

Pantheon Report

Generated at 2017-09-22 15:21:15 (UTC).

Data path: AWS Korea Ethernet (*local*) → China 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).

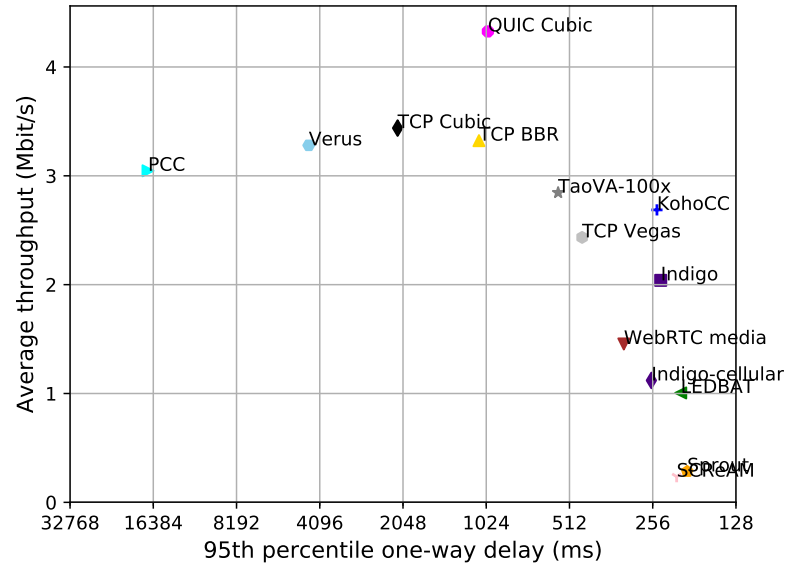
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

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

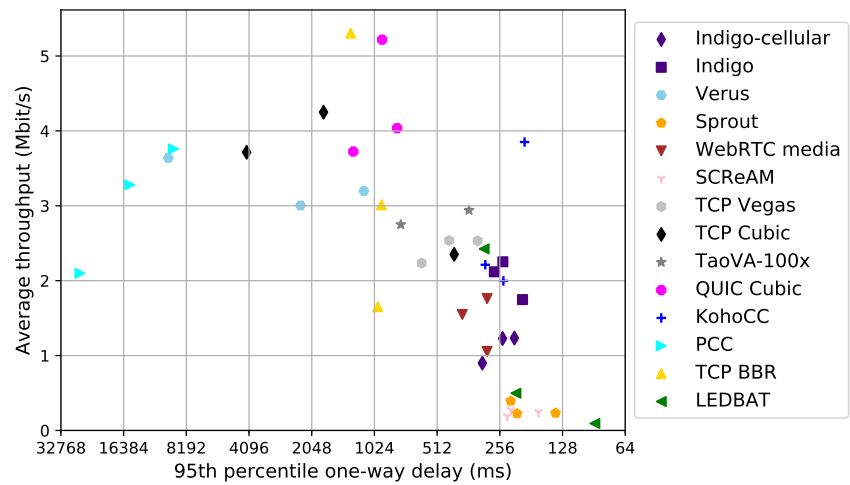
Git summary:

```
branch: indigos @ 46c7c812d4acb71eea4f5fb0b03b3657cea3062f
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
M datagrump/sender.cc
third_party/genericCC @ f7ca42f251bf49b432bb71de6d13fa903515c366
third_party/indigo @ b19f3730105f9aa95452552af924e3719b03cc55
third_party/indigo-cellular @ aee99e8eb842cb053f8c9a80e28cd256a930bbc2
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/indigo-no-cwnd @ 3e58442c04028a11d7b02456e137604633ba2d6c
third_party/indigo-no-delivery-rate @ 57caa40858b964906edff4876d5a7e5bfff666c5
third_party/indigo-no-queuing-delay @ 03455460fd1a8ffbdad86fabb936fdca204b80db
third_party/indigo-no-send-rate @ b39dfa6b2c5f19cb7cd89626cb4f5bb81f9fecda
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ baf443516dea3eeddeccaf9b916cc313273ca4f4
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 @ f1a14bffe749737437f61b1eaeeb30b267cde681
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 Korea Ethernet to China ppp0, 3 runs of 30s each per scheme
3 flows with 10s interval between flows (mean of all runs by scheme)



test from AWS Korea Ethernet to China 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	3	1.52	1.72	2.07	905.90	1066.50	1072.30	33.01	22.12	30.45
TCP Cubic	3	2.44	1.16	0.73	2104.73	2276.53	1550.61	7.49	4.75	21.93
LEDBAT	3	0.61	0.34	0.52	185.08	181.89	203.01	16.40	27.02	28.04
PCC	3	2.86	0.01	0.87	17125.46	9492.32	4893.60	45.60	20.77	55.45
QUIC Cubic	3	3.75	0.64	0.51	994.94	999.56	1073.25	4.70	8.92	14.61
SCReAM	3	0.10	0.14	0.14	183.42	148.99	153.59	8.08	4.46	11.30
WebRTC media	3	0.97	0.35	0.15	355.60	293.59	231.40	0.36	12.76	13.10
Sprout	3	0.12	0.17	0.16	147.38	178.60	152.56	19.93	12.23	15.57
TaoVA-100x	2	1.44	1.40	1.62	278.26	643.25	840.88	38.94	16.82	2.67
TCP Vegas	3	0.48	1.50	2.93	294.01	464.94	392.71	12.38	0.89	1.47
Verus	3	1.15	3.11	0.40	4283.66	1607.59	1535.48	25.64	9.89	22.02
Indigo	3	0.71	1.23	1.63	323.17	129.00	253.27	21.63	48.09	1.11
Indigo-cellular	3	0.51	0.53	0.83	176.21	235.76	220.42	15.83	21.62	42.12
KohoCC	3	0.93	1.52	2.28	161.82	212.15	303.43	76.55	26.20	1.48

Run 1: Statistics of TCP BBR

Start at: 2017-09-22 14:37:52

End at: 2017-09-22 14:38:22

Local clock offset: -2.008 ms

Remote clock offset: -1.64 ms

Below is generated by plot.py at 2017-09-22 15:20:36

Datalink statistics

-- Total of 3 flows:

Average throughput: 1.65 Mbit/s

95th percentile per-packet one-way delay: 986.630 ms

Loss rate: 16.46%

-- Flow 1:

Average throughput: 0.15 Mbit/s

95th percentile per-packet one-way delay: 786.529 ms

Loss rate: 47.42%

-- Flow 2:

Average throughput: 0.06 Mbit/s

95th percentile per-packet one-way delay: 874.048 ms

Loss rate: 55.68%

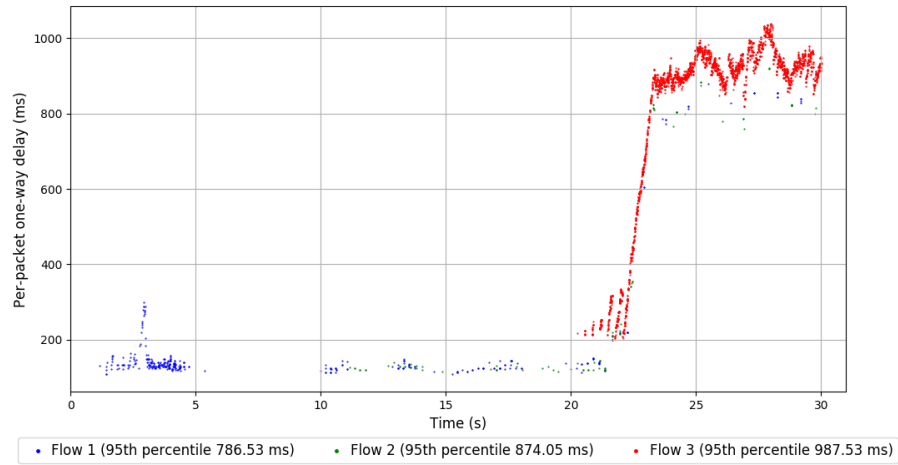
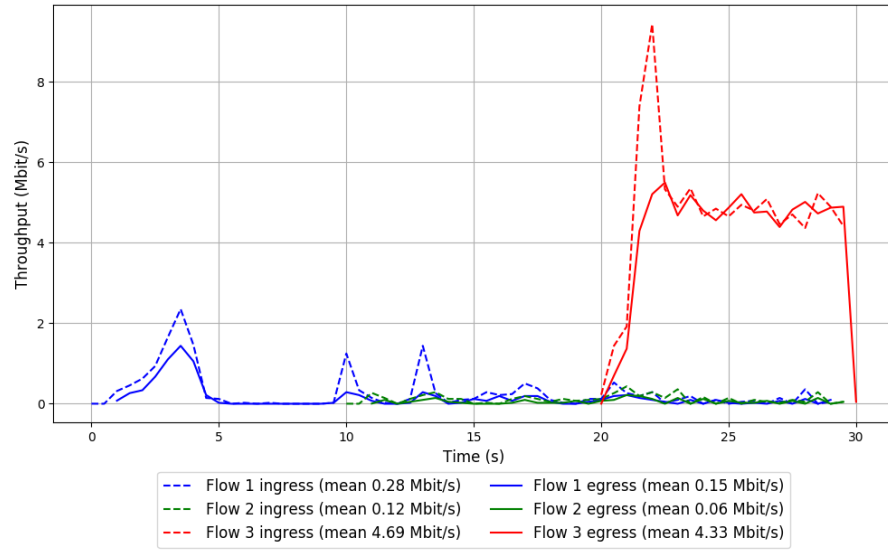
-- Flow 3:

Average throughput: 4.33 Mbit/s

95th percentile per-packet one-way delay: 987.529 ms

Loss rate: 9.00%

Run 1: Report of TCP BBR — Data Link

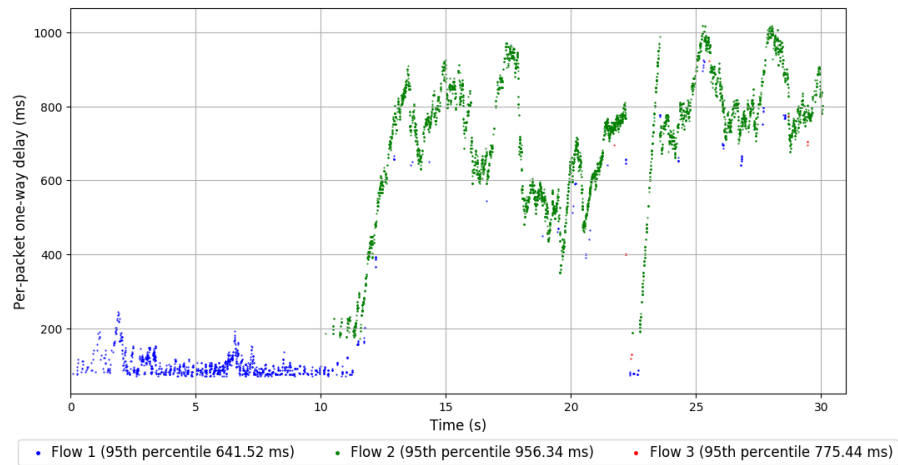
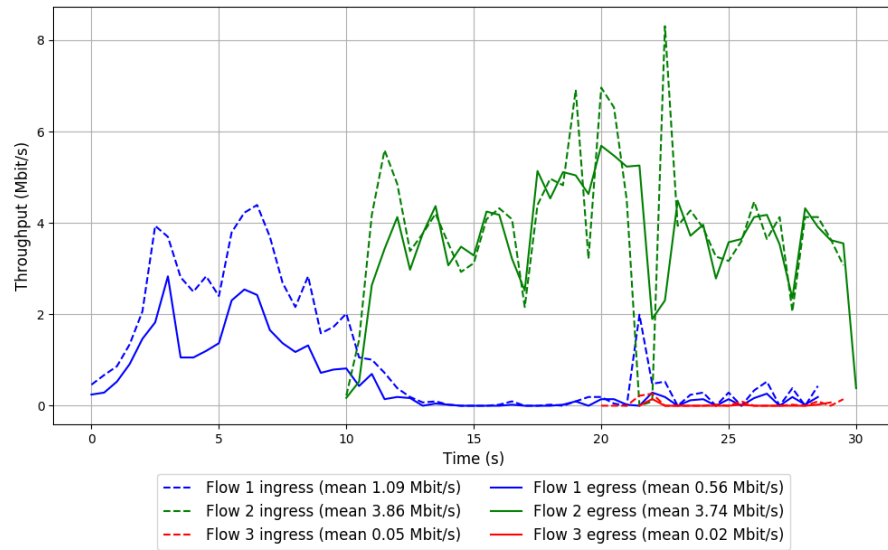


Run 2: Statistics of TCP BBR

Start at: 2017-09-22 14:56:34
End at: 2017-09-22 14:57:04
Local clock offset: -1.776 ms
Remote clock offset: -2.054 ms

Below is generated by plot.py at 2017-09-22 15:20:39
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.01 Mbit/s
95th percentile per-packet one-way delay: 947.410 ms
Loss rate: 16.91%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 641.516 ms
Loss rate: 49.08%
-- Flow 2:
Average throughput: 3.74 Mbit/s
95th percentile per-packet one-way delay: 956.343 ms
Loss rate: 3.58%
-- Flow 3:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 775.441 ms
Loss rate: 69.11%

Run 2: Report of TCP BBR — Data Link

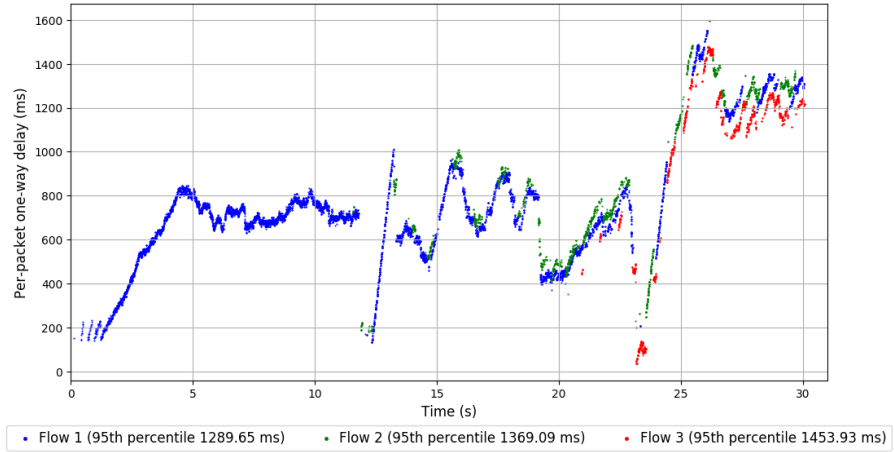
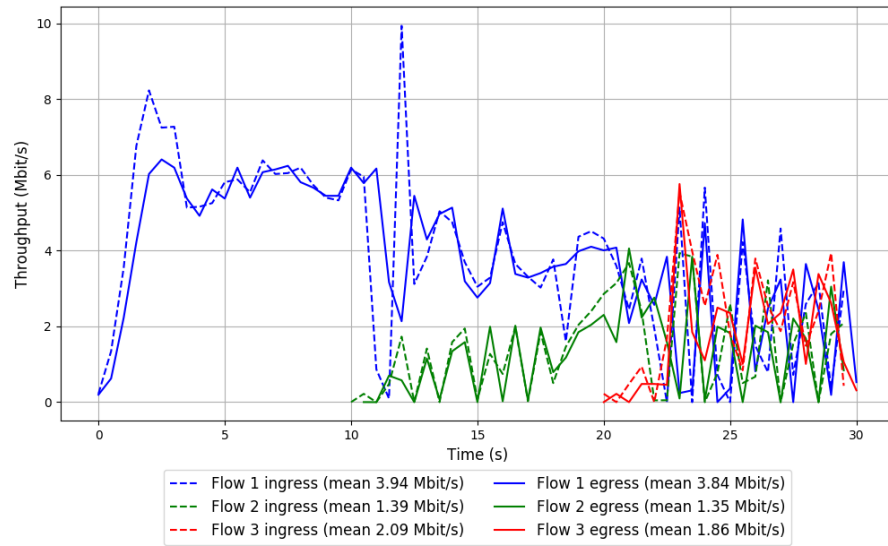


Run 3: Statistics of TCP BBR

Start at: 2017-09-22 15:14:41
End at: 2017-09-22 15:15:11
