

Pantheon Report

Generated at 2018-01-02 22:08:06 (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).

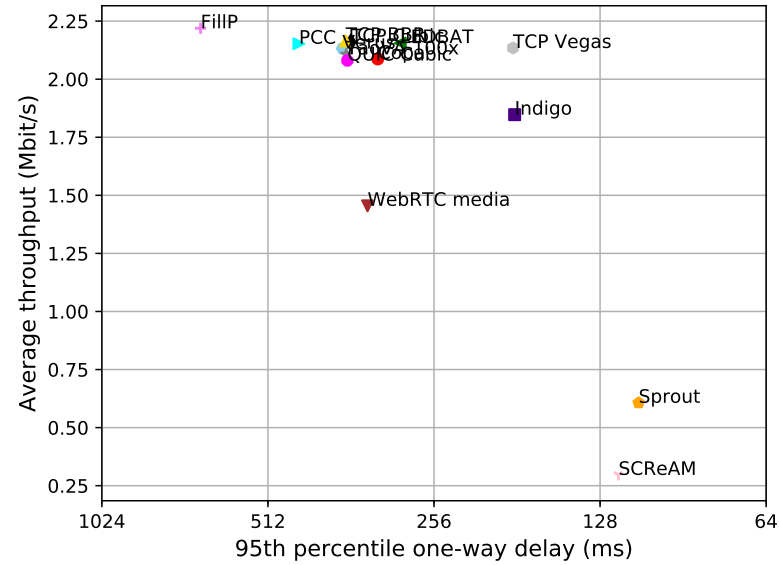
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo_fast**).

