

Pantheon Report

Generated at 2018-08-31 05:51:37 (UTC).

Data path: Brazil on **p4p1** (*remote*) → AWS Brazil 1 on **ens5** (*local*).

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.

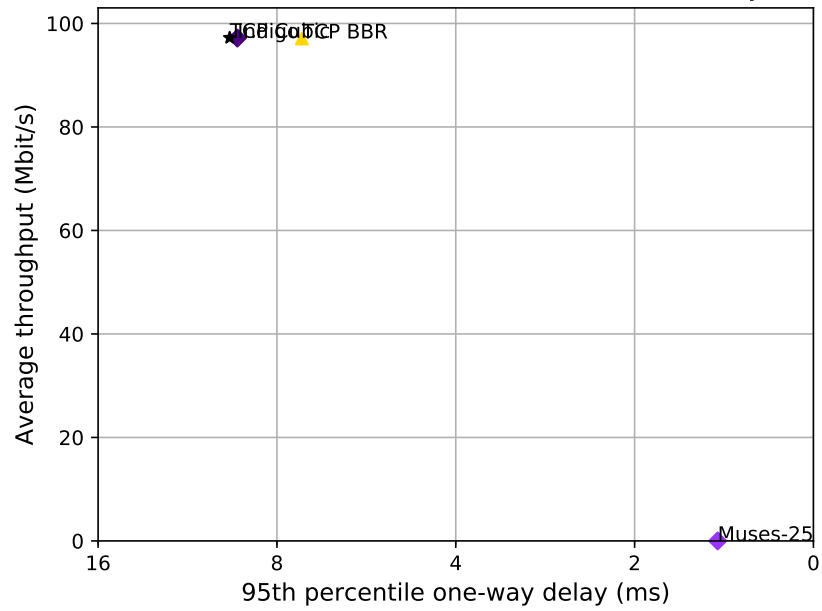
System info:

```
Linux 4.15.0-1020-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
net.ipv4.tcp_mem = 536870912 536870912 536870912
```

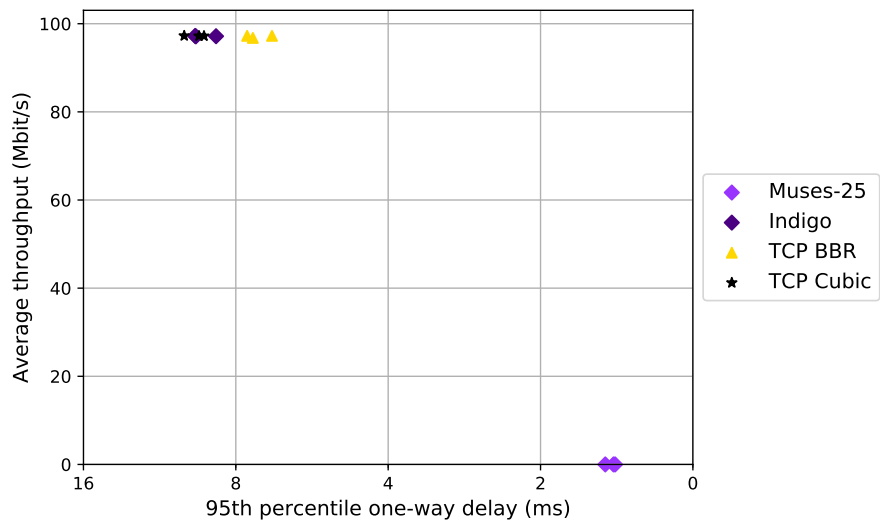
Git summary:

```
branch: muses @ 2de97ca91a065473c29a25fffe63fb137c97a67c
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ b59e0d118c50af3579569c462d33045741c85981
third_party/pantheon-tunnel @ cbfce6db5ff5740dafa1771f813cd646339e1952
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 Brazil to AWS Brazil 1, 3 runs of 30s each per scheme
 3 flows with 10s interval between flows (mean of all runs by scheme)



test from Brazil to AWS Brazil 1, 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	59.07	40.76	32.76	7.15	7.03	7.46	0.10	0.04	0.12
TCP Cubic	3	59.46	40.54	32.41	9.81	9.43	9.57	0.10	0.17	0.27
Indigo	3	59.52	40.58	32.40	8.96	9.20	7.74	0.59	1.55	0.12
Muses-25	3	0.00	0.00	0.00	1.23	1.08	1.29	0.00	0.00	0.00

Run 1: Statistics of TCP BBR

Start at: 2018-08-31 05:40:37

End at: 2018-08-31 05:41:07

