

## Pantheon Report

Generated at 2018-01-10 16:35:57 (UTC).

Data path: Colombia ppp0 (*remote*) → AWS Brazil 2 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).

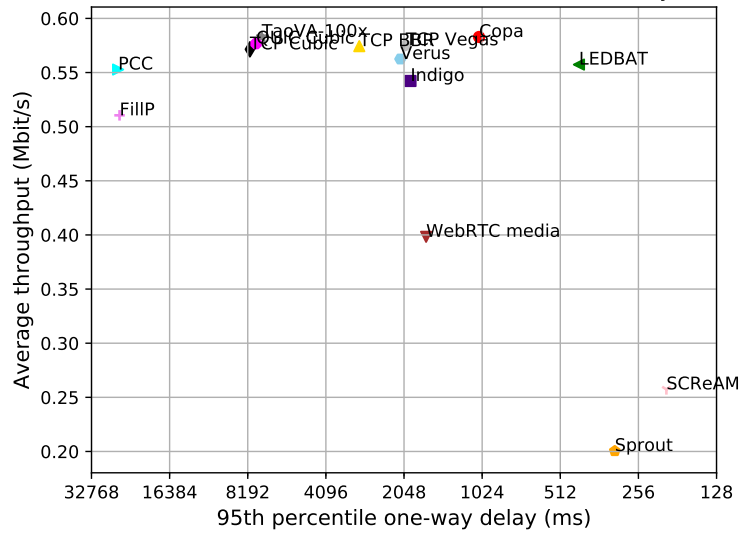
Tested BBR with qdisc of Fair Queuing (*fq*), and other schemes with the default Linux qdisc (*pfifo\_fast*).

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

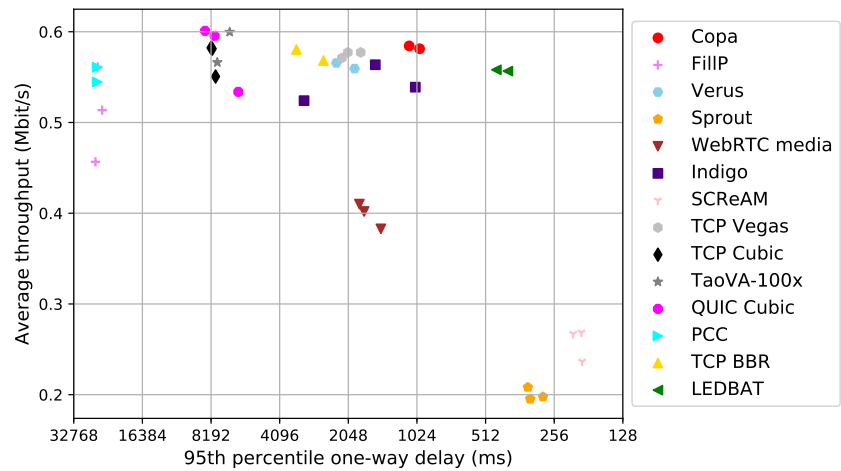
Git summary:

```
branch: master @ 56d1792c316a5efca3f2d21342905405fedffb48
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/fillp @ ec9585325218d5048c4d4152fa42240af54c6e67
third_party/genericCC @ 80b516c448f795fd6e9675f7177b69c622f07da8
third_party/indigo @ b19f3730105f9aa95452552af924e3719b03cc55
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
  M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ fb1053193c2861da659ba9013db26744ccfcf993
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
  M receiver/src/buffer.h
  M receiver/src/core.cpp
  M sender/src/buffer.h
  M sender/src/core.cpp
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ f1a14bffe749737437f61b1eaeeb30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
  M src/examples/cellsim.cc
  M src/examples/sproutbt2.cc
  M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
  M src/verus.hpp
  M tools/plot.py
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

test from Colombia ppp0 to AWS Brazil 2 Ethernet, 3 runs of 30s each per scheme  
3 flows with 10s interval between flows (mean of all runs by scheme)



test from Colombia ppp0 to AWS Brazil 2 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	2	0.38	0.27	0.06	3019.39	3252.42	2574.99	1.09	11.29	39.51
TCP Cubic	3	0.56	0.03	0.00	8044.63	6421.11	8318.08	30.83	53.61	74.06
LEDBAT	2	0.23	0.37	0.24	346.29	443.77	458.01	0.09	1.02	7.71
PCC	2	0.55	0.00	N/A	25867.03	N/A	N/A	58.75	N/A	N/A
QUIC Cubic	3	0.58	0.00	0.00	7602.78	5437.12	7895.05	30.53	0.00	33.33
SCReAM	3	0.08	0.18	0.16	179.77	199.07	230.78	0.80	1.04	1.73
WebRTC media	3	0.21	0.15	0.05	1588.15	1734.85	1734.24	0.95	1.92	9.44
Sprout	3	0.09	0.10	0.11	553.21	245.56	276.89	0.91	1.00	1.47
TaoVA-100x	2	0.41	0.32	0.35	7502.83	6815.90	5018.92	16.34	20.11	77.38
TCP Vegas	3	0.39	0.21	0.19	1770.43	1910.29	2166.89	3.47	7.16	32.13
Verus	2	0.55	0.01	0.01	2117.41	2107.75	1907.14	4.27	4.88	9.54
Copa	2	0.42	0.21	0.09	1011.62	1078.73	1128.55	3.23	6.27	18.28
FillP	3	0.51	0.00	N/A	25547.83	N/A	N/A	64.81	N/A	N/A
Indigo	3	0.28	0.25	0.33	1461.91	1860.22	1268.80	3.93	1.63	1.34

Run 1: Statistics of TCP BBR

Start at: 2018-01-10 14:50:35

End at: 2018-01-10 14:51:05

Local clock offset: 0.355 ms

Remote clock offset: 1.733 ms

# Below is generated by plot.py at 2018-01-10 16:35:23

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.58 Mbit/s

95th percentile per-packet one-way delay: 3459.973 ms

Loss rate: 3.91%

-- Flow 1:

Average throughput: 0.37 Mbit/s

95th percentile per-packet one-way delay: 3444.749 ms

Loss rate: 1.72%

-- Flow 2:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 3470.000 ms

Loss rate: 5.98%

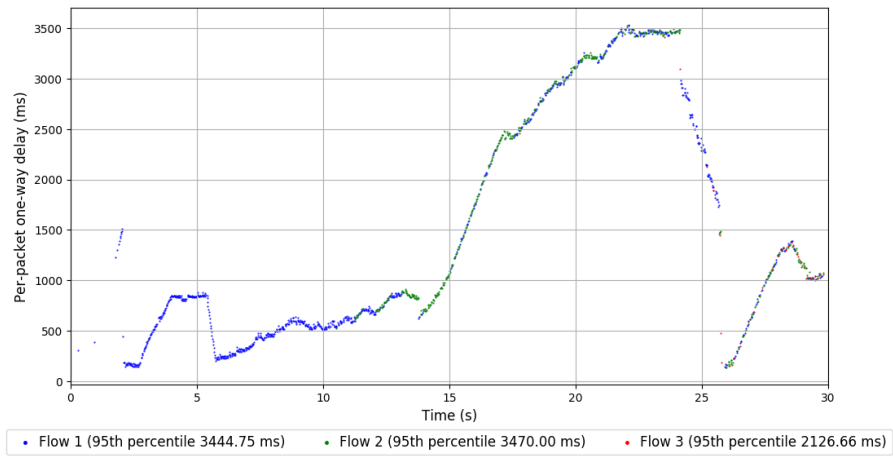
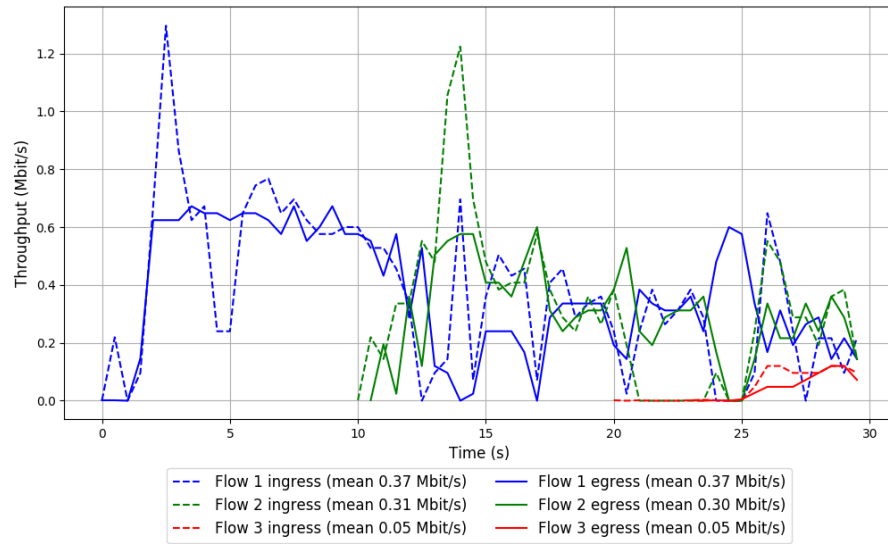
-- Flow 3:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 2126.664 ms

Loss rate: 28.61%

# Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

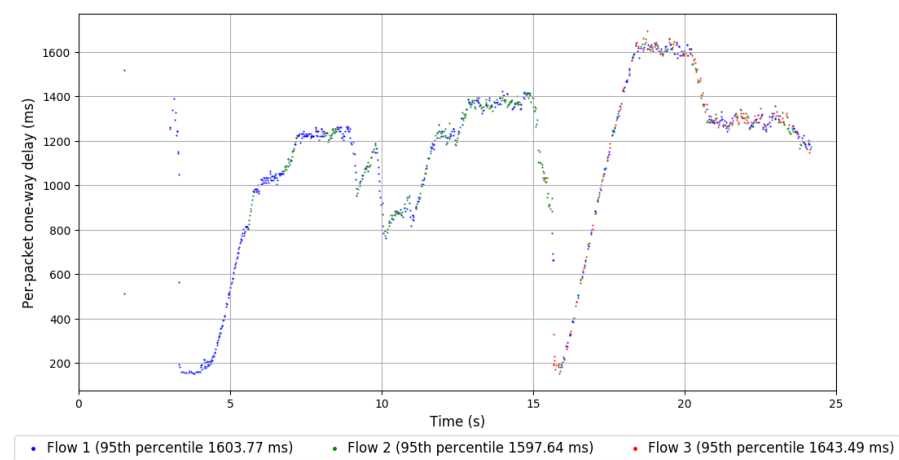
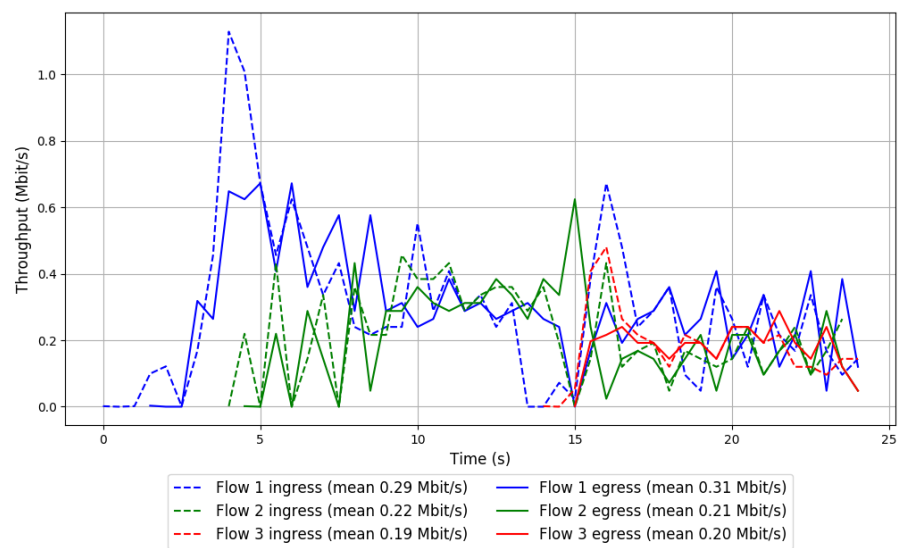
Start at: 2018-01-10 15:09:26

End at: 2018-01-10 15:09:56

Local clock offset: 0.327 ms

Remote clock offset: -4.625 ms

Run 2: Report of TCP BBR — Data Link



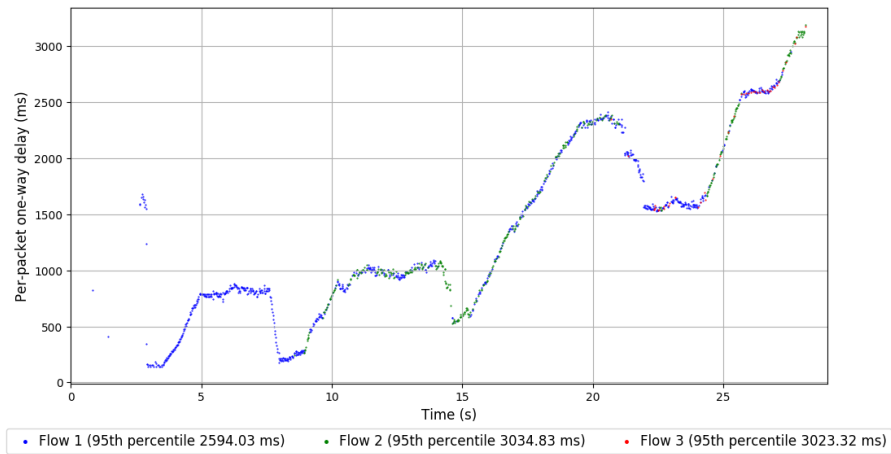
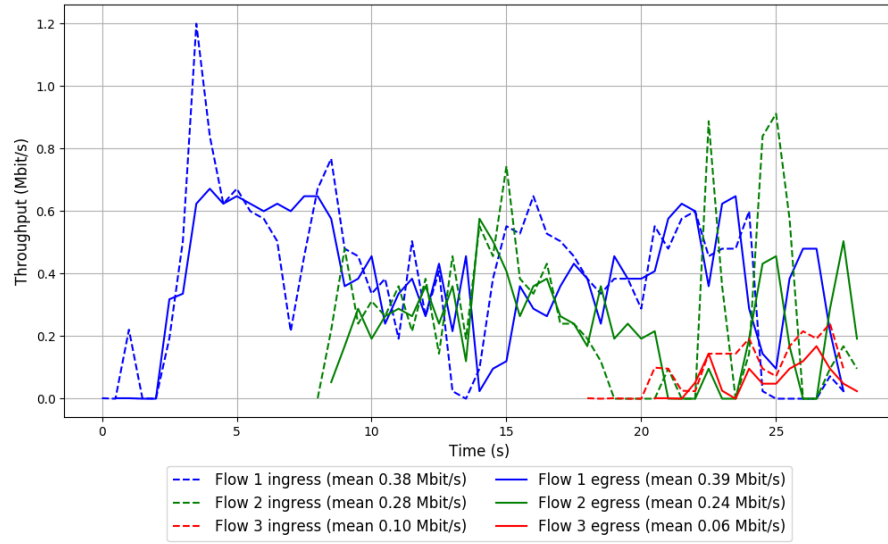
Run 3: Statistics of TCP BBR

Start at: 2018-01-10 15:28:08  
End at: 2018-01-10 15:28:38  
Local clock offset: 0.574 ms  
Remote clock offset: -0.341 ms

# Below is generated by plot.py at 2018-01-10 16:35:24  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.57 Mbit/s  
95th percentile per-packet one-way delay: 2631.140 ms  
Loss rate: 8.61%  
-- Flow 1:  
Average throughput: 0.39 Mbit/s  
95th percentile per-packet one-way delay: 2594.029 ms  
