

Pantheon Report

Generated at 2018-01-25 20:13:58 (UTC).

Data path: AWS India 1 Ethernet (*local*) → India ppp0 (*remote*).

Repeated the test of 15 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).

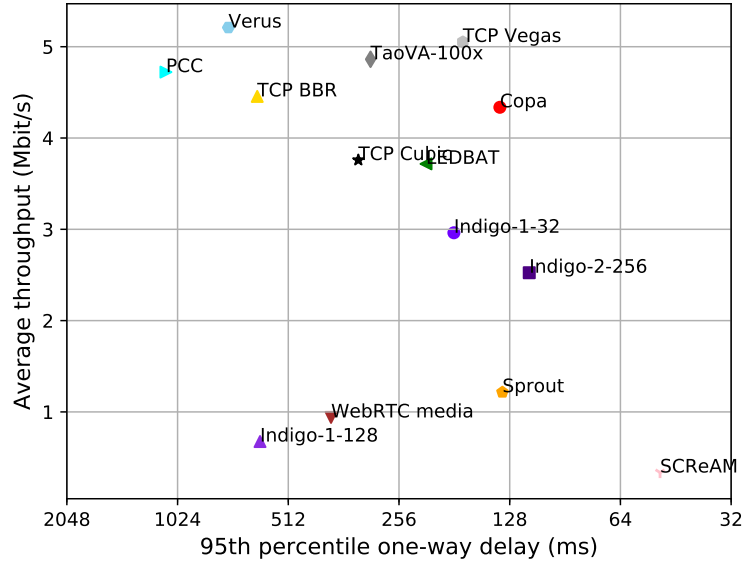
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

NTP offsets were measured against **nets.org.sg** and have been applied to correct the timestamps in logs.

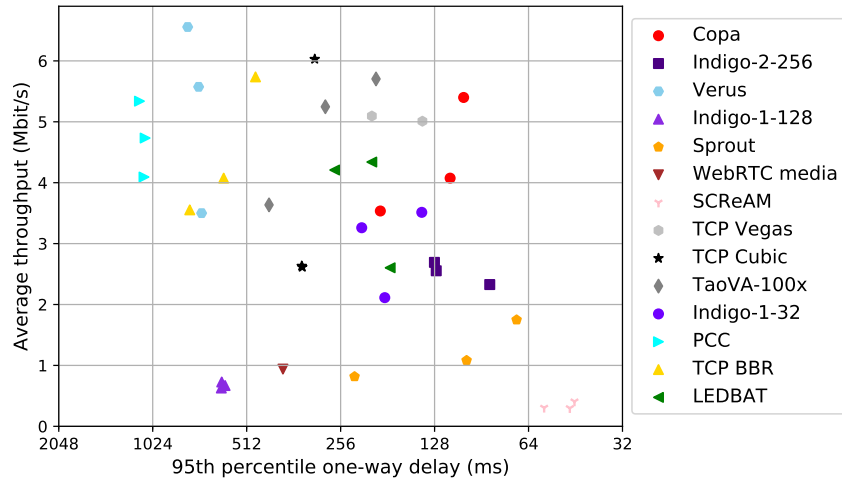
Git summary:

```
branch: master @ f23294ec38436c9f802847d477a41b7343ec76e6
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/fillp @ ec9585325218d5048c4d4152fa42240af54c6e67
third_party/genericCC @ 80b516c448f795fd6e9675f7177b69c622f07da8
third_party/indigo @ a9b2060d39e4da2e8987e893e3eca2a6c7cd0ab9
third_party/indigo-1-layer-128-unit @ 3ae9e4ef4230db7484501f82ce8b377695f2f66d
third_party/indigo-1-layer-32-unit @ 2601c92e4aa9d58d38dc4dfe0ecd90c077e64d
third_party/indigo-1-layer-32-unit-no-calib @ 1f3a7f75b41135ed5b540c0fd3505939528e2a5f
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
  M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ fb1053193c2861da659ba9013db26744ccfcf993
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
  M receiver/src/buffer.h
  M receiver/src/core.cpp
  M sender/src/buffer.h
  M sender/src/core.cpp
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ f1a14bffe749737437f61b1eae30b267cde681
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/vivace @ 423cbca3e8ea1d599e7b5cf725835e8a2b6bfac6
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

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



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



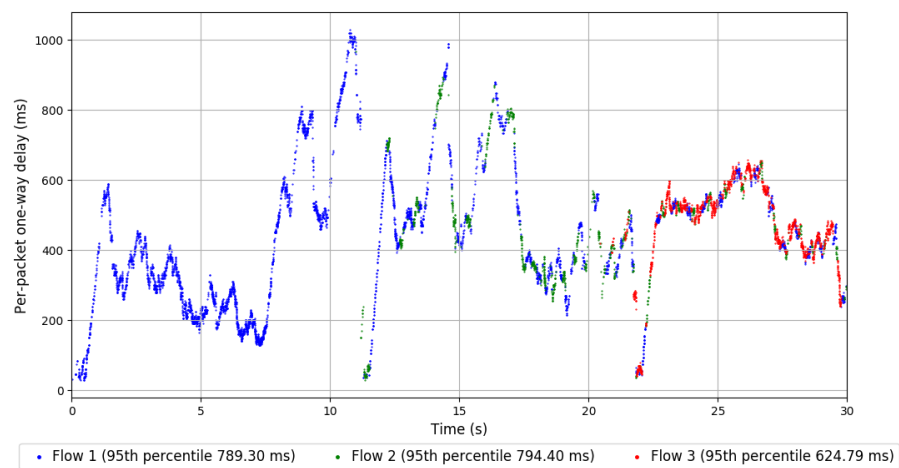
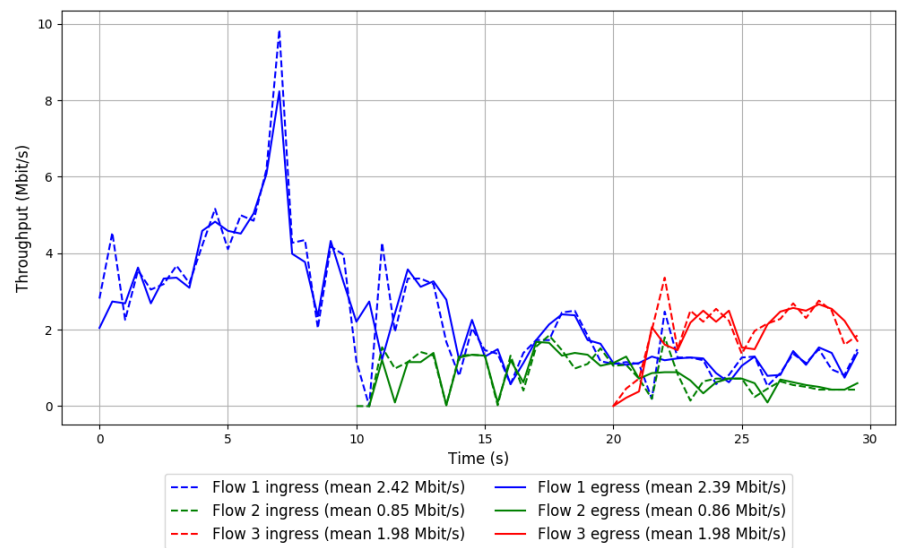
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	2.68	1.55	2.42	591.72	668.40	621.94	0.95	1.90	4.05
TCP Cubic	3	2.45	1.55	0.87	315.56	371.86	332.41	0.72	1.18	2.10
LEDBAT	3	2.97	2.24	1.40	1513.12	196.38	254.14	0.19	0.77	2.77
PCC	3	2.75	1.98	2.18	1068.31	1117.25	1136.84	21.81	47.51	91.63
QUIC Cubic	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SCReAM	3	0.13	0.21	0.21	50.87	52.67	47.80	0.32	0.23	0.45
WebRTC media	1	0.49	0.28	0.17	354.92	436.79	410.41	0.10	0.58	0.56
Sprout	3	0.59	0.60	0.61	770.48	87.38	97.77	0.49	0.27	1.27
TaoVA-100x	3	2.93	2.21	1.84	254.25	317.23	550.25	0.60	2.25	3.02
TCP Vegas	2	2.58	2.64	2.23	156.57	251.53	101.24	0.17	0.29	0.90
Verus	3	3.20	2.15	1.79	703.33	752.35	753.78	1.11	1.98	5.31
Copa	3	2.86	1.92	1.03	131.85	134.62	160.06	0.20	0.41	0.80
Indigo-2-256	3	1.07	1.65	1.13	89.88	129.65	119.99	0.07	0.14	0.19
Indigo-1-32	3	1.35	1.38	2.15	129.03	221.16	302.87	0.17	0.41	0.79
Indigo-1-128	3	0.33	0.34	0.44	567.36	530.76	301.25	1.17	0.36	1.62

Run 1: Statistics of TCP BBR

Start at: 2018-01-25 19:29:44
End at: 2018-01-25 19:30:14
Local clock offset: 0.755 ms
Remote clock offset: -15.655 ms

Below is generated by plot.py at 2018-01-25 20:13:13
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.55 Mbit/s
95th percentile per-packet one-way delay: 779.251 ms
Loss rate: 2.07%
-- Flow 1:
Average throughput: 2.39 Mbit/s
95th percentile per-packet one-way delay: 789.303 ms
Loss rate: 1.23%
-- Flow 2:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 794.404 ms
Loss rate: 2.08%
-- Flow 3:
Average throughput: 1.98 Mbit/s
95th percentile per-packet one-way delay: 624.786 ms
Loss rate: 5.17%

Run 1: Report of TCP BBR — Data Link

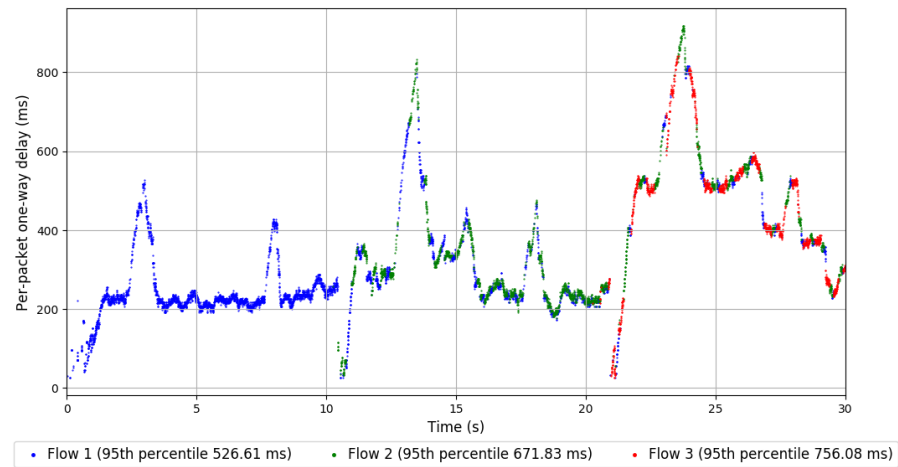
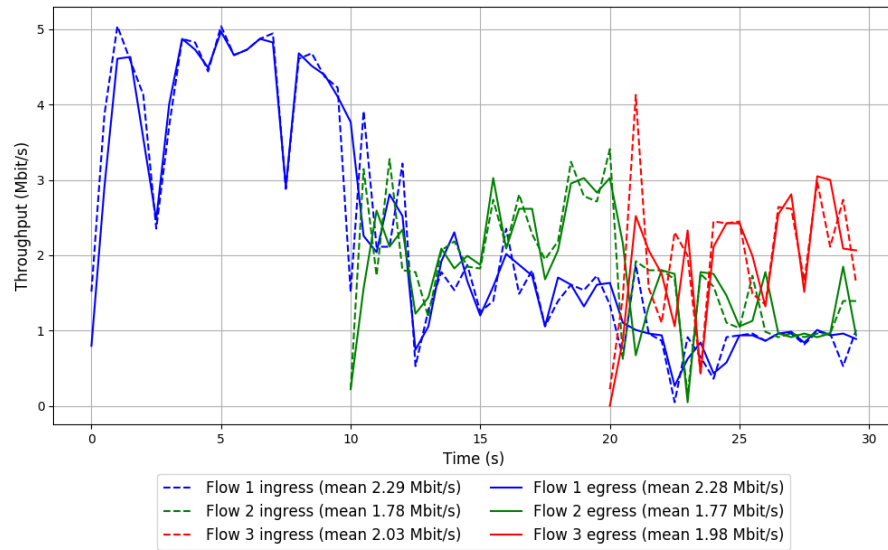


Run 2: Statistics of TCP BBR

Start at: 2018-01-25 19:47:22
End at: 2018-01-25 19:47:52
Local clock offset: 2.505 ms
Remote clock offset: -17.95 ms

Below is generated by plot.py at 2018-01-25 20:13:15
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.08 Mbit/s
95th percentile per-packet one-way delay: 606.664 ms
Loss rate: 1.63%
-- Flow 1:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 526.609 ms
Loss rate: 0.86%
-- Flow 2:
Average throughput: 1.77 Mbit/s
95th percentile per-packet one-way delay: 671.829 ms
Loss rate: 2.13%
-- Flow 3:
Average throughput: 1.98 Mbit/s
95th percentile per-packet one-way delay: 756.079 ms
Loss rate: 3.39%

Run 2: Report of TCP BBR — Data Link

