

Pantheon Report

Generated at 2017-09-22 15:15:55 (UTC).

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

Repeated the test of 14 congestion control schemes 3 times.

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

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

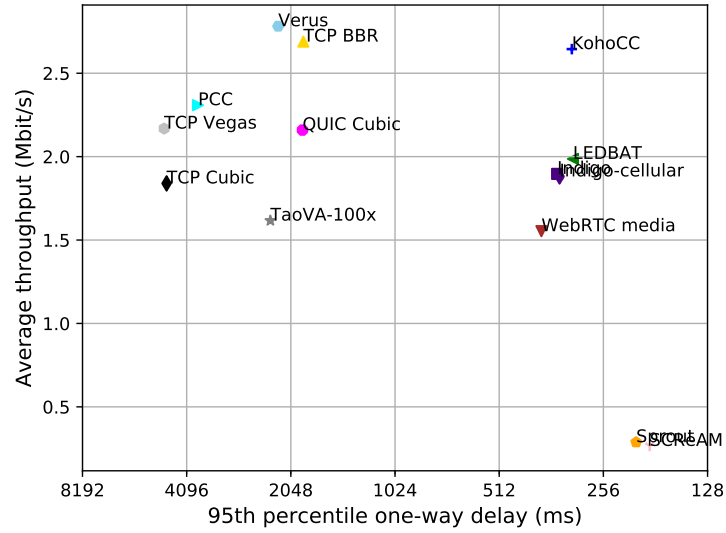
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

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

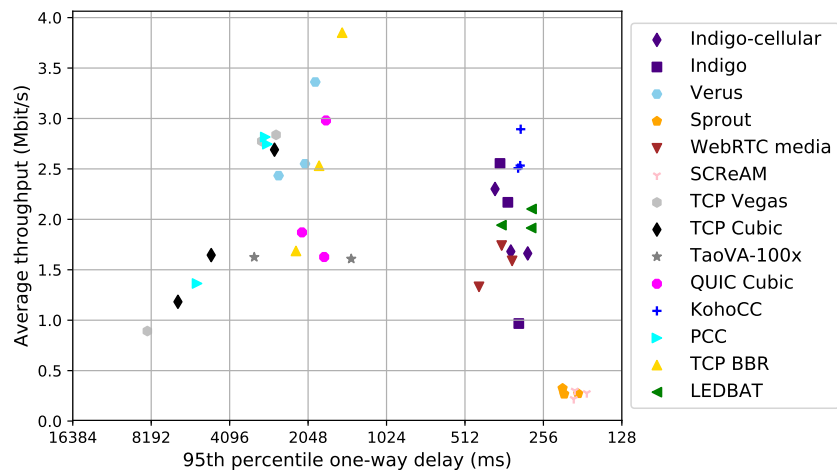
Git summary:

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



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



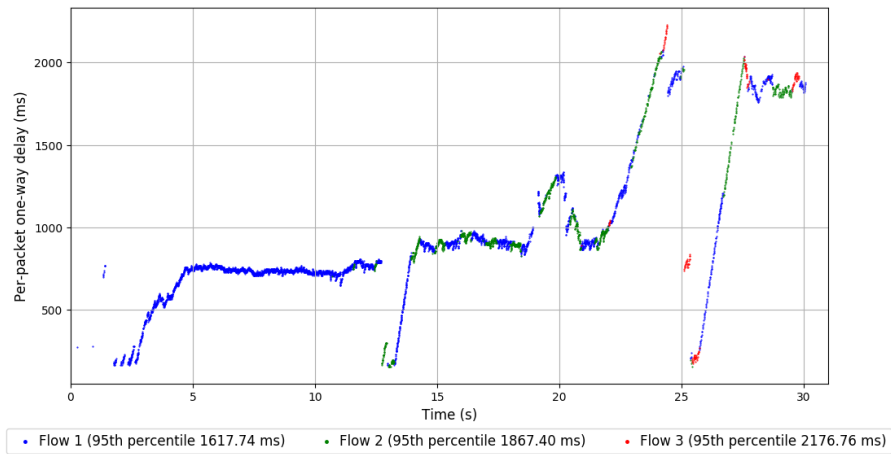
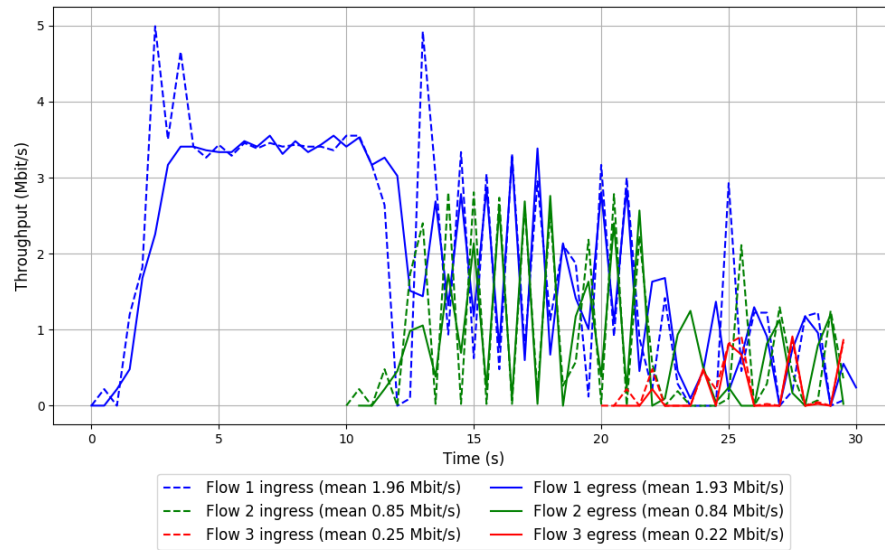
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	1.67	1.23	0.72	1580.90	1640.25	1930.31	4.29	7.29	20.59
TCP Cubic	3	1.77	0.10	0.04	4635.11	4567.92	4031.59	18.46	30.51	62.79
LEDBAT	3	1.29	0.78	0.54	313.11	320.65	312.13	0.46	0.91	1.35
PCC	3	1.56	1.11	0.00	3783.84	3737.87	3513.57	51.95	25.78	25.31
QUIC Cubic	3	1.36	1.13	0.25	1335.73	1907.85	2145.43	3.68	10.95	24.77
SCReAM	3	0.08	0.17	0.21	184.76	178.21	188.84	0.26	0.17	0.46
WebRTC media	3	1.04	0.39	0.13	369.83	442.13	377.47	0.12	0.36	0.66
Sprout	3	0.14	0.15	0.15	217.10	195.38	195.63	0.12	0.48	1.41
TaoVA-100x	2	0.83	0.78	0.80	1514.29	2277.60	2571.33	1.54	3.43	4.57
TCP Vegas	3	1.91	0.42	0.05	4706.09	4849.79	4769.83	20.33	42.08	51.23
Verus	3	2.66	0.18	0.02	2217.48	2203.92	1865.19	5.51	5.39	7.14
Indigo	3	0.74	1.10	1.35	289.32	338.07	397.47	0.05	0.32	2.03
Indigo-cellular	3	1.33	0.51	0.68	297.32	313.35	479.60	0.14	0.45	0.60
KohoCC	3	1.80	0.92	0.67	302.82	332.21	302.09	0.35	1.15	0.94

Run 1: Statistics of TCP BBR

Start at: 2017-09-22 14:35:57
End at: 2017-09-22 14:36:27
Local clock offset: -0.048 ms
Remote clock offset: 17.307 ms

Below is generated by plot.py at 2017-09-22 15:15:21
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.53 Mbit/s
95th percentile per-packet one-way delay: 1857.972 ms
Loss rate: 2.86%
-- Flow 1:
Average throughput: 1.93 Mbit/s
95th percentile per-packet one-way delay: 1617.737 ms
Loss rate: 1.60%
-- Flow 2:
Average throughput: 0.84 Mbit/s
95th percentile per-packet one-way delay: 1867.397 ms
Loss rate: 5.04%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 2176.762 ms
Loss rate: 18.20%

Run 1: Report of TCP BBR — Data Link

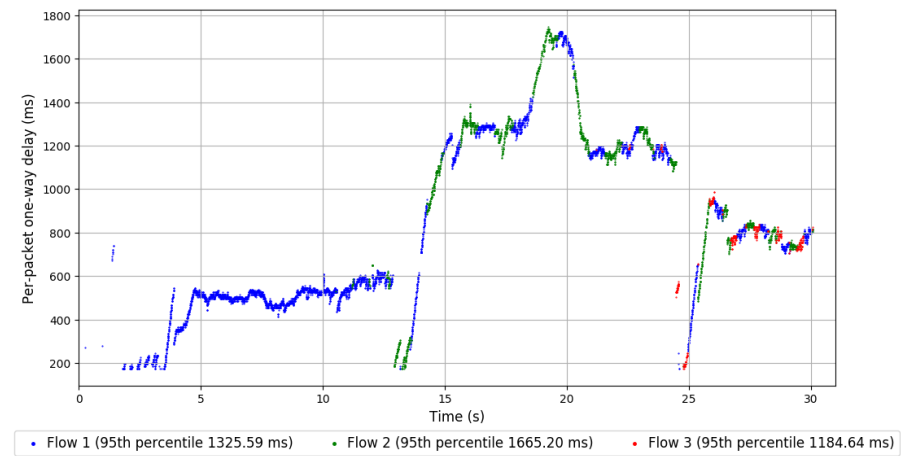
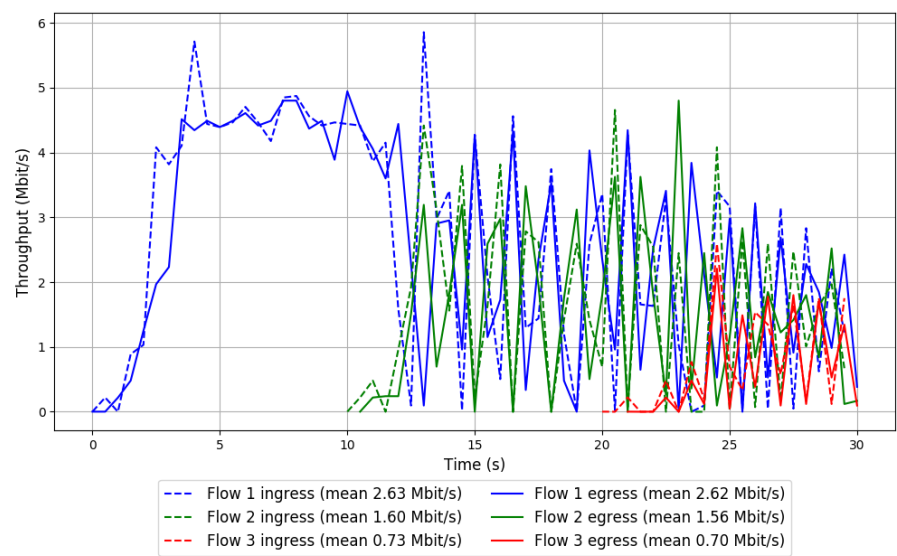


Run 2: Statistics of TCP BBR

Start at: 2017-09-22 14:53:34
End at: 2017-09-22 14:54:04
Local clock offset: -0.056 ms
Remote clock offset: 13.482 ms

Below is generated by plot.py at 2017-09-22 15:15:23
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.85 Mbit/s
95th percentile per-packet one-way delay: 1515.509 ms
Loss rate: 2.43%
-- Flow 1:
Average throughput: 2.62 Mbit/s
95th percentile per-packet one-way delay: 1325.585 ms
Loss rate: 0.90%
-- Flow 2:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 1665.202 ms
Loss rate: 3.96%
-- Flow 3:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 1184.643 ms
Loss rate: 12.51%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2017-09-22 15:11:17

End at: 2017-09-22 15:11:47

Local clock offset: -0.052 ms

Remote clock offset: 4.627 ms

Below is generated by plot.py at 2017-09-22 15:15:23

Datalink statistics

-- Total of 3 flows:

Average throughput: 1.69 Mbit/s

95th percentile per-packet one-way delay: 2279.589 ms

Loss rate: 17.17%

-- Flow 1:

Average throughput: 0.47 Mbit/s

95th percentile per-packet one-way delay: 1799.391 ms

Loss rate: 10.36%

-- Flow 2:

Average throughput: 1.29 Mbit/s

95th percentile per-packet one-way delay: 1388.164 ms

Loss rate: 12.86%

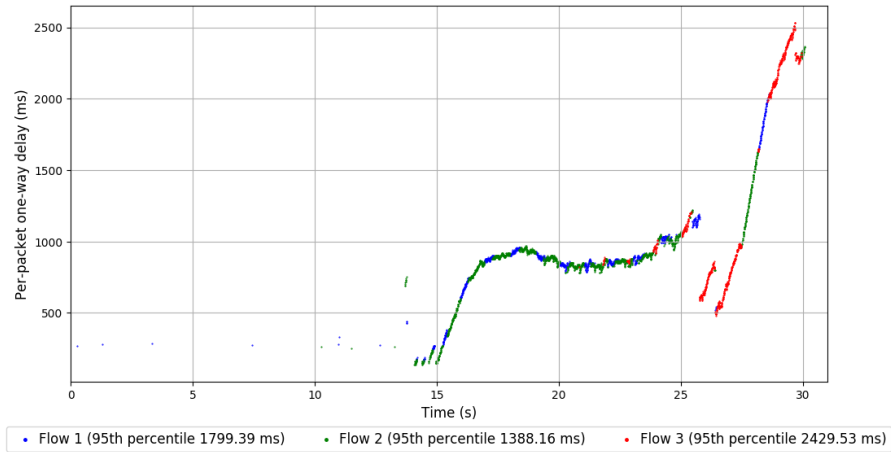
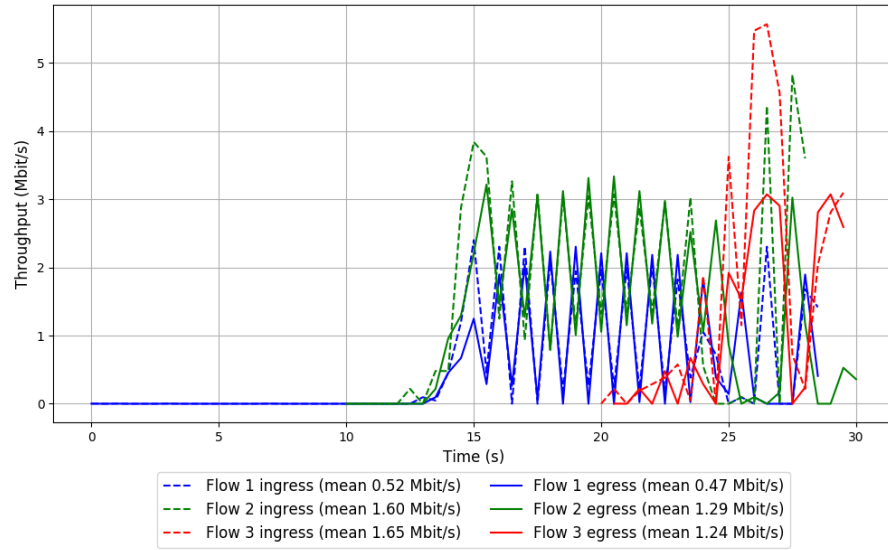
-- Flow 3:

Average throughput: 1.24 Mbit/s

95th percentile per-packet one-way delay: 2429.526 ms

Loss rate: 31.06%

Run 3: Report of TCP BBR — Data Link

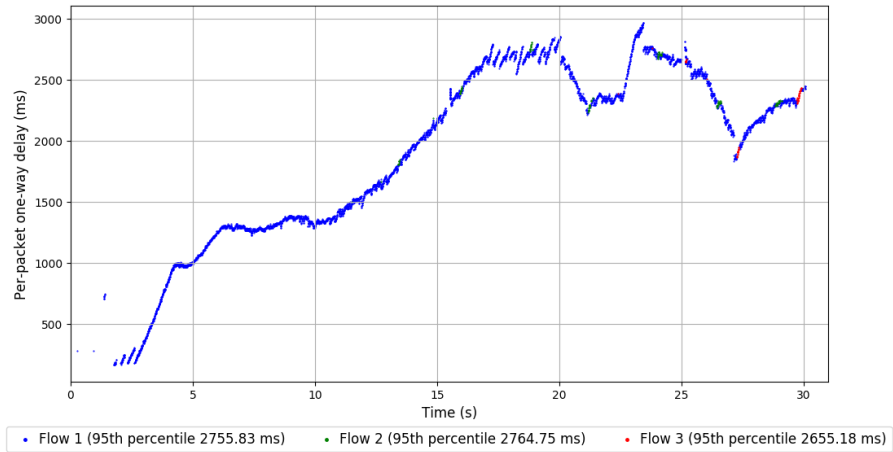
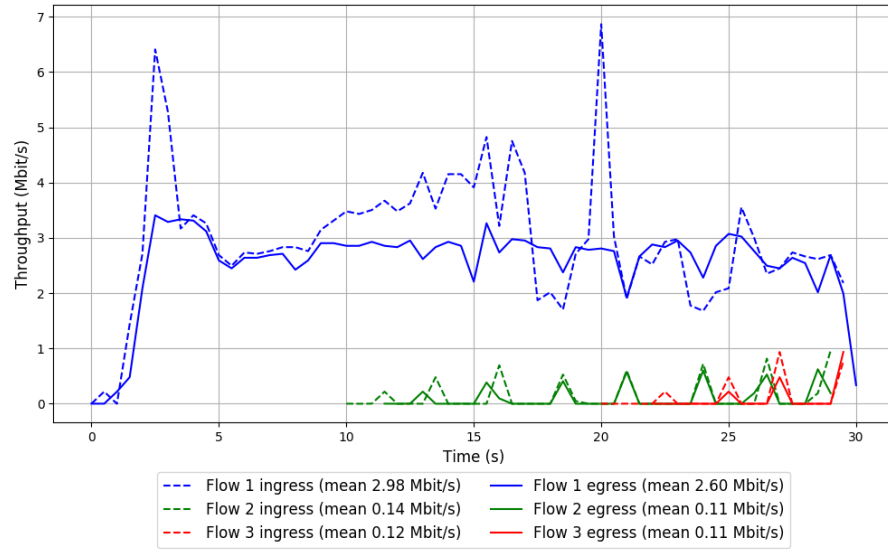


Run 1: Statistics of TCP Cubic

Start at: 2017-09-22 14:22:02
End at: 2017-09-22 14:22:32
Local clock offset: -0.082 ms
Remote clock offset: 23.705 ms

Below is generated by plot.py at 2017-09-22 15:15:23
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.69 Mbit/s
95th percentile per-packet one-way delay: 2755.802 ms
Loss rate: 13.79%
-- Flow 1:
Average throughput: 2.60 Mbit/s
95th percentile per-packet one-way delay: 2755.826 ms
Loss rate: 13.14%
-- Flow 2:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 2764.751 ms
Loss rate: 27.36%
-- Flow 3:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 2655.179 ms
Loss rate: 31.90%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2017-09-22 14:39:45

End at: 2017-09-22 14:40:15

Local clock offset: -0.107 ms

Remote clock offset: 19.64 ms

Below is generated by plot.py at 2017-09-22 15:15:23

Datalink statistics

-- Total of 3 flows:

Average throughput: 1.65 Mbit/s

95th percentile per-packet one-way delay: 4820.781 ms

Loss rate: 19.17%

-- Flow 1:

Average throughput: 1.62 Mbit/s

95th percentile per-packet one-way delay: 4830.793 ms

Loss rate: 18.80%

-- Flow 2:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 4150.413 ms

Loss rate: 35.11%

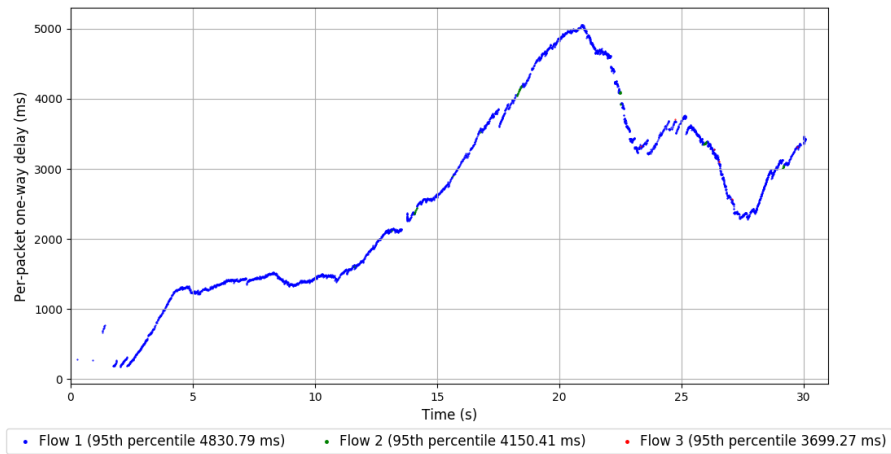
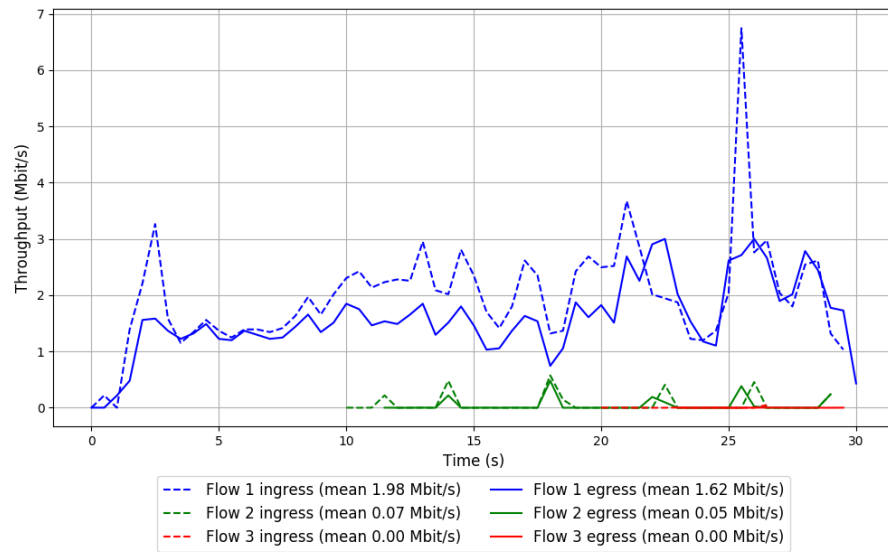
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 3699.271 ms

Loss rate: 81.61%

Run 2: Report of TCP Cubic — Data Link

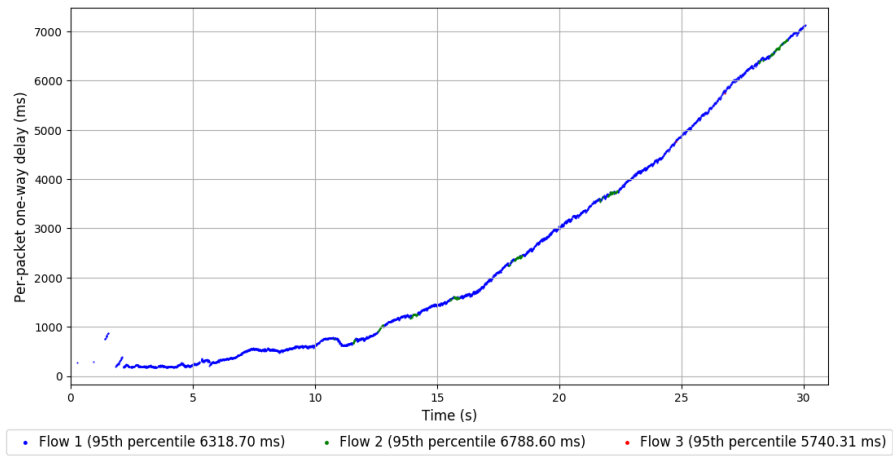
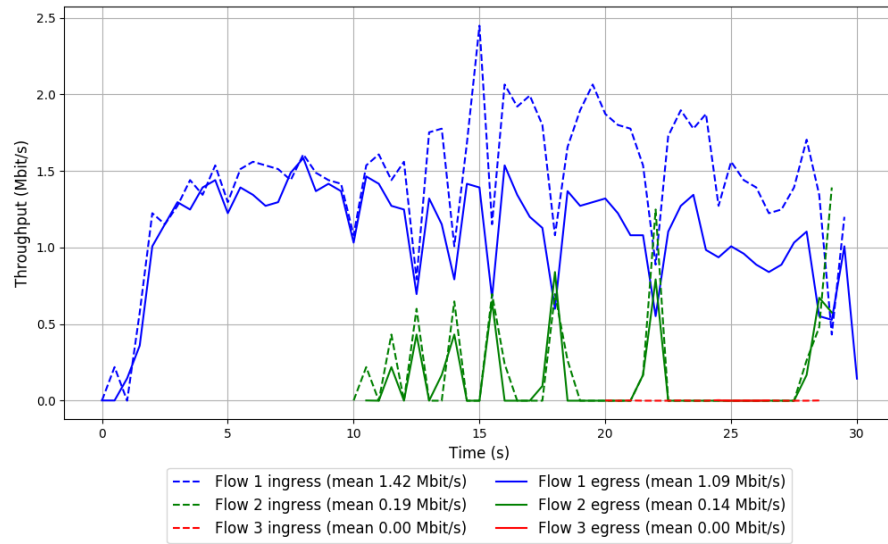


Run 3: Statistics of TCP Cubic

Start at: 2017-09-22 14:57:25
End at: 2017-09-22 14:57:55
Local clock offset: -0.047 ms
Remote clock offset: 13.551 ms

Below is generated by plot.py at 2017-09-22 15:15:23
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 6468.808 ms
Loss rate: 23.88%
-- Flow 1:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 6318.705 ms
Loss rate: 23.43%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 6788.603 ms
Loss rate: 29.07%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5740.312 ms
Loss rate: 74.87%

Run 3: Report of TCP Cubic — Data Link

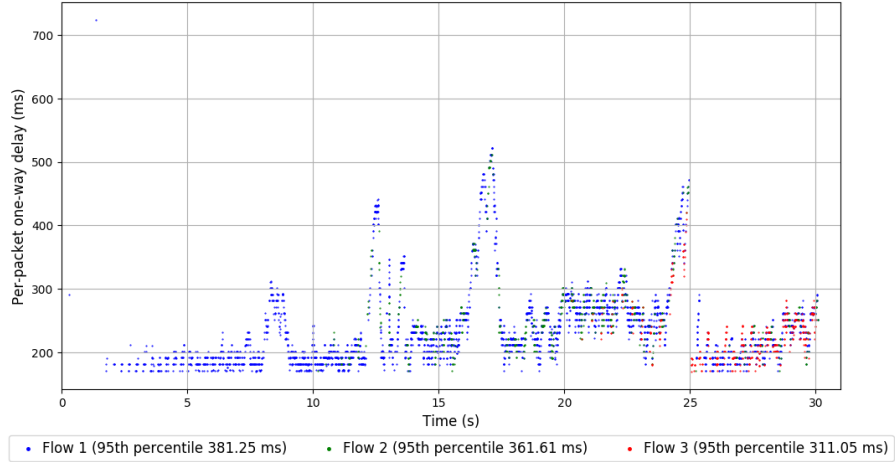
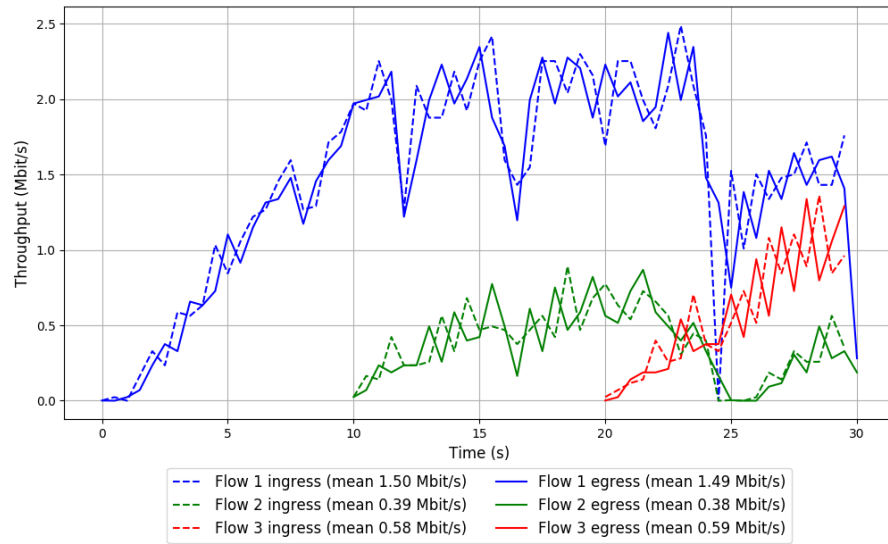


Run 1: Statistics of LEDBAT

Start at: 2017-09-22 14:37:13
End at: 2017-09-22 14:37:43
Local clock offset: -0.055 ms
Remote clock offset: 14.134 ms

Below is generated by plot.py at 2017-09-22 15:15:23
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.94 Mbit/s
95th percentile per-packet one-way delay: 370.963 ms
Loss rate: 0.94%
-- Flow 1:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 381.248 ms
Loss rate: 0.78%
-- Flow 2:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 361.606 ms
Loss rate: 1.36%
-- Flow 3:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 311.053 ms
Loss rate: 1.63%

Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2017-09-22 14:54:52

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

Local clock offset: -0.091 ms

Remote clock offset: 8.41 ms

Below is generated by plot.py at 2017-09-22 15:15:23

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.10 Mbit/s

95th percentile per-packet one-way delay: 284.336 ms

Loss rate: 0.71%

-- Flow 1:

Average throughput: 1.31 Mbit/s

95th percentile per-packet one-way delay: 283.328 ms

Loss rate: 0.33%

-- Flow 2:

Average throughput: 0.93 Mbit/s

95th percentile per-packet one-way delay: 314.458 ms

Loss rate: 1.14%

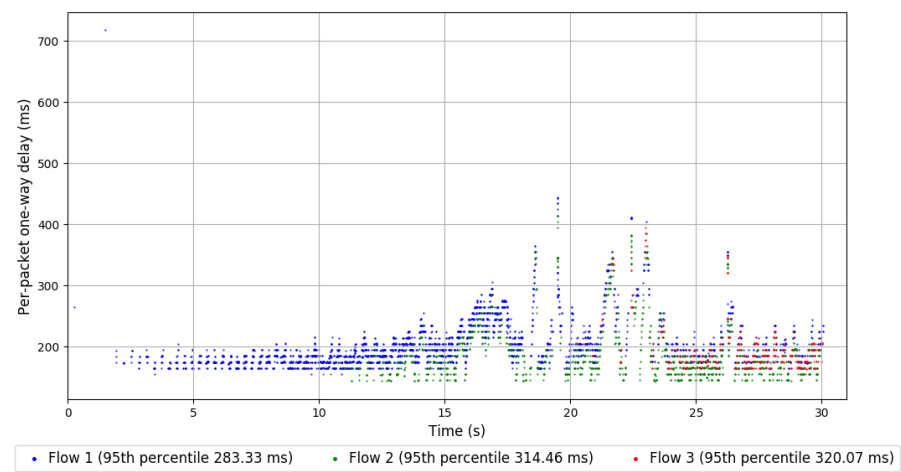
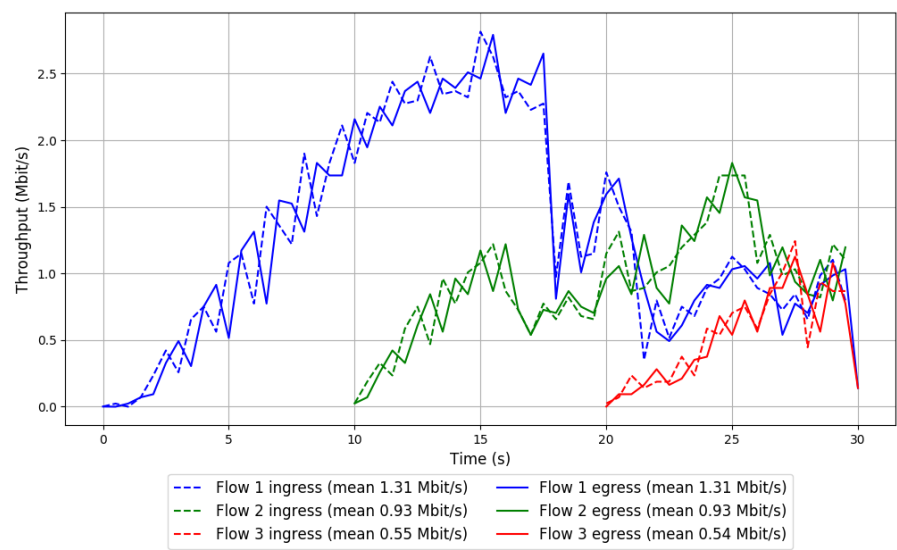
-- Flow 3:

Average throughput: 0.54 Mbit/s

95th percentile per-packet one-way delay: 320.073 ms

Loss rate: 1.95%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2017-09-22 15:12:32

End at: 2017-09-22 15:13:02

Local clock offset: -0.045 ms

Remote clock offset: 9.665 ms

Below is generated by plot.py at 2017-09-22 15:15:23

Datalink statistics

-- Total of 3 flows:

Average throughput: 1.91 Mbit/s

95th percentile per-packet one-way delay: 285.226 ms

Loss rate: 0.27%

-- Flow 1:

Average throughput: 1.06 Mbit/s

95th percentile per-packet one-way delay: 274.755 ms

Loss rate: 0.26%

-- Flow 2:

Average throughput: 1.04 Mbit/s

95th percentile per-packet one-way delay: 285.877 ms

Loss rate: 0.23%

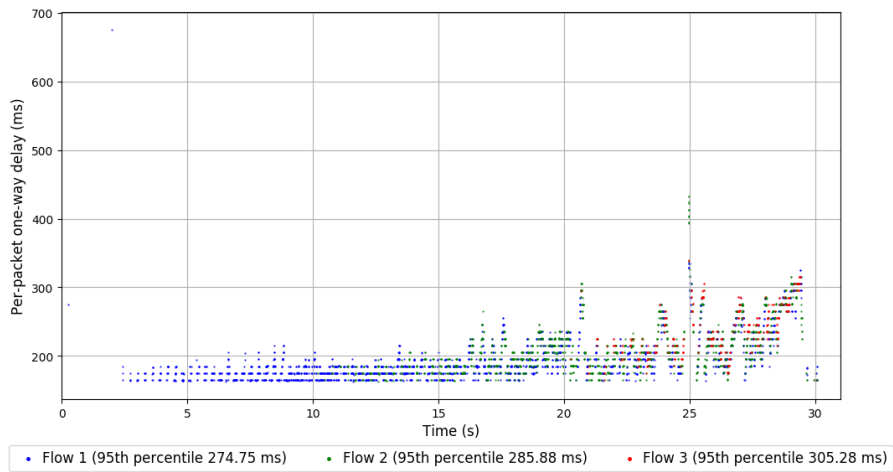
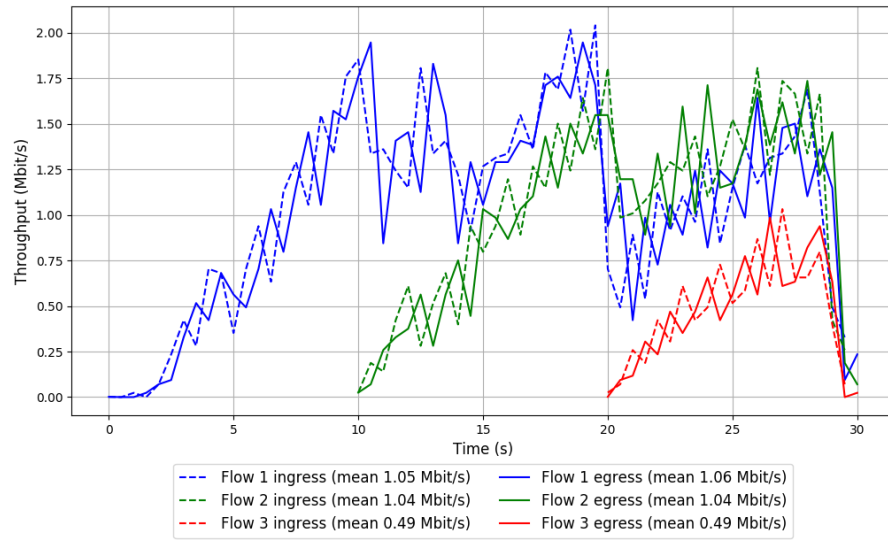
-- Flow 3:

Average throughput: 0.49 Mbit/s

95th percentile per-packet one-way delay: 305.279 ms

Loss rate: 0.48%

Run 3: Report of LEDBAT — Data Link

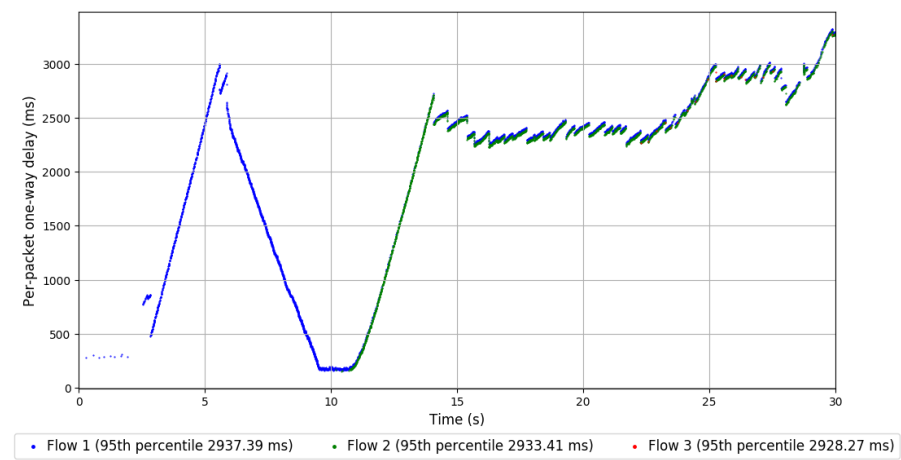
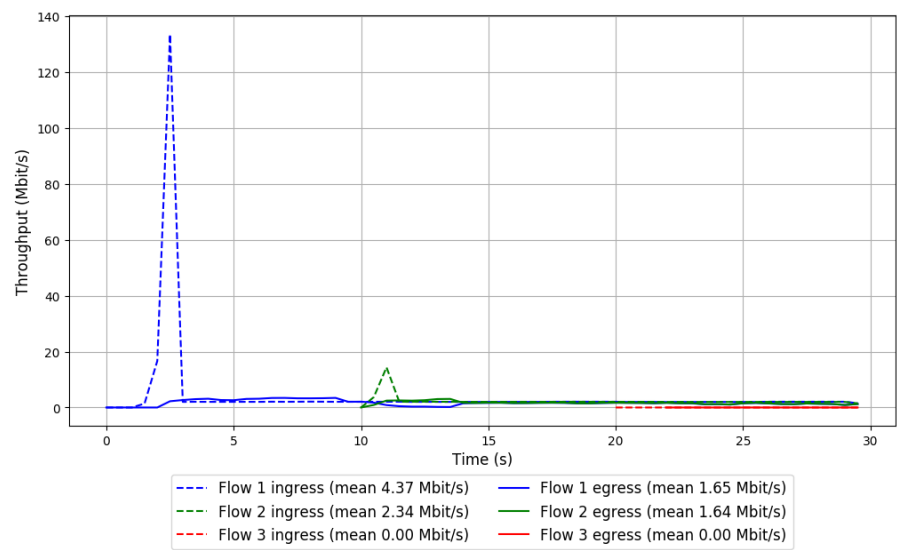


