

## Pantheon Report

Generated at 2018-09-05 22:10:10 (UTC).

Data path: India on `em1` (*remote*) → AWS India 1 on `ens5` (*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 `nets.org.sg` and have been applied to correct the timestamps in logs.

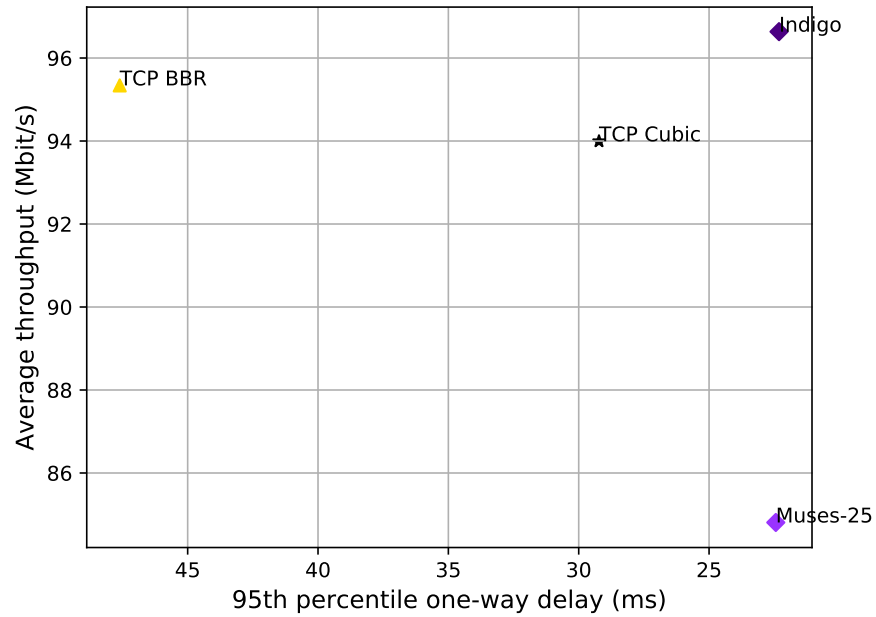
### System info:

```
Linux 4.15.0-1020-aws
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
```

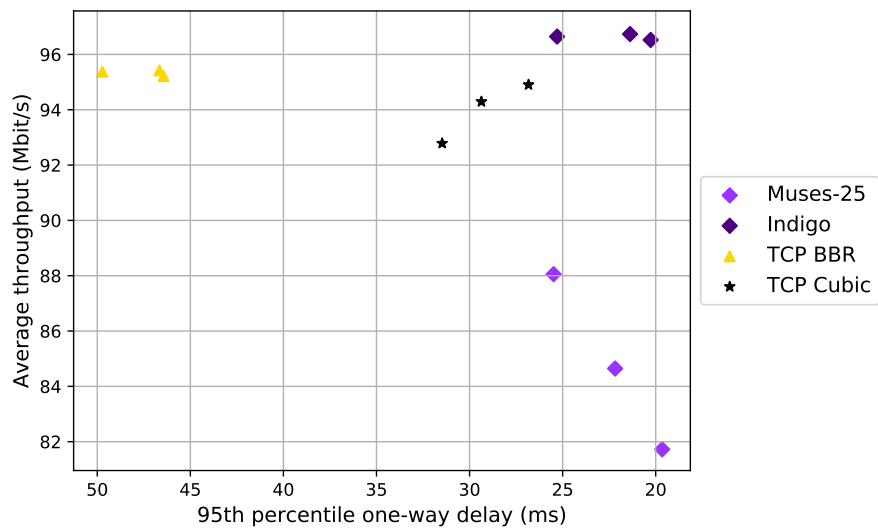
### Git summary:

```
branch: muses @ 18b9165265c8ba2915c862e8713fd9ad82c1ac21
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf5e58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecd90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ a28d20fb82a95a965a3da65fd1eb71b8994e9b84
third_party/pantheon-tunnel @ cbfce6db5ff5740d4fe1771f813cd646339e1952
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 India to AWS India 1, 3 runs of 30s each per scheme  
(mean of all runs by scheme)



test from India to AWS India 1, 3 runs of 30s each per scheme



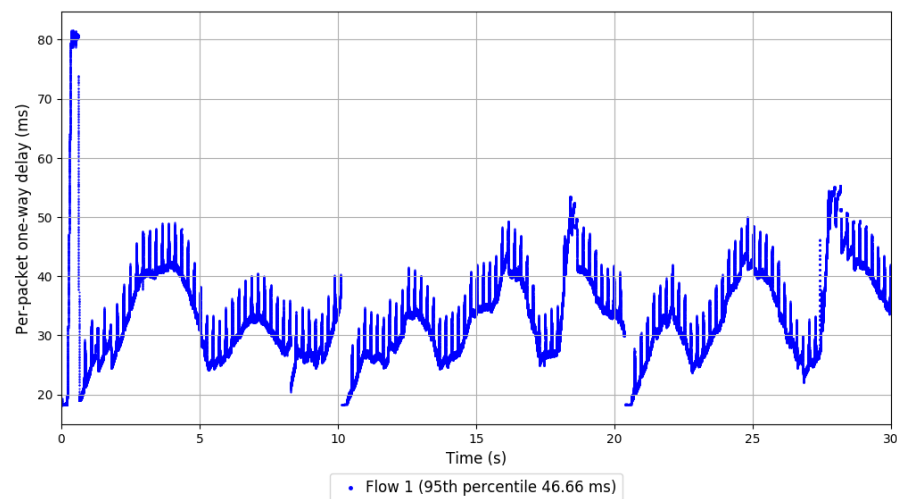
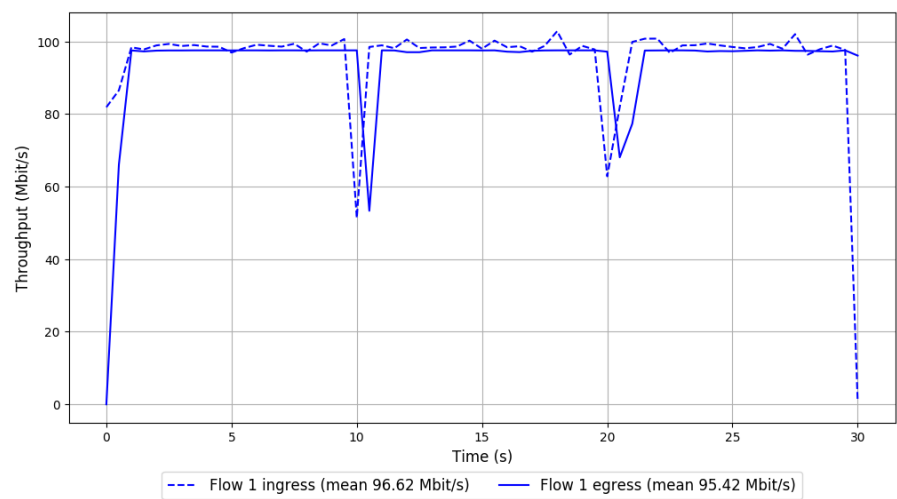
