

## Pantheon Report

Generated at 2018-01-02 22:18:44 (UTC).

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

Repeated the test of 14 congestion control schemes 3 times.

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

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

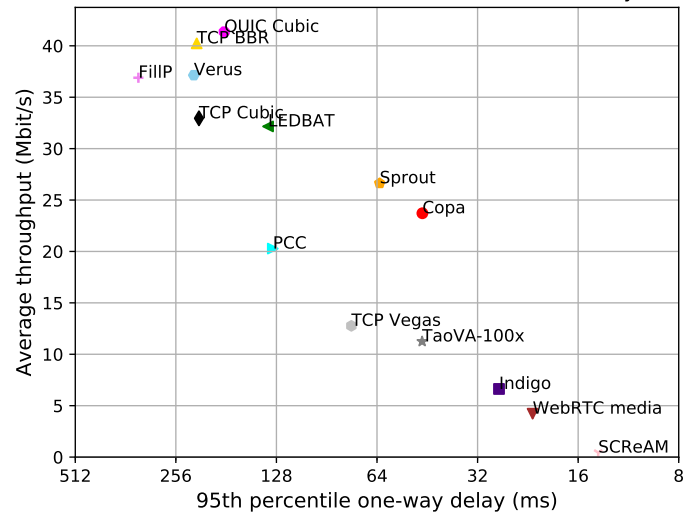
Tested BBR with qdisc of Fair Queuing (*fq*), and other schemes with the default Linux qdisc (*pfifo\_fast*).

