

Pantheon Report

Generated at 2018-08-28 06:43:47 (UTC).

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

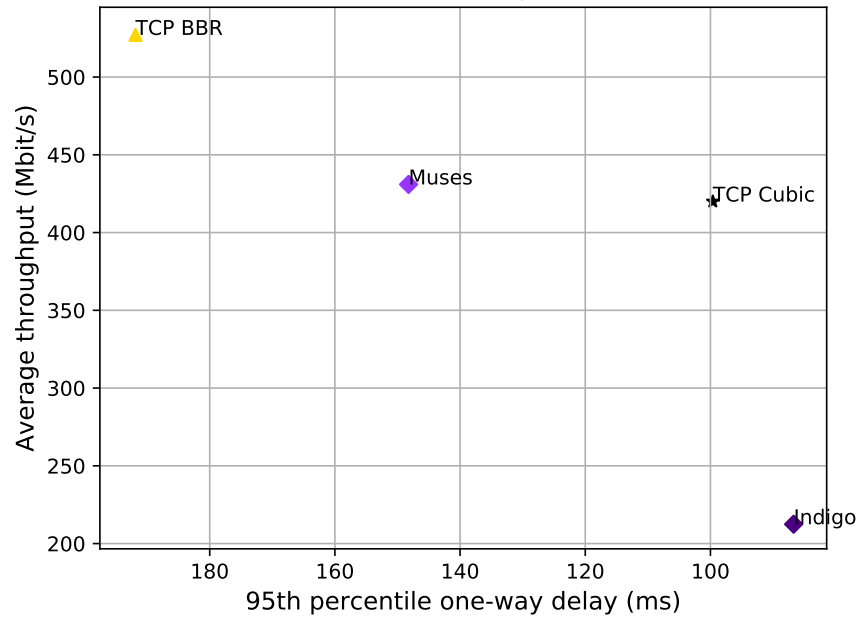
System info:

```
Linux 4.15.0-1015-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
```

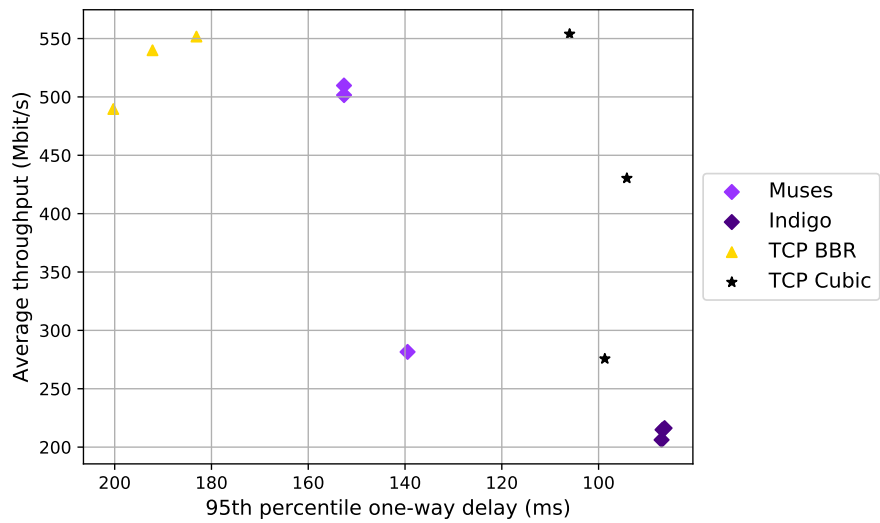
Git summary:

```
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 Iowa to GCE Sydney, 3 runs of 30s each per scheme
(mean of all runs by scheme)



test from GCE Iowa to GCE Sydney, 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	527.10	191.86	2.35
TCP Cubic	3	419.93	99.62	0.37
Indigo	3	212.45	86.71	0.62
Muses	3	430.95	148.23	1.53

Run 1: Statistics of TCP BBR

Start at: 2018-08-28 06:11:55

End at: 2018-08-28 06:12:25

Local clock offset: 0.493 ms

Remote clock offset: 0.134 ms

Below is generated by plot.py at 2018-08-28 06:40:53

Datalink statistics

-- Total of 1 flow:

Average throughput: 539.96 Mbit/s

