

## Pantheon Report

Generated at 2017-12-11 10:46:22 (UTC).

Data path: AWS Korea Ethernet (*local*) → China 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).

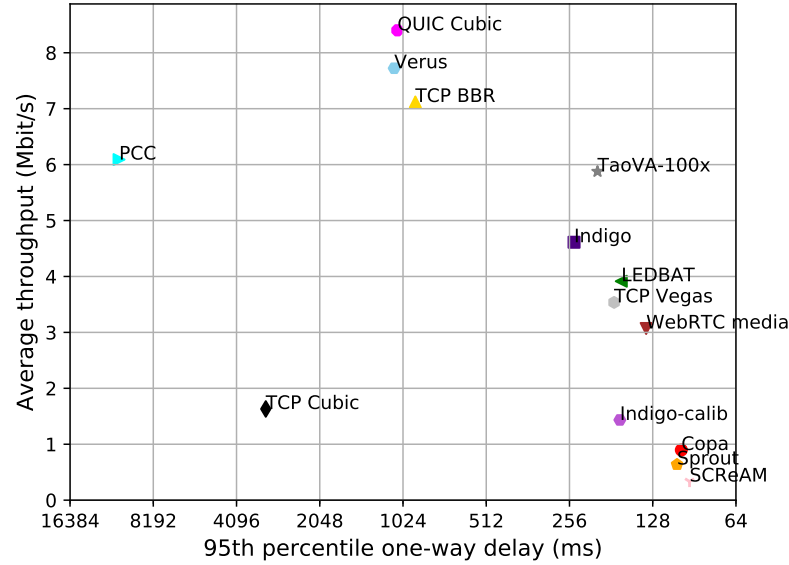
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo\_fast**).

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

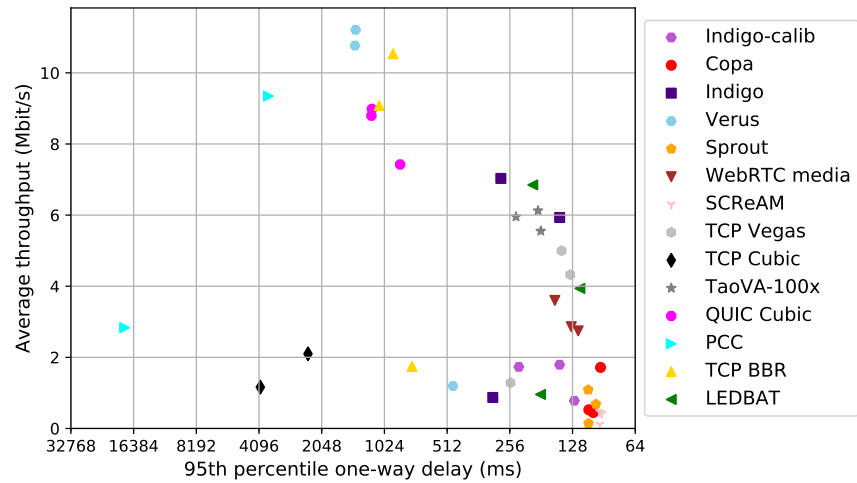
Git summary:

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



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



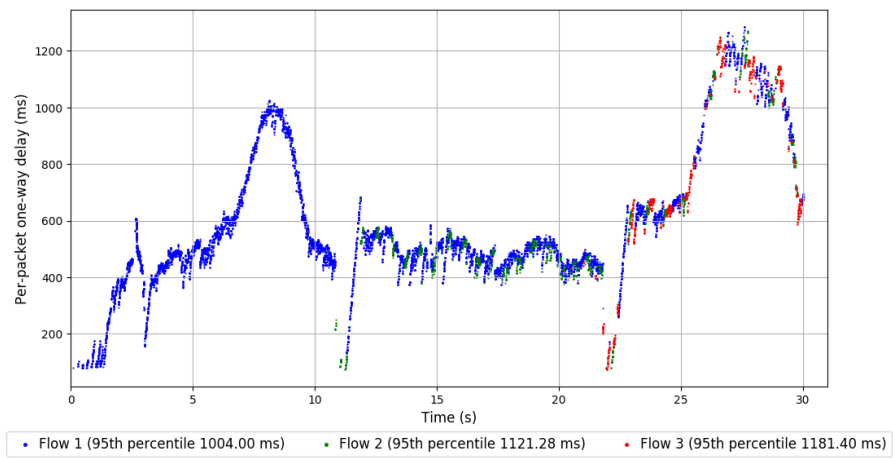
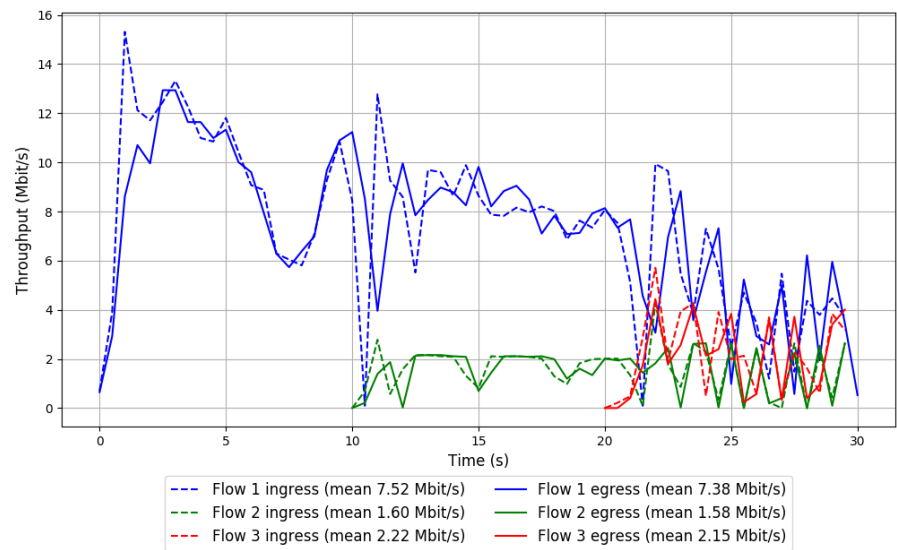
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	5.15	1.69	2.88	796.56	834.03	1053.42	2.77	2.75	8.55
TCP Cubic	2	1.19	0.71	0.09	3017.83	2439.91	1975.80	3.30	30.38	0.00
LEDBAT	3	2.40	1.97	0.69	167.96	162.55	153.30	0.80	0.36	1.29
PCC	2	4.91	1.78	0.00	10886.85	10351.39	3736.70	25.80	31.67	14.80
QUIC Cubic	3	7.29	1.35	0.77	1050.82	1218.43	1265.23	2.78	5.76	13.61
SCReAM	3	0.21	0.18	0.16	1016.05	90.86	98.98	0.04	0.00	0.36
WebRTC media	3	1.89	0.84	0.35	129.09	141.50	143.62	0.12	0.32	0.72
Sprout	3	0.30	0.36	0.31	106.11	103.83	103.33	0.01	0.26	0.05
TaoVA-100x	3	3.21	3.00	2.63	188.64	204.42	239.15	0.14	0.19	0.45
TCP Vegas	3	1.55	1.96	2.07	177.63	142.22	190.16	0.54	0.31	1.20
Verus	3	7.52	0.15	0.37	1103.85	1012.39	1258.36	1.27	7.16	6.18
Copa	3	0.49	0.46	0.40	99.01	103.05	99.03	0.08	0.19	0.37
Indigo	3	2.54	1.64	3.07	227.42	244.42	229.89	0.12	0.23	0.50
Indigo-calib	3	0.56	0.73	1.23	161.75	128.79	150.18	0.22	0.48	0.06

Run 1: Statistics of TCP BBR

Start at: 2017-12-11 09:59:18  
End at: 2017-12-11 09:59:48  
Local clock offset: -2.317 ms  
Remote clock offset: -0.109 ms

# Below is generated by plot.py at 2017-12-11 10:45:44  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 9.08 Mbit/s  
95th percentile per-packet one-way delay: 1085.864 ms  
Loss rate: 2.23%  
-- Flow 1:  
Average throughput: 7.38 Mbit/s  
95th percentile per-packet one-way delay: 1004.003 ms  
Loss rate: 1.42%  
-- Flow 2:  
Average throughput: 1.58 Mbit/s  
95th percentile per-packet one-way delay: 1121.280 ms  
Loss rate: 4.15%  
-- Flow 3:  
Average throughput: 2.15 Mbit/s  
95th percentile per-packet one-way delay: 1181.399 ms  
Loss rate: 7.61%

Run 1: Report of TCP BBR — Data Link

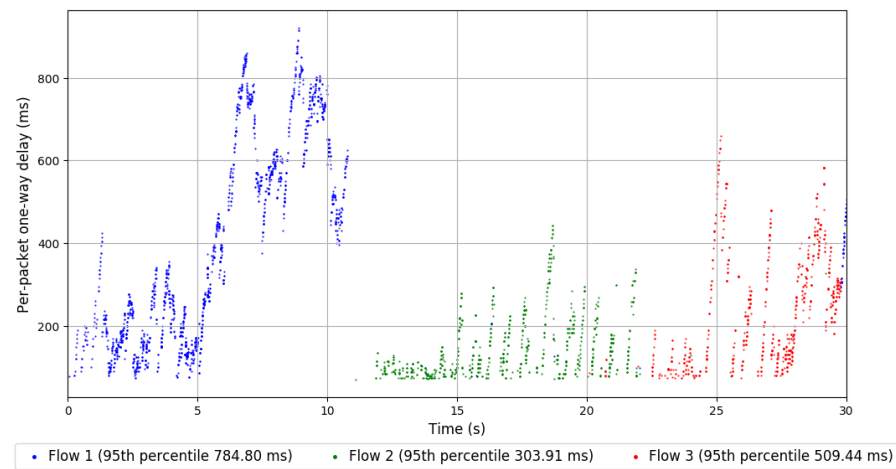
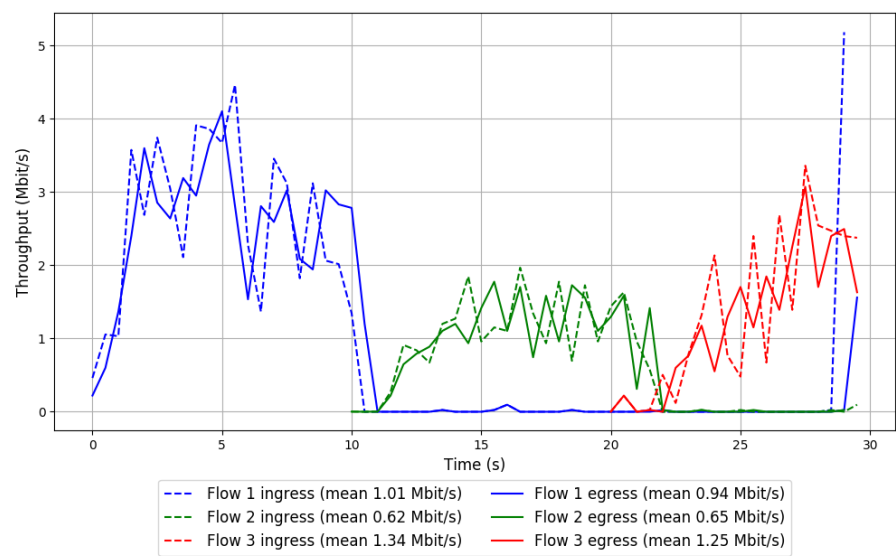


Run 2: Statistics of TCP BBR

Start at: 2017-12-11 10:17:01  
End at: 2017-12-11 10:17:31  
Local clock offset: -1.763 ms  
Remote clock offset: -1.277 ms

# Below is generated by plot.py at 2017-12-11 10:45:44  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.75 Mbit/s  
95th percentile per-packet one-way delay: 755.260 ms  
Loss rate: 5.64%  
-- Flow 1:  
Average throughput: 0.94 Mbit/s  
95th percentile per-packet one-way delay: 784.801 ms  
Loss rate: 6.08%  
-- Flow 2:  
Average throughput: 0.65 Mbit/s  
95th percentile per-packet one-way delay: 303.913 ms  
Loss rate: 0.98%  
-- Flow 3:  
Average throughput: 1.25 Mbit/s  
95th percentile per-packet one-way delay: 509.444 ms  
Loss rate: 8.91%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2017-12-11 10:34:15

End at: 2017-12-11 10:34:45

Local clock offset: 1.358 ms

Remote clock offset: -2.72 ms

# Below is generated by plot.py at 2017-12-11 10:45:46

# Datalink statistics

-- Total of 3 flows:

Average throughput: 10.54 Mbit/s

95th percentile per-packet one-way delay: 930.795 ms

Loss rate: 2.65%

-- Flow 1:

Average throughput: 7.12 Mbit/s

95th percentile per-packet one-way delay: 600.886 ms

Loss rate: 0.81%

-- Flow 2:

Average throughput: 2.85 Mbit/s

95th percentile per-packet one-way delay: 1076.884 ms

Loss rate: 3.12%

-- Flow 3:

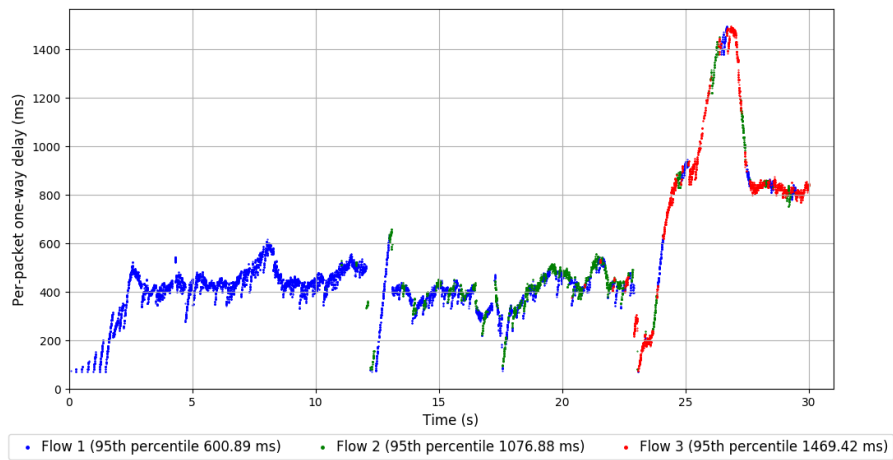
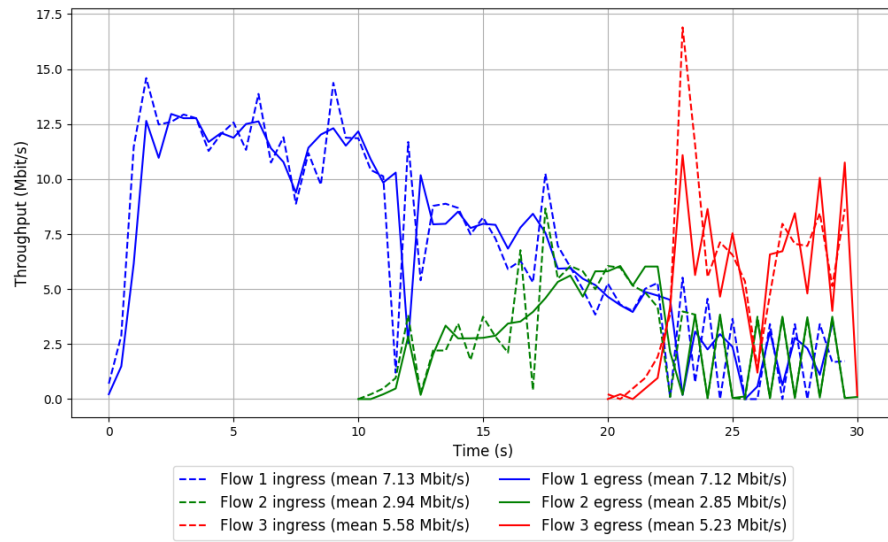
Average throughput: 5.23 Mbit/s

95th percentile per-packet one-way delay: 1469.422 ms

Loss rate: 9.14%



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



Run 1: Statistics of TCP Cubic

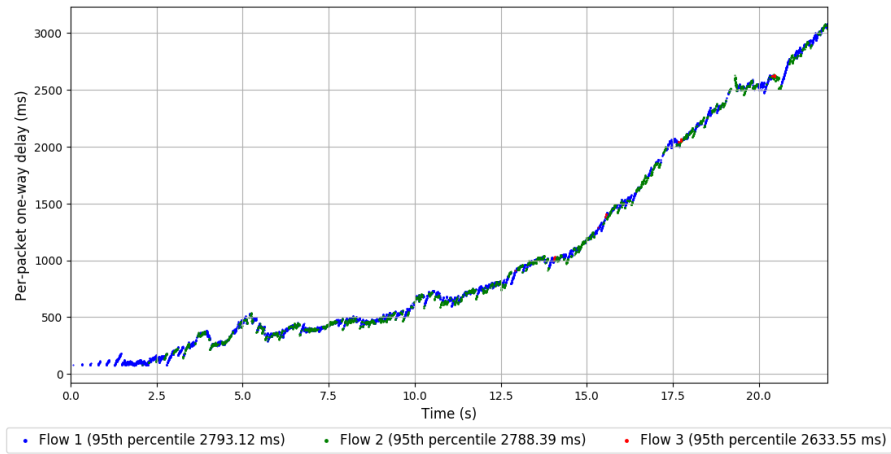
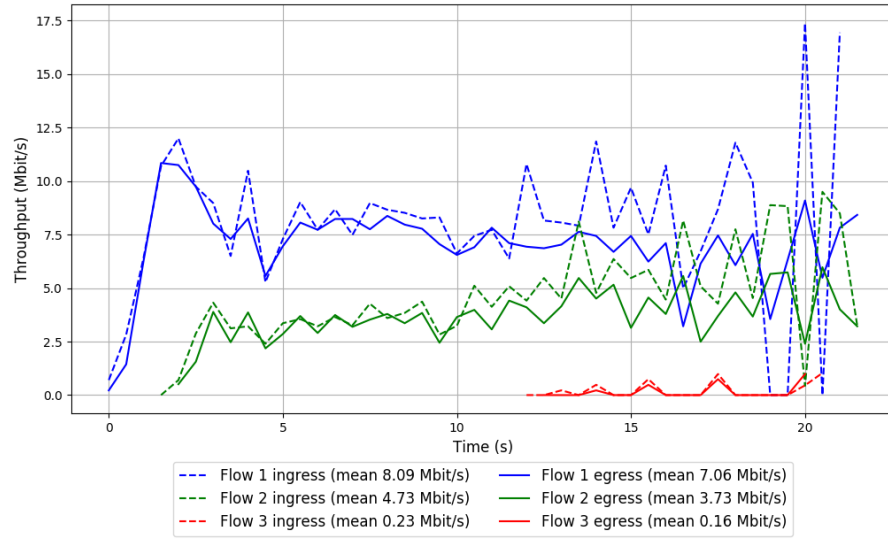
Start at: 2017-12-11 09:53:48

End at: 2017-12-11 09:54:18

Local clock offset: -2.139 ms

Remote clock offset: 0.362 ms

# Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2017-12-11 10:11:48

End at: 2017-12-11 10:12:18

Local clock offset: -3.528 ms

Remote clock offset: -0.95 ms

# Below is generated by plot.py at 2017-12-11 10:45:46

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.10 Mbit/s

95th percentile per-packet one-way delay: 2383.716 ms

Loss rate: 12.79%

-- Flow 1:

Average throughput: 1.42 Mbit/s

95th percentile per-packet one-way delay: 1872.582 ms

Loss rate: 3.34%

-- Flow 2:

Average throughput: 1.00 Mbit/s

95th percentile per-packet one-way delay: 2453.608 ms

Loss rate: 28.64%

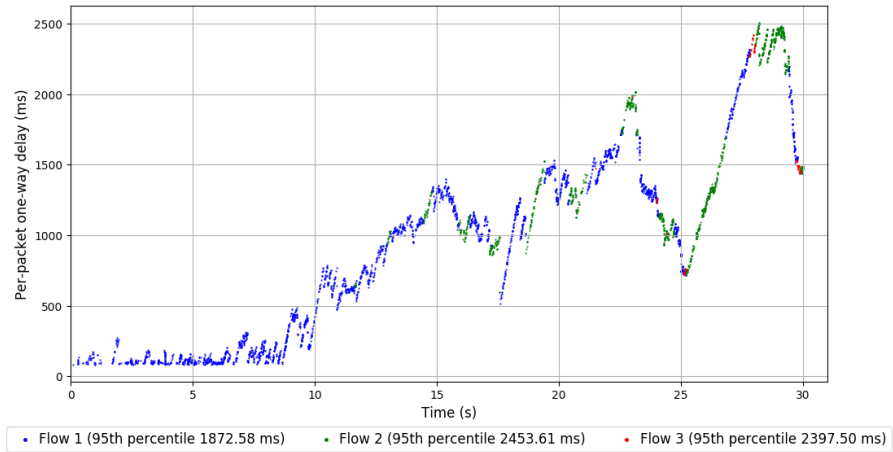
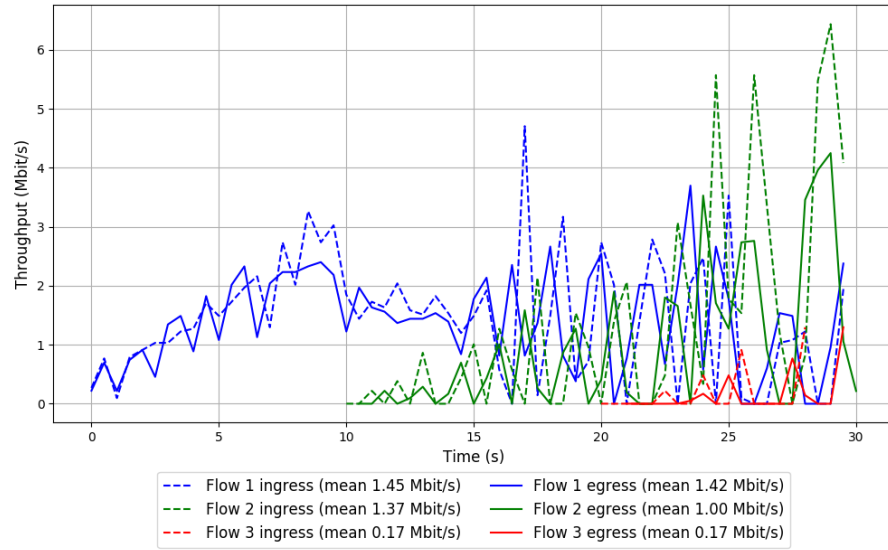
-- Flow 3:

Average throughput: 0.17 Mbit/s

95th percentile per-packet one-way delay: 2397.500 ms

Loss rate: 0.00%

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

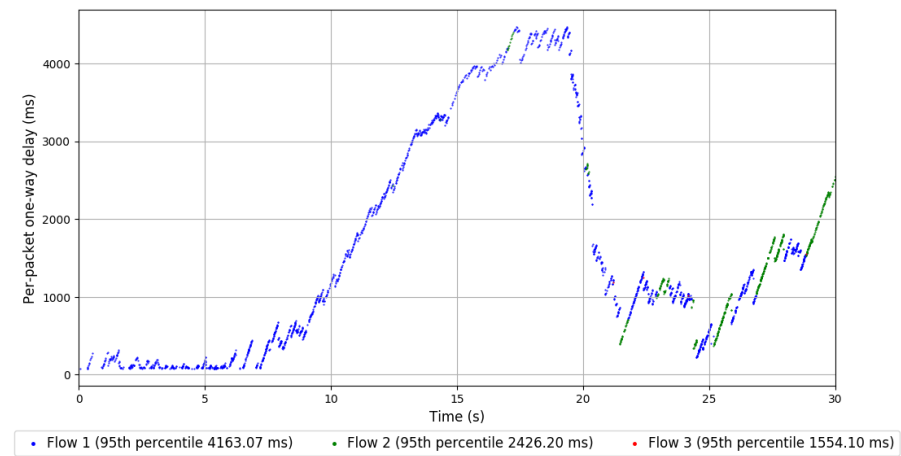
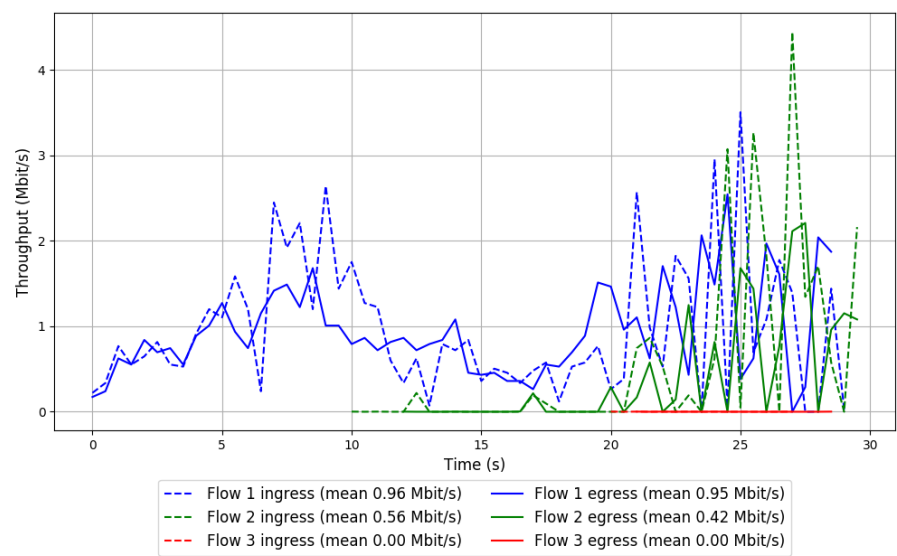


Run 3: Statistics of TCP Cubic

Start at: 2017-12-11 10:29:25  
End at: 2017-12-11 10:29:55  
Local clock offset: 0.467 ms  
Remote clock offset: -2.129 ms

# Below is generated by plot.py at 2017-12-11 10:45:46  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.16 Mbit/s  
95th percentile per-packet one-way delay: 4037.947 ms  
Loss rate: 11.33%  
-- Flow 1:  
Average throughput: 0.95 Mbit/s  
95th percentile per-packet one-way delay: 4163.074 ms  
Loss rate: 3.27%  
-- Flow 2:  
Average throughput: 0.42 Mbit/s  
95th percentile per-packet one-way delay: 2426.205 ms  
Loss rate: 32.12%  
-- Flow 3:  
Average throughput: 0.00 Mbit/s  
95th percentile per-packet one-way delay: 1554.096 ms  
Loss rate: 0.00%

Run 3: Report of TCP Cubic — Data Link



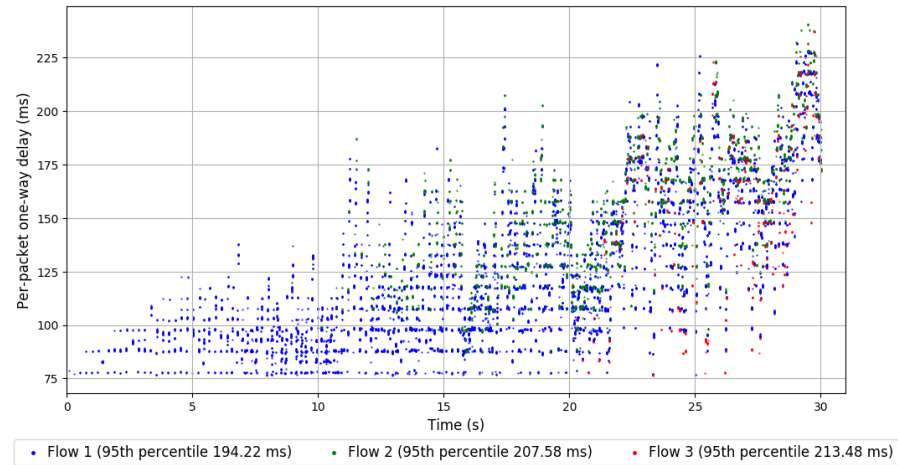
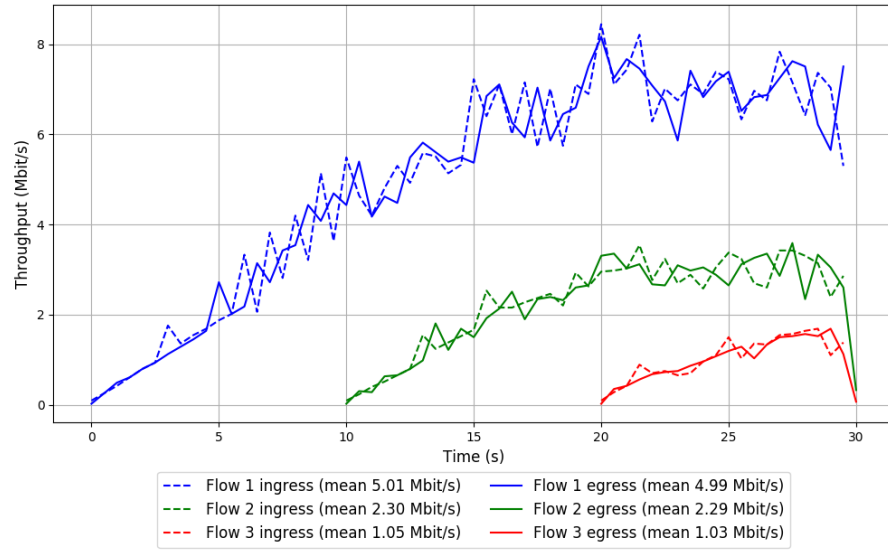
```
Run 1: Statistics of LEDBAT

Start at: 2017-12-11 09:52:35
End at: 2017-12-11 09:53:05
Local clock offset: -2.165 ms
Remote clock offset: 0.429 ms

# Below is generated by plot.py at 2017-12-11 10:45:46
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.85 Mbit/s
95th percentile per-packet one-way delay: 198.725 ms
Loss rate: 0.63%
-- Flow 1:
Average throughput: 4.99 Mbit/s
95th percentile per-packet one-way delay: 194.224 ms
Loss rate: 0.49%
-- Flow 2:
Average throughput: 2.29 Mbit/s
95th percentile per-packet one-way delay: 207.583 ms
Loss rate: 0.71%
-- Flow 3:
Average throughput: 1.03 Mbit/s
95th percentile per-packet one-way delay: 213.483 ms
Loss rate: 2.15%
```



# Run 1: Report of LEDBAT — Data Link

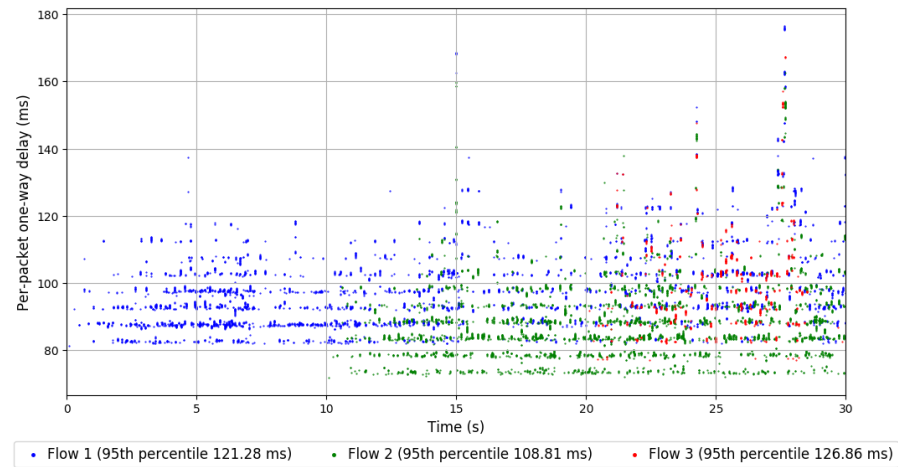
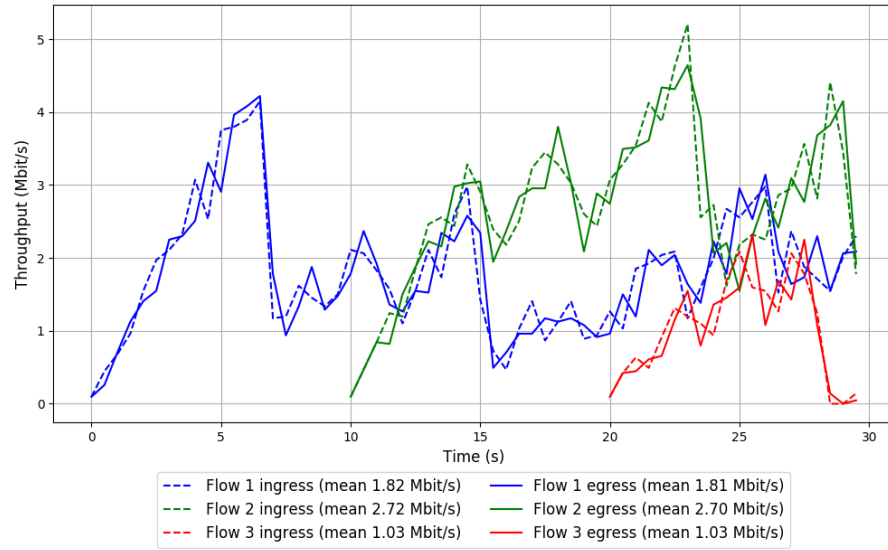


Run 2: Statistics of LEDBAT

Start at: 2017-12-11 10:10:36  
End at: 2017-12-11 10:11:06  
Local clock offset: -3.349 ms  
Remote clock offset: -0.868 ms

# Below is generated by plot.py at 2017-12-11 10:45:46  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.94 Mbit/s  
95th percentile per-packet one-way delay: 118.042 ms  
Loss rate: 0.64%  
-- Flow 1:  
Average throughput: 1.81 Mbit/s  
95th percentile per-packet one-way delay: 121.283 ms  
Loss rate: 0.71%  
-- Flow 2:  
Average throughput: 2.70 Mbit/s  
95th percentile per-packet one-way delay: 108.811 ms  
Loss rate: 0.37%  
-- Flow 3:  
Average throughput: 1.03 Mbit/s  
95th percentile per-packet one-way delay: 126.862 ms  
Loss rate: 1.71%

## Run 2: Report of LEDBAT — Data Link

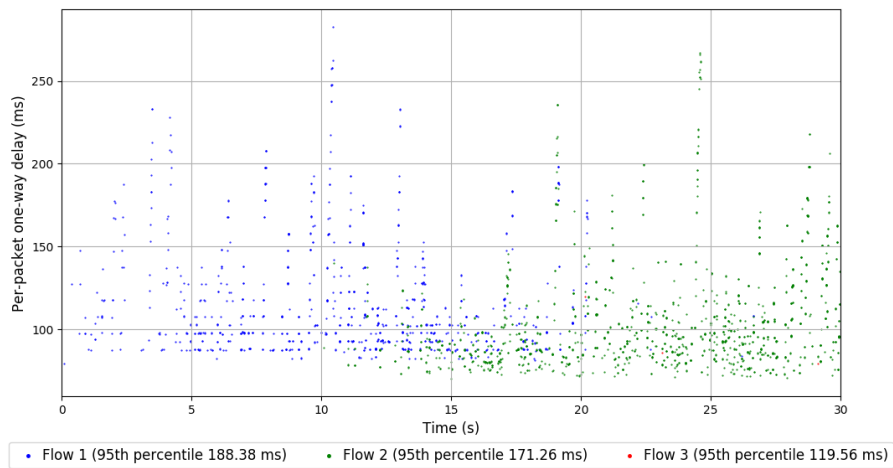
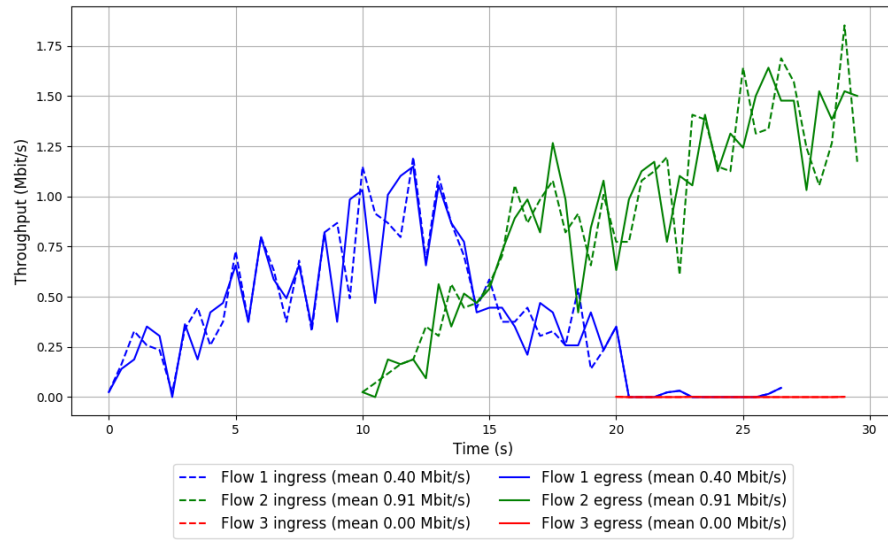


Run 3: Statistics of LEDBAT

Start at: 2017-12-11 10:28:11  
End at: 2017-12-11 10:28:41  
Local clock offset: 0.248 ms  
Remote clock offset: -1.887 ms

# Below is generated by plot.py at 2017-12-11 10:45:46  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.96 Mbit/s  
95th percentile per-packet one-way delay: 182.301 ms  
Loss rate: 0.45%  
-- Flow 1:  
Average throughput: 0.40 Mbit/s  
95th percentile per-packet one-way delay: 188.382 ms  
Loss rate: 1.21%  
-- Flow 2:  
Average throughput: 0.91 Mbit/s  
95th percentile per-packet one-way delay: 171.265 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.00 Mbit/s  
95th percentile per-packet one-way delay: 119.556 ms  
Loss rate: 0.00%

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



Run 1: Statistics of PCC

Start at: 2017-12-11 09:56:21

End at: 2017-12-11 09:56:51

Local clock offset: -2.203 ms

Remote clock offset: 0.139 ms

# Below is generated by plot.py at 2017-12-11 10:45:52

# Datalink statistics

-- Total of 3 flows:

Average throughput: 9.35 Mbit/s

95th percentile per-packet one-way delay: 3693.083 ms

Loss rate: 14.09%

-- Flow 1:

Average throughput: 6.99 Mbit/s

95th percentile per-packet one-way delay: 3681.173 ms

Loss rate: 12.48%

-- Flow 2:

Average throughput: 3.55 Mbit/s

95th percentile per-packet one-way delay: 3719.955 ms

Loss rate: 18.52%

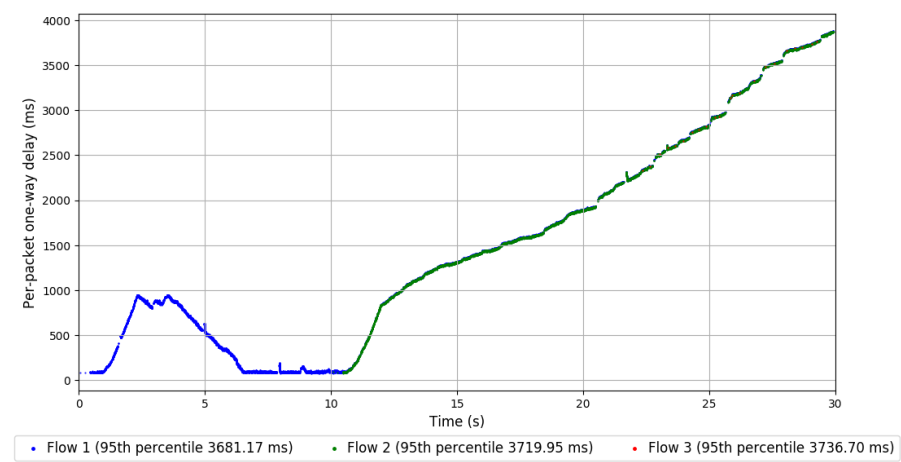
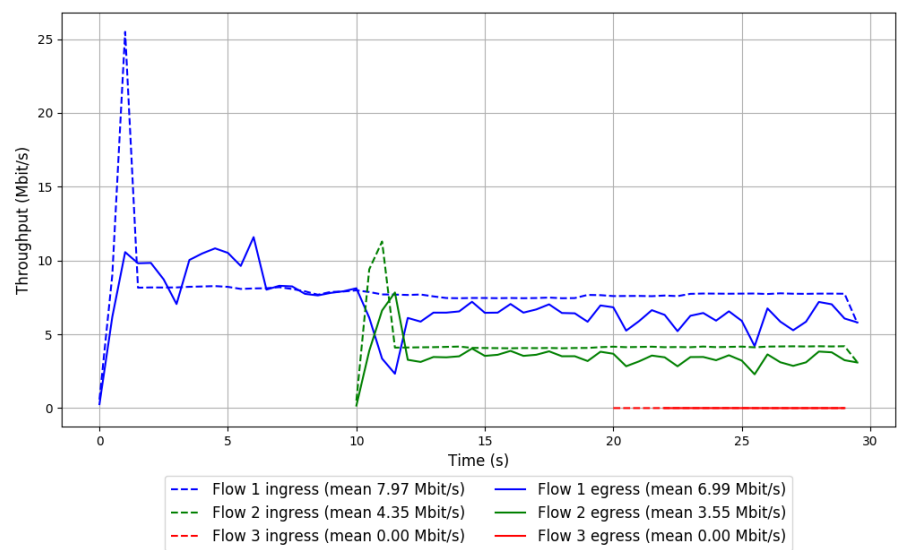
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 3736.695 ms

Loss rate: 14.80%

Run 1: Report of PCC — Data Link



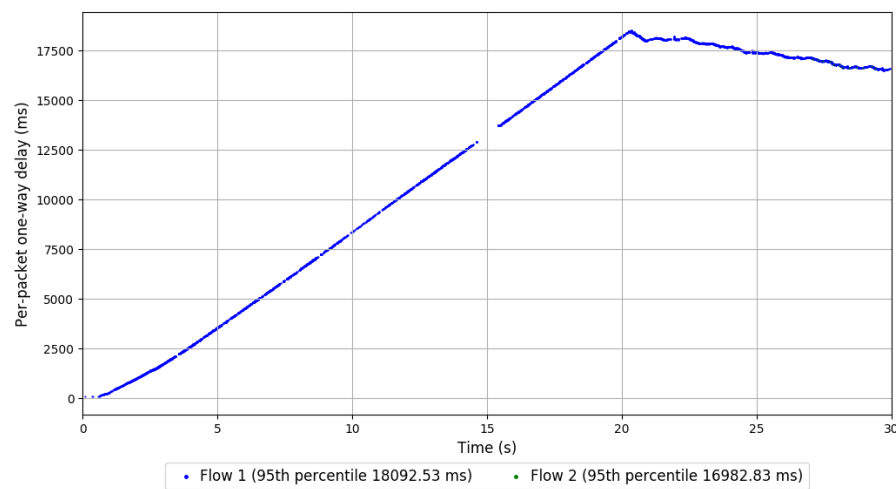
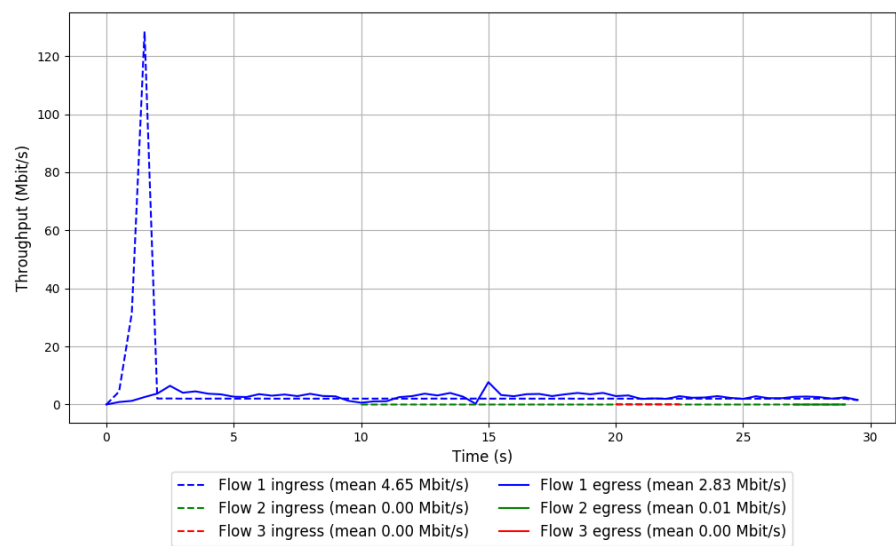
Run 2: Statistics of PCC

Start at: 2017-12-11 10:14:17  
End at: 2017-12-11 10:14:47  
Local clock offset: -2.893 ms  
Remote clock offset: -1.105 ms

# Below is generated by plot.py at 2017-12-11 10:45:52  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 2.83 Mbit/s  
95th percentile per-packet one-way delay: 18092.426 ms  
Loss rate: 39.13%  
-- Flow 1:  
Average throughput: 2.83 Mbit/s  
95th percentile per-packet one-way delay: 18092.527 ms  
Loss rate: 39.13%  
-- Flow 2:  
Average throughput: 0.01 Mbit/s  
95th percentile per-packet one-way delay: 16982.834 ms  
Loss rate: 44.83%  
-- Flow 3:  
Average throughput: 0.00 Mbit/s



Run 2: Report of PCC — Data Link



Run 3: Statistics of PCC

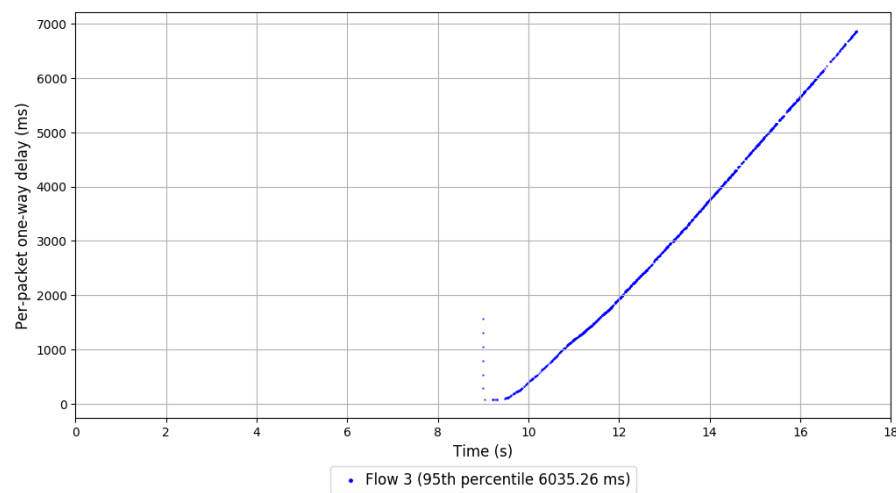
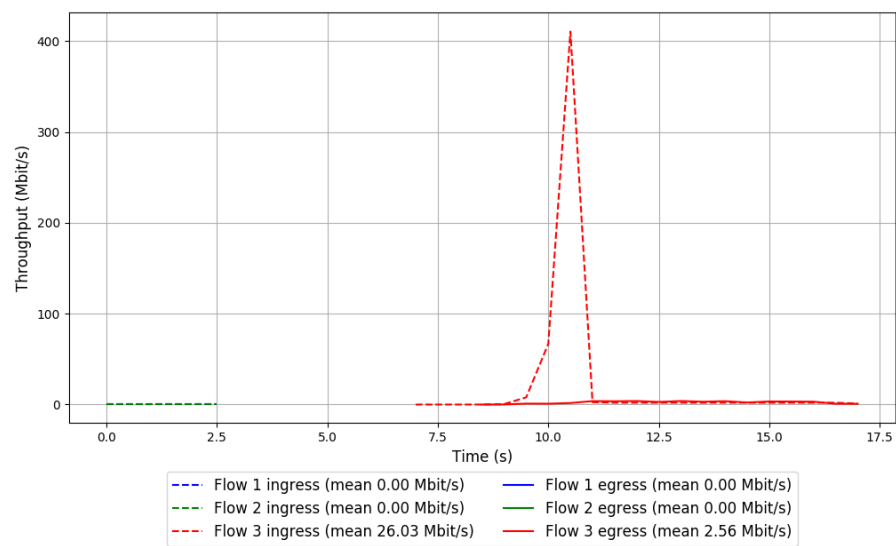
Start at: 2017-12-11 10:31:51

End at: 2017-12-11 10:32:21

Local clock offset: 0.939 ms

Remote clock offset: -2.328 ms

Run 3: Report of PCC — Data Link

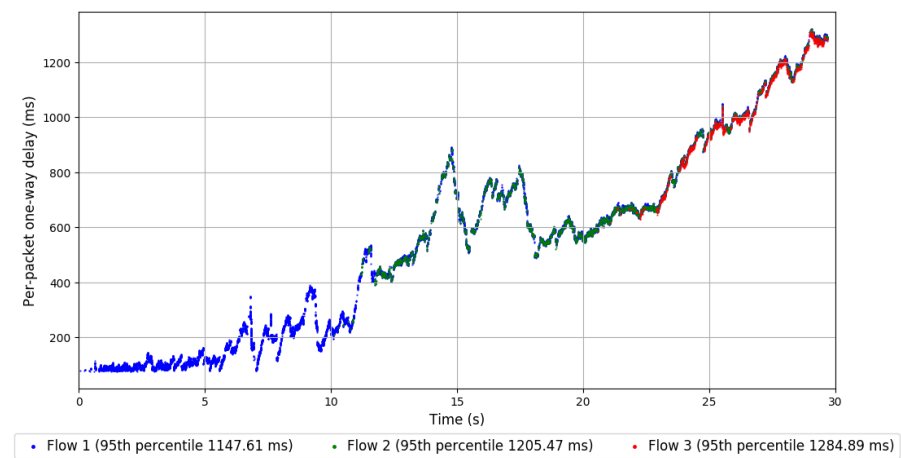
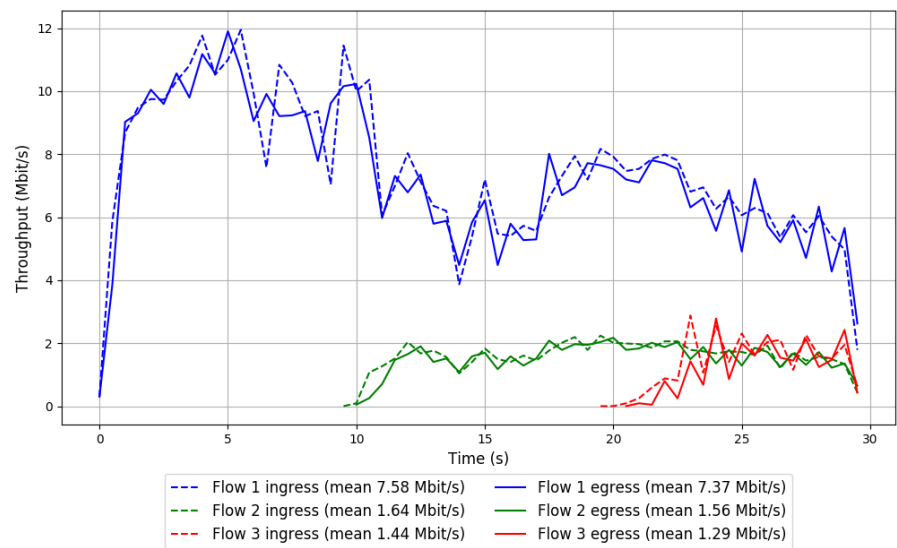


Run 1: Statistics of QUIC Cubic

Start at: 2017-12-11 10:04:36  
End at: 2017-12-11 10:05:06  
Local clock offset: -2.703 ms  
Remote clock offset: -0.499 ms

# Below is generated by plot.py at 2017-12-11 10:45:54  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 8.80 Mbit/s  
95th percentile per-packet one-way delay: 1182.608 ms  
Loss rate: 3.88%  
-- Flow 1:  
Average throughput: 7.37 Mbit/s  
95th percentile per-packet one-way delay: 1147.611 ms  
Loss rate: 2.94%  
-- Flow 2:  
Average throughput: 1.56 Mbit/s  
95th percentile per-packet one-way delay: 1205.470 ms  
Loss rate: 5.54%  
-- Flow 3:  
Average throughput: 1.29 Mbit/s  
95th percentile per-packet one-way delay: 1284.894 ms  
Loss rate: 15.27%

Run 1: Report of QUIC Cubic — Data Link

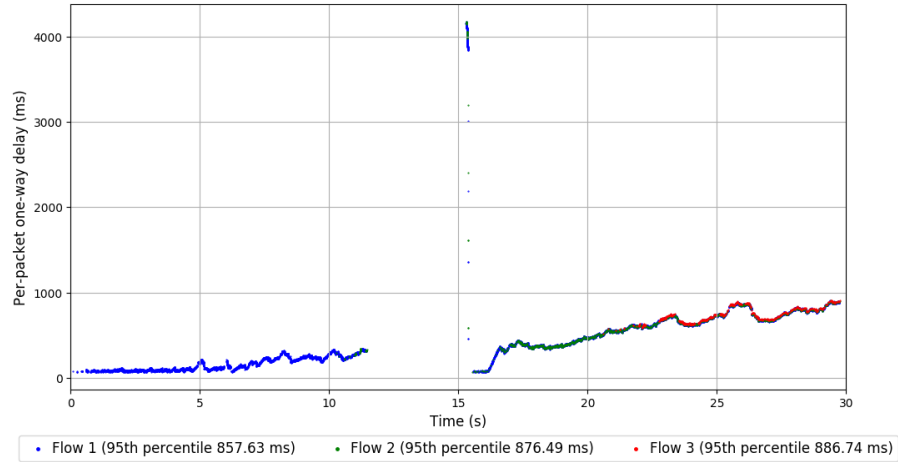
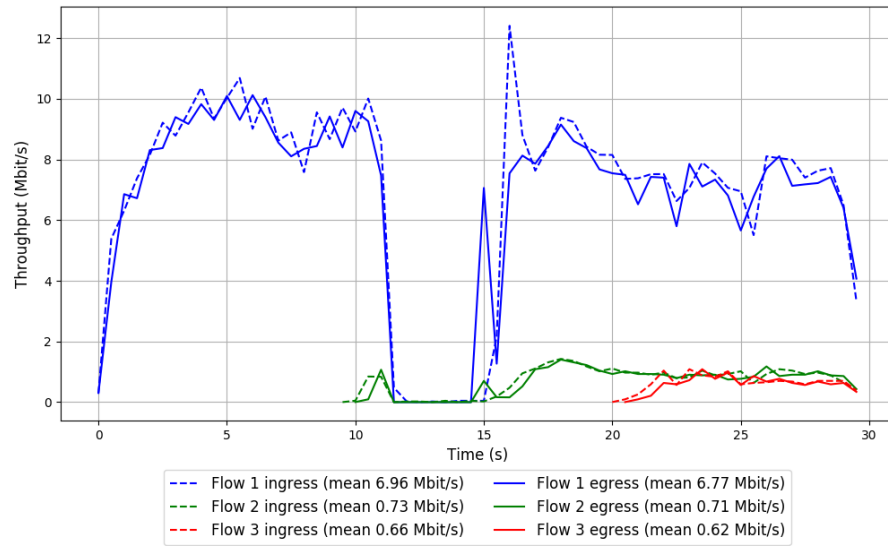


Run 2: Statistics of QUIC Cubic

Start at: 2017-12-11 10:22:05  
End at: 2017-12-11 10:22:35  
Local clock offset: -0.908 ms  
Remote clock offset: -1.629 ms

# Below is generated by plot.py at 2017-12-11 10:45:56  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 7.42 Mbit/s  
95th percentile per-packet one-way delay: 860.614 ms  
Loss rate: 3.20%  
-- Flow 1:  
Average throughput: 6.77 Mbit/s  
95th percentile per-packet one-way delay: 857.631 ms  
Loss rate: 2.88%  
-- Flow 2:  
Average throughput: 0.71 Mbit/s  
95th percentile per-packet one-way delay: 876.489 ms  
Loss rate: 4.63%  
-- Flow 3:  
Average throughput: 0.62 Mbit/s  
95th percentile per-packet one-way delay: 886.744 ms  
Loss rate: 10.33%

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



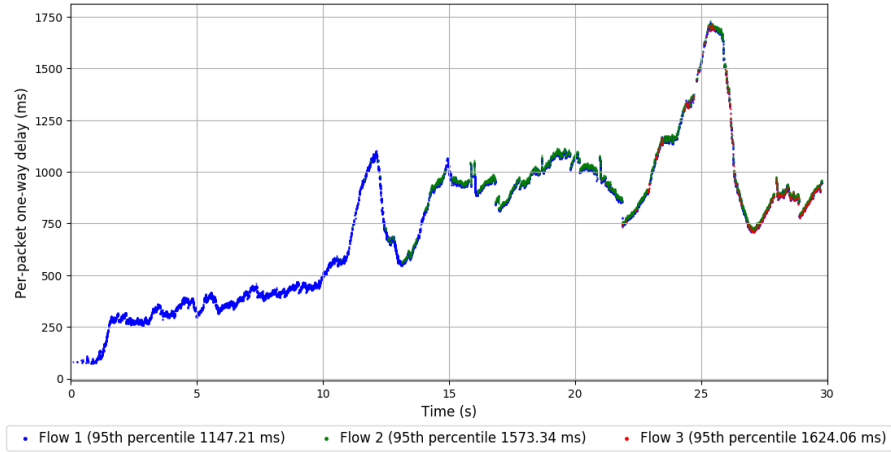
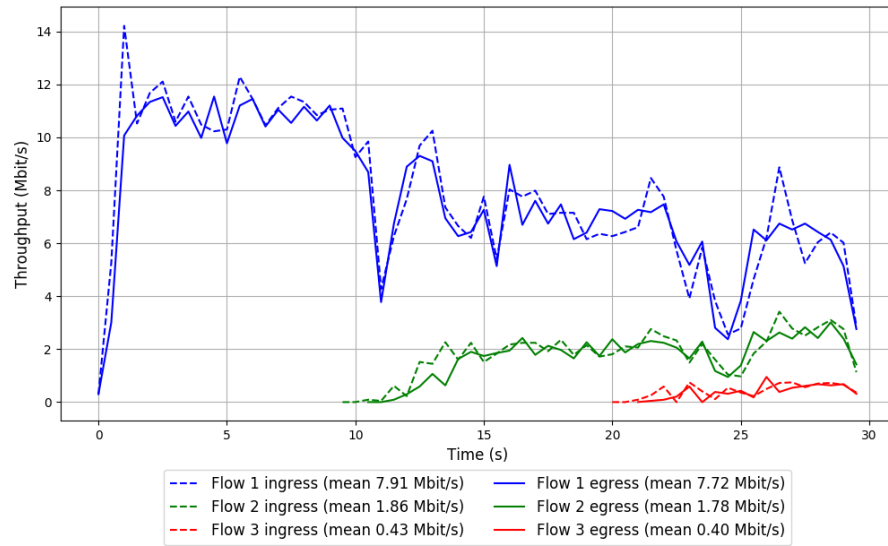
Run 3: Statistics of QUIC Cubic