Run 1: Statistics of PCC

Start at: 2017-09-22 14:24:36
End at: 2017-09-22 14:25:06
Local clock offset: -0.064 ms
Remote clock offset: 12.922 ms

Below is generated by plot.py at 2017-09-22 15:15:32
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.75 Mbit/s
95th percentile per-packet one-way delay: 2935.503 ms
Loss rate: 53.95%
-- Flow 1:
Average throughput: 1.65 Mbit/s
95th percentile per-packet one-way delay: 2937.393 ms
Loss rate: 62.46%
-- Flow 2:
Average throughput: 1.64 Mbit/s
95th percentile per-packet one-way delay: 2933.409 ms
Loss rate: 30.05%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2928.274 ms
Loss rate: 24.22%

Run 1: Report of PCC — Data Link

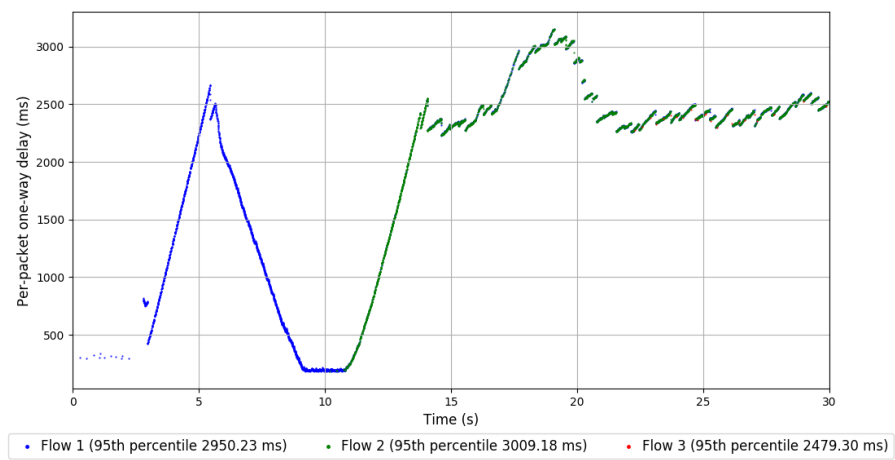
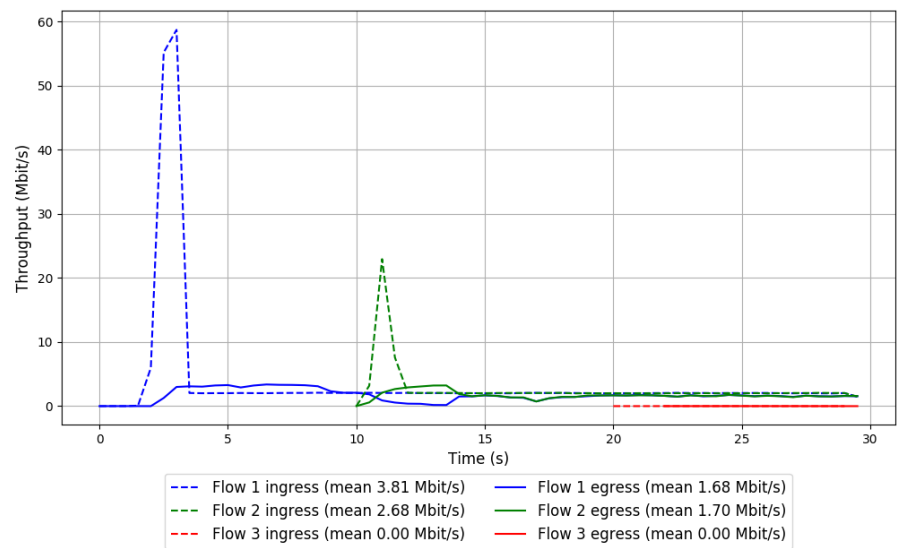


Run 2: Statistics of PCC

Start at: 2017-09-22 14:42:16
End at: 2017-09-22 14:42:46
Local clock offset: -0.122 ms
Remote clock offset: 17.165 ms

Below is generated by plot.py at 2017-09-22 15:15:33
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.82 Mbit/s
95th percentile per-packet one-way delay: 2989.714 ms
Loss rate: 49.98%
-- Flow 1:
Average throughput: 1.68 Mbit/s
95th percentile per-packet one-way delay: 2950.230 ms
Loss rate: 56.21%
-- Flow 2:
Average throughput: 1.70 Mbit/s
95th percentile per-packet one-way delay: 3009.177 ms
Loss rate: 36.69%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2479.297 ms
Loss rate: 6.88%

Run 2: Report of PCC — Data Link

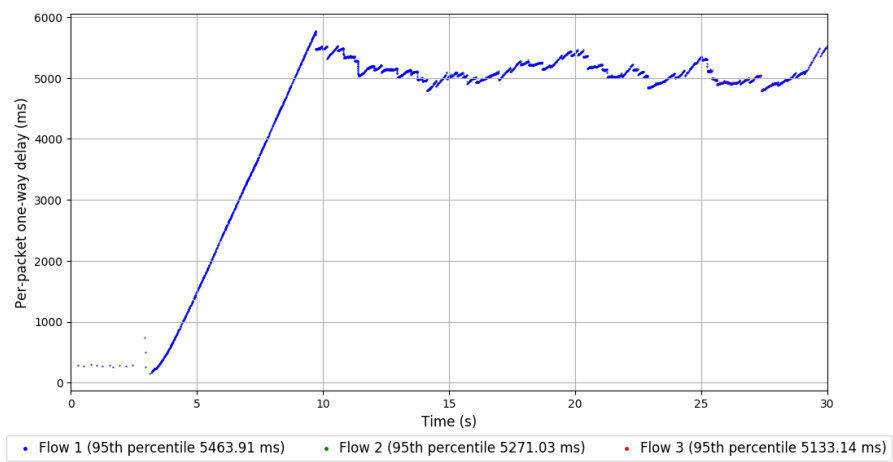
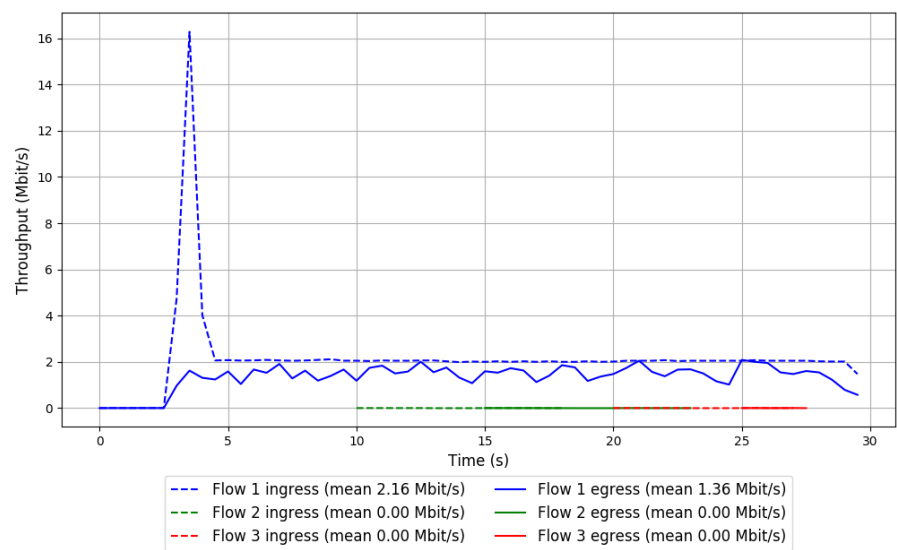


Run 3: Statistics of PCC

Start at: 2017-09-22 14:59:55
End at: 2017-09-22 15:00:25
Local clock offset: -0.028 ms
Remote clock offset: 13.343 ms

Below is generated by plot.py at 2017-09-22 15:15:33
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.36 Mbit/s
95th percentile per-packet one-way delay: 5463.119 ms
Loss rate: 37.16%
-- Flow 1:
Average throughput: 1.36 Mbit/s
95th percentile per-packet one-way delay: 5463.907 ms
Loss rate: 37.17%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5271.027 ms
Loss rate: 10.61%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5133.138 ms
Loss rate: 44.83%

Run 3: Report of PCC — Data Link

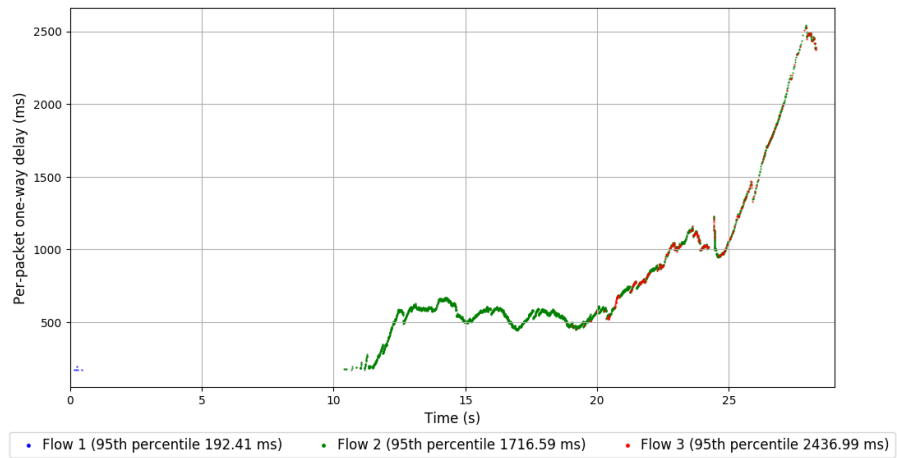
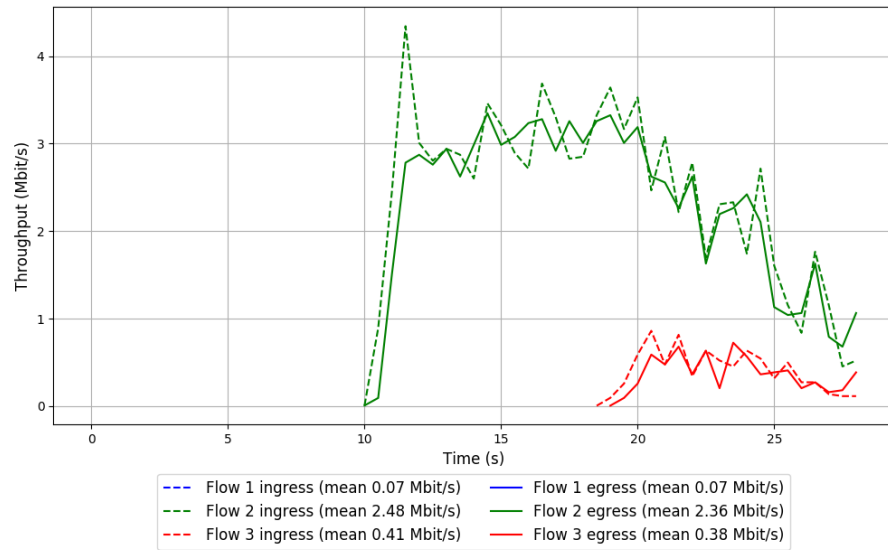


Run 1: Statistics of QUIC Cubic

Start at: 2017-09-22 14:28:24
End at: 2017-09-22 14:28:54
Local clock offset: -0.046 ms
Remote clock offset: 23.094 ms

Below is generated by plot.py at 2017-09-22 15:15:33
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.63 Mbit/s
95th percentile per-packet one-way delay: 1776.638 ms
Loss rate: 5.97%
-- Flow 1:
Average throughput: 0.07 Mbit/s
95th percentile per-packet one-way delay: 192.406 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.36 Mbit/s
95th percentile per-packet one-way delay: 1716.585 ms
Loss rate: 5.39%
-- Flow 3:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 2436.989 ms
Loss rate: 12.55%

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2017-09-22 14:46:02

End at: 2017-09-22 14:46:32

Local clock offset: -0.04 ms

Remote clock offset: 13.17 ms

Below is generated by plot.py at 2017-09-22 15:15:33

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.98 Mbit/s

95th percentile per-packet one-way delay: 1748.427 ms

Loss rate: 6.24%

-- Flow 1:

Average throughput: 2.42 Mbit/s

95th percentile per-packet one-way delay: 1698.321 ms

Loss rate: 4.84%

-- Flow 2:

Average throughput: 0.66 Mbit/s

95th percentile per-packet one-way delay: 1768.860 ms

Loss rate: 10.08%

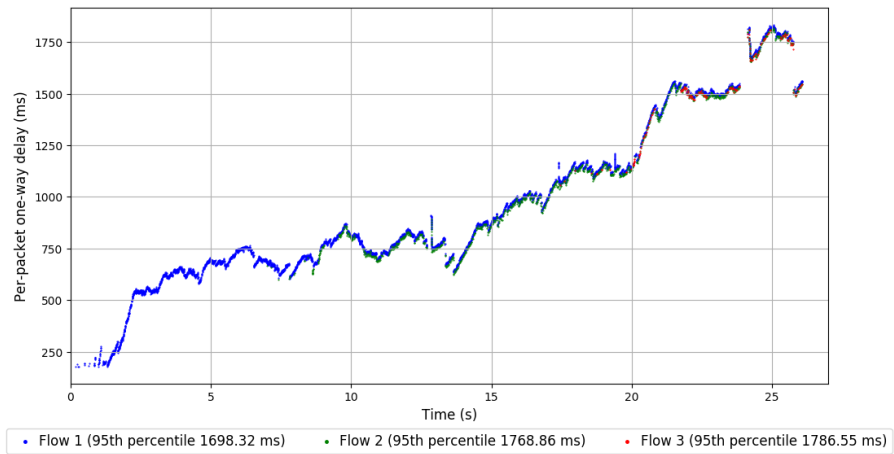
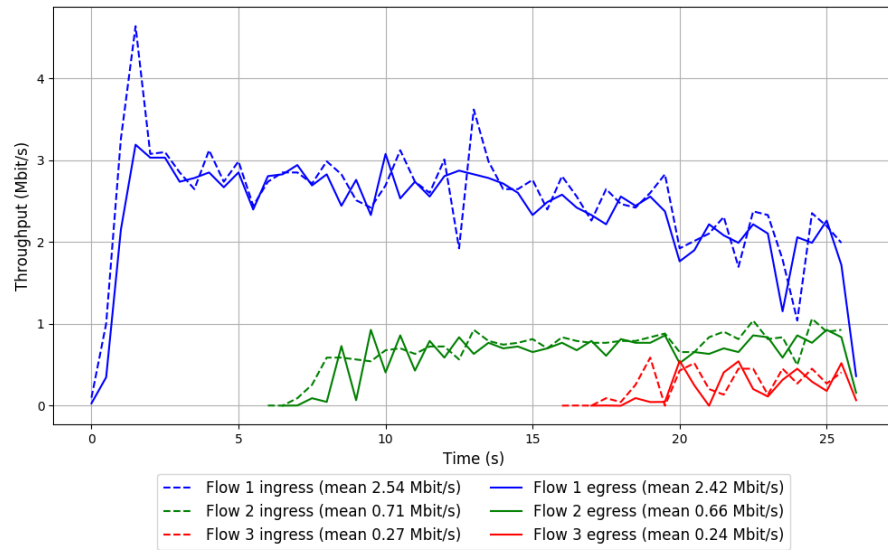
-- Flow 3:

Average throughput: 0.24 Mbit/s

95th percentile per-packet one-way delay: 1786.550 ms

Loss rate: 20.99%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2017-09-22 15:03:40

End at: 2017-09-22 15:04:10

Local clock offset: -0.095 ms

Remote clock offset: 13.46 ms

Below is generated by plot.py at 2017-09-22 15:15:33

Datalink statistics

-- Total of 3 flows:

Average throughput: 1.87 Mbit/s

95th percentile per-packet one-way delay: 2161.509 ms

Loss rate: 8.76%

-- Flow 1:

Average throughput: 1.60 Mbit/s

95th percentile per-packet one-way delay: 2116.468 ms

Loss rate: 6.20%

-- Flow 2:

Average throughput: 0.36 Mbit/s

95th percentile per-packet one-way delay: 2238.107 ms

Loss rate: 17.38%

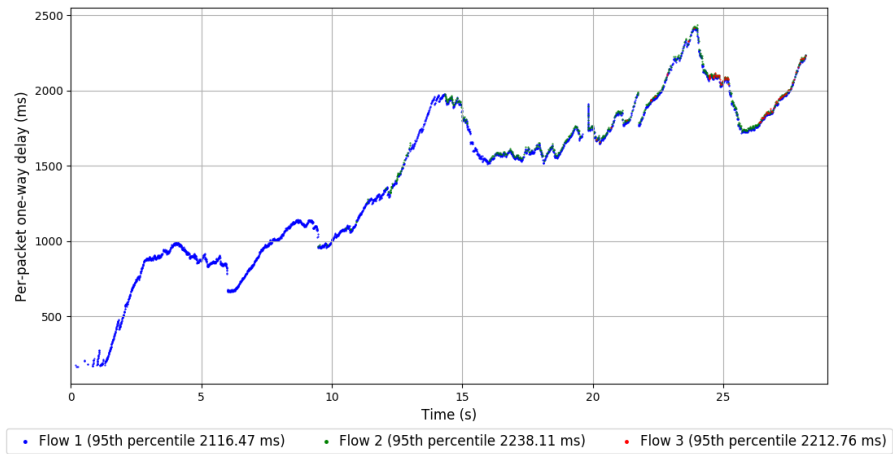
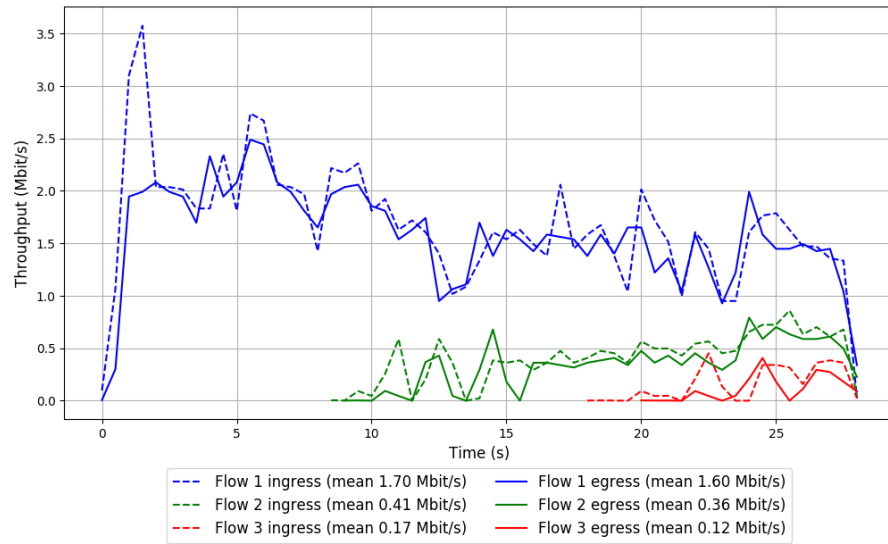
-- Flow 3:

Average throughput: 0.12 Mbit/s

95th percentile per-packet one-way delay: 2212.763 ms

Loss rate: 40.77%

Run 3: Report of QUIC Cubic — Data Link

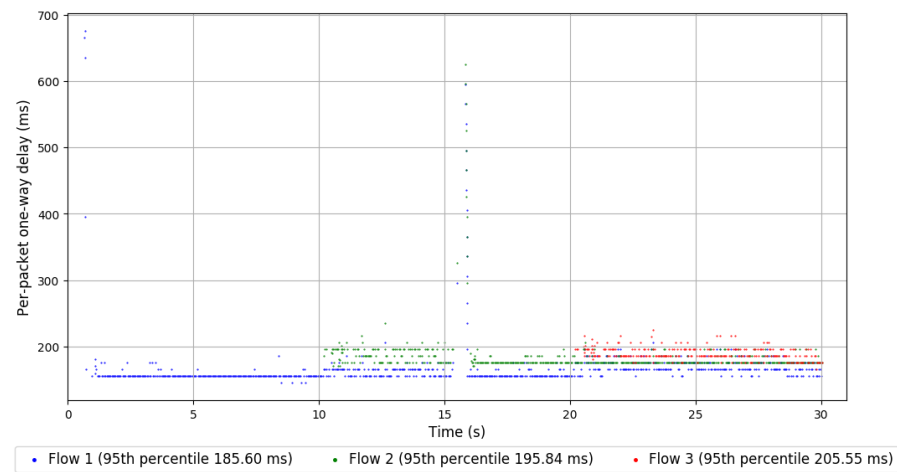
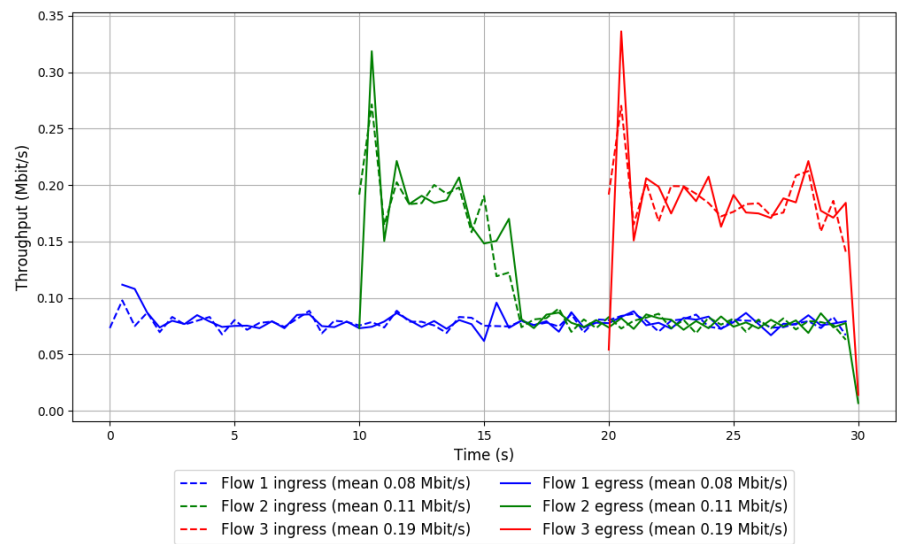


```
Run 1: Statistics of SCReAM

Start at: 2017-09-22 14:32:11
End at: 2017-09-22 14:32:41
Local clock offset: -0.098 ms
Remote clock offset: 19.337 ms

# Below is generated by plot.py at 2017-09-22 15:15:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 195.791 ms
Loss rate: 0.25%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 185.603 ms
Loss rate: 0.26%
-- Flow 2:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 195.839 ms
Loss rate: 0.14%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 205.552 ms
Loss rate: 0.35%
```

Run 1: Report of SReAM — Data Link



Run 2: Statistics of SCReAM

Start at: 2017-09-22 14:49:48

End at: 2017-09-22 14:50:18

Local clock offset: -0.025 ms

Remote clock offset: 8.437 ms

Below is generated by plot.py at 2017-09-22 15:15:33

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.28 Mbit/s

95th percentile per-packet one-way delay: 174.437 ms

Loss rate: 0.23%

-- Flow 1:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 174.511 ms

Loss rate: 0.26%

-- Flow 2:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 154.566 ms

Loss rate: 0.18%

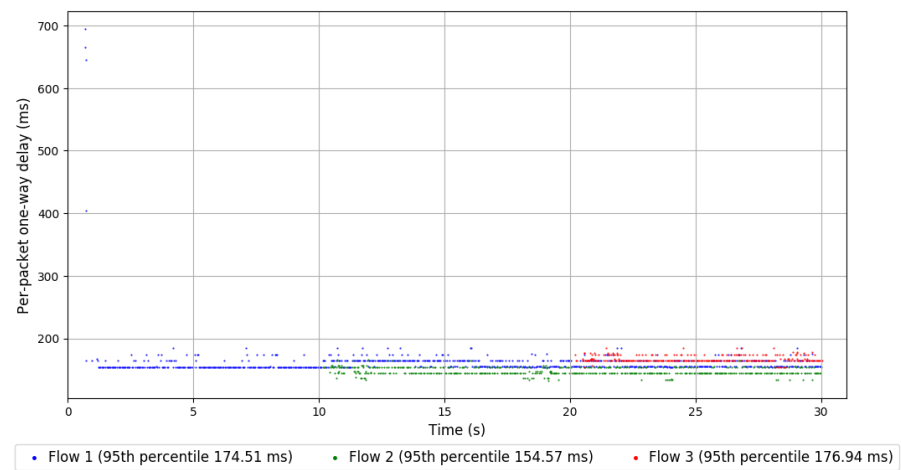
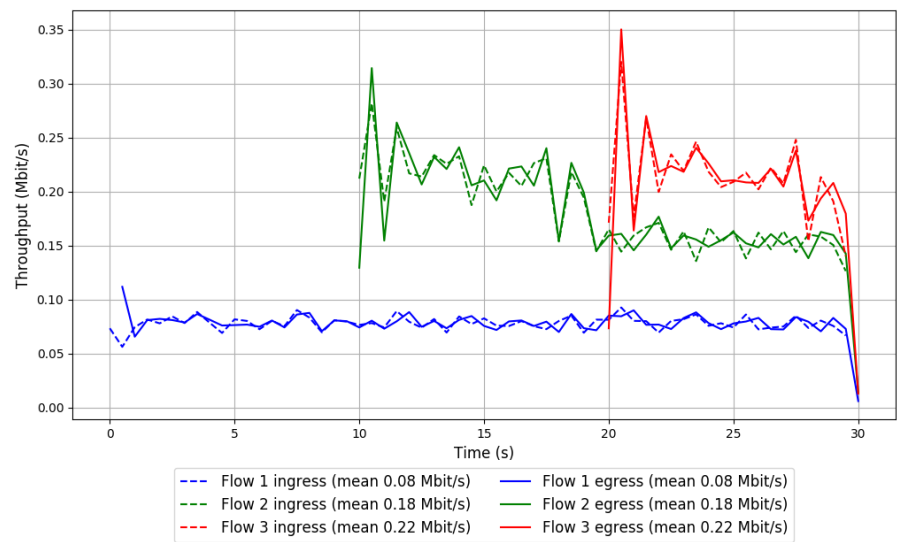
-- Flow 3:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 176.940 ms

Loss rate: 0.28%

Run 2: Report of SReAM — Data Link



Run 3: Statistics of SReAM

Start at: 2017-09-22 15:07:26

End at: 2017-09-22 15:07:56

Local clock offset: -0.116 ms

Remote clock offset: 8.718 ms

Below is generated by plot.py at 2017-09-22 15:15:33

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 194.068 ms

Loss rate: 0.35%

-- Flow 1:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 194.165 ms

Loss rate: 0.26%

-- Flow 2:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 184.236 ms

Loss rate: 0.20%

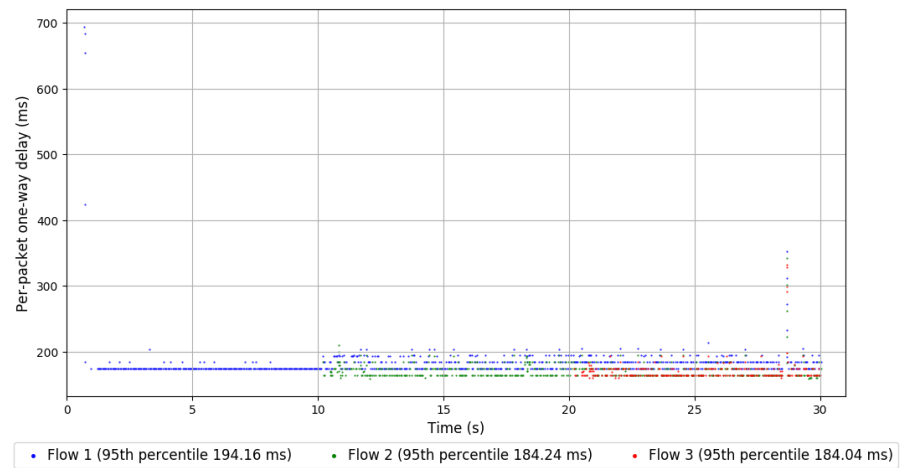
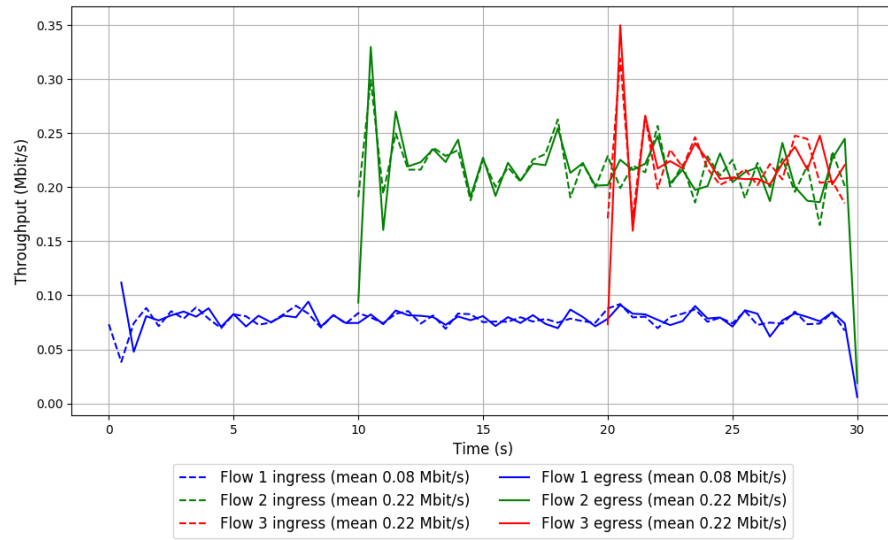
-- Flow 3:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 184.037 ms

Loss rate: 0.74%

Run 3: Report of SCReAM — Data Link

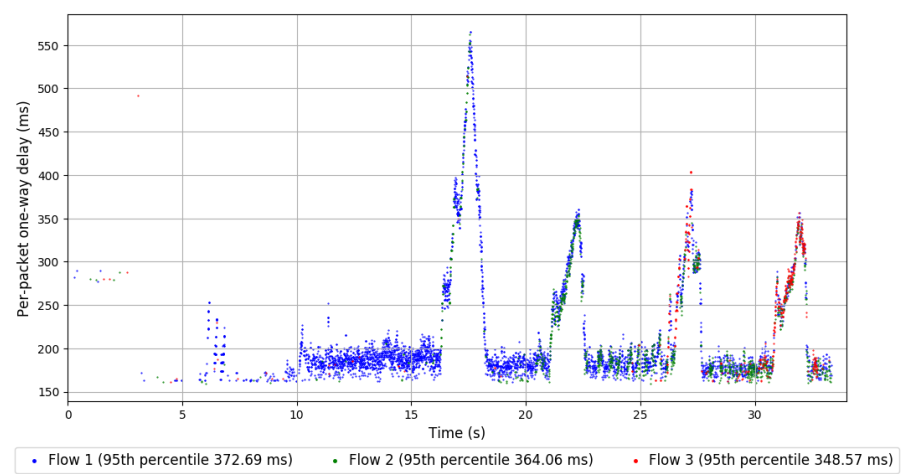
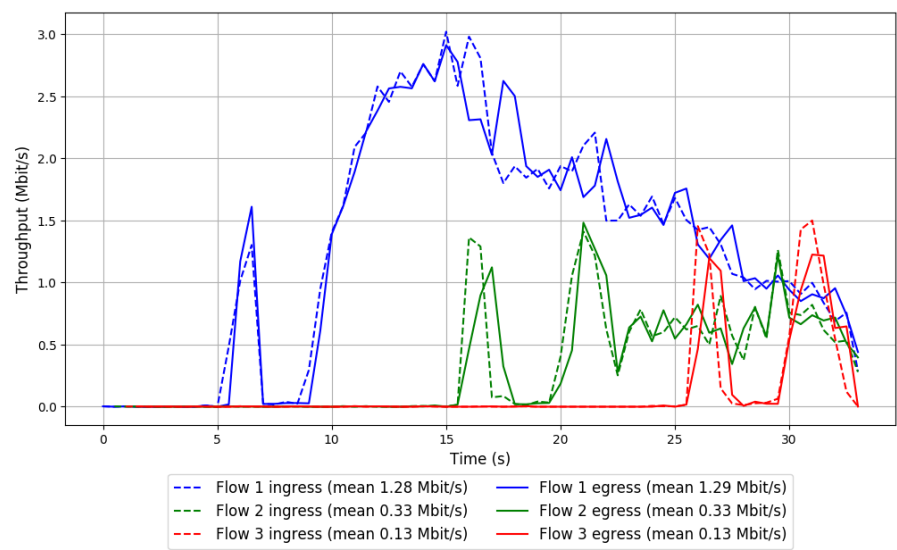


Run 1: Statistics of WebRTC media

Start at: 2017-09-22 14:33:26
End at: 2017-09-22 14:33:56
Local clock offset: -0.025 ms
Remote clock offset: 12.087 ms

Below is generated by plot.py at 2017-09-22 15:15:36
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.74 Mbit/s
95th percentile per-packet one-way delay: 370.198 ms
Loss rate: 0.17%
-- Flow 1:
Average throughput: 1.29 Mbit/s
95th percentile per-packet one-way delay: 372.687 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 364.061 ms
Loss rate: 0.42%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 348.571 ms
Loss rate: 0.00%

Run 1: Report of WebRTC media — Data Link

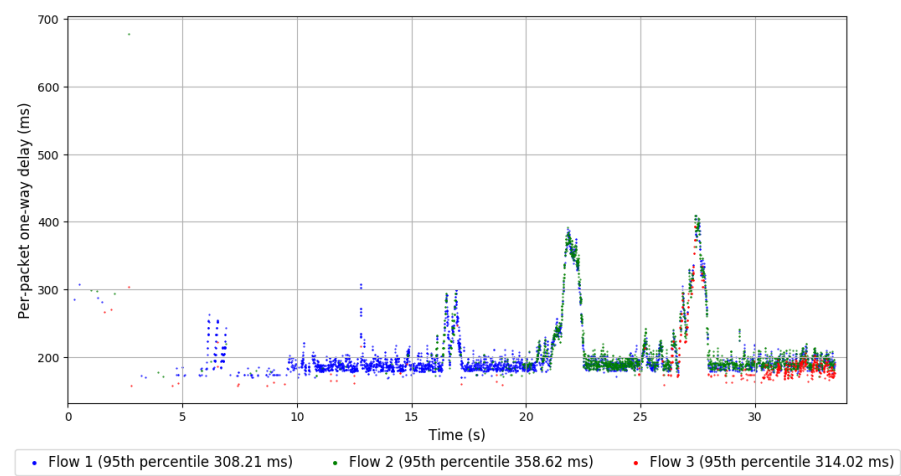
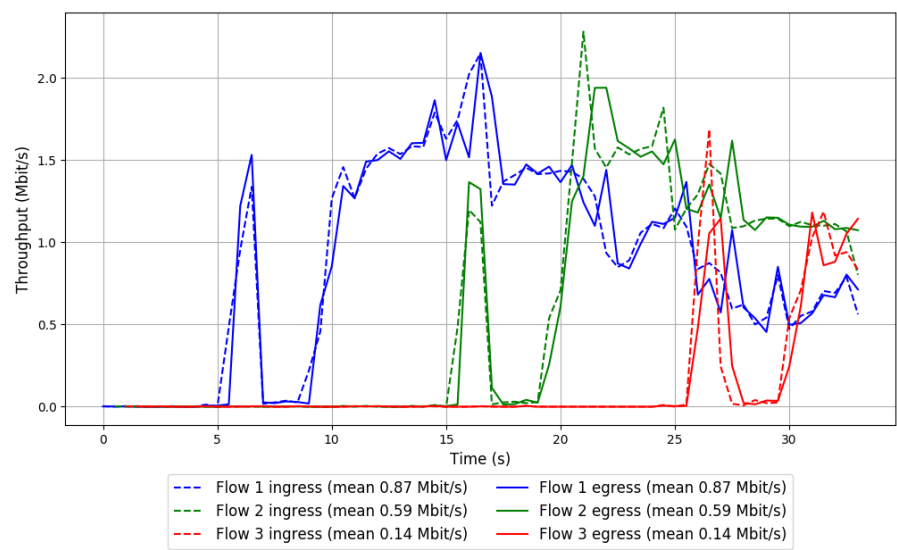


Run 2: Statistics of WebRTC media

Start at: 2017-09-22 14:51:03
End at: 2017-09-22 14:51:33
Local clock offset: -0.035 ms
Remote clock offset: 13.133 ms

Below is generated by plot.py at 2017-09-22 15:15:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.59 Mbit/s
95th percentile per-packet one-way delay: 337.531 ms
Loss rate: 0.46%
-- Flow 1:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 308.206 ms
Loss rate: 0.23%
-- Flow 2:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 358.623 ms
Loss rate: 0.44%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 314.025 ms
Loss rate: 1.99%

