

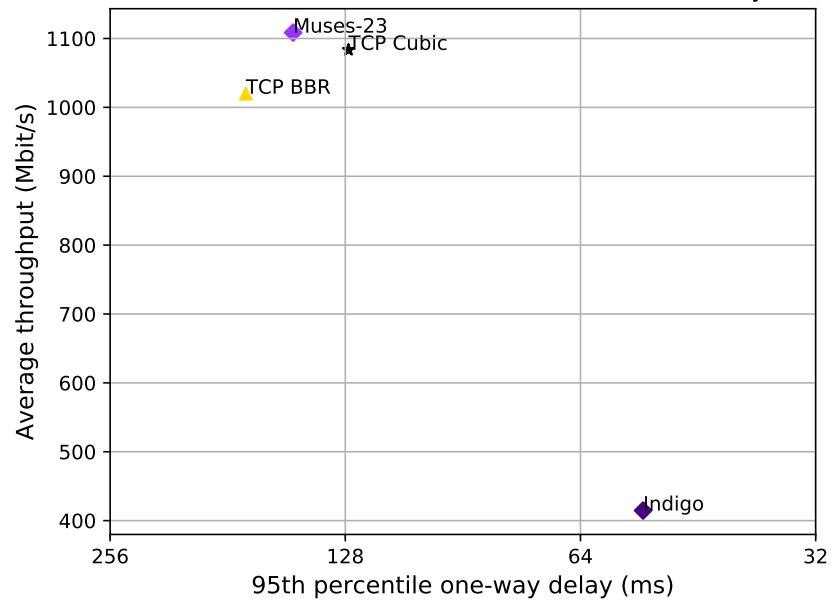
Pantheon Report

Generated at 2018-08-28 16:57:48 (UTC).
Data path: GCE London on `ens4 (local)` → GCE Iowa on `ens4 (remote)`.
Repeated the test of 4 congestion control schemes twice.
Each test lasted for 30 seconds running 3 flows with 10-second interval between two flows.
NTP offsets were measured against `time.google.com` and have been applied to correct the timestamps in logs.

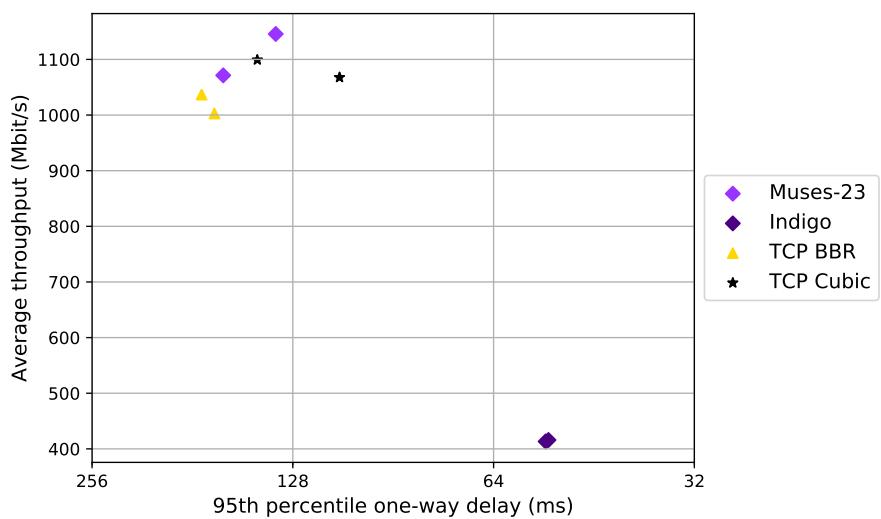
System info:
Linux 4.15.0-1017-gcp
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912

Git summary:
branch: muses-23 @ 88af05c5b0b7531637ca401951507a2fde628df6
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbfe58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ b261c9e99c63be452bc16f94ce0caa99a4c9d39a
third_party/pantheon-tunnel @ cbfce6db5ff5740dafe1771f813cd646339e1952
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 London to GCE Iowa, 2 runs of 30s each per scheme
3 flows with 10s interval between flows (mean of all runs by scheme)



test from GCE London to GCE Iowa, 2 runs of 30s each per scheme
3 flows with 10s interval between flows



