

## Pantheon Report

Generated at 2018-01-16 02:13:39 (UTC).

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

Repeated the test of 14 congestion control schemes 3 times.

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

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

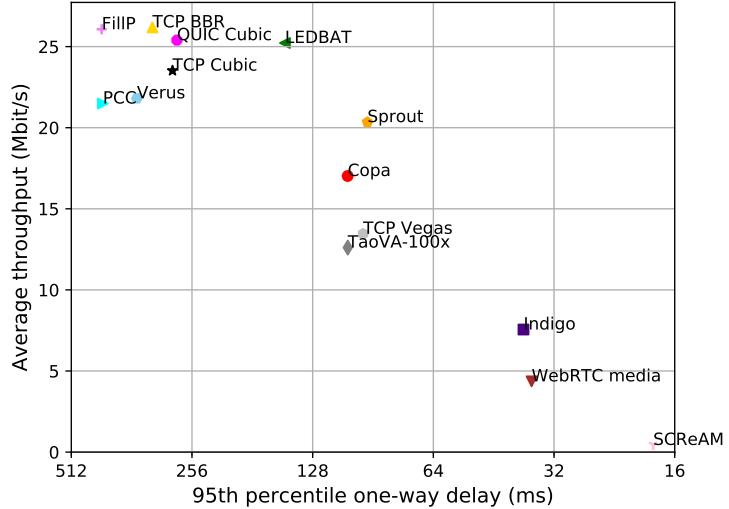
Tested BBR with qdisc of Fair Queuing (**fq**), and other schemes with the default Linux qdisc (**pfifo\_fast**).

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

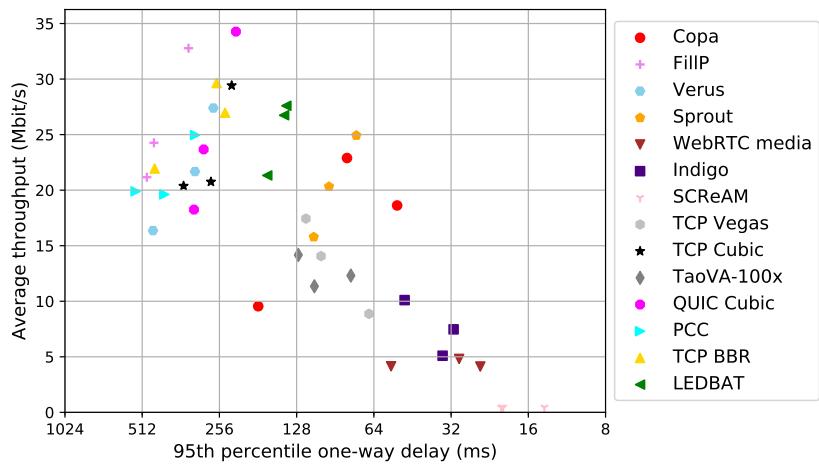
**Git summary:**

```
branch: master @ af8abdfa95588b0c5f2aeca9e856a1656b0c598
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
  M datagrump/sender.cc
third_party/fillp @ ec9585325218d5048c4d4152fa42240af54c6e67
third_party/genericCC @ 80b516c448f795fd6e9675f7177b69c622f07da8
third_party/indigo @ b19f3730105f9aa95452552af924e3719b03cc55
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
  M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ fb1053193c2861da659ba9013db26744ccfcf993
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
  M receiver/src/buffer.h
  M receiver/src/core.cpp
  M sender/src/buffer.h
  M sender/src/core.cpp
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ f1a14bffe749737437f61b1eaeeb30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
  M src/examples/cellsim.cc
  M src/examples/sproutbt2.cc
  M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
  M src/verus.hpp
  M tools/plot.py
third_party/vivace @ 423cbca3e8ea1d599e7b5cf725835e8a2b6bfac6
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```

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



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



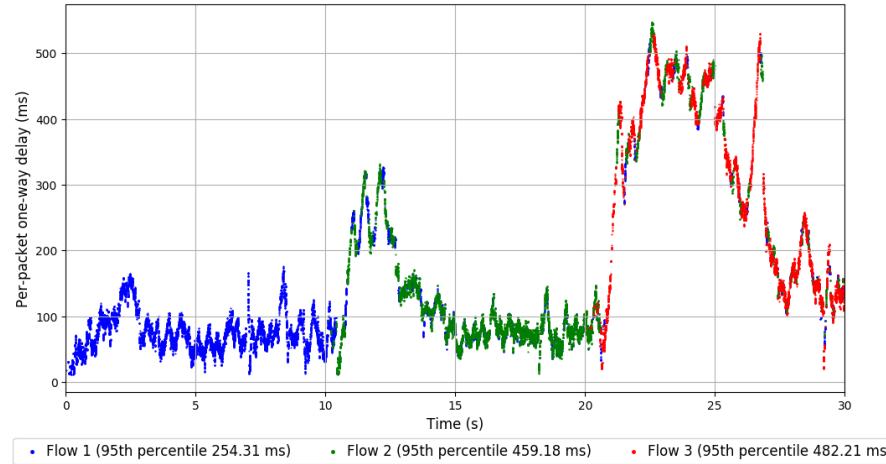
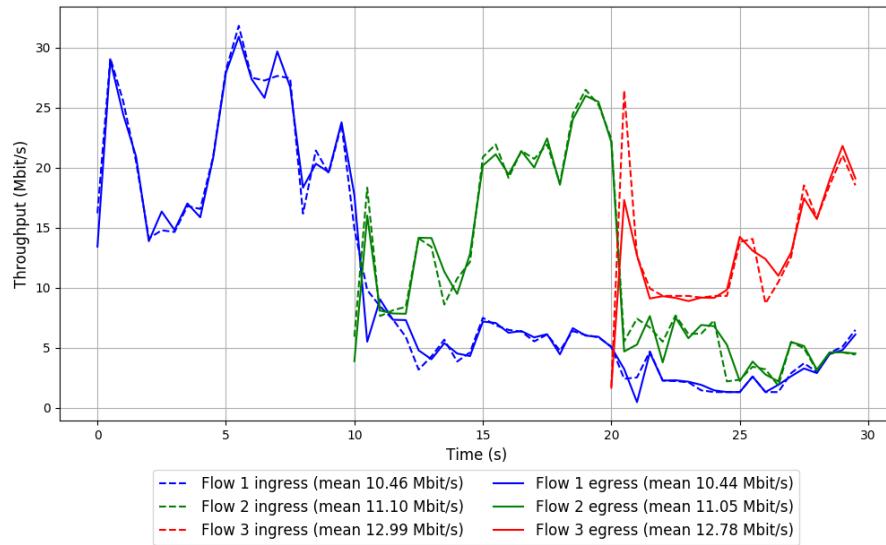
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	12.67	12.97	14.98	241.21	309.51	412.39	0.36	0.92	3.42
TCP Cubic		15.70	10.09	3.38	251.42	331.93	344.04	0.34	0.53	1.48
LEDBAT		18.50	8.13	3.93	144.59	160.23	171.78	0.19	0.47	1.24
PCC		16.64	4.78	5.04	420.76	438.33	481.44	6.47	9.39	17.06
QUIC Cubic		16.80	10.84	4.40	263.17	300.59	345.98	0.46	1.05	3.15
SCReAM		0.22	0.22	0.22	18.16	17.93	18.75	0.00	0.00	0.00
WebRTC media		2.34	1.54	0.51	31.23	36.87	53.28	0.00	0.00	0.00
Sprout		10.98	10.08	7.92	87.21	95.83	116.20	0.21	0.42	0.90
TaoVA-100x		5.15	5.78	13.02	73.98	93.99	117.25	0.14	0.18	1.10
TCP Vegas		6.29	7.47	6.60	74.63	143.45	57.74	0.00	0.01	0.00
Verus		13.95	8.61	6.63	342.50	371.34	361.57	5.60	17.06	11.86
Copa		11.28	7.06	3.09	101.91	103.61	166.56	0.02	0.08	0.17
FillP		13.35	10.95	16.96	405.84	449.93	459.87	60.62	74.19	75.68
Indigo		2.86	3.75	6.76	32.23	36.84	43.02	0.00	0.00	0.00

Run 1: Statistics of TCP BBR

