

Pantheon Report

Generated at 2017-12-20 19:42:53 (UTC).

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

Repeated the test of 14 congestion control schemes 3 times.

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

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

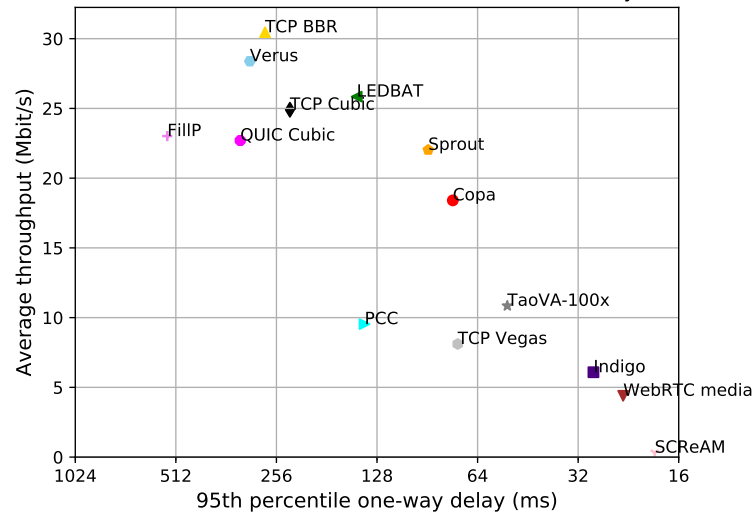
Tested BBR with qdisc of Fair Queuing (*fq*), and other schemes with the default Linux qdisc (*pfifo_fast*).

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

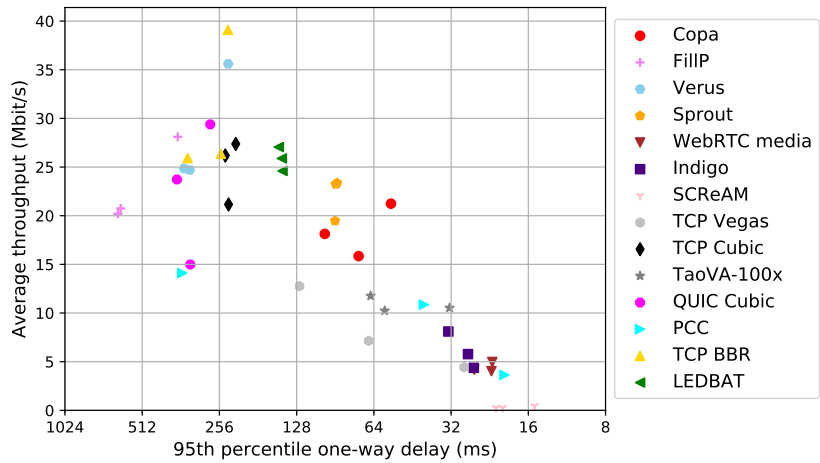
Git summary:

```
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 @ f1a14bffe749737437f61b1eaeab30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
  M src/examples/cellsim.cc
  M src/examples/sproutbt2.cc
  M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
  M src/verus.hpp
  M tools/plot.py
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

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



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



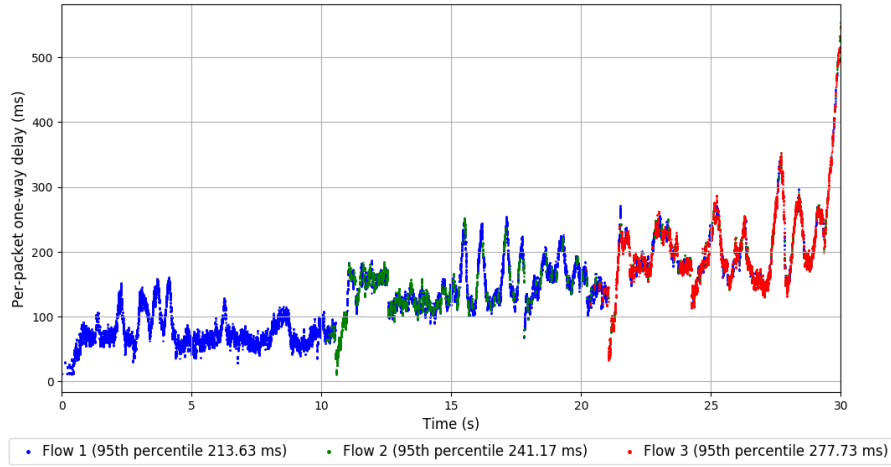
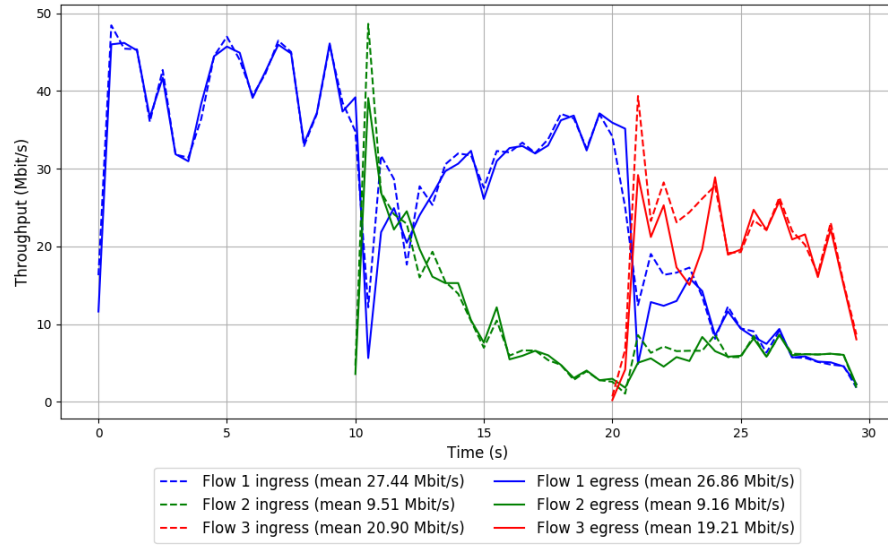
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	16.66	13.13	15.75	217.55	280.88	329.37	0.83	2.16	7.24
TCP Cubic	3	16.48	9.83	4.61	219.16	253.45	260.77	0.26	0.67	2.01
LEDBAT	3	18.80	8.52	4.24	140.93	160.16	170.73	0.17	0.43	1.69
PCC	3	12.63	9.66	2.07	1317.06	142.58	94.06	0.11	0.14	0.00
QUIC Cubic	3	14.58	8.83	7.04	302.00	340.51	384.04	0.63	1.40	3.90
SCReAM	3	0.86	0.22	0.22	2588.84	17.78	18.36	0.00	0.00	0.00
WebRTC media	3	2.33	1.56	0.51	23.36	23.01	24.14	0.00	0.00	0.00
Sprout	3	12.12	10.52	8.65	79.29	90.83	115.91	0.06	0.16	0.44
TaoVA-100x	3	4.78	6.25	7.14	38.21	44.96	118.75	0.00	0.00	0.04
TCP Vegas	3	3.18	2.27	10.19	62.97	35.06	81.46	0.00	0.00	0.00
Verus	3	18.98	9.73	9.34	285.82	343.49	316.89	9.99	19.51	20.93
Copa	3	10.14	10.05	6.24	71.91	81.10	76.06	0.09	0.13	0.28
FillP	3	10.66	11.50	14.75	527.33	532.66	586.41	67.49	70.30	77.38
Indigo	3	2.22	3.37	5.03	27.65	28.78	31.53	0.00	0.00	0.00

Run 1: Statistics of TCP BBR

Start at: 2017-12-20 18:59:18
End at: 2017-12-20 18:59:48
Local clock offset: 0.639 ms
Remote clock offset: -2.593 ms

Below is generated by plot.py at 2017-12-20 19:41:36
Datalink statistics
-- Total of 3 flows:
Average throughput: 39.10 Mbit/s
95th percentile per-packet one-way delay: 237.314 ms
Loss rate: 3.77%
-- Flow 1:
Average throughput: 26.86 Mbit/s
95th percentile per-packet one-way delay: 213.629 ms
Loss rate: 2.24%
-- Flow 2:
Average throughput: 9.16 Mbit/s
95th percentile per-packet one-way delay: 241.173 ms
Loss rate: 4.01%
-- Flow 3:
Average throughput: 19.21 Mbit/s
95th percentile per-packet one-way delay: 277.726 ms
Loss rate: 9.56%

Run 1: Report of TCP BBR — Data Link

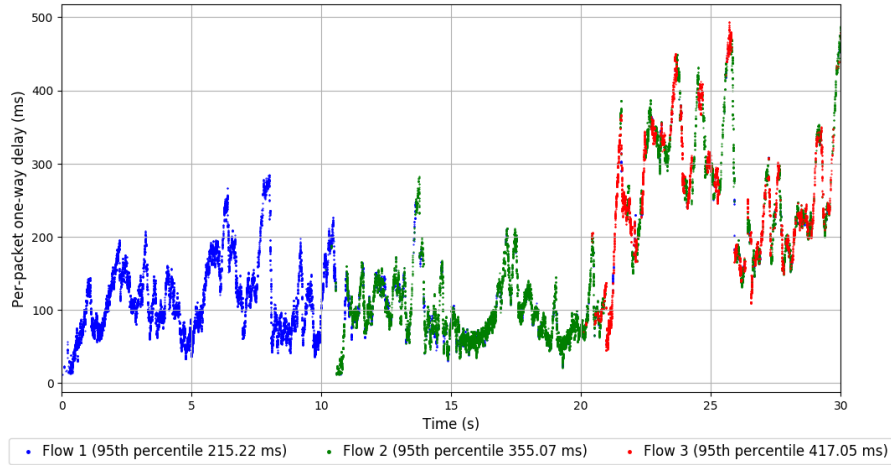
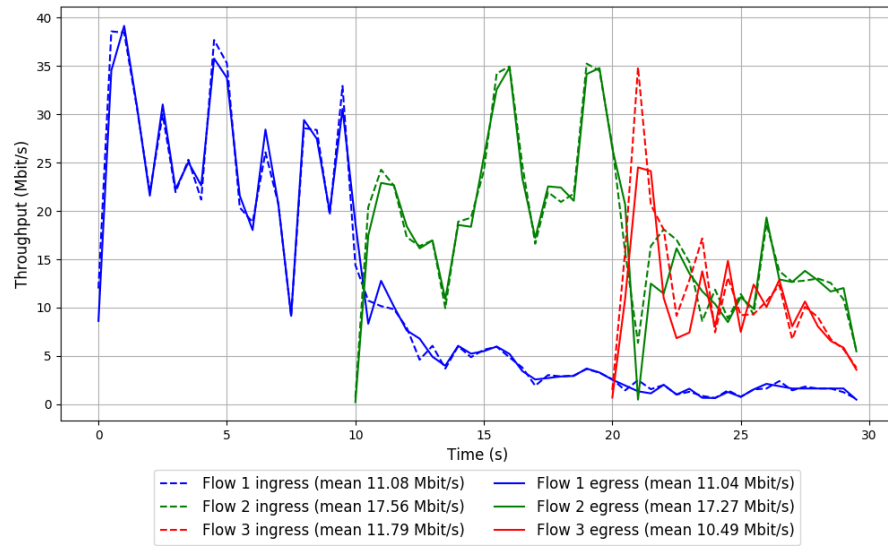


Run 2: Statistics of TCP BBR

Start at: 2017-12-20 19:17:16
End at: 2017-12-20 19:17:46
Local clock offset: 0.456 ms
Remote clock offset: -2.331 ms

Below is generated by plot.py at 2017-12-20 19:41:36
Datalink statistics
-- Total of 3 flows:
Average throughput: 25.92 Mbit/s
95th percentile per-packet one-way delay: 340.493 ms
Loss rate: 2.78%
-- Flow 1:
Average throughput: 11.04 Mbit/s
95th percentile per-packet one-way delay: 215.220 ms
Loss rate: 0.22%
-- Flow 2:
Average throughput: 17.27 Mbit/s
95th percentile per-packet one-way delay: 355.072 ms
Loss rate: 2.34%
-- Flow 3:
Average throughput: 10.49 Mbit/s
95th percentile per-packet one-way delay: 417.052 ms
Loss rate: 11.34%

Run 2: Report of TCP BBR — Data Link

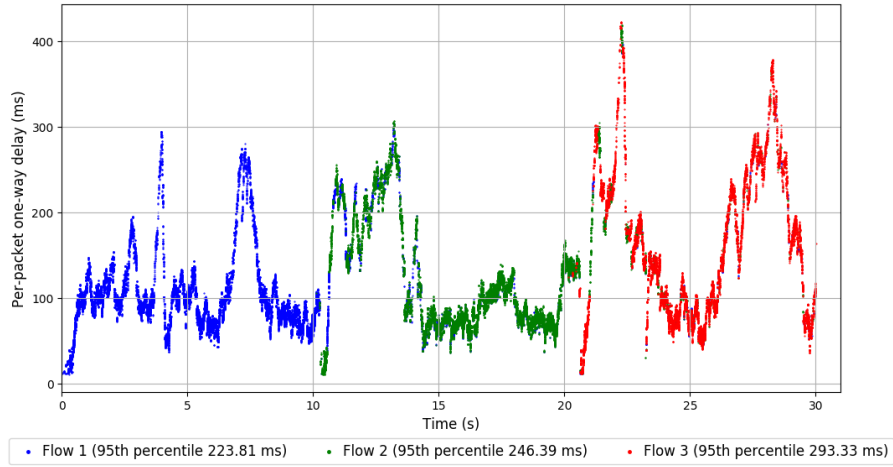
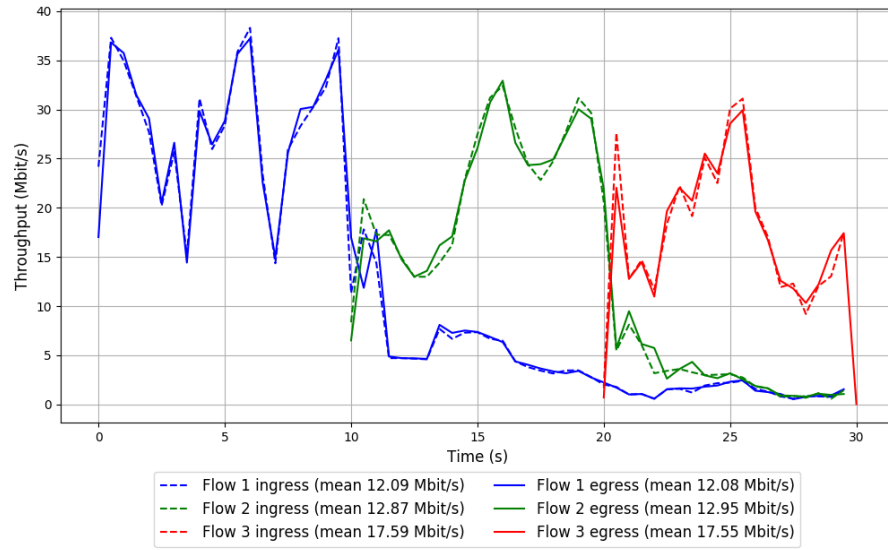


Run 3: Statistics of TCP BBR

Start at: 2017-12-20 19:35:13
End at: 2017-12-20 19:35:43
Local clock offset: 0.355 ms
Remote clock offset: -2.165 ms

Below is generated by plot.py at 2017-12-20 19:41:36
Datalink statistics
-- Total of 3 flows:
Average throughput: 26.36 Mbit/s
95th percentile per-packet one-way delay: 252.862 ms
Loss rate: 0.24%
-- Flow 1:
Average throughput: 12.08 Mbit/s
95th percentile per-packet one-way delay: 223.806 ms
Loss rate: 0.04%
-- Flow 2:
Average throughput: 12.95 Mbit/s
95th percentile per-packet one-way delay: 246.393 ms
Loss rate: 0.12%
-- Flow 3:
Average throughput: 17.55 Mbit/s
95th percentile per-packet one-way delay: 293.328 ms
Loss rate: 0.82%

Run 3: Report of TCP BBR — Data Link

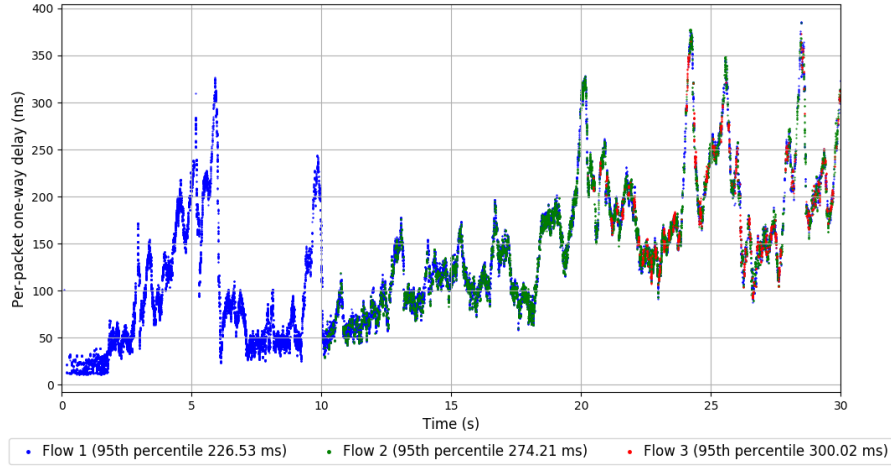
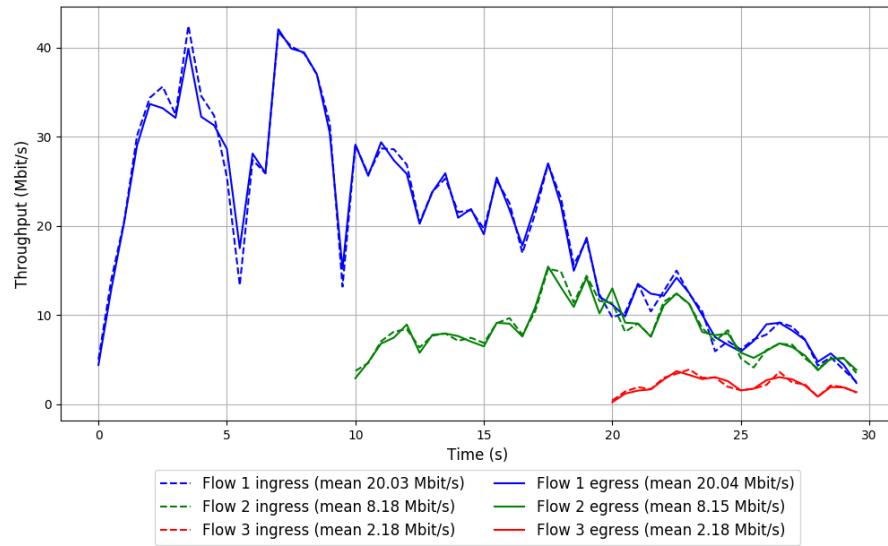


Run 1: Statistics of TCP Cubic

Start at: 2017-12-20 19:02:54
End at: 2017-12-20 19:03:24
Local clock offset: 0.631 ms
Remote clock offset: -2.419 ms

Below is generated by plot.py at 2017-12-20 19:41:36
Datalink statistics
-- Total of 3 flows:
Average throughput: 26.18 Mbit/s
95th percentile per-packet one-way delay: 242.820 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 20.04 Mbit/s
95th percentile per-packet one-way delay: 226.526 ms
Loss rate: 0.15%
-- Flow 2:
Average throughput: 8.15 Mbit/s
95th percentile per-packet one-way delay: 274.211 ms
Loss rate: 0.56%
-- Flow 3:
Average throughput: 2.18 Mbit/s
95th percentile per-packet one-way delay: 300.019 ms
Loss rate: 1.94%

Run 1: Report of TCP Cubic — Data Link

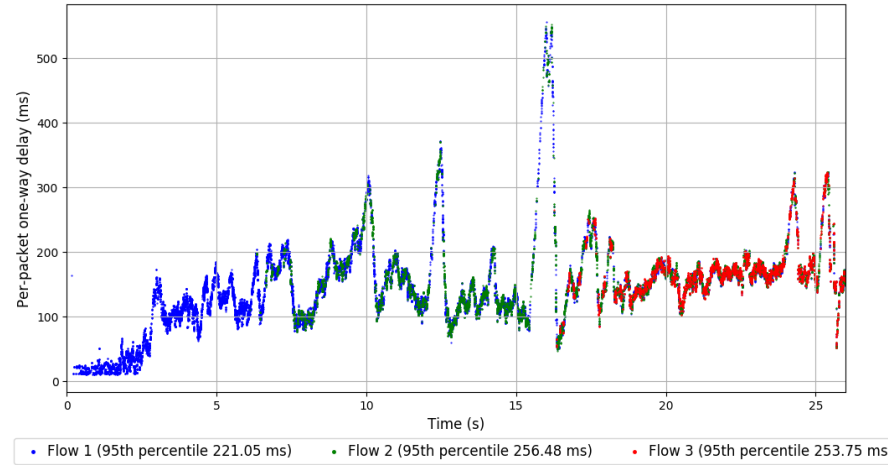
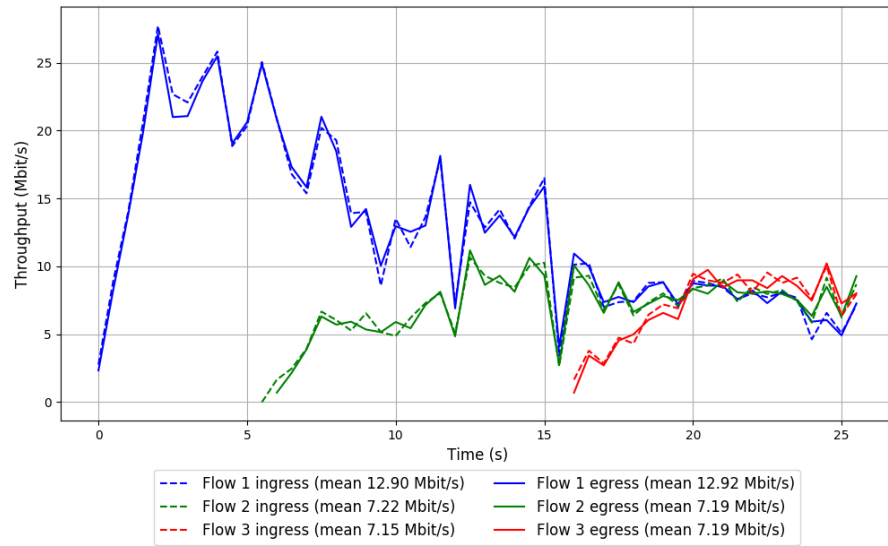


Run 2: Statistics of TCP Cubic

Start at: 2017-12-20 19:20:52
End at: 2017-12-20 19:21:22
Local clock offset: 0.43 ms
Remote clock offset: -2.322 ms

Below is generated by plot.py at 2017-12-20 19:41:36
Datalink statistics
-- Total of 3 flows:
Average throughput: 21.16 Mbit/s
95th percentile per-packet one-way delay: 235.886 ms
Loss rate: 0.66%
-- Flow 1:
Average throughput: 12.92 Mbit/s
95th percentile per-packet one-way delay: 221.054 ms
Loss rate: 0.37%
-- Flow 2:
Average throughput: 7.19 Mbit/s
95th percentile per-packet one-way delay: 256.479 ms
Loss rate: 0.80%
-- Flow 3:
Average throughput: 7.19 Mbit/s
95th percentile per-packet one-way delay: 253.747 ms
Loss rate: 1.79%

Run 2: Report of TCP Cubic — Data Link

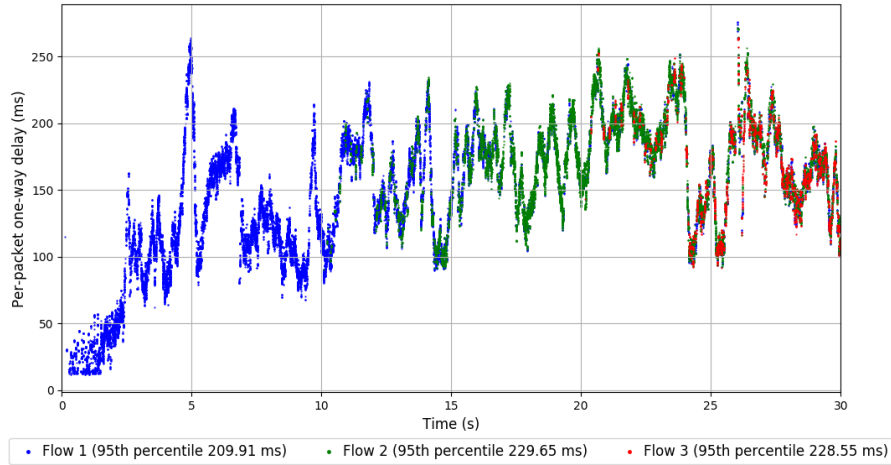
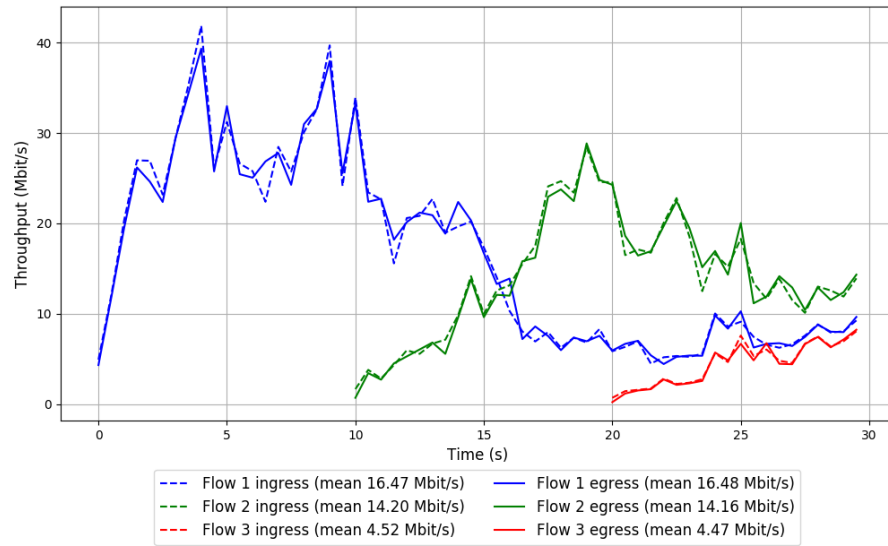


Run 3: Statistics of TCP Cubic

Start at: 2017-12-20 19:38:49
End at: 2017-12-20 19:39:19
Local clock offset: 0.277 ms
Remote clock offset: -2.073 ms

Below is generated by plot.py at 2017-12-20 19:41:36
Datalink statistics
-- Total of 3 flows:
Average throughput: 27.38 Mbit/s
95th percentile per-packet one-way delay: 221.134 ms
Loss rate: 0.50%
-- Flow 1:
Average throughput: 16.48 Mbit/s
95th percentile per-packet one-way delay: 209.911 ms
Loss rate: 0.25%
-- Flow 2:
Average throughput: 14.16 Mbit/s
95th percentile per-packet one-way delay: 229.645 ms
Loss rate: 0.64%
-- Flow 3:
Average throughput: 4.47 Mbit/s
95th percentile per-packet one-way delay: 228.548 ms
Loss rate: 2.30%

Run 3: Report of TCP Cubic — Data Link

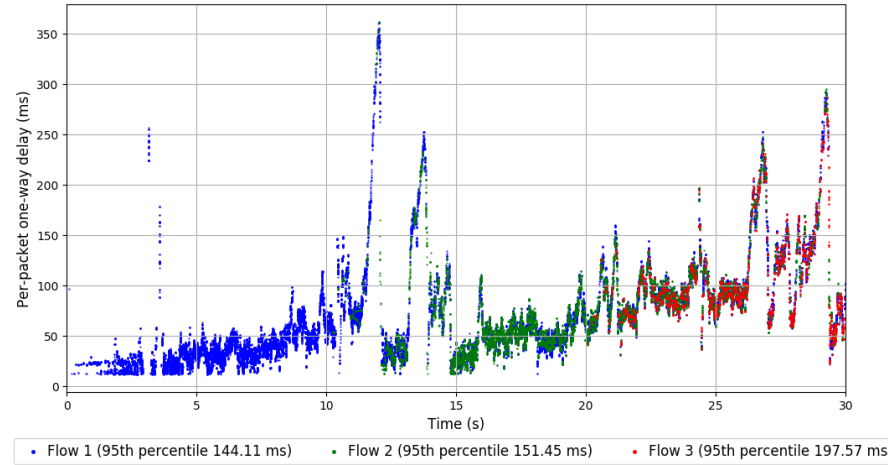
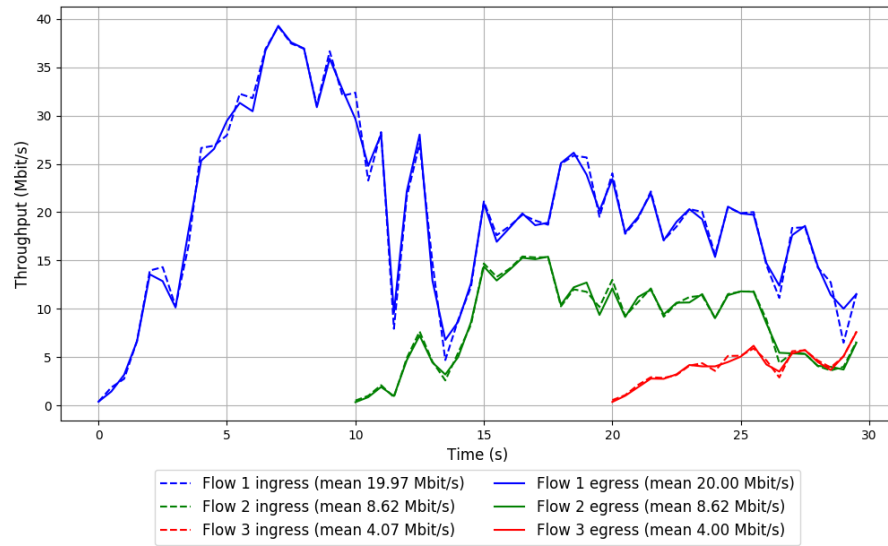


