

## Pantheon Report

Generated at 2017-11-30 08:40:58 (UTC).

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

Repeated the test of 14 congestion control schemes 3 times.

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

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

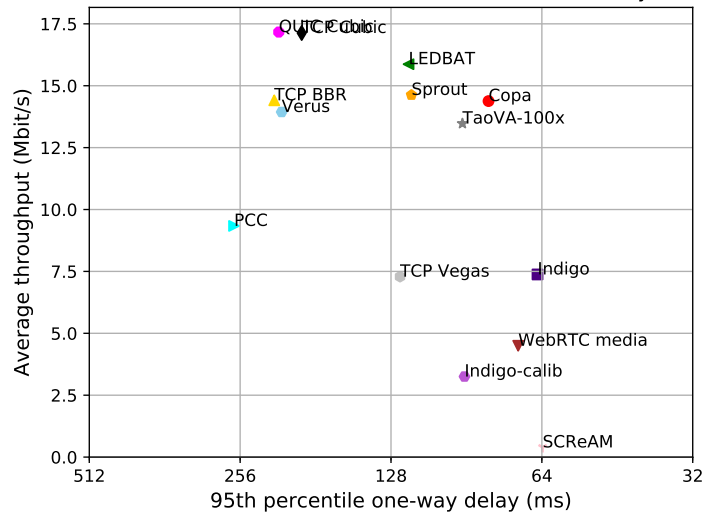
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo\_fast**).

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

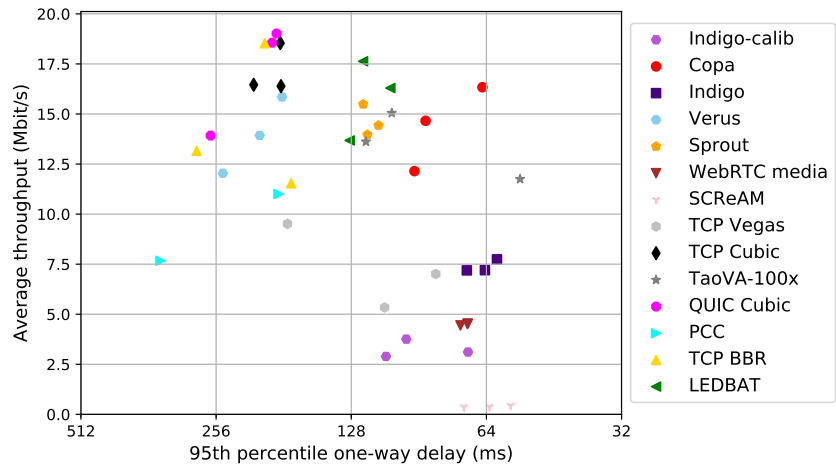
Git summary:

```
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 @ f1a14bffe749737437f61b1eae30b267cde681
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 Stanford ppp0 to AWS California 1 Ethernet, 3 runs of 30s each per scheme  
 3 flows with 10s interval between flows (mean of all runs by scheme)



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



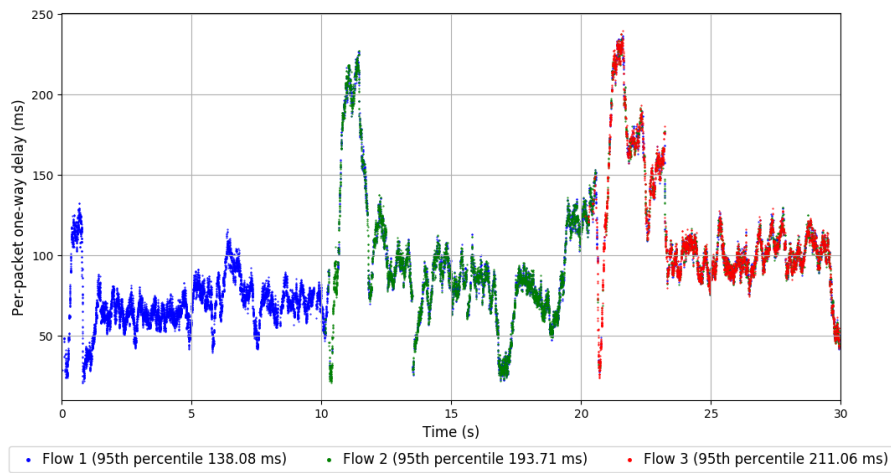
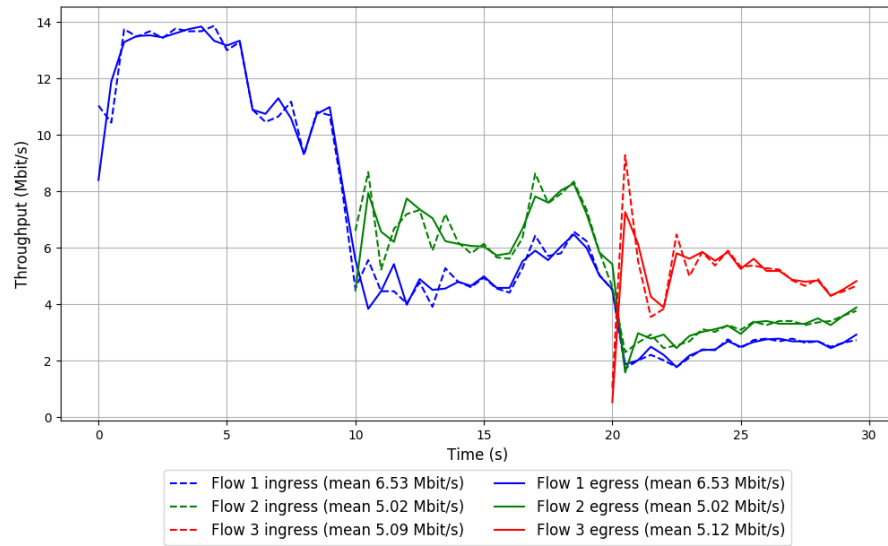
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	9.01	5.02	6.32	189.08	220.74	250.63	1.57	3.03	8.05
TCP Cubic	3	10.86	5.67	7.68	201.08	164.32	127.83	0.35	0.59	0.70
LEDBAT	3	10.78	5.05	5.31	120.98	104.56	84.69	0.36	0.89	1.37
PCC	2	4.27	6.03	3.23	256.93	263.03	274.41	1.68	2.04	4.41
QUIC Cubic	3	12.19	5.72	3.55	212.12	219.56	220.69	1.02	2.07	3.04
SCReAM	3	0.18	0.20	0.21	65.67	59.22	56.32	0.21	0.42	0.76
WebRTC media	3	2.51	1.49	0.51	70.52	71.59	71.79	1.15	0.96	2.19
Sprout	3	7.99	6.22	4.70	112.23	114.89	133.26	2.02	1.95	2.73
TaoVA-100x	3	7.10	7.02	6.66	99.14	77.05	67.36	1.07	1.29	2.16
TCP Vegas	3	1.58	4.47	8.30	86.37	117.57	99.04	0.29	0.25	0.27
Verus	3	8.20	6.57	4.18	206.48	210.26	233.51	31.93	10.82	48.01
Copa	3	9.63	5.72	3.85	79.58	86.23	87.22	0.18	0.32	0.66
Indigo	3	3.16	3.49	5.02	67.32	61.31	60.05	0.19	0.19	0.34
Indigo-calib	3	1.46	1.31	2.81	86.99	79.96	94.09	0.12	0.22	0.43

Run 1: Statistics of TCP BBR

Start at: 2017-11-30 07:06:35  
End at: 2017-11-30 07:07:05  
Local clock offset: -0.572 ms  
Remote clock offset: -3.247 ms

# Below is generated by plot.py at 2017-11-30 08:39:40  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 11.54 Mbit/s  
95th percentile per-packet one-way delay: 174.271 ms  
Loss rate: 0.25%  
-- Flow 1:  
Average throughput: 6.53 Mbit/s  
95th percentile per-packet one-way delay: 138.076 ms  
Loss rate: 0.10%  
-- Flow 2:  
Average throughput: 5.02 Mbit/s  
95th percentile per-packet one-way delay: 193.708 ms  
Loss rate: 0.30%  
-- Flow 3:  
Average throughput: 5.12 Mbit/s  
95th percentile per-packet one-way delay: 211.060 ms  
Loss rate: 0.71%

# Run 1: Report of TCP BBR — Data Link

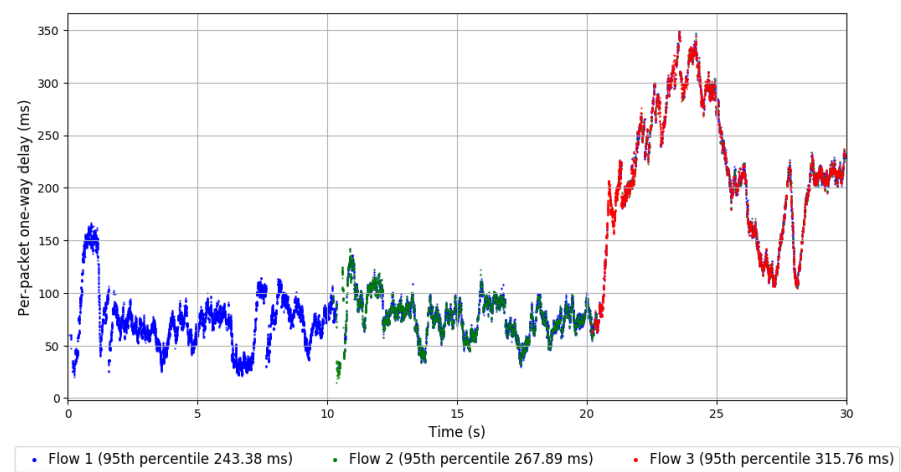
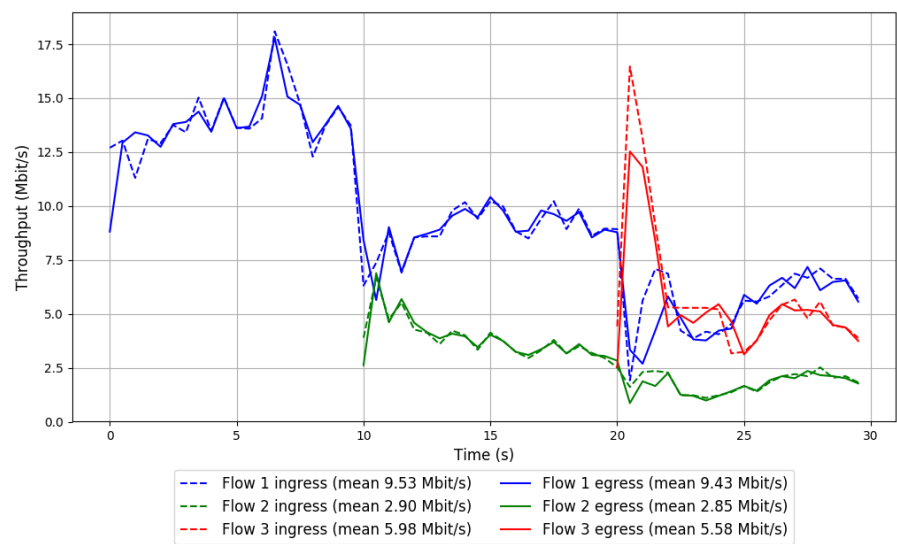


Run 2: Statistics of TCP BBR

Start at: 2017-11-30 07:23:15  
End at: 2017-11-30 07:23:45  
Local clock offset: -0.385 ms  
Remote clock offset: -3.225 ms

# Below is generated by plot.py at 2017-11-30 08:39:43  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 13.16 Mbit/s  
95th percentile per-packet one-way delay: 282.901 ms  
Loss rate: 2.30%  
-- Flow 1:  
Average throughput: 9.43 Mbit/s  
95th percentile per-packet one-way delay: 243.381 ms  
Loss rate: 1.28%  
-- Flow 2:  
Average throughput: 2.85 Mbit/s  
95th percentile per-packet one-way delay: 267.893 ms  
Loss rate: 2.02%  
-- Flow 3:  
Average throughput: 5.58 Mbit/s  
95th percentile per-packet one-way delay: 315.758 ms  
Loss rate: 7.49%

Run 2: Report of TCP BBR — Data Link



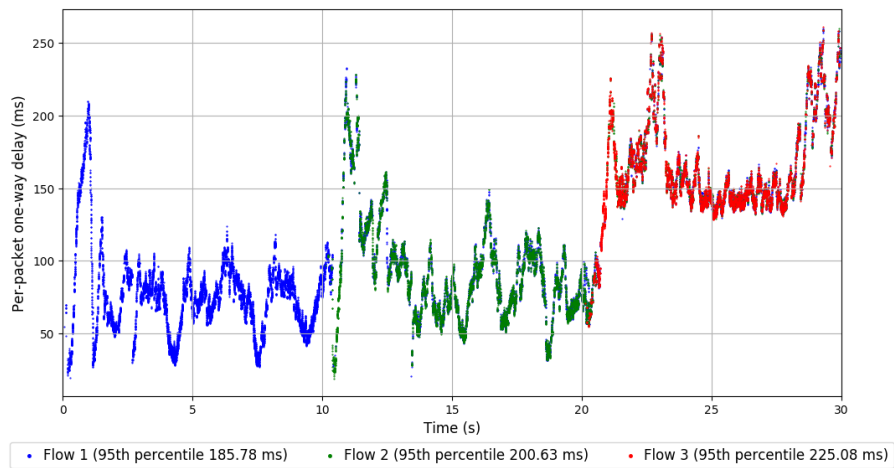
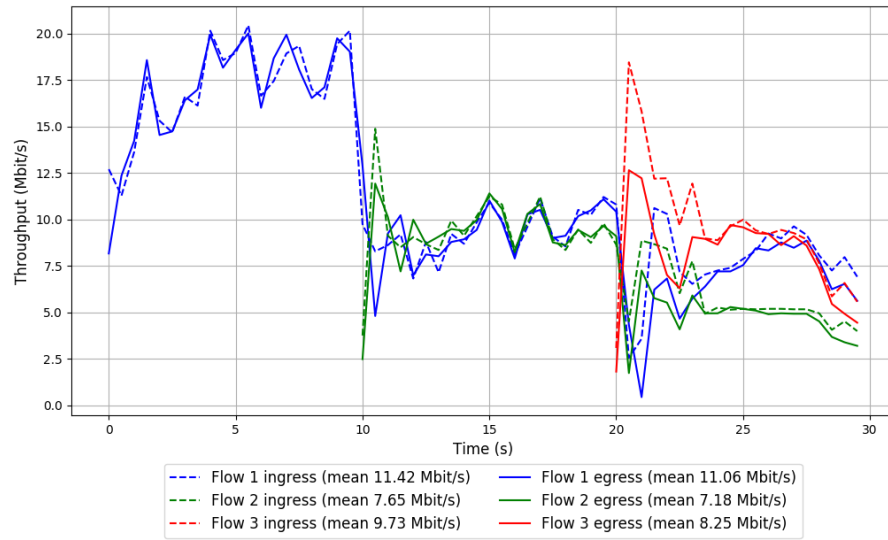
Run 3: Statistics of TCP BBR

Start at: 2017-11-30 07:39:57  
End at: 2017-11-30 07:40:27  
Local clock offset: -0.146 ms  
Remote clock offset: -3.276 ms

# Below is generated by plot.py at 2017-11-30 08:39:52  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 18.53 Mbit/s  
95th percentile per-packet one-way delay: 199.488 ms  
Loss rate: 6.27%  
-- Flow 1:  
Average throughput: 11.06 Mbit/s  
95th percentile per-packet one-way delay: 185.780 ms  
Loss rate: 3.32%  
-- Flow 2:  
Average throughput: 7.18 Mbit/s  
95th percentile per-packet one-way delay: 200.629 ms  
Loss rate: 6.77%  
-- Flow 3:  
Average throughput: 8.25 Mbit/s  
95th percentile per-packet one-way delay: 225.079 ms  
Loss rate: 15.94%



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

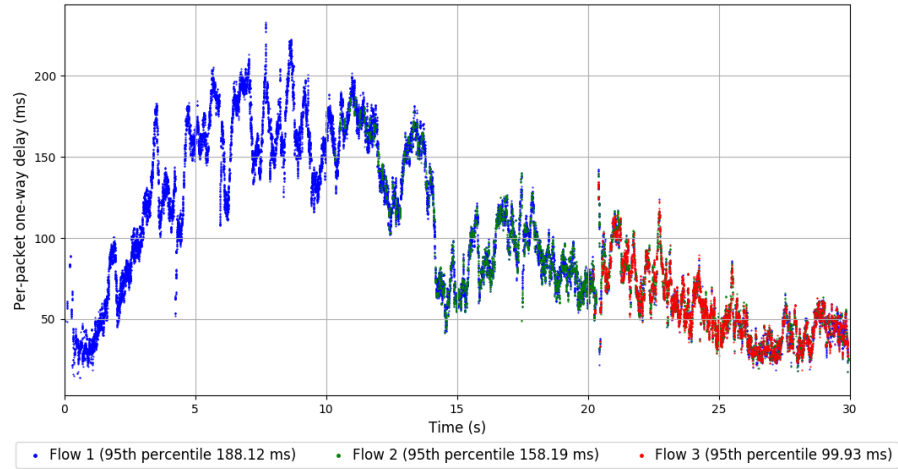
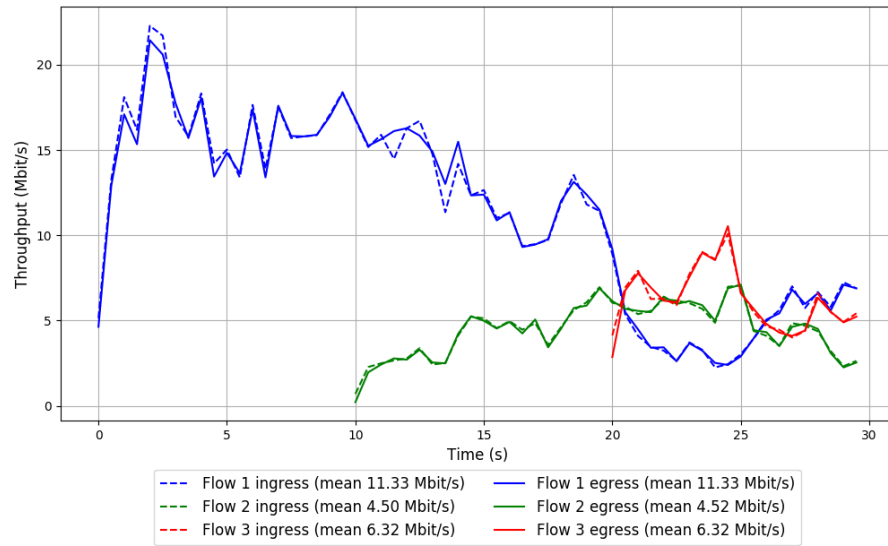


Run 1: Statistics of TCP Cubic

Start at: 2017-11-30 07:14:55  
End at: 2017-11-30 07:15:25  
Local clock offset: -0.327 ms  
Remote clock offset: -3.298 ms

# Below is generated by plot.py at 2017-11-30 08:39:52  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 16.39 Mbit/s  
95th percentile per-packet one-way delay: 183.526 ms  
Loss rate: 0.33%  
-- Flow 1:  
Average throughput: 11.33 Mbit/s  
95th percentile per-packet one-way delay: 188.120 ms  
Loss rate: 0.21%  
-- Flow 2:  
Average throughput: 4.52 Mbit/s  
95th percentile per-packet one-way delay: 158.194 ms  
Loss rate: 0.48%  
-- Flow 3:  
Average throughput: 6.32 Mbit/s  
95th percentile per-packet one-way delay: 99.930 ms  
Loss rate: 0.75%

# Run 1: Report of TCP Cubic — Data Link

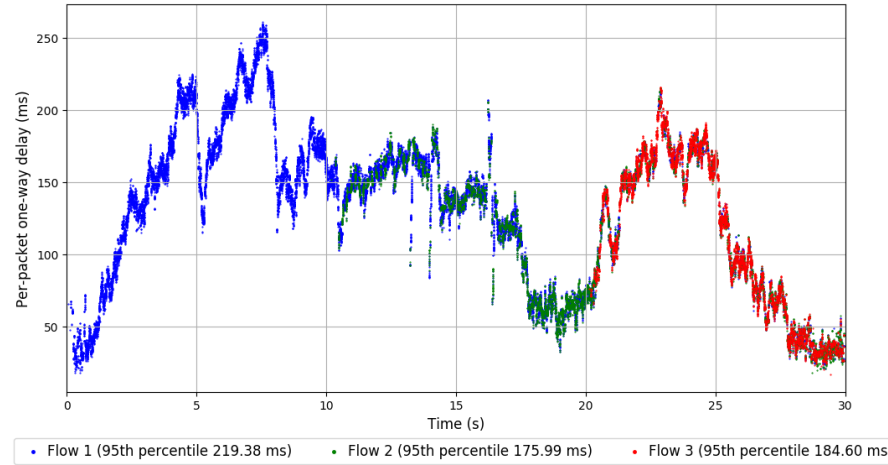
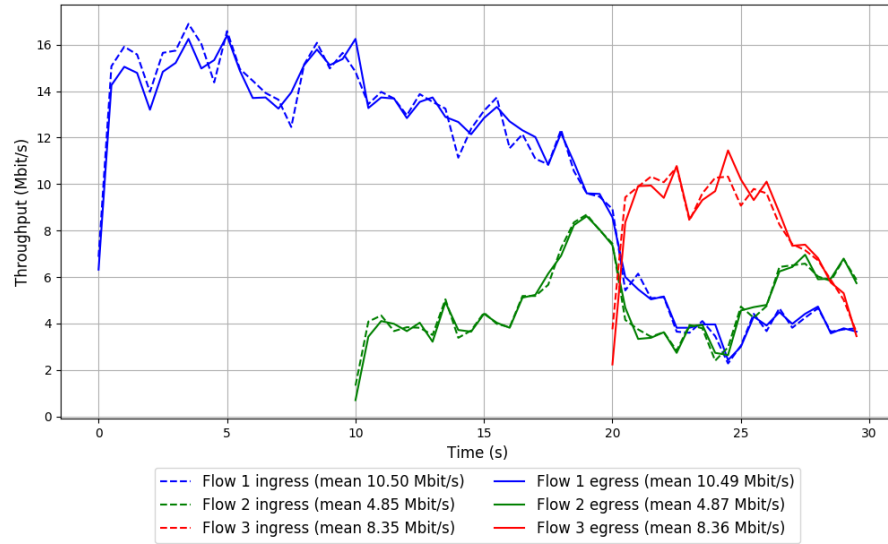


Run 2: Statistics of TCP Cubic

Start at: 2017-11-30 07:31:35  
End at: 2017-11-30 07:32:05  
Local clock offset: -0.28 ms  
Remote clock offset: -3.325 ms

# Below is generated by plot.py at 2017-11-30 08:39:52  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 16.46 Mbit/s  
95th percentile per-packet one-way delay: 211.122 ms  
Loss rate: 0.47%  
-- Flow 1:  
Average throughput: 10.49 Mbit/s  
95th percentile per-packet one-way delay: 219.376 ms  
Loss rate: 0.37%  
-- Flow 2:  
Average throughput: 4.87 Mbit/s  
95th percentile per-packet one-way delay: 175.992 ms  
Loss rate: 0.53%  
-- Flow 3:  
Average throughput: 8.36 Mbit/s  
95th percentile per-packet one-way delay: 184.599 ms  
Loss rate: 0.80%

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

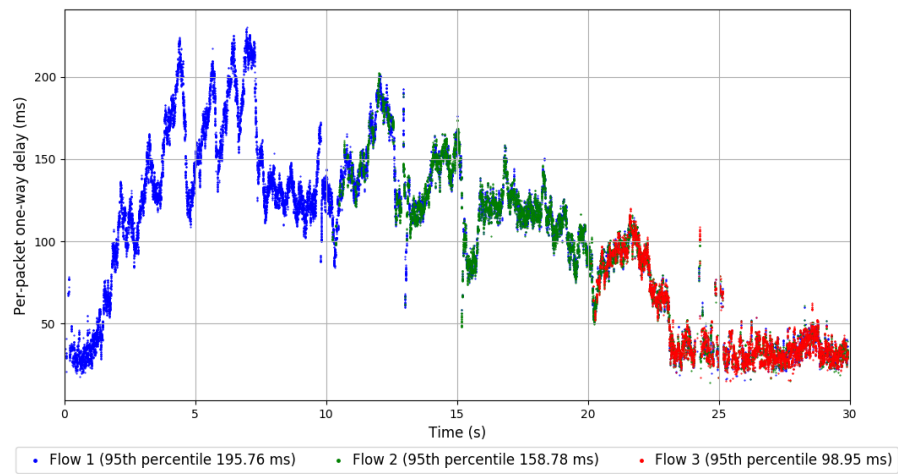
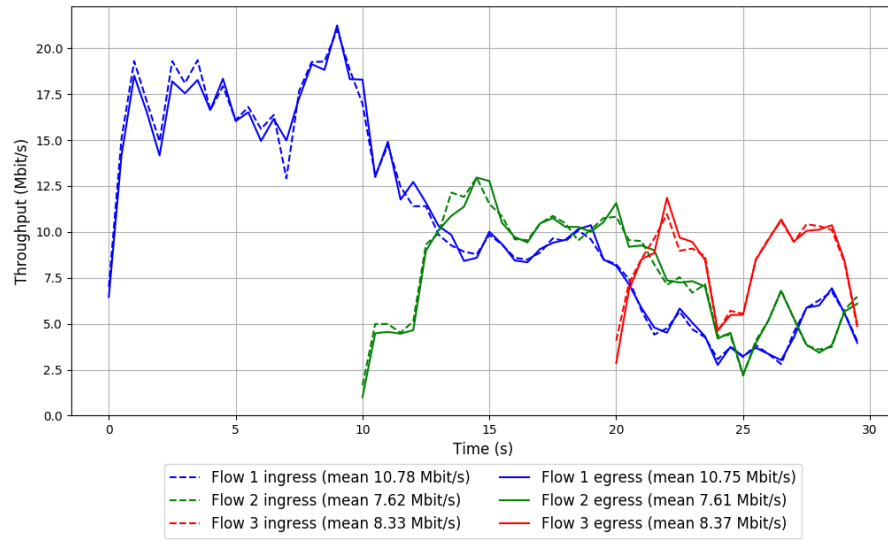


Run 3: Statistics of TCP Cubic

Start at: 2017-11-30 07:48:18  
End at: 2017-11-30 07:48:48  
Local clock offset: -0.116 ms  
Remote clock offset: -3.249 ms

# Below is generated by plot.py at 2017-11-30 08:39:52  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 18.54 Mbit/s  
95th percentile per-packet one-way delay: 184.190 ms  
Loss rate: 0.57%  
-- Flow 1:  
Average throughput: 10.75 Mbit/s  
95th percentile per-packet one-way delay: 195.756 ms  
Loss rate: 0.48%  
-- Flow 2:  
Average throughput: 7.61 Mbit/s  
95th percentile per-packet one-way delay: 158.785 ms  
Loss rate: 0.77%  
-- Flow 3:  
Average throughput: 8.37 Mbit/s  
95th percentile per-packet one-way delay: 98.952 ms  
Loss rate: 0.55%

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



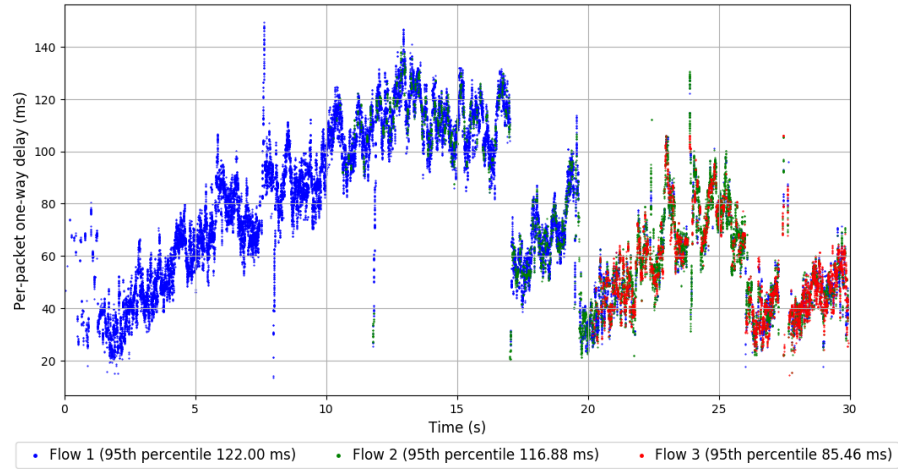
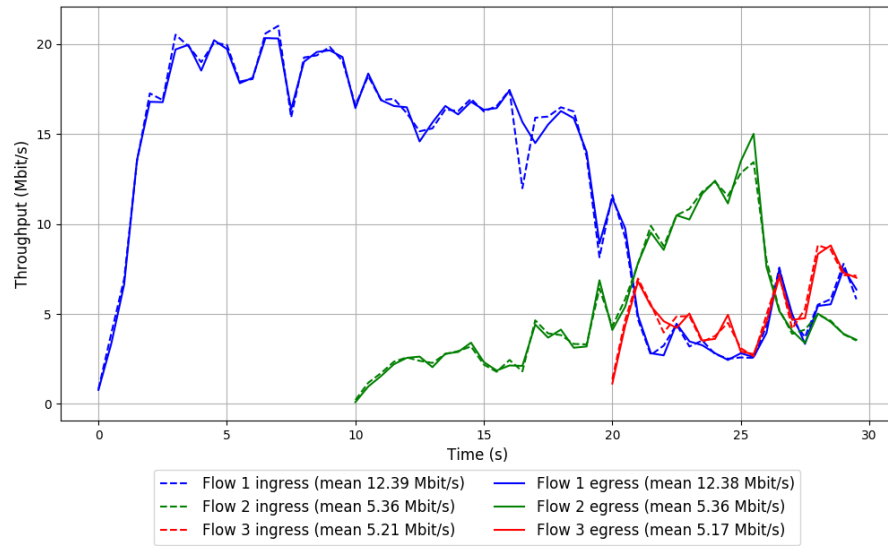
```
Run 1: Statistics of LEDBAT

