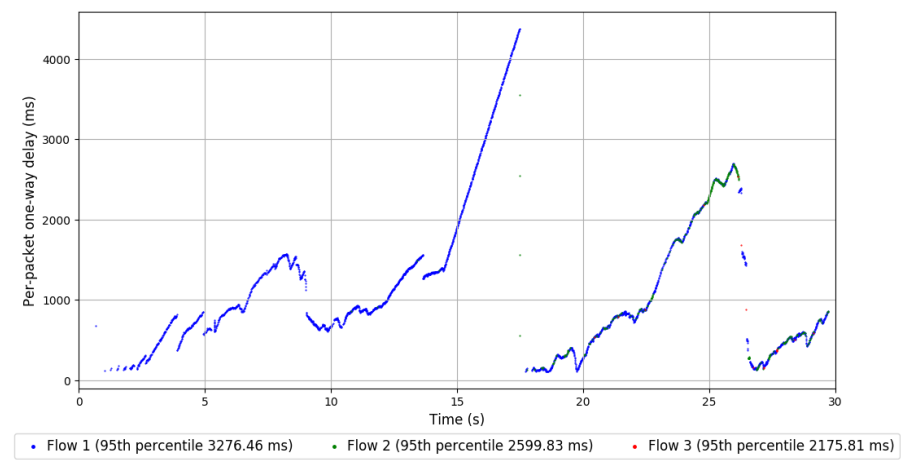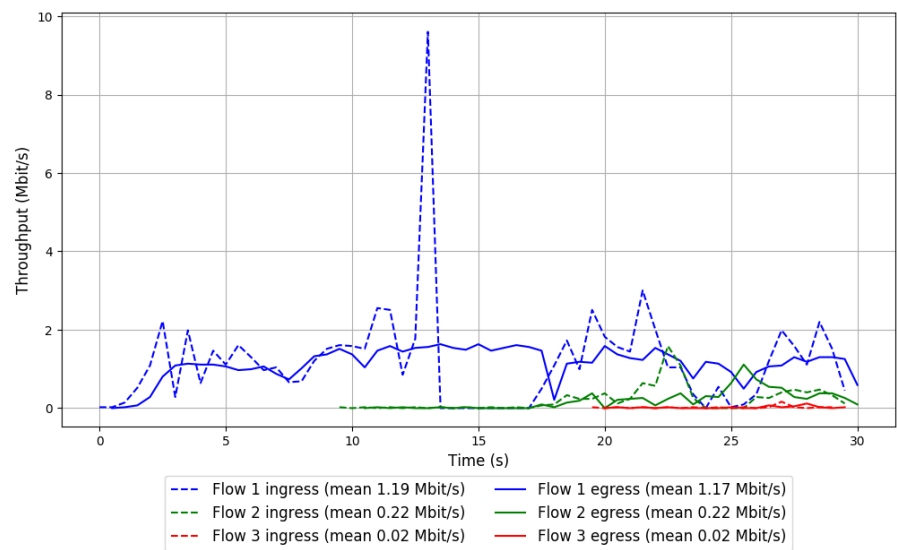Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2019-01-02 23:28:16
End at: 2019-01-02 23:28:46
Local clock offset: -6.007 ms
Remote clock offset: -4.666 ms