95th percentile per-packet one-way delay: 192.184 ms

Loss rate: 1.81%

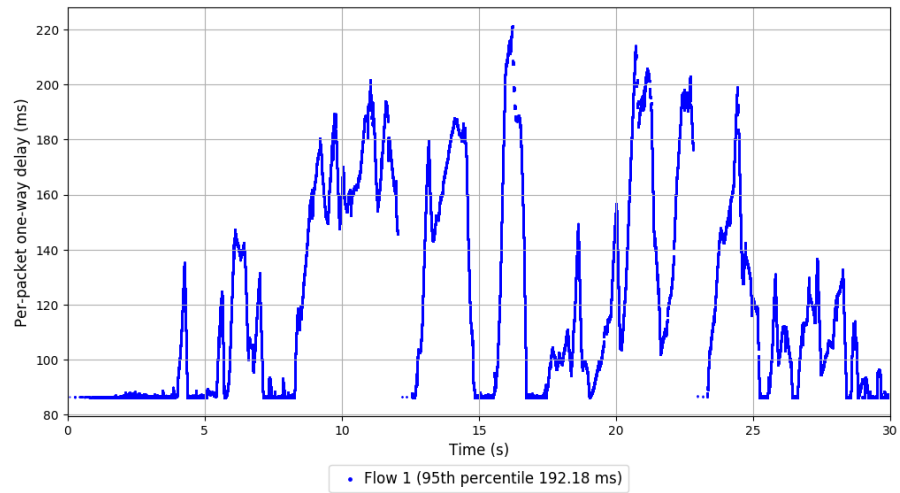
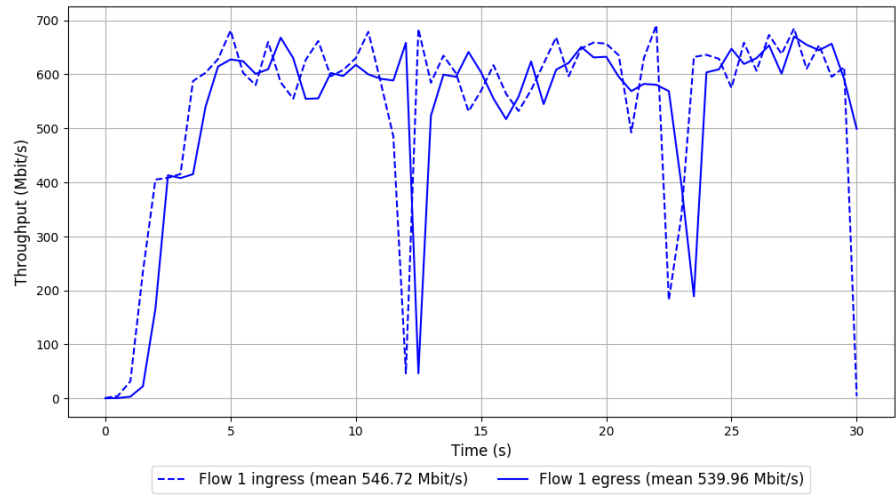
-- Flow 1:

Average throughput: 539.96 Mbit/s

95th percentile per-packet one-way delay: 192.184 ms

Loss rate: 1.81%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-08-28 06:17:55

End at: 2018-08-28 06:18:25

Local clock offset: 0.79 ms

Remote clock offset: 0.104 ms

Below is generated by plot.py at 2018-08-28 06:40:53

Datalink statistics

-- Total of 1 flow:

Average throughput: 489.63 Mbit/s

95th percentile per-packet one-way delay: 200.290 ms

Loss rate: 3.50%

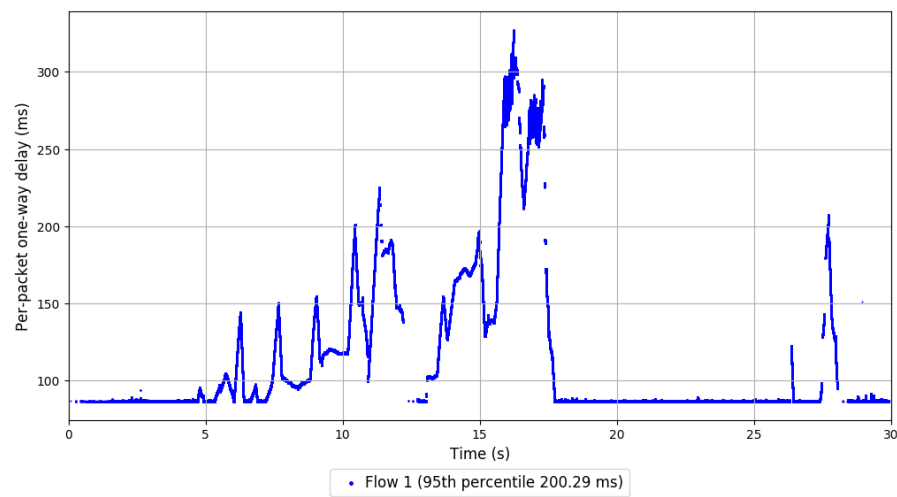
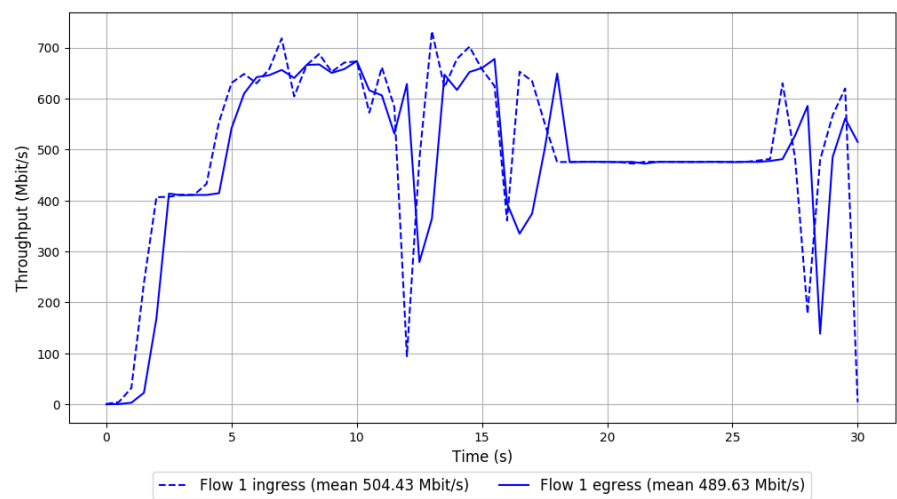
-- Flow 1:

Average throughput: 489.63 Mbit/s

95th percentile per-packet one-way delay: 200.290 ms

Loss rate: 3.50%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2018-08-28 06:24:38

End at: 2018-08-28 06:25:08