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

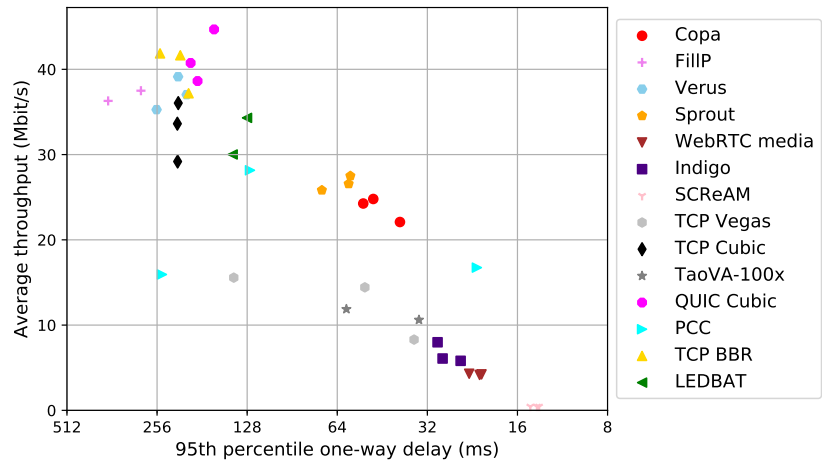
Git summary:

```
branch: master @ 904a5750834816b1e46a2c86405d707788d27c16
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
M datagrump/sender.cc
third_party/fillp @ dcaef6b00654e660f73f7ed679d2eab61ce08639
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 @ f1a14bffe749737437f61b1eaeab30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
M src/examples/cellsim.cc
M src/examples/sproutbt2.cc
M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
M src/verus.hpp
M tools/plot.py
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

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



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



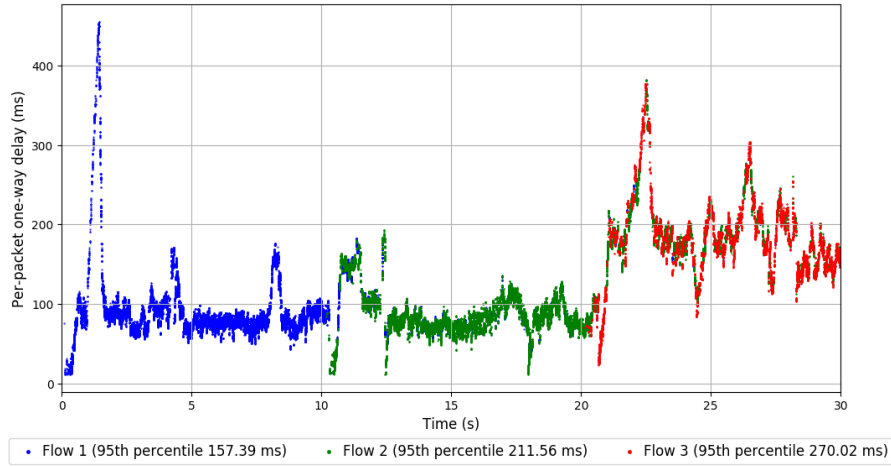
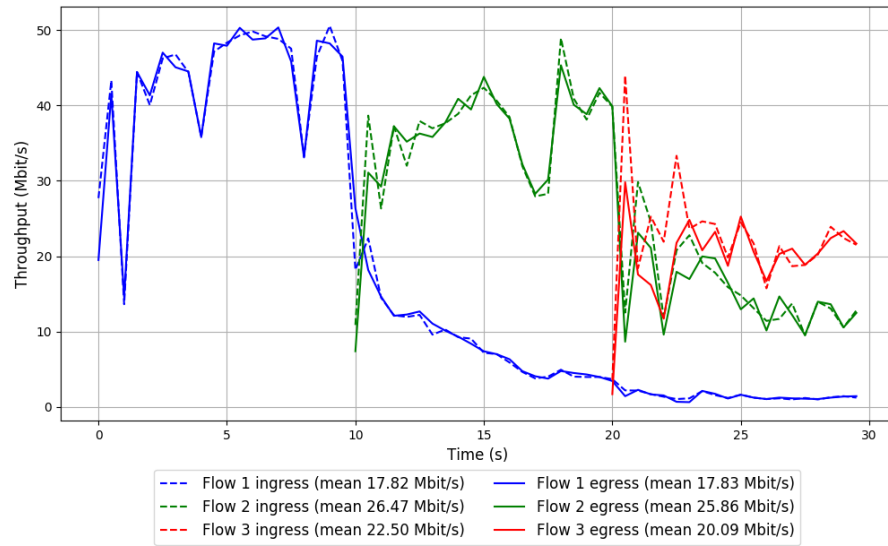
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	19.46	20.29	22.02	183.79	244.16	277.85	2.42	4.38	8.19
TCP Cubic	3	20.89	11.80	13.05	213.24	233.63	215.22	0.17	0.44	1.60
LEDBAT	2	22.91	11.05	5.76	133.51	137.33	144.98	0.24	0.70	1.56
PCC	3	8.56	9.06	17.15	92.26	106.21	145.80	0.81	1.28	2.79
QUIC Cubic	3	28.28	15.27	9.15	179.36	195.01	197.96	0.35	0.91	2.05
SCReAM	3	0.22	0.22	0.22	14.43	13.70	14.04	0.00	0.00	0.00
WebRTC media	3	2.25	1.41	0.56	21.77	22.27	22.33	0.00	0.00	0.05
Sprout	3	13.83	13.34	11.81	57.66	64.55	71.28	0.05	0.09	0.09
TaoVA-100x	2	4.99	6.21	7.83	24.81	56.12	60.45	0.00	0.00	0.00
TCP Vegas	3	5.58	3.68	14.30	61.35	54.13	129.93	0.03	0.03	0.29
Verus	3	24.44	12.48	12.12	215.59	248.00	237.33	13.25	9.21	22.73
Copa	3	13.91	13.14	4.87	42.03	50.95	36.85	0.03	0.04	0.00
FillP	2	15.29	16.25	33.77	295.68	373.26	288.52	58.11	64.32	63.37
Indigo	3	2.45	3.34	6.00	25.65	25.96	29.62	0.00	0.04	0.06

Run 1: Statistics of TCP BBR

Start at: 2018-01-02 21:22:39  
End at: 2018-01-02 21:23:09  
Local clock offset: 0.481 ms  
Remote clock offset: -2.216 ms

# Below is generated by plot.py at 2018-01-02 22:17:01  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 41.65 Mbit/s  
95th percentile per-packet one-way delay: 214.084 ms  
Loss rate: 3.20%  
-- Flow 1:  
Average throughput: 17.83 Mbit/s  
95th percentile per-packet one-way delay: 157.391 ms  
Loss rate: 0.24%  
-- Flow 2:  
Average throughput: 25.86 Mbit/s  
95th percentile per-packet one-way delay: 211.556 ms  
Loss rate: 2.74%  
-- Flow 3:  
Average throughput: 20.09 Mbit/s  
95th percentile per-packet one-way delay: 270.024 ms  
Loss rate: 11.35%

# Run 1: Report of TCP BBR — Data Link

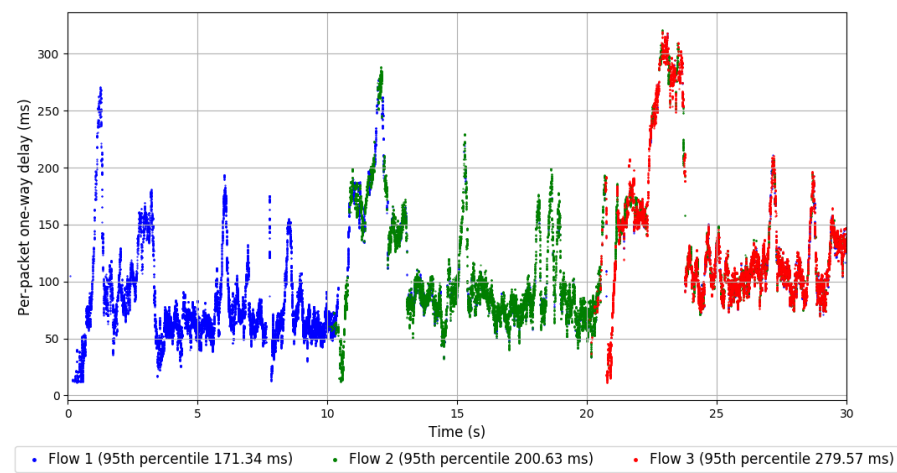
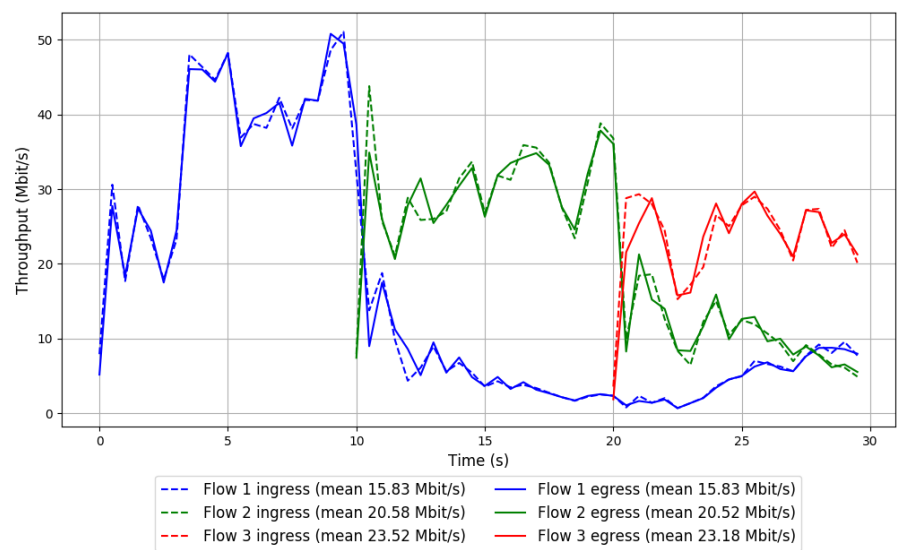


Run 2: Statistics of TCP BBR

Start at: 2018-01-02 21:40:38  
End at: 2018-01-02 21:41:08  
Local clock offset: 0.436 ms  
Remote clock offset: -1.903 ms

# Below is generated by plot.py at 2018-01-02 22:17:01  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 37.19 Mbit/s  
95th percentile per-packet one-way delay: 200.900 ms  
Loss rate: 0.69%  
-- Flow 1:  
Average throughput: 15.83 Mbit/s  
95th percentile per-packet one-way delay: 171.342 ms  
Loss rate: 0.29%  
-- Flow 2:  
Average throughput: 20.52 Mbit/s  
95th percentile per-packet one-way delay: 200.626 ms  
Loss rate: 0.47%  
-- Flow 3:  
Average throughput: 23.18 Mbit/s  
95th percentile per-packet one-way delay: 279.572 ms  
Loss rate: 1.89%

Run 2: Report of TCP BBR — Data Link

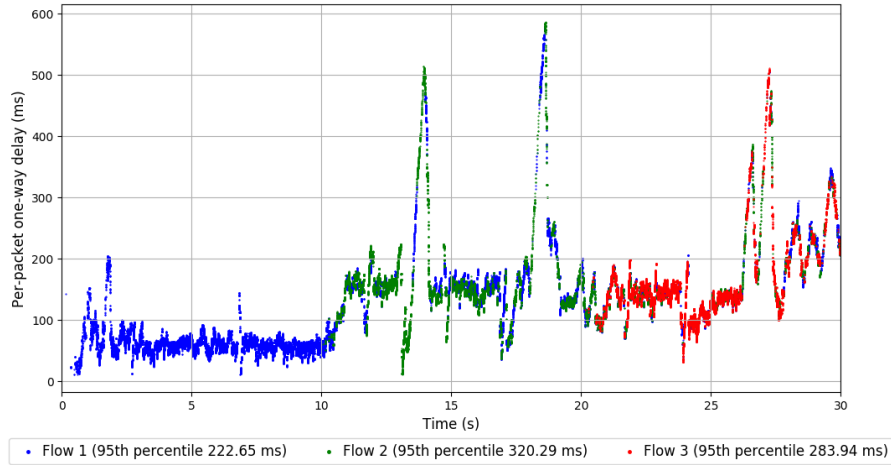
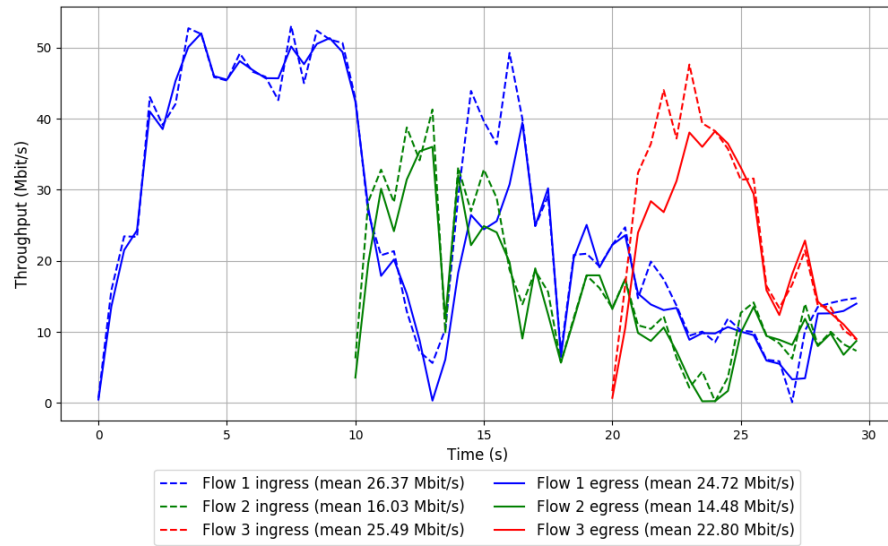


Run 3: Statistics of TCP BBR

Start at: 2018-01-02 21:58:38  
End at: 2018-01-02 21:59:08  
Local clock offset: 0.57 ms  
Remote clock offset: -1.499 ms

# Below is generated by plot.py at 2018-01-02 22:17:02  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 41.87 Mbit/s  
95th percentile per-packet one-way delay: 250.205 ms  
Loss rate: 8.33%  
-- Flow 1:  
Average throughput: 24.72 Mbit/s  
95th percentile per-packet one-way delay: 222.651 ms  
Loss rate: 6.72%  
-- Flow 2:  
Average throughput: 14.48 Mbit/s  
95th percentile per-packet one-way delay: 320.291 ms  
Loss rate: 9.93%  
-- Flow 3:  
Average throughput: 22.80 Mbit/s  
95th percentile per-packet one-way delay: 283.944 ms  
Loss rate: 11.33%

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



Run 1: Statistics of TCP Cubic

Start at: 2018-01-02 21:27:28

End at: 2018-01-02 21:27:58

Local clock offset: 0.4 ms

Remote clock offset: -2.33 ms

# Below is generated by plot.py at 2018-01-02 22:17:02

# Datalink statistics

-- Total of 3 flows:

Average throughput: 36.04 Mbit/s

95th percentile per-packet one-way delay: 217.465 ms

Loss rate: 0.61%

-- Flow 1:

Average throughput: 24.45 Mbit/s