# Below is generated by plot.py at 2019-01-02 23:40:39
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.32 Mbit/s
95th percentile per-packet one-way delay: 3146.543 ms
Loss rate: 3.76%
-- Flow 1:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 3276.461 ms
Loss rate: 3.38%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 2599.832 ms
Loss rate: 6.74%
-- Flow 3:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 2175.811 ms
Loss rate: 5.56%
```

Run 3: Report of Verus — Data Link

Legend:
- Flow 1 ingress (mean 1.19 Mbit/s)
- Flow 1 egress (mean 1.17 Mbit/s)
- Flow 2 ingress (mean 0.22 Mbit/s)
- Flow 2 egress (mean 0.22 Mbit/s)
- Flow 3 ingress (mean 0.02 Mbit/s)
- Flow 3 egress (mean 0.02 Mbit/s)

Legend:
- Flow 1 (95th percentile 3276.46 ms)
- Flow 2 (95th percentile 2599.83 ms)
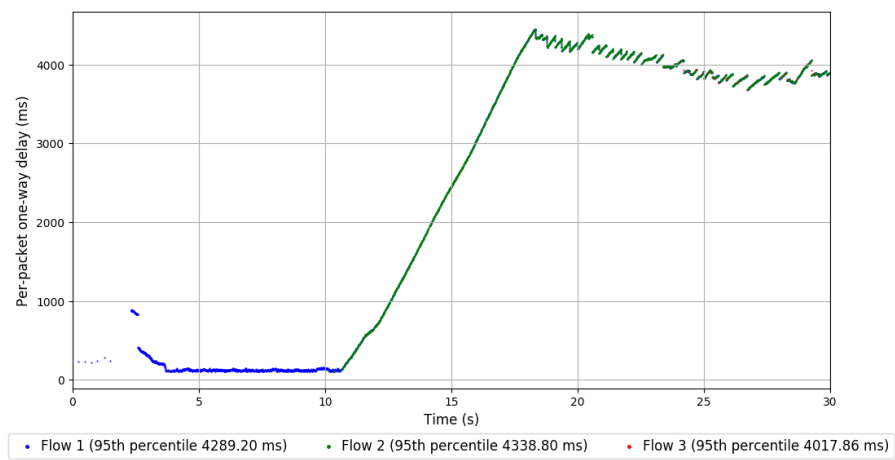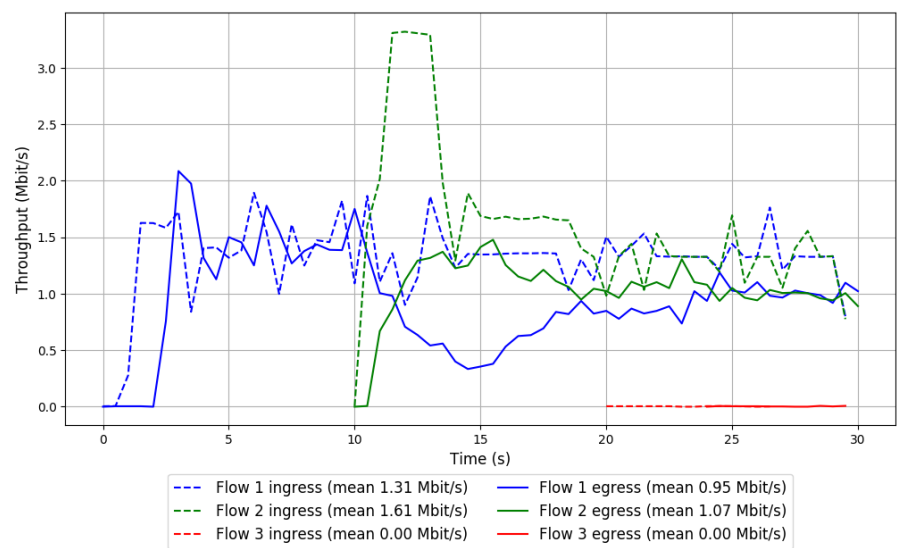- Flow 3 (95th percentile 2175.81 ms)

```
Run 1: Statistics of PCC-Vivace

Start at: 2019-01-02 22:47:45
End at: 2019-01-02 22:48:15
Local clock offset: -2.272 ms
Remote clock offset: 10.643 ms


