

Pantheon Report

Generated at 2018-01-10 16:37:09 (UTC).

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

Repeated the test of 14 congestion control schemes 3 times.

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

Increased UDP receive buffer to 16 MB (default) and 32 MB (max).

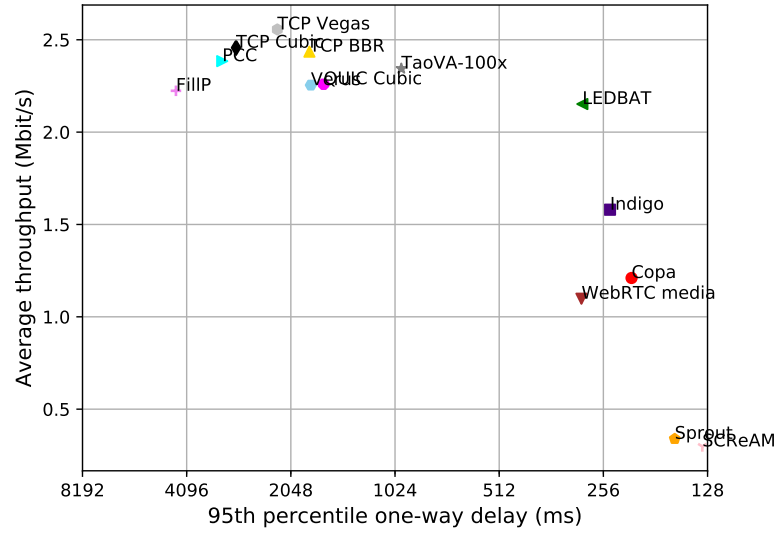
Tested BBR with qdisc of Fair Queuing (*fq*), and other schemes with the default Linux qdisc (*pfifo_fast*).

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

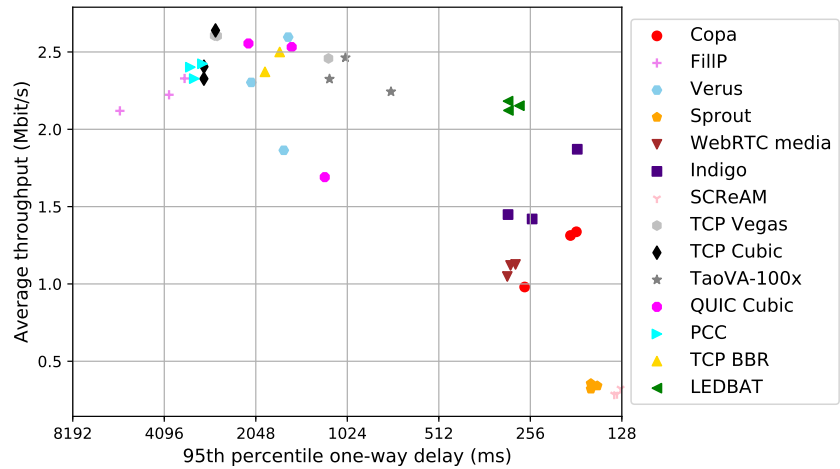
Git summary:

```
branch: master @ 56d1792c316a5efca3f2d21342905405fedffb48
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/fillp @ ec9585325218d5048c4d4152fa42240af54c6e67
third_party/genericCC @ 80b516c448f795fd6e9675f7177b69c622f07da8
third_party/indigo @ b19f3730105f9aa95452552af924e3719b03cc55
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
  M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ fb1053193c2861da659ba9013db26744ccfcf993
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/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ f1a14bffe749737437f61b1eaaeb30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
  M src/examples/cellsim.cc
  M src/examples/sproutbt2.cc
  M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
  M src/verus.hpp
  M tools/plot.py
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

test from AWS Brazil 2 Ethernet to Colombia ppp0, 3 runs of 30s each per scheme
3 flows with 10s interval between flows (mean of all runs by scheme)



test from AWS Brazil 2 Ethernet to Colombia ppp0, 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	2	1.65	0.85	0.86	1514.63	1813.23	1933.50	1.90	5.77	23.19
TCP Cubic	3	2.37	0.12	0.10	2948.64	2985.89	2857.29	12.71	27.73	34.59
LEDBAT	3	1.59	0.58	0.43	288.80	293.04	311.88	0.49	0.68	2.41
PCC	3	1.50	1.41	0.00	3187.98	3268.79	3129.08	52.50	88.71	4.60
QUIC Cubic	3	1.42	1.19	0.26	1275.22	1663.99	1678.46	3.26	9.18	23.63
SCReAM	3	0.08	0.21	0.19	130.12	133.33	132.70	0.13	0.06	0.33
WebRTC media	3	0.61	0.36	0.14	249.25	331.08	357.93	0.12	0.39	2.06
Sprout	3	0.16	0.16	0.21	164.34	152.35	156.43	0.18	0.02	0.05
TaoVA-100x	3	1.28	1.13	0.90	706.01	1039.32	1092.97	0.90	2.03	2.23
TCP Vegas	3	1.98	0.77	0.30	2126.80	2203.05	1833.16	7.02	10.60	38.24
Verus	3	2.24	0.01	0.01	1792.31	1813.81	1738.93	5.11	6.20	12.22
Copa	3	0.05	1.38	0.80	2974.38	204.74	236.02	0.00	0.21	0.81
FillP	3	1.87	0.64	0.13	4425.77	3320.47	3189.08	94.61	99.44	99.89
Indigo	3	0.78	0.83	0.71	245.94	257.98	209.48	0.05	0.12	0.94

Run 1: Statistics of TCP BBR

Start at: 2018-01-10 15:44:26

End at: 2018-01-10 15:44:56

Local clock offset: 1.394 ms

Remote clock offset: 0.166 ms

Below is generated by plot.py at 2018-01-10 16:36:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.37 Mbit/s

95th percentile per-packet one-way delay: 1910.592 ms

Loss rate: 5.71%

-- Flow 1:

Average throughput: 1.50 Mbit/s

95th percentile per-packet one-way delay: 1339.155 ms

Loss rate: 0.88%

-- Flow 2:

Average throughput: 0.99 Mbit/s

95th percentile per-packet one-way delay: 1957.388 ms

Loss rate: 5.99%

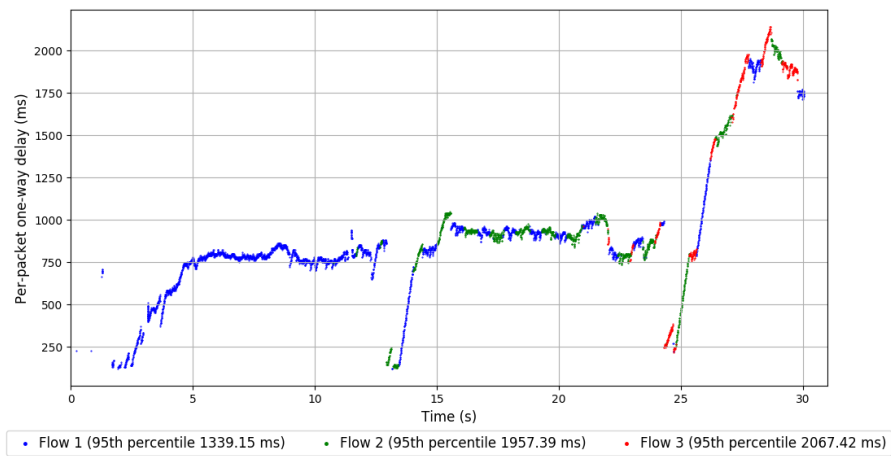
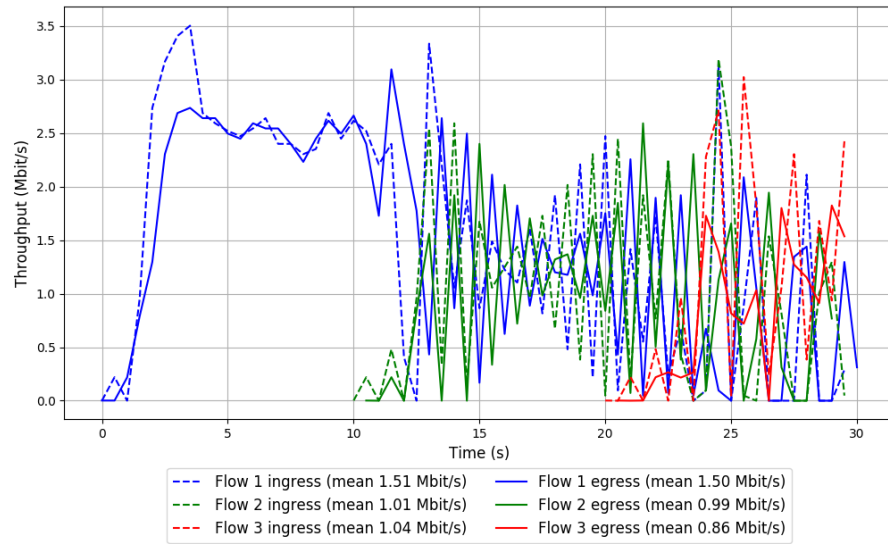
-- Flow 3:

Average throughput: 0.86 Mbit/s

95th percentile per-packet one-way delay: 2067.420 ms

Loss rate: 26.36%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2018-01-10 15:59:50

End at: 2018-01-10 16:00:20

Local clock offset: 2.338 ms

Run 2: Report of TCP BBR — Data Link

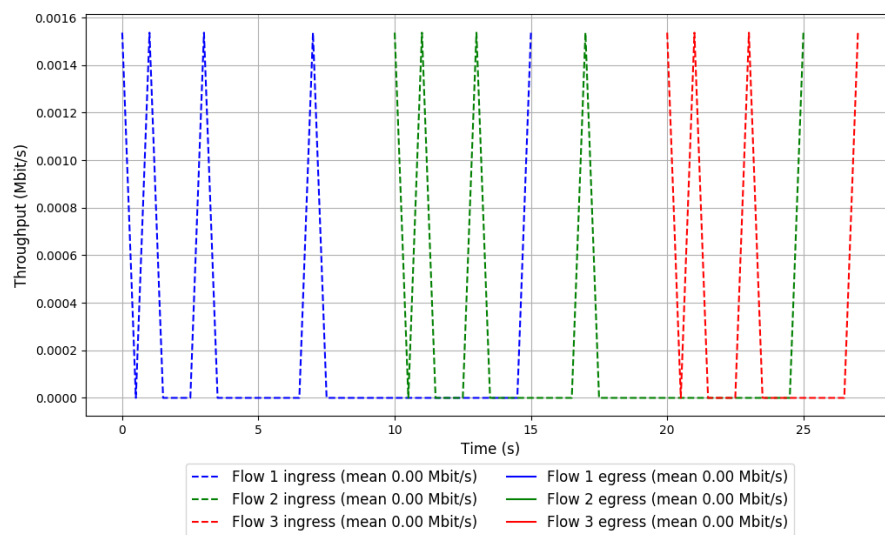


Figure is missing

Run 3: Statistics of TCP BBR

Start at: 2018-01-10 16:18:20

End at: 2018-01-10 16:18:50

Local clock offset: 2.906 ms

Remote clock offset: -3.13 ms

Below is generated by plot.py at 2018-01-10 16:36:18

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.50 Mbit/s

95th percentile per-packet one-way delay: 1709.108 ms

Loss rate: 5.39%

-- Flow 1:

Average throughput: 1.80 Mbit/s

95th percentile per-packet one-way delay: 1690.113 ms

Loss rate: 2.92%

-- Flow 2:

Average throughput: 0.71 Mbit/s

95th percentile per-packet one-way delay: 1669.067 ms

Loss rate: 5.54%

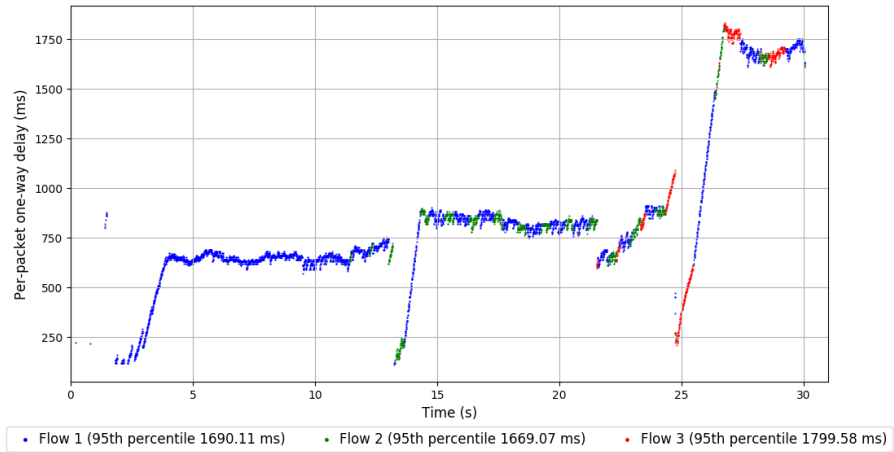
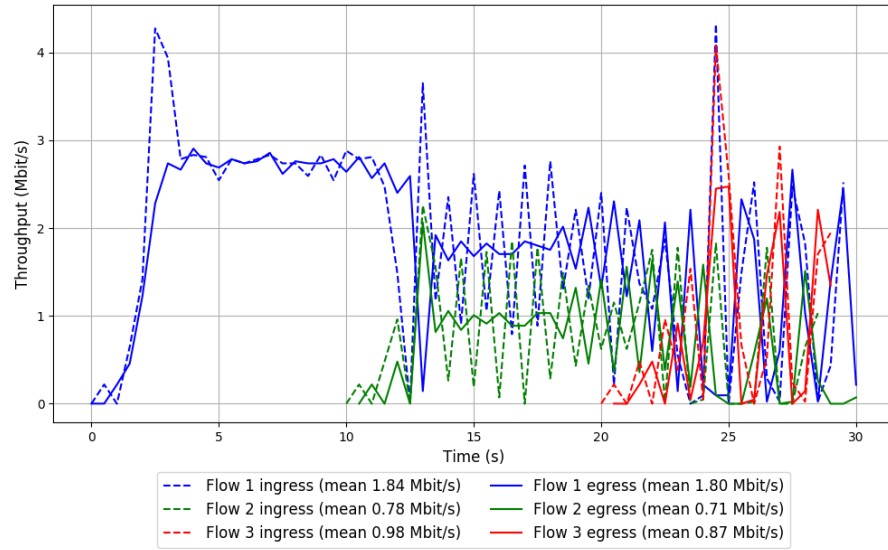
-- Flow 3:

Average throughput: 0.87 Mbit/s

95th percentile per-packet one-way delay: 1799.581 ms

Loss rate: 20.02%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2018-01-10 15:53:44

End at: 2018-01-10 15:54:14

Local clock offset: 1.978 ms

Below is generated by plot.py at 2018-01-10 16:36:19

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.64 Mbit/s

95th percentile per-packet one-way delay: 2778.801 ms

Loss rate: 12.94%

-- Flow 1:

Average throughput: 2.52 Mbit/s

95th percentile per-packet one-way delay: 2779.496 ms

Loss rate: 12.41%

-- Flow 2:

Average throughput: 0.15 Mbit/s

95th percentile per-packet one-way delay: 2771.534 ms

Loss rate: 27.13%

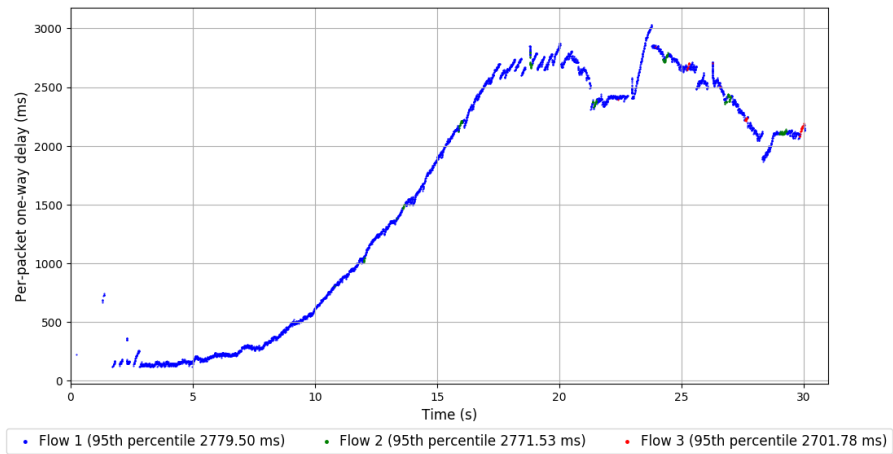
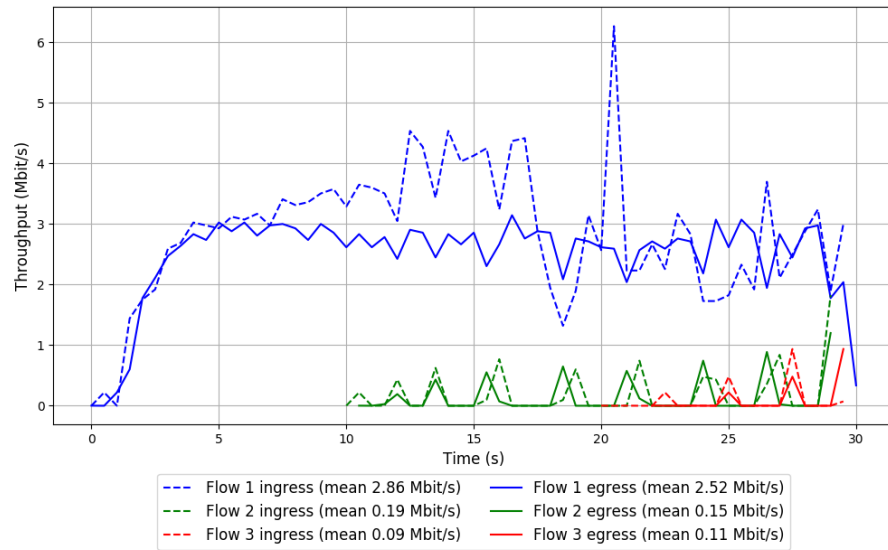
-- Flow 3:

Average throughput: 0.11 Mbit/s

95th percentile per-packet one-way delay: 2701.775 ms

Loss rate: 4.20%

Run 1: Report of TCP Cubic — Data Link

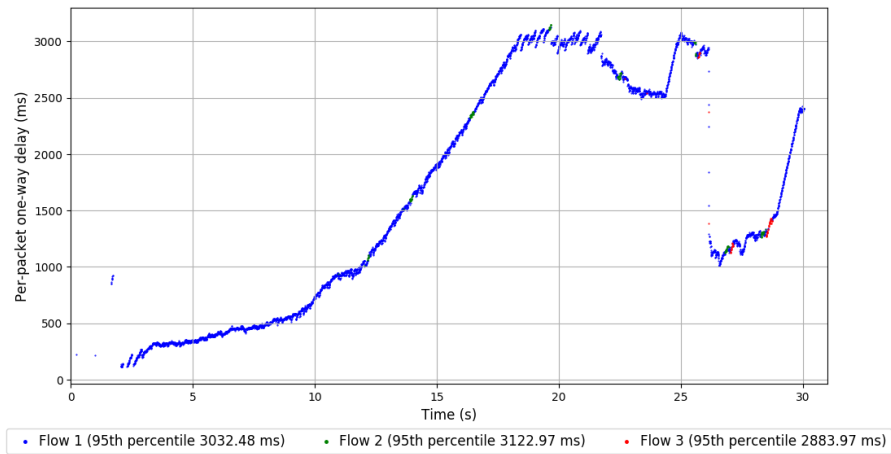
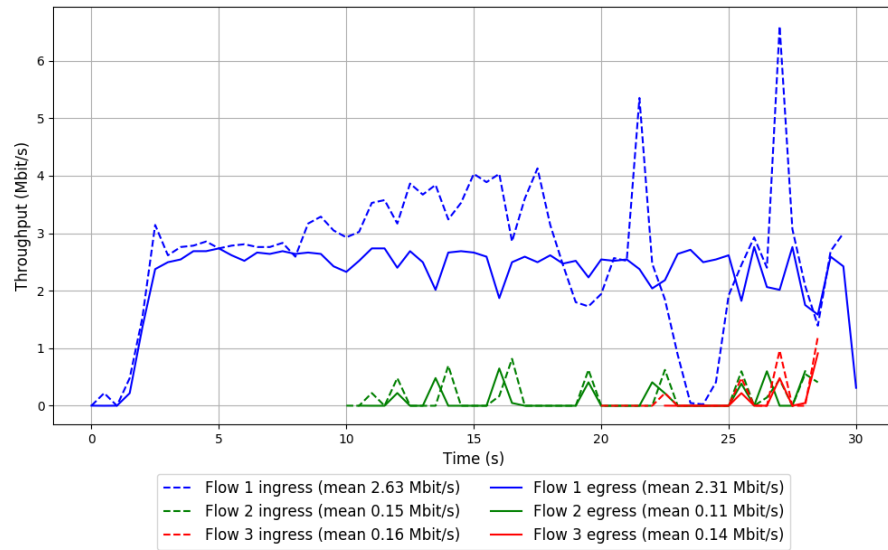


Run 2: Statistics of TCP Cubic

Start at: 2018-01-10 16:10:48
End at: 2018-01-10 16:11:18
Local clock offset: 2.699 ms
Remote clock offset: -4.026 ms

Below is generated by plot.py at 2018-01-10 16:36:19
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 3032.607 ms
Loss rate: 13.84%
-- Flow 1:
Average throughput: 2.31 Mbit/s
95th percentile per-packet one-way delay: 3032.480 ms
Loss rate: 12.71%
-- Flow 2:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 3122.973 ms
Loss rate: 30.66%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 2883.972 ms
Loss rate: 41.88%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2018-01-10 16:29:34

End at: 2018-01-10 16:30:04

Local clock offset: 3.162 ms

Remote clock offset: 1.046 ms

Below is generated by plot.py at 2018-01-10 16:36:19

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.33 Mbit/s

95th percentile per-packet one-way delay: 3034.010 ms

Loss rate: 13.78%

-- Flow 1:

Average throughput: 2.27 Mbit/s

95th percentile per-packet one-way delay: 3033.935 ms

Loss rate: 13.02%

-- Flow 2:

Average throughput: 0.09 Mbit/s

95th percentile per-packet one-way delay: 3063.170 ms

Loss rate: 25.41%

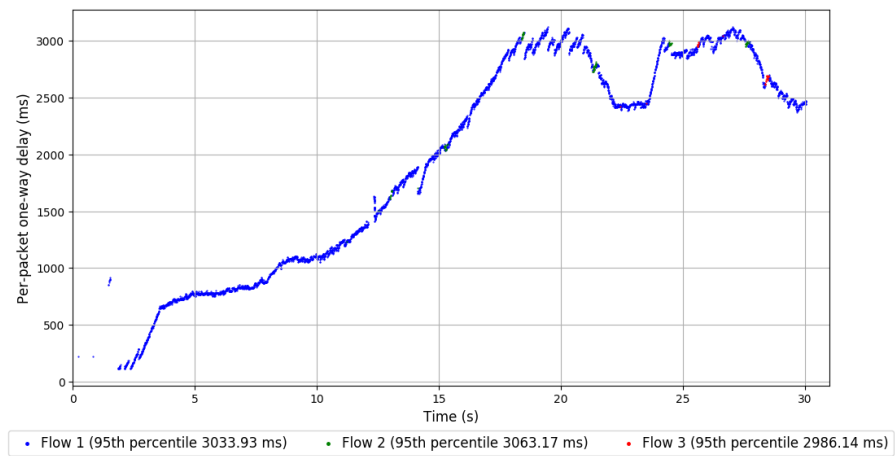
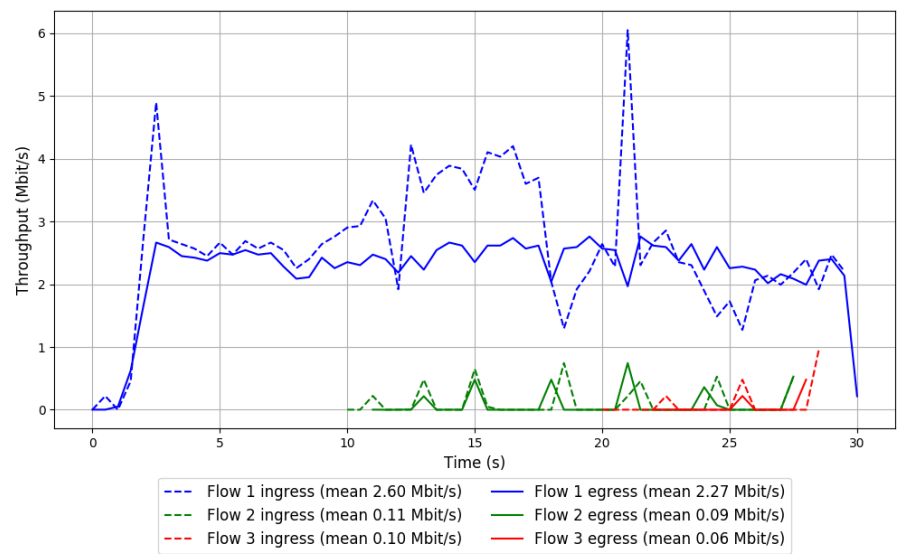
-- Flow 3:

Average throughput: 0.06 Mbit/s

95th percentile per-packet one-way delay: 2986.136 ms

Loss rate: 57.70%

Run 3: Report of TCP Cubic — Data Link

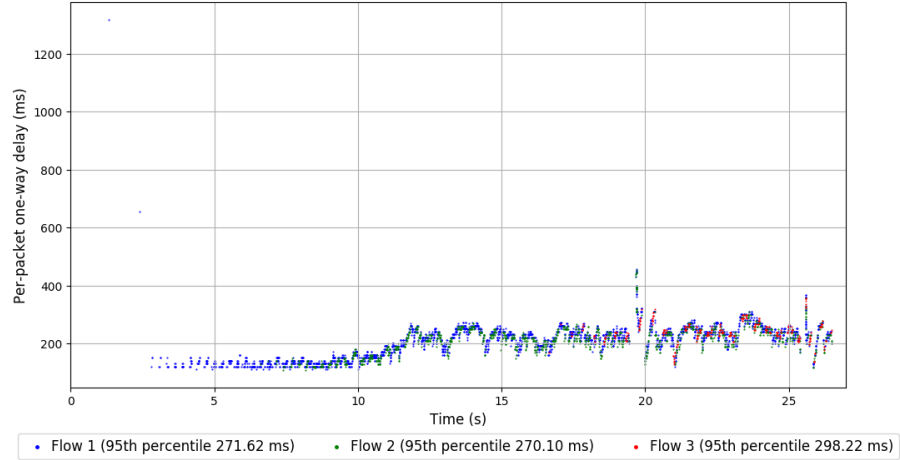
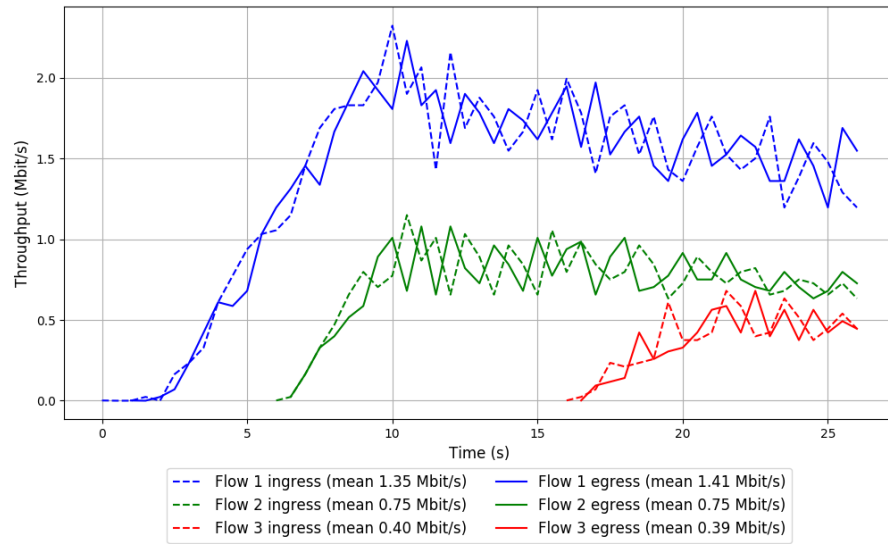