```
Start at: 2018-01-16 01:28:59
End at: 2018-01-16 01:29:29
Local clock offset: 4.032 ms
Remote clock offset: -2.318 ms

# Below is generated by plot.py at 2018-01-16 02:12:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 21.95 Mbit/s
95th percentile per-packet one-way delay: 457.832 ms
Loss rate: 0.97%
-- Flow 1:
Average throughput: 10.44 Mbit/s
95th percentile per-packet one-way delay: 254.305 ms
Loss rate: 0.41%
-- Flow 2:
Average throughput: 11.05 Mbit/s
95th percentile per-packet one-way delay: 459.179 ms
Loss rate: 1.09%
-- Flow 3:
Average throughput: 12.78 Mbit/s
95th percentile per-packet one-way delay: 482.207 ms
Loss rate: 2.15%
```

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

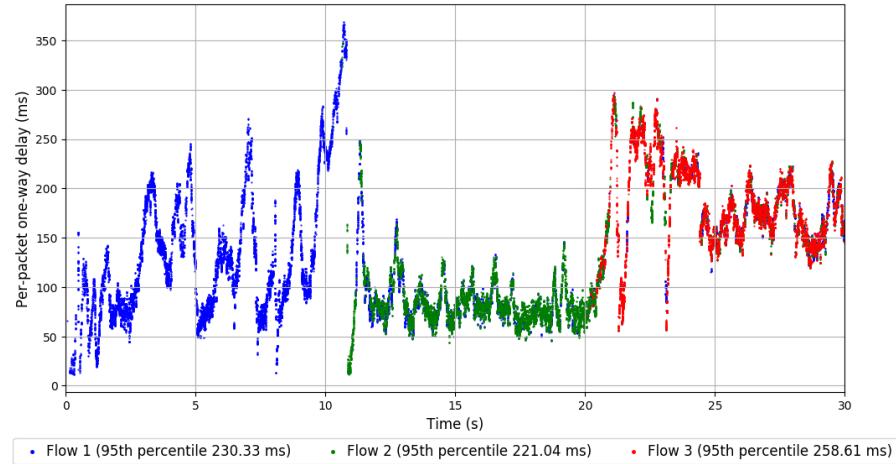
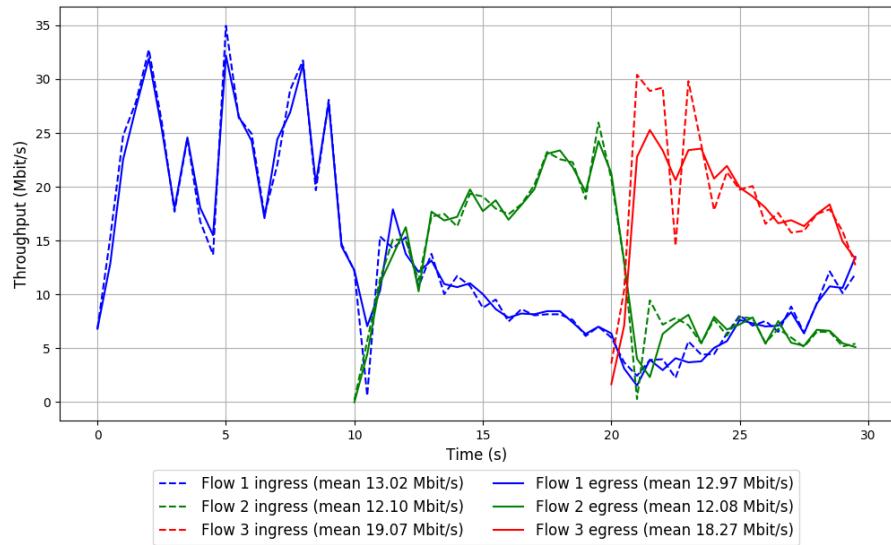


Run 2: Statistics of TCP BBR

```
Start at: 2018-01-16 01:46:52
End at: 2018-01-16 01:47:22
Local clock offset: 3.794 ms
Remote clock offset: -2.724 ms

# Below is generated by plot.py at 2018-01-16 02:12:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 26.97 Mbit/s
95th percentile per-packet one-way delay: 243.341 ms
Loss rate: 1.78%
-- Flow 1:
Average throughput: 12.97 Mbit/s
95th percentile per-packet one-way delay: 230.327 ms
Loss rate: 0.55%
-- Flow 2:
Average throughput: 12.08 Mbit/s
95th percentile per-packet one-way delay: 221.036 ms
Loss rate: 1.44%
-- Flow 3:
Average throughput: 18.27 Mbit/s
95th percentile per-packet one-way delay: 258.606 ms
Loss rate: 4.77%
```

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

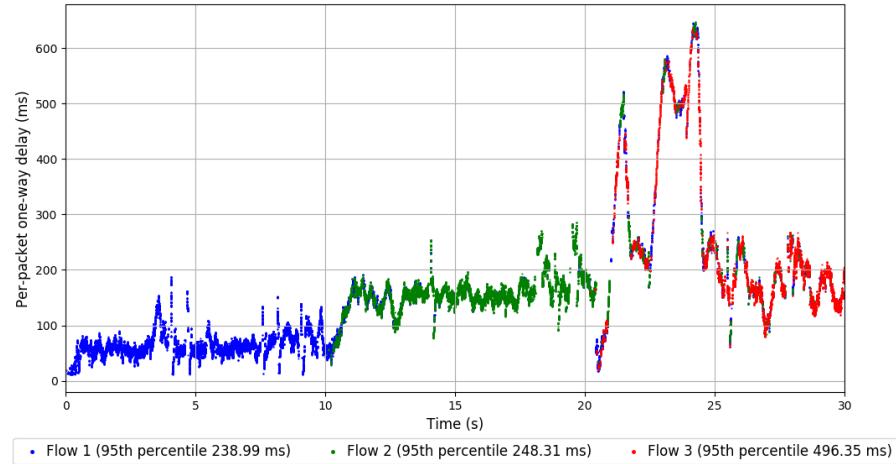
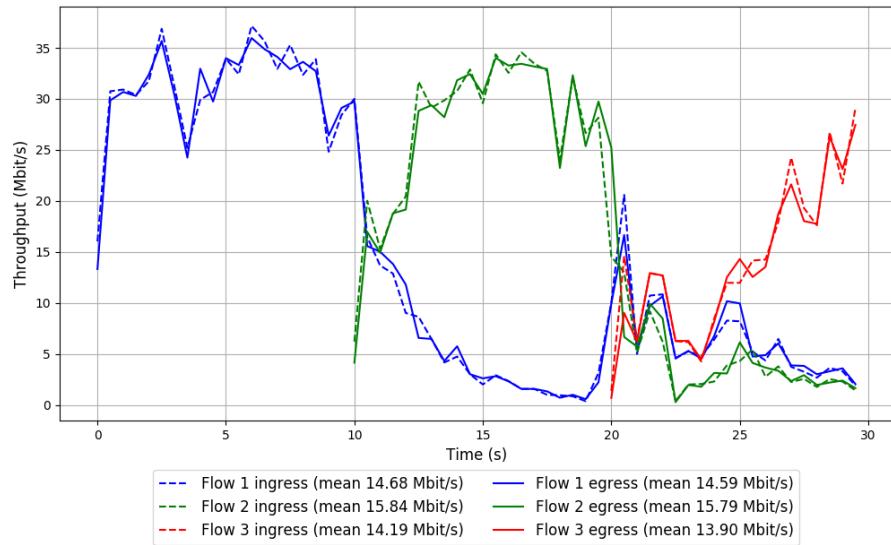


Run 3: Statistics of TCP BBR