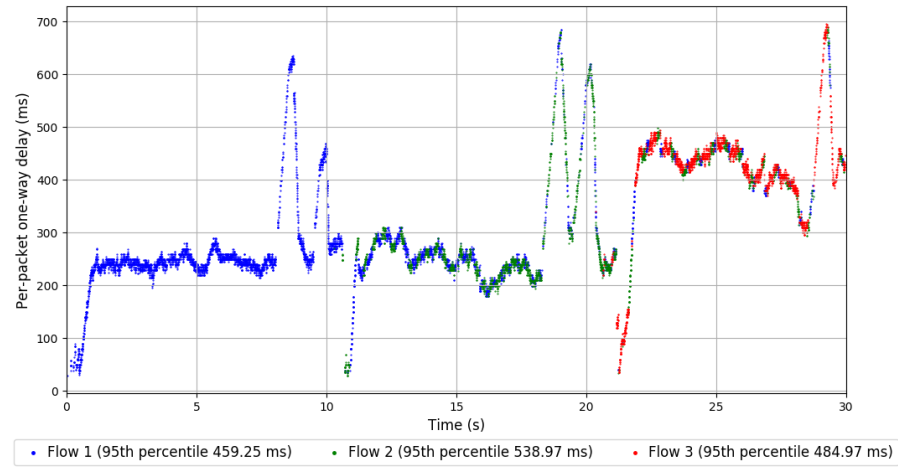
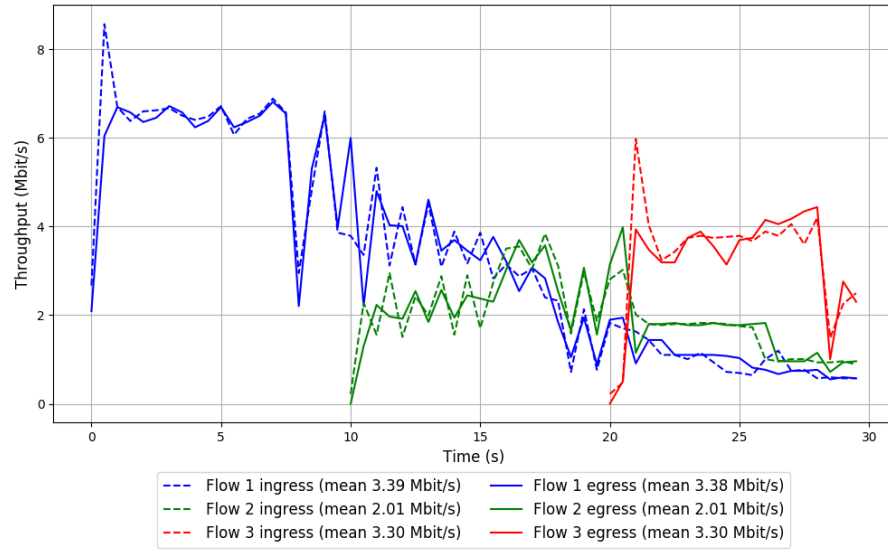


Run 3: Statistics of TCP BBR

Start at: 2018-01-25 20:04:59
End at: 2018-01-25 20:05:29
Local clock offset: 1.064 ms
Remote clock offset: -17.631 ms

Below is generated by plot.py at 2018-01-25 20:13:19
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.74 Mbit/s
95th percentile per-packet one-way delay: 479.692 ms
Loss rate: 1.46%
-- Flow 1:
Average throughput: 3.38 Mbit/s
95th percentile per-packet one-way delay: 459.252 ms
Loss rate: 0.76%
-- Flow 2:
Average throughput: 2.01 Mbit/s
95th percentile per-packet one-way delay: 538.967 ms
Loss rate: 1.50%
-- Flow 3:
Average throughput: 3.30 Mbit/s
95th percentile per-packet one-way delay: 484.967 ms
Loss rate: 3.58%

Run 3: Report of TCP BBR — Data Link

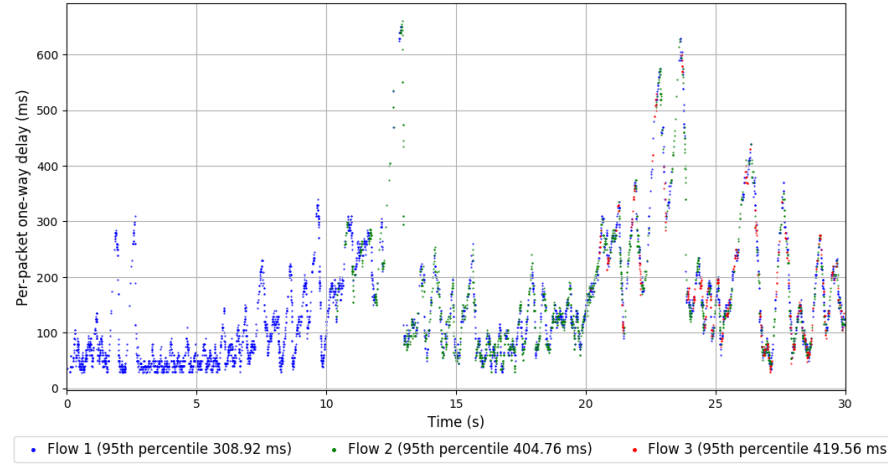
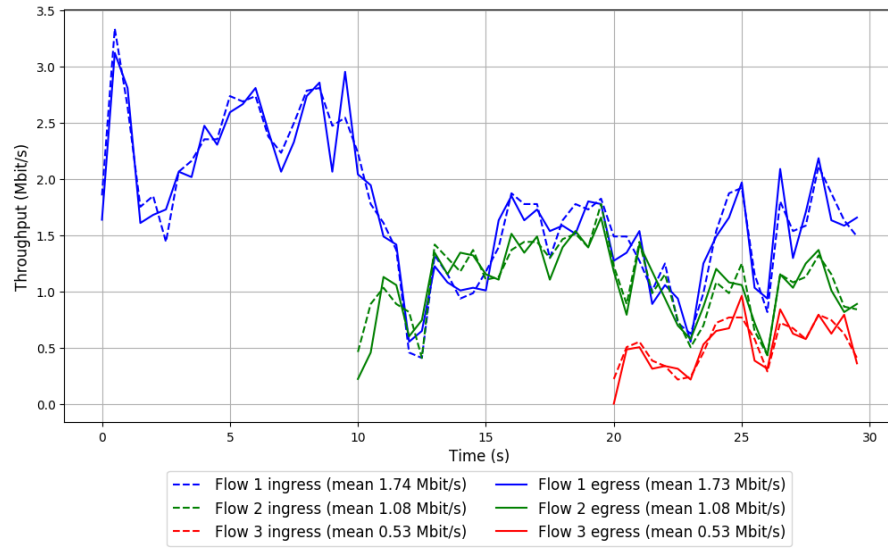


Run 1: Statistics of TCP Cubic

Start at: 2018-01-25 19:22:02
End at: 2018-01-25 19:22:32
Local clock offset: 0.832 ms
Remote clock offset: -17.567 ms

Below is generated by plot.py at 2018-01-25 20:13:19
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.61 Mbit/s
95th percentile per-packet one-way delay: 339.768 ms
Loss rate: 1.06%
-- Flow 1:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 308.919 ms
Loss rate: 0.81%
-- Flow 2:
Average throughput: 1.08 Mbit/s
95th percentile per-packet one-way delay: 404.757 ms
Loss rate: 1.28%
-- Flow 3:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 419.565 ms
Loss rate: 2.73%

Run 1: Report of TCP Cubic — Data Link

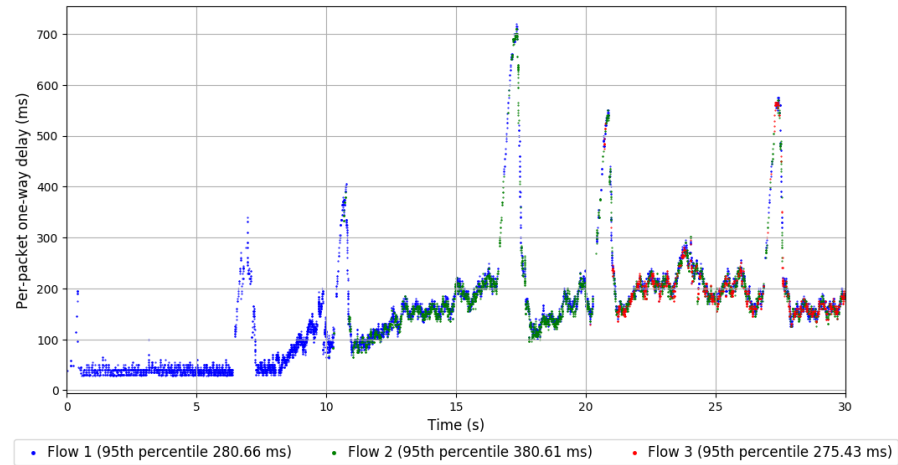
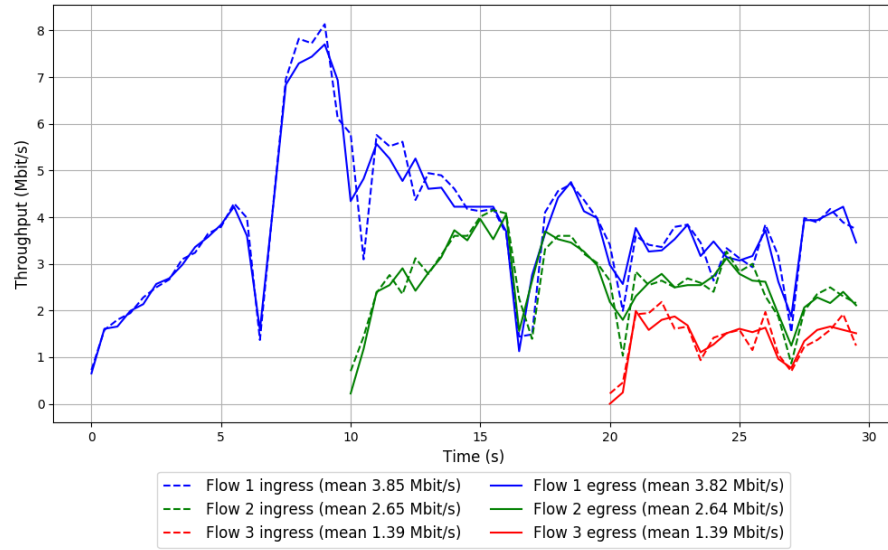


Run 2: Statistics of TCP Cubic

Start at: 2018-01-25 19:39:37
End at: 2018-01-25 19:40:07
Local clock offset: 3.013 ms
Remote clock offset: -16.299 ms

Below is generated by plot.py at 2018-01-25 20:13:20
Datalink statistics
-- Total of 3 flows:
Average throughput: 6.03 Mbit/s
95th percentile per-packet one-way delay: 309.886 ms
Loss rate: 0.87%
-- Flow 1:
Average throughput: 3.82 Mbit/s
95th percentile per-packet one-way delay: 280.662 ms
Loss rate: 0.75%
-- Flow 2:
Average throughput: 2.64 Mbit/s
95th percentile per-packet one-way delay: 380.610 ms
Loss rate: 0.97%
-- Flow 3:
Average throughput: 1.39 Mbit/s
95th percentile per-packet one-way delay: 275.432 ms
Loss rate: 1.48%

Run 2: Report of TCP Cubic — Data Link

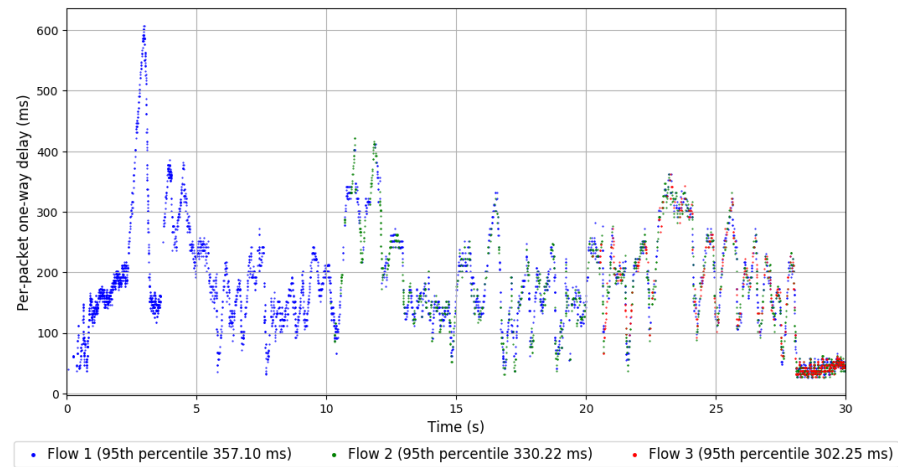
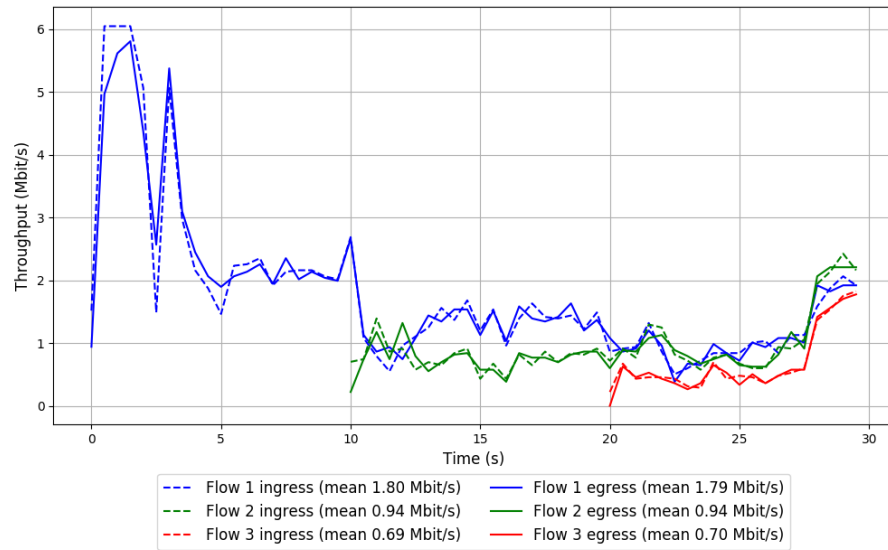


Run 3: Statistics of TCP Cubic

Start at: 2018-01-25 19:57:16
End at: 2018-01-25 19:57:46
Local clock offset: 1.304 ms
Remote clock offset: -16.808 ms

Below is generated by plot.py at 2018-01-25 20:13:20
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.63 Mbit/s
95th percentile per-packet one-way delay: 341.044 ms
Loss rate: 0.89%
-- Flow 1:
Average throughput: 1.79 Mbit/s
95th percentile per-packet one-way delay: 357.096 ms
Loss rate: 0.60%
-- Flow 2:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 330.222 ms
Loss rate: 1.28%
-- Flow 3:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 302.247 ms
Loss rate: 2.09%

Run 3: Report of TCP Cubic — Data Link

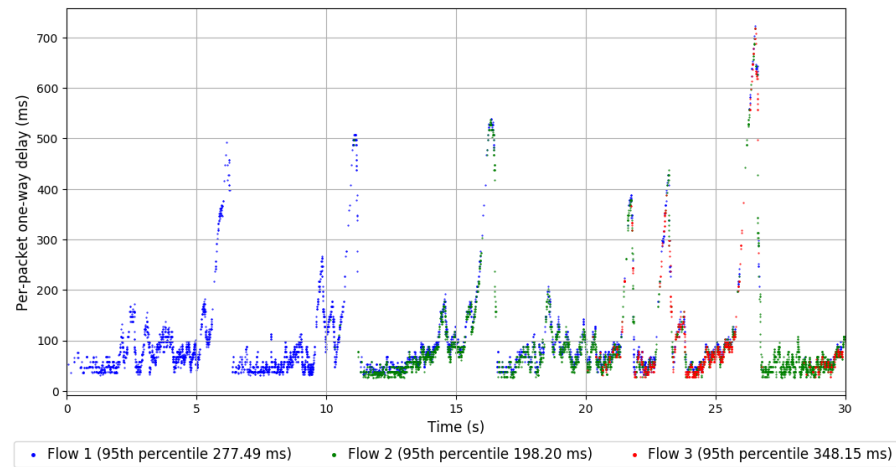
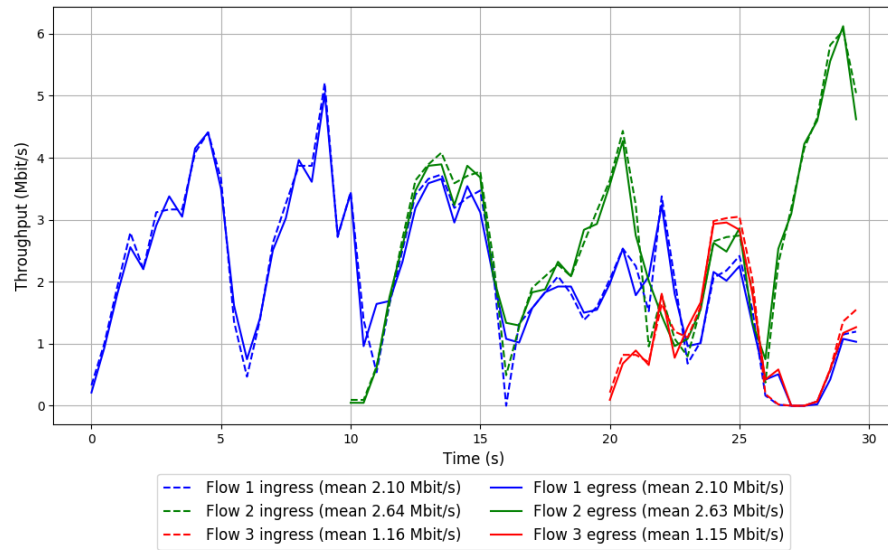


Run 1: Statistics of LEDBAT

Start at: 2018-01-25 19:28:38
End at: 2018-01-25 19:29:08
Local clock offset: 0.749 ms
Remote clock offset: -16.939 ms

Below is generated by plot.py at 2018-01-25 20:13:20
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.21 Mbit/s
95th percentile per-packet one-way delay: 267.449 ms
Loss rate: 0.85%
-- Flow 1:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 277.488 ms
Loss rate: 0.50%
-- Flow 2:
Average throughput: 2.63 Mbit/s
95th percentile per-packet one-way delay: 198.203 ms
Loss rate: 0.98%
-- Flow 3:
Average throughput: 1.15 Mbit/s
95th percentile per-packet one-way delay: 348.148 ms
Loss rate: 2.15%

Run 1: Report of LEDBAT — Data Link

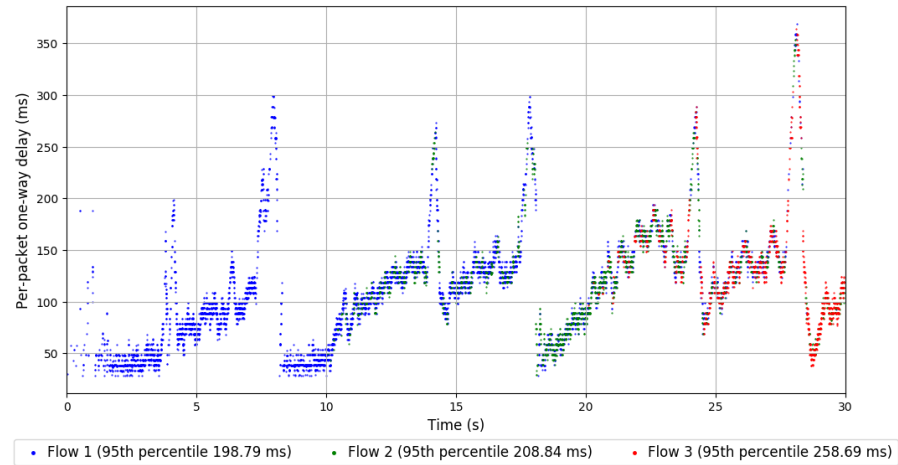
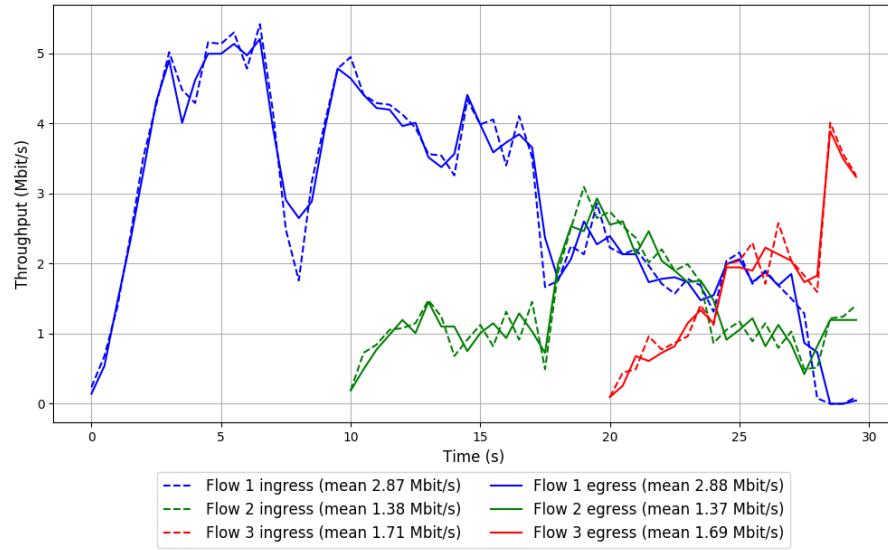


Run 2: Statistics of LEDBAT

Start at: 2018-01-25 19:46:16
End at: 2018-01-25 19:46:46
Local clock offset: 1.272 ms
Remote clock offset: -16.645 ms

Below is generated by plot.py at 2018-01-25 20:13:20