Local clock offset: -1.251 ms

Remote clock offset: 0.19 ms

Below is generated by plot.py at 2018-08-31 05:51:30

Datalink statistics

-- Total of 3 flows:

Average throughput: 97.26 Mbit/s

95th percentile per-packet one-way delay: 6.786 ms

Loss rate: 0.05%

-- Flow 1:

Average throughput: 59.16 Mbit/s

95th percentile per-packet one-way delay: 6.507 ms

Loss rate: 0.02%

-- Flow 2:

Average throughput: 40.82 Mbit/s

95th percentile per-packet one-way delay: 6.549 ms

Loss rate: 0.04%

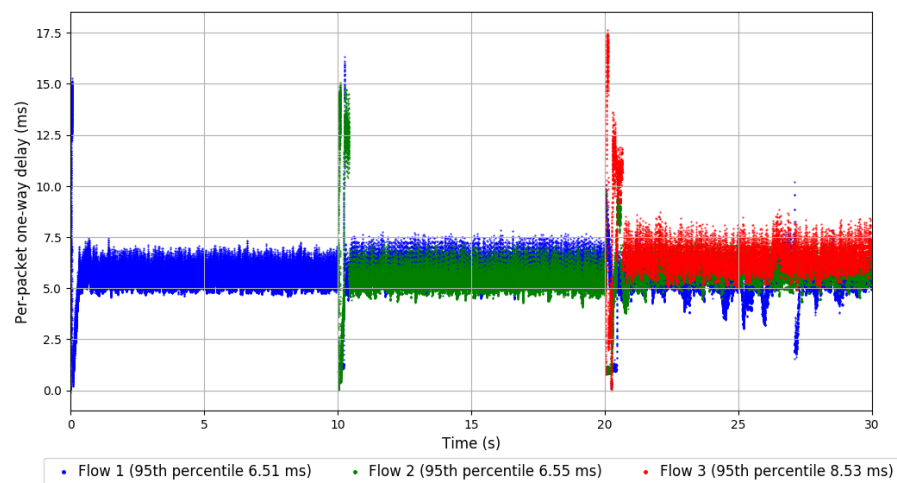
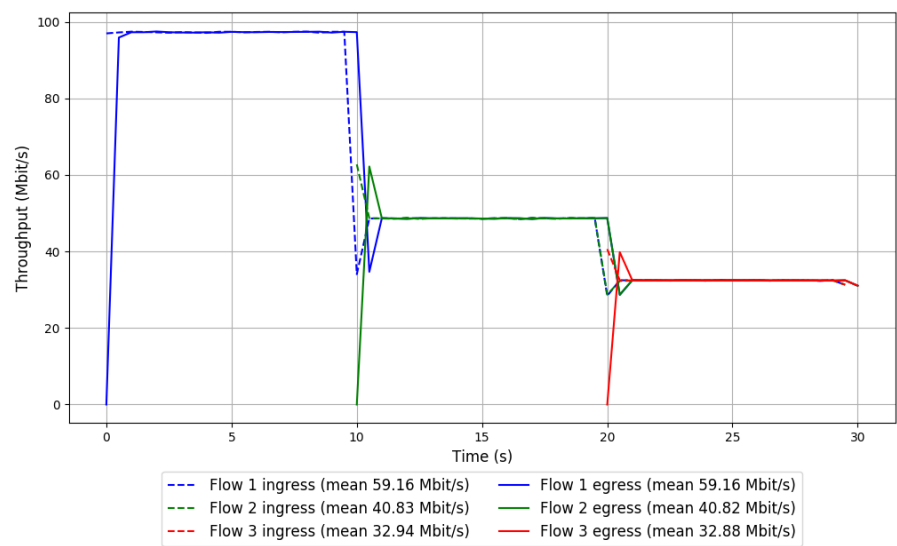
-- Flow 3:

Average throughput: 32.88 Mbit/s

95th percentile per-packet one-way delay: 8.527 ms

Loss rate: 0.22%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-08-31 05:45:04

End at: 2018-08-31 05:45:34

Local clock offset: -0.485 ms

Remote clock offset: 0.161 ms

Below is generated by plot.py at 2018-08-31 05:51:30

Datalink statistics

-- Total of 3 flows:

Average throughput: 97.25 Mbit/s

95th percentile per-packet one-way delay: 7.599 ms

Loss rate: 0.17%

-- Flow 1:

Average throughput: 59.12 Mbit/s

95th percentile per-packet one-way delay: 7.768 ms

Loss rate: 0.25%

-- Flow 2:

Average throughput: 40.88 Mbit/s

95th percentile per-packet one-way delay: 6.740 ms

