

Pantheon Report

Generated at 2017-09-22 15:15:03 (UTC).

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

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).

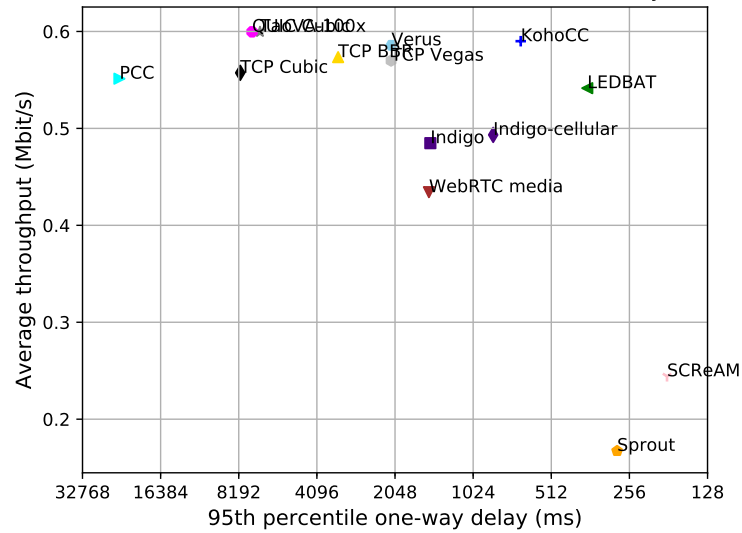
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

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

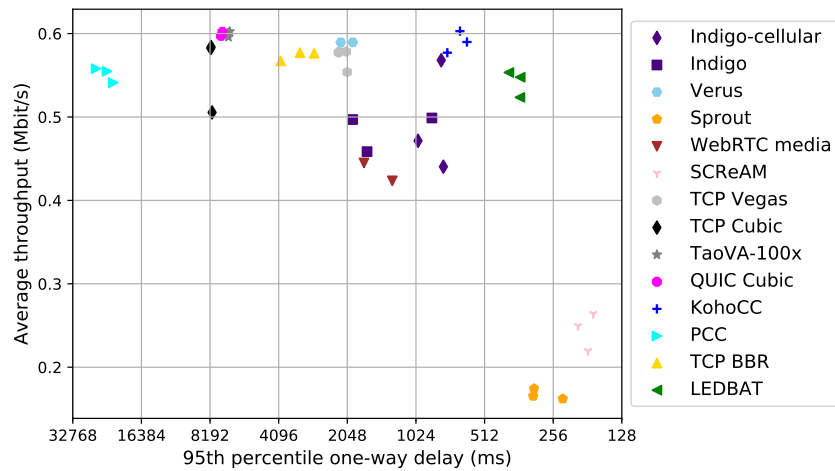
Git summary:

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



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



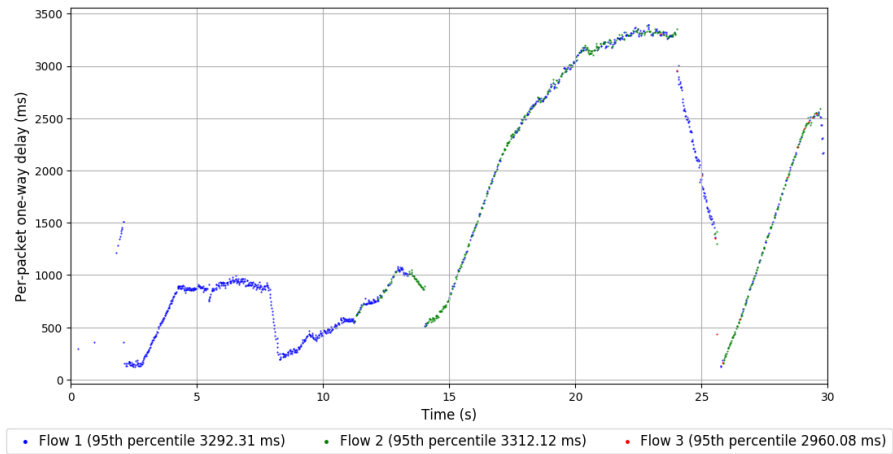
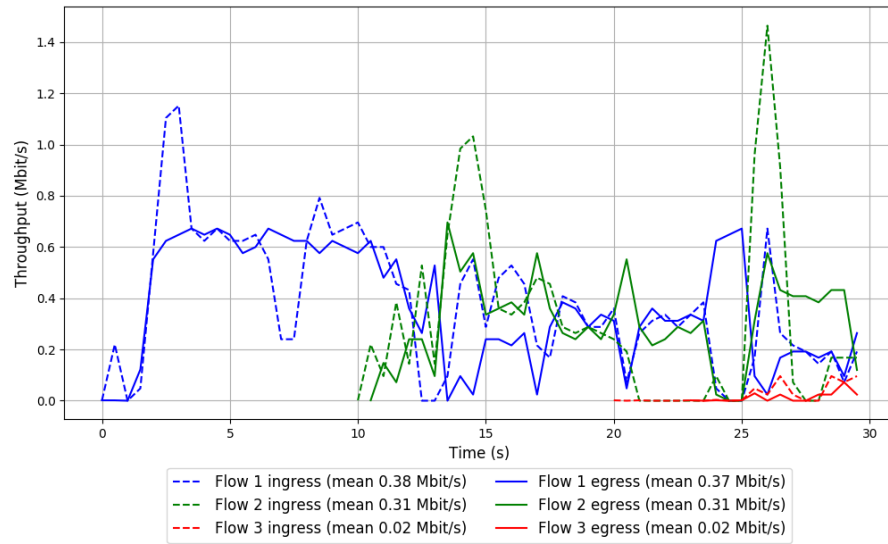
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	0.37	0.33	0.01	3400.97	3385.94	3300.27	5.21	9.20	60.64
TCP Cubic	3	0.54	0.03	0.00	8090.57	6577.37	8325.33	31.10	53.61	73.00
LEDBAT	3	0.27	0.33	0.19	338.34	391.66	385.53	0.14	1.63	6.40
PCC	3	0.55	0.00	N/A	23605.67	N/A	N/A	98.61	N/A	N/A
QUIC Cubic	2	0.56	0.07	0.00	7263.50	6815.80	7307.14	27.05	33.45	41.66
SCReAM	3	0.08	0.17	0.14	159.27	181.63	265.72	0.79	0.90	1.75
WebRTC media	2	0.22	0.16	0.06	1455.93	1487.96	1658.60	0.76	3.65	6.43
Sprout	3	0.08	0.09	0.09	654.30	221.30	250.96	2.14	1.69	3.12
TaoVA-100x	3	0.38	0.35	0.09	7152.04	6171.23	6583.77	19.14	22.48	58.33
TCP Vegas	3	0.41	0.18	0.15	1978.86	2134.40	2194.31	4.51	8.20	29.64
Verus	3	0.58	0.01	0.01	2112.43	2110.06	2120.59	6.12	8.17	13.33
Indigo	3	0.24	0.22	0.36	1285.60	1233.48	1649.47	12.19	3.57	20.28
Indigo-cellular	3	0.29	0.21	0.20	924.23	736.50	851.75	1.61	3.38	7.11
KohoCC	3	0.31	0.28	0.26	865.16	573.04	671.35	1.20	1.60	4.29

Run 1: Statistics of TCP BBR

Start at: 2017-09-22 13:42:58
End at: 2017-09-22 13:43:28
Local clock offset: -0.033 ms
Remote clock offset: 15.052 ms

Below is generated by plot.py at 2017-09-22 15:14:32
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 3302.128 ms
Loss rate: 4.25%
-- Flow 1:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 3292.306 ms
Loss rate: 3.29%
-- Flow 2:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 3312.121 ms
Loss rate: 4.04%
-- Flow 3:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 2960.083 ms
Loss rate: 56.72%

Run 1: Report of TCP BBR — Data Link

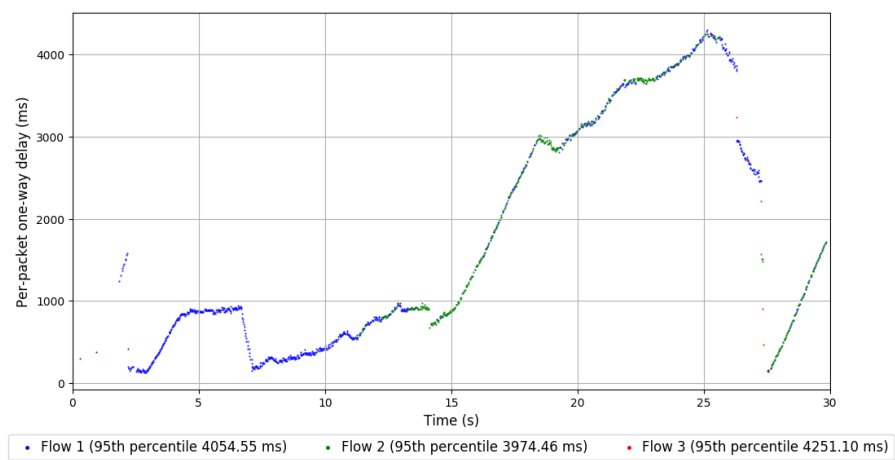
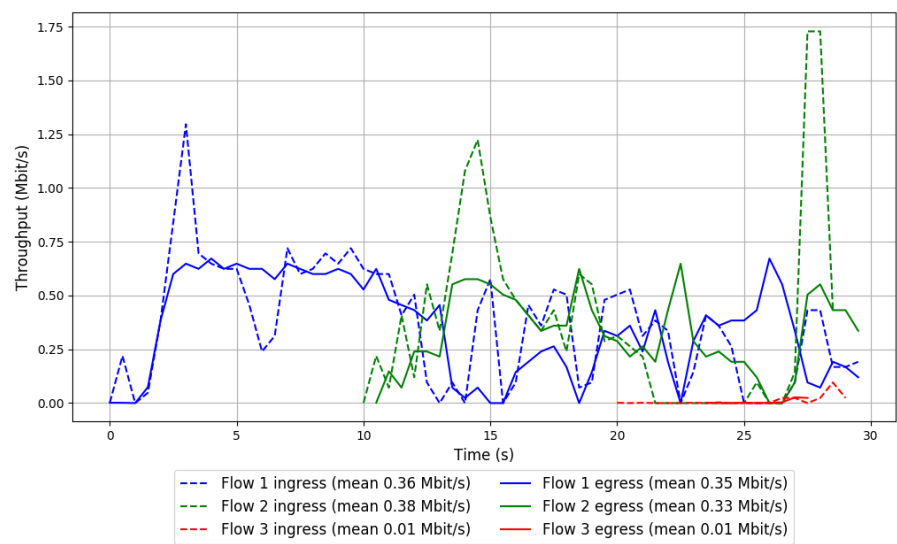


Run 2: Statistics of TCP BBR

Start at: 2017-09-22 14:00:34
End at: 2017-09-22 14:01:04
Local clock offset: -0.07 ms
Remote clock offset: 10.512 ms

Below is generated by plot.py at 2017-09-22 15:14:32
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 4016.084 ms
Loss rate: 7.61%
-- Flow 1:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 4054.548 ms
Loss rate: 3.88%
-- Flow 2:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 3974.459 ms
Loss rate: 12.33%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 4251.101 ms
Loss rate: 71.00%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2017-09-22 14:18:13

End at: 2017-09-22 14:18:43

Local clock offset: -0.108 ms

Remote clock offset: 20.1 ms

Below is generated by plot.py at 2017-09-22 15:14:32

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.58 Mbit/s

95th percentile per-packet one-way delay: 2861.541 ms

Loss rate: 10.08%

-- Flow 1:

Average throughput: 0.38 Mbit/s

95th percentile per-packet one-way delay: 2856.059 ms

Loss rate: 8.47%

-- Flow 2:

Average throughput: 0.34 Mbit/s

95th percentile per-packet one-way delay: 2871.253 ms

Loss rate: 11.23%

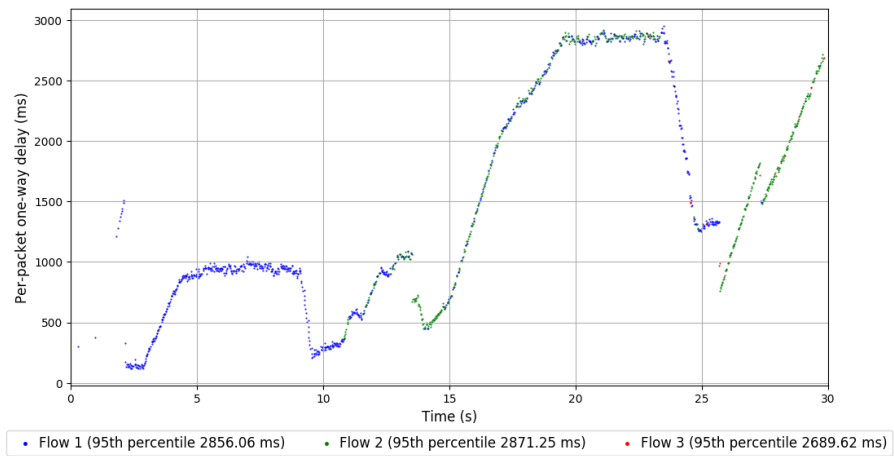
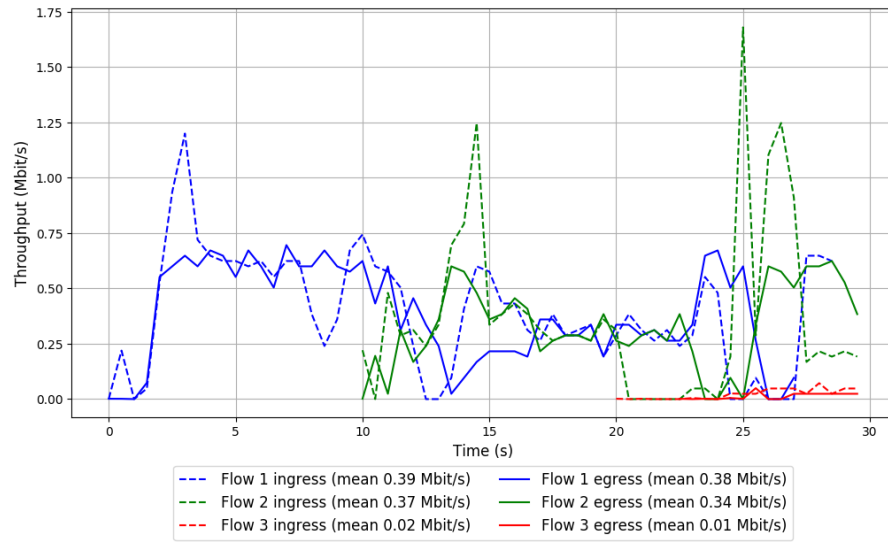
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 2689.621 ms

Loss rate: 54.20%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2017-09-22 13:35:24

End at: 2017-09-22 13:35:54

Local clock offset: -0.061 ms

Remote clock offset: 9.283 ms

Below is generated by plot.py at 2017-09-22 15:14:32

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.58 Mbit/s

95th percentile per-packet one-way delay: 8104.291 ms

Loss rate: 31.61%

-- Flow 1:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 8113.961 ms

Loss rate: 30.91%

-- Flow 2:

Average throughput: 0.03 Mbit/s

95th percentile per-packet one-way delay: 6274.111 ms

Loss rate: 53.64%

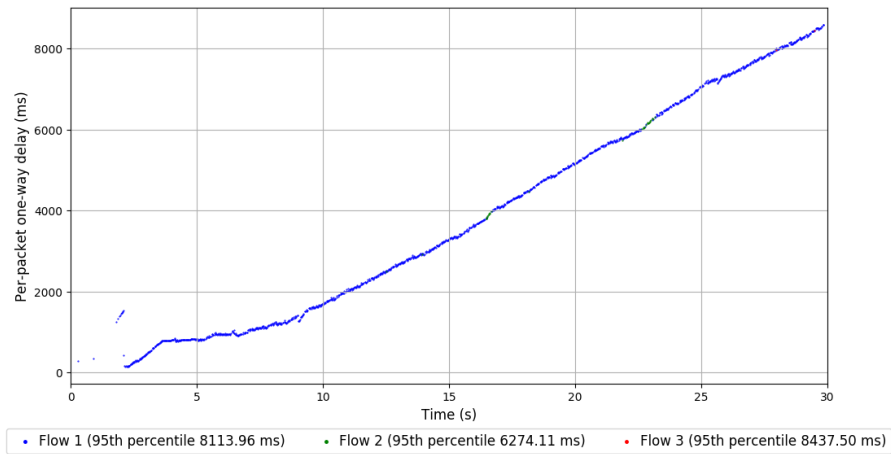
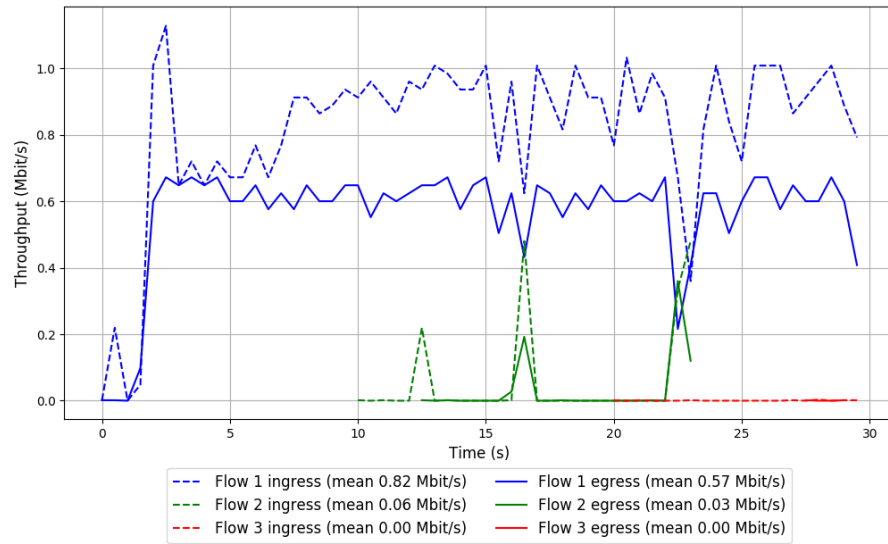
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 8437.498 ms

