

## Pantheon Report

Generated at 2018-01-26 02:17:10 (UTC).

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

Repeated the test of 15 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).

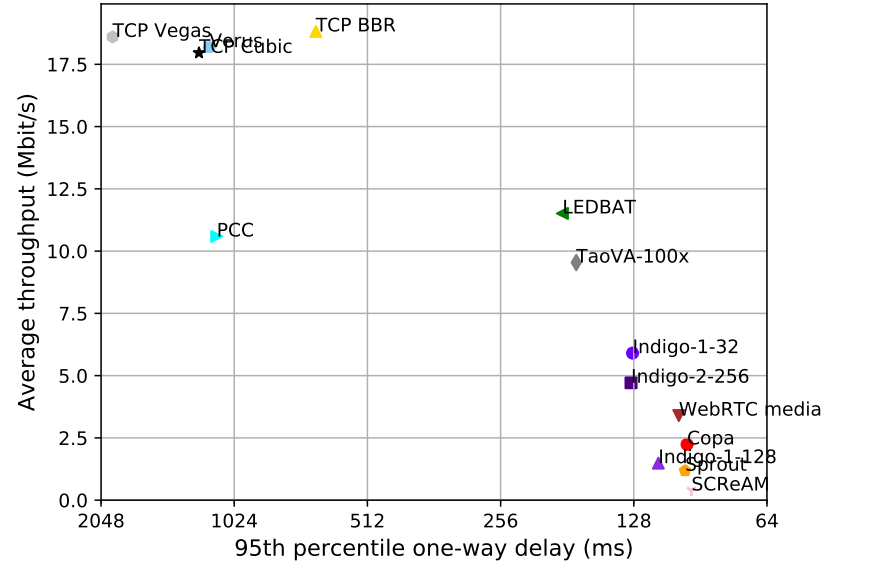
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo\_fast**).

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

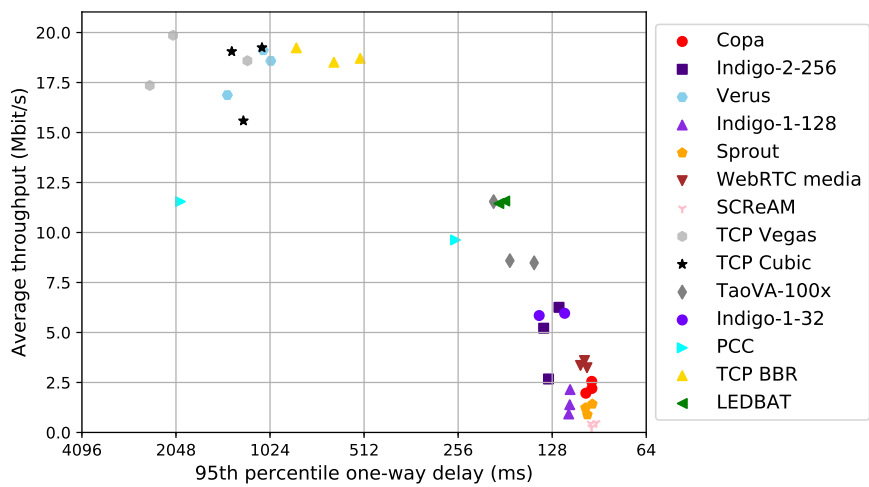
Git summary:

```
branch: master @ f23294ec38436c9f802847d477a41b7343ec76e6
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/fillp @ ec9585325218d5048c4d4152fa42240af54c6e67
third_party/genericCC @ 80b516c448f795fd6e9675f7177b69c622f07da8
third_party/indigo @ a9b2060d39e4da2e8987e893e3eca2a6c7cd0ab9
third_party/indigo-1-layer-128-unit @ 3ae9e4ef4230db7484501f82ce8b377695f2f66d
third_party/indigo-1-layer-32-unit @ 2601c92e4aa9d58d38dc4dfe0ecd90c077e64d
third_party/indigo-1-layer-32-unit-no-calib @ 1f3a7f75b41135ed5b540c0fd3505939528e2a5f
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
  M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ fb1053193c2861da659ba9013db26744ccfcf993
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
  M receiver/src/buffer.h
  M receiver/src/core.cpp
  M sender/src/buffer.h
  M sender/src/core.cpp
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ 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/vivace @ 423cbca3e8ea1d599e7b5cf725835e8a2b6bfac6
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



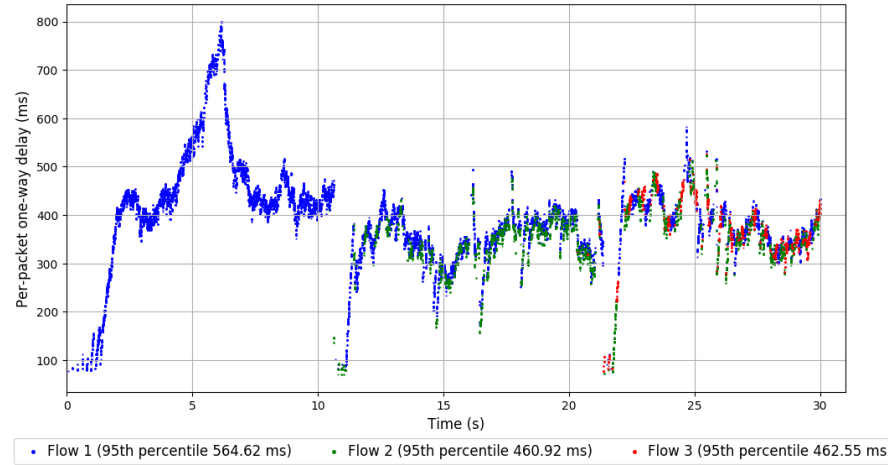
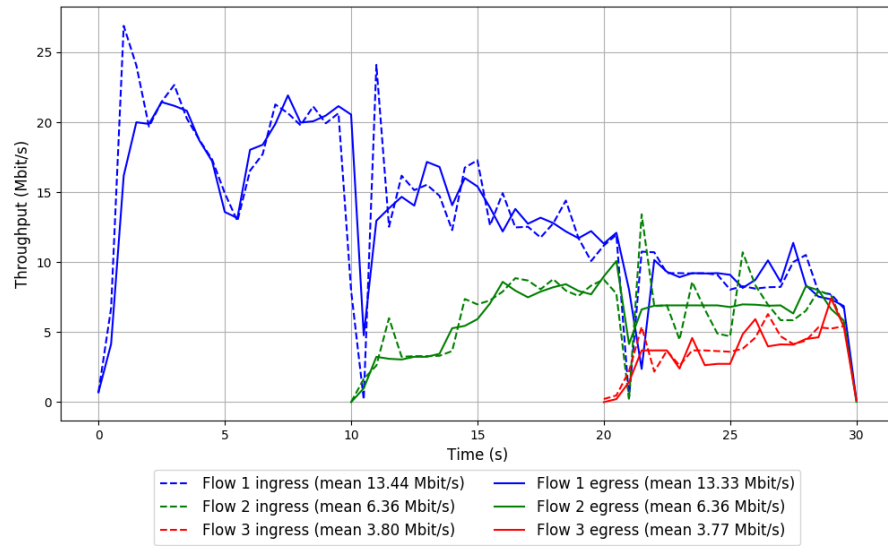
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	12.88	6.33	5.68	655.72	656.33	677.19	0.59	2.32	7.14
TCP Cubic	3	16.01	2.78	0.49	1220.98	1244.01	1211.51	2.72	16.33	26.95
LEDBAT	2	8.11	4.33	1.60	177.90	211.35	253.23	0.68	0.74	1.89
PCC	2	4.01	5.87	8.14	1013.10	1100.10	1178.98	3.50	5.42	9.26
QUIC Cubic	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SCReAM	3	0.32	0.22	0.22	1402.85	90.80	101.02	0.10	0.13	0.23
WebRTC media	3	2.09	1.04	0.28	101.08	102.26	122.27	0.19	0.34	1.02
Sprout	3	0.63	0.55	0.56	96.68	99.06	97.74	0.17	0.05	0.02
TaoVA-100x	3	4.99	4.49	5.93	159.22	179.97	202.43	0.10	0.13	0.24
TCP Vegas	3	16.79	3.02	0.42	1876.79	1882.36	1804.17	3.92	11.21	20.87
Verus	3	14.16	5.90	0.65	969.47	1108.16	1032.95	0.47	9.65	10.55
Copa	3	1.11	1.18	1.33	97.76	96.10	95.08	0.28	0.26	0.81
Indigo-2-256	3	2.59	1.68	3.14	126.33	133.90	124.94	0.08	0.28	0.00
Indigo-1-32	2	1.75	4.14	4.35	126.14	125.95	132.50	0.01	0.30	0.07
Indigo-1-128	3	0.53	0.99	0.95	106.73	108.06	106.11	0.00	0.03	0.00

Run 1: Statistics of TCP BBR

Start at: 2018-01-26 01:34:55  
End at: 2018-01-26 01:35:25  
Local clock offset: 0.374 ms  
Remote clock offset: -10.516 ms

# Below is generated by plot.py at 2018-01-26 02:16:15  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 18.71 Mbit/s  
95th percentile per-packet one-way delay: 526.624 ms  
Loss rate: 1.15%  
-- Flow 1:  
Average throughput: 13.33 Mbit/s  
95th percentile per-packet one-way delay: 564.622 ms  
Loss rate: 0.80%  
-- Flow 2:  
Average throughput: 6.36 Mbit/s  
95th percentile per-packet one-way delay: 460.915 ms  
Loss rate: 1.63%  
-- Flow 3:  
Average throughput: 3.77 Mbit/s  
95th percentile per-packet one-way delay: 462.550 ms  
Loss rate: 3.25%

# Run 1: Report of TCP BBR — Data Link

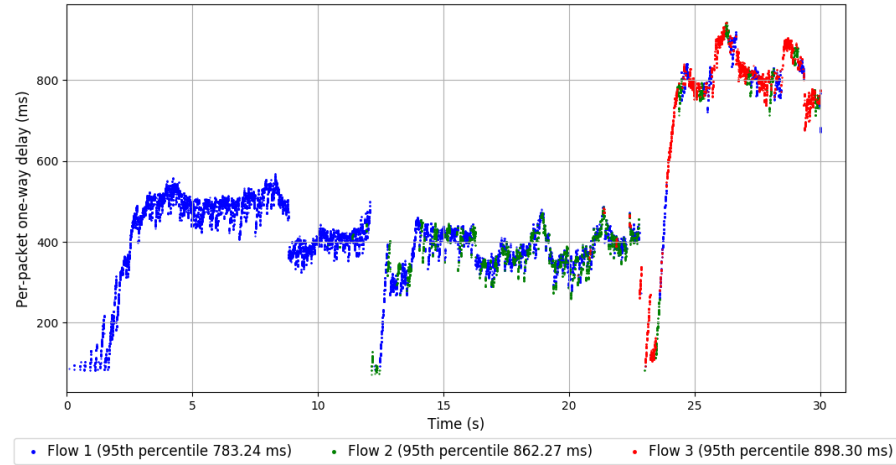
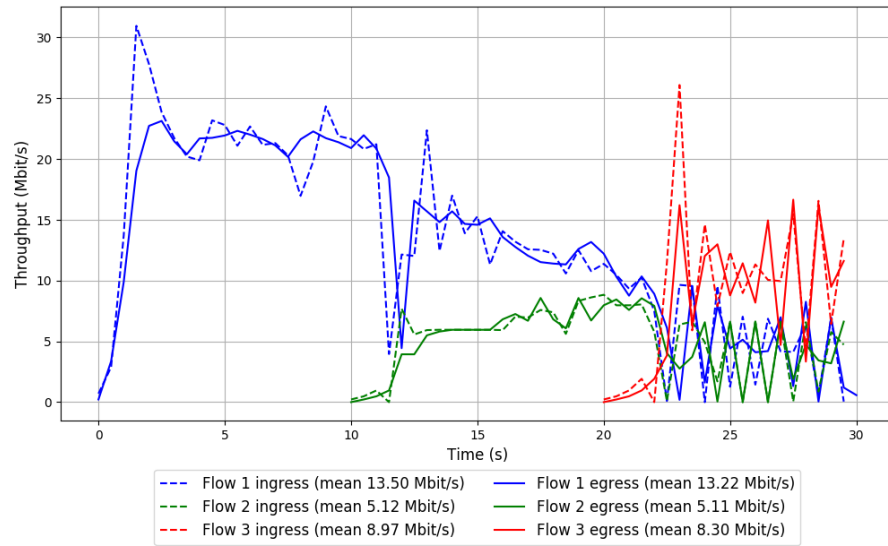


Run 2: Statistics of TCP BBR

Start at: 2018-01-26 01:53:58  
End at: 2018-01-26 01:54:28  
Local clock offset: 0.573 ms  
Remote clock offset: -9.705 ms

# Below is generated by plot.py at 2018-01-26 02:16:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 19.24 Mbit/s  
95th percentile per-packet one-way delay: 843.318 ms  
Loss rate: 2.38%  
-- Flow 1:  
Average throughput: 13.22 Mbit/s  
95th percentile per-packet one-way delay: 783.237 ms  
Loss rate: 0.65%  
-- Flow 2:  
Average throughput: 5.11 Mbit/s  
95th percentile per-packet one-way delay: 862.271 ms  
Loss rate: 2.32%  
-- Flow 3:  
Average throughput: 8.30 Mbit/s  
95th percentile per-packet one-way delay: 898.298 ms  
Loss rate: 10.14%

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



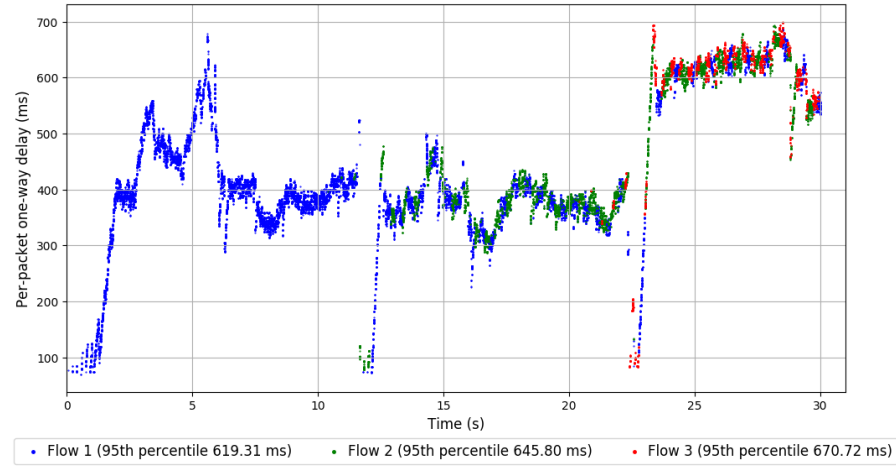
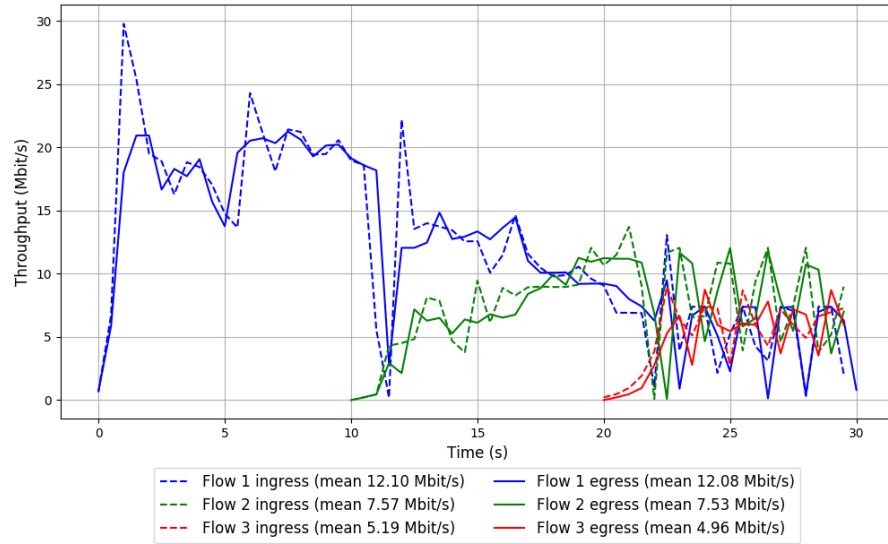
Run 3: Statistics of TCP BBR

Start at: 2018-01-26 02:13:03  
End at: 2018-01-26 02:13:33  
Local clock offset: 0.978 ms  
Remote clock offset: -8.937 ms

# Below is generated by plot.py at 2018-01-26 02:16:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 18.52 Mbit/s  
95th percentile per-packet one-way delay: 639.554 ms  
