

Pantheon Report

Generated at 2018-09-03 12:14:57 (UTC).

Data path: GCE Tokyo on `ens4` (*remote*) → GCE Iowa on `ens4` (*local*).

Repeated the test of 4 congestion control schemes twice.

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

NTP offsets were measured against `time.google.com` and have been applied to correct the timestamps in logs.

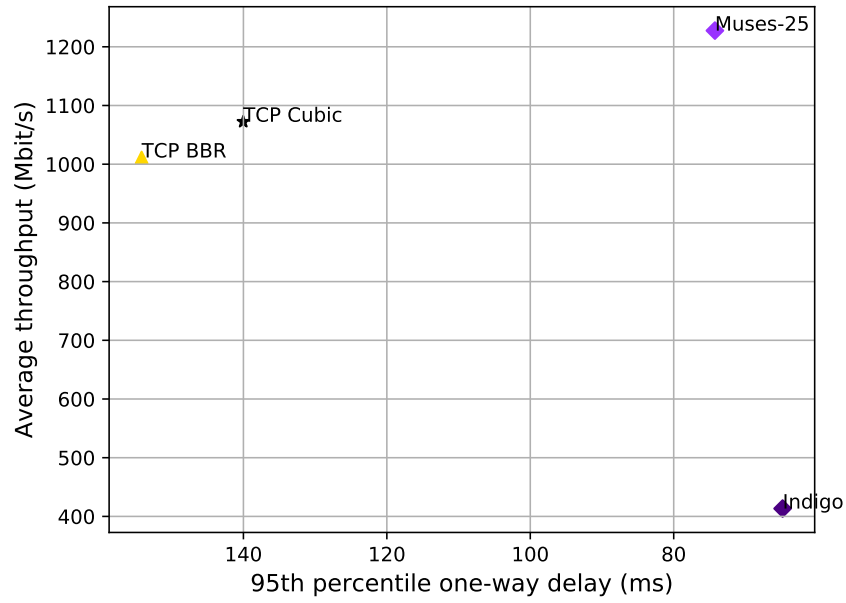
System info:

```
Linux 4.15.0-1018-gcp
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
```

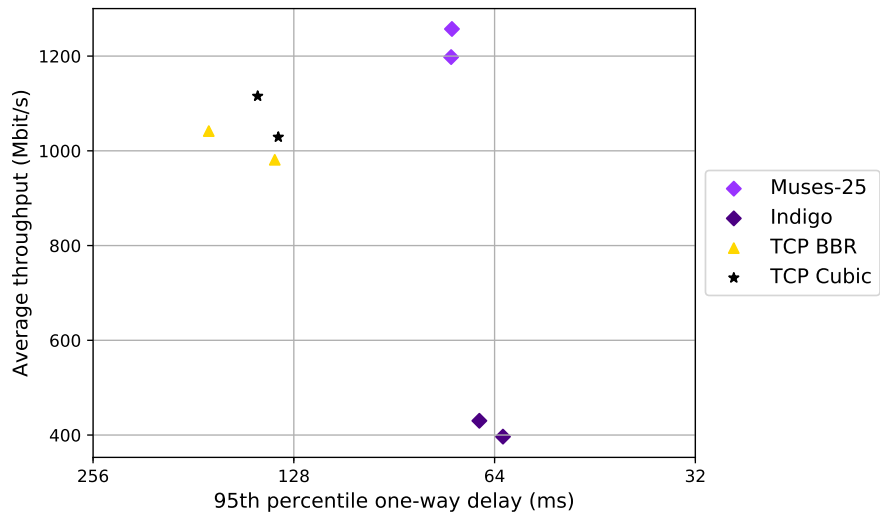
Git summary:

```
branch: muses @ f309f5459e2c5237279a184e52ece7a2b47ef1c9
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ b8d5019b83a3a678804d830fcfe1da7b3a63421b
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 GCE Tokyo to GCE Iowa, 2 runs of 30s each per scheme
 3 flows with 10s interval between flows (mean of all runs by scheme)



test from GCE Tokyo to GCE Iowa, 2 runs of 30s each per scheme