Start at: 2017-11-30 07:03:01
End at: 2017-11-30 07:03:31
Local clock offset: -0.665 ms
Remote clock offset: -3.319 ms

# Below is generated by plot.py at 2017-11-30 08:39:52
# Datalink statistics
-- Total of 3 flows:
Average throughput: 17.63 Mbit/s
95th percentile per-packet one-way delay: 120.481 ms
Loss rate: 0.40%
-- Flow 1:
Average throughput: 12.38 Mbit/s
95th percentile per-packet one-way delay: 122.001 ms
Loss rate: 0.24%
-- Flow 2:
Average throughput: 5.36 Mbit/s
95th percentile per-packet one-way delay: 116.882 ms
Loss rate: 0.59%
-- Flow 3:
Average throughput: 5.17 Mbit/s
95th percentile per-packet one-way delay: 85.463 ms
Loss rate: 1.14%
```



## Run 1: Report of LEDBAT — Data Link

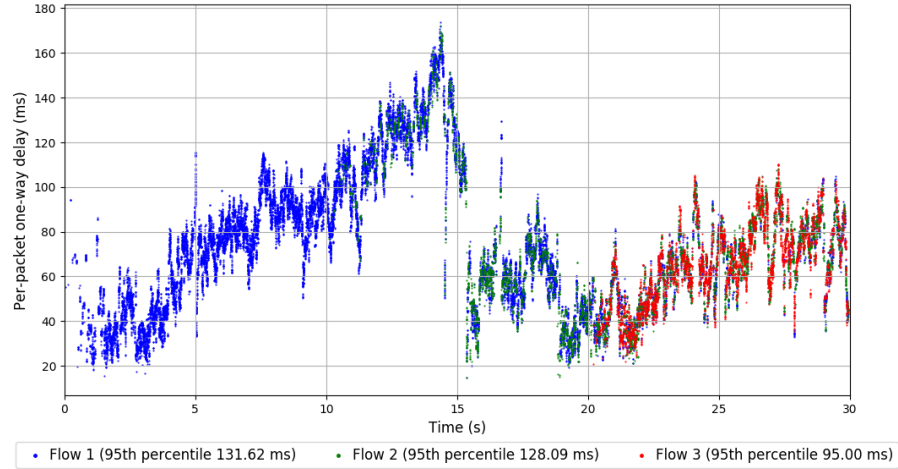
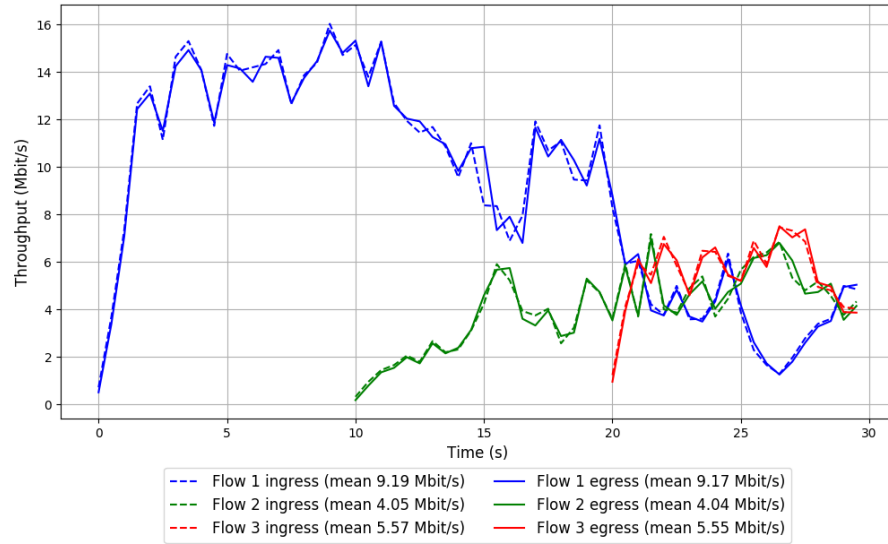


Run 2: Statistics of LEDBAT

Start at: 2017-11-30 07:19:40  
End at: 2017-11-30 07:20:10  
Local clock offset: -0.295 ms  
Remote clock offset: -3.281 ms

# Below is generated by plot.py at 2017-11-30 08:39:52  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 13.68 Mbit/s  
95th percentile per-packet one-way delay: 129.055 ms  
Loss rate: 0.50%  
-- Flow 1:  
Average throughput: 9.17 Mbit/s  
95th percentile per-packet one-way delay: 131.624 ms  
Loss rate: 0.31%  
-- Flow 2:  
Average throughput: 4.04 Mbit/s  
95th percentile per-packet one-way delay: 128.091 ms  
Loss rate: 0.86%  
-- Flow 3:  
Average throughput: 5.55 Mbit/s  
95th percentile per-packet one-way delay: 94.995 ms  
Loss rate: 0.94%

## Run 2: Report of LEDBAT — Data Link

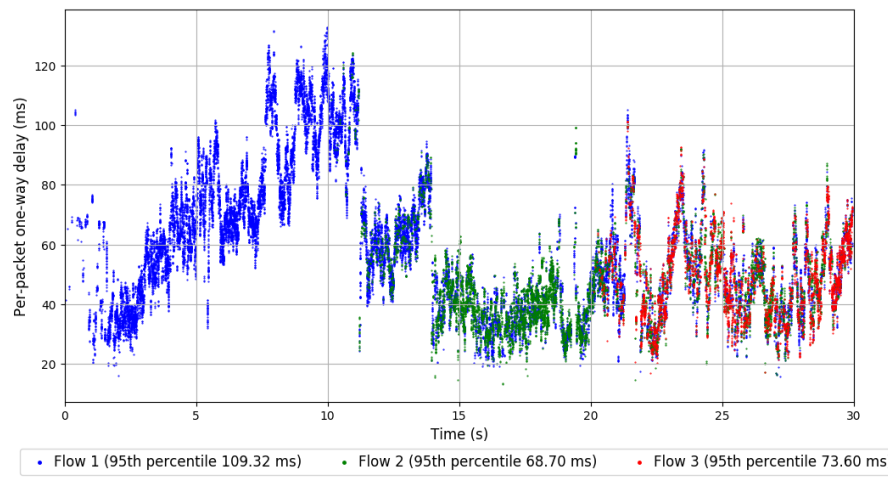
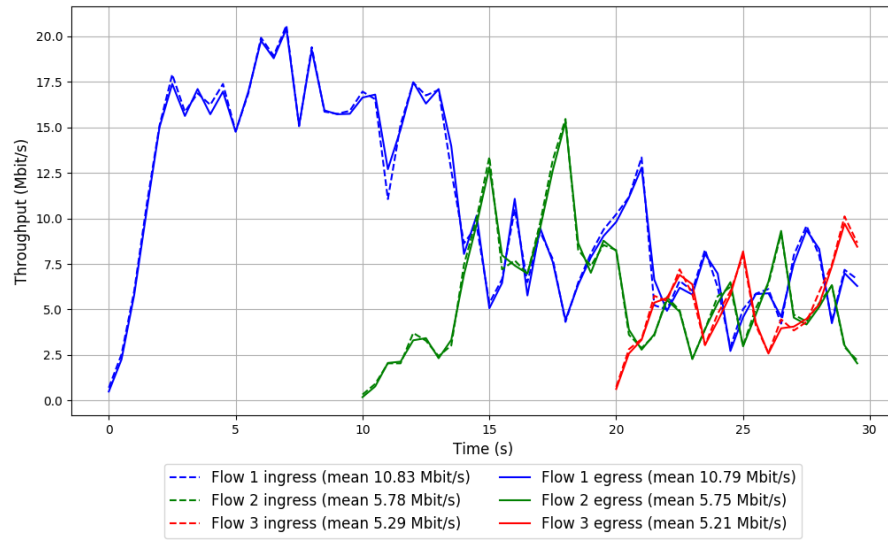


Run 3: Statistics of LEDBAT

Start at: 2017-11-30 07:36:22  
End at: 2017-11-30 07:36:52  
Local clock offset: -0.195 ms  
Remote clock offset: -3.273 ms

# Below is generated by plot.py at 2017-11-30 08:40:06  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 16.30 Mbit/s  
95th percentile per-packet one-way delay: 104.758 ms  
Loss rate: 0.85%  
-- Flow 1:  
Average throughput: 10.79 Mbit/s  
95th percentile per-packet one-way delay: 109.321 ms  
Loss rate: 0.53%  
-- Flow 2:  
Average throughput: 5.75 Mbit/s  
95th percentile per-packet one-way delay: 68.705 ms  
Loss rate: 1.23%  
-- Flow 3:  
Average throughput: 5.21 Mbit/s  
95th percentile per-packet one-way delay: 73.598 ms  
Loss rate: 2.02%

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

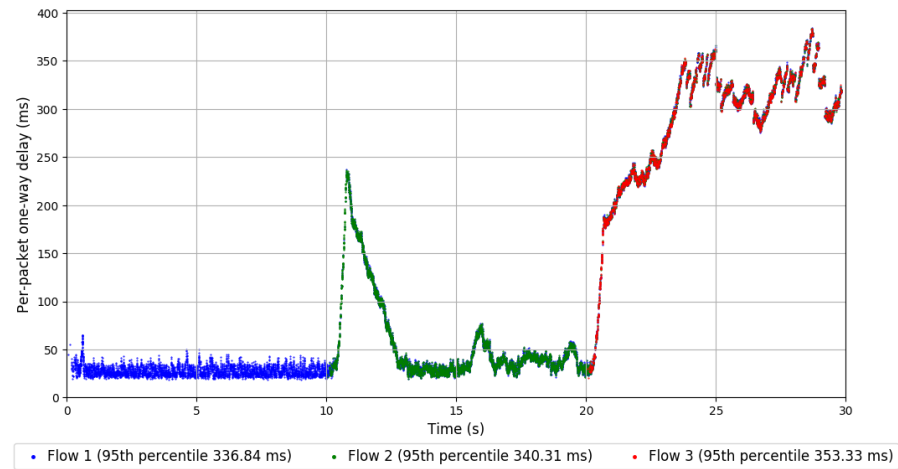
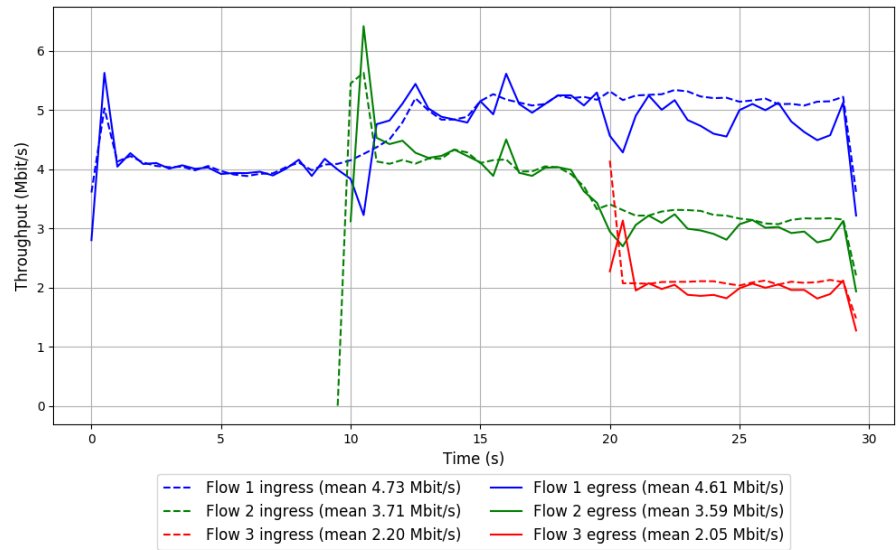


Run 1: Statistics of PCC

Start at: 2017-11-30 07:10:09  
End at: 2017-11-30 07:10:39  
Local clock offset: -0.485 ms  
Remote clock offset: -3.226 ms

# Below is generated by plot.py at 2017-11-30 08:40:06  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 7.67 Mbit/s  
95th percentile per-packet one-way delay: 340.561 ms  
Loss rate: 3.36%  
-- Flow 1:  
Average throughput: 4.61 Mbit/s  
95th percentile per-packet one-way delay: 336.841 ms  
Loss rate: 2.79%  
-- Flow 2:  
Average throughput: 3.59 Mbit/s  
95th percentile per-packet one-way delay: 340.306 ms  
Loss rate: 3.28%  
-- Flow 3:  
Average throughput: 2.05 Mbit/s  
95th percentile per-packet one-way delay: 353.334 ms  
Loss rate: 7.37%

# Run 1: Report of PCC — Data Link



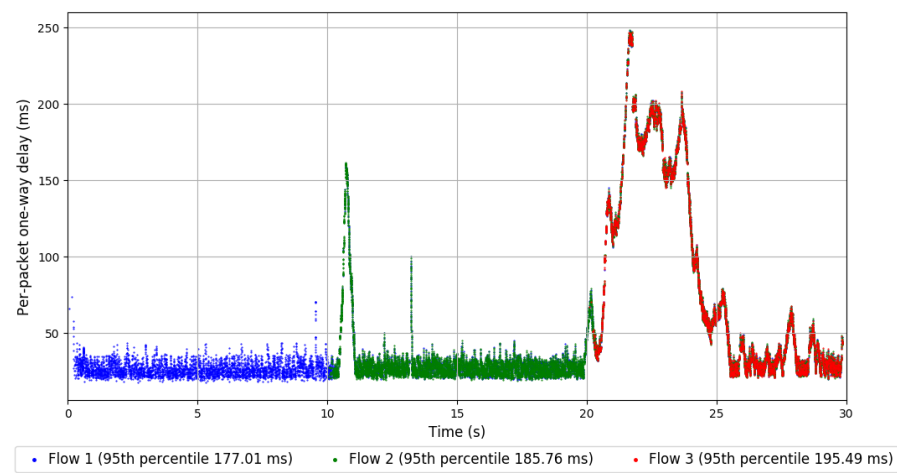
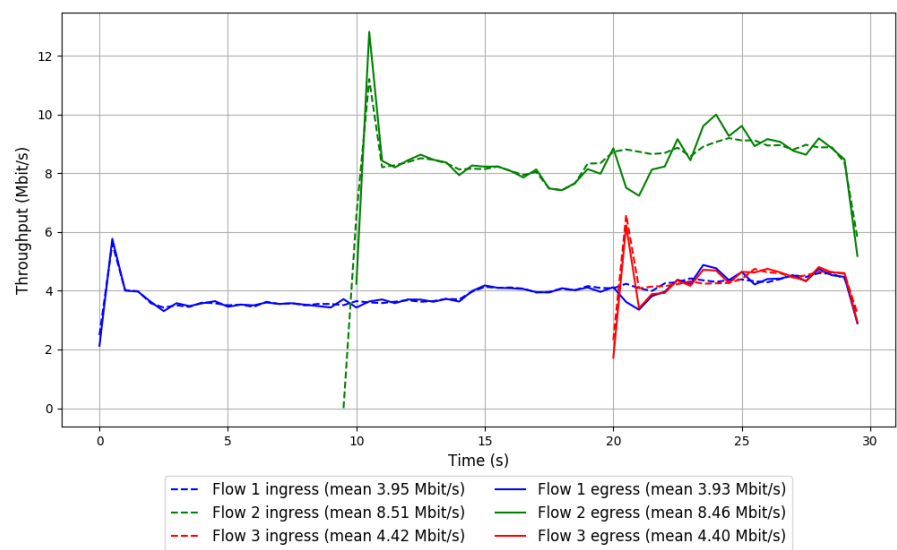
Run 2: Statistics of PCC

Start at: 2017-11-30 07:26:49  
End at: 2017-11-30 07:27:19  
Local clock offset: -0.376 ms  
Remote clock offset: -3.303 ms

# Below is generated by plot.py at 2017-11-30 08:40:06  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 11.00 Mbit/s  
95th percentile per-packet one-way delay: 185.897 ms  
Loss rate: 0.80%  
-- Flow 1:  
Average throughput: 3.93 Mbit/s  
95th percentile per-packet one-way delay: 177.010 ms  
Loss rate: 0.56%  
-- Flow 2:  
Average throughput: 8.46 Mbit/s  
95th percentile per-packet one-way delay: 185.762 ms  
Loss rate: 0.79%  
-- Flow 3:  
Average throughput: 4.40 Mbit/s  
95th percentile per-packet one-way delay: 195.490 ms  
Loss rate: 1.45%



Run 2: Report of PCC — Data Link



Run 3: Statistics of PCC

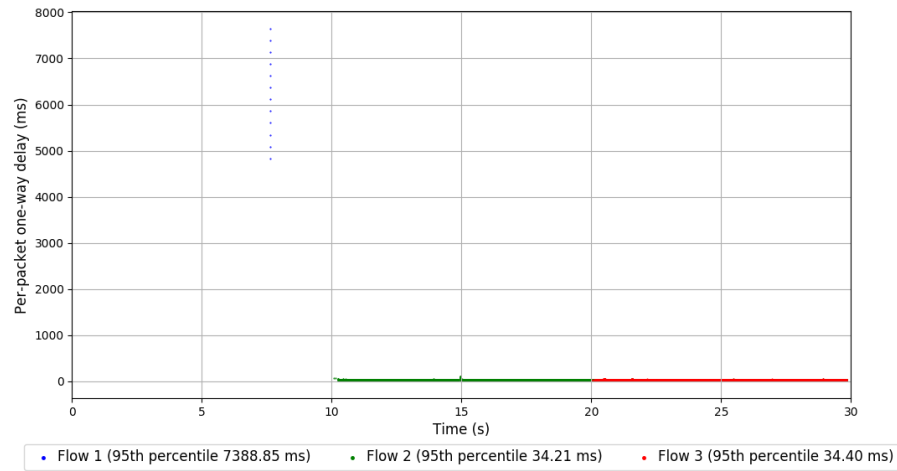
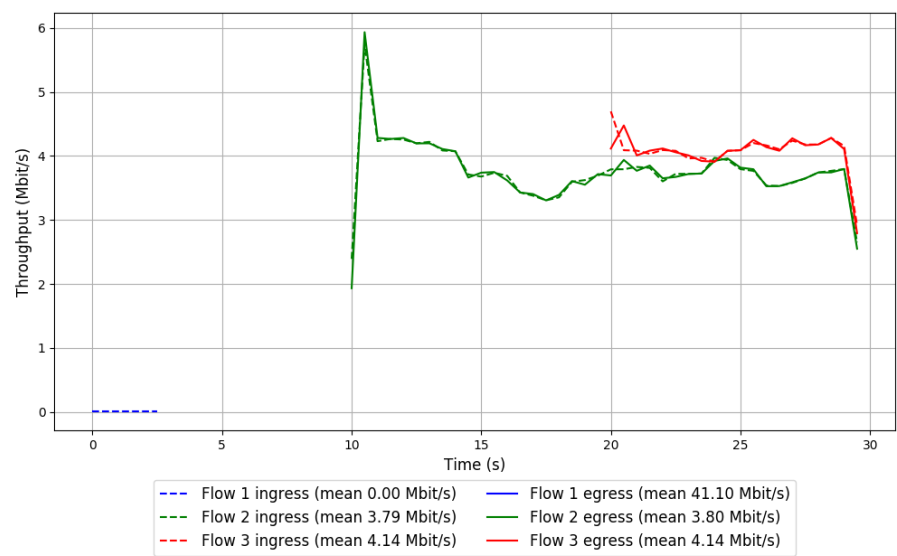
Start at: 2017-11-30 07:43:31

End at: 2017-11-30 07:44:01

Local clock offset: -0.117 ms

Remote clock offset: -3.132 ms