```
Run 1: Statistics of LEDBAT

Start at: 2017-12-20 18:54:31
End at: 2017-12-20 18:55:01
Local clock offset: 0.565 ms
Remote clock offset: -2.679 ms

# Below is generated by plot.py at 2017-12-20 19:41:36
# Datalink statistics
-- Total of 3 flows:
Average throughput: 27.06 Mbit/s
95th percentile per-packet one-way delay: 150.300 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 20.00 Mbit/s
95th percentile per-packet one-way delay: 144.112 ms
Loss rate: 0.08%
-- Flow 2:
Average throughput: 8.62 Mbit/s
95th percentile per-packet one-way delay: 151.453 ms
Loss rate: 0.42%
-- Flow 3:
Average throughput: 4.00 Mbit/s
95th percentile per-packet one-way delay: 197.573 ms
Loss rate: 1.68%
```


Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2017-12-20 19:12:29

End at: 2017-12-20 19:12:59

Local clock offset: 0.419 ms

Remote clock offset: -2.2 ms

Below is generated by plot.py at 2017-12-20 19:41:36

Datalink statistics

-- Total of 3 flows:

Average throughput: 25.89 Mbit/s

95th percentile per-packet one-way delay: 146.166 ms

Loss rate: 0.29%

-- Flow 1:

Average throughput: 18.13 Mbit/s

95th percentile per-packet one-way delay: 139.661 ms

Loss rate: 0.21%

-- Flow 2:

Average throughput: 9.97 Mbit/s

95th percentile per-packet one-way delay: 166.225 ms

Loss rate: 0.22%

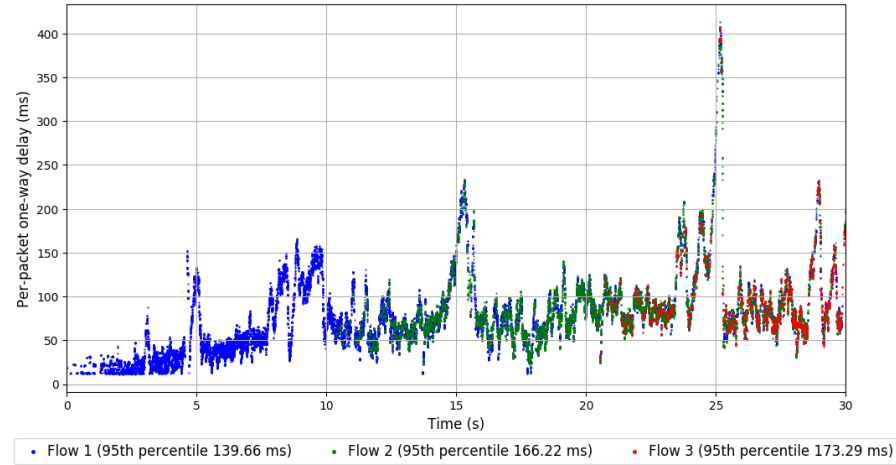
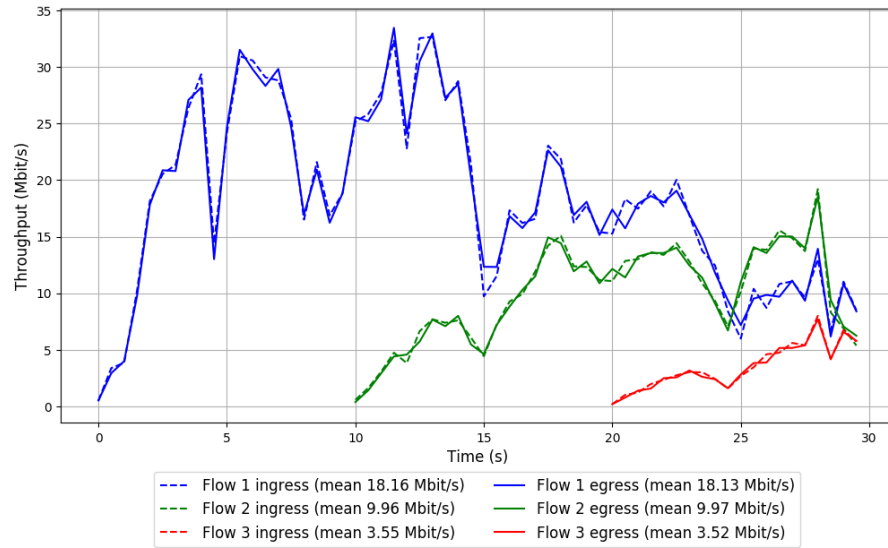
-- Flow 3:

Average throughput: 3.52 Mbit/s

95th percentile per-packet one-way delay: 173.292 ms

Loss rate: 1.96%

Run 2: Report of LEDBAT — Data Link

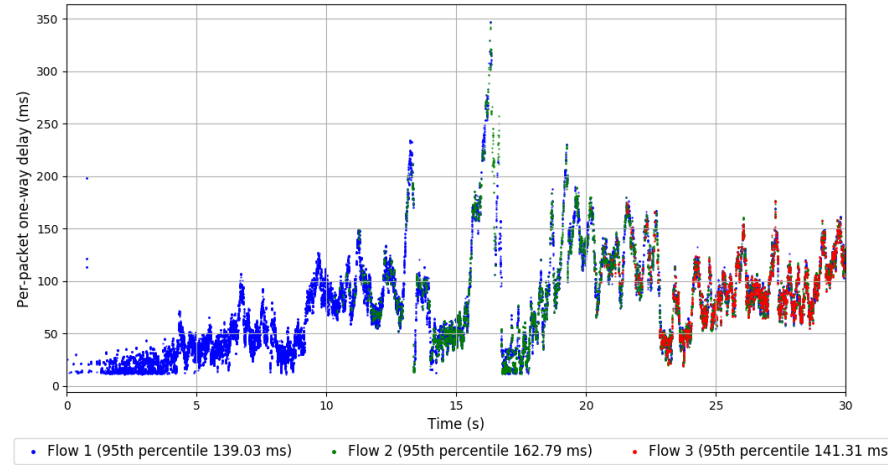
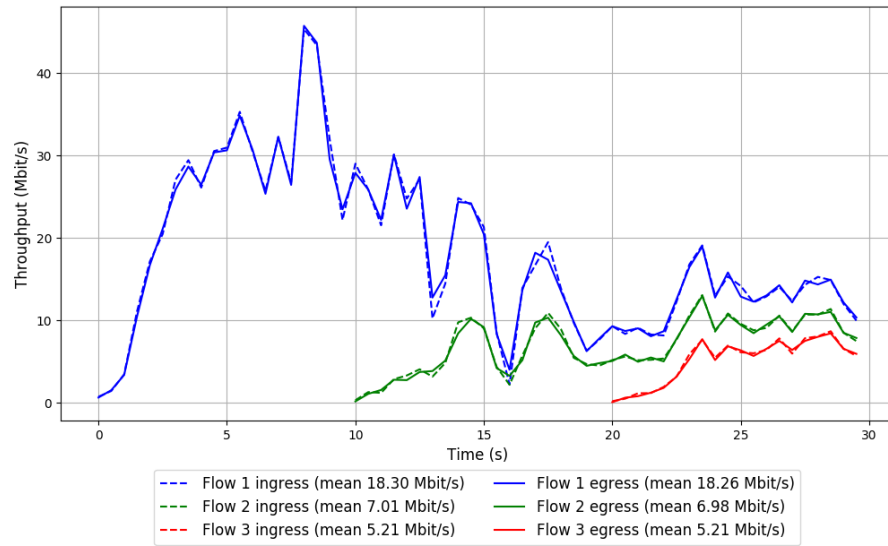


Run 3: Statistics of LEDBAT

Start at: 2017-12-20 19:30:26
End at: 2017-12-20 19:30:56
Local clock offset: 0.296 ms
Remote clock offset: -2.142 ms

Below is generated by plot.py at 2017-12-20 19:41:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 24.60 Mbit/s
95th percentile per-packet one-way delay: 145.329 ms
Loss rate: 0.39%
-- Flow 1:
Average throughput: 18.26 Mbit/s
95th percentile per-packet one-way delay: 139.029 ms
Loss rate: 0.23%
-- Flow 2:
Average throughput: 6.98 Mbit/s
95th percentile per-packet one-way delay: 162.793 ms
Loss rate: 0.64%
-- Flow 3:
Average throughput: 5.21 Mbit/s
95th percentile per-packet one-way delay: 141.315 ms
Loss rate: 1.43%

Run 3: Report of LEDBAT — Data Link

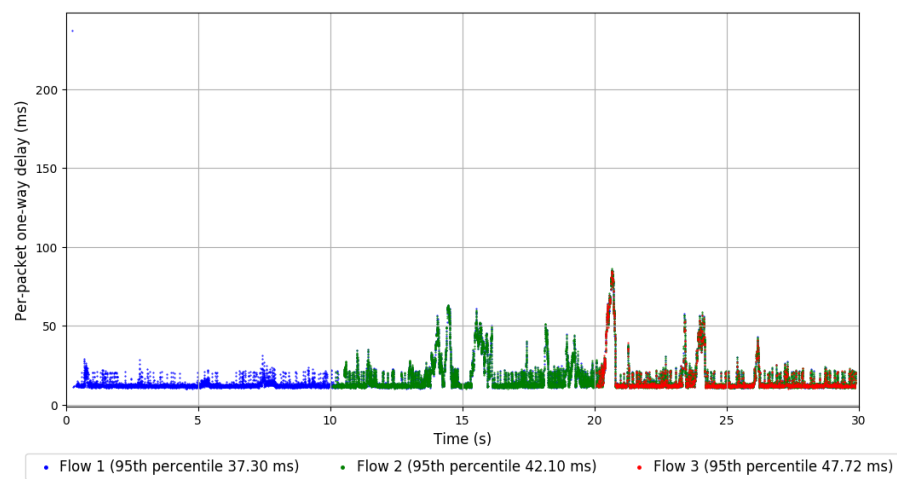
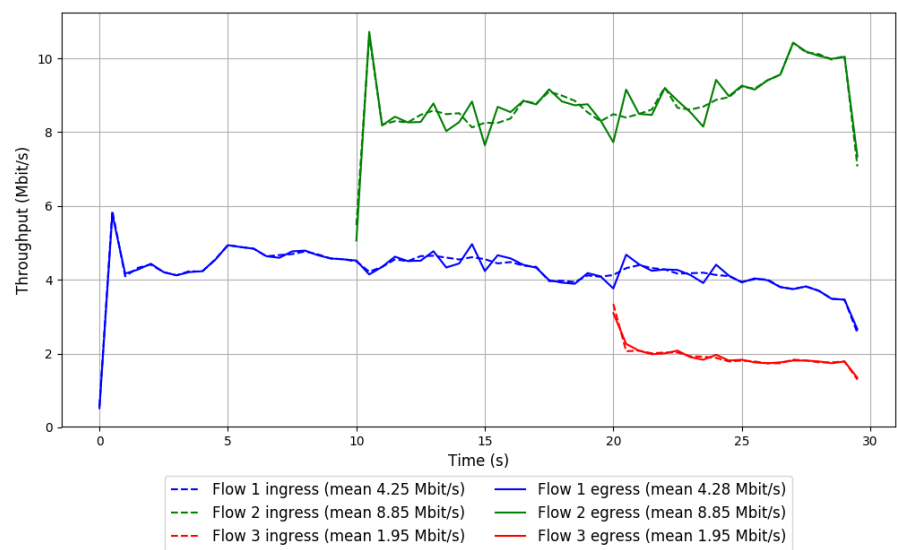


Run 1: Statistics of PCC

Start at: 2017-12-20 18:49:42
End at: 2017-12-20 18:50:12
Local clock offset: 0.649 ms
Remote clock offset: -2.629 ms

Below is generated by plot.py at 2017-12-20 19:41:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 10.86 Mbit/s
95th percentile per-packet one-way delay: 40.866 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 4.28 Mbit/s
95th percentile per-packet one-way delay: 37.304 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 8.85 Mbit/s
95th percentile per-packet one-way delay: 42.099 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 1.95 Mbit/s
95th percentile per-packet one-way delay: 47.724 ms
Loss rate: 0.00%

Run 1: Report of PCC — Data Link

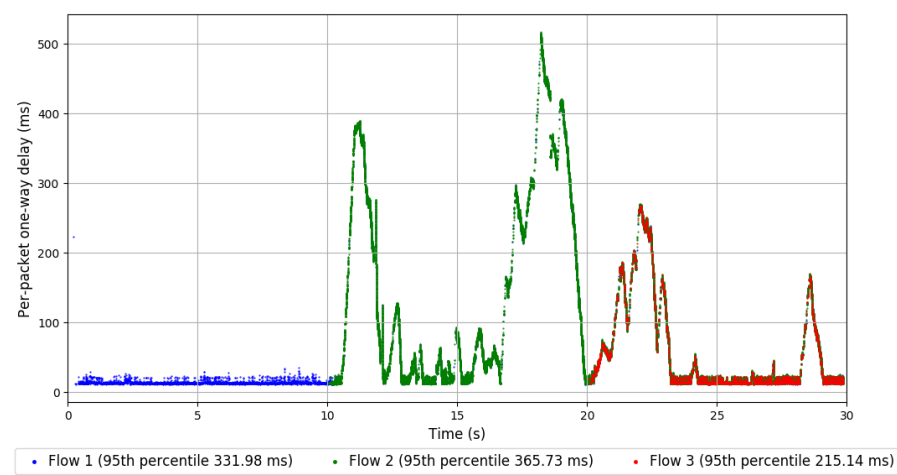
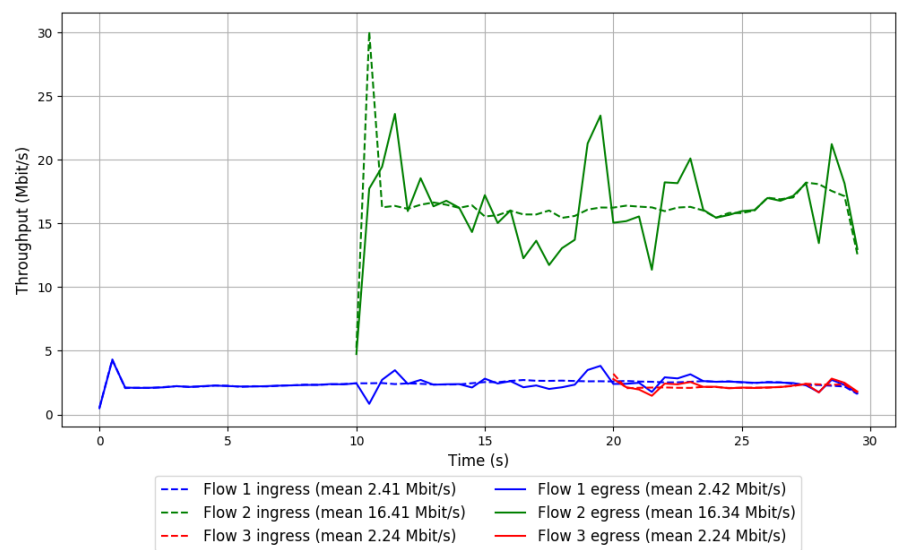


Run 2: Statistics of PCC

Start at: 2017-12-20 19:07:41
End at: 2017-12-20 19:08:11
Local clock offset: 0.488 ms
Remote clock offset: -2.345 ms

Below is generated by plot.py at 2017-12-20 19:41:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 14.11 Mbit/s
95th percentile per-packet one-way delay: 357.604 ms
Loss rate: 0.38%
-- Flow 1:
Average throughput: 2.42 Mbit/s
95th percentile per-packet one-way delay: 331.984 ms
Loss rate: 0.33%
-- Flow 2:
Average throughput: 16.34 Mbit/s
95th percentile per-packet one-way delay: 365.725 ms
Loss rate: 0.42%
-- Flow 3:
Average throughput: 2.24 Mbit/s
95th percentile per-packet one-way delay: 215.139 ms
Loss rate: 0.00%

Run 2: Report of PCC — Data Link

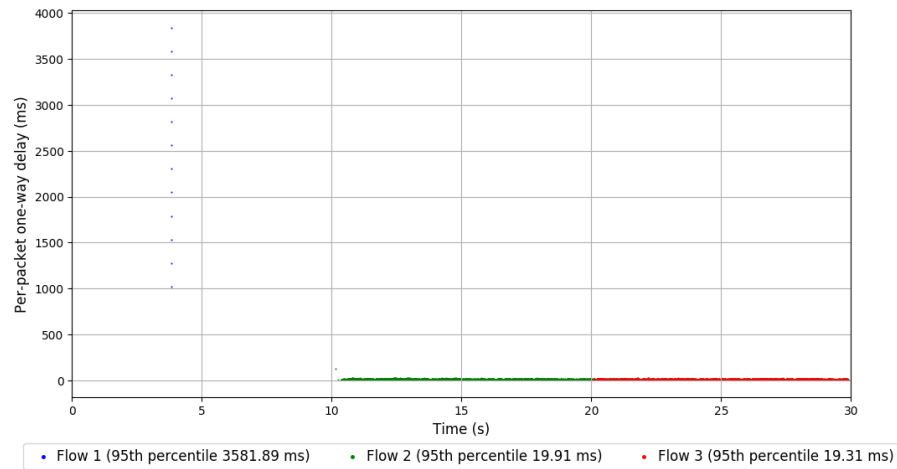
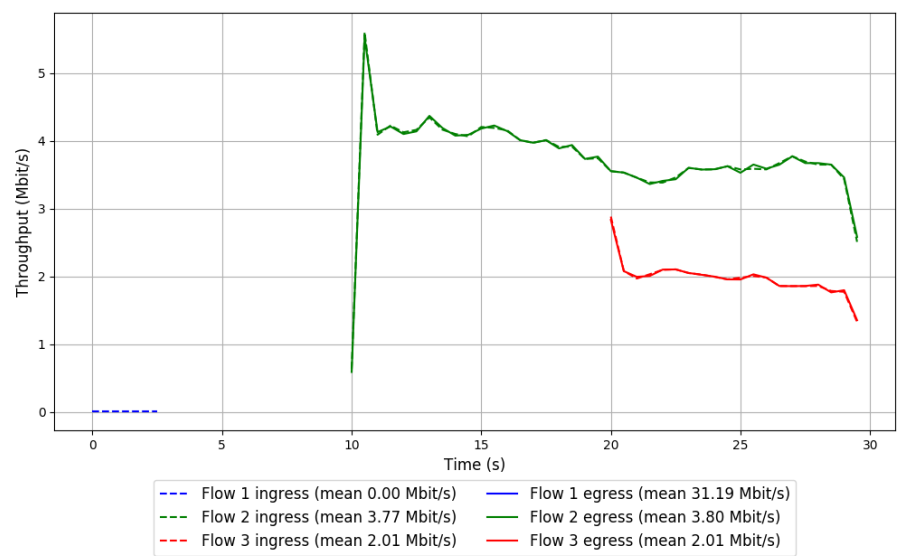


Run 3: Statistics of PCC

Start at: 2017-12-20 19:25:38
End at: 2017-12-20 19:26:08
Local clock offset: 0.337 ms
Remote clock offset: -2.277 ms

Below is generated by plot.py at 2017-12-20 19:41:43
Datalink statistics
-- Total of 3 flows:
Average throughput: 3.63 Mbit/s
95th percentile per-packet one-way delay: 19.816 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 31.19 Mbit/s
95th percentile per-packet one-way delay: 3581.895 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 3.80 Mbit/s
95th percentile per-packet one-way delay: 19.909 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 2.01 Mbit/s
95th percentile per-packet one-way delay: 19.310 ms
Loss rate: 0.00%

Run 3: Report of PCC — Data Link

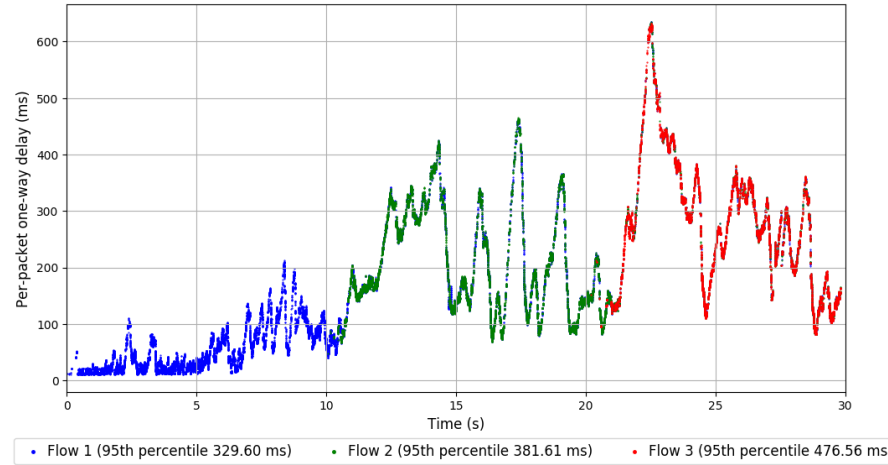
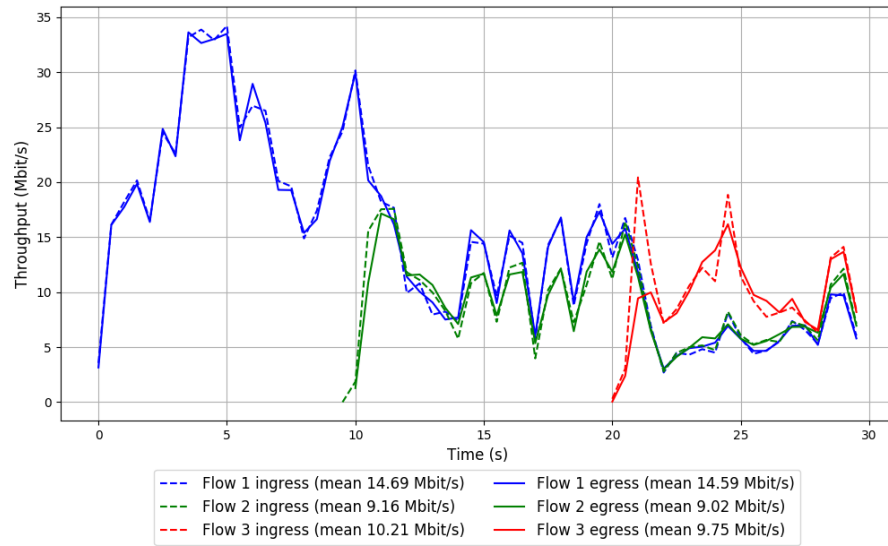


Run 1: Statistics of QUIC Cubic

Start at: 2017-12-20 19:00:31
End at: 2017-12-20 19:01:01
Local clock offset: 0.596 ms
Remote clock offset: -2.575 ms

Below is generated by plot.py at 2017-12-20 19:41:51
Datalink statistics
-- Total of 3 flows:
Average throughput: 23.72 Mbit/s
95th percentile per-packet one-way delay: 374.885 ms
Loss rate: 1.59%
-- Flow 1:
Average throughput: 14.59 Mbit/s
95th percentile per-packet one-way delay: 329.601 ms
Loss rate: 0.62%
-- Flow 2:
Average throughput: 9.02 Mbit/s
95th percentile per-packet one-way delay: 381.611 ms
Loss rate: 1.62%
-- Flow 3:
Average throughput: 9.75 Mbit/s
95th percentile per-packet one-way delay: 476.555 ms
Loss rate: 5.82%

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2017-12-20 19:18:29

End at: 2017-12-20 19:18:59

Local clock offset: 0.482 ms

Remote clock offset: -2.33 ms

Below is generated by plot.py at 2017-12-20 19:41:58

Datalink statistics

-- Total of 3 flows:

Average throughput: 29.38 Mbit/s

95th percentile per-packet one-way delay: 278.075 ms

Loss rate: 0.77%

-- Flow 1:

Average throughput: 20.81 Mbit/s

95th percentile per-packet one-way delay: 259.295 ms

Loss rate: 0.43%

-- Flow 2:

Average throughput: 9.92 Mbit/s

95th percentile per-packet one-way delay: 300.297 ms

Loss rate: 1.13%

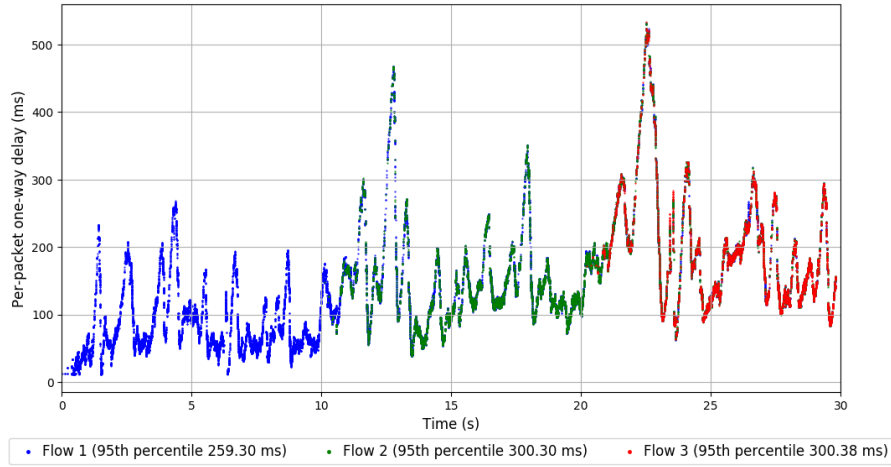
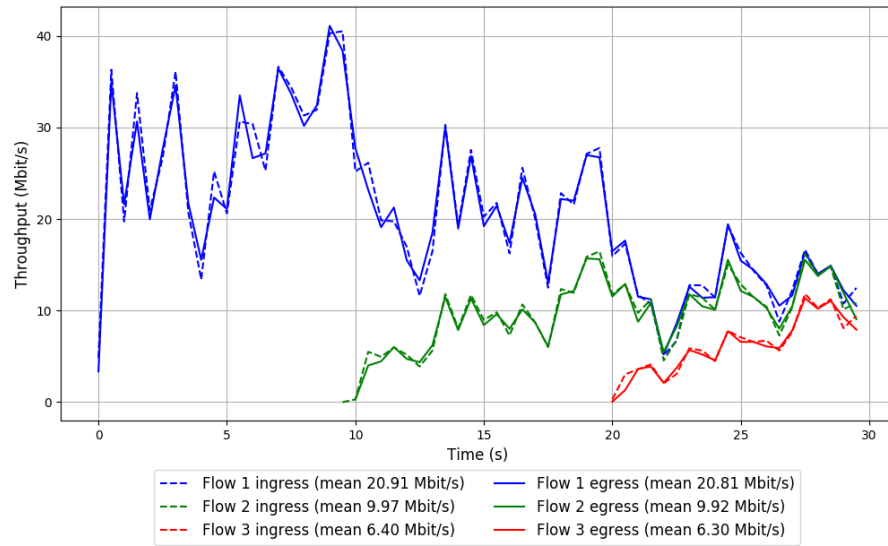
-- Flow 3:

Average throughput: 6.30 Mbit/s

95th percentile per-packet one-way delay: 300.385 ms

Loss rate: 3.02%

Run 2: Report of QUIC Cubic — Data Link

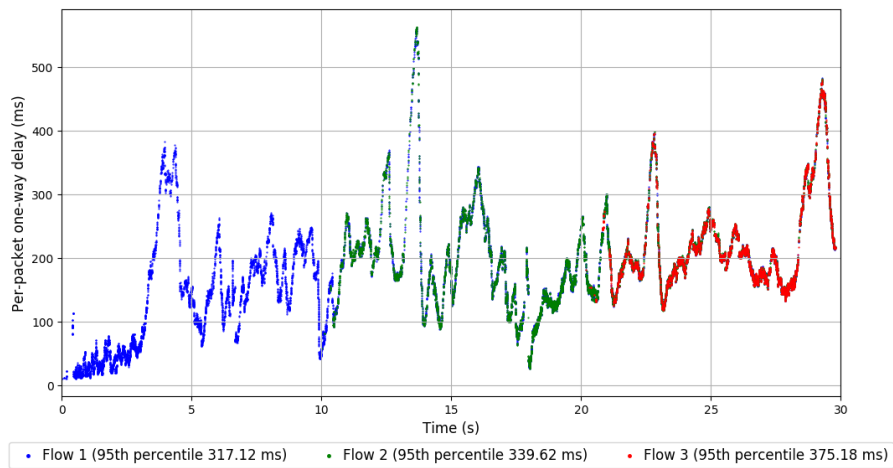
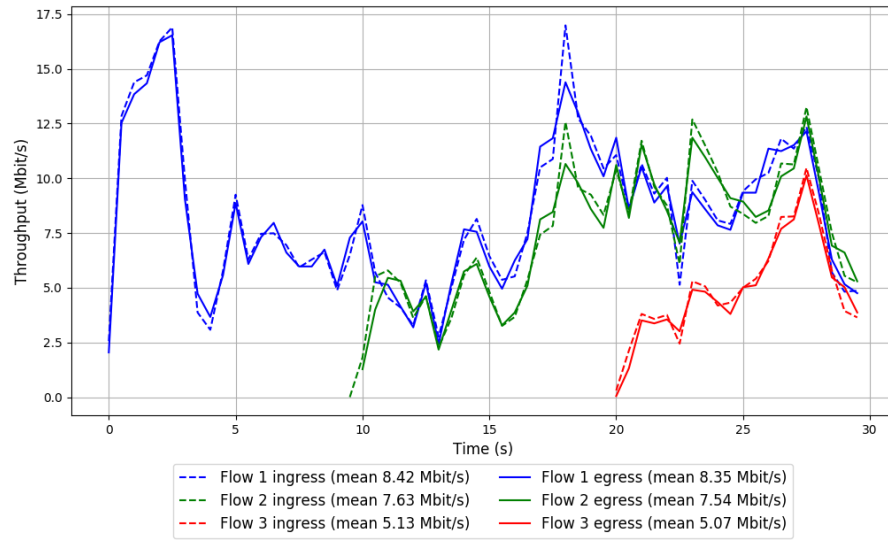


Run 3: Statistics of QUIC Cubic

Start at: 2017-12-20 19:36:26
End at: 2017-12-20 19:36:56
Local clock offset: 0.372 ms
Remote clock offset: -2.055 ms

Below is generated by plot.py at 2017-12-20 19:41:58
Datalink statistics
-- Total of 3 flows:
Average throughput: 14.99 Mbit/s
95th percentile per-packet one-way delay: 332.520 ms
Loss rate: 1.27%
-- Flow 1:
Average throughput: 8.35 Mbit/s
95th percentile per-packet one-way delay: 317.115 ms
Loss rate: 0.84%
-- Flow 2:
Average throughput: 7.54 Mbit/s
95th percentile per-packet one-way delay: 339.618 ms
Loss rate: 1.45%
-- Flow 3:
Average throughput: 5.07 Mbit/s
95th percentile per-packet one-way delay: 375.182 ms
Loss rate: 2.85%

Run 3: Report of QUIC Cubic — Data Link

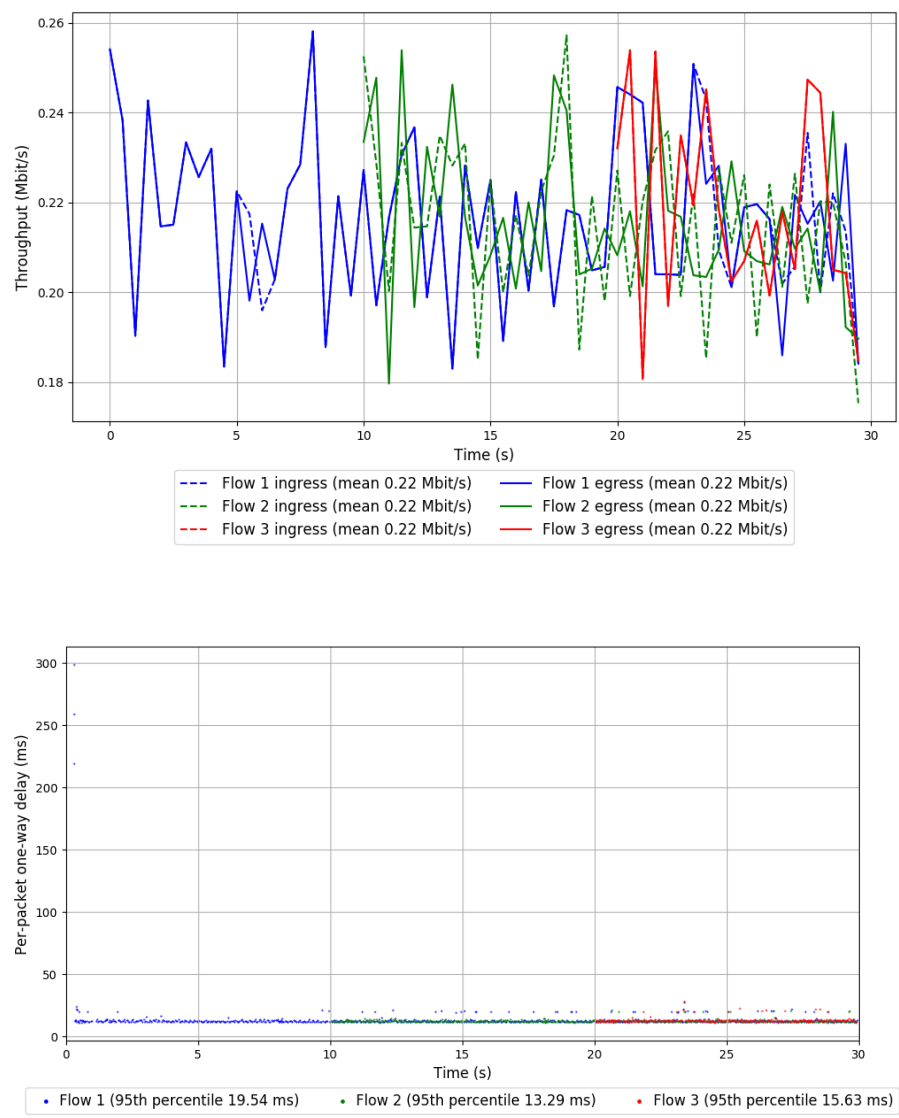


