

Pantheon Report

Generated at 2018-08-28 05:27:32 (UTC).

Data path: AWS Brazil 2 on `ens5` (*local*) → Colombia on `p4p1` (*remote*).

Repeated the test of 4 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.

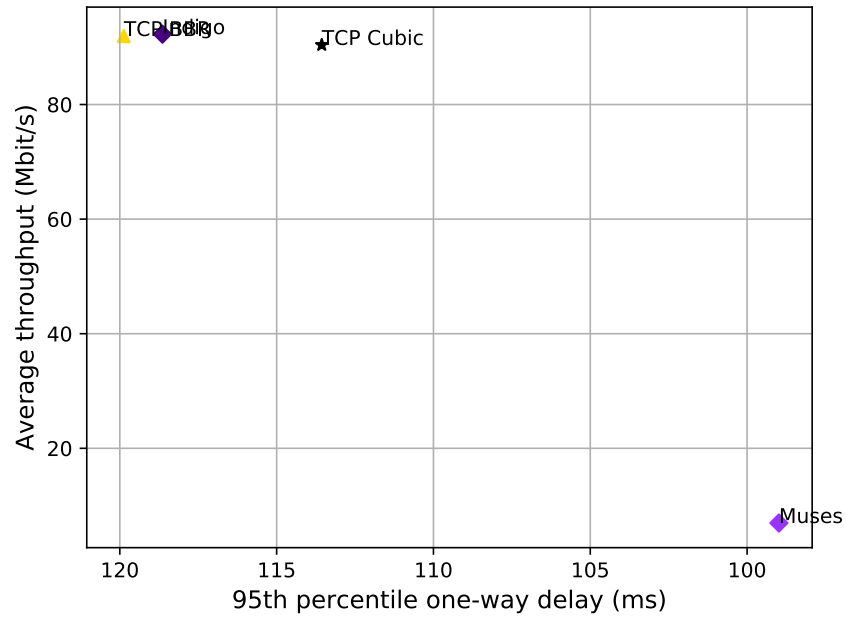
System info:

```
Linux 4.15.0-1019-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
```

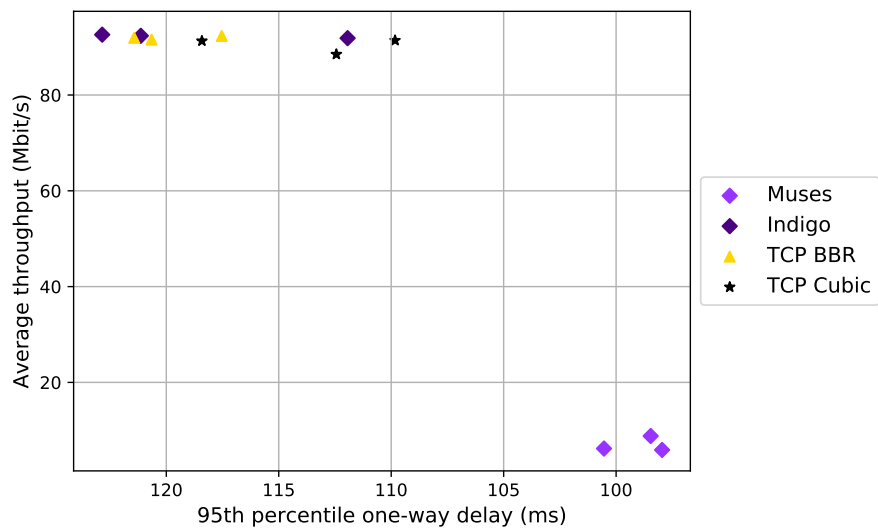
Git summary:

```
branch: muses @ 86ef433b09b2f4ecae1186d6940af93bcf0969cd
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecd90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ b261c9e99c63be452bc16f94ce0caa99a4c9d39a
third_party/pantheon-tunnel @ cbfce6db5ff5740d4fe1771f813cd646339e1952
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 AWS Brazil 2 to Colombia, 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, 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	55.45	39.40	30.87	116.45	117.31	116.75	12.04	20.28	28.21
TCP Cubic	3	74.56	16.01	15.58	113.94	114.64	103.99	0.66	0.21	0.21
Indigo	3	65.16	27.95	26.72	116.35	116.65	116.30	8.64	22.88	54.97
Muses	3	4.94	5.77	0.82	89.00	96.60	88.13	54.38	50.88	38.43

Run 1: Statistics of TCP BBR

Start at: 2018-08-28 05:15:23

End at: 2018-08-28 05:15:53

Local clock offset: 6.961 ms

Remote clock offset: 7.378 ms

Below is generated by plot.py at 2018-08-28 05:27:23

