

Pantheon Report

Generated at 2018-01-10 16:27:39 (UTC).

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

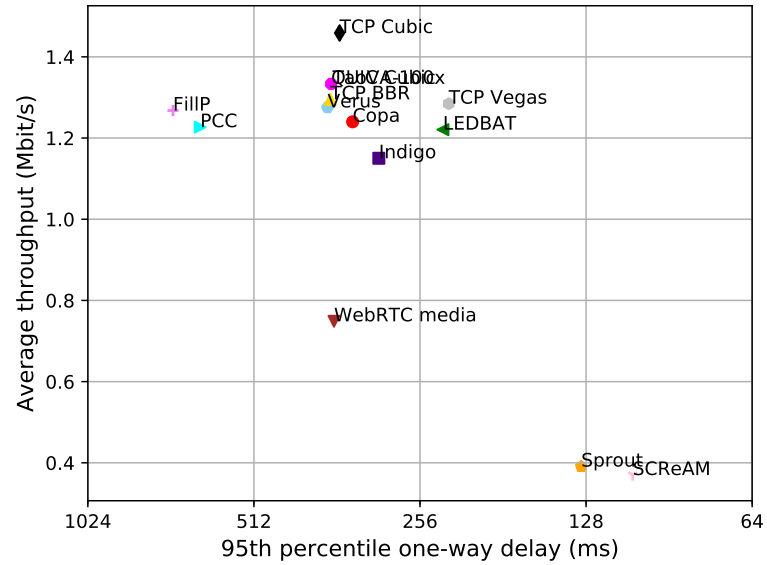
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

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

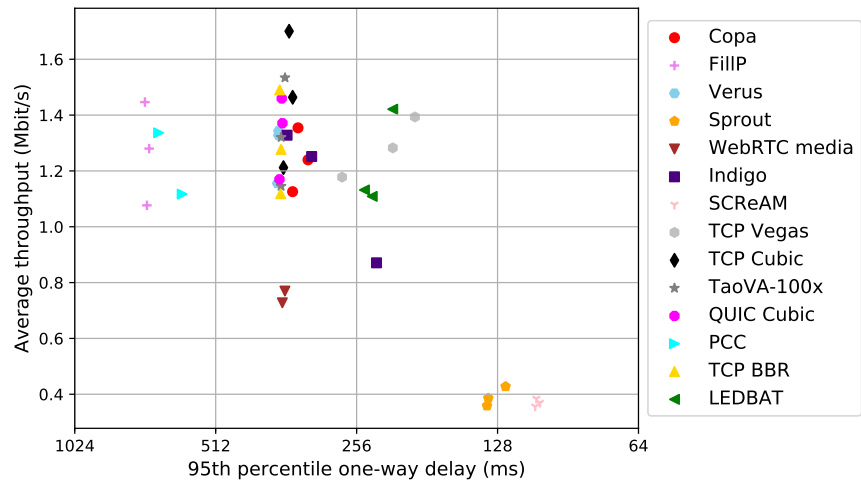
Git summary:

```
branch: master @ 56d1792c316a5efca3f2d21342905405fedffb48
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/fillp @ ec9585325218d5048c4d4152fa42240af54c6e67
third_party/genericCC @ 80b516c448f795fd6e9675f7177b69c622f07da8
third_party/indigo @ b19f3730105f9aa95452552af924e3719b03cc55
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 @ 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 India ppp0 to AWS India 1 Ethernet, 3 runs of 30s each per scheme
3 flows with 10s interval between flows (mean of all runs by scheme)



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



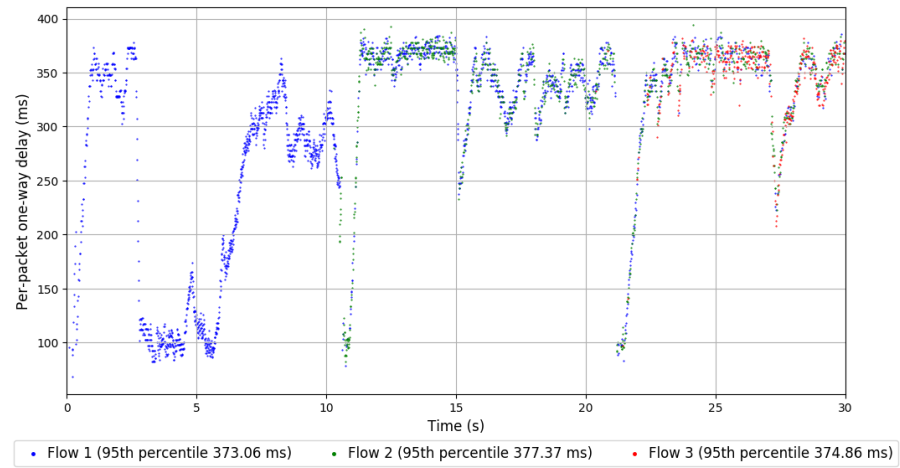
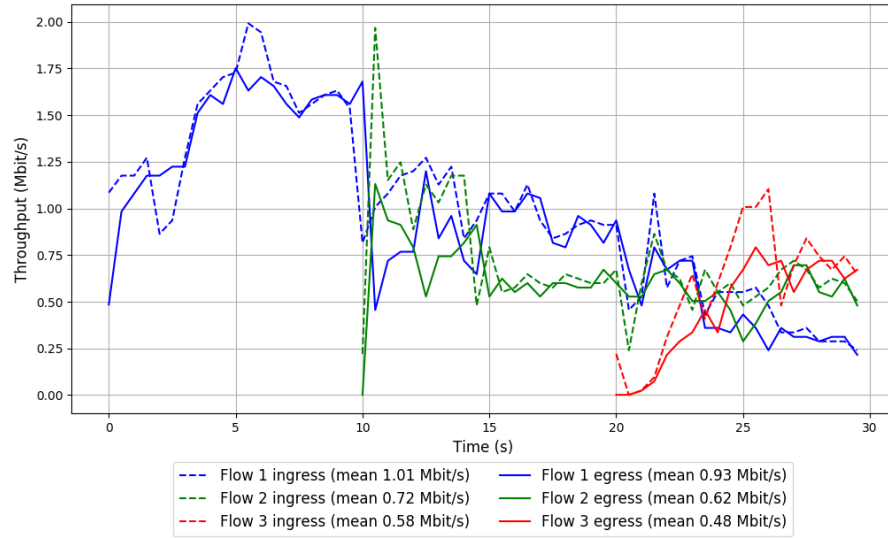
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	0.77	0.57	0.44	371.52	373.36	374.02	10.45	19.56	24.44
TCP Cubic	3	0.99	0.48	0.49	354.83	358.09	360.66	2.22	4.03	7.66
LEDBAT	3	0.60	0.61	0.66	221.31	235.72	236.34	0.67	1.27	2.85
PCC	2	0.69	0.57	0.55	419.13	689.16	756.92	85.41	84.85	94.51
QUIC Cubic	3	0.80	0.53	0.57	370.29	372.29	371.92	7.44	11.98	15.46
SCReAM	3	0.17	0.20	0.20	108.26	105.79	101.09	0.50	0.74	1.07
WebRTC media	2	0.41	0.22	0.12	366.84	366.43	366.54	7.37	10.32	11.74
Sprout	3	0.19	0.20	0.21	128.64	131.31	134.97	1.10	1.30	1.66
TaoVA-100x	3	0.83	0.71	0.20	366.17	370.80	379.18	31.89	32.71	64.42
TCP Vegas	3	0.70	0.56	0.65	199.19	216.83	274.20	0.91	1.81	4.80
Verus	3	1.03	0.32	0.12	375.77	379.34	374.34	23.05	82.62	59.86
Copa	3	0.73	0.64	0.40	328.30	345.68	353.24	1.31	2.46	5.47
FillP	3	0.91	0.34	0.44	383.30	787.27	838.22	97.19	99.30	99.55
Indigo	3	0.59	0.54	0.63	331.57	266.29	287.72	4.55	4.92	10.58

Run 1: Statistics of TCP BBR

Start at: 2018-01-10 15:02:21
End at: 2018-01-10 15:02:51
Local clock offset: 4.371 ms
Remote clock offset: -15.008 ms

Below is generated by plot.py at 2018-01-10 16:26:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 373.708 ms
Loss rate: 11.23%
-- Flow 1:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 373.063 ms
Loss rate: 7.58%
-- Flow 2:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 377.368 ms
Loss rate: 15.11%
-- Flow 3:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 374.855 ms
Loss rate: 20.63%

Run 1: Report of TCP BBR — Data Link

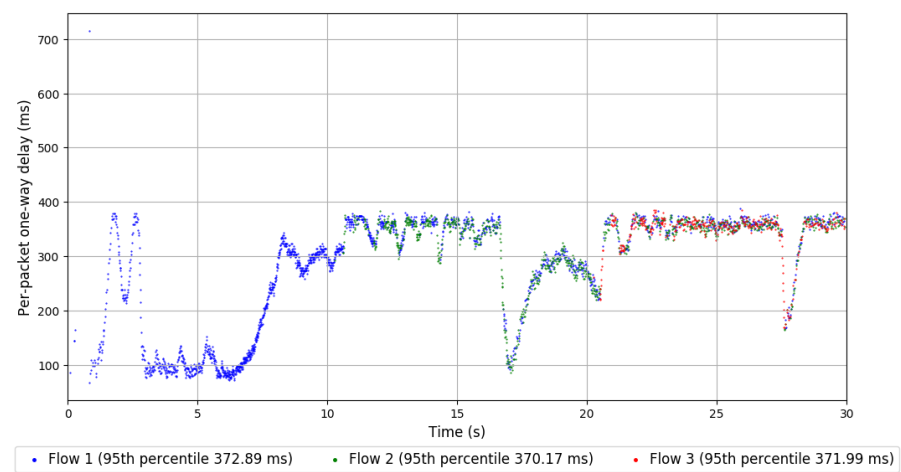
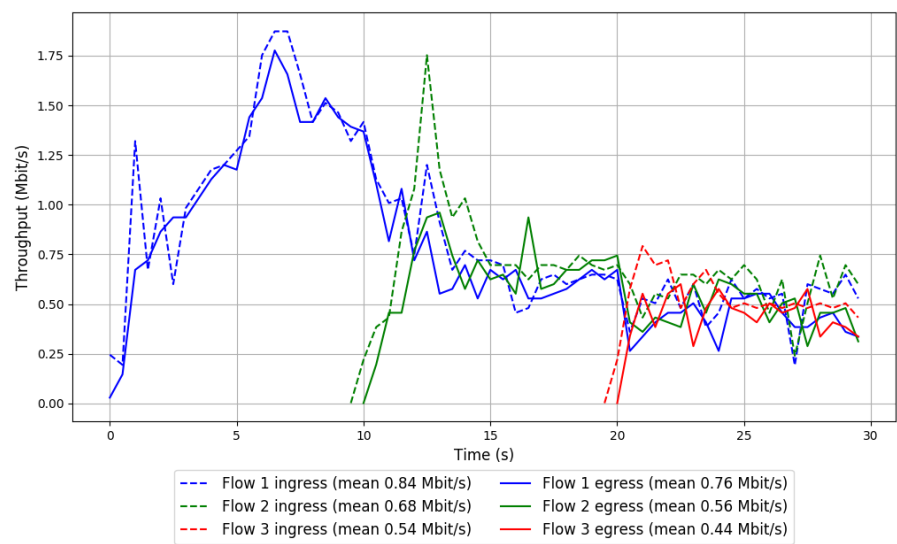


Run 2: Statistics of TCP BBR

Start at: 2018-01-10 15:19:03
End at: 2018-01-10 15:19:33
Local clock offset: 0.282 ms
Remote clock offset: -15.599 ms

Below is generated by plot.py at 2018-01-10 16:26:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.28 Mbit/s
95th percentile per-packet one-way delay: 371.220 ms
Loss rate: 13.51%
-- Flow 1:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 372.895 ms
Loss rate: 9.23%
-- Flow 2:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 370.166 ms
Loss rate: 19.08%
-- Flow 3:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 371.988 ms
Loss rate: 19.36%

Run 2: Report of TCP BBR — Data Link

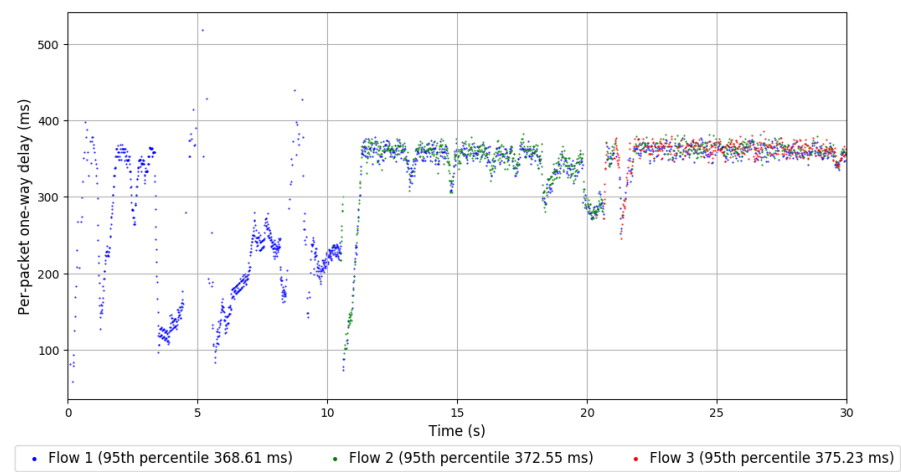
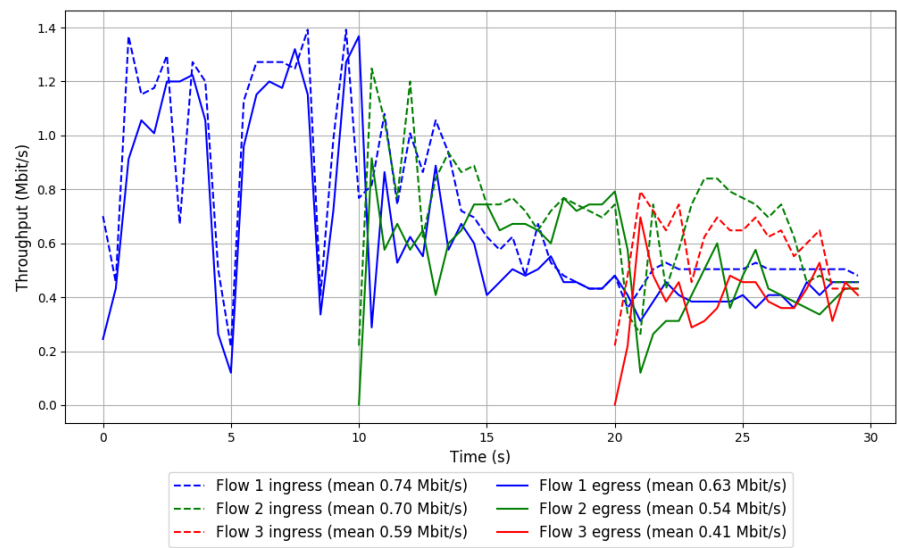


Run 3: Statistics of TCP BBR

Start at: 2018-01-10 15:35:54
End at: 2018-01-10 15:36:24
Local clock offset: -0.772 ms
Remote clock offset: -15.13 ms

Below is generated by plot.py at 2018-01-10 16:26:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.12 Mbit/s
95th percentile per-packet one-way delay: 371.979 ms
Loss rate: 20.49%
-- Flow 1:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 368.613 ms
Loss rate: 14.54%
-- Flow 2:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 372.548 ms
Loss rate: 24.50%
-- Flow 3:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 375.228 ms
Loss rate: 33.32%

Run 3: Report of TCP BBR — Data Link

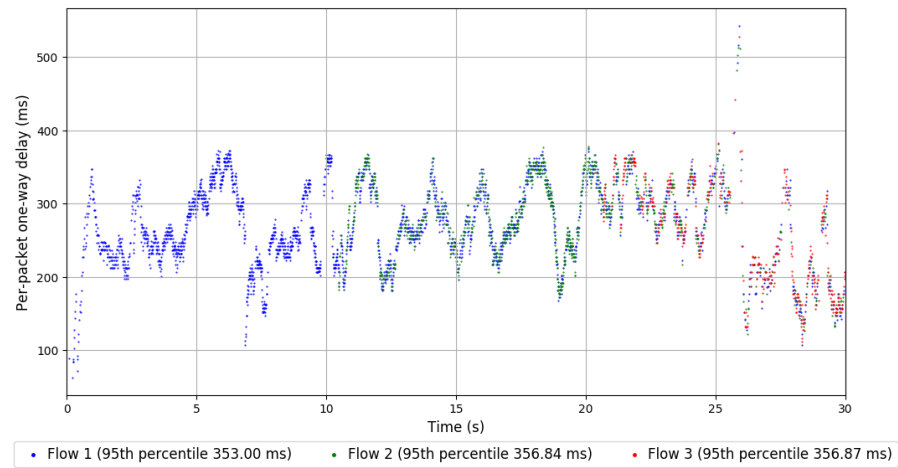
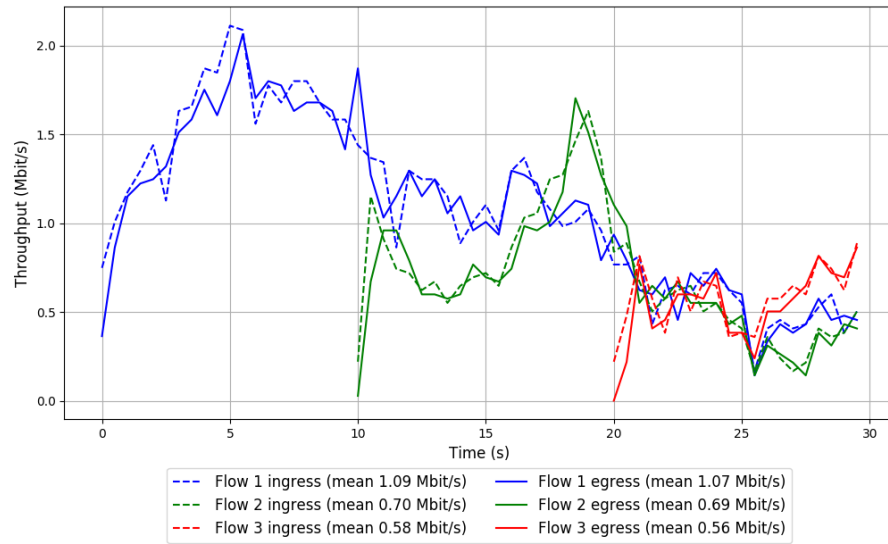


Run 1: Statistics of TCP Cubic

Start at: 2018-01-10 15:01:14
End at: 2018-01-10 15:01:44
Local clock offset: 1.717 ms
Remote clock offset: -14.275 ms

Below is generated by plot.py at 2018-01-10 16:26:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.70 Mbit/s
95th percentile per-packet one-way delay: 356.781 ms
Loss rate: 3.02%
-- Flow 1:
Average throughput: 1.07 Mbit/s
95th percentile per-packet one-way delay: 353.000 ms
Loss rate: 2.38%
-- Flow 2:
Average throughput: 0.69 Mbit/s
95th percentile per-packet one-way delay: 356.839 ms
Loss rate: 2.60%
-- Flow 3:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 356.866 ms
Loss rate: 7.67%

Run 1: Report of TCP Cubic — Data Link

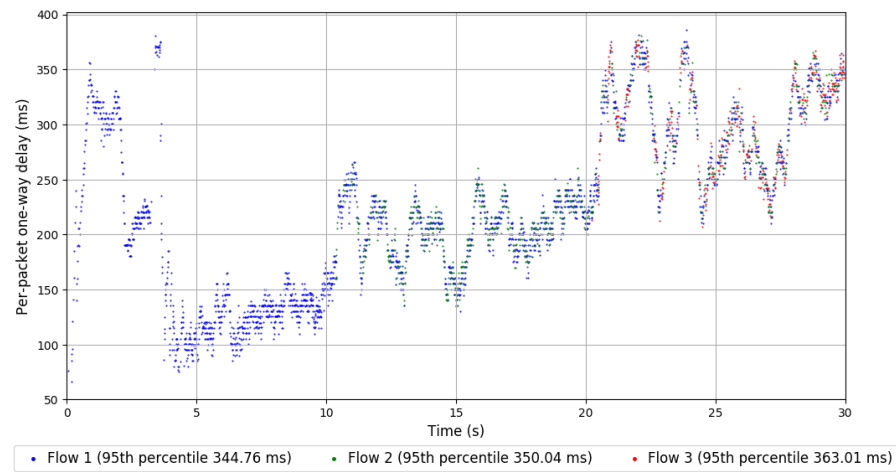
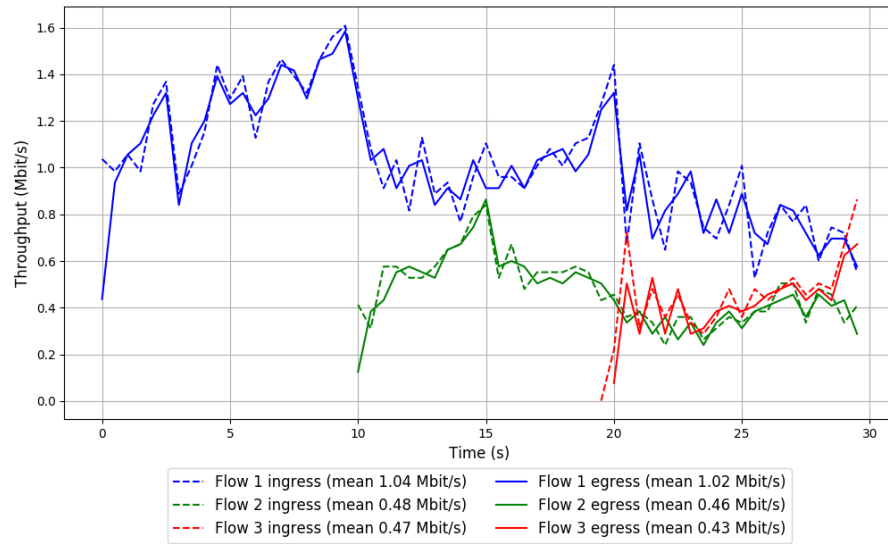


Run 2: Statistics of TCP Cubic

Start at: 2018-01-10 15:17:54
End at: 2018-01-10 15:18:24
Local clock offset: 2.311 ms
Remote clock offset: -15.185 ms

Below is generated by plot.py at 2018-01-10 16:26:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.46 Mbit/s
95th percentile per-packet one-way delay: 350.639 ms
Loss rate: 2.88%
-- Flow 1:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 344.760 ms
Loss rate: 1.75%
-- Flow 2:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 350.041 ms
Loss rate: 3.55%
-- Flow 3:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 363.013 ms
Loss rate: 9.06%

Run 2: Report of TCP Cubic — Data Link

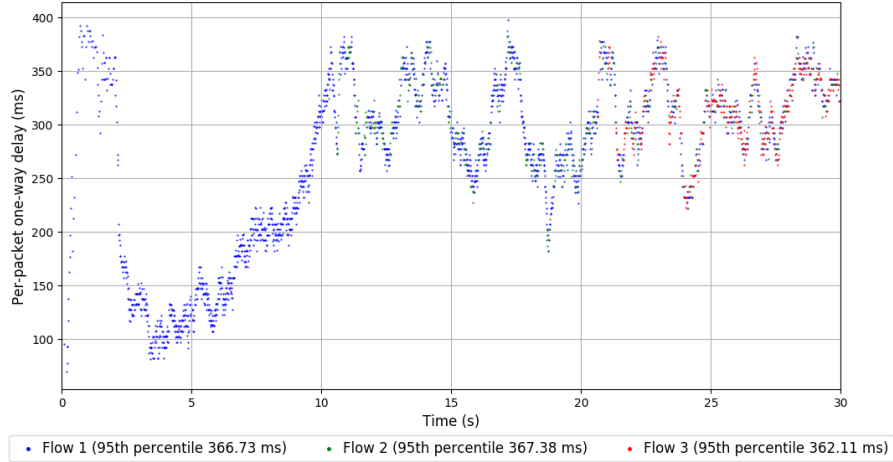
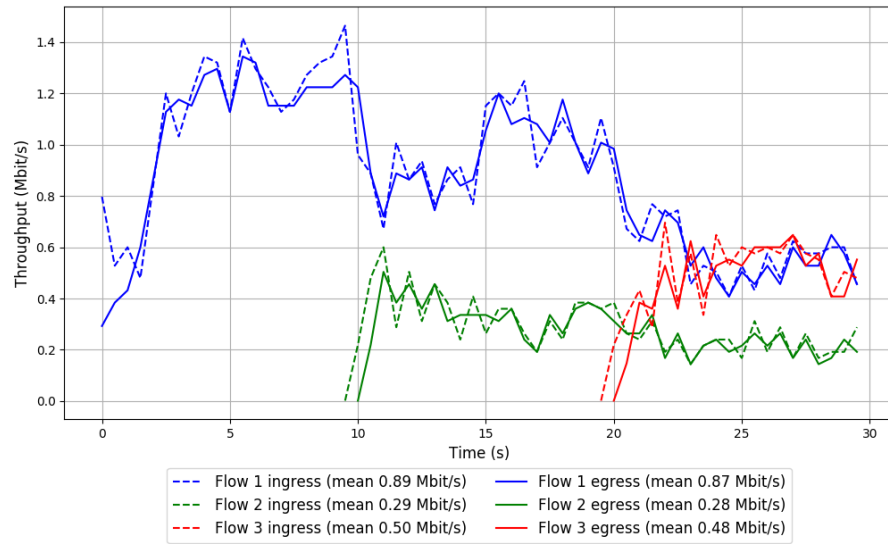


Run 3: Statistics of TCP Cubic

Start at: 2018-01-10 15:34:48
End at: 2018-01-10 15:35:18
Local clock offset: 2.753 ms
Remote clock offset: -17.356 ms

Below is generated by plot.py at 2018-01-10 16:26:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.21 Mbit/s
95th percentile per-packet one-way delay: 366.867 ms
Loss rate: 3.55%
-- Flow 1:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 366.729 ms
Loss rate: 2.52%
-- Flow 2:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 367.379 ms
Loss rate: 5.94%
-- Flow 3:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 362.109 ms
Loss rate: 6.26%

Run 3: Report of TCP Cubic — Data Link

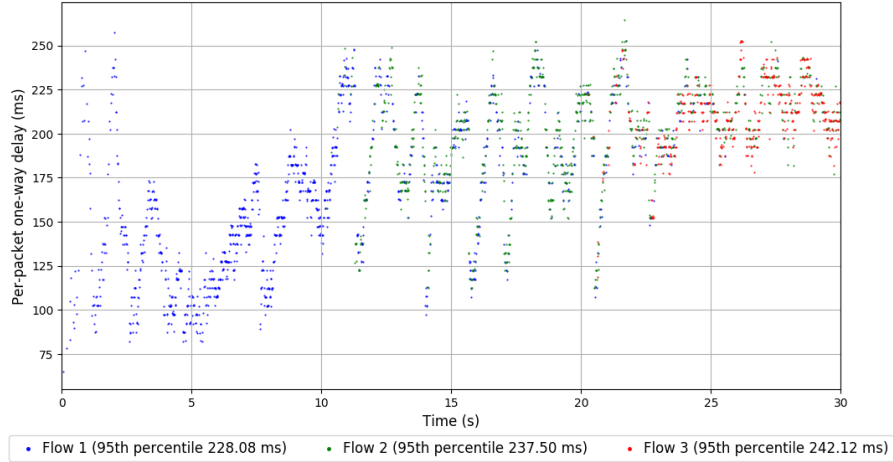
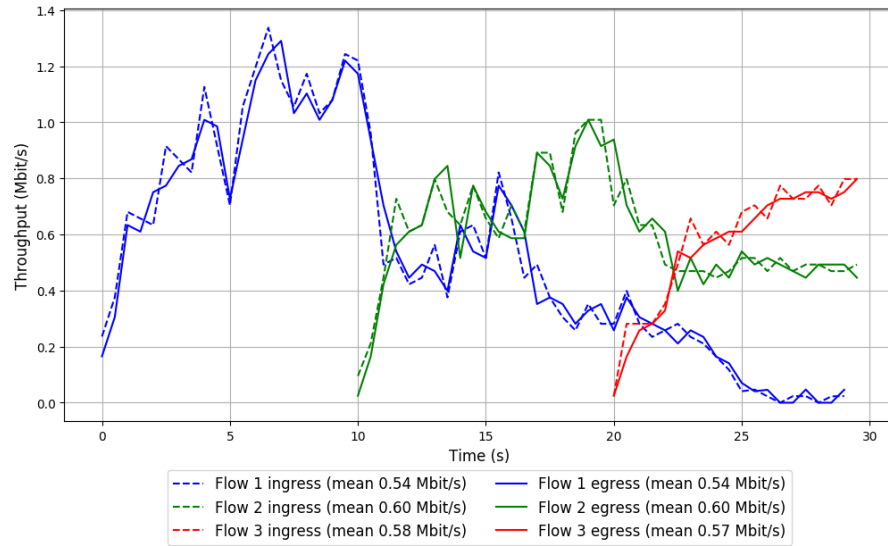