Start at: 2017-12-11 10:39:05  
End at: 2017-12-11 10:39:35  
Local clock offset: 1.441 ms  
Remote clock offset: -2.898 ms

# Below is generated by plot.py at 2017-12-11 10:45:59  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 8.99 Mbit/s  
95th percentile per-packet one-way delay: 1175.700 ms  
Loss rate: 3.33%  
-- Flow 1:  
Average throughput: 7.72 Mbit/s  
95th percentile per-packet one-way delay: 1147.214 ms  
Loss rate: 2.52%  
-- Flow 2:  
Average throughput: 1.78 Mbit/s  
95th percentile per-packet one-way delay: 1573.343 ms  
Loss rate: 7.11%  
-- Flow 3:  
Average throughput: 0.40 Mbit/s  
95th percentile per-packet one-way delay: 1624.057 ms  
Loss rate: 15.23%



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

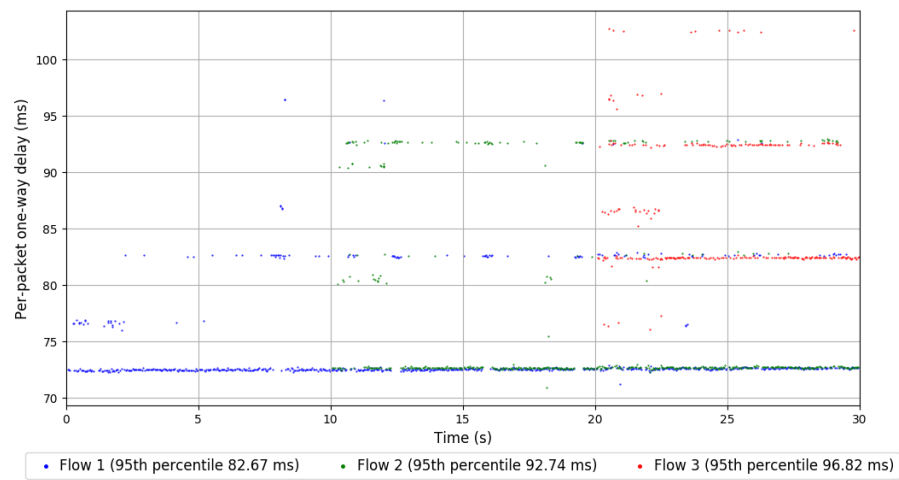
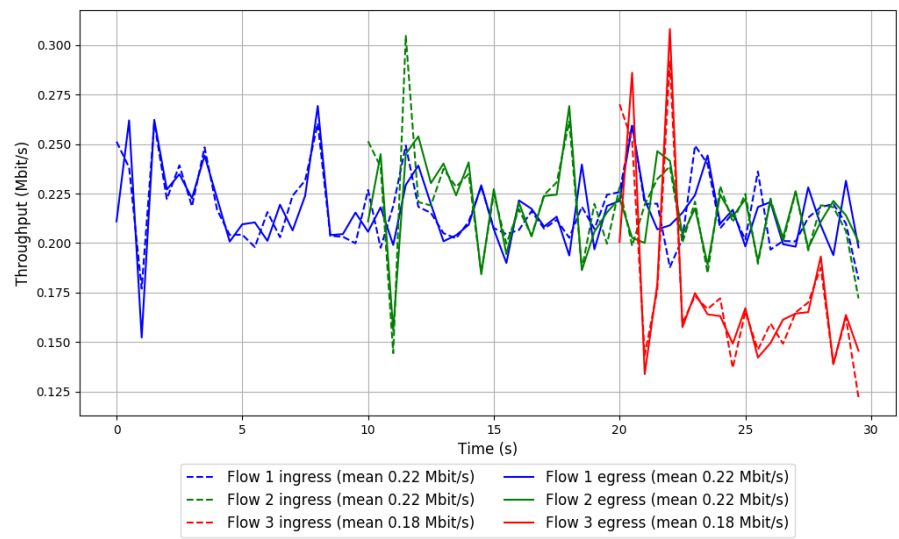


```
Run 1: Statistics of SReAM

Start at: 2017-12-11 10:02:02
End at: 2017-12-11 10:02:32
Local clock offset: -2.493 ms
Remote clock offset: -0.215 ms

# Below is generated by plot.py at 2017-12-11 10:45:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 92.647 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 82.667 ms
Loss rate: 0.12%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 92.740 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 96.821 ms
Loss rate: 0.00%
```

Run 1: Report of SReAM — Data Link

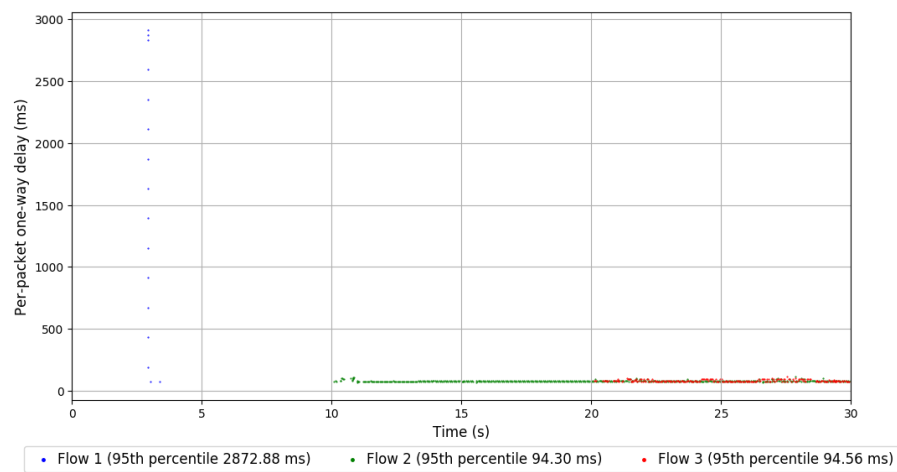
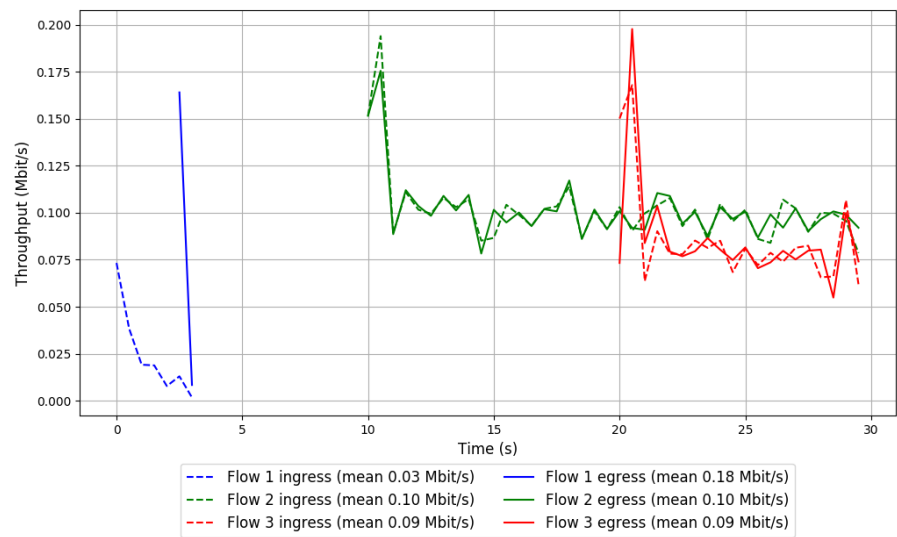


Run 2: Statistics of SCReAM

Start at: 2017-12-11 10:19:42  
End at: 2017-12-11 10:20:12  
Local clock offset: -1.238 ms  
Remote clock offset: -1.388 ms

# Below is generated by plot.py at 2017-12-11 10:45:59  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.11 Mbit/s  
95th percentile per-packet one-way delay: 94.565 ms  
Loss rate: 0.21%  
-- Flow 1:  
Average throughput: 0.18 Mbit/s  
95th percentile per-packet one-way delay: 2872.877 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.10 Mbit/s  
95th percentile per-packet one-way delay: 94.295 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.09 Mbit/s  
95th percentile per-packet one-way delay: 94.557 ms  
Loss rate: 0.73%

Run 2: Report of SReAM — Data Link

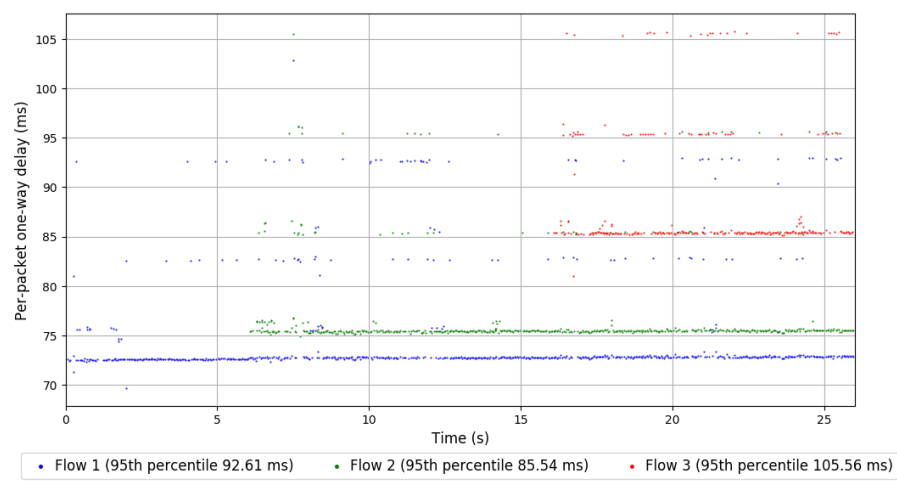
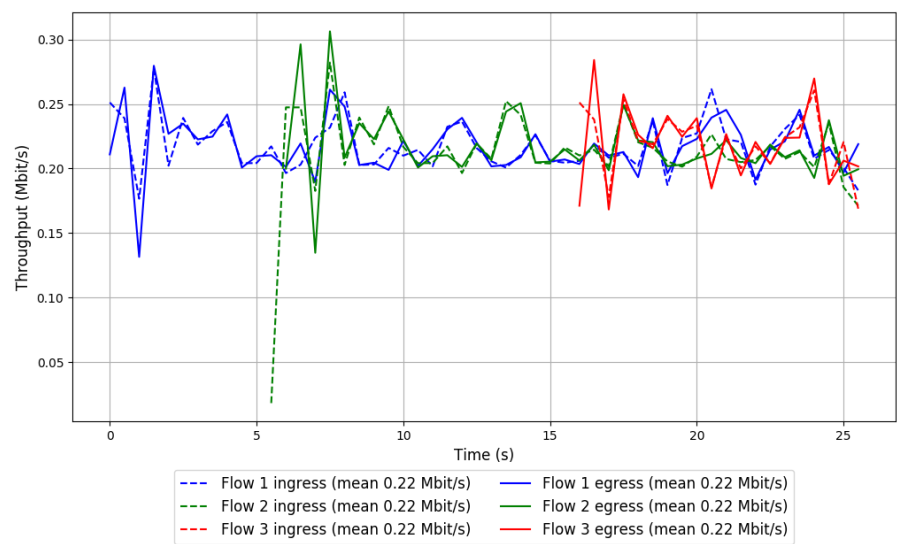


Run 3: Statistics of SCReAM

Start at: 2017-12-11 10:36:39  
End at: 2017-12-11 10:37:09  
Local clock offset: 1.392 ms  
Remote clock offset: -2.671 ms

# Below is generated by plot.py at 2017-12-11 10:45:59  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.47 Mbit/s  
95th percentile per-packet one-way delay: 95.365 ms  
Loss rate: 0.06%  
-- Flow 1:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 92.613 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 85.539 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 105.557 ms  
Loss rate: 0.35%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of WebRTC media

Start at: 2017-12-11 10:03:25

End at: 2017-12-11 10:03:55

Local clock offset: -2.605 ms

Remote clock offset: -0.39 ms

# Below is generated by plot.py at 2017-12-11 10:45:59

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.86 Mbit/s

95th percentile per-packet one-way delay: 129.771 ms

Loss rate: 0.30%

-- Flow 1:

Average throughput: 1.82 Mbit/s

95th percentile per-packet one-way delay: 130.085 ms

Loss rate: 0.13%

-- Flow 2:

Average throughput: 0.67 Mbit/s

95th percentile per-packet one-way delay: 139.259 ms

Loss rate: 0.46%

-- Flow 3:

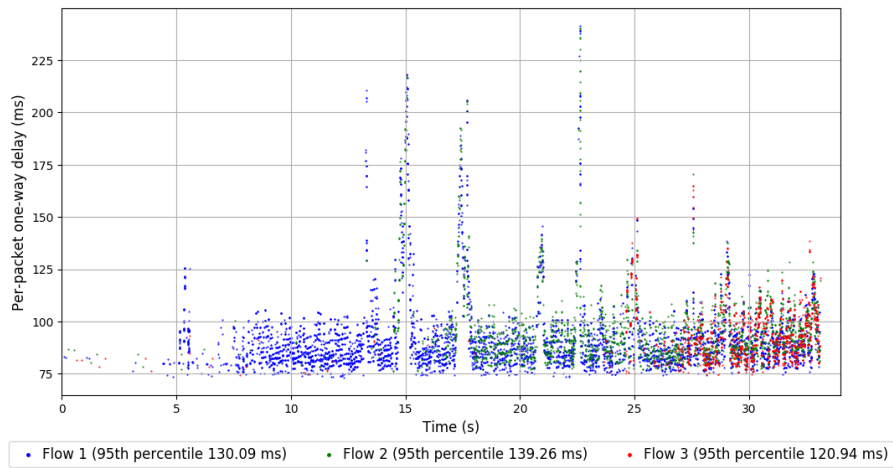
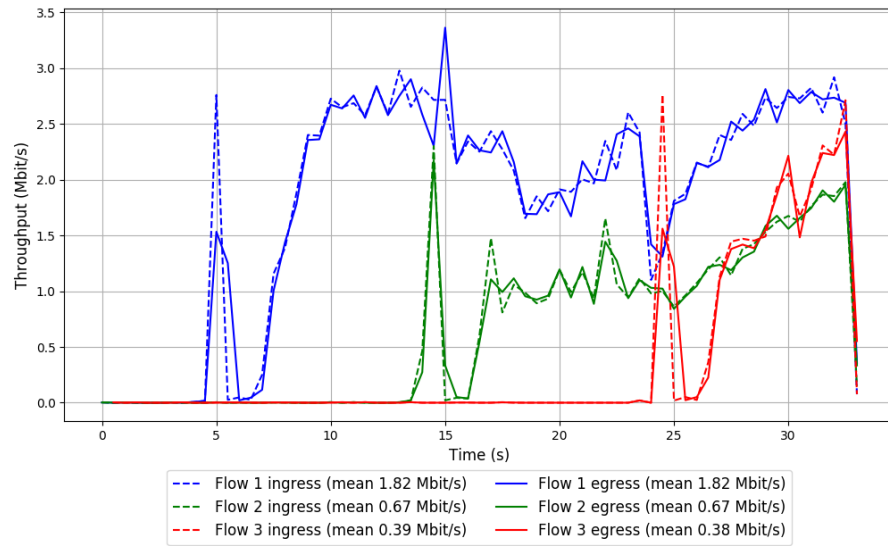
Average throughput: 0.38 Mbit/s

95th percentile per-packet one-way delay: 120.937 ms

Loss rate: 0.83%



# Run 1: Report of WebRTC media — Data Link

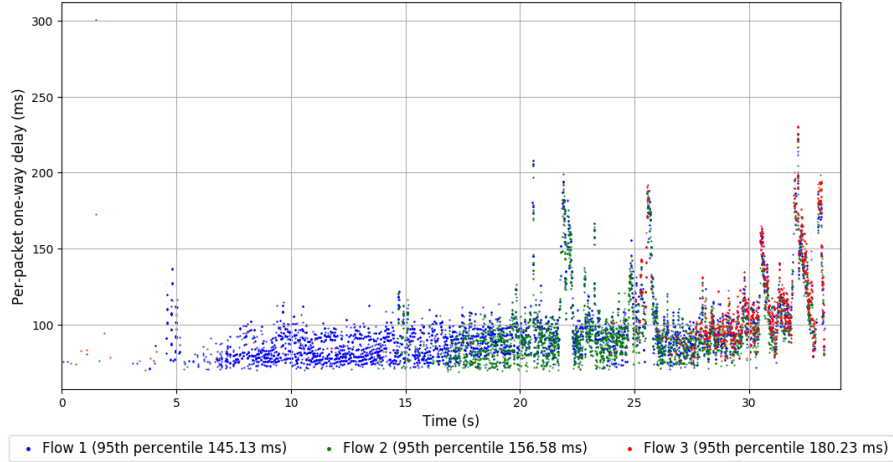
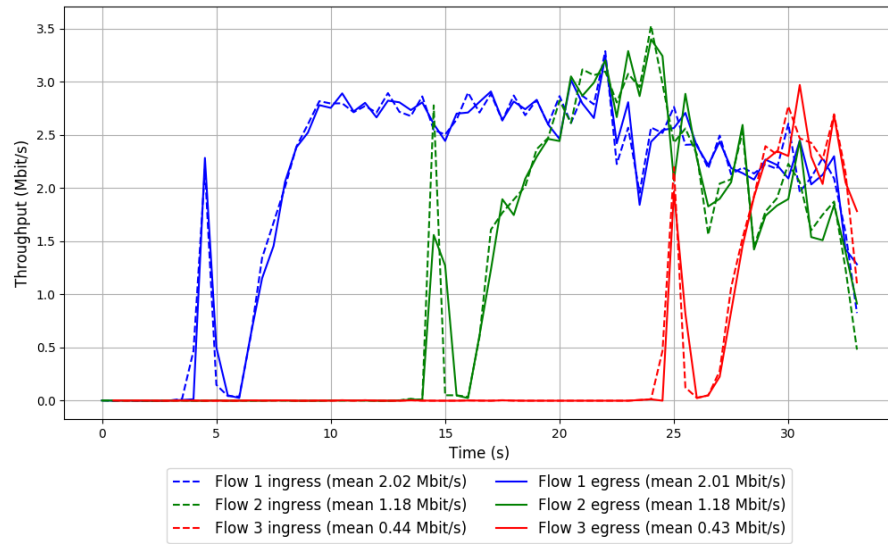


Run 2: Statistics of WebRTC media

Start at: 2017-12-11 10:20:53  
End at: 2017-12-11 10:21:23  
Local clock offset: -1.035 ms  
Remote clock offset: -1.547 ms

# Below is generated by plot.py at 2017-12-11 10:45:59  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.60 Mbit/s  
95th percentile per-packet one-way delay: 155.621 ms  
Loss rate: 0.21%  
-- Flow 1:  
Average throughput: 2.01 Mbit/s  
95th percentile per-packet one-way delay: 145.127 ms  
Loss rate: 0.09%  
-- Flow 2:  
Average throughput: 1.18 Mbit/s  
95th percentile per-packet one-way delay: 156.576 ms  
Loss rate: 0.21%  
-- Flow 3:  
Average throughput: 0.43 Mbit/s  
95th percentile per-packet one-way delay: 180.228 ms  
Loss rate: 0.77%