Loss rate: 0.04%

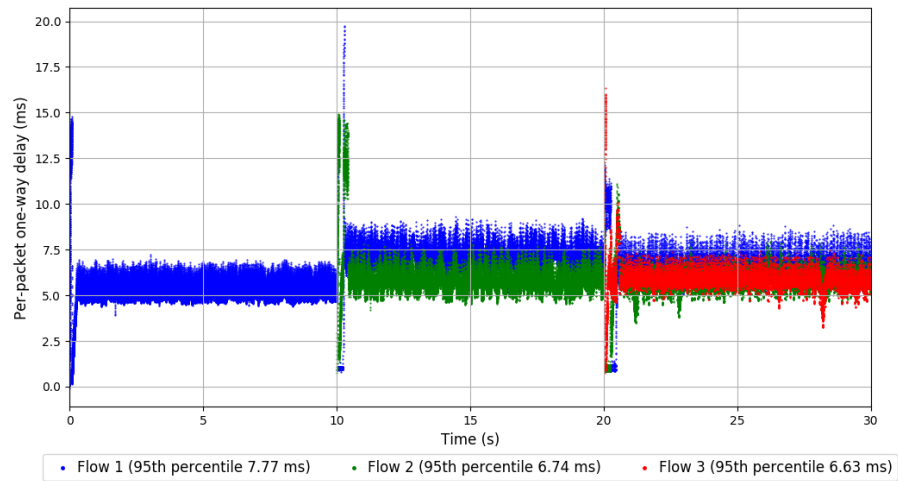
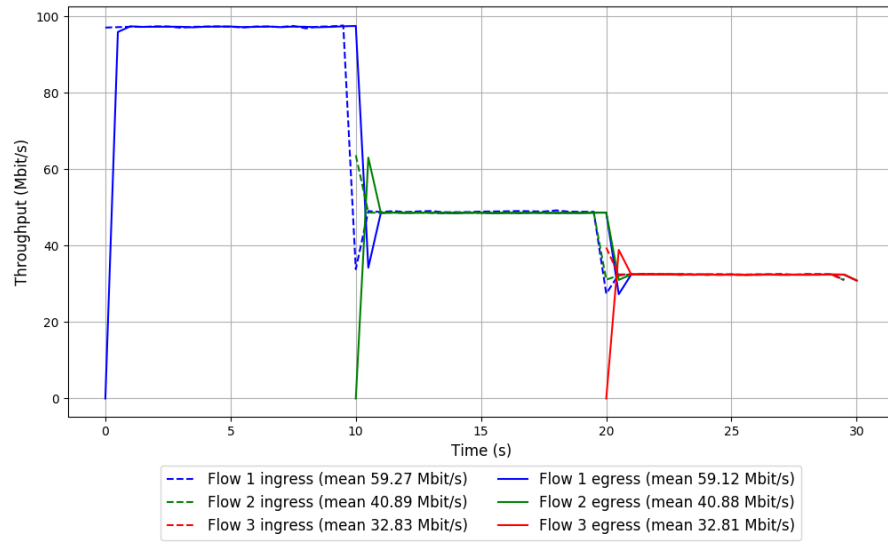
-- Flow 3:

Average throughput: 32.81 Mbit/s

95th percentile per-packet one-way delay: 6.630 ms

Loss rate: 0.08%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2018-08-31 05:49:32

End at: 2018-08-31 05:50:02

Local clock offset: 0.893 ms

Remote clock offset: 0.104 ms

Below is generated by plot.py at 2018-08-31 05:51:30

Datalink statistics

-- Total of 3 flows:

Average throughput: 96.79 Mbit/s

95th percentile per-packet one-way delay: 7.403 ms

Loss rate: 0.03%

-- Flow 1:

Average throughput: 58.93 Mbit/s

95th percentile per-packet one-way delay: 7.181 ms

Loss rate: 0.02%

-- Flow 2:

Average throughput: 40.59 Mbit/s

95th percentile per-packet one-way delay: 7.813 ms

Loss rate: 0.03%

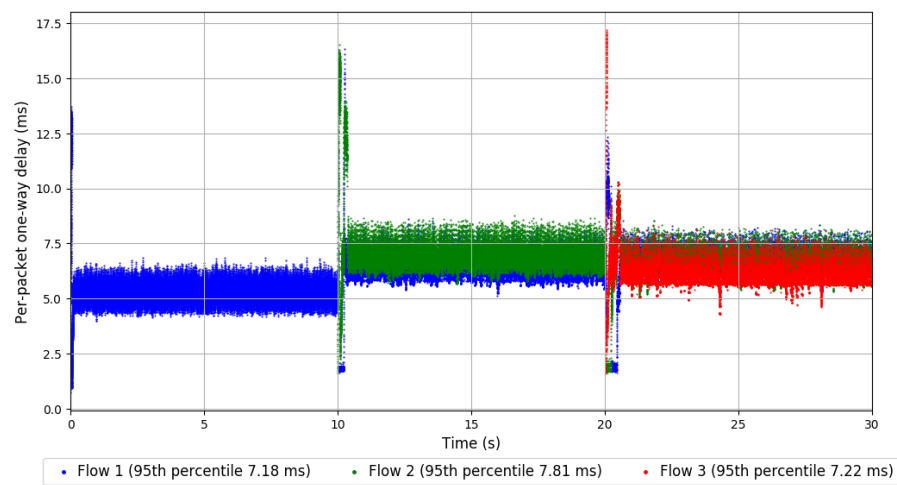
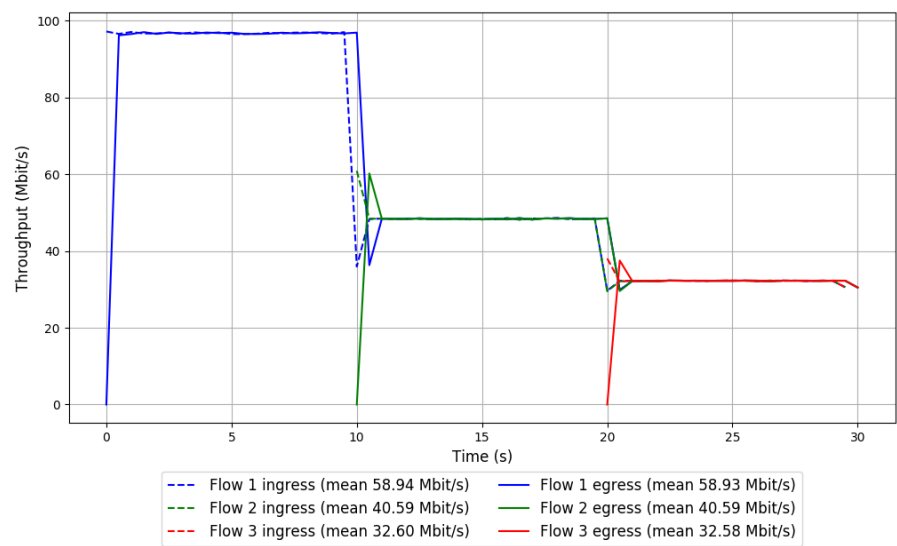
-- Flow 3:

Average throughput: 32.58 Mbit/s

95th percentile per-packet one-way delay: 7.219 ms

Loss rate: 0.07%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2018-08-31 05:38:26

End at: 2018-08-31 05:38:56

Local clock offset: -0.23 ms

Remote clock offset: 0.188 ms

Below is generated by plot.py at 2018-08-31 05:51:30

Datalink statistics

-- Total of 3 flows:

Average throughput: 97.26 Mbit/s

95th percentile per-packet one-way delay: 10.117 ms

Loss rate: 0.14%

-- Flow 1:

Average throughput: 59.49 Mbit/s

95th percentile per-packet one-way delay: 10.442 ms

Loss rate: 0.10%

-- Flow 2:

Average throughput: 40.55 Mbit/s

95th percentile per-packet one-way delay: 9.911 ms

Loss rate: 0.18%

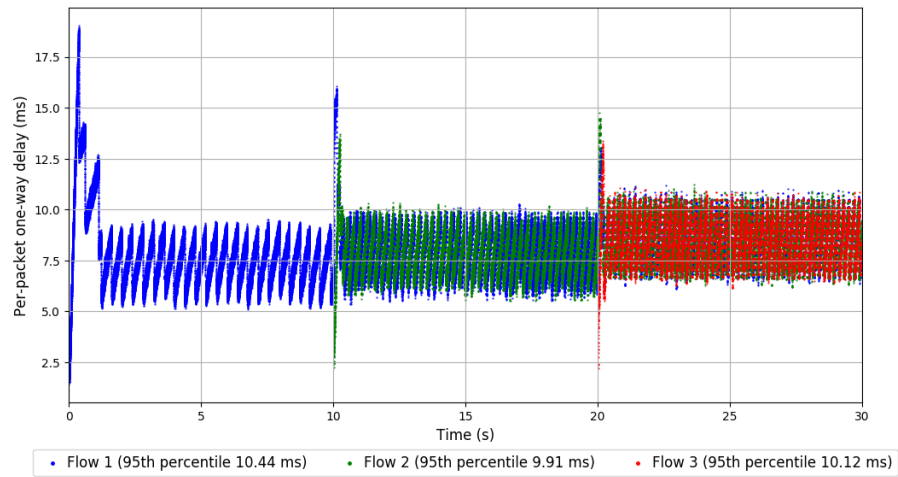
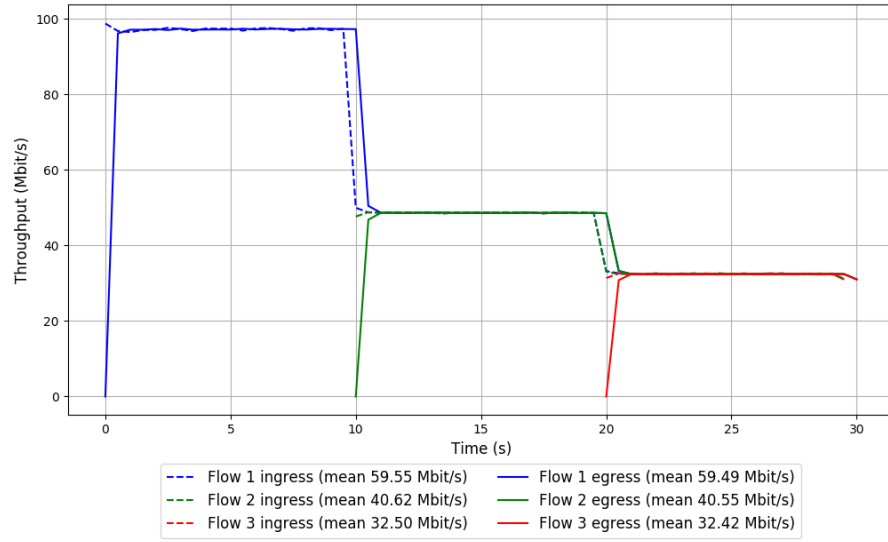
-- Flow 3:

Average throughput: 32.42 Mbit/s

95th percentile per-packet one-way delay: 10.119 ms

Loss rate: 0.28%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2018-08-31 05:42:53

End at: 2018-08-31 05:43:23

Local clock offset: -0.078 ms

Remote clock offset: 0.185 ms

Below is generated by plot.py at 2018-08-31 05:51:32

Datalink statistics

-- Total of 3 flows:

Average throughput: 97.21 Mbit/s

95th percentile per-packet one-way delay: 9.246 ms

Loss rate: 0.13%

-- Flow 1:

Average throughput: 59.42 Mbit/s

95th percentile per-packet one-way delay: 9.212 ms

Loss rate: 0.09%

-- Flow 2:

Average throughput: 40.54 Mbit/s

95th percentile per-packet one-way delay: 9.125 ms

Loss rate: 0.17%

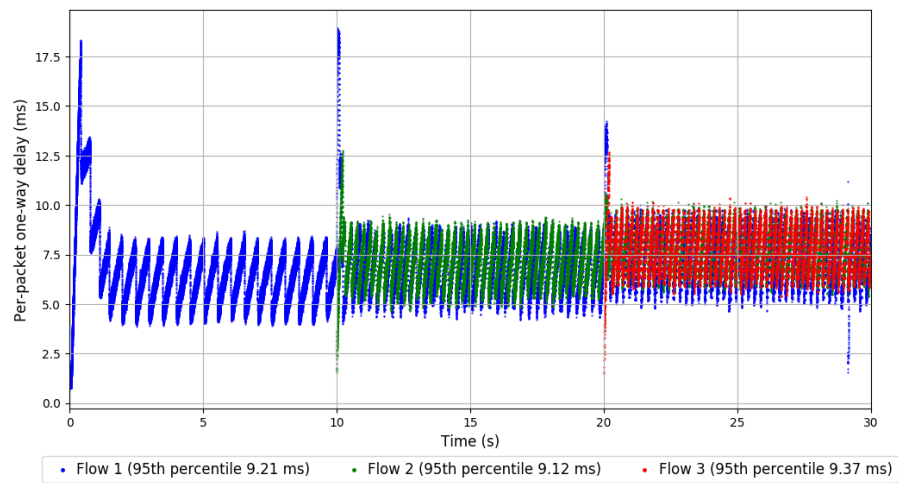
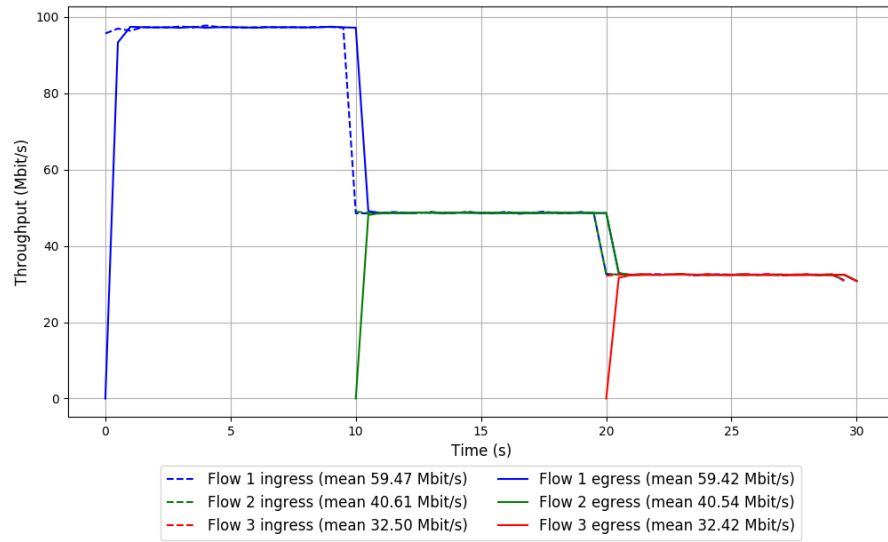
-- Flow 3:

Average throughput: 32.42 Mbit/s