```
Run 1: Statistics of LEDBAT

Start at: 2018-01-10 15:43:11
End at: 2018-01-10 15:43:41
Local clock offset: 1.412 ms
Remote clock offset: -4.6 ms

# Below is generated by plot.py at 2018-01-10 16:36:19
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.15 Mbit/s
95th percentile per-packet one-way delay: 278.136 ms
Loss rate: 0.69%
-- Flow 1:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 271.619 ms
Loss rate: 0.36%
-- Flow 2:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 270.102 ms
Loss rate: 0.78%
-- Flow 3:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 298.220 ms
Loss rate: 3.28%
```


Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2018-01-10 15:58:49

End at: 2018-01-10 15:59:19

Local clock offset: 2.21 ms

Below is generated by plot.py at 2018-01-10 16:36:19

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.18 Mbit/s

95th percentile per-packet one-way delay: 303.007 ms

Loss rate: 0.73%

-- Flow 1:

Average throughput: 1.77 Mbit/s

95th percentile per-packet one-way delay: 302.155 ms

Loss rate: 0.58%

-- Flow 2:

Average throughput: 0.41 Mbit/s

95th percentile per-packet one-way delay: 303.534 ms

Loss rate: 0.86%

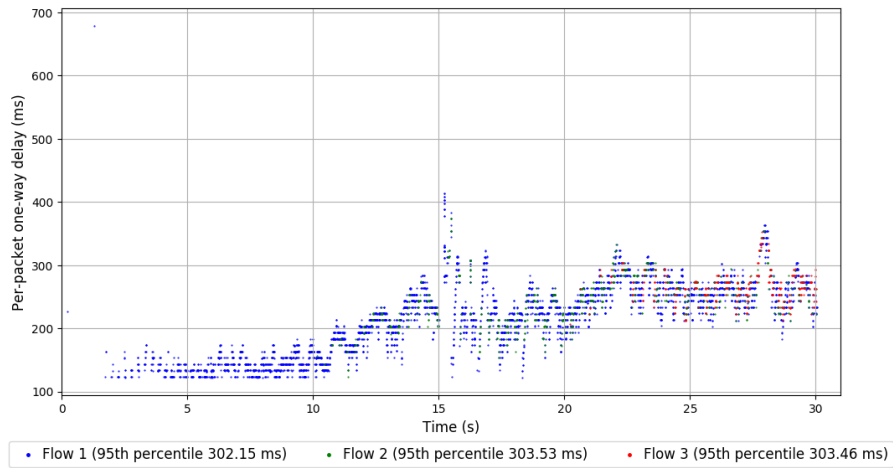
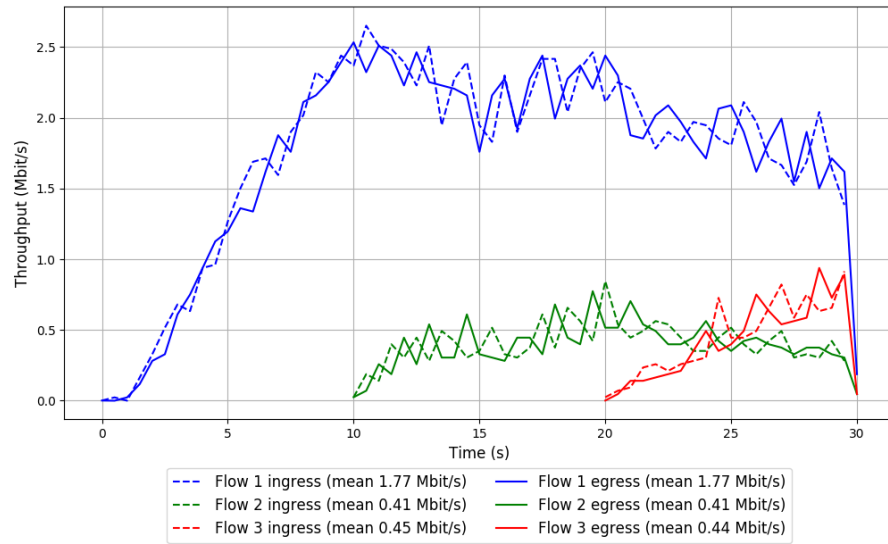
-- Flow 3:

Average throughput: 0.44 Mbit/s

95th percentile per-packet one-way delay: 303.463 ms

Loss rate: 2.38%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2018-01-10 16:17:05

End at: 2018-01-10 16:17:35

Local clock offset: 2.886 ms

Remote clock offset: 1.366 ms

Below is generated by plot.py at 2018-01-10 16:36:19

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.12 Mbit/s

95th percentile per-packet one-way delay: 302.299 ms

Loss rate: 0.57%

-- Flow 1:

Average throughput: 1.59 Mbit/s

95th percentile per-packet one-way delay: 292.627 ms

Loss rate: 0.52%

-- Flow 2:

Average throughput: 0.58 Mbit/s

95th percentile per-packet one-way delay: 305.485 ms

Loss rate: 0.40%

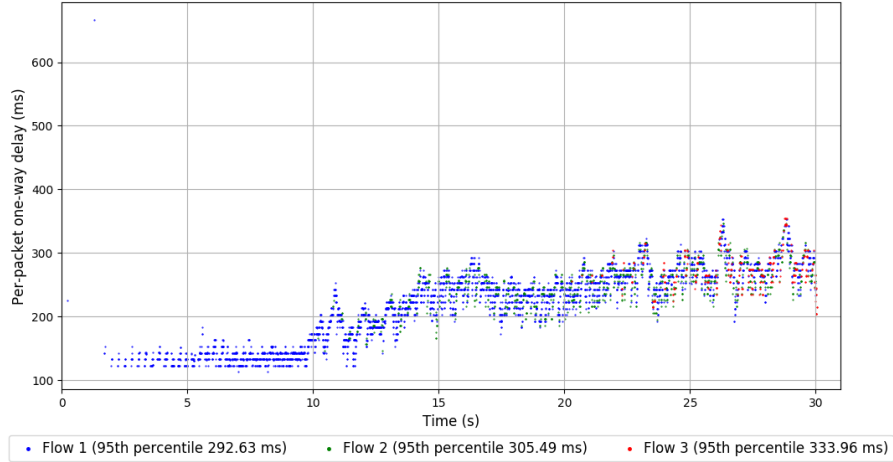
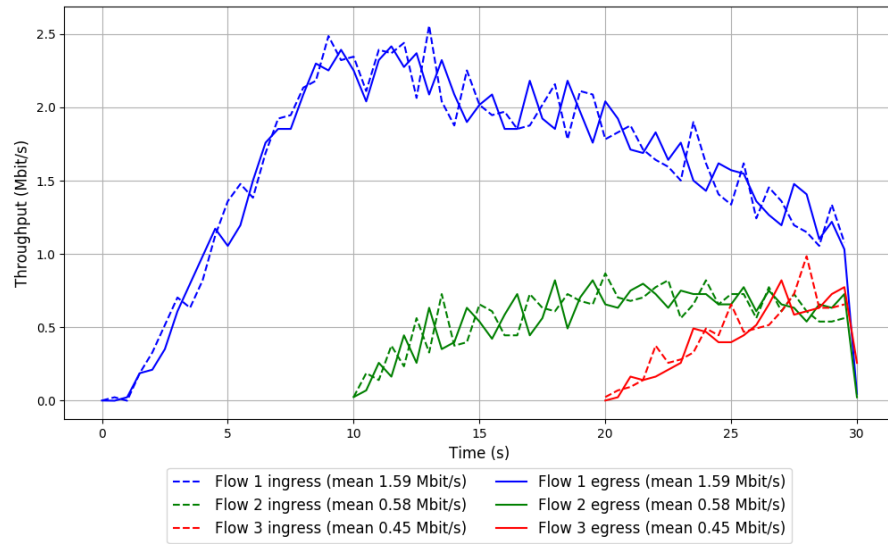
-- Flow 3:

Average throughput: 0.45 Mbit/s

95th percentile per-packet one-way delay: 333.962 ms

Loss rate: 1.58%

Run 3: Report of LEDBAT — Data Link

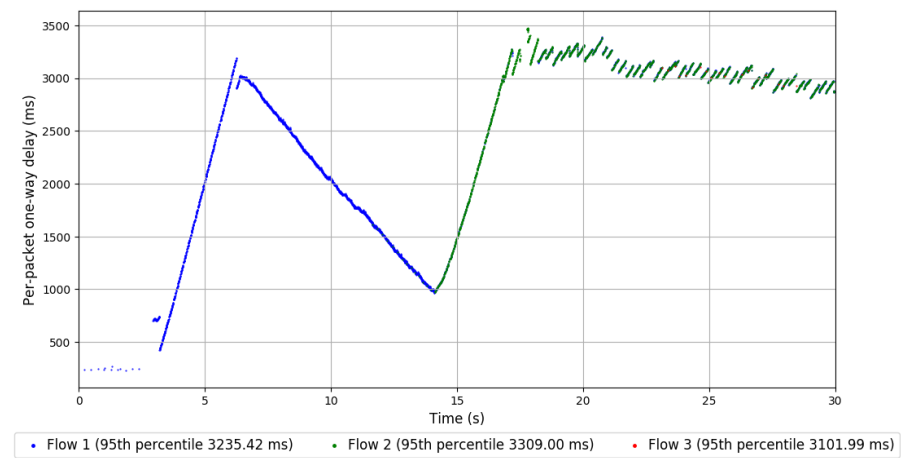
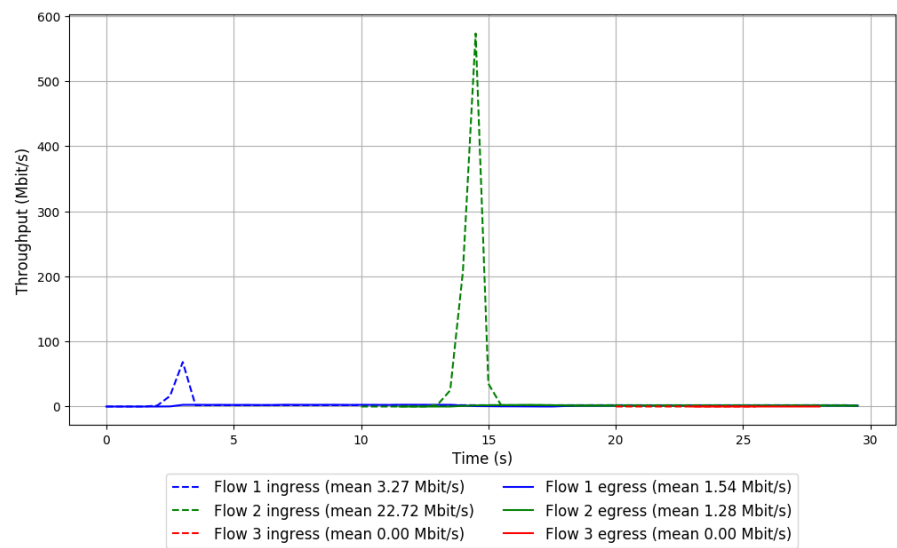