Loss rate: 0.46%  
-- Flow 2:  
Average throughput: 0.24 Mbit/s  
95th percentile per-packet one-way delay: 3034.833 ms  
Loss rate: 16.59%  
-- Flow 3:  
Average throughput: 0.06 Mbit/s  
95th percentile per-packet one-way delay: 3023.318 ms  
Loss rate: 50.41%



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



Run 1: Statistics of TCP Cubic

Start at: 2018-01-10 14:58:08

End at: 2018-01-10 14:58:38

Local clock offset: 0.339 ms

Remote clock offset: 0.28 ms

# Below is generated by plot.py at 2018-01-10 16:35:25

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.58 Mbit/s

95th percentile per-packet one-way delay: 8192.655 ms

Loss rate: 31.61%

-- Flow 1:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 8212.041 ms

Loss rate: 30.91%

-- Flow 2:

Average throughput: 0.03 Mbit/s

95th percentile per-packet one-way delay: 6580.487 ms

Loss rate: 53.59%

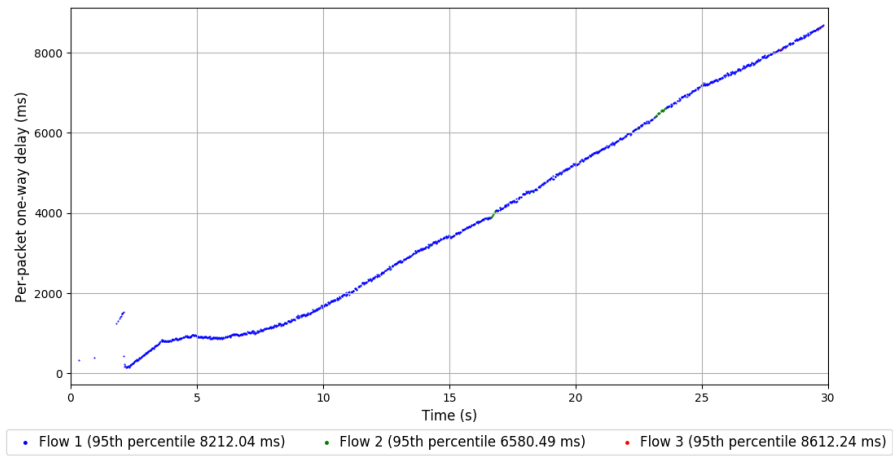
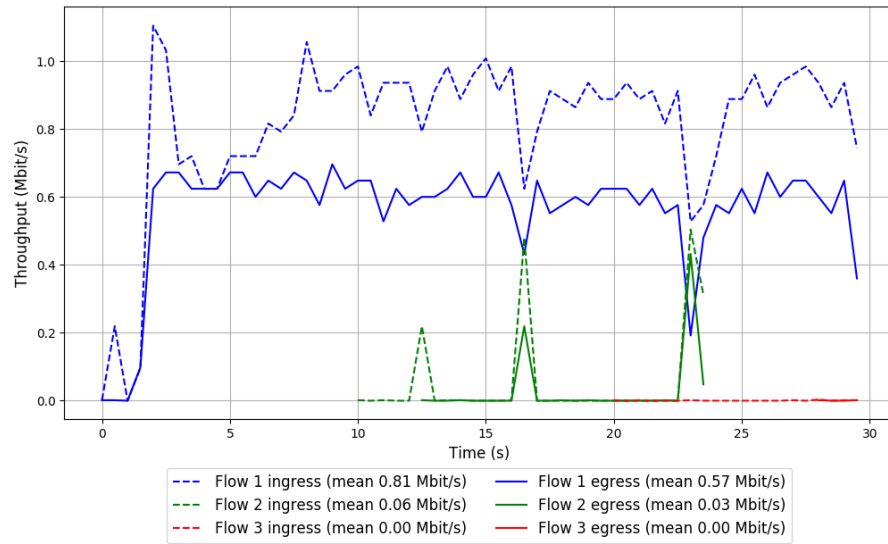
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 8612.243 ms

Loss rate: 75.13%

# Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2018-01-10 15:16:56

End at: 2018-01-10 15:17:26

Local clock offset: 0.402 ms

Remote clock offset: 7.112 ms

# Below is generated by plot.py at 2018-01-10 16:35:25

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.58 Mbit/s

95th percentile per-packet one-way delay: 8095.487 ms

Loss rate: 31.51%

-- Flow 1:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 8096.219 ms

Loss rate: 30.81%

-- Flow 2:

Average throughput: 0.03 Mbit/s

95th percentile per-packet one-way delay: 6305.809 ms

Loss rate: 53.59%

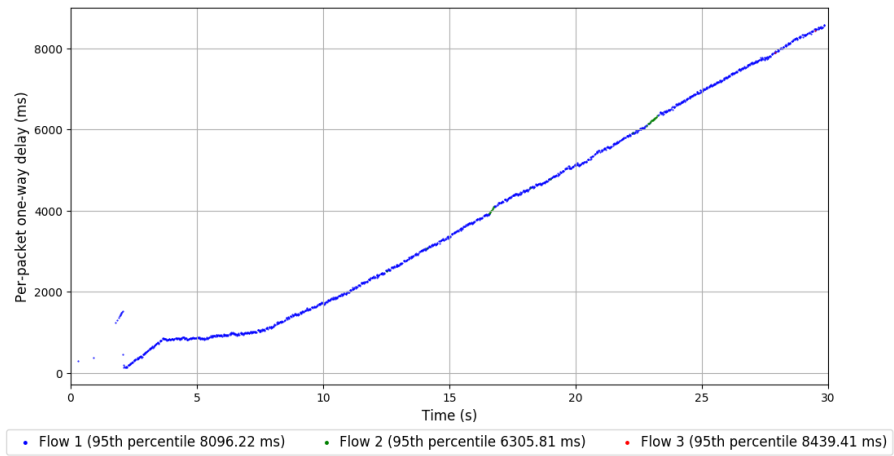
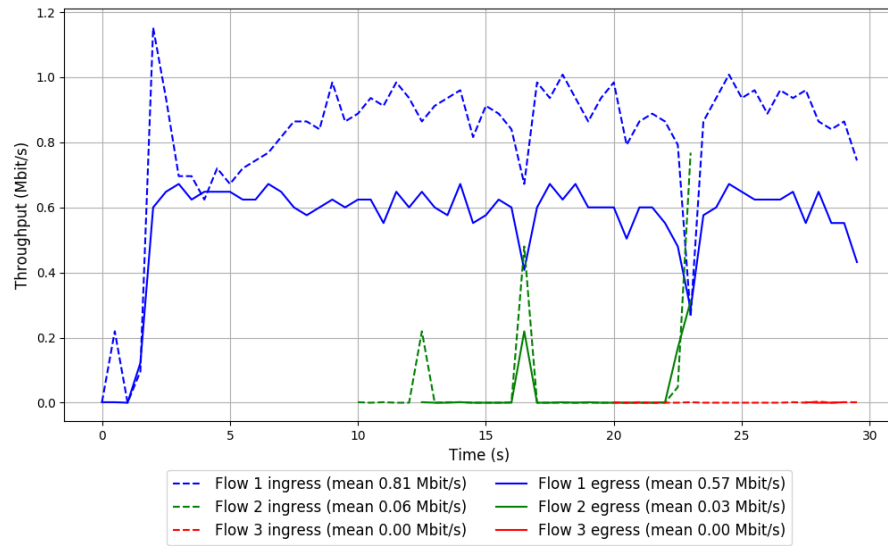
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 8439.407 ms

Loss rate: 75.13%

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

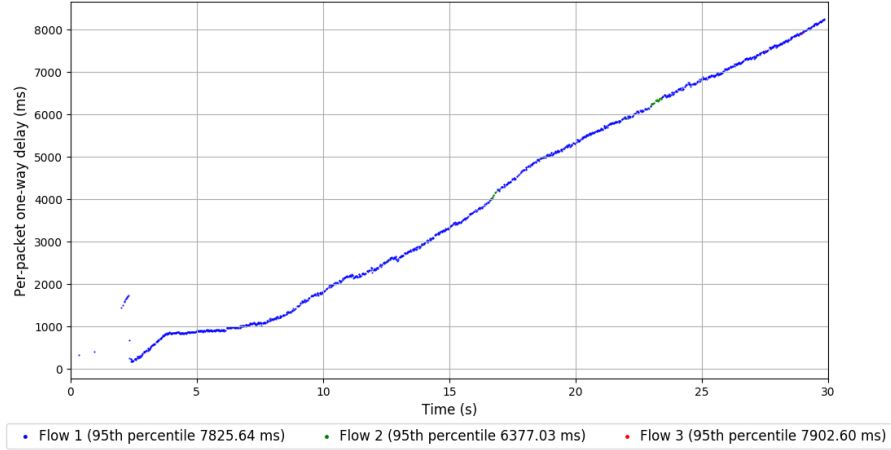
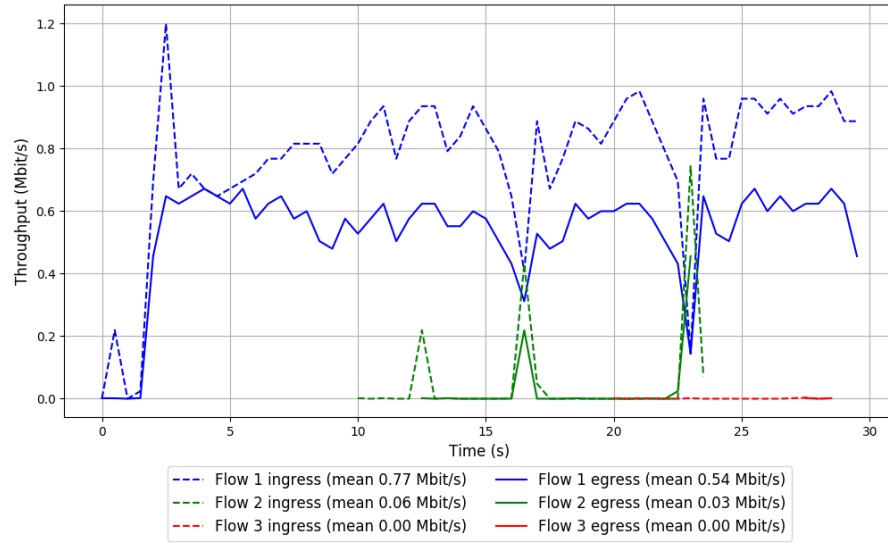


Run 3: Statistics of TCP Cubic

Start at: 2018-01-10 15:35:43  
End at: 2018-01-10 15:36:13  
Local clock offset: 0.94 ms  
Remote clock offset: -4.763 ms

# Below is generated by plot.py at 2018-01-10 16:35:25  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.55 Mbit/s  
95th percentile per-packet one-way delay: 7824.960 ms  
Loss rate: 31.51%  
-- Flow 1:  
Average throughput: 0.54 Mbit/s  
95th percentile per-packet one-way delay: 7825.644 ms  
Loss rate: 30.77%  
-- Flow 2:  
Average throughput: 0.03 Mbit/s  
95th percentile per-packet one-way delay: 6377.030 ms  
Loss rate: 53.64%  
-- Flow 3:  
Average throughput: 0.00 Mbit/s  
95th percentile per-packet one-way delay: 7902.602 ms  
Loss rate: 71.93%

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



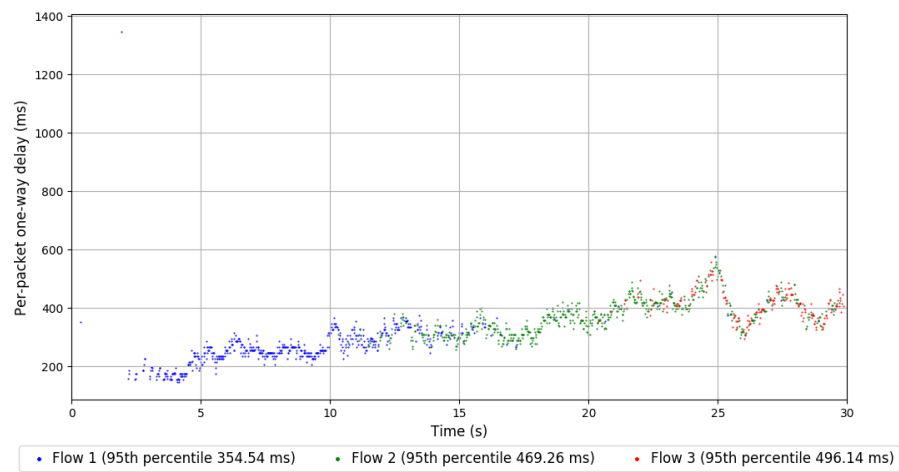
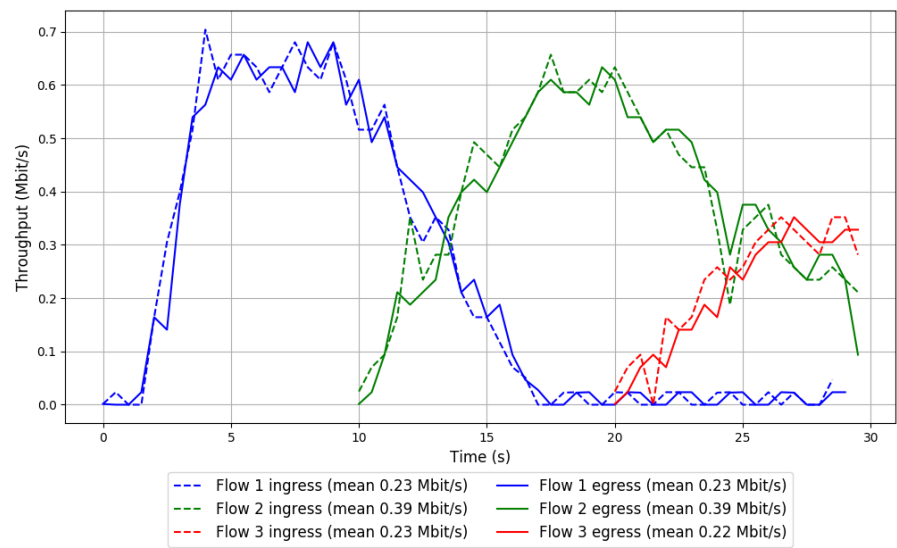
Run 1: Statistics of LEDBAT

Start at: 2018-01-10 15:01:58  
End at: 2018-01-10 15:02:28  
Local clock offset: 0.357 ms  
Remote clock offset: -4.315 ms

# Below is generated by plot.py at 2018-01-10 16:35:25  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.56 Mbit/s  
95th percentile per-packet one-way delay: 459.206 ms  
Loss rate: 1.61%  
-- Flow 1:  
Average throughput: 0.23 Mbit/s  
95th percentile per-packet one-way delay: 354.540 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.39 Mbit/s  
95th percentile per-packet one-way delay: 469.262 ms  
Loss rate: 1.52%  
-- Flow 3:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 496.141 ms  
Loss rate: 6.73%



Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2018-01-10 15:20:40

End at: 2018-01-10 15:21:10

Local clock offset: 0.459 ms

Remote clock offset: 1.115 ms

# Below is generated by plot.py at 2018-01-10 16:35:25

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.56 Mbit/s

95th percentile per-packet one-way delay: 408.708 ms

Loss rate: 1.75%

-- Flow 1:

Average throughput: 0.24 Mbit/s

95th percentile per-packet one-way delay: 338.046 ms

Loss rate: 0.17%

-- Flow 2:

Average throughput: 0.35 Mbit/s

95th percentile per-packet one-way delay: 418.278 ms

