

## Pantheon Report

Generated at 2018-01-25 20:29:10 (UTC).

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

Repeated the test of 15 congestion control schemes 3 times.

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

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

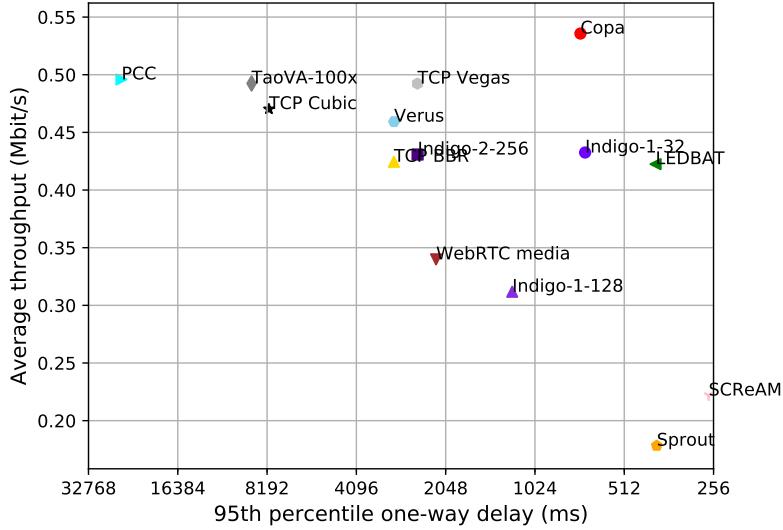
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo\_fast**).

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

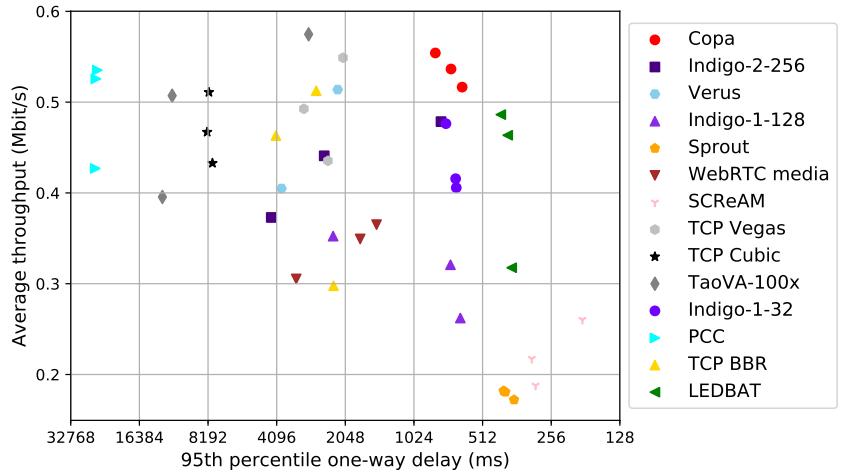
Git summary:

```
branch: master @ f23294ec38436c9f802847d477a41b7343ec76e6
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/fillp @ ec9585325218d5048c4d4152fa42240af54c6e67
third_party/genericCC @ 80b516c448f795fd6e9675f7177b69c622f07da8
third_party/indigo @ a9b2060d39e4da2e8987e893e3eca2a6c7cd0ab9
third_party/indigo-1-layer-128-unit @ 3ae9e4ef4230db7484501f82ce8b377695f2f66d
third_party/indigo-1-layer-32-unit @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/indigo-1-layer-32-unit-no-calib @ 1f3a7f75b41135ed5b540c0fd3505939528e2a5f
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/koho_cc @ f0f2e693303aeee82ea808e6928eac4f1083a6681
  M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179aab4a906ce6bb7cf3cf
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 @ f1a14bf7e749737437f61b1eaeeb30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
  M src/examples/cellsim.cc
  M src/examples/sproutbt2.cc
  M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
  M src/verus.hpp
  M tools/plot.py
third_party/vivace @ 423cbca3e8ea1d599e7b5cf725835e8a2b6bfac6
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

test from 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



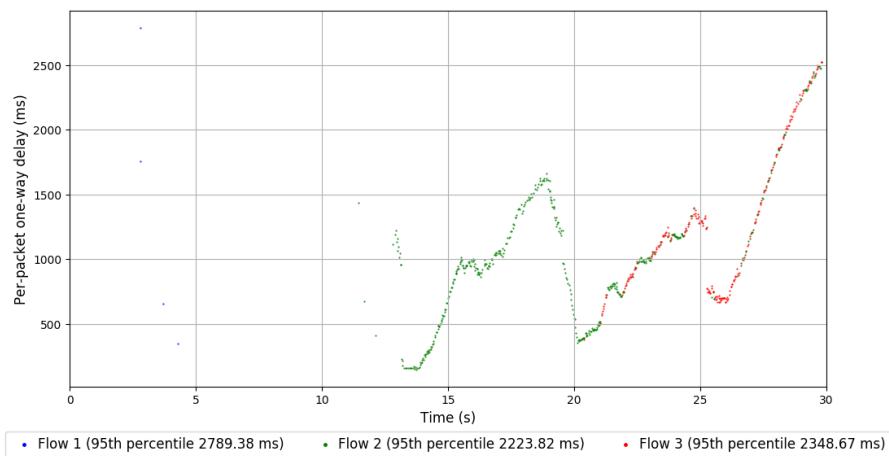
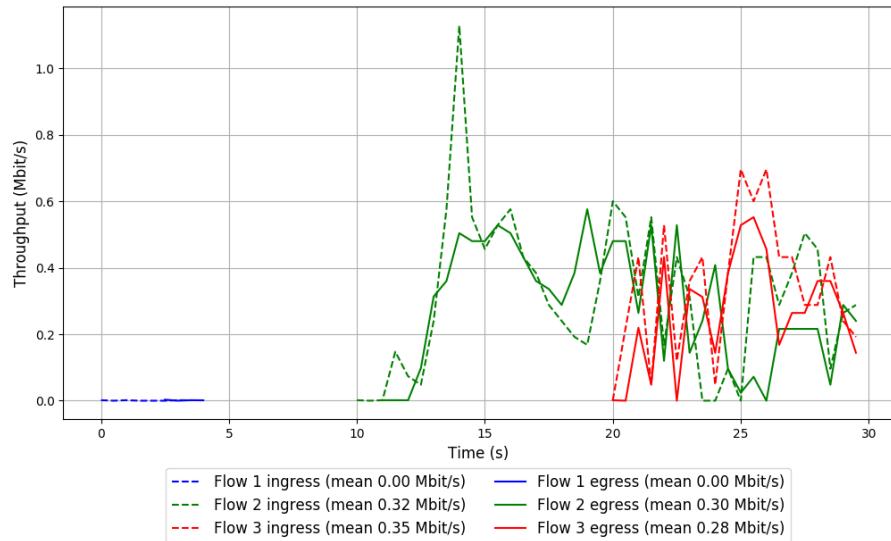
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	0.20	0.28	0.13	3213.84	3050.60	3006.07	3.12	11.91	33.73
TCP Cubic		0.46	0.03	0.00	8073.74	6745.11	8195.45	31.25	44.99	71.93
LEDBAT		0.12	0.31	0.22	1072.09	404.69	396.61	0.25	1.50	6.24
PCC		0.50	0.00	N/A	25361.38	N/A	N/A	98.78	N/A	N/A
QUIC Cubic		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SCReAM		0.08	0.14	0.11	247.33	244.28	273.38	0.91	1.04	2.00
WebRTC media		0.18	0.12	0.05	2110.45	2272.38	2050.98	3.92	3.24	0.61
Sprout		0.09	0.09	0.09	848.86	252.65	344.86	1.61	2.29	4.48
TaoVA-100x		0.33	0.32	0.07	5788.58	9314.43	3642.32	34.67	26.27	70.47
TCP Vegas		0.36	0.17	0.13	2363.62	2470.45	2683.96	5.72	11.54	41.43
Verus		0.43	0.02	0.07	3101.38	2732.25	2041.37	12.21	2.27	17.39
Copa		0.34	0.24	0.16	647.57	773.57	825.54	1.56	3.87	11.27
Indigo-2-256		0.17	0.28	0.26	1673.31	2138.17	2702.22	9.23	6.67	24.47
Indigo-1-32		0.23	0.21	0.20	591.60	718.01	719.34	1.81	2.03	5.98
Indigo-1-128		0.16	0.14	0.18	1159.63	709.45	1414.26	3.73	3.42	11.97

Run 1: Statistics of TCP BBR

```
Start at: 2018-01-25 18:35:58
End at: 2018-01-25 18:36:28
Local clock offset: 1.369 ms
Remote clock offset: -5.483 ms

# Below is generated by plot.py at 2018-01-25 20:28:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 2306.819 ms
Loss rate: 17.17%
-- Flow 1:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2789.384 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 2223.823 ms
Loss rate: 13.57%
-- Flow 3:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 2348.667 ms
Loss rate: 23.76%
```

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

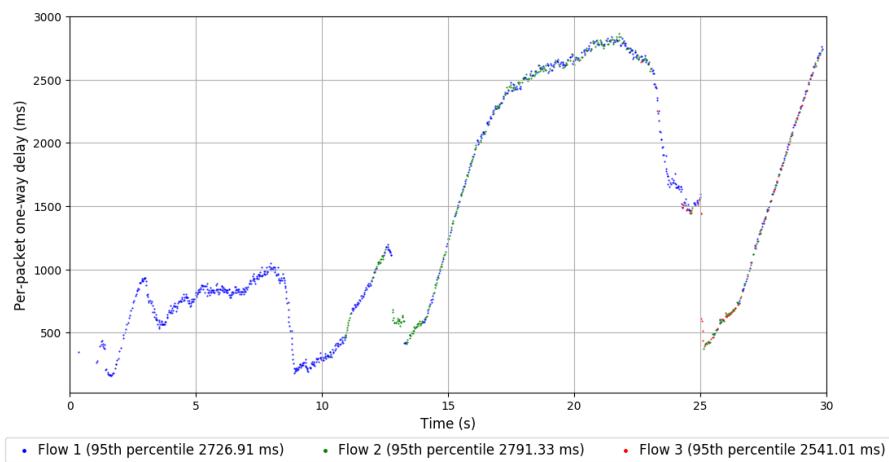
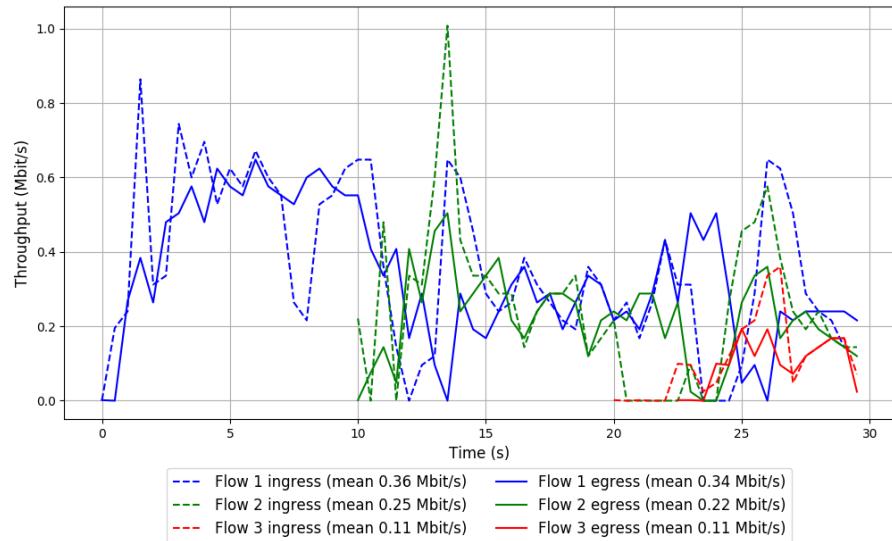


Run 2: Statistics of TCP BBR

```
Start at: 2018-01-25 18:56:17
End at: 2018-01-25 18:56:47
Local clock offset: 1.42 ms
Remote clock offset: 0.177 ms

# Below is generated by plot.py at 2018-01-25 20:28:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 2747.284 ms
Loss rate: 9.36%
-- Flow 1:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 2726.909 ms
Loss rate: 6.20%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 2791.330 ms
Loss rate: 11.00%
-- Flow 3:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 2541.005 ms
Loss rate: 32.49%
```

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

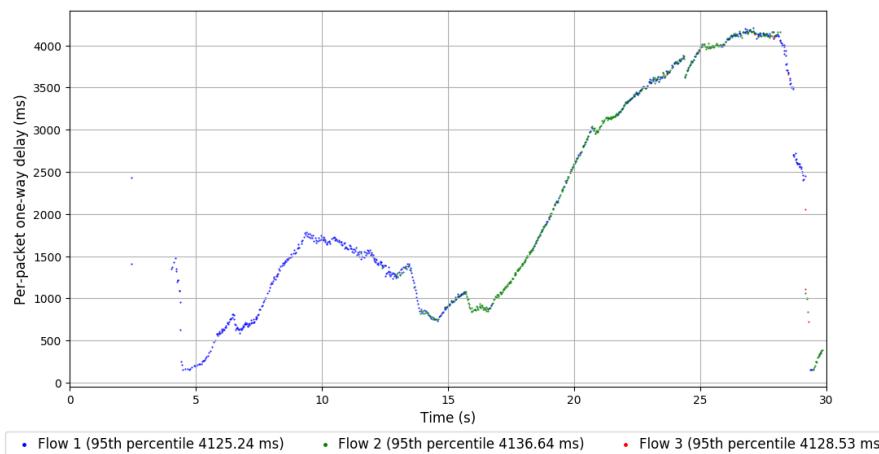
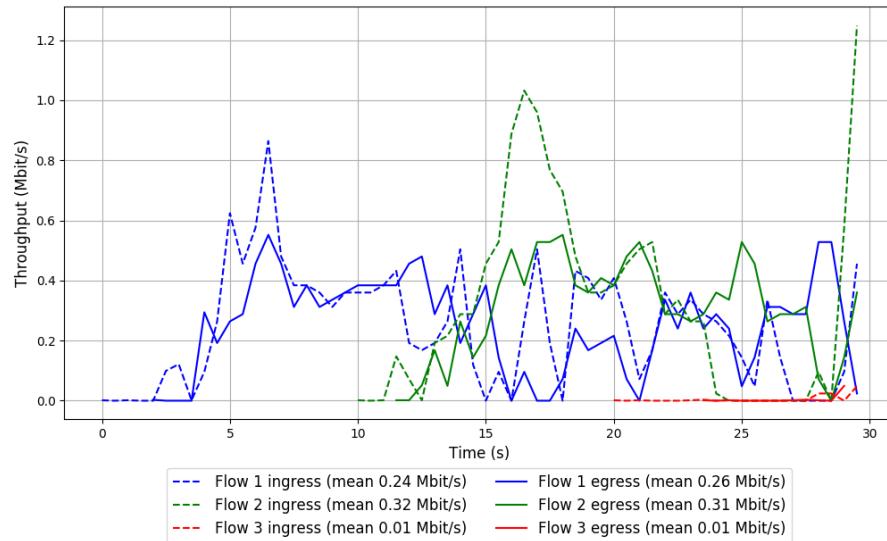


Run 3: Statistics of TCP BBR

```
Start at: 2018-01-25 19:16:37
End at: 2018-01-25 19:17:07
Local clock offset: 1.604 ms
Remote clock offset: -5.676 ms

# Below is generated by plot.py at 2018-01-25 20:28:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 4127.983 ms
Loss rate: 7.04%
-- Flow 1:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 4125.237 ms
Loss rate: 3.15%
-- Flow 2:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 4136.636 ms
Loss rate: 11.15%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 4128.532 ms
Loss rate: 44.94%
```

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

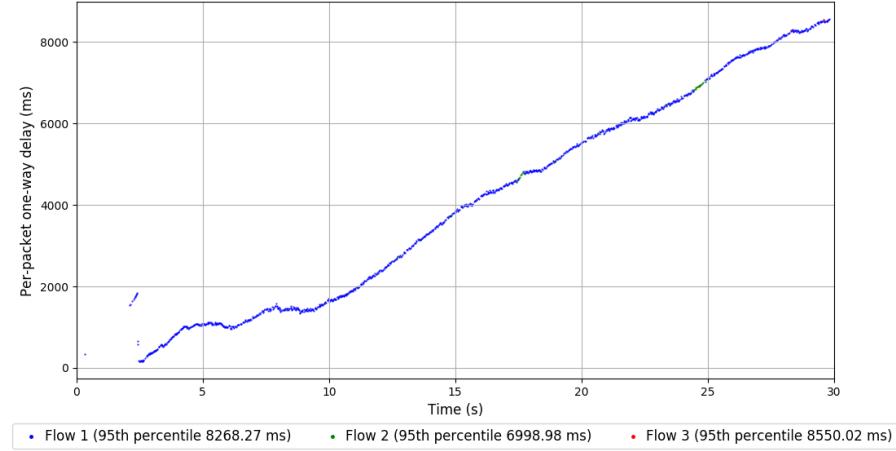
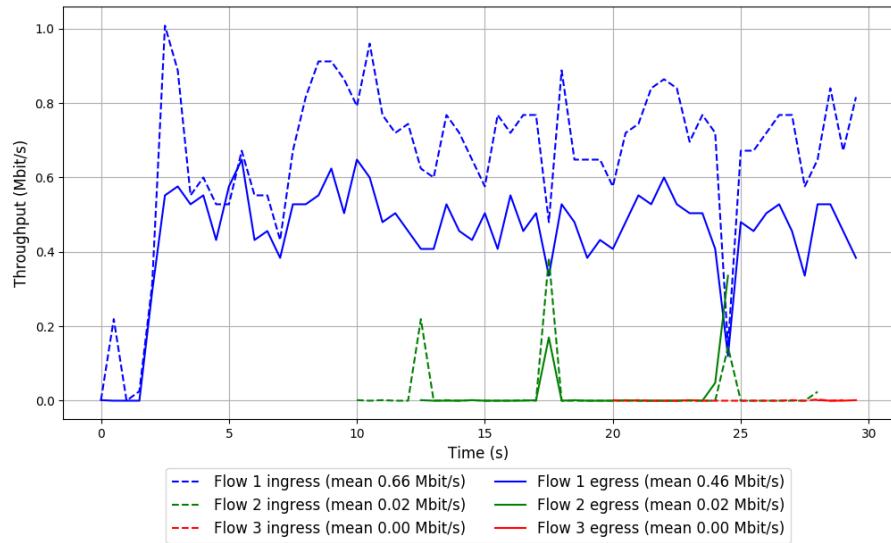


Run 1: Statistics of TCP Cubic

```
Start at: 2018-01-25 18:38:31
End at: 2018-01-25 18:39:01
Local clock offset: 1.405 ms
Remote clock offset: 1.07 ms

