

Pantheon Report

Generated at 2018-08-22 18:34:48 (UTC).

Data path: Colombia ppp0 ppp0 (*remote*) →AWS Brazil 2 Ethernet (*local*).

Repeated the test of 17 congestion control schemes 3 times.

Each test lasted for 30 seconds running 3 flows with 10-second interval between two flows.

NTP offsets were measured against `gps.ntp.br` and have been applied to correct the timestamps in logs.

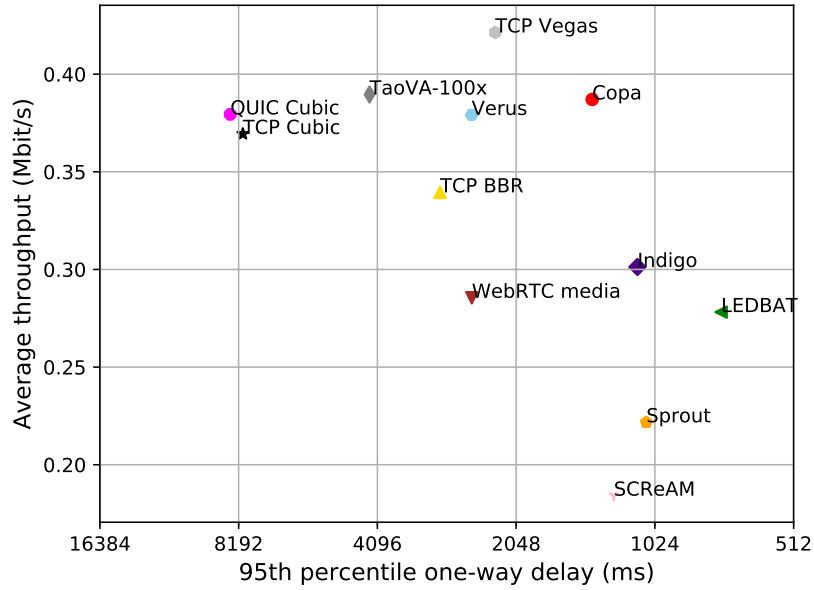
System info:

```
Linux 4.15.0-1017-aws
net.core.default_qdisc = fq_codel
net.core.rmem_default = 16777216
net.core.rmem_max = 33554432
net.core.wmem_default = 212992
net.core.wmem_max = 212992
net.ipv4.tcp_rmem = 4096 87380 6291456
net.ipv4.tcp_wmem = 4096 16384 4194304
```

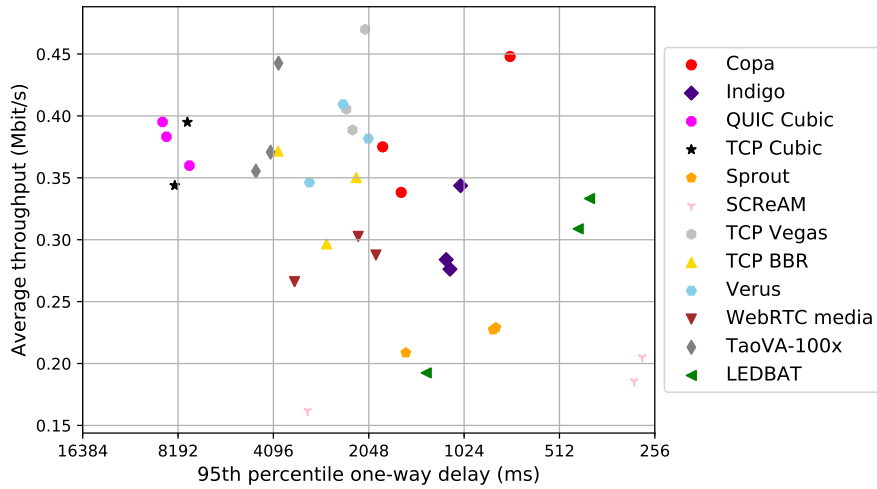
Git summary:

```
branch: master @ 7719b900495aa706f8452ab7d4a94dd562e9296e
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ 6f038ed31259d366f9840f65b82cbe8f464b1b39
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 Colombia ppp0 to AWS Brazil 2, 3 runs of 30s each per scheme
 3 flows with 10s interval between flows (mean of all runs by scheme)



test from Colombia ppp0 to AWS Brazil 2, 3 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	3	0.22	0.16	0.10	2804.24	2914.45	3140.71	4.68	7.98	43.88
Copa	3	0.23	0.17	0.11	1405.77	1348.83	1376.97	3.26	6.72	10.23
TCP Cubic	2	0.36	0.00	0.00	8017.39	7249.73	8330.73	32.02	53.44	90.87
FillP	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
FillP-Sheep	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Indigo	3	0.16	0.12	0.18	1116.62	1068.45	1081.95	0.61	0.82	2.28
LEDBAT	3	0.18	0.10	0.09	519.69	2222.22	554.57	1.14	1.42	7.31
PCC-Allegro	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PCC-Expr	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
QUIC Cubic	3	0.37	0.01	0.00	8538.31	7143.94	8765.72	30.98	0.00	50.00
SCReAM	3	0.08	0.11	0.10	1039.82	1343.62	1370.81	0.79	0.73	2.33
Sprout	3	0.11	0.11	0.13	1059.58	1034.32	1155.43	0.99	0.92	2.60
TaoVA-100x	3	0.23	0.19	0.16	3776.15	4246.12	4663.43	10.82	17.44	46.61
TCP Vegas	3	0.27	0.20	0.12	2165.39	2233.18	2376.78	3.62	8.88	45.48
Verus	3	0.37	0.01	0.01	2565.37	2239.64	2500.16	4.42	4.62	15.45
PCC-Vivace	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WebRTC media	3	0.13	0.11	0.05	2549.61	2563.14	2410.12	0.74	1.62	11.19

Run 1: Statistics of TCP BBR

Start at: 2018-08-22 17:45:12

End at: 2018-08-22 17:45:42

Local clock offset: -4.644 ms

Remote clock offset: 8.502 ms

Below is generated by plot.py at 2018-08-22 18:34:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.37 Mbit/s

95th percentile per-packet one-way delay: 3959.217 ms

Loss rate: 4.79%

-- Flow 1:

Average throughput: 0.26 Mbit/s

95th percentile per-packet one-way delay: 3957.462 ms

Loss rate: 3.24%

-- Flow 2:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 3964.740 ms

Loss rate: 6.29%

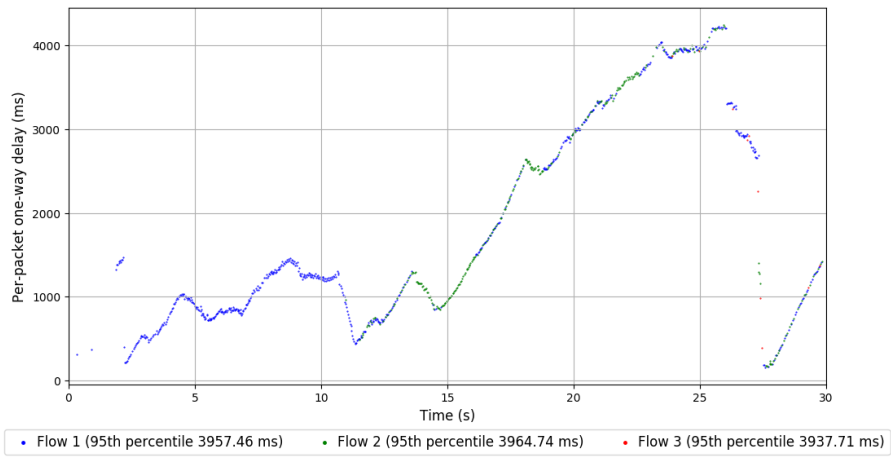
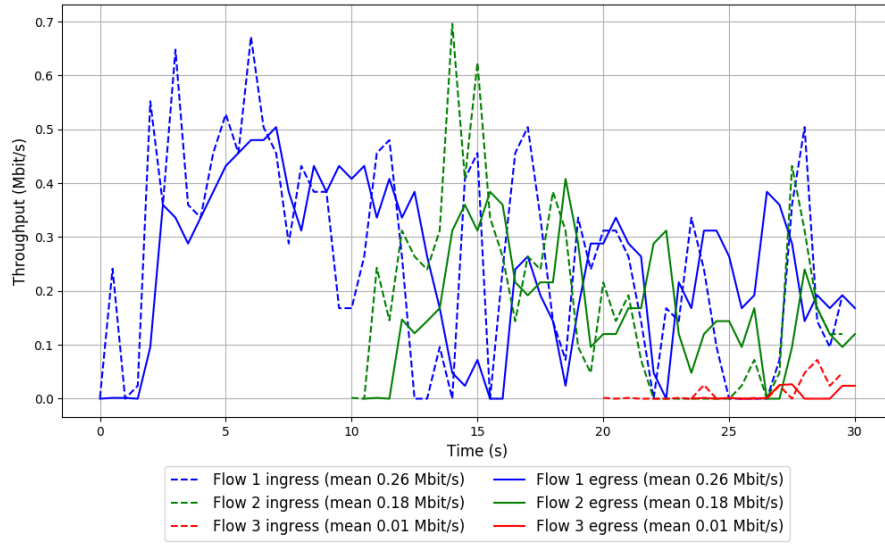
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 3937.711 ms

Loss rate: 57.87%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-08-22 18:06:05

End at: 2018-08-22 18:06:35

Local clock offset: -4.469 ms

Remote clock offset: 6.812 ms

Below is generated by plot.py at 2018-08-22 18:34:18

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.35 Mbit/s

95th percentile per-packet one-way delay: 2242.044 ms

Loss rate: 10.31%

-- Flow 1:

Average throughput: 0.23 Mbit/s

95th percentile per-packet one-way delay: 2141.765 ms

Loss rate: 3.23%

-- Flow 2:

Average throughput: 0.15 Mbit/s

95th percentile per-packet one-way delay: 2346.141 ms

Loss rate: 6.00%

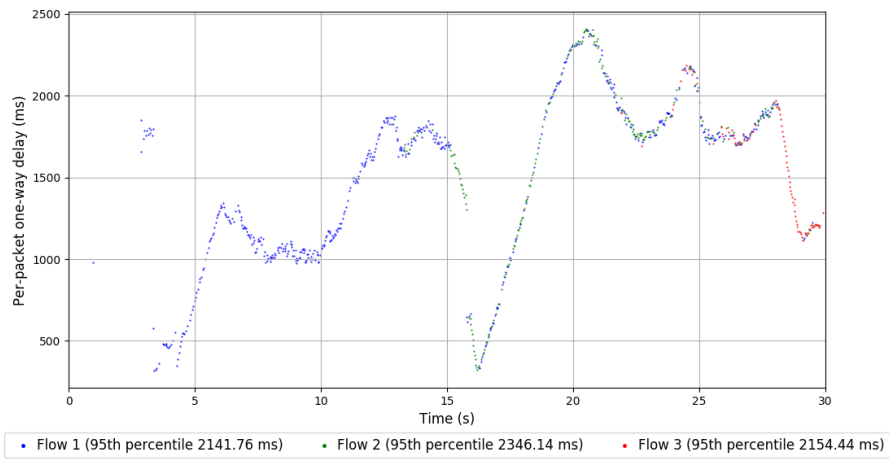
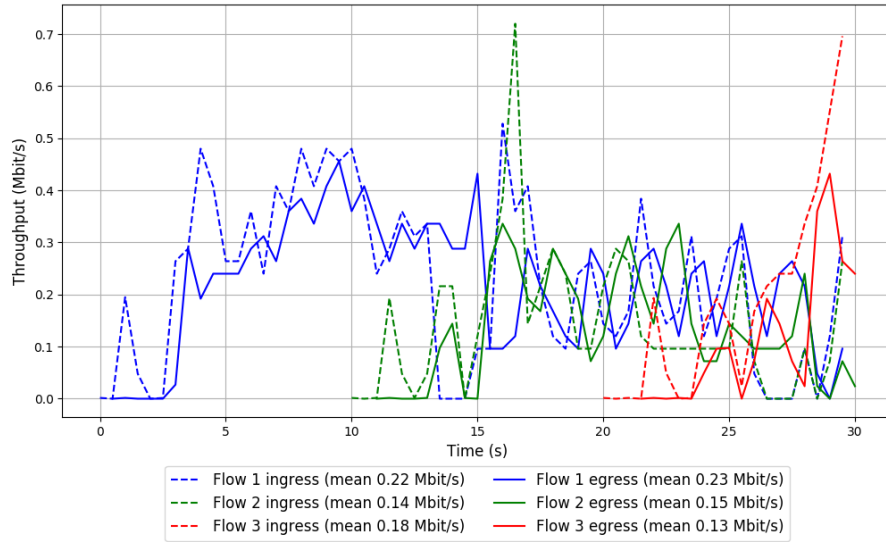
-- Flow 3:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 2154.442 ms

Loss rate: 43.25%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2018-08-22 18:27:21

End at: 2018-08-22 18:27:51

Local clock offset: -5.061 ms

Remote clock offset: 2.604 ms

Below is generated by plot.py at 2018-08-22 18:34:18

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 2782.454 ms

Loss rate: 13.28%

-- Flow 1:

Average throughput: 0.16 Mbit/s

95th percentile per-packet one-way delay: 2313.497 ms

Loss rate: 7.57%

-- Flow 2:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 2432.482 ms

Loss rate: 11.65%

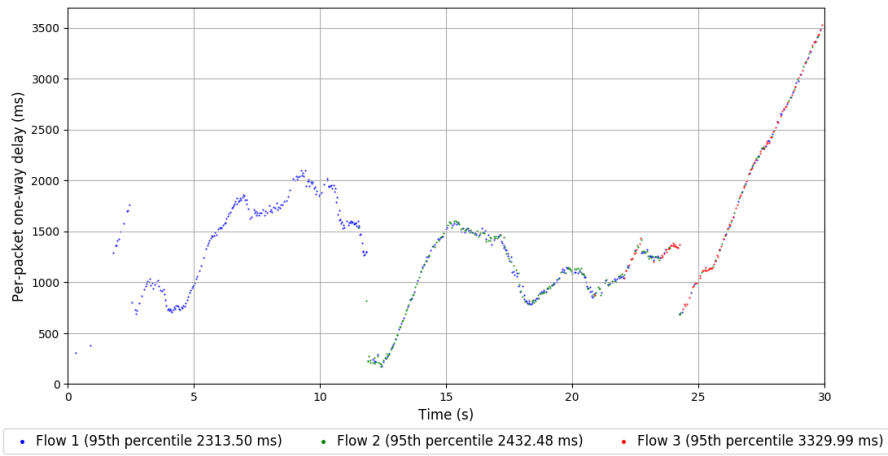
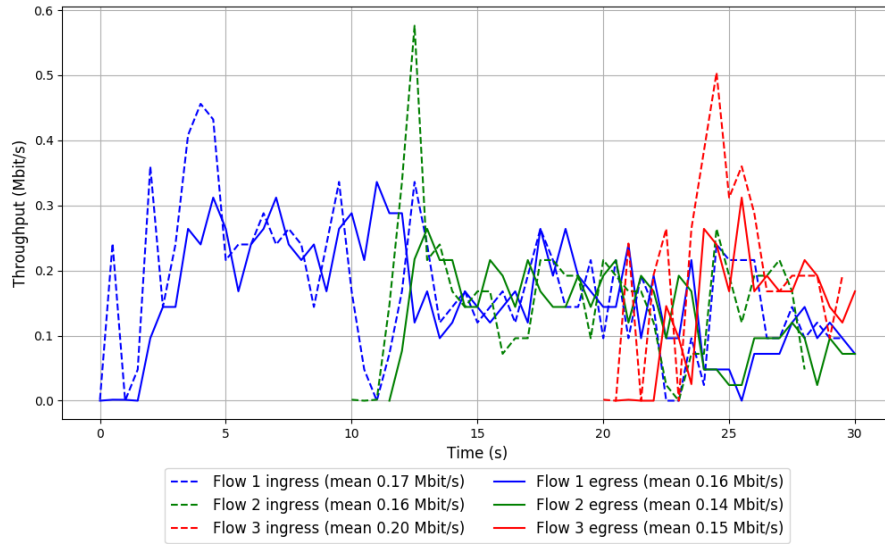
-- Flow 3:

Average throughput: 0.15 Mbit/s

95th percentile per-packet one-way delay: 3329.990 ms

Loss rate: 30.51%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

Start at: 2018-08-22 17:40:06

End at: 2018-08-22 17:40:36

Local clock offset: -4.279 ms

Remote clock offset: 9.671 ms

Below is generated by plot.py at 2018-08-22 18:34:19

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.38 Mbit/s

95th percentile per-packet one-way delay: 1850.884 ms

Loss rate: 7.28%

-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 1829.535 ms

Loss rate: 6.25%

-- Flow 2:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 1843.632 ms

Loss rate: 8.54%

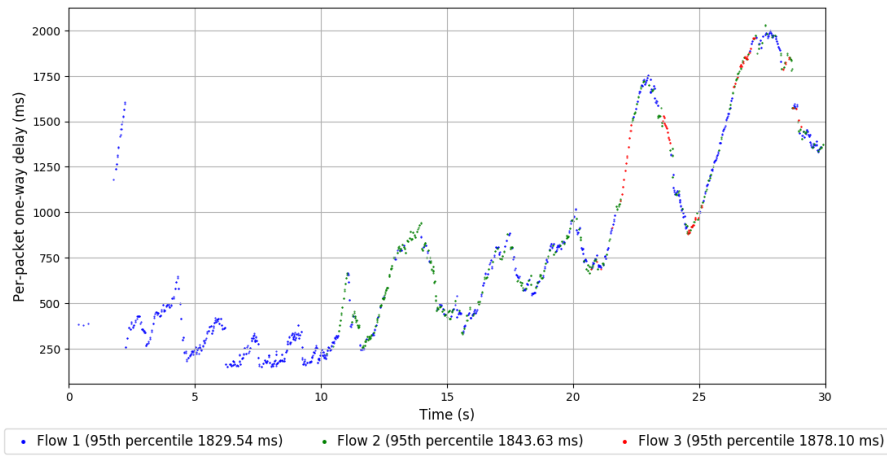
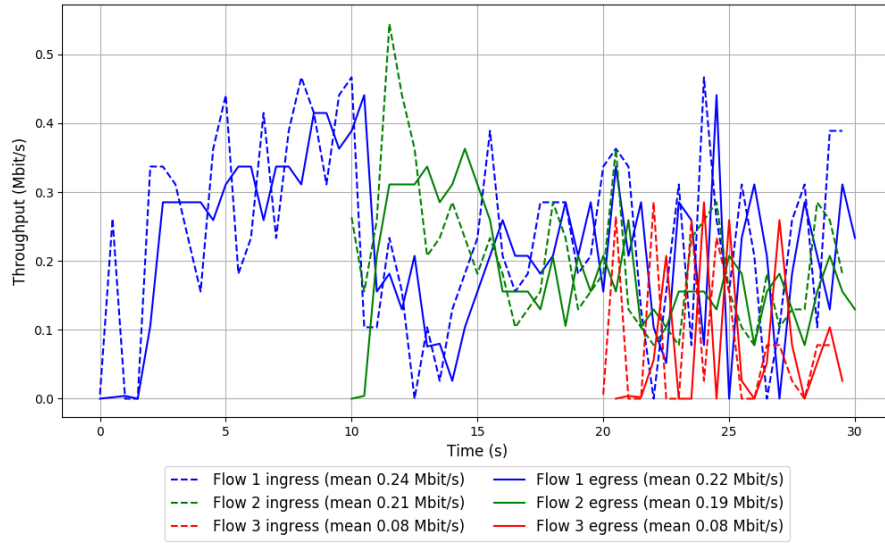
-- Flow 3:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 1878.104 ms

Loss rate: 9.93%

Run 1: Report of Copa — Data Link



Run 2: Statistics of Copa

Start at: 2018-08-22 18:01:07

End at: 2018-08-22 18:01:37

Local clock offset: -5.904 ms

Remote clock offset: 8.008 ms

Below is generated by plot.py at 2018-08-22 18:34:19

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.34 Mbit/s

95th percentile per-packet one-way delay: 1617.754 ms

Loss rate: 5.98%

-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 1601.344 ms

Loss rate: 2.52%

-- Flow 2:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 1559.527 ms

Loss rate: 10.58%

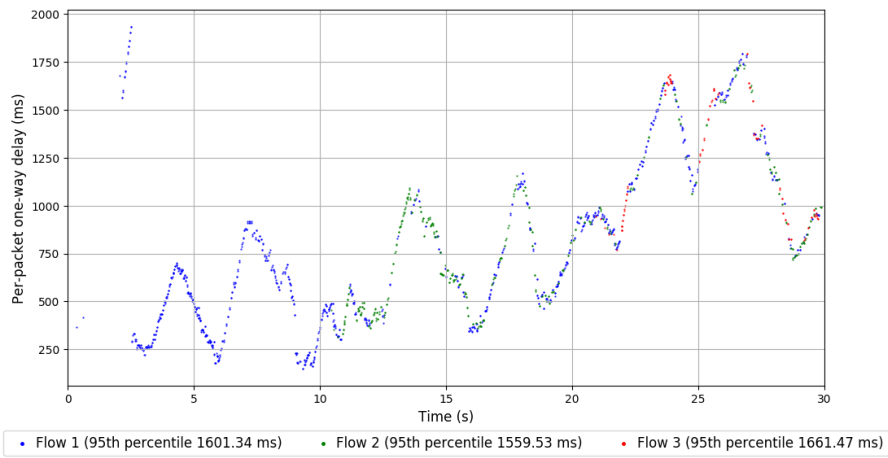
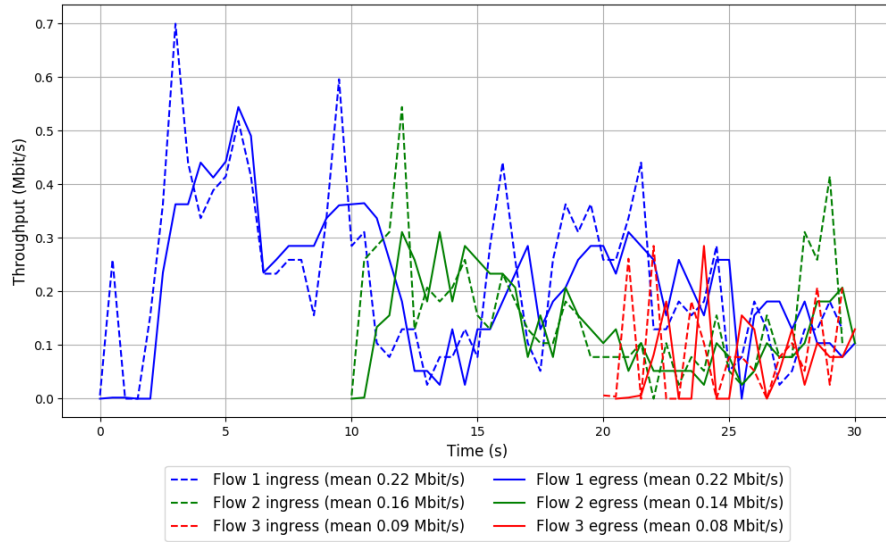
-- Flow 3:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 1661.472 ms

Loss rate: 16.55%

Run 2: Report of Copa — Data Link



Run 3: Statistics of Copa

Start at: 2018-08-22 18:22:17

End at: 2018-08-22 18:22:47

Local clock offset: -5.775 ms

Remote clock offset: 7.837 ms

Below is generated by plot.py at 2018-08-22 18:34:19

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.45 Mbit/s

95th percentile per-packet one-way delay: 733.054 ms

Loss rate: 1.46%

-- Flow 1:

Average throughput: 0.26 Mbit/s

95th percentile per-packet one-way delay: 786.431 ms

Loss rate: 1.01%

-- Flow 2:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 643.320 ms

Loss rate: 1.03%

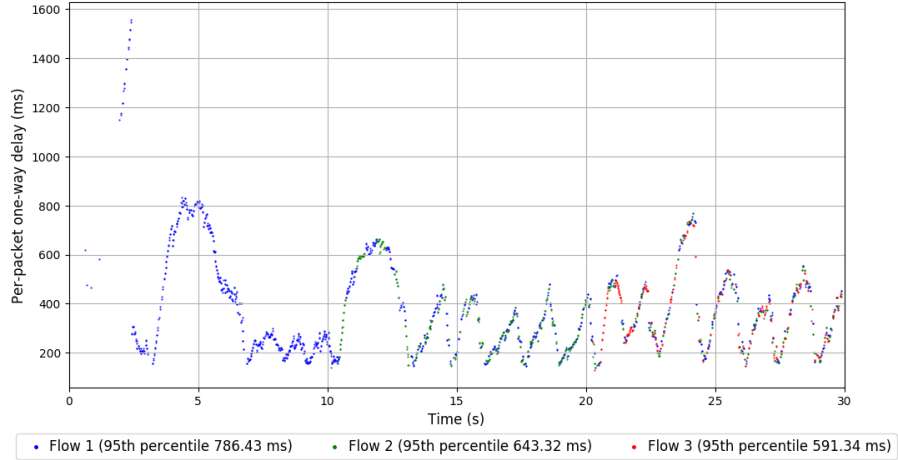
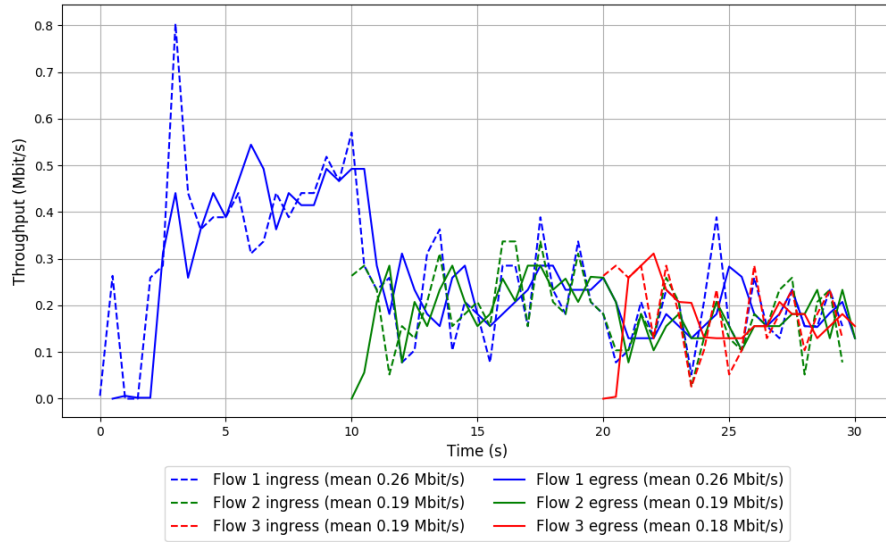
-- Flow 3:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 591.335 ms

Loss rate: 4.22%

Run 3: Report of Copa — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2018-08-22 17:44:00

End at: 2018-08-22 17:44:30

Local clock offset: -4.555 ms

Remote clock offset: 3.64 ms

Below is generated by plot.py at 2018-08-22 18:34:19

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.39 Mbit/s

95th percentile per-packet one-way delay: 7653.820 ms

Loss rate: 31.62%

-- Flow 1:

Average throughput: 0.39 Mbit/s

95th percentile per-packet one-way delay: 7643.983 ms

Loss rate: 31.45%

-- Flow 2:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 6862.020 ms

Loss rate: 53.44%

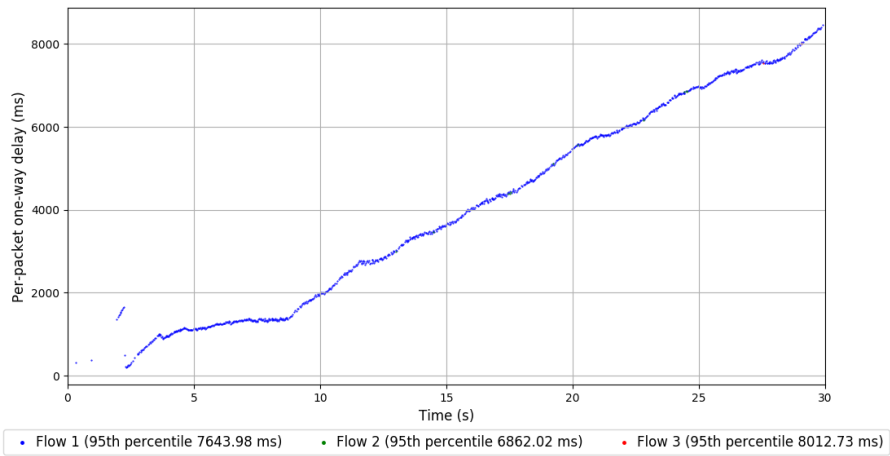
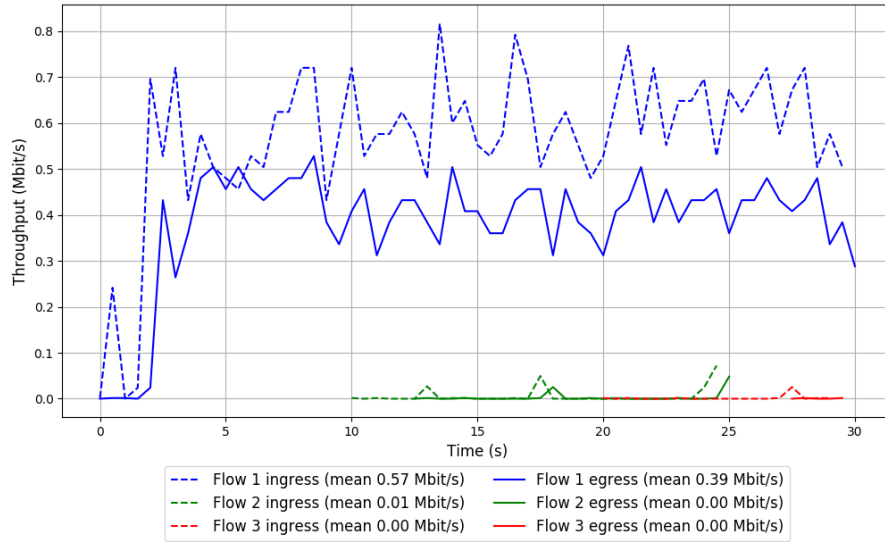
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 8012.730 ms

Loss rate: 91.06%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2018-08-22 18:04:53

End at: 2018-08-22 18:05:23

Local clock offset: -5.268 ms

Remote clock offset: 8.889 ms

Below is generated by plot.py at 2018-08-22 18:34:19

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.34 Mbit/s

95th percentile per-packet one-way delay: 8390.806 ms

Loss rate: 32.77%

-- Flow 1:

Average throughput: 0.34 Mbit/s

95th percentile per-packet one-way delay: 8390.806 ms

Loss rate: 32.58%

-- Flow 2:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 7637.441 ms

Loss rate: 53.44%

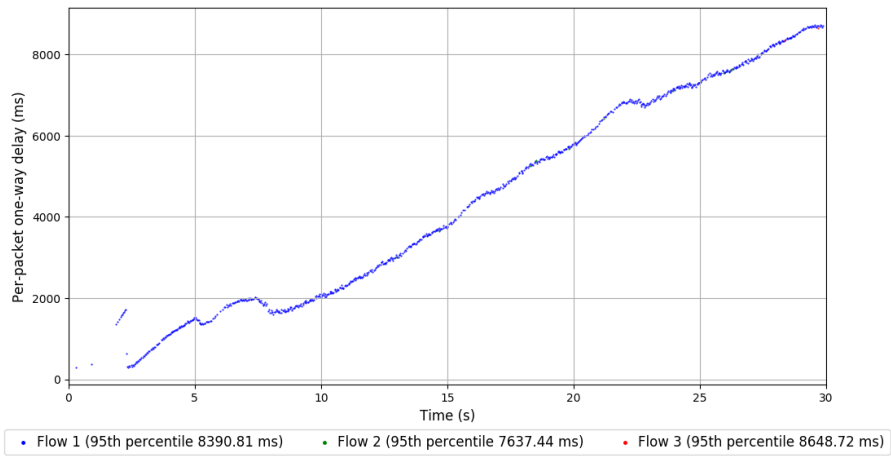
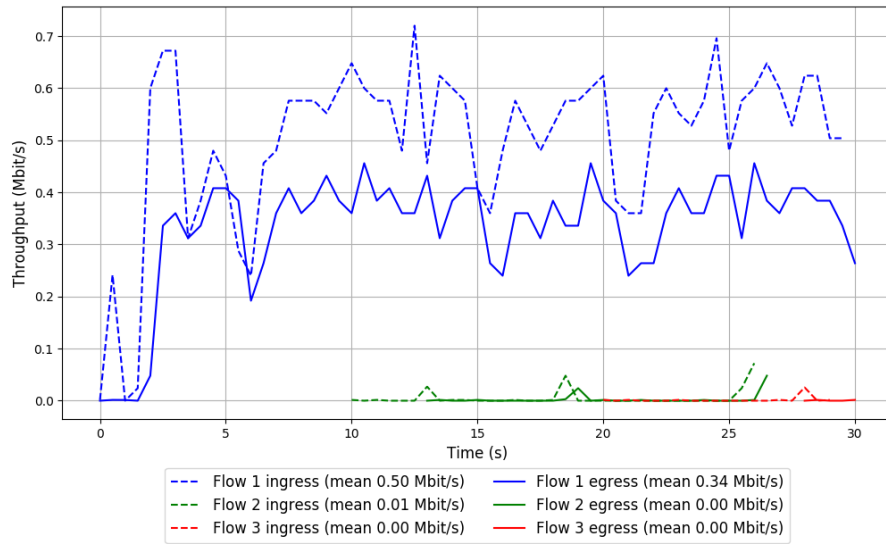
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 8648.722 ms