Run 2: Report of WebRTC media — Data Link

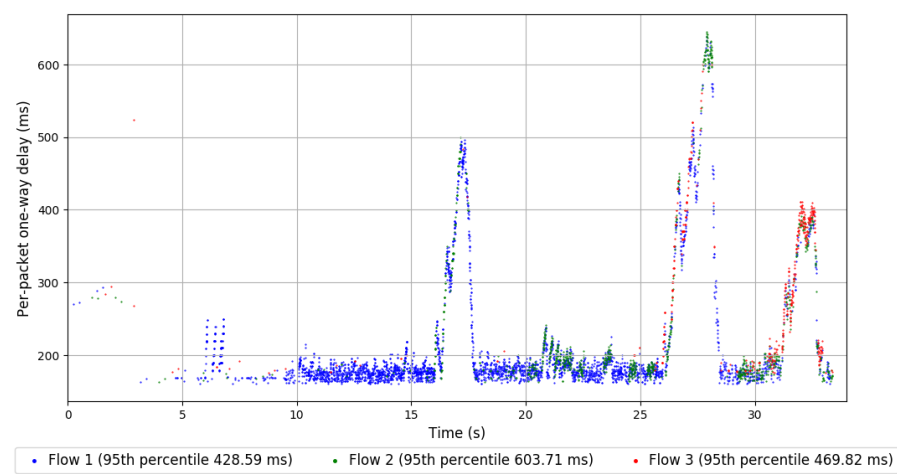
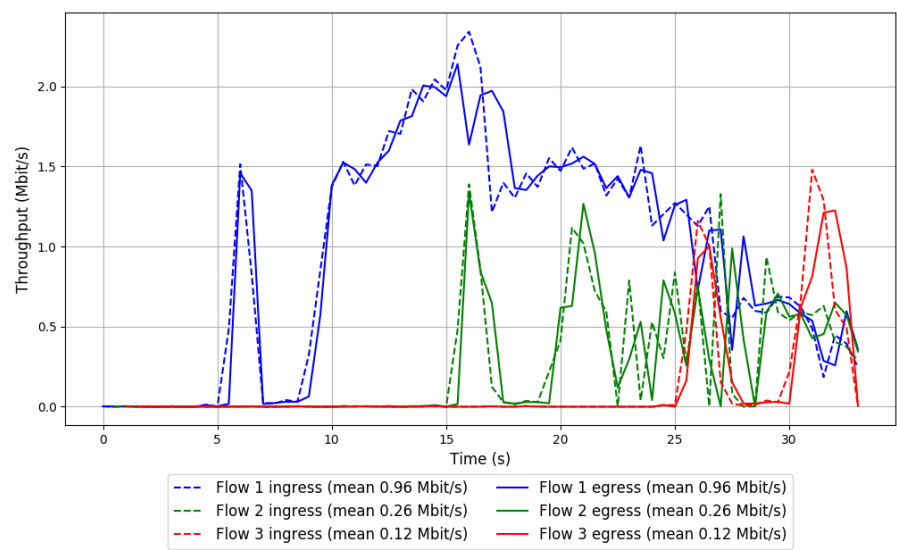


Run 3: Statistics of WebRTC media

Start at: 2017-09-22 15:08:41
End at: 2017-09-22 15:09:11
Local clock offset: -0.047 ms
Remote clock offset: 13.736 ms

Below is generated by plot.py at 2017-09-22 15:15:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.33 Mbit/s
95th percentile per-packet one-way delay: 452.295 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 428.587 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 603.712 ms
Loss rate: 0.21%
-- Flow 3:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 469.824 ms
Loss rate: 0.00%

Run 3: Report of WebRTC media — Data Link

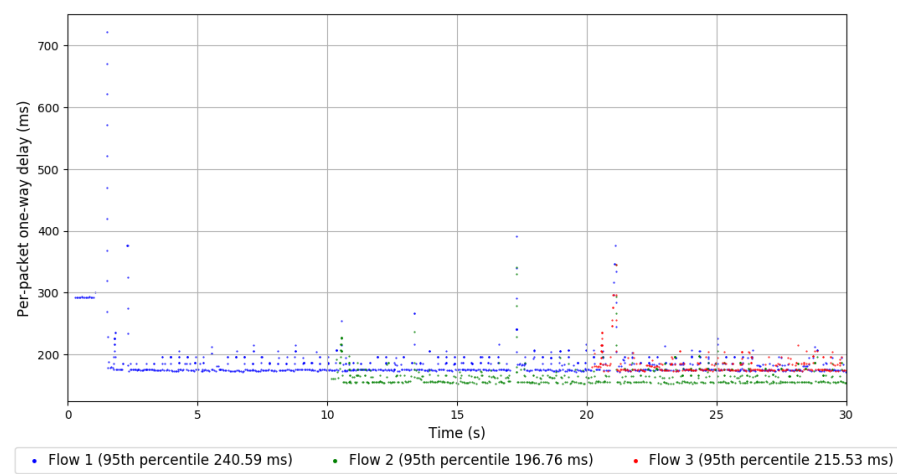
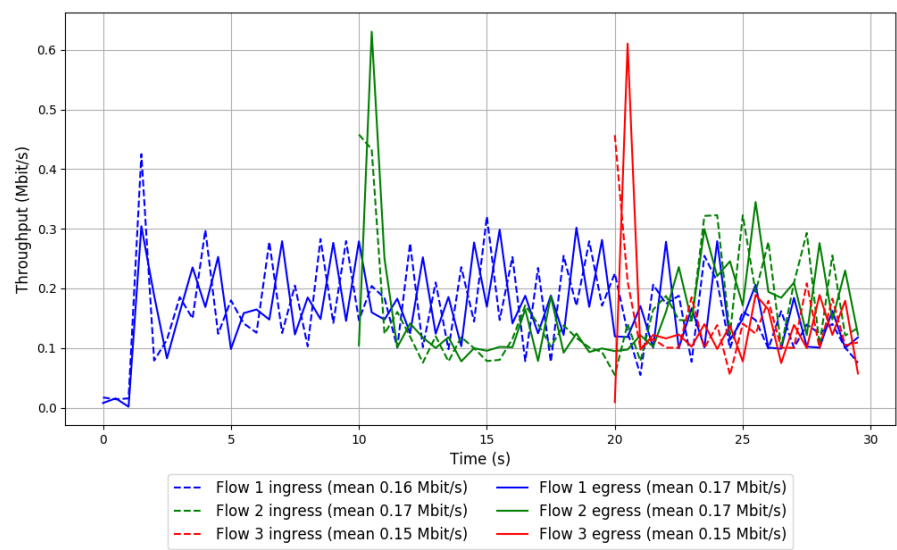


Run 1: Statistics of Sprout

Start at: 2017-09-22 14:38:29
End at: 2017-09-22 14:38:59
Local clock offset: -0.05 ms
Remote clock offset: 21.502 ms

Below is generated by plot.py at 2017-09-22 15:15:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 216.096 ms
Loss rate: 0.43%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 240.590 ms
Loss rate: 0.03%
-- Flow 2:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 196.756 ms
Loss rate: 0.24%
-- Flow 3:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 215.530 ms
Loss rate: 2.21%

Run 1: Report of Sprout — Data Link



Run 2: Statistics of Sprout

Start at: 2017-09-22 14:56:10

End at: 2017-09-22 14:56:40

Local clock offset: -0.12 ms

Remote clock offset: 13.35 ms

Below is generated by plot.py at 2017-09-22 15:15:37

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.27 Mbit/s

95th percentile per-packet one-way delay: 213.018 ms

Loss rate: 0.32%

-- Flow 1:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 221.848 ms

Loss rate: 0.32%

-- Flow 2:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 203.112 ms

Loss rate: 0.03%

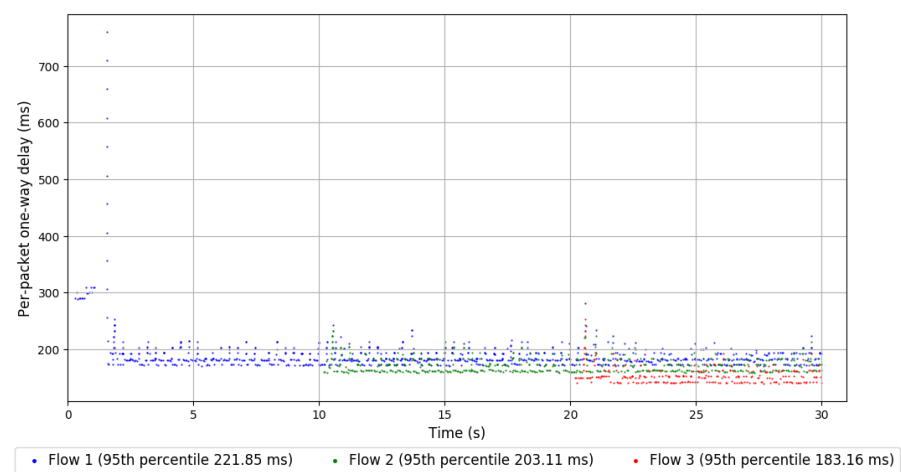
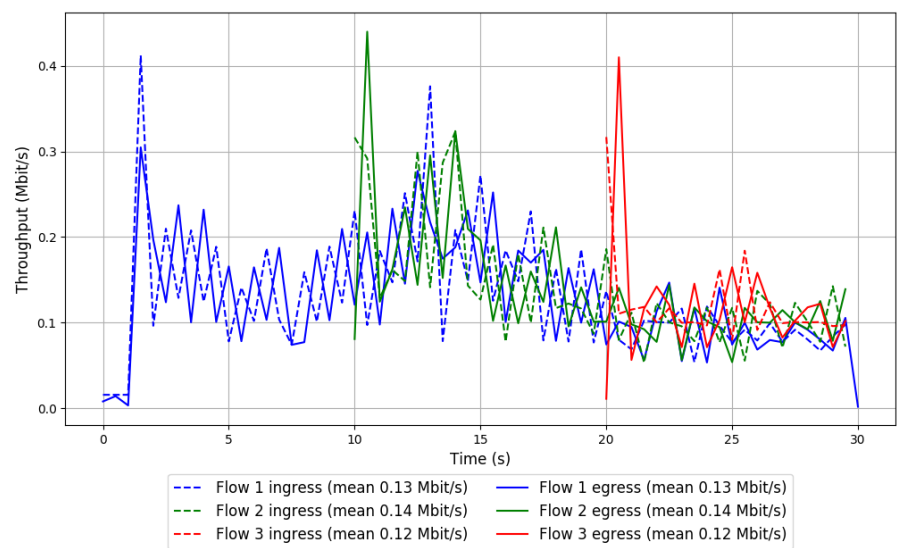
-- Flow 3:

Average throughput: 0.12 Mbit/s

95th percentile per-packet one-way delay: 183.159 ms

Loss rate: 1.00%

Run 2: Report of Sprout — Data Link



Run 3: Statistics of Sprout

Start at: 2017-09-22 15:13:47

End at: 2017-09-22 15:14:17

Local clock offset: -0.04 ms

Remote clock offset: 4.751 ms

Below is generated by plot.py at 2017-09-22 15:15:37

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.27 Mbit/s

95th percentile per-packet one-way delay: 188.350 ms

Loss rate: 0.63%

-- Flow 1:

Average throughput: 0.12 Mbit/s

95th percentile per-packet one-way delay: 188.862 ms

Loss rate: 0.02%

-- Flow 2:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 186.269 ms

Loss rate: 1.17%

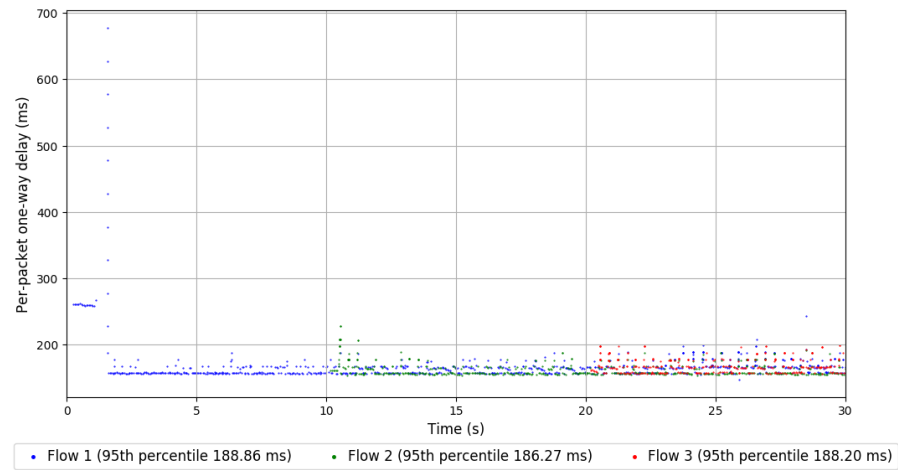
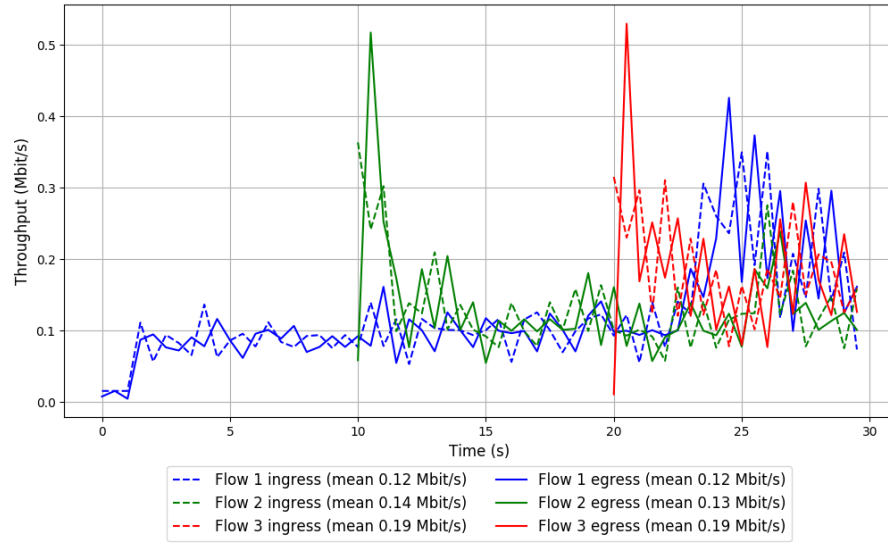
-- Flow 3:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 188.204 ms

Loss rate: 1.01%

Run 3: Report of Sprout — Data Link

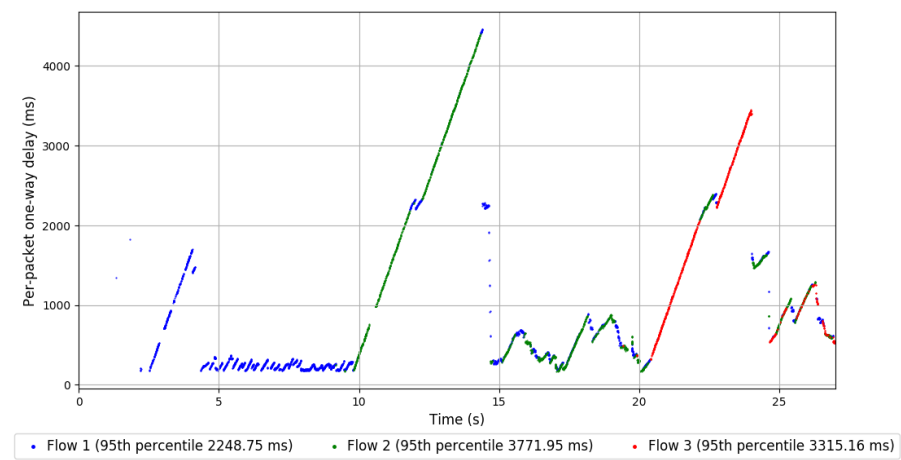
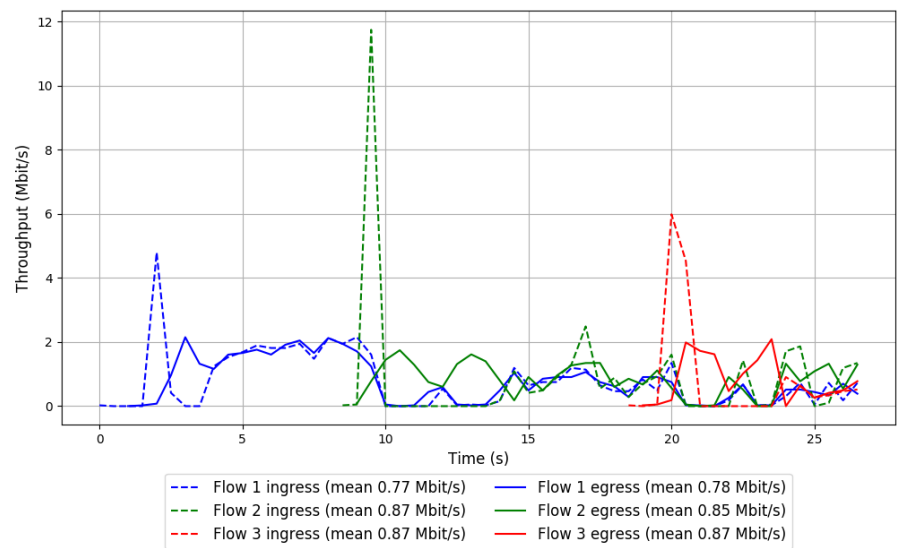


Run 1: Statistics of TaoVA-100x

Start at: 2017-09-22 14:29:39
End at: 2017-09-22 14:30:09
Local clock offset: -0.028 ms
Remote clock offset: 17.196 ms

Below is generated by plot.py at 2017-09-22 15:15:39
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.62 Mbit/s
95th percentile per-packet one-way delay: 3295.064 ms
Loss rate: 3.05%
-- Flow 1:
Average throughput: 0.78 Mbit/s
95th percentile per-packet one-way delay: 2248.746 ms
Loss rate: 1.78%
-- Flow 2:
Average throughput: 0.85 Mbit/s
95th percentile per-packet one-way delay: 3771.951 ms
Loss rate: 4.30%
-- Flow 3:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 3315.161 ms
Loss rate: 3.96%