```
Run 1: Statistics of LEDBAT

Start at: 2018-01-10 14:53:25
End at: 2018-01-10 14:53:55
Local clock offset: 1.173 ms
Remote clock offset: -15.116 ms

# Below is generated by plot.py at 2018-01-10 16:26:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.11 Mbit/s
95th percentile per-packet one-way delay: 237.130 ms
Loss rate: 1.33%
-- Flow 1:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 228.083 ms
Loss rate: 0.67%
-- Flow 2:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 237.504 ms
Loss rate: 1.27%
-- Flow 3:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 242.118 ms
Loss rate: 3.28%
```


Run 1: Report of LEDBAT — Data Link

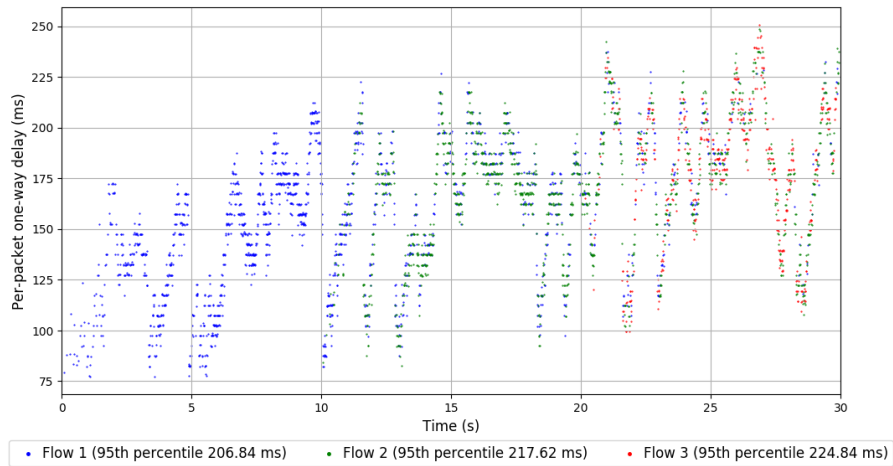
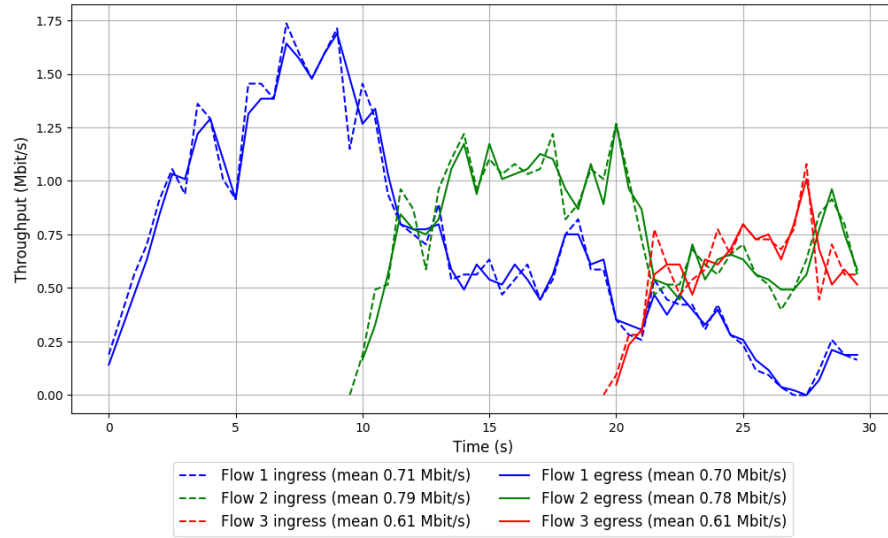


Run 2: Statistics of LEDBAT

Start at: 2018-01-10 15:10:05
End at: 2018-01-10 15:10:35
Local clock offset: 1.98 ms
Remote clock offset: -14.214 ms

Below is generated by plot.py at 2018-01-10 16:26:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 214.377 ms
Loss rate: 1.34%
-- Flow 1:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 206.844 ms
Loss rate: 0.94%
-- Flow 2:
Average throughput: 0.78 Mbit/s
95th percentile per-packet one-way delay: 217.625 ms
Loss rate: 1.26%
-- Flow 3:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 224.841 ms
Loss rate: 2.90%

Run 2: Report of LEDBAT — Data Link

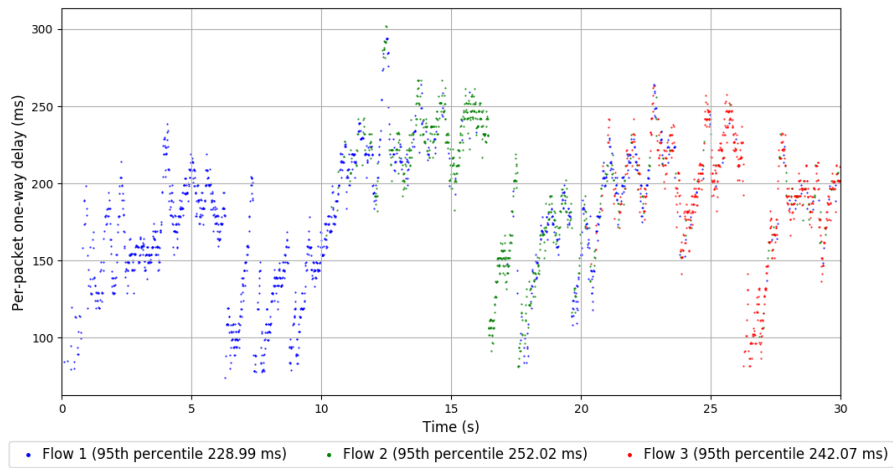
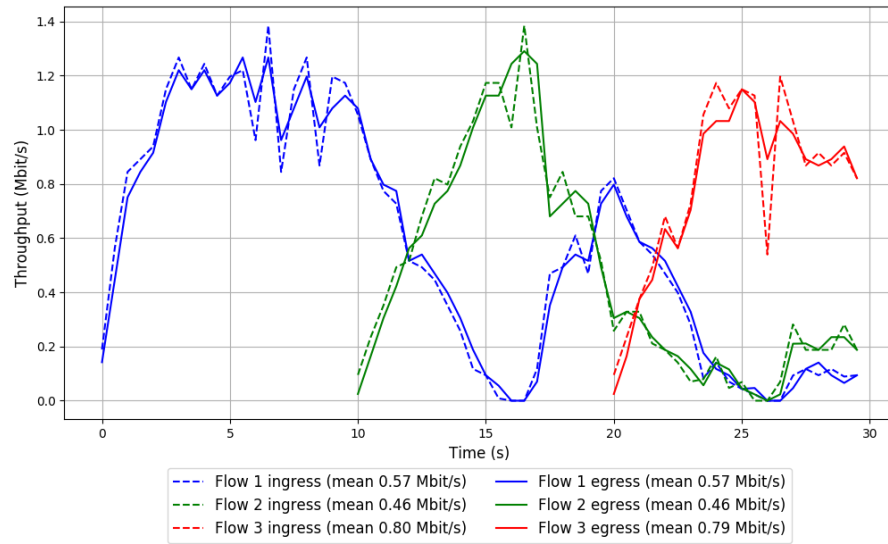


Run 3: Statistics of LEDBAT

Start at: 2018-01-10 15:26:58
End at: 2018-01-10 15:27:28
Local clock offset: 1.799 ms
Remote clock offset: -15.498 ms

Below is generated by plot.py at 2018-01-10 16:26:56
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.13 Mbit/s
95th percentile per-packet one-way delay: 246.406 ms
Loss rate: 1.10%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 228.991 ms
Loss rate: 0.41%
-- Flow 2:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 252.023 ms
Loss rate: 1.27%
-- Flow 3:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 242.074 ms
Loss rate: 2.36%

Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of PCC

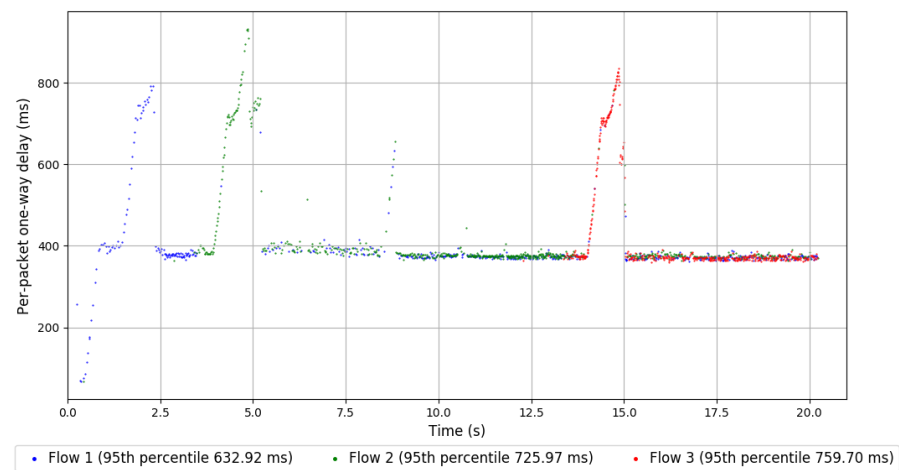
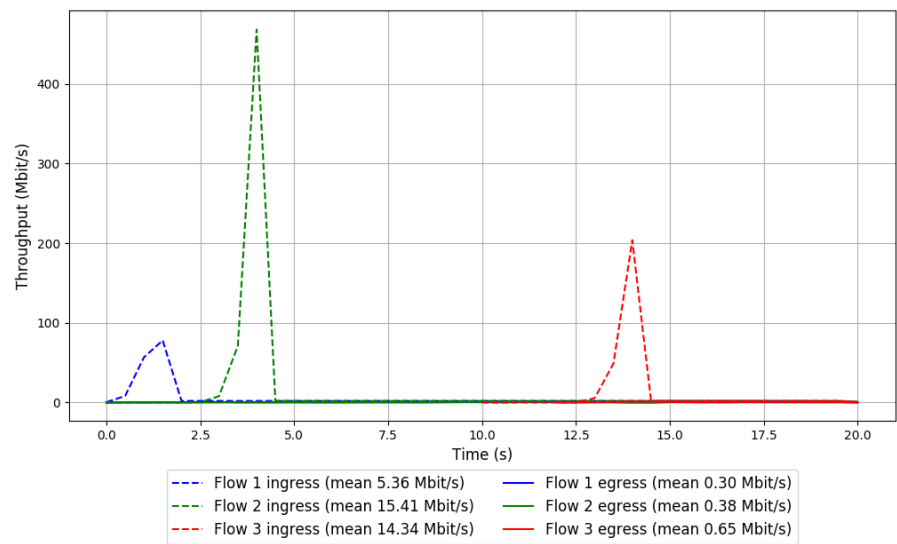
Start at: 2018-01-10 14:55:38

End at: 2018-01-10 14:56:08

Local clock offset: 2.712 ms

Remote clock offset: -15.522 ms

Run 1: Report of PCC — Data Link

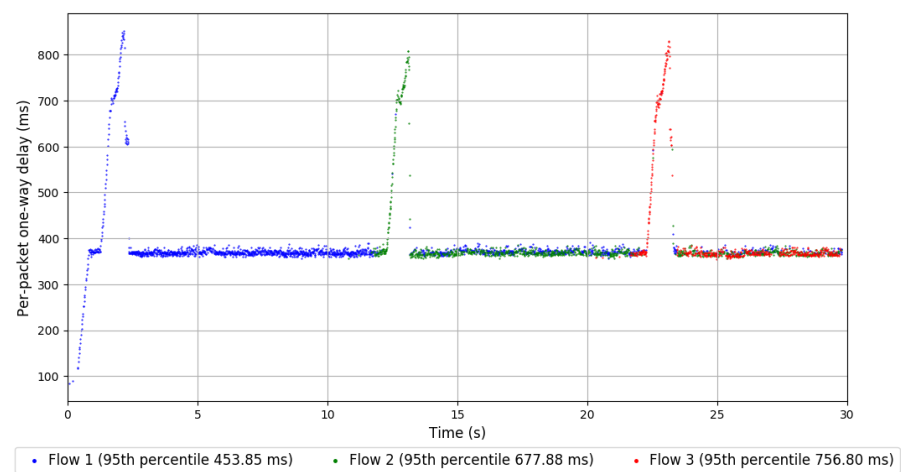
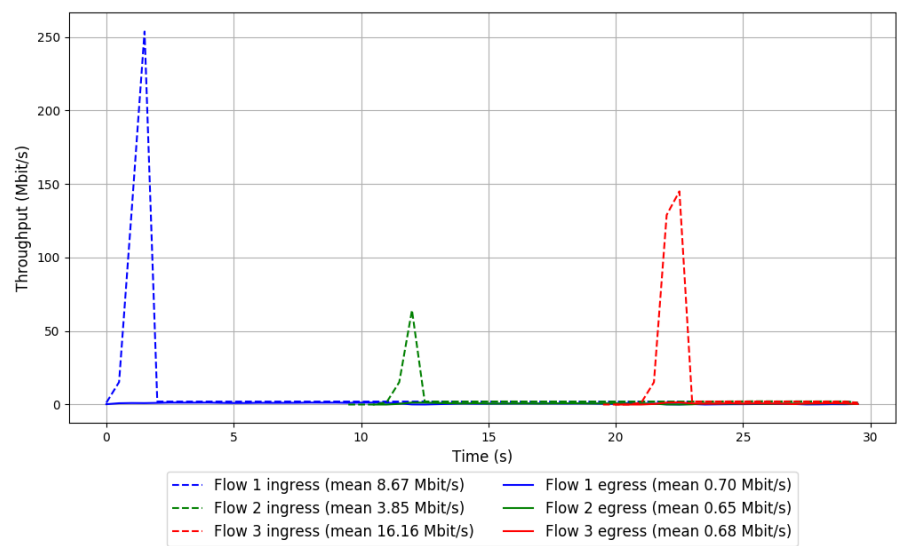


Run 2: Statistics of PCC

Start at: 2018-01-10 15:12:18
End at: 2018-01-10 15:12:48
Local clock offset: 0.482 ms
Remote clock offset: -14.39 ms

Below is generated by plot.py at 2018-01-10 16:27:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.34 Mbit/s
95th percentile per-packet one-way delay: 677.713 ms
Loss rate: 91.96%
-- Flow 1:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 453.848 ms
Loss rate: 91.93%
-- Flow 2:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 677.883 ms
Loss rate: 83.75%
-- Flow 3:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 756.805 ms
Loss rate: 95.96%