Loss rate: 1.74%  
-- Flow 1:  
Average throughput: 12.08 Mbit/s  
95th percentile per-packet one-way delay: 619.309 ms  
Loss rate: 0.32%  
-- Flow 2:  
Average throughput: 7.53 Mbit/s  
95th percentile per-packet one-way delay: 645.799 ms  
Loss rate: 3.00%  
-- Flow 3:  
Average throughput: 4.96 Mbit/s  
95th percentile per-packet one-way delay: 670.723 ms  
Loss rate: 8.04%



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

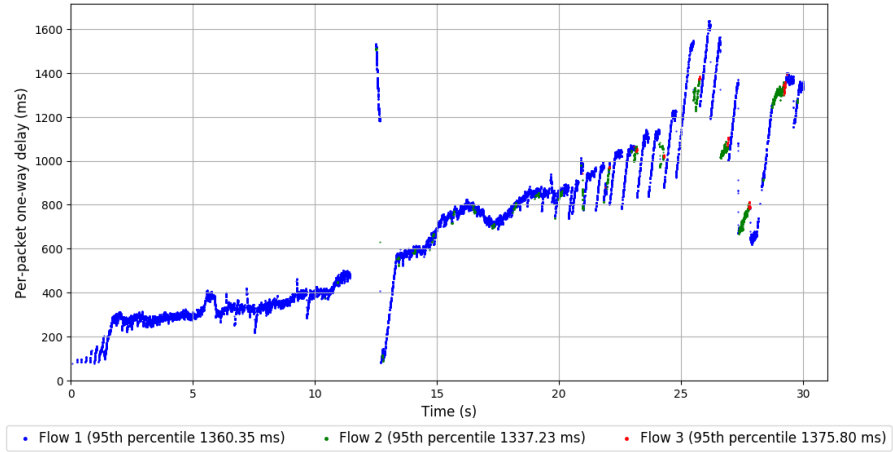
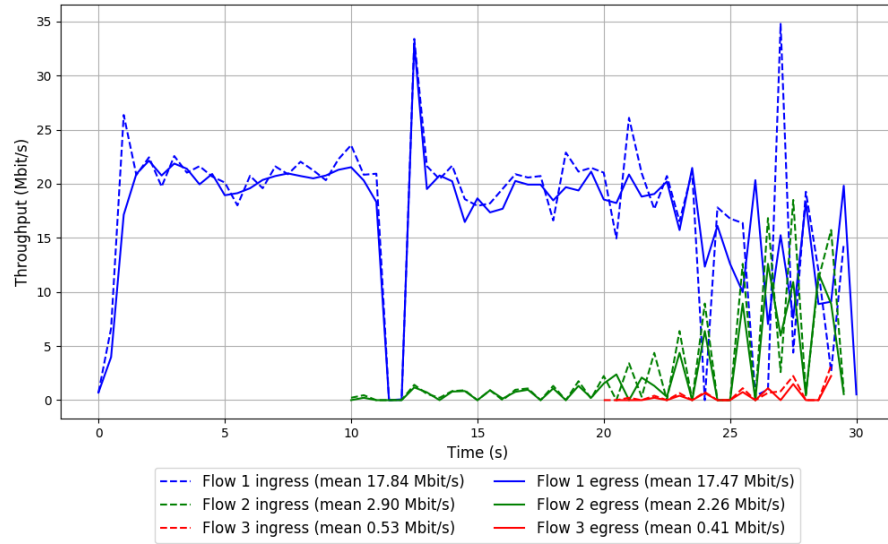


Run 1: Statistics of TCP Cubic

Start at: 2018-01-26 01:23:01  
End at: 2018-01-26 01:23:31  
Local clock offset: 0.026 ms  
Remote clock offset: -10.585 ms

# Below is generated by plot.py at 2018-01-26 02:16:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 19.05 Mbit/s  
95th percentile per-packet one-way delay: 1357.778 ms  
Loss rate: 4.53%  
-- Flow 1:  
Average throughput: 17.47 Mbit/s  
95th percentile per-packet one-way delay: 1360.345 ms  
Loss rate: 2.18%  
-- Flow 2:  
Average throughput: 2.26 Mbit/s  
95th percentile per-packet one-way delay: 1337.230 ms  
Loss rate: 24.04%  
-- Flow 3:  
Average throughput: 0.41 Mbit/s  
95th percentile per-packet one-way delay: 1375.801 ms  
Loss rate: 31.95%

# Run 1: Report of TCP Cubic — Data Link

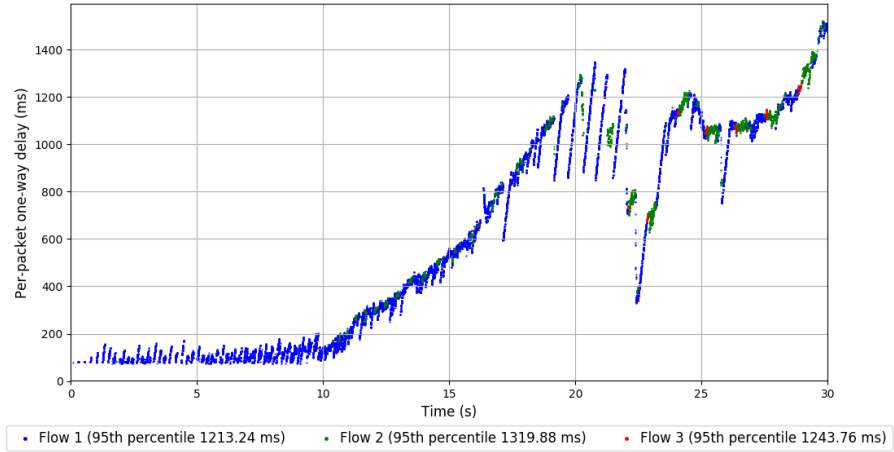
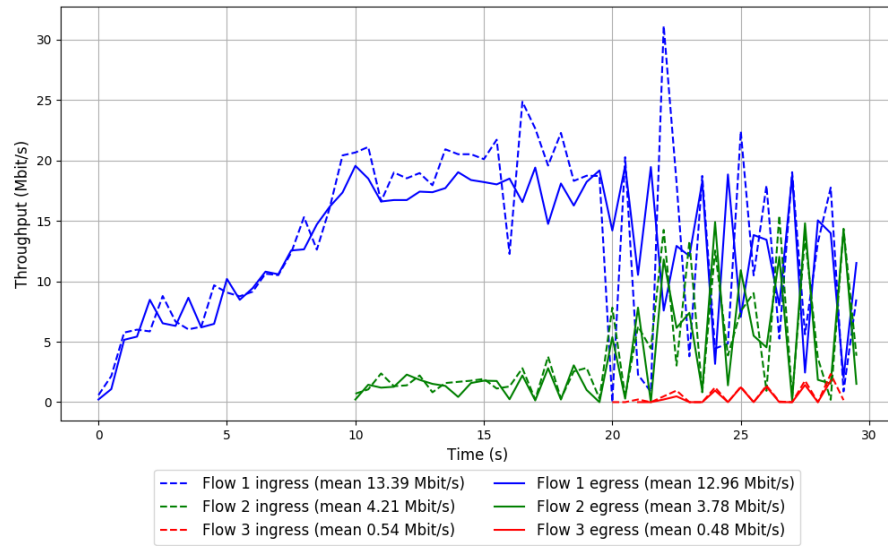


Run 2: Statistics of TCP Cubic

Start at: 2018-01-26 01:42:04  
End at: 2018-01-26 01:42:34  
Local clock offset: 0.286 ms  
Remote clock offset: -10.31 ms

# Below is generated by plot.py at 2018-01-26 02:16:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 15.59 Mbit/s  
95th percentile per-packet one-way delay: 1245.899 ms  
Loss rate: 4.87%  
-- Flow 1:  
Average throughput: 12.96 Mbit/s  
95th percentile per-packet one-way delay: 1213.237 ms  
Loss rate: 3.35%  
-- Flow 2:  
Average throughput: 3.78 Mbit/s  
95th percentile per-packet one-way delay: 1319.880 ms  
Loss rate: 10.95%  
-- Flow 3:  
Average throughput: 0.48 Mbit/s  
95th percentile per-packet one-way delay: 1243.762 ms  
Loss rate: 25.34%

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

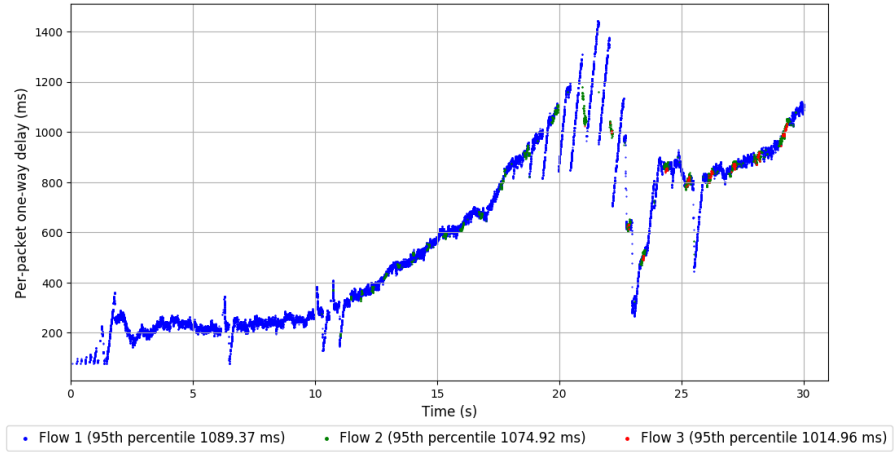
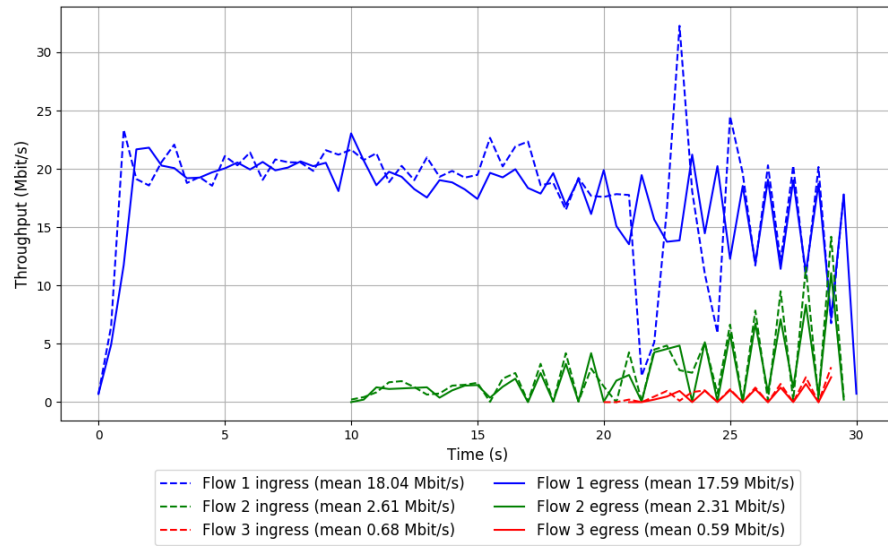


Run 3: Statistics of TCP Cubic

Start at: 2018-01-26 02:01:07  
End at: 2018-01-26 02:01:37  
Local clock offset: 0.148 ms  
Remote clock offset: -9.423 ms

# Below is generated by plot.py at 2018-01-26 02:16:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 19.24 Mbit/s  
95th percentile per-packet one-way delay: 1086.680 ms  
Loss rate: 3.83%  
-- Flow 1:  
Average throughput: 17.59 Mbit/s  
95th percentile per-packet one-way delay: 1089.367 ms  
Loss rate: 2.62%  
-- Flow 2:  
Average throughput: 2.31 Mbit/s  
95th percentile per-packet one-way delay: 1074.920 ms  
Loss rate: 14.00%  
-- Flow 3:  
Average throughput: 0.59 Mbit/s  
95th percentile per-packet one-way delay: 1014.963 ms  
Loss rate: 23.57%

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



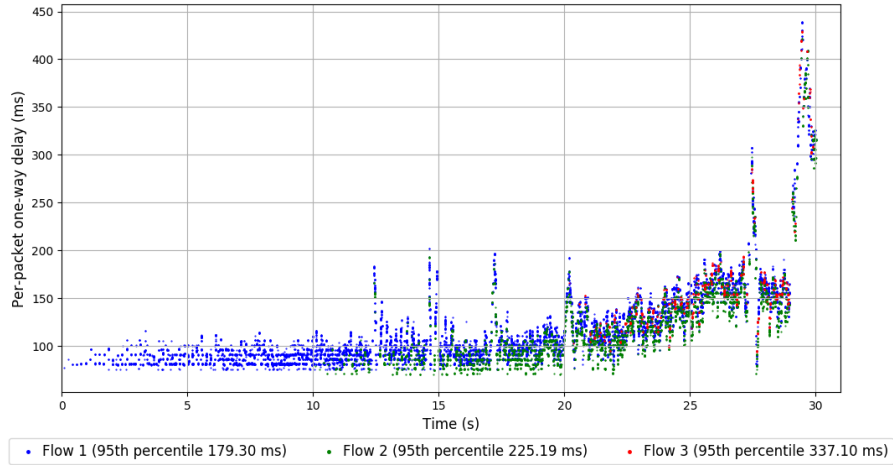
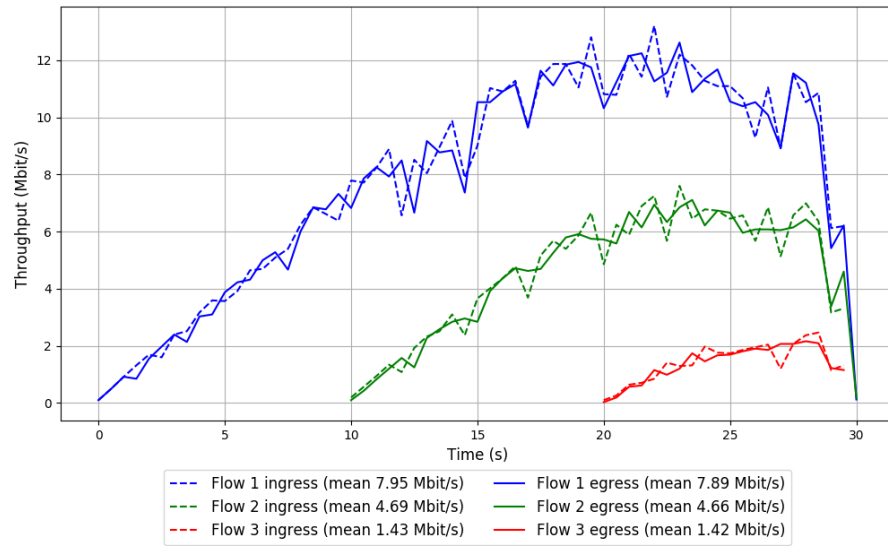
Run 1: Statistics of LEDBAT

Start at: 2018-01-26 01:26:35  
End at: 2018-01-26 01:27:06  
Local clock offset: -0.171 ms  
Remote clock offset: -10.45 ms

# Below is generated by plot.py at 2018-01-26 02:16:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 11.45 Mbit/s  
95th percentile per-packet one-way delay: 189.633 ms  
Loss rate: 0.92%  
-- Flow 1:  
Average throughput: 7.89 Mbit/s  
95th percentile per-packet one-way delay: 179.304 ms  
Loss rate: 0.89%  
-- Flow 2:  
Average throughput: 4.66 Mbit/s  
95th percentile per-packet one-way delay: 225.190 ms  
Loss rate: 0.69%  
-- Flow 3:  
Average throughput: 1.42 Mbit/s  
95th percentile per-packet one-way delay: 337.103 ms  
Loss rate: 2.97%



# Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

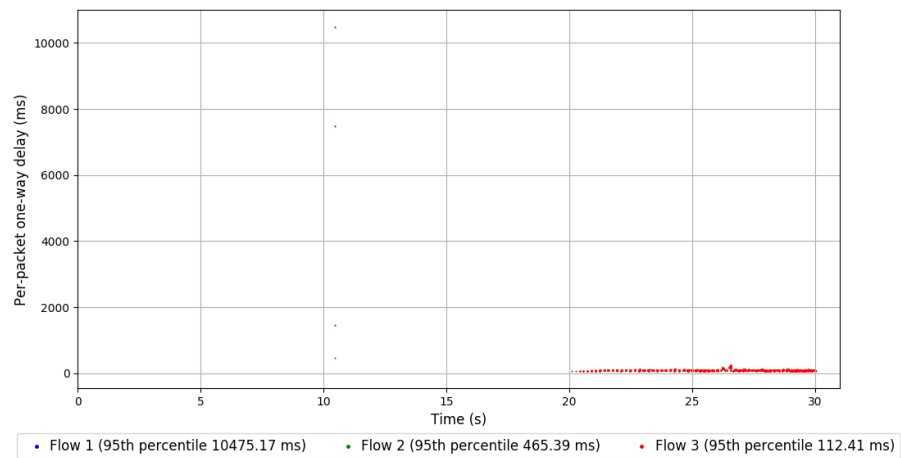
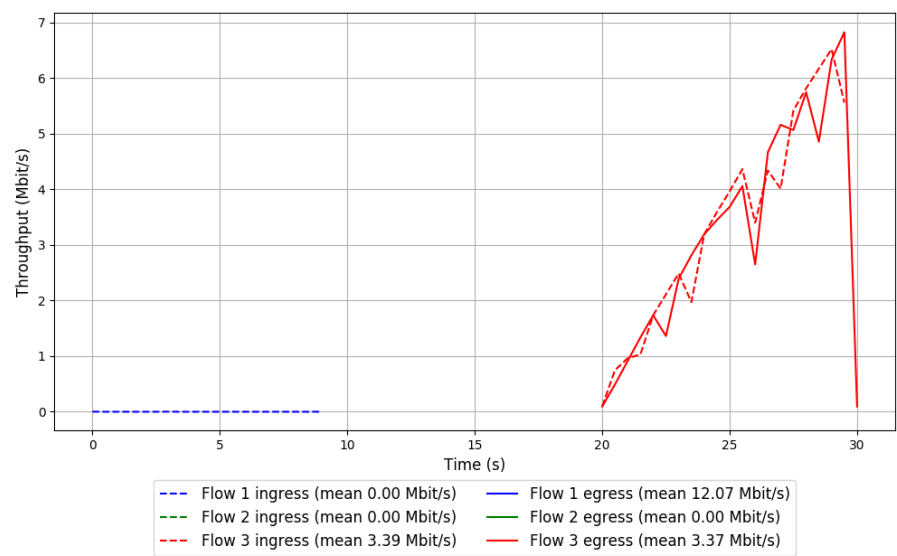
Start at: 2018-01-26 01:45:39

End at: 2018-01-26 01:46:09

Local clock offset: 0.462 ms

Remote clock offset: -10.183 ms

Run 2: Report of LEDBAT — Data Link

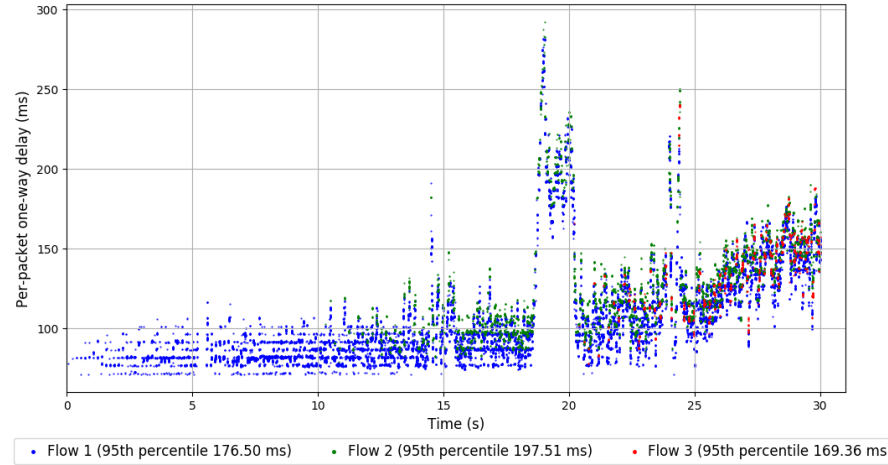
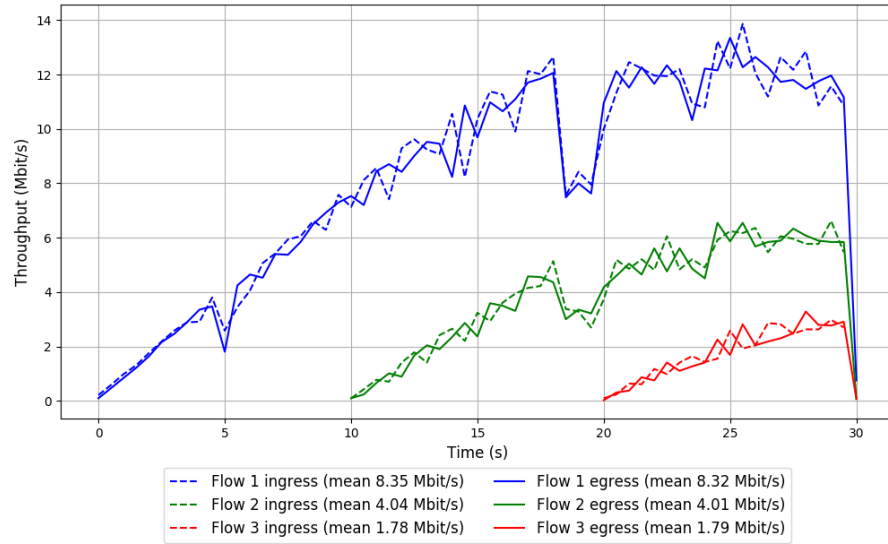


Run 3: Statistics of LEDBAT

Start at: 2018-01-26 02:04:42  
End at: 2018-01-26 02:05:12  
Local clock offset: 0.124 ms  
Remote clock offset: -9.282 ms

# Below is generated by plot.py at 2018-01-26 02:16:18  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 11.57 Mbit/s  
95th percentile per-packet one-way delay: 181.585 ms  