| scheme    | # runs | mean avg tput (Mbit/s)<br>flow 1 | mean 95th-%ile delay (ms)<br>flow 1 | mean loss rate (%)<br>flow 1 |
|-----------|--------|----------------------------------|-------------------------------------|------------------------------|
| TCP BBR   | 3      | 95.34                            | 47.61                               | 1.32                         |
| TCP Cubic | 3      | 93.99                            | 29.22                               | 0.12                         |
| Indigo    | 3      | 96.64                            | 22.32                               | 0.10                         |
| Muses-25  | 3      | 84.80                            | 22.44                               | 0.10                         |

Run 1: Statistics of TCP BBR

Start at: 2018-09-05 21:54:31  
End at: 2018-09-05 21:55:01  
Local clock offset: 1.023 ms  
Remote clock offset: -2.354 ms

# Below is generated by plot.py at 2018-09-05 22:09:36  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 95.42 Mbit/s  
95th percentile per-packet one-way delay: 46.657 ms  
Loss rate: 1.34%  
-- Flow 1:  
Average throughput: 95.42 Mbit/s  
95th percentile per-packet one-way delay: 46.657 ms  
Loss rate: 1.34%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-09-05 21:59:13

End at: 2018-09-05 21:59:43

Local clock offset: 2.295 ms

Remote clock offset: -2.768 ms

# Below is generated by plot.py at 2018-09-05 22:09:37

# Datalink statistics

-- Total of 1 flow:

Average throughput: 95.22 Mbit/s

95th percentile per-packet one-way delay: 46.436 ms

Loss rate: 1.36%

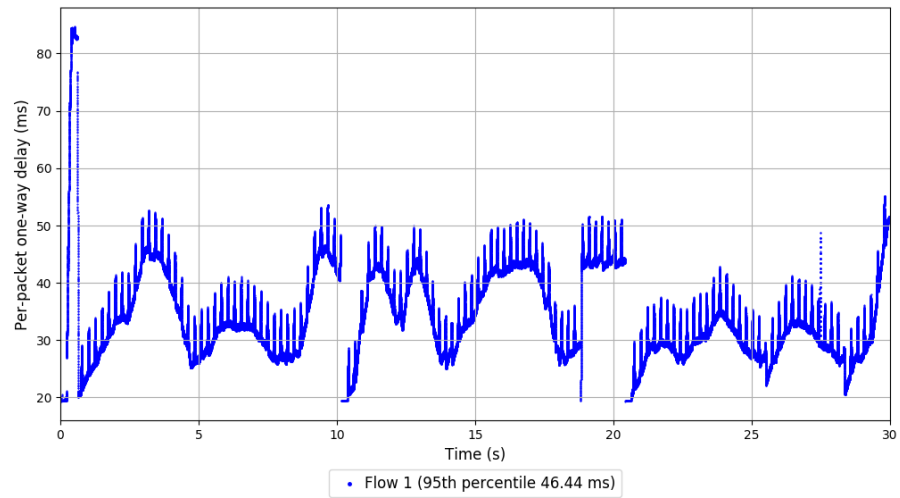
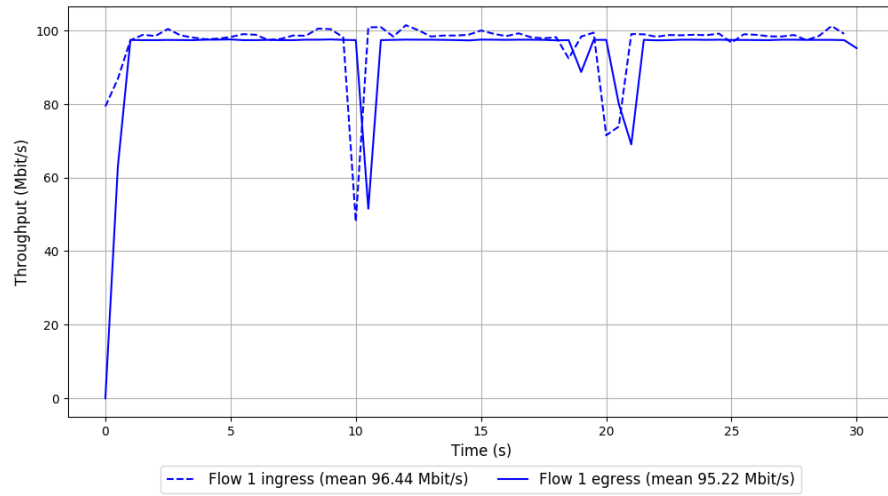
-- Flow 1:

Average throughput: 95.22 Mbit/s

95th percentile per-packet one-way delay: 46.436 ms

Loss rate: 1.36%

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



Run 3: Statistics of TCP BBR

Start at: 2018-09-05 22:03:57

End at: 2018-09-05 22:04:27

Local clock offset: 5.697 ms

Remote clock offset: -1.575 ms

# Below is generated by plot.py at 2018-09-05 22:09:37

# Datalink statistics

-- Total of 1 flow:

Average throughput: 95.38 Mbit/s

95th percentile per-packet one-way delay: 49.725 ms

Loss rate: 1.25%

