

Pantheon Report

Generated at 2018-09-05 03:19:01 (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.

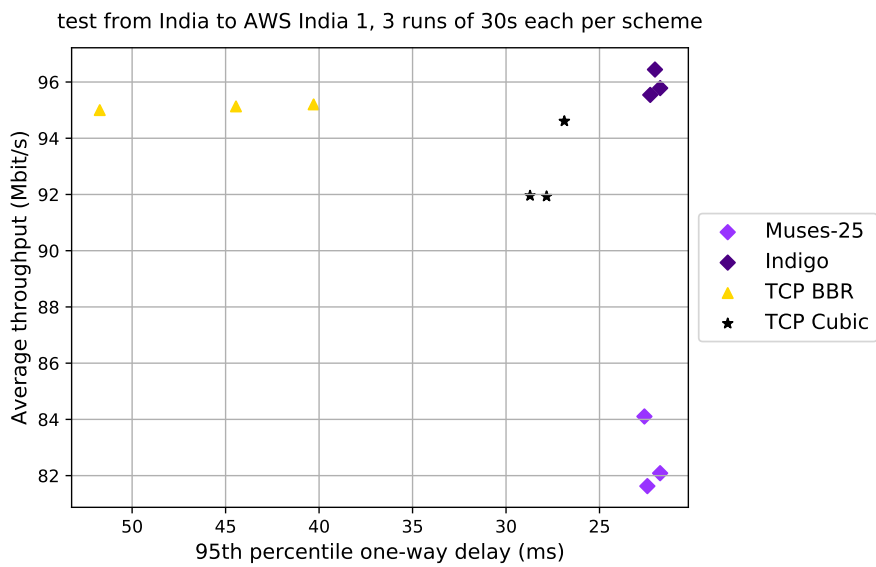
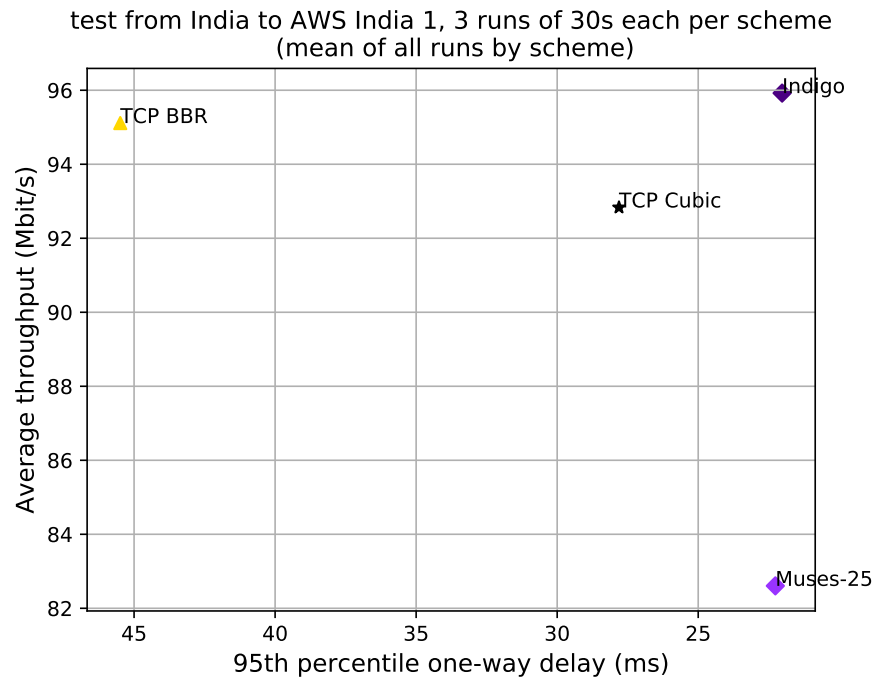
NTP offsets were measured against `nets.org.sg` and have been applied to correct the timestamps in logs.

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 @ 71e71e9a55b945431a7dea72180c1c9381097db9
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecd90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ 96fbc95fb38373d71fbc80c5a105e62e7636623b
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) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	95.11	45.49	1.44
TCP Cubic	3	92.83	27.81	0.10
Indigo	3	95.92	22.03	0.10
Muses-25	3	82.61	22.27	0.08

Run 1: Statistics of TCP BBR

Start at: 2018-09-05 03:03:24

End at: 2018-09-05 03:03:54

Local clock offset: 0.756 ms

Remote clock offset: -3.326 ms

Below is generated by plot.py at 2018-09-05 03:18:30

Datalink statistics

-- Total of 1 flow:

Average throughput: 95.00 Mbit/s

95th percentile per-packet one-way delay: 51.731 ms

Loss rate: 1.76%

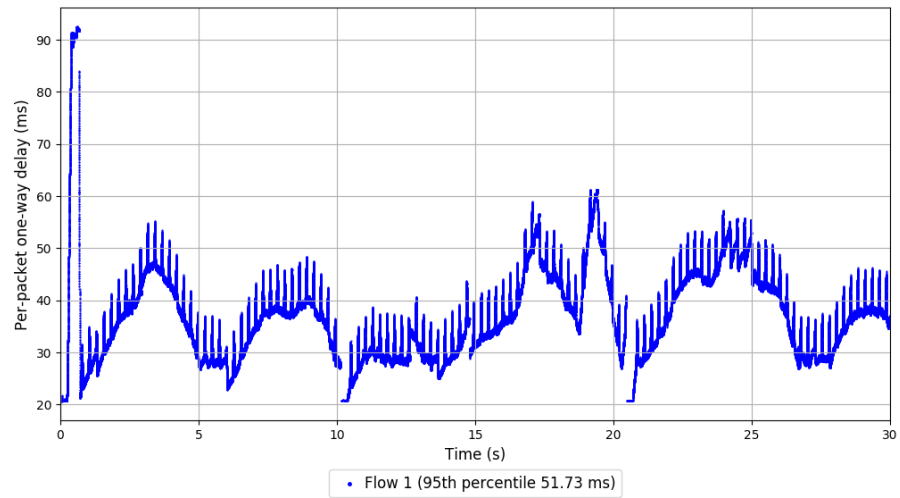
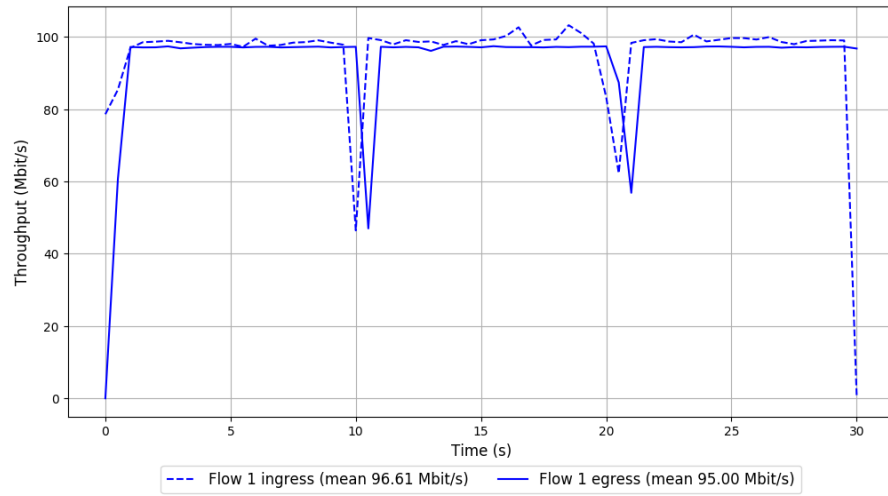
-- Flow 1:

Average throughput: 95.00 Mbit/s

95th percentile per-packet one-way delay: 51.731 ms

Loss rate: 1.76%

Run 1: Report of TCP BBR — Data Link

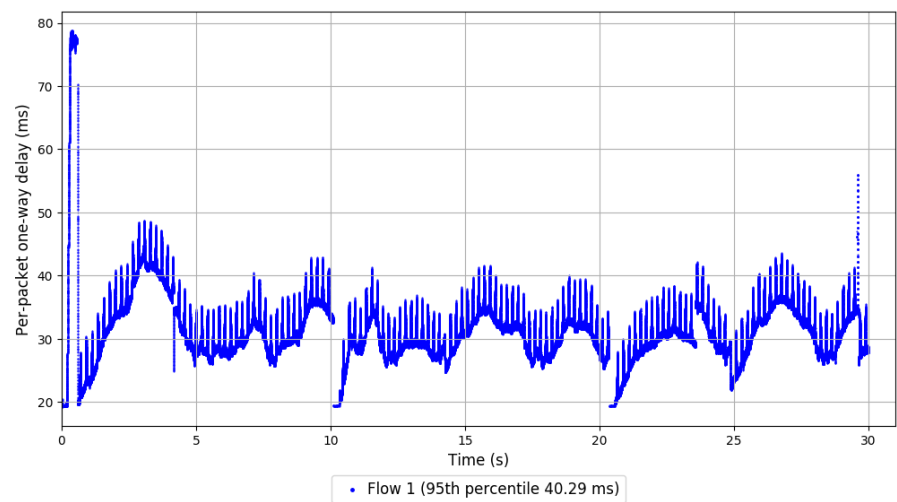
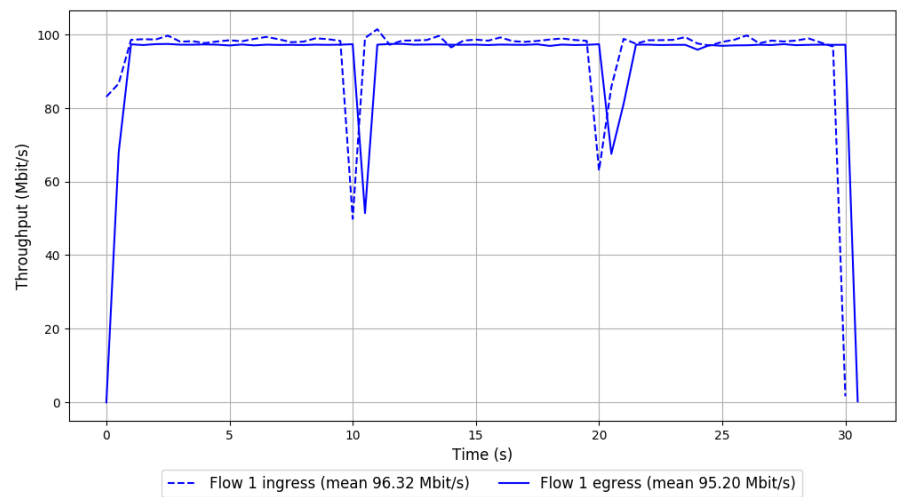


Run 2: Statistics of TCP BBR

Start at: 2018-09-05 03:08:13
End at: 2018-09-05 03:08:43
Local clock offset: -0.295 ms
Remote clock offset: -2.999 ms