# Below is generated by plot.py at 2019-01-02 23:40:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.67 Mbit/s
95th percentile per-packet one-way delay: 4328.630 ms
Loss rate: 30.32%
-- Flow 1:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 4289.204 ms
Loss rate: 27.74%
-- Flow 2:
Average throughput: 1.07 Mbit/s
95th percentile per-packet one-way delay: 4338.798 ms
Loss rate: 33.49%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 4017.855 ms
Loss rate: 10.20%
```

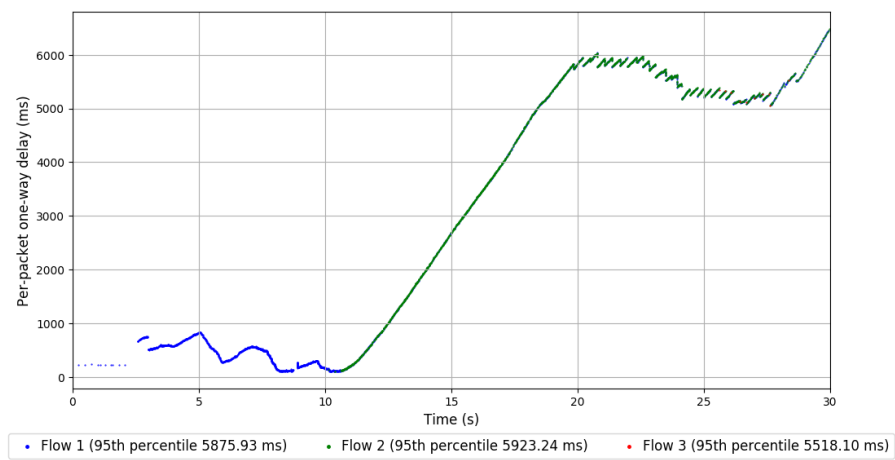## Run 1: Report of PCC-Vivace — Data Link

- - - - Flow 1 ingress (mean 1.31 Mbit/s) ——— Flow 1 egress (mean 0.95 Mbit/s)
- - - - Flow 2 ingress (mean 1.61 Mbit/s) ——— Flow 2 egress (mean 1.07 Mbit/s)
- - - - Flow 3 ingress (mean 0.00 Mbit/s) ——— Flow 3 egress (mean 0.00 Mbit/s)

- Flow 1 (95th percentile 4289.20 ms)   • Flow 2 (95th percentile 4338.80 ms)   • Flow 3 (95th percentile 4017.86 ms)
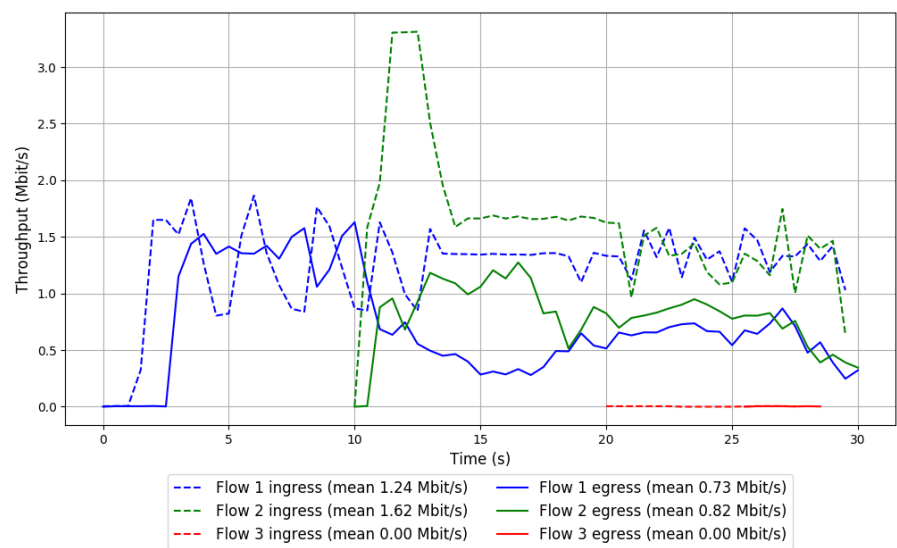
```
Run 2: Statistics of PCC-Vivace

Start at: 2019-01-02 23:11:06
End at: 2019-01-02 23:11:36
Local clock offset: -7.005 ms
Remote clock offset: -3.232 ms