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



Run 2: Statistics of TaoVA-100x

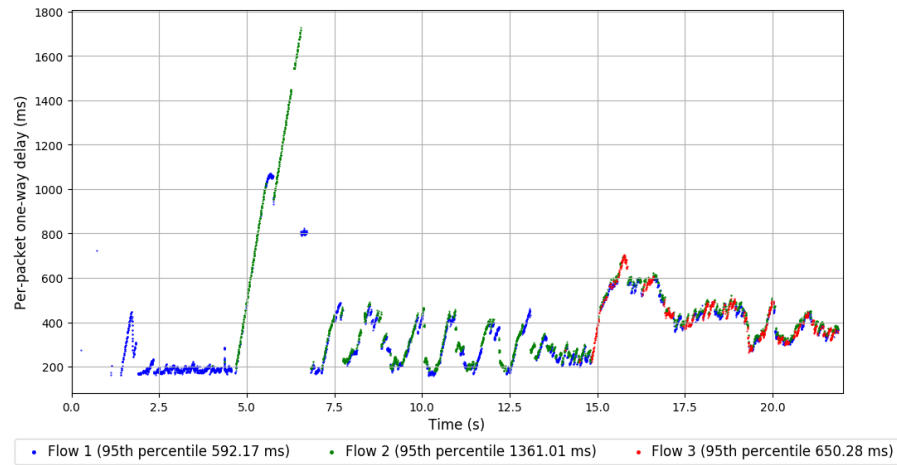
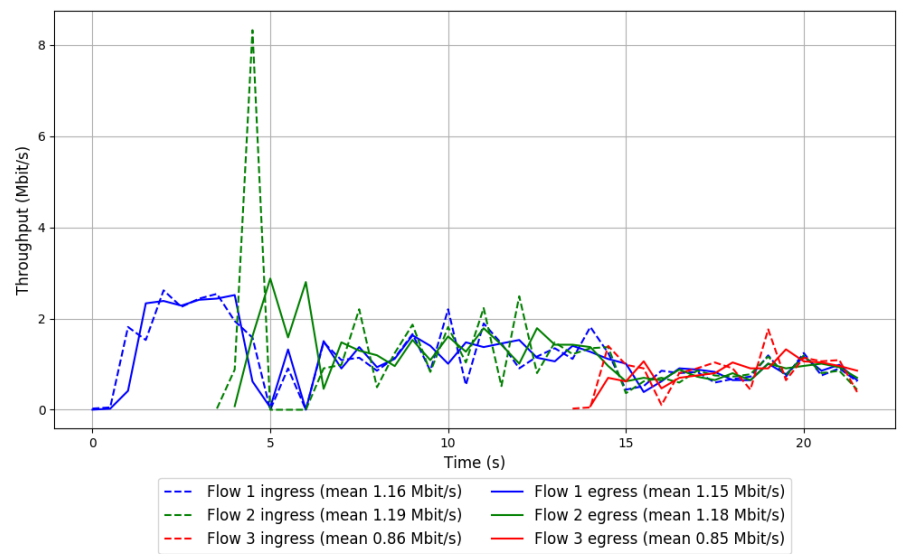
Start at: 2017-09-22 14:47:18

End at: 2017-09-22 14:47:48

Local clock offset: -0.061 ms

Remote clock offset: 13.218 ms

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



Run 3: Statistics of TaoVA-100x

Start at: 2017-09-22 15:04:55

End at: 2017-09-22 15:05:25

Local clock offset: -0.063 ms

Remote clock offset: 8.592 ms

Below is generated by plot.py at 2017-09-22 15:15:42

Datalink statistics

-- Total of 3 flows:

Average throughput: 1.61 Mbit/s

95th percentile per-packet one-way delay: 1398.856 ms

Loss rate: 2.26%

-- Flow 1:

Average throughput: 0.89 Mbit/s

95th percentile per-packet one-way delay: 779.824 ms

Loss rate: 1.30%

-- Flow 2:

Average throughput: 0.72 Mbit/s

95th percentile per-packet one-way delay: 783.248 ms

Loss rate: 2.57%

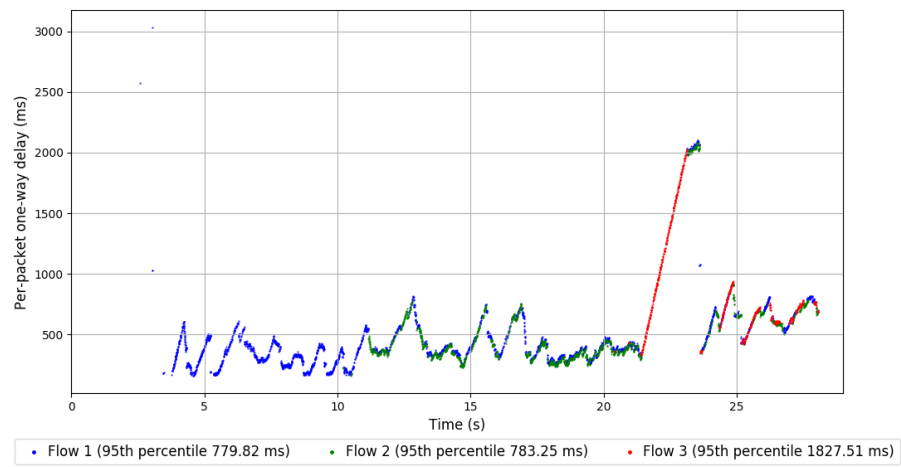
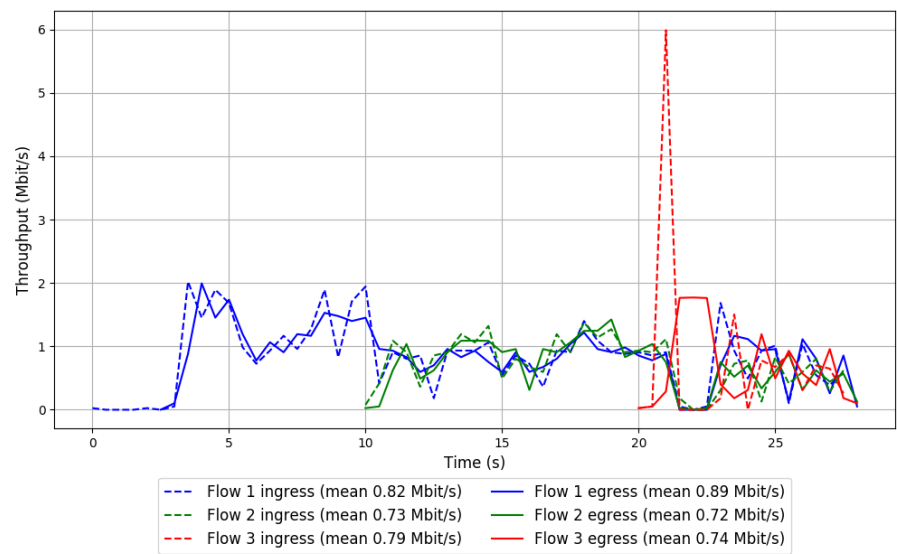
-- Flow 3:

Average throughput: 0.74 Mbit/s

95th percentile per-packet one-way delay: 1827.506 ms

Loss rate: 5.18%

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



Run 1: Statistics of TCP Vegas

Start at: 2017-09-22 14:25:52

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

Local clock offset: -0.03 ms

Remote clock offset: 14.98 ms

Below is generated by plot.py at 2017-09-22 15:15:43

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.84 Mbit/s

95th percentile per-packet one-way delay: 2717.470 ms

Loss rate: 15.44%

-- Flow 1:

Average throughput: 2.47 Mbit/s

95th percentile per-packet one-way delay: 2598.547 ms

Loss rate: 14.23%

-- Flow 2:

Average throughput: 0.61 Mbit/s

95th percentile per-packet one-way delay: 2808.072 ms

Loss rate: 18.78%

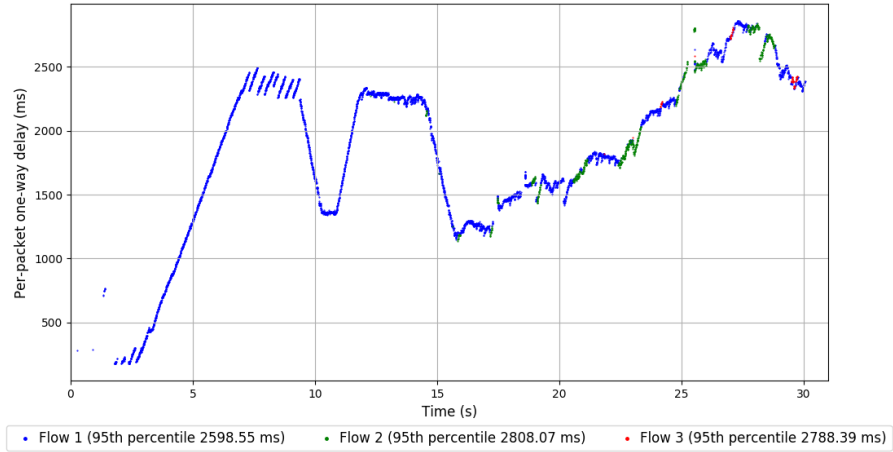
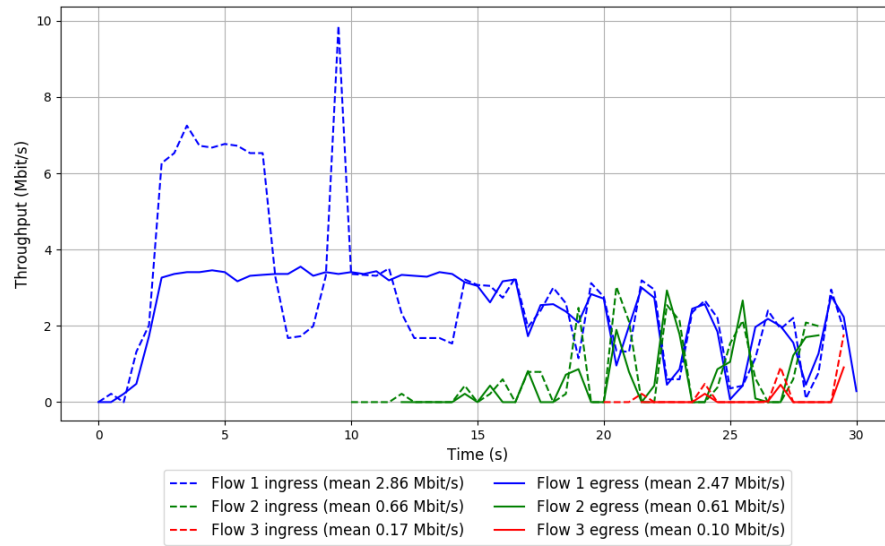
-- Flow 3:

Average throughput: 0.10 Mbit/s

95th percentile per-packet one-way delay: 2788.392 ms

Loss rate: 52.36%

Run 1: Report of TCP Vegas — Data Link

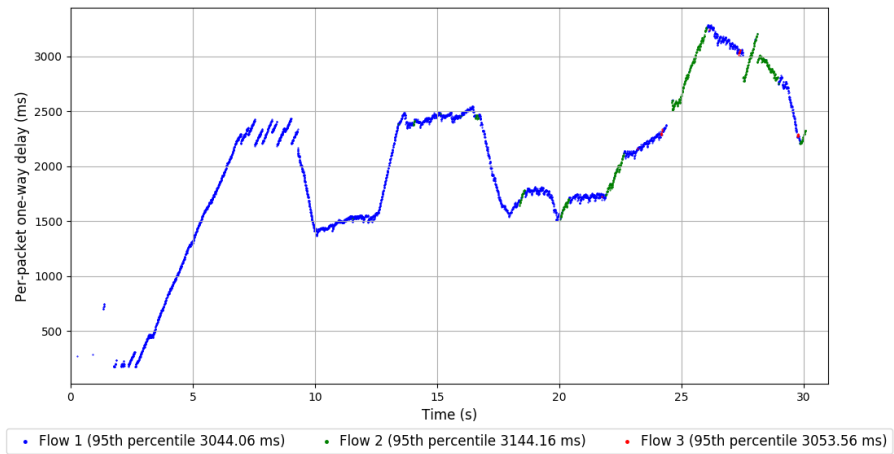
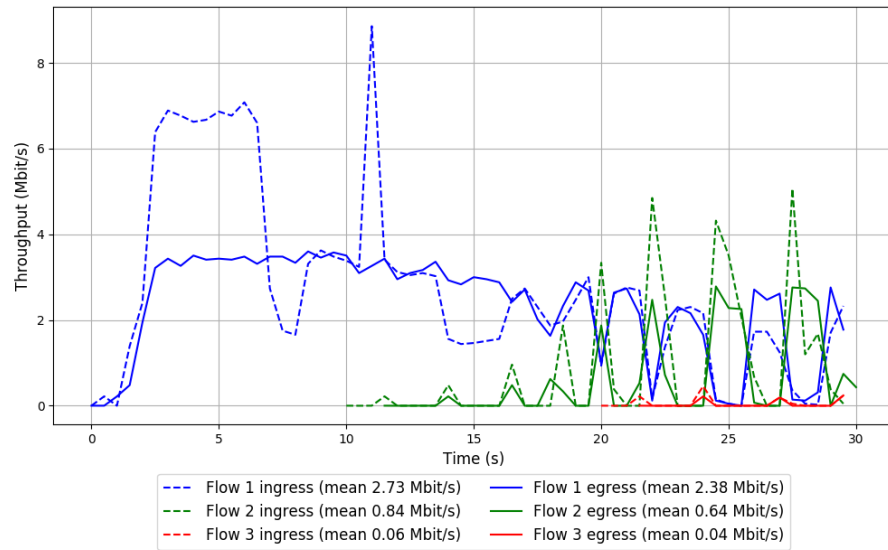


Run 2: Statistics of TCP Vegas

Start at: 2017-09-22 14:43:31
End at: 2017-09-22 14:44:01
Local clock offset: -0.062 ms
Remote clock offset: 17.483 ms

Below is generated by plot.py at 2017-09-22 15:15:44
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.77 Mbit/s
95th percentile per-packet one-way delay: 3084.521 ms
Loss rate: 16.54%
-- Flow 1:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 3044.064 ms
Loss rate: 13.74%
-- Flow 2:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 3144.161 ms
Loss rate: 29.23%
-- Flow 3:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 3053.563 ms
Loss rate: 43.45%

Run 2: Report of TCP Vegas — Data Link

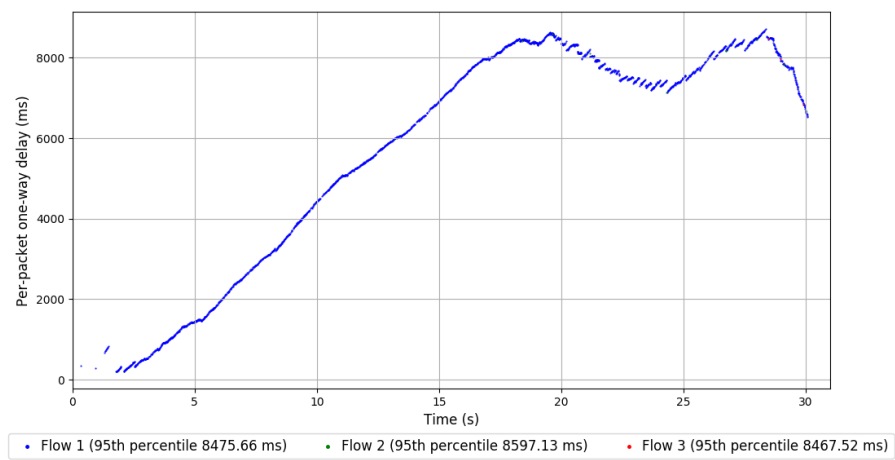
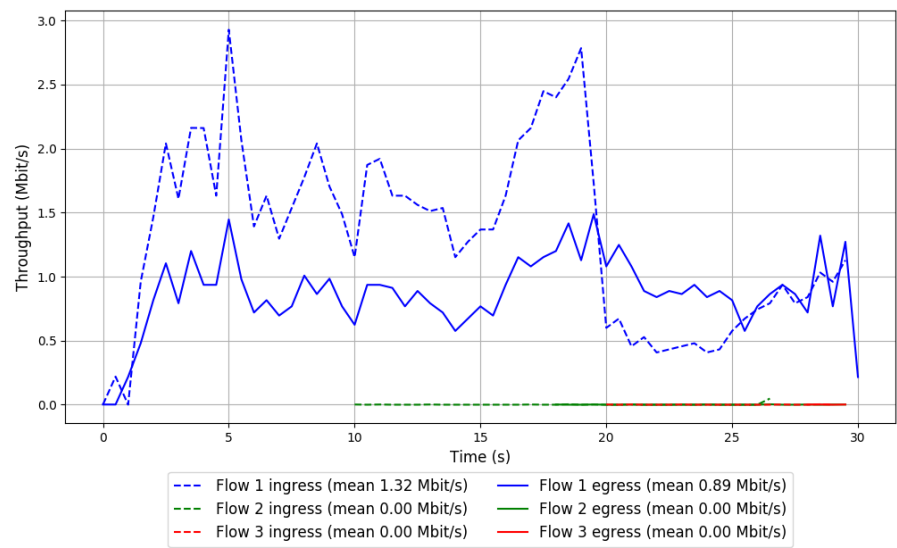


Run 3: Statistics of TCP Vegas

Start at: 2017-09-22 15:01:10
End at: 2017-09-22 15:01:40
Local clock offset: -0.035 ms
Remote clock offset: 13.349 ms

Below is generated by plot.py at 2017-09-22 15:15:44
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.89 Mbit/s
95th percentile per-packet one-way delay: 8475.685 ms
Loss rate: 33.05%
-- Flow 1:
Average throughput: 0.89 Mbit/s
95th percentile per-packet one-way delay: 8475.656 ms
Loss rate: 33.01%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 8597.133 ms
Loss rate: 78.22%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 8467.521 ms
Loss rate: 57.89%

Run 3: Report of TCP Vegas — Data Link

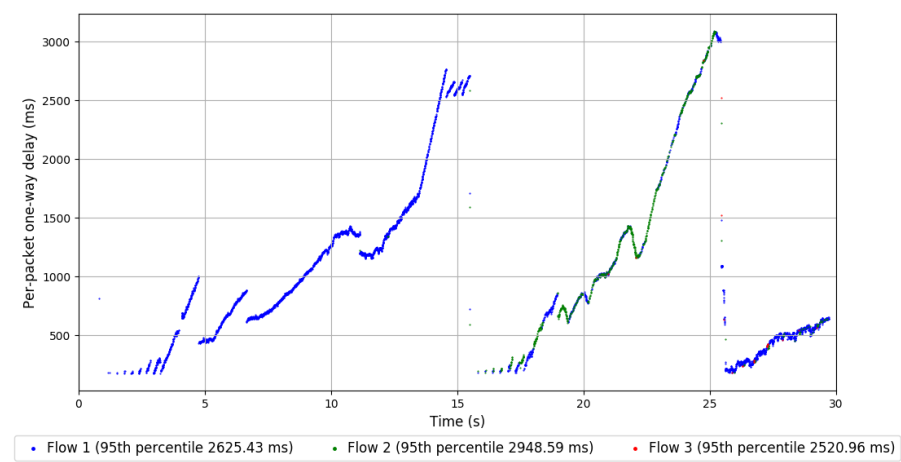
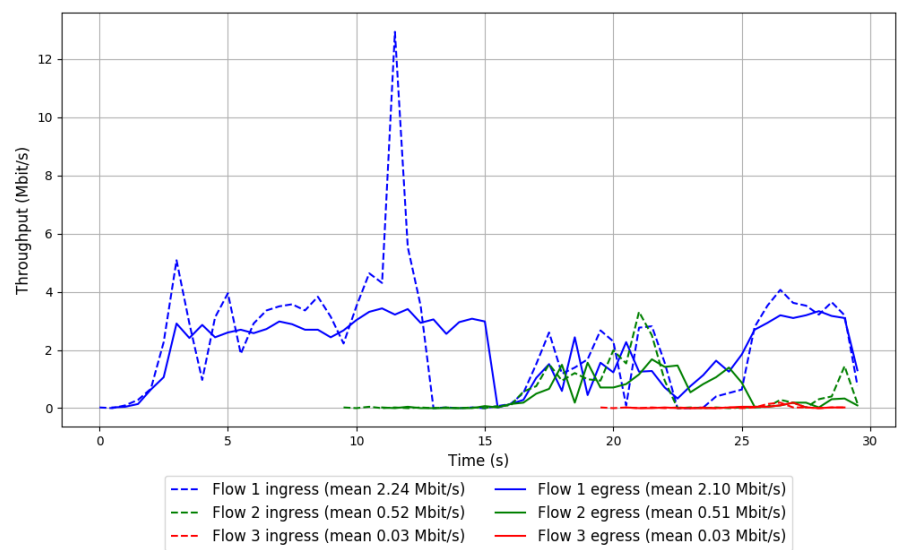