95th percentile per-packet one-way delay: 214.668 ms

Loss rate: 0.25%

-- Flow 2:

Average throughput: 10.50 Mbit/s

95th percentile per-packet one-way delay: 234.328 ms

Loss rate: 0.47%

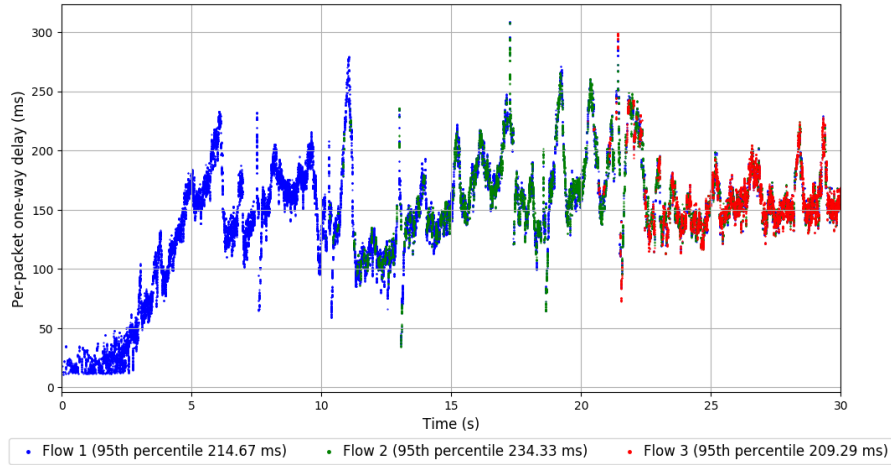
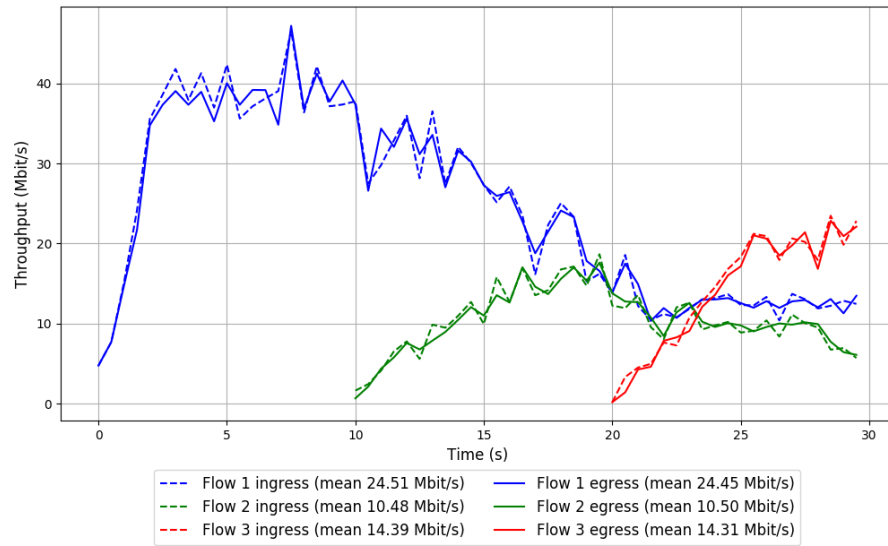
-- Flow 3:

Average throughput: 14.31 Mbit/s

95th percentile per-packet one-way delay: 209.289 ms

Loss rate: 2.62%

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

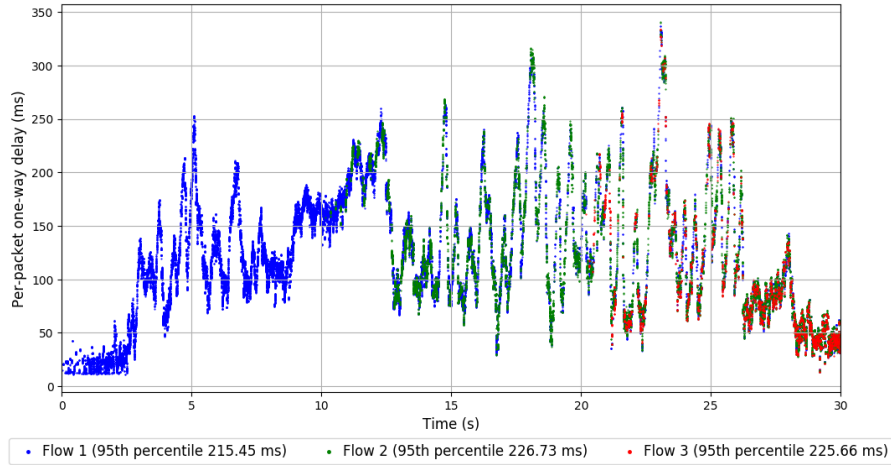
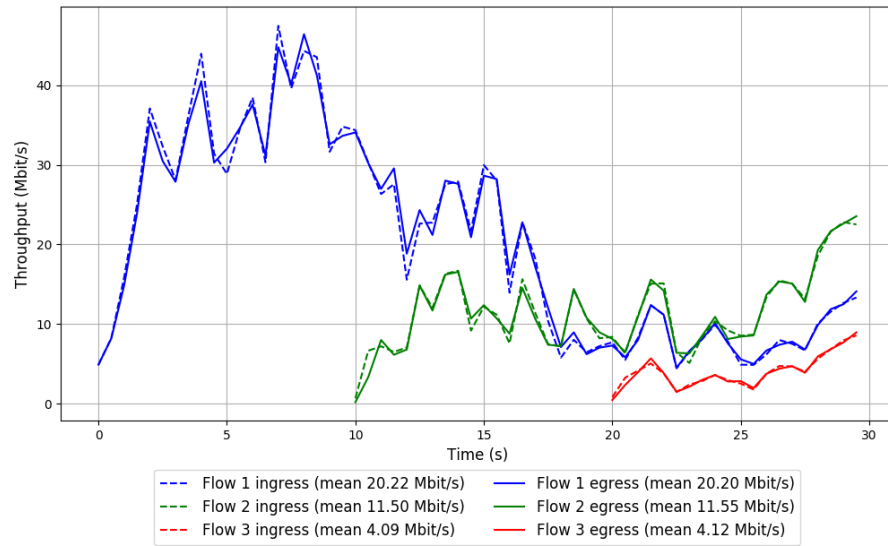


Run 2: Statistics of TCP Cubic

Start at: 2018-01-02 21:45:26  
End at: 2018-01-02 21:45:56  
Local clock offset: 0.435 ms  
Remote clock offset: -1.842 ms

# Below is generated by plot.py at 2018-01-02 22:17:02  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 29.19 Mbit/s  
95th percentile per-packet one-way delay: 218.554 ms  
Loss rate: 0.14%  
-- Flow 1:  
Average throughput: 20.20 Mbit/s  
95th percentile per-packet one-way delay: 215.453 ms  
Loss rate: 0.05%  
-- Flow 2:  
Average throughput: 11.55 Mbit/s  
95th percentile per-packet one-way delay: 226.728 ms  
Loss rate: 0.28%  
-- Flow 3:  
Average throughput: 4.12 Mbit/s  
95th percentile per-packet one-way delay: 225.655 ms  
Loss rate: 0.62%

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

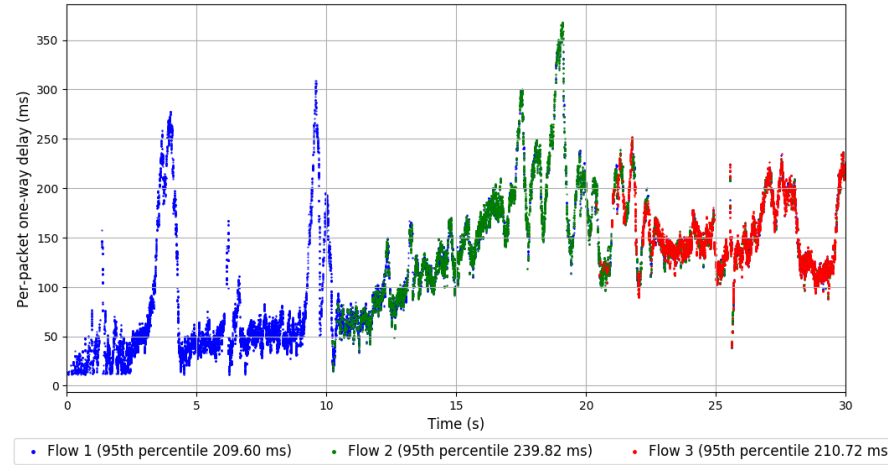
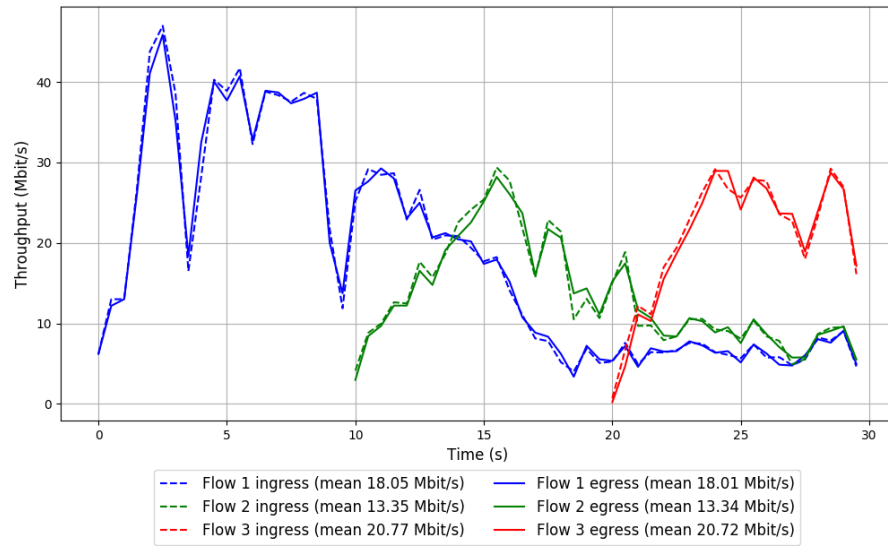


Run 3: Statistics of TCP Cubic

Start at: 2018-01-02 22:03:27  
End at: 2018-01-02 22:03:57  
Local clock offset: 0.46 ms  
Remote clock offset: -1.317 ms

# Below is generated by plot.py at 2018-01-02 22:17:02  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 33.62 Mbit/s  
95th percentile per-packet one-way delay: 218.964 ms  
Loss rate: 0.58%  
-- Flow 1:  
Average throughput: 18.01 Mbit/s  
95th percentile per-packet one-way delay: 209.601 ms  
Loss rate: 0.21%  
-- Flow 2:  
Average throughput: 13.34 Mbit/s  
95th percentile per-packet one-way delay: 239.824 ms  
Loss rate: 0.58%  
-- Flow 3:  
Average throughput: 20.72 Mbit/s  
95th percentile per-packet one-way delay: 210.721 ms  
Loss rate: 1.57%

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



Run 1: Statistics of LEDBAT

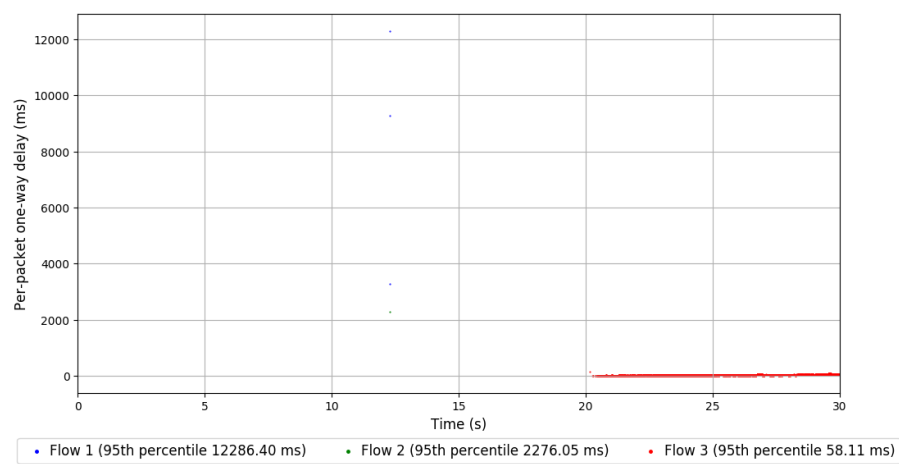
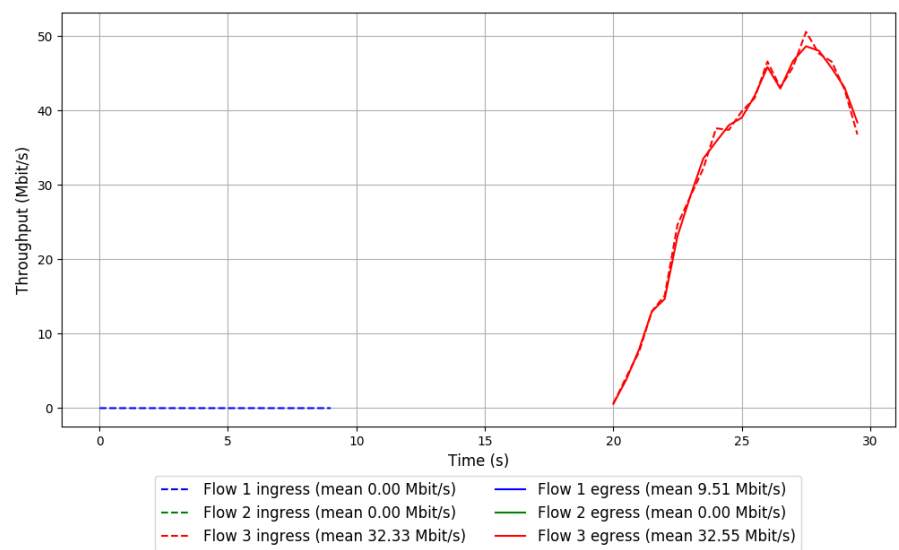
Start at: 2018-01-02 21:32:14

End at: 2018-01-02 21:32:44

Local clock offset: 0.514 ms

Remote clock offset: -2.106 ms

Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2018-01-02 21:50:13

End at: 2018-01-02 21:50:43

Local clock offset: 0.447 ms

Remote clock offset: -1.65 ms

# Below is generated by plot.py at 2018-01-02 22:17:02

# Datalink statistics

-- Total of 3 flows:

Average throughput: 30.01 Mbit/s

95th percentile per-packet one-way delay: 143.136 ms

Loss rate: 0.47%

-- Flow 1:

Average throughput: 22.15 Mbit/s

95th percentile per-packet one-way delay: 138.807 ms

Loss rate: 0.27%

-- Flow 2:

Average throughput: 9.13 Mbit/s

95th percentile per-packet one-way delay: 147.901 ms

Loss rate: 0.81%

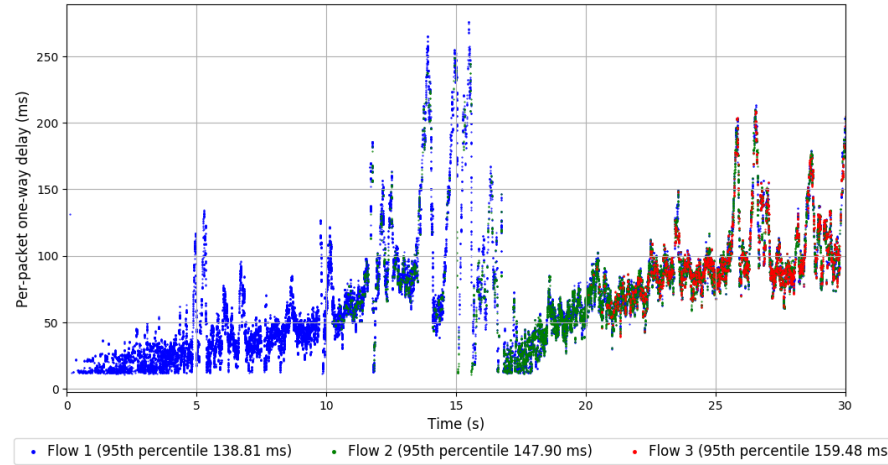
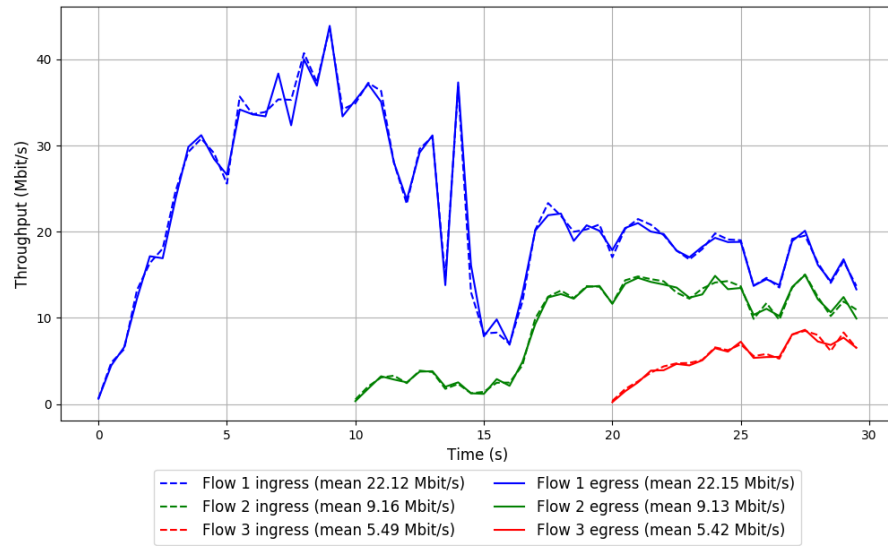
-- Flow 3:

Average throughput: 5.42 Mbit/s

95th percentile per-packet one-way delay: 159.483 ms

Loss rate: 1.76%

## Run 2: Report of LEDBAT — Data Link

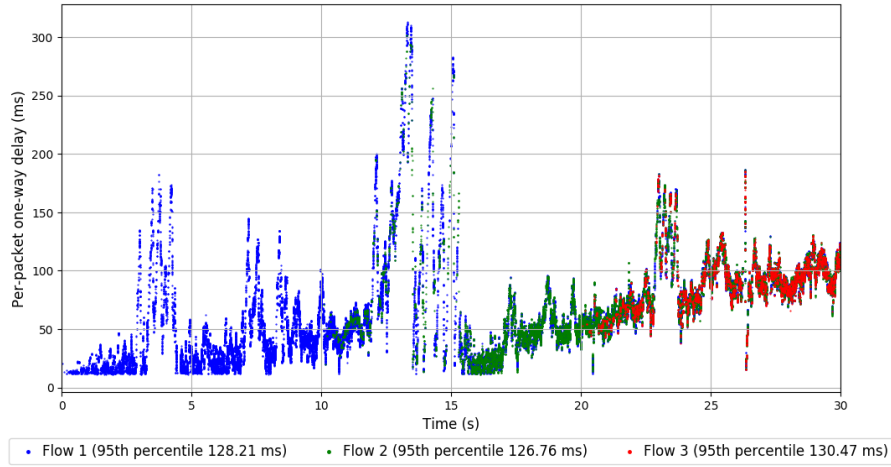
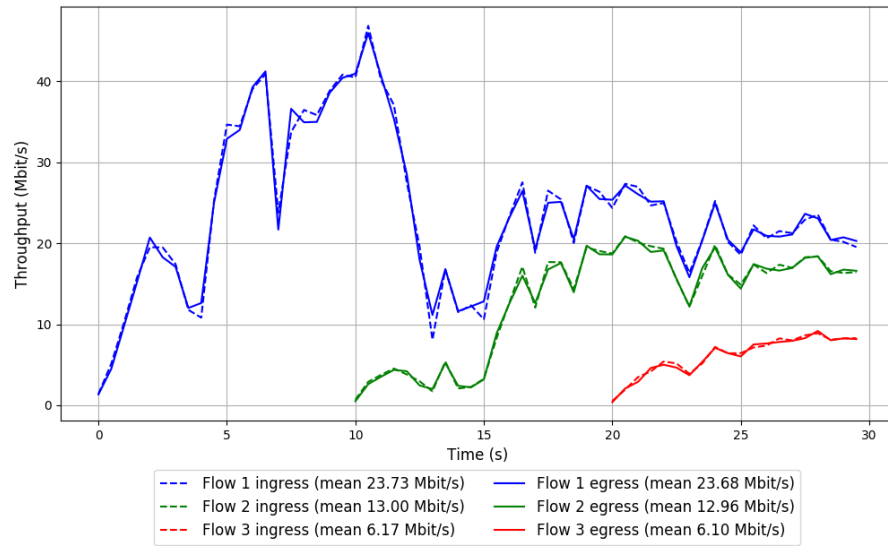


Run 3: Statistics of LEDBAT

Start at: 2018-01-02 22:08:14  
End at: 2018-01-02 22:08:44  
Local clock offset: 0.462 ms  
Remote clock offset: -1.245 ms

# Below is generated by plot.py at 2018-01-02 22:17:09  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 34.31 Mbit/s  
95th percentile per-packet one-way delay: 128.139 ms  
Loss rate: 0.38%  
-- Flow 1:  
Average throughput: 23.68 Mbit/s  
95th percentile per-packet one-way delay: 128.210 ms  
Loss rate: 0.22%  
-- Flow 2:  
Average throughput: 12.96 Mbit/s  
95th percentile per-packet one-way delay: 126.757 ms  
Loss rate: 0.59%  
-- Flow 3:  
Average throughput: 6.10 Mbit/s  
95th percentile per-packet one-way delay: 130.470 ms  
Loss rate: 1.36%

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

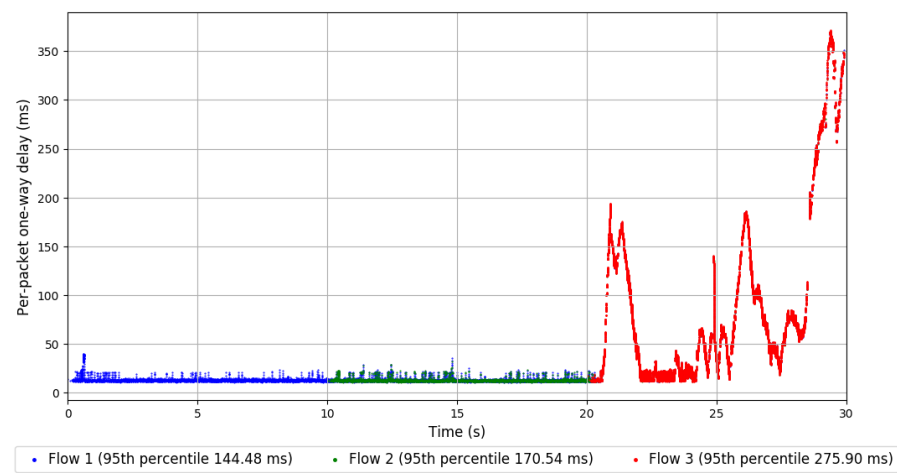
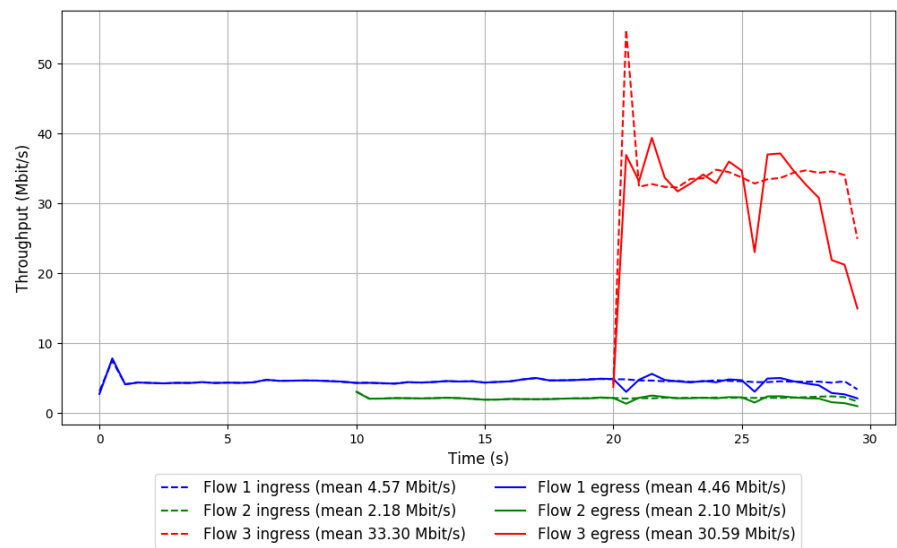


Run 1: Statistics of PCC

Start at: 2018-01-02 21:21:28  
End at: 2018-01-02 21:21:58  
Local clock offset: 0.49 ms  
Remote clock offset: -2.171 ms

# Below is generated by plot.py at 2018-01-02 22:17:10  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 15.94 Mbit/s  
95th percentile per-packet one-way delay: 246.554 ms  
Loss rate: 6.19%  
-- Flow 1:  
Average throughput: 4.46 Mbit/s  
95th percentile per-packet one-way delay: 144.479 ms  