Loss rate: 0.56%  
-- Flow 1:  
Average throughput: 8.32 Mbit/s  
95th percentile per-packet one-way delay: 176.500 ms  
Loss rate: 0.46%  
-- Flow 2:  
Average throughput: 4.01 Mbit/s  
95th percentile per-packet one-way delay: 197.513 ms  
Loss rate: 0.80%  
-- Flow 3:  
Average throughput: 1.79 Mbit/s  
95th percentile per-packet one-way delay: 169.356 ms  
Loss rate: 0.80%

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

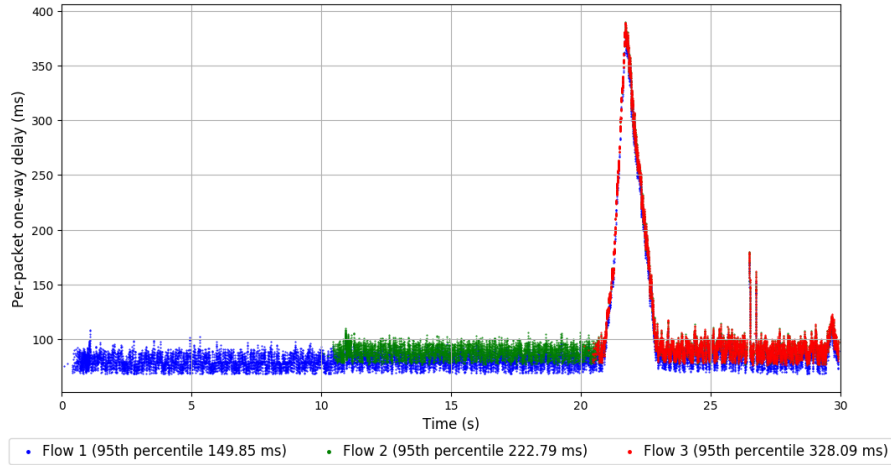
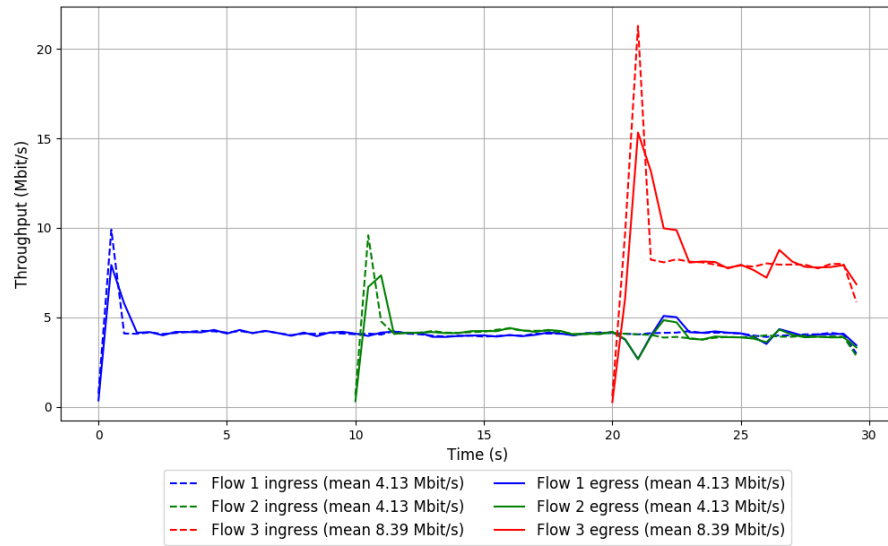


Run 1: Statistics of PCC

Start at: 2018-01-26 01:25:24  
End at: 2018-01-26 01:25:54  
Local clock offset: -0.156 ms  
Remote clock offset: -10.493 ms

# Below is generated by plot.py at 2018-01-26 02:16:25  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 9.63 Mbit/s  
95th percentile per-packet one-way delay: 260.905 ms  
Loss rate: 0.22%  
-- Flow 1:  
Average throughput: 4.13 Mbit/s  
95th percentile per-packet one-way delay: 149.852 ms  
Loss rate: 0.11%  
-- Flow 2:  
Average throughput: 4.13 Mbit/s  
95th percentile per-packet one-way delay: 222.788 ms  
Loss rate: 0.21%  
-- Flow 3:  
Average throughput: 8.39 Mbit/s  
95th percentile per-packet one-way delay: 328.092 ms  
Loss rate: 0.39%

# Run 1: Report of PCC — Data Link



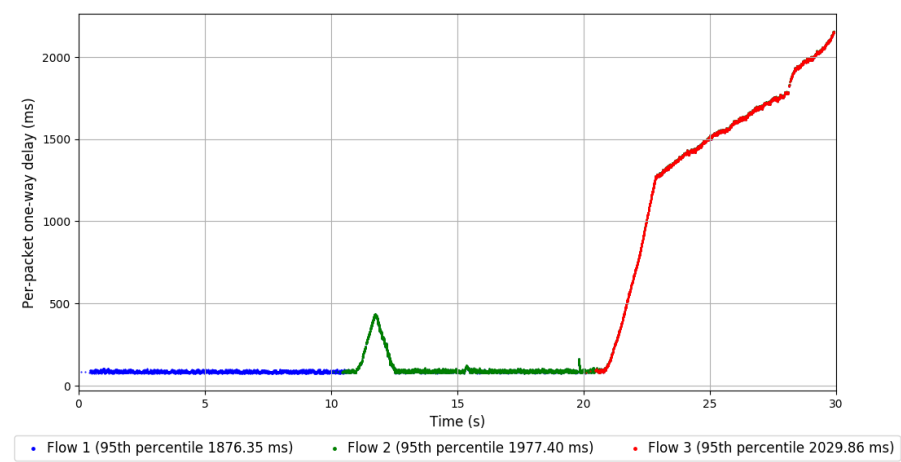
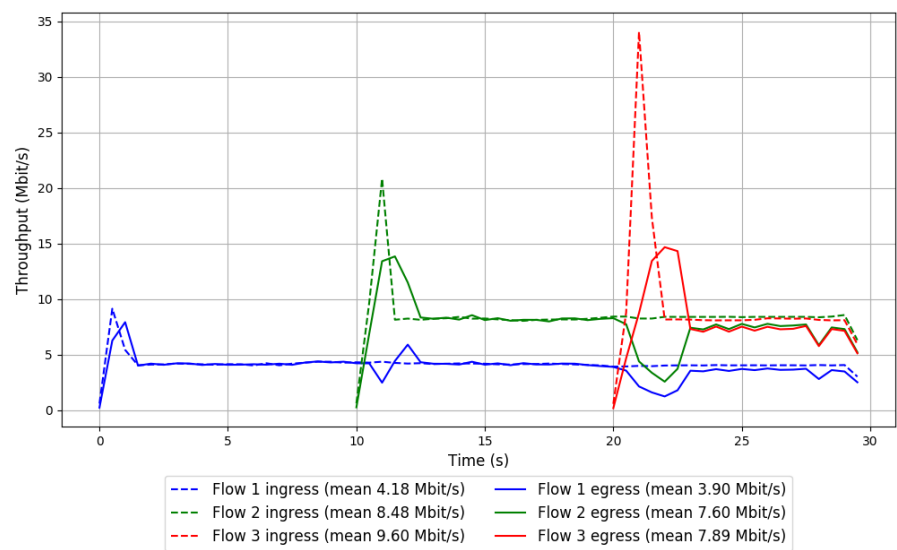
Run 2: Statistics of PCC

Start at: 2018-01-26 01:44:27  
End at: 2018-01-26 01:44:57  
Local clock offset: 0.784 ms  
Remote clock offset: -10.175 ms

# Below is generated by plot.py at 2018-01-26 02:16:31  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 11.55 Mbit/s  
95th percentile per-packet one-way delay: 1982.260 ms  
Loss rate: 11.25%  
-- Flow 1:  
Average throughput: 3.90 Mbit/s  
95th percentile per-packet one-way delay: 1876.349 ms  
Loss rate: 6.88%  
-- Flow 2:  
Average throughput: 7.60 Mbit/s  
95th percentile per-packet one-way delay: 1977.402 ms  
Loss rate: 10.63%  
-- Flow 3:  
Average throughput: 7.89 Mbit/s  
95th percentile per-packet one-way delay: 2029.861 ms  
Loss rate: 18.12%



Run 2: Report of PCC — Data Link



Run 3: Statistics of PCC

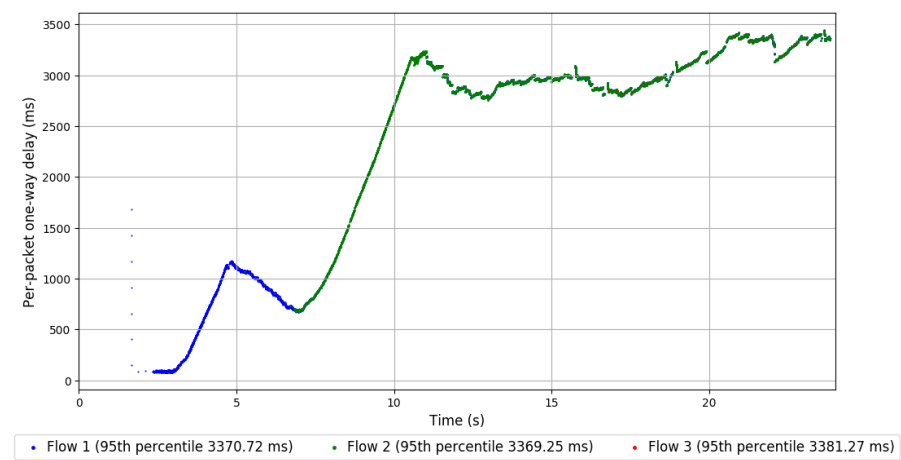
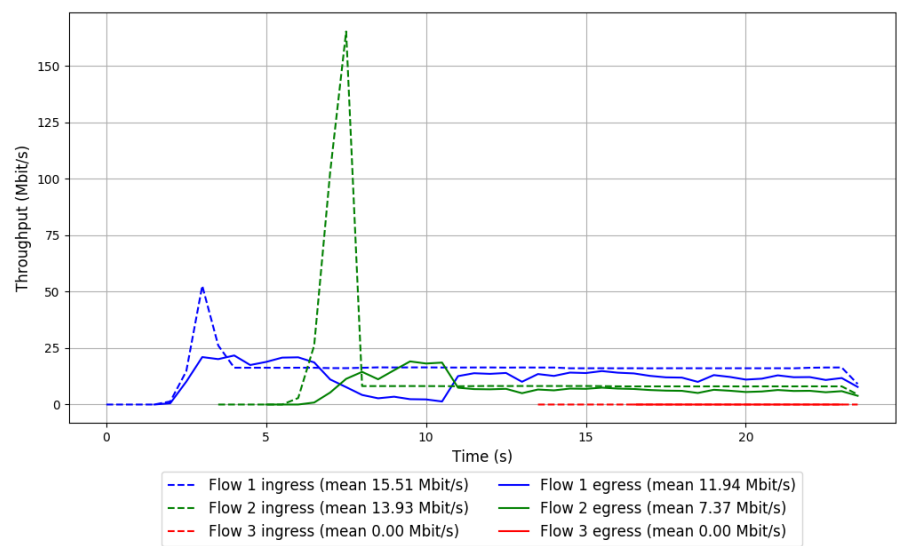
Start at: 2018-01-26 02:03:31

End at: 2018-01-26 02:04:01

Local clock offset: 0.99 ms

Remote clock offset: -9.31 ms

Run 3: Report of PCC — Data Link



Run 1: Statistics of QUIC Cubic

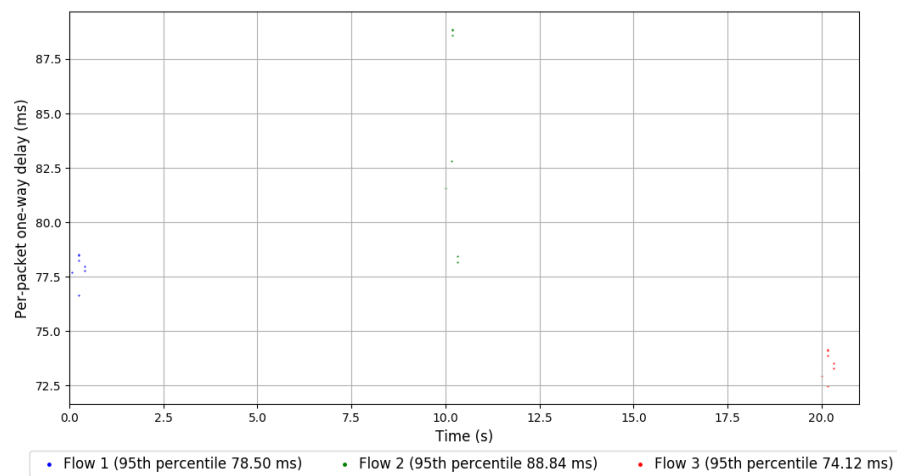
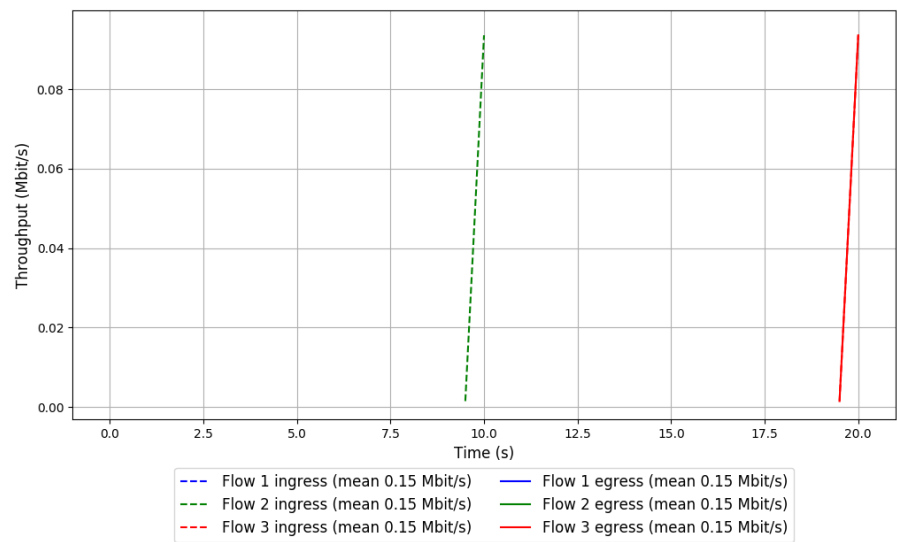
Start at: 2018-01-26 01:21:50

End at: 2018-01-26 01:22:20

Local clock offset: 0.22 ms

Remote clock offset: -10.457 ms

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

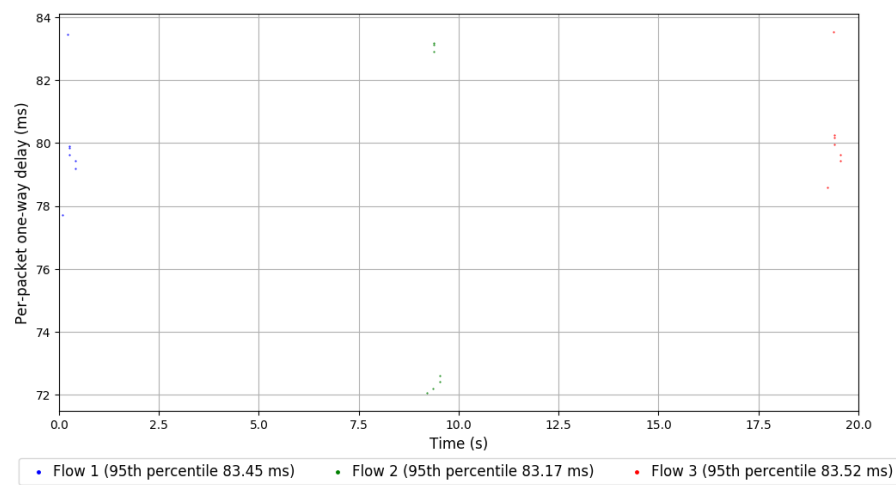
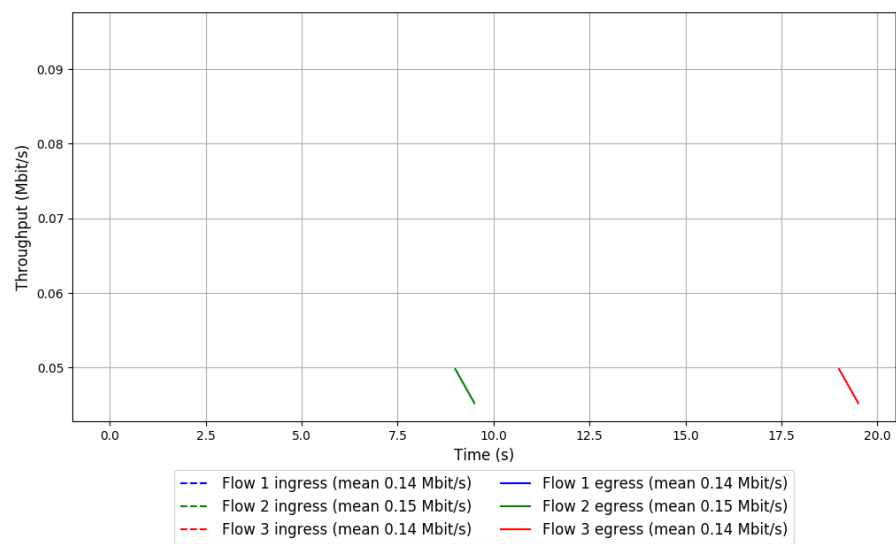
Start at: 2018-01-26 01:40:54

End at: 2018-01-26 01:41:24

Local clock offset: 0.181 ms

Remote clock offset: -10.364 ms

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2018-01-26 01:59:57

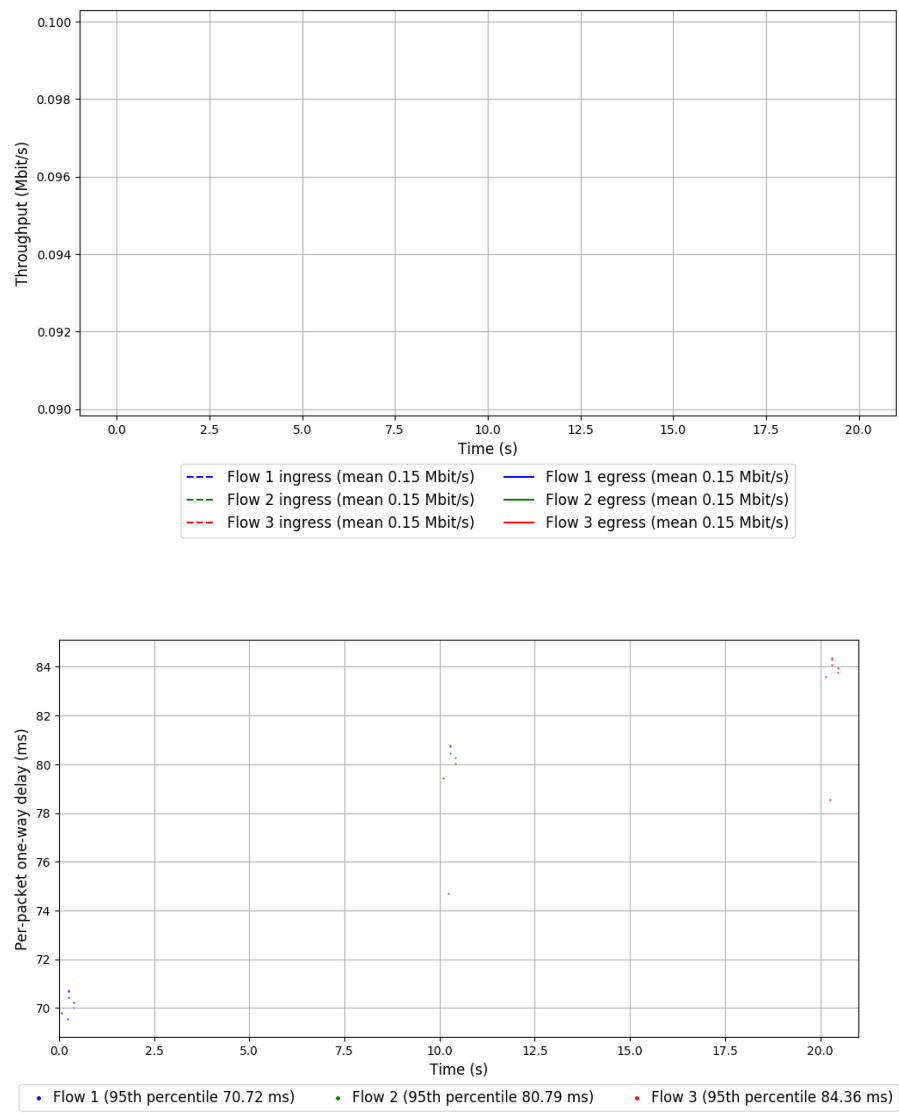
End at: 2018-01-26 02:00:27

Local clock offset: 0.288 ms

Remote clock offset: -9.477 ms



Run 3: Report of QUIC Cubic — Data Link

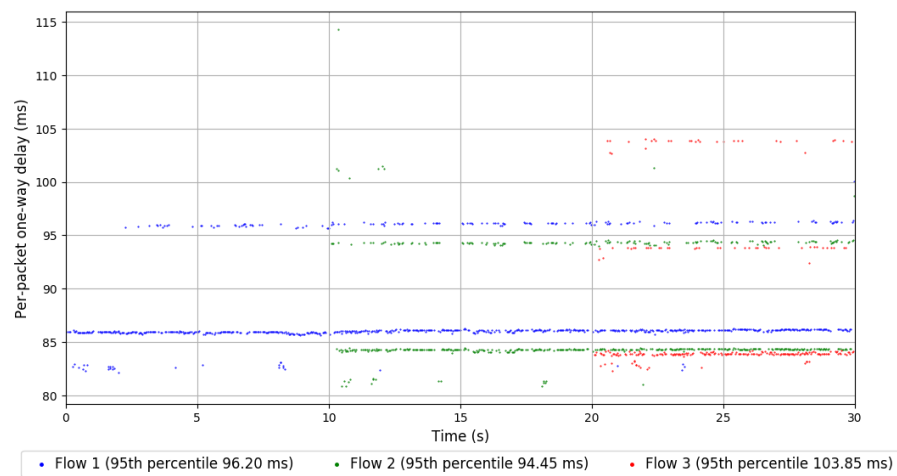
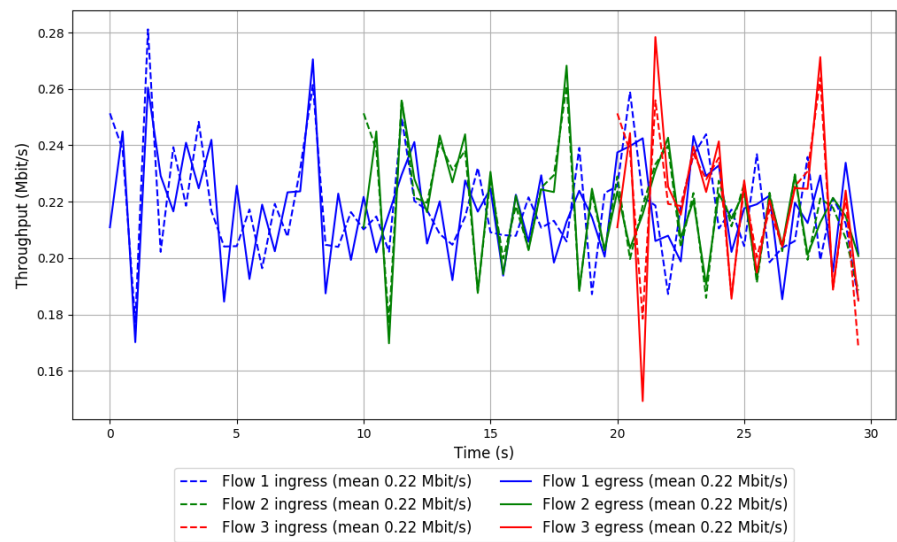


```
Run 1: Statistics of SReAM

Start at: 2018-01-26 01:19:28
End at: 2018-01-26 01:19:58
Local clock offset: 0.233 ms
Remote clock offset: -10.419 ms

# Below is generated by plot.py at 2018-01-26 02:16:36
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 96.197 ms
Loss rate: 0.19%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 96.197 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 94.451 ms
Loss rate: 0.19%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 103.846 ms
Loss rate: 0.35%
```

Run 1: Report of SReAM — Data Link

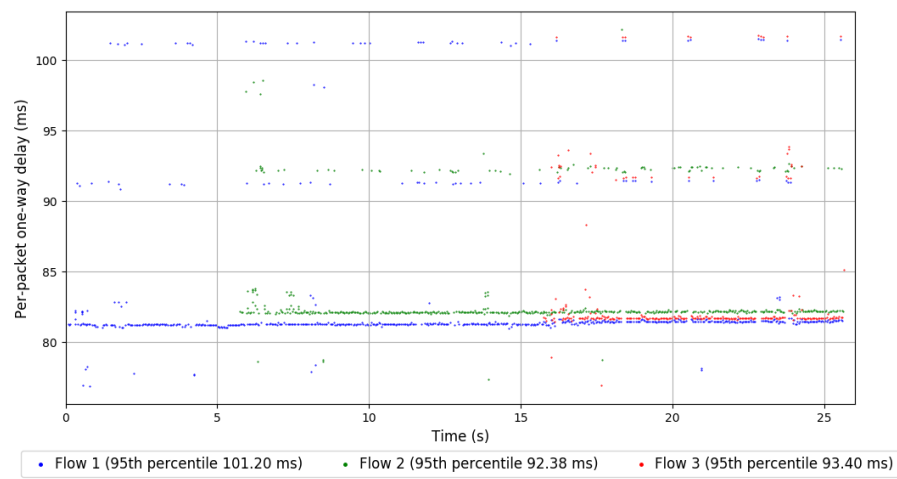
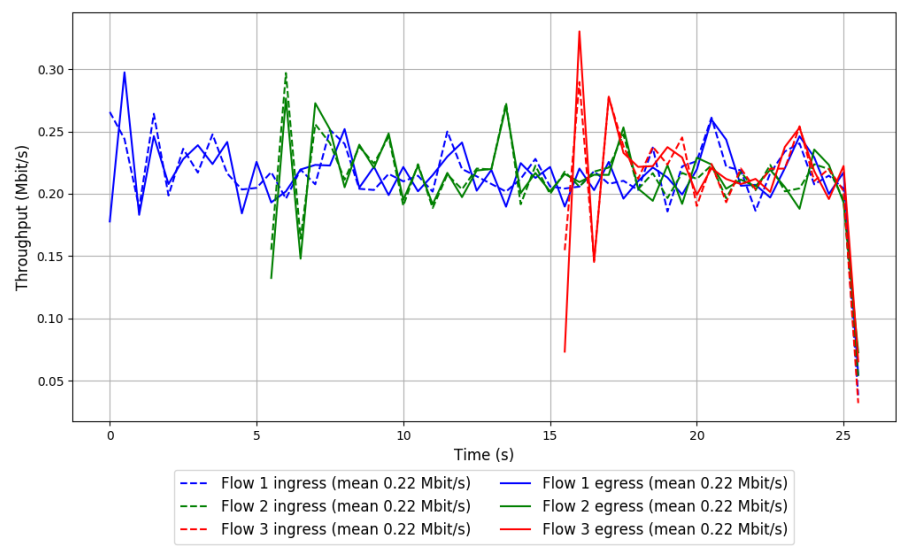


Run 2: Statistics of SReAM

Start at: 2018-01-26 01:38:31  
End at: 2018-01-26 01:39:01  
Local clock offset: 0.7 ms  
Remote clock offset: -10.486 ms

# Below is generated by plot.py at 2018-01-26 02:16:36  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.47 Mbit/s  
95th percentile per-packet one-way delay: 92.479 ms  
Loss rate: 0.15%  
-- Flow 1:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 101.205 ms  
Loss rate: 0.18%  
-- Flow 2:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 92.376 ms  
Loss rate: 0.19%  
-- Flow 3:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 93.402 ms  