```
Run 1: Statistics of PCC

Start at: 2018-01-10 15:51:42
End at: 2018-01-10 15:52:12
Local clock offset: 1.882 ms

# Below is generated by plot.py at 2018-01-10 16:36:31
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 3264.852 ms
Loss rate: 87.40%
-- Flow 1:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 3235.423 ms
Loss rate: 53.31%
-- Flow 2:
Average throughput: 1.28 Mbit/s
95th percentile per-packet one-way delay: 3309.004 ms
Loss rate: 94.79%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 3101.987 ms
Loss rate: 9.20%
```

Run 1: Report of PCC — Data Link

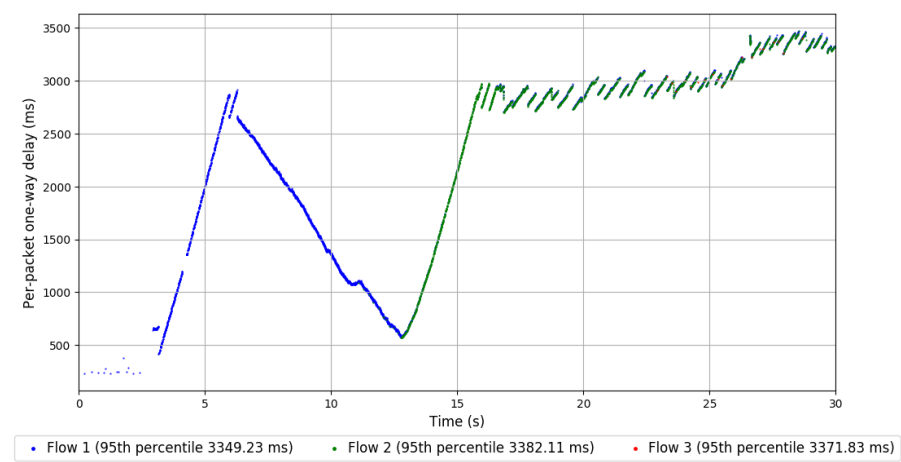
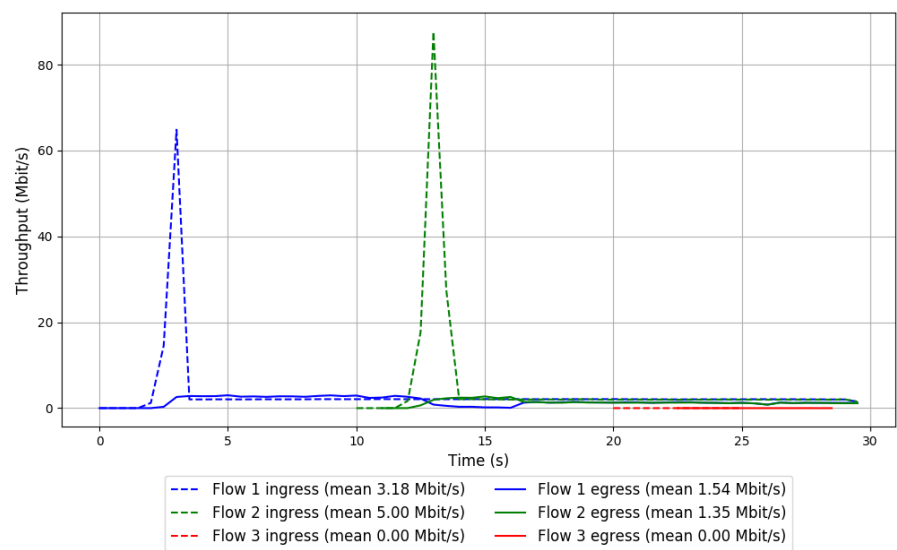


Run 2: Statistics of PCC

Start at: 2018-01-10 16:08:18
End at: 2018-01-10 16:08:48
Local clock offset: 2.704 ms
Remote clock offset: -4.077 ms

Below is generated by plot.py at 2018-01-10 16:36:31
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 3362.289 ms
Loss rate: 63.26%
-- Flow 1:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 3349.234 ms
Loss rate: 51.73%
-- Flow 2:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 3382.111 ms
Loss rate: 74.32%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 3371.828 ms
Loss rate: 0.00%

Run 2: Report of PCC — Data Link



Run 3: Statistics of PCC

Start at: 2018-01-10 16:27:04

End at: 2018-01-10 16:27:34

Local clock offset: 3.097 ms

Remote clock offset: 1.31 ms

Below is generated by plot.py at 2018-01-10 16:36:31

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.42 Mbit/s

95th percentile per-packet one-way delay: 3068.921 ms

Loss rate: 93.36%

-- Flow 1:

Average throughput: 1.43 Mbit/s

95th percentile per-packet one-way delay: 2979.286 ms

Loss rate: 52.47%

-- Flow 2:

Average throughput: 1.60 Mbit/s

95th percentile per-packet one-way delay: 3115.247 ms

Loss rate: 97.03%

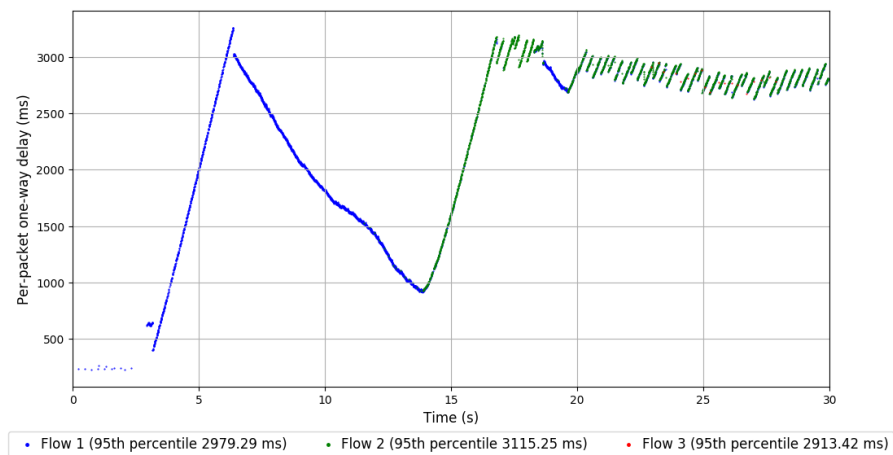
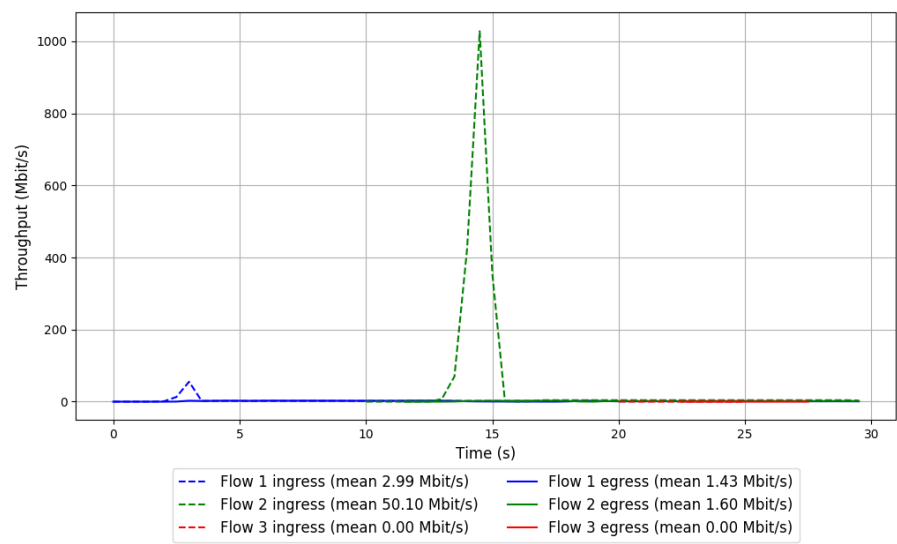
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 2913.419 ms

Loss rate: 4.60%

Run 3: Report of PCC — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2018-01-10 15:55:48

End at: 2018-01-10 15:56:18

Local clock offset: 2.059 ms

Below is generated by plot.py at 2018-01-10 16:36:31

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.53 Mbit/s

95th percentile per-packet one-way delay: 1560.409 ms

Loss rate: 5.44%

-- Flow 1:

Average throughput: 2.00 Mbit/s

95th percentile per-packet one-way delay: 1552.178 ms

Loss rate: 4.09%

-- Flow 2:

Average throughput: 0.67 Mbit/s

95th percentile per-packet one-way delay: 1566.358 ms

Loss rate: 8.09%

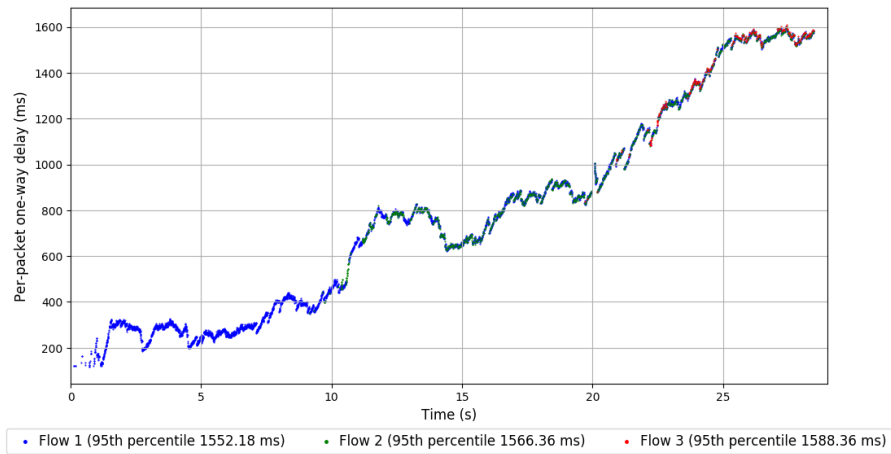
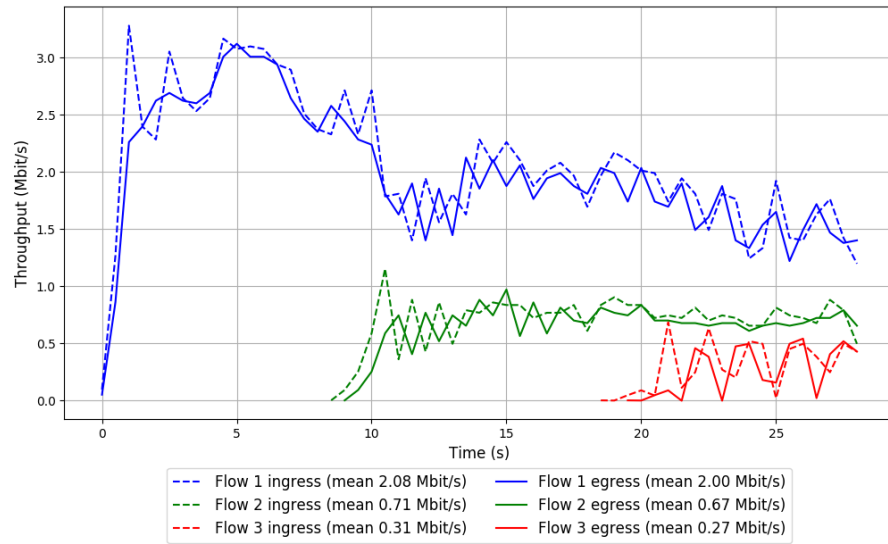
-- Flow 3:

Average throughput: 0.27 Mbit/s

95th percentile per-packet one-way delay: 1588.363 ms

Loss rate: 19.95%

Run 1: Report of QUIC Cubic — Data Link

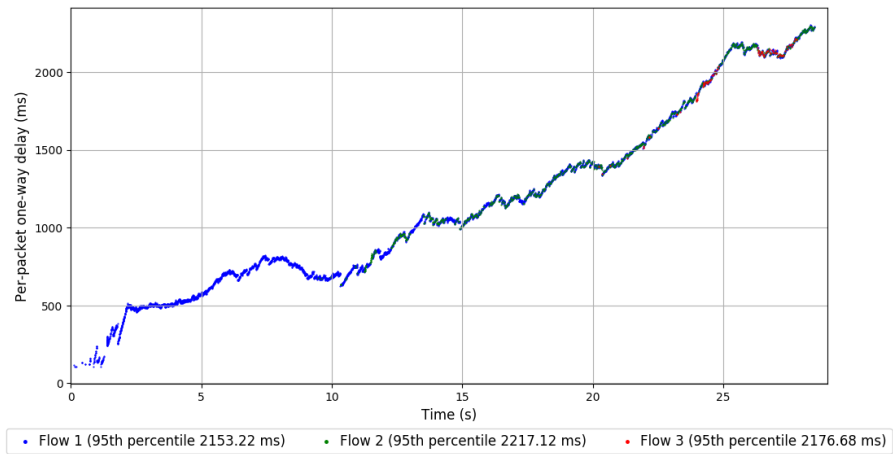
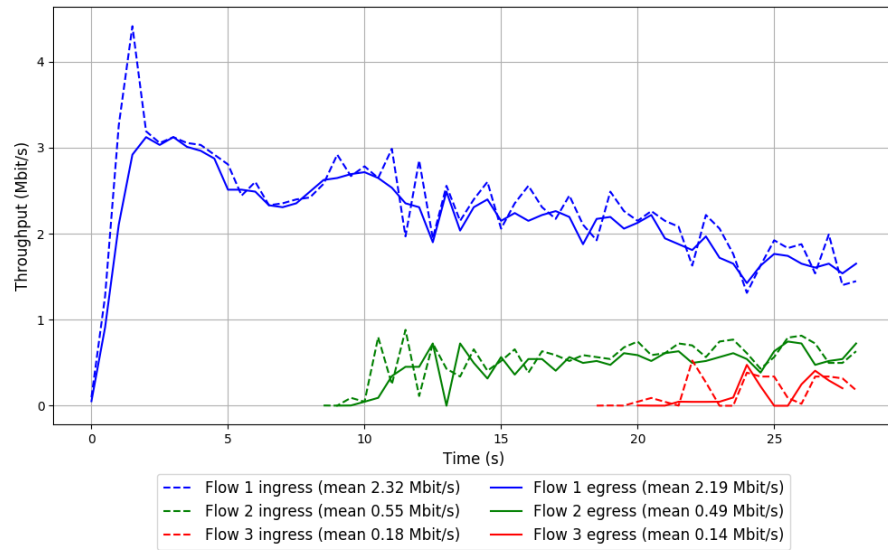


Run 2: Statistics of QUIC Cubic

Start at: 2018-01-10 16:13:21
End at: 2018-01-10 16:13:51
Local clock offset: 2.823 ms
Remote clock offset: -3.171 ms

Below is generated by plot.py at 2018-01-10 16:36:31
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.55 Mbit/s
95th percentile per-packet one-way delay: 2165.058 ms
Loss rate: 7.39%
-- Flow 1:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 2153.220 ms
Loss rate: 5.70%
-- Flow 2:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 2217.116 ms
Loss rate: 13.30%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 2176.684 ms
Loss rate: 35.93%

Run 2: Report of QUIC Cubic — Data Link

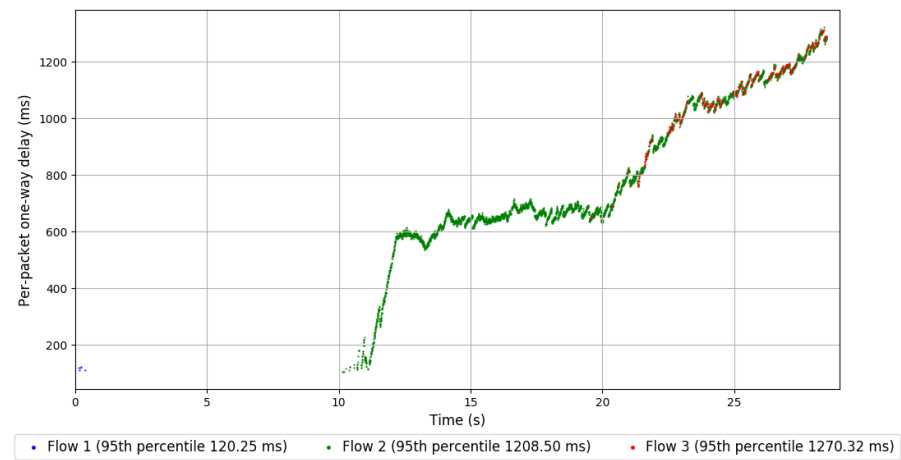
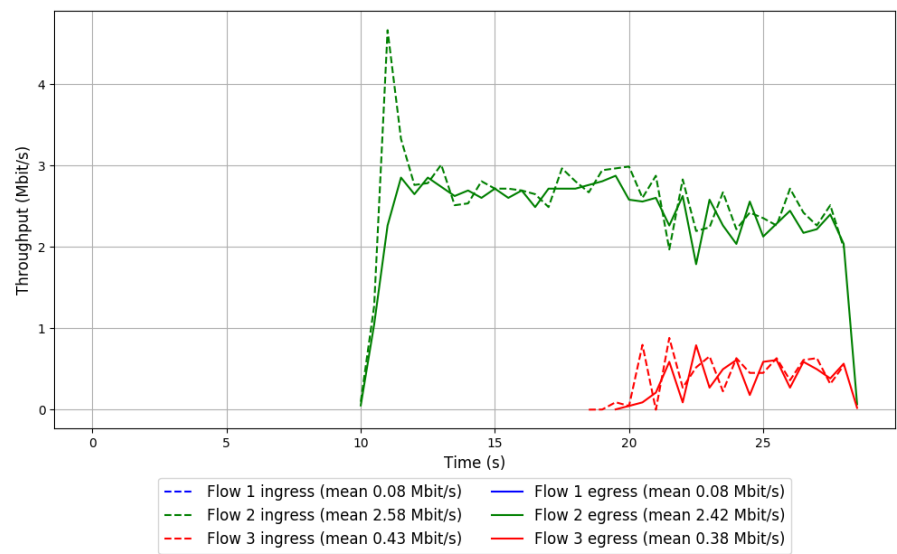


Run 3: Statistics of QUIC Cubic

Start at: 2018-01-10 16:32:07
End at: 2018-01-10 16:32:37
Local clock offset: 3.215 ms
Remote clock offset: -4.366 ms

Below is generated by plot.py at 2018-01-10 16:36:31
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.69 Mbit/s
95th percentile per-packet one-way delay: 1214.716 ms
Loss rate: 6.85%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 120.249 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.42 Mbit/s
95th percentile per-packet one-way delay: 1208.498 ms
Loss rate: 6.15%
-- Flow 3:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 1270.322 ms
Loss rate: 15.02%

Run 3: Report of QUIC Cubic — Data Link

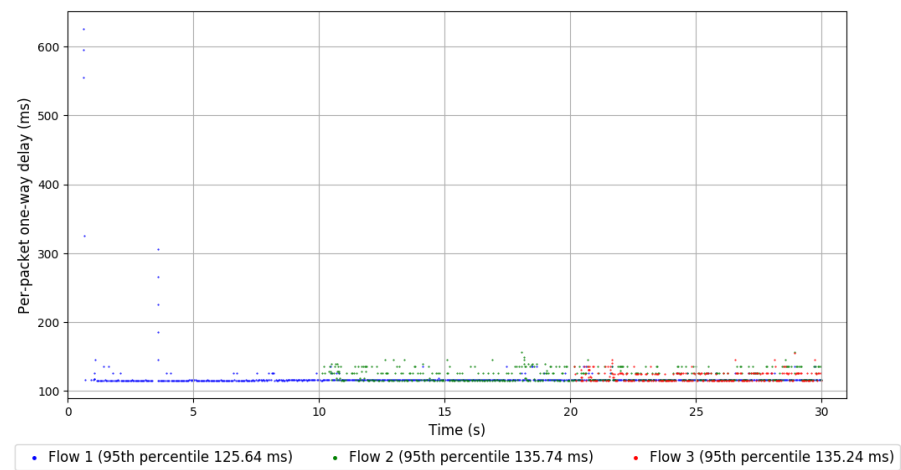
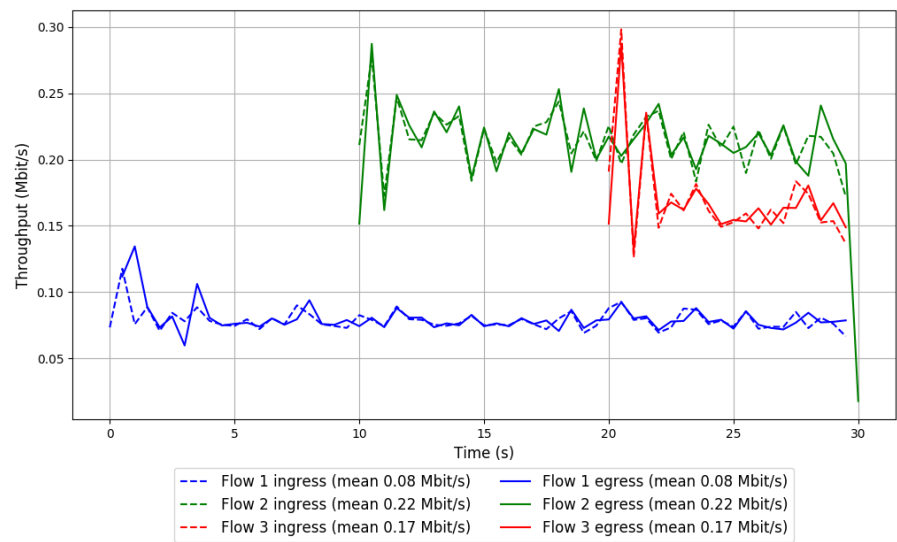


