

Pantheon Report

Generated at 2018-08-28 09:27:25 (UTC).

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

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.

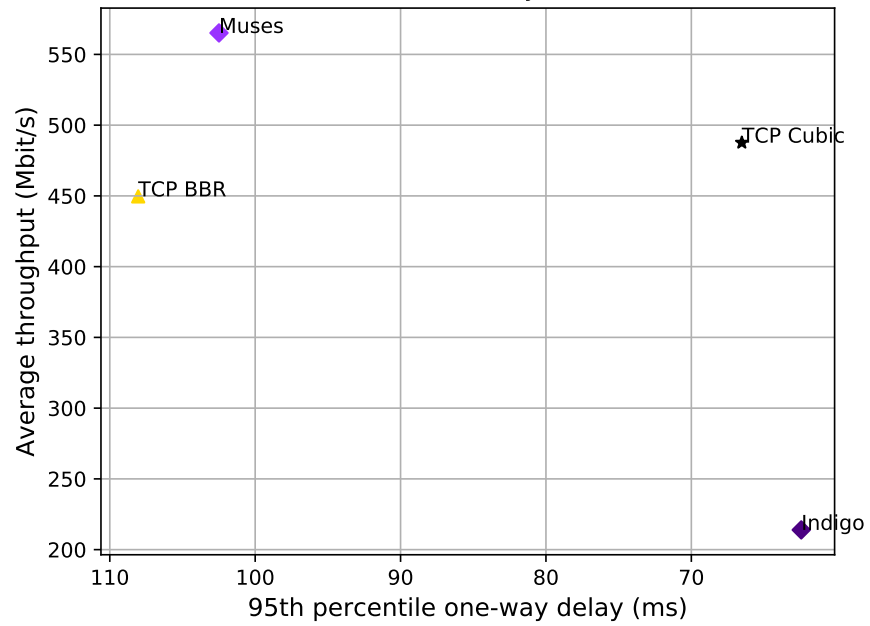
System info:

```
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
```

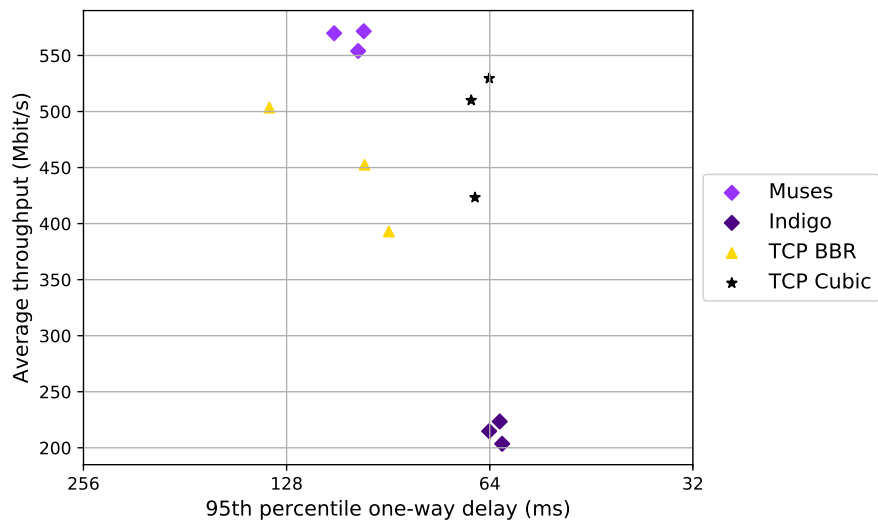
Git summary:

```
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 @ cbf6e6db5ff5740dfe1771f813cd646339e1952
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, 3 runs of 30s each per scheme
(mean of all runs by scheme)



test from GCE Tokyo to GCE Iowa, 3 runs of 30s each per scheme



scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	449.67	108.05	0.50
TCP Cubic	3	487.61	66.53	0.44
Indigo	3	213.94	62.44	0.45
Muses	3	565.17	102.49	0.68

Run 1: Statistics of TCP BBR

Start at: 2018-08-28 08:55:26

End at: 2018-08-28 08:55:56

Local clock offset: 0.394 ms

Remote clock offset: 2.599 ms

