

## Pantheon Report

Generated at 2017-08-13 07:47:03 (UTC).

Data path: Mexico ppp0 (*remote*) → AWS California 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).

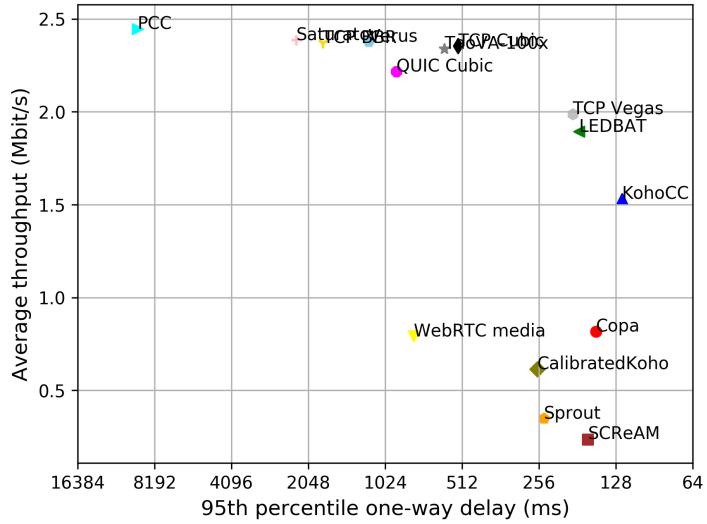
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo\_fast**).

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

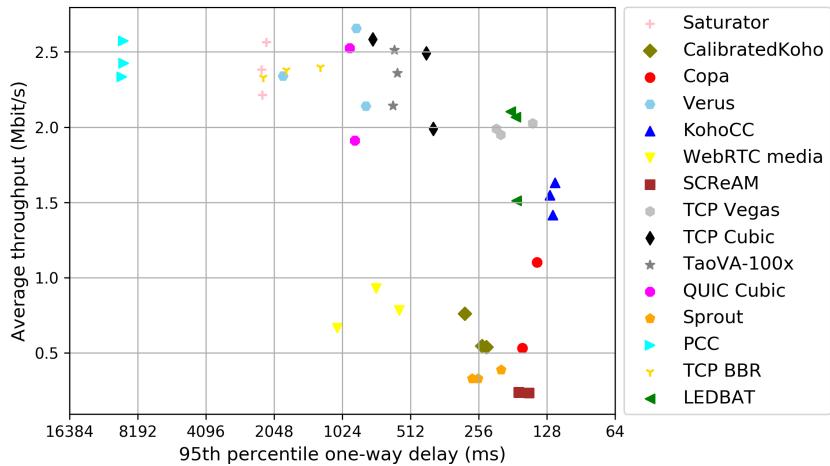
**Git summary:**

```
branch: master @ e43be7582298d552838afcfc6382342bf187fb9bd6
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/genericCC @ dae96123232f1bcb37725348fa2378691ce26725
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
  M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-stimuli @ fc73a85ca16c34366d1888dc8a0d0d88d4ebf2a7
third_party/pantheon-tunnel @ baf443516dea3eeddeccaf9b916cc313273ca4f4
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
  M receiver/src/buffer.h
  M receiver/src/core.cpp
  M sender/src/buffer.h
  M sender/src/core.cpp
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ f1a14bffe749737437f61b1eaeeb30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
  M src/examples/cellsim.cc
  M src/examples/sproutbt2.cc
  M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
  M src/verus.hpp
  M tools/plot.py
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

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



test from Mexico ppp0 to AWS California 2 Ethernet, 3 runs of 30s each per scheme  
3 flows with 10s interval between flows



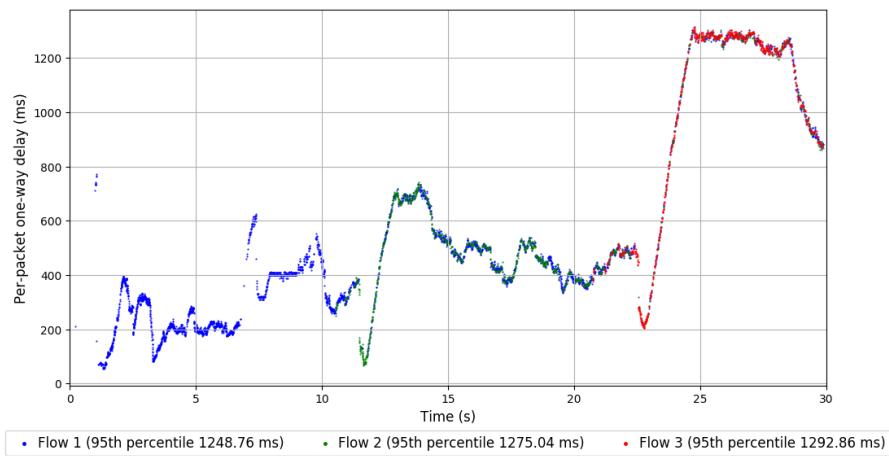
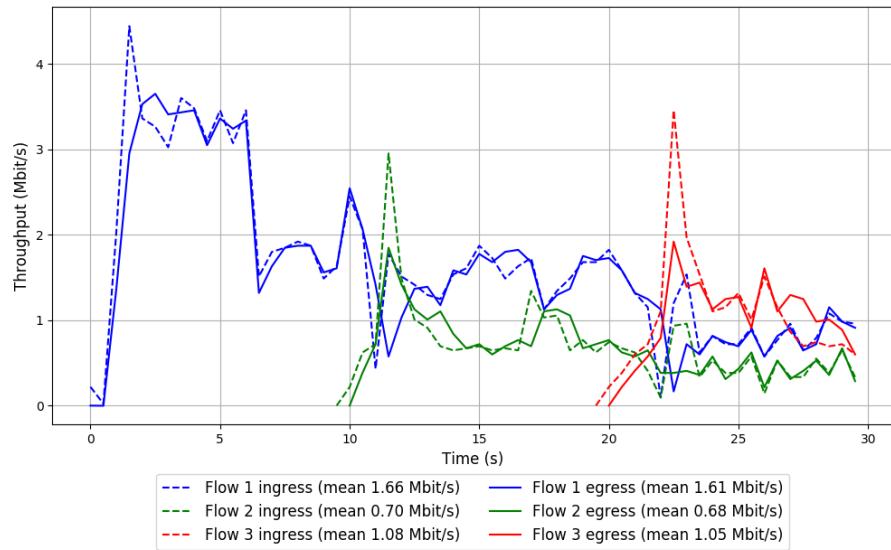
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	1.52	1.00	0.60	1758.19	1807.81	1825.61	4.98	7.74	17.01
CalibratedKoho	3	0.29	0.29	0.36	488.06	236.77	198.51	2.08	1.82	3.09
Copa	2	0.46	0.33	0.54	147.81	216.18	151.31	1.01	1.00	1.85
TCP Cubic	3	1.65	0.66	0.86	499.20	530.51	545.14	2.40	4.05	8.46
KohoCC	3	0.63	0.75	1.16	136.25	126.96	101.09	1.63	1.64	3.21
LEDBAT	3	0.94	1.01	0.86	172.21	179.75	181.02	1.90	2.68	3.30
PCC	3	2.44	0.00	0.01	9547.82	9244.01	8933.15	85.70	18.01	76.30
QUIC Cubic	2	1.53	0.72	0.54	914.56	931.54	956.67	4.21	6.67	15.39
Saturator	3	1.70	0.98	0.28	2137.80	2334.57	2322.29	7.02	13.38	52.71
SCReAM	3	0.08	0.15	0.13	152.76	161.69	191.93	0.73	0.90	1.20
Sprout	3	0.17	0.17	0.20	258.09	235.62	232.96	0.97	1.63	3.16
TaoVA-100x	3	1.43	1.02	0.84	586.35	597.84	664.23	4.89	6.70	27.73
TCP Vegas	3	0.98	1.02	0.98	211.41	166.93	190.90	2.05	2.02	3.28
Verus	3	1.71	0.76	0.50	864.48	1332.07	795.19	4.44	22.46	6.55
WebRTC media	3	0.35	0.30	0.15	762.29	702.13	829.91	1.40	1.45	3.70

Run 1: Statistics of TCP BBR

```
Start at: 2017-08-13 05:49:54
End at: 2017-08-13 05:50:24
Local clock offset: 0.503 ms
Remote clock offset: -2.947 ms

# Below is generated by plot.py at 2017-08-13 07:46:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 1278.218 ms
Loss rate: 4.20%
-- Flow 1:
Average throughput: 1.61 Mbit/s
95th percentile per-packet one-way delay: 1248.763 ms
Loss rate: 3.47%
-- Flow 2:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 1275.039 ms
Loss rate: 4.63%
-- Flow 3:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 1292.862 ms
Loss rate: 7.01%
```

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

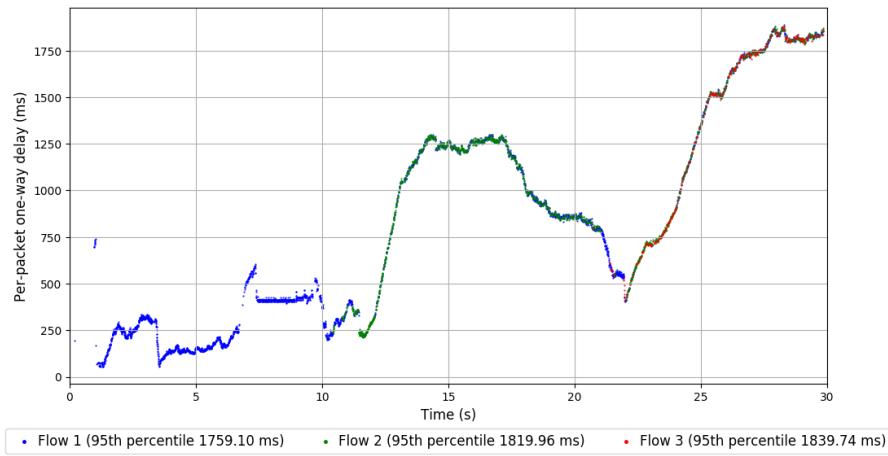
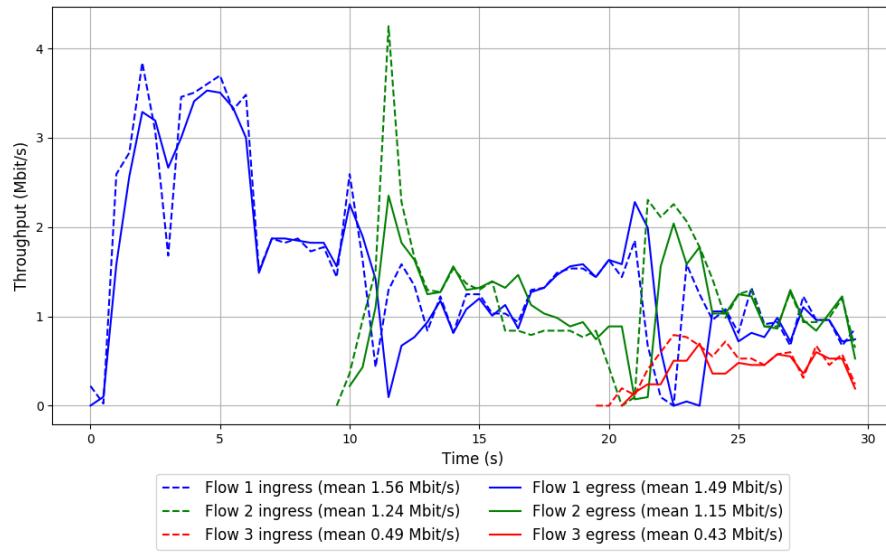


Run 2: Statistics of TCP BBR

```
Start at: 2017-08-13 06:09:59
End at: 2017-08-13 06:10:29
Local clock offset: 0.552 ms
Remote clock offset: -2.307 ms

# Below is generated by plot.py at 2017-08-13 07:46:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 1813.178 ms
Loss rate: 7.35%
-- Flow 1:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 1759.097 ms
Loss rate: 5.28%
-- Flow 2:
Average throughput: 1.15 Mbit/s
95th percentile per-packet one-way delay: 1819.958 ms
Loss rate: 8.68%
-- Flow 3:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 1839.737 ms
Loss rate: 20.38%
```

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

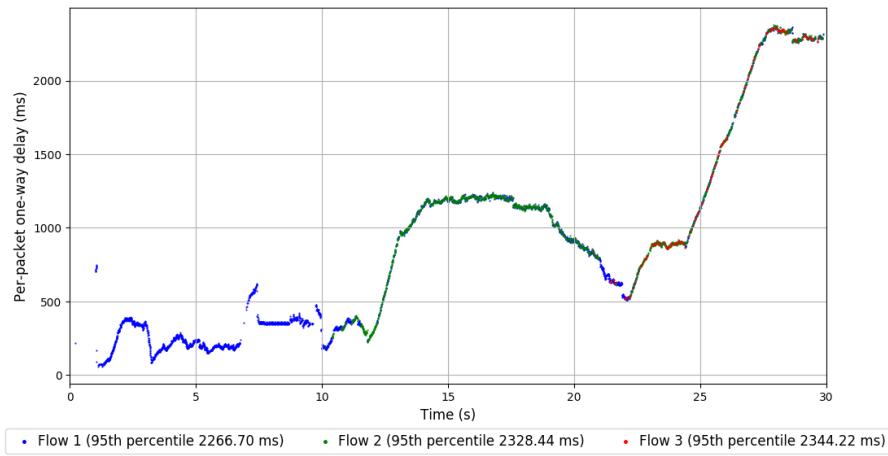
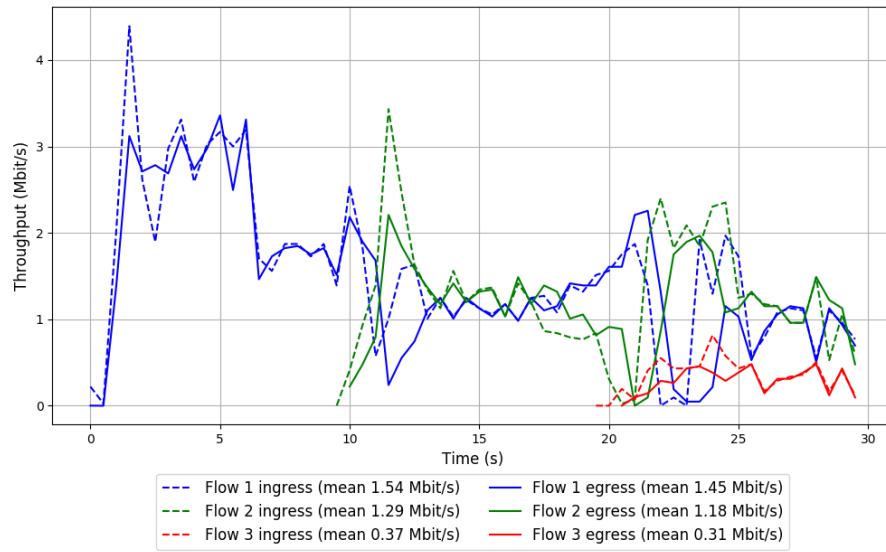


Run 3: Statistics of TCP BBR

```
Start at: 2017-08-13 06:30:04
End at: 2017-08-13 06:30:34
Local clock offset: 0.561 ms
Remote clock offset: 0.899 ms

# Below is generated by plot.py at 2017-08-13 07:46:31
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 2293.202 ms
Loss rate: 8.30%
-- Flow 1:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 2266.702 ms
Loss rate: 6.19%
-- Flow 2:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 2328.442 ms
Loss rate: 9.91%
-- Flow 3:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 2344.225 ms
Loss rate: 23.65%
```

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

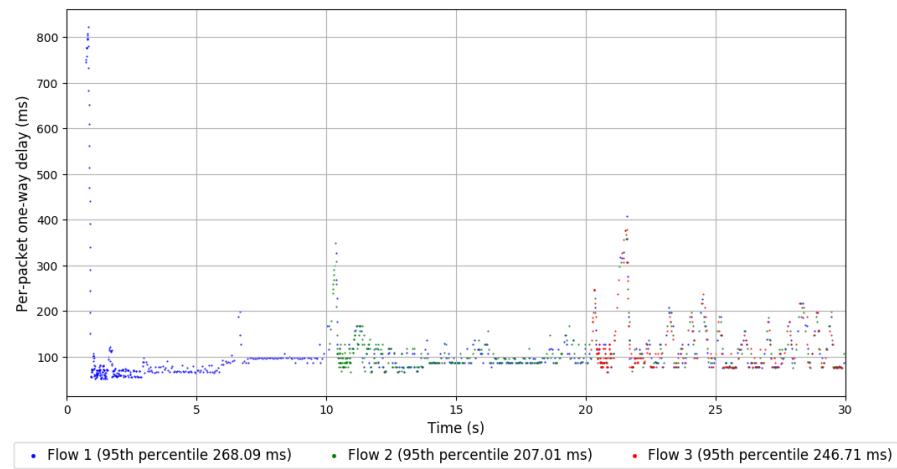
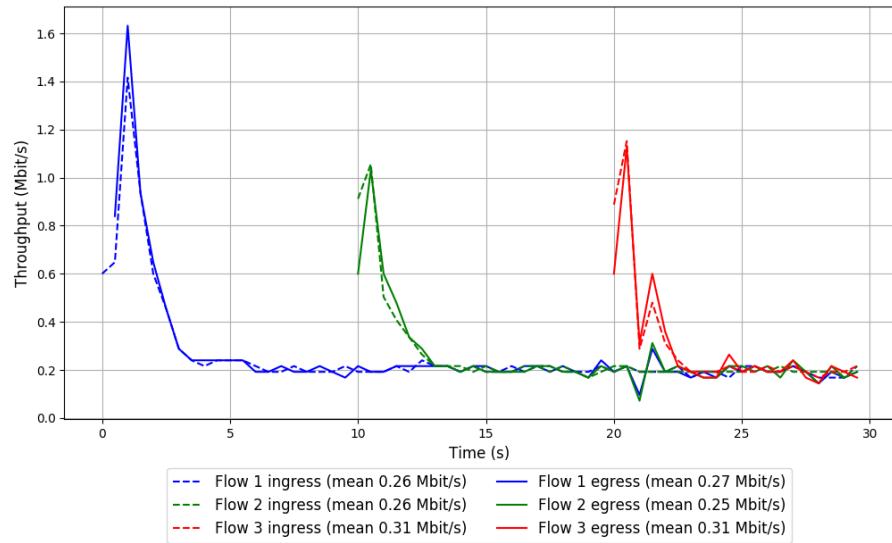


```
Run 1: Statistics of CalibratedKoho

Start at: 2017-08-13 06:01:57
End at: 2017-08-13 06:02:27
Local clock offset: 0.629 ms
Remote clock offset: -0.623 ms