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.34 Mbit/s
95th percentile per-packet one-way delay: 203.427 ms
Loss rate: 0.50%
-- Flow 1:
Average throughput: 2.88 Mbit/s
95th percentile per-packet one-way delay: 198.793 ms
Loss rate: 0.07%
-- Flow 2:
Average throughput: 1.37 Mbit/s
95th percentile per-packet one-way delay: 208.843 ms
Loss rate: 0.64%
-- Flow 3:
Average throughput: 1.69 Mbit/s
95th percentile per-packet one-way delay: 258.695 ms
Loss rate: 2.48%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2018-01-25 20:03:53

End at: 2018-01-25 20:04:23

Local clock offset: 2.781 ms

Remote clock offset: -17.6 ms

Below is generated by plot.py at 2018-01-25 20:13:20

Datalink statistics

-- Total of 3 flows:

Average throughput: 2.60 Mbit/s

95th percentile per-packet one-way delay: 177.662 ms

Loss rate: 1.31%

-- Flow 1:

Average throughput: 3.94 Mbit/s

95th percentile per-packet one-way delay: 4063.070 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 2.71 Mbit/s

95th percentile per-packet one-way delay: 182.100 ms

Loss rate: 0.69%

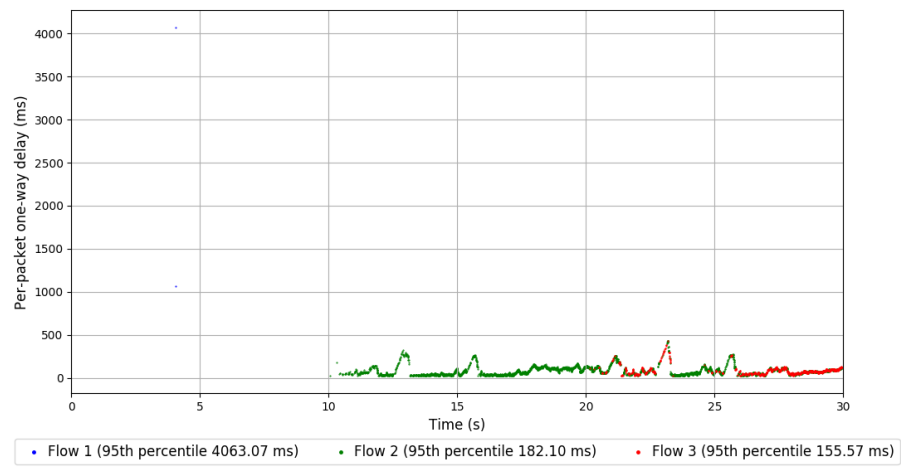
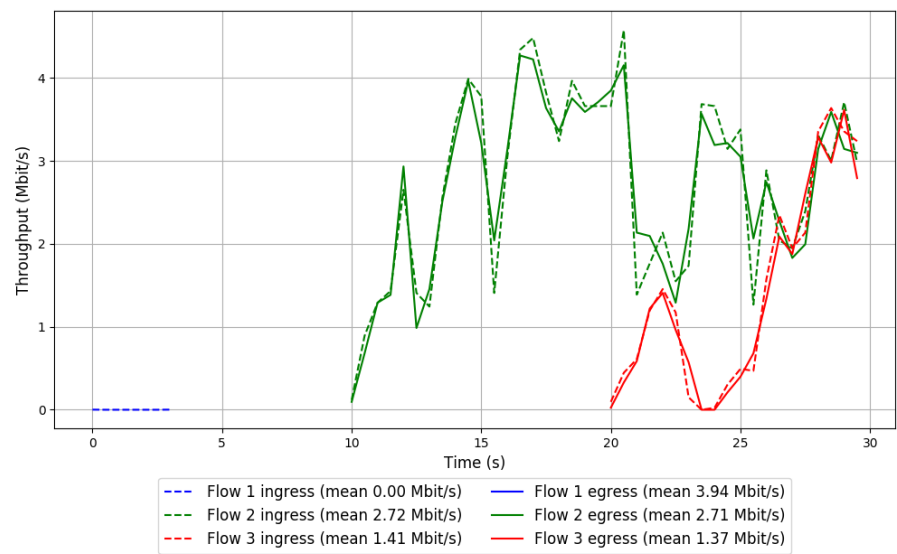
-- Flow 3:

Average throughput: 1.37 Mbit/s

95th percentile per-packet one-way delay: 155.572 ms

Loss rate: 3.69%

Run 3: Report of LEDBAT — Data Link

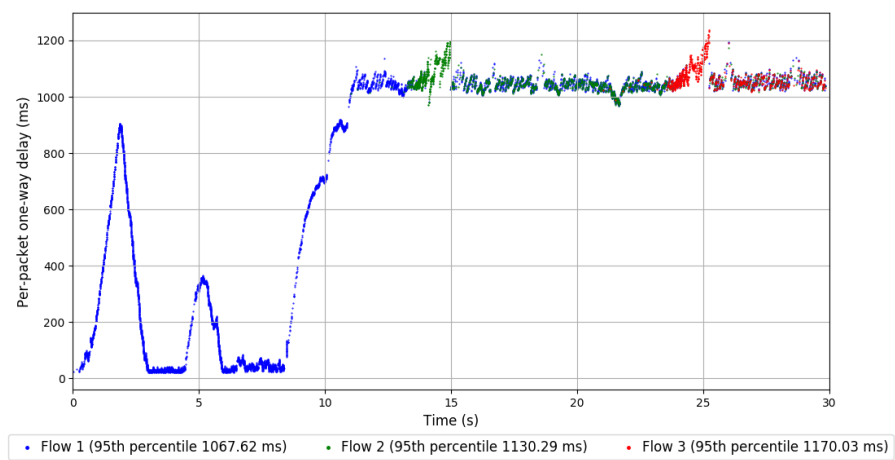
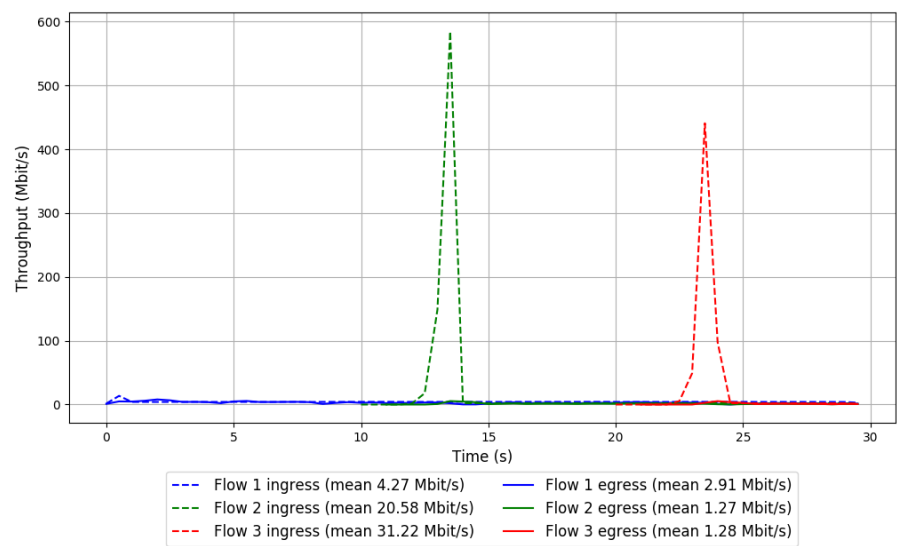


Run 1: Statistics of PCC

Start at: 2018-01-25 19:26:26
End at: 2018-01-25 19:26:56
Local clock offset: 3.933 ms
Remote clock offset: -17.519 ms

Below is generated by plot.py at 2018-01-25 20:13:38
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.09 Mbit/s
95th percentile per-packet one-way delay: 1091.827 ms
Loss rate: 85.54%
-- Flow 1:
Average throughput: 2.91 Mbit/s
95th percentile per-packet one-way delay: 1067.622 ms
Loss rate: 32.00%
-- Flow 2:
Average throughput: 1.27 Mbit/s
95th percentile per-packet one-way delay: 1130.290 ms
Loss rate: 94.13%
-- Flow 3:
Average throughput: 1.28 Mbit/s
95th percentile per-packet one-way delay: 1170.030 ms
Loss rate: 96.34%

Run 1: Report of PCC — Data Link

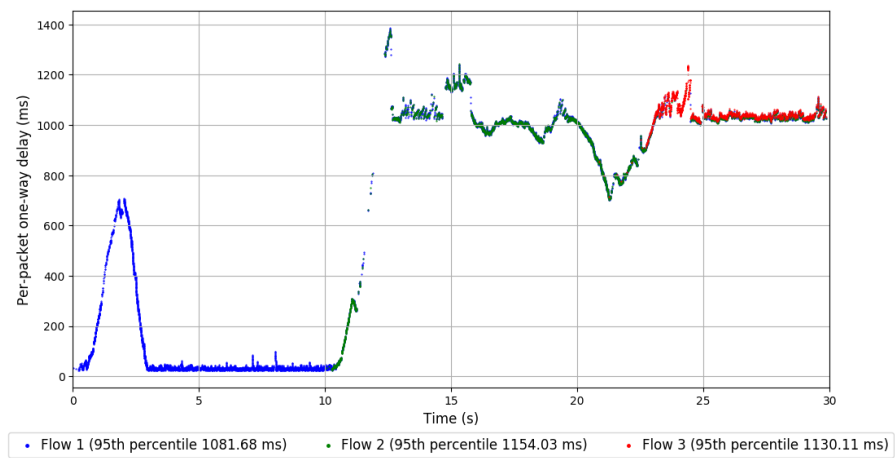
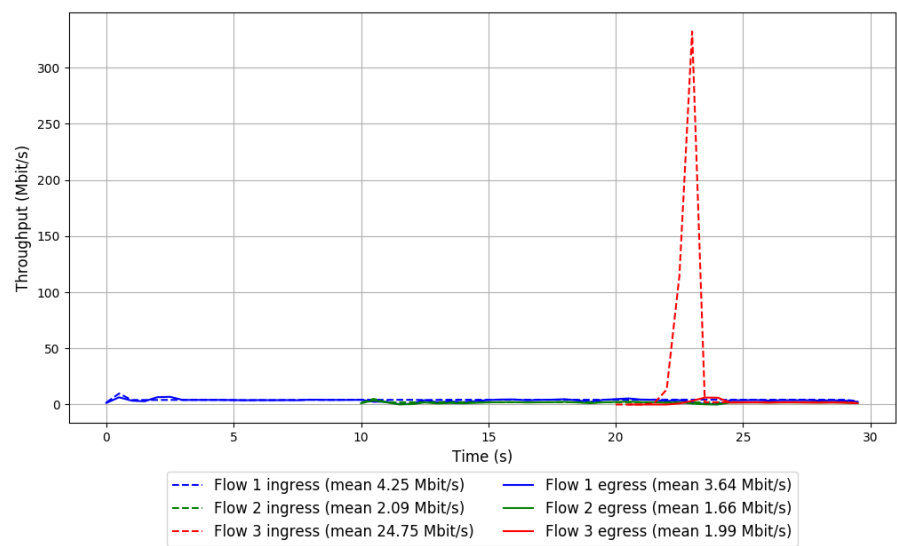


Run 2: Statistics of PCC

Start at: 2018-01-25 19:44:03
End at: 2018-01-25 19:44:33
Local clock offset: 1.202 ms
Remote clock offset: -18.306 ms

Below is generated by plot.py at 2018-01-25 20:13:38
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.34 Mbit/s
95th percentile per-packet one-way delay: 1129.285 ms
Loss rate: 61.37%
-- Flow 1:
Average throughput: 3.64 Mbit/s
95th percentile per-packet one-way delay: 1081.685 ms
Loss rate: 14.59%
-- Flow 2:
Average throughput: 1.66 Mbit/s
95th percentile per-packet one-way delay: 1154.028 ms
Loss rate: 20.90%
-- Flow 3:
Average throughput: 1.99 Mbit/s
95th percentile per-packet one-way delay: 1130.113 ms
Loss rate: 92.67%

Run 2: Report of PCC — Data Link

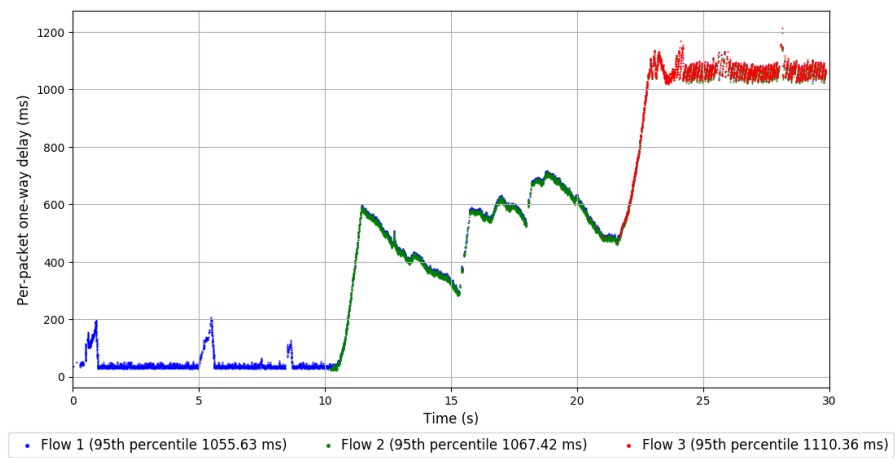
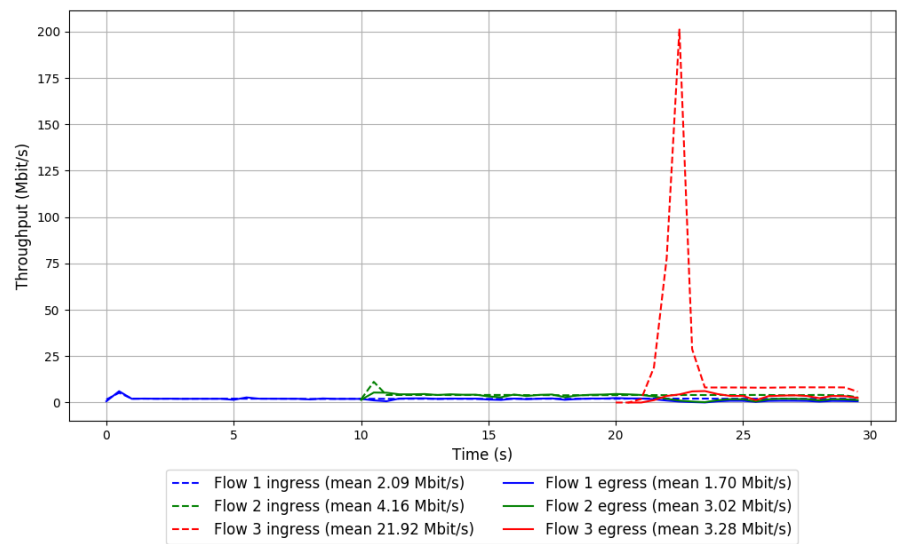


Run 3: Statistics of PCC

Start at: 2018-01-25 20:01:41
End at: 2018-01-25 20:02:11
Local clock offset: 3.268 ms
Remote clock offset: -18.489 ms

Below is generated by plot.py at 2018-01-25 20:13:38
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.73 Mbit/s
95th percentile per-packet one-way delay: 1082.834 ms
Loss rate: 60.93%
-- Flow 1:
Average throughput: 1.70 Mbit/s
95th percentile per-packet one-way delay: 1055.633 ms
Loss rate: 18.85%
-- Flow 2:
Average throughput: 3.02 Mbit/s
95th percentile per-packet one-way delay: 1067.419 ms
Loss rate: 27.49%
-- Flow 3:
Average throughput: 3.28 Mbit/s
95th percentile per-packet one-way delay: 1110.363 ms
Loss rate: 85.89%

Run 3: Report of PCC — Data Link



Run 1: Statistics of QUIC Cubic

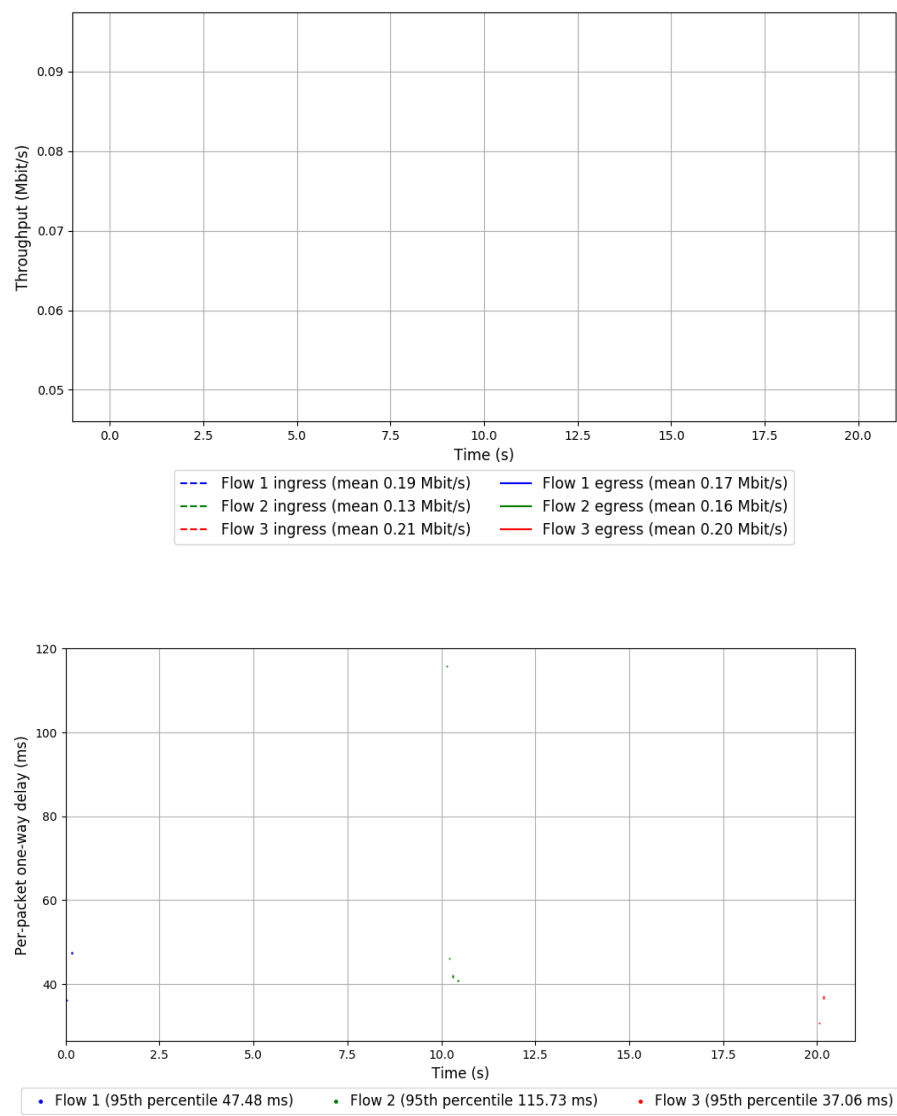
Start at: 2018-01-25 19:31:56

End at: 2018-01-25 19:32:26

Local clock offset: 1.03 ms

Remote clock offset: -17.314 ms

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

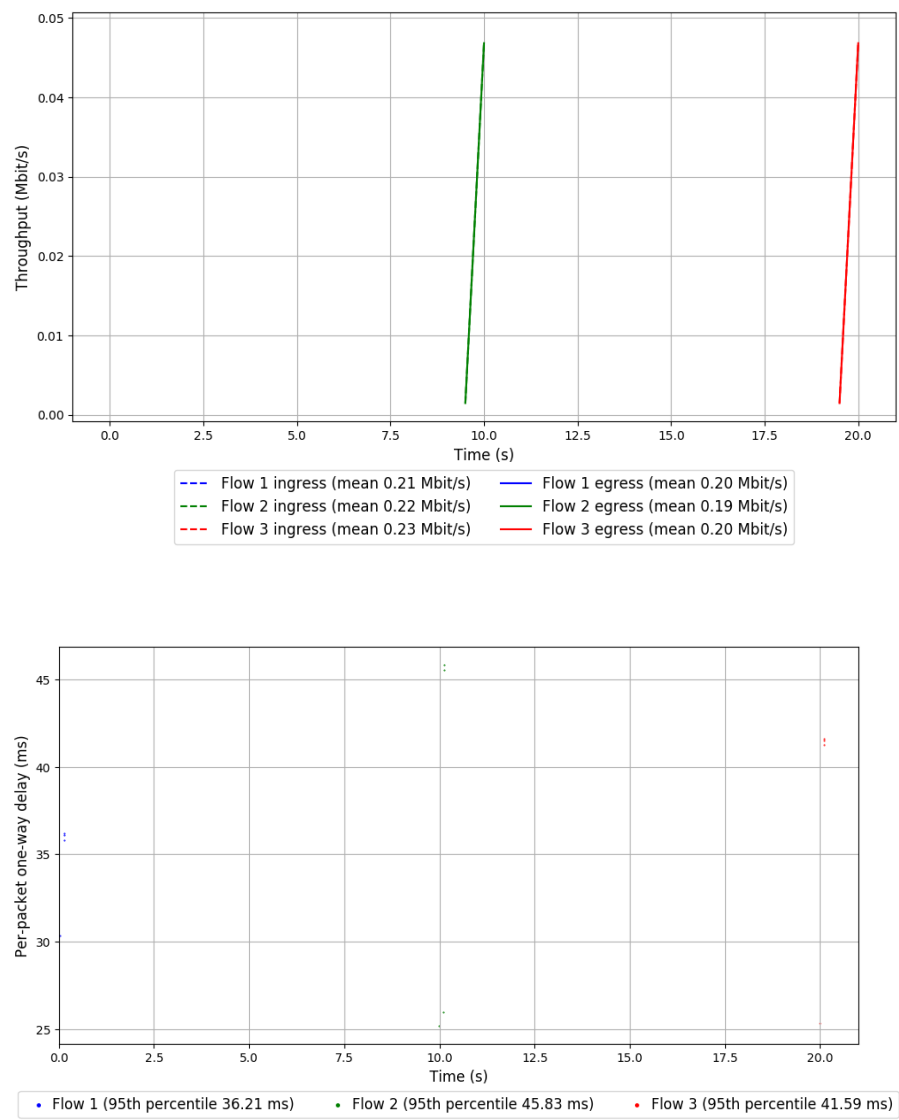
Start at: 2018-01-25 19:49:34

End at: 2018-01-25 19:50:04

Local clock offset: 3.597 ms

Remote clock offset: -16.46 ms

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

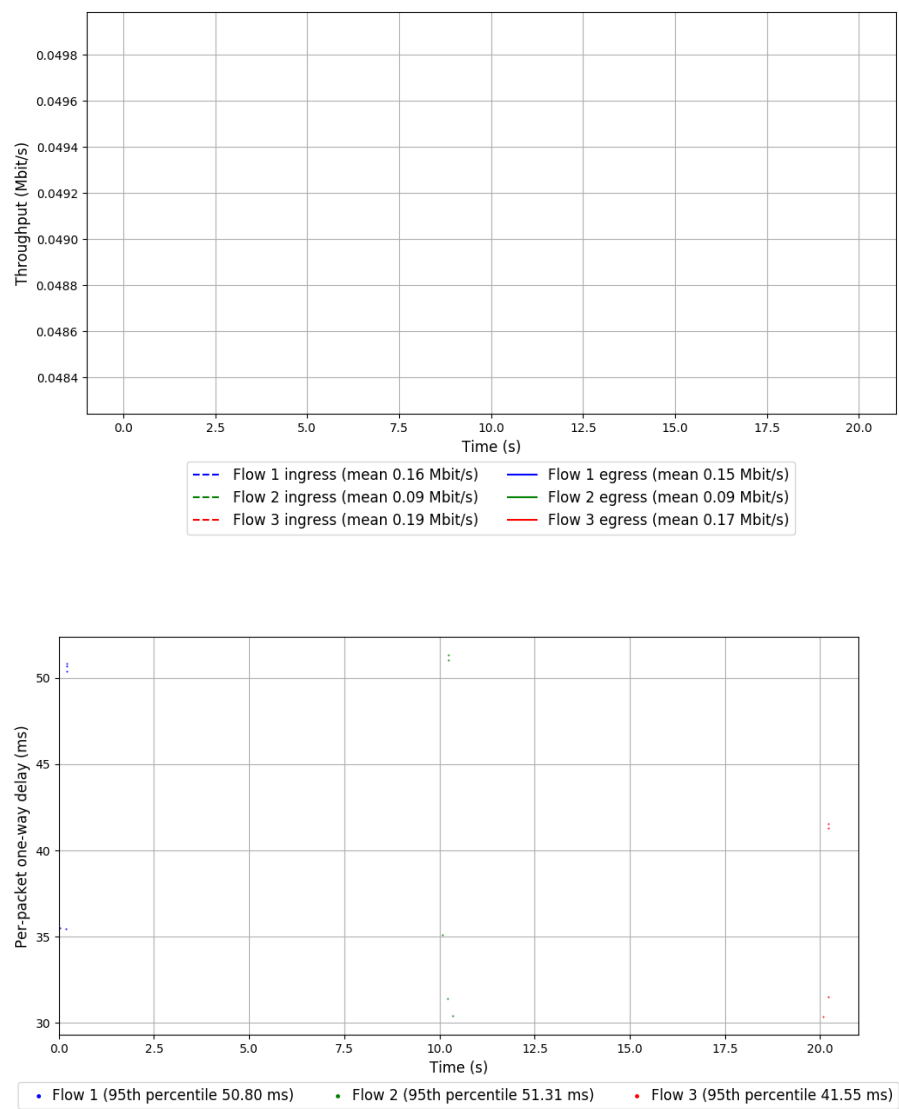
Start at: 2018-01-25 20:07:12