Loss rate: 90.68%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

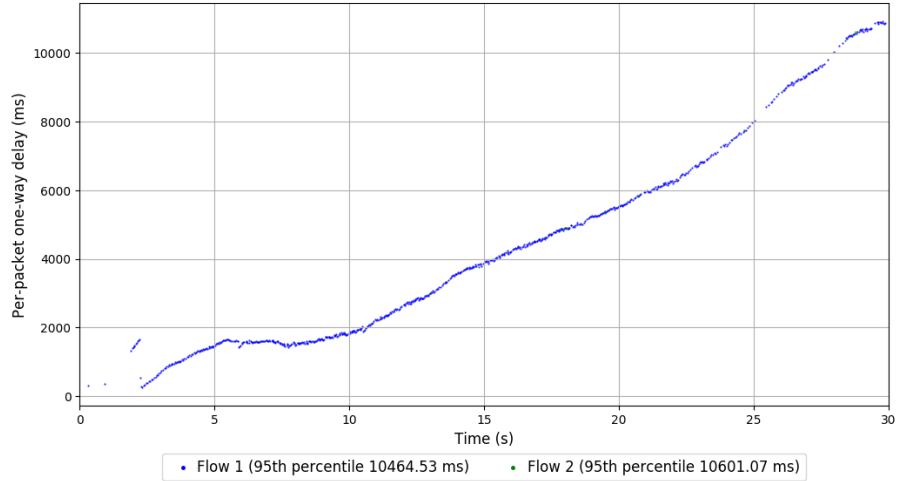
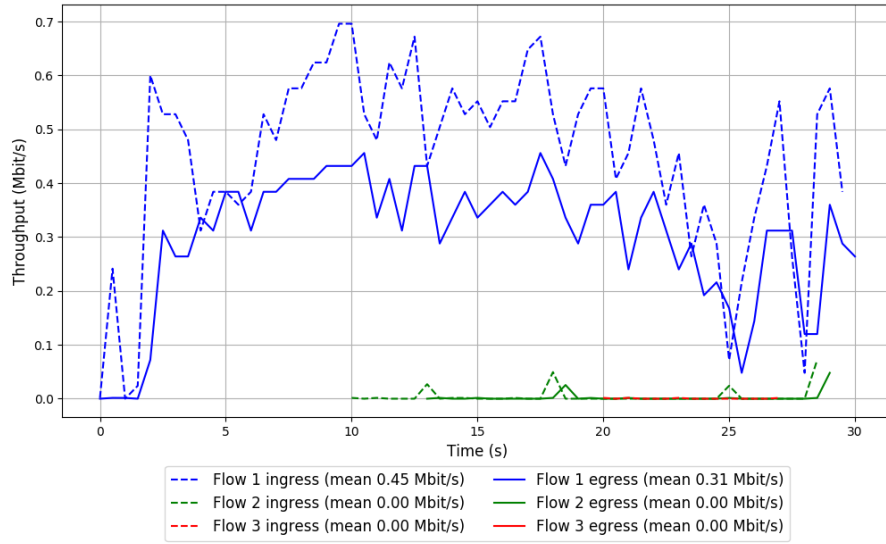
Start at: 2018-08-22 18:26:09

End at: 2018-08-22 18:26:39

Local clock offset: -5.081 ms

Remote clock offset: 7.772 ms

Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of FillP

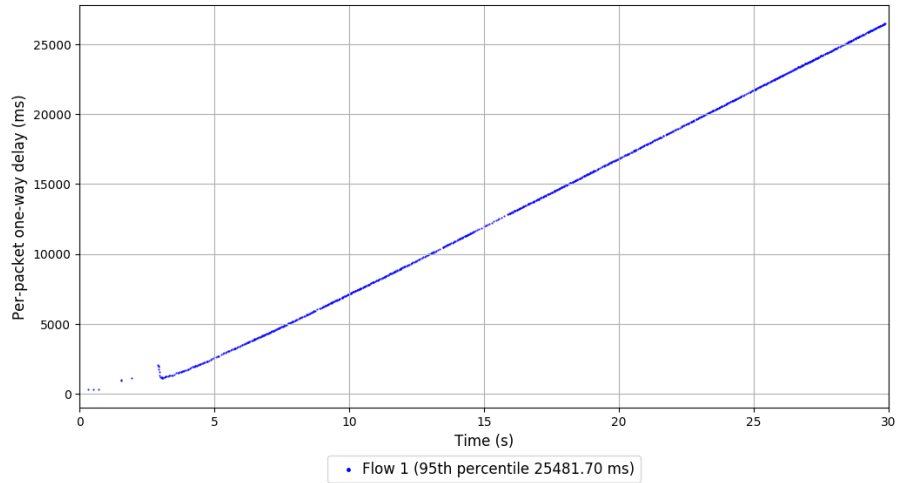
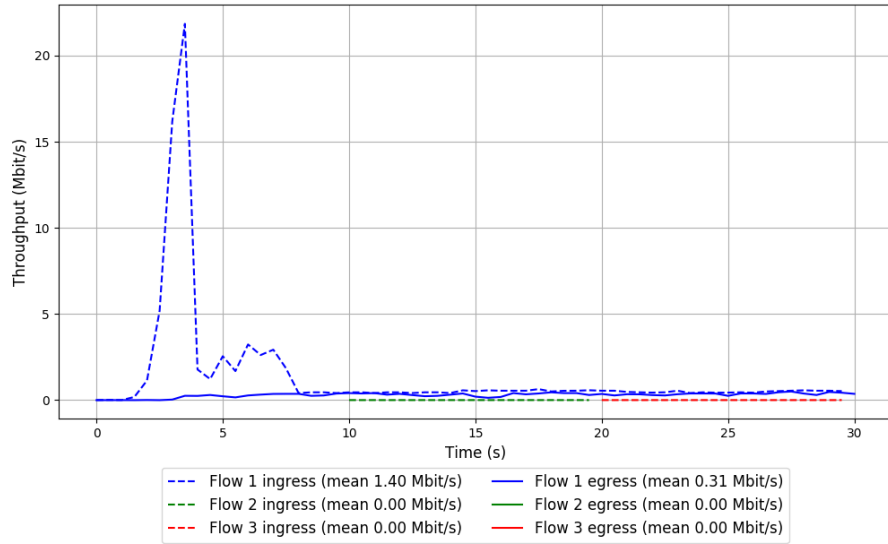
Start at: 2018-08-22 17:32:42

End at: 2018-08-22 17:33:12

Local clock offset: -4.27 ms

Remote clock offset: 8.496 ms

Run 1: Report of FillP — Data Link



Run 2: Statistics of FillP

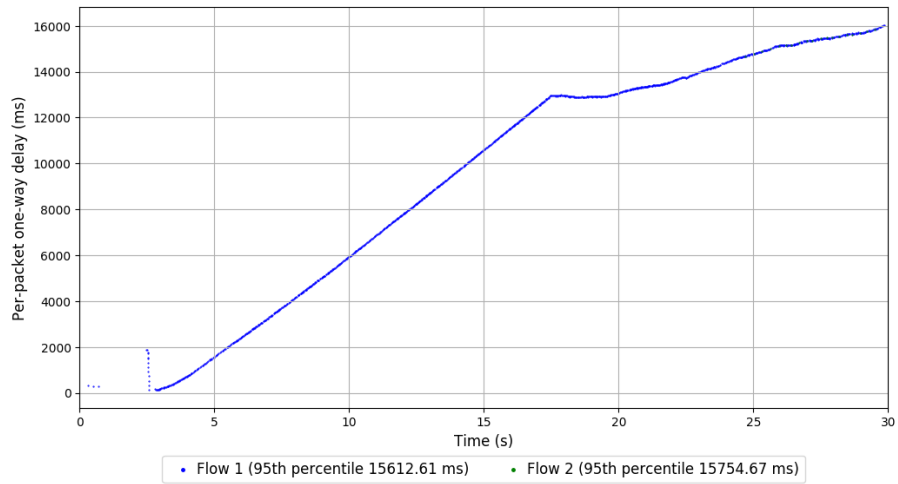
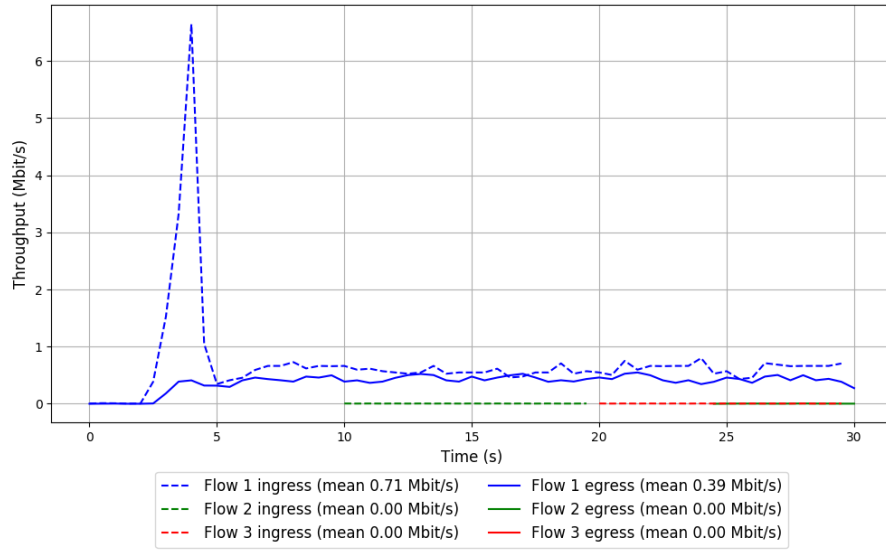
Start at: 2018-08-22 17:53:55

End at: 2018-08-22 17:54:25

Local clock offset: -4.966 ms

Remote clock offset: 7.344 ms

Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

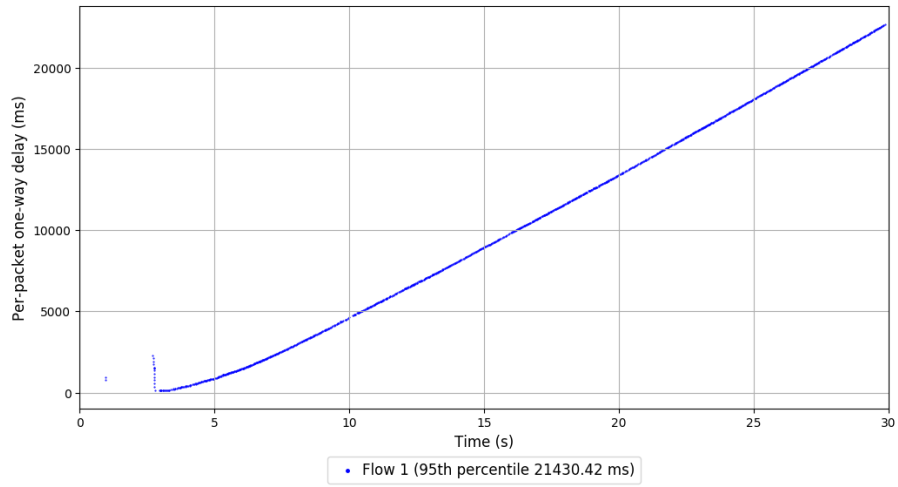
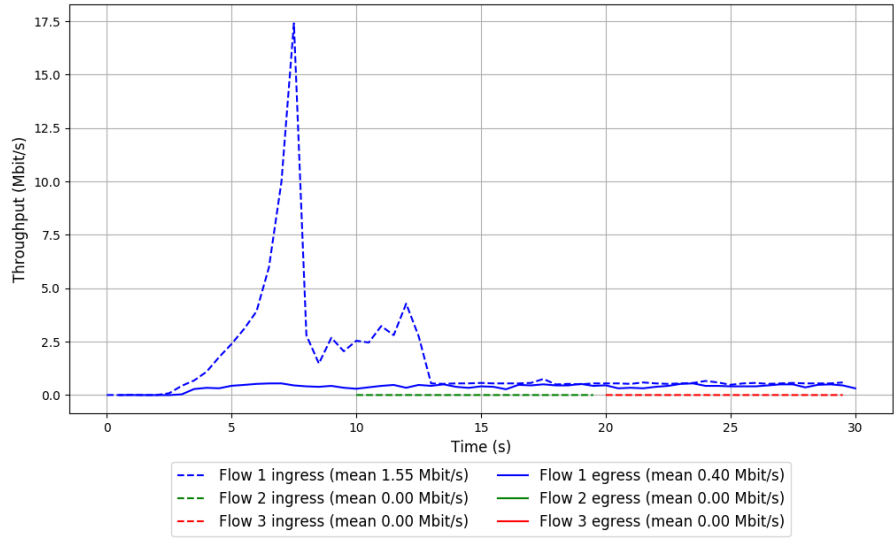
Start at: 2018-08-22 18:14:55

End at: 2018-08-22 18:15:25

Local clock offset: -5.811 ms

Remote clock offset: 7.888 ms

Run 3: Report of FillP — Data Link



Run 1: Statistics of FillP-Sheep

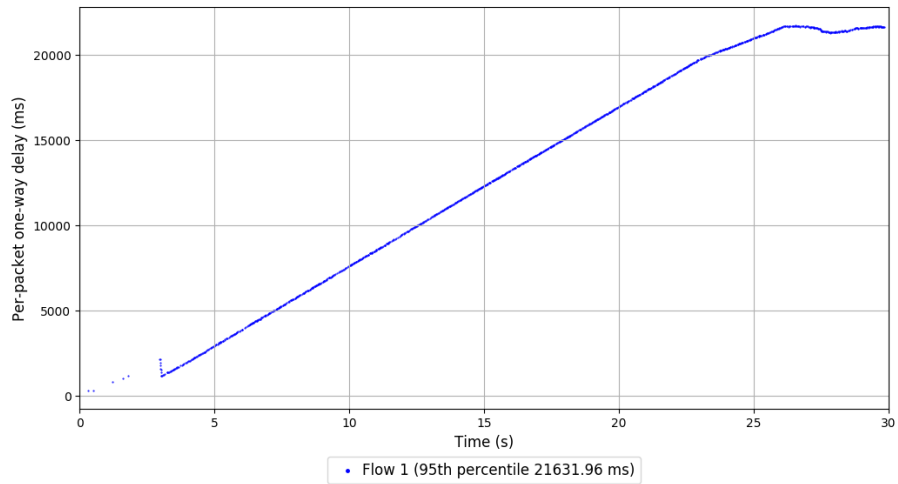
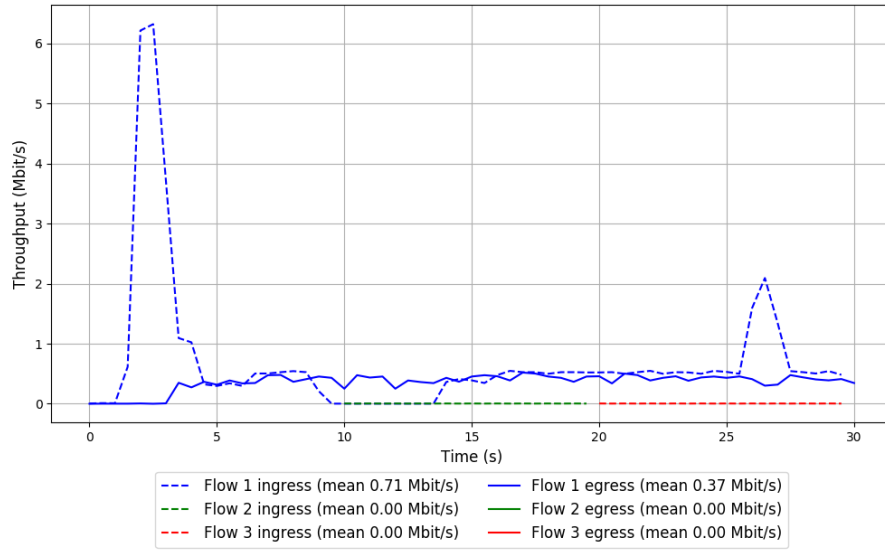
Start at: 2018-08-22 17:31:30

End at: 2018-08-22 17:32:00

Local clock offset: -3.933 ms

Remote clock offset: 8.537 ms

Run 1: Report of FillP-Sheep — Data Link



Run 2: Statistics of FillP-Sheep

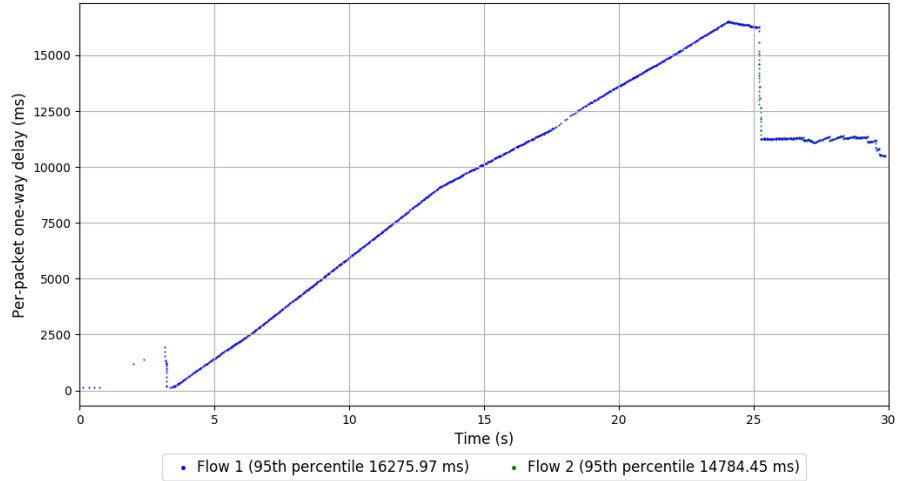
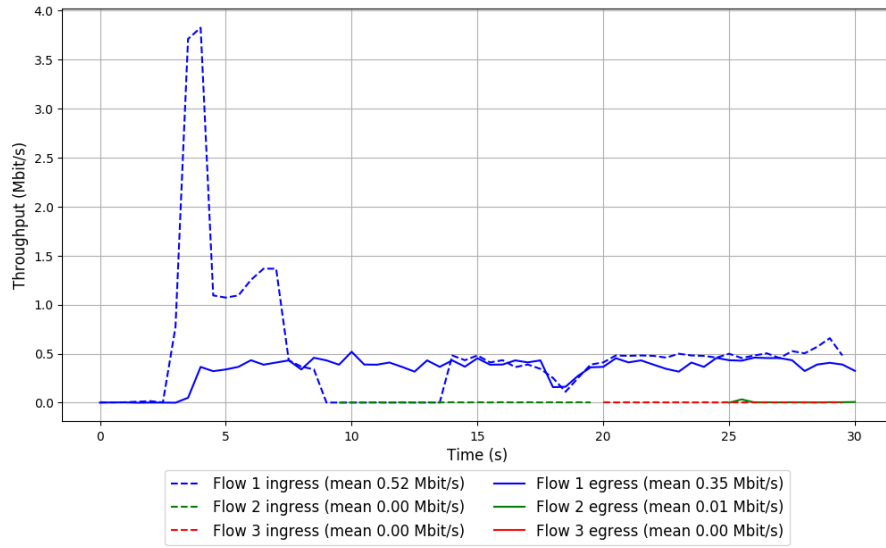
Start at: 2018-08-22 17:52:42

End at: 2018-08-22 17:53:12

Local clock offset: -4.172 ms

Remote clock offset: 4.66 ms

Run 2: Report of FillP-Sheep — Data Link



Run 3: Statistics of FillP-Sheep

/home/ubuntu/pantheon/data/2018-08-22T17-30-Colombia-ppp0-to-AWS-Brazil-2-3-runs-3-flows/fil

Run 3: Report of FillP-Sheep — Data Link

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Figure is missing

Run 1: Statistics of Indigo

Start at: 2018-08-22 17:38:54

End at: 2018-08-22 17:39:24

Local clock offset: -4.963 ms

Remote clock offset: 3.55 ms

Below is generated by plot.py at 2018-08-22 18:34:24

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.28 Mbit/s

95th percentile per-packet one-way delay: 1134.882 ms

Loss rate: 1.18%

-- Flow 1:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 1174.753 ms

Loss rate: 0.85%

-- Flow 2:

Average throughput: 0.11 Mbit/s

95th percentile per-packet one-way delay: 1117.131 ms

Loss rate: 1.06%

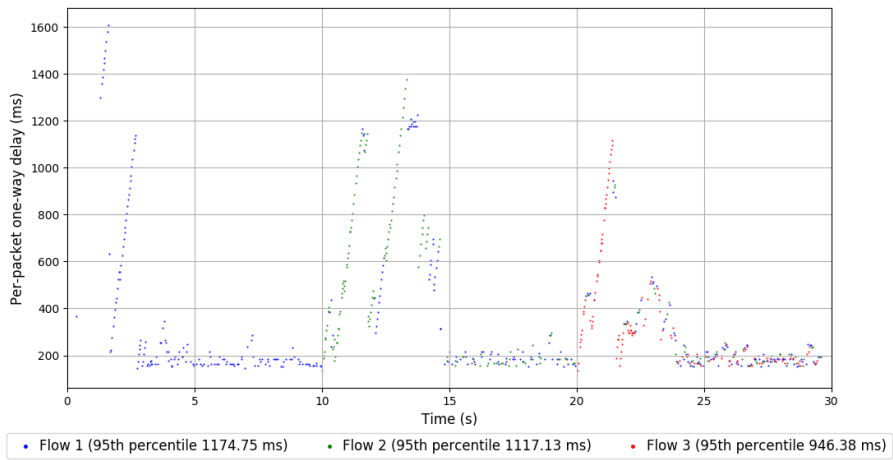
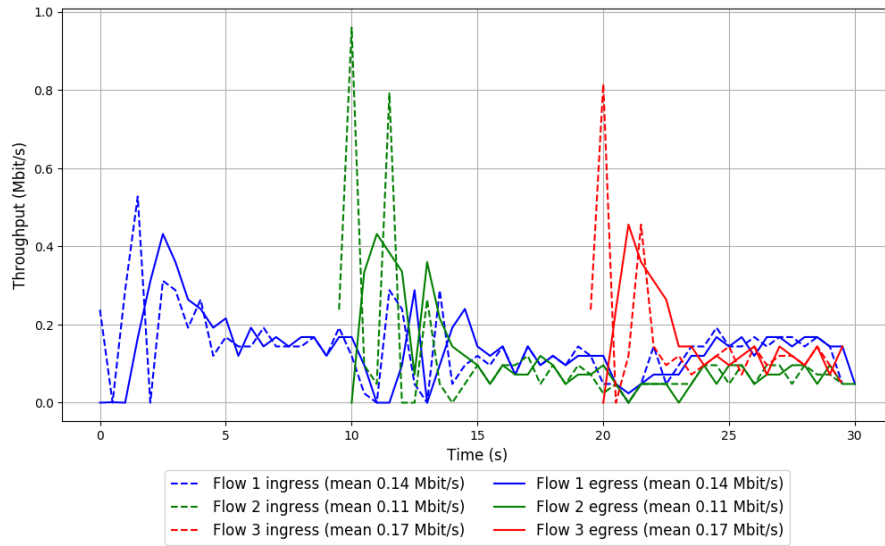
-- Flow 3:

Average throughput: 0.17 Mbit/s

95th percentile per-packet one-way delay: 946.382 ms

Loss rate: 2.14%

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2018-08-22 17:59:56

End at: 2018-08-22 18:00:26

Local clock offset: -5.127 ms

Remote clock offset: 9.236 ms

Below is generated by plot.py at 2018-08-22 18:34:24

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.28 Mbit/s

95th percentile per-packet one-way delay: 1166.411 ms

Loss rate: 0.86%

-- Flow 1:

Average throughput: 0.15 Mbit/s

95th percentile per-packet one-way delay: 1186.227 ms

Loss rate: 0.57%

-- Flow 2:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 1026.681 ms

Loss rate: 0.86%

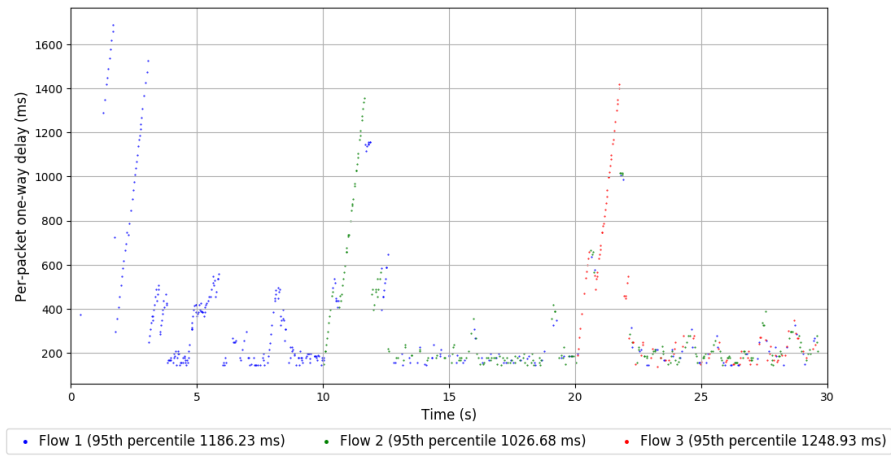
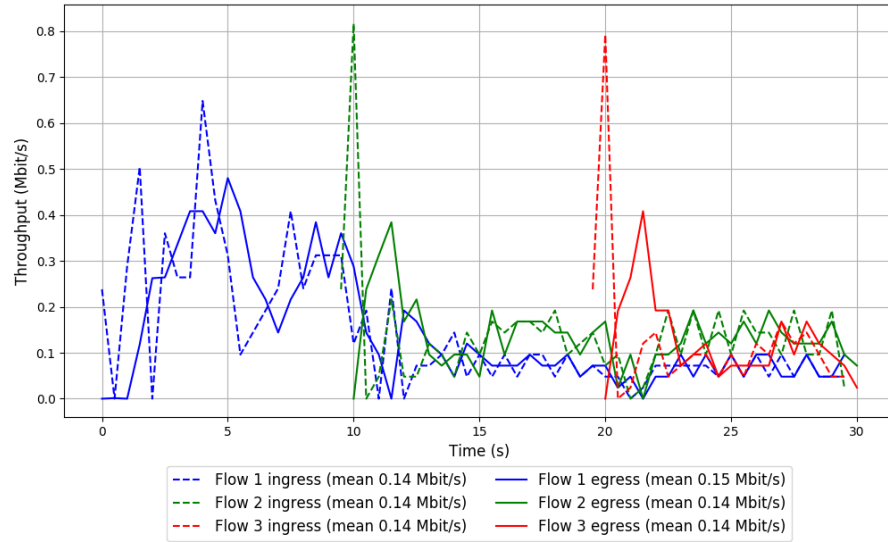
-- Flow 3:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 1248.934 ms

Loss rate: 1.80%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-08-22 18:21:05

End at: 2018-08-22 18:21:35

Local clock offset: -5.781 ms

Remote clock offset: 7.838 ms

Below is generated by plot.py at 2018-08-22 18:34:25

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.34 Mbit/s

95th percentile per-packet one-way delay: 1050.530 ms

Loss rate: 0.95%

-- Flow 1:

Average throughput: 0.20 Mbit/s

95th percentile per-packet one-way delay: 988.888 ms

Loss rate: 0.41%

-- Flow 2:

Average throughput: 0.12 Mbit/s

95th percentile per-packet one-way delay: 1061.539 ms

Loss rate: 0.53%

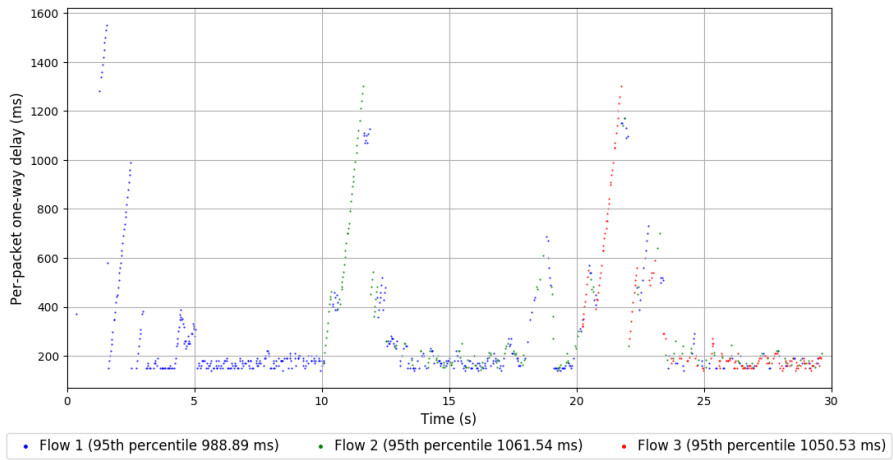
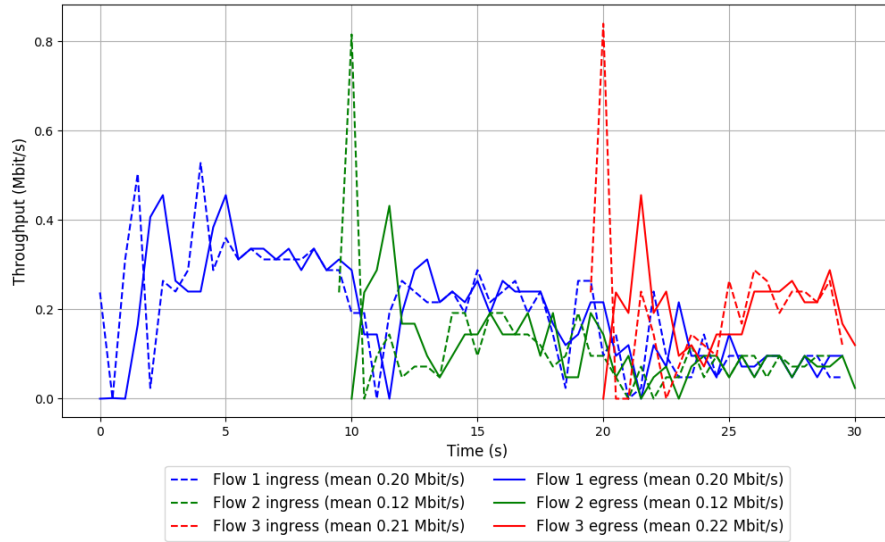
-- Flow 3:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 1050.530 ms