Run 3: Report of PCC — Data Link

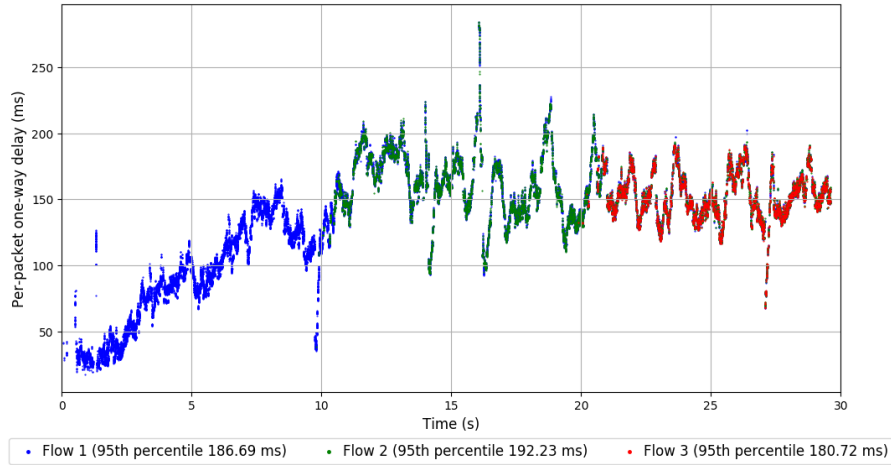
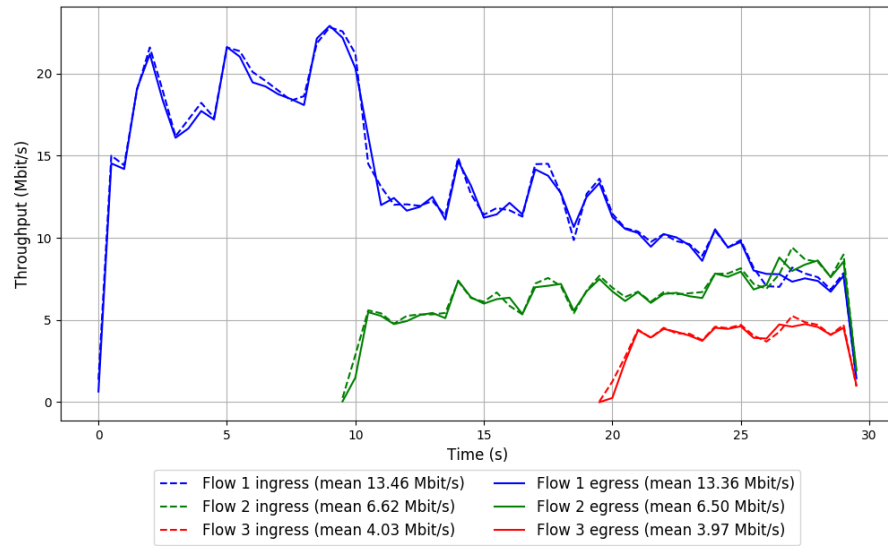


Run 1: Statistics of QUIC Cubic

Start at: 2017-11-30 06:59:26  
End at: 2017-11-30 06:59:56  
Local clock offset: -0.836 ms  
Remote clock offset: -3.455 ms

# Below is generated by plot.py at 2017-11-30 08:40:14  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 19.02 Mbit/s  
95th percentile per-packet one-way delay: 187.798 ms  
Loss rate: 1.33%  
-- Flow 1:  
Average throughput: 13.36 Mbit/s  
95th percentile per-packet one-way delay: 186.688 ms  
Loss rate: 0.92%  
-- Flow 2:  
Average throughput: 6.50 Mbit/s  
95th percentile per-packet one-way delay: 192.230 ms  
Loss rate: 2.15%  
-- Flow 3:  
Average throughput: 3.97 Mbit/s  
95th percentile per-packet one-way delay: 180.719 ms  
Loss rate: 2.76%

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

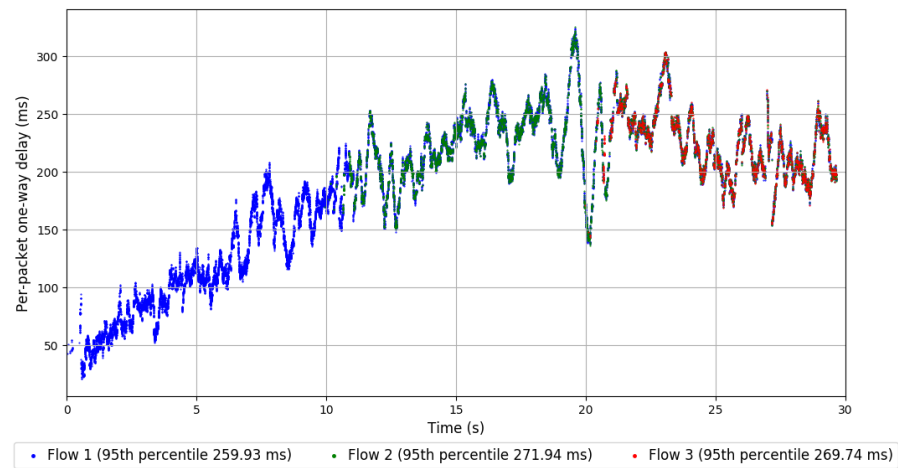
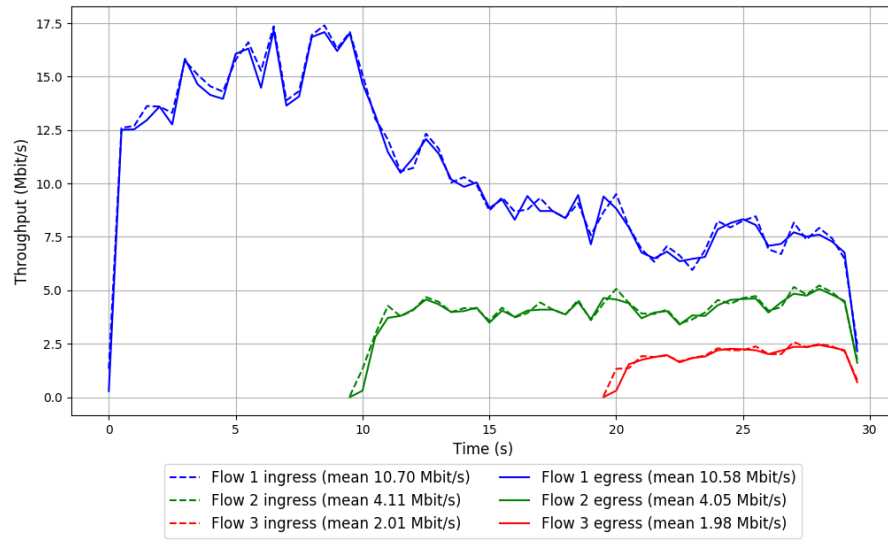


Run 2: Statistics of QUIC Cubic

Start at: 2017-11-30 07:16:06  
End at: 2017-11-30 07:16:36  
Local clock offset: -0.306 ms  
Remote clock offset: -3.298 ms

# Below is generated by plot.py at 2017-11-30 08:40:14  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 13.92 Mbit/s  
95th percentile per-packet one-way delay: 263.345 ms  
Loss rate: 1.61%  
-- Flow 1:  
Average throughput: 10.58 Mbit/s  
95th percentile per-packet one-way delay: 259.925 ms  
Loss rate: 1.28%  
-- Flow 2:  
Average throughput: 4.05 Mbit/s  
95th percentile per-packet one-way delay: 271.940 ms  
Loss rate: 2.35%  
-- Flow 3:  
Average throughput: 1.98 Mbit/s  
95th percentile per-packet one-way delay: 269.744 ms  
Loss rate: 3.76%

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



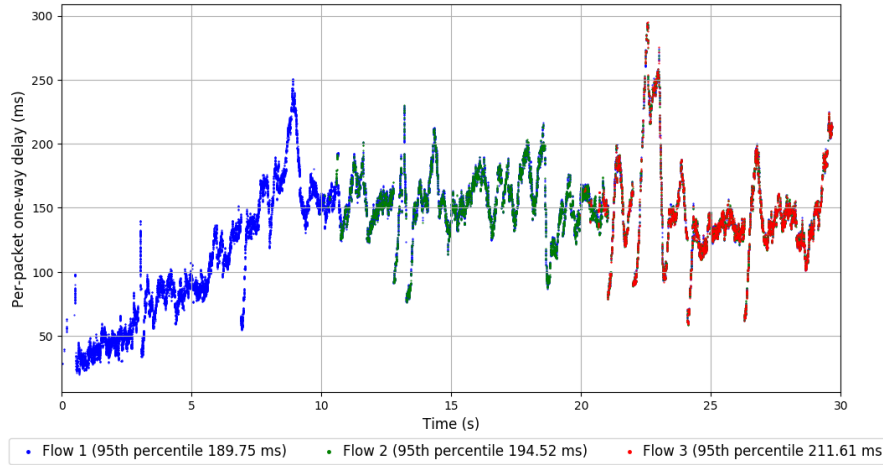
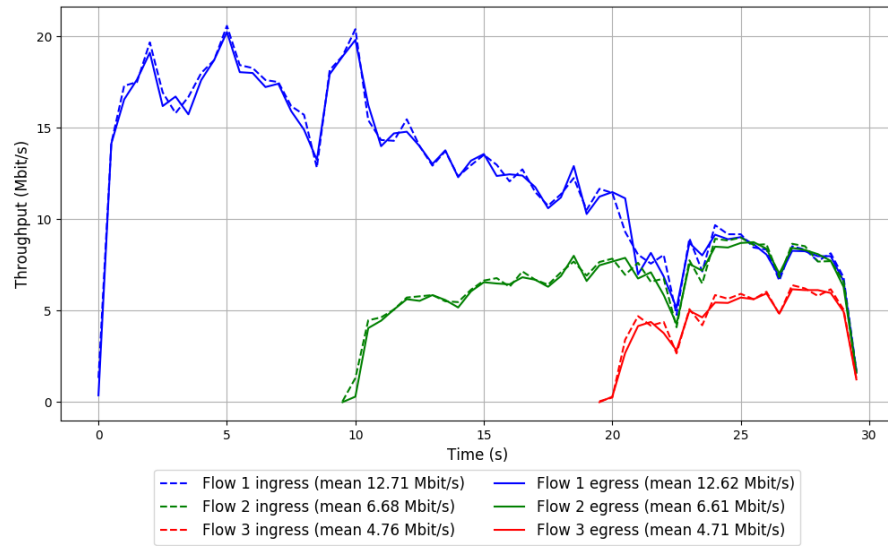
Run 3: Statistics of QUIC Cubic

Start at: 2017-11-30 07:32:47  
End at: 2017-11-30 07:33:17  
Local clock offset: -0.257 ms  
Remote clock offset: -3.272 ms

# Below is generated by plot.py at 2017-11-30 08:40:16  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 18.56 Mbit/s  
95th percentile per-packet one-way delay: 192.005 ms  
Loss rate: 1.21%  
-- Flow 1:  
Average throughput: 12.62 Mbit/s  
95th percentile per-packet one-way delay: 189.755 ms  
Loss rate: 0.85%  
-- Flow 2:  
Average throughput: 6.61 Mbit/s  
95th percentile per-packet one-way delay: 194.524 ms  
Loss rate: 1.71%  
-- Flow 3:  
Average throughput: 4.71 Mbit/s  
95th percentile per-packet one-way delay: 211.613 ms  
Loss rate: 2.60%



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

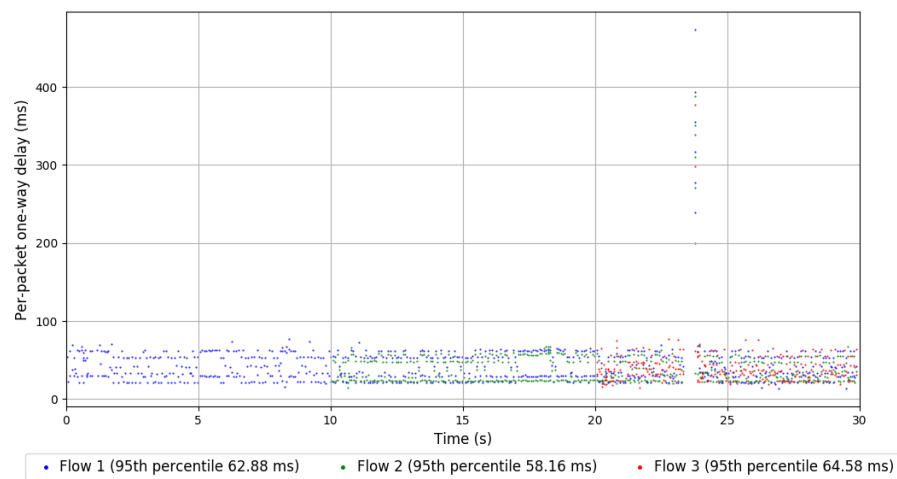
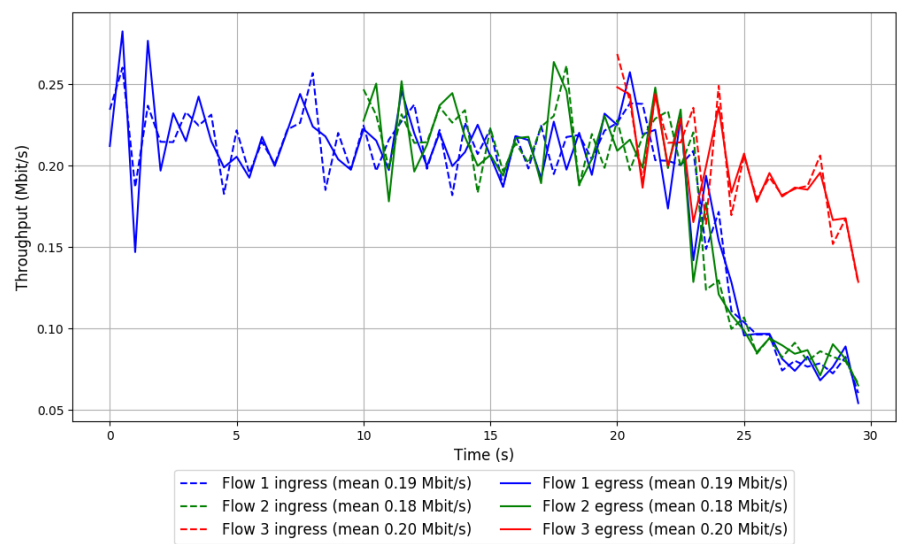


Run 1: Statistics of SCReAM

Start at: 2017-11-30 07:07:47  
End at: 2017-11-30 07:08:17  
Local clock offset: -0.538 ms  
Remote clock offset: -3.264 ms

# Below is generated by plot.py at 2017-11-30 08:40:16  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.37 Mbit/s  
95th percentile per-packet one-way delay: 62.991 ms  
Loss rate: 0.54%  
-- Flow 1:  
Average throughput: 0.19 Mbit/s  
95th percentile per-packet one-way delay: 62.880 ms  
Loss rate: 0.25%  
-- Flow 2:  
Average throughput: 0.18 Mbit/s  
95th percentile per-packet one-way delay: 58.162 ms  
Loss rate: 0.64%  
-- Flow 3:  
Average throughput: 0.20 Mbit/s  
95th percentile per-packet one-way delay: 64.583 ms  
Loss rate: 1.21%

Run 1: Report of SReAM — Data Link

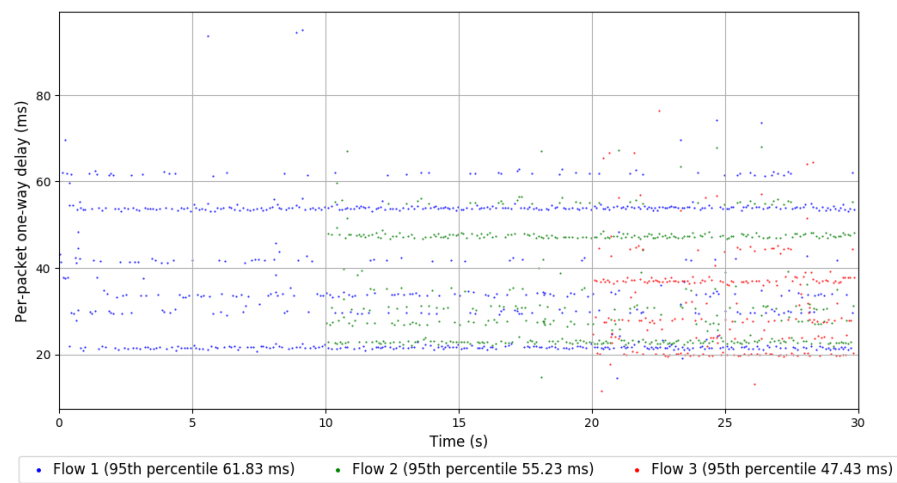
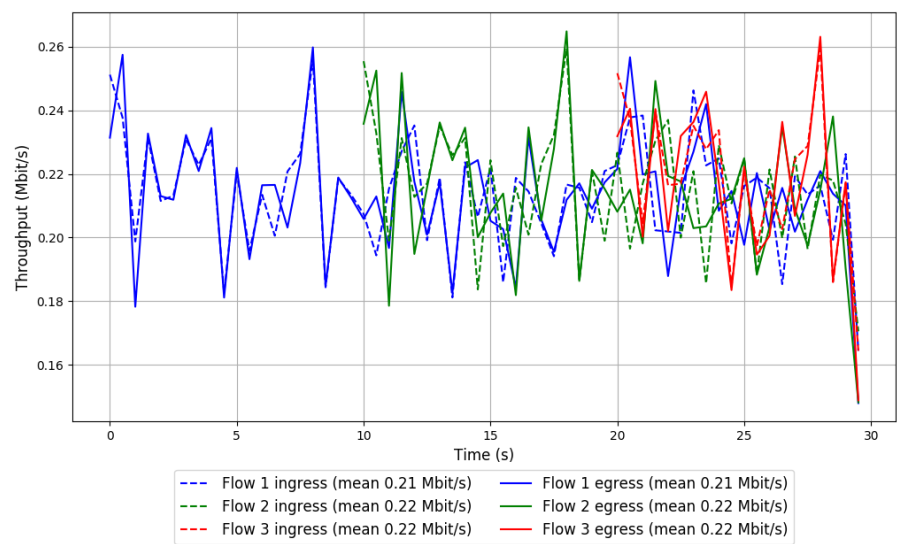


Run 2: Statistics of SReAM

Start at: 2017-11-30 07:24:26  
End at: 2017-11-30 07:24:56  
Local clock offset: -0.283 ms  
Remote clock offset: -3.225 ms

# Below is generated by plot.py at 2017-11-30 08:40:16  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.43 Mbit/s  
95th percentile per-packet one-way delay: 56.527 ms  
Loss rate: 0.39%  
-- Flow 1:  
Average throughput: 0.21 Mbit/s  
95th percentile per-packet one-way delay: 61.827 ms  
Loss rate: 0.25%  
-- Flow 2:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 55.233 ms  
Loss rate: 0.42%  
-- Flow 3:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 47.427 ms  
Loss rate: 0.72%

Run 2: Report of SReAM — Data Link

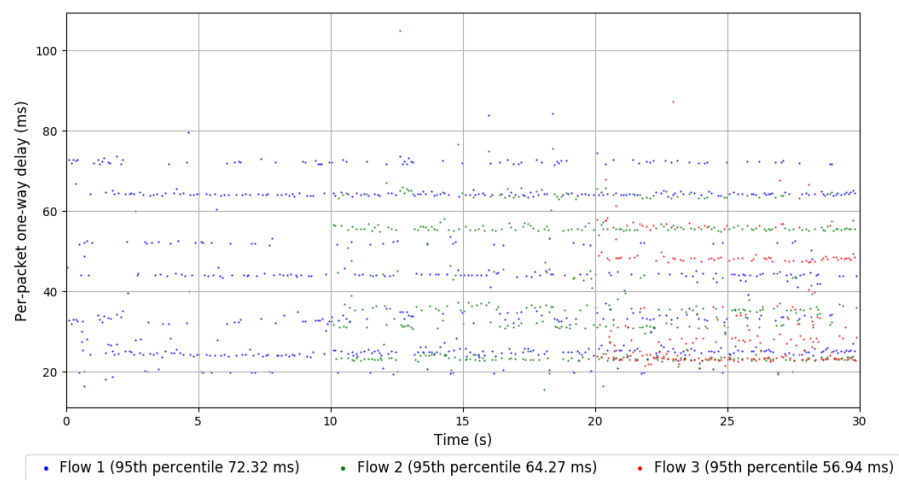
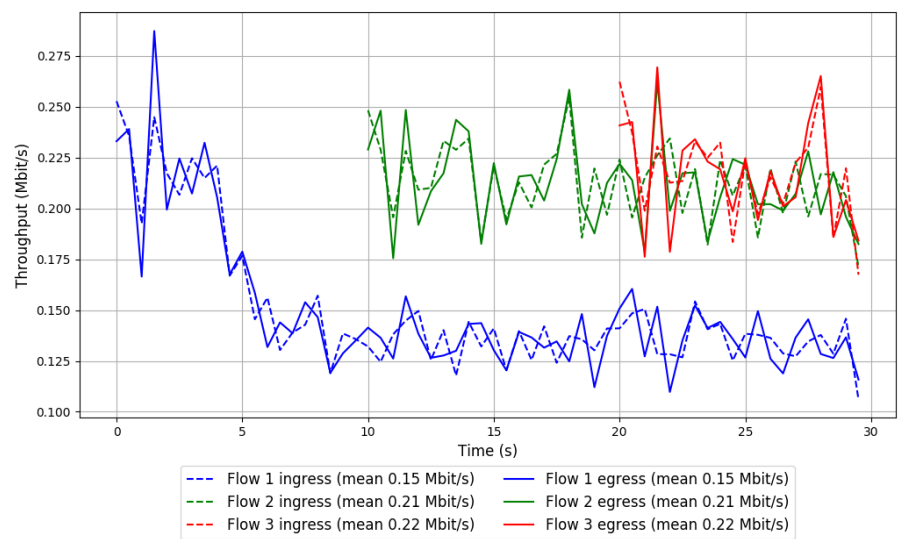


Run 3: Statistics of SReAM