Datalink statistics

-- Total of 3 flows:

Average throughput: 91.94 Mbit/s

95th percentile per-packet one-way delay: 121.427 ms

Loss rate: 15.69%

-- Flow 1:

Average throughput: 54.37 Mbit/s

95th percentile per-packet one-way delay: 114.578 ms

Loss rate: 11.47%

-- Flow 2:

Average throughput: 41.38 Mbit/s

95th percentile per-packet one-way delay: 121.532 ms

Loss rate: 19.52%

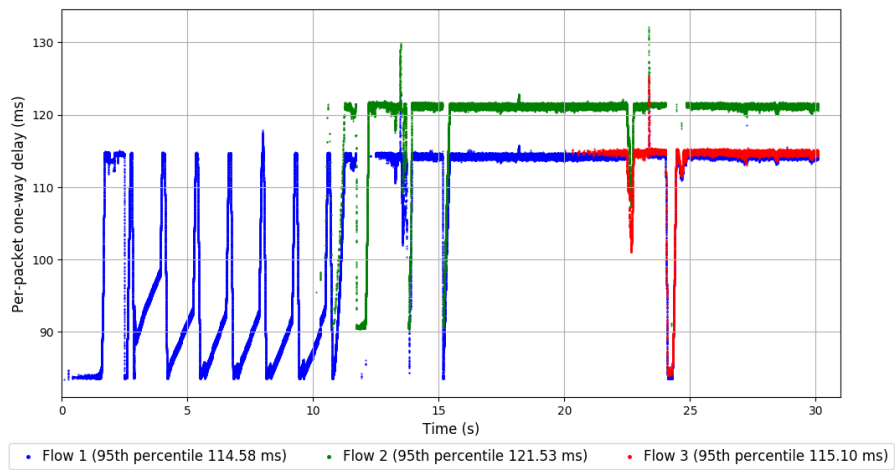
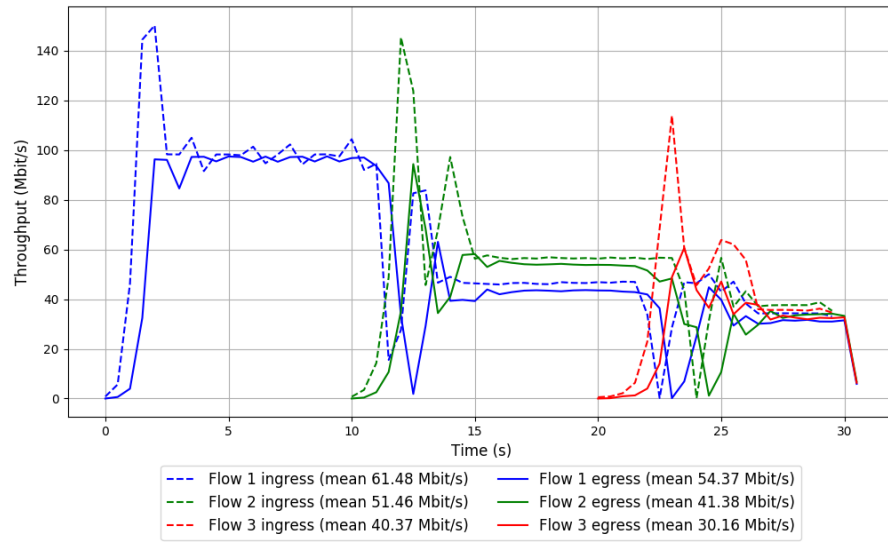
-- Flow 3:

Average throughput: 30.16 Mbit/s

95th percentile per-packet one-way delay: 115.099 ms

Loss rate: 25.29%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-08-28 05:20:23

End at: 2018-08-28 05:20:53

Local clock offset: 4.845 ms

Remote clock offset: 3.302 ms

Below is generated by plot.py at 2018-08-28 05:27:26

Datalink statistics

-- Total of 3 flows:

Average throughput: 92.34 Mbit/s

95th percentile per-packet one-way delay: 117.534 ms

Loss rate: 16.99%

-- Flow 1:

Average throughput: 56.73 Mbit/s

95th percentile per-packet one-way delay: 114.052 ms

Loss rate: 11.36%

-- Flow 2:

Average throughput: 37.72 Mbit/s

95th percentile per-packet one-way delay: 112.925 ms

Loss rate: 20.27%

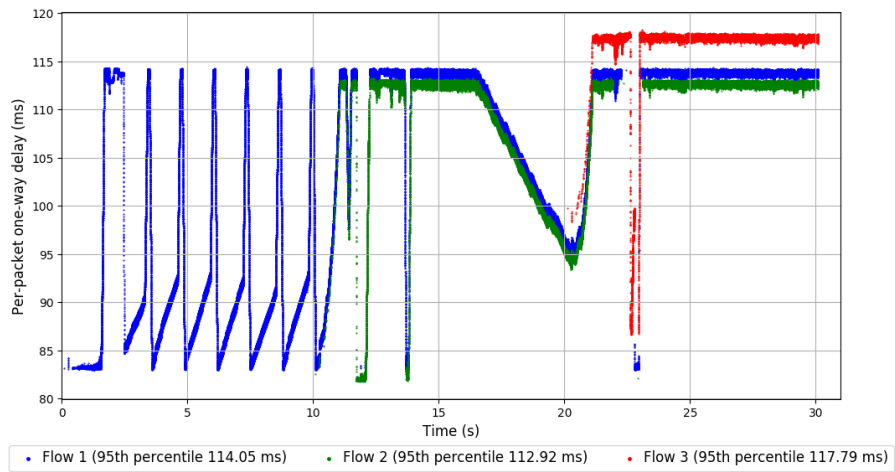
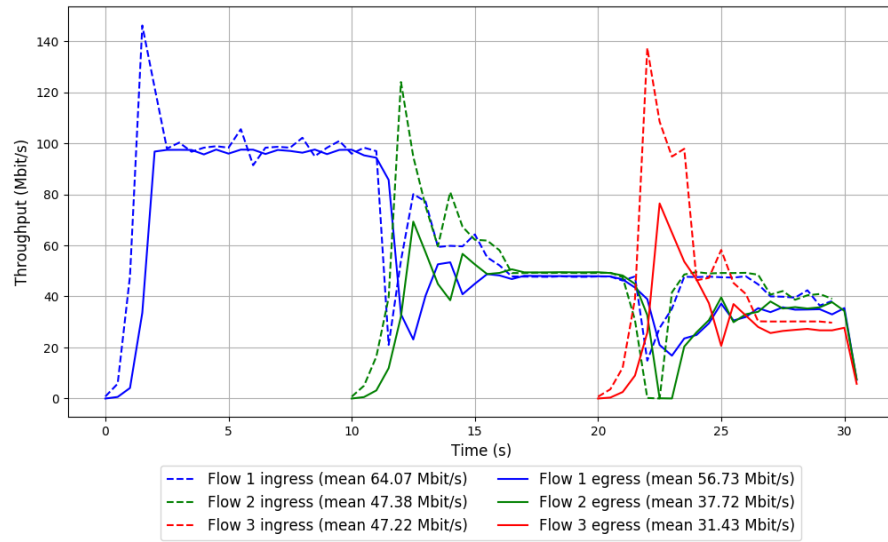
-- Flow 3:

Average throughput: 31.43 Mbit/s

95th percentile per-packet one-way delay: 117.787 ms