Run 2: Report of PCC — Data Link

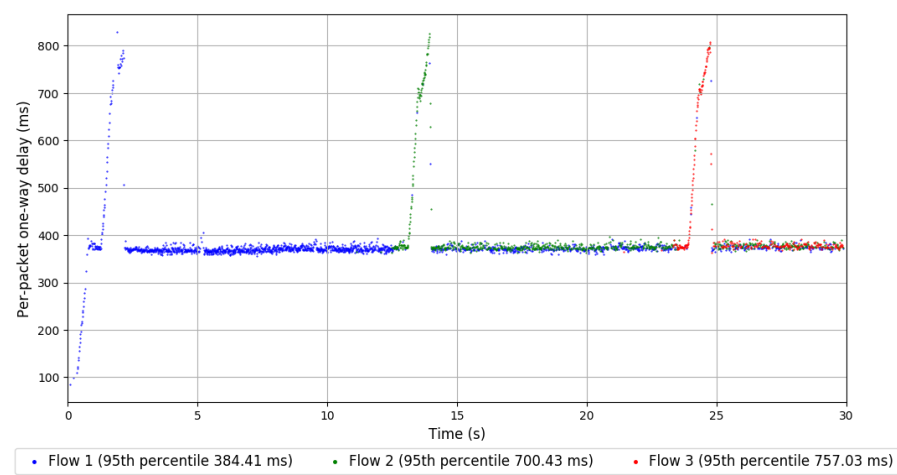
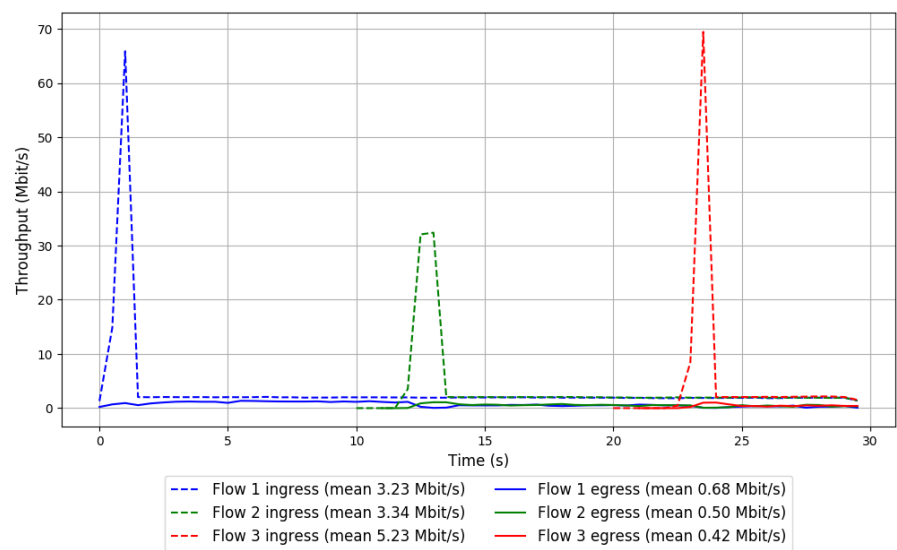


Run 3: Statistics of PCC

Start at: 2018-01-10 15:29:11
End at: 2018-01-10 15:29:41
Local clock offset: 3.597 ms
Remote clock offset: -15.126 ms

Below is generated by plot.py at 2018-01-10 16:27:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.12 Mbit/s
95th percentile per-packet one-way delay: 603.652 ms
Loss rate: 84.47%
-- Flow 1:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 384.411 ms
Loss rate: 78.88%
-- Flow 2:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 700.432 ms
Loss rate: 85.95%
-- Flow 3:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 757.031 ms
Loss rate: 93.07%

Run 3: Report of PCC — Data Link

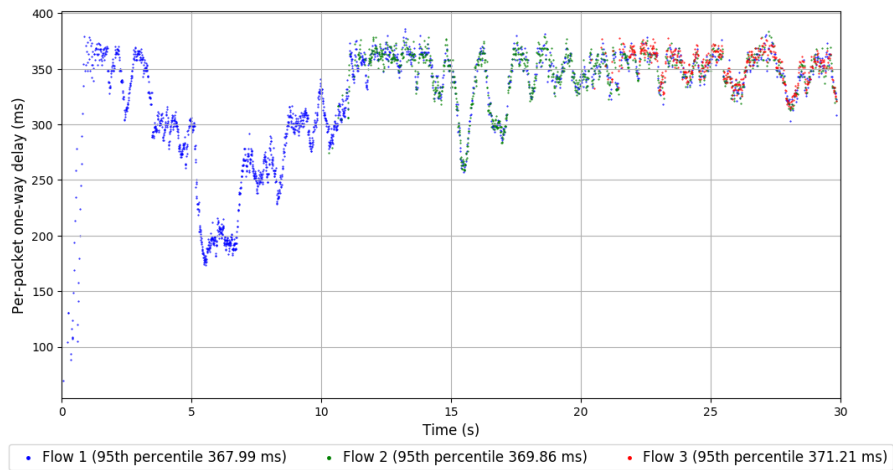
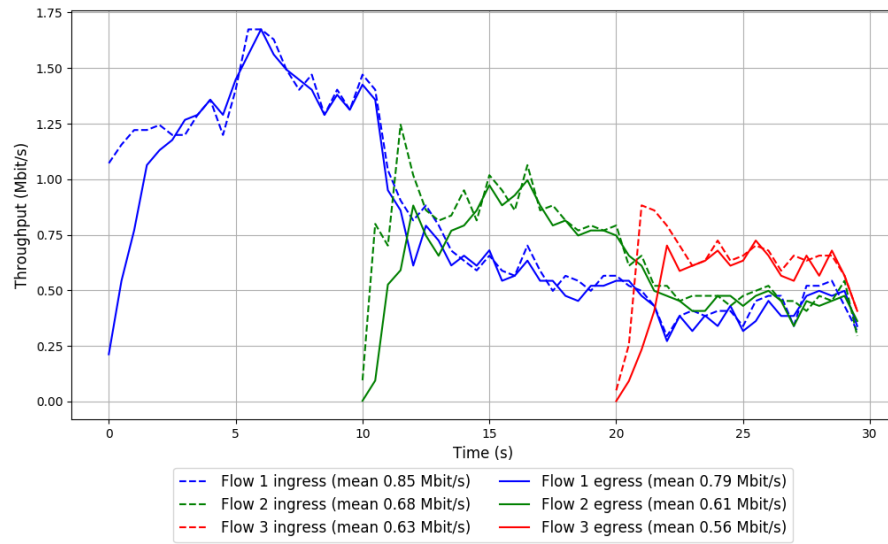


Run 1: Statistics of QUIC Cubic

Start at: 2018-01-10 14:50:06
End at: 2018-01-10 14:50:36
Local clock offset: 0.565 ms
Remote clock offset: -14.097 ms

Below is generated by plot.py at 2018-01-10 16:27:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.37 Mbit/s
95th percentile per-packet one-way delay: 368.713 ms
Loss rate: 9.12%
-- Flow 1:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 367.987 ms
Loss rate: 7.02%
-- Flow 2:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 369.858 ms
Loss rate: 10.61%
-- Flow 3:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 371.215 ms
Loss rate: 14.49%

Run 1: Report of QUIC Cubic — Data Link

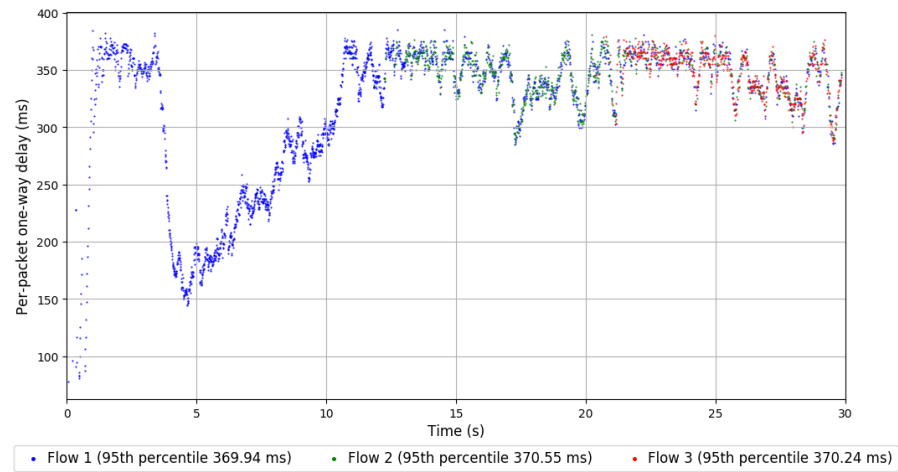
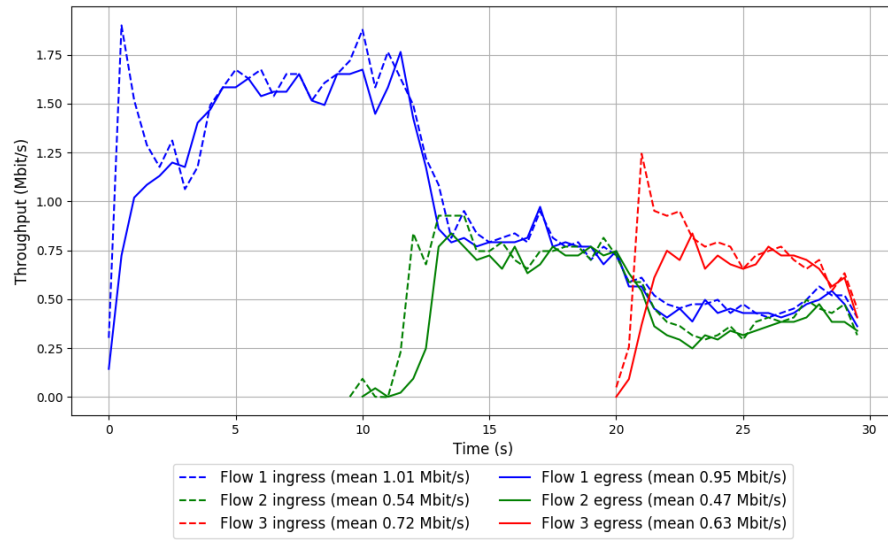


Run 2: Statistics of QUIC Cubic

Start at: 2018-01-10 15:06:46
End at: 2018-01-10 15:07:16
Local clock offset: 0.293 ms
Remote clock offset: -15.833 ms

Below is generated by plot.py at 2018-01-10 16:27:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.46 Mbit/s
95th percentile per-packet one-way delay: 370.019 ms
Loss rate: 9.22%
-- Flow 1:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 369.941 ms
Loss rate: 6.48%
-- Flow 2:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 370.551 ms
Loss rate: 12.79%
-- Flow 3:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 370.239 ms
Loss rate: 15.57%

Run 2: Report of QUIC Cubic — Data Link

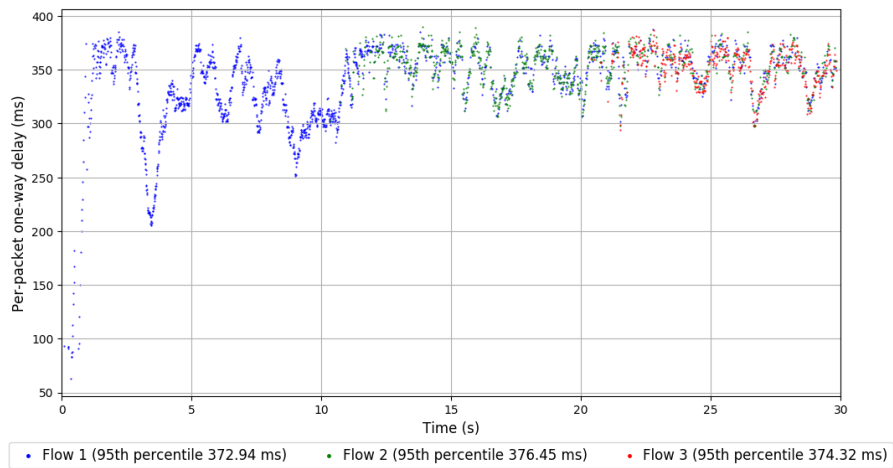
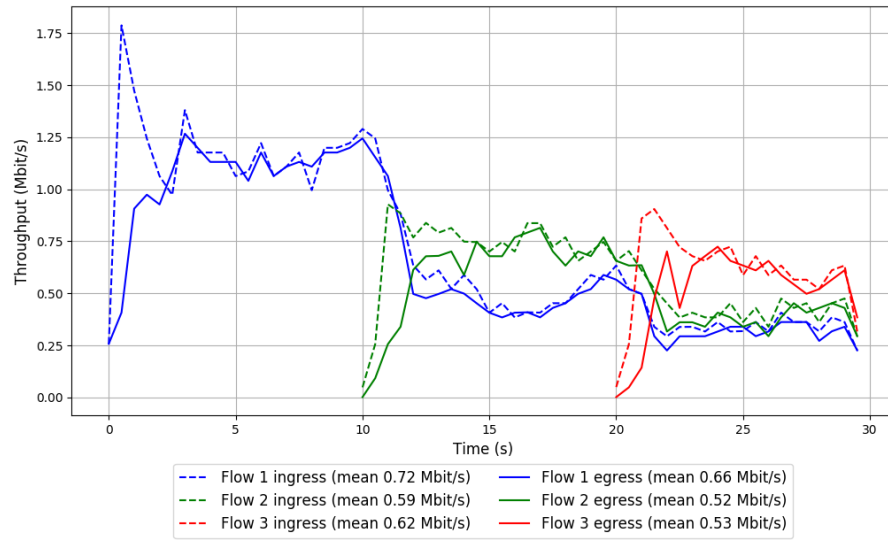


Run 3: Statistics of QUIC Cubic

Start at: 2018-01-10 15:23:38
End at: 2018-01-10 15:24:08
Local clock offset: 1.714 ms
Remote clock offset: -15.598 ms

Below is generated by plot.py at 2018-01-10 16:27:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 374.125 ms
Loss rate: 11.08%
-- Flow 1:
Average throughput: 0.66 Mbit/s
95th percentile per-packet one-way delay: 372.945 ms
Loss rate: 8.81%
-- Flow 2:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 376.448 ms
Loss rate: 12.55%
-- Flow 3:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 374.318 ms
Loss rate: 16.31%

Run 3: Report of QUIC Cubic — Data Link

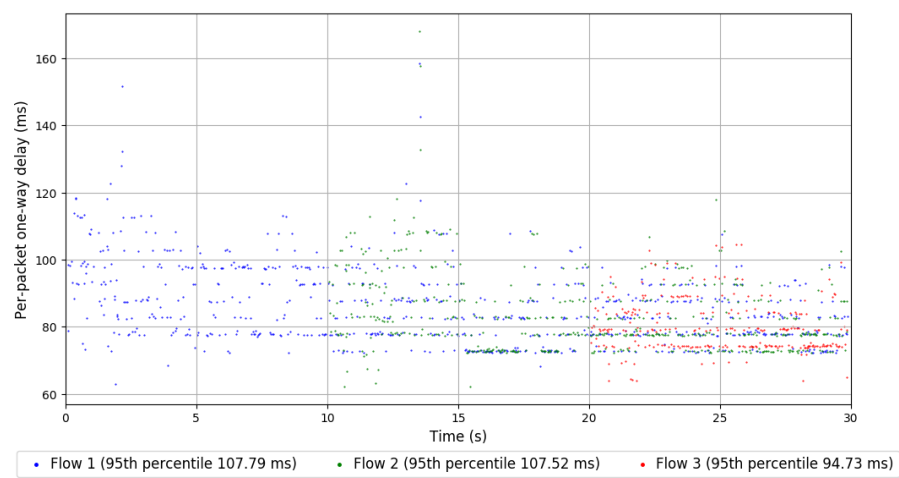
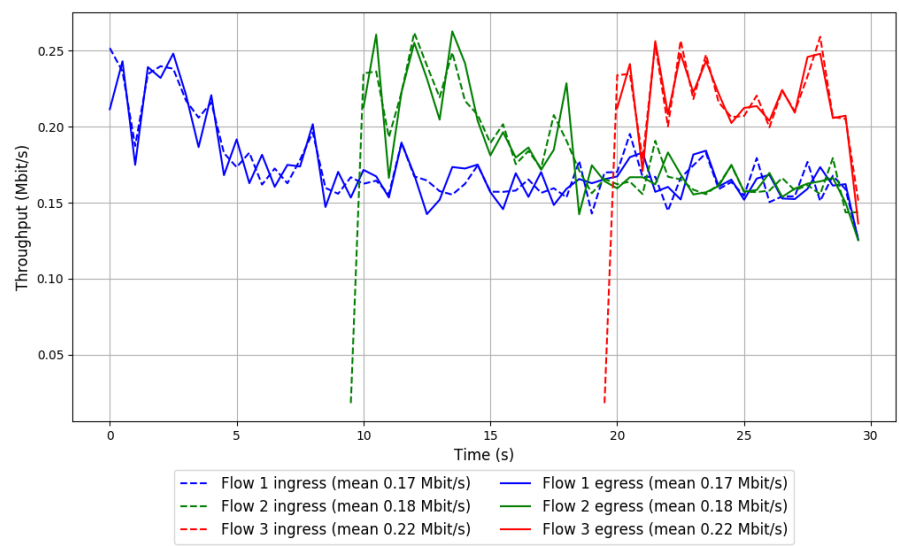