Loss rate: 75.13%

Run 1: Report of TCP Cubic — Data Link

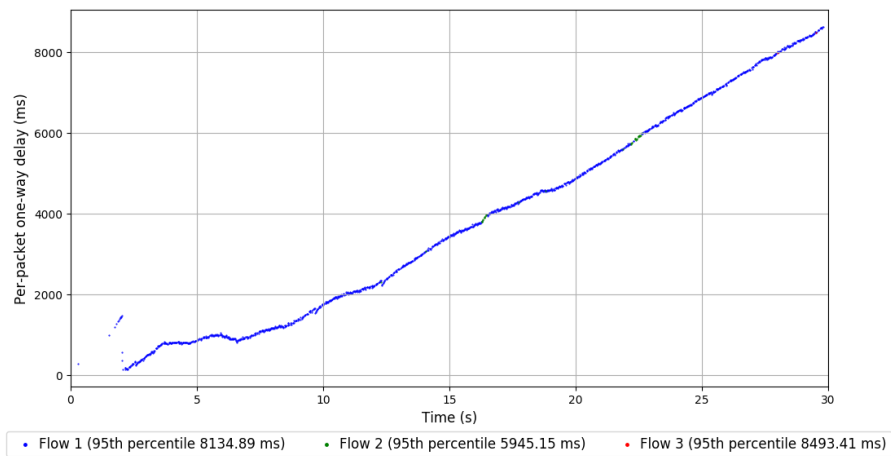
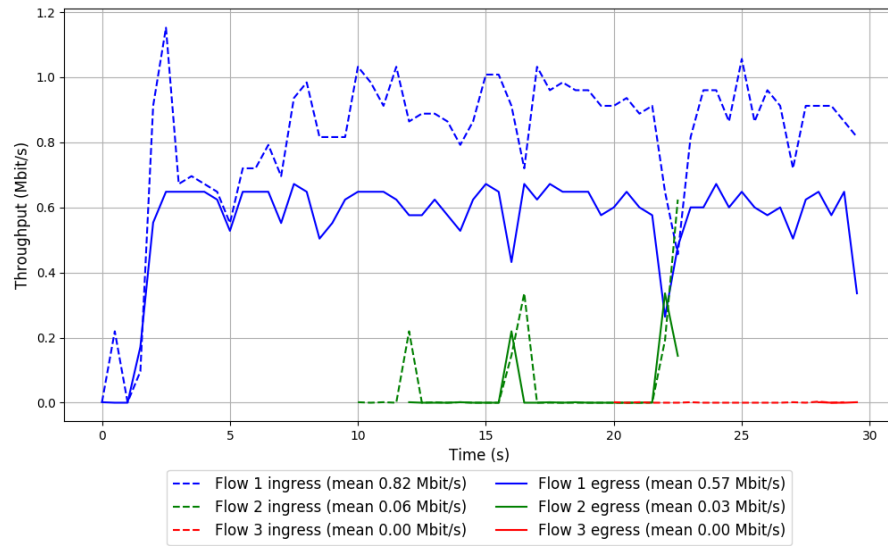


Run 2: Statistics of TCP Cubic

Start at: 2017-09-22 13:53:03
End at: 2017-09-22 13:53:33
Local clock offset: -0.065 ms
Remote clock offset: 13.749 ms

Below is generated by plot.py at 2017-09-22 15:14:32
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 8134.878 ms
Loss rate: 31.64%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 8134.889 ms
Loss rate: 30.95%
-- Flow 2:
Average throughput: 0.03 Mbit/s
95th percentile per-packet one-way delay: 5945.146 ms
Loss rate: 53.59%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 8493.414 ms
Loss rate: 71.93%

Run 2: Report of TCP Cubic — Data Link

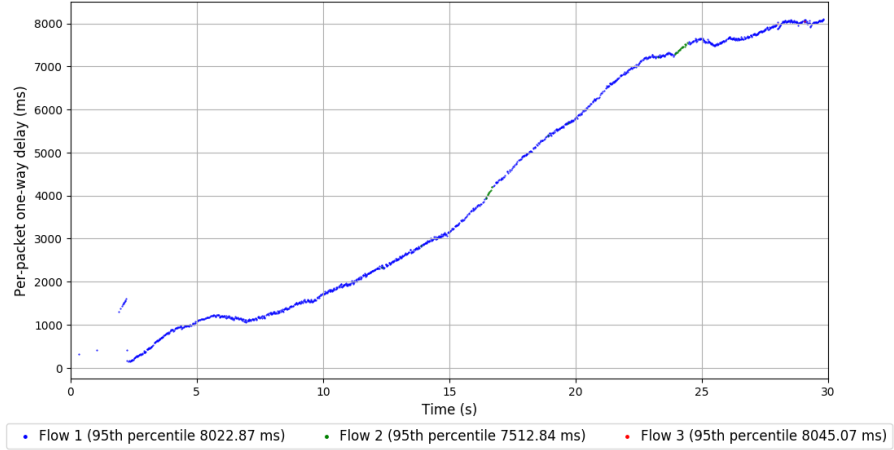
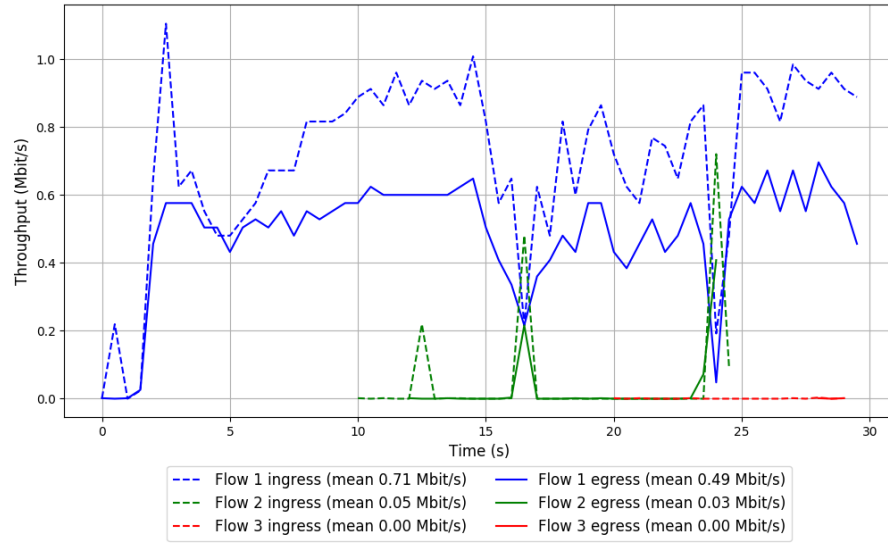


Run 3: Statistics of TCP Cubic

Start at: 2017-09-22 14:10:40
End at: 2017-09-22 14:11:10
Local clock offset: -0.068 ms
Remote clock offset: 12.819 ms

Below is generated by plot.py at 2017-09-22 15:14:32
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 8022.854 ms
Loss rate: 32.20%
-- Flow 1:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 8022.866 ms
Loss rate: 31.43%
-- Flow 2:
Average throughput: 0.03 Mbit/s
95th percentile per-packet one-way delay: 7512.842 ms
Loss rate: 53.59%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 8045.072 ms
Loss rate: 71.93%

Run 3: Report of TCP Cubic — Data Link

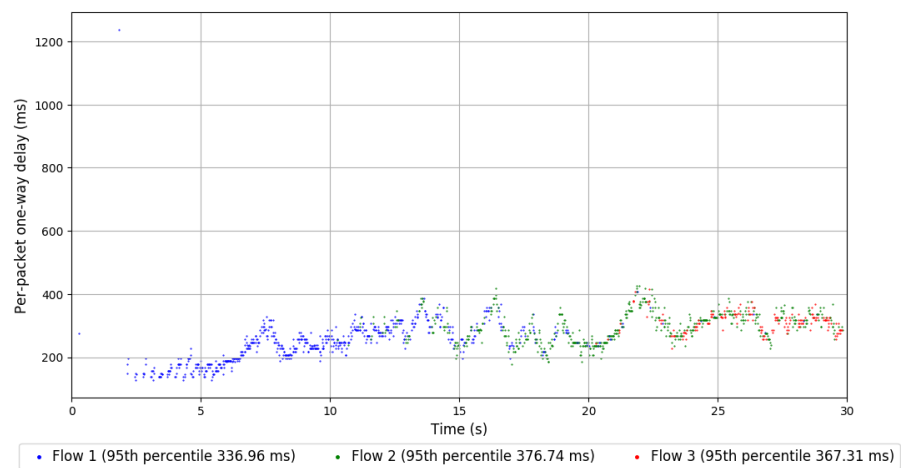
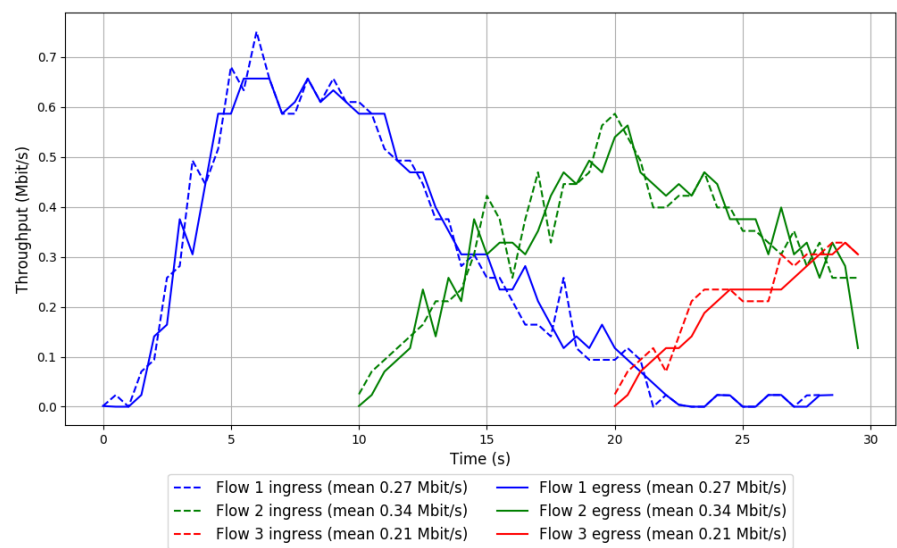


Run 1: Statistics of LEDBAT

Start at: 2017-09-22 13:32:53
End at: 2017-09-22 13:33:23
Local clock offset: -0.061 ms
Remote clock offset: 17.169 ms

Below is generated by plot.py at 2017-09-22 15:14:32
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 357.386 ms
Loss rate: 1.57%
-- Flow 1:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 336.956 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 376.735 ms
Loss rate: 1.58%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 367.311 ms
Loss rate: 7.22%

Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2017-09-22 13:50:32

End at: 2017-09-22 13:51:02

Local clock offset: -0.078 ms

Remote clock offset: 9.113 ms

Below is generated by plot.py at 2017-09-22 15:14:32

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.52 Mbit/s

95th percentile per-packet one-way delay: 358.458 ms

Loss rate: 1.27%

-- Flow 1:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 337.702 ms

Loss rate: 0.27%

-- Flow 2:

Average throughput: 0.26 Mbit/s

95th percentile per-packet one-way delay: 377.839 ms

Loss rate: 1.79%

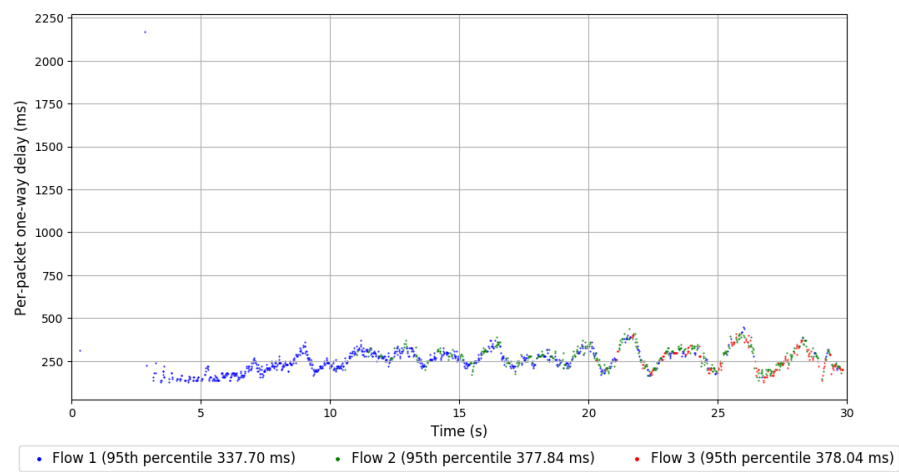
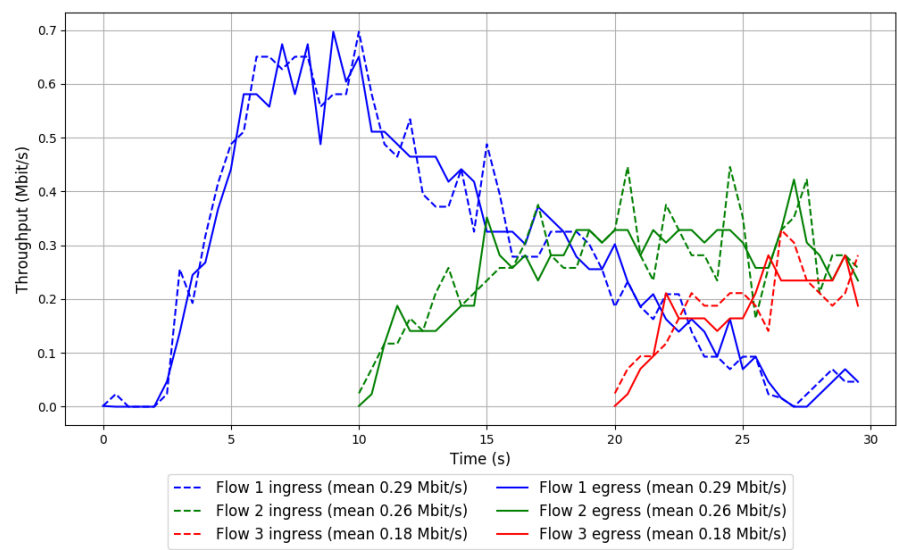
-- Flow 3:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 378.042 ms

Loss rate: 4.49%

Run 2: Report of LEDBAT — Data Link

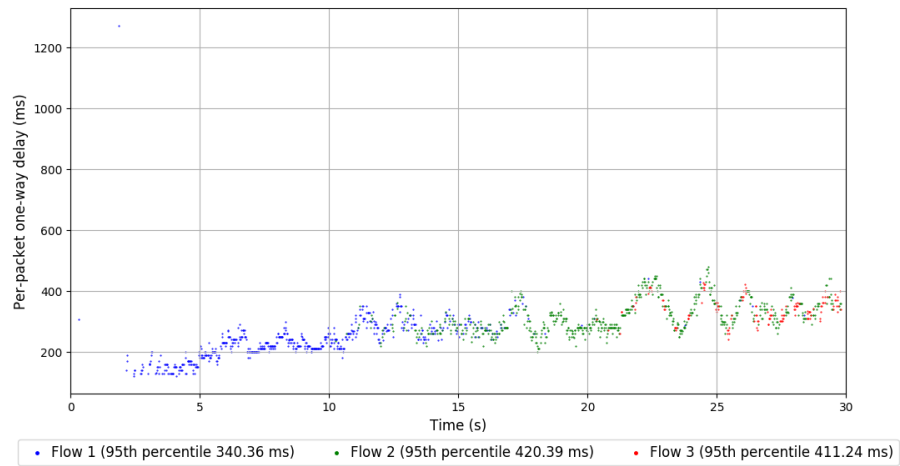
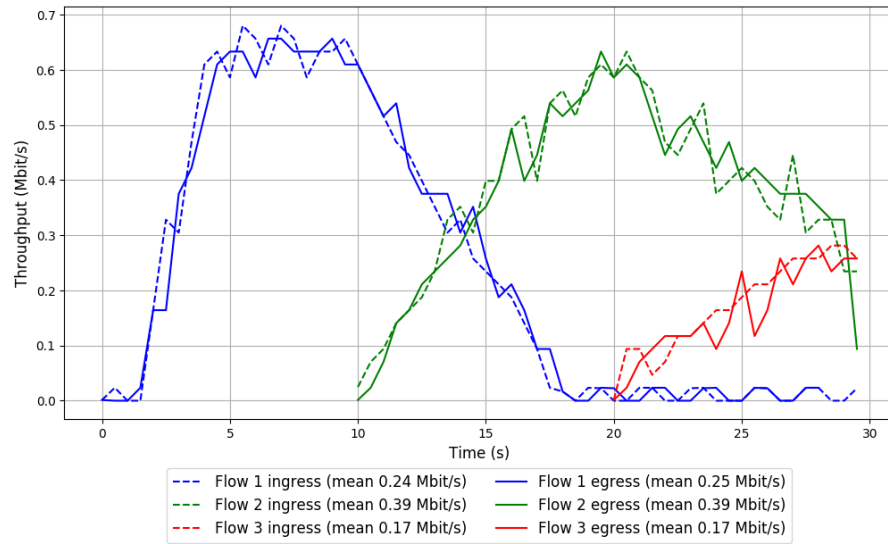


Run 3: Statistics of LEDBAT

Start at: 2017-09-22 14:08:09
End at: 2017-09-22 14:08:39
Local clock offset: -0.111 ms
Remote clock offset: 15.766 ms

Below is generated by plot.py at 2017-09-22 15:14:35
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 400.576 ms
Loss rate: 1.55%
-- Flow 1:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 340.364 ms
Loss rate: 0.16%
-- Flow 2:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 420.391 ms
Loss rate: 1.52%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 411.239 ms
Loss rate: 7.48%