Local clock offset: -0.369 ms
Remote clock offset: -41.114 ms

Below is generated by plot.py at 2017-09-22 15:20:42
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.30 Mbit/s
95th percentile per-packet one-way delay: 1330.101 ms
Loss rate: 4.63%
-- Flow 1:
Average throughput: 3.84 Mbit/s
95th percentile per-packet one-way delay: 1289.654 ms
Loss rate: 2.53%
-- Flow 2:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 1369.094 ms
Loss rate: 7.09%
-- Flow 3:
Average throughput: 1.86 Mbit/s
95th percentile per-packet one-way delay: 1453.932 ms
Loss rate: 13.23%

Run 3: Report of TCP BBR — Data Link

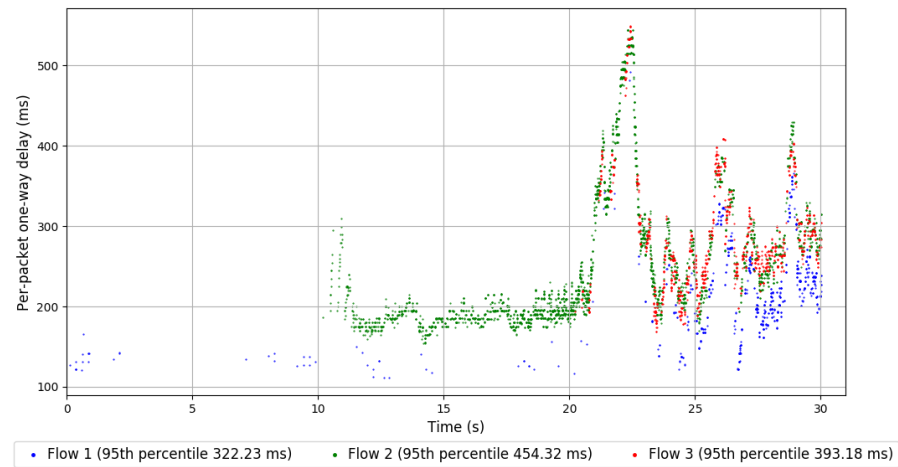
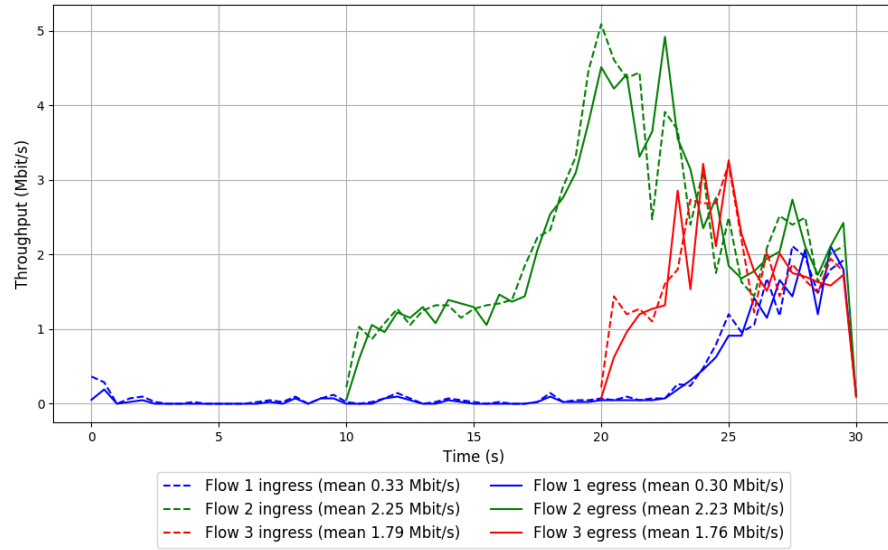


Run 1: Statistics of TCP Cubic

Start at: 2017-09-22 14:28:01
End at: 2017-09-22 14:28:31
Local clock offset: -0.98 ms
Remote clock offset: -1.665 ms

Below is generated by plot.py at 2017-09-22 15:20:42
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.35 Mbit/s
95th percentile per-packet one-way delay: 424.314 ms
Loss rate: 2.97%
-- Flow 1:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 322.228 ms
Loss rate: 9.67%
-- Flow 2:
Average throughput: 2.23 Mbit/s
95th percentile per-packet one-way delay: 454.317 ms
Loss rate: 1.45%
-- Flow 3:
Average throughput: 1.76 Mbit/s
95th percentile per-packet one-way delay: 393.176 ms
Loss rate: 3.10%

Run 1: Report of TCP Cubic — Data Link

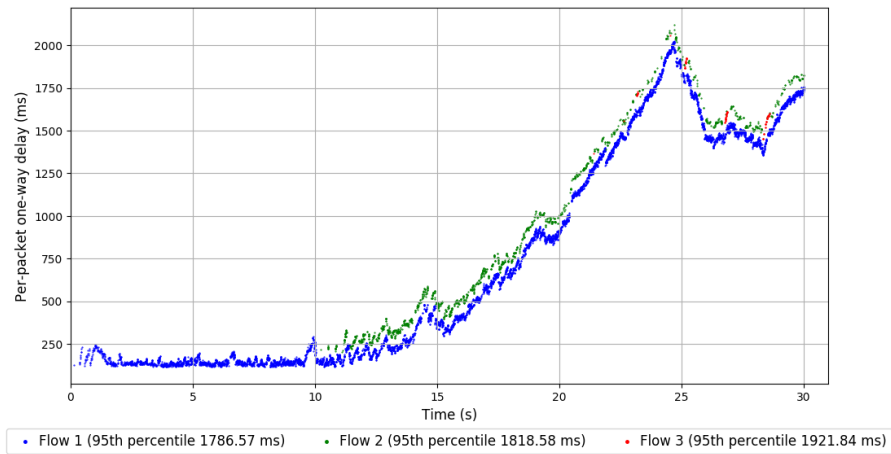
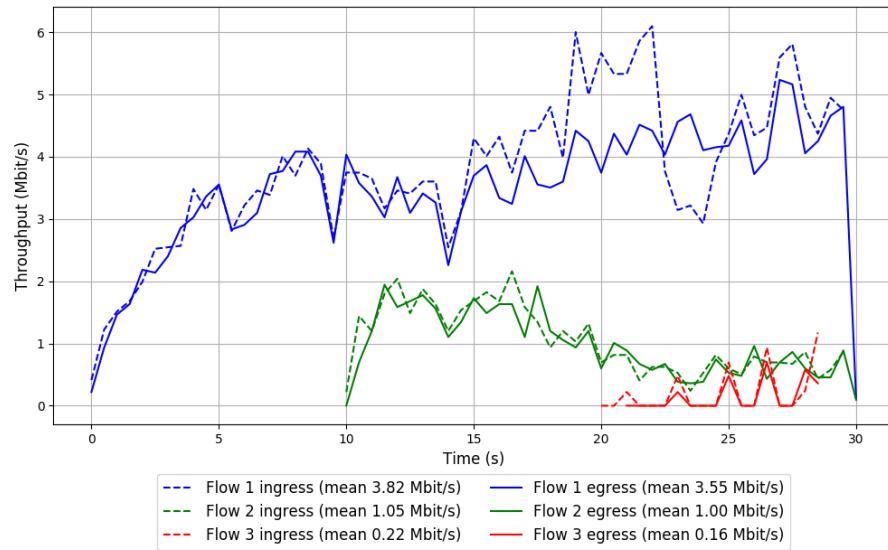


Run 2: Statistics of TCP Cubic

Start at: 2017-09-22 14:45:30
End at: 2017-09-22 14:46:00
Local clock offset: -1.937 ms
Remote clock offset: -1.326 ms

Below is generated by plot.py at 2017-09-22 15:20:42
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.25 Mbit/s
95th percentile per-packet one-way delay: 1797.290 ms
Loss rate: 7.40%
-- Flow 1:
Average throughput: 3.55 Mbit/s
95th percentile per-packet one-way delay: 1786.571 ms
Loss rate: 7.19%
-- Flow 2:
Average throughput: 1.00 Mbit/s
95th percentile per-packet one-way delay: 1818.576 ms
Loss rate: 5.83%
-- Flow 3:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 1921.839 ms
Loss rate: 37.74%

Run 2: Report of TCP Cubic — Data Link

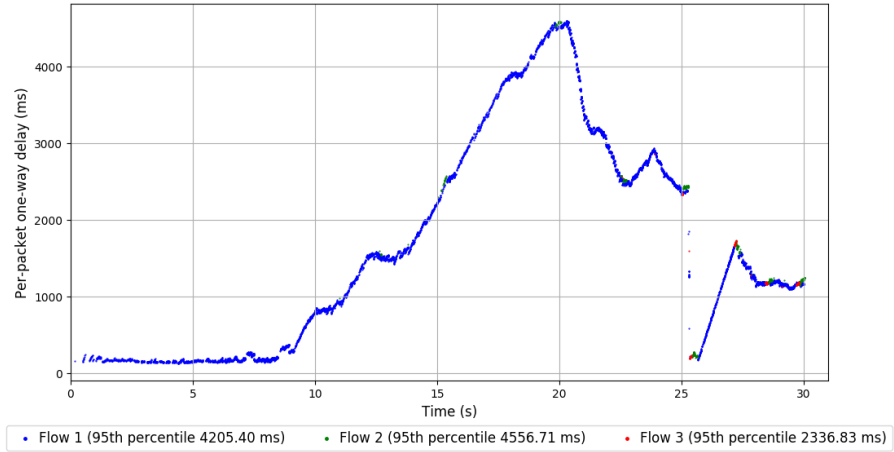
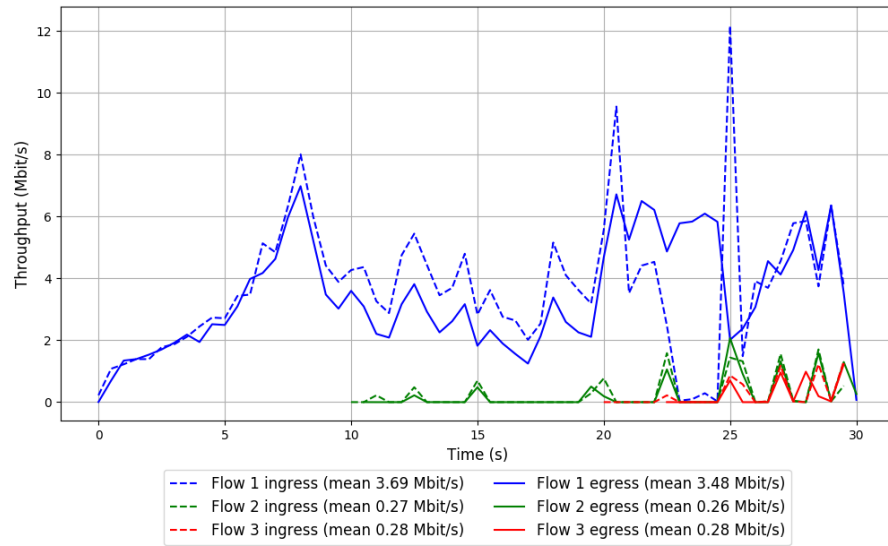


Run 3: Statistics of TCP Cubic

Start at: 2017-09-22 15:03:56
End at: 2017-09-22 15:04:26
Local clock offset: 17.599 ms
Remote clock offset: -1.693 ms

Below is generated by plot.py at 2017-09-22 15:20:42
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.72 Mbit/s
95th percentile per-packet one-way delay: 4205.304 ms
Loss rate: 6.13%
-- Flow 1:
Average throughput: 3.48 Mbit/s
95th percentile per-packet one-way delay: 4205.398 ms
Loss rate: 5.62%
-- Flow 2:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 4556.710 ms
Loss rate: 6.96%
-- Flow 3:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 2336.828 ms
Loss rate: 24.96%

Run 3: Report of TCP Cubic — Data Link

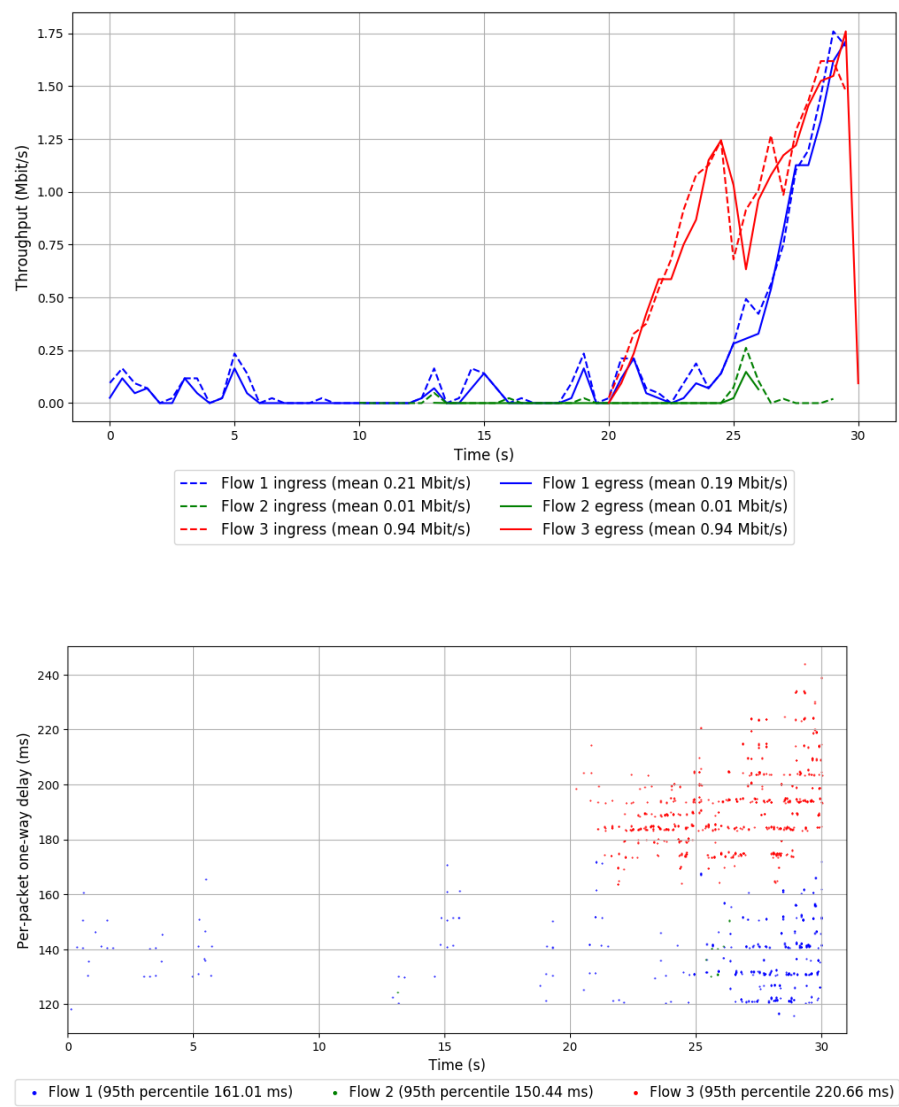


```
Run 1: Statistics of LEDBAT

Start at: 2017-09-22 14:25:35
End at: 2017-09-22 14:26:05
Local clock offset: -2.137 ms
Remote clock offset: -1.5 ms

# Below is generated by plot.py at 2017-09-22 15:20:42
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 214.362 ms
Loss rate: 7.54%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 161.012 ms
Loss rate: 13.16%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 150.437 ms
Loss rate: 58.83%
-- Flow 3:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 220.656 ms
Loss rate: 2.12%
```


Run 1: Report of LEDBAT — Data Link

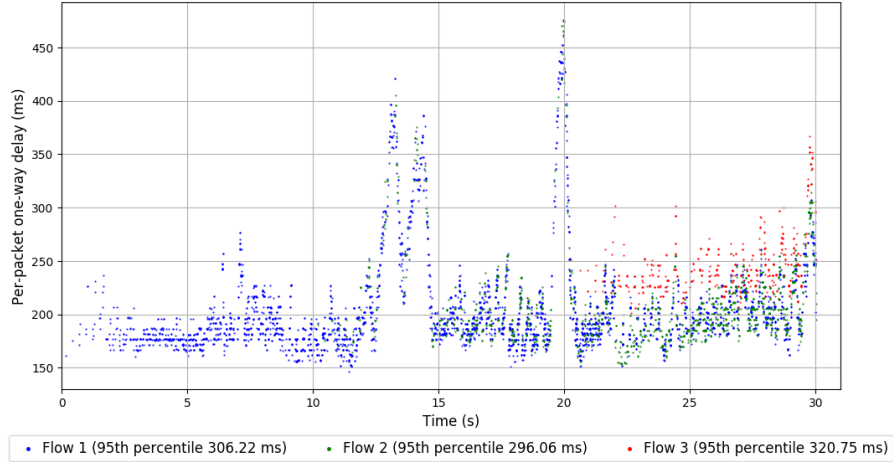
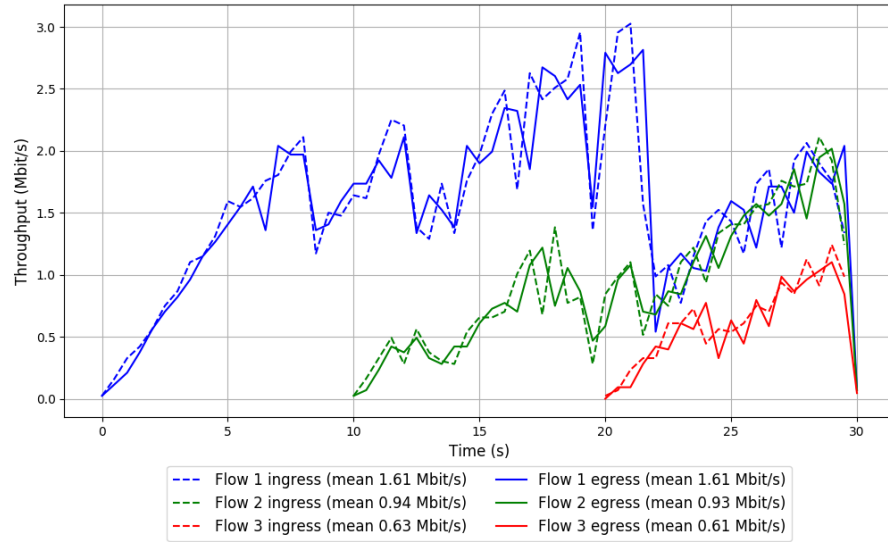


Run 2: Statistics of LEDBAT

Start at: 2017-09-22 14:42:57
End at: 2017-09-22 14:43:27
Local clock offset: -0.777 ms
Remote clock offset: -2.063 ms

Below is generated by plot.py at 2017-09-22 15:20:42
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.42 Mbit/s
95th percentile per-packet one-way delay: 304.478 ms
Loss rate: 1.25%
-- Flow 1:
Average throughput: 1.61 Mbit/s
95th percentile per-packet one-way delay: 306.223 ms
Loss rate: 0.39%