# Below is generated by plot.py at 2017-08-13 07:46:31
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 236.945 ms
Loss rate: 1.80%
-- Flow 1:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 268.087 ms
Loss rate: 1.07%
-- Flow 2:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 207.013 ms
Loss rate: 2.11%
-- Flow 3:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 246.711 ms
Loss rate: 3.14%
```

## Run 1: Report of CalibratedKoho — Data Link

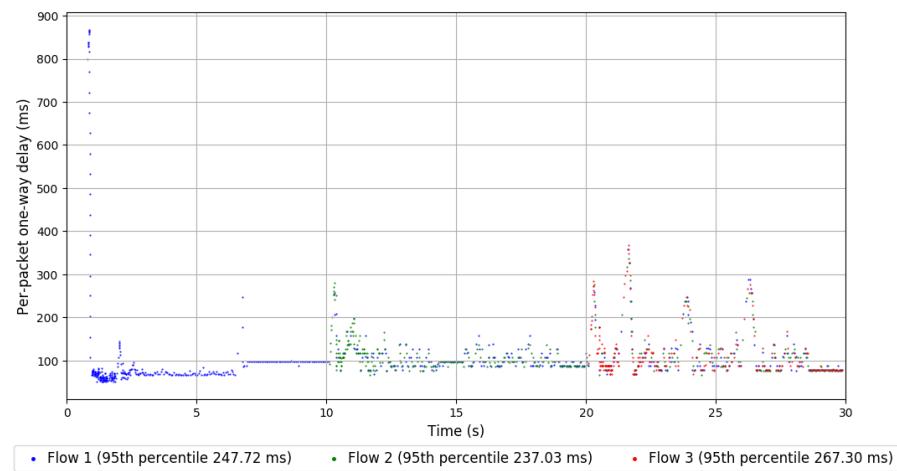
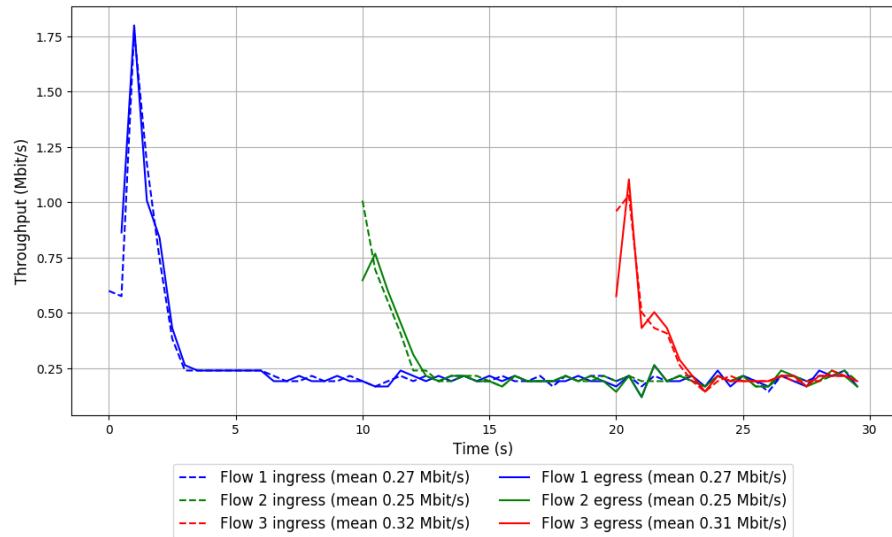


Run 2: Statistics of CalibratedKoho

```
Start at: 2017-08-13 06:22:02
End at: 2017-08-13 06:22:32
Local clock offset: 0.657 ms
Remote clock offset: -1.889 ms

# Below is generated by plot.py at 2017-08-13 07:46:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 247.783 ms
Loss rate: 2.50%
-- Flow 1:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 247.717 ms
Loss rate: 2.20%
-- Flow 2:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 237.029 ms
Loss rate: 2.18%
-- Flow 3:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 267.300 ms
Loss rate: 3.77%
```

Run 2: Report of CalibratedKoho — Data Link

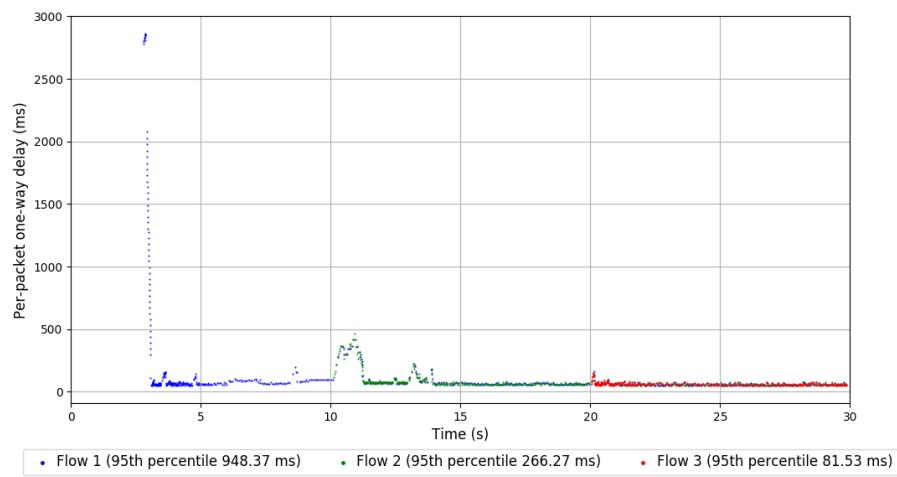
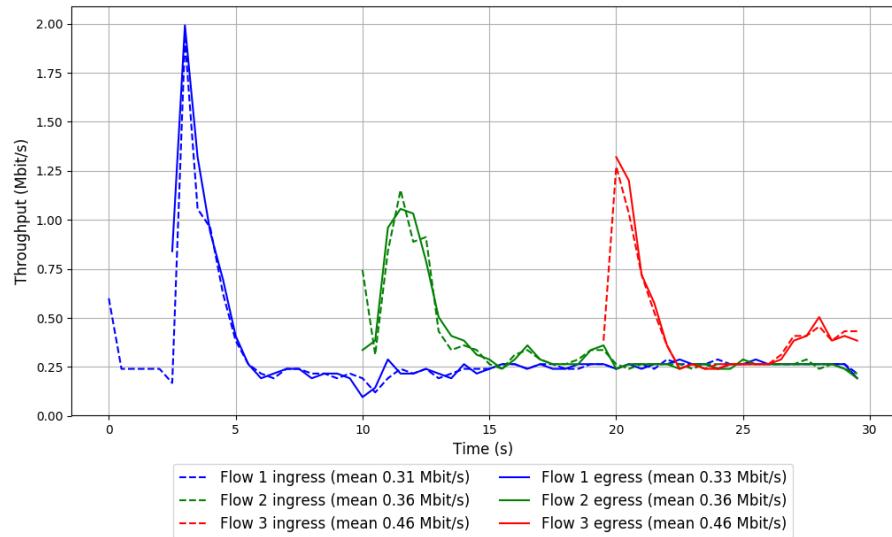


```
Run 3: Statistics of CalibratedKoho
```

```
Start at: 2017-08-13 06:42:07
End at: 2017-08-13 06:42:37
Local clock offset: 0.646 ms
Remote clock offset: 0.687 ms

# Below is generated by plot.py at 2017-08-13 07:46:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 295.293 ms
Loss rate: 2.22%
-- Flow 1:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 948.373 ms
Loss rate: 2.98%
-- Flow 2:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 266.270 ms
Loss rate: 1.17%
-- Flow 3:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 81.530 ms
Loss rate: 2.35%
```

Run 3: Report of CalibratedKoho — Data Link

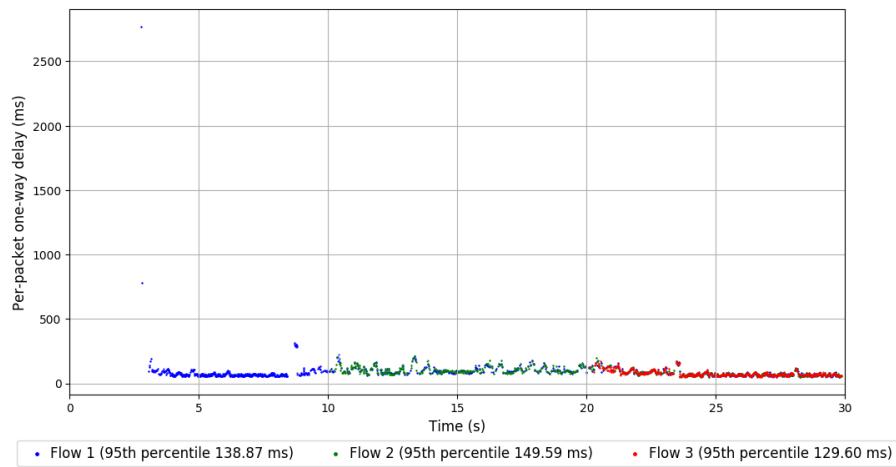
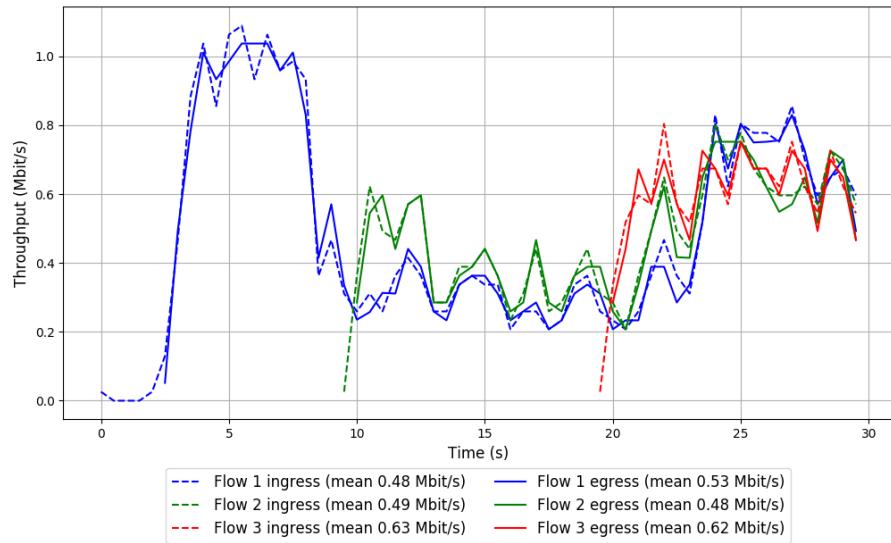


Run 1: Statistics of Copa

```
Start at: 2017-08-13 05:48:34
End at: 2017-08-13 05:49:04
Local clock offset: 0.521 ms
Remote clock offset: -0.909 ms

# Below is generated by plot.py at 2017-08-13 07:46:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.10 Mbit/s
95th percentile per-packet one-way delay: 141.672 ms
Loss rate: 1.69%
-- Flow 1:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 138.867 ms
Loss rate: 1.23%
-- Flow 2:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 149.595 ms
Loss rate: 2.00%
-- Flow 3:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 129.596 ms
Loss rate: 2.27%
```

## Run 1: Report of Copa — Data Link

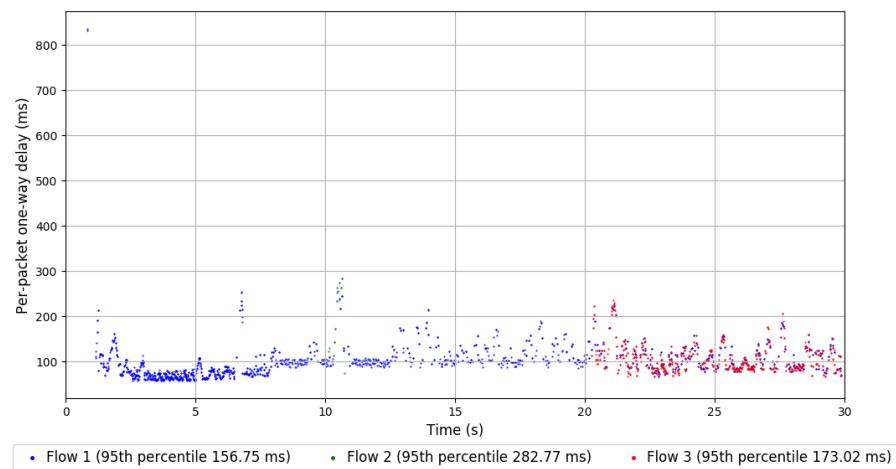
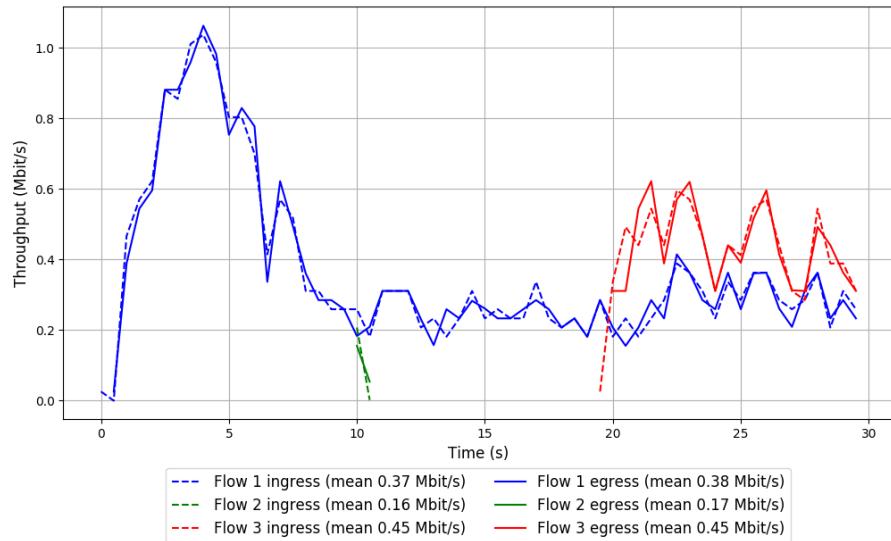


Run 2: Statistics of Copa

```
Start at: 2017-08-13 06:08:39
End at: 2017-08-13 06:09:09
Local clock offset: 0.551 ms
Remote clock offset: -2.499 ms

# Below is generated by plot.py at 2017-08-13 07:46:34
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 164.521 ms
Loss rate: 0.97%
-- Flow 1:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 156.747 ms
Loss rate: 0.79%
-- Flow 2:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 282.766 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 173.019 ms
Loss rate: 1.44%
```

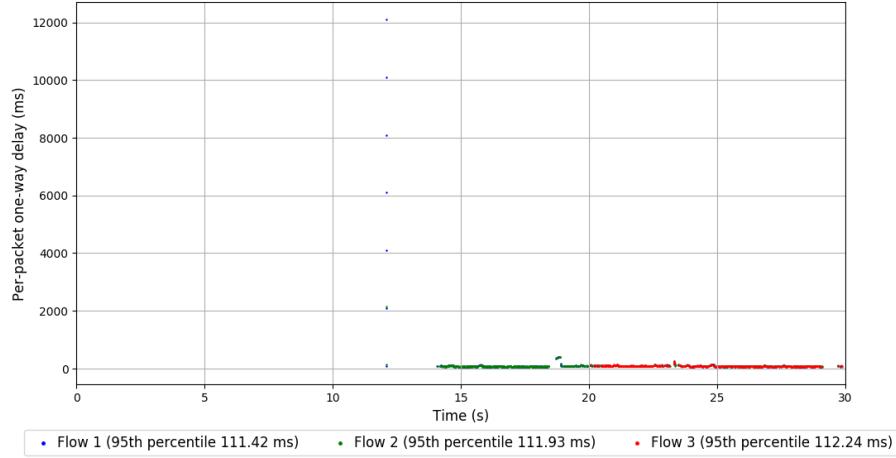
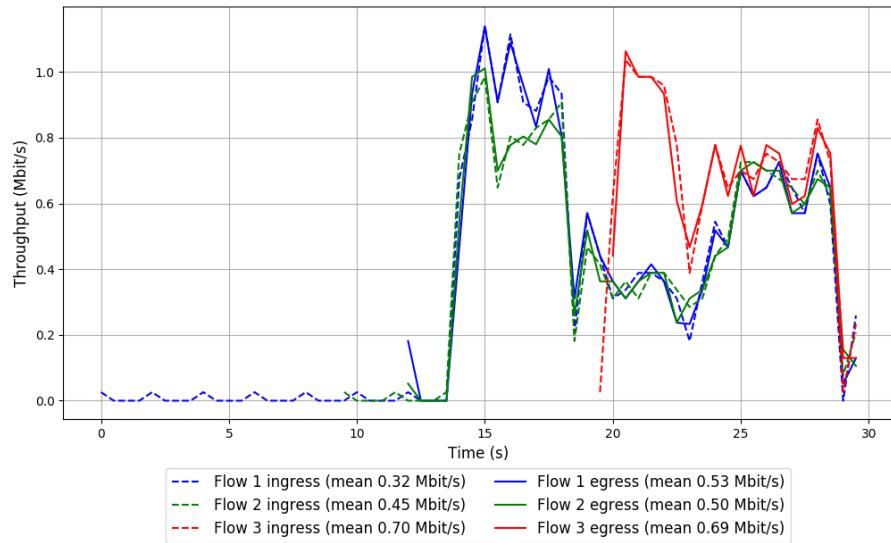
## Run 2: Report of Copa — Data Link



Run 3: Statistics of Copa

Start at: 2017-08-13 06:28:43  
End at: 2017-08-13 06:29:13  
Local clock offset: 0.666 ms  
Remote clock offset: -1.716 ms

### Run 3: Report of Copa — Data Link

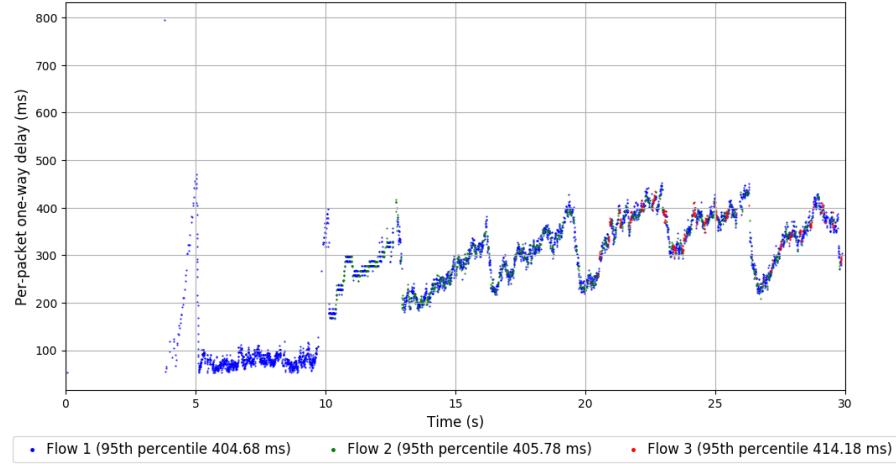
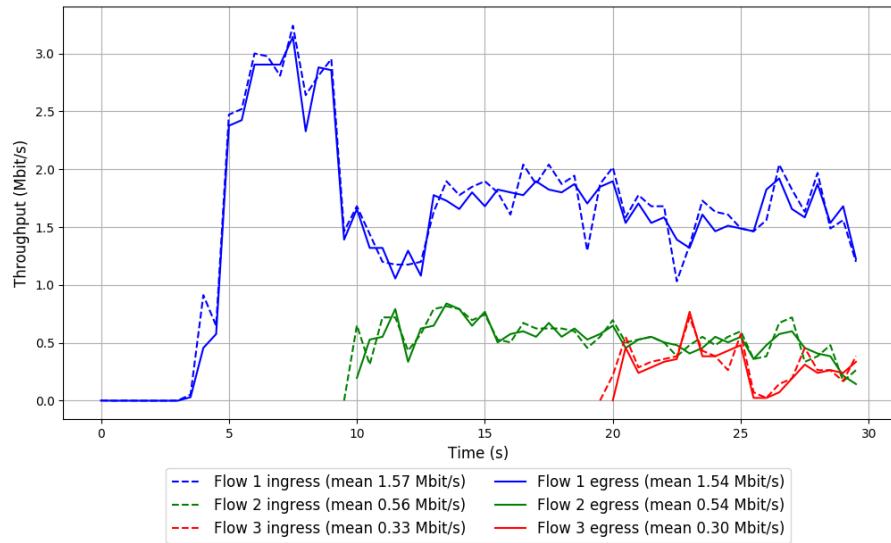


```
Run 1: Statistics of TCP Cubic
```

```
Start at: 2017-08-13 05:45:54
End at: 2017-08-13 05:46:24
Local clock offset: 0.59 ms
Remote clock offset: -3.026 ms