```
Run 1: Statistics of SCReAM

Start at: 2018-01-10 14:52:19
End at: 2018-01-10 14:52:49
Local clock offset: 1.114 ms
Remote clock offset: -14.561 ms

# Below is generated by plot.py at 2018-01-10 16:27:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 103.923 ms
Loss rate: 0.67%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 107.790 ms
Loss rate: 0.42%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 107.520 ms
Loss rate: 0.77%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 94.729 ms
Loss rate: 1.07%
```

Run 1: Report of SReAM — Data Link

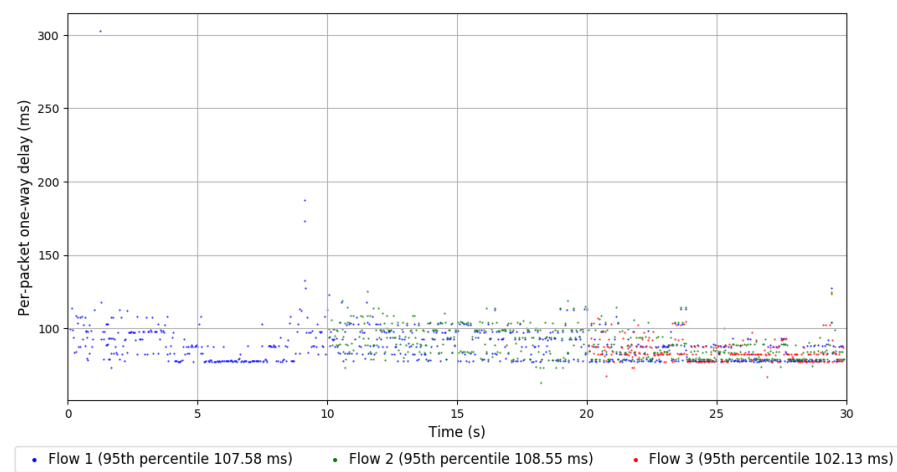
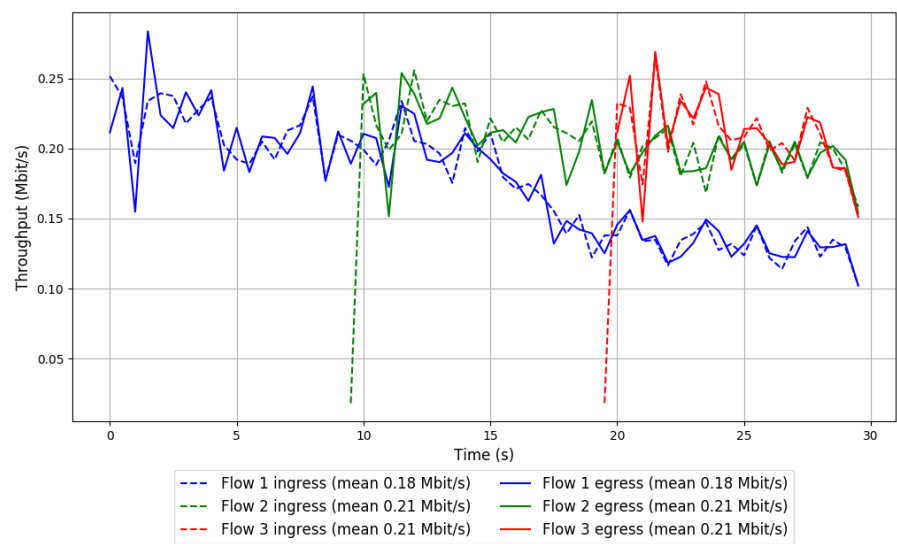


Run 2: Statistics of SReAM

Start at: 2018-01-10 15:08:59
End at: 2018-01-10 15:09:29
Local clock offset: 3.36 ms
Remote clock offset: -14.023 ms

Below is generated by plot.py at 2018-01-10 16:27:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 105.767 ms
Loss rate: 0.64%
-- Flow 1:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 107.585 ms
Loss rate: 0.45%
-- Flow 2:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 108.553 ms
Loss rate: 0.63%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 102.132 ms
Loss rate: 1.13%

Run 2: Report of SReAM — Data Link

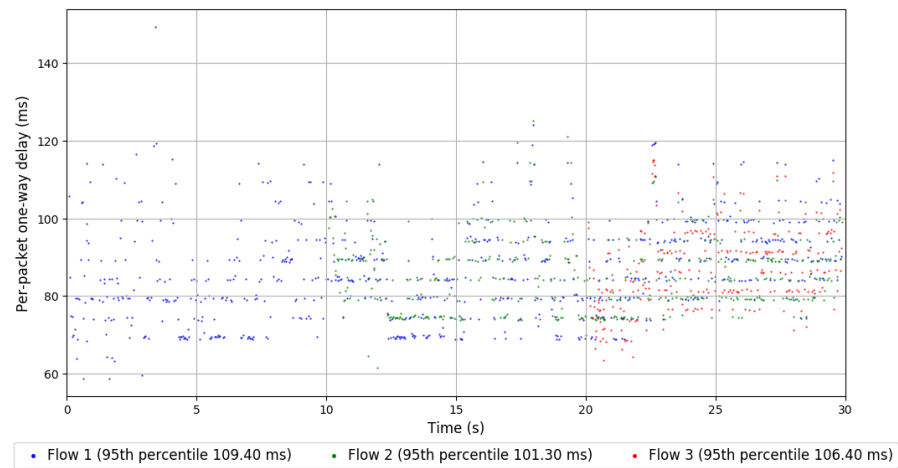
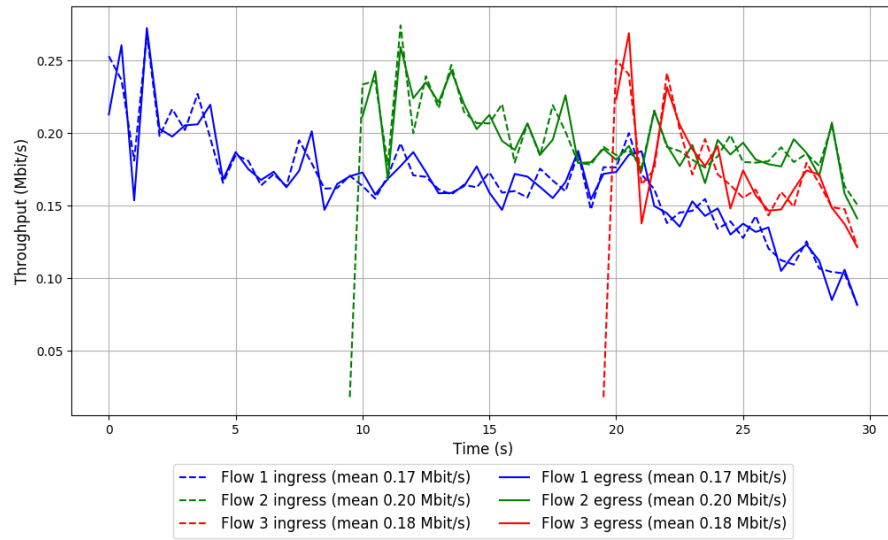


Run 3: Statistics of SReAM

Start at: 2018-01-10 15:25:50
End at: 2018-01-10 15:26:20
Local clock offset: 2.534 ms
Remote clock offset: -14.947 ms

Below is generated by plot.py at 2018-01-10 16:27:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 106.383 ms
Loss rate: 0.76%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 109.400 ms
Loss rate: 0.63%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 101.299 ms
Loss rate: 0.81%
-- Flow 3:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 106.401 ms
Loss rate: 1.00%

Run 3: Report of SReAM — Data Link

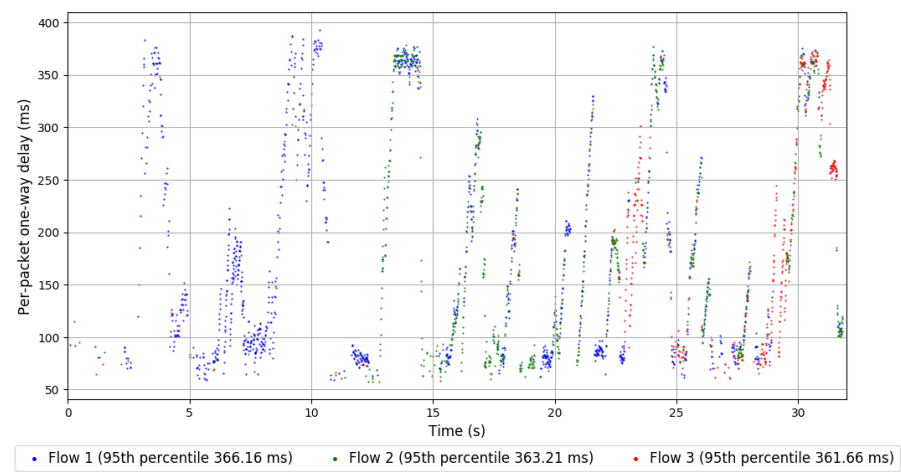
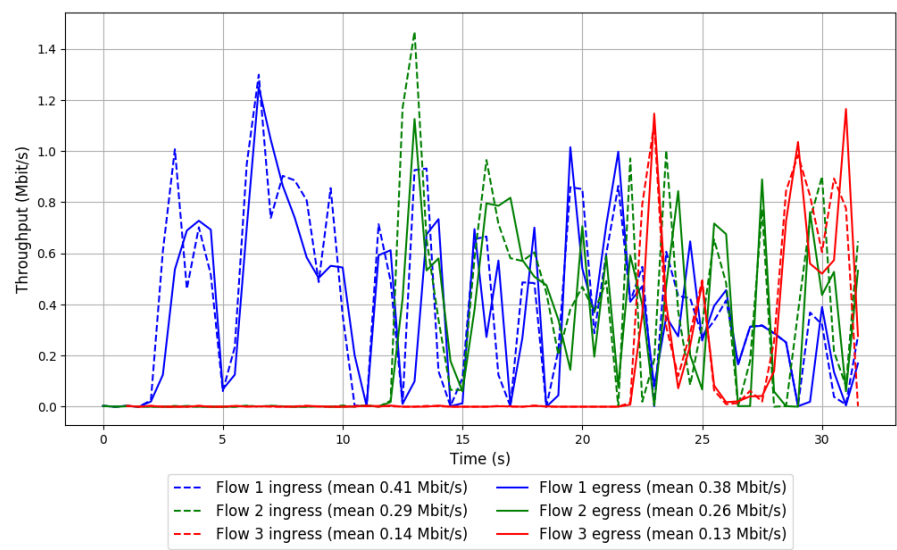


Run 1: Statistics of WebRTC media

Start at: 2018-01-10 14:49:00
End at: 2018-01-10 14:49:30
Local clock offset: -0.064 ms
Remote clock offset: -13.762 ms

Below is generated by plot.py at 2018-01-10 16:27:06
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 364.277 ms
Loss rate: 7.58%
-- Flow 1:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 366.158 ms
Loss rate: 6.99%
-- Flow 2:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 363.212 ms
Loss rate: 8.81%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 361.662 ms
Loss rate: 6.73%

Run 1: Report of WebRTC media — Data Link



Run 2: Statistics of WebRTC media

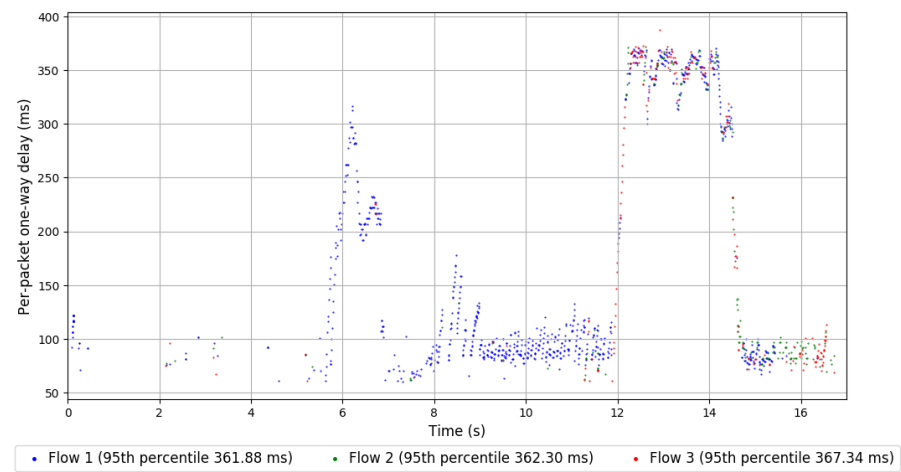
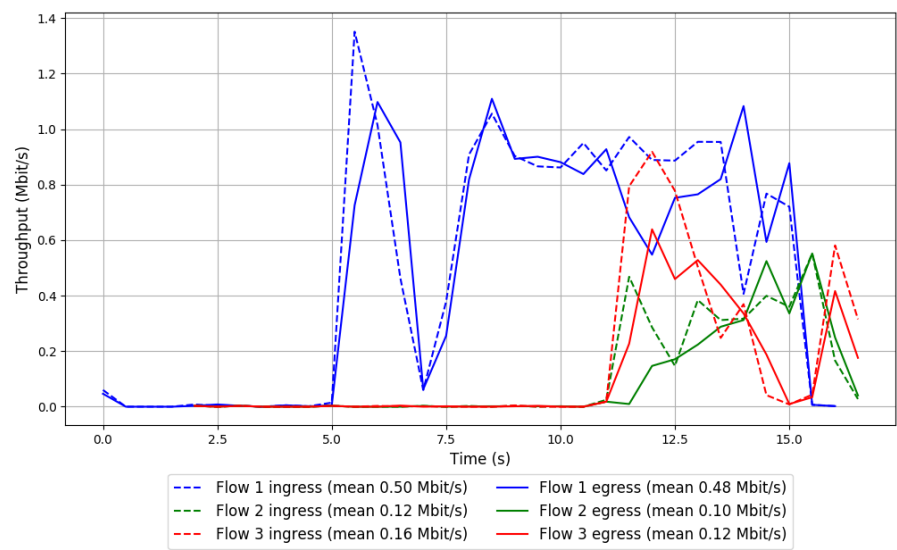
Start at: 2018-01-10 15:05:40

End at: 2018-01-10 15:06:10

Local clock offset: 2.815 ms

Remote clock offset: -14.492 ms

Run 2: Report of WebRTC media — Data Link

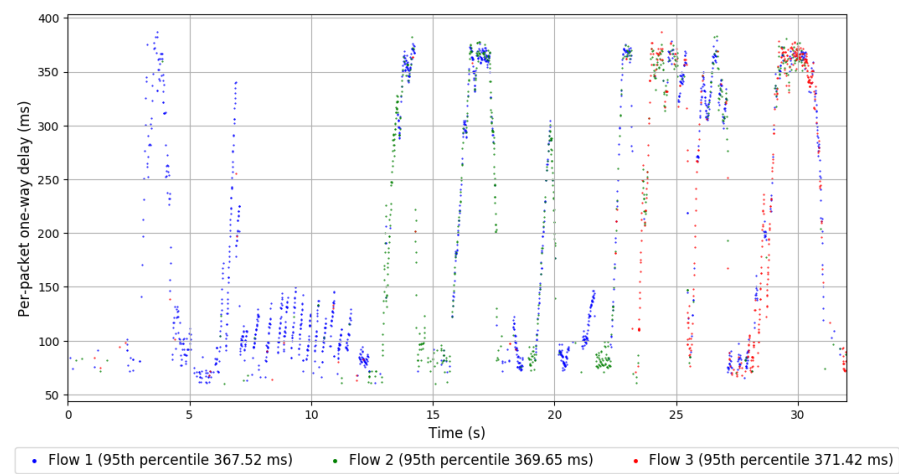
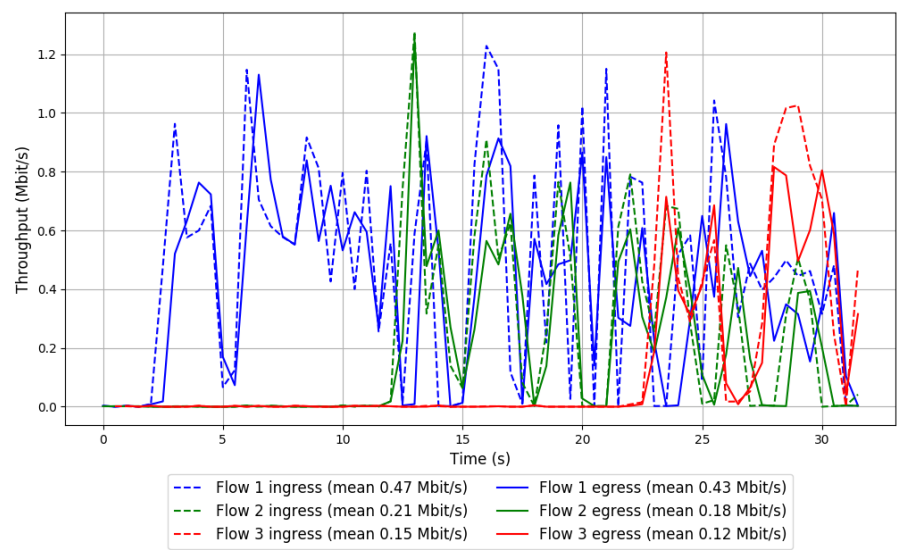


Run 3: Statistics of WebRTC media

Start at: 2018-01-10 15:22:32
End at: 2018-01-10 15:23:02
Local clock offset: -0.785 ms
Remote clock offset: -16.678 ms

Below is generated by plot.py at 2018-01-10 16:27:08
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 368.868 ms
Loss rate: 10.37%
-- Flow 1:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 367.525 ms
Loss rate: 7.75%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 369.652 ms
Loss rate: 11.84%
-- Flow 3:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 371.424 ms
Loss rate: 16.75%

Run 3: Report of WebRTC media — Data Link

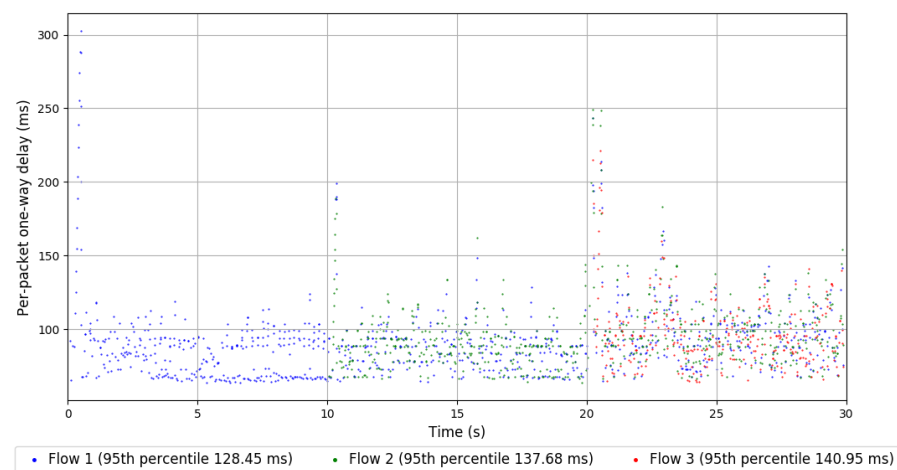
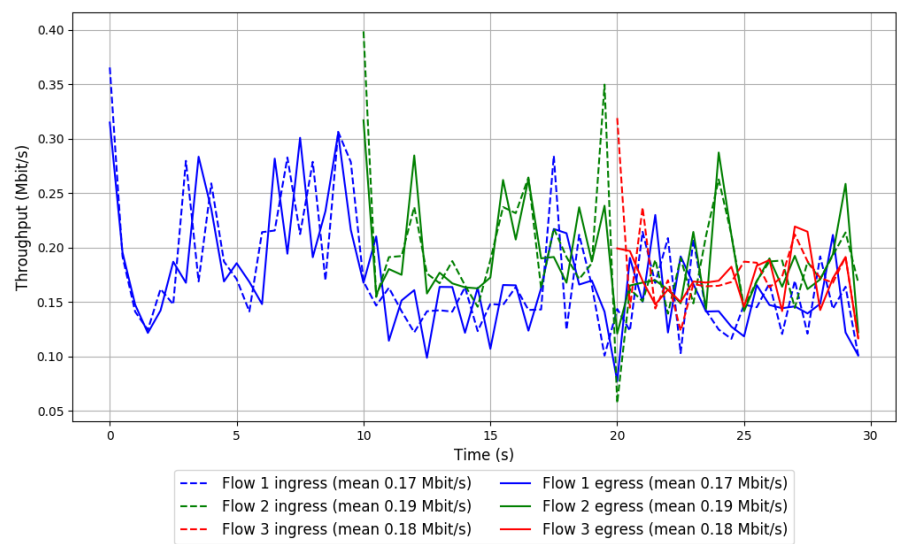


Run 1: Statistics of Sprout

Start at: 2018-01-10 14:54:32
End at: 2018-01-10 14:55:02
Local clock offset: 3.934 ms
Remote clock offset: -14.545 ms

Below is generated by plot.py at 2018-01-10 16:27:09
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 134.816 ms
Loss rate: 1.44%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 128.452 ms
Loss rate: 0.85%
-- Flow 2:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 137.683 ms
Loss rate: 1.19%
-- Flow 3:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 140.946 ms
Loss rate: 3.68%

Run 1: Report of Sprout — Data Link

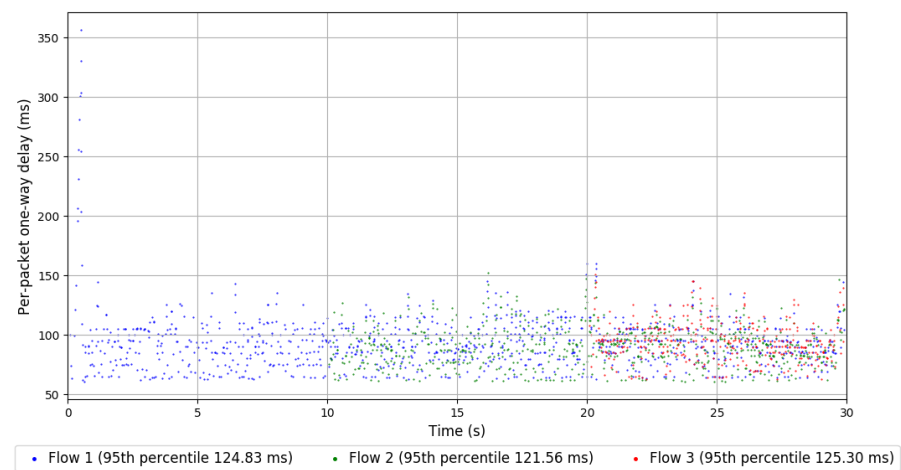
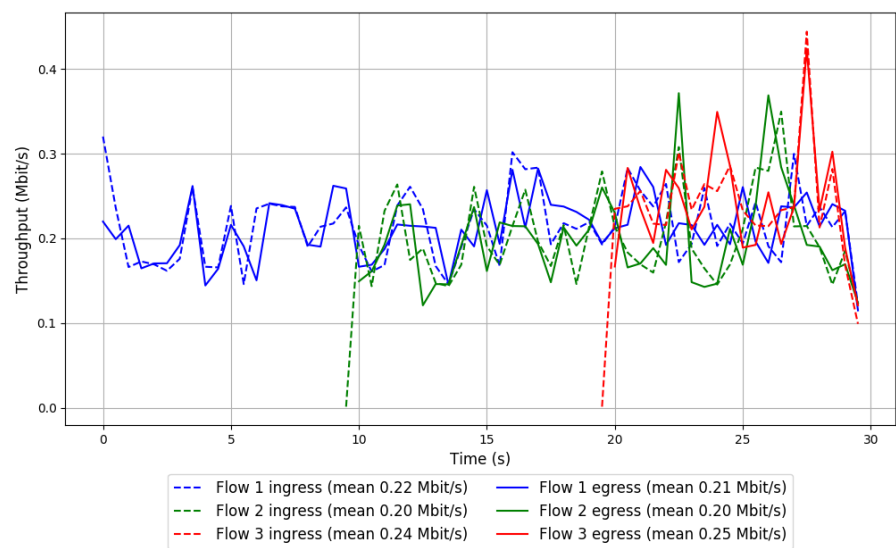


Run 2: Statistics of Sprout

Start at: 2018-01-10 15:11:11
End at: 2018-01-10 15:11:41
Local clock offset: -0.33 ms
Remote clock offset: -15.589 ms

Below is generated by plot.py at 2018-01-10 16:27:10
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 123.044 ms
Loss rate: 1.30%
-- Flow 1:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 124.830 ms
Loss rate: 1.20%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 121.558 ms
Loss rate: 2.16%
-- Flow 3:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 125.297 ms
Loss rate: 0.11%

Run 2: Report of Sprout — Data Link

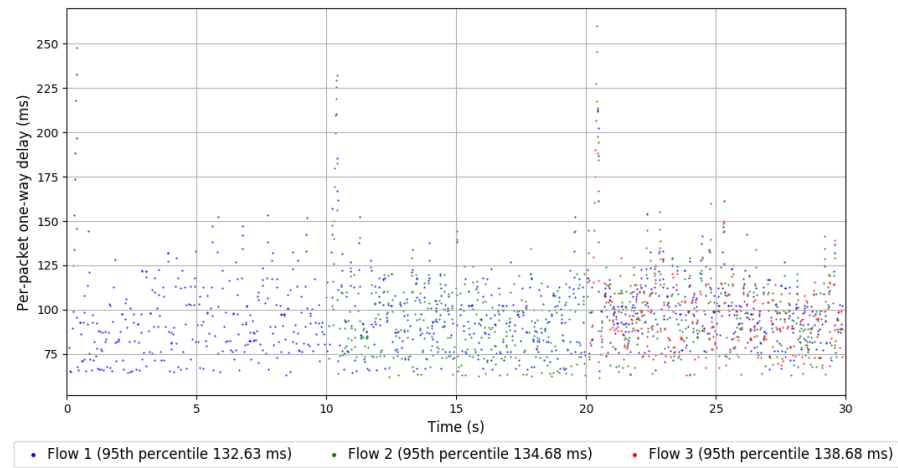
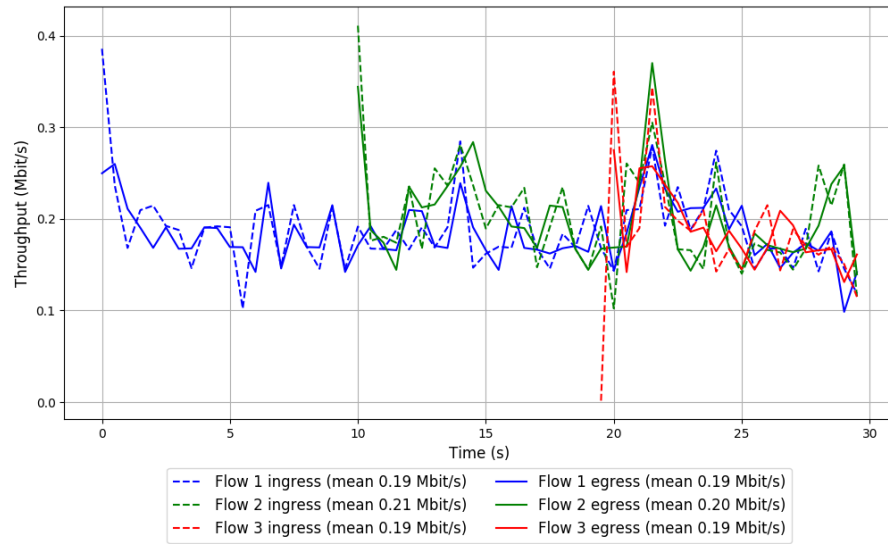


Run 3: Statistics of Sprout

Start at: 2018-01-10 15:28:05
End at: 2018-01-10 15:28:35
Local clock offset: 4.29 ms
Remote clock offset: -14.77 ms