Run 1: Statistics of Verus

Start at: 2017-09-22 14:34:41
End at: 2017-09-22 14:35:11
Local clock offset: -0.063 ms
Remote clock offset: 21.982 ms

Below is generated by plot.py at 2017-09-22 15:15:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.43 Mbit/s
95th percentile per-packet one-way delay: 2657.967 ms
Loss rate: 8.65%
-- Flow 1:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 2625.425 ms
Loss rate: 8.79%
-- Flow 2:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 2948.592 ms
Loss rate: 7.84%
-- Flow 3:
Average throughput: 0.03 Mbit/s
95th percentile per-packet one-way delay: 2520.963 ms
Loss rate: 4.00%

Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2017-09-22 14:52:18

End at: 2017-09-22 14:52:48

Local clock offset: -0.05 ms

Remote clock offset: 8.263 ms

Below is generated by plot.py at 2017-09-22 15:15:47

Datalink statistics

-- Total of 3 flows:

Average throughput: 3.36 Mbit/s

95th percentile per-packet one-way delay: 1921.852 ms

Loss rate: 4.73%

-- Flow 1:

Average throughput: 3.35 Mbit/s

95th percentile per-packet one-way delay: 1921.882 ms

Loss rate: 4.73%

-- Flow 2:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 1707.414 ms

Loss rate: 4.76%

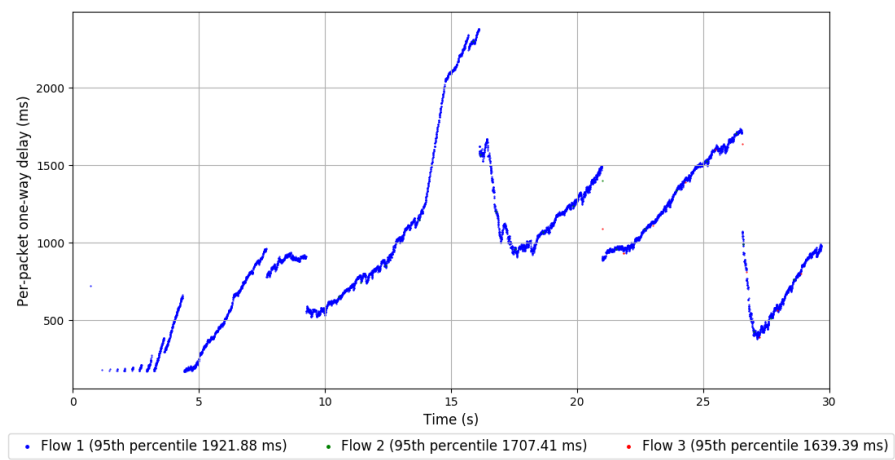
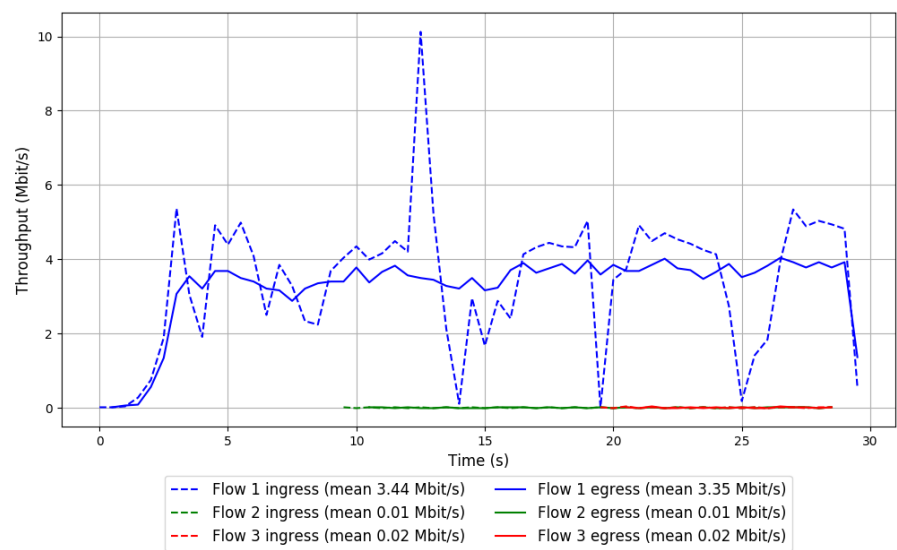
-- Flow 3:

Average throughput: 0.02 Mbit/s

95th percentile per-packet one-way delay: 1639.389 ms

Loss rate: 8.33%

Run 2: Report of Verus — Data Link



Run 3: Statistics of Verus

Start at: 2017-09-22 15:09:57

End at: 2017-09-22 15:10:27

Local clock offset: -0.049 ms

Remote clock offset: 4.596 ms

Below is generated by plot.py at 2017-09-22 15:15:48

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.55 Mbit/s

95th percentile per-packet one-way delay: 2104.497 ms

Loss rate: 3.02%

-- Flow 1:

Average throughput: 2.54 Mbit/s

95th percentile per-packet one-way delay: 2105.145 ms

Loss rate: 3.01%

-- Flow 2:

Average throughput: 0.02 Mbit/s

95th percentile per-packet one-way delay: 1955.754 ms

Loss rate: 3.57%

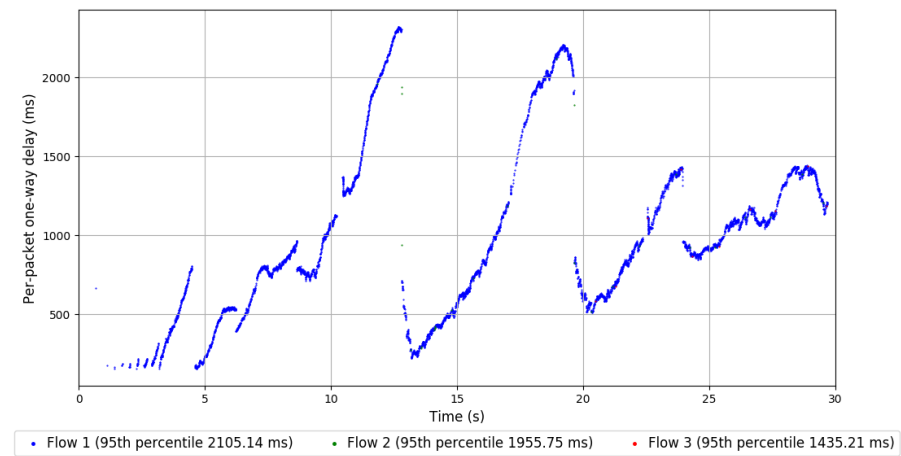
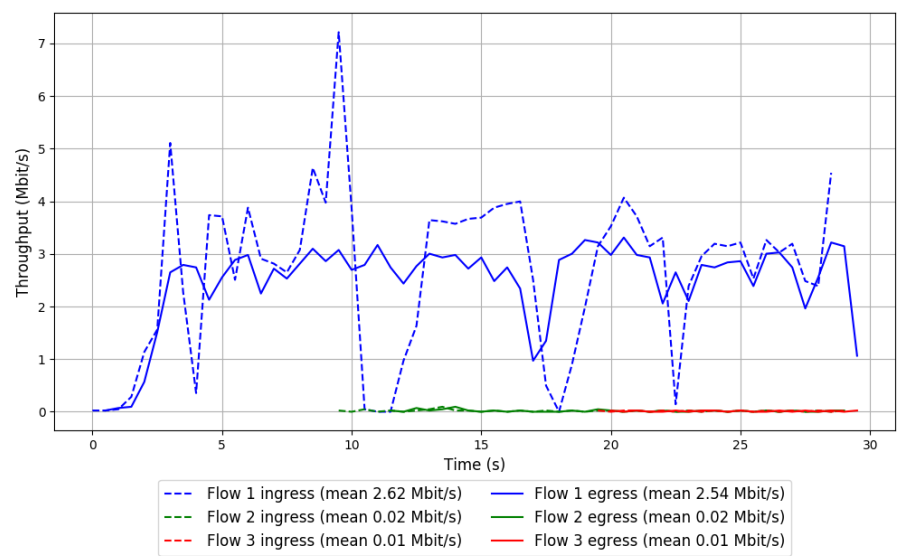
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 1435.206 ms

Loss rate: 9.09%

Run 3: Report of Verus — Data Link

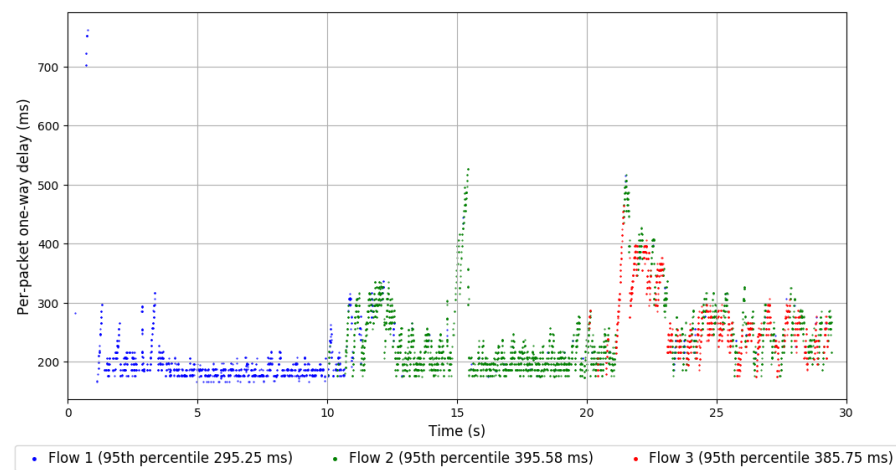
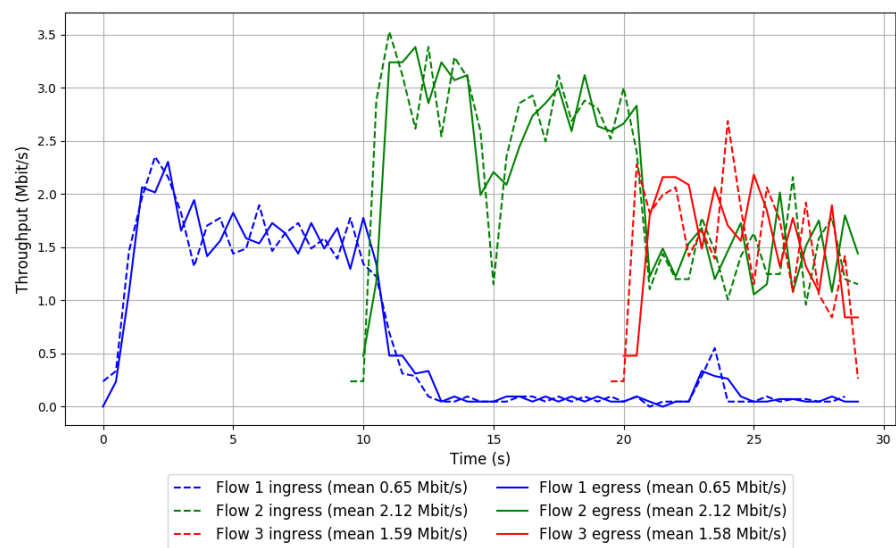


Run 1: Statistics of Indigo

Start at: 2017-09-22 14:23:20
End at: 2017-09-22 14:23:50
Local clock offset: -0.139 ms
Remote clock offset: 16.357 ms

Below is generated by plot.py at 2017-09-22 15:15:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.55 Mbit/s
95th percentile per-packet one-way delay: 375.638 ms
Loss rate: 0.27%
-- Flow 1:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 295.250 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 395.585 ms
Loss rate: 0.35%
-- Flow 3:
Average throughput: 1.58 Mbit/s
95th percentile per-packet one-way delay: 385.748 ms
Loss rate: 0.41%

Run 1: Report of Indigo — Data Link

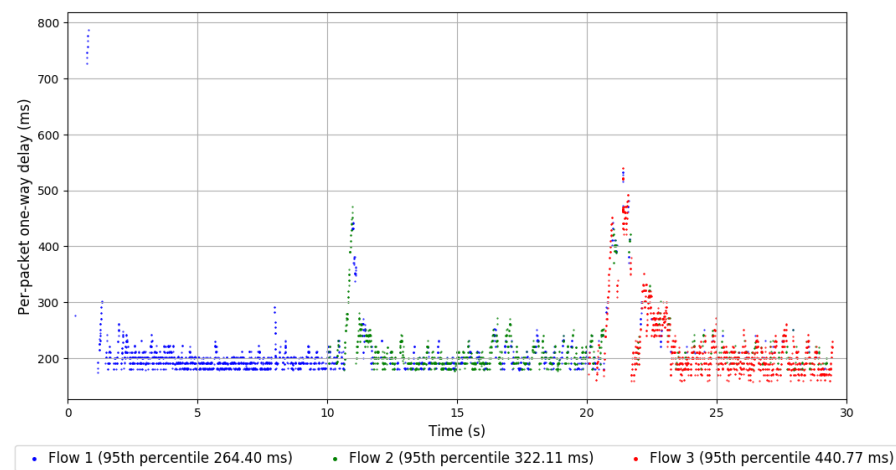
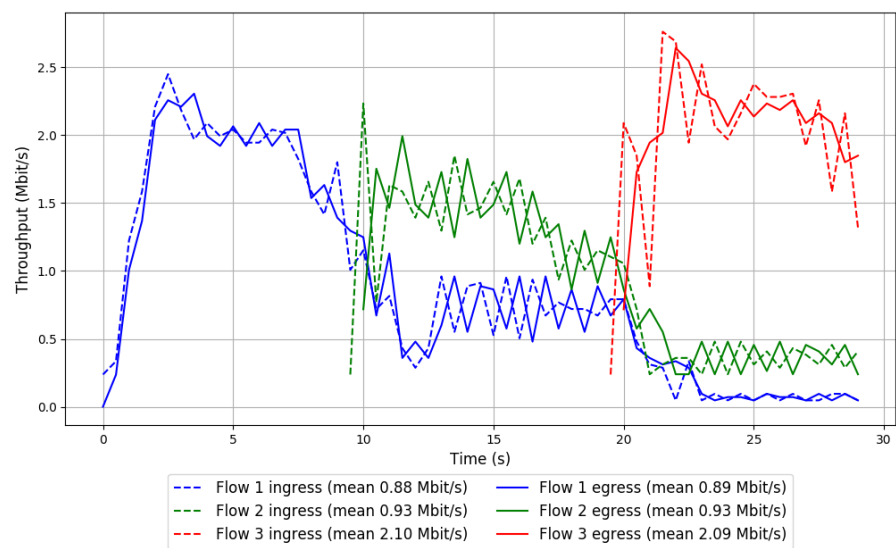


Run 2: Statistics of Indigo

Start at: 2017-09-22 14:41:00
End at: 2017-09-22 14:41:30
Local clock offset: -0.06 ms
Remote clock offset: 22.503 ms

Below is generated by plot.py at 2017-09-22 15:15:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 350.514 ms
Loss rate: 0.53%
-- Flow 1:
Average throughput: 0.89 Mbit/s
95th percentile per-packet one-way delay: 264.397 ms
Loss rate: 0.14%
-- Flow 2:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 322.106 ms
Loss rate: 0.60%
-- Flow 3:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 440.768 ms
Loss rate: 0.97%

Run 2: Report of Indigo — Data Link

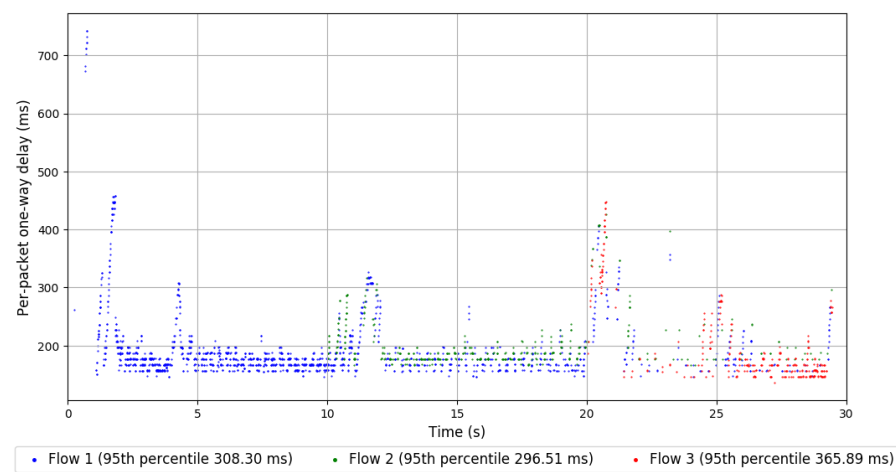
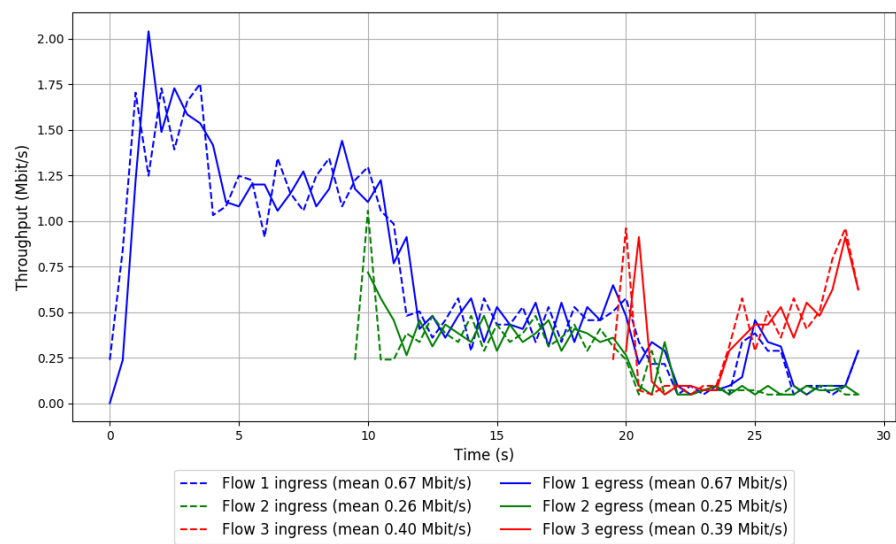


Run 3: Statistics of Indigo

Start at: 2017-09-22 14:58:40
End at: 2017-09-22 14:59:10
Local clock offset: -0.027 ms
Remote clock offset: 8.605 ms

Below is generated by plot.py at 2017-09-22 15:15:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 318.211 ms
Loss rate: 0.63%
-- Flow 1:
Average throughput: 0.67 Mbit/s
95th percentile per-packet one-way delay: 308.304 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 296.514 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 365.895 ms
Loss rate: 4.70%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of Indigo-cellular

