

Pantheon Report

Generated at 2018-08-28 08:07:16 (UTC).

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

Repeated the test of 4 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

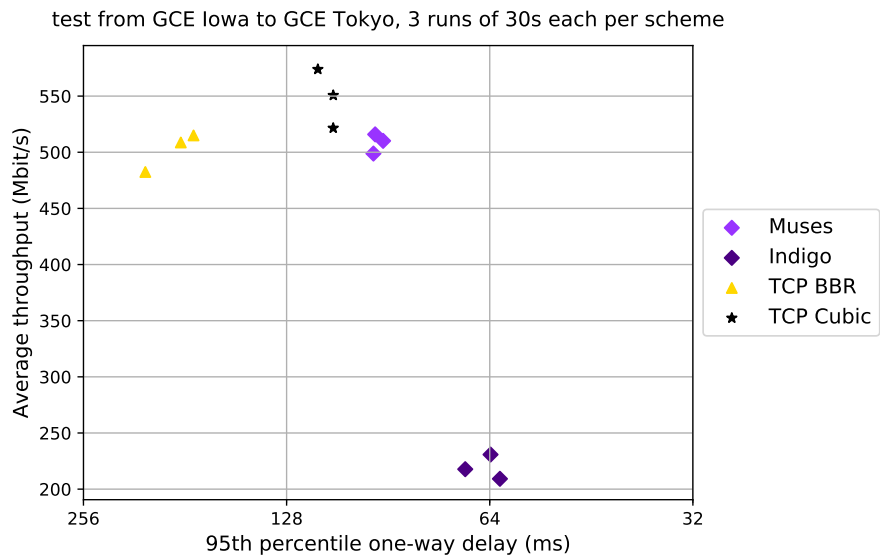
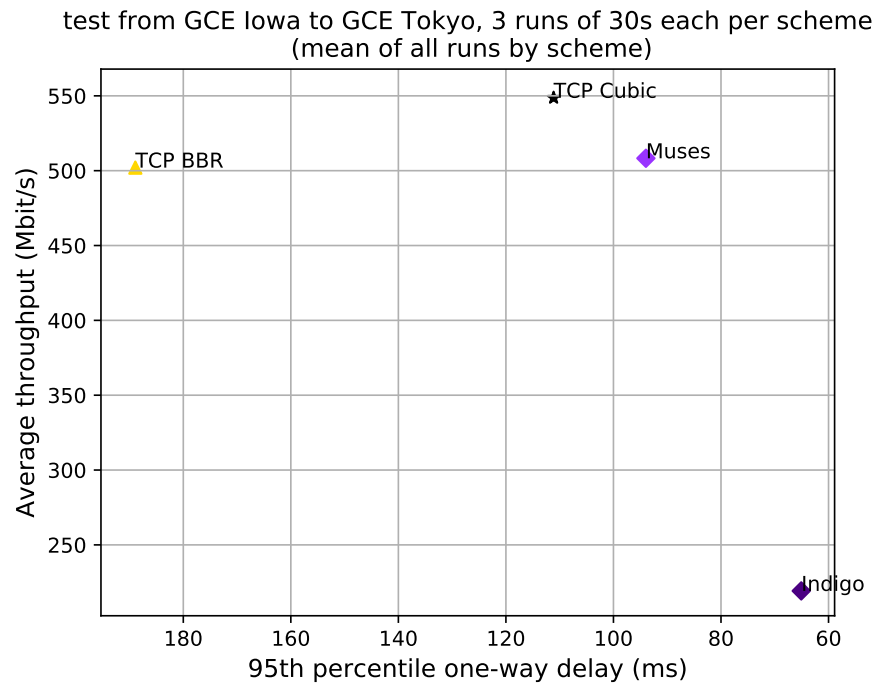
NTP offsets were measured against `time.google.com` and have been applied to correct the timestamps in logs.

System info:

```
Linux 4.15.0-1017-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
```

Git summary:

```
branch: muses @ 86ef433b09b2f4ecae1186d6940af93bcf0969cd
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ b261c9e99c63be452bc16f94ce0caa99a4c9d39a
third_party/pantheon-tunnel @ cbfce6db5ff5740dafe1771f813cd646339e1952
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
```



scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	502.05	188.92	2.29
TCP Cubic	3	548.70	111.13	0.15
Indigo	3	219.25	65.07	0.00
Muses	3	508.29	93.96	0.12

Run 1: Statistics of TCP BBR

Start at: 2018-08-28 07:36:34

End at: 2018-08-28 07:37:04

Local clock offset: 0.237 ms

Remote clock offset: 2.825 ms

Below is generated by plot.py at 2018-08-28 08:02:40

Datalink statistics

-- Total of 1 flow:

Average throughput: 482.44 Mbit/s

95th percentile per-packet one-way delay: 207.266 ms

Loss rate: 3.36%

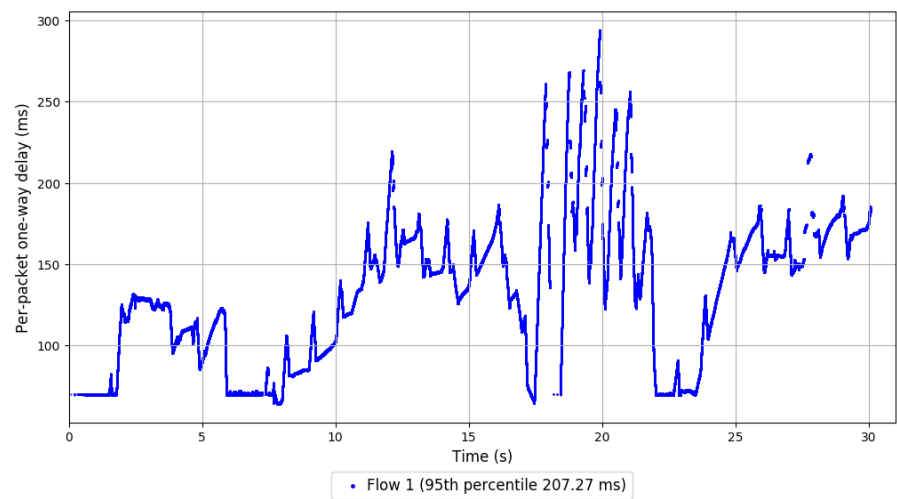
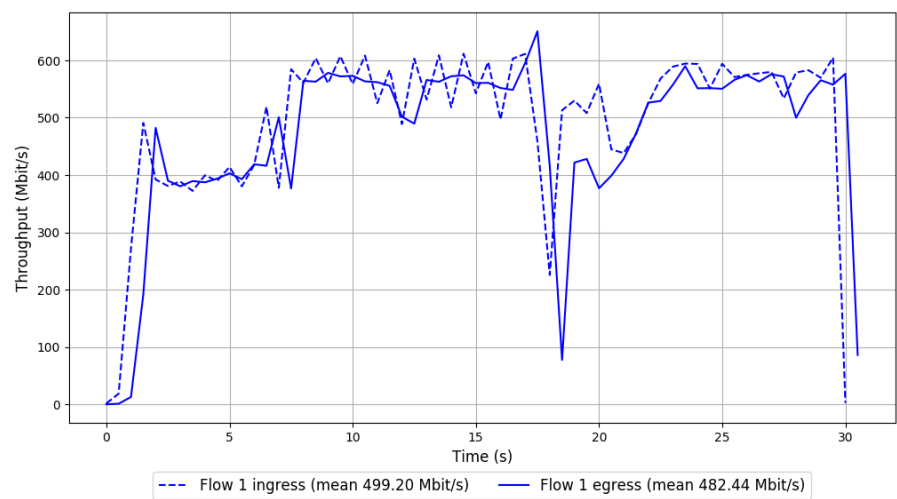
-- Flow 1:

Average throughput: 482.44 Mbit/s

95th percentile per-packet one-way delay: 207.266 ms

Loss rate: 3.36%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-08-28 07:42:35

End at: 2018-08-28 07:43:05

Local clock offset: 0.275 ms

Remote clock offset: 0.049 ms

Below is generated by plot.py at 2018-08-28 08:02:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 508.71 Mbit/s

95th percentile per-packet one-way delay: 183.648 ms

Loss rate: 1.78%

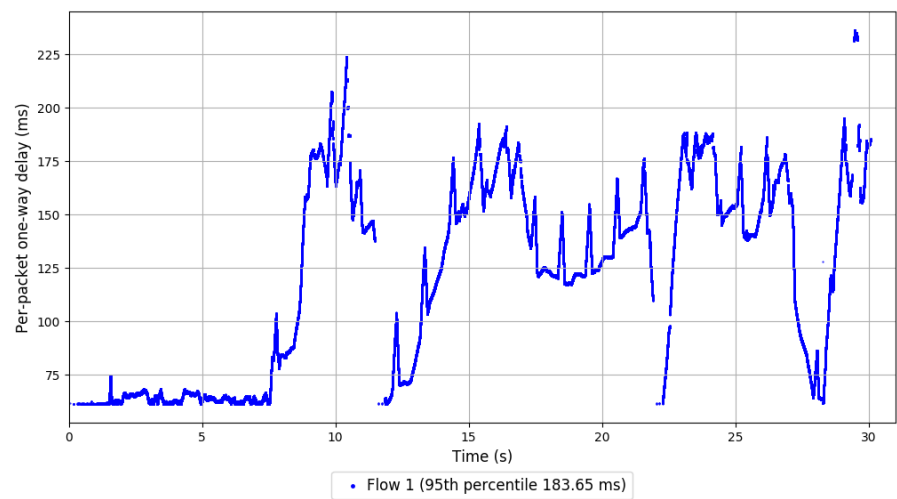
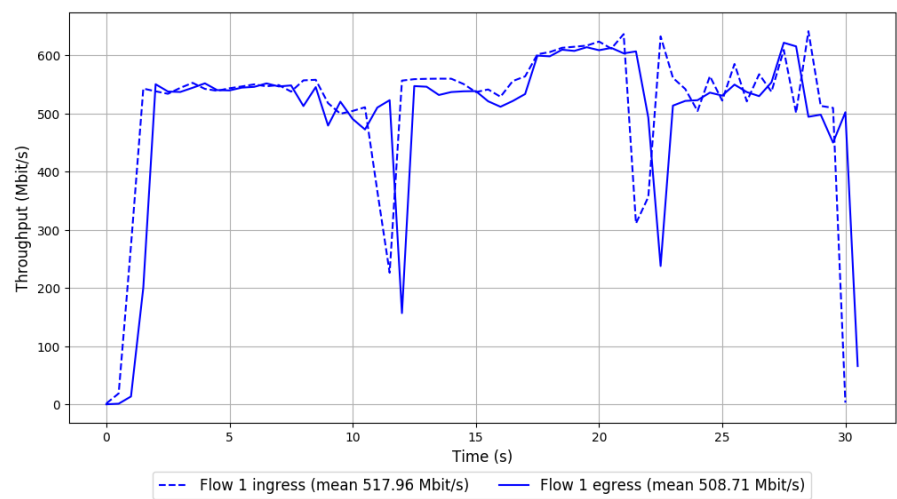
-- Flow 1:

Average throughput: 508.71 Mbit/s

95th percentile per-packet one-way delay: 183.648 ms

Loss rate: 1.78%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2018-08-28 07:48:39

End at: 2018-08-28 07:49:09

Local clock offset: 0.254 ms

Remote clock offset: -2.706 ms

Below is generated by plot.py at 2018-08-28 08:03:02

Datalink statistics

-- Total of 1 flow:

Average throughput: 515.00 Mbit/s

95th percentile per-packet one-way delay: 175.838 ms

Loss rate: 1.74%

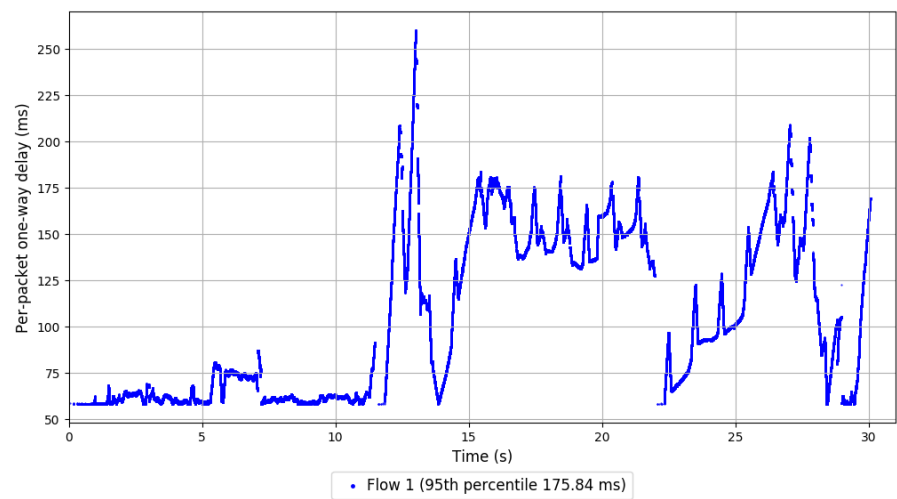
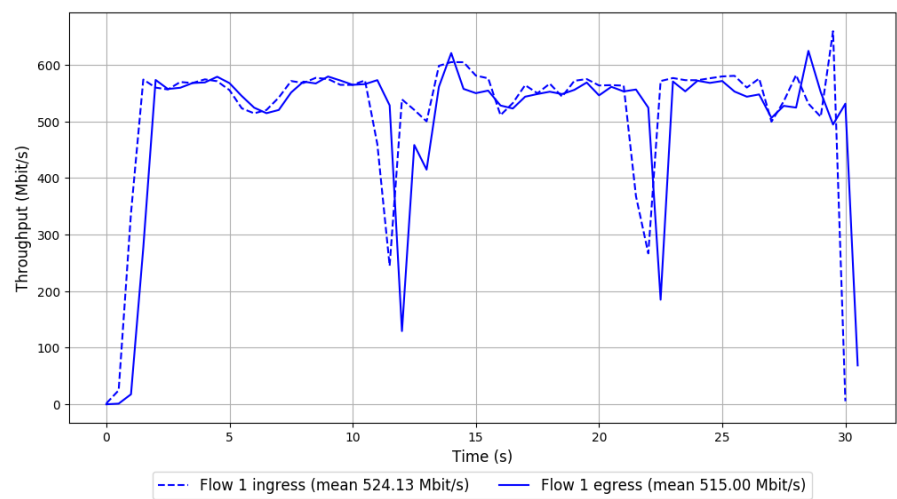
-- Flow 1:

Average throughput: 515.00 Mbit/s

95th percentile per-packet one-way delay: 175.838 ms

Loss rate: 1.74%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2018-08-28 07:35:03

End at: 2018-08-28 07:35:33

Local clock offset: 0.271 ms

Remote clock offset: 0.053 ms

Below is generated by plot.py at 2018-08-28 08:03:05

Datalink statistics

-- Total of 1 flow:

Average throughput: 521.53 Mbit/s

95th percentile per-packet one-way delay: 109.172 ms

Loss rate: 0.15%

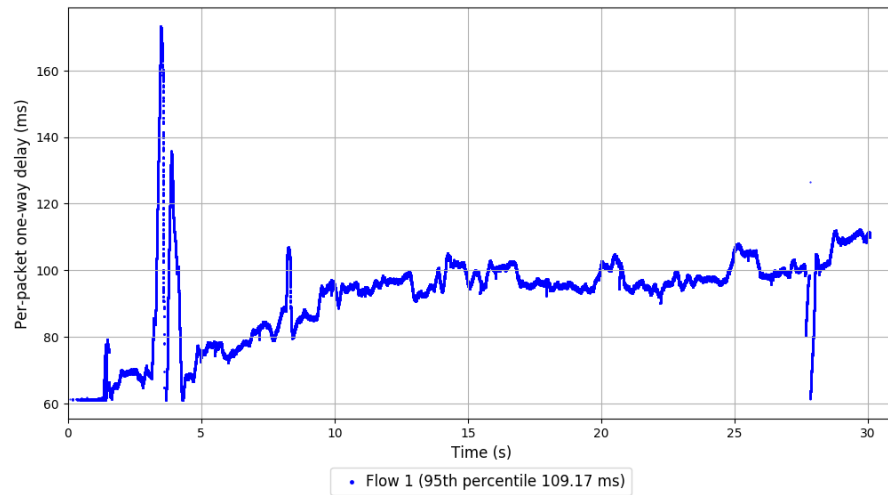
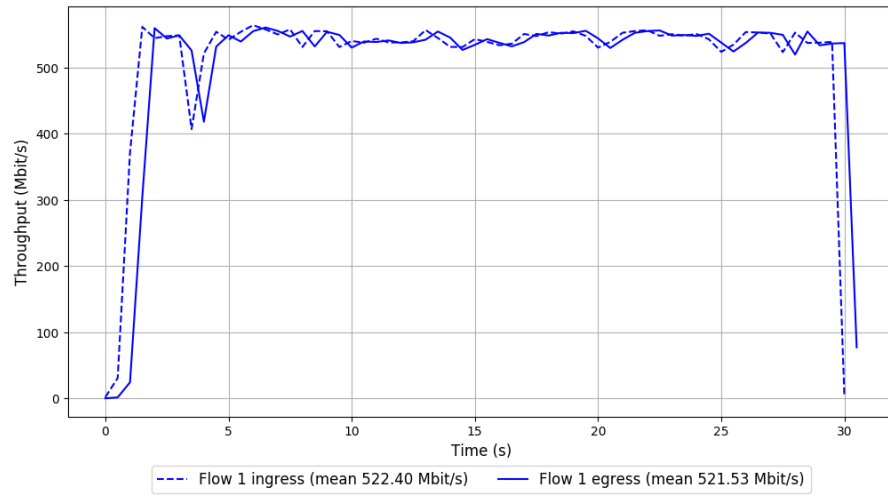
-- Flow 1:

Average throughput: 521.53 Mbit/s

95th percentile per-packet one-way delay: 109.172 ms

Loss rate: 0.15%

Run 1: Report of TCP Cubic — Data Link

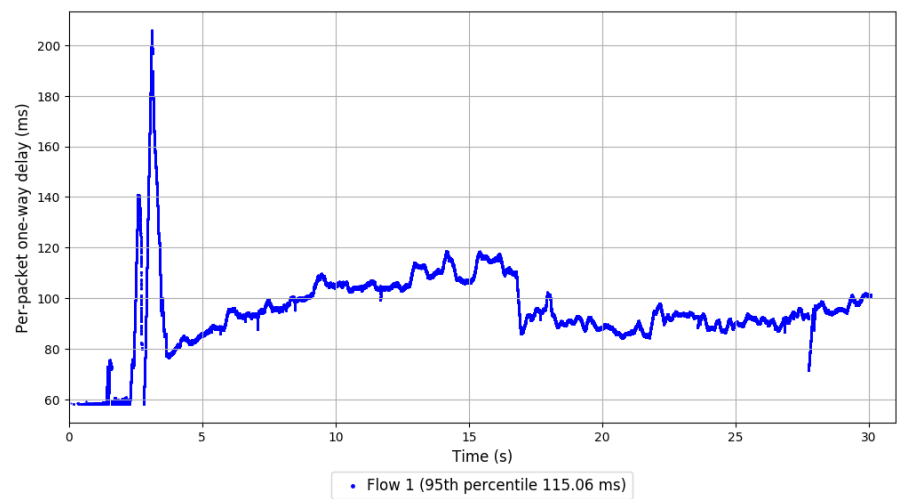
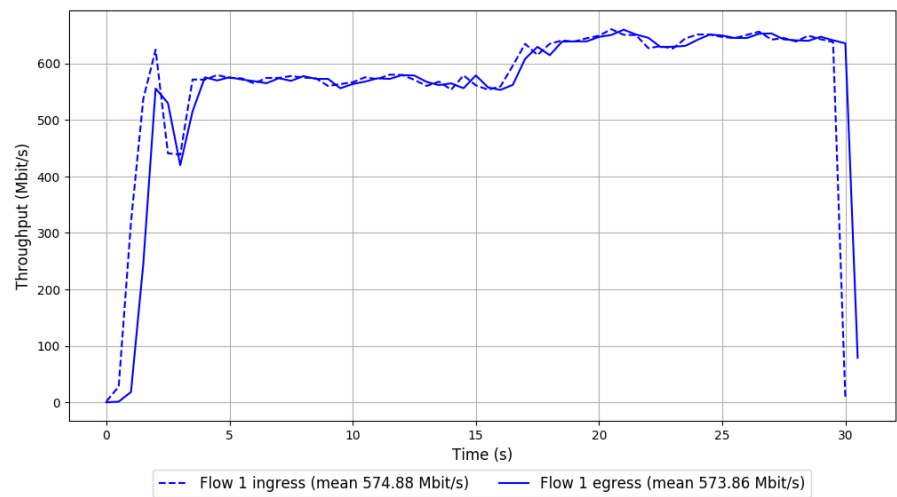


Run 2: Statistics of TCP Cubic

Start at: 2018-08-28 07:41:02
End at: 2018-08-28 07:41:32
Local clock offset: 0.269 ms
Remote clock offset: -2.851 ms

Below is generated by plot.py at 2018-08-28 08:03:30
Datalink statistics
-- Total of 1 flow:
Average throughput: 573.86 Mbit/s
95th percentile per-packet one-way delay: 115.058 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 573.86 Mbit/s
95th percentile per-packet one-way delay: 115.058 ms
Loss rate: 0.18%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2018-08-28 07:47:07

