

Pantheon Report

Generated at 2017-09-22 15:09:47 (UTC).

Data path: Stanford ppp0 (*remote*) → AWS California 1 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).

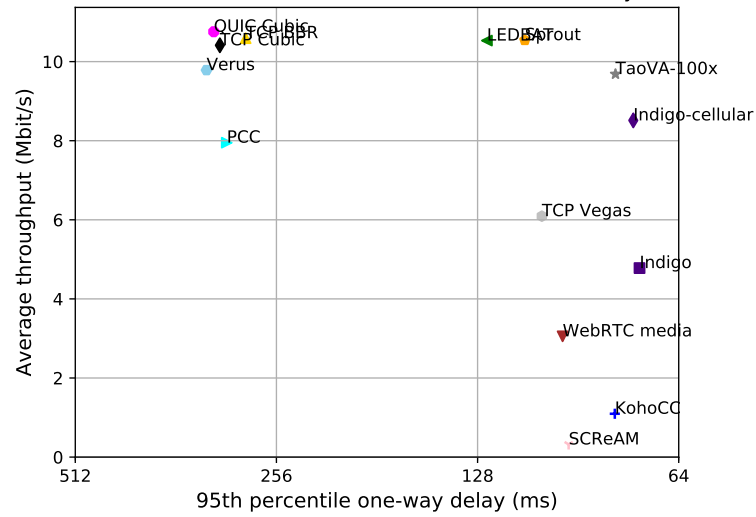
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

NTP offsets were measured against `time.stanford.edu` and have been applied to correct the timestamps in logs.

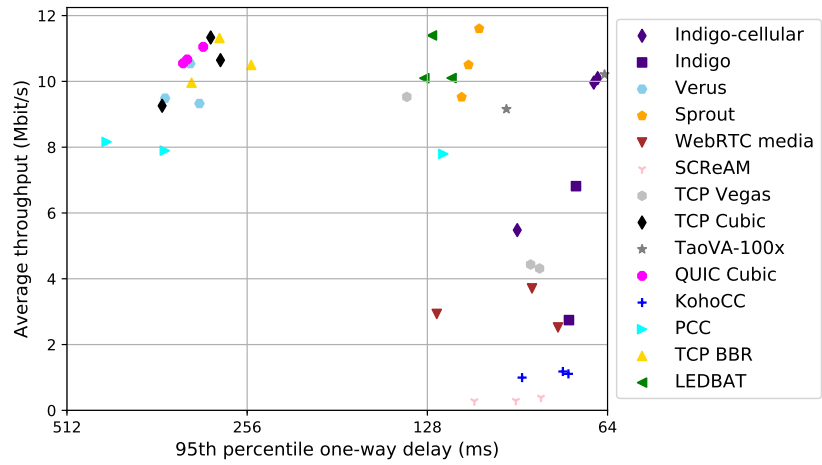
Git summary:

```
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 Stanford ppp0 to AWS California 1 Ethernet, 3 runs of 30s each per scheme
 3 flows with 10s interval between flows (mean of all runs by scheme)



test from Stanford ppp0 to AWS California 1 Ethernet, 3 runs of 30s each per scheme
 3 flows with 10s interval between flows



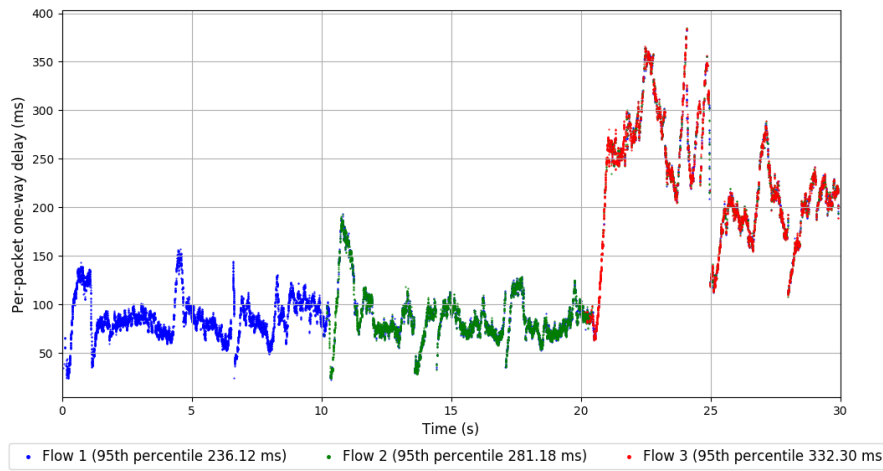
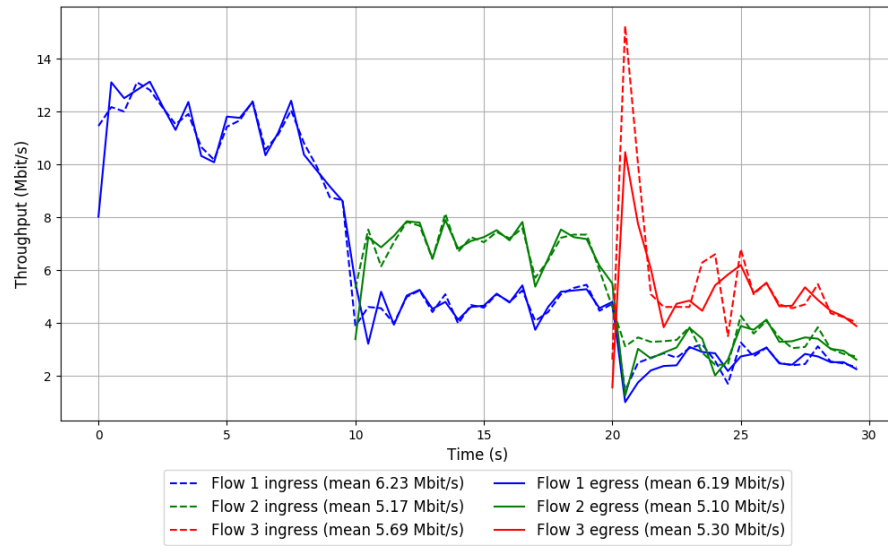
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	6.22	4.74	3.77	255.02	289.97	315.30	0.63	1.54	4.37
TCP Cubic	3	7.73	3.37	1.42	307.46	315.34	301.86	0.94	1.95	3.58
LEDBAT	3	6.74	3.70	4.10	124.94	119.92	116.06	0.47	0.72	1.30
PCC	3	5.23	3.14	1.93	295.55	313.00	319.92	6.84	12.47	17.46
QUIC Cubic	3	8.52	2.15	2.50	316.87	321.74	322.53	1.80	2.77	4.32
SCReAM	3	0.14	0.17	0.20	93.24	95.83	85.19	0.27	0.41	0.34
WebRTC media	3	1.50	1.01	0.56	89.71	104.70	100.26	0.29	0.53	1.97
Sprout	3	5.74	4.74	3.21	105.76	108.41	116.82	1.40	1.52	1.91
TaoVA-100x	2	5.60	4.38	4.53	75.57	74.41	118.05	0.92	2.33	0.83
TCP Vegas	3	3.03	2.58	4.10	101.53	102.10	79.78	0.13	0.32	0.17
Verus	3	5.68	4.43	2.76	314.74	331.74	327.68	19.61	21.60	31.56
Indigo	2	2.35	1.84	3.65	76.30	71.93	58.32	0.34	0.30	0.34
Indigo-cellular	3	5.04	3.12	3.74	71.32	77.13	78.84	0.20	0.31	0.60
KohoCC	3	0.46	0.60	0.72	89.08	75.11	72.58	0.81	0.72	1.07

Run 1: Statistics of TCP BBR

Start at: 2017-09-22 13:31:27
End at: 2017-09-22 13:31:57
Local clock offset: 0.461 ms
Remote clock offset: -3.068 ms

Below is generated by plot.py at 2017-09-22 15:08:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 11.32 Mbit/s
95th percentile per-packet one-way delay: 284.755 ms
Loss rate: 2.23%
-- Flow 1:
Average throughput: 6.19 Mbit/s
95th percentile per-packet one-way delay: 236.121 ms
Loss rate: 0.83%
-- Flow 2:
Average throughput: 5.10 Mbit/s
95th percentile per-packet one-way delay: 281.182 ms
Loss rate: 1.76%
-- Flow 3:
Average throughput: 5.30 Mbit/s
95th percentile per-packet one-way delay: 332.302 ms
Loss rate: 7.73%

Run 1: Report of TCP BBR — Data Link

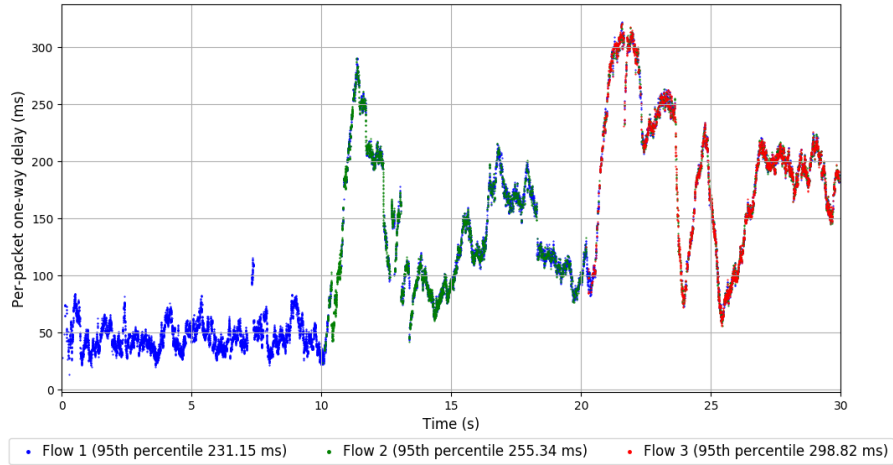
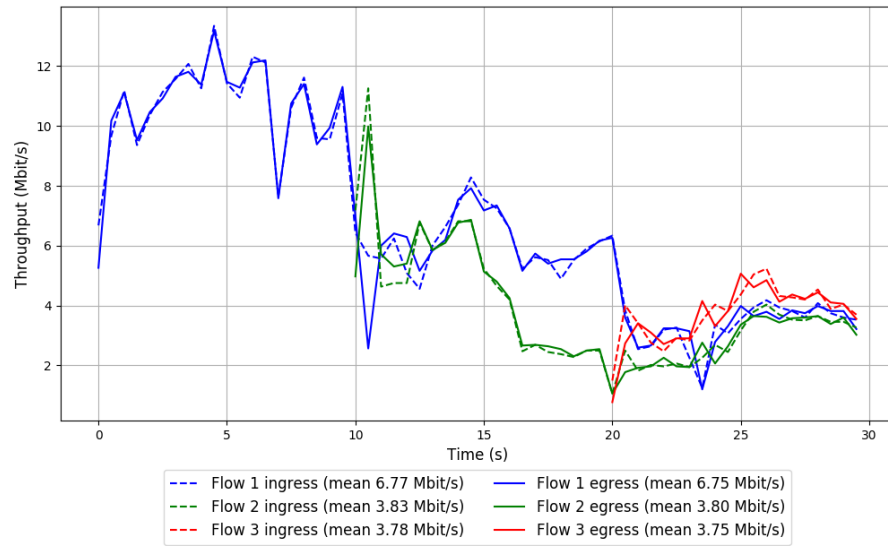


Run 2: Statistics of TCP BBR

Start at: 2017-09-22 13:48:05
End at: 2017-09-22 13:48:35
Local clock offset: 0.475 ms
Remote clock offset: -2.885 ms

Below is generated by plot.py at 2017-09-22 15:08:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 10.50 Mbit/s
95th percentile per-packet one-way delay: 252.068 ms
Loss rate: 0.75%
-- Flow 1:
Average throughput: 6.75 Mbit/s
95th percentile per-packet one-way delay: 231.149 ms
Loss rate: 0.40%
-- Flow 2:
Average throughput: 3.80 Mbit/s
95th percentile per-packet one-way delay: 255.337 ms
Loss rate: 1.01%
-- Flow 3:
Average throughput: 3.75 Mbit/s
95th percentile per-packet one-way delay: 298.823 ms
Loss rate: 2.18%

Run 2: Report of TCP BBR — Data Link

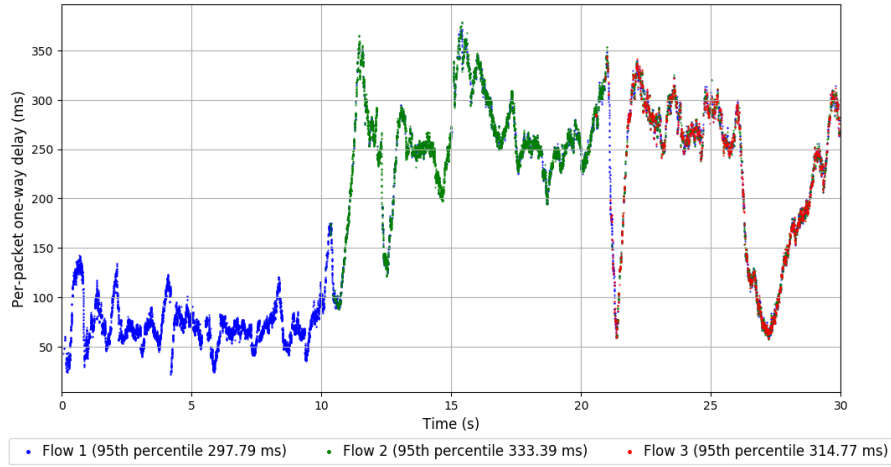
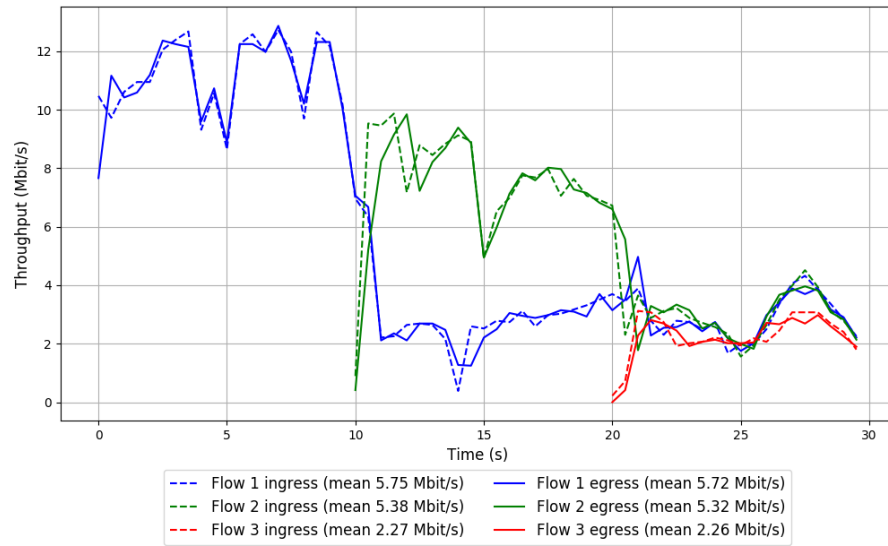


Run 3: Statistics of TCP BBR

Start at: 2017-09-22 14:04:44
End at: 2017-09-22 14:05:14
Local clock offset: 0.531 ms
Remote clock offset: -2.565 ms

Below is generated by plot.py at 2017-09-22 15:08:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 9.96 Mbit/s
95th percentile per-packet one-way delay: 317.087 ms
Loss rate: 1.27%
-- Flow 1:
Average throughput: 5.72 Mbit/s
95th percentile per-packet one-way delay: 297.790 ms
Loss rate: 0.65%
-- Flow 2:
Average throughput: 5.32 Mbit/s
95th percentile per-packet one-way delay: 333.395 ms
Loss rate: 1.86%
-- Flow 3:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 314.772 ms
Loss rate: 3.20%

Run 3: Report of TCP BBR — Data Link

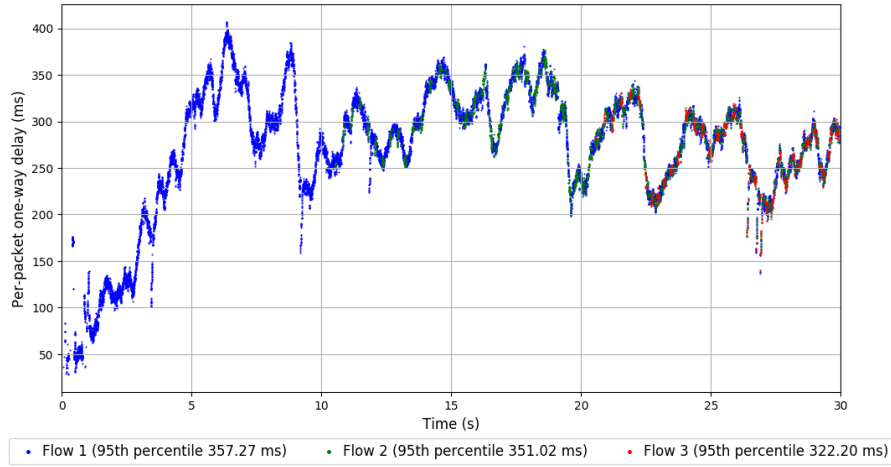
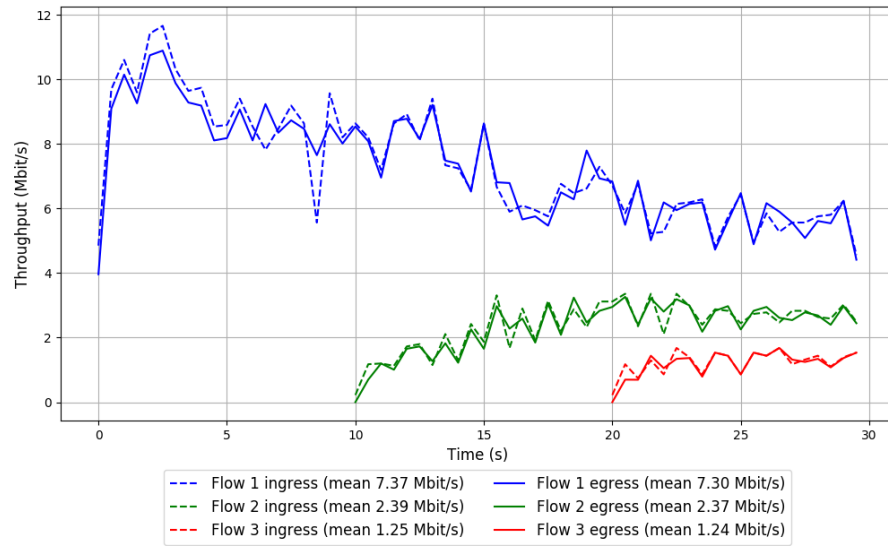


Run 1: Statistics of TCP Cubic

Start at: 2017-09-22 13:39:47