 3 flows with 10s interval between flows



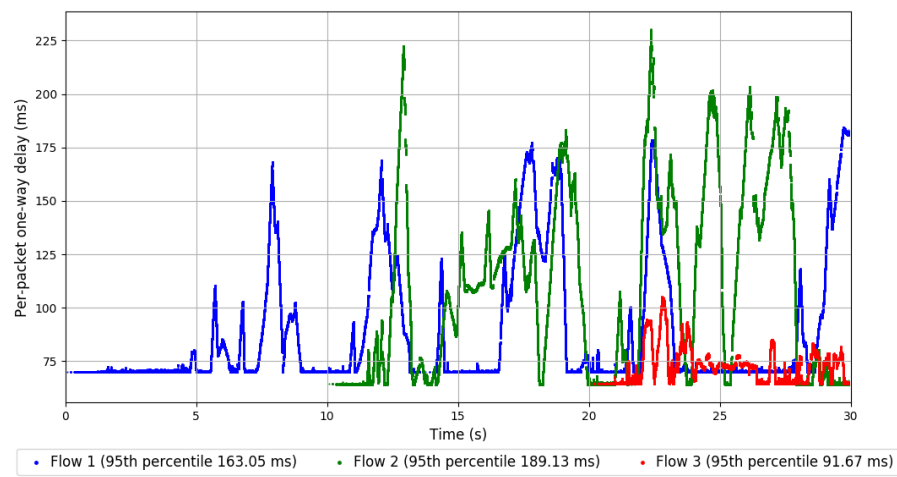
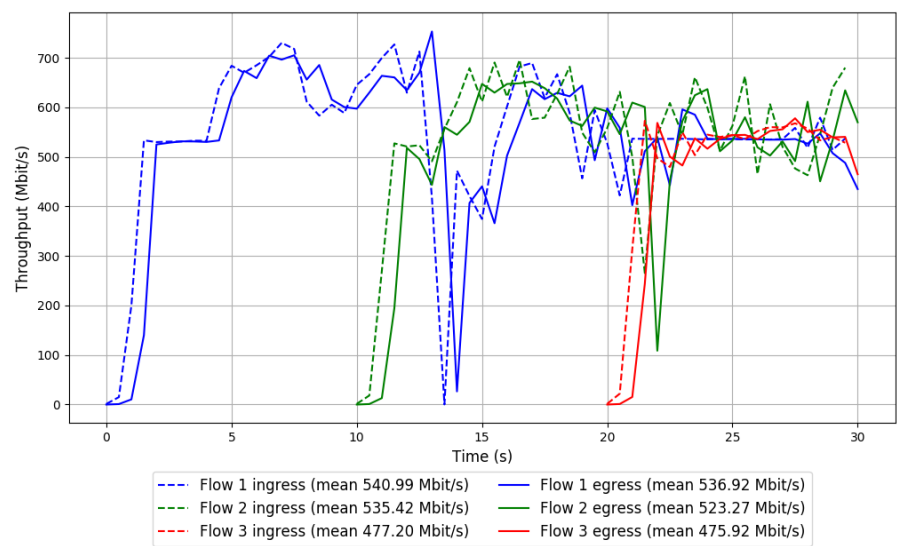
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	2	514.75	517.09	463.36	146.87	166.87	112.88	1.10	2.08	2.38
TCP Cubic	2	559.62	542.94	462.69	136.53	127.03	113.02	0.49	0.94	1.70
Indigo	2	214.72	206.38	190.84	62.10	65.71	63.09	0.43	0.71	1.42
Muses-25	2	673.65	572.95	531.38	75.11	74.57	71.37	0.46	0.62	1.19

Run 1: Statistics of TCP BBR

Start at: 2018-09-03 11:41:00
End at: 2018-09-03 11:41:30
Local clock offset: 0.673 ms
Remote clock offset: -2.102 ms

Below is generated by plot.py at 2018-09-03 12:13:51
Datalink statistics
-- Total of 3 flows:
Average throughput: 1041.72 Mbit/s
95th percentile per-packet one-way delay: 171.683 ms
Loss rate: 1.81%
-- Flow 1:
Average throughput: 536.92 Mbit/s
95th percentile per-packet one-way delay: 163.048 ms
Loss rate: 1.19%
-- Flow 2:
Average throughput: 523.27 Mbit/s
95th percentile per-packet one-way delay: 189.130 ms
