

## Pantheon Report

Generated at 2017-12-11 10:45:17 (UTC).

Data path: China ppp0 (*remote*) → AWS Korea 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).

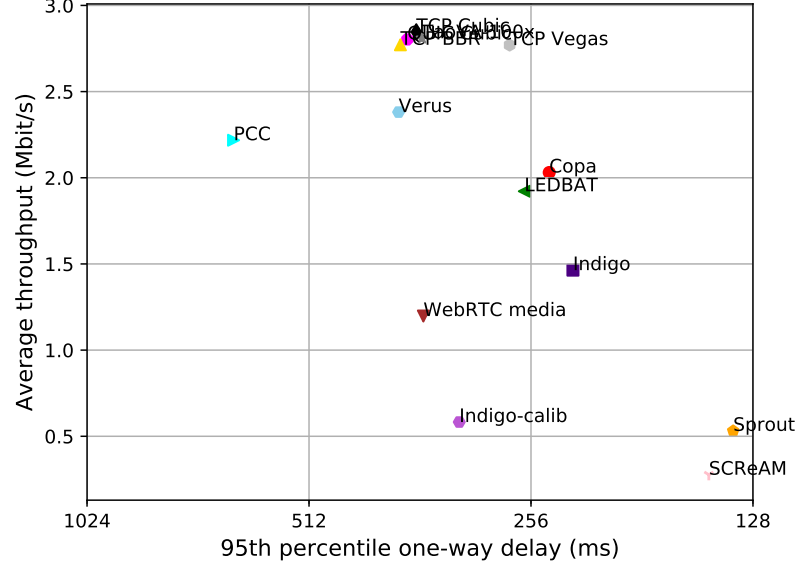
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo\_fast**).

NTP offsets were measured against `ntp.nict.jp` and have been applied to correct the timestamps in logs.

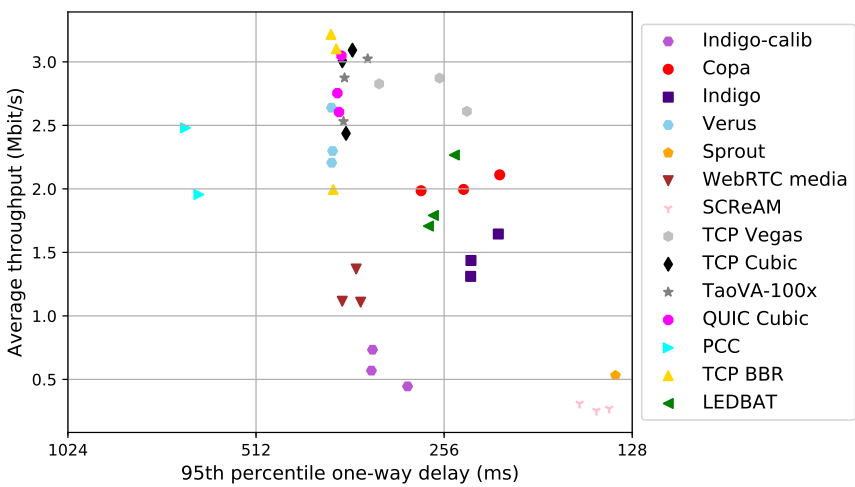
Git summary:

```
branch: indigos @ e3a57ad5ac5cfcaca0e3f983c8dd4cc3509e0262
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/genericCC @ b5b7c38e8391001927dc41c6cfa2627d03dde737
third_party/indigo @ b19f3730105f9aa95452552af924e3719b03cc55
third_party/indigo-cellular @ aee99e8eb842cb053f8c9a80e28cd256a930bbc2
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/indigo-no-cwnd @ 3e58442c04028a11d7b02456e137604633ba2d6c
third_party/indigo-no-delivery-rate @ 57caa40858b964906edff4876d5a7e5bfff666c5
third_party/indigo-no-queuing-delay @ 03455460fd1a8ffbdad86fabb936fdca204b80db
third_party/indigo-no-send-rate @ b39dfa6b2c5f19cb7cd89626cb4f5bb81f9fecda
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
  M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ baf443516dea3eeddeccaf9b916cc313273ca4f4
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
  M receiver/src/buffer.h
  M receiver/src/core.cpp
  M sender/src/buffer.h
  M sender/src/core.cpp
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ f1a14bffe749737437f61b1eaeeb30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
  M src/examples/cellsim.cc
  M src/examples/sproutbt2.cc
  M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
  M src/verus.hpp
  M tools/plot.py
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

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



test from China ppp0 to AWS Korea 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	2.16	0.77	0.34	383.24	389.32	381.53	12.92	21.16	24.72
TCP Cubic	3	2.03	0.76	0.82	365.79	366.11	370.16	2.11	4.13	9.73
LEDBAT	3	1.35	0.65	0.55	258.08	268.23	244.91	1.17	2.05	3.99
PCC	2	1.25	1.01	1.00	391.34	752.59	779.63	47.84	78.28	94.61
QUIC Cubic	3	1.75	1.13	0.98	374.20	378.42	380.35	4.11	5.51	9.63
SCReAM	3	0.10	0.18	0.17	145.83	143.67	137.69	0.48	0.68	1.41
WebRTC media	3	0.60	0.36	0.23	336.87	340.04	332.26	4.54	5.62	10.46
Sprout	1	0.23	0.30	0.30	137.32	136.52	129.66	0.33	0.03	3.07
TaoVA-100x	3	1.67	1.41	0.88	349.26	362.79	374.84	3.62	8.29	33.32
TCP Vegas	3	1.52	1.29	1.23	275.13	272.22	257.92	1.73	1.30	2.01
Verus	3	1.83	0.57	0.64	384.87	386.46	455.92	33.16	56.58	57.11
Copa	3	1.23	0.98	0.65	238.84	235.98	280.04	0.58	1.34	3.81
Indigo	3	0.61	0.62	1.17	208.34	235.69	207.55	1.25	1.03	2.04
Indigo-calib	3	0.23	0.29	0.50	324.08	297.03	303.57	15.30	1.79	4.17

Run 1: Statistics of TCP BBR

Start at: 2017-12-11 09:17:01

End at: 2017-12-11 09:17:31

Local clock offset: -6.755 ms

Remote clock offset: 2.211 ms

# Below is generated by plot.py at 2017-12-11 10:44:41

# Datalink statistics

-- Total of 3 flows:

Average throughput: 3.10 Mbit/s

95th percentile per-packet one-way delay: 380.961 ms

Loss rate: 14.81%

-- Flow 1:

Average throughput: 2.39 Mbit/s

95th percentile per-packet one-way delay: 380.318 ms

Loss rate: 12.72%

-- Flow 2:

Average throughput: 1.00 Mbit/s

95th percentile per-packet one-way delay: 382.974 ms

Loss rate: 20.83%

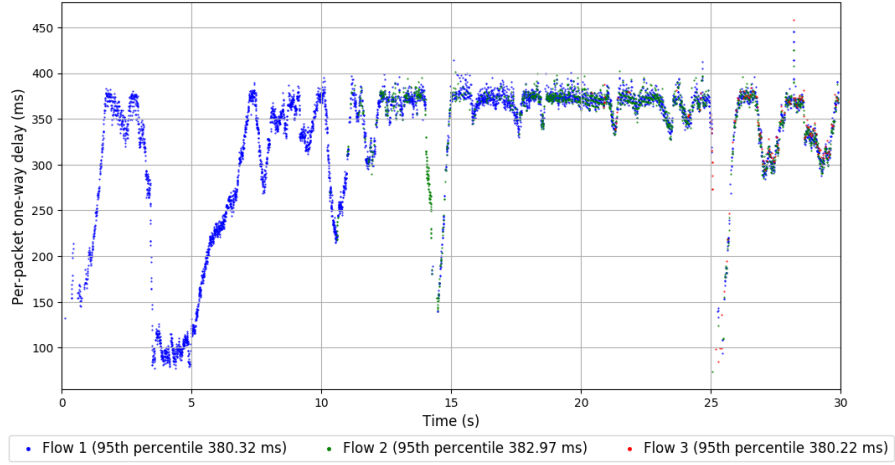
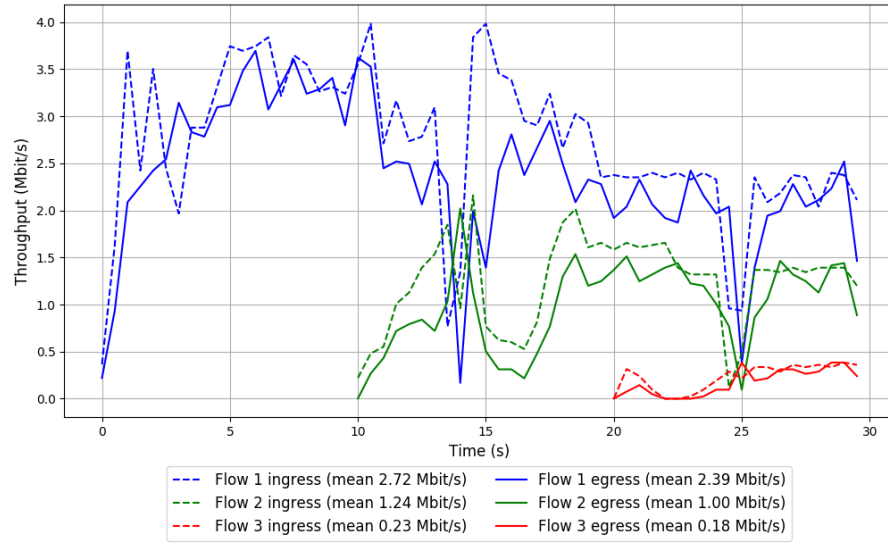
-- Flow 3:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 380.216 ms

Loss rate: 24.18%

# Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2017-12-11 09:33:35

End at: 2017-12-11 09:34:05

Local clock offset: -4.7 ms

Remote clock offset: 1.301 ms

# Below is generated by plot.py at 2017-12-11 10:44:41

# Datalink statistics

-- Total of 3 flows:

Average throughput: 3.22 Mbit/s

95th percentile per-packet one-way delay: 388.449 ms

Loss rate: 18.97%

-- Flow 1:

Average throughput: 2.66 Mbit/s

95th percentile per-packet one-way delay: 388.074 ms

Loss rate: 16.88%

-- Flow 2:

Average throughput: 0.59 Mbit/s

95th percentile per-packet one-way delay: 391.562 ms

Loss rate: 29.22%

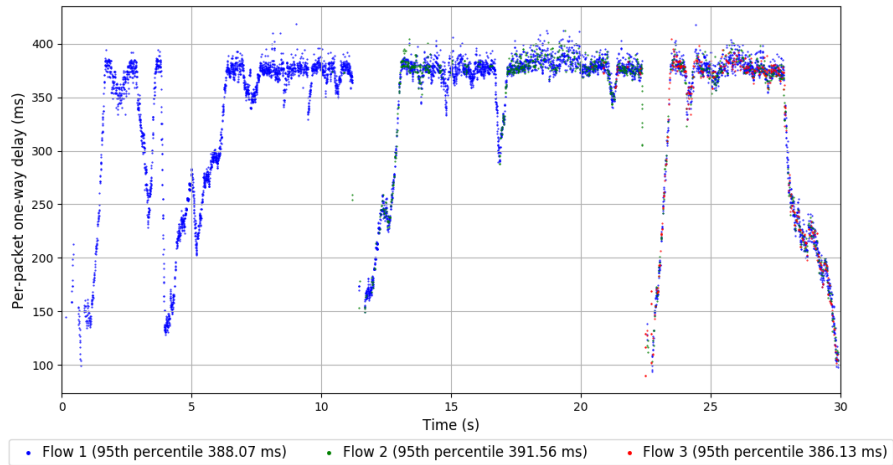
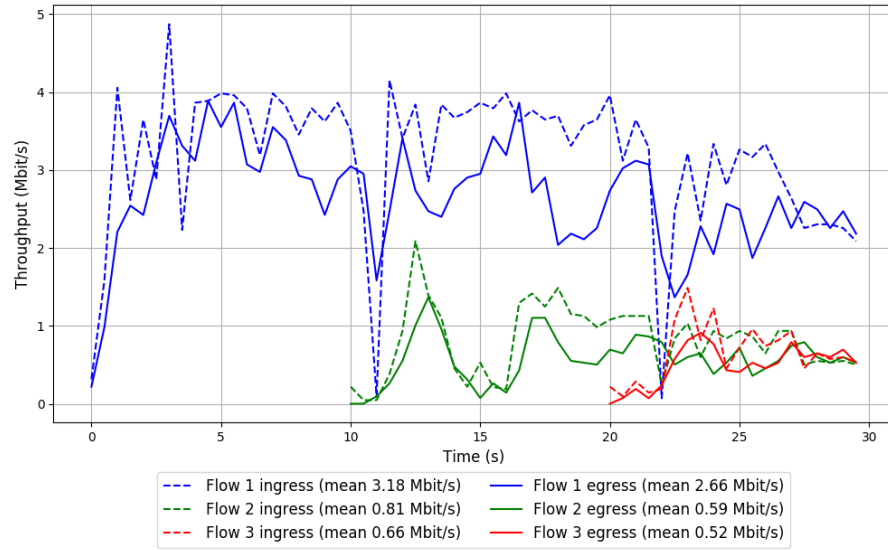
-- Flow 3:

Average throughput: 0.52 Mbit/s

95th percentile per-packet one-way delay: 386.130 ms

Loss rate: 24.02%

## Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2017-12-11 09:50:10

End at: 2017-12-11 09:50:40

Local clock offset: -2.232 ms

Remote clock offset: 0.578 ms

# Below is generated by plot.py at 2017-12-11 10:44:41

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.00 Mbit/s

95th percentile per-packet one-way delay: 385.234 ms

Loss rate: 11.25%

-- Flow 1:

Average throughput: 1.42 Mbit/s

95th percentile per-packet one-way delay: 381.314 ms

Loss rate: 9.16%

-- Flow 2:

Average throughput: 0.71 Mbit/s

95th percentile per-packet one-way delay: 393.437 ms

Loss rate: 13.44%

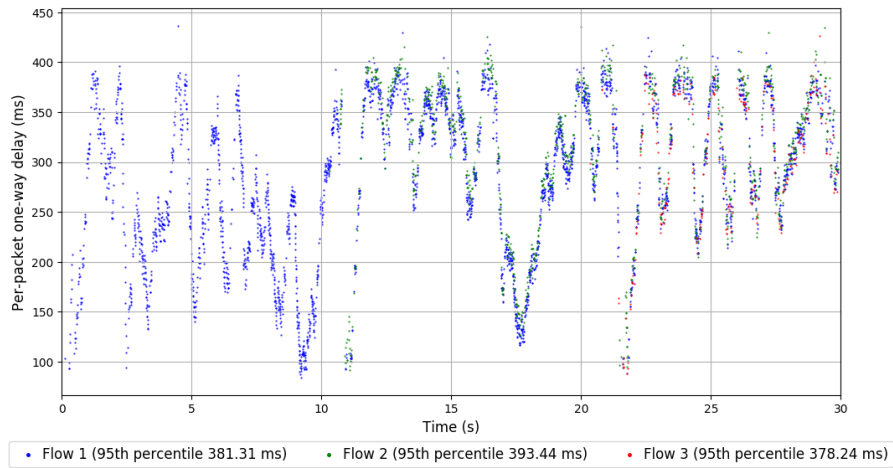
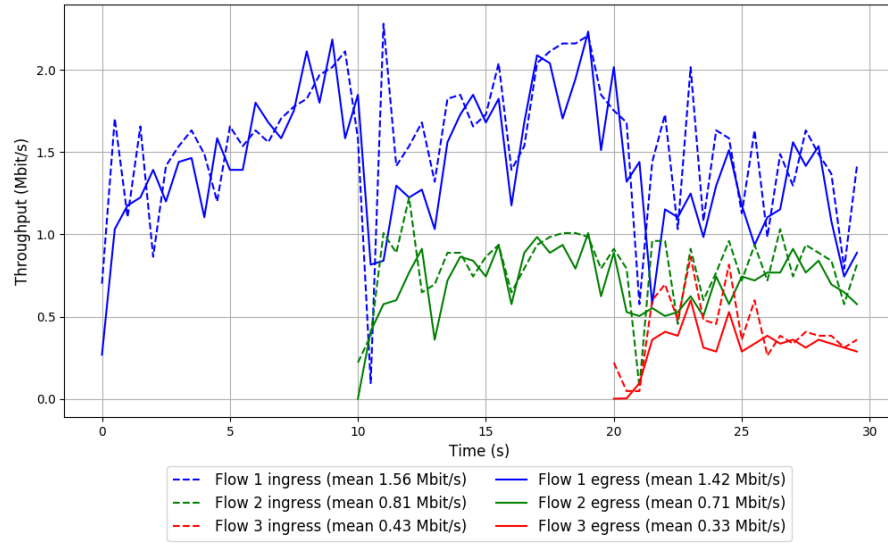
-- Flow 3:

Average throughput: 0.33 Mbit/s

95th percentile per-packet one-way delay: 378.239 ms

Loss rate: 25.97%

### Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2017-12-11 09:02:33

End at: 2017-12-11 09:03:03

Local clock offset: -3.427 ms

Remote clock offset: 1.786 ms

# Below is generated by plot.py at 2017-12-11 10:44:41

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.44 Mbit/s

95th percentile per-packet one-way delay: 367.465 ms

Loss rate: 3.55%

-- Flow 1:

Average throughput: 1.88 Mbit/s

95th percentile per-packet one-way delay: 366.507 ms

Loss rate: 2.41%

-- Flow 2:

Average throughput: 0.71 Mbit/s

95th percentile per-packet one-way delay: 369.802 ms

Loss rate: 5.16%

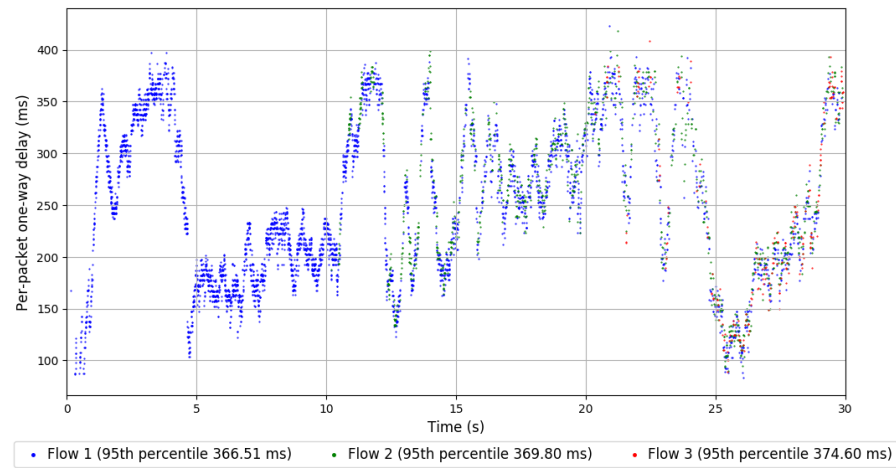
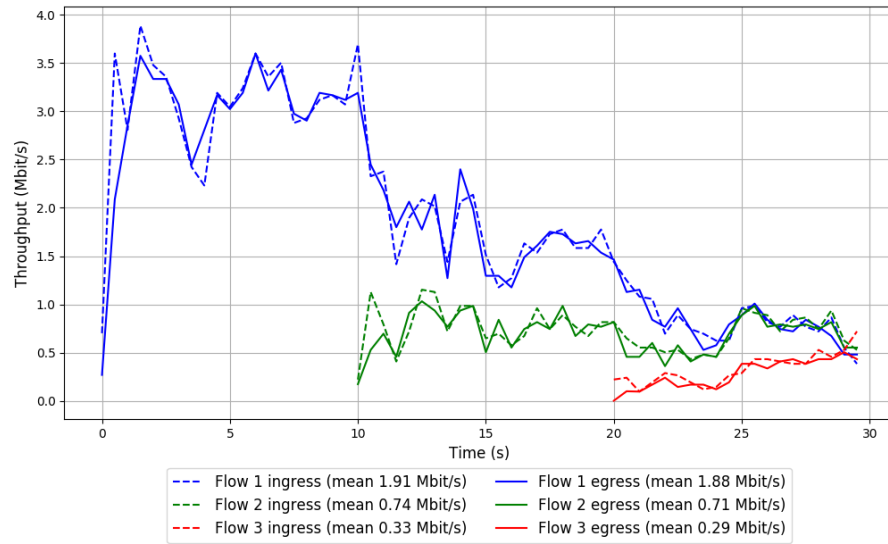
-- Flow 3:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 374.604 ms

Loss rate: 16.05%

# Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2017-12-11 09:19:24

End at: 2017-12-11 09:19:54

Local clock offset: -7.432 ms

Remote clock offset: 2.056 ms

# Below is generated by plot.py at 2017-12-11 10:44:41

# Datalink statistics

-- Total of 3 flows:

Average throughput: 3.09 Mbit/s

95th percentile per-packet one-way delay: 358.888 ms

Loss rate: 2.62%

-- Flow 1:

Average throughput: 2.06 Mbit/s

95th percentile per-packet one-way delay: 358.444 ms

Loss rate: 1.59%

-- Flow 2:

Average throughput: 0.86 Mbit/s

95th percentile per-packet one-way delay: 359.012 ms

Loss rate: 3.98%

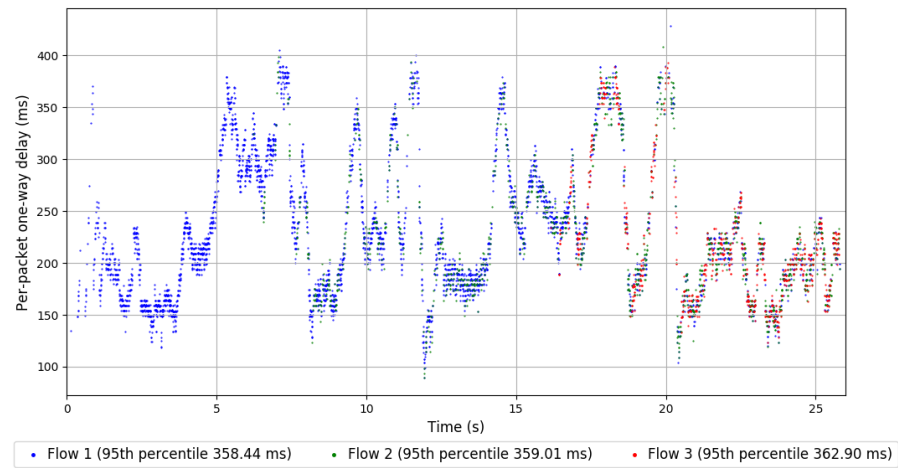
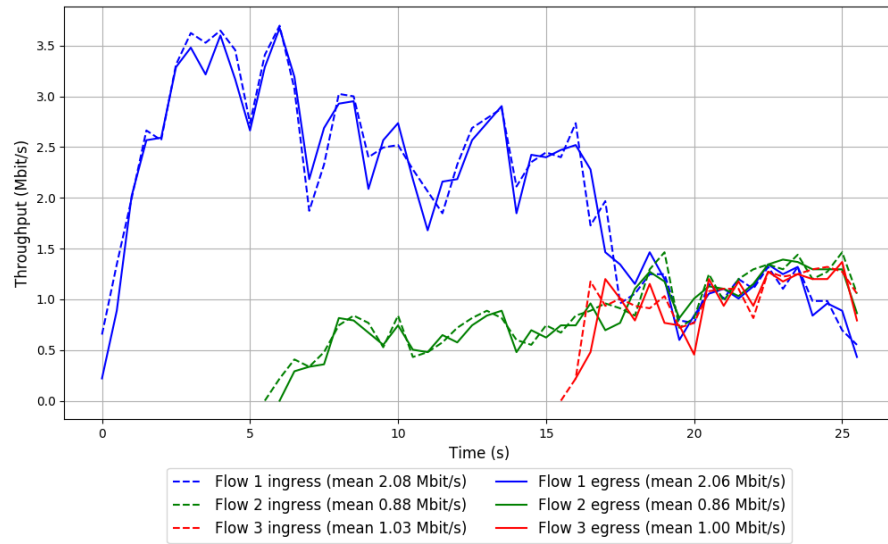
-- Flow 3:

Average throughput: 1.00 Mbit/s

95th percentile per-packet one-way delay: 362.896 ms

Loss rate: 5.74%

## Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2017-12-11 09:35:58

End at: 2017-12-11 09:36:28

Local clock offset: -4.338 ms

Remote clock offset: 1.145 ms

# Below is generated by plot.py at 2017-12-11 10:44:41

# Datalink statistics

-- Total of 3 flows:

Average throughput: 3.01 Mbit/s

95th percentile per-packet one-way delay: 372.475 ms

Loss rate: 3.15%

-- Flow 1:

Average throughput: 2.15 Mbit/s

95th percentile per-packet one-way delay: 372.405 ms

Loss rate: 2.33%

-- Flow 2:

Average throughput: 0.72 Mbit/s

95th percentile per-packet one-way delay: 369.510 ms

Loss rate: 3.25%

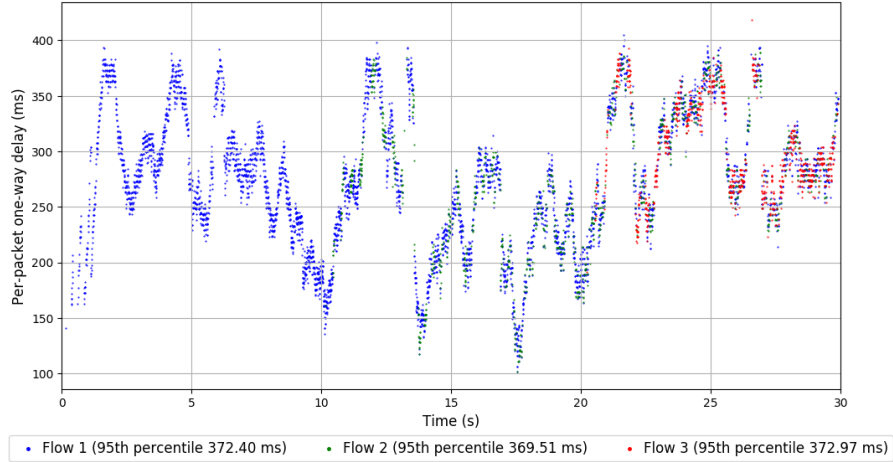
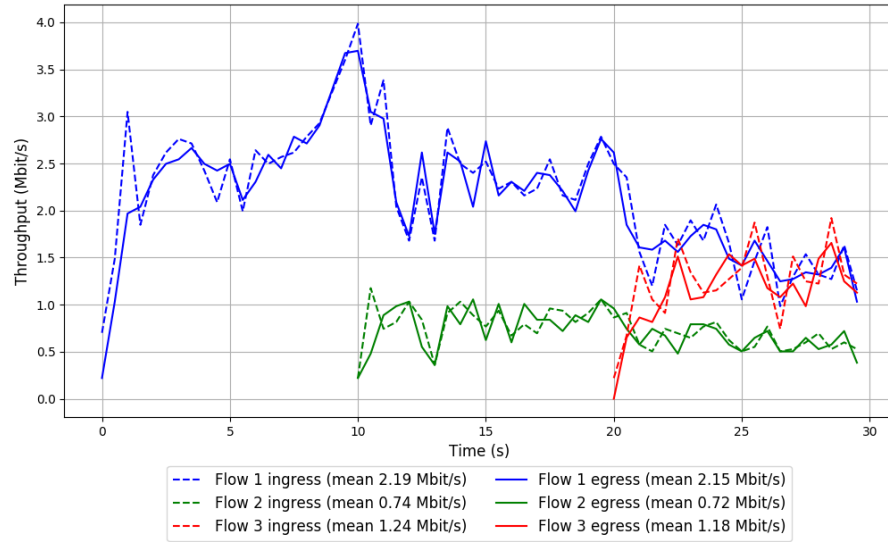
-- Flow 3:

Average throughput: 1.18 Mbit/s

95th percentile per-packet one-way delay: 372.973 ms

Loss rate: 7.41%

### Run 3: Report of TCP Cubic — Data Link

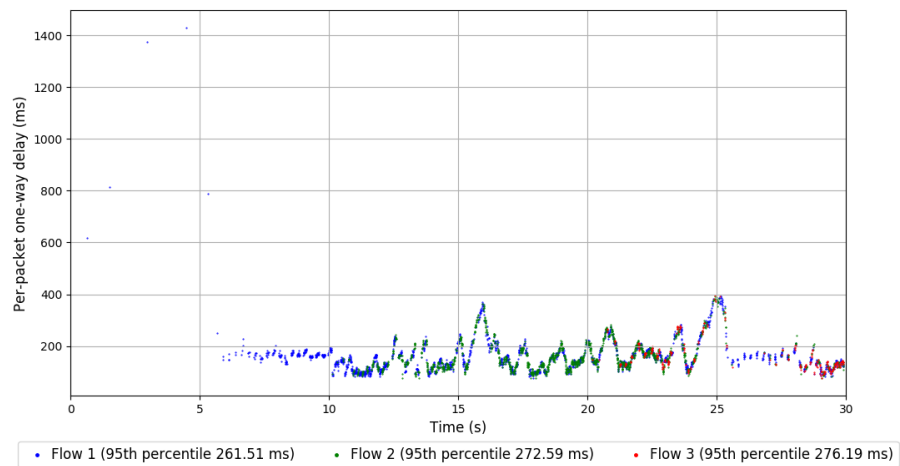
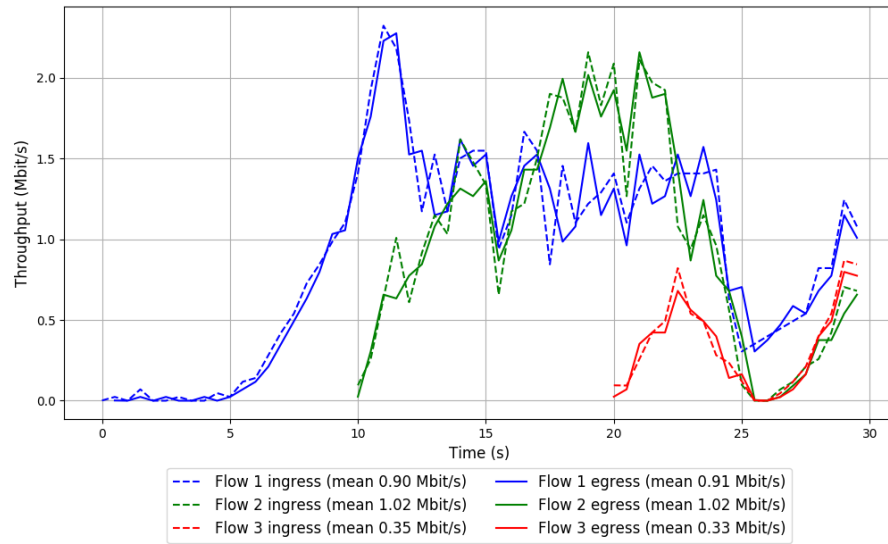