End at: 2017-09-22 13:40:17
Local clock offset: 0.442 ms
Remote clock offset: -2.938 ms

Below is generated by plot.py at 2017-09-22 15:08:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 9.26 Mbit/s
95th percentile per-packet one-way delay: 355.035 ms
Loss rate: 1.43%
-- Flow 1:
Average throughput: 7.30 Mbit/s
95th percentile per-packet one-way delay: 357.274 ms
Loss rate: 1.16%
-- Flow 2:
Average throughput: 2.37 Mbit/s
95th percentile per-packet one-way delay: 351.020 ms
Loss rate: 2.09%
-- Flow 3:
Average throughput: 1.24 Mbit/s
95th percentile per-packet one-way delay: 322.198 ms
Loss rate: 3.69%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2017-09-22 13:56:25

End at: 2017-09-22 13:56:55

Local clock offset: 0.498 ms

Remote clock offset: -2.66 ms

Below is generated by plot.py at 2017-09-22 15:08:54

Datalink statistics

-- Total of 3 flows:

Average throughput: 11.33 Mbit/s

95th percentile per-packet one-way delay: 294.561 ms

Loss rate: 0.91%

-- Flow 1:

Average throughput: 9.31 Mbit/s

95th percentile per-packet one-way delay: 294.686 ms

Loss rate: 0.64%

-- Flow 2:

Average throughput: 2.52 Mbit/s

95th percentile per-packet one-way delay: 295.995 ms

Loss rate: 1.57%

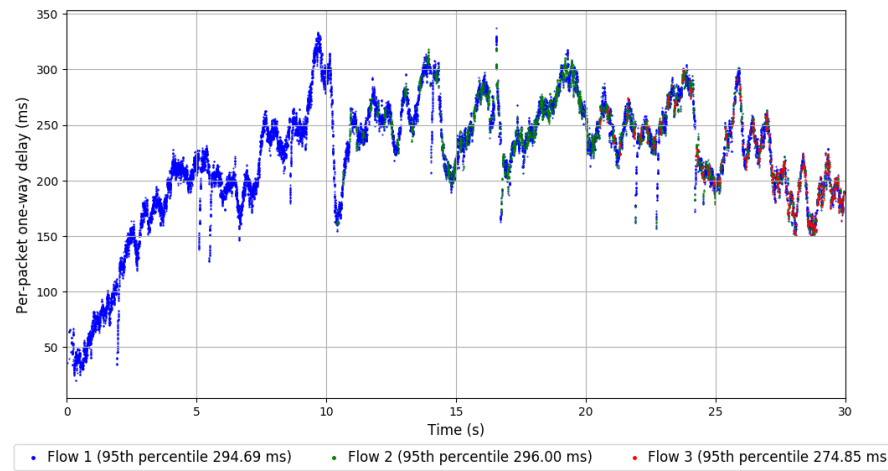
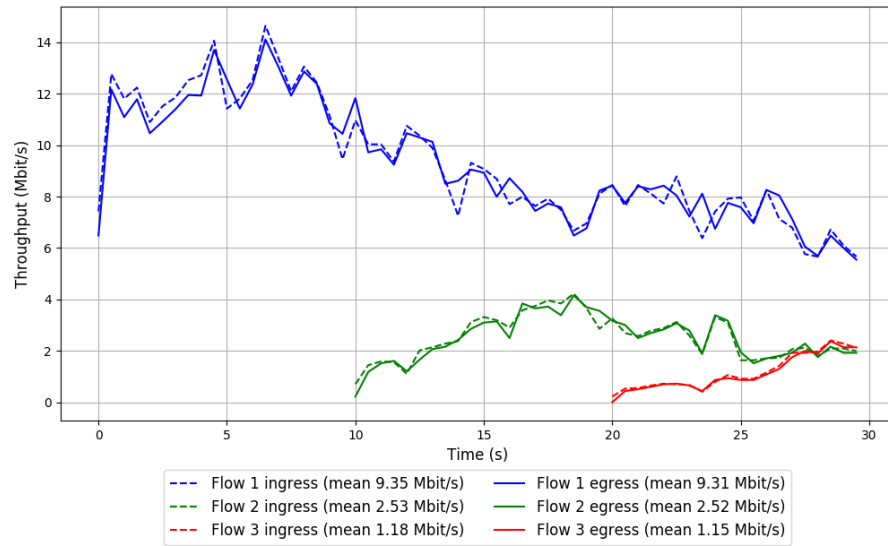
-- Flow 3:

Average throughput: 1.15 Mbit/s

95th percentile per-packet one-way delay: 274.851 ms

Loss rate: 4.54%

Run 2: Report of TCP Cubic — Data Link

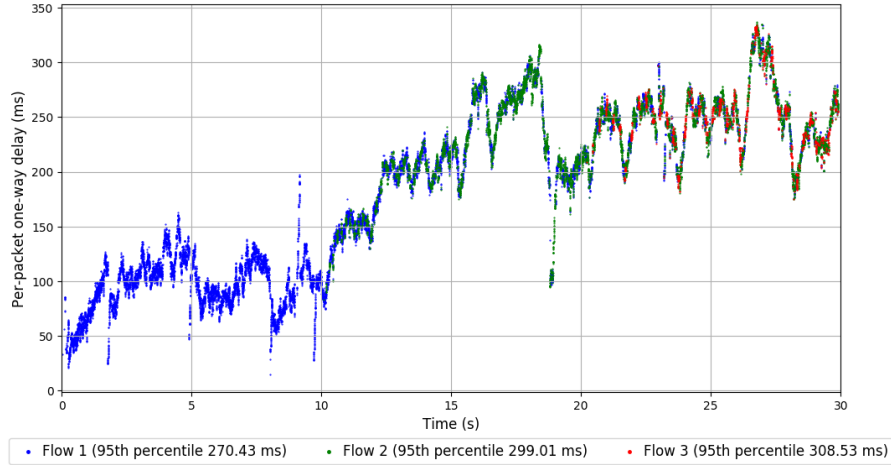
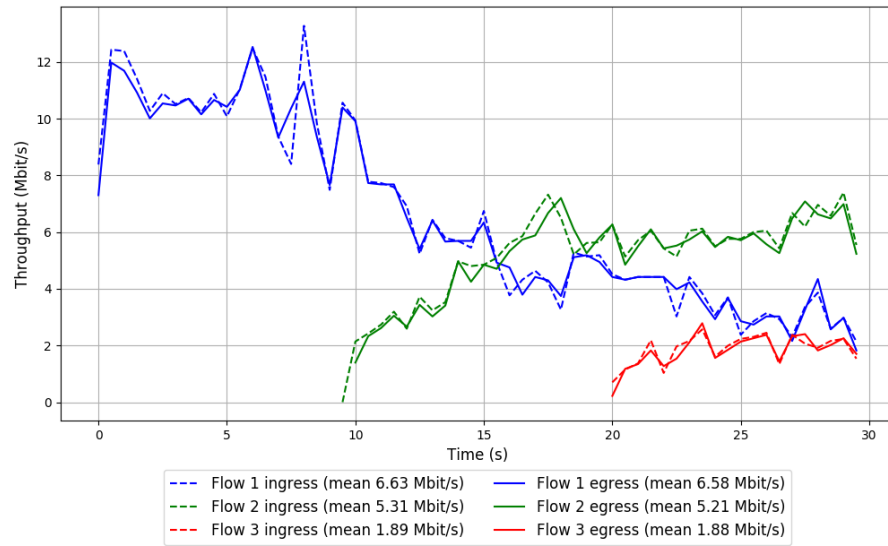


Run 3: Statistics of TCP Cubic

Start at: 2017-09-22 14:13:04
End at: 2017-09-22 14:13:34
Local clock offset: 0.451 ms
Remote clock offset: -2.453 ms

Below is generated by plot.py at 2017-09-22 15:08:54
Datalink statistics
-- Total of 3 flows:
Average throughput: 10.65 Mbit/s
95th percentile per-packet one-way delay: 283.665 ms
Loss rate: 1.49%
-- Flow 1:
Average throughput: 6.58 Mbit/s
95th percentile per-packet one-way delay: 270.429 ms
Loss rate: 1.02%
-- Flow 2:
Average throughput: 5.21 Mbit/s
95th percentile per-packet one-way delay: 299.011 ms
Loss rate: 2.20%
-- Flow 3:
Average throughput: 1.88 Mbit/s
95th percentile per-packet one-way delay: 308.533 ms
Loss rate: 2.51%

Run 3: Report of TCP Cubic — Data Link

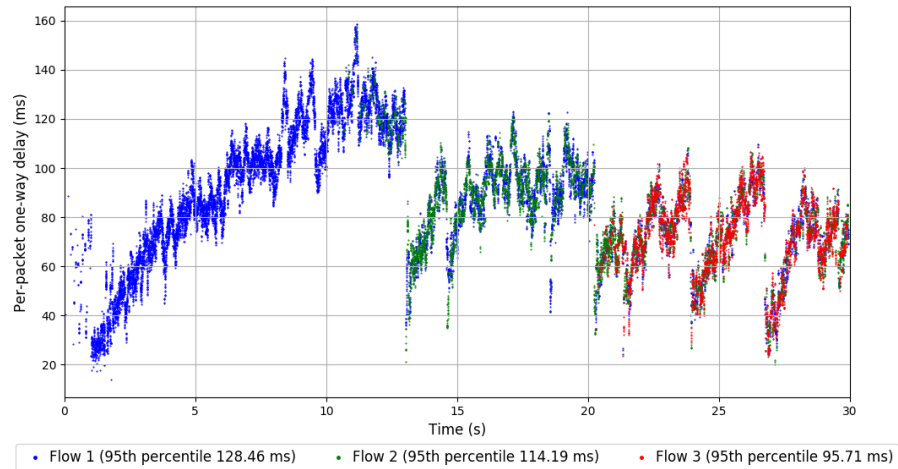
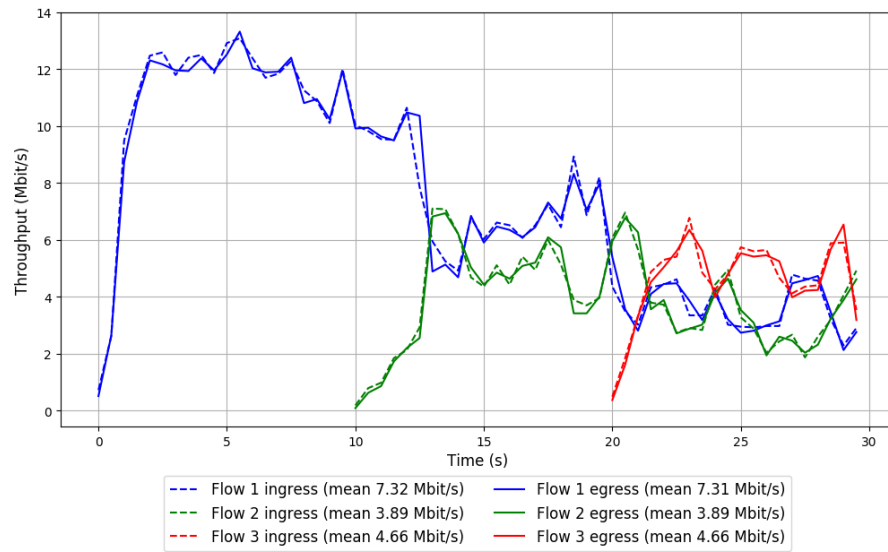


Run 1: Statistics of LEDBAT

Start at: 2017-09-22 13:35:01
End at: 2017-09-22 13:35:31
Local clock offset: 0.497 ms
Remote clock offset: -3.008 ms

Below is generated by plot.py at 2017-09-22 15:08:54
Datalink statistics
-- Total of 3 flows:
Average throughput: 11.40 Mbit/s
95th percentile per-packet one-way delay: 125.758 ms
Loss rate: 0.59%
-- Flow 1:
Average throughput: 7.31 Mbit/s
95th percentile per-packet one-way delay: 128.457 ms
Loss rate: 0.38%
-- Flow 2:
Average throughput: 3.89 Mbit/s
95th percentile per-packet one-way delay: 114.193 ms
Loss rate: 0.86%
-- Flow 3:
Average throughput: 4.66 Mbit/s
95th percentile per-packet one-way delay: 95.711 ms
Loss rate: 1.15%

Run 1: Report of LEDBAT — Data Link

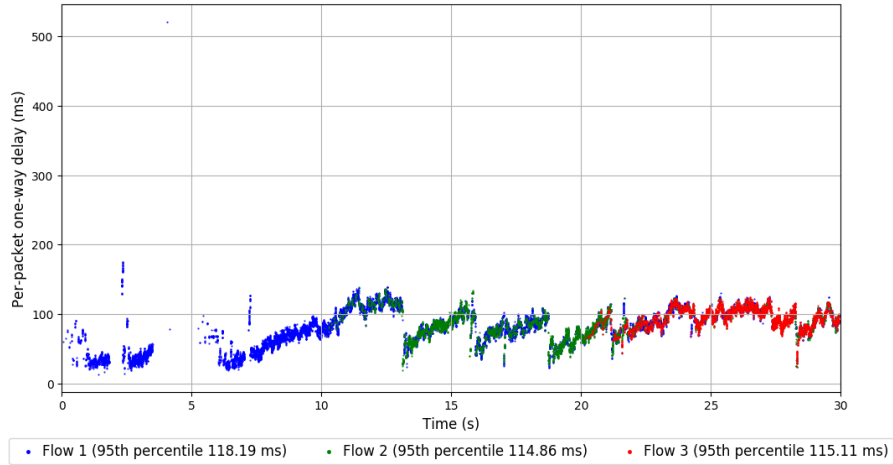
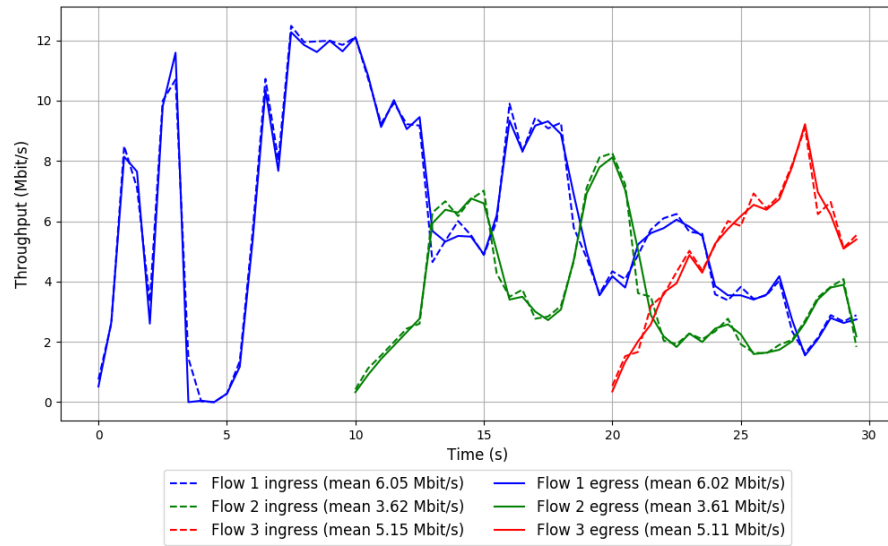


Run 2: Statistics of LEDBAT

Start at: 2017-09-22 13:51:39
End at: 2017-09-22 13:52:09
Local clock offset: 0.404 ms
Remote clock offset: -2.774 ms

Below is generated by plot.py at 2017-09-22 15:08:54
Datalink statistics
-- Total of 3 flows:
Average throughput: 10.10 Mbit/s
95th percentile per-packet one-way delay: 116.631 ms
Loss rate: 0.84%
-- Flow 1:
Average throughput: 6.02 Mbit/s
95th percentile per-packet one-way delay: 118.191 ms
Loss rate: 0.74%
-- Flow 2:
Average throughput: 3.61 Mbit/s
95th percentile per-packet one-way delay: 114.860 ms
Loss rate: 0.70%
-- Flow 3:
Average throughput: 5.11 Mbit/s
95th percentile per-packet one-way delay: 115.106 ms
Loss rate: 1.36%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2017-09-22 14:08:18

End at: 2017-09-22 14:08:48

Local clock offset: 0.543 ms

Remote clock offset: -2.54 ms

Below is generated by plot.py at 2017-09-22 15:09:08

Datalink statistics

-- Total of 3 flows:

Average throughput: 10.10 Mbit/s

95th percentile per-packet one-way delay: 129.506 ms