# Below is generated by plot.py at 2017-08-13 07:46:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.99 Mbit/s
95th percentile per-packet one-way delay: 406.278 ms
Loss rate: 3.17%
-- Flow 1:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 404.678 ms
Loss rate: 2.53%
-- Flow 2:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 405.783 ms
Loss rate: 3.92%
-- Flow 3:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 414.182 ms
Loss rate: 10.01%
```

Run 1: Report of TCP Cubic — Data Link

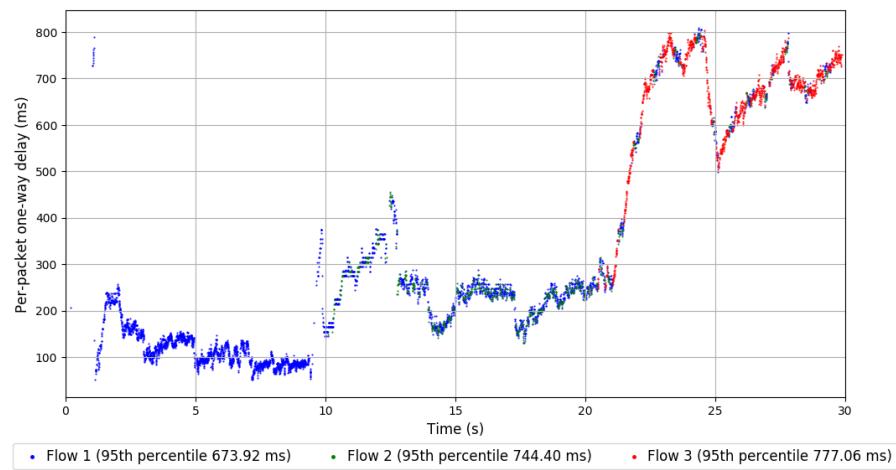
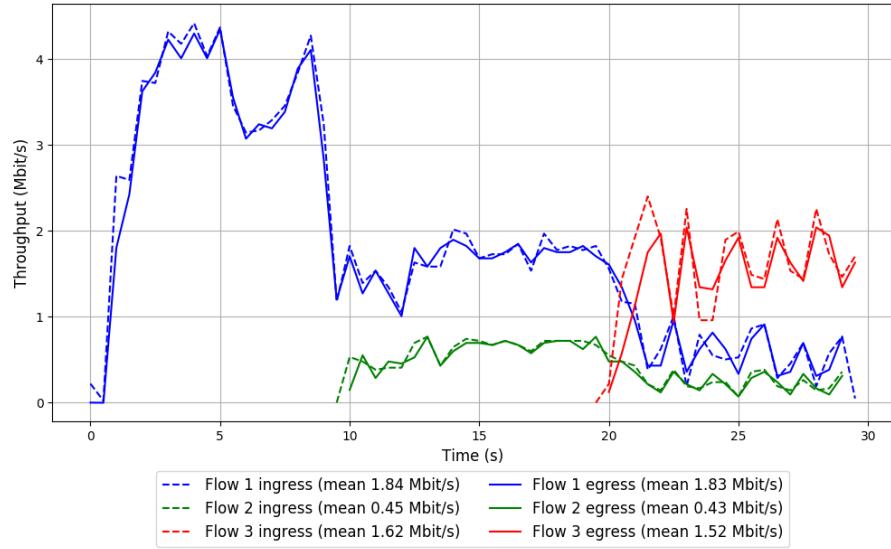


Run 2: Statistics of TCP Cubic

```
Start at: 2017-08-13 06:05:58
End at: 2017-08-13 06:06:28
Local clock offset: 0.607 ms
Remote clock offset: -0.318 ms

# Below is generated by plot.py at 2017-08-13 07:46:36
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.58 Mbit/s
95th percentile per-packet one-way delay: 750.352 ms
Loss rate: 4.19%
-- Flow 1:
Average throughput: 1.83 Mbit/s
95th percentile per-packet one-way delay: 673.925 ms
Loss rate: 2.77%
-- Flow 2:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 744.404 ms
Loss rate: 4.92%
-- Flow 3:
Average throughput: 1.52 Mbit/s
95th percentile per-packet one-way delay: 777.062 ms
Loss rate: 8.66%
```

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

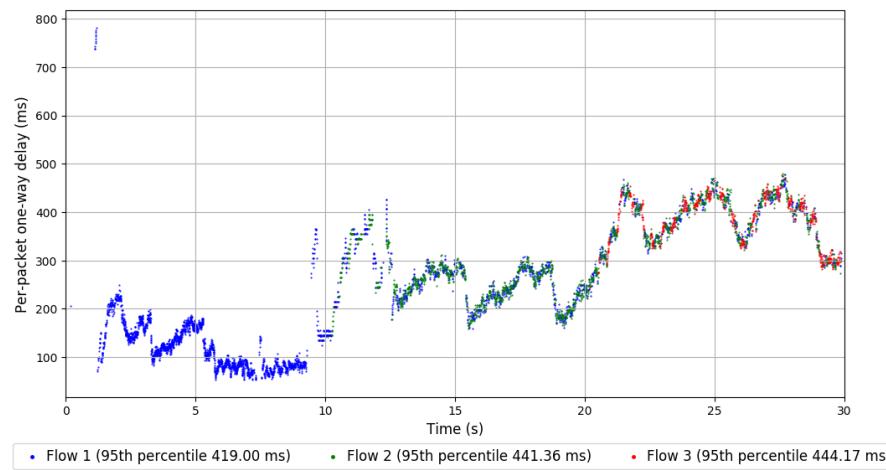
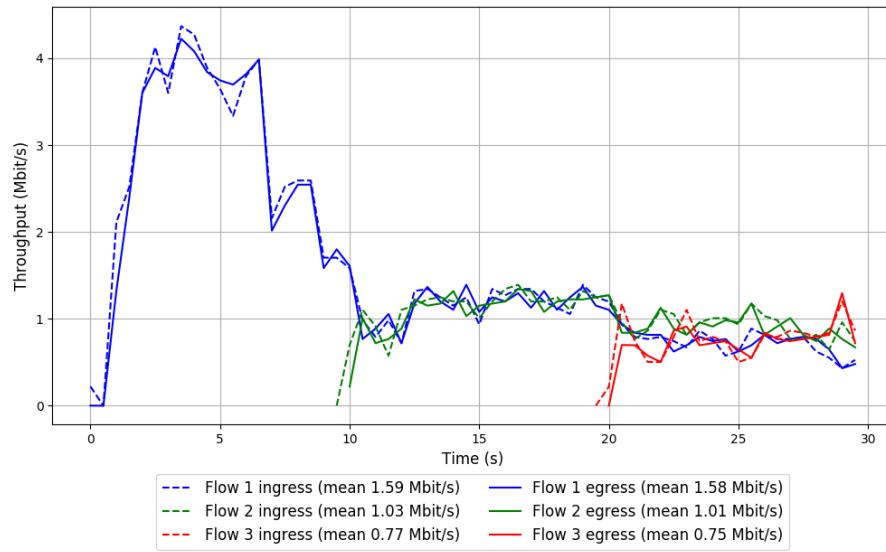


Run 3: Statistics of TCP Cubic

```
Start at: 2017-08-13 06:26:03
End at: 2017-08-13 06:26:33
Local clock offset: 0.583 ms
Remote clock offset: -1.84 ms

# Below is generated by plot.py at 2017-08-13 07:46:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.49 Mbit/s
95th percentile per-packet one-way delay: 435.568 ms
Loss rate: 2.76%
-- Flow 1:
Average throughput: 1.58 Mbit/s
95th percentile per-packet one-way delay: 418.999 ms
Loss rate: 1.89%
-- Flow 2:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 441.356 ms
Loss rate: 3.31%
-- Flow 3:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 444.169 ms
Loss rate: 6.71%
```

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

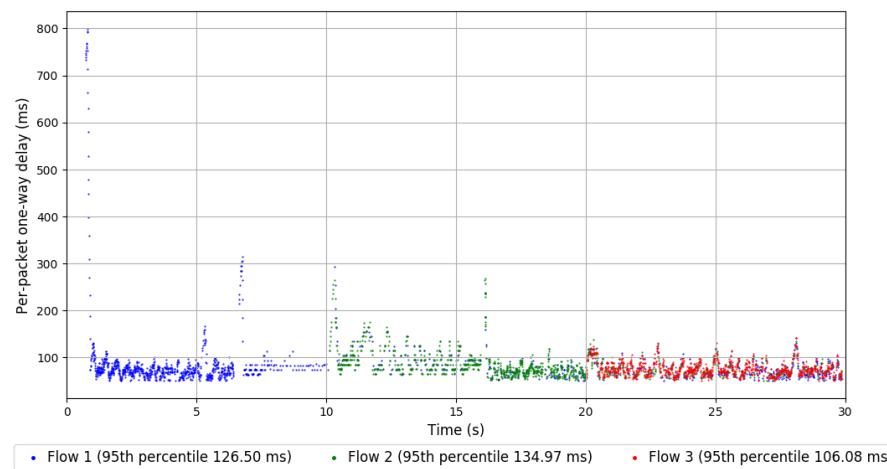
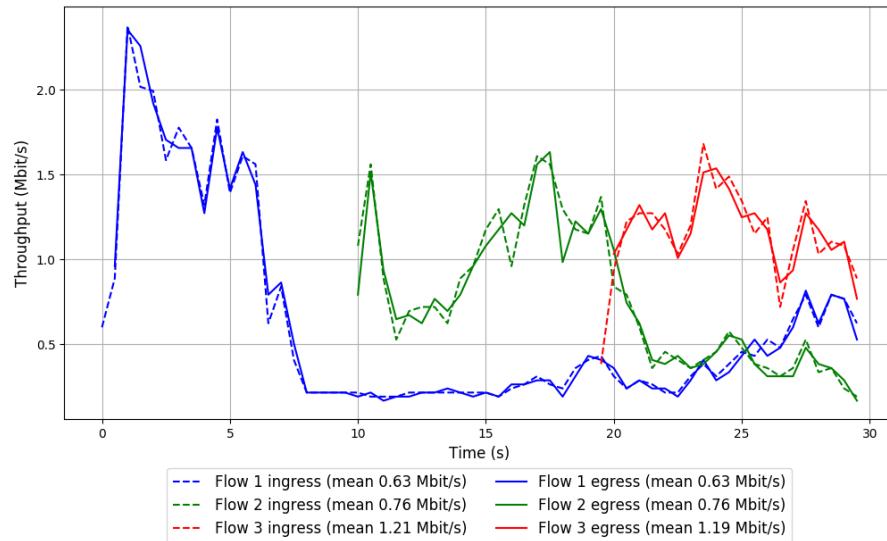


Run 1: Statistics of KohoCC

```
Start at: 2017-08-13 05:55:15
End at: 2017-08-13 05:55:45
Local clock offset: 0.525 ms
Remote clock offset: -0.186 ms

# Below is generated by plot.py at 2017-08-13 07:46:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.55 Mbit/s
95th percentile per-packet one-way delay: 124.458 ms
Loss rate: 1.75%
-- Flow 1:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 126.504 ms
Loss rate: 1.48%
-- Flow 2:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 134.969 ms
Loss rate: 1.58%
-- Flow 3:
Average throughput: 1.19 Mbit/s
95th percentile per-packet one-way delay: 106.077 ms
Loss rate: 2.40%
```

Run 1: Report of KohoCC — Data Link

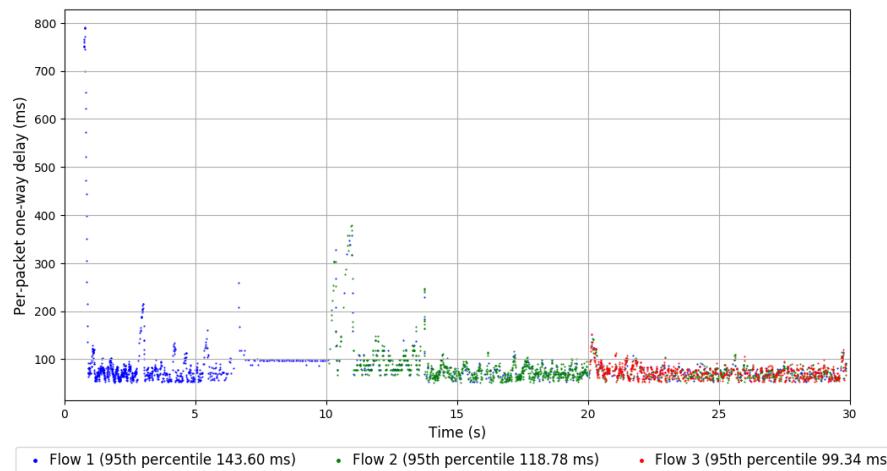
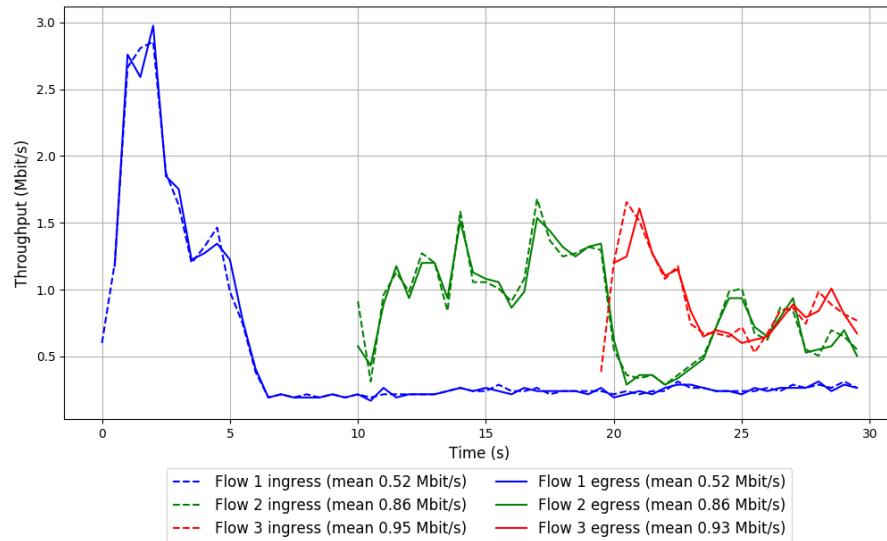


Run 2: Statistics of KohoCC

```
Start at: 2017-08-13 06:15:20
End at: 2017-08-13 06:15:50
Local clock offset: 0.648 ms
Remote clock offset: -2.296 ms

# Below is generated by plot.py at 2017-08-13 07:46:38
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 120.728 ms
Loss rate: 2.05%
-- Flow 1:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 143.604 ms
Loss rate: 1.63%
-- Flow 2:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 118.781 ms
Loss rate: 1.40%
-- Flow 3:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 99.340 ms
Loss rate: 3.95%
```

## Run 2: Report of KohoCC — Data Link

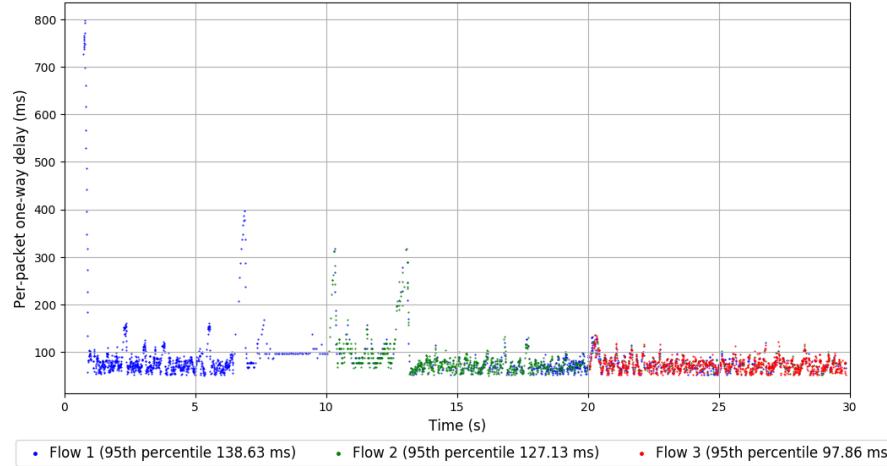
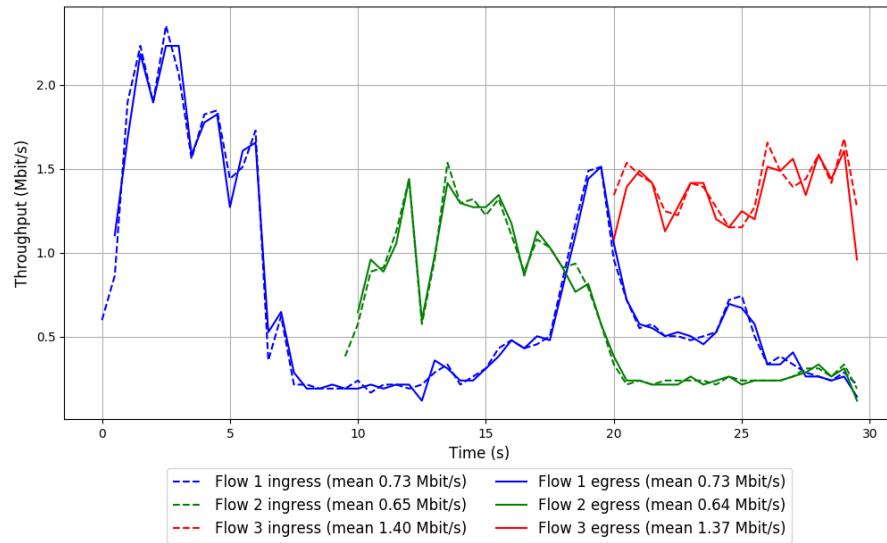


Run 3: Statistics of KohoCC

```
Start at: 2017-08-13 06:35:26
End at: 2017-08-13 06:35:56
Local clock offset: 0.563 ms
Remote clock offset: 0.961 ms

# Below is generated by plot.py at 2017-08-13 07:46:39
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.63 Mbit/s
95th percentile per-packet one-way delay: 117.834 ms
Loss rate: 2.25%
-- Flow 1:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 138.632 ms
Loss rate: 1.77%
-- Flow 2:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 127.133 ms
Loss rate: 1.94%
-- Flow 3:
Average throughput: 1.37 Mbit/s
95th percentile per-packet one-way delay: 97.863 ms
Loss rate: 3.28%
```

Run 3: Report of KohoCC — Data Link

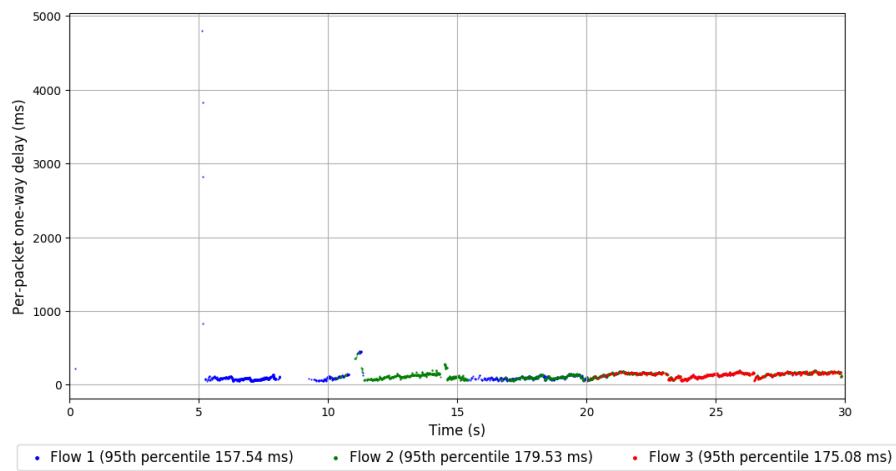
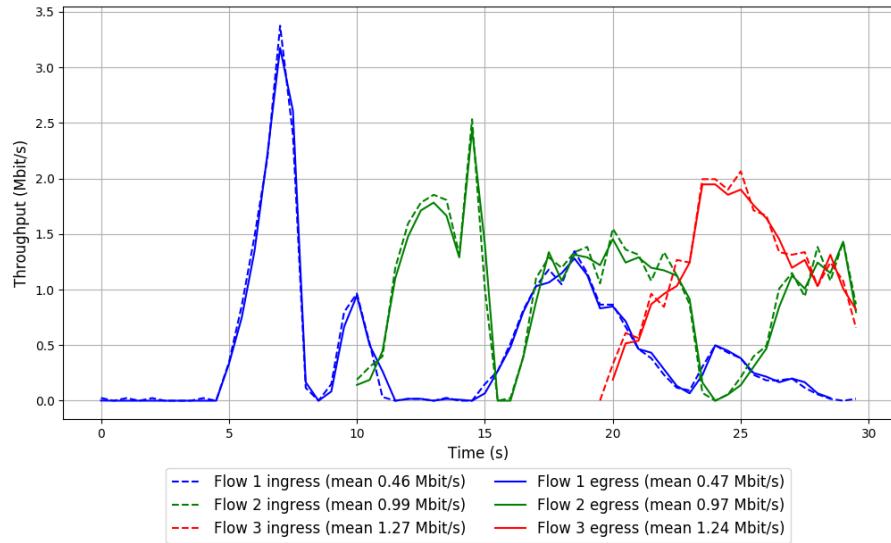


