

## Pantheon Report

Generated at 2018-08-31 09:46:37 (UTC).

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

Repeated the test of 4 congestion control schemes twice.

Each test lasted for 30 seconds running 1 flow.

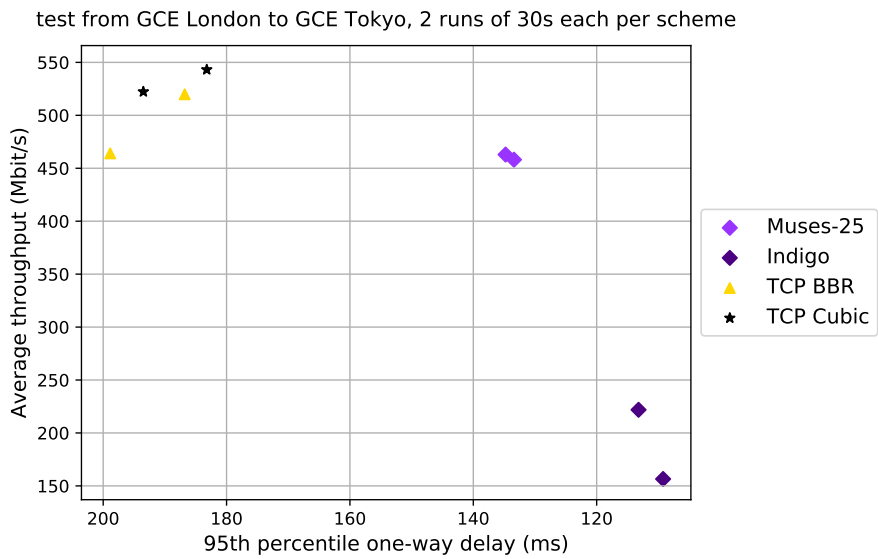
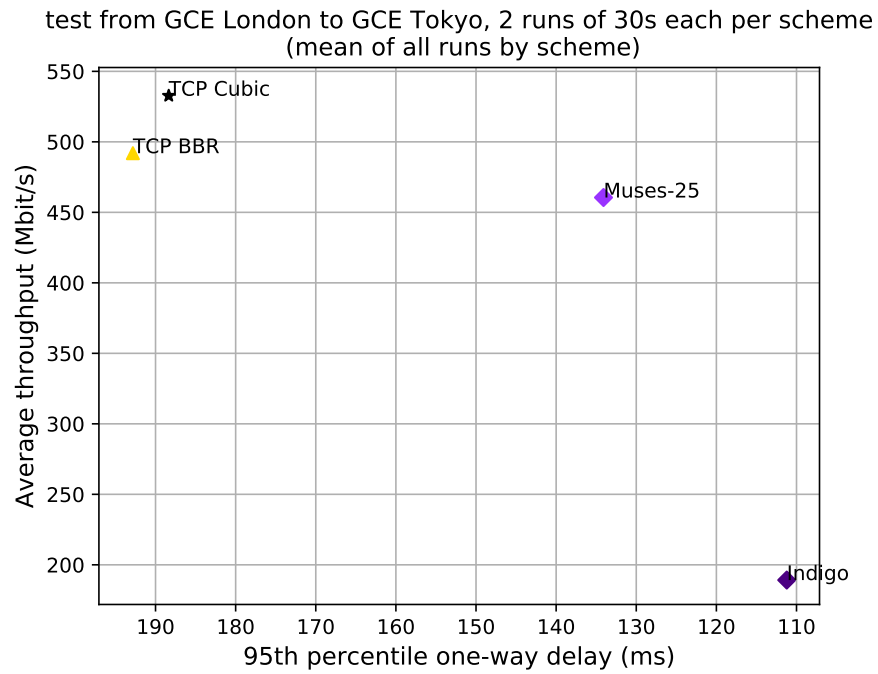
NTP offsets were measured against `time.google.com` and have been applied to correct the timestamps in logs.