```
# Below is generated by plot.py at 2018-01-10 16:27:11
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 133.973 ms
Loss rate: 0.99%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 132.632 ms
Loss rate: 1.25%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 134.678 ms
Loss rate: 0.54%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 138.679 ms
Loss rate: 1.20%
```

Run 3: Report of Sprout — Data Link

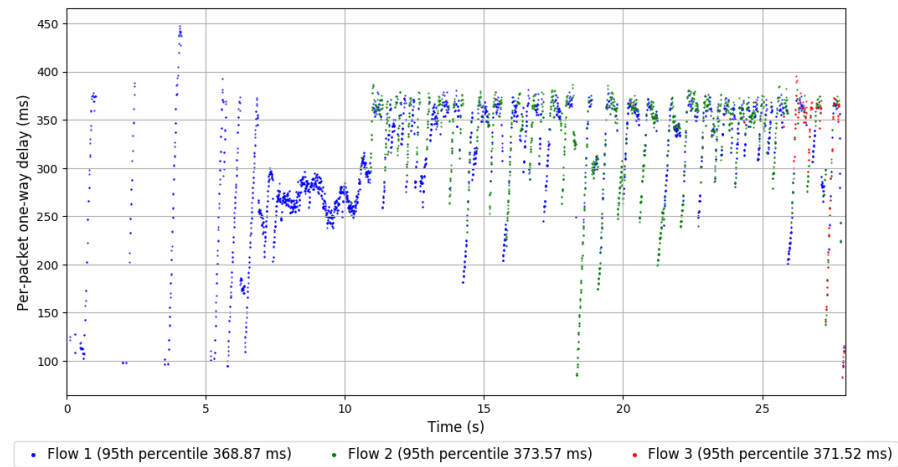
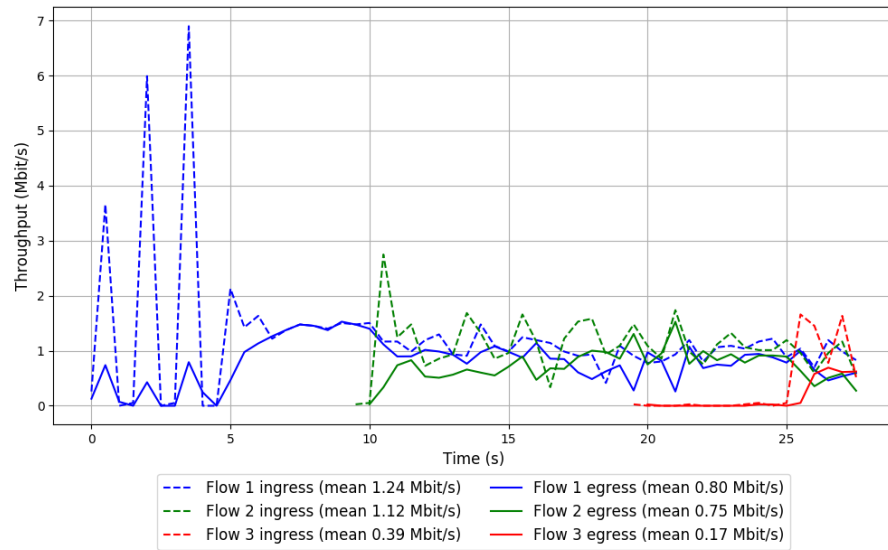


Run 1: Statistics of TaoVA-100x

Start at: 2018-01-10 14:56:45
End at: 2018-01-10 14:57:15
Local clock offset: 0.71 ms
Remote clock offset: -14.815 ms

Below is generated by plot.py at 2018-01-10 16:27:13
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.32 Mbit/s
95th percentile per-packet one-way delay: 371.111 ms
Loss rate: 36.49%
-- Flow 1:
Average throughput: 0.80 Mbit/s
95th percentile per-packet one-way delay: 368.865 ms
Loss rate: 35.79%
-- Flow 2:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 373.571 ms
Loss rate: 34.41%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 371.520 ms
Loss rate: 57.72%

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

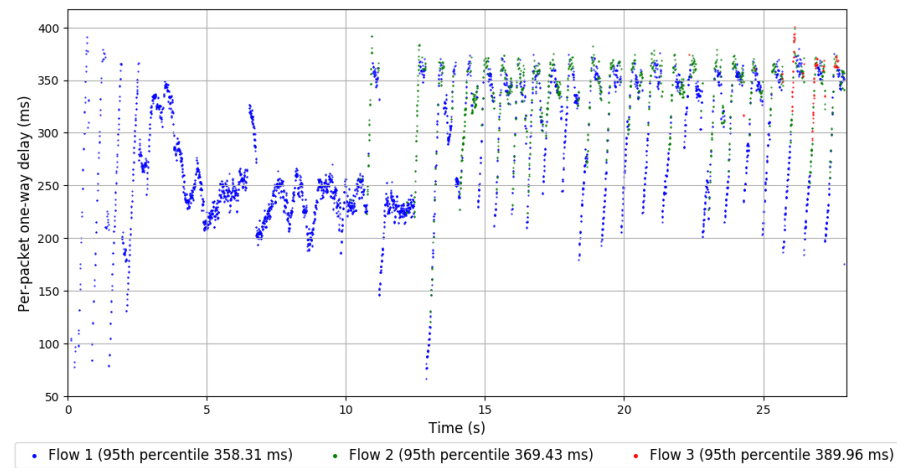
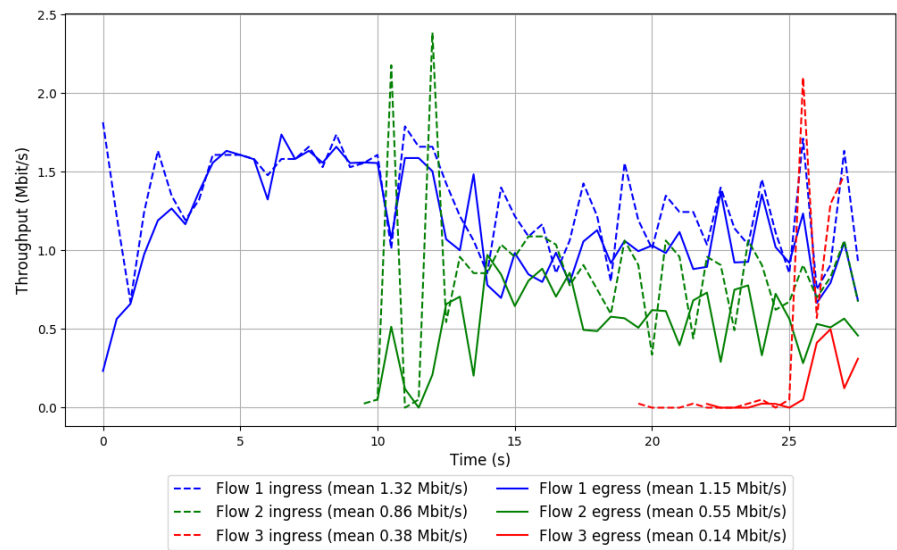


Run 2: Statistics of TaoVA-100x

Start at: 2018-01-10 15:13:25
End at: 2018-01-10 15:13:55
Local clock offset: -7.102 ms
Remote clock offset: -17.943 ms

Below is generated by plot.py at 2018-01-10 16:27:13
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.53 Mbit/s
95th percentile per-packet one-way delay: 364.108 ms
Loss rate: 22.40%
-- Flow 1:
Average throughput: 1.15 Mbit/s
95th percentile per-packet one-way delay: 358.311 ms
Loss rate: 12.79%
-- Flow 2:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 369.427 ms
Loss rate: 36.01%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 389.964 ms
Loss rate: 73.83%

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

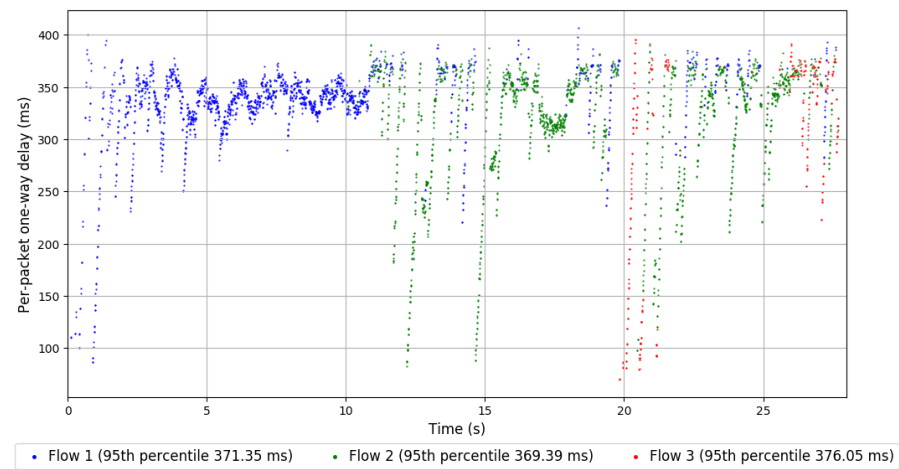
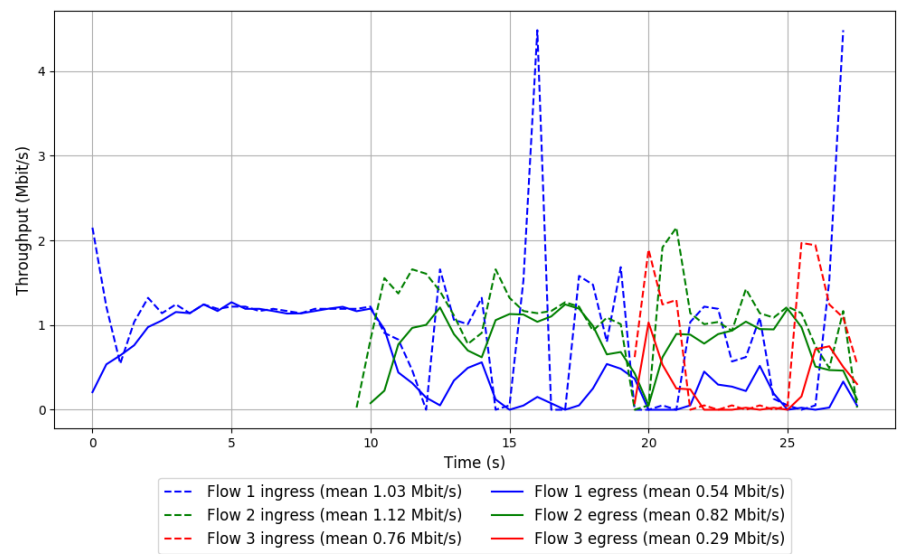


Run 3: Statistics of TaoVA-100x

Start at: 2018-01-10 15:30:18
End at: 2018-01-10 15:30:48
Local clock offset: -0.854 ms
Remote clock offset: -15.99 ms

Below is generated by plot.py at 2018-01-10 16:27:15
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.15 Mbit/s
95th percentile per-packet one-way delay: 371.186 ms
Loss rate: 41.57%
-- Flow 1:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 371.349 ms
Loss rate: 47.09%
-- Flow 2:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 369.388 ms
Loss rate: 27.71%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 376.054 ms
Loss rate: 61.72%

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

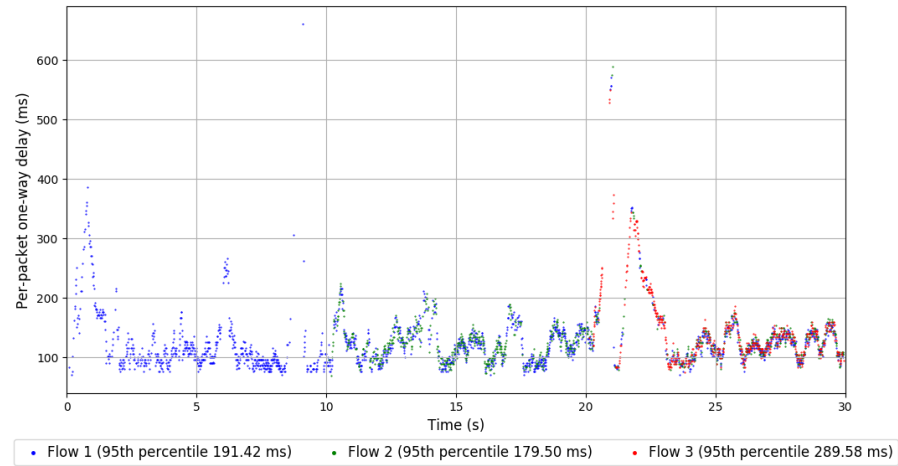
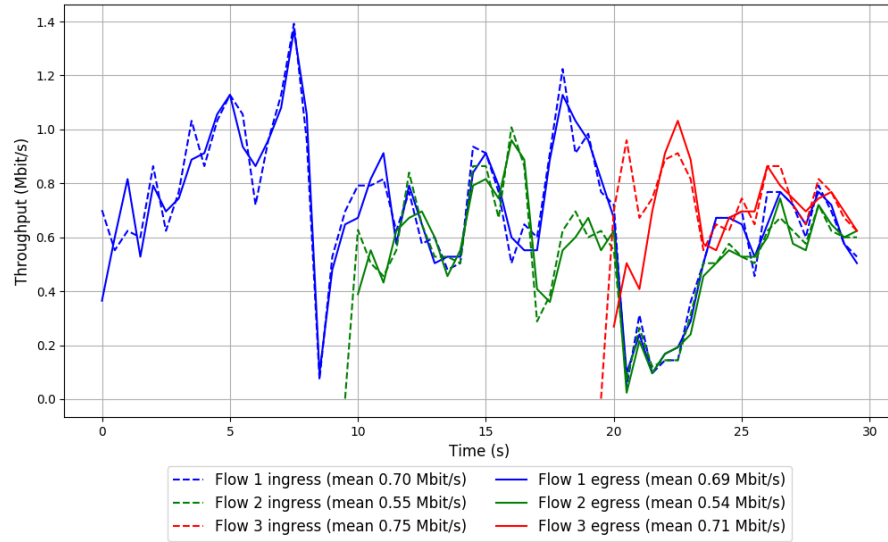


Run 1: Statistics of TCP Vegas

Start at: 2018-01-10 15:00:08
End at: 2018-01-10 15:00:38
Local clock offset: 0.87 ms
Remote clock offset: -14.283 ms

Below is generated by plot.py at 2018-01-10 16:27:15
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.28 Mbit/s
95th percentile per-packet one-way delay: 214.249 ms
Loss rate: 2.54%
-- Flow 1:
Average throughput: 0.69 Mbit/s
95th percentile per-packet one-way delay: 191.421 ms
Loss rate: 1.21%
-- Flow 2:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 179.497 ms
Loss rate: 1.97%
-- Flow 3:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 289.584 ms
Loss rate: 7.09%

Run 1: Report of TCP Vegas — Data Link

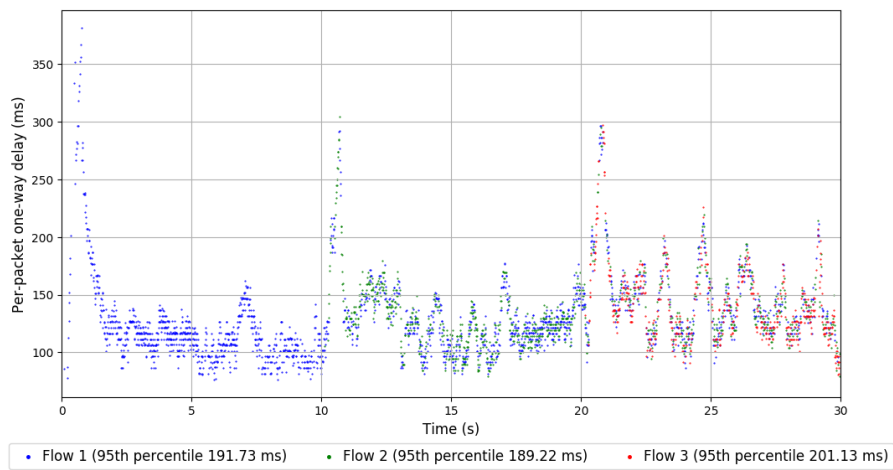
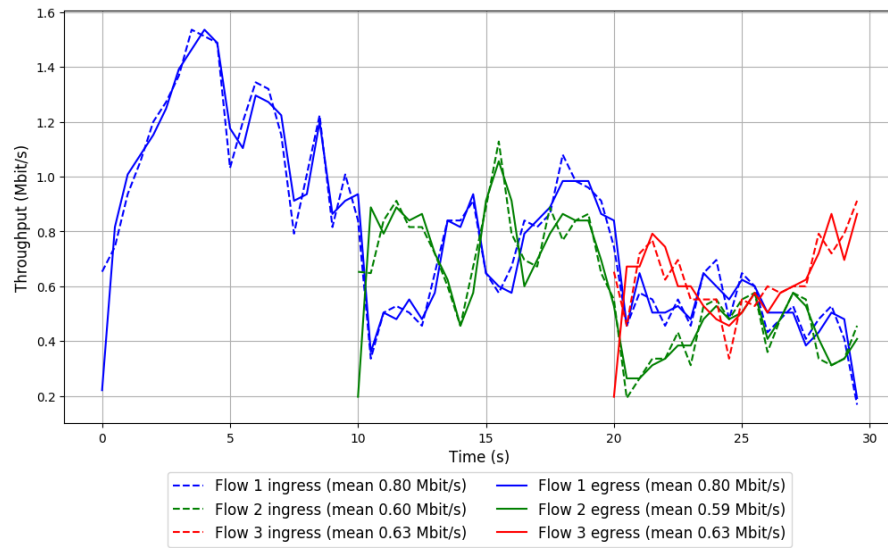


Run 2: Statistics of TCP Vegas

Start at: 2018-01-10 15:16:47
End at: 2018-01-10 15:17:17
Local clock offset: 4.143 ms
Remote clock offset: -16.935 ms

Below is generated by plot.py at 2018-01-10 16:27:16
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.39 Mbit/s