End at: 2018-01-25 20:07:42

Local clock offset: 2.356 ms

Remote clock offset: -18.775 ms

Run 3: Report of QUIC Cubic — Data Link

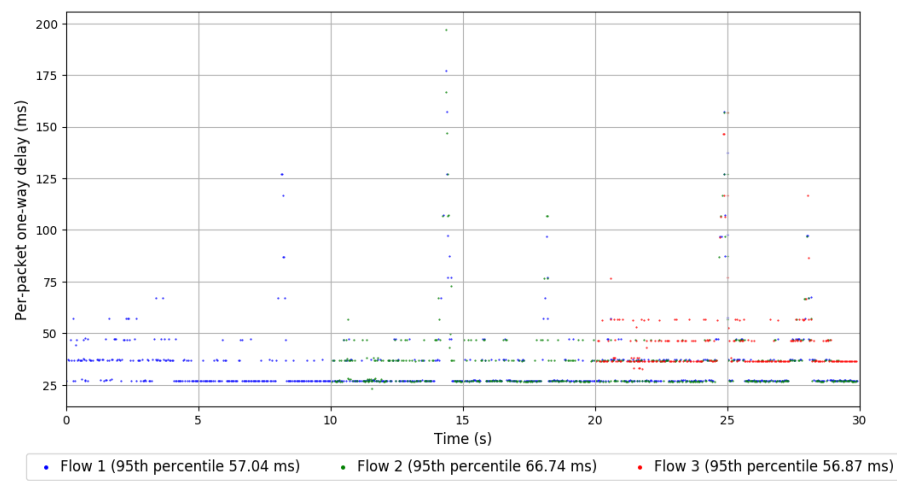
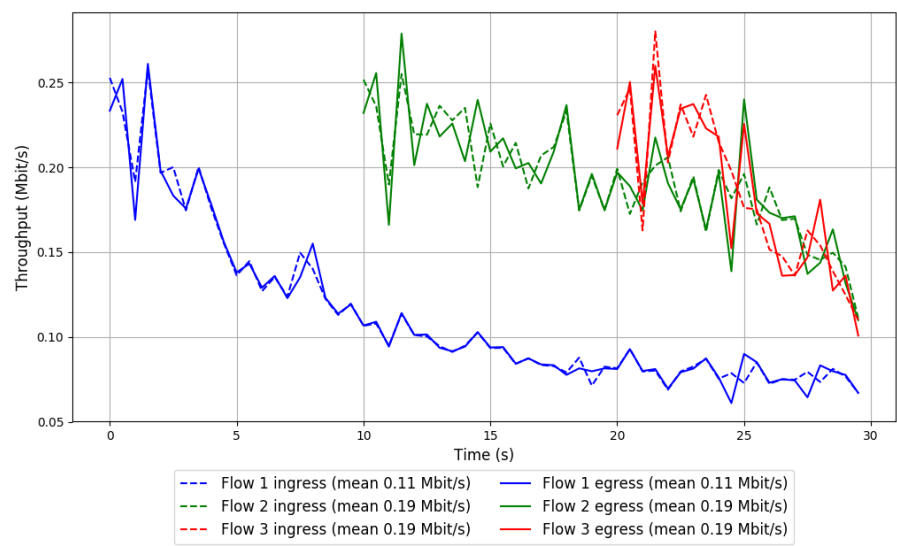


Run 1: Statistics of SCReAM

Start at: 2018-01-25 19:20:56
End at: 2018-01-25 19:21:26
Local clock offset: 3.374 ms
Remote clock offset: -16.254 ms

Below is generated by plot.py at 2018-01-25 20:13:38
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 57.037 ms
Loss rate: 0.34%
-- Flow 1:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 57.037 ms
Loss rate: 0.46%
-- Flow 2:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 66.740 ms
Loss rate: 0.29%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 56.867 ms
Loss rate: 0.25%

Run 1: Report of SReAM — Data Link

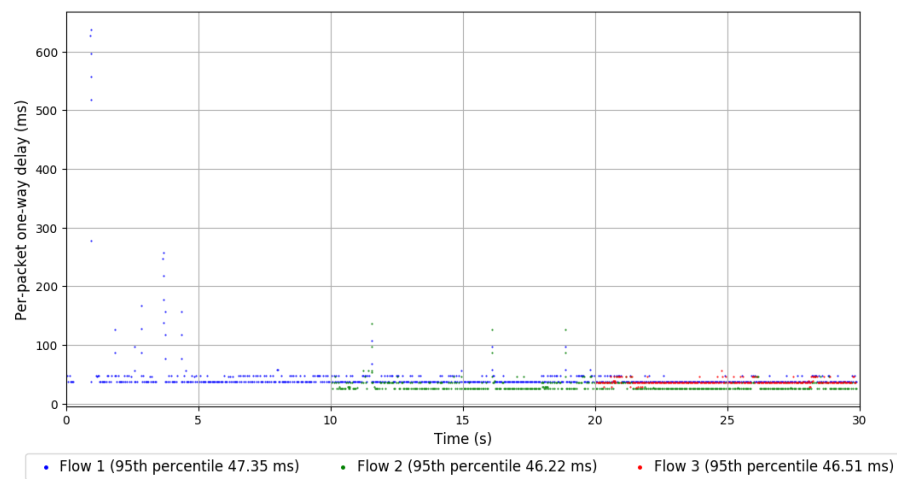
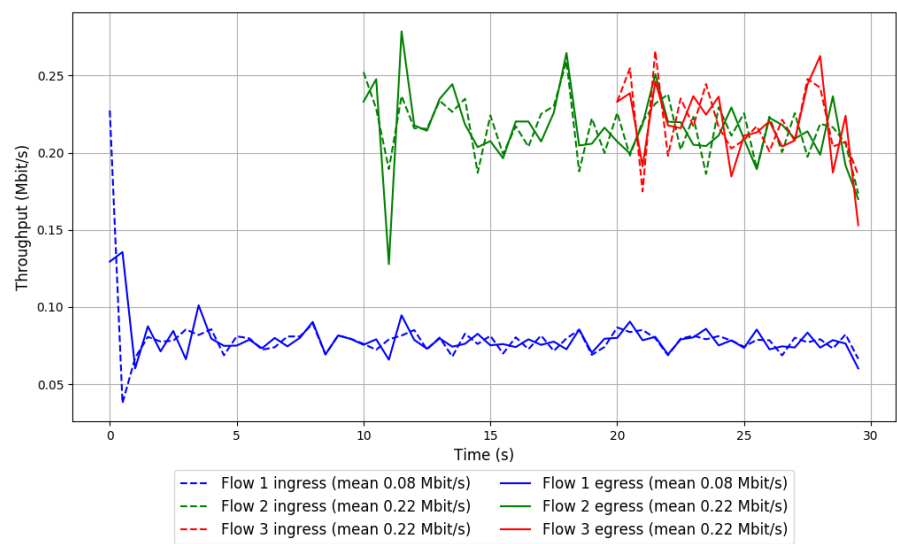


Run 2: Statistics of SReAM

Start at: 2018-01-25 19:38:32
End at: 2018-01-25 19:39:02
Local clock offset: 3.134 ms
Remote clock offset: -16.897 ms

Below is generated by plot.py at 2018-01-25 20:13:38
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 47.192 ms
Loss rate: 0.35%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 47.350 ms
Loss rate: 0.25%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 46.216 ms
Loss rate: 0.21%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 46.514 ms
Loss rate: 0.74%

Run 2: Report of SReAM — Data Link

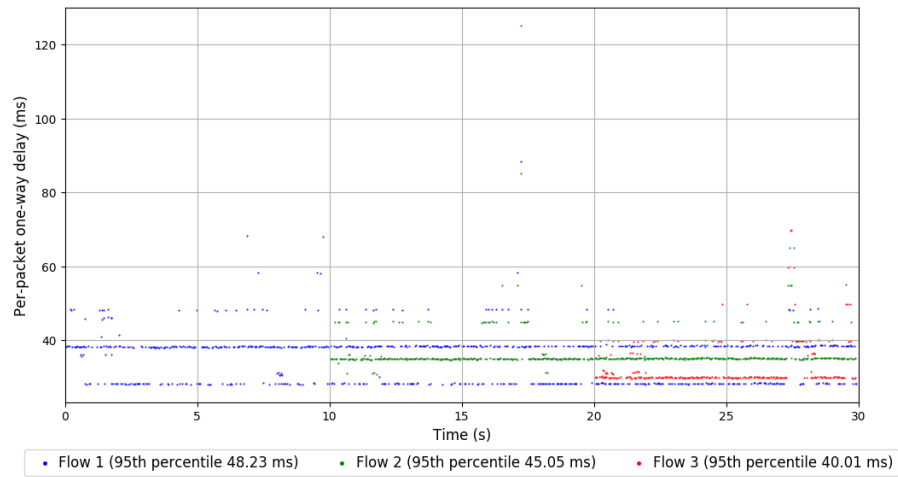
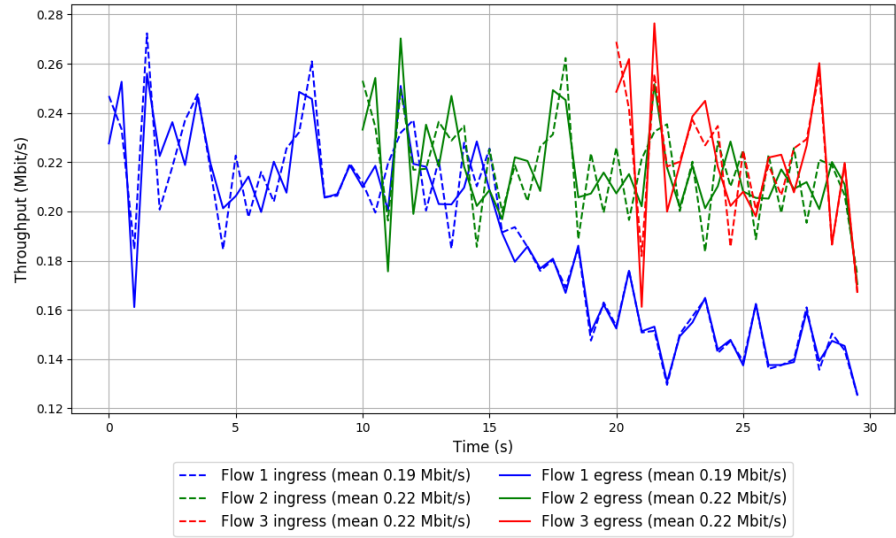


Run 3: Statistics of SReAM

Start at: 2018-01-25 19:56:10
End at: 2018-01-25 19:56:40
Local clock offset: 1.037 ms
Remote clock offset: -17.256 ms

Below is generated by plot.py at 2018-01-25 20:13:38
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 45.603 ms
Loss rate: 0.25%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 48.235 ms
Loss rate: 0.24%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 45.055 ms
Loss rate: 0.20%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 40.012 ms
Loss rate: 0.35%

Run 3: Report of SReAM — Data Link

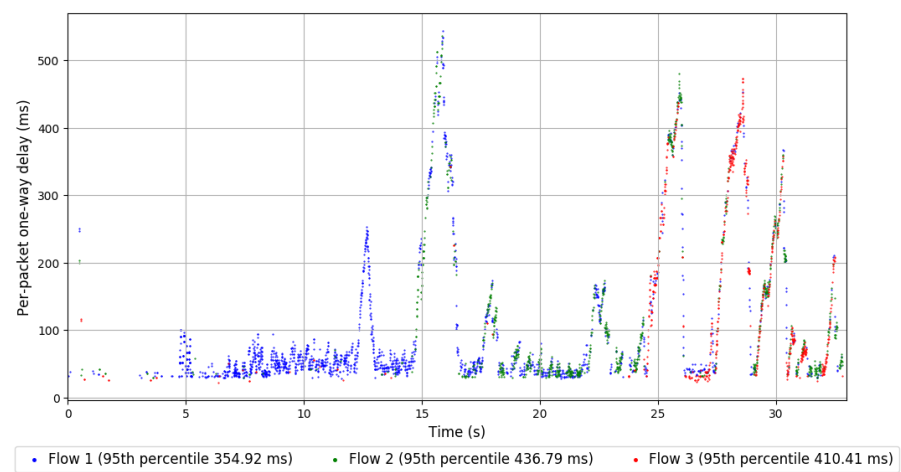
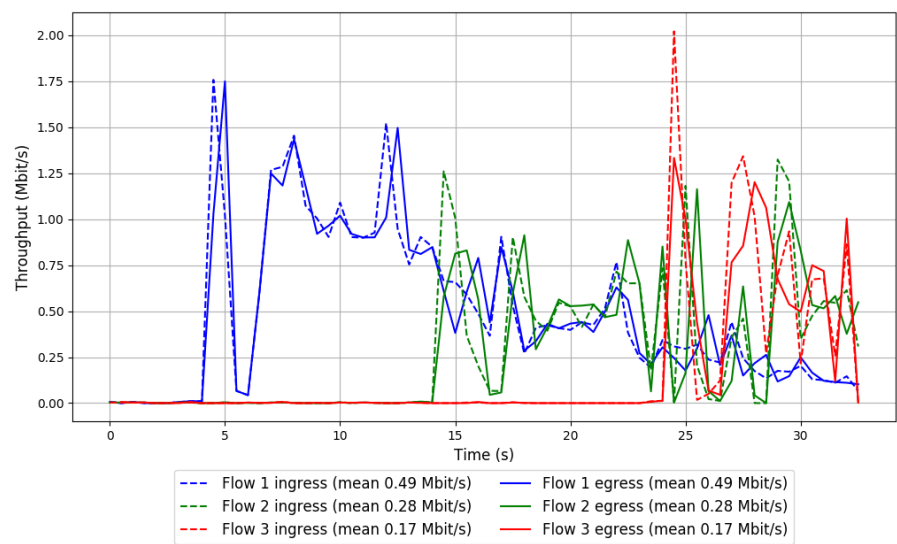


Run 1: Statistics of WebRTC media

Start at: 2018-01-25 19:36:20
End at: 2018-01-25 19:36:50
Local clock offset: 3.246 ms
Remote clock offset: -17.552 ms

Below is generated by plot.py at 2018-01-25 20:13:38
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 391.784 ms
Loss rate: 0.33%
-- Flow 1:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 354.922 ms
Loss rate: 0.10%
-- Flow 2:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 436.789 ms
Loss rate: 0.58%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 410.411 ms
Loss rate: 0.56%

Run 1: Report of WebRTC media — Data Link



Run 2: Statistics of WebRTC media

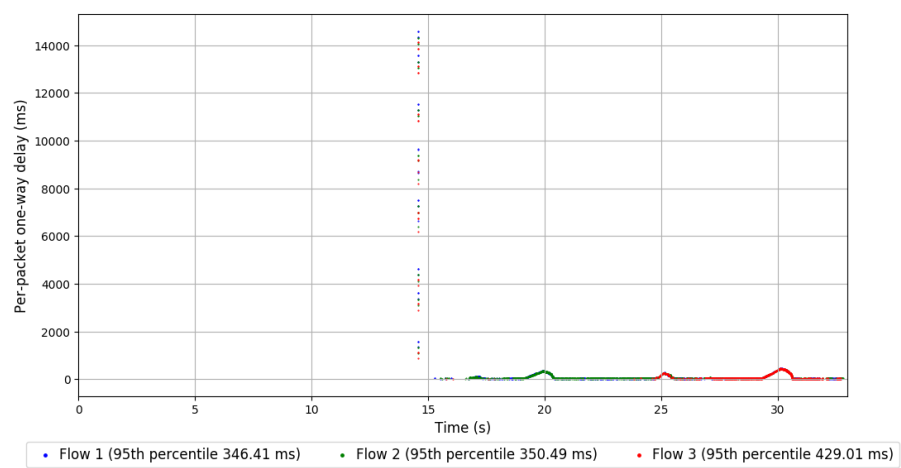
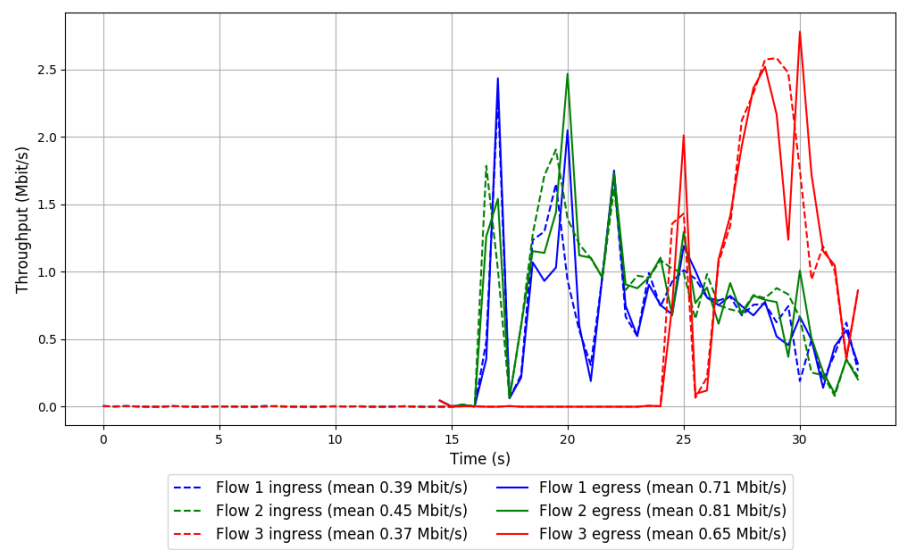
Start at: 2018-01-25 19:53:58

End at: 2018-01-25 19:54:28

Local clock offset: 3.418 ms

Remote clock offset: -16.309 ms

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

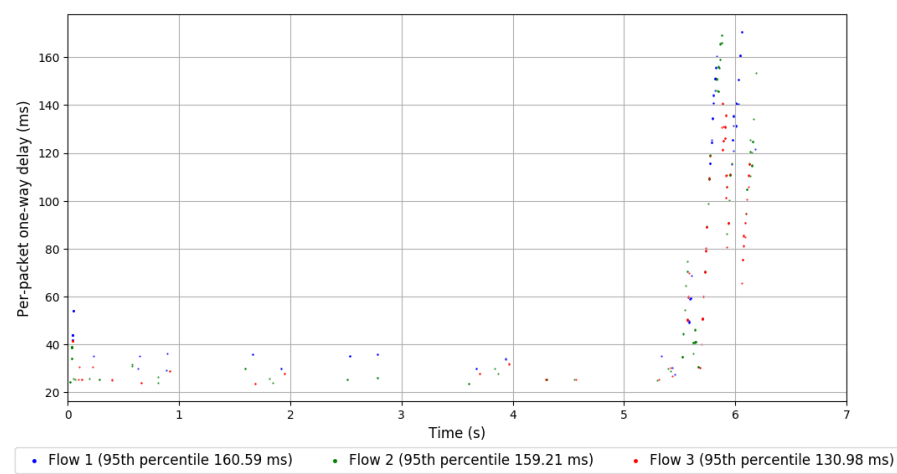
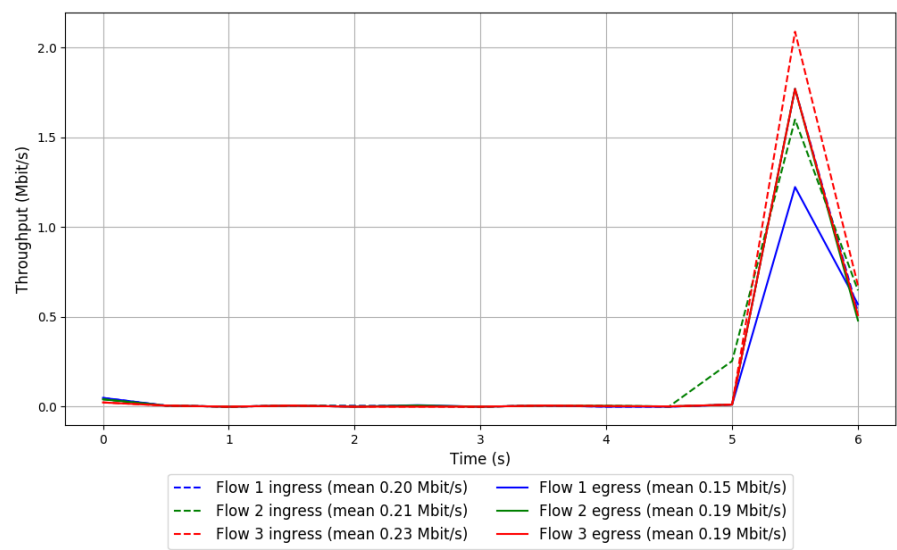
Start at: 2018-01-25 20:11:38

End at: 2018-01-25 20:12:08

Local clock offset: 0.689 ms

Remote clock offset: -18.825 ms

Run 3: Report of WebRTC media — Data Link

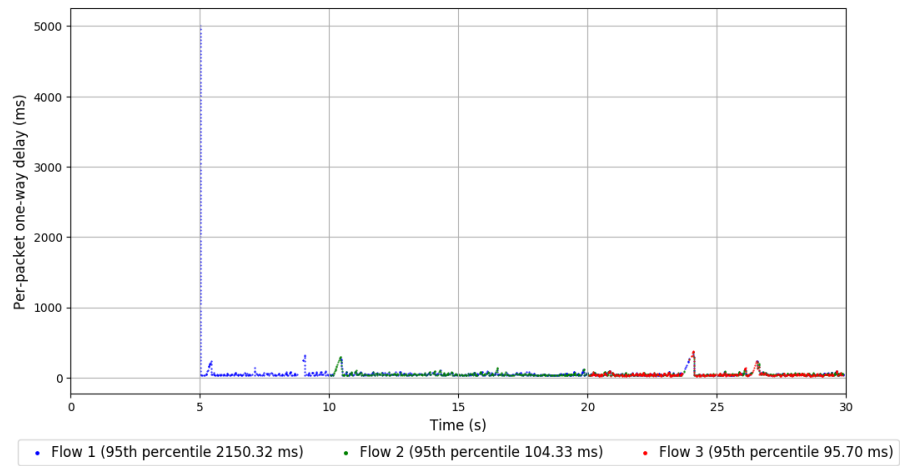
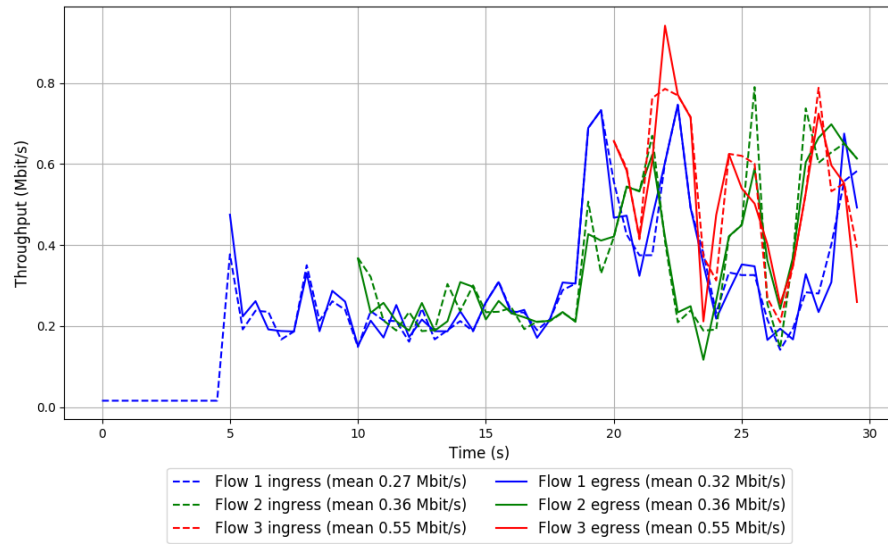


Run 1: Statistics of Sprout

Start at: 2018-01-25 19:19:51
End at: 2018-01-25 19:20:21
Local clock offset: 4.324 ms
Remote clock offset: -16.621 ms

Below is generated by plot.py at 2018-01-25 20:13:38
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 231.013 ms
Loss rate: 0.71%
-- Flow 1:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 2150.316 ms
Loss rate: 0.95%
-- Flow 2:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 104.330 ms
Loss rate: 0.02%
-- Flow 3:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 95.697 ms
Loss rate: 1.26%

Run 1: Report of Sprout — Data Link

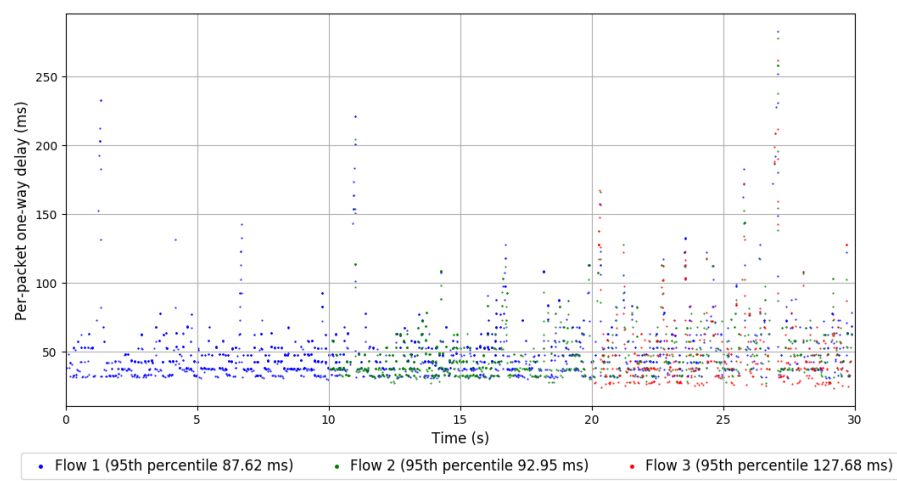
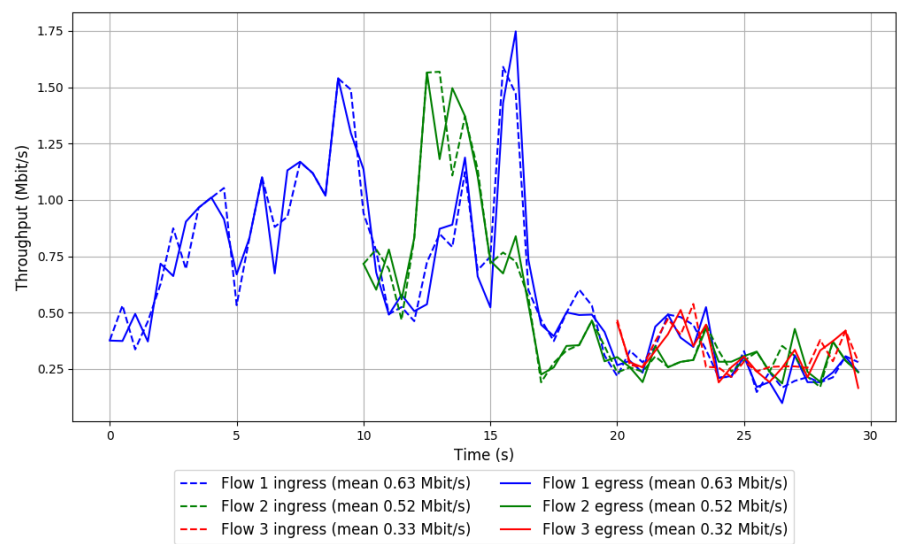


Run 2: Statistics of Sprout

Start at: 2018-01-25 19:37:26
End at: 2018-01-25 19:37:56
Local clock offset: 1.186 ms