Start at: 2017-11-30 07:41:09  
End at: 2017-11-30 07:41:39  
Local clock offset: -0.203 ms  
Remote clock offset: -3.178 ms

# Below is generated by plot.py at 2017-11-30 08:40:16  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.37 Mbit/s  
95th percentile per-packet one-way delay: 71.832 ms  
Loss rate: 0.20%  
-- Flow 1:  
Average throughput: 0.15 Mbit/s  
95th percentile per-packet one-way delay: 72.317 ms  
Loss rate: 0.12%  
-- Flow 2:  
Average throughput: 0.21 Mbit/s  
95th percentile per-packet one-way delay: 64.270 ms  
Loss rate: 0.21%  
-- Flow 3:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 56.936 ms  
Loss rate: 0.35%

Run 3: Report of SReAM — Data Link



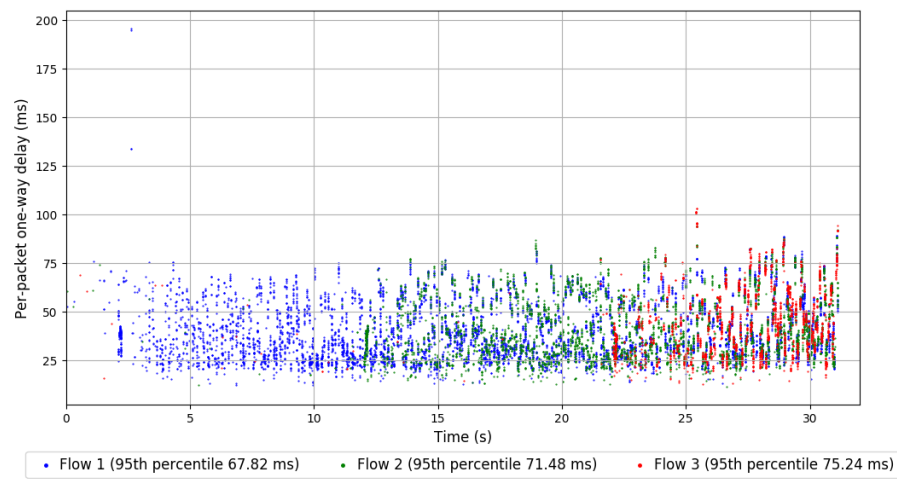
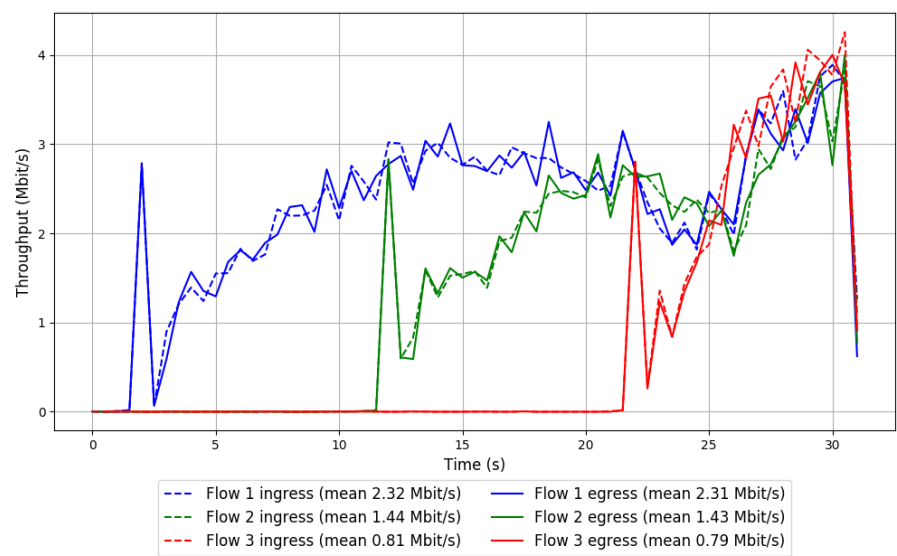
Run 1: Statistics of WebRTC media

Start at: 2017-11-30 07:00:38  
End at: 2017-11-30 07:01:08  
Local clock offset: -0.672 ms  
Remote clock offset: -3.331 ms

# Below is generated by plot.py at 2017-11-30 08:40:16  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.51 Mbit/s  
95th percentile per-packet one-way delay: 70.541 ms  
Loss rate: 1.22%  
-- Flow 1:  
Average throughput: 2.31 Mbit/s  
95th percentile per-packet one-way delay: 67.818 ms  
Loss rate: 0.89%  
-- Flow 2:  
Average throughput: 1.43 Mbit/s  
95th percentile per-packet one-way delay: 71.481 ms  
Loss rate: 0.75%  
-- Flow 3:  
Average throughput: 0.79 Mbit/s  
95th percentile per-packet one-way delay: 75.243 ms  
Loss rate: 3.03%



Run 1: Report of WebRTC media — Data Link

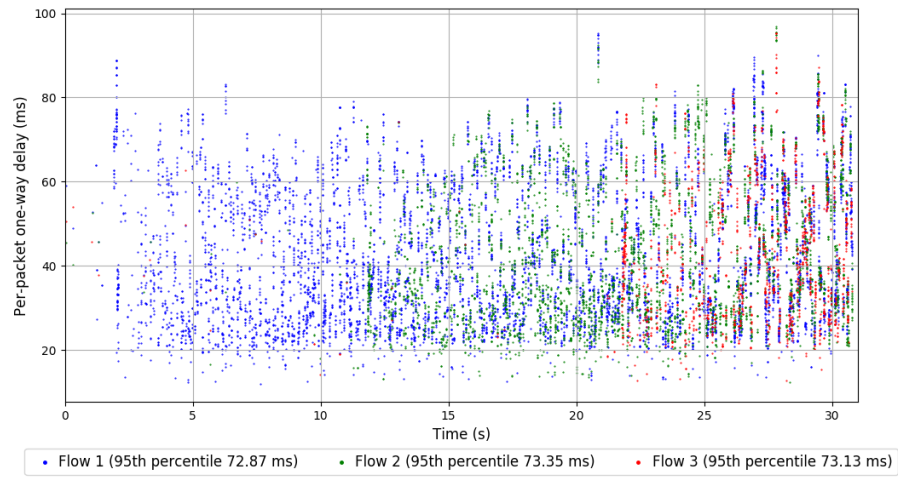
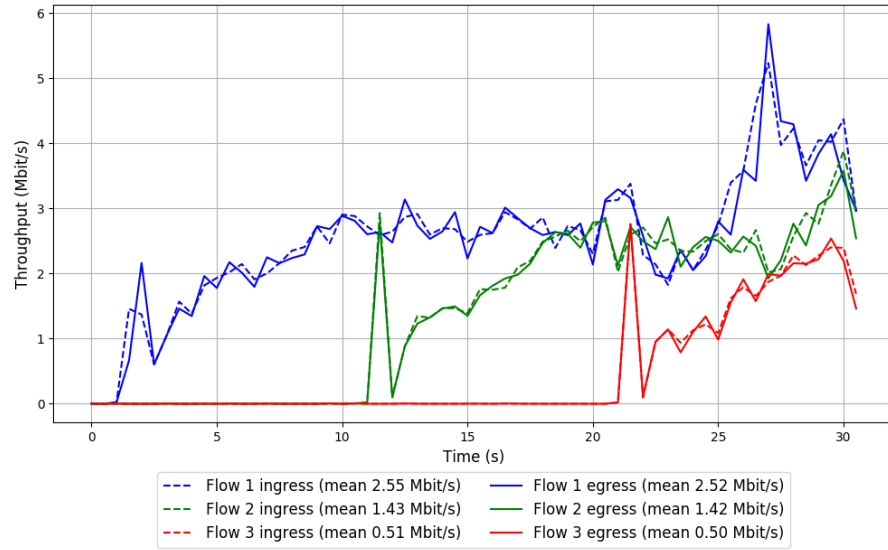


Run 2: Statistics of WebRTC media

Start at: 2017-11-30 07:17:18  
End at: 2017-11-30 07:17:48  
Local clock offset: -0.37 ms  
Remote clock offset: -3.294 ms

# Below is generated by plot.py at 2017-11-30 08:40:16  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.44 Mbit/s  
95th percentile per-packet one-way delay: 73.121 ms  
Loss rate: 1.50%  
-- Flow 1:  
Average throughput: 2.52 Mbit/s  
95th percentile per-packet one-way delay: 72.866 ms  
Loss rate: 1.50%  
-- Flow 2:  
Average throughput: 1.42 Mbit/s  
95th percentile per-packet one-way delay: 73.352 ms  
Loss rate: 1.45%  
-- Flow 3:  
Average throughput: 0.50 Mbit/s  
95th percentile per-packet one-way delay: 73.132 ms  
Loss rate: 1.60%

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

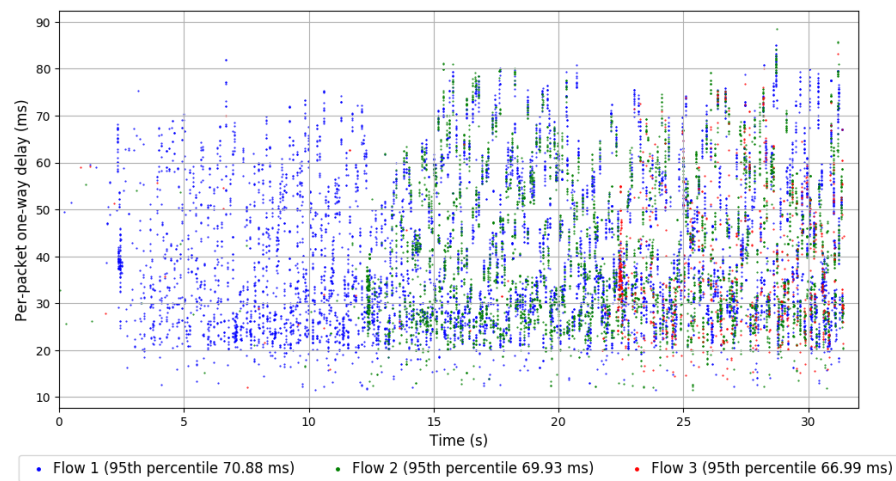
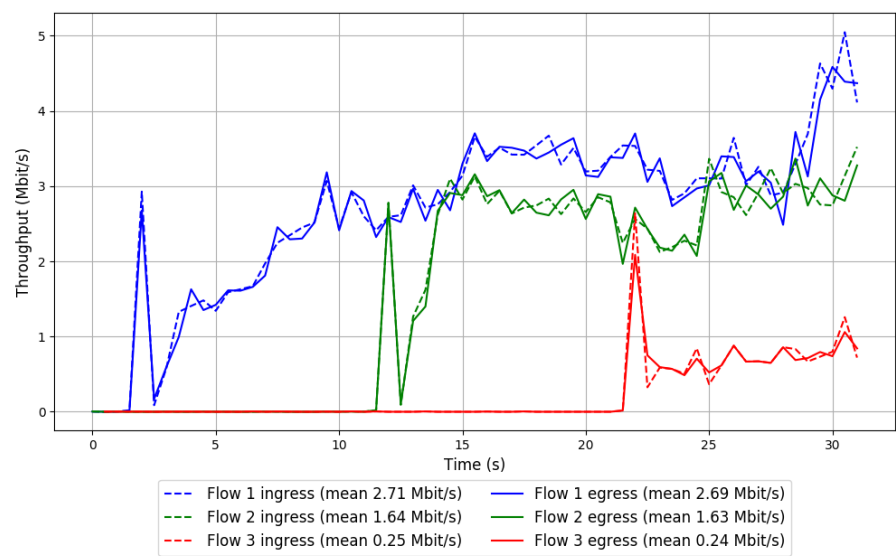


Run 3: Statistics of WebRTC media

Start at: 2017-11-30 07:33:59  
End at: 2017-11-30 07:34:29  
Local clock offset: -0.342 ms  
Remote clock offset: -3.286 ms

# Below is generated by plot.py at 2017-11-30 08:40:16  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.54 Mbit/s  
95th percentile per-packet one-way delay: 70.414 ms  
Loss rate: 0.96%  
-- Flow 1:  
Average throughput: 2.69 Mbit/s  
95th percentile per-packet one-way delay: 70.879 ms  
Loss rate: 1.06%  
-- Flow 2:  
Average throughput: 1.63 Mbit/s  
95th percentile per-packet one-way delay: 69.933 ms  
Loss rate: 0.67%  
-- Flow 3:  
Average throughput: 0.24 Mbit/s  
95th percentile per-packet one-way delay: 66.989 ms  
Loss rate: 1.93%

Run 3: Report of WebRTC media — Data Link

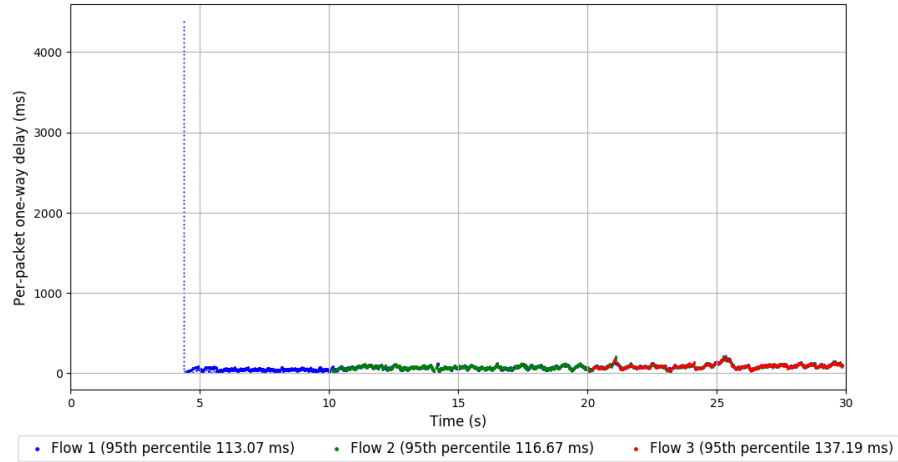
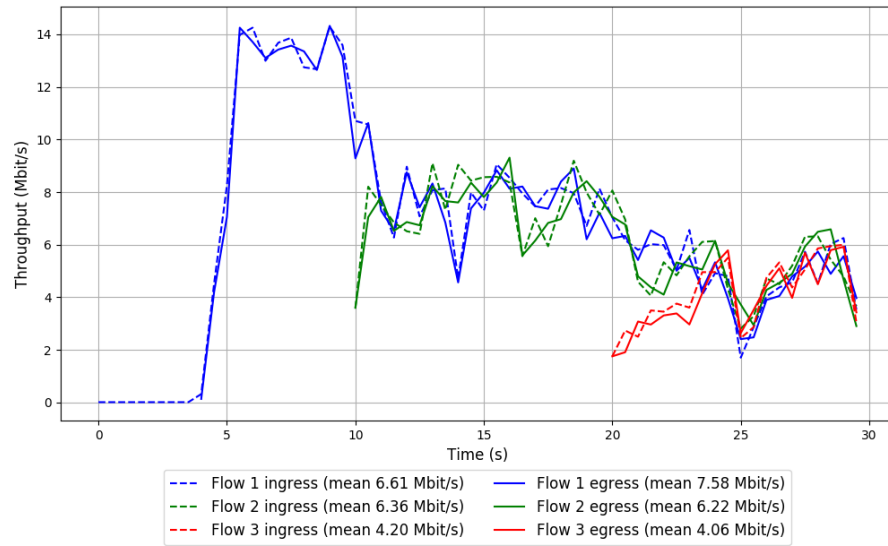


Run 1: Statistics of Sprout

Start at: 2017-11-30 07:05:24  
End at: 2017-11-30 07:05:54  
Local clock offset: -0.495 ms  
Remote clock offset: -3.297 ms

# Below is generated by plot.py at 2017-11-30 08:40:19  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 13.97 Mbit/s  
95th percentile per-packet one-way delay: 117.852 ms  
Loss rate: 2.32%  
-- Flow 1:  
Average throughput: 7.58 Mbit/s  
95th percentile per-packet one-way delay: 113.074 ms  
Loss rate: 2.11%  
-- Flow 2:  
Average throughput: 6.22 Mbit/s  
95th percentile per-packet one-way delay: 116.675 ms  
Loss rate: 2.31%  
-- Flow 3:  
Average throughput: 4.06 Mbit/s  
95th percentile per-packet one-way delay: 137.195 ms  
Loss rate: 3.40%

## Run 1: Report of Sprout — Data Link



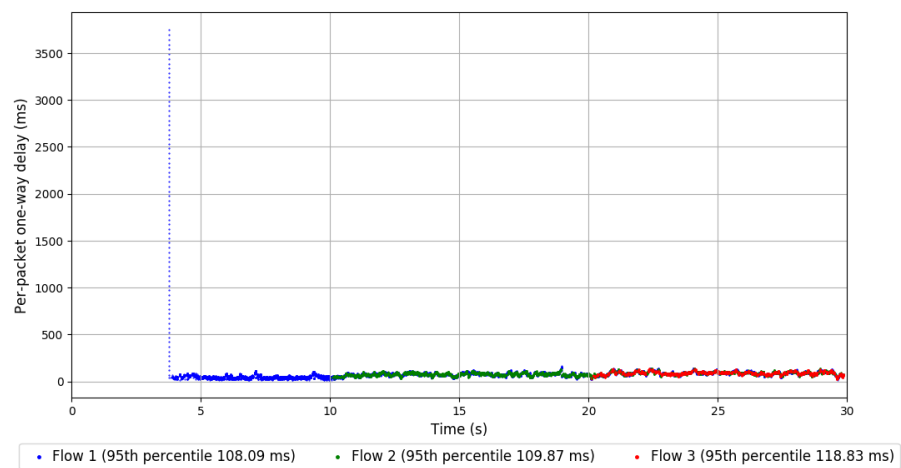
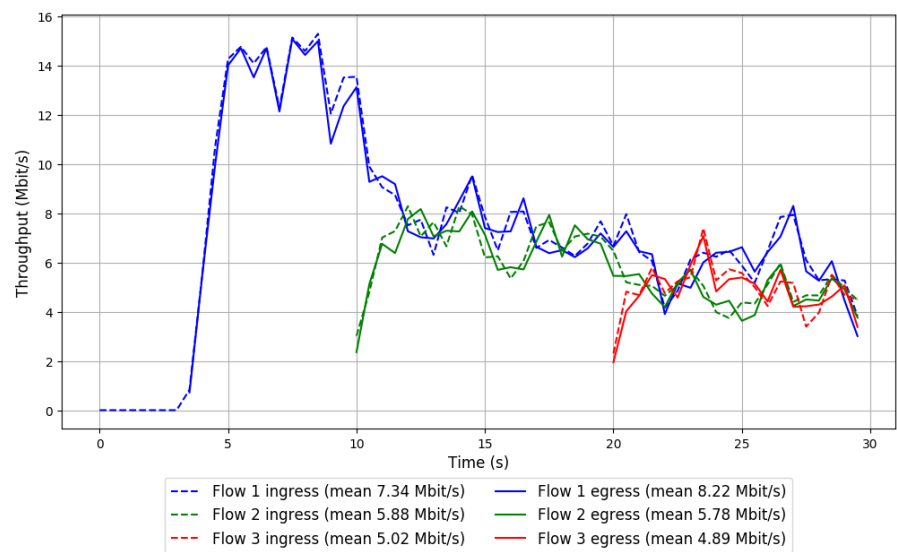
## Run 2: Statistics of Sprout

Start at: 2017-11-30 07:22:03  
End at: 2017-11-30 07:22:33  
Local clock offset: -0.277 ms  
Remote clock offset: -3.24 ms