```
Run 1: Statistics of LEDBAT

Start at: 2017-12-11 09:06:12
End at: 2017-12-11 09:06:42
Local clock offset: -4.108 ms
Remote clock offset: 1.907 ms

# Below is generated by plot.py at 2017-12-11 10:44:41
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.71 Mbit/s
95th percentile per-packet one-way delay: 271.306 ms
Loss rate: 1.59%
-- Flow 1:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 261.513 ms
Loss rate: 1.65%
-- Flow 2:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 272.593 ms
Loss rate: 0.75%
-- Flow 3:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 276.194 ms
Loss rate: 6.14%
```

## Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2017-12-11 09:22:57

End at: 2017-12-11 09:23:27

Local clock offset: -6.707 ms

Remote clock offset: 1.878 ms

# Below is generated by plot.py at 2017-12-11 10:44:41

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.27 Mbit/s

95th percentile per-packet one-way delay: 246.531 ms

Loss rate: 1.32%

-- Flow 1:

Average throughput: 1.64 Mbit/s

95th percentile per-packet one-way delay: 246.374 ms

Loss rate: 0.95%

-- Flow 2:

Average throughput: 0.65 Mbit/s

95th percentile per-packet one-way delay: 251.092 ms

Loss rate: 2.06%

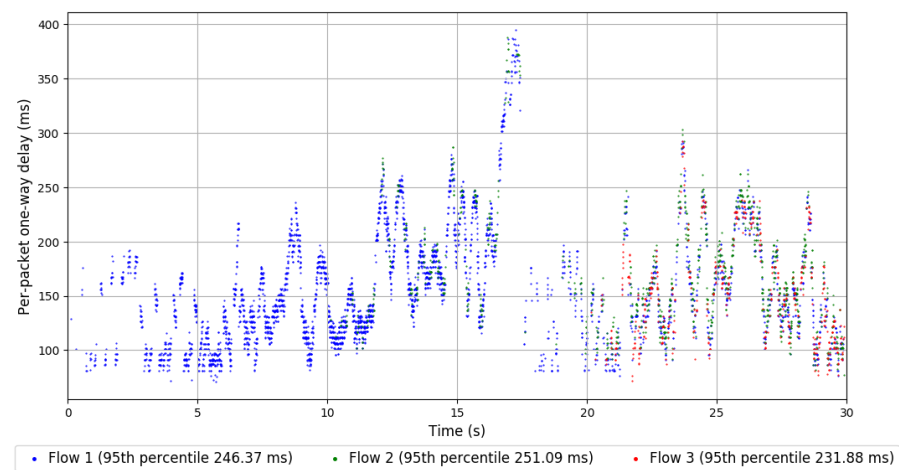
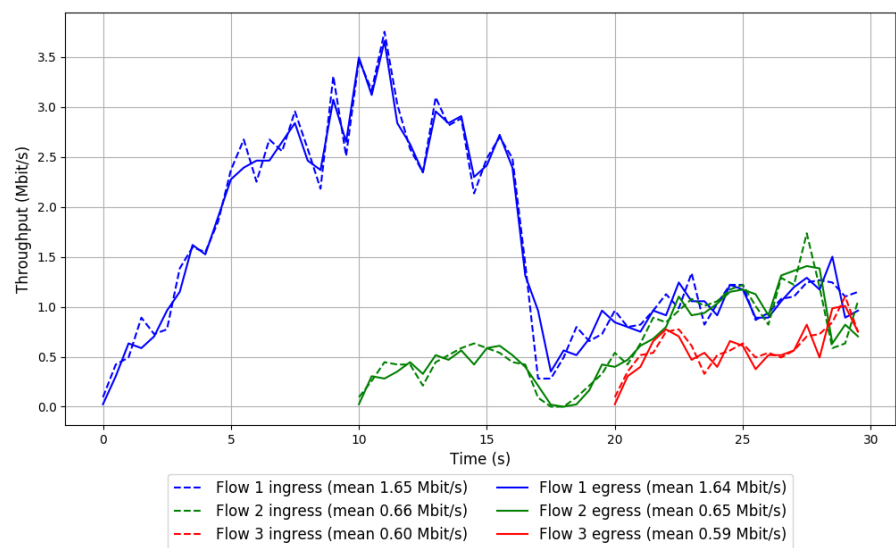
-- Flow 3:

Average throughput: 0.59 Mbit/s

95th percentile per-packet one-way delay: 231.884 ms

Loss rate: 2.76%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2017-12-11 09:39:31

End at: 2017-12-11 09:40:01

Local clock offset: -3.611 ms

Remote clock offset: 0.967 ms

# Below is generated by plot.py at 2017-12-11 10:44:42

# Datalink statistics

-- Total of 3 flows:

Average throughput: 1.79 Mbit/s

95th percentile per-packet one-way delay: 266.349 ms

Loss rate: 1.28%

-- Flow 1:

Average throughput: 1.50 Mbit/s

95th percentile per-packet one-way delay: 266.349 ms

Loss rate: 0.91%

-- Flow 2:

Average throughput: 0.28 Mbit/s

95th percentile per-packet one-way delay: 281.005 ms

Loss rate: 3.35%

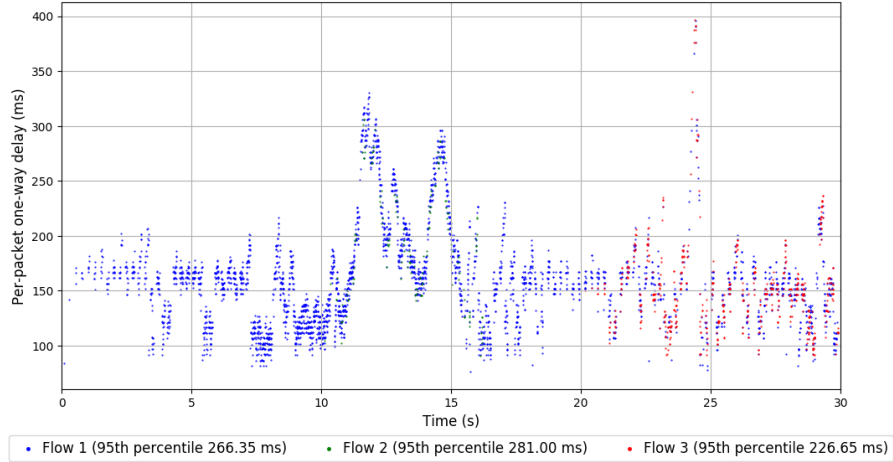
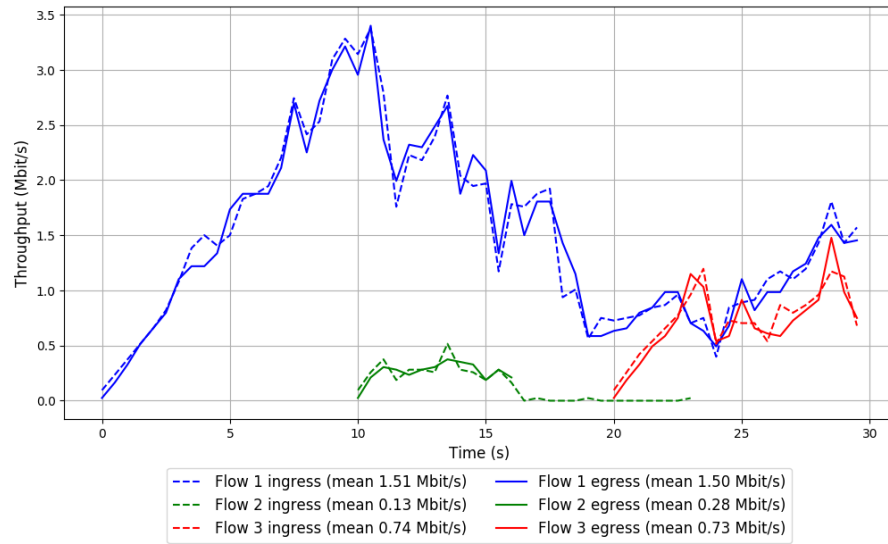
-- Flow 3:

Average throughput: 0.73 Mbit/s

95th percentile per-packet one-way delay: 226.653 ms

Loss rate: 3.06%

### Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of PCC

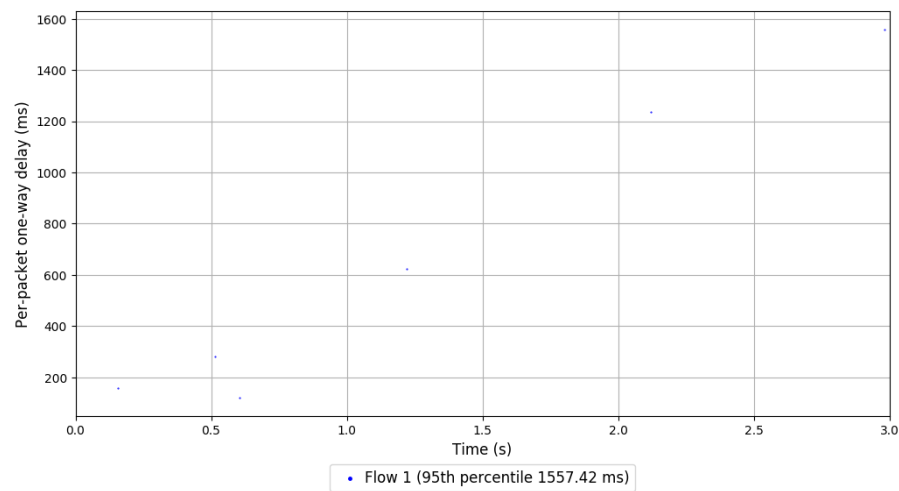
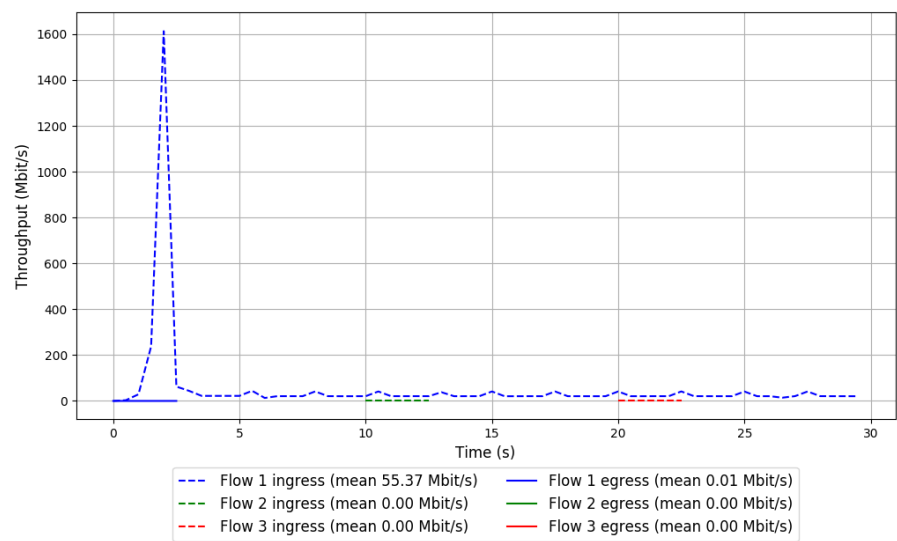
Start at: 2017-12-11 09:07:27

End at: 2017-12-11 09:07:57

Local clock offset: -4.426 ms

Remote clock offset: 1.815 ms

Run 1: Report of PCC — Data Link



Run 2: Statistics of PCC

Start at: 2017-12-11 09:24:08

End at: 2017-12-11 09:24:38

Local clock offset: -6.477 ms

Remote clock offset: 1.79 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.48 Mbit/s

95th percentile per-packet one-way delay: 663.926 ms

Loss rate: 76.06%

-- Flow 1:

Average throughput: 1.34 Mbit/s

95th percentile per-packet one-way delay: 393.705 ms

Loss rate: 42.95%

-- Flow 2:

Average throughput: 1.25 Mbit/s

95th percentile per-packet one-way delay: 776.015 ms

Loss rate: 62.83%

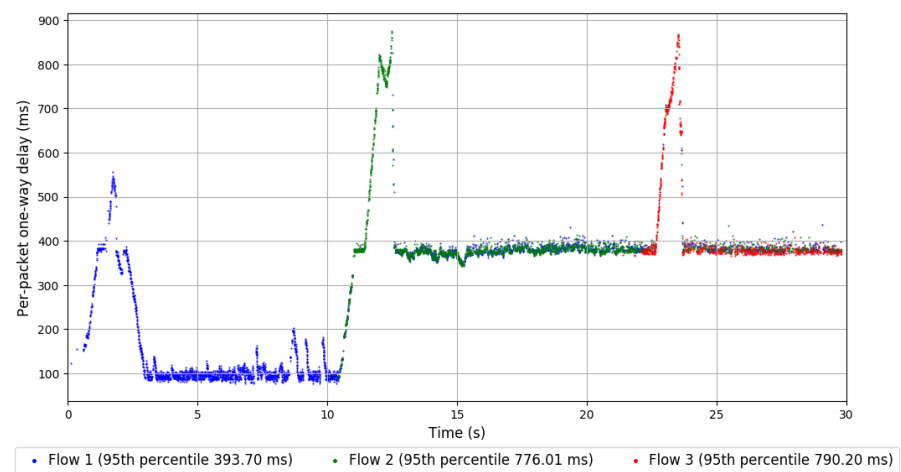
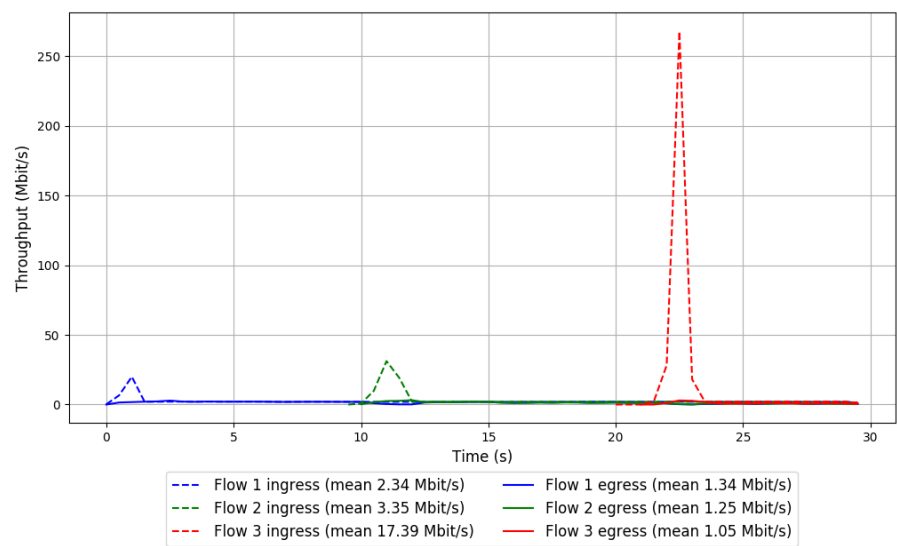
-- Flow 3:

Average throughput: 1.05 Mbit/s