Loss rate: 33.35%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2018-08-28 05:25:22

End at: 2018-08-28 05:25:52

Local clock offset: 6.25 ms

Remote clock offset: 7.984 ms

Below is generated by plot.py at 2018-08-28 05:27:26

Datalink statistics

-- Total of 3 flows:

Average throughput: 91.58 Mbit/s

95th percentile per-packet one-way delay: 120.655 ms

Loss rate: 17.21%

-- Flow 1:

Average throughput: 55.24 Mbit/s

95th percentile per-packet one-way delay: 120.707 ms

Loss rate: 13.30%

-- Flow 2:

Average throughput: 39.09 Mbit/s

95th percentile per-packet one-way delay: 117.467 ms

Loss rate: 21.05%

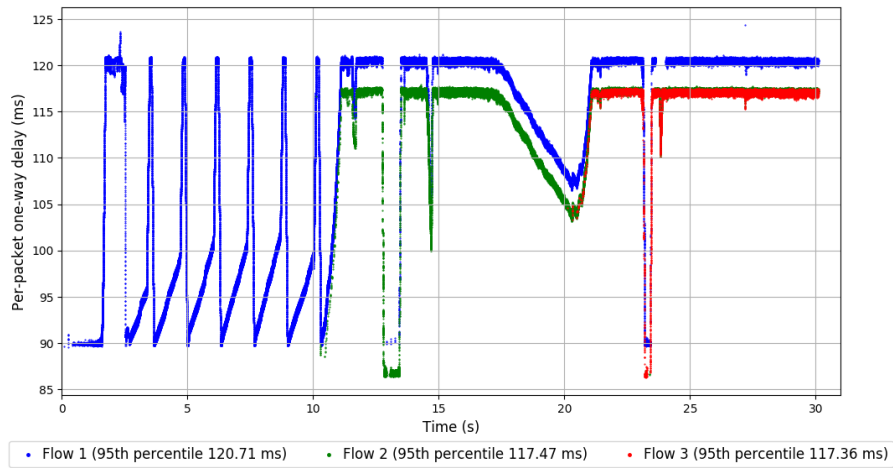
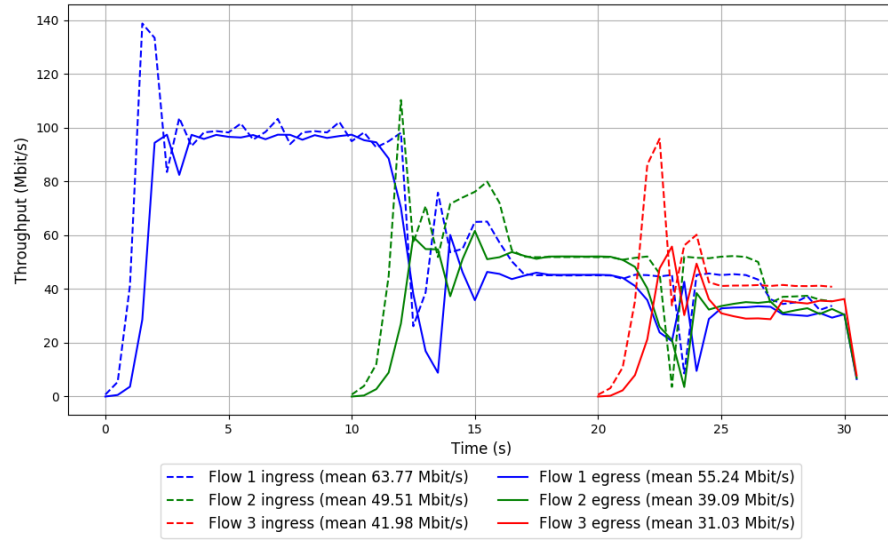
-- Flow 3:

Average throughput: 31.03 Mbit/s

95th percentile per-packet one-way delay: 117.362 ms

Loss rate: 26.00%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2018-08-28 05:12:57

End at: 2018-08-28 05:13:27

Local clock offset: 6.657 ms

Remote clock offset: 3.812 ms

Below is generated by plot.py at 2018-08-28 05:27:26

Datalink statistics

-- Total of 3 flows:

Average throughput: 91.40 Mbit/s

95th percentile per-packet one-way delay: 109.829 ms

Loss rate: 0.55%

-- Flow 1:

Average throughput: 73.83 Mbit/s

95th percentile per-packet one-way delay: 109.567 ms

Loss rate: 0.65%

-- Flow 2:

Average throughput: 17.49 Mbit/s

95th percentile per-packet one-way delay: 111.643 ms

Loss rate: 0.14%

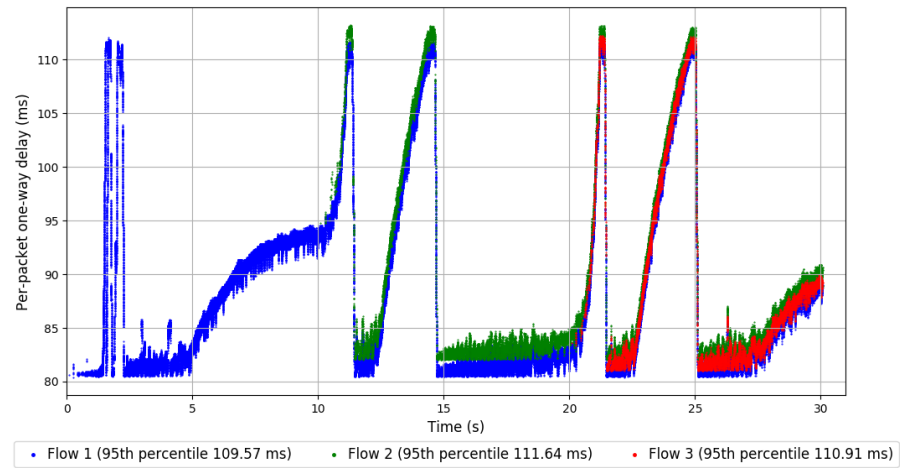
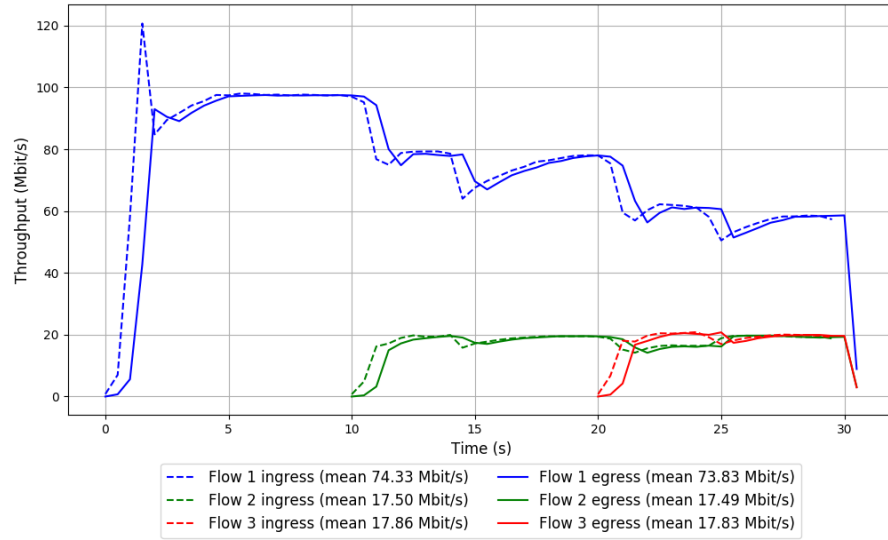
-- Flow 3:

Average throughput: 17.83 Mbit/s

95th percentile per-packet one-way delay: 110.905 ms

Loss rate: 0.15%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2018-08-28 05:17:56

End at: 2018-08-28 05:18:26

Local clock offset: 5.868 ms

Remote clock offset: 2.184 ms

Below is generated by plot.py at 2018-08-28 05:27:26

Datalink statistics

-- Total of 3 flows:

Average throughput: 88.50 Mbit/s

95th percentile per-packet one-way delay: 112.438 ms

Loss rate: 0.61%

-- Flow 1:

Average throughput: 75.10 Mbit/s

95th percentile per-packet one-way delay: 113.394 ms

Loss rate: 0.67%

-- Flow 2:

Average throughput: 15.46 Mbit/s

95th percentile per-packet one-way delay: 111.142 ms

Loss rate: 0.31%

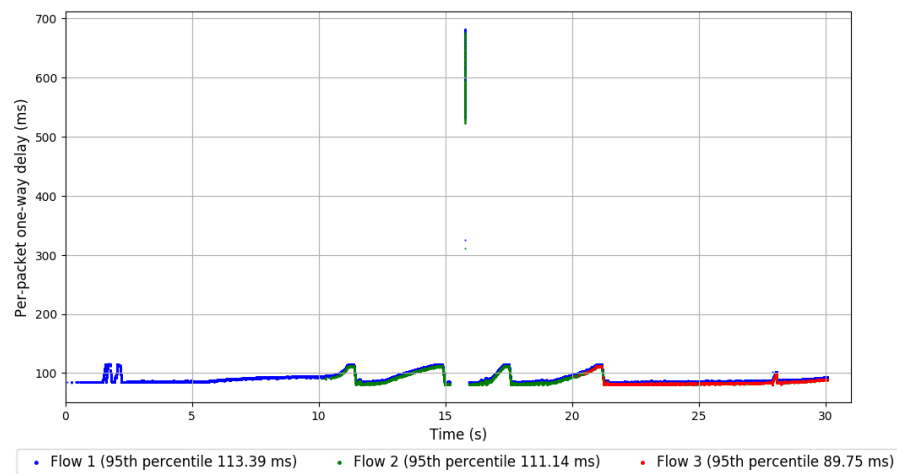
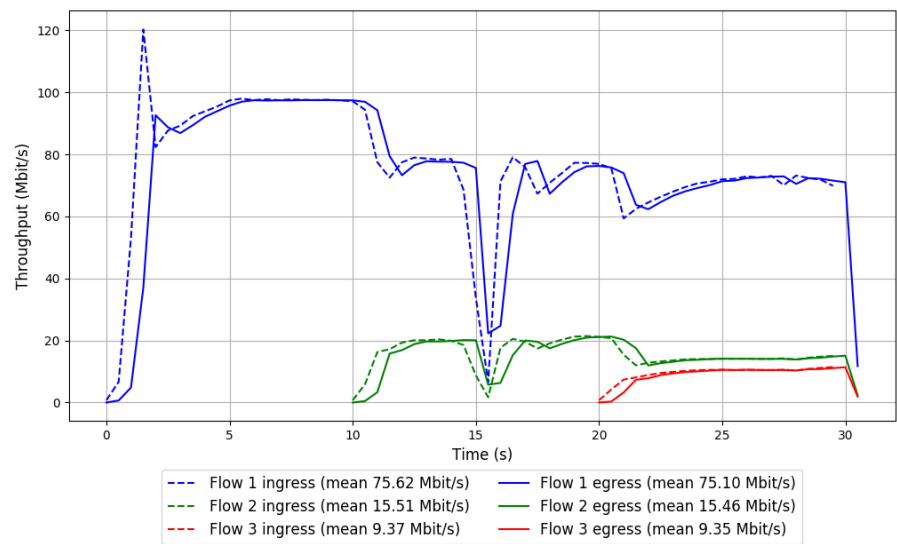
-- Flow 3:

Average throughput: 9.35 Mbit/s

95th percentile per-packet one-way delay: 89.749 ms

Loss rate: 0.27%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2018-08-28 05:22:55

End at: 2018-08-28 05:23:25

Local clock offset: 4.783 ms

Remote clock offset: 8.045 ms

Below is generated by plot.py at 2018-08-28 05:27:26

Datalink statistics

-- Total of 3 flows:

Average throughput: 91.29 Mbit/s

95th percentile per-packet one-way delay: 118.417 ms

Loss rate: 0.57%

-- Flow 1:

Average throughput: 74.74 Mbit/s

95th percentile per-packet one-way delay: 118.857 ms

Loss rate: 0.65%

-- Flow 2:

Average throughput: 15.08 Mbit/s

95th percentile per-packet one-way delay: 121.138 ms

Loss rate: 0.17%

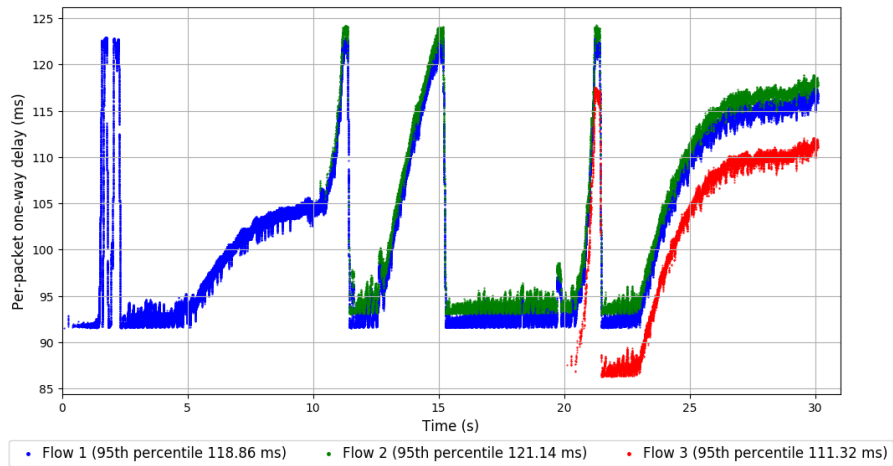
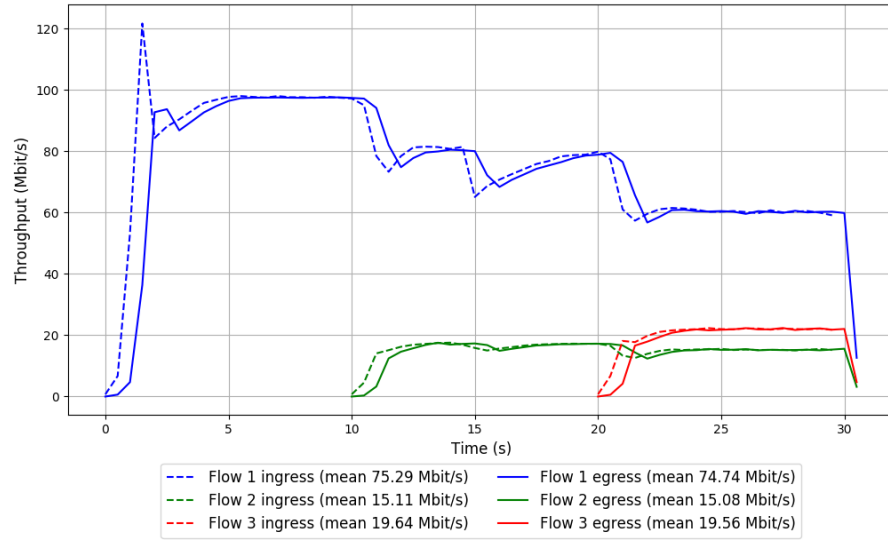
-- Flow 3:

Average throughput: 19.56 Mbit/s

95th percentile per-packet one-way delay: 111.317 ms

Loss rate: 0.20%

Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of Indigo

Start at: 2018-08-28 05:11:40

End at: 2018-08-28 05:12:10

Local clock offset: 6.884 ms

Remote clock offset: 2.681 ms

Below is generated by plot.py at 2018-08-28 05:27:27

Datalink statistics

-- Total of 3 flows:

Average throughput: 91.87 Mbit/s

95th percentile per-packet one-way delay: 111.938 ms

Loss rate: 22.52%

-- Flow 1:

Average throughput: 66.08 Mbit/s

95th percentile per-packet one-way delay: 111.883 ms

Loss rate: 6.53%

-- Flow 2:

Average throughput: 28.09 Mbit/s

95th percentile per-packet one-way delay: 112.060 ms

Loss rate: 20.81%

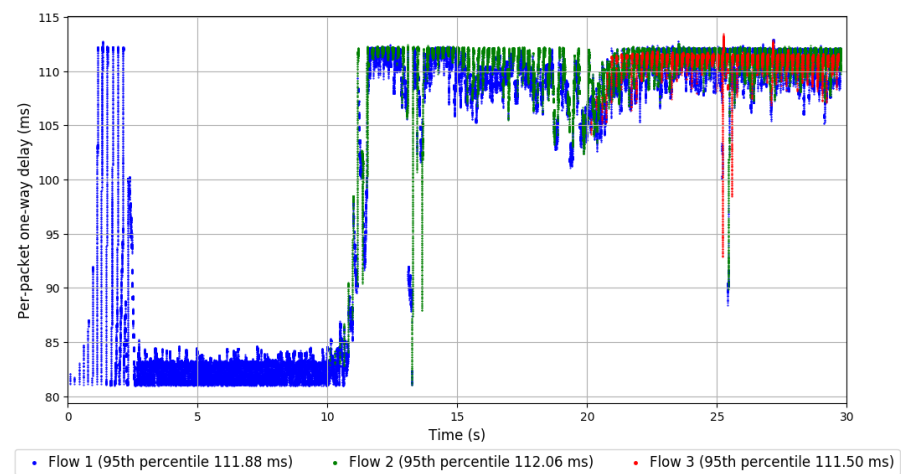
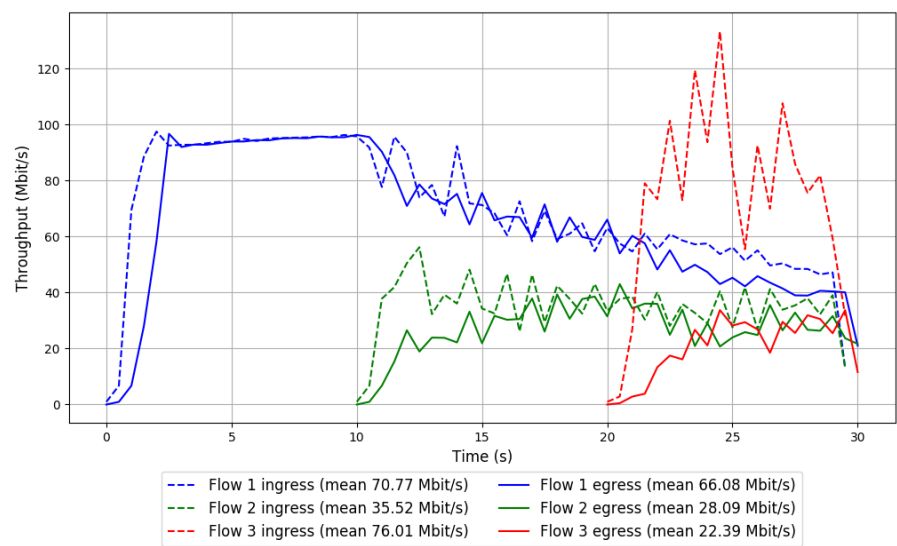
-- Flow 3:

Average throughput: 22.39 Mbit/s

95th percentile per-packet one-way delay: 111.499 ms