-- Flow 2:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 296.060 ms
Loss rate: 1.94%
-- Flow 3:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 320.750 ms
Loss rate: 5.77%

Run 2: Report of LEDBAT — Data Link

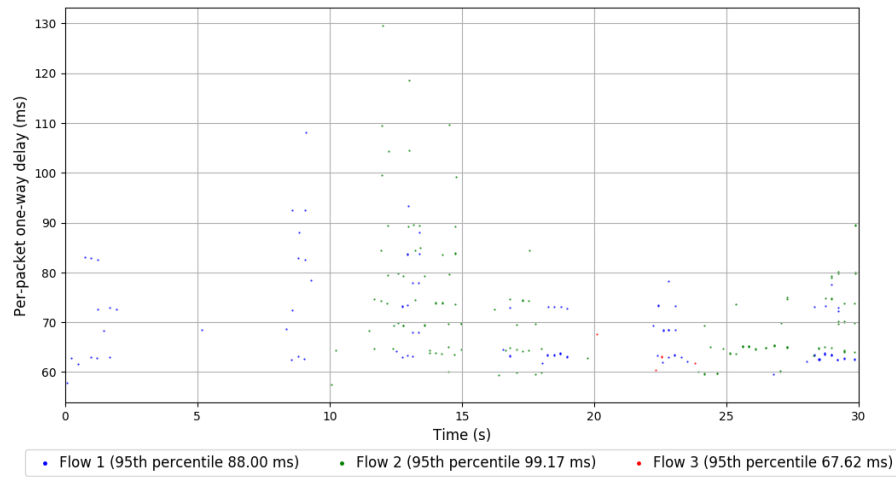
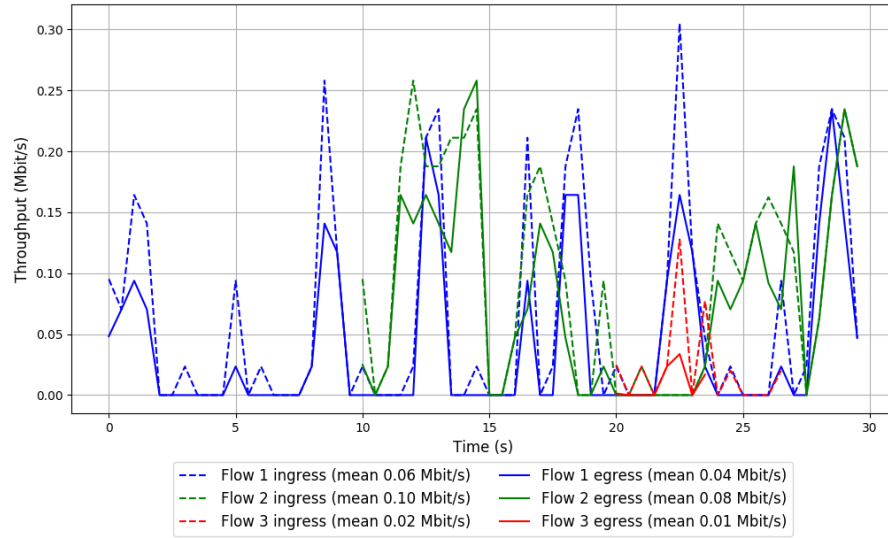


Run 3: Statistics of LEDBAT

Start at: 2017-09-22 15:01:32
End at: 2017-09-22 15:02:02
Local clock offset: 17.953 ms
Remote clock offset: -2.509 ms

Below is generated by plot.py at 2017-09-22 15:20:42
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 89.571 ms
Loss rate: 29.66%
-- Flow 1:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 88.000 ms
Loss rate: 35.66%
-- Flow 2:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 99.166 ms
Loss rate: 20.29%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 67.618 ms
Loss rate: 76.24%

Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of PCC

Start at: 2017-09-22 14:40:27

End at: 2017-09-22 14:40:57

Local clock offset: -2.027 ms

Remote clock offset: -1.53 ms

Below is generated by plot.py at 2017-09-22 15:20:49

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.10 Mbit/s

95th percentile per-packet one-way delay: 26578.091 ms

Loss rate: 83.24%

-- Flow 1:

Average throughput: 2.10 Mbit/s

95th percentile per-packet one-way delay: 26578.091 ms

Loss rate: 83.23%

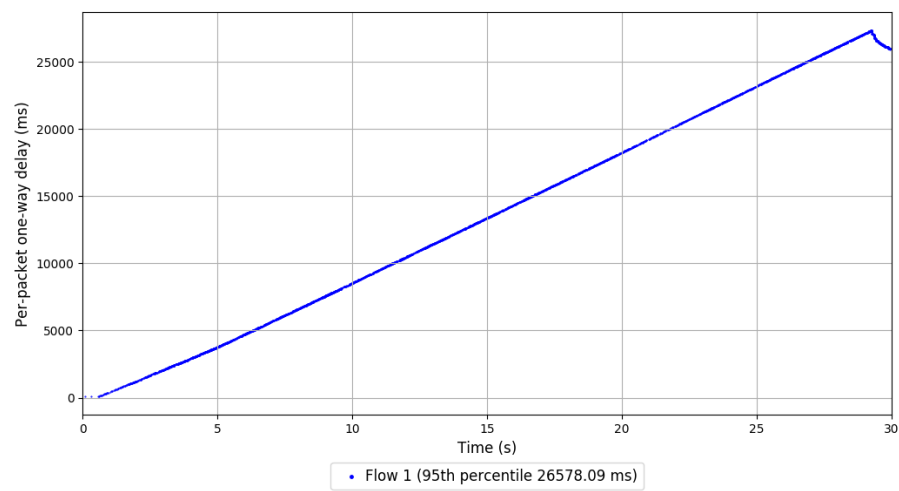
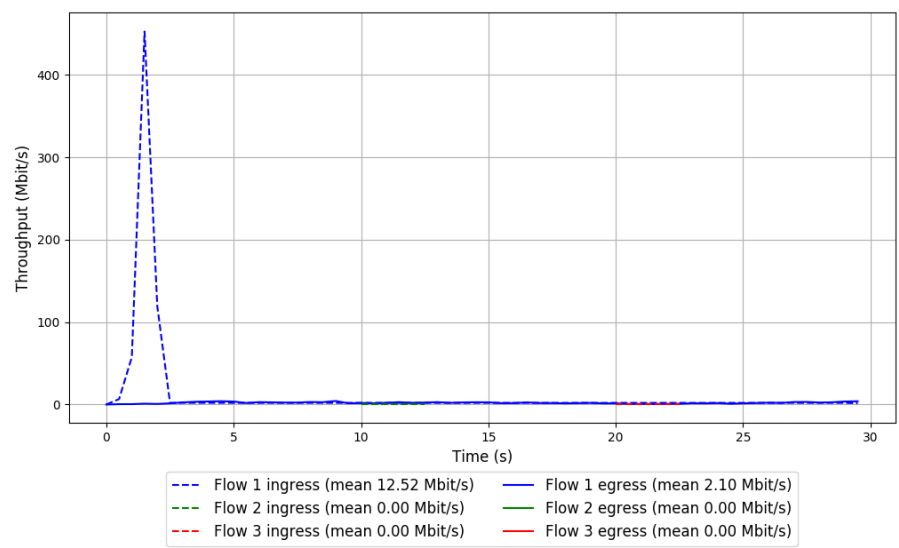
-- Flow 2:

Average throughput: 0.00 Mbit/s

-- Flow 3:

Average throughput: 0.00 Mbit/s

Run 1: Report of PCC — Data Link

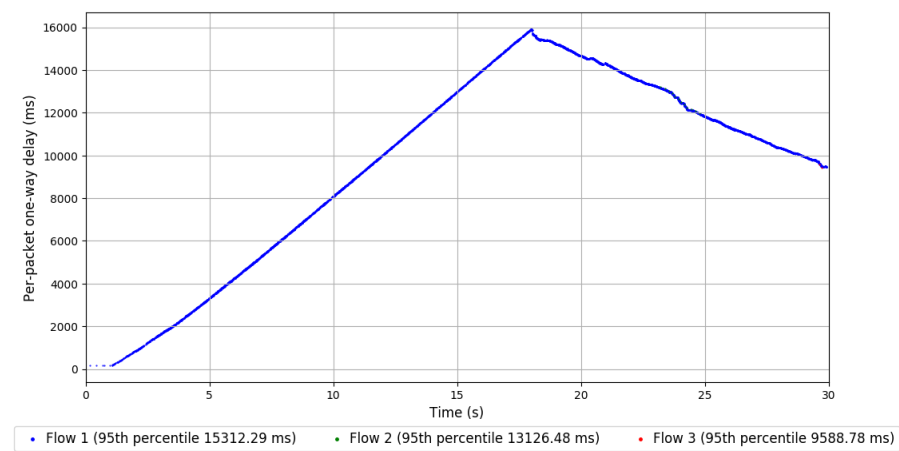
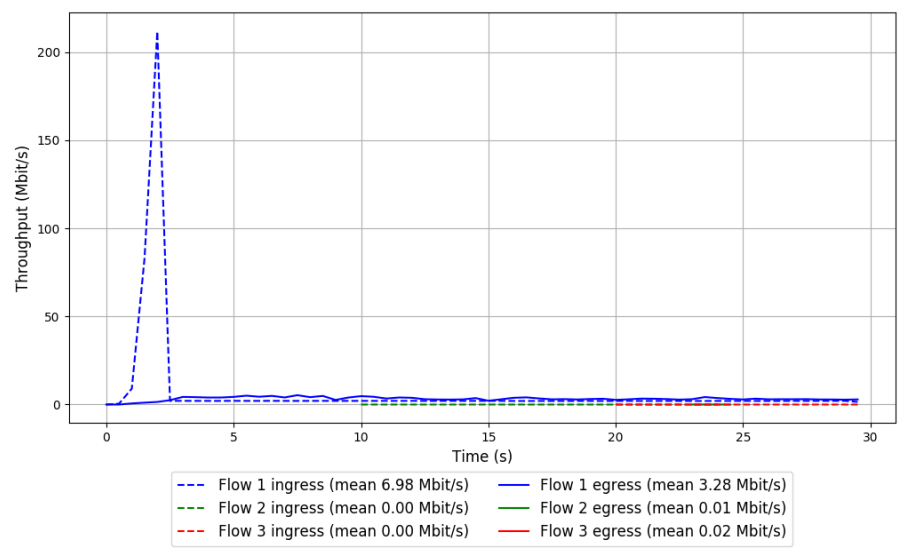


Run 2: Statistics of PCC

Start at: 2017-09-22 14:59:03
End at: 2017-09-22 14:59:33
Local clock offset: -1.719 ms
Remote clock offset: -1.645 ms

Below is generated by plot.py at 2017-09-22 15:20:49
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.28 Mbit/s
95th percentile per-packet one-way delay: 15312.293 ms
Loss rate: 53.19%
-- Flow 1:
Average throughput: 3.28 Mbit/s
95th percentile per-packet one-way delay: 15312.293 ms
Loss rate: 53.19%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 13126.483 ms
Loss rate: 41.55%
-- Flow 3:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 9588.783 ms
Loss rate: 86.15%

Run 2: Report of PCC — Data Link

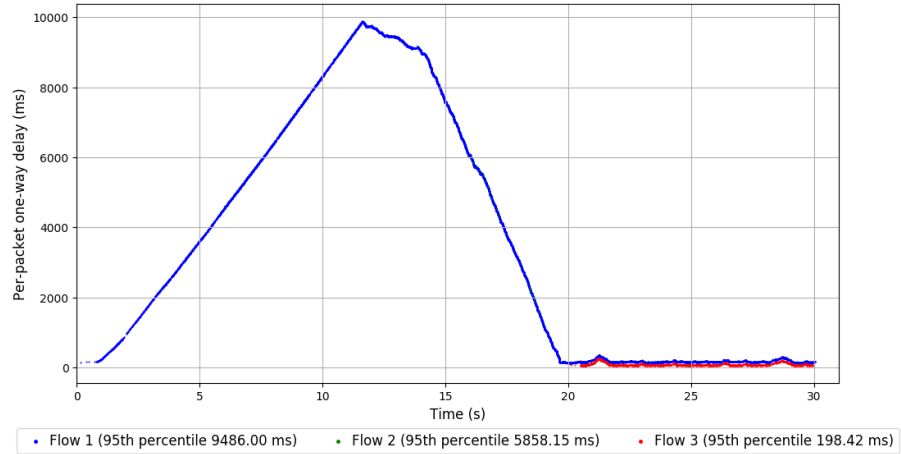
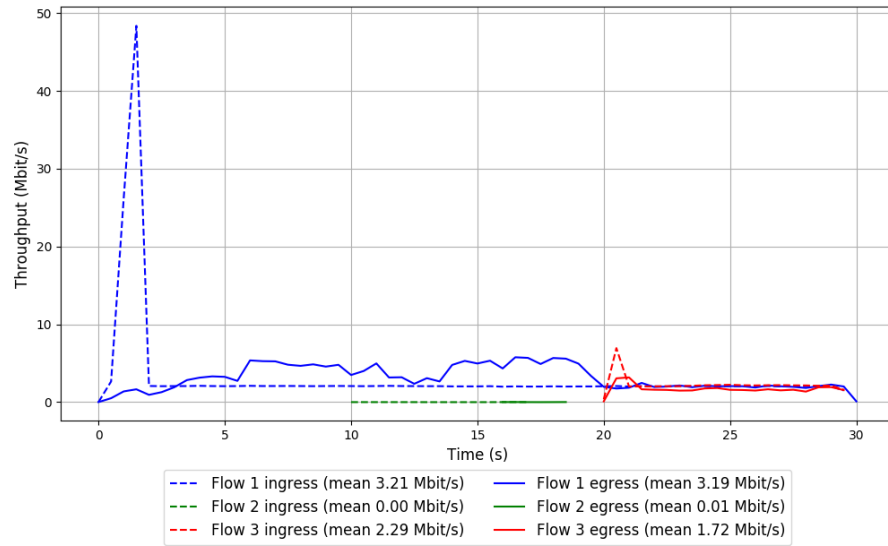


Run 3: Statistics of PCC

Start at: 2017-09-22 15:17:42
End at: 2017-09-22 15:18:12
Local clock offset: -0.336 ms
Remote clock offset: -26.691 ms

Below is generated by plot.py at 2017-09-22 15:20:49
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.76 Mbit/s
95th percentile per-packet one-way delay: 9455.807 ms
Loss rate: 5.03%
-- Flow 1:
Average throughput: 3.19 Mbit/s
95th percentile per-packet one-way delay: 9486.004 ms
Loss rate: 0.39%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 5858.148 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 1.72 Mbit/s
95th percentile per-packet one-way delay: 198.418 ms
Loss rate: 24.75%

Run 3: Report of PCC — Data Link

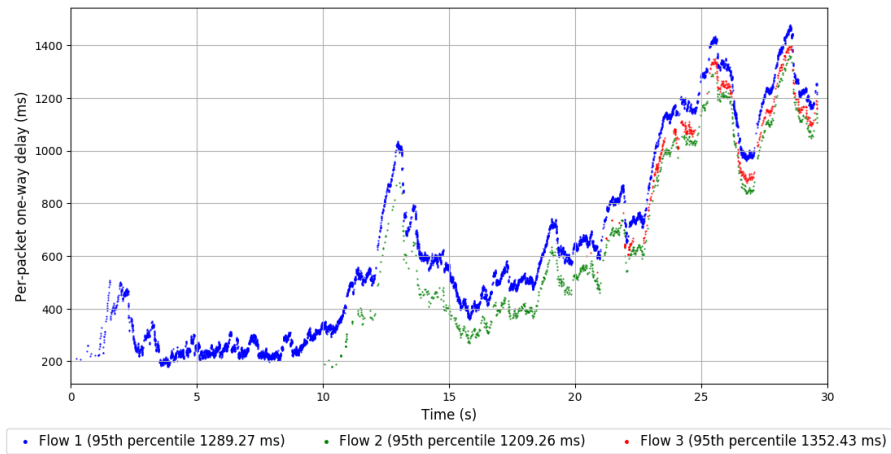
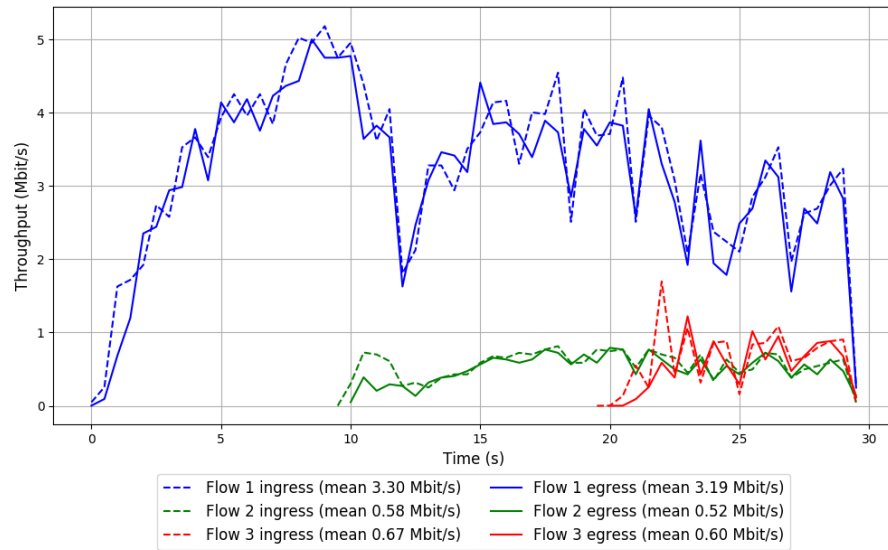


Run 1: Statistics of QUIC Cubic

Start at: 2017-09-22 14:39:05
End at: 2017-09-22 14:39:35
Local clock offset: -1.873 ms
Remote clock offset: -1.711 ms

Below is generated by plot.py at 2017-09-22 15:20:49
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.72 Mbit/s
95th percentile per-packet one-way delay: 1293.778 ms
Loss rate: 5.24%
-- Flow 1:
Average throughput: 3.19 Mbit/s
95th percentile per-packet one-way delay: 1289.266 ms
Loss rate: 3.91%
-- Flow 2:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 1209.260 ms
Loss rate: 10.99%
-- Flow 3:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 1352.433 ms
Loss rate: 15.29%

Run 1: Report of QUIC Cubic — Data Link

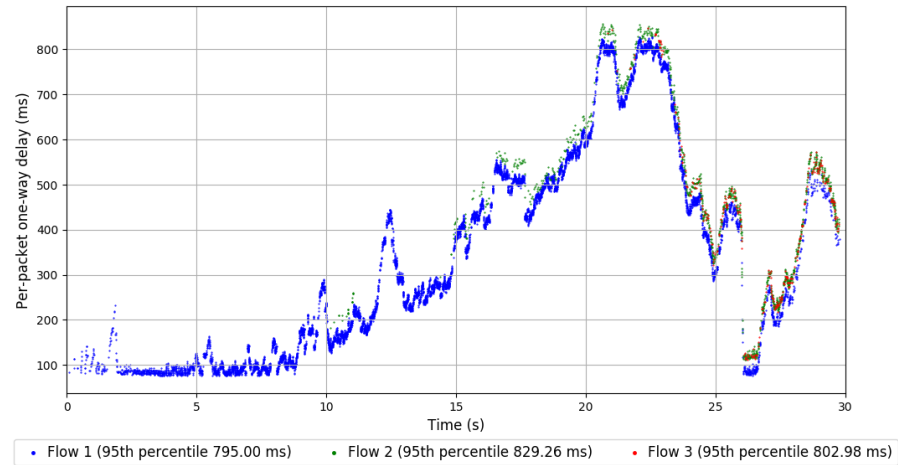
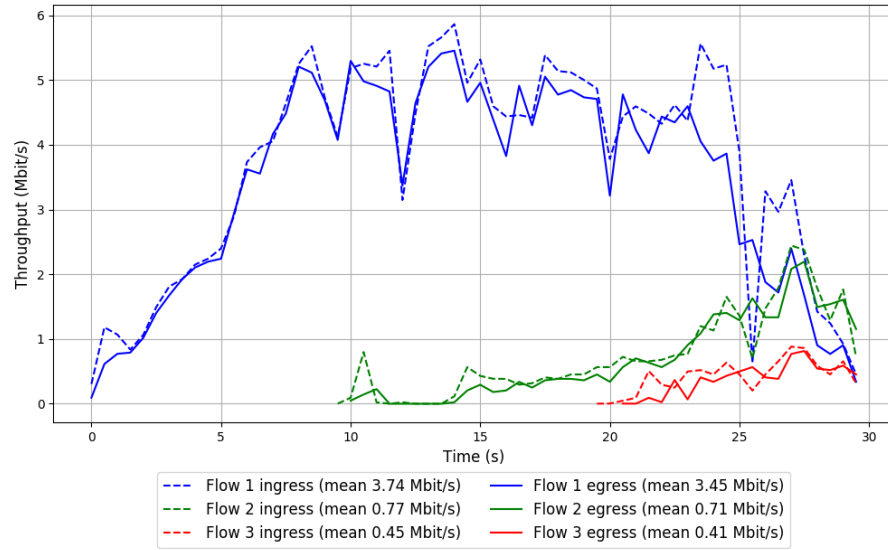


Run 2: Statistics of QUIC Cubic

Start at: 2017-09-22 14:57:49
End at: 2017-09-22 14:58:19
Local clock offset: -1.76 ms
Remote clock offset: -2.818 ms

Below is generated by plot.py at 2017-09-22 15:20:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.04 Mbit/s