95th percentile per-packet one-way delay: 790.196 ms

Loss rate: 94.70%

Run 2: Report of PCC — Data Link



Run 3: Statistics of PCC

Start at: 2017-12-11 09:40:41

End at: 2017-12-11 09:41:11

Local clock offset: -3.391 ms

Remote clock offset: 0.914 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 1.96 Mbit/s

95th percentile per-packet one-way delay: 632.041 ms

Loss rate: 87.74%

-- Flow 1:

Average throughput: 1.15 Mbit/s

95th percentile per-packet one-way delay: 388.984 ms

Loss rate: 52.72%

-- Flow 2:

Average throughput: 0.77 Mbit/s

95th percentile per-packet one-way delay: 729.158 ms

Loss rate: 93.72%

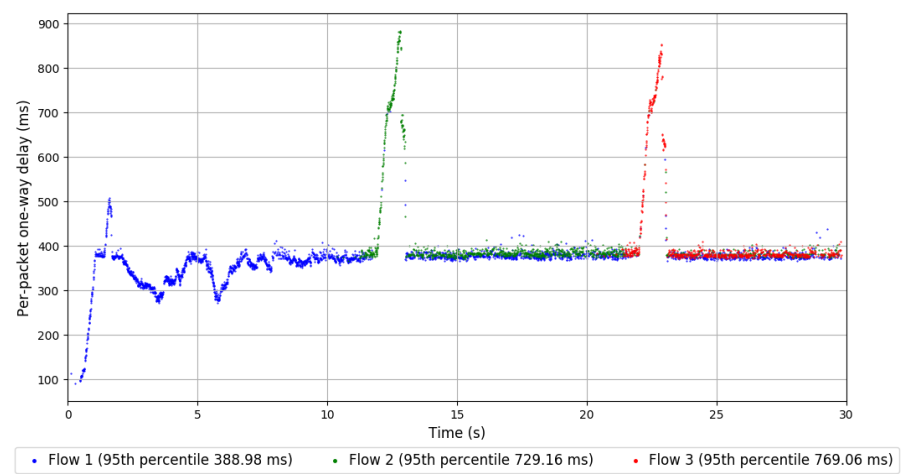
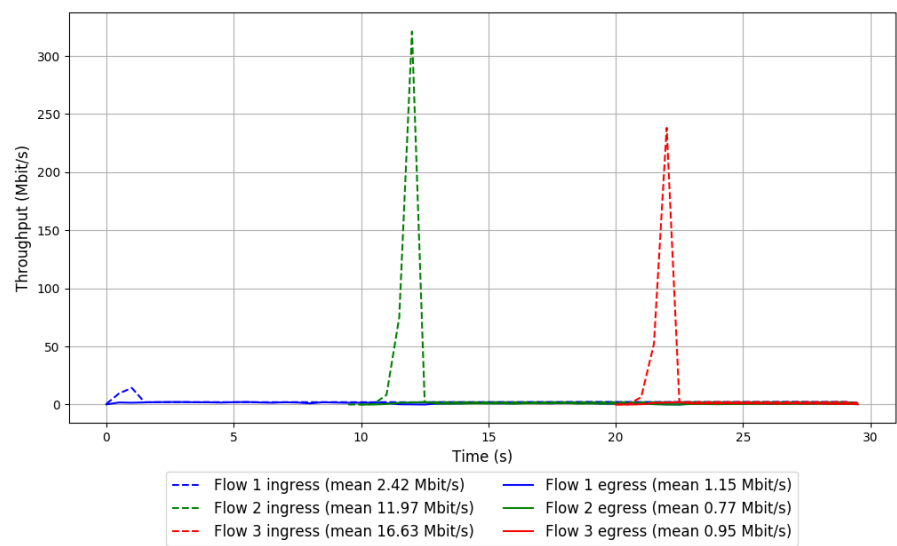
-- Flow 3:

Average throughput: 0.95 Mbit/s

95th percentile per-packet one-way delay: 769.057 ms

Loss rate: 94.52%

Run 3: Report of PCC — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2017-12-11 09:09:52

End at: 2017-12-11 09:10:22

Local clock offset: -4.935 ms

Remote clock offset: 1.944 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.75 Mbit/s

95th percentile per-packet one-way delay: 379.345 ms

Loss rate: 5.40%

-- Flow 1:

Average throughput: 1.73 Mbit/s

95th percentile per-packet one-way delay: 378.333 ms

Loss rate: 4.21%

-- Flow 2:

Average throughput: 1.11 Mbit/s

95th percentile per-packet one-way delay: 380.541 ms

Loss rate: 5.99%

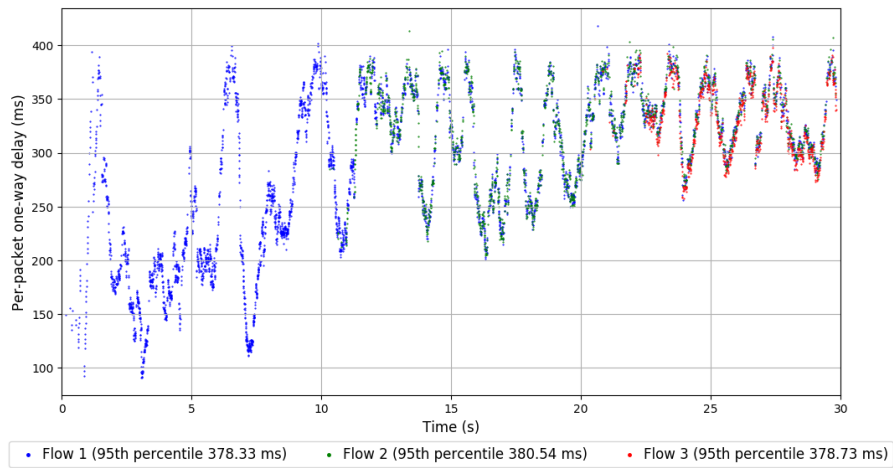
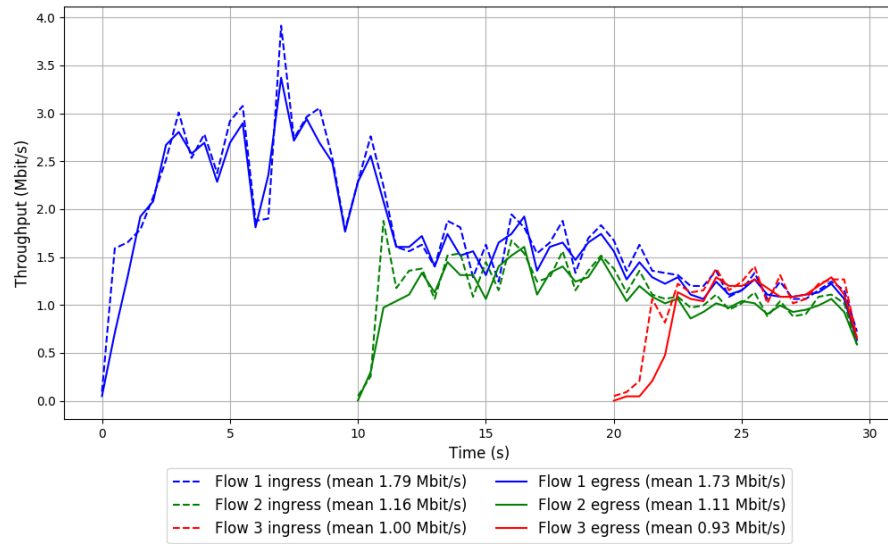
-- Flow 3:

Average throughput: 0.93 Mbit/s

95th percentile per-packet one-way delay: 378.732 ms

Loss rate: 10.44%

## Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2017-12-11 09:26:30

End at: 2017-12-11 09:27:00

Local clock offset: -6.109 ms

Remote clock offset: 1.674 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.60 Mbit/s

95th percentile per-packet one-way delay: 377.106 ms

Loss rate: 5.87%

-- Flow 1:

Average throughput: 1.49 Mbit/s

95th percentile per-packet one-way delay: 374.446 ms

Loss rate: 4.94%

-- Flow 2:

Average throughput: 1.19 Mbit/s

95th percentile per-packet one-way delay: 376.154 ms

Loss rate: 5.69%

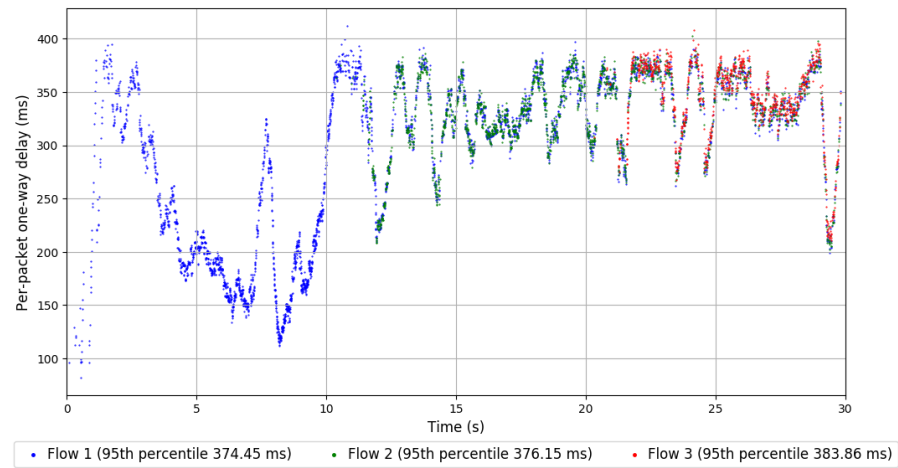
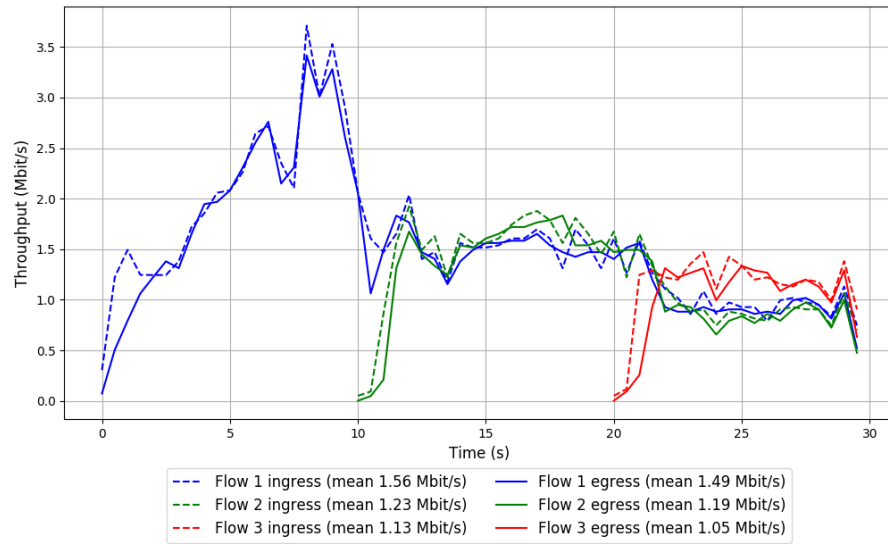
-- Flow 3:

Average throughput: 1.05 Mbit/s

95th percentile per-packet one-way delay: 383.860 ms

Loss rate: 10.20%

## Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2017-12-11 09:43:04

End at: 2017-12-11 09:43:34

Local clock offset: -2.921 ms

Remote clock offset: 0.826 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 3.05 Mbit/s

95th percentile per-packet one-way delay: 373.756 ms

Loss rate: 4.09%

-- Flow 1:

Average throughput: 2.03 Mbit/s

95th percentile per-packet one-way delay: 369.818 ms

Loss rate: 3.17%

-- Flow 2:

Average throughput: 1.09 Mbit/s

95th percentile per-packet one-way delay: 378.578 ms

Loss rate: 4.84%

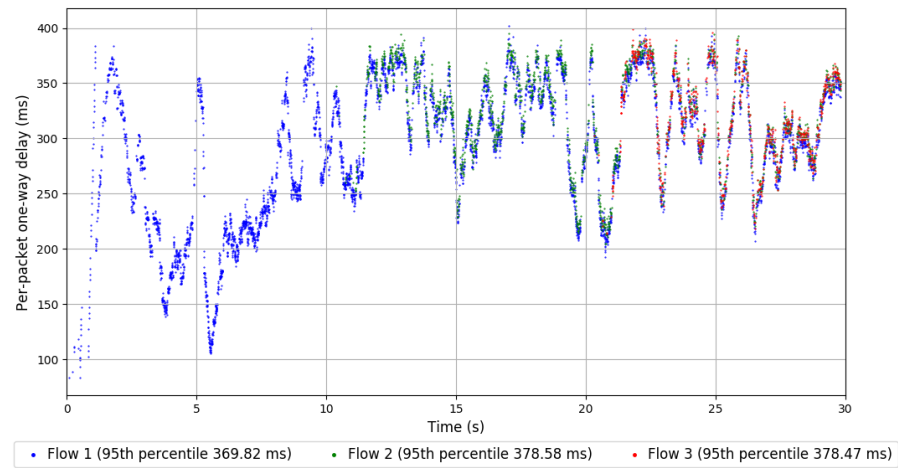
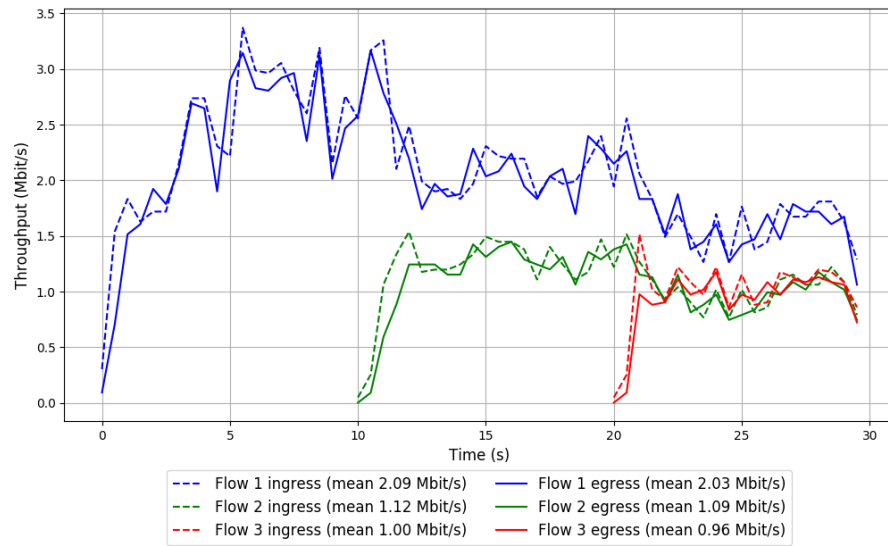
-- Flow 3:

Average throughput: 0.96 Mbit/s

95th percentile per-packet one-way delay: 378.470 ms

Loss rate: 8.24%

### Run 3: Report of QUIC Cubic — Data Link

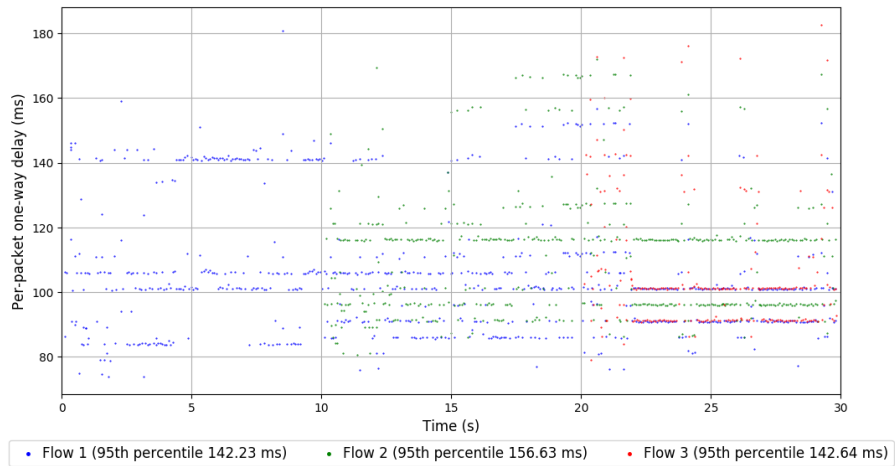
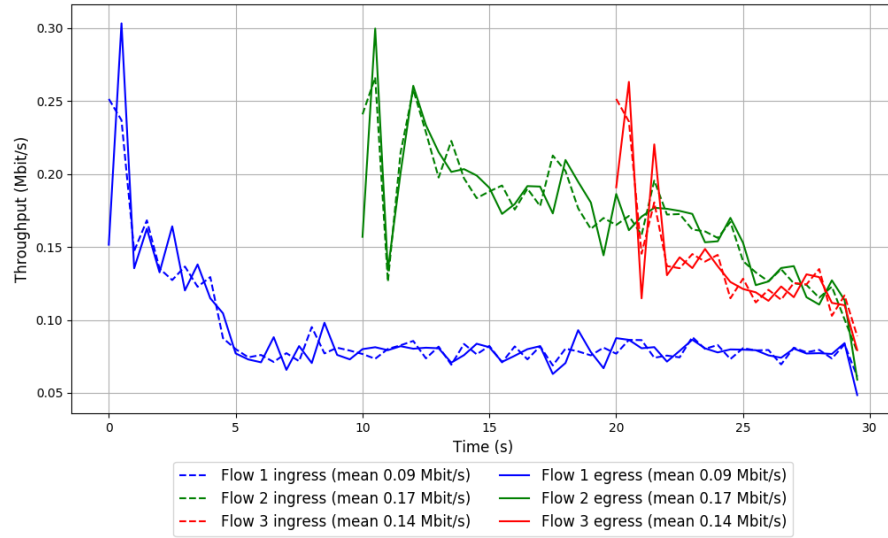