Loss rate: 0.46%

-- Flow 1:

Average throughput: 6.89 Mbit/s

95th percentile per-packet one-way delay: 128.168 ms

Loss rate: 0.30%

-- Flow 2:

Average throughput: 3.59 Mbit/s

95th percentile per-packet one-way delay: 130.695 ms

Loss rate: 0.61%

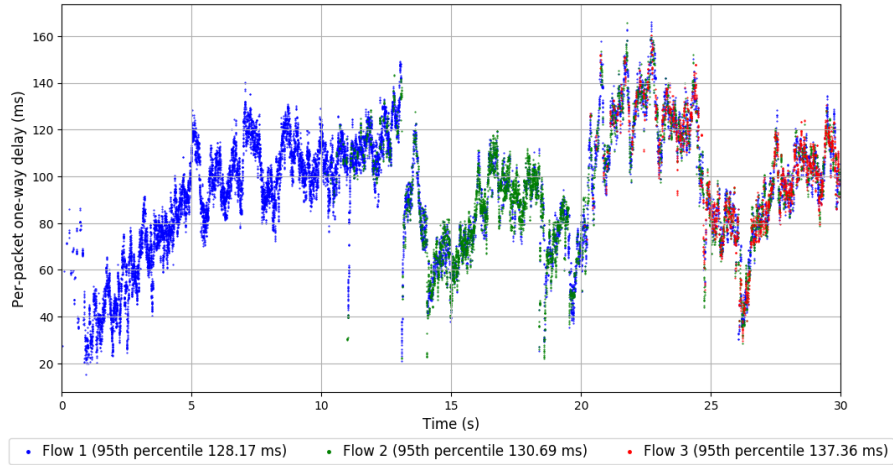
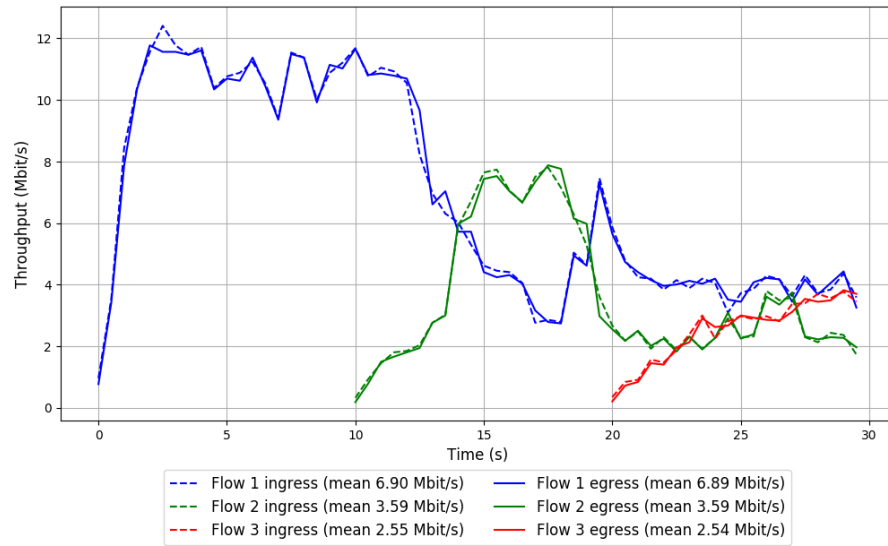
-- Flow 3:

Average throughput: 2.54 Mbit/s

95th percentile per-packet one-way delay: 137.360 ms

Loss rate: 1.40%

Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of PCC

Start at: 2017-09-22 13:38:36

End at: 2017-09-22 13:39:06

Local clock offset: 0.377 ms

Remote clock offset: -2.89 ms

Below is generated by plot.py at 2017-09-22 15:09:08

Datalink statistics

-- Total of 3 flows:

Average throughput: 7.90 Mbit/s

95th percentile per-packet one-way delay: 351.391 ms

Loss rate: 5.30%

-- Flow 1:

Average throughput: 4.71 Mbit/s

95th percentile per-packet one-way delay: 343.733 ms

Loss rate: 4.14%

-- Flow 2:

Average throughput: 3.84 Mbit/s

95th percentile per-packet one-way delay: 354.493 ms

Loss rate: 5.86%

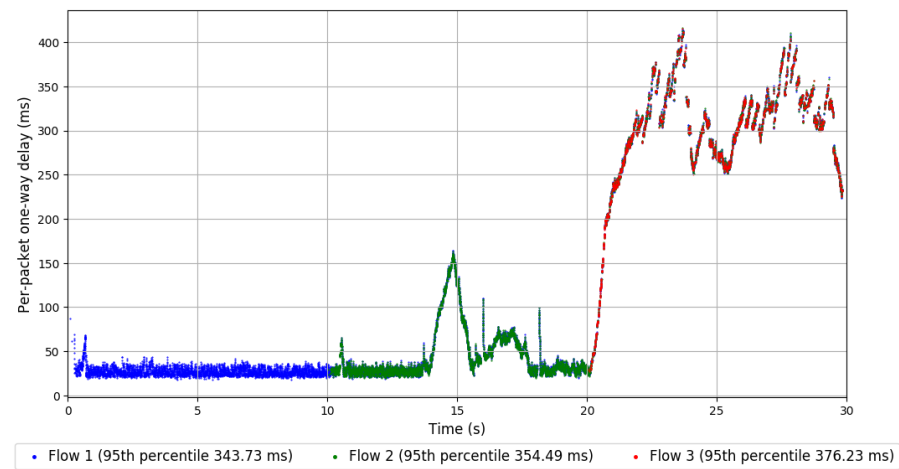
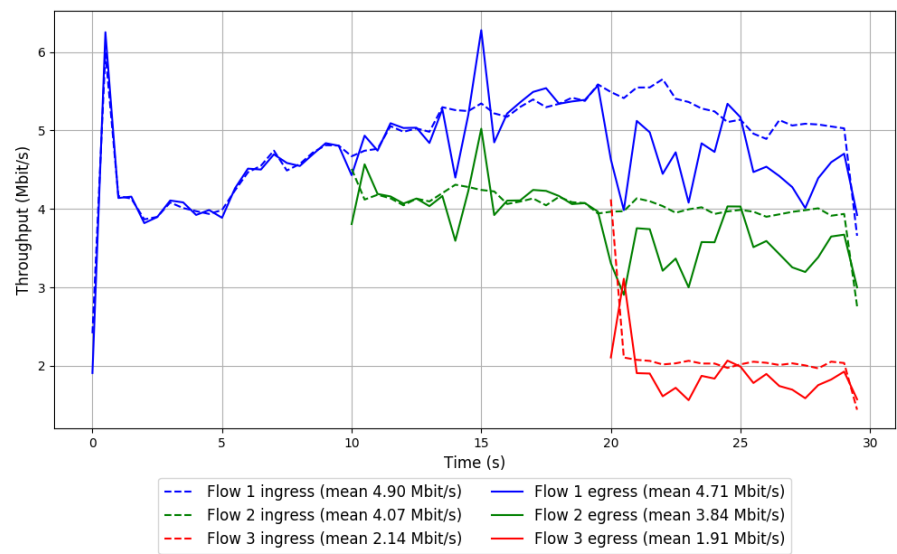
-- Flow 3:

Average throughput: 1.91 Mbit/s

95th percentile per-packet one-way delay: 376.234 ms

Loss rate: 11.15%

Run 1: Report of PCC — Data Link

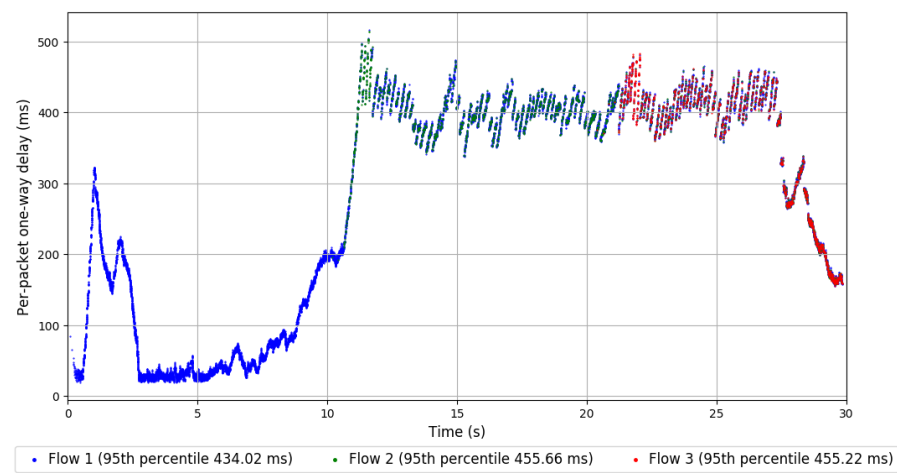
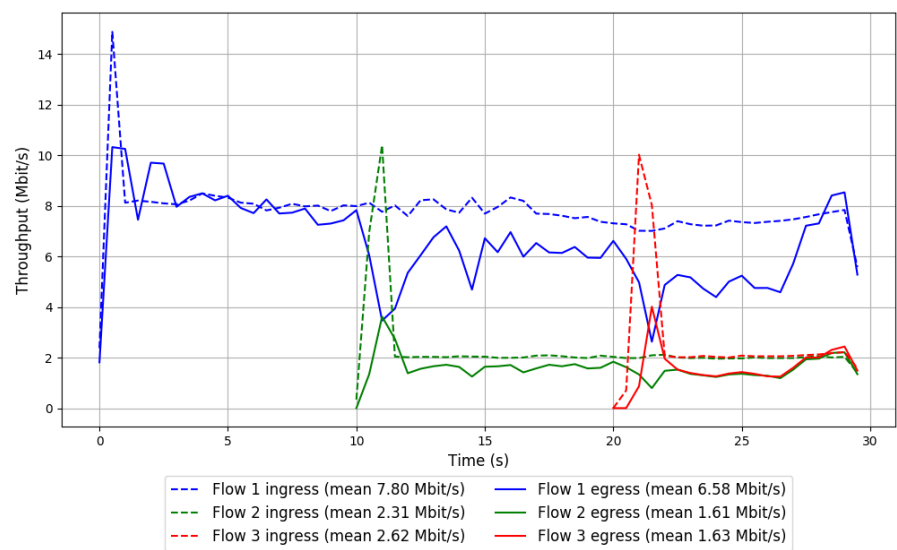


Run 2: Statistics of PCC

Start at: 2017-09-22 13:55:14
End at: 2017-09-22 13:55:44
Local clock offset: 0.407 ms
Remote clock offset: -2.768 ms

Below is generated by plot.py at 2017-09-22 15:09:08
Datalink statistics
-- Total of 3 flows:
Average throughput: 8.16 Mbit/s
95th percentile per-packet one-way delay: 439.546 ms
Loss rate: 20.29%
-- Flow 1:
Average throughput: 6.58 Mbit/s
95th percentile per-packet one-way delay: 434.023 ms
Loss rate: 15.99%
-- Flow 2:
Average throughput: 1.61 Mbit/s
95th percentile per-packet one-way delay: 455.659 ms
Loss rate: 31.03%
-- Flow 3:
Average throughput: 1.63 Mbit/s
95th percentile per-packet one-way delay: 455.222 ms
Loss rate: 40.08%

Run 2: Report of PCC — Data Link



Run 3: Statistics of PCC

Start at: 2017-09-22 14:11:53

End at: 2017-09-22 14:12:23

Local clock offset: 0.45 ms

Remote clock offset: -2.47 ms

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

Datalink statistics

-- Total of 3 flows:

Average throughput: 7.79 Mbit/s

95th percentile per-packet one-way delay: 120.340 ms

Loss rate: 0.50%

-- Flow 1:

Average throughput: 4.41 Mbit/s

95th percentile per-packet one-way delay: 108.884 ms

Loss rate: 0.38%

-- Flow 2:

Average throughput: 3.98 Mbit/s

95th percentile per-packet one-way delay: 128.838 ms

Loss rate: 0.53%

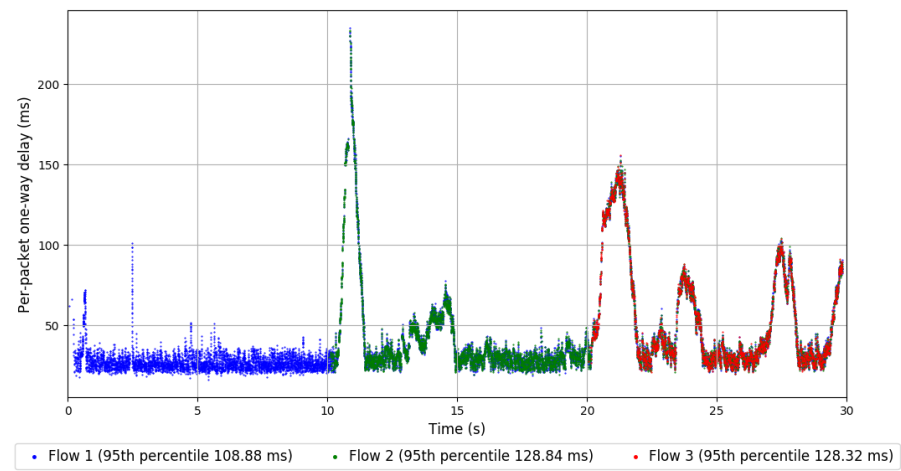
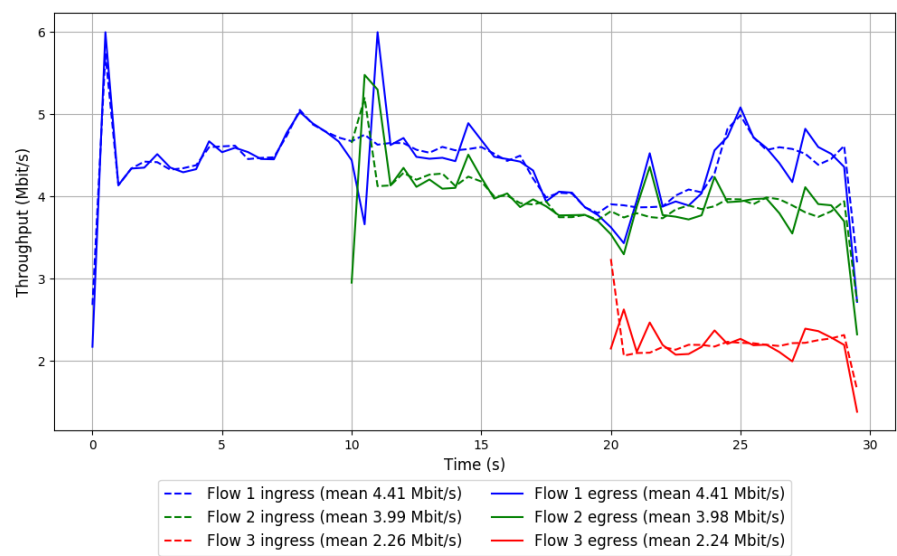
-- Flow 3:

Average throughput: 2.24 Mbit/s

95th percentile per-packet one-way delay: 128.318 ms

Loss rate: 1.15%

Run 3: Report of PCC — Data Link

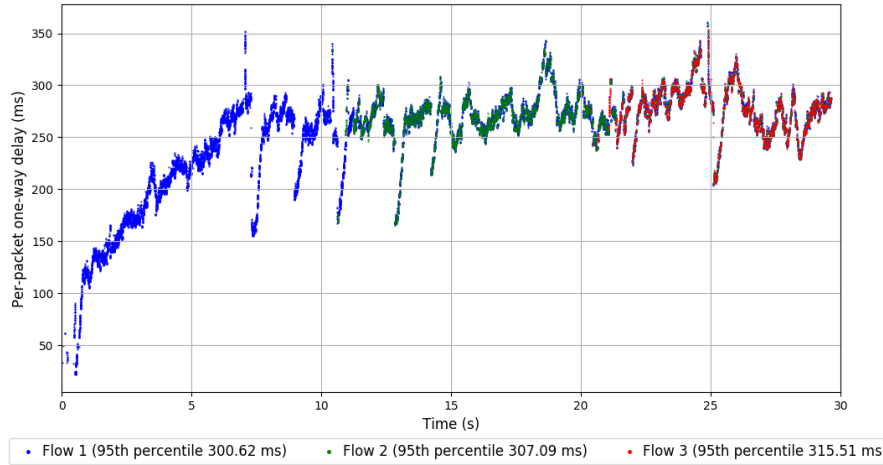
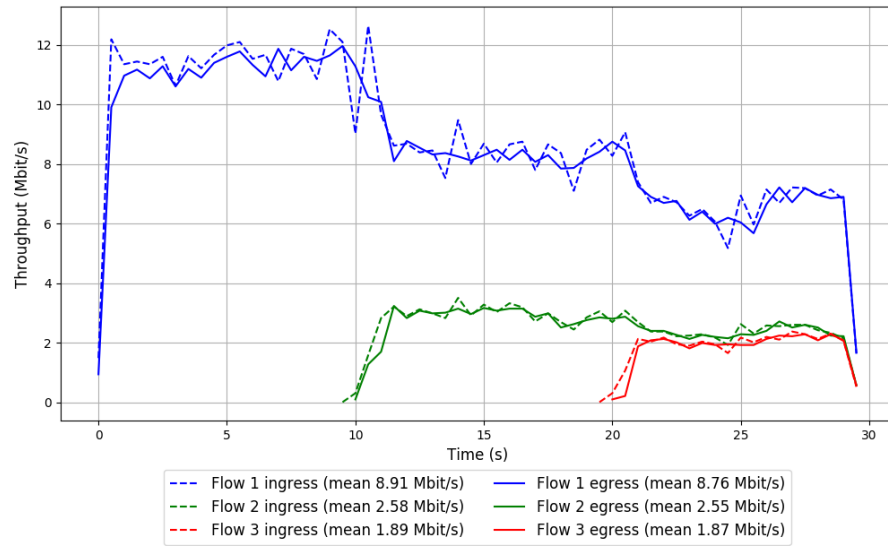


Run 1: Statistics of QUIC Cubic

Start at: 2017-09-22 13:36:13
End at: 2017-09-22 13:36:43
Local clock offset: 0.48 ms
Remote clock offset: -2.982 ms

Below is generated by plot.py at 2017-09-22 15:09:11
Datalink statistics
-- Total of 3 flows:
Average throughput: 11.05 Mbit/s
95th percentile per-packet one-way delay: 303.138 ms
Loss rate: 2.15%
-- Flow 1:
Average throughput: 8.76 Mbit/s
95th percentile per-packet one-way delay: 300.618 ms
Loss rate: 1.90%
-- Flow 2:
Average throughput: 2.55 Mbit/s
95th percentile per-packet one-way delay: 307.089 ms
Loss rate: 2.69%
-- Flow 3:
Average throughput: 1.87 Mbit/s
95th percentile per-packet one-way delay: 315.511 ms
Loss rate: 4.12%

Run 1: Report of QUIC Cubic — Data Link

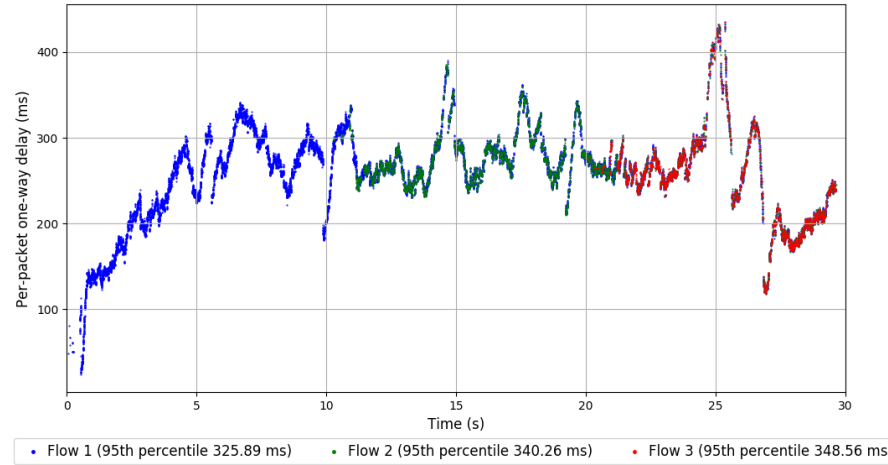
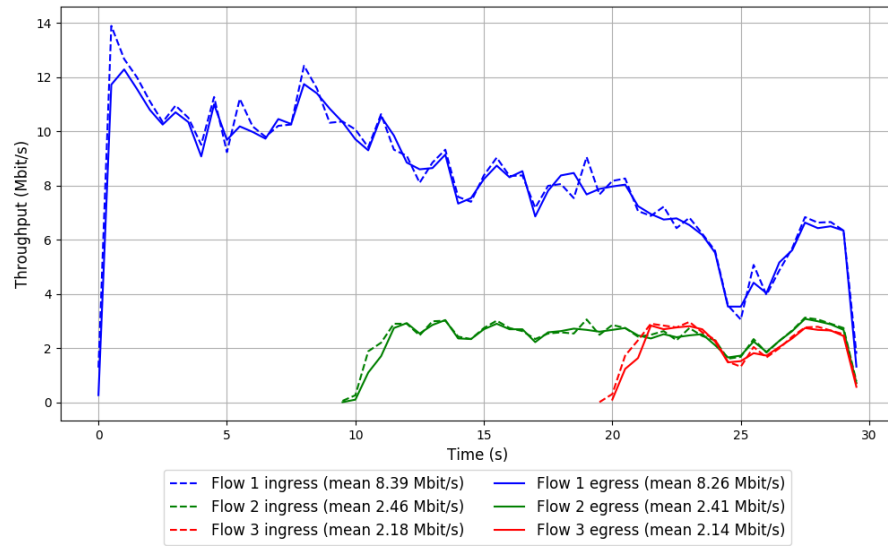


Run 2: Statistics of QUIC Cubic

Start at: 2017-09-22 13:52:51
End at: 2017-09-22 13:53:21
Local clock offset: 0.397 ms
Remote clock offset: -2.821 ms

Below is generated by plot.py at 2017-09-22 15:09:11
Datalink statistics
-- Total of 3 flows:
Average throughput: 10.55 Mbit/s
95th percentile per-packet one-way delay: 327.583 ms