Loss rate: 2.89%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of LEDBAT

Start at: 2018-08-22 17:48:58

End at: 2018-08-22 17:49:28

Local clock offset: -5.661 ms

Remote clock offset: 3.581 ms

Below is generated by plot.py at 2018-08-22 18:34:27

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 1348.584 ms

Loss rate: 2.44%

-- Flow 1:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 719.766 ms

Loss rate: 1.65%

-- Flow 2:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 5808.348 ms

Loss rate: 0.00%

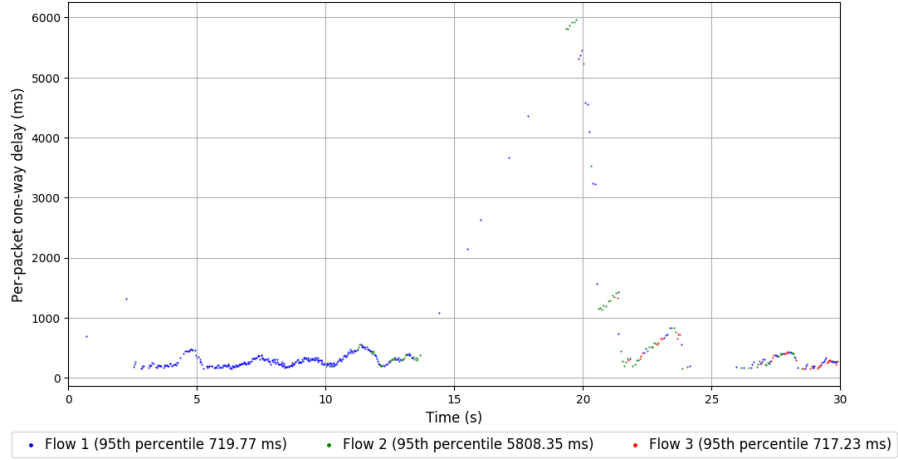
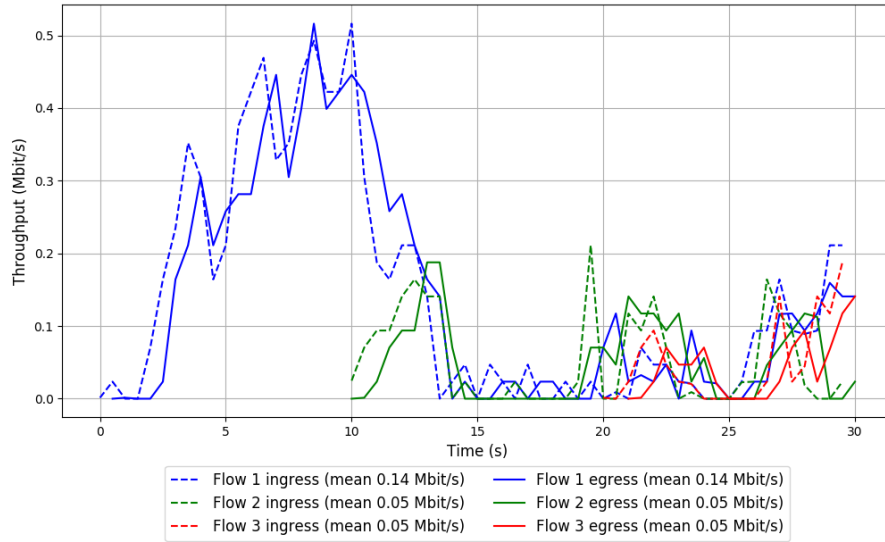
-- Flow 3:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 717.233 ms

Loss rate: 14.70%

Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2018-08-22 18:09:48

End at: 2018-08-22 18:10:18

Local clock offset: -5.976 ms

Remote clock offset: 4.135 ms

Below is generated by plot.py at 2018-08-22 18:34:27

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.33 Mbit/s

95th percentile per-packet one-way delay: 411.468 ms

Loss rate: 1.29%

-- Flow 1:

Average throughput: 0.24 Mbit/s

95th percentile per-packet one-way delay: 400.891 ms

Loss rate: 0.82%

-- Flow 2:

Average throughput: 0.10 Mbit/s

95th percentile per-packet one-way delay: 421.435 ms

Loss rate: 1.83%

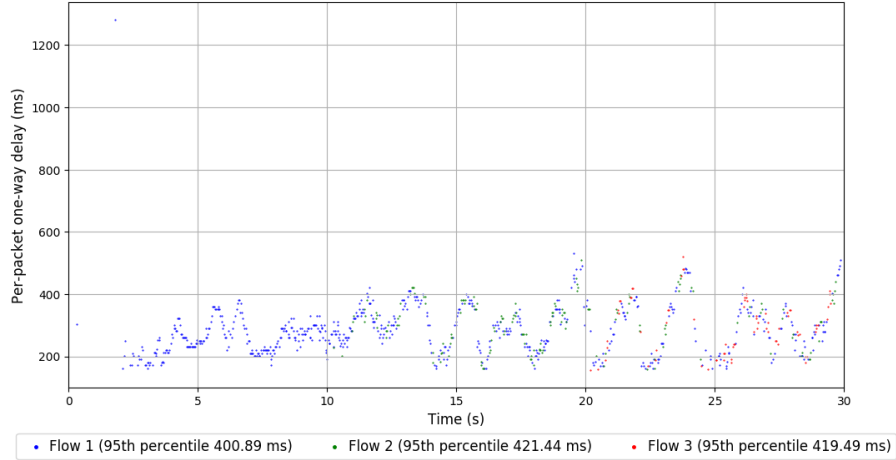
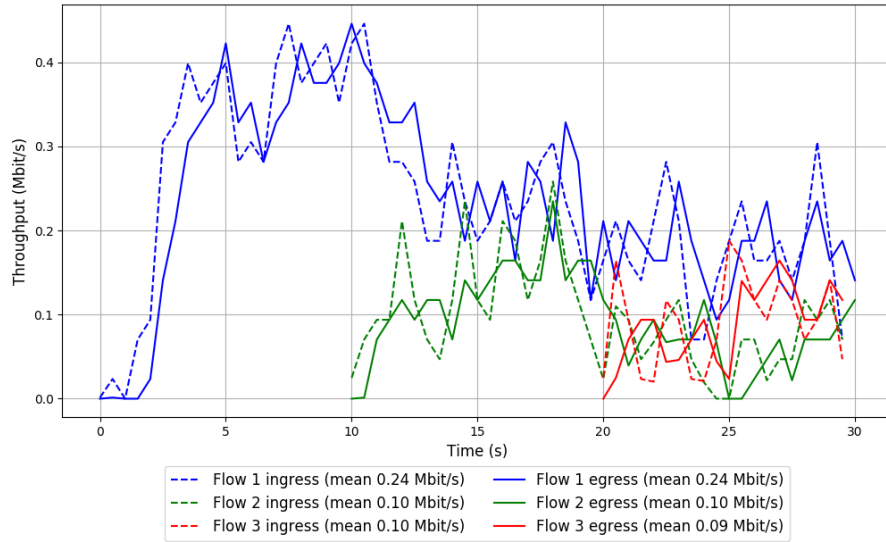
-- Flow 3:

Average throughput: 0.09 Mbit/s

95th percentile per-packet one-way delay: 419.488 ms

Loss rate: 3.86%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2018-08-22 18:31:11

End at: 2018-08-22 18:31:41

Local clock offset: -5.861 ms

Remote clock offset: 6.859 ms

Below is generated by plot.py at 2018-08-22 18:34:27

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.31 Mbit/s

95th percentile per-packet one-way delay: 446.881 ms

Loss rate: 1.77%

-- Flow 1:

Average throughput: 0.17 Mbit/s

95th percentile per-packet one-way delay: 438.421 ms

Loss rate: 0.94%

-- Flow 2:

Average throughput: 0.15 Mbit/s

95th percentile per-packet one-way delay: 436.875 ms

Loss rate: 2.43%

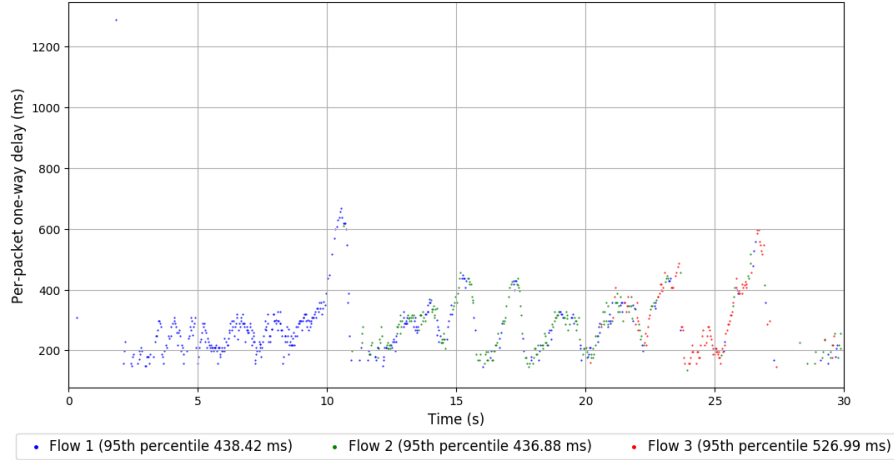
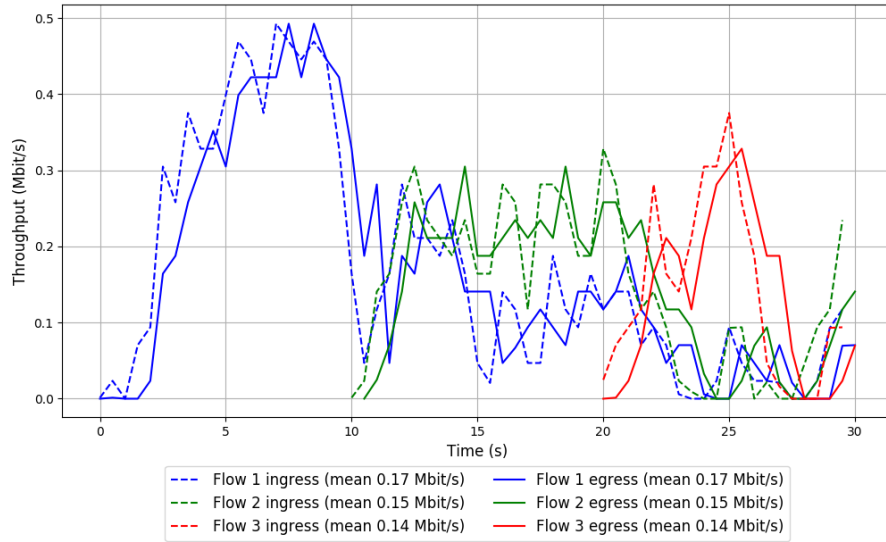
-- Flow 3:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 526.987 ms

Loss rate: 3.37%

Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of PCC-Allegro

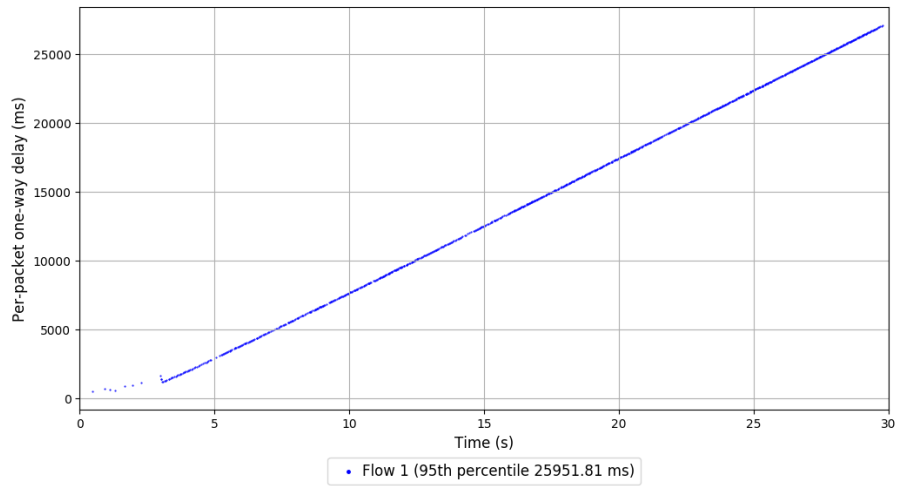
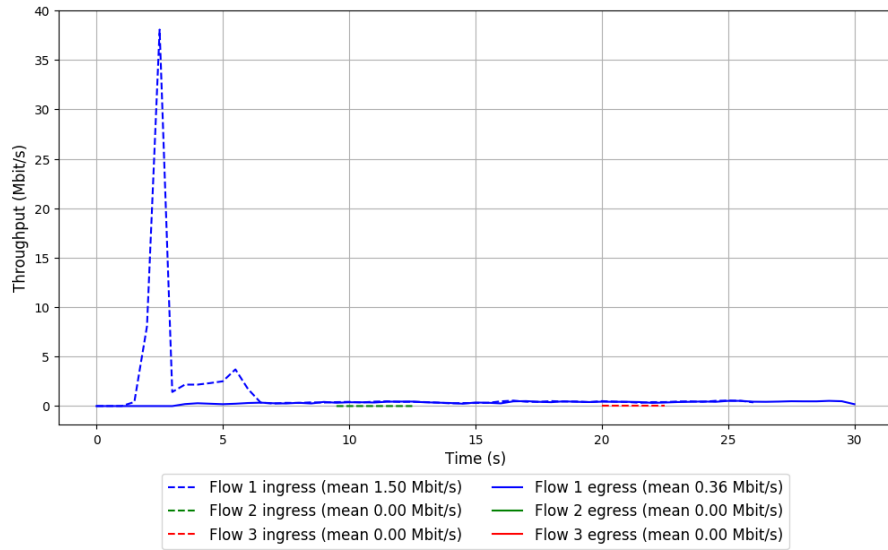
Start at: 2018-08-22 17:51:21

End at: 2018-08-22 17:51:51

Local clock offset: -4.893 ms

Remote clock offset: 9.694 ms

Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

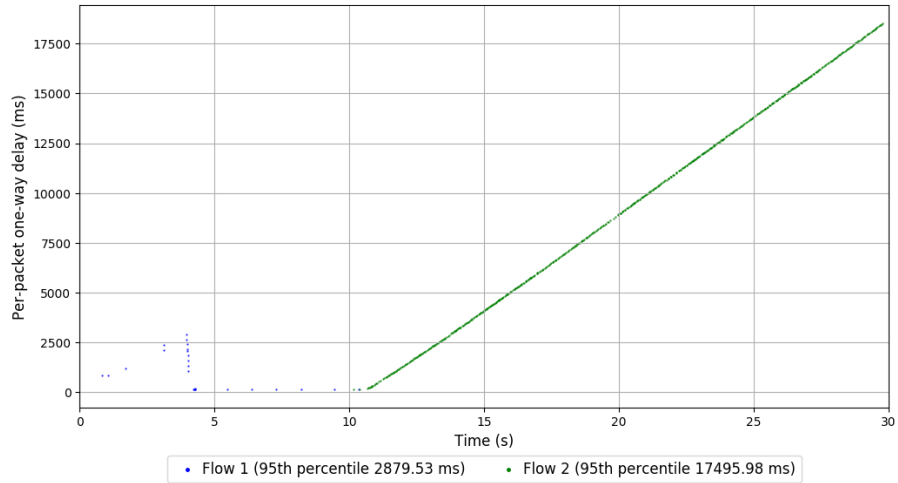
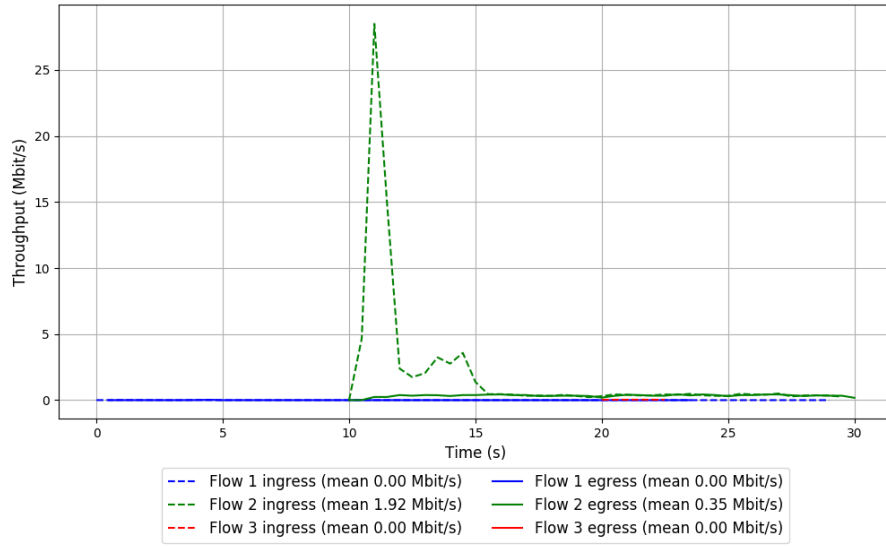
Start at: 2018-08-22 18:12:12

End at: 2018-08-22 18:12:42

Local clock offset: -5.088 ms

Remote clock offset: 2.948 ms

Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

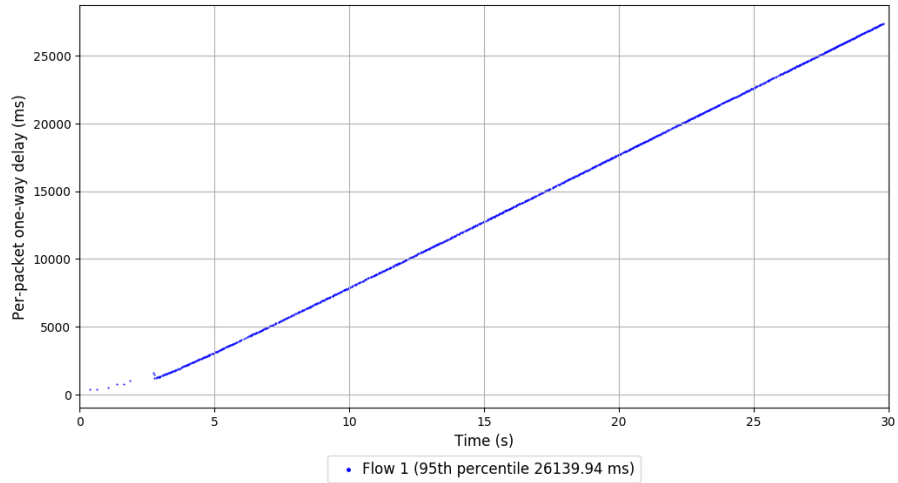
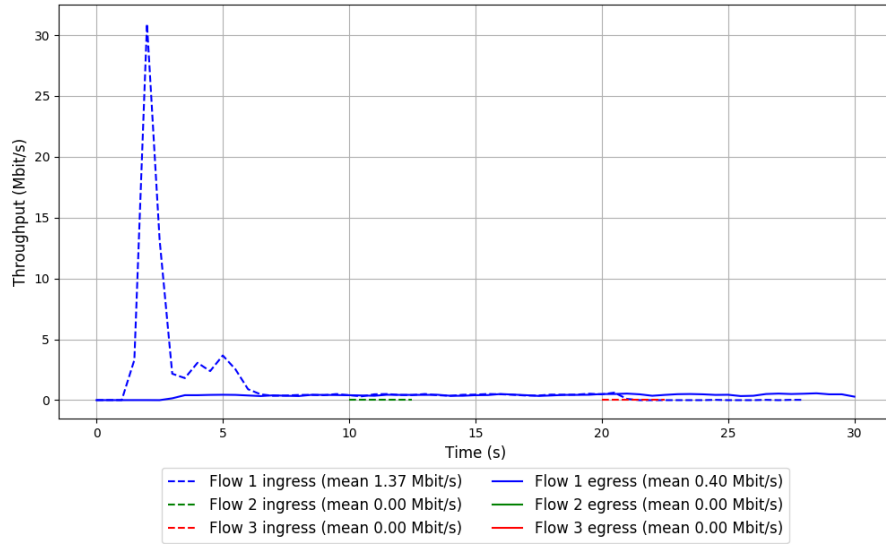
Start at: 2018-08-22 18:33:35

End at: 2018-08-22 18:34:05

Local clock offset: -4.267 ms

Remote clock offset: 1.819 ms

Run 3: Report of PCC-Allegro — Data Link



Run 1: Statistics of PCC-Expr

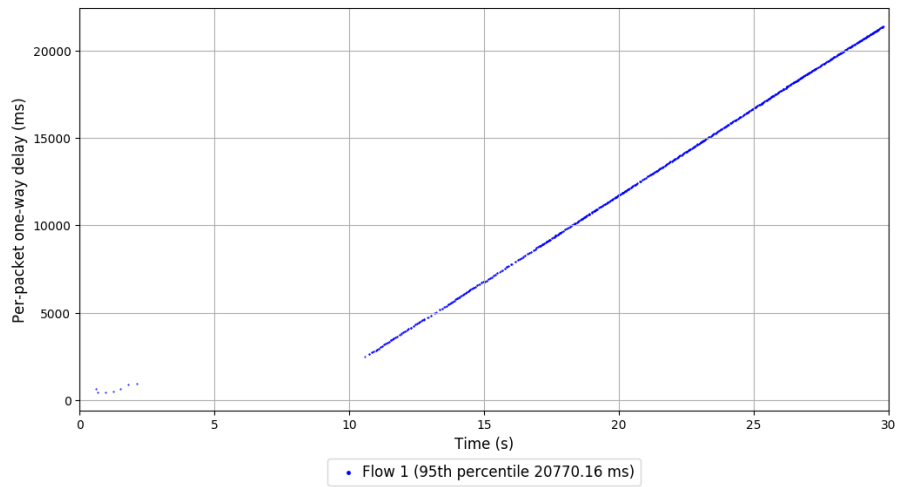
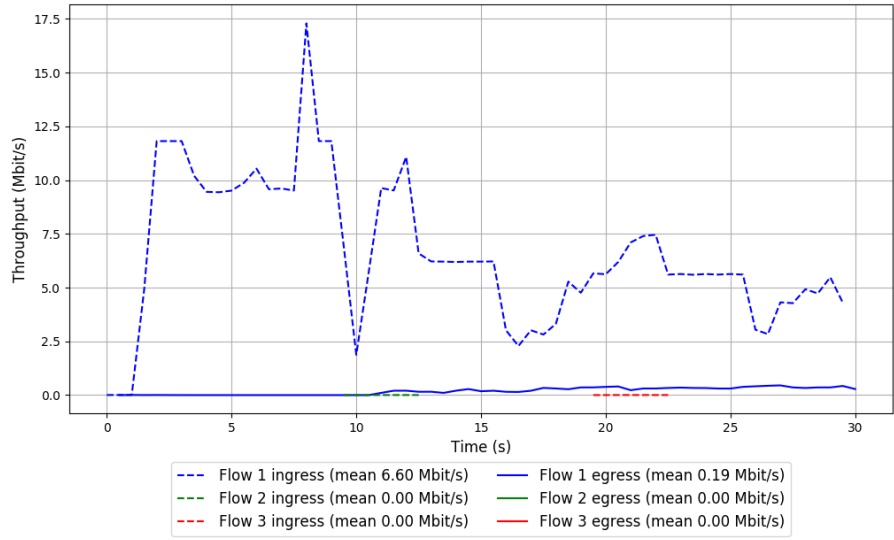
Start at: 2018-08-22 17:46:23

End at: 2018-08-22 17:46:53

Local clock offset: -5.509 ms

Remote clock offset: 3.718 ms

Run 1: Report of PCC-Expr — Data Link



Run 2: Statistics of PCC-Expr

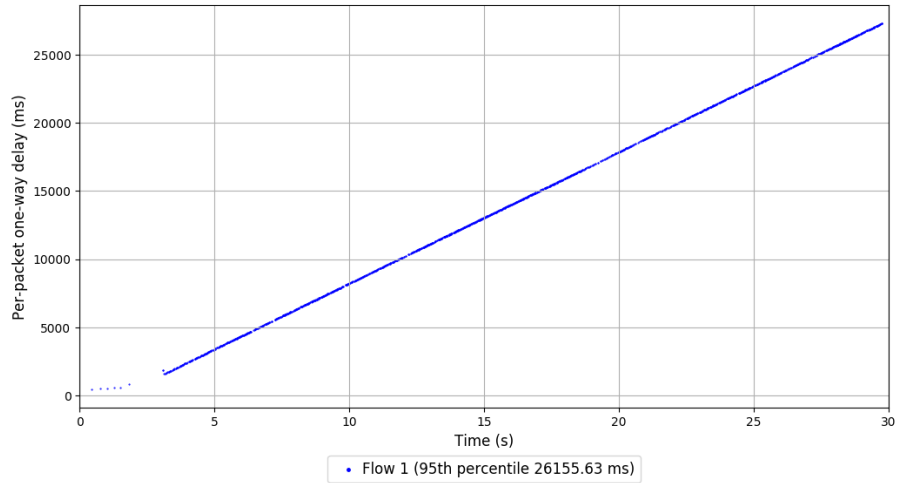
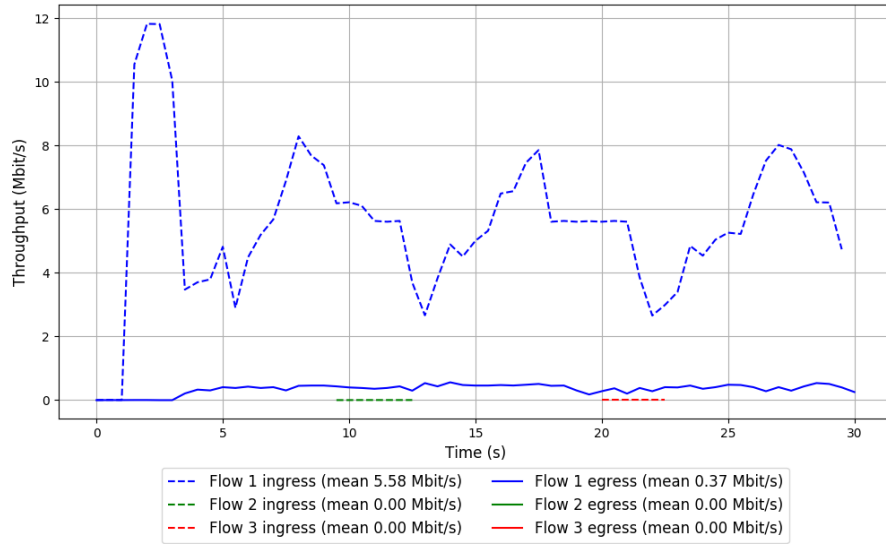
Start at: 2018-08-22 18:07:16

End at: 2018-08-22 18:07:46

Local clock offset: -5.246 ms

Remote clock offset: 4.107 ms

Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

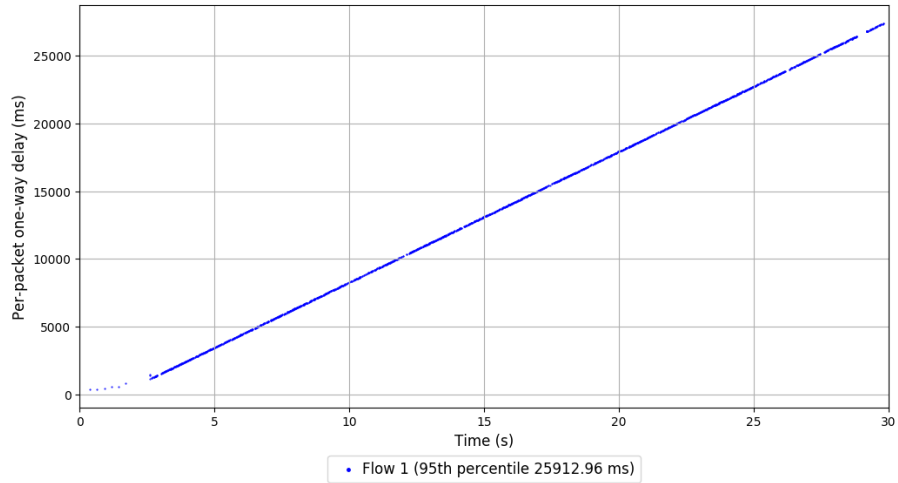
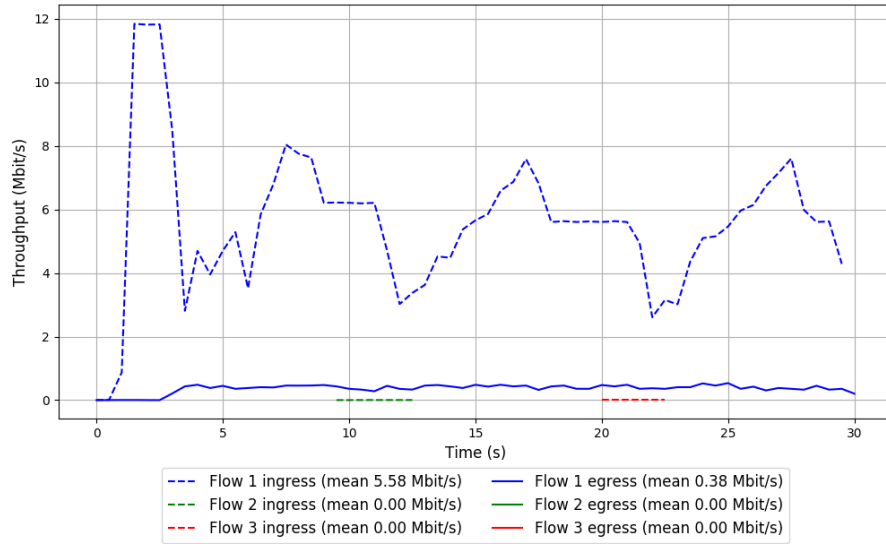
Start at: 2018-08-22 18:28:33

End at: 2018-08-22 18:29:03

Local clock offset: -5.013 ms

Remote clock offset: 7.365 ms

Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2018-08-22 17:34:07

End at: 2018-08-22 17:34:37

Local clock offset: -3.933 ms

Remote clock offset: 9.493 ms

Below is generated by plot.py at 2018-08-22 18:34:39