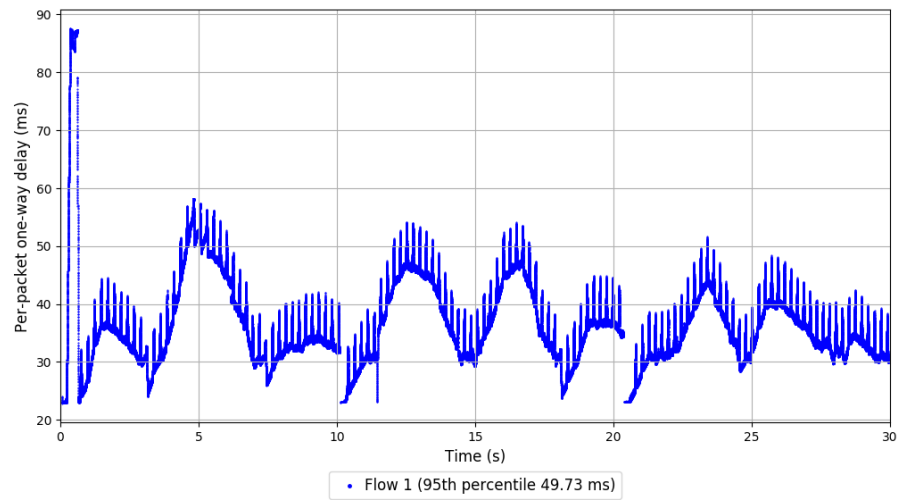
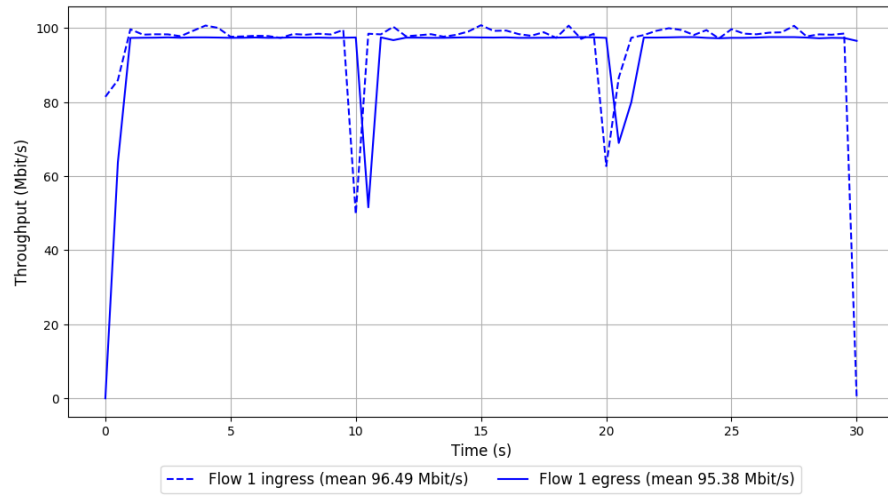
-- Flow 1:

Average throughput: 95.38 Mbit/s

95th percentile per-packet one-way delay: 49.725 ms

Loss rate: 1.25%

### Run 3: Report of TCP BBR — Data Link

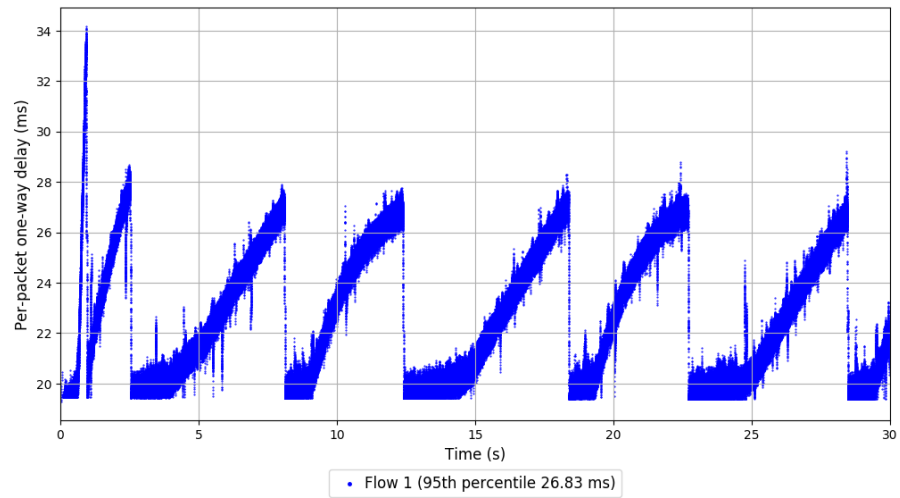
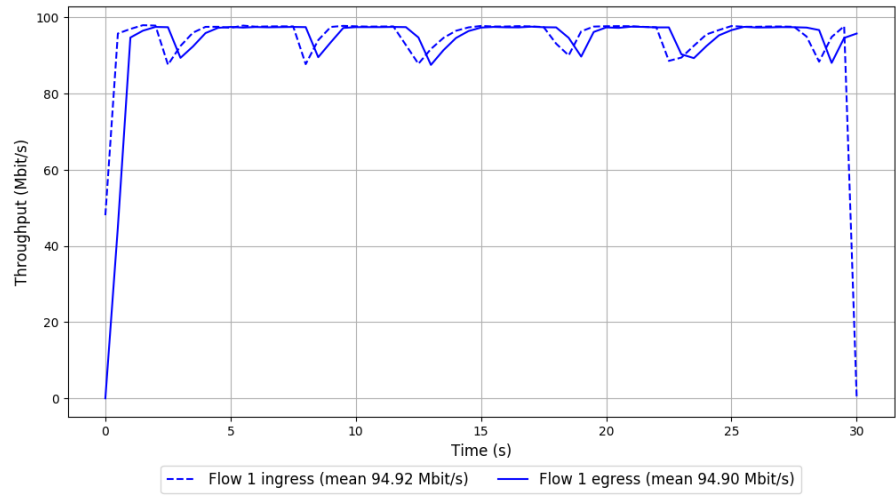


Run 1: Statistics of TCP Cubic

Start at: 2018-09-05 21:58:02  
End at: 2018-09-05 21:58:32  
Local clock offset: 2.235 ms  
Remote clock offset: -2.777 ms

# Below is generated by plot.py at 2018-09-05 22:09:37  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 94.90 Mbit/s  
95th percentile per-packet one-way delay: 26.833 ms  
Loss rate: 0.11%  
-- Flow 1:  
Average throughput: 94.90 Mbit/s  
95th percentile per-packet one-way delay: 26.833 ms  
Loss rate: 0.11%

### Run 1: Report of TCP Cubic — Data Link

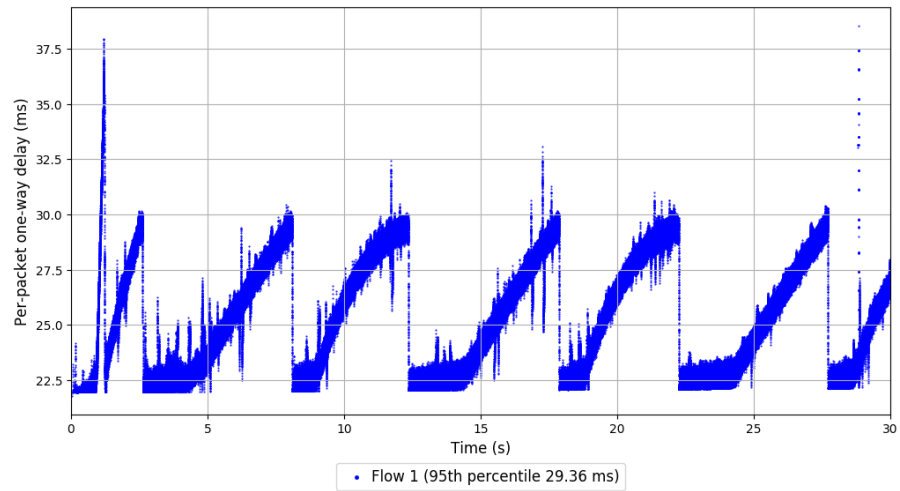
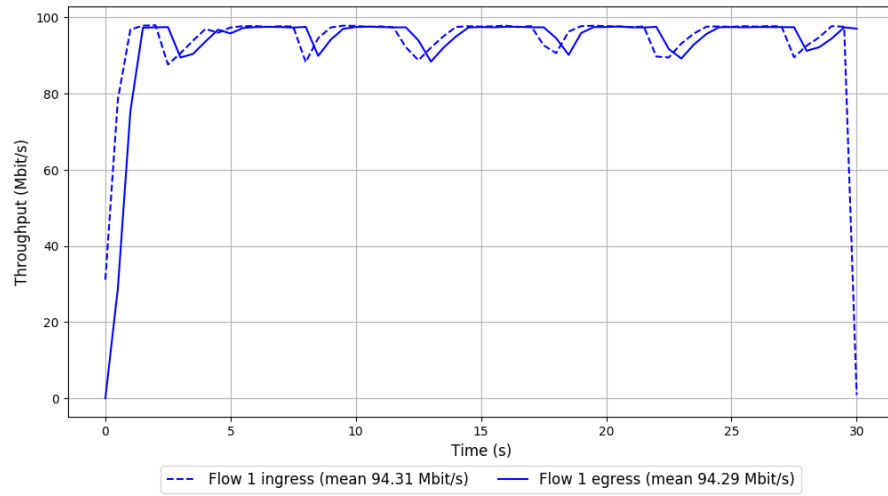


Run 2: Statistics of TCP Cubic

Start at: 2018-09-05 22:02:46  
End at: 2018-09-05 22:03:16  
Local clock offset: 4.835 ms  
Remote clock offset: -1.866 ms