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

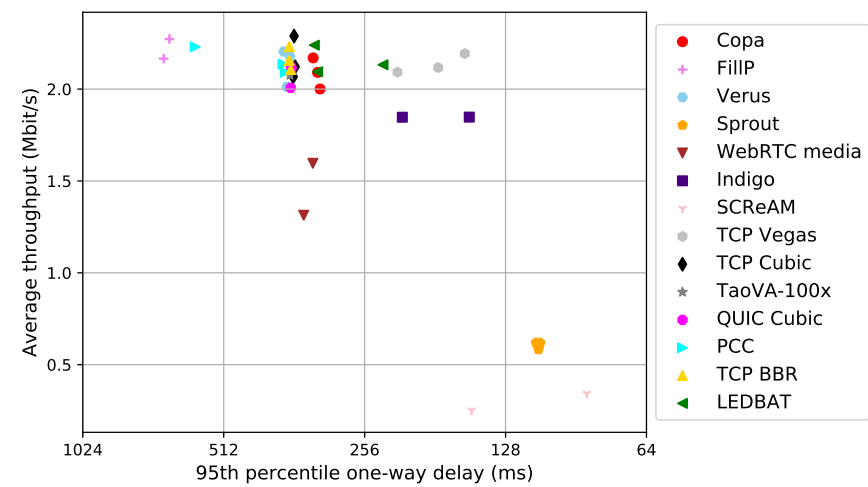
Git summary:

```
branch: master @ 904a5750834816b1e46a2c86405d707788d27c16
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/fillp @ dcaef6b00654e660f73f7ed679d2eab61ce08639
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 @ f1a14bffe749737437f61b1eaaeb30b267cde681
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



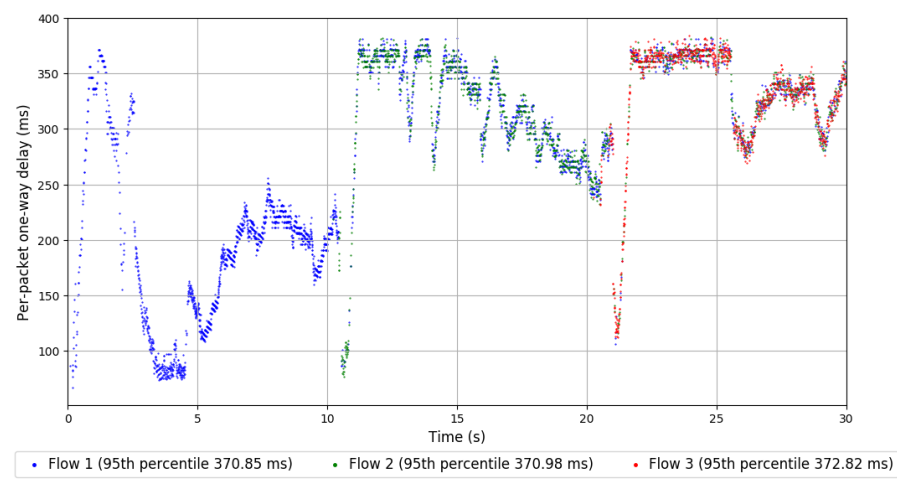
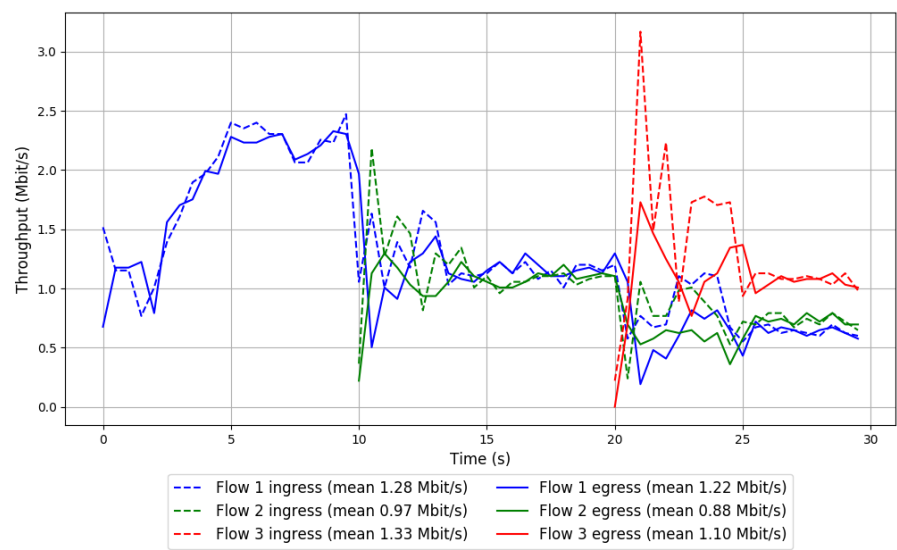
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	1.27	0.87	0.99	368.61	370.81	371.37	5.90	12.35	19.53
TCP Cubic	3	1.44	0.80	0.59	361.95	363.53	363.60	2.20	3.76	6.49
LEDBAT	3	1.10	1.22	0.81	238.32	295.16	308.09	0.23	0.97	4.50
PCC	3	1.21	1.01	0.88	375.61	431.17	761.43	50.76	62.67	92.04
QUIC Cubic	3	1.38	0.71	0.72	367.04	367.82	369.02	4.27	8.36	11.00
SCReAM	2	0.12	0.16	0.21	119.52	120.90	93.50	0.27	0.30	0.72
WebRTC media	2	0.68	0.56	0.23	301.02	350.28	352.27	0.98	1.59	4.29
Sprout	3	0.32	0.30	0.27	110.41	108.57	108.99	0.56	0.32	1.75
TaoVA-100x	3	1.35	0.88	0.71	364.57	389.68	374.74	9.22	33.28	45.72
TCP Vegas	3	1.09	1.02	1.12	184.08	183.98	169.53	0.64	0.75	1.65
Verus	3	1.60	0.74	0.21	371.30	382.85	403.37	28.85	65.19	77.04
Copa	3	1.33	0.91	0.64	310.38	338.28	327.94	0.55	1.18	3.22
FillP	2	1.32	1.00	0.81	376.74	772.61	665.47	95.85	97.97	99.20
Indigo	2	0.82	1.02	1.09	215.67	131.64	187.72	1.27	0.81	3.48

Run 1: Statistics of TCP BBR

Start at: 2018-01-02 20:42:22
End at: 2018-01-02 20:42:52
Local clock offset: 2.756 ms
Remote clock offset: -15.31 ms

Below is generated by plot.py at 2018-01-02 22:07:27
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.16 Mbit/s
95th percentile per-packet one-way delay: 371.147 ms
Loss rate: 9.35%
-- Flow 1:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 370.852 ms
Loss rate: 5.18%
-- Flow 2:
Average throughput: 0.88 Mbit/s
95th percentile per-packet one-way delay: 370.978 ms
Loss rate: 10.68%
-- Flow 3:
Average throughput: 1.10 Mbit/s
95th percentile per-packet one-way delay: 372.818 ms
Loss rate: 19.54%

Run 1: Report of TCP BBR — Data Link

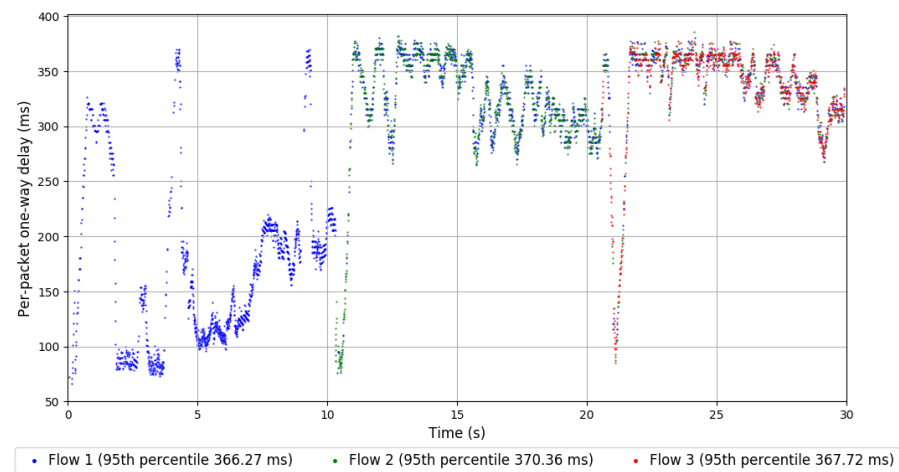
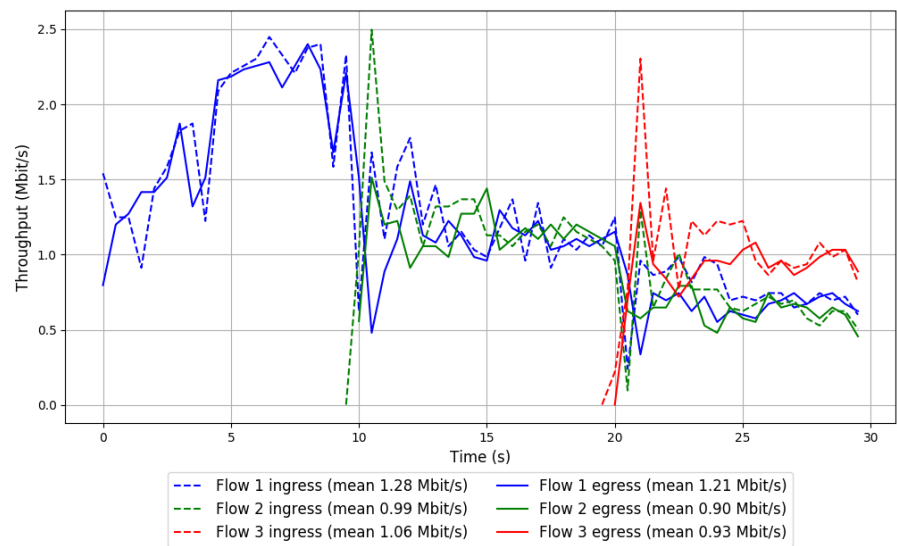


Run 2: Statistics of TCP BBR

Start at: 2018-01-02 20:59:05
End at: 2018-01-02 20:59:35
Local clock offset: 1.736 ms
Remote clock offset: -15.906 ms

Below is generated by plot.py at 2018-01-02 22:07:27
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 368.252 ms
Loss rate: 8.36%
-- Flow 1:
Average throughput: 1.21 Mbit/s
95th percentile per-packet one-way delay: 366.266 ms
Loss rate: 5.88%
-- Flow 2:
Average throughput: 0.90 Mbit/s
95th percentile per-packet one-way delay: 370.357 ms
Loss rate: 9.85%
-- Flow 3:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 367.721 ms
Loss rate: 14.63%

Run 2: Report of TCP BBR — Data Link

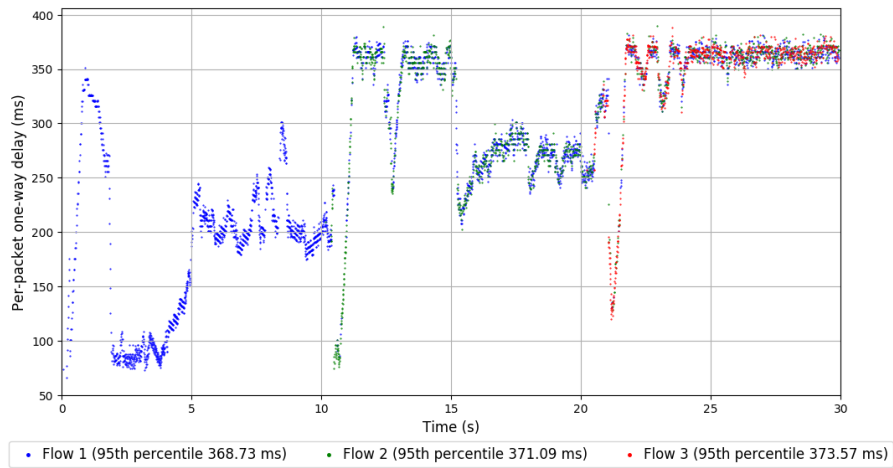
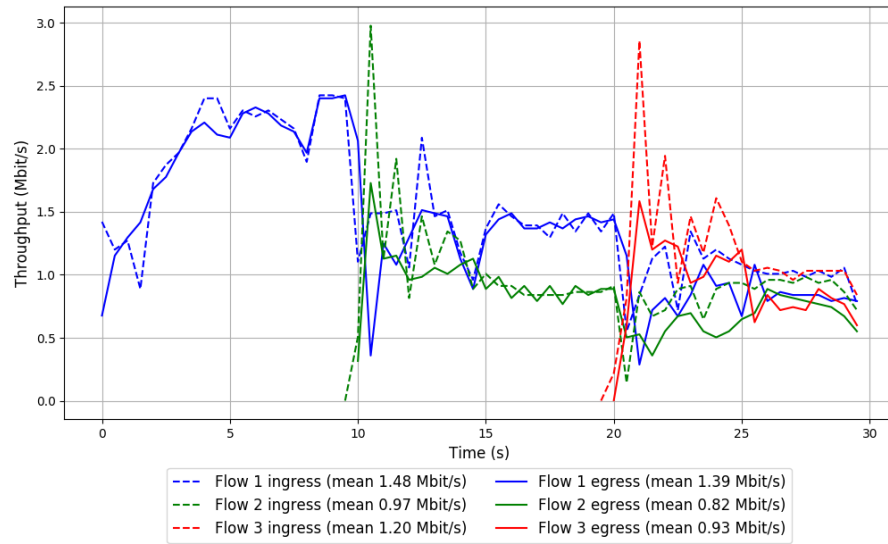


Run 3: Statistics of TCP BBR

Start at: 2018-01-02 21:15:38
End at: 2018-01-02 21:16:08
Local clock offset: 2.821 ms
Remote clock offset: -14.974 ms

Below is generated by plot.py at 2018-01-02 22:07:27
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.23 Mbit/s
95th percentile per-packet one-way delay: 370.821 ms
Loss rate: 11.98%
-- Flow 1:
Average throughput: 1.39 Mbit/s
95th percentile per-packet one-way delay: 368.727 ms
Loss rate: 6.64%
-- Flow 2:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 371.091 ms
Loss rate: 16.53%
-- Flow 3:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 373.573 ms
Loss rate: 24.41%

Run 3: Report of TCP BBR — Data Link

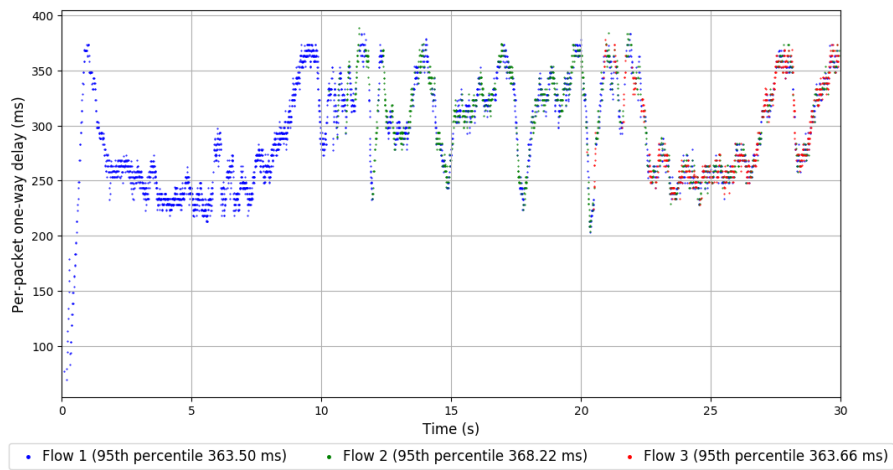
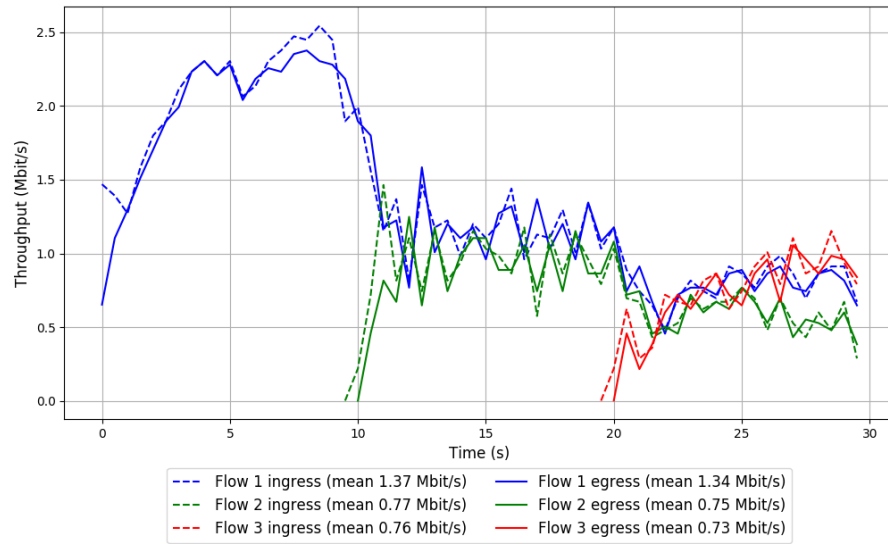


Run 1: Statistics of TCP Cubic

Start at: 2018-01-02 20:35:45
End at: 2018-01-02 20:36:15
Local clock offset: 2.432 ms
Remote clock offset: -15.85 ms

Below is generated by plot.py at 2018-01-02 22:07:27
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 363.723 ms
Loss rate: 3.53%
-- Flow 1:
Average throughput: 1.34 Mbit/s
95th percentile per-packet one-way delay: 363.501 ms
Loss rate: 2.75%
-- Flow 2:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 368.217 ms