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.38 Mbit/s

95th percentile per-packet one-way delay: 8912.741 ms

Loss rate: 30.38%

-- Flow 1:

Average throughput: 0.38 Mbit/s

95th percentile per-packet one-way delay: 8910.240 ms

Loss rate: 30.38%

-- Flow 2:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 7204.285 ms

Loss rate: 0.00%

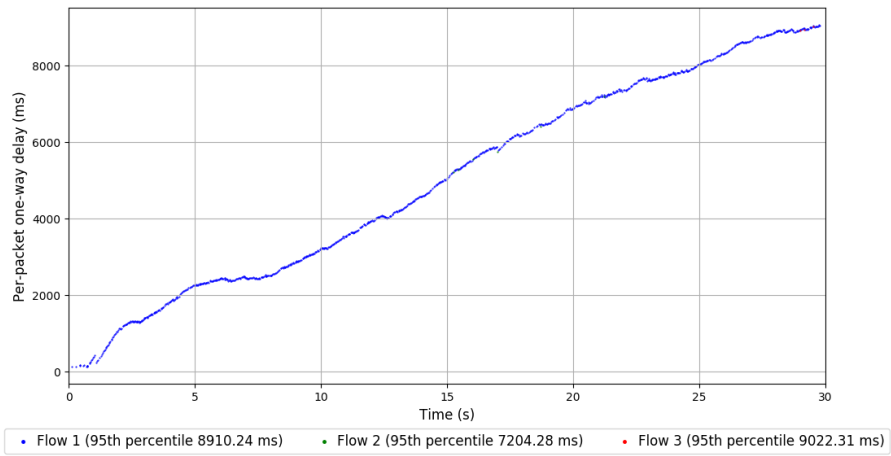
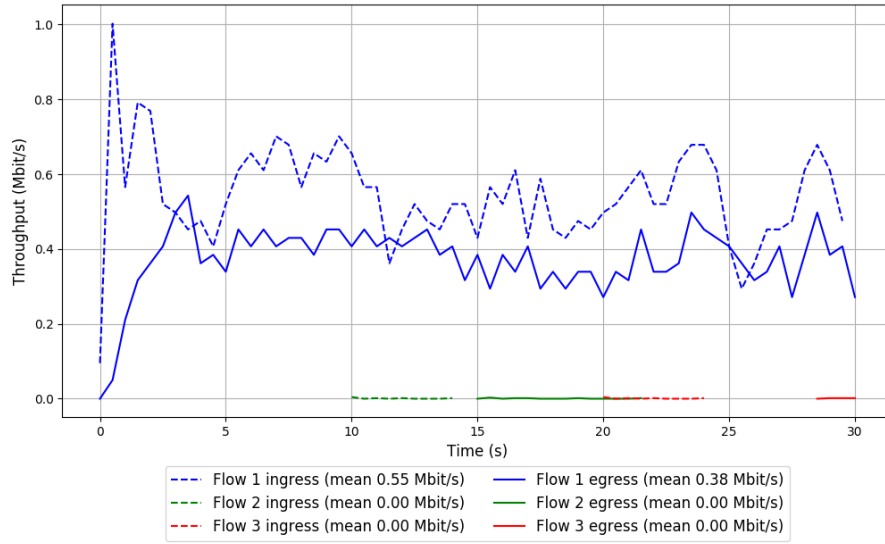
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 9022.309 ms

Loss rate: 50.00%

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2018-08-22 17:55:07

End at: 2018-08-22 17:55:37

Local clock offset: -5.774 ms

Remote clock offset: 9.352 ms

Below is generated by plot.py at 2018-08-22 18:34:39

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.36 Mbit/s

95th percentile per-packet one-way delay: 7541.036 ms

Loss rate: 27.82%

-- Flow 1:

Average throughput: 0.34 Mbit/s

95th percentile per-packet one-way delay: 7591.161 ms

Loss rate: 28.69%

-- Flow 2:

Average throughput: 0.03 Mbit/s

95th percentile per-packet one-way delay: 7108.220 ms

Loss rate: 0.00%

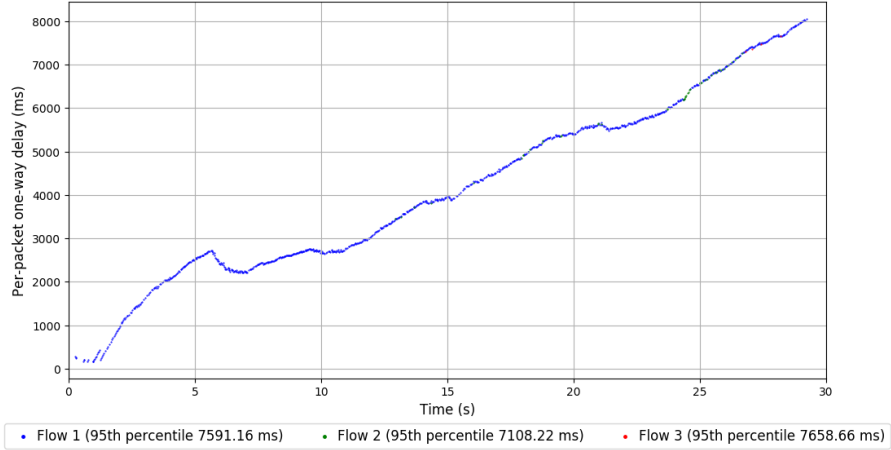
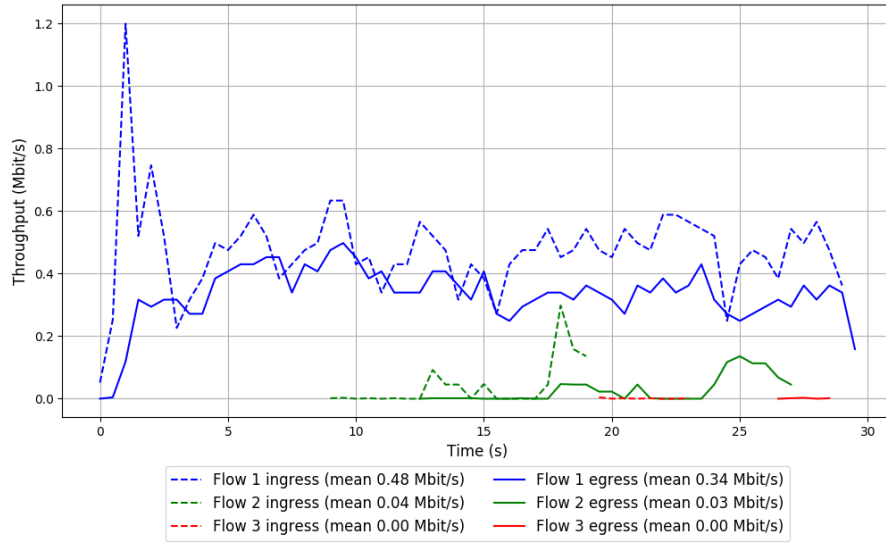
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 7658.656 ms

Loss rate: 33.33%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2018-08-22 18:16:17

End at: 2018-08-22 18:16:47

Local clock offset: -5.04 ms

Remote clock offset: 4.104 ms

Below is generated by plot.py at 2018-08-22 18:34:39

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.40 Mbit/s

95th percentile per-packet one-way delay: 9169.571 ms

Loss rate: 33.88%

-- Flow 1:

Average throughput: 0.39 Mbit/s

95th percentile per-packet one-way delay: 9113.543 ms

Loss rate: 33.88%

-- Flow 2:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 7119.307 ms

Loss rate: 0.00%

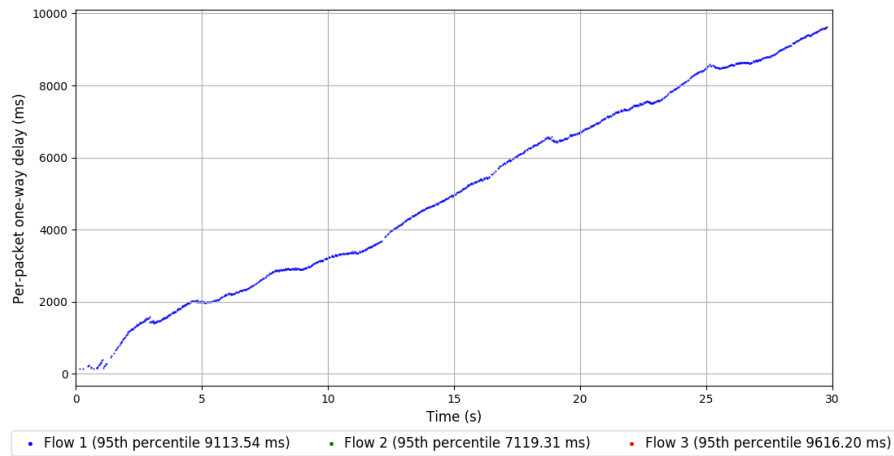
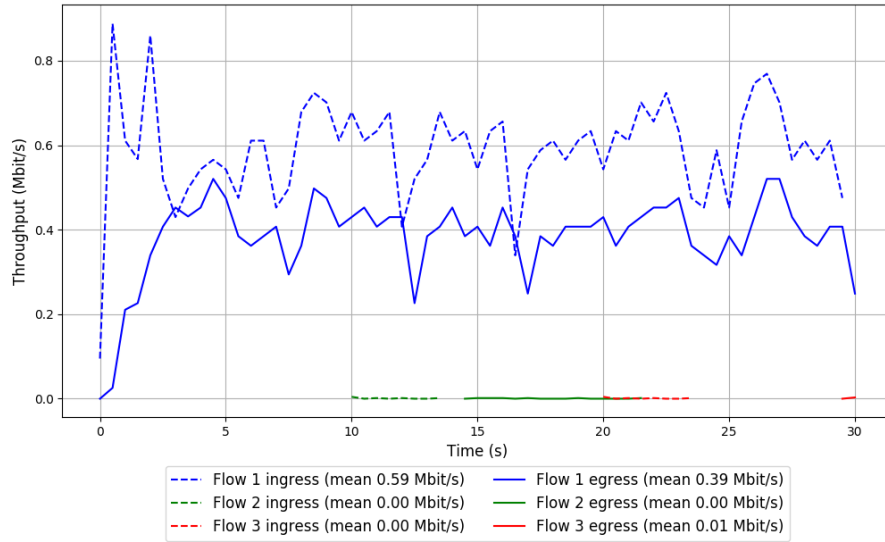
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 9616.199 ms

Loss rate: 66.67%

Run 3: Report of QUIC Cubic — Data Link



Run 1: Statistics of SCReAM

Start at: 2018-08-22 17:50:10

End at: 2018-08-22 17:50:40

Local clock offset: -5.629 ms

Remote clock offset: 3.672 ms

Below is generated by plot.py at 2018-08-22 18:34:39

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 280.422 ms

Loss rate: 0.94%

-- Flow 1:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 268.223 ms

Loss rate: 0.79%

-- Flow 2:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 277.515 ms

Loss rate: 0.79%

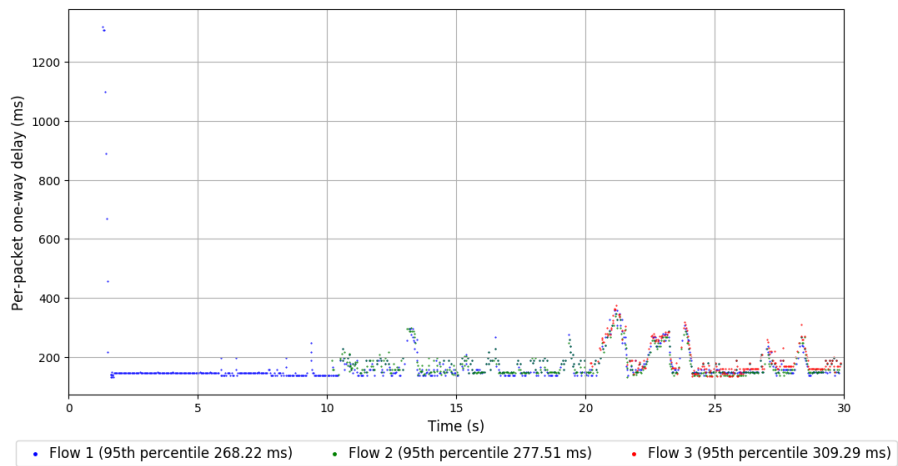
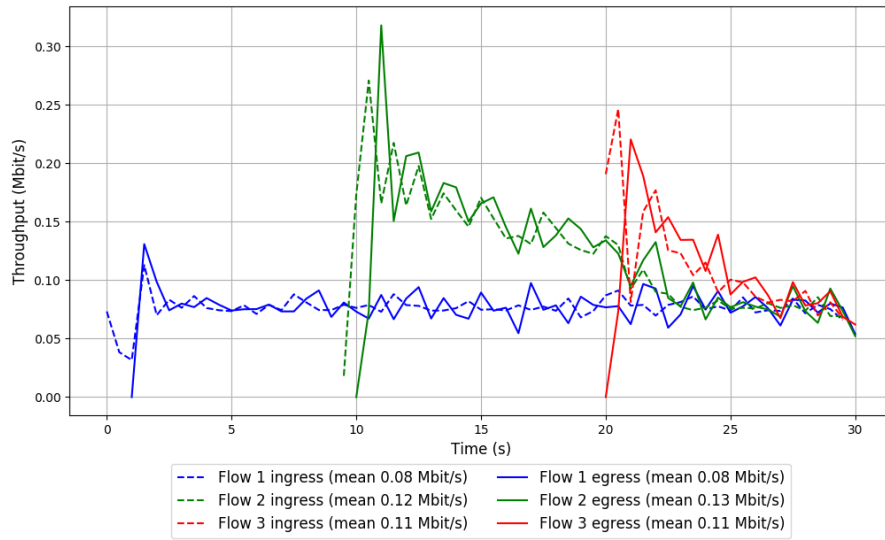
-- Flow 3:

Average throughput: 0.11 Mbit/s

95th percentile per-packet one-way delay: 309.287 ms

Loss rate: 1.60%

Run 1: Report of SCReAM — Data Link



Run 2: Statistics of SCReAM

Start at: 2018-08-22 18:11:00

End at: 2018-08-22 18:11:30

Local clock offset: -5.884 ms

Remote clock offset: 4.146 ms

Below is generated by plot.py at 2018-08-22 18:34:39

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.16 Mbit/s

95th percentile per-packet one-way delay: 3193.914 ms

Loss rate: 0.97%

-- Flow 1:

Average throughput: 0.07 Mbit/s

95th percentile per-packet one-way delay: 2564.081 ms

Loss rate: 0.92%

-- Flow 2:

Average throughput: 0.11 Mbit/s

95th percentile per-packet one-way delay: 3453.006 ms

Loss rate: 0.41%

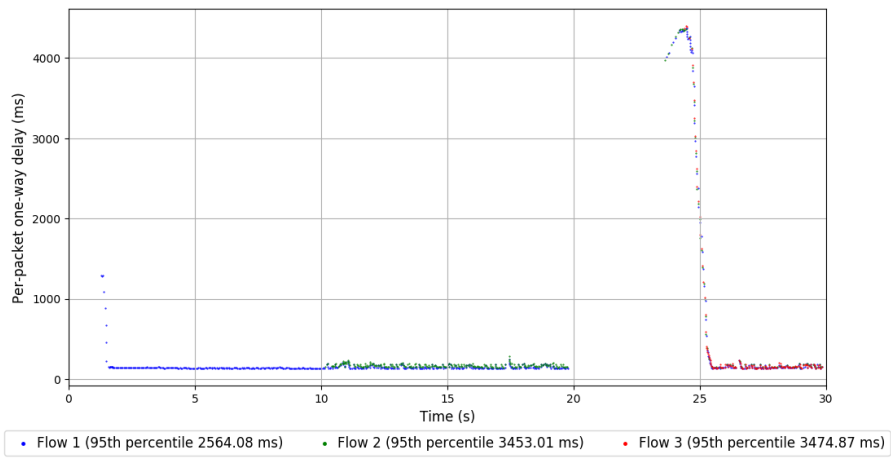
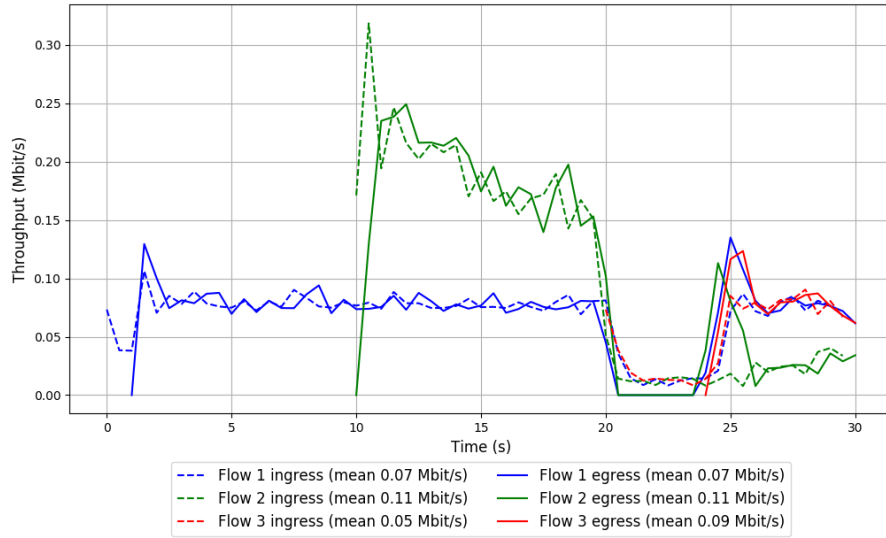
-- Flow 3:

Average throughput: 0.09 Mbit/s

95th percentile per-packet one-way delay: 3474.871 ms

Loss rate: 3.51%

Run 2: Report of SCReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2018-08-22 18:32:23

End at: 2018-08-22 18:32:53

Local clock offset: -5.812 ms

Remote clock offset: 1.893 ms

Below is generated by plot.py at 2018-08-22 18:34:39

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 297.402 ms

Loss rate: 1.01%

-- Flow 1:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 287.170 ms

Loss rate: 0.66%

-- Flow 2:

Average throughput: 0.10 Mbit/s

95th percentile per-packet one-way delay: 300.352 ms

Loss rate: 0.99%

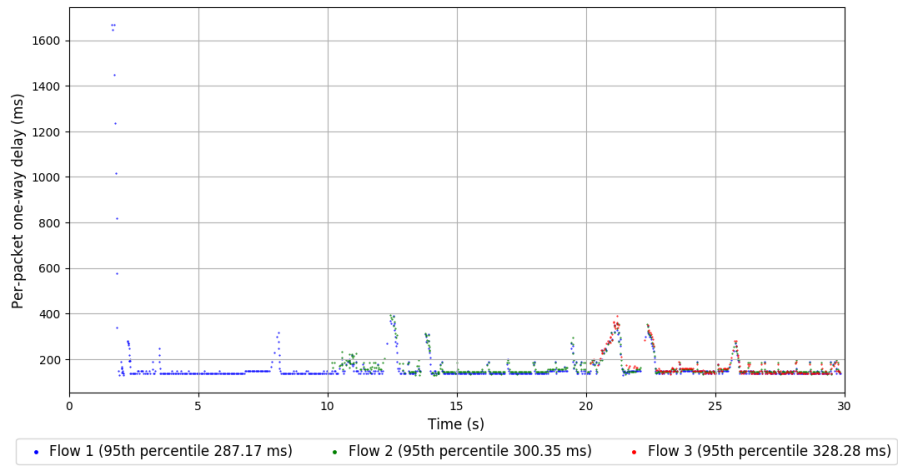