```
Run 1: Statistics of SCReAM

Start at: 2017-12-11 09:15:50
End at: 2017-12-11 09:16:20
Local clock offset: -6.426 ms
Remote clock offset: 2.122 ms

# Below is generated by plot.py at 2017-12-11 10:45:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 146.047 ms
Loss rate: 0.62%
-- Flow 1:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 142.226 ms
Loss rate: 0.45%
-- Flow 2:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 156.627 ms
Loss rate: 0.49%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 142.643 ms
Loss rate: 1.25%
```

# Run 1: Report of SReAM — Data Link

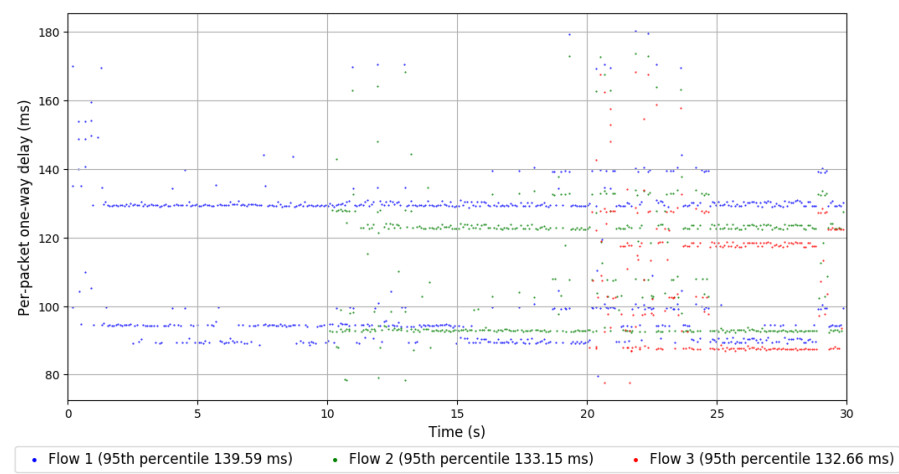
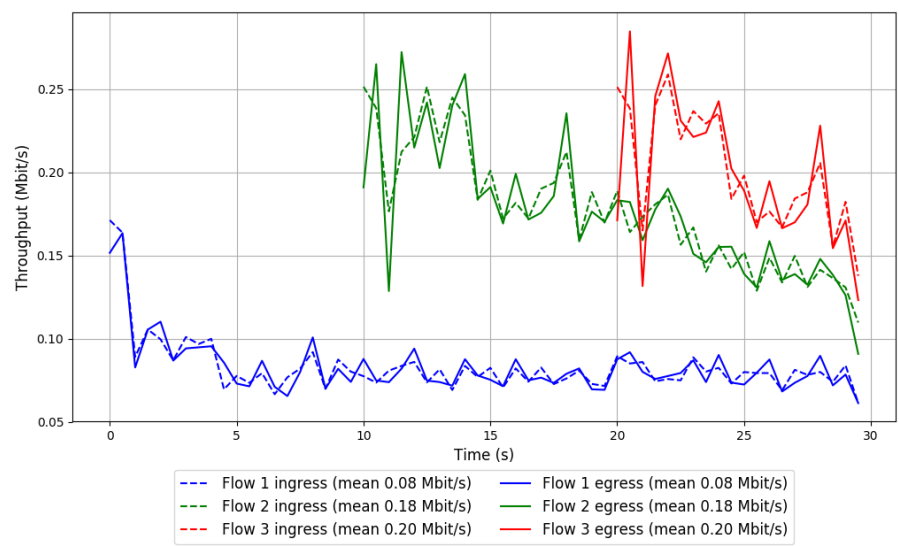


Run 2: Statistics of SCReAM

Start at: 2017-12-11 09:32:24  
End at: 2017-12-11 09:32:54  
Local clock offset: -4.887 ms  
Remote clock offset: 1.372 ms

# Below is generated by plot.py at 2017-12-11 10:45:15  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.27 Mbit/s  
95th percentile per-packet one-way delay: 139.354 ms  
Loss rate: 0.74%  
-- Flow 1:  
Average throughput: 0.08 Mbit/s  
95th percentile per-packet one-way delay: 139.592 ms  
Loss rate: 0.37%  
-- Flow 2:  
Average throughput: 0.18 Mbit/s  
95th percentile per-packet one-way delay: 133.153 ms  
Loss rate: 0.66%  
-- Flow 3:  
Average throughput: 0.20 Mbit/s  
95th percentile per-packet one-way delay: 132.655 ms  
Loss rate: 1.34%

Run 2: Report of SReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2017-12-11 09:48:59

End at: 2017-12-11 09:49:29

Local clock offset: -2.27 ms

Remote clock offset: 0.592 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.31 Mbit/s

95th percentile per-packet one-way delay: 155.370 ms

Loss rate: 0.91%

-- Flow 1:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 155.671 ms

Loss rate: 0.62%

-- Flow 2:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 141.241 ms

Loss rate: 0.89%

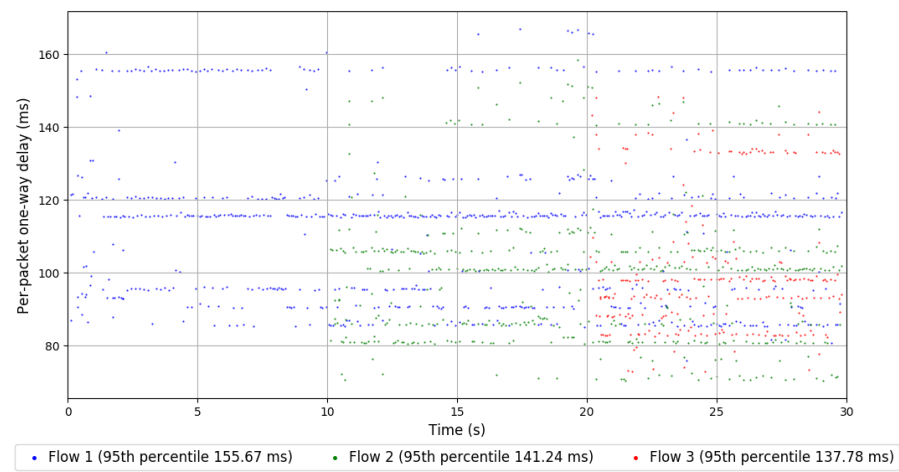
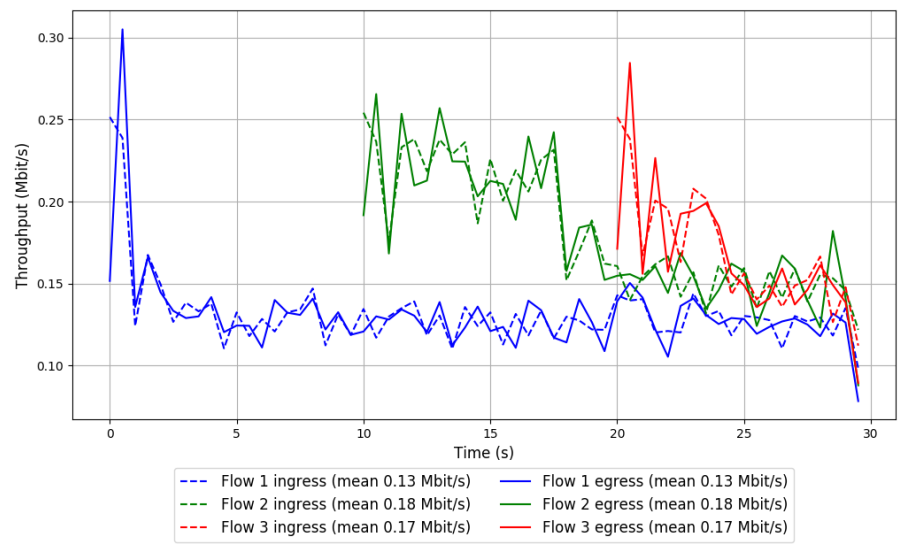
-- Flow 3:

Average throughput: 0.17 Mbit/s

95th percentile per-packet one-way delay: 137.779 ms

Loss rate: 1.63%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of WebRTC media

Start at: 2017-12-11 09:04:56

End at: 2017-12-11 09:05:26

Local clock offset: -3.872 ms

Remote clock offset: 1.62 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 1.12 Mbit/s

95th percentile per-packet one-way delay: 372.607 ms

Loss rate: 10.13%

-- Flow 1:

Average throughput: 0.45 Mbit/s

95th percentile per-packet one-way delay: 377.674 ms

Loss rate: 11.30%

-- Flow 2:

Average throughput: 0.37 Mbit/s

95th percentile per-packet one-way delay: 376.037 ms

Loss rate: 10.71%

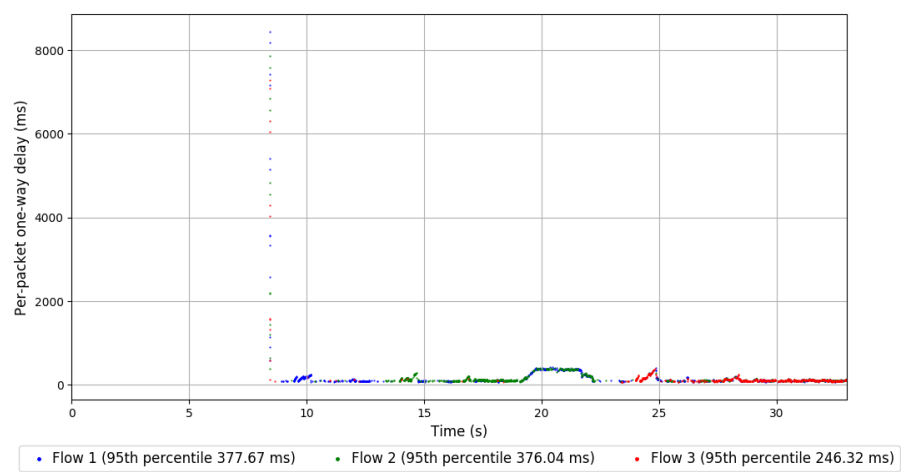
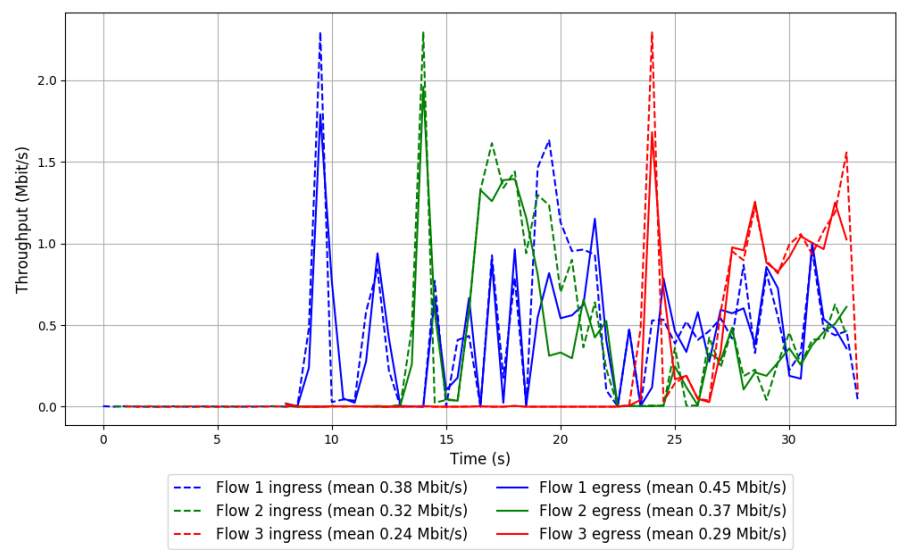
-- Flow 3:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 246.317 ms

Loss rate: 7.50%

Run 1: Report of WebRTC media — Data Link



Run 2: Statistics of WebRTC media