Loss rate: 2.33%  
-- Flow 2:  
Average throughput: 2.10 Mbit/s  
95th percentile per-packet one-way delay: 170.543 ms  
Loss rate: 3.70%  
-- Flow 3:  
Average throughput: 30.59 Mbit/s  
95th percentile per-packet one-way delay: 275.899 ms  
Loss rate: 8.12%

Run 1: Report of PCC — Data Link

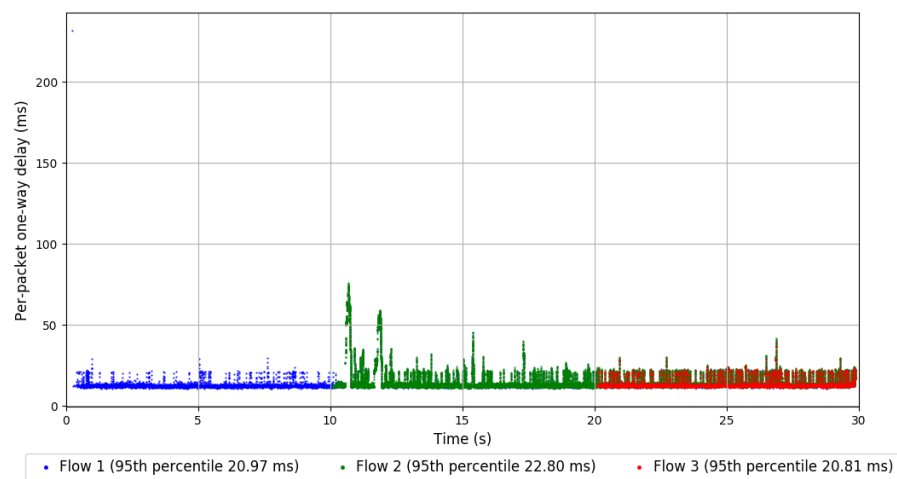
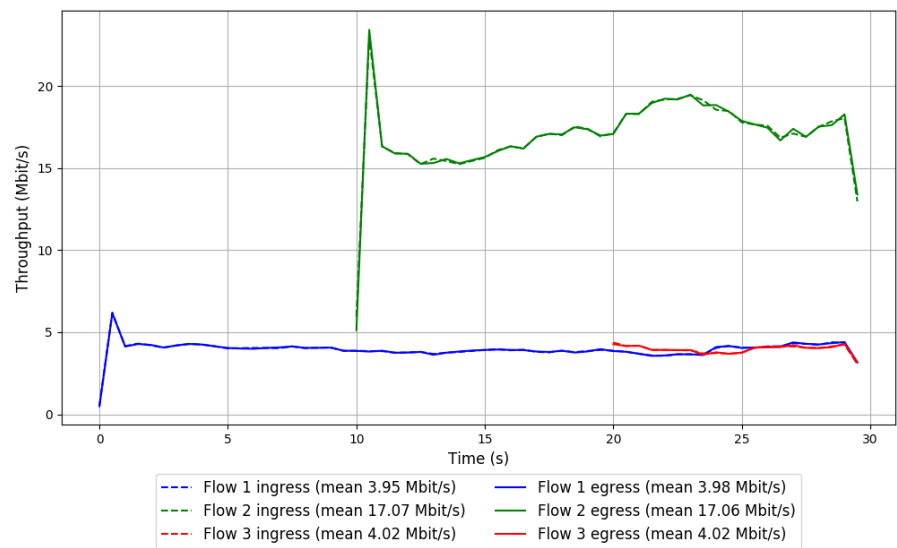


Run 2: Statistics of PCC

Start at: 2018-01-02 21:39:26  
End at: 2018-01-02 21:39:56  
Local clock offset: 0.452 ms  
Remote clock offset: -2.015 ms

# Below is generated by plot.py at 2018-01-02 22:17:12  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 16.74 Mbit/s  
95th percentile per-packet one-way delay: 21.861 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 3.98 Mbit/s  
95th percentile per-packet one-way delay: 20.966 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 17.06 Mbit/s  
95th percentile per-packet one-way delay: 22.803 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 4.02 Mbit/s  
95th percentile per-packet one-way delay: 20.814 ms  
Loss rate: 0.00%

Run 2: Report of PCC — Data Link

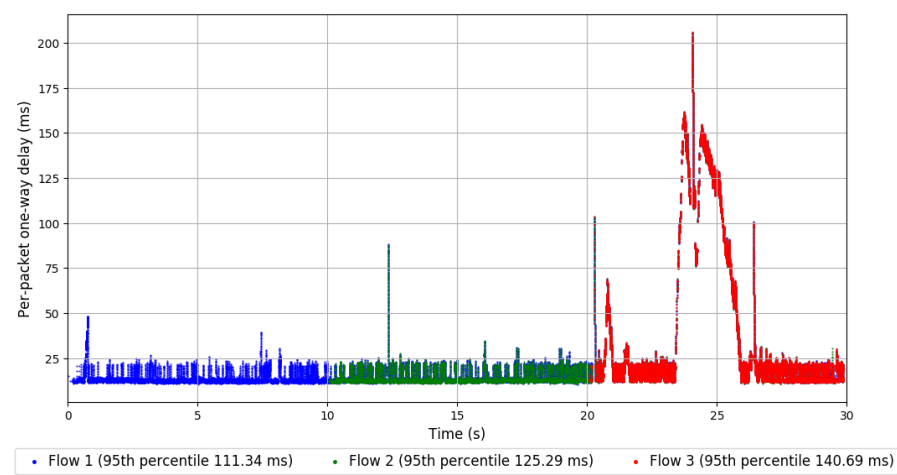
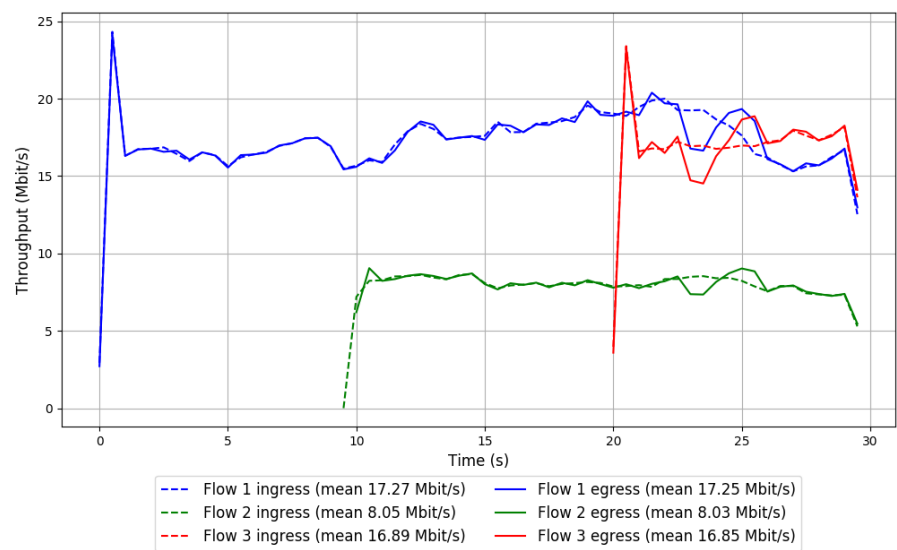


Run 3: Statistics of PCC

Start at: 2018-01-02 21:57:26  
End at: 2018-01-02 21:57:56  
Local clock offset: 0.484 ms  
Remote clock offset: -1.462 ms

# Below is generated by plot.py at 2018-01-02 22:17:24  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 28.16 Mbit/s  
95th percentile per-packet one-way delay: 125.241 ms  
Loss rate: 0.12%  
-- Flow 1:  
Average throughput: 17.25 Mbit/s  
95th percentile per-packet one-way delay: 111.345 ms  
Loss rate: 0.09%  
-- Flow 2:  
Average throughput: 8.03 Mbit/s  
95th percentile per-packet one-way delay: 125.290 ms  
Loss rate: 0.13%  
-- Flow 3:  
Average throughput: 16.85 Mbit/s  
95th percentile per-packet one-way delay: 140.694 ms  
Loss rate: 0.24%

Run 3: Report of PCC — Data Link

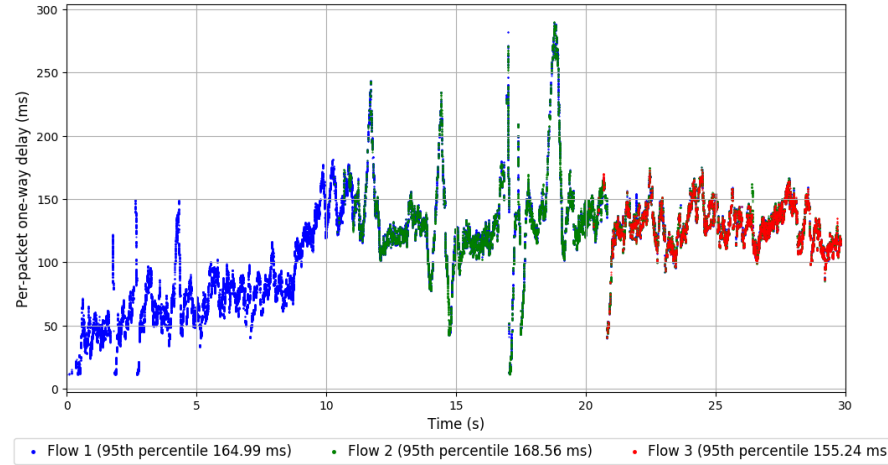
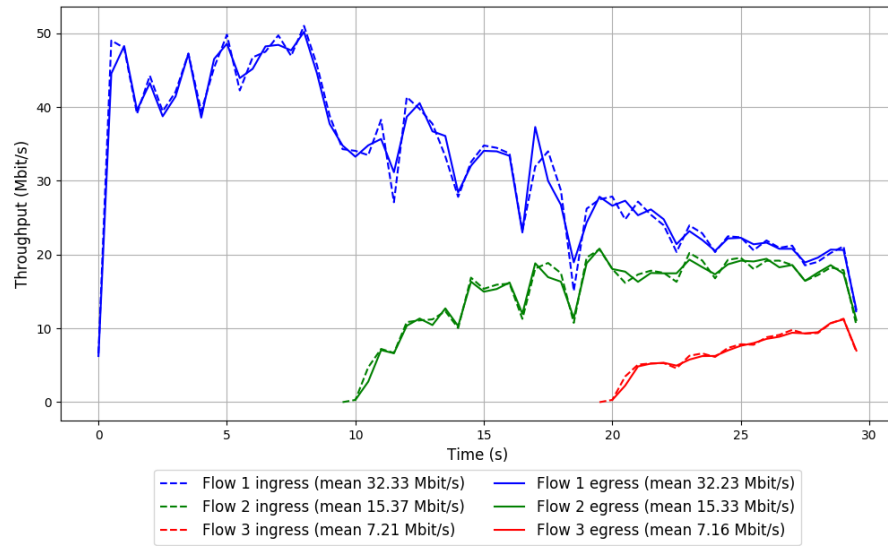


Run 1: Statistics of QUIC Cubic

Start at: 2018-01-02 21:35:50  
End at: 2018-01-02 21:36:20  
Local clock offset: 0.429 ms  
Remote clock offset: -2.069 ms

# Below is generated by plot.py at 2018-01-02 22:17:49  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 44.68 Mbit/s  
95th percentile per-packet one-way delay: 165.106 ms  
Loss rate: 0.52%  
-- Flow 1:  
Average throughput: 32.23 Mbit/s  
95th percentile per-packet one-way delay: 164.986 ms  
Loss rate: 0.31%  
-- Flow 2:  
Average throughput: 15.33 Mbit/s  
95th percentile per-packet one-way delay: 168.562 ms  
Loss rate: 0.87%  
-- Flow 3:  
Average throughput: 7.16 Mbit/s  
95th percentile per-packet one-way delay: 155.237 ms  
Loss rate: 1.95%

# Run 1: Report of QUIC Cubic — Data Link

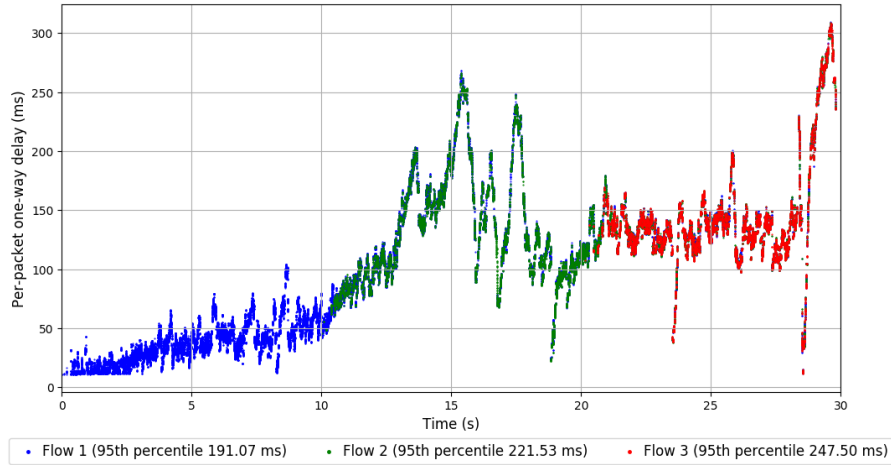
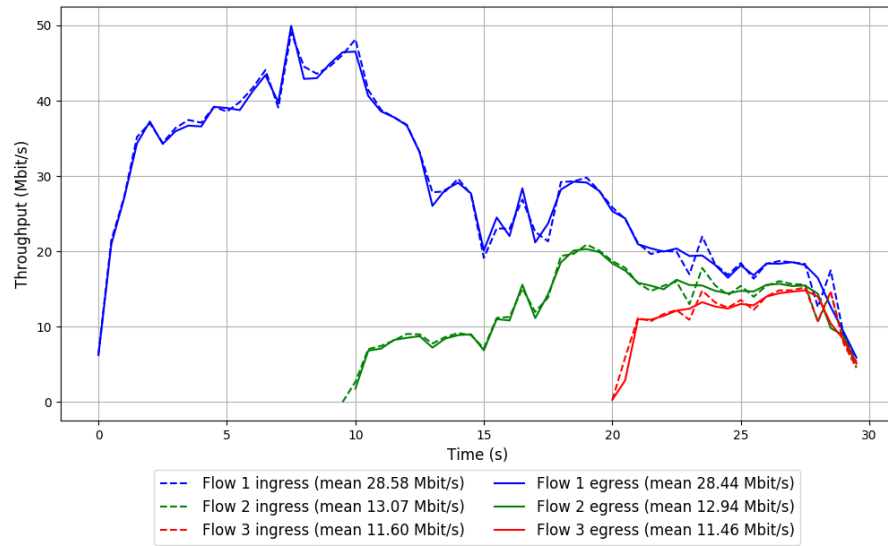


Run 2: Statistics of QUIC Cubic

Start at: 2018-01-02 21:53:50  
End at: 2018-01-02 21:54:20  
Local clock offset: 0.455 ms  
Remote clock offset: -1.599 ms

# Below is generated by plot.py at 2018-01-02 22:17:49  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 40.75 Mbit/s  
95th percentile per-packet one-way delay: 197.734 ms  
Loss rate: 0.75%  
-- Flow 1:  
Average throughput: 28.44 Mbit/s  
95th percentile per-packet one-way delay: 191.072 ms  
Loss rate: 0.46%  
-- Flow 2:  
Average throughput: 12.94 Mbit/s  
95th percentile per-packet one-way delay: 221.529 ms  
Loss rate: 1.13%  
-- Flow 3:  
Average throughput: 11.46 Mbit/s  
95th percentile per-packet one-way delay: 247.498 ms  
Loss rate: 2.12%

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

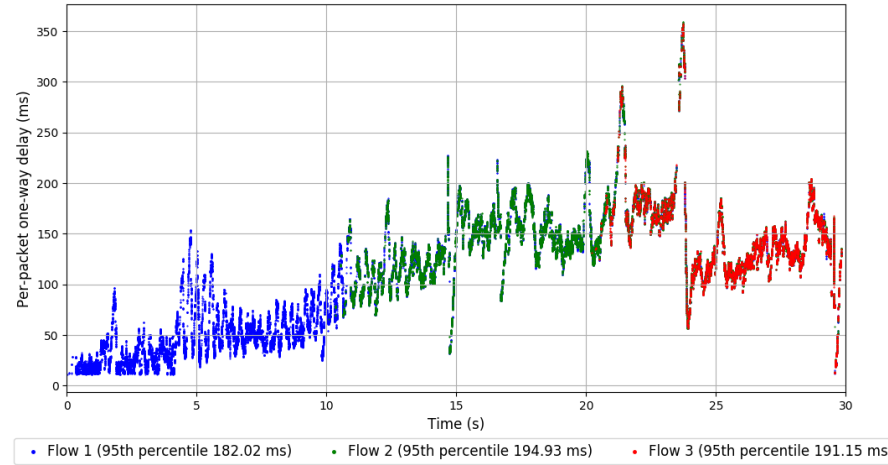
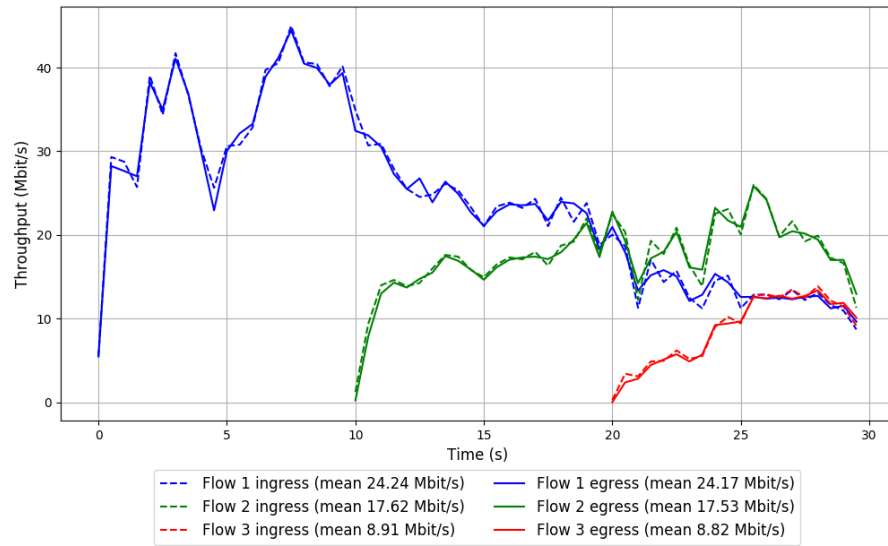


Run 3: Statistics of QUIC Cubic

Start at: 2018-01-02 22:11:52  
End at: 2018-01-02 22:12:22  
Local clock offset: 0.55 ms  
Remote clock offset: -1.274 ms

# Below is generated by plot.py at 2018-01-02 22:17:49  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 38.63 Mbit/s  
95th percentile per-packet one-way delay: 187.478 ms  
Loss rate: 0.55%  
-- Flow 1:  
Average throughput: 24.17 Mbit/s  
95th percentile per-packet one-way delay: 182.024 ms  
Loss rate: 0.29%  
-- Flow 2:  
Average throughput: 17.53 Mbit/s  
95th percentile per-packet one-way delay: 194.928 ms  
Loss rate: 0.73%  
-- Flow 3:  
Average throughput: 8.82 Mbit/s  
95th percentile per-packet one-way delay: 191.150 ms  
Loss rate: 2.07%

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

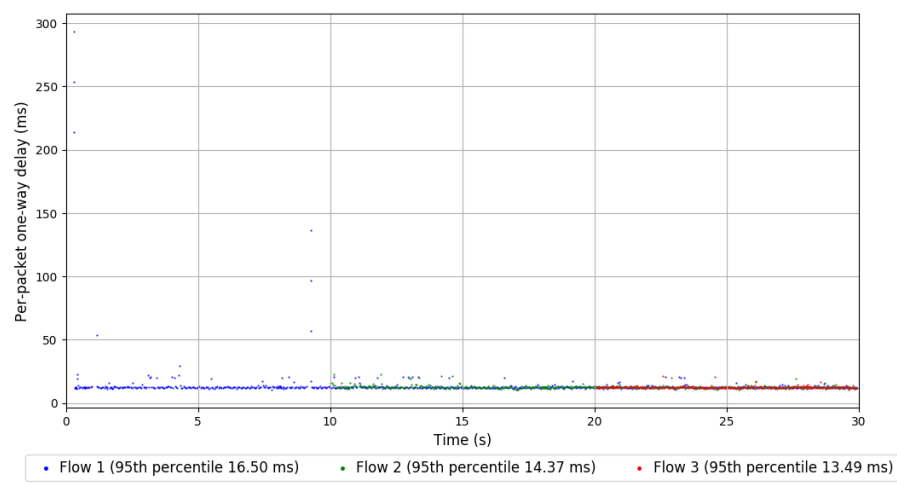
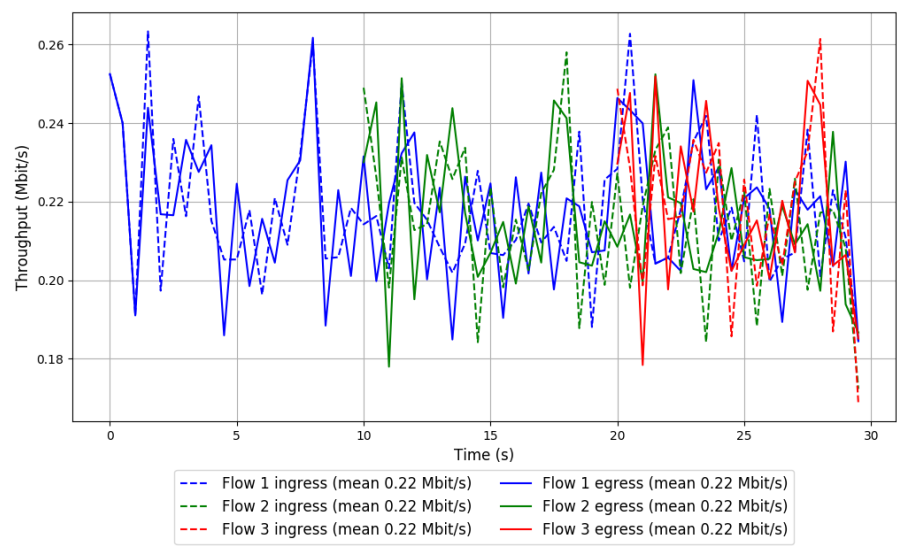