Loss rate: 2.89%
-- Flow 3:
Average throughput: 475.92 Mbit/s
95th percentile per-packet one-way delay: 91.672 ms
Loss rate: 1.50%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-09-03 11:48:54

End at: 2018-09-03 11:49:24

Local clock offset: 0.778 ms

Remote clock offset: 0.906 ms

Below is generated by plot.py at 2018-09-03 12:13:51

Datalink statistics

-- Total of 3 flows:

Average throughput: 981.08 Mbit/s

95th percentile per-packet one-way delay: 136.702 ms

Loss rate: 1.45%

-- Flow 1:

Average throughput: 492.59 Mbit/s

95th percentile per-packet one-way delay: 130.686 ms

Loss rate: 1.02%

-- Flow 2:

Average throughput: 510.91 Mbit/s

95th percentile per-packet one-way delay: 144.618 ms

Loss rate: 1.26%

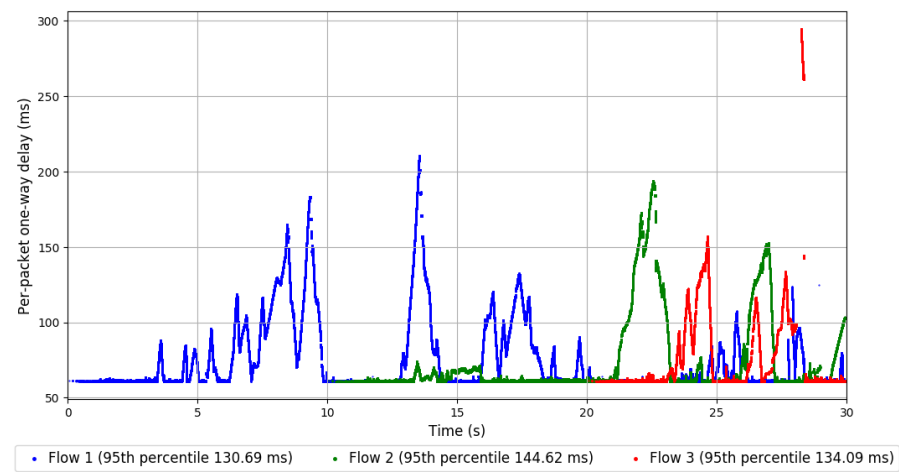
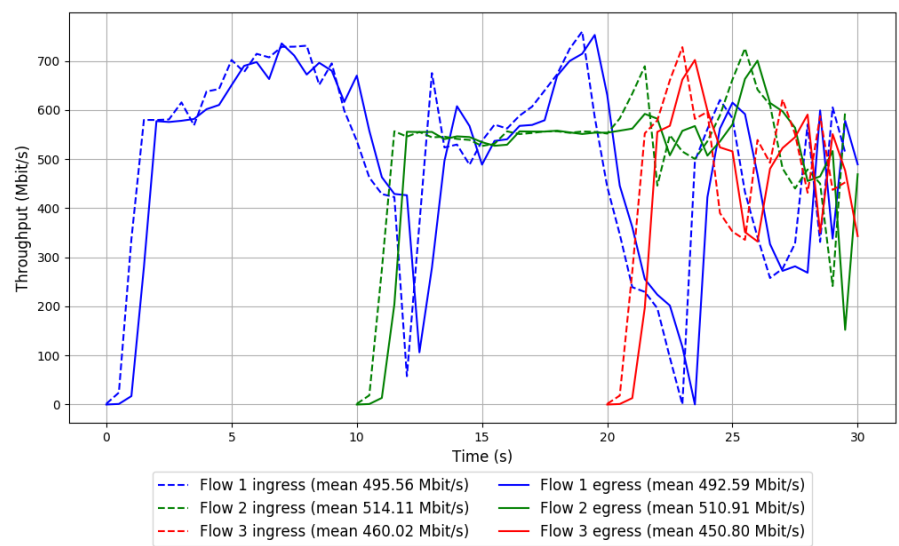
-- Flow 3:

Average throughput: 450.80 Mbit/s

95th percentile per-packet one-way delay: 134.089 ms

Loss rate: 3.26%

Run 2: Report of TCP BBR — Data Link