Start at: 2017-12-11 09:21:46

End at: 2017-12-11 09:22:16

Local clock offset: -6.94 ms

Remote clock offset: 1.945 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 1.11 Mbit/s

95th percentile per-packet one-way delay: 348.202 ms

Loss rate: 6.44%

-- Flow 1:

Average throughput: 0.56 Mbit/s

95th percentile per-packet one-way delay: 288.000 ms

Loss rate: 1.58%

-- Flow 2:

Average throughput: 0.35 Mbit/s

95th percentile per-packet one-way delay: 280.797 ms

Loss rate: 3.64%

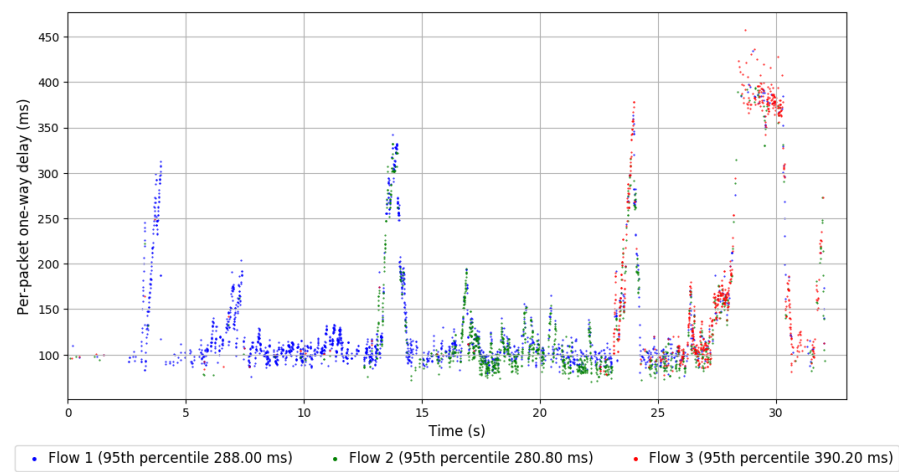
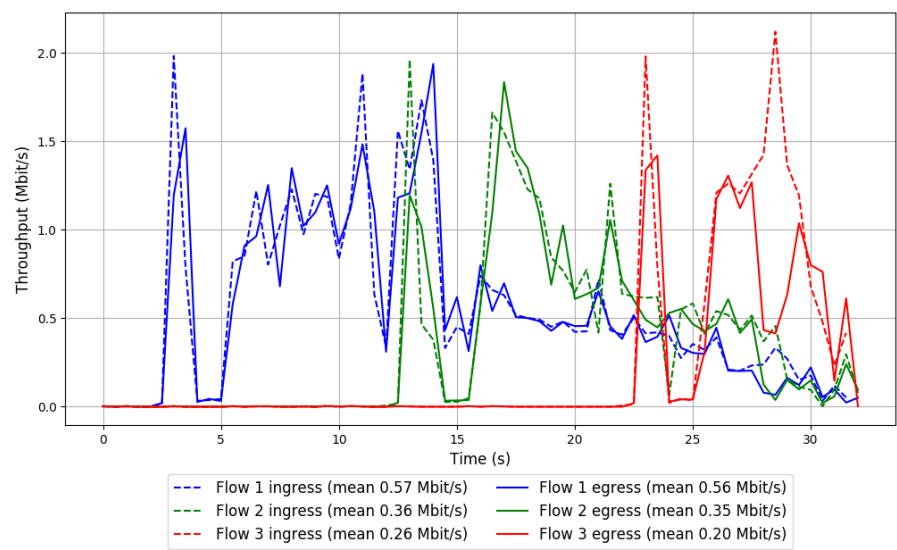
-- Flow 3:

Average throughput: 0.20 Mbit/s

95th percentile per-packet one-way delay: 390.201 ms

Loss rate: 21.12%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2017-12-11 09:38:19

End at: 2017-12-11 09:38:49

Local clock offset: -3.96 ms

Remote clock offset: 1.02 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 1.37 Mbit/s

95th percentile per-packet one-way delay: 353.977 ms

Loss rate: 1.53%

-- Flow 1:

Average throughput: 0.80 Mbit/s

95th percentile per-packet one-way delay: 344.928 ms

Loss rate: 0.74%

-- Flow 2:

Average throughput: 0.37 Mbit/s

95th percentile per-packet one-way delay: 363.282 ms

Loss rate: 2.52%

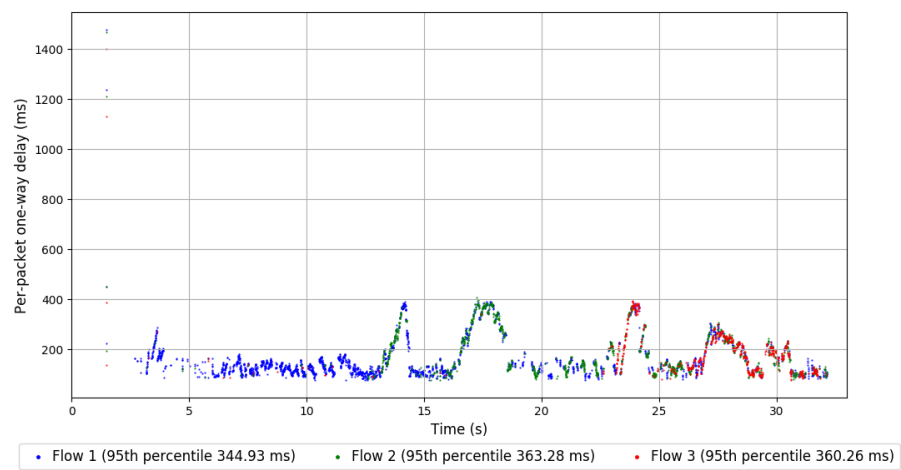
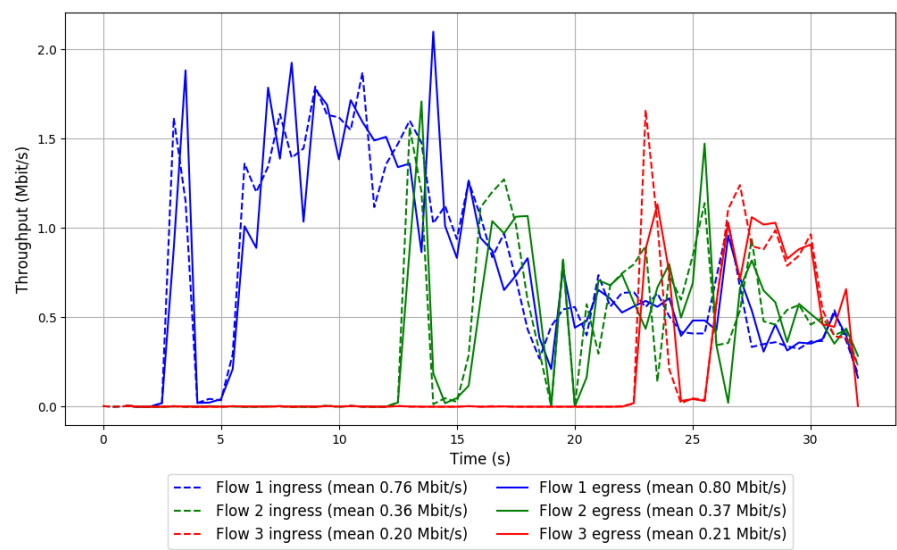
-- Flow 3:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 360.259 ms

Loss rate: 2.75%

Run 3: Report of WebRTC media — Data Link



Run 1: Statistics of Sprout

Start at: 2017-12-11 09:14:39

End at: 2017-12-11 09:15:09

Local clock offset: -6.136 ms

Remote clock offset: 2.171 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.53 Mbit/s

95th percentile per-packet one-way delay: 136.154 ms

Loss rate: 0.73%

-- Flow 1:

Average throughput: 0.23 Mbit/s

95th percentile per-packet one-way delay: 137.317 ms

Loss rate: 0.33%

-- Flow 2:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 136.516 ms

Loss rate: 0.03%

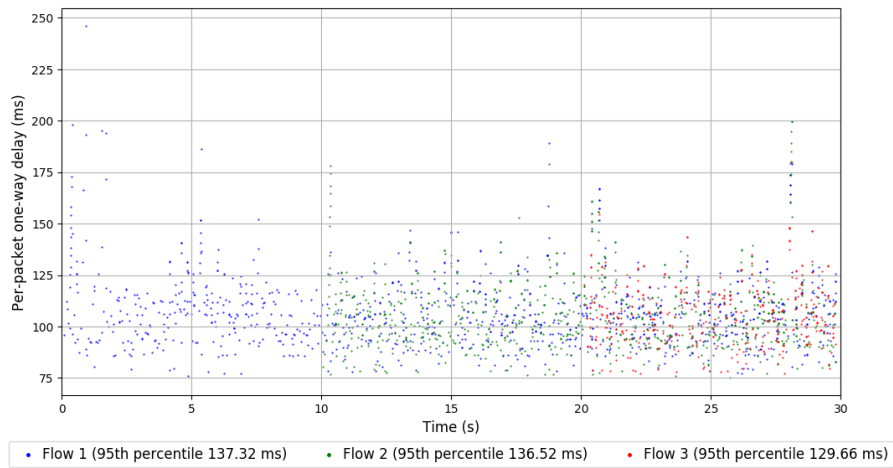
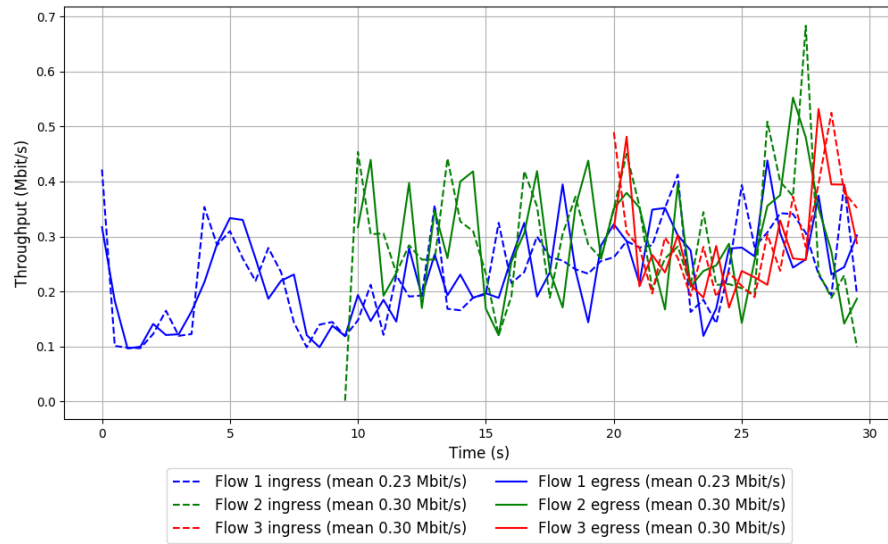
-- Flow 3:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 129.665 ms

Loss rate: 3.07%

## Run 1: Report of Sprout — Data Link



Run 2: Statistics of Sprout

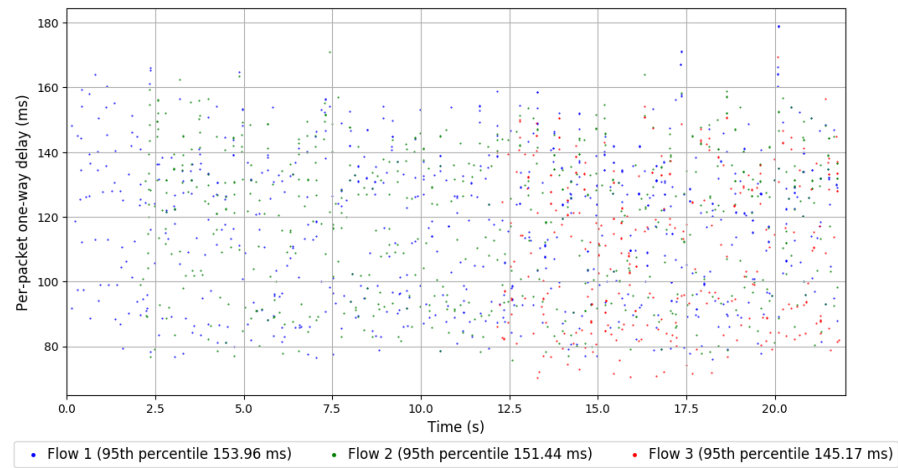
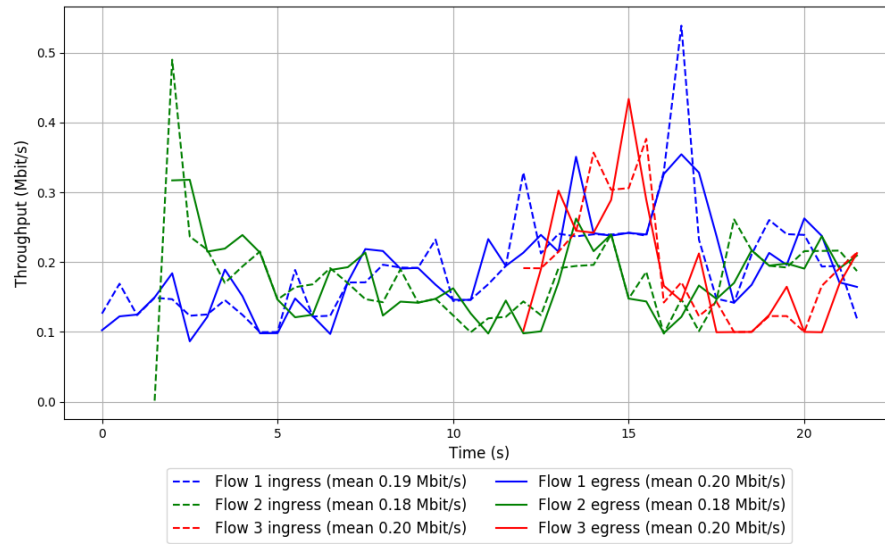
Start at: 2017-12-11 09:31:13

End at: 2017-12-11 09:31:43

Local clock offset: -5.188 ms

Remote clock offset: 1.491 ms

## Run 2: Report of Sprout — Data Link



Run 3: Statistics of Sprout

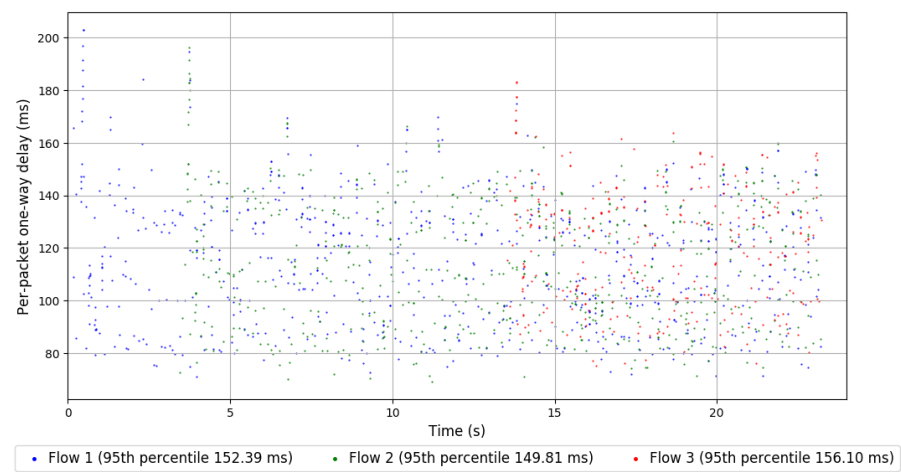
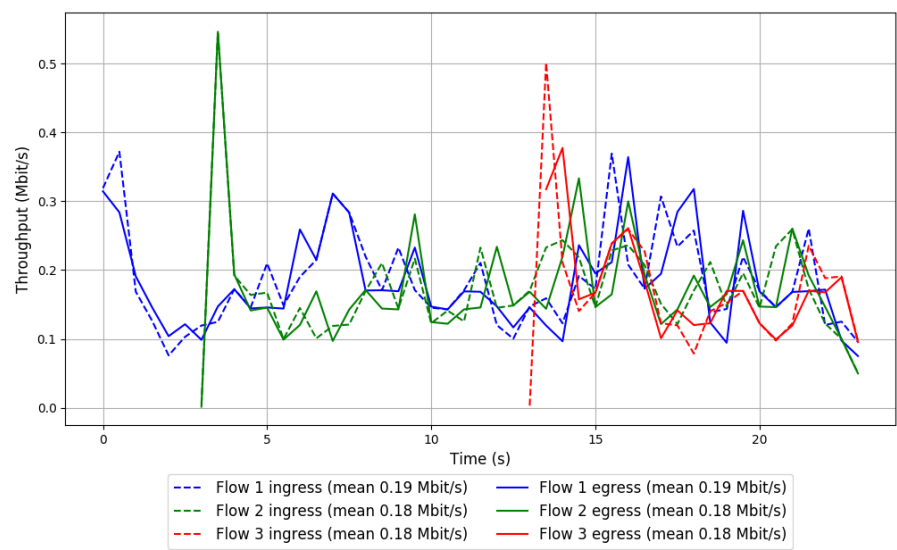
Start at: 2017-12-11 09:47:48

End at: 2017-12-11 09:48:18

Local clock offset: -2.356 ms

Remote clock offset: 0.667 ms

Run 3: Report of Sprout — Data Link

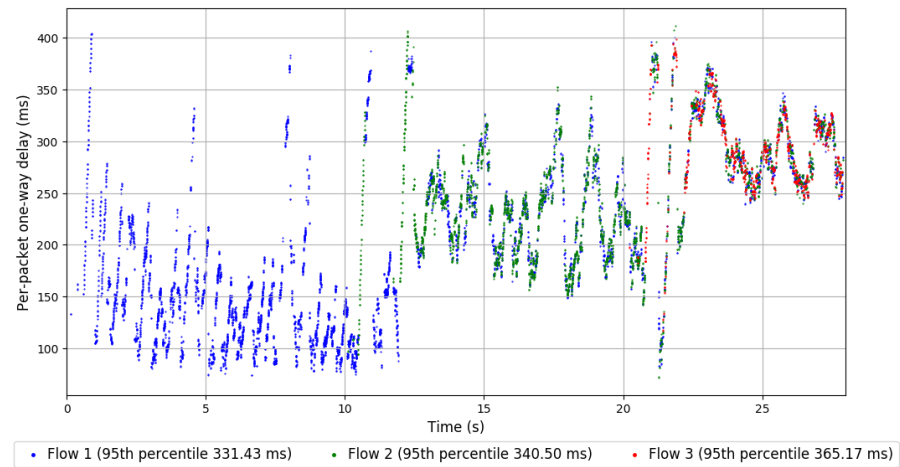
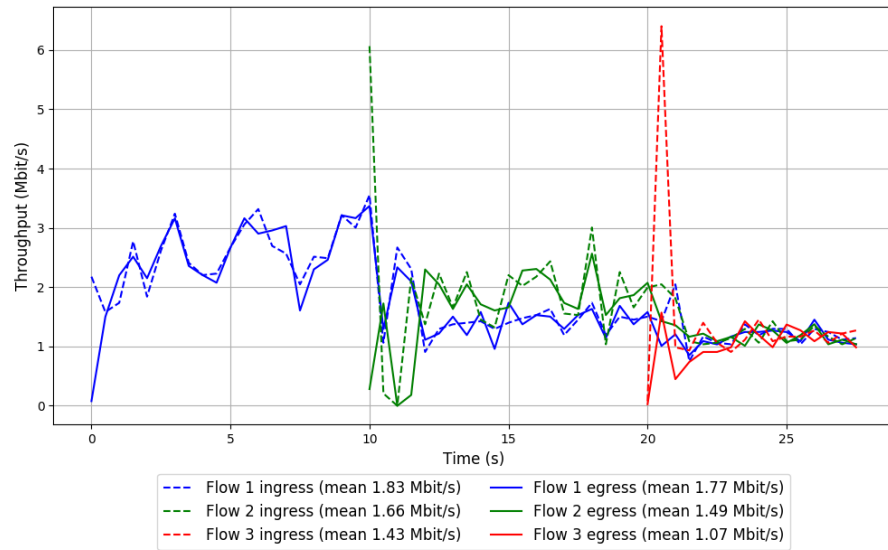


```
Run 1: Statistics of TaoVA-100x

Start at: 2017-12-11 09:18:12
End at: 2017-12-11 09:18:42
Local clock offset: -7.092 ms
Remote clock offset: 2.195 ms