## Run 2: Report of WebRTC media — Data Link

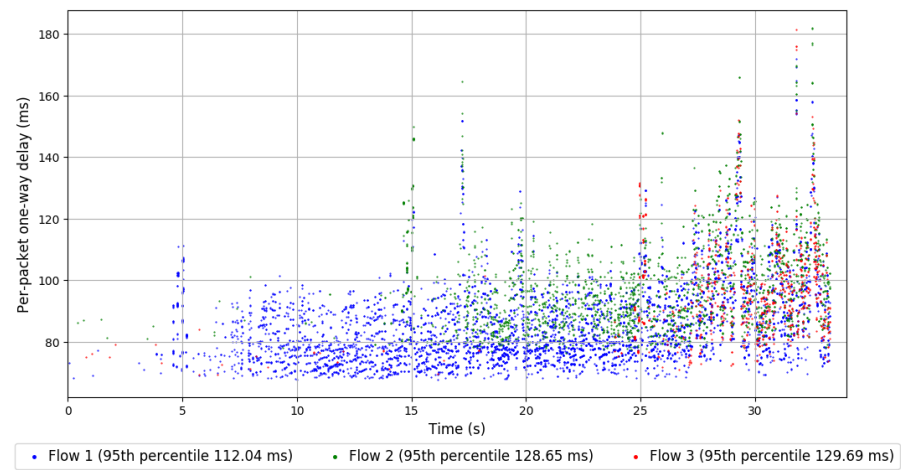
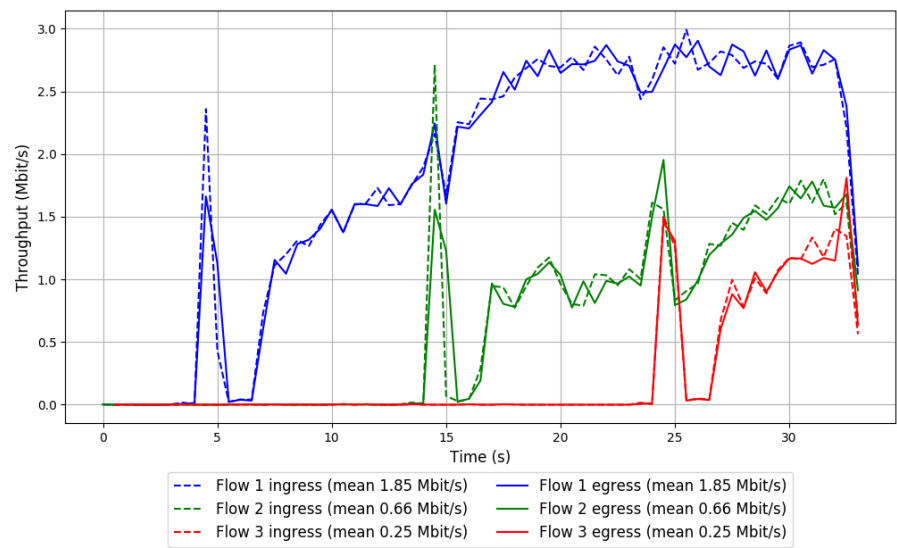


Run 3: Statistics of WebRTC media

Start at: 2017-12-11 10:37:53  
End at: 2017-12-11 10:38:23  
Local clock offset: 1.45 ms  
Remote clock offset: -2.798 ms

# Below is generated by plot.py at 2017-12-11 10:45:59  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 2.74 Mbit/s  
95th percentile per-packet one-way delay: 120.233 ms  
Loss rate: 0.22%  
-- Flow 1:  
Average throughput: 1.85 Mbit/s  
95th percentile per-packet one-way delay: 112.043 ms  
Loss rate: 0.15%  
-- Flow 2:  
Average throughput: 0.66 Mbit/s  
95th percentile per-packet one-way delay: 128.652 ms  
Loss rate: 0.28%  
-- Flow 3:  
Average throughput: 0.25 Mbit/s  
95th percentile per-packet one-way delay: 129.695 ms  
Loss rate: 0.55%

Run 3: Report of WebRTC media — Data Link

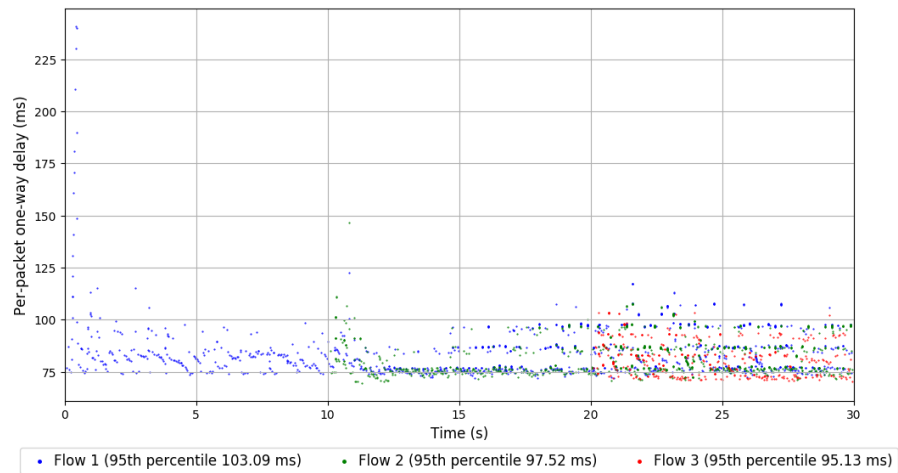
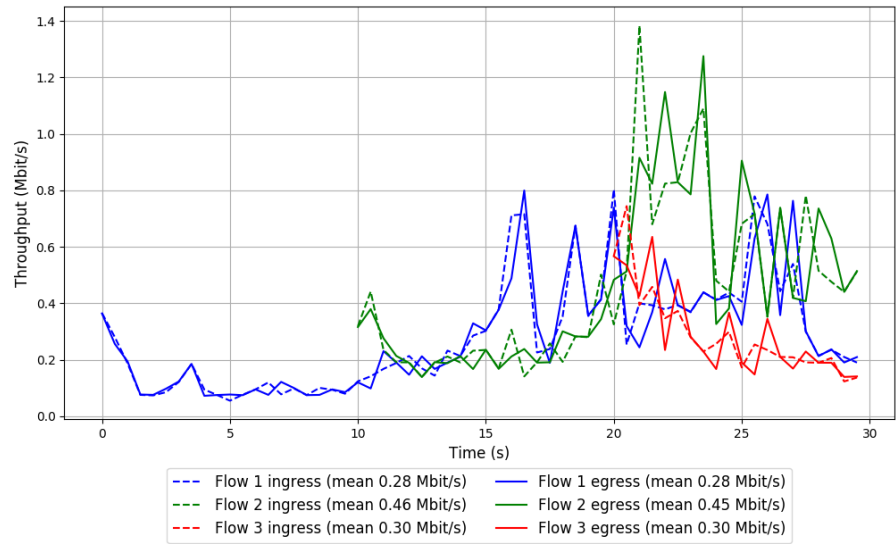


Run 1: Statistics of Sprout

Start at: 2017-12-11 10:08:13  
End at: 2017-12-11 10:08:43  
Local clock offset: -3.085 ms  
Remote clock offset: -0.677 ms

# Below is generated by plot.py at 2017-12-11 10:45:59  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.68 Mbit/s  
95th percentile per-packet one-way delay: 98.793 ms  
Loss rate: 0.12%  
-- Flow 1:  
Average throughput: 0.28 Mbit/s  
95th percentile per-packet one-way delay: 103.091 ms  
Loss rate: 0.02%  
-- Flow 2:  
Average throughput: 0.45 Mbit/s  
95th percentile per-packet one-way delay: 97.521 ms  
Loss rate: 0.25%  
-- Flow 3:  
Average throughput: 0.30 Mbit/s  
95th percentile per-packet one-way delay: 95.130 ms  
Loss rate: 0.00%

## Run 1: Report of Sprout — Data Link



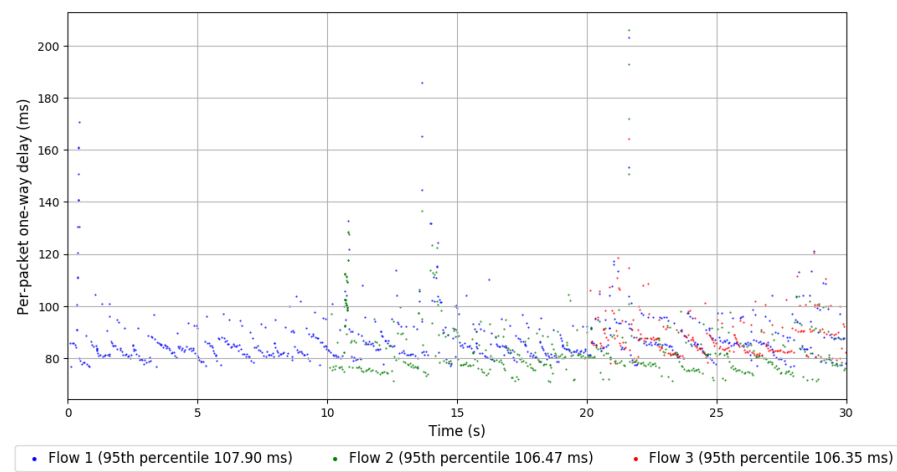
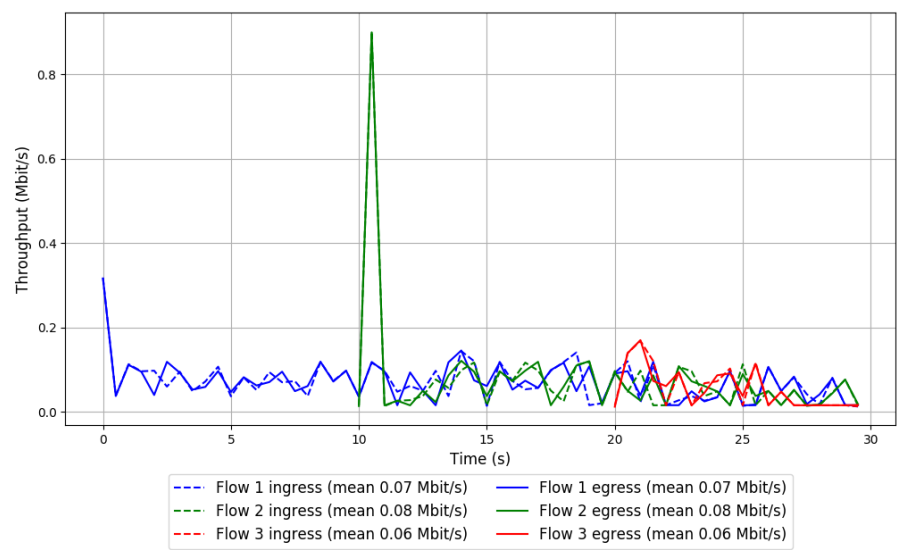
## Run 2: Statistics of Sprout

Start at: 2017-12-11 10:25:48  
End at: 2017-12-11 10:26:18  
Local clock offset: -0.23 ms  
Remote clock offset: -1.834 ms

```
# Below is generated by plot.py at 2017-12-11 10:45:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 107.262 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 0.07 Mbit/s
95th percentile per-packet one-way delay: 107.904 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 106.475 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 106.354 ms
Loss rate: 0.14%
```



Run 2: Report of Sprout — Data Link

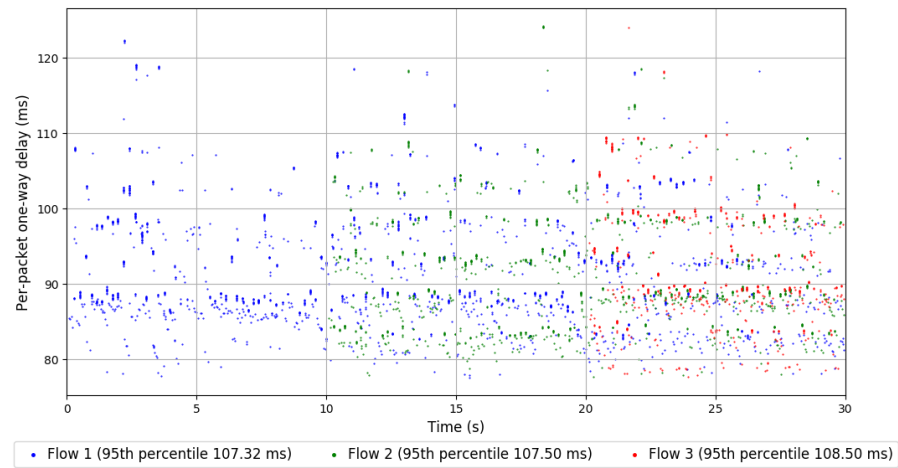
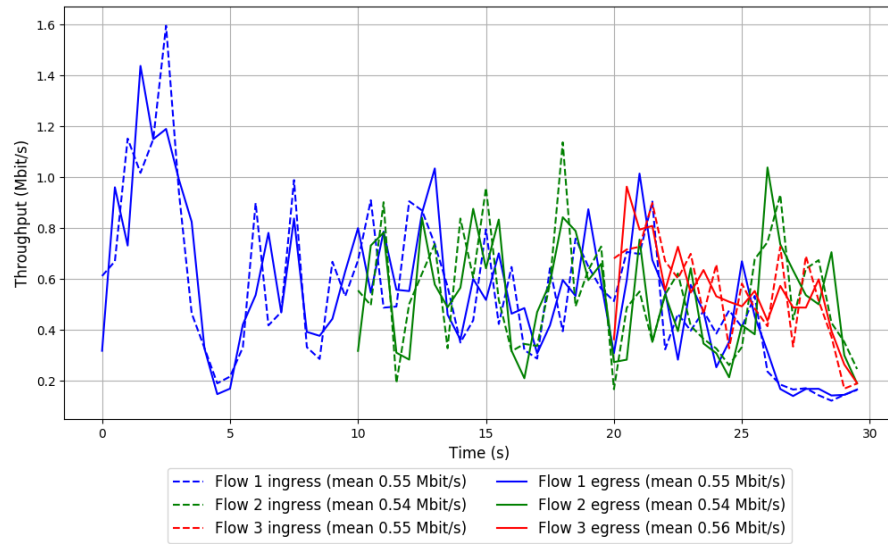


### Run 3: Statistics of Sprout

Start at: 2017-12-11 10:42:42  
End at: 2017-12-11 10:43:12  
Local clock offset: 1.466 ms  
Remote clock offset: -3.215 ms

```
# Below is generated by plot.py at 2017-12-11 10:45:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 107.609 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 107.324 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 107.504 ms
Loss rate: 0.53%
-- Flow 3:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 108.504 ms
Loss rate: 0.01%
```

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

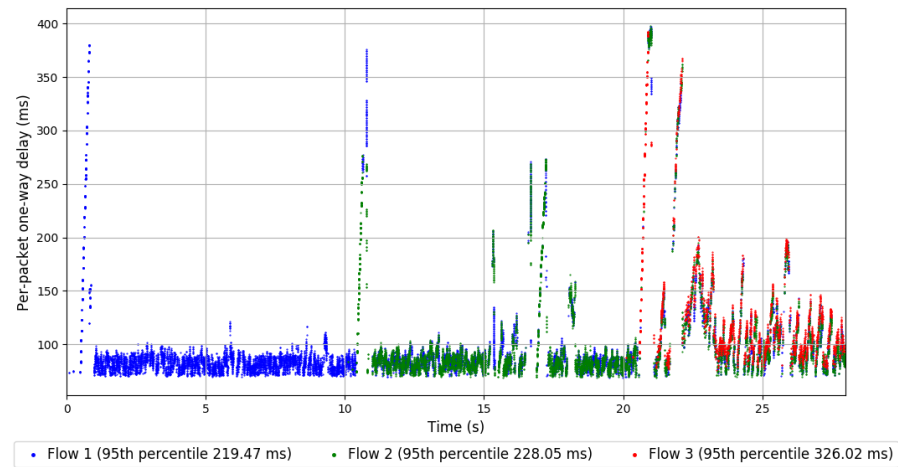
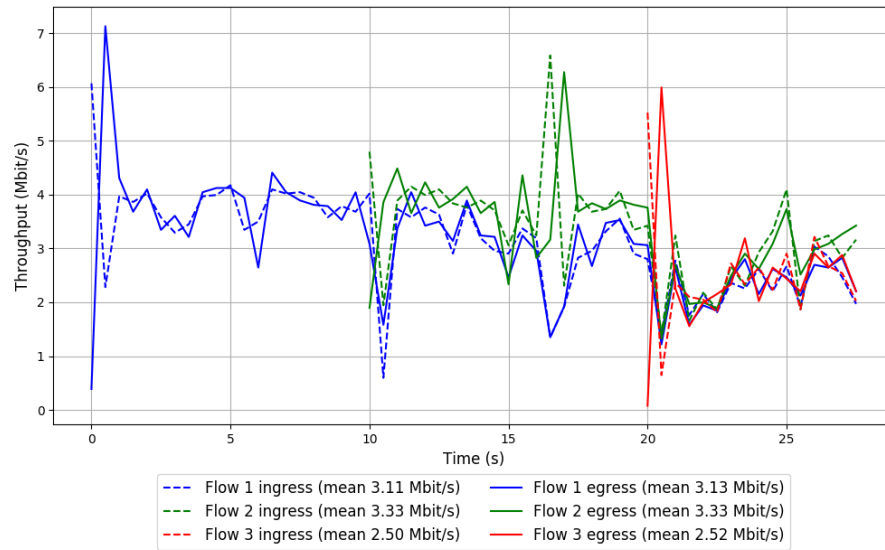


Run 1: Statistics of TaoVA-100x

Start at: 2017-12-11 10:00:32  
End at: 2017-12-11 10:01:02  
Local clock offset: -2.383 ms  
Remote clock offset: -0.199 ms

# Below is generated by plot.py at 2017-12-11 10:46:13  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.95 Mbit/s  
95th percentile per-packet one-way delay: 238.989 ms  
Loss rate: 0.09%  
-- Flow 1:  
Average throughput: 3.13 Mbit/s  
95th percentile per-packet one-way delay: 219.465 ms  
Loss rate: 0.07%  
-- Flow 2:  
Average throughput: 3.33 Mbit/s  
95th percentile per-packet one-way delay: 228.051 ms  
Loss rate: 0.02%  
-- Flow 3:  
Average throughput: 2.52 Mbit/s  
95th percentile per-packet one-way delay: 326.022 ms  
Loss rate: 0.39%

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

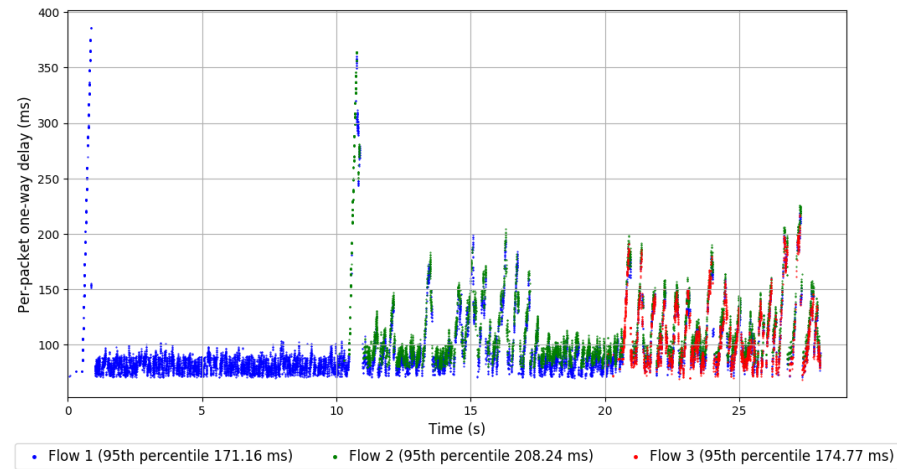
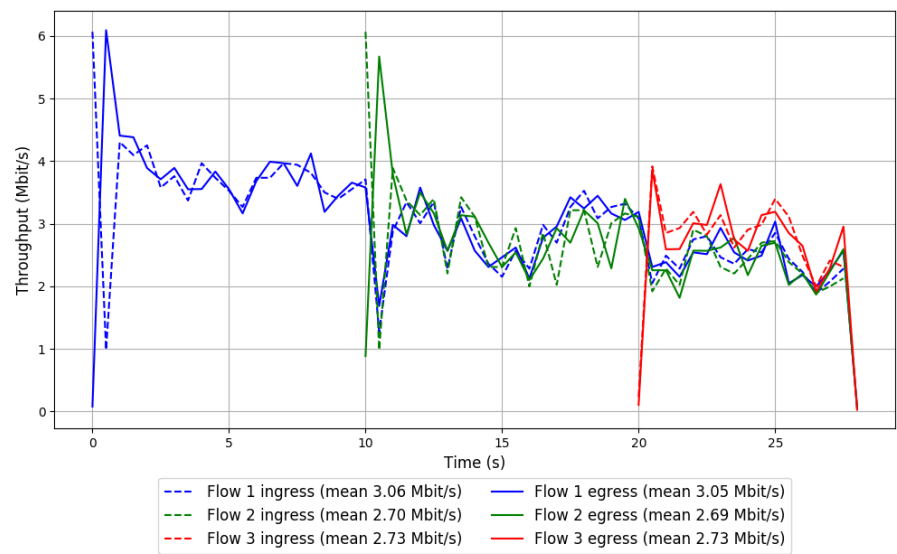