Remote clock offset: -18.827 ms

```
# Below is generated by plot.py at 2018-01-25 20:13:38
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.08 Mbit/s
95th percentile per-packet one-way delay: 101.076 ms
Loss rate: 0.25%
-- Flow 1:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 87.619 ms
Loss rate: 0.12%
-- Flow 2:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 92.952 ms
Loss rate: 0.01%
-- Flow 3:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 127.676 ms
Loss rate: 1.83%
```


Run 2: Report of Sprout — Data Link

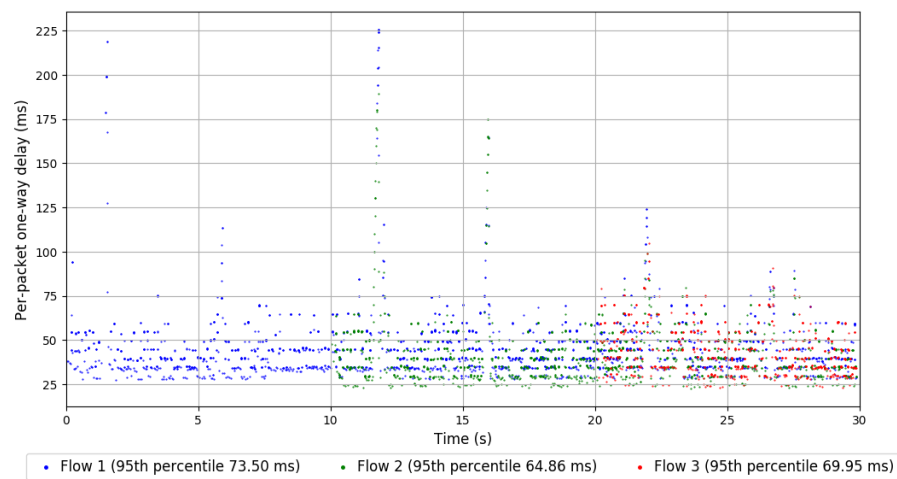
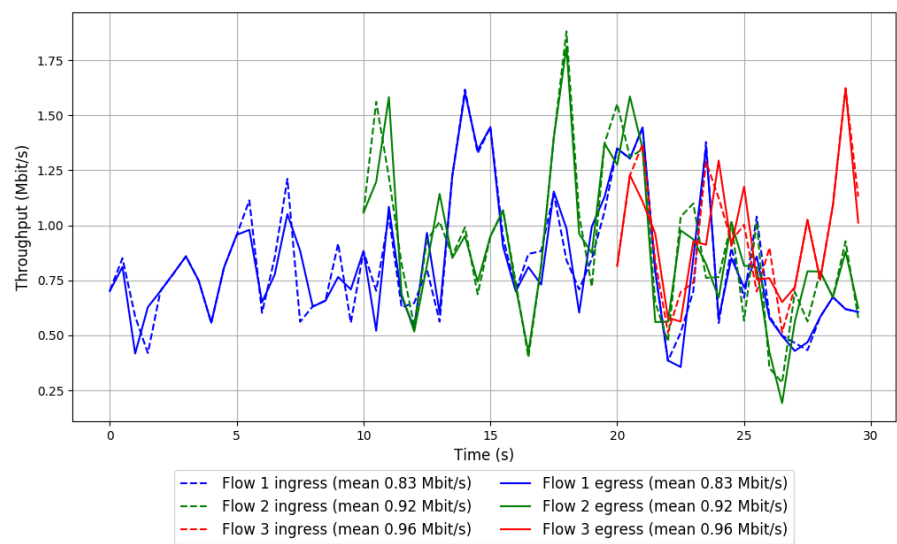


Run 3: Statistics of Sprout

Start at: 2018-01-25 19:55:04
End at: 2018-01-25 19:55:34
Local clock offset: 2.097 ms
Remote clock offset: -16.962 ms

Below is generated by plot.py at 2018-01-25 20:13:38
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.75 Mbit/s
95th percentile per-packet one-way delay: 69.891 ms
Loss rate: 0.58%
-- Flow 1:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 73.501 ms
Loss rate: 0.39%
-- Flow 2:
Average throughput: 0.92 Mbit/s
95th percentile per-packet one-way delay: 64.856 ms
Loss rate: 0.78%
-- Flow 3:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 69.951 ms
Loss rate: 0.71%

Run 3: Report of Sprout — Data Link

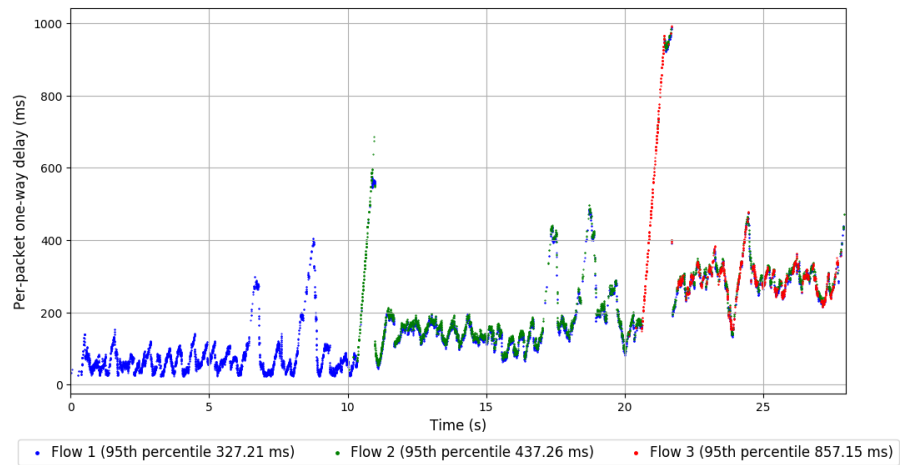
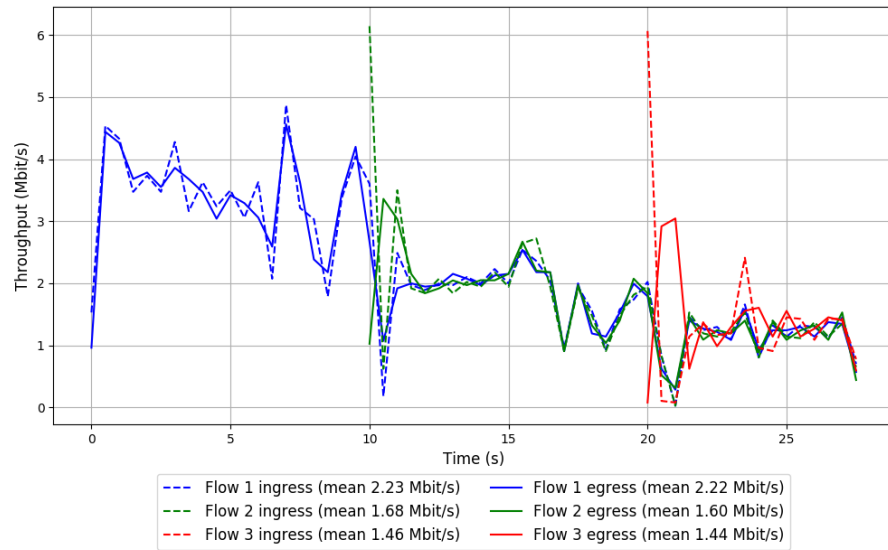


Run 1: Statistics of TaoVA-100x

Start at: 2018-01-25 19:24:14
End at: 2018-01-25 19:24:44
Local clock offset: 2.986 ms
Remote clock offset: -16.586 ms

Below is generated by plot.py at 2018-01-25 20:13:38
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.64 Mbit/s
95th percentile per-packet one-way delay: 434.124 ms
Loss rate: 2.42%
-- Flow 1:
Average throughput: 2.22 Mbit/s
95th percentile per-packet one-way delay: 327.212 ms
Loss rate: 0.99%
-- Flow 2:
Average throughput: 1.60 Mbit/s
95th percentile per-packet one-way delay: 437.259 ms
Loss rate: 4.74%
-- Flow 3:
Average throughput: 1.44 Mbit/s
95th percentile per-packet one-way delay: 857.149 ms
Loss rate: 4.11%

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

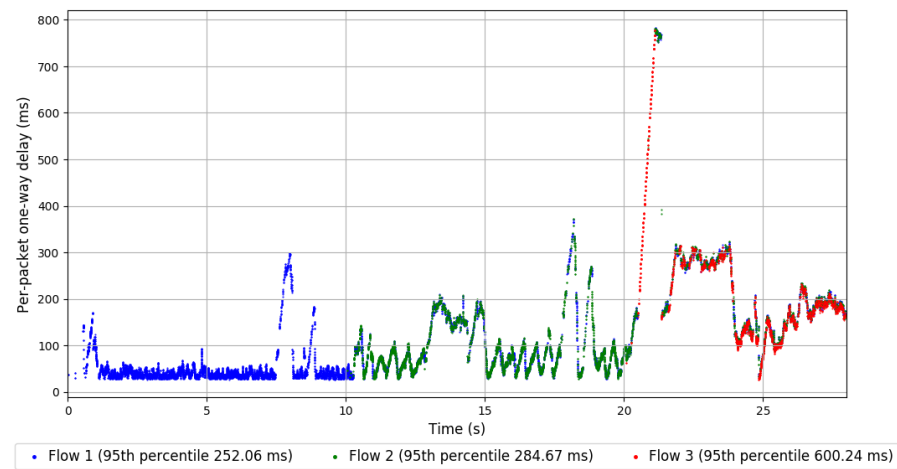
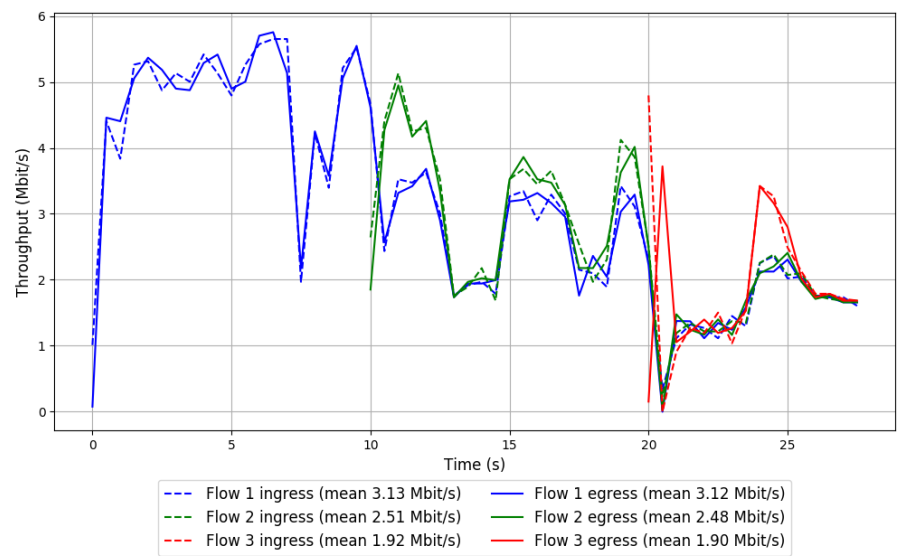


Run 2: Statistics of TaoVA-100x

Start at: 2018-01-25 19:41:51
End at: 2018-01-25 19:42:21
Local clock offset: 0.717 ms
Remote clock offset: -17.571 ms

Below is generated by plot.py at 2018-01-25 20:13:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.25 Mbit/s
95th percentile per-packet one-way delay: 286.525 ms
Loss rate: 0.95%
-- Flow 1:
Average throughput: 3.12 Mbit/s
95th percentile per-packet one-way delay: 252.064 ms
Loss rate: 0.49%
-- Flow 2:
Average throughput: 2.48 Mbit/s
95th percentile per-packet one-way delay: 284.669 ms
Loss rate: 1.38%
-- Flow 3:
Average throughput: 1.90 Mbit/s
95th percentile per-packet one-way delay: 600.235 ms
Loss rate: 2.29%

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

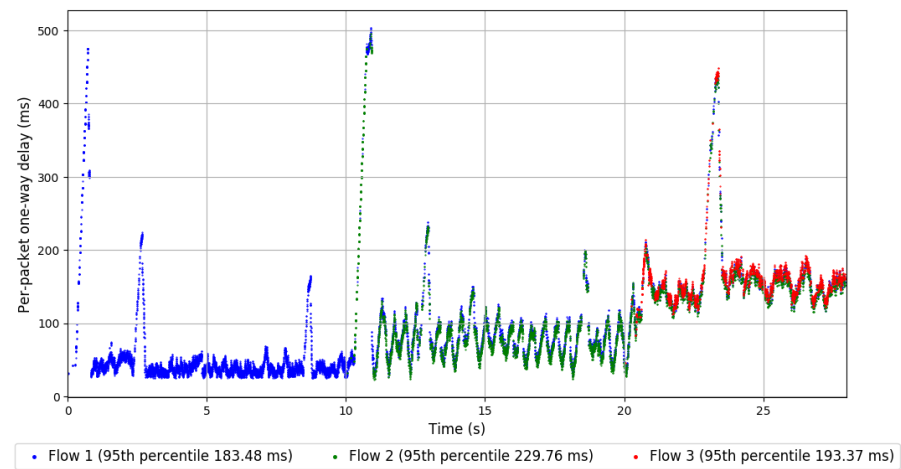
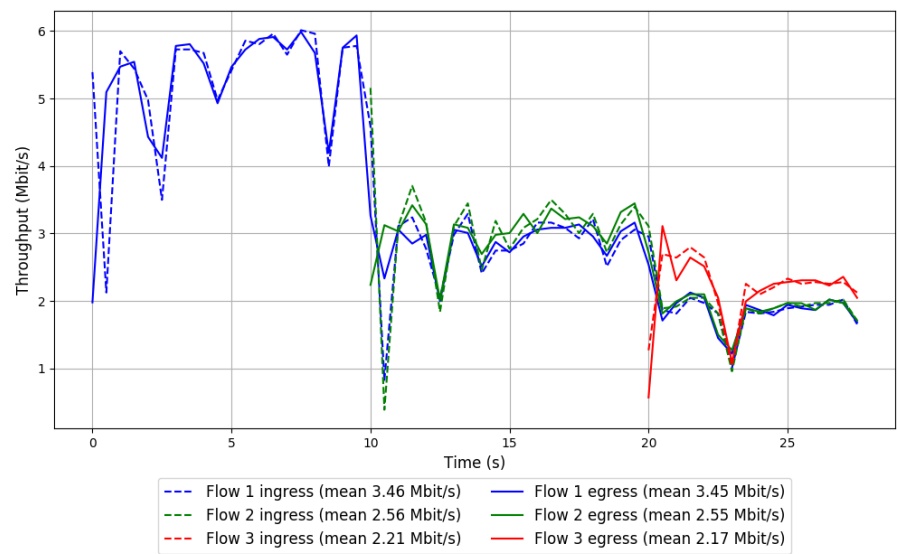


Run 3: Statistics of TaoVA-100x

Start at: 2018-01-25 19:59:29
End at: 2018-01-25 19:59:59
Local clock offset: 4.159 ms
Remote clock offset: -17.641 ms

Below is generated by plot.py at 2018-01-25 20:13:44
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.70 Mbit/s
95th percentile per-packet one-way delay: 197.170 ms
Loss rate: 0.67%
-- Flow 1:
Average throughput: 3.45 Mbit/s
95th percentile per-packet one-way delay: 183.483 ms
Loss rate: 0.33%
-- Flow 2:
Average throughput: 2.55 Mbit/s
95th percentile per-packet one-way delay: 229.762 ms
Loss rate: 0.63%
-- Flow 3:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 193.367 ms
Loss rate: 2.65%

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



Run 1: Statistics of TCP Vegas

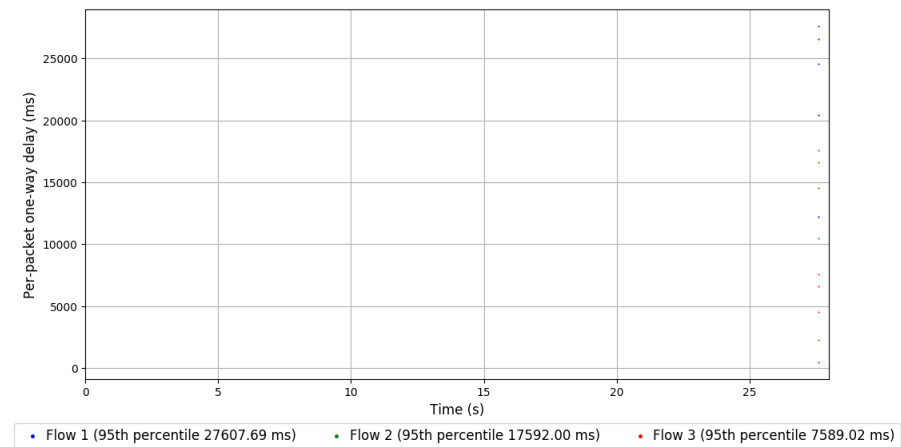
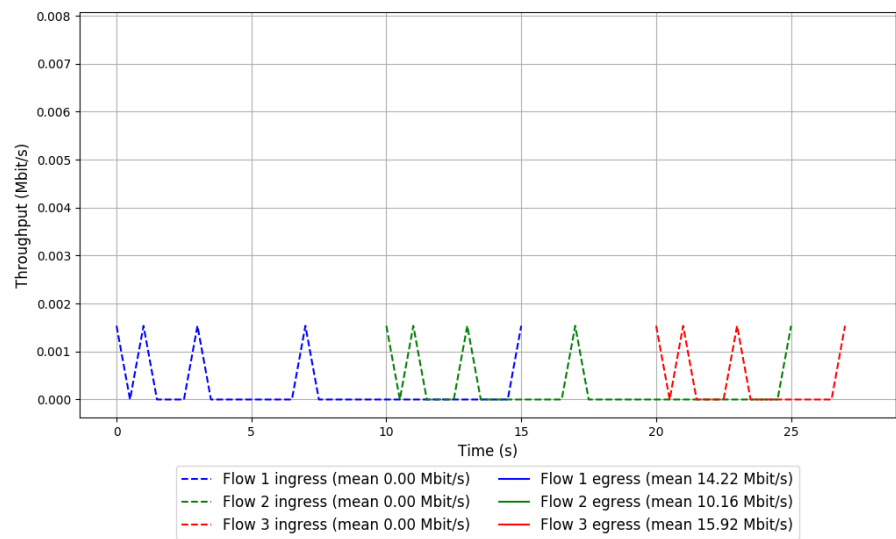
Start at: 2018-01-25 19:33:02

End at: 2018-01-25 19:33:32

Local clock offset: 2.819 ms

Remote clock offset: -17.584 ms

Run 1: Report of TCP Vegas — Data Link

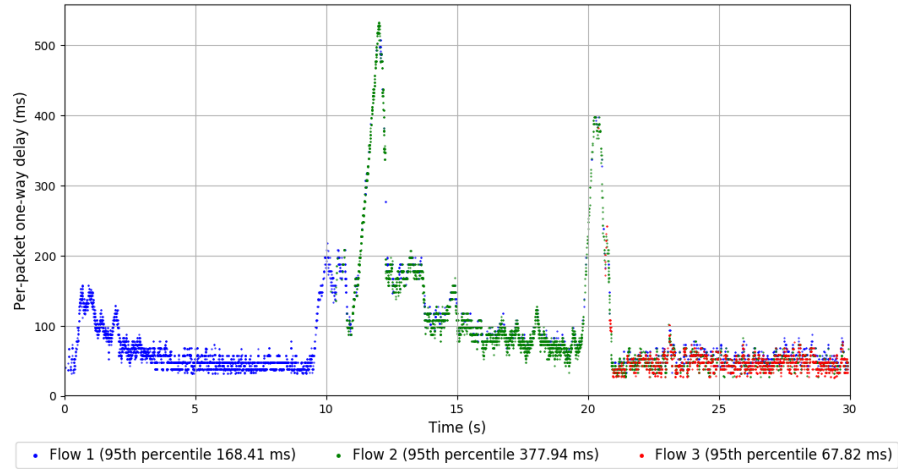
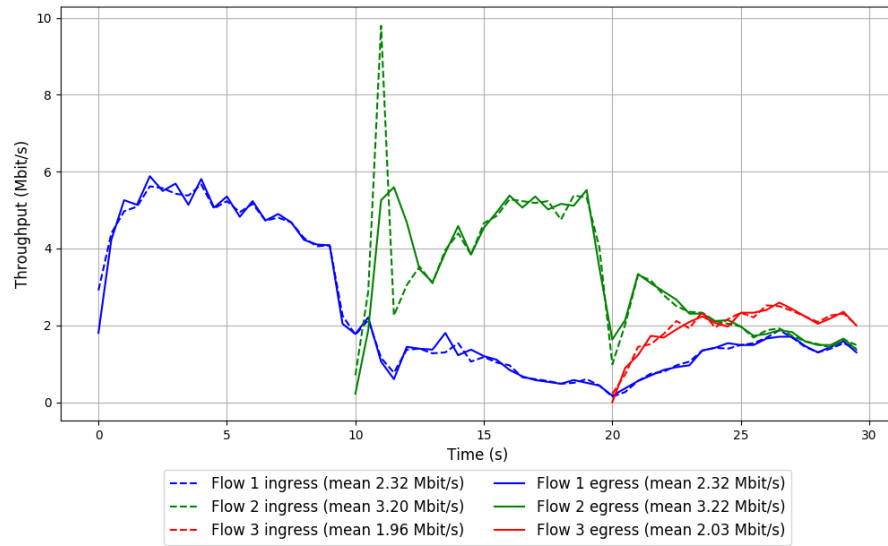


Run 2: Statistics of TCP Vegas

Start at: 2018-01-25 19:50:40
End at: 2018-01-25 19:51:10
Local clock offset: 3.181 ms