# Below is generated by plot.py at 2017-12-11 10:45:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.02 Mbit/s
95th percentile per-packet one-way delay: 339.326 ms
Loss rate: 8.86%
-- Flow 1:
Average throughput: 1.77 Mbit/s
95th percentile per-packet one-way delay: 331.428 ms
Loss rate: 3.58%
-- Flow 2:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 340.498 ms
Loss rate: 10.85%
-- Flow 3:
Average throughput: 1.07 Mbit/s
95th percentile per-packet one-way delay: 365.167 ms
Loss rate: 27.51%
```

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



Run 2: Statistics of TaoVA-100x

Start at: 2017-12-11 09:34:46

End at: 2017-12-11 09:35:16

Local clock offset: -4.493 ms

Remote clock offset: 1.235 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.87 Mbit/s

95th percentile per-packet one-way delay: 369.518 ms

Loss rate: 3.84%

-- Flow 1:

Average throughput: 1.65 Mbit/s

95th percentile per-packet one-way delay: 359.133 ms

Loss rate: 2.28%

-- Flow 2:

Average throughput: 1.42 Mbit/s

95th percentile per-packet one-way delay: 372.178 ms

Loss rate: 4.81%

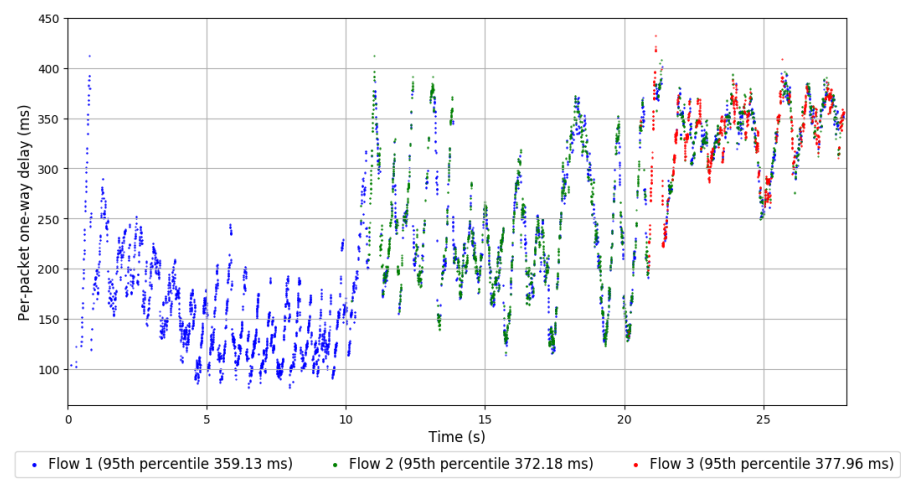
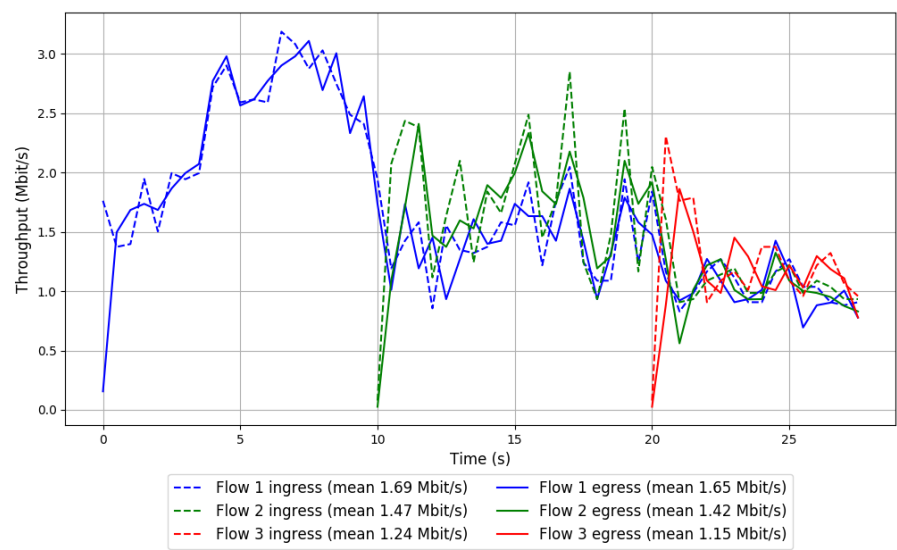
-- Flow 3:

Average throughput: 1.15 Mbit/s

95th percentile per-packet one-way delay: 377.964 ms

Loss rate: 8.78%

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



Run 3: Statistics of TaoVA-100x

Start at: 2017-12-11 09:51:21

End at: 2017-12-11 09:51:51

Local clock offset: -2.241 ms

Remote clock offset: 0.474 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.53 Mbit/s

95th percentile per-packet one-way delay: 370.870 ms

Loss rate: 12.83%

-- Flow 1:

Average throughput: 1.58 Mbit/s

95th percentile per-packet one-way delay: 357.233 ms

Loss rate: 5.01%

-- Flow 2:

Average throughput: 1.32 Mbit/s

95th percentile per-packet one-way delay: 375.697 ms

Loss rate: 9.21%

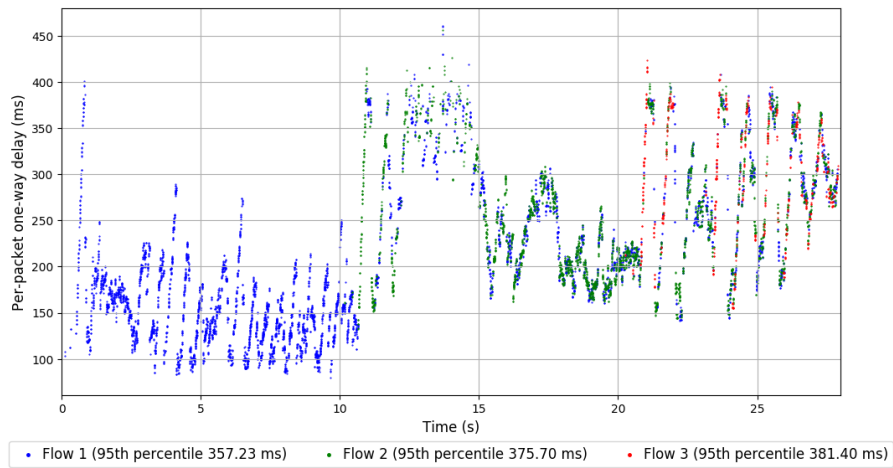
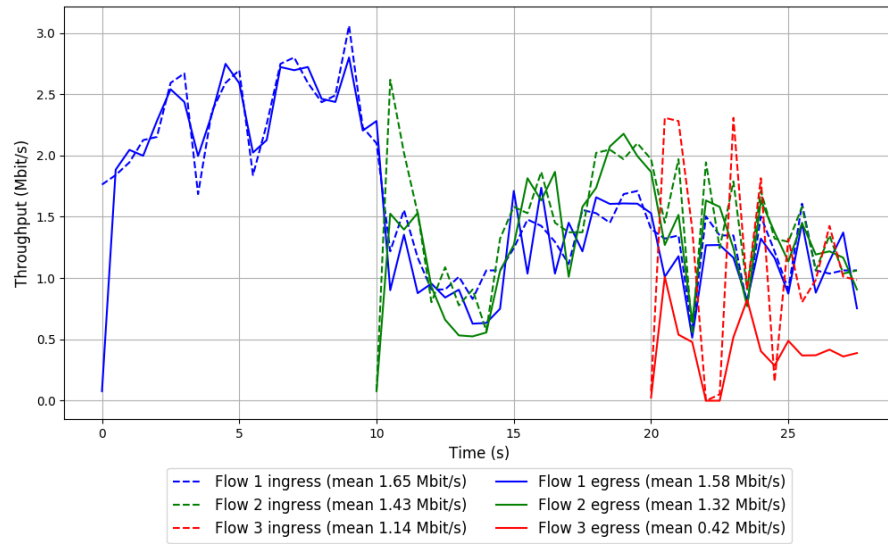
-- Flow 3:

Average throughput: 0.42 Mbit/s

95th percentile per-packet one-way delay: 381.396 ms

Loss rate: 63.66%

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



Run 1: Statistics of TCP Vegas

Start at: 2017-12-11 09:12:16

End at: 2017-12-11 09:12:46

Local clock offset: -5.58 ms

Remote clock offset: 2.012 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.61 Mbit/s

95th percentile per-packet one-way delay: 235.426 ms

Loss rate: 0.69%

-- Flow 1:

Average throughput: 1.64 Mbit/s

95th percentile per-packet one-way delay: 225.144 ms

Loss rate: 0.49%

-- Flow 2:

Average throughput: 1.02 Mbit/s

95th percentile per-packet one-way delay: 232.371 ms

Loss rate: 0.89%

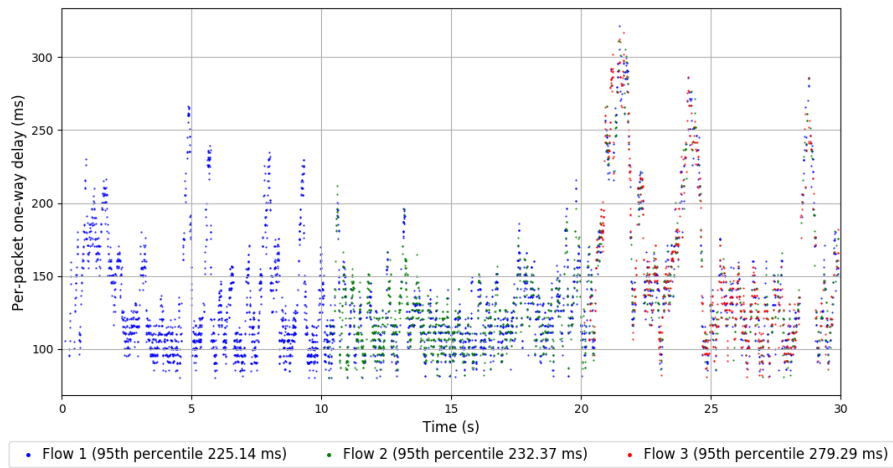
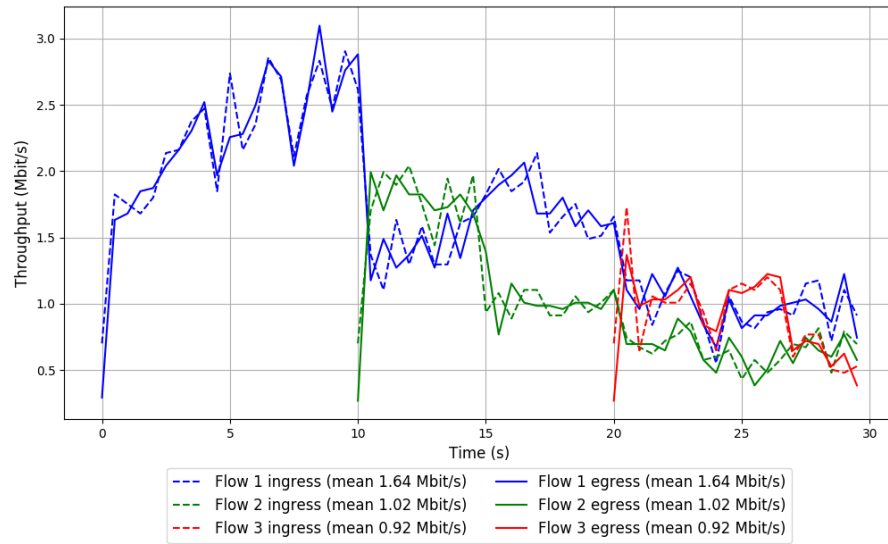
-- Flow 3:

Average throughput: 0.92 Mbit/s

95th percentile per-packet one-way delay: 279.286 ms

Loss rate: 1.32%

# Run 1: Report of TCP Vegas — Data Link



Run 2: Statistics of TCP Vegas

Start at: 2017-12-11 09:28:52

End at: 2017-12-11 09:29:22

Local clock offset: -5.763 ms

Remote clock offset: 1.505 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.83 Mbit/s

95th percentile per-packet one-way delay: 325.240 ms

Loss rate: 2.49%

-- Flow 1:

Average throughput: 1.18 Mbit/s

95th percentile per-packet one-way delay: 325.150 ms

Loss rate: 2.80%

-- Flow 2:

Average throughput: 1.48 Mbit/s

95th percentile per-packet one-way delay: 339.878 ms

Loss rate: 1.98%

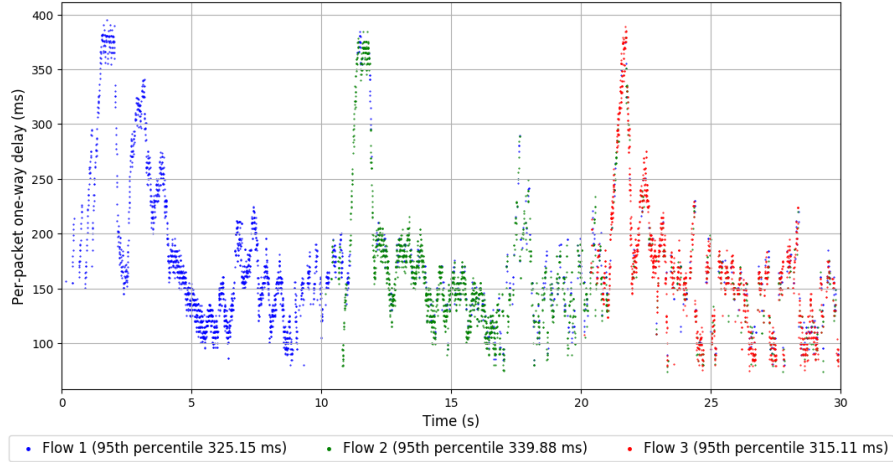
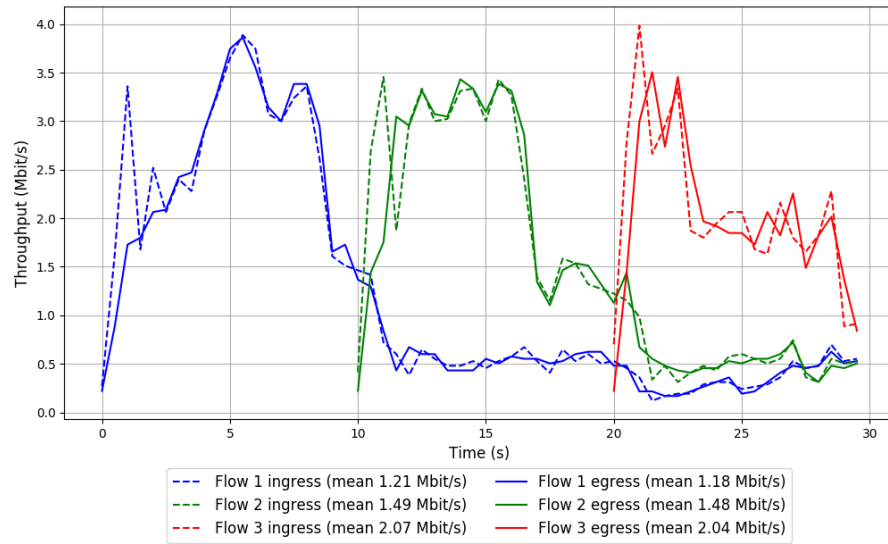
-- Flow 3:

Average throughput: 2.04 Mbit/s

95th percentile per-packet one-way delay: 315.111 ms

Loss rate: 2.69%

## Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2017-12-11 09:45:26

End at: 2017-12-11 09:45:56

Local clock offset: -2.583 ms

Remote clock offset: 0.751 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.87 Mbit/s

95th percentile per-packet one-way delay: 260.343 ms

Loss rate: 1.63%

-- Flow 1:

Average throughput: 1.74 Mbit/s

95th percentile per-packet one-way delay: 275.109 ms

Loss rate: 1.89%

-- Flow 2:

Average throughput: 1.36 Mbit/s

95th percentile per-packet one-way delay: 244.411 ms

Loss rate: 1.02%

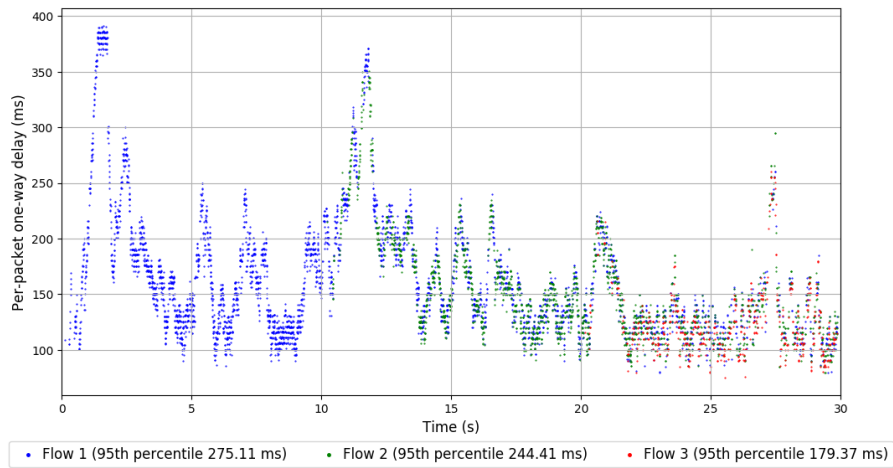
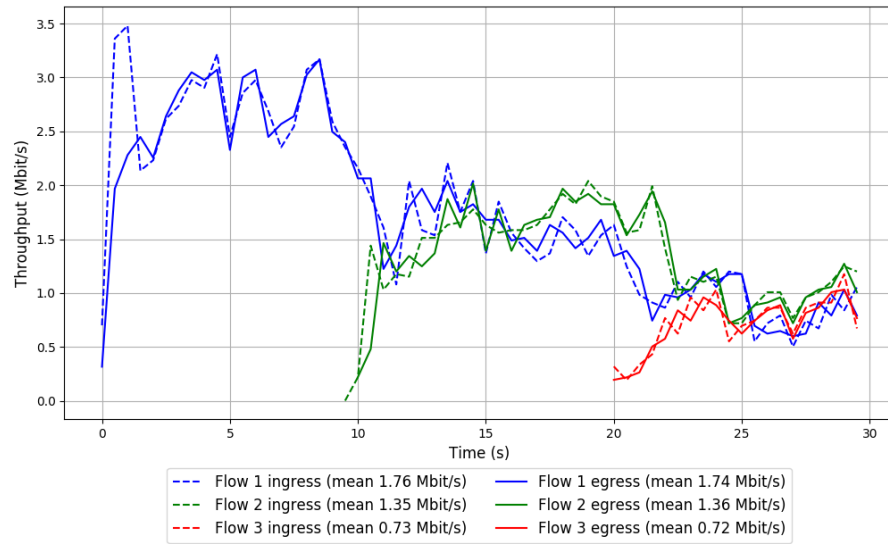
-- Flow 3:

Average throughput: 0.72 Mbit/s

95th percentile per-packet one-way delay: 179.372 ms

Loss rate: 2.02%

### Run 3: Report of TCP Vegas — Data Link

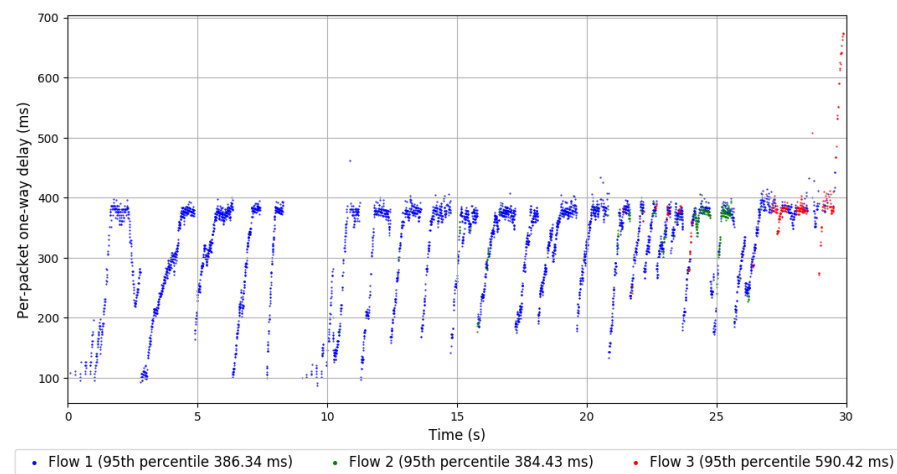
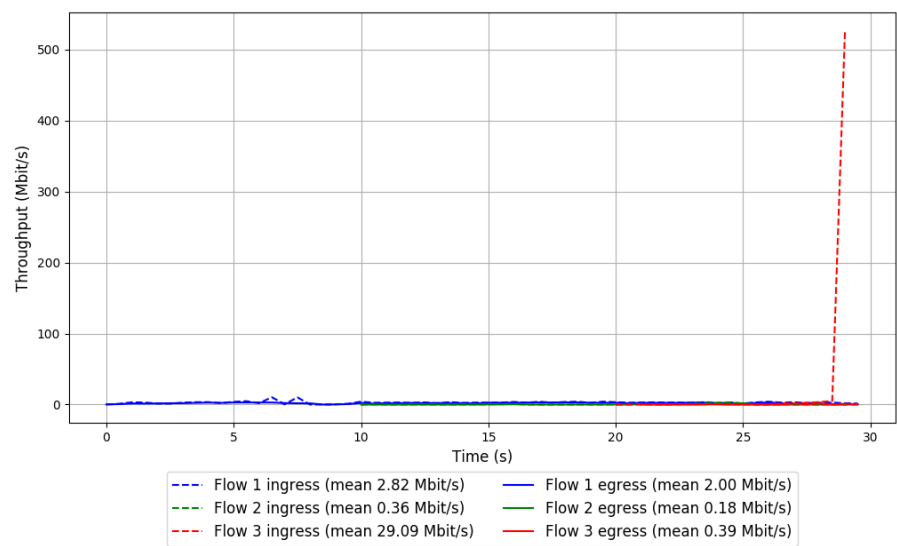


Run 1: Statistics of Verus

Start at: 2017-12-11 09:11:03  
End at: 2017-12-11 09:11:33  
Local clock offset: -5.251 ms  
Remote clock offset: 2.132 ms