Below is generated by plot.py at 2018-08-28 09:22:52

Datalink statistics

-- Total of 1 flow:

Average throughput: 503.53 Mbit/s

95th percentile per-packet one-way delay: 135.747 ms

Loss rate: 0.20%

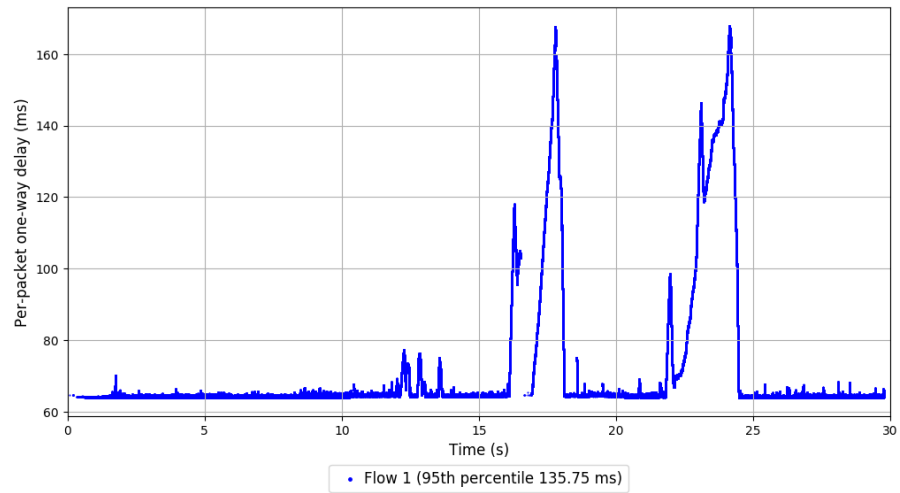
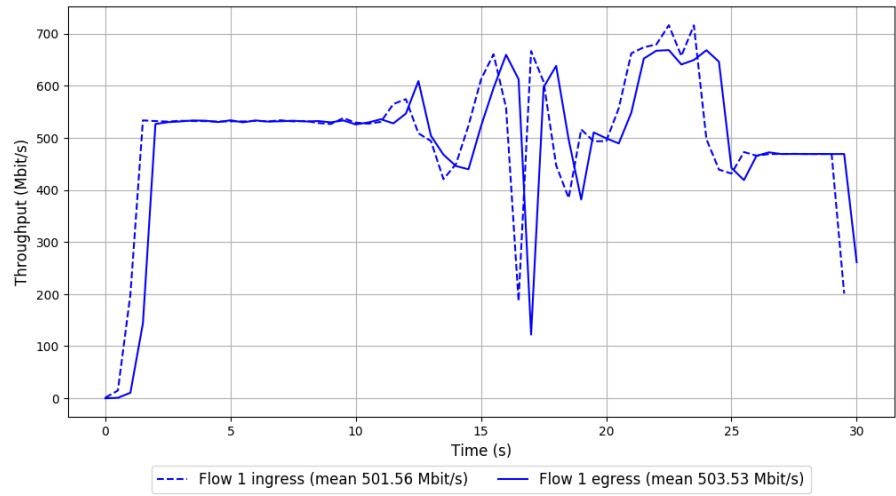
-- Flow 1:

Average throughput: 503.53 Mbit/s

95th percentile per-packet one-way delay: 135.747 ms

Loss rate: 0.20%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-08-28 09:01:30

End at: 2018-08-28 09:02:00

Local clock offset: 0.456 ms

Remote clock offset: -2.907 ms

Below is generated by plot.py at 2018-08-28 09:22:52

Datalink statistics

-- Total of 1 flow:

Average throughput: 392.97 Mbit/s

95th percentile per-packet one-way delay: 90.290 ms

Loss rate: 0.74%

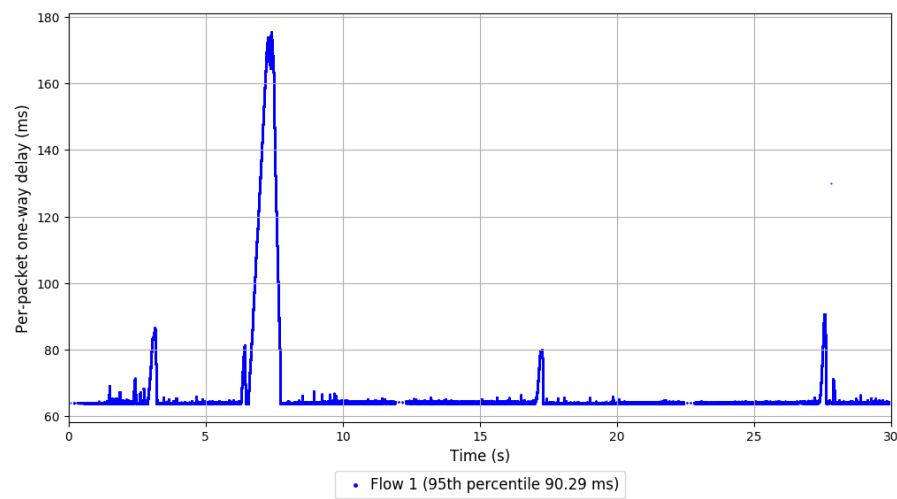
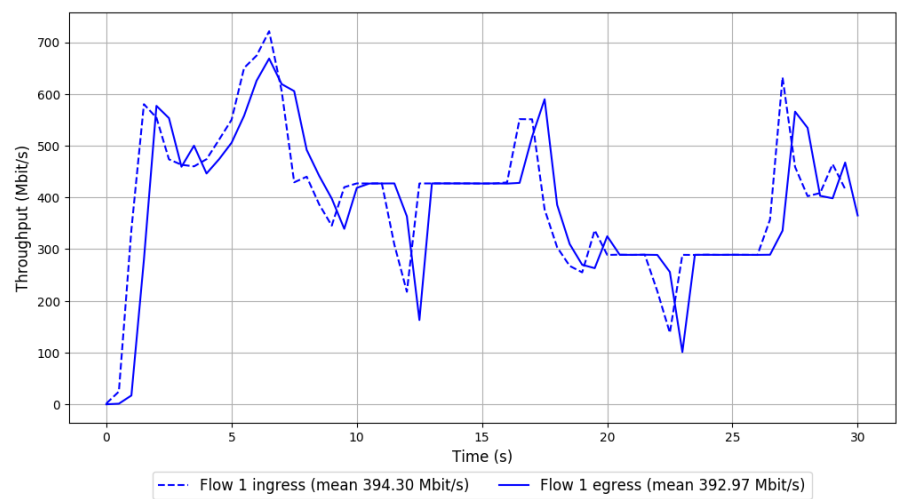
-- Flow 1:

Average throughput: 392.97 Mbit/s

95th percentile per-packet one-way delay: 90.290 ms