# Below is generated by plot.py at 2019-01-02 23:40:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.27 Mbit/s
95th percentile per-packet one-way delay: 5904.813 ms
Loss rate: 45.26%
-- Flow 1:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 5875.933 ms
Loss rate: 41.76%
-- Flow 2:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 5923.240 ms
Loss rate: 49.29%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5518.101 ms
Loss rate: 54.02%
```

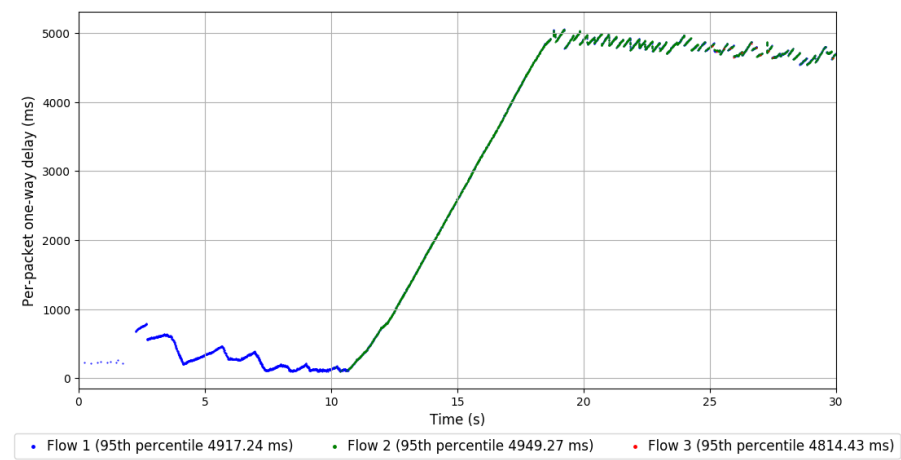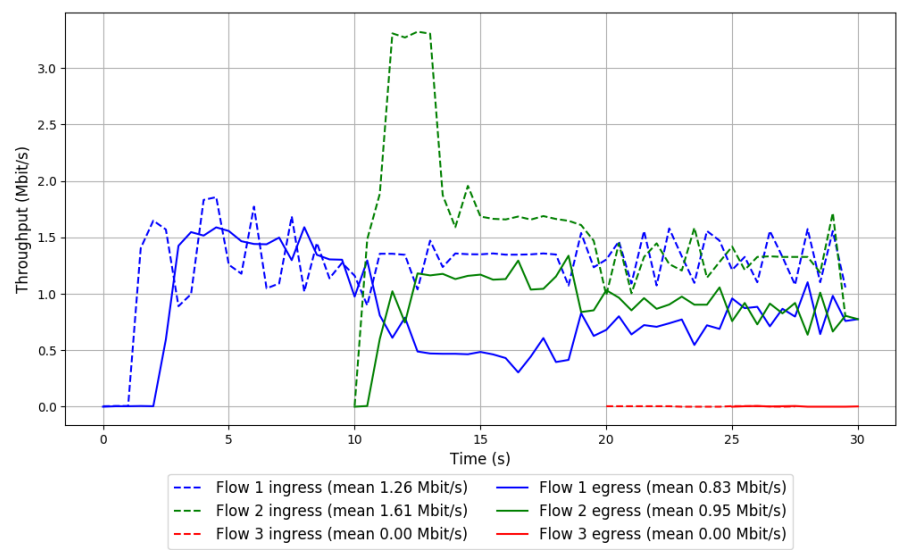## Run 2: Report of PCC-Vivace — Data Link

```
Run 3: Statistics of PCC-Vivace

Start at: 2019-01-02 23:34:24
End at: 2019-01-02 23:34:54
Local clock offset: -3.735 ms
Remote clock offset: -5.015 ms