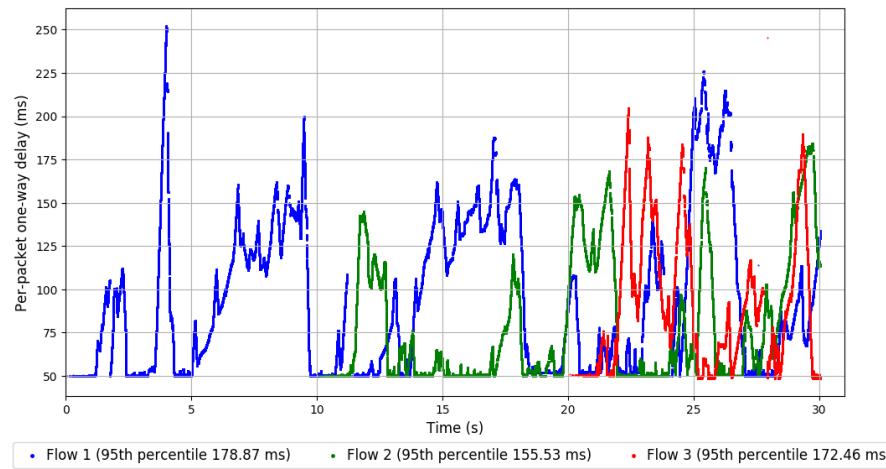
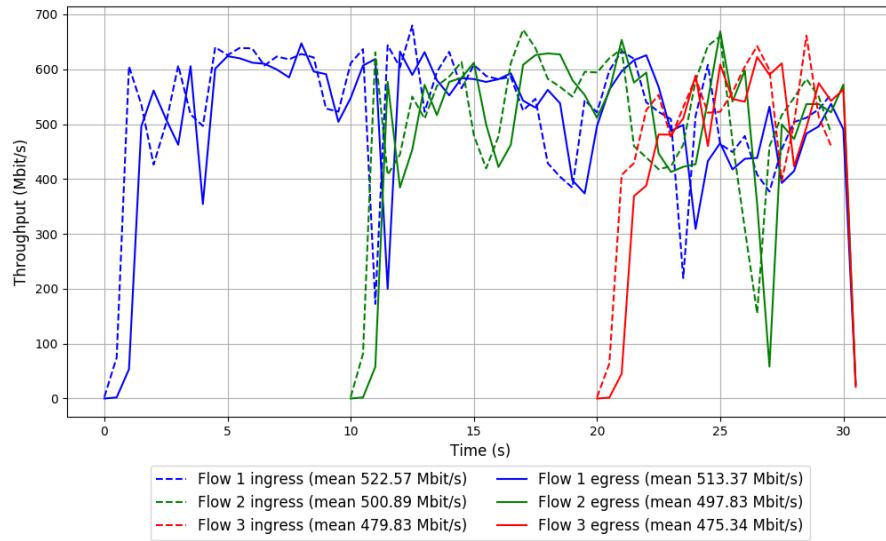
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	2	529.22	499.04	476.10	180.99	162.59	166.32	1.73	0.84	1.48
TCP Cubic	2	557.05	547.27	486.75	128.68	112.63	130.83	0.09	0.17	0.75
Indigo	2	219.48	204.06	185.75	53.21	52.94	53.65	0.00	0.00	0.01
Muses-23	2	611.26	504.45	516.60	130.79	159.47	164.54	1.63	5.04	1.84

Run 1: Statistics of TCP BBR

```
Start at: 2018-08-28 16:23:12
End at: 2018-08-28 16:23:42
Local clock offset: 0.31 ms
Remote clock offset: -0.054 ms

# Below is generated by plot.py at 2018-08-28 16:54:53
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1002.76 Mbit/s
95th percentile per-packet one-way delay: 167.786 ms
Loss rate: 1.25%
-- Flow 1:
Average throughput: 513.37 Mbit/s
95th percentile per-packet one-way delay: 178.872 ms
Loss rate: 1.76%
-- Flow 2:
Average throughput: 497.83 Mbit/s
95th percentile per-packet one-way delay: 155.527 ms
Loss rate: 0.61%
-- Flow 3:
Average throughput: 475.34 Mbit/s
95th percentile per-packet one-way delay: 172.455 ms
Loss rate: 0.96%
```