Loss rate: 0.00%

Run 2: Report of SReAM — Data Link

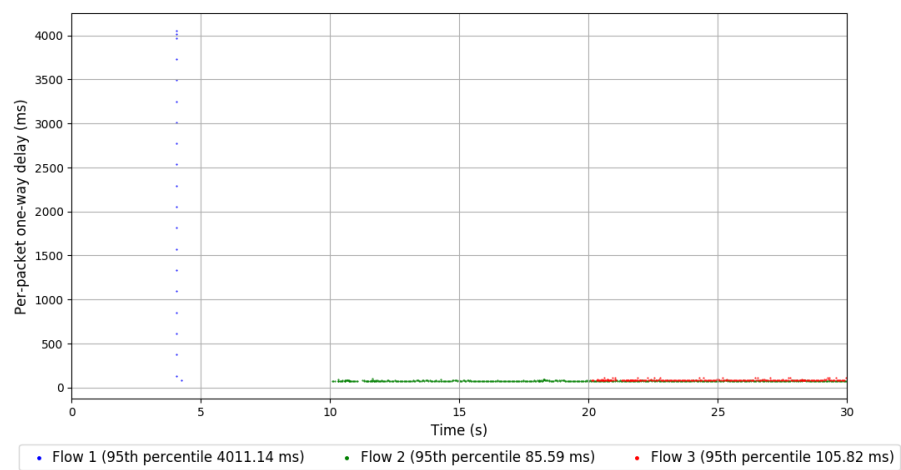
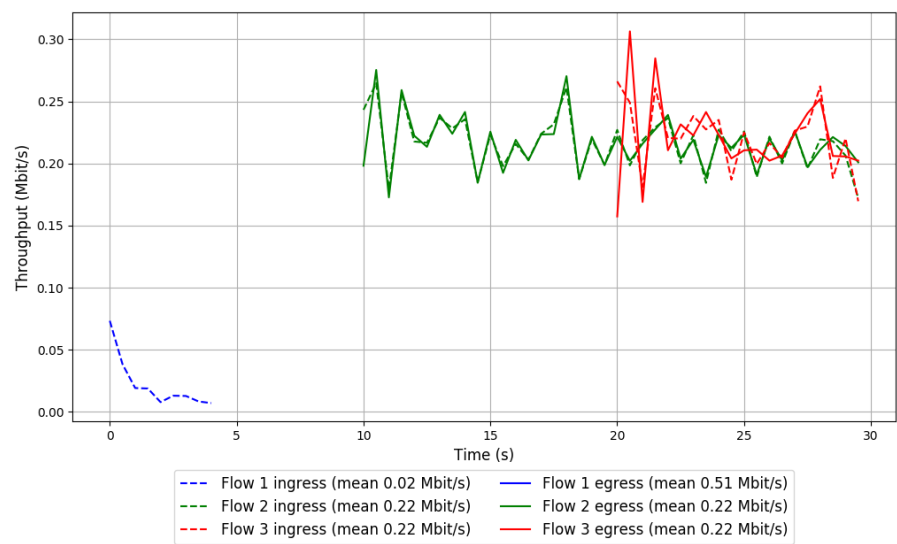


Run 3: Statistics of SReAM

Start at: 2018-01-26 01:57:34  
End at: 2018-01-26 01:58:04  
Local clock offset: 0.593 ms  
Remote clock offset: -9.521 ms

# Below is generated by plot.py at 2018-01-26 02:16:36  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.26 Mbit/s  
95th percentile per-packet one-way delay: 95.727 ms  
Loss rate: 0.12%  
-- Flow 1:  
Average throughput: 0.51 Mbit/s  
95th percentile per-packet one-way delay: 4011.139 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 85.587 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 105.818 ms  
Loss rate: 0.35%

Run 3: Report of SReAM — Data Link



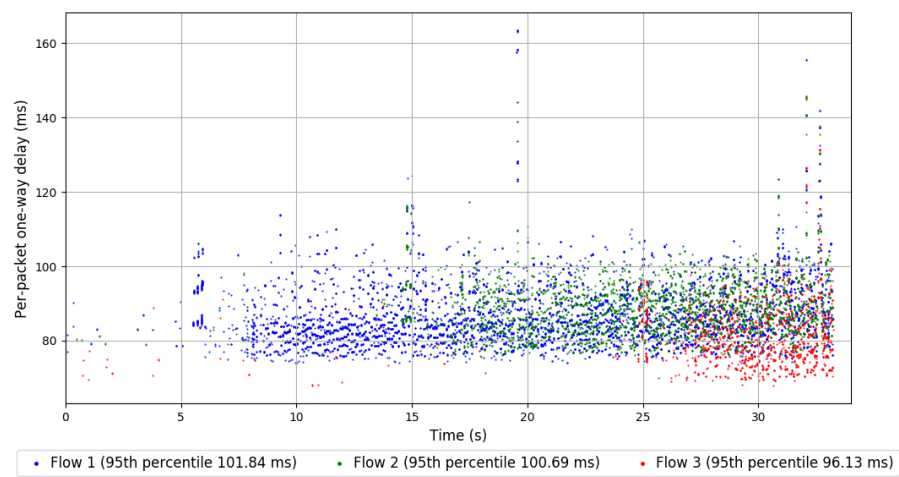
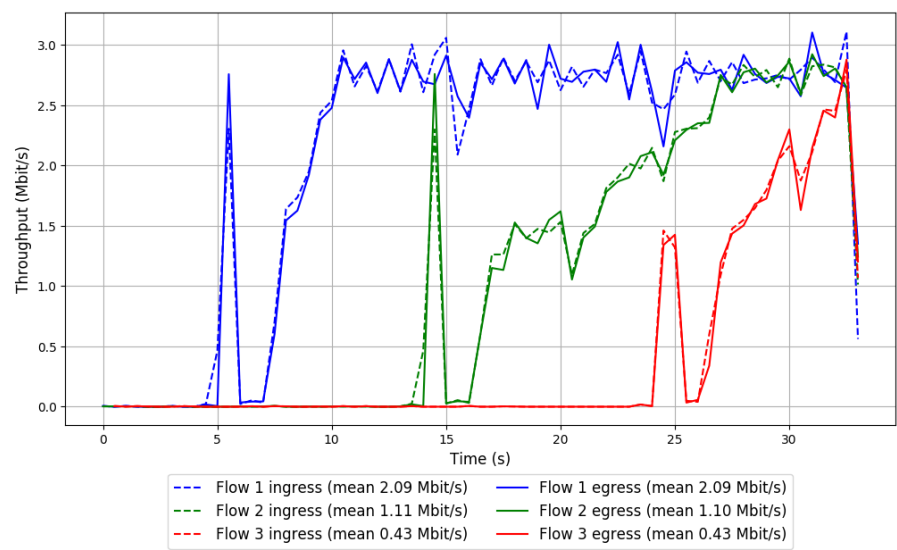
Run 1: Statistics of WebRTC media

Start at: 2018-01-26 01:28:58  
End at: 2018-01-26 01:29:28  
Local clock offset: 0.655 ms  
Remote clock offset: -10.483 ms

# Below is generated by plot.py at 2018-01-26 02:16:36  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.60 Mbit/s  
95th percentile per-packet one-way delay: 100.863 ms  
Loss rate: 0.23%  
-- Flow 1:  
Average throughput: 2.09 Mbit/s  
95th percentile per-packet one-way delay: 101.837 ms  
Loss rate: 0.10%  
-- Flow 2:  
Average throughput: 1.10 Mbit/s  
95th percentile per-packet one-way delay: 100.695 ms  
Loss rate: 0.29%  
-- Flow 3:  
Average throughput: 0.43 Mbit/s  
95th percentile per-packet one-way delay: 96.129 ms  
Loss rate: 0.72%



Run 1: Report of WebRTC media — Data Link

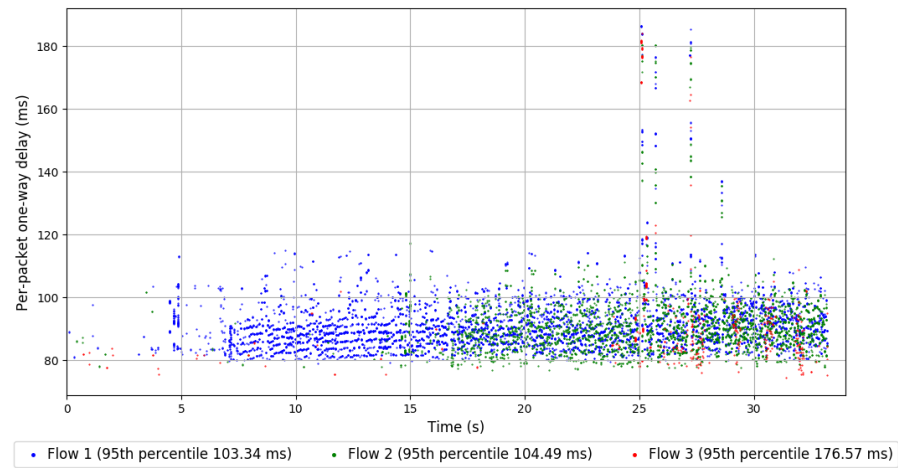
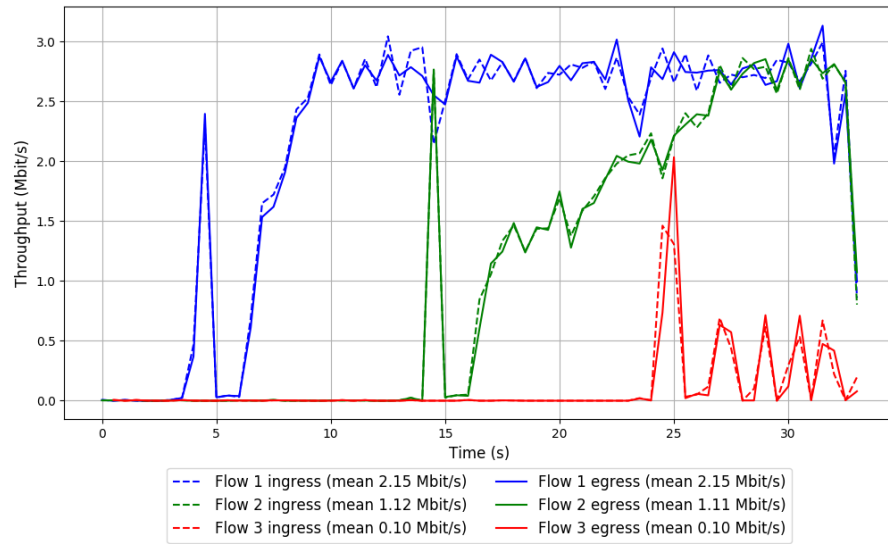


Run 2: Statistics of WebRTC media

Start at: 2018-01-26 01:48:01  
End at: 2018-01-26 01:48:31  
Local clock offset: -2.116 ms  
Remote clock offset: -10.017 ms

# Below is generated by plot.py at 2018-01-26 02:16:36  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.35 Mbit/s  
95th percentile per-packet one-way delay: 103.877 ms  
Loss rate: 0.32%  
-- Flow 1:  
Average throughput: 2.15 Mbit/s  
95th percentile per-packet one-way delay: 103.337 ms  
Loss rate: 0.31%  
-- Flow 2:  
Average throughput: 1.11 Mbit/s  
95th percentile per-packet one-way delay: 104.492 ms  
Loss rate: 0.22%  
-- Flow 3:  
Average throughput: 0.10 Mbit/s  
95th percentile per-packet one-way delay: 176.566 ms  
Loss rate: 1.73%

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

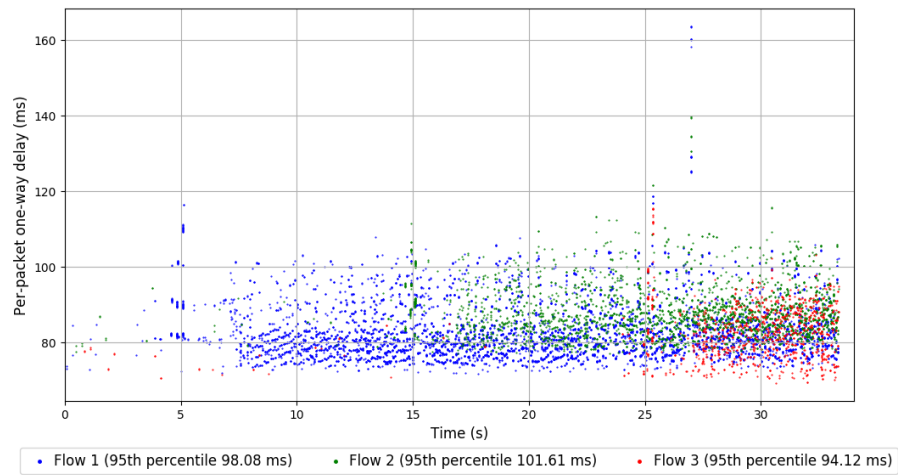
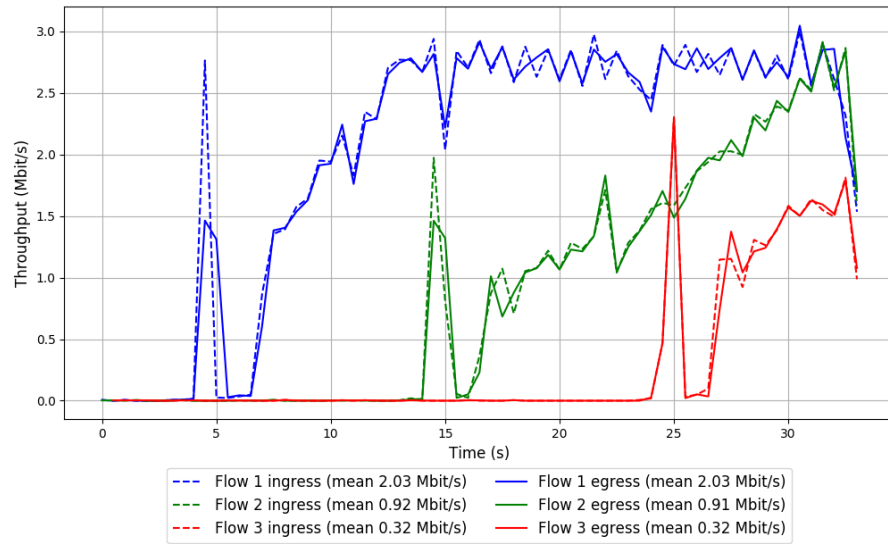


Run 3: Statistics of WebRTC media

Start at: 2018-01-26 02:07:06  
End at: 2018-01-26 02:07:36  
Local clock offset: 0.78 ms  
Remote clock offset: -9.219 ms

# Below is generated by plot.py at 2018-01-26 02:16:36  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 3.24 Mbit/s  
95th percentile per-packet one-way delay: 99.039 ms  
Loss rate: 0.30%  
-- Flow 1:  
Average throughput: 2.03 Mbit/s  
95th percentile per-packet one-way delay: 98.078 ms  
Loss rate: 0.17%  
-- Flow 2:  
Average throughput: 0.91 Mbit/s  
95th percentile per-packet one-way delay: 101.605 ms  
Loss rate: 0.51%  
-- Flow 3:  
Average throughput: 0.32 Mbit/s  
95th percentile per-packet one-way delay: 94.122 ms  
Loss rate: 0.62%

### Run 3: Report of WebRTC media — Data Link

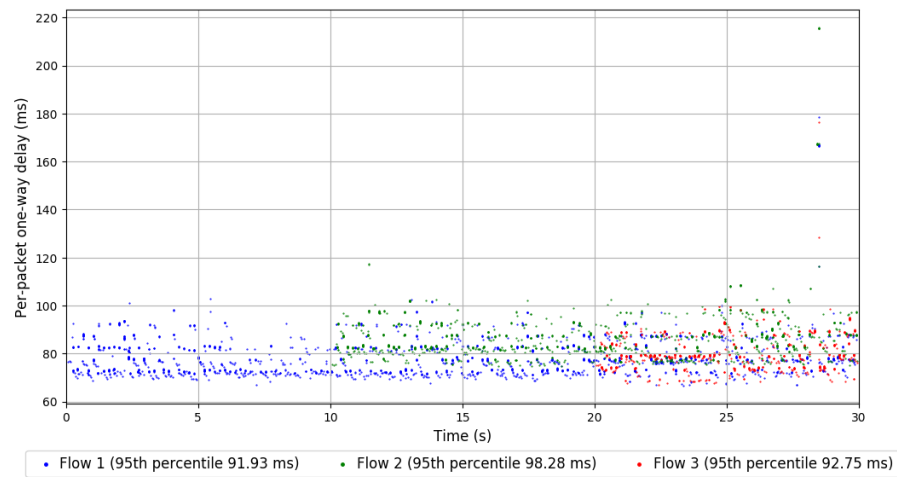
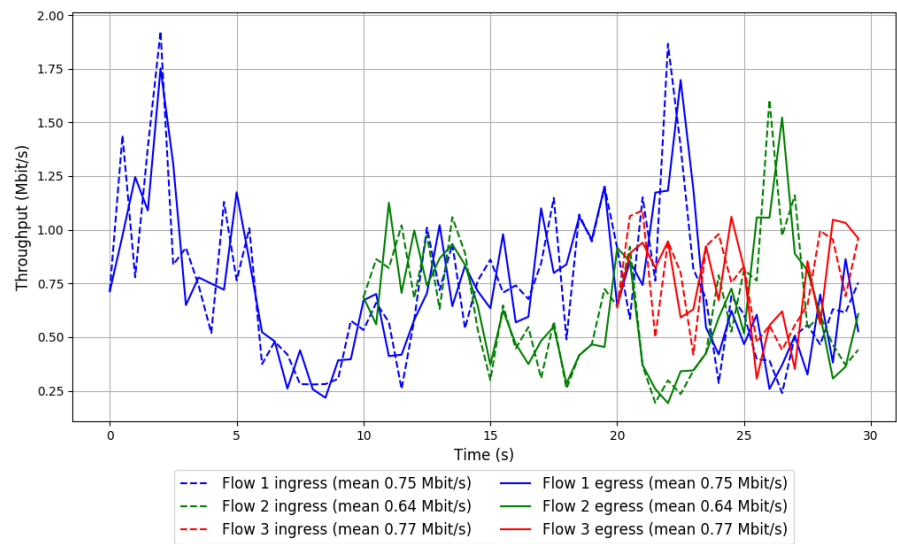


Run 1: Statistics of Sprout

Start at: 2018-01-26 01:24:13  
End at: 2018-01-26 01:24:43  
Local clock offset: 0.416 ms  
Remote clock offset: -10.486 ms

# Below is generated by plot.py at 2018-01-26 02:16:36  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.42 Mbit/s  
95th percentile per-packet one-way delay: 95.201 ms  
Loss rate: 0.27%  
-- Flow 1:  
Average throughput: 0.75 Mbit/s  
95th percentile per-packet one-way delay: 91.934 ms  
Loss rate: 0.51%  
-- Flow 2:  
Average throughput: 0.64 Mbit/s  
95th percentile per-packet one-way delay: 98.281 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.77 Mbit/s  
95th percentile per-packet one-way delay: 92.753 ms  
Loss rate: 0.01%

Run 1: Report of Sprout — Data Link



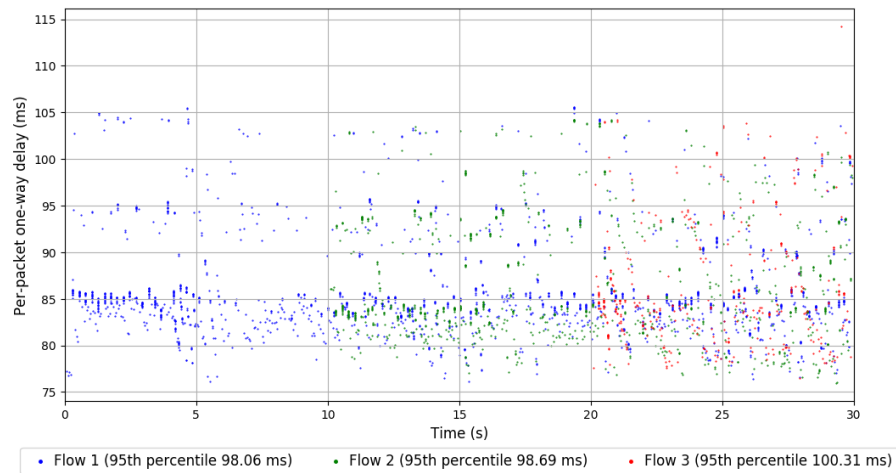
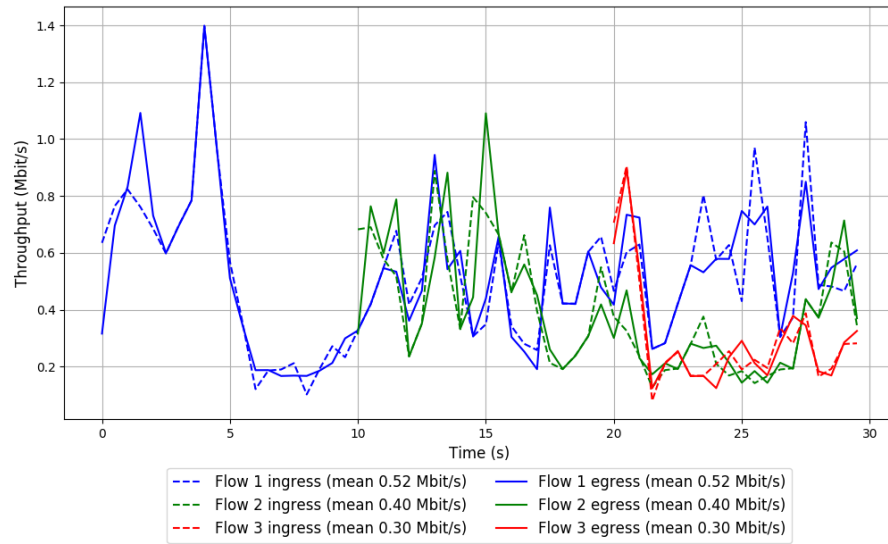
## Run 2: Statistics of Sprout

Start at: 2018-01-26 01:43:16  
End at: 2018-01-26 01:43:46  
Local clock offset: 0.299 ms  
Remote clock offset: -10.252 ms

```
# Below is generated by plot.py at 2018-01-26 02:16:36
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.89 Mbit/s