# Below is generated by plot.py at 2017-12-11 10:45:15  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 2.21 Mbit/s  
95th percentile per-packet one-way delay: 387.390 ms  
Loss rate: 81.88%  
-- Flow 1:  
Average throughput: 2.00 Mbit/s  
95th percentile per-packet one-way delay: 386.342 ms  
Loss rate: 30.12%  
-- Flow 2:  
Average throughput: 0.18 Mbit/s  
95th percentile per-packet one-way delay: 384.433 ms  
Loss rate: 51.16%  
-- Flow 3:  
Average throughput: 0.39 Mbit/s  
95th percentile per-packet one-way delay: 590.425 ms  
Loss rate: 98.79%

Run 1: Report of Verus — Data Link

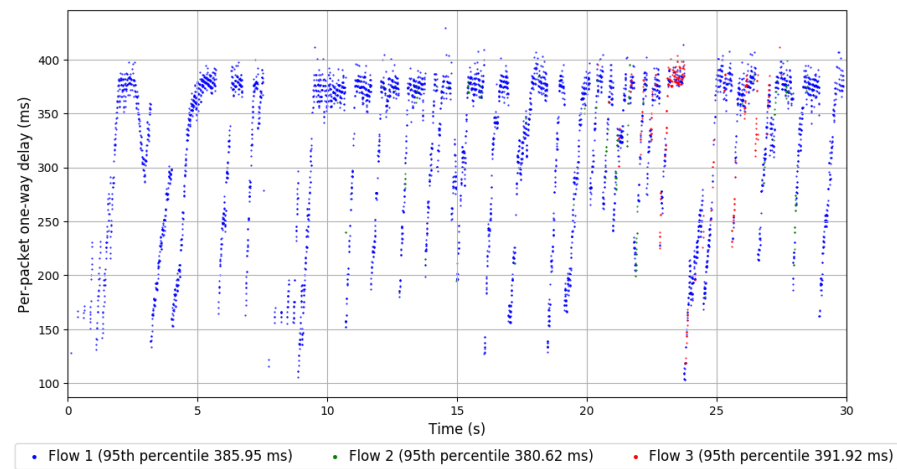
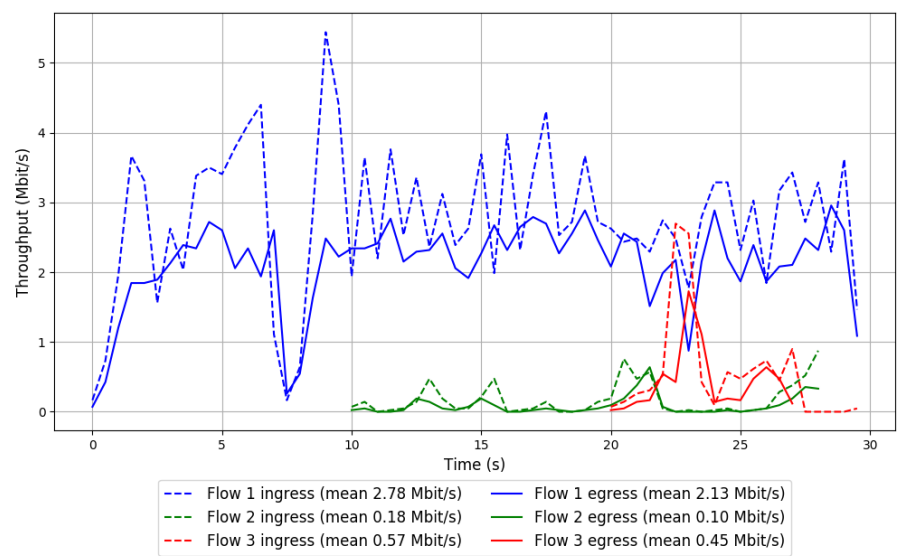


Run 2: Statistics of Verus

Start at: 2017-12-11 09:27:41  
End at: 2017-12-11 09:28:11  
Local clock offset: -5.942 ms  
Remote clock offset: 1.675 ms

# Below is generated by plot.py at 2017-12-11 10:45:15  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 2.30 Mbit/s  
95th percentile per-packet one-way delay: 386.159 ms  
Loss rate: 25.38%  
-- Flow 1:  
Average throughput: 2.13 Mbit/s  
95th percentile per-packet one-way delay: 385.946 ms  
Loss rate: 23.50%  
-- Flow 2:  
Average throughput: 0.10 Mbit/s  
95th percentile per-packet one-way delay: 380.624 ms  
Loss rate: 46.91%  
-- Flow 3:  
Average throughput: 0.45 Mbit/s  
95th percentile per-packet one-way delay: 391.918 ms  
Loss rate: 41.18%

Run 2: Report of Verus — Data Link

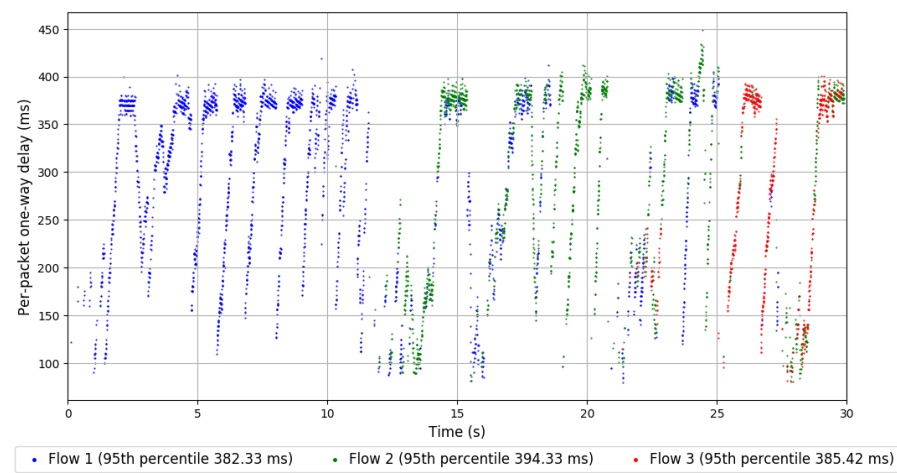
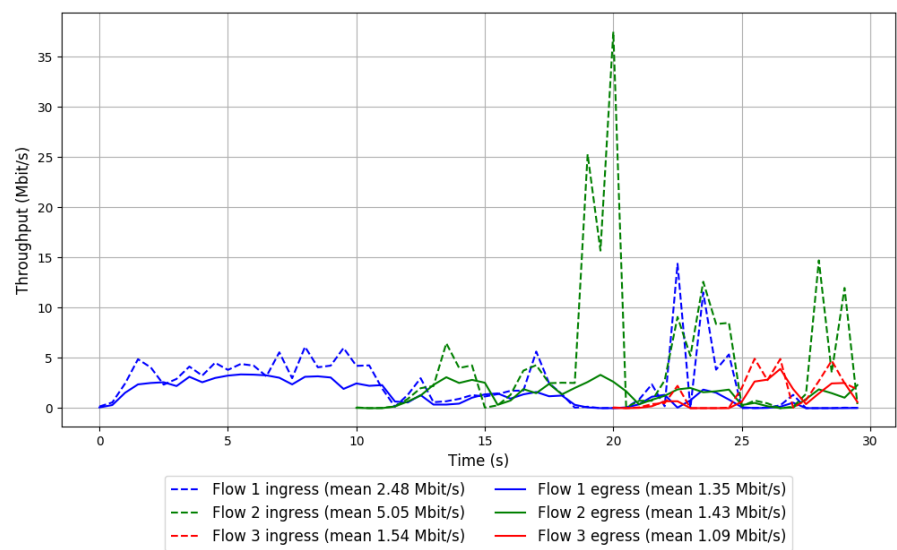


Run 3: Statistics of Verus

Start at: 2017-12-11 09:44:15  
End at: 2017-12-11 09:44:45  
Local clock offset: -2.741 ms  
Remote clock offset: 0.767 ms

# Below is generated by plot.py at 2017-12-11 10:45:15  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 2.64 Mbit/s  
95th percentile per-packet one-way delay: 387.720 ms  
Loss rate: 58.22%  
-- Flow 1:  
Average throughput: 1.35 Mbit/s  
95th percentile per-packet one-way delay: 382.330 ms  
Loss rate: 45.87%  
-- Flow 2:  
Average throughput: 1.43 Mbit/s  
95th percentile per-packet one-way delay: 394.330 ms  
Loss rate: 71.66%  
-- Flow 3:  
Average throughput: 1.09 Mbit/s  
95th percentile per-packet one-way delay: 385.417 ms  
Loss rate: 31.35%

Run 3: Report of Verus — Data Link



Run 1: Statistics of Copa

Start at: 2017-12-11 09:08:41

End at: 2017-12-11 09:09:11

Local clock offset: -4.66 ms

Remote clock offset: 1.95 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 1.99 Mbit/s

95th percentile per-packet one-way delay: 278.667 ms

Loss rate: 0.93%

-- Flow 1:

Average throughput: 1.14 Mbit/s

95th percentile per-packet one-way delay: 277.839 ms

Loss rate: 0.49%

-- Flow 2:

Average throughput: 1.08 Mbit/s

95th percentile per-packet one-way delay: 266.392 ms

Loss rate: 1.14%

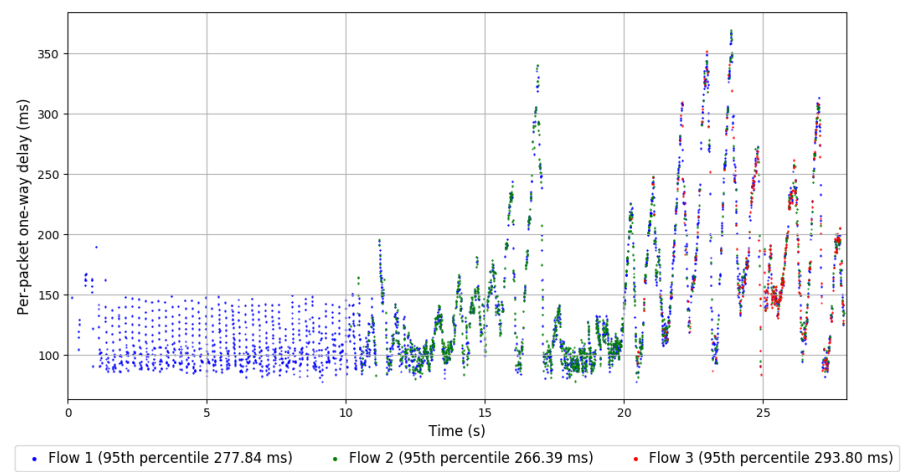
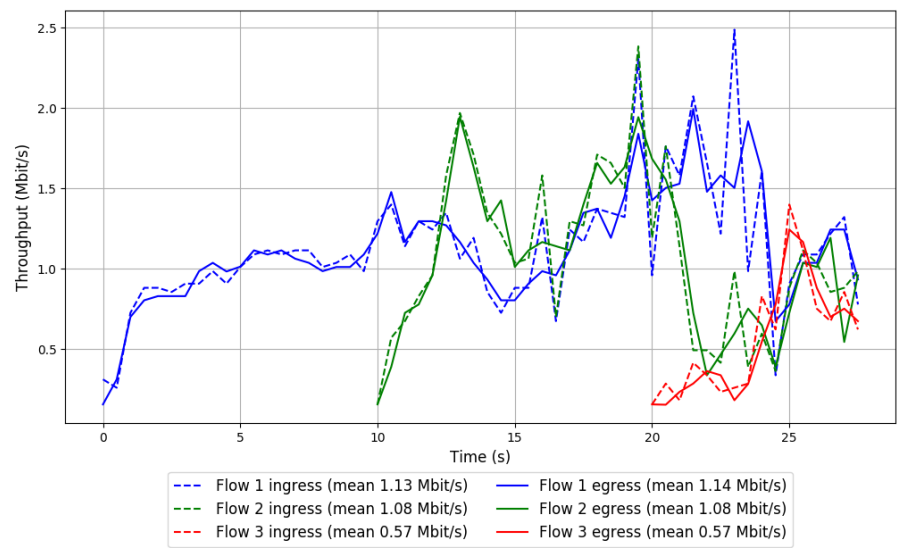
-- Flow 3:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 293.797 ms

Loss rate: 3.18%

Run 1: Report of Copa — Data Link



Run 2: Statistics of Copa

Start at: 2017-12-11 09:25:19

End at: 2017-12-11 09:25:49

Local clock offset: -6.253 ms

Remote clock offset: 1.692 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.00 Mbit/s

95th percentile per-packet one-way delay: 238.268 ms

Loss rate: 1.33%

-- Flow 1:

Average throughput: 1.35 Mbit/s

95th percentile per-packet one-way delay: 236.547 ms

Loss rate: 0.78%

-- Flow 2:

Average throughput: 0.81 Mbit/s

95th percentile per-packet one-way delay: 229.985 ms

Loss rate: 1.90%

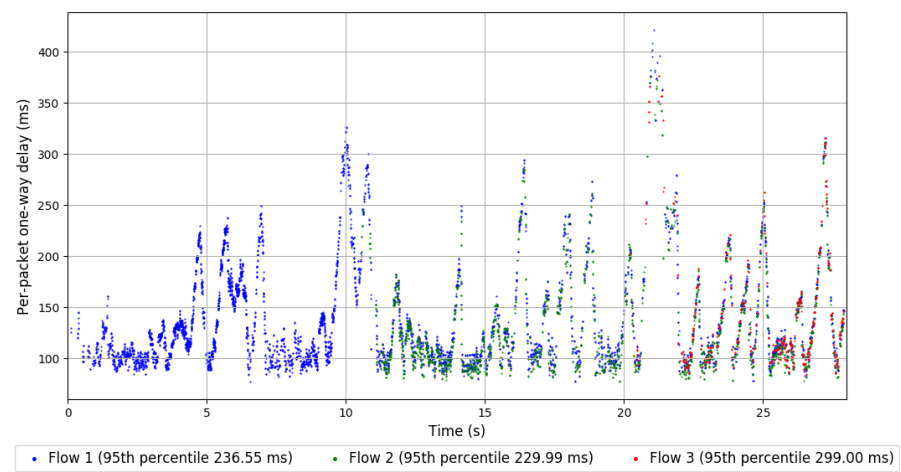
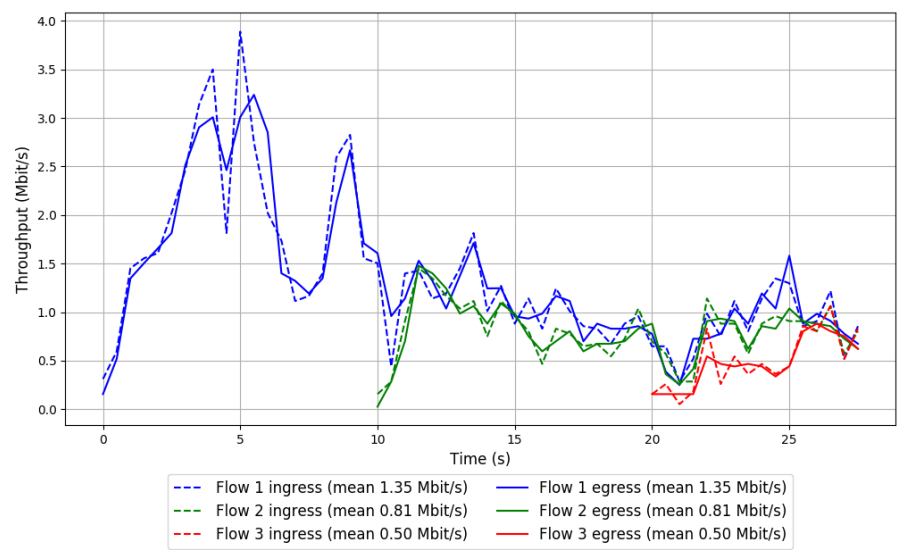
-- Flow 3:

Average throughput: 0.50 Mbit/s

95th percentile per-packet one-way delay: 298.996 ms

Loss rate: 4.55%

Run 2: Report of Copa — Data Link

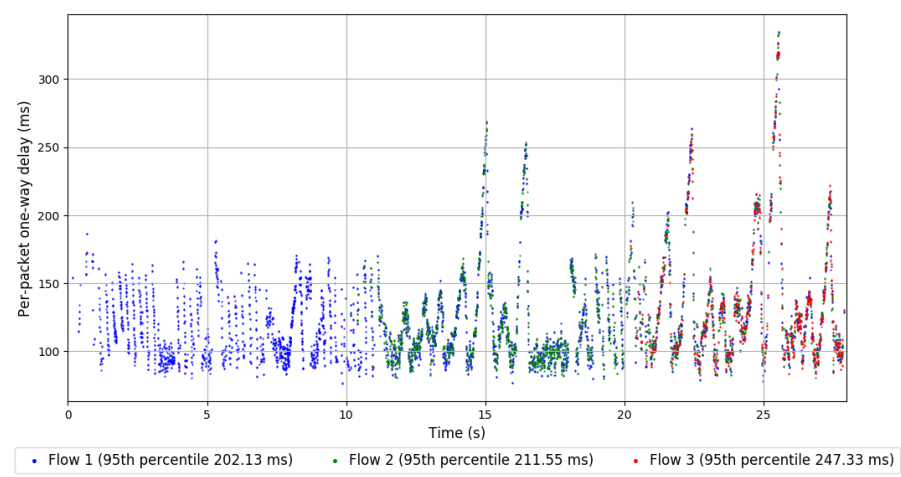
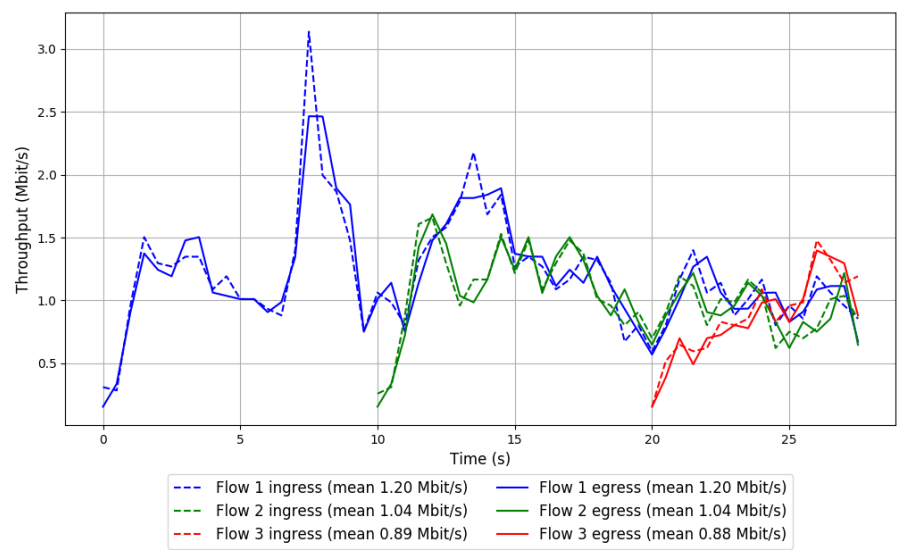


Run 3: Statistics of Copa

Start at: 2017-12-11 09:41:53  
End at: 2017-12-11 09:42:23  
Local clock offset: -3.128 ms  
Remote clock offset: 0.874 ms

# Below is generated by plot.py at 2017-12-11 10:45:15  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 2.11 Mbit/s  
95th percentile per-packet one-way delay: 208.593 ms  
Loss rate: 1.01%  
-- Flow 1:  
Average throughput: 1.20 Mbit/s  
95th percentile per-packet one-way delay: 202.135 ms  
Loss rate: 0.46%  
-- Flow 2:  
Average throughput: 1.04 Mbit/s  
95th percentile per-packet one-way delay: 211.550 ms  
Loss rate: 0.98%  
-- Flow 3:  
Average throughput: 0.88 Mbit/s  
95th percentile per-packet one-way delay: 247.326 ms  
Loss rate: 3.70%

Run 3: Report of Copa — Data Link

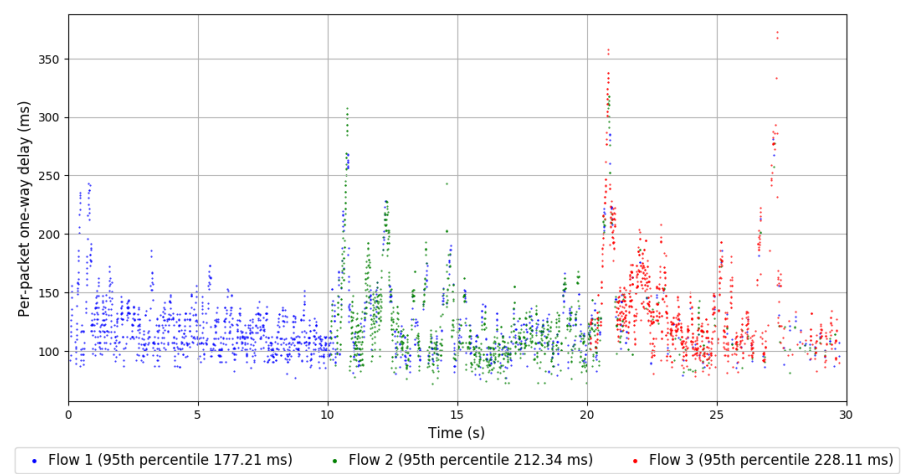
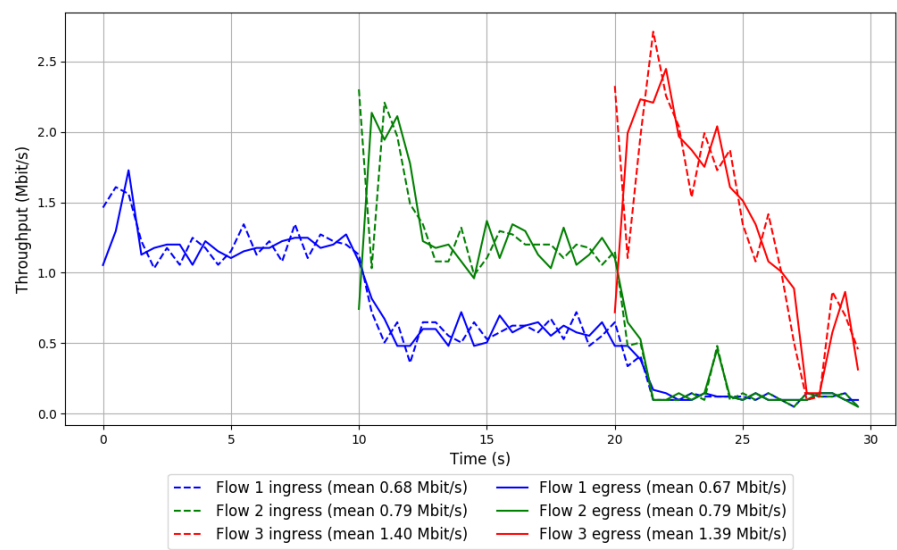