# Below is generated by plot.py at 2018-01-25 20:28:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 8268.275 ms
Loss rate: 31.46%
-- Flow 1:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 8268.275 ms
Loss rate: 31.52%
-- Flow 2:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 6998.976 ms
Loss rate: 27.74%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 8550.018 ms
Loss rate: 71.93%
```

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

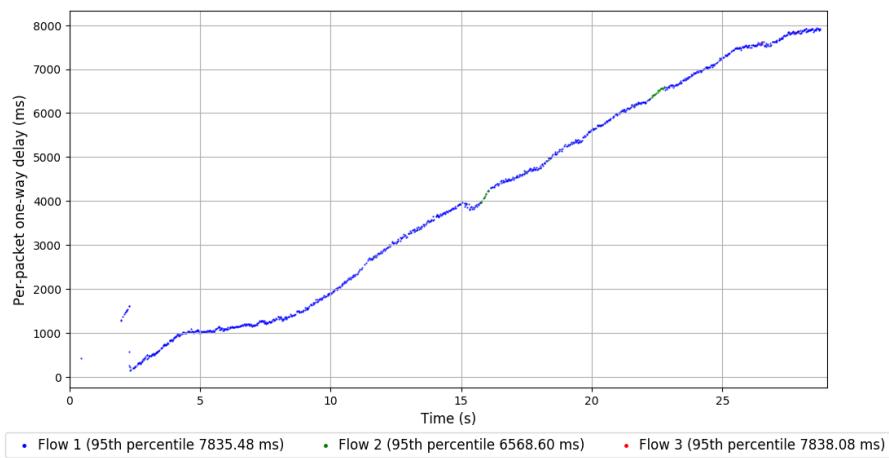
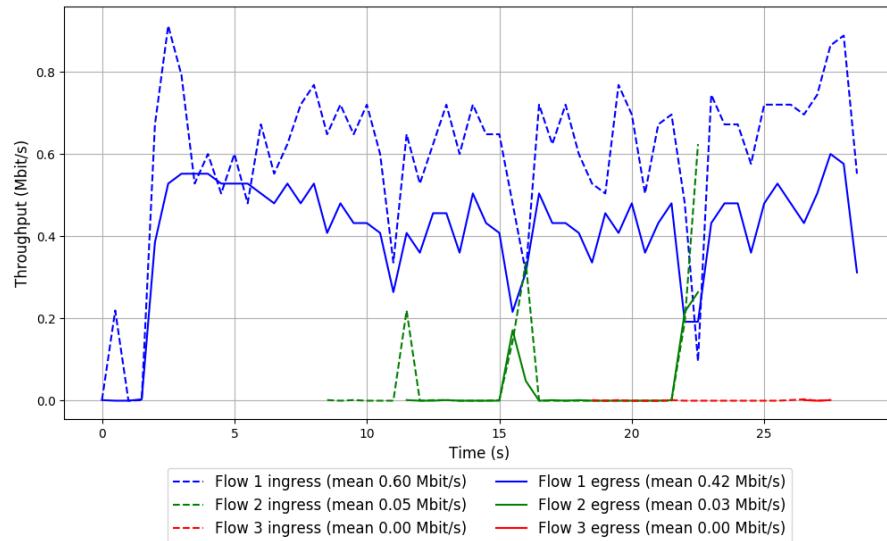


Run 2: Statistics of TCP Cubic

```
Start at: 2018-01-25 18:58:48
End at: 2018-01-25 18:59:18
Local clock offset: 1.418 ms
Remote clock offset: -4.585 ms

# Below is generated by plot.py at 2018-01-25 20:28:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 7835.367 ms
Loss rate: 31.86%
-- Flow 1:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 7835.481 ms
Loss rate: 30.89%
-- Flow 2:
Average throughput: 0.03 Mbit/s
95th percentile per-packet one-way delay: 6568.602 ms
Loss rate: 53.59%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 7838.080 ms
Loss rate: 71.93%
```

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

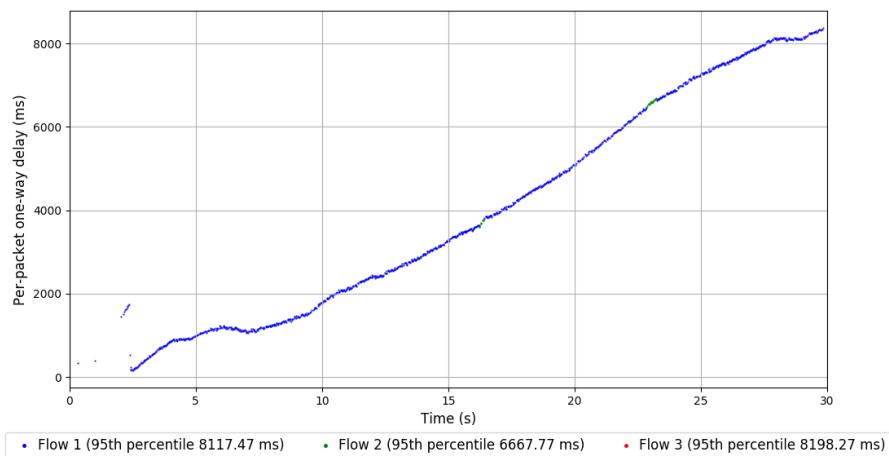
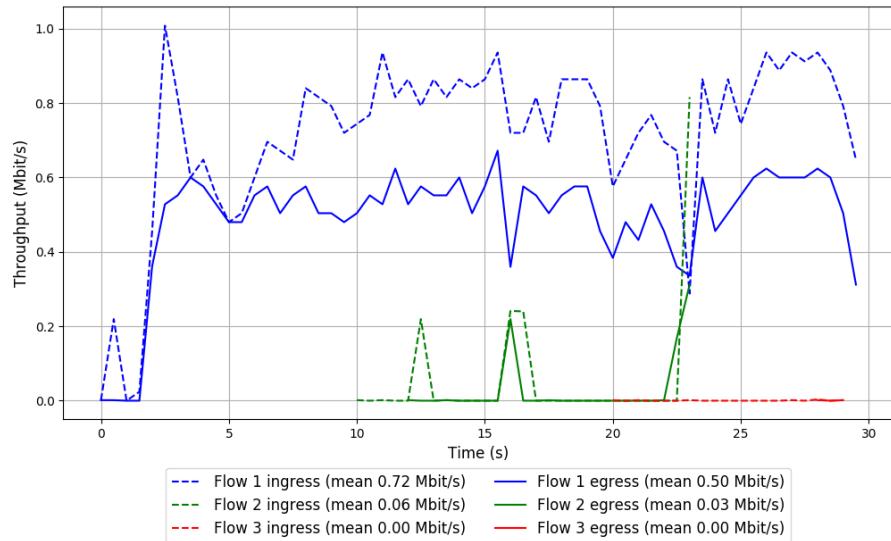


Run 3: Statistics of TCP Cubic

```
Start at: 2018-01-25 19:19:09
End at: 2018-01-25 19:19:39
Local clock offset: 1.53 ms
Remote clock offset: 0.928 ms

# Below is generated by plot.py at 2018-01-25 20:28:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 8117.471 ms
Loss rate: 32.13%
-- Flow 1:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 8117.471 ms
Loss rate: 31.35%
-- Flow 2:
Average throughput: 0.03 Mbit/s
95th percentile per-packet one-way delay: 6667.765 ms
Loss rate: 53.64%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 8198.267 ms
Loss rate: 71.93%
```

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

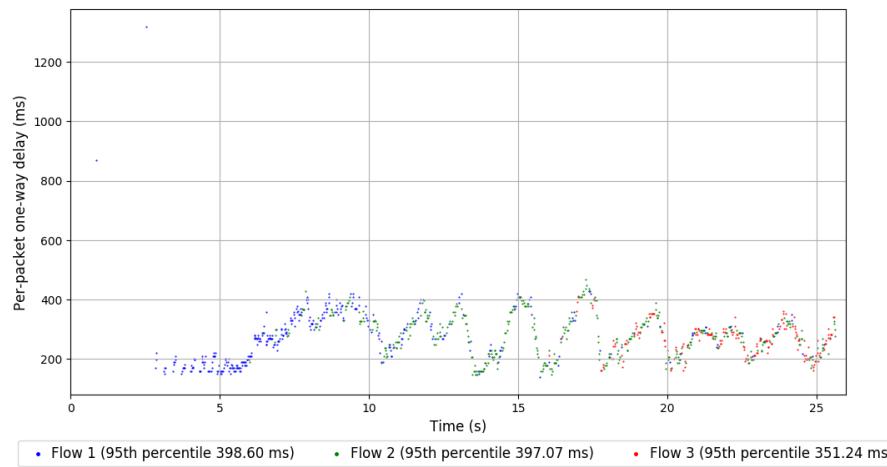
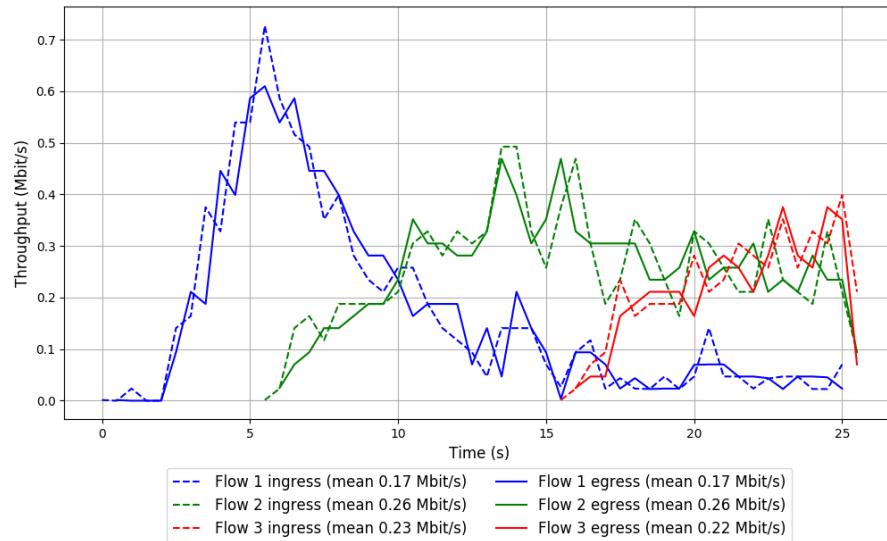


```
Run 1: Statistics of LEDBAT
```

```
Start at: 2018-01-25 18:44:50
End at: 2018-01-25 18:45:20
Local clock offset: 1.44 ms
Remote clock offset: 0.136 ms

# Below is generated by plot.py at 2018-01-25 20:28:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 397.207 ms
Loss rate: 2.20%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 398.600 ms
Loss rate: 0.55%
-- Flow 2:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 397.067 ms
Loss rate: 1.58%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 351.239 ms
Loss rate: 6.66%
```

## Run 1: Report of LEDBAT — Data Link

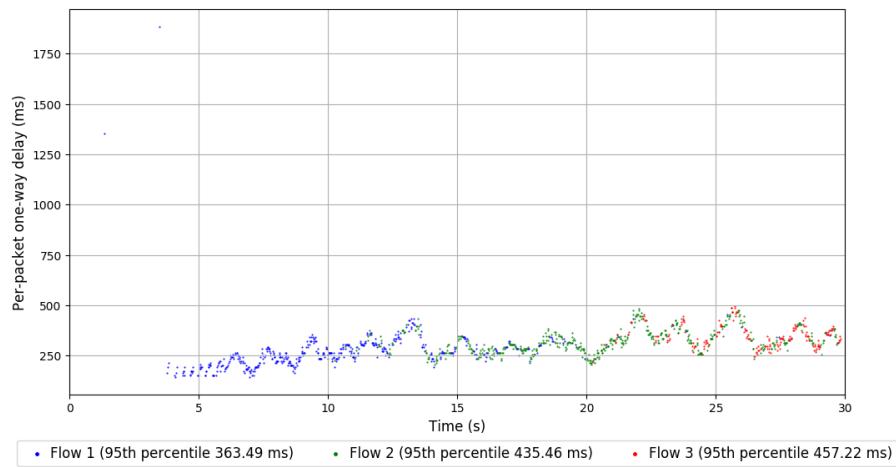
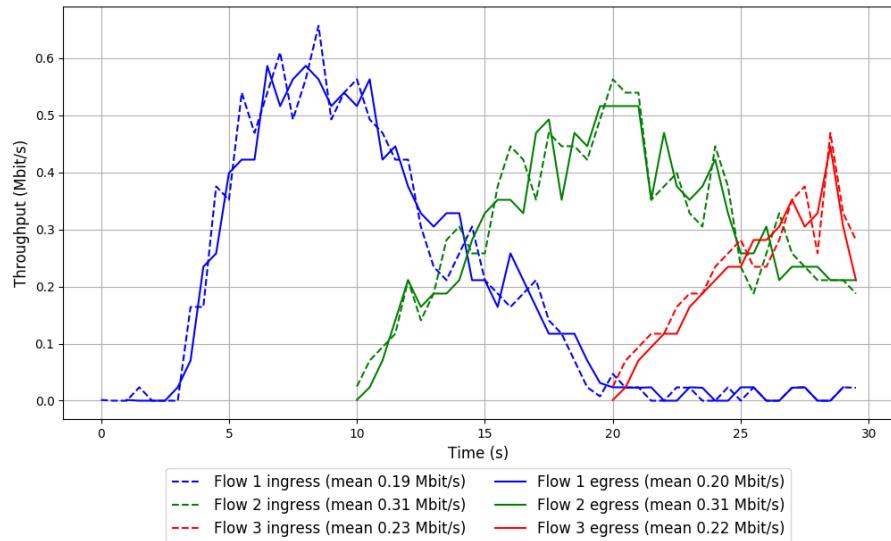


Run 2: Statistics of LEDBAT

```
Start at: 2018-01-25 19:05:06
End at: 2018-01-25 19:05:36
Local clock offset: 1.521 ms
Remote clock offset: -4.614 ms

# Below is generated by plot.py at 2018-01-25 20:28:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 425.902 ms
Loss rate: 1.75%
-- Flow 1:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 363.492 ms
Loss rate: 0.20%
-- Flow 2:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 435.463 ms
Loss rate: 1.52%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 457.218 ms
Loss rate: 6.18%
```

## Run 2: Report of LEDBAT — Data Link

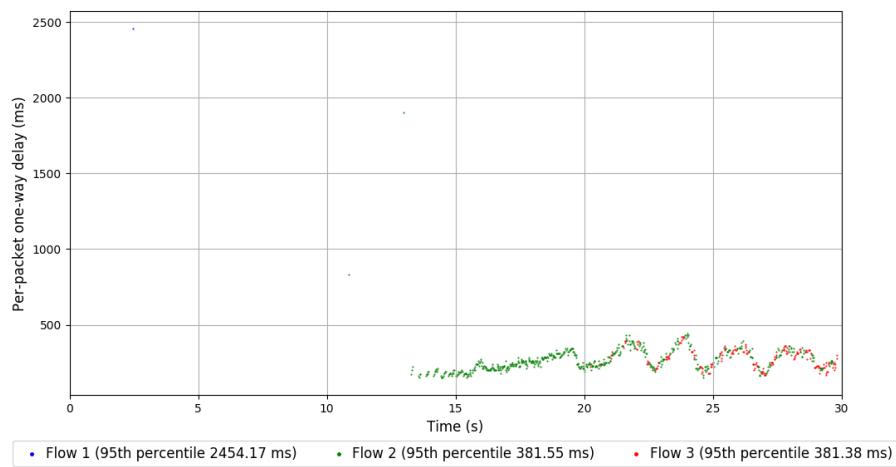
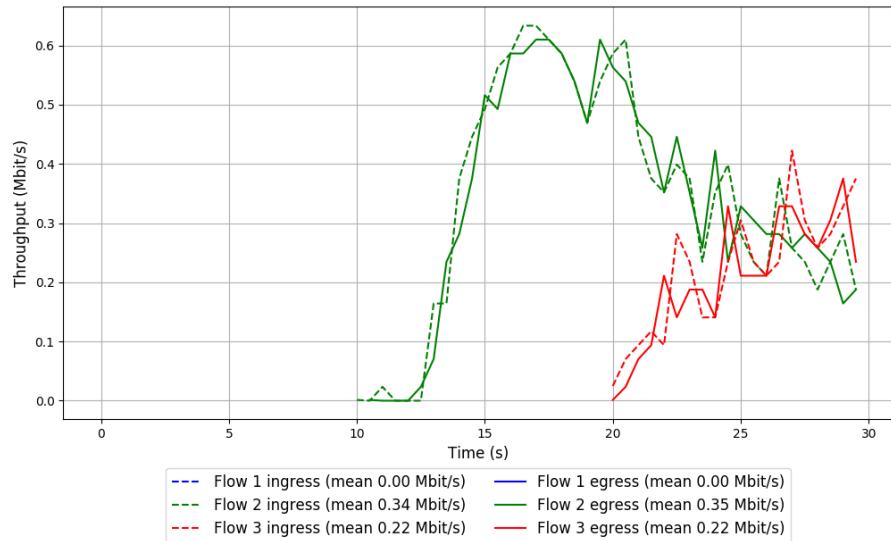


Run 3: Statistics of LEDBAT

```
Start at: 2018-01-25 19:25:30
End at: 2018-01-25 19:26:00
Local clock offset: 1.596 ms
Remote clock offset: -5.023 ms

# Below is generated by plot.py at 2018-01-25 20:28:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 381.609 ms
Loss rate: 2.50%
-- Flow 1:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2454.168 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 381.545 ms
Loss rate: 1.40%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 381.385 ms
Loss rate: 5.88%
```

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

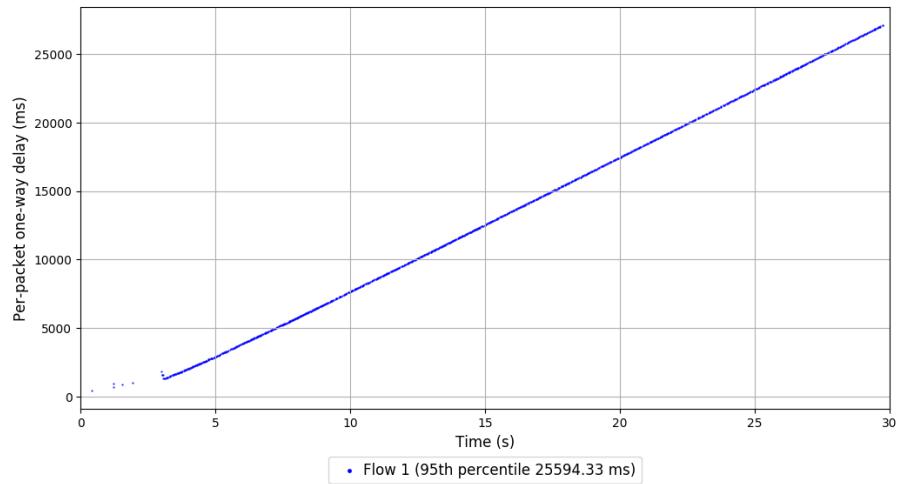
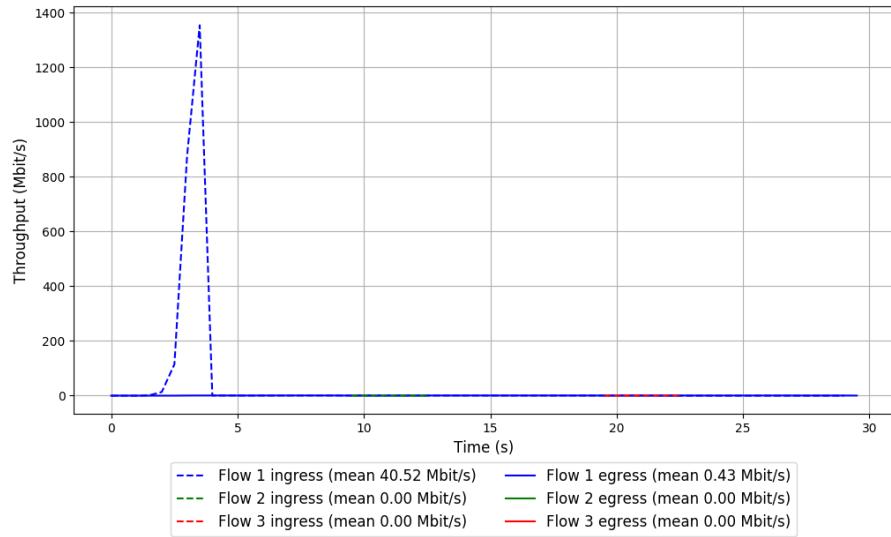


Run 1: Statistics of PCC