95th percentile per-packet one-way delay: 98.737 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 98.058 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 98.689 ms
Loss rate: 0.15%
-- Flow 3:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 100.306 ms
Loss rate: 0.03%
```



## Run 2: Report of Sprout — Data Link

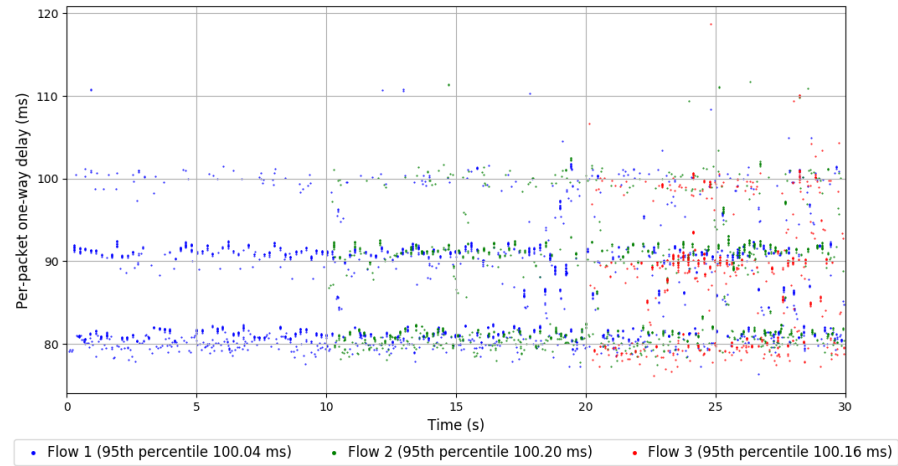
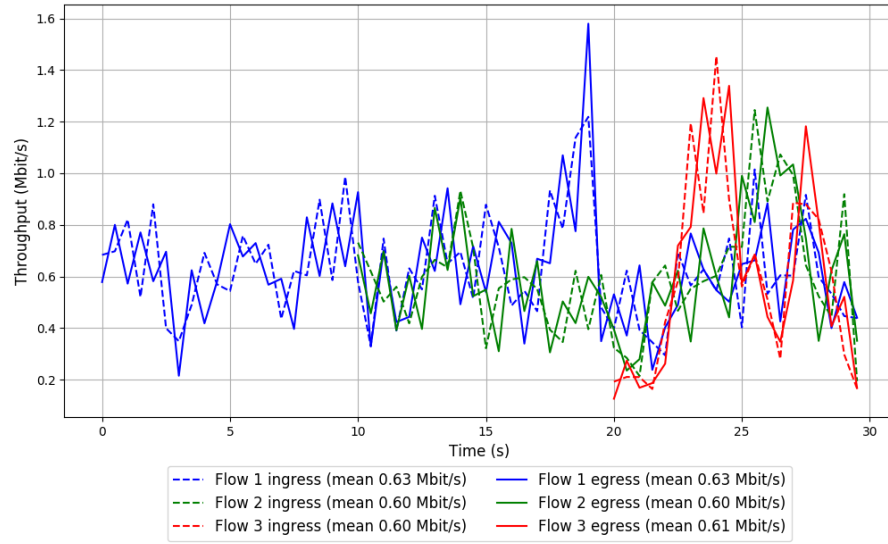


### Run 3: Statistics of Sprout

Start at: 2018-01-26 02:02:20  
End at: 2018-01-26 02:02:50  
Local clock offset: 0.236 ms  
Remote clock offset: -9.376 ms

```
# Below is generated by plot.py at 2018-01-26 02:16:36
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 100.118 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 100.039 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 100.200 ms
Loss rate: 0.01%
-- Flow 3:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 100.160 ms
Loss rate: 0.01%
```

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

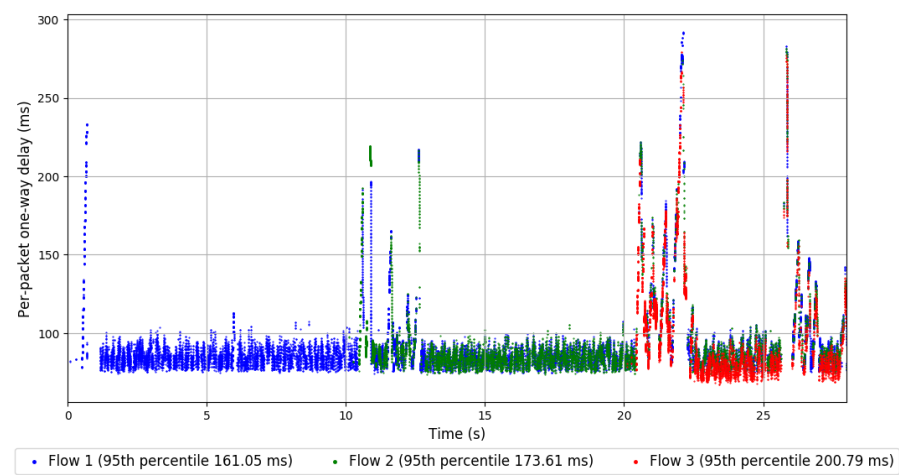
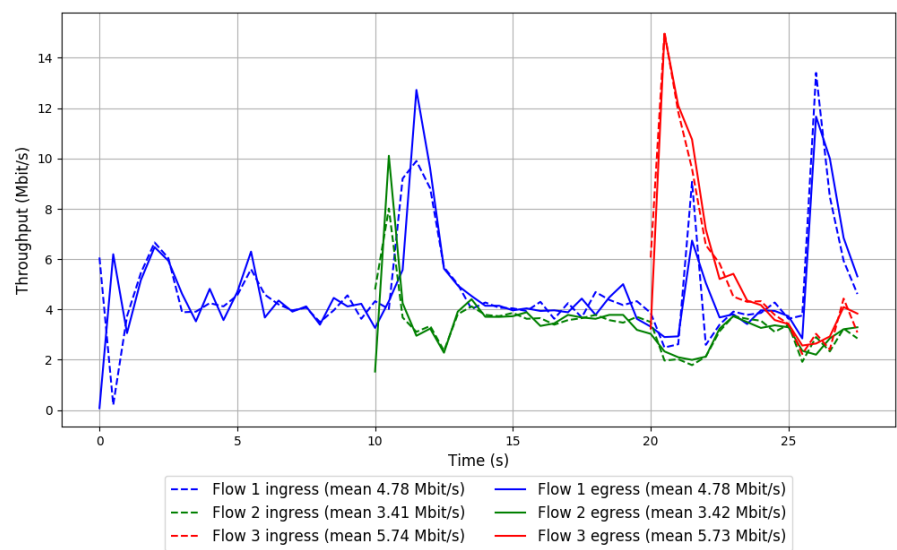


Run 1: Statistics of TaoVA-100x

Start at: 2018-01-26 01:20:39  
End at: 2018-01-26 01:21:09  
Local clock offset: 0.546 ms  
Remote clock offset: -10.45 ms

# Below is generated by plot.py at 2018-01-26 02:16:41  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 8.59 Mbit/s  
95th percentile per-packet one-way delay: 174.827 ms  
Loss rate: 0.10%  
-- Flow 1:  
Average throughput: 4.78 Mbit/s  
95th percentile per-packet one-way delay: 161.050 ms  
Loss rate: 0.17%  
-- Flow 2:  
Average throughput: 3.42 Mbit/s  
95th percentile per-packet one-way delay: 173.606 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 5.73 Mbit/s  
95th percentile per-packet one-way delay: 200.789 ms  
Loss rate: 0.00%

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

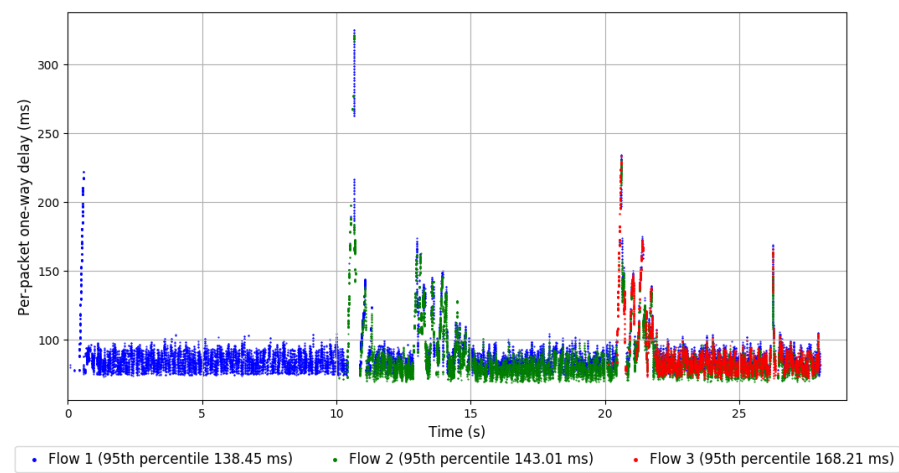
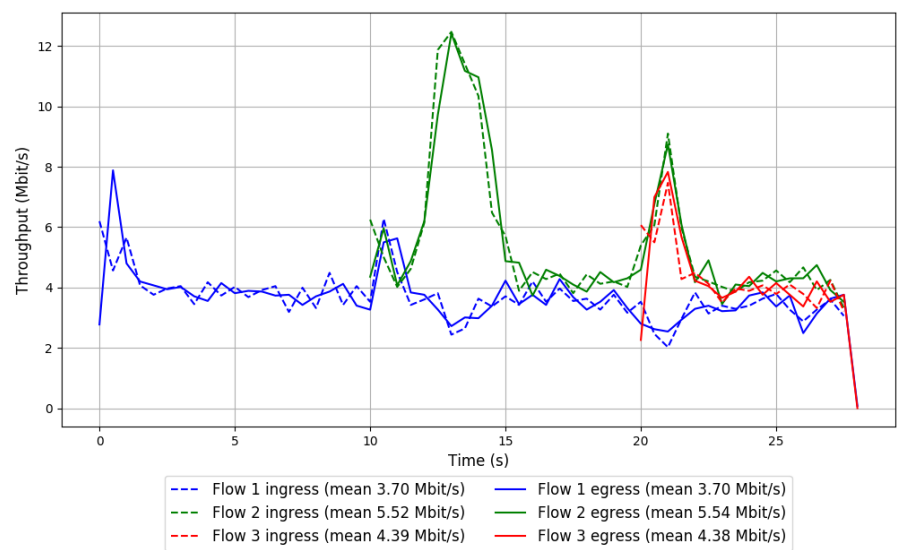


Run 2: Statistics of TaoVA-100x

Start at: 2018-01-26 01:39:42  
End at: 2018-01-26 01:40:12  
Local clock offset: 0.684 ms  
Remote clock offset: -10.379 ms

# Below is generated by plot.py at 2018-01-26 02:16:42  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 8.48 Mbit/s  
95th percentile per-packet one-way delay: 146.162 ms  
Loss rate: 0.14%  
-- Flow 1:  
Average throughput: 3.70 Mbit/s  
95th percentile per-packet one-way delay: 138.446 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 5.54 Mbit/s  
95th percentile per-packet one-way delay: 143.009 ms  
Loss rate: 0.17%  
-- Flow 3:  
Average throughput: 4.38 Mbit/s  
95th percentile per-packet one-way delay: 168.214 ms  
Loss rate: 0.48%

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



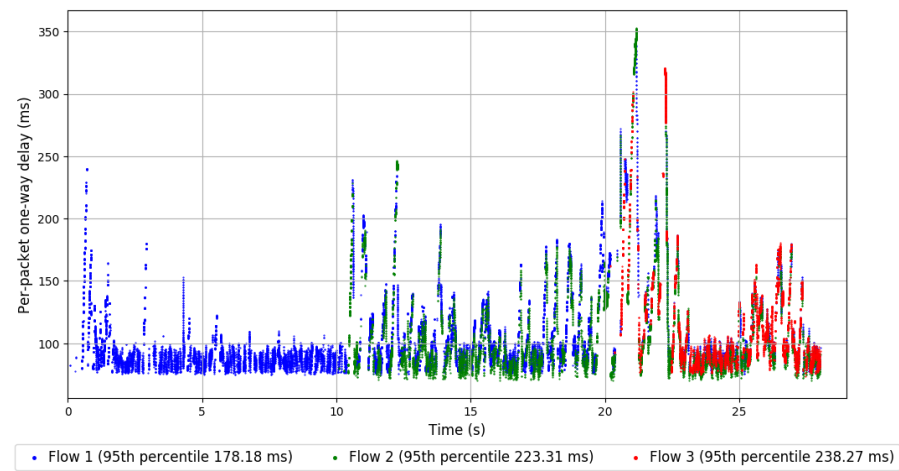
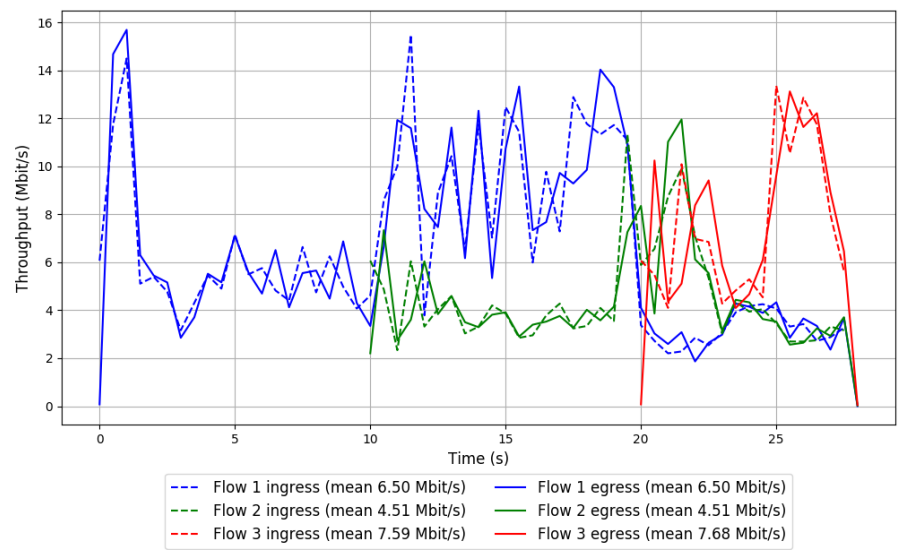
Run 3: Statistics of TaoVA-100x

Start at: 2018-01-26 01:58:45  
End at: 2018-01-26 01:59:15  
Local clock offset: 0.851 ms  
Remote clock offset: -9.504 ms

# Below is generated by plot.py at 2018-01-26 02:16:52  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 11.54 Mbit/s  
95th percentile per-packet one-way delay: 197.094 ms  
Loss rate: 0.17%  
-- Flow 1:  
Average throughput: 6.50 Mbit/s  
95th percentile per-packet one-way delay: 178.175 ms  
Loss rate: 0.13%  
-- Flow 2:  
Average throughput: 4.51 Mbit/s  
95th percentile per-packet one-way delay: 223.310 ms  
Loss rate: 0.21%  
-- Flow 3:  
Average throughput: 7.68 Mbit/s  
95th percentile per-packet one-way delay: 238.274 ms  
Loss rate: 0.24%



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

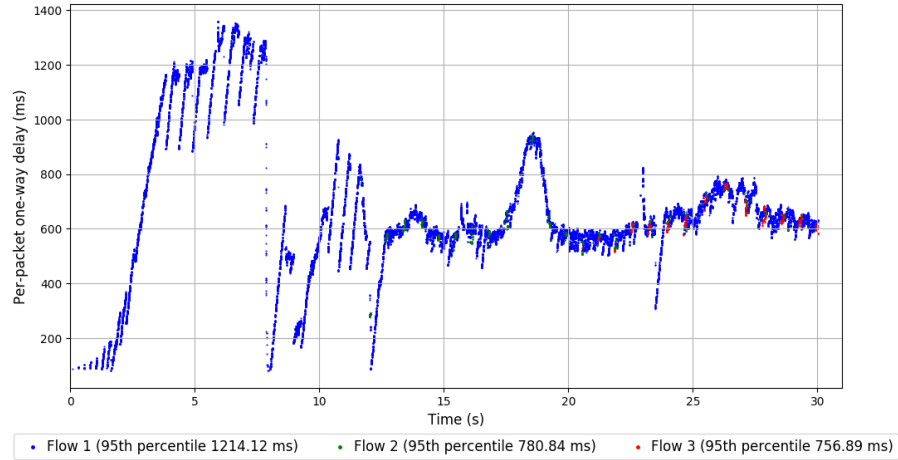
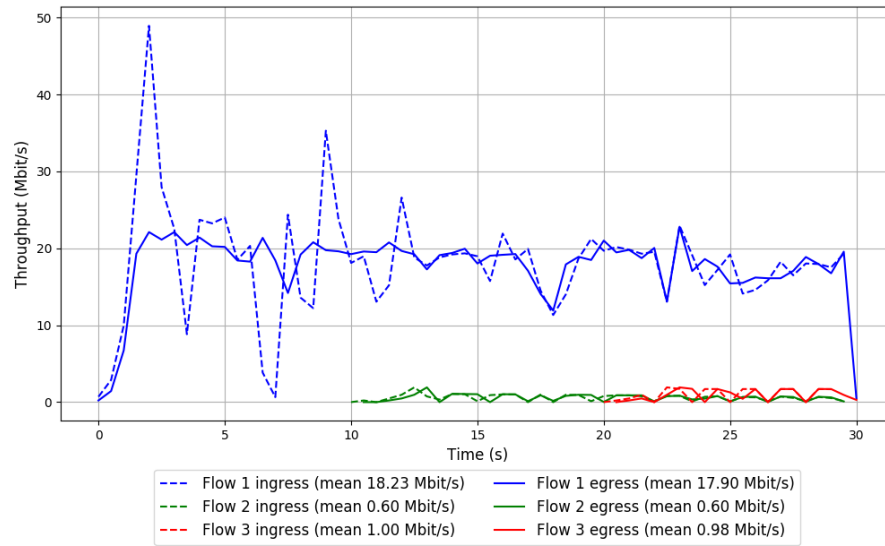


Run 1: Statistics of TCP Vegas

Start at: 2018-01-26 01:36:07  
End at: 2018-01-26 01:36:37  
Local clock offset: 0.331 ms  
Remote clock offset: -10.516 ms

# Below is generated by plot.py at 2018-01-26 02:16:52  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 18.59 Mbit/s  
95th percentile per-packet one-way delay: 1209.876 ms  
Loss rate: 2.01%  
-- Flow 1:  
Average throughput: 17.90 Mbit/s  
95th percentile per-packet one-way delay: 1214.121 ms  
Loss rate: 1.99%  
-- Flow 2:  
Average throughput: 0.60 Mbit/s  
95th percentile per-packet one-way delay: 780.837 ms  
Loss rate: 2.54%  
-- Flow 3:  
Average throughput: 0.98 Mbit/s  
95th percentile per-packet one-way delay: 756.886 ms  
Loss rate: 2.41%

# Run 1: Report of TCP Vegas — Data Link

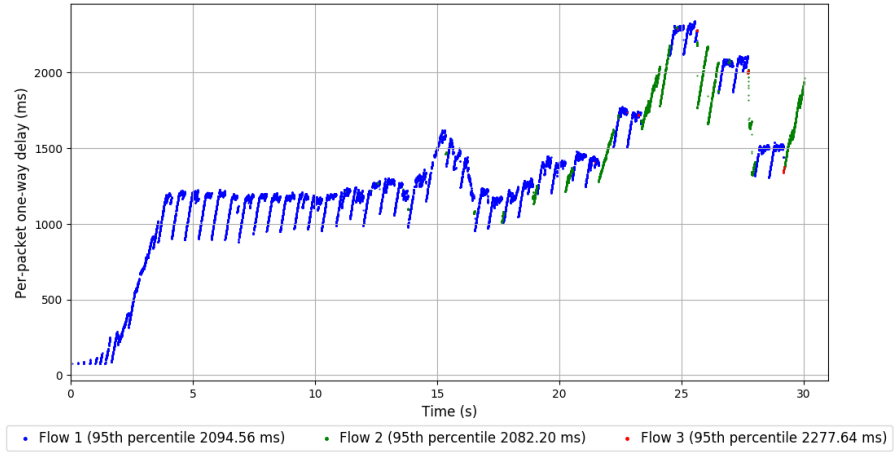
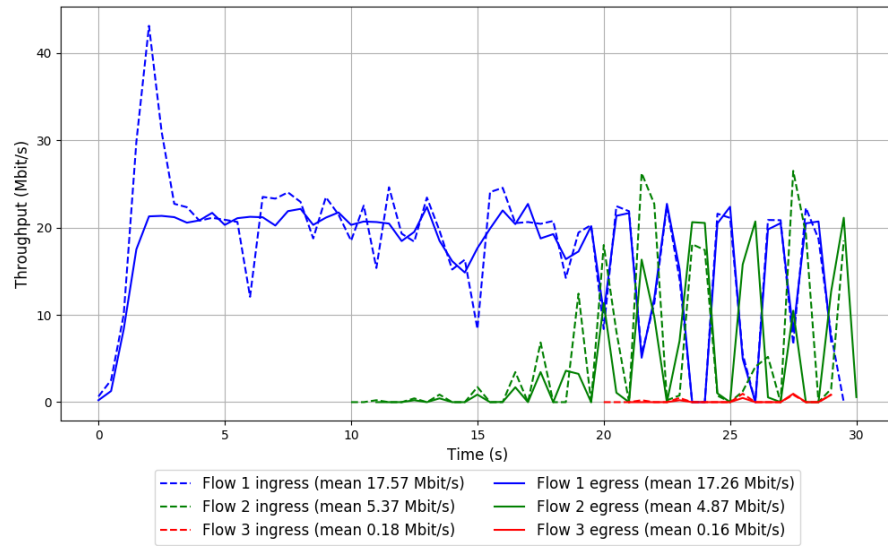