```
# Below is generated by plot.py at 2017-11-30 08:40:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 14.43 Mbit/s
95th percentile per-packet one-way delay: 111.327 ms
Loss rate: 2.25%
-- Flow 1:
Average throughput: 8.22 Mbit/s
95th percentile per-packet one-way delay: 108.086 ms
Loss rate: 2.16%
-- Flow 2:
Average throughput: 5.78 Mbit/s
95th percentile per-packet one-way delay: 109.869 ms
Loss rate: 2.07%
-- Flow 3:
Average throughput: 4.89 Mbit/s
95th percentile per-packet one-way delay: 118.826 ms
Loss rate: 3.05%
```



Run 2: Report of Sprout — Data Link

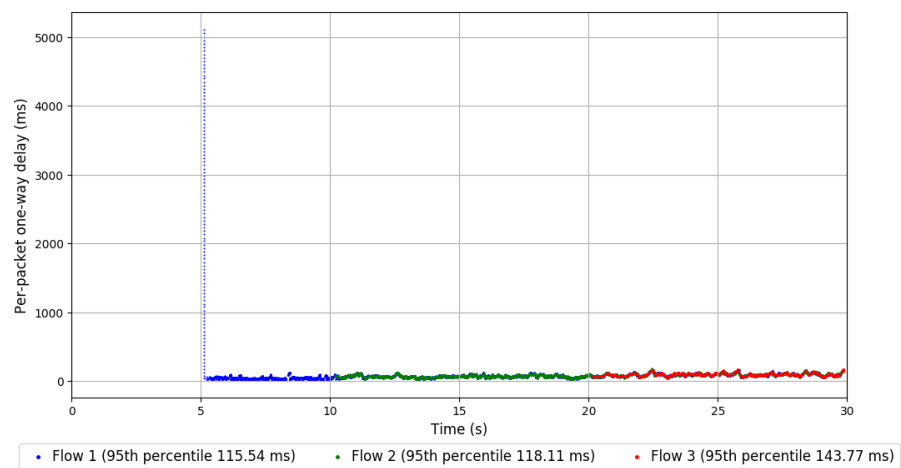
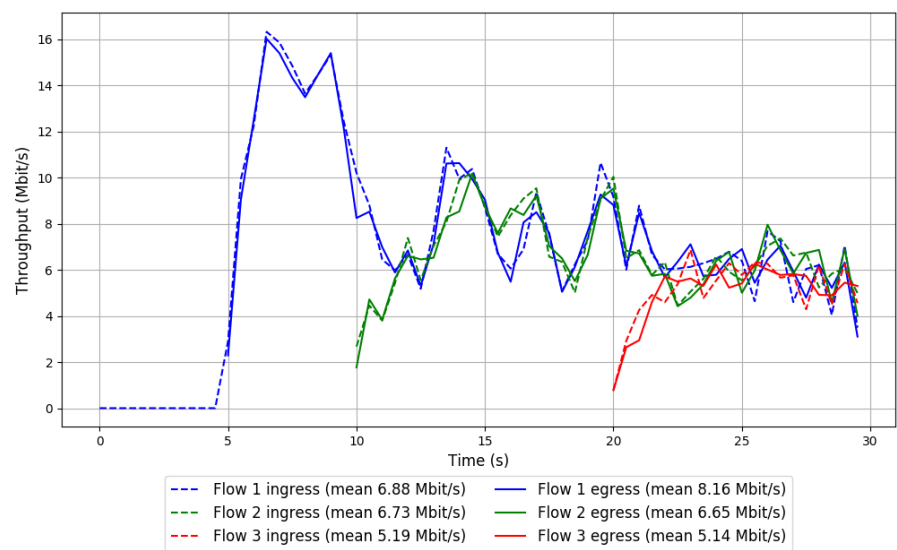


Run 3: Statistics of Sprout

Start at: 2017-11-30 07:38:45  
End at: 2017-11-30 07:39:15  
Local clock offset: -0.243 ms  
Remote clock offset: -3.326 ms

# Below is generated by plot.py at 2017-11-30 08:40:22  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 15.49 Mbit/s  
95th percentile per-packet one-way delay: 120.405 ms  
Loss rate: 1.67%  
-- Flow 1:  
Average throughput: 8.16 Mbit/s  
95th percentile per-packet one-way delay: 115.540 ms  
Loss rate: 1.79%  
-- Flow 2:  
Average throughput: 6.65 Mbit/s  
95th percentile per-packet one-way delay: 118.112 ms  
Loss rate: 1.46%  
-- Flow 3:  
Average throughput: 5.14 Mbit/s  
95th percentile per-packet one-way delay: 143.772 ms  
Loss rate: 1.73%

Run 3: Report of Sprout — Data Link

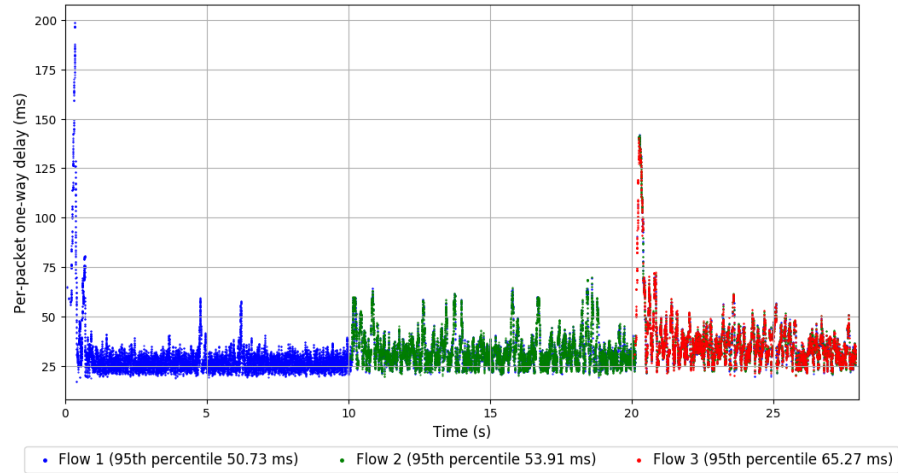
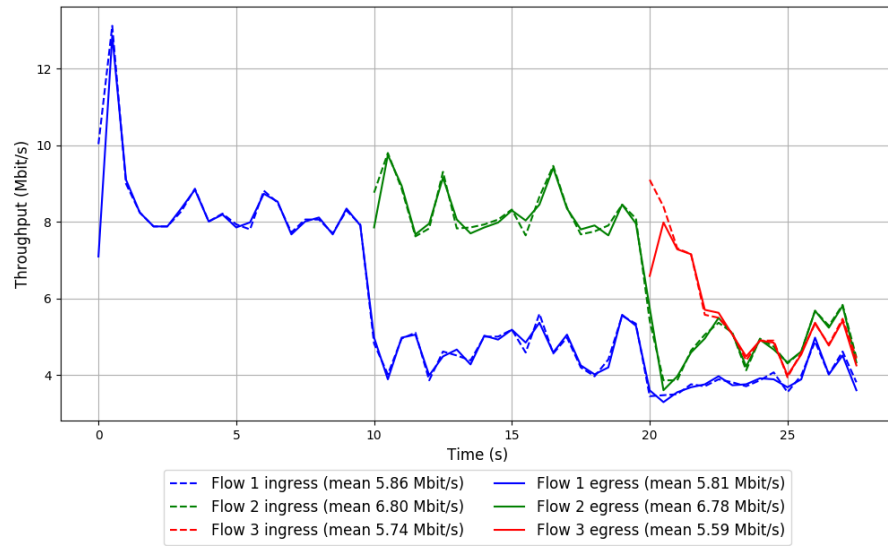


Run 1: Statistics of TaoVA-100x

Start at: 2017-11-30 07:11:20  
End at: 2017-11-30 07:11:50  
Local clock offset: -0.367 ms  
Remote clock offset: -3.284 ms

# Below is generated by plot.py at 2017-11-30 08:40:31  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 11.75 Mbit/s  
95th percentile per-packet one-way delay: 53.846 ms  
Loss rate: 1.09%  
-- Flow 1:  
Average throughput: 5.81 Mbit/s  
95th percentile per-packet one-way delay: 50.730 ms  
Loss rate: 1.01%  
-- Flow 2:  
Average throughput: 6.78 Mbit/s  
95th percentile per-packet one-way delay: 53.913 ms  
Loss rate: 0.42%  
-- Flow 3:  
Average throughput: 5.59 Mbit/s  
95th percentile per-packet one-way delay: 65.267 ms  
Loss rate: 3.19%

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

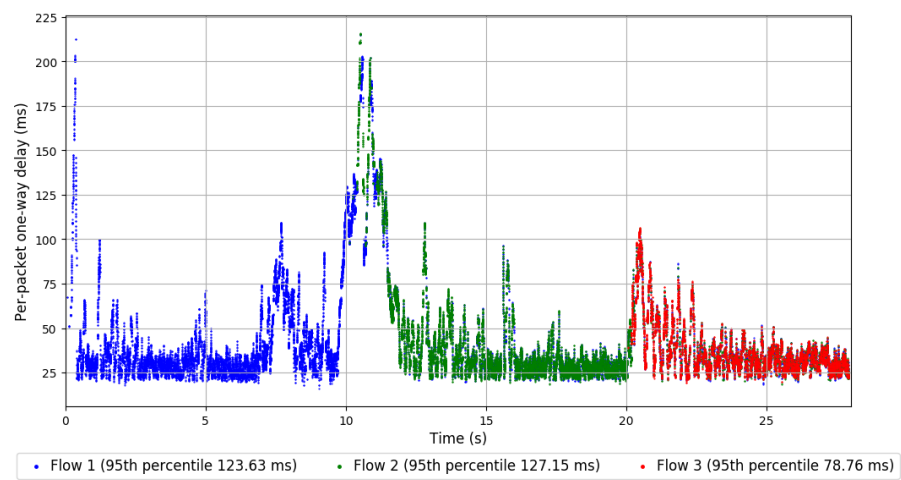
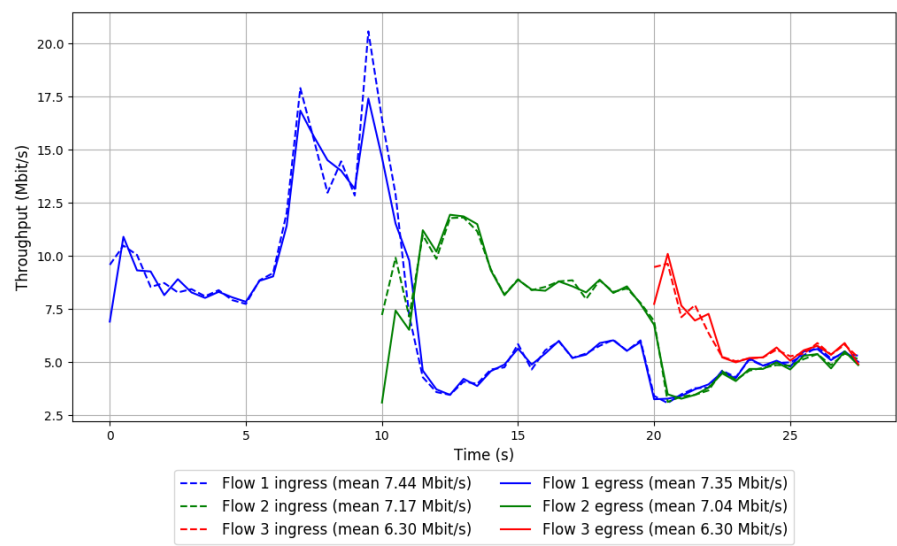


Run 2: Statistics of TaoVA-100x

Start at: 2017-11-30 07:28:00  
End at: 2017-11-30 07:28:30  
Local clock offset: -0.387 ms  
Remote clock offset: -3.322 ms

# Below is generated by plot.py at 2017-11-30 08:40:34  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 13.62 Mbit/s  
95th percentile per-packet one-way delay: 118.726 ms  
Loss rate: 1.76%  
-- Flow 1:  
Average throughput: 7.35 Mbit/s  
95th percentile per-packet one-way delay: 123.628 ms  
Loss rate: 1.50%  
-- Flow 2:  
Average throughput: 7.04 Mbit/s  
95th percentile per-packet one-way delay: 127.153 ms  
Loss rate: 2.52%  
-- Flow 3:  
Average throughput: 6.30 Mbit/s  
95th percentile per-packet one-way delay: 78.756 ms  
Loss rate: 0.91%

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



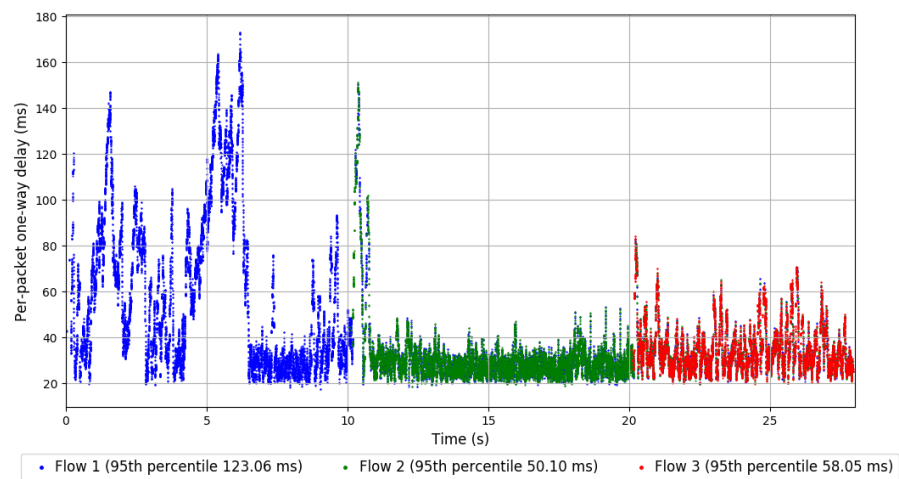
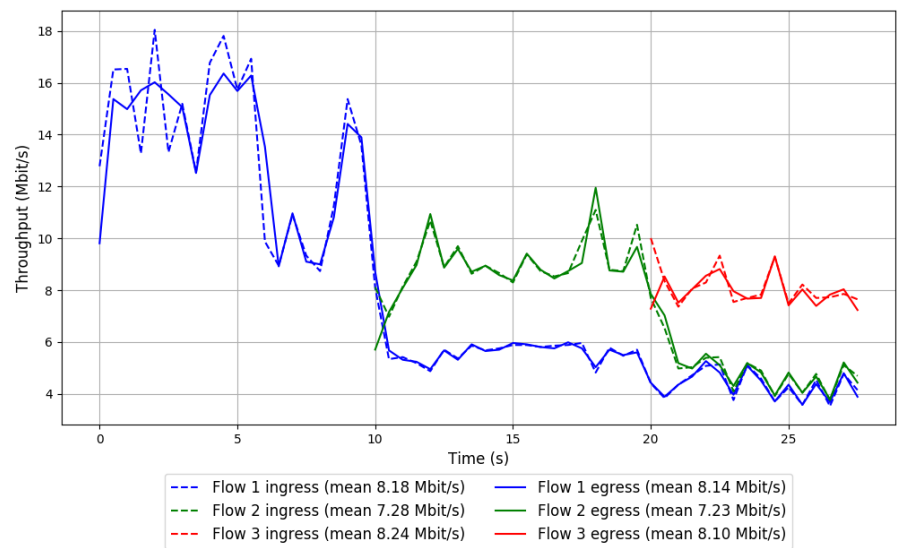
Run 3: Statistics of TaoVA-100x

Start at: 2017-11-30 07:44:43  
End at: 2017-11-30 07:45:13  
Local clock offset: -0.167 ms  
Remote clock offset: -3.171 ms

# Below is generated by plot.py at 2017-11-30 08:40:42  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 15.05 Mbit/s  
95th percentile per-packet one-way delay: 103.978 ms  
Loss rate: 1.03%  
-- Flow 1:  
Average throughput: 8.14 Mbit/s  
95th percentile per-packet one-way delay: 123.059 ms  
Loss rate: 0.71%  
-- Flow 2:  
Average throughput: 7.23 Mbit/s  
95th percentile per-packet one-way delay: 50.098 ms  
Loss rate: 0.92%  
-- Flow 3:  
Average throughput: 8.10 Mbit/s  