Local clock offset: 0.638 ms

Remote clock offset: 0.14 ms

Below is generated by plot.py at 2018-08-28 06:41:01

Datalink statistics

-- Total of 1 flow:

Average throughput: 551.70 Mbit/s

95th percentile per-packet one-way delay: 183.104 ms

Loss rate: 1.73%

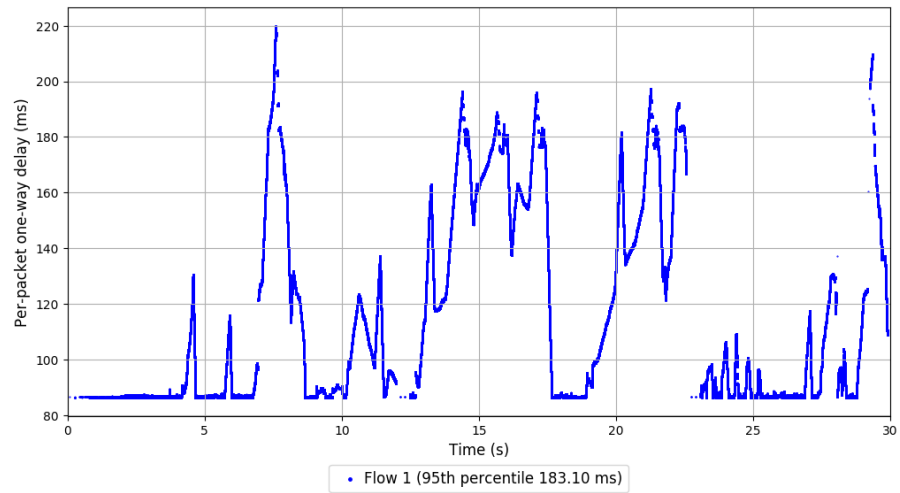
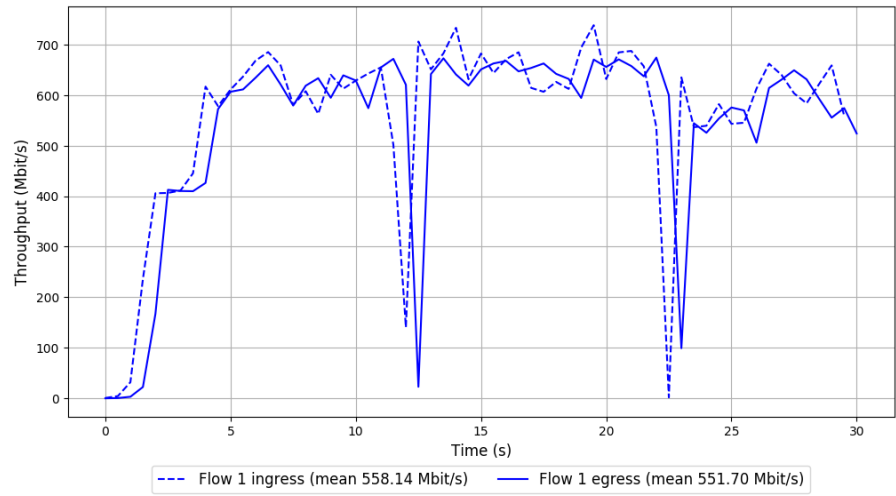
-- Flow 1:

Average throughput: 551.70 Mbit/s

95th percentile per-packet one-way delay: 183.104 ms

Loss rate: 1.73%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2018-08-28 06:16:22

End at: 2018-08-28 06:16:52

Local clock offset: 0.773 ms

Remote clock offset: 0.08 ms

Below is generated by plot.py at 2018-08-28 06:41:01

Datalink statistics

-- Total of 1 flow:

Average throughput: 430.30 Mbit/s

95th percentile per-packet one-way delay: 94.157 ms

Loss rate: 0.33%

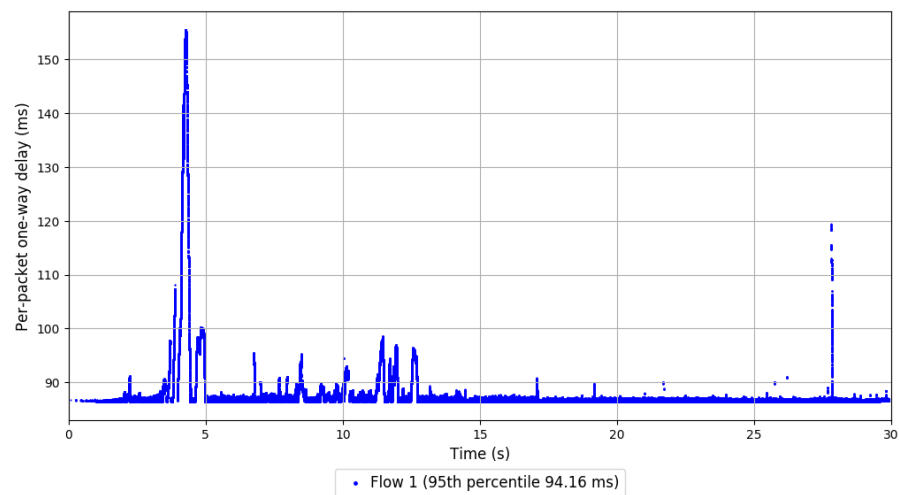
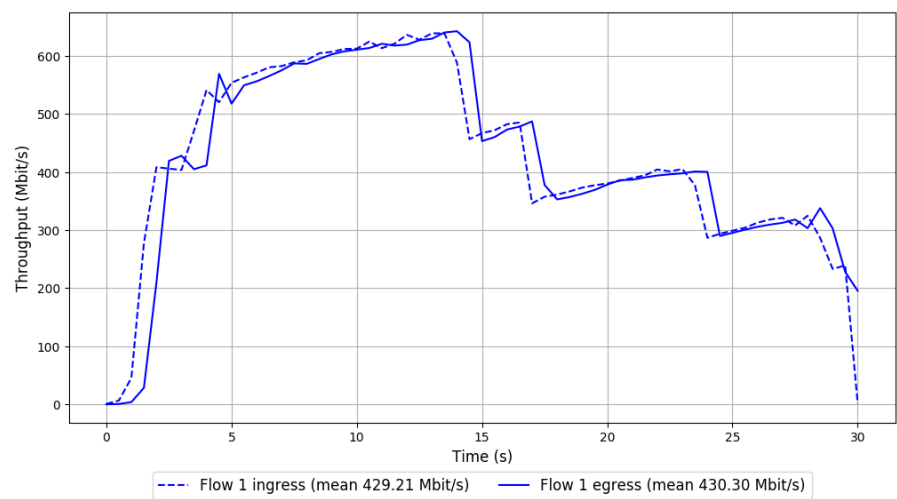
-- Flow 1:

Average throughput: 430.30 Mbit/s