```
Run 1: Statistics of SReAM

Start at: 2017-12-20 18:48:32
End at: 2017-12-20 18:49:02
Local clock offset: 0.68 ms
Remote clock offset: -2.522 ms

# Below is generated by plot.py at 2017-12-20 19:41:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 15.115 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 19.540 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.285 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 15.631 ms
Loss rate: 0.00%
```

Run 1: Report of SCRaM — Data Link

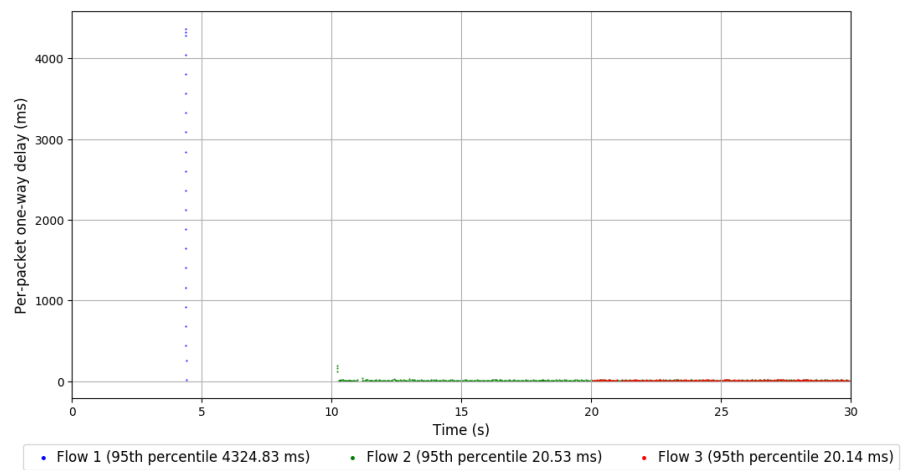
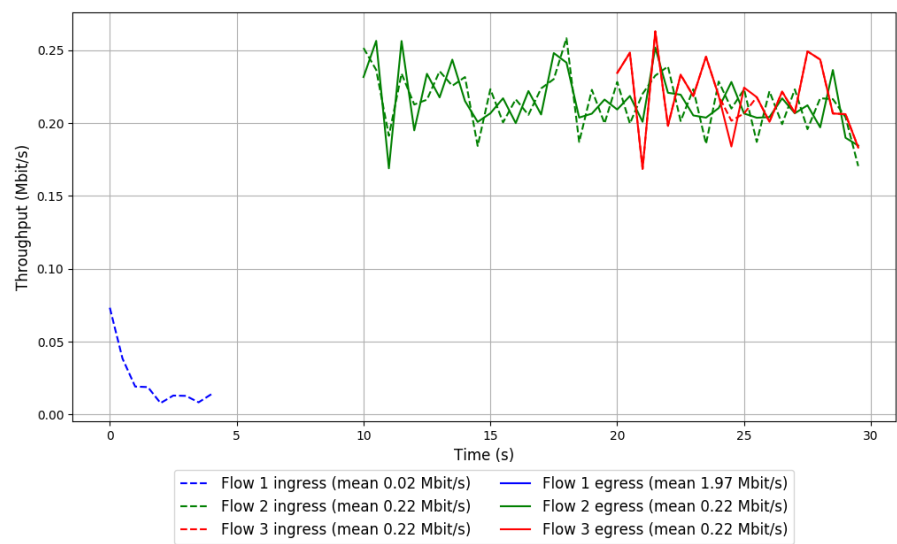


Run 2: Statistics of SReAM

Start at: 2017-12-20 19:06:30
End at: 2017-12-20 19:07:00
Local clock offset: 0.495 ms
Remote clock offset: -2.343 ms

Below is generated by plot.py at 2017-12-20 19:41:58
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 21.398 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.97 Mbit/s
95th percentile per-packet one-way delay: 4324.831 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.526 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.139 ms
Loss rate: 0.00%

Run 2: Report of SReAM — Data Link

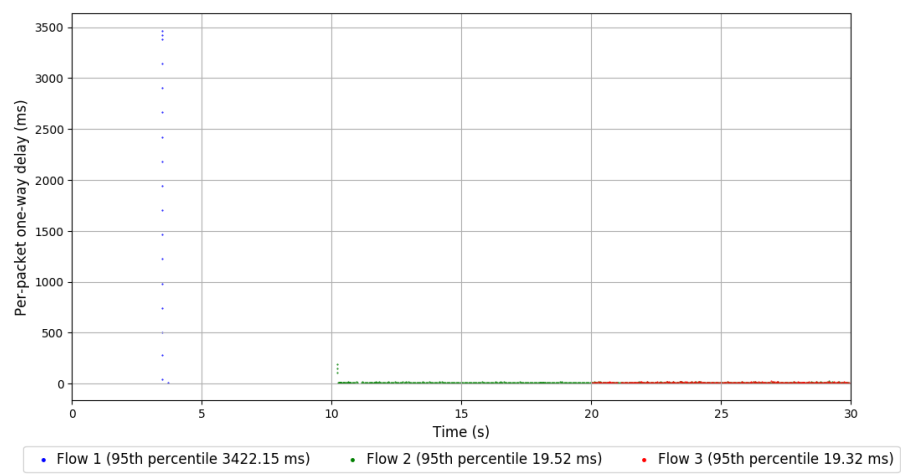
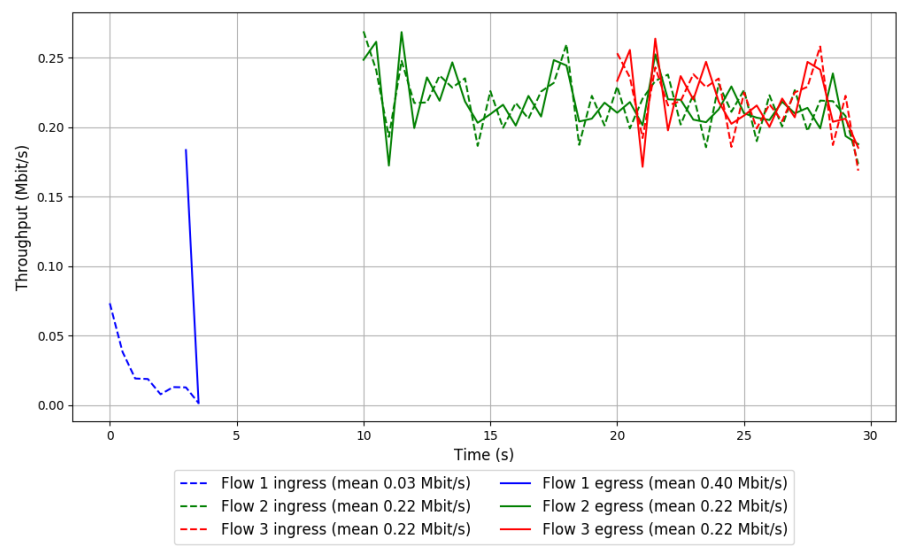


Run 3: Statistics of SReAM

Start at: 2017-12-20 19:24:27
End at: 2017-12-20 19:24:57
Local clock offset: 0.324 ms
Remote clock offset: -2.293 ms

Below is generated by plot.py at 2017-12-20 19:41:58
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 20.126 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 3422.152 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 19.519 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 19.322 ms
Loss rate: 0.00%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of WebRTC media

Start at: 2017-12-20 19:01:43

End at: 2017-12-20 19:02:13

Local clock offset: 0.618 ms

Remote clock offset: -2.56 ms

Below is generated by plot.py at 2017-12-20 19:41:58

Datalink statistics

-- Total of 3 flows:

Average throughput: 4.97 Mbit/s

95th percentile per-packet one-way delay: 22.107 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 2.50 Mbit/s

95th percentile per-packet one-way delay: 22.447 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 1.85 Mbit/s

95th percentile per-packet one-way delay: 21.497 ms

Loss rate: 0.00%

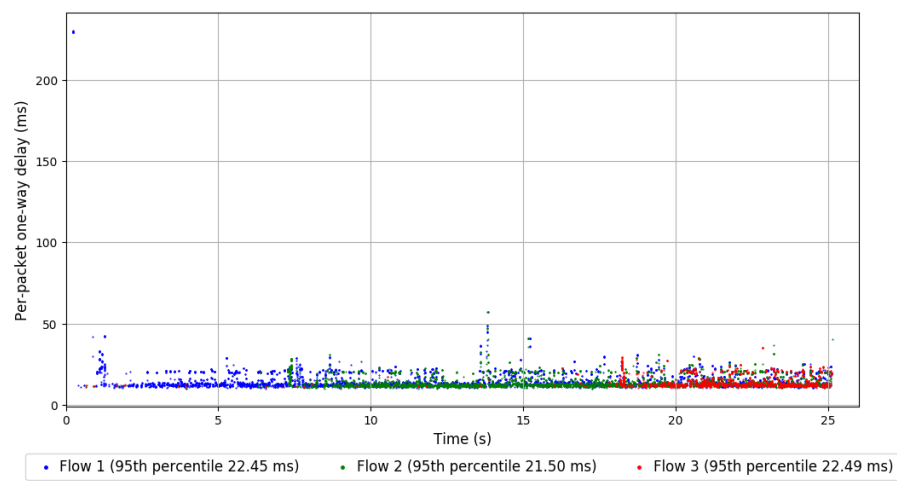
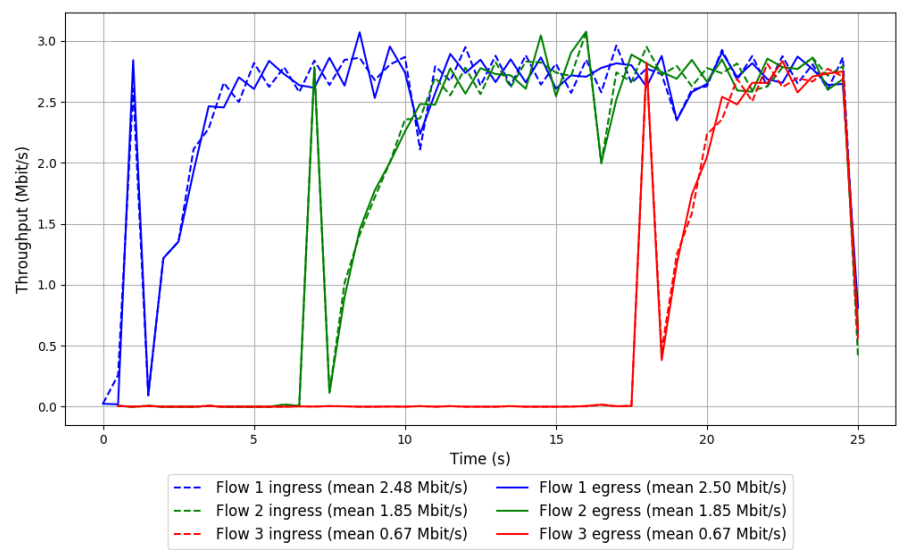
-- Flow 3:

Average throughput: 0.67 Mbit/s

95th percentile per-packet one-way delay: 22.493 ms

Loss rate: 0.00%

Run 1: Report of WebRTC media — Data Link

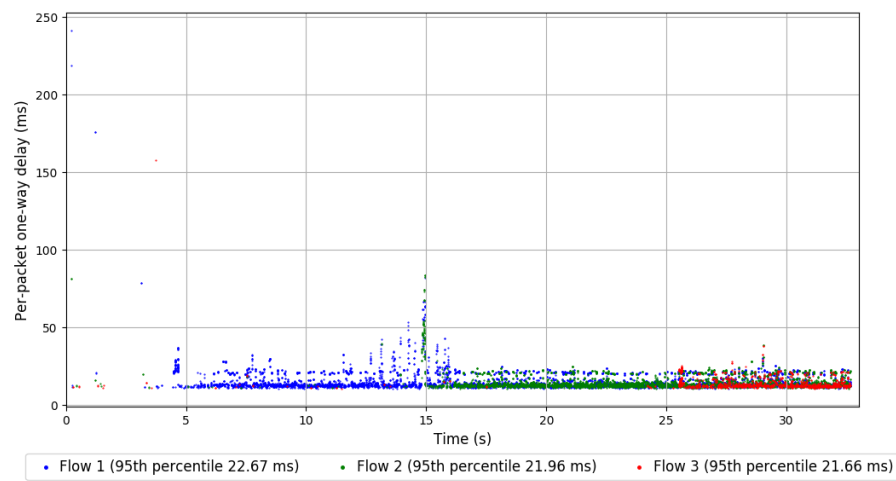
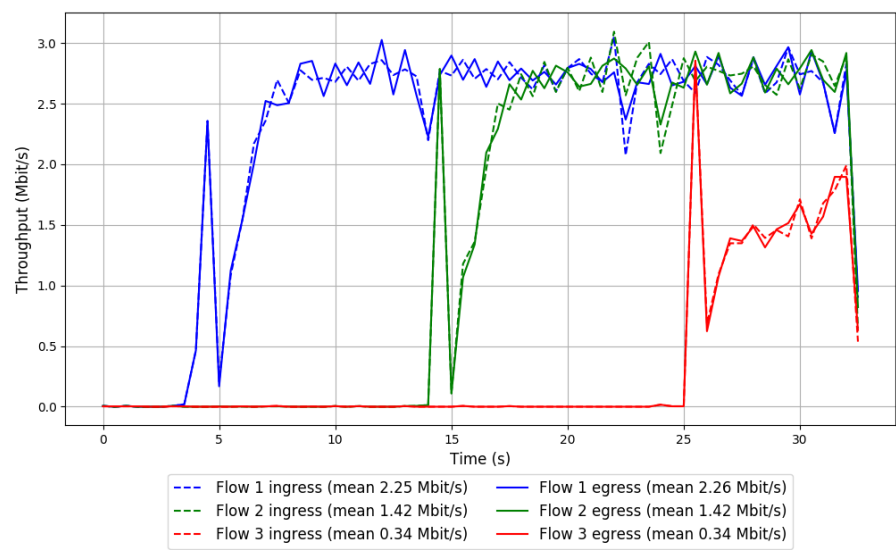


Run 2: Statistics of WebRTC media

Start at: 2017-12-20 19:19:41
End at: 2017-12-20 19:20:11
Local clock offset: 0.429 ms
Remote clock offset: -2.227 ms

Below is generated by plot.py at 2017-12-20 19:41:58
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.03 Mbit/s
95th percentile per-packet one-way delay: 22.276 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 22.666 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 21.956 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 21.658 ms
Loss rate: 0.00%

Run 2: Report of WebRTC media — Data Link

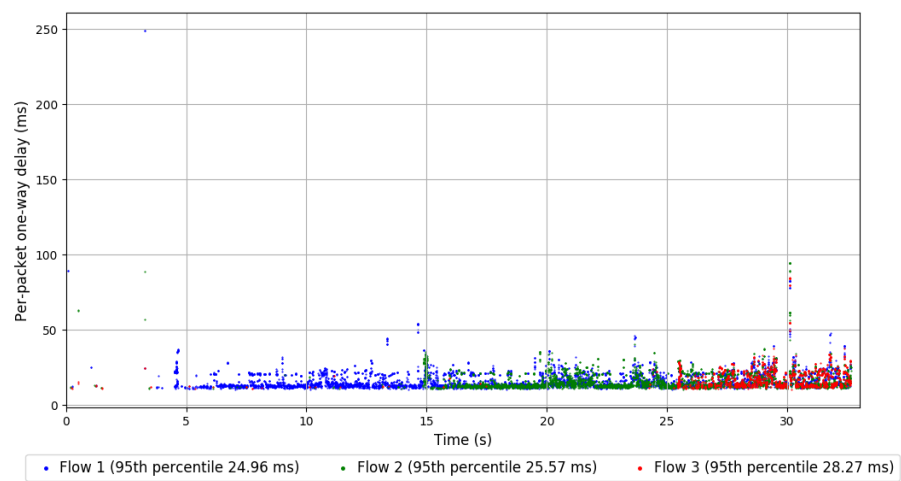
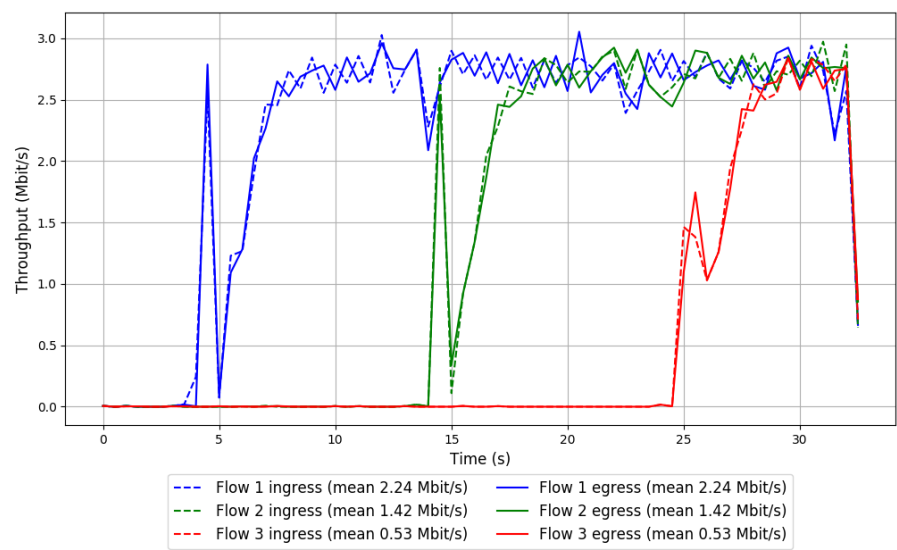


Run 3: Statistics of WebRTC media

Start at: 2017-12-20 19:37:37
End at: 2017-12-20 19:38:07
Local clock offset: 0.344 ms
Remote clock offset: -2.055 ms

Below is generated by plot.py at 2017-12-20 19:41:58
Datalink statistics
-- Total of 3 flows:
Average throughput: 4.18 Mbit/s
95th percentile per-packet one-way delay: 26.012 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.24 Mbit/s
95th percentile per-packet one-way delay: 24.965 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 25.568 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 28.267 ms
Loss rate: 0.00%

Run 3: Report of WebRTC media — Data Link

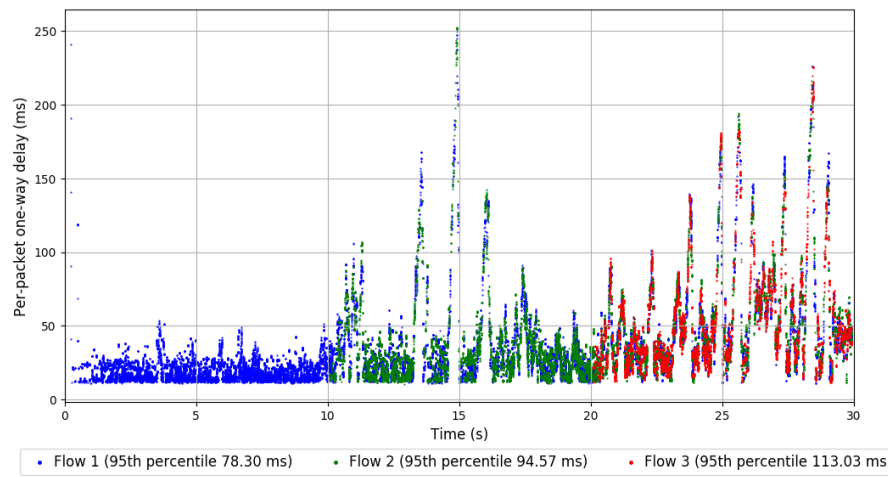
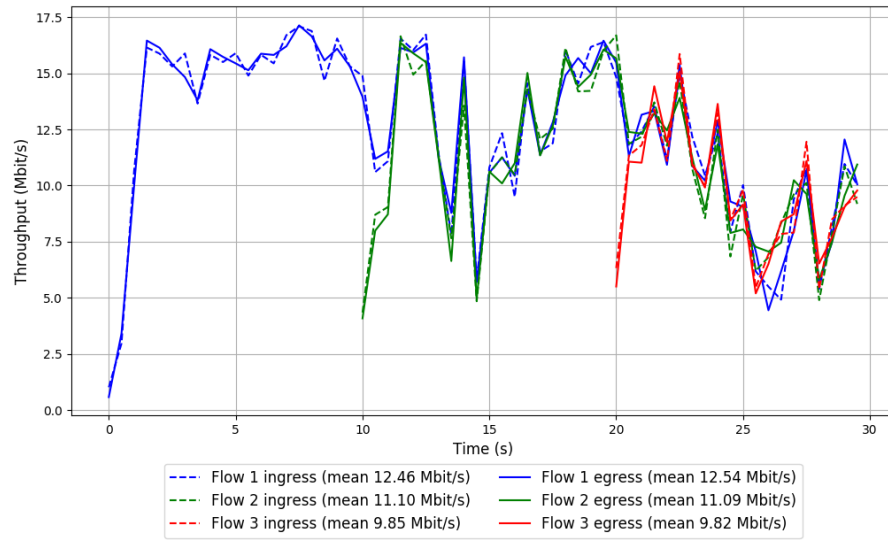


Run 1: Statistics of Sprout

Start at: 2017-12-20 18:58:06
End at: 2017-12-20 18:58:36
Local clock offset: 0.569 ms
Remote clock offset: -2.624 ms

Below is generated by plot.py at 2017-12-20 19:42:08
Datalink statistics
-- Total of 3 flows:
Average throughput: 23.24 Mbit/s
95th percentile per-packet one-way delay: 90.087 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 12.54 Mbit/s
95th percentile per-packet one-way delay: 78.302 ms
Loss rate: 0.11%
-- Flow 2:
Average throughput: 11.09 Mbit/s
95th percentile per-packet one-way delay: 94.569 ms
Loss rate: 0.01%
-- Flow 3:
Average throughput: 9.82 Mbit/s
95th percentile per-packet one-way delay: 113.026 ms
Loss rate: 0.39%

Run 1: Report of Sprout — Data Link

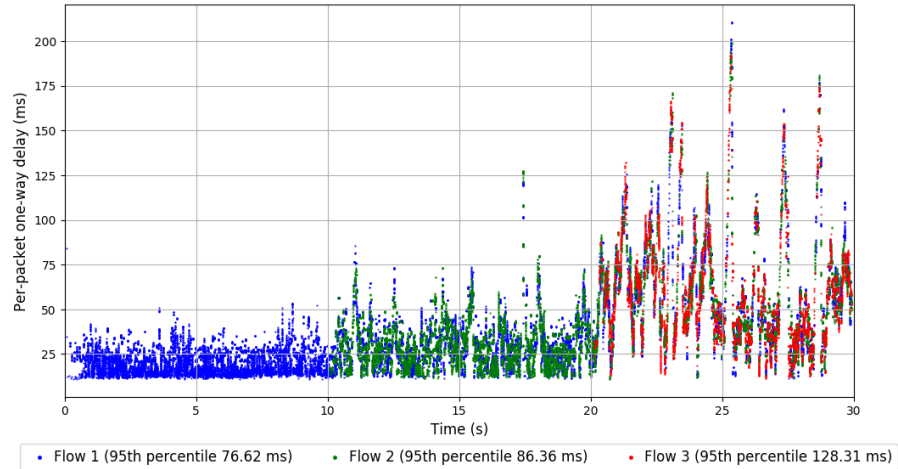
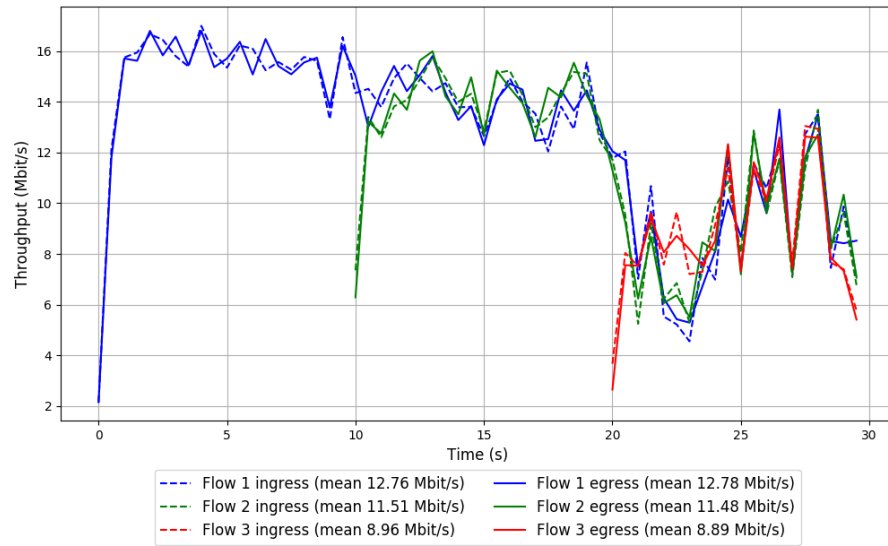


Run 2: Statistics of Sprout

Start at: 2017-12-20 19:16:05
End at: 2017-12-20 19:16:35
Local clock offset: 0.394 ms
Remote clock offset: -2.261 ms

Below is generated by plot.py at 2017-12-20 19:42:11
Datalink statistics
-- Total of 3 flows:
Average throughput: 23.37 Mbit/s
95th percentile per-packet one-way delay: 89.044 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 12.78 Mbit/s
95th percentile per-packet one-way delay: 76.617 ms
Loss rate: 0.06%
-- Flow 2:
Average throughput: 11.48 Mbit/s
95th percentile per-packet one-way delay: 86.362 ms
Loss rate: 0.11%
-- Flow 3:
Average throughput: 8.89 Mbit/s
95th percentile per-packet one-way delay: 128.305 ms
Loss rate: 0.72%

Run 2: Report of Sprout — Data Link

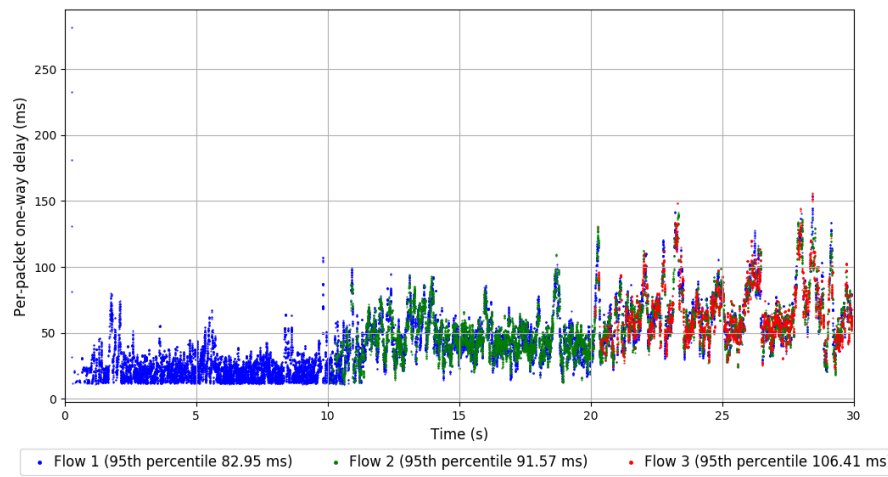
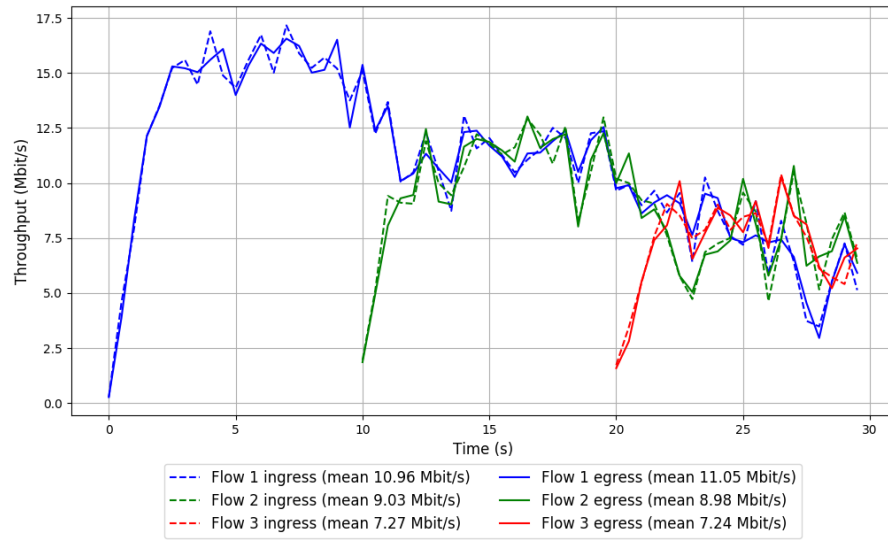


Run 3: Statistics of Sprout

Start at: 2017-12-20 19:34:02
End at: 2017-12-20 19:34:32
Local clock offset: 0.373 ms
Remote clock offset: -2.158 ms