Run 2: Statistics of TCP Vegas

Start at: 2018-01-26 01:55:10  
End at: 2018-01-26 01:55:40  
Local clock offset: 0.644 ms  
Remote clock offset: -9.729 ms

# Below is generated by plot.py at 2018-01-26 02:16:55  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 19.86 Mbit/s  
95th percentile per-packet one-way delay: 2092.916 ms  
Loss rate: 6.37%  
-- Flow 1:  
Average throughput: 17.26 Mbit/s  
95th percentile per-packet one-way delay: 2094.563 ms  
Loss rate: 4.62%  
-- Flow 2:  
Average throughput: 4.87 Mbit/s  
95th percentile per-packet one-way delay: 2082.198 ms  
Loss rate: 14.66%  
-- Flow 3:  
Average throughput: 0.16 Mbit/s  
95th percentile per-packet one-way delay: 2277.636 ms  
Loss rate: 25.69%

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

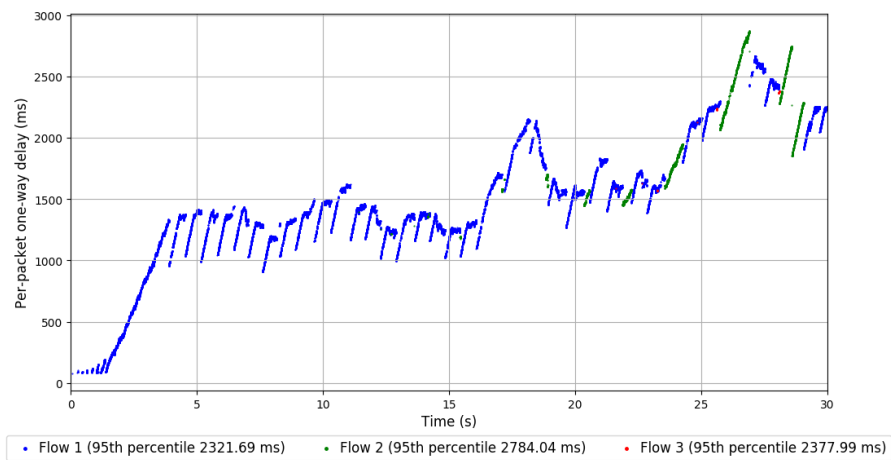
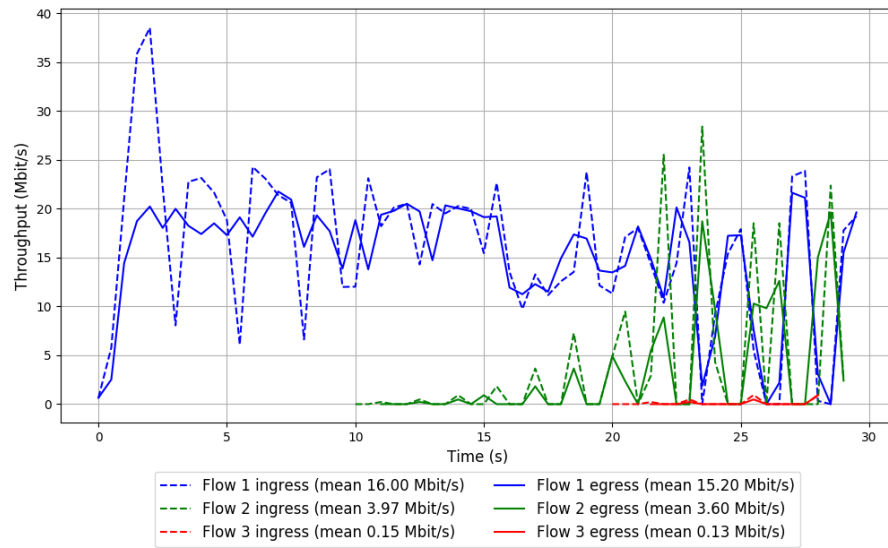


Run 3: Statistics of TCP Vegas

Start at: 2018-01-26 02:14:15  
End at: 2018-01-26 02:14:45  
Local clock offset: 0.993 ms  
Remote clock offset: -8.871 ms

# Below is generated by plot.py at 2018-01-26 02:16:55  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 17.35 Mbit/s  
95th percentile per-packet one-way delay: 2484.187 ms  
Loss rate: 6.76%  
-- Flow 1:  
Average throughput: 15.20 Mbit/s  
95th percentile per-packet one-way delay: 2321.689 ms  
Loss rate: 5.15%  
-- Flow 2:  
Average throughput: 3.60 Mbit/s  
95th percentile per-packet one-way delay: 2784.038 ms  
Loss rate: 16.43%  
-- Flow 3:  
Average throughput: 0.13 Mbit/s  
95th percentile per-packet one-way delay: 2377.990 ms  
Loss rate: 34.51%

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



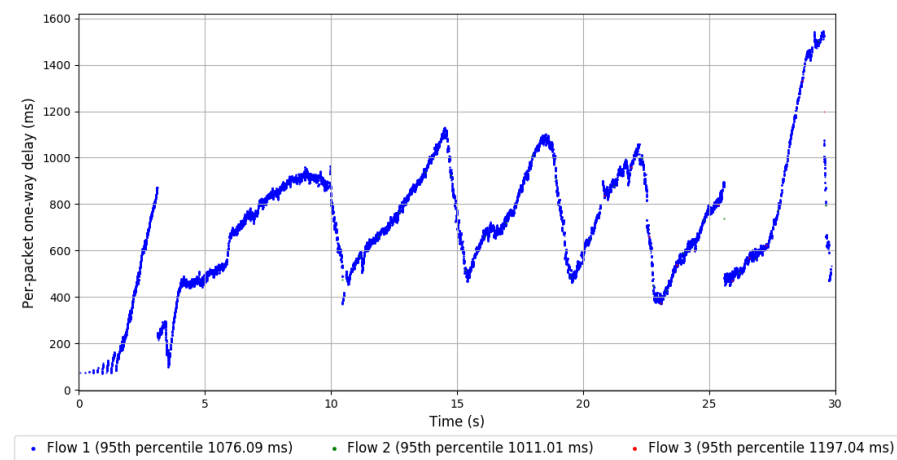
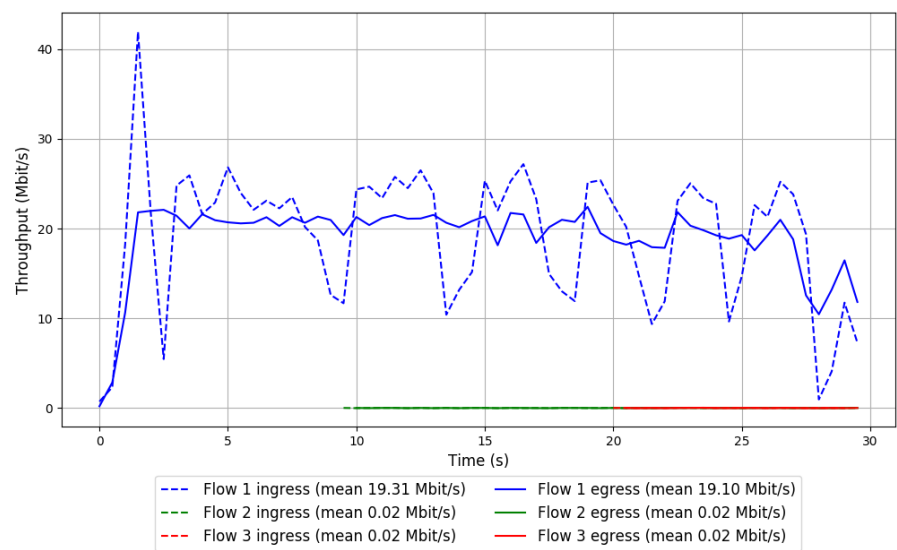
Run 1: Statistics of Verus

Start at: 2018-01-26 01:33:43  
End at: 2018-01-26 01:34:13  
Local clock offset: 0.525 ms  
Remote clock offset: -10.486 ms

# Below is generated by plot.py at 2018-01-26 02:16:55  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 19.12 Mbit/s  
95th percentile per-packet one-way delay: 1076.089 ms  
Loss rate: 1.11%  
-- Flow 1:  
Average throughput: 19.10 Mbit/s  
95th percentile per-packet one-way delay: 1076.088 ms  
Loss rate: 1.10%  
-- Flow 2:  
Average throughput: 0.02 Mbit/s  
95th percentile per-packet one-way delay: 1011.007 ms  
Loss rate: 3.85%  
-- Flow 3:  
Average throughput: 0.02 Mbit/s  
95th percentile per-packet one-way delay: 1197.042 ms  
Loss rate: 7.14%



Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2018-01-26 01:52:45

End at: 2018-01-26 01:53:16

Local clock offset: 0.212 ms

Remote clock offset: -9.79 ms

# Below is generated by plot.py at 2018-01-26 02:17:01

# Datalink statistics

-- Total of 3 flows:

Average throughput: 18.58 Mbit/s

95th percentile per-packet one-way delay: 1018.208 ms

Loss rate: 1.57%

-- Flow 1:

Average throughput: 17.48 Mbit/s

95th percentile per-packet one-way delay: 1020.114 ms

Loss rate: 0.29%

-- Flow 2:

Average throughput: 0.80 Mbit/s

95th percentile per-packet one-way delay: 847.366 ms

Loss rate: 19.47%

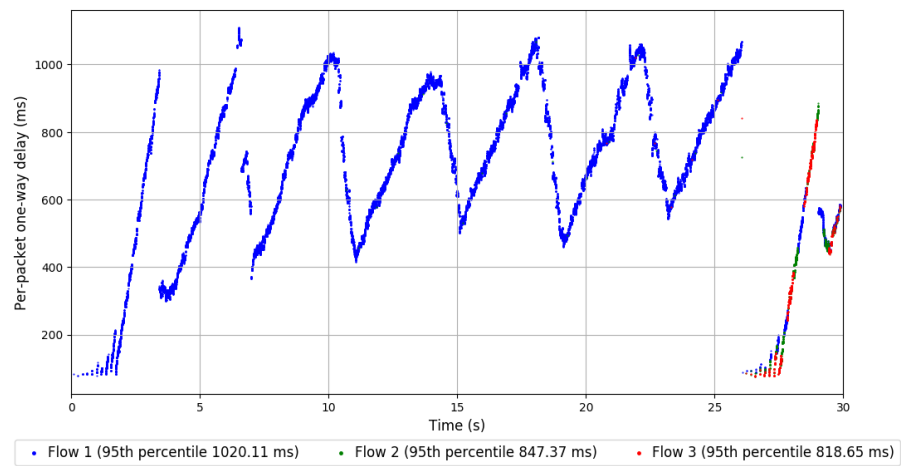
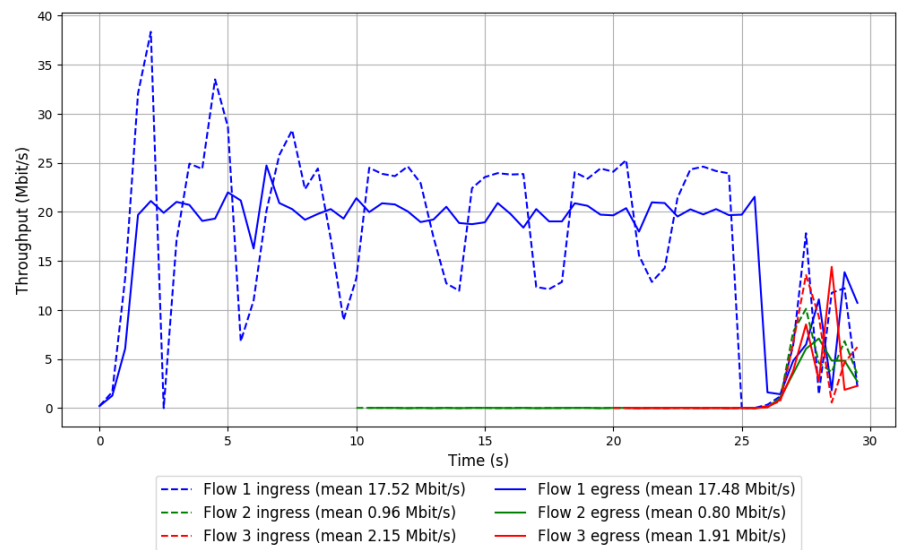
-- Flow 3:

Average throughput: 1.91 Mbit/s

95th percentile per-packet one-way delay: 818.650 ms

Loss rate: 17.37%

Run 2: Report of Verus — Data Link

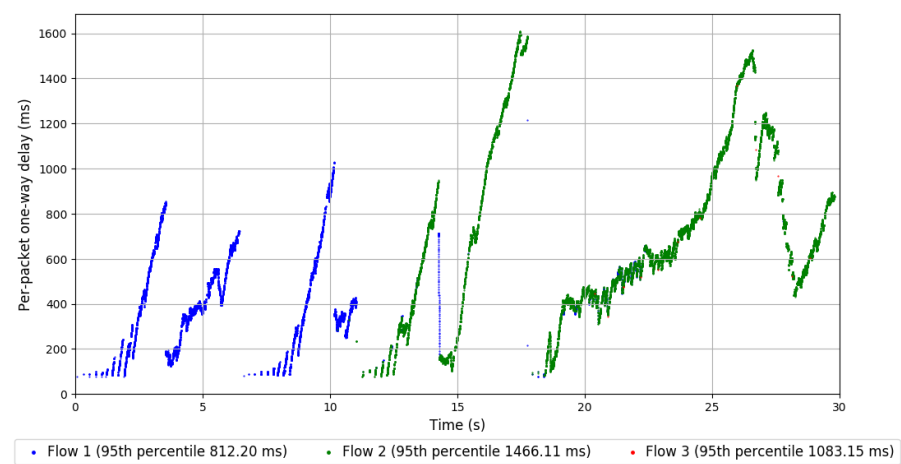
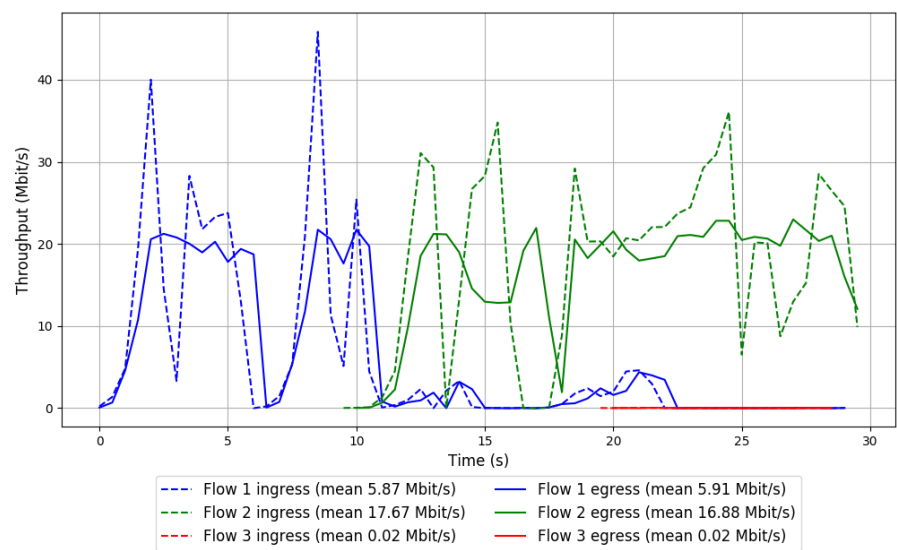


Run 3: Statistics of Verus

Start at: 2018-01-26 02:11:51  
End at: 2018-01-26 02:12:21  
Local clock offset: 0.317 ms  
Remote clock offset: -8.979 ms

# Below is generated by plot.py at 2018-01-26 02:17:08  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 16.87 Mbit/s  
95th percentile per-packet one-way delay: 1402.291 ms  
Loss rate: 3.78%  
-- Flow 1:  
Average throughput: 5.91 Mbit/s  
95th percentile per-packet one-way delay: 812.201 ms  
Loss rate: 0.01%  
-- Flow 2:  
Average throughput: 16.88 Mbit/s  
95th percentile per-packet one-way delay: 1466.107 ms  
Loss rate: 5.63%  
-- Flow 3:  
Average throughput: 0.02 Mbit/s  
95th percentile per-packet one-way delay: 1083.151 ms  
Loss rate: 7.14%

Run 3: Report of Verus — Data Link

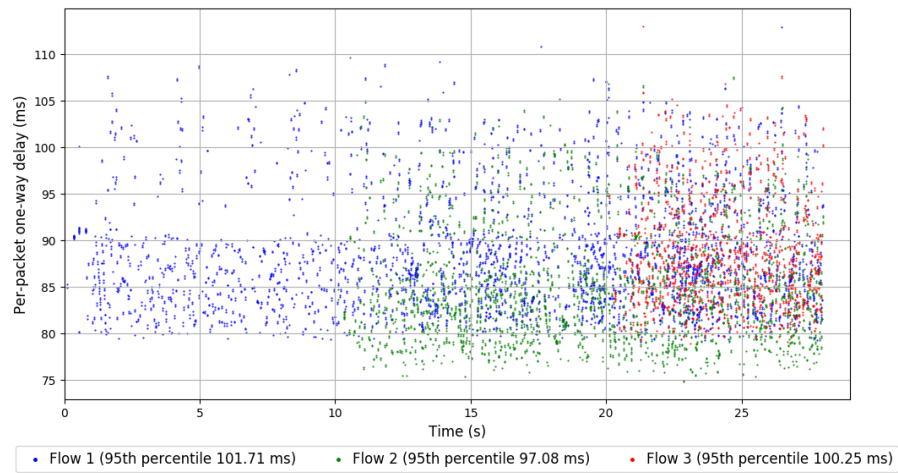
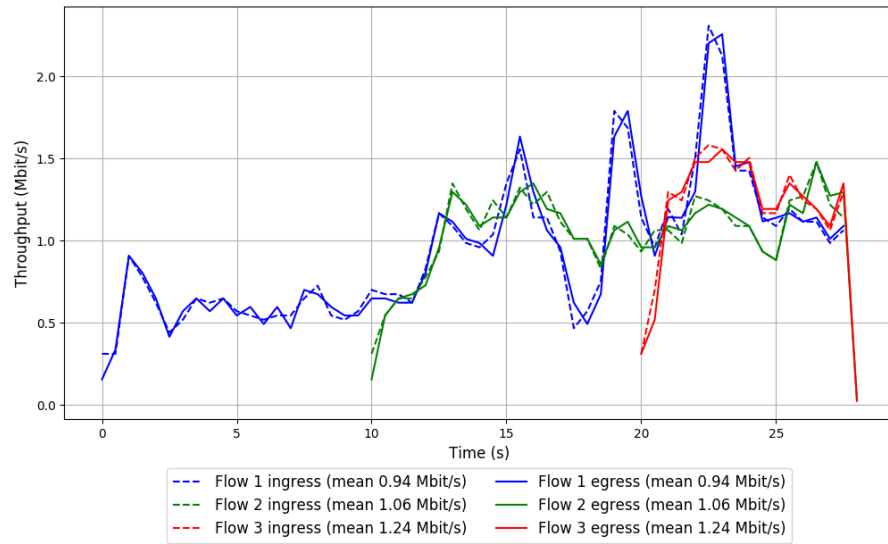


Run 1: Statistics of Copa

Start at: 2018-01-26 01:18:17  
End at: 2018-01-26 01:18:47  
Local clock offset: -2.648 ms  
Remote clock offset: -10.413 ms

# Below is generated by plot.py at 2018-01-26 02:17:08  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.96 Mbit/s  
95th percentile per-packet one-way delay: 99.884 ms  