95th percentile per-packet one-way delay: 94.157 ms

Loss rate: 0.33%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2018-08-28 06:22:55

End at: 2018-08-28 06:23:25

Local clock offset: 0.885 ms

Remote clock offset: 0.091 ms

Below is generated by plot.py at 2018-08-28 06:41:01

Datalink statistics

-- Total of 1 flow:

Average throughput: 553.85 Mbit/s

95th percentile per-packet one-way delay: 105.992 ms

Loss rate: 0.69%

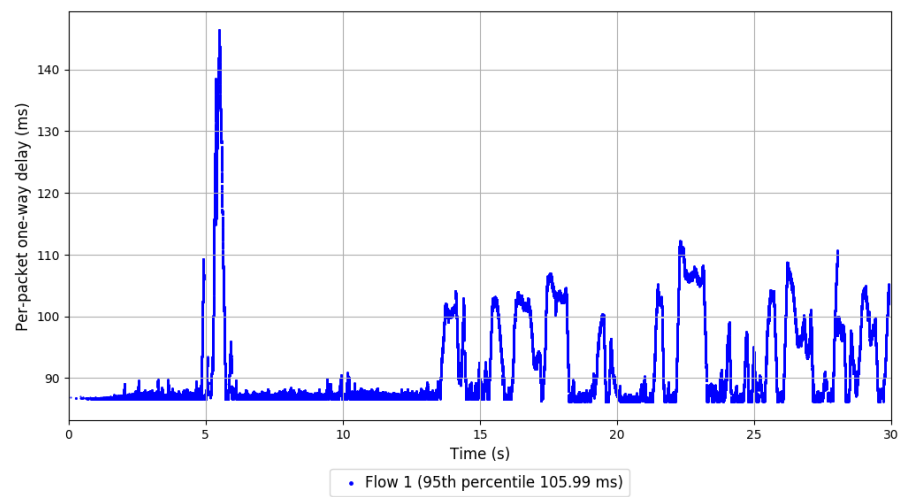
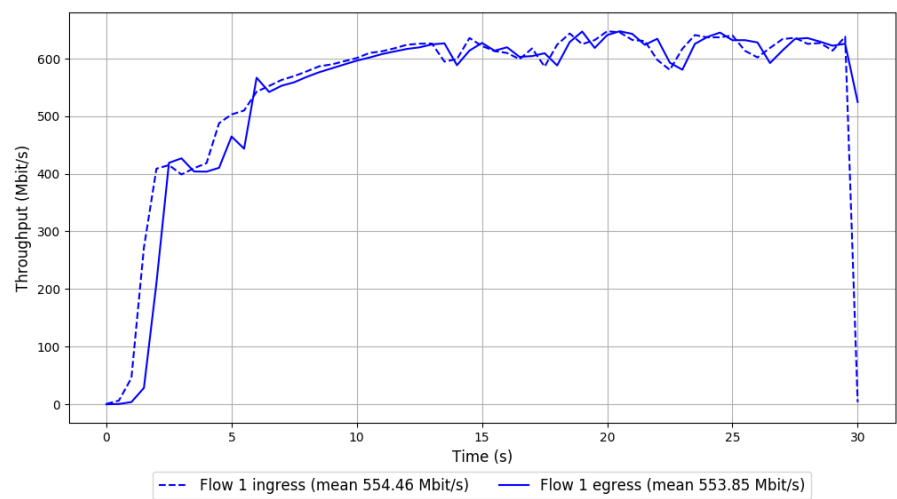
-- Flow 1:

Average throughput: 553.85 Mbit/s

95th percentile per-packet one-way delay: 105.992 ms

Loss rate: 0.69%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2018-08-28 06:29:19

End at: 2018-08-28 06:29:49

Local clock offset: 0.855 ms

Remote clock offset: 0.159 ms

Below is generated by plot.py at 2018-08-28 06:41:01

Datalink statistics

-- Total of 1 flow:

Average throughput: 275.64 Mbit/s