95th percentile per-packet one-way delay: 9.370 ms

Loss rate: 0.27%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2018-08-31 05:47:20

End at: 2018-08-31 05:47:50

Local clock offset: 0.621 ms

Remote clock offset: 0.097 ms

Below is generated by plot.py at 2018-08-31 05:51:32

Datalink statistics

-- Total of 3 flows:

Average throughput: 97.22 Mbit/s

95th percentile per-packet one-way delay: 9.458 ms

Loss rate: 0.14%

-- Flow 1:

Average throughput: 59.47 Mbit/s

95th percentile per-packet one-way delay: 9.779 ms

Loss rate: 0.10%

-- Flow 2:

Average throughput: 40.53 Mbit/s

95th percentile per-packet one-way delay: 9.253 ms

Loss rate: 0.17%

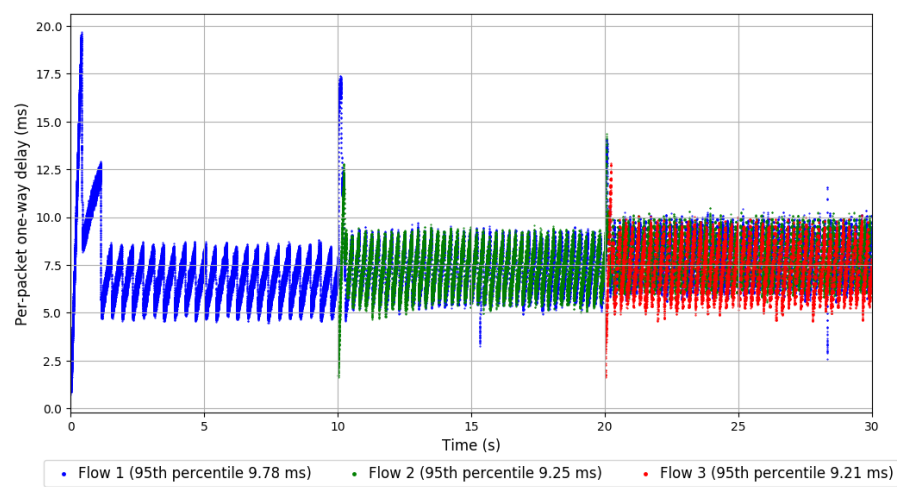
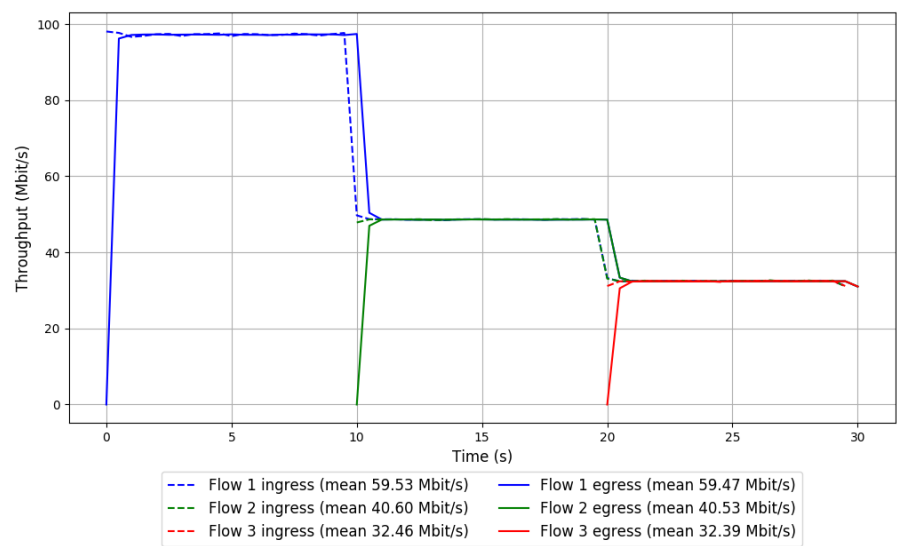
-- Flow 3:

Average throughput: 32.39 Mbit/s

95th percentile per-packet one-way delay: 9.211 ms

Loss rate: 0.25%

Run 3: Report of TCP Cubic — Data Link

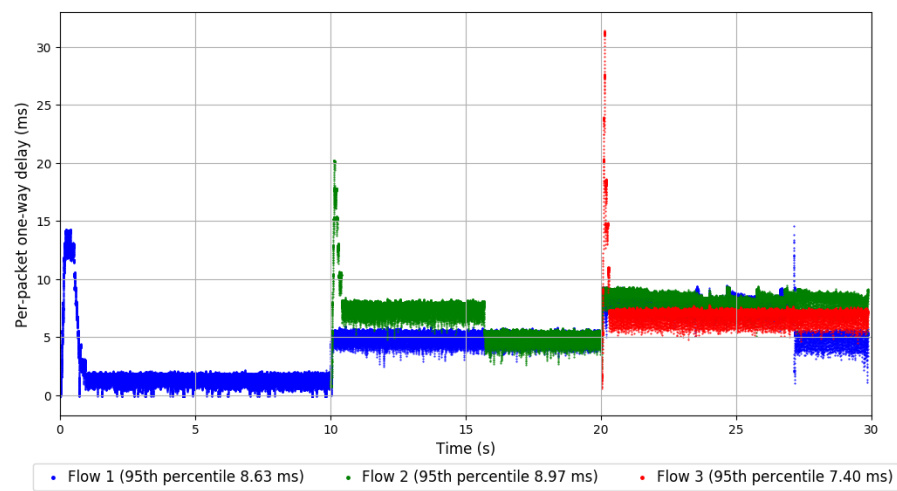
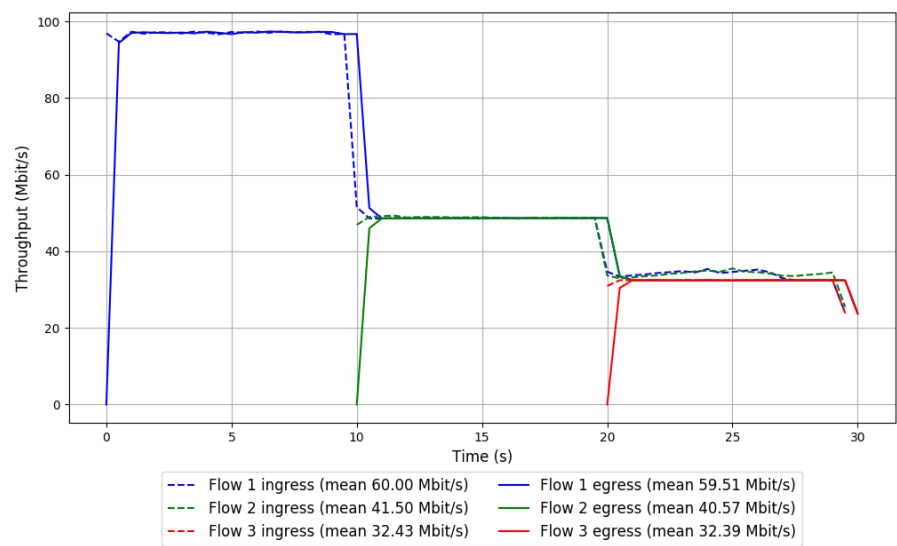


```
Run 1: Statistics of Indigo

Start at: 2018-08-31 05:37:17
End at: 2018-08-31 05:37:47
Local clock offset: -2.09 ms
Remote clock offset: 0.239 ms

# Below is generated by plot.py at 2018-08-31 05:51:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 97.16 Mbit/s
95th percentile per-packet one-way delay: 8.753 ms