Remote clock offset: -16.868 ms

Below is generated by plot.py at 2018-01-25 20:13:44
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.09 Mbit/s
95th percentile per-packet one-way delay: 203.323 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 2.32 Mbit/s
95th percentile per-packet one-way delay: 168.413 ms
Loss rate: 0.17%
-- Flow 2:
Average throughput: 3.22 Mbit/s
95th percentile per-packet one-way delay: 377.945 ms
Loss rate: 0.28%
-- Flow 3:
Average throughput: 2.03 Mbit/s
95th percentile per-packet one-way delay: 67.822 ms
Loss rate: 0.86%

Run 2: Report of TCP Vegas — Data Link

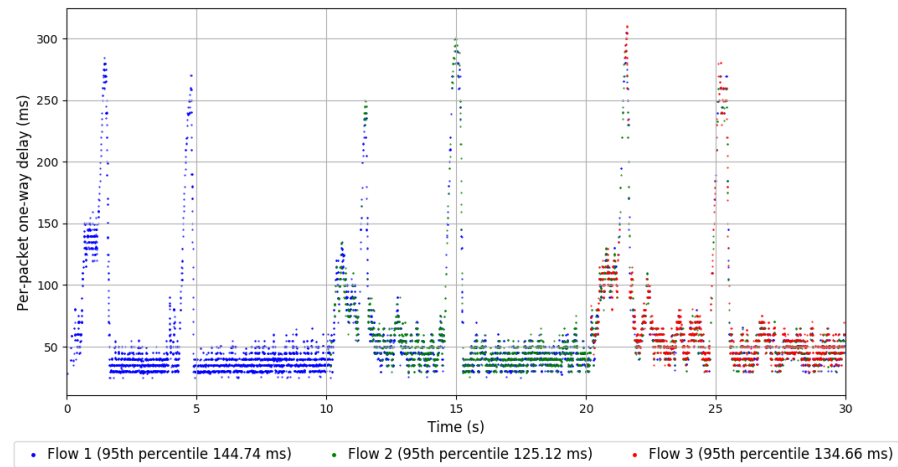
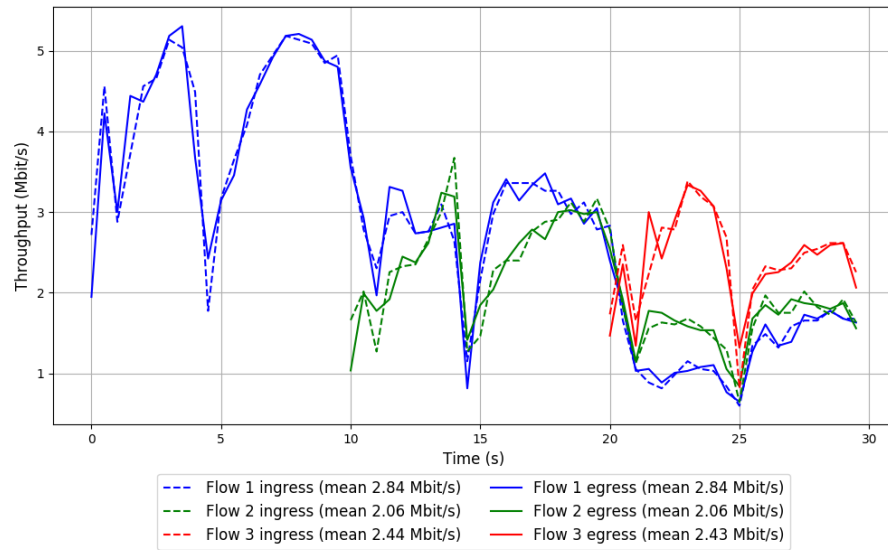


Run 3: Statistics of TCP Vegas

Start at: 2018-01-25 20:08:18
End at: 2018-01-25 20:08:48
Local clock offset: 2.646 ms
Remote clock offset: -16.673 ms

Below is generated by plot.py at 2018-01-25 20:13:44
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.01 Mbit/s
95th percentile per-packet one-way delay: 140.027 ms
Loss rate: 0.32%
-- Flow 1:
Average throughput: 2.84 Mbit/s
95th percentile per-packet one-way delay: 144.736 ms
Loss rate: 0.16%
-- Flow 2:
Average throughput: 2.06 Mbit/s
95th percentile per-packet one-way delay: 125.124 ms
Loss rate: 0.29%
-- Flow 3:
Average throughput: 2.43 Mbit/s
95th percentile per-packet one-way delay: 134.665 ms
Loss rate: 0.94%

Run 3: Report of TCP Vegas — Data Link

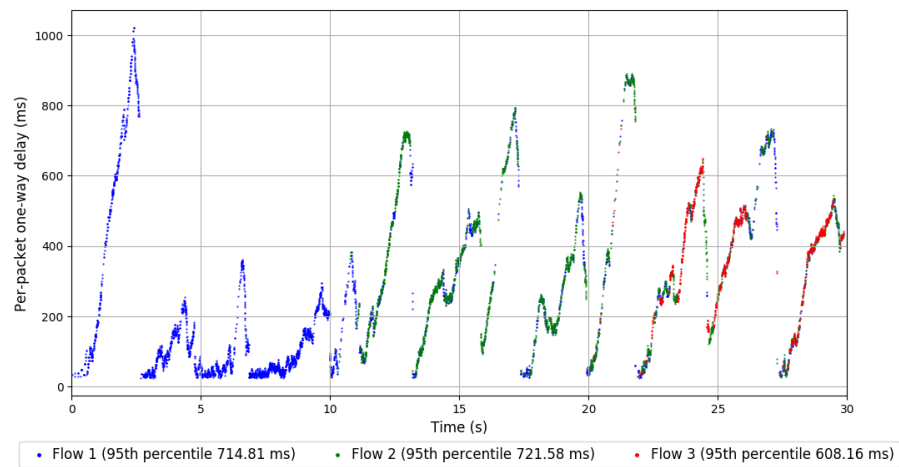
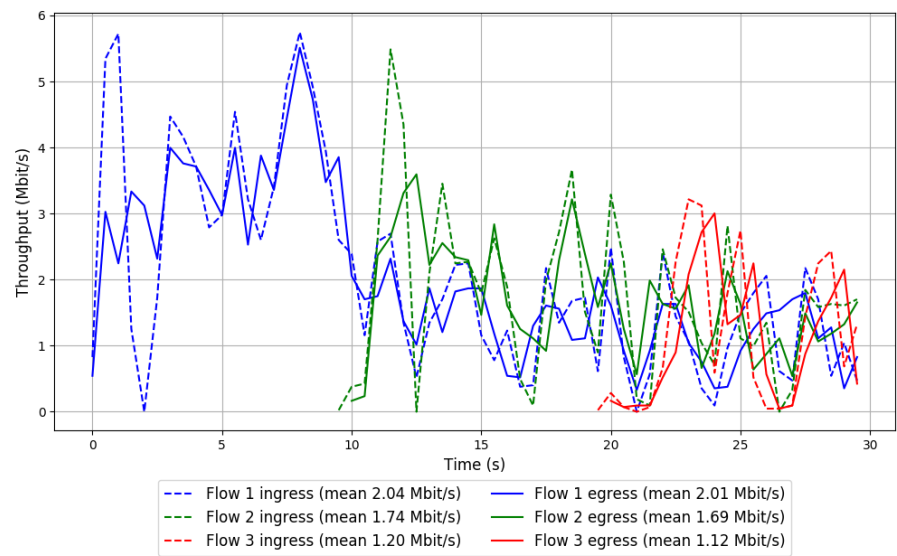


Run 1: Statistics of Verus

Start at: 2018-01-25 19:23:08
End at: 2018-01-25 19:23:38
Local clock offset: 3.727 ms
Remote clock offset: -16.287 ms

Below is generated by plot.py at 2018-01-25 20:13:44
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.50 Mbit/s
95th percentile per-packet one-way delay: 713.849 ms
Loss rate: 2.50%
-- Flow 1:
Average throughput: 2.01 Mbit/s
95th percentile per-packet one-way delay: 714.810 ms
Loss rate: 1.13%
-- Flow 2:
Average throughput: 1.69 Mbit/s
95th percentile per-packet one-way delay: 721.579 ms
Loss rate: 3.21%
-- Flow 3:
Average throughput: 1.12 Mbit/s
95th percentile per-packet one-way delay: 608.162 ms
Loss rate: 7.39%

Run 1: Report of Verus — Data Link

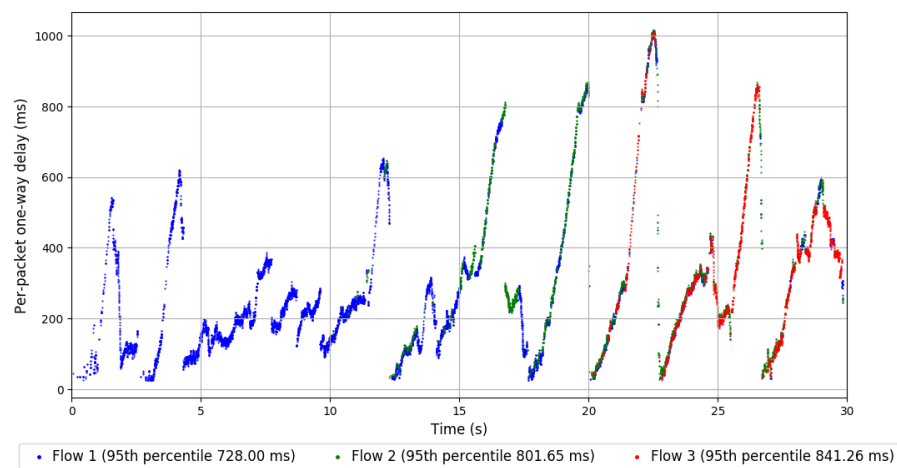
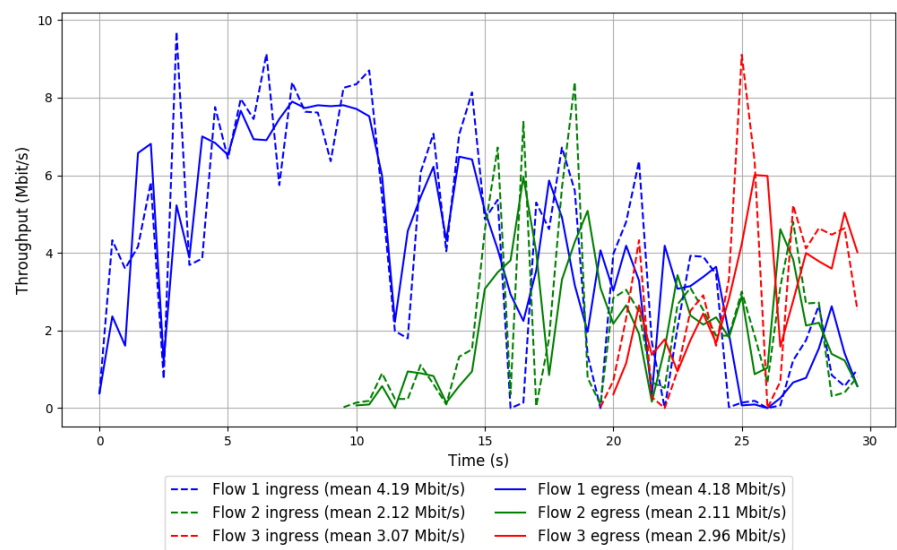


Run 2: Statistics of Verus

Start at: 2018-01-25 19:40:44
End at: 2018-01-25 19:41:14
Local clock offset: 1.033 ms
Remote clock offset: -17.18 ms

Below is generated by plot.py at 2018-01-25 20:13:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 6.56 Mbit/s
95th percentile per-packet one-way delay: 791.156 ms
Loss rate: 1.17%
-- Flow 1:
Average throughput: 4.18 Mbit/s
95th percentile per-packet one-way delay: 727.998 ms
Loss rate: 0.40%
-- Flow 2:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 801.651 ms
Loss rate: 0.96%
-- Flow 3:
Average throughput: 2.96 Mbit/s
95th percentile per-packet one-way delay: 841.265 ms
Loss rate: 4.63%

Run 2: Report of Verus — Data Link

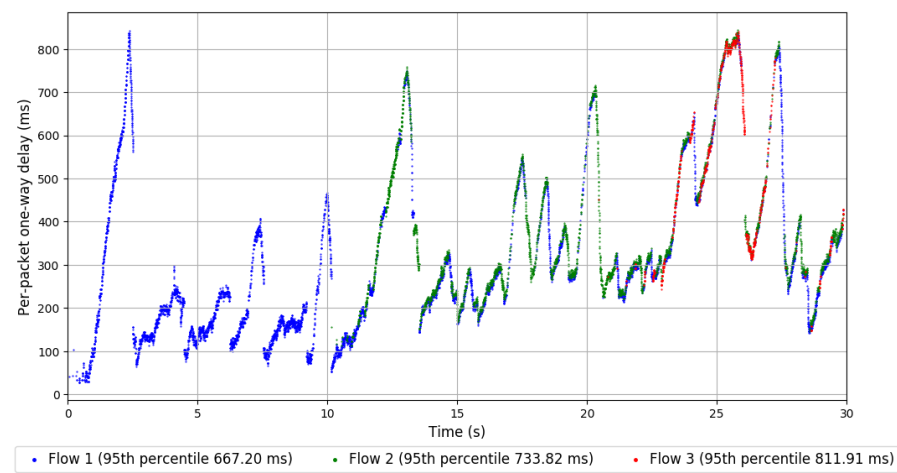
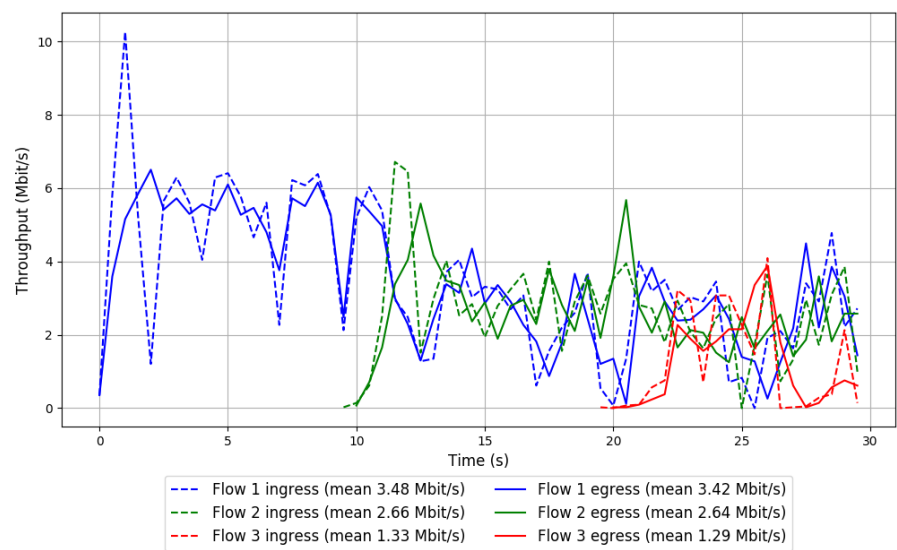


Run 3: Statistics of Verus

Start at: 2018-01-25 19:58:22
End at: 2018-01-25 19:58:52
Local clock offset: 3.567 ms
Remote clock offset: -18.419 ms

Below is generated by plot.py at 2018-01-25 20:13:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.57 Mbit/s
95th percentile per-packet one-way delay: 729.811 ms
Loss rate: 1.95%
-- Flow 1:
Average throughput: 3.42 Mbit/s
95th percentile per-packet one-way delay: 667.196 ms
Loss rate: 1.80%
-- Flow 2:
Average throughput: 2.64 Mbit/s
95th percentile per-packet one-way delay: 733.820 ms
Loss rate: 1.76%
-- Flow 3:
Average throughput: 1.29 Mbit/s
95th percentile per-packet one-way delay: 811.913 ms
Loss rate: 3.92%

Run 3: Report of Verus — Data Link

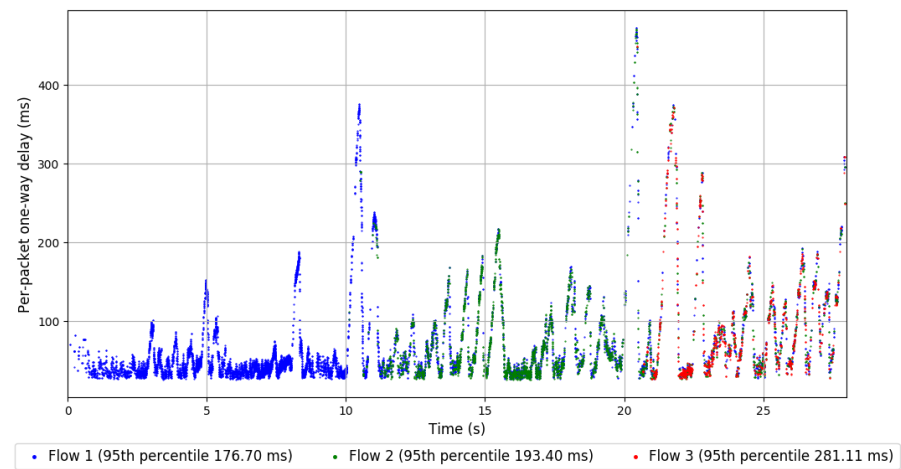
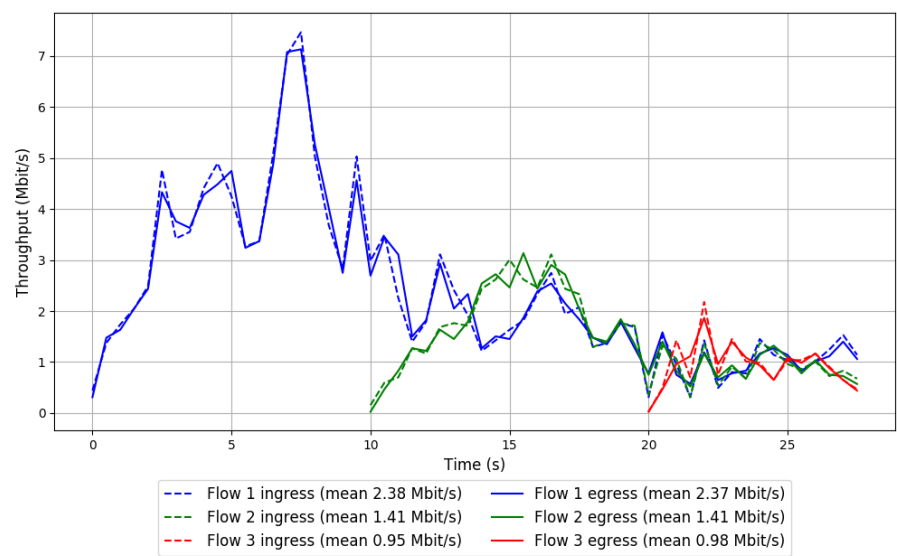


Run 1: Statistics of Copa

Start at: 2018-01-25 19:27:32
End at: 2018-01-25 19:28:02
Local clock offset: 3.604 ms
Remote clock offset: -19.276 ms

Below is generated by plot.py at 2018-01-25 20:13:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.54 Mbit/s
95th percentile per-packet one-way delay: 190.972 ms
Loss rate: 0.59%
-- Flow 1:
Average throughput: 2.37 Mbit/s