95th percentile per-packet one-way delay: 58.050 ms  
Loss rate: 2.37%



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

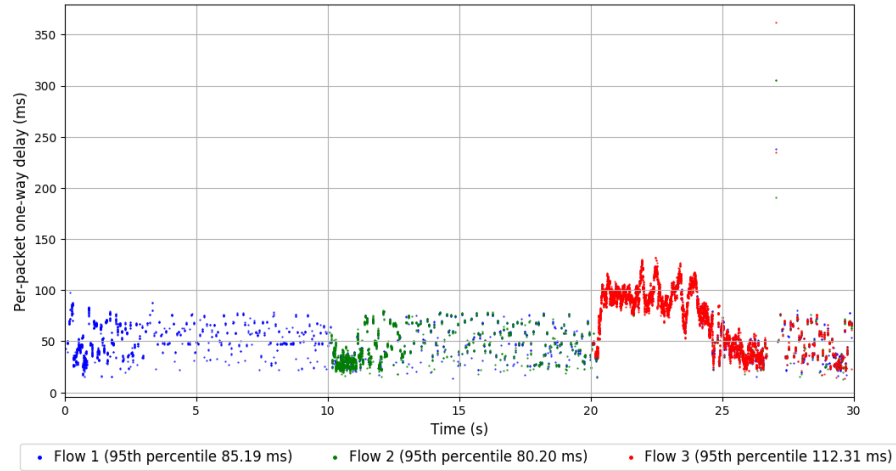
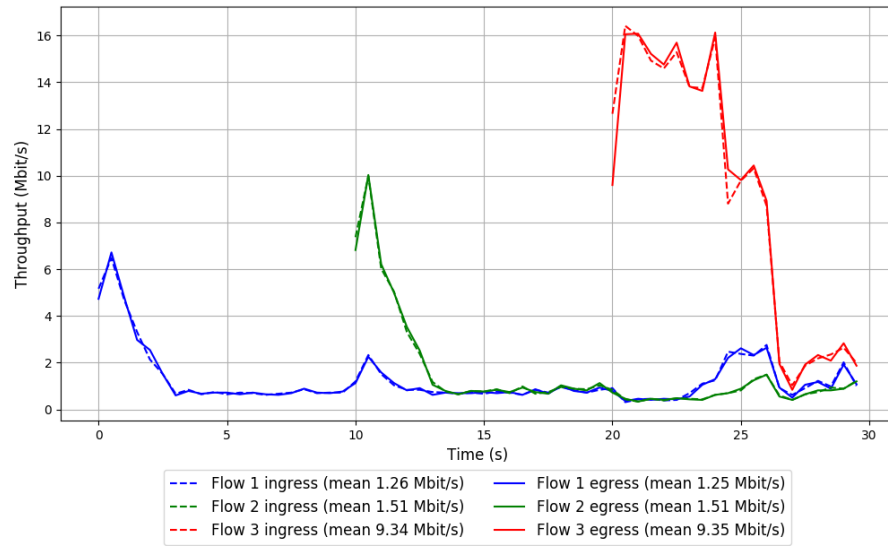


Run 1: Statistics of TCP Vegas

Start at: 2017-11-30 07:04:13  
End at: 2017-11-30 07:04:43  
Local clock offset: -0.561 ms  
Remote clock offset: -3.271 ms

# Below is generated by plot.py at 2017-11-30 08:40:42  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.34 Mbit/s  
95th percentile per-packet one-way delay: 107.874 ms  
Loss rate: 0.43%  
-- Flow 1:  
Average throughput: 1.25 Mbit/s  
95th percentile per-packet one-way delay: 85.191 ms  
Loss rate: 0.51%  
-- Flow 2:  
Average throughput: 1.51 Mbit/s  
95th percentile per-packet one-way delay: 80.197 ms  
Loss rate: 0.36%  
-- Flow 3:  
Average throughput: 9.35 Mbit/s  
95th percentile per-packet one-way delay: 112.313 ms  
Loss rate: 0.43%

# Run 1: Report of TCP Vegas — Data Link



Run 2: Statistics of TCP Vegas

Start at: 2017-11-30 07:20:52

End at: 2017-11-30 07:21:22

Local clock offset: -0.275 ms

Remote clock offset: -3.19 ms

# Below is generated by plot.py at 2017-11-30 08:40:42

# Datalink statistics

-- Total of 3 flows:

Average throughput: 9.51 Mbit/s

95th percentile per-packet one-way delay: 177.541 ms

Loss rate: 0.23%

-- Flow 1:

Average throughput: 1.14 Mbit/s

95th percentile per-packet one-way delay: 99.761 ms

Loss rate: 0.28%

-- Flow 2:

Average throughput: 6.77 Mbit/s

95th percentile per-packet one-way delay: 184.545 ms

Loss rate: 0.33%

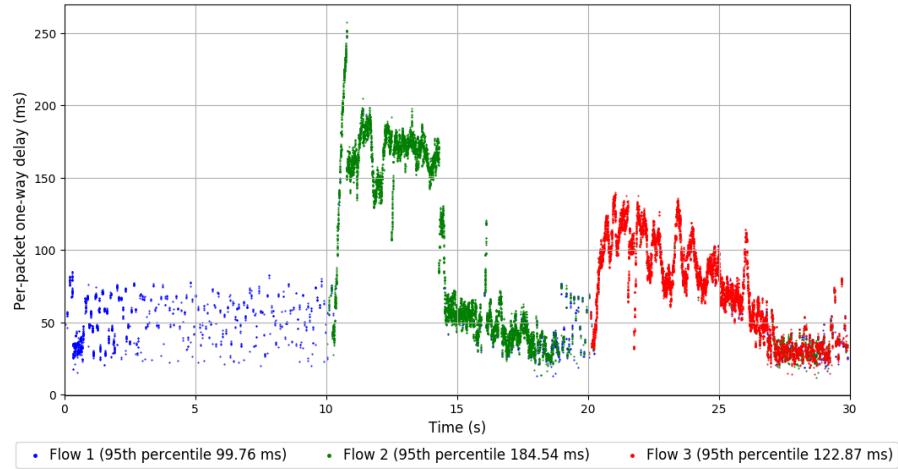
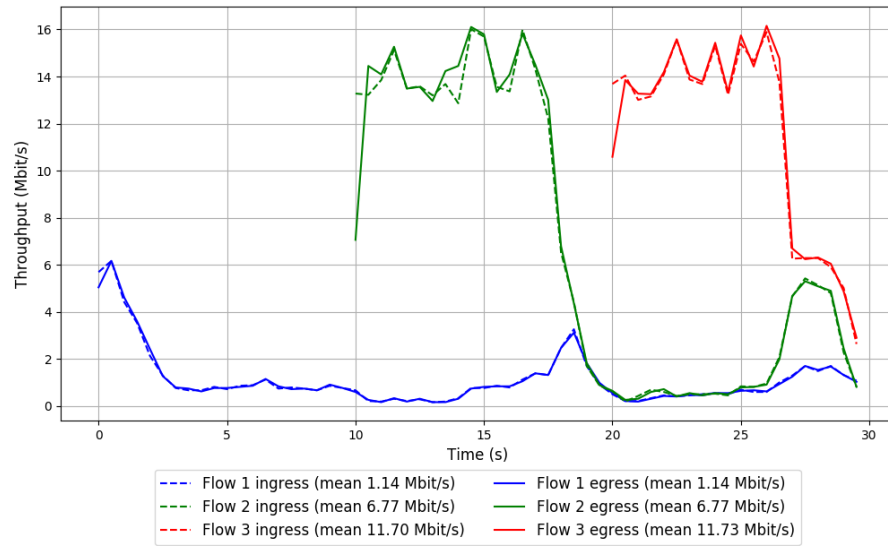
-- Flow 3:

Average throughput: 11.73 Mbit/s

95th percentile per-packet one-way delay: 122.867 ms

Loss rate: 0.10%

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

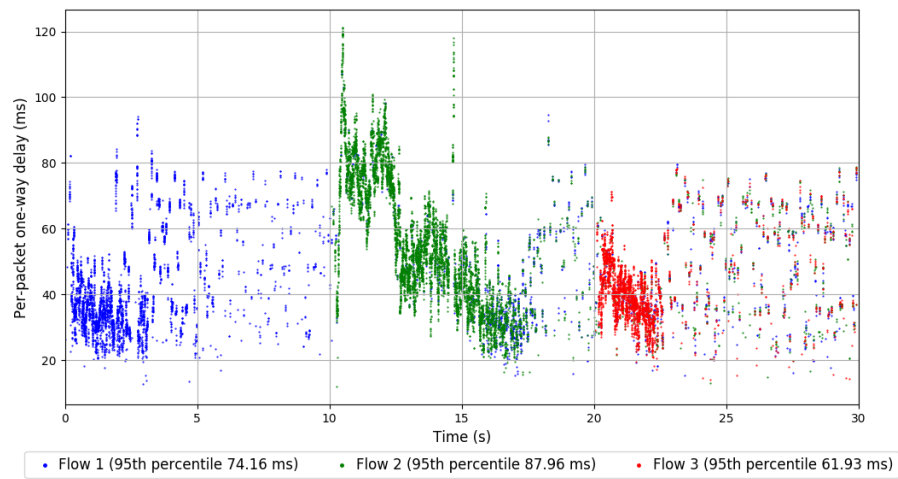
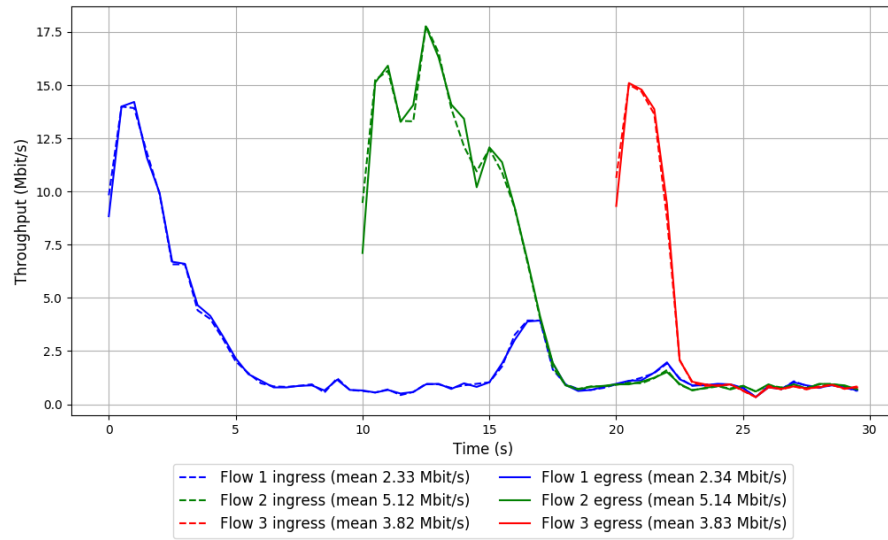


Run 3: Statistics of TCP Vegas

Start at: 2017-11-30 07:37:34  
End at: 2017-11-30 07:38:04  
Local clock offset: -0.171 ms  
Remote clock offset: -3.321 ms

# Below is generated by plot.py at 2017-11-30 08:40:42  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 7.01 Mbit/s  
95th percentile per-packet one-way delay: 82.963 ms  
Loss rate: 0.10%  
-- Flow 1:  
Average throughput: 2.34 Mbit/s  
95th percentile per-packet one-way delay: 74.161 ms  
Loss rate: 0.09%  
-- Flow 2:  
Average throughput: 5.14 Mbit/s  
95th percentile per-packet one-way delay: 87.962 ms  
Loss rate: 0.05%  
-- Flow 3:  
Average throughput: 3.83 Mbit/s  
95th percentile per-packet one-way delay: 61.931 ms  
Loss rate: 0.28%

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



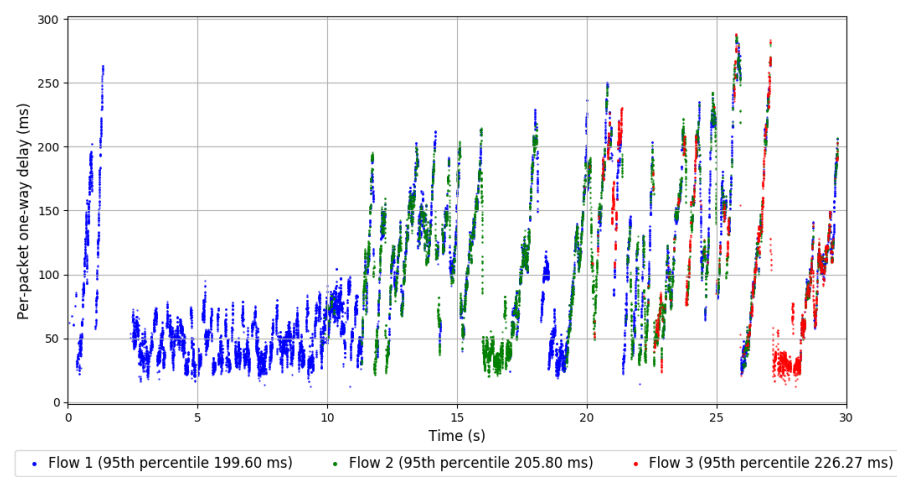
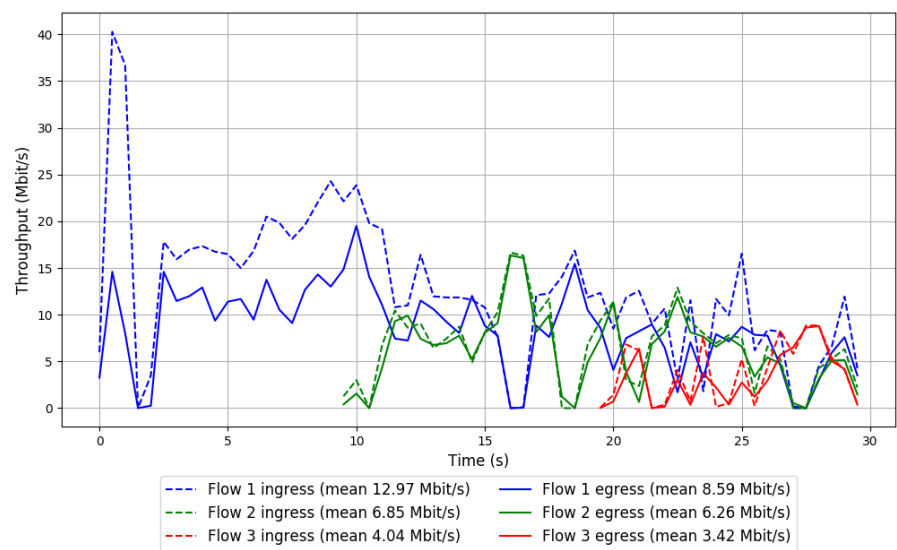
Run 1: Statistics of Verus

Start at: 2017-11-30 07:01:49  
End at: 2017-11-30 07:02:19  
Local clock offset: -0.698 ms  
Remote clock offset: -3.313 ms

# Below is generated by plot.py at 2017-11-30 08:40:42  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 13.93 Mbit/s  
95th percentile per-packet one-way delay: 204.734 ms  
Loss rate: 26.55%  
-- Flow 1:  
Average throughput: 8.59 Mbit/s  
95th percentile per-packet one-way delay: 199.599 ms  
Loss rate: 33.96%  
-- Flow 2:  
Average throughput: 6.26 Mbit/s  
95th percentile per-packet one-way delay: 205.801 ms  
Loss rate: 8.74%  
-- Flow 3:  
Average throughput: 3.42 Mbit/s  
95th percentile per-packet one-way delay: 226.268 ms  
Loss rate: 15.99%



Run 1: Report of Verus — Data Link

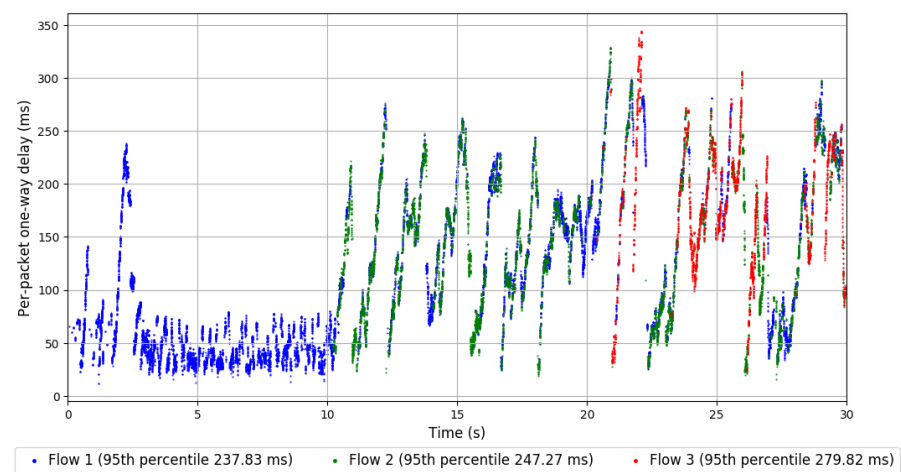
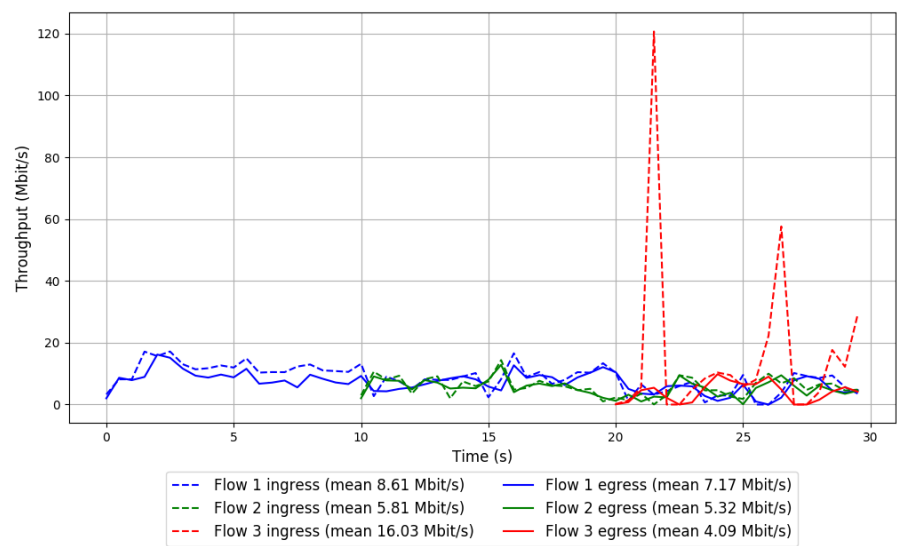


Run 2: Statistics of Verus

Start at: 2017-11-30 07:18:29  
End at: 2017-11-30 07:18:59  
Local clock offset: -0.38 ms  
Remote clock offset: -3.311 ms

# Below is generated by plot.py at 2017-11-30 08:40:42  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 12.04 Mbit/s  
95th percentile per-packet one-way delay: 247.276 ms  