Run 1: Report of TCP BBR — Data Link

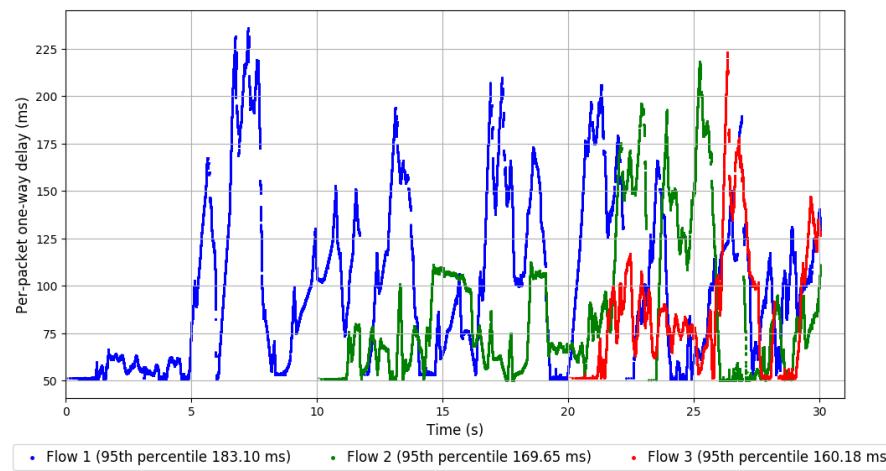
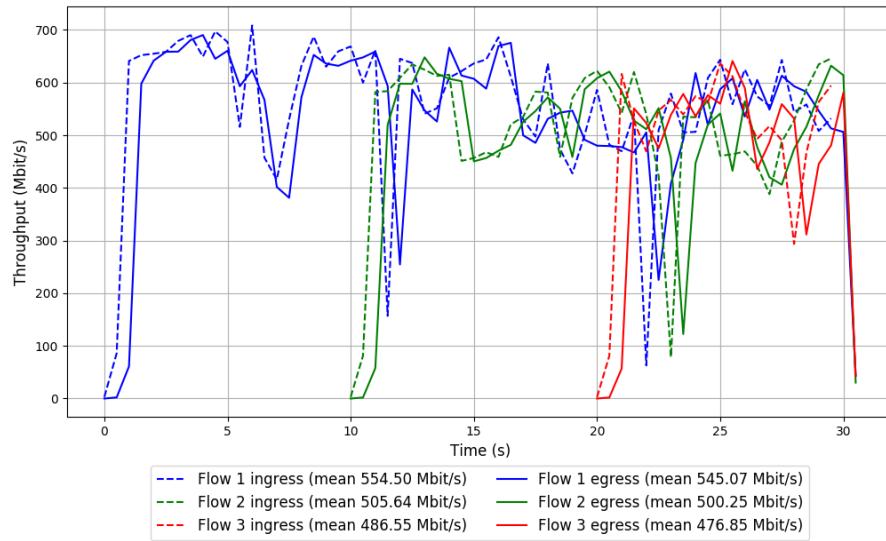


Run 2: Statistics of TCP BBR

```
Start at: 2018-08-28 16:31:10
End at: 2018-08-28 16:31:40
Local clock offset: -0.567 ms
Remote clock offset: -0.025 ms

# Below is generated by plot.py at 2018-08-28 16:55:10
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1036.76 Mbit/s
95th percentile per-packet one-way delay: 175.371 ms
Loss rate: 1.55%
-- Flow 1:
Average throughput: 545.07 Mbit/s
95th percentile per-packet one-way delay: 183.098 ms
Loss rate: 1.70%
-- Flow 2:
Average throughput: 500.25 Mbit/s
95th percentile per-packet one-way delay: 169.650 ms
Loss rate: 1.07%
-- Flow 3:
Average throughput: 476.85 Mbit/s
95th percentile per-packet one-way delay: 160.182 ms
Loss rate: 2.01%
```