```
Run 1: Statistics of SReAM

Start at: 2018-01-10 15:46:42
End at: 2018-01-10 15:47:12
Local clock offset: 1.605 ms

# Below is generated by plot.py at 2018-01-10 16:36:31
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 135.623 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 125.645 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 135.744 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 135.244 ms
Loss rate: 0.34%
```

Run 1: Report of SReAM — Data Link

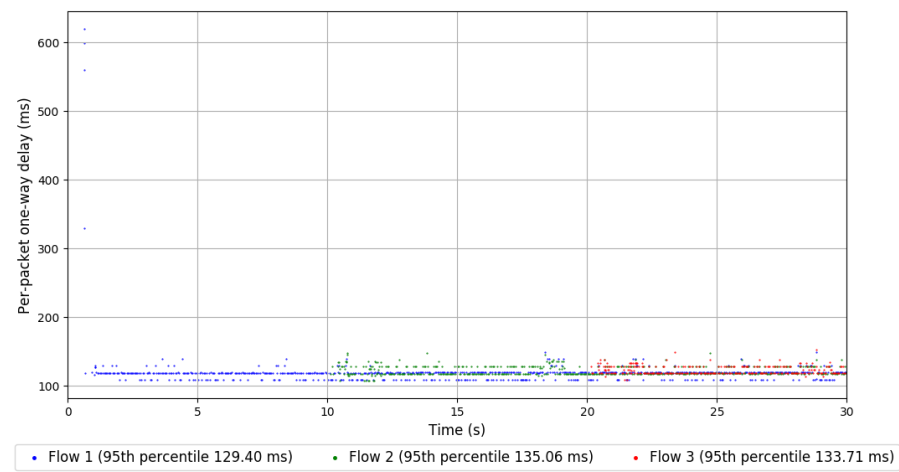
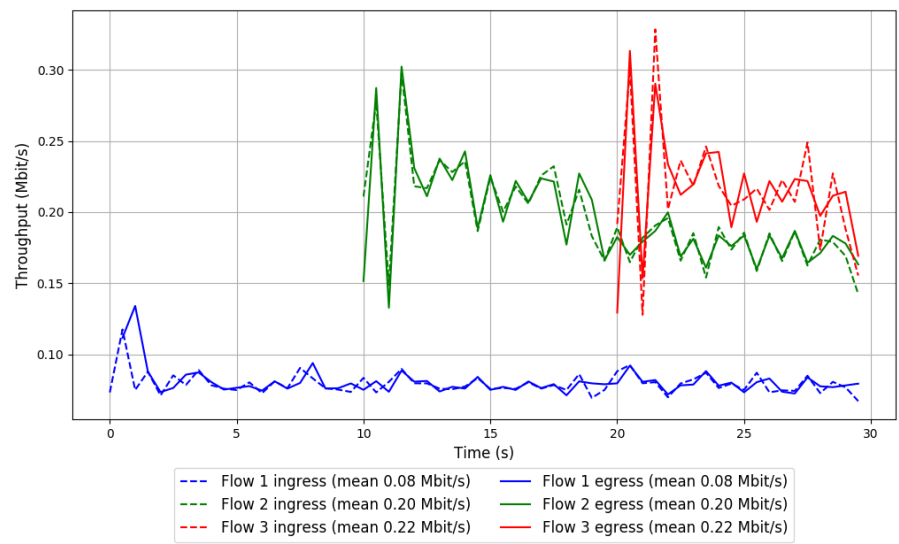


Run 2: Statistics of SCReAM

Start at: 2018-01-10 16:02:04
End at: 2018-01-10 16:02:34
Local clock offset: 2.427 ms
Remote clock offset: -4.437 ms

Below is generated by plot.py at 2018-01-10 16:36:31
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 132.815 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 129.399 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 135.063 ms
Loss rate: 0.19%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 133.714 ms
Loss rate: 0.30%

Run 2: Report of SReAM — Data Link

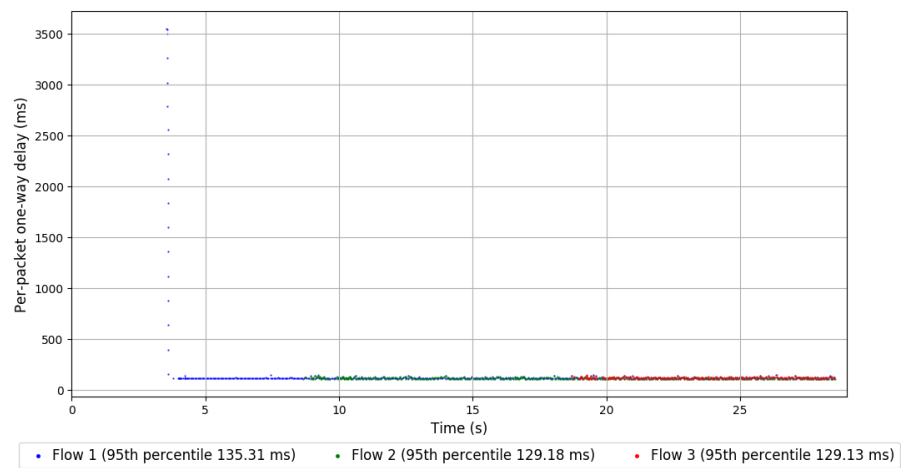
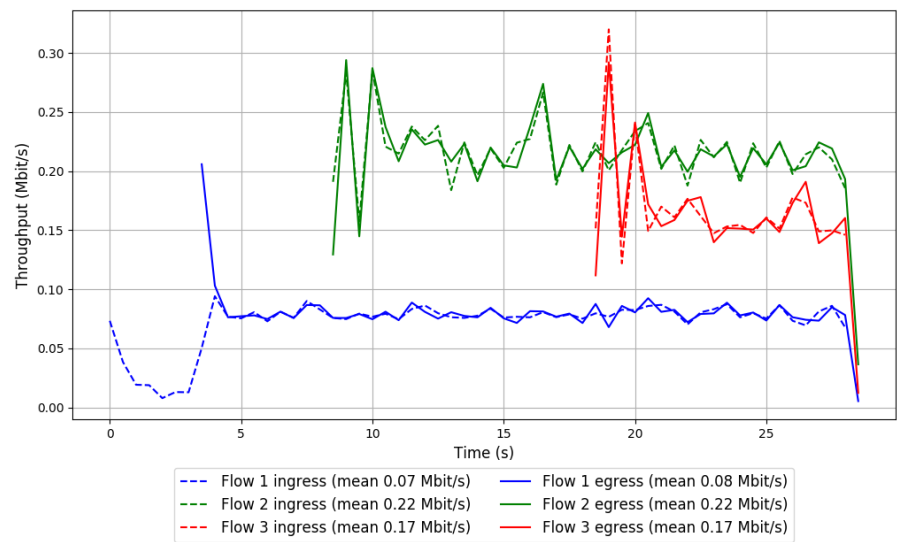


Run 3: Statistics of SCReAM

Start at: 2018-01-10 16:20:51
End at: 2018-01-10 16:21:21
Local clock offset: 2.959 ms
Remote clock offset: -4.313 ms

Below is generated by plot.py at 2018-01-10 16:36:34
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 129.190 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 135.311 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 129.178 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 129.133 ms
Loss rate: 0.34%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of WebRTC media

Start at: 2018-01-10 15:45:41

End at: 2018-01-10 15:46:11

Local clock offset: 1.497 ms

Remote clock offset: 0.66 ms

Below is generated by plot.py at 2018-01-10 16:36:37

Datalink statistics

-- Total of 3 flows:

Average throughput: 1.05 Mbit/s

95th percentile per-packet one-way delay: 304.779 ms

Loss rate: 0.18%

-- Flow 1:

Average throughput: 0.55 Mbit/s

95th percentile per-packet one-way delay: 254.876 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 0.38 Mbit/s

95th percentile per-packet one-way delay: 327.565 ms

Loss rate: 0.14%

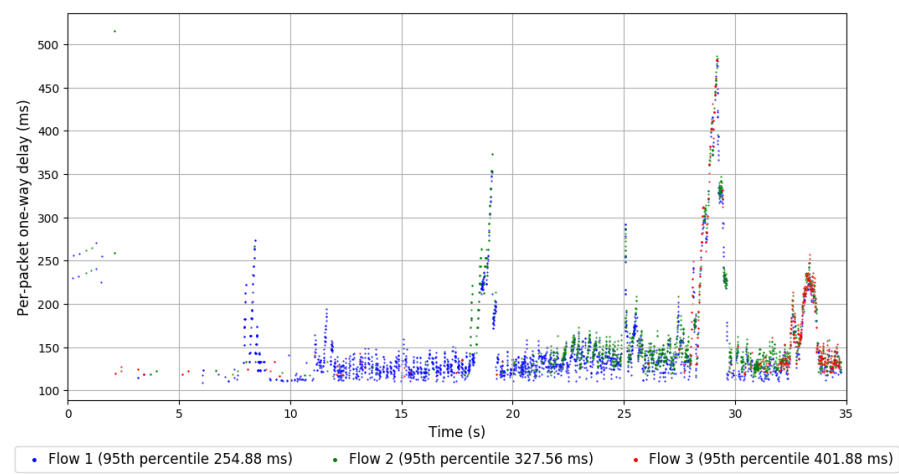
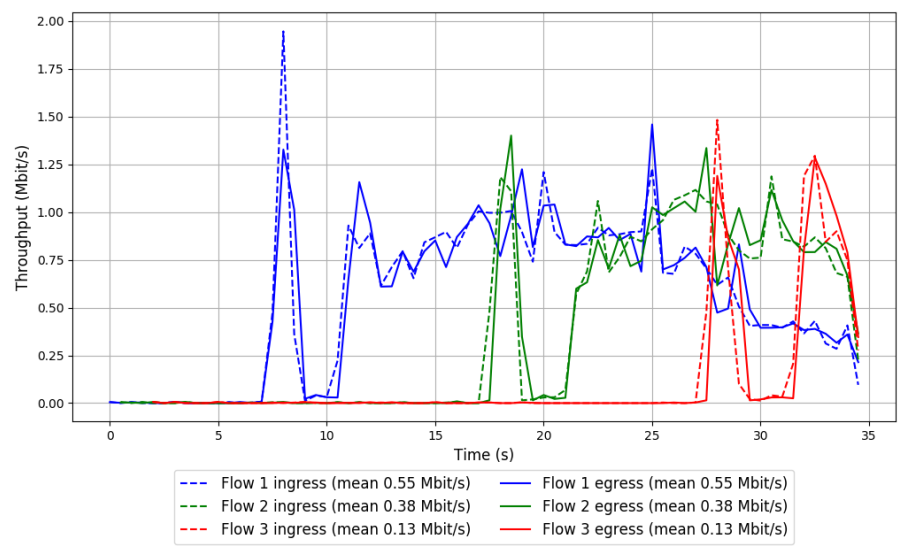
-- Flow 3:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 401.882 ms

Loss rate: 1.12%

Run 1: Report of WebRTC media — Data Link



Run 2: Statistics of WebRTC media

Start at: 2018-01-10 16:00:49

End at: 2018-01-10 16:01:19

Local clock offset: 2.366 ms

Below is generated by plot.py at 2018-01-10 16:36:37

Datalink statistics

-- Total of 3 flows:

Average throughput: 1.12 Mbit/s

95th percentile per-packet one-way delay: 297.423 ms

Loss rate: 0.92%

-- Flow 1:

Average throughput: 0.58 Mbit/s

95th percentile per-packet one-way delay: 277.135 ms

Loss rate: 0.29%

-- Flow 2:

Average throughput: 0.38 Mbit/s

95th percentile per-packet one-way delay: 342.336 ms

Loss rate: 0.57%

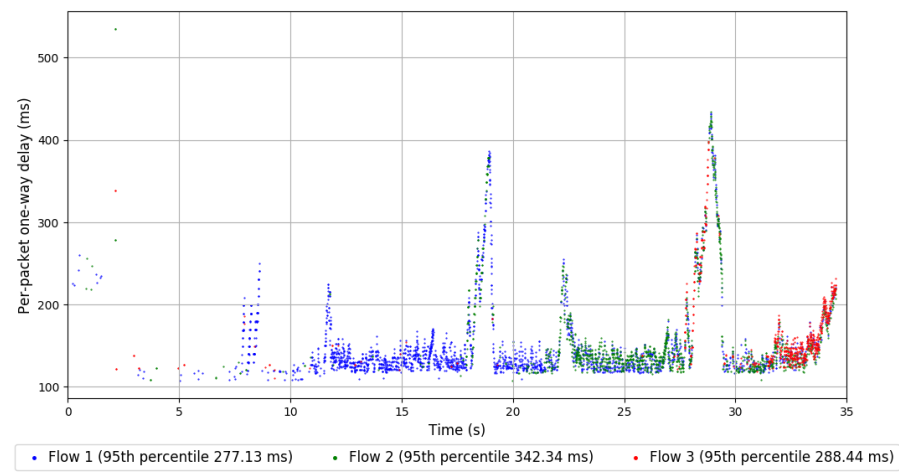
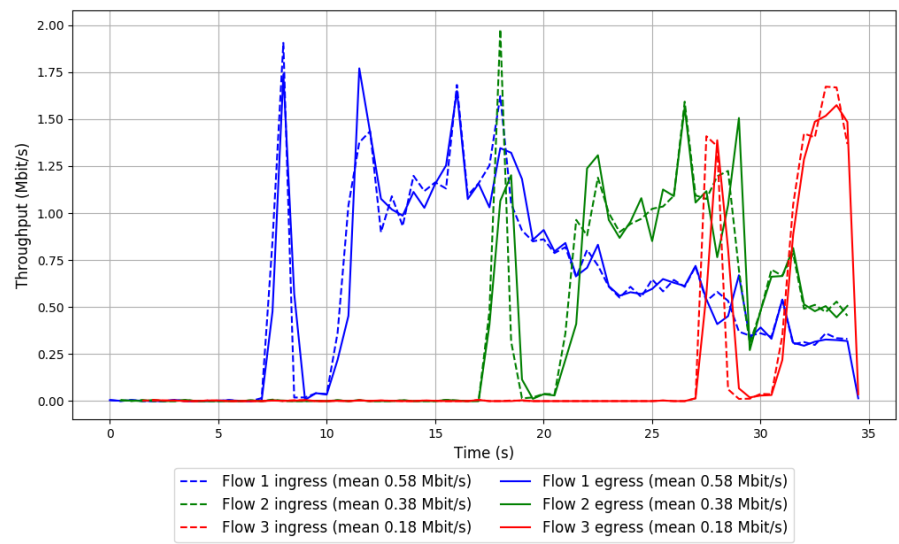
-- Flow 3:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 288.439 ms

Loss rate: 3.78%

Run 2: Report of WebRTC media — Data Link

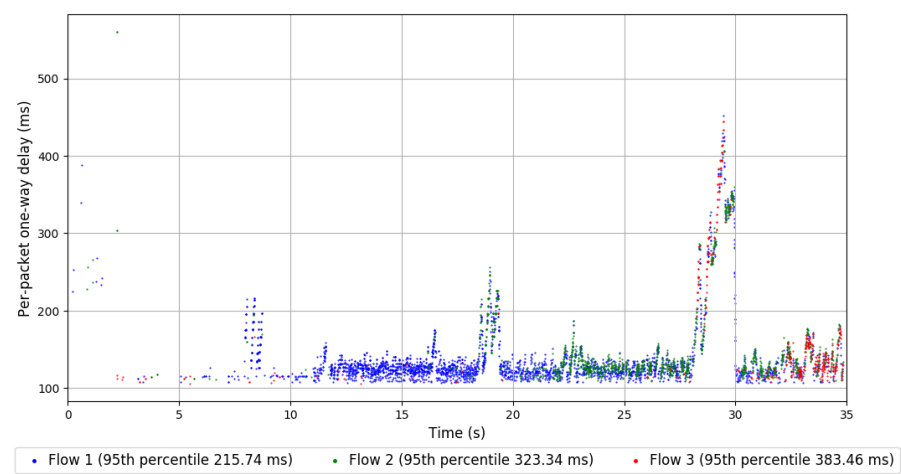
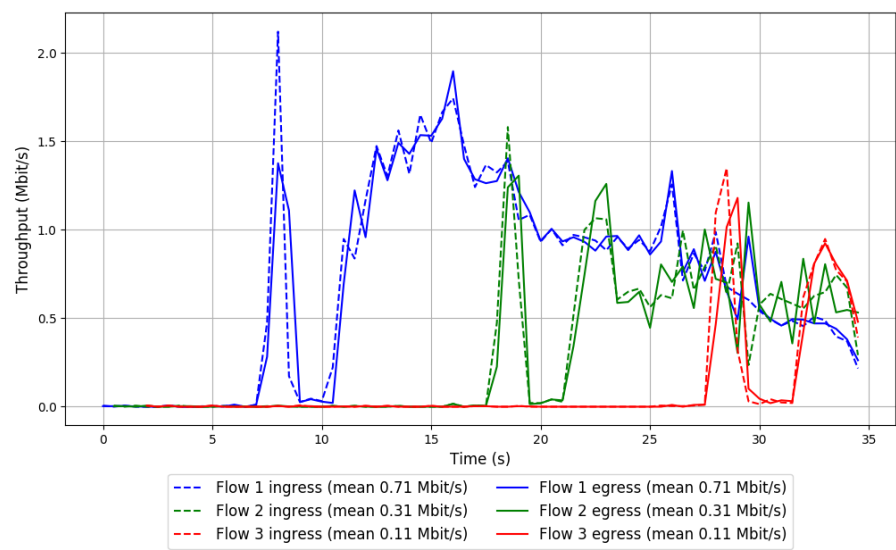


Run 3: Statistics of WebRTC media

Start at: 2018-01-10 16:19:36
End at: 2018-01-10 16:20:06
Local clock offset: 2.934 ms
Remote clock offset: -3.521 ms