```
Run 1: Statistics of LEDBAT
```

```
Start at: 2017-08-13 06:00:37
End at: 2017-08-13 06:01:07
Local clock offset: 0.626 ms
Remote clock offset: -0.446 ms

# Below is generated by plot.py at 2017-08-13 07:46:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 174.357 ms
Loss rate: 2.39%
-- Flow 1:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 157.542 ms
Loss rate: 1.35%
-- Flow 2:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 179.526 ms
Loss rate: 2.97%
-- Flow 3:
Average throughput: 1.24 Mbit/s
95th percentile per-packet one-way delay: 175.082 ms
Loss rate: 2.61%
```

## Run 1: Report of LEDBAT — Data Link

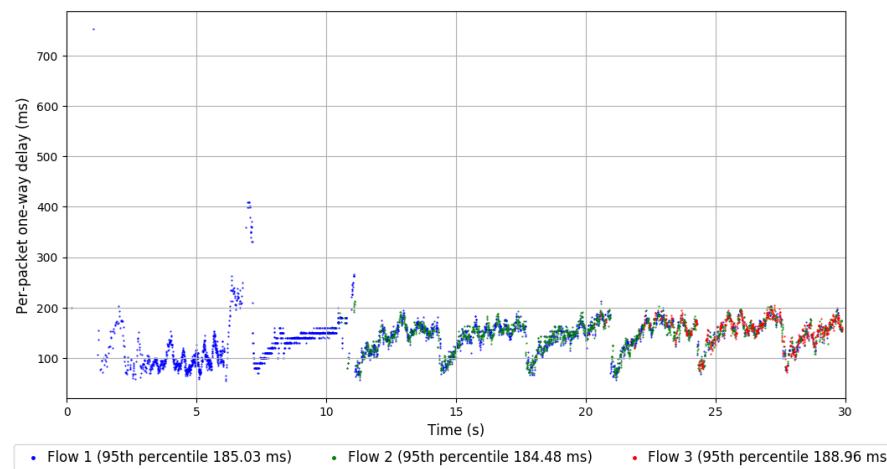
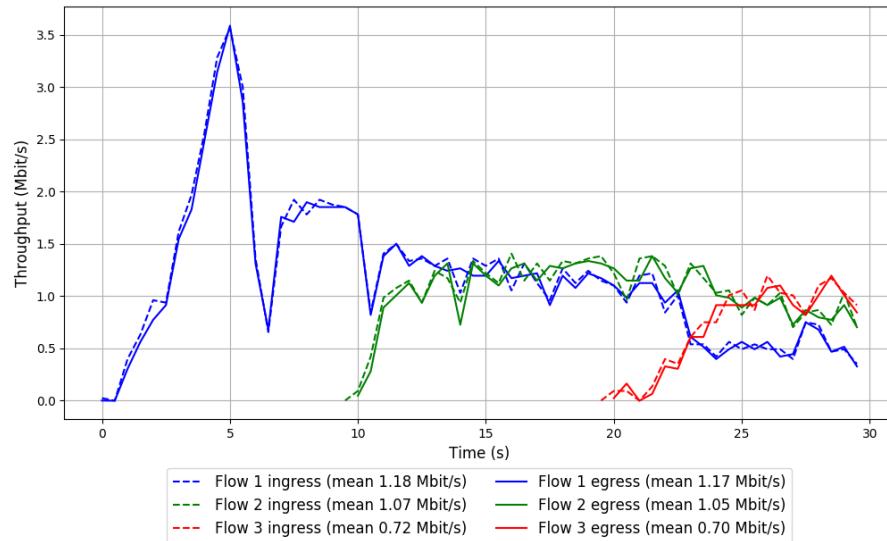


Run 2: Statistics of LEDBAT

```
Start at: 2017-08-13 06:20:41
End at: 2017-08-13 06:21:11
Local clock offset: 0.646 ms
Remote clock offset: -2.092 ms

# Below is generated by plot.py at 2017-08-13 07:46:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 185.263 ms
Loss rate: 2.28%
-- Flow 1:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 185.035 ms
Loss rate: 1.92%
-- Flow 2:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 184.477 ms
Loss rate: 2.09%
-- Flow 3:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 188.956 ms
Loss rate: 4.56%
```

## Run 2: Report of LEDBAT — Data Link

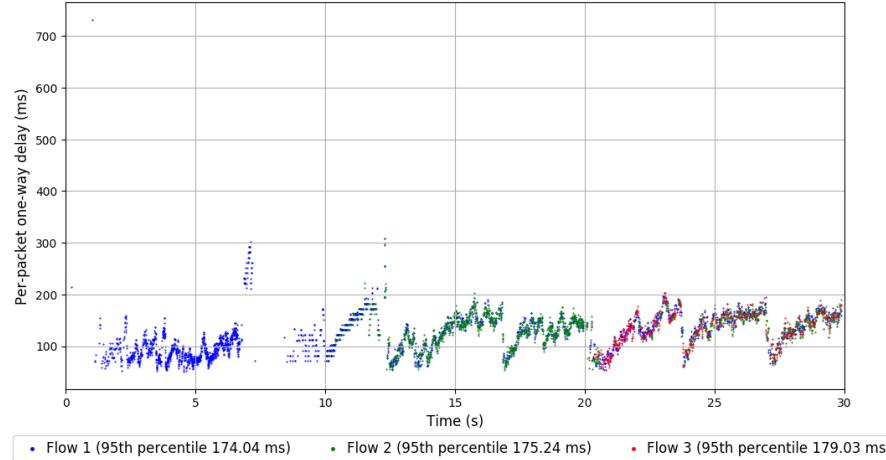
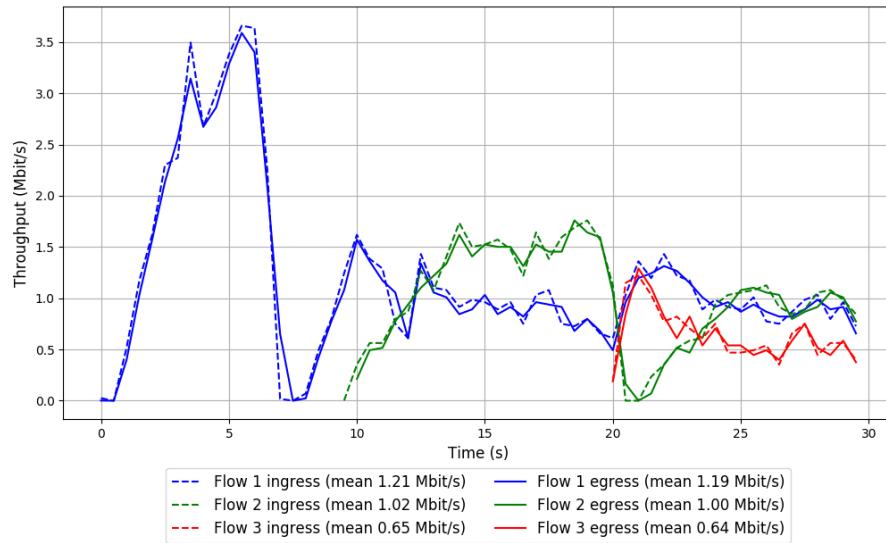


Run 3: Statistics of LEDBAT

```
Start at: 2017-08-13 06:40:47
End at: 2017-08-13 06:41:17
Local clock offset: 0.575 ms
Remote clock offset: -1.519 ms

# Below is generated by plot.py at 2017-08-13 07:46:41
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 175.743 ms
Loss rate: 2.65%
-- Flow 1:
Average throughput: 1.19 Mbit/s
95th percentile per-packet one-way delay: 174.043 ms
Loss rate: 2.44%
-- Flow 2:
Average throughput: 1.00 Mbit/s
95th percentile per-packet one-way delay: 175.244 ms
Loss rate: 2.99%
-- Flow 3:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 179.027 ms
Loss rate: 2.72%
```

Run 3: Report of LEDBAT — Data Link

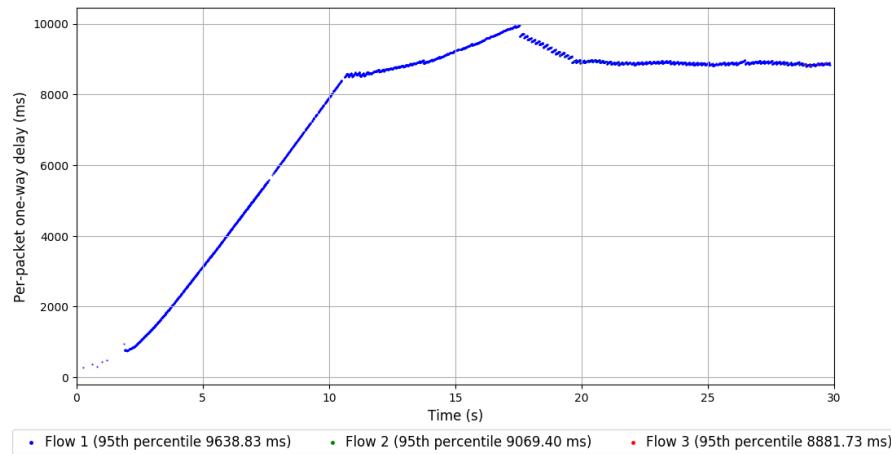
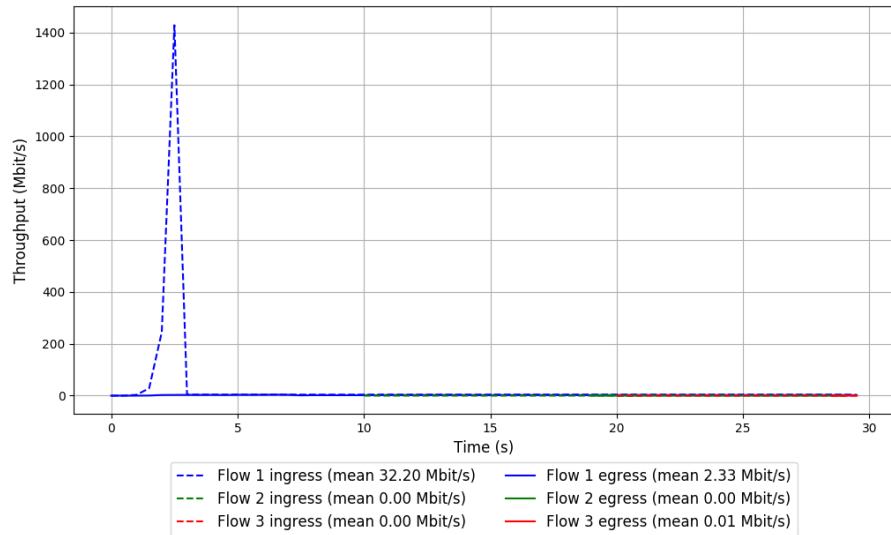


Run 1: Statistics of PCC

```
Start at: 2017-08-13 05:56:35
End at: 2017-08-13 05:57:05
Local clock offset: 0.616 ms
Remote clock offset: -0.723 ms

# Below is generated by plot.py at 2017-08-13 07:46:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 9638.642 ms
Loss rate: 92.83%
-- Flow 1:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 9638.829 ms
Loss rate: 92.83%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 9069.396 ms
Loss rate: 21.41%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 8881.729 ms
Loss rate: 76.30%
```

## Run 1: Report of PCC — Data Link

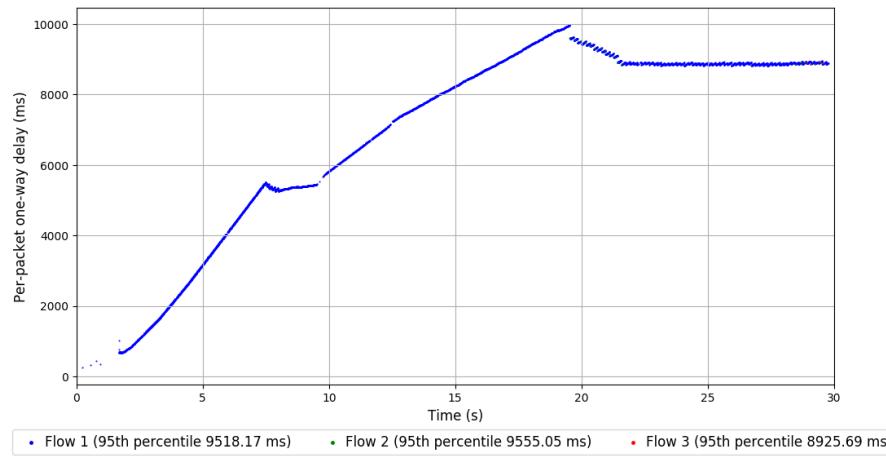
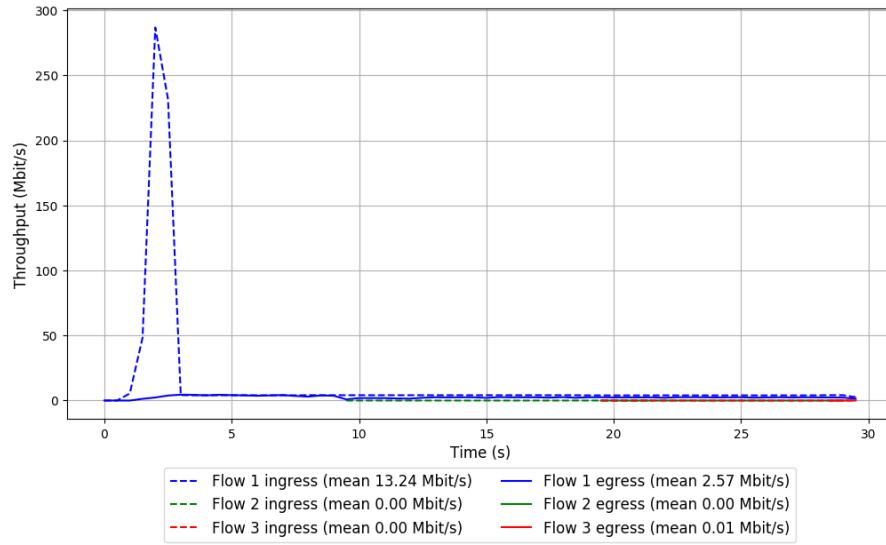


Run 2: Statistics of PCC

```
Start at: 2017-08-13 06:16:40
End at: 2017-08-13 06:17:10
Local clock offset: 0.559 ms
Remote clock offset: -2.172 ms

# Below is generated by plot.py at 2017-08-13 07:46:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.57 Mbit/s
95th percentile per-packet one-way delay: 9518.389 ms
Loss rate: 80.75%
-- Flow 1:
Average throughput: 2.57 Mbit/s
95th percentile per-packet one-way delay: 9518.168 ms
Loss rate: 80.75%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 9555.049 ms
Loss rate: 16.81%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 8925.692 ms
Loss rate: 76.30%
```

## Run 2: Report of PCC — Data Link

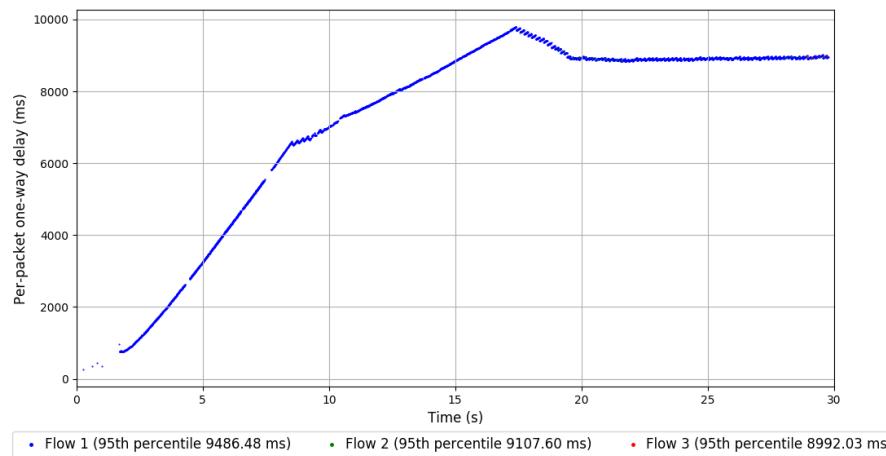
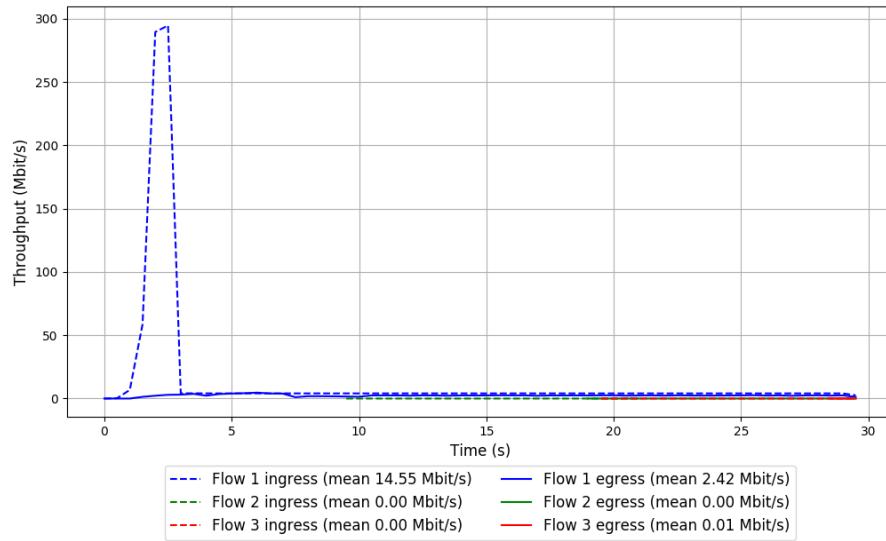


Run 3: Statistics of PCC

```
Start at: 2017-08-13 06:36:45
End at: 2017-08-13 06:37:15
Local clock offset: 0.672 ms
Remote clock offset: -1.493 ms