Loss rate: 0.51%

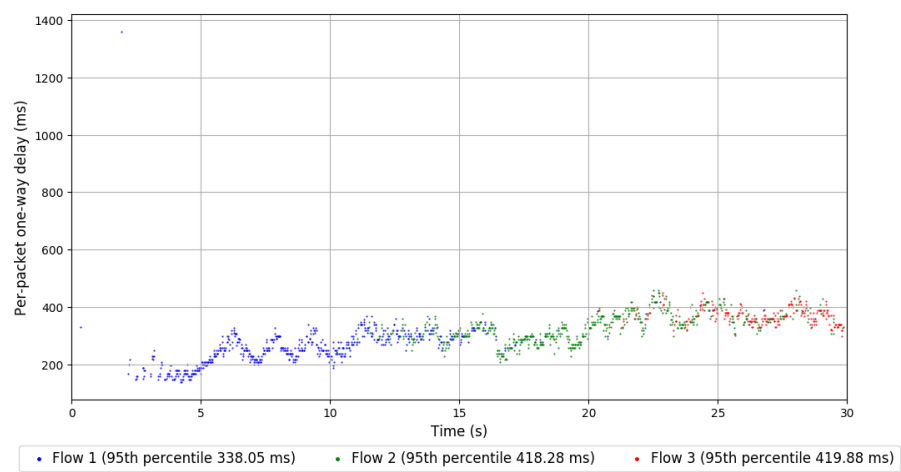
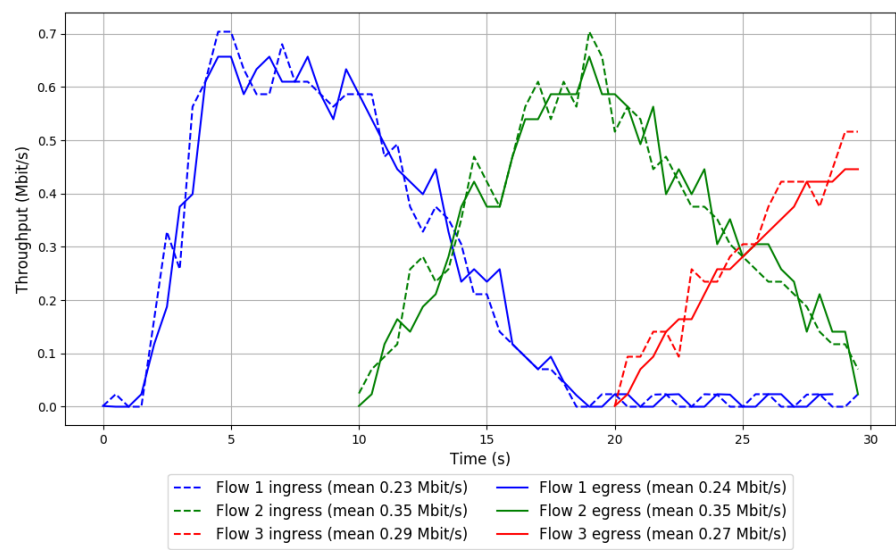
-- Flow 3:

Average throughput: 0.27 Mbit/s

95th percentile per-packet one-way delay: 419.876 ms

Loss rate: 8.68%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

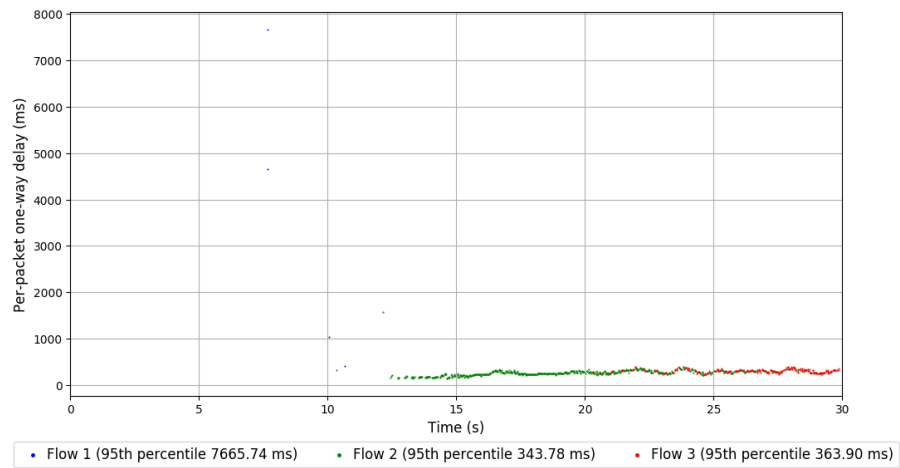
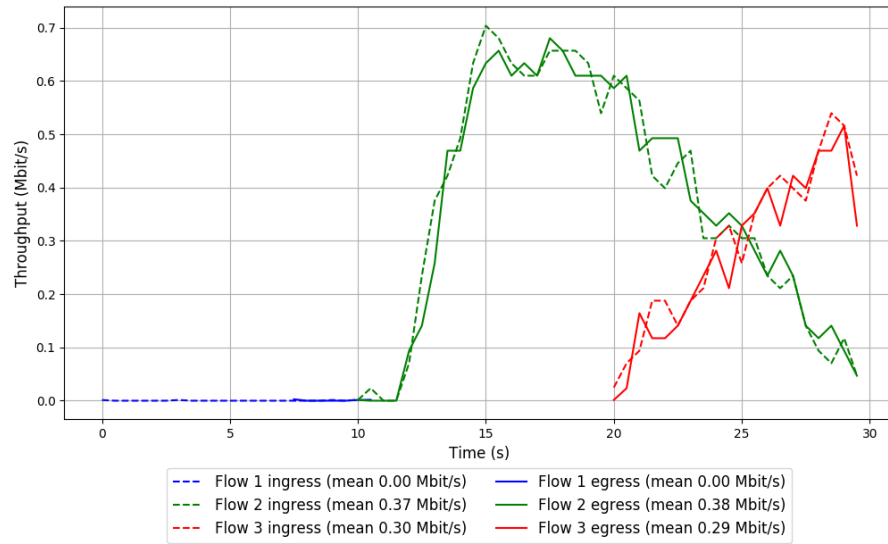
Start at: 2018-01-10 15:39:26

End at: 2018-01-10 15:39:56

Local clock offset: 1.165 ms

Remote clock offset: -4.134 ms

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

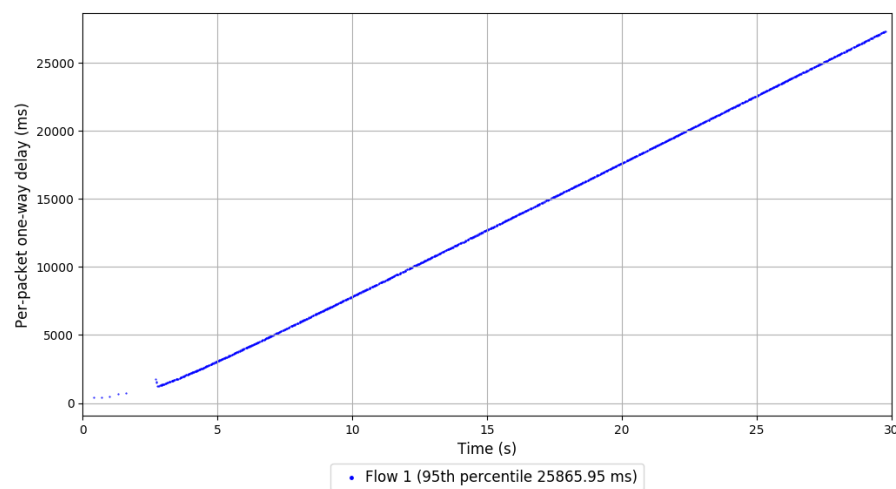
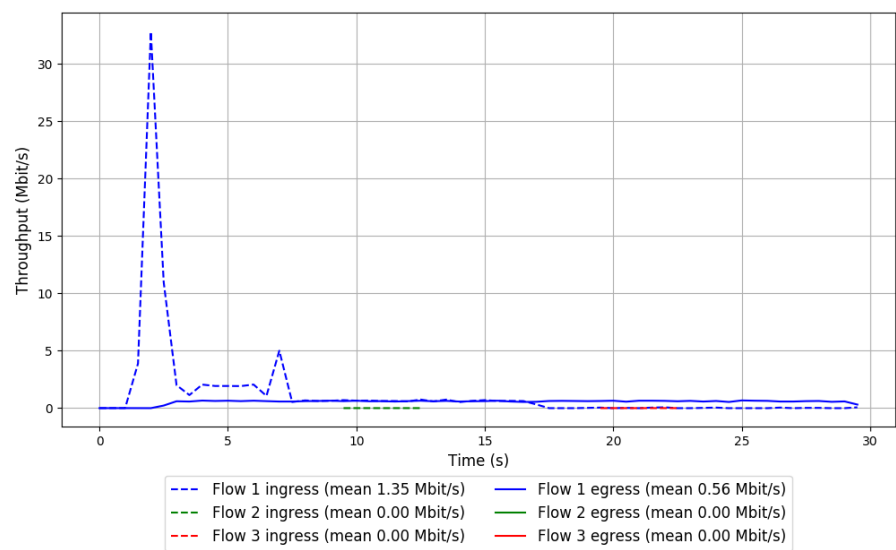


Run 1: Statistics of PCC

Start at: 2018-01-10 15:03:12  
End at: 2018-01-10 15:03:42  
Local clock offset: 0.354 ms  
Remote clock offset: -4.749 ms

# Below is generated by plot.py at 2018-01-10 16:35:31  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.56 Mbit/s  
95th percentile per-packet one-way delay: 25865.953 ms  
Loss rate: 58.71%  
-- Flow 1:  
Average throughput: 0.56 Mbit/s  
95th percentile per-packet one-way delay: 25865.953 ms  
Loss rate: 58.68%  
-- Flow 2:  
Average throughput: 0.00 Mbit/s  
-- Flow 3:  
Average throughput: 0.00 Mbit/s

Run 1: Report of PCC — Data Link



Run 2: Statistics of PCC

Start at: 2018-01-10 15:21:54

End at: 2018-01-10 15:22:24

Local clock offset: 0.479 ms

Remote clock offset: 1.279 ms

# Below is generated by plot.py at 2018-01-10 16:35:31

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.54 Mbit/s

95th percentile per-packet one-way delay: 25868.113 ms

Loss rate: 58.84%

-- Flow 1:

Average throughput: 0.54 Mbit/s

95th percentile per-packet one-way delay: 25868.113 ms

Loss rate: 58.82%

-- Flow 2:

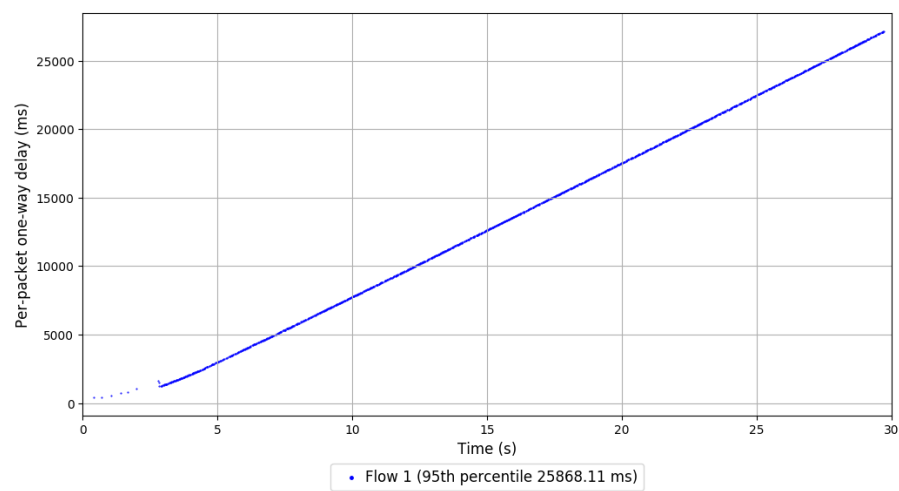
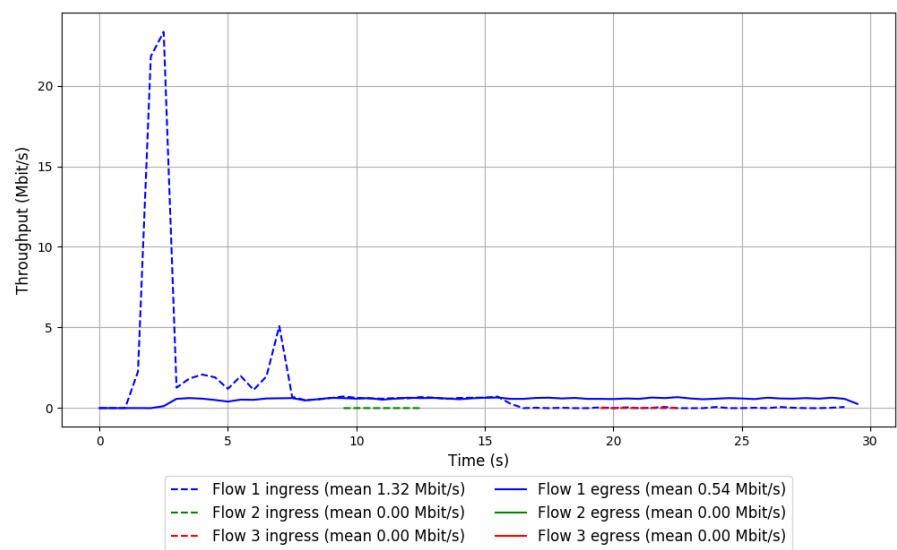
Average throughput: 0.00 Mbit/s

-- Flow 3:

Average throughput: 0.00 Mbit/s



Run 2: Report of PCC — Data Link



Run 3: Statistics of PCC

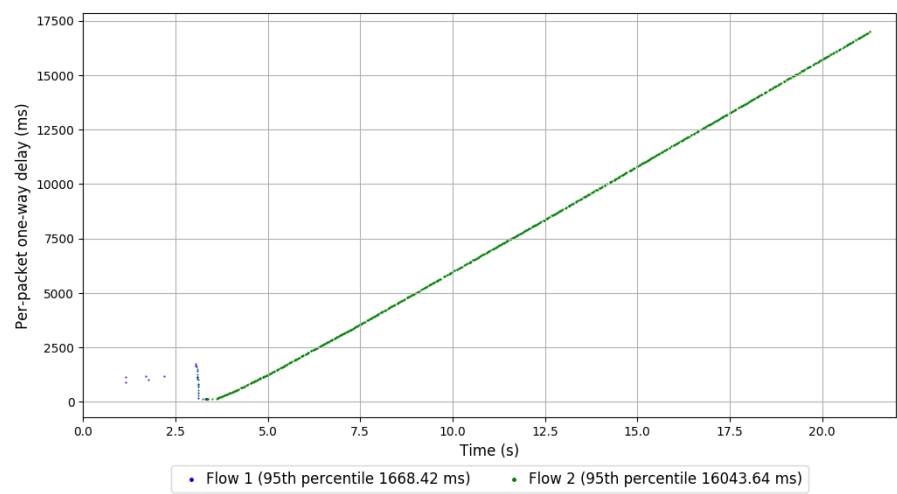
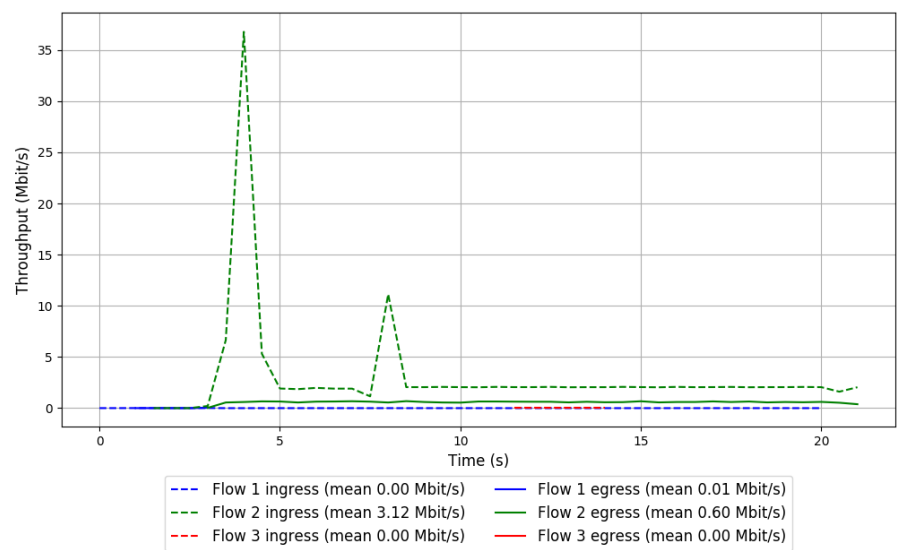
Start at: 2018-01-10 15:40:41

End at: 2018-01-10 15:41:11

Local clock offset: 1.226 ms

Remote clock offset: 1.881 ms

Run 3: Report of PCC — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2018-01-10 14:54:20

End at: 2018-01-10 14:54:50

Local clock offset: 0.375 ms

Remote clock offset: 0.181 ms

# Below is generated by plot.py at 2018-01-10 16:35:32

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.60 Mbit/s

95th percentile per-packet one-way delay: 8697.712 ms

Loss rate: 32.74%

-- Flow 1:

Average throughput: 0.60 Mbit/s

95th percentile per-packet one-way delay: 8688.640 ms

Loss rate: 32.74%

-- Flow 2:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 6075.086 ms

Loss rate: 0.00%

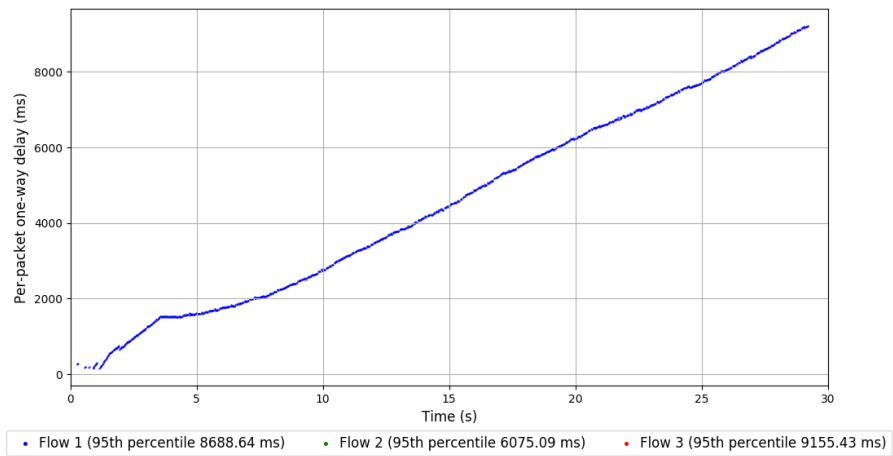
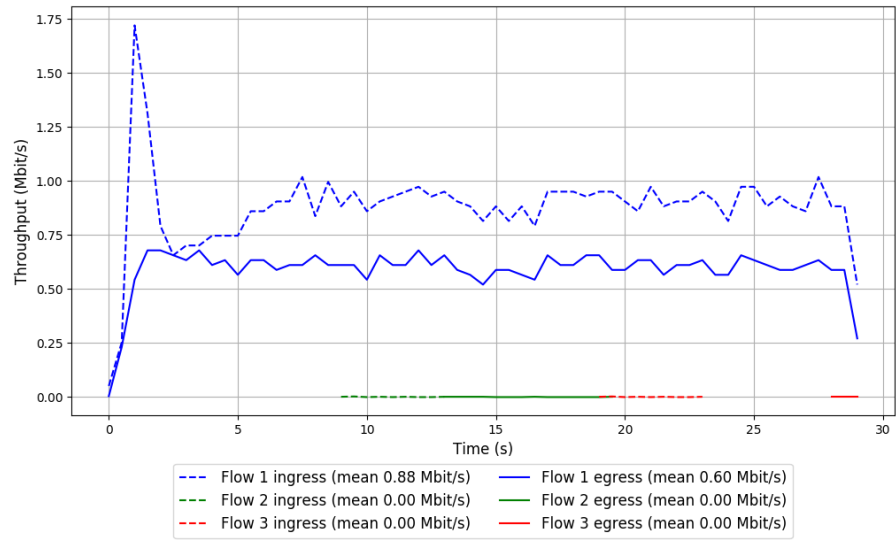
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 9155.426 ms

Loss rate: 50.00%

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

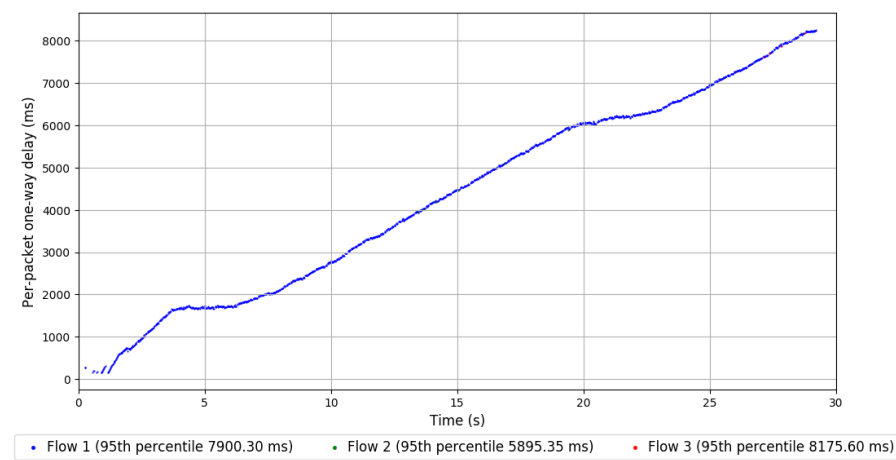
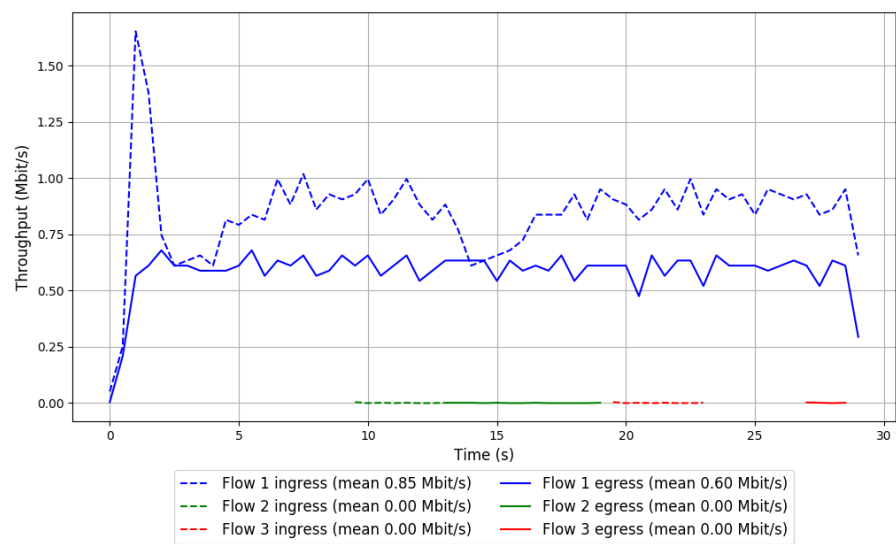


Run 2: Statistics of QUIC Cubic

Start at: 2018-01-10 15:13:11  
End at: 2018-01-10 15:13:41  
Local clock offset: 0.345 ms  
Remote clock offset: -0.156 ms

# Below is generated by plot.py at 2018-01-10 16:35:32  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.60 Mbit/s  
95th percentile per-packet one-way delay: 7900.300 ms  
Loss rate: 30.64%  
-- Flow 1:  
Average throughput: 0.60 Mbit/s  
95th percentile per-packet one-way delay: 7900.300 ms  
Loss rate: 30.64%  
-- Flow 2:  
Average throughput: 0.00 Mbit/s  
95th percentile per-packet one-way delay: 5895.353 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.00 Mbit/s  
95th percentile per-packet one-way delay: 8175.599 ms  
Loss rate: 33.33%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2018-01-10 15:31:55

End at: 2018-01-10 15:32:25

Local clock offset: 0.668 ms

Remote clock offset: 1.424 ms

# Below is generated by plot.py at 2018-01-10 16:35:32

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.53 Mbit/s