Loss rate: 1.15%
-- Flow 1:
Average throughput: 59.51 Mbit/s
95th percentile per-packet one-way delay: 8.627 ms
Loss rate: 0.81%
-- Flow 2:
Average throughput: 40.57 Mbit/s
95th percentile per-packet one-way delay: 8.969 ms
Loss rate: 2.27%
-- Flow 3:
Average throughput: 32.39 Mbit/s
95th percentile per-packet one-way delay: 7.404 ms
Loss rate: 0.15%
```

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2018-08-31 05:41:44

End at: 2018-08-31 05:42:14

Local clock offset: -0.243 ms

Remote clock offset: 0.188 ms

Below is generated by plot.py at 2018-08-31 05:51:32

Datalink statistics

-- Total of 3 flows:

Average throughput: 97.23 Mbit/s

95th percentile per-packet one-way delay: 9.626 ms

Loss rate: 0.61%

-- Flow 1:

Average throughput: 59.55 Mbit/s

95th percentile per-packet one-way delay: 9.704 ms

Loss rate: 0.87%

-- Flow 2:

Average throughput: 40.61 Mbit/s

95th percentile per-packet one-way delay: 8.735 ms

Loss rate: 0.22%

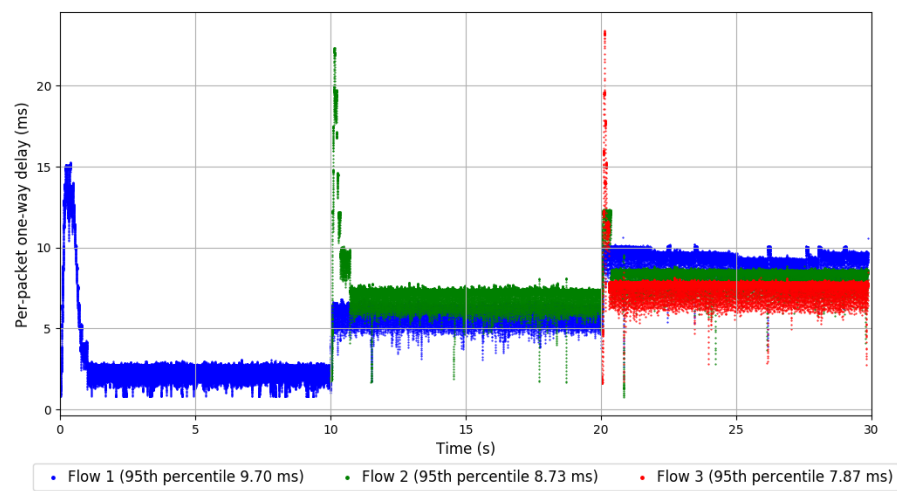
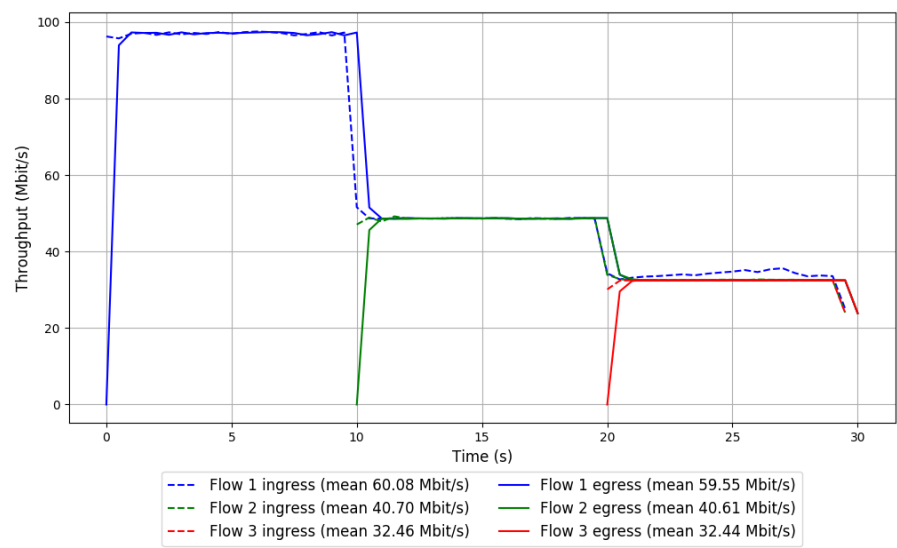
-- Flow 3:

Average throughput: 32.44 Mbit/s

95th percentile per-packet one-way delay: 7.871 ms

Loss rate: 0.10%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-08-31 05:46:12