# Below is generated by plot.py at 2017-08-13 07:46:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.42 Mbit/s
95th percentile per-packet one-way delay: 9485.978 ms
Loss rate: 83.51%
-- Flow 1:
Average throughput: 2.42 Mbit/s
95th percentile per-packet one-way delay: 9486.477 ms
Loss rate: 83.51%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 9107.598 ms
Loss rate: 15.80%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 8992.027 ms
Loss rate: 76.30%
```

### Run 3: Report of PCC — Data Link

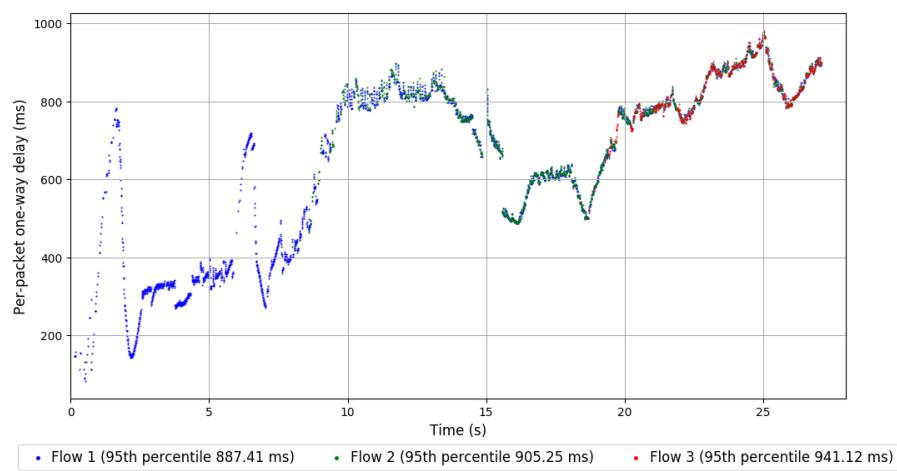
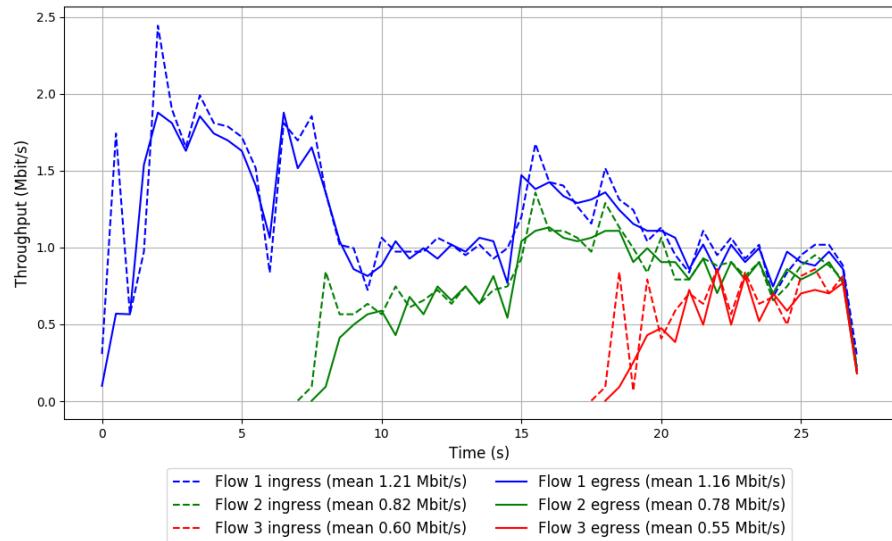


```
Run 1: Statistics of QUIC Cubic
```

```
Start at: 2017-08-13 05:53:55
End at: 2017-08-13 05:54:25
Local clock offset: 0.512 ms
Remote clock offset: -2.917 ms

# Below is generated by plot.py at 2017-08-13 07:46:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 900.947 ms
Loss rate: 6.05%
-- Flow 1:
Average throughput: 1.16 Mbit/s
95th percentile per-packet one-way delay: 887.414 ms
Loss rate: 4.42%
-- Flow 2:
Average throughput: 0.78 Mbit/s
95th percentile per-packet one-way delay: 905.251 ms
Loss rate: 6.40%
-- Flow 3:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 941.117 ms
Loss rate: 14.28%
```

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



Run 2: Statistics of QUIC Cubic

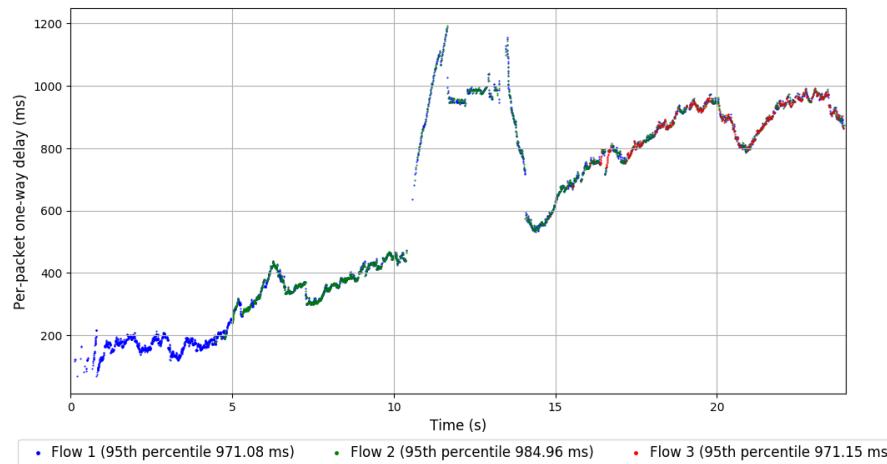
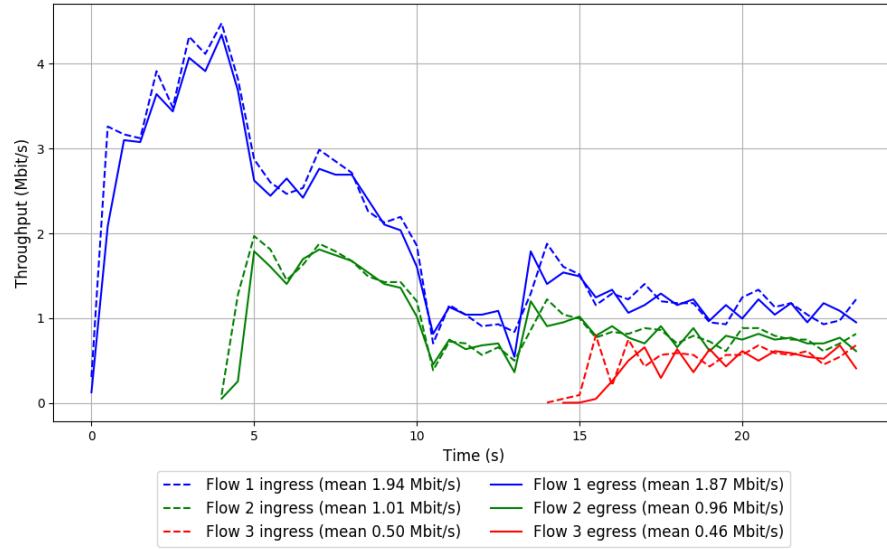
Start at: 2017-08-13 06:13:59

End at: 2017-08-13 06:14:29

Local clock offset: 0.557 ms

Remote clock offset: -0.287 ms

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

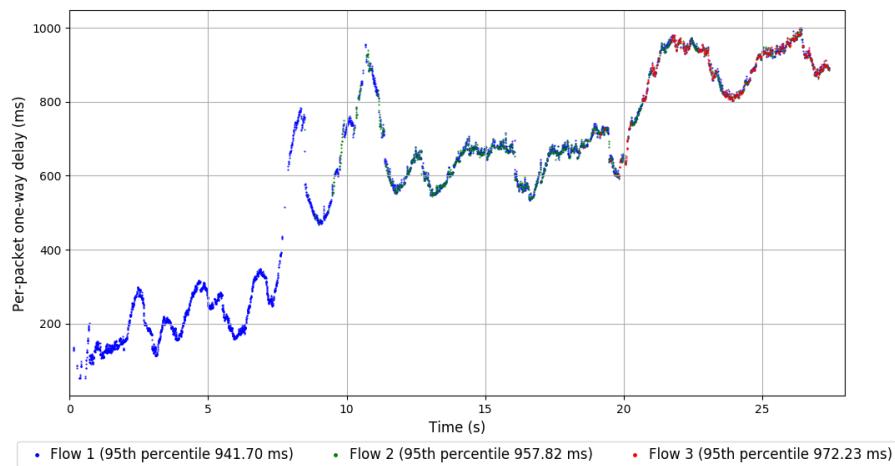
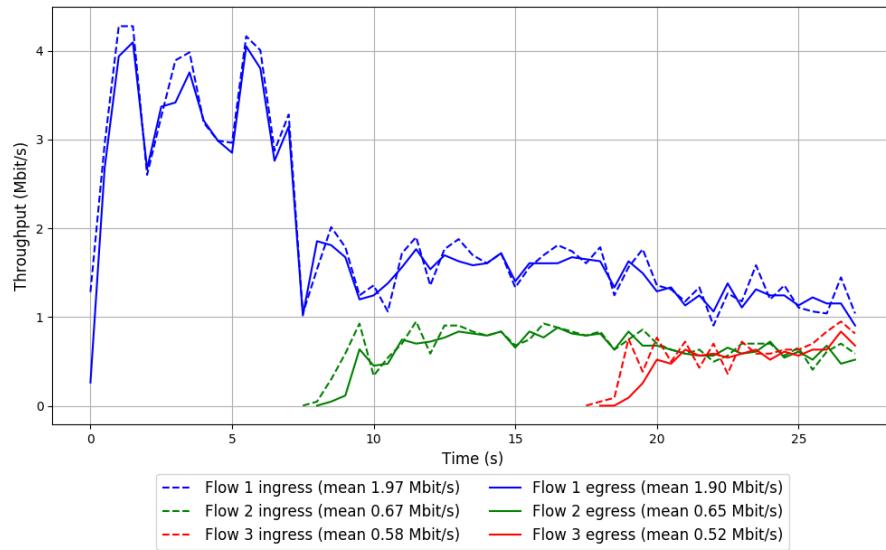


Run 3: Statistics of QUIC Cubic

```
Start at: 2017-08-13 06:34:05
End at: 2017-08-13 06:34:35
Local clock offset: 0.653 ms
Remote clock offset: 0.337 ms

# Below is generated by plot.py at 2017-08-13 07:46:46
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.52 Mbit/s
95th percentile per-packet one-way delay: 950.088 ms
Loss rate: 5.49%
-- Flow 1:
Average throughput: 1.90 Mbit/s
95th percentile per-packet one-way delay: 941.697 ms
Loss rate: 4.00%
-- Flow 2:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 957.822 ms
Loss rate: 6.93%
-- Flow 3:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 972.225 ms
Loss rate: 16.51%
```

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

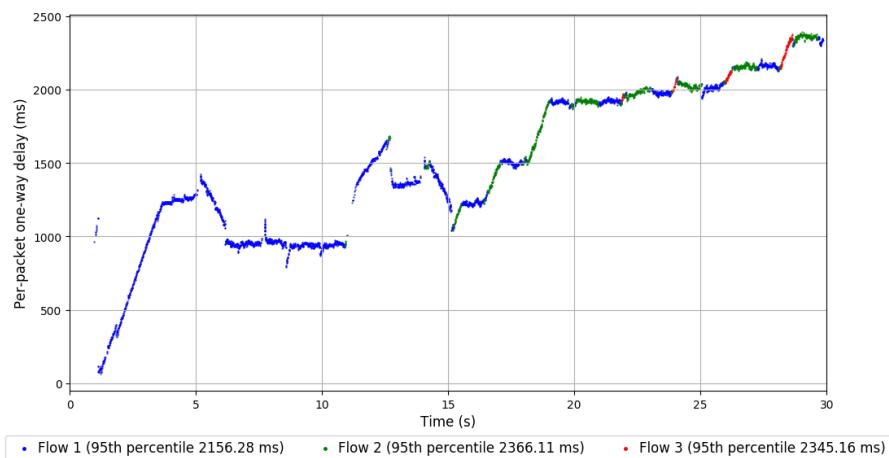
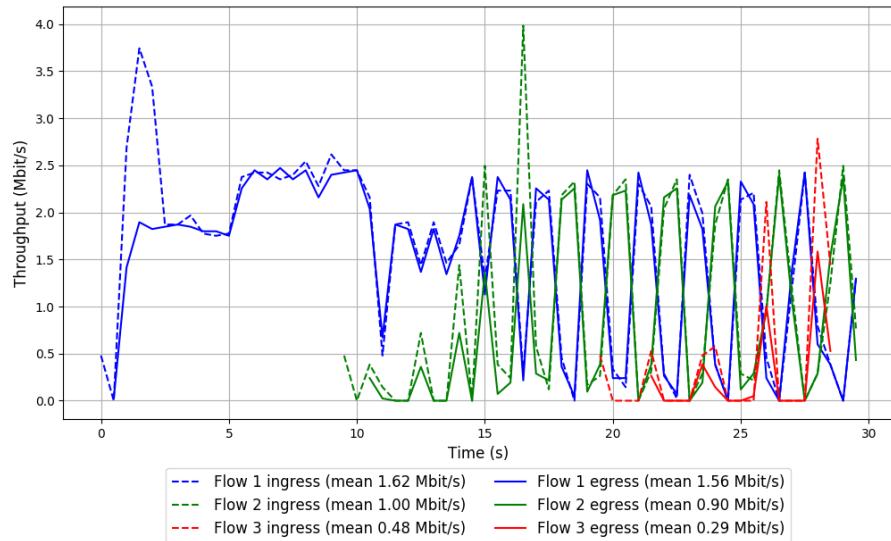


```
Run 1: Statistics of Saturator
```

```
Start at: 2017-08-13 05:57:56
End at: 2017-08-13 05:58:26
Local clock offset: 0.548 ms
Remote clock offset: -0.227 ms

# Below is generated by plot.py at 2017-08-13 07:46:47
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.21 Mbit/s
95th percentile per-packet one-way delay: 2307.552 ms
Loss rate: 11.78%
-- Flow 1:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 2156.281 ms
Loss rate: 6.98%
-- Flow 2:
Average throughput: 0.90 Mbit/s
95th percentile per-packet one-way delay: 2366.114 ms
Loss rate: 14.81%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 2345.163 ms
Loss rate: 52.86%
```

Run 1: Report of Saturator — Data Link

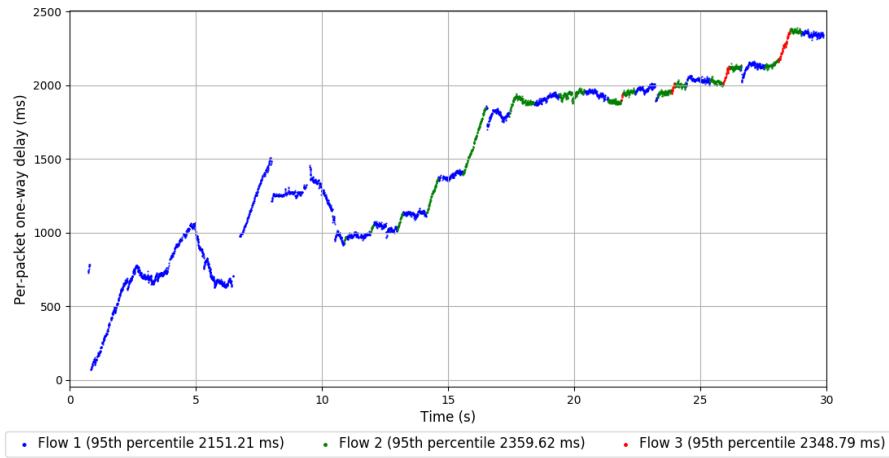
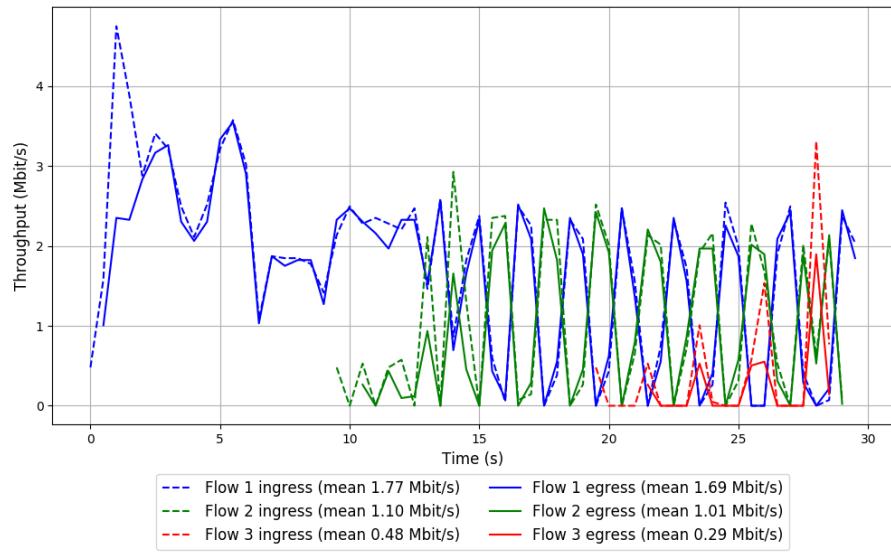


Run 2: Statistics of Saturator

```
Start at: 2017-08-13 06:18:01
End at: 2017-08-13 06:18:31
Local clock offset: 0.658 ms
Remote clock offset: 0.006 ms

# Below is generated by plot.py at 2017-08-13 07:46:48
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 2325.972 ms
Loss rate: 11.10%
-- Flow 1:
Average throughput: 1.69 Mbit/s
95th percentile per-packet one-way delay: 2151.213 ms
Loss rate: 7.09%
-- Flow 2:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 2359.625 ms
Loss rate: 12.97%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 2348.792 ms
Loss rate: 52.91%
```

## Run 2: Report of Saturator — Data Link

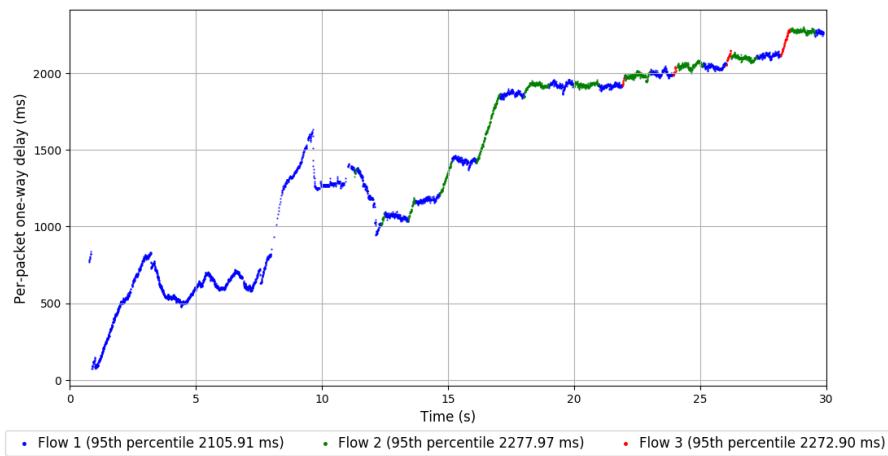
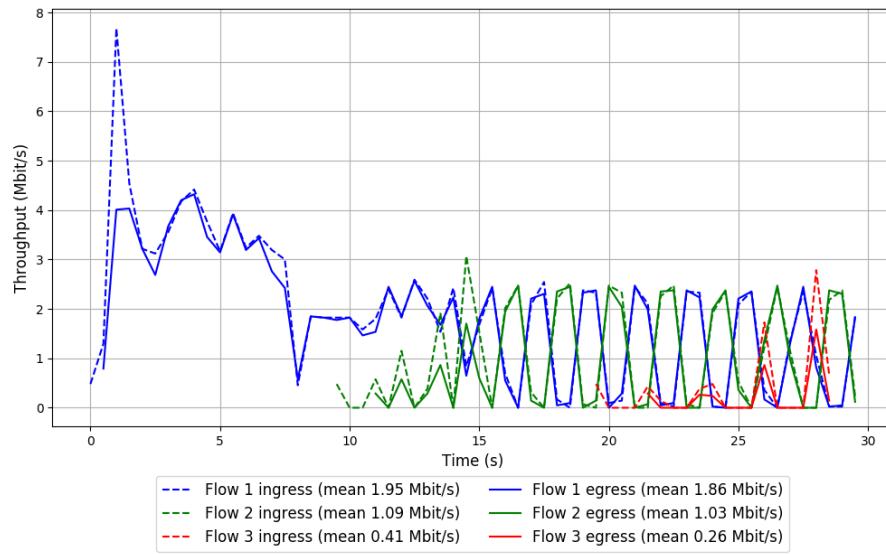


Run 3: Statistics of Saturator

```
Start at: 2017-08-13 06:38:06
End at: 2017-08-13 06:38:36
Local clock offset: 0.649 ms
Remote clock offset: -1.57 ms