```
Start at: 2018-01-16 02:04:49
End at: 2018-01-16 02:05:19
Local clock offset: 3.064 ms
Remote clock offset: -2.688 ms

# Below is generated by plot.py at 2018-01-16 02:12:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 29.64 Mbit/s
95th percentile per-packet one-way delay: 262.461 ms
Loss rate: 0.67%
-- Flow 1:
Average throughput: 14.59 Mbit/s
95th percentile per-packet one-way delay: 238.992 ms
Loss rate: 0.12%
-- Flow 2:
Average throughput: 15.79 Mbit/s
95th percentile per-packet one-way delay: 248.306 ms
Loss rate: 0.24%
-- Flow 3:
Average throughput: 13.90 Mbit/s
95th percentile per-packet one-way delay: 496.354 ms
Loss rate: 3.35%
```

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

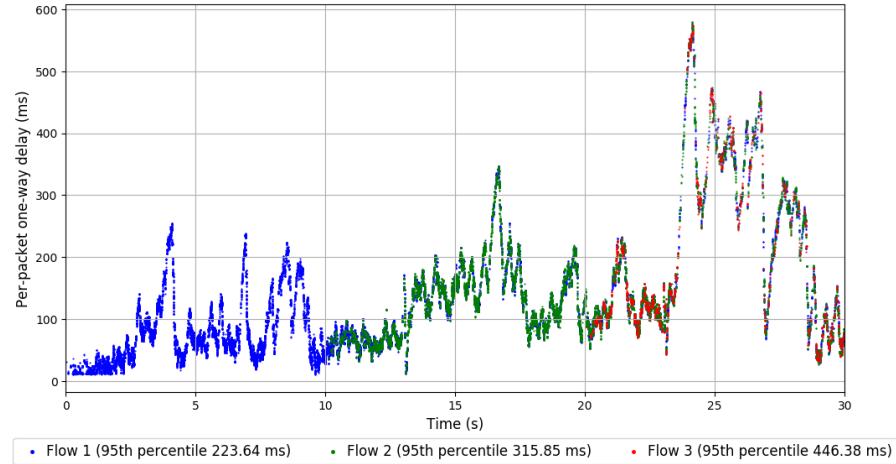
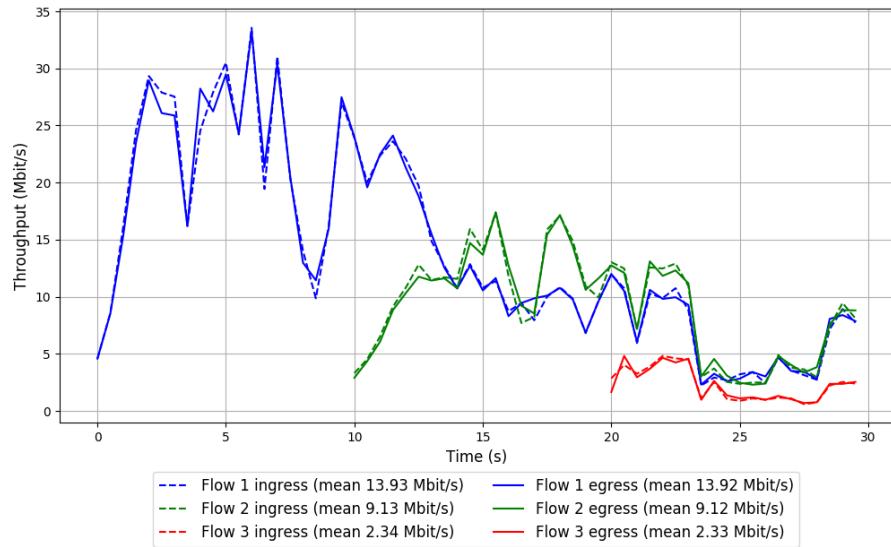


```
Run 1: Statistics of TCP Cubic
```

```
Start at: 2018-01-16 01:30:10
End at: 2018-01-16 01:30:41
Local clock offset: 4.076 ms
Remote clock offset: -2.346 ms

# Below is generated by plot.py at 2018-01-16 02:12:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 20.75 Mbit/s
95th percentile per-packet one-way delay: 276.273 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 13.92 Mbit/s
95th percentile per-packet one-way delay: 223.643 ms
Loss rate: 0.14%
-- Flow 2:
Average throughput: 9.12 Mbit/s
95th percentile per-packet one-way delay: 315.846 ms
Loss rate: 0.29%
-- Flow 3:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 446.377 ms
Loss rate: 0.98%
```

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

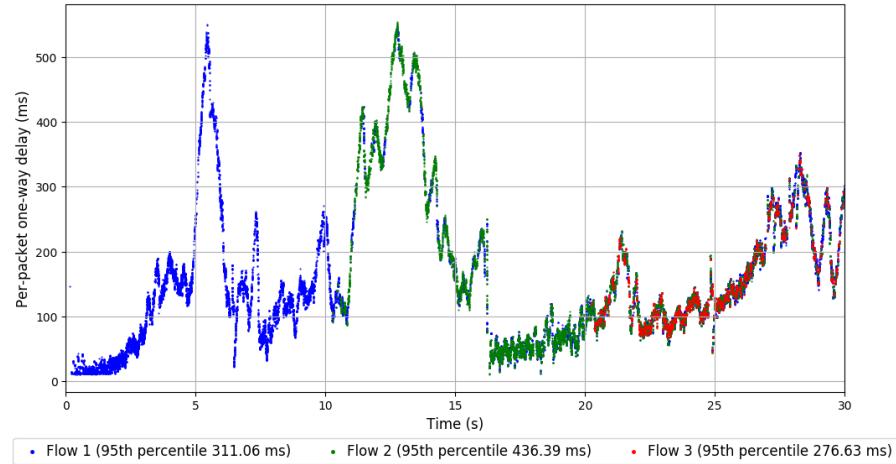
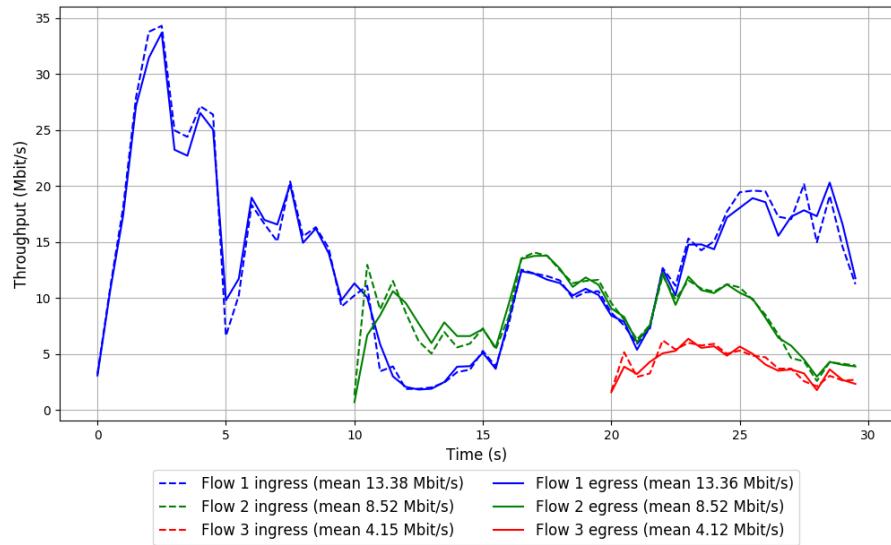


Run 2: Statistics of TCP Cubic