# Below is generated by plot.py at 2019-01-02 23:40:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.46 Mbit/s
95th percentile per-packet one-way delay: 4932.716 ms
Loss rate: 37.85%
-- Flow 1:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 4917.237 ms
Loss rate: 34.83%
-- Flow 2:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 4949.265 ms
Loss rate: 41.41%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 4814.427 ms
Loss rate: 43.82%
```

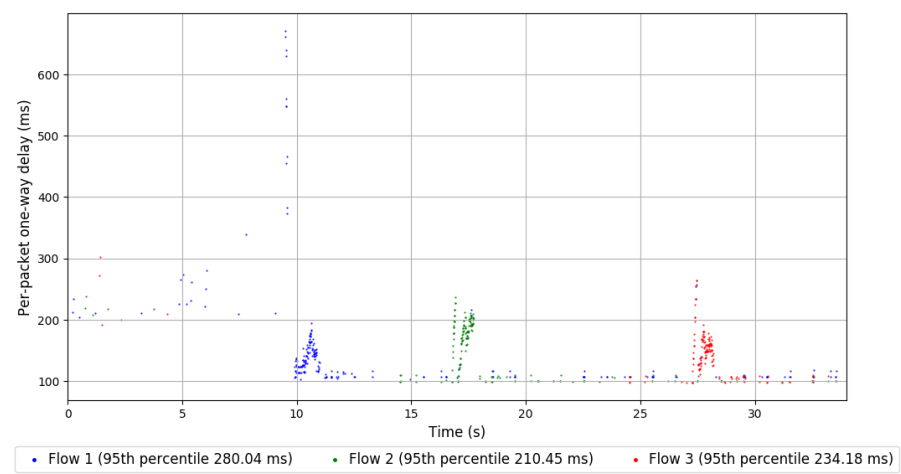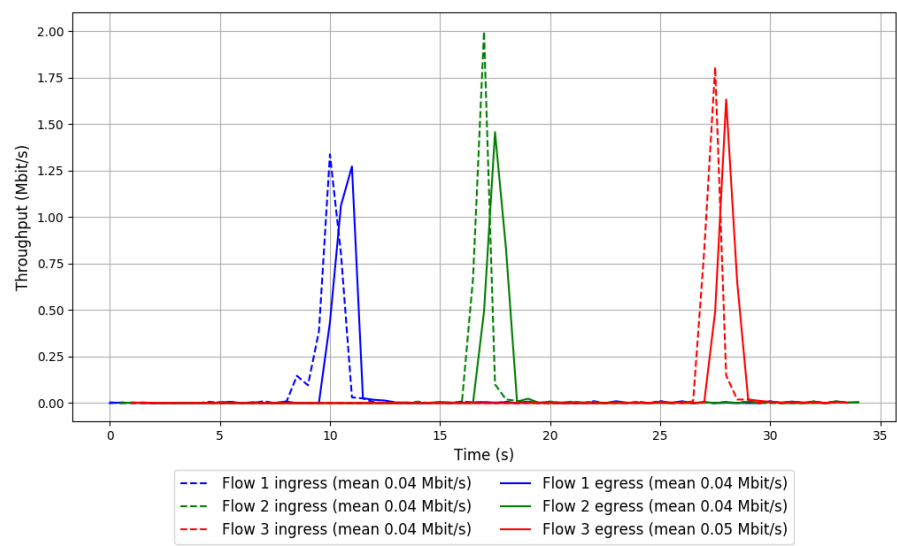## Run 3: Report of PCC-Vivace — Data Link

```
Run 1: Statistics of WebRTC media

Start at: 2019-01-02 22:44:03
End at: 2019-01-02 22:44:33
Local clock offset: -1.601 ms
Remote clock offset: 12.016 ms


# Below is generated by plot.py at 2019-01-02 23:40:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 230.778 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 280.043 ms
Loss rate: 0.05%
-- Flow 2:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 210.451 ms
Loss rate: 0.05%
-- Flow 3:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 234.177 ms
Loss rate: 0.00%
```

Run 1: Report of WebRTC media — Data Link