Loss rate: 4.37%
-- Flow 3:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 363.662 ms
Loss rate: 6.06%

Run 1: Report of TCP Cubic — Data Link

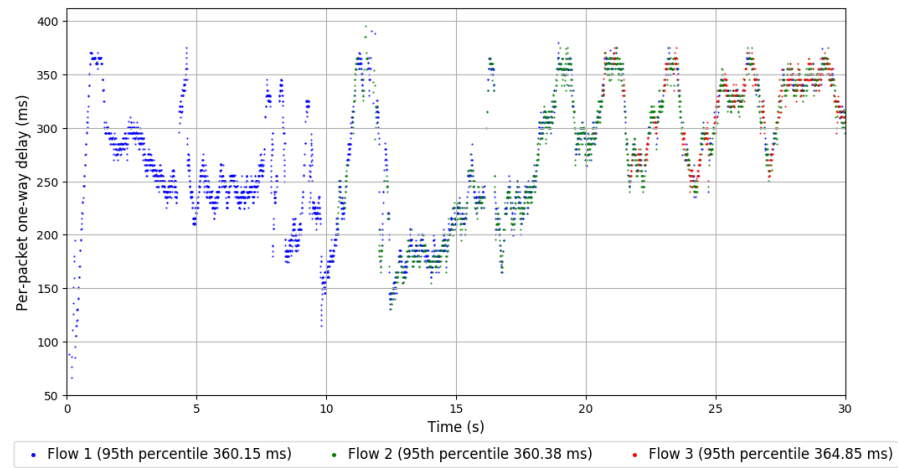
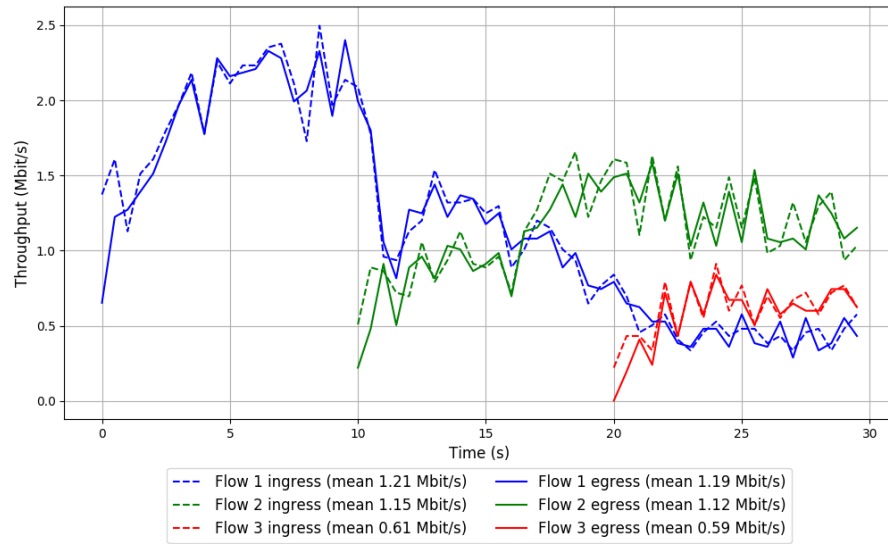


Run 2: Statistics of TCP Cubic

Start at: 2018-01-02 20:52:28
End at: 2018-01-02 20:52:58
Local clock offset: 1.005 ms
Remote clock offset: -14.261 ms

Below is generated by plot.py at 2018-01-02 22:07:27
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 360.302 ms
Loss rate: 2.80%
-- Flow 1:
Average throughput: 1.19 Mbit/s
95th percentile per-packet one-way delay: 360.155 ms
Loss rate: 1.89%
-- Flow 2:
Average throughput: 1.12 Mbit/s
95th percentile per-packet one-way delay: 360.384 ms
Loss rate: 3.29%
-- Flow 3:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 364.854 ms
Loss rate: 6.35%

Run 2: Report of TCP Cubic — Data Link

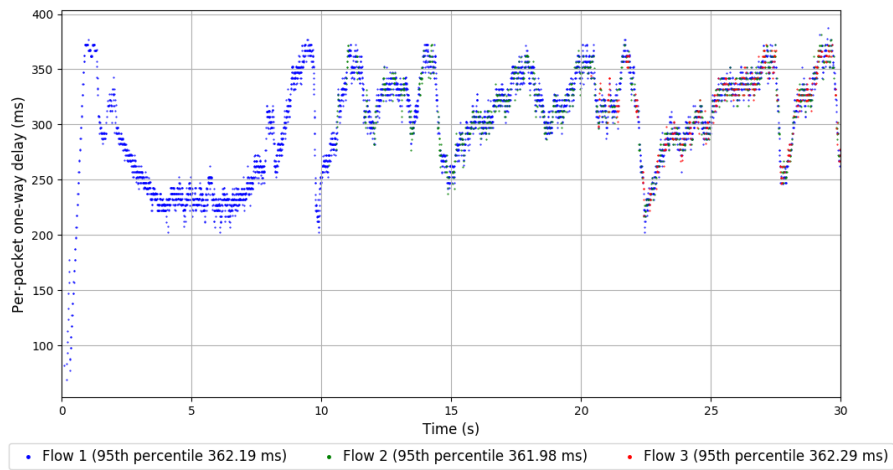
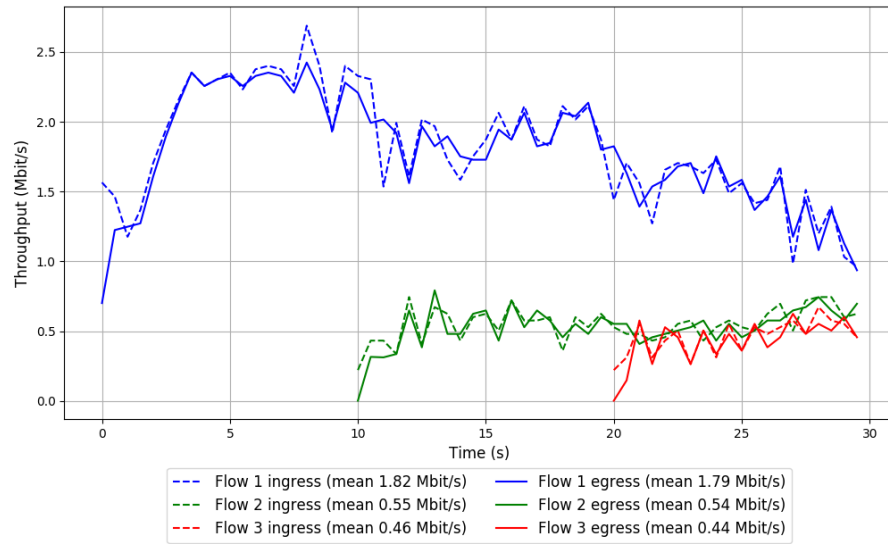


Run 3: Statistics of TCP Cubic

Start at: 2018-01-02 21:09:02
End at: 2018-01-02 21:09:32
Local clock offset: 2.023 ms
Remote clock offset: -15.067 ms

Below is generated by plot.py at 2018-01-02 22:07:27
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.29 Mbit/s
95th percentile per-packet one-way delay: 362.187 ms
Loss rate: 2.55%
-- Flow 1:
Average throughput: 1.79 Mbit/s
95th percentile per-packet one-way delay: 362.192 ms
Loss rate: 1.95%
-- Flow 2:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 361.979 ms
Loss rate: 3.61%
-- Flow 3:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 362.289 ms
Loss rate: 7.06%

Run 3: Report of TCP Cubic — Data Link

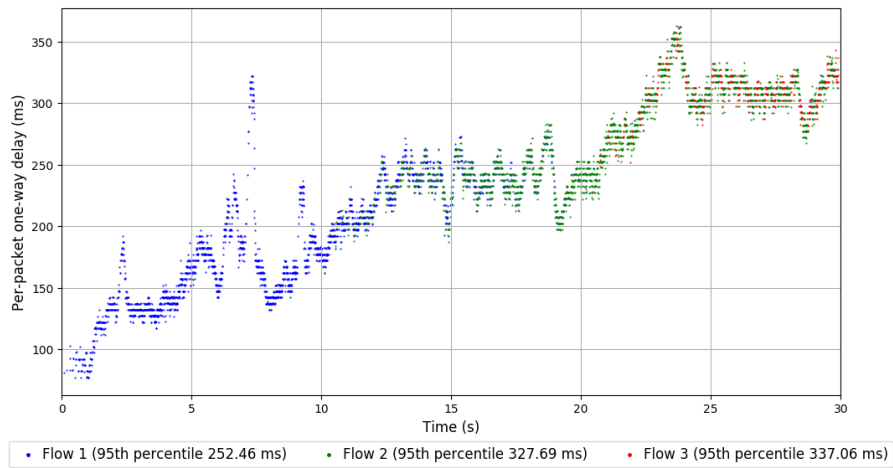
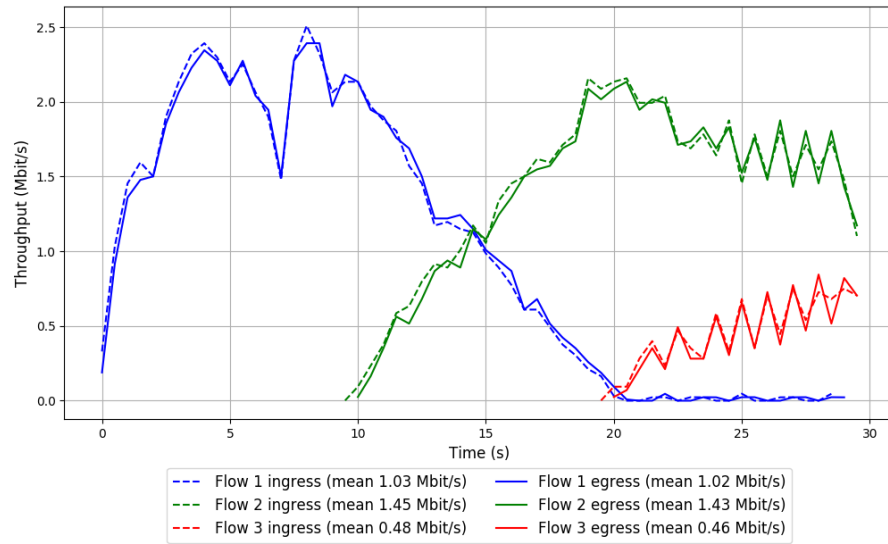


Run 1: Statistics of LEDBAT

Start at: 2018-01-02 20:31:10
End at: 2018-01-02 20:31:40
Local clock offset: 1.025 ms
Remote clock offset: -14.51 ms

Below is generated by plot.py at 2018-01-02 22:07:27
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 322.530 ms
Loss rate: 1.11%
-- Flow 1:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 252.460 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.43 Mbit/s
95th percentile per-packet one-way delay: 327.688 ms
Loss rate: 1.71%
-- Flow 3:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 337.058 ms
Loss rate: 4.47%

Run 1: Report of LEDBAT — Data Link

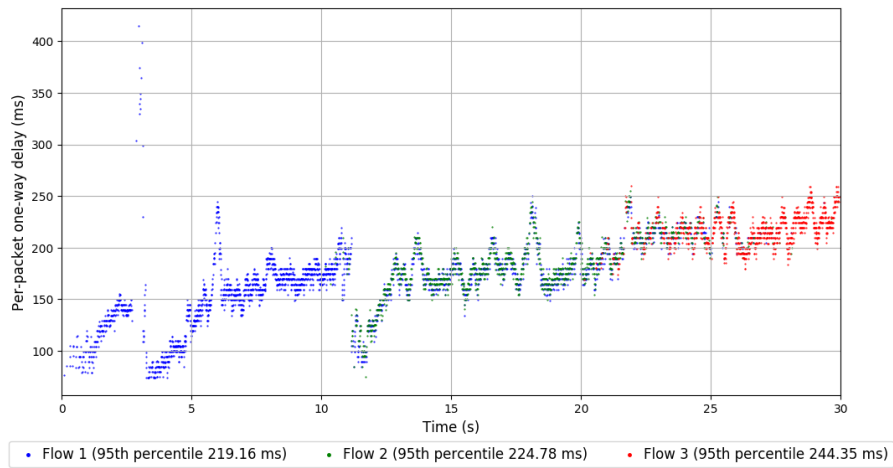
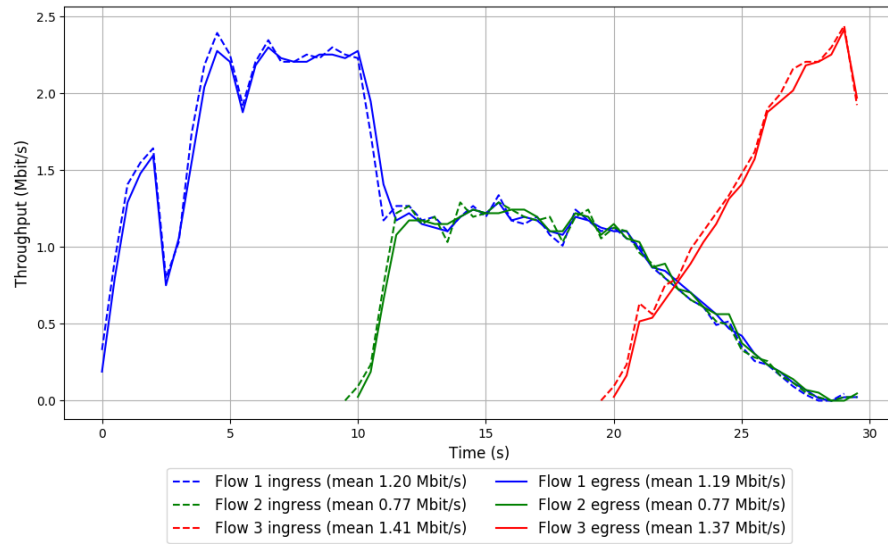


Run 2: Statistics of LEDBAT

Start at: 2018-01-02 20:48:02
End at: 2018-01-02 20:48:32
Local clock offset: 1.924 ms
Remote clock offset: -16.466 ms

Below is generated by plot.py at 2018-01-02 22:07:27
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 233.891 ms
Loss rate: 1.18%
-- Flow 1:
Average throughput: 1.19 Mbit/s
95th percentile per-packet one-way delay: 219.161 ms
Loss rate: 0.70%
-- Flow 2:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 224.778 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 1.37 Mbit/s
95th percentile per-packet one-way delay: 244.347 ms
Loss rate: 3.69%

Run 2: Report of LEDBAT — Data Link

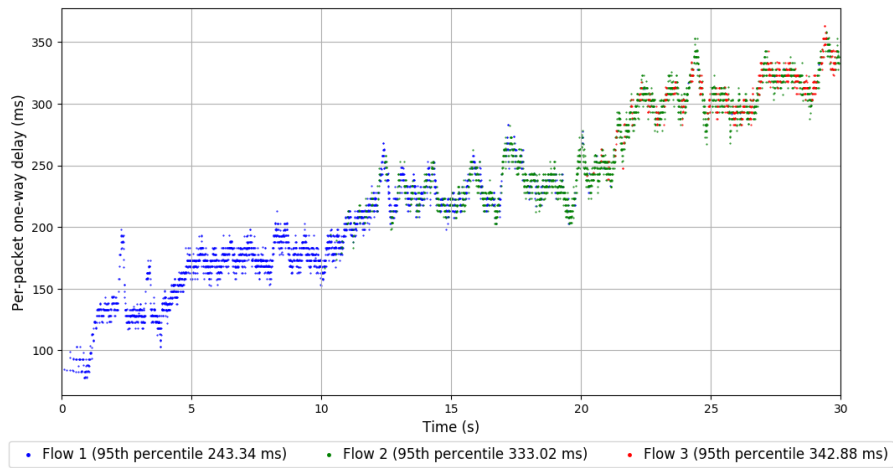
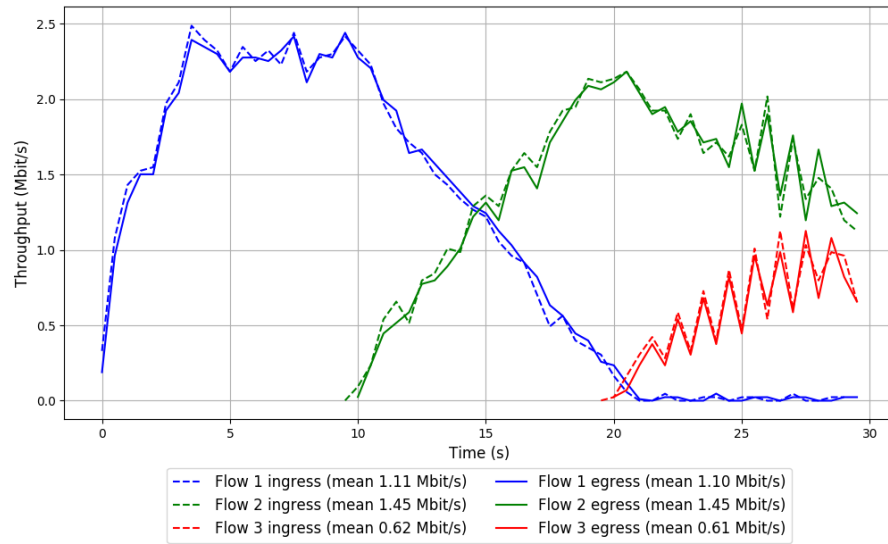


Run 3: Statistics of LEDBAT

Start at: 2018-01-02 21:04:38
End at: 2018-01-02 21:05:08
Local clock offset: 4.149 ms
Remote clock offset: -12.846 ms

Below is generated by plot.py at 2018-01-02 22:07:32
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.24 Mbit/s
95th percentile per-packet one-way delay: 327.866 ms
Loss rate: 1.01%
-- Flow 1:
Average throughput: 1.10 Mbit/s
95th percentile per-packet one-way delay: 243.337 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 333.022 ms
Loss rate: 1.21%
-- Flow 3:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 342.875 ms
Loss rate: 5.34%

Run 3: Report of LEDBAT — Data Link

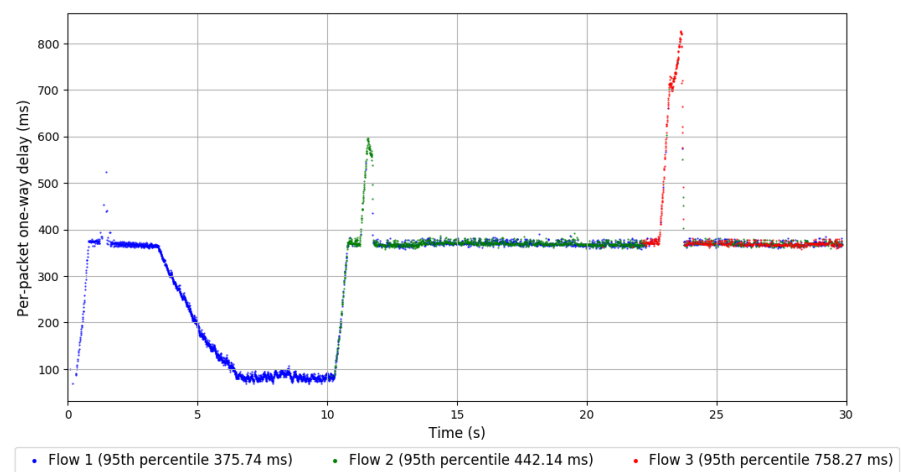
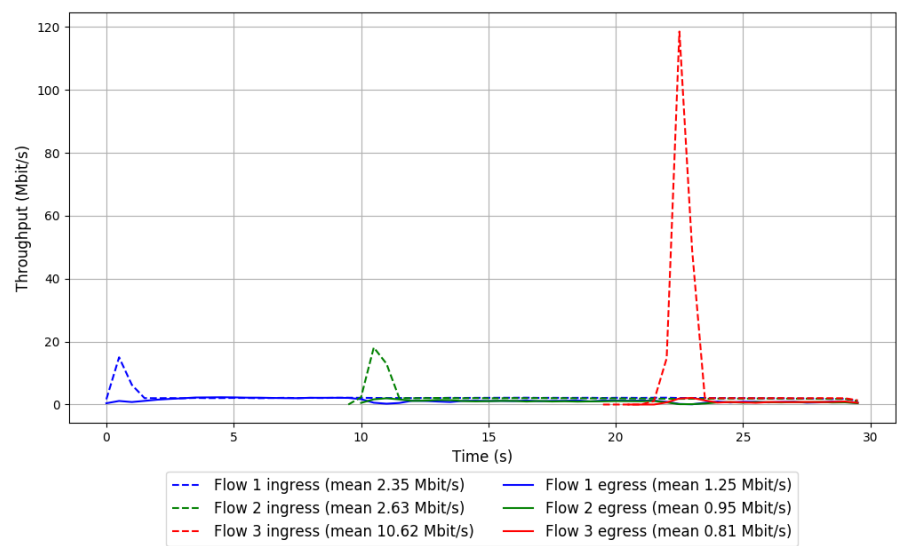


Run 1: Statistics of PCC

Start at: 2018-01-02 20:33:22
End at: 2018-01-02 20:33:52
Local clock offset: 2.671 ms
Remote clock offset: -15.612 ms

Below is generated by plot.py at 2018-01-02 22:07:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.14 Mbit/s