```
Run 1: Statistics of Indigo

Start at: 2017-12-11 09:03:45
End at: 2017-12-11 09:04:15
Local clock offset: -3.624 ms
Remote clock offset: 1.934 ms

# Below is generated by plot.py at 2017-12-11 10:45:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.64 Mbit/s
95th percentile per-packet one-way delay: 209.669 ms
Loss rate: 0.76%
-- Flow 1:
Average throughput: 0.67 Mbit/s
95th percentile per-packet one-way delay: 177.213 ms
Loss rate: 0.60%
-- Flow 2:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 212.345 ms
Loss rate: 0.31%
-- Flow 3:
Average throughput: 1.39 Mbit/s
95th percentile per-packet one-way delay: 228.113 ms
Loss rate: 1.50%
```

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2017-12-11 09:20:35

End at: 2017-12-11 09:21:05

Local clock offset: -7.288 ms

Remote clock offset: 2.005 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 1.44 Mbit/s

95th percentile per-packet one-way delay: 231.897 ms

Loss rate: 2.68%

-- Flow 1:

Average throughput: 0.36 Mbit/s

95th percentile per-packet one-way delay: 196.614 ms

Loss rate: 1.01%

-- Flow 2:

Average throughput: 0.73 Mbit/s

95th percentile per-packet one-way delay: 292.285 ms

Loss rate: 2.78%

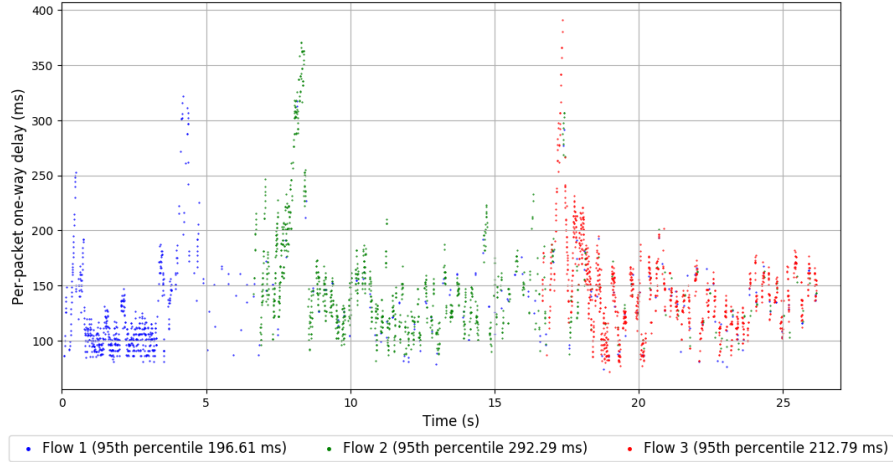
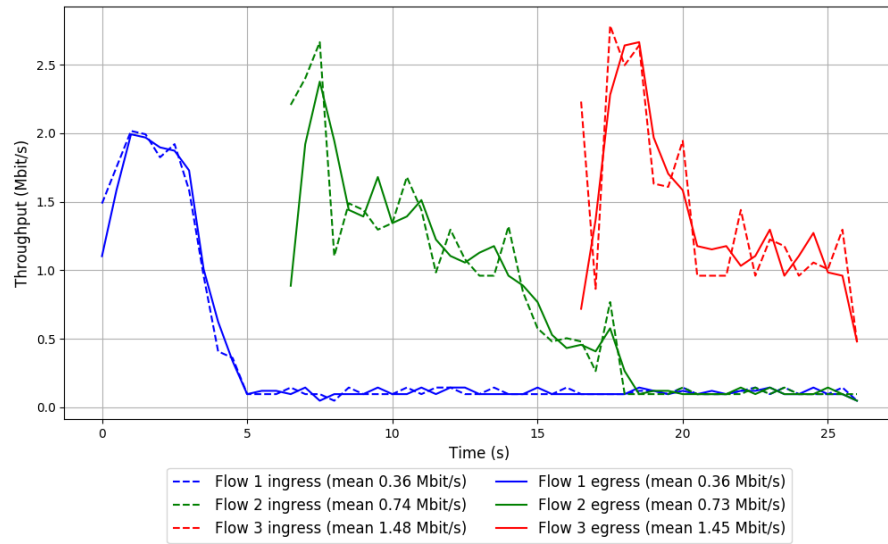
-- Flow 3:

Average throughput: 1.45 Mbit/s

95th percentile per-packet one-way delay: 212.795 ms

Loss rate: 3.68%

## Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2017-12-11 09:37:08

End at: 2017-12-11 09:37:38

Local clock offset: -4.186 ms

Remote clock offset: 1.089 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 1.31 Mbit/s

95th percentile per-packet one-way delay: 232.152 ms

Loss rate: 1.48%

-- Flow 1:

Average throughput: 0.79 Mbit/s

95th percentile per-packet one-way delay: 251.195 ms

Loss rate: 2.15%

-- Flow 2:

Average throughput: 0.33 Mbit/s

95th percentile per-packet one-way delay: 202.448 ms

Loss rate: 0.00%

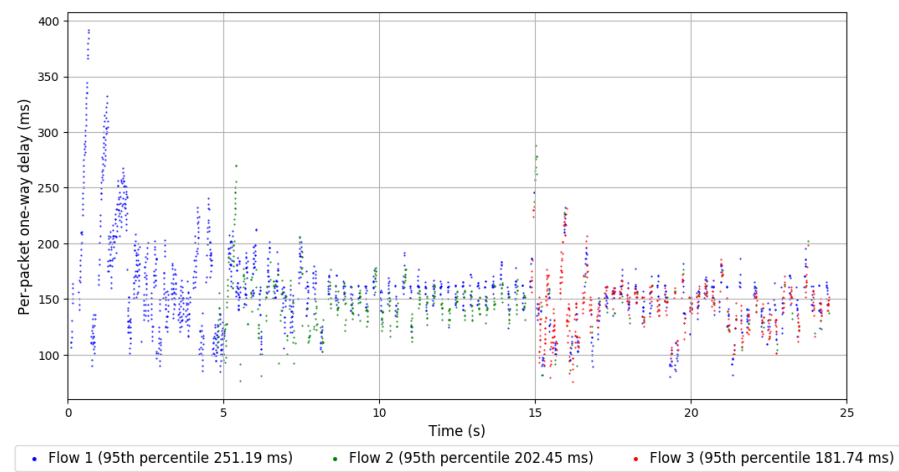
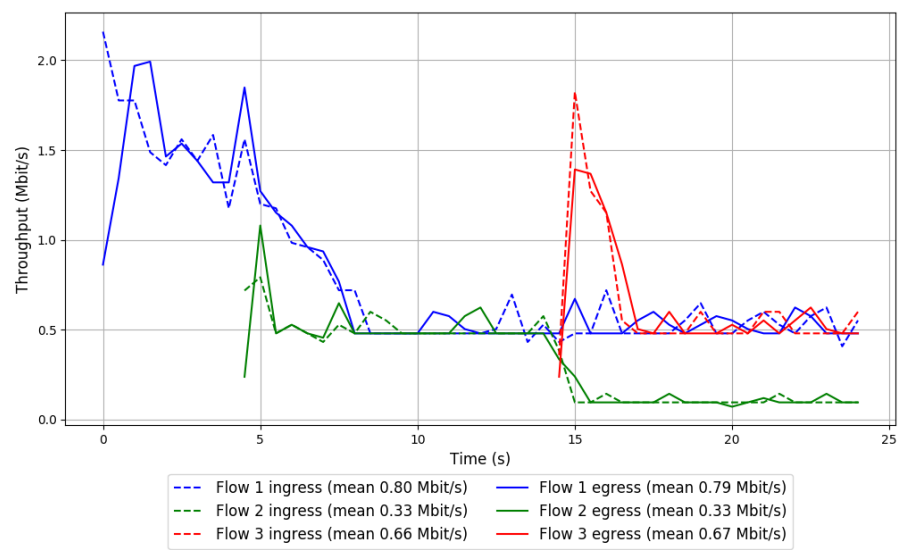
-- Flow 3:

Average throughput: 0.67 Mbit/s

95th percentile per-packet one-way delay: 181.737 ms

Loss rate: 0.93%

Run 3: Report of Indigo — Data Link

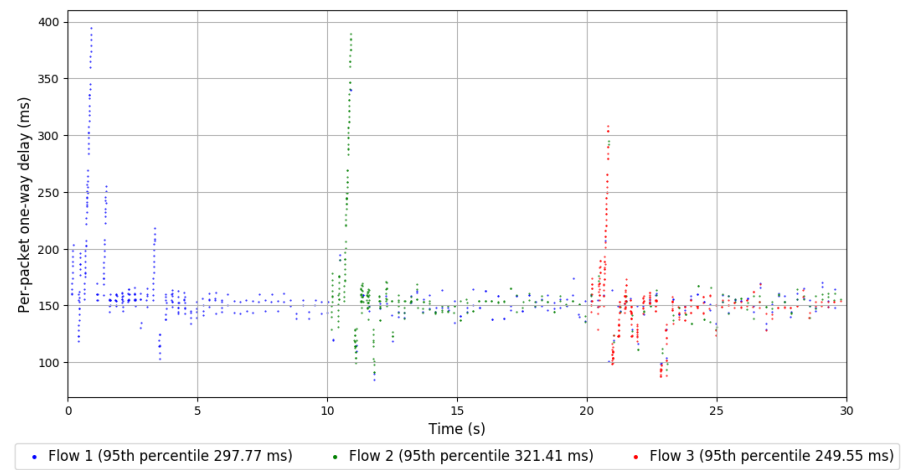
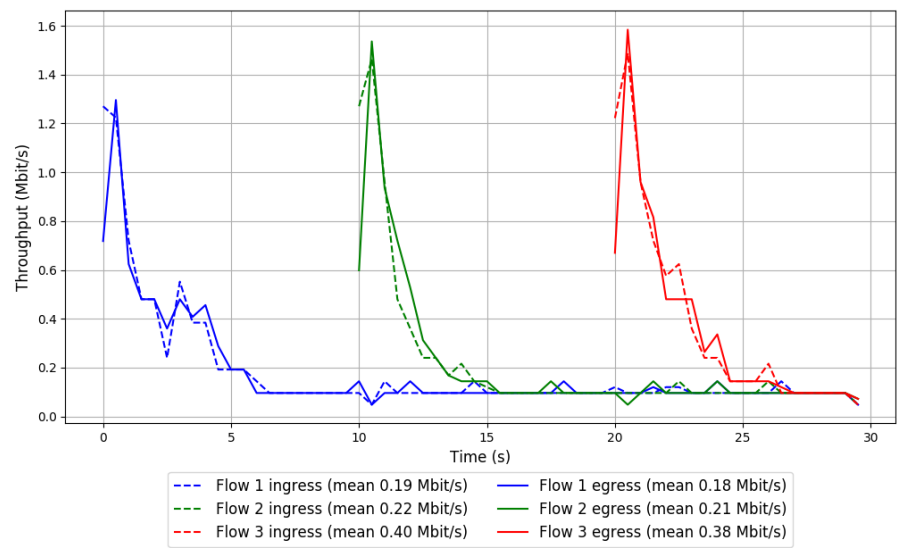


```
Run 1: Statistics of Indigo-calib

Start at: 2017-12-11 09:13:27
End at: 2017-12-11 09:13:57
Local clock offset: -5.854 ms
Remote clock offset: 2.147 ms

# Below is generated by plot.py at 2017-12-11 10:45:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 292.924 ms
Loss rate: 3.43%
-- Flow 1:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 297.767 ms
Loss rate: 3.46%
-- Flow 2:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 321.411 ms
Loss rate: 1.98%
-- Flow 3:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 249.550 ms
Loss rate: 4.99%
```

Run 1: Report of Indigo-calib — Data Link



Run 2: Statistics of Indigo-calib

Start at: 2017-12-11 09:30:02

End at: 2017-12-11 09:30:32

Local clock offset: -5.45 ms

Remote clock offset: 1.355 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.73 Mbit/s

95th percentile per-packet one-way delay: 333.299 ms

Loss rate: 13.92%

-- Flow 1:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 367.544 ms

Loss rate: 27.19%

-- Flow 2:

Average throughput: 0.44 Mbit/s

95th percentile per-packet one-way delay: 269.009 ms

Loss rate: 0.14%

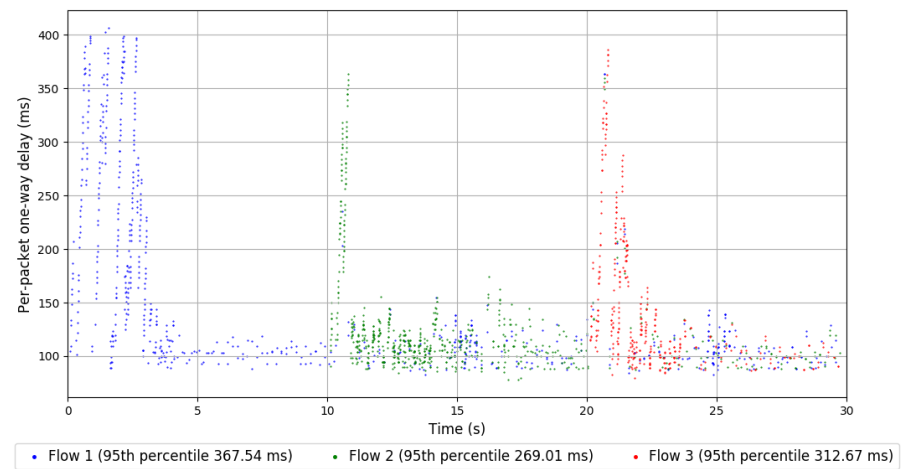
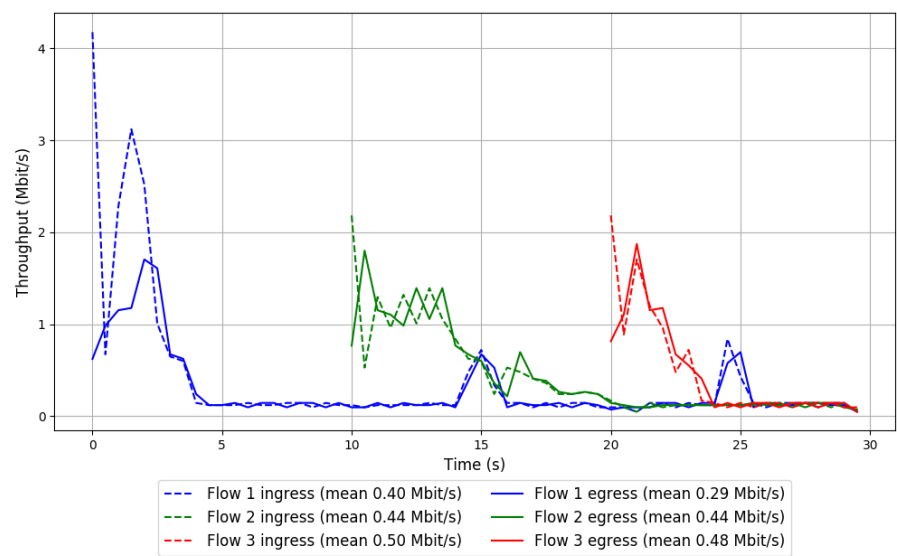
-- Flow 3:

Average throughput: 0.48 Mbit/s

95th percentile per-packet one-way delay: 312.667 ms

Loss rate: 6.13%

Run 2: Report of Indigo-calib — Data Link



Run 3: Statistics of Indigo-calib

Start at: 2017-12-11 09:46:37

End at: 2017-12-11 09:47:07

Local clock offset: -2.458 ms

Remote clock offset: 0.645 ms

# Below is generated by plot.py at 2017-12-11 10:45:15

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 334.640 ms

Loss rate: 7.69%

-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 306.942 ms

Loss rate: 15.24%

-- Flow 2:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 300.670 ms

Loss rate: 3.24%

-- Flow 3:

Average throughput: 0.64 Mbit/s

95th percentile per-packet one-way delay: 348.480 ms

Loss rate: 1.38%

Run 3: Report of Indigo-calib — Data Link