End at: 2018-08-28 07:47:37

Local clock offset: 0.317 ms

Remote clock offset: 0.051 ms

Below is generated by plot.py at 2018-08-28 08:03:30

Datalink statistics

-- Total of 1 flow:

Average throughput: 550.71 Mbit/s

95th percentile per-packet one-way delay: 109.155 ms

Loss rate: 0.11%

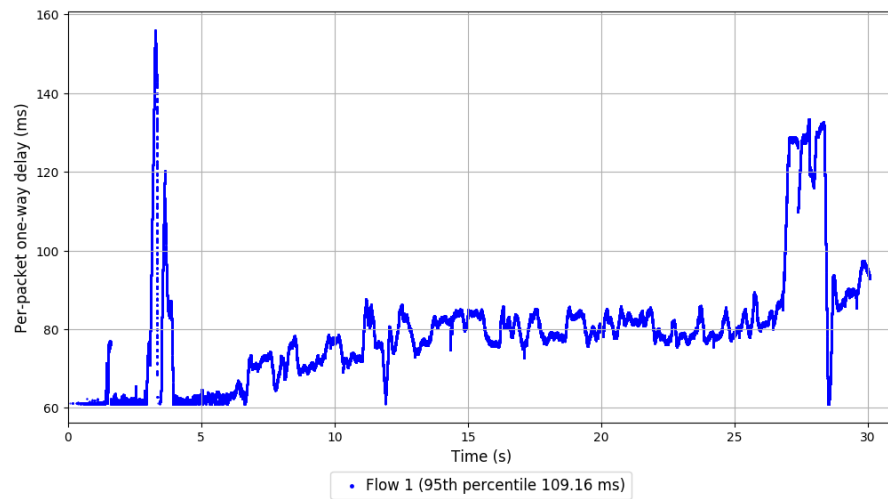
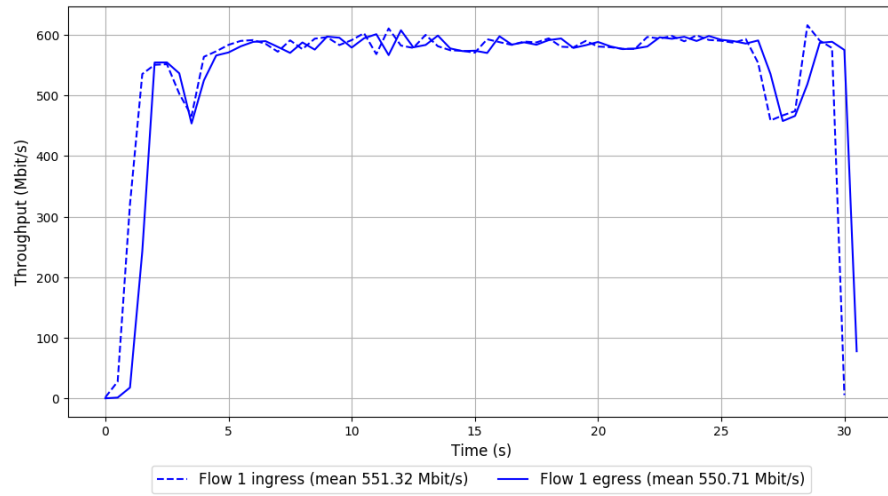
-- Flow 1:

Average throughput: 550.71 Mbit/s

95th percentile per-packet one-way delay: 109.155 ms

Loss rate: 0.11%

Run 3: Report of TCP Cubic — Data Link

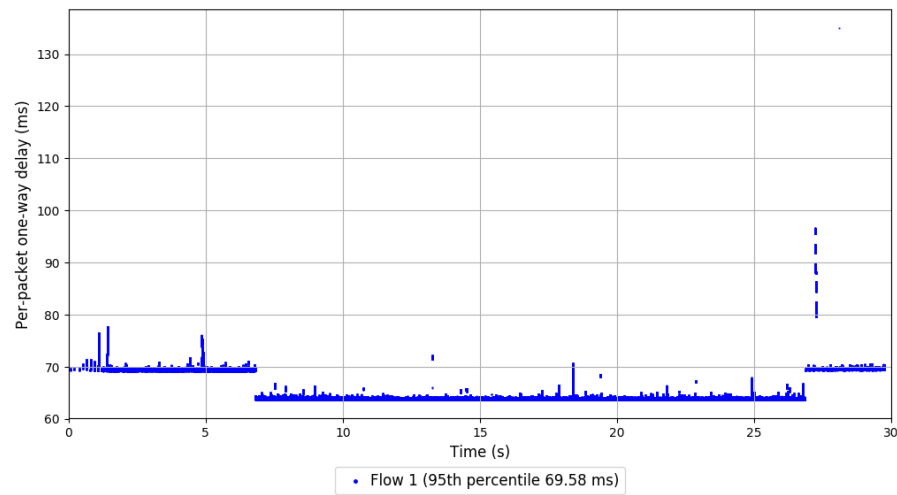
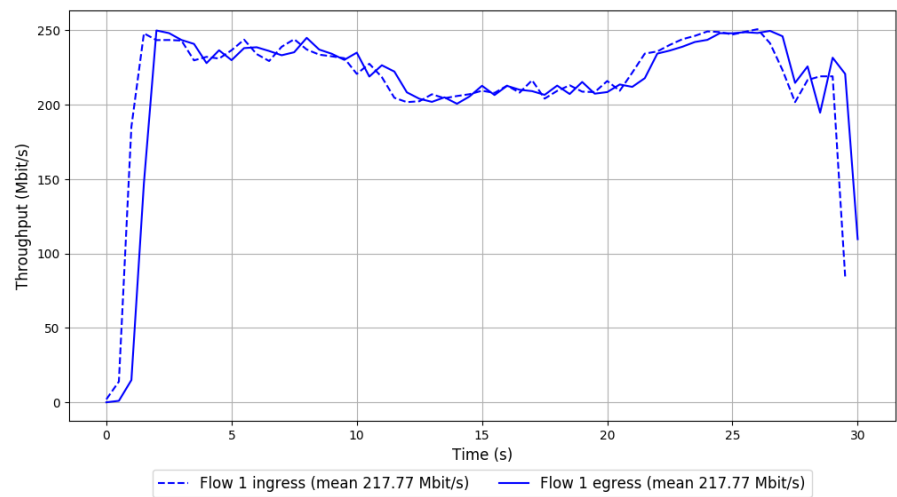


```
Run 1: Statistics of Indigo

Start at: 2018-08-28 07:38:05
End at: 2018-08-28 07:38:35
Local clock offset: 0.237 ms
Remote clock offset: 2.681 ms

# Below is generated by plot.py at 2018-08-28 08:03:30
# Datalink statistics
-- Total of 1 flow:
Average throughput: 217.77 Mbit/s
95th percentile per-packet one-way delay: 69.582 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 217.77 Mbit/s
95th percentile per-packet one-way delay: 69.582 ms
Loss rate: 0.00%
```