95th percentile per-packet one-way delay: 382.453 ms
Loss rate: 72.00%
-- Flow 1:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 375.741 ms
Loss rate: 46.94%
-- Flow 2:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 442.138 ms
Loss rate: 63.93%
-- Flow 3:
Average throughput: 0.81 Mbit/s
95th percentile per-packet one-way delay: 758.274 ms
Loss rate: 92.81%

Run 1: Report of PCC — Data Link

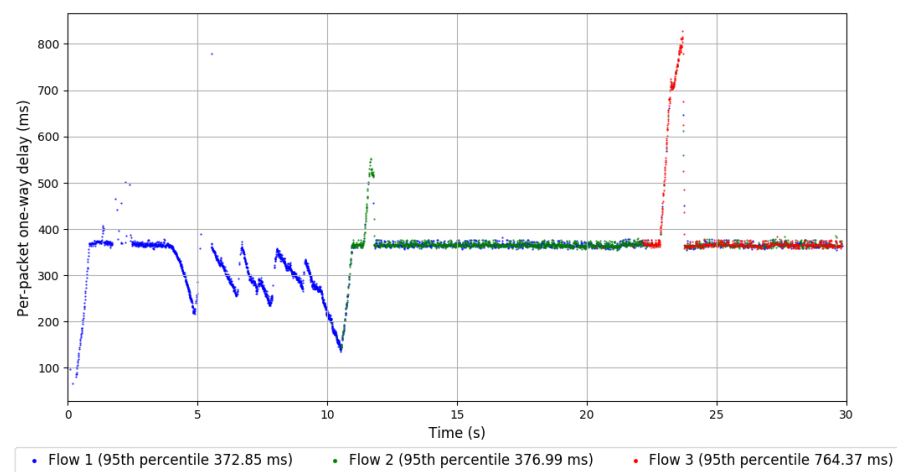
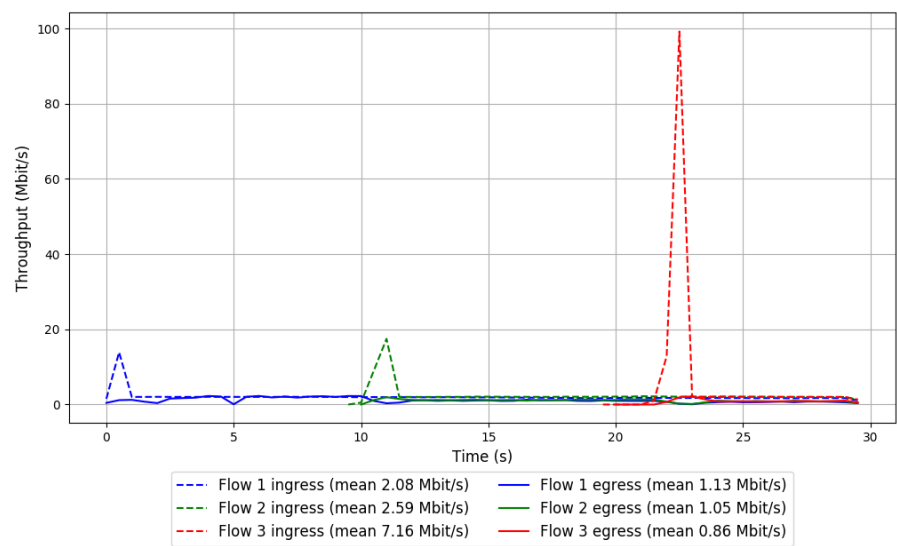


Run 2: Statistics of PCC

Start at: 2018-01-02 20:50:14
End at: 2018-01-02 20:50:44
Local clock offset: 0.69 ms
Remote clock offset: -14.134 ms

Below is generated by plot.py at 2018-01-02 22:07:37
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 378.284 ms
Loss rate: 66.16%
-- Flow 1:
Average throughput: 1.13 Mbit/s
95th percentile per-packet one-way delay: 372.850 ms
Loss rate: 45.99%
-- Flow 2:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 376.990 ms
Loss rate: 59.92%
-- Flow 3:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 764.371 ms
Loss rate: 88.45%

Run 2: Report of PCC — Data Link

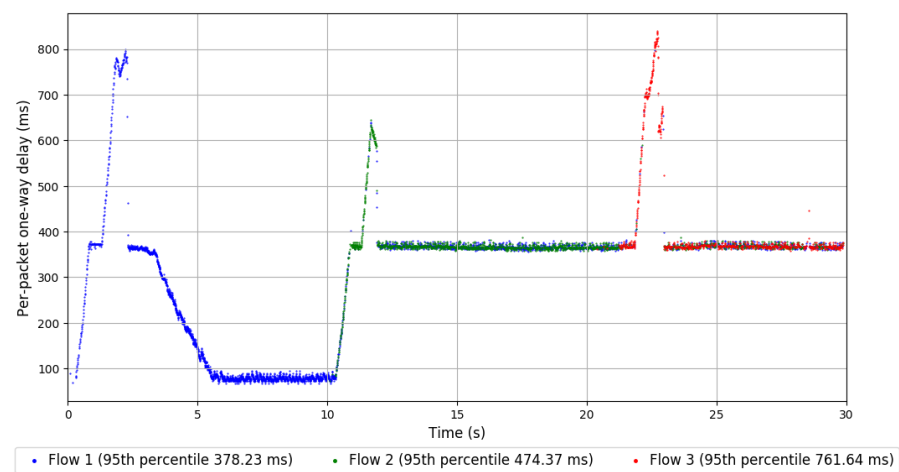
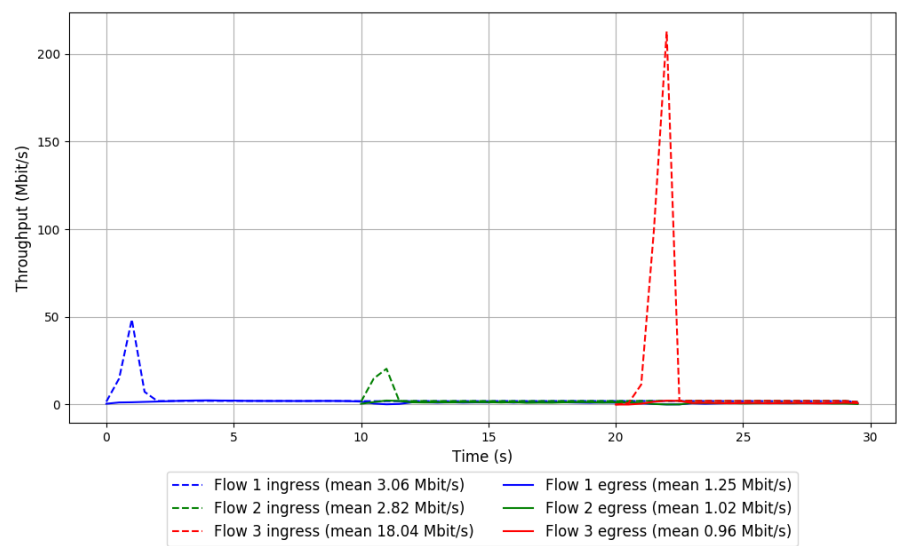


Run 3: Statistics of PCC

Start at: 2018-01-02 21:06:50
End at: 2018-01-02 21:07:20
Local clock offset: 3.426 ms
Remote clock offset: -13.346 ms

Below is generated by plot.py at 2018-01-02 22:07:42
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.23 Mbit/s
95th percentile per-packet one-way delay: 588.905 ms
Loss rate: 79.56%
-- Flow 1:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 378.226 ms
Loss rate: 59.36%
-- Flow 2:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 474.369 ms
Loss rate: 64.17%
-- Flow 3:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 761.638 ms
Loss rate: 94.85%

Run 3: Report of PCC — Data Link

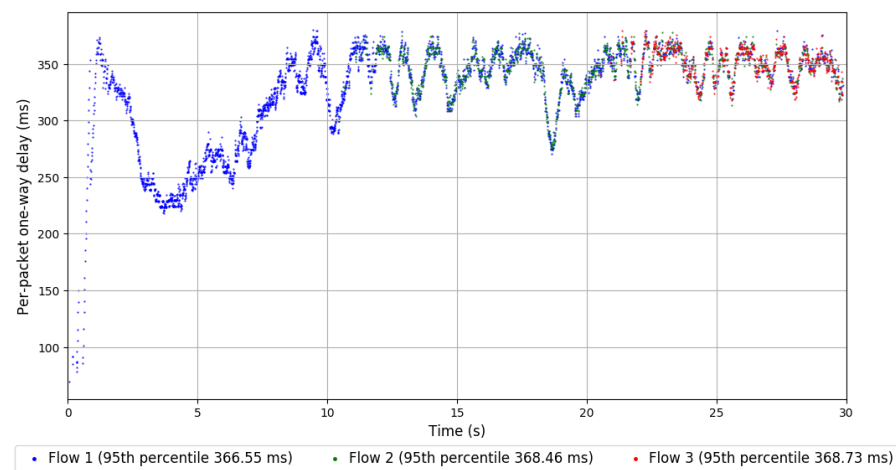
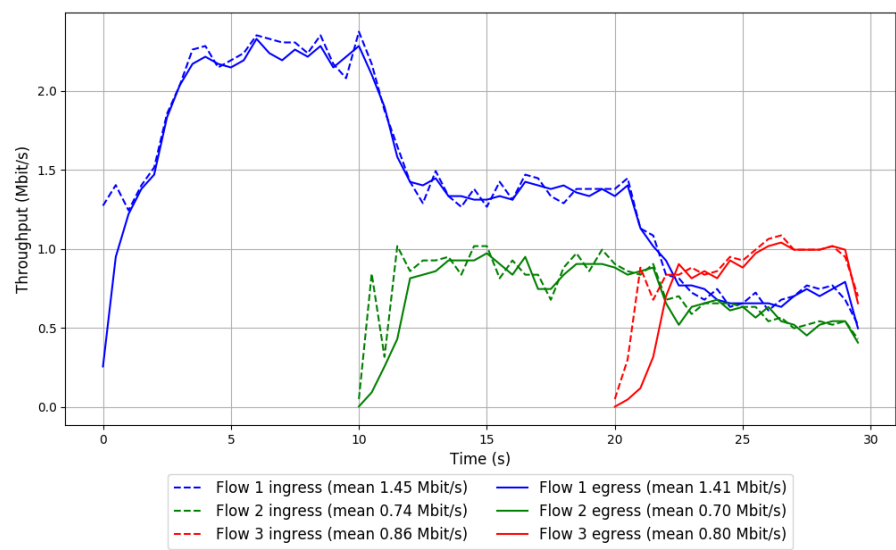


Run 1: Statistics of QUIC Cubic

Start at: 2018-01-02 20:30:04
End at: 2018-01-02 20:30:34
Local clock offset: 1.919 ms
Remote clock offset: -15.034 ms

Below is generated by plot.py at 2018-01-02 22:07:42
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 367.477 ms
Loss rate: 4.68%
-- Flow 1:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 366.554 ms
Loss rate: 2.73%
-- Flow 2:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 368.463 ms
Loss rate: 7.07%
-- Flow 3:
Average throughput: 0.80 Mbit/s
95th percentile per-packet one-way delay: 368.727 ms
Loss rate: 10.49%

Run 1: Report of QUIC Cubic — Data Link

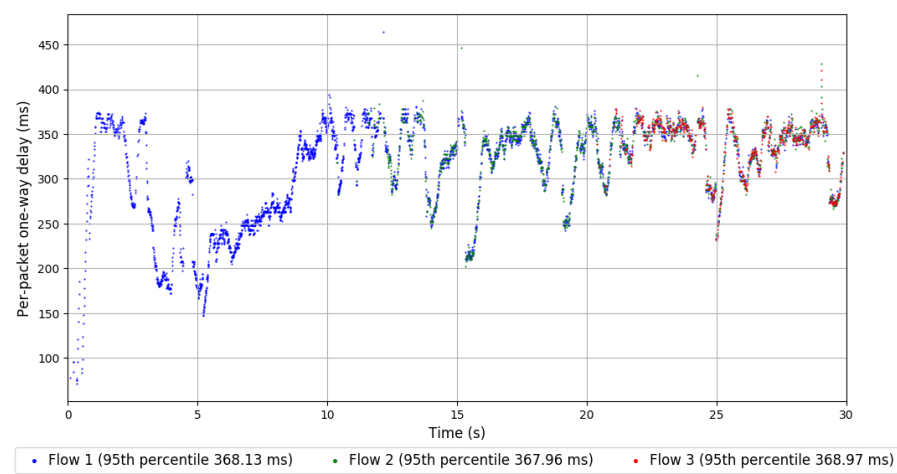
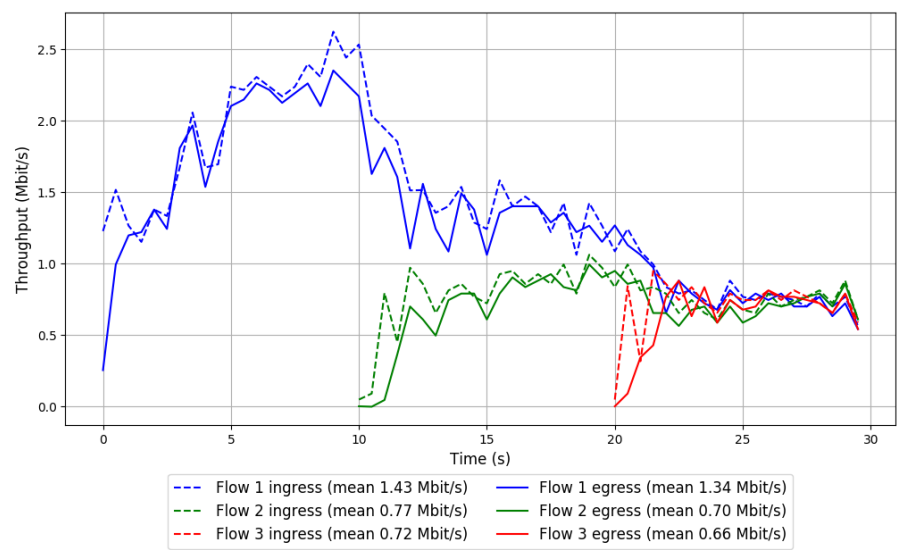


Run 2: Statistics of QUIC Cubic

Start at: 2018-01-02 20:46:56
End at: 2018-01-02 20:47:26
Local clock offset: 1.408 ms
Remote clock offset: -15.12 ms

Below is generated by plot.py at 2018-01-02 22:07:42
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.01 Mbit/s
95th percentile per-packet one-way delay: 368.192 ms
Loss rate: 7.92%
-- Flow 1:
Average throughput: 1.34 Mbit/s
95th percentile per-packet one-way delay: 368.133 ms
Loss rate: 6.54%
-- Flow 2:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 367.959 ms
Loss rate: 10.03%
-- Flow 3:
Average throughput: 0.66 Mbit/s
95th percentile per-packet one-way delay: 368.969 ms
Loss rate: 11.67%

Run 2: Report of QUIC Cubic — Data Link

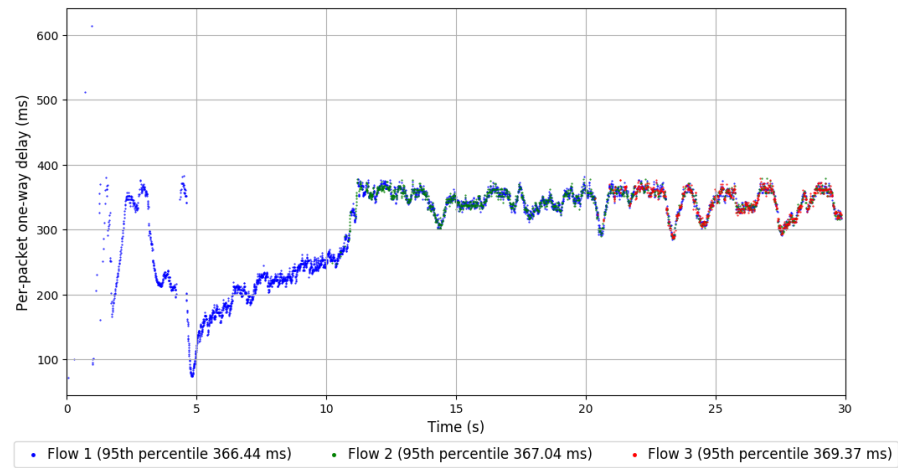
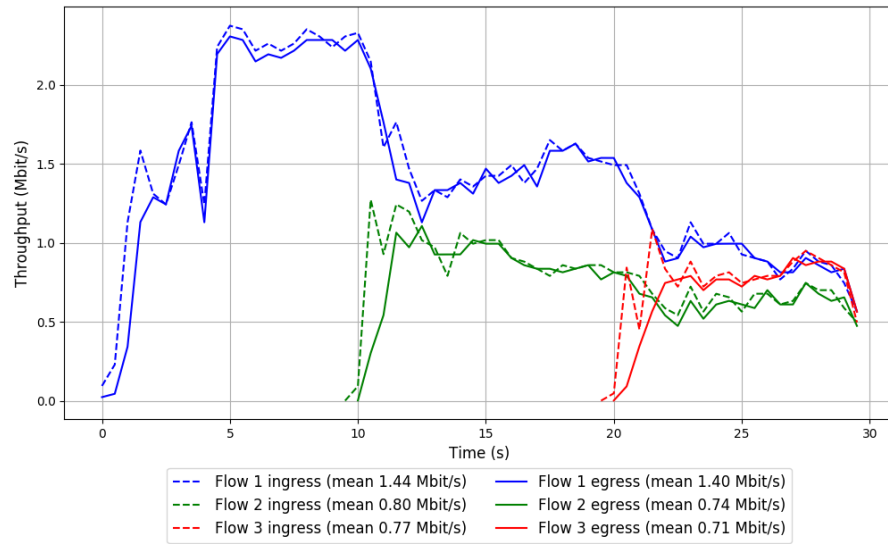


Run 3: Statistics of QUIC Cubic

Start at: 2018-01-02 21:03:32
End at: 2018-01-02 21:04:02
Local clock offset: 0.415 ms
Remote clock offset: -15.007 ms

Below is generated by plot.py at 2018-01-02 22:07:42
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 366.893 ms
Loss rate: 5.45%
-- Flow 1:
Average throughput: 1.40 Mbit/s
95th percentile per-packet one-way delay: 366.443 ms
Loss rate: 3.55%
-- Flow 2:
Average throughput: 0.74 Mbit/s
95th percentile per-packet one-way delay: 367.035 ms
Loss rate: 7.99%
-- Flow 3:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 369.374 ms
Loss rate: 10.85%

Run 3: Report of QUIC Cubic — Data Link

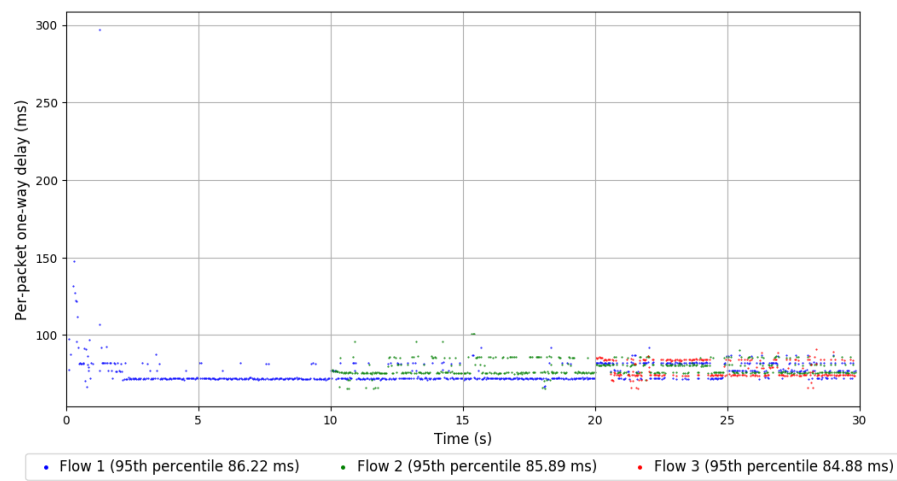
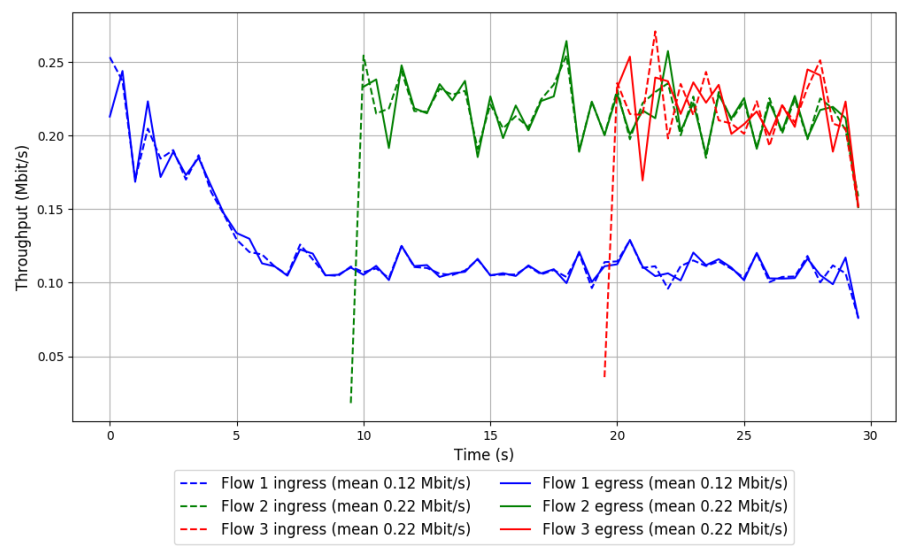