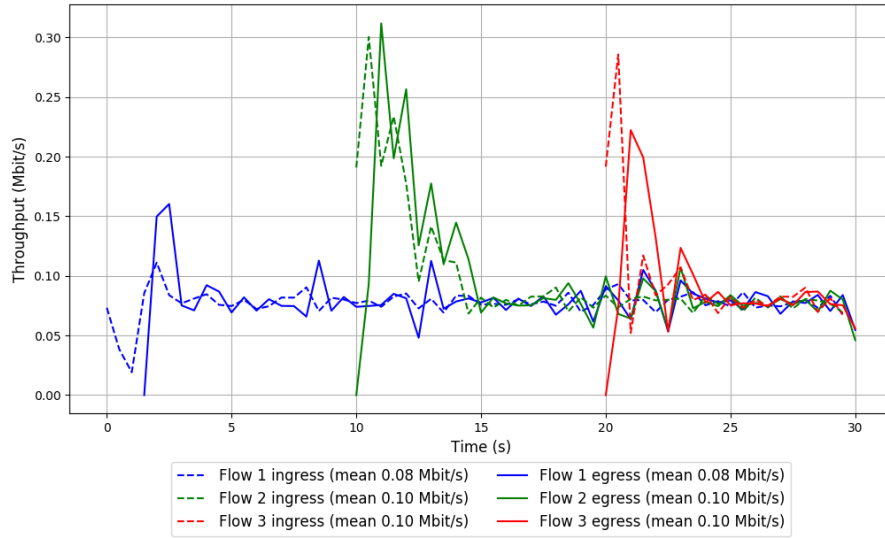
-- Flow 3:

Average throughput: 0.10 Mbit/s

95th percentile per-packet one-way delay: 328.280 ms

Loss rate: 1.87%

Run 3: Report of SCReAM — Data Link



Run 1: Statistics of Sprout

Start at: 2018-08-22 17:42:48

End at: 2018-08-22 17:43:18

Local clock offset: -4.465 ms

Remote clock offset: 3.603 ms

Below is generated by plot.py at 2018-08-22 18:34:39

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.23 Mbit/s

95th percentile per-packet one-way delay: 812.895 ms

Loss rate: 1.56%

-- Flow 1:

Average throughput: 0.11 Mbit/s

95th percentile per-packet one-way delay: 796.948 ms

Loss rate: 1.40%

-- Flow 2:

Average throughput: 0.11 Mbit/s

95th percentile per-packet one-way delay: 787.532 ms

Loss rate: 0.65%

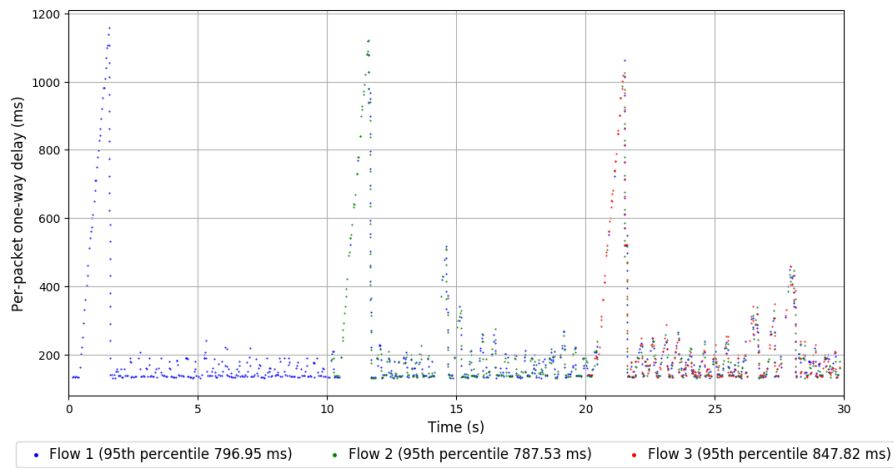
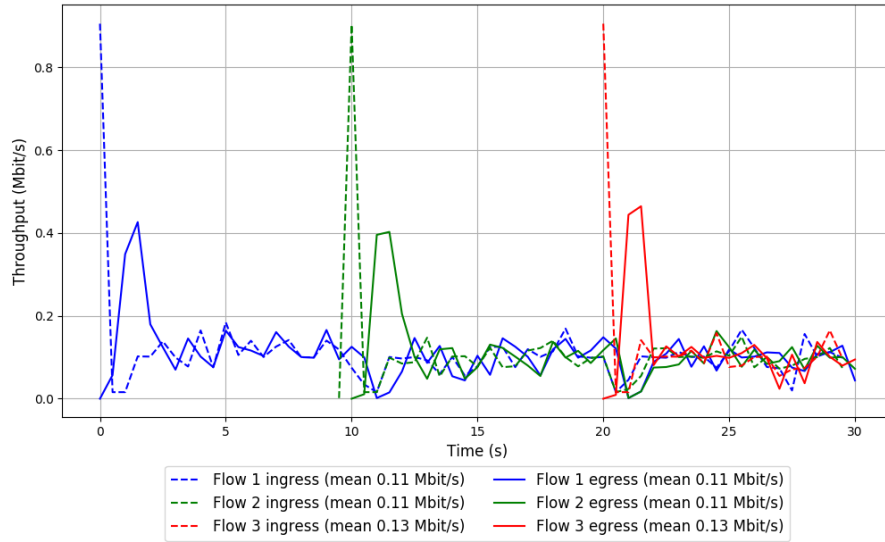
-- Flow 3:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 847.823 ms

Loss rate: 3.48%

Run 1: Report of Sprout — Data Link



Run 2: Statistics of Sprout

Start at: 2018-08-22 18:03:42

End at: 2018-08-22 18:04:12

Local clock offset: -5.956 ms

Remote clock offset: 3.171 ms

Below is generated by plot.py at 2018-08-22 18:34:39

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 1564.030 ms

Loss rate: 1.24%

-- Flow 1:

Average throughput: 0.10 Mbit/s

95th percentile per-packet one-way delay: 1563.673 ms

Loss rate: 0.51%

-- Flow 2:

Average throughput: 0.10 Mbit/s

95th percentile per-packet one-way delay: 1505.318 ms

Loss rate: 1.07%

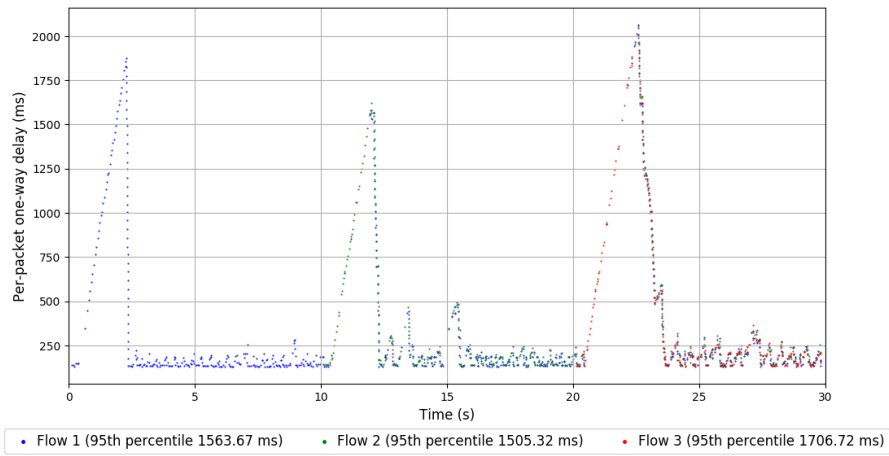
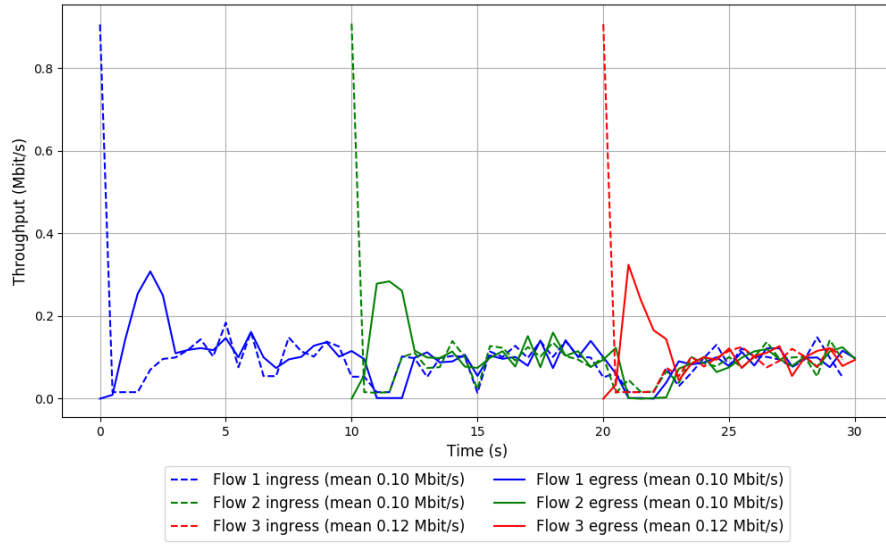
-- Flow 3:

Average throughput: 0.12 Mbit/s

95th percentile per-packet one-way delay: 1706.716 ms

Loss rate: 3.34%

Run 2: Report of Sprout — Data Link



Run 3: Statistics of Sprout

Start at: 2018-08-22 18:24:58

End at: 2018-08-22 18:25:28

Local clock offset: -4.99 ms

Remote clock offset: 4.083 ms

Below is generated by plot.py at 2018-08-22 18:34:39

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.23 Mbit/s

95th percentile per-packet one-way delay: 828.939 ms

Loss rate: 1.04%

-- Flow 1:

Average throughput: 0.11 Mbit/s

95th percentile per-packet one-way delay: 818.110 ms

Loss rate: 1.05%

-- Flow 2:

Average throughput: 0.11 Mbit/s

95th percentile per-packet one-way delay: 810.115 ms

Loss rate: 1.04%

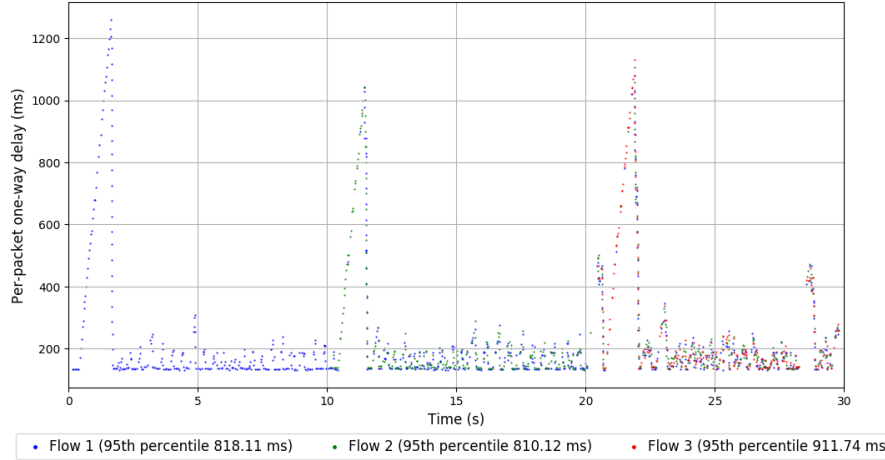
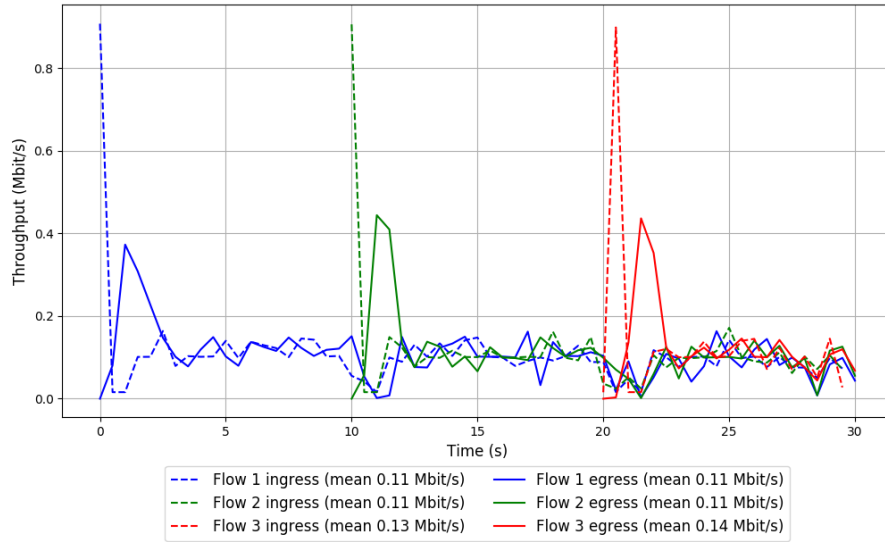
-- Flow 3:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 911.742 ms

Loss rate: 0.99%

Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

Start at: 2018-08-22 17:37:42

End at: 2018-08-22 17:38:12

Local clock offset: -4.749 ms

Remote clock offset: 8.399 ms

Below is generated by plot.py at 2018-08-22 18:34:39

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.36 Mbit/s

95th percentile per-packet one-way delay: 4651.712 ms

Loss rate: 28.98%

-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 4364.537 ms

Loss rate: 20.56%

-- Flow 2:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 5009.251 ms

Loss rate: 30.09%

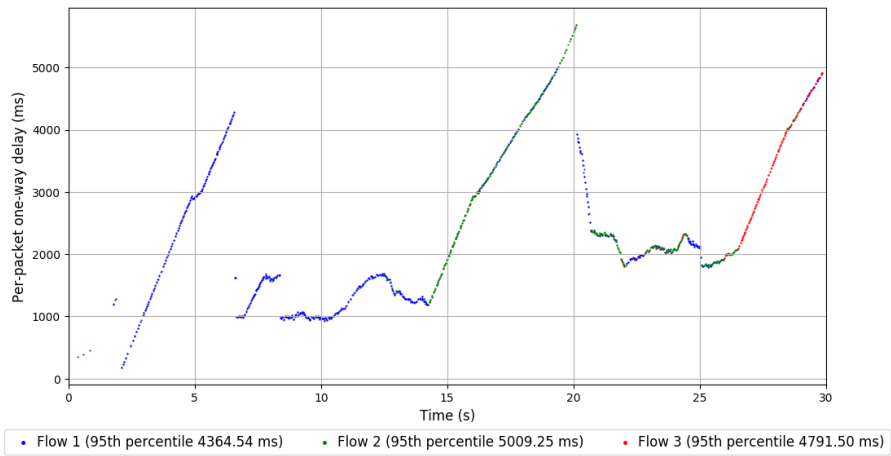
-- Flow 3:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 4791.498 ms

Loss rate: 54.09%

Run 1: Report of TaoVA-100x — Data Link



Run 2: Statistics of TaoVA-100x

Start at: 2018-08-22 17:58:43

End at: 2018-08-22 17:59:13

Local clock offset: -5.094 ms

Remote clock offset: 8.113 ms

Below is generated by plot.py at 2018-08-22 18:34:40

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.37 Mbit/s

95th percentile per-packet one-way delay: 4182.148 ms

Loss rate: 15.17%

-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 3808.667 ms

Loss rate: 6.44%

-- Flow 2:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 4171.615 ms

Loss rate: 11.85%

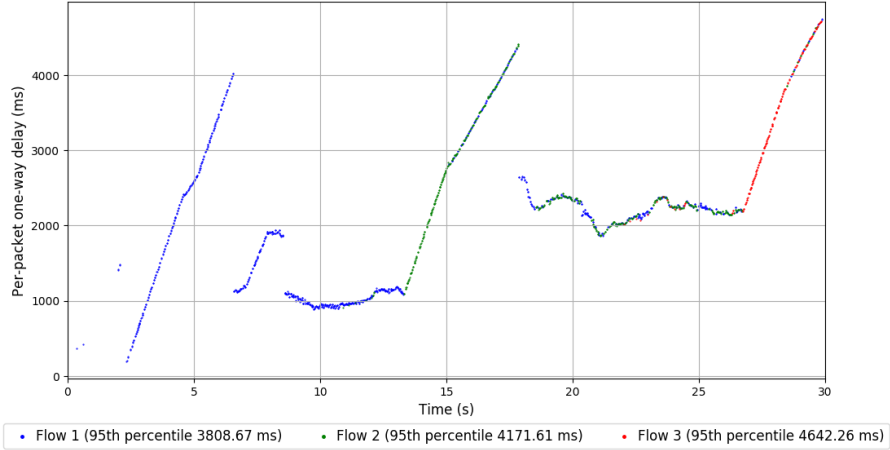
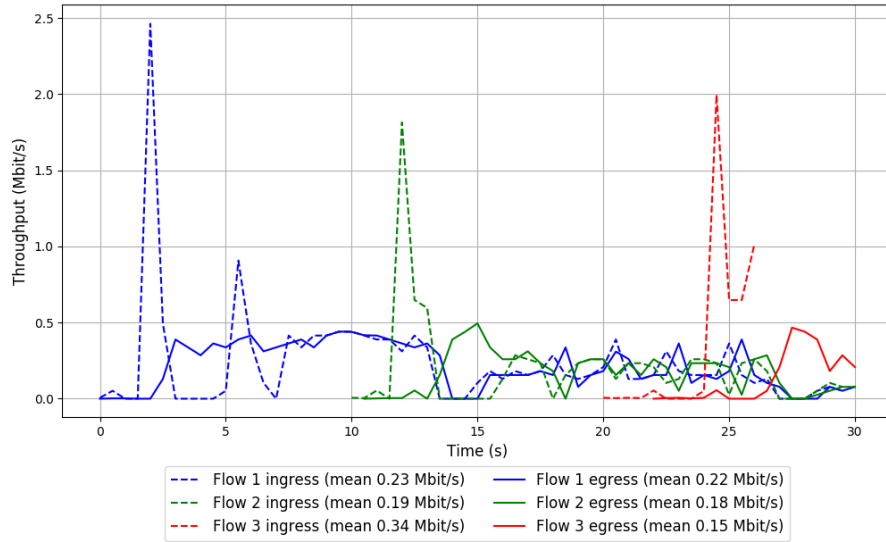
-- Flow 3:

Average throughput: 0.15 Mbit/s

95th percentile per-packet one-way delay: 4642.255 ms

Loss rate: 47.99%

Run 2: Report of TaoVA-100x — Data Link



Run 3: Statistics of TaoVA-100x

Start at: 2018-08-22 18:19:53

End at: 2018-08-22 18:20:23

Local clock offset: -5.789 ms