Start at: 2017-09-22 14:27:07

End at: 2017-09-22 14:27:37

Local clock offset: -0.085 ms

Remote clock offset: 16.89 ms

Below is generated by plot.py at 2017-09-22 15:15:50

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.30 Mbit/s

95th percentile per-packet one-way delay: 392.526 ms

Loss rate: 0.16%

-- Flow 1:

Average throughput: 1.77 Mbit/s

95th percentile per-packet one-way delay: 257.504 ms

Loss rate: 0.07%

-- Flow 2:

Average throughput: 0.31 Mbit/s

95th percentile per-packet one-way delay: 327.061 ms

Loss rate: 0.97%

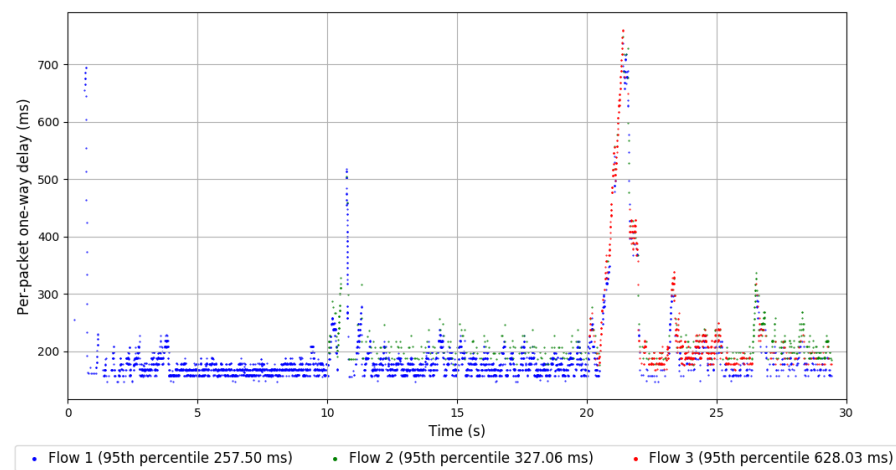
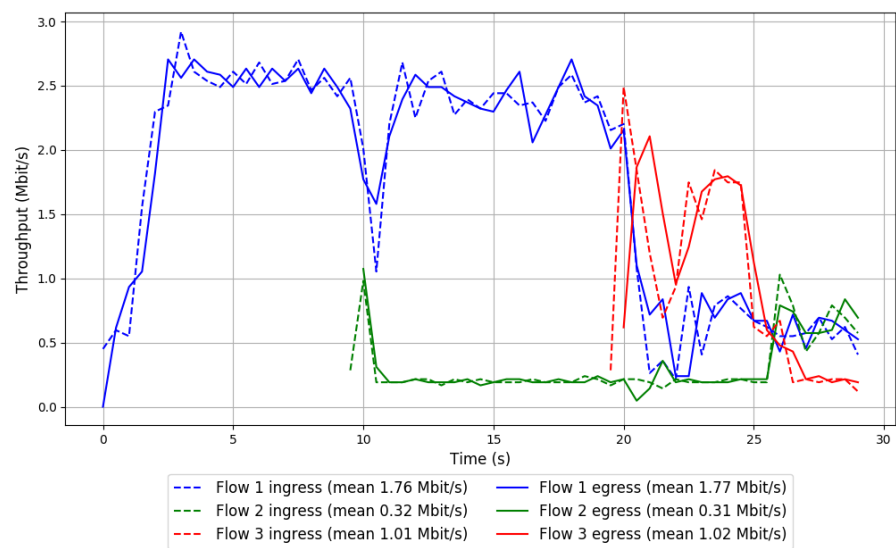
-- Flow 3:

Average throughput: 1.02 Mbit/s

95th percentile per-packet one-way delay: 628.033 ms

Loss rate: 0.13%

Run 1: Report of Indigo-cellular — Data Link

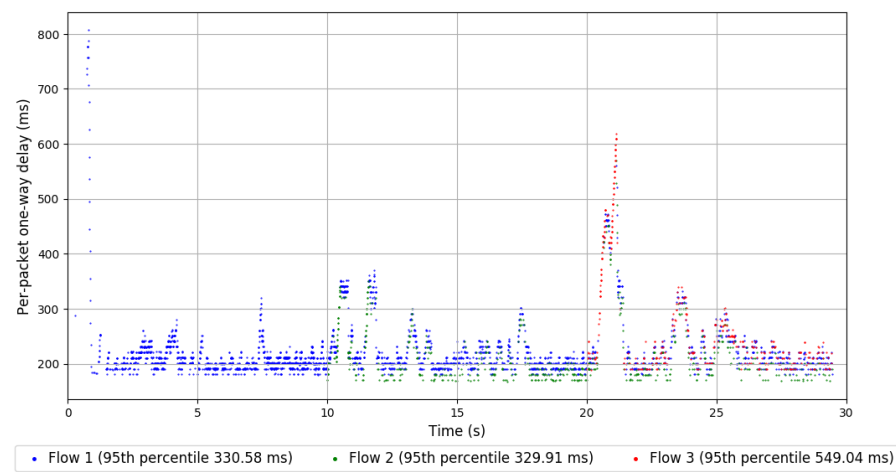
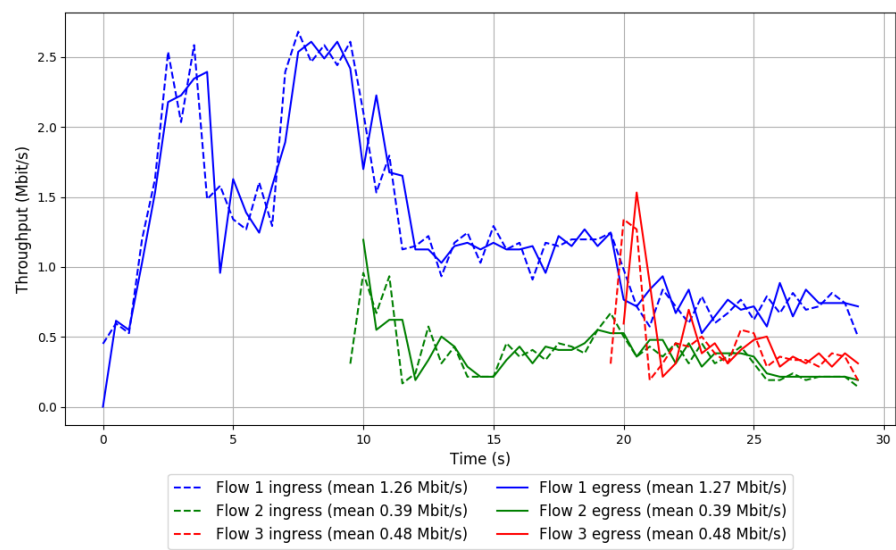


Run 2: Statistics of Indigo-cellular

Start at: 2017-09-22 14:44:47
End at: 2017-09-22 14:45:17
Local clock offset: -0.136 ms
Remote clock offset: 30.095 ms

Below is generated by plot.py at 2017-09-22 15:15:51
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.68 Mbit/s
95th percentile per-packet one-way delay: 341.447 ms
Loss rate: 0.17%
-- Flow 1:
Average throughput: 1.27 Mbit/s
95th percentile per-packet one-way delay: 330.578 ms
Loss rate: 0.16%
-- Flow 2:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 329.914 ms
Loss rate: 0.16%
-- Flow 3:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 549.043 ms
Loss rate: 0.26%

Run 2: Report of Indigo-cellular — Data Link

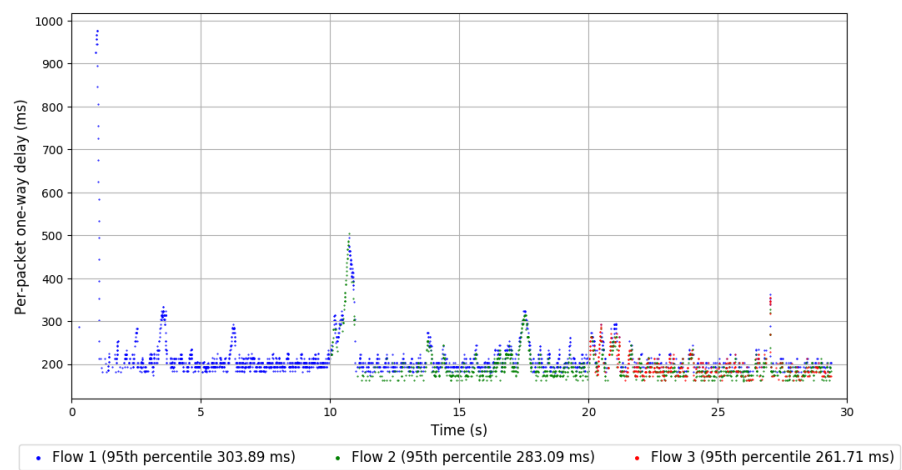
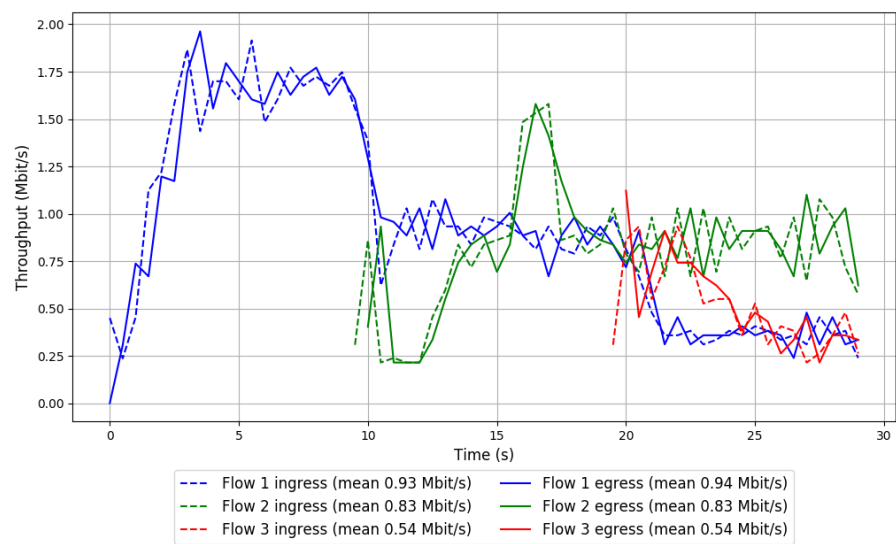


Run 3: Statistics of Indigo-cellular

Start at: 2017-09-22 15:02:25
End at: 2017-09-22 15:02:55
Local clock offset: -0.077 ms
Remote clock offset: 13.453 ms

Below is generated by plot.py at 2017-09-22 15:15:51
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.66 Mbit/s
95th percentile per-packet one-way delay: 294.075 ms
Loss rate: 0.32%
-- Flow 1:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 303.890 ms
Loss rate: 0.18%
-- Flow 2:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 283.089 ms
Loss rate: 0.22%
-- Flow 3:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 261.711 ms
Loss rate: 1.40%

Run 3: Report of Indigo-cellular — Data Link

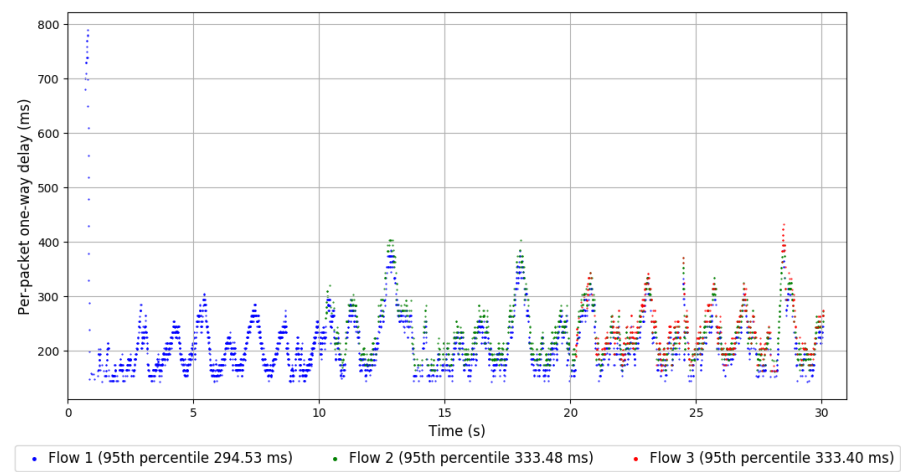
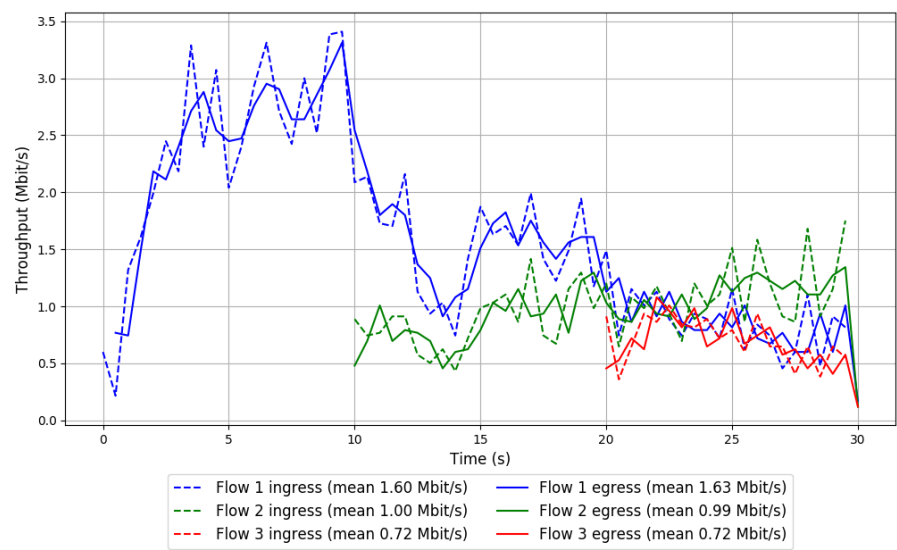


```
Run 1: Statistics of KohoCC

Start at: 2017-09-22 14:30:55
End at: 2017-09-22 14:31:25
Local clock offset: -0.003 ms
Remote clock offset: 13.343 ms

# Below is generated by plot.py at 2017-09-22 15:15:53
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.53 Mbit/s
95th percentile per-packet one-way delay: 314.316 ms
Loss rate: 0.59%
-- Flow 1:
Average throughput: 1.63 Mbit/s
95th percentile per-packet one-way delay: 294.526 ms
Loss rate: 0.08%
-- Flow 2:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 333.476 ms
Loss rate: 1.63%
-- Flow 3:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 333.401 ms
Loss rate: 1.18%
```

Run 1: Report of KohoCC — Data Link



Run 2: Statistics of KohoCC

Start at: 2017-09-22 14:48:33

End at: 2017-09-22 14:49:03

Local clock offset: -0.045 ms

Remote clock offset: 8.335 ms

Below is generated by plot.py at 2017-09-22 15:15:53

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.51 Mbit/s

95th percentile per-packet one-way delay: 320.143 ms

Loss rate: 0.73%

-- Flow 1:

Average throughput: 1.80 Mbit/s

95th percentile per-packet one-way delay: 310.449 ms

Loss rate: 0.61%

-- Flow 2:

Average throughput: 0.68 Mbit/s

95th percentile per-packet one-way delay: 340.246 ms

Loss rate: 1.06%

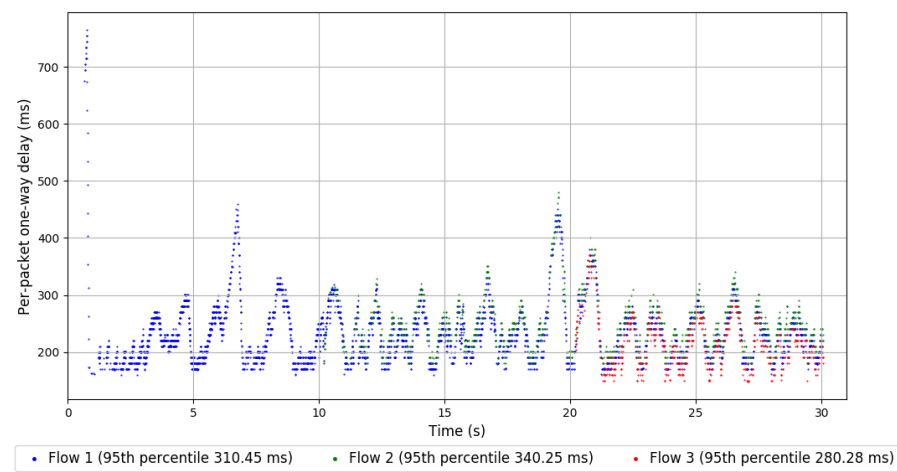
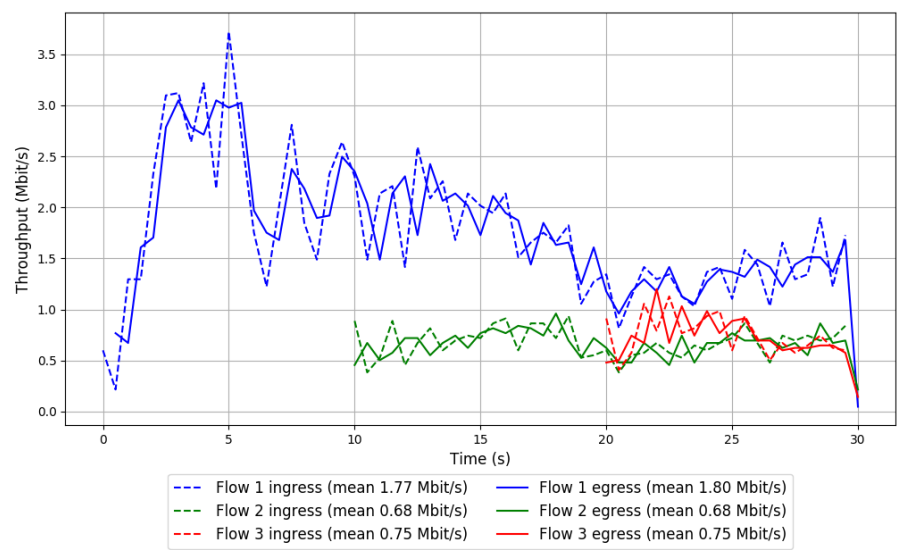
-- Flow 3:

Average throughput: 0.75 Mbit/s

95th percentile per-packet one-way delay: 280.281 ms

Loss rate: 0.96%

Run 2: Report of KohoCC — Data Link



Run 3: Statistics of KohoCC

Start at: 2017-09-22 15:06:11
End at: 2017-09-22 15:06:41
Local clock offset: -0.055 ms
Remote clock offset: 13.608 ms

Below is generated by plot.py at 2017-09-22 15:15:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.89 Mbit/s
95th percentile per-packet one-way delay: 312.906 ms
Loss rate: 0.48%
-- Flow 1:
Average throughput: 1.97 Mbit/s
95th percentile per-packet one-way delay: 303.472 ms
Loss rate: 0.35%
-- Flow 2:
Average throughput: 1.10 Mbit/s
95th percentile per-packet one-way delay: 322.897 ms
Loss rate: 0.76%
-- Flow 3:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 292.574 ms
Loss rate: 0.68%

Run 3: Report of KohoCC — Data Link