```
# Below is generated by plot.py at 2017-12-20 19:42:11
# Datalink statistics
-- Total of 3 flows:
Average throughput: 19.48 Mbit/s
95th percentile per-packet one-way delay: 90.655 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 11.05 Mbit/s
95th percentile per-packet one-way delay: 82.949 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 8.98 Mbit/s
95th percentile per-packet one-way delay: 91.571 ms
Loss rate: 0.37%
-- Flow 3:
Average throughput: 7.24 Mbit/s
95th percentile per-packet one-way delay: 106.413 ms
Loss rate: 0.21%
```

Run 3: Report of Sprout — Data Link

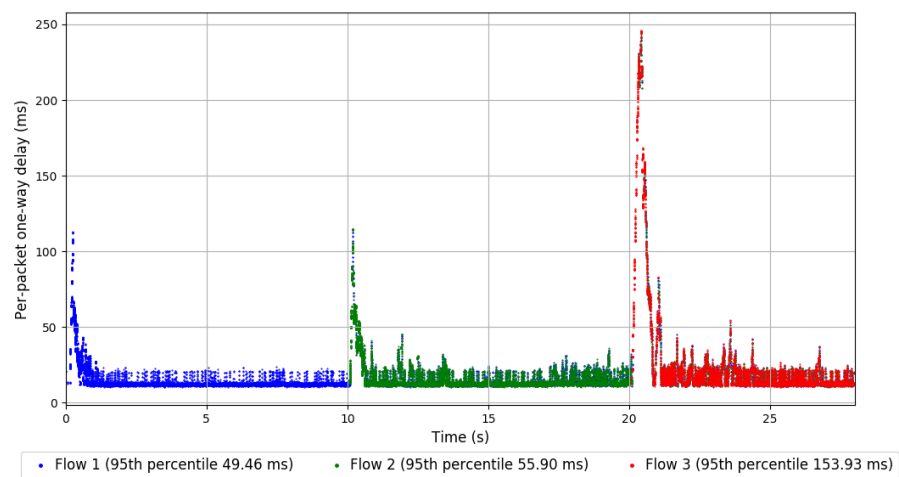
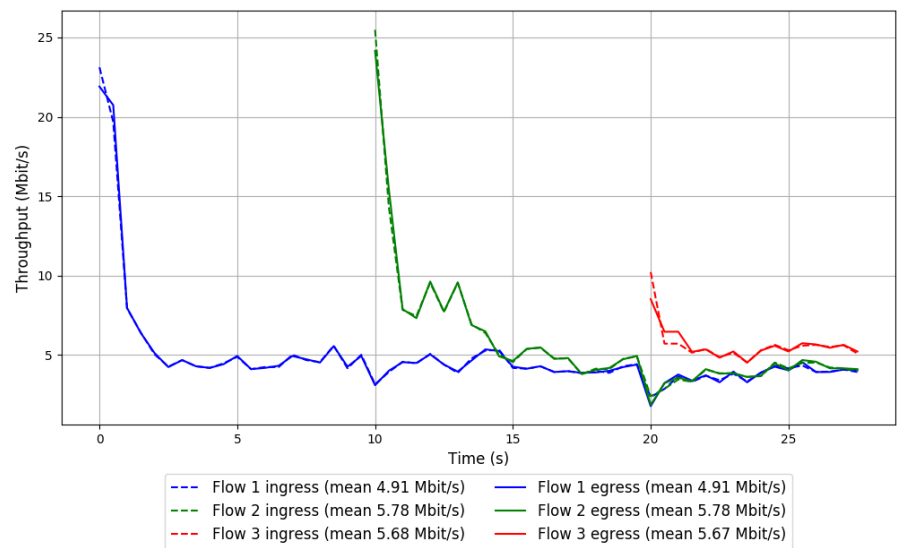


```
Run 1: Statistics of TaoVA-100x

Start at: 2017-12-20 18:55:43
End at: 2017-12-20 18:56:13
Local clock offset: 0.638 ms
Remote clock offset: -2.681 ms