Loss rate: 2.20%
-- Flow 1:
Average throughput: 8.26 Mbit/s
95th percentile per-packet one-way delay: 325.895 ms
Loss rate: 1.84%
-- Flow 2:
Average throughput: 2.41 Mbit/s
95th percentile per-packet one-way delay: 340.261 ms
Loss rate: 2.98%
-- Flow 3:
Average throughput: 2.14 Mbit/s
95th percentile per-packet one-way delay: 348.561 ms
Loss rate: 4.64%

Run 2: Report of QUIC Cubic — Data Link

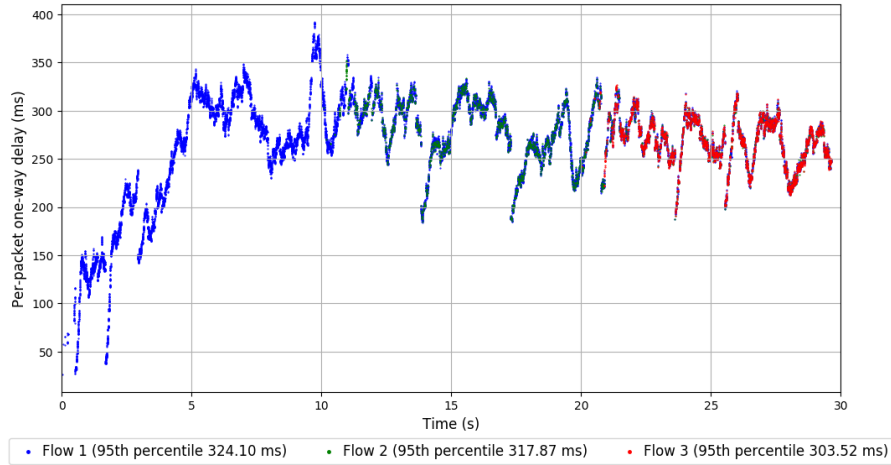
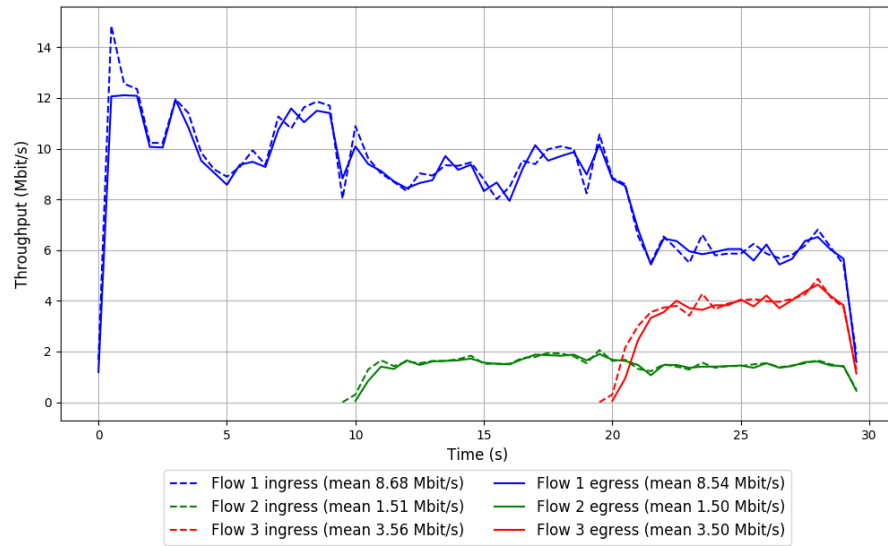


Run 3: Statistics of QUIC Cubic

Start at: 2017-09-22 14:09:29
End at: 2017-09-22 14:09:59
Local clock offset: 0.538 ms
Remote clock offset: -2.536 ms

Below is generated by plot.py at 2017-09-22 15:09:12
Datalink statistics
-- Total of 3 flows:
Average throughput: 10.67 Mbit/s
95th percentile per-packet one-way delay: 322.418 ms
Loss rate: 2.03%
-- Flow 1:
Average throughput: 8.54 Mbit/s
95th percentile per-packet one-way delay: 324.101 ms
Loss rate: 1.67%
-- Flow 2:
Average throughput: 1.50 Mbit/s
95th percentile per-packet one-way delay: 317.874 ms
Loss rate: 2.63%
-- Flow 3:
Average throughput: 3.50 Mbit/s
95th percentile per-packet one-way delay: 303.523 ms
Loss rate: 4.19%

Run 3: Report of QUIC Cubic — Data Link

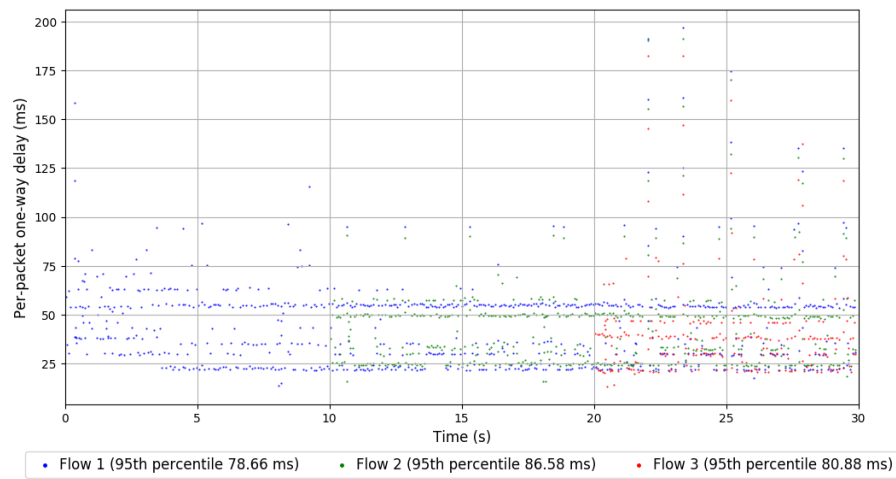
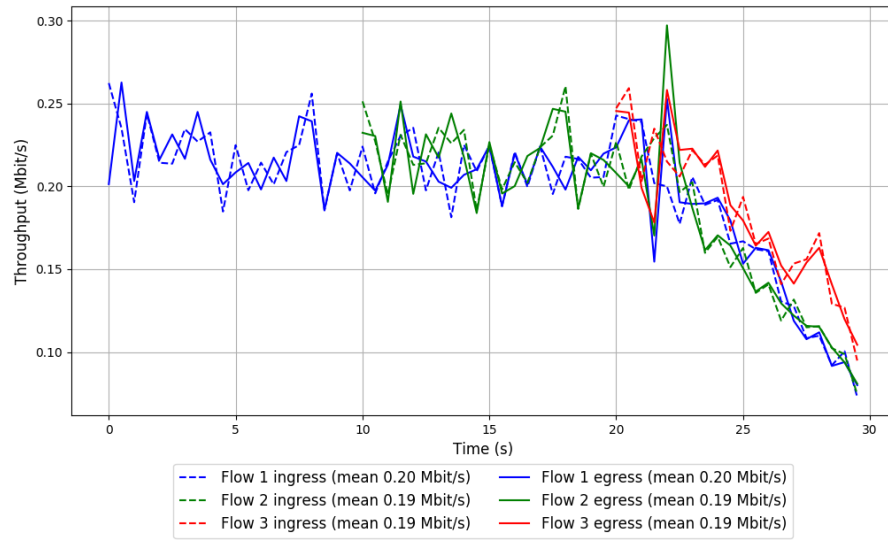


```
Run 1: Statistics of SCReAM

Start at: 2017-09-22 13:40:58
End at: 2017-09-22 13:41:28
Local clock offset: 0.453 ms
Remote clock offset: -2.936 ms

# Below is generated by plot.py at 2017-09-22 15:09:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 82.671 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 78.659 ms
Loss rate: 0.06%
-- Flow 2:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 86.585 ms
Loss rate: 0.10%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 80.882 ms
Loss rate: 0.23%
```

Run 1: Report of SReAM — Data Link

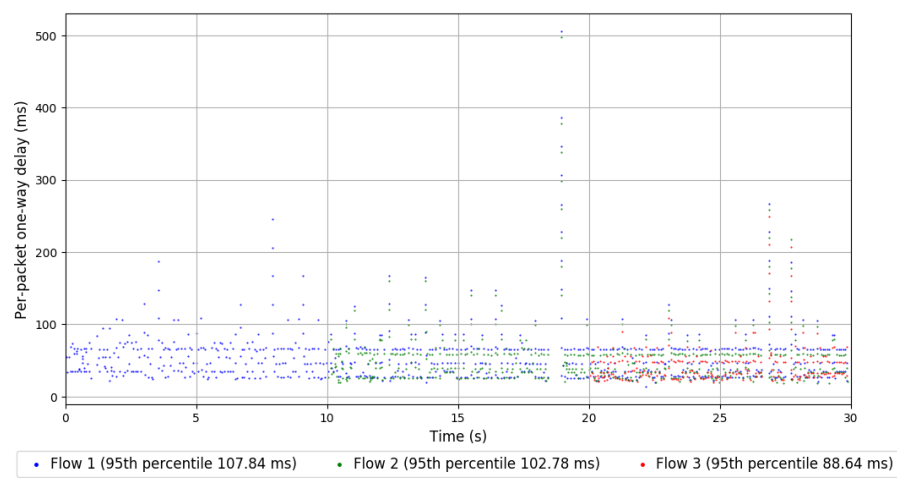
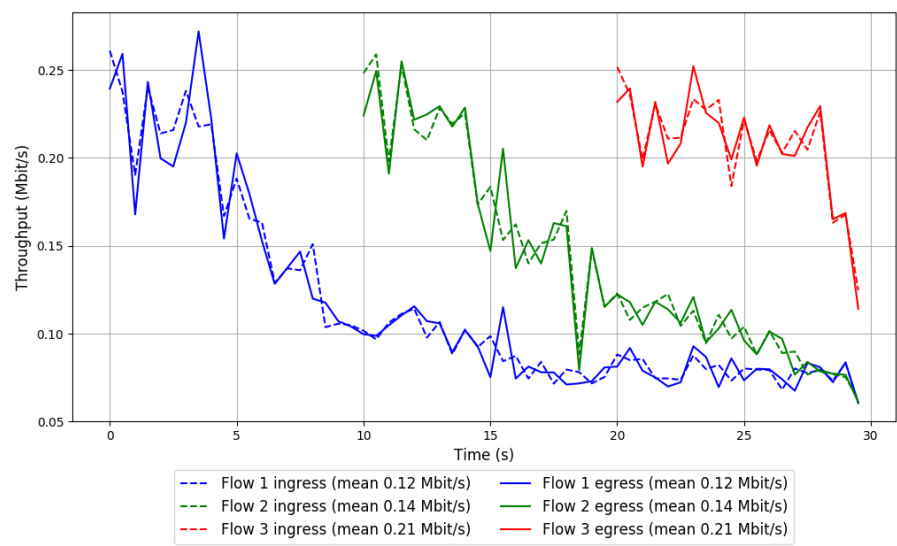


Run 2: Statistics of SCReAM

Start at: 2017-09-22 13:57:36
End at: 2017-09-22 13:58:06
Local clock offset: 0.413 ms
Remote clock offset: -2.623 ms

Below is generated by plot.py at 2017-09-22 15:09:12
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 106.836 ms
Loss rate: 0.43%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 107.836 ms
Loss rate: 0.29%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 102.777 ms
Loss rate: 0.50%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 88.642 ms
Loss rate: 0.55%

Run 2: Report of SReAM — Data Link

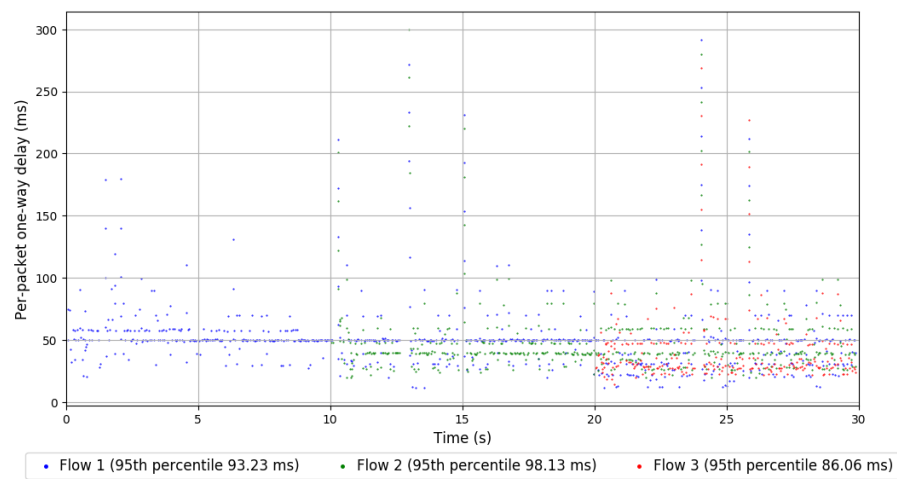
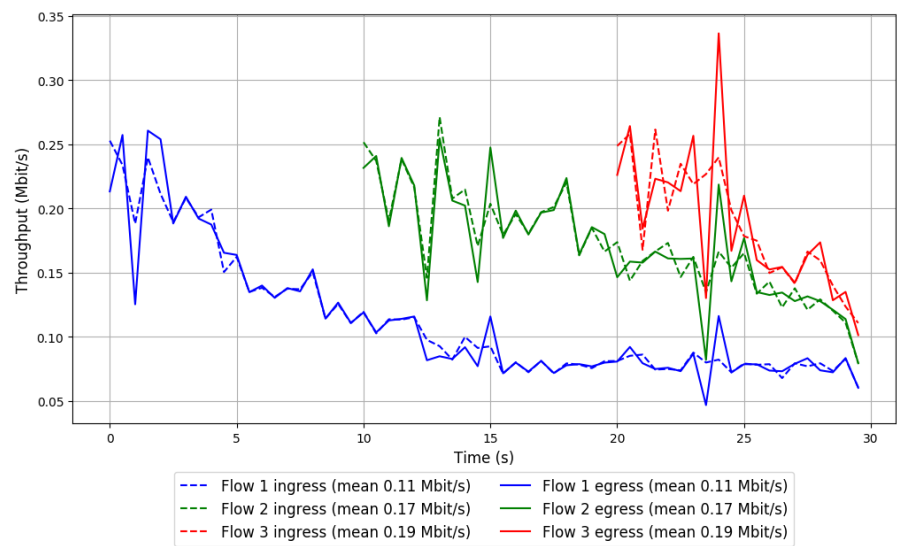


Run 3: Statistics of SReAM

Start at: 2017-09-22 14:14:16
End at: 2017-09-22 14:14:46
Local clock offset: 0.44 ms
Remote clock offset: -2.306 ms

Below is generated by plot.py at 2017-09-22 15:09:12
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 91.064 ms
Loss rate: 0.48%
-- Flow 1:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 93.228 ms
Loss rate: 0.45%
-- Flow 2:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 98.126 ms
Loss rate: 0.63%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 86.057 ms
Loss rate: 0.25%

Run 3: Report of SReAM — Data Link

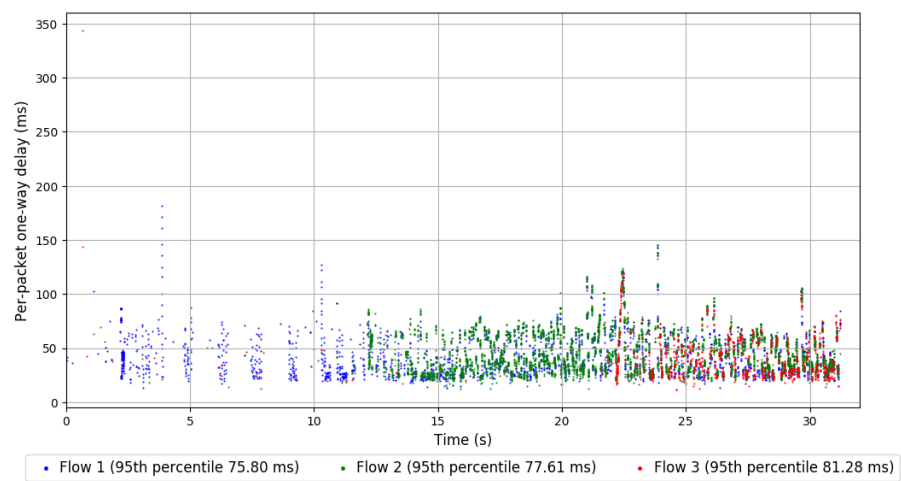
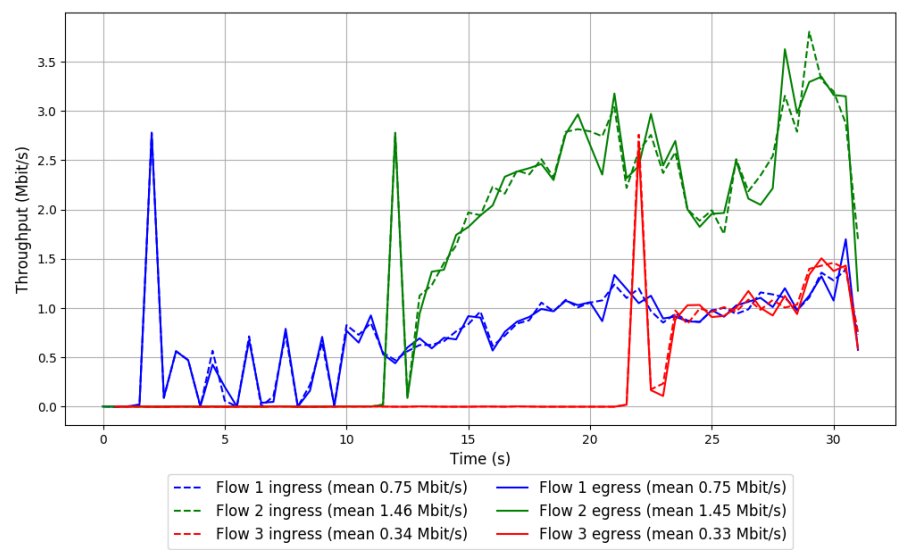


Run 1: Statistics of WebRTC media

Start at: 2017-09-22 13:32:39
End at: 2017-09-22 13:33:09
Local clock offset: 0.493 ms
Remote clock offset: -3.008 ms

Below is generated by plot.py at 2017-09-22 15:09:12
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.52 Mbit/s
95th percentile per-packet one-way delay: 77.444 ms
Loss rate: 0.91%
-- Flow 1:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 75.797 ms
Loss rate: 0.33%
-- Flow 2:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 77.608 ms
Loss rate: 0.90%
-- Flow 3:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 81.276 ms
Loss rate: 2.24%

Run 1: Report of WebRTC media — Data Link

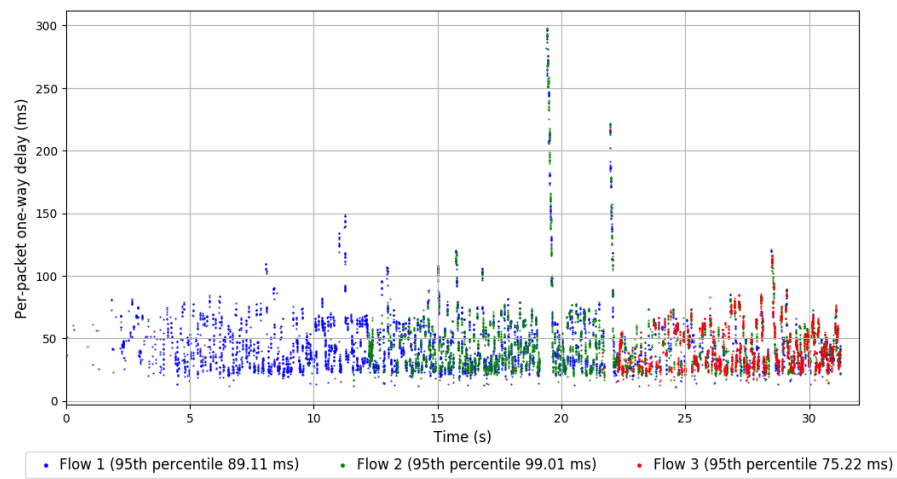
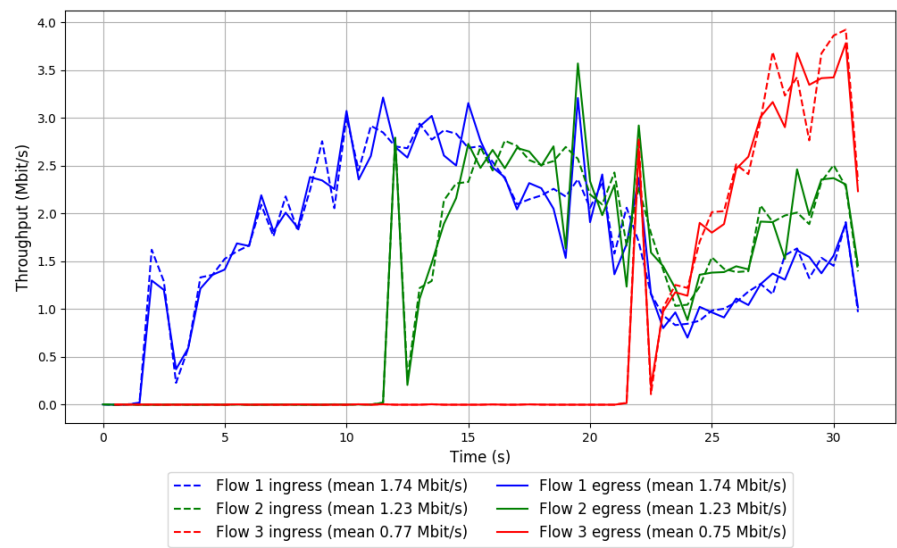


Run 2: Statistics of WebRTC media

Start at: 2017-09-22 13:49:17
End at: 2017-09-22 13:49:47
Local clock offset: 0.469 ms
Remote clock offset: -2.892 ms

Below is generated by plot.py at 2017-09-22 15:09:14