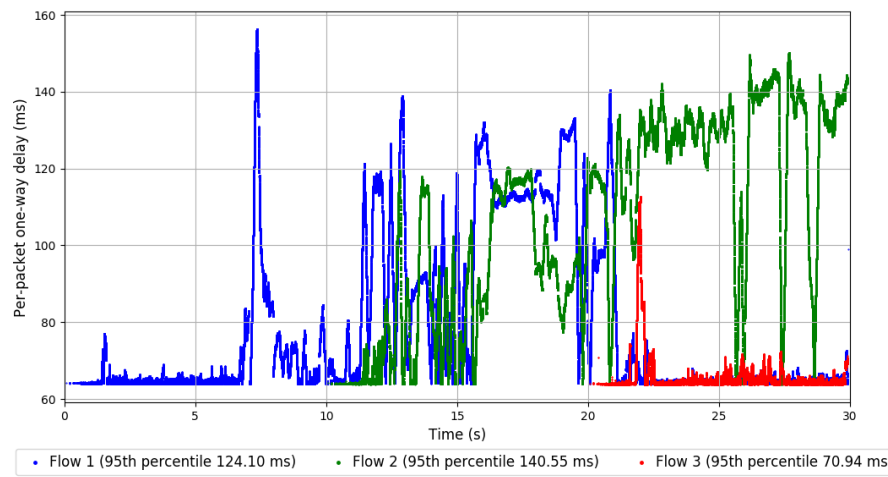
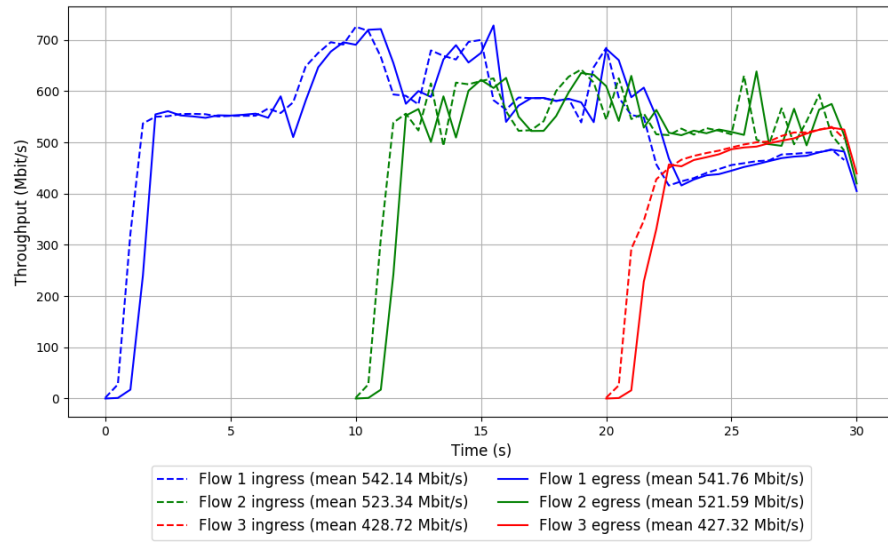


Run 1: Statistics of TCP Cubic

Start at: 2018-09-03 11:45:06
End at: 2018-09-03 11:45:36
Local clock offset: 0.727 ms
Remote clock offset: -2.046 ms

Below is generated by plot.py at 2018-09-03 12:13:51
Datalink statistics
-- Total of 3 flows:
Average throughput: 1029.06 Mbit/s
95th percentile per-packet one-way delay: 135.031 ms
Loss rate: 0.75%
-- Flow 1:
Average throughput: 541.76 Mbit/s
95th percentile per-packet one-way delay: 124.101 ms
Loss rate: 0.39%
-- Flow 2:
Average throughput: 521.59 Mbit/s
95th percentile per-packet one-way delay: 140.553 ms
Loss rate: 0.97%
-- Flow 3:
Average throughput: 427.32 Mbit/s
95th percentile per-packet one-way delay: 70.945 ms
Loss rate: 1.59%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2018-09-03 11:52:58

End at: 2018-09-03 11:53:28

Local clock offset: 0.86 ms

Remote clock offset: 0.849 ms