```
# Below is generated by plot.py at 2018-01-10 16:36:39
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.13 Mbit/s
95th percentile per-packet one-way delay: 286.411 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 215.740 ms
Loss rate: 0.07%
-- Flow 2:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 323.343 ms
Loss rate: 0.45%
-- Flow 3:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 383.456 ms
Loss rate: 1.29%
```

Run 3: Report of WebRTC media — Data Link

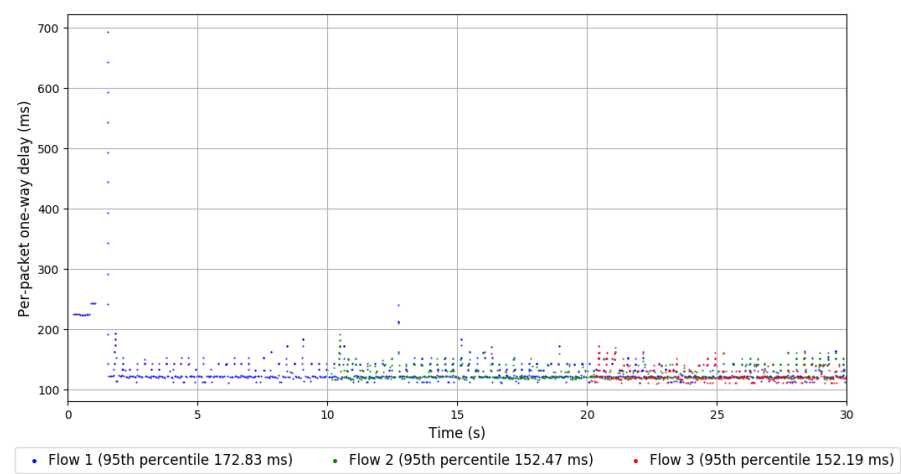
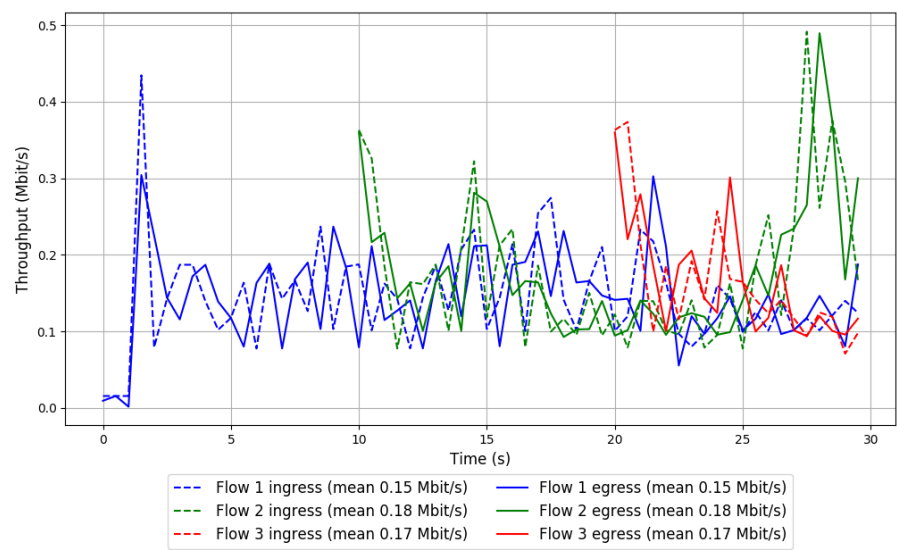


```
Run 1: Statistics of Sprout

Start at: 2018-01-10 15:50:42
End at: 2018-01-10 15:51:12
Local clock offset: 1.766 ms

# Below is generated by plot.py at 2018-01-10 16:36:39
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 161.834 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 172.828 ms
Loss rate: 0.02%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 152.471 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 152.185 ms
Loss rate: 0.00%
```

Run 1: Report of Sprout — Data Link



Run 2: Statistics of Sprout

Start at: 2018-01-10 16:07:03

End at: 2018-01-10 16:07:33

Local clock offset: 2.676 ms

Remote clock offset: 0.368 ms

Below is generated by plot.py at 2018-01-10 16:36:39

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.36 Mbit/s

95th percentile per-packet one-way delay: 161.838 ms

Loss rate: 0.02%

-- Flow 1:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 155.776 ms

Loss rate: 0.01%

-- Flow 2:

Average throughput: 0.15 Mbit/s

95th percentile per-packet one-way delay: 161.653 ms

Loss rate: 0.03%

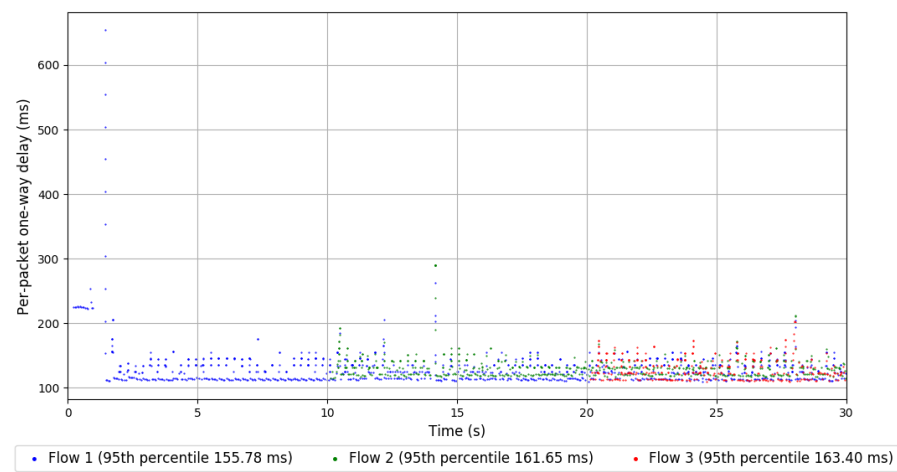
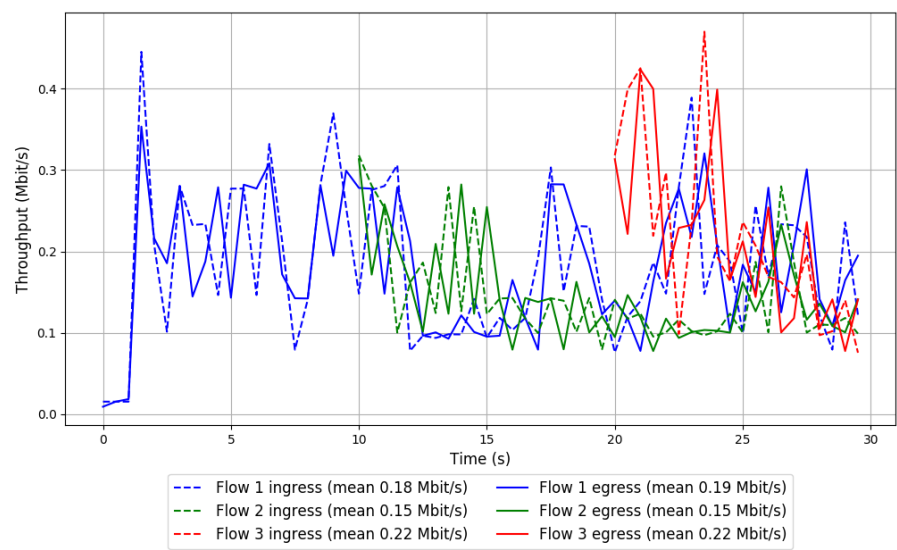
-- Flow 3:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 163.399 ms

Loss rate: 0.04%

Run 2: Report of Sprout — Data Link

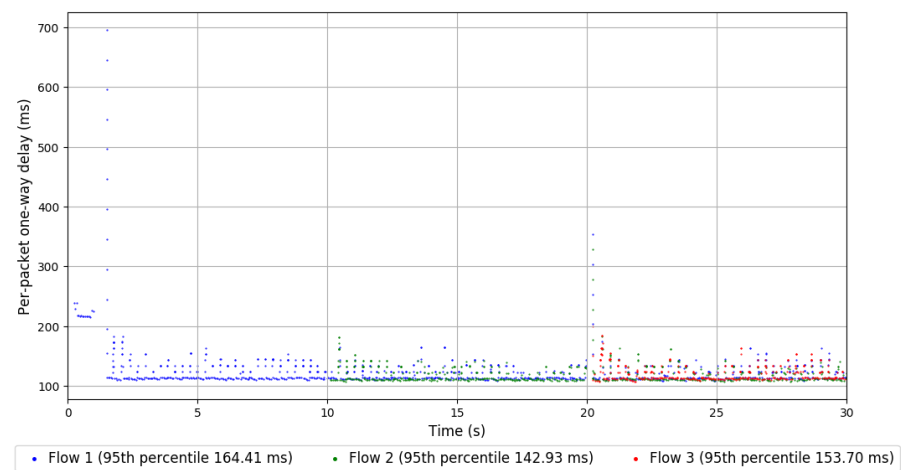
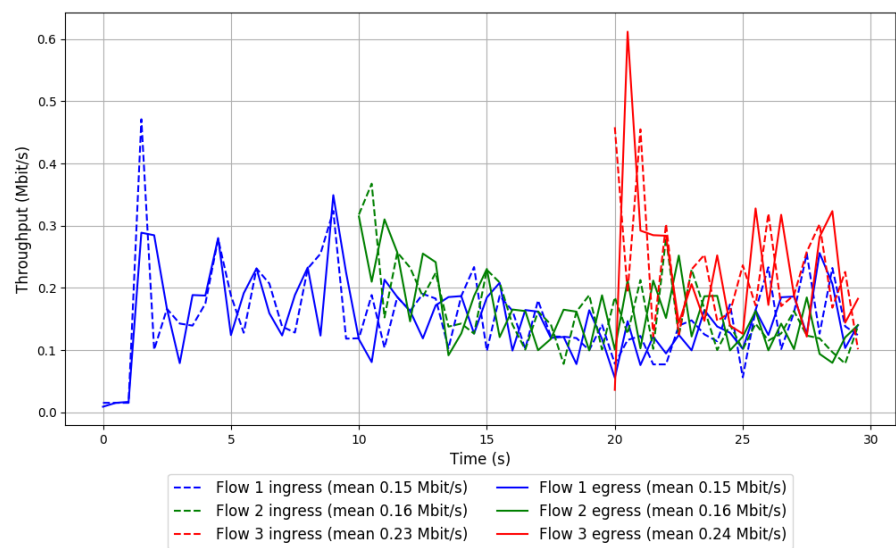


Run 3: Statistics of Sprout

Start at: 2018-01-10 16:25:50
End at: 2018-01-10 16:26:20
Local clock offset: 3.069 ms
Remote clock offset: -4.703 ms

```
# Below is generated by plot.py at 2018-01-10 16:36:39
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 154.175 ms
Loss rate: 0.27%
-- Flow 1:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 164.407 ms
Loss rate: 0.51%
-- Flow 2:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 142.930 ms
Loss rate: 0.02%
-- Flow 3:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 153.704 ms
Loss rate: 0.11%
```

Run 3: Report of Sprout — Data Link

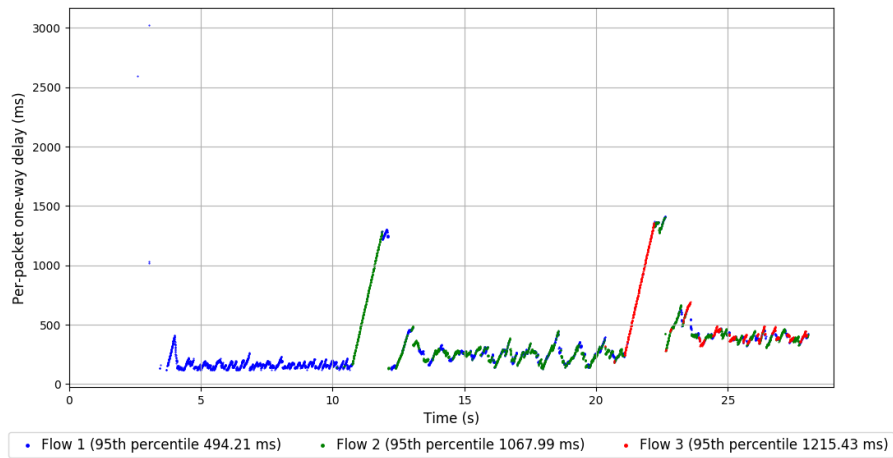
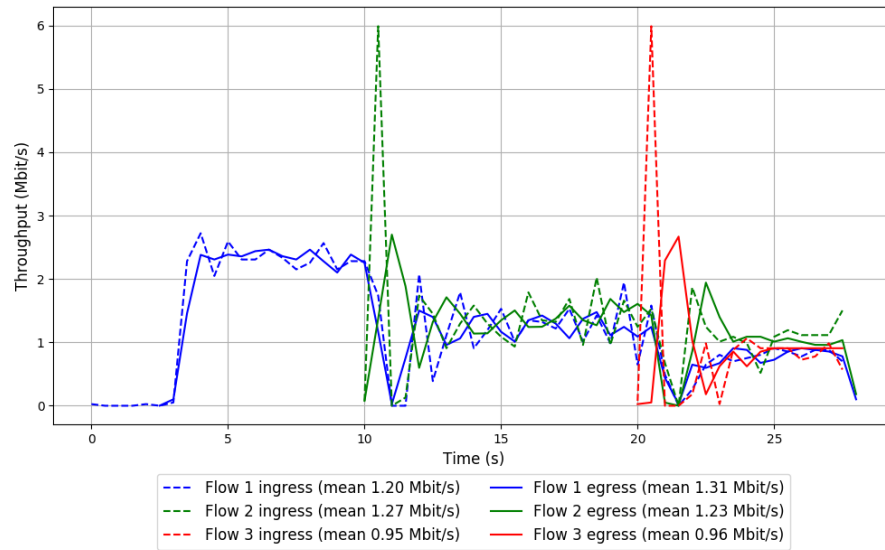


```
Run 1: Statistics of TaoVA-100x

Start at: 2018-01-10 15:56:48
End at: 2018-01-10 15:57:18
Local clock offset: 2.109 ms