```
Start at: 2018-01-25 18:28:21
End at: 2018-01-25 18:28:51
Local clock offset: 1.215 ms
Remote clock offset: -5.528 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 25594.328 ms
Loss rate: 98.95%
-- Flow 1:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 25594.328 ms
Loss rate: 98.95%
-- Flow 2:
Average throughput: 0.00 Mbit/s
-- Flow 3:
Average throughput: 0.00 Mbit/s
```

## Run 1: Report of PCC — Data Link

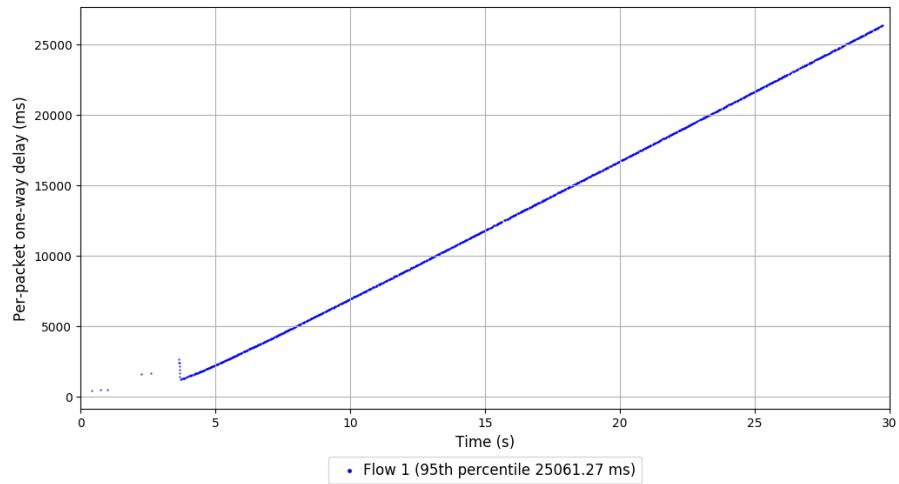
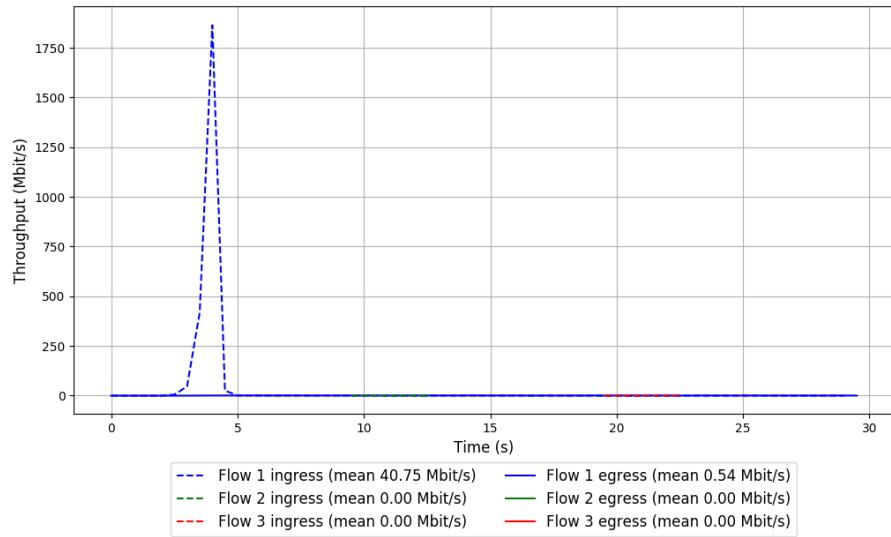


Run 2: Statistics of PCC

```
Start at: 2018-01-25 18:48:39
End at: 2018-01-25 18:49:09
Local clock offset: 1.465 ms
Remote clock offset: -5.551 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 25061.267 ms
Loss rate: 98.68%
-- Flow 1:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 25061.267 ms
Loss rate: 98.68%
-- Flow 2:
Average throughput: 0.00 Mbit/s
-- Flow 3:
Average throughput: 0.00 Mbit/s
```

## Run 2: Report of PCC — Data Link

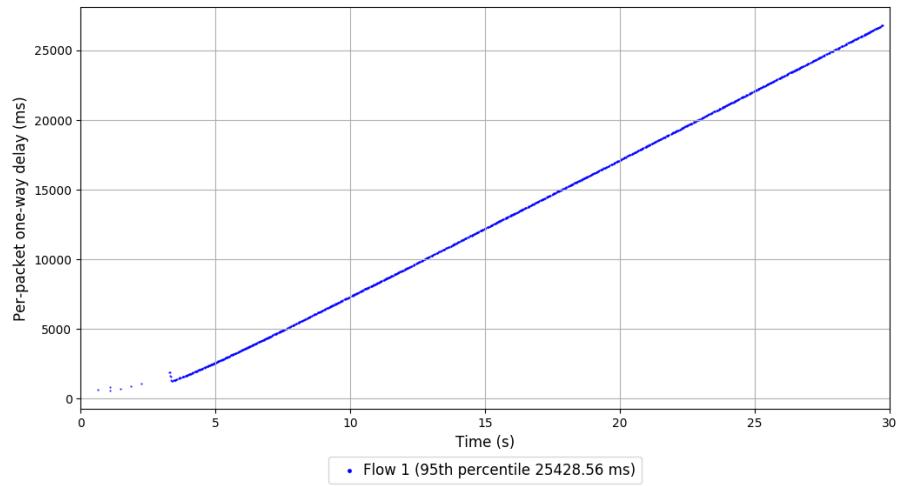
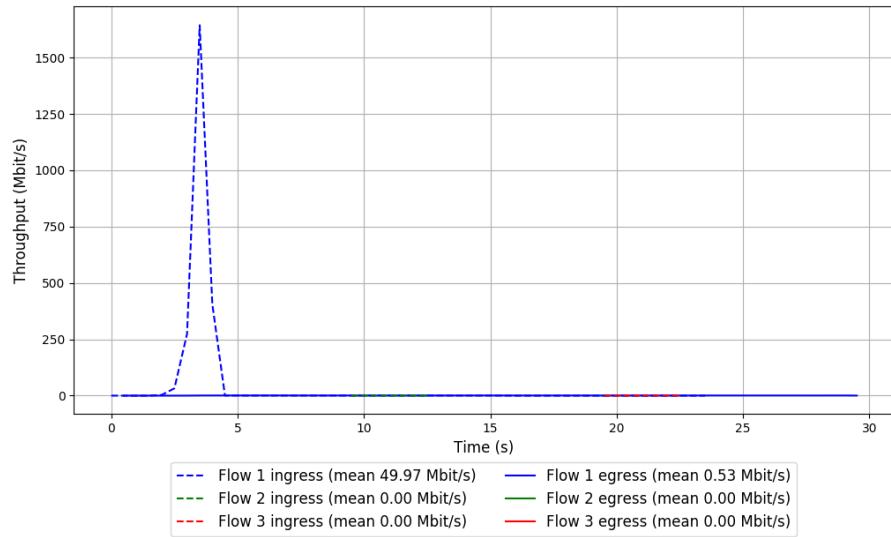


Run 3: Statistics of PCC

```
Start at: 2018-01-25 19:08:57
End at: 2018-01-25 19:09:27
Local clock offset: 1.491 ms
Remote clock offset: -4.72 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 25428.557 ms
Loss rate: 98.71%
-- Flow 1:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 25428.557 ms
Loss rate: 98.71%
-- Flow 2:
Average throughput: 0.00 Mbit/s
-- Flow 3:
Average throughput: 0.00 Mbit/s
```

### Run 3: Report of PCC — Data Link



Run 1: Statistics of QUIC Cubic

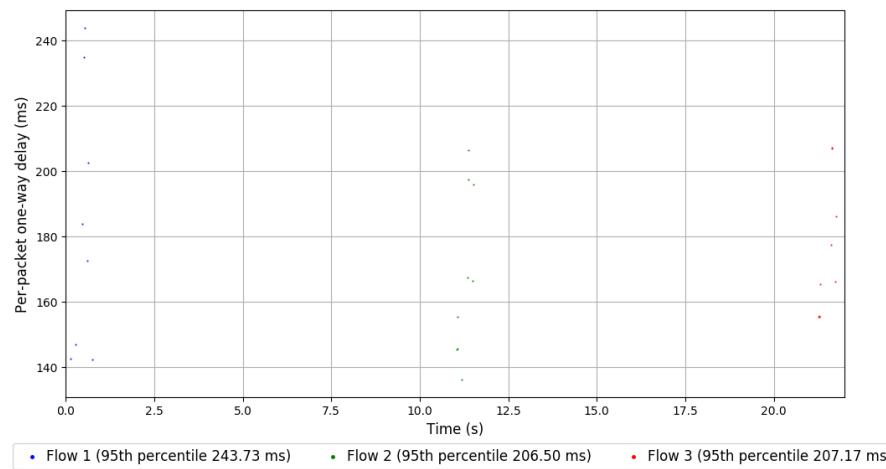
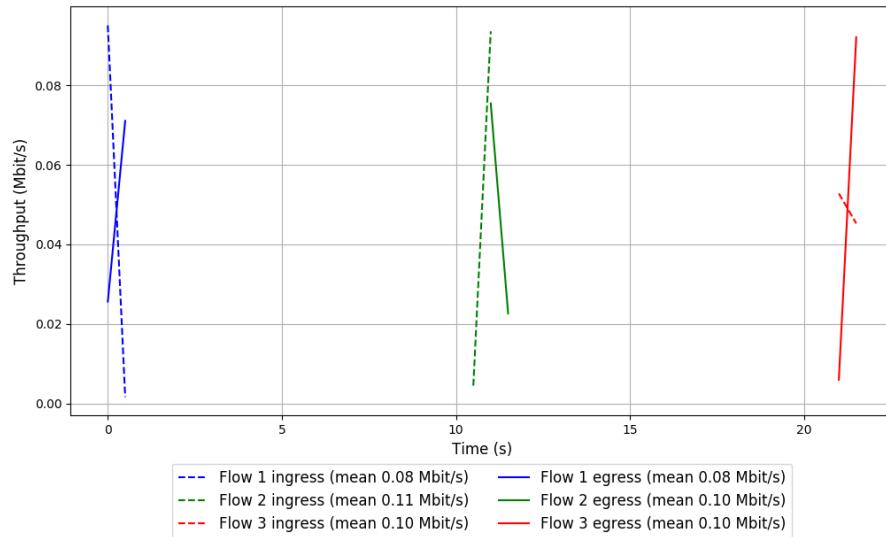
Start at: 2018-01-25 18:30:54

End at: 2018-01-25 18:31:24

Local clock offset: 1.316 ms

Remote clock offset: -5.506 ms

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



Run 2: Statistics of QUIC Cubic

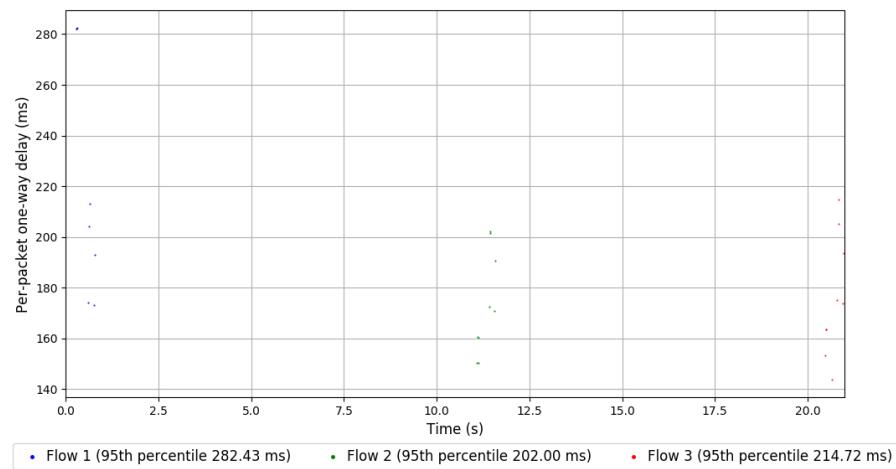
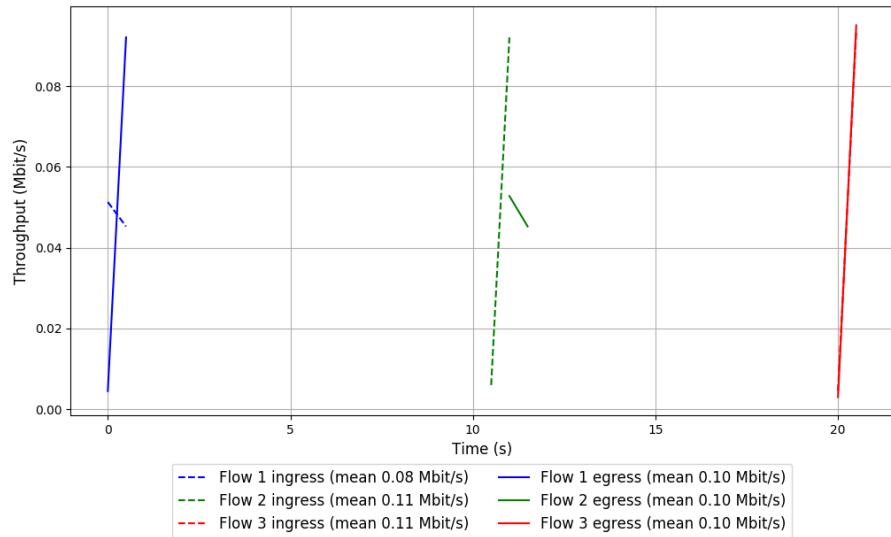
Start at: 2018-01-25 18:51:12

End at: 2018-01-25 18:51:42

Local clock offset: 1.465 ms

Remote clock offset: -4.634 ms

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



Run 3: Statistics of QUIC Cubic

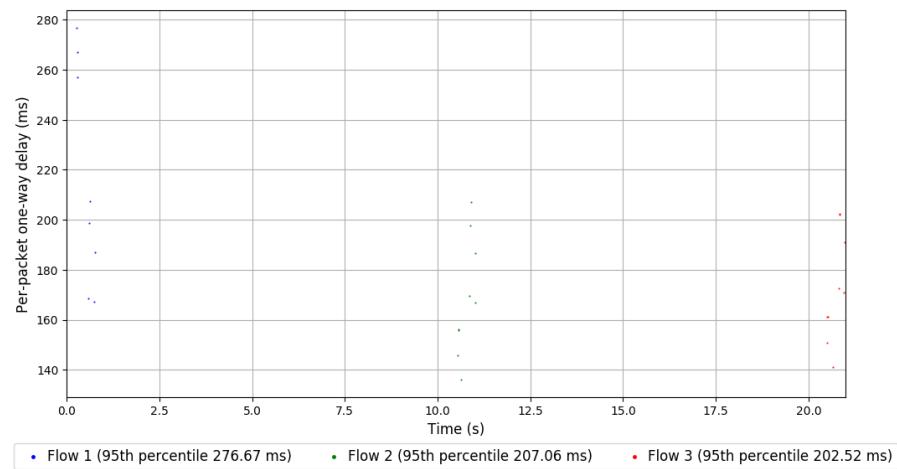
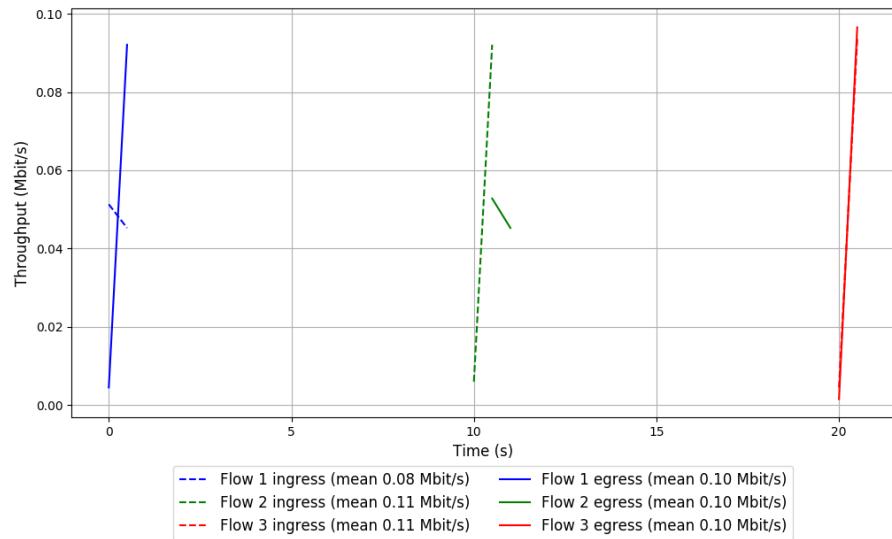
Start at: 2018-01-25 19:11:33

End at: 2018-01-25 19:12:03

Local clock offset: 1.547 ms

Remote clock offset: -4.6 ms

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

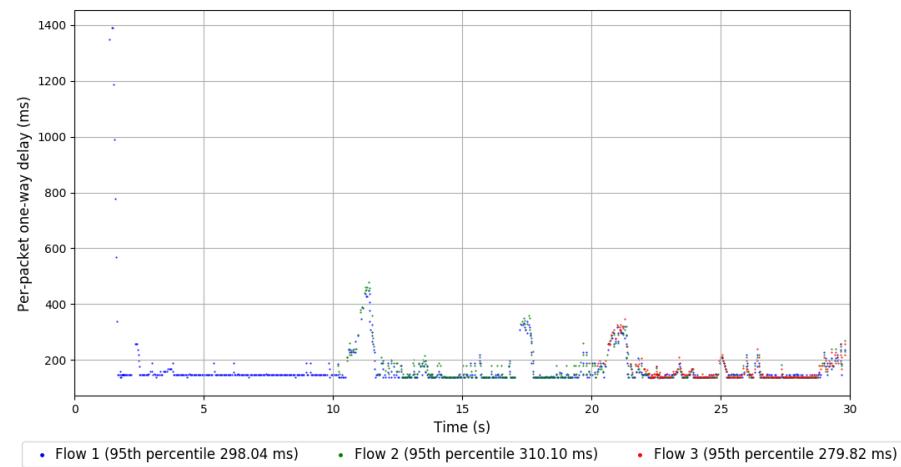
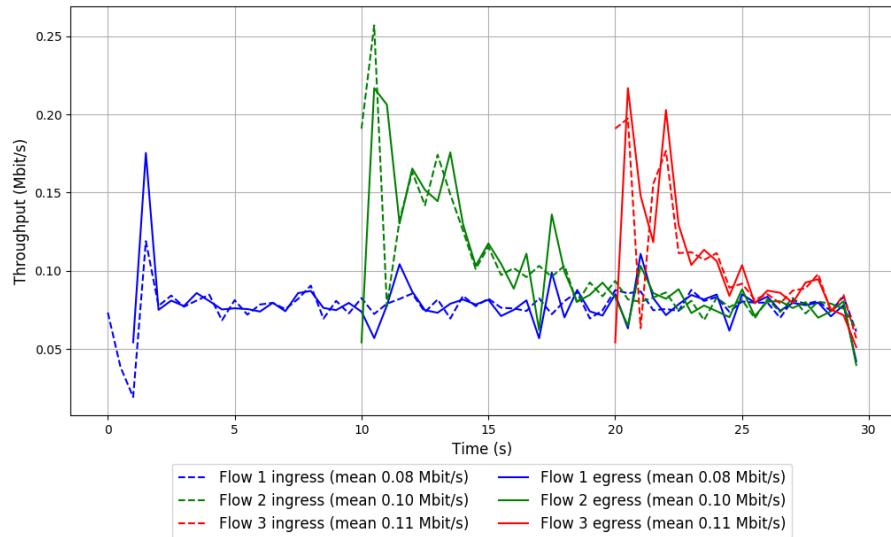