95th percentile per-packet one-way delay: 176.702 ms
Loss rate: 0.41%
-- Flow 2:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 193.397 ms
Loss rate: 0.72%
-- Flow 3:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 281.114 ms
Loss rate: 1.74%

Run 1: Report of Copa — Data Link

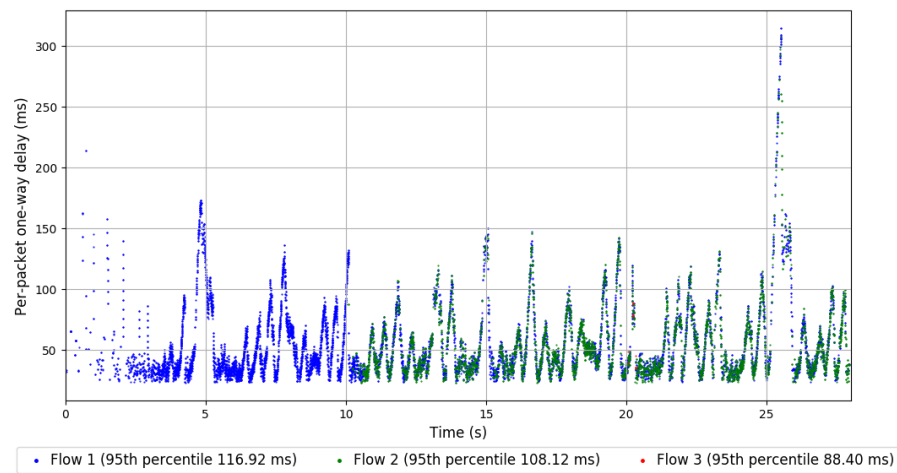
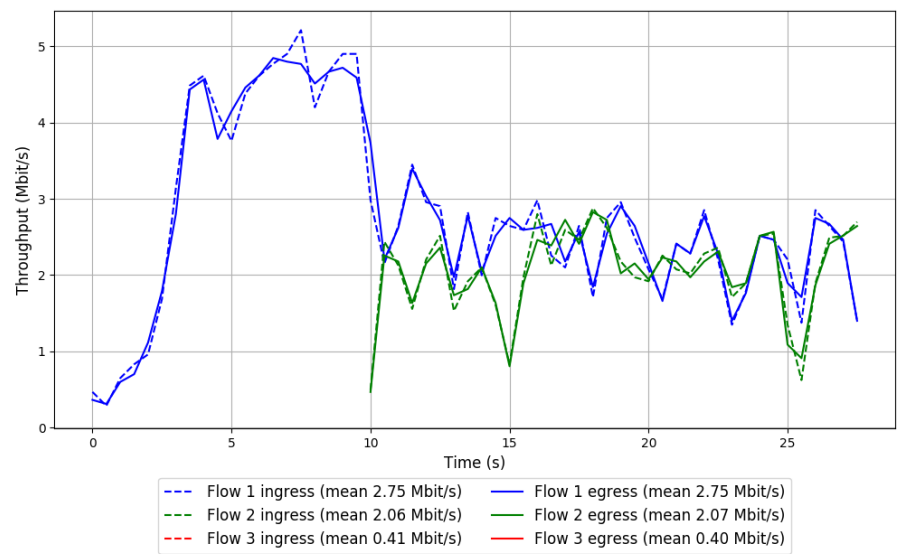


Run 2: Statistics of Copa

Start at: 2018-01-25 19:45:10
End at: 2018-01-25 19:45:40
Local clock offset: 0.827 ms
Remote clock offset: -17.682 ms

Below is generated by plot.py at 2018-01-25 20:13:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.07 Mbit/s
95th percentile per-packet one-way delay: 114.127 ms
Loss rate: 0.19%
-- Flow 1:
Average throughput: 2.75 Mbit/s
95th percentile per-packet one-way delay: 116.918 ms
Loss rate: 0.12%
-- Flow 2:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 108.120 ms
Loss rate: 0.35%
-- Flow 3:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 88.400 ms
Loss rate: 0.00%

Run 2: Report of Copa — Data Link

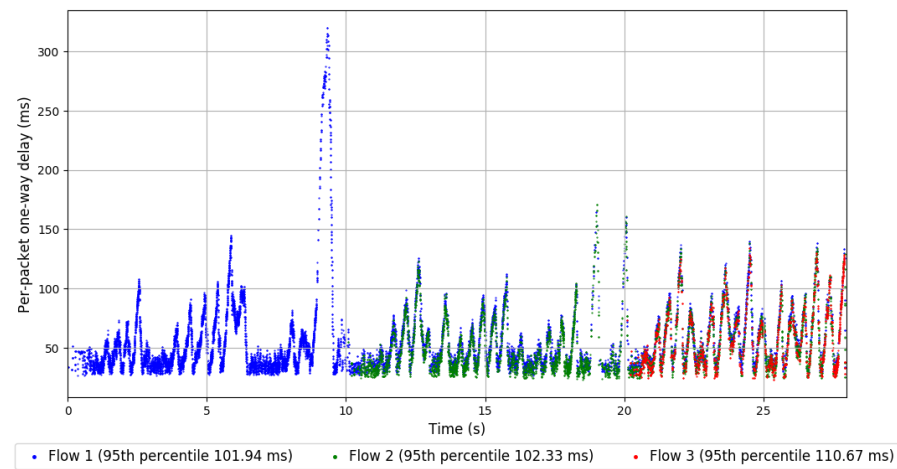
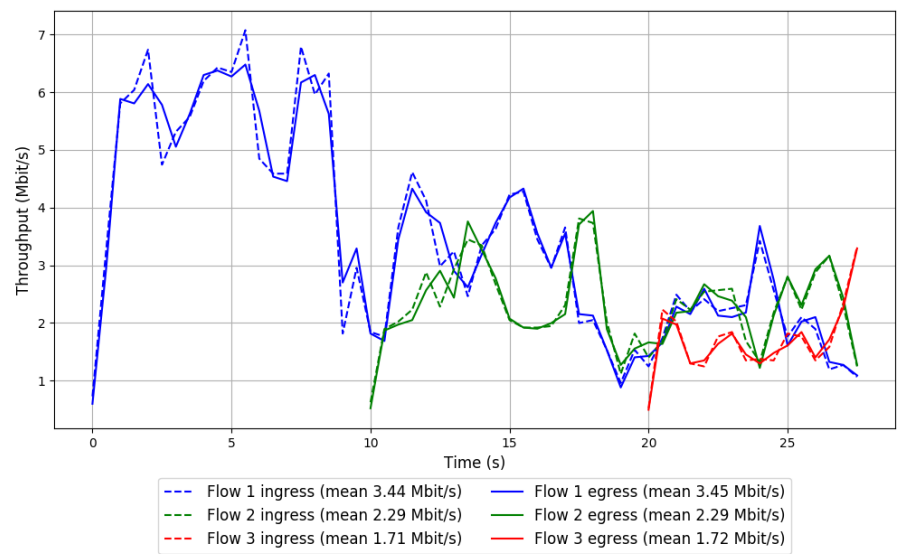


Run 3: Statistics of Copa

Start at: 2018-01-25 20:02:47
End at: 2018-01-25 20:03:17
Local clock offset: 2.544 ms
Remote clock offset: -17.132 ms

Below is generated by plot.py at 2018-01-25 20:13:56
Datalink statistics
-- Total of 3 flows:
Average throughput: 5.40 Mbit/s
95th percentile per-packet one-way delay: 103.301 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 3.45 Mbit/s
95th percentile per-packet one-way delay: 101.941 ms
Loss rate: 0.07%
-- Flow 2:
Average throughput: 2.29 Mbit/s
95th percentile per-packet one-way delay: 102.332 ms
Loss rate: 0.15%
-- Flow 3:
Average throughput: 1.72 Mbit/s
95th percentile per-packet one-way delay: 110.671 ms
Loss rate: 0.67%

Run 3: Report of Copa — Data Link

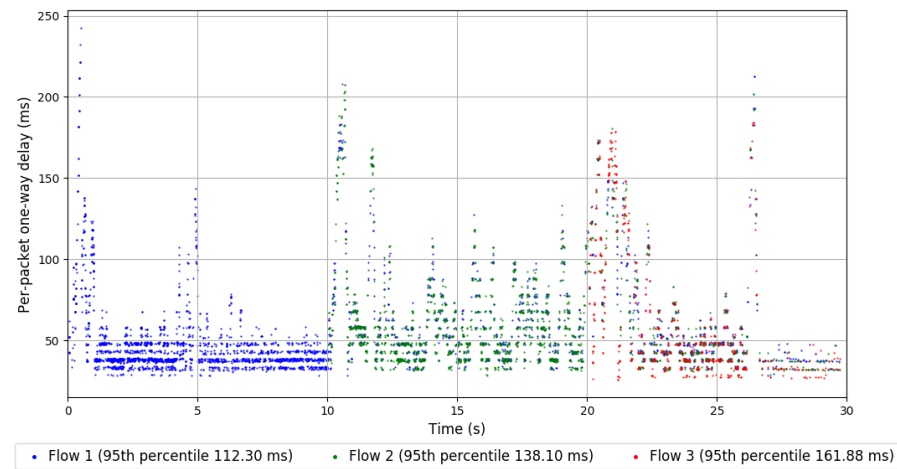
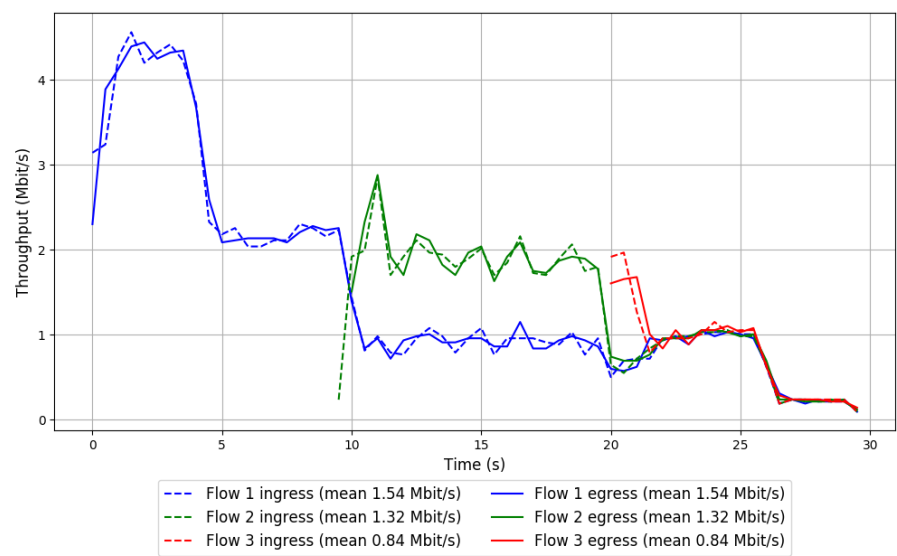


Run 1: Statistics of Indigo-2-256

Start at: 2018-01-25 19:34:08
End at: 2018-01-25 19:34:38
Local clock offset: 0.83 ms
Remote clock offset: -18.123 ms

Below is generated by plot.py at 2018-01-25 20:13:56
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.69 Mbit/s
95th percentile per-packet one-way delay: 128.139 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 112.302 ms
Loss rate: 0.03%
-- Flow 2:
Average throughput: 1.32 Mbit/s
95th percentile per-packet one-way delay: 138.100 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.84 Mbit/s
95th percentile per-packet one-way delay: 161.881 ms
Loss rate: 0.00%

Run 1: Report of Indigo-2-256 — Data Link

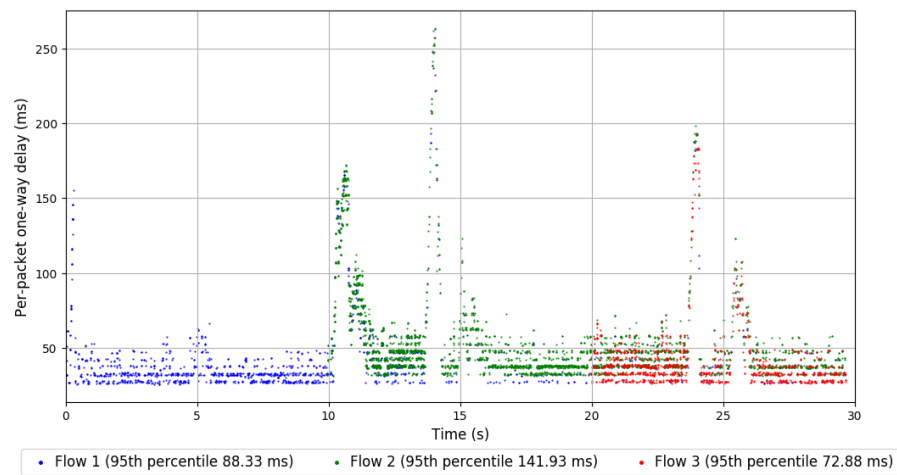
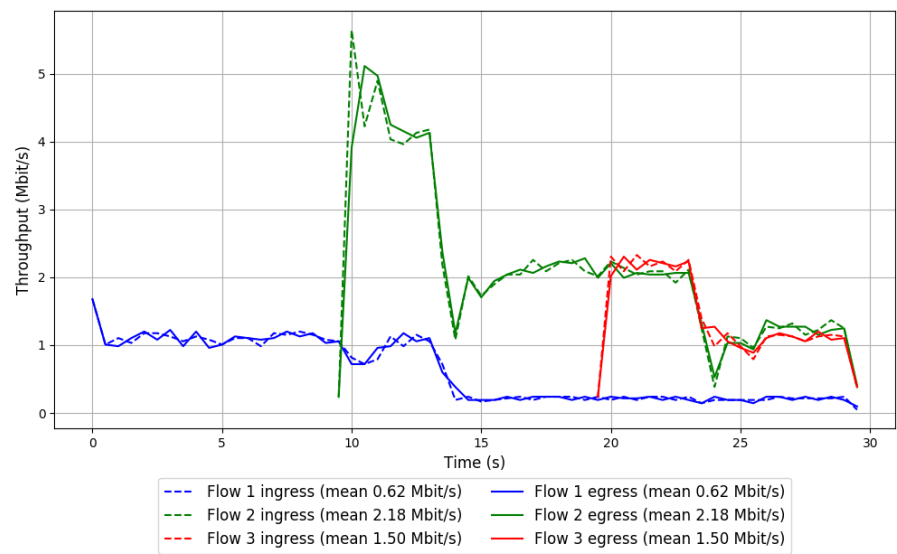


Run 2: Statistics of Indigo-2-256

Start at: 2018-01-25 19:51:46
End at: 2018-01-25 19:52:16
Local clock offset: 2.61 ms
Remote clock offset: -17.289 ms

Below is generated by plot.py at 2018-01-25 20:13:56
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.55 Mbit/s
95th percentile per-packet one-way delay: 126.451 ms
Loss rate: 0.19%
-- Flow 1:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 88.326 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.18 Mbit/s
95th percentile per-packet one-way delay: 141.928 ms
Loss rate: 0.22%
-- Flow 3:
Average throughput: 1.50 Mbit/s
95th percentile per-packet one-way delay: 72.881 ms
Loss rate: 0.33%

Run 2: Report of Indigo-2-256 — Data Link

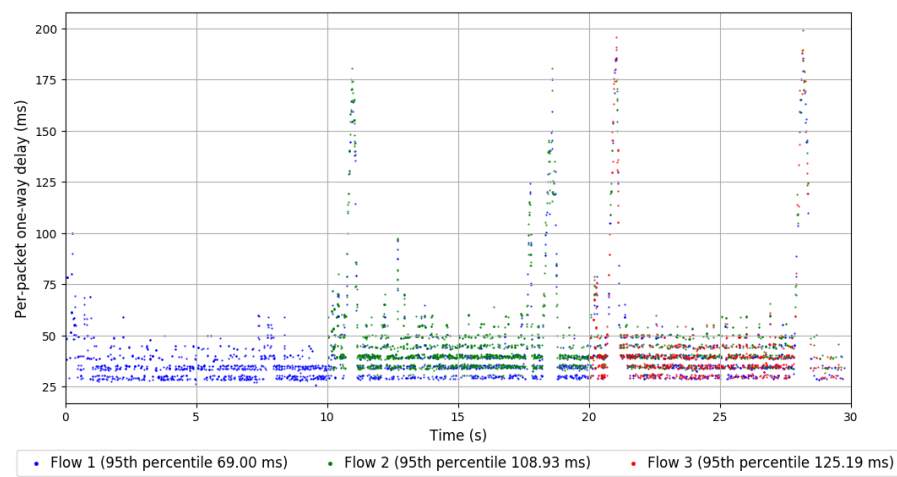
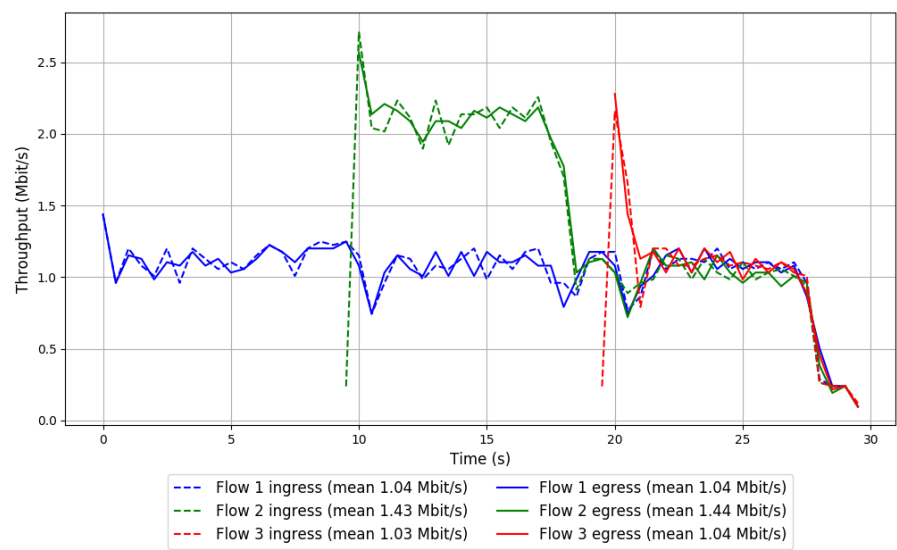


Run 3: Statistics of Indigo-2-256

Start at: 2018-01-25 20:09:24
End at: 2018-01-25 20:09:54
Local clock offset: 0.405 ms
Remote clock offset: -18.334 ms

Below is generated by plot.py at 2018-01-25 20:13:56
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 85.205 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 1.04 Mbit/s
95th percentile per-packet one-way delay: 68.998 ms
Loss rate: 0.19%
-- Flow 2:
Average throughput: 1.44 Mbit/s
95th percentile per-packet one-way delay: 108.931 ms
Loss rate: 0.21%
-- Flow 3:
Average throughput: 1.04 Mbit/s
95th percentile per-packet one-way delay: 125.194 ms
Loss rate: 0.24%

Run 3: Report of Indigo-2-256 — Data Link

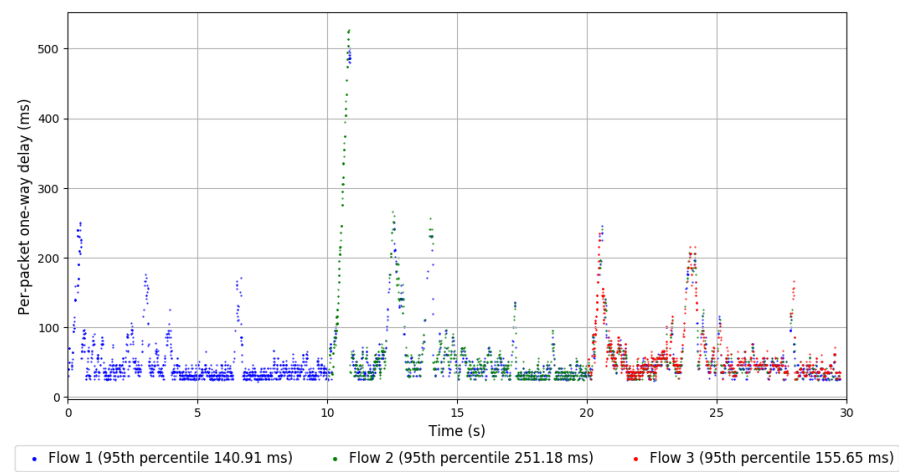
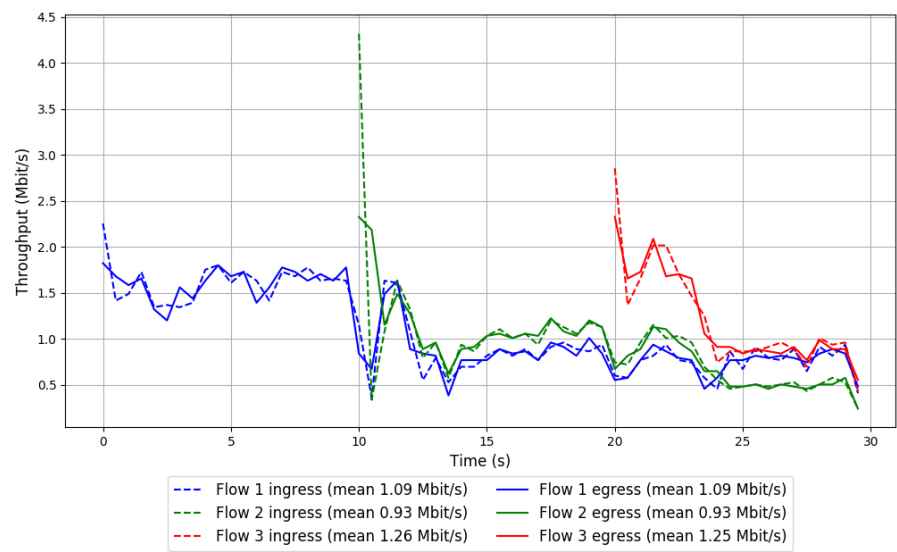