# Below is generated by plot.py at 2017-08-13 07:46:49
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.56 Mbit/s
95th percentile per-packet one-way delay: 2218.524 ms
Loss rate: 10.31%
-- Flow 1:
Average throughput: 1.86 Mbit/s
95th percentile per-packet one-way delay: 2105.915 ms
Loss rate: 7.00%
-- Flow 2:
Average throughput: 1.03 Mbit/s
95th percentile per-packet one-way delay: 2277.971 ms
Loss rate: 12.36%
-- Flow 3:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 2272.901 ms
Loss rate: 52.36%
```

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

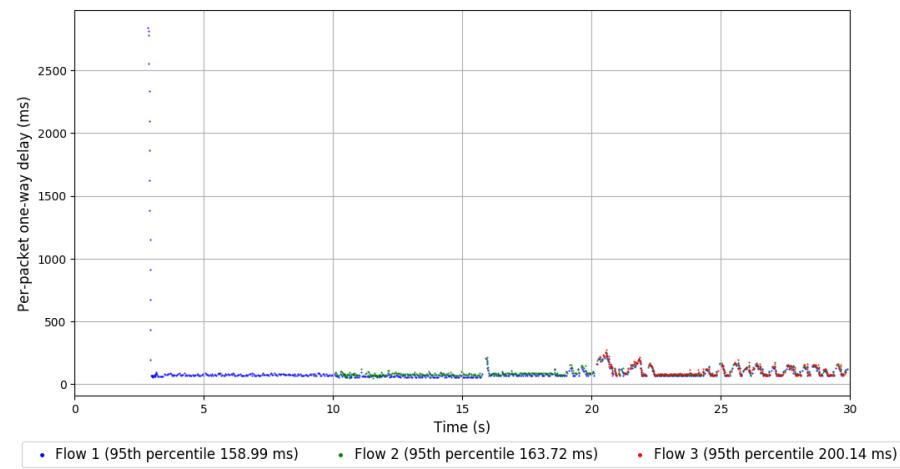
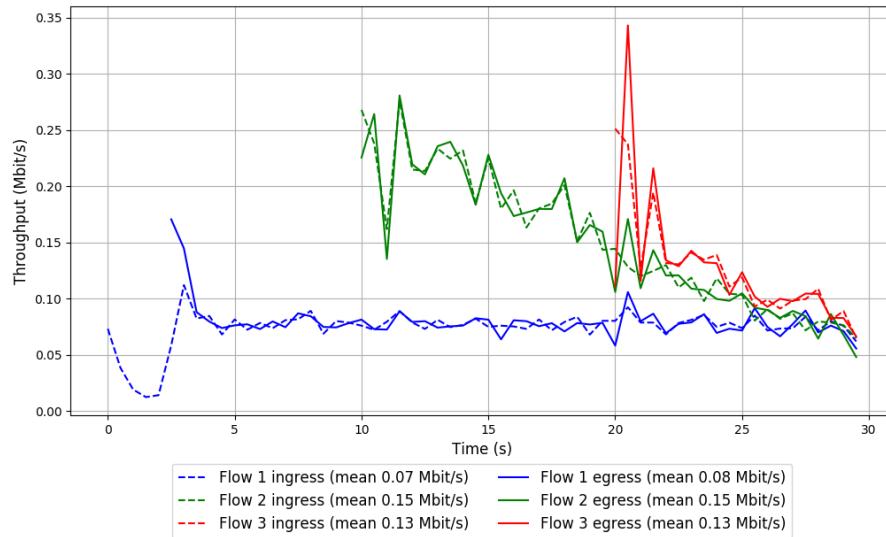


```
Run 1: Statistics of SCReAM

Start at: 2017-08-13 06:03:17
End at: 2017-08-13 06:03:47
Local clock offset: 0.636 ms
Remote clock offset: -2.474 ms

# Below is generated by plot.py at 2017-08-13 07:46:49
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 170.215 ms
Loss rate: 0.72%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 158.986 ms
Loss rate: 0.69%
-- Flow 2:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 163.722 ms
Loss rate: 0.64%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 200.143 ms
Loss rate: 0.99%
```

## Run 1: Report of SCReAM — Data Link

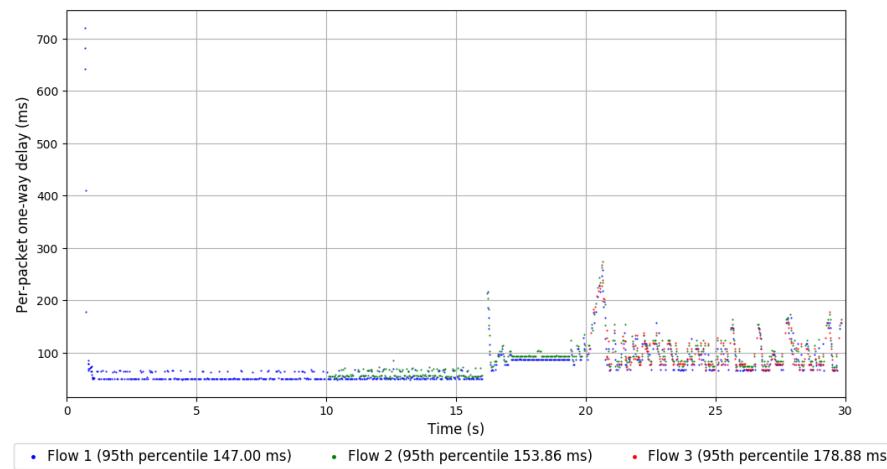
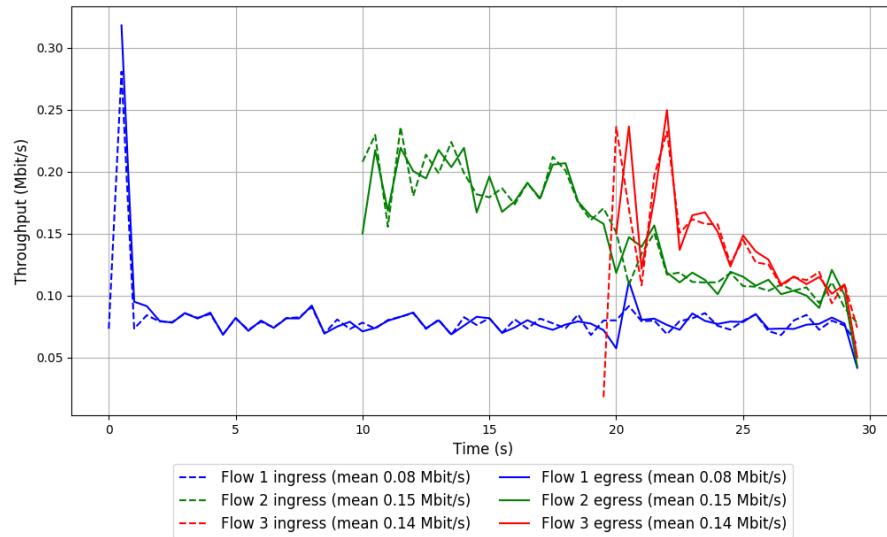


Run 2: Statistics of SCReAM

```
Start at: 2017-08-13 06:23:22
End at: 2017-08-13 06:23:52
Local clock offset: 0.563 ms
Remote clock offset: -1.877 ms

# Below is generated by plot.py at 2017-08-13 07:46:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 153.606 ms
Loss rate: 1.14%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 147.002 ms
Loss rate: 0.74%
-- Flow 2:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 153.860 ms
Loss rate: 1.32%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 178.882 ms
Loss rate: 1.42%
```

## Run 2: Report of SCReAM — Data Link

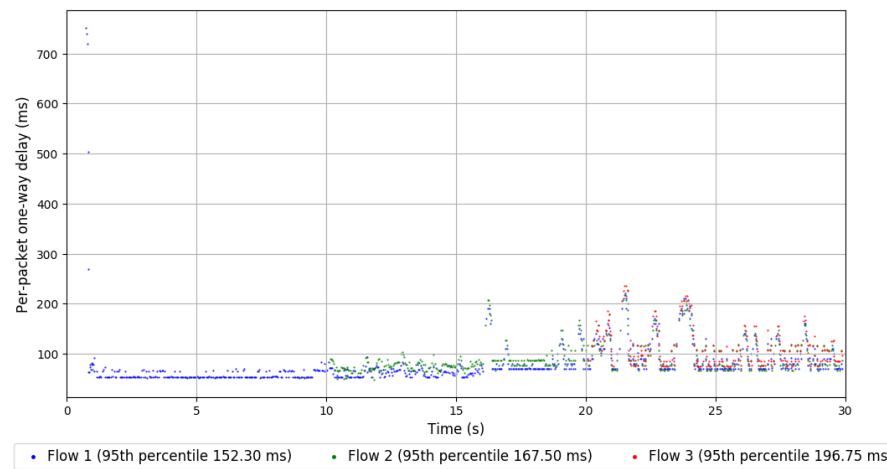
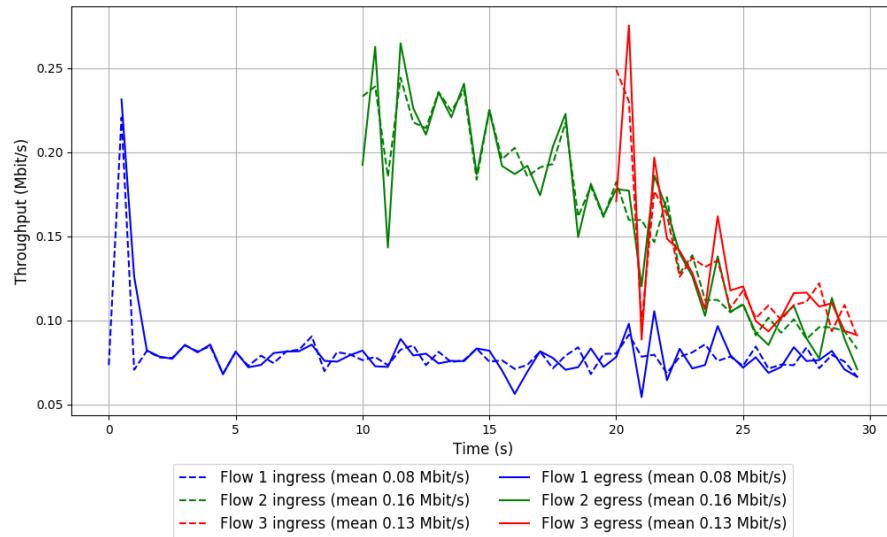


Run 3: Statistics of SCReAM

```
Start at: 2017-08-13 06:43:27
End at: 2017-08-13 06:43:57
Local clock offset: 0.627 ms
Remote clock offset: -1.514 ms

# Below is generated by plot.py at 2017-08-13 07:46:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 170.247 ms
Loss rate: 0.84%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 152.299 ms
Loss rate: 0.77%
-- Flow 2:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 167.503 ms
Loss rate: 0.75%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 196.752 ms
Loss rate: 1.20%
```

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

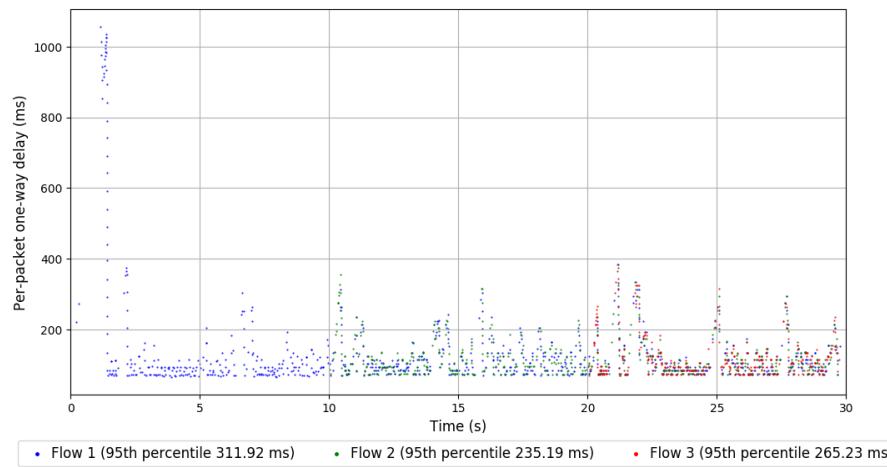
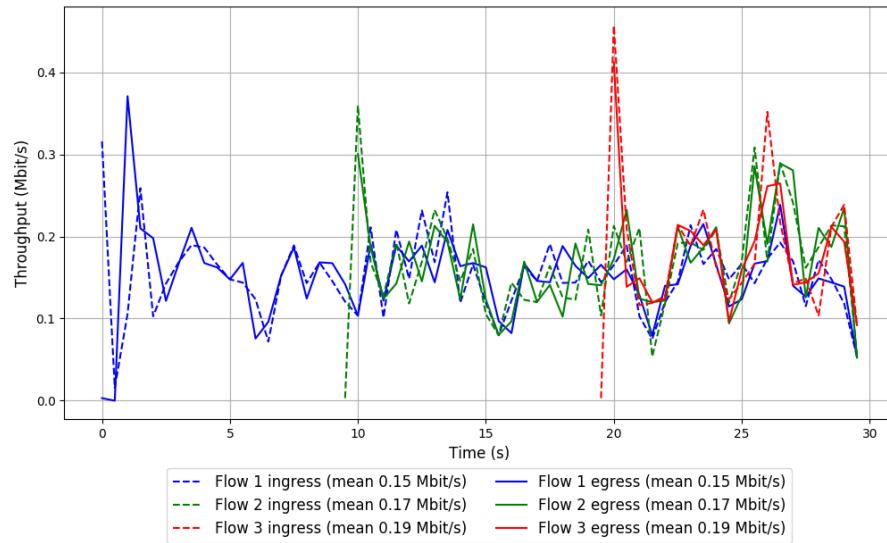


Run 1: Statistics of Sprout

```
Start at: 2017-08-13 05:59:17
End at: 2017-08-13 05:59:47
Local clock offset: 0.545 ms
Remote clock offset: -2.685 ms

# Below is generated by plot.py at 2017-08-13 07:46:51
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 274.021 ms
Loss rate: 1.31%
-- Flow 1:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 311.924 ms
Loss rate: 0.77%
-- Flow 2:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 235.190 ms
Loss rate: 1.36%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 265.225 ms
Loss rate: 2.51%
```

## Run 1: Report of Sprout — Data Link

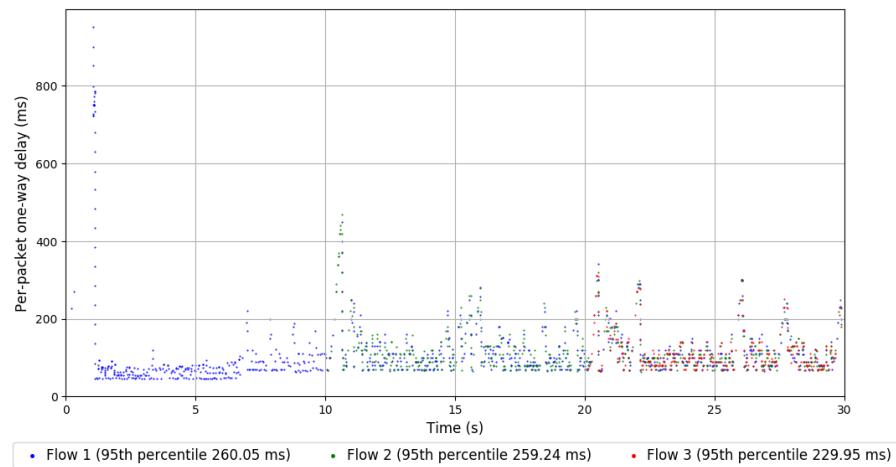
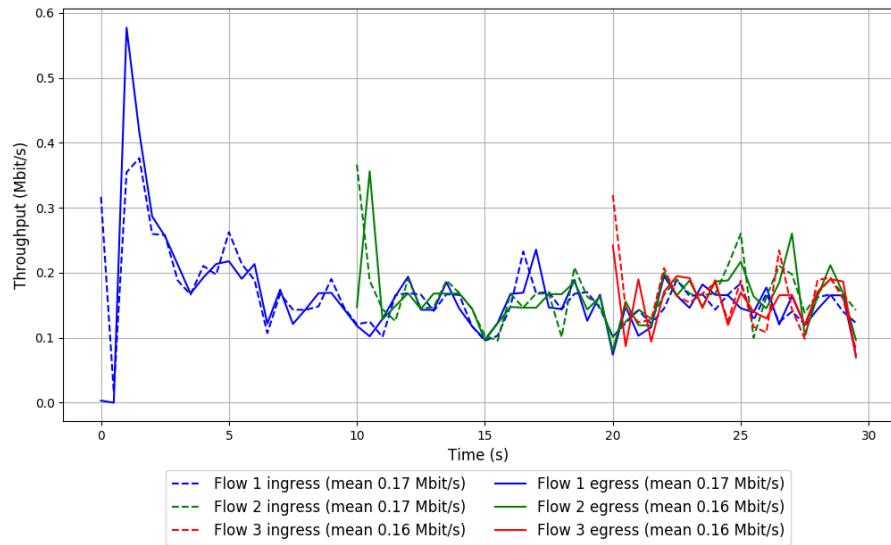


Run 2: Statistics of Sprout

```
Start at: 2017-08-13 06:19:21
End at: 2017-08-13 06:19:51
Local clock offset: 0.661 ms
Remote clock offset: 0.384 ms

# Below is generated by plot.py at 2017-08-13 07:46:52
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 257.660 ms
Loss rate: 1.42%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 260.053 ms
Loss rate: 0.89%
-- Flow 2:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 259.236 ms
Loss rate: 1.38%
-- Flow 3:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 229.951 ms
Loss rate: 3.12%
```

## Run 2: Report of Sprout — Data Link

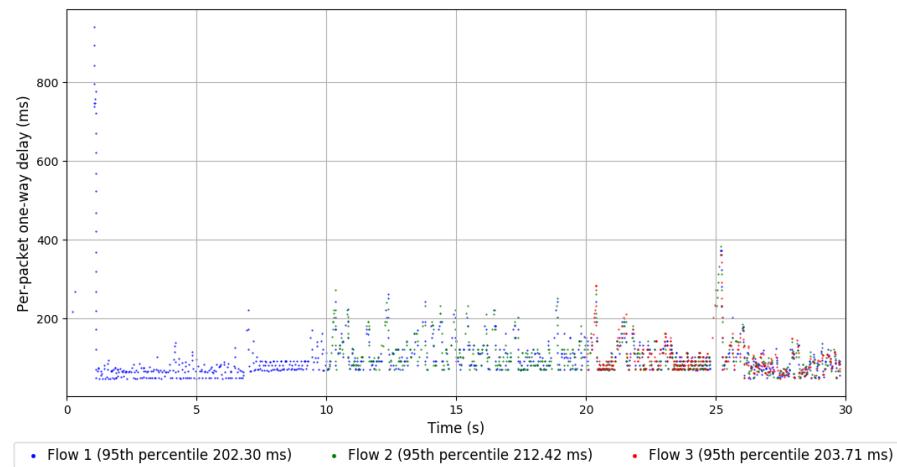
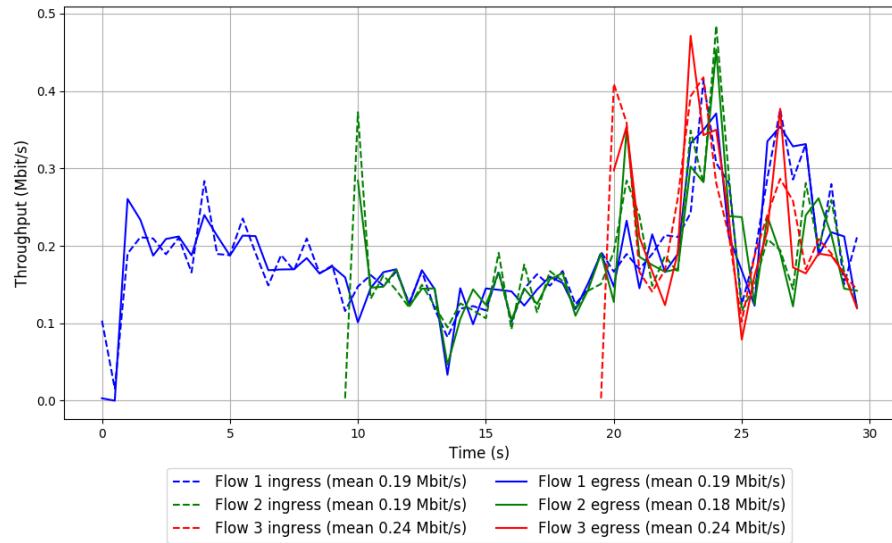


Run 3: Statistics of Sprout