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.71 Mbit/s
95th percentile per-packet one-way delay: 85.587 ms
Loss rate: 0.76%
-- Flow 1:
Average throughput: 1.74 Mbit/s
95th percentile per-packet one-way delay: 89.112 ms
Loss rate: 0.32%
-- Flow 2:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 99.010 ms
Loss rate: 0.33%
-- Flow 3:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 75.220 ms
Loss rate: 2.48%

Run 2: Report of WebRTC media — Data Link

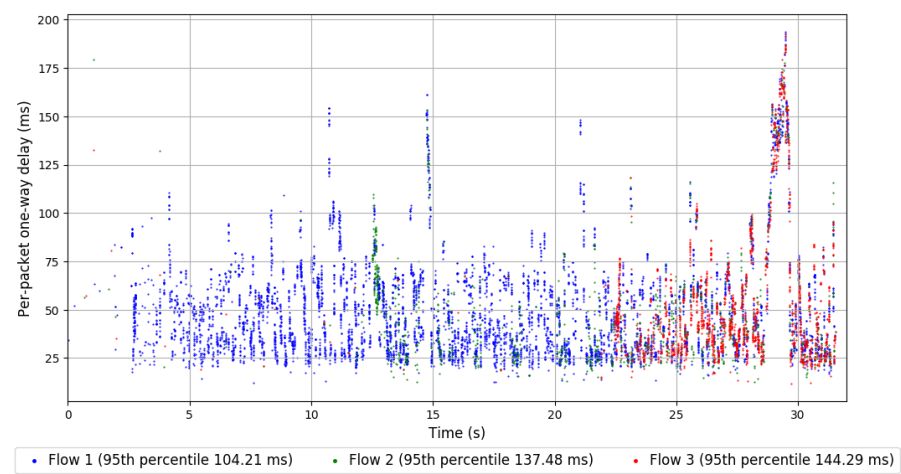
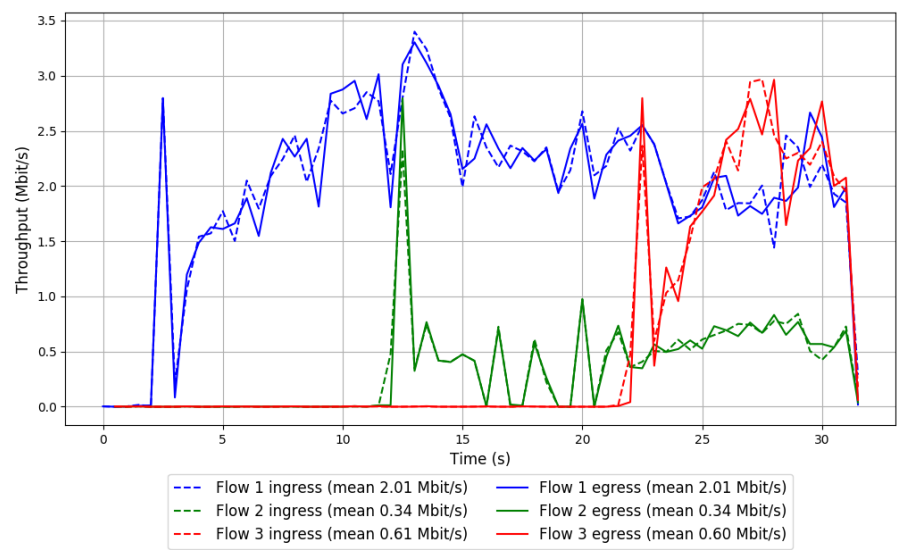


Run 3: Statistics of WebRTC media

Start at: 2017-09-22 14:05:55
End at: 2017-09-22 14:06:25
Local clock offset: 0.536 ms
Remote clock offset: -2.597 ms

Below is generated by plot.py at 2017-09-22 15:09:14
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.93 Mbit/s
95th percentile per-packet one-way delay: 123.453 ms
Loss rate: 0.44%
-- Flow 1:
Average throughput: 2.01 Mbit/s
95th percentile per-packet one-way delay: 104.213 ms
Loss rate: 0.23%
-- Flow 2:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 137.482 ms
Loss rate: 0.35%
-- Flow 3:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 144.295 ms
Loss rate: 1.19%

Run 3: Report of WebRTC media — Data Link

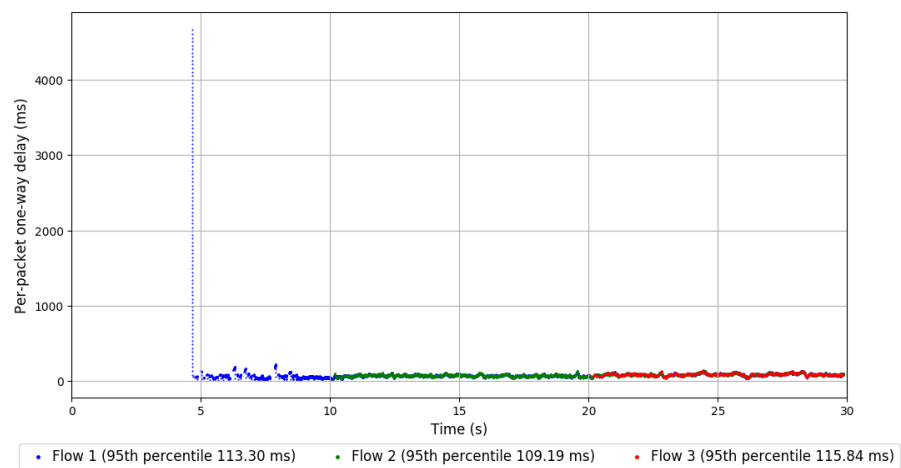
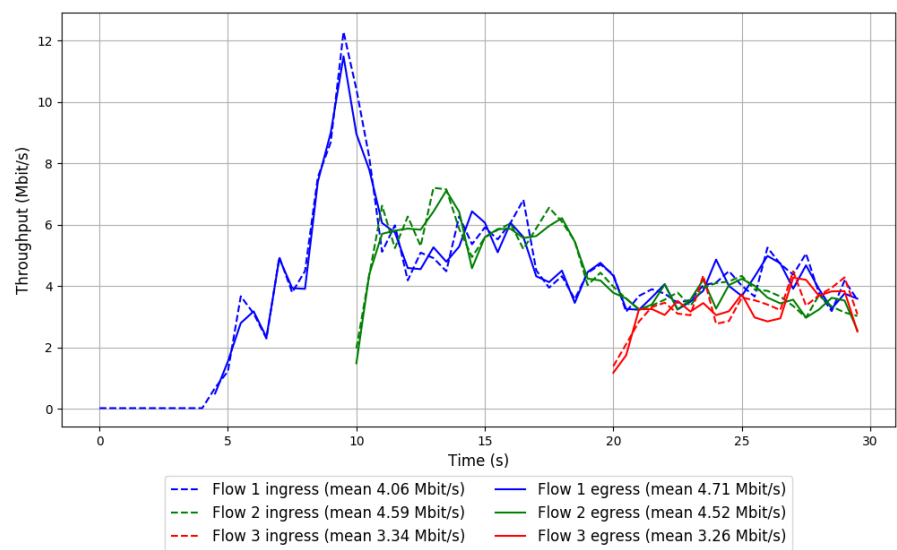


Run 1: Statistics of Sprout

Start at: 2017-09-22 13:42:09
End at: 2017-09-22 13:42:39
Local clock offset: 0.452 ms
Remote clock offset: -2.926 ms

Below is generated by plot.py at 2017-09-22 15:09:20
Datalink statistics
-- Total of 3 flows:
Average throughput: 9.52 Mbit/s
95th percentile per-packet one-way delay: 112.176 ms
Loss rate: 2.15%
-- Flow 1:
Average throughput: 4.71 Mbit/s
95th percentile per-packet one-way delay: 113.296 ms
Loss rate: 2.18%
-- Flow 2:
Average throughput: 4.52 Mbit/s
95th percentile per-packet one-way delay: 109.190 ms
Loss rate: 1.68%
-- Flow 3:
Average throughput: 3.26 Mbit/s
95th percentile per-packet one-way delay: 115.839 ms
Loss rate: 3.33%

Run 1: Report of Sprout — Data Link

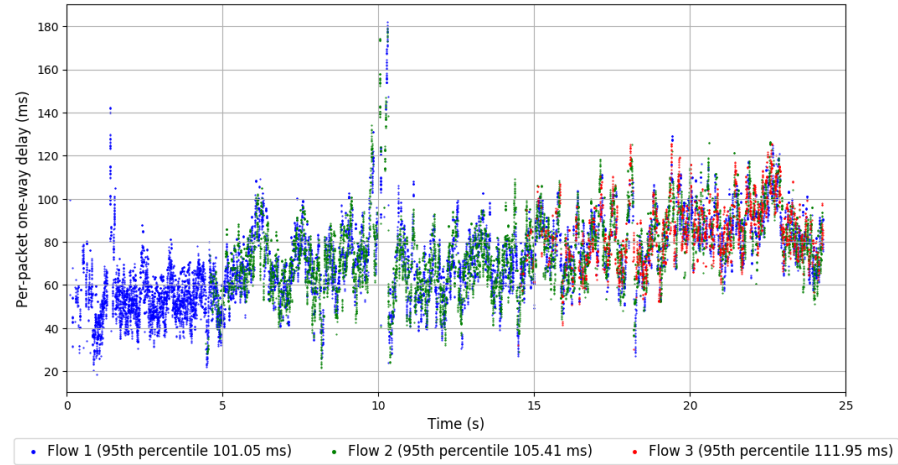
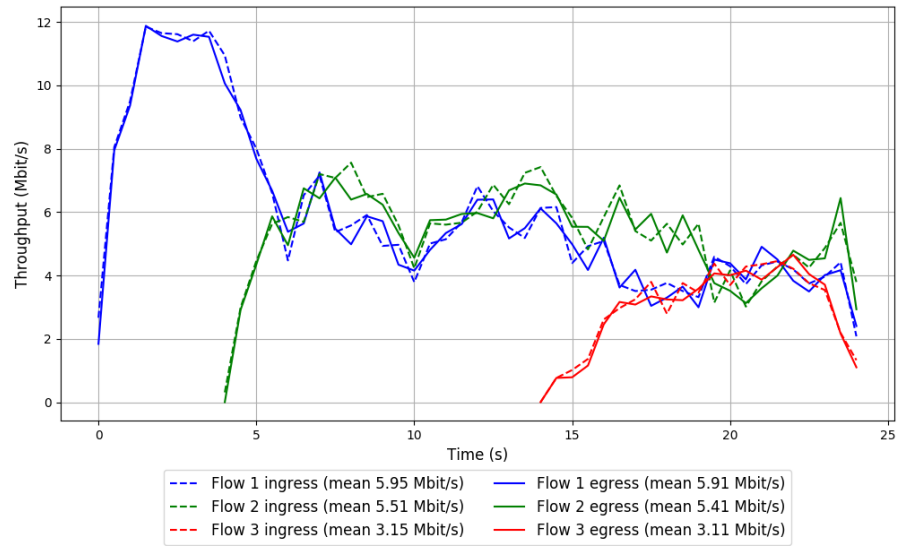


Run 2: Statistics of Sprout

Start at: 2017-09-22 13:58:47
End at: 2017-09-22 13:59:17
Local clock offset: 0.423 ms
Remote clock offset: -2.681 ms

Below is generated by plot.py at 2017-09-22 15:09:22
Datalink statistics
-- Total of 3 flows:
Average throughput: 11.60 Mbit/s
95th percentile per-packet one-way delay: 104.877 ms
Loss rate: 1.49%
-- Flow 1:
Average throughput: 5.91 Mbit/s
95th percentile per-packet one-way delay: 101.045 ms
Loss rate: 1.07%
-- Flow 2:
Average throughput: 5.41 Mbit/s
95th percentile per-packet one-way delay: 105.412 ms
Loss rate: 1.95%
-- Flow 3:
Average throughput: 3.11 Mbit/s
95th percentile per-packet one-way delay: 111.946 ms
Loss rate: 1.84%

Run 2: Report of Sprout — Data Link

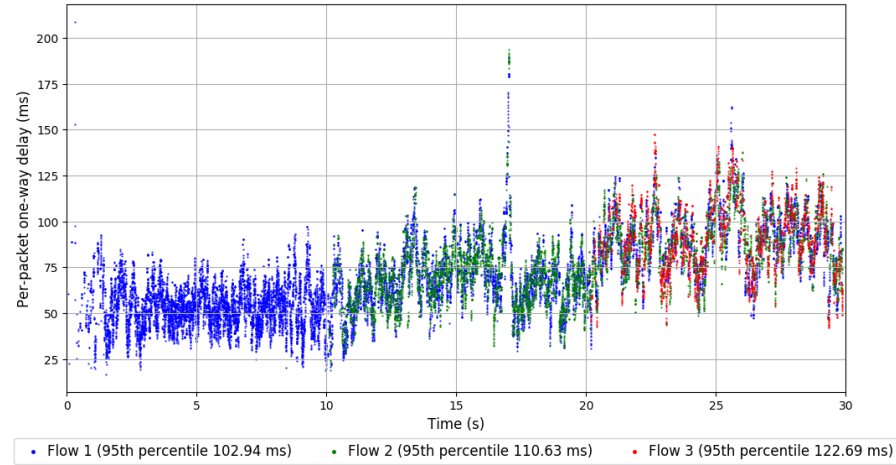
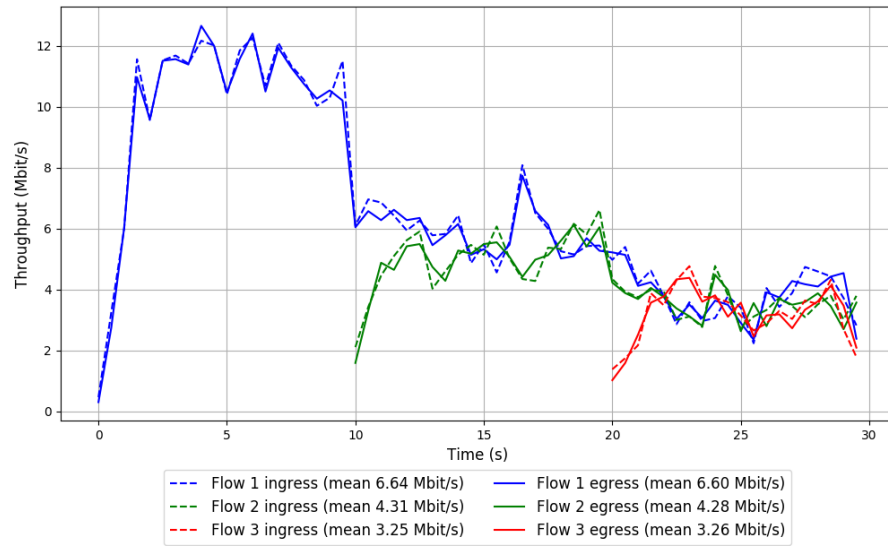


Run 3: Statistics of Sprout

Start at: 2017-09-22 14:15:26
End at: 2017-09-22 14:15:57
Local clock offset: 0.425 ms
Remote clock offset: -2.301 ms

```
# Below is generated by plot.py at 2017-09-22 15:09:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 10.50 Mbit/s
95th percentile per-packet one-way delay: 109.256 ms
Loss rate: 0.91%
-- Flow 1:
Average throughput: 6.60 Mbit/s
95th percentile per-packet one-way delay: 102.942 ms
Loss rate: 0.96%
-- Flow 2:
Average throughput: 4.28 Mbit/s
95th percentile per-packet one-way delay: 110.627 ms
Loss rate: 0.92%
-- Flow 3:
Average throughput: 3.26 Mbit/s
95th percentile per-packet one-way delay: 122.686 ms
Loss rate: 0.56%
```

Run 3: Report of Sprout — Data Link

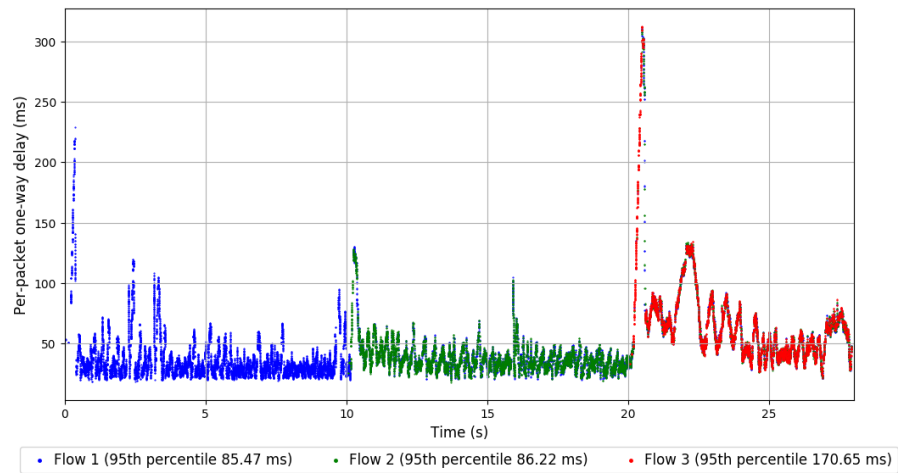
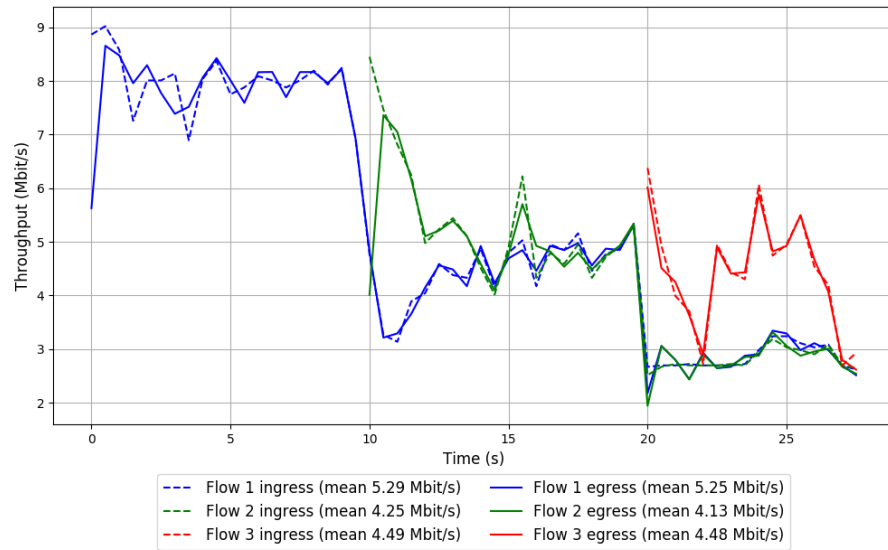


Run 1: Statistics of TaoVA-100x

Start at: 2017-09-22 13:43:20
End at: 2017-09-22 13:43:50
Local clock offset: 0.461 ms
Remote clock offset: -2.789 ms

Below is generated by plot.py at 2017-09-22 15:09:34
Datalink statistics
-- Total of 3 flows:
Average throughput: 9.16 Mbit/s
95th percentile per-packet one-way delay: 94.425 ms
Loss rate: 1.57%
-- Flow 1:
Average throughput: 5.25 Mbit/s