```
Run 1: Statistics of SReAM

Start at: 2018-01-02 21:34:39
End at: 2018-01-02 21:35:09
Local clock offset: 0.435 ms
Remote clock offset: -2.105 ms

# Below is generated by plot.py at 2018-01-02 22:17:49
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 14.493 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 16.502 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 14.367 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.492 ms
Loss rate: 0.00%
```

Run 1: Report of SReAM — Data Link

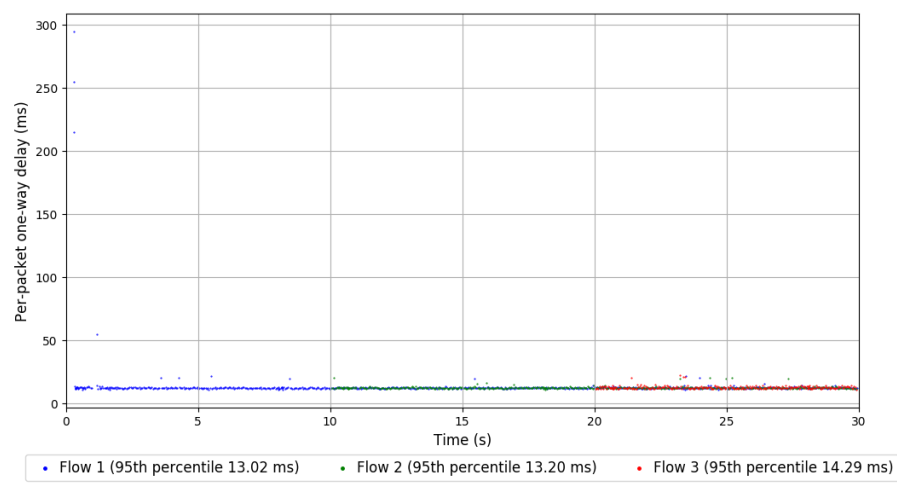
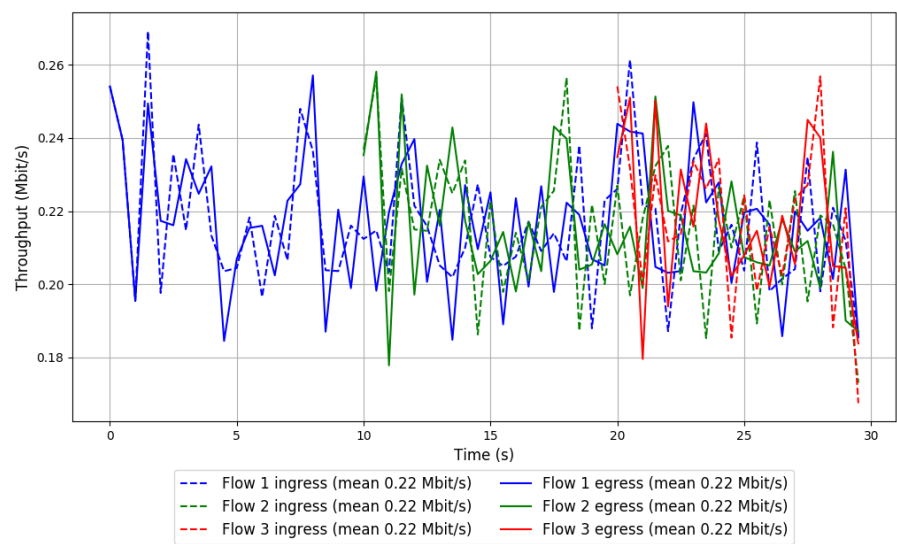


Run 2: Statistics of SReAM

Start at: 2018-01-02 21:52:39  
End at: 2018-01-02 21:53:09  
Local clock offset: 0.458 ms  
Remote clock offset: -1.723 ms

# Below is generated by plot.py at 2018-01-02 22:17:49  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.44 Mbit/s  
95th percentile per-packet one-way delay: 13.545 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 13.017 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 13.195 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 14.291 ms  
Loss rate: 0.00%

Run 2: Report of SReAM — Data Link

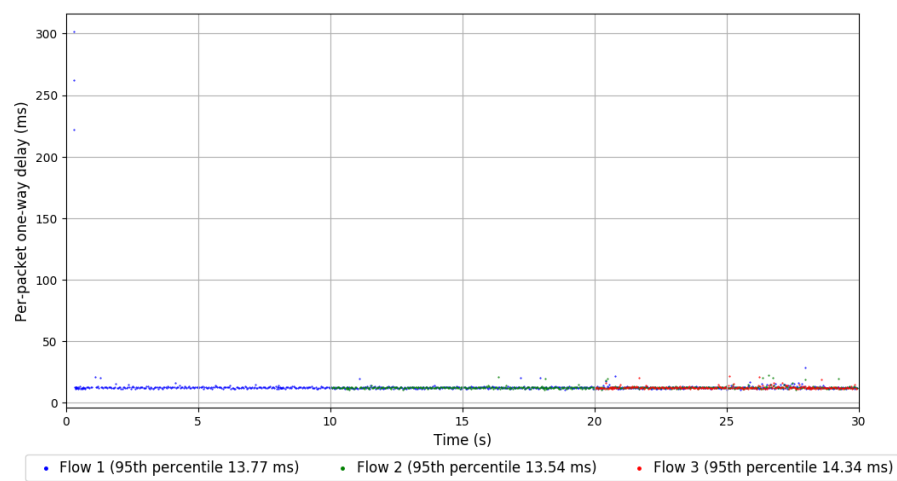
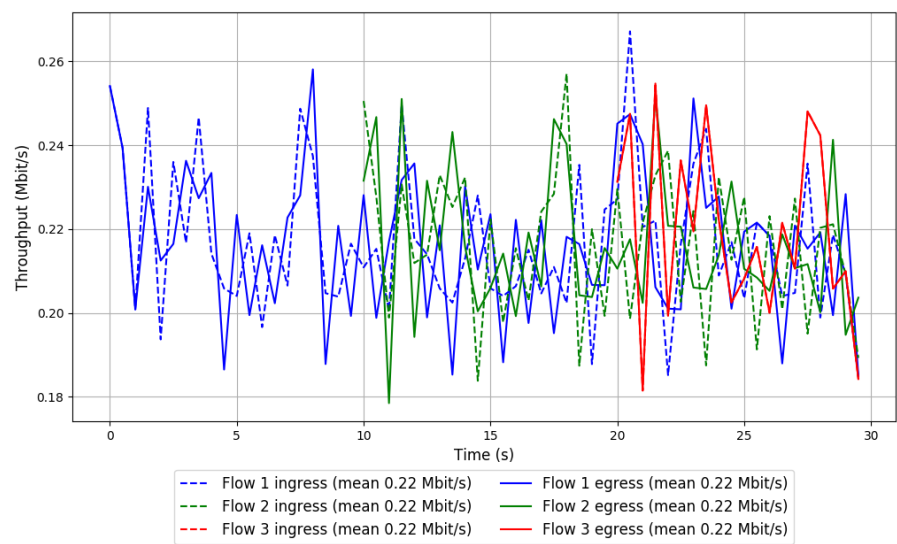


Run 3: Statistics of SReAM

Start at: 2018-01-02 22:10:41  
End at: 2018-01-02 22:11:11  
Local clock offset: 0.558 ms  
Remote clock offset: -1.339 ms

# Below is generated by plot.py at 2018-01-02 22:17:49  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 0.44 Mbit/s  
95th percentile per-packet one-way delay: 13.773 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 13.773 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 13.537 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.22 Mbit/s  
95th percentile per-packet one-way delay: 14.343 ms  
Loss rate: 0.00%

Run 3: Report of SReAM — Data Link

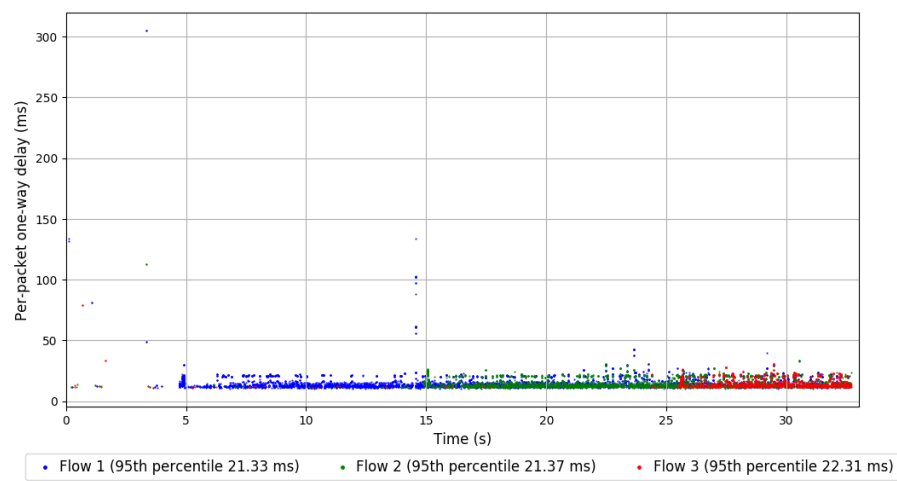
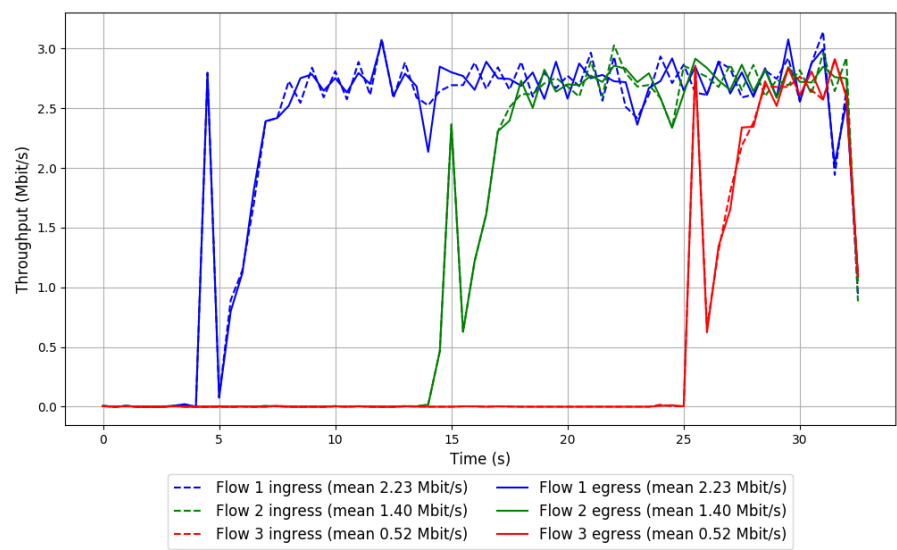


Run 1: Statistics of WebRTC media

Start at: 2018-01-02 21:28:40  
End at: 2018-01-02 21:29:10  
Local clock offset: 0.416 ms  
Remote clock offset: -2.332 ms

# Below is generated by plot.py at 2018-01-02 22:17:49  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.15 Mbit/s  
95th percentile per-packet one-way delay: 21.408 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 2.23 Mbit/s  
95th percentile per-packet one-way delay: 21.330 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 1.40 Mbit/s  
95th percentile per-packet one-way delay: 21.368 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.52 Mbit/s  
95th percentile per-packet one-way delay: 22.306 ms  
Loss rate: 0.00%

Run 1: Report of WebRTC media — Data Link

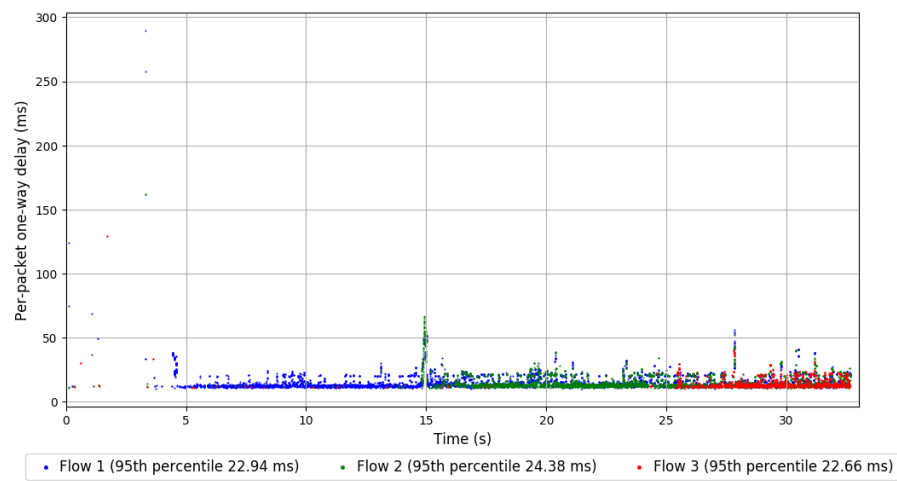
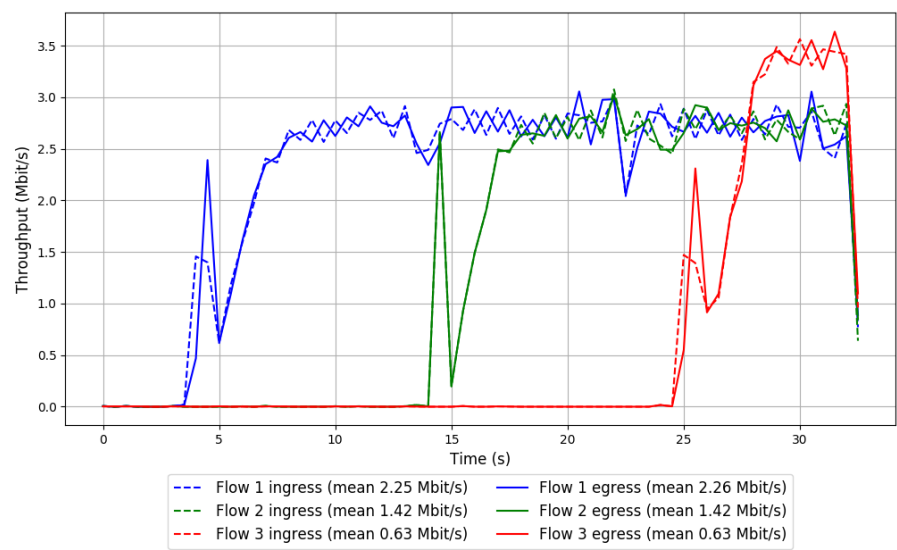


Run 2: Statistics of WebRTC media

Start at: 2018-01-02 21:46:38  
End at: 2018-01-02 21:47:08  
Local clock offset: 0.521 ms  
Remote clock offset: -1.756 ms

# Below is generated by plot.py at 2018-01-02 22:17:49  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.29 Mbit/s  
95th percentile per-packet one-way delay: 23.197 ms  
Loss rate: 0.02%  
-- Flow 1:  
Average throughput: 2.26 Mbit/s  
95th percentile per-packet one-way delay: 22.938 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 1.42 Mbit/s  
95th percentile per-packet one-way delay: 24.376 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.63 Mbit/s  
95th percentile per-packet one-way delay: 22.661 ms  
Loss rate: 0.14%

Run 2: Report of WebRTC media — Data Link

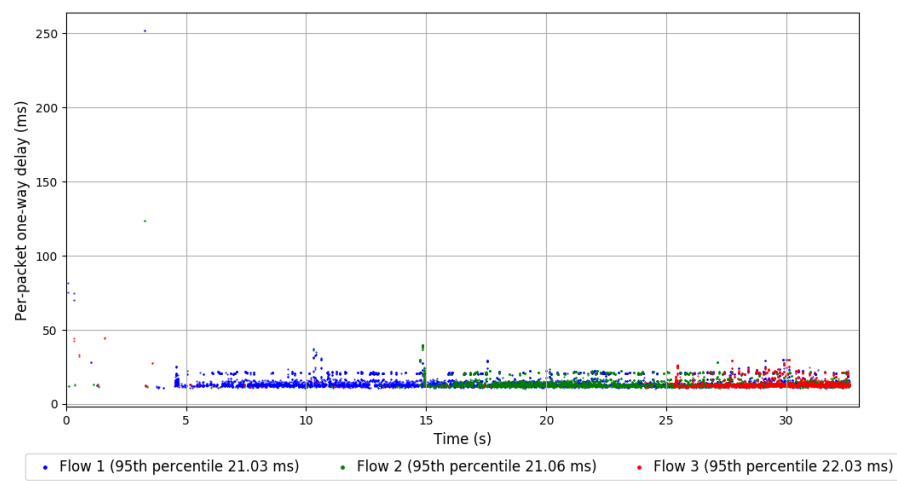
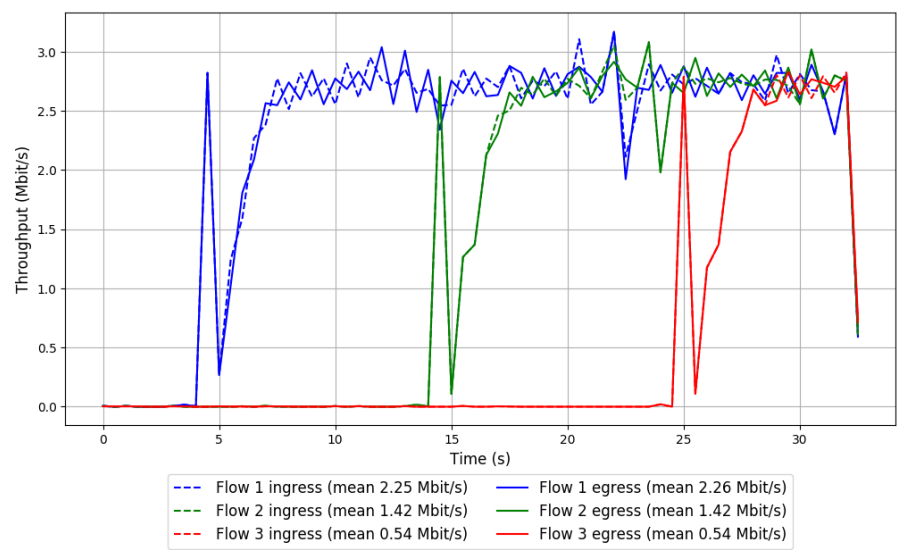


Run 3: Statistics of WebRTC media

Start at: 2018-01-02 22:04:39  
End at: 2018-01-02 22:05:09  
Local clock offset: 0.531 ms  
Remote clock offset: -1.294 ms

# Below is generated by plot.py at 2018-01-02 22:17:49  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 4.22 Mbit/s  
95th percentile per-packet one-way delay: 21.095 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 2.26 Mbit/s  
95th percentile per-packet one-way delay: 21.032 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 1.42 Mbit/s  
95th percentile per-packet one-way delay: 21.064 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 0.54 Mbit/s  
95th percentile per-packet one-way delay: 22.028 ms  
Loss rate: 0.00%

Run 3: Report of WebRTC media — Data Link

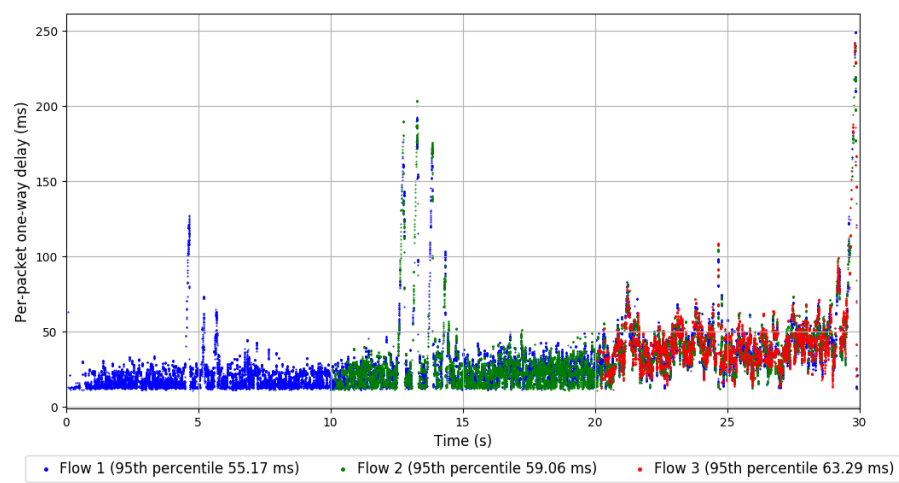
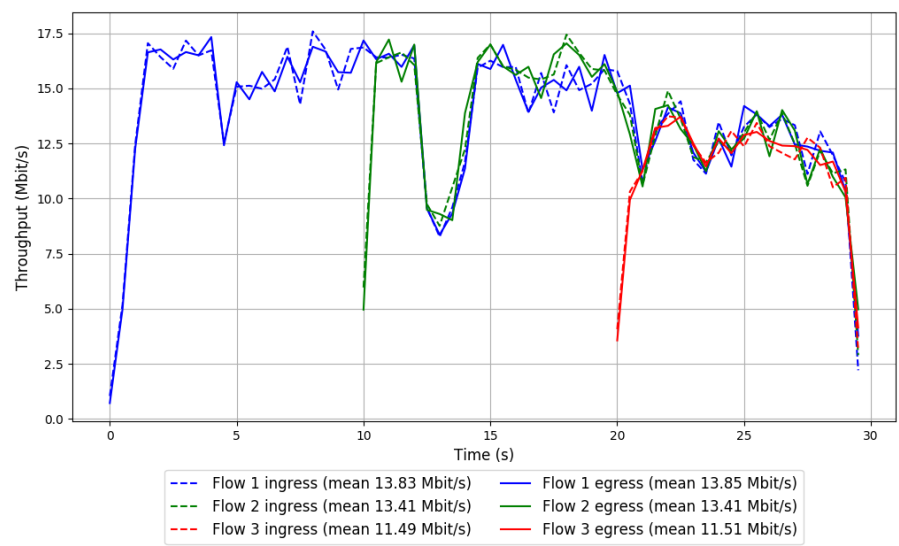


Run 1: Statistics of Sprout

Start at: 2018-01-02 21:29:51  
End at: 2018-01-02 21:30:21  
Local clock offset: 0.412 ms  
Remote clock offset: -2.185 ms

# Below is generated by plot.py at 2018-01-02 22:17:49  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 26.57 Mbit/s  
95th percentile per-packet one-way delay: 58.628 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 13.85 Mbit/s  
95th percentile per-packet one-way delay: 55.169 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 13.41 Mbit/s  
95th percentile per-packet one-way delay: 59.060 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 11.51 Mbit/s  
95th percentile per-packet one-way delay: 63.291 ms  
Loss rate: 0.00%

Run 1: Report of Sprout — Data Link

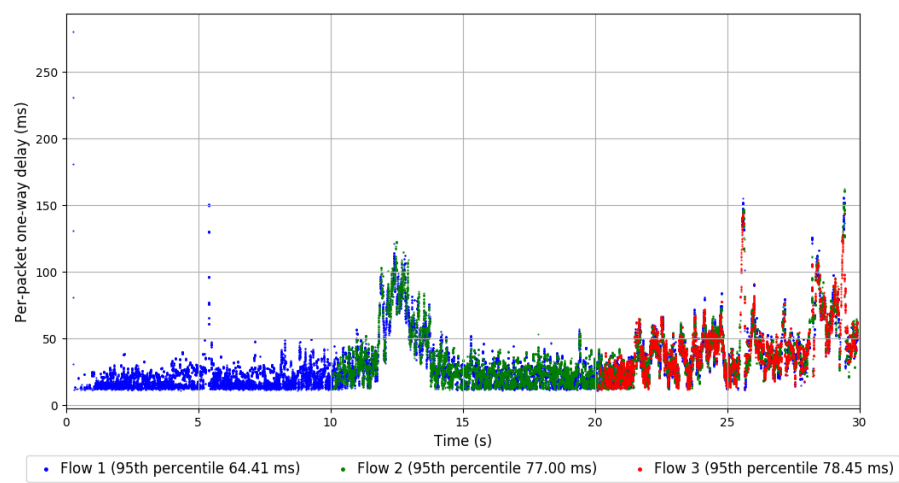
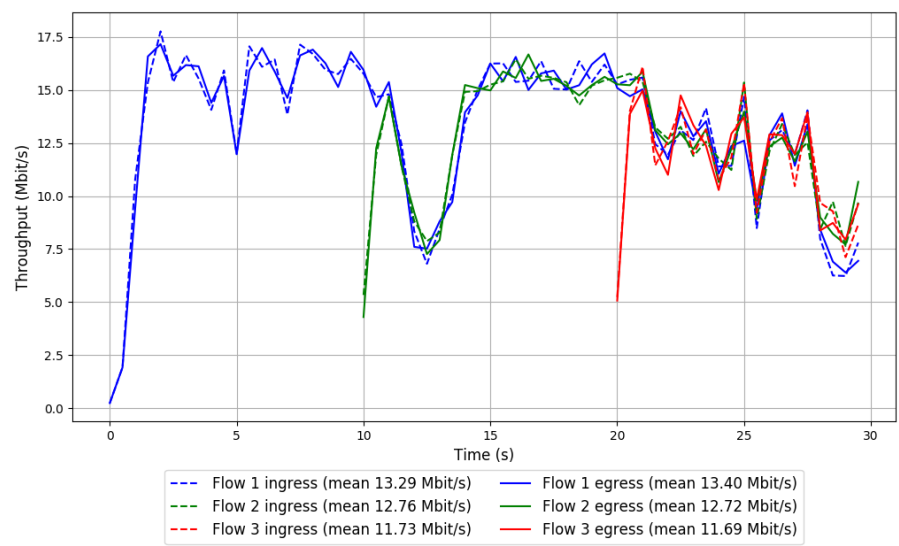


Run 2: Statistics of Sprout

Start at: 2018-01-02 21:47:49  
End at: 2018-01-02 21:48:19  
Local clock offset: 0.444 ms  
Remote clock offset: -1.674 ms

# Below is generated by plot.py at 2018-01-02 22:17:49  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 25.83 Mbit/s  
95th percentile per-packet one-way delay: 72.045 ms  
Loss rate: 0.16%  
-- Flow 1:  
Average throughput: 13.40 Mbit/s  
95th percentile per-packet one-way delay: 64.414 ms  
Loss rate: 0.15%  
-- Flow 2:  
Average throughput: 12.72 Mbit/s  
95th percentile per-packet one-way delay: 77.004 ms  
Loss rate: 0.21%  
-- Flow 3:  
Average throughput: 11.69 Mbit/s  
95th percentile per-packet one-way delay: 78.446 ms  
Loss rate: 0.11%

Run 2: Report of Sprout — Data Link

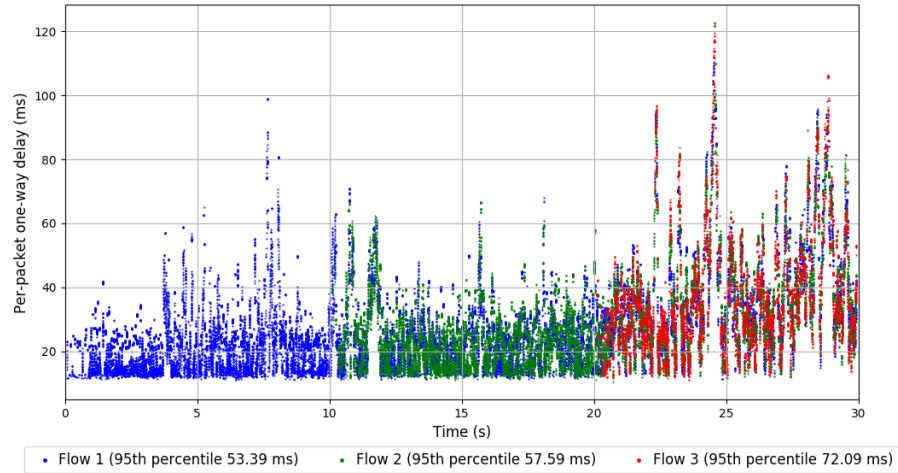
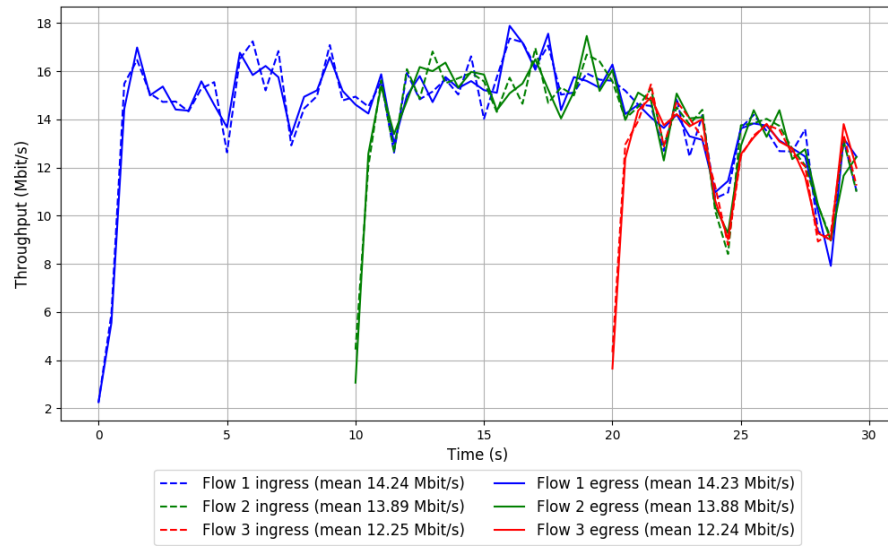


### Run 3: Statistics of Sprout

Start at: 2018-01-02 22:05:51  
End at: 2018-01-02 22:06:21  
Local clock offset: 0.563 ms  
Remote clock offset: -1.26 ms