Run 2: Report of TCP BBR — Data Link

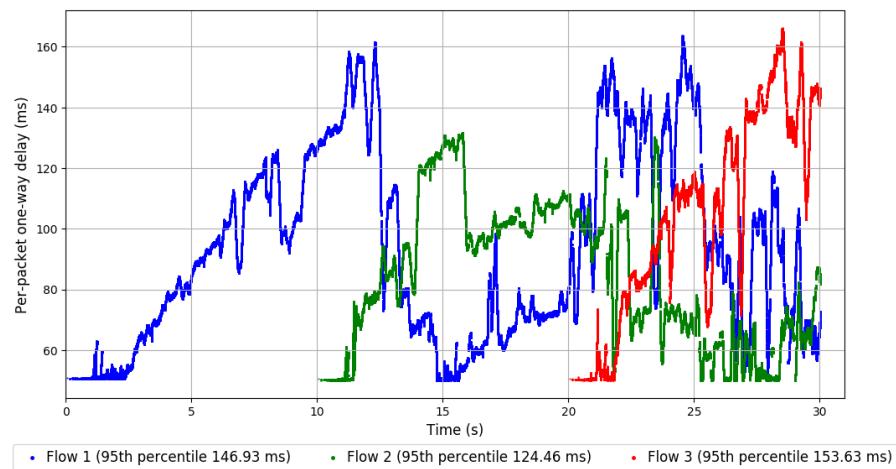
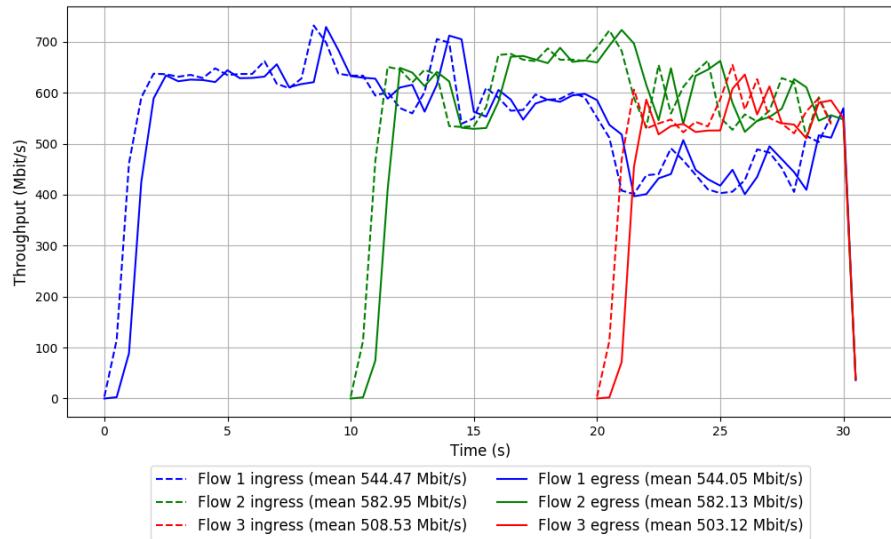


Run 1: Statistics of TCP Cubic

```
Start at: 2018-08-28 16:27:23
End at: 2018-08-28 16:27:53
Local clock offset: 0.081 ms
Remote clock offset: -0.056 ms

# Below is generated by plot.py at 2018-08-28 16:55:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1099.16 Mbit/s
95th percentile per-packet one-way delay: 144.691 ms
Loss rate: 0.25%
-- Flow 1:
Average throughput: 544.05 Mbit/s
95th percentile per-packet one-way delay: 146.932 ms
Loss rate: 0.08%
-- Flow 2:
Average throughput: 582.13 Mbit/s
95th percentile per-packet one-way delay: 124.462 ms
Loss rate: 0.14%
-- Flow 3:
Average throughput: 503.12 Mbit/s
95th percentile per-packet one-way delay: 153.635 ms
Loss rate: 1.06%
```