95th percentile per-packet one-way delay: 192.161 ms
Loss rate: 1.06%
-- Flow 1:
Average throughput: 0.80 Mbit/s
95th percentile per-packet one-way delay: 191.734 ms
Loss rate: 0.60%
-- Flow 2:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 189.215 ms
Loss rate: 1.21%
-- Flow 3:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 201.131 ms
Loss rate: 2.48%

Run 2: Report of TCP Vegas — Data Link

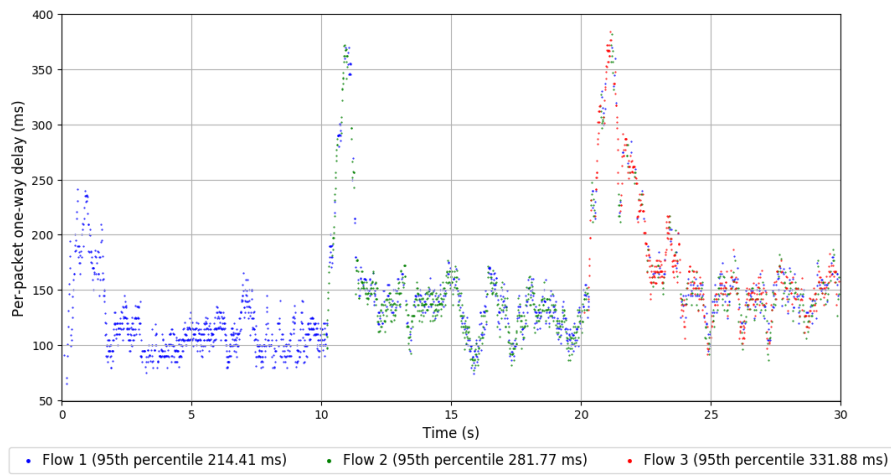
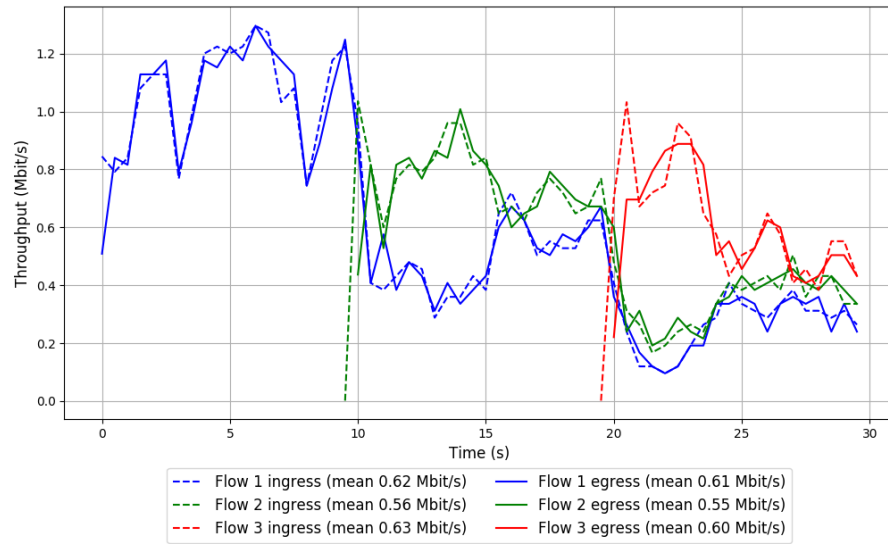


Run 3: Statistics of TCP Vegas

Start at: 2018-01-10 15:33:42
End at: 2018-01-10 15:34:12
Local clock offset: 1.841 ms
Remote clock offset: -15.551 ms

Below is generated by plot.py at 2018-01-10 16:27:17
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 274.964 ms
Loss rate: 2.01%
-- Flow 1:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 214.412 ms
Loss rate: 0.91%
-- Flow 2:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 281.775 ms
Loss rate: 2.25%
-- Flow 3:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 331.882 ms
Loss rate: 4.82%

Run 3: Report of TCP Vegas — Data Link

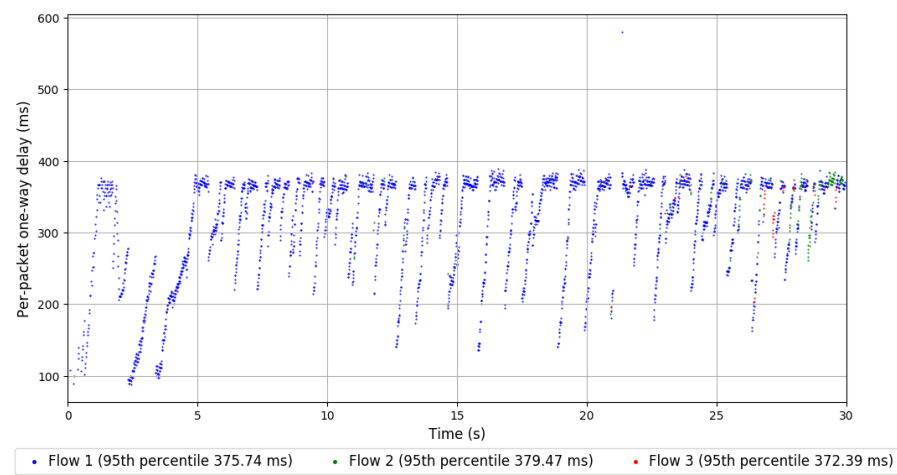
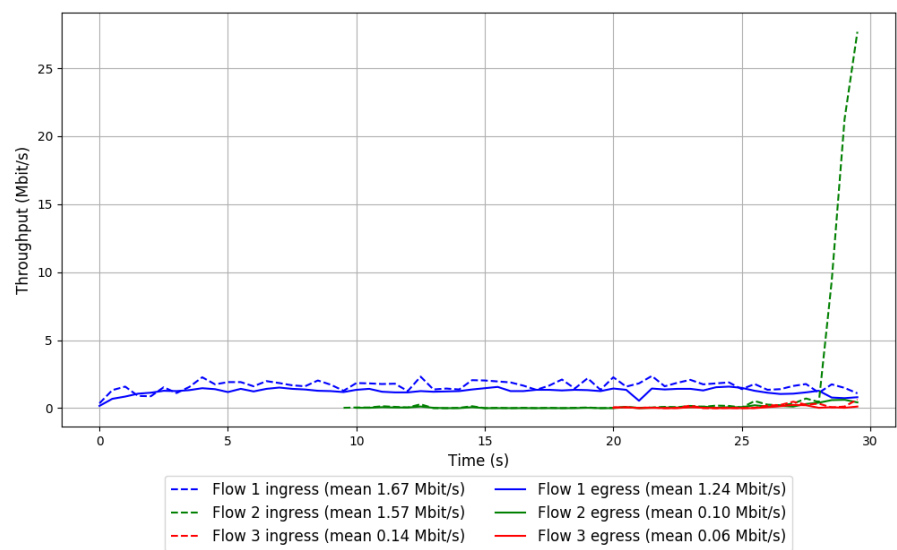


Run 1: Statistics of Verus

Start at: 2018-01-10 14:51:12
End at: 2018-01-10 14:51:42
Local clock offset: 0.56 ms
Remote clock offset: -14.263 ms

Below is generated by plot.py at 2018-01-10 16:27:20
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.33 Mbit/s
95th percentile per-packet one-way delay: 376.046 ms
Loss rate: 51.98%
-- Flow 1:
Average throughput: 1.24 Mbit/s
95th percentile per-packet one-way delay: 375.735 ms
Loss rate: 25.43%
-- Flow 2:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 379.469 ms
Loss rate: 93.71%
-- Flow 3:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 372.391 ms
Loss rate: 59.48%

Run 1: Report of Verus — Data Link

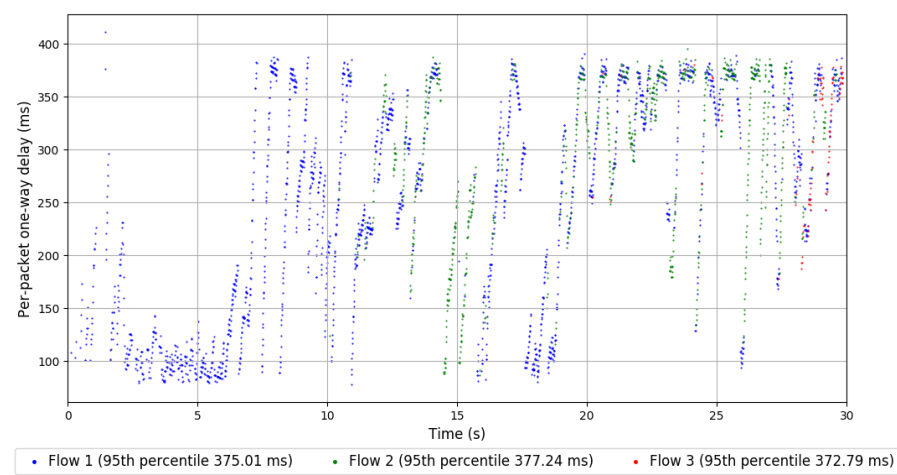
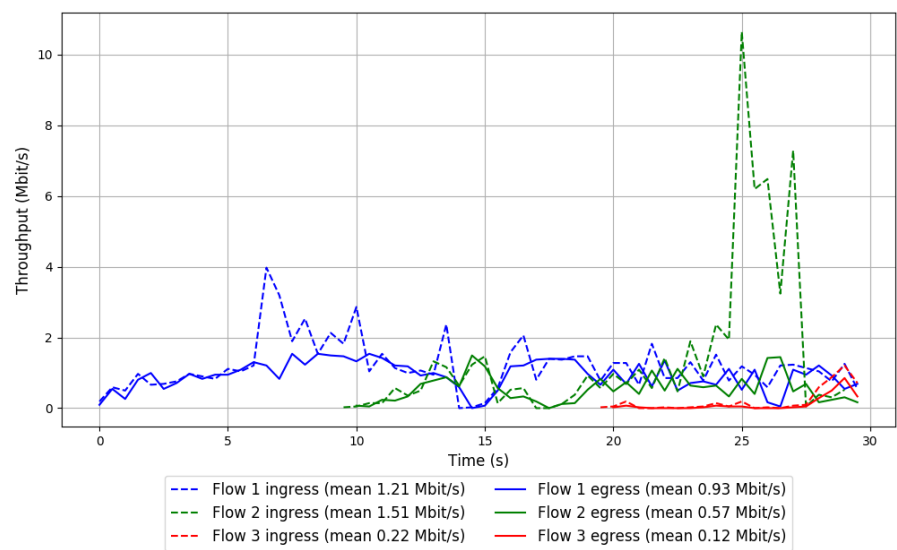


Run 2: Statistics of Verus

Start at: 2018-01-10 15:07:53
End at: 2018-01-10 15:08:23
Local clock offset: 3.937 ms
Remote clock offset: -14.516 ms

Below is generated by plot.py at 2018-01-10 16:27:20
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.34 Mbit/s
95th percentile per-packet one-way delay: 375.877 ms
Loss rate: 40.64%
-- Flow 1:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 375.007 ms
Loss rate: 23.10%
-- Flow 2:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 377.242 ms
Loss rate: 62.01%
-- Flow 3:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 372.785 ms
Loss rate: 45.60%

Run 2: Report of Verus — Data Link

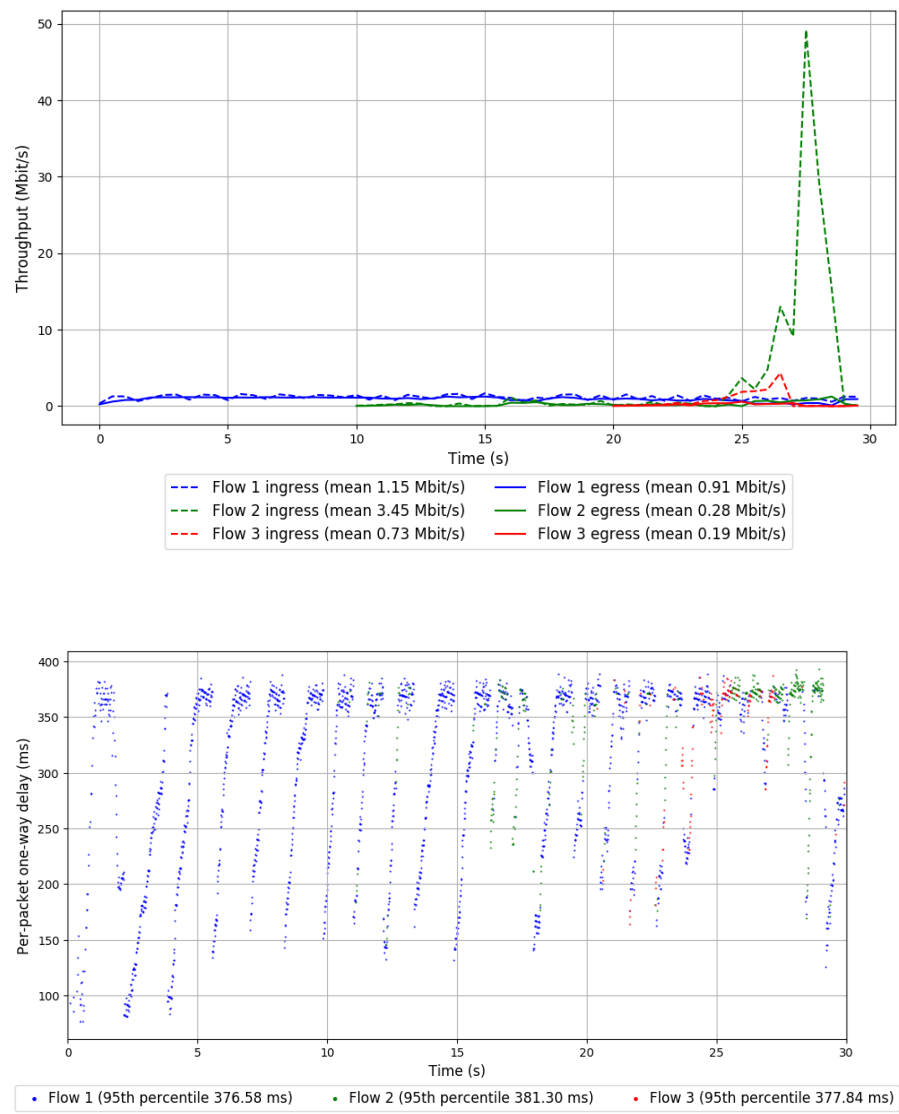


Run 3: Statistics of Verus

Start at: 2018-01-10 15:24:44
End at: 2018-01-10 15:25:14
Local clock offset: 0.525 ms
Remote clock offset: -15.709 ms

Below is generated by plot.py at 2018-01-10 16:27:21
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.16 Mbit/s
95th percentile per-packet one-way delay: 378.140 ms
Loss rate: 68.60%
-- Flow 1:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 376.581 ms
Loss rate: 20.61%
-- Flow 2:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 381.298 ms
Loss rate: 92.14%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 377.838 ms
Loss rate: 74.51%

Run 3: Report of Verus — Data Link

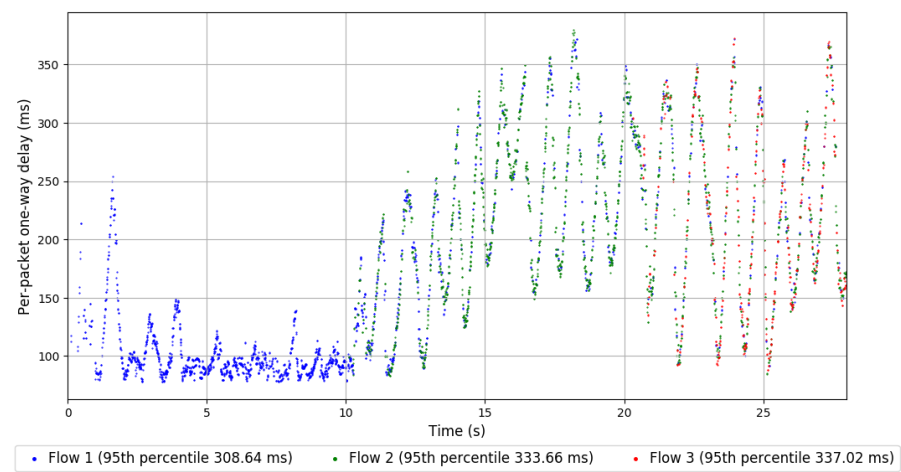
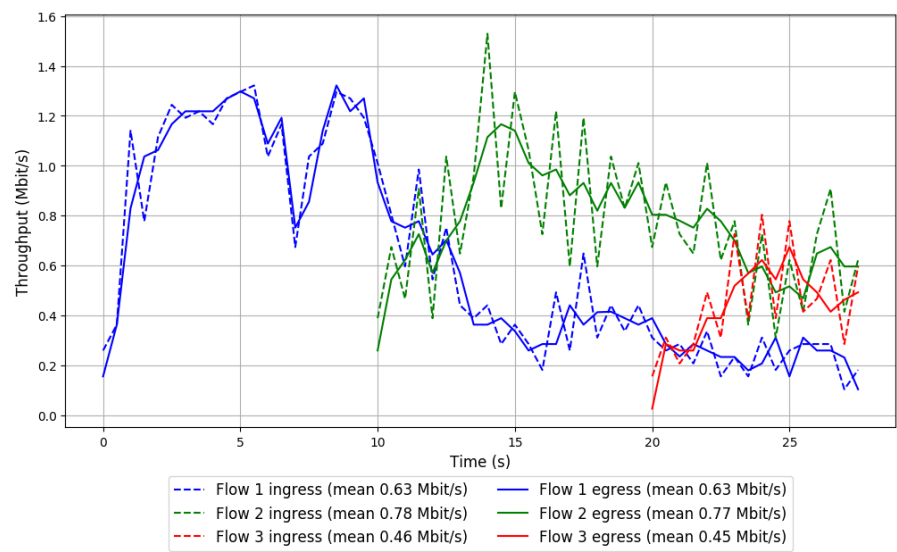


Run 1: Statistics of Copa

Start at: 2018-01-10 14:47:53
End at: 2018-01-10 14:48:23
Local clock offset: 3.321 ms
Remote clock offset: -14.105 ms

Below is generated by plot.py at 2018-01-10 16:27:22
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.24 Mbit/s
95th percentile per-packet one-way delay: 325.158 ms
Loss rate: 1.44%
-- Flow 1:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 308.643 ms
Loss rate: 0.76%
-- Flow 2:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 333.659 ms