# Below is generated by plot.py at 2018-01-10 16:36:41
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.46 Mbit/s
95th percentile per-packet one-way delay: 1038.411 ms
Loss rate: 1.71%
-- Flow 1:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 494.210 ms
Loss rate: 0.74%
-- Flow 2:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 1067.989 ms
Loss rate: 2.95%
-- Flow 3:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 1215.431 ms
Loss rate: 2.25%
```

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



Run 2: Statistics of TaoVA-100x

Start at: 2018-01-10 16:14:36

End at: 2018-01-10 16:15:06

Local clock offset: 2.853 ms

Remote clock offset: 1.279 ms

Below is generated by plot.py at 2018-01-10 16:36:47

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.24 Mbit/s

95th percentile per-packet one-way delay: 735.592 ms

Loss rate: 1.42%

-- Flow 1:

Average throughput: 1.27 Mbit/s

95th percentile per-packet one-way delay: 549.682 ms

Loss rate: 1.14%

-- Flow 2:

Average throughput: 1.09 Mbit/s

95th percentile per-packet one-way delay: 936.045 ms

Loss rate: 1.56%

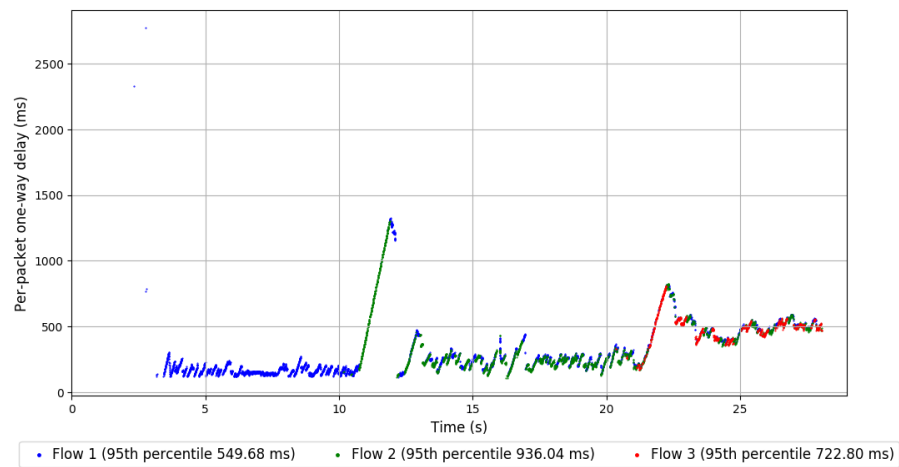
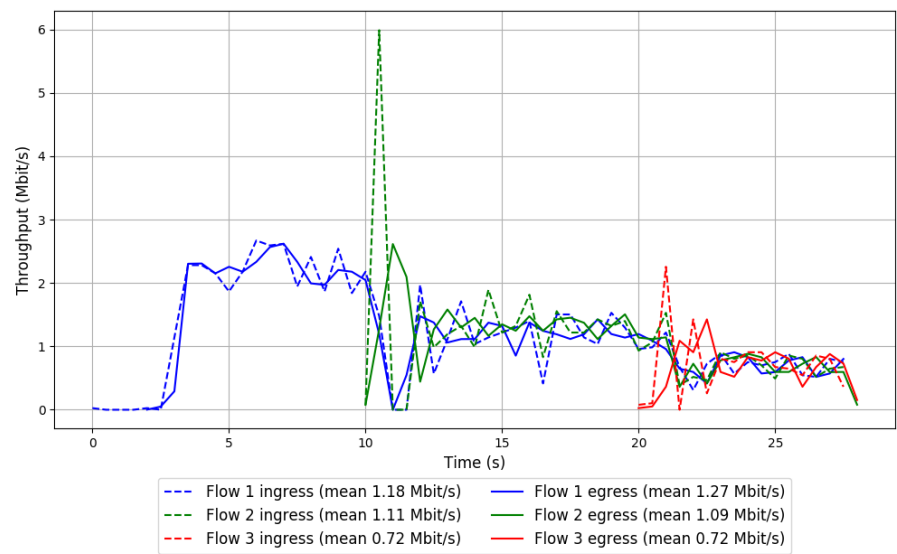
-- Flow 3:

Average throughput: 0.72 Mbit/s

95th percentile per-packet one-way delay: 722.796 ms

Loss rate: 2.51%

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



Run 3: Statistics of TaoVA-100x

Start at: 2018-01-10 16:33:22

End at: 2018-01-10 16:33:52

Local clock offset: 3.155 ms

Remote clock offset: 1.34 ms

Below is generated by plot.py at 2018-01-10 16:36:48

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.33 Mbit/s

95th percentile per-packet one-way delay: 1171.790 ms

Loss rate: 1.22%

-- Flow 1:

Average throughput: 1.27 Mbit/s

95th percentile per-packet one-way delay: 1074.137 ms

Loss rate: 0.83%

-- Flow 2:

Average throughput: 1.08 Mbit/s

95th percentile per-packet one-way delay: 1113.925 ms

Loss rate: 1.58%

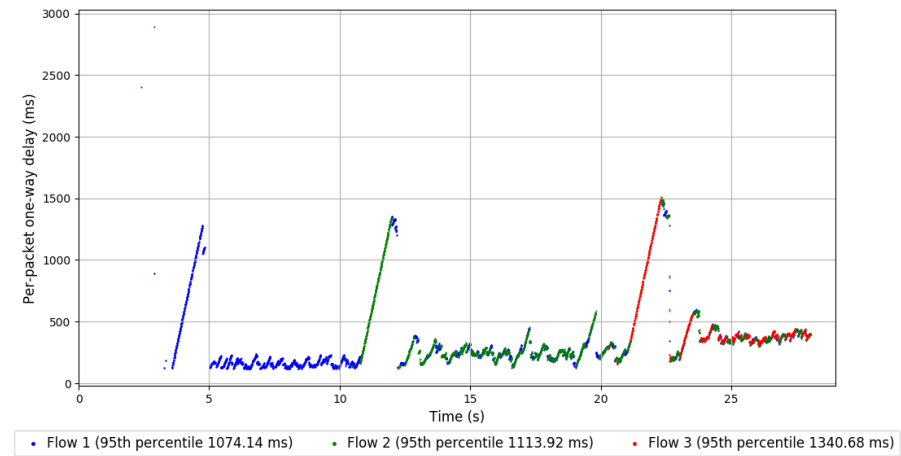
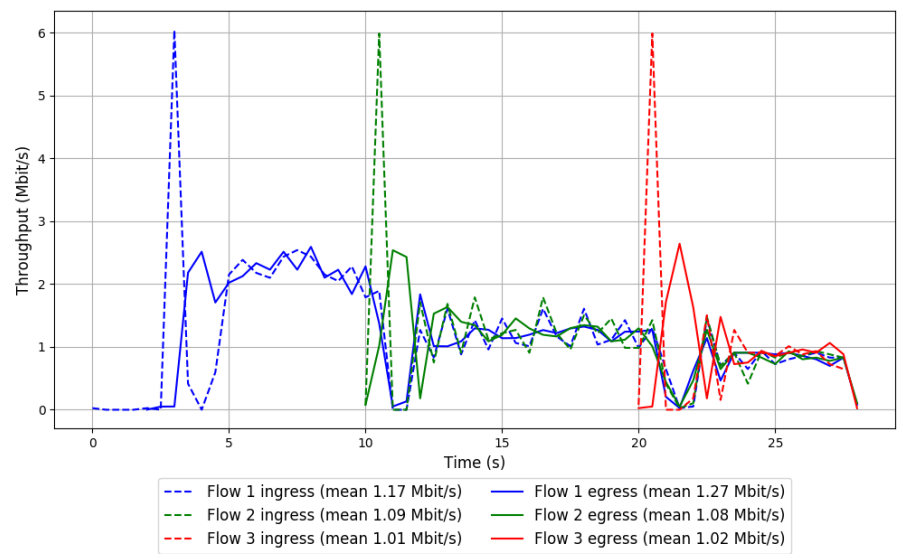
-- Flow 3:

Average throughput: 1.02 Mbit/s

95th percentile per-packet one-way delay: 1340.679 ms

Loss rate: 1.94%

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



Run 1: Statistics of TCP Vegas

Start at: 2018-01-10 15:47:41

End at: 2018-01-10 15:48:11

Local clock offset: 1.667 ms

Below is generated by plot.py at 2018-01-10 16:36:48

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.46 Mbit/s

95th percentile per-packet one-way delay: 1180.987 ms

Loss rate: 3.69%

-- Flow 1:

Average throughput: 1.93 Mbit/s

95th percentile per-packet one-way delay: 1160.885 ms

Loss rate: 3.08%

-- Flow 2:

Average throughput: 0.55 Mbit/s

95th percentile per-packet one-way delay: 1189.667 ms

Loss rate: 5.31%

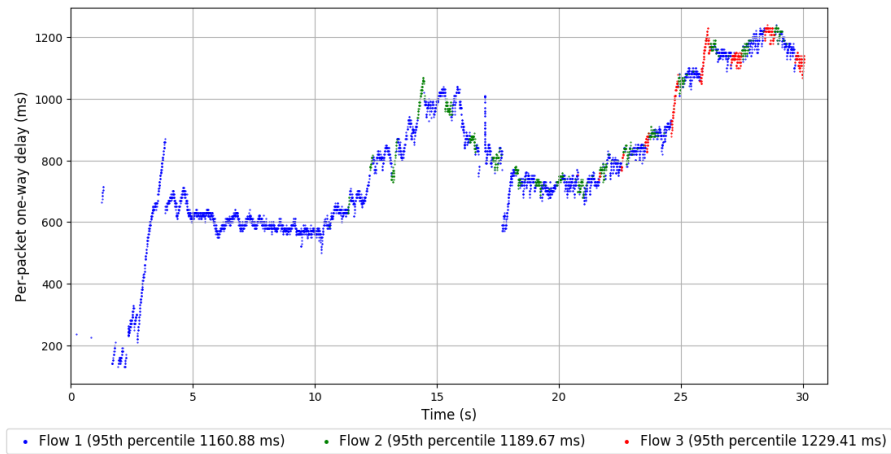
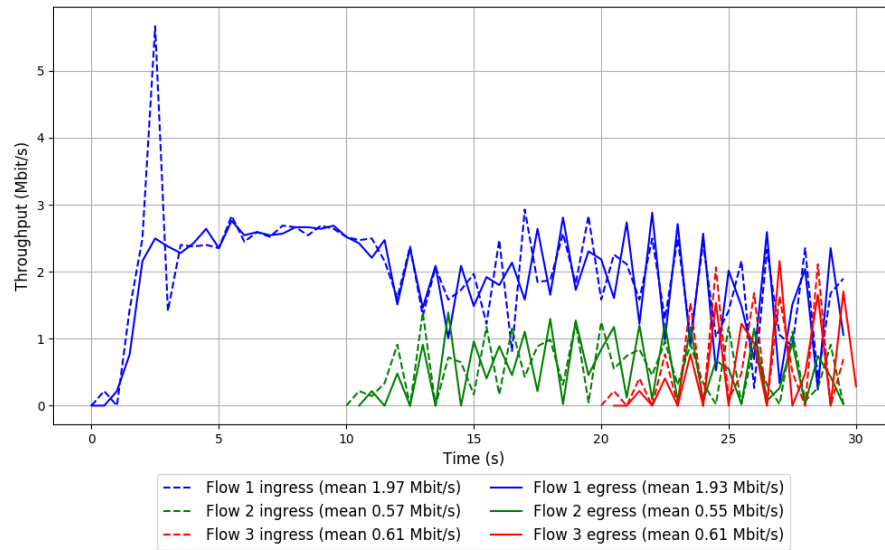
-- Flow 3:

Average throughput: 0.61 Mbit/s

95th percentile per-packet one-way delay: 1229.407 ms

Loss rate: 6.69%

Run 1: Report of TCP Vegas — Data Link



Run 2: Statistics of TCP Vegas

Start at: 2018-01-10 16:03:19

End at: 2018-01-10 16:03:49

Local clock offset: 2.5 ms

Remote clock offset: 1.598 ms

Below is generated by plot.py at 2018-01-10 16:36:49

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.61 Mbit/s

95th percentile per-packet one-way delay: 2797.295 ms

Loss rate: 14.08%

-- Flow 1:

Average throughput: 1.58 Mbit/s

95th percentile per-packet one-way delay: 2466.182 ms

Loss rate: 3.14%

-- Flow 2:

Average throughput: 1.59 Mbit/s

95th percentile per-packet one-way delay: 2867.745 ms

Loss rate: 26.12%

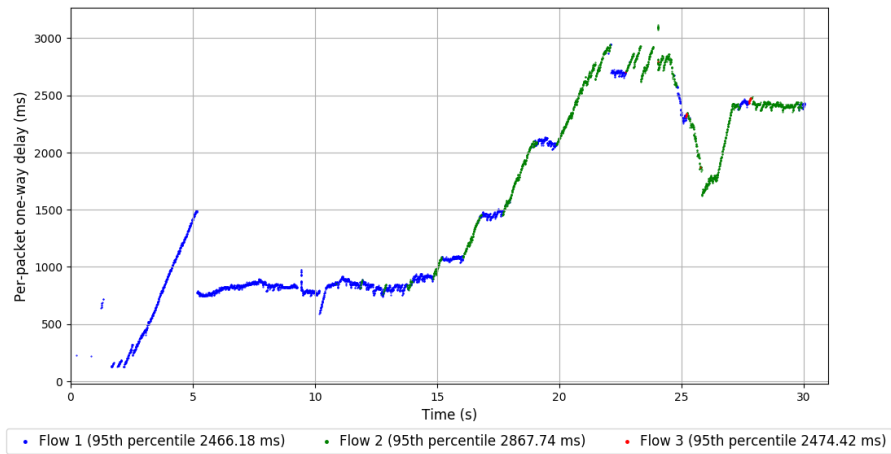
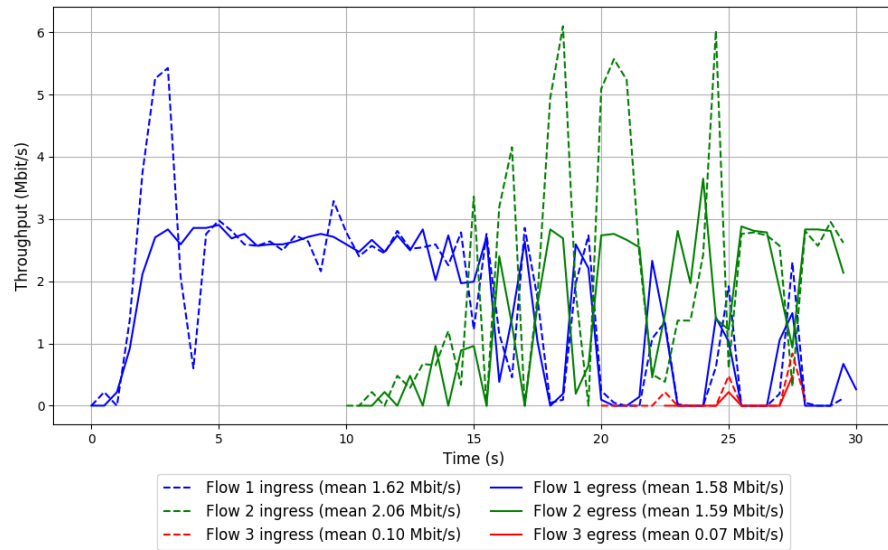
-- Flow 3:

Average throughput: 0.07 Mbit/s

95th percentile per-packet one-way delay: 2474.419 ms

Loss rate: 57.08%

Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2018-01-10 16:22:05

End at: 2018-01-10 16:22:35

Local clock offset: 2.975 ms

Remote clock offset: 1.376 ms

Below is generated by plot.py at 2018-01-10 16:36:51

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.60 Mbit/s

95th percentile per-packet one-way delay: 2743.751 ms

Loss rate: 15.71%

-- Flow 1:

Average throughput: 2.44 Mbit/s

95th percentile per-packet one-way delay: 2753.328 ms

Loss rate: 14.83%

-- Flow 2:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 2551.738 ms

Loss rate: 0.37%

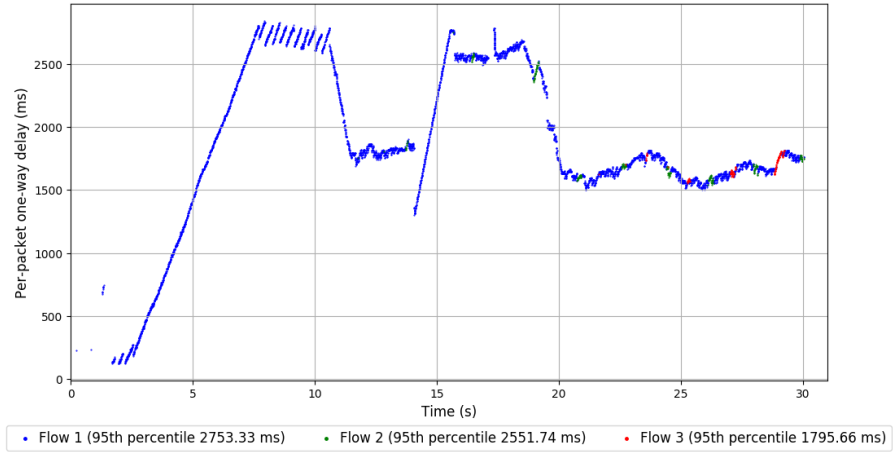
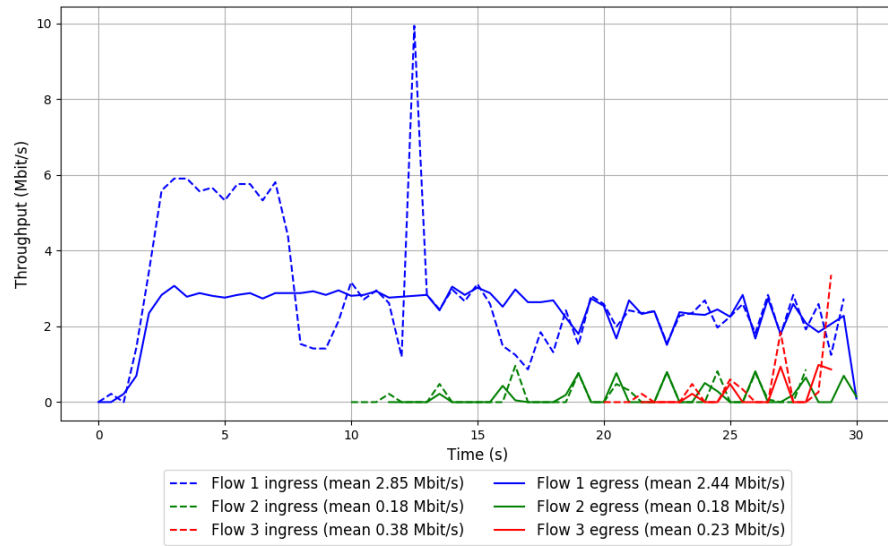
-- Flow 3:

Average throughput: 0.23 Mbit/s

95th percentile per-packet one-way delay: 1795.659 ms

Loss rate: 50.96%

Run 3: Report of TCP Vegas — Data Link

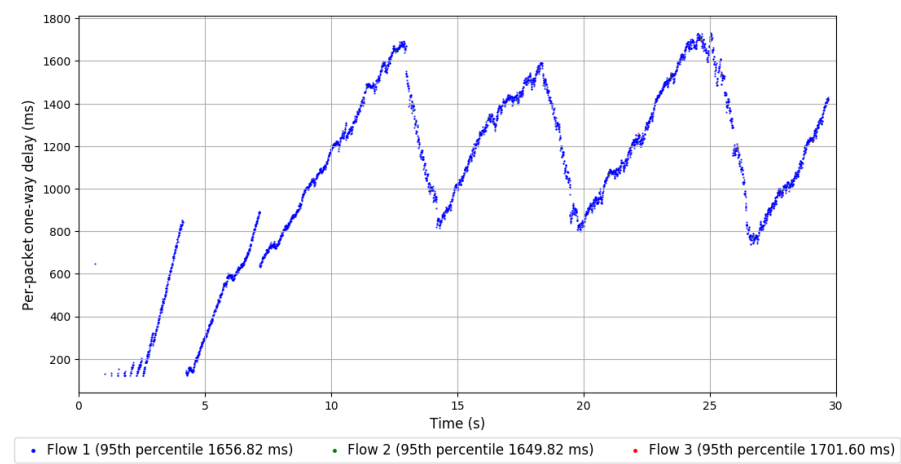
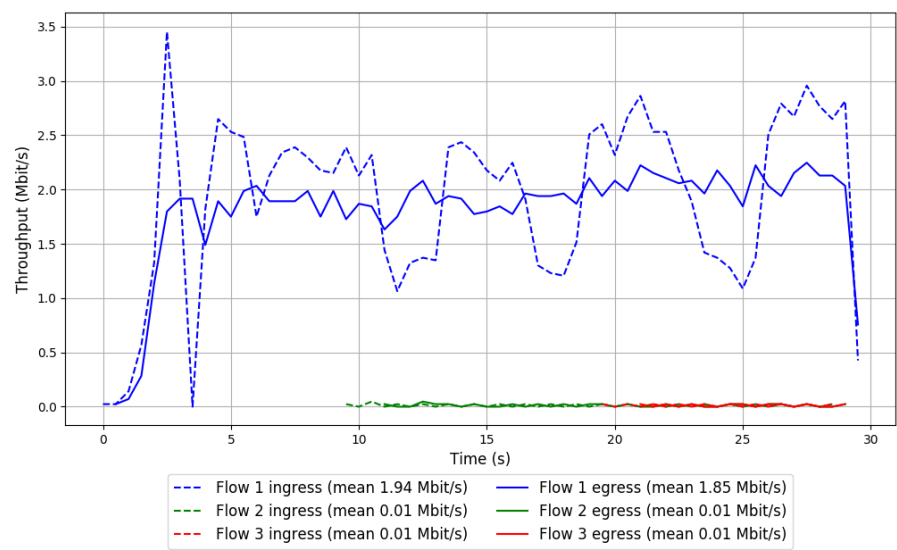