Below is generated by plot.py at 2018-09-05 03:18:30
Datalink statistics
-- Total of 1 flow:
Average throughput: 95.20 Mbit/s
95th percentile per-packet one-way delay: 40.292 ms
Loss rate: 1.24%
-- Flow 1:
Average throughput: 95.20 Mbit/s
95th percentile per-packet one-way delay: 40.292 ms
Loss rate: 1.24%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2018-09-05 03:12:58

End at: 2018-09-05 03:13:28

Local clock offset: 1.964 ms

Remote clock offset: -2.869 ms

Below is generated by plot.py at 2018-09-05 03:18:30

Datalink statistics

-- Total of 1 flow:

Average throughput: 95.13 Mbit/s

95th percentile per-packet one-way delay: 44.445 ms

Loss rate: 1.33%

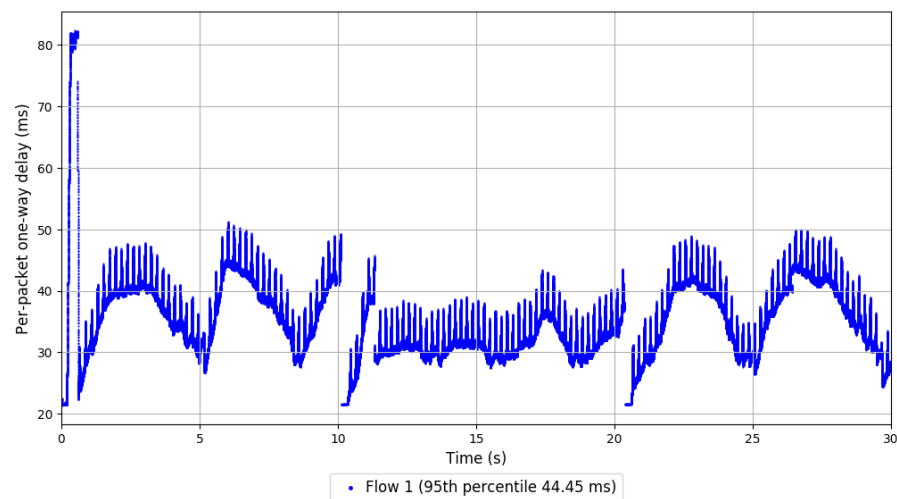
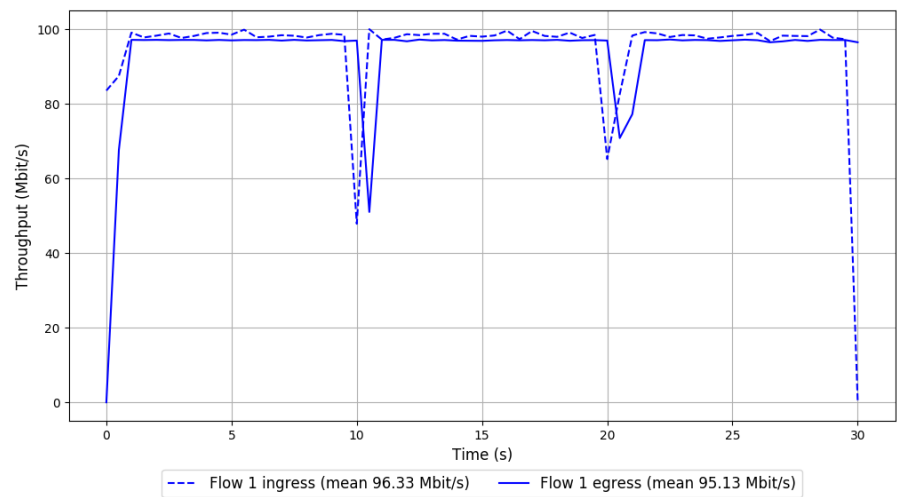
-- Flow 1:

Average throughput: 95.13 Mbit/s

95th percentile per-packet one-way delay: 44.445 ms

Loss rate: 1.33%

Run 3: Report of TCP BBR — Data Link

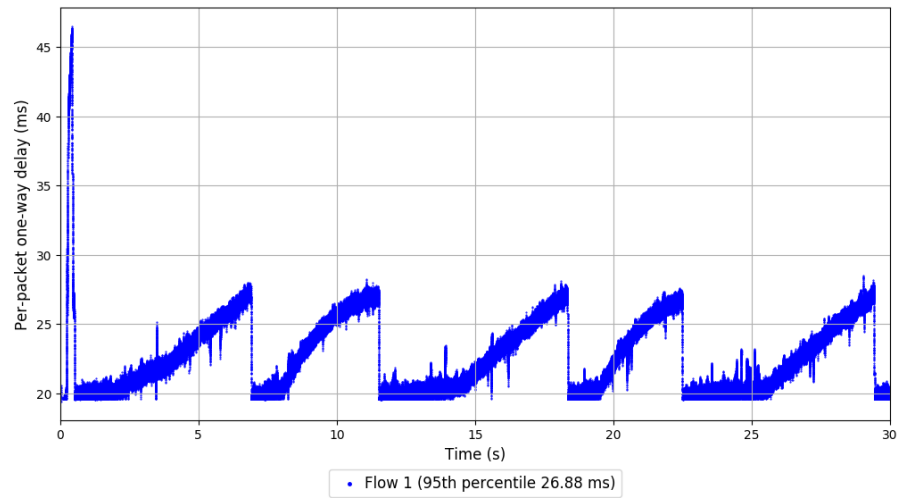
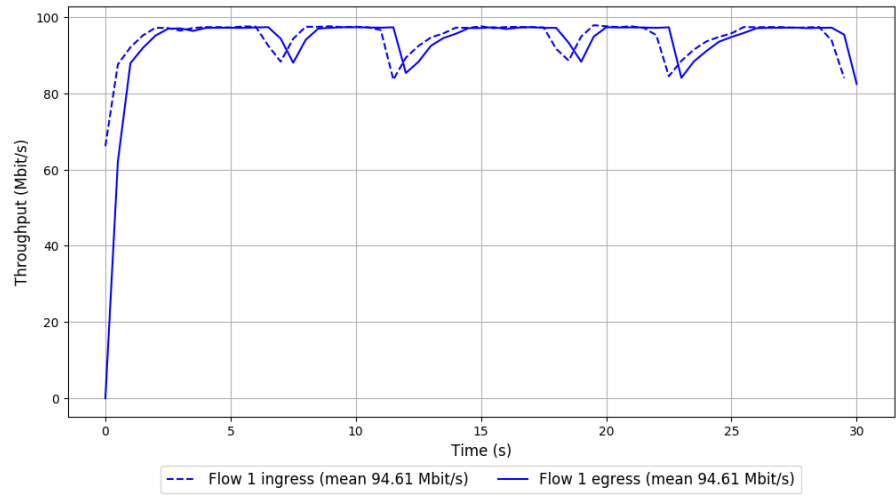


Run 1: Statistics of TCP Cubic

Start at: 2018-09-05 03:05:48
End at: 2018-09-05 03:06:19
Local clock offset: -0.589 ms
Remote clock offset: -3.543 ms

Below is generated by plot.py at 2018-09-05 03:18:30
Datalink statistics
-- Total of 1 flow:
Average throughput: 94.61 Mbit/s
95th percentile per-packet one-way delay: 26.880 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 94.61 Mbit/s
95th percentile per-packet one-way delay: 26.880 ms
Loss rate: 0.09%

Run 1: Report of TCP Cubic — Data Link

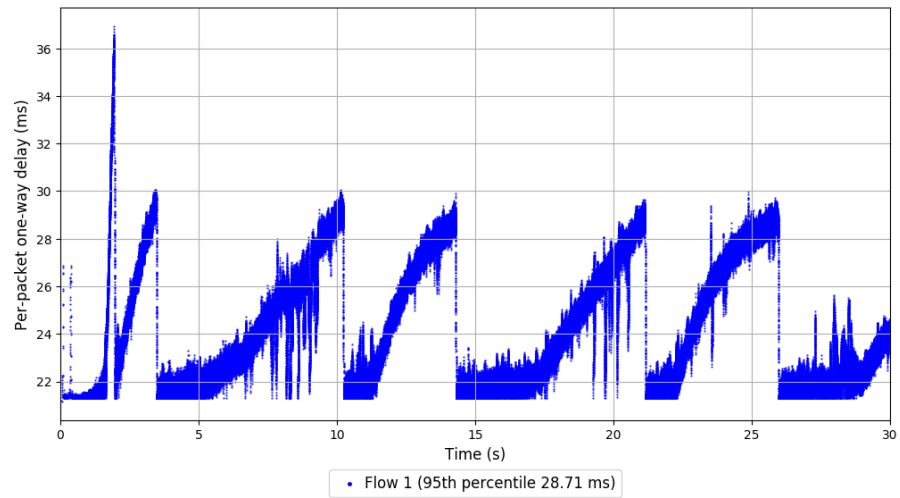
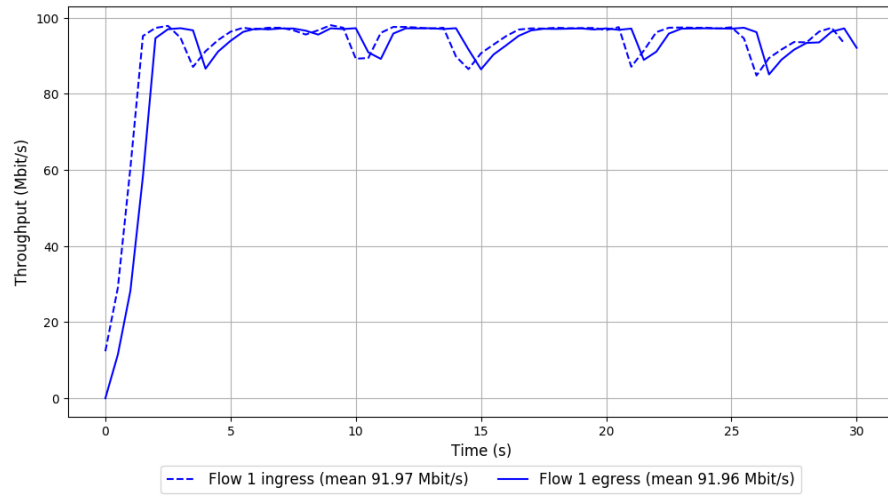


Run 2: Statistics of TCP Cubic

Start at: 2018-09-05 03:10:40
End at: 2018-09-05 03:11:10
Local clock offset: 1.468 ms
Remote clock offset: -3.194 ms

Below is generated by plot.py at 2018-09-05 03:18:30
Datalink statistics
-- Total of 1 flow:
Average throughput: 91.96 Mbit/s
95th percentile per-packet one-way delay: 28.715 ms
Loss rate: 0.11%
-- Flow 1:
Average throughput: 91.96 Mbit/s
95th percentile per-packet one-way delay: 28.715 ms
Loss rate: 0.11%