Below is generated by plot.py at 2018-09-03 12:14:34

Datalink statistics

-- Total of 3 flows:

Average throughput: 1115.49 Mbit/s

95th percentile per-packet one-way delay: 145.028 ms

Loss rate: 0.87%

-- Flow 1:

Average throughput: 577.49 Mbit/s

95th percentile per-packet one-way delay: 148.960 ms

Loss rate: 0.59%

-- Flow 2:

Average throughput: 564.30 Mbit/s

95th percentile per-packet one-way delay: 113.501 ms

Loss rate: 0.90%

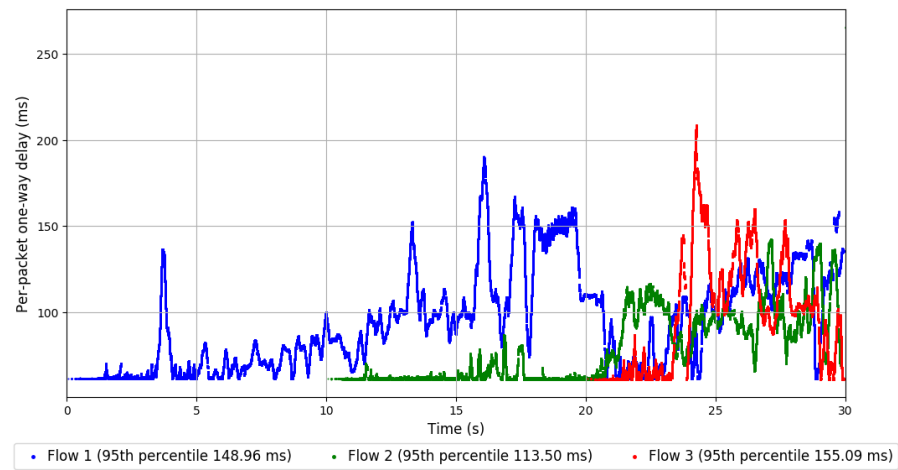
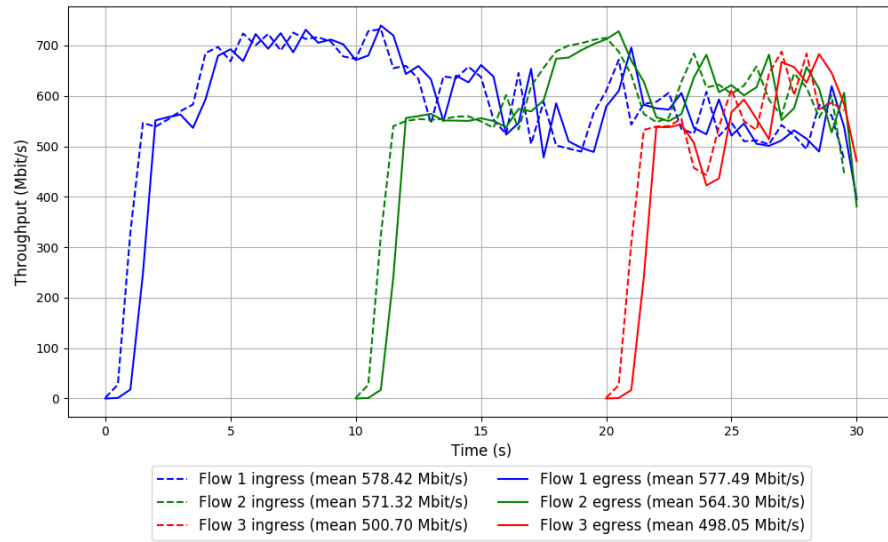
-- Flow 3:

Average throughput: 498.05 Mbit/s

95th percentile per-packet one-way delay: 155.091 ms

Loss rate: 1.80%

Run 2: Report of TCP Cubic — Data Link



Run 1: Statistics of Indigo

Start at: 2018-09-03 11:47:07

End at: 2018-09-03 11:47:37

Local clock offset: 0.759 ms

Remote clock offset: 0.871 ms

Below is generated by plot.py at 2018-09-03 12:14:34

Datalink statistics

-- Total of 3 flows:

Average throughput: 396.64 Mbit/s