Run 1: Report of Indigo — Data Link

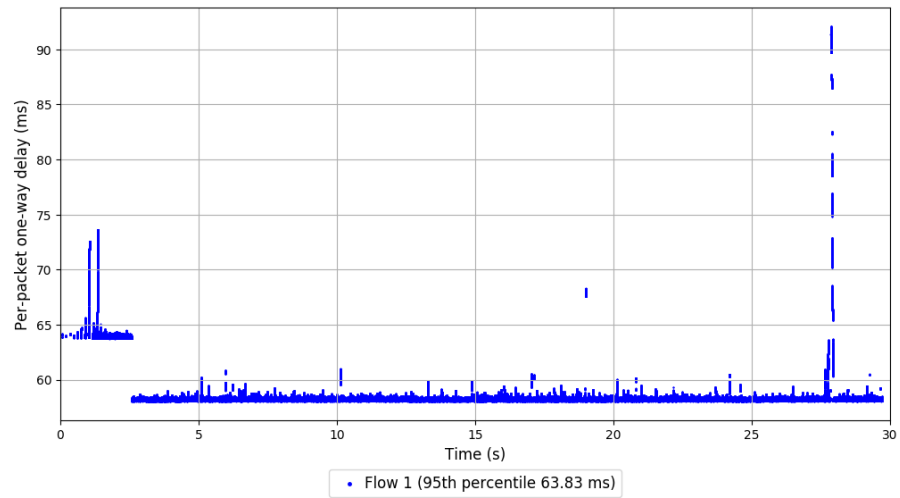
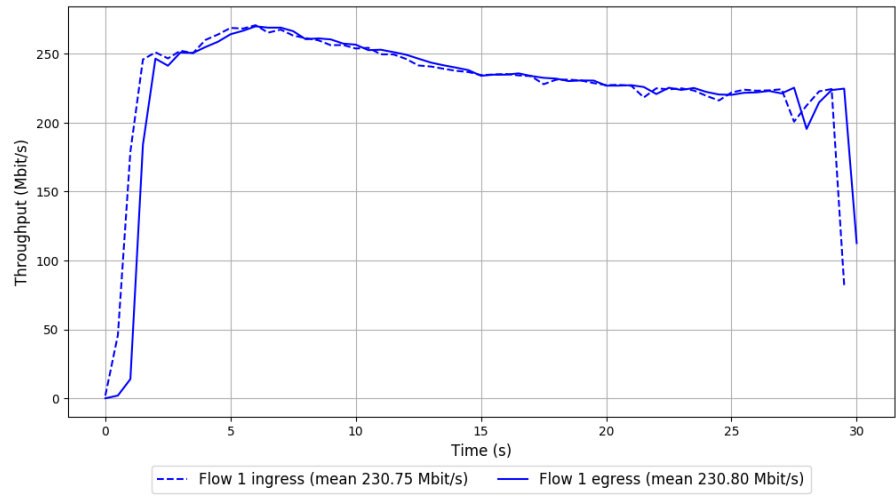


Run 2: Statistics of Indigo

Start at: 2018-08-28 07:44:09
End at: 2018-08-28 07:44:39
Local clock offset: 0.308 ms
Remote clock offset: -2.895 ms

Below is generated by plot.py at 2018-08-28 08:03:30
Datalink statistics
-- Total of 1 flow:
Average throughput: 230.80 Mbit/s
95th percentile per-packet one-way delay: 63.826 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 230.80 Mbit/s
95th percentile per-packet one-way delay: 63.826 ms
Loss rate: 0.00%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-08-28 07:50:11

End at: 2018-08-28 07:50:41

Local clock offset: 0.27 ms

Remote clock offset: 0.02 ms

Below is generated by plot.py at 2018-08-28 08:04:56

Datalink statistics

-- Total of 1 flow:

Average throughput: 209.19 Mbit/s

95th percentile per-packet one-way delay: 61.816 ms

Loss rate: 0.00%

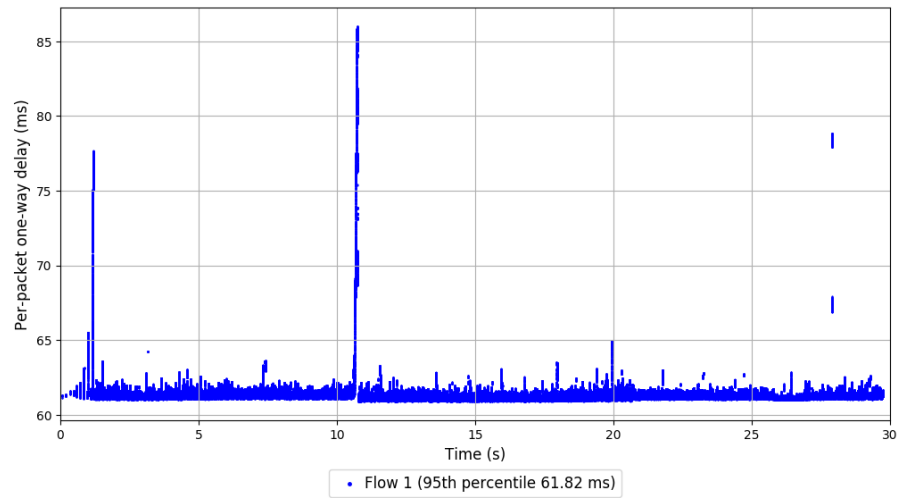
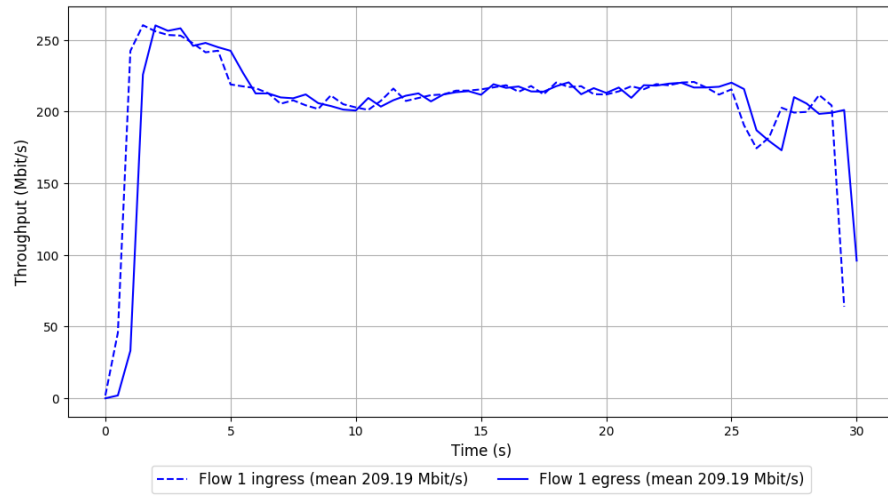
-- Flow 1:

Average throughput: 209.19 Mbit/s

95th percentile per-packet one-way delay: 61.816 ms

Loss rate: 0.00%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of Muses

Start at: 2018-08-28 07:39:30

End at: 2018-08-28 07:40:00

Local clock offset: 0.269 ms

Remote clock offset: 0.051 ms

Below is generated by plot.py at 2018-08-28 08:07:06

Datalink statistics

-- Total of 1 flow:

Average throughput: 510.14 Mbit/s

95th percentile per-packet one-way delay: 92.095 ms

Loss rate: 0.12%

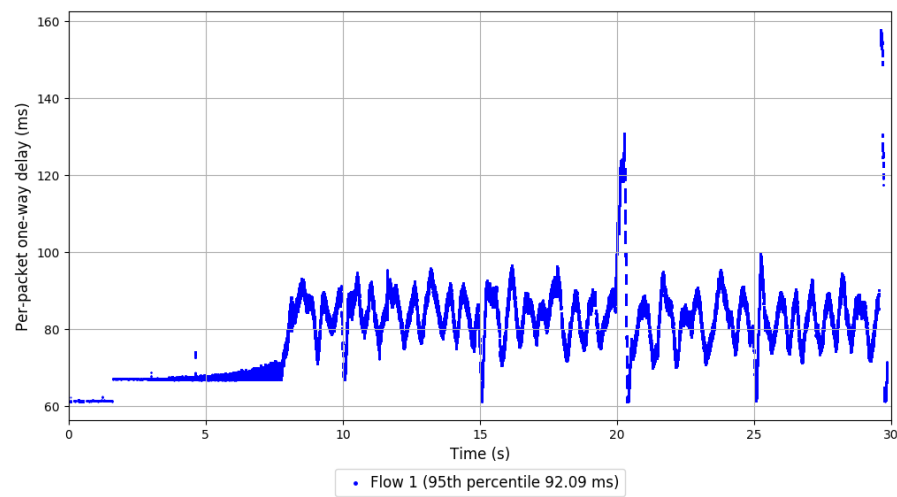
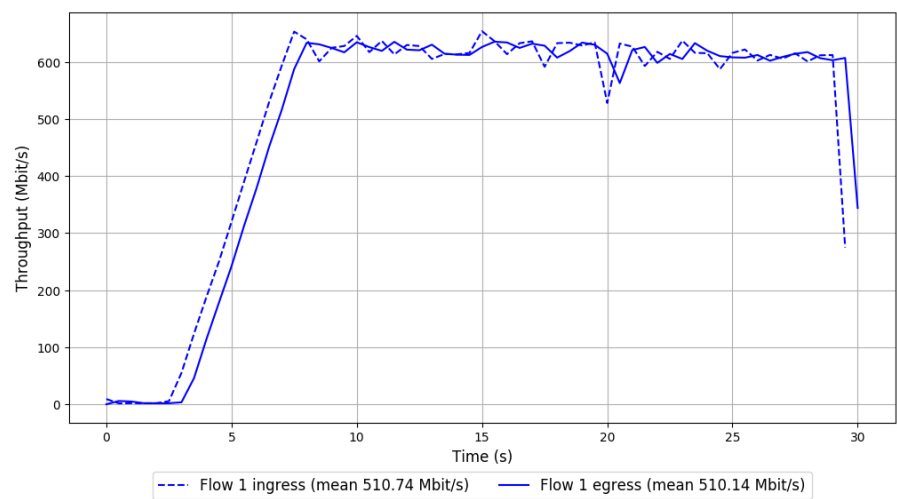
-- Flow 1:

Average throughput: 510.14 Mbit/s

95th percentile per-packet one-way delay: 92.095 ms

Loss rate: 0.12%

Run 1: Report of Muses — Data Link



Run 2: Statistics of Muses

Start at: 2018-08-28 07:45:35

End at: 2018-08-28 07:46:05

Local clock offset: 0.296 ms

Remote clock offset: 2.714 ms

Below is generated by plot.py at 2018-08-28 08:07:12

Datalink statistics

-- Total of 1 flow:

Average throughput: 498.83 Mbit/s

95th percentile per-packet one-way delay: 95.180 ms

Loss rate: 0.12%

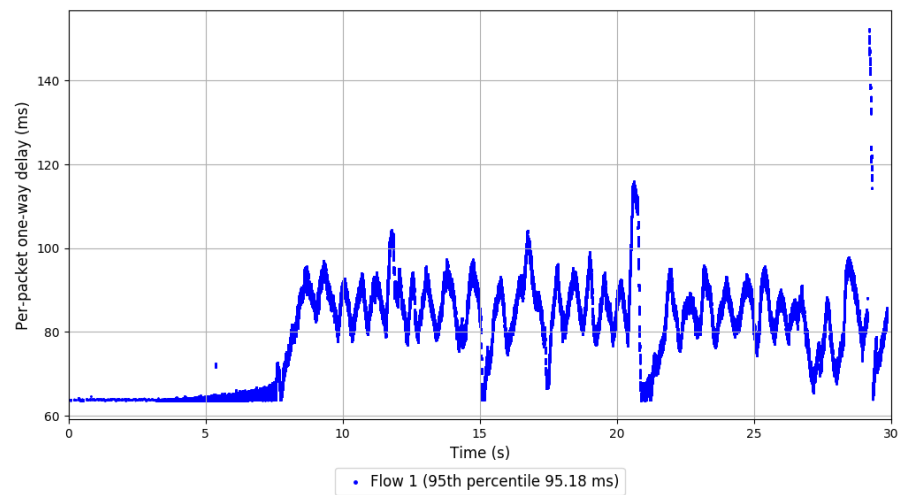
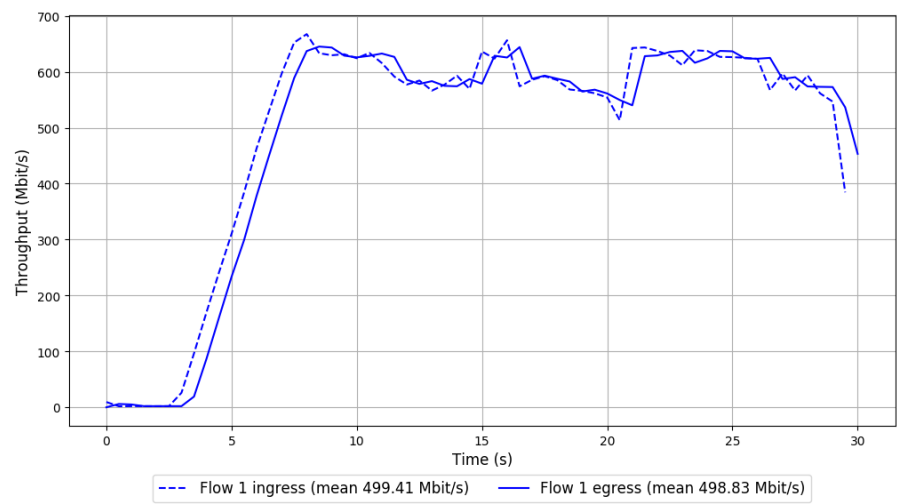
-- Flow 1:

Average throughput: 498.83 Mbit/s

95th percentile per-packet one-way delay: 95.180 ms

Loss rate: 0.12%

Run 2: Report of Muses — Data Link



Run 3: Statistics of Muses

Start at: 2018-08-28 07:51:36
End at: 2018-08-28 07:52:06
Local clock offset: 0.297 ms
Remote clock offset: -0.066 ms

Below is generated by plot.py at 2018-08-28 08:07:15
Datalink statistics
-- Total of 1 flow:
Average throughput: 515.91 Mbit/s
95th percentile per-packet one-way delay: 94.619 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 515.91 Mbit/s
95th percentile per-packet one-way delay: 94.619 ms
Loss rate: 0.13%

Run 3: Report of Muses — Data Link