```
Run 1: Statistics of SReAM

Start at: 2018-01-02 20:37:57
End at: 2018-01-02 20:38:27
Local clock offset: 1.547 ms
Remote clock offset: -15.04 ms

# Below is generated by plot.py at 2018-01-02 22:07:42
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 85.851 ms
Loss rate: 0.42%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 86.220 ms
Loss rate: 0.23%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 85.892 ms
Loss rate: 0.43%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 84.880 ms
Loss rate: 0.74%
```

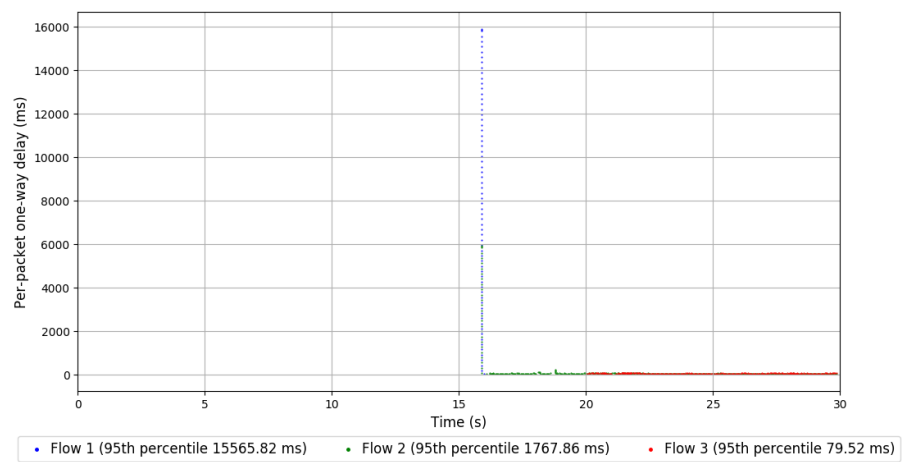
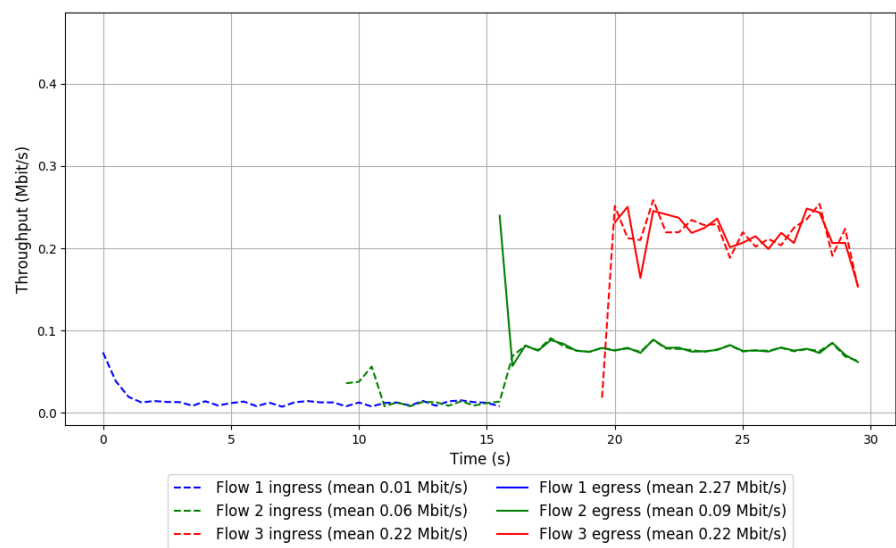
Run 1: Report of SReAM — Data Link



Run 2: Statistics of SCReAM

Start at: 2018-01-02 20:54:41
End at: 2018-01-02 20:55:11
Local clock offset: -0.542 ms
Remote clock offset: -13.278 ms

Run 2: Report of SReAM — Data Link

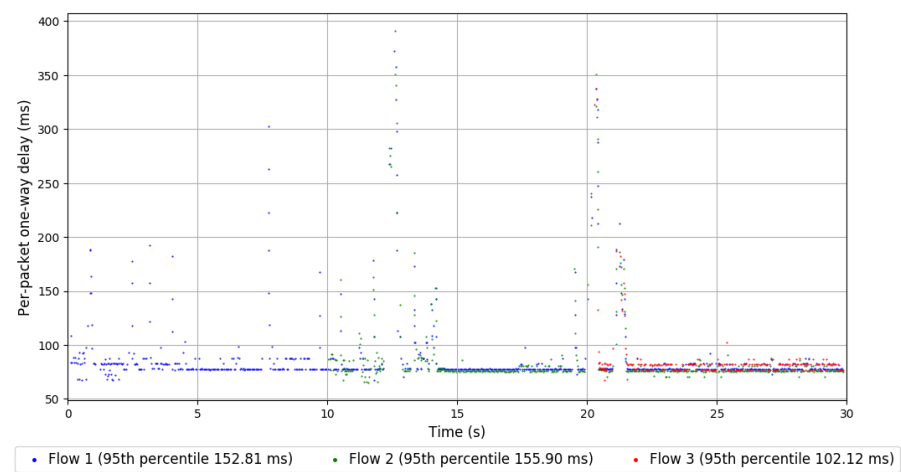
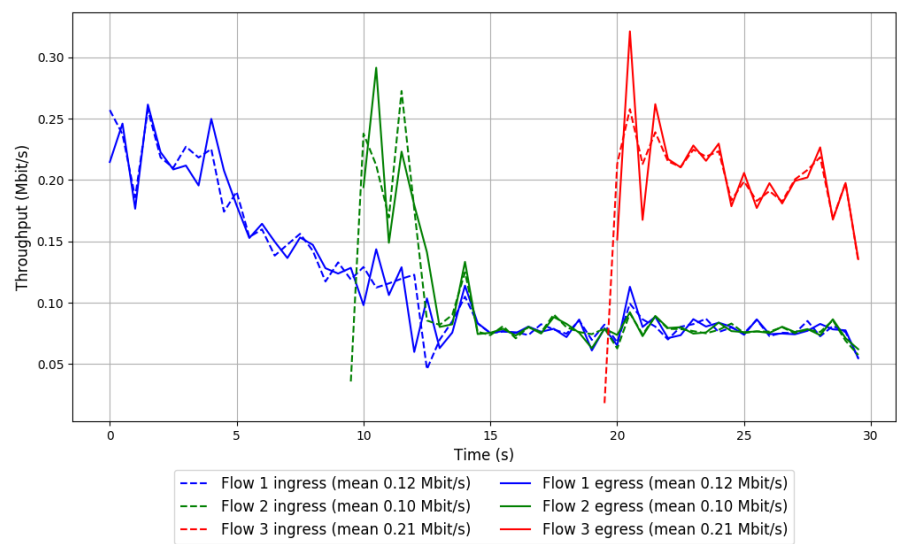


Run 3: Statistics of SCReAM

Start at: 2018-01-02 21:11:14
End at: 2018-01-02 21:11:44
Local clock offset: 3.05 ms
Remote clock offset: -15.822 ms

Below is generated by plot.py at 2018-01-02 22:07:42
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 151.215 ms
Loss rate: 0.38%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 152.811 ms
Loss rate: 0.30%
-- Flow 2:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 155.900 ms
Loss rate: 0.17%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 102.117 ms
Loss rate: 0.70%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of WebRTC media

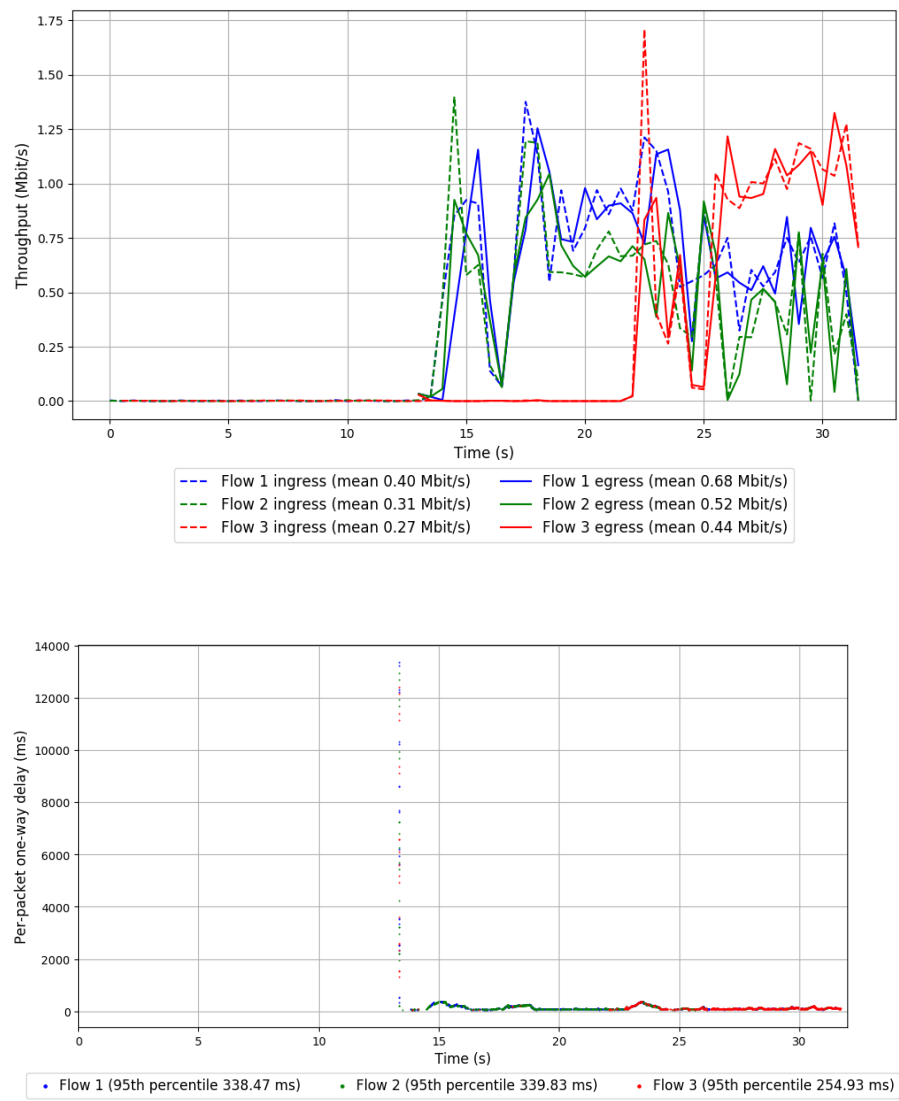
Start at: 2018-01-02 20:41:16

End at: 2018-01-02 20:41:46

Local clock offset: 2.251 ms

Remote clock offset: -14.202 ms

Run 1: Report of WebRTC media — Data Link

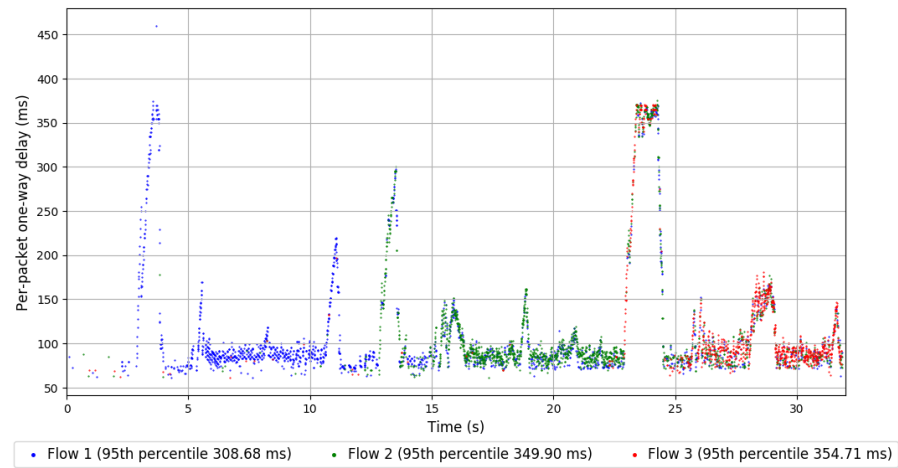
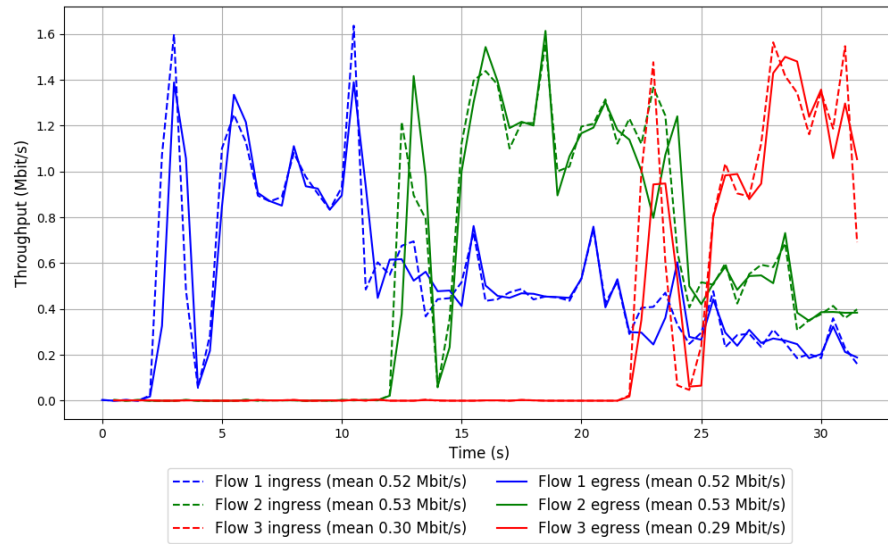


Run 2: Statistics of WebRTC media

Start at: 2018-01-02 20:57:59
End at: 2018-01-02 20:58:29
Local clock offset: -0.1 ms
Remote clock offset: -16.53 ms

Below is generated by plot.py at 2018-01-02 22:07:42
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 345.467 ms
Loss rate: 1.93%
-- Flow 1:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 308.676 ms
Loss rate: 1.53%
-- Flow 2:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 349.902 ms
Loss rate: 1.80%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 354.715 ms
Loss rate: 2.89%

Run 2: Report of WebRTC media — Data Link

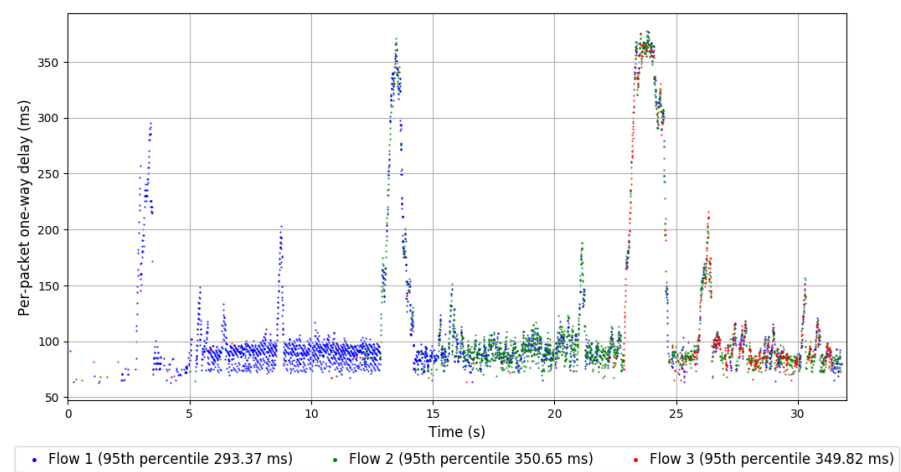
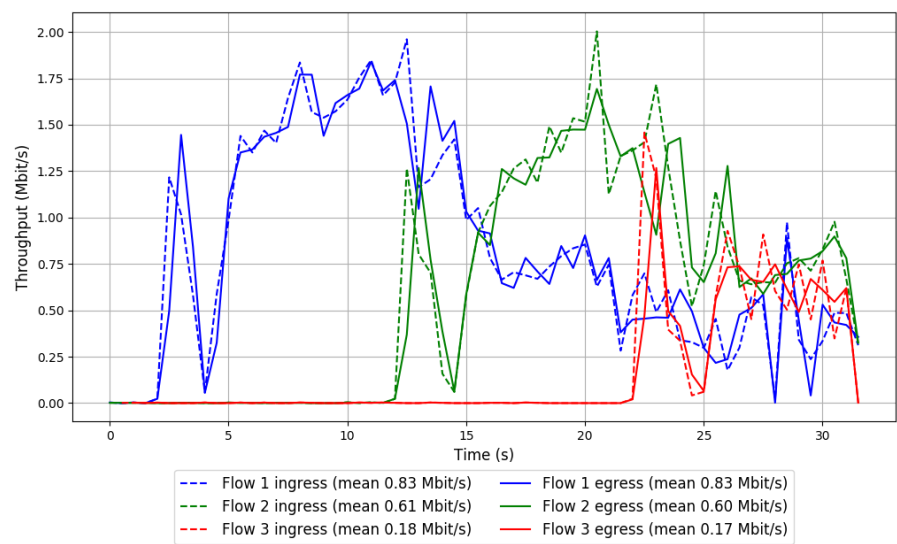


Run 3: Statistics of WebRTC media

Start at: 2018-01-02 21:14:32
End at: 2018-01-02 21:15:02
Local clock offset: 2.896 ms
Remote clock offset: -14.335 ms

Below is generated by plot.py at 2018-01-02 22:07:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.60 Mbit/s
95th percentile per-packet one-way delay: 330.261 ms
Loss rate: 1.36%
-- Flow 1:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 293.371 ms
Loss rate: 0.43%
-- Flow 2:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 350.655 ms
Loss rate: 1.38%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 349.820 ms
Loss rate: 5.68%

Run 3: Report of WebRTC media — Data Link



Run 1: Statistics of Sprout

Start at: 2018-01-02 20:36:51

End at: 2018-01-02 20:37:21

Local clock offset: 0.258 ms

Remote clock offset: -14.2 ms

Below is generated by plot.py at 2018-01-02 22:07:43

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.58 Mbit/s

95th percentile per-packet one-way delay: 108.844 ms

Loss rate: 0.66%

-- Flow 1:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 108.608 ms

Loss rate: 0.13%

-- Flow 2:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 107.877 ms

Loss rate: 0.37%

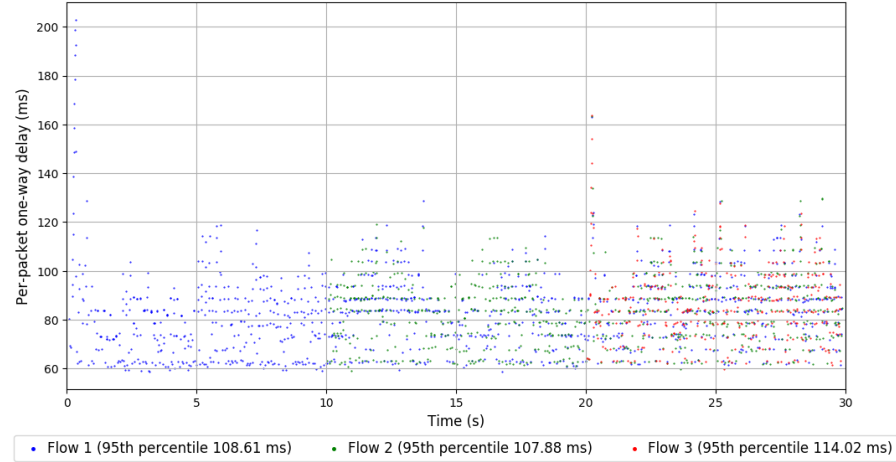
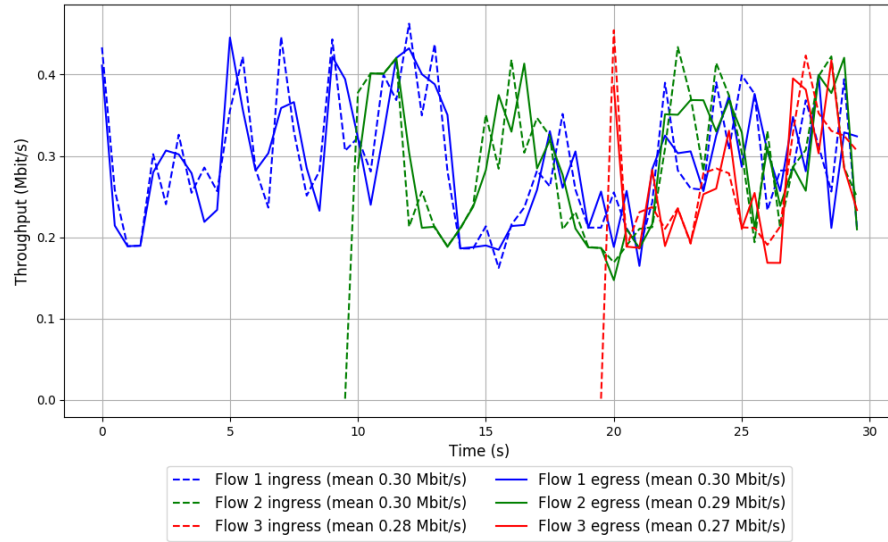
-- Flow 3:

Average throughput: 0.27 Mbit/s

95th percentile per-packet one-way delay: 114.020 ms

Loss rate: 2.98%

Run 1: Report of Sprout — Data Link

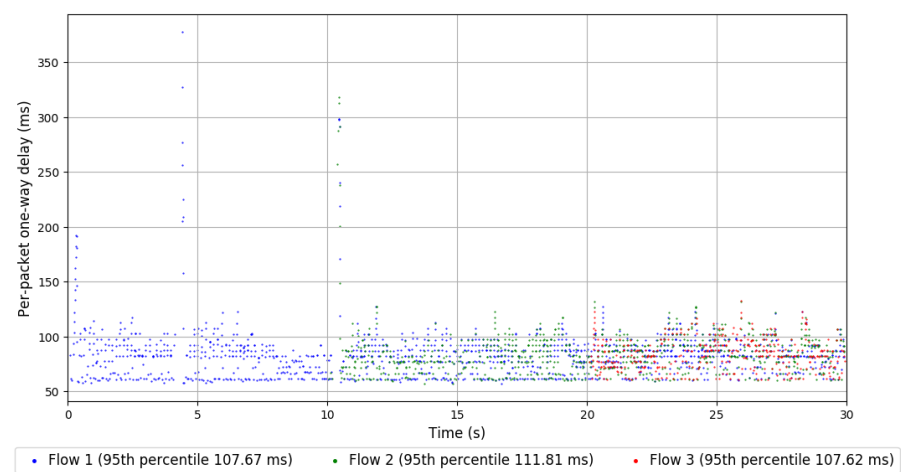
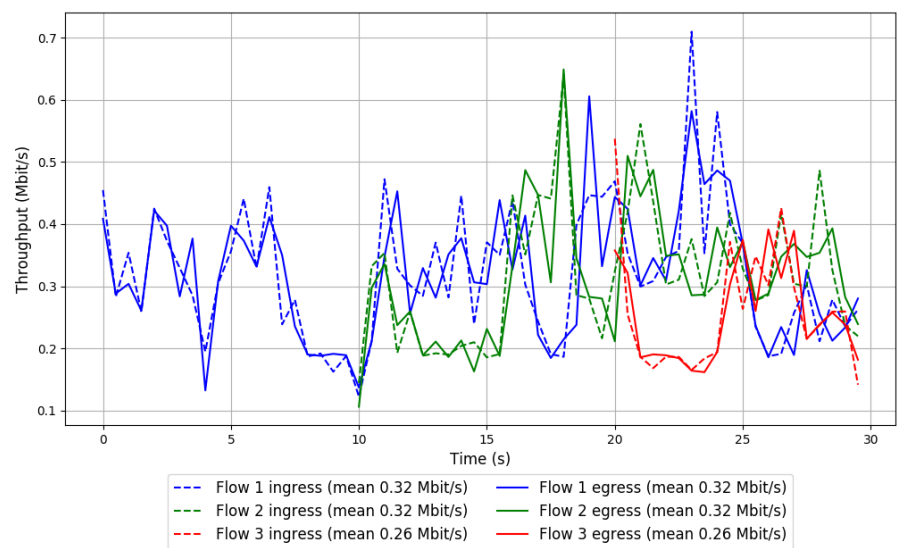


Run 2: Statistics of Sprout

Start at: 2018-01-02 20:53:35
End at: 2018-01-02 20:54:05
Local clock offset: -0.161 ms
Remote clock offset: -13.543 ms

Below is generated by plot.py at 2018-01-02 22:07:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 107.855 ms
Loss rate: 0.44%
-- Flow 1:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 107.668 ms
Loss rate: 0.47%
-- Flow 2:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 111.805 ms
Loss rate: 0.01%
-- Flow 3:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 107.625 ms
Loss rate: 1.40%

Run 2: Report of Sprout — Data Link

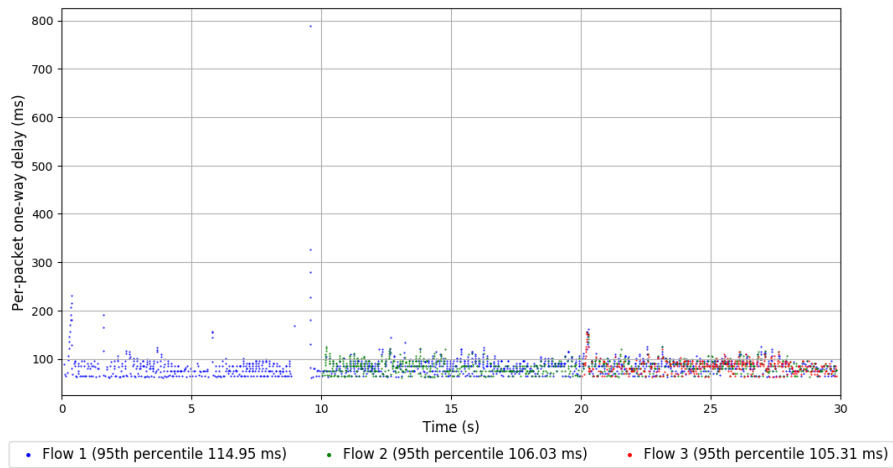
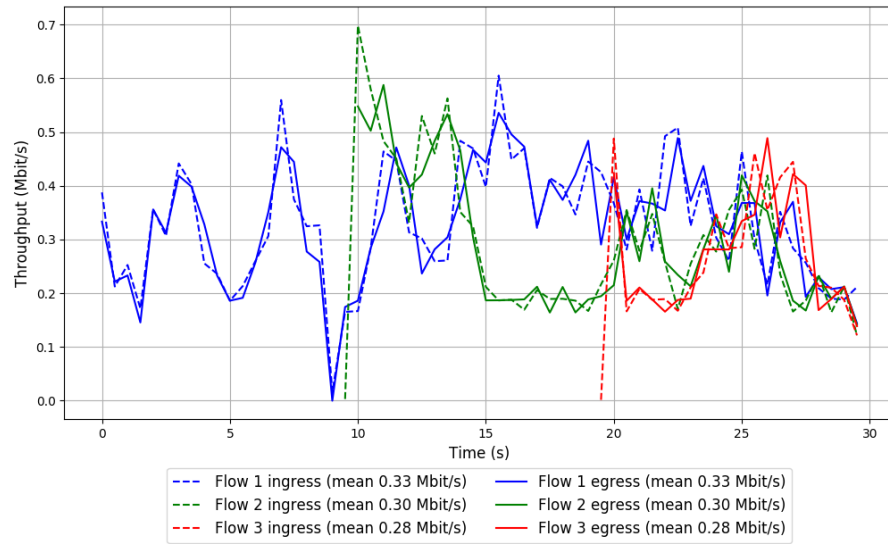


Run 3: Statistics of Sprout

Start at: 2018-01-02 21:10:08
End at: 2018-01-02 21:10:38
Local clock offset: 4.047 ms
Remote clock offset: -12.336 ms