95th percentile per-packet one-way delay: 6219.401 ms

Loss rate: 28.20%

-- Flow 1:

Average throughput: 0.53 Mbit/s

95th percentile per-packet one-way delay: 6219.401 ms

Loss rate: 28.20%

-- Flow 2:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 4340.931 ms

Loss rate: 0.00%

-- Flow 3:

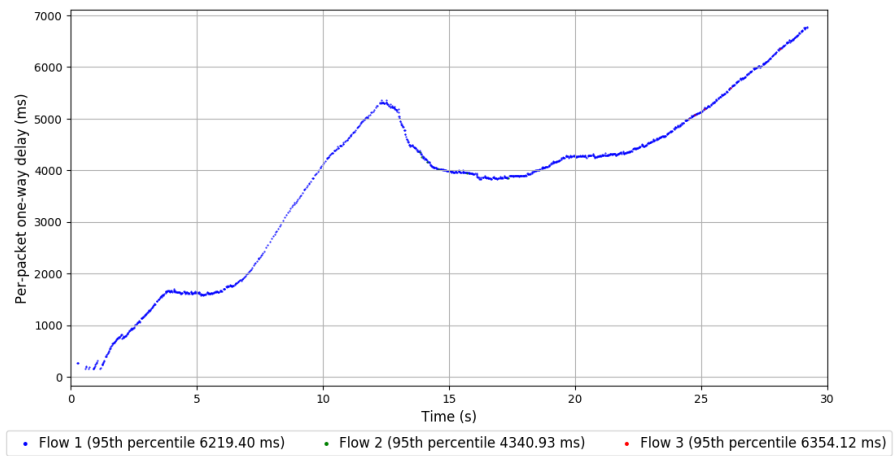
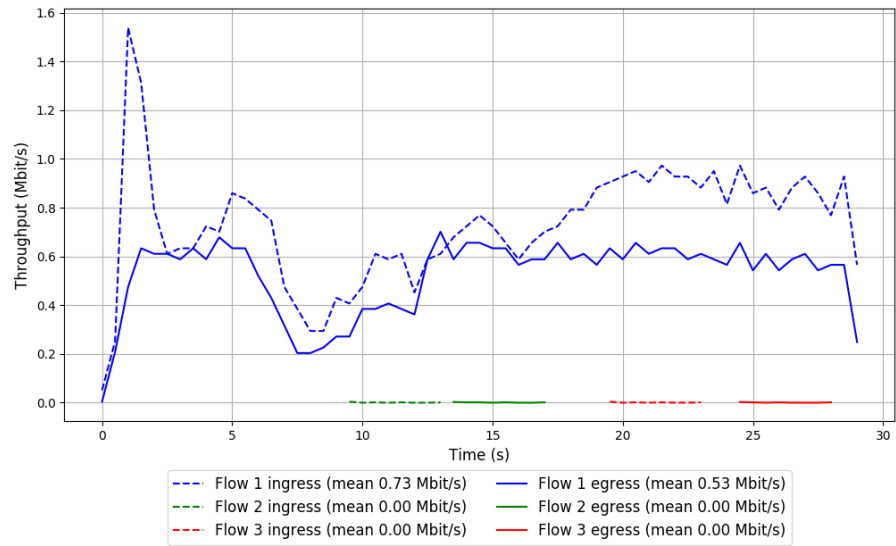
Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 6354.124 ms

Loss rate: 16.67%



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

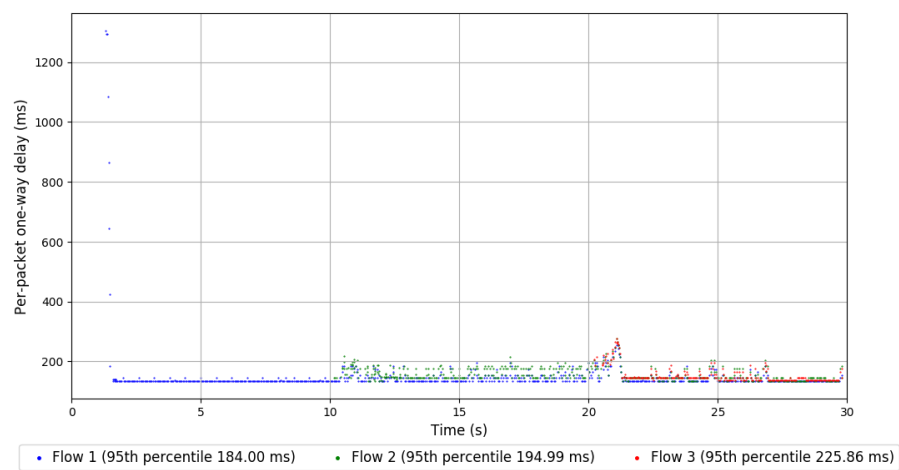
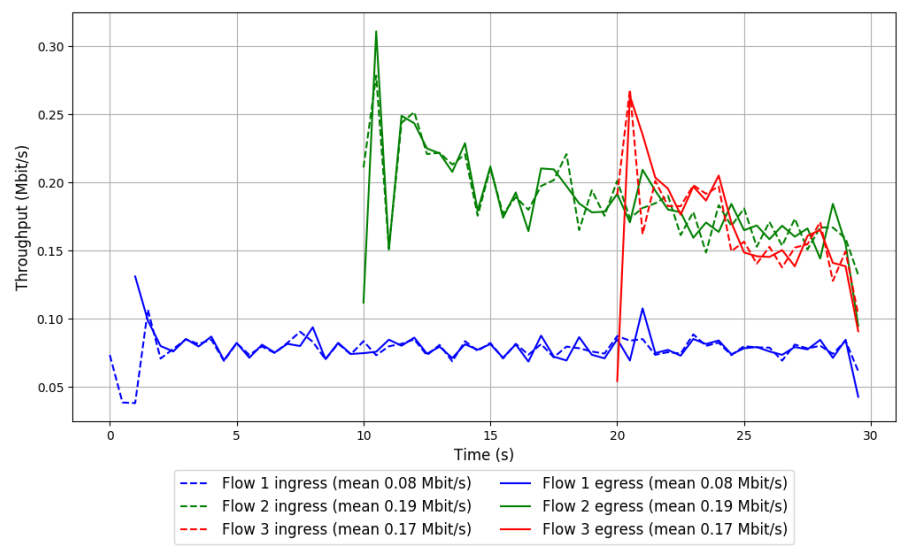


```
Run 1: Statistics of SCReAM

Start at: 2018-01-10 14:48:06
End at: 2018-01-10 14:48:36
Local clock offset: 0.355 ms
Remote clock offset: -4.865 ms

# Below is generated by plot.py at 2018-01-10 16:35:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 194.606 ms
Loss rate: 1.14%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 183.999 ms
Loss rate: 0.80%
-- Flow 2:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 194.987 ms
Loss rate: 1.11%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 225.863 ms
Loss rate: 1.68%
```

Run 1: Report of SReAM — Data Link



Run 2: Statistics of SCReAM

Start at: 2018-01-10 15:06:57

End at: 2018-01-10 15:07:27

Local clock offset: 0.276 ms

Remote clock offset: 0.557 ms

# Below is generated by plot.py at 2018-01-10 16:35:36

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.24 Mbit/s

95th percentile per-packet one-way delay: 192.997 ms

Loss rate: 1.12%

-- Flow 1:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 173.074 ms

Loss rate: 0.80%

-- Flow 2:

Average throughput: 0.16 Mbit/s

95th percentile per-packet one-way delay: 195.525 ms

Loss rate: 1.08%

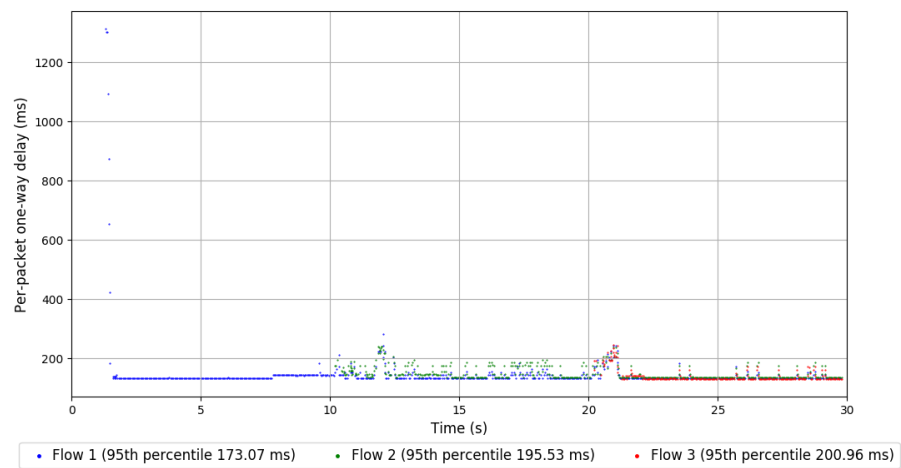
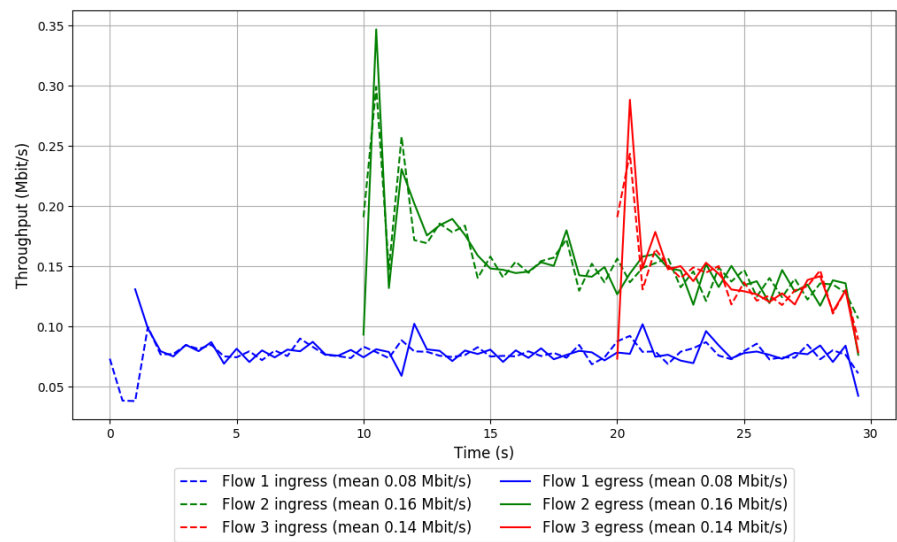
-- Flow 3:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 200.964 ms

Loss rate: 1.73%

Run 2: Report of SReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2018-01-10 15:25:39

End at: 2018-01-10 15:26:09

Local clock offset: 0.568 ms

Remote clock offset: 0.494 ms

# Below is generated by plot.py at 2018-01-10 16:35:37

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.27 Mbit/s

95th percentile per-packet one-way delay: 211.615 ms

Loss rate: 1.08%

-- Flow 1:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 182.232 ms

Loss rate: 0.79%

-- Flow 2:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 206.695 ms

Loss rate: 0.94%

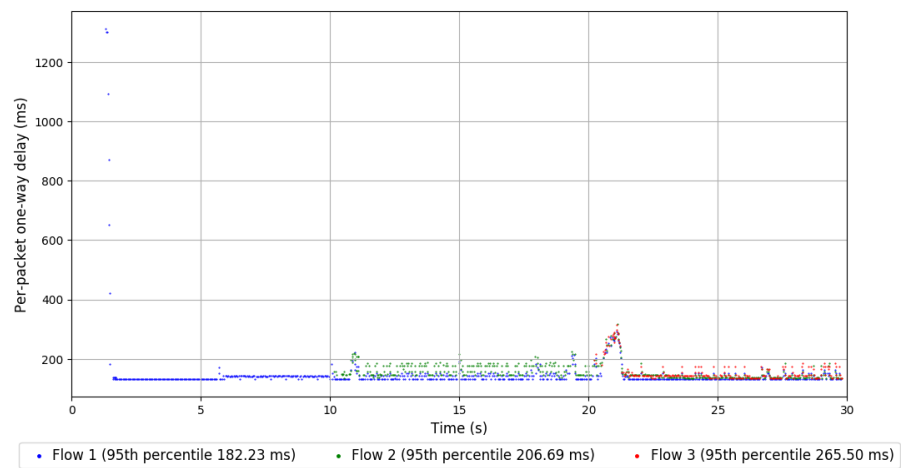
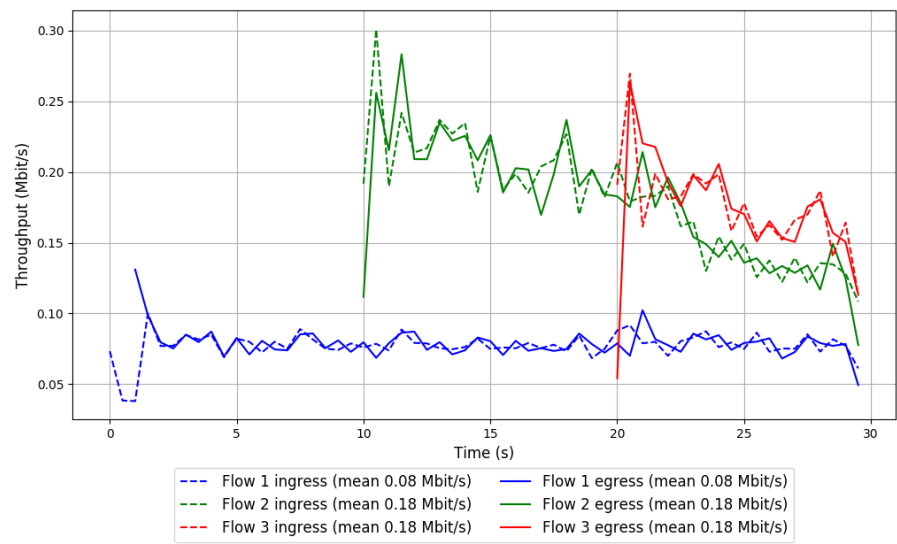
-- Flow 3:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 265.499 ms

Loss rate: 1.77%

Run 3: Report of SReAM — Data Link



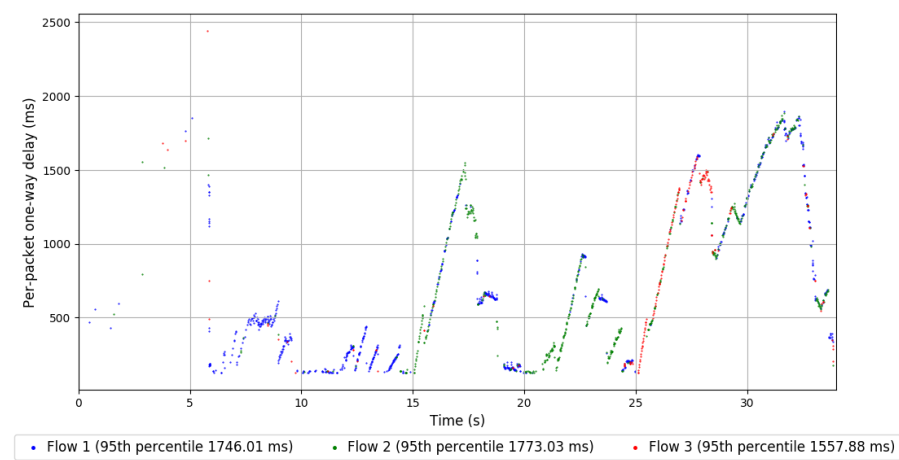
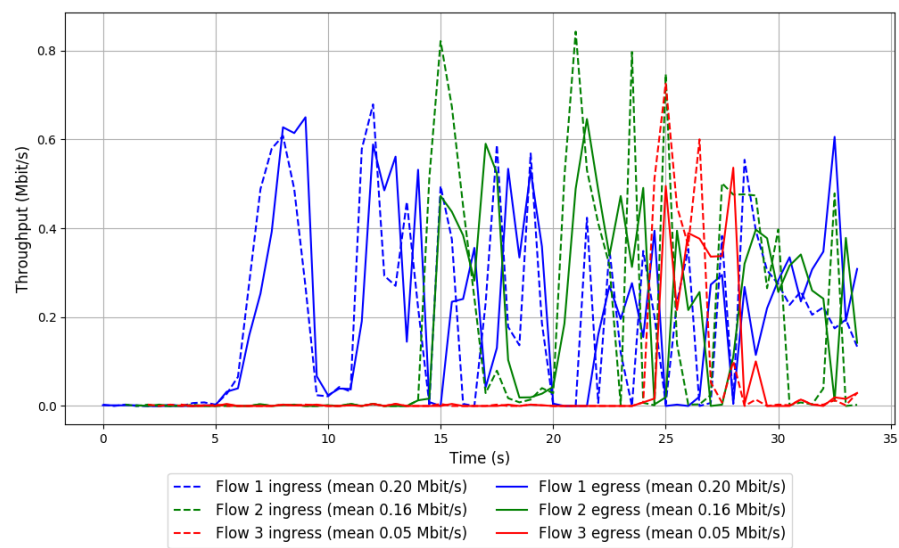
Run 1: Statistics of WebRTC media

Start at: 2018-01-10 14:59:26  
End at: 2018-01-10 14:59:56  
Local clock offset: 0.359 ms  
Remote clock offset: -0.324 ms

# Below is generated by plot.py at 2018-01-10 16:35:38  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.40 Mbit/s  
95th percentile per-packet one-way delay: 1745.874 ms  
Loss rate: 0.43%  
-- Flow 1:  
Average throughput: 0.20 Mbit/s  
95th percentile per-packet one-way delay: 1746.005 ms  
Loss rate: 0.84%  
-- Flow 2:  
Average throughput: 0.16 Mbit/s  
95th percentile per-packet one-way delay: 1773.033 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.05 Mbit/s  
95th percentile per-packet one-way delay: 1557.876 ms  
Loss rate: 0.05%



Run 1: Report of WebRTC media — Data Link

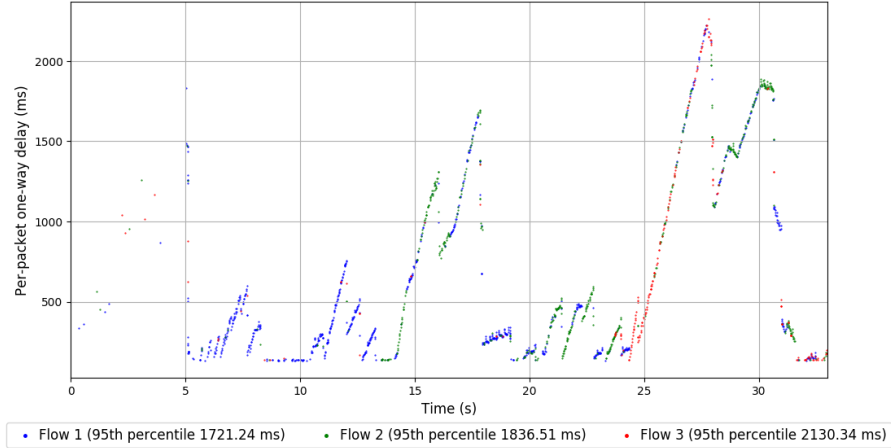
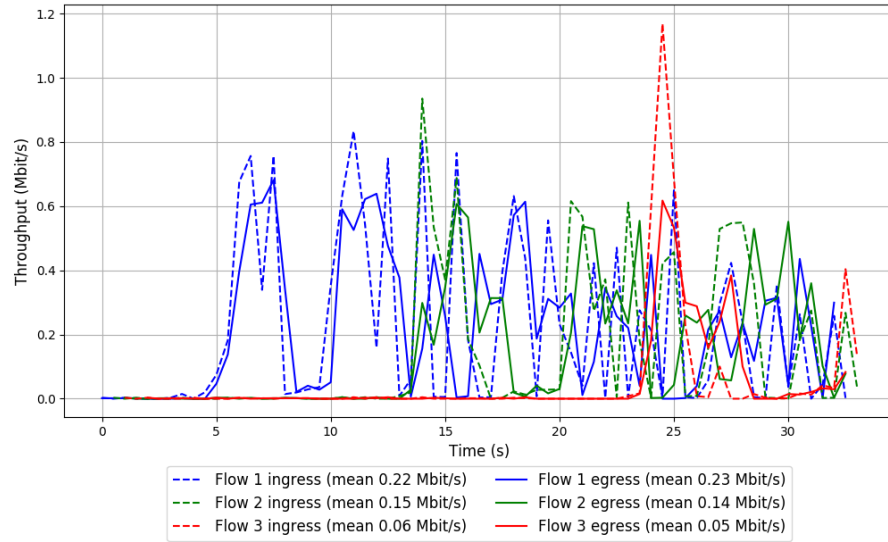


Run 2: Statistics of WebRTC media

Start at: 2018-01-10 15:18:11  
End at: 2018-01-10 15:18:41  
Local clock offset: 0.414 ms  
Remote clock offset: -4.884 ms

# Below is generated by plot.py at 2018-01-10 16:35:39  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.41 Mbit/s  
95th percentile per-packet one-way delay: 1831.041 ms  
Loss rate: 2.55%  
-- Flow 1:  
Average throughput: 0.23 Mbit/s  
95th percentile per-packet one-way delay: 1721.243 ms  