# Below is generated by plot.py at 2018-09-05 22:09:37  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 94.29 Mbit/s  
95th percentile per-packet one-way delay: 29.363 ms  
Loss rate: 0.12%  
-- Flow 1:  
Average throughput: 94.29 Mbit/s  
95th percentile per-packet one-way delay: 29.363 ms  
Loss rate: 0.12%

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



Run 3: Statistics of TCP Cubic

Start at: 2018-09-05 22:07:33

End at: 2018-09-05 22:08:03

Local clock offset: 5.351 ms

Remote clock offset: -2.098 ms

# Below is generated by plot.py at 2018-09-05 22:09:37

# Datalink statistics

-- Total of 1 flow:

Average throughput: 92.79 Mbit/s

95th percentile per-packet one-way delay: 31.471 ms

Loss rate: 0.13%

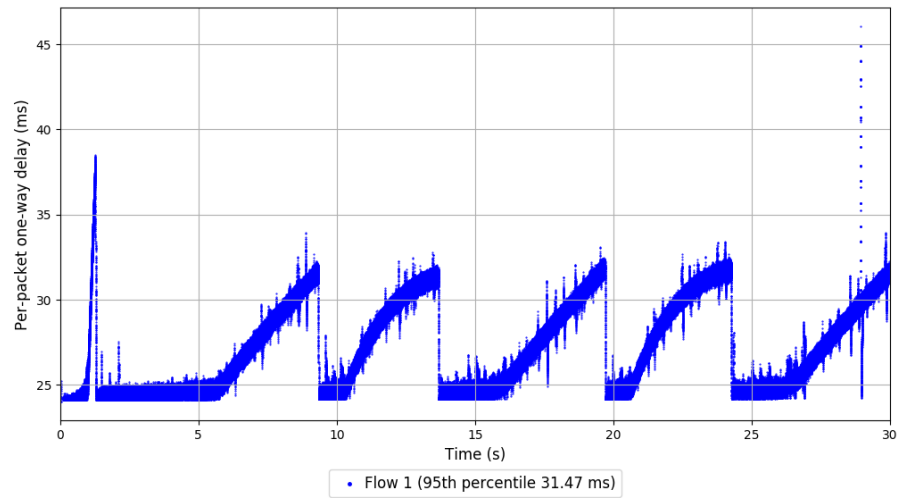
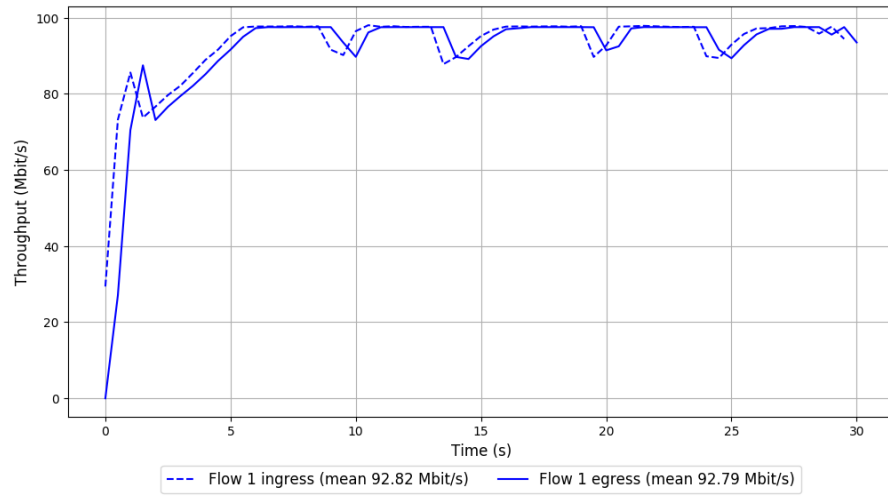
-- Flow 1:

Average throughput: 92.79 Mbit/s

95th percentile per-packet one-way delay: 31.471 ms

Loss rate: 0.13%

### Run 3: Report of TCP Cubic — Data Link

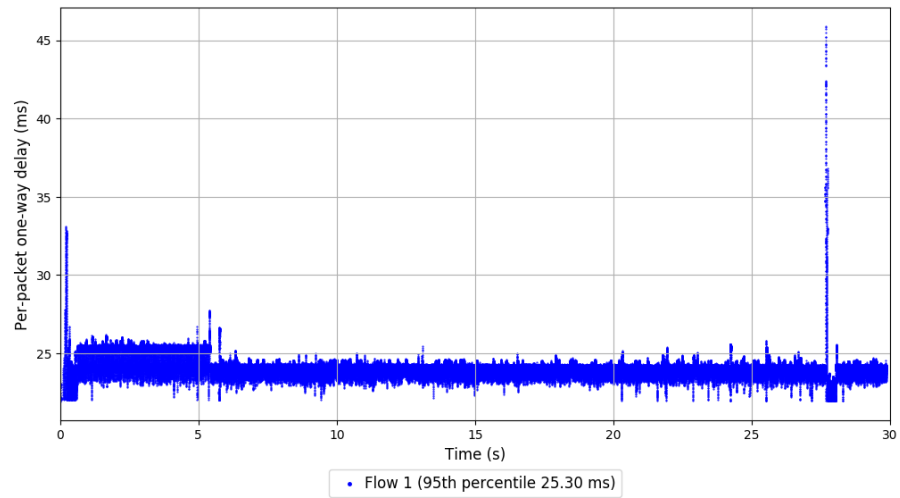
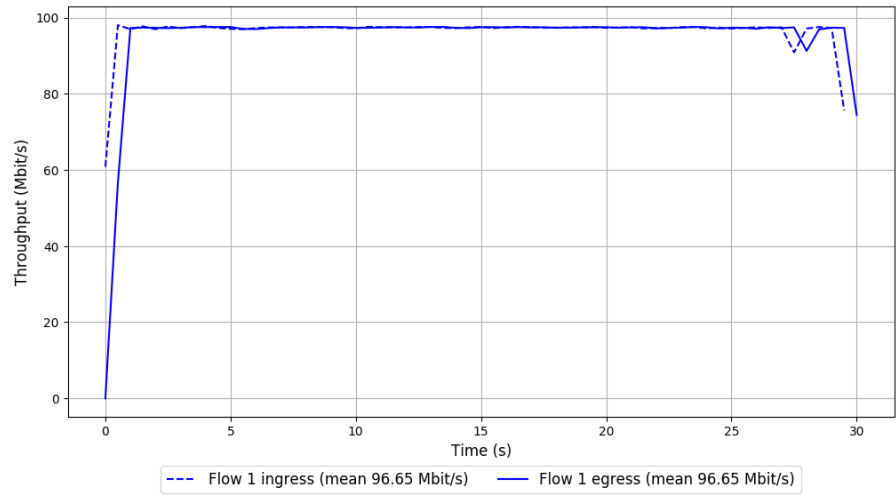


```
Run 1: Statistics of Indigo

Start at: 2018-09-05 21:55:42
End at: 2018-09-05 21:56:12