```
# Below is generated by plot.py at 2018-01-02 22:07:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 110.224 ms
Loss rate: 0.88%
-- Flow 1:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 114.947 ms
Loss rate: 1.07%
-- Flow 2:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 106.025 ms
Loss rate: 0.58%
-- Flow 3:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 105.313 ms
Loss rate: 0.86%
```

Run 3: Report of Sprout — Data Link

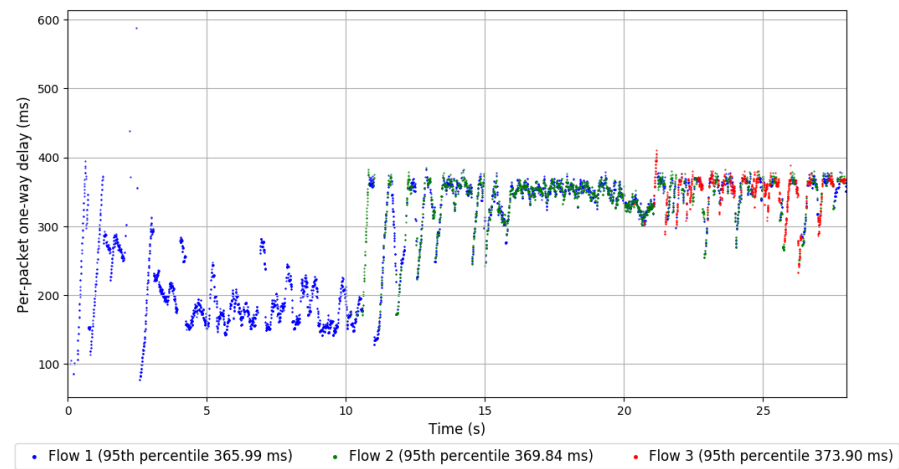
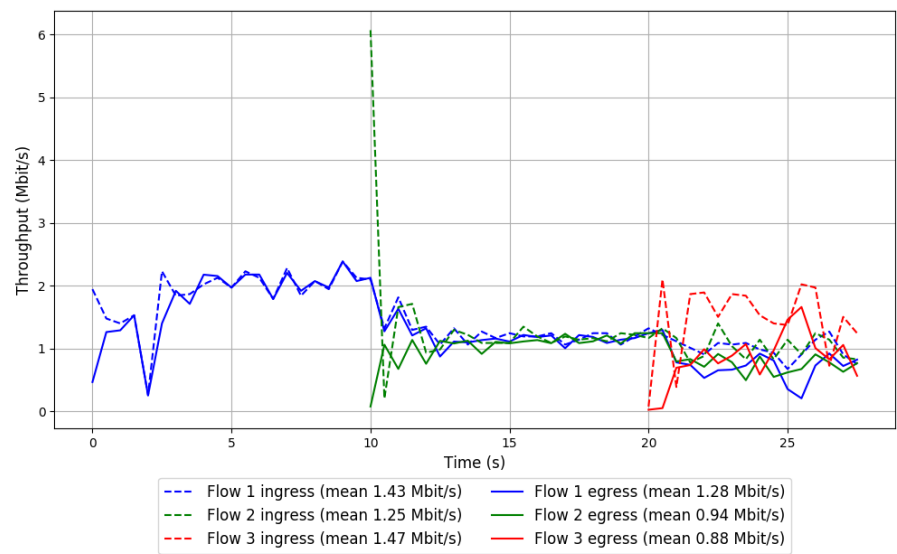


Run 1: Statistics of TaoVA-100x

Start at: 2018-01-02 20:40:09
End at: 2018-01-02 20:40:39
Local clock offset: 0.544 ms
Remote clock offset: -15.689 ms

Below is generated by plot.py at 2018-01-02 22:07:47
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 368.628 ms
Loss rate: 19.91%
-- Flow 1:
Average throughput: 1.28 Mbit/s
95th percentile per-packet one-way delay: 365.992 ms
Loss rate: 10.00%
-- Flow 2:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 369.837 ms
Loss rate: 25.62%
-- Flow 3:
Average throughput: 0.88 Mbit/s
95th percentile per-packet one-way delay: 373.904 ms
Loss rate: 42.69%

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

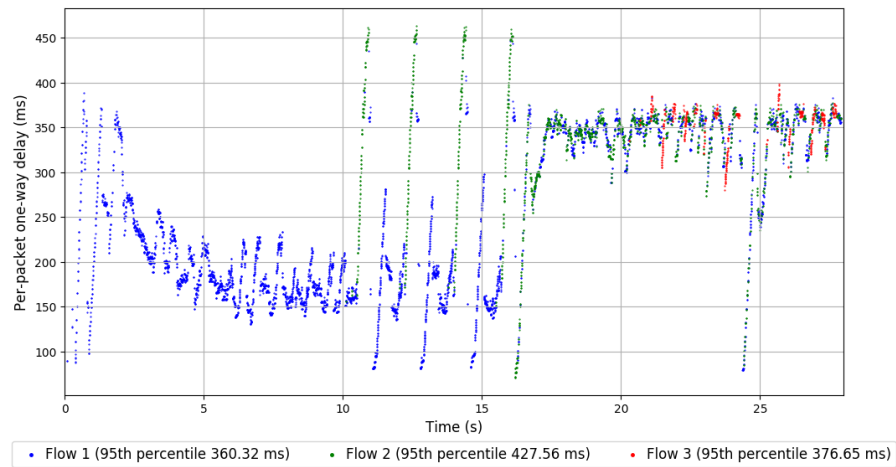
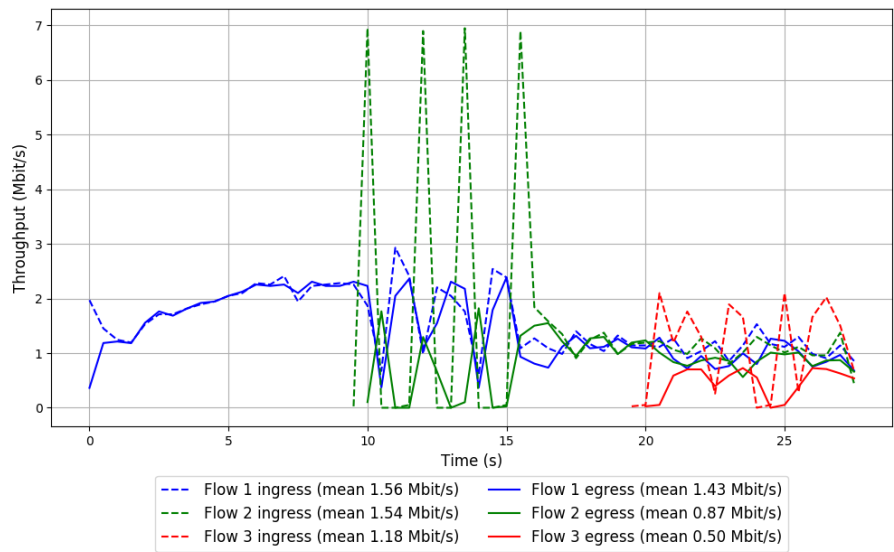


Run 2: Statistics of TaoVA-100x

Start at: 2018-01-02 20:56:53
End at: 2018-01-02 20:57:23
Local clock offset: -0.618 ms
Remote clock offset: -14.268 ms

Below is generated by plot.py at 2018-01-02 22:07:49
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 369.630 ms
Loss rate: 26.45%
-- Flow 1:
Average throughput: 1.43 Mbit/s
95th percentile per-packet one-way delay: 360.320 ms
Loss rate: 8.36%
-- Flow 2:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 427.556 ms
Loss rate: 43.66%
-- Flow 3:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 376.652 ms
Loss rate: 60.23%

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

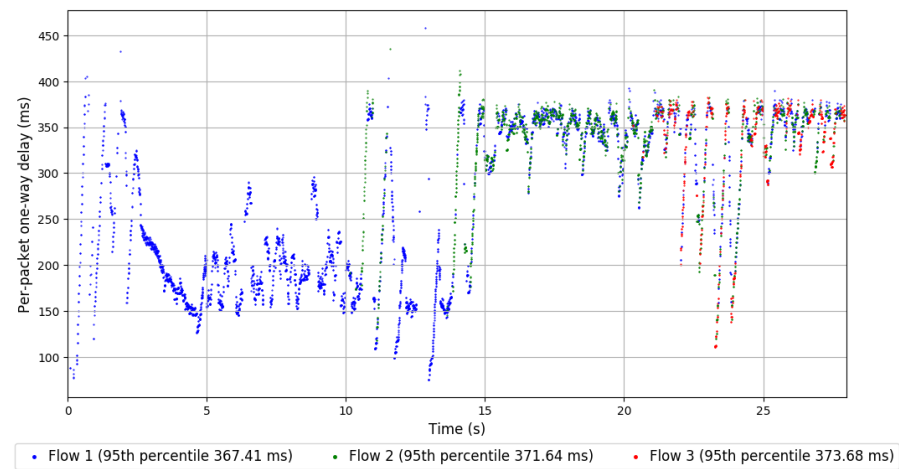
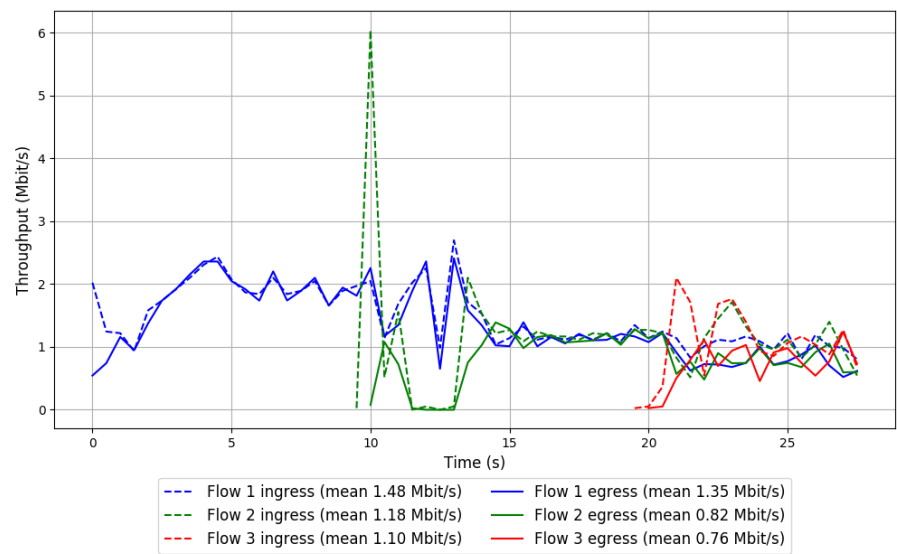


Run 3: Statistics of TaoVA-100x

Start at: 2018-01-02 21:13:26
End at: 2018-01-02 21:13:56
Local clock offset: 3.198 ms
Remote clock offset: -14.853 ms

Below is generated by plot.py at 2018-01-02 22:07:49
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.08 Mbit/s
95th percentile per-packet one-way delay: 369.611 ms
Loss rate: 18.69%
-- Flow 1:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 367.410 ms
Loss rate: 9.29%
-- Flow 2:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 371.640 ms
Loss rate: 30.57%
-- Flow 3:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 373.678 ms
Loss rate: 34.23%

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

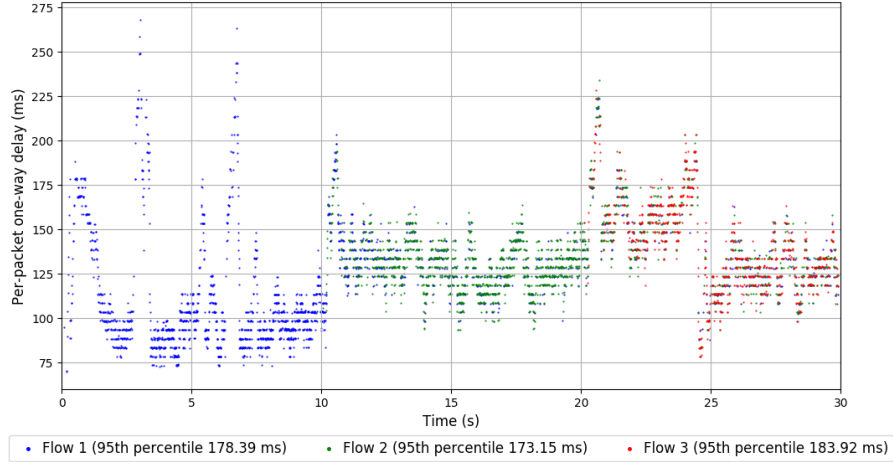
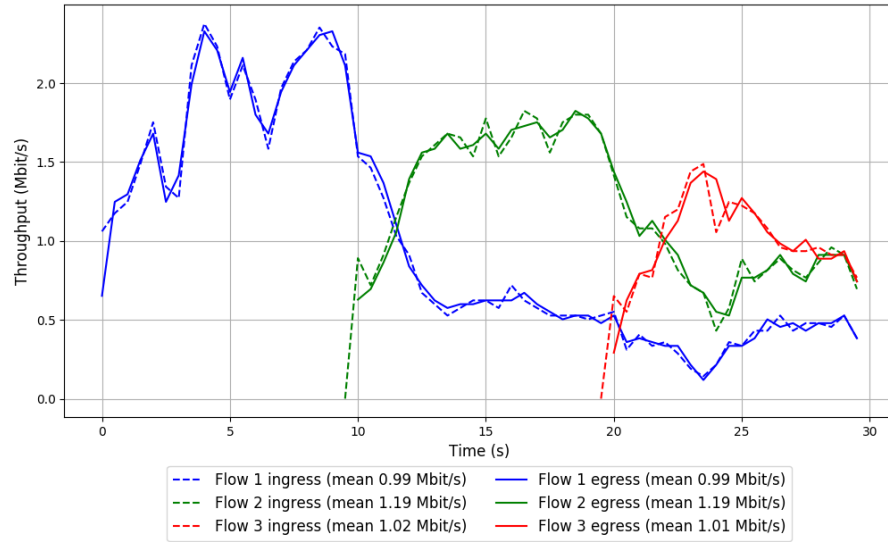


Run 1: Statistics of TCP Vegas

Start at: 2018-01-02 20:32:16
End at: 2018-01-02 20:32:46
Local clock offset: 3.237 ms
Remote clock offset: -14.06 ms

Below is generated by plot.py at 2018-01-02 22:07:49
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 178.258 ms
Loss rate: 0.57%
-- Flow 1:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 178.388 ms
Loss rate: 0.24%
-- Flow 2:
Average throughput: 1.19 Mbit/s
95th percentile per-packet one-way delay: 173.152 ms
Loss rate: 0.51%
-- Flow 3:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 183.920 ms
Loss rate: 1.66%

Run 1: Report of TCP Vegas — Data Link

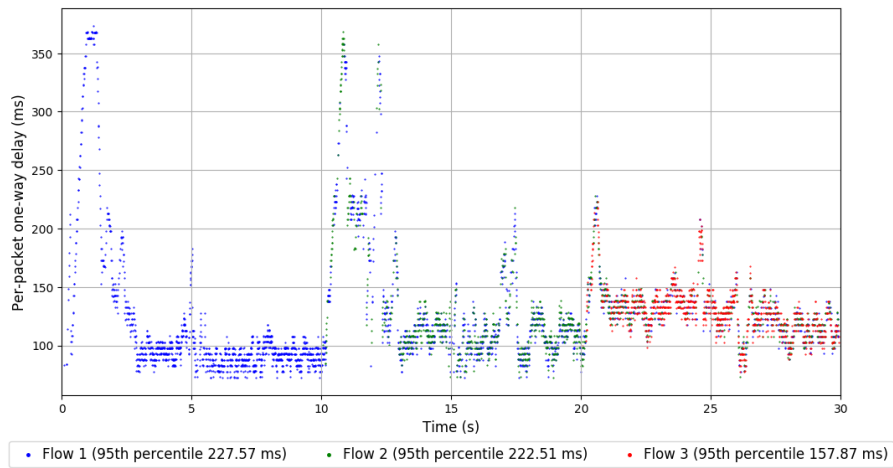
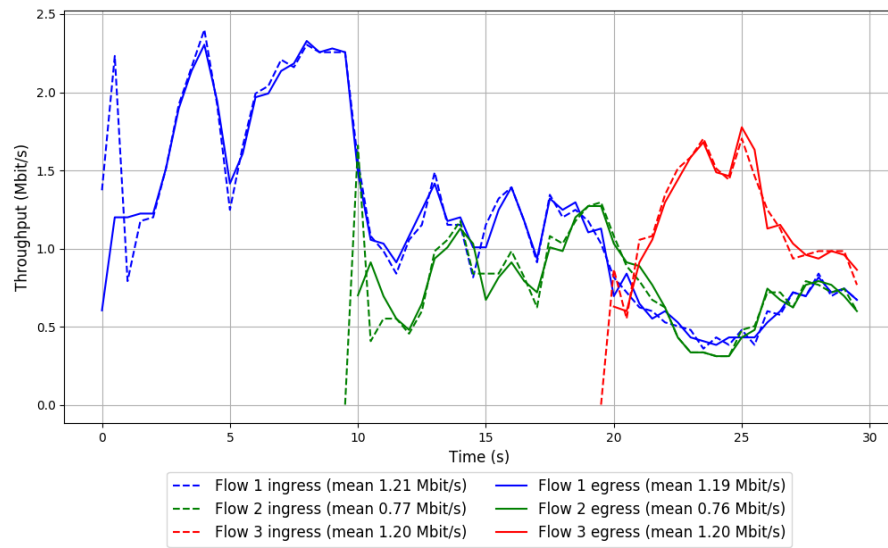


Run 2: Statistics of TCP Vegas

Start at: 2018-01-02 20:49:08
End at: 2018-01-02 20:49:38
Local clock offset: 1.804 ms
Remote clock offset: -15.103 ms

Below is generated by plot.py at 2018-01-02 22:07:49
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 217.705 ms
Loss rate: 1.42%
-- Flow 1:
Average throughput: 1.19 Mbit/s
95th percentile per-packet one-way delay: 227.567 ms
Loss rate: 1.56%
-- Flow 2:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 222.512 ms
Loss rate: 1.41%
-- Flow 3:
Average throughput: 1.20 Mbit/s
95th percentile per-packet one-way delay: 157.869 ms
Loss rate: 1.01%

Run 2: Report of TCP Vegas — Data Link

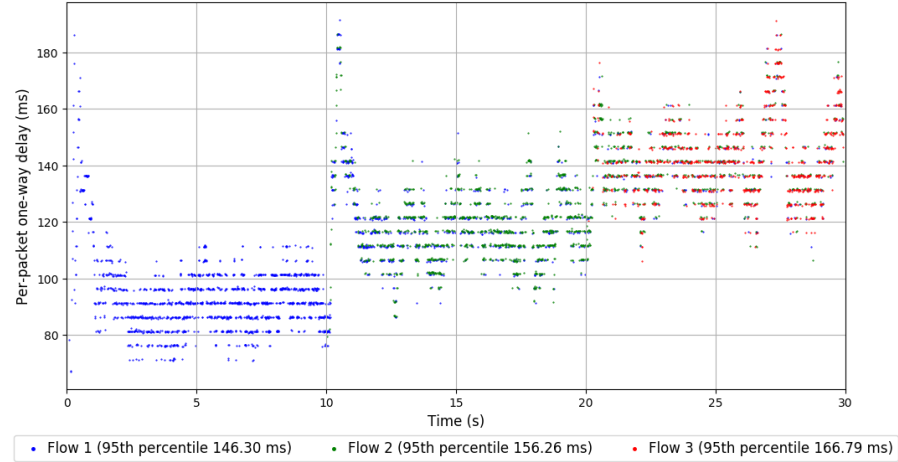
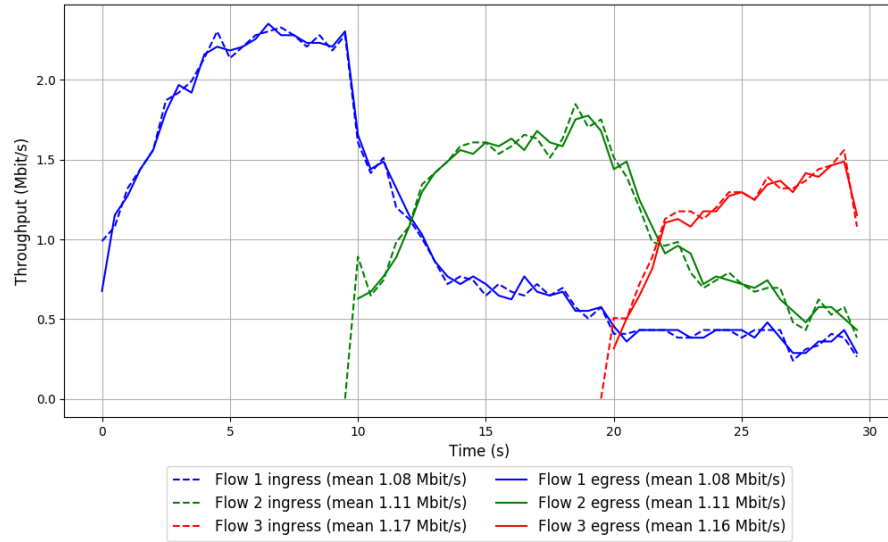


Run 3: Statistics of TCP Vegas

Start at: 2018-01-02 21:05:44
End at: 2018-01-02 21:06:14
Local clock offset: 1.295 ms
Remote clock offset: -14.259 ms

Below is generated by plot.py at 2018-01-02 22:07:49
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 156.392 ms
Loss rate: 0.57%
-- Flow 1:
Average throughput: 1.08 Mbit/s
95th percentile per-packet one-way delay: 146.296 ms
Loss rate: 0.11%
-- Flow 2:
Average throughput: 1.11 Mbit/s