```
Start at: 2018-01-16 01:48:04
End at: 2018-01-16 01:48:34
Local clock offset: 3.765 ms
Remote clock offset: -2.654 ms

# Below is generated by plot.py at 2018-01-16 02:12:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 20.38 Mbit/s
95th percentile per-packet one-way delay: 353.193 ms
Loss rate: 0.69%
-- Flow 1:
Average throughput: 13.36 Mbit/s
95th percentile per-packet one-way delay: 311.057 ms
Loss rate: 0.63%
-- Flow 2:
Average throughput: 8.52 Mbit/s
95th percentile per-packet one-way delay: 436.392 ms
Loss rate: 0.60%
-- Flow 3:
Average throughput: 4.12 Mbit/s
95th percentile per-packet one-way delay: 276.626 ms
Loss rate: 1.63%
```

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

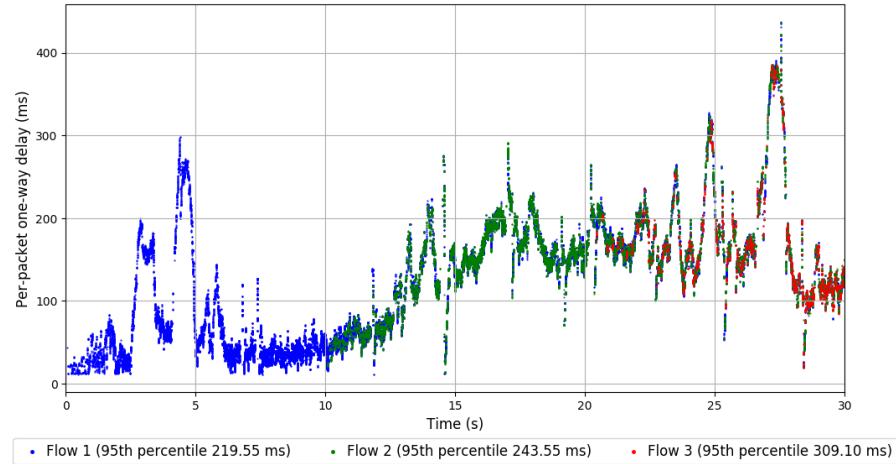
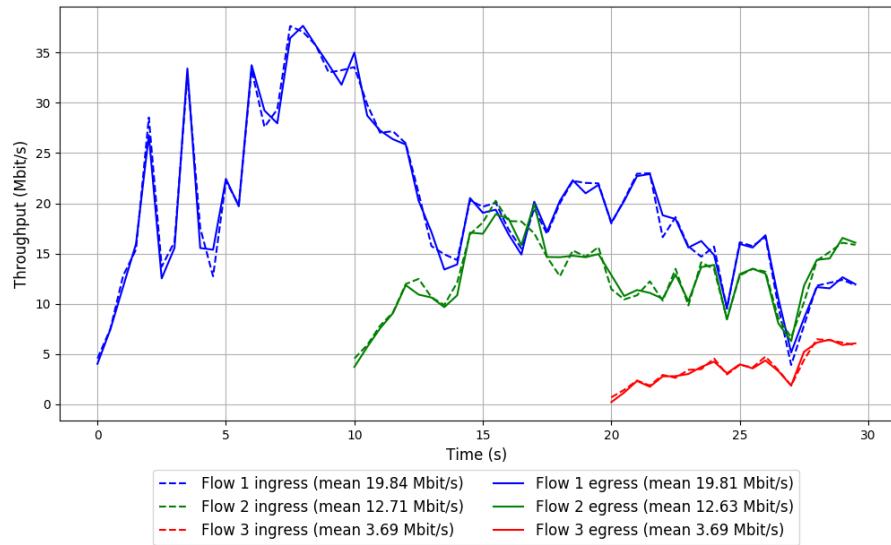


Run 3: Statistics of TCP Cubic

```
Start at: 2018-01-16 02:06:01
End at: 2018-01-16 02:06:31
Local clock offset: 2.907 ms
Remote clock offset: -2.702 ms

# Below is generated by plot.py at 2018-01-16 02:12:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 29.42 Mbit/s
95th percentile per-packet one-way delay: 229.346 ms
Loss rate: 0.44%
-- Flow 1:
Average throughput: 19.81 Mbit/s
95th percentile per-packet one-way delay: 219.547 ms
Loss rate: 0.25%
-- Flow 2:
Average throughput: 12.63 Mbit/s
95th percentile per-packet one-way delay: 243.546 ms
Loss rate: 0.70%
-- Flow 3:
Average throughput: 3.69 Mbit/s
95th percentile per-packet one-way delay: 309.102 ms
Loss rate: 1.83%
```

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

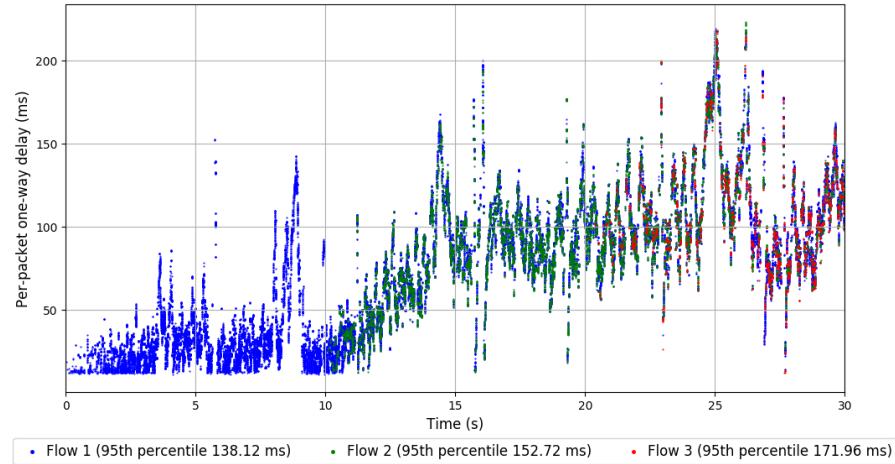
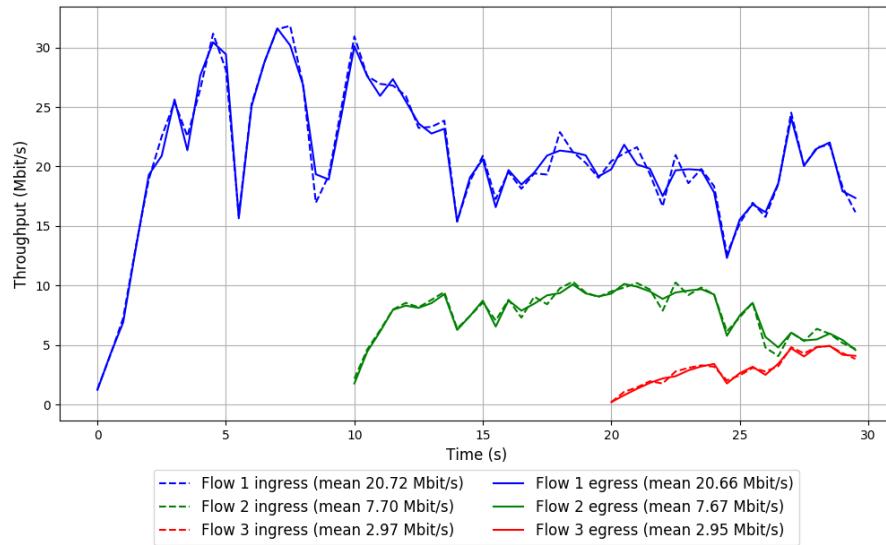


```
Run 1: Statistics of LEDBAT

Start at: 2018-01-16 01:21:48
End at: 2018-01-16 01:22:18
Local clock offset: 3.079 ms
Remote clock offset: -2.277 ms