```
Run 1: Statistics of SCReAM
```

```
Start at: 2018-01-25 18:39:47
End at: 2018-01-25 18:40:17
Local clock offset: 1.418 ms
Remote clock offset: -5.561 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 299.882 ms
Loss rate: 1.33%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 298.040 ms
Loss rate: 1.06%
-- Flow 2:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 310.099 ms
Loss rate: 1.26%
-- Flow 3:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 279.818 ms
Loss rate: 2.05%
```

## Run 1: Report of SCReAM — Data Link

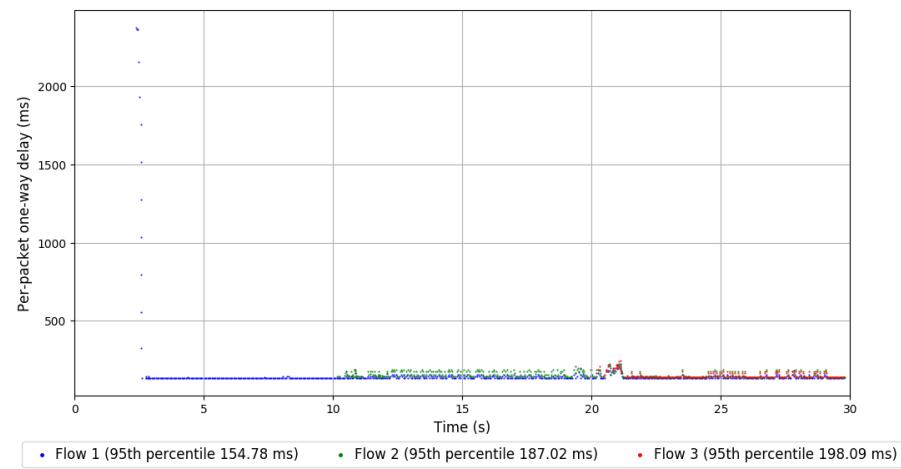
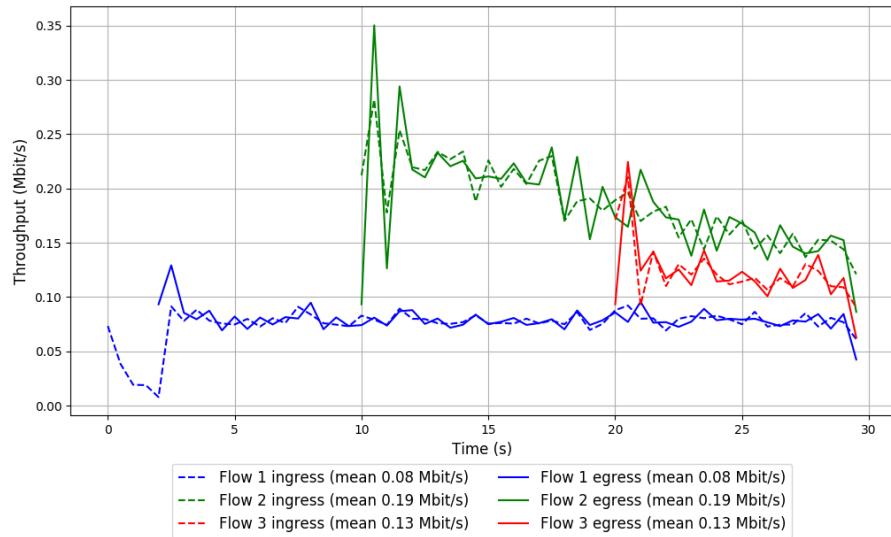


Run 2: Statistics of SCReAM

```
Start at: 2018-01-25 19:00:04
End at: 2018-01-25 19:00:34
Local clock offset: 1.497 ms
Remote clock offset: 1.233 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 186.854 ms
Loss rate: 1.16%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 154.782 ms
Loss rate: 0.82%
-- Flow 2:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 187.021 ms
Loss rate: 1.01%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 198.087 ms
Loss rate: 2.19%
```

## Run 2: Report of SCReAM — Data Link

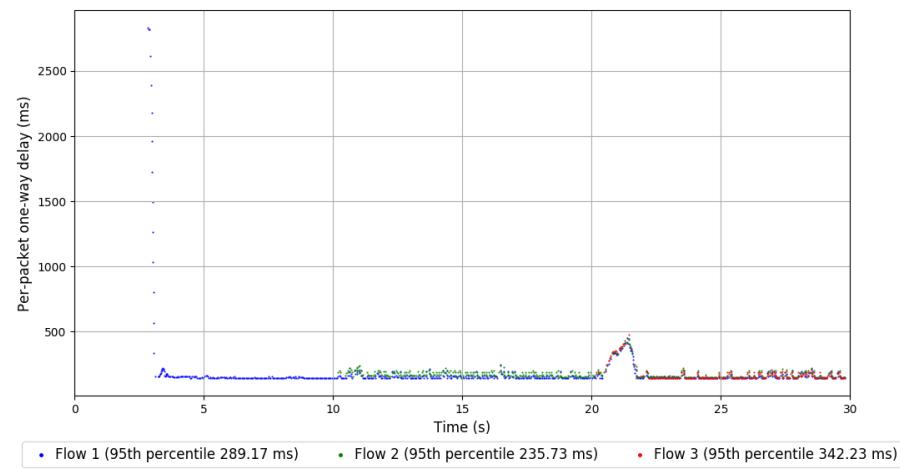
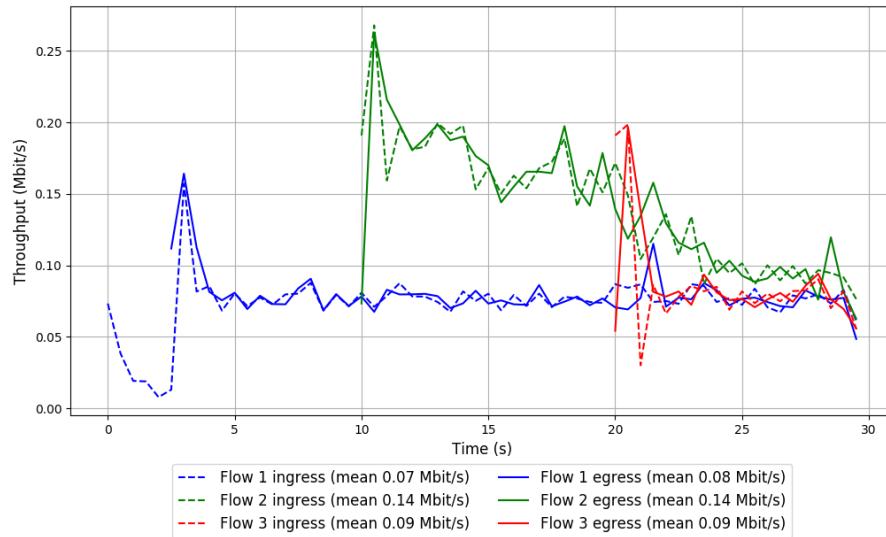


Run 3: Statistics of SCReAM

```
Start at: 2018-01-25 19:20:25
End at: 2018-01-25 19:20:55
Local clock offset: 1.596 ms
Remote clock offset: -5.76 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 311.452 ms
Loss rate: 0.97%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 289.171 ms
Loss rate: 0.84%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 235.730 ms
Loss rate: 0.84%
-- Flow 3:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 342.230 ms
Loss rate: 1.75%
```

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

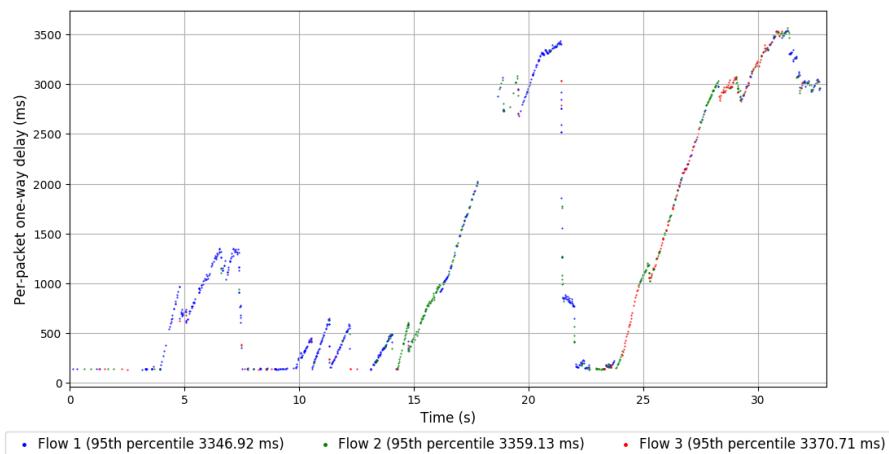
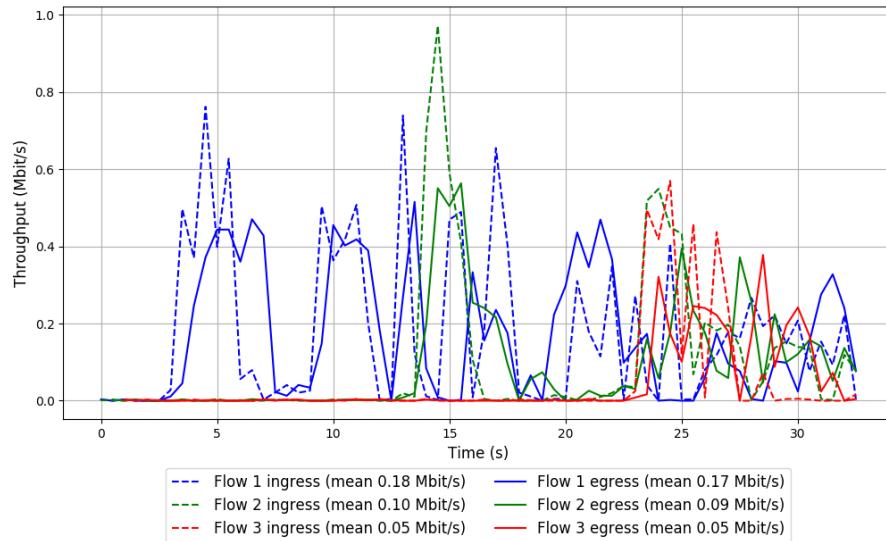


```
Run 1: Statistics of WebRTC media

Start at: 2018-01-25 18:29:38
End at: 2018-01-25 18:30:08
Local clock offset: 1.321 ms
Remote clock offset: -4.722 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 3362.209 ms
Loss rate: 6.61%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 3346.916 ms
Loss rate: 6.98%
-- Flow 2:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 3359.134 ms
Loss rate: 8.50%
-- Flow 3:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 3370.711 ms
Loss rate: 0.83%
```

## Run 1: Report of WebRTC media — Data Link

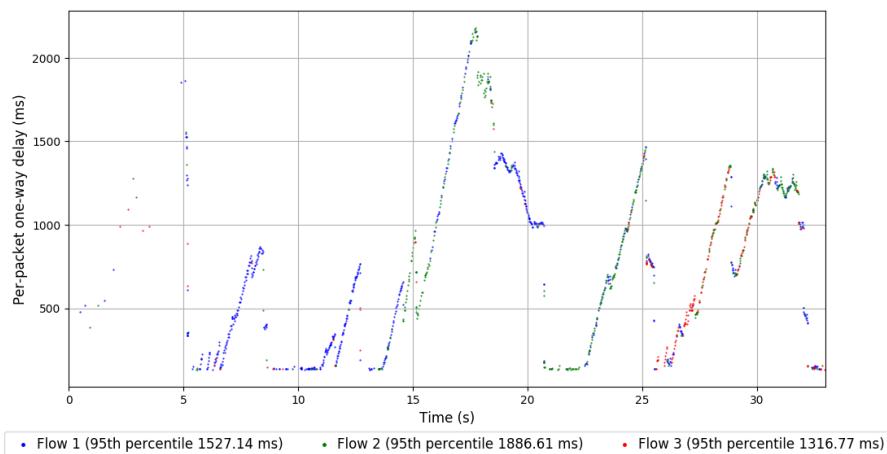
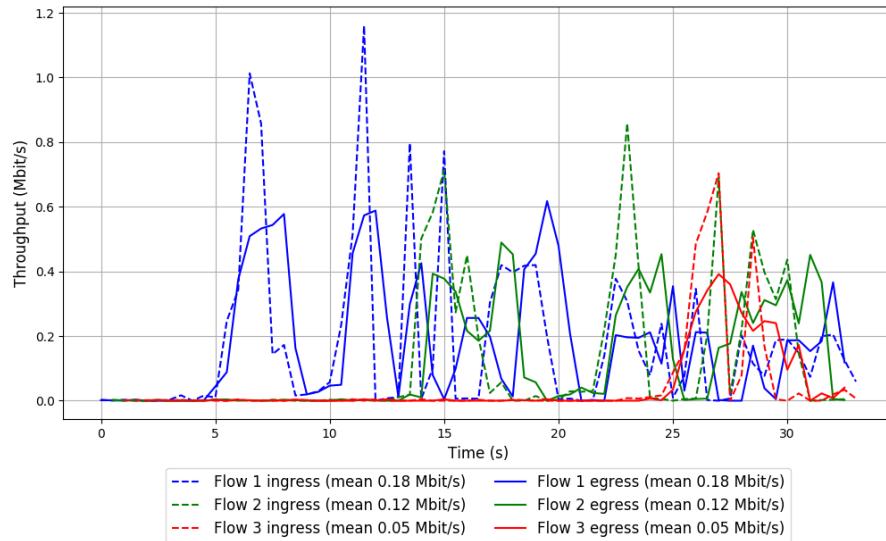


Run 2: Statistics of WebRTC media

```
Start at: 2018-01-25 18:49:56
End at: 2018-01-25 18:50:26
Local clock offset: 1.482 ms
Remote clock offset: -5.558 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 1762.568 ms
Loss rate: 0.84%
-- Flow 1:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 1527.139 ms
Loss rate: 1.48%
-- Flow 2:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 1886.605 ms
Loss rate: 0.03%
-- Flow 3:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 1316.765 ms
Loss rate: 0.39%
```

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

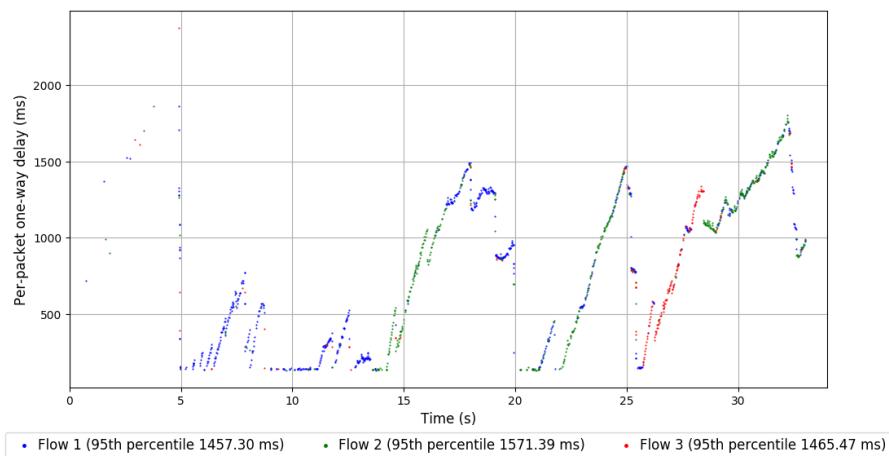
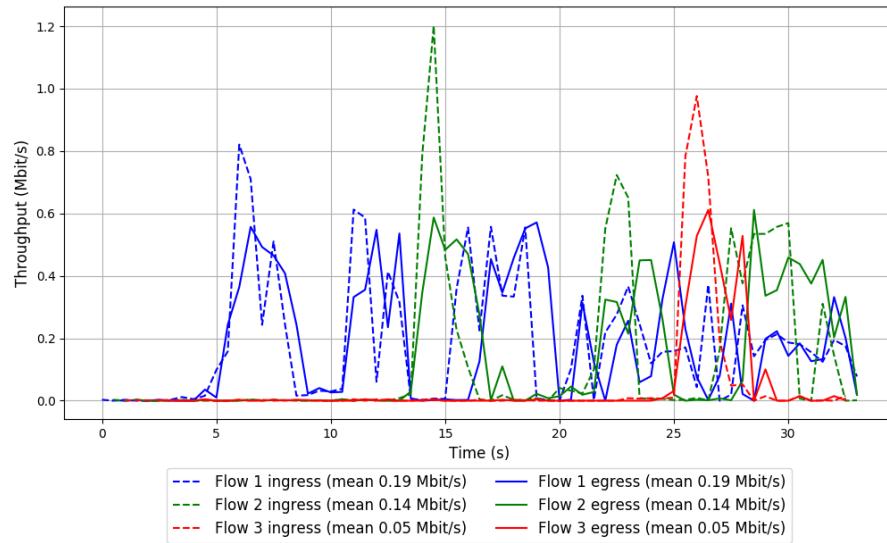