```
# Below is generated by plot.py at 2018-01-02 22:17:49
# Datalink statistics
-- Total of 3 flows:
Average throughput: 27.50 Mbit/s
95th percentile per-packet one-way delay: 57.862 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 14.23 Mbit/s
95th percentile per-packet one-way delay: 53.389 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 13.88 Mbit/s
95th percentile per-packet one-way delay: 57.586 ms
Loss rate: 0.07%
-- Flow 3:
Average throughput: 12.24 Mbit/s
95th percentile per-packet one-way delay: 72.094 ms
Loss rate: 0.15%
```

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



Run 1: Statistics of TaoVA-100x

Start at: 2018-01-02 21:31:02

End at: 2018-01-02 21:31:32

Local clock offset: 0.491 ms

Remote clock offset: -2.27 ms

# Below is generated by plot.py at 2018-01-02 22:17:49

# Datalink statistics

-- Total of 3 flows:

Average throughput: 11.87 Mbit/s

95th percentile per-packet one-way delay: 59.655 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 5.00 Mbit/s

95th percentile per-packet one-way delay: 24.837 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 6.50 Mbit/s

95th percentile per-packet one-way delay: 79.930 ms

Loss rate: 0.00%

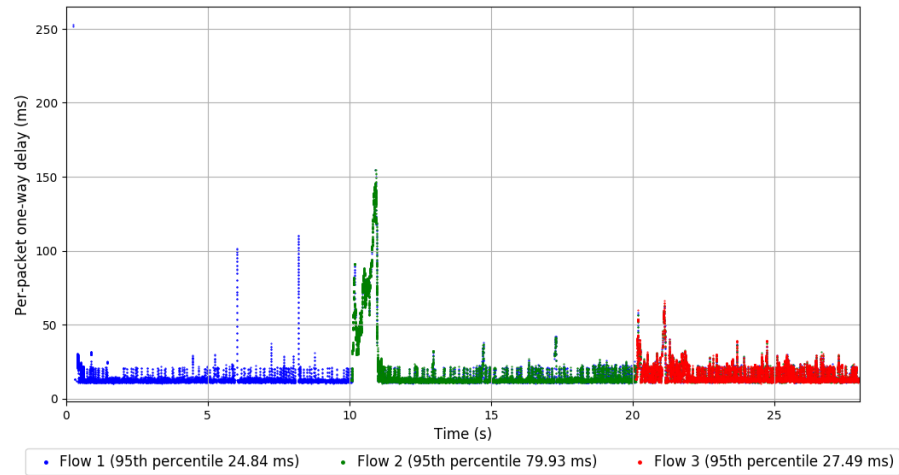
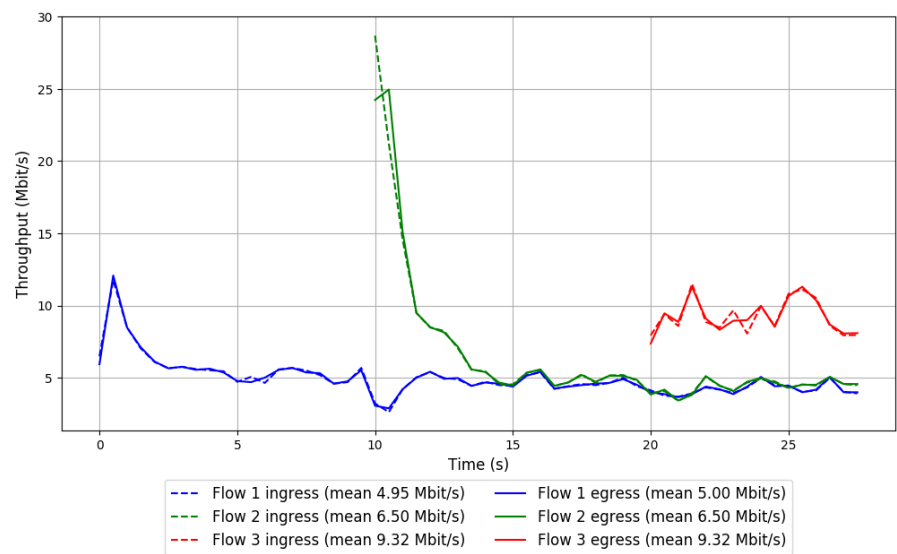
-- Flow 3:

Average throughput: 9.32 Mbit/s

95th percentile per-packet one-way delay: 27.486 ms

Loss rate: 0.00%

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



Run 2: Statistics of TaoVA-100x

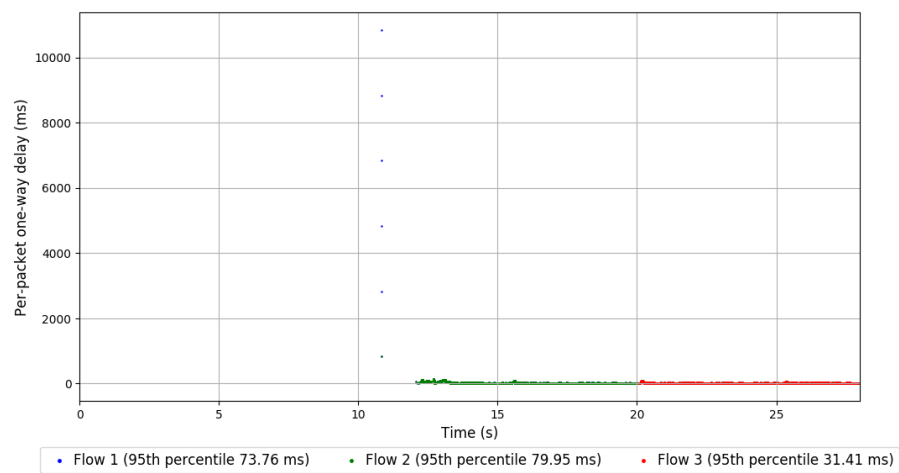
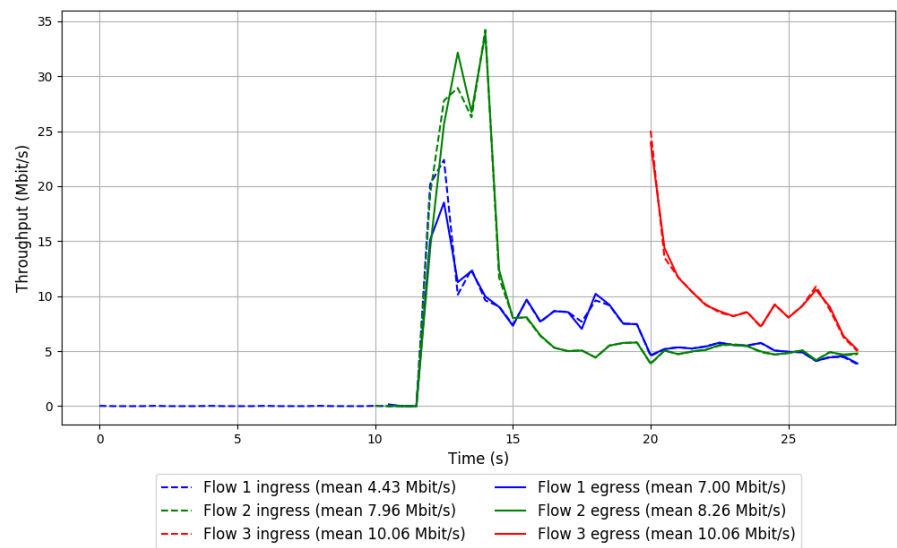
Start at: 2018-01-02 21:49:01

End at: 2018-01-02 21:49:31

Local clock offset: 0.521 ms

Remote clock offset: -1.752 ms

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

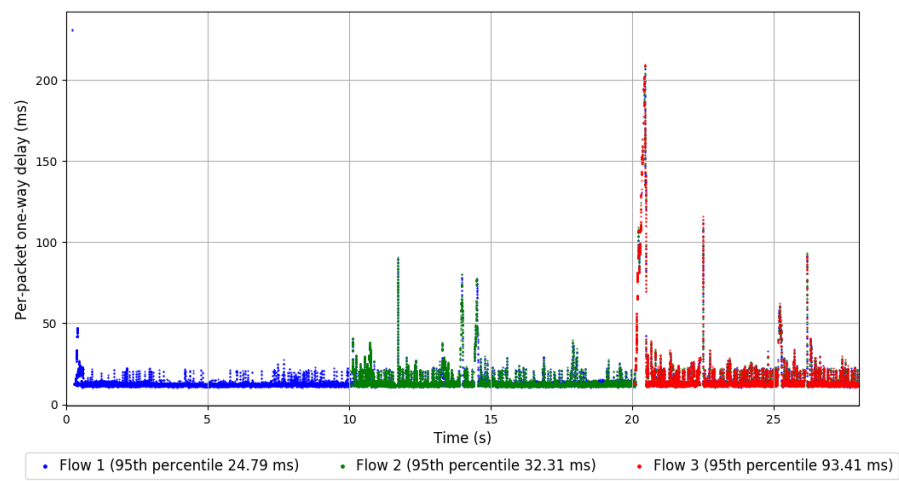
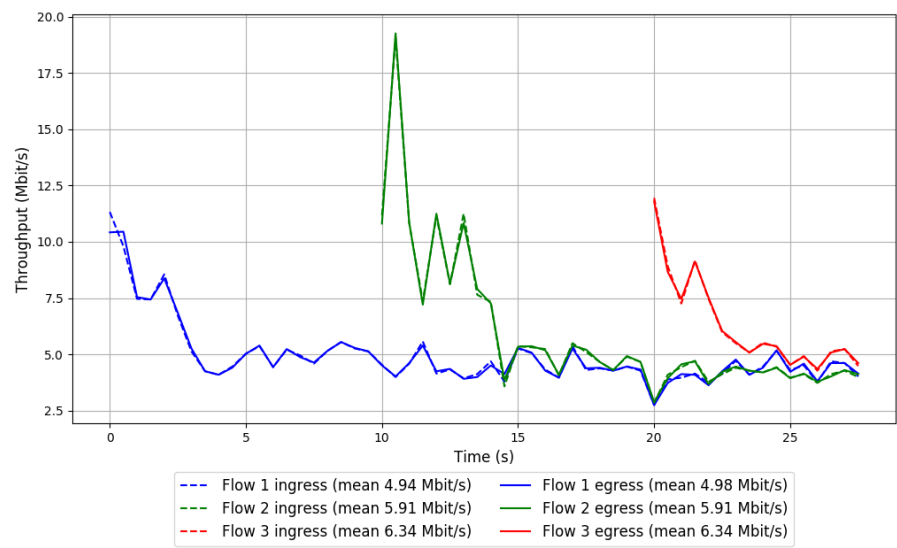


Run 3: Statistics of TaoVA-100x

Start at: 2018-01-02 22:07:02  
End at: 2018-01-02 22:07:32  
Local clock offset: 0.476 ms  
Remote clock offset: -1.288 ms

# Below is generated by plot.py at 2018-01-02 22:17:59  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 10.62 Mbit/s  
95th percentile per-packet one-way delay: 34.134 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 4.98 Mbit/s  
95th percentile per-packet one-way delay: 24.786 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 5.91 Mbit/s  
95th percentile per-packet one-way delay: 32.311 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 6.34 Mbit/s  
95th percentile per-packet one-way delay: 93.405 ms  
Loss rate: 0.00%

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

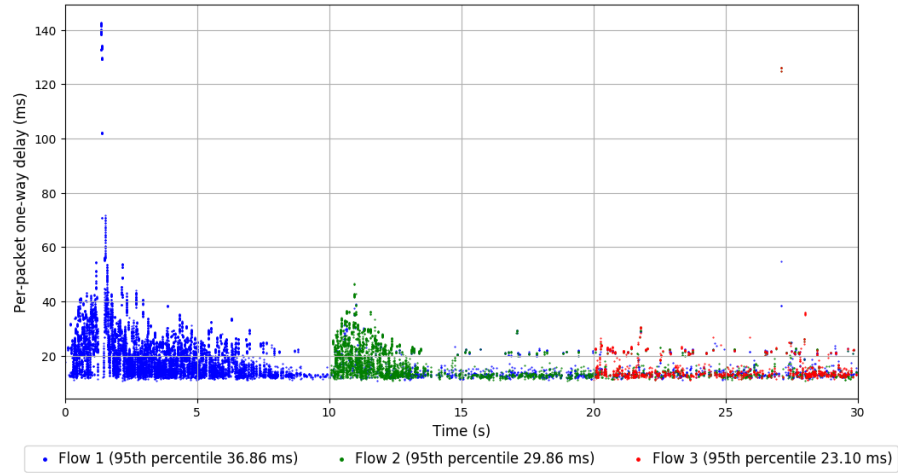
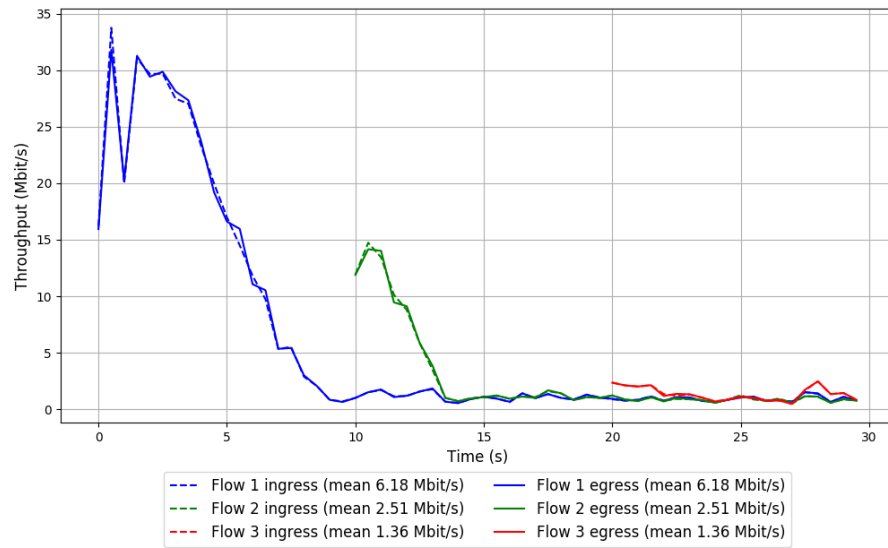


Run 1: Statistics of TCP Vegas

Start at: 2018-01-02 21:26:17  
End at: 2018-01-02 21:26:47  
Local clock offset: 0.483 ms  
Remote clock offset: -2.226 ms

# Below is generated by plot.py at 2018-01-02 22:17:59  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 8.30 Mbit/s  
95th percentile per-packet one-way delay: 35.448 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 6.18 Mbit/s  
95th percentile per-packet one-way delay: 36.864 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 2.51 Mbit/s  
95th percentile per-packet one-way delay: 29.860 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 1.36 Mbit/s  
95th percentile per-packet one-way delay: 23.097 ms  
Loss rate: 0.00%

## Run 1: Report of TCP Vegas — Data Link

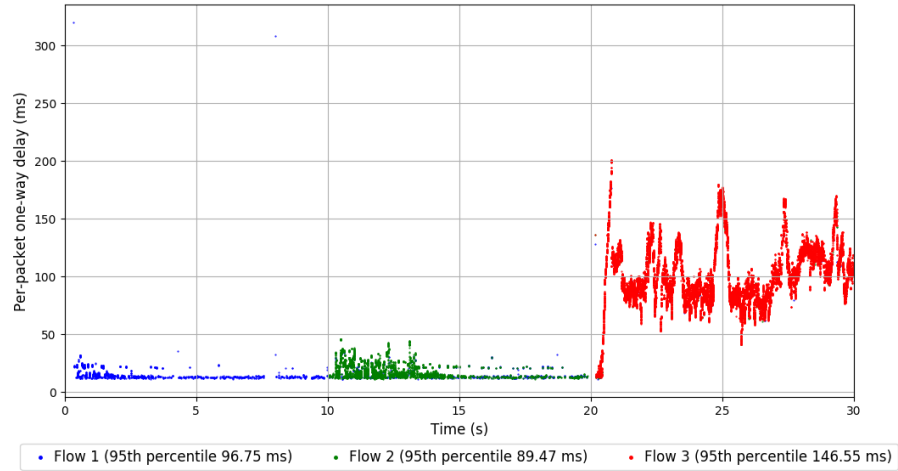
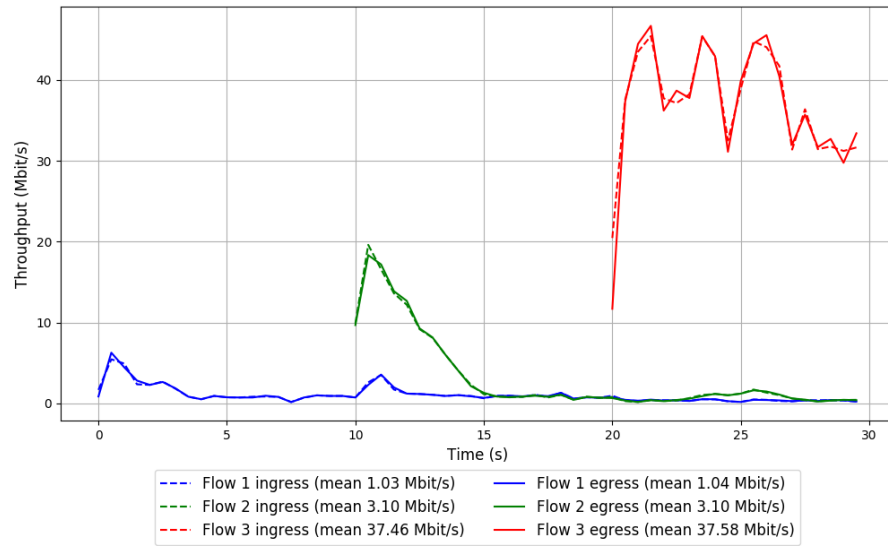


Run 2: Statistics of TCP Vegas

Start at: 2018-01-02 21:44:14  
End at: 2018-01-02 21:44:44  
Local clock offset: 0.44 ms  
Remote clock offset: -1.895 ms

# Below is generated by plot.py at 2018-01-02 22:18:00  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 15.56 Mbit/s  
95th percentile per-packet one-way delay: 141.895 ms  
Loss rate: 0.69%  
-- Flow 1:  
Average throughput: 1.04 Mbit/s  
95th percentile per-packet one-way delay: 96.746 ms  
Loss rate: 0.08%  
-- Flow 2:  
Average throughput: 3.10 Mbit/s  
95th percentile per-packet one-way delay: 89.469 ms  
Loss rate: 0.10%  
-- Flow 3:  
Average throughput: 37.58 Mbit/s  
95th percentile per-packet one-way delay: 146.548 ms  
Loss rate: 0.84%

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

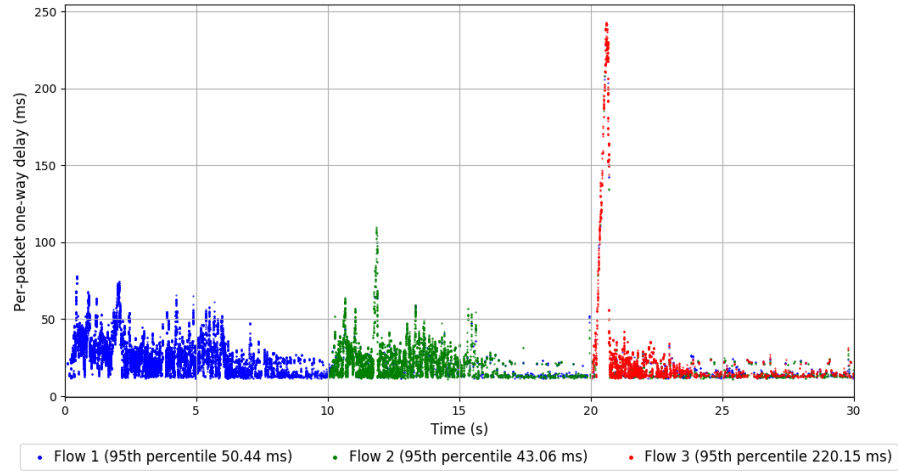
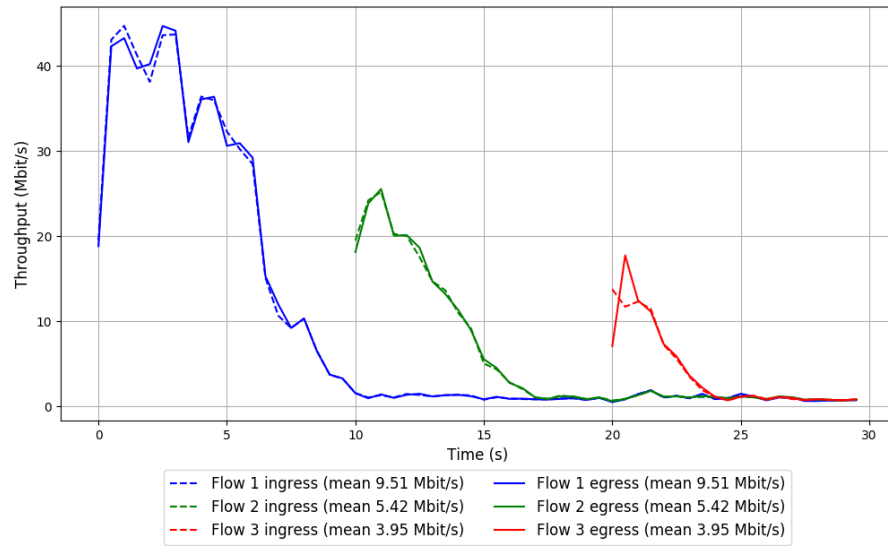


Run 3: Statistics of TCP Vegas

Start at: 2018-01-02 22:02:16  
End at: 2018-01-02 22:02:46  
Local clock offset: 0.462 ms  
Remote clock offset: -1.318 ms

# Below is generated by plot.py at 2018-01-02 22:18:01  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 14.43 Mbit/s  
95th percentile per-packet one-way delay: 51.760 ms  
Loss rate: 0.01%  
-- Flow 1:  
Average throughput: 9.51 Mbit/s  
95th percentile per-packet one-way delay: 50.435 ms  
Loss rate: 0.01%  
-- Flow 2:  
Average throughput: 5.42 Mbit/s  
95th percentile per-packet one-way delay: 43.058 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 3.95 Mbit/s  
95th percentile per-packet one-way delay: 220.154 ms  
Loss rate: 0.03%

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

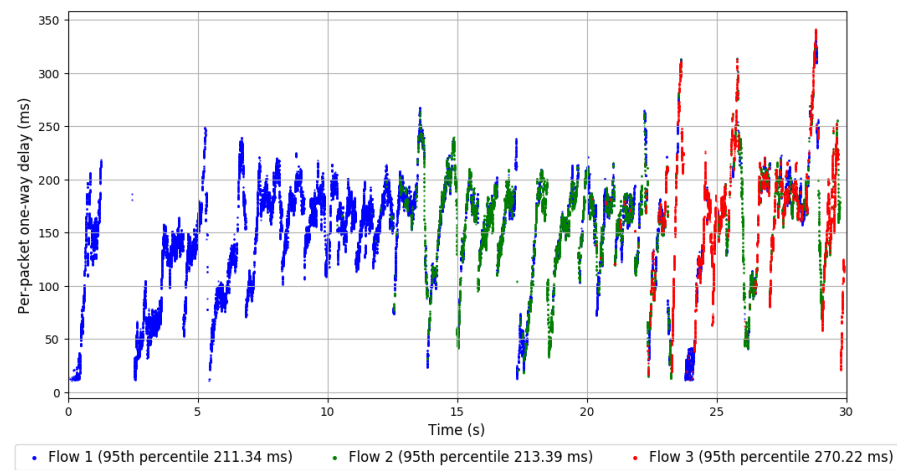
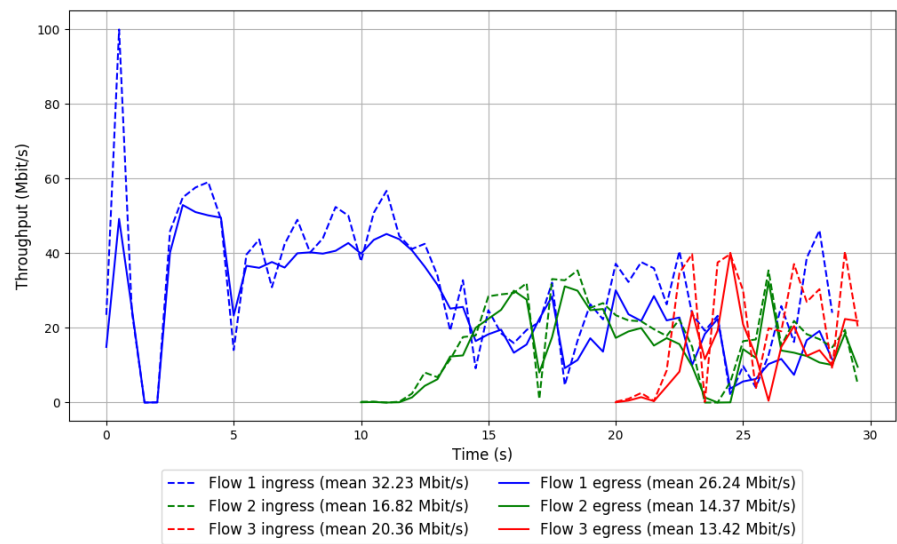


Run 1: Statistics of Verus

Start at: 2018-01-02 21:25:03  
End at: 2018-01-02 21:25:33  
Local clock offset: 0.382 ms  
Remote clock offset: -2.306 ms

# Below is generated by plot.py at 2018-01-02 22:18:28  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 39.13 Mbit/s  
95th percentile per-packet one-way delay: 217.732 ms  
Loss rate: 19.79%  
-- Flow 1:  
Average throughput: 26.24 Mbit/s  
95th percentile per-packet one-way delay: 211.343 ms  
Loss rate: 17.94%  
-- Flow 2:  
Average throughput: 14.37 Mbit/s  
95th percentile per-packet one-way delay: 213.389 ms  
Loss rate: 15.63%  
-- Flow 3:  
Average throughput: 13.42 Mbit/s  
95th percentile per-packet one-way delay: 270.217 ms  
Loss rate: 35.20%

Run 1: Report of Verus — Data Link

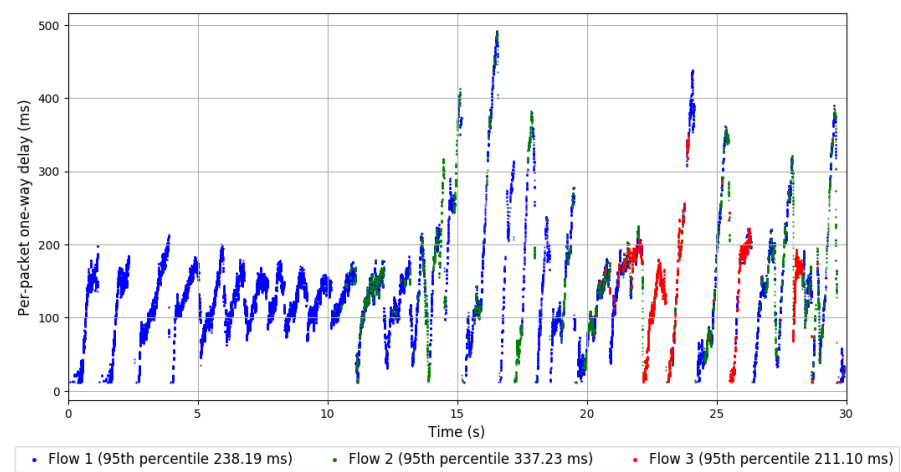
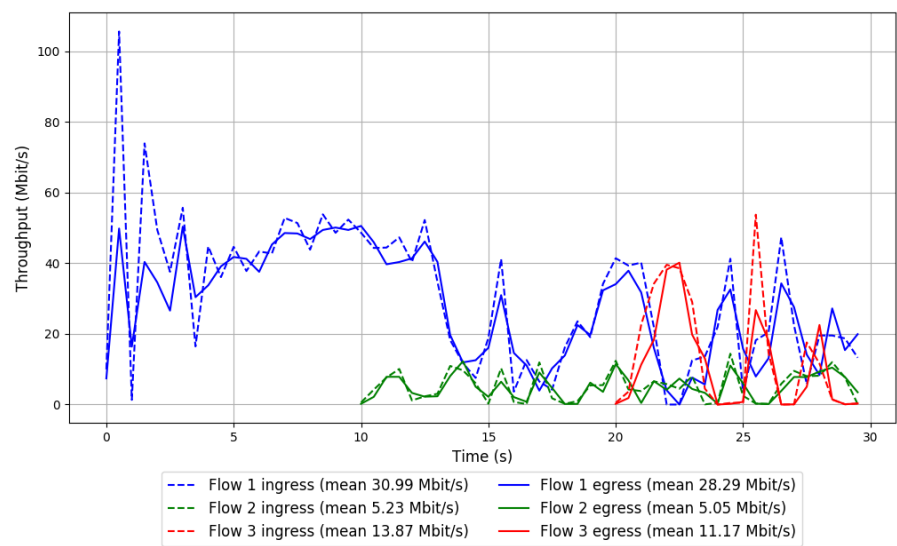


Run 2: Statistics of Verus