95th percentile per-packet one-way delay: 98.711 ms

Loss rate: 0.09%

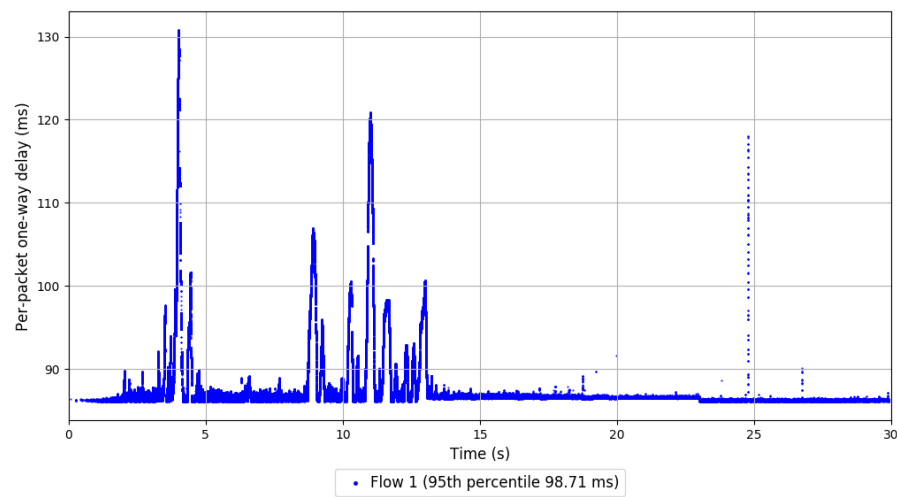
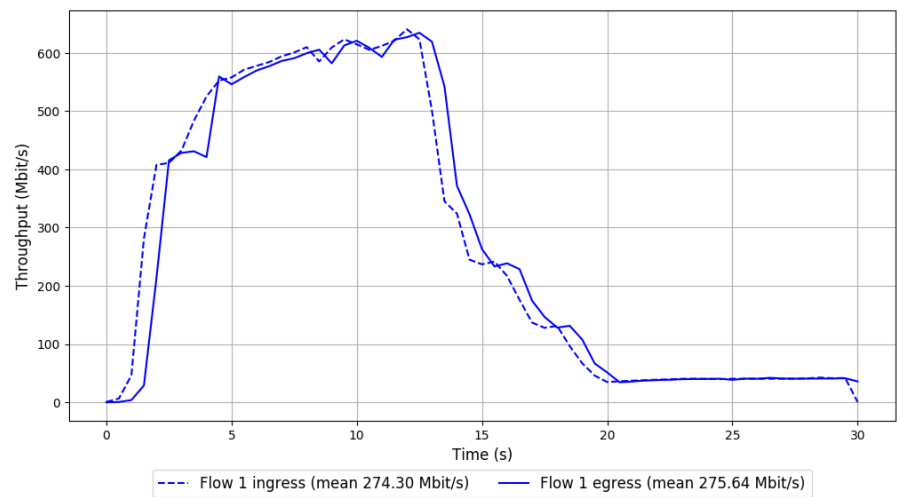
-- Flow 1:

Average throughput: 275.64 Mbit/s

95th percentile per-packet one-way delay: 98.711 ms

Loss rate: 0.09%

Run 3: Report of TCP Cubic — Data Link

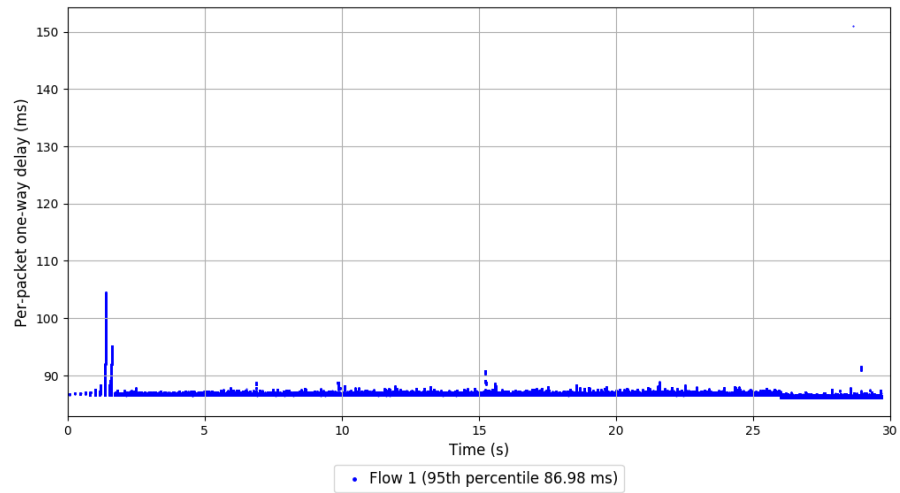
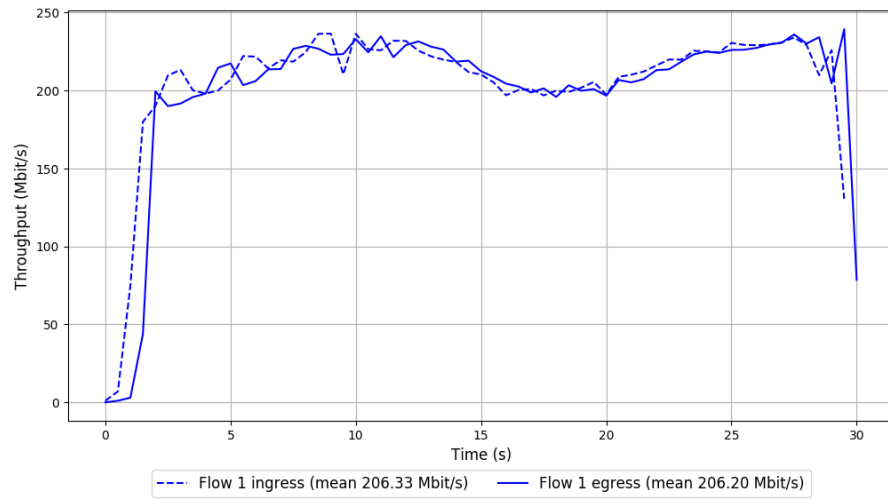


```
Run 1: Statistics of Indigo

Start at: 2018-08-28 06:14:56
End at: 2018-08-28 06:15:26
Local clock offset: 0.735 ms
Remote clock offset: 0.109 ms

# Below is generated by plot.py at 2018-08-28 06:41:01
# Datalink statistics
-- Total of 1 flow:
Average throughput: 206.20 Mbit/s
95th percentile per-packet one-way delay: 86.981 ms
Loss rate: 0.64%
-- Flow 1:
Average throughput: 206.20 Mbit/s
95th percentile per-packet one-way delay: 86.981 ms
Loss rate: 0.64%
```

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2018-08-28 06:21:17