```
Run 3: Statistics of WebRTC media
```

```
Start at: 2018-01-25 19:10:15
End at: 2018-01-25 19:10:45
Local clock offset: 1.541 ms
Remote clock offset: 0.149 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 1493.928 ms
Loss rate: 2.20%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 1457.298 ms
Loss rate: 3.29%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 1571.391 ms
Loss rate: 1.20%
-- Flow 3:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 1465.475 ms
Loss rate: 0.60%
```

Run 3: Report of WebRTC media — Data Link

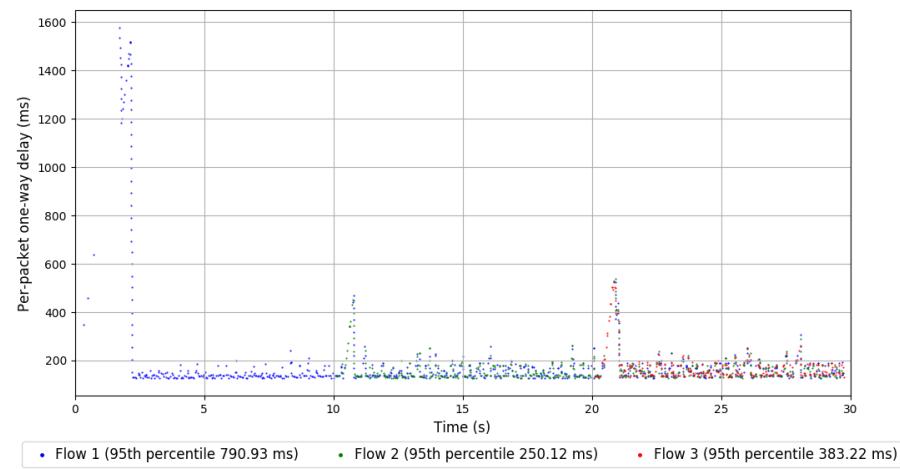
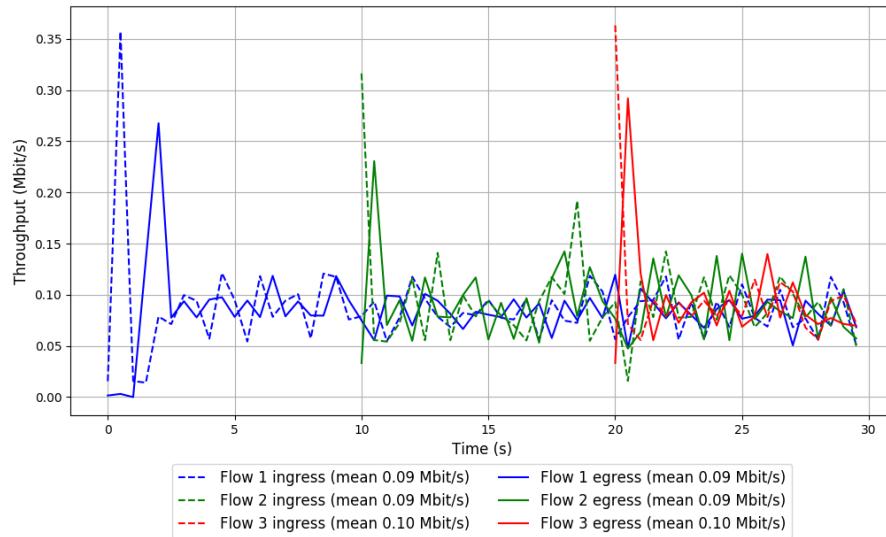


Run 1: Statistics of Sprout

```
Start at: 2018-01-25 18:27:06
End at: 2018-01-25 18:27:36
Local clock offset: 1.28 ms
Remote clock offset: 1.108 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 406.876 ms
Loss rate: 2.53%
-- Flow 1:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 790.934 ms
Loss rate: 1.38%
-- Flow 2:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 250.125 ms
Loss rate: 2.98%
-- Flow 3:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 383.217 ms
Loss rate: 4.68%
```

## Run 1: Report of Sprout — Data Link

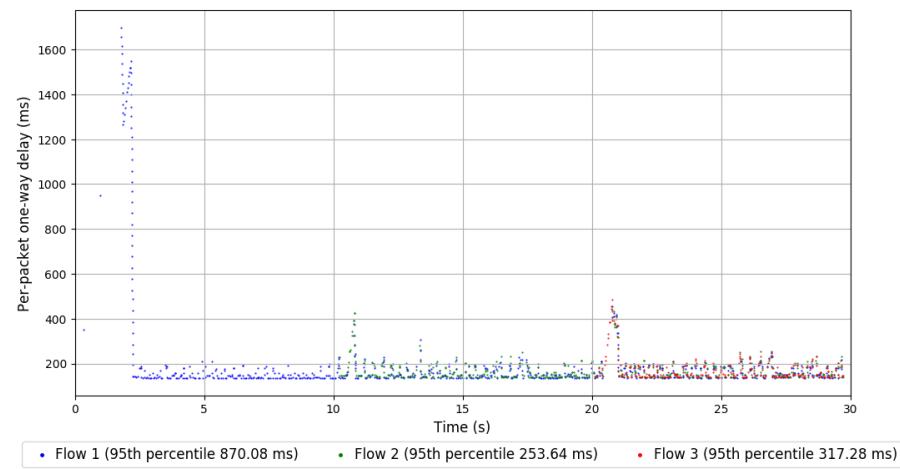
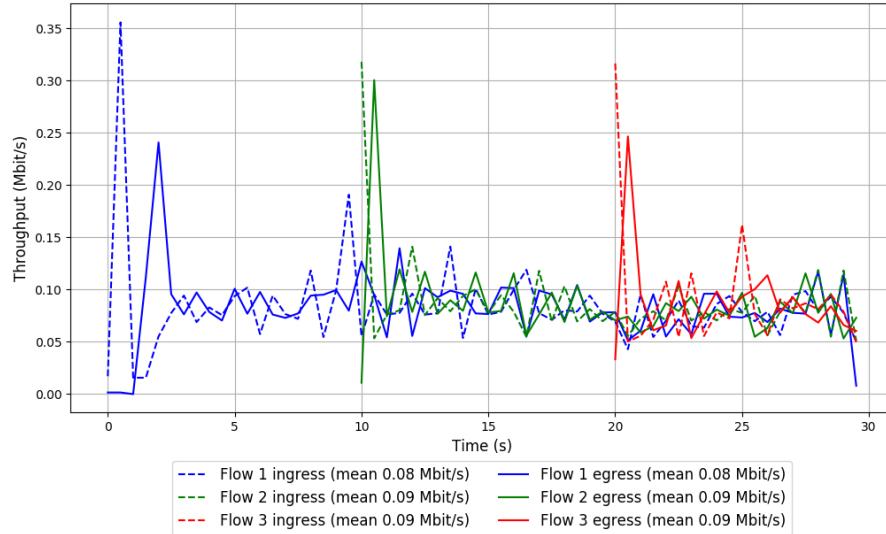


Run 2: Statistics of Sprout

```
Start at: 2018-01-25 18:47:23
End at: 2018-01-25 18:47:53
Local clock offset: 1.466 ms
Remote clock offset: -5.561 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 372.514 ms
Loss rate: 2.50%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 870.077 ms
Loss rate: 2.11%
-- Flow 2:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 253.640 ms
Loss rate: 1.86%
-- Flow 3:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 317.277 ms
Loss rate: 4.78%
```

## Run 2: Report of Sprout — Data Link

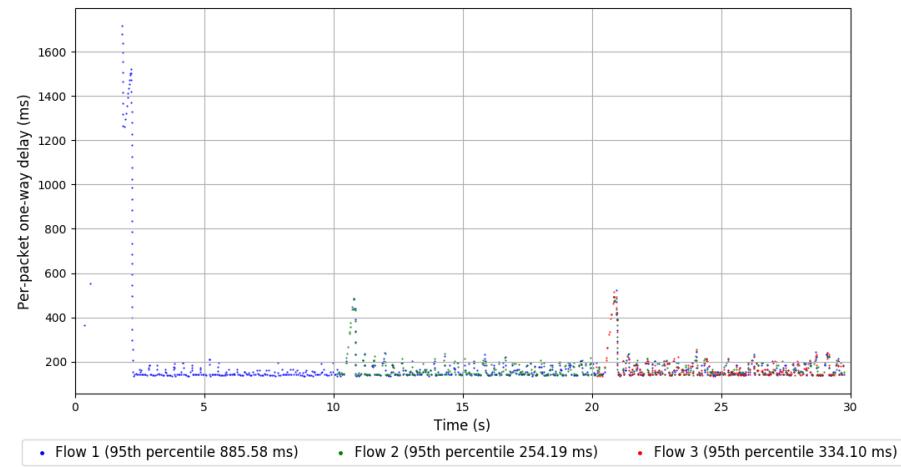
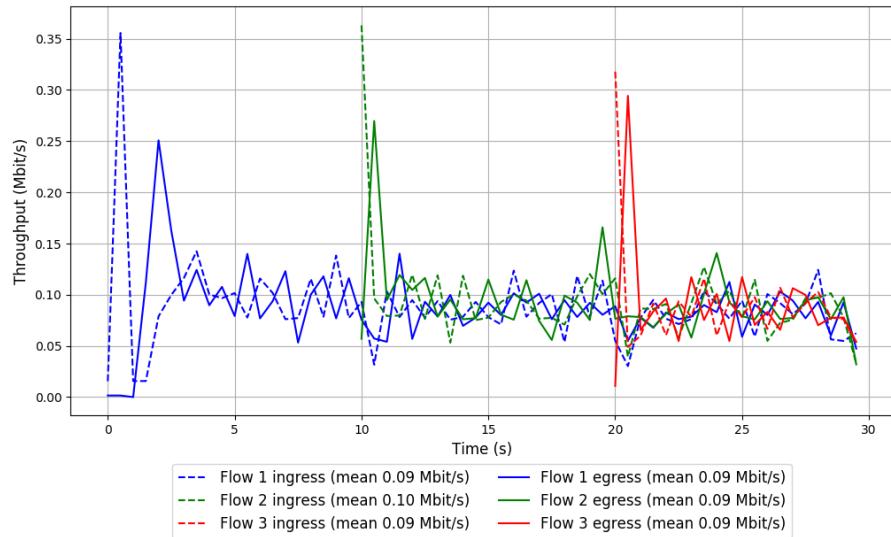


Run 3: Statistics of Sprout

```
Start at: 2018-01-25 19:07:40
End at: 2018-01-25 19:08:10
Local clock offset: 1.469 ms
Remote clock offset: -4.642 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 414.038 ms
Loss rate: 2.03%
-- Flow 1:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 885.584 ms
Loss rate: 1.35%
-- Flow 2:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 254.188 ms
Loss rate: 2.04%
-- Flow 3:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 334.095 ms
Loss rate: 3.97%
```

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

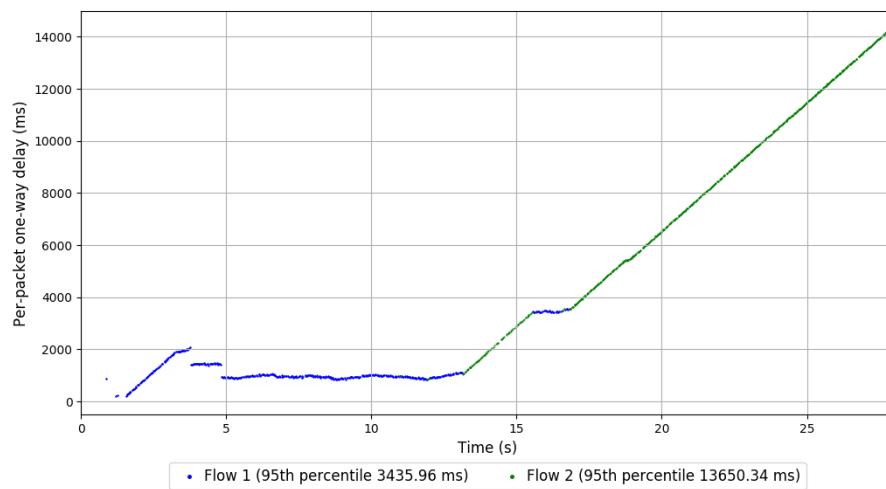
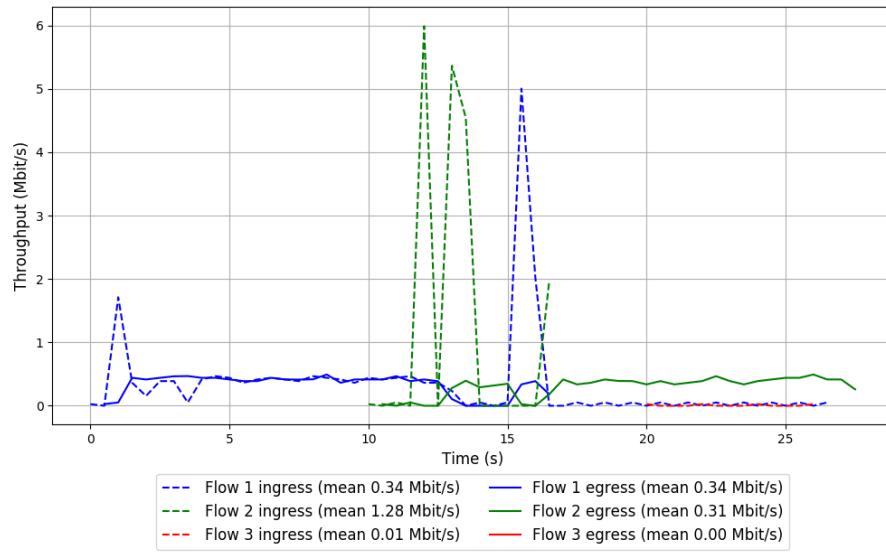


Run 1: Statistics of TaoVA-100x

```
Start at: 2018-01-25 18:32:10
End at: 2018-01-25 18:32:40
Local clock offset: 1.349 ms
Remote clock offset: -4.671 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 12988.561 ms
Loss rate: 41.59%
-- Flow 1:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 3435.956 ms
Loss rate: 41.37%
-- Flow 2:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 13650.345 ms
Loss rate: 41.48%
-- Flow 3:
Average throughput: 0.00 Mbit/s
```

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

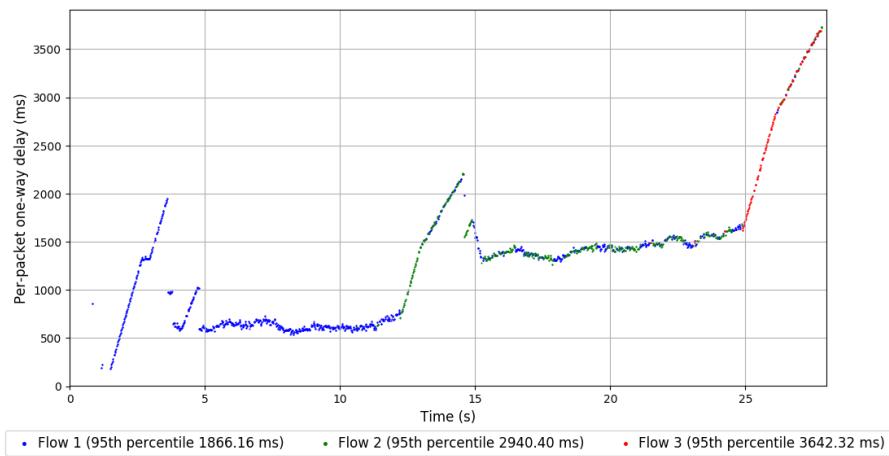
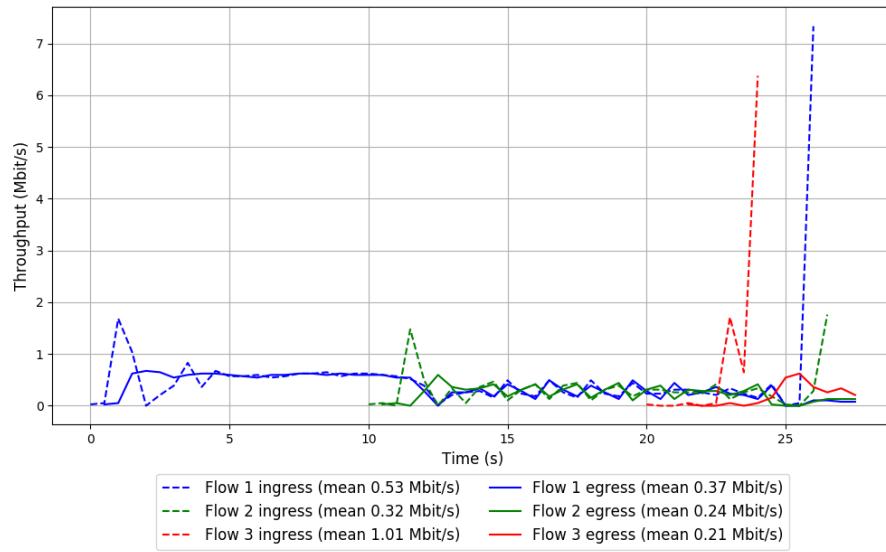


Run 2: Statistics of TaoVA-100x

```
Start at: 2018-01-25 18:52:27
End at: 2018-01-25 18:52:57
Local clock offset: 1.495 ms
Remote clock offset: -5.57 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 2966.754 ms
Loss rate: 35.07%
-- Flow 1:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 1866.156 ms
Loss rate: 28.53%
-- Flow 2:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 2940.403 ms
Loss rate: 23.02%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 3642.322 ms
Loss rate: 70.47%
```

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

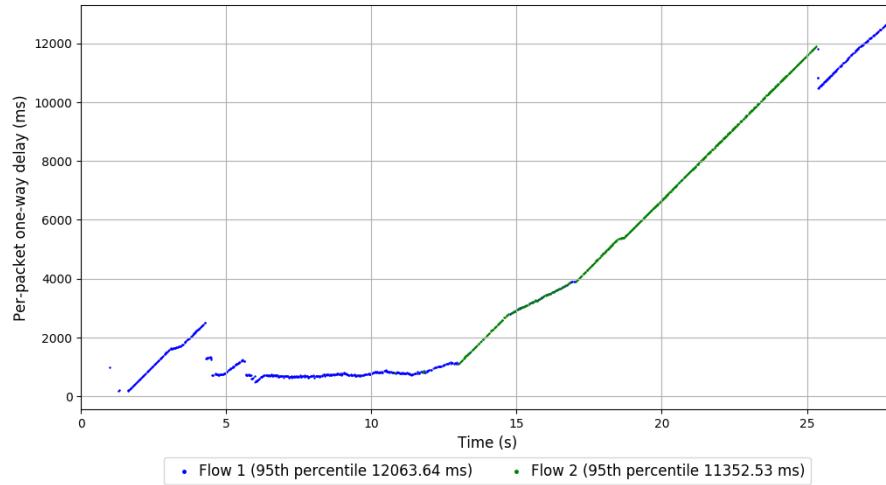
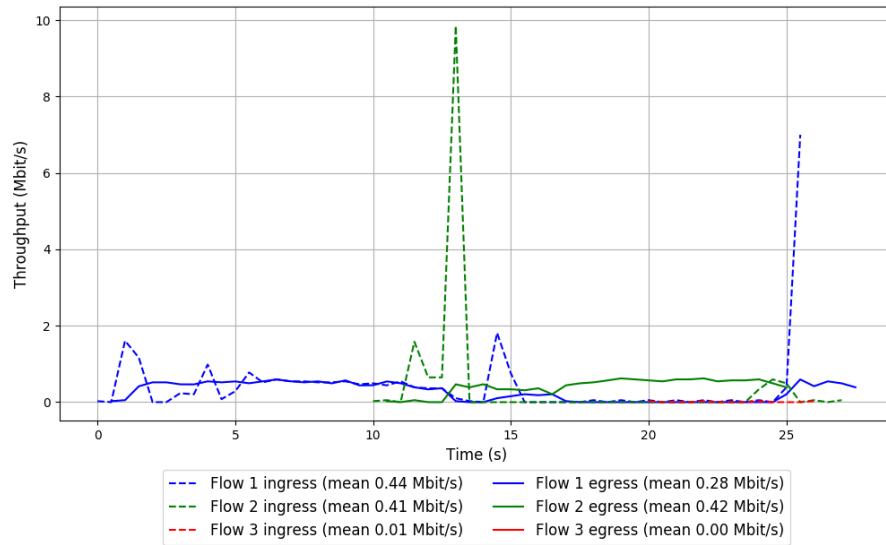


Run 3: Statistics of TaoVA-100x