Start at: 2018-01-02 21:43:01  
End at: 2018-01-02 21:43:31  
Local clock offset: 0.445 ms  
Remote clock offset: -1.93 ms

# Below is generated by plot.py at 2018-01-02 22:18:28  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 35.27 Mbit/s  
95th percentile per-packet one-way delay: 256.938 ms  
Loss rate: 9.60%  
-- Flow 1:  
Average throughput: 28.29 Mbit/s  
95th percentile per-packet one-way delay: 238.187 ms  
Loss rate: 8.70%  
-- Flow 2:  
Average throughput: 5.05 Mbit/s  
95th percentile per-packet one-way delay: 337.229 ms  
Loss rate: 3.80%  
-- Flow 3:  
Average throughput: 11.17 Mbit/s  
95th percentile per-packet one-way delay: 211.104 ms  
Loss rate: 20.12%

Run 2: Report of Verus — Data Link

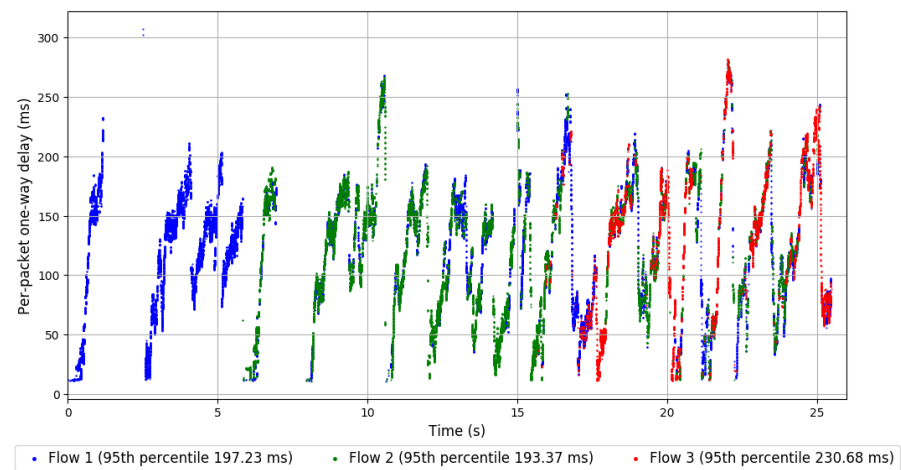
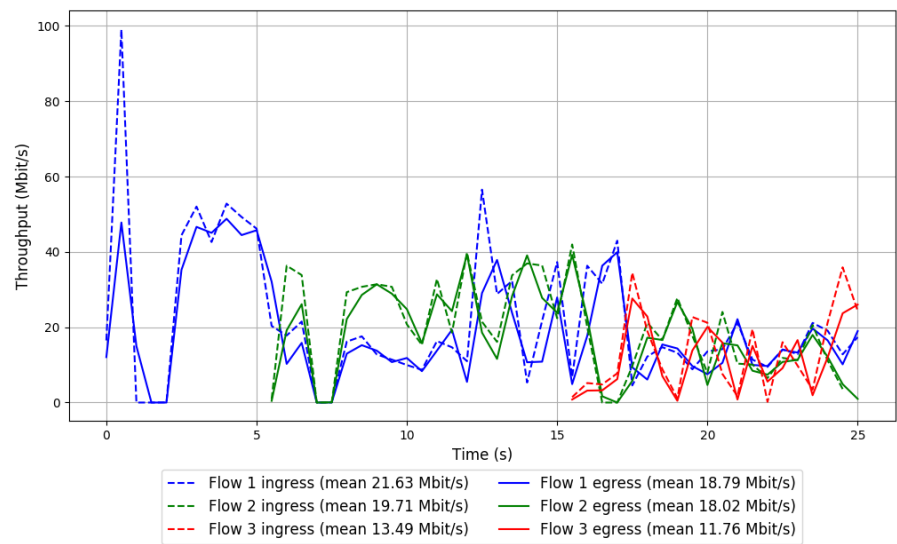


Run 3: Statistics of Verus

Start at: 2018-01-02 22:01:03  
End at: 2018-01-02 22:01:33  
Local clock offset: 0.561 ms  
Remote clock offset: -1.472 ms

# Below is generated by plot.py at 2018-01-02 22:18:28  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 37.03 Mbit/s  
95th percentile per-packet one-way delay: 203.906 ms  
Loss rate: 11.33%  
-- Flow 1:  
Average throughput: 18.79 Mbit/s  
95th percentile per-packet one-way delay: 197.229 ms  
Loss rate: 13.12%  
-- Flow 2:  
Average throughput: 18.02 Mbit/s  
95th percentile per-packet one-way delay: 193.374 ms  
Loss rate: 8.20%  
-- Flow 3:  
Average throughput: 11.76 Mbit/s  
95th percentile per-packet one-way delay: 230.678 ms  
Loss rate: 12.87%

Run 3: Report of Verus — Data Link

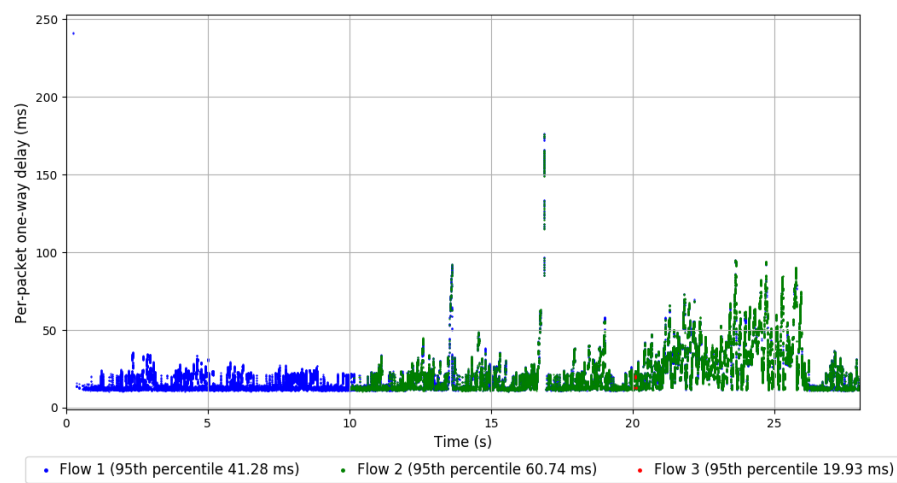
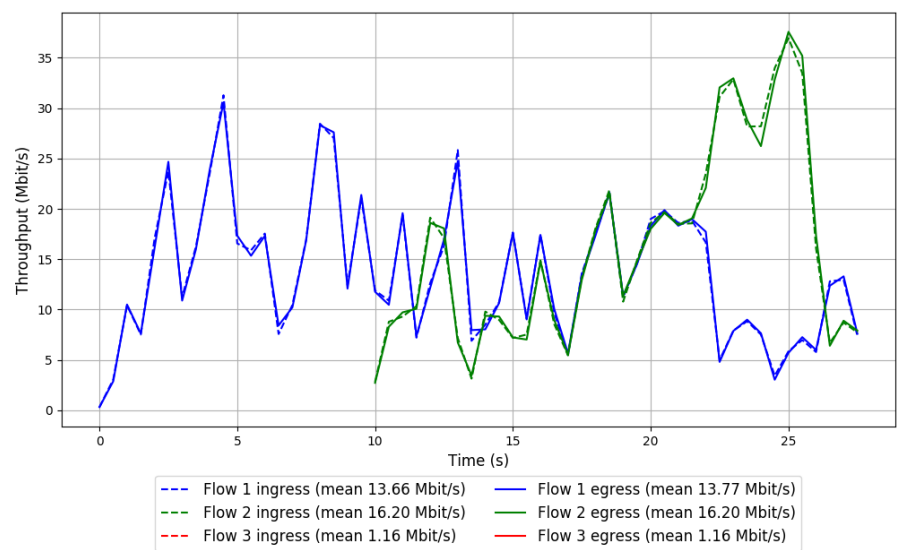


Run 1: Statistics of Copa

Start at: 2018-01-02 21:38:14  
End at: 2018-01-02 21:38:44  
Local clock offset: 0.511 ms  
Remote clock offset: -2.079 ms

# Below is generated by plot.py at 2018-01-02 22:18:30  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 24.26 Mbit/s  
95th percentile per-packet one-way delay: 52.405 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 13.77 Mbit/s  
95th percentile per-packet one-way delay: 41.280 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 16.20 Mbit/s  
95th percentile per-packet one-way delay: 60.737 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 1.16 Mbit/s  
95th percentile per-packet one-way delay: 19.934 ms  
Loss rate: 0.00%

Run 1: Report of Copa — Data Link

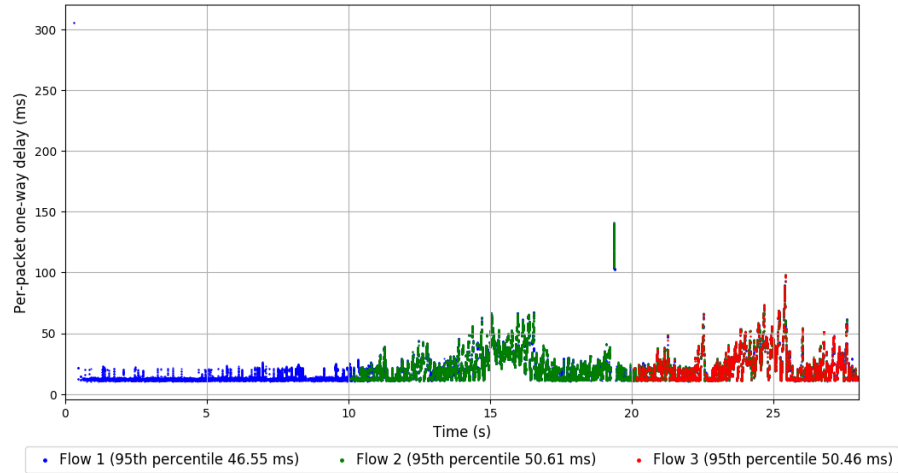
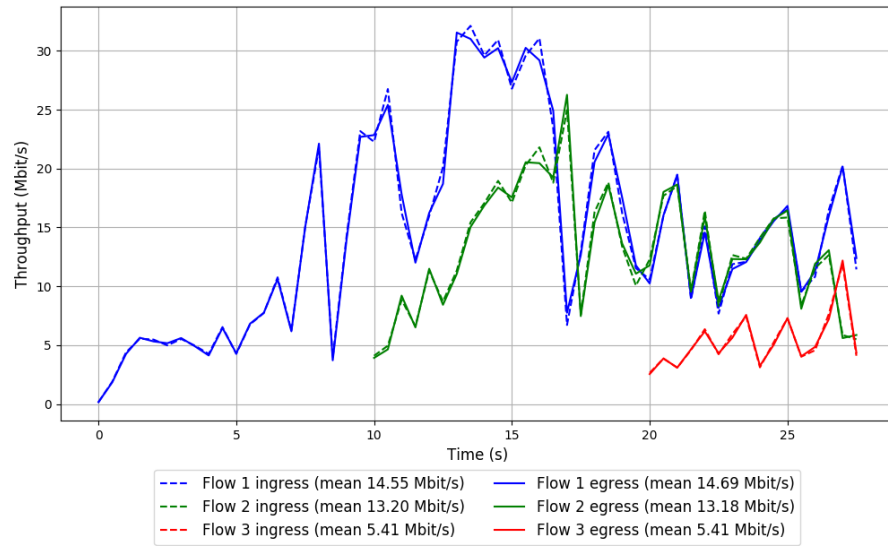


Run 2: Statistics of Copa

Start at: 2018-01-02 21:56:13  
End at: 2018-01-02 21:56:44  
Local clock offset: 0.53 ms  
Remote clock offset: -1.519 ms

# Below is generated by plot.py at 2018-01-02 22:18:32  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 24.79 Mbit/s  
95th percentile per-packet one-way delay: 48.512 ms  
Loss rate: 0.09%  
-- Flow 1:  
Average throughput: 14.69 Mbit/s  
95th percentile per-packet one-way delay: 46.551 ms  
Loss rate: 0.09%  
-- Flow 2:  
Average throughput: 13.18 Mbit/s  
95th percentile per-packet one-way delay: 50.614 ms  
Loss rate: 0.11%  
-- Flow 3:  
Average throughput: 5.41 Mbit/s  
95th percentile per-packet one-way delay: 50.462 ms  
Loss rate: 0.00%

## Run 2: Report of Copa — Data Link

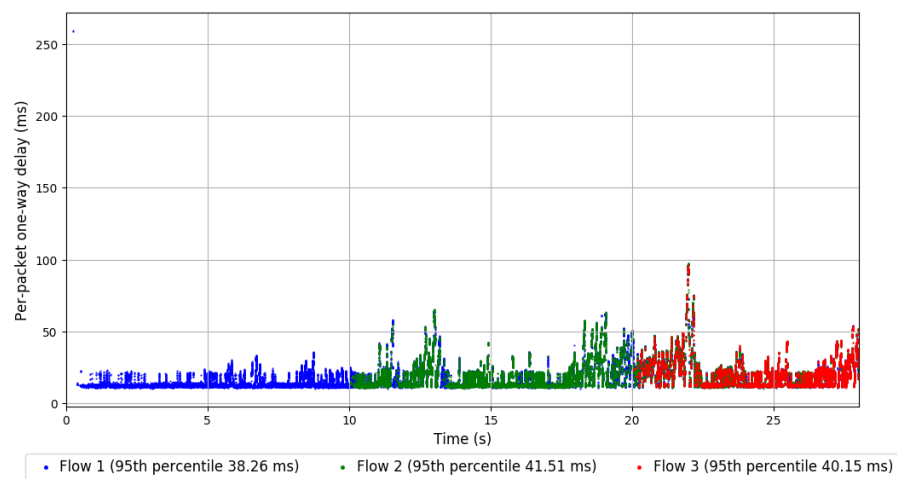
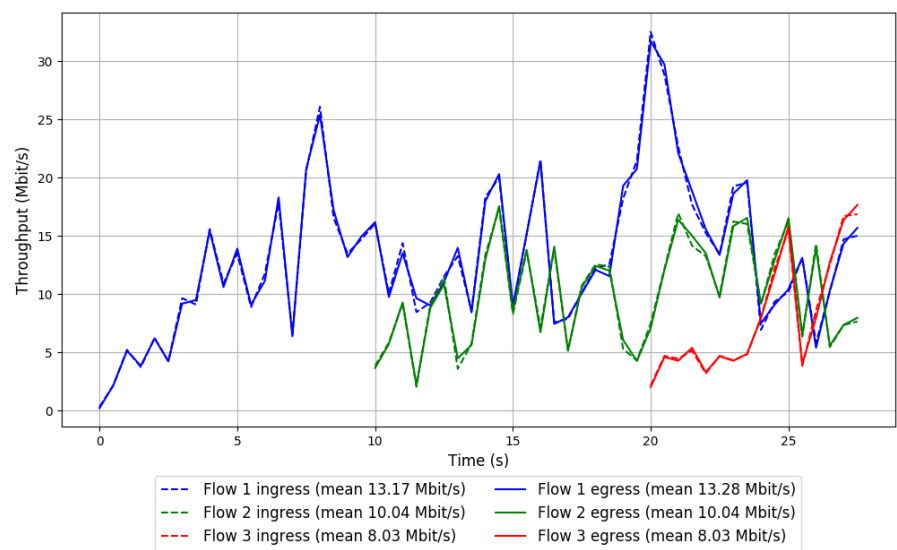


Run 3: Statistics of Copa

Start at: 2018-01-02 22:14:15  
End at: 2018-01-02 22:14:45  
Local clock offset: 0.55 ms  
Remote clock offset: -1.309 ms

# Below is generated by plot.py at 2018-01-02 22:18:34  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 22.09 Mbit/s  
95th percentile per-packet one-way delay: 39.515 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 13.28 Mbit/s  
95th percentile per-packet one-way delay: 38.259 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 10.04 Mbit/s  
95th percentile per-packet one-way delay: 41.510 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 8.03 Mbit/s  
95th percentile per-packet one-way delay: 40.151 ms  
Loss rate: 0.00%

Run 3: Report of Copa — Data Link



Run 1: Statistics of FillP

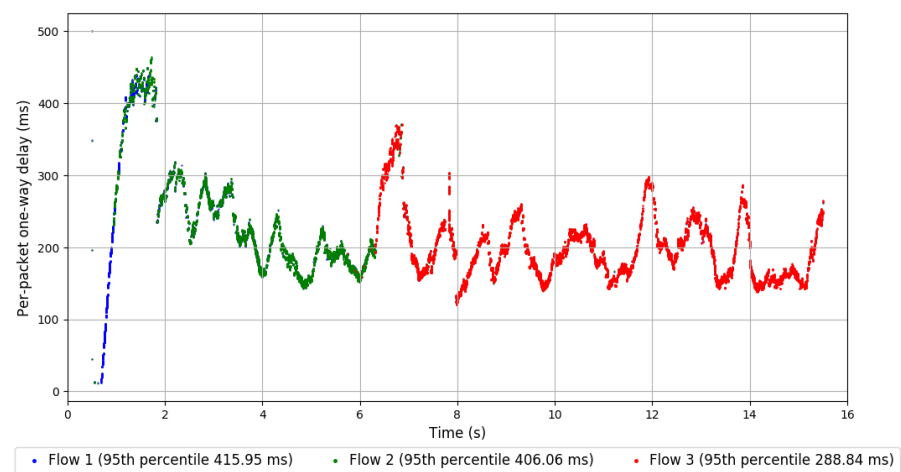
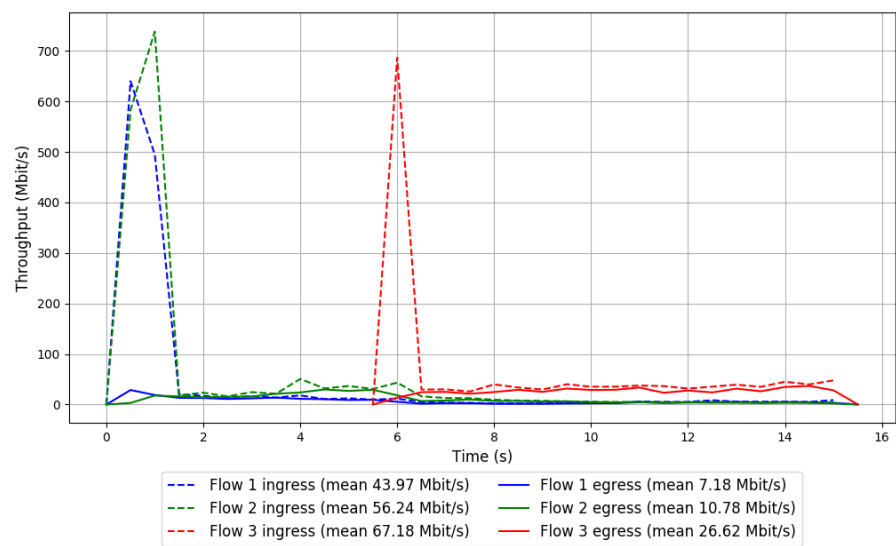
Start at: 2018-01-02 21:33:26

End at: 2018-01-02 21:33:56

Local clock offset: 0.438 ms

Remote clock offset: -2.152 ms

Run 1: Report of FillP — Data Link

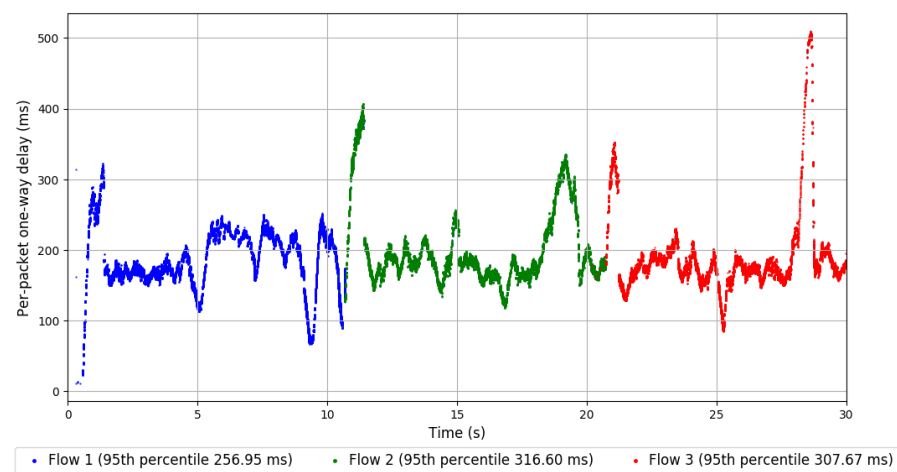
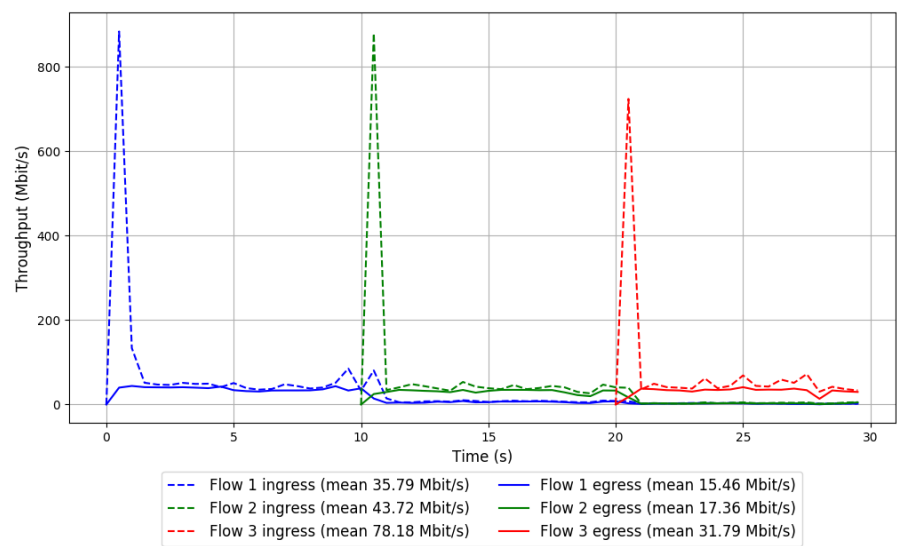


Run 2: Statistics of FillP

Start at: 2018-01-02 21:51:26  
End at: 2018-01-02 21:51:56  
Local clock offset: 0.569 ms  
Remote clock offset: -1.743 ms

# Below is generated by plot.py at 2018-01-02 22:18:40  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 37.49 Mbit/s  
95th percentile per-packet one-way delay: 289.819 ms  
Loss rate: 59.12%  
-- Flow 1:  
Average throughput: 15.46 Mbit/s  
95th percentile per-packet one-way delay: 256.947 ms  
Loss rate: 57.24%  
-- Flow 2:  
Average throughput: 17.36 Mbit/s  
95th percentile per-packet one-way delay: 316.600 ms  
Loss rate: 60.68%  
-- Flow 3:  
Average throughput: 31.79 Mbit/s  
95th percentile per-packet one-way delay: 307.667 ms  
Loss rate: 59.97%

Run 2: Report of FillP — Data Link

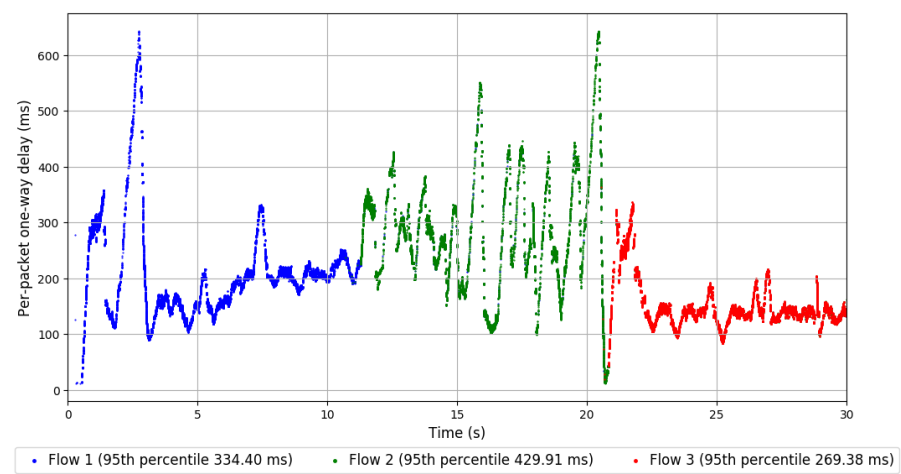
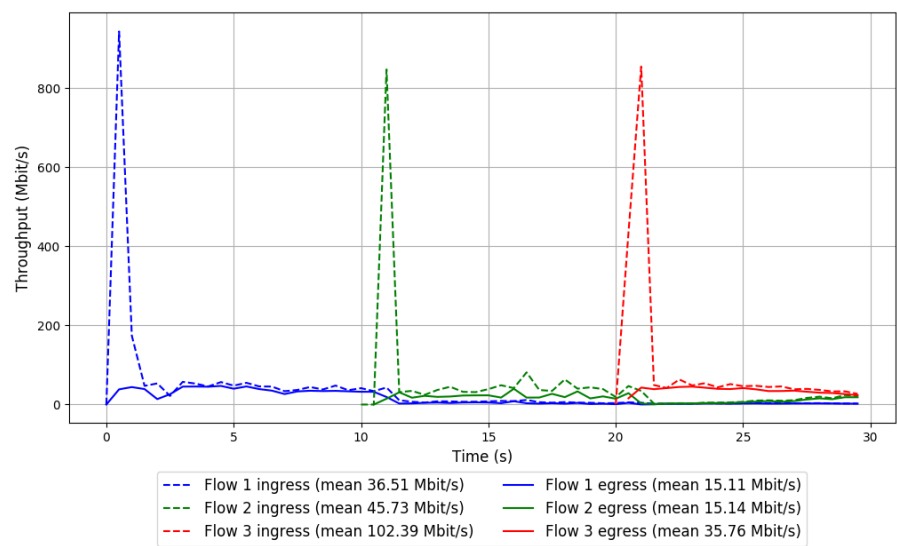


Run 3: Statistics of FillP

Start at: 2018-01-02 22:09:27  
End at: 2018-01-02 22:09:57  
Local clock offset: 0.452 ms  
Remote clock offset: -1.315 ms

# Below is generated by plot.py at 2018-01-02 22:18:42  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 36.30 Mbit/s  
95th percentile per-packet one-way delay: 373.009 ms  
Loss rate: 64.31%  
-- Flow 1:  
Average throughput: 15.11 Mbit/s  
95th percentile per-packet one-way delay: 334.404 ms  
Loss rate: 58.97%  
-- Flow 2:  
Average throughput: 15.14 Mbit/s  
95th percentile per-packet one-way delay: 429.913 ms  
Loss rate: 67.96%  
-- Flow 3:  
Average throughput: 35.76 Mbit/s  
95th percentile per-packet one-way delay: 269.379 ms  
Loss rate: 66.77%

Run 3: Report of FillP — Data Link

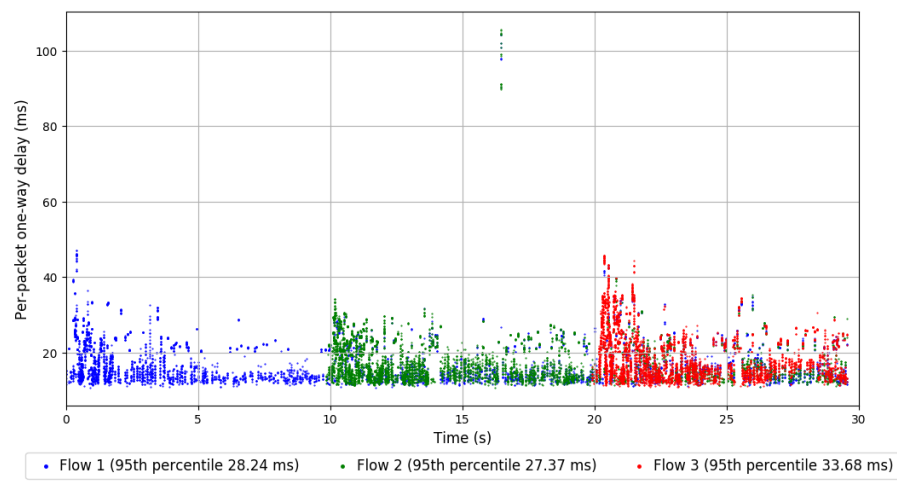
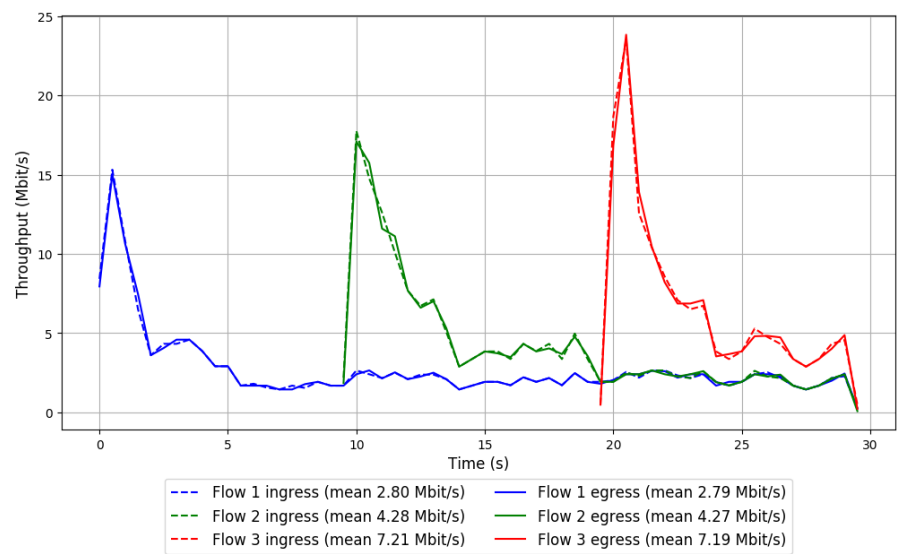