End at: 2018-08-28 06:21:47

Local clock offset: 0.662 ms

Remote clock offset: 0.137 ms

Below is generated by plot.py at 2018-08-28 06:41:01

Datalink statistics

-- Total of 1 flow:

Average throughput: 214.89 Mbit/s

95th percentile per-packet one-way delay: 86.785 ms

Loss rate: 0.56%

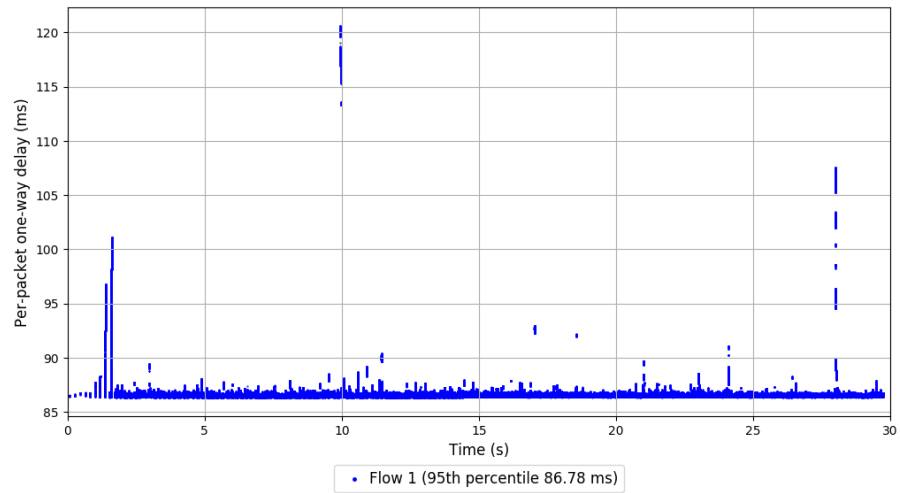
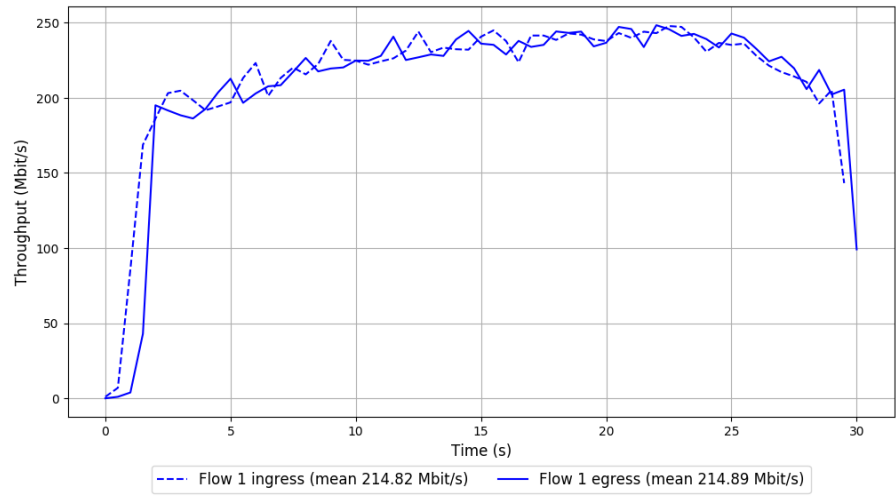
-- Flow 1:

Average throughput: 214.89 Mbit/s

95th percentile per-packet one-way delay: 86.785 ms

Loss rate: 0.56%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-08-28 06:27:52

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

Local clock offset: 0.537 ms

Remote clock offset: 0.177 ms

Below is generated by plot.py at 2018-08-28 06:42:13

Datalink statistics

-- Total of 1 flow:

Average throughput: 216.26 Mbit/s

95th percentile per-packet one-way delay: 86.359 ms

Loss rate: 0.66%

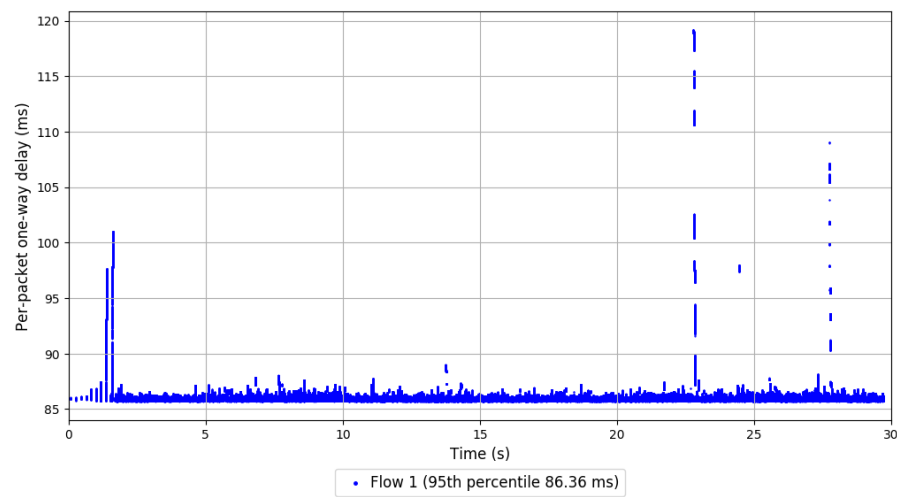