```
Run 1: Statistics of Verus

Start at: 2018-01-10 15:48:42
End at: 2018-01-10 15:49:12
Local clock offset: 1.724 ms

# Below is generated by plot.py at 2018-01-10 16:36:51
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.86 Mbit/s
95th percentile per-packet one-way delay: 1656.819 ms
Loss rate: 6.27%
-- Flow 1:
Average throughput: 1.85 Mbit/s
95th percentile per-packet one-way delay: 1656.819 ms
Loss rate: 6.27%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1649.817 ms
Loss rate: 4.76%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1701.602 ms
Loss rate: 10.00%
```


Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2018-01-10 16:04:33

End at: 2018-01-10 16:05:03

Local clock offset: 2.555 ms

Remote clock offset: -4.17 ms

Below is generated by plot.py at 2018-01-10 16:36:51

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.30 Mbit/s

95th percentile per-packet one-way delay: 2119.284 ms

Loss rate: 3.09%

-- Flow 1:

Average throughput: 2.29 Mbit/s

95th percentile per-packet one-way delay: 2117.792 ms

Loss rate: 3.04%

-- Flow 2:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 2159.298 ms

Loss rate: 9.09%

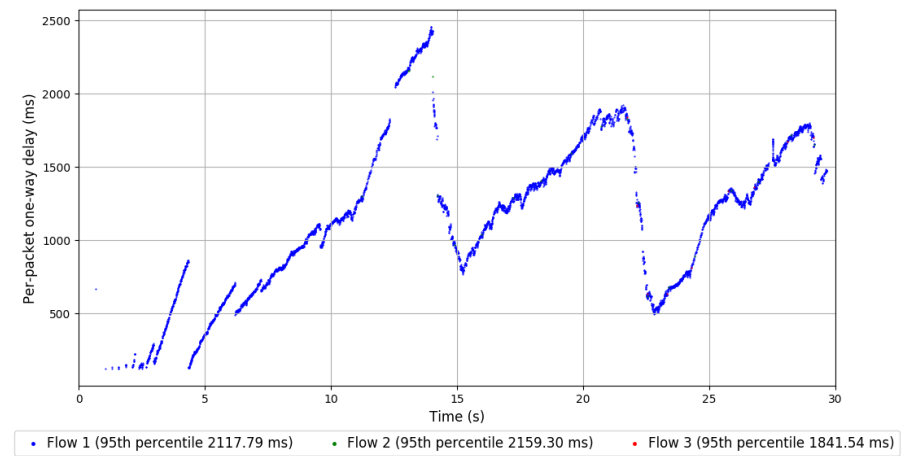
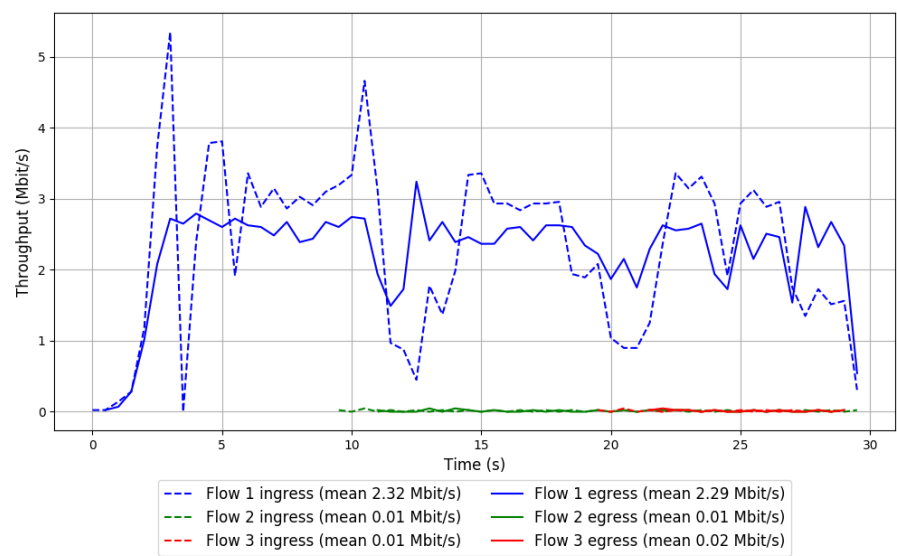
-- Flow 3:

Average throughput: 0.02 Mbit/s

95th percentile per-packet one-way delay: 1841.538 ms

Loss rate: 16.67%

Run 2: Report of Verus — Data Link



Run 3: Statistics of Verus

Start at: 2018-01-10 16:23:20

End at: 2018-01-10 16:23:50

Local clock offset: 2.937 ms

Remote clock offset: 0.559 ms

Below is generated by plot.py at 2018-01-10 16:36:52

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.60 Mbit/s

95th percentile per-packet one-way delay: 1602.350 ms

Loss rate: 6.02%

-- Flow 1:

Average throughput: 2.58 Mbit/s

95th percentile per-packet one-way delay: 1602.319 ms

Loss rate: 6.02%

-- Flow 2:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 1632.326 ms

Loss rate: 4.76%

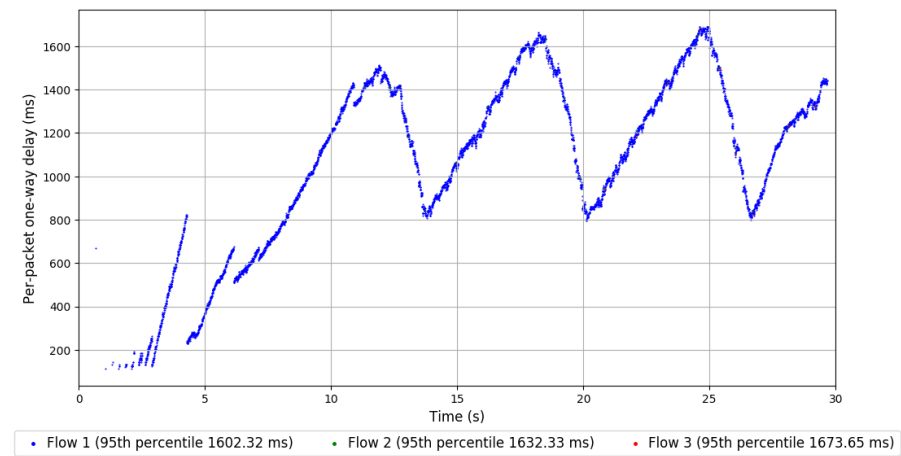
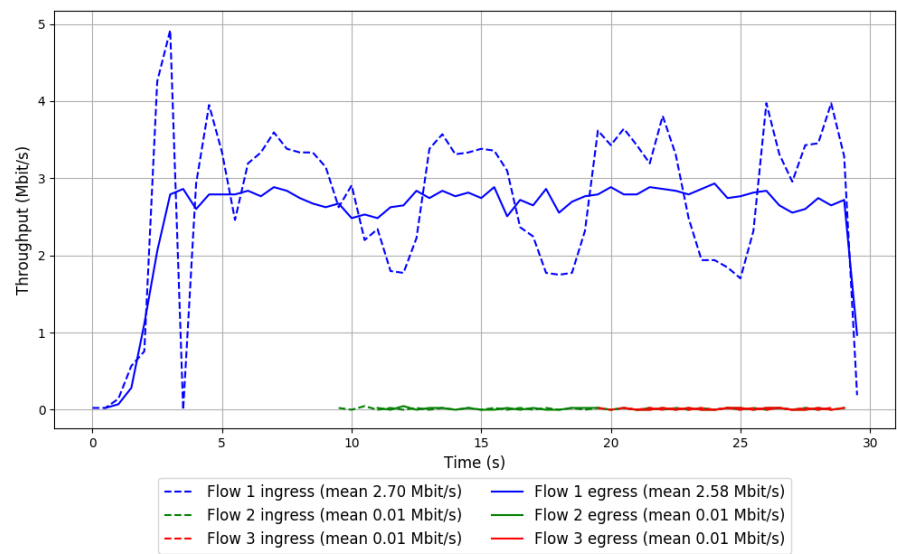
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 1673.654 ms

Loss rate: 10.00%

Run 3: Report of Verus — Data Link



Run 1: Statistics of Copa

Start at: 2018-01-10 15:52:43

End at: 2018-01-10 15:53:13

Local clock offset: 1.952 ms

Below is generated by plot.py at 2018-01-10 16:36:56

Datalink statistics

-- Total of 3 flows:

Average throughput: 1.34 Mbit/s

95th percentile per-packet one-way delay: 180.619 ms

Loss rate: 0.30%

-- Flow 1:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 3092.251 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 1.54 Mbit/s

95th percentile per-packet one-way delay: 171.982 ms

Loss rate: 0.24%

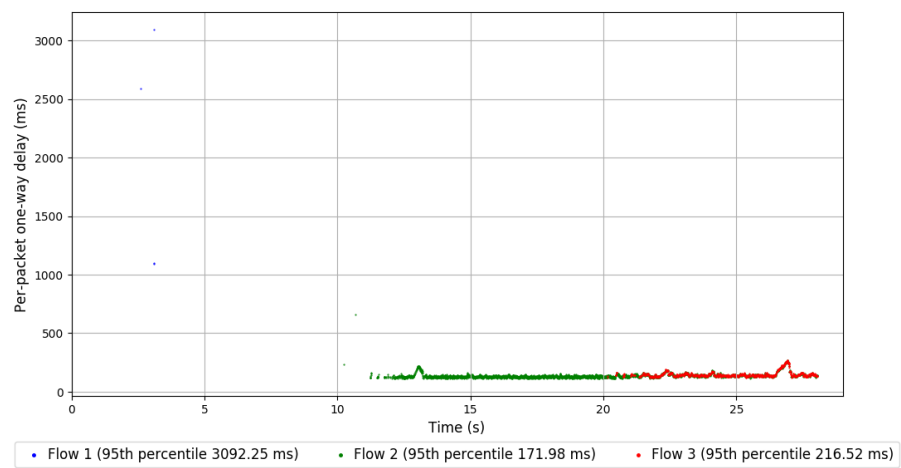
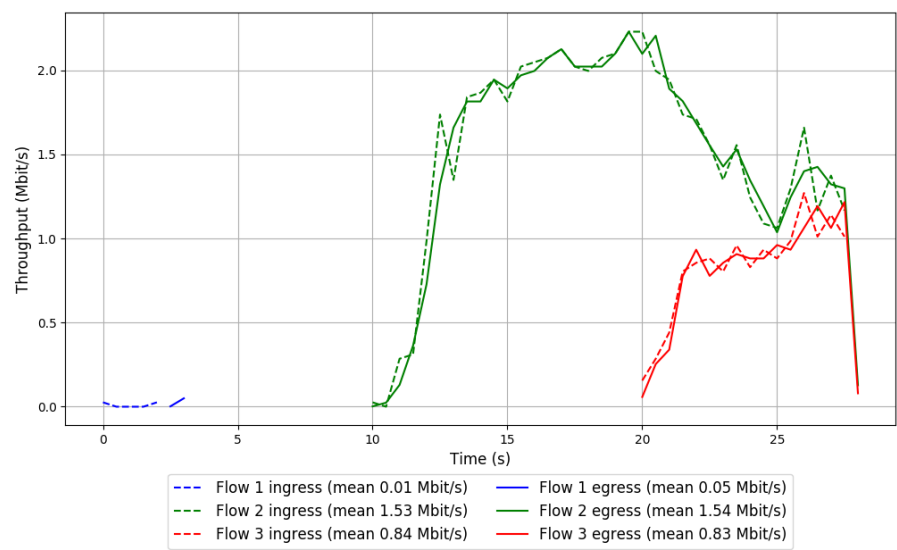
-- Flow 3:

Average throughput: 0.83 Mbit/s

95th percentile per-packet one-way delay: 216.516 ms

Loss rate: 0.57%

Run 1: Report of Copa — Data Link



Run 2: Statistics of Copa

Start at: 2018-01-10 16:09:33

End at: 2018-01-10 16:10:03

Local clock offset: 2.74 ms

Remote clock offset: 0.445 ms

Below is generated by plot.py at 2018-01-10 16:36:56

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.98 Mbit/s

95th percentile per-packet one-way delay: 267.247 ms

Loss rate: 0.36%

-- Flow 1:

Average throughput: 0.06 Mbit/s

95th percentile per-packet one-way delay: 2919.878 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 1.18 Mbit/s

95th percentile per-packet one-way delay: 263.409 ms

Loss rate: 0.19%

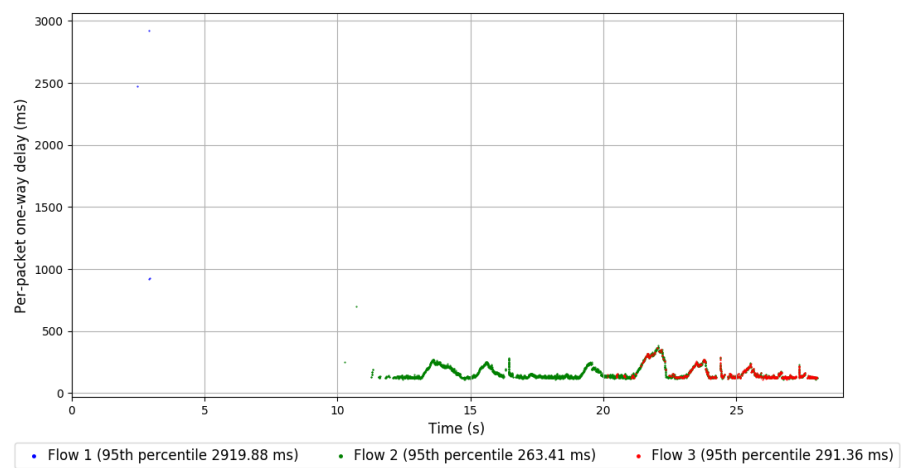
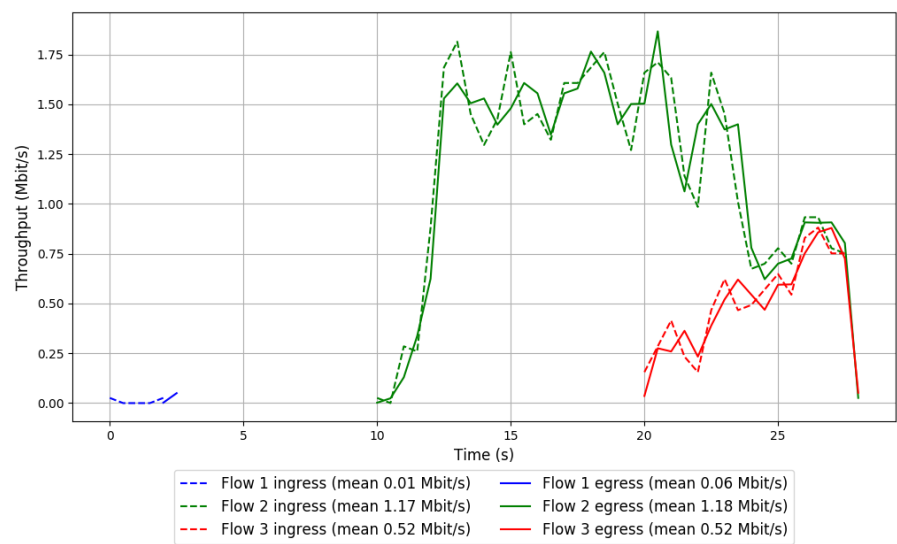
-- Flow 3:

Average throughput: 0.52 Mbit/s

95th percentile per-packet one-way delay: 291.359 ms

Loss rate: 1.25%

Run 2: Report of Copa — Data Link

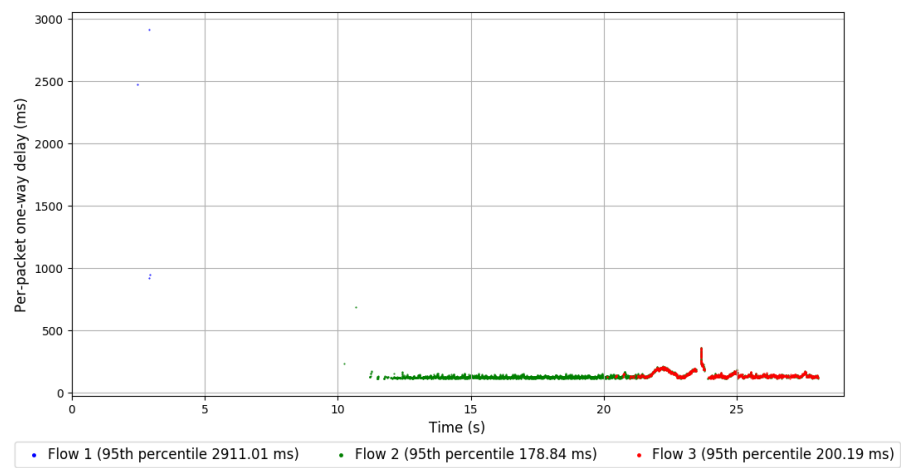
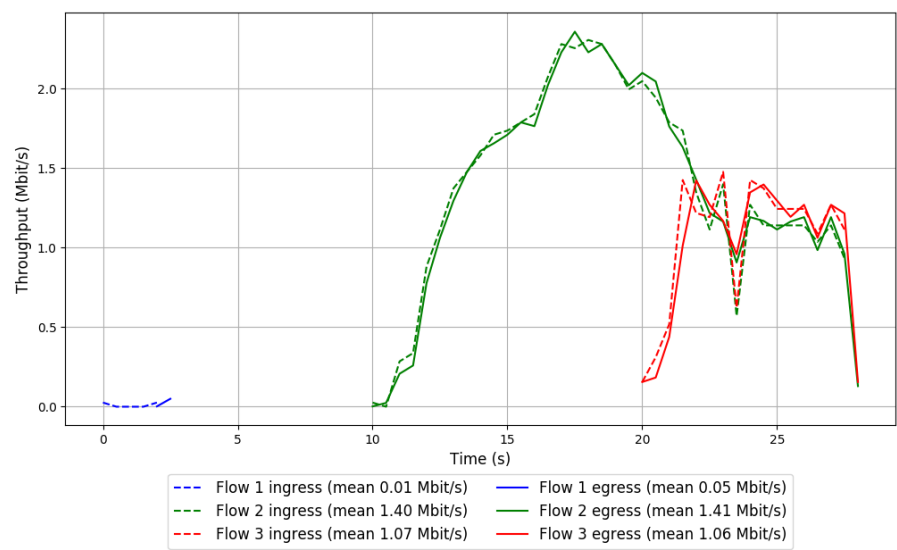


Run 3: Statistics of Copa

Start at: 2018-01-10 16:28:20
End at: 2018-01-10 16:28:50
Local clock offset: 3.123 ms
Remote clock offset: 1.105 ms

Below is generated by plot.py at 2018-01-10 16:36:57
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 188.866 ms
Loss rate: 0.30%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 2911.009 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 178.838 ms
Loss rate: 0.20%
-- Flow 3:
Average throughput: 1.06 Mbit/s
95th percentile per-packet one-way delay: 200.188 ms
Loss rate: 0.61%

Run 3: Report of Copa — Data Link

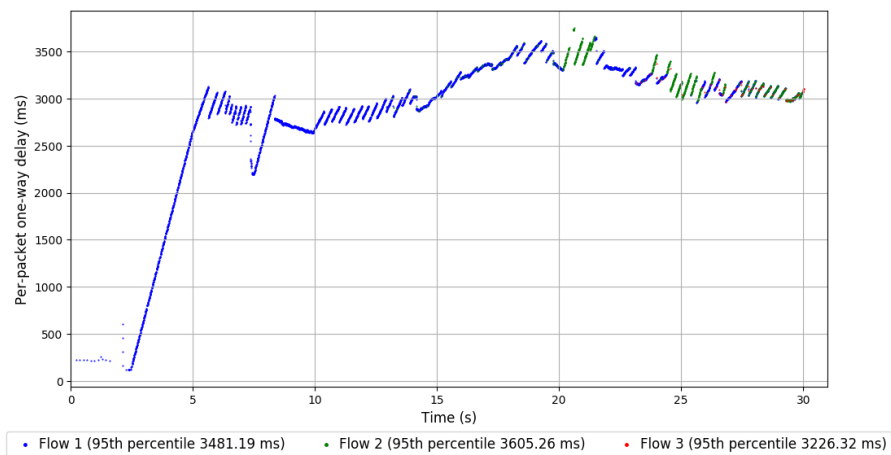
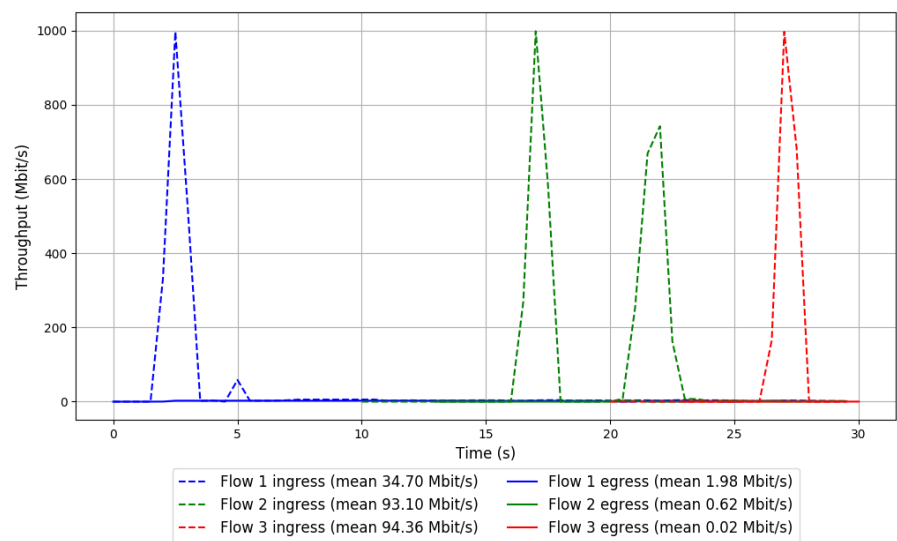