# Below is generated by plot.py at 2018-01-16 02:12:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 26.74 Mbit/s
95th percentile per-packet one-way delay: 143.279 ms
Loss rate: 0.34%
-- Flow 1:
Average throughput: 20.66 Mbit/s
95th percentile per-packet one-way delay: 138.122 ms
Loss rate: 0.28%
-- Flow 2:
Average throughput: 7.67 Mbit/s
95th percentile per-packet one-way delay: 152.724 ms
Loss rate: 0.38%
-- Flow 3:
Average throughput: 2.95 Mbit/s
95th percentile per-packet one-way delay: 171.963 ms
Loss rate: 1.47%
```

Run 1: Report of LEDBAT — Data Link

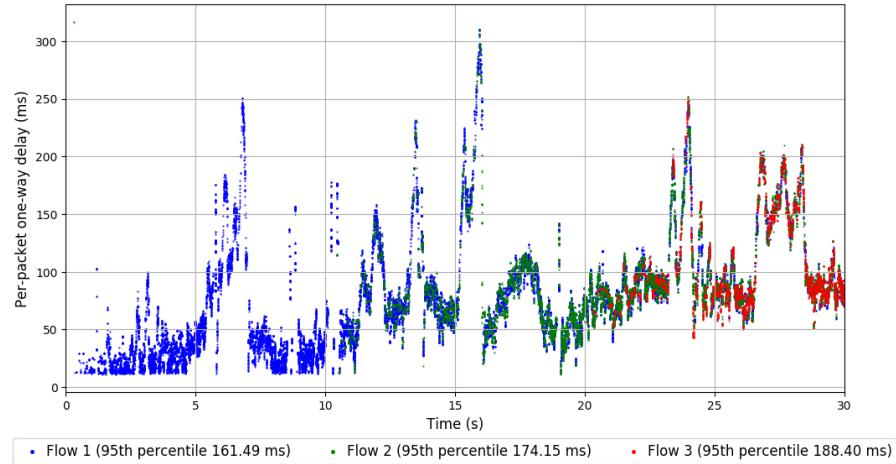
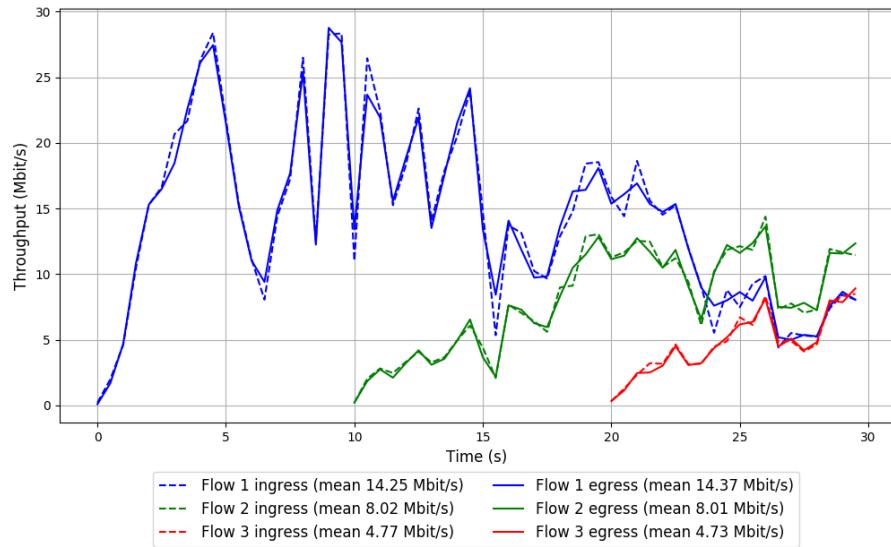


Run 2: Statistics of LEDBAT

```
Start at: 2018-01-16 01:39:41
End at: 2018-01-16 01:40:11
Local clock offset: 3.916 ms
Remote clock offset: -2.459 ms

# Below is generated by plot.py at 2018-01-16 02:12:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 21.33 Mbit/s
95th percentile per-packet one-way delay: 166.635 ms
Loss rate: 0.30%
-- Flow 1:
Average throughput: 14.37 Mbit/s
95th percentile per-packet one-way delay: 161.486 ms
Loss rate: 0.16%
-- Flow 2:
Average throughput: 8.01 Mbit/s
95th percentile per-packet one-way delay: 174.152 ms
Loss rate: 0.41%
-- Flow 3:
Average throughput: 4.73 Mbit/s
95th percentile per-packet one-way delay: 188.404 ms
Loss rate: 1.19%
```

## Run 2: Report of LEDBAT — Data Link

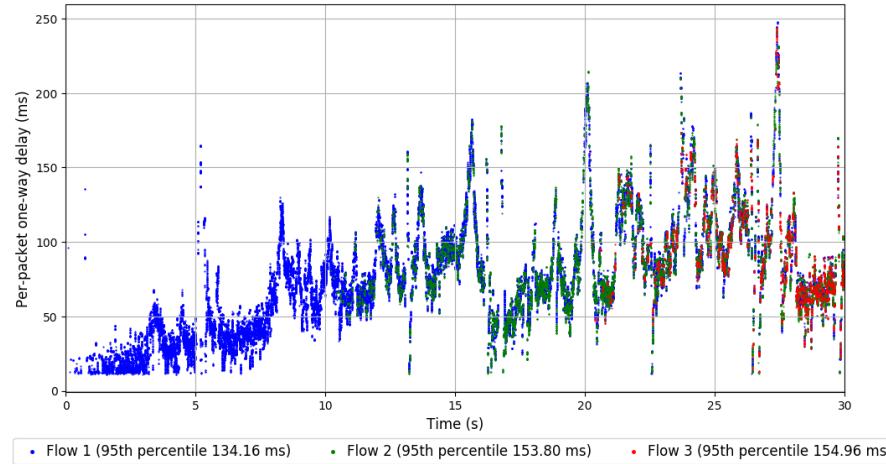
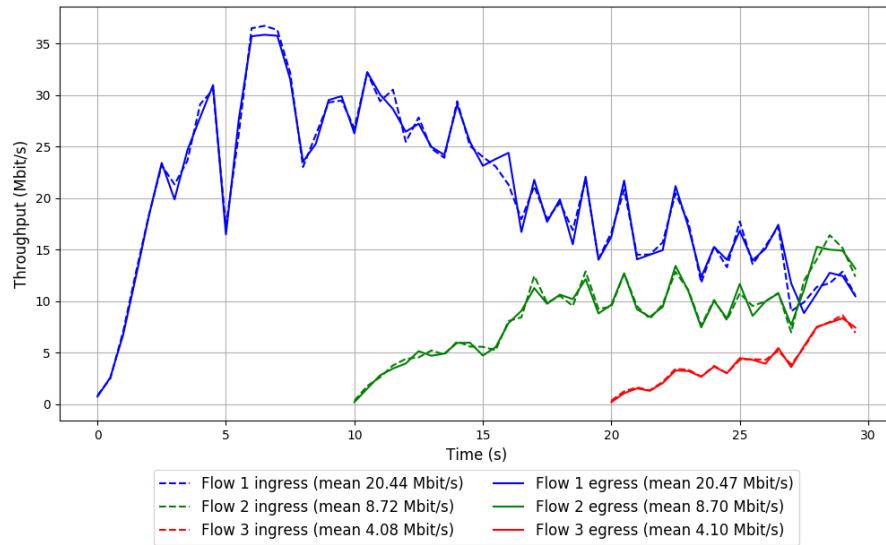


Run 3: Statistics of LEDBAT

```
Start at: 2018-01-16 01:57:37
End at: 2018-01-16 01:58:07
Local clock offset: 3.656 ms
Remote clock offset: -2.729 ms