End at: 2018-08-31 05:46:42

Local clock offset: 0.397 ms

Remote clock offset: 0.155 ms

Below is generated by plot.py at 2018-08-31 05:51:36

Datalink statistics

-- Total of 3 flows:

Average throughput: 97.13 Mbit/s

95th percentile per-packet one-way delay: 9.597 ms

Loss rate: 0.68%

-- Flow 1:

Average throughput: 59.50 Mbit/s

95th percentile per-packet one-way delay: 8.561 ms

Loss rate: 0.08%

-- Flow 2:

Average throughput: 40.57 Mbit/s

95th percentile per-packet one-way delay: 9.883 ms

Loss rate: 2.17%

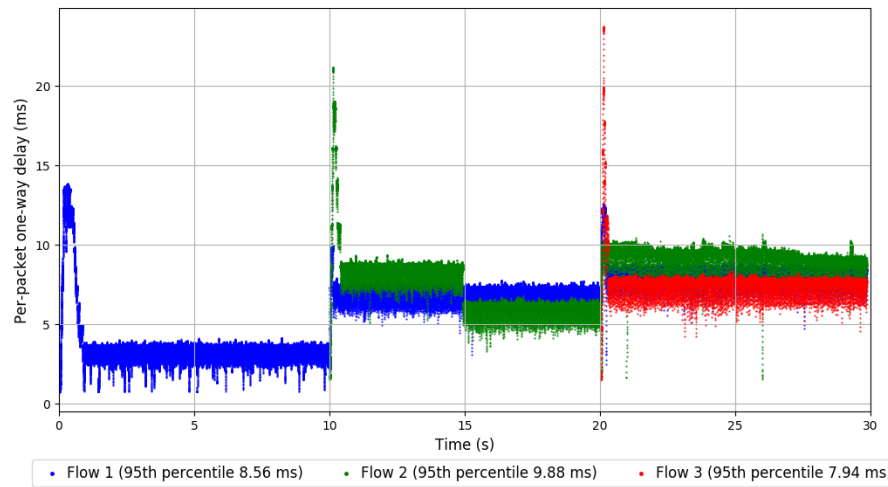
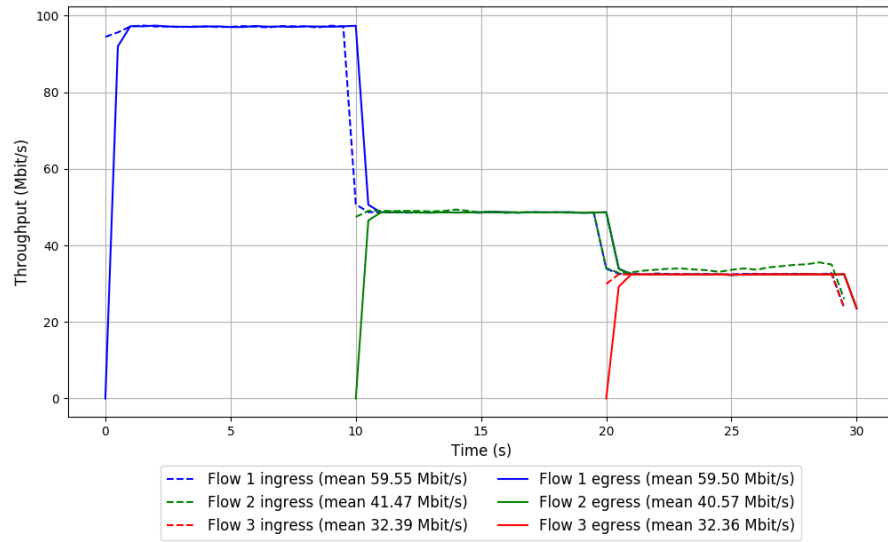
-- Flow 3:

Average throughput: 32.36 Mbit/s

95th percentile per-packet one-way delay: 7.939 ms

Loss rate: 0.12%

Run 3: Report of Indigo — Data Link

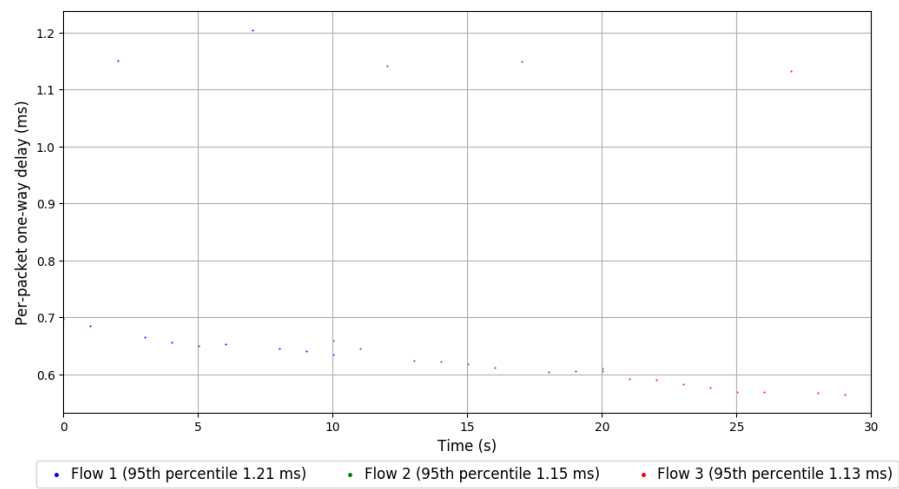
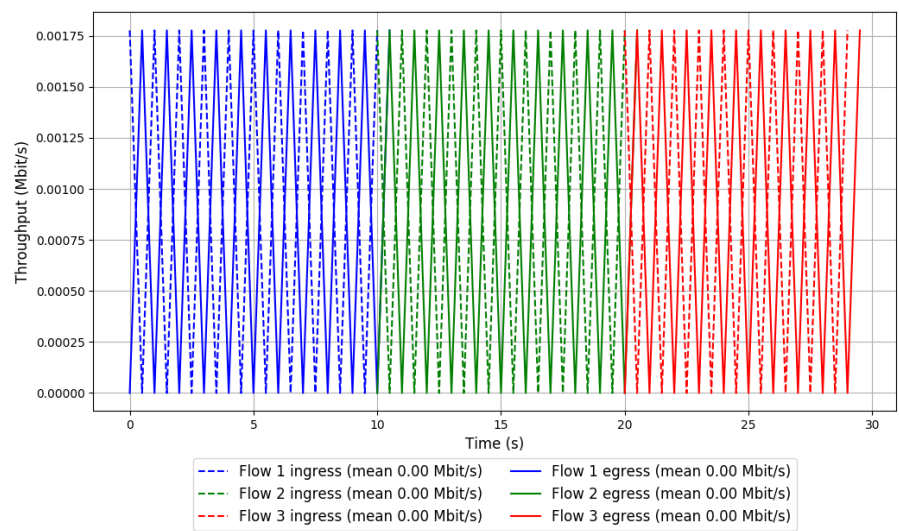


```
Run 1: Statistics of Muses-25

Start at: 2018-08-31 05:39:33
End at: 2018-08-31 05:40:03
Local clock offset: -0.706 ms
Remote clock offset: 0.187 ms

# Below is generated by plot.py at 2018-08-31 05:51:36
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 1.150 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 1.205 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 1.150 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 1.132 ms