95th percentile per-packet one-way delay: 85.474 ms
Loss rate: 1.02%
-- Flow 2:
Average throughput: 4.13 Mbit/s
95th percentile per-packet one-way delay: 86.225 ms
Loss rate: 2.92%
-- Flow 3:
Average throughput: 4.48 Mbit/s
95th percentile per-packet one-way delay: 170.653 ms
Loss rate: 0.99%

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

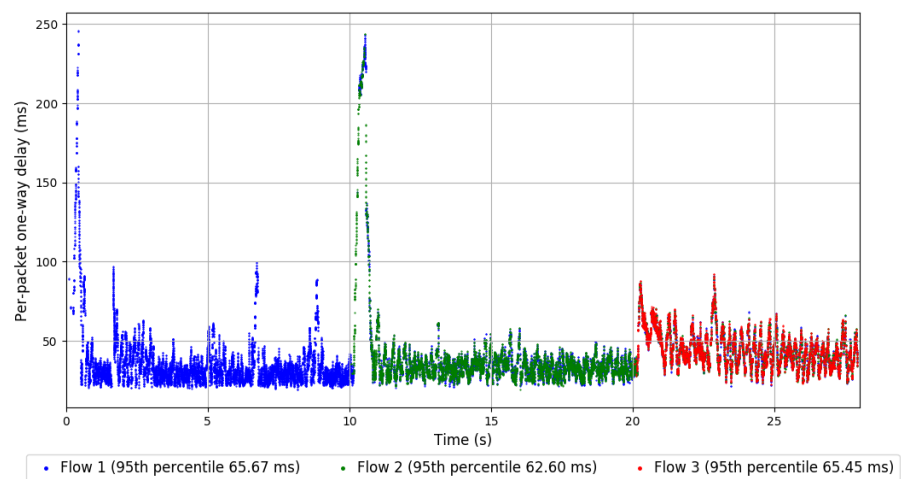
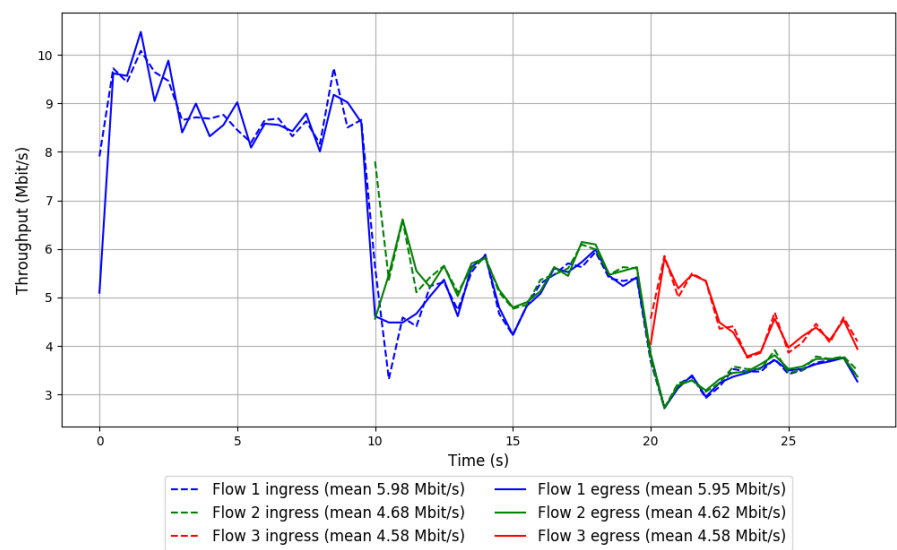


Run 2: Statistics of TaoVA-100x

Start at: 2017-09-22 13:59:59
End at: 2017-09-22 14:00:29
Local clock offset: 0.497 ms
Remote clock offset: -2.668 ms

Below is generated by plot.py at 2017-09-22 15:09:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 10.21 Mbit/s
95th percentile per-packet one-way delay: 64.750 ms
Loss rate: 1.07%
-- Flow 1:
Average throughput: 5.95 Mbit/s
95th percentile per-packet one-way delay: 65.667 ms
Loss rate: 0.82%
-- Flow 2:
Average throughput: 4.62 Mbit/s
95th percentile per-packet one-way delay: 62.599 ms
Loss rate: 1.74%
-- Flow 3:
Average throughput: 4.58 Mbit/s
95th percentile per-packet one-way delay: 65.453 ms
Loss rate: 0.68%

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



Run 3: Statistics of TaoVA-100x

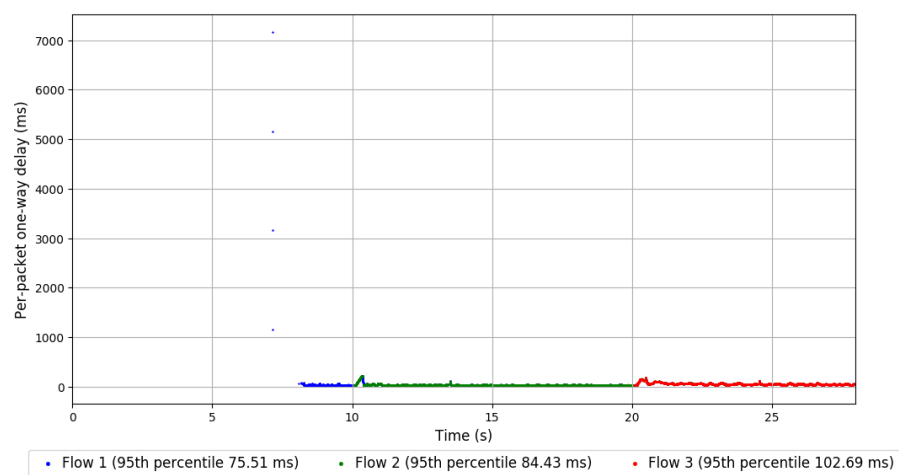
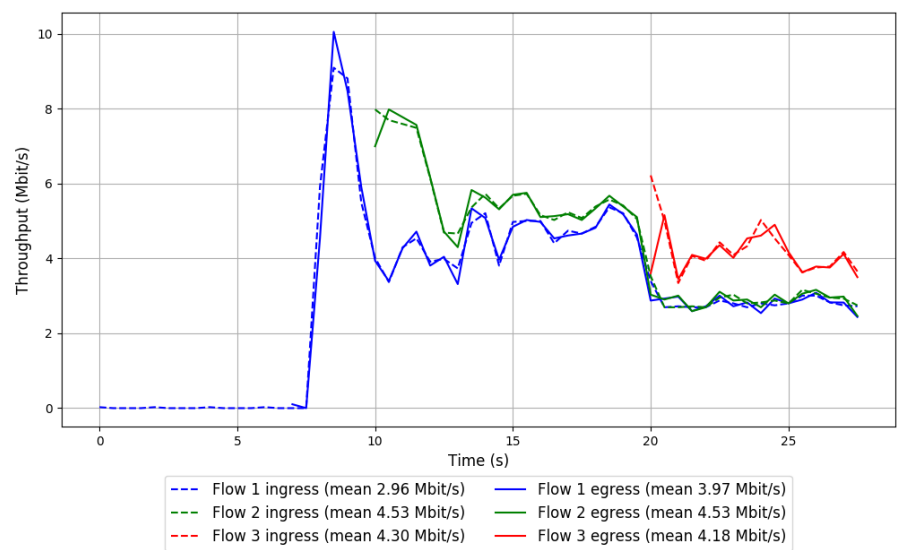
Start at: 2017-09-22 14:16:38

End at: 2017-09-22 14:17:08

Local clock offset: 0.513 ms

Remote clock offset: -2.43 ms

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

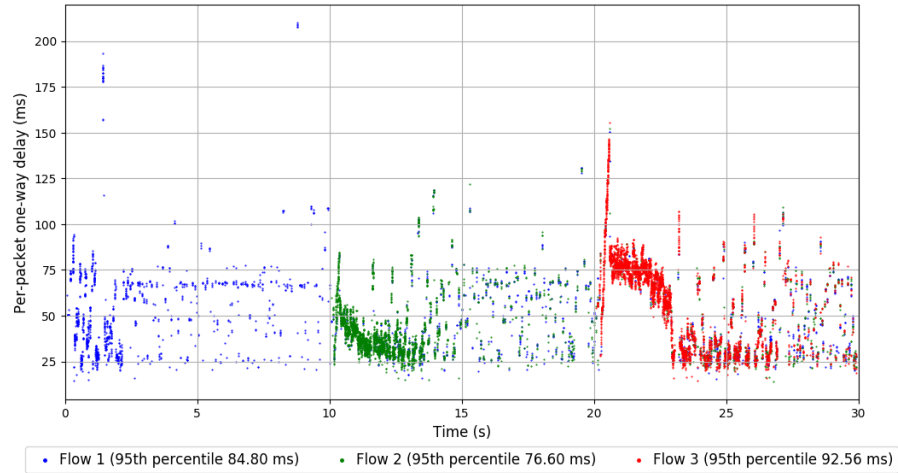
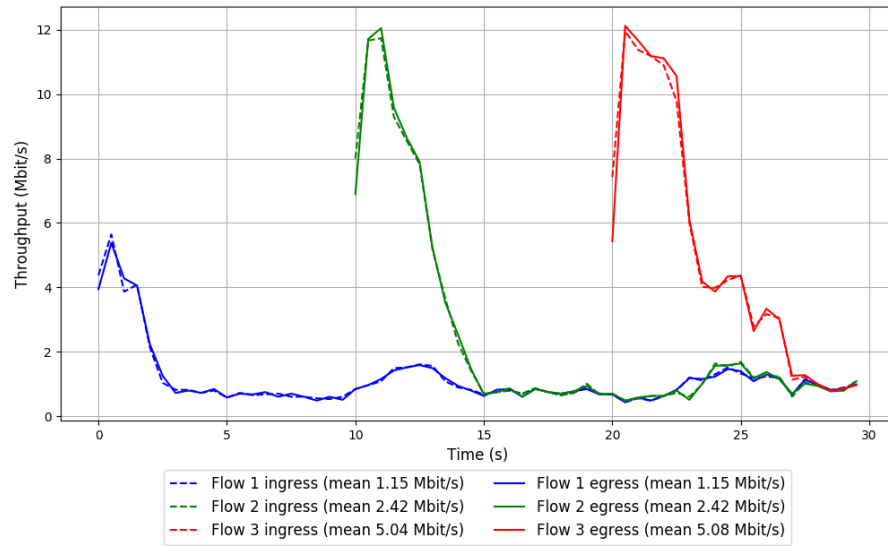


Run 1: Statistics of TCP Vegas

Start at: 2017-09-22 13:29:05
End at: 2017-09-22 13:29:35
Local clock offset: 0.472 ms
Remote clock offset: -3.087 ms

Below is generated by plot.py at 2017-09-22 15:09:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.43 Mbit/s
95th percentile per-packet one-way delay: 86.043 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 1.15 Mbit/s
95th percentile per-packet one-way delay: 84.796 ms
Loss rate: 0.24%
-- Flow 2:
Average throughput: 2.42 Mbit/s
95th percentile per-packet one-way delay: 76.597 ms
Loss rate: 0.20%
-- Flow 3:
Average throughput: 5.08 Mbit/s
95th percentile per-packet one-way delay: 92.556 ms
Loss rate: 0.19%

Run 1: Report of TCP Vegas — Data Link

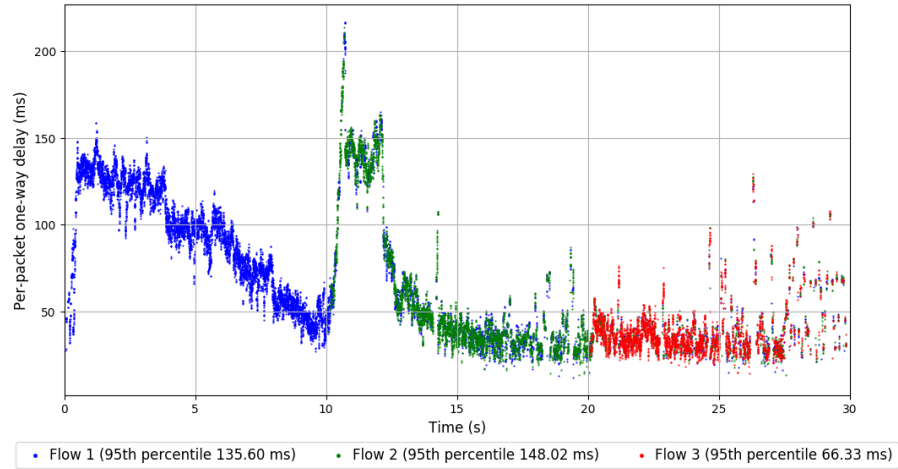
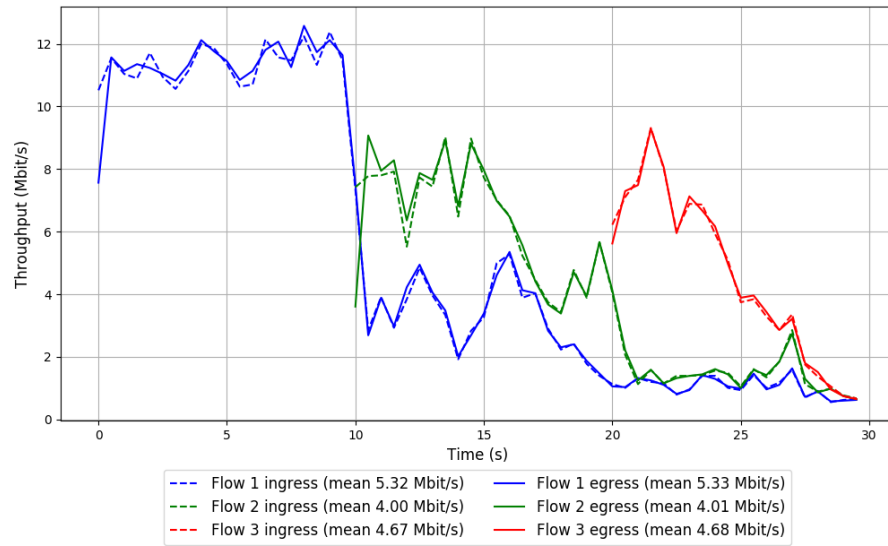


Run 2: Statistics of TCP Vegas

Start at: 2017-09-22 13:45:42
End at: 2017-09-22 13:46:12
Local clock offset: 0.458 ms
Remote clock offset: -2.879 ms

Below is generated by plot.py at 2017-09-22 15:09:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 9.53 Mbit/s
95th percentile per-packet one-way delay: 138.522 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 5.33 Mbit/s
95th percentile per-packet one-way delay: 135.599 ms
Loss rate: 0.04%
-- Flow 2:
Average throughput: 4.01 Mbit/s
95th percentile per-packet one-way delay: 148.022 ms
Loss rate: 0.11%
-- Flow 3:
Average throughput: 4.68 Mbit/s
95th percentile per-packet one-way delay: 66.333 ms
Loss rate: 0.13%

Run 2: Report of TCP Vegas — Data Link

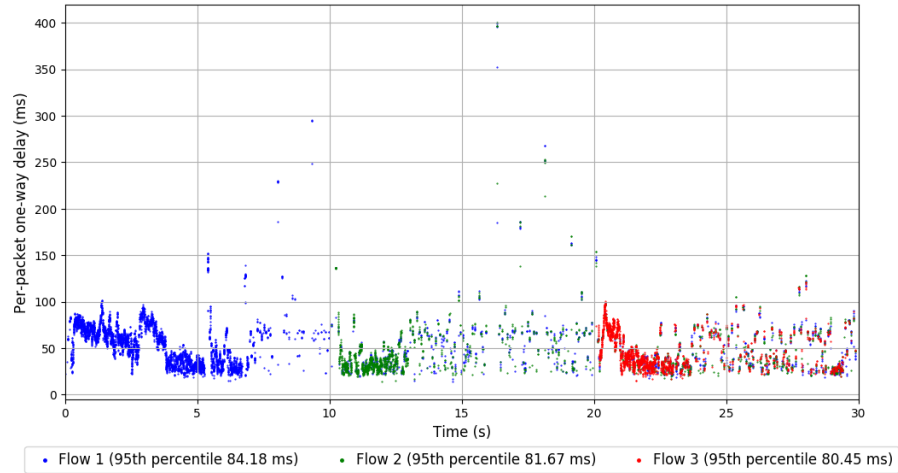
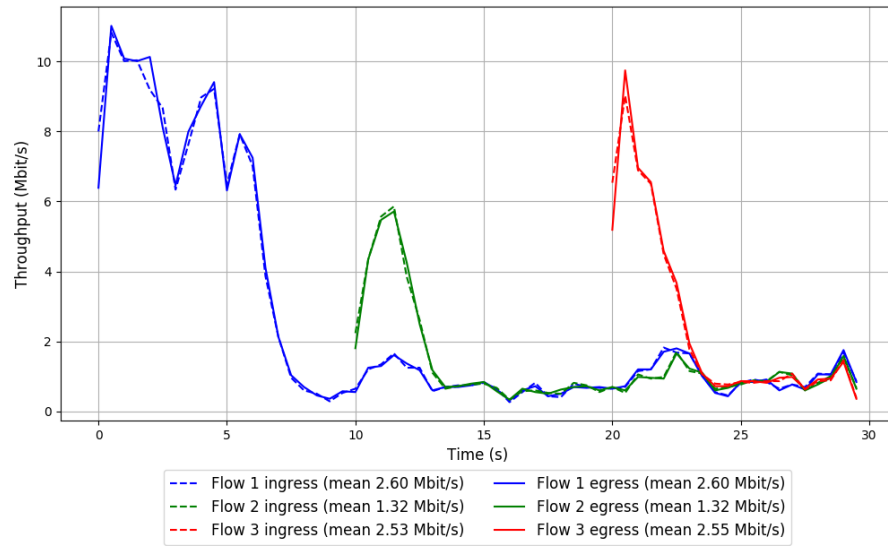


Run 3: Statistics of TCP Vegas

Start at: 2017-09-22 14:02:22
End at: 2017-09-22 14:02:52
Local clock offset: 0.531 ms
Remote clock offset: -2.666 ms

Below is generated by plot.py at 2017-09-22 15:09:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.31 Mbit/s
95th percentile per-packet one-way delay: 83.139 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 2.60 Mbit/s
95th percentile per-packet one-way delay: 84.184 ms
Loss rate: 0.11%
-- Flow 2:
Average throughput: 1.32 Mbit/s
95th percentile per-packet one-way delay: 81.669 ms
Loss rate: 0.64%
-- Flow 3:
Average throughput: 2.55 Mbit/s
95th percentile per-packet one-way delay: 80.447 ms
Loss rate: 0.19%

Run 3: Report of TCP Vegas — Data Link

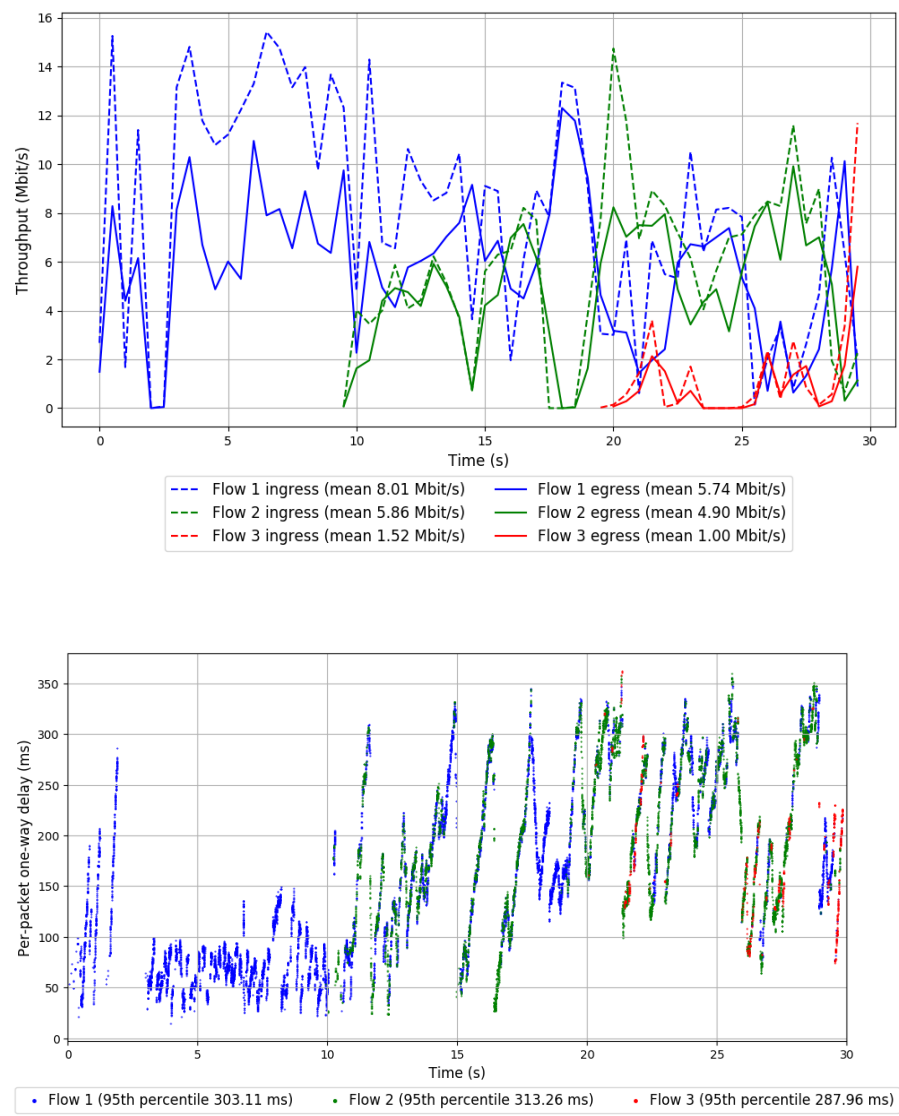


Run 1: Statistics of Verus

Start at: 2017-09-22 13:33:50
End at: 2017-09-22 13:34:20
Local clock offset: 0.491 ms
Remote clock offset: -2.995 ms

Below is generated by plot.py at 2017-09-22 15:09:38
Datalink statistics
-- Total of 3 flows:
Average throughput: 9.33 Mbit/s