```
Start at: 2018-01-25 19:12:48
End at: 2018-01-25 19:13:18
Local clock offset: 1.48 ms
Remote clock offset: 1.103 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 11766.305 ms
Loss rate: 26.64%
-- Flow 1:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 12063.639 ms
Loss rate: 34.10%
-- Flow 2:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 11352.533 ms
Loss rate: 14.30%
-- Flow 3:
Average throughput: 0.00 Mbit/s
```

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

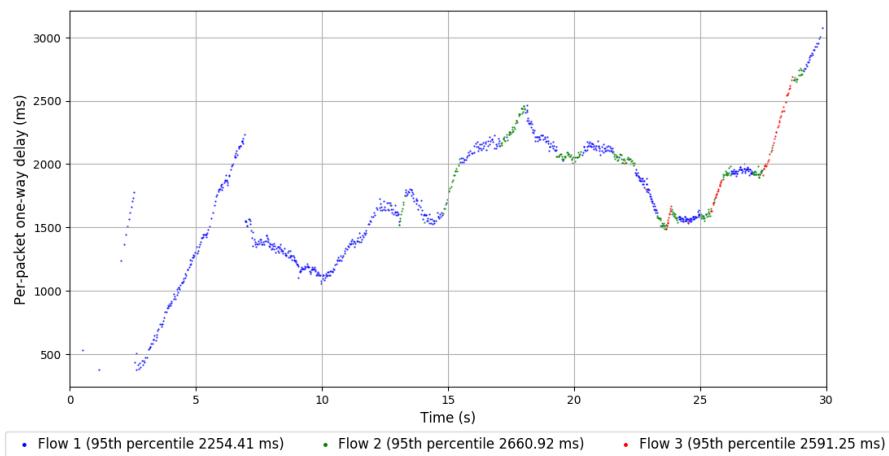
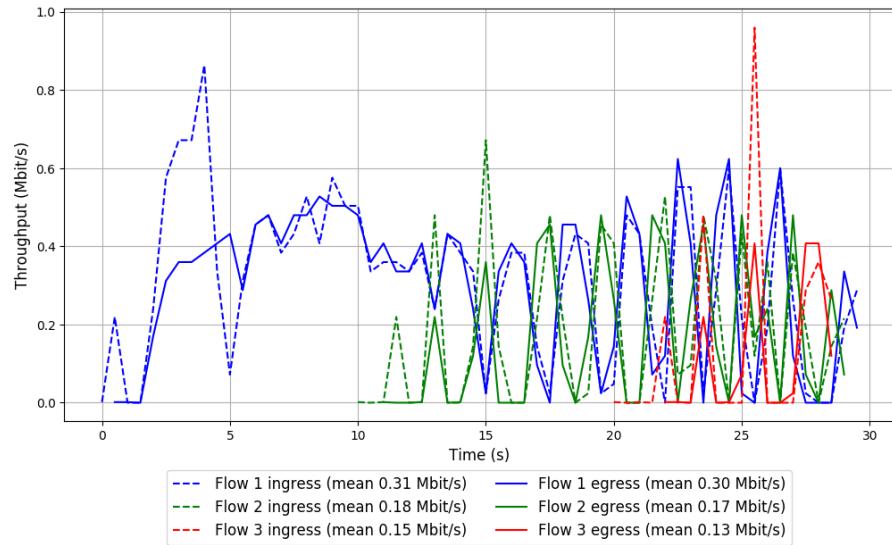


Run 1: Statistics of TCP Vegas

```
Start at: 2018-01-25 18:41:03
End at: 2018-01-25 18:41:33
Local clock offset: 1.397 ms
Remote clock offset: -4.603 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 2441.146 ms
Loss rate: 10.14%
-- Flow 1:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 2254.410 ms
Loss rate: 5.50%
-- Flow 2:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 2660.923 ms
Loss rate: 13.25%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 2591.253 ms
Loss rate: 35.41%
```

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

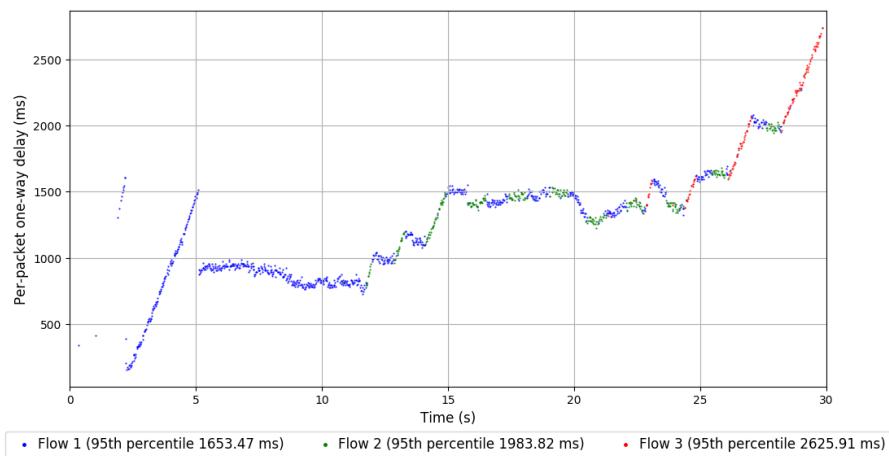
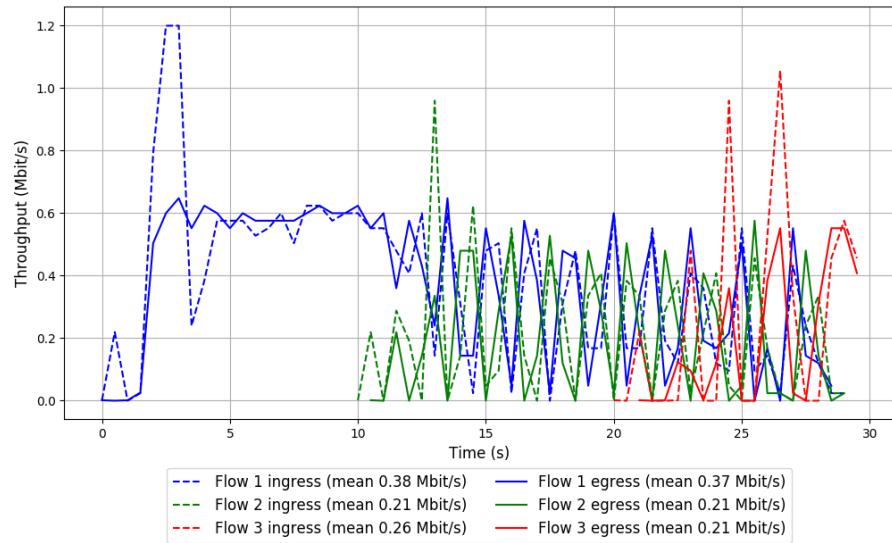


Run 2: Statistics of TCP Vegas

```
Start at: 2018-01-25 19:01:19
End at: 2018-01-25 19:01:49
Local clock offset: 1.497 ms
Remote clock offset: -5.446 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 2096.478 ms
Loss rate: 8.61%
-- Flow 1:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 1653.474 ms
Loss rate: 3.78%
-- Flow 2:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 1983.821 ms
Loss rate: 7.66%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 2625.915 ms
Loss rate: 31.23%
```

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

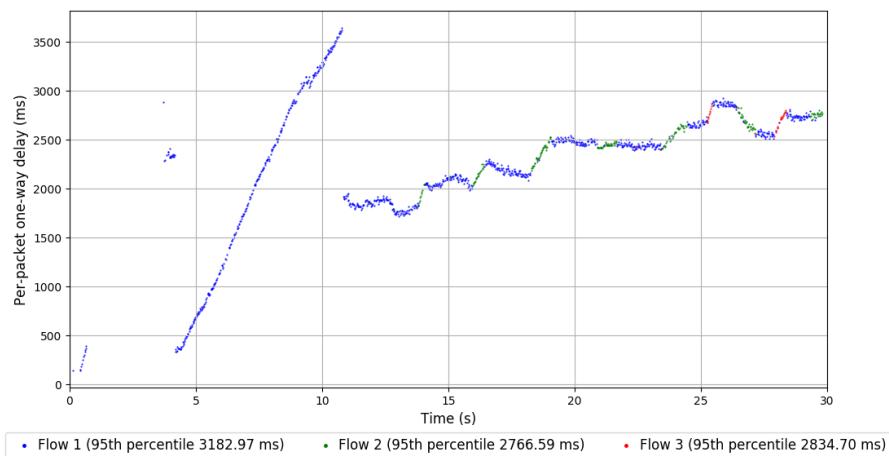
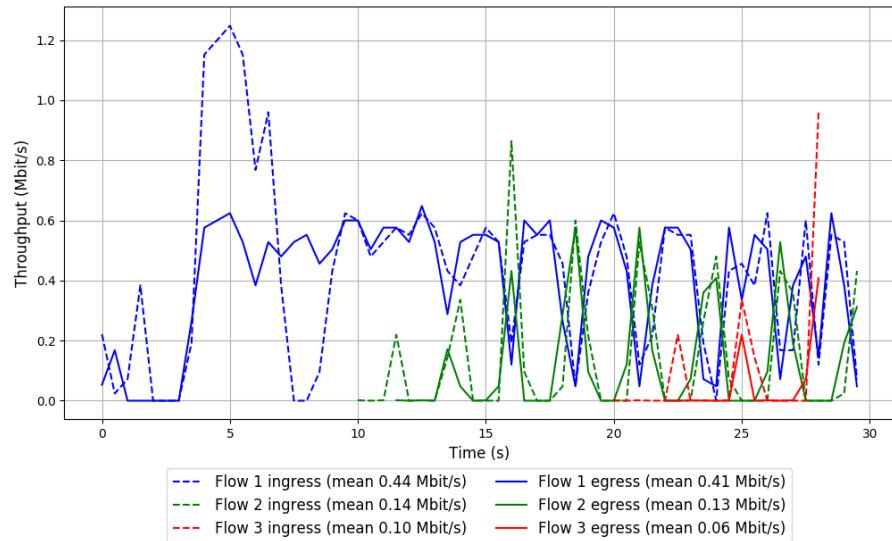


Run 3: Statistics of TCP Vegas

```
Start at: 2018-01-25 19:21:43
End at: 2018-01-25 19:22:13
Local clock offset: 1.595 ms
Remote clock offset: -5.82 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 3113.014 ms
Loss rate: 11.35%
-- Flow 1:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 3182.970 ms
Loss rate: 7.88%
-- Flow 2:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 2766.594 ms
Loss rate: 13.70%
-- Flow 3:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 2834.703 ms
Loss rate: 57.65%
```

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

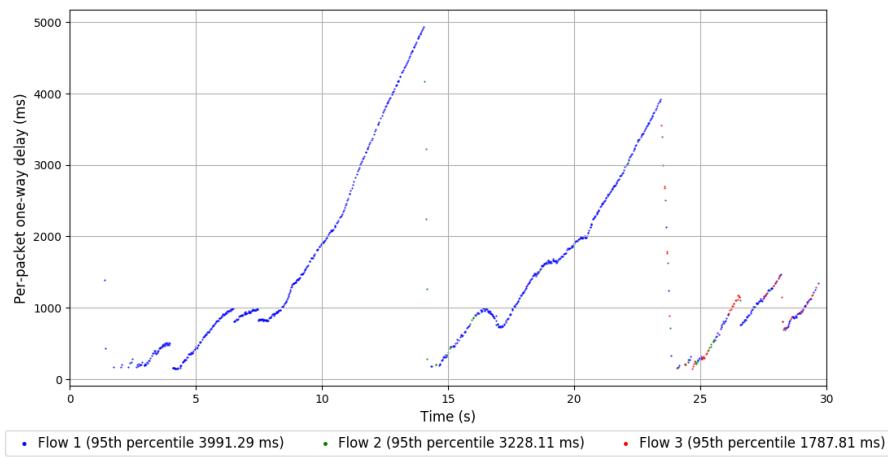
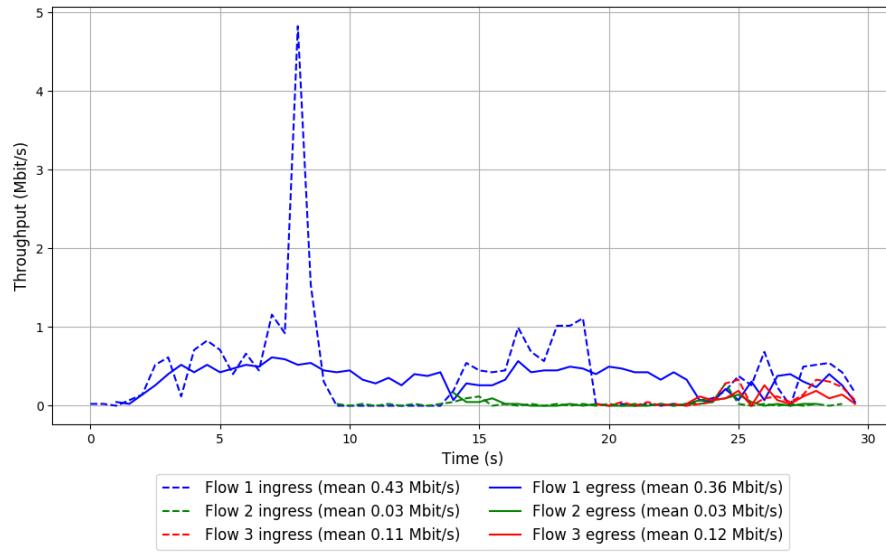


Run 1: Statistics of Verus

```
Start at: 2018-01-25 18:42:19
End at: 2018-01-25 18:42:49
Local clock offset: 1.417 ms
Remote clock offset: 0.106 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 3901.764 ms
Loss rate: 20.66%
-- Flow 1:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 3991.288 ms
Loss rate: 20.11%
-- Flow 2:
Average throughput: 0.03 Mbit/s
95th percentile per-packet one-way delay: 3228.108 ms
Loss rate: 4.55%
-- Flow 3:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 1787.810 ms
Loss rate: 34.78%
```

## Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

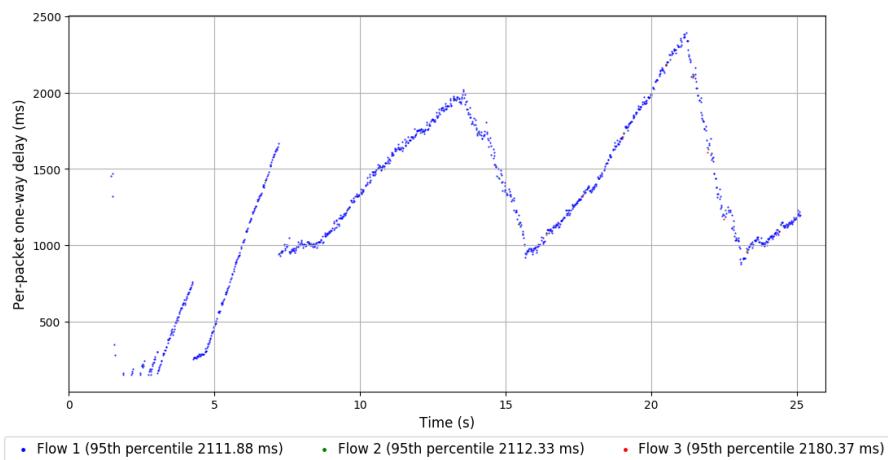
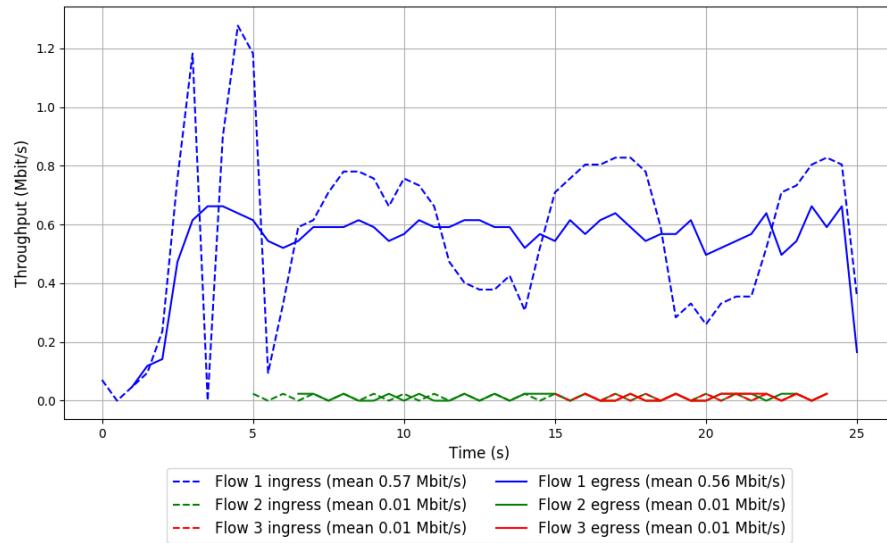
Start at: 2018-01-25 19:02:35

End at: 2018-01-25 19:03:05

Local clock offset: 1.507 ms

Remote clock offset: 0.184 ms

## Run 2: Report of Verus — Data Link

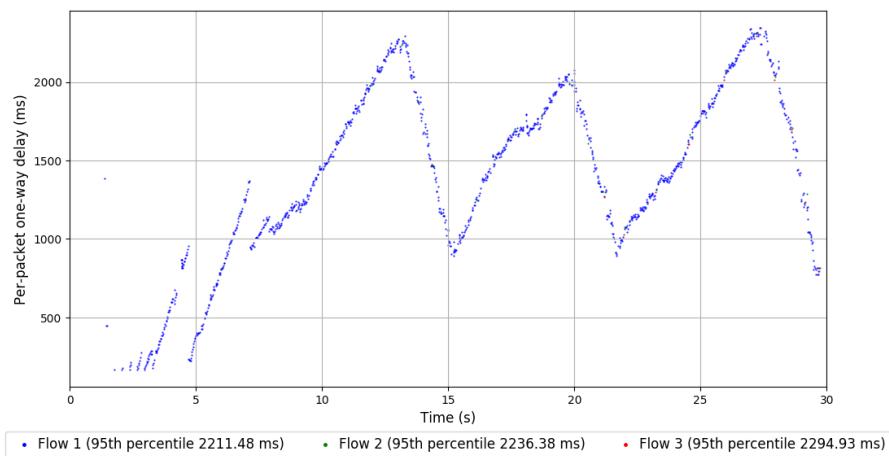
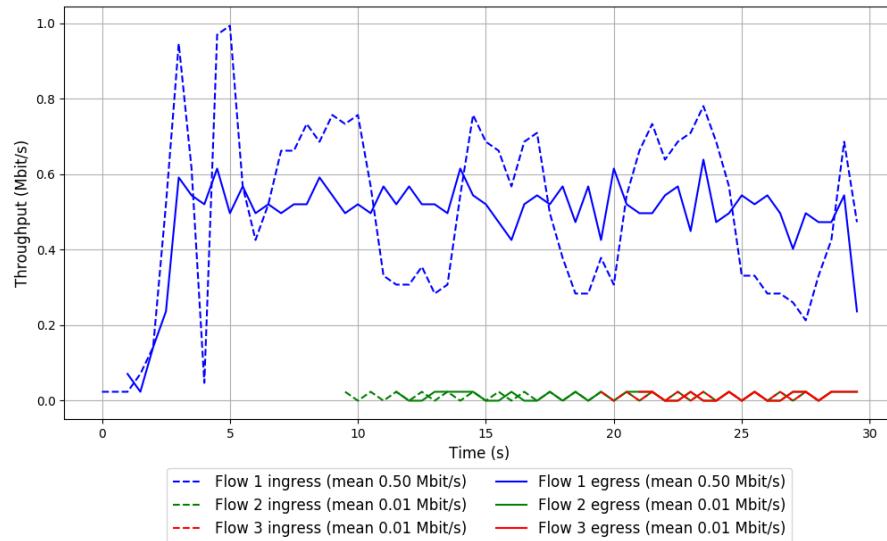


Run 3: Statistics of Verus