95th percentile per-packet one-way delay: 156.264 ms
Loss rate: 0.33%
-- Flow 3:
Average throughput: 1.16 Mbit/s
95th percentile per-packet one-way delay: 166.788 ms
Loss rate: 2.27%

Run 3: Report of TCP Vegas — Data Link

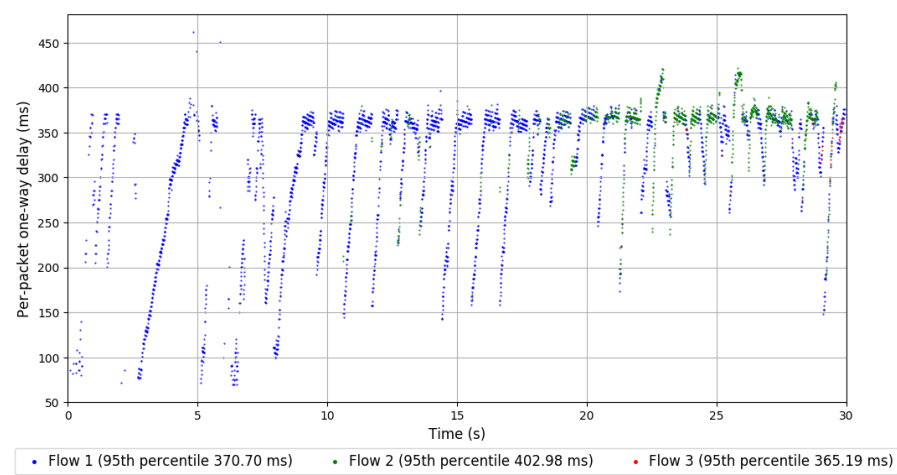
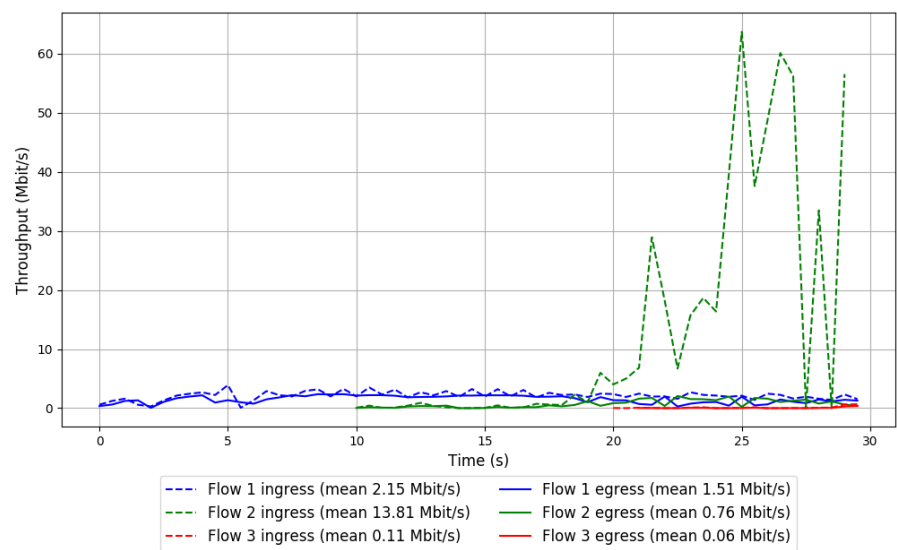


Run 1: Statistics of Verus

Start at: 2018-01-02 20:34:29
End at: 2018-01-02 20:34:59
Local clock offset: 1.266 ms
Remote clock offset: -13.066 ms

Below is generated by plot.py at 2018-01-02 22:07:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.01 Mbit/s
95th percentile per-packet one-way delay: 375.422 ms
Loss rate: 81.83%
-- Flow 1:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 370.704 ms
Loss rate: 29.76%
-- Flow 2:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 402.980 ms
Loss rate: 94.48%
-- Flow 3:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 365.190 ms
Loss rate: 54.55%

Run 1: Report of Verus — Data Link

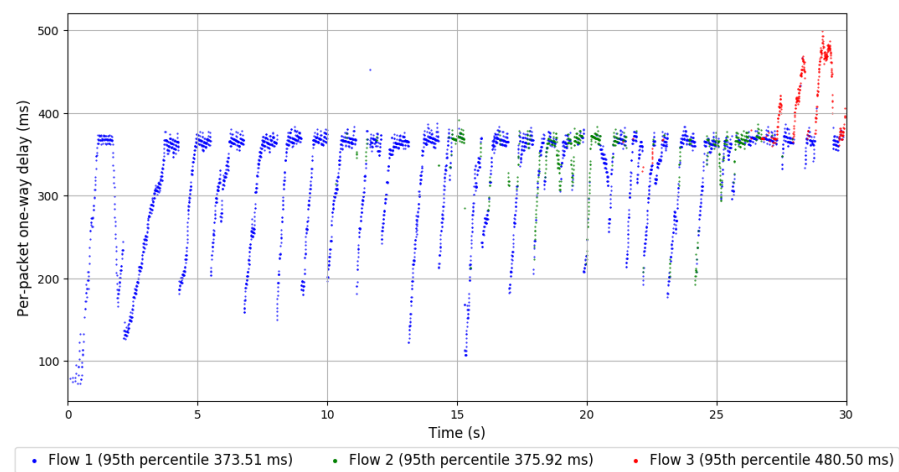
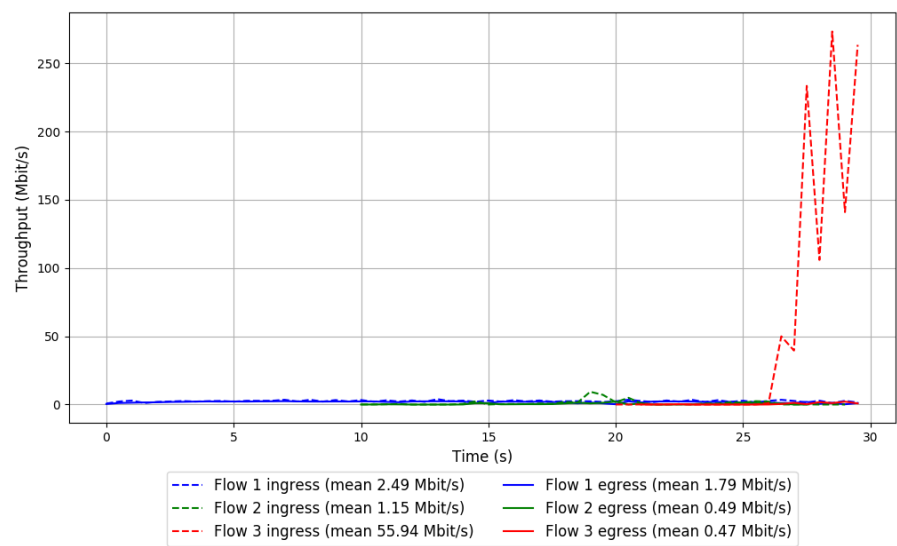


Run 2: Statistics of Verus

Start at: 2018-01-02 20:51:20
End at: 2018-01-02 20:51:50
Local clock offset: 3.261 ms
Remote clock offset: -14.365 ms

Below is generated by plot.py at 2018-01-02 22:07:59
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.20 Mbit/s
95th percentile per-packet one-way delay: 381.070 ms
Loss rate: 89.88%
-- Flow 1:
Average throughput: 1.79 Mbit/s
95th percentile per-packet one-way delay: 373.515 ms
Loss rate: 28.63%
-- Flow 2:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 375.918 ms
Loss rate: 60.68%
-- Flow 3:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 480.498 ms
Loss rate: 99.27%

Run 2: Report of Verus — Data Link

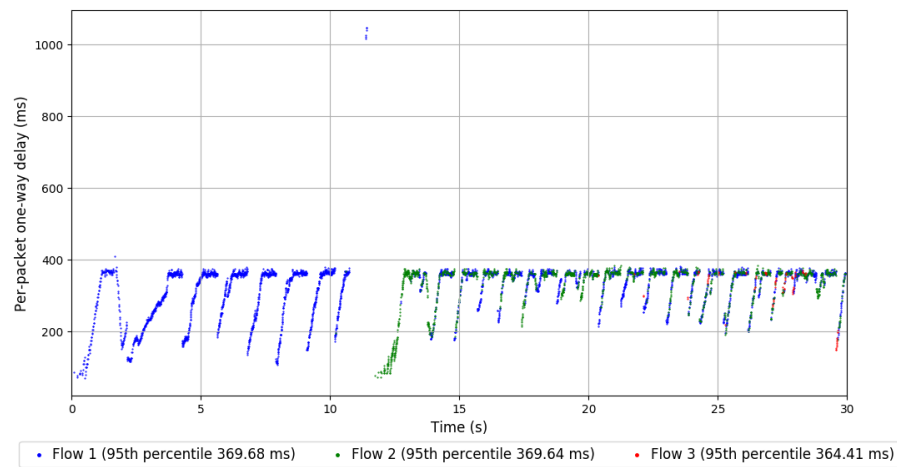
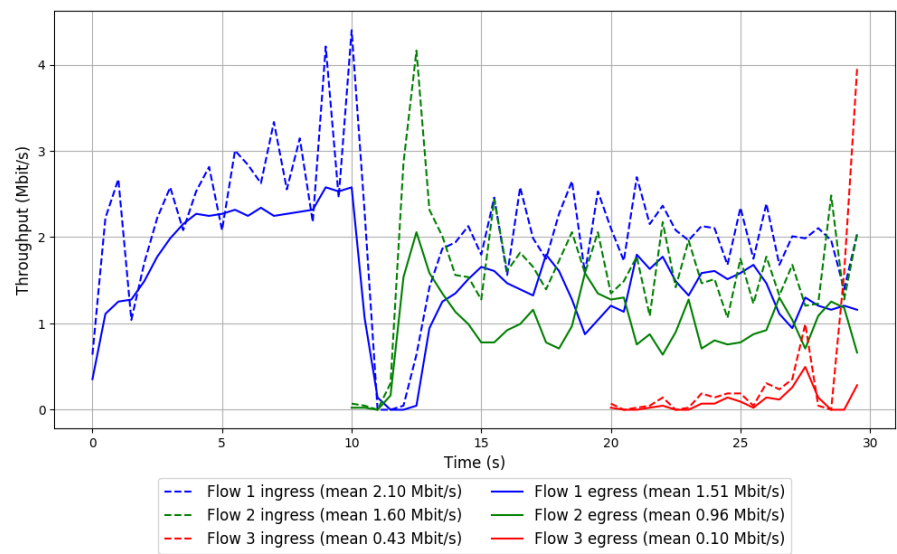


Run 3: Statistics of Verus

Start at: 2018-01-02 21:07:56
End at: 2018-01-02 21:08:26
Local clock offset: -0.094 ms
Remote clock offset: -13.706 ms

Below is generated by plot.py at 2018-01-02 22:07:59
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.18 Mbit/s
95th percentile per-packet one-way delay: 369.660 ms
Loss rate: 34.23%
-- Flow 1:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 369.678 ms
Loss rate: 28.16%
-- Flow 2:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 369.643 ms
Loss rate: 40.42%
-- Flow 3:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 364.414 ms
Loss rate: 77.29%

Run 3: Report of Verus — Data Link

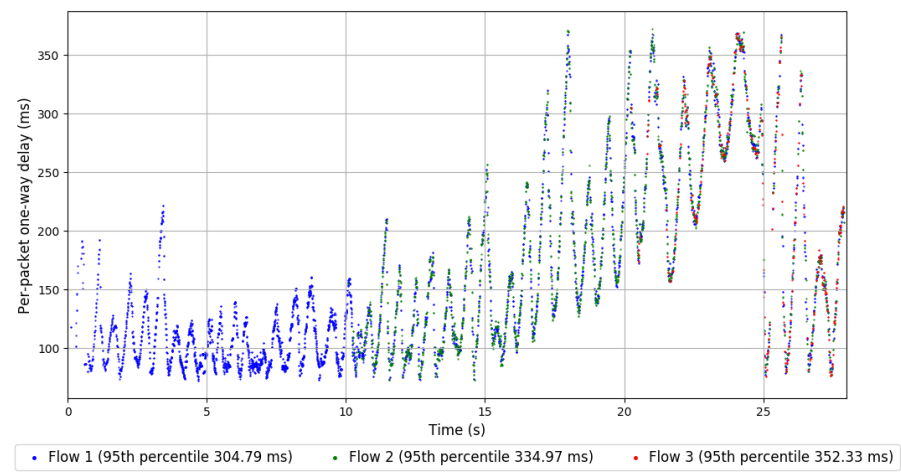
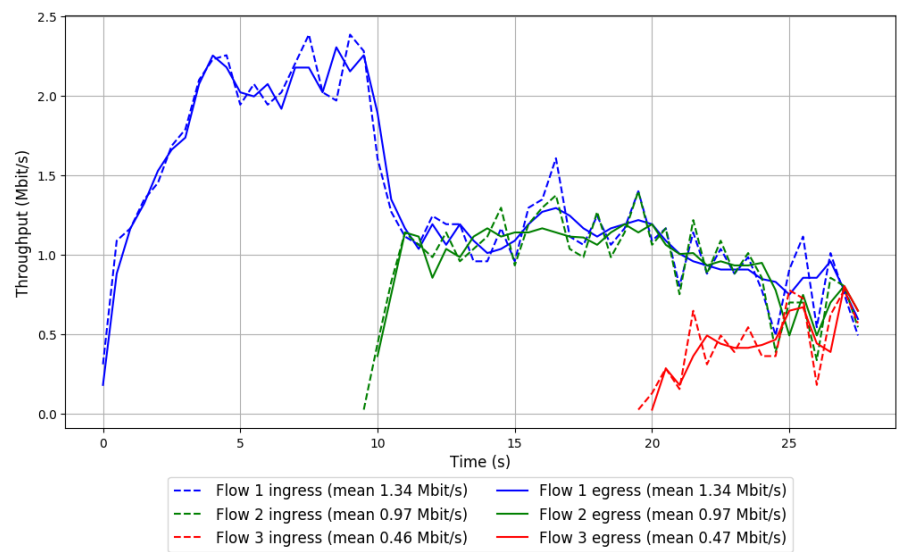


Run 1: Statistics of Copa

Start at: 2018-01-02 20:39:03
End at: 2018-01-02 20:39:33
Local clock offset: 0.135 ms
Remote clock offset: -16.35 ms

Below is generated by plot.py at 2018-01-02 22:07:59
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 322.699 ms
Loss rate: 0.71%
-- Flow 1:
Average throughput: 1.34 Mbit/s
95th percentile per-packet one-way delay: 304.788 ms
Loss rate: 0.43%
-- Flow 2:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 334.970 ms
Loss rate: 0.74%
-- Flow 3:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 352.326 ms
Loss rate: 3.30%

Run 1: Report of Copa — Data Link

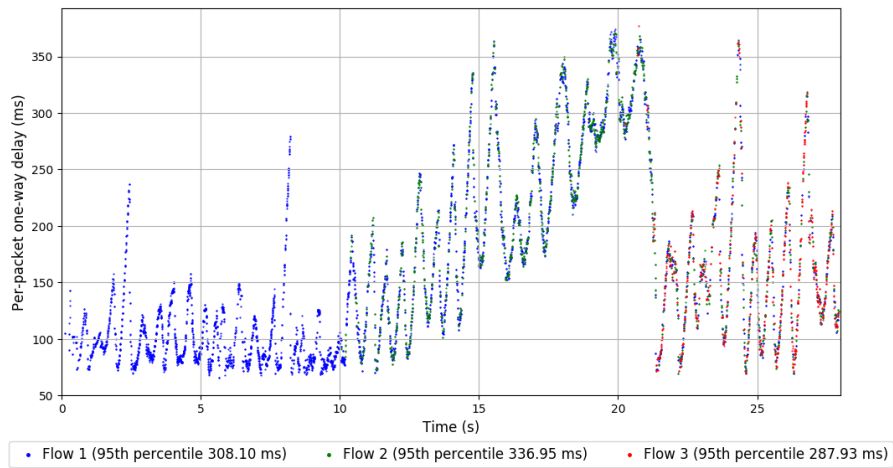
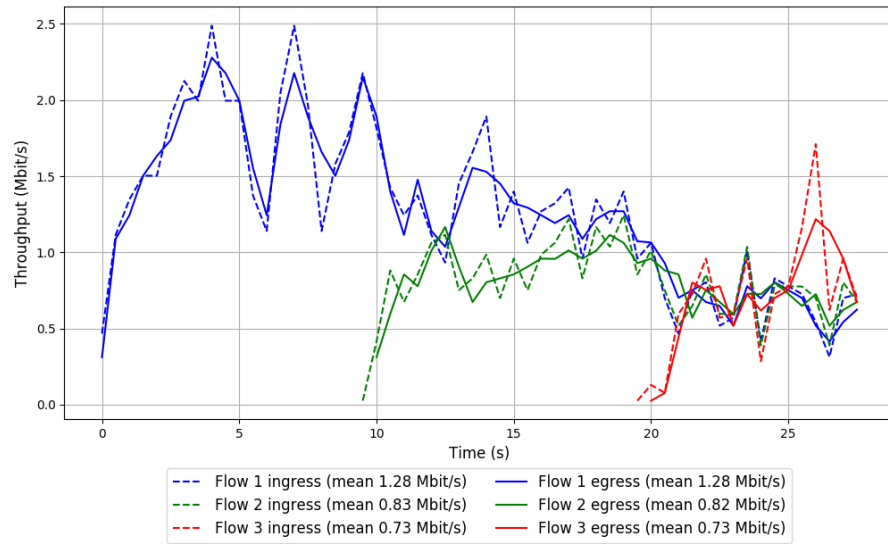


Run 2: Statistics of Copa

Start at: 2018-01-02 20:55:46
End at: 2018-01-02 20:56:16
Local clock offset: -0.451 ms
Remote clock offset: -13.447 ms

Below is generated by plot.py at 2018-01-02 22:07:59
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 318.702 ms
Loss rate: 1.29%
-- Flow 1:
Average throughput: 1.28 Mbit/s
95th percentile per-packet one-way delay: 308.099 ms
Loss rate: 0.68%
-- Flow 2:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 336.954 ms
Loss rate: 1.85%
-- Flow 3:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 287.931 ms
Loss rate: 3.63%

Run 2: Report of Copa — Data Link

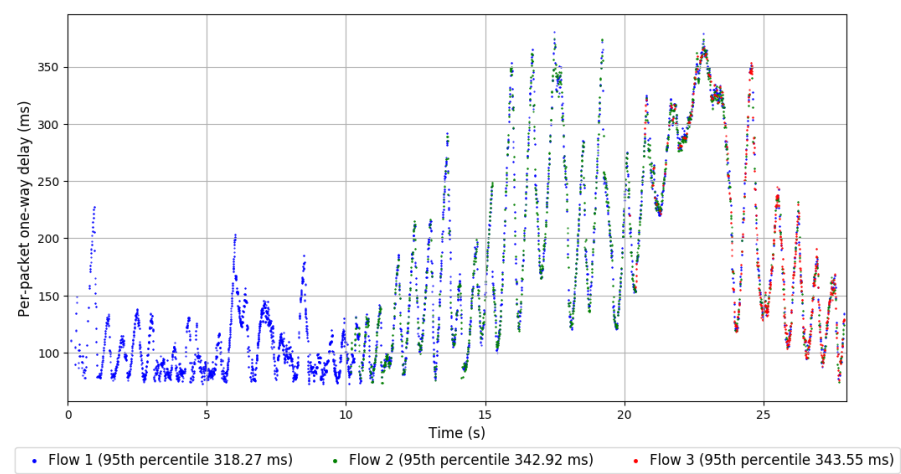
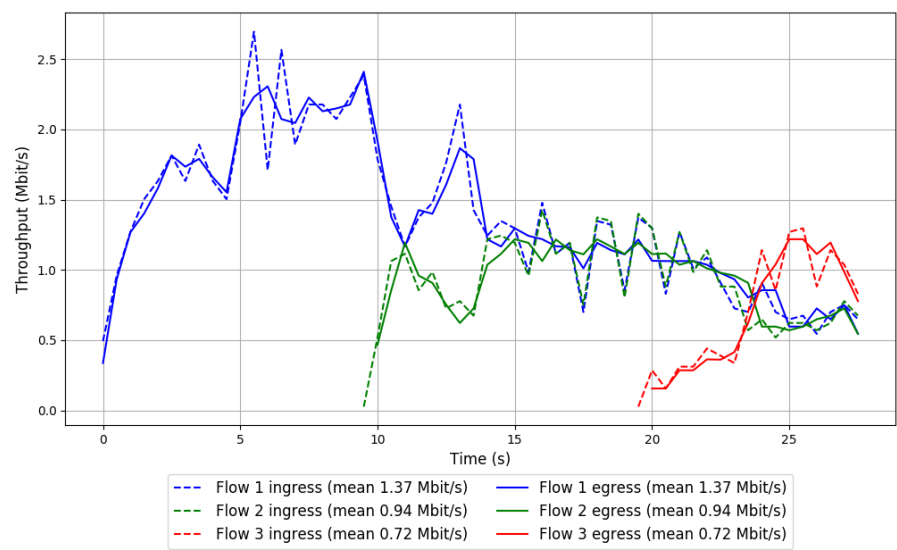


Run 3: Statistics of Copa

Start at: 2018-01-02 21:12:20
End at: 2018-01-02 21:12:50
Local clock offset: 3.949 ms
Remote clock offset: -13.495 ms

Below is generated by plot.py at 2018-01-02 22:07:59
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 329.767 ms
Loss rate: 0.86%
-- Flow 1:
Average throughput: 1.37 Mbit/s
95th percentile per-packet one-way delay: 318.268 ms
Loss rate: 0.53%
-- Flow 2:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 342.918 ms
Loss rate: 0.96%
-- Flow 3:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 343.548 ms
Loss rate: 2.74%

Run 3: Report of Copa — Data Link

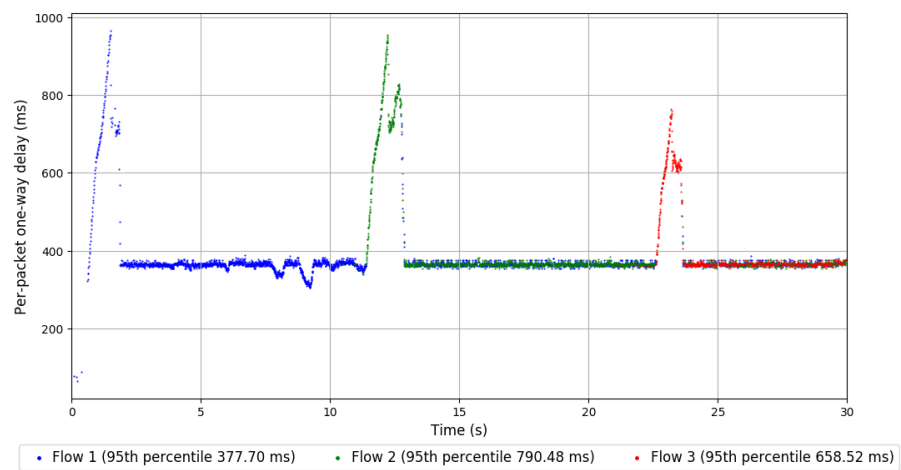
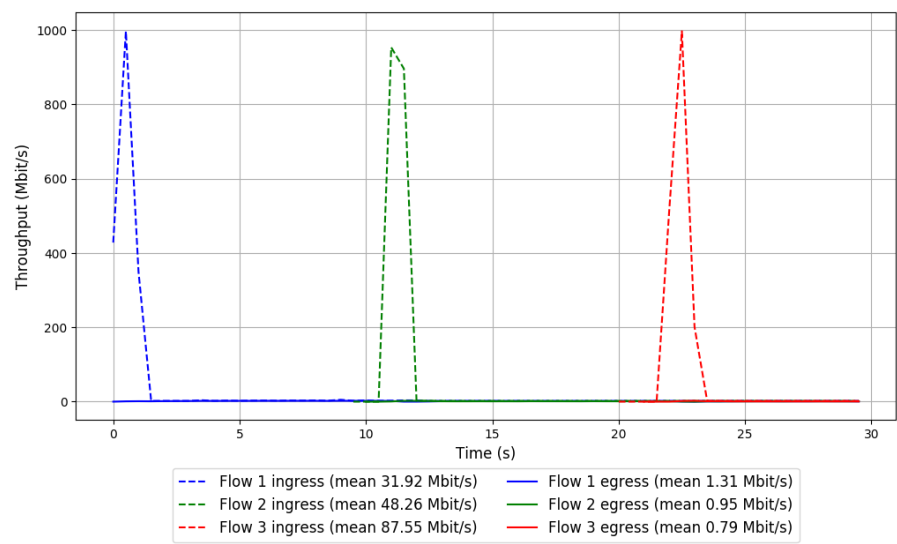