# Below is generated by plot.py at 2018-01-16 02:12:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 27.60 Mbit/s
95th percentile per-packet one-way delay: 140.394 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 20.47 Mbit/s
95th percentile per-packet one-way delay: 134.158 ms
Loss rate: 0.14%
-- Flow 2:
Average throughput: 8.70 Mbit/s
95th percentile per-packet one-way delay: 153.804 ms
Loss rate: 0.61%
-- Flow 3:
Average throughput: 4.10 Mbit/s
95th percentile per-packet one-way delay: 154.964 ms
Loss rate: 1.07%
```

Run 3: Report of LEDBAT — Data Link

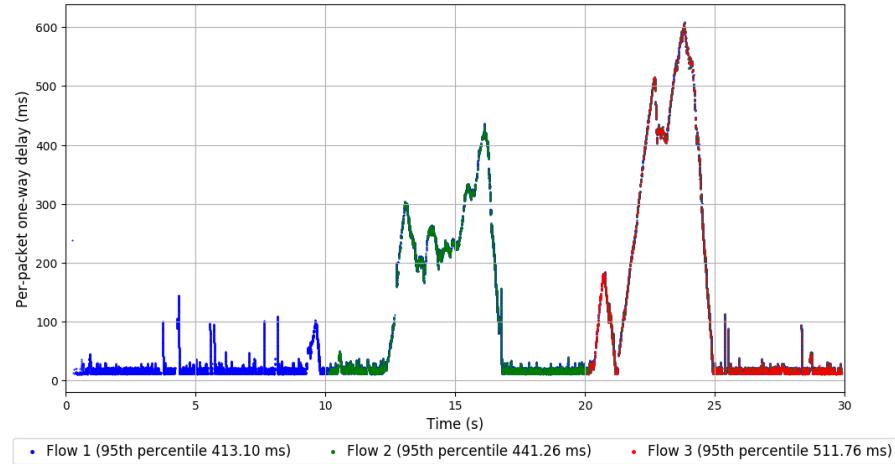
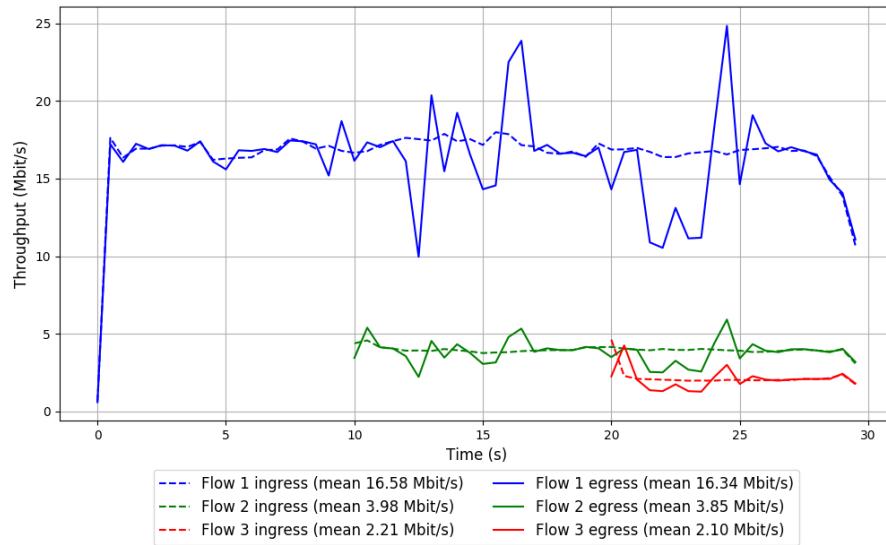


Run 1: Statistics of PCC

```
Start at: 2018-01-16 01:18:13
End at: 2018-01-16 01:18:43
Local clock offset: 2.69 ms
Remote clock offset: -2.378 ms

# Below is generated by plot.py at 2018-01-16 02:12:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 19.62 Mbit/s
95th percentile per-packet one-way delay: 419.783 ms
Loss rate: 2.44%
-- Flow 1:
Average throughput: 16.34 Mbit/s
95th percentile per-packet one-way delay: 413.099 ms
Loss rate: 2.18%
-- Flow 2:
Average throughput: 3.85 Mbit/s
95th percentile per-packet one-way delay: 441.256 ms
Loss rate: 3.27%
-- Flow 3:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 511.760 ms
Loss rate: 5.18%
```

## Run 1: Report of PCC — Data Link

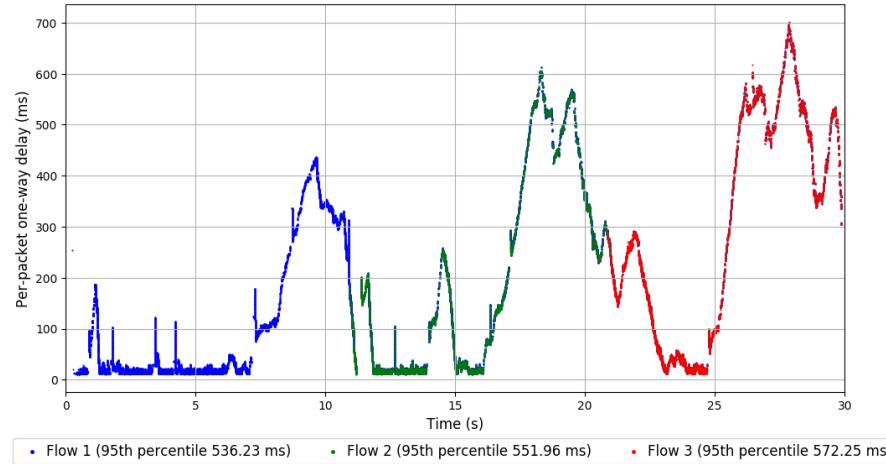
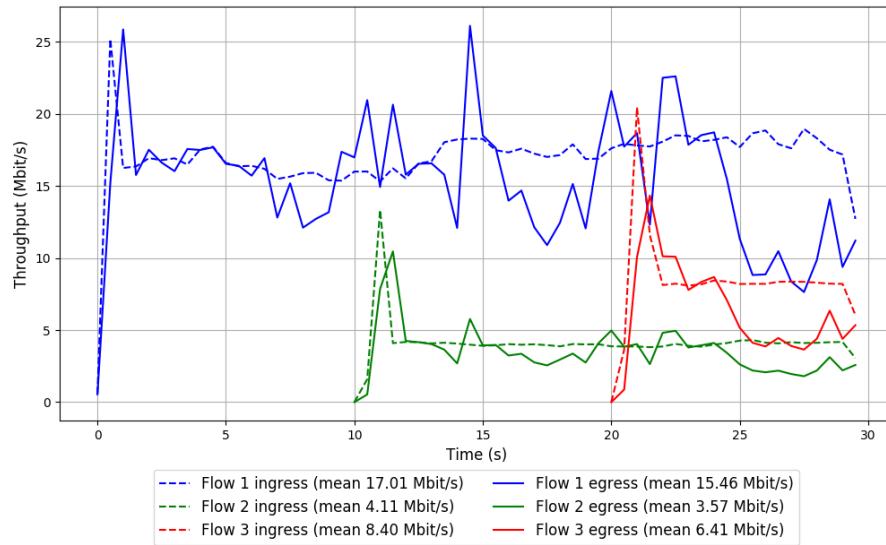


Run 2: Statistics of PCC

```
Start at: 2018-01-16 01:36:07
End at: 2018-01-16 01:36:37
Local clock offset: 3.958 ms
Remote clock offset: -2.464 ms