Loss rate: 0.74%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2018-08-28 09:07:27

End at: 2018-08-28 09:07:57

Local clock offset: 0.469 ms

Remote clock offset: 2.921 ms

Below is generated by plot.py at 2018-08-28 09:22:52

Datalink statistics

-- Total of 1 flow:

Average throughput: 452.51 Mbit/s

95th percentile per-packet one-way delay: 98.104 ms

Loss rate: 0.56%

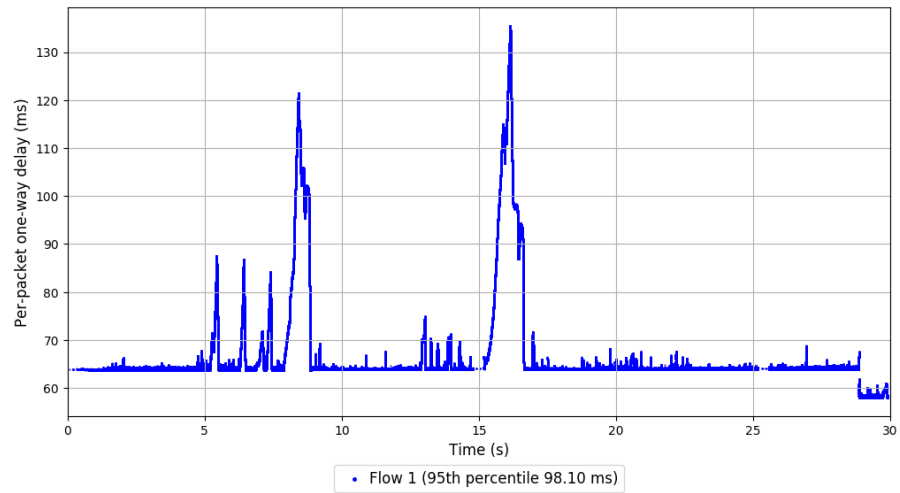
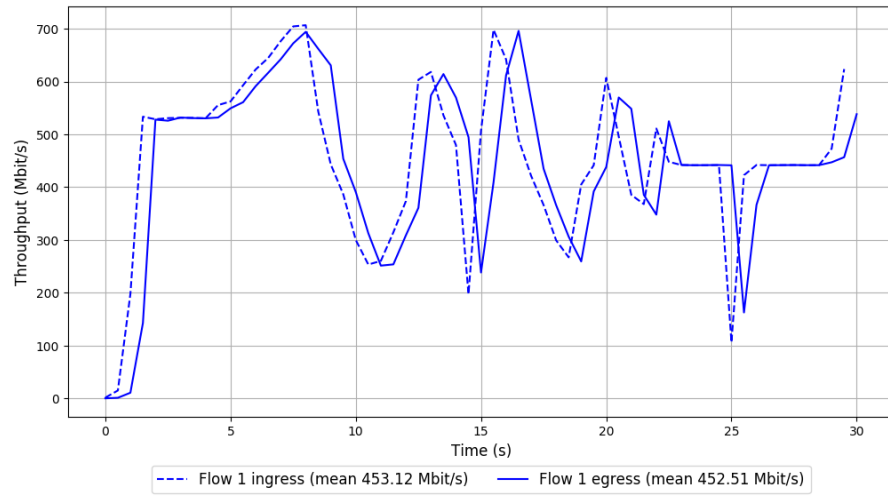
-- Flow 1:

Average throughput: 452.51 Mbit/s

95th percentile per-packet one-way delay: 98.104 ms

Loss rate: 0.56%

Run 3: Report of TCP BBR — Data Link

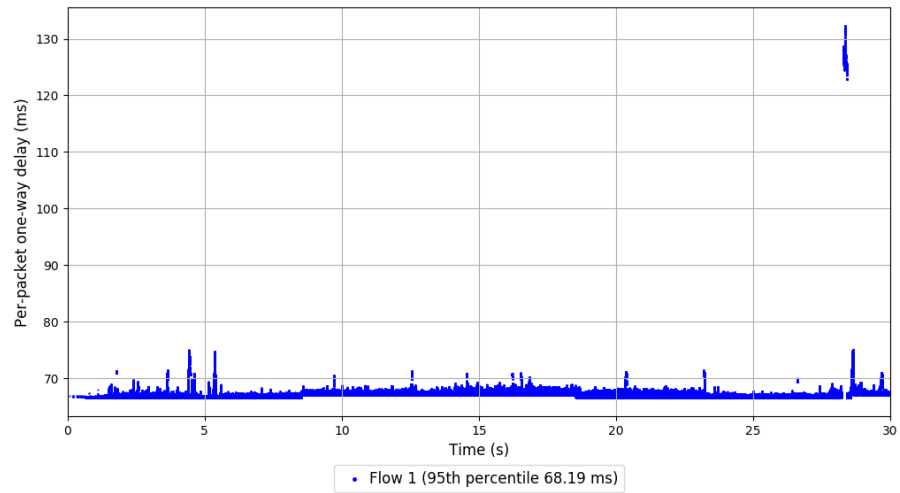
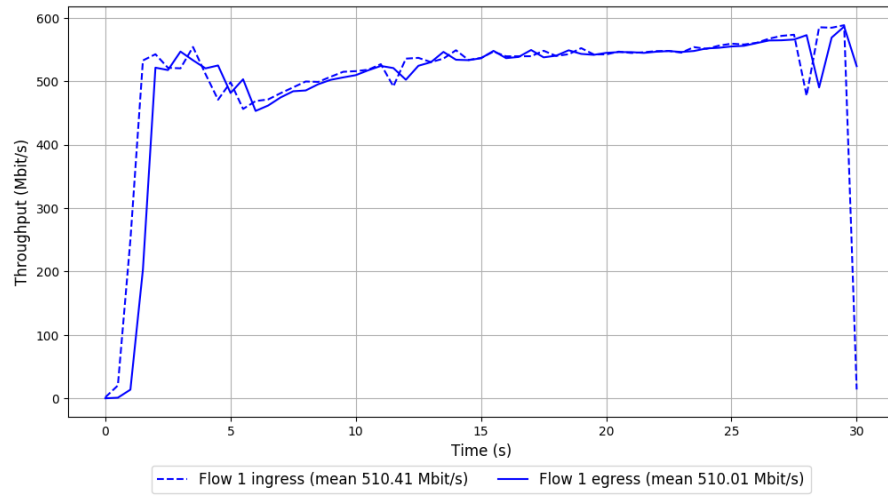


Run 1: Statistics of TCP Cubic

Start at: 2018-08-28 08:56:58
End at: 2018-08-28 08:57:28
Local clock offset: 0.42 ms
Remote clock offset: -0.118 ms

Below is generated by plot.py at 2018-08-28 09:22:58
Datalink statistics
-- Total of 1 flow:
Average throughput: 510.01 Mbit/s