Local clock offset: 4.947 ms
Remote clock offset: -2.337 ms

# Below is generated by plot.py at 2018-09-05 22:09:38
# Datalink statistics
-- Total of 1 flow:
Average throughput: 96.65 Mbit/s
95th percentile per-packet one-way delay: 25.298 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 96.65 Mbit/s
95th percentile per-packet one-way delay: 25.298 ms
Loss rate: 0.10%
```

### Run 1: Report of Indigo — Data Link

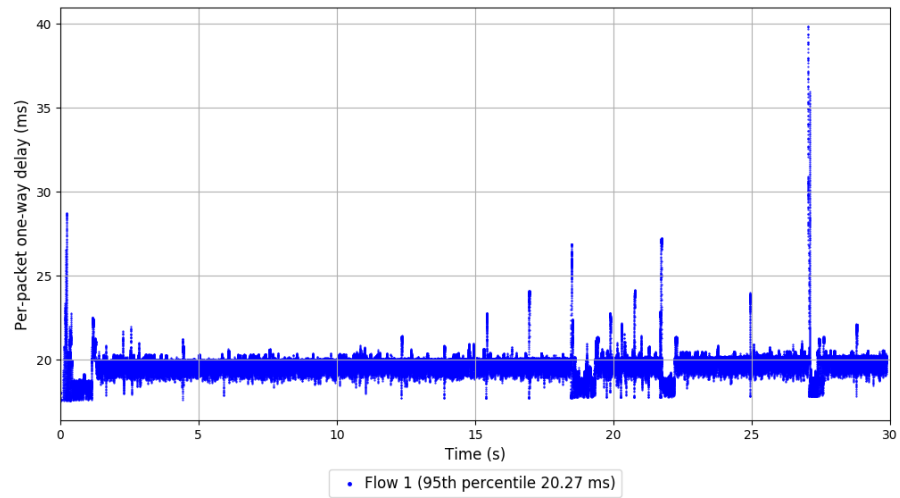
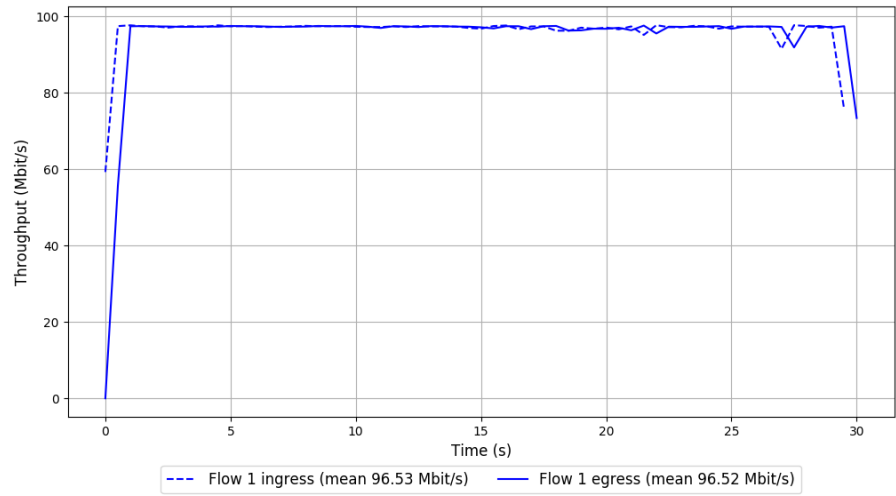


Run 2: Statistics of Indigo

Start at: 2018-09-05 22:00:25  
End at: 2018-09-05 22:00:55  
Local clock offset: 1.029 ms  
Remote clock offset: -2.413 ms

# Below is generated by plot.py at 2018-09-05 22:09:38  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 96.52 Mbit/s  
95th percentile per-packet one-way delay: 20.271 ms  
Loss rate: 0.10%  
-- Flow 1:  
Average throughput: 96.52 Mbit/s  
95th percentile per-packet one-way delay: 20.271 ms  
Loss rate: 0.10%

## Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-09-05 22:05:08

End at: 2018-09-05 22:05:38

Local clock offset: 1.906 ms