Loss rate: 0.01%  
-- Flow 2:  
Average throughput: 0.14 Mbit/s  
95th percentile per-packet one-way delay: 1836.507 ms  
Loss rate: 2.41%  
-- Flow 3:  
Average throughput: 0.05 Mbit/s  
95th percentile per-packet one-way delay: 2130.341 ms  
Loss rate: 13.35%

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

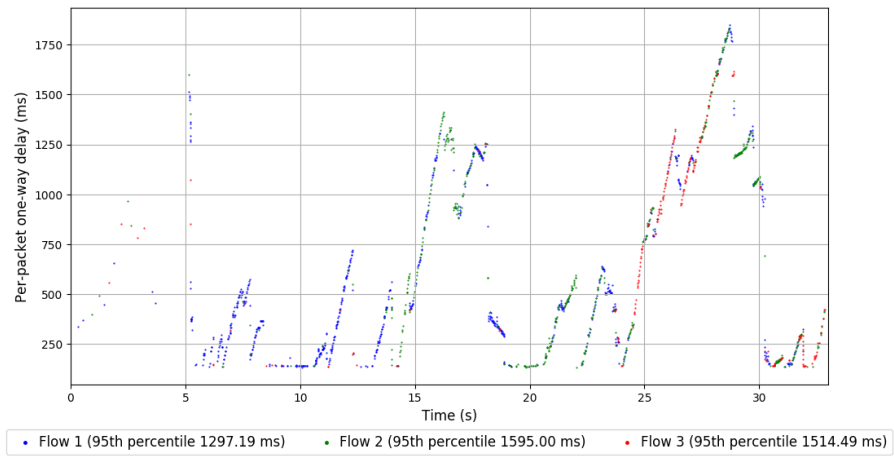
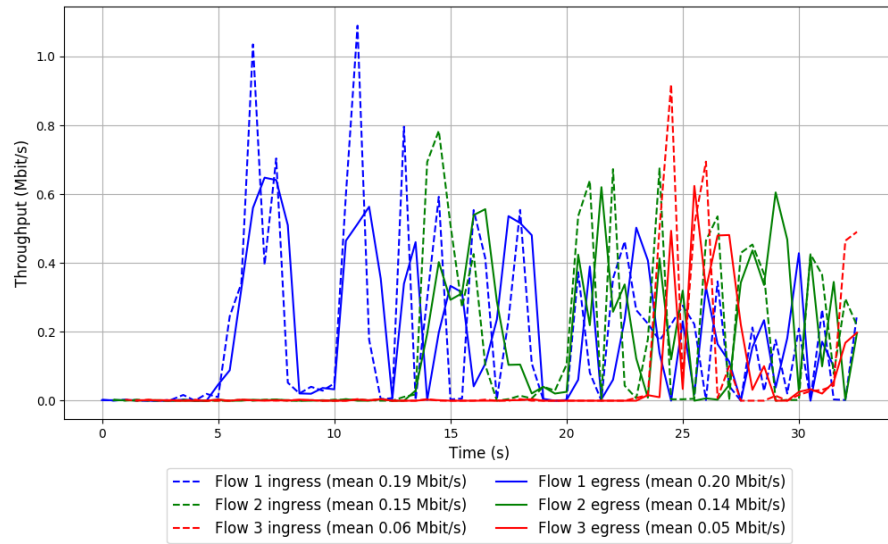


Run 3: Statistics of WebRTC media

Start at: 2018-01-10 15:36:57  
End at: 2018-01-10 15:37:27  
Local clock offset: 1.015 ms  
Remote clock offset: -4.224 ms

# Below is generated by plot.py at 2018-01-10 16:35:39  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.38 Mbit/s  
95th percentile per-packet one-way delay: 1473.788 ms  
Loss rate: 4.44%  
-- Flow 1:  
Average throughput: 0.20 Mbit/s  
95th percentile per-packet one-way delay: 1297.195 ms  
Loss rate: 1.99%  
-- Flow 2:  
Average throughput: 0.14 Mbit/s  
95th percentile per-packet one-way delay: 1594.998 ms  
Loss rate: 3.35%  
-- Flow 3:  
Average throughput: 0.05 Mbit/s  
95th percentile per-packet one-way delay: 1514.492 ms  
Loss rate: 14.93%

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

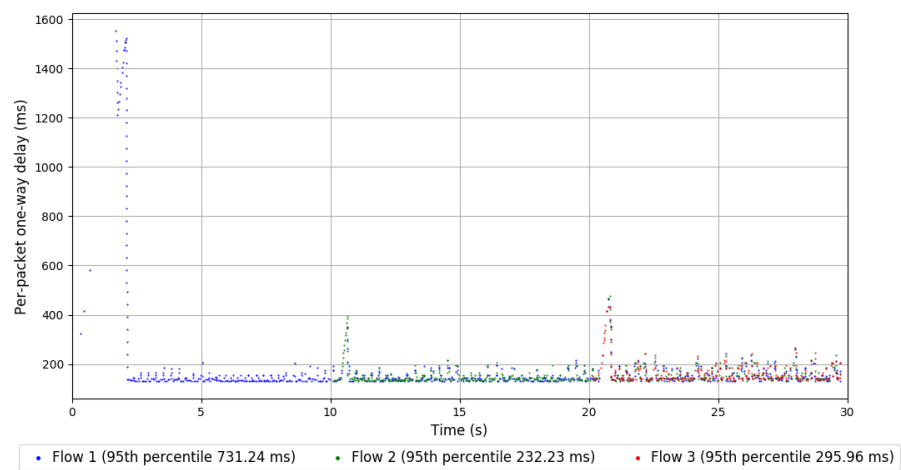
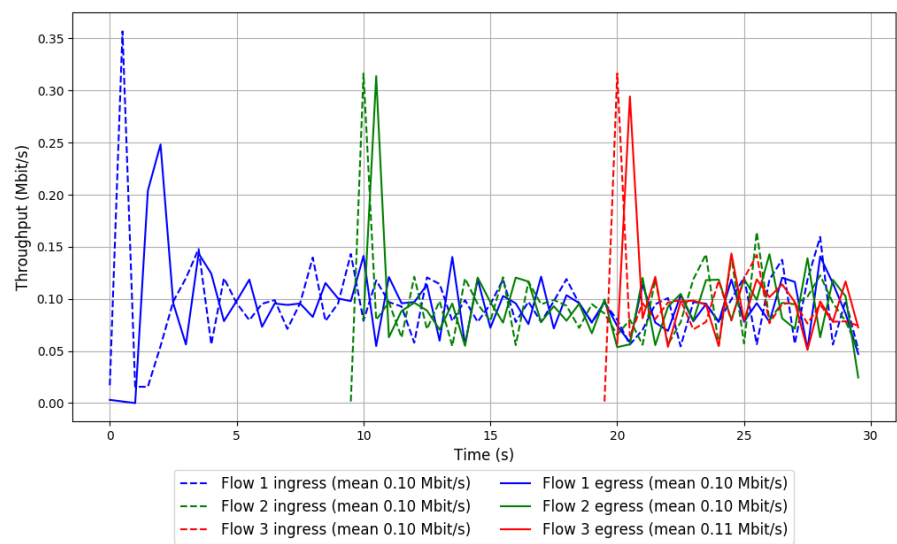


Run 1: Statistics of Sprout

Start at: 2018-01-10 14:49:20  
End at: 2018-01-10 14:49:50  
Local clock offset: 0.373 ms  
Remote clock offset: -3.972 ms

# Below is generated by plot.py at 2018-01-10 16:35:39  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.20 Mbit/s  
95th percentile per-packet one-way delay: 326.268 ms  
Loss rate: 0.90%  
-- Flow 1:  
Average throughput: 0.10 Mbit/s  
95th percentile per-packet one-way delay: 731.238 ms  
Loss rate: 0.85%  
-- Flow 2:  
Average throughput: 0.10 Mbit/s  
95th percentile per-packet one-way delay: 232.234 ms  
Loss rate: 1.24%  
-- Flow 3:  
Average throughput: 0.11 Mbit/s  
95th percentile per-packet one-way delay: 295.956 ms  
Loss rate: 0.39%

Run 1: Report of Sprout — Data Link



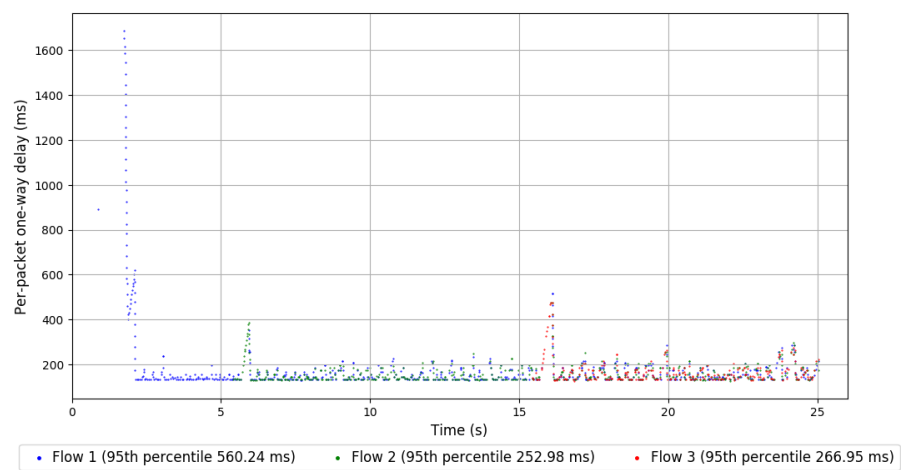
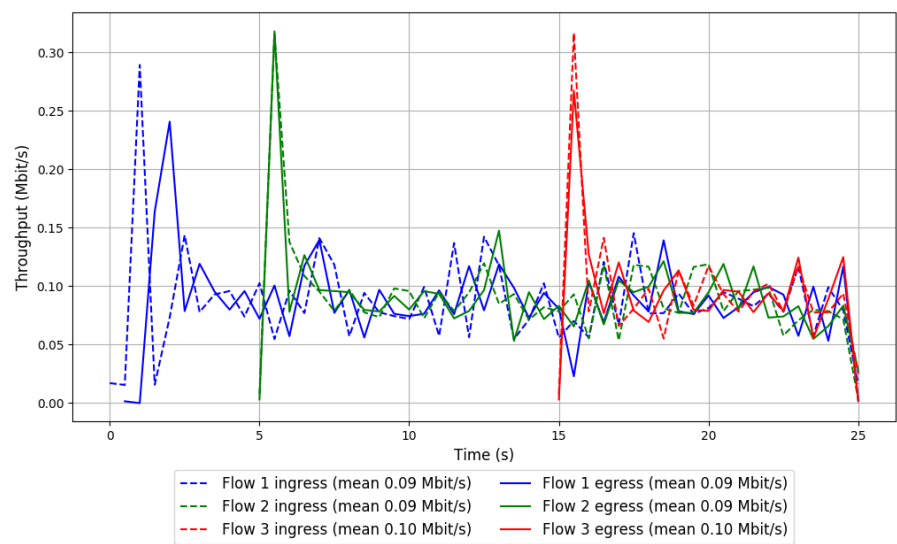
## Run 2: Statistics of Sprout

Start at: 2018-01-10 15:08:11  
End at: 2018-01-10 15:08:41  
Local clock offset: 0.339 ms  
Remote clock offset: 1.411 ms

# Below is generated by plot.py at 2018-01-10 16:35:40  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.21 Mbit/s  
95th percentile per-packet one-way delay: 334.160 ms  
Loss rate: 1.13%  
-- Flow 1:  
Average throughput: 0.09 Mbit/s  
95th percentile per-packet one-way delay: 560.237 ms  
Loss rate: 1.02%  
-- Flow 2:  
Average throughput: 0.09 Mbit/s  
95th percentile per-packet one-way delay: 252.982 ms  
Loss rate: 0.60%  
-- Flow 3:  
Average throughput: 0.10 Mbit/s  
95th percentile per-packet one-way delay: 266.952 ms  
Loss rate: 2.37%



Run 2: Report of Sprout — Data Link

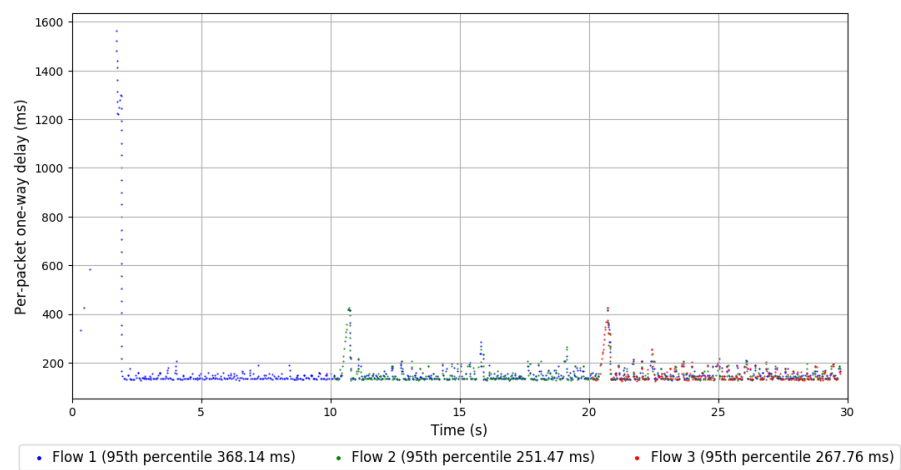
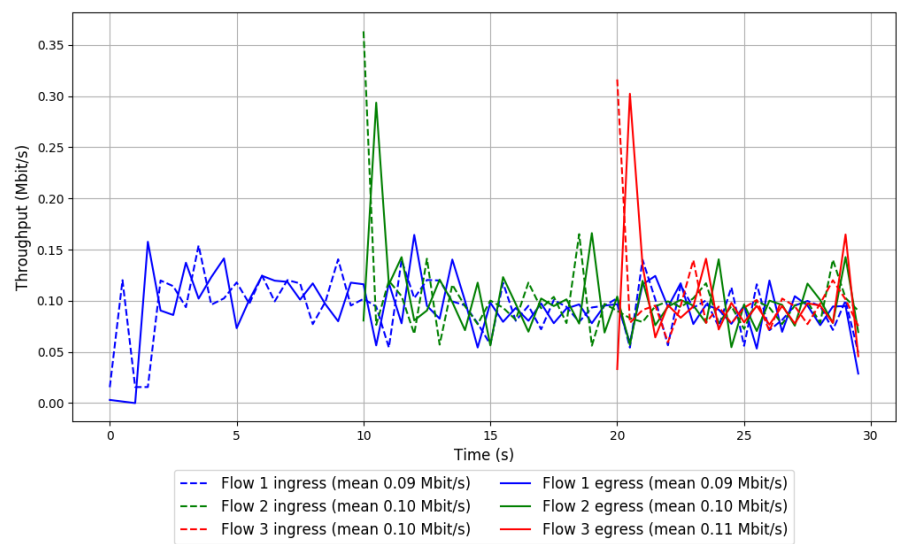


### Run 3: Statistics of Sprout

Start at: 2018-01-10 15:26:53  
End at: 2018-01-10 15:27:23  
Local clock offset: 0.559 ms  
Remote clock offset: 1.69 ms

```
# Below is generated by plot.py at 2018-01-10 16:35:41
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 286.768 ms
Loss rate: 1.10%
-- Flow 1:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 368.144 ms
Loss rate: 0.85%
-- Flow 2:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 251.470 ms
Loss rate: 1.16%
-- Flow 3:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 267.762 ms
Loss rate: 1.66%
```

Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

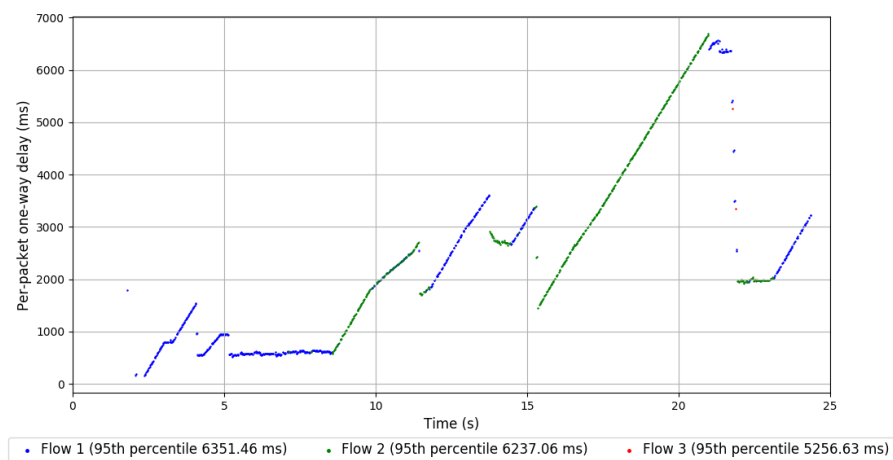
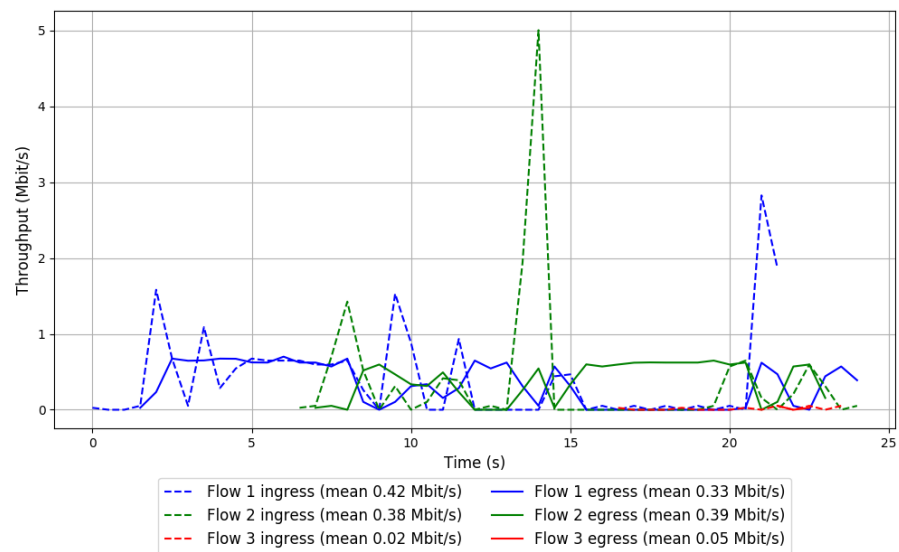
Start at: 2018-01-10 14:53:05

End at: 2018-01-10 14:53:35

Local clock offset: 0.366 ms

Remote clock offset: 0.818 ms

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

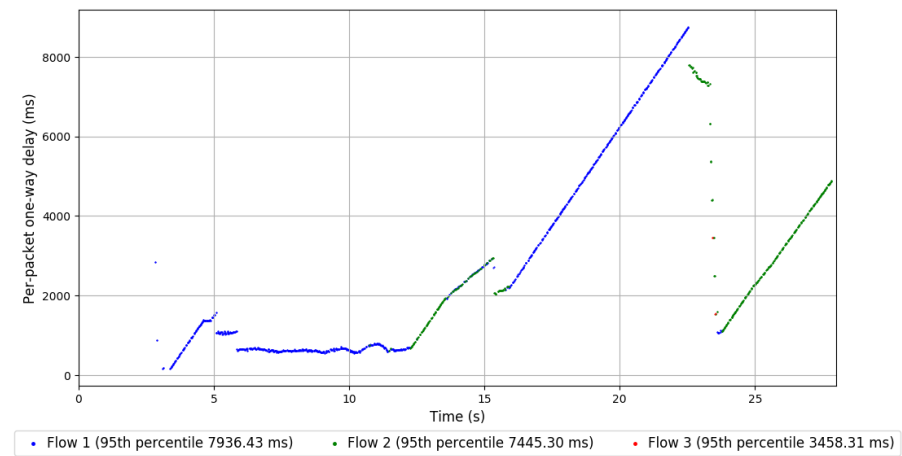
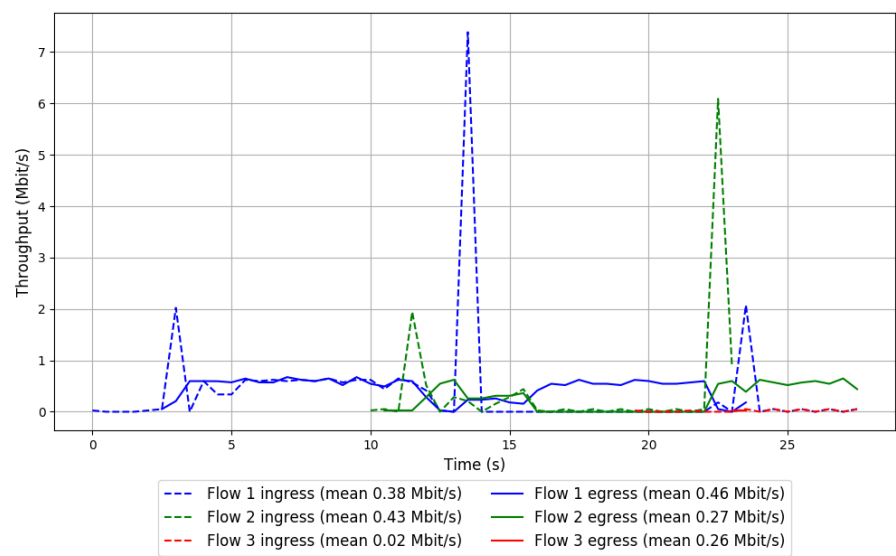


Run 2: Statistics of TaoVA-100x

Start at: 2018-01-10 15:11:56  
End at: 2018-01-10 15:12:26  
Local clock offset: 0.333 ms  