```
Run 1: Statistics of FillP

Start at: 2018-01-10 15:54:45
End at: 2018-01-10 15:55:15
Local clock offset: 2.05 ms

# Below is generated by plot.py at 2018-01-10 16:37:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 3511.882 ms
Loss rate: 98.18%
-- Flow 1:
Average throughput: 1.98 Mbit/s
95th percentile per-packet one-way delay: 3481.190 ms
Loss rate: 94.34%
-- Flow 2:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 3605.265 ms
Loss rate: 99.44%
-- Flow 3:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 3226.316 ms
Loss rate: 99.98%
```

Run 1: Report of FillP — Data Link

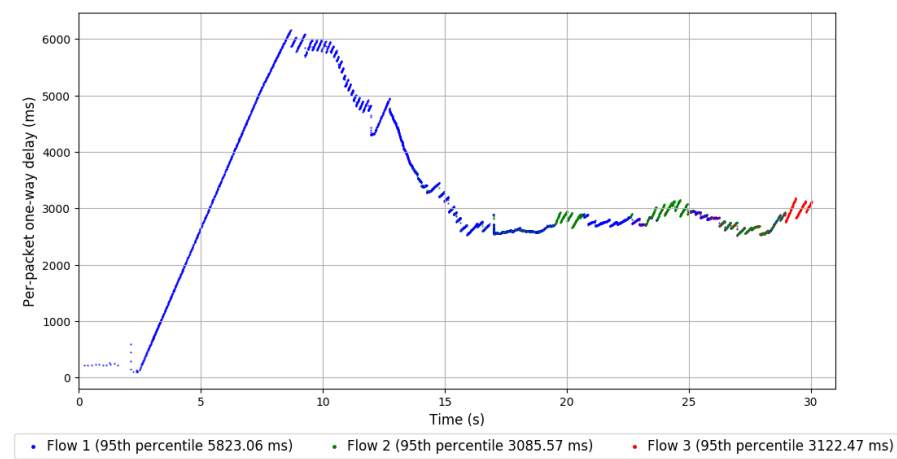
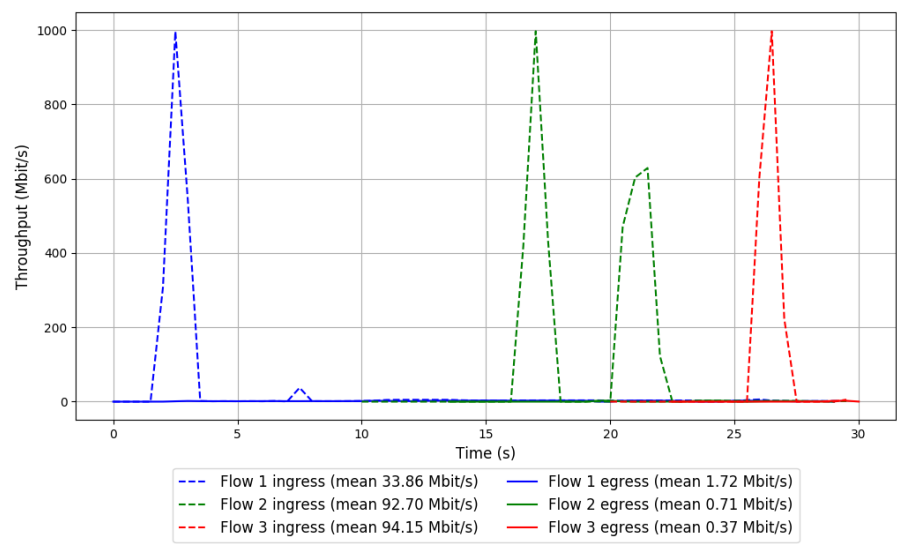


Run 2: Statistics of FillP

Start at: 2018-01-10 16:12:03
End at: 2018-01-10 16:12:33
Local clock offset: 2.779 ms
Remote clock offset: -3.518 ms

Below is generated by plot.py at 2018-01-10 16:37:07
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 5733.072 ms
Loss rate: 98.33%
-- Flow 1:
Average throughput: 1.72 Mbit/s
95th percentile per-packet one-way delay: 5823.055 ms
Loss rate: 95.13%
-- Flow 2:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 3085.571 ms
Loss rate: 99.40%
-- Flow 3:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 3122.475 ms
Loss rate: 99.71%

Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

Start at: 2018-01-10 16:30:50

End at: 2018-01-10 16:31:20

Local clock offset: 3.133 ms

Remote clock offset: 0.957 ms

Below is generated by plot.py at 2018-01-10 16:37:07

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.22 Mbit/s

95th percentile per-packet one-way delay: 3950.738 ms

Loss rate: 98.24%

-- Flow 1:

Average throughput: 1.90 Mbit/s

95th percentile per-packet one-way delay: 3973.071 ms

Loss rate: 94.36%

-- Flow 2:

Average throughput: 0.60 Mbit/s

95th percentile per-packet one-way delay: 3270.582 ms

Loss rate: 99.48%

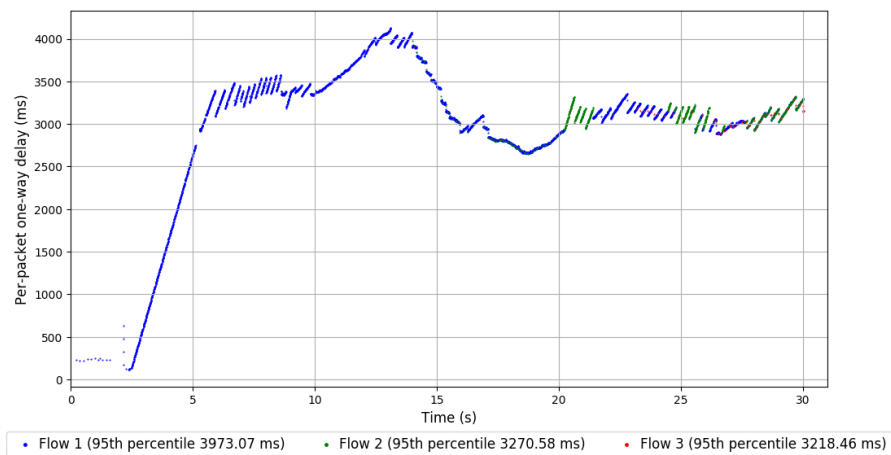
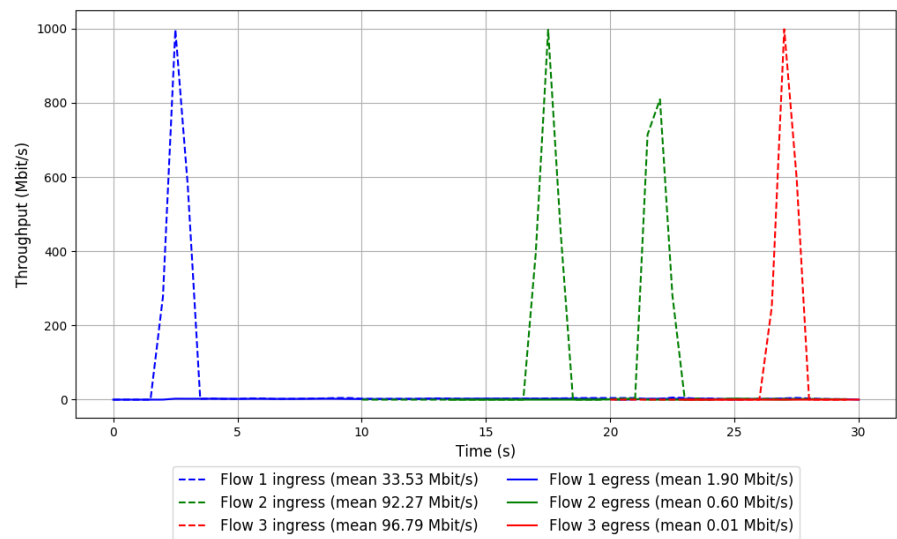
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 3218.456 ms

Loss rate: 99.99%

Run 3: Report of FillP — Data Link

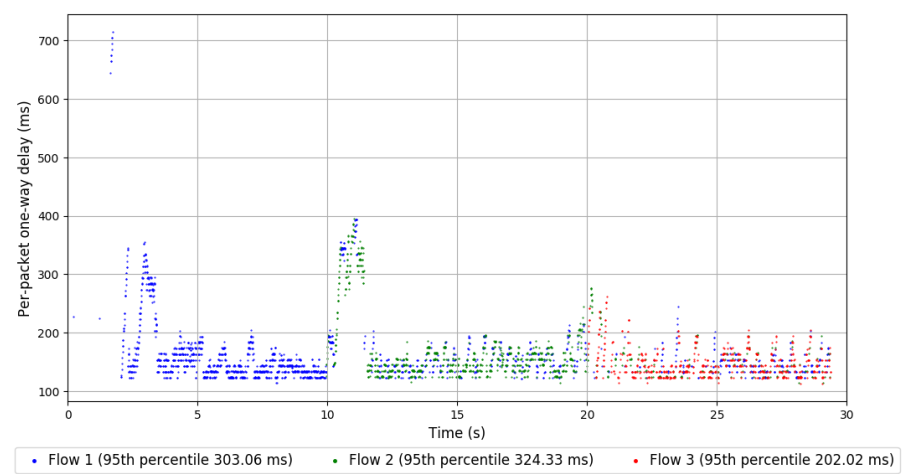
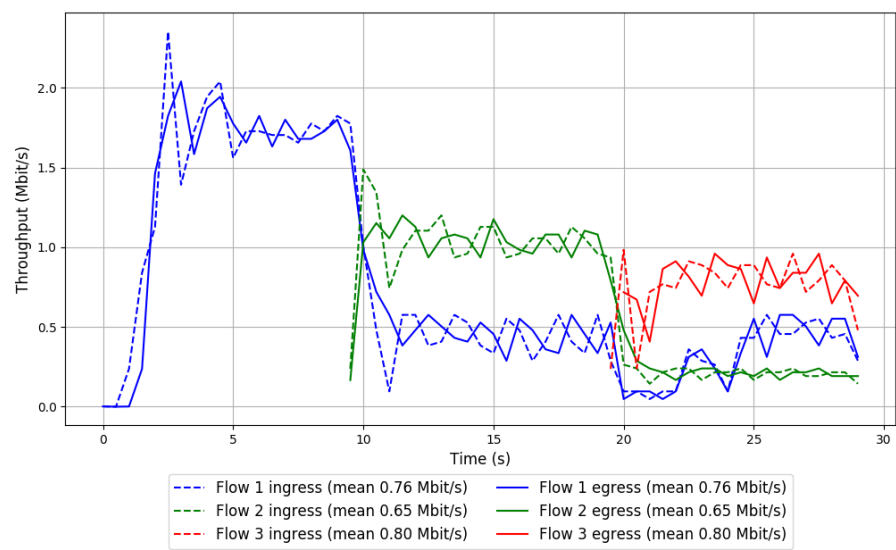


```
Run 1: Statistics of Indigo

Start at: 2018-01-10 15:49:42
End at: 2018-01-10 15:50:12
Local clock offset: 1.697 ms

# Below is generated by plot.py at 2018-01-10 16:37:07
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 303.058 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 303.058 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 324.327 ms
Loss rate: 0.09%
-- Flow 3:
Average throughput: 0.80 Mbit/s
95th percentile per-packet one-way delay: 202.017 ms
Loss rate: 0.64%
```

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2018-01-10 16:05:49

End at: 2018-01-10 16:06:19

Local clock offset: 2.624 ms

Remote clock offset: -4.03 ms

Below is generated by plot.py at 2018-01-10 16:37:07

Datalink statistics

-- Total of 3 flows:

Average throughput: 1.42 Mbit/s

95th percentile per-packet one-way delay: 252.543 ms

Loss rate: 0.54%

-- Flow 1:

Average throughput: 0.47 Mbit/s

95th percentile per-packet one-way delay: 258.708 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 0.89 Mbit/s

95th percentile per-packet one-way delay: 262.498 ms

Loss rate: 0.28%

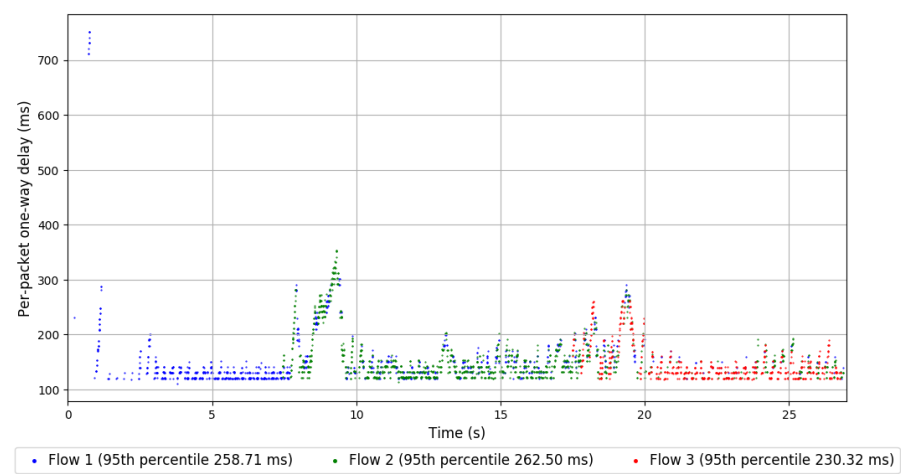
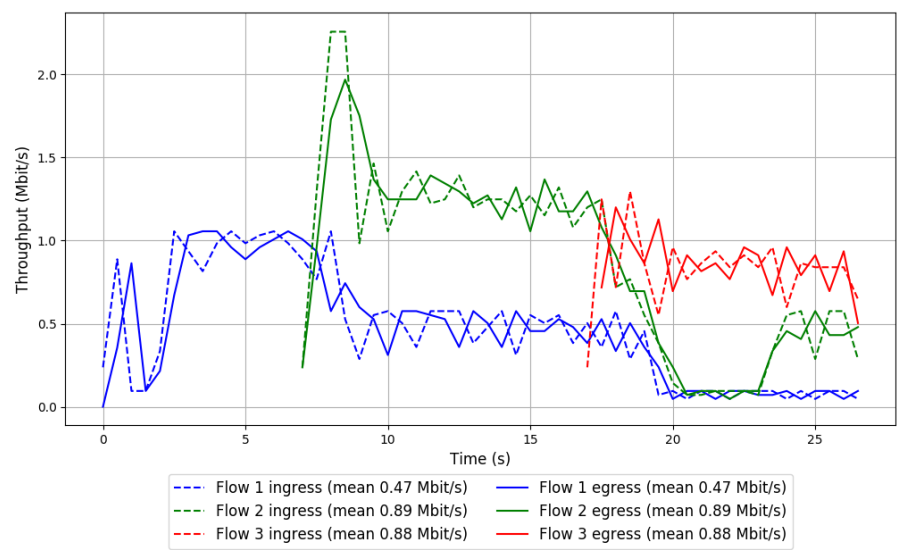
-- Flow 3:

Average throughput: 0.88 Mbit/s

95th percentile per-packet one-way delay: 230.319 ms

Loss rate: 1.88%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-01-10 16:24:35
End at: 2018-01-10 16:25:05
Local clock offset: 2.943 ms
Remote clock offset: -3.503 ms

```
# Below is generated by plot.py at 2018-01-10 16:37:07
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.87 Mbit/s
95th percentile per-packet one-way delay: 179.421 ms
Loss rate: 0.11%
-- Flow 1:
Average throughput: 1.10 Mbit/s
95th percentile per-packet one-way delay: 176.049 ms
Loss rate: 0.15%
-- Flow 2:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 187.105 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 196.100 ms
Loss rate: 0.29%
```

Run 3: Report of Indigo — Data Link