# Below is generated by plot.py at 2018-01-16 02:12:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 19.89 Mbit/s
95th percentile per-packet one-way delay: 543.159 ms
Loss rate: 12.35%
-- Flow 1:
Average throughput: 15.46 Mbit/s
95th percentile per-packet one-way delay: 536.229 ms
Loss rate: 9.87%
-- Flow 2:
Average throughput: 3.57 Mbit/s
95th percentile per-packet one-way delay: 551.962 ms
Loss rate: 14.29%
-- Flow 3:
Average throughput: 6.41 Mbit/s
95th percentile per-packet one-way delay: 572.247 ms
Loss rate: 25.71%
```

## Run 2: Report of PCC — Data Link

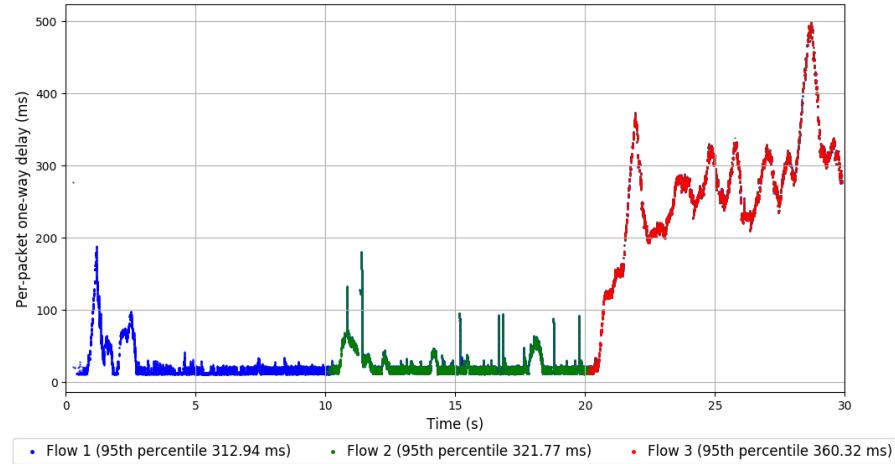
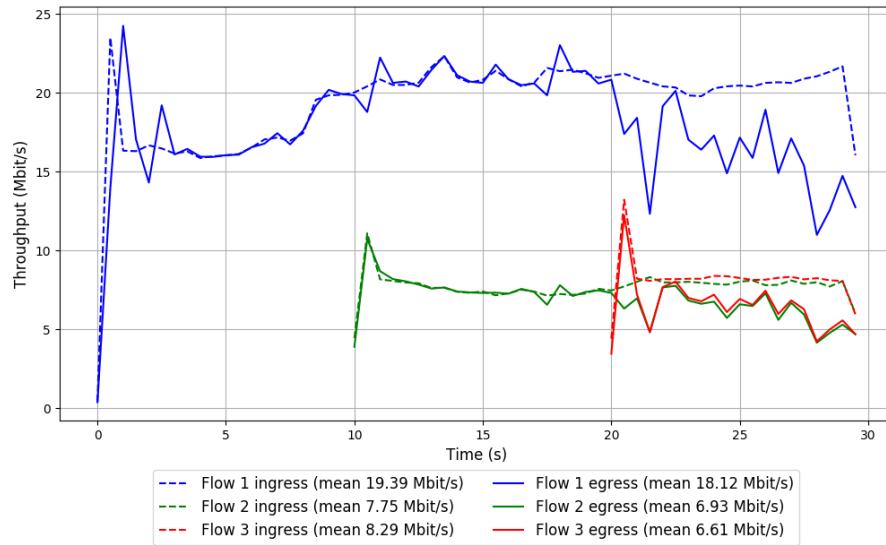


Run 3: Statistics of PCC

```
Start at: 2018-01-16 01:54:01
End at: 2018-01-16 01:54:31
Local clock offset: 3.795 ms
Remote clock offset: -2.642 ms

# Below is generated by plot.py at 2018-01-16 02:12:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 24.96 Mbit/s
95th percentile per-packet one-way delay: 318.269 ms
Loss rate: 9.28%
-- Flow 1:
Average throughput: 18.12 Mbit/s
95th percentile per-packet one-way delay: 312.945 ms
Loss rate: 7.37%
-- Flow 2:
Average throughput: 6.93 Mbit/s
95th percentile per-packet one-way delay: 321.775 ms
Loss rate: 10.61%
-- Flow 3:
Average throughput: 6.61 Mbit/s
95th percentile per-packet one-way delay: 360.324 ms
Loss rate: 20.29%
```

### Run 3: Report of PCC — Data Link

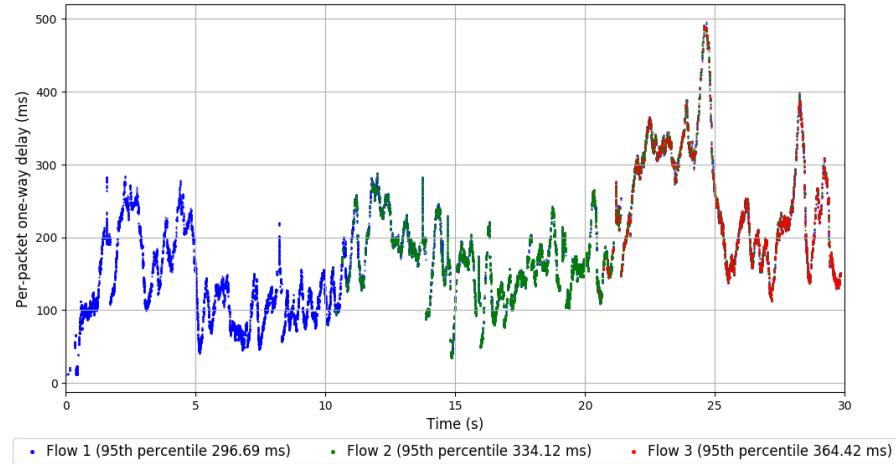
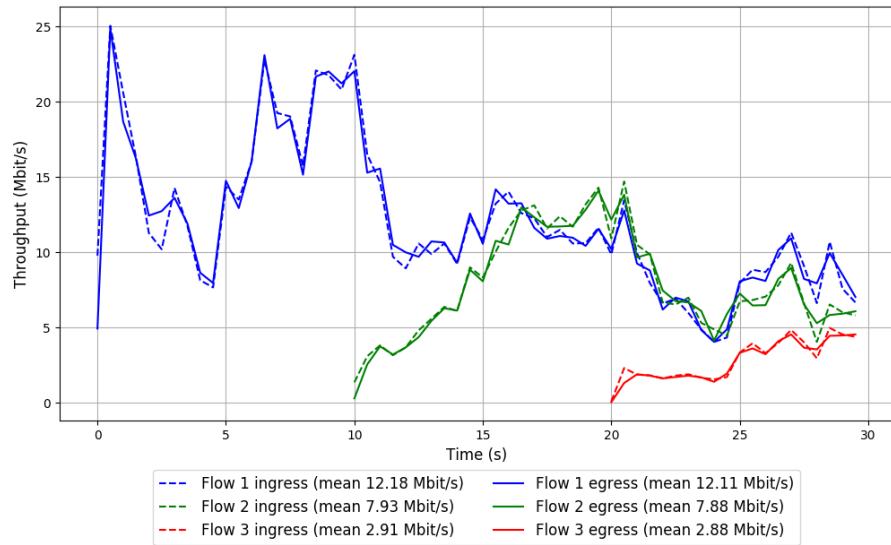


```
Run 1: Statistics of QUIC Cubic
```

```
Start at: 2018-01-16 01:27:47
End at: 2018-01-16 01:28:17
Local clock offset: 3.854 ms
Remote clock offset: -2.188 ms