Run 1: Report of TCP Cubic — Data Link

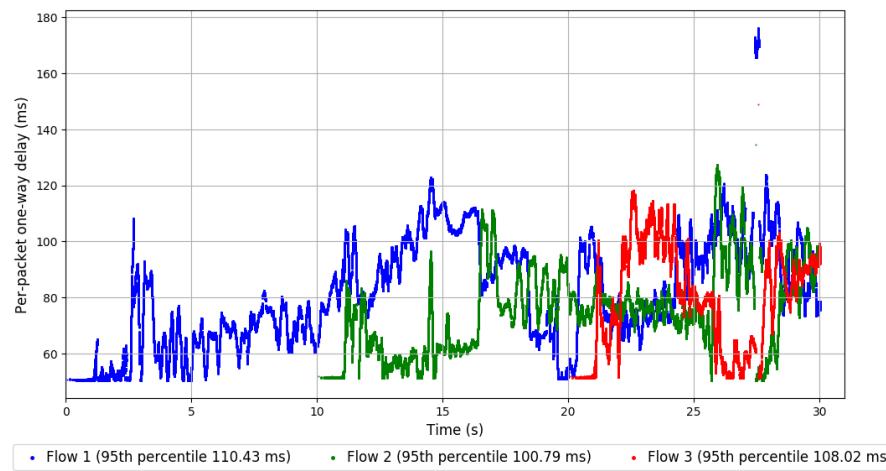
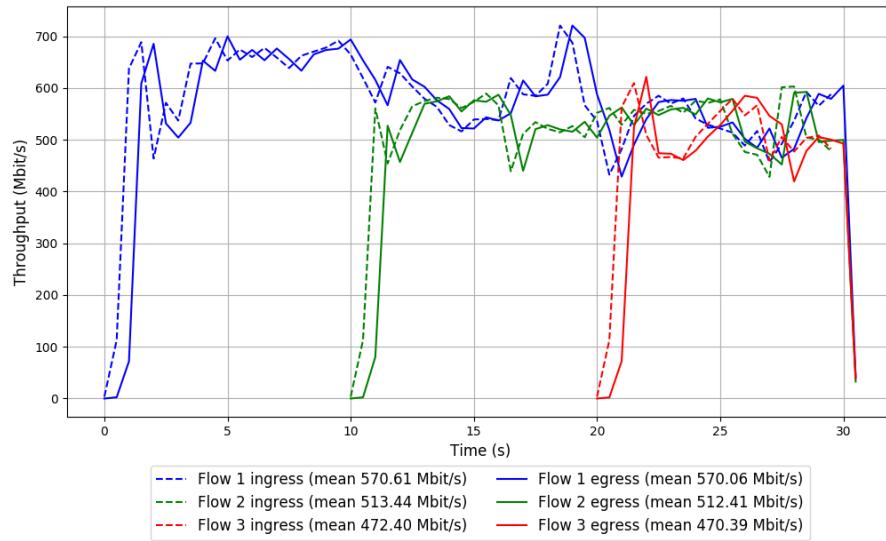


Run 2: Statistics of TCP Cubic

```
Start at: 2018-08-28 16:35:18
End at: 2018-08-28 16:35:48
Local clock offset: -0.785 ms
Remote clock offset: -0.097 ms

# Below is generated by plot.py at 2018-08-28 16:55:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1067.69 Mbit/s
95th percentile per-packet one-way delay: 108.940 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 570.06 Mbit/s
95th percentile per-packet one-way delay: 110.426 ms
Loss rate: 0.10%
-- Flow 2:
Average throughput: 512.41 Mbit/s
95th percentile per-packet one-way delay: 100.793 ms
Loss rate: 0.21%
-- Flow 3:
Average throughput: 470.39 Mbit/s
95th percentile per-packet one-way delay: 108.018 ms
Loss rate: 0.44%
```