Remote clock offset: -0.964 ms

# Below is generated by plot.py at 2018-09-05 22:10:09

# Datalink statistics

-- Total of 1 flow:

Average throughput: 96.74 Mbit/s

95th percentile per-packet one-way delay: 21.379 ms

Loss rate: 0.10%

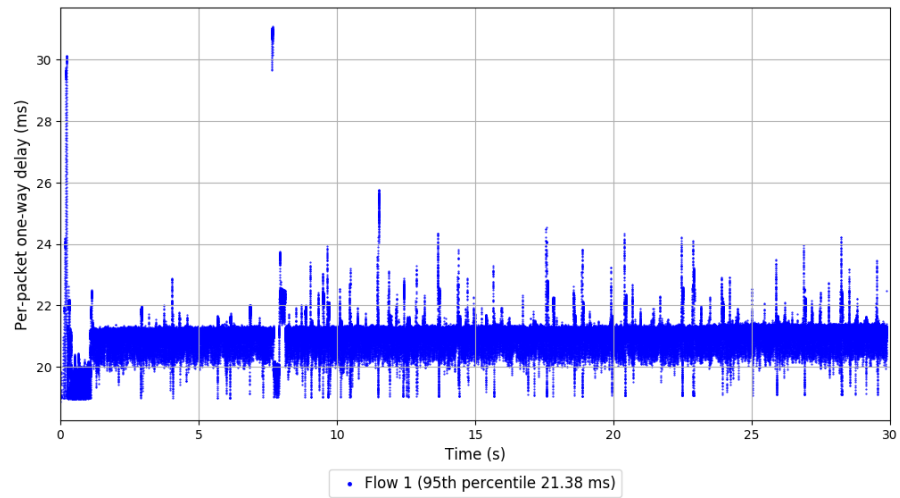
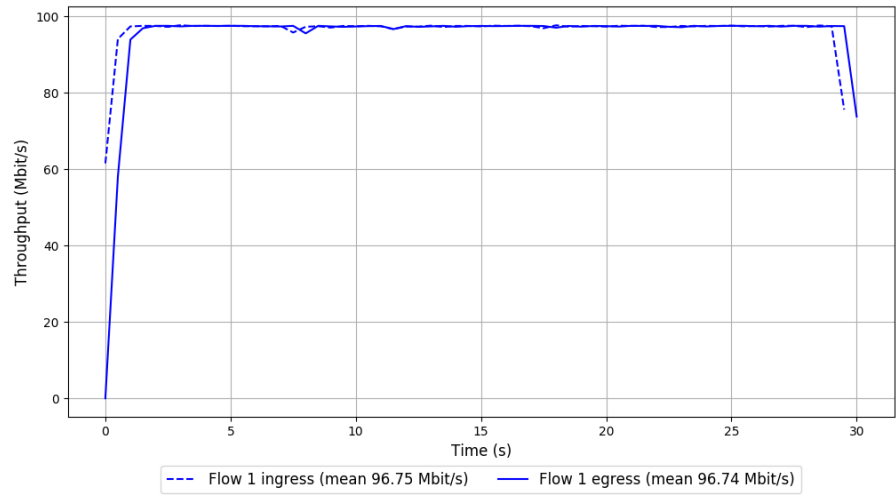
-- Flow 1:

Average throughput: 96.74 Mbit/s

95th percentile per-packet one-way delay: 21.379 ms

Loss rate: 0.10%

### Run 3: Report of Indigo — Data Link



Run 1: Statistics of Muses-25

Start at: 2018-09-05 21:56:53

End at: 2018-09-05 21:57:23

Local clock offset: 1.406 ms

Remote clock offset: -2.891 ms

# Below is generated by plot.py at 2018-09-05 22:10:09

# Datalink statistics

-- Total of 1 flow:

Average throughput: 81.72 Mbit/s

95th percentile per-packet one-way delay: 19.654 ms

Loss rate: 0.09%

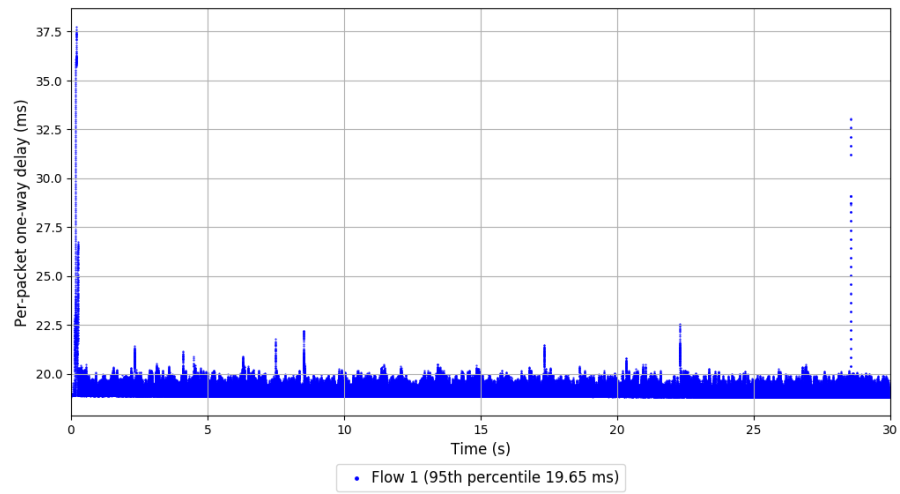
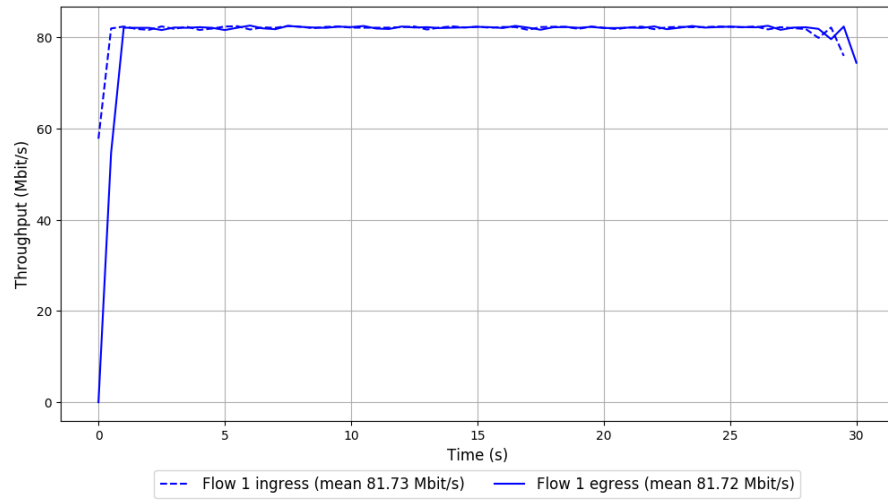
-- Flow 1:

Average throughput: 81.72 Mbit/s

95th percentile per-packet one-way delay: 19.654 ms

Loss rate: 0.09%

# Run 1: Report of Muses-25 — Data Link

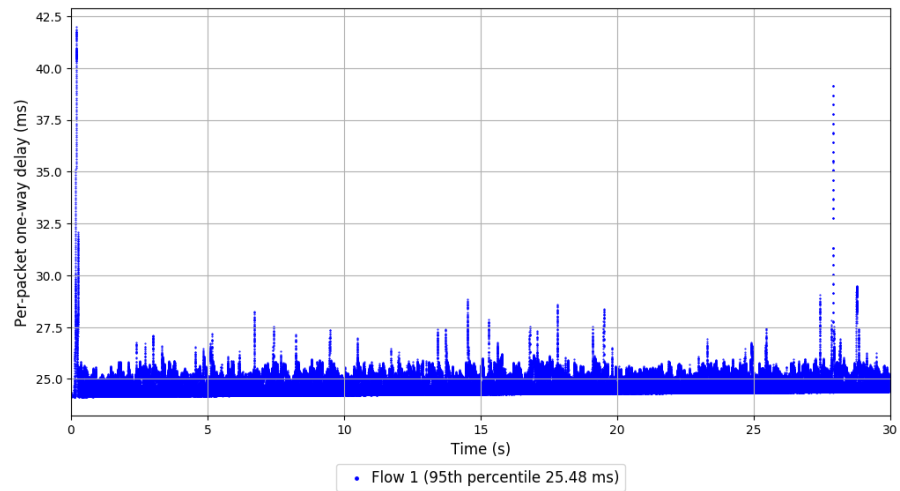