Run 3: Report of LEDBAT — Data Link

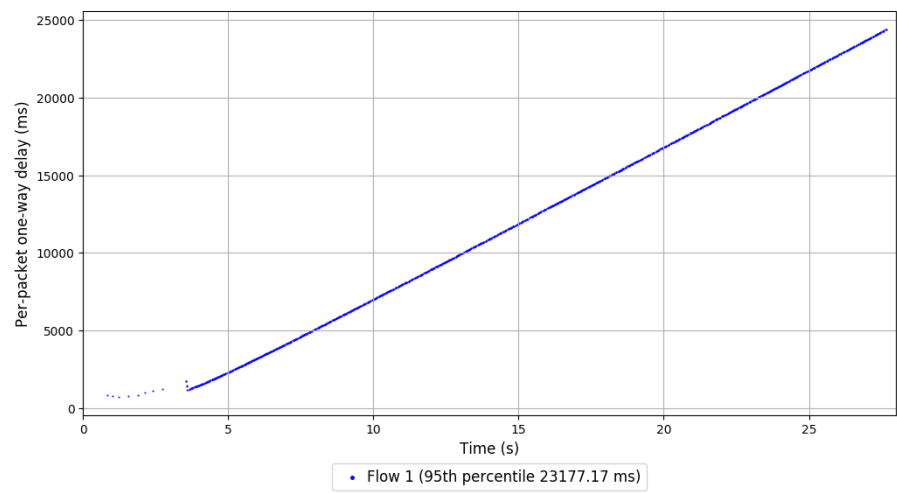
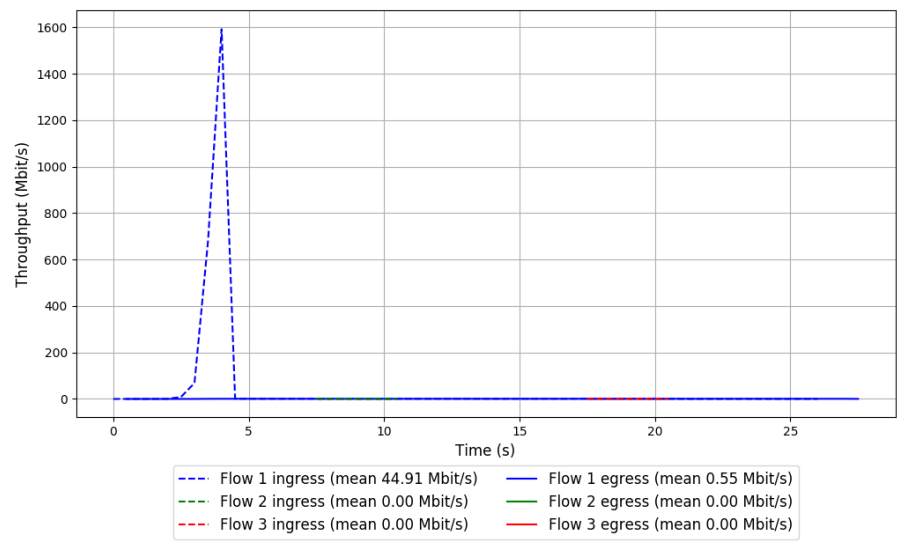


Run 1: Statistics of PCC

Start at: 2017-09-22 13:45:29
End at: 2017-09-22 13:45:59
Local clock offset: -0.035 ms
Remote clock offset: -1.281 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 23177.165 ms
Loss rate: 98.75%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 23177.165 ms
Loss rate: 98.75%
-- Flow 2:
Average throughput: 0.00 Mbit/s
-- Flow 3:
Average throughput: 0.00 Mbit/s

Run 1: Report of PCC — Data Link

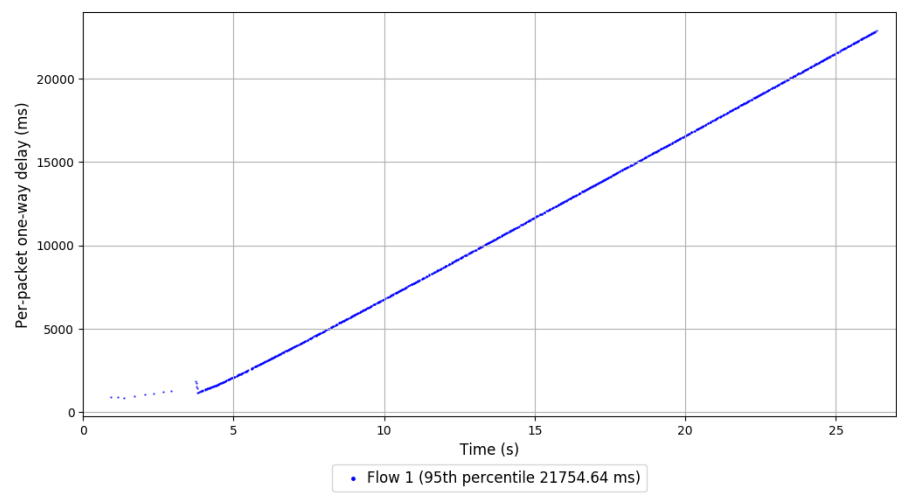
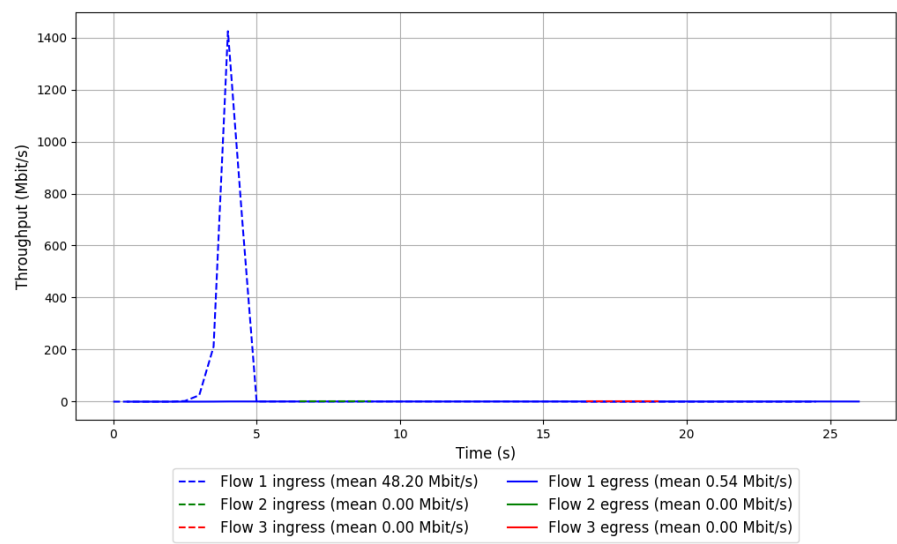


Run 2: Statistics of PCC

Start at: 2017-09-22 14:03:04
End at: 2017-09-22 14:03:34
Local clock offset: -0.181 ms
Remote clock offset: 14.084 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 21754.643 ms
Loss rate: 98.84%
-- Flow 1:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 21754.643 ms
Loss rate: 98.84%
-- Flow 2:
Average throughput: 0.00 Mbit/s
-- Flow 3:
Average throughput: 0.00 Mbit/s

Run 2: Report of PCC — Data Link

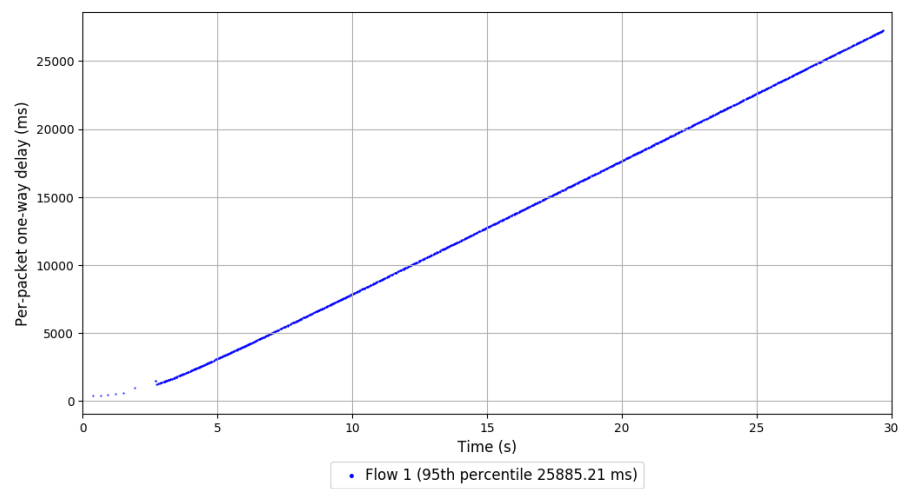
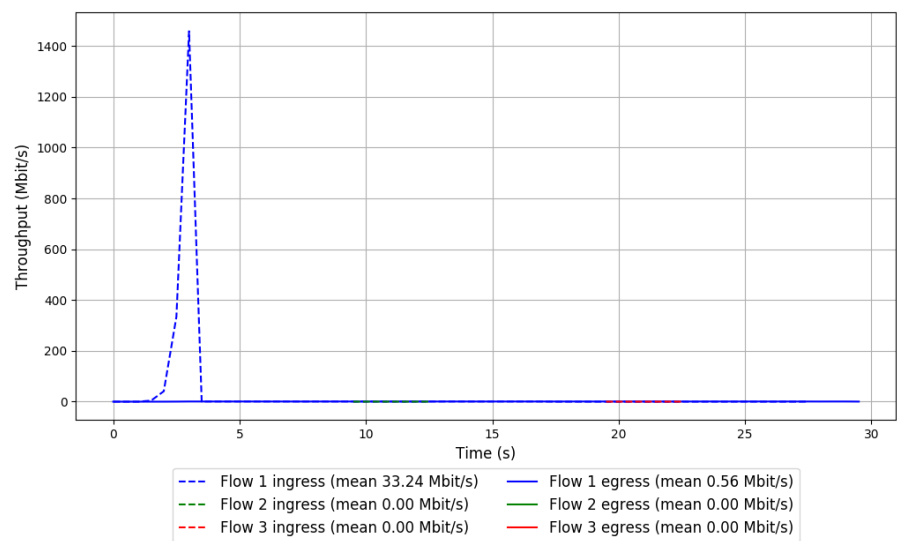


Run 3: Statistics of PCC

Start at: 2017-09-22 14:20:44
End at: 2017-09-22 14:21:14
Local clock offset: -0.131 ms
Remote clock offset: 25.118 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 25885.209 ms
Loss rate: 98.24%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 25885.209 ms
Loss rate: 98.24%
-- Flow 2:
Average throughput: 0.00 Mbit/s
-- Flow 3:
Average throughput: 0.00 Mbit/s

Run 3: Report of PCC — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2017-09-22 13:37:55

End at: 2017-09-22 13:38:25

Local clock offset: -0.134 ms

Remote clock offset: 6.095 ms

Below is generated by plot.py at 2017-09-22 15:15:01

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.60 Mbit/s

95th percentile per-packet one-way delay: 7228.387 ms

Loss rate: 28.51%

-- Flow 1:

Average throughput: 0.56 Mbit/s

95th percentile per-packet one-way delay: 7237.857 ms

Loss rate: 27.96%

-- Flow 2:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 5950.504 ms

Loss rate: 35.94%

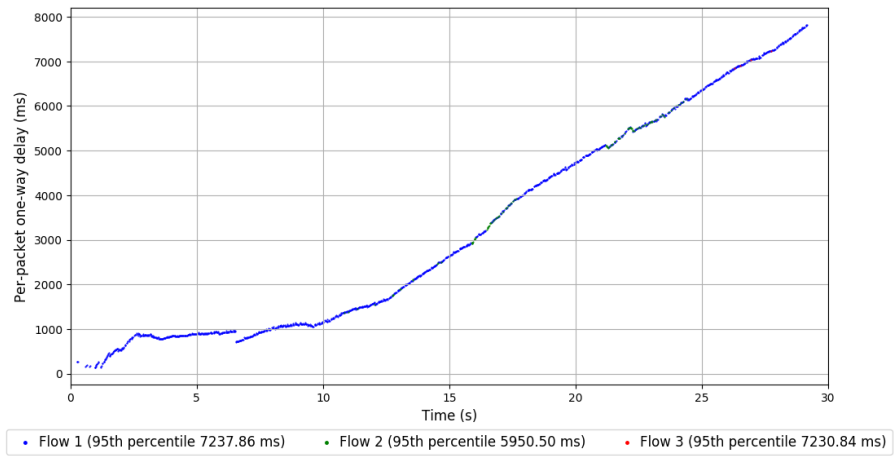
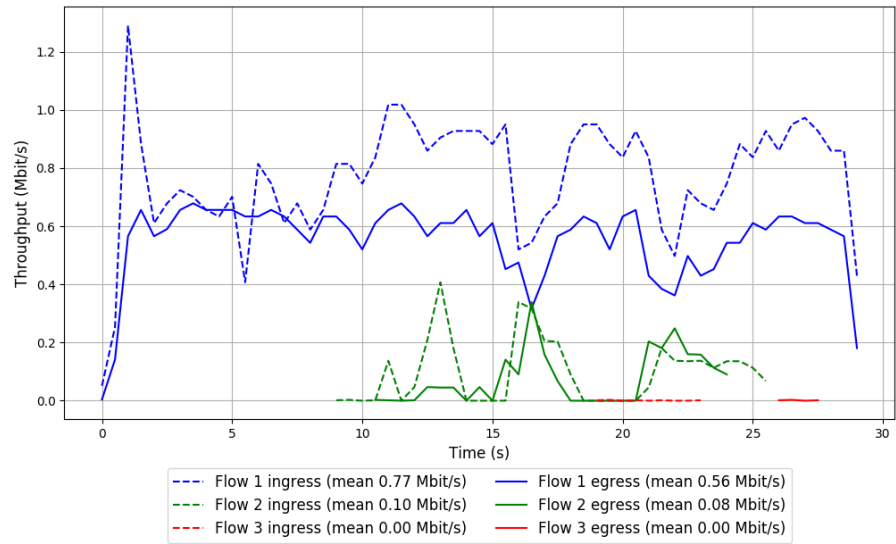
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 7230.844 ms

Loss rate: 33.33%

Run 1: Report of QUIC Cubic — Data Link

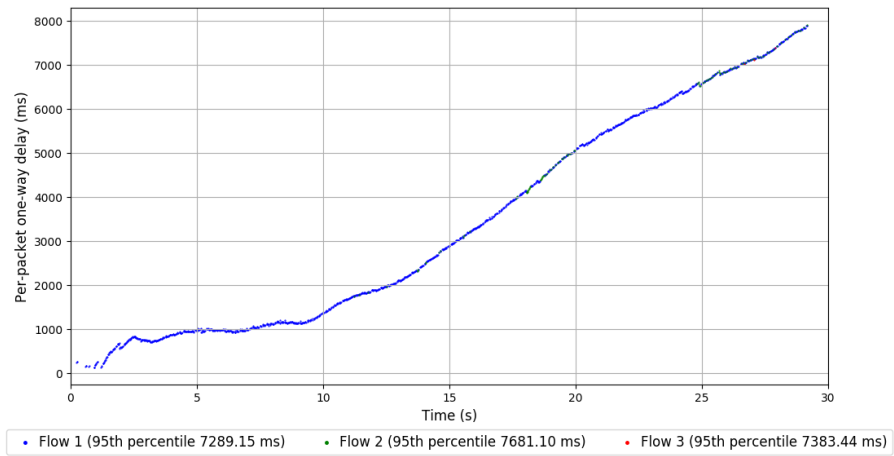
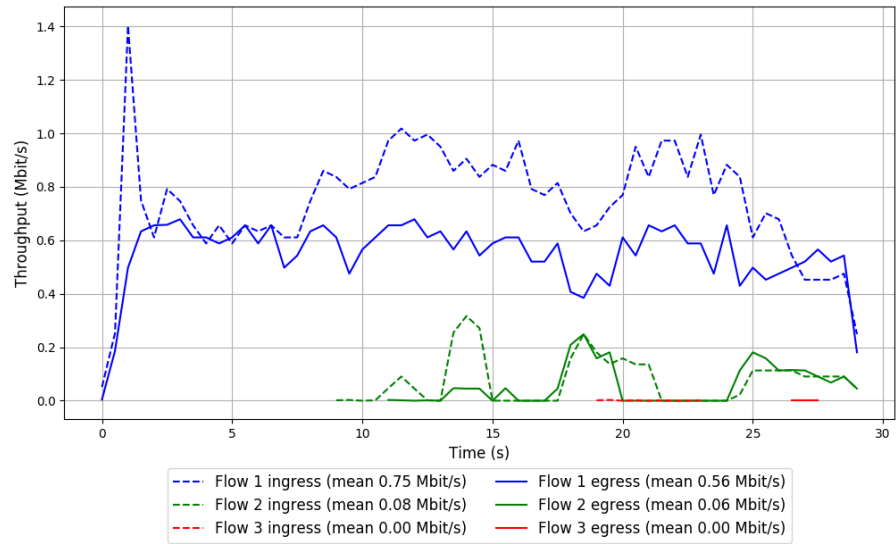


Run 2: Statistics of QUIC Cubic

Start at: 2017-09-22 13:55:33
End at: 2017-09-22 13:56:03
Local clock offset: -0.064 ms
Remote clock offset: 14.07 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 7334.090 ms
Loss rate: 26.45%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 7289.148 ms
Loss rate: 26.13%
-- Flow 2:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 7681.100 ms
Loss rate: 30.95%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 7383.441 ms
Loss rate: 50.00%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

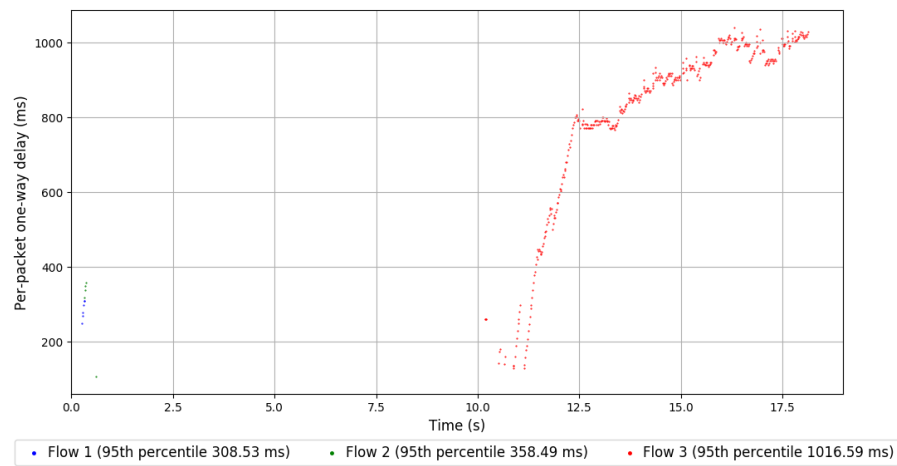
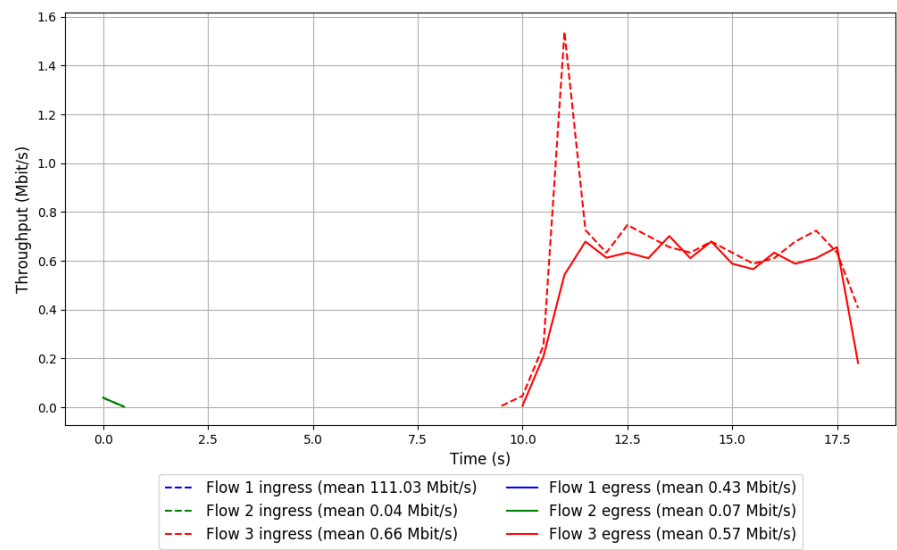
Start at: 2017-09-22 14:13:10