```
Run 2: Statistics of WebRTC media

Start at: 2019-01-02 23:07:24
End at: 2019-01-02 23:07:54
Local clock offset: -7.207 ms
Remote clock offset: 1.165 ms


# Below is generated by plot.py at 2019-01-02 23:40:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 343.469 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 341.887 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 363.357 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 239.001 ms
Loss rate: 0.00%
```
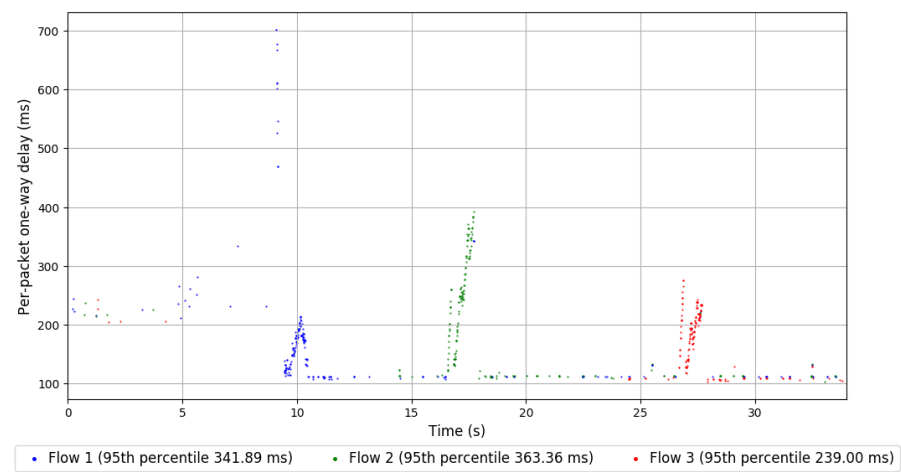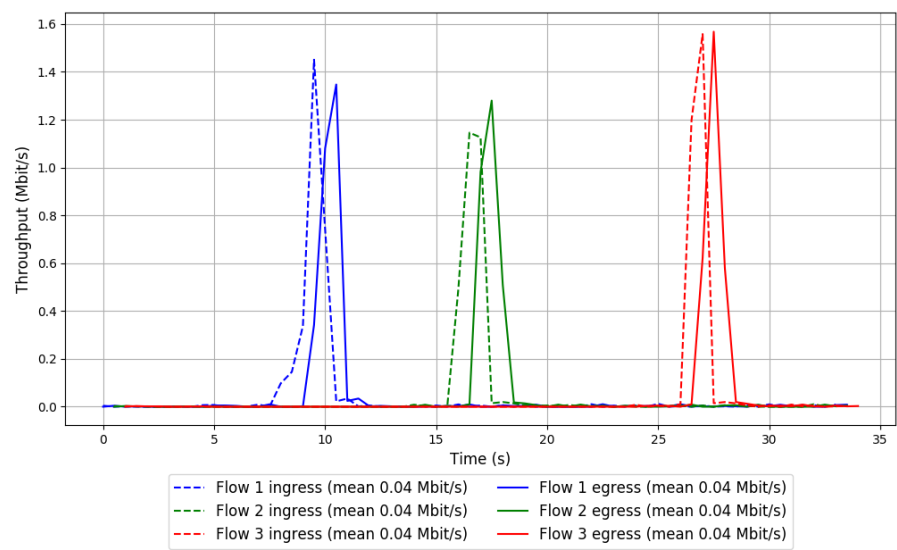
Run 2: Report of WebRTC media — Data Link

```
Run 3: Statistics of WebRTC media

Start at: 2019-01-02 23:30:43
End at: 2019-01-02 23:31:13
Local clock offset: -4.954 ms
Remote clock offset: -0.906 ms

# Below is generated by plot.py at 2019-01-02 23:40:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 334.099 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 329.528 ms
Loss rate: 0.05%
-- Flow 2:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 281.852 ms
Loss rate: 0.05%
-- Flow 3:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 364.245 ms
Loss rate: 0.00%
```

Run 3: Report of WebRTC media — Data Link