Loss rate: 32.48%  
-- Flow 1:  
Average throughput: 7.17 Mbit/s  
95th percentile per-packet one-way delay: 237.827 ms  
Loss rate: 17.04%  
-- Flow 2:  
Average throughput: 5.32 Mbit/s  
95th percentile per-packet one-way delay: 247.274 ms  
Loss rate: 8.63%  
-- Flow 3:  
Average throughput: 4.09 Mbit/s  
95th percentile per-packet one-way delay: 279.822 ms  
Loss rate: 74.92%

Run 2: Report of Verus — Data Link

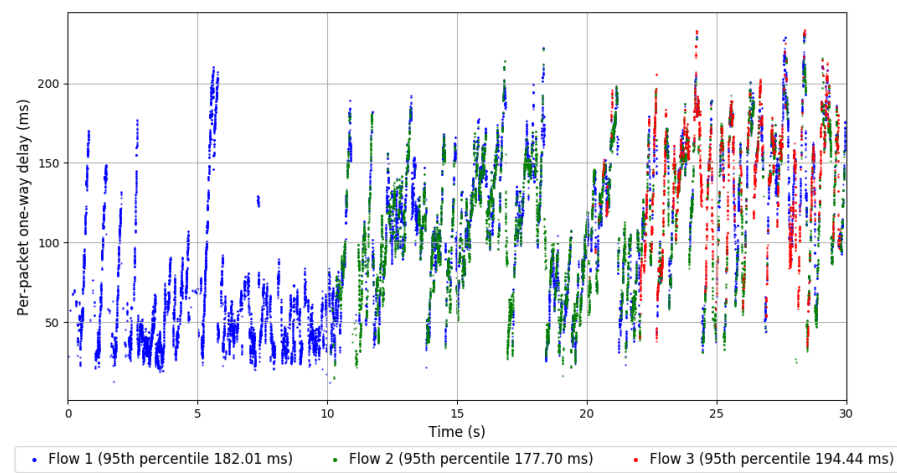
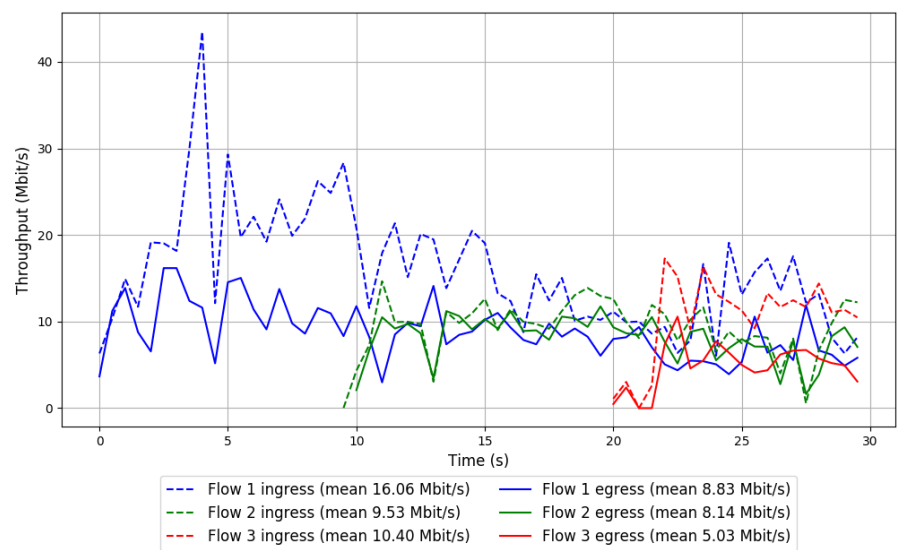


Run 3: Statistics of Verus

Start at: 2017-11-30 07:35:10  
End at: 2017-11-30 07:35:40  
Local clock offset: -0.217 ms  
Remote clock offset: -3.331 ms

# Below is generated by plot.py at 2017-11-30 08:40:46  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 15.85 Mbit/s  
95th percentile per-packet one-way delay: 182.599 ms  
Loss rate: 38.58%  
-- Flow 1:  
Average throughput: 8.83 Mbit/s  
95th percentile per-packet one-way delay: 182.007 ms  
Loss rate: 44.78%  
-- Flow 2:  
Average throughput: 8.14 Mbit/s  
95th percentile per-packet one-way delay: 177.704 ms  
Loss rate: 15.09%  
-- Flow 3:  
Average throughput: 5.03 Mbit/s  
95th percentile per-packet one-way delay: 194.443 ms  
Loss rate: 53.12%

Run 3: Report of Verus — Data Link

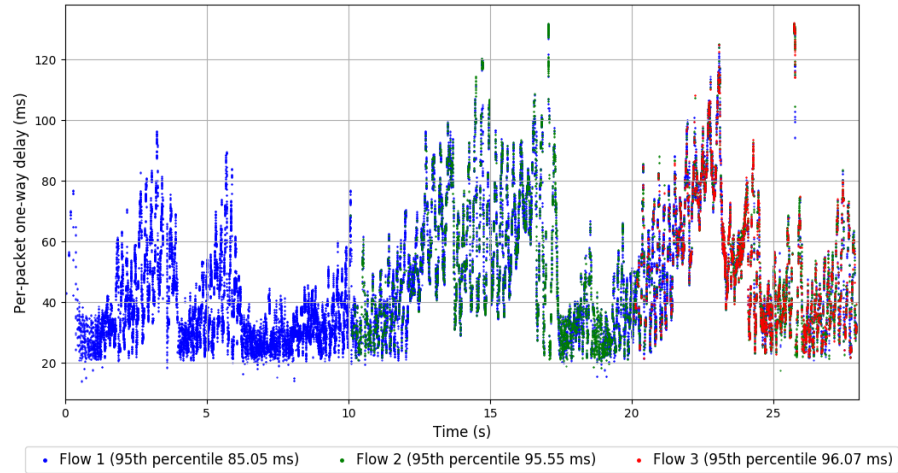
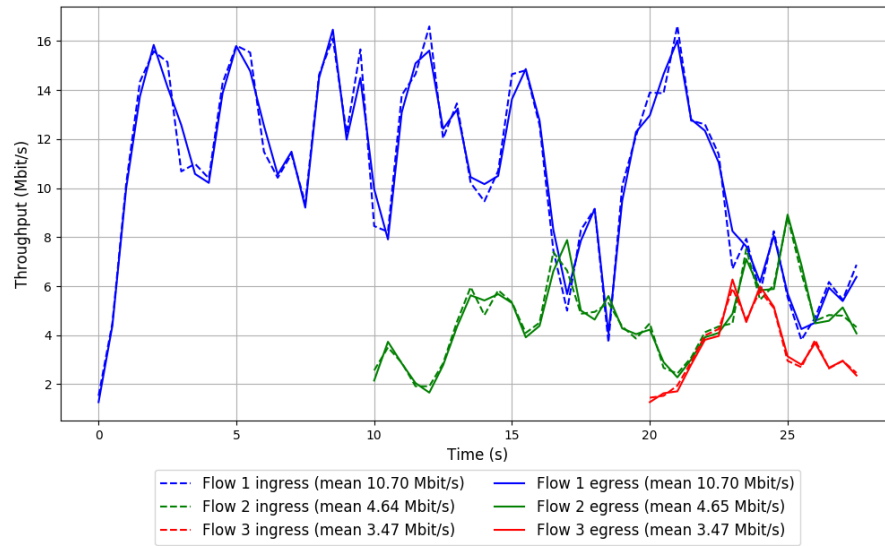


Run 1: Statistics of Copa

Start at: 2017-11-30 07:12:32  
End at: 2017-11-30 07:13:02  
Local clock offset: -0.34 ms  
Remote clock offset: -3.253 ms

# Below is generated by plot.py at 2017-11-30 08:40:55  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 14.66 Mbit/s  
95th percentile per-packet one-way delay: 87.435 ms  
Loss rate: 0.23%  
-- Flow 1:  
Average throughput: 10.70 Mbit/s  
95th percentile per-packet one-way delay: 85.047 ms  
Loss rate: 0.18%  
-- Flow 2:  
Average throughput: 4.65 Mbit/s  
95th percentile per-packet one-way delay: 95.545 ms  
Loss rate: 0.31%  
-- Flow 3:  
Average throughput: 3.47 Mbit/s  
95th percentile per-packet one-way delay: 96.072 ms  
Loss rate: 0.56%

# Run 1: Report of Copa — Data Link



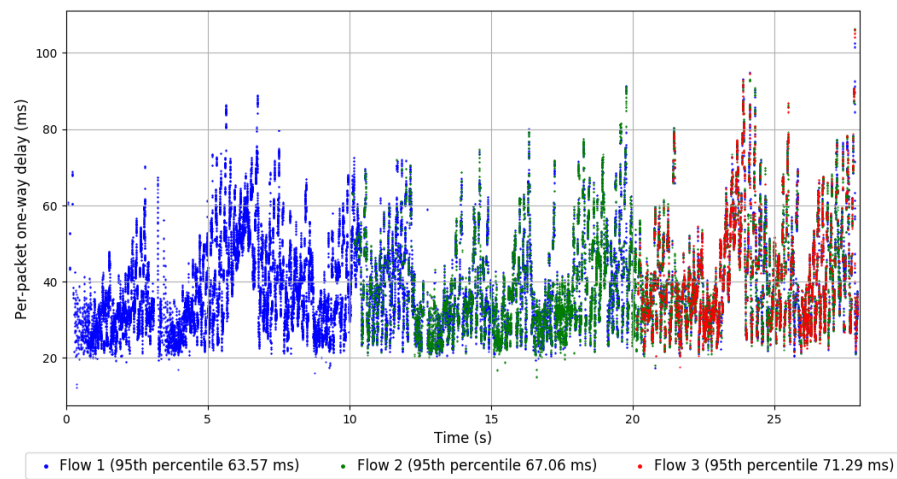
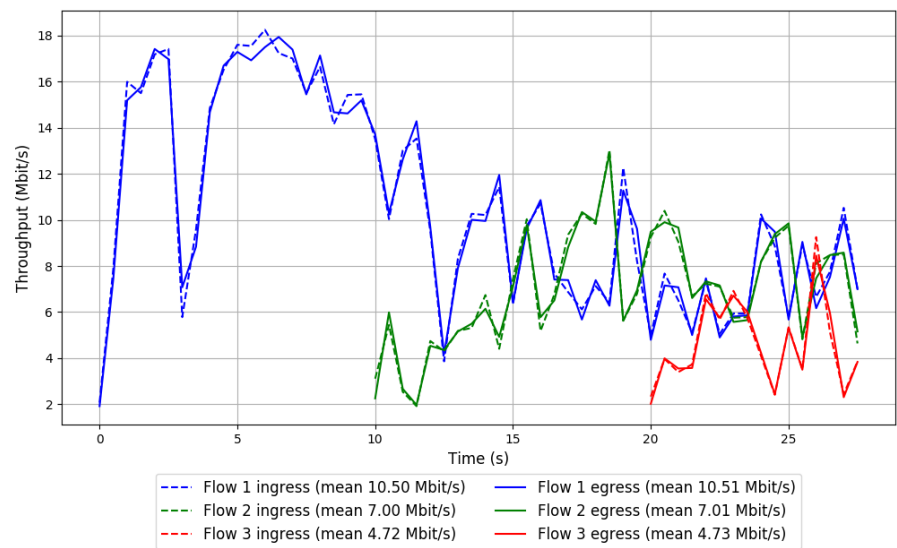
Run 2: Statistics of Copa

Start at: 2017-11-30 07:29:12  
End at: 2017-11-30 07:29:42  
Local clock offset: -0.398 ms  
Remote clock offset: -3.319 ms

# Below is generated by plot.py at 2017-11-30 08:40:56  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 16.33 Mbit/s  
95th percentile per-packet one-way delay: 65.320 ms  
Loss rate: 0.24%  
-- Flow 1:  
Average throughput: 10.51 Mbit/s  
95th percentile per-packet one-way delay: 63.574 ms  
Loss rate: 0.23%  
-- Flow 2:  
Average throughput: 7.01 Mbit/s  
95th percentile per-packet one-way delay: 67.061 ms  
Loss rate: 0.17%  
-- Flow 3:  
Average throughput: 4.73 Mbit/s  
95th percentile per-packet one-way delay: 71.288 ms  
Loss rate: 0.59%



Run 2: Report of Copa — Data Link

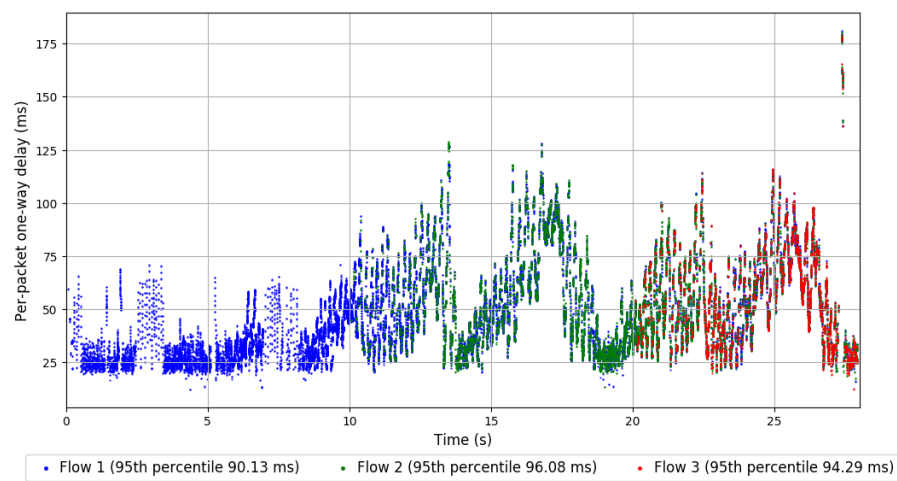
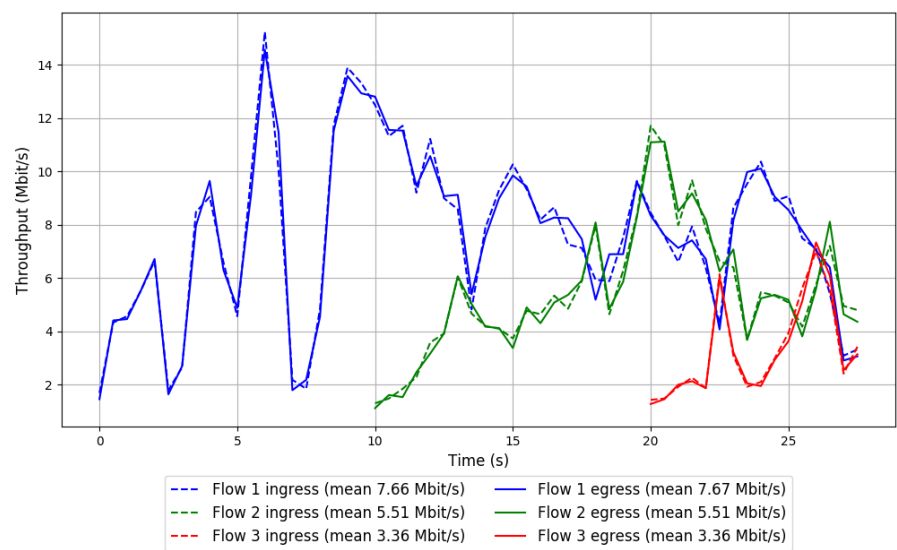


Run 3: Statistics of Copa

Start at: 2017-11-30 07:45:55  
End at: 2017-11-30 07:46:25  
Local clock offset: -0.175 ms  
Remote clock offset: -3.225 ms

# Below is generated by plot.py at 2017-11-30 08:40:56  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 12.15 Mbit/s  
95th percentile per-packet one-way delay: 92.573 ms  
Loss rate: 0.29%  
-- Flow 1:  
Average throughput: 7.67 Mbit/s  
95th percentile per-packet one-way delay: 90.133 ms  
Loss rate: 0.14%  
-- Flow 2:  
Average throughput: 5.51 Mbit/s  
95th percentile per-packet one-way delay: 96.085 ms  
Loss rate: 0.47%  
-- Flow 3:  
Average throughput: 3.36 Mbit/s  
95th percentile per-packet one-way delay: 94.293 ms  
Loss rate: 0.83%

Run 3: Report of Copa — Data Link

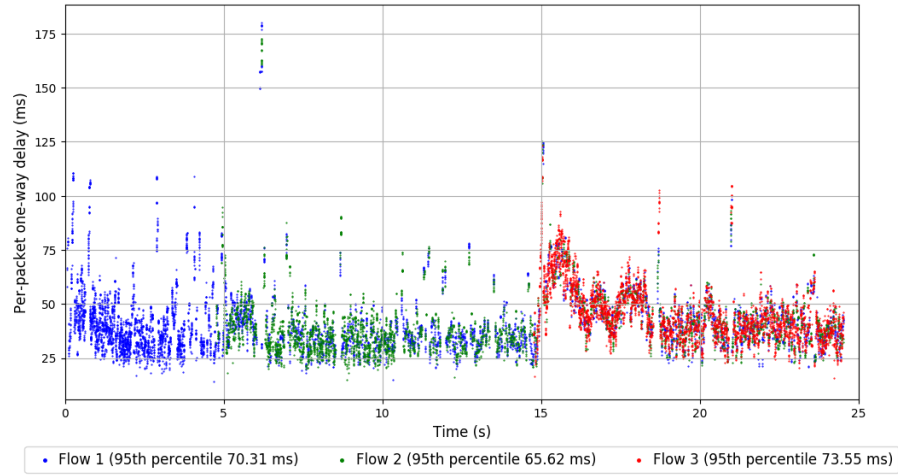
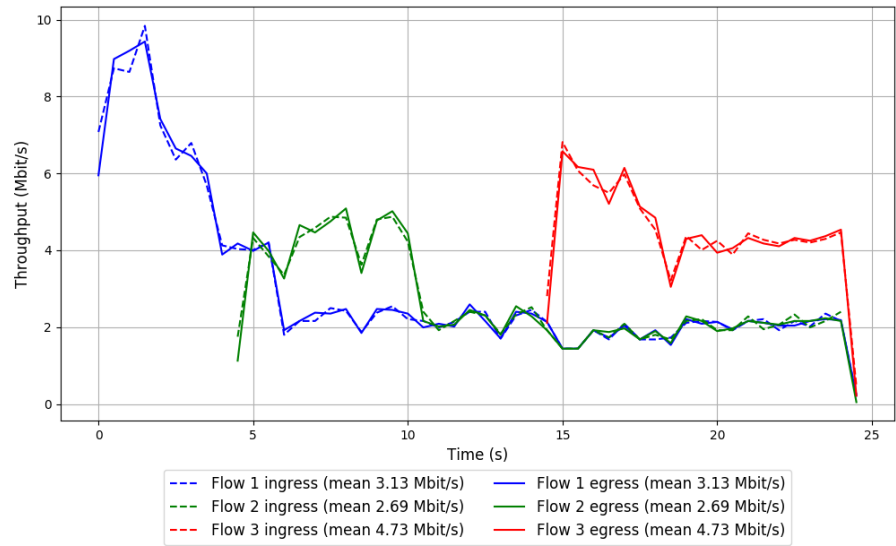