95th percentile per-packet one-way delay: 62.177 ms

Loss rate: 0.69%

-- Flow 1:

Average throughput: 207.65 Mbit/s

95th percentile per-packet one-way delay: 61.819 ms

Loss rate: 0.45%

-- Flow 2:

Average throughput: 199.37 Mbit/s

95th percentile per-packet one-way delay: 62.627 ms

Loss rate: 0.70%

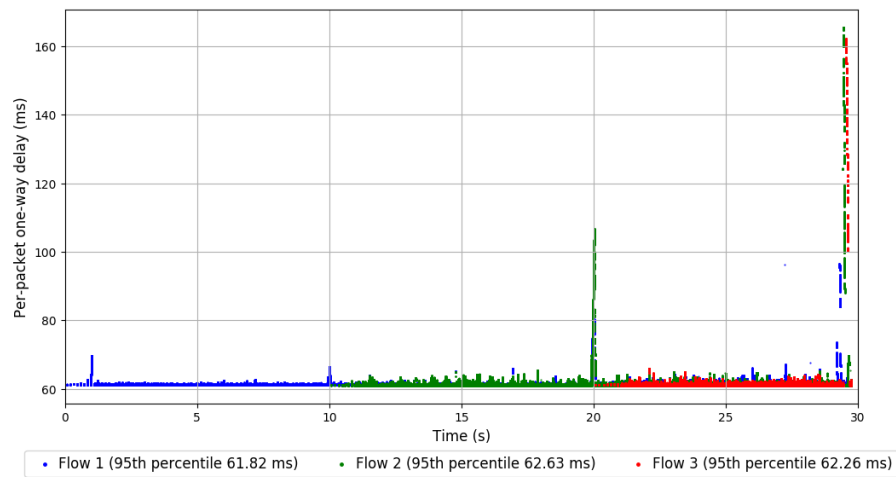
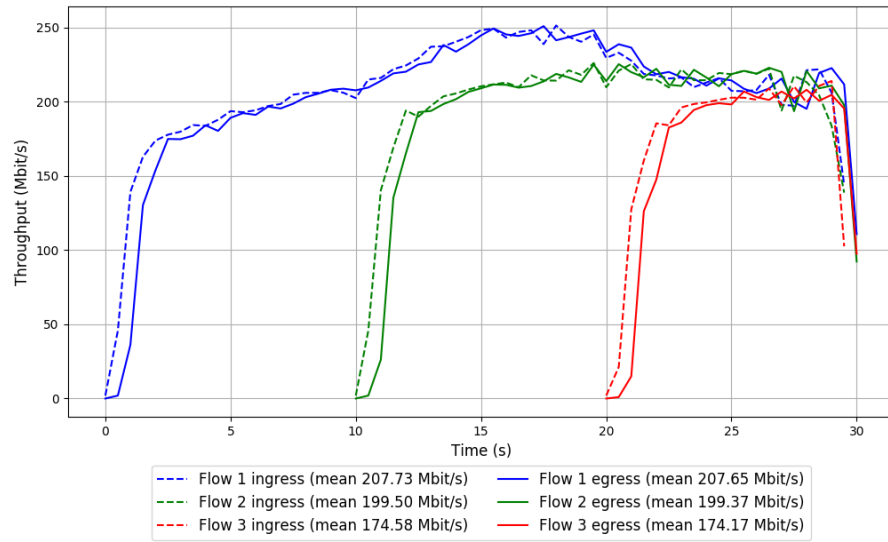
-- Flow 3:

Average throughput: 174.17 Mbit/s

95th percentile per-packet one-way delay: 62.260 ms

Loss rate: 1.53%

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2018-09-03 11:55:03

End at: 2018-09-03 11:55:33

Local clock offset: 0.855 ms

Remote clock offset: 0.968 ms

Below is generated by plot.py at 2018-09-03 12:14:34

Datalink statistics

-- Total of 3 flows:

Average throughput: 430.11 Mbit/s

95th percentile per-packet one-way delay: 67.454 ms

Loss rate: 0.66%

-- Flow 1:

Average throughput: 221.79 Mbit/s

95th percentile per-packet one-way delay: 62.378 ms

Loss rate: 0.42%