95th percentile per-packet one-way delay: 307.570 ms
Loss rate: 25.07%
-- Flow 1:
Average throughput: 5.74 Mbit/s
95th percentile per-packet one-way delay: 303.114 ms
Loss rate: 28.49%
-- Flow 2:
Average throughput: 4.90 Mbit/s
95th percentile per-packet one-way delay: 313.264 ms
Loss rate: 16.73%
-- Flow 3:
Average throughput: 1.00 Mbit/s
95th percentile per-packet one-way delay: 287.964 ms
Loss rate: 35.34%

Run 1: Report of Verus — Data Link

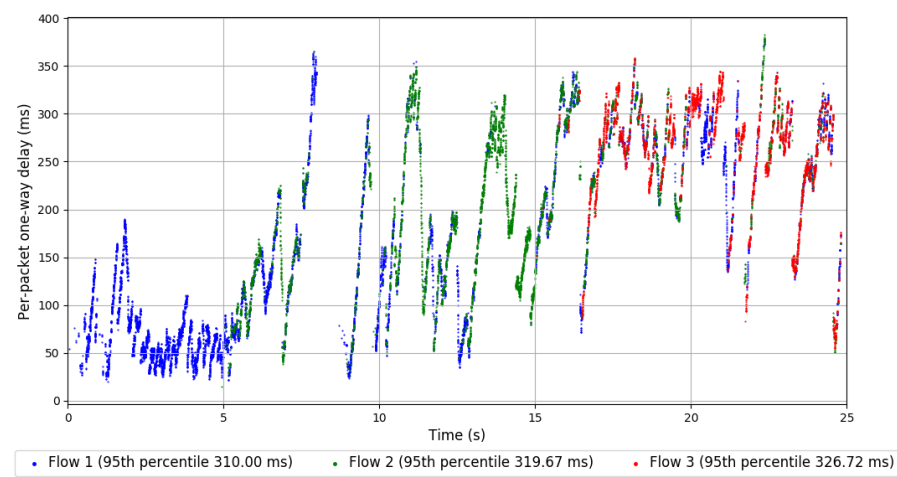
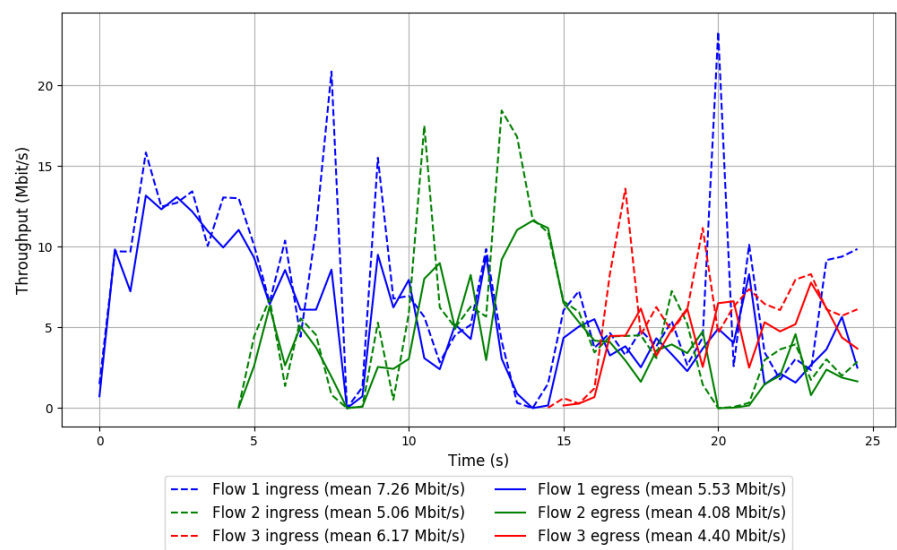


Run 2: Statistics of Verus

Start at: 2017-09-22 13:50:28
End at: 2017-09-22 13:50:58
Local clock offset: 0.497 ms
Remote clock offset: -2.868 ms

Below is generated by plot.py at 2017-09-22 15:09:38
Datalink statistics
-- Total of 3 flows:
Average throughput: 10.54 Mbit/s
95th percentile per-packet one-way delay: 318.632 ms
Loss rate: 23.68%
-- Flow 1:
Average throughput: 5.53 Mbit/s
95th percentile per-packet one-way delay: 309.996 ms
Loss rate: 24.11%
-- Flow 2:
Average throughput: 4.08 Mbit/s
95th percentile per-packet one-way delay: 319.673 ms
Loss rate: 19.42%
-- Flow 3:
Average throughput: 4.40 Mbit/s
95th percentile per-packet one-way delay: 326.719 ms
Loss rate: 29.46%

Run 2: Report of Verus — Data Link

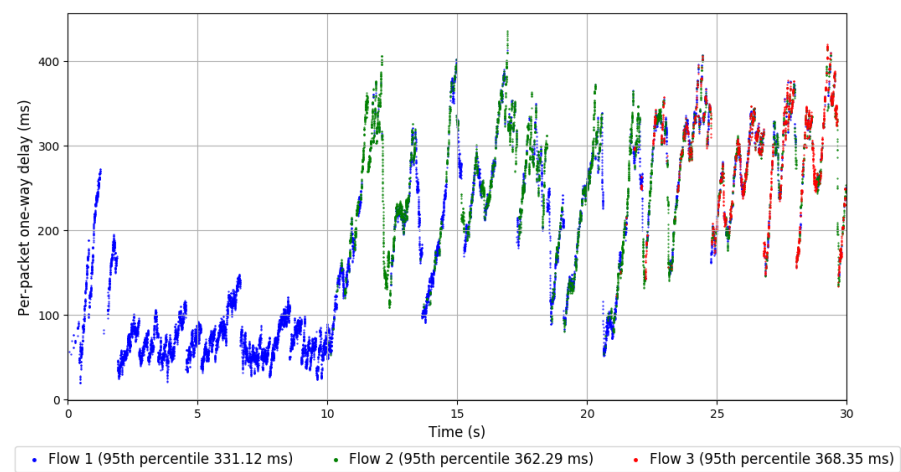
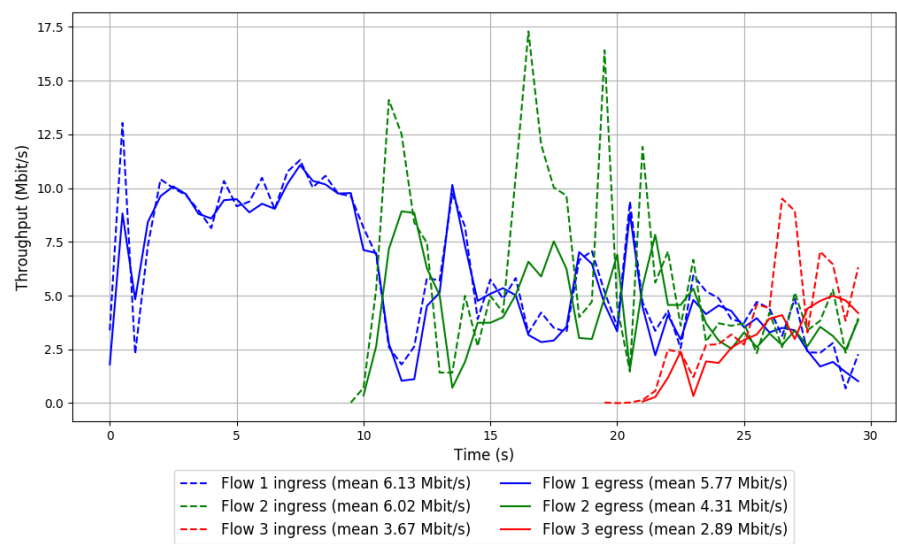


Run 3: Statistics of Verus

Start at: 2017-09-22 14:07:06
End at: 2017-09-22 14:07:36
Local clock offset: 0.435 ms
Remote clock offset: -2.528 ms

Below is generated by plot.py at 2017-09-22 15:09:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 9.49 Mbit/s
95th percentile per-packet one-way delay: 351.032 ms
Loss rate: 16.67%
-- Flow 1:
Average throughput: 5.77 Mbit/s
95th percentile per-packet one-way delay: 331.125 ms
Loss rate: 6.22%
-- Flow 2:
Average throughput: 4.31 Mbit/s
95th percentile per-packet one-way delay: 362.287 ms
Loss rate: 28.64%
-- Flow 3:
Average throughput: 2.89 Mbit/s
95th percentile per-packet one-way delay: 368.351 ms
Loss rate: 29.89%

Run 3: Report of Verus — Data Link

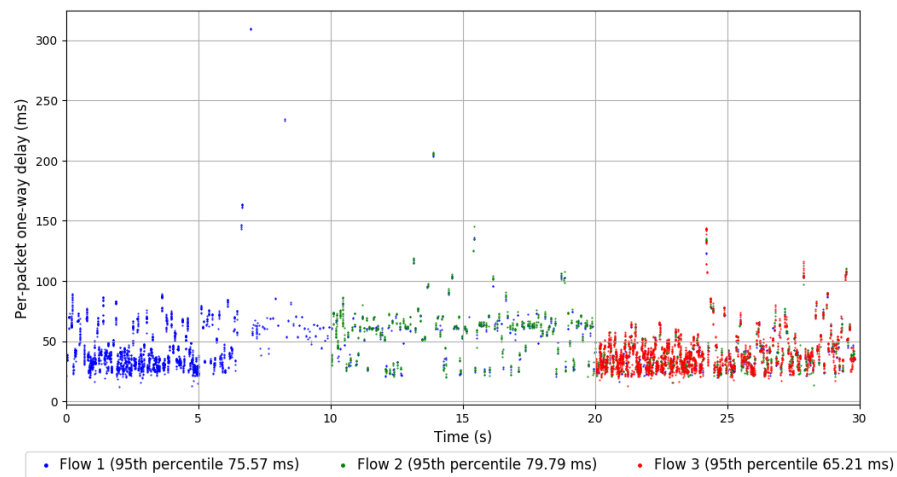
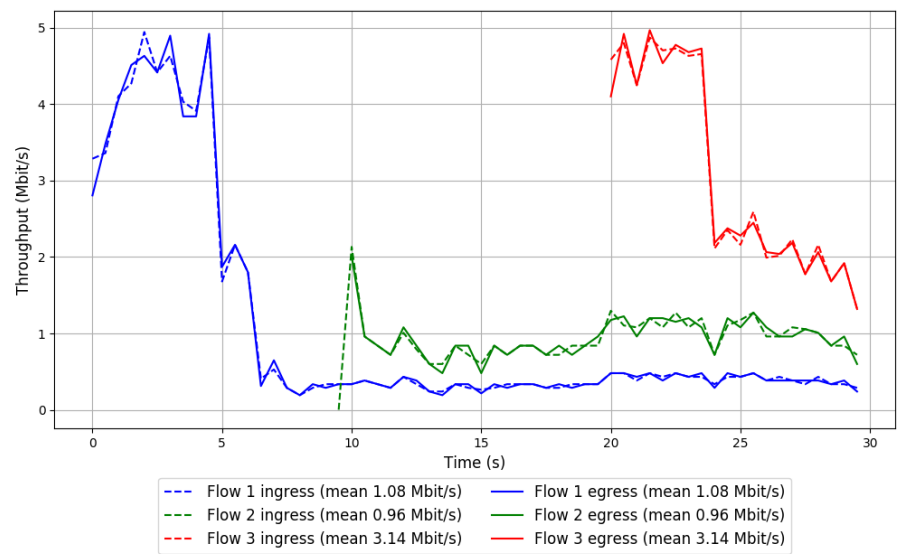


Run 1: Statistics of Indigo

Start at: 2017-09-22 13:44:31
End at: 2017-09-22 13:45:01
Local clock offset: 0.465 ms
Remote clock offset: -2.904 ms

Below is generated by plot.py at 2017-09-22 15:09:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.74 Mbit/s
95th percentile per-packet one-way delay: 74.244 ms
Loss rate: 0.35%
-- Flow 1:
Average throughput: 1.08 Mbit/s
95th percentile per-packet one-way delay: 75.571 ms
Loss rate: 0.34%
-- Flow 2:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 79.789 ms
Loss rate: 0.32%
-- Flow 3:
Average throughput: 3.14 Mbit/s
95th percentile per-packet one-way delay: 65.213 ms
Loss rate: 0.39%

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

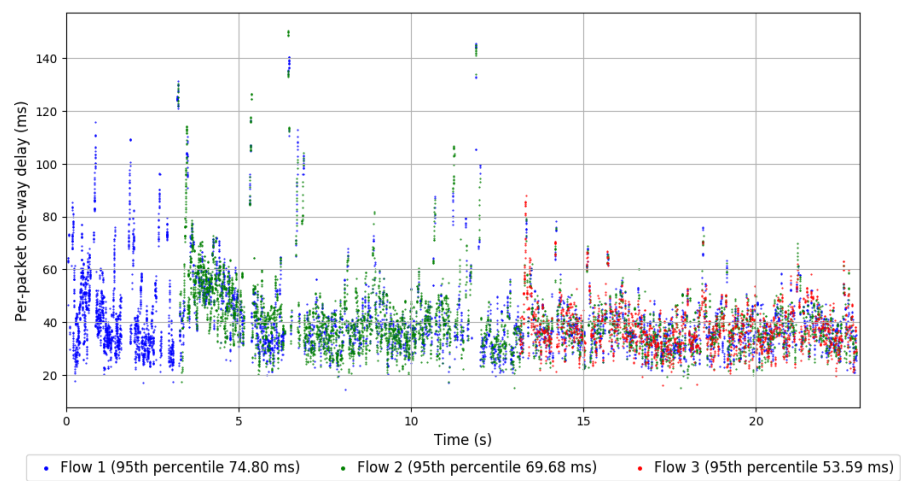
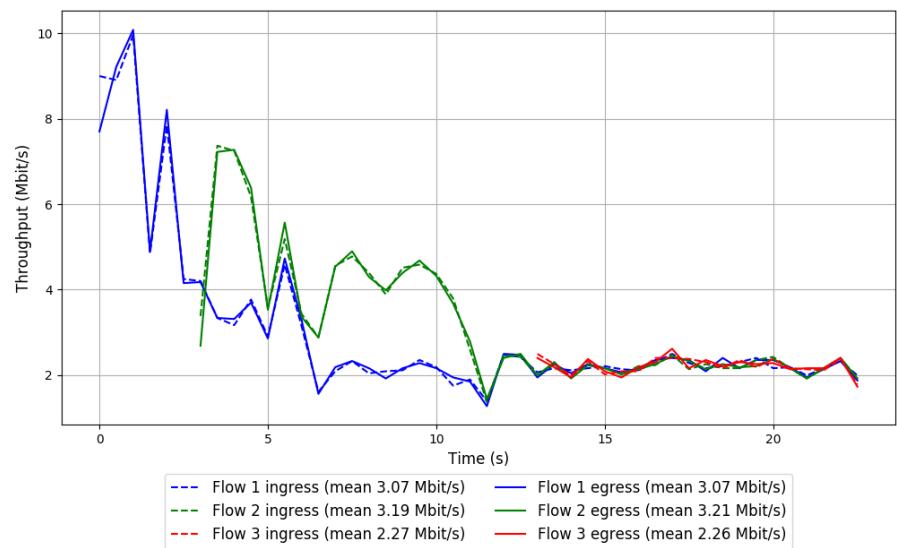
Start at: 2017-09-22 14:01:10

End at: 2017-09-22 14:01:40

Local clock offset: 0.525 ms

Remote clock offset: -2.663 ms

Run 2: Report of Indigo — Data Link

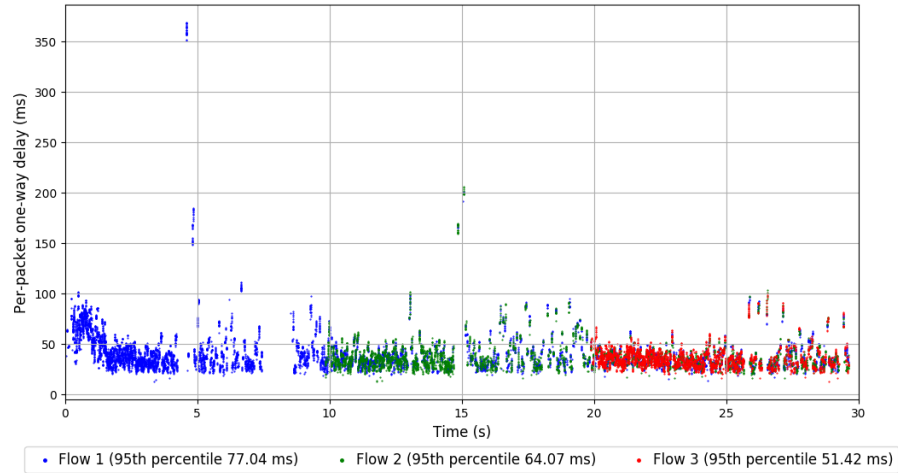
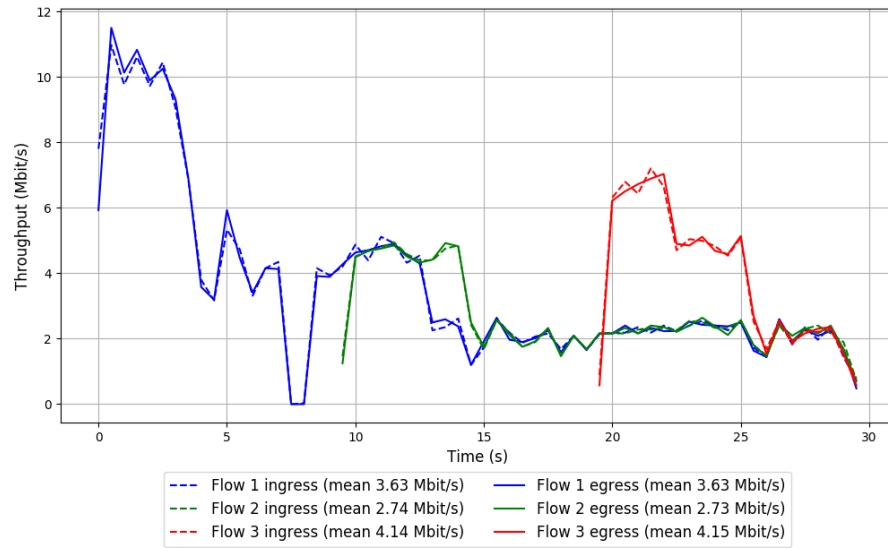


Run 3: Statistics of Indigo

Start at: 2017-09-22 14:17:49
End at: 2017-09-22 14:18:19
Local clock offset: 0.435 ms
Remote clock offset: -2.408 ms

Below is generated by plot.py at 2017-09-22 15:09:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 6.82 Mbit/s
95th percentile per-packet one-way delay: 72.267 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 3.63 Mbit/s
95th percentile per-packet one-way delay: 77.036 ms
Loss rate: 0.33%
-- Flow 2:
Average throughput: 2.73 Mbit/s
95th percentile per-packet one-way delay: 64.069 ms
Loss rate: 0.27%
-- Flow 3:
Average throughput: 4.15 Mbit/s
95th percentile per-packet one-way delay: 51.419 ms
Loss rate: 0.30%

Run 3: Report of Indigo — Data Link

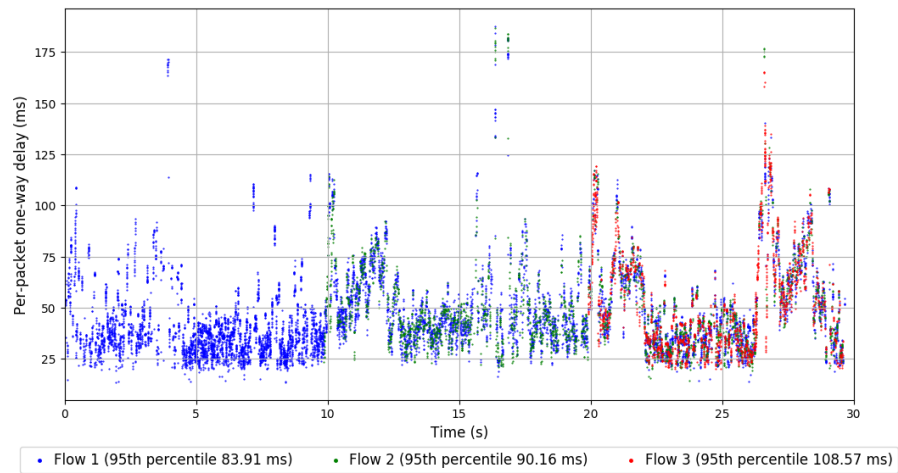
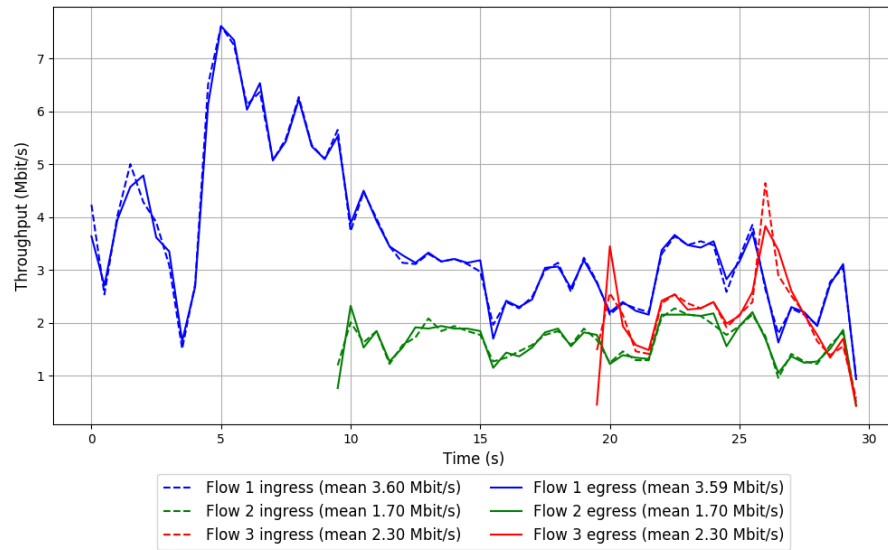


Run 1: Statistics of Indigo-cellular

Start at: 2017-09-22 13:37:24
End at: 2017-09-22 13:37:55
Local clock offset: 0.399 ms
Remote clock offset: -2.954 ms

Below is generated by plot.py at 2017-09-22 15:09:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.48 Mbit/s