95th percentile per-packet one-way delay: 68.185 ms
Loss rate: 0.52%
-- Flow 1:
Average throughput: 510.01 Mbit/s
95th percentile per-packet one-way delay: 68.185 ms
Loss rate: 0.52%

Run 1: Report of TCP Cubic — Data Link

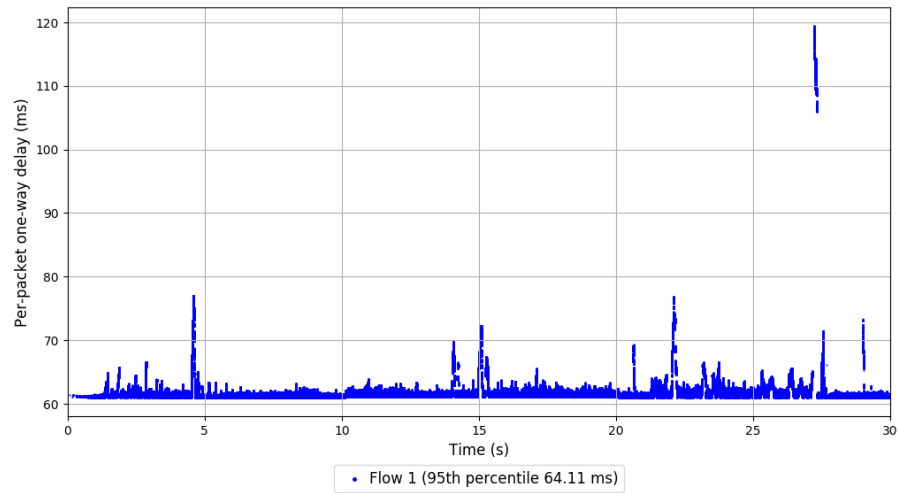
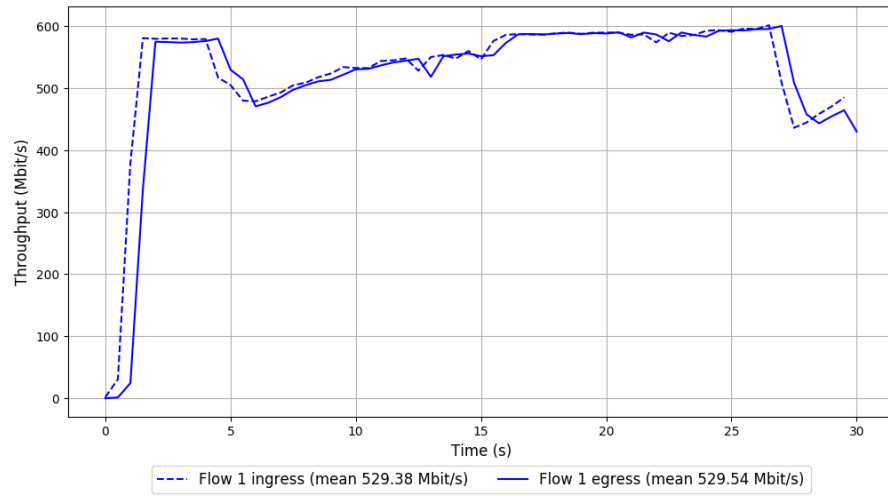


Run 2: Statistics of TCP Cubic

Start at: 2018-08-28 09:02:56
End at: 2018-08-28 09:03:26
Local clock offset: 0.425 ms
Remote clock offset: -0.089 ms

Below is generated by plot.py at 2018-08-28 09:23:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 529.54 Mbit/s
95th percentile per-packet one-way delay: 64.105 ms
Loss rate: 0.38%
-- Flow 1:
Average throughput: 529.54 Mbit/s
95th percentile per-packet one-way delay: 64.105 ms
Loss rate: 0.38%

Run 2: Report of TCP Cubic — Data Link

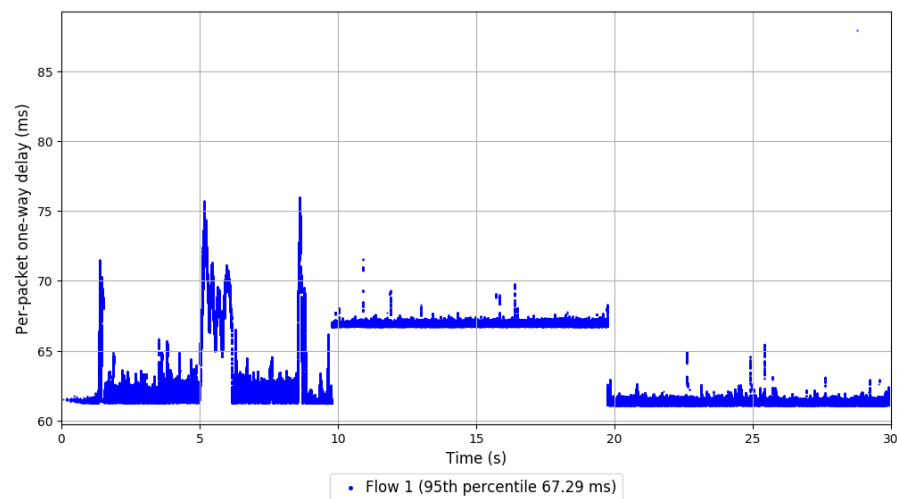
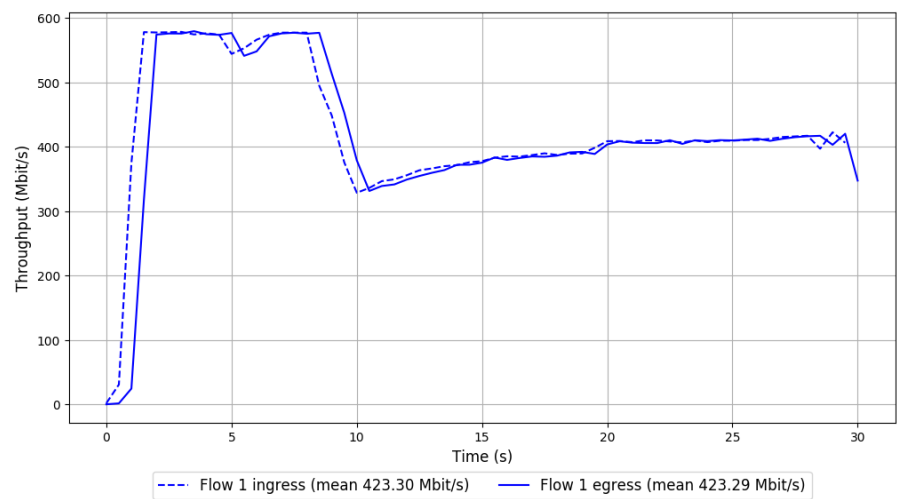


Run 3: Statistics of TCP Cubic

Start at: 2018-08-28 09:08:56