```
Start at: 2018-01-25 19:22:59
End at: 2018-01-25 19:23:29
Local clock offset: 1.551 ms
Remote clock offset: -5.908 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 2211.766 ms
Loss rate: 4.20%
-- Flow 1:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 2211.479 ms
Loss rate: 4.30%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 2236.384 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 2294.935 ms
Loss rate: 0.00%
```

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

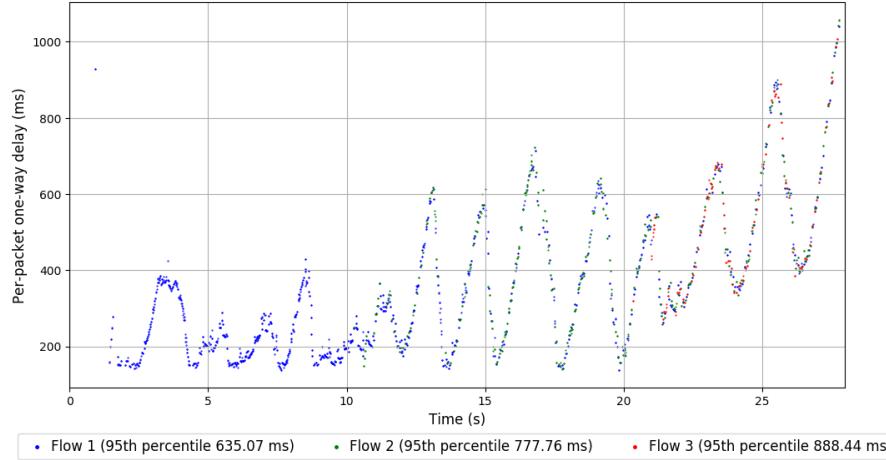
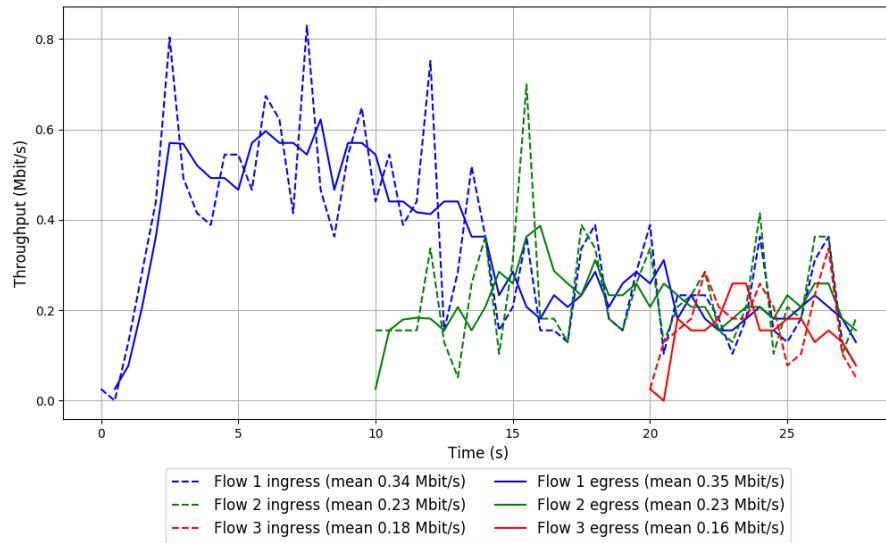


Run 1: Statistics of Copa

```
Start at: 2018-01-25 18:46:05
End at: 2018-01-25 18:46:35
Local clock offset: 1.447 ms
Remote clock offset: 1.191 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 704.289 ms
Loss rate: 3.56%
-- Flow 1:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 635.071 ms
Loss rate: 1.79%
-- Flow 2:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 777.762 ms
Loss rate: 4.69%
-- Flow 3:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 888.442 ms
Loss rate: 12.38%
```

## Run 1: Report of Copa — Data Link

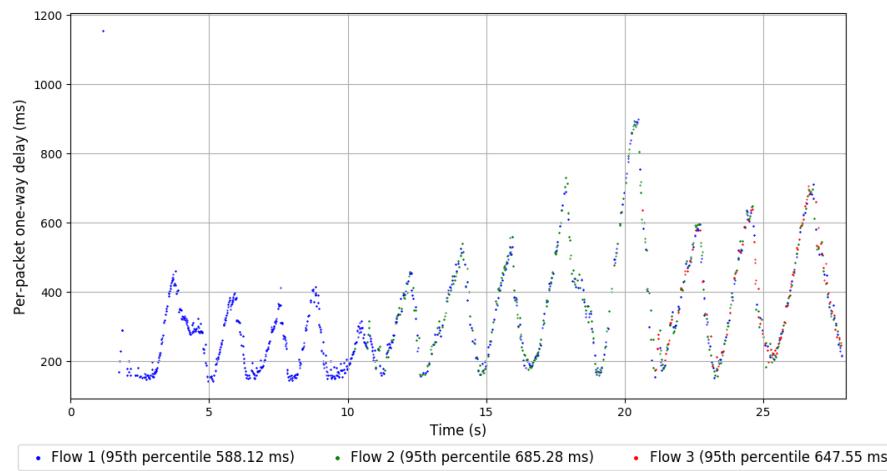
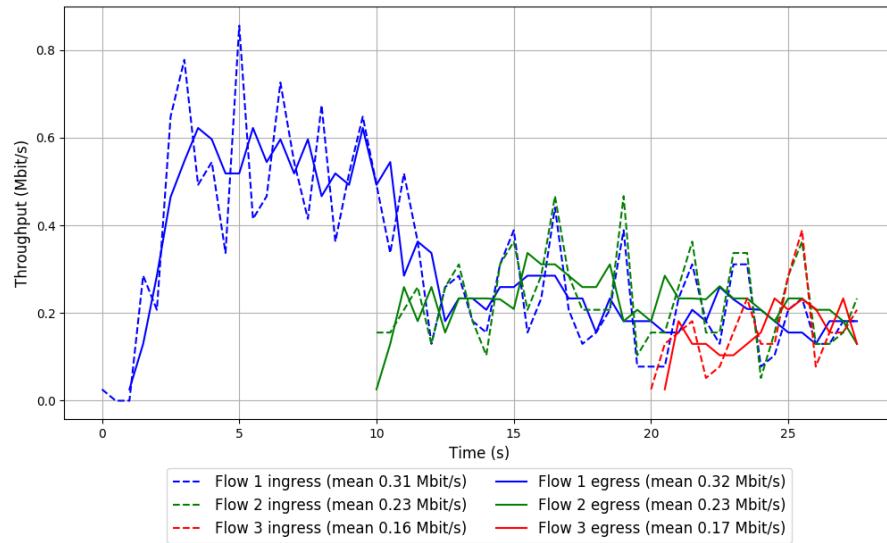


Run 2: Statistics of Copa

```
Start at: 2018-01-25 19:06:24
End at: 2018-01-25 19:06:54
Local clock offset: 1.524 ms
Remote clock offset: 0.227 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 629.349 ms
Loss rate: 1.85%
-- Flow 1:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 588.117 ms
Loss rate: 0.75%
-- Flow 2:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 685.277 ms
Loss rate: 2.50%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 647.546 ms
Loss rate: 7.14%
```

## Run 2: Report of Copa — Data Link

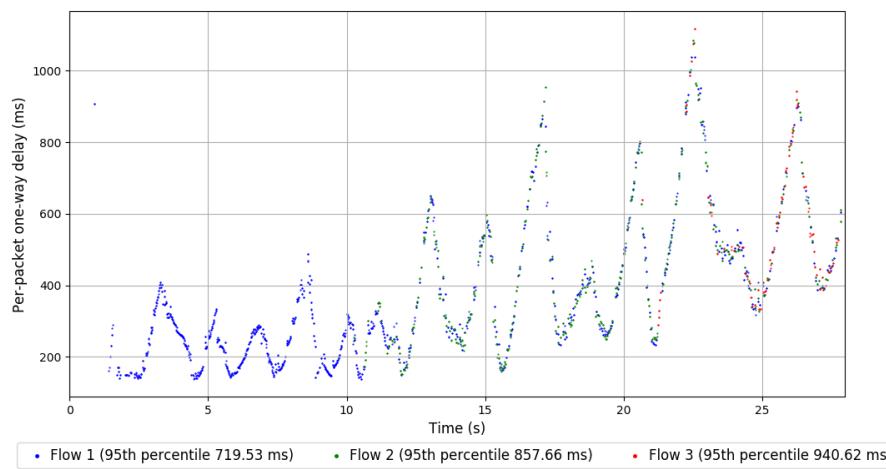
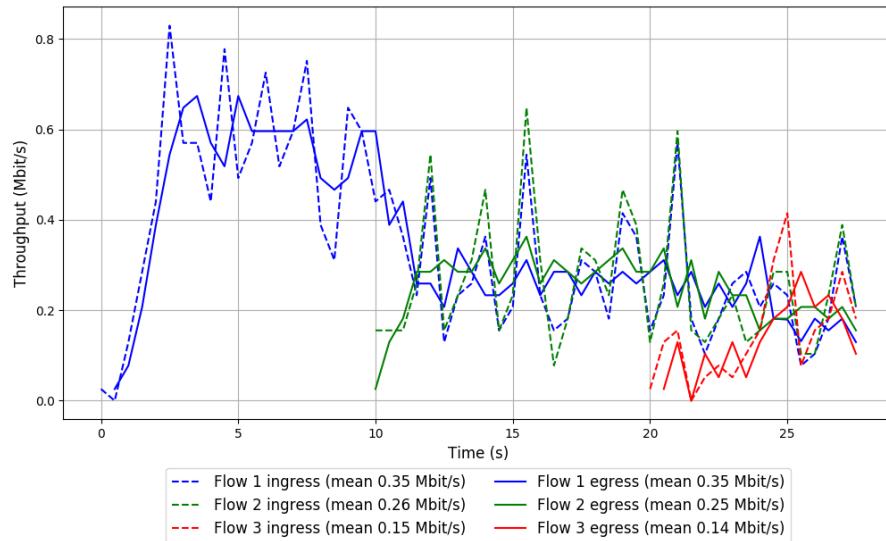


Run 3: Statistics of Copa

```
Start at: 2018-01-25 19:26:47
End at: 2018-01-25 19:27:17
Local clock offset: 1.651 ms
Remote clock offset: -0.24 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 825.105 ms
Loss rate: 3.76%
-- Flow 1:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 719.532 ms
Loss rate: 2.15%
-- Flow 2:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 857.661 ms
Loss rate: 4.43%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 940.625 ms
Loss rate: 14.29%
```

### Run 3: Report of Copa — Data Link

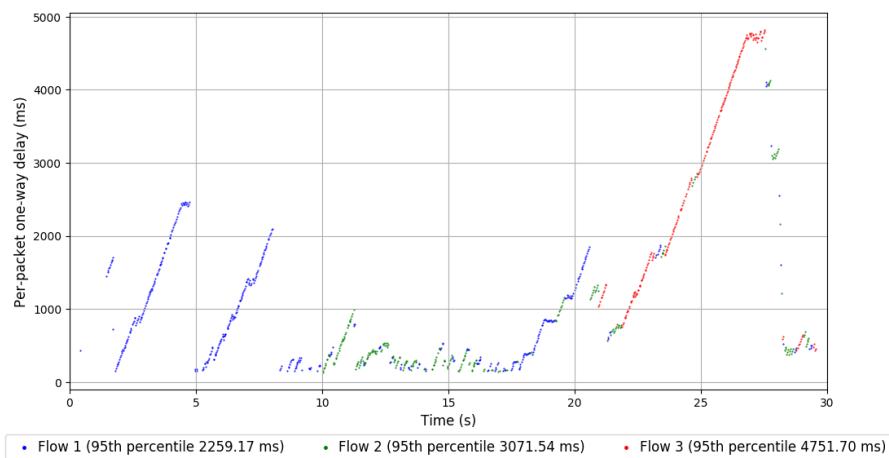
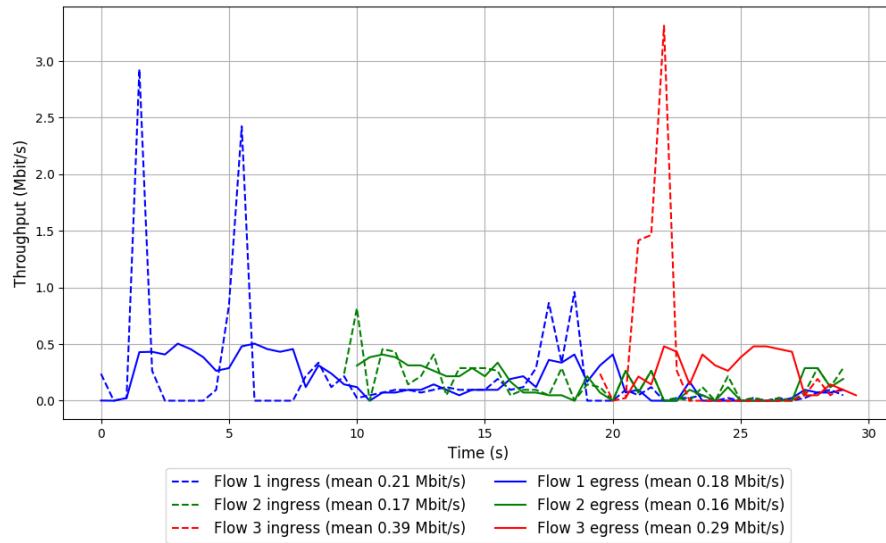


```
Run 1: Statistics of Indigo-2-256

Start at: 2018-01-25 18:34:41
End at: 2018-01-25 18:35:11
Local clock offset: 1.359 ms
Remote clock offset: 0.114 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 4325.608 ms
Loss rate: 15.74%
-- Flow 1:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 2259.170 ms
Loss rate: 12.85%
-- Flow 2:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 3071.541 ms
Loss rate: 6.27%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 4751.703 ms
Loss rate: 29.30%
```

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

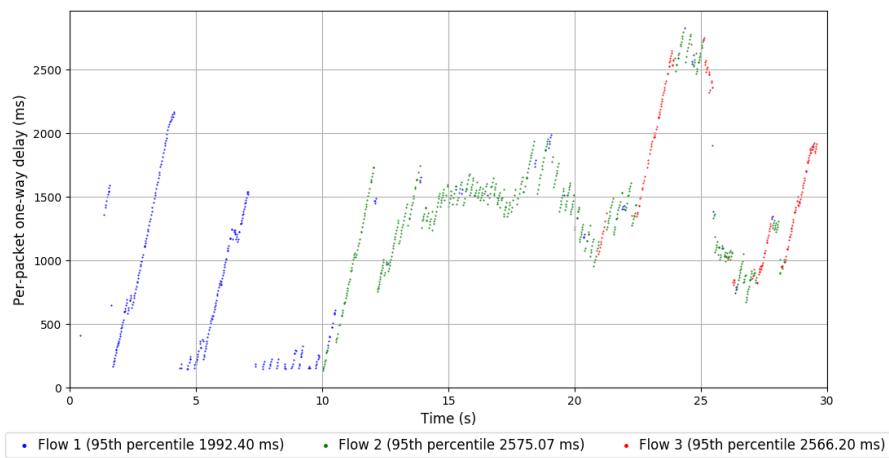
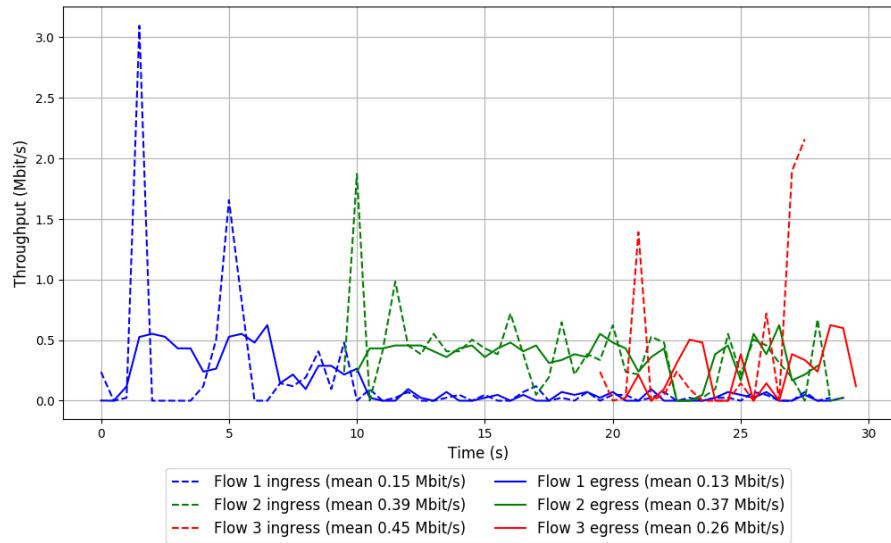


Run 2: Statistics of Indigo-2-256

```
Start at: 2018-01-25 18:55:01
End at: 2018-01-25 18:55:31
Local clock offset: 1.433 ms
Remote clock offset: -4.552 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 2534.454 ms
Loss rate: 17.10%
-- Flow 1:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 1992.403 ms
Loss rate: 12.84%
-- Flow 2:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 2575.073 ms
Loss rate: 10.97%
-- Flow 3:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 2566.197 ms
Loss rate: 35.87%
```

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

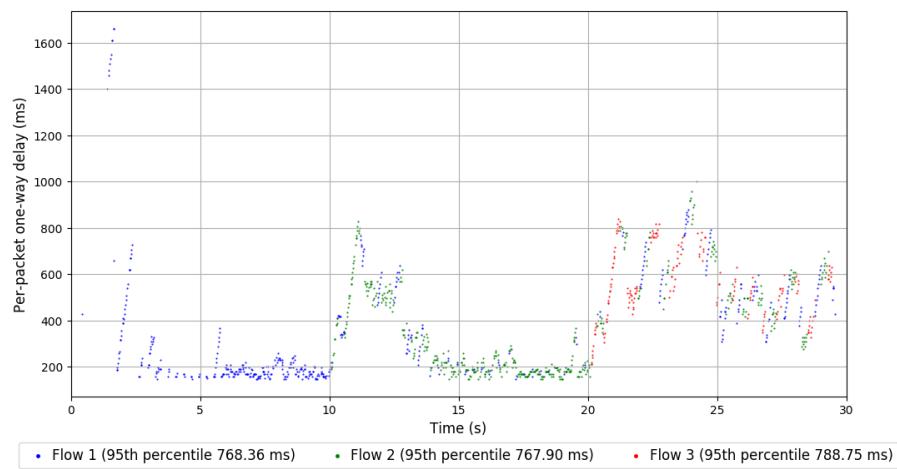
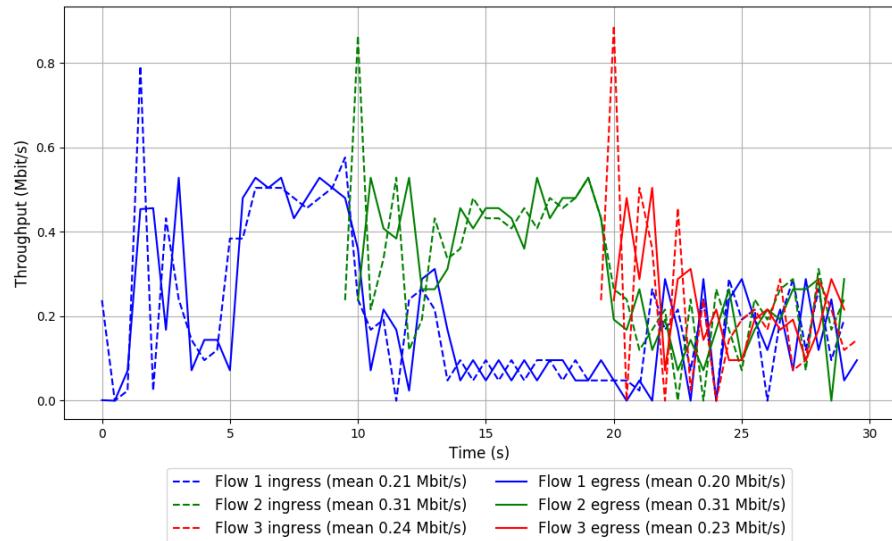


Run 3: Statistics of Indigo-2-256