Remote clock offset: 4.157 ms

Below is generated by plot.py at 2018-08-22 18:34:42

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.44 Mbit/s

95th percentile per-packet one-way delay: 3947.563 ms

Loss rate: 11.81%

-- Flow 1:

Average throughput: 0.27 Mbit/s

95th percentile per-packet one-way delay: 3155.251 ms

Loss rate: 5.46%

-- Flow 2:

Average throughput: 0.20 Mbit/s

95th percentile per-packet one-way delay: 3557.495 ms

Loss rate: 10.39%

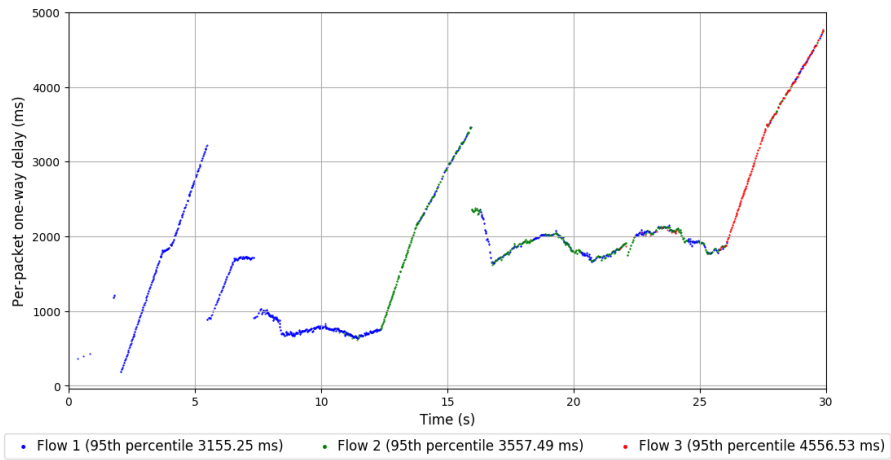
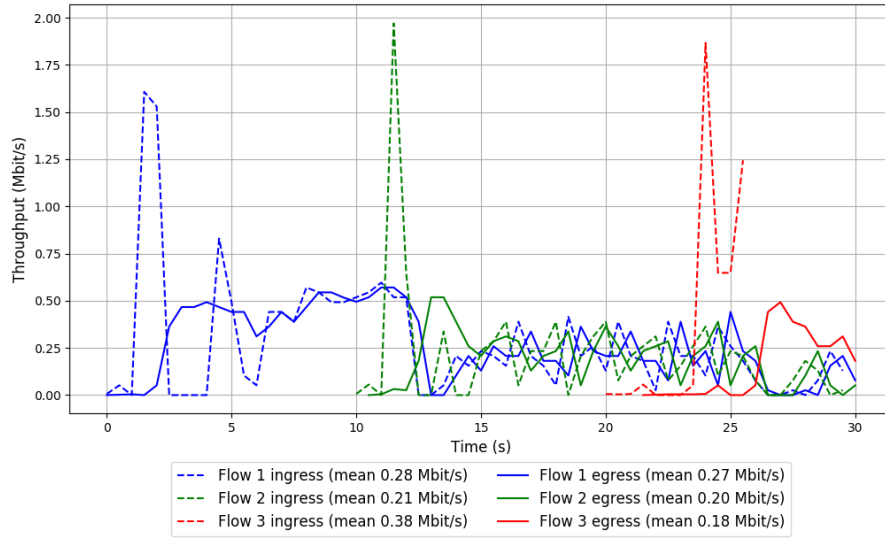
-- Flow 3:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 4556.532 ms

Loss rate: 37.76%

Run 3: Report of TaoVA-100x — Data Link



Run 1: Statistics of TCP Vegas

Start at: 2018-08-22 17:35:19

End at: 2018-08-22 17:35:49

Local clock offset: -4.008 ms

Remote clock offset: 7.354 ms

Below is generated by plot.py at 2018-08-22 18:34:42

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.41 Mbit/s

95th percentile per-packet one-way delay: 2411.383 ms

Loss rate: 12.30%

-- Flow 1:

Average throughput: 0.26 Mbit/s

95th percentile per-packet one-way delay: 2410.291 ms

Loss rate: 4.26%

-- Flow 2:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 2281.313 ms

Loss rate: 10.06%

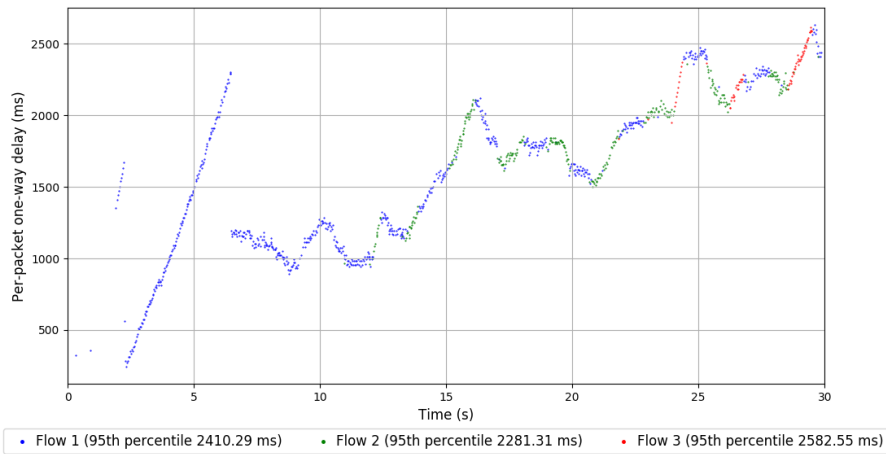
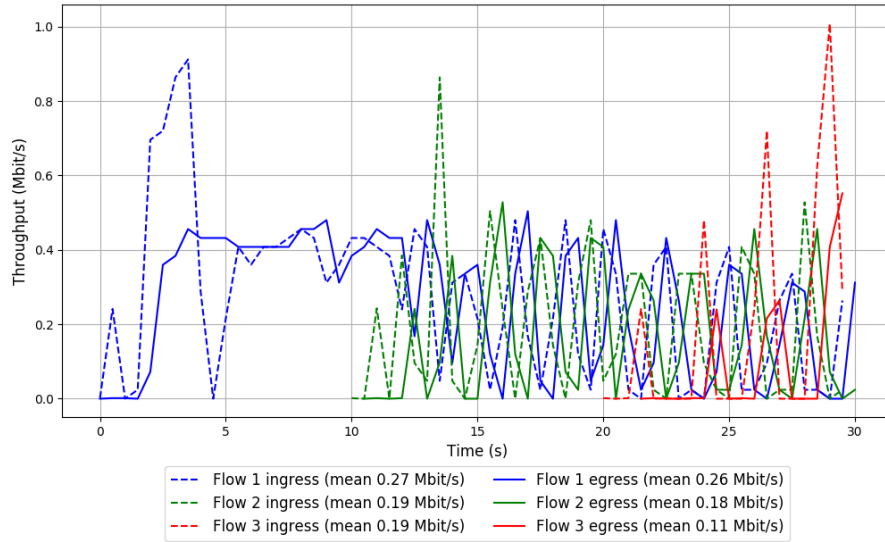
-- Flow 3:

Average throughput: 0.11 Mbit/s

95th percentile per-packet one-way delay: 2582.555 ms

Loss rate: 53.25%

Run 1: Report of TCP Vegas — Data Link



Run 2: Statistics of TCP Vegas

Start at: 2018-08-22 17:56:18

End at: 2018-08-22 17:56:48

Local clock offset: -4.277 ms

Remote clock offset: 8.18 ms

Below is generated by plot.py at 2018-08-22 18:34:42

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.39 Mbit/s

95th percentile per-packet one-way delay: 2305.883 ms

Loss rate: 7.62%

-- Flow 1:

Average throughput: 0.23 Mbit/s

95th percentile per-packet one-way delay: 1993.534 ms

Loss rate: 2.94%

-- Flow 2:

Average throughput: 0.20 Mbit/s

95th percentile per-packet one-way delay: 2345.896 ms

Loss rate: 8.98%

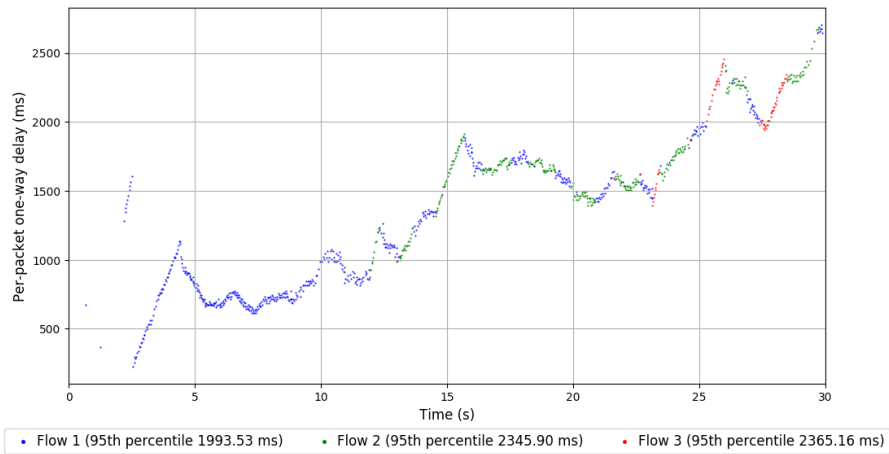
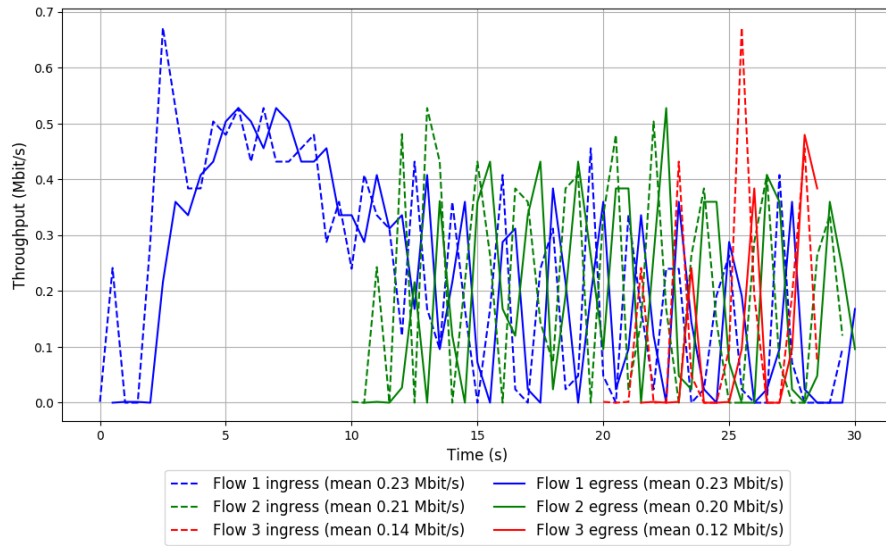
-- Flow 3:

Average throughput: 0.12 Mbit/s

95th percentile per-packet one-way delay: 2365.162 ms

Loss rate: 29.93%

Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2018-08-22 18:17:29

End at: 2018-08-22 18:17:59

Local clock offset: -4.262 ms

Remote clock offset: 3.008 ms

Below is generated by plot.py at 2018-08-22 18:34:42

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.47 Mbit/s

95th percentile per-packet one-way delay: 2102.823 ms

Loss rate: 10.51%

-- Flow 1:

Average throughput: 0.31 Mbit/s

95th percentile per-packet one-way delay: 2092.331 ms

Loss rate: 3.67%

-- Flow 2:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 2072.336 ms

Loss rate: 7.60%

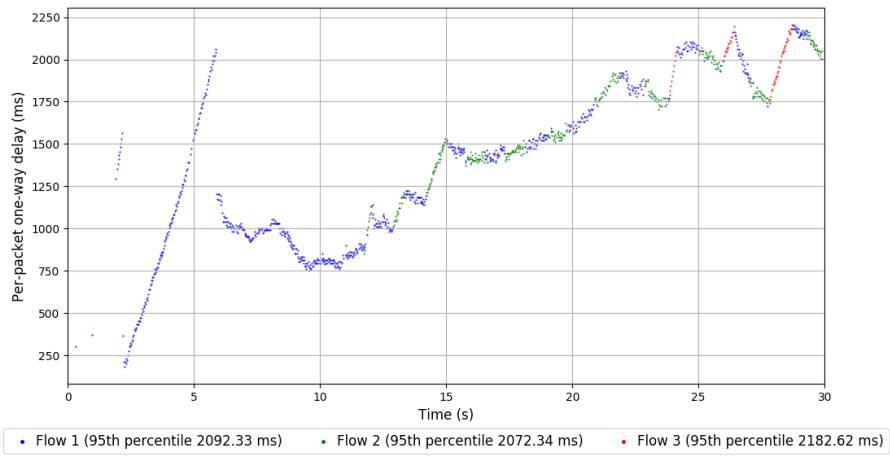
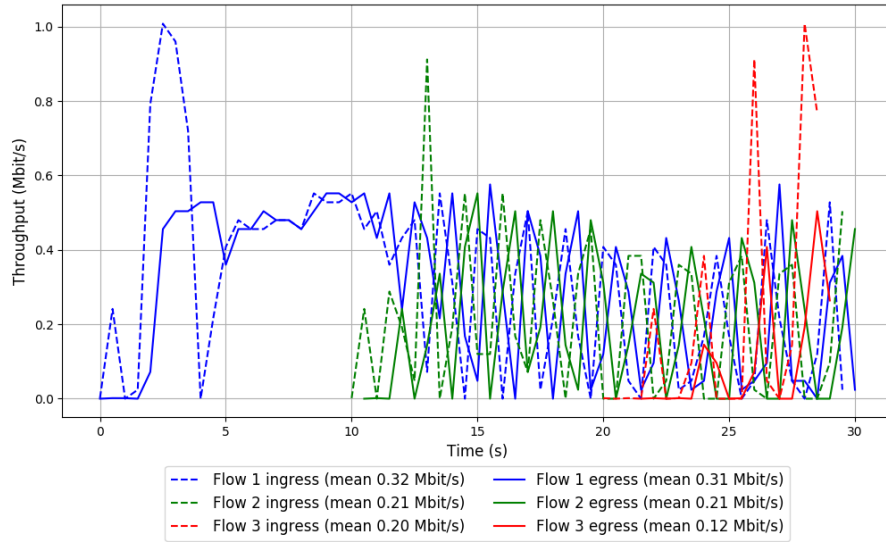
-- Flow 3:

Average throughput: 0.12 Mbit/s

95th percentile per-packet one-way delay: 2182.622 ms

Loss rate: 53.25%

Run 3: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2018-08-22 17:47:46

End at: 2018-08-22 17:48:16

Local clock offset: -5.512 ms

Remote clock offset: 9.673 ms

Below is generated by plot.py at 2018-08-22 18:34:42

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.41 Mbit/s

95th percentile per-packet one-way delay: 2468.183 ms

Loss rate: 5.60%

-- Flow 1:

Average throughput: 0.40 Mbit/s

95th percentile per-packet one-way delay: 2459.327 ms

Loss rate: 5.49%

-- Flow 2:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 2493.416 ms

Loss rate: 4.76%

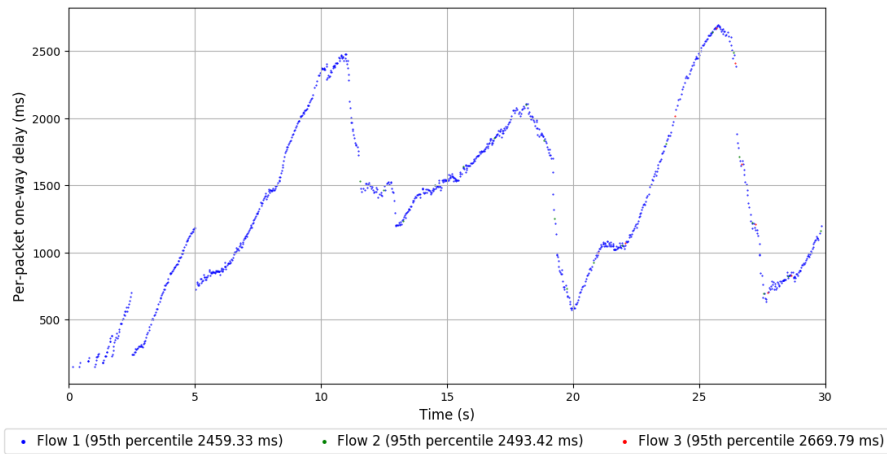
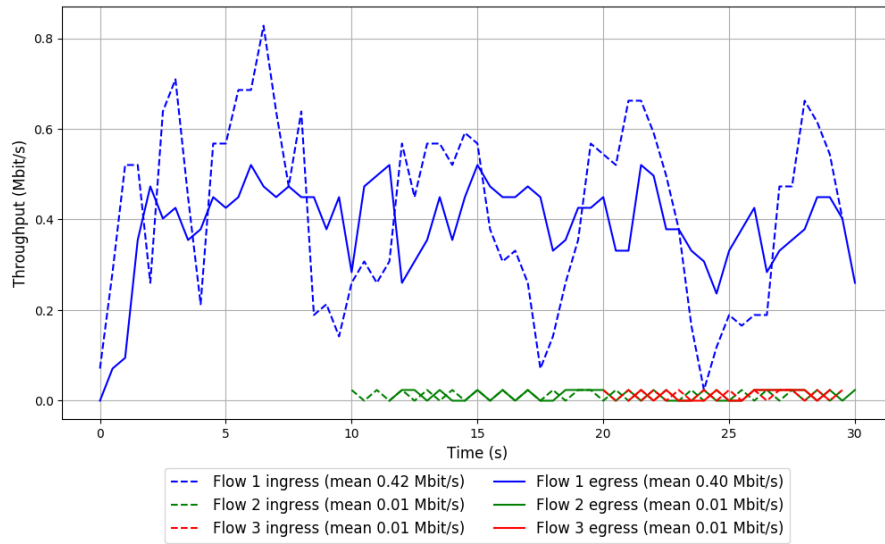
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 2669.793 ms

Loss rate: 18.18%

Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2018-08-22 18:08:37

End at: 2018-08-22 18:09:07

Local clock offset: -5.182 ms

Remote clock offset: 3.083 ms

Below is generated by plot.py at 2018-08-22 18:34:42

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.38 Mbit/s

95th percentile per-packet one-way delay: 2053.637 ms