95th percentile per-packet one-way delay: 796.899 ms
Loss rate: 8.15%
-- Flow 1:
Average throughput: 3.45 Mbit/s
95th percentile per-packet one-way delay: 794.995 ms
Loss rate: 7.80%
-- Flow 2:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 829.261 ms
Loss rate: 7.95%
-- Flow 3:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 802.980 ms
Loss rate: 17.47%

Run 2: Report of QUIC Cubic — Data Link

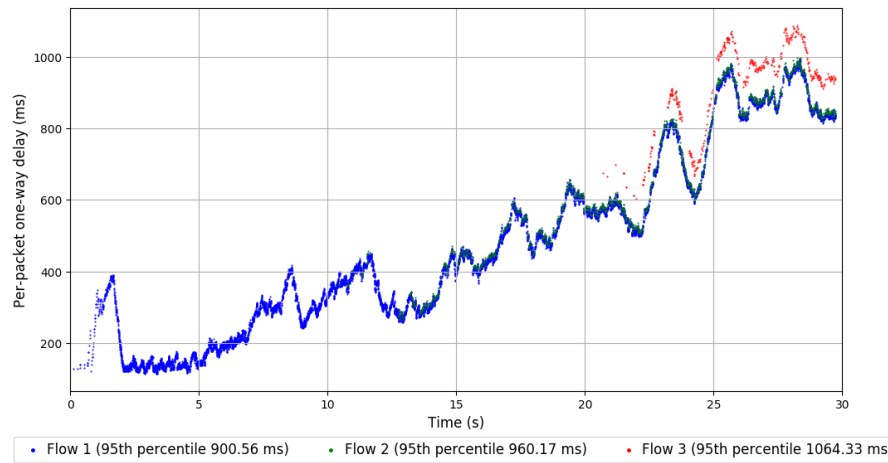
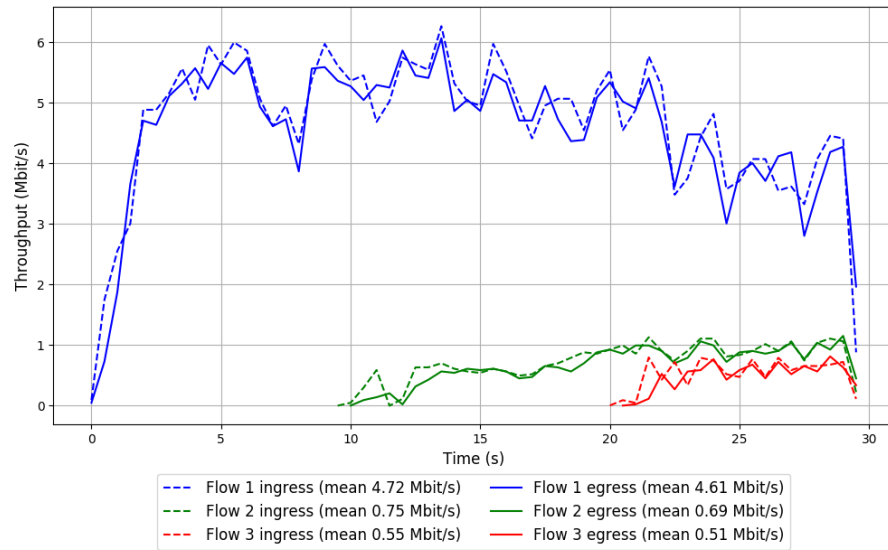


Run 3: Statistics of QUIC Cubic

Start at: 2017-09-22 15:16:20
End at: 2017-09-22 15:16:50
Local clock offset: -1.393 ms
Remote clock offset: -1.409 ms

Below is generated by plot.py at 2017-09-22 15:20:54
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.22 Mbit/s
95th percentile per-packet one-way delay: 940.282 ms
Loss rate: 3.18%
-- Flow 1:
Average throughput: 4.61 Mbit/s
95th percentile per-packet one-way delay: 900.556 ms
Loss rate: 2.40%
-- Flow 2:
Average throughput: 0.69 Mbit/s
95th percentile per-packet one-way delay: 960.170 ms
Loss rate: 7.81%
-- Flow 3:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 1064.333 ms
Loss rate: 11.07%

Run 3: Report of QUIC Cubic — Data Link

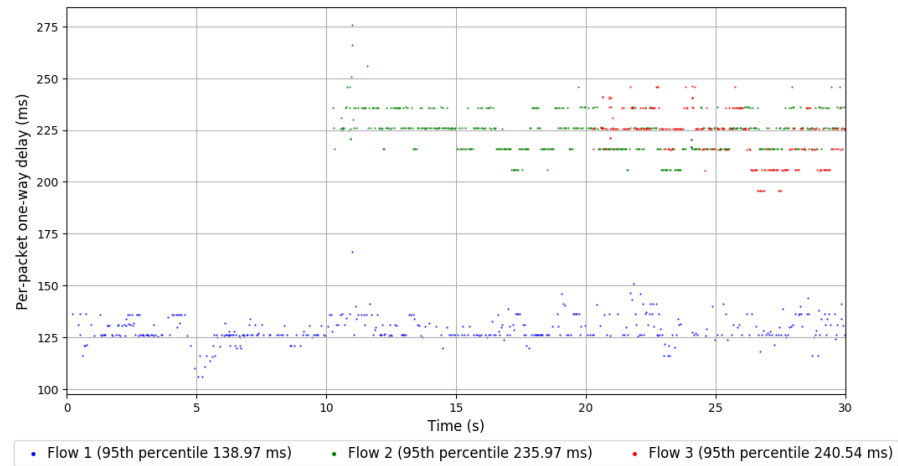
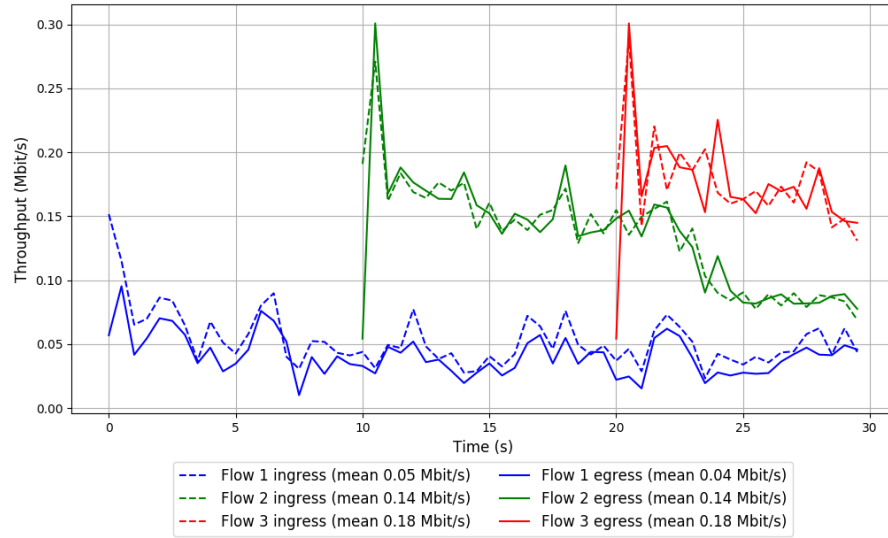


Run 1: Statistics of SCReAM

Start at: 2017-09-22 14:35:28
End at: 2017-09-22 14:35:58
Local clock offset: -1.979 ms
Remote clock offset: -1.586 ms

Below is generated by plot.py at 2017-09-22 15:20:54
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 235.943 ms
Loss rate: 6.93%
-- Flow 1:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 138.973 ms
Loss rate: 22.54%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 235.965 ms
Loss rate: 1.06%
-- Flow 3:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 240.538 ms
Loss rate: 1.79%

Run 1: Report of SReAM — Data Link

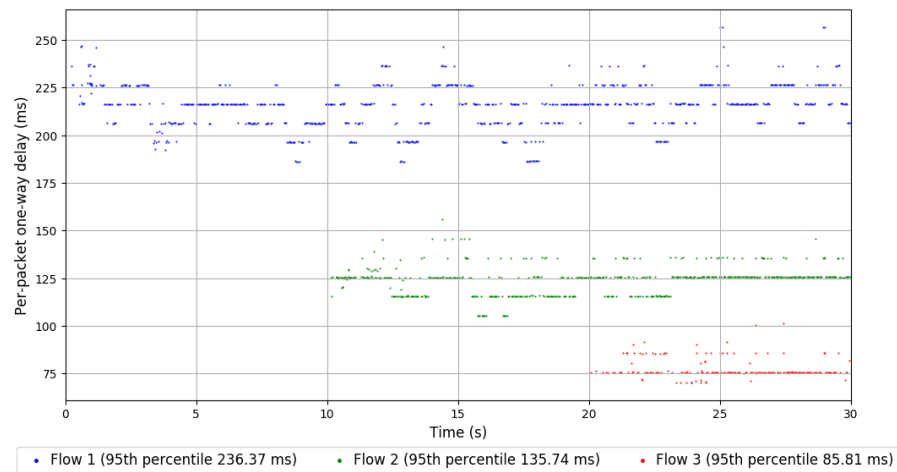
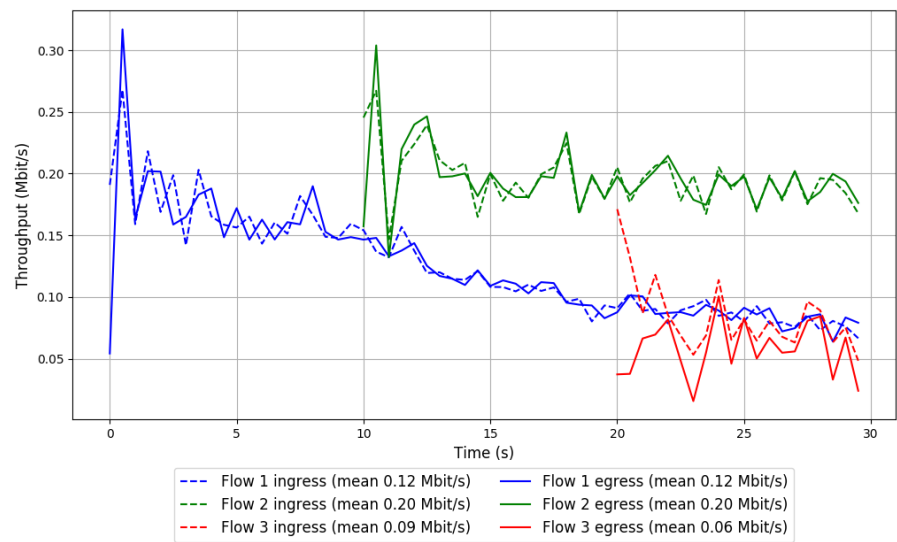


Run 2: Statistics of SReAM

Start at: 2017-09-22 14:53:33
End at: 2017-09-22 14:54:03
Local clock offset: -0.576 ms
Remote clock offset: -1.756 ms

Below is generated by plot.py at 2017-09-22 15:20:54
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 226.438 ms
Loss rate: 3.71%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 236.366 ms
Loss rate: 0.87%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 135.735 ms
Loss rate: 0.39%
-- Flow 3:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 85.805 ms
Loss rate: 31.63%

Run 2: Report of SReAM — Data Link

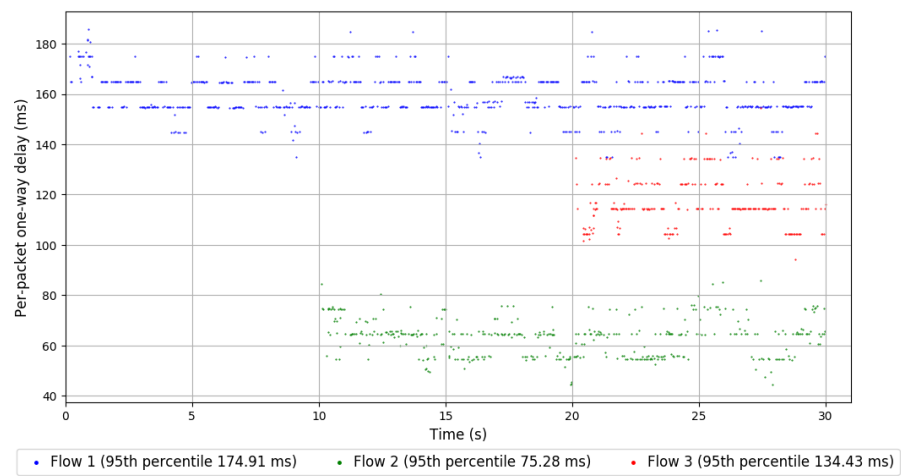
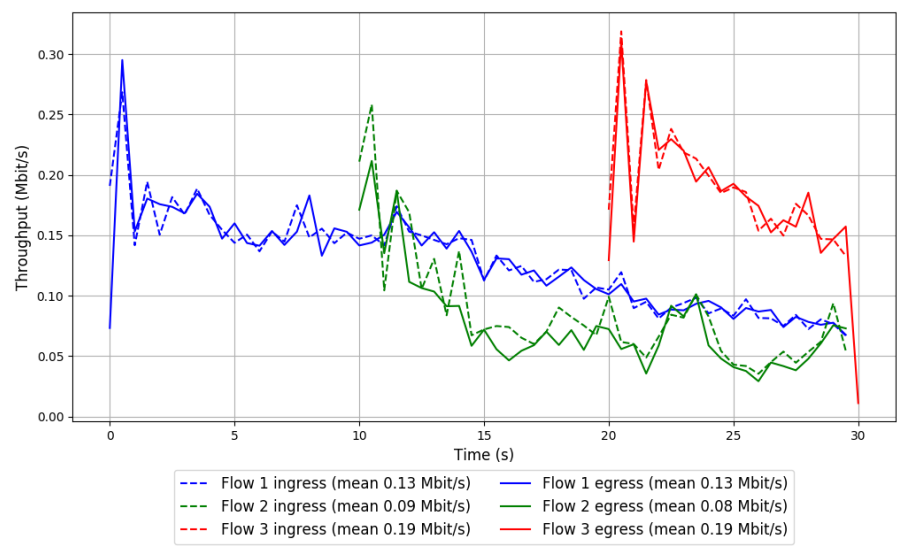


Run 3: Statistics of SCReAM

Start at: 2017-09-22 15:12:03
End at: 2017-09-22 15:12:33
Local clock offset: 14.98 ms
Remote clock offset: -47.518 ms

Below is generated by plot.py at 2017-09-22 15:20:54
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 166.883 ms
Loss rate: 3.30%
-- Flow 1:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 174.909 ms
Loss rate: 0.83%
-- Flow 2:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 75.275 ms
Loss rate: 11.93%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 134.430 ms
Loss rate: 0.48%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of WebRTC media

Start at: 2017-09-22 14:36:40

End at: 2017-09-22 14:37:10

Local clock offset: -1.969 ms

Remote clock offset: -2.03 ms

Below is generated by plot.py at 2017-09-22 15:20:55

Datalink statistics

-- Total of 3 flows:

Average throughput: 1.55 Mbit/s

95th percentile per-packet one-way delay: 387.611 ms

Loss rate: 2.03%

-- Flow 1:

Average throughput: 1.05 Mbit/s

95th percentile per-packet one-way delay: 388.752 ms

Loss rate: 0.74%

-- Flow 2:

Average throughput: 0.47 Mbit/s

95th percentile per-packet one-way delay: 388.353 ms

Loss rate: 0.62%

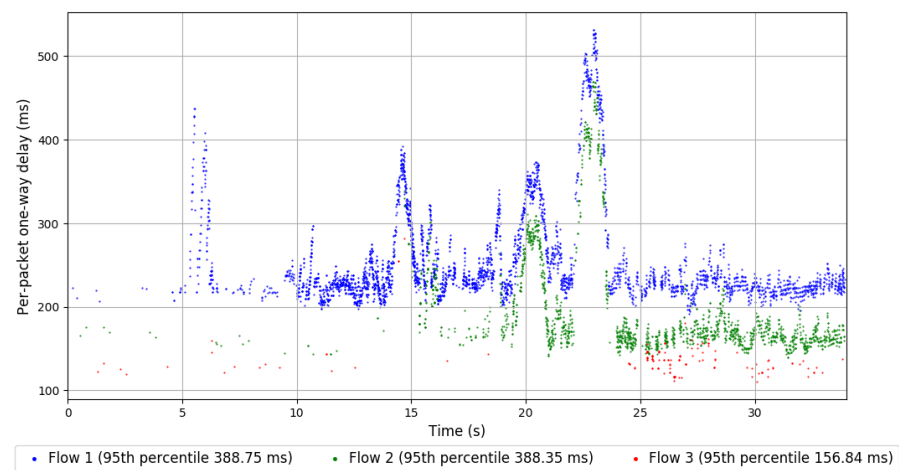
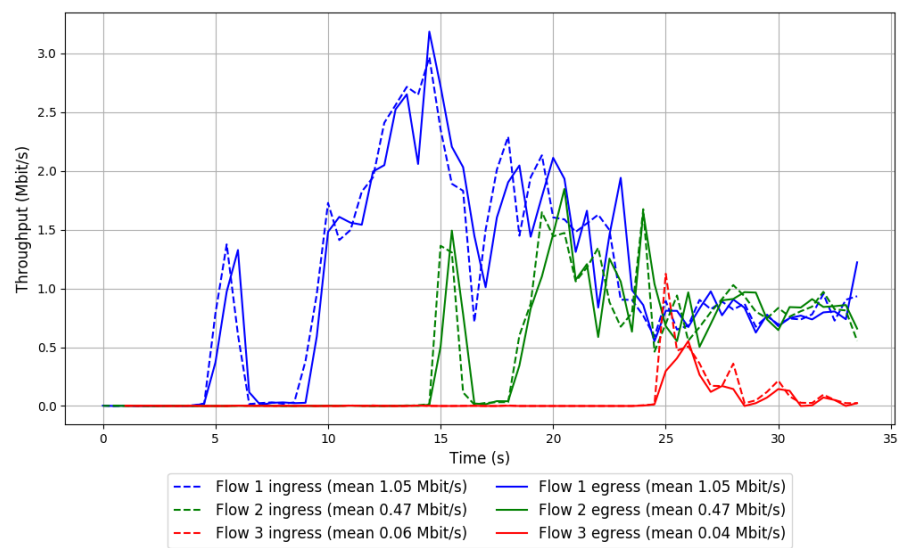
-- Flow 3:

Average throughput: 0.04 Mbit/s

95th percentile per-packet one-way delay: 156.840 ms

Loss rate: 36.28%

Run 1: Report of WebRTC media — Data Link



Run 2: Statistics of WebRTC media

Start at: 2017-09-22 14:54:45

End at: 2017-09-22 14:55:15

Local clock offset: -1.654 ms