Run 2: Report of TCP Cubic — Data Link

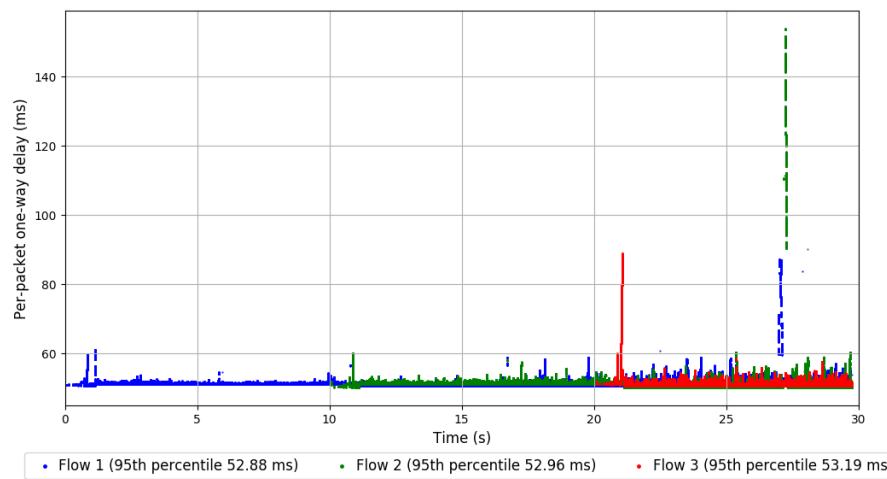
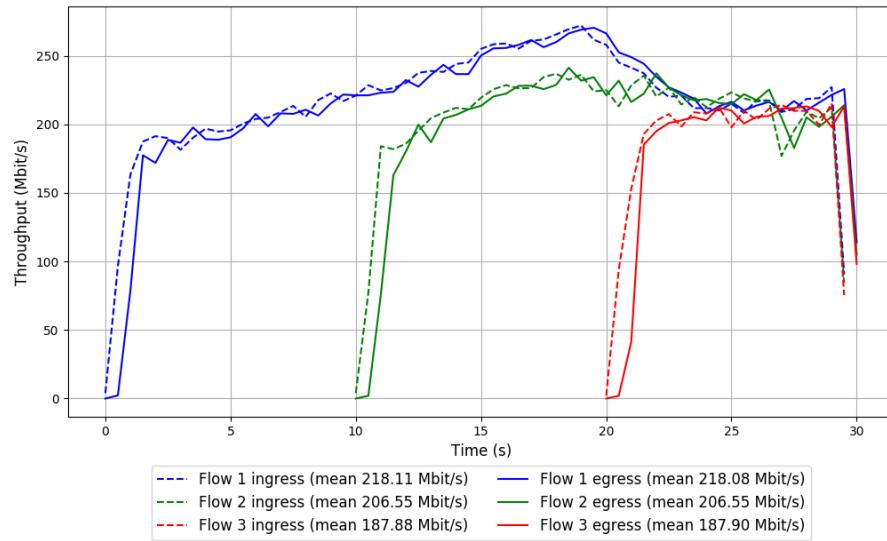


Run 1: Statistics of Indigo

```
Start at: 2018-08-28 16:29:25
End at: 2018-08-28 16:29:55
Local clock offset: -0.576 ms
Remote clock offset: -0.086 ms

# Below is generated by plot.py at 2018-08-28 16:55:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 415.91 Mbit/s
95th percentile per-packet one-way delay: 52.957 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 218.08 Mbit/s
95th percentile per-packet one-way delay: 52.882 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 206.55 Mbit/s
95th percentile per-packet one-way delay: 52.960 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 187.90 Mbit/s
95th percentile per-packet one-way delay: 53.193 ms
Loss rate: 0.01%
```