End at: 2017-09-22 14:13:40

Local clock offset: -0.133 ms

Remote clock offset: 23.519 ms

Run 3: Report of QUIC Cubic — Data Link

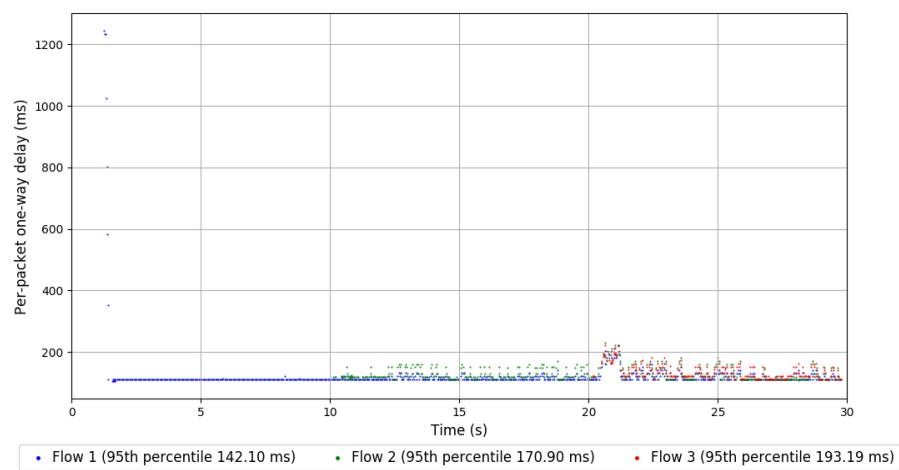
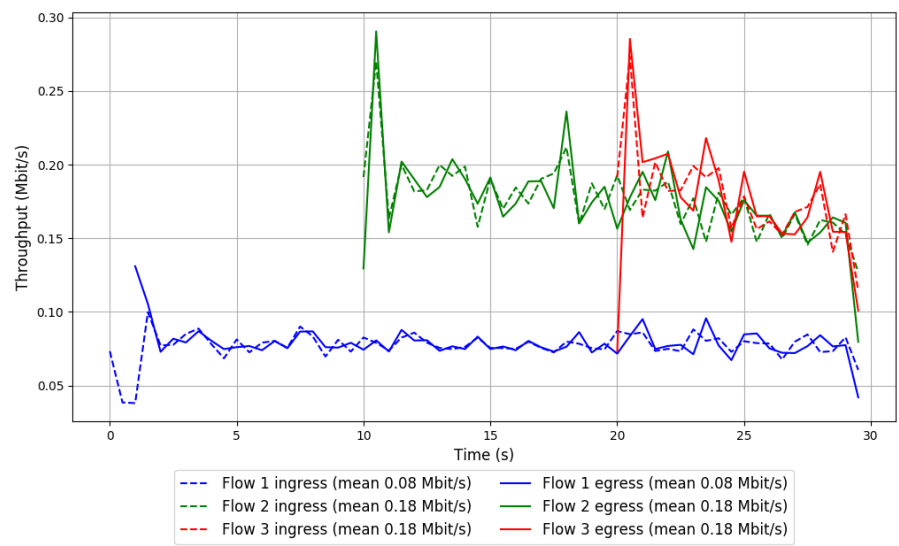


```
Run 1: Statistics of SCReAM

Start at: 2017-09-22 13:29:07
End at: 2017-09-22 13:29:37
Local clock offset: 0.011 ms
Remote clock offset: 20.757 ms

# Below is generated by plot.py at 2017-09-22 15:15:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 170.859 ms
Loss rate: 1.18%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 142.101 ms
Loss rate: 0.79%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 170.901 ms
Loss rate: 1.12%
-- Flow 3:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 193.187 ms
Loss rate: 1.78%
```

Run 1: Report of SReAM — Data Link

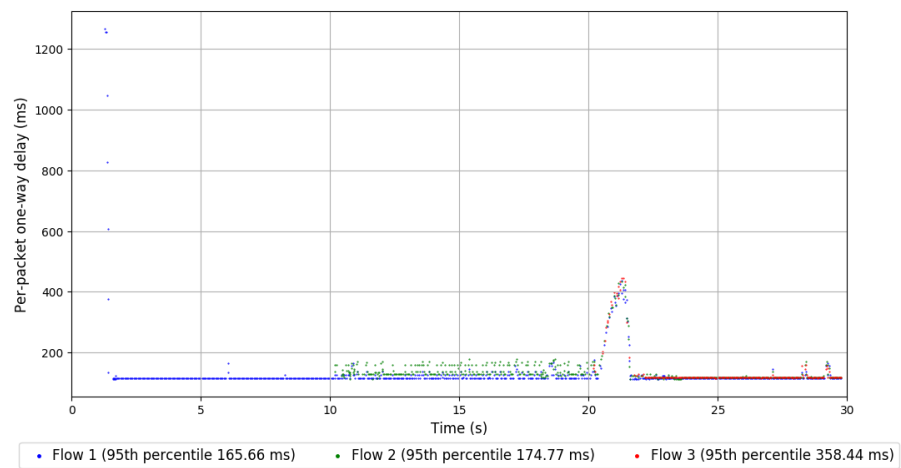
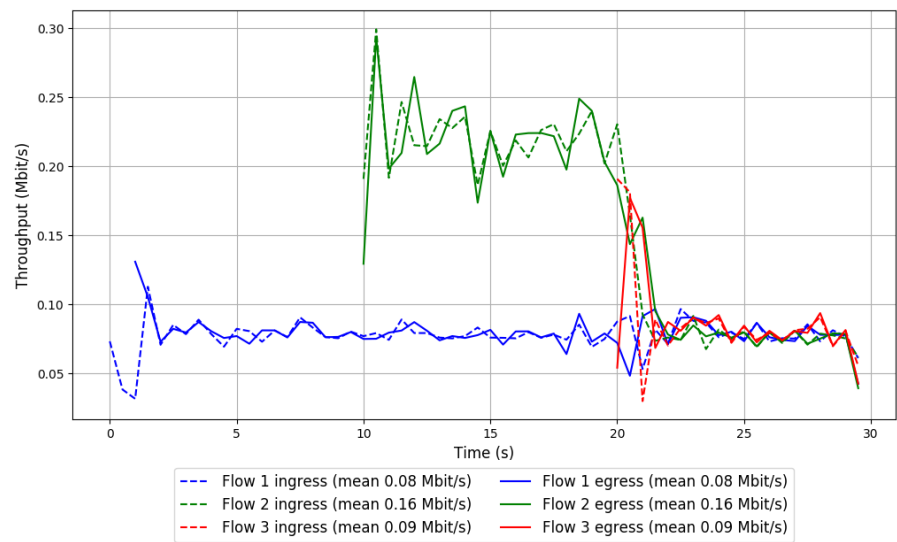


Run 2: Statistics of SReAM

Start at: 2017-09-22 13:46:46
End at: 2017-09-22 13:47:16
Local clock offset: -0.005 ms
Remote clock offset: 15.797 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 179.995 ms
Loss rate: 0.84%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 165.655 ms
Loss rate: 0.79%
-- Flow 2:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 174.769 ms
Loss rate: 0.62%
-- Flow 3:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 358.445 ms
Loss rate: 1.74%

Run 2: Report of SReAM — Data Link

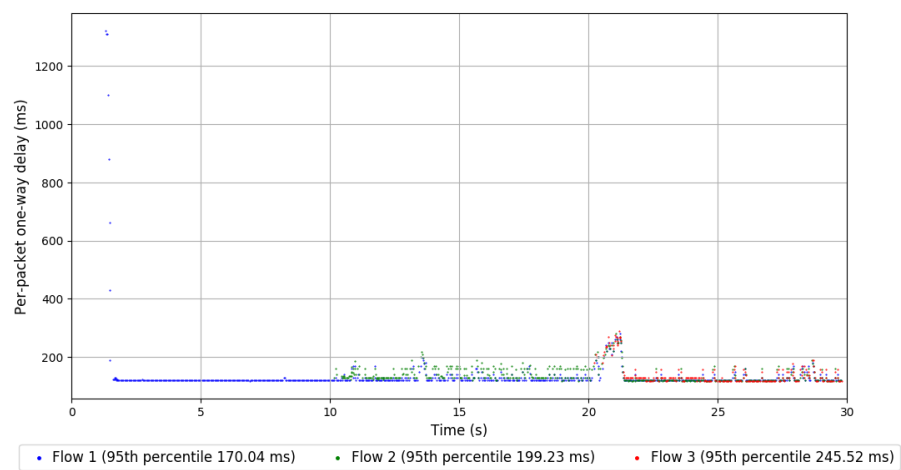
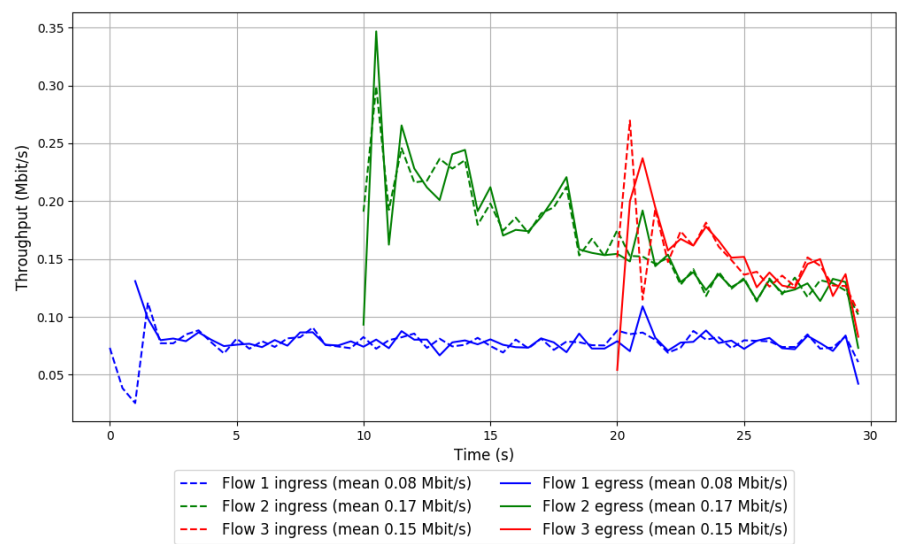


Run 3: Statistics of SCReAM

Start at: 2017-09-22 14:04:23
End at: 2017-09-22 14:04:53
Local clock offset: -0.037 ms
Remote clock offset: 10.282 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 199.273 ms
Loss rate: 1.06%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 170.042 ms
Loss rate: 0.80%
-- Flow 2:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 199.229 ms
Loss rate: 0.95%
-- Flow 3:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 245.518 ms
Loss rate: 1.73%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of WebRTC media

Start at: 2017-09-22 13:39:10

End at: 2017-09-22 13:39:40

Local clock offset: -0.016 ms

Remote clock offset: 7.639 ms

Below is generated by plot.py at 2017-09-22 15:15:01

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.44 Mbit/s

95th percentile per-packet one-way delay: 1731.063 ms

Loss rate: 4.07%

-- Flow 1:

Average throughput: 0.24 Mbit/s

95th percentile per-packet one-way delay: 1679.996 ms

Loss rate: 1.48%

-- Flow 2:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 1675.239 ms

Loss rate: 5.19%

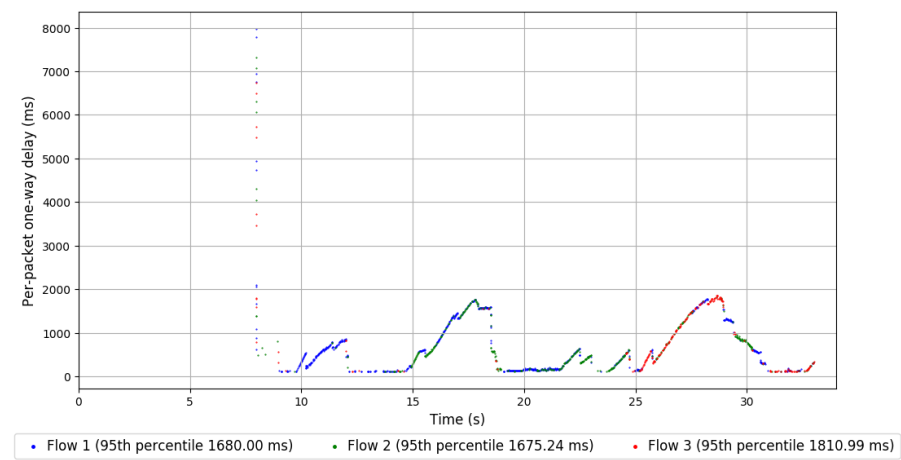
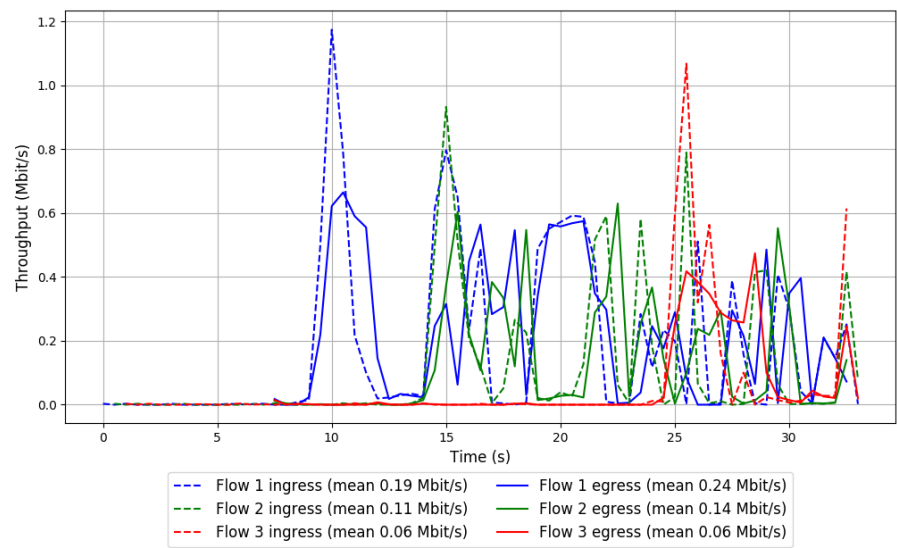
-- Flow 3:

Average throughput: 0.06 Mbit/s

95th percentile per-packet one-way delay: 1810.988 ms

Loss rate: 10.54%

Run 1: Report of WebRTC media — Data Link

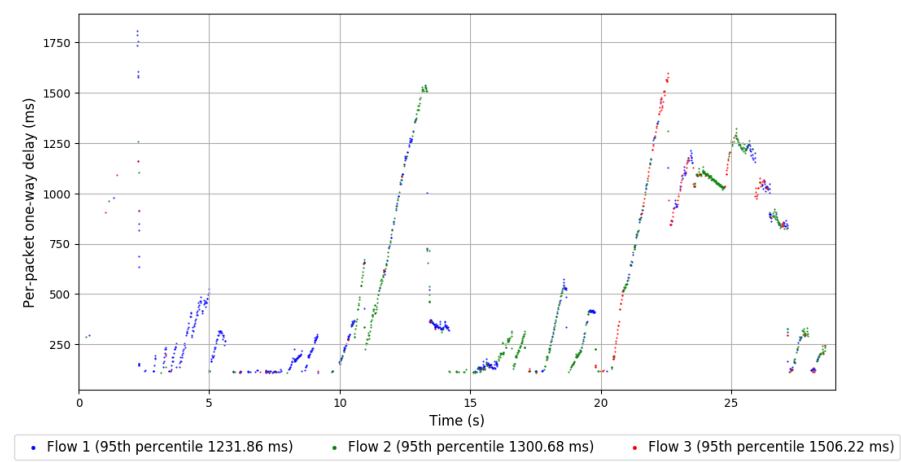
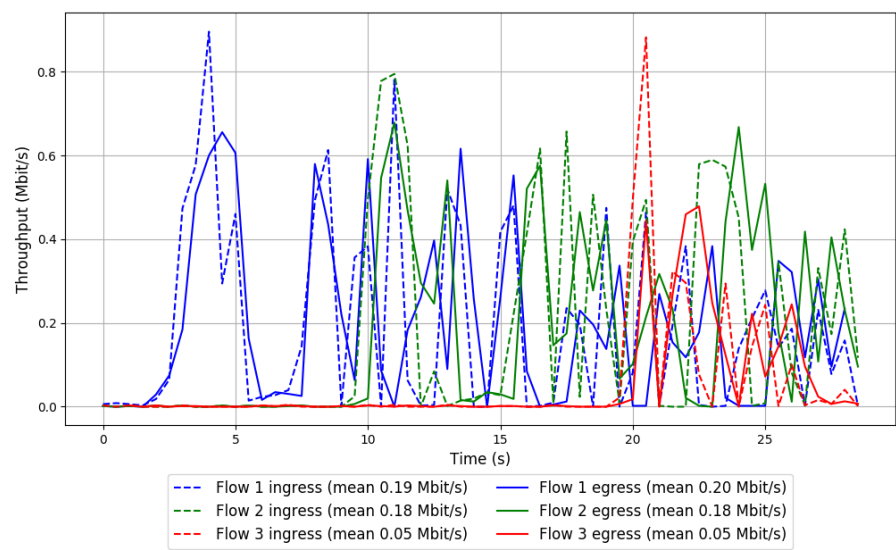