End at: 2018-08-28 09:09:26
Local clock offset: 0.423 ms
Remote clock offset: -0.173 ms

Below is generated by plot.py at 2018-08-28 09:23:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 423.29 Mbit/s
95th percentile per-packet one-way delay: 67.294 ms
Loss rate: 0.41%
-- Flow 1:
Average throughput: 423.29 Mbit/s
95th percentile per-packet one-way delay: 67.294 ms
Loss rate: 0.41%

Run 3: Report of TCP Cubic — Data Link

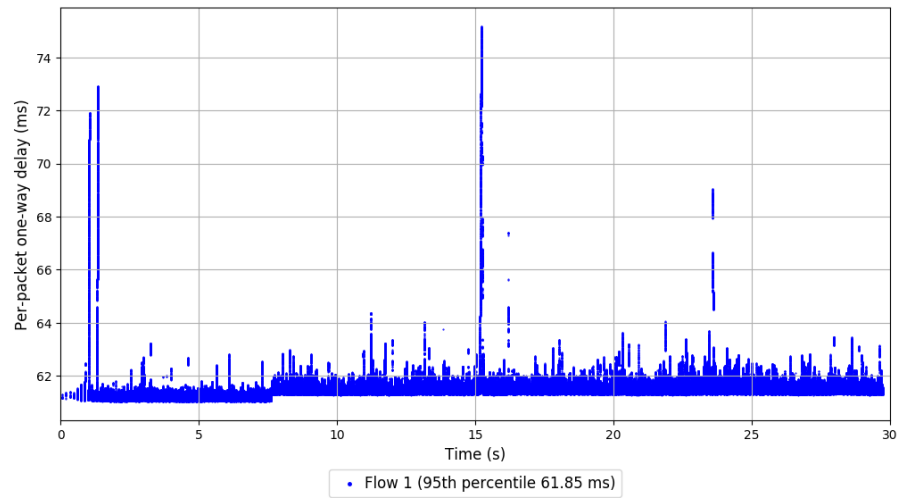
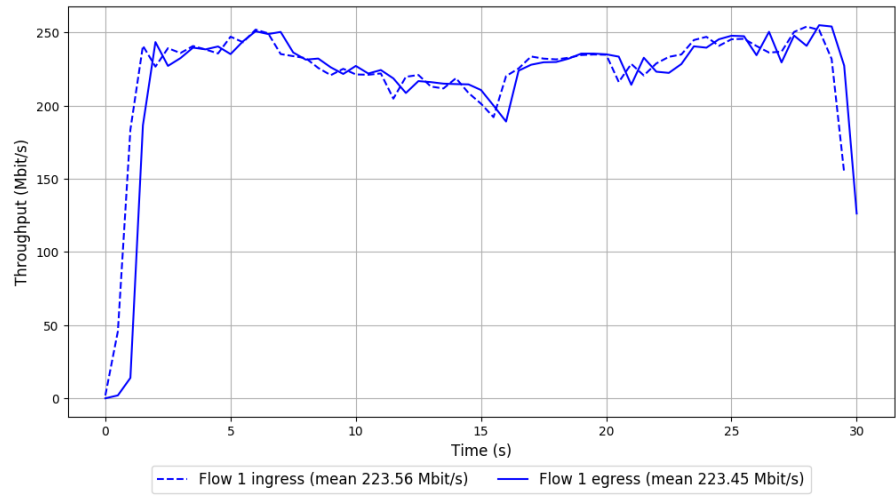


Run 1: Statistics of Indigo

Start at: 2018-08-28 08:58:28
End at: 2018-08-28 08:58:58
Local clock offset: 0.413 ms
Remote clock offset: -0.118 ms

Below is generated by plot.py at 2018-08-28 09:23:08
Datalink statistics
-- Total of 1 flow:
Average throughput: 223.45 Mbit/s
95th percentile per-packet one-way delay: 61.853 ms
Loss rate: 0.47%
-- Flow 1:
Average throughput: 223.45 Mbit/s
95th percentile per-packet one-way delay: 61.853 ms