# Below is generated by plot.py at 2017-12-20 19:42:11
# Datalink statistics
-- Total of 3 flows:
Average throughput: 10.24 Mbit/s
95th percentile per-packet one-way delay: 58.085 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 4.91 Mbit/s
95th percentile per-packet one-way delay: 49.460 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 5.78 Mbit/s
95th percentile per-packet one-way delay: 55.895 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 5.67 Mbit/s
95th percentile per-packet one-way delay: 153.925 ms
Loss rate: 0.00%
```

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

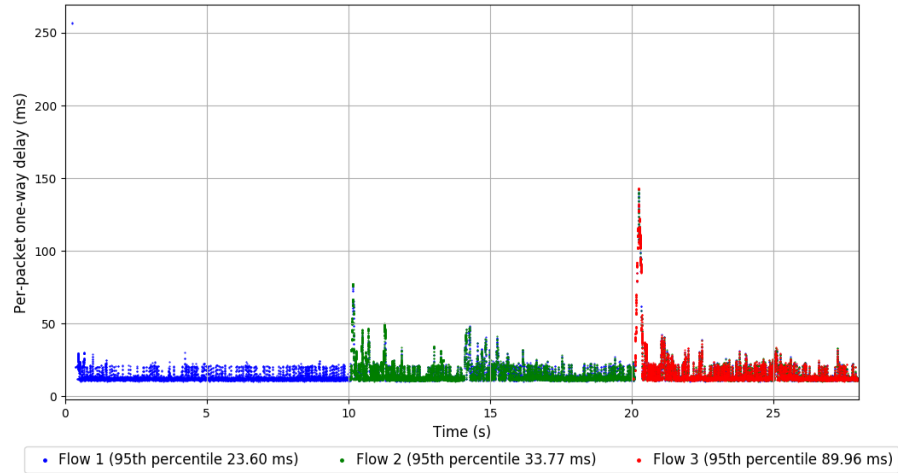
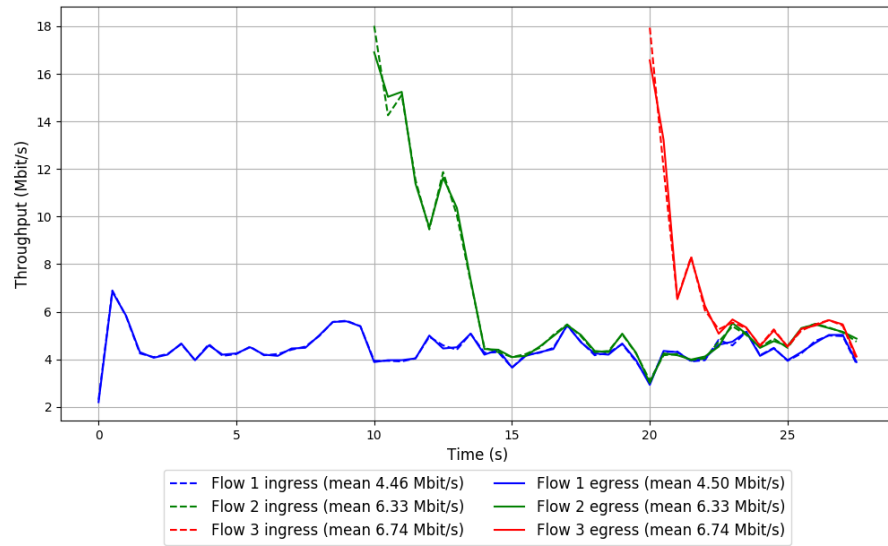


Run 2: Statistics of TaoVA-100x

Start at: 2017-12-20 19:13:42
End at: 2017-12-20 19:14:12
Local clock offset: 0.523 ms
Remote clock offset: -2.221 ms

Below is generated by plot.py at 2017-12-20 19:42:11
Datalink statistics
-- Total of 3 flows:
Average throughput: 10.53 Mbit/s
95th percentile per-packet one-way delay: 32.449 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 4.50 Mbit/s
95th percentile per-packet one-way delay: 23.604 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 6.33 Mbit/s
95th percentile per-packet one-way delay: 33.765 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 6.74 Mbit/s
95th percentile per-packet one-way delay: 89.962 ms
Loss rate: 0.00%

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

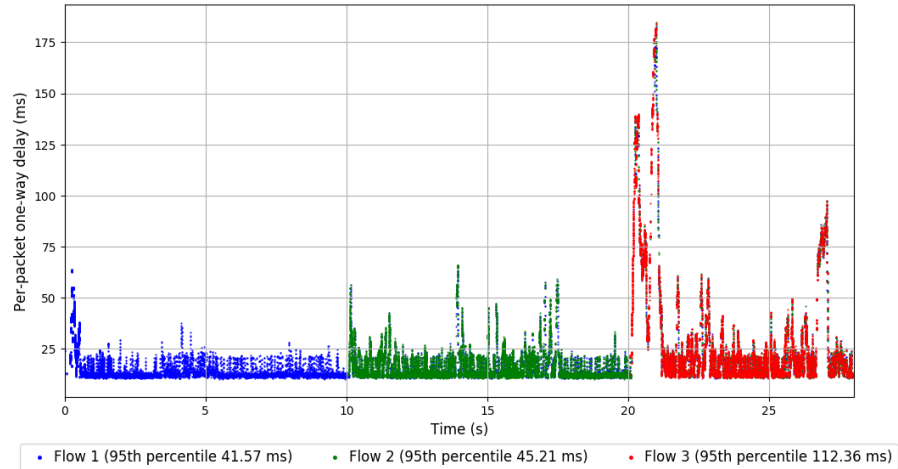
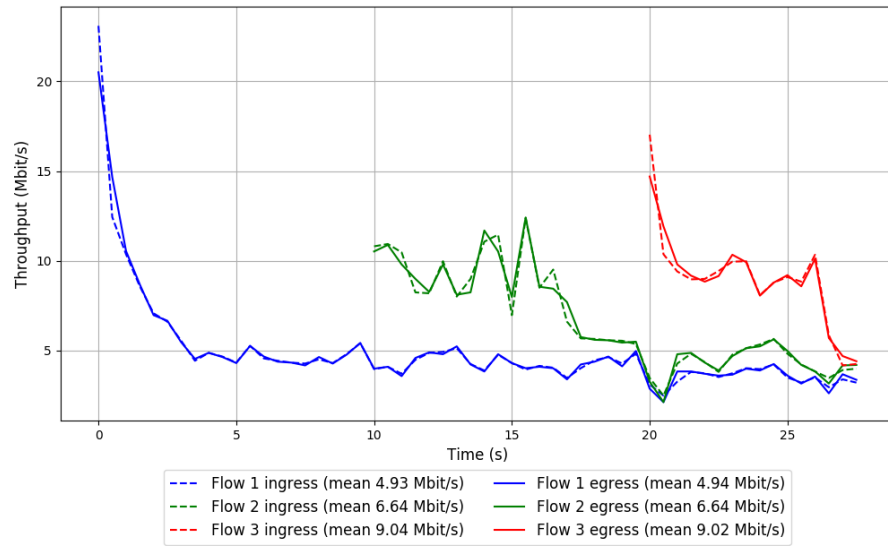


Run 3: Statistics of TaoVA-100x

Start at: 2017-12-20 19:31:38
End at: 2017-12-20 19:32:08
Local clock offset: 0.376 ms
Remote clock offset: -2.201 ms

Below is generated by plot.py at 2017-12-20 19:42:11
Datalink statistics
-- Total of 3 flows:
Average throughput: 11.77 Mbit/s
95th percentile per-packet one-way delay: 65.892 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 4.94 Mbit/s
95th percentile per-packet one-way delay: 41.569 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 6.64 Mbit/s
95th percentile per-packet one-way delay: 45.214 ms
Loss rate: 0.01%
-- Flow 3:
Average throughput: 9.02 Mbit/s
95th percentile per-packet one-way delay: 112.361 ms
Loss rate: 0.13%

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



Run 1: Statistics of TCP Vegas

Start at: 2017-12-20 18:47:20

End at: 2017-12-20 18:47:50

Local clock offset: 0.696 ms

Remote clock offset: -2.5 ms

Below is generated by plot.py at 2017-12-20 19:42:11

Datalink statistics

-- Total of 3 flows:

Average throughput: 4.42 Mbit/s

95th percentile per-packet one-way delay: 28.493 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 1.49 Mbit/s

95th percentile per-packet one-way delay: 25.667 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 1.68 Mbit/s

95th percentile per-packet one-way delay: 24.247 ms

Loss rate: 0.00%

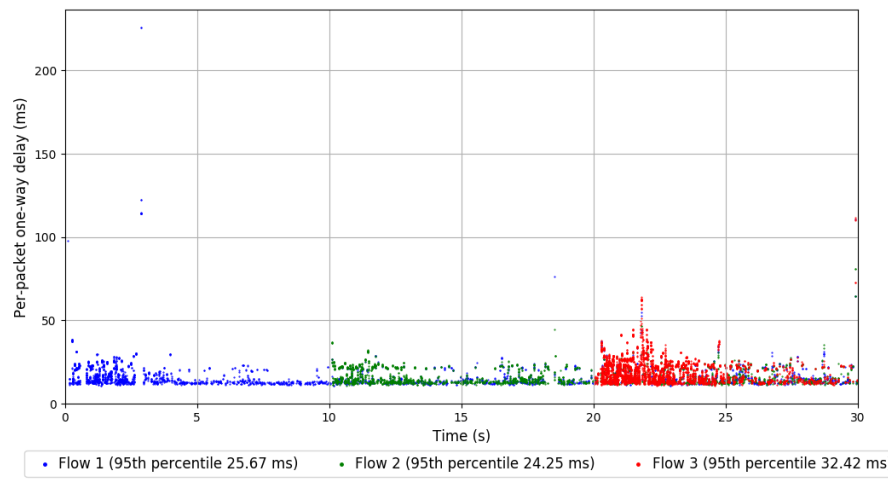
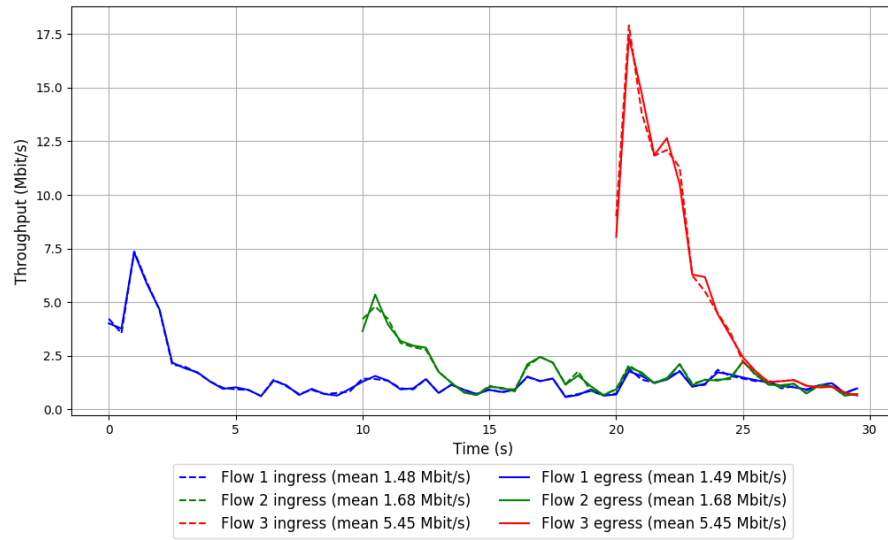
-- Flow 3:

Average throughput: 5.45 Mbit/s

95th percentile per-packet one-way delay: 32.418 ms

Loss rate: 0.00%

Run 1: Report of TCP Vegas — Data Link

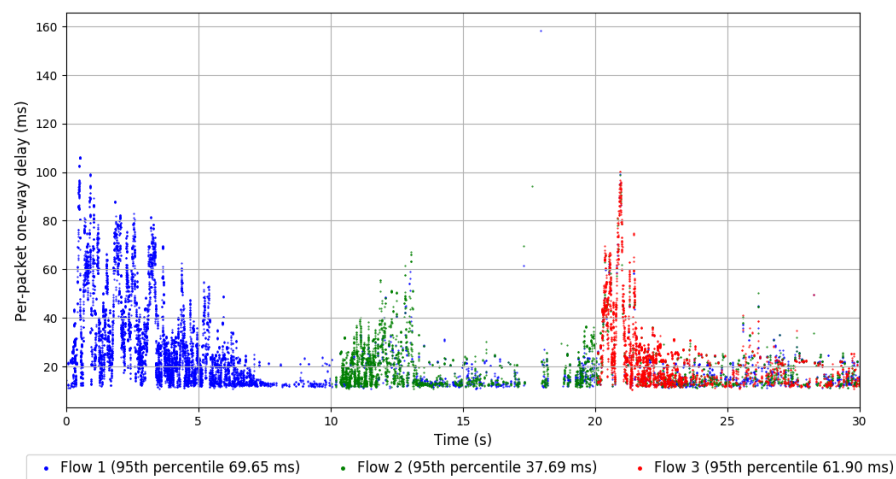
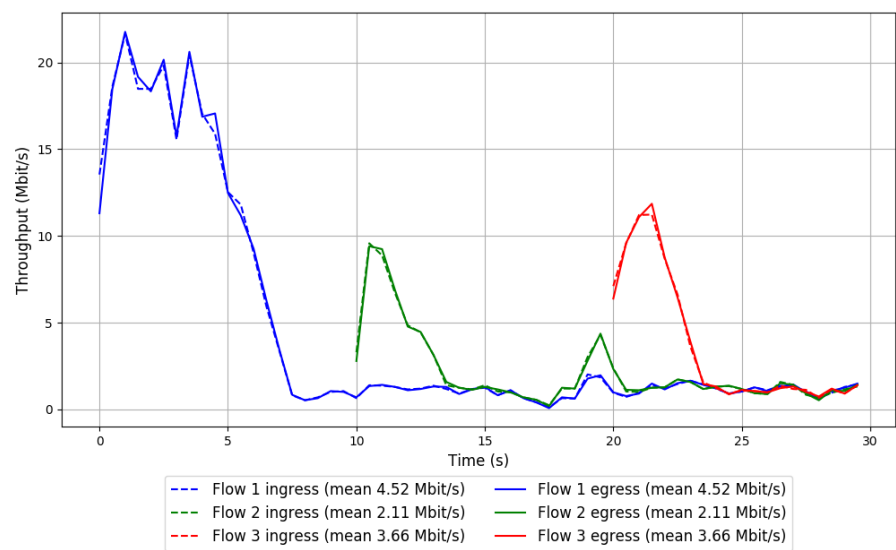


Run 2: Statistics of TCP Vegas

Start at: 2017-12-20 19:05:18
End at: 2017-12-20 19:05:48
Local clock offset: 0.582 ms
Remote clock offset: -2.369 ms

Below is generated by plot.py at 2017-12-20 19:42:11
Datalink statistics
-- Total of 3 flows:
Average throughput: 7.14 Mbit/s
95th percentile per-packet one-way delay: 67.026 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 4.52 Mbit/s
95th percentile per-packet one-way delay: 69.651 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.11 Mbit/s
95th percentile per-packet one-way delay: 37.685 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 3.66 Mbit/s
95th percentile per-packet one-way delay: 61.902 ms
Loss rate: 0.00%

Run 2: Report of TCP Vegas — Data Link

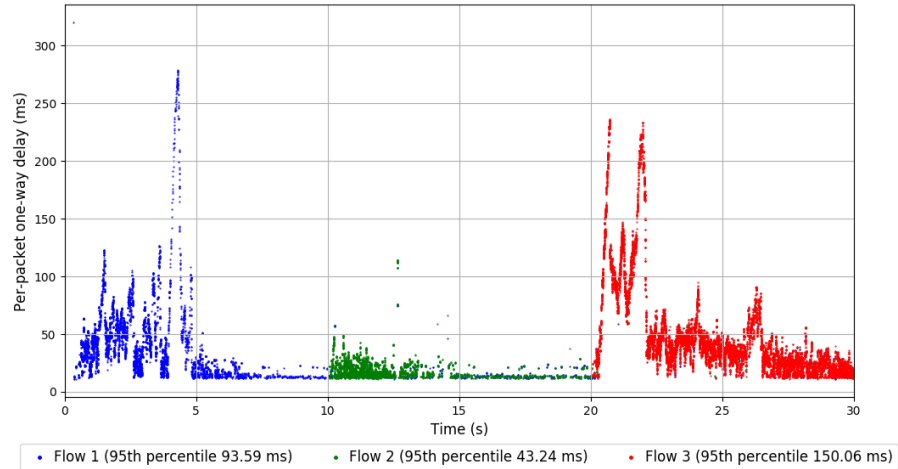
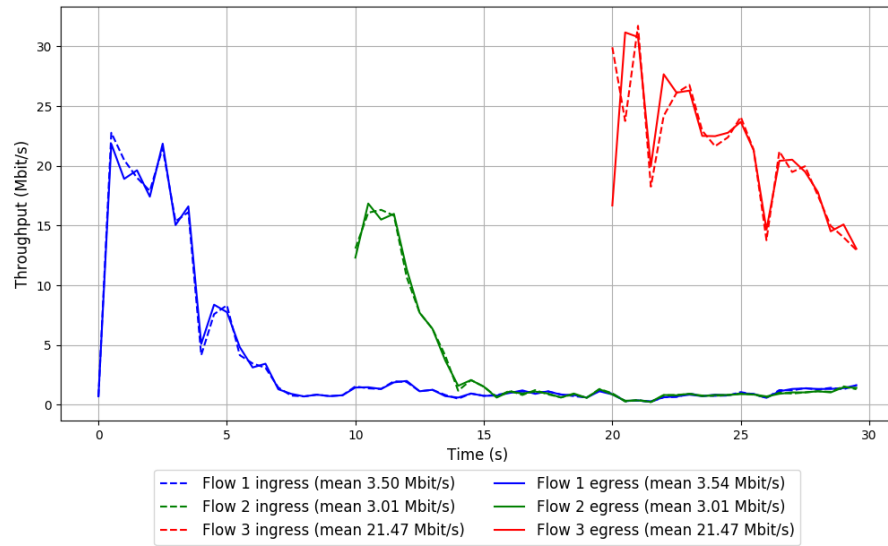