Run 2: Statistics of WebRTC media

Start at: 2017-09-22 13:56:48
End at: 2017-09-22 13:57:18
Local clock offset: -0.031 ms
Remote clock offset: 15.745 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 1300.682 ms
Loss rate: 1.19%
-- Flow 1:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 1231.859 ms
Loss rate: 0.04%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 1300.682 ms
Loss rate: 2.11%
-- Flow 3:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 1506.216 ms
Loss rate: 2.33%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

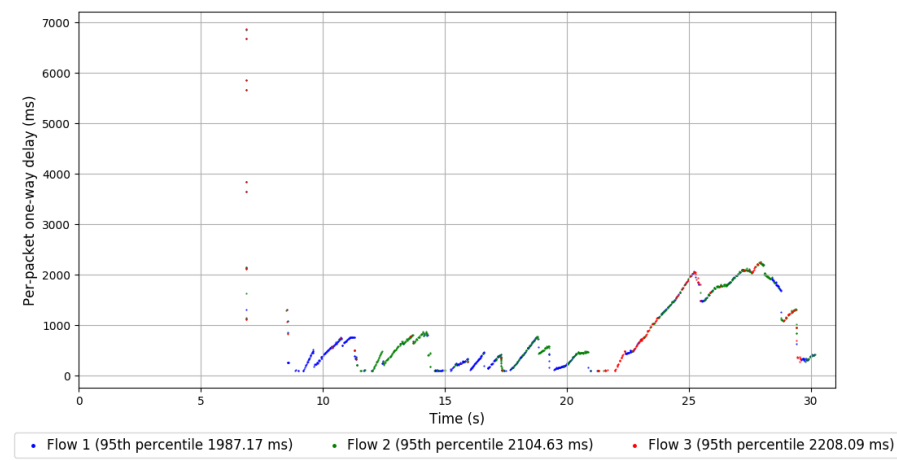
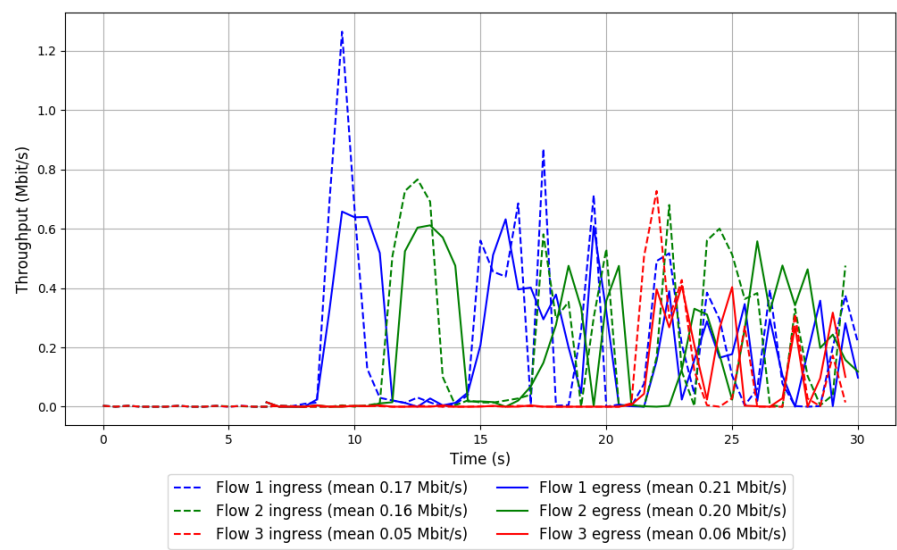
Start at: 2017-09-22 14:14:26

End at: 2017-09-22 14:14:56

Local clock offset: -0.039 ms

Remote clock offset: 22.962 ms

Run 3: Report of WebRTC media — Data Link

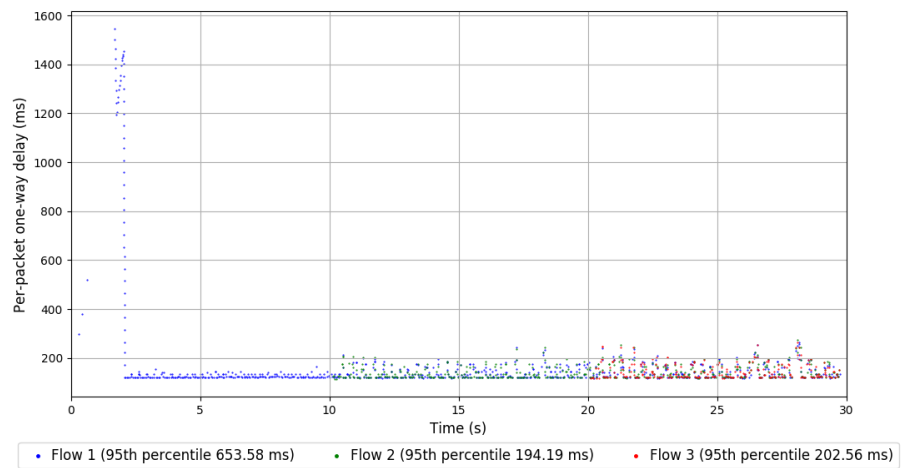
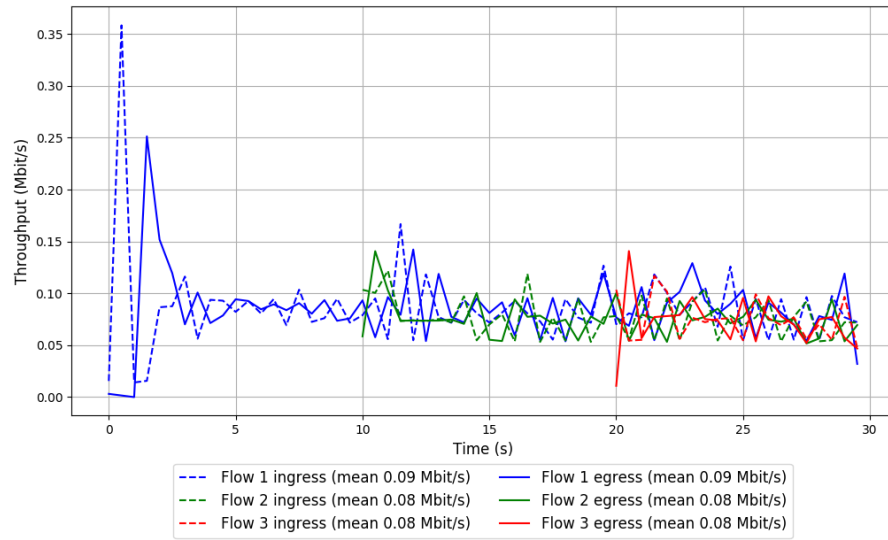


Run 1: Statistics of Sprout

Start at: 2017-09-22 13:36:39
End at: 2017-09-22 13:37:09
Local clock offset: -0.028 ms
Remote clock offset: 10.102 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 232.447 ms
Loss rate: 1.65%
-- Flow 1:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 653.578 ms
Loss rate: 1.79%
-- Flow 2:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 194.193 ms
Loss rate: 0.78%
-- Flow 3:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 202.561 ms
Loss rate: 2.91%

Run 1: Report of Sprout — Data Link

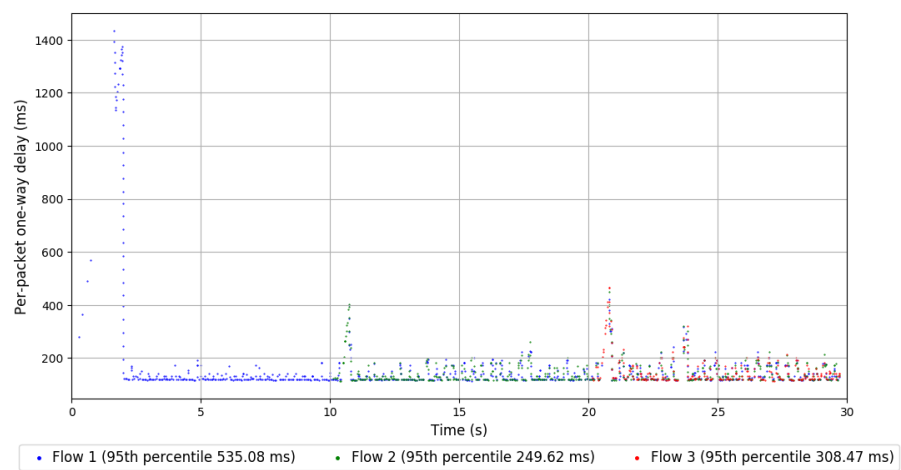
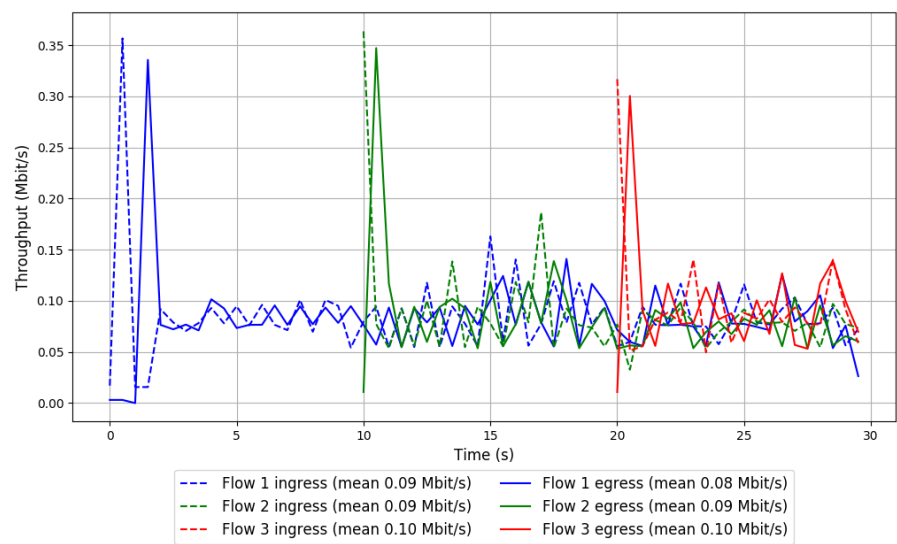


Run 2: Statistics of Sprout

Start at: 2017-09-22 13:54:18
End at: 2017-09-22 13:54:48
Local clock offset: -0.072 ms
Remote clock offset: 10.592 ms

```
# Below is generated by plot.py at 2017-09-22 15:15:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 310.809 ms
Loss rate: 2.28%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 535.077 ms
Loss rate: 2.50%
-- Flow 2:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 249.623 ms
Loss rate: 2.50%
-- Flow 3:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 308.470 ms
Loss rate: 1.26%
```


Run 2: Report of Sprout — Data Link

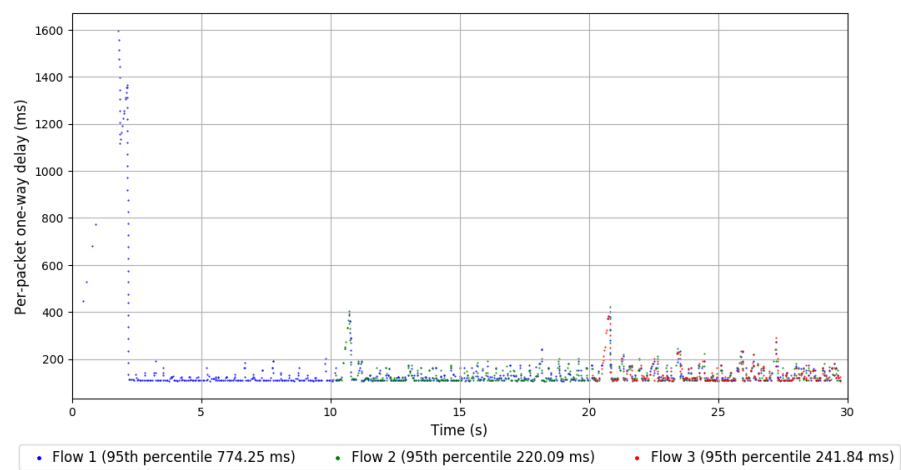
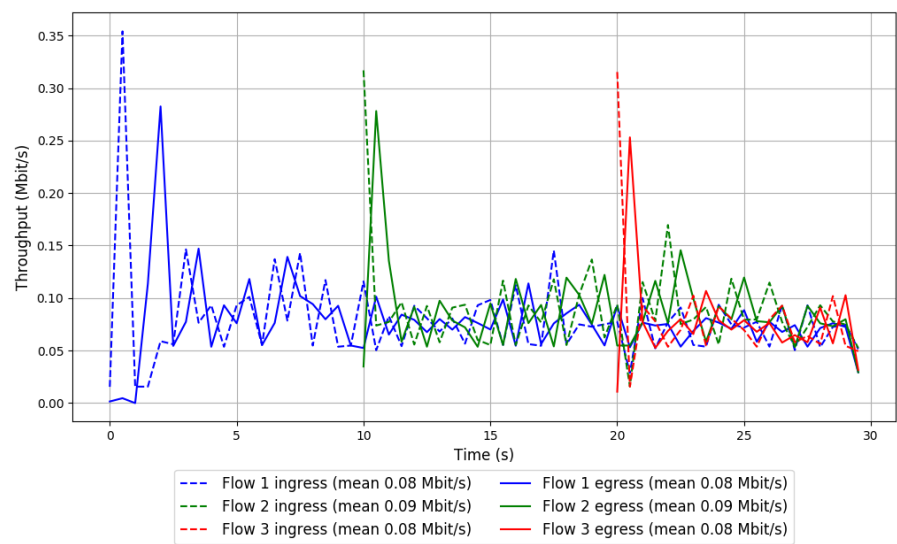


Run 3: Statistics of Sprout

Start at: 2017-09-22 14:11:55
End at: 2017-09-22 14:12:25
Local clock offset: -0.071 ms
Remote clock offset: 18.329 ms

```
# Below is generated by plot.py at 2017-09-22 15:15:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 313.426 ms
Loss rate: 2.51%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 774.250 ms
Loss rate: 2.13%
-- Flow 2:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 220.088 ms
Loss rate: 1.80%
-- Flow 3:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 241.840 ms
Loss rate: 5.19%
```

Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

Start at: 2017-09-22 13:31:37

End at: 2017-09-22 13:32:07

Local clock offset: -0.035 ms

Remote clock offset: 7.182 ms

Below is generated by plot.py at 2017-09-22 15:15:01

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.60 Mbit/s

95th percentile per-packet one-way delay: 6835.303 ms

Loss rate: 18.65%

-- Flow 1:

Average throughput: 0.38 Mbit/s

95th percentile per-packet one-way delay: 7320.631 ms

Loss rate: 19.42%

-- Flow 2:

Average throughput: 0.35 Mbit/s

95th percentile per-packet one-way delay: 6190.299 ms

Loss rate: 16.78%

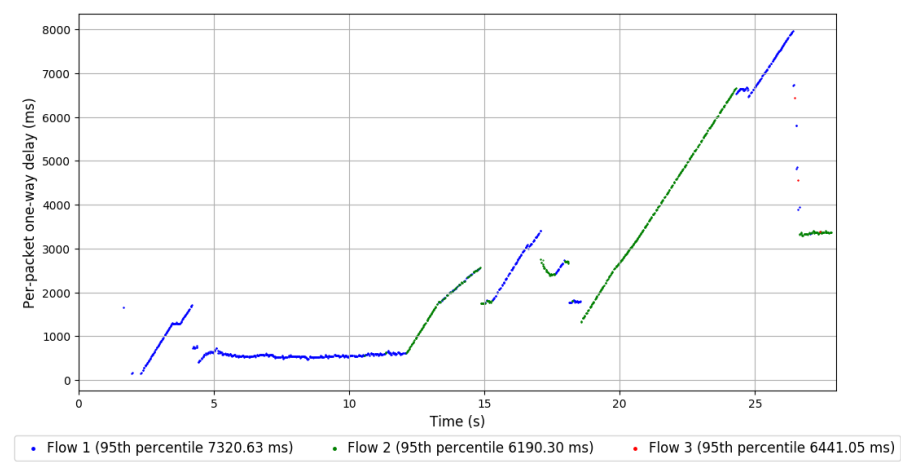
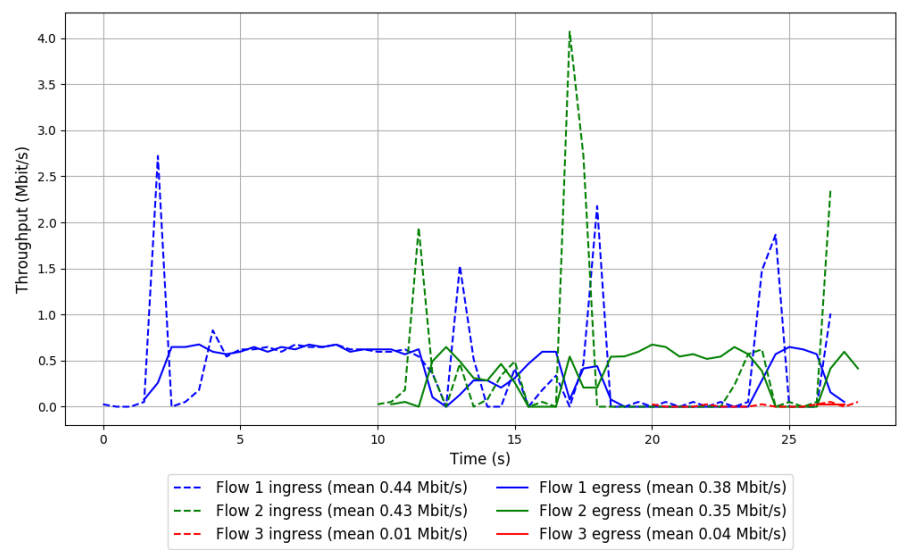
-- Flow 3:

Average throughput: 0.04 Mbit/s

95th percentile per-packet one-way delay: 6441.052 ms

Loss rate: 62.50%

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

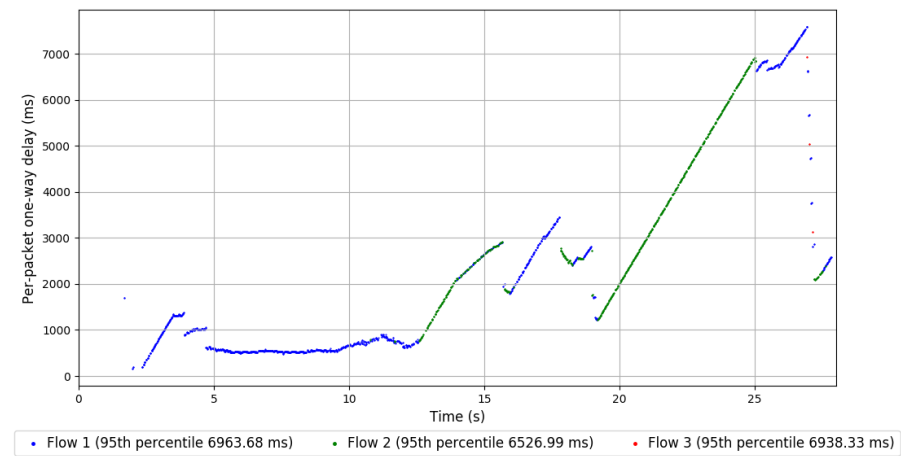
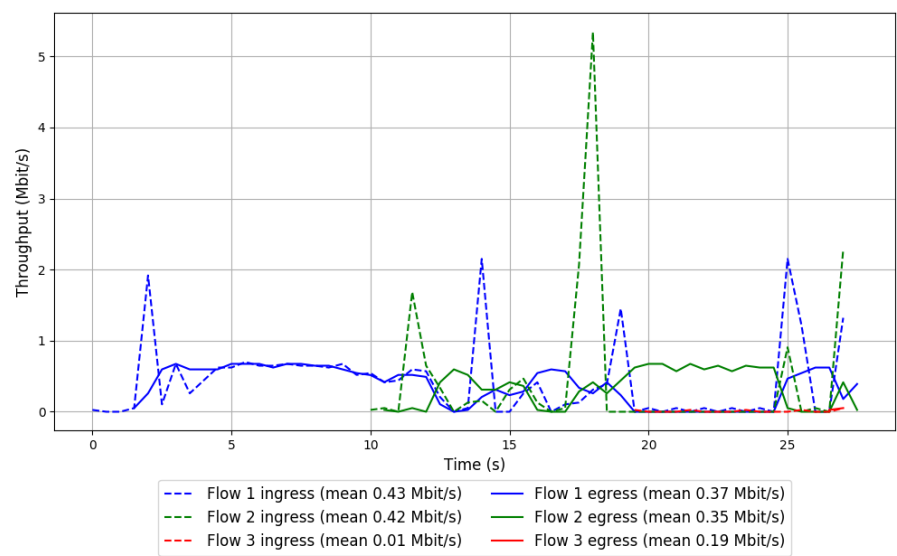


Run 2: Statistics of TaoVA-100x

Start at: 2017-09-22 13:49:17
End at: 2017-09-22 13:49:47
Local clock offset: -0.059 ms
Remote clock offset: 12.901 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 6805.694 ms
Loss rate: 18.69%
-- Flow 1:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 6963.676 ms
Loss rate: 18.21%
-- Flow 2:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 6526.995 ms
Loss rate: 19.12%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 6938.329 ms
Loss rate: 50.00%

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

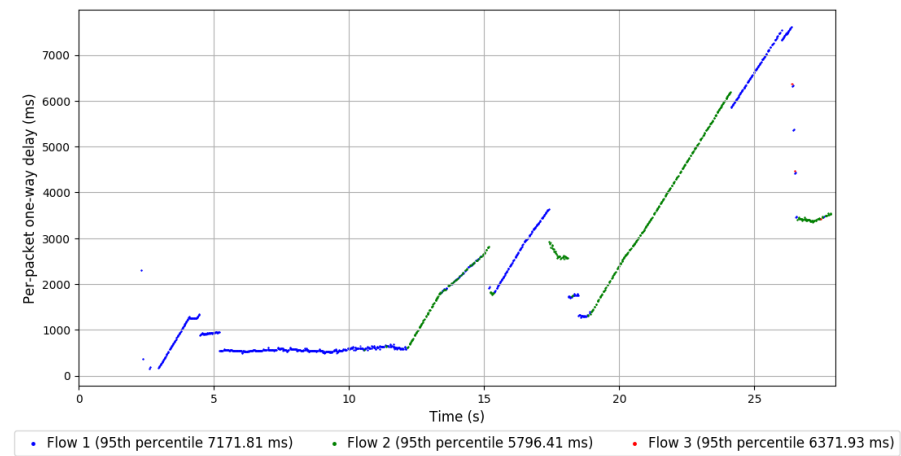
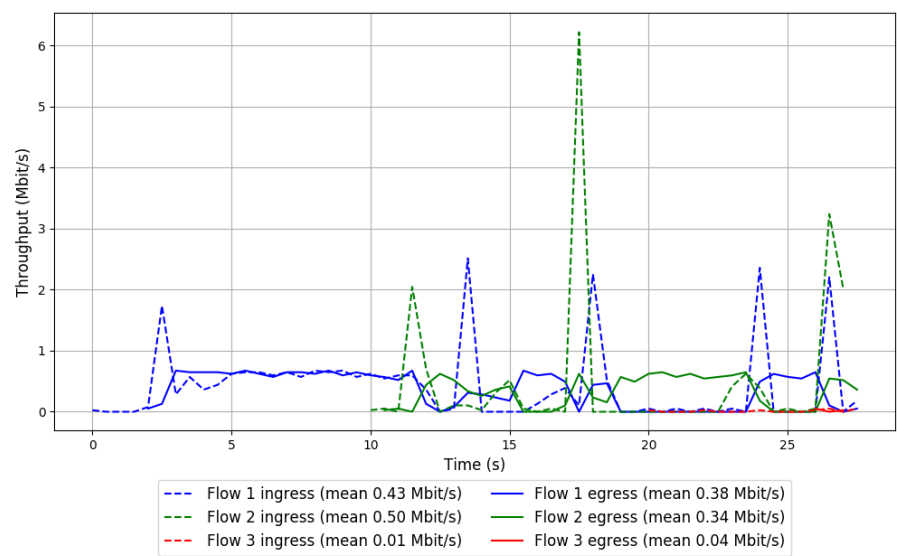


Run 3: Statistics of TaoVA-100x

Start at: 2017-09-22 14:06:54
End at: 2017-09-22 14:07:24
Local clock offset: -0.069 ms
Remote clock offset: 11.514 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 6723.090 ms
Loss rate: 24.89%
-- Flow 1:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 7171.811 ms
Loss rate: 19.78%
-- Flow 2:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 5796.408 ms
Loss rate: 31.55%
-- Flow 3:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 6371.927 ms
Loss rate: 62.50%

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

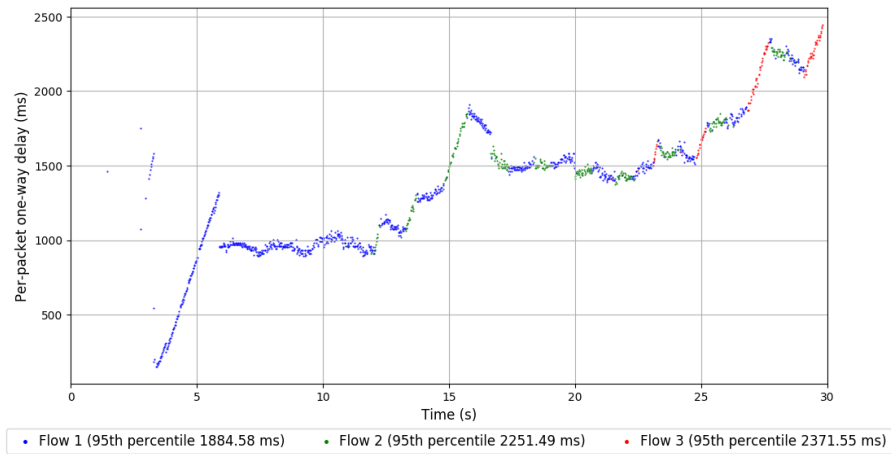
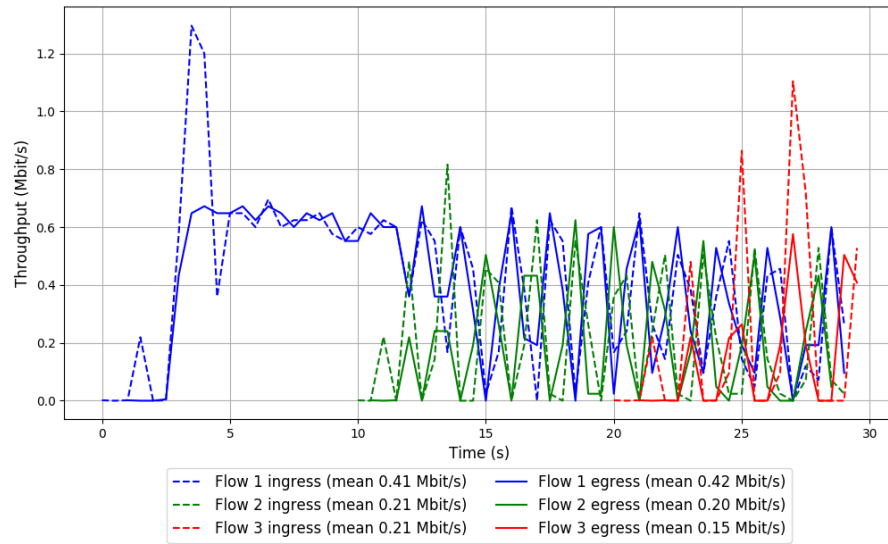


Run 1: Statistics of TCP Vegas

Start at: 2017-09-22 13:40:27
End at: 2017-09-22 13:40:57
Local clock offset: -0.003 ms
Remote clock offset: -3.528 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 2241.458 ms
Loss rate: 9.13%
-- Flow 1:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 1884.583 ms
Loss rate: 4.40%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 2251.490 ms
Loss rate: 8.81%
-- Flow 3:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 2371.555 ms
Loss rate: 37.36%

Run 1: Report of TCP Vegas — Data Link

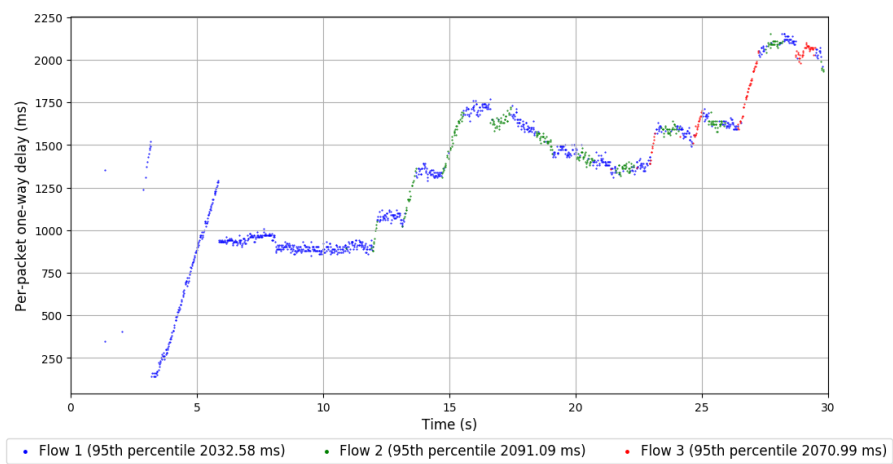
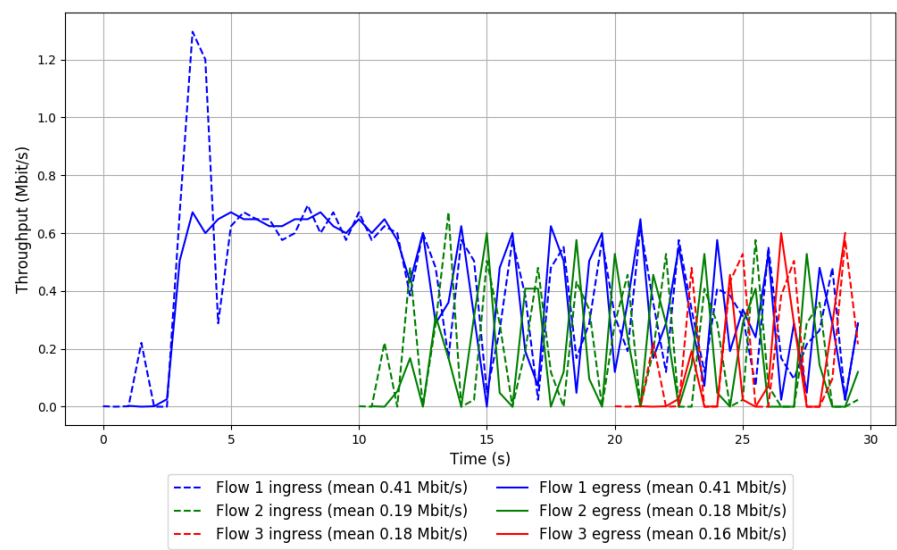


Run 2: Statistics of TCP Vegas

Start at: 2017-09-22 13:58:03
End at: 2017-09-22 13:58:33
Local clock offset: 0.047 ms
Remote clock offset: 15.093 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 2070.863 ms
Loss rate: 7.05%
-- Flow 1:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 2032.583 ms
Loss rate: 4.32%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 2091.090 ms
Loss rate: 7.32%
-- Flow 3:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 2070.991 ms
Loss rate: 25.81%

Run 2: Report of TCP Vegas — Data Link

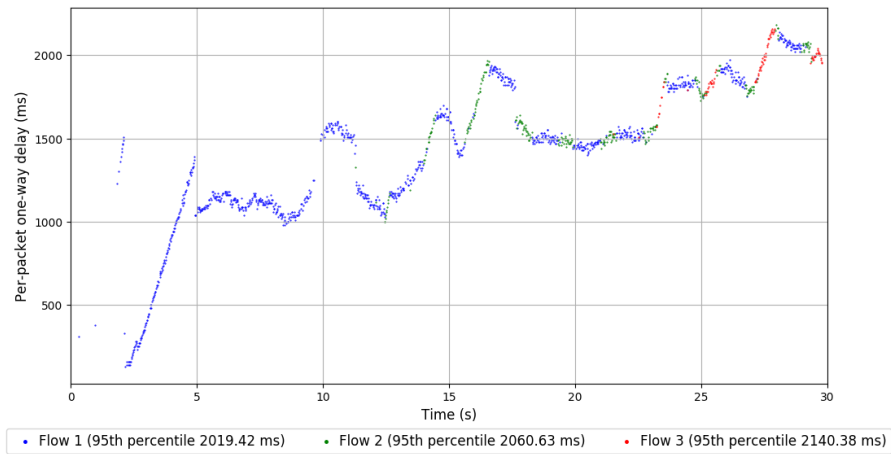
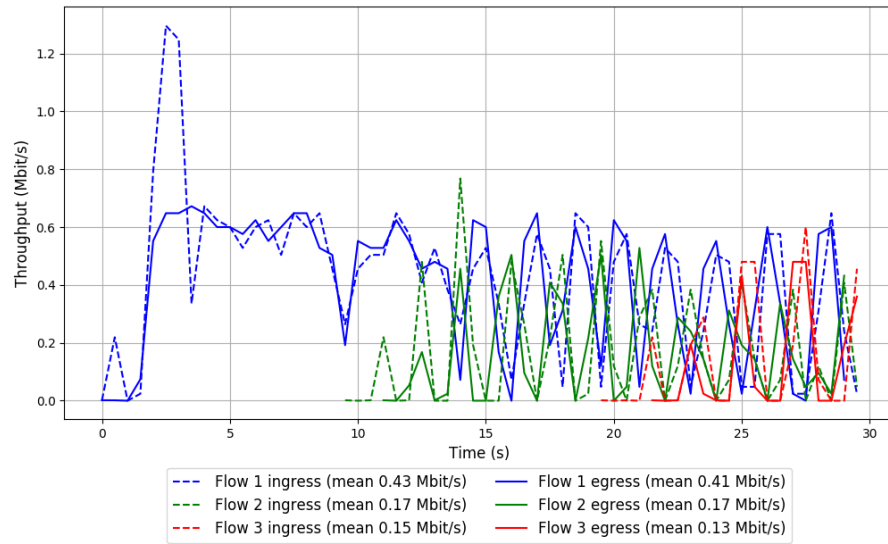


Run 3: Statistics of TCP Vegas

Start at: 2017-09-22 14:15:41
End at: 2017-09-22 14:16:11
Local clock offset: -0.107 ms
Remote clock offset: 14.336 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 2050.299 ms
Loss rate: 7.29%
-- Flow 1:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 2019.418 ms
Loss rate: 4.81%
-- Flow 2:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 2060.627 ms
Loss rate: 8.47%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 2140.380 ms
Loss rate: 25.74%

Run 3: Report of TCP Vegas — Data Link

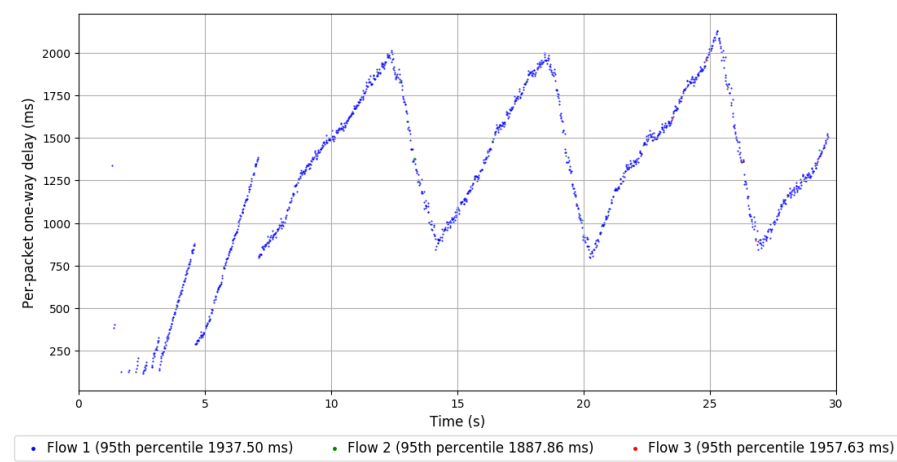
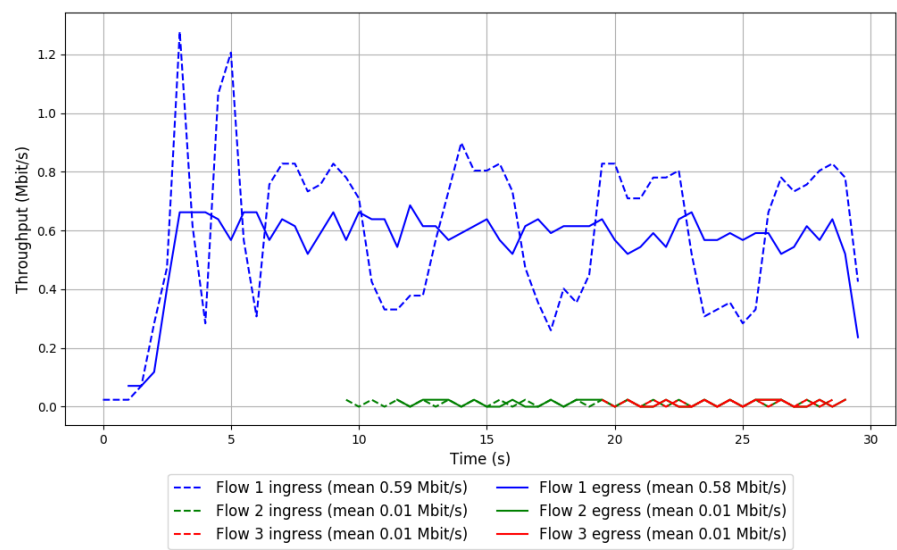