Run 2: Statistics of TaoVA-100x

Start at: 2017-12-11 10:18:28  
End at: 2017-12-11 10:18:58  
Local clock offset: -1.452 ms  
Remote clock offset: -1.362 ms

# Below is generated by plot.py at 2017-12-11 10:46:13  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.55 Mbit/s  
95th percentile per-packet one-way delay: 181.842 ms  
Loss rate: 0.30%  
-- Flow 1:  
Average throughput: 3.05 Mbit/s  
95th percentile per-packet one-way delay: 171.158 ms  
Loss rate: 0.20%  
-- Flow 2:  
Average throughput: 2.69 Mbit/s  
95th percentile per-packet one-way delay: 208.237 ms  
Loss rate: 0.40%  
-- Flow 3:  
Average throughput: 2.73 Mbit/s  
95th percentile per-packet one-way delay: 174.771 ms  
Loss rate: 0.48%

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



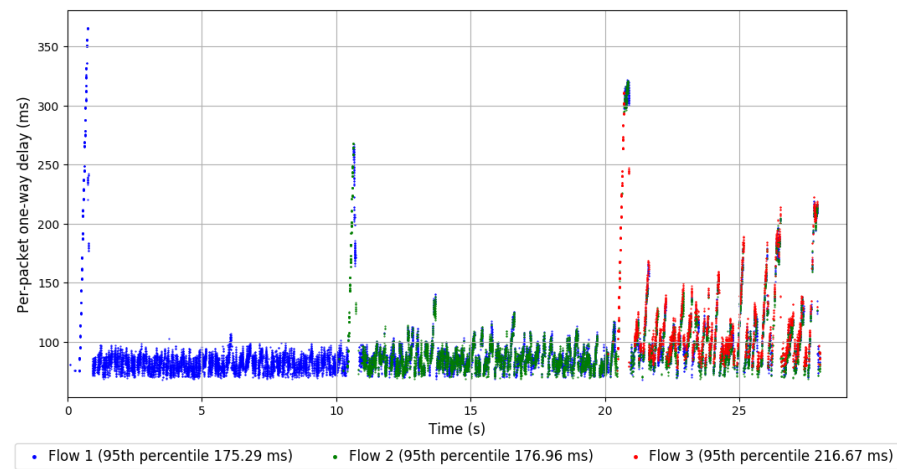
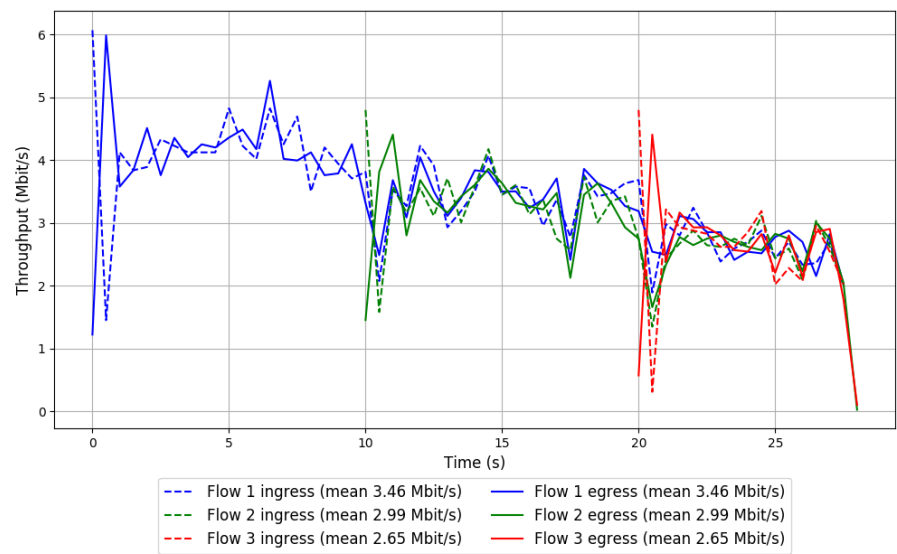
Run 3: Statistics of TaoVA-100x

Start at: 2017-12-11 10:35:27  
End at: 2017-12-11 10:35:57  
Local clock offset: 1.384 ms  
Remote clock offset: -2.742 ms

# Below is generated by plot.py at 2017-12-11 10:46:14  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 6.12 Mbit/s  
95th percentile per-packet one-way delay: 187.407 ms  
Loss rate: 0.20%  
-- Flow 1:  
Average throughput: 3.46 Mbit/s  
95th percentile per-packet one-way delay: 175.292 ms  
Loss rate: 0.16%  
-- Flow 2:  
Average throughput: 2.99 Mbit/s  
95th percentile per-packet one-way delay: 176.964 ms  
Loss rate: 0.14%  
-- Flow 3:  
Average throughput: 2.65 Mbit/s  
95th percentile per-packet one-way delay: 216.670 ms  
Loss rate: 0.49%



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

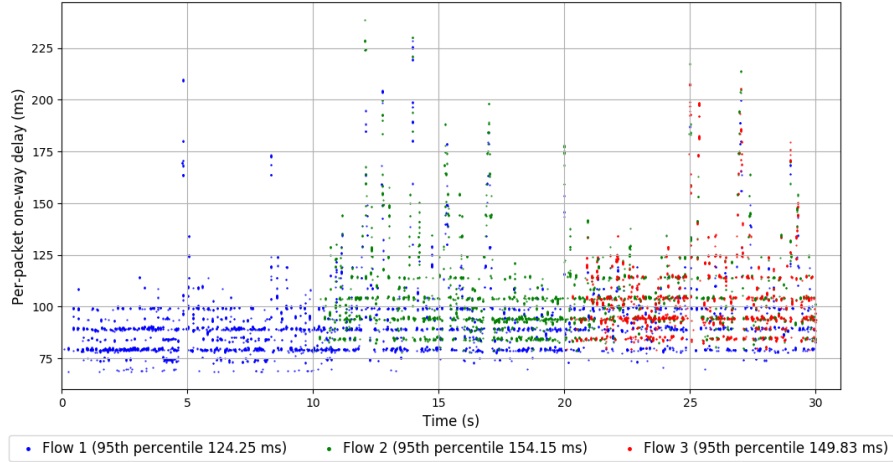
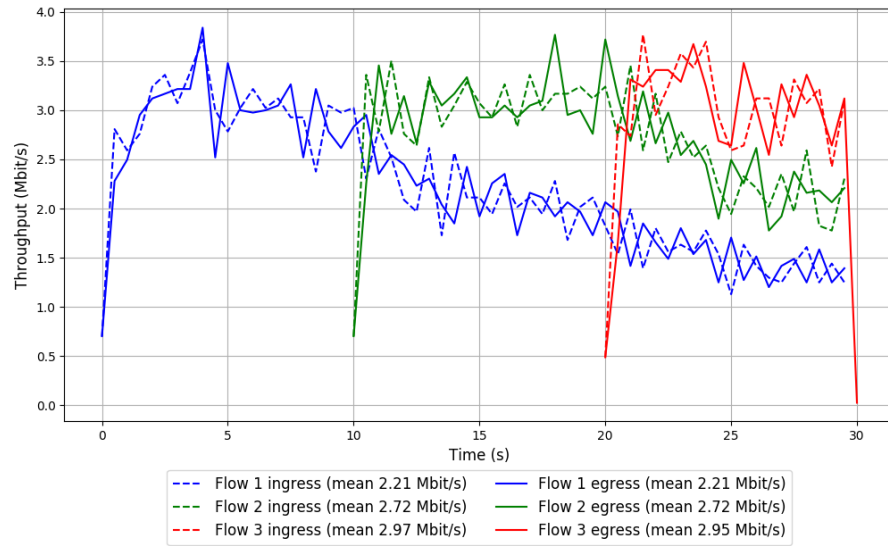


Run 1: Statistics of TCP Vegas

Start at: 2017-12-11 09:57:50  
End at: 2017-12-11 09:58:20  
Local clock offset: -2.253 ms  
Remote clock offset: -0.021 ms

# Below is generated by plot.py at 2017-12-11 10:46:14  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.00 Mbit/s  
95th percentile per-packet one-way delay: 144.461 ms  
Loss rate: 0.30%  
-- Flow 1:  
Average throughput: 2.21 Mbit/s  
95th percentile per-packet one-way delay: 124.247 ms  
Loss rate: 0.16%  
-- Flow 2:  
Average throughput: 2.72 Mbit/s  
95th percentile per-packet one-way delay: 154.151 ms  
Loss rate: 0.22%  
-- Flow 3:  
Average throughput: 2.95 Mbit/s  
95th percentile per-packet one-way delay: 149.833 ms  
Loss rate: 0.73%

# Run 1: Report of TCP Vegas — Data Link

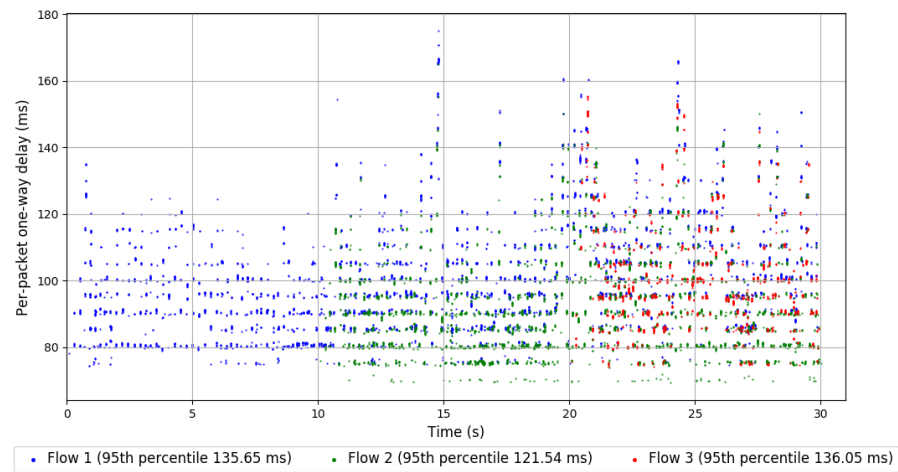
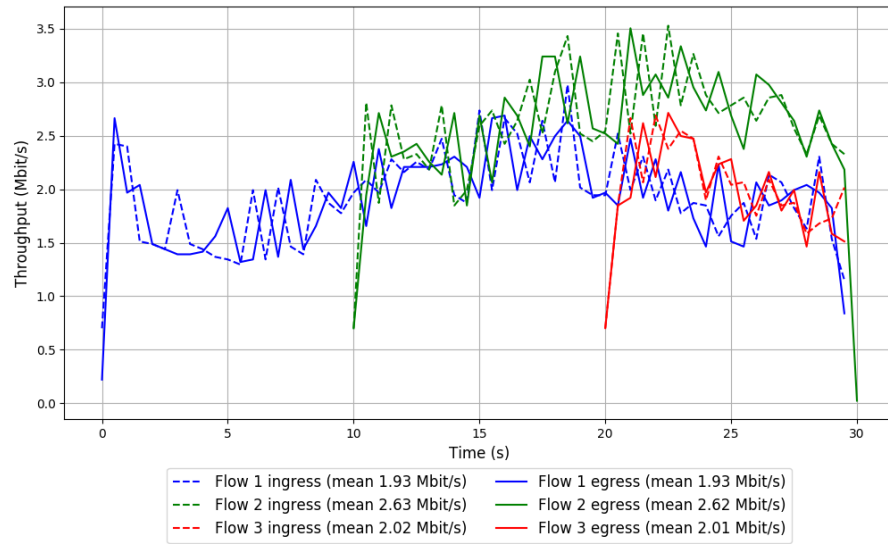


Run 2: Statistics of TCP Vegas

Start at: 2017-12-11 10:15:30  
End at: 2017-12-11 10:16:00  
Local clock offset: -2.325 ms  
Remote clock offset: -1.193 ms

# Below is generated by plot.py at 2017-12-11 10:46:14  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.33 Mbit/s  
95th percentile per-packet one-way delay: 131.259 ms  
Loss rate: 0.65%  
-- Flow 1:  
Average throughput: 1.93 Mbit/s  
95th percentile per-packet one-way delay: 135.647 ms  
Loss rate: 0.48%  
-- Flow 2:  
Average throughput: 2.62 Mbit/s  
95th percentile per-packet one-way delay: 121.539 ms  
Loss rate: 0.48%  
-- Flow 3:  
Average throughput: 2.01 Mbit/s  
95th percentile per-packet one-way delay: 136.054 ms  
Loss rate: 1.61%

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

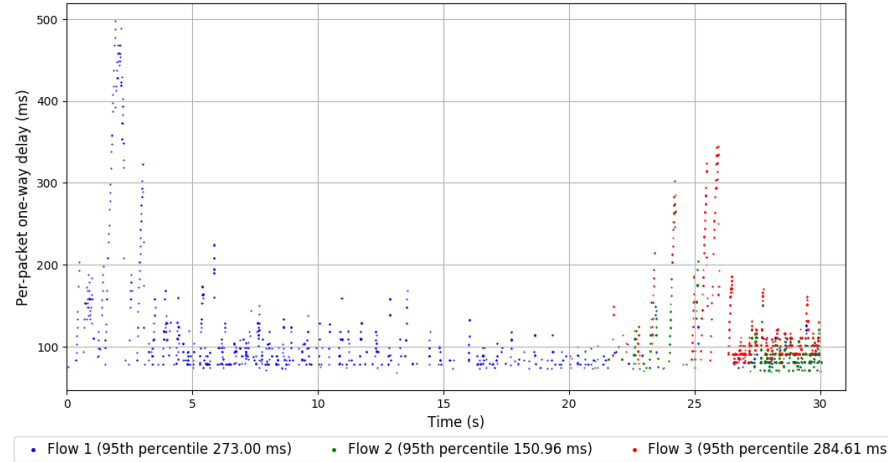
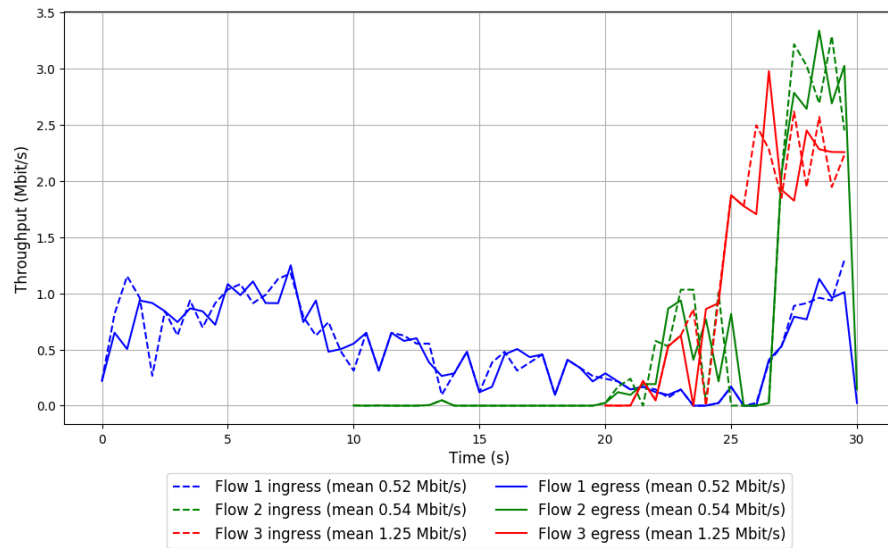


Run 3: Statistics of TCP Vegas

Start at: 2017-12-11 10:33:03  
End at: 2017-12-11 10:33:33  
Local clock offset: 1.136 ms  
Remote clock offset: -2.449 ms

# Below is generated by plot.py at 2017-12-11 10:46:14  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.29 Mbit/s  
95th percentile per-packet one-way delay: 253.993 ms  
Loss rate: 0.87%  
-- Flow 1:  
Average throughput: 0.52 Mbit/s  
95th percentile per-packet one-way delay: 273.003 ms  
Loss rate: 0.99%  
-- Flow 2:  
Average throughput: 0.54 Mbit/s  
95th percentile per-packet one-way delay: 150.963 ms  
Loss rate: 0.22%  
-- Flow 3:  
Average throughput: 1.25 Mbit/s  
95th percentile per-packet one-way delay: 284.608 ms  
Loss rate: 1.26%

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



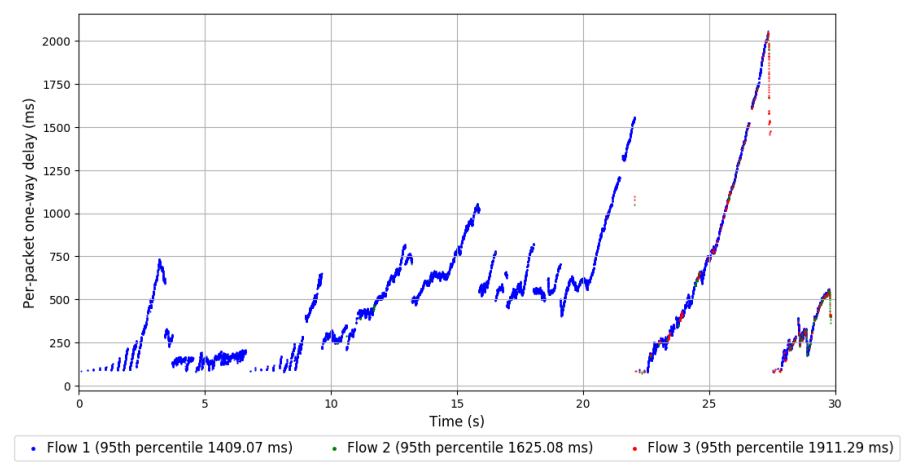
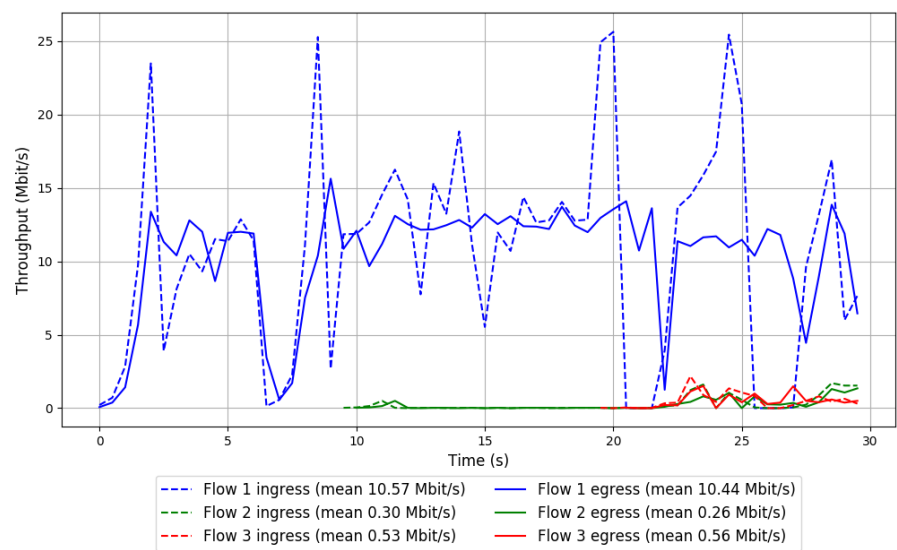
Run 1: Statistics of Verus