Run 3: Statistics of TCP Vegas

Start at: 2017-12-20 19:23:16
End at: 2017-12-20 19:23:46
Local clock offset: 0.45 ms
Remote clock offset: -2.153 ms

Below is generated by plot.py at 2017-12-20 19:42:15
Datalink statistics
-- Total of 3 flows:
Average throughput: 12.76 Mbit/s
95th percentile per-packet one-way delay: 124.681 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 3.54 Mbit/s
95th percentile per-packet one-way delay: 93.589 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 3.01 Mbit/s
95th percentile per-packet one-way delay: 43.243 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 21.47 Mbit/s
95th percentile per-packet one-way delay: 150.063 ms
Loss rate: 0.01%

Run 3: Report of TCP Vegas — Data Link

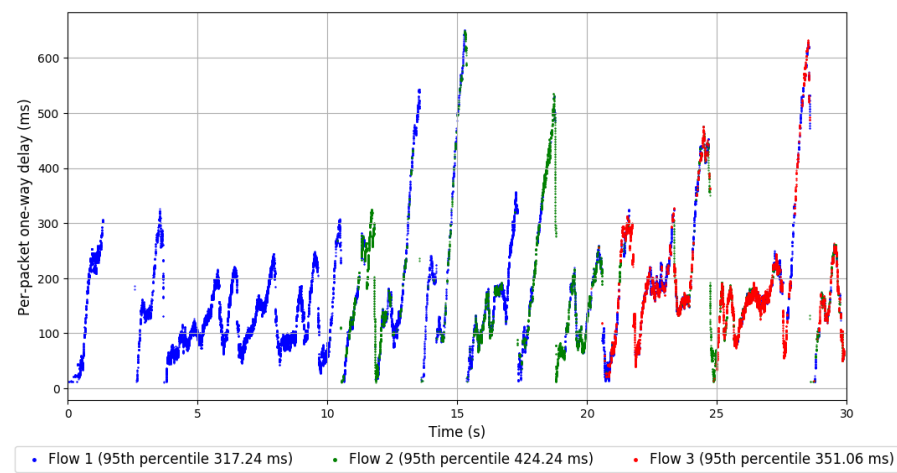
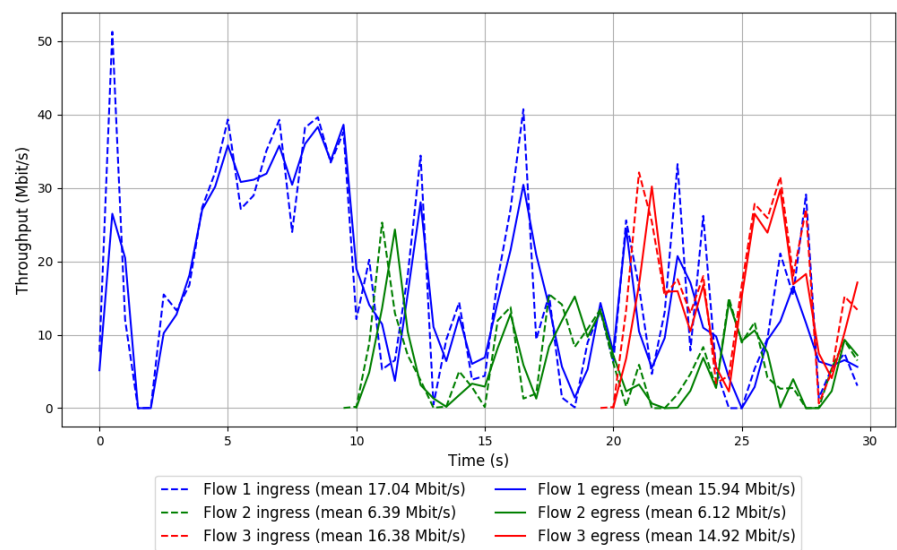


Run 1: Statistics of Verus

Start at: 2017-12-20 18:50:54
End at: 2017-12-20 18:51:24
Local clock offset: 0.657 ms
Remote clock offset: -2.644 ms

Below is generated by plot.py at 2017-12-20 19:42:28
Datalink statistics
-- Total of 3 flows:
Average throughput: 24.86 Mbit/s
95th percentile per-packet one-way delay: 351.888 ms
Loss rate: 6.95%
-- Flow 1:
Average throughput: 15.94 Mbit/s
95th percentile per-packet one-way delay: 317.237 ms
Loss rate: 6.45%
-- Flow 2:
Average throughput: 6.12 Mbit/s
95th percentile per-packet one-way delay: 424.244 ms
Loss rate: 4.50%
-- Flow 3:
Average throughput: 14.92 Mbit/s
95th percentile per-packet one-way delay: 351.061 ms
Loss rate: 10.41%

Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2017-12-20 19:08:52

End at: 2017-12-20 19:09:22

Local clock offset: 0.552 ms

Remote clock offset: -2.38 ms

Below is generated by plot.py at 2017-12-20 19:42:45

Datalink statistics

-- Total of 3 flows:

Average throughput: 35.60 Mbit/s

95th percentile per-packet one-way delay: 236.606 ms

Loss rate: 18.57%

-- Flow 1:

Average throughput: 25.49 Mbit/s

95th percentile per-packet one-way delay: 219.110 ms

Loss rate: 14.91%

-- Flow 2:

Average throughput: 12.29 Mbit/s

95th percentile per-packet one-way delay: 254.591 ms

Loss rate: 23.53%

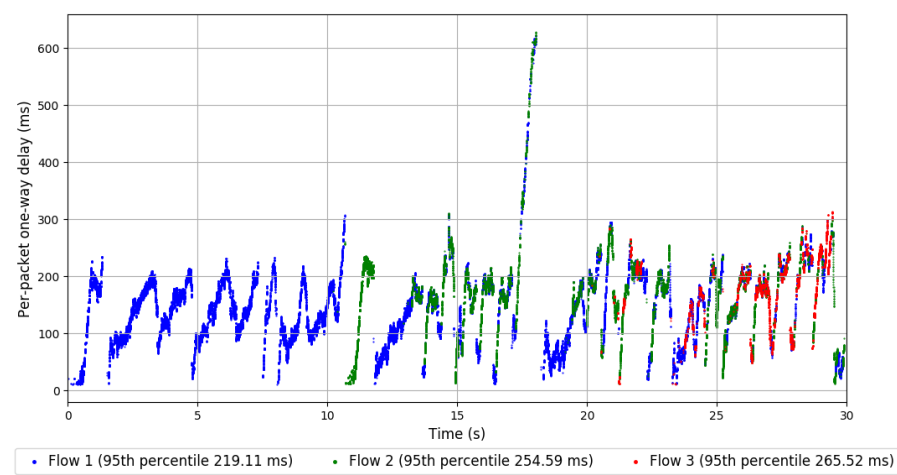
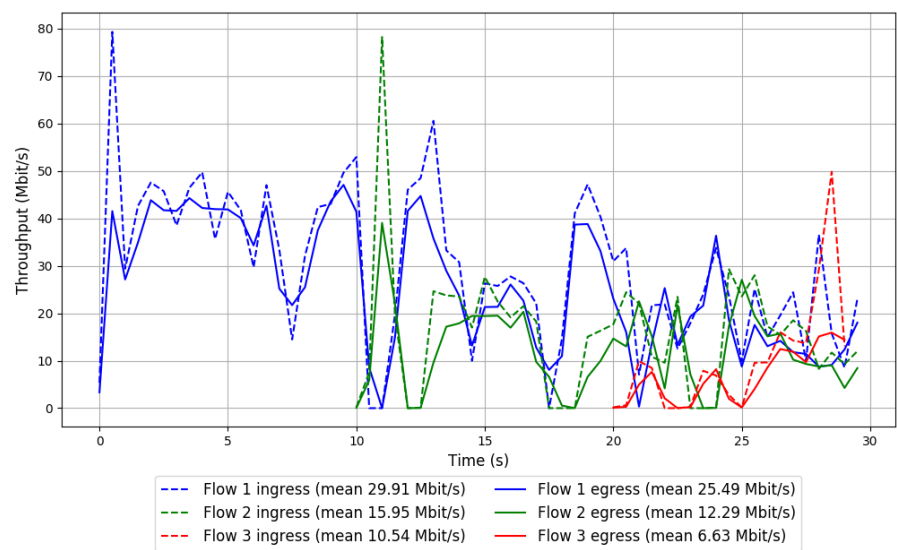
-- Flow 3:

Average throughput: 6.63 Mbit/s

95th percentile per-packet one-way delay: 265.522 ms

Loss rate: 36.15%

Run 2: Report of Verus — Data Link

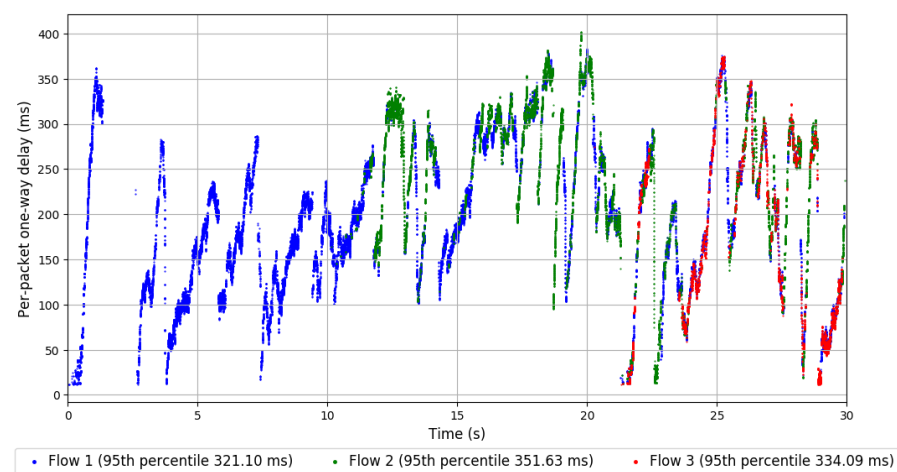
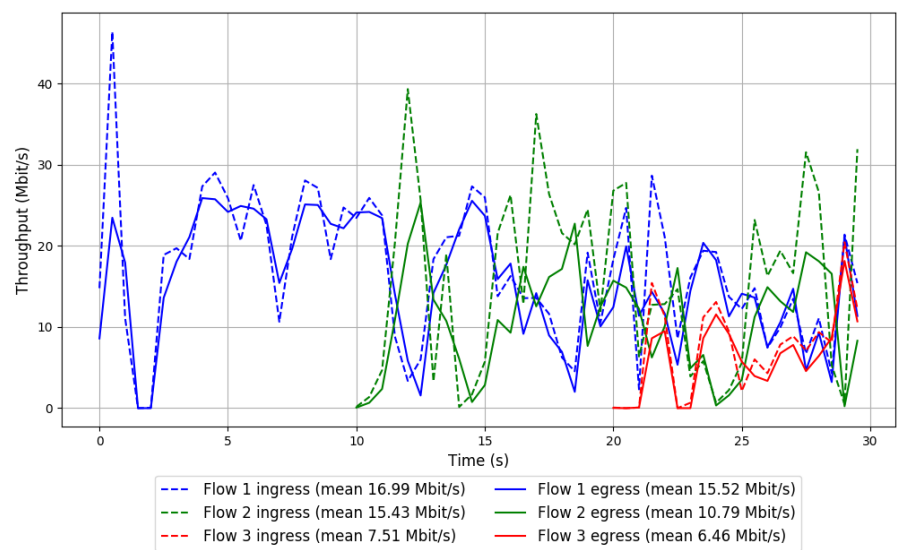


Run 3: Statistics of Verus

Start at: 2017-12-20 19:26:49
End at: 2017-12-20 19:27:19
Local clock offset: 0.307 ms
Remote clock offset: -2.276 ms

Below is generated by plot.py at 2017-12-20 19:42:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 24.70 Mbit/s
95th percentile per-packet one-way delay: 333.984 ms
Loss rate: 16.80%
-- Flow 1:
Average throughput: 15.52 Mbit/s
95th percentile per-packet one-way delay: 321.099 ms
Loss rate: 8.62%
-- Flow 2:
Average throughput: 10.79 Mbit/s
95th percentile per-packet one-way delay: 351.635 ms
Loss rate: 30.49%
-- Flow 3:
Average throughput: 6.46 Mbit/s
95th percentile per-packet one-way delay: 334.090 ms
Loss rate: 16.24%

Run 3: Report of Verus — Data Link

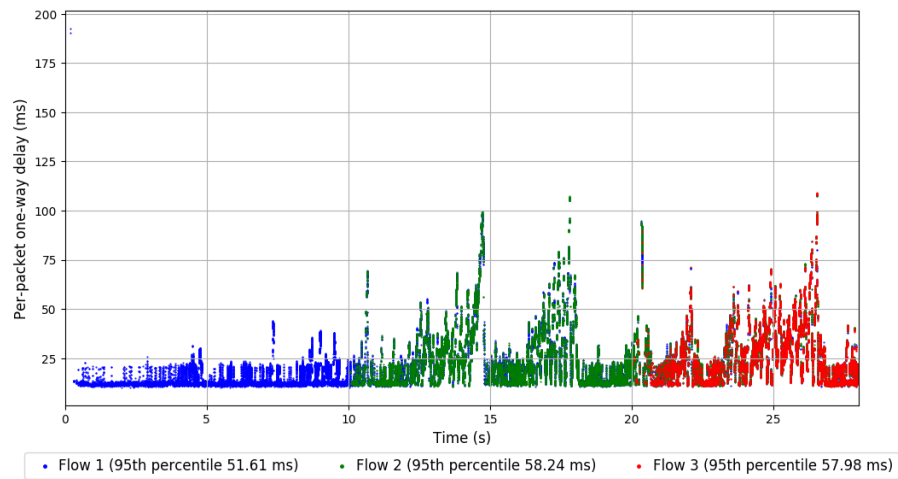
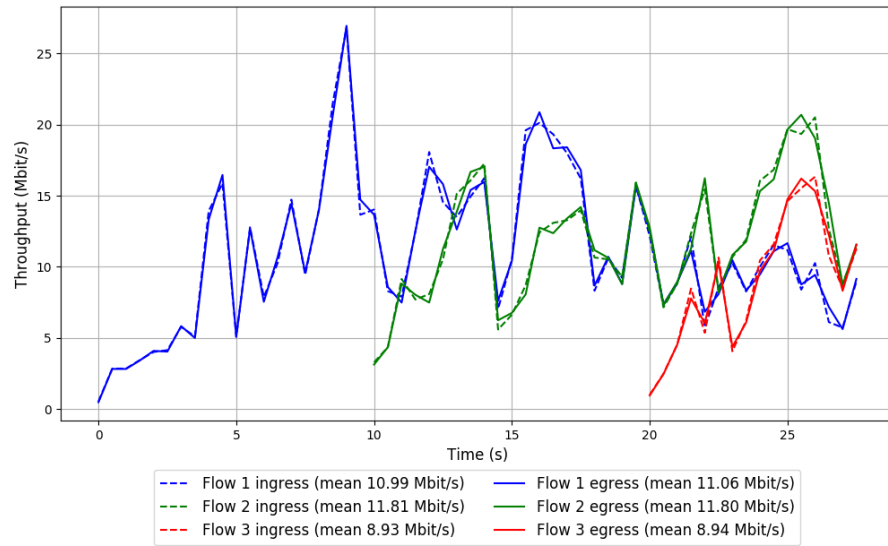


Run 1: Statistics of Copa

Start at: 2017-12-20 18:46:08
End at: 2017-12-20 18:46:38
Local clock offset: 0.695 ms
Remote clock offset: -2.563 ms

Below is generated by plot.py at 2017-12-20 19:42:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 21.24 Mbit/s
95th percentile per-packet one-way delay: 54.912 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 11.06 Mbit/s
95th percentile per-packet one-way delay: 51.611 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 11.80 Mbit/s
95th percentile per-packet one-way delay: 58.237 ms
Loss rate: 0.03%
-- Flow 3:
Average throughput: 8.94 Mbit/s
95th percentile per-packet one-way delay: 57.981 ms
Loss rate: 0.09%

Run 1: Report of Copa — Data Link

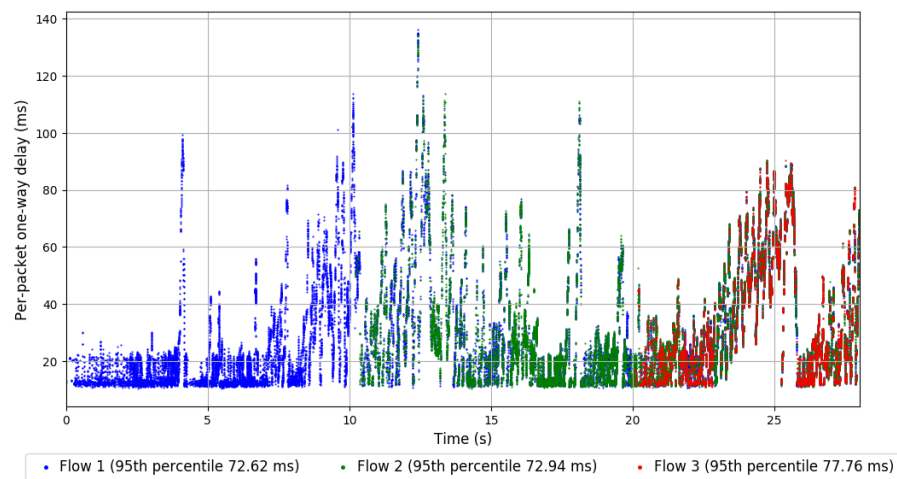
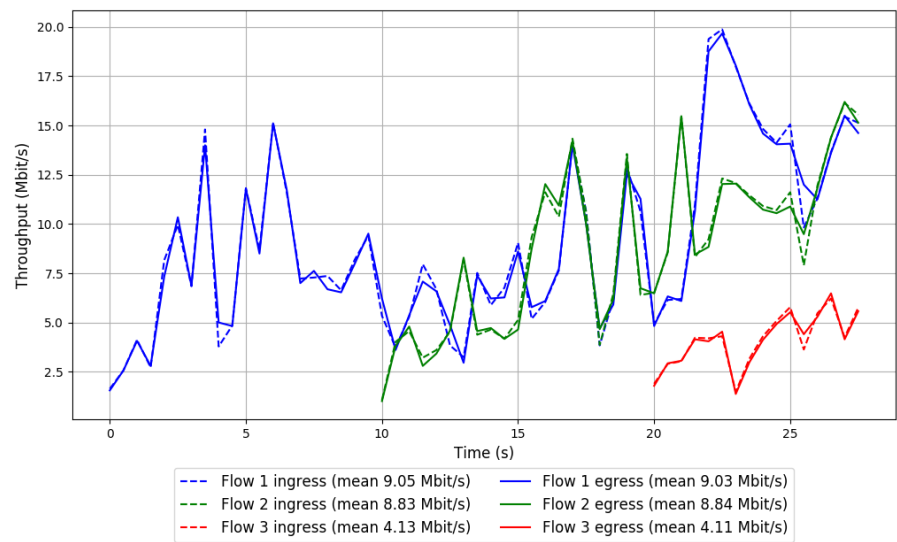