Run 1: Statistics of Verus

Start at: 2017-09-22 13:30:22
End at: 2017-09-22 13:30:52
Local clock offset: -0.004 ms
Remote clock offset: 23.836 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 1937.503 ms
Loss rate: 7.16%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 1937.503 ms
Loss rate: 7.17%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1887.859 ms
Loss rate: 5.00%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1957.627 ms
Loss rate: 10.00%

Run 1: Report of Verus — Data Link

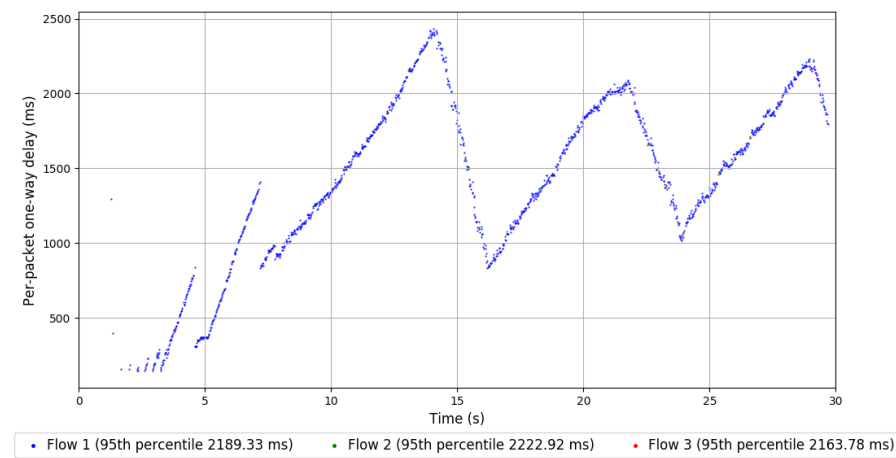
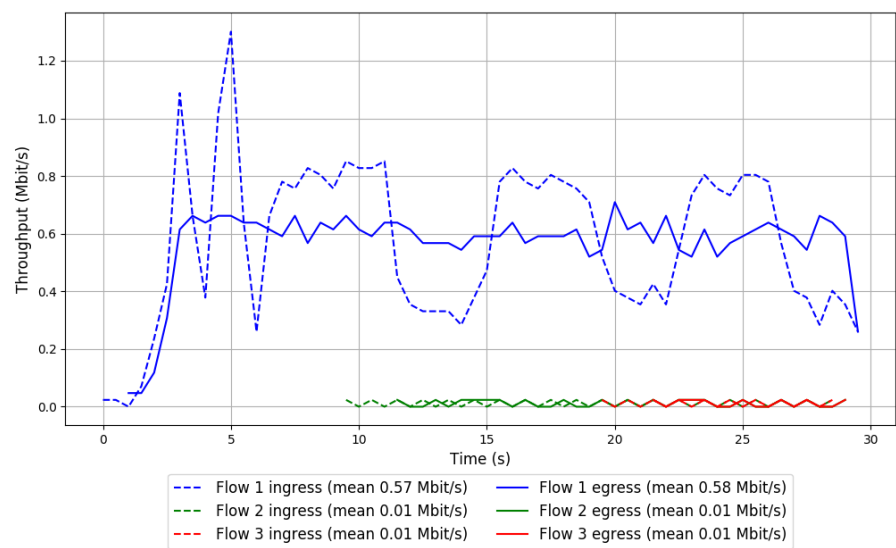


Run 2: Statistics of Verus

Start at: 2017-09-22 13:48:02
End at: 2017-09-22 13:48:32
Local clock offset: -0.011 ms
Remote clock offset: 6.1 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 2189.328 ms
Loss rate: 4.19%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 2189.328 ms
Loss rate: 4.01%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 2222.923 ms
Loss rate: 10.00%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 2163.781 ms
Loss rate: 20.00%

Run 2: Report of Verus — Data Link

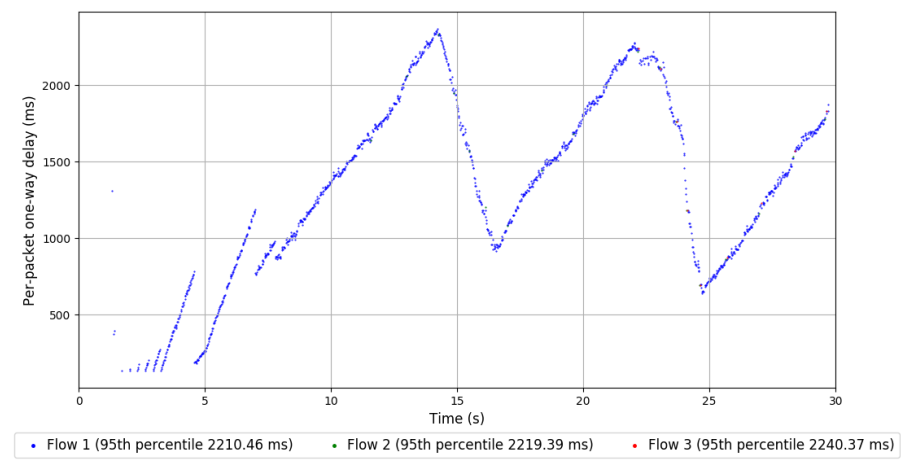
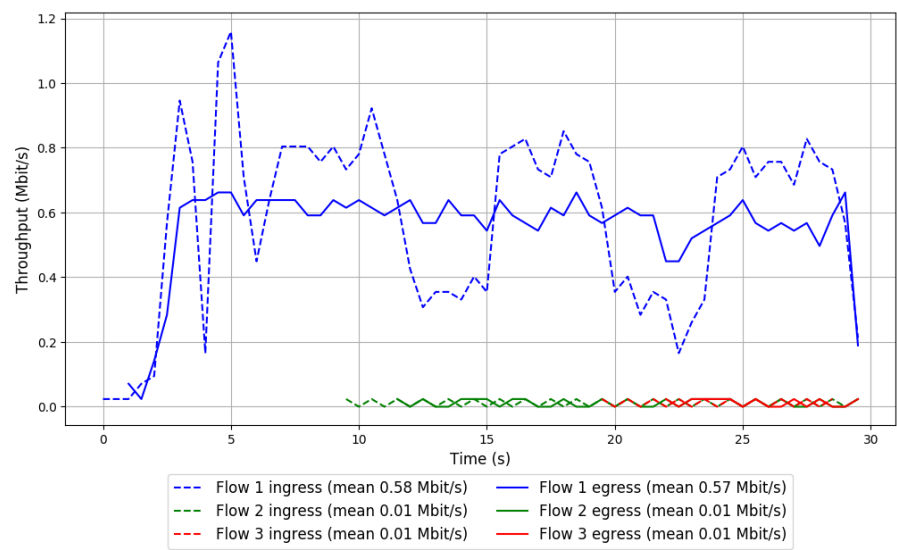


Run 3: Statistics of Verus

Start at: 2017-09-22 14:05:38
End at: 2017-09-22 14:06:08
Local clock offset: -0.092 ms
Remote clock offset: 21.257 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 2218.566 ms
Loss rate: 7.22%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 2210.456 ms
Loss rate: 7.17%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 2219.387 ms
Loss rate: 9.52%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 2240.373 ms
Loss rate: 10.00%

Run 3: Report of Verus — Data Link

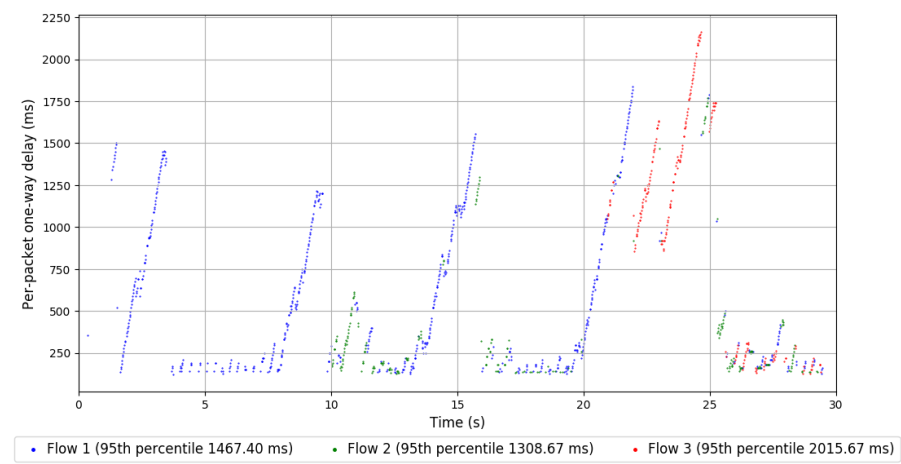
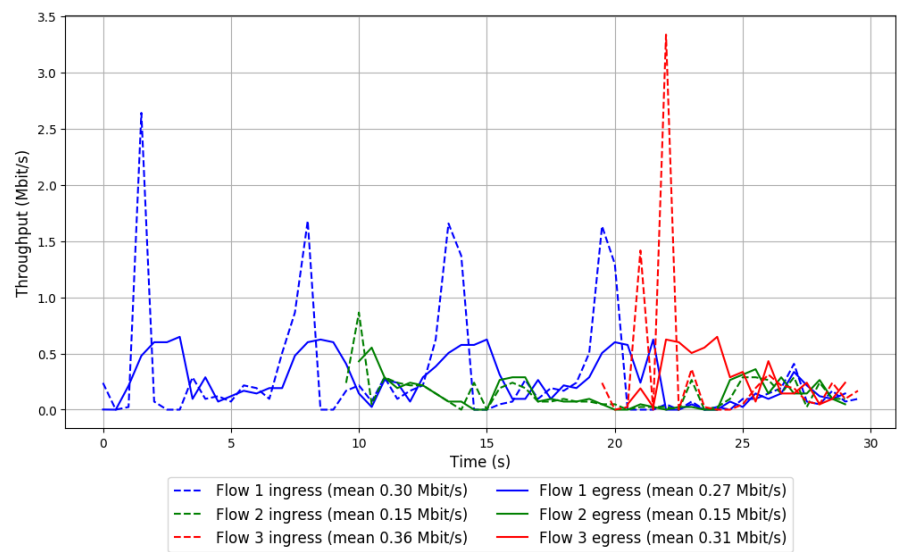


```
Run 1: Statistics of Indigo

Start at: 2017-09-22 13:44:13
End at: 2017-09-22 13:44:43
Local clock offset: -0.032 ms
Remote clock offset: 13.683 ms

# Below is generated by plot.py at 2017-09-22 15:15:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 1677.824 ms
Loss rate: 13.53%
-- Flow 1:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 1467.400 ms
Loss rate: 12.52%
-- Flow 2:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 1308.672 ms
Loss rate: 2.87%
-- Flow 3:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 2015.675 ms
Loss rate: 25.09%
```

Run 1: Report of Indigo — Data Link

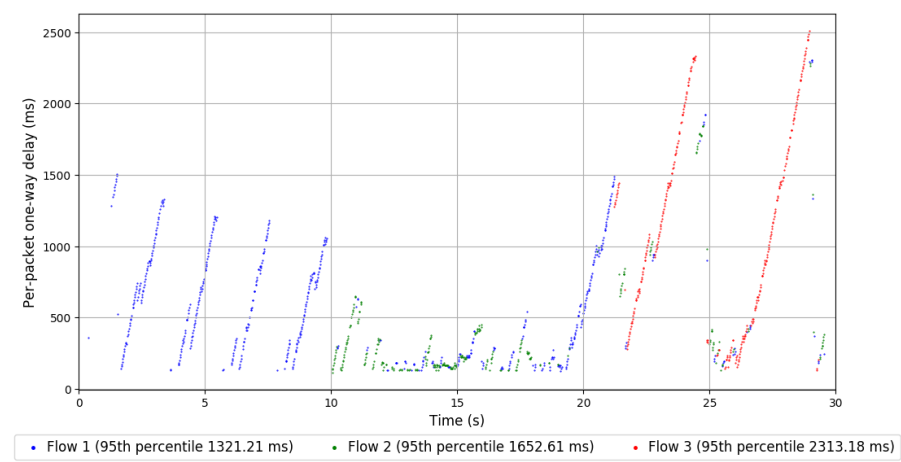
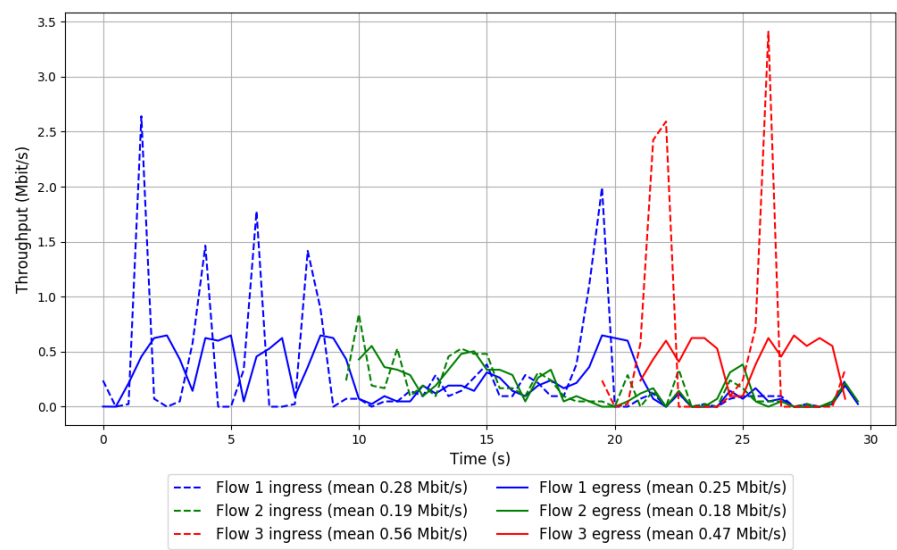


Run 2: Statistics of Indigo

Start at: 2017-09-22 14:01:49
End at: 2017-09-22 14:02:19
Local clock offset: -0.077 ms
Remote clock offset: 13.514 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 1941.395 ms
Loss rate: 15.63%
-- Flow 1:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 1321.209 ms
Loss rate: 13.15%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 1652.612 ms
Loss rate: 1.35%
-- Flow 3:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 2313.175 ms
Loss rate: 29.06%

Run 2: Report of Indigo — Data Link

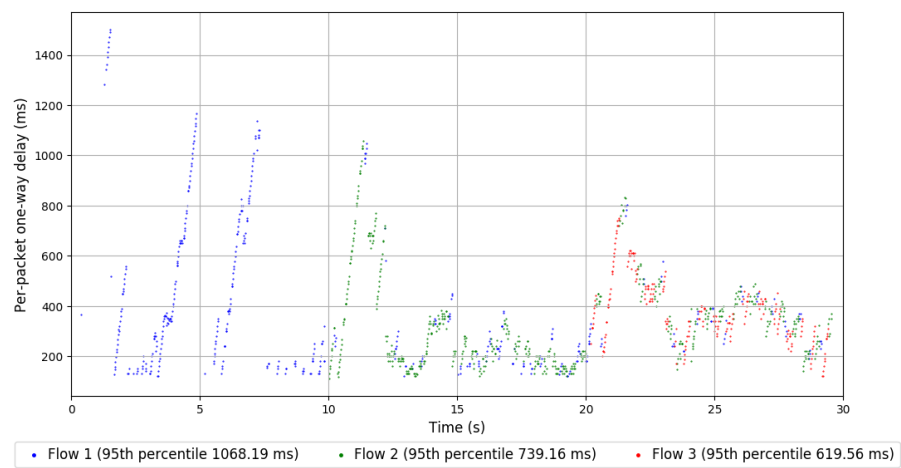
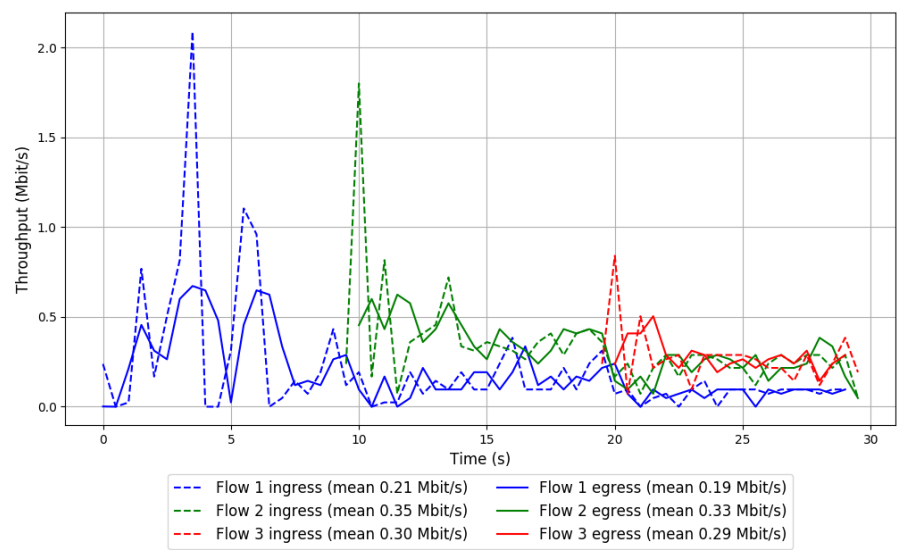


Run 3: Statistics of Indigo

Start at: 2017-09-22 14:19:29
End at: 2017-09-22 14:19:59
Local clock offset: -0.123 ms
Remote clock offset: 23.682 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 871.870 ms
Loss rate: 8.25%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 1068.186 ms
Loss rate: 10.90%
-- Flow 2:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 739.159 ms
Loss rate: 6.50%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 619.559 ms
Loss rate: 6.70%