Remote clock offset: -4.563 ms

# Below is generated by plot.py at 2018-01-10 16:35:45  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.57 Mbit/s  
95th percentile per-packet one-way delay: 7689.493 ms  
Loss rate: 14.22%  
-- Flow 1:  
Average throughput: 0.46 Mbit/s  
95th percentile per-packet one-way delay: 7936.433 ms  
Loss rate: 10.63%  
-- Flow 2:  
Average throughput: 0.27 Mbit/s  
95th percentile per-packet one-way delay: 7445.303 ms  
Loss rate: 19.17%  
-- Flow 3:  
Average throughput: 0.26 Mbit/s  
95th percentile per-packet one-way delay: 3458.308 ms  
Loss rate: 83.33%

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



Run 3: Statistics of TaoVA-100x

Start at: 2018-01-10 15:30:37

End at: 2018-01-10 15:31:07

Local clock offset: 0.632 ms

Remote clock offset: 1.356 ms

# Below is generated by plot.py at 2018-01-10 16:35:46

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.60 Mbit/s

95th percentile per-packet one-way delay: 6786.330 ms

Loss rate: 21.87%

-- Flow 1:

Average throughput: 0.36 Mbit/s

95th percentile per-packet one-way delay: 7069.223 ms

Loss rate: 22.06%

-- Flow 2:

Average throughput: 0.36 Mbit/s

95th percentile per-packet one-way delay: 6186.502 ms

Loss rate: 21.04%

-- Flow 3:

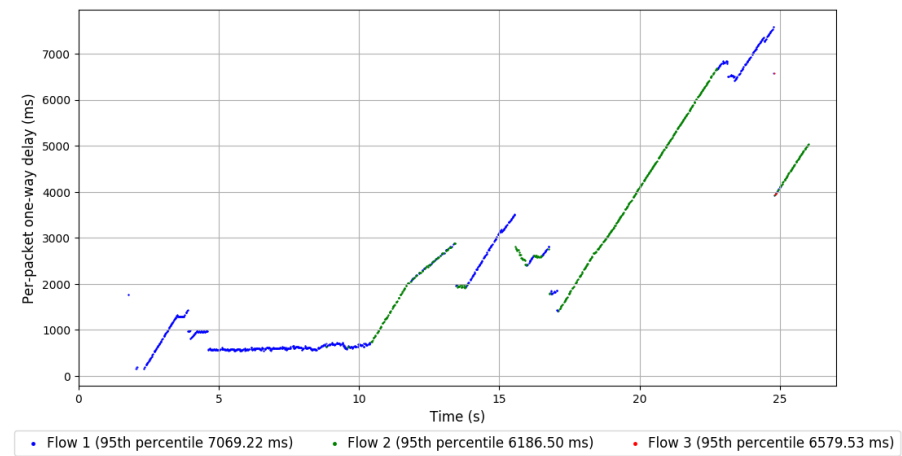
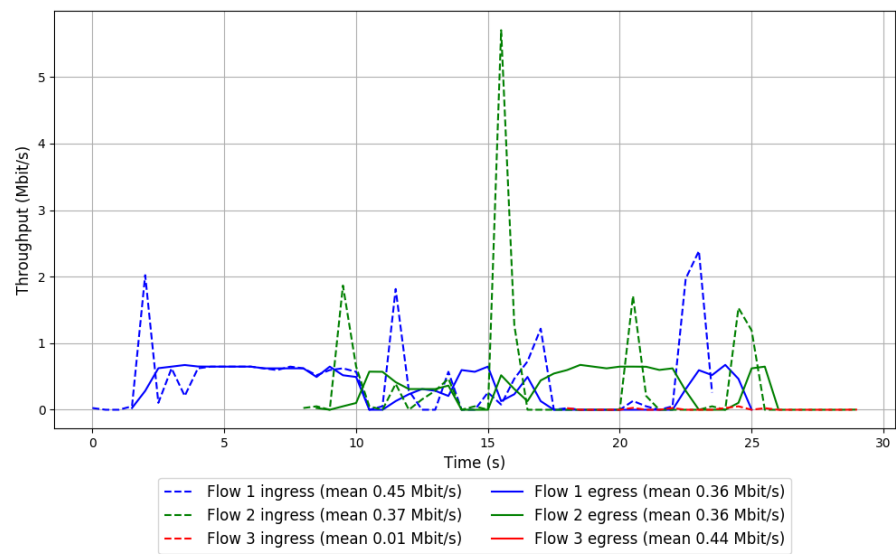
Average throughput: 0.44 Mbit/s

95th percentile per-packet one-way delay: 6579.526 ms

Loss rate: 71.43%



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

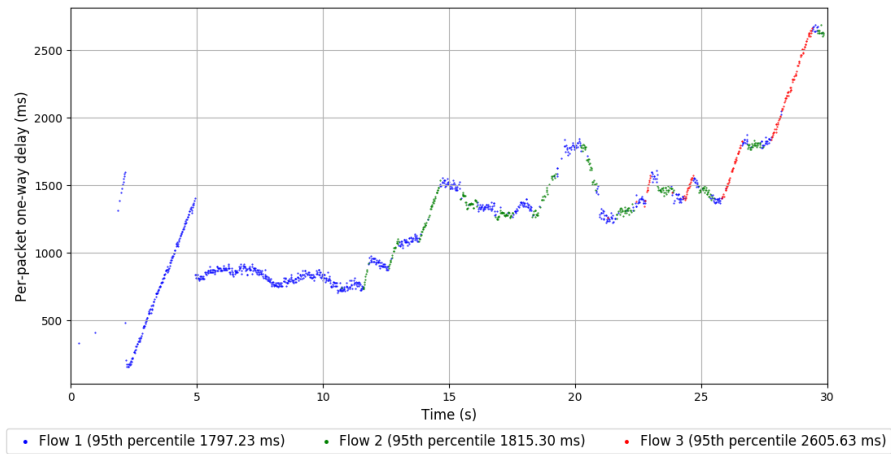
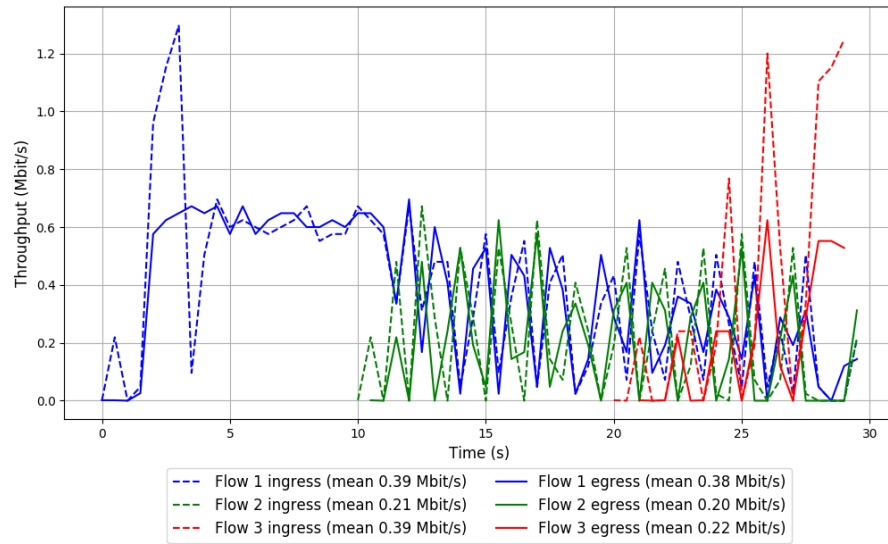


Run 1: Statistics of TCP Vegas

Start at: 2018-01-10 14:46:51  
End at: 2018-01-10 14:47:21  
Local clock offset: 0.372 ms  
Remote clock offset: -4.316 ms

# Below is generated by plot.py at 2018-01-10 16:35:46  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.57 Mbit/s  
95th percentile per-packet one-way delay: 2185.377 ms  
Loss rate: 13.22%  
-- Flow 1:  
Average throughput: 0.38 Mbit/s  
95th percentile per-packet one-way delay: 1797.233 ms  
Loss rate: 3.33%  
-- Flow 2:  
Average throughput: 0.20 Mbit/s  
95th percentile per-packet one-way delay: 1815.303 ms  
Loss rate: 6.34%  
-- Flow 3:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 2605.634 ms  
Loss rate: 51.73%

# Run 1: Report of TCP Vegas — Data Link

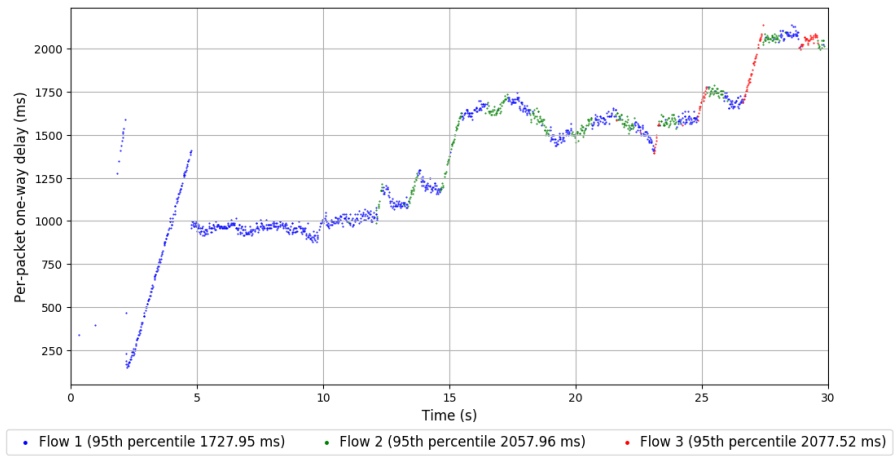
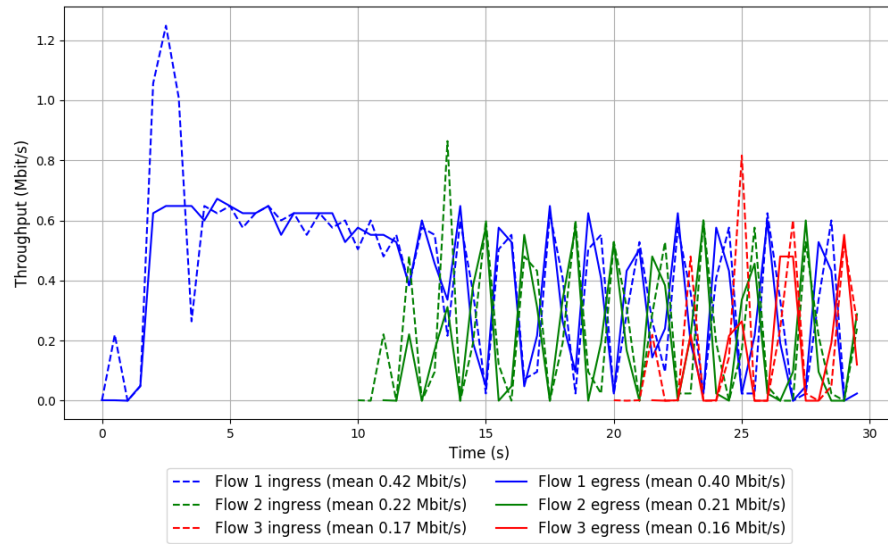


Run 2: Statistics of TCP Vegas

Start at: 2018-01-10 15:05:42  
End at: 2018-01-10 15:06:12  
Local clock offset: 0.339 ms  
Remote clock offset: -3.915 ms

# Below is generated by plot.py at 2018-01-10 16:35:46  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.58 Mbit/s  
95th percentile per-packet one-way delay: 2057.849 ms  
Loss rate: 6.89%  
-- Flow 1:  
Average throughput: 0.40 Mbit/s  
95th percentile per-packet one-way delay: 1727.950 ms  
Loss rate: 3.92%  
-- Flow 2:  
Average throughput: 0.21 Mbit/s  
95th percentile per-packet one-way delay: 2057.964 ms  
Loss rate: 8.28%  
-- Flow 3:  
Average throughput: 0.16 Mbit/s  
95th percentile per-packet one-way delay: 2077.520 ms  
Loss rate: 24.94%

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

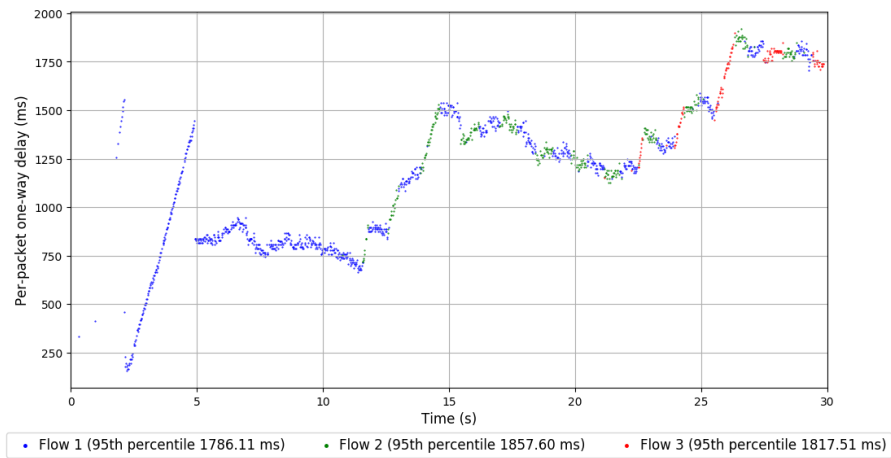
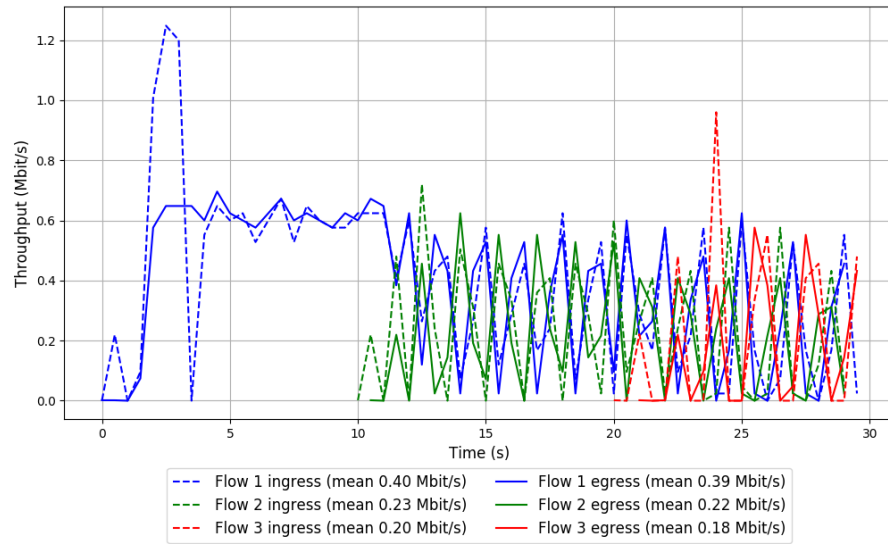


Run 3: Statistics of TCP Vegas

Start at: 2018-01-10 15:24:24  
End at: 2018-01-10 15:24:54  
Local clock offset: 0.521 ms  
Remote clock offset: -3.974 ms

# Below is generated by plot.py at 2018-01-10 16:35:48  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.58 Mbit/s  
95th percentile per-packet one-way delay: 1807.591 ms  
Loss rate: 5.84%  
-- Flow 1:  
Average throughput: 0.39 Mbit/s  
95th percentile per-packet one-way delay: 1786.112 ms  
Loss rate: 3.16%  
-- Flow 2:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 1857.603 ms  
Loss rate: 6.86%  
-- Flow 3:  
Average throughput: 0.18 Mbit/s  
95th percentile per-packet one-way delay: 1817.509 ms  
Loss rate: 19.71%

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



Run 1: Statistics of Verus