Run 2: Statistics of Copa

Start at: 2017-12-20 19:04:06
End at: 2017-12-20 19:04:36
Local clock offset: 0.492 ms
Remote clock offset: -2.383 ms

Below is generated by plot.py at 2017-12-20 19:42:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 15.85 Mbit/s
95th percentile per-packet one-way delay: 73.385 ms
Loss rate: 0.27%
-- Flow 1:
Average throughput: 9.03 Mbit/s
95th percentile per-packet one-way delay: 72.623 ms
Loss rate: 0.20%
-- Flow 2:
Average throughput: 8.84 Mbit/s
95th percentile per-packet one-way delay: 72.936 ms
Loss rate: 0.31%
-- Flow 3:
Average throughput: 4.11 Mbit/s
95th percentile per-packet one-way delay: 77.756 ms
Loss rate: 0.55%

Run 2: Report of Copa — Data Link

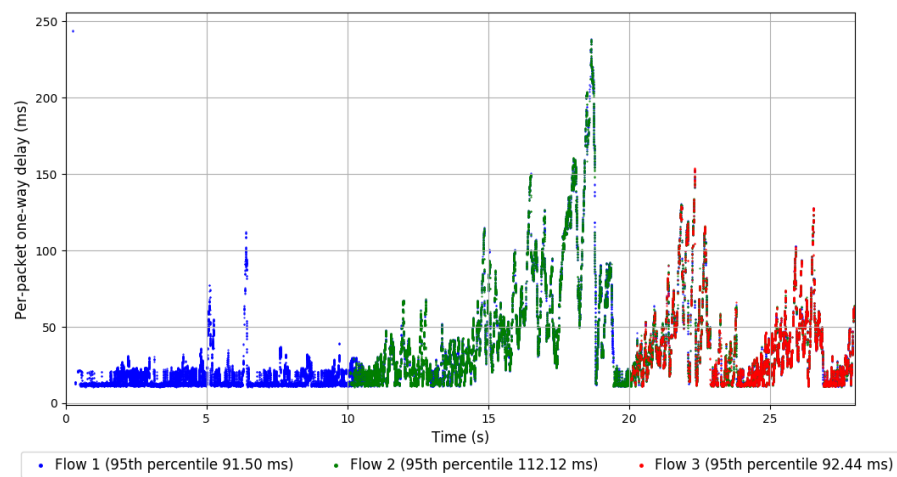
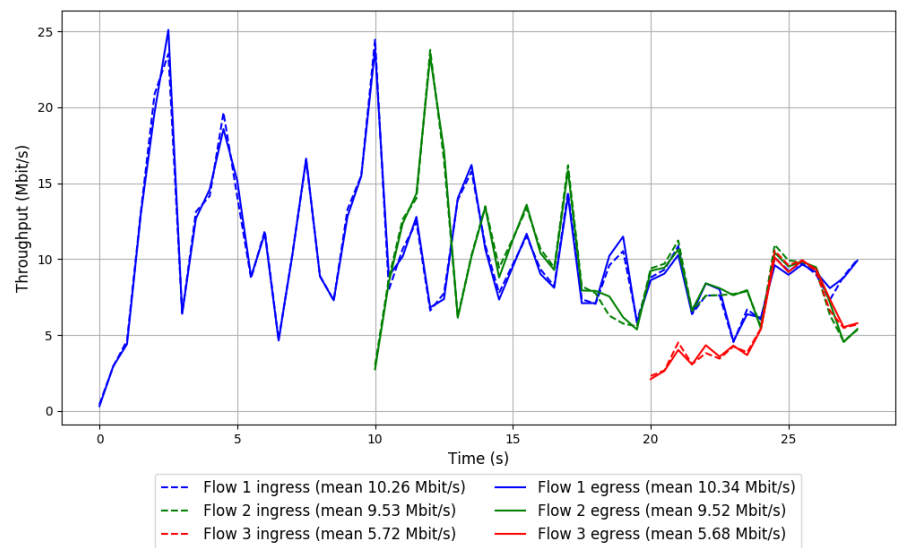


Run 3: Statistics of Copa

Start at: 2017-12-20 19:22:04
End at: 2017-12-20 19:22:34
Local clock offset: 0.32 ms
Remote clock offset: -2.308 ms

Below is generated by plot.py at 2017-12-20 19:42:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 18.13 Mbit/s
95th percentile per-packet one-way delay: 99.441 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 10.34 Mbit/s
95th percentile per-packet one-way delay: 91.495 ms
Loss rate: 0.07%
-- Flow 2:
Average throughput: 9.52 Mbit/s
95th percentile per-packet one-way delay: 112.123 ms
Loss rate: 0.05%
-- Flow 3:
Average throughput: 5.68 Mbit/s
95th percentile per-packet one-way delay: 92.440 ms
Loss rate: 0.20%

Run 3: Report of Copa — Data Link

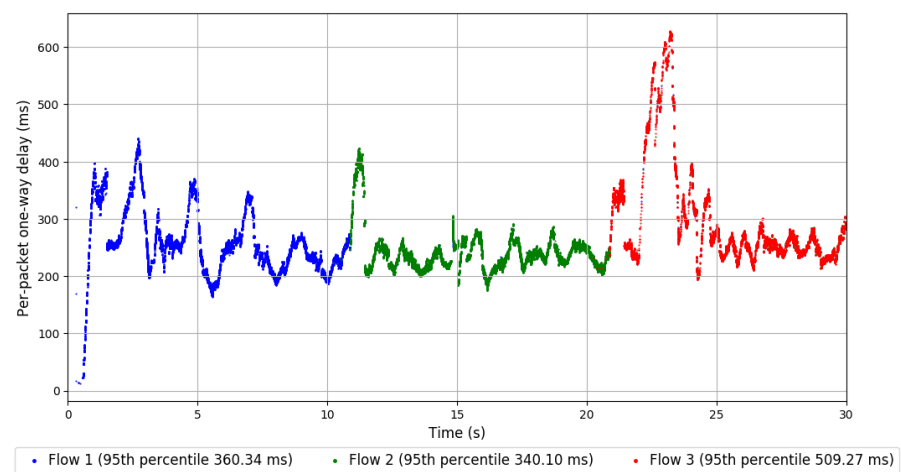
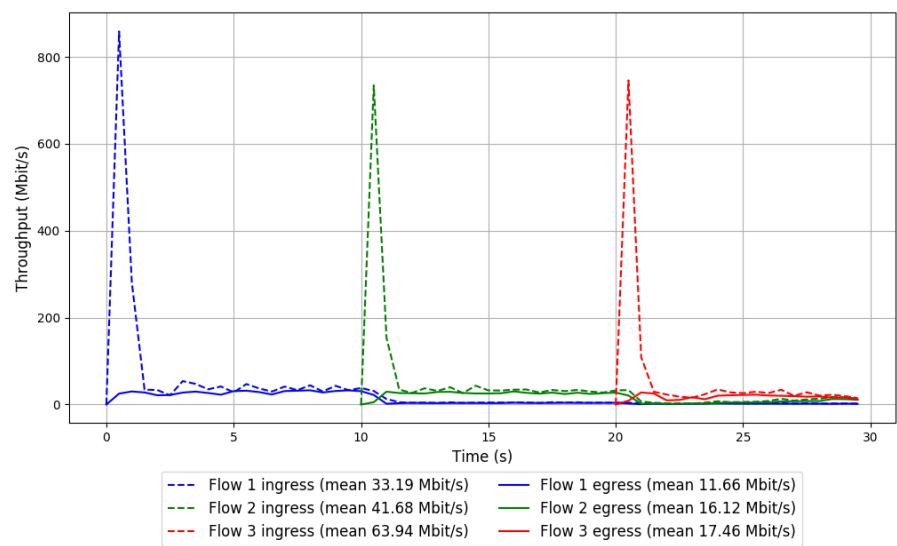


Run 1: Statistics of FillP

Start at: 2017-12-20 18:53:18
End at: 2017-12-20 18:53:48
Local clock offset: 0.659 ms
Remote clock offset: -2.667 ms

Below is generated by plot.py at 2017-12-20 19:42:49
Datalink statistics
-- Total of 3 flows:
Average throughput: 28.11 Mbit/s
95th percentile per-packet one-way delay: 371.890 ms
Loss rate: 66.12%
-- Flow 1:
Average throughput: 11.66 Mbit/s
95th percentile per-packet one-way delay: 360.336 ms
Loss rate: 65.24%
-- Flow 2:
Average throughput: 16.12 Mbit/s
95th percentile per-packet one-way delay: 340.097 ms
Loss rate: 61.71%
-- Flow 3:
Average throughput: 17.46 Mbit/s
95th percentile per-packet one-way delay: 509.268 ms
Loss rate: 73.28%

Run 1: Report of FillP — Data Link

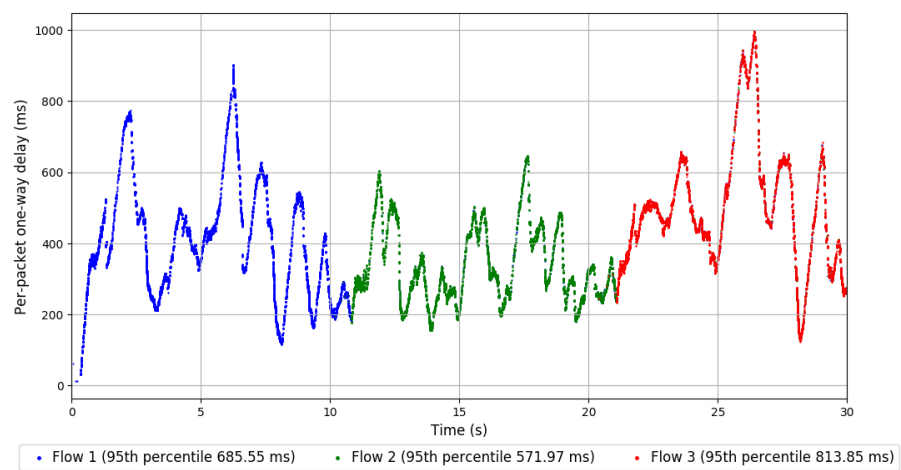
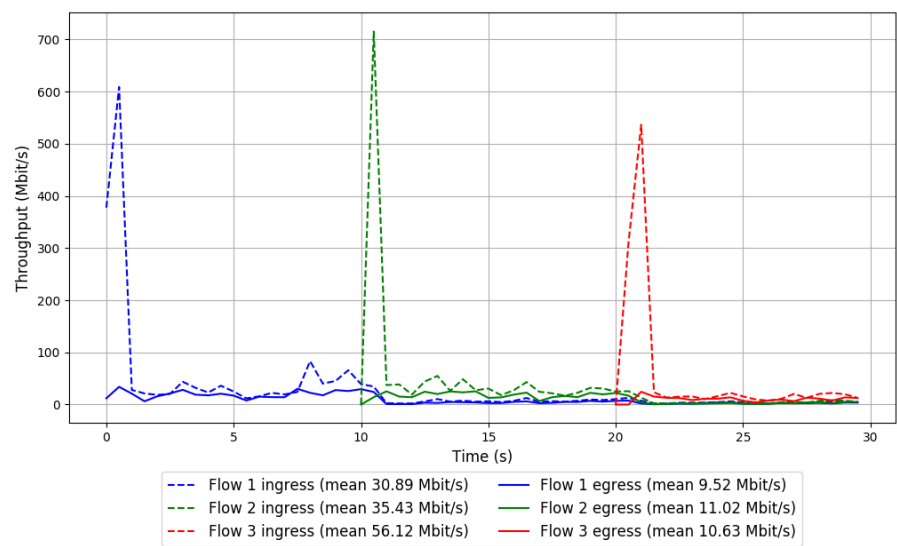


Run 2: Statistics of FillP

Start at: 2017-12-20 19:11:17
End at: 2017-12-20 19:11:47
Local clock offset: 0.423 ms
Remote clock offset: -2.345 ms

Below is generated by plot.py at 2017-12-20 19:42:49
Datalink statistics
-- Total of 3 flows:
Average throughput: 20.20 Mbit/s
95th percentile per-packet one-way delay: 636.359 ms
Loss rate: 72.41%
-- Flow 1:
Average throughput: 9.52 Mbit/s
95th percentile per-packet one-way delay: 685.546 ms
Loss rate: 69.24%
-- Flow 2:
Average throughput: 11.02 Mbit/s
95th percentile per-packet one-way delay: 571.972 ms
Loss rate: 69.18%
-- Flow 3:
Average throughput: 10.63 Mbit/s
95th percentile per-packet one-way delay: 813.850 ms
Loss rate: 81.78%

Run 2: Report of FillP — Data Link

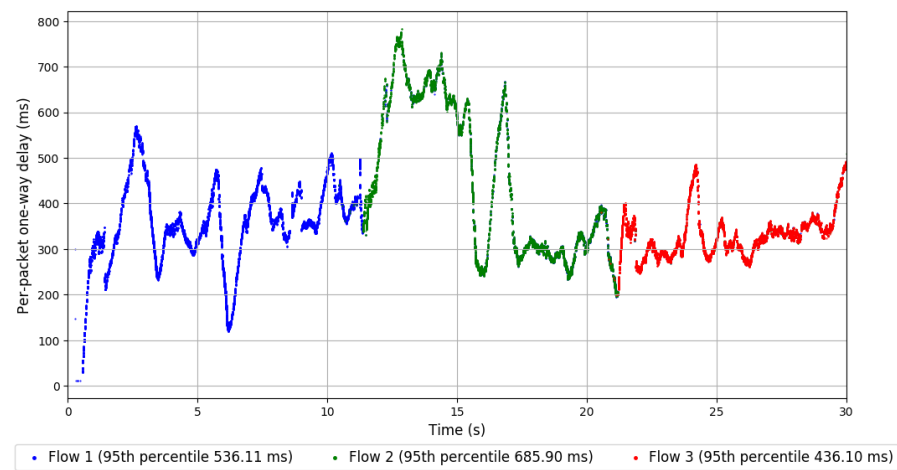
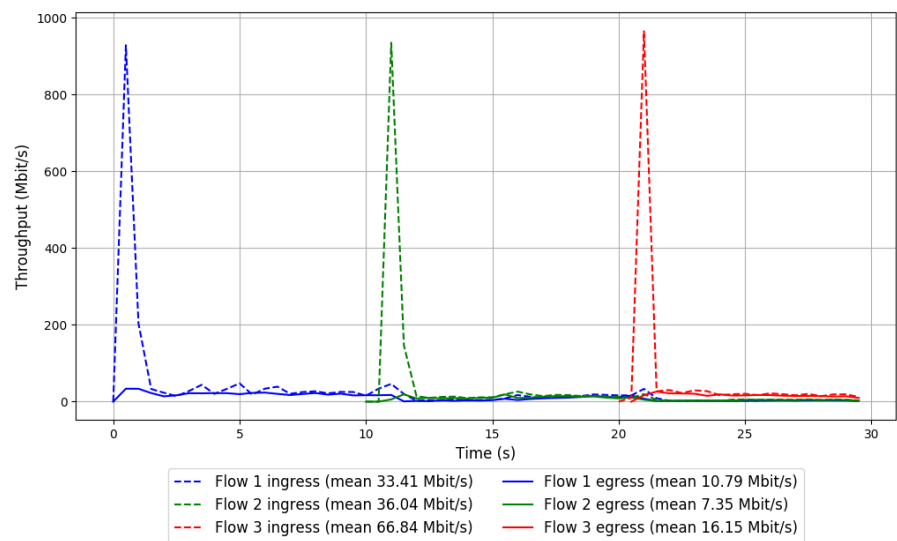


Run 3: Statistics of FillP

Start at: 2017-12-20 19:29:13
End at: 2017-12-20 19:29:43
Local clock offset: 0.302 ms
Remote clock offset: -2.227 ms

Below is generated by plot.py at 2017-12-20 19:42:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 20.74 Mbit/s
95th percentile per-packet one-way delay: 621.200 ms
Loss rate: 74.15%
-- Flow 1:
Average throughput: 10.79 Mbit/s
95th percentile per-packet one-way delay: 536.113 ms
Loss rate: 67.99%
-- Flow 2:
Average throughput: 7.35 Mbit/s
95th percentile per-packet one-way delay: 685.902 ms
Loss rate: 80.02%
-- Flow 3:
Average throughput: 16.15 Mbit/s
95th percentile per-packet one-way delay: 436.103 ms
Loss rate: 77.07%

Run 3: Report of FillP — Data Link

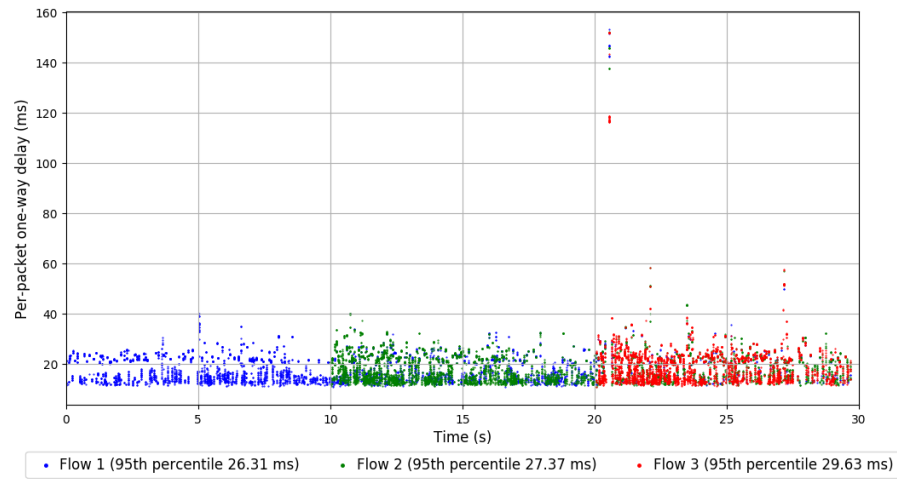
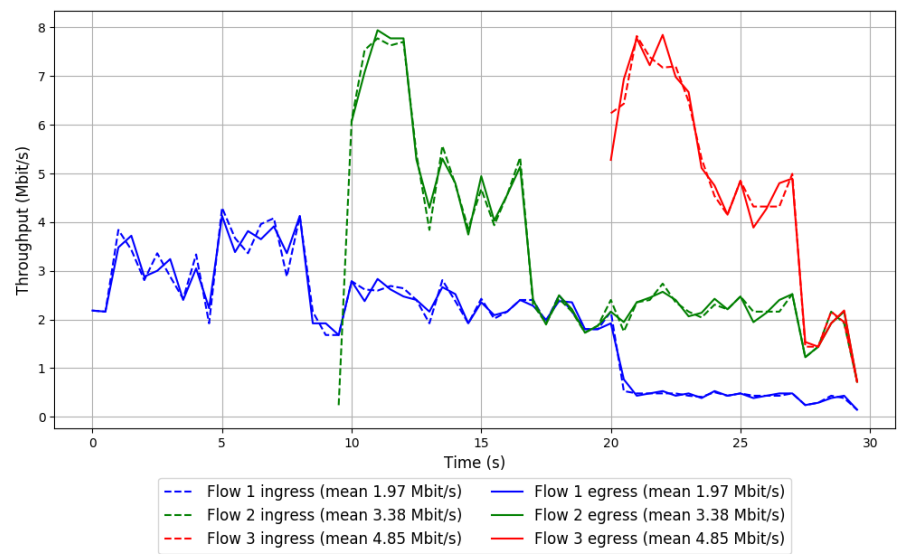