95th percentile per-packet one-way delay: 90.578 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 3.59 Mbit/s
95th percentile per-packet one-way delay: 83.907 ms
Loss rate: 0.27%
-- Flow 2:
Average throughput: 1.70 Mbit/s
95th percentile per-packet one-way delay: 90.160 ms
Loss rate: 0.36%
-- Flow 3:
Average throughput: 2.30 Mbit/s
95th percentile per-packet one-way delay: 108.571 ms
Loss rate: 0.43%

Run 1: Report of Indigo-cellular — Data Link

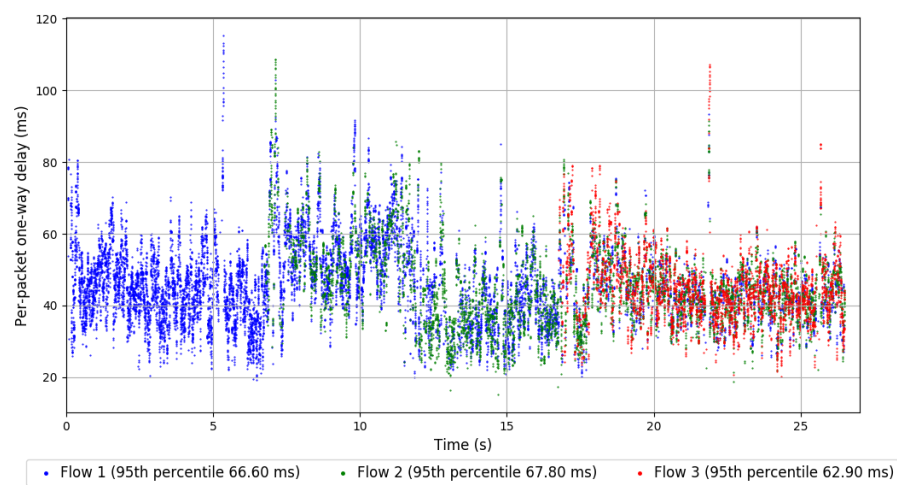
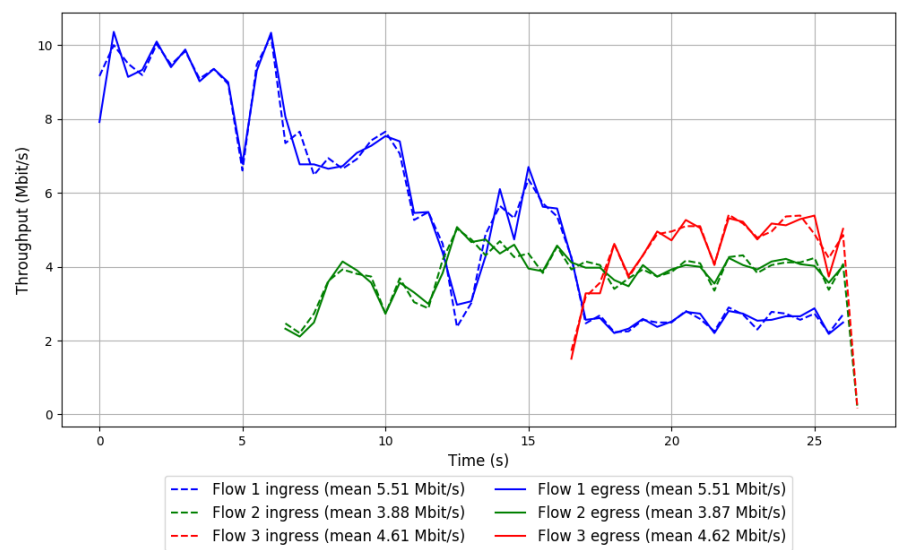


Run 2: Statistics of Indigo-cellular

Start at: 2017-09-22 13:54:02
End at: 2017-09-22 13:54:32
Local clock offset: 0.477 ms
Remote clock offset: -2.715 ms

Below is generated by plot.py at 2017-09-22 15:09:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 10.10 Mbit/s
95th percentile per-packet one-way delay: 66.477 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 5.51 Mbit/s
95th percentile per-packet one-way delay: 66.601 ms
Loss rate: 0.19%
-- Flow 2:
Average throughput: 3.87 Mbit/s
95th percentile per-packet one-way delay: 67.798 ms
Loss rate: 0.34%
-- Flow 3:
Average throughput: 4.62 Mbit/s
95th percentile per-packet one-way delay: 62.899 ms
Loss rate: 0.66%

Run 2: Report of Indigo-cellular — Data Link

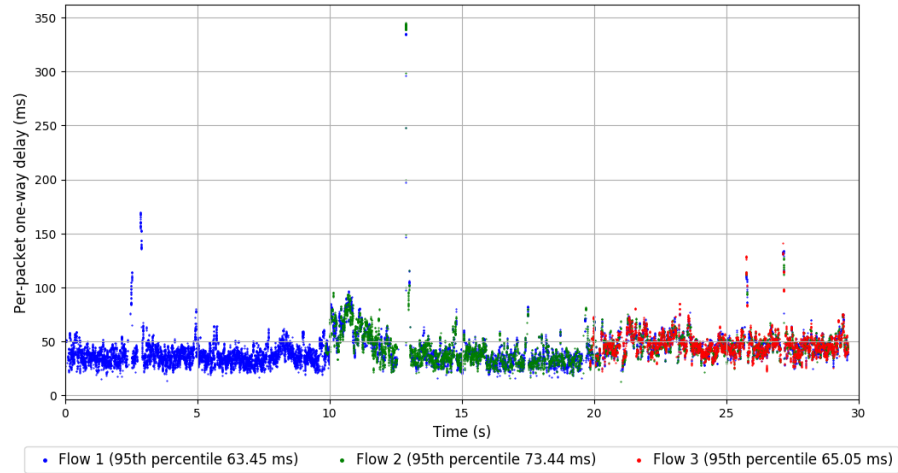
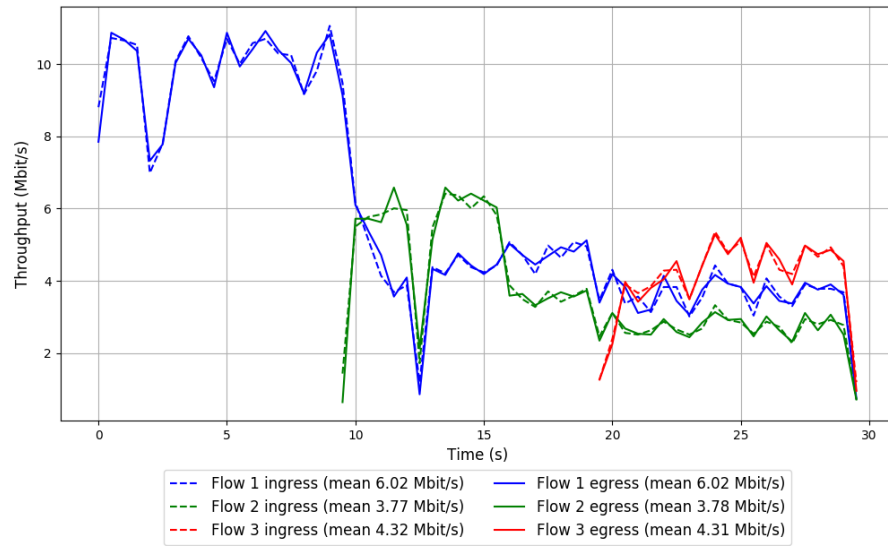


Run 3: Statistics of Indigo-cellular

Start at: 2017-09-22 14:10:41
End at: 2017-09-22 14:11:11
Local clock offset: 0.558 ms
Remote clock offset: -2.489 ms

Below is generated by plot.py at 2017-09-22 15:09:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 9.96 Mbit/s
95th percentile per-packet one-way delay: 67.490 ms
Loss rate: 0.24%
-- Flow 1:
Average throughput: 6.02 Mbit/s
95th percentile per-packet one-way delay: 63.453 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 3.78 Mbit/s
95th percentile per-packet one-way delay: 73.443 ms
Loss rate: 0.24%
-- Flow 3:
Average throughput: 4.31 Mbit/s
95th percentile per-packet one-way delay: 65.048 ms
Loss rate: 0.71%

Run 3: Report of Indigo-cellular — Data Link

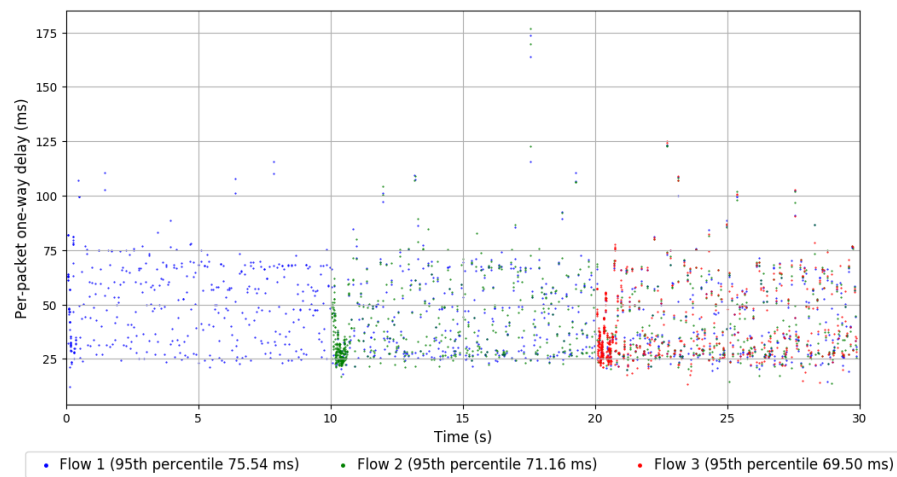
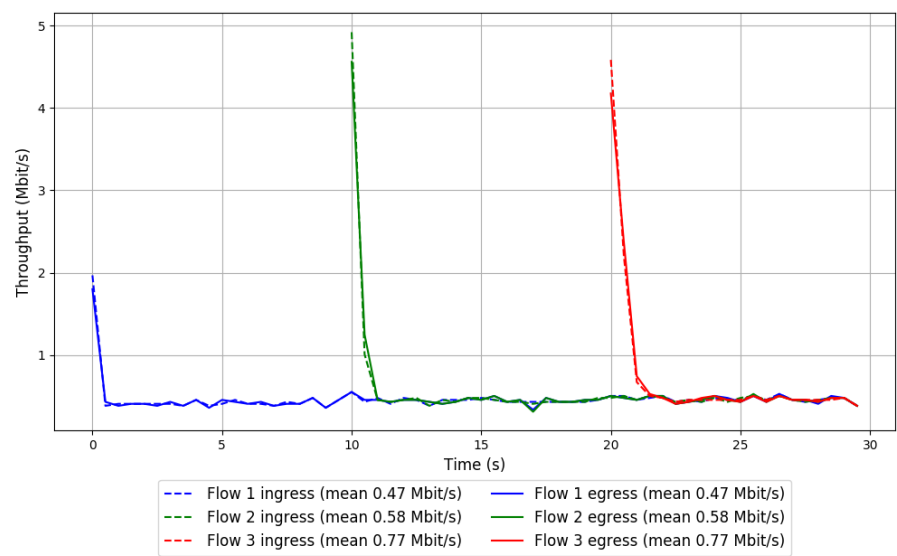


```
Run 1: Statistics of KohoCC

Start at: 2017-09-22 13:30:16
End at: 2017-09-22 13:30:46
Local clock offset: 0.395 ms
Remote clock offset: -3.088 ms

# Below is generated by plot.py at 2017-09-22 15:09:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.11 Mbit/s
95th percentile per-packet one-way delay: 74.398 ms
Loss rate: 0.68%
-- Flow 1:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 75.542 ms
Loss rate: 0.51%
-- Flow 2:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 71.155 ms
Loss rate: 0.62%
-- Flow 3:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 69.505 ms
Loss rate: 1.10%
```

Run 1: Report of KohoCC — Data Link

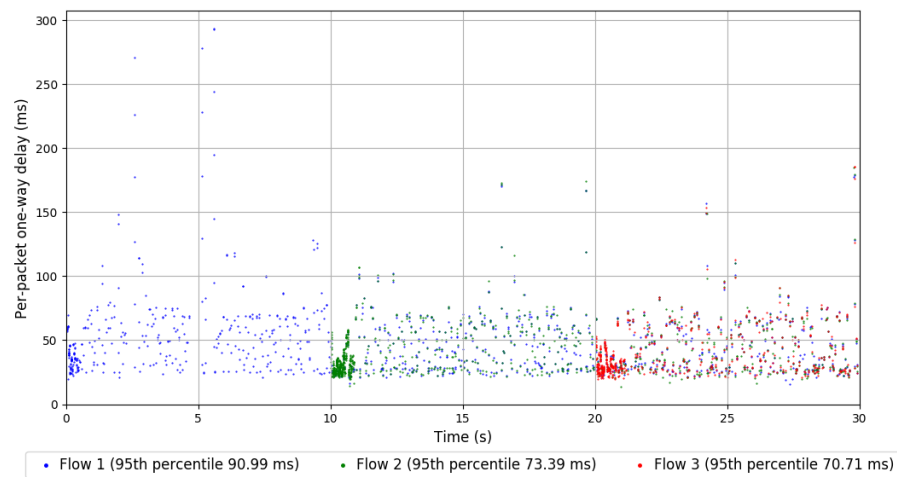
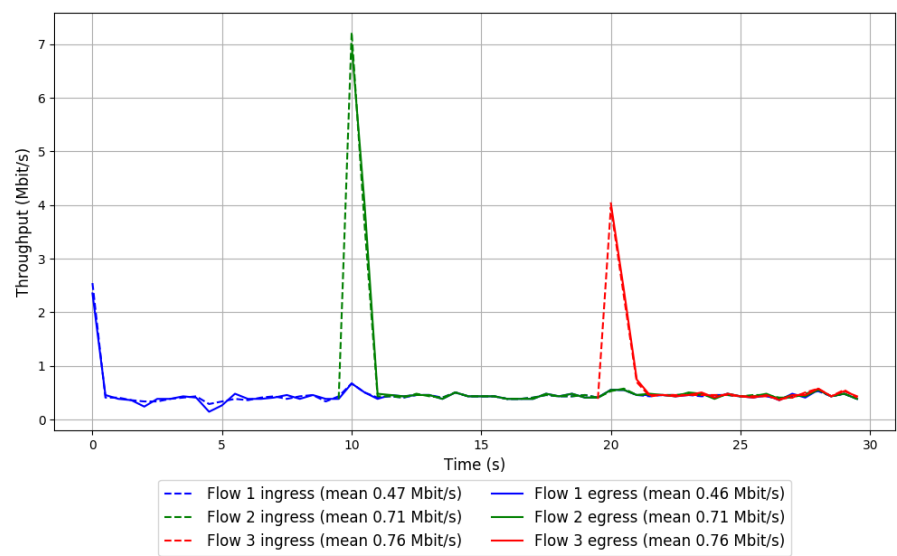


Run 2: Statistics of KohoCC

Start at: 2017-09-22 13:46:54
End at: 2017-09-22 13:47:24
Local clock offset: 0.457 ms
Remote clock offset: -2.837 ms

Below is generated by plot.py at 2017-09-22 15:09:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 76.000 ms
Loss rate: 0.91%
-- Flow 1:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 90.986 ms
Loss rate: 1.20%
-- Flow 2:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 73.394 ms
Loss rate: 0.60%
-- Flow 3:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 70.712 ms
Loss rate: 0.96%

Run 2: Report of KohoCC — Data Link



Run 3: Statistics of KohoCC

Start at: 2017-09-22 14:03:33
End at: 2017-09-22 14:04:03
Local clock offset: 0.528 ms
Remote clock offset: -2.585 ms

Below is generated by plot.py at 2017-09-22 15:09:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.00 Mbit/s
95th percentile per-packet one-way delay: 88.919 ms
Loss rate: 0.88%
-- Flow 1:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 100.724 ms
Loss rate: 0.72%
-- Flow 2:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 80.769 ms
Loss rate: 0.93%
-- Flow 3:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 77.518 ms
Loss rate: 1.16%

Run 3: Report of KohoCC — Data Link