Loss rate: 0.47%

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2018-08-28 09:04:27

End at: 2018-08-28 09:04:57

Local clock offset: 0.401 ms

Remote clock offset: 2.758 ms

Below is generated by plot.py at 2018-08-28 09:23:08

Datalink statistics

-- Total of 1 flow:

Average throughput: 214.82 Mbit/s

95th percentile per-packet one-way delay: 64.125 ms

Loss rate: 0.45%

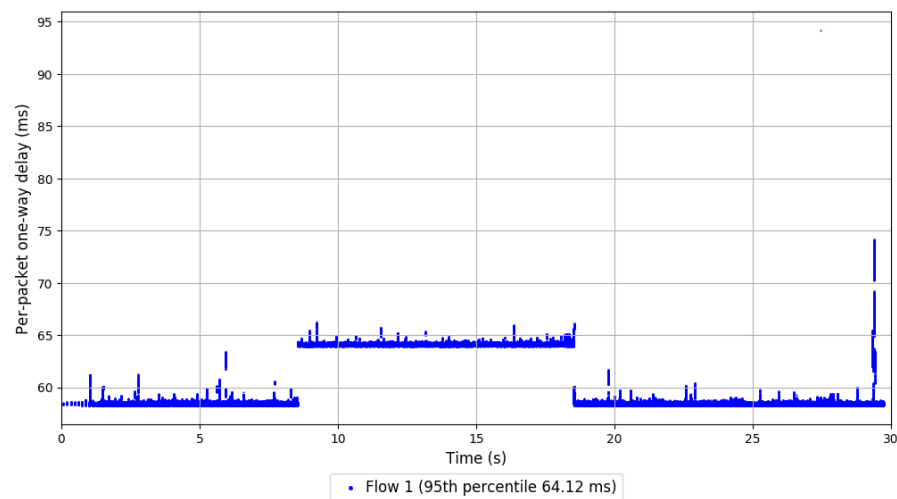
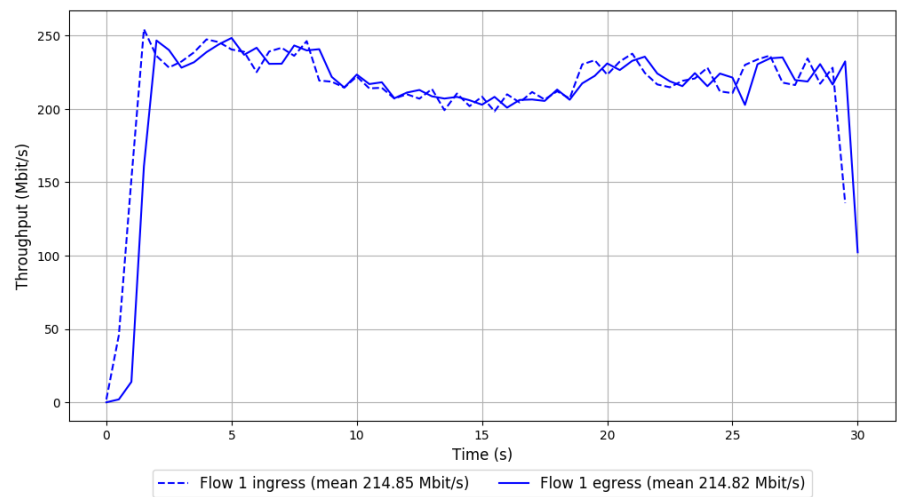
-- Flow 1:

Average throughput: 214.82 Mbit/s

95th percentile per-packet one-way delay: 64.125 ms

Loss rate: 0.45%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-08-28 09:10:23

End at: 2018-08-28 09:10:53

Local clock offset: 0.431 ms

Remote clock offset: -0.112 ms

Below is generated by plot.py at 2018-08-28 09:24:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 203.56 Mbit/s

95th percentile per-packet one-way delay: 61.343 ms

Loss rate: 0.42%