```
Run 1: Statistics of Indigo

Start at: 2018-01-02 21:23:52
End at: 2018-01-02 21:24:22
Local clock offset: 0.489 ms
Remote clock offset: -2.242 ms

# Below is generated by plot.py at 2018-01-02 22:18:42
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.99 Mbit/s
95th percentile per-packet one-way delay: 29.584 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 2.79 Mbit/s
95th percentile per-packet one-way delay: 28.241 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 4.27 Mbit/s
95th percentile per-packet one-way delay: 27.368 ms
Loss rate: 0.11%
-- Flow 3:
Average throughput: 7.19 Mbit/s
95th percentile per-packet one-way delay: 33.680 ms
Loss rate: 0.19%
```

Run 1: Report of Indigo — Data Link

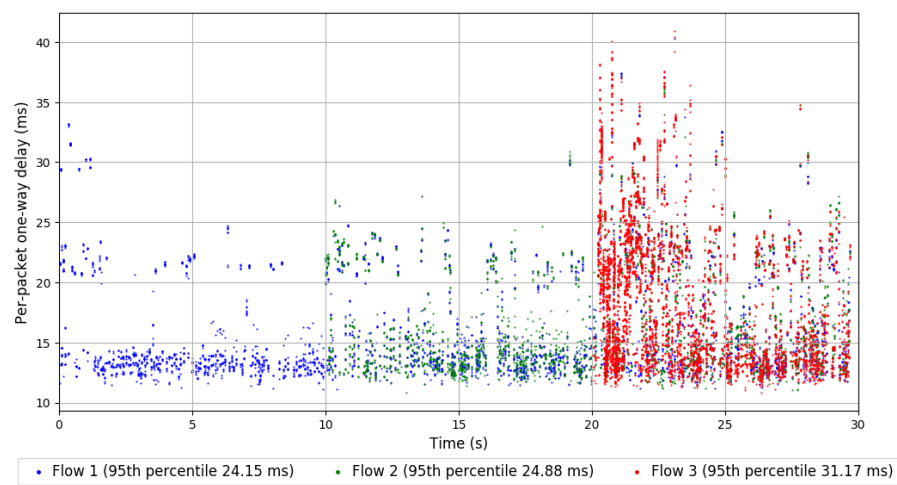
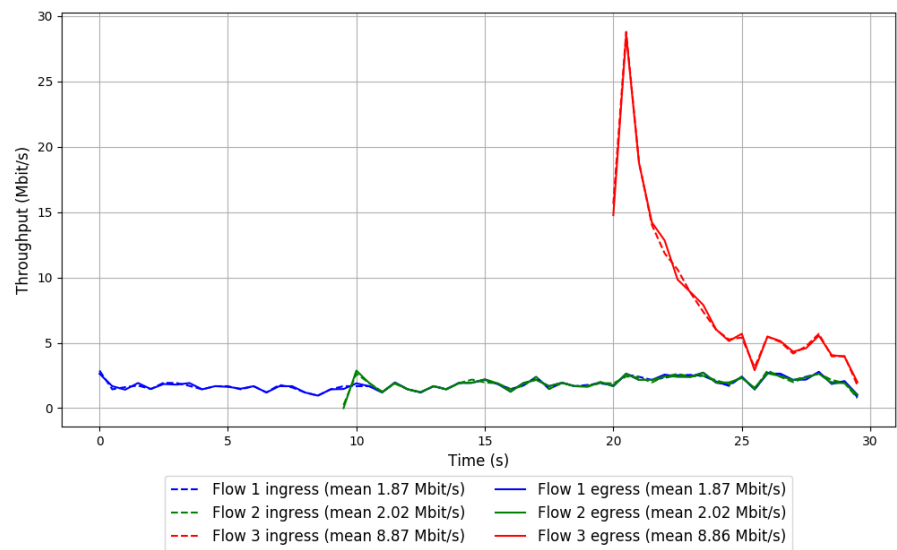


Run 2: Statistics of Indigo

Start at: 2018-01-02 21:41:50  
End at: 2018-01-02 21:42:20  
Local clock offset: 0.449 ms  
Remote clock offset: -1.852 ms

# Below is generated by plot.py at 2018-01-02 22:18:42  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 6.08 Mbit/s  
95th percentile per-packet one-way delay: 28.462 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 1.87 Mbit/s  
95th percentile per-packet one-way delay: 24.146 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 2.02 Mbit/s  
95th percentile per-packet one-way delay: 24.882 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 8.86 Mbit/s  
95th percentile per-packet one-way delay: 31.172 ms  
Loss rate: 0.00%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2018-01-02 21:59:51  
End at: 2018-01-02 22:00:21  
Local clock offset: 0.469 ms  
Remote clock offset: -1.497 ms

# Below is generated by plot.py at 2018-01-02 22:18:42  
# Datalink statistics  
-- Total of 3 flows:  
Average throughput: 5.81 Mbit/s  
95th percentile per-packet one-way delay: 24.775 ms  
Loss rate: 0.00%  
-- Flow 1:  
Average throughput: 2.69 Mbit/s  
95th percentile per-packet one-way delay: 24.557 ms  
Loss rate: 0.00%  
-- Flow 2:  
Average throughput: 3.74 Mbit/s  
95th percentile per-packet one-way delay: 25.624 ms  
Loss rate: 0.00%  
-- Flow 3:  
Average throughput: 1.95 Mbit/s  
95th percentile per-packet one-way delay: 23.999 ms  
Loss rate: 0.00%

Run 3: Report of Indigo — Data Link