```
Start at: 2018-01-25 19:15:20
End at: 2018-01-25 19:15:50
Local clock offset: 1.563 ms
Remote clock offset: 0.115 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 779.005 ms
Loss rate: 3.33%
-- Flow 1:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 768.364 ms
Loss rate: 1.99%
-- Flow 2:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 767.900 ms
Loss rate: 2.77%
-- Flow 3:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 788.752 ms
Loss rate: 8.25%
```

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

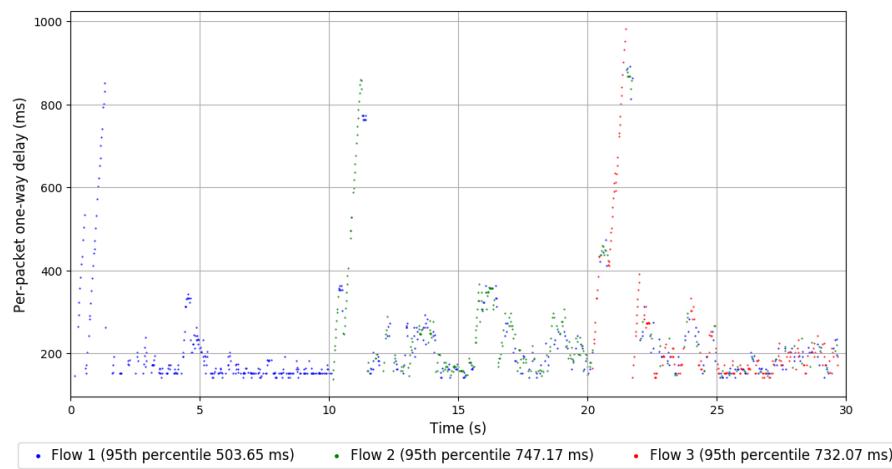
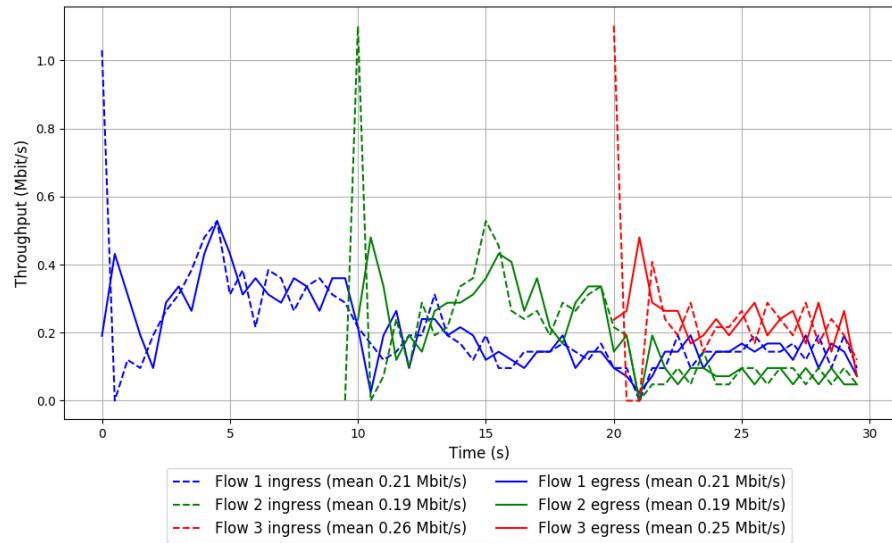


```
Run 1: Statistics of Indigo-1-32
```

```
Start at: 2018-01-25 18:37:16
End at: 2018-01-25 18:37:46
Local clock offset: 1.404 ms
Remote clock offset: -0.682 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 672.139 ms
Loss rate: 2.29%
-- Flow 1:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 503.646 ms
Loss rate: 1.73%
-- Flow 2:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 747.166 ms
Loss rate: 1.87%
-- Flow 3:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 732.074 ms
Loss rate: 4.35%
```

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

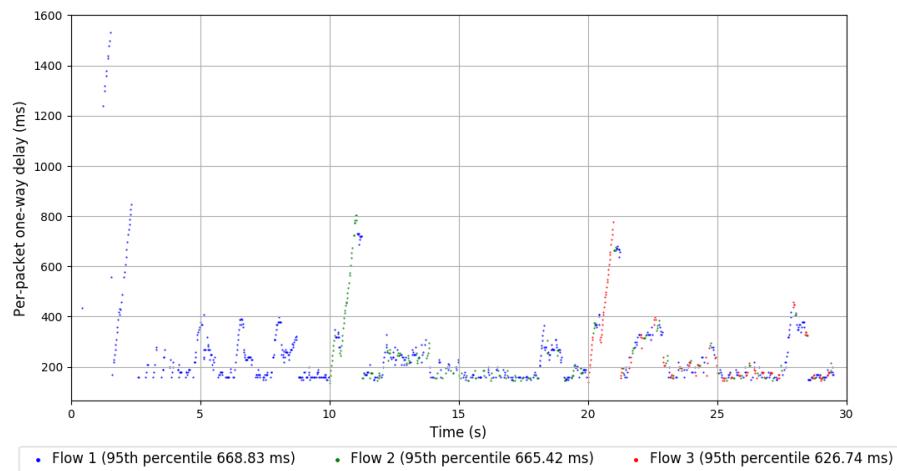
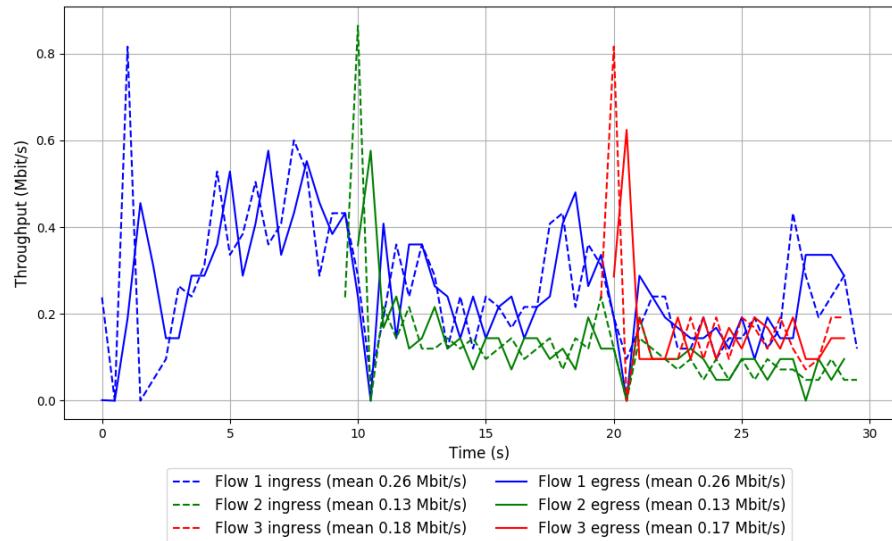


Run 2: Statistics of Indigo-1-32

```
Start at: 2018-01-25 18:57:32
End at: 2018-01-25 18:58:02
Local clock offset: 1.487 ms
Remote clock offset: -4.515 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 667.974 ms
Loss rate: 2.67%
-- Flow 1:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 668.829 ms
Loss rate: 1.69%
-- Flow 2:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 665.419 ms
Loss rate: 2.80%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 626.736 ms
Loss rate: 6.95%
```

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

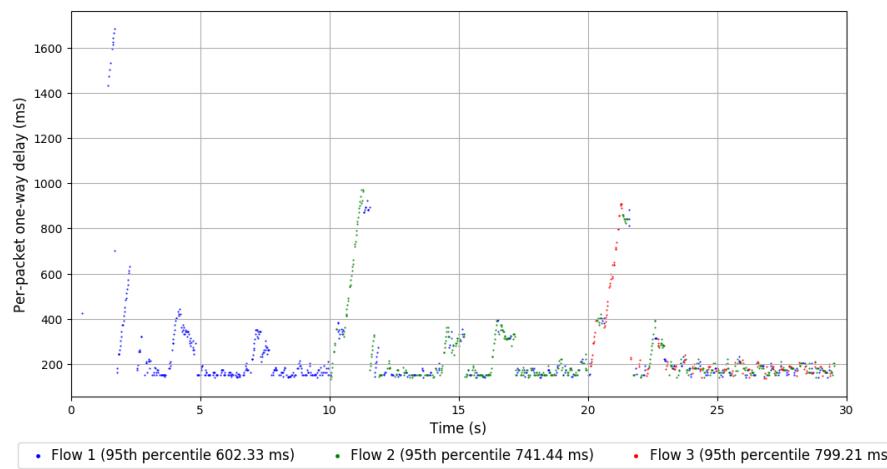
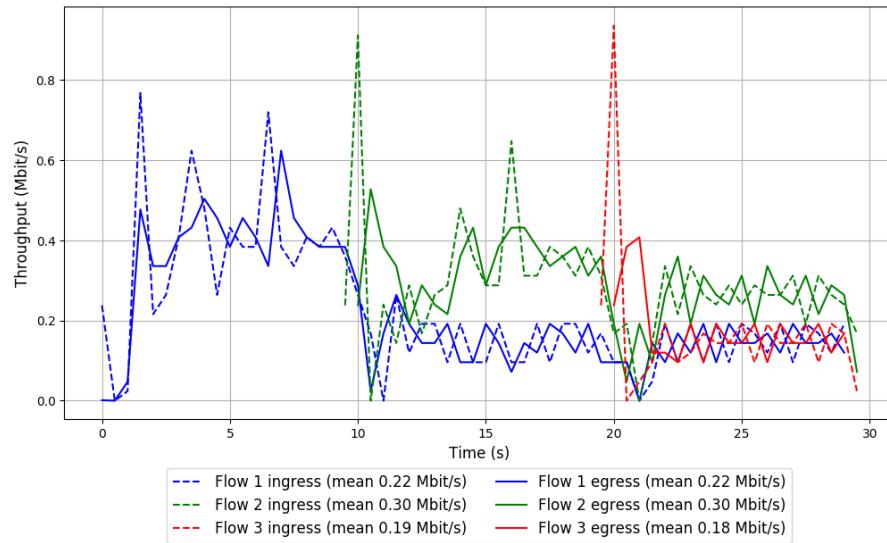


Run 3: Statistics of Indigo-1-32

```
Start at: 2018-01-25 19:17:53
End at: 2018-01-25 19:18:23
Local clock offset: 1.599 ms
Remote clock offset: 0.021 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 741.438 ms
Loss rate: 2.37%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 602.329 ms
Loss rate: 2.02%
-- Flow 2:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 741.438 ms
Loss rate: 1.43%
-- Flow 3:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 799.211 ms
Loss rate: 6.63%
```

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

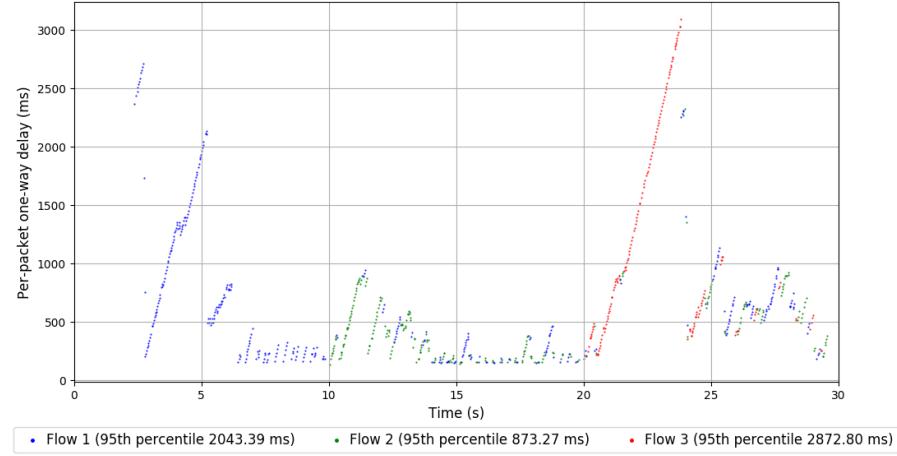
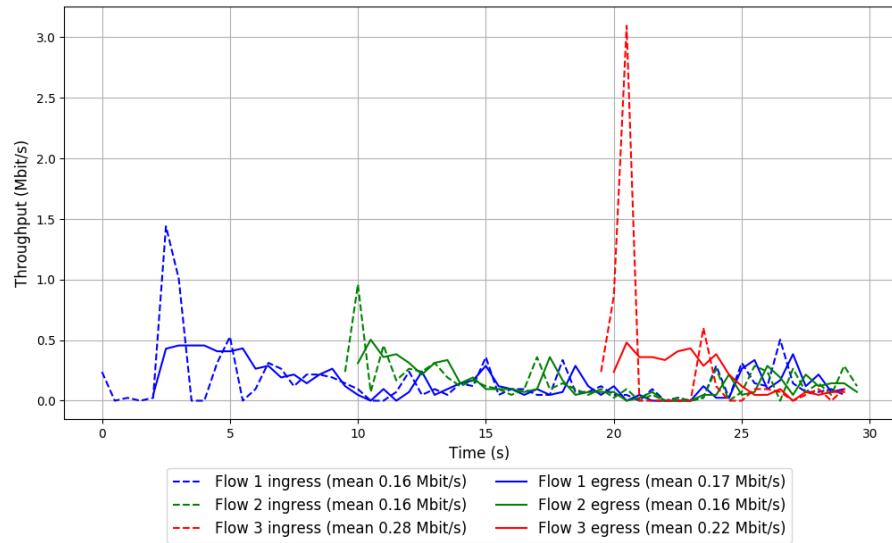


```
Run 1: Statistics of Indigo-1-128

Start at: 2018-01-25 18:33:26
End at: 2018-01-25 18:33:56
Local clock offset: 1.342 ms
Remote clock offset: 0.281 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 2315.808 ms
Loss rate: 9.52%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 2043.390 ms
Loss rate: 3.59%
-- Flow 2:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 873.272 ms
Loss rate: 5.25%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 2872.805 ms
Loss rate: 24.79%
```

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

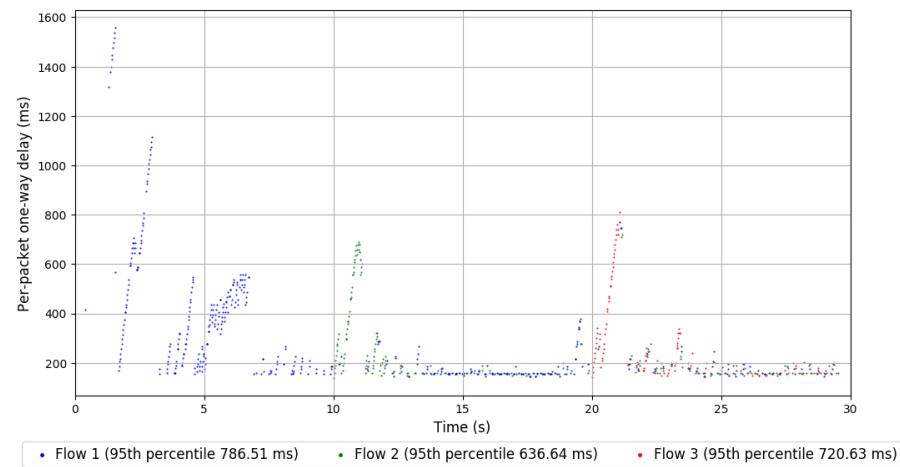
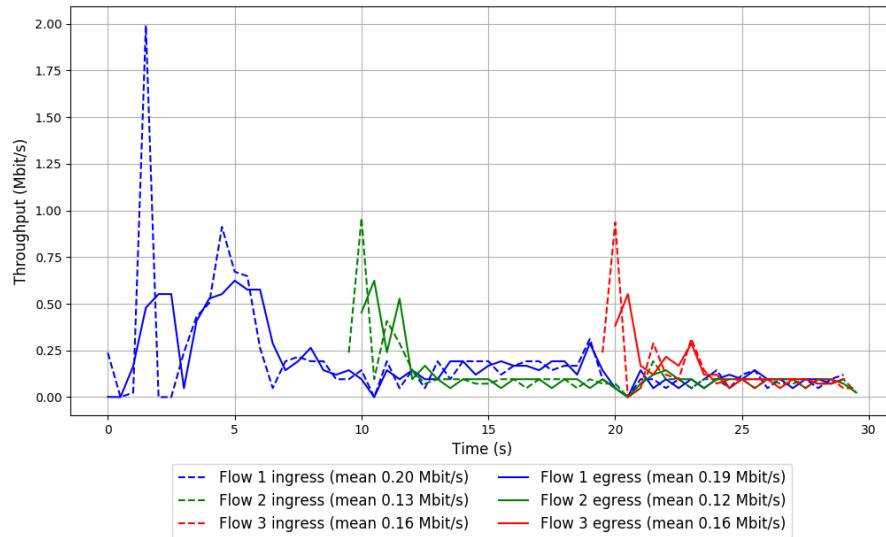


Run 2: Statistics of Indigo-1-128

```
Start at: 2018-01-25 18:53:43
End at: 2018-01-25 18:54:13
Local clock offset: 1.49 ms
Remote clock offset: -5.449 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 707.996 ms
Loss rate: 4.77%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 786.511 ms
Loss rate: 5.61%
-- Flow 2:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 636.636 ms
Loss rate: 2.42%
-- Flow 3:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 720.632 ms
Loss rate: 5.39%
```

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



Run 3: Statistics of Indigo-1-128

```
Start at: 2018-01-25 19:14:04
End at: 2018-01-25 19:14:34
Local clock offset: 1.572 ms
Remote clock offset: -4.748 ms

# Below is generated by plot.py at 2018-01-25 20:29:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 640.953 ms
Loss rate: 2.90%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 648.985 ms
Loss rate: 1.99%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 618.452 ms
Loss rate: 2.58%
-- Flow 3:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 649.340 ms
Loss rate: 5.74%
```

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