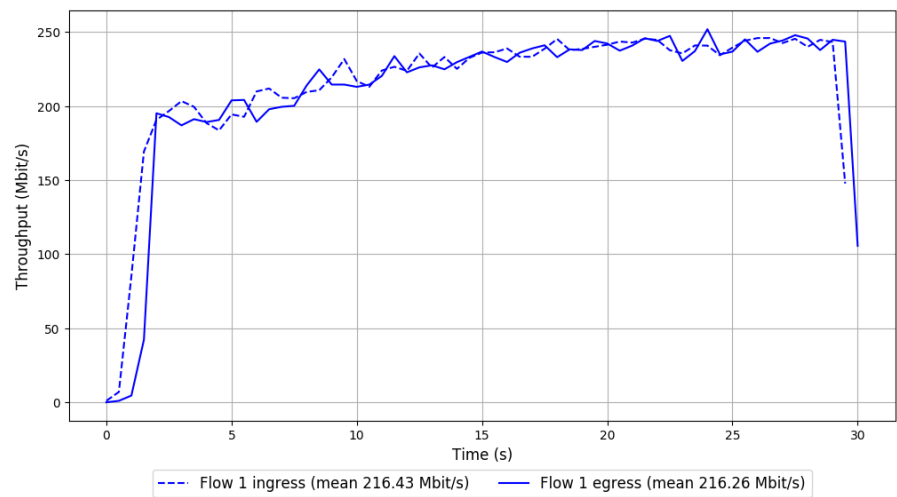
-- Flow 1:

Average throughput: 216.26 Mbit/s

95th percentile per-packet one-way delay: 86.359 ms

Loss rate: 0.66%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of Muses

Start at: 2018-08-28 06:13:33

End at: 2018-08-28 06:14:03

Local clock offset: 0.484 ms

Remote clock offset: 0.162 ms

Below is generated by plot.py at 2018-08-28 06:42:26

Datalink statistics

-- Total of 1 flow:

Average throughput: 281.56 Mbit/s

95th percentile per-packet one-way delay: 139.474 ms

Loss rate: 1.59%

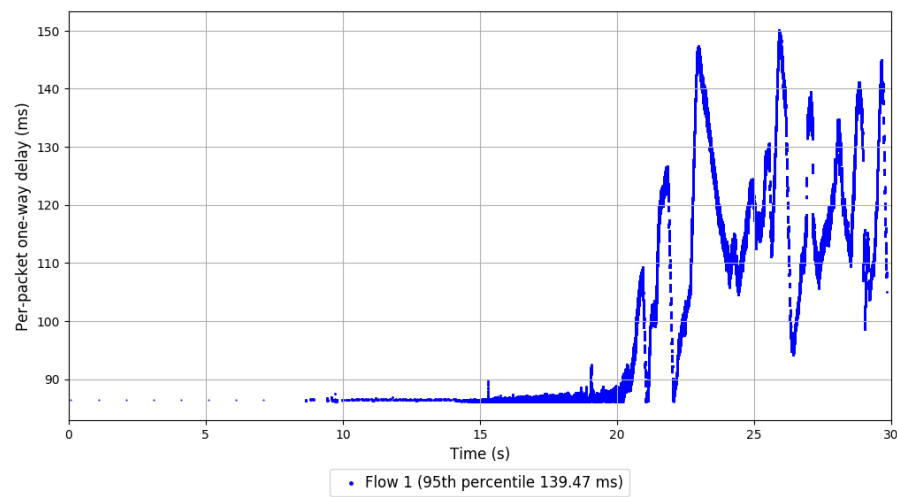
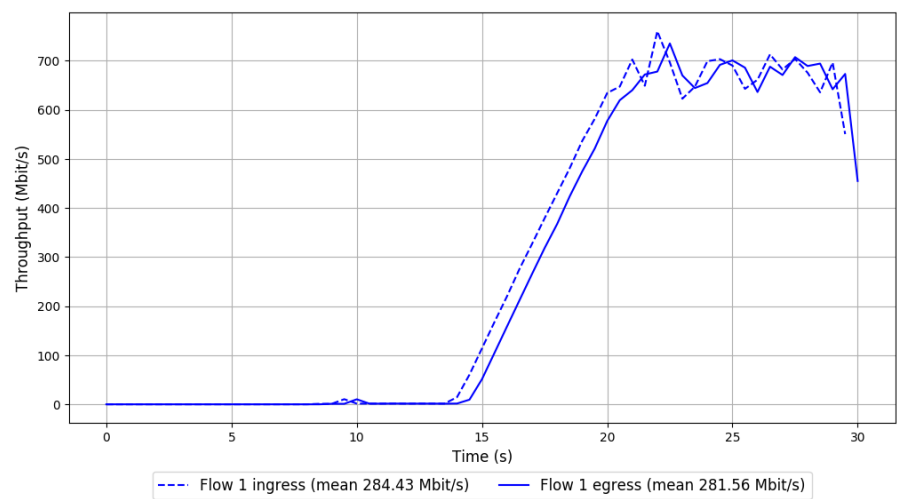
-- Flow 1:

Average throughput: 281.56 Mbit/s

95th percentile per-packet one-way delay: 139.474 ms

Loss rate: 1.59%

Run 1: Report of Muses — Data Link



Run 2: Statistics of Muses

Start at: 2018-08-28 06:19:38

End at: 2018-08-28 06:20:08

Local clock offset: 0.637 ms

Remote clock offset: 0.072 ms