Loss rate: 0.38%  
-- Flow 1:  
Average throughput: 0.94 Mbit/s  
95th percentile per-packet one-way delay: 101.709 ms  
Loss rate: 0.35%  
-- Flow 2:  
Average throughput: 1.06 Mbit/s  
95th percentile per-packet one-way delay: 97.078 ms  
Loss rate: 0.21%  
-- Flow 3:  
Average throughput: 1.24 Mbit/s  
95th percentile per-packet one-way delay: 100.245 ms  
Loss rate: 0.79%

## Run 1: Report of Copa — Data Link



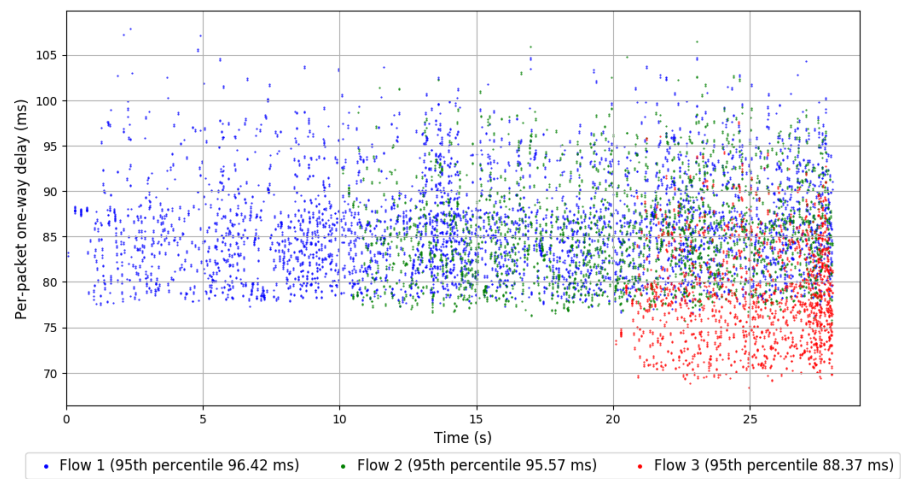
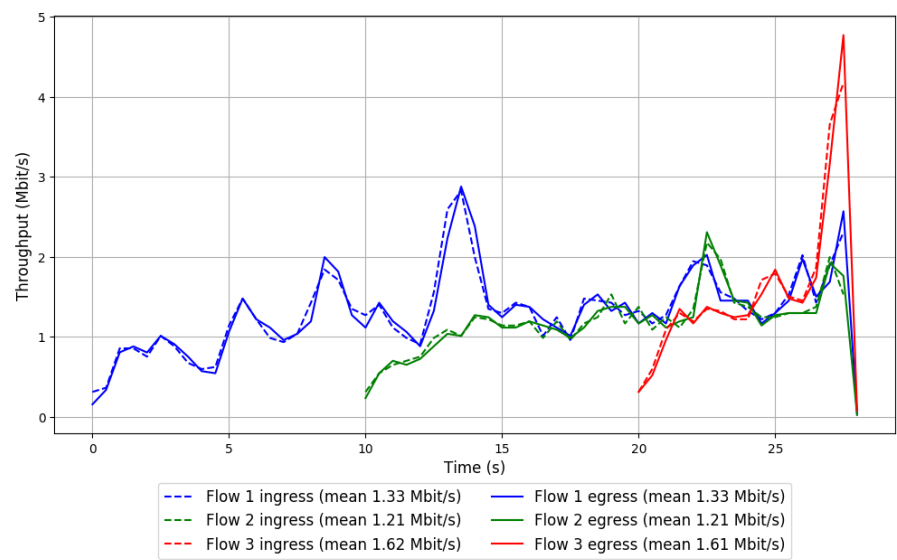
Run 2: Statistics of Copa

Start at: 2018-01-26 01:37:20  
End at: 2018-01-26 01:37:50  
Local clock offset: 0.403 ms  
Remote clock offset: -10.518 ms

# Below is generated by plot.py at 2018-01-26 02:17:08  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 2.56 Mbit/s  
95th percentile per-packet one-way delay: 95.631 ms  
Loss rate: 0.40%  
-- Flow 1:  
Average throughput: 1.33 Mbit/s  
95th percentile per-packet one-way delay: 96.424 ms  
Loss rate: 0.28%  
-- Flow 2:  
Average throughput: 1.21 Mbit/s  
95th percentile per-packet one-way delay: 95.568 ms  
Loss rate: 0.30%  
-- Flow 3:  
Average throughput: 1.61 Mbit/s  
95th percentile per-packet one-way delay: 88.370 ms  
Loss rate: 0.91%



Run 2: Report of Copa — Data Link



Run 3: Statistics of Copa

Start at: 2018-01-26 01:56:23

End at: 2018-01-26 01:56:53

Local clock offset: 0.13 ms

Remote clock offset: -9.6 ms

# Below is generated by plot.py at 2018-01-26 02:17:08

# Datalink statistics

-- Total of 3 flows:

Average throughput: 2.20 Mbit/s

95th percentile per-packet one-way delay: 95.526 ms

Loss rate: 0.31%

-- Flow 1:

Average throughput: 1.06 Mbit/s

95th percentile per-packet one-way delay: 95.136 ms

Loss rate: 0.22%

-- Flow 2:

Average throughput: 1.28 Mbit/s

95th percentile per-packet one-way delay: 95.648 ms

Loss rate: 0.28%

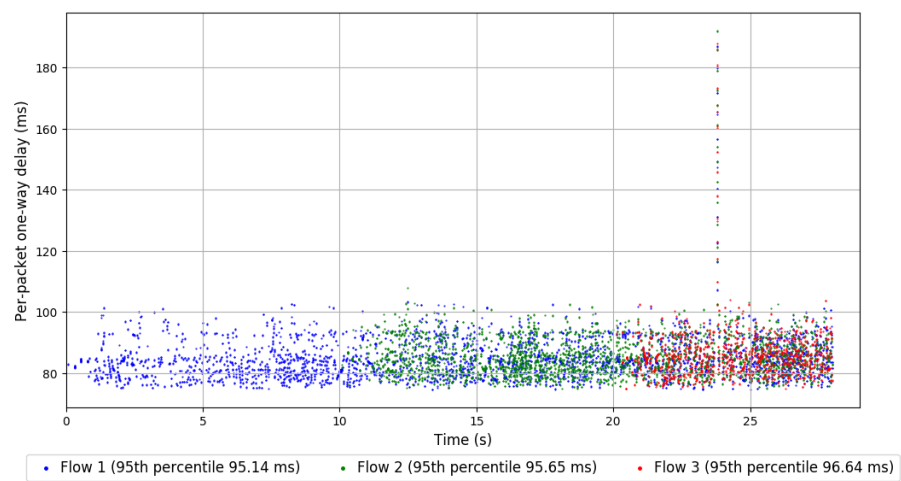
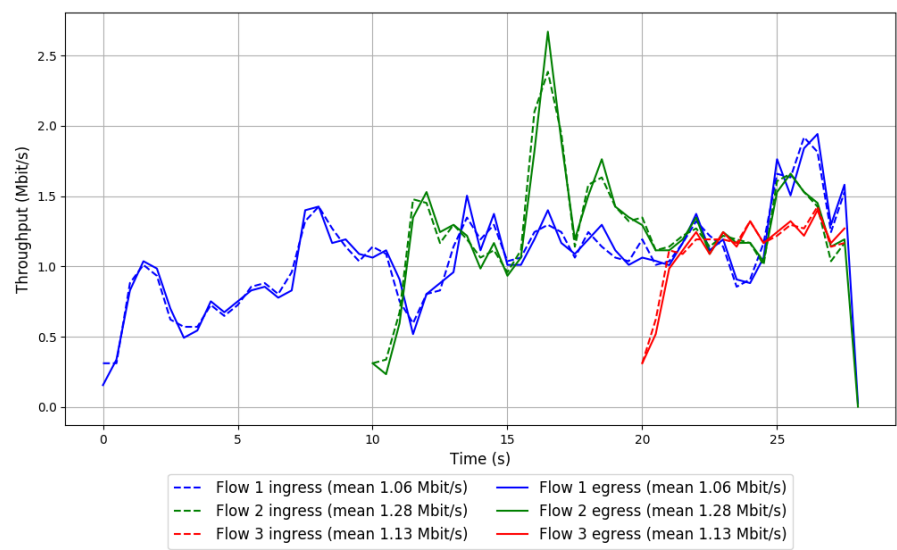
-- Flow 3:

Average throughput: 1.13 Mbit/s

95th percentile per-packet one-way delay: 96.636 ms

Loss rate: 0.72%

Run 3: Report of Copa — Data Link

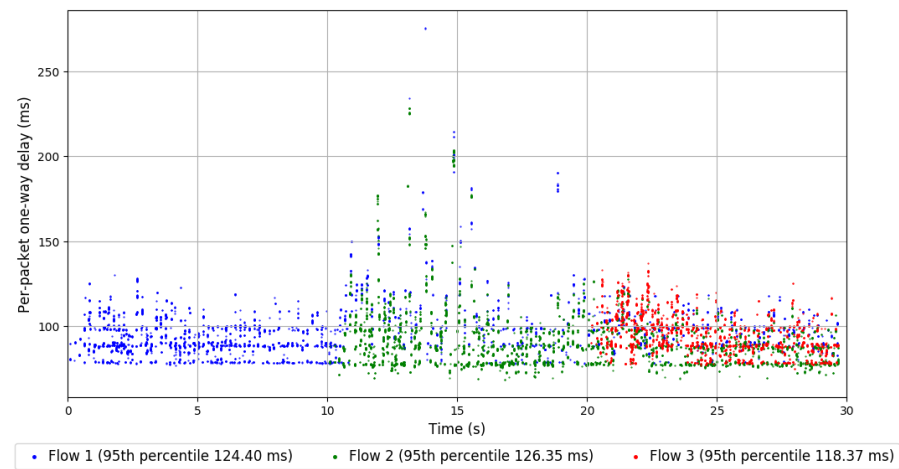
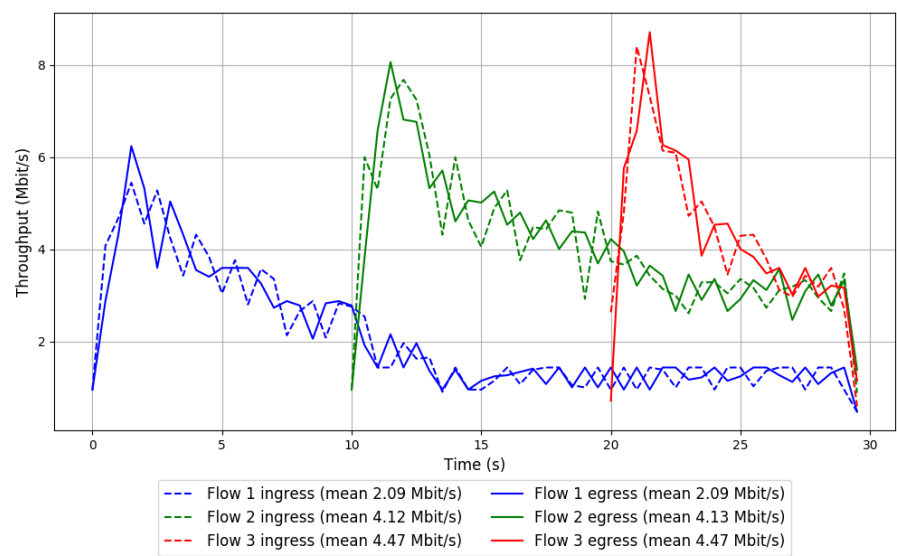


Run 1: Statistics of Indigo-2-256

Start at: 2018-01-26 01:27:47  
End at: 2018-01-26 01:28:17  
Local clock offset: 0.352 ms  
Remote clock offset: -10.481 ms

# Below is generated by plot.py at 2018-01-26 02:17:08  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 6.26 Mbit/s  
95th percentile per-packet one-way delay: 121.717 ms  
Loss rate: 0.03%  
-- Flow 1:  
Average throughput: 2.09 Mbit/s  
95th percentile per-packet one-way delay: 124.400 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 4.13 Mbit/s  
95th percentile per-packet one-way delay: 126.348 ms  
Loss rate: 0.06%  
-- Flow 3:  
Average throughput: 4.47 Mbit/s  
95th percentile per-packet one-way delay: 118.370 ms  
Loss rate: 0.00%

Run 1: Report of Indigo-2-256 — Data Link

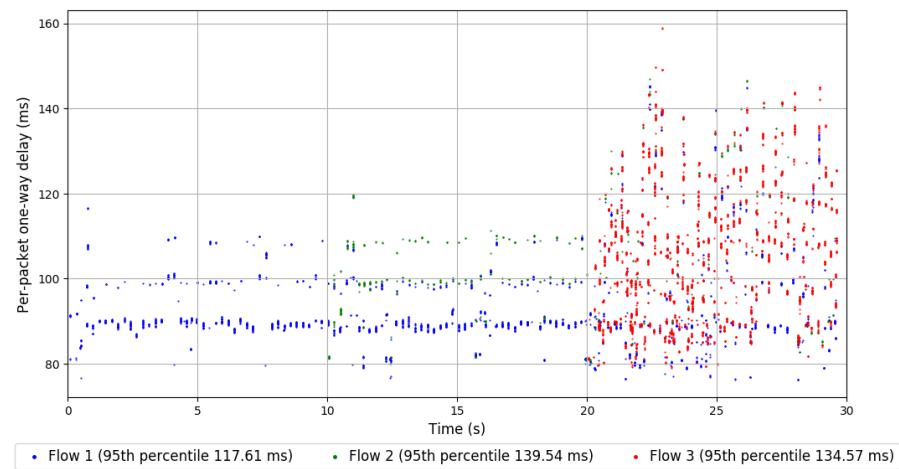
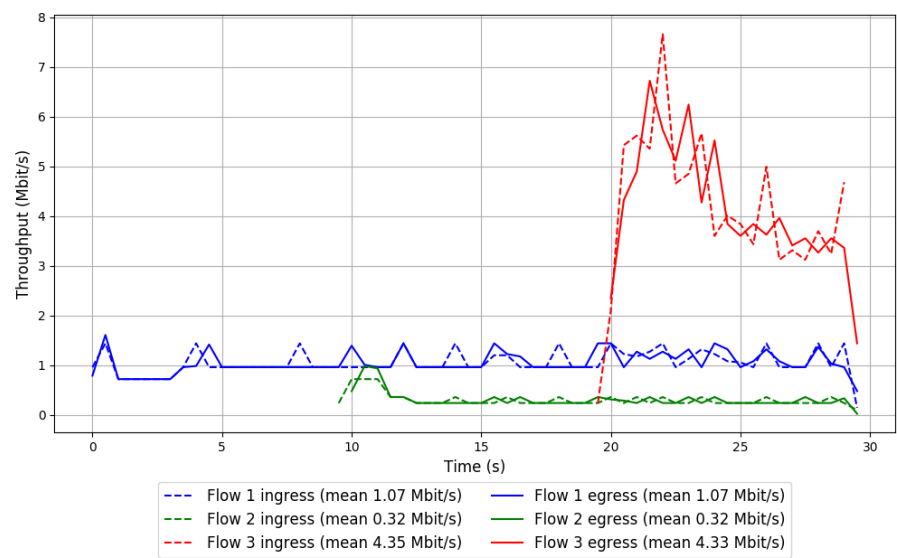


Run 2: Statistics of Indigo-2-256

Start at: 2018-01-26 01:46:50  
End at: 2018-01-26 01:47:20  
Local clock offset: 0.318 ms  
Remote clock offset: -10.115 ms

# Below is generated by plot.py at 2018-01-26 02:17:08  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 2.67 Mbit/s  
95th percentile per-packet one-way delay: 131.518 ms  
Loss rate: 0.15%  
-- Flow 1:  
Average throughput: 1.07 Mbit/s  
95th percentile per-packet one-way delay: 117.605 ms  
Loss rate: 0.23%  
-- Flow 2:  
Average throughput: 0.32 Mbit/s  
95th percentile per-packet one-way delay: 139.544 ms  
Loss rate: 0.77%  
-- Flow 3:  
Average throughput: 4.33 Mbit/s  
95th percentile per-packet one-way delay: 134.572 ms  
Loss rate: 0.00%

Run 2: Report of Indigo-2-256 — Data Link



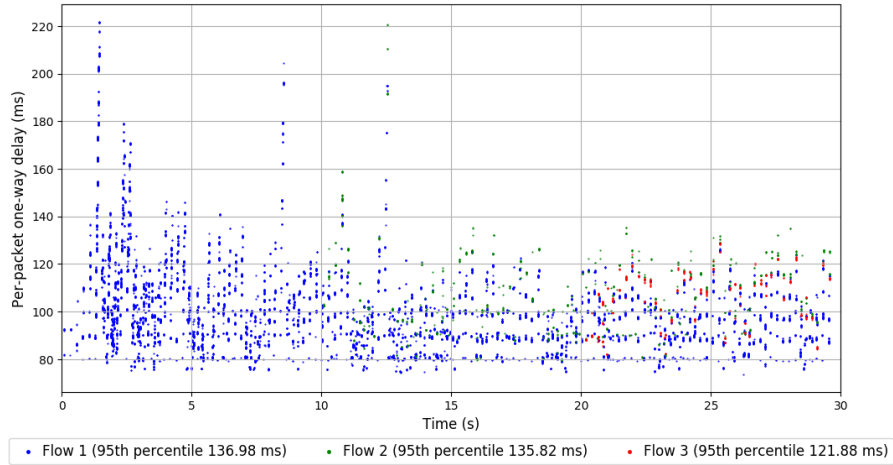
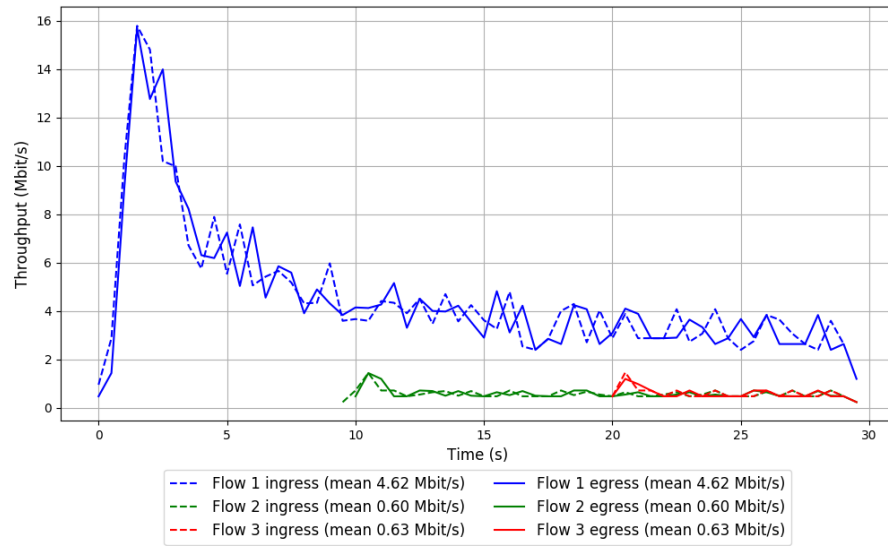
Run 3: Statistics of Indigo-2-256

Start at: 2018-01-26 02:05:54  
End at: 2018-01-26 02:06:24  
Local clock offset: 0.644 ms  
Remote clock offset: -9.264 ms

# Below is generated by plot.py at 2018-01-26 02:17:08  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.21 Mbit/s  
95th percentile per-packet one-way delay: 136.292 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 4.62 Mbit/s  
95th percentile per-packet one-way delay: 136.984 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.60 Mbit/s  
95th percentile per-packet one-way delay: 135.818 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.63 Mbit/s  