Run 2: Report of TCP Cubic — Data Link

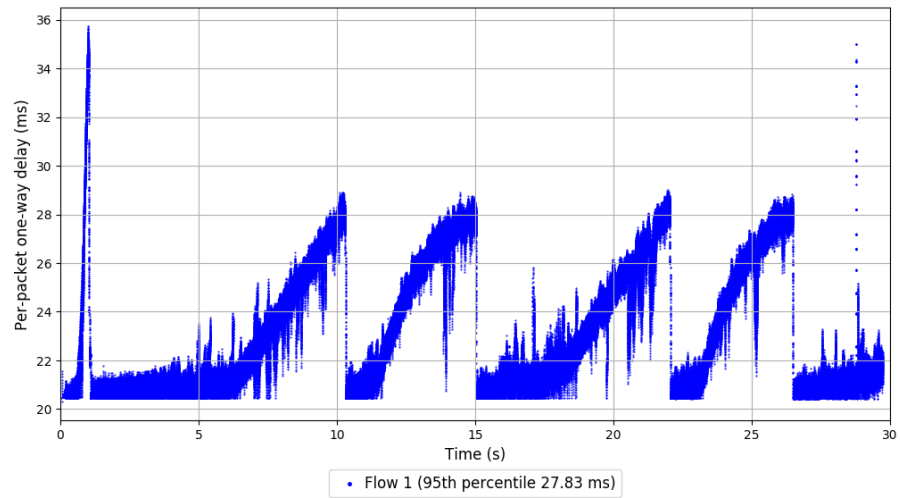
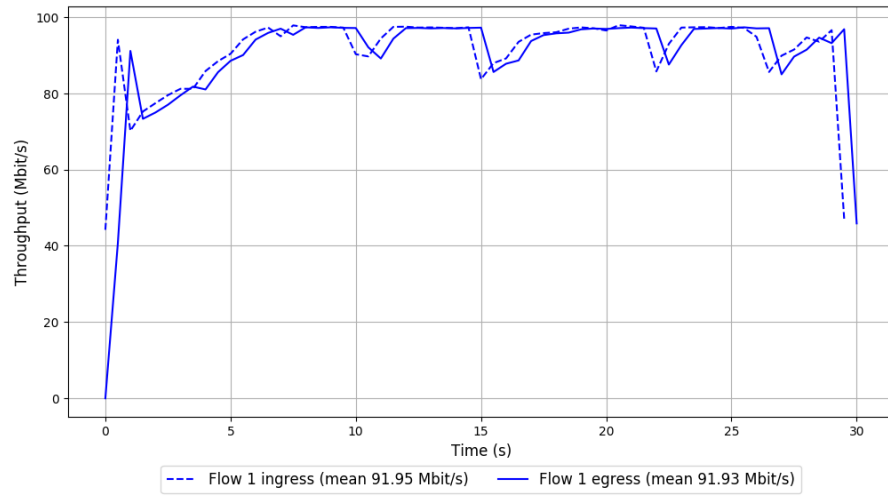


Run 3: Statistics of TCP Cubic

Start at: 2018-09-05 03:15:19
End at: 2018-09-05 03:15:49
Local clock offset: 0.522 ms
Remote clock offset: -3.349 ms

Below is generated by plot.py at 2018-09-05 03:18:30
Datalink statistics
-- Total of 1 flow:
Average throughput: 91.93 Mbit/s
95th percentile per-packet one-way delay: 27.832 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 91.93 Mbit/s
95th percentile per-packet one-way delay: 27.832 ms
Loss rate: 0.10%