Loss rate: 70.53%

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2018-08-28 05:16:39

End at: 2018-08-28 05:17:09

Local clock offset: 5.258 ms

Remote clock offset: 7.319 ms

Below is generated by plot.py at 2018-08-28 05:27:27

Datalink statistics

-- Total of 3 flows:

Average throughput: 92.60 Mbit/s

95th percentile per-packet one-way delay: 122.850 ms

Loss rate: 15.95%

-- Flow 1:

Average throughput: 63.92 Mbit/s

95th percentile per-packet one-way delay: 115.989 ms

Loss rate: 10.31%

-- Flow 2:

Average throughput: 29.11 Mbit/s

95th percentile per-packet one-way delay: 123.059 ms

Loss rate: 22.57%

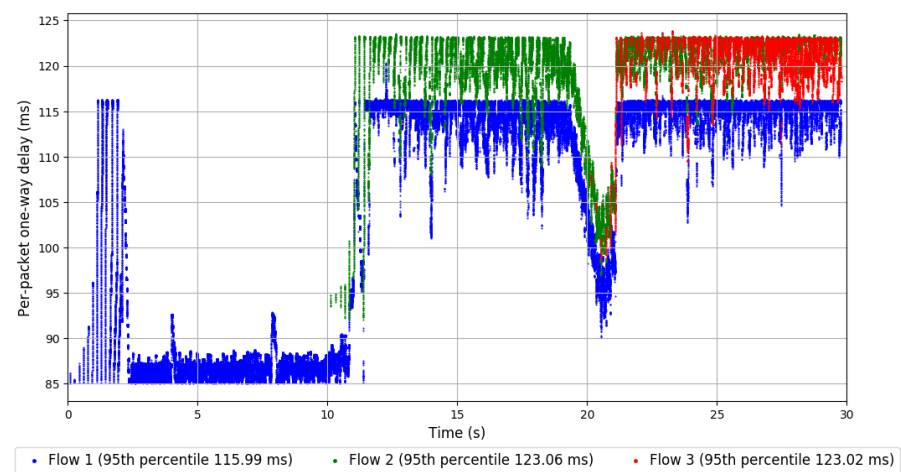
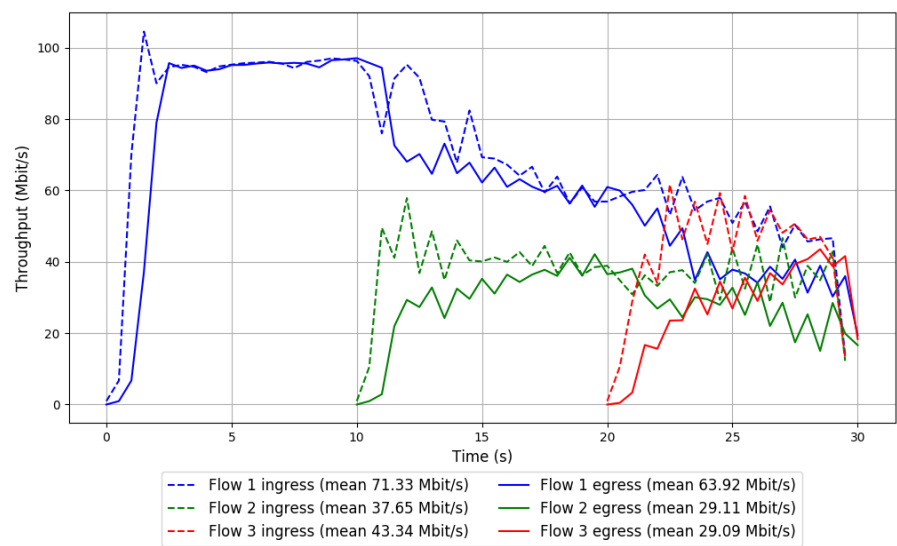
-- Flow 3:

Average throughput: 29.09 Mbit/s

95th percentile per-packet one-way delay: 123.019 ms

Loss rate: 32.83%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-08-28 05:21:39

End at: 2018-08-28 05:22:09

Local clock offset: 5.609 ms

Remote clock offset: 6.089 ms

Below is generated by plot.py at 2018-08-28 05:27:31

Datalink statistics

-- Total of 3 flows:

Average throughput: 92.36 Mbit/s

95th percentile per-packet one-way delay: 121.133 ms

Loss rate: 22.85%

-- Flow 1:

Average throughput: 65.47 Mbit/s

95th percentile per-packet one-way delay: 121.184 ms

Loss rate: 9.07%

-- Flow 2:

Average throughput: 26.66 Mbit/s

95th percentile per-packet one-way delay: 114.821 ms

Loss rate: 25.25%

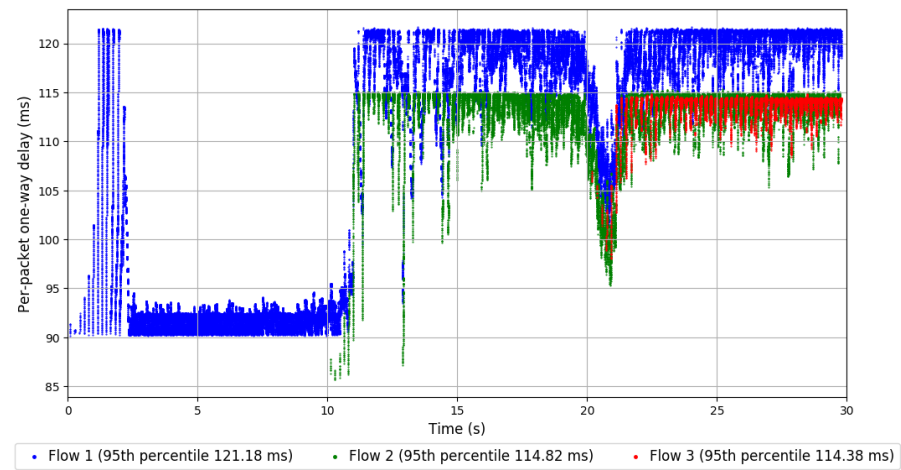
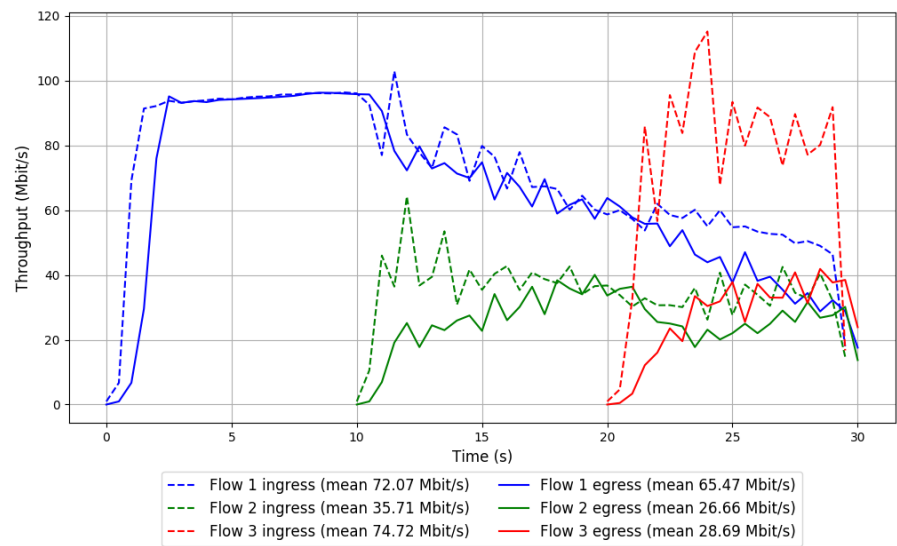
-- Flow 3:

Average throughput: 28.69 Mbit/s

95th percentile per-packet one-way delay: 114.384 ms

Loss rate: 61.56%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of Muses

Start at: 2018-08-28 05:14:12

End at: 2018-08-28 05:14:42

Local clock offset: 5.558 ms

Remote clock offset: 3.61 ms

Below is generated by plot.py at 2018-08-28 05:27:31

Datalink statistics

-- Total of 3 flows:

Average throughput: 5.90 Mbit/s

95th percentile per-packet one-way delay: 97.954 ms

Loss rate: 67.43%

-- Flow 1:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 81.550 ms

Loss rate: 97.39%

-- Flow 2:

Average throughput: 8.29 Mbit/s

95th percentile per-packet one-way delay: 98.122 ms

Loss rate: 68.86%

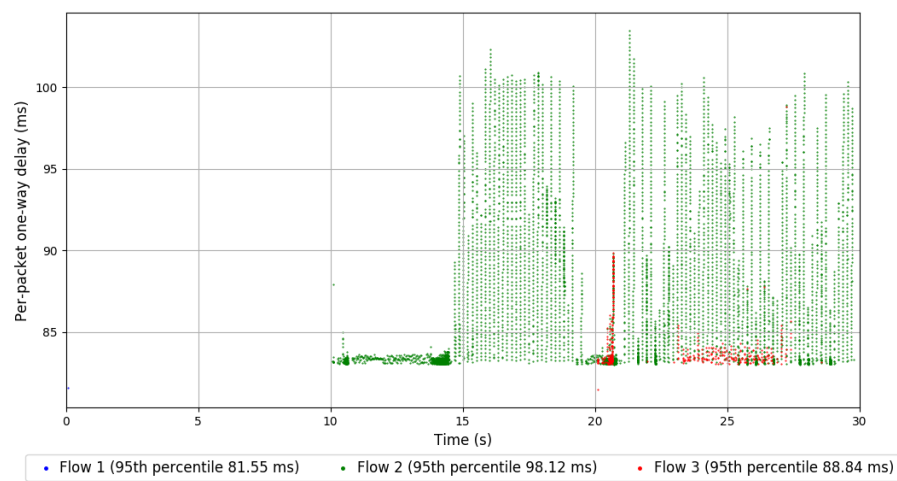
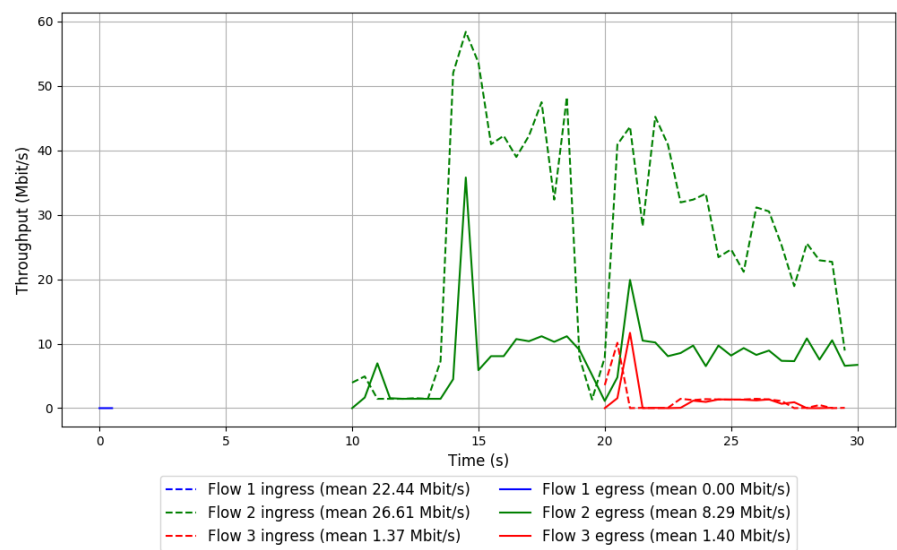
-- Flow 3:

Average throughput: 1.40 Mbit/s

95th percentile per-packet one-way delay: 88.838 ms

Loss rate: 10.42%

Run 1: Report of Muses — Data Link



Run 2: Statistics of Muses

Start at: 2018-08-28 05:19:11

End at: 2018-08-28 05:19:41

Local clock offset: 6.539 ms

Remote clock offset: 8.403 ms

Below is generated by plot.py at 2018-08-28 05:27:31

Datalink statistics