Run 1: Statistics of Indigo-1-32

Start at: 2018-01-25 19:30:50
End at: 2018-01-25 19:31:20
Local clock offset: 3.519 ms
Remote clock offset: -16.402 ms

Below is generated by plot.py at 2018-01-25 20:13:56
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 184.833 ms
Loss rate: 0.57%
-- Flow 1:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 140.905 ms
Loss rate: 0.26%
-- Flow 2:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 251.176 ms
Loss rate: 0.65%
-- Flow 3:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 155.651 ms
Loss rate: 1.28%

Run 1: Report of Indigo-1-32 — Data Link

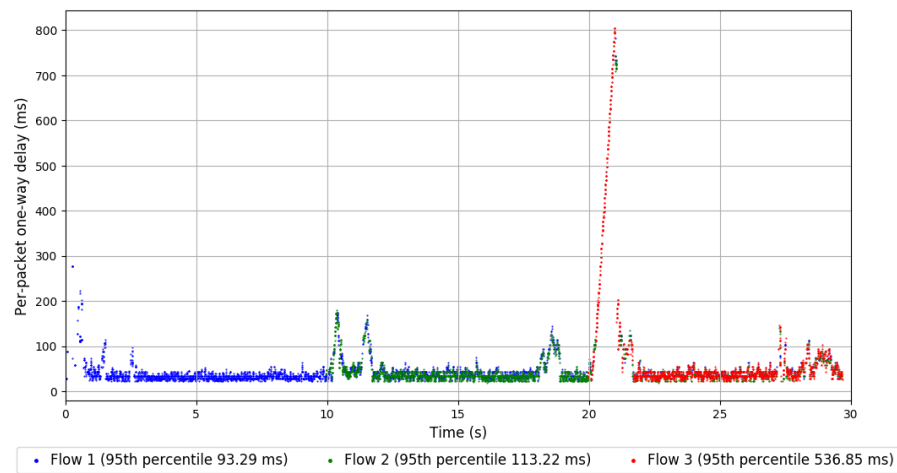
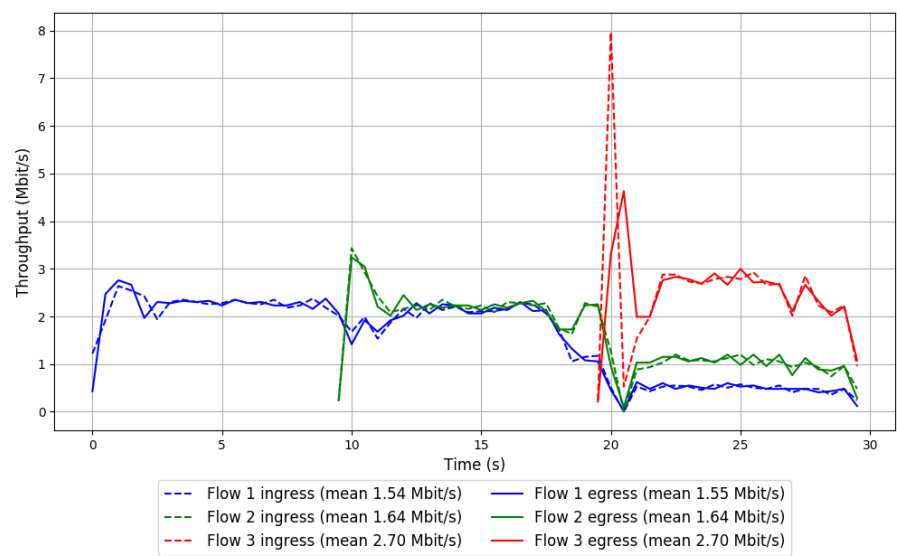


Run 2: Statistics of Indigo-1-32

Start at: 2018-01-25 19:48:28
End at: 2018-01-25 19:48:58
Local clock offset: 3.937 ms
Remote clock offset: -19.609 ms

Below is generated by plot.py at 2018-01-25 20:13:56
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.51 Mbit/s
95th percentile per-packet one-way delay: 140.688 ms
Loss rate: 0.25%
-- Flow 1:
Average throughput: 1.55 Mbit/s
95th percentile per-packet one-way delay: 93.287 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 1.64 Mbit/s
95th percentile per-packet one-way delay: 113.222 ms
Loss rate: 0.30%
-- Flow 3:
Average throughput: 2.70 Mbit/s
95th percentile per-packet one-way delay: 536.854 ms
Loss rate: 0.41%

Run 2: Report of Indigo-1-32 — Data Link

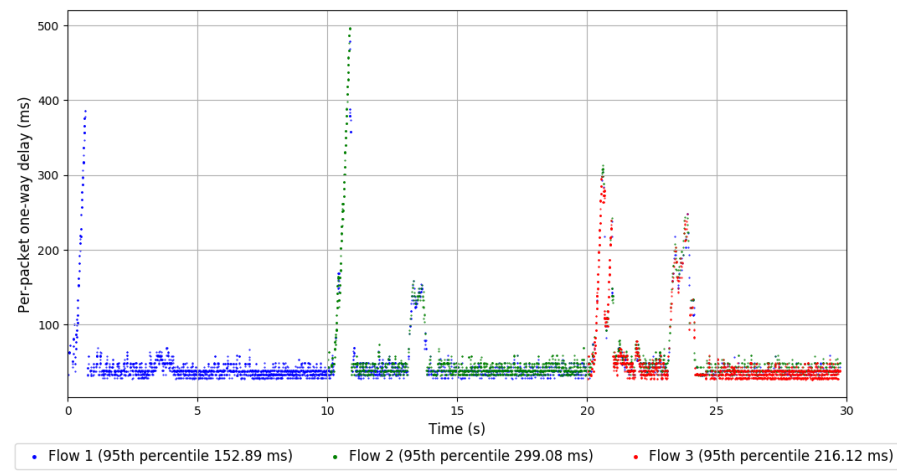
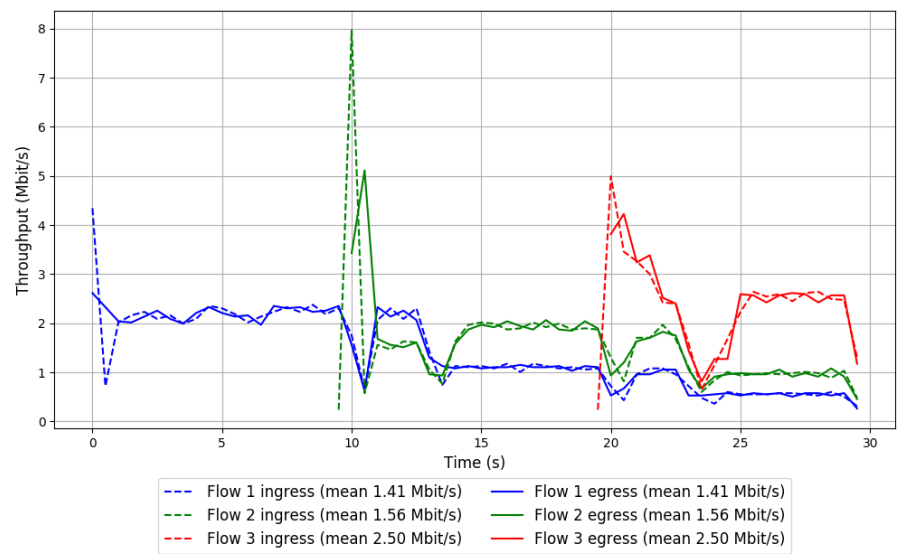


Run 3: Statistics of Indigo-1-32

Start at: 2018-01-25 20:06:06
End at: 2018-01-25 20:06:36
Local clock offset: 1.627 ms
Remote clock offset: -17.582 ms

Below is generated by plot.py at 2018-01-25 20:13:56
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.26 Mbit/s
95th percentile per-packet one-way delay: 219.109 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 152.890 ms
Loss rate: 0.11%
-- Flow 2:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 299.079 ms
Loss rate: 0.27%
-- Flow 3:
Average throughput: 2.50 Mbit/s
95th percentile per-packet one-way delay: 216.116 ms
Loss rate: 0.69%

Run 3: Report of Indigo-1-32 — Data Link

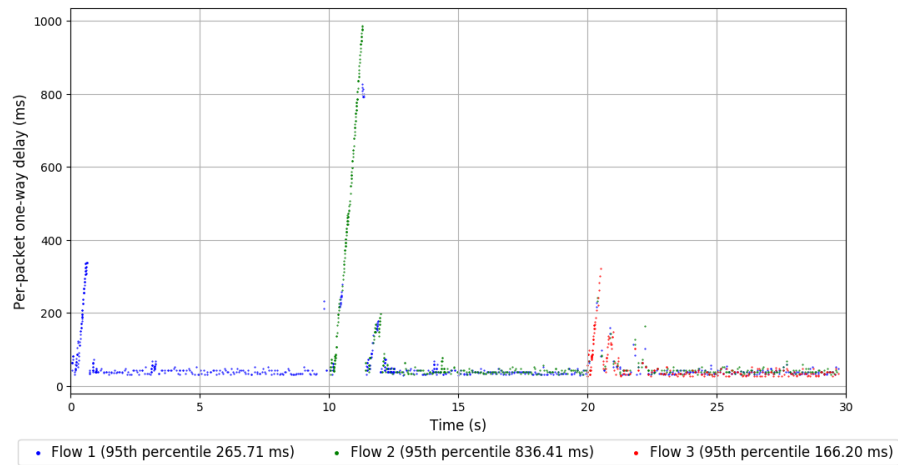
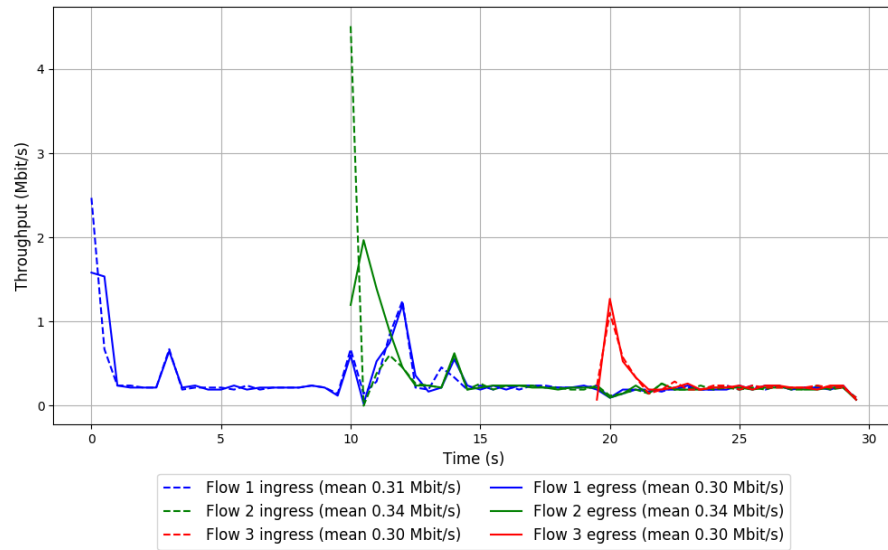


Run 1: Statistics of Indigo-1-128

Start at: 2018-01-25 19:35:14
End at: 2018-01-25 19:35:44
Local clock offset: 3.035 ms
Remote clock offset: -16.261 ms

Below is generated by plot.py at 2018-01-25 20:13:56
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 617.301 ms
Loss rate: 0.45%
-- Flow 1:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 265.715 ms
Loss rate: 0.26%
-- Flow 2:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 836.410 ms
Loss rate: 0.71%
-- Flow 3:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 166.201 ms
Loss rate: 0.41%

Run 1: Report of Indigo-1-128 — Data Link

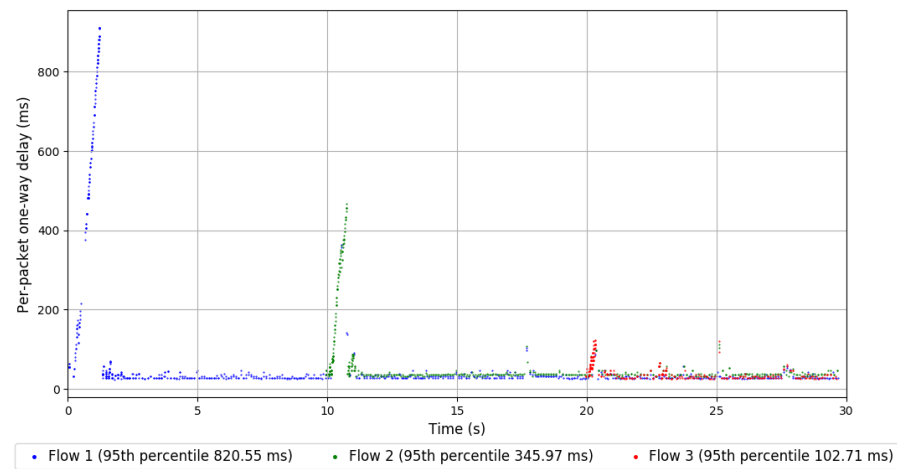
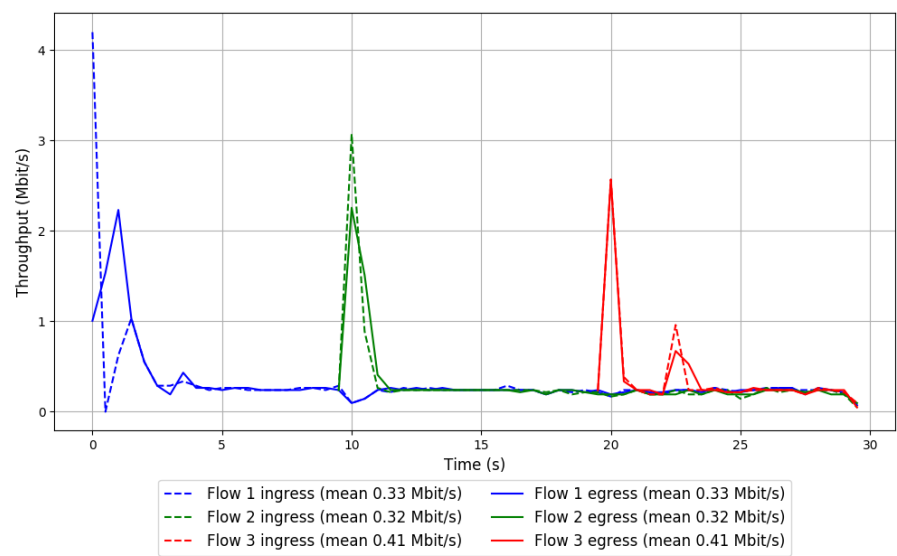


Run 2: Statistics of Indigo-1-128

Start at: 2018-01-25 19:52:52
End at: 2018-01-25 19:53:22
Local clock offset: 2.622 ms
Remote clock offset: -18.785 ms

Below is generated by plot.py at 2018-01-25 20:13:56
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.67 Mbit/s
95th percentile per-packet one-way delay: 600.319 ms
Loss rate: 0.36%
-- Flow 1:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 820.548 ms
Loss rate: 0.37%
-- Flow 2:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 345.974 ms
Loss rate: 0.19%
-- Flow 3:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 102.713 ms
Loss rate: 0.61%

Run 2: Report of Indigo-1-128 — Data Link



Run 3: Statistics of Indigo-1-128

Start at: 2018-01-25 20:10:31
End at: 2018-01-25 20:11:01
Local clock offset: 2.386 ms
Remote clock offset: -17.472 ms

Below is generated by plot.py at 2018-01-25 20:13:56
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 615.574 ms
Loss rate: 2.22%
-- Flow 1:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 615.818 ms
Loss rate: 2.89%
-- Flow 2:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 409.906 ms
Loss rate: 0.18%
-- Flow 3:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 634.828 ms
Loss rate: 3.85%

Run 3: Report of Indigo-1-128 — Data Link