Run 3: Report of TCP Cubic — Data Link

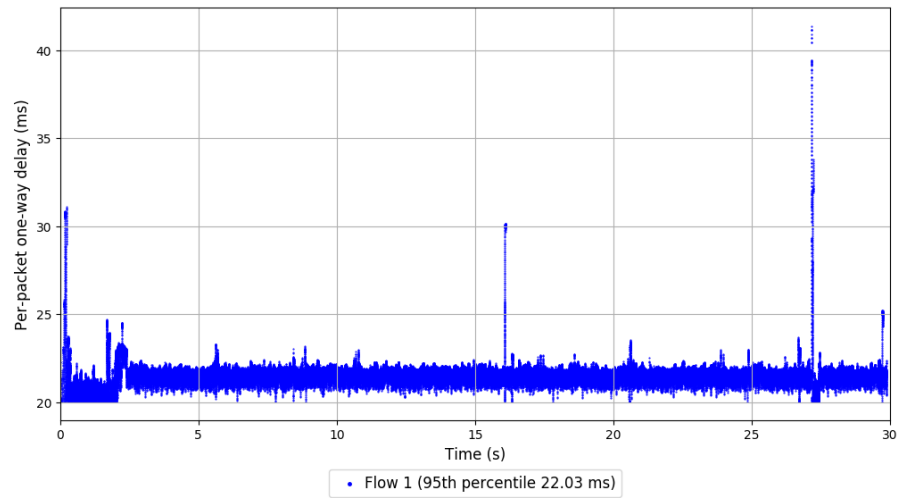
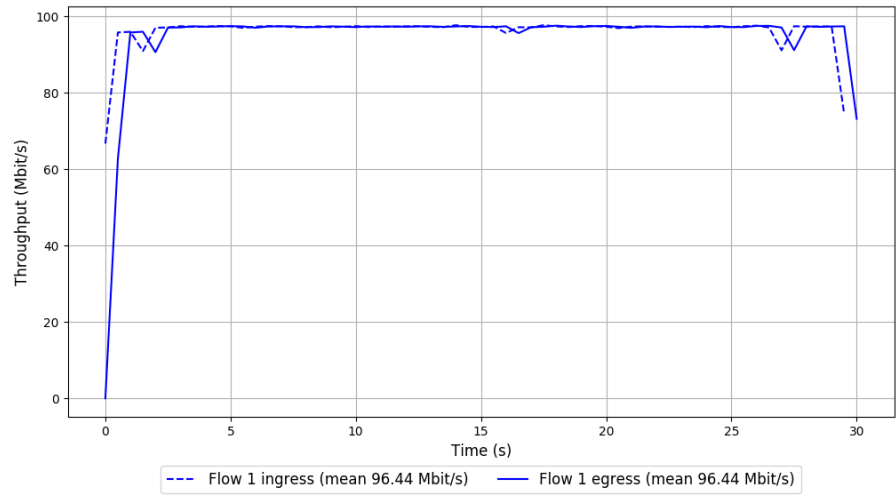


```
Run 1: Statistics of Indigo

Start at: 2018-09-05 03:04:35
End at: 2018-09-05 03:05:05
Local clock offset: 0.902 ms
Remote clock offset: -2.52 ms

# Below is generated by plot.py at 2018-09-05 03:18:31
# Datalink statistics
-- Total of 1 flow:
Average throughput: 96.44 Mbit/s
95th percentile per-packet one-way delay: 22.034 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 96.44 Mbit/s
95th percentile per-packet one-way delay: 22.034 ms
Loss rate: 0.10%
```

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2018-09-05 03:09:26

End at: 2018-09-05 03:09:56

Local clock offset: 0.32 ms

Remote clock offset: -3.13 ms

Below is generated by plot.py at 2018-09-05 03:18:31

Datalink statistics

-- Total of 1 flow:

Average throughput: 95.54 Mbit/s

95th percentile per-packet one-way delay: 22.286 ms

Loss rate: 0.10%

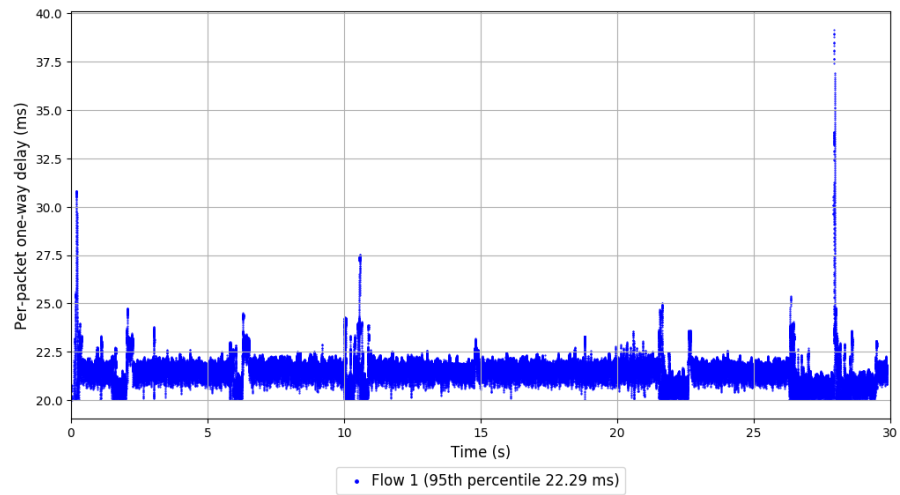
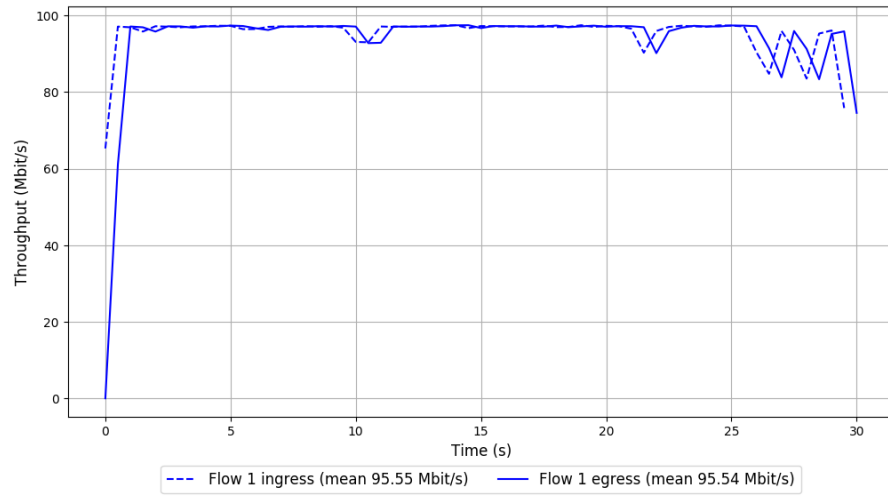
-- Flow 1:

Average throughput: 95.54 Mbit/s

95th percentile per-packet one-way delay: 22.286 ms

Loss rate: 0.10%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-09-05 03:14:09

End at: 2018-09-05 03:14:39

Local clock offset: 0.208 ms

Remote clock offset: -2.379 ms

Below is generated by plot.py at 2018-09-05 03:19:00

Datalink statistics

-- Total of 1 flow:

Average throughput: 95.78 Mbit/s

95th percentile per-packet one-way delay: 21.756 ms

Loss rate: 0.10%

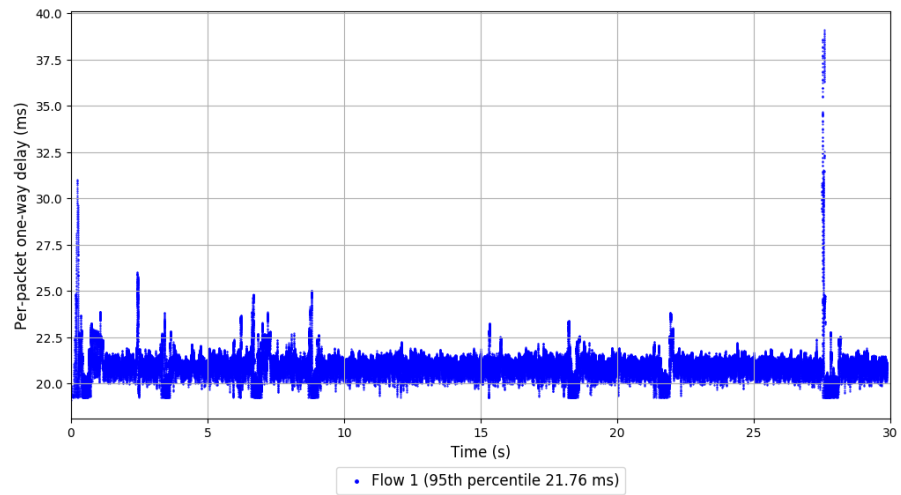
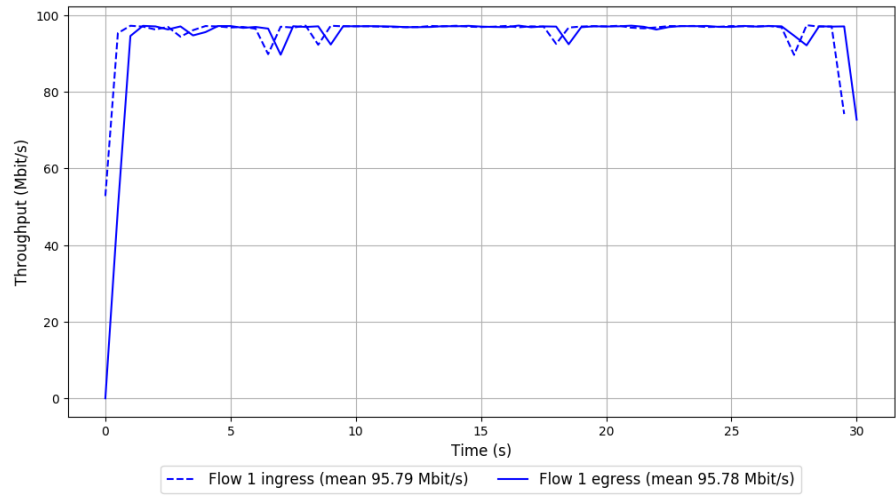
-- Flow 1:

Average throughput: 95.78 Mbit/s

95th percentile per-packet one-way delay: 21.756 ms

Loss rate: 0.10%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of Muses-25

Start at: 2018-09-05 03:07:02

End at: 2018-09-05 03:07:32

Local clock offset: 3.032 ms

Remote clock offset: -1.755 ms

Below is generated by plot.py at 2018-09-05 03:19:00

Datalink statistics

-- Total of 1 flow:

Average throughput: 81.63 Mbit/s

95th percentile per-packet one-way delay: 22.441 ms

Loss rate: 0.08%

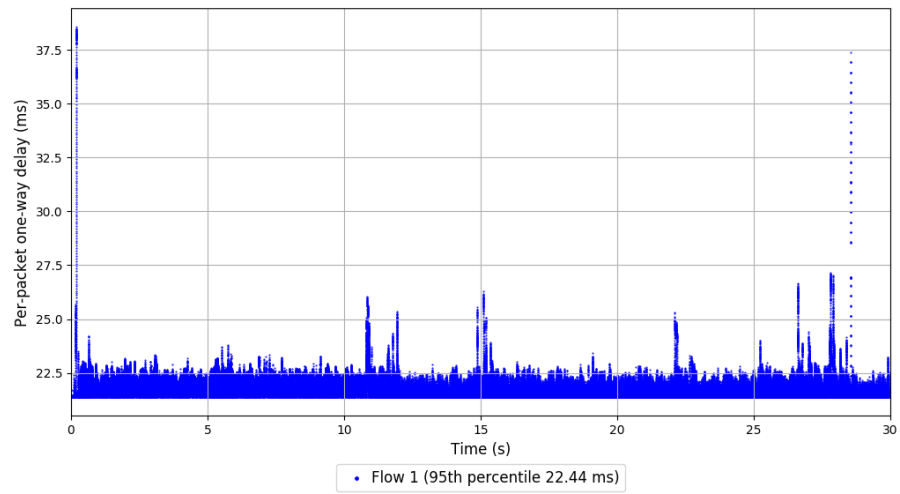
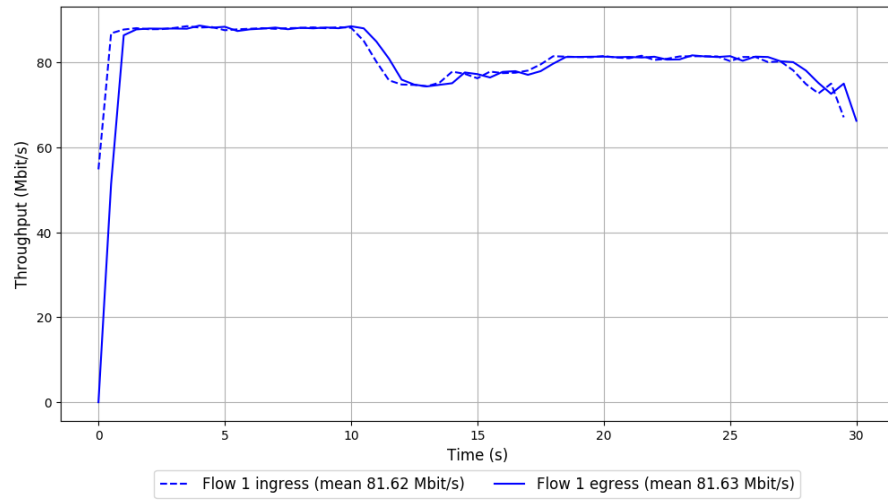
-- Flow 1:

Average throughput: 81.63 Mbit/s

95th percentile per-packet one-way delay: 22.441 ms

Loss rate: 0.08%

Run 1: Report of Muses-25 — Data Link

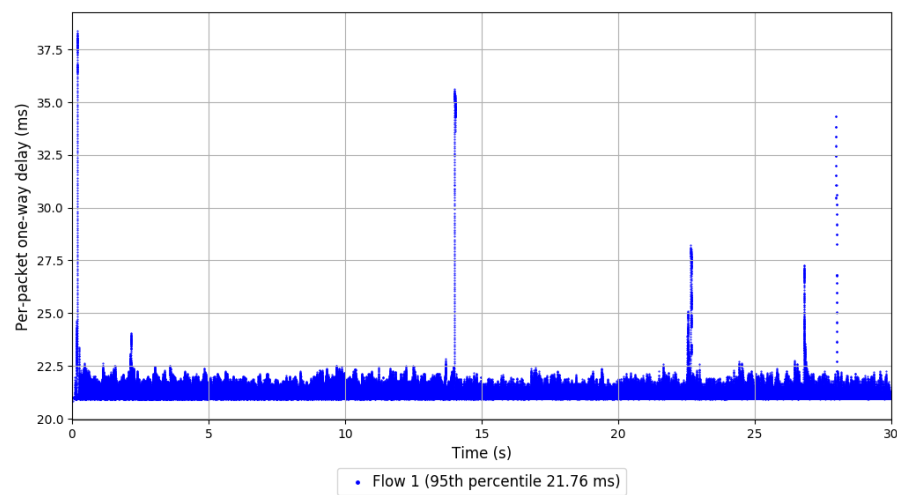
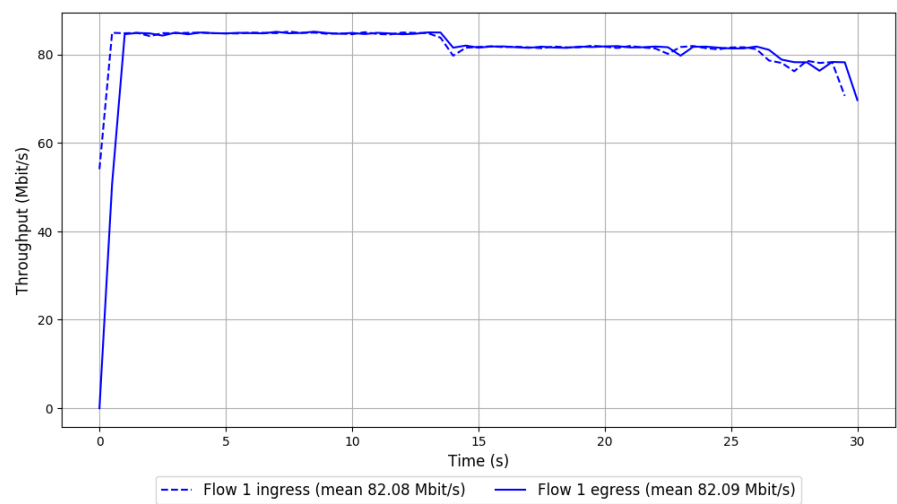


Run 2: Statistics of Muses-25

Start at: 2018-09-05 03:11:49
End at: 2018-09-05 03:12:19
Local clock offset: 1.214 ms
Remote clock offset: -3.101 ms

Below is generated by plot.py at 2018-09-05 03:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 82.09 Mbit/s
95th percentile per-packet one-way delay: 21.758 ms
Loss rate: 0.08%
-- Flow 1:
Average throughput: 82.09 Mbit/s
95th percentile per-packet one-way delay: 21.758 ms
Loss rate: 0.08%

Run 2: Report of Muses-25 — Data Link



Run 3: Statistics of Muses-25

Start at: 2018-09-05 03:16:27
End at: 2018-09-05 03:16:57
Local clock offset: 2.254 ms
Remote clock offset: -2.835 ms

Below is generated by plot.py at 2018-09-05 03:19:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 84.10 Mbit/s
95th percentile per-packet one-way delay: 22.598 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 84.10 Mbit/s
95th percentile per-packet one-way delay: 22.598 ms
Loss rate: 0.09%

Run 3: Report of Muses-25 — Data Link