Start at: 2018-01-10 14:51:49

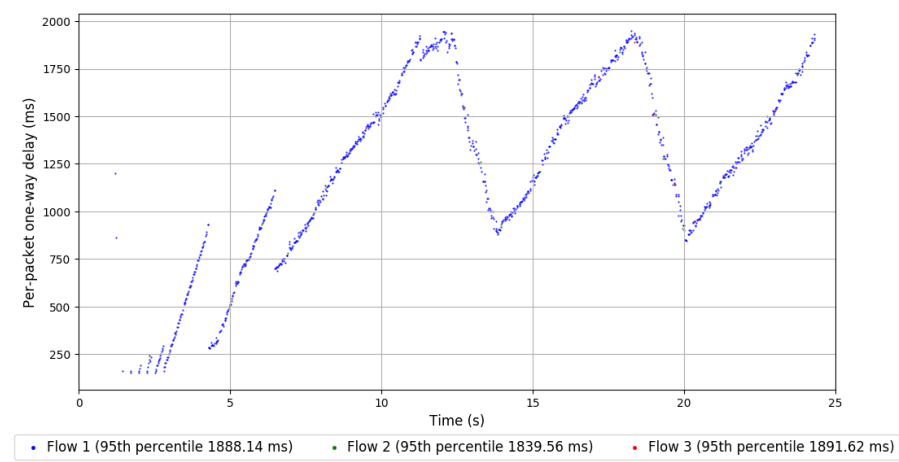
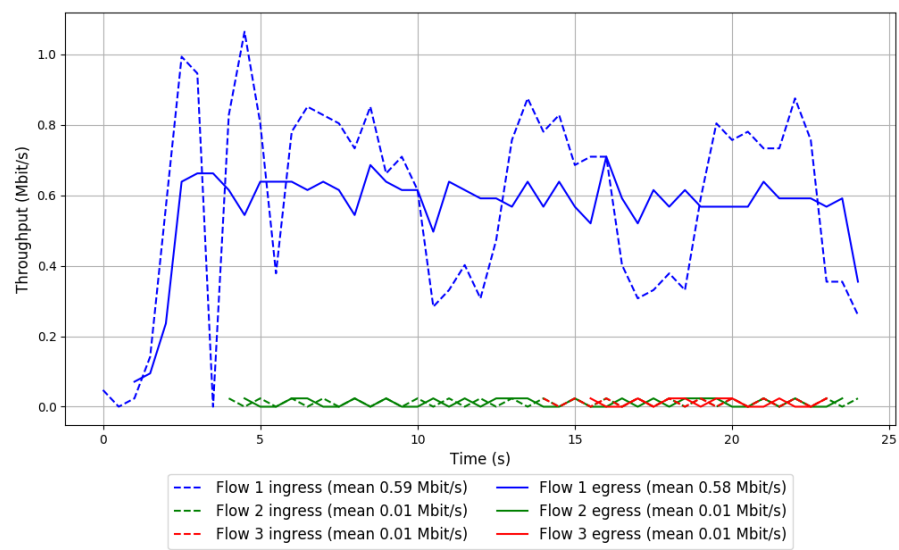
End at: 2018-01-10 14:52:19

Local clock offset: 0.375 ms

Remote clock offset: 0.003 ms



Run 1: Report of Verus — Data Link

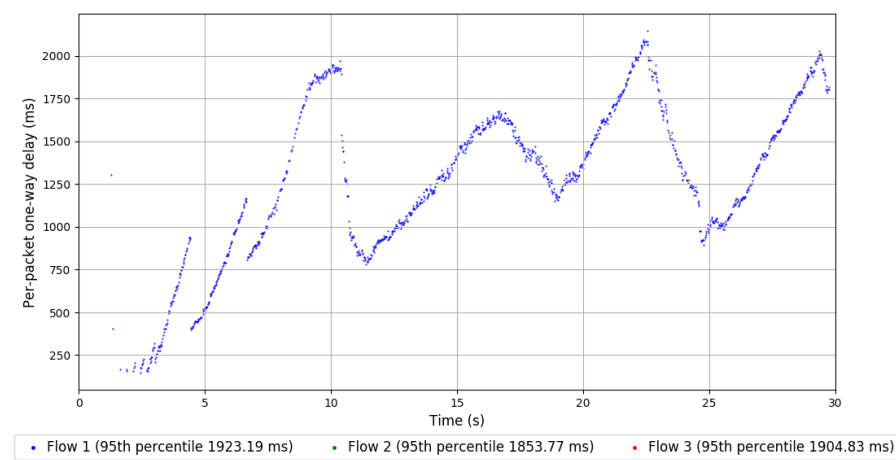
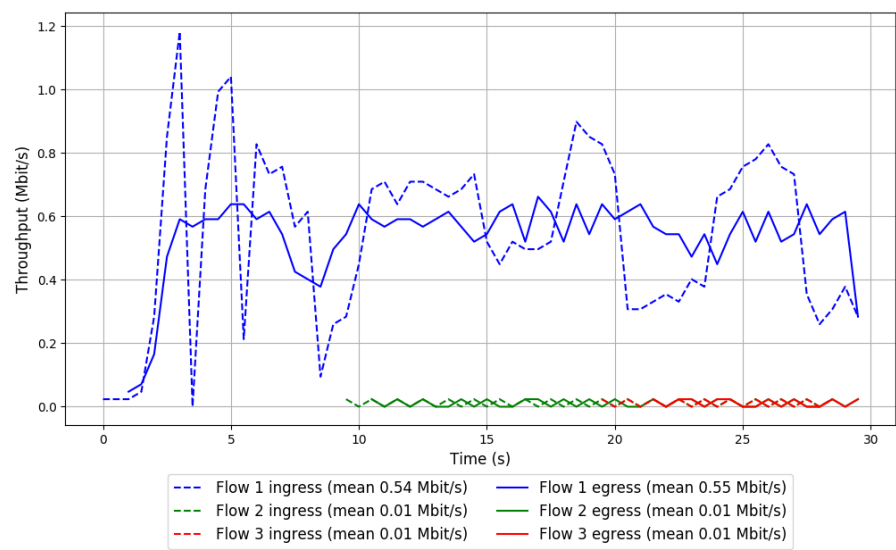


Run 2: Statistics of Verus

Start at: 2018-01-10 15:10:41  
End at: 2018-01-10 15:11:11  
Local clock offset: 0.345 ms  
Remote clock offset: -4.175 ms

# Below is generated by plot.py at 2018-01-10 16:35:49  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.56 Mbit/s  
95th percentile per-packet one-way delay: 1922.953 ms  
Loss rate: 3.93%  
-- Flow 1:  
Average throughput: 0.55 Mbit/s  
95th percentile per-packet one-way delay: 1923.194 ms  
Loss rate: 3.87%  
-- Flow 2:  
Average throughput: 0.01 Mbit/s  
95th percentile per-packet one-way delay: 1853.769 ms  
Loss rate: 5.00%  
-- Flow 3:  
Average throughput: 0.01 Mbit/s  
95th percentile per-packet one-way delay: 1904.827 ms  
Loss rate: 10.00%

Run 2: Report of Verus — Data Link



Run 3: Statistics of Verus

Start at: 2018-01-10 15:29:22

End at: 2018-01-10 15:29:52

Local clock offset: 0.621 ms

Remote clock offset: 0.495 ms

# Below is generated by plot.py at 2018-01-10 16:35:52

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 2311.618 ms

Loss rate: 4.70%

-- Flow 1:

Average throughput: 0.55 Mbit/s

95th percentile per-packet one-way delay: 2311.618 ms

Loss rate: 4.66%

-- Flow 2:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 2361.732 ms

Loss rate: 4.76%

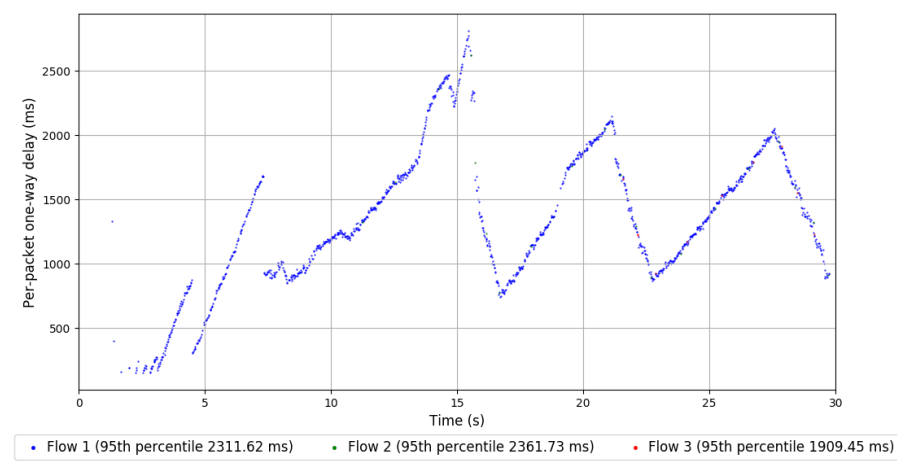
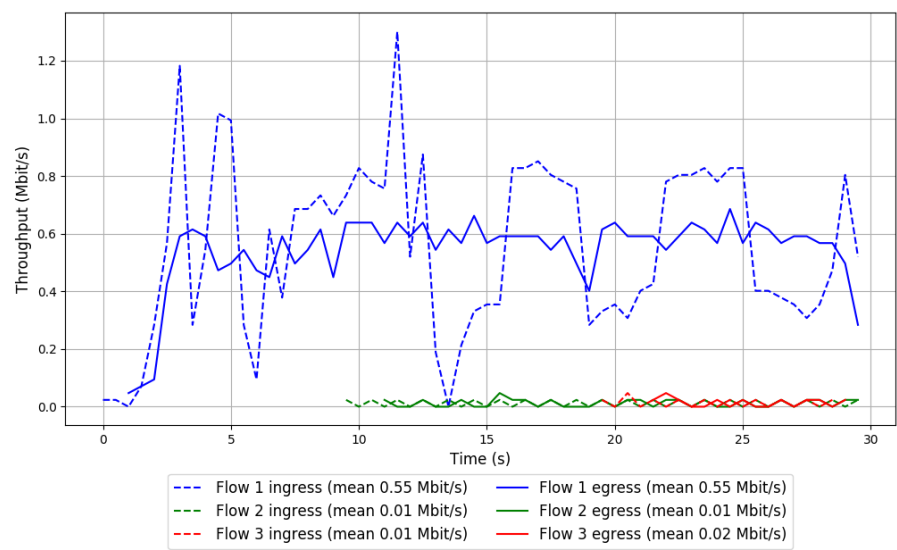
-- Flow 3:

Average throughput: 0.02 Mbit/s

95th percentile per-packet one-way delay: 1909.454 ms

Loss rate: 9.09%

Run 3: Report of Verus — Data Link



Run 1: Statistics of Copa

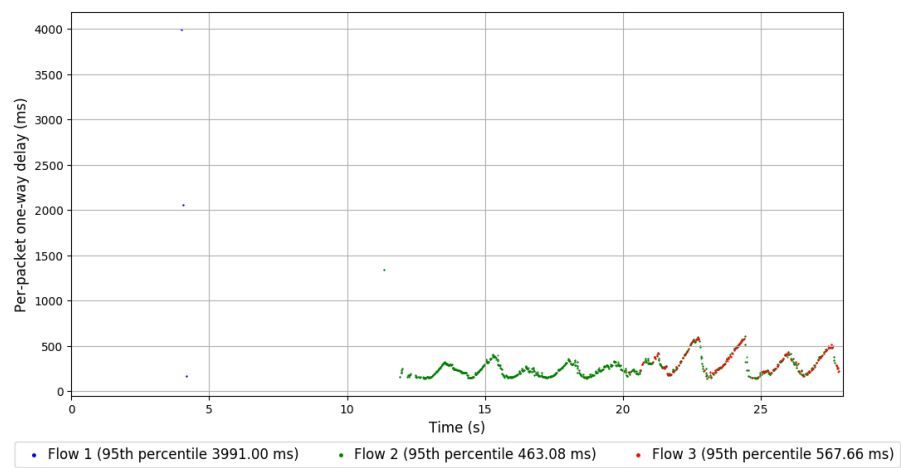
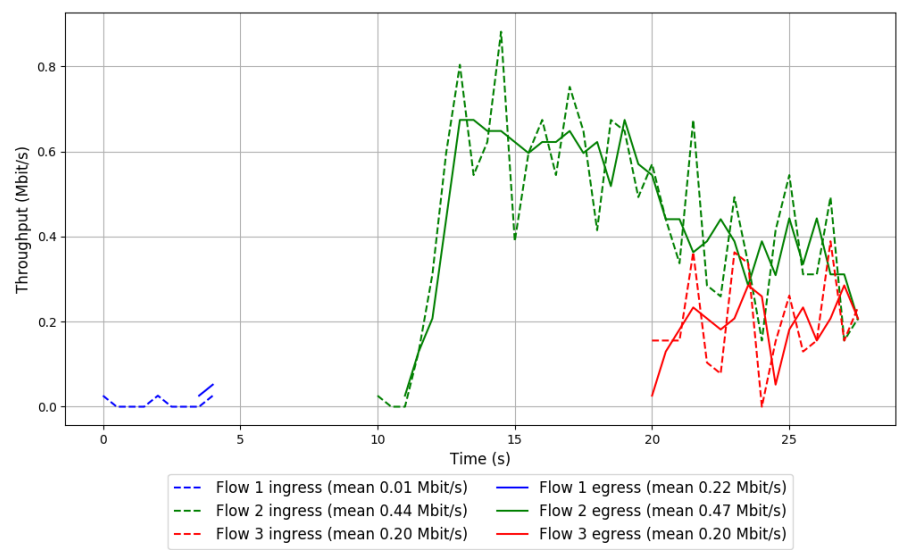
Start at: 2018-01-10 14:55:35

End at: 2018-01-10 14:56:05

Local clock offset: 0.304 ms

Remote clock offset: -4.298 ms

Run 1: Report of Copa — Data Link



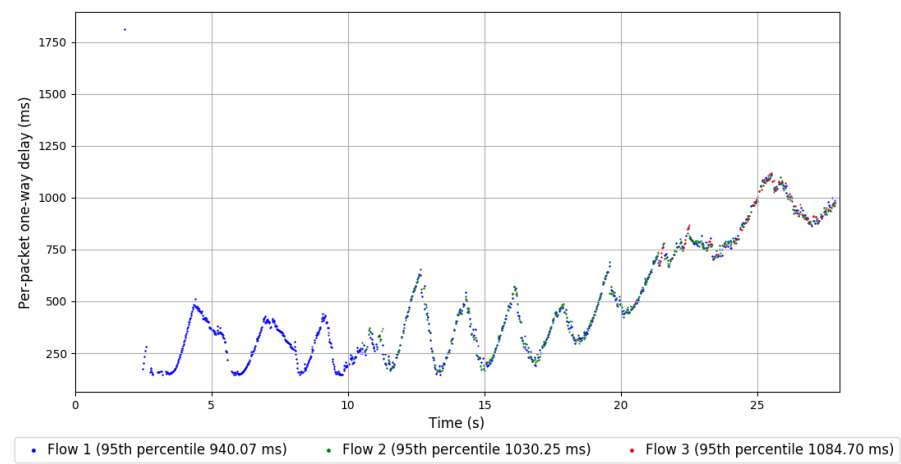
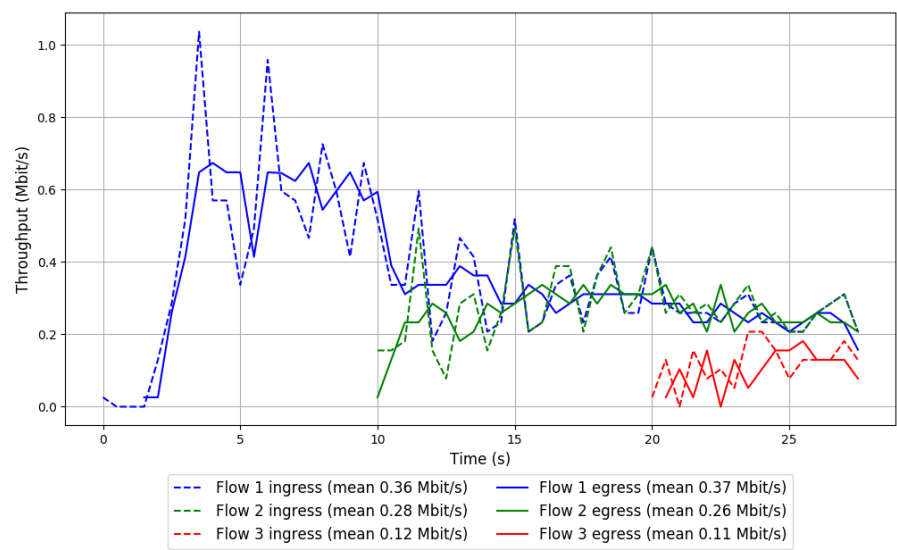
Run 2: Statistics of Copa

Start at: 2018-01-10 15:14:25  
End at: 2018-01-10 15:14:55  
Local clock offset: 0.349 ms  
Remote clock offset: -4.201 ms

# Below is generated by plot.py at 2018-01-10 16:35:53  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.58 Mbit/s  
95th percentile per-packet one-way delay: 997.209 ms  
Loss rate: 4.73%  
-- Flow 1:  
Average throughput: 0.37 Mbit/s  
95th percentile per-packet one-way delay: 940.073 ms  
Loss rate: 2.98%  
-- Flow 2:  
Average throughput: 0.26 Mbit/s  
95th percentile per-packet one-way delay: 1030.254 ms  
Loss rate: 5.76%  
-- Flow 3:  
Average throughput: 0.11 Mbit/s  
95th percentile per-packet one-way delay: 1084.701 ms  
Loss rate: 17.81%



Run 2: Report of Copa — Data Link

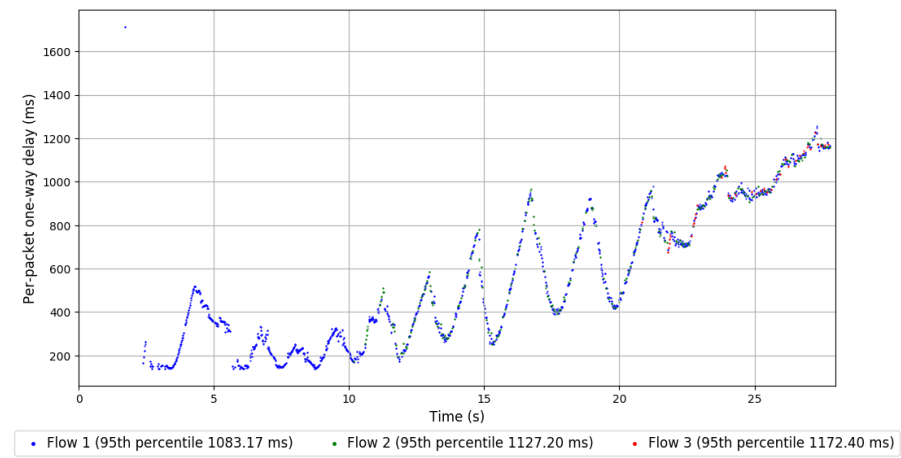
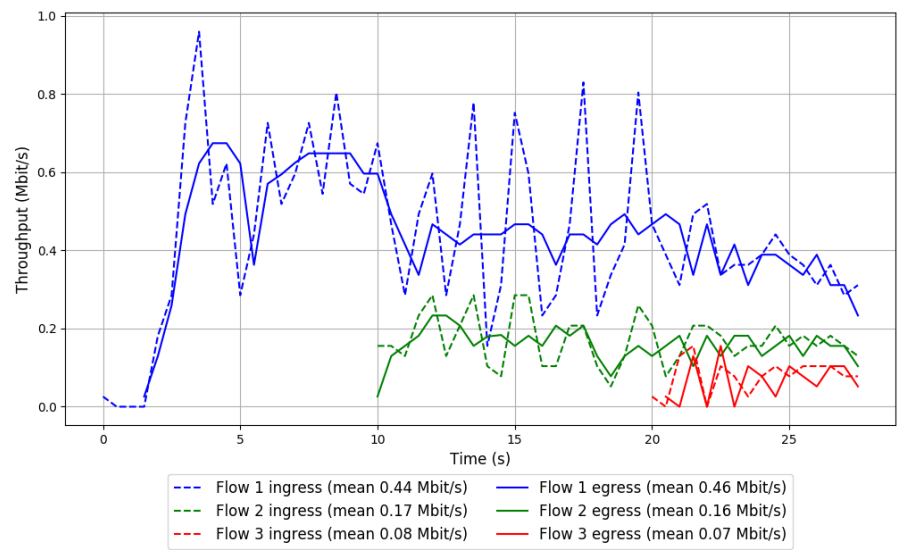


Run 3: Statistics of Copa

Start at: 2018-01-10 15:33:10  
End at: 2018-01-10 15:33:40  
Local clock offset: 0.762 ms  
Remote clock offset: 1.451 ms

# Below is generated by plot.py at 2018-01-10 16:35:53  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.58 Mbit/s  
95th percentile per-packet one-way delay: 1107.730 ms  
Loss rate: 4.70%  
-- Flow 1:  
Average throughput: 0.46 Mbit/s  
95th percentile per-packet one-way delay: 1083.167 ms  
Loss rate: 3.47%  
-- Flow 2:  
Average throughput: 0.16 Mbit/s  
95th percentile per-packet one-way delay: 1127.197 ms  
Loss rate: 6.78%  
-- Flow 3:  
Average throughput: 0.07 Mbit/s  
95th percentile per-packet one-way delay: 1172.404 ms  
Loss rate: 18.75%

Run 3: Report of Copa — Data Link

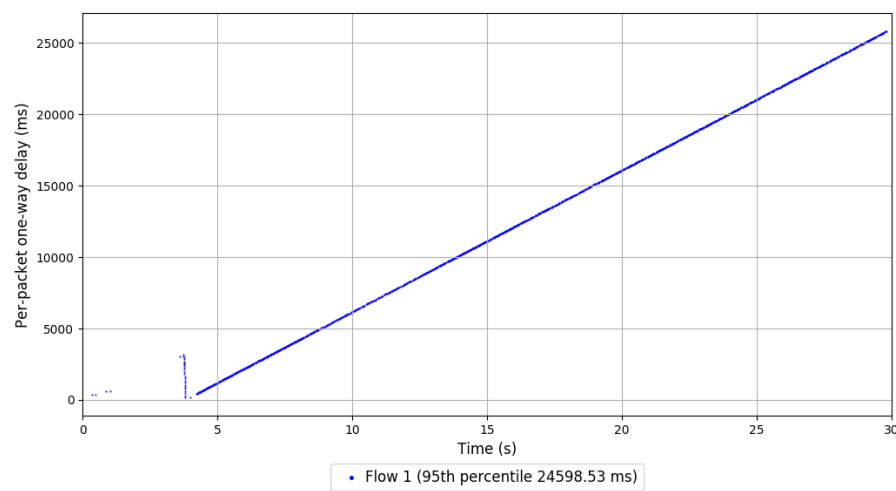
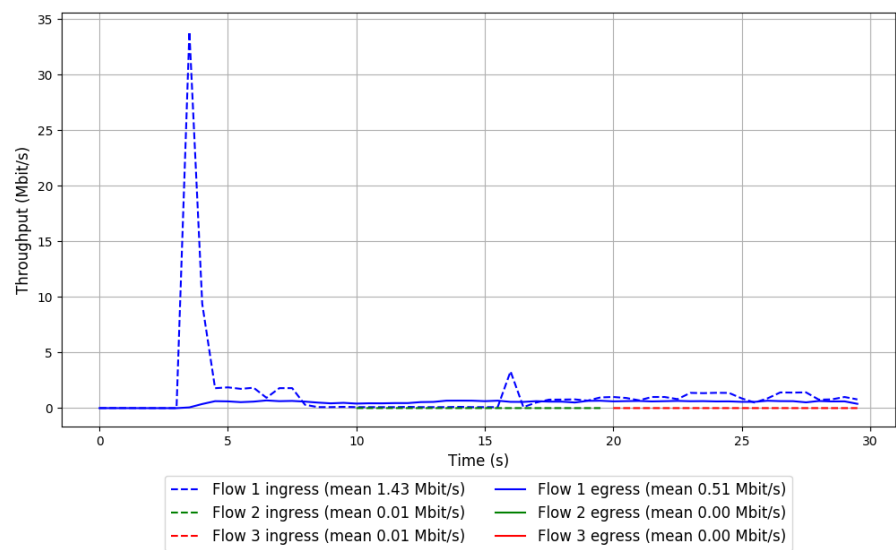


Run 1: Statistics of FillP

Start at: 2018-01-10 14:56:53  
End at: 2018-01-10 14:57:23  
Local clock offset: 0.372 ms  
Remote clock offset: -4.293 ms