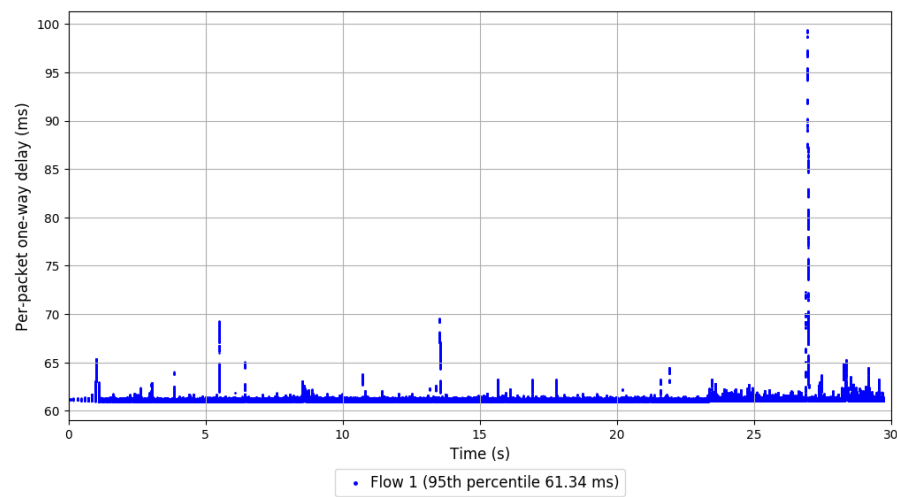
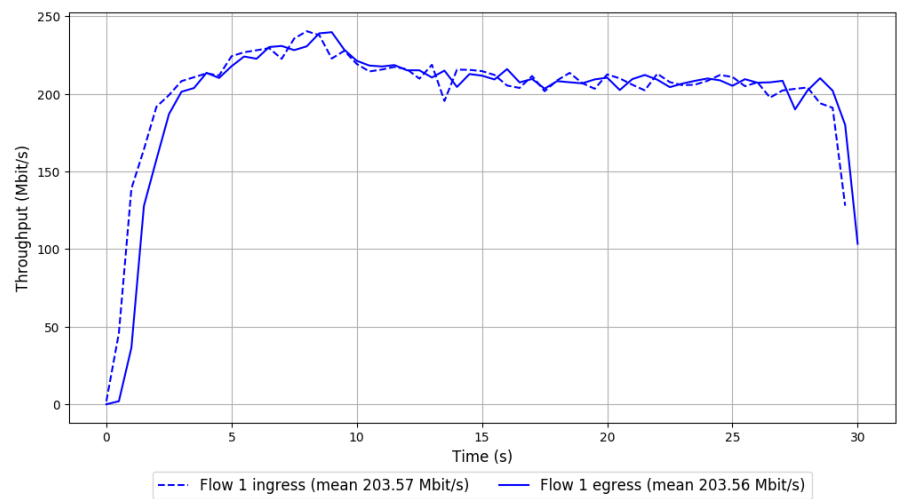
-- Flow 1:

Average throughput: 203.56 Mbit/s

95th percentile per-packet one-way delay: 61.343 ms

Loss rate: 0.42%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of Muses

Start at: 2018-08-28 08:59:54

End at: 2018-08-28 09:00:24

Local clock offset: 0.42 ms

Remote clock offset: -0.076 ms

Below is generated by plot.py at 2018-08-28 09:27:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 569.85 Mbit/s

95th percentile per-packet one-way delay: 108.822 ms

Loss rate: 0.80%

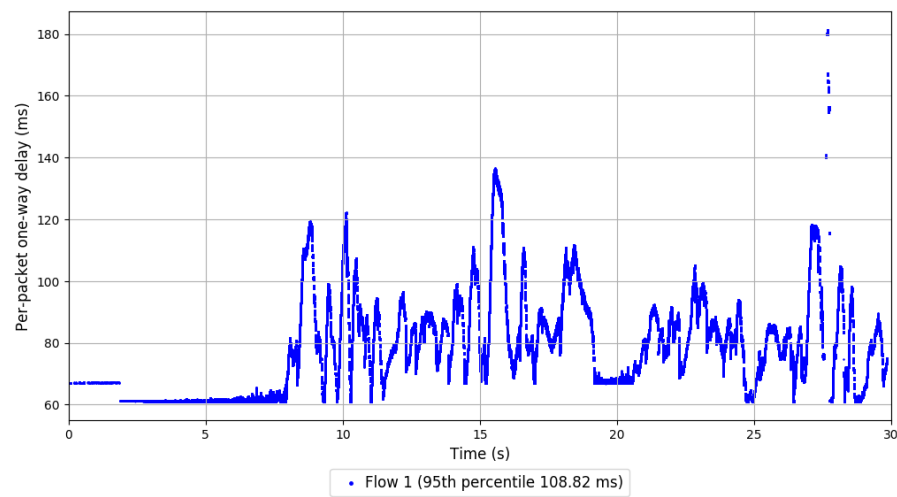
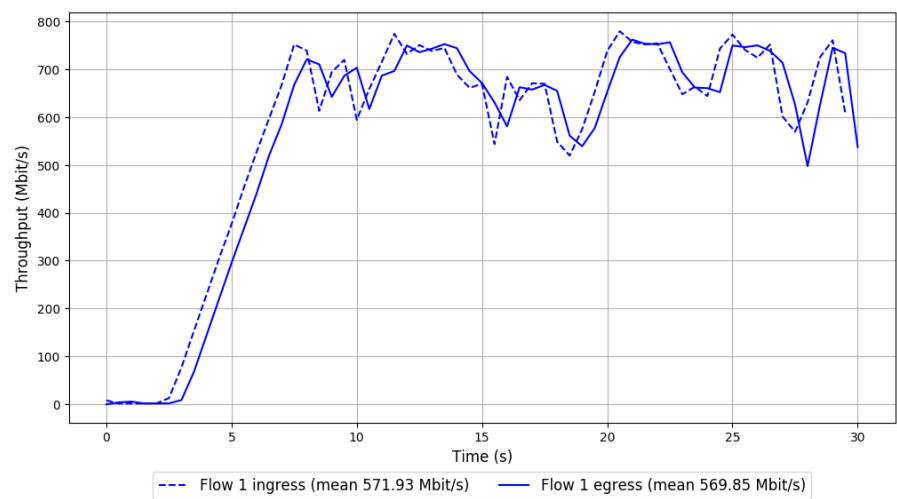
-- Flow 1:

Average throughput: 569.85 Mbit/s

95th percentile per-packet one-way delay: 108.822 ms

Loss rate: 0.80%

Run 1: Report of Muses — Data Link



Run 2: Statistics of Muses

Start at: 2018-08-28 09:05:52

End at: 2018-08-28 09:06:22

Local clock offset: 0.419 ms

Remote clock offset: 2.736 ms