```
Start at: 2017-08-13 06:39:27
End at: 2017-08-13 06:39:57
Local clock offset: 0.547 ms
Remote clock offset: -1.464 ms

# Below is generated by plot.py at 2017-08-13 07:46:52
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 203.684 ms
Loss rate: 2.07%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 202.300 ms
Loss rate: 1.24%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 212.420 ms
Loss rate: 2.16%
-- Flow 3:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 203.707 ms
Loss rate: 3.86%
```

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

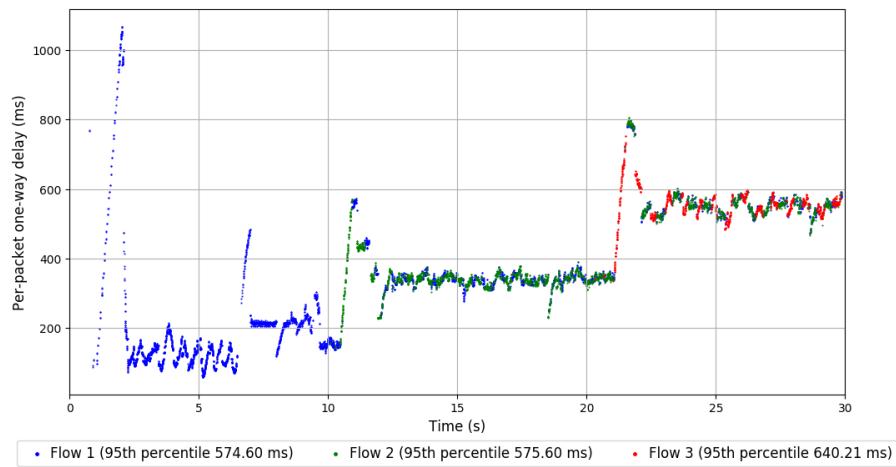
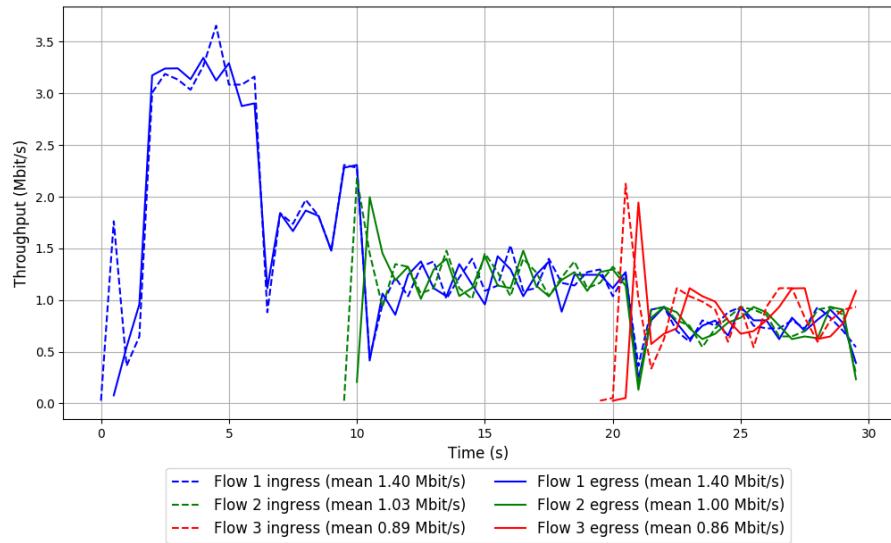


Run 1: Statistics of TaoVA-100x

```
Start at: 2017-08-13 05:51:14
End at: 2017-08-13 05:51:44
Local clock offset: 0.615 ms
Remote clock offset: -0.832 ms

# Below is generated by plot.py at 2017-08-13 07:46:53
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.36 Mbit/s
95th percentile per-packet one-way delay: 585.050 ms
Loss rate: 3.67%
-- Flow 1:
Average throughput: 1.40 Mbit/s
95th percentile per-packet one-way delay: 574.603 ms
Loss rate: 2.93%
-- Flow 2:
Average throughput: 1.00 Mbit/s
95th percentile per-packet one-way delay: 575.595 ms
Loss rate: 4.05%
-- Flow 3:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 640.207 ms
Loss rate: 6.35%
```

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

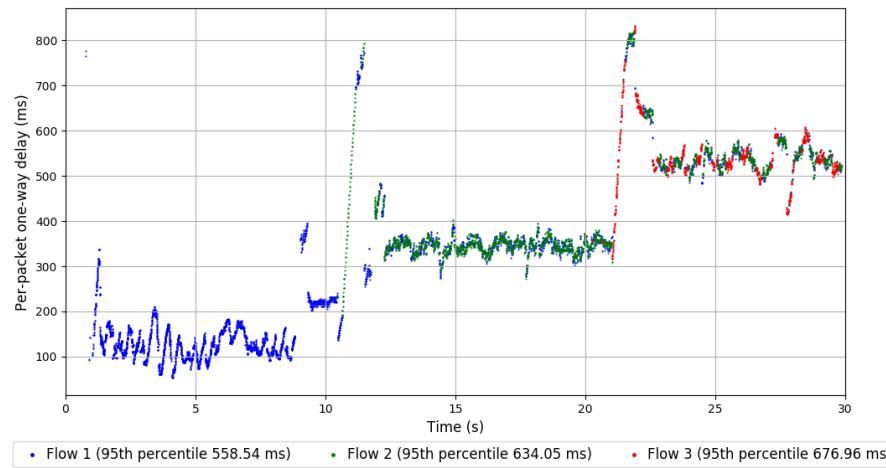
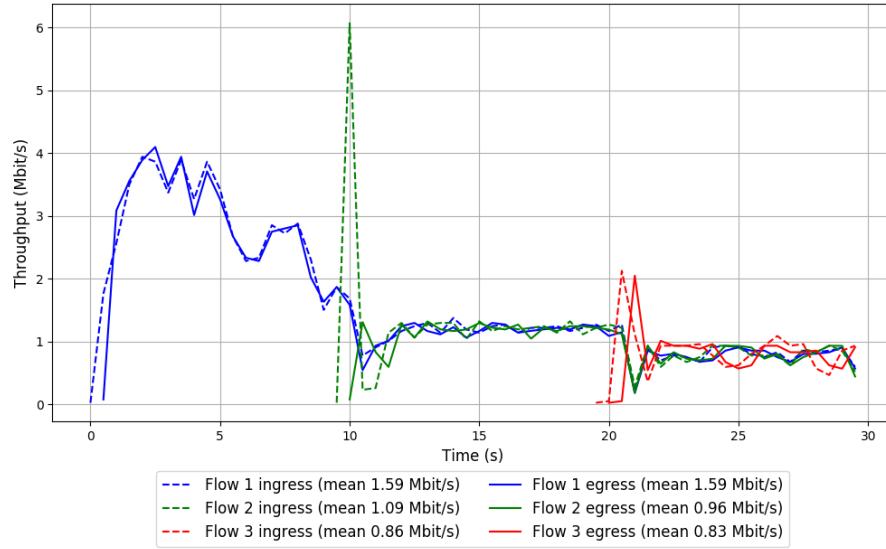


Run 2: Statistics of TaoVA-100x

```
Start at: 2017-08-13 06:11:19
End at: 2017-08-13 06:11:49
Local clock offset: 0.551 ms
Remote clock offset: -2.267 ms

# Below is generated by plot.py at 2017-08-13 07:46:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.51 Mbit/s
95th percentile per-packet one-way delay: 604.279 ms
Loss rate: 5.95%
-- Flow 1:
Average throughput: 1.59 Mbit/s
95th percentile per-packet one-way delay: 558.536 ms
Loss rate: 2.74%
-- Flow 2:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 634.049 ms
Loss rate: 12.46%
-- Flow 3:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 676.963 ms
Loss rate: 7.30%
```

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

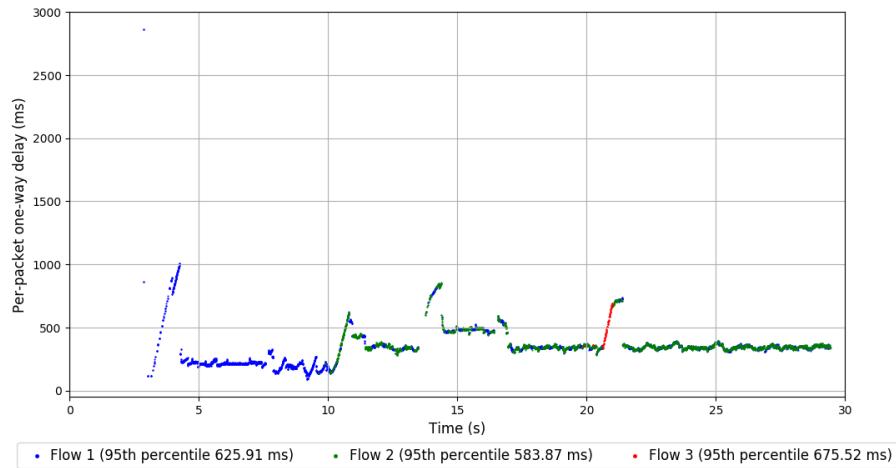
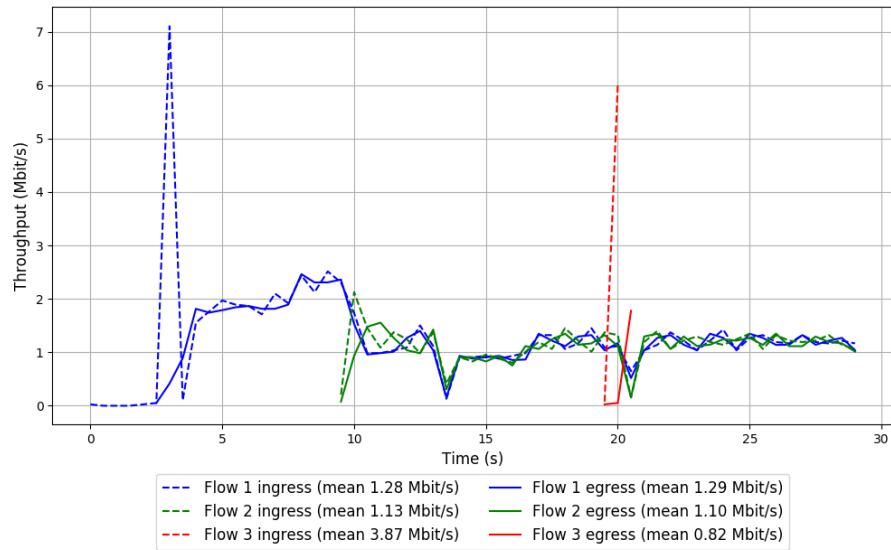


Run 3: Statistics of TaoVA-100x

```
Start at: 2017-08-13 06:31:24
End at: 2017-08-13 06:31:54
Local clock offset: 0.658 ms
Remote clock offset: -1.655 ms

# Below is generated by plot.py at 2017-08-13 07:46:55
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.14 Mbit/s
95th percentile per-packet one-way delay: 611.390 ms
Loss rate: 9.99%
-- Flow 1:
Average throughput: 1.29 Mbit/s
95th percentile per-packet one-way delay: 625.915 ms
Loss rate: 9.00%
-- Flow 2:
Average throughput: 1.10 Mbit/s
95th percentile per-packet one-way delay: 583.869 ms
Loss rate: 3.58%
-- Flow 3:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 675.521 ms
Loss rate: 69.55%
```

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

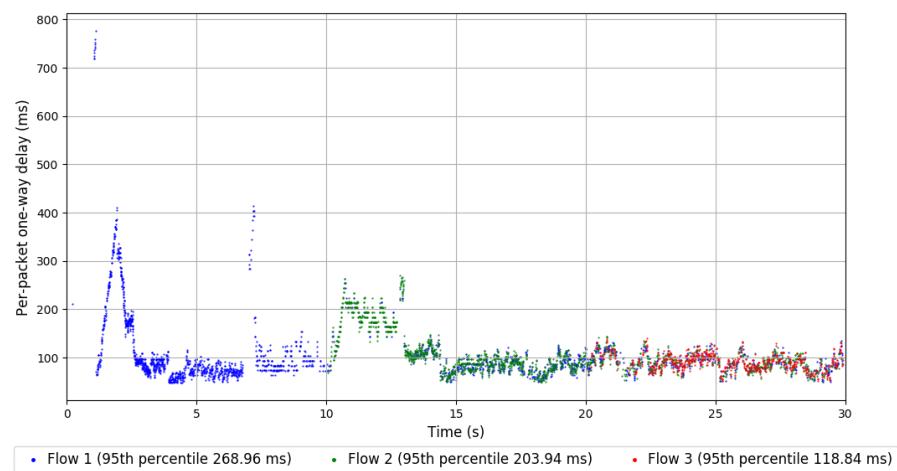
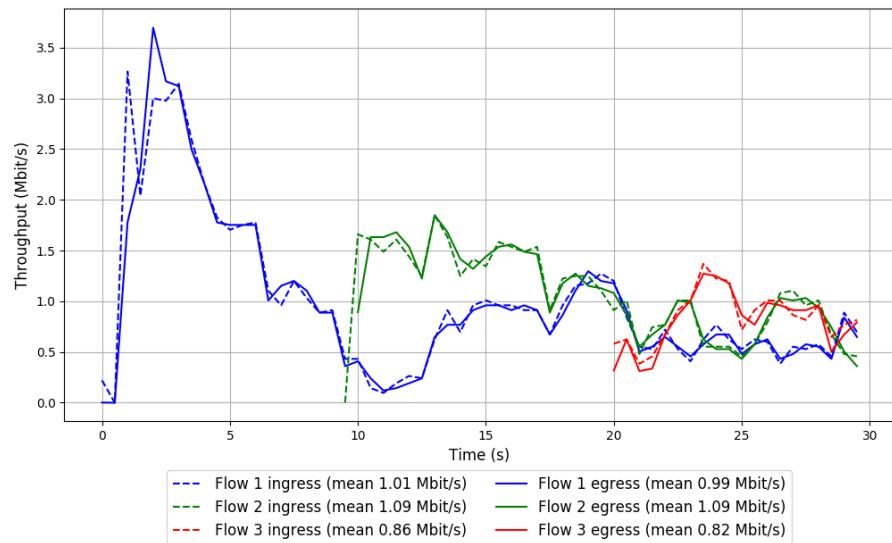


Run 1: Statistics of TCP Vegas

```
Start at: 2017-08-13 06:04:37
End at: 2017-08-13 06:05:07
Local clock offset: 0.537 ms
Remote clock offset: -0.429 ms

# Below is generated by plot.py at 2017-08-13 07:46:56
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.99 Mbit/s
95th percentile per-packet one-way delay: 213.682 ms
Loss rate: 2.07%
-- Flow 1:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 268.958 ms
Loss rate: 1.92%
-- Flow 2:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 203.943 ms
Loss rate: 1.27%
-- Flow 3:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 118.844 ms
Loss rate: 4.67%
```

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

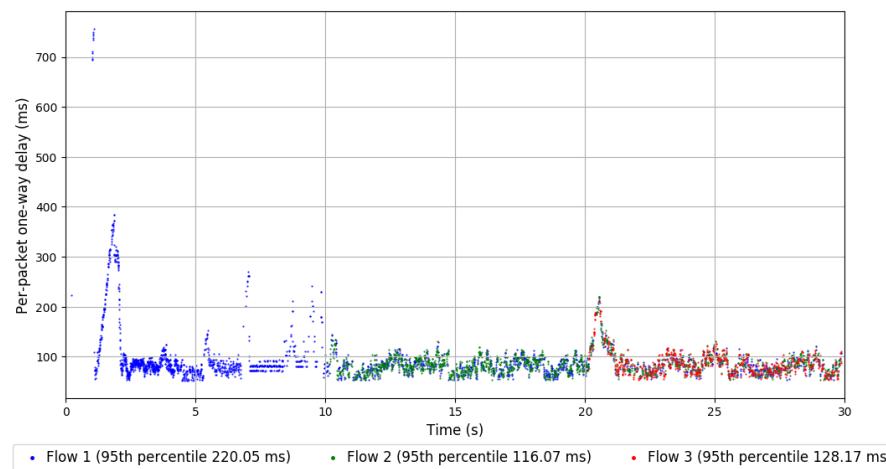
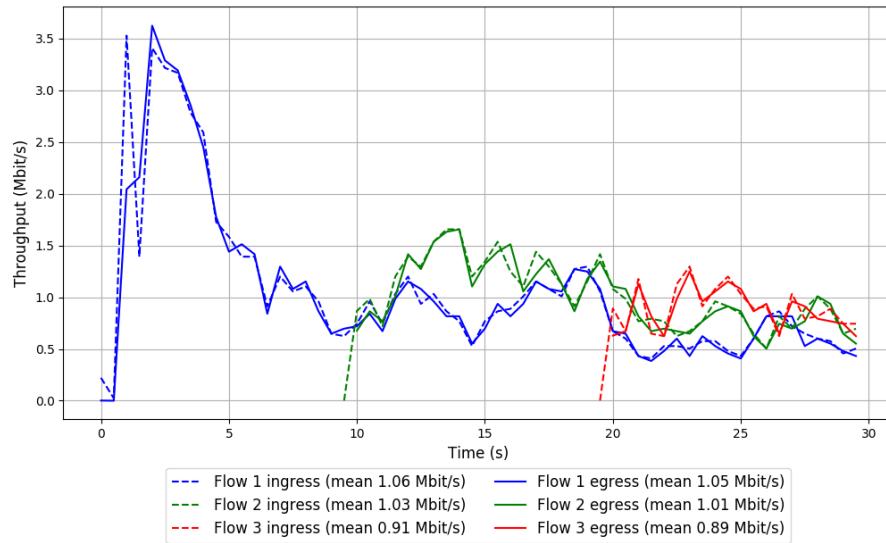


Run 2: Statistics of TCP Vegas

```
Start at: 2017-08-13 06:24:42
End at: 2017-08-13 06:25:12
Local clock offset: 0.581 ms
Remote clock offset: -1.864 ms

# Below is generated by plot.py at 2017-08-13 07:46:57
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.03 Mbit/s
95th percentile per-packet one-way delay: 148.223 ms
Loss rate: 2.25%
-- Flow 1:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 220.051 ms
Loss rate: 1.81%
-- Flow 2:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 116.069 ms
Loss rate: 2.69%
-- Flow 3:
Average throughput: 0.89 Mbit/s
95th percentile per-packet one-way delay: 128.166 ms
Loss rate: 2.78%
```

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

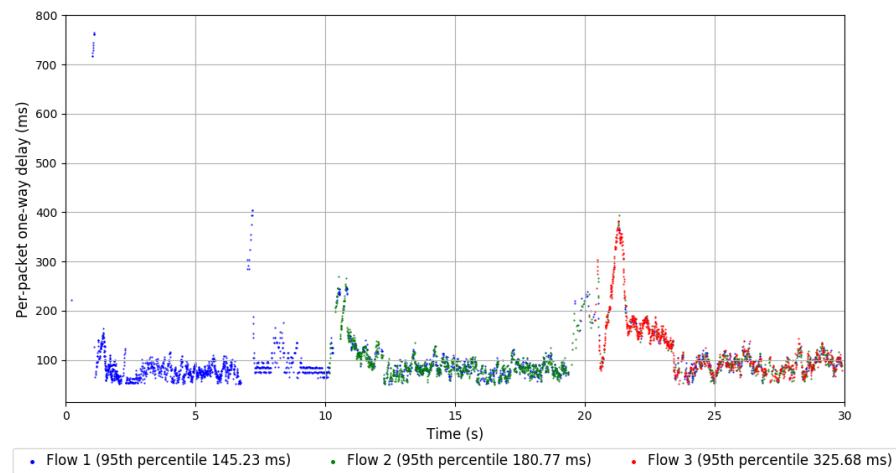
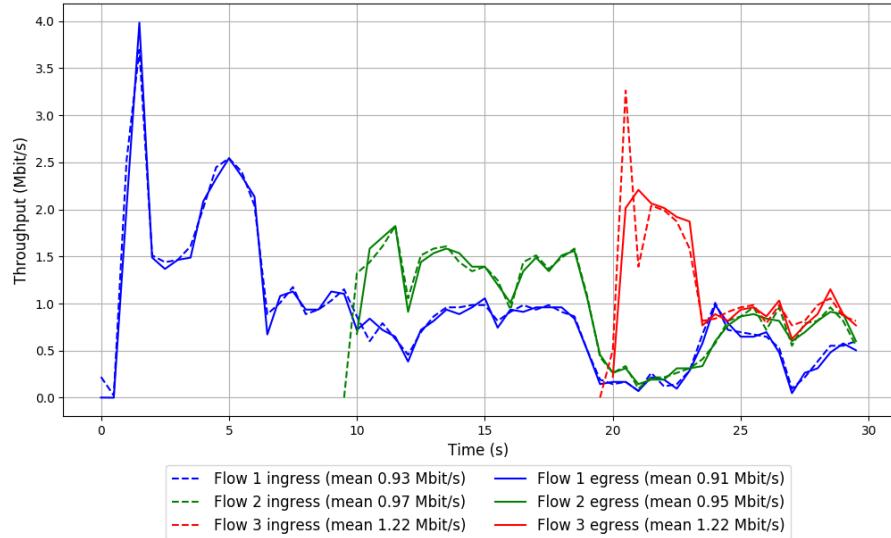


Run 3: Statistics of TCP Vegas