```
Run 1: Statistics of FillP

Start at: 2018-01-02 20:43:28
End at: 2018-01-02 20:43:58
Local clock offset: 3.815 ms
Remote clock offset: -14.205 ms

# Below is generated by plot.py at 2018-01-02 22:08:03
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 687.601 ms
Loss rate: 97.68%
-- Flow 1:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 377.699 ms
Loss rate: 95.91%
-- Flow 2:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 790.484 ms
Loss rate: 98.07%
-- Flow 3:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 658.520 ms
Loss rate: 99.19%
```

Run 1: Report of FillP — Data Link



Run 2: Statistics of FillP

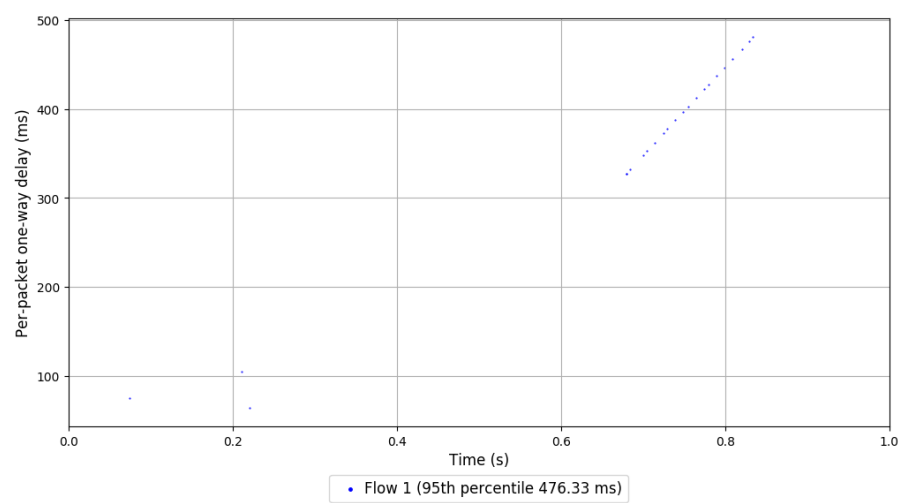
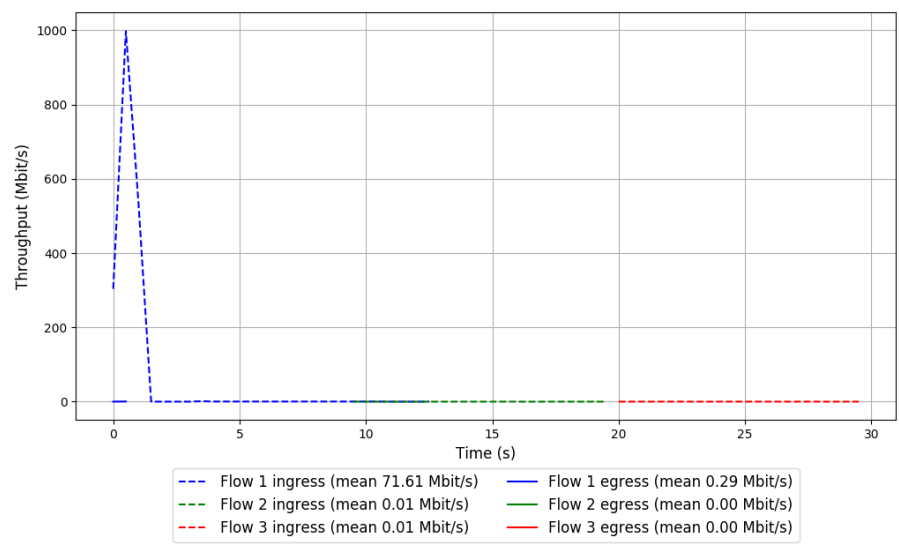
Start at: 2018-01-02 21:00:11

End at: 2018-01-02 21:00:41

Local clock offset: -0.269 ms

Remote clock offset: -16.478 ms

Run 2: Report of FillP — Data Link

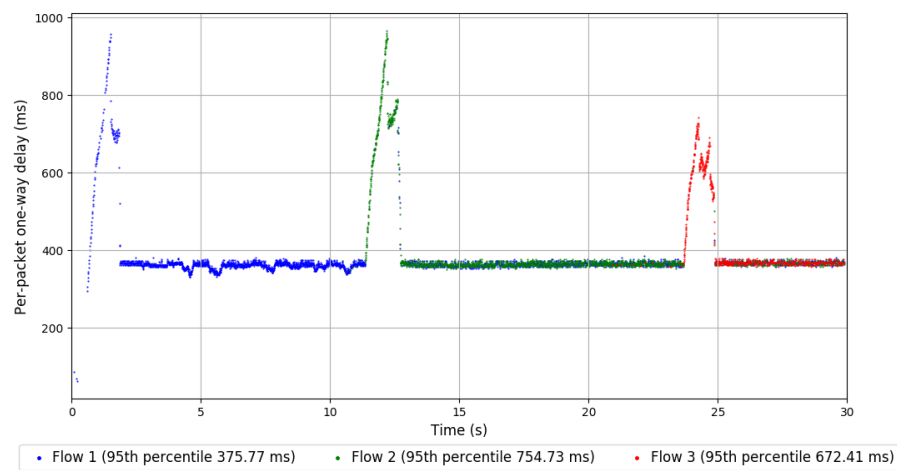
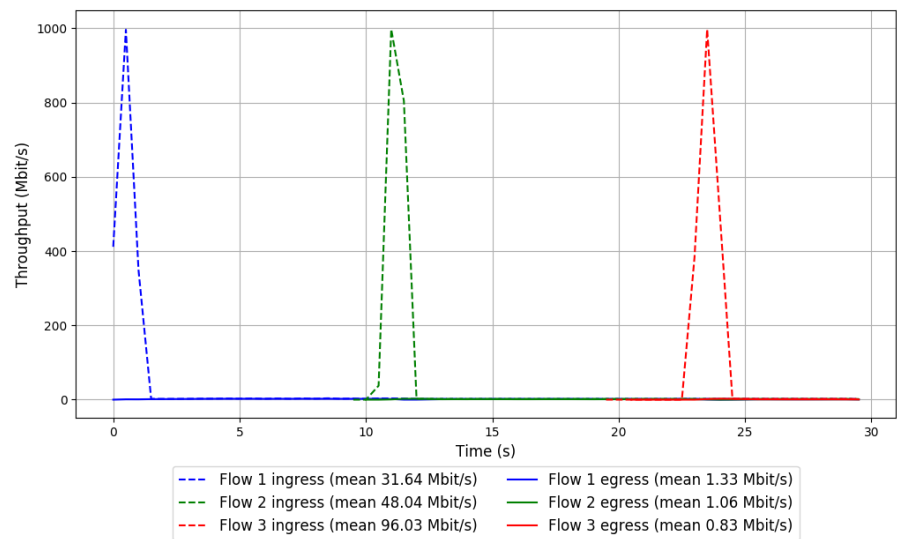


Run 3: Statistics of FillP

Start at: 2018-01-02 21:16:44
End at: 2018-01-02 21:17:14
Local clock offset: 0.669 ms
Remote clock offset: -14.965 ms

Below is generated by plot.py at 2018-01-02 22:08:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 2.27 Mbit/s
95th percentile per-packet one-way delay: 668.643 ms
Loss rate: 97.63%
-- Flow 1:
Average throughput: 1.33 Mbit/s
95th percentile per-packet one-way delay: 375.774 ms
Loss rate: 95.80%
-- Flow 2:
Average throughput: 1.06 Mbit/s
95th percentile per-packet one-way delay: 754.728 ms
Loss rate: 97.86%
-- Flow 3:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 672.414 ms
Loss rate: 99.22%

Run 3: Report of FillP — Data Link

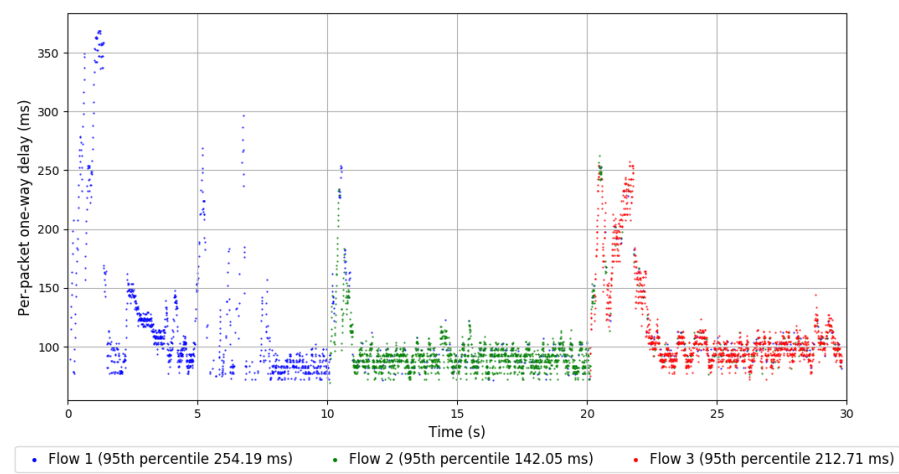
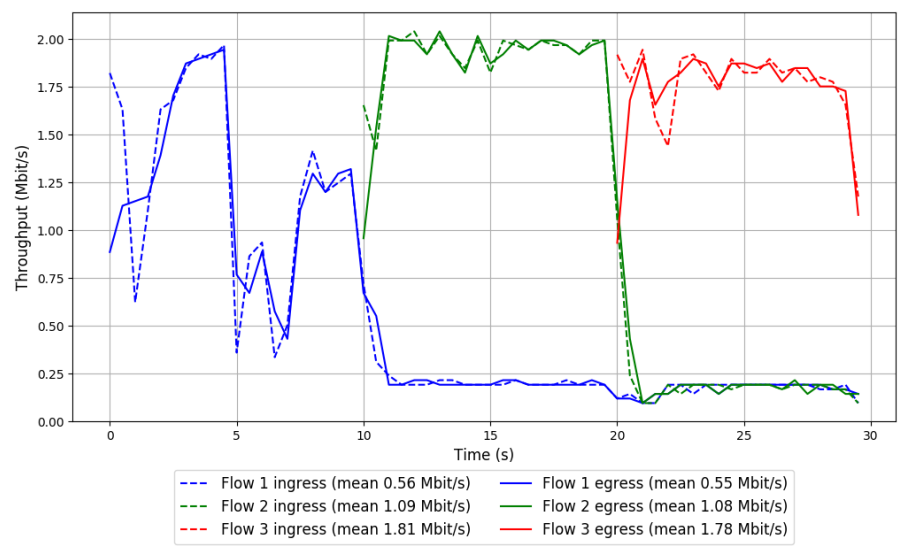


```
Run 1: Statistics of Indigo

Start at: 2018-01-02 20:28:57
End at: 2018-01-02 20:29:27
Local clock offset: 2.141 ms
Remote clock offset: -14.032 ms

# Below is generated by plot.py at 2018-01-02 22:08:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.85 Mbit/s
95th percentile per-packet one-way delay: 212.678 ms
Loss rate: 1.51%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 254.185 ms
Loss rate: 1.94%
-- Flow 2:
Average throughput: 1.08 Mbit/s
95th percentile per-packet one-way delay: 142.051 ms
Loss rate: 0.56%
-- Flow 3:
Average throughput: 1.78 Mbit/s
95th percentile per-packet one-way delay: 212.710 ms
Loss rate: 2.24%
```

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

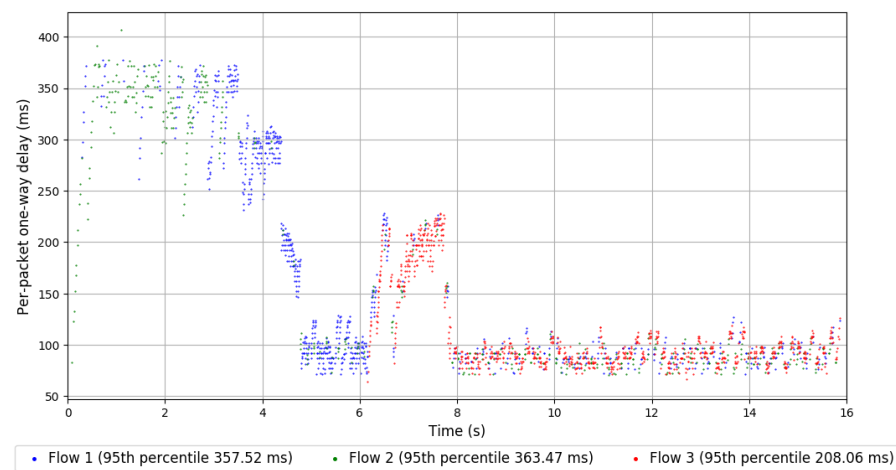
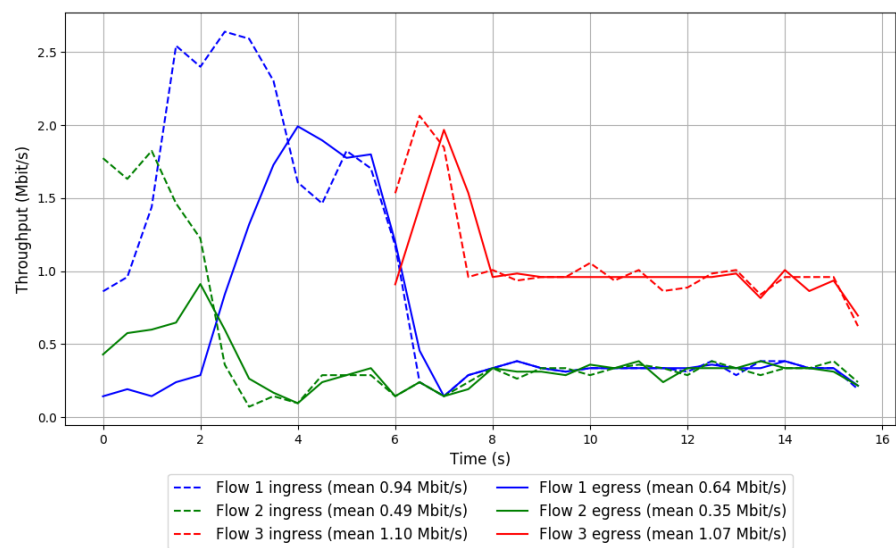
Start at: 2018-01-02 20:45:50

End at: 2018-01-02 20:46:20

Local clock offset: -0.04 ms

Remote clock offset: -16.434 ms

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-01-02 21:02:25
End at: 2018-01-02 21:02:55
Local clock offset: 0.235 ms
Remote clock offset: -15.362 ms

Below is generated by plot.py at 2018-01-02 22:08:04
Datalink statistics
-- Total of 3 flows:
Average throughput: 1.85 Mbit/s
95th percentile per-packet one-way delay: 152.997 ms
Loss rate: 1.06%
-- Flow 1:
Average throughput: 1.08 Mbit/s
95th percentile per-packet one-way delay: 177.150 ms
Loss rate: 0.60%
-- Flow 2:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 121.223 ms
Loss rate: 1.06%
-- Flow 3:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 162.727 ms
Loss rate: 4.72%

Run 3: Report of Indigo — Data Link