Run 1: Report of Indigo — Data Link

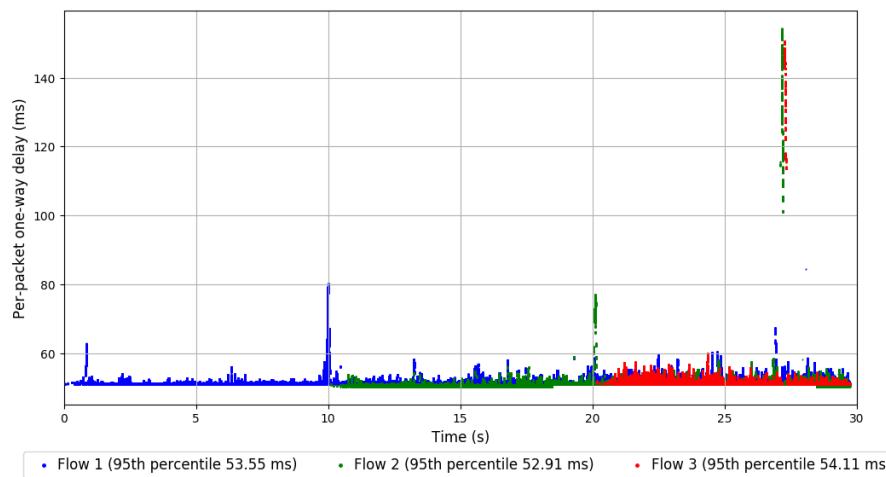
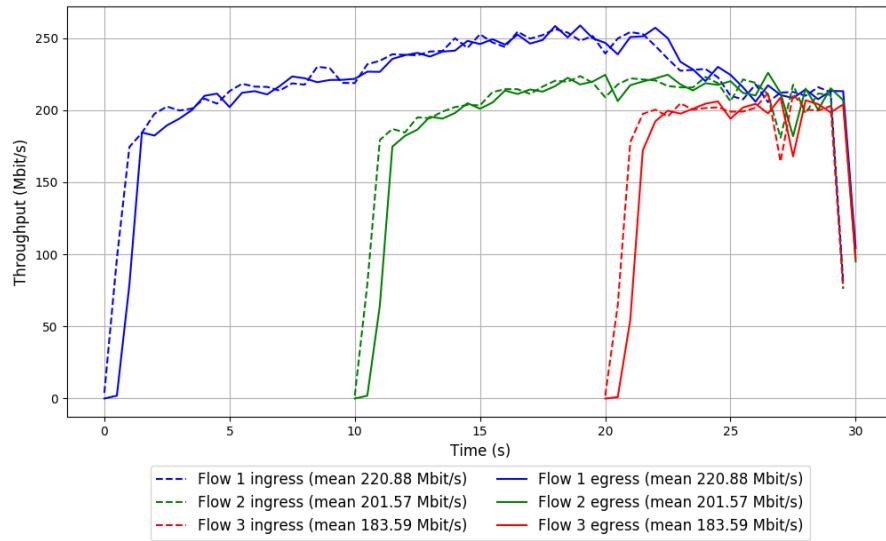


Run 2: Statistics of Indigo

```
Start at: 2018-08-28 16:37:17
End at: 2018-08-28 16:37:47
Local clock offset: -0.86 ms
Remote clock offset: -0.082 ms

# Below is generated by plot.py at 2018-08-28 16:55:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 413.32 Mbit/s
95th percentile per-packet one-way delay: 53.474 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 220.88 Mbit/s
95th percentile per-packet one-way delay: 53.546 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 201.57 Mbit/s
95th percentile per-packet one-way delay: 52.910 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 183.59 Mbit/s
95th percentile per-packet one-way delay: 54.107 ms
Loss rate: 0.00%
```