-- Flow 2:

Average throughput: 213.39 Mbit/s

95th percentile per-packet one-way delay: 68.788 ms

Loss rate: 0.72%

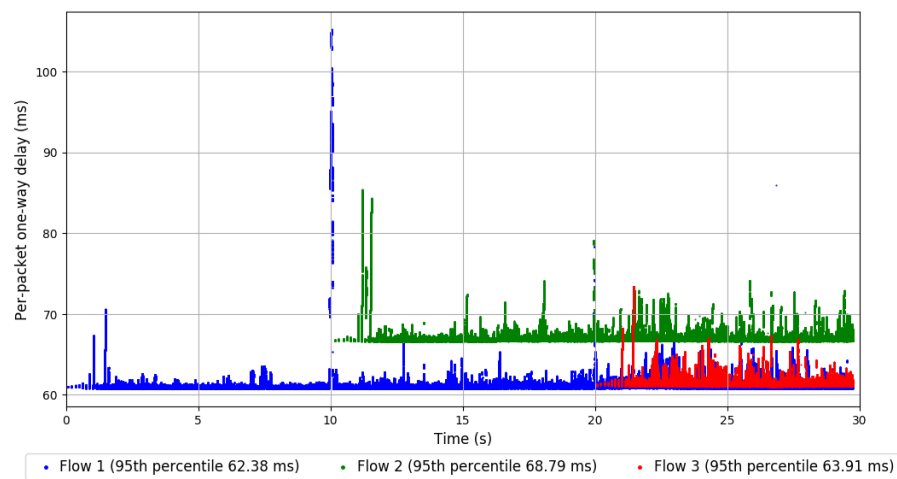
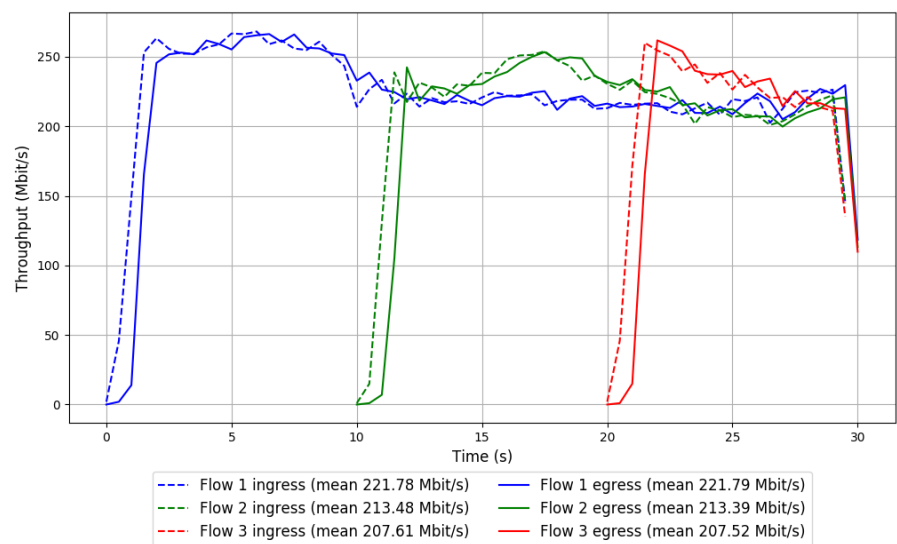
-- Flow 3:

Average throughput: 207.52 Mbit/s

95th percentile per-packet one-way delay: 63.912 ms

Loss rate: 1.30%

Run 2: Report of Indigo — Data Link



Run 1: Statistics of Muses-25

Start at: 2018-09-03 11:43:05

End at: 2018-09-03 11:43:35

Local clock offset: 0.711 ms

Remote clock offset: 0.706 ms

Below is generated by plot.py at 2018-09-03 12:14:55

Datalink statistics

-- Total of 3 flows:

Average throughput: 1257.22 Mbit/s

95th percentile per-packet one-way delay: 74.152 ms

Loss rate: 0.63%

-- Flow 1:

Average throughput: 677.48 Mbit/s

95th percentile per-packet one-way delay: 74.923 ms

Loss rate: 0.46%

-- Flow 2:

Average throughput: 603.92 Mbit/s

95th percentile per-packet one-way delay: 73.719 ms

Loss rate: 0.53%