-- Total of 3 flows:

Average throughput: 8.81 Mbit/s

95th percentile per-packet one-way delay: 98.462 ms

Loss rate: 65.24%

-- Flow 1:

Average throughput: 8.44 Mbit/s

95th percentile per-packet one-way delay: 98.630 ms

Loss rate: 65.10%

-- Flow 2:

Average throughput: 0.48 Mbit/s

95th percentile per-packet one-way delay: 90.719 ms

Loss rate: 15.81%

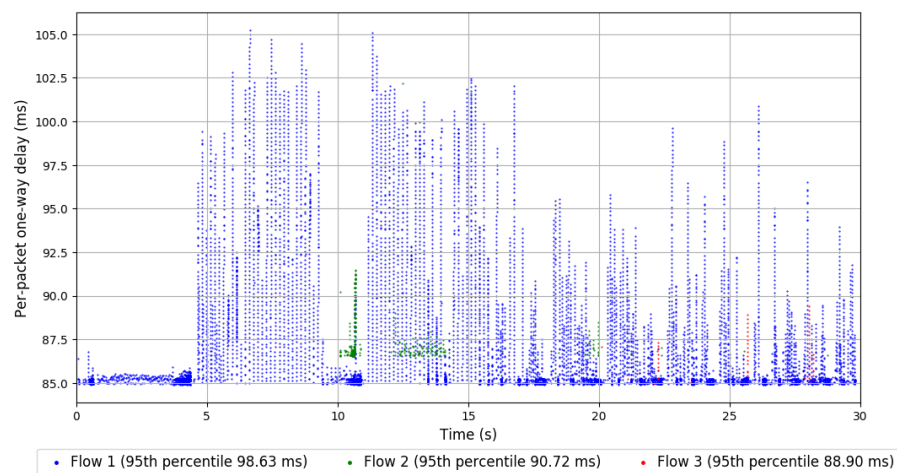
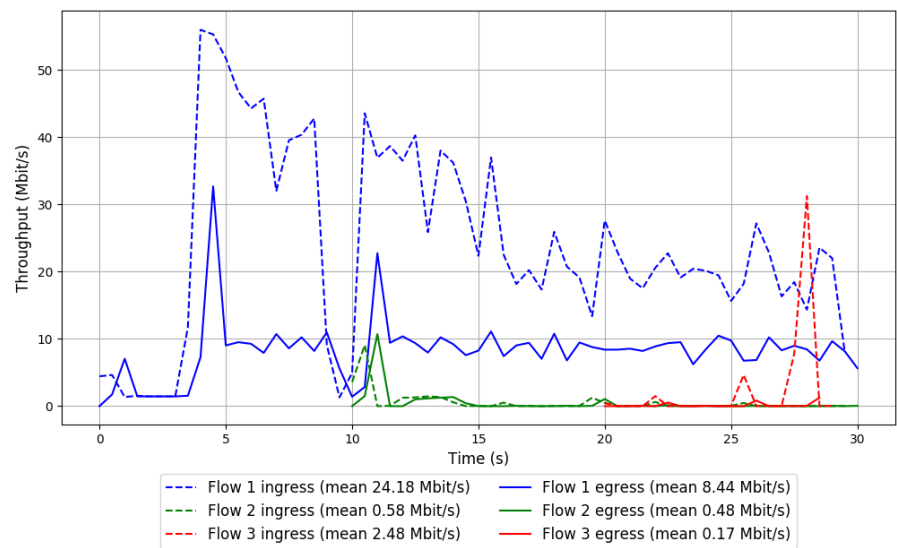
-- Flow 3:

Average throughput: 0.17 Mbit/s

95th percentile per-packet one-way delay: 88.898 ms

Loss rate: 93.90%

Run 2: Report of Muses — Data Link



Run 3: Statistics of Muses

Start at: 2018-08-28 05:24:11

End at: 2018-08-28 05:24:41

Local clock offset: 4.729 ms

Remote clock offset: 7.08 ms

Below is generated by plot.py at 2018-08-28 05:27:31

Datalink statistics

-- Total of 3 flows:

Average throughput: 6.19 Mbit/s

95th percentile per-packet one-way delay: 100.539 ms

Loss rate: 66.13%

-- Flow 1:

Average throughput: 6.37 Mbit/s

95th percentile per-packet one-way delay: 86.828 ms

Loss rate: 0.66%

-- Flow 2:

Average throughput: 8.55 Mbit/s

95th percentile per-packet one-way delay: 100.961 ms

Loss rate: 67.98%

-- Flow 3:

Average throughput: 0.90 Mbit/s

95th percentile per-packet one-way delay: 86.662 ms

Loss rate: 10.96%

Run 3: Report of Muses — Data Link