95th percentile per-packet one-way delay: 121.879 ms  
Loss rate: 0.00%



### Run 3: Report of Indigo-2-256 — Data Link

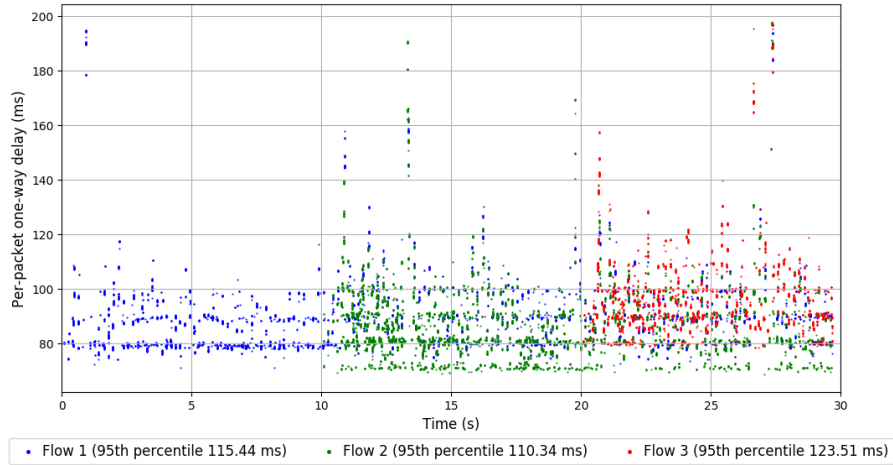
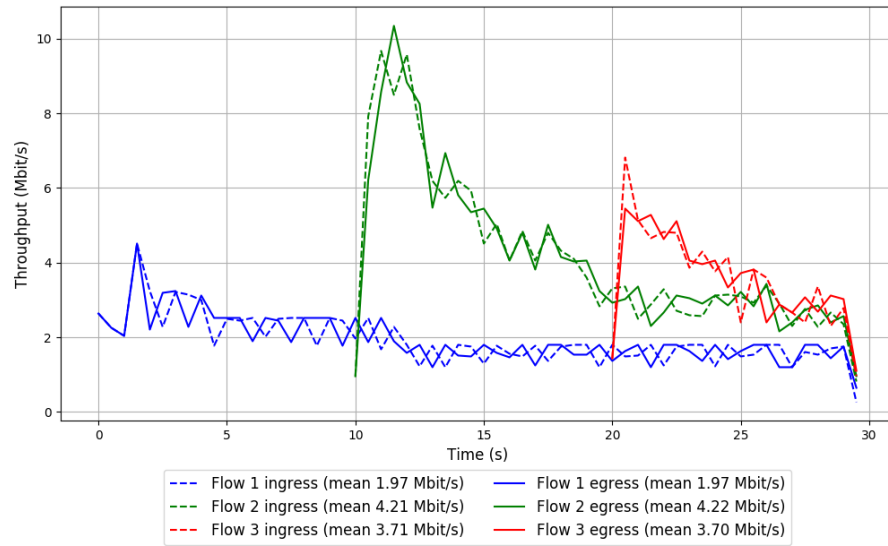


Run 1: Statistics of Indigo-1-32

Start at: 2018-01-26 01:32:31  
End at: 2018-01-26 01:33:01  
Local clock offset: 0.279 ms  
Remote clock offset: -10.511 ms

# Below is generated by plot.py at 2018-01-26 02:17:08  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.96 Mbit/s  
95th percentile per-packet one-way delay: 116.761 ms  
Loss rate: 0.07%  
-- Flow 1:  
Average throughput: 1.97 Mbit/s  
95th percentile per-packet one-way delay: 115.442 ms  
Loss rate: 0.02%  
-- Flow 2:  
Average throughput: 4.22 Mbit/s  
95th percentile per-packet one-way delay: 110.345 ms  
Loss rate: 0.13%  
-- Flow 3:  
Average throughput: 3.70 Mbit/s  
95th percentile per-packet one-way delay: 123.509 ms  
Loss rate: 0.00%

# Run 1: Report of Indigo-1-32 — Data Link

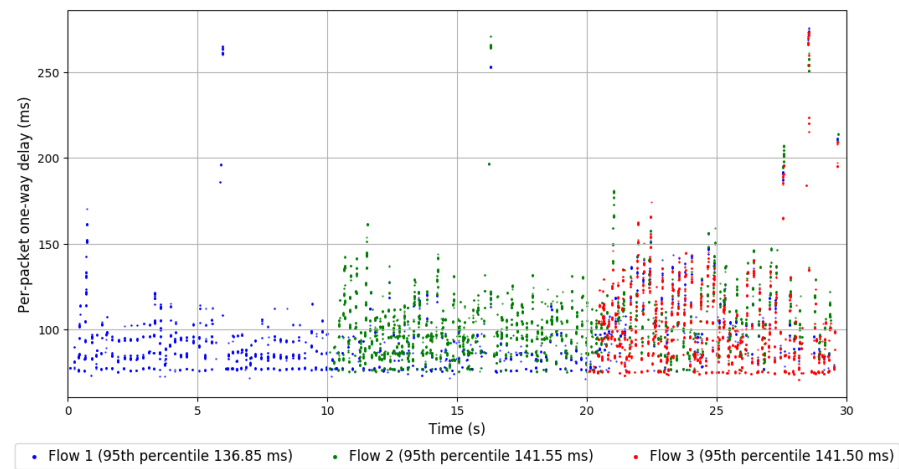
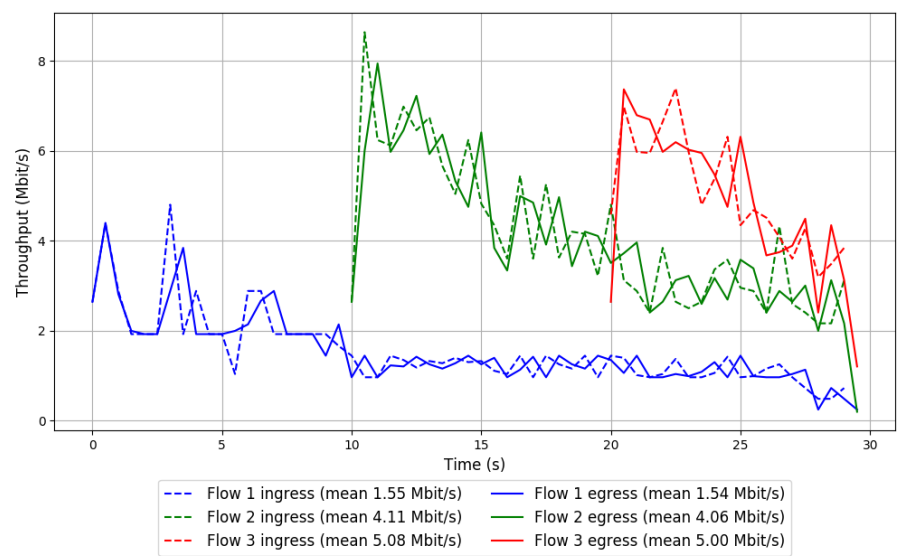


Run 2: Statistics of Indigo-1-32

Start at: 2018-01-26 01:51:34  
End at: 2018-01-26 01:52:04  
Local clock offset: 0.669 ms  
Remote clock offset: -9.803 ms

# Below is generated by plot.py at 2018-01-26 02:17:08  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.85 Mbit/s  
95th percentile per-packet one-way delay: 140.855 ms  
Loss rate: 0.26%  
-- Flow 1:  
Average throughput: 1.54 Mbit/s  
95th percentile per-packet one-way delay: 136.847 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 4.06 Mbit/s  
95th percentile per-packet one-way delay: 141.549 ms  
Loss rate: 0.48%  
-- Flow 3:  
Average throughput: 5.00 Mbit/s  
95th percentile per-packet one-way delay: 141.496 ms  
Loss rate: 0.13%

Run 2: Report of Indigo-1-32 — Data Link



Run 3: Statistics of Indigo-1-32

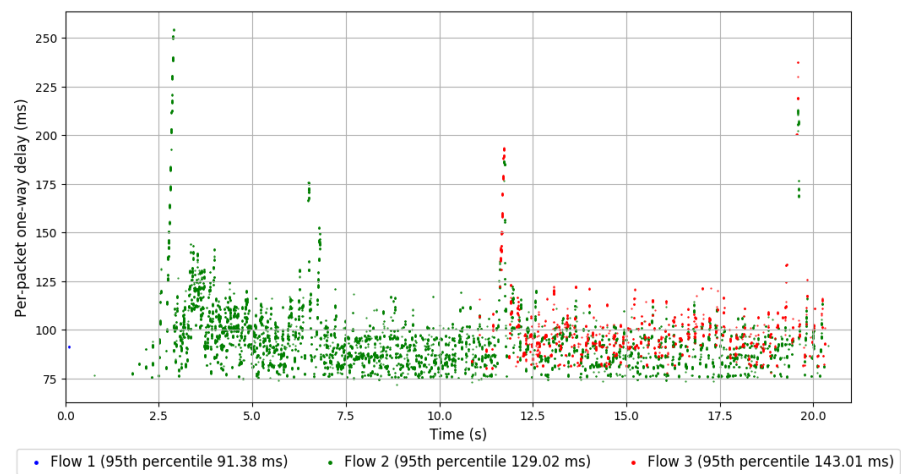
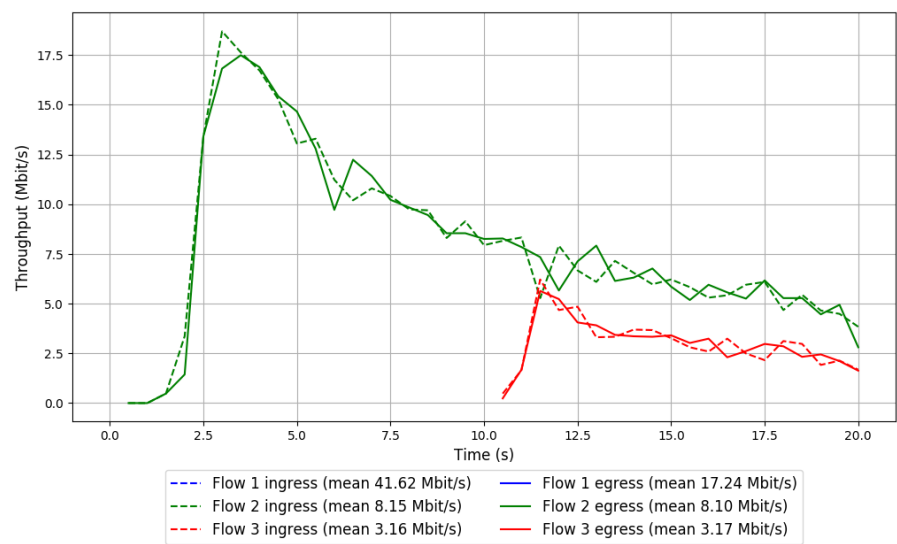
Start at: 2018-01-26 02:10:39

End at: 2018-01-26 02:11:09

Local clock offset: 0.544 ms

Remote clock offset: -9.026 ms

Run 3: Report of Indigo-1-32 — Data Link



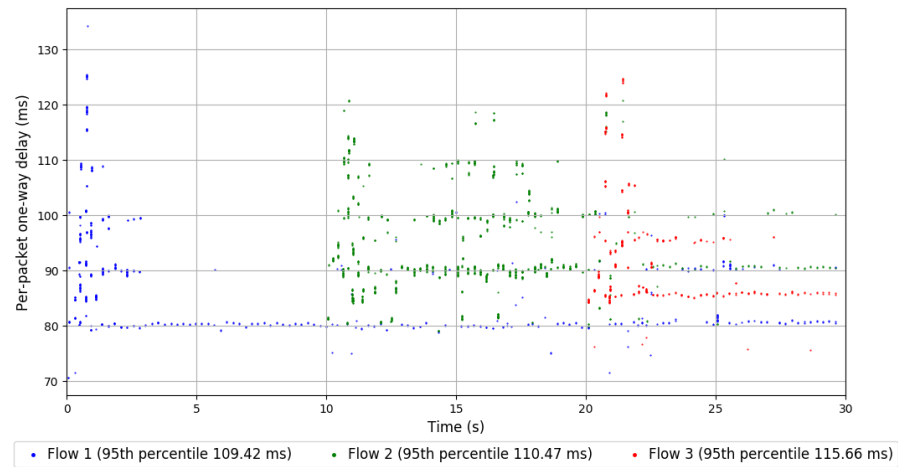
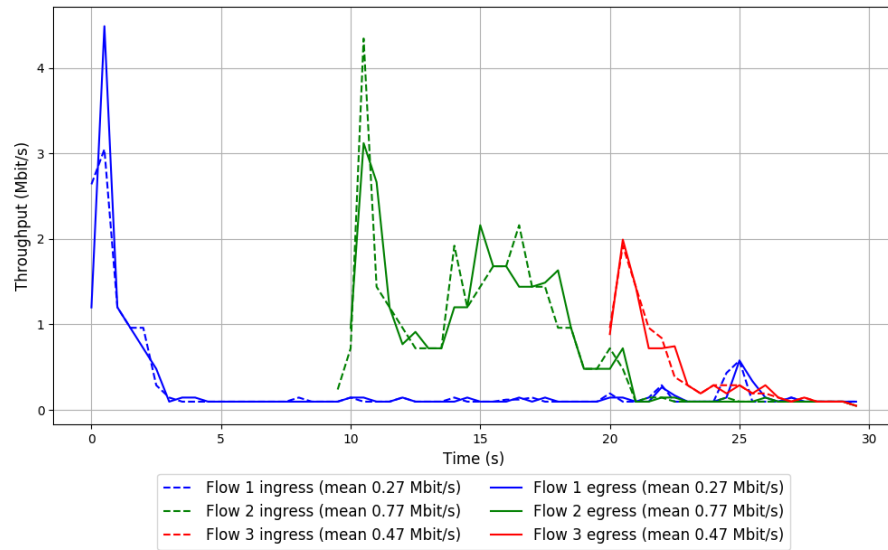
Run 1: Statistics of Indigo-1-128

Start at: 2018-01-26 01:31:21  
End at: 2018-01-26 01:31:51  
Local clock offset: 0.048 ms  
Remote clock offset: -10.477 ms

# Below is generated by plot.py at 2018-01-26 02:17:08  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.93 Mbit/s  
95th percentile per-packet one-way delay: 113.307 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 0.27 Mbit/s  
95th percentile per-packet one-way delay: 109.419 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.77 Mbit/s  
95th percentile per-packet one-way delay: 110.471 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.47 Mbit/s  
95th percentile per-packet one-way delay: 115.662 ms  
Loss rate: 0.00%



# Run 1: Report of Indigo-1-128 — Data Link

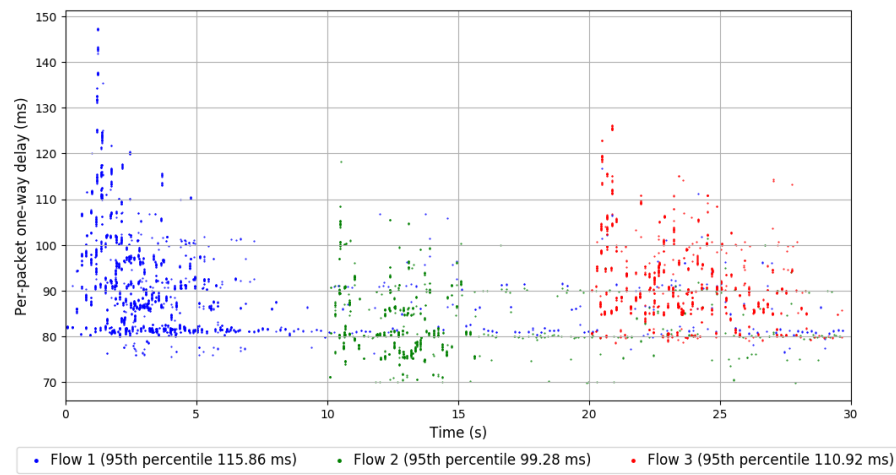
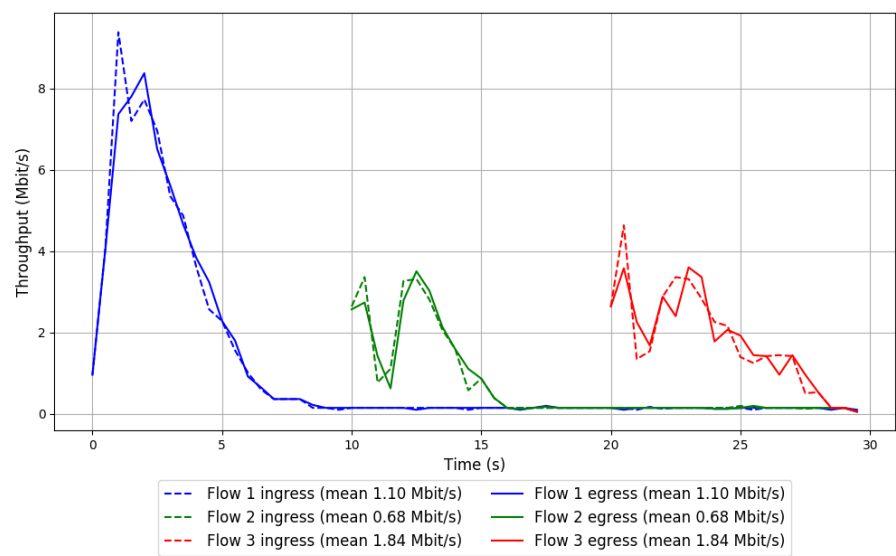


Run 2: Statistics of Indigo-1-128

Start at: 2018-01-26 01:50:23  
End at: 2018-01-26 01:50:53  
Local clock offset: 0.725 ms  
Remote clock offset: -9.945 ms

# Below is generated by plot.py at 2018-01-26 02:17:08  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 2.15 Mbit/s  
95th percentile per-packet one-way delay: 112.165 ms  
Loss rate: 0.02%  
-- Flow 1:  
Average throughput: 1.10 Mbit/s  
95th percentile per-packet one-way delay: 115.865 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.68 Mbit/s  
95th percentile per-packet one-way delay: 99.284 ms  
Loss rate: 0.09%  
-- Flow 3:  
Average throughput: 1.84 Mbit/s  
95th percentile per-packet one-way delay: 110.922 ms  
Loss rate: 0.00%

Run 2: Report of Indigo-1-128 — Data Link



Run 3: Statistics of Indigo-1-128

Start at: 2018-01-26 02:09:28  
End at: 2018-01-26 02:09:58  
Local clock offset: 0.319 ms  
Remote clock offset: -9.089 ms

# Below is generated by plot.py at 2018-01-26 02:17:08  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 1.39 Mbit/s  
95th percentile per-packet one-way delay: 112.469 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 0.21 Mbit/s  
95th percentile per-packet one-way delay: 94.898 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 1.51 Mbit/s  
95th percentile per-packet one-way delay: 114.416 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.55 Mbit/s  
95th percentile per-packet one-way delay: 91.753 ms  
Loss rate: 0.00%

Run 3: Report of Indigo-1-128 — Data Link