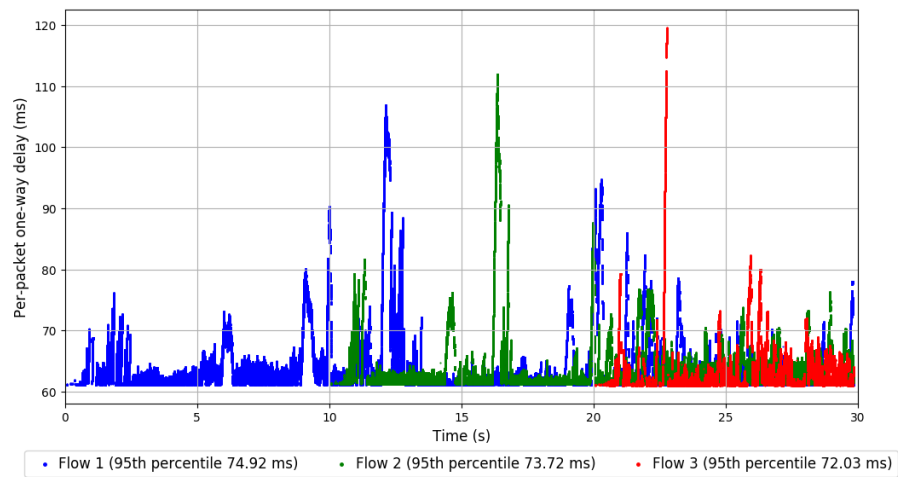
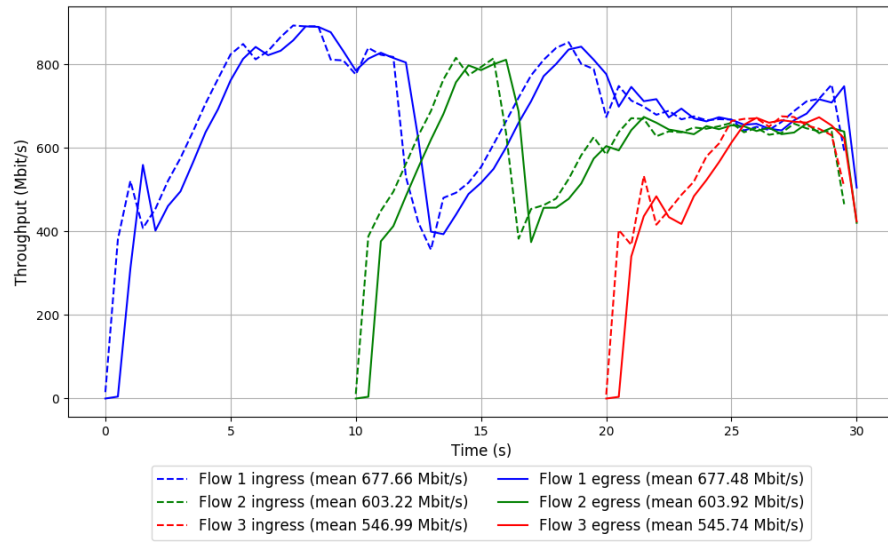
-- Flow 3:

Average throughput: 545.74 Mbit/s

95th percentile per-packet one-way delay: 72.027 ms

Loss rate: 1.53%

Run 1: Report of Muses-25 — Data Link



Run 2: Statistics of Muses-25

Start at: 2018-09-03 11:50:59

End at: 2018-09-03 11:51:29

Local clock offset: 0.792 ms

Remote clock offset: 1.056 ms

Below is generated by plot.py at 2018-09-03 12:14:55

Datalink statistics

-- Total of 3 flows:

Average throughput: 1197.91 Mbit/s

95th percentile per-packet one-way delay: 74.358 ms

Loss rate: 0.59%

-- Flow 1:

Average throughput: 669.83 Mbit/s

95th percentile per-packet one-way delay: 75.292 ms

Loss rate: 0.46%

-- Flow 2:

Average throughput: 541.98 Mbit/s

95th percentile per-packet one-way delay: 75.427 ms

Loss rate: 0.72%

-- Flow 3:

Average throughput: 517.01 Mbit/s

95th percentile per-packet one-way delay: 70.710 ms

Loss rate: 0.85%

Run 2: Report of Muses-25 — Data Link