```
Run 1: Statistics of Indigo

Start at: 2017-11-30 07:08:57
End at: 2017-11-30 07:09:27
Local clock offset: -0.507 ms
Remote clock offset: -3.28 ms

# Below is generated by plot.py at 2017-11-30 08:40:56
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.19 Mbit/s
95th percentile per-packet one-way delay: 70.761 ms
Loss rate: 0.28%
-- Flow 1:
Average throughput: 3.13 Mbit/s
95th percentile per-packet one-way delay: 70.311 ms
Loss rate: 0.20%
-- Flow 2:
Average throughput: 2.69 Mbit/s
95th percentile per-packet one-way delay: 65.623 ms
Loss rate: 0.18%
-- Flow 3:
Average throughput: 4.73 Mbit/s
95th percentile per-packet one-way delay: 73.545 ms
Loss rate: 0.52%
```

## Run 1: Report of Indigo — Data Link

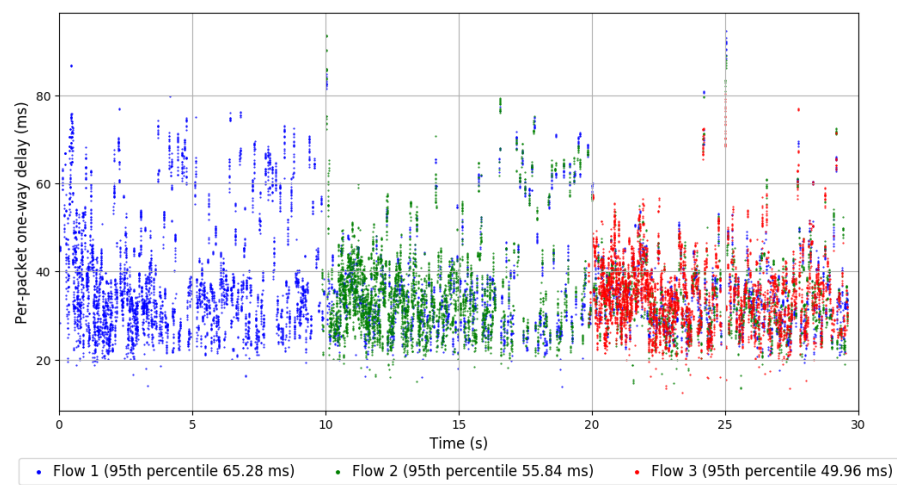
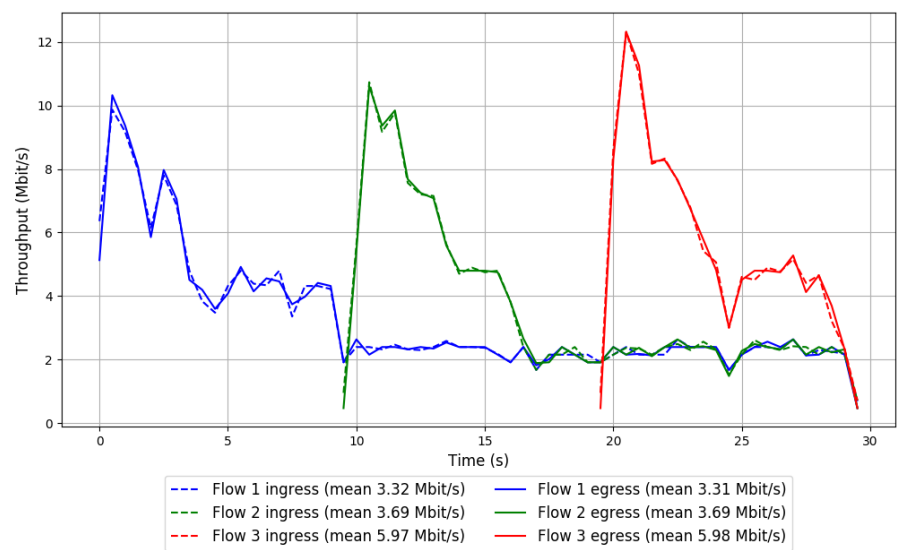


Run 2: Statistics of Indigo

Start at: 2017-11-30 07:25:37  
End at: 2017-11-30 07:26:07  
Local clock offset: -0.29 ms  
Remote clock offset: -3.235 ms

# Below is generated by plot.py at 2017-11-30 08:40:56  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 7.74 Mbit/s  
95th percentile per-packet one-way delay: 60.628 ms  
Loss rate: 0.21%  
-- Flow 1:  
Average throughput: 3.31 Mbit/s  
95th percentile per-packet one-way delay: 65.285 ms  
Loss rate: 0.23%  
-- Flow 2:  
Average throughput: 3.69 Mbit/s  
95th percentile per-packet one-way delay: 55.843 ms  
Loss rate: 0.16%  
-- Flow 3:  
Average throughput: 5.98 Mbit/s  
95th percentile per-packet one-way delay: 49.963 ms  
Loss rate: 0.23%

Run 2: Report of Indigo — Data Link



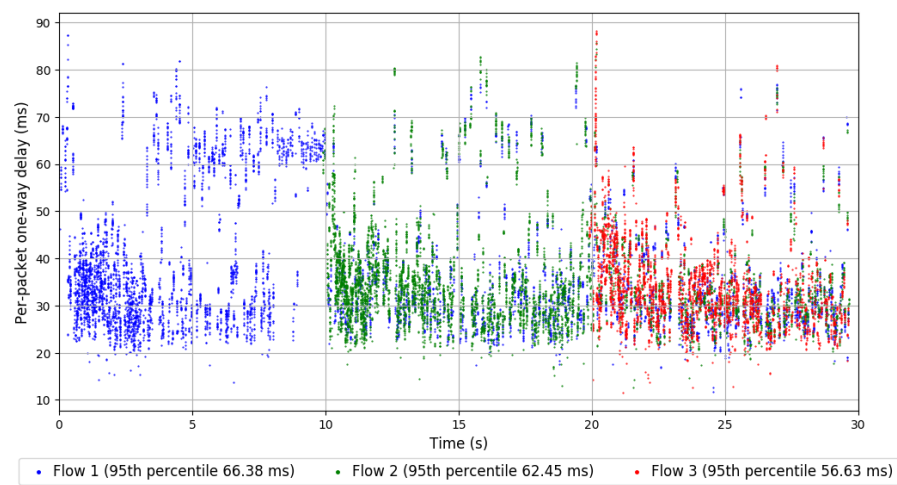
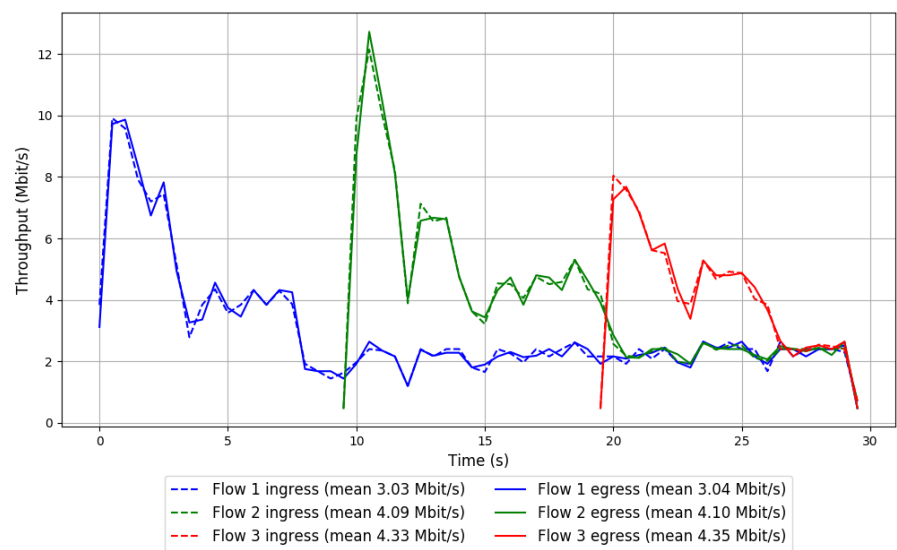
Run 3: Statistics of Indigo

Start at: 2017-11-30 07:42:20  
End at: 2017-11-30 07:42:50  
Local clock offset: -0.119 ms  
Remote clock offset: -3.114 ms

# Below is generated by plot.py at 2017-11-30 08:40:56  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 7.20 Mbit/s  
95th percentile per-packet one-way delay: 64.488 ms  
Loss rate: 0.21%  
-- Flow 1:  
Average throughput: 3.04 Mbit/s  
95th percentile per-packet one-way delay: 66.375 ms  
Loss rate: 0.15%  
-- Flow 2:  
Average throughput: 4.10 Mbit/s  
95th percentile per-packet one-way delay: 62.451 ms  
Loss rate: 0.24%  
-- Flow 3:  
Average throughput: 4.35 Mbit/s  
95th percentile per-packet one-way delay: 56.631 ms  
Loss rate: 0.28%



Run 3: Report of Indigo — Data Link

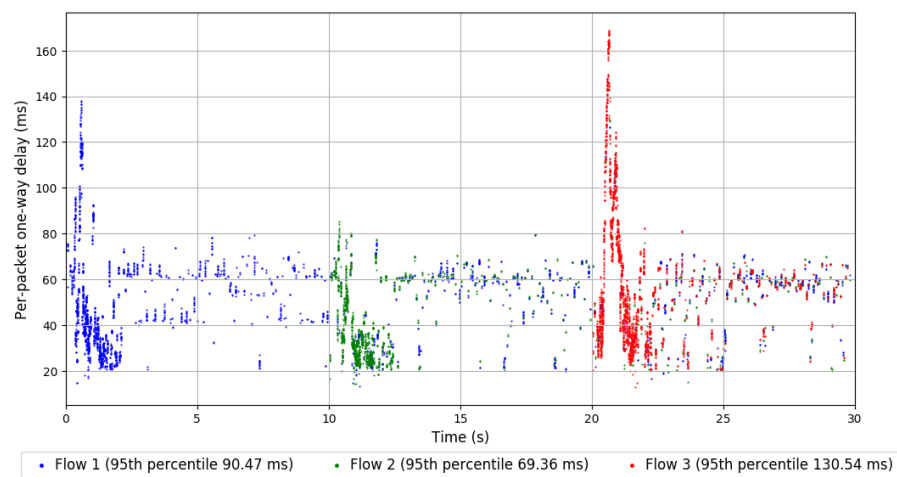
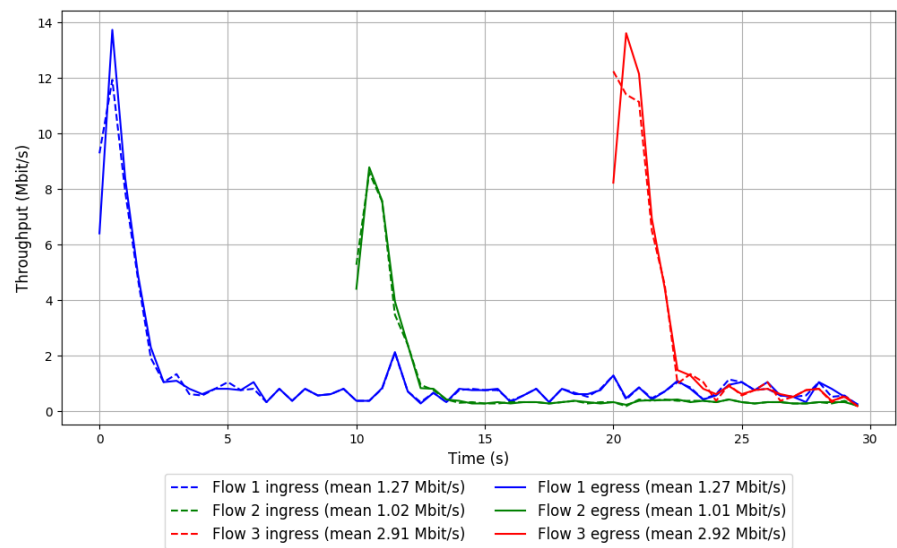


```
Run 1: Statistics of Indigo-calib

Start at: 2017-11-30 07:13:44
End at: 2017-11-30 07:14:14
Local clock offset: -0.397 ms
Remote clock offset: -3.291 ms

# Below is generated by plot.py at 2017-11-30 08:40:56
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.89 Mbit/s
95th percentile per-packet one-way delay: 107.122 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 1.27 Mbit/s
95th percentile per-packet one-way delay: 90.466 ms
Loss rate: 0.03%
-- Flow 2:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 69.355 ms
Loss rate: 0.48%
-- Flow 3:
Average throughput: 2.92 Mbit/s
95th percentile per-packet one-way delay: 130.536 ms
Loss rate: 0.08%
```

Run 1: Report of Indigo-calib — Data Link

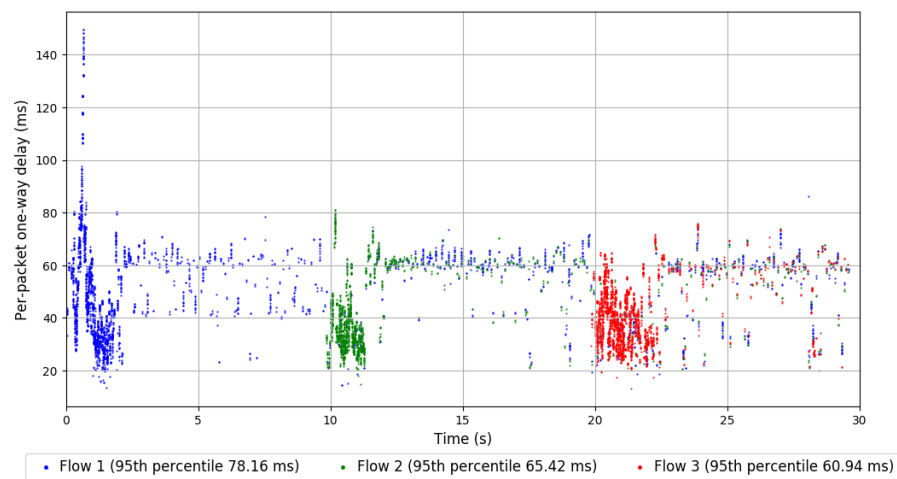
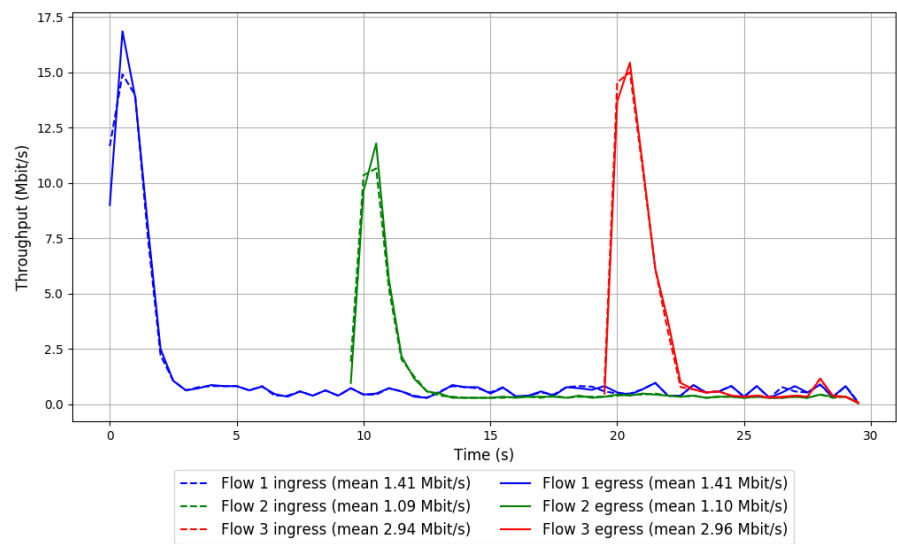


Run 2: Statistics of Indigo-calib

Start at: 2017-11-30 07:30:24  
End at: 2017-11-30 07:30:54  
Local clock offset: -0.298 ms  
Remote clock offset: -3.312 ms

# Below is generated by plot.py at 2017-11-30 08:40:56  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.11 Mbit/s  
95th percentile per-packet one-way delay: 70.341 ms  
Loss rate: 0.08%  
-- Flow 1:  
Average throughput: 1.41 Mbit/s  
95th percentile per-packet one-way delay: 78.163 ms  
Loss rate: 0.06%  
-- Flow 2:  
Average throughput: 1.10 Mbit/s  
95th percentile per-packet one-way delay: 65.423 ms  
Loss rate: 0.11%  
-- Flow 3:  
Average throughput: 2.96 Mbit/s  
95th percentile per-packet one-way delay: 60.937 ms  
Loss rate: 0.08%

Run 2: Report of Indigo-calib — Data Link



Run 3: Statistics of Indigo-calib

Start at: 2017-11-30 07:47:07  
End at: 2017-11-30 07:47:37  
Local clock offset: -0.066 ms  
Remote clock offset: -3.254 ms

# Below is generated by plot.py at 2017-11-30 08:40:56  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.76 Mbit/s  
95th percentile per-packet one-way delay: 96.509 ms  
Loss rate: 0.41%  
-- Flow 1:  
Average throughput: 1.71 Mbit/s  
95th percentile per-packet one-way delay: 92.336 ms  
Loss rate: 0.28%  
-- Flow 2:  
Average throughput: 1.82 Mbit/s  
95th percentile per-packet one-way delay: 105.093 ms  
Loss rate: 0.07%  
-- Flow 3:  
Average throughput: 2.56 Mbit/s  
95th percentile per-packet one-way delay: 90.808 ms  
Loss rate: 1.14%

Run 3: Report of Indigo-calib — Data Link