### System info:

```
Linux 4.15.0-1018-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 @ e3c5aa19ca94c3066828fb83f16a8fb6b2731e7a
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
```



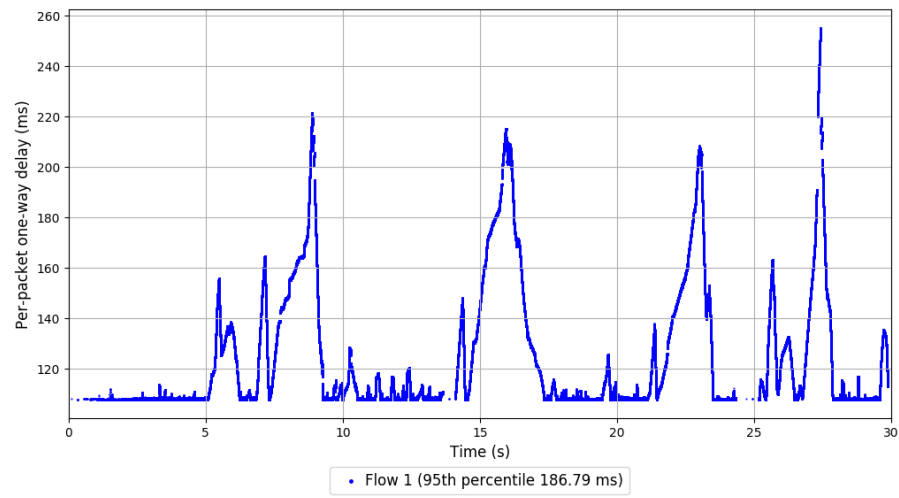
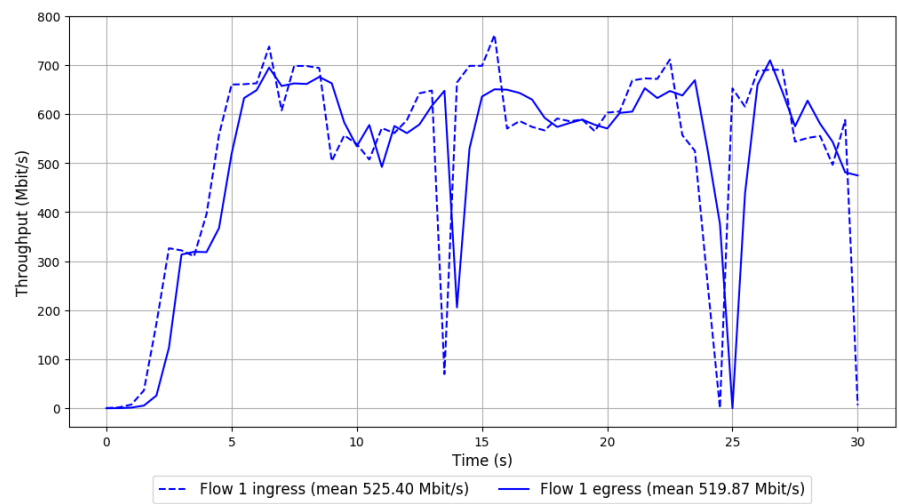
| scheme    | # runs | mean avg tput (Mbit/s)<br>flow 1 | mean 95th-%ile delay (ms)<br>flow 1 | mean loss rate (%)<br>flow 1 |
|-----------|--------|----------------------------------|-------------------------------------|------------------------------|
| TCP BBR   | 2      | 491.96                           | 192.83                              | 1.89                         |
| TCP Cubic | 2      | 532.68                           | 188.35                              | 0.90                         |
| Indigo    | 2      | 189.19                           | 111.22                              | 0.91                         |
| Muses-25  | 2      | 460.51                           | 134.09                              | 0.48                         |

Run 1: Statistics of TCP BBR

Start at: 2018-08-31 09:25:36  
End at: 2018-08-31 09:26:06  
Local clock offset: 26.432 ms  
Remote clock offset: 34.596 ms

# Below is generated by plot.py at 2018-08-31 09:46:21  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 519.87 Mbit/s  
95th percentile per-packet one-way delay: 186.787 ms  
Loss rate: 1.79%  
-- Flow 1:  
Average throughput: 519.87 Mbit/s  
95th percentile per-packet one-way delay: 186.787 ms  
Loss rate: 1.79%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-08-31 09:31:48

End at: 2018-08-31 09:32:18

Local clock offset: 32.543 ms

Remote clock offset: 41.73 ms

# Below is generated by plot.py at 2018-08-31 09:46:21

# Datalink statistics

-- Total of 1 flow:

Average throughput: 464.04 Mbit/s

95th percentile per-packet one-way delay: 198.864 ms

Loss rate: 1.98%

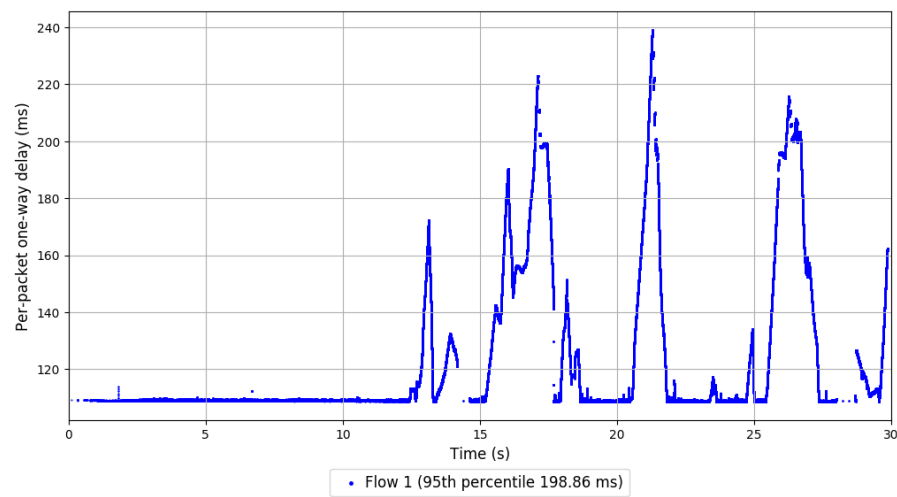
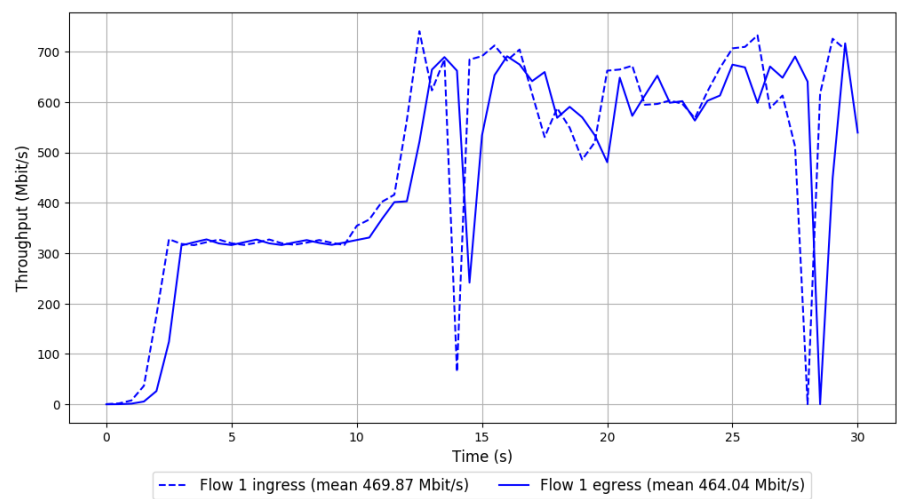
-- Flow 1:

Average throughput: 464.04 Mbit/s

95th percentile per-packet one-way delay: 198.864 ms

Loss rate: 1.98%

Run 2: Report of TCP BBR — Data Link

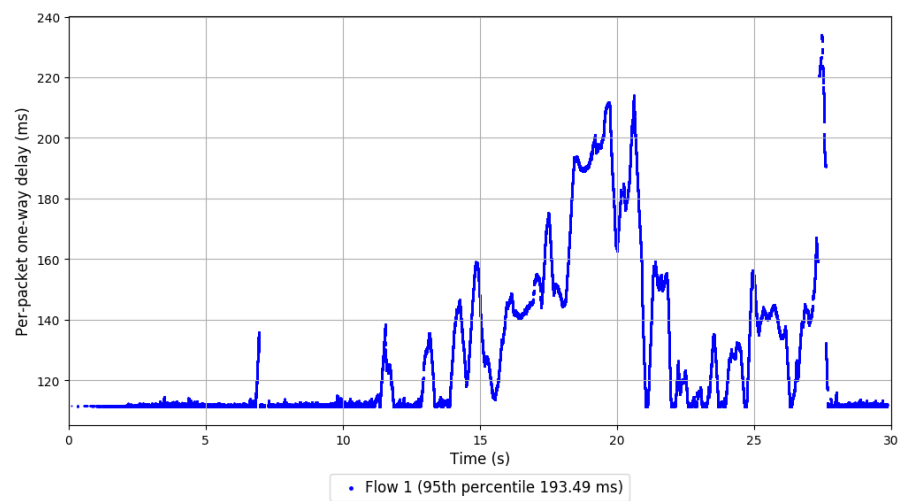
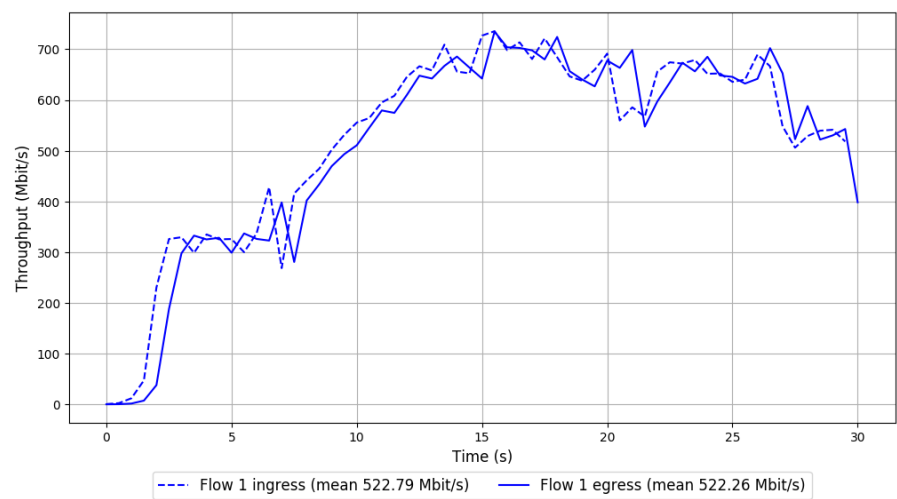


Run 1: Statistics of TCP Cubic

Start at: 2018-08-31 09:27:15  
End at: 2018-08-31 09:27:45  
Local clock offset: 30.986 ms  
Remote clock offset: 36.353 ms

# Below is generated by plot.py at 2018-08-31 09:46:21  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 522.26 Mbit/s  
95th percentile per-packet one-way delay: 193.490 ms  
Loss rate: 0.84%  
-- Flow 1:  
Average throughput: 522.26 Mbit/s  
95th percentile per-packet one-way delay: 193.490 ms  
Loss rate: 0.84%

Run 1: Report of TCP Cubic — Data Link

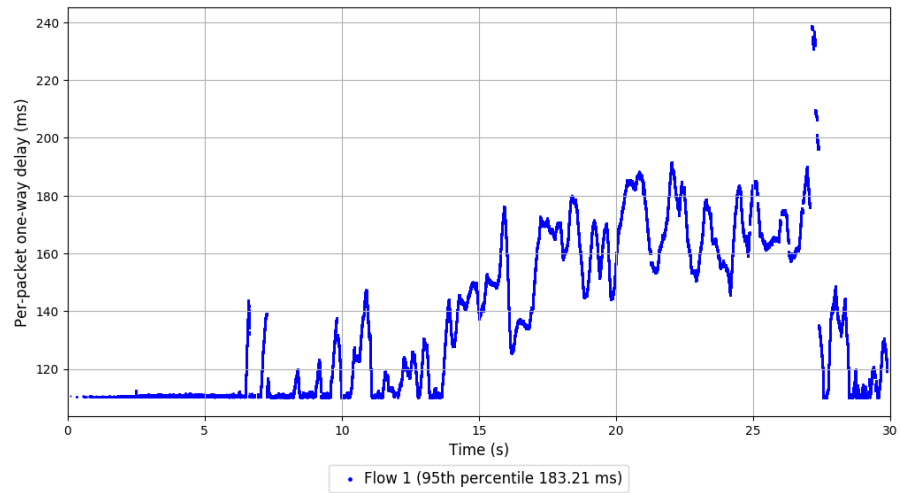
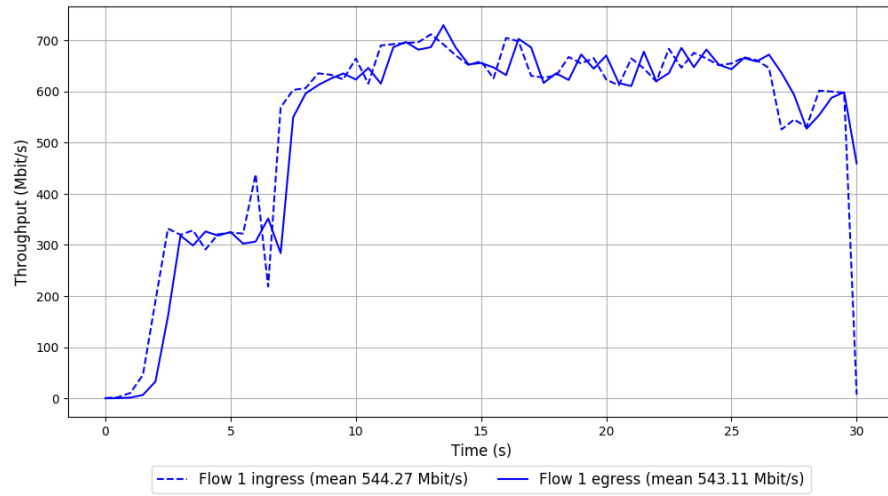