Loss rate: 0.00%
```

Run 1: Report of Muses-25 — Data Link



Run 2: Statistics of Muses-25

Start at: 2018-08-31 05:44:00

End at: 2018-08-31 05:44:30

Local clock offset: 0.071 ms

Remote clock offset: 0.14 ms

Below is generated by plot.py at 2018-08-31 05:51:36

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 1.042 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 1.299 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 1.042 ms

Loss rate: 0.00%

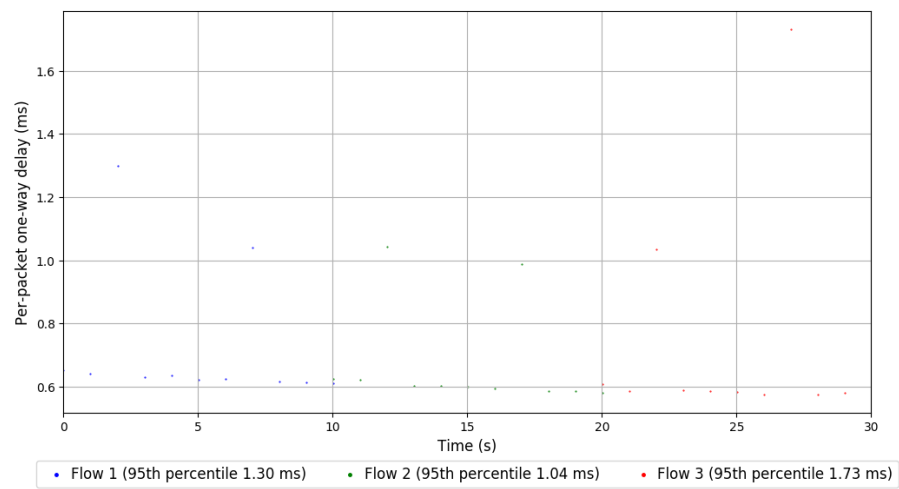
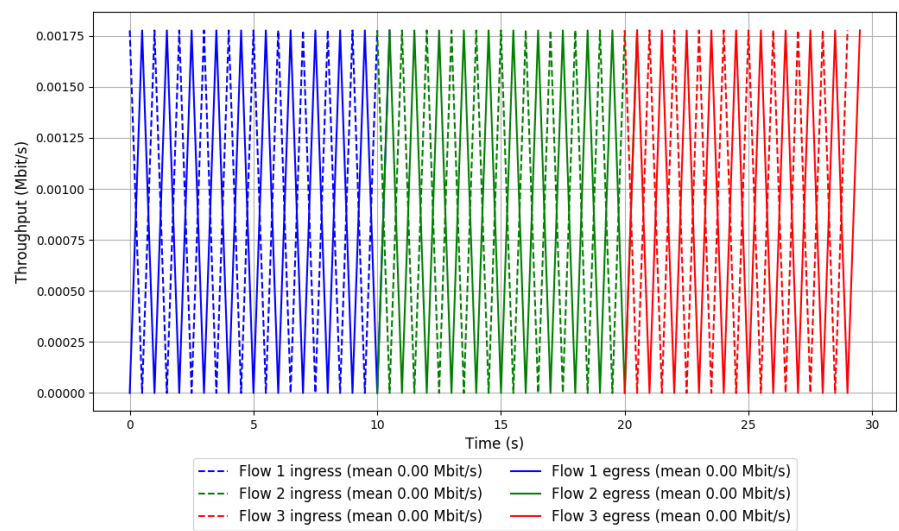
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 1.731 ms

Loss rate: 0.00%

Run 2: Report of Muses-25 — Data Link



Run 3: Statistics of Muses-25

Start at: 2018-08-31 05:48:28

End at: 2018-08-31 05:48:58

Local clock offset: 0.769 ms

Remote clock offset: 0.162 ms

Below is generated by plot.py at 2018-08-31 05:51:36

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 1.021 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 1.178 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 1.045 ms

Loss rate: 0.00%

-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 1.005 ms

Loss rate: 0.00%

Run 3: Report of Muses-25 — Data Link