Remote clock offset: -1.59 ms

Below is generated by plot.py at 2017-09-22 15:20:55

Datalink statistics

-- Total of 3 flows:

Average throughput: 1.06 Mbit/s

95th percentile per-packet one-way delay: 294.862 ms

Loss rate: 2.59%

-- Flow 1:

Average throughput: 0.91 Mbit/s

95th percentile per-packet one-way delay: 273.097 ms

Loss rate: 0.02%

-- Flow 2:

Average throughput: 0.04 Mbit/s

95th percentile per-packet one-way delay: 308.473 ms

Loss rate: 36.80%

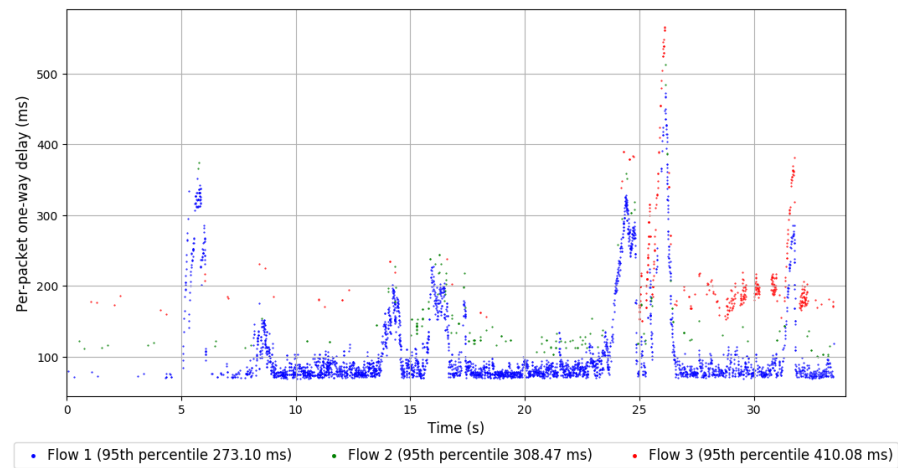
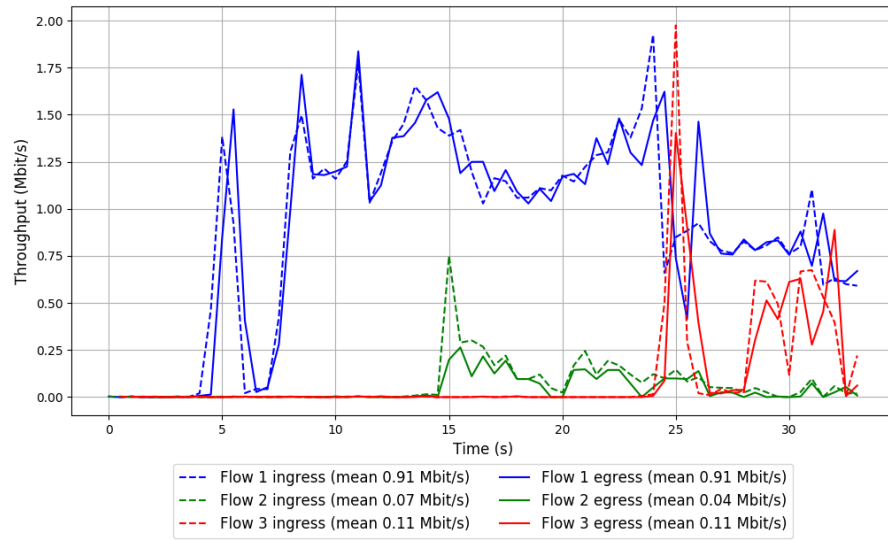
-- Flow 3:

Average throughput: 0.11 Mbit/s

95th percentile per-packet one-way delay: 410.085 ms

Loss rate: 2.45%

Run 2: Report of WebRTC media — Data Link

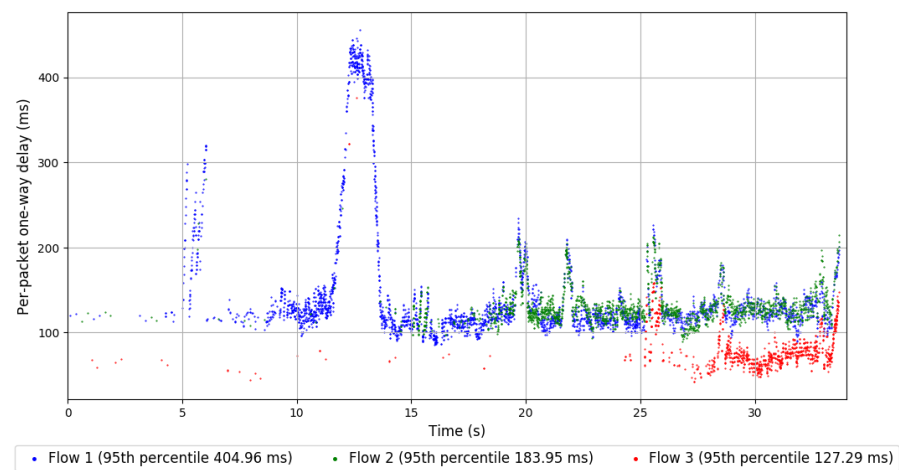
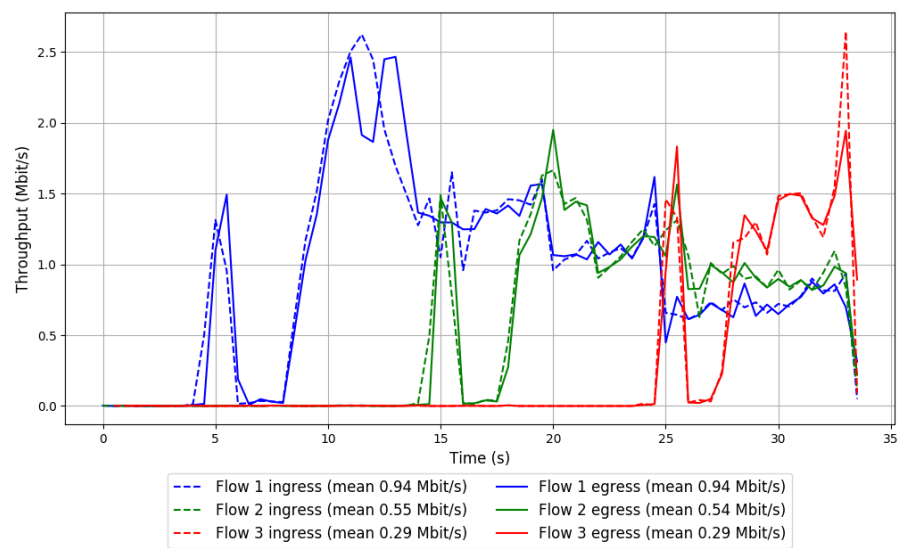


Run 3: Statistics of WebRTC media

Start at: 2017-09-22 15:13:21
End at: 2017-09-22 15:13:51
Local clock offset: 18.001 ms
Remote clock offset: -44.18 ms

Below is generated by plot.py at 2017-09-22 15:20:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.76 Mbit/s
95th percentile per-packet one-way delay: 294.528 ms
Loss rate: 0.52%
-- Flow 1:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 404.958 ms
Loss rate: 0.32%
-- Flow 2:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 183.954 ms
Loss rate: 0.85%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 127.290 ms
Loss rate: 0.56%

Run 3: Report of WebRTC media — Data Link

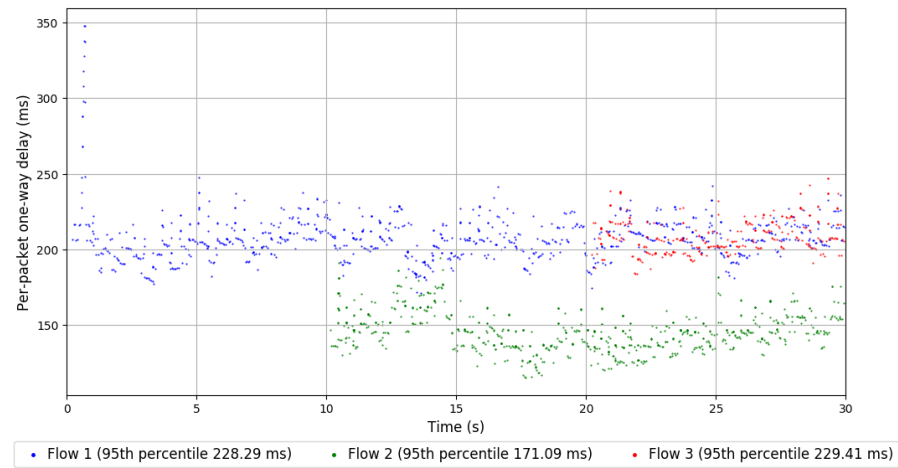
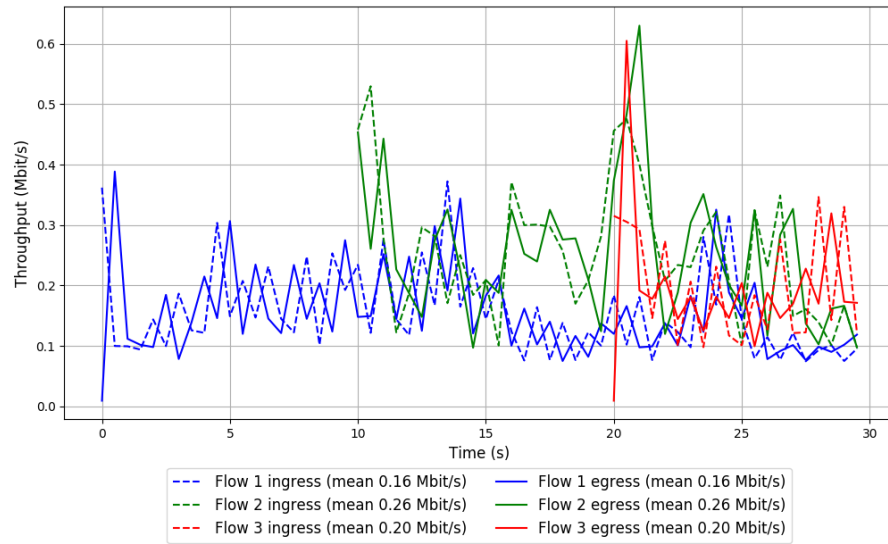


Run 1: Statistics of Sprout

Start at: 2017-09-22 14:26:48
End at: 2017-09-22 14:27:18
Local clock offset: 19.515 ms
Remote clock offset: -1.343 ms

Below is generated by plot.py at 2017-09-22 15:20:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 226.886 ms
Loss rate: 0.74%
-- Flow 1:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 228.295 ms
Loss rate: 0.32%
-- Flow 2:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 171.094 ms
Loss rate: 0.29%
-- Flow 3:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 229.407 ms
Loss rate: 2.86%

Run 1: Report of Sprout — Data Link

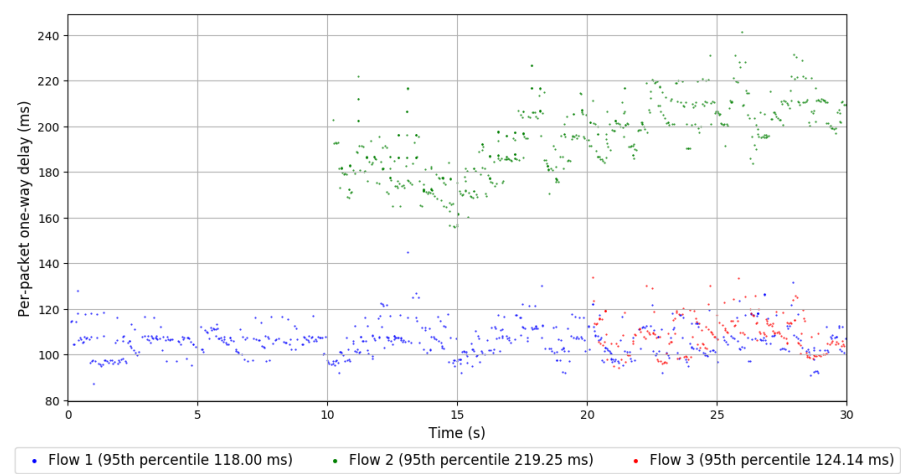
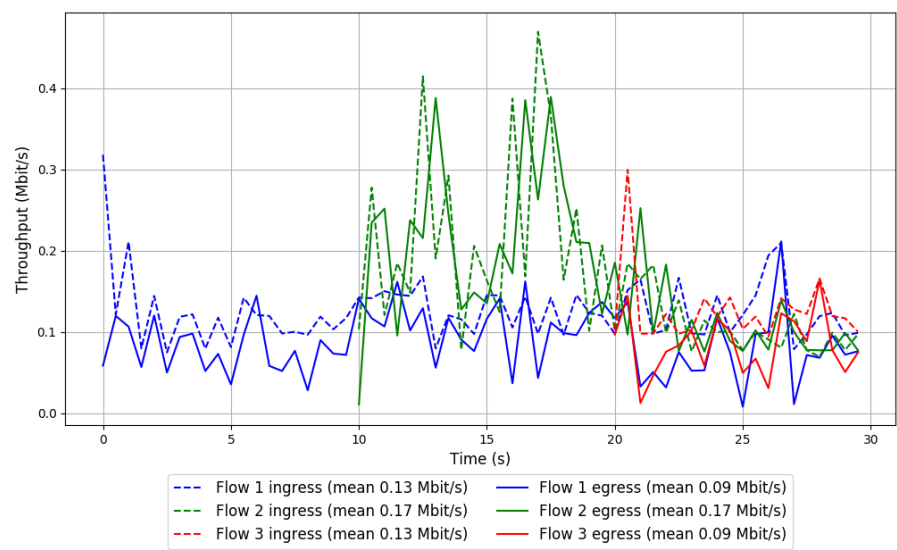


Run 2: Statistics of Sprout

Start at: 2017-09-22 14:44:11
End at: 2017-09-22 14:44:41
Local clock offset: 15.554 ms
Remote clock offset: -1.591 ms

```
# Below is generated by plot.py at 2017-09-22 15:20:55
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 211.470 ms
Loss rate: 19.14%
-- Flow 1:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 118.003 ms
Loss rate: 30.27%
-- Flow 2:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 219.252 ms
Loss rate: 0.67%
-- Flow 3:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 124.139 ms
Loss rate: 33.84%
```


Run 2: Report of Sprout — Data Link

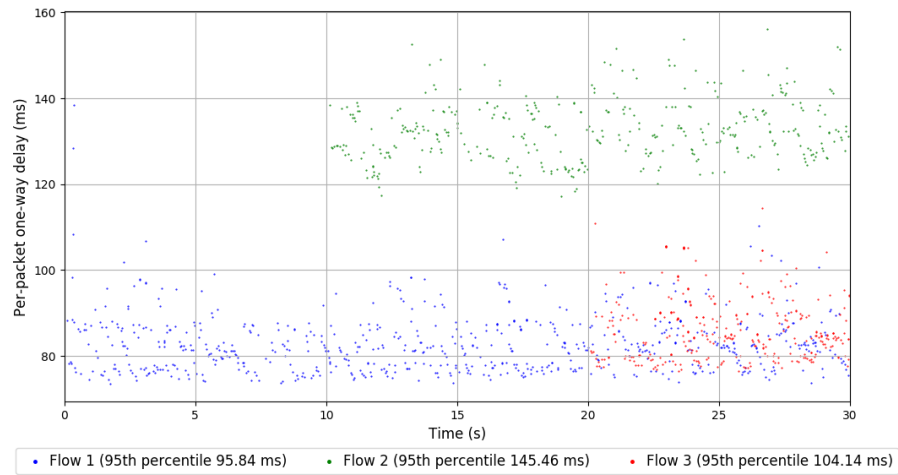
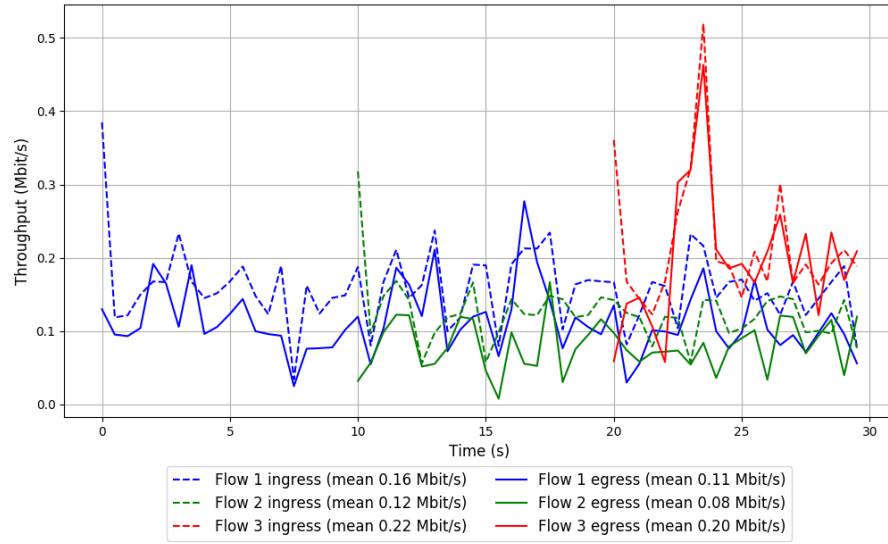


Run 3: Statistics of Sprout

Start at: 2017-09-22 15:02:44
End at: 2017-09-22 15:03:14
Local clock offset: -1.688 ms
Remote clock offset: -1.454 ms

```
# Below is generated by plot.py at 2017-09-22 15:20:55
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 138.179 ms
Loss rate: 26.47%
-- Flow 1:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 95.844 ms
Loss rate: 29.21%
-- Flow 2:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 145.461 ms
Loss rate: 35.74%
-- Flow 3:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 104.142 ms
Loss rate: 10.01%
```

Run 3: Report of Sprout — Data Link

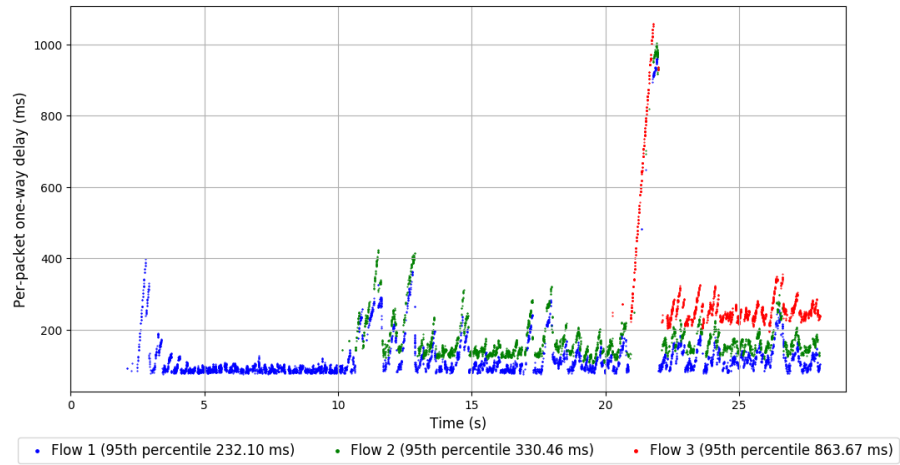
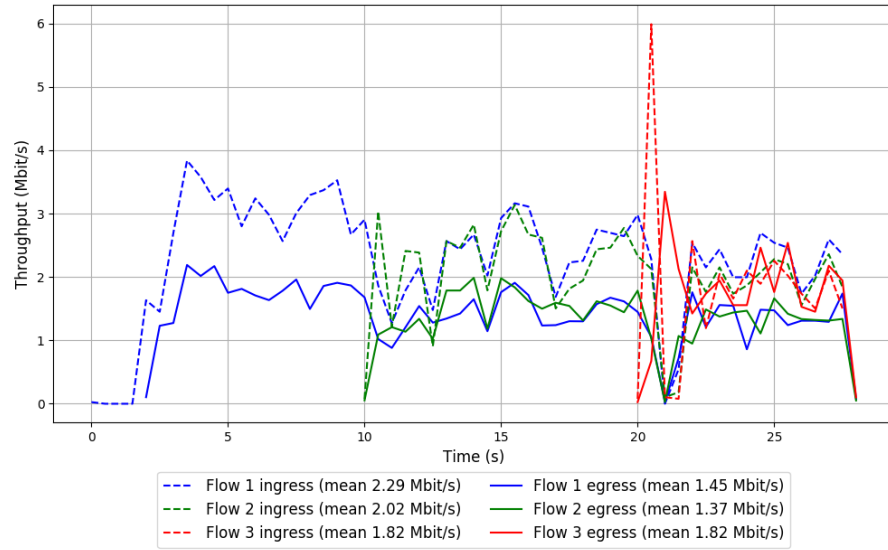


Run 1: Statistics of TaoVA-100x

Start at: 2017-09-22 14:34:15
End at: 2017-09-22 14:34:45
Local clock offset: -1.999 ms
Remote clock offset: -1.539 ms

Below is generated by plot.py at 2017-09-22 15:21:03
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.94 Mbit/s
95th percentile per-packet one-way delay: 359.961 ms
Loss rate: 33.40%
-- Flow 1:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 232.097 ms
Loss rate: 40.98%
-- Flow 2:
Average throughput: 1.37 Mbit/s
95th percentile per-packet one-way delay: 330.464 ms
Loss rate: 32.68%
-- Flow 3:
Average throughput: 1.82 Mbit/s
95th percentile per-packet one-way delay: 863.675 ms
Loss rate: 1.64%

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

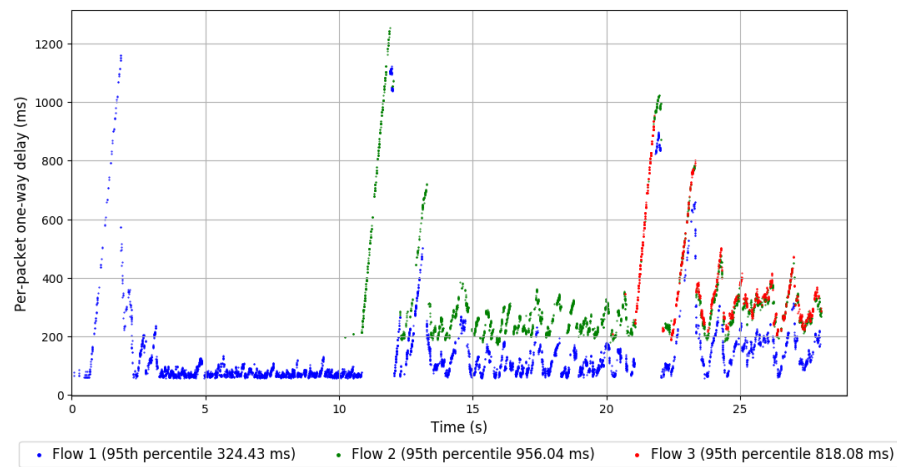
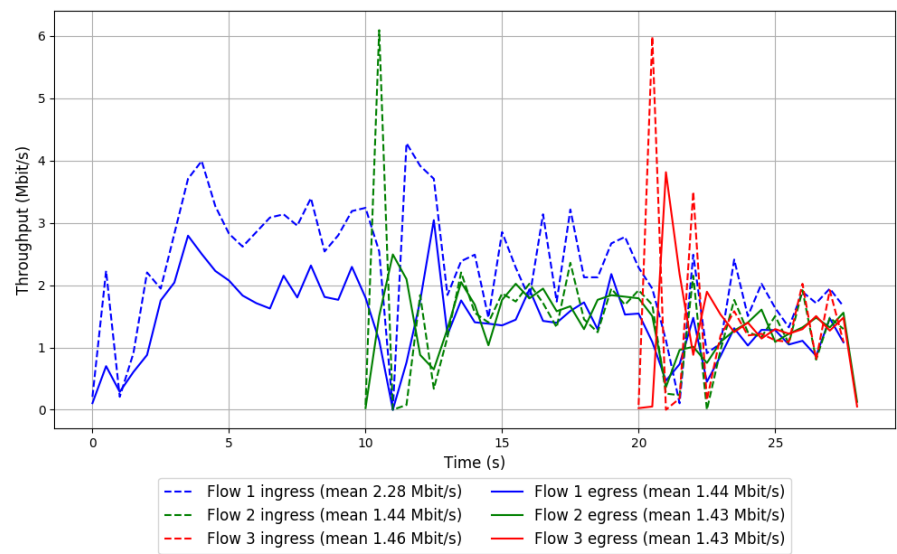


Run 2: Statistics of TaoVA-100x

Start at: 2017-09-22 14:52:18
End at: 2017-09-22 14:52:48
Local clock offset: 13.493 ms
Remote clock offset: -1.712 ms

Below is generated by plot.py at 2017-09-22 15:21:05
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.75 Mbit/s
95th percentile per-packet one-way delay: 765.588 ms
Loss rate: 23.94%
-- Flow 1:
Average throughput: 1.44 Mbit/s
95th percentile per-packet one-way delay: 324.433 ms
Loss rate: 36.91%
-- Flow 2:
Average throughput: 1.43 Mbit/s
95th percentile per-packet one-way delay: 956.038 ms
Loss rate: 0.96%
-- Flow 3:
Average throughput: 1.43 Mbit/s
95th percentile per-packet one-way delay: 818.079 ms
Loss rate: 3.70%

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



Run 3: Statistics of TaoVA-100x

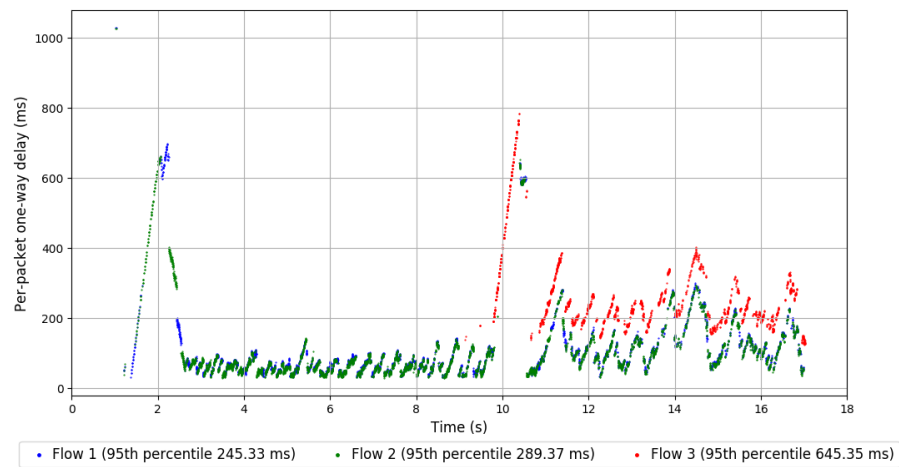
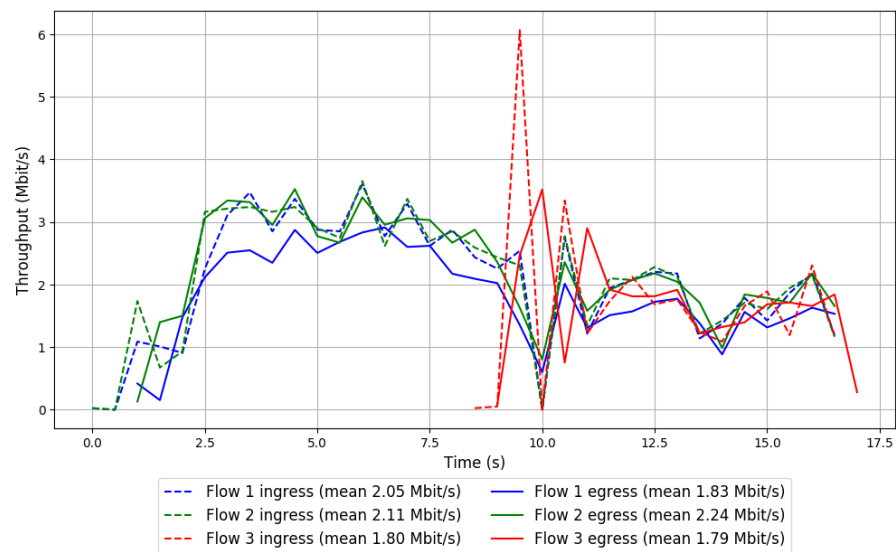
Start at: 2017-09-22 15:10:42

End at: 2017-09-22 15:11:12

Local clock offset: -1.549 ms

Remote clock offset: -45.314 ms

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

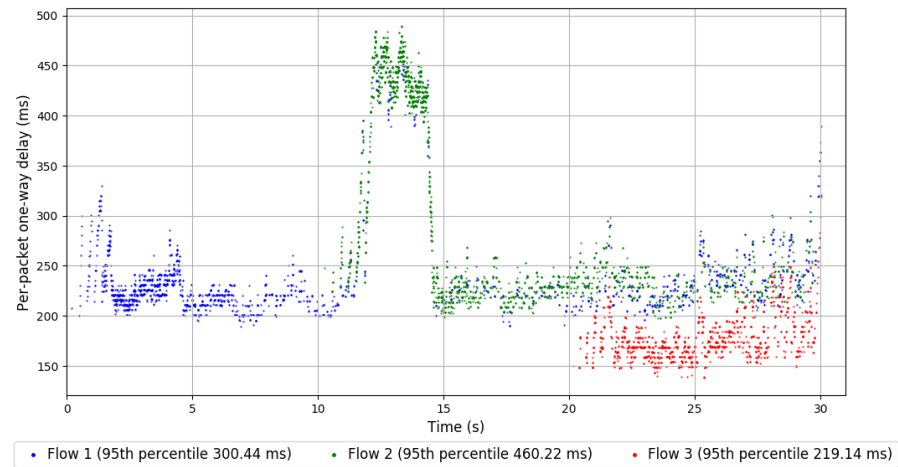
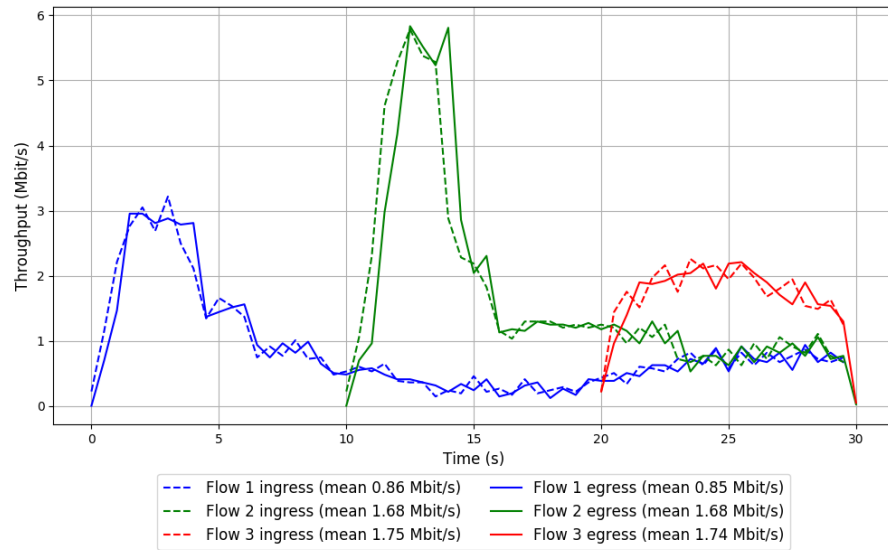


Run 1: Statistics of TCP Vegas

Start at: 2017-09-22 14:31:49
End at: 2017-09-22 14:32:19
Local clock offset: -2.041 ms
Remote clock offset: -1.506 ms

Below is generated by plot.py at 2017-09-22 15:21:05
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.54 Mbit/s
95th percentile per-packet one-way delay: 448.359 ms
Loss rate: 1.16%
-- Flow 1:
Average throughput: 0.85 Mbit/s
95th percentile per-packet one-way delay: 300.437 ms
Loss rate: 1.22%
-- Flow 2:
Average throughput: 1.68 Mbit/s
95th percentile per-packet one-way delay: 460.219 ms
Loss rate: 0.93%
-- Flow 3:
Average throughput: 1.74 Mbit/s
95th percentile per-packet one-way delay: 219.136 ms
Loss rate: 1.52%

Run 1: Report of TCP Vegas — Data Link

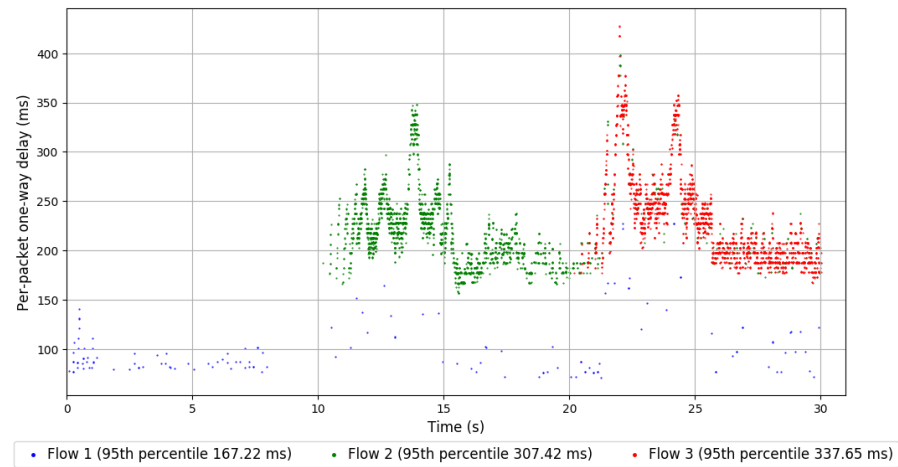
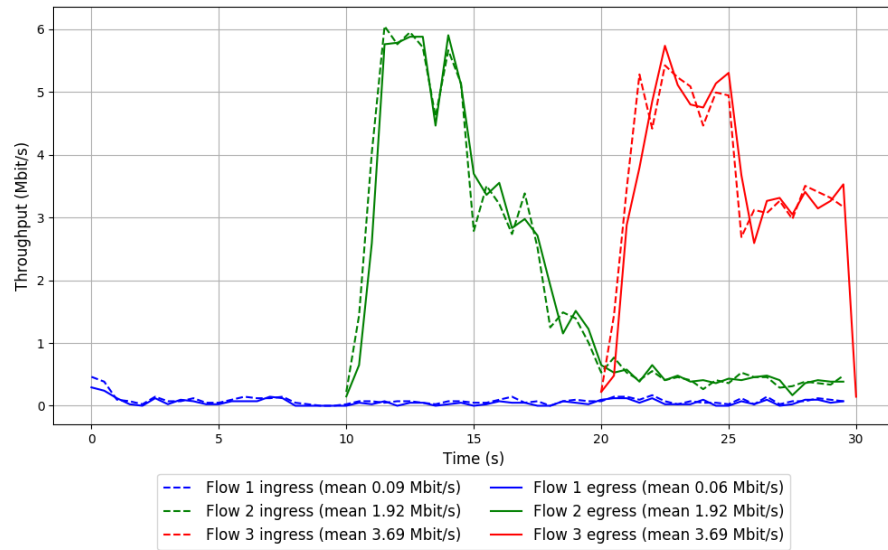


Run 2: Statistics of TCP Vegas

Start at: 2017-09-22 14:49:19
End at: 2017-09-22 14:49:49
Local clock offset: -1.759 ms
Remote clock offset: -1.492 ms

Below is generated by plot.py at 2017-09-22 15:21:05
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.53 Mbit/s
95th percentile per-packet one-way delay: 327.106 ms
Loss rate: 2.29%
-- Flow 1:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 167.219 ms
Loss rate: 34.85%
-- Flow 2:
Average throughput: 1.92 Mbit/s
95th percentile per-packet one-way delay: 307.418 ms
Loss rate: 0.94%
-- Flow 3:
Average throughput: 3.69 Mbit/s
95th percentile per-packet one-way delay: 337.651 ms
Loss rate: 1.40%

Run 2: Report of TCP Vegas — Data Link

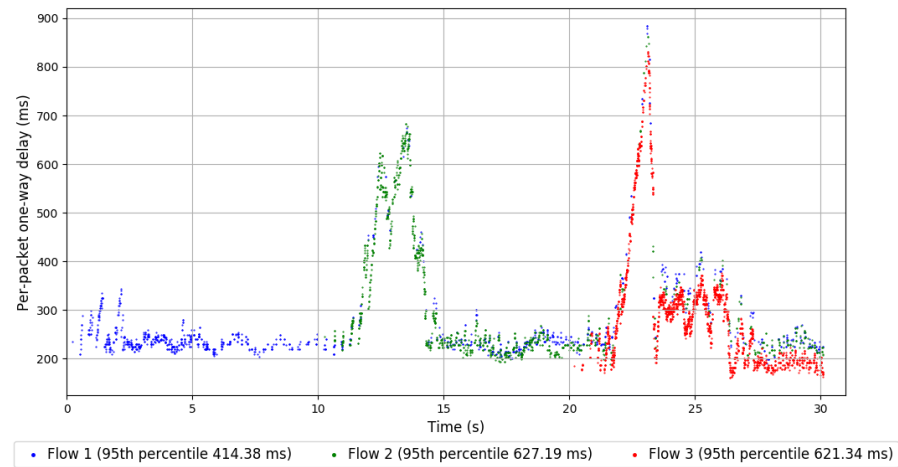
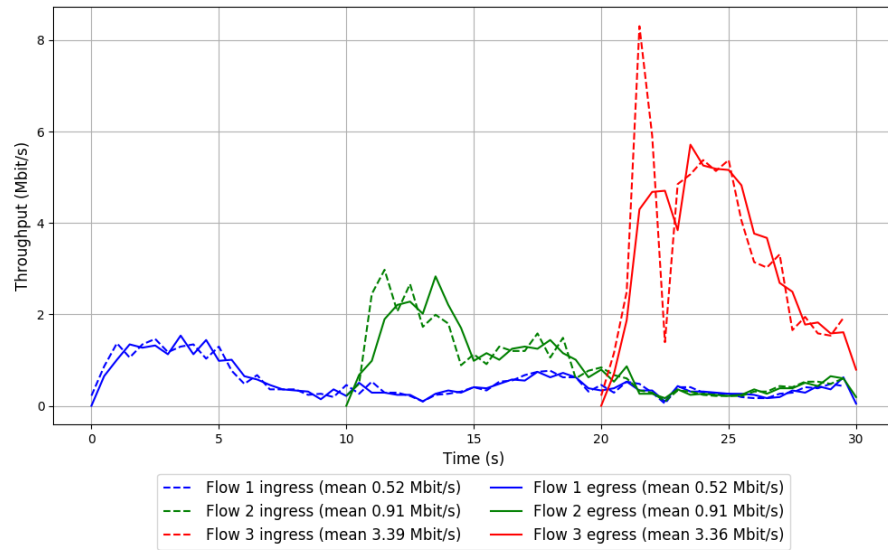


Run 3: Statistics of TCP Vegas

Start at: 2017-09-22 15:07:53
End at: 2017-09-22 15:08:23
Local clock offset: -1.58 ms
Remote clock offset: -4.324 ms

Below is generated by plot.py at 2017-09-22 15:21:05
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.23 Mbit/s
95th percentile per-packet one-way delay: 607.220 ms
Loss rate: 1.21%
-- Flow 1:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 414.377 ms
Loss rate: 1.08%
-- Flow 2:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 627.192 ms
Loss rate: 0.79%
-- Flow 3:
Average throughput: 3.36 Mbit/s
95th percentile per-packet one-way delay: 621.339 ms
Loss rate: 1.49%

Run 3: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2017-09-22 14:29:15

End at: 2017-09-22 14:29:45

Local clock offset: 15.692 ms

Remote clock offset: -2.04 ms

Below is generated by plot.py at 2017-09-22 15:21:05

Datalink statistics

-- Total of 3 flows:

Average throughput: 3.00 Mbit/s

95th percentile per-packet one-way delay: 2317.238 ms

Loss rate: 5.66%

-- Flow 1:

Average throughput: 0.02 Mbit/s

95th percentile per-packet one-way delay: 1731.392 ms

Loss rate: 51.94%

-- Flow 2:

Average throughput: 4.50 Mbit/s

95th percentile per-packet one-way delay: 2317.441 ms