Run 2: Statistics of TCP Cubic

Start at: 2018-08-31 09:33:23  
End at: 2018-08-31 09:33:53  
Local clock offset: 29.229 ms  
Remote clock offset: 36.153 ms

# Below is generated by plot.py at 2018-08-31 09:46:26  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 543.11 Mbit/s  
95th percentile per-packet one-way delay: 183.214 ms  
Loss rate: 0.96%  
-- Flow 1:  
Average throughput: 543.11 Mbit/s  
95th percentile per-packet one-way delay: 183.214 ms  
Loss rate: 0.96%

## Run 2: Report of TCP Cubic — Data Link

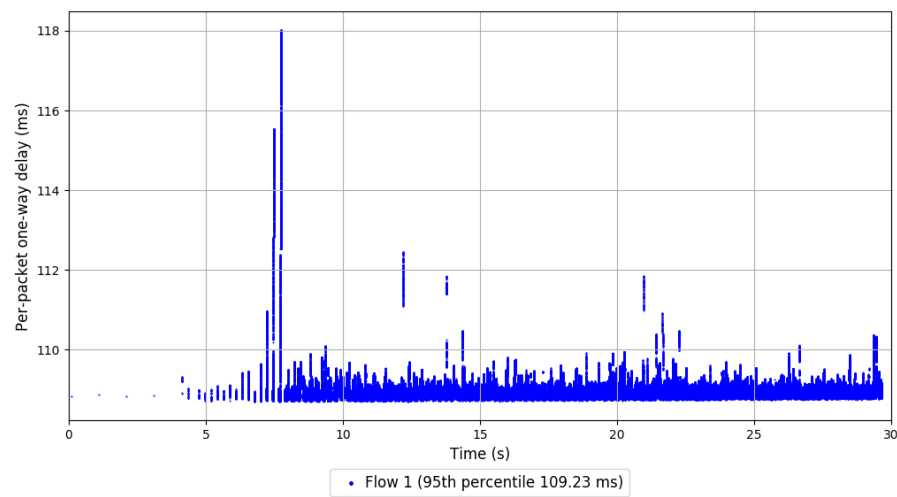
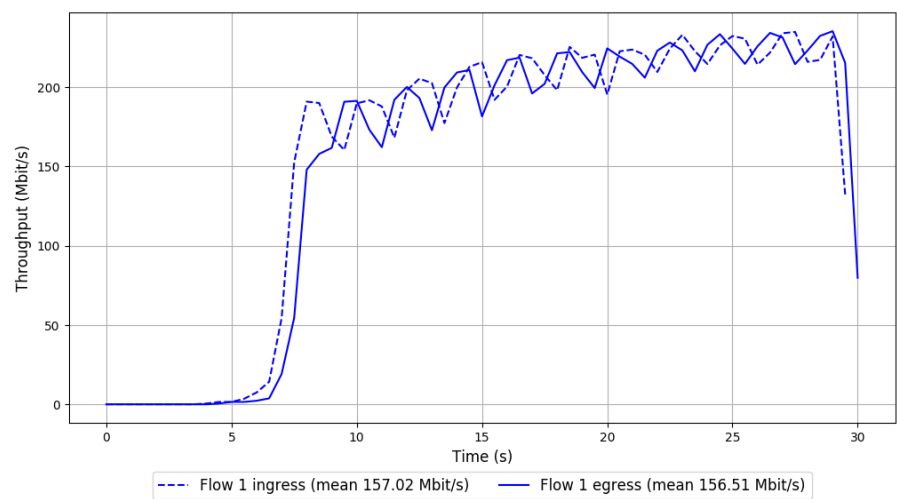