Start at: 2017-12-11 10:09:24  
End at: 2017-12-11 10:09:54  
Local clock offset: -3.234 ms  
Remote clock offset: -0.753 ms

# Below is generated by plot.py at 2017-12-11 10:46:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 10.77 Mbit/s  
95th percentile per-packet one-way delay: 1418.447 ms  
Loss rate: 1.77%  
-- Flow 1:  
Average throughput: 10.44 Mbit/s  
95th percentile per-packet one-way delay: 1409.074 ms  
Loss rate: 1.47%  
-- Flow 2:  
Average throughput: 0.26 Mbit/s  
95th percentile per-packet one-way delay: 1625.081 ms  
Loss rate: 14.63%  
-- Flow 3:  
Average throughput: 0.56 Mbit/s  
95th percentile per-packet one-way delay: 1911.294 ms  
Loss rate: 5.20%



Run 1: Report of Verus — Data Link

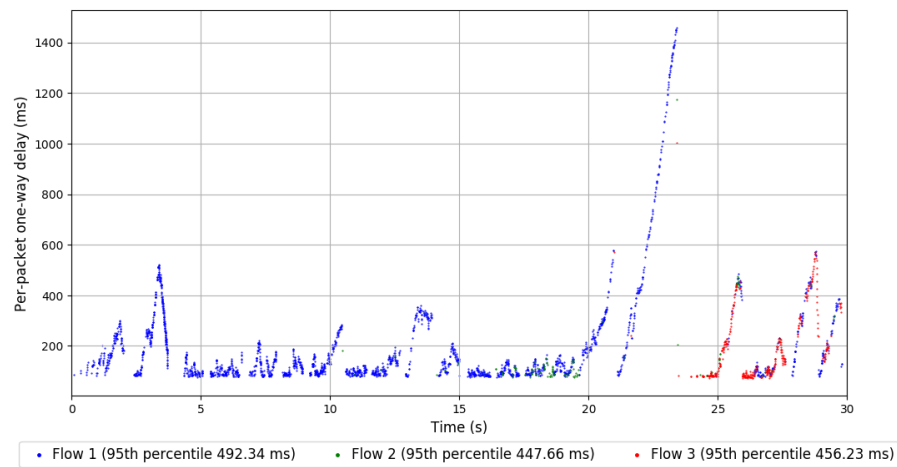
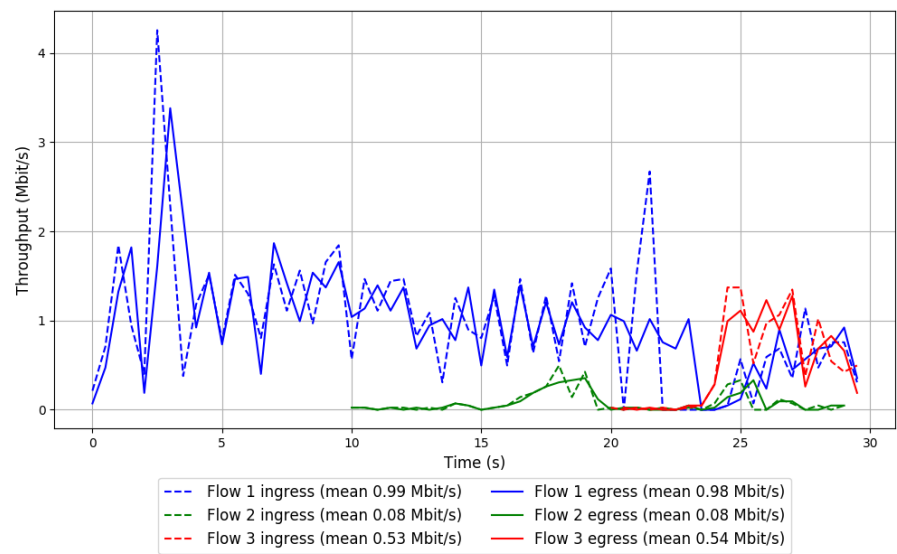


Run 2: Statistics of Verus

Start at: 2017-12-11 10:26:59  
End at: 2017-12-11 10:27:30  
Local clock offset: -0.038 ms  
Remote clock offset: -1.897 ms

# Below is generated by plot.py at 2017-12-11 10:46:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.19 Mbit/s  
95th percentile per-packet one-way delay: 480.250 ms  
Loss rate: 1.22%  
-- Flow 1:  
Average throughput: 0.98 Mbit/s  
95th percentile per-packet one-way delay: 492.344 ms  
Loss rate: 0.64%  
-- Flow 2:  
Average throughput: 0.08 Mbit/s  
95th percentile per-packet one-way delay: 447.657 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.54 Mbit/s  
95th percentile per-packet one-way delay: 456.225 ms  
Loss rate: 5.00%

Run 2: Report of Verus — Data Link

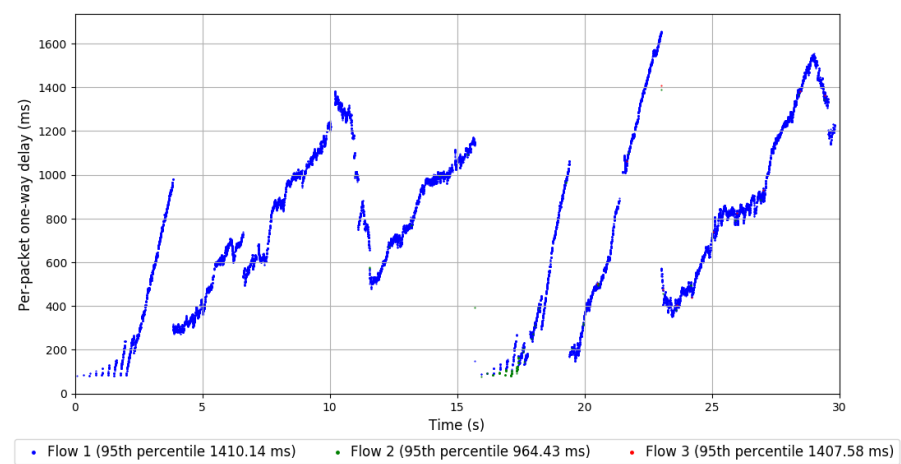
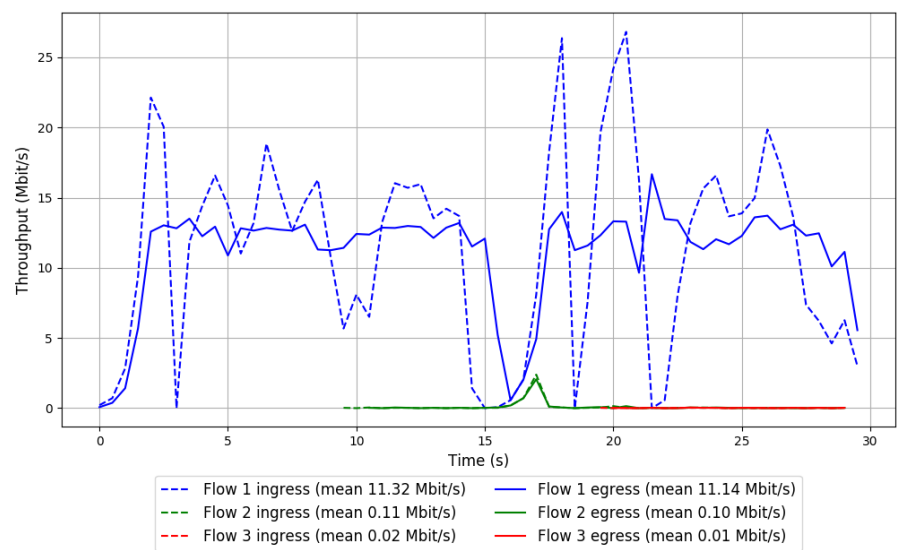


Run 3: Statistics of Verus

Start at: 2017-12-11 10:43:53  
End at: 2017-12-11 10:44:23  
Local clock offset: 1.477 ms  
Remote clock offset: -3.167 ms

# Below is generated by plot.py at 2017-12-11 10:46:19  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 11.21 Mbit/s  
95th percentile per-packet one-way delay: 1407.423 ms  
Loss rate: 1.74%  
-- Flow 1:  
Average throughput: 11.14 Mbit/s  
95th percentile per-packet one-way delay: 1410.138 ms  
Loss rate: 1.70%  
-- Flow 2:  
Average throughput: 0.10 Mbit/s  
95th percentile per-packet one-way delay: 964.434 ms  
Loss rate: 6.86%  
-- Flow 3:  
Average throughput: 0.01 Mbit/s  
95th percentile per-packet one-way delay: 1407.575 ms  
Loss rate: 8.33%

Run 3: Report of Verus — Data Link



Run 1: Statistics of Copa

Start at: 2017-12-11 09:55:07

End at: 2017-12-11 09:55:37

Local clock offset: -2.171 ms

Remote clock offset: 0.204 ms

# Below is generated by plot.py at 2017-12-11 10:46:19

# Datalink statistics

-- Total of 3 flows:

Average throughput: 1.72 Mbit/s

95th percentile per-packet one-way delay: 93.923 ms

Loss rate: 0.21%

-- Flow 1:

Average throughput: 0.88 Mbit/s

95th percentile per-packet one-way delay: 92.438 ms

Loss rate: 0.10%

-- Flow 2:

Average throughput: 0.88 Mbit/s

95th percentile per-packet one-way delay: 95.565 ms

Loss rate: 0.24%

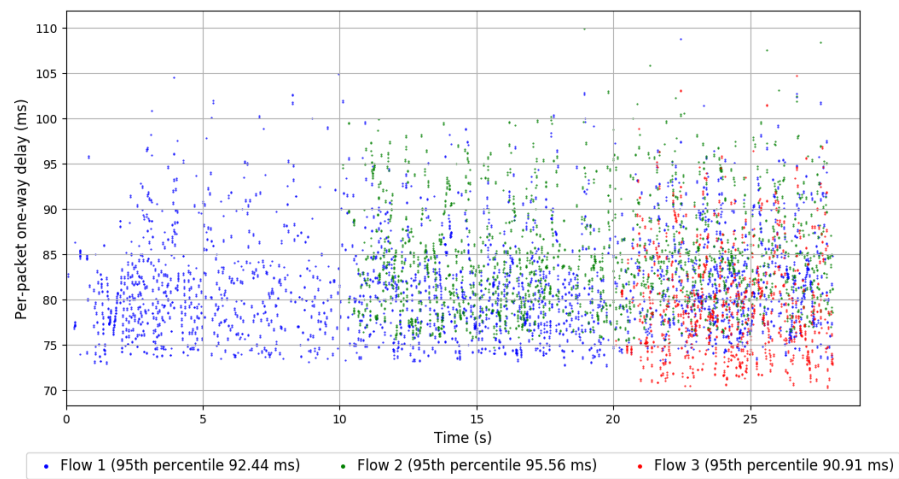
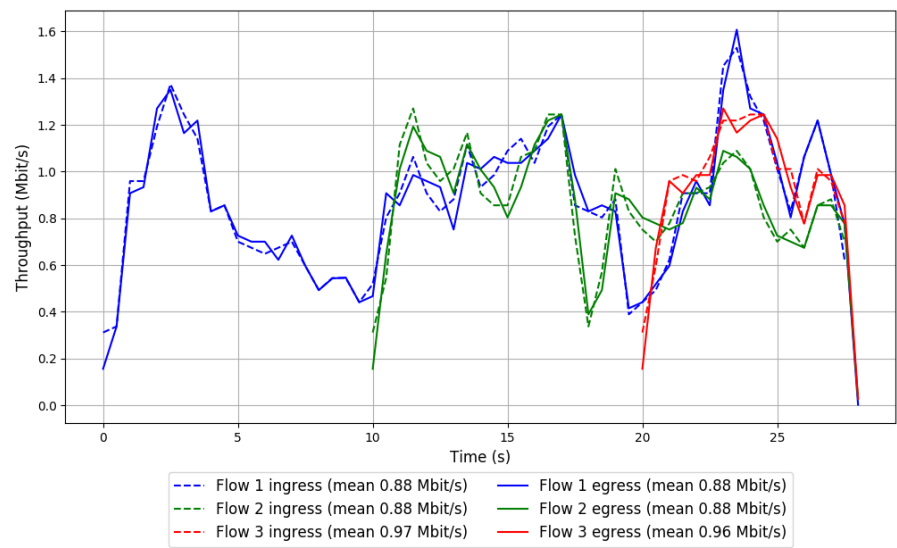
-- Flow 3:

Average throughput: 0.96 Mbit/s

95th percentile per-packet one-way delay: 90.913 ms

Loss rate: 0.49%

Run 1: Report of Copa — Data Link



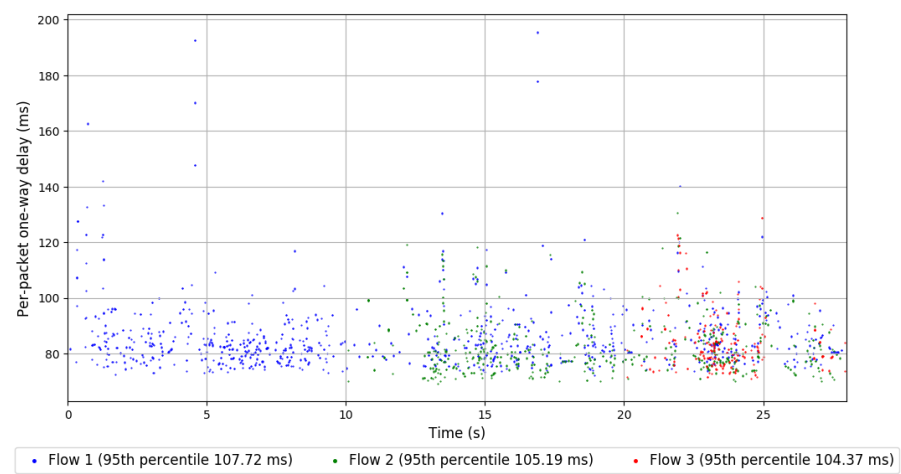
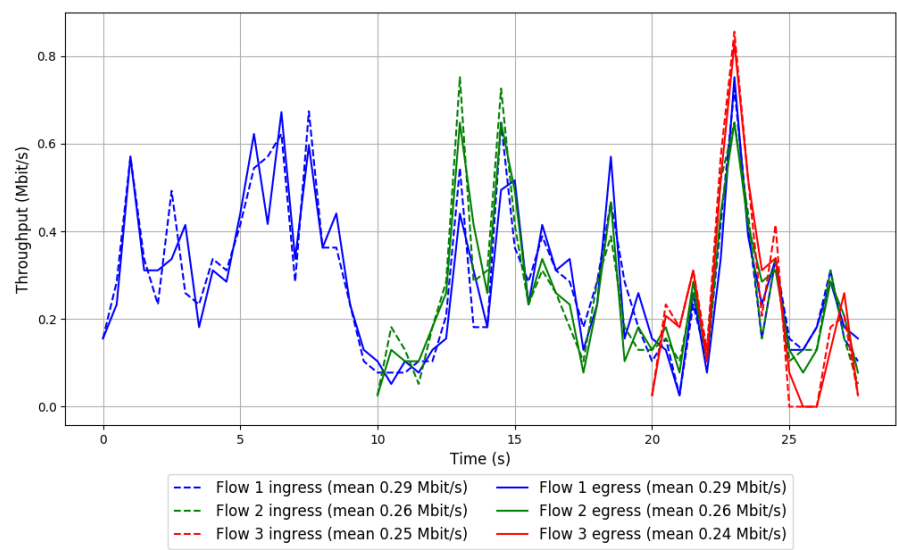
Run 2: Statistics of Copa

Start at: 2017-12-11 10:13:04  
End at: 2017-12-11 10:13:34  
Local clock offset: -3.51 ms  
Remote clock offset: -1.004 ms

# Below is generated by plot.py at 2017-12-11 10:46:19  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.53 Mbit/s  
95th percentile per-packet one-way delay: 106.885 ms  
Loss rate: 0.08%  
-- Flow 1:  
Average throughput: 0.29 Mbit/s  
95th percentile per-packet one-way delay: 107.723 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.26 Mbit/s  
95th percentile per-packet one-way delay: 105.193 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.24 Mbit/s  
95th percentile per-packet one-way delay: 104.371 ms  
Loss rate: 0.62%



Run 2: Report of Copa — Data Link

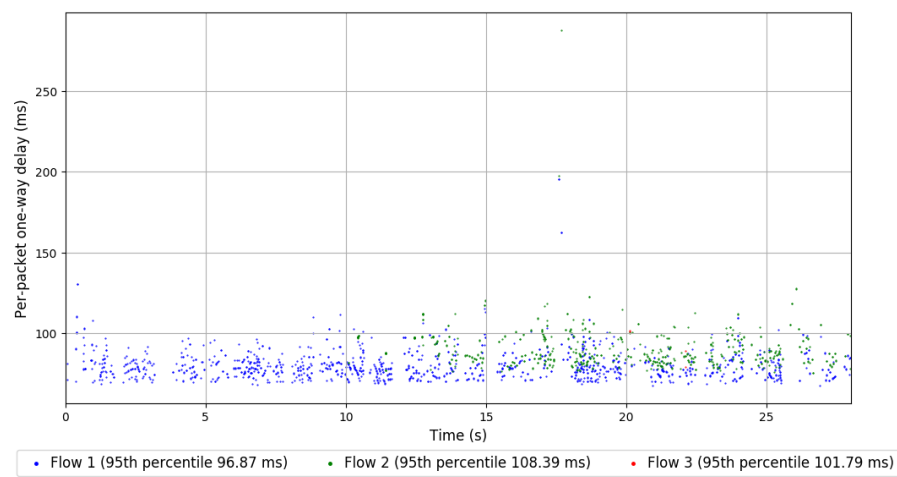
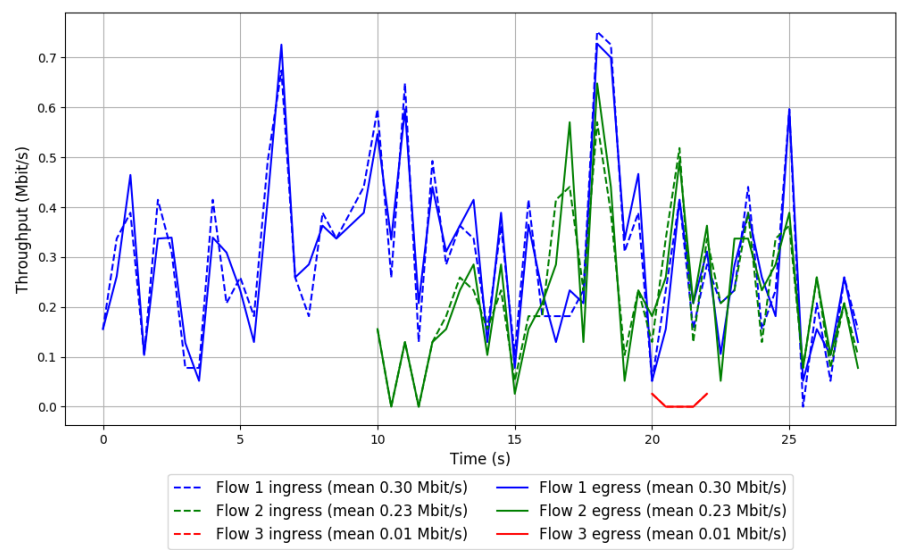


Run 3: Statistics of Copa

Start at: 2017-12-11 10:30:37  
End at: 2017-12-11 10:31:07  
Local clock offset: 0.704 ms  
Remote clock offset: -2.256 ms