Loss rate: 4.88%

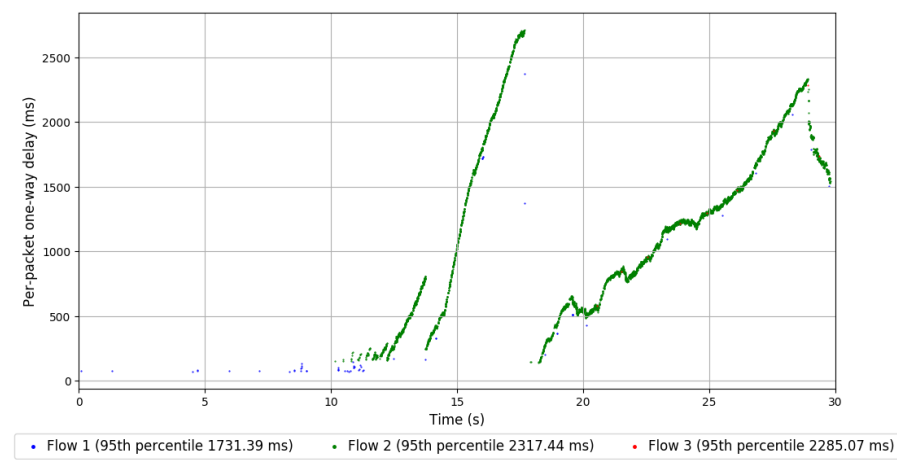
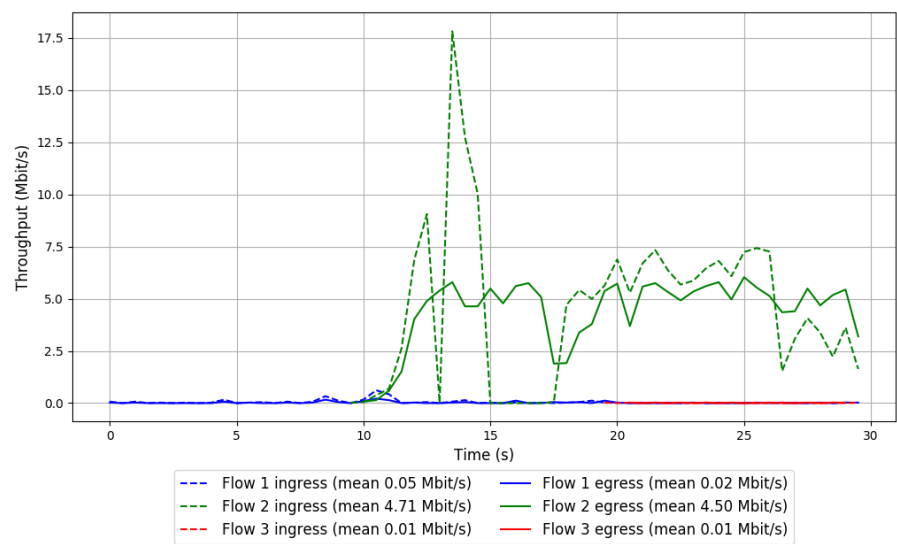
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 2285.068 ms

Loss rate: 18.18%

Run 1: Report of Verus — Data Link

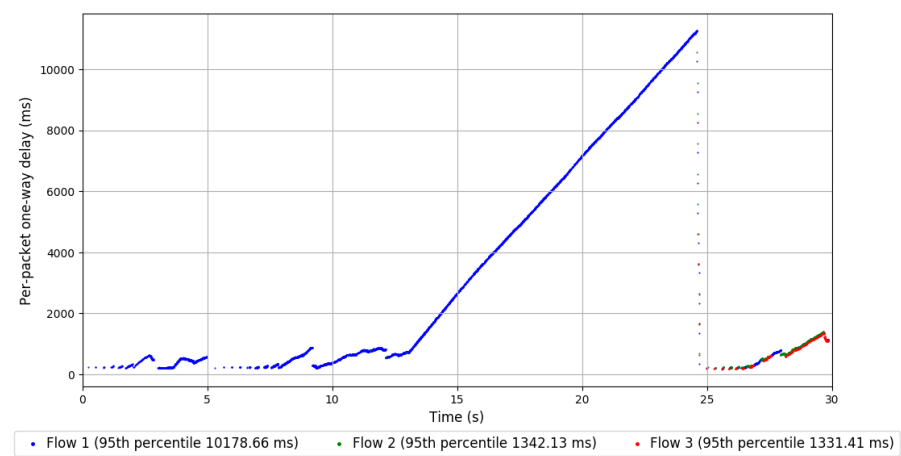
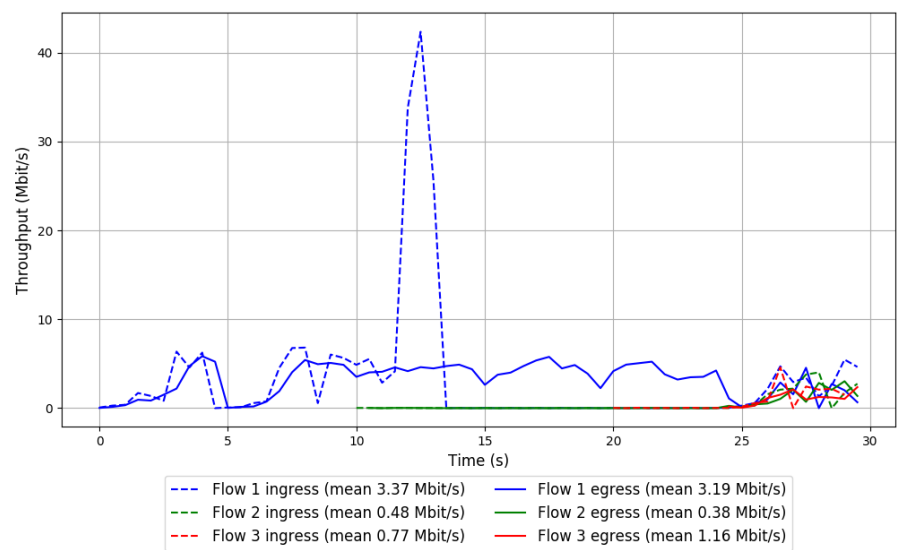


Run 2: Statistics of Verus

Start at: 2017-09-22 14:46:44
End at: 2017-09-22 14:47:14
Local clock offset: -1.723 ms
Remote clock offset: -1.842 ms

Below is generated by plot.py at 2017-09-22 15:21:05
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.64 Mbit/s
95th percentile per-packet one-way delay: 9999.255 ms
Loss rate: 8.00%
-- Flow 1:
Average throughput: 3.19 Mbit/s
95th percentile per-packet one-way delay: 10178.664 ms
Loss rate: 5.95%
-- Flow 2:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 1342.132 ms
Loss rate: 23.54%
-- Flow 3:
Average throughput: 1.16 Mbit/s
95th percentile per-packet one-way delay: 1331.406 ms
Loss rate: 16.07%

Run 2: Report of Verus — Data Link

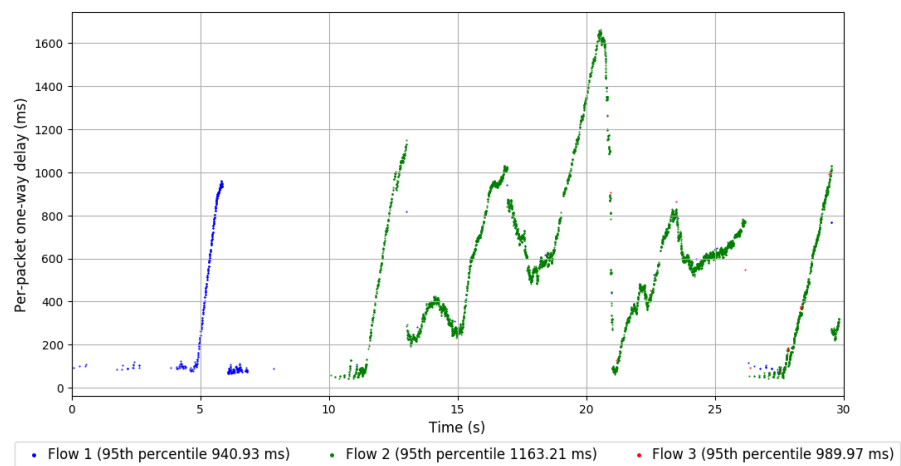
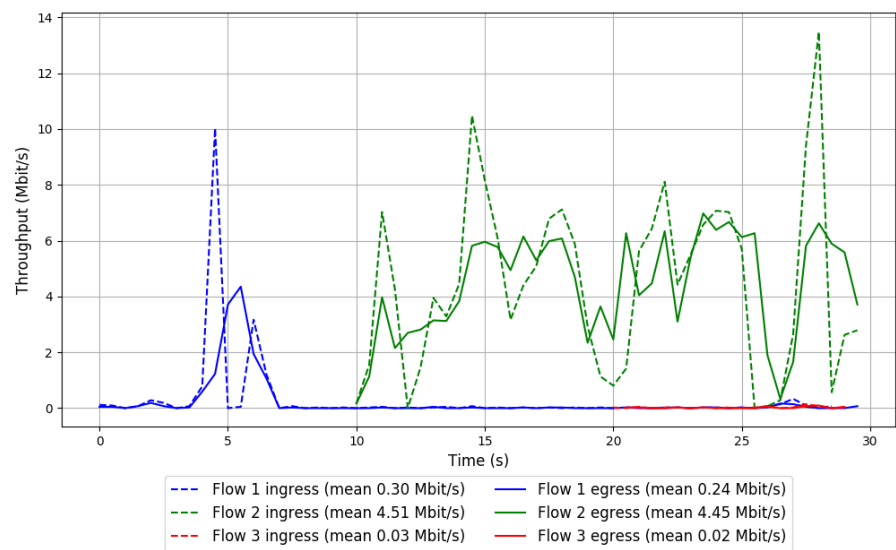


Run 3: Statistics of Verus

Start at: 2017-09-22 15:05:15
End at: 2017-09-22 15:05:45
Local clock offset: -1.518 ms
Remote clock offset: -37.908 ms

Below is generated by plot.py at 2017-09-22 15:21:10
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.20 Mbit/s
95th percentile per-packet one-way delay: 1149.968 ms
Loss rate: 2.92%
-- Flow 1:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 940.933 ms
Loss rate: 19.02%
-- Flow 2:
Average throughput: 4.45 Mbit/s
95th percentile per-packet one-way delay: 1163.210 ms
Loss rate: 1.26%
-- Flow 3:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 989.970 ms
Loss rate: 31.82%

Run 3: Report of Verus — Data Link

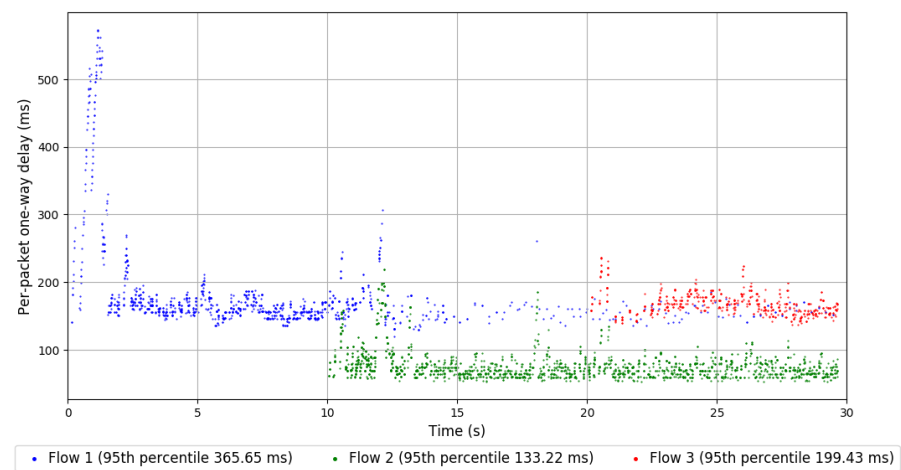
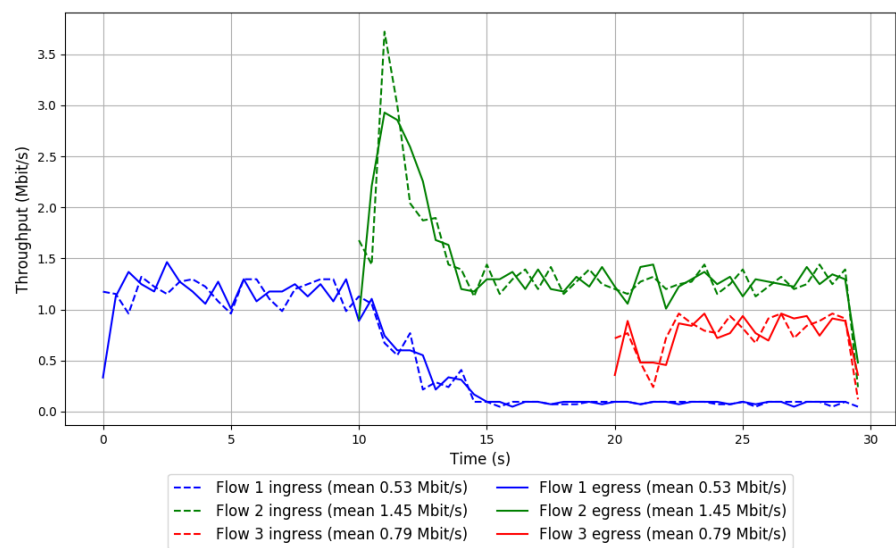


Run 1: Statistics of Indigo

Start at: 2017-09-22 14:30:35
End at: 2017-09-22 14:31:05
Local clock offset: 17.888 ms
Remote clock offset: -1.549 ms

Below is generated by plot.py at 2017-09-22 15:21:10
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.75 Mbit/s
95th percentile per-packet one-way delay: 199.169 ms
Loss rate: 0.32%
-- Flow 1:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 365.646 ms
Loss rate: 0.61%
-- Flow 2:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 133.219 ms
Loss rate: 0.04%
-- Flow 3:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 199.426 ms
Loss rate: 0.80%

Run 1: Report of Indigo — Data Link

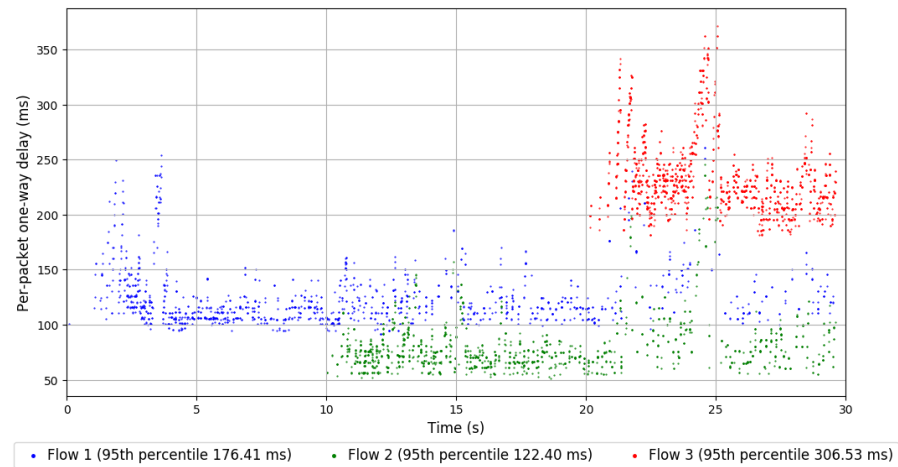
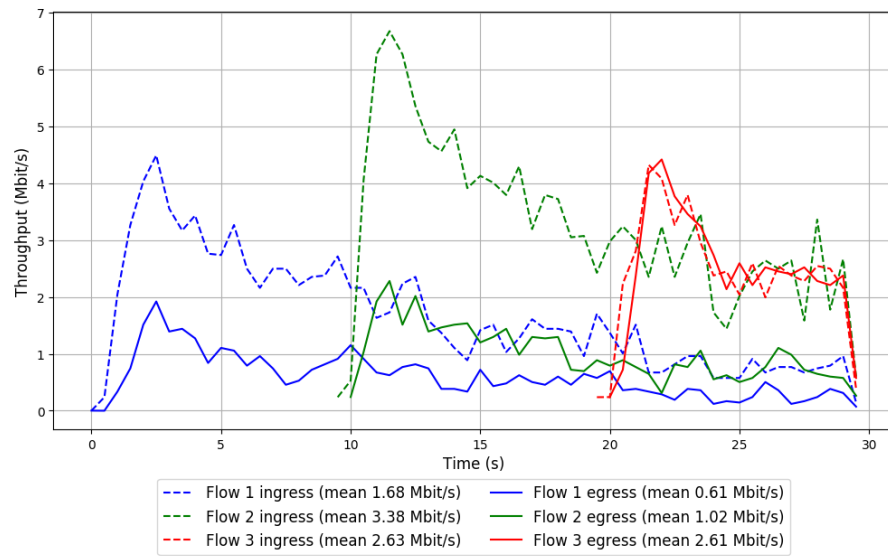


Run 2: Statistics of Indigo

Start at: 2017-09-22 14:47:58
End at: 2017-09-22 14:48:28
Local clock offset: 19.581 ms
Remote clock offset: -1.452 ms

Below is generated by plot.py at 2017-09-22 15:21:10
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 271.911 ms
Loss rate: 55.59%
-- Flow 1:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 176.411 ms
Loss rate: 64.11%
-- Flow 2:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 122.402 ms
Loss rate: 69.72%
-- Flow 3:
Average throughput: 2.61 Mbit/s
95th percentile per-packet one-way delay: 306.533 ms
Loss rate: 1.53%

Run 2: Report of Indigo — Data Link

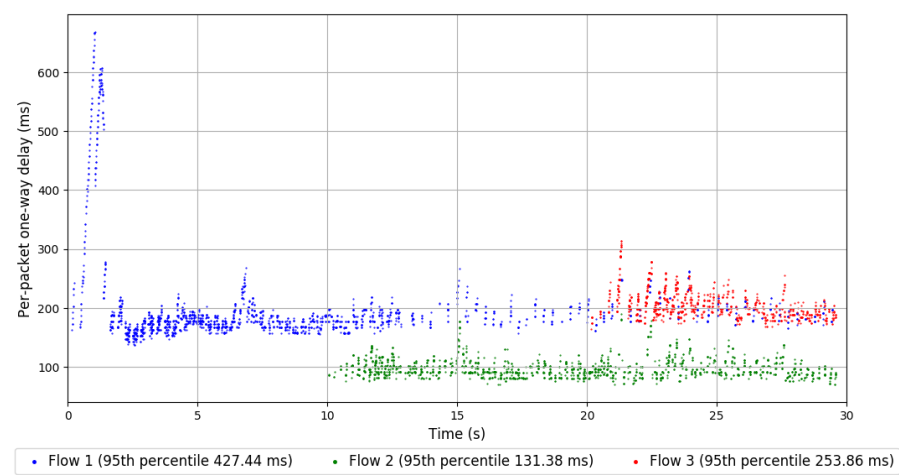
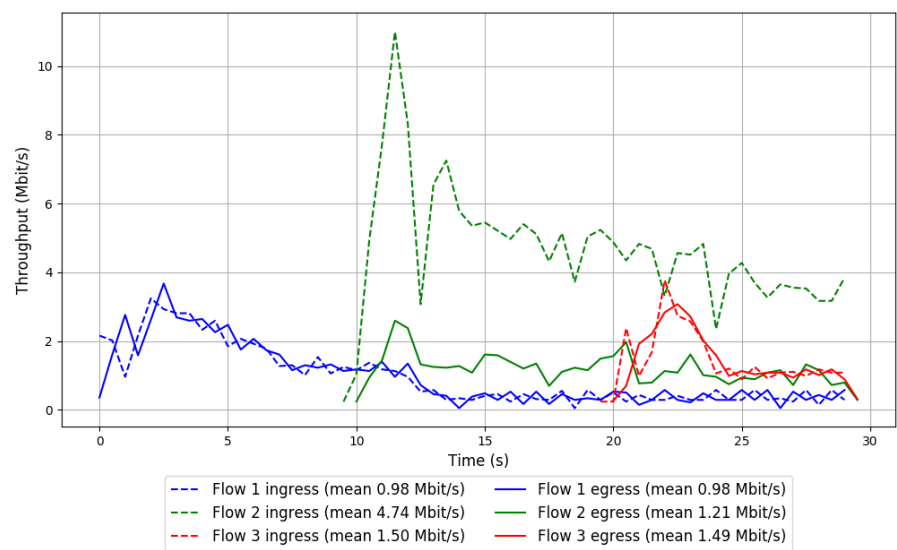


Run 3: Statistics of Indigo

Start at: 2017-09-22 15:06:33
End at: 2017-09-22 15:07:03
Local clock offset: -1.557 ms
Remote clock offset: -47.167 ms

Below is generated by plot.py at 2017-09-22 15:21:11
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.25 Mbit/s
95th percentile per-packet one-way delay: 247.528 ms
Loss rate: 51.08%
-- Flow 1:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 427.443 ms
Loss rate: 0.17%
-- Flow 2:
Average throughput: 1.21 Mbit/s
95th percentile per-packet one-way delay: 131.381 ms
Loss rate: 74.52%
-- Flow 3:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 253.861 ms
Loss rate: 1.01%

Run 3: Report of Indigo — Data Link

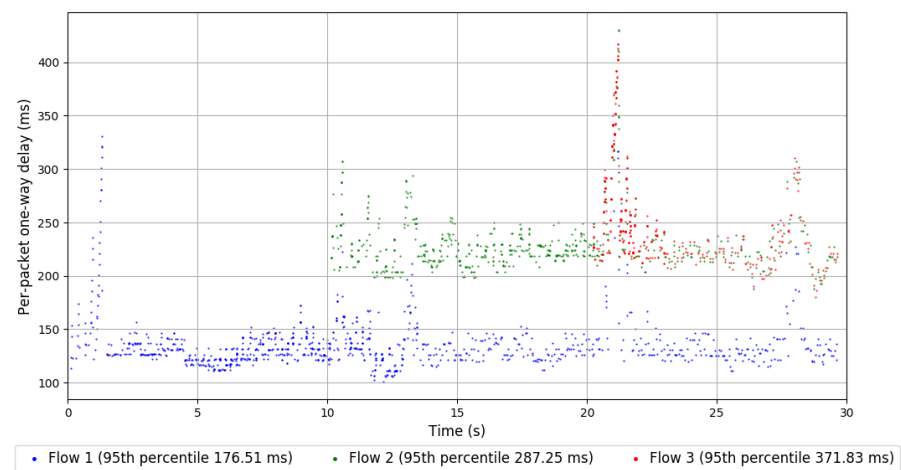
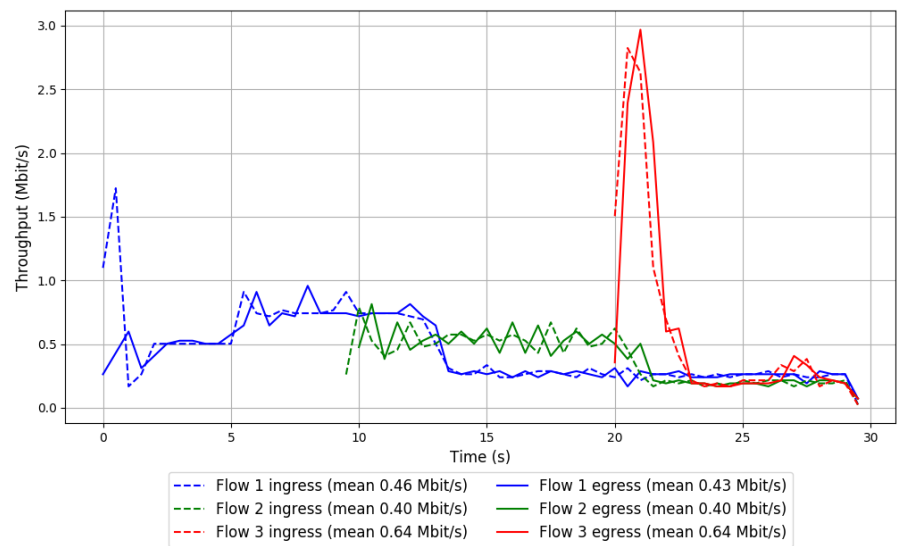


Run 1: Statistics of Indigo-cellular

Start at: 2017-09-22 14:41:41
End at: 2017-09-22 14:42:11
Local clock offset: -0.895 ms