Run 1: Statistics of Indigo

Start at: 2018-08-31 09:28:50  
End at: 2018-08-31 09:29:20  
Local clock offset: 32.387 ms  
Remote clock offset: 38.155 ms

# Below is generated by plot.py at 2018-08-31 09:46:26  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 156.51 Mbit/s  
95th percentile per-packet one-way delay: 109.227 ms  
Loss rate: 1.06%  
-- Flow 1:  
Average throughput: 156.51 Mbit/s  
95th percentile per-packet one-way delay: 109.227 ms  
Loss rate: 1.06%

Run 1: Report of Indigo — Data Link

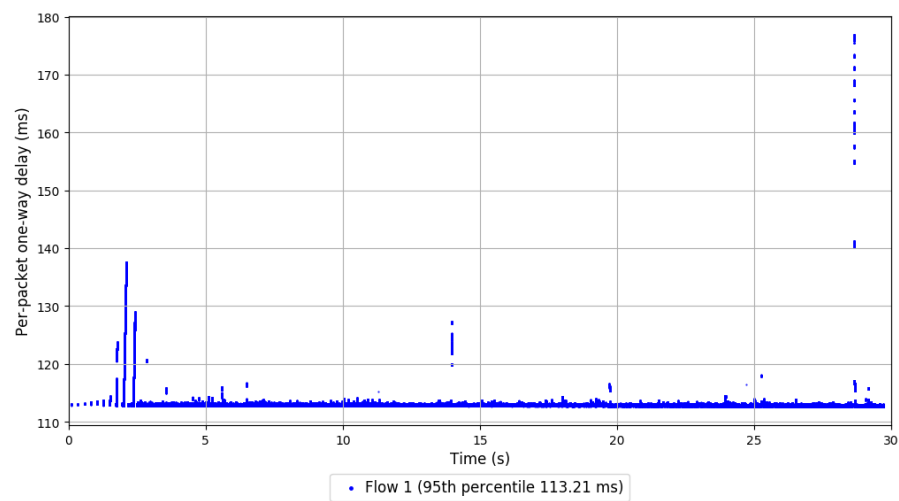
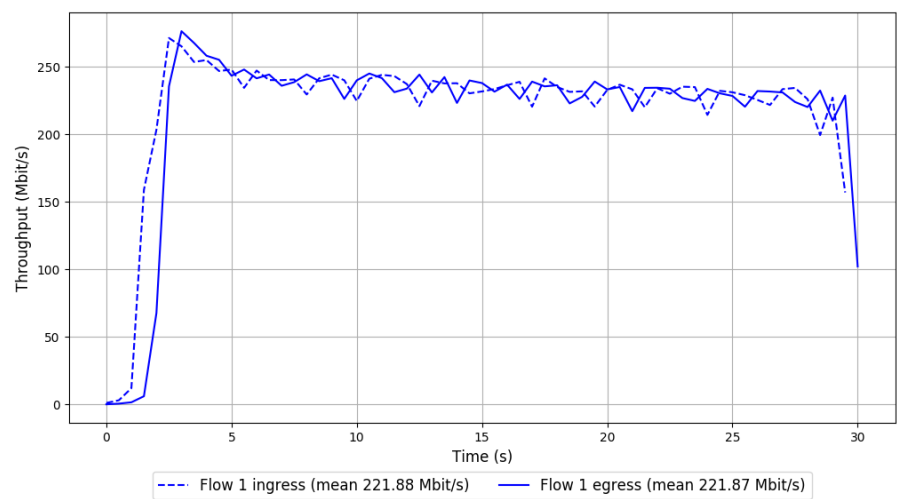


Run 2: Statistics of Indigo

Start at: 2018-08-31 09:35:00  
End at: 2018-08-31 09:35:30  
Local clock offset: 26.899 ms  
Remote clock offset: 30.527 ms

# Below is generated by plot.py at 2018-08-31 09:46:26  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 221.87 Mbit/s  
95th percentile per-packet one-way delay: 113.208 ms  
Loss rate: 0.76%  
-- Flow 1:  
Average throughput: 221.87 Mbit/s  
95th percentile per-packet one-way delay: 113.208 ms  
Loss rate: 0.76%