Loss rate: 1.62%
-- Flow 3:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 337.023 ms
Loss rate: 4.02%

Run 1: Report of Copa — Data Link

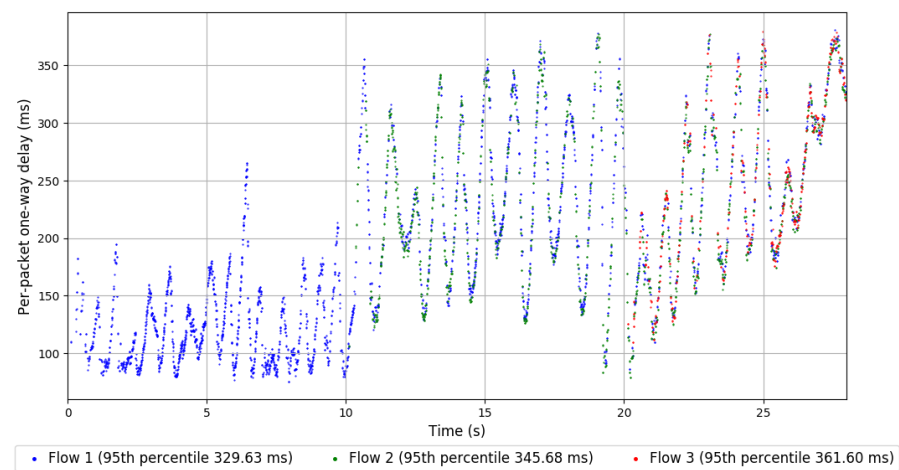
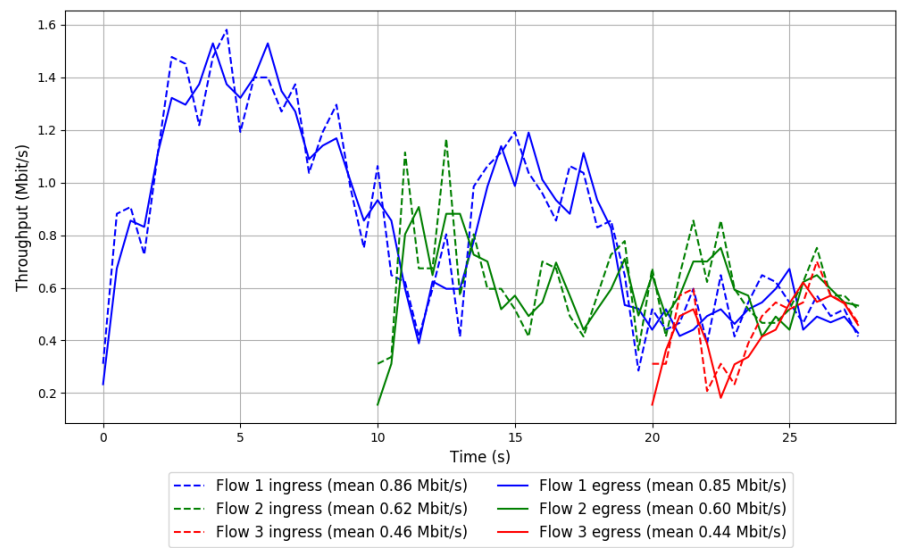


Run 2: Statistics of Copa

Start at: 2018-01-10 15:04:34
End at: 2018-01-10 15:05:04
Local clock offset: 2.103 ms
Remote clock offset: -16.706 ms

Below is generated by plot.py at 2018-01-10 16:27:22
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 341.539 ms
Loss rate: 2.39%
-- Flow 1:
Average throughput: 0.85 Mbit/s
95th percentile per-packet one-way delay: 329.635 ms
Loss rate: 1.52%
-- Flow 2:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 345.682 ms
Loss rate: 3.09%
-- Flow 3:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 361.597 ms
Loss rate: 5.92%

Run 2: Report of Copa — Data Link

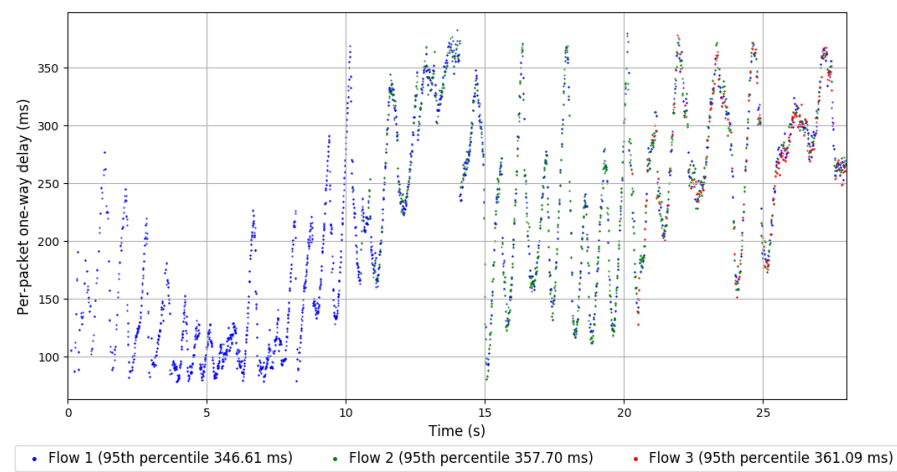
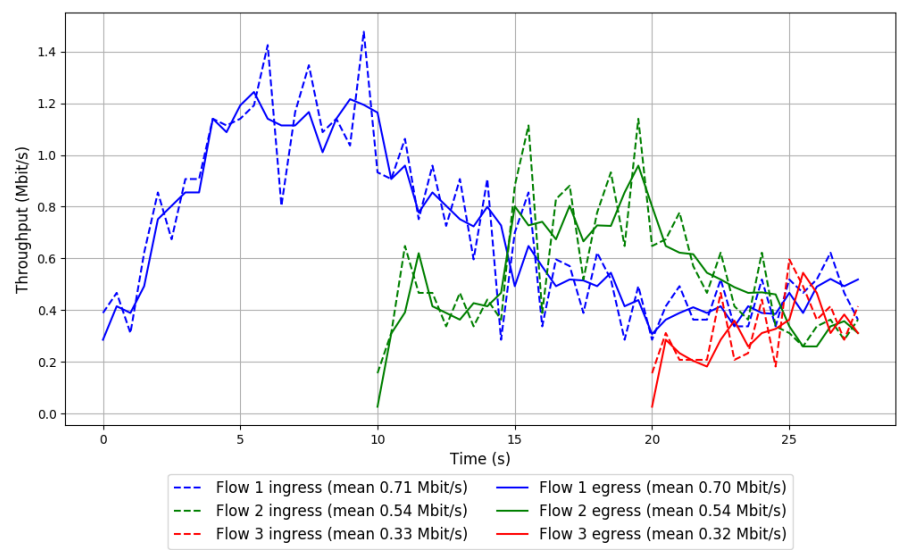


Run 3: Statistics of Copa

Start at: 2018-01-10 15:21:25
End at: 2018-01-10 15:21:55
Local clock offset: 0.415 ms
Remote clock offset: -16.952 ms

Below is generated by plot.py at 2018-01-10 16:27:23
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.13 Mbit/s
95th percentile per-packet one-way delay: 350.716 ms
Loss rate: 2.34%
-- Flow 1:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 346.614 ms
Loss rate: 1.64%
-- Flow 2:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 357.703 ms
Loss rate: 2.66%
-- Flow 3:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 361.094 ms
Loss rate: 6.46%

Run 3: Report of Copa — Data Link

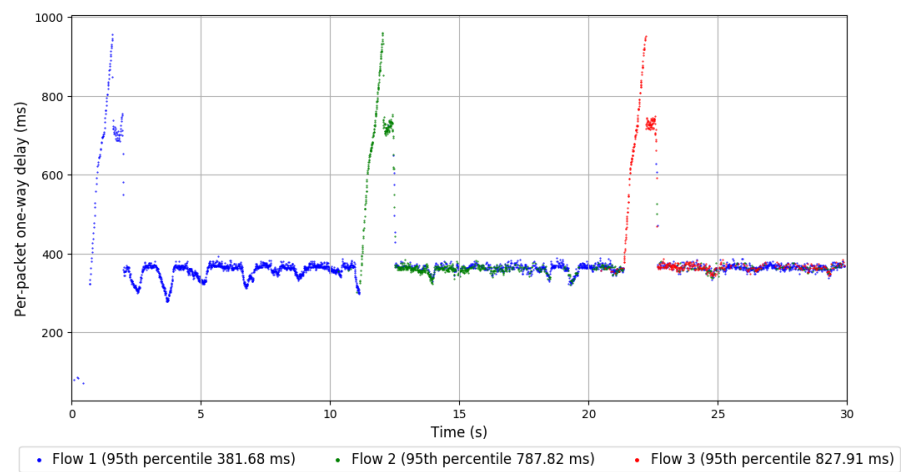
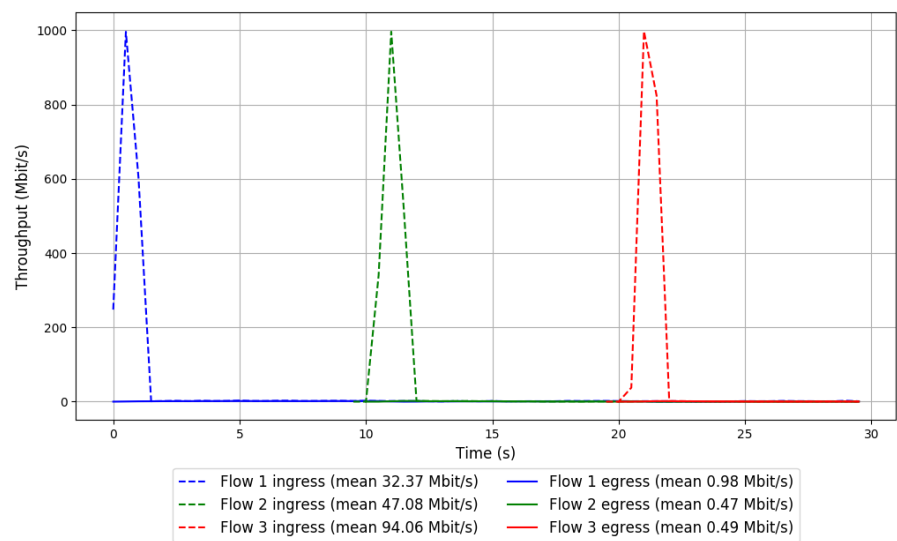


Run 1: Statistics of FillP

Start at: 2018-01-10 14:58:57
End at: 2018-01-10 14:59:27
Local clock offset: 1.268 ms
Remote clock offset: -14.286 ms

Below is generated by plot.py at 2018-01-10 16:27:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 725.165 ms
Loss rate: 98.48%
-- Flow 1:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 381.681 ms
Loss rate: 96.97%
-- Flow 2:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 787.823 ms
Loss rate: 99.03%
-- Flow 3:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 827.913 ms
Loss rate: 99.50%

Run 1: Report of FillP — Data Link

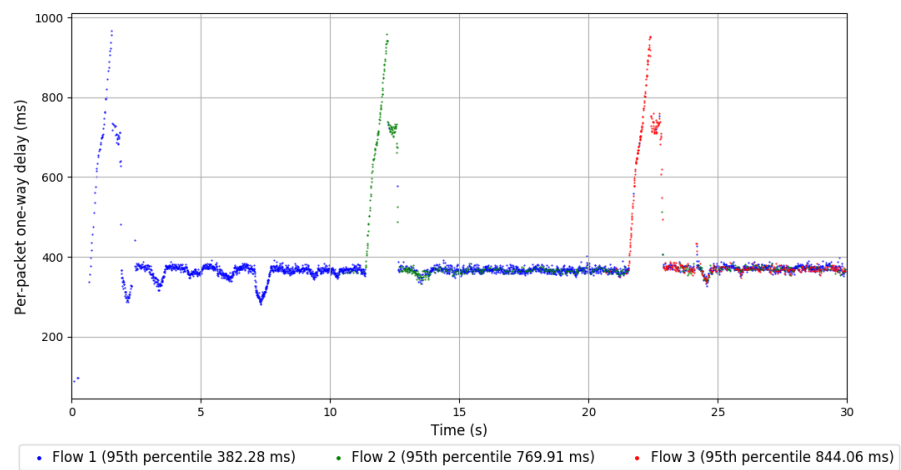
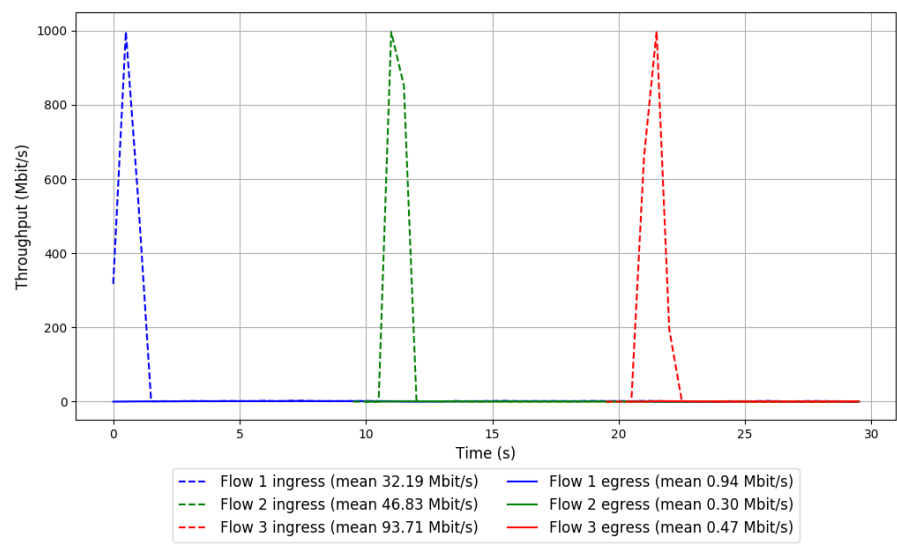


Run 2: Statistics of FillP

Start at: 2018-01-10 15:15:37
End at: 2018-01-10 15:16:07
Local clock offset: 2.301 ms
Remote clock offset: -16.432 ms

Below is generated by plot.py at 2018-01-10 16:27:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.28 Mbit/s
95th percentile per-packet one-way delay: 710.168 ms
Loss rate: 98.65%
-- Flow 1:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 382.283 ms
Loss rate: 97.09%
-- Flow 2:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 769.907 ms
Loss rate: 99.38%
-- Flow 3:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 844.056 ms
Loss rate: 99.53%

Run 2: Report of FillP — Data Link

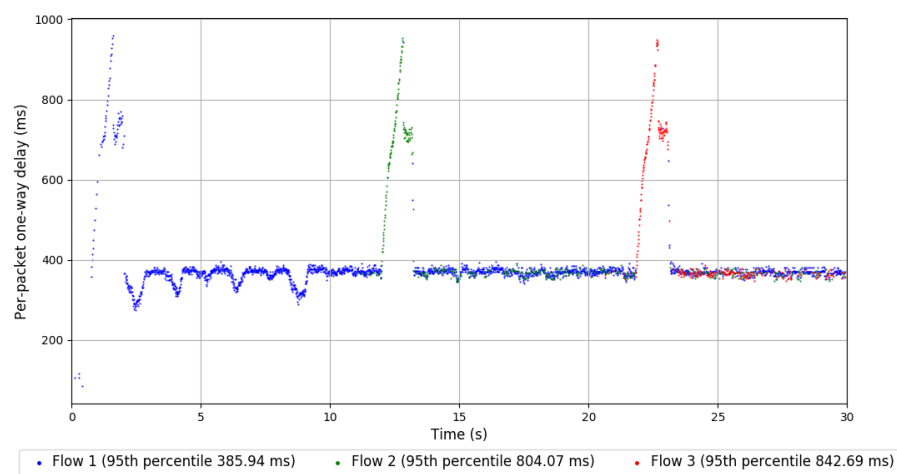
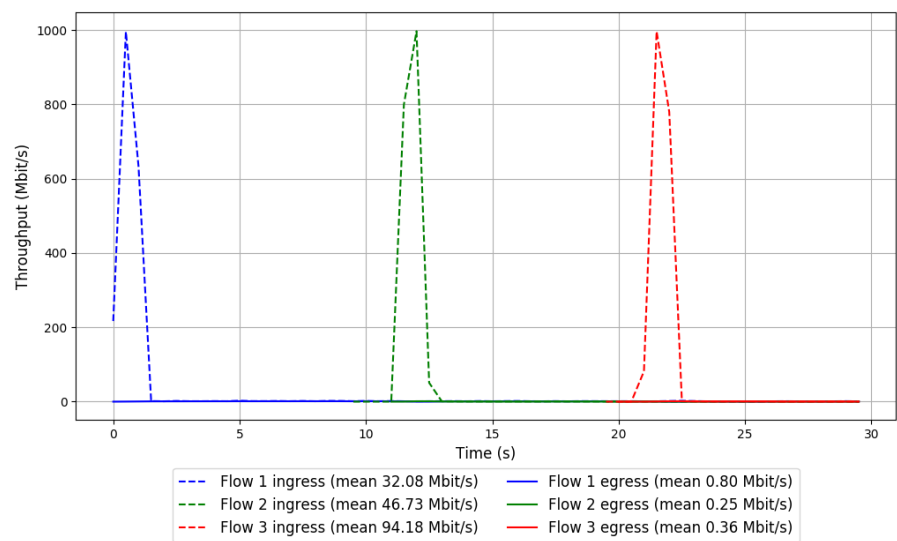


Run 3: Statistics of FillP

Start at: 2018-01-10 15:32:30
End at: 2018-01-10 15:33:00
Local clock offset: 1.578 ms
Remote clock offset: -16.577 ms

Below is generated by plot.py at 2018-01-10 16:27:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.08 Mbit/s
95th percentile per-packet one-way delay: 718.057 ms
Loss rate: 98.86%
-- Flow 1:
Average throughput: 0.80 Mbit/s
95th percentile per-packet one-way delay: 385.936 ms
Loss rate: 97.50%
-- Flow 2:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 804.074 ms
Loss rate: 99.50%
-- Flow 3:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 842.686 ms
Loss rate: 99.63%

Run 3: Report of FillP — Data Link

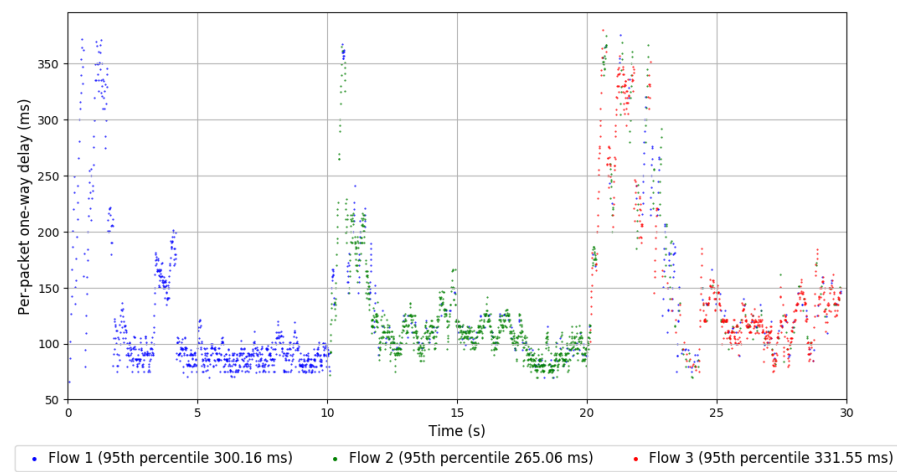
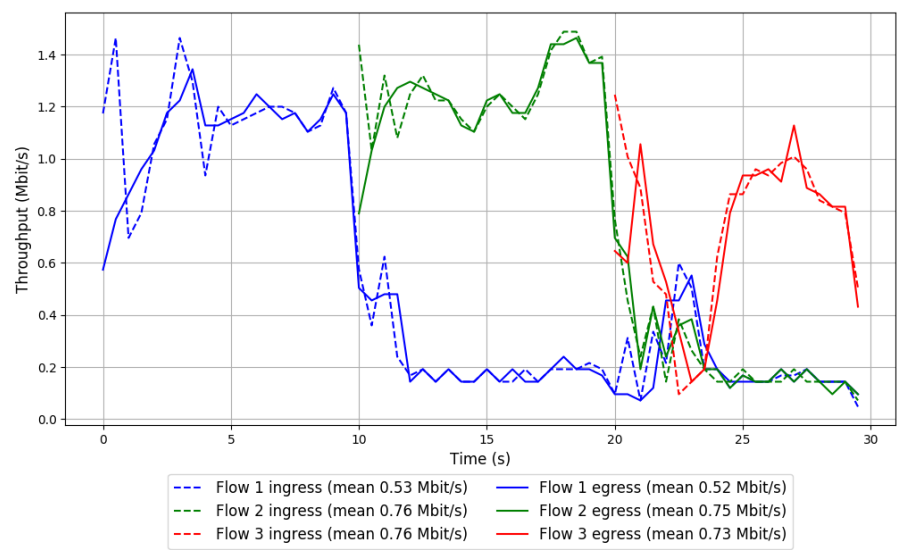