Remote clock offset: -1.831 ms

Below is generated by plot.py at 2017-09-22 15:21:11
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.90 Mbit/s
95th percentile per-packet one-way delay: 310.484 ms
Loss rate: 3.35%
-- Flow 1:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 176.510 ms
Loss rate: 5.81%
-- Flow 2:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 287.255 ms
Loss rate: 0.61%
-- Flow 3:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 371.831 ms
Loss rate: 1.38%

Run 1: Report of Indigo-cellular — Data Link

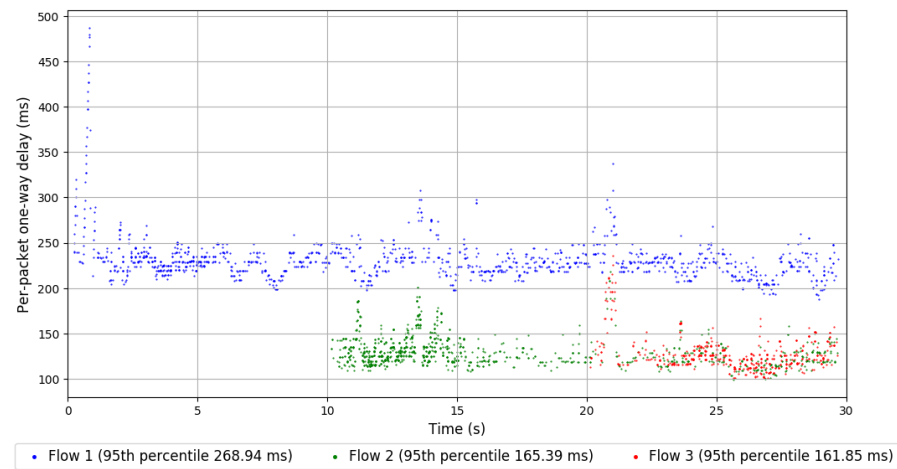
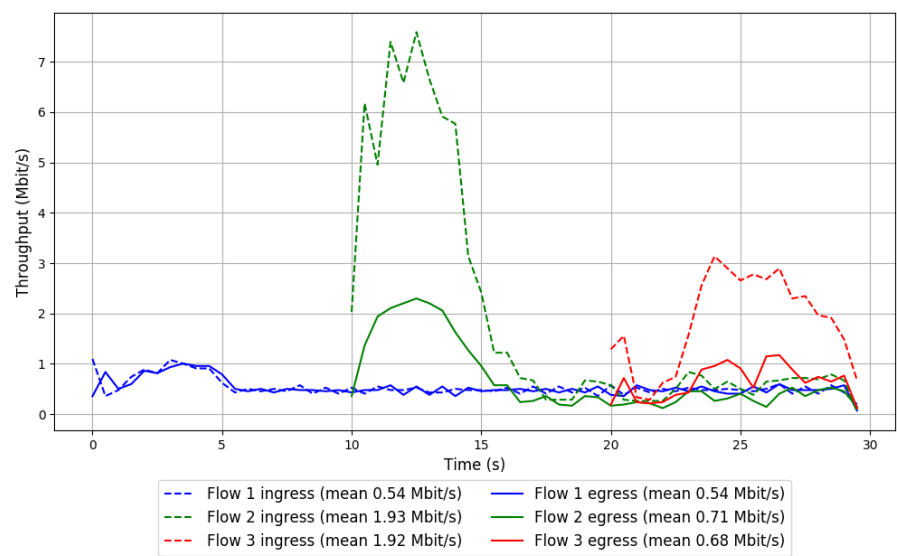


Run 2: Statistics of Indigo-cellular

Start at: 2017-09-22 15:00:19
End at: 2017-09-22 15:00:49
Local clock offset: -0.525 ms
Remote clock offset: -4.929 ms

Below is generated by plot.py at 2017-09-22 15:21:11
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 248.404 ms
Loss rate: 49.85%
-- Flow 1:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 268.944 ms
Loss rate: 1.56%
-- Flow 2:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 165.393 ms
Loss rate: 63.10%
-- Flow 3:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 161.846 ms
Loss rate: 64.90%

Run 2: Report of Indigo-cellular — Data Link

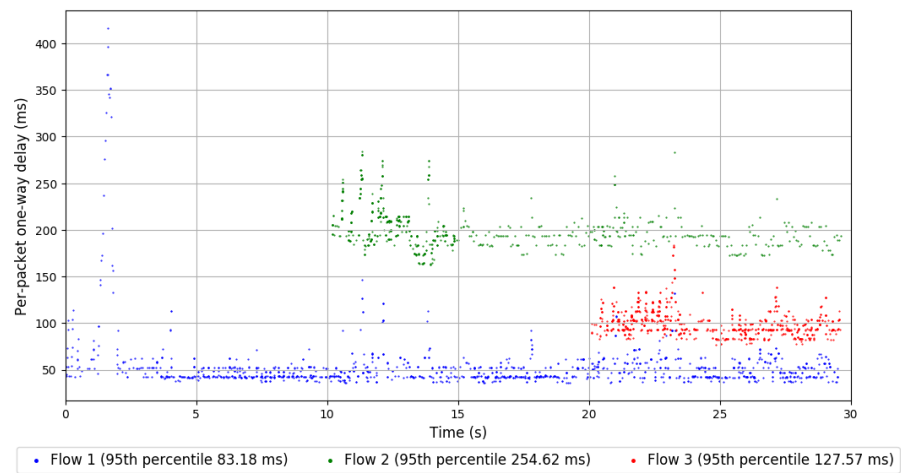
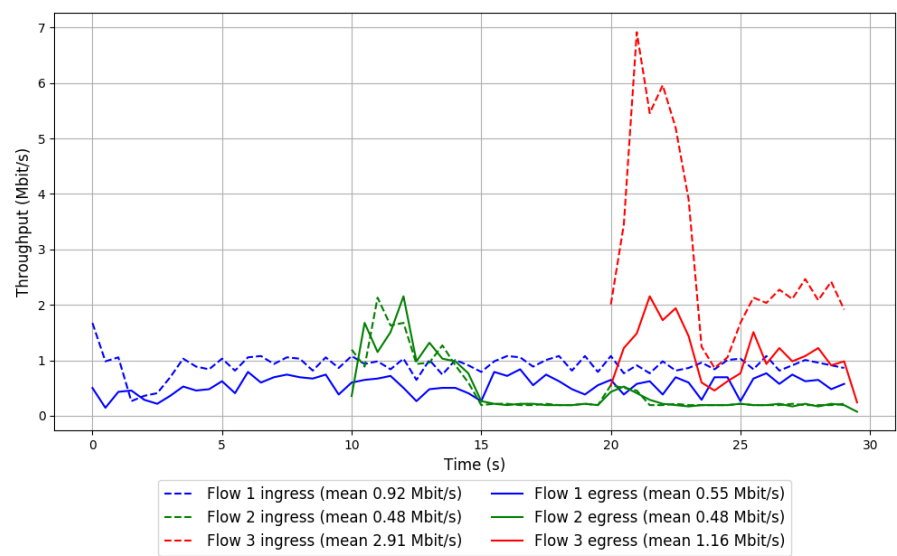


Run 3: Statistics of Indigo-cellular

Start at: 2017-09-22 15:19:05
End at: 2017-09-22 15:19:35
Local clock offset: -1.39 ms
Remote clock offset: -37.354 ms

Below is generated by plot.py at 2017-09-22 15:21:11
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 217.844 ms
Loss rate: 42.97%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 83.179 ms
Loss rate: 40.11%
-- Flow 2:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 254.621 ms
Loss rate: 1.14%
-- Flow 3:
Average throughput: 1.16 Mbit/s
95th percentile per-packet one-way delay: 127.572 ms
Loss rate: 60.07%

Run 3: Report of Indigo-cellular — Data Link

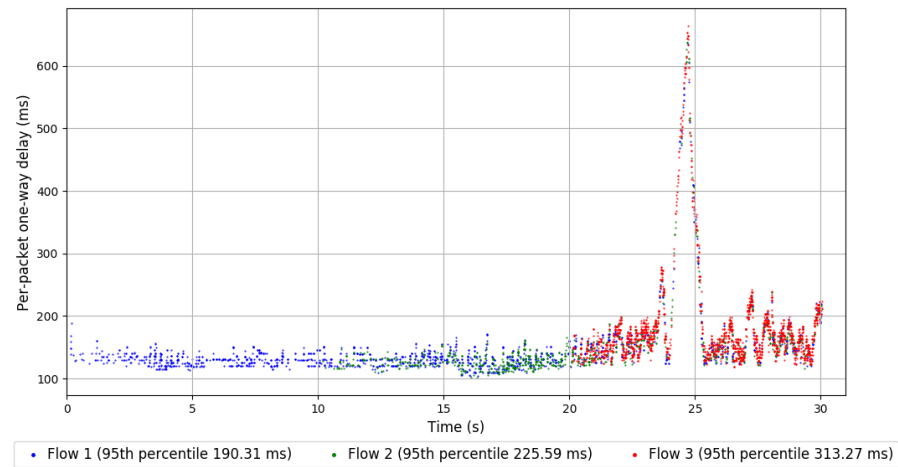
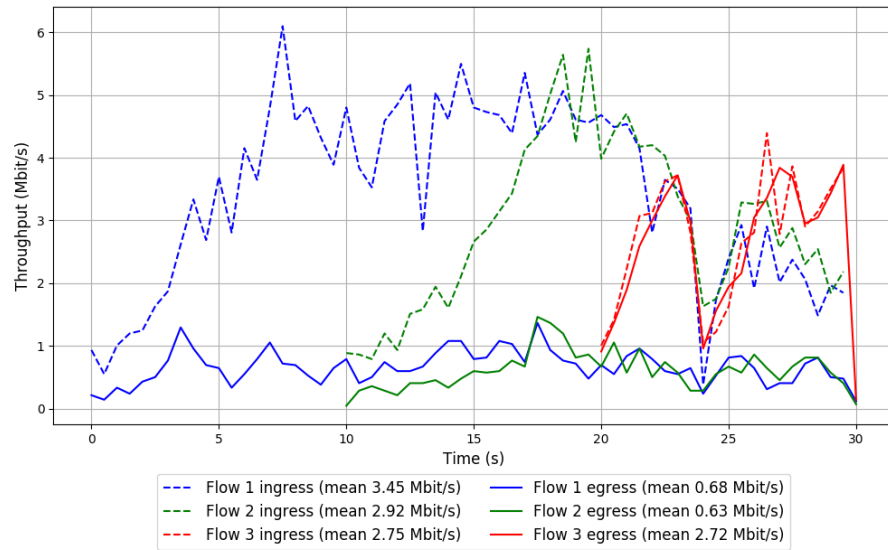


```
Run 1: Statistics of KohoCC

Start at: 2017-09-22 14:33:01
End at: 2017-09-22 14:33:32
Local clock offset: -2.171 ms
Remote clock offset: -1.584 ms

# Below is generated by plot.py at 2017-09-22 15:21:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 246.157 ms
Loss rate: 68.41%
-- Flow 1:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 190.305 ms
Loss rate: 80.40%
-- Flow 2:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 225.586 ms
Loss rate: 78.51%
-- Flow 3:
Average throughput: 2.72 Mbit/s
95th percentile per-packet one-way delay: 313.274 ms
Loss rate: 1.66%
```

Run 1: Report of KohoCC — Data Link

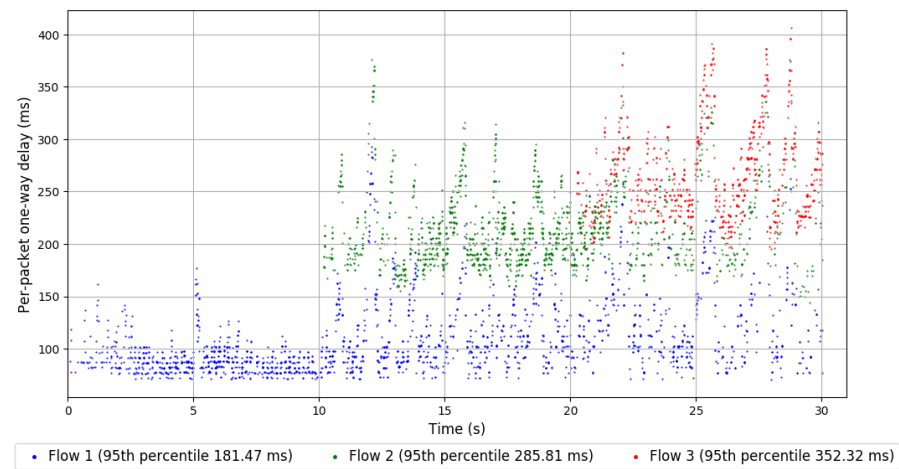
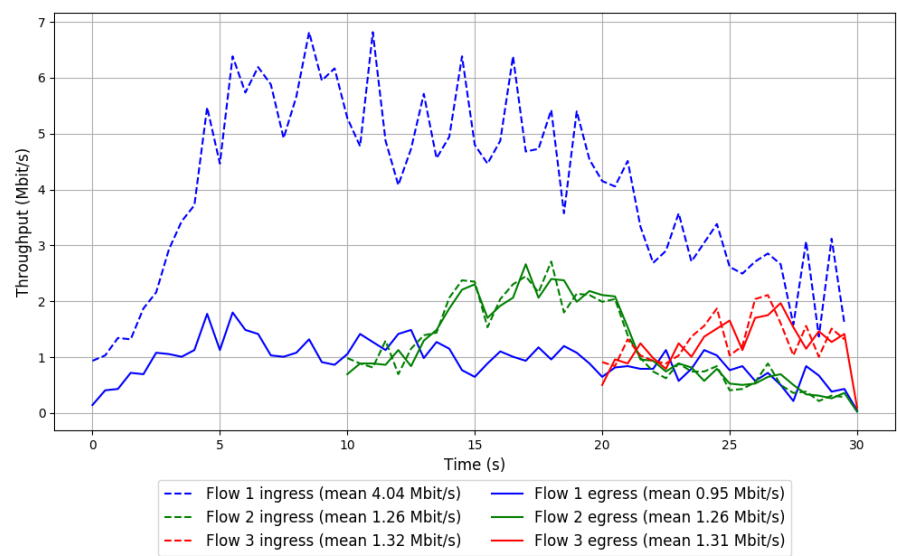


Run 2: Statistics of KohoCC

Start at: 2017-09-22 14:51:02
End at: 2017-09-22 14:51:32
Local clock offset: -1.749 ms
Remote clock offset: -1.642 ms

Below is generated by plot.py at 2017-09-22 15:21:12
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.21 Mbit/s
95th percentile per-packet one-way delay: 300.573 ms
Loss rate: 58.34%
-- Flow 1:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 181.470 ms
Loss rate: 76.48%
-- Flow 2:
Average throughput: 1.26 Mbit/s
95th percentile per-packet one-way delay: 285.808 ms
Loss rate: 0.10%
-- Flow 3:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 352.316 ms
Loss rate: 2.02%

Run 2: Report of KohoCC — Data Link



Run 3: Statistics of KohoCC

Start at: 2017-09-22 15:09:17
End at: 2017-09-22 15:09:47
Local clock offset: -1.509 ms
Remote clock offset: -43.117 ms

Below is generated by plot.py at 2017-09-22 15:21:13
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.85 Mbit/s
95th percentile per-packet one-way delay: 194.700 ms
Loss rate: 44.36%
-- Flow 1:
Average throughput: 1.15 Mbit/s
95th percentile per-packet one-way delay: 113.678 ms
Loss rate: 72.76%
-- Flow 2:
Average throughput: 2.67 Mbit/s
95th percentile per-packet one-way delay: 125.056 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 2.82 Mbit/s
95th percentile per-packet one-way delay: 244.711 ms
Loss rate: 0.77%

Run 3: Report of KohoCC — Data Link