```
Start at: 2017-08-13 06:44:47
End at: 2017-08-13 06:45:17
Local clock offset: 0.554 ms
Remote clock offset: 1.204 ms

# Below is generated by plot.py at 2017-08-13 07:46:57
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.95 Mbit/s
95th percentile per-packet one-way delay: 204.818 ms
Loss rate: 2.31%
-- Flow 1:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 145.226 ms
Loss rate: 2.43%
-- Flow 2:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 180.774 ms
Loss rate: 2.11%
-- Flow 3:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 325.676 ms
Loss rate: 2.38%
```

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

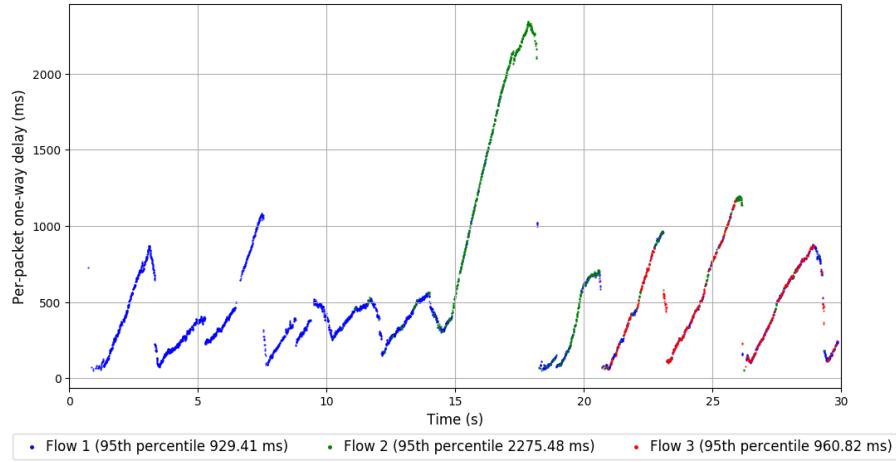
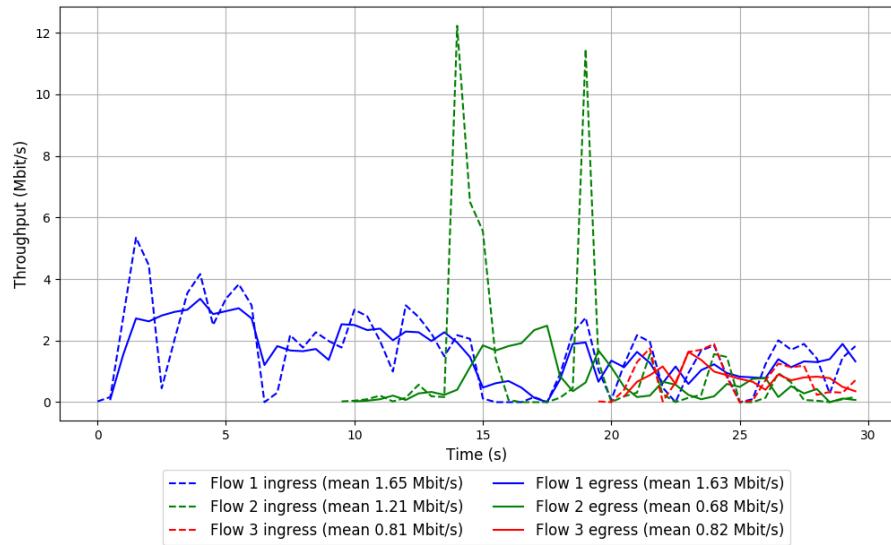


Run 1: Statistics of Verus

```
Start at: 2017-08-13 05:52:35
End at: 2017-08-13 05:53:05
Local clock offset: 0.503 ms
Remote clock offset: -2.814 ms

# Below is generated by plot.py at 2017-08-13 07:46:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.34 Mbit/s
95th percentile per-packet one-way delay: 1870.076 ms
Loss rate: 16.63%
-- Flow 1:
Average throughput: 1.63 Mbit/s
95th percentile per-packet one-way delay: 929.410 ms
Loss rate: 4.16%
-- Flow 2:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 2275.483 ms
Loss rate: 45.49%
-- Flow 3:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 960.818 ms
Loss rate: 6.47%
```

## Run 1: Report of Verus — Data Link

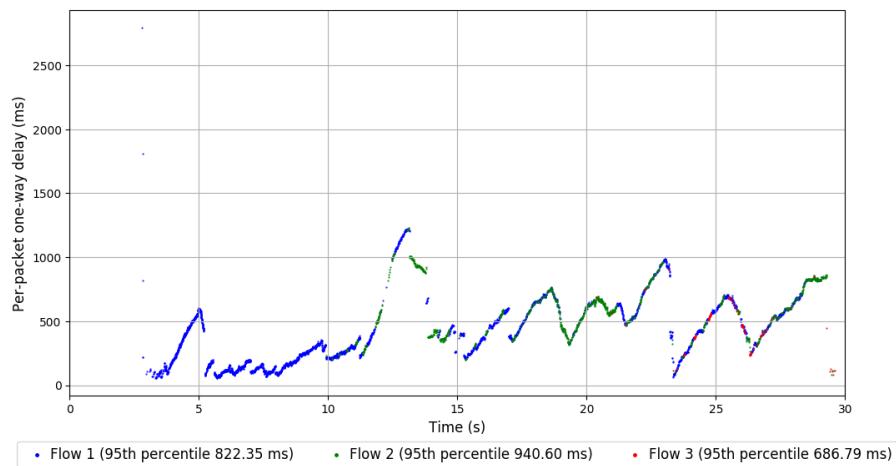
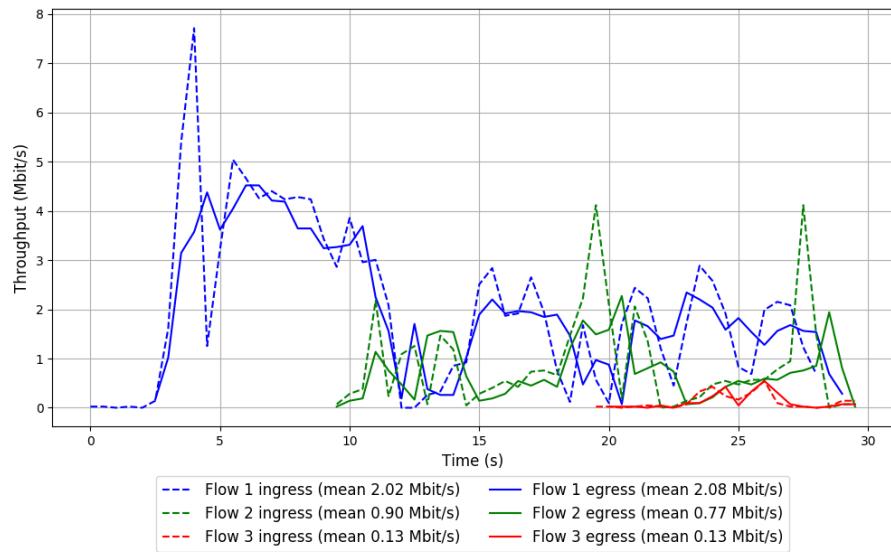


Run 2: Statistics of Verus

```
Start at: 2017-08-13 06:12:39
End at: 2017-08-13 06:13:09
Local clock offset: 0.554 ms
Remote clock offset: -2.324 ms

# Below is generated by plot.py at 2017-08-13 07:46:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.66 Mbit/s
95th percentile per-packet one-way delay: 887.391 ms
Loss rate: 7.24%
-- Flow 1:
Average throughput: 2.08 Mbit/s
95th percentile per-packet one-way delay: 822.346 ms
Loss rate: 4.43%
-- Flow 2:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 940.596 ms
Loss rate: 16.14%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 686.788 ms
Loss rate: 7.96%
```

## Run 2: Report of Verus — Data Link

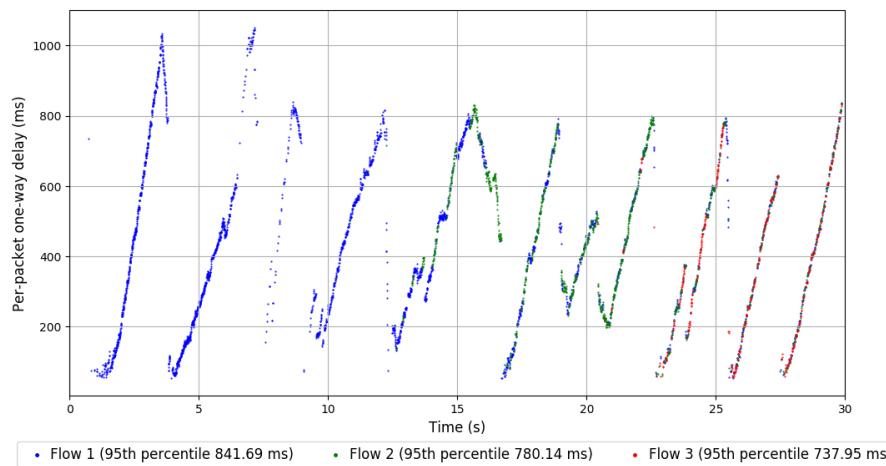
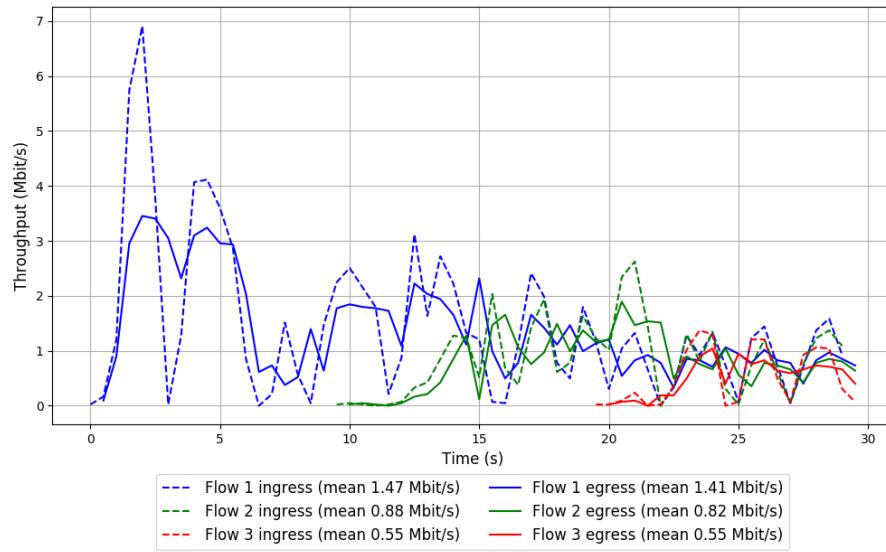


Run 3: Statistics of Verus

```
Start at: 2017-08-13 06:32:45
End at: 2017-08-13 06:33:15
Local clock offset: 0.55 ms
Remote clock offset: -1.627 ms

# Below is generated by plot.py at 2017-08-13 07:47:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.14 Mbit/s
95th percentile per-packet one-way delay: 806.463 ms
Loss rate: 5.04%
-- Flow 1:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 841.686 ms
Loss rate: 4.74%
-- Flow 2:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 780.143 ms
Loss rate: 5.75%
-- Flow 3:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 737.951 ms
Loss rate: 5.21%
```

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

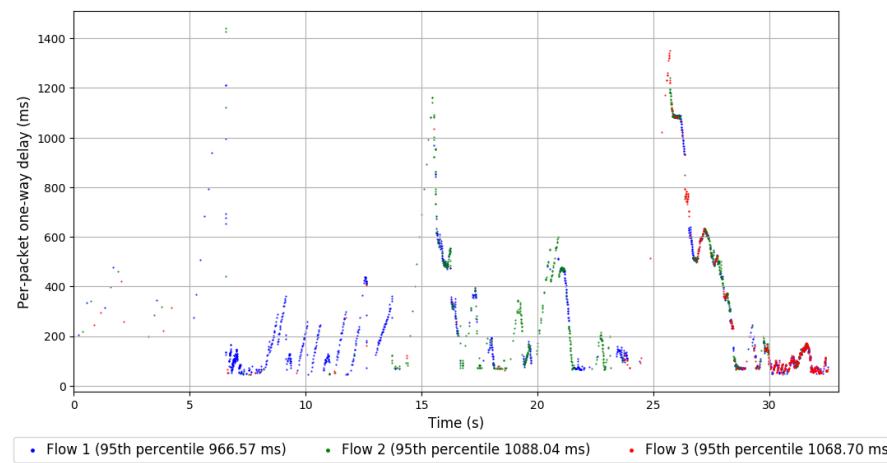
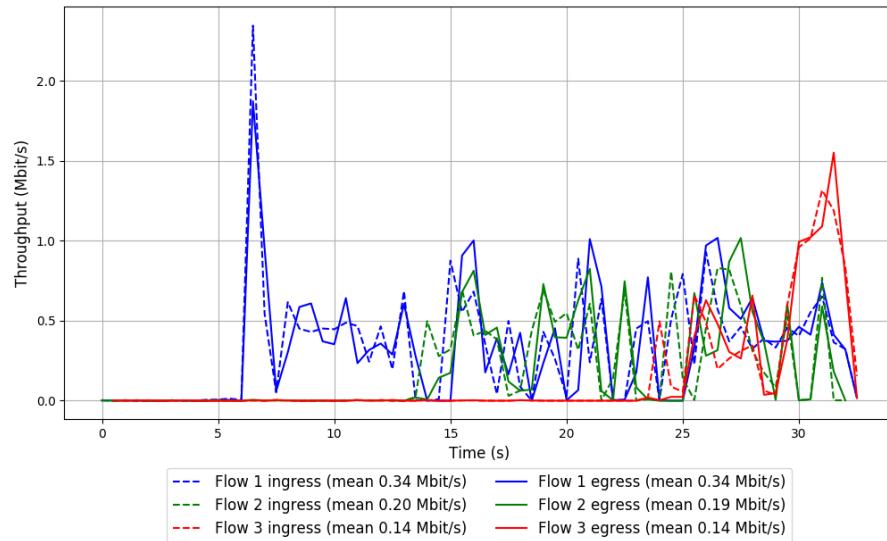


```
Run 1: Statistics of WebRTC media

Start at: 2017-08-13 05:47:14
End at: 2017-08-13 05:47:44
Local clock offset: 0.521 ms
Remote clock offset: -0.957 ms

# Below is generated by plot.py at 2017-08-13 07:47:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.67 Mbit/s
95th percentile per-packet one-way delay: 1078.632 ms
Loss rate: 2.14%
-- Flow 1:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 966.566 ms
Loss rate: 1.14%
-- Flow 2:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 1088.036 ms
Loss rate: 2.36%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 1068.696 ms
Loss rate: 4.24%
```

Run 1: Report of WebRTC media — Data Link

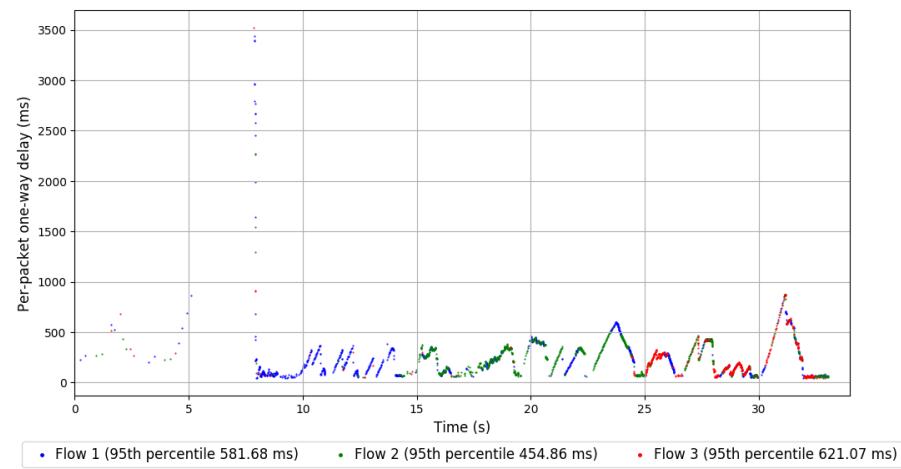
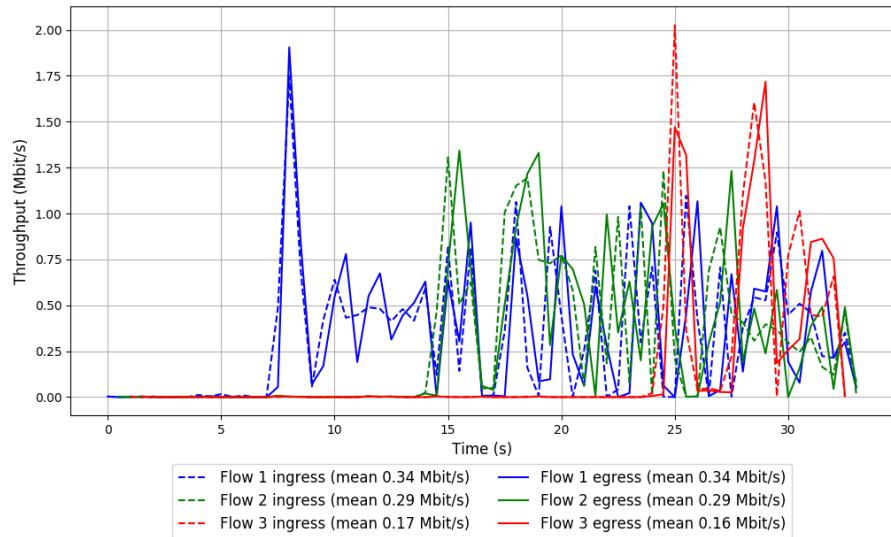


Run 2: Statistics of WebRTC media

```
Start at: 2017-08-13 06:07:19
End at: 2017-08-13 06:07:49
Local clock offset: 0.62 ms
Remote clock offset: -0.369 ms

# Below is generated by plot.py at 2017-08-13 07:47:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.78 Mbit/s
95th percentile per-packet one-way delay: 574.325 ms
Loss rate: 1.63%
-- Flow 1:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 581.678 ms
Loss rate: 1.36%
-- Flow 2:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 454.864 ms
Loss rate: 0.83%
-- Flow 3:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 621.071 ms
Loss rate: 3.68%
```

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



```
Run 3: Statistics of WebRTC media

Start at: 2017-08-13 06:27:23
End at: 2017-08-13 06:27:53
Local clock offset: 0.561 ms
Remote clock offset: -1.79 ms

# Below is generated by plot.py at 2017-08-13 07:47:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 725.665 ms
Loss rate: 1.69%
-- Flow 1:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 738.623 ms
Loss rate: 1.71%
-- Flow 2:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 563.485 ms
Loss rate: 1.17%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 799.972 ms
Loss rate: 3.18%
```

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