Loss rate: 4.68%

-- Flow 1:

Average throughput: 0.37 Mbit/s

95th percentile per-packet one-way delay: 2053.637 ms

Loss rate: 4.53%

-- Flow 2:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 1825.551 ms

Loss rate: 4.76%

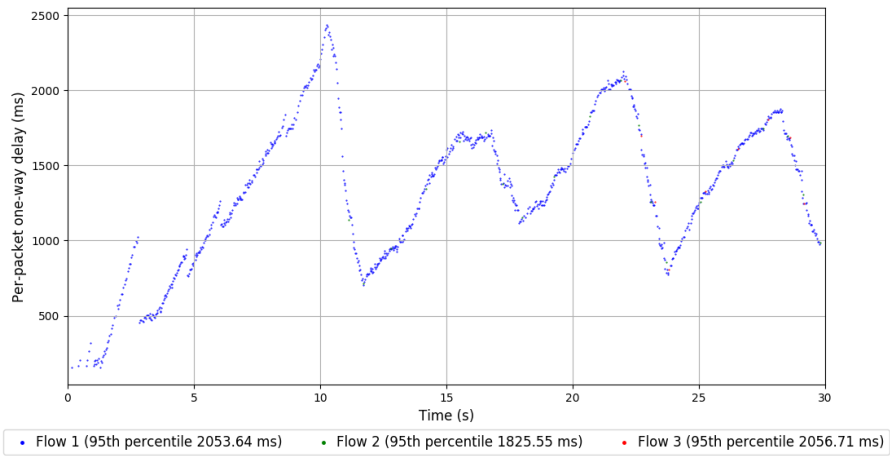
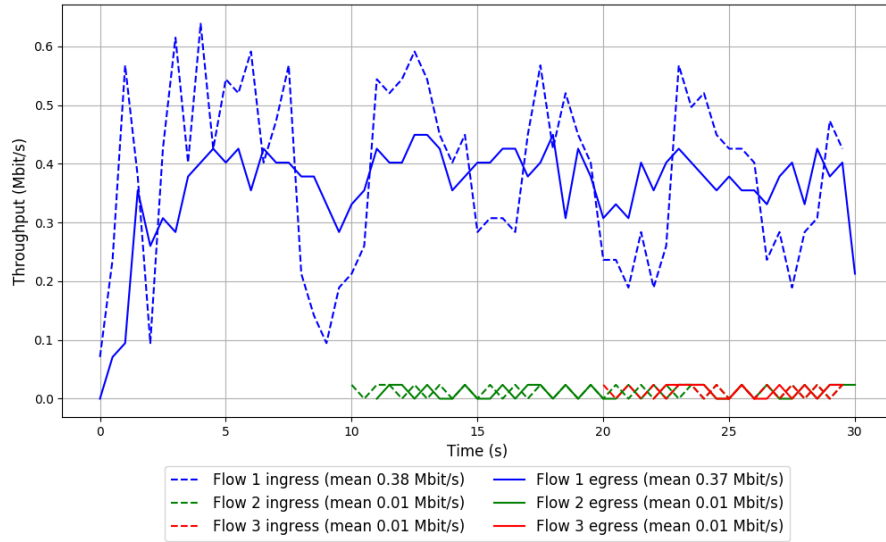
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 2056.711 ms

Loss rate: 18.18%

Run 2: Report of Verus — Data Link



Run 3: Statistics of Verus

Start at: 2018-08-22 18:30:00

End at: 2018-08-22 18:30:30

Local clock offset: -5.022 ms

Remote clock offset: 3.312 ms

Below is generated by plot.py at 2018-08-22 18:34:43

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.35 Mbit/s

95th percentile per-packet one-way delay: 3152.698 ms

Loss rate: 3.34%

-- Flow 1:

Average throughput: 0.33 Mbit/s

95th percentile per-packet one-way delay: 3183.156 ms

Loss rate: 3.23%

-- Flow 2:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 2399.949 ms

Loss rate: 4.35%

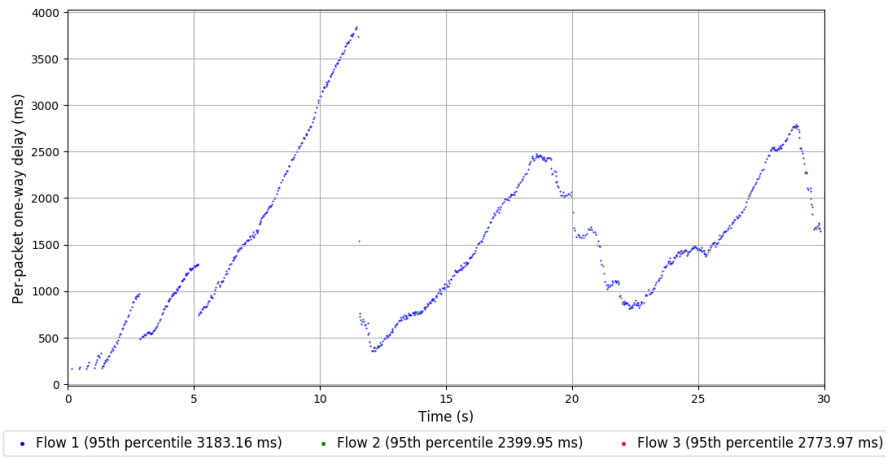
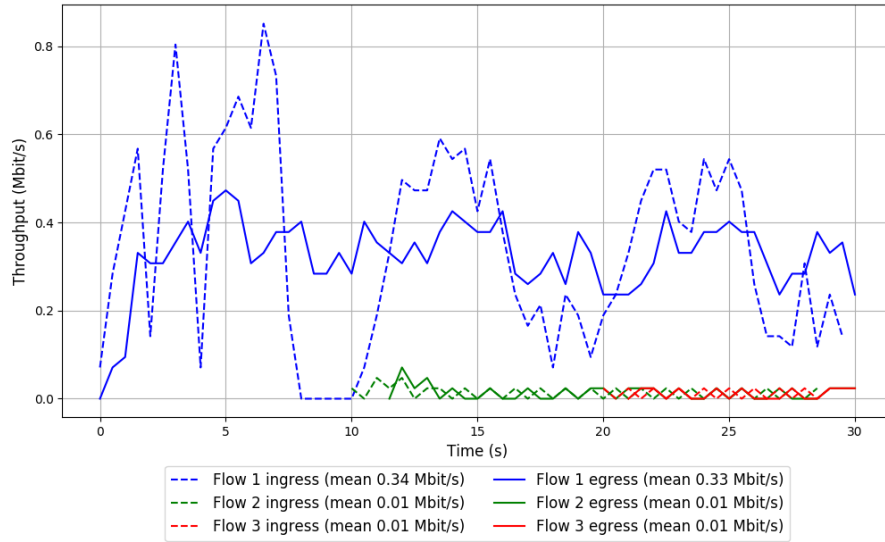
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 2773.972 ms

Loss rate: 10.00%

Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

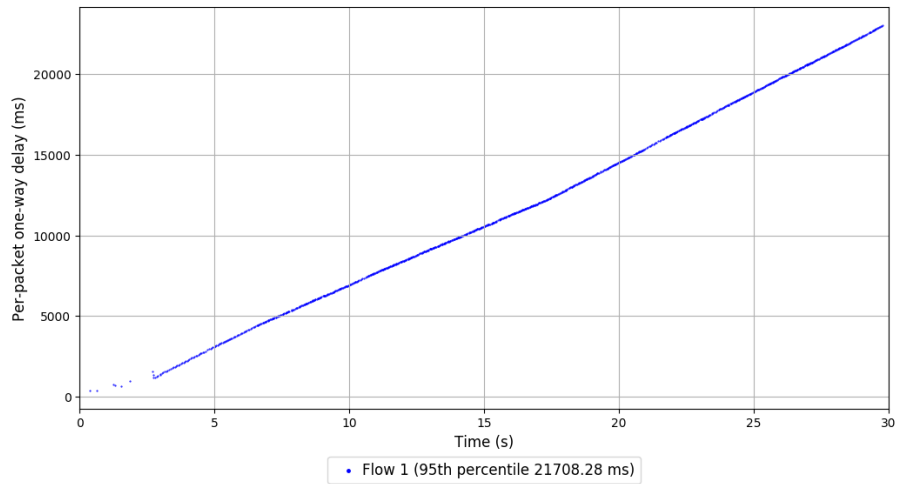
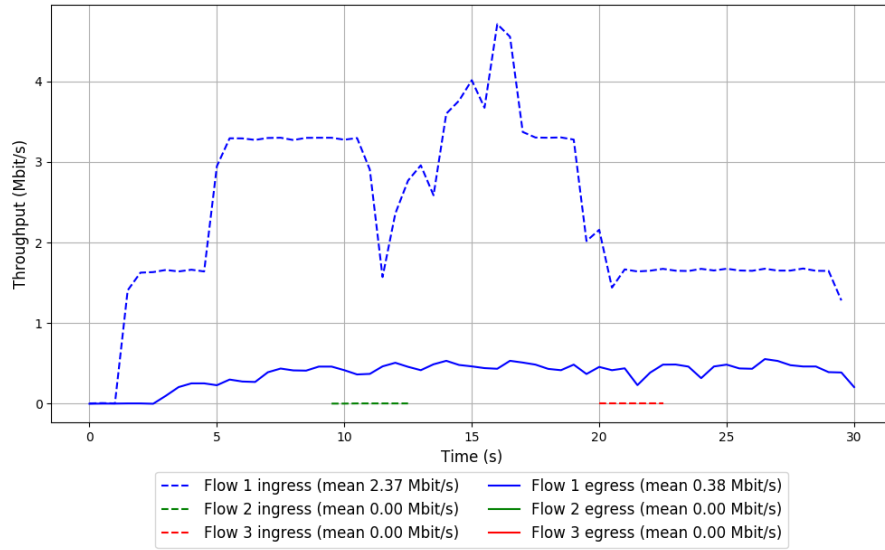
Start at: 2018-08-22 17:41:20

End at: 2018-08-22 17:41:50

Local clock offset: -4.37 ms

Remote clock offset: 9.526 ms

Run 1: Report of PCC-Vivace — Data Link



Run 2: Statistics of PCC-Vivace

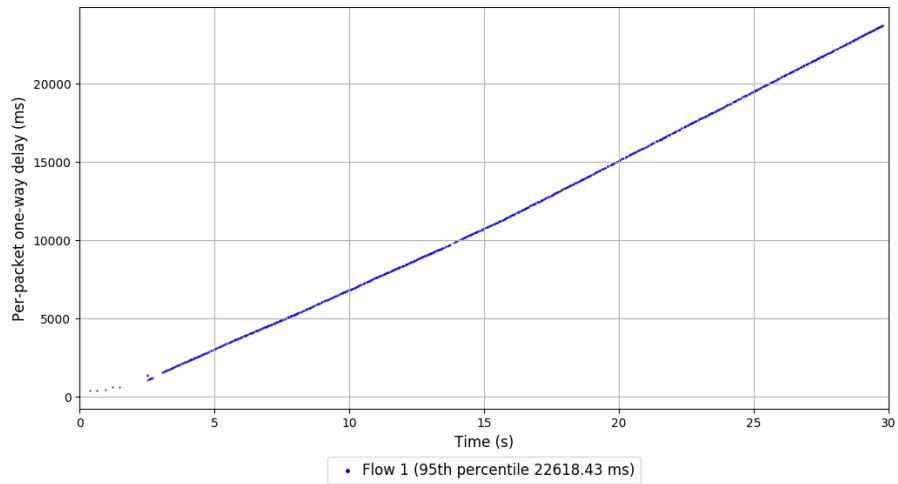
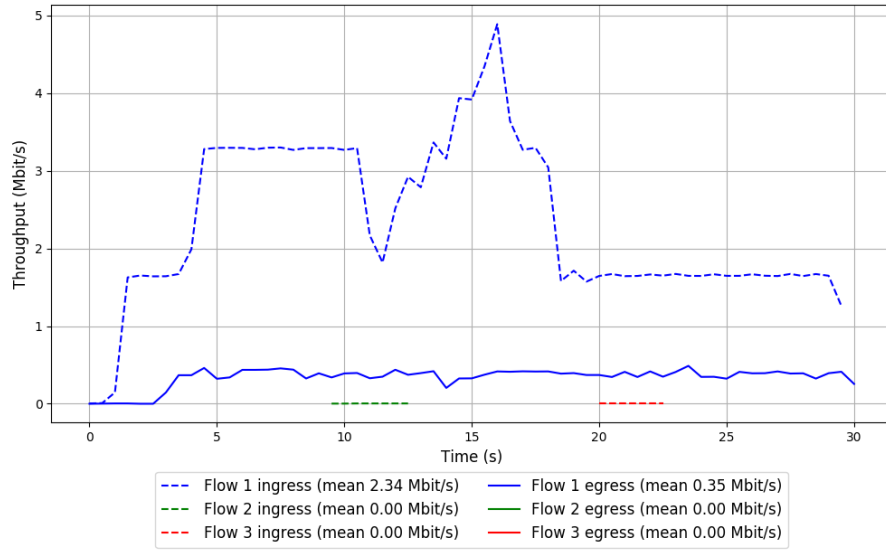
Start at: 2018-08-22 18:02:19

End at: 2018-08-22 18:02:49

Local clock offset: -5.924 ms

Remote clock offset: 3.113 ms

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

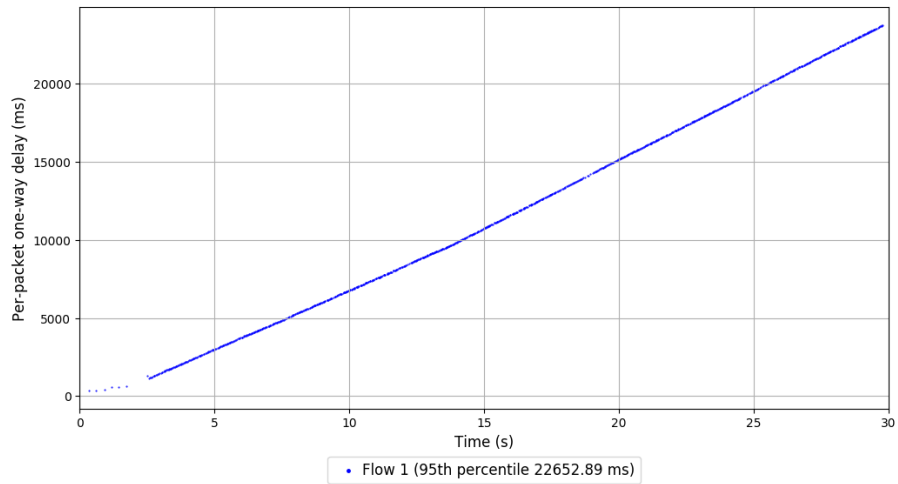
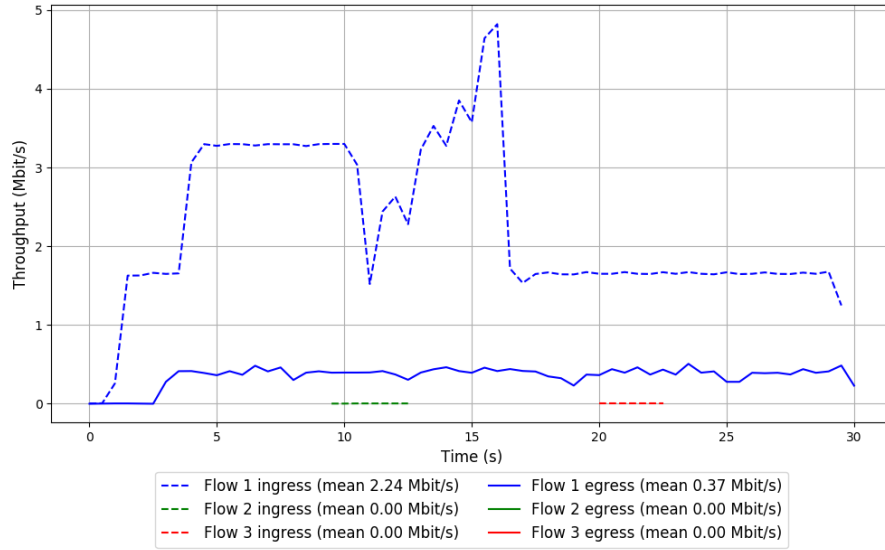
Start at: 2018-08-22 18:23:28

End at: 2018-08-22 18:23:58

Local clock offset: -4.228 ms

Remote clock offset: 8.929 ms

Run 3: Report of PCC-Vivace — Data Link

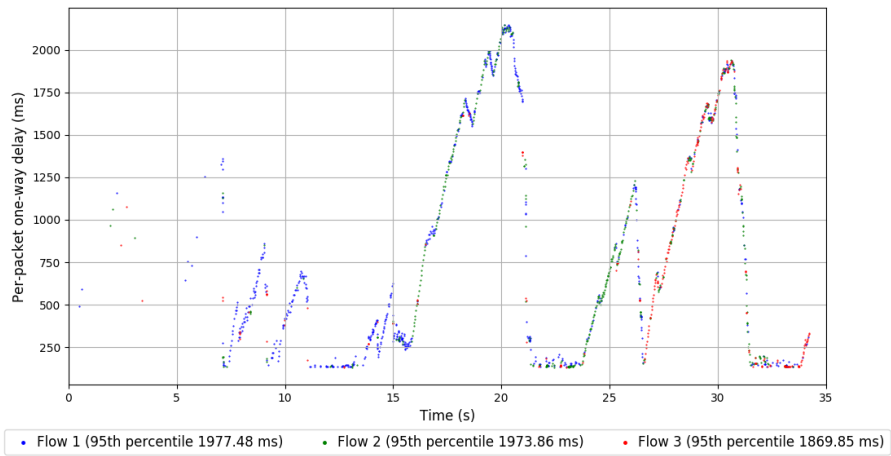
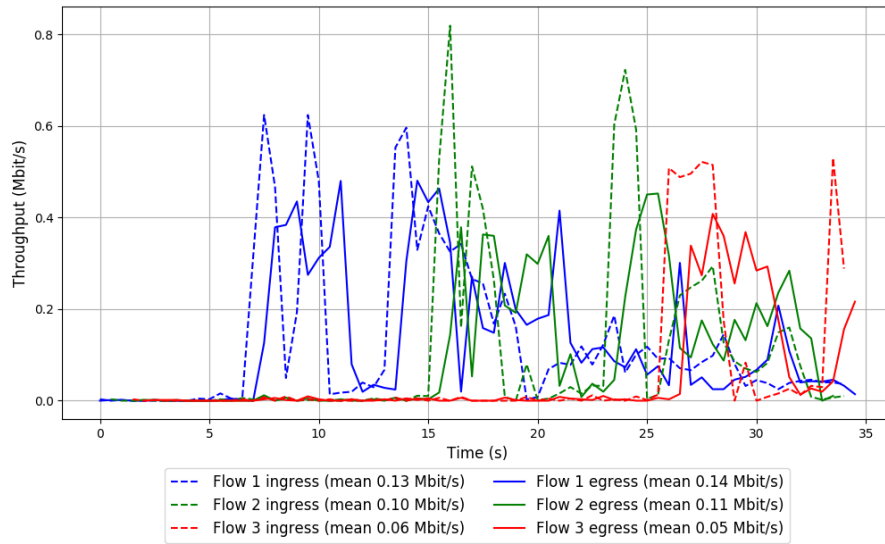


Run 1: Statistics of WebRTC media

Start at: 2018-08-22 17:36:31
End at: 2018-08-22 17:37:01
Local clock offset: -4.743 ms
Remote clock offset: 4.611 ms

```
# Below is generated by plot.py at 2018-08-22 18:34:46
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 1944.022 ms
Loss rate: 2.53%
-- Flow 1:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 1977.478 ms
Loss rate: 0.45%
-- Flow 2:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 1973.864 ms
Loss rate: 0.25%
-- Flow 3:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 1869.854 ms
Loss rate: 11.59%
```

Run 1: Report of WebRTC media — Data Link



Run 2: Statistics of WebRTC media

Start at: 2018-08-22 17:57:31

End at: 2018-08-22 17:58:01

Local clock offset: -5.828 ms

Remote clock offset: 4.37 ms

Below is generated by plot.py at 2018-08-22 18:34:46

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.27 Mbit/s

95th percentile per-packet one-way delay: 3512.543 ms

Loss rate: 0.70%

-- Flow 1:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 3434.148 ms

Loss rate: 0.46%

-- Flow 2:

Average throughput: 0.09 Mbit/s

95th percentile per-packet one-way delay: 3512.543 ms

Loss rate: 1.23%

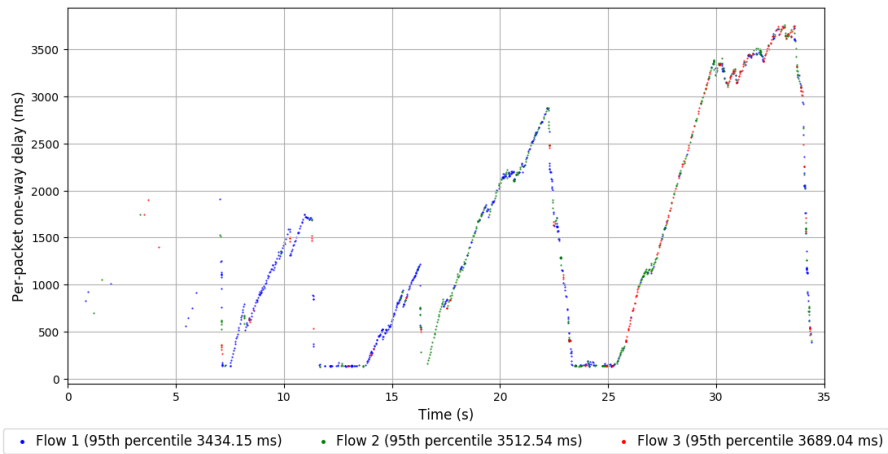
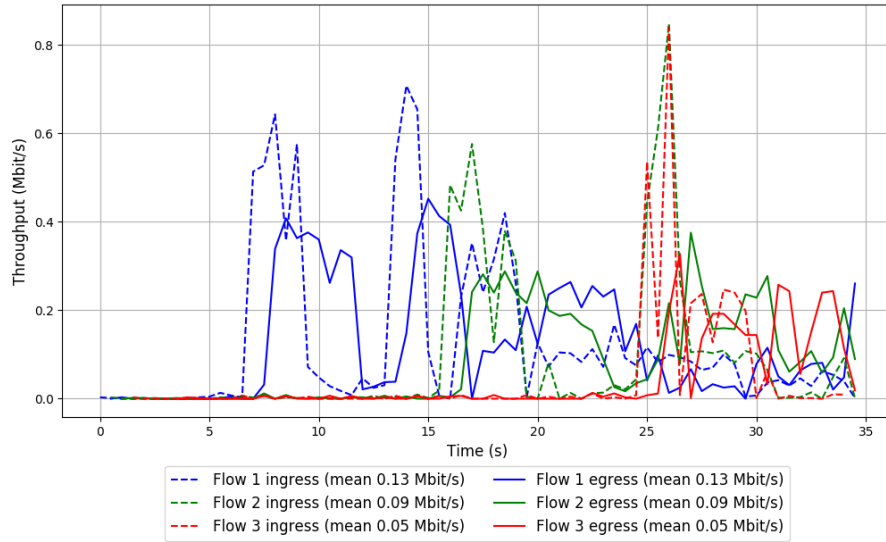
-- Flow 3:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 3689.039 ms

Loss rate: 0.31%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2018-08-22 18:18:41

End at: 2018-08-22 18:19:11

Local clock offset: -5.019 ms

Remote clock offset: 4.022 ms

Below is generated by plot.py at 2018-08-22 18:34:46

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 2210.867 ms

Loss rate: 6.48%

-- Flow 1:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 2237.189 ms

Loss rate: 1.30%

-- Flow 2:

Average throughput: 0.12 Mbit/s

95th percentile per-packet one-way delay: 2203.019 ms

Loss rate: 3.37%

-- Flow 3:

Average throughput: 0.06 Mbit/s

95th percentile per-packet one-way delay: 1671.468 ms

Loss rate: 21.67%

Run 3: Report of WebRTC media — Data Link