Below is generated by plot.py at 2018-08-28 09:27:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 554.00 Mbit/s

95th percentile per-packet one-way delay: 100.275 ms

Loss rate: 0.67%

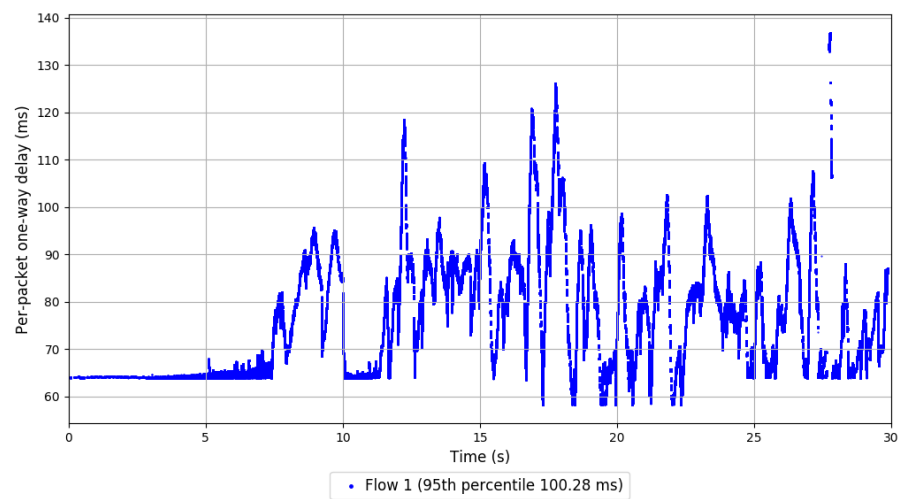
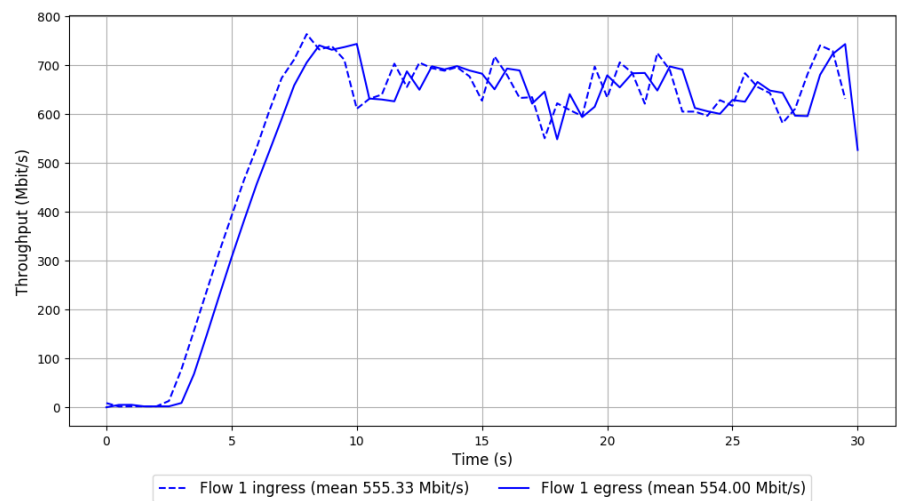
-- Flow 1:

Average throughput: 554.00 Mbit/s

95th percentile per-packet one-way delay: 100.275 ms

Loss rate: 0.67%

Run 2: Report of Muses — Data Link



Run 3: Statistics of Muses

Start at: 2018-08-28 09:11:46

End at: 2018-08-28 09:12:16

Local clock offset: 0.458 ms

Remote clock offset: 2.681 ms

Below is generated by plot.py at 2018-08-28 09:27:23

Datalink statistics

-- Total of 1 flow:

Average throughput: 571.65 Mbit/s

95th percentile per-packet one-way delay: 98.371 ms

Loss rate: 0.57%

-- Flow 1:

Average throughput: 571.65 Mbit/s

95th percentile per-packet one-way delay: 98.371 ms

Loss rate: 0.57%

Run 3: Report of Muses — Data Link