# Below is generated by plot.py at 2017-12-11 10:46:19  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.45 Mbit/s  
95th percentile per-packet one-way delay: 101.792 ms  
Loss rate: 0.21%  
-- Flow 1:  
Average throughput: 0.30 Mbit/s  
95th percentile per-packet one-way delay: 96.866 ms  
Loss rate: 0.15%  
-- Flow 2:  
Average throughput: 0.23 Mbit/s  
95th percentile per-packet one-way delay: 108.393 ms  
Loss rate: 0.32%  
-- Flow 3:  
Average throughput: 0.01 Mbit/s  
95th percentile per-packet one-way delay: 101.792 ms  
Loss rate: 0.00%

Run 3: Report of Copa — Data Link

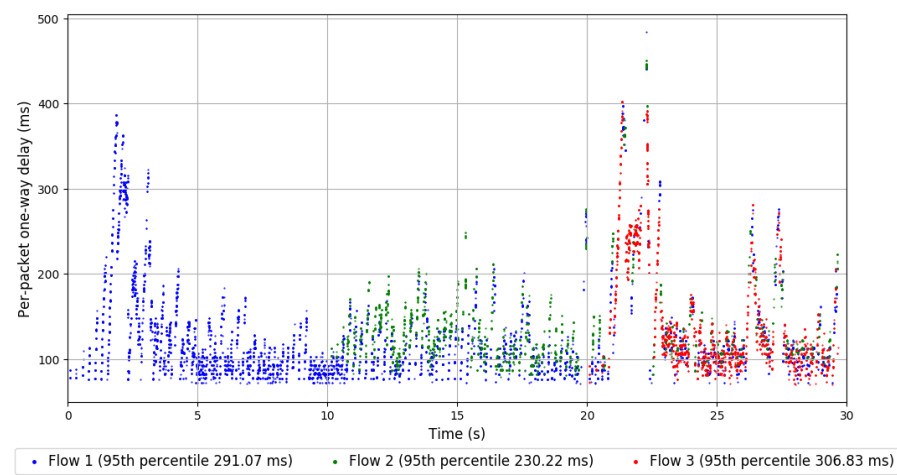
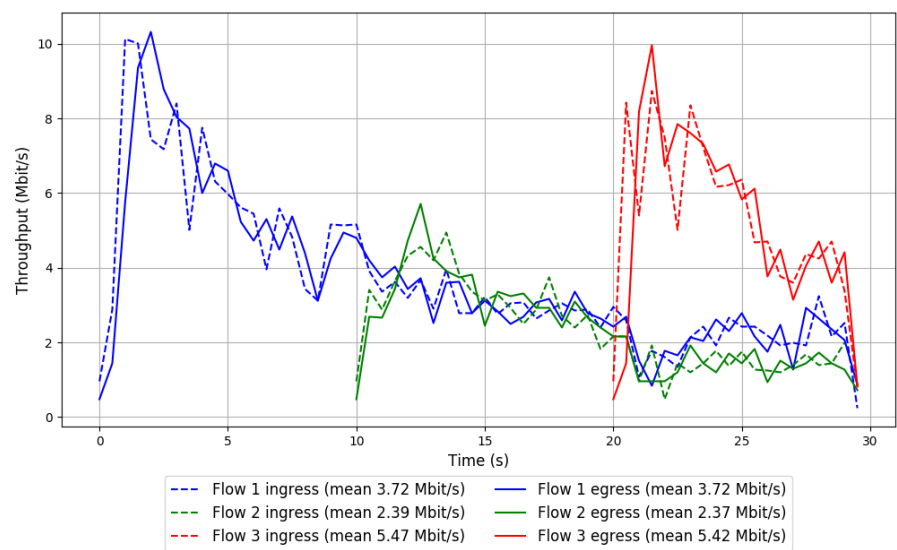


Run 1: Statistics of Indigo

Start at: 2017-12-11 10:07:00  
End at: 2017-12-11 10:07:30  
Local clock offset: -2.967 ms  
Remote clock offset: -0.567 ms

# Below is generated by plot.py at 2017-12-11 10:46:20  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 7.03 Mbit/s  
95th percentile per-packet one-way delay: 282.721 ms  
Loss rate: 0.27%  
-- Flow 1:  
Average throughput: 3.72 Mbit/s  
95th percentile per-packet one-way delay: 291.068 ms  
Loss rate: 0.16%  
-- Flow 2:  
Average throughput: 2.37 Mbit/s  
95th percentile per-packet one-way delay: 230.224 ms  
Loss rate: 0.05%  
-- Flow 3:  
Average throughput: 5.42 Mbit/s  
95th percentile per-packet one-way delay: 306.831 ms  
Loss rate: 0.69%

Run 1: Report of Indigo — Data Link

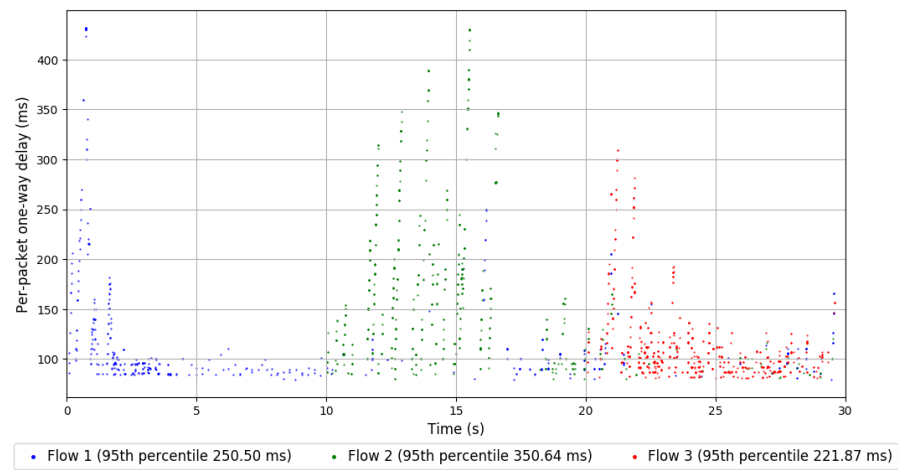
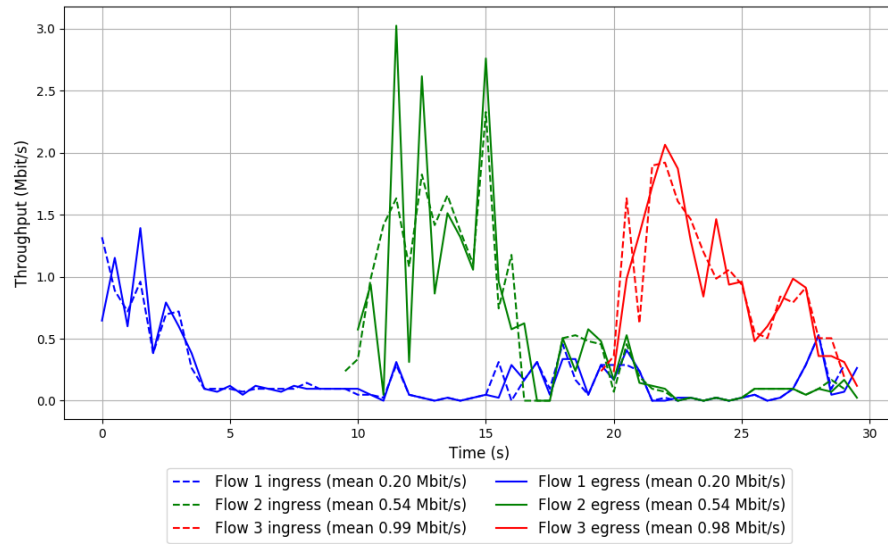


Run 2: Statistics of Indigo

Start at: 2017-12-11 10:24:32  
End at: 2017-12-11 10:25:02  
Local clock offset: -0.453 ms  
Remote clock offset: -1.797 ms

# Below is generated by plot.py at 2017-12-11 10:46:20  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.87 Mbit/s  
95th percentile per-packet one-way delay: 309.099 ms  
Loss rate: 0.42%  
-- Flow 1:  
Average throughput: 0.20 Mbit/s  
95th percentile per-packet one-way delay: 250.504 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.54 Mbit/s  
95th percentile per-packet one-way delay: 350.639 ms  
Loss rate: 0.57%  
-- Flow 3:  
Average throughput: 0.98 Mbit/s  
95th percentile per-packet one-way delay: 221.869 ms  
Loss rate: 0.51%

## Run 2: Report of Indigo — Data Link



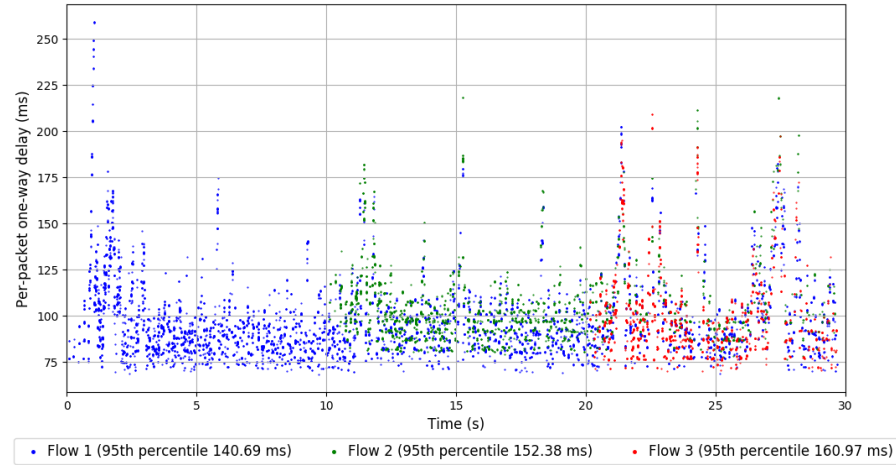
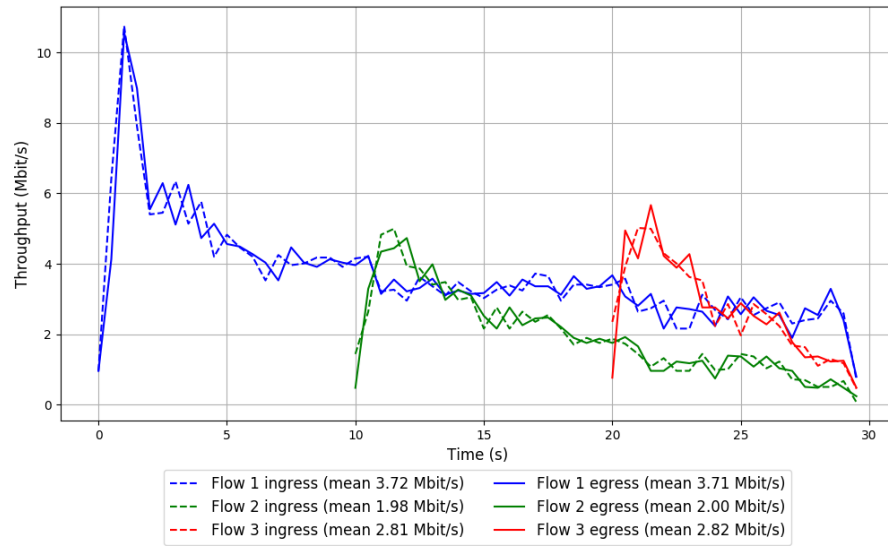
Run 3: Statistics of Indigo

Start at: 2017-12-11 10:41:30  
End at: 2017-12-11 10:42:00  
Local clock offset: 1.478 ms  
Remote clock offset: -3.078 ms

# Below is generated by plot.py at 2017-12-11 10:46:20  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.93 Mbit/s  
95th percentile per-packet one-way delay: 147.560 ms  
Loss rate: 0.19%  
-- Flow 1:  
Average throughput: 3.71 Mbit/s  
95th percentile per-packet one-way delay: 140.689 ms  
Loss rate: 0.21%  
-- Flow 2:  
Average throughput: 2.00 Mbit/s  
95th percentile per-packet one-way delay: 152.382 ms  
Loss rate: 0.06%  
-- Flow 3:  
Average throughput: 2.82 Mbit/s  
95th percentile per-packet one-way delay: 160.971 ms  
Loss rate: 0.31%



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

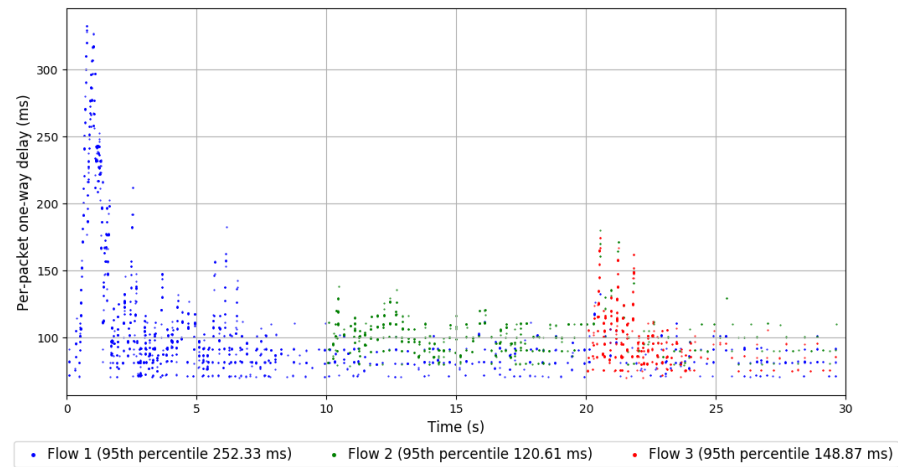
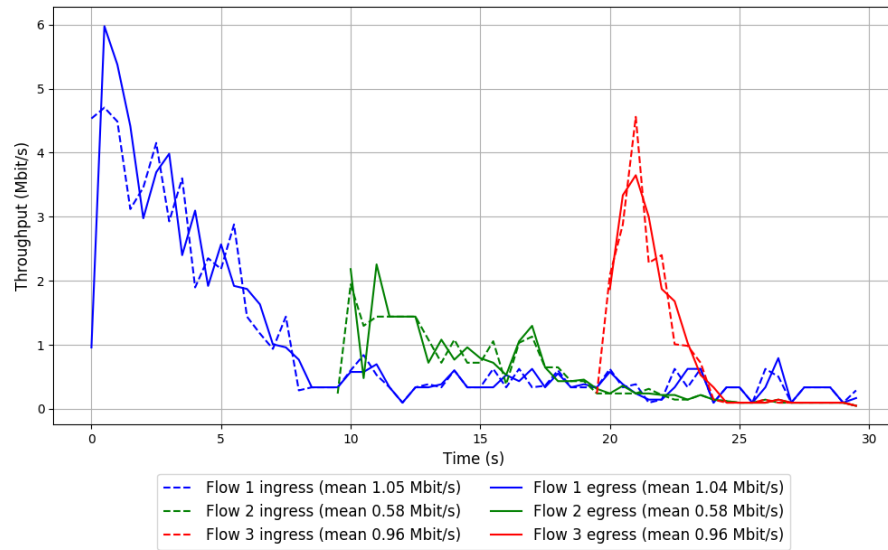


```
Run 1: Statistics of Indigo-calib

Start at: 2017-12-11 10:05:48
End at: 2017-12-11 10:06:18
Local clock offset: -2.831 ms
Remote clock offset: -0.498 ms

# Below is generated by plot.py at 2017-12-11 10:46:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 231.754 ms
Loss rate: 0.40%
-- Flow 1:
Average throughput: 1.04 Mbit/s
95th percentile per-packet one-way delay: 252.330 ms
Loss rate: 0.66%
-- Flow 2:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 120.611 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 148.867 ms
Loss rate: 0.00%
```

# Run 1: Report of Indigo-calib — Data Link

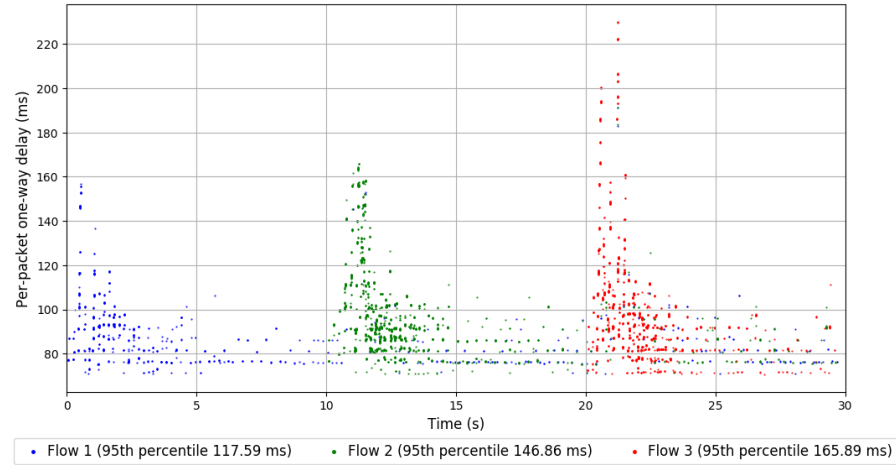
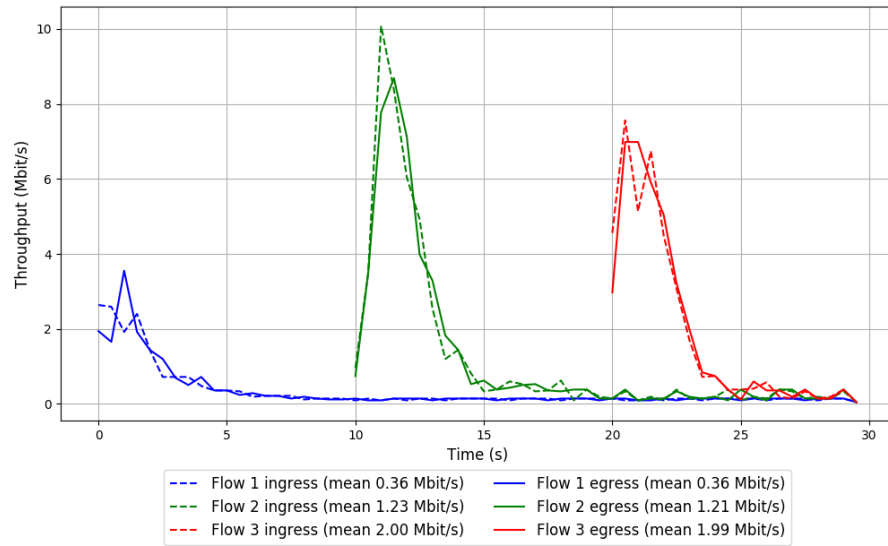


Run 2: Statistics of Indigo-calib

Start at: 2017-12-11 10:23:16  
End at: 2017-12-11 10:23:46  
Local clock offset: -0.642 ms  
Remote clock offset: -1.651 ms

# Below is generated by plot.py at 2017-12-11 10:46:20  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.79 Mbit/s  
95th percentile per-packet one-way delay: 147.704 ms  
Loss rate: 0.72%  
-- Flow 1:  
Average throughput: 0.36 Mbit/s  
95th percentile per-packet one-way delay: 117.586 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 1.21 Mbit/s  
95th percentile per-packet one-way delay: 146.861 ms  
Loss rate: 1.45%  
-- Flow 3:  
Average throughput: 1.99 Mbit/s  
95th percentile per-packet one-way delay: 165.886 ms  
Loss rate: 0.19%

## Run 2: Report of Indigo-calib — Data Link



Run 3: Statistics of Indigo-calib

Start at: 2017-12-11 10:40:19  
End at: 2017-12-11 10:40:49  
Local clock offset: 1.46 ms  
Remote clock offset: -3.028 ms

# Below is generated by plot.py at 2017-12-11 10:46:20  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.78 Mbit/s  
95th percentile per-packet one-way delay: 125.420 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 0.28 Mbit/s  
95th percentile per-packet one-way delay: 115.326 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.39 Mbit/s  
95th percentile per-packet one-way delay: 118.910 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.75 Mbit/s  
95th percentile per-packet one-way delay: 135.777 ms  
Loss rate: 0.00%

Run 3: Report of Indigo-calib — Data Link