```
Run 1: Statistics of Indigo

Start at: 2017-12-20 18:52:06
End at: 2017-12-20 18:52:36
Local clock offset: 0.667 ms
Remote clock offset: -2.59 ms

# Below is generated by plot.py at 2017-12-20 19:42:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 5.78 Mbit/s
95th percentile per-packet one-way delay: 27.503 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.97 Mbit/s
95th percentile per-packet one-way delay: 26.306 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 3.38 Mbit/s
95th percentile per-packet one-way delay: 27.368 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 4.85 Mbit/s
95th percentile per-packet one-way delay: 29.631 ms
Loss rate: 0.00%
```

Run 1: Report of Indigo — Data Link

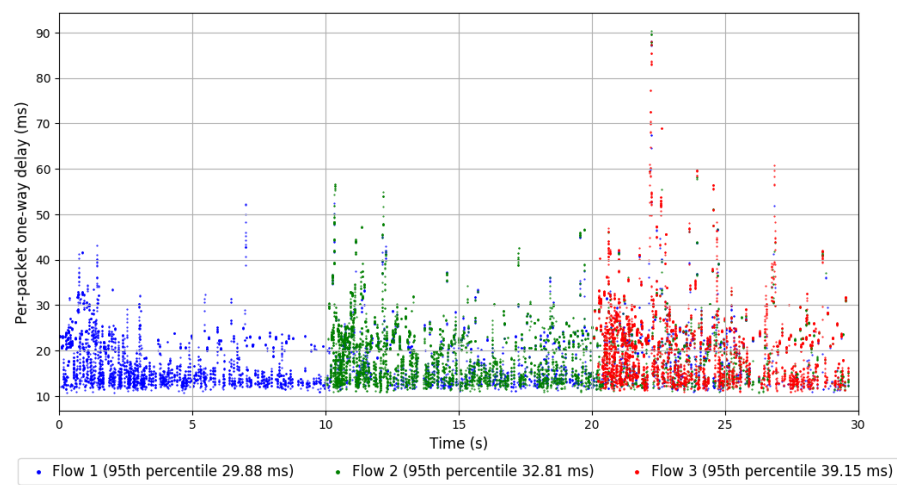
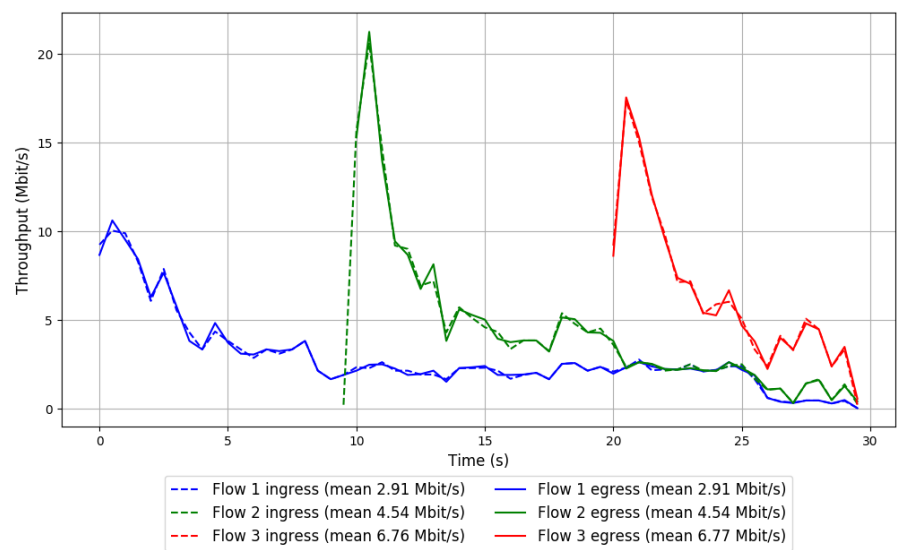


Run 2: Statistics of Indigo

Start at: 2017-12-20 19:10:05
End at: 2017-12-20 19:10:35
Local clock offset: 0.516 ms
Remote clock offset: -2.368 ms

Below is generated by plot.py at 2017-12-20 19:42:50
Datalink statistics
-- Total of 3 flows:
Average throughput: 8.10 Mbit/s
95th percentile per-packet one-way delay: 32.802 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.91 Mbit/s
95th percentile per-packet one-way delay: 29.884 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 4.54 Mbit/s
95th percentile per-packet one-way delay: 32.815 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 6.77 Mbit/s
95th percentile per-packet one-way delay: 39.154 ms
Loss rate: 0.00%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2017-12-20 19:28:02
End at: 2017-12-20 19:28:32
Local clock offset: 0.395 ms
Remote clock offset: -2.278 ms

```
# Below is generated by plot.py at 2017-12-20 19:42:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.37 Mbit/s
95th percentile per-packet one-way delay: 26.096 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.79 Mbit/s
95th percentile per-packet one-way delay: 26.765 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 26.153 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 3.46 Mbit/s
95th percentile per-packet one-way delay: 25.807 ms
Loss rate: 0.00%
```

Run 3: Report of Indigo — Data Link