# Below is generated by plot.py at 2018-01-10 16:35:53  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.51 Mbit/s  
95th percentile per-packet one-way delay: 24598.535 ms  
Loss rate: 64.70%  
-- Flow 1:  
Average throughput: 0.51 Mbit/s  
95th percentile per-packet one-way delay: 24598.535 ms  
Loss rate: 64.61%  
-- Flow 2:  
Average throughput: 0.00 Mbit/s  
-- Flow 3:  
Average throughput: 0.00 Mbit/s

Run 1: Report of FillP — Data Link



Run 2: Statistics of FillP

Start at: 2018-01-10 15:15:41

End at: 2018-01-10 15:16:11

Local clock offset: 0.359 ms

Remote clock offset: 1.539 ms

# Below is generated by plot.py at 2018-01-10 16:35:53

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.56 Mbit/s

95th percentile per-packet one-way delay: 25721.643 ms

Loss rate: 60.82%

-- Flow 1:

Average throughput: 0.56 Mbit/s

95th percentile per-packet one-way delay: 25721.643 ms

Loss rate: 60.73%

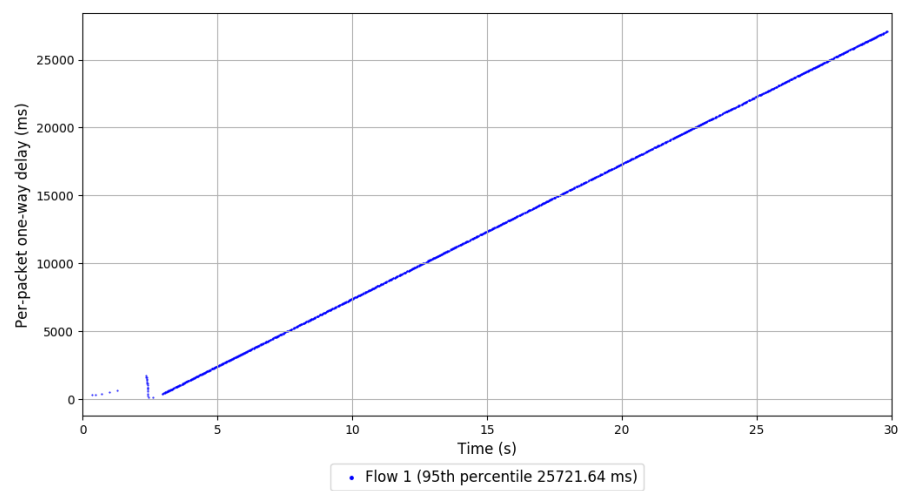
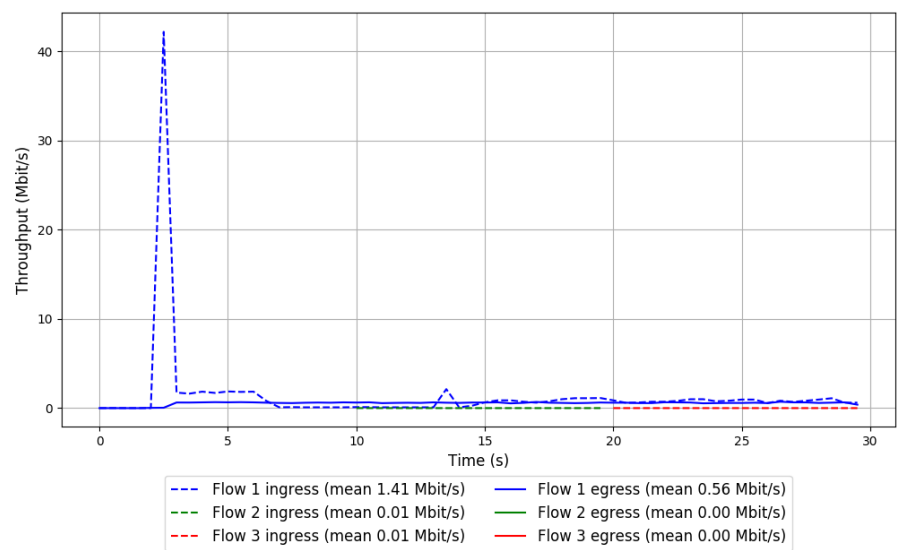
-- Flow 2:

Average throughput: 0.00 Mbit/s

-- Flow 3:

Average throughput: 0.00 Mbit/s

Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

Start at: 2018-01-10 15:34:27

End at: 2018-01-10 15:34:57

Local clock offset: 0.826 ms

Remote clock offset: 1.516 ms

# Below is generated by plot.py at 2018-01-10 16:35:53

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.46 Mbit/s

95th percentile per-packet one-way delay: 26323.307 ms

Loss rate: 69.15%

-- Flow 1:

Average throughput: 0.46 Mbit/s

95th percentile per-packet one-way delay: 26323.307 ms

Loss rate: 69.08%

-- Flow 2:

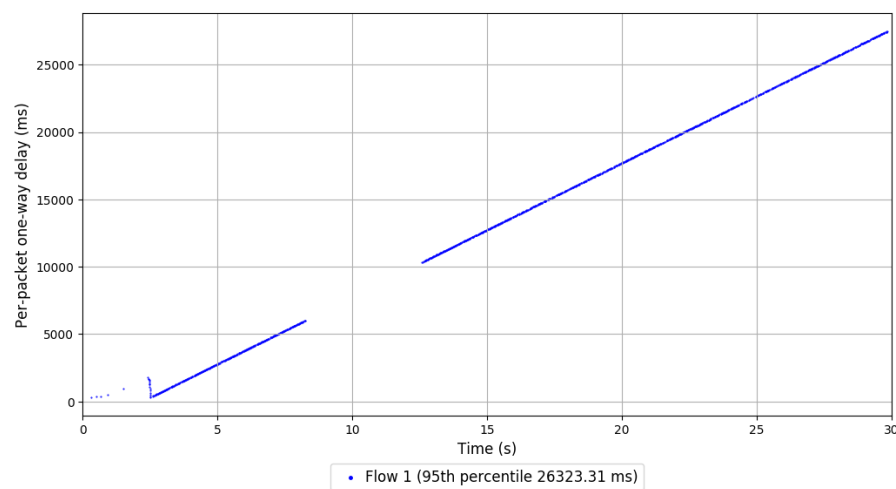
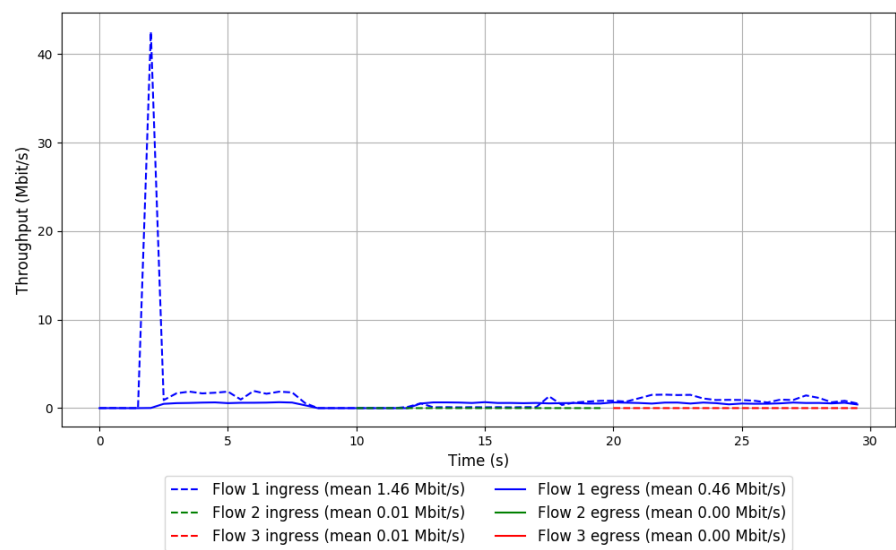
Average throughput: 0.00 Mbit/s

-- Flow 3:

Average throughput: 0.00 Mbit/s



Run 3: Report of FillP — Data Link

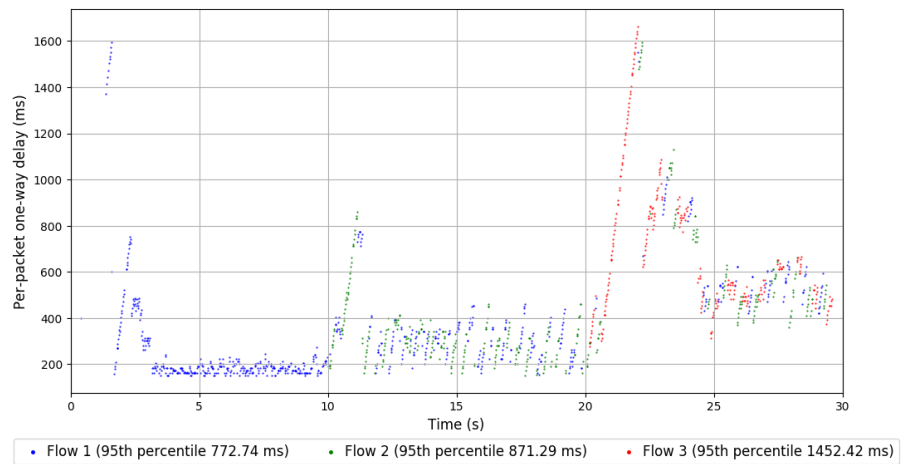
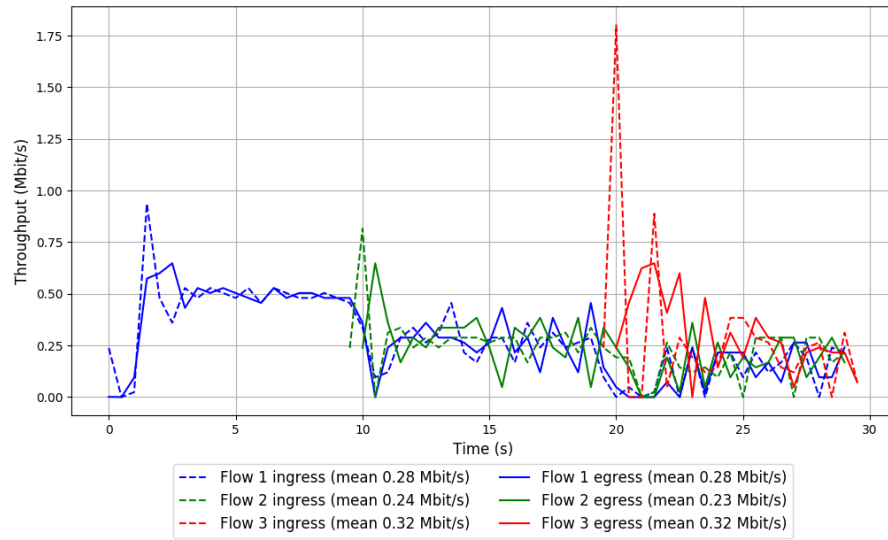


Run 1: Statistics of Indigo

Start at: 2018-01-10 15:00:43  
End at: 2018-01-10 15:01:13  
Local clock offset: 0.368 ms  
Remote clock offset: -4.241 ms

# Below is generated by plot.py at 2018-01-10 16:35:54  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.54 Mbit/s  
95th percentile per-packet one-way delay: 1041.214 ms  
Loss rate: 1.80%  
-- Flow 1:  
Average throughput: 0.28 Mbit/s  
95th percentile per-packet one-way delay: 772.736 ms  
Loss rate: 1.30%  
-- Flow 2:  
Average throughput: 0.23 Mbit/s  
95th percentile per-packet one-way delay: 871.292 ms  
Loss rate: 2.34%  
-- Flow 3:  
Average throughput: 0.32 Mbit/s  
95th percentile per-packet one-way delay: 1452.423 ms  
Loss rate: 2.33%

## Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2018-01-10 15:19:25

End at: 2018-01-10 15:19:55

Local clock offset: 0.448 ms

Remote clock offset: 1.172 ms

# Below is generated by plot.py at 2018-01-10 16:35:54

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.52 Mbit/s

95th percentile per-packet one-way delay: 3202.195 ms

Loss rate: 5.70%

-- Flow 1:

Average throughput: 0.25 Mbit/s

95th percentile per-packet one-way delay: 1972.361 ms

Loss rate: 9.94%

-- Flow 2:

Average throughput: 0.32 Mbit/s

95th percentile per-packet one-way delay: 3989.500 ms

Loss rate: 1.62%

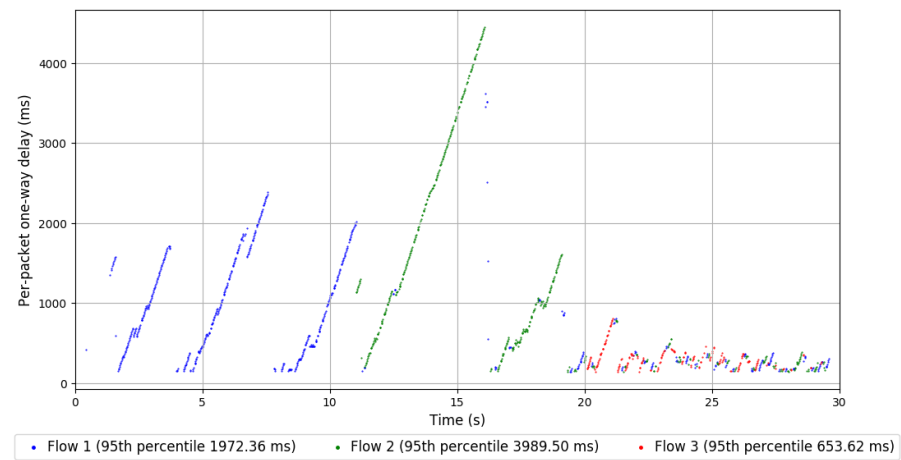
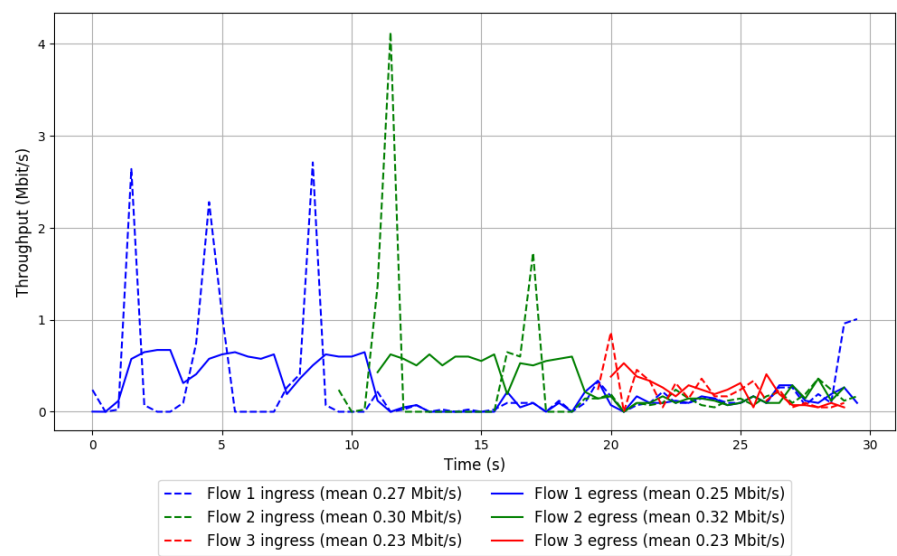
-- Flow 3:

Average throughput: 0.23 Mbit/s

95th percentile per-packet one-way delay: 653.617 ms

Loss rate: 1.10%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-01-10 15:38:12

End at: 2018-01-10 15:38:42

Local clock offset: 0.989 ms

Remote clock offset: 0.593 ms

# Below is generated by plot.py at 2018-01-10 16:35:55

# Datalink statistics

-- Total of 3 flows:

Average throughput: 0.56 Mbit/s

95th percentile per-packet one-way delay: 1559.468 ms

Loss rate: 0.65%

-- Flow 1:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 1640.629 ms

Loss rate: 0.55%

-- Flow 2:

Average throughput: 0.20 Mbit/s

95th percentile per-packet one-way delay: 719.853 ms

Loss rate: 0.93%

-- Flow 3:

Average throughput: 0.45 Mbit/s

95th percentile per-packet one-way delay: 1700.349 ms

Loss rate: 0.60%

Run 3: Report of Indigo — Data Link