Run 2: Report of Indigo — Data Link

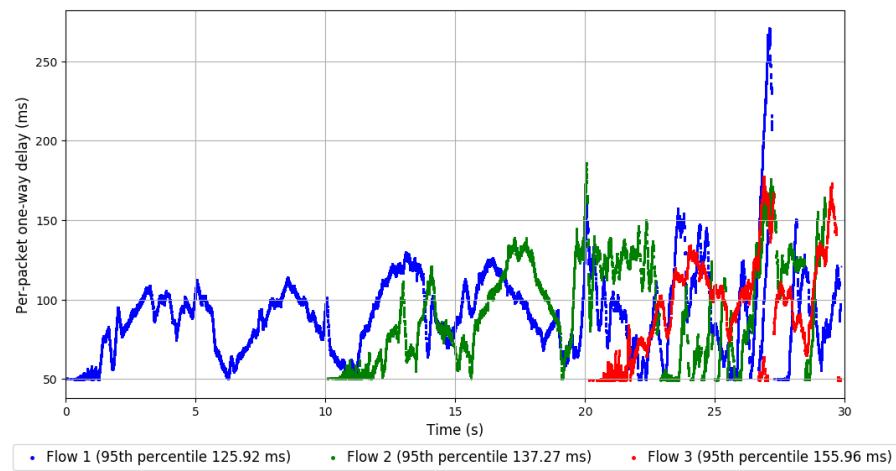
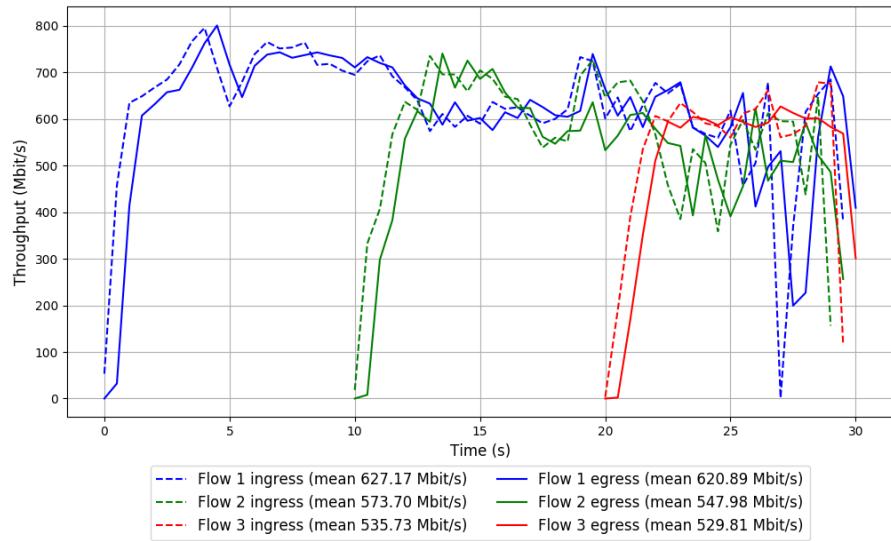


Run 1: Statistics of Muses-23

```
Start at: 2018-08-28 16:25:16
End at: 2018-08-28 16:25:46
Local clock offset: 0.273 ms
Remote clock offset: -0.11 ms

# Below is generated by plot.py at 2018-08-28 16:57:46
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1145.70 Mbit/s
95th percentile per-packet one-way delay: 135.780 ms
Loss rate: 1.93%
-- Flow 1:
Average throughput: 620.89 Mbit/s
95th percentile per-packet one-way delay: 125.916 ms
Loss rate: 0.96%
-- Flow 2:
Average throughput: 547.98 Mbit/s
95th percentile per-packet one-way delay: 137.270 ms
Loss rate: 3.99%
-- Flow 3:
Average throughput: 529.81 Mbit/s
95th percentile per-packet one-way delay: 155.962 ms
Loss rate: 1.10%
```

Run 1: Report of Muses-23 — Data Link



Run 2: Statistics of Muses-23

```
Start at: 2018-08-28 16:33:13
End at: 2018-08-28 16:33:43
Local clock offset: -0.951 ms
Remote clock offset: -0.078 ms

# Below is generated by plot.py at 2018-08-28 16:57:46
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1071.36 Mbit/s
95th percentile per-packet one-way delay: 162.769 ms
Loss rate: 3.46%
-- Flow 1:
Average throughput: 601.64 Mbit/s
95th percentile per-packet one-way delay: 135.673 ms
Loss rate: 2.30%
-- Flow 2:
Average throughput: 460.91 Mbit/s
95th percentile per-packet one-way delay: 181.675 ms
Loss rate: 6.09%
-- Flow 3:
Average throughput: 503.38 Mbit/s
95th percentile per-packet one-way delay: 173.112 ms
Loss rate: 2.58%
```

Run 2: Report of Muses-23 — Data Link