Run 3: Report of Indigo — Data Link

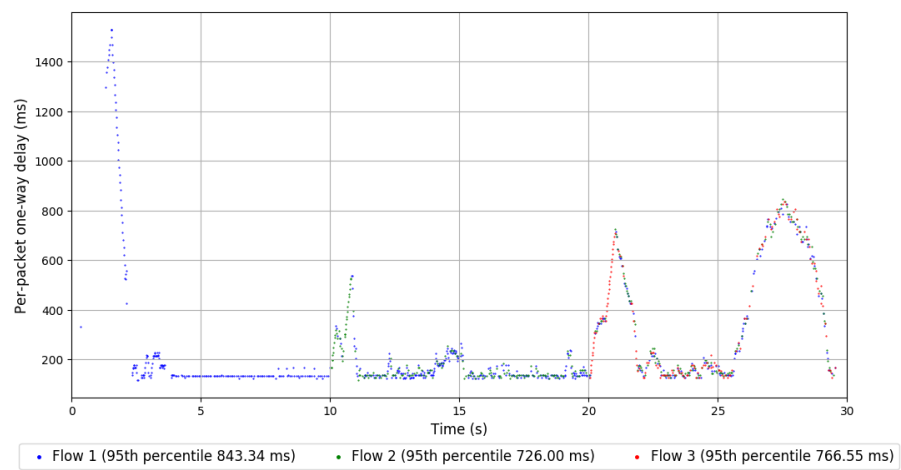
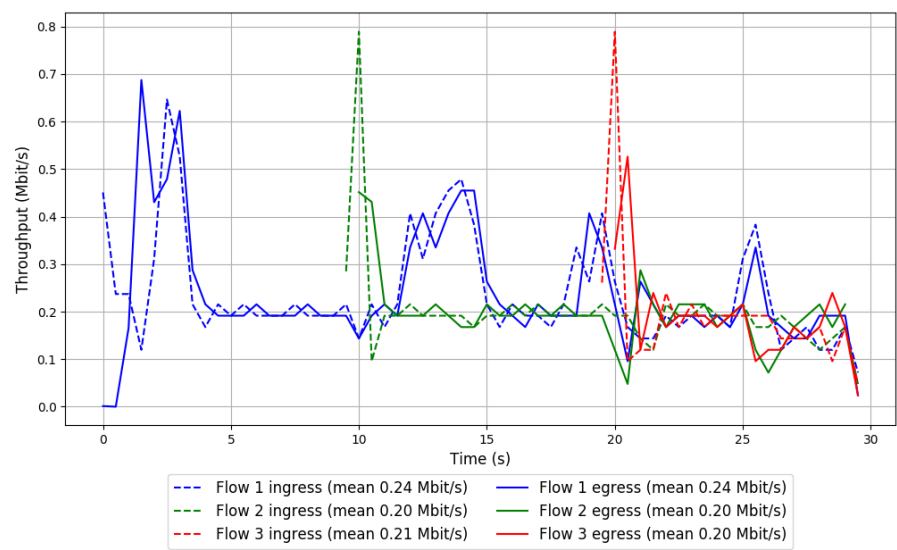


Run 1: Statistics of Indigo-cellular

Start at: 2017-09-22 13:34:08
End at: 2017-09-22 13:34:38
Local clock offset: -0.11 ms
Remote clock offset: 17.578 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 775.987 ms
Loss rate: 2.72%
-- Flow 1:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 843.341 ms
Loss rate: 0.84%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 726.005 ms
Loss rate: 4.16%
-- Flow 3:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 766.547 ms
Loss rate: 6.51%

Run 1: Report of Indigo-cellular — Data Link



Run 2: Statistics of Indigo-cellular

Start at: 2017-09-22 13:51:47

End at: 2017-09-22 13:52:17

Local clock offset: -0.102 ms

Remote clock offset: 8.251 ms

Below is generated by plot.py at 2017-09-22 15:15:01

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 793.136 ms

Loss rate: 3.83%

-- Flow 1:

Average throughput: 0.36 Mbit/s

95th percentile per-packet one-way delay: 875.993 ms

Loss rate: 3.53%

-- Flow 2:

Average throughput: 0.20 Mbit/s

95th percentile per-packet one-way delay: 690.688 ms

Loss rate: 2.14%

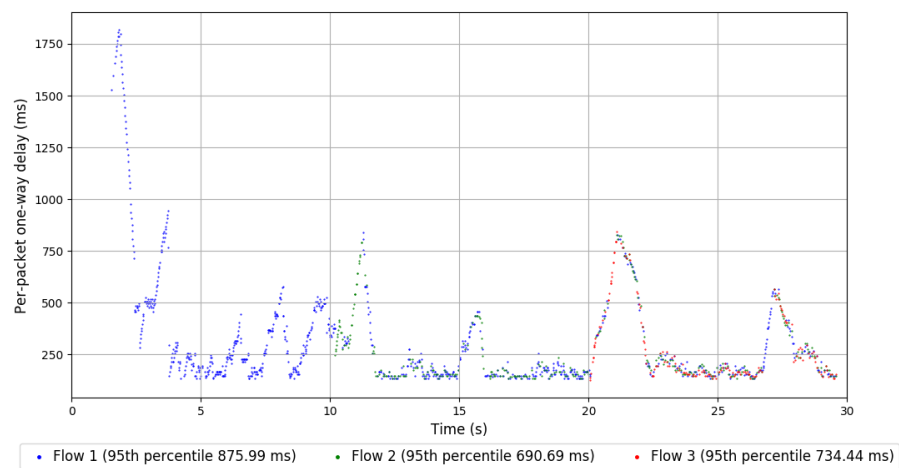
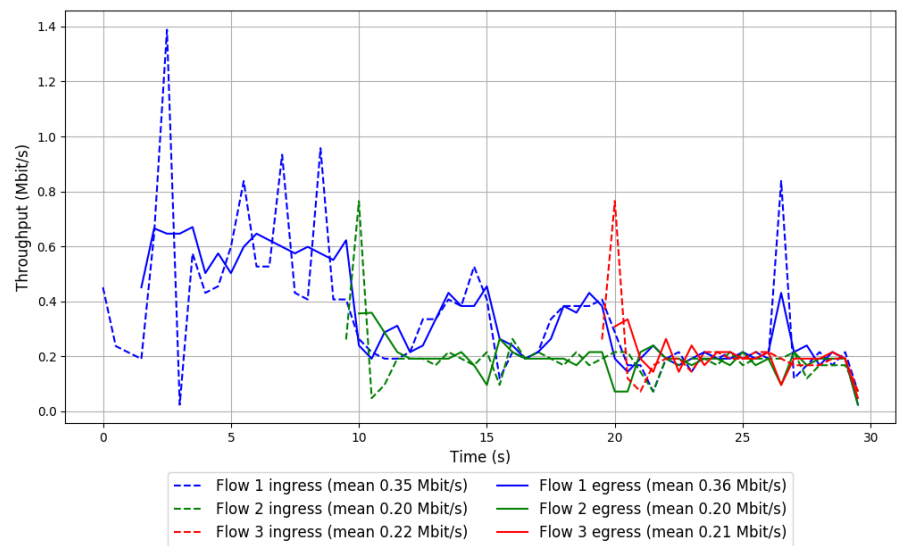
-- Flow 3:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 734.442 ms

Loss rate: 8.34%

Run 2: Report of Indigo-cellular — Data Link

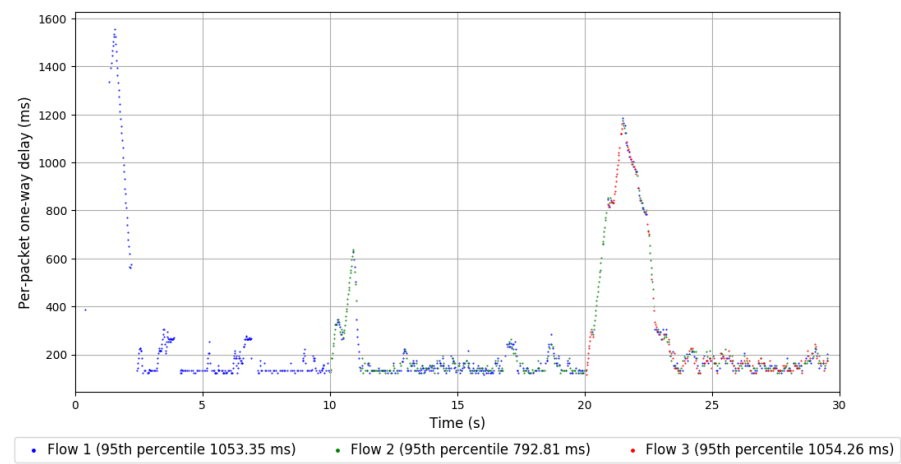
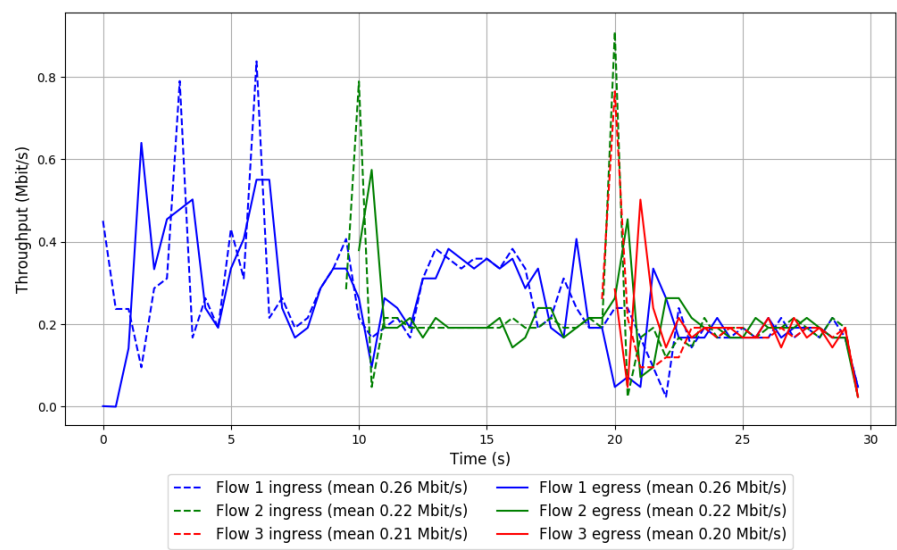


Run 3: Statistics of Indigo-cellular

Start at: 2017-09-22 14:09:24
End at: 2017-09-22 14:09:54
Local clock offset: -0.079 ms
Remote clock offset: 20.302 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 1002.665 ms
Loss rate: 2.38%
-- Flow 1:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 1053.348 ms
Loss rate: 0.47%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 792.807 ms
Loss rate: 3.84%
-- Flow 3:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 1054.264 ms
Loss rate: 6.48%

Run 3: Report of Indigo-cellular — Data Link

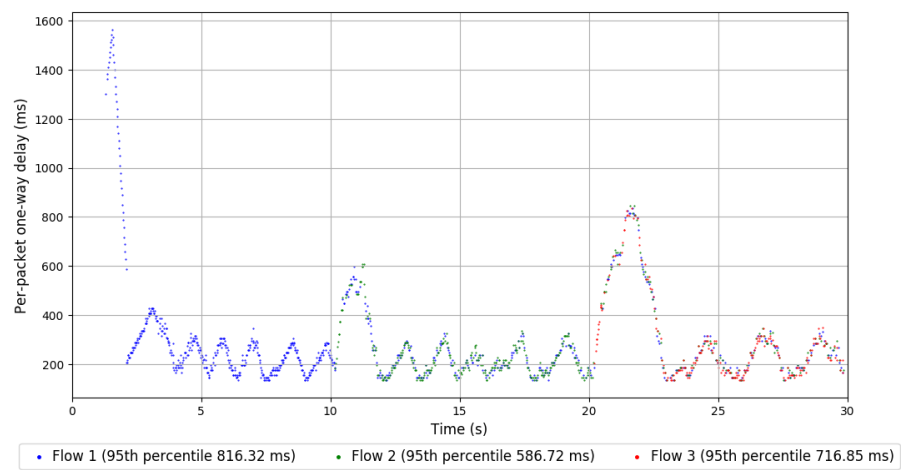
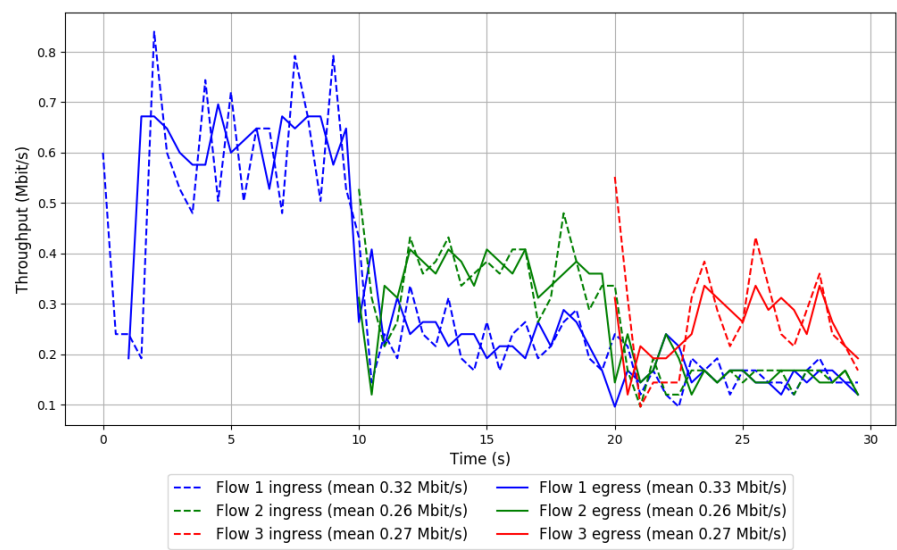


```
Run 1: Statistics of KohoCC

Start at: 2017-09-22 13:41:42
End at: 2017-09-22 13:42:12
Local clock offset: -0.071 ms
Remote clock offset: 5.088 ms

# Below is generated by plot.py at 2017-09-22 15:15:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 656.623 ms
Loss rate: 1.58%
-- Flow 1:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 816.324 ms
Loss rate: 1.00%
-- Flow 2:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 586.720 ms
Loss rate: 1.61%
-- Flow 3:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 716.849 ms
Loss rate: 3.59%
```

Run 1: Report of KohoCC — Data Link

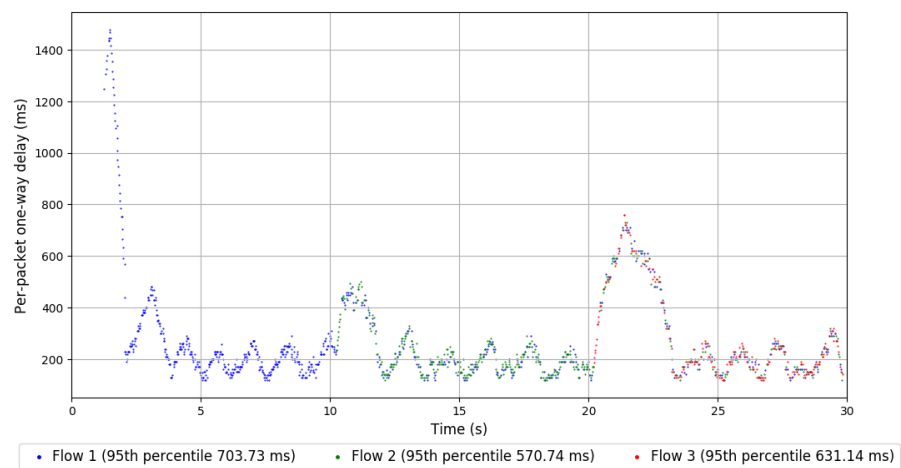
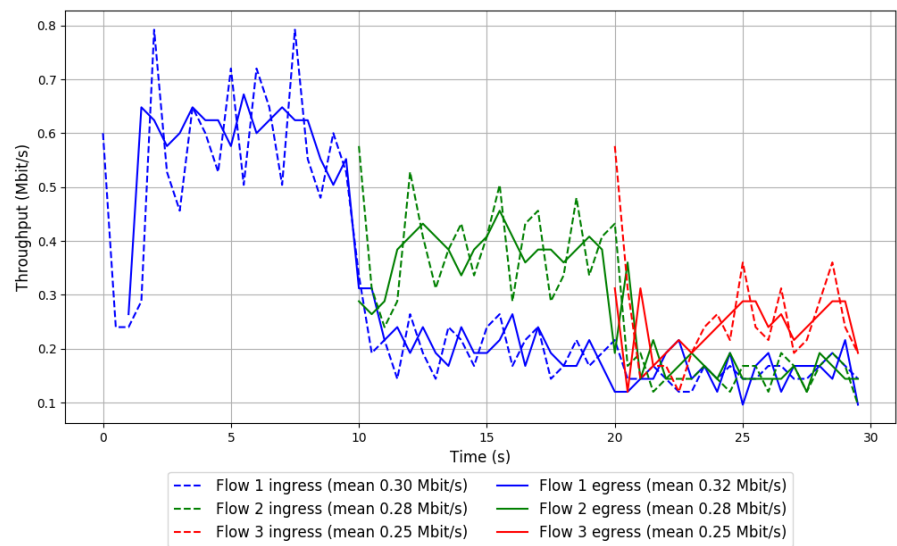


Run 2: Statistics of KohoCC

Start at: 2017-09-22 13:59:19
End at: 2017-09-22 13:59:49
Local clock offset: 0.016 ms
Remote clock offset: 16.792 ms

Below is generated by plot.py at 2017-09-22 15:15:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 611.763 ms
Loss rate: 1.75%
-- Flow 1:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 703.734 ms
Loss rate: 1.32%
-- Flow 2:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 570.737 ms
Loss rate: 1.30%
-- Flow 3:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 631.142 ms
Loss rate: 4.31%

Run 2: Report of KohoCC — Data Link



Run 3: Statistics of KohoCC

Start at: 2017-09-22 14:16:58

End at: 2017-09-22 14:17:28

Local clock offset: -0.056 ms

Remote clock offset: 24.03 ms

Below is generated by plot.py at 2017-09-22 15:15:01

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.58 Mbit/s

95th percentile per-packet one-way delay: 745.869 ms

Loss rate: 2.07%

-- Flow 1:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 1075.418 ms

Loss rate: 1.28%

-- Flow 2:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 561.660 ms

Loss rate: 1.89%

-- Flow 3:

Average throughput: 0.26 Mbit/s

95th percentile per-packet one-way delay: 666.047 ms

Loss rate: 4.98%

Run 3: Report of KohoCC — Data Link