Below is generated by plot.py at 2018-08-28 06:43:43

Datalink statistics

-- Total of 1 flow:

Average throughput: 501.55 Mbit/s

95th percentile per-packet one-way delay: 152.602 ms

Loss rate: 1.28%

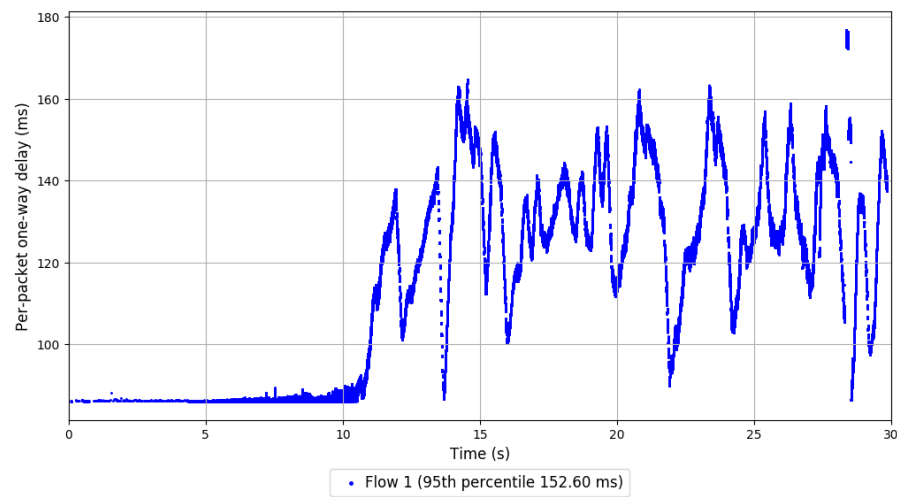
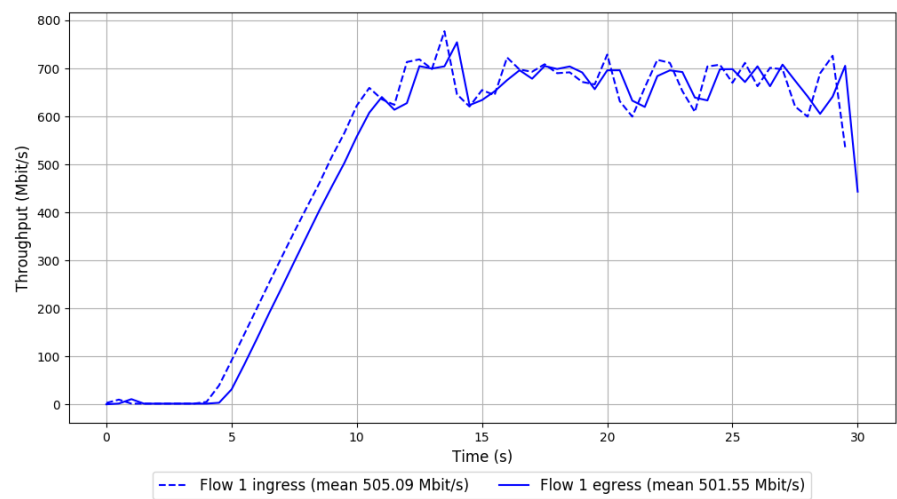
-- Flow 1:

Average throughput: 501.55 Mbit/s

95th percentile per-packet one-way delay: 152.602 ms

Loss rate: 1.28%

Run 2: Report of Muses — Data Link



Run 3: Statistics of Muses

Start at: 2018-08-28 06:26:16

End at: 2018-08-28 06:26:46

Local clock offset: 0.721 ms

Remote clock offset: 0.159 ms

Below is generated by plot.py at 2018-08-28 06:43:46

Datalink statistics

-- Total of 1 flow:

Average throughput: 509.75 Mbit/s

95th percentile per-packet one-way delay: 152.614 ms

Loss rate: 1.71%

-- Flow 1:

Average throughput: 509.75 Mbit/s

95th percentile per-packet one-way delay: 152.614 ms

Loss rate: 1.71%

Run 3: Report of Muses — Data Link