Run 2: Report of Indigo — Data Link

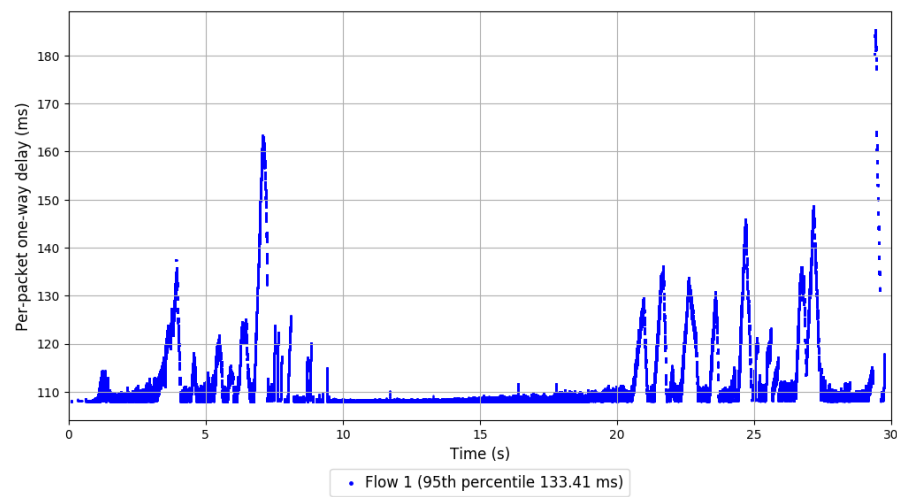
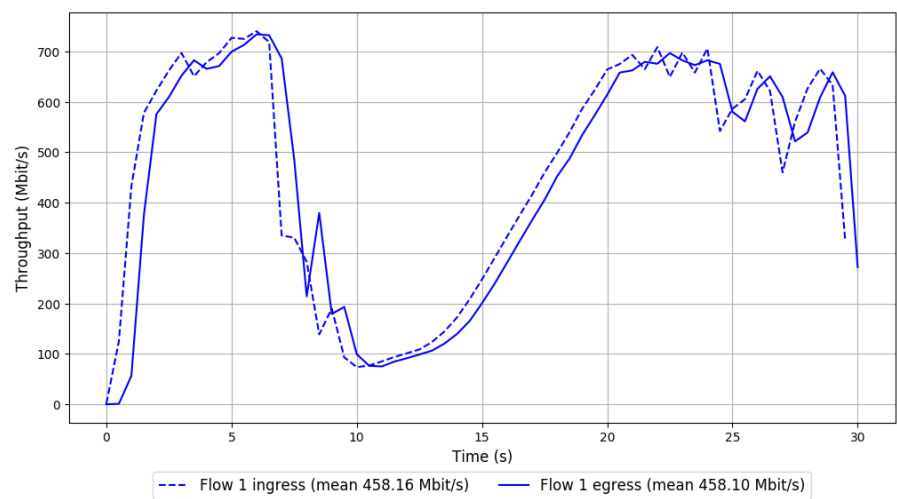


Run 1: Statistics of Muses-25

Start at: 2018-08-31 09:30:14  
End at: 2018-08-31 09:30:44  
Local clock offset: 31.04 ms  
Remote clock offset: 39.633 ms

# Below is generated by plot.py at 2018-08-31 09:46:33  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 458.10 Mbit/s  
95th percentile per-packet one-way delay: 133.408 ms  
Loss rate: 0.81%  
-- Flow 1:  
Average throughput: 458.10 Mbit/s  
95th percentile per-packet one-way delay: 133.408 ms  
Loss rate: 0.81%

Run 1: Report of Muses-25 — Data Link



Run 2: Statistics of Muses-25

Start at: 2018-08-31 09:36:30  
End at: 2018-08-31 09:37:00  
Local clock offset: 23.558 ms  
Remote clock offset: 26.795 ms

# Below is generated by plot.py at 2018-08-31 09:46:35  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 462.93 Mbit/s  
95th percentile per-packet one-way delay: 134.768 ms  
Loss rate: 0.15%  
-- Flow 1:  
Average throughput: 462.93 Mbit/s  
95th percentile per-packet one-way delay: 134.768 ms  
Loss rate: 0.15%

Run 2: Report of Muses-25 — Data Link