```
Run 1: Statistics of Indigo

Start at: 2018-01-10 14:57:51
End at: 2018-01-10 14:58:21
Local clock offset: -0.646 ms
Remote clock offset: -15.017 ms

# Below is generated by plot.py at 2018-01-10 16:27:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 319.367 ms
Loss rate: 2.58%
-- Flow 1:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 300.160 ms
Loss rate: 3.19%
-- Flow 2:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 265.056 ms
Loss rate: 1.12%
-- Flow 3:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 331.550 ms
Loss rate: 4.24%
```

Run 1: Report of Indigo — Data Link

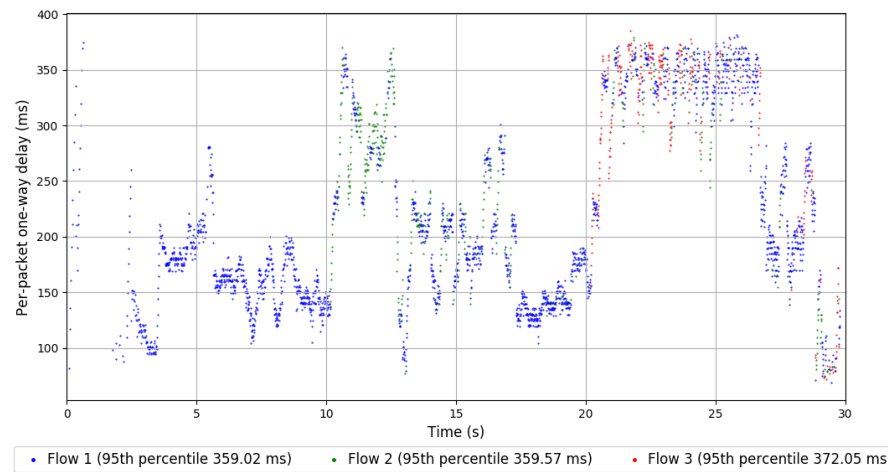
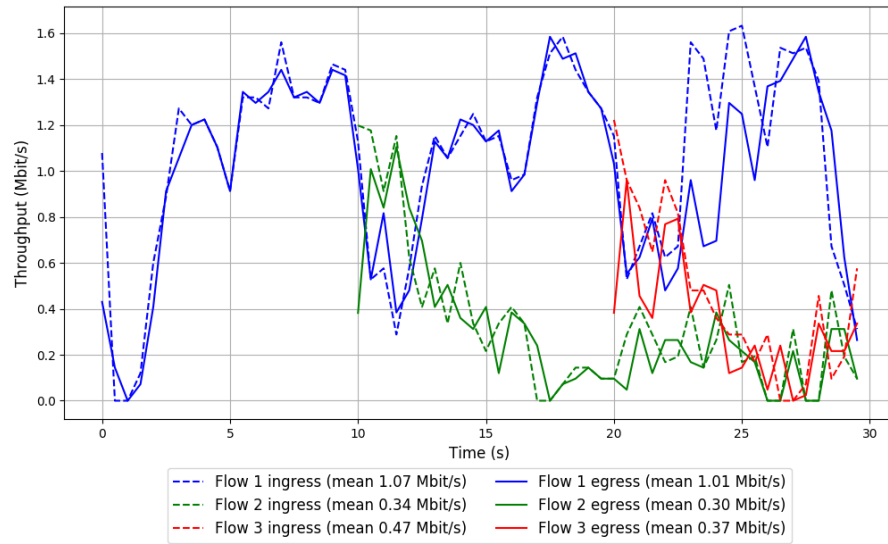


Run 2: Statistics of Indigo

Start at: 2018-01-10 15:14:31
End at: 2018-01-10 15:15:01
Local clock offset: 0.58 ms
Remote clock offset: -14.052 ms

Below is generated by plot.py at 2018-01-10 16:27:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.33 Mbit/s
95th percentile per-packet one-way delay: 360.428 ms
Loss rate: 8.67%
-- Flow 1:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 359.023 ms
Loss rate: 5.90%
-- Flow 2:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 359.574 ms
Loss rate: 11.57%
-- Flow 3:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 372.054 ms
Loss rate: 23.76%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-01-10 15:31:24
End at: 2018-01-10 15:31:54
Local clock offset: 0.799 ms
Remote clock offset: -17.262 ms

Below is generated by plot.py at 2018-01-10 16:27:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 232.161 ms
Loss rate: 3.23%
-- Flow 1:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 335.520 ms
Loss rate: 4.56%
-- Flow 2:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 174.234 ms
Loss rate: 2.07%
-- Flow 3:
Average throughput: 0.80 Mbit/s
95th percentile per-packet one-way delay: 159.568 ms
Loss rate: 3.73%

Run 3: Report of Indigo — Data Link