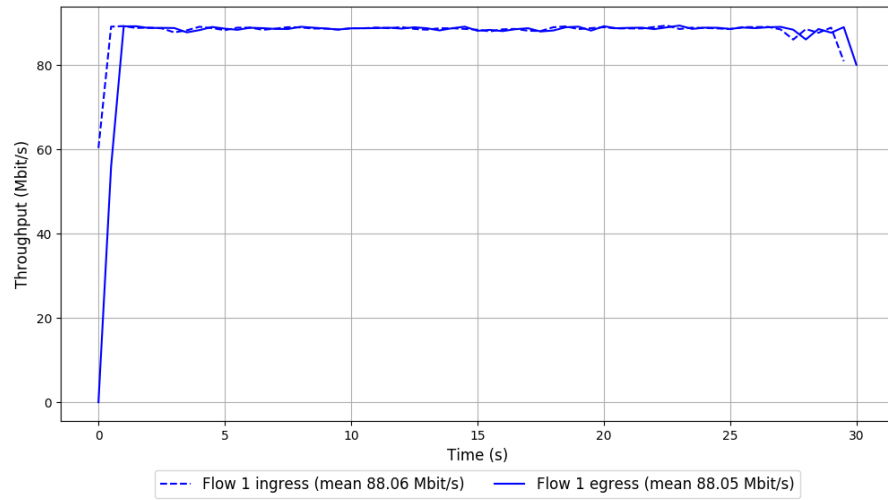


Run 2: Statistics of Muses-25

Start at: 2018-09-05 22:01:35  
End at: 2018-09-05 22:02:05  
Local clock offset: 6.817 ms  
Remote clock offset: -2.619 ms

# Below is generated by plot.py at 2018-09-05 22:10:09  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 88.05 Mbit/s  
95th percentile per-packet one-way delay: 25.485 ms  
Loss rate: 0.10%  
-- Flow 1:  
Average throughput: 88.05 Mbit/s  
95th percentile per-packet one-way delay: 25.485 ms  
Loss rate: 0.10%

## Run 2: Report of Muses-25 — Data Link



Run 3: Statistics of Muses-25

Start at: 2018-09-05 22:06:23

End at: 2018-09-05 22:06:54

Local clock offset: 3.533 ms

Remote clock offset: -1.234 ms

# Below is generated by plot.py at 2018-09-05 22:10:09

# Datalink statistics

-- Total of 1 flow:

Average throughput: 84.64 Mbit/s

95th percentile per-packet one-way delay: 22.182 ms

Loss rate: 0.10%

-- Flow 1:

Average throughput: 84.64 Mbit/s

95th percentile per-packet one-way delay: 22.182 ms

Loss rate: 0.10%

### Run 3: Report of Muses-25 — Data Link