# Below is generated by plot.py at 2018-01-16 02:12:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 18.25 Mbit/s
95th percentile per-packet one-way delay: 321.666 ms
Loss rate: 0.72%
-- Flow 1:
Average throughput: 12.11 Mbit/s
95th percentile per-packet one-way delay: 296.695 ms
Loss rate: 0.45%
-- Flow 2:
Average throughput: 7.88 Mbit/s
95th percentile per-packet one-way delay: 334.118 ms
Loss rate: 0.85%
-- Flow 3:
Average throughput: 2.88 Mbit/s
95th percentile per-packet one-way delay: 364.422 ms
Loss rate: 3.43%
```

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

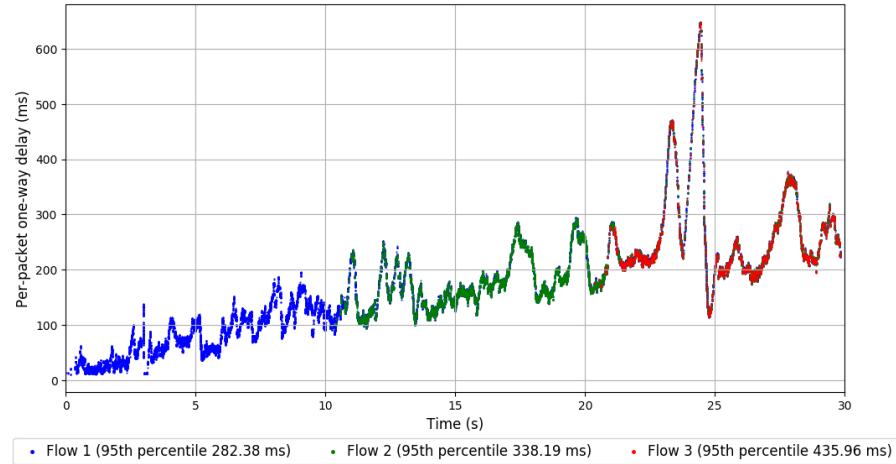
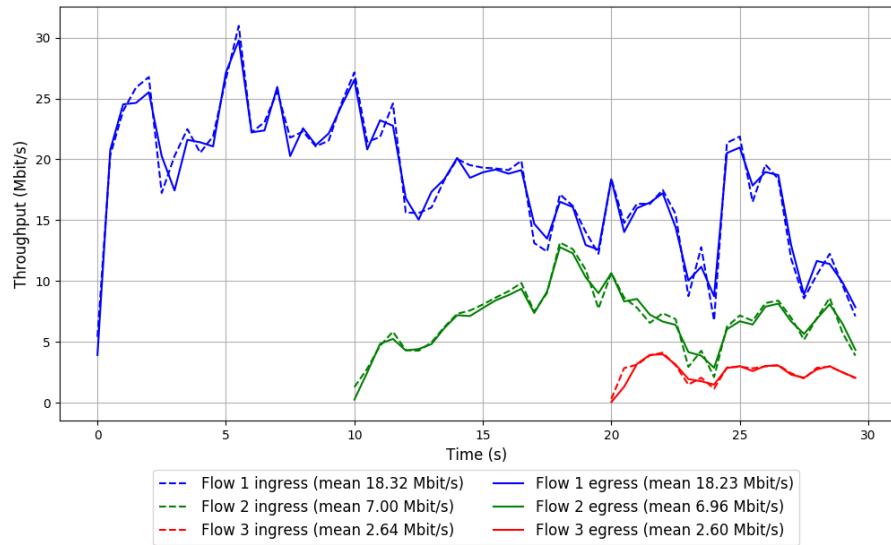


Run 2: Statistics of QUIC Cubic

```
Start at: 2018-01-16 01:45:40
End at: 2018-01-16 01:46:10
Local clock offset: 3.789 ms
Remote clock offset: -2.63 ms

# Below is generated by plot.py at 2018-01-16 02:12:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 23.67 Mbit/s
95th percentile per-packet one-way delay: 294.917 ms
Loss rate: 0.69%
-- Flow 1:
Average throughput: 18.23 Mbit/s
95th percentile per-packet one-way delay: 282.385 ms
Loss rate: 0.47%
-- Flow 2:
Average throughput: 6.96 Mbit/s
95th percentile per-packet one-way delay: 338.194 ms
Loss rate: 1.11%
-- Flow 3:
Average throughput: 2.60 Mbit/s
95th percentile per-packet one-way delay: 435.965 ms
Loss rate: 3.07%
```

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

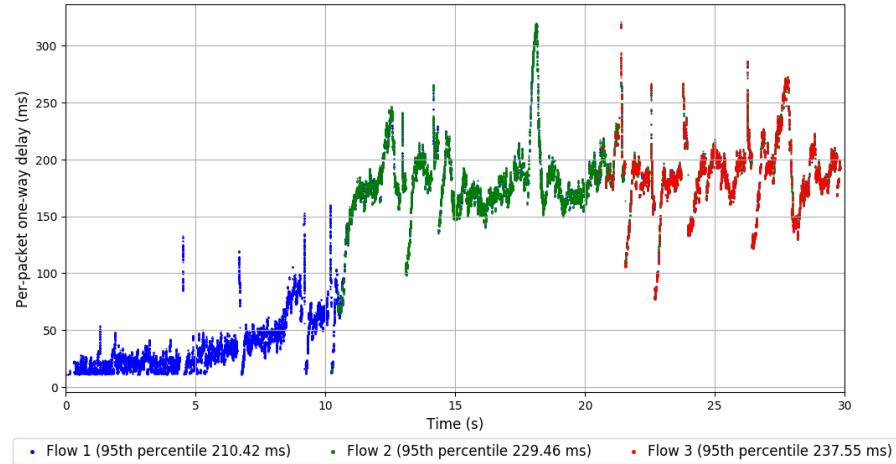
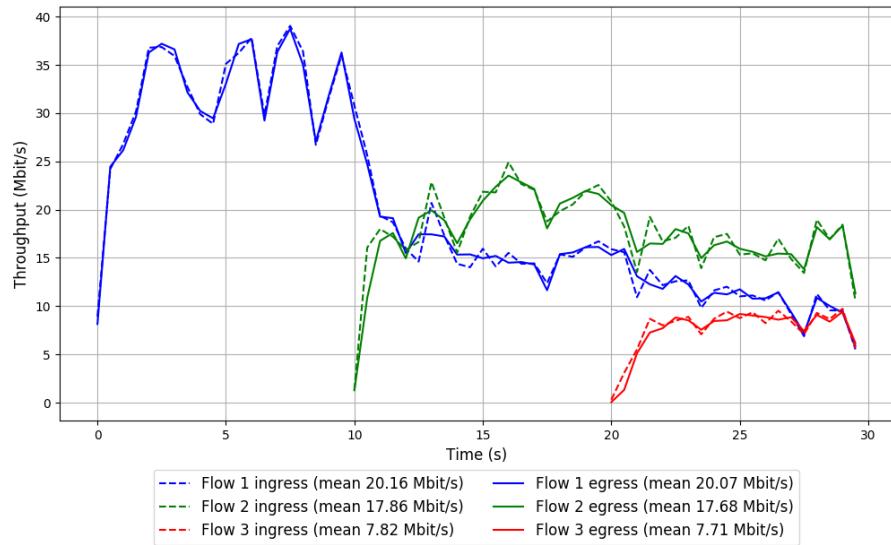


Run 3: Statistics of QUIC Cubic

```
Start at: 2018-01-16 02:03:36
End at: 2018-01-16 02:04:06
Local clock offset: 3.08 ms
Remote clock offset: -2.669 ms

# Below is generated by plot.py at 2018-01-16 02:12:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 34.27 Mbit/s
95th percentile per-packet one-way delay: 220.729 ms
Loss rate: 0.89%
-- Flow 1:
Average throughput: 20.07 Mbit/s
95th percentile per-packet one-way delay: 210.422 ms
Loss rate: 0.45%
-- Flow 2:
Average throughput: 17.68 Mbit/s
95th percentile per-packet one-way delay: 229.459 ms
Loss rate: 1.20%
-- Flow 3:
Average throughput: 7.71 Mbit/s
95th percentile per-packet one-way delay: 237.551 ms
Loss rate: 2.94%
```

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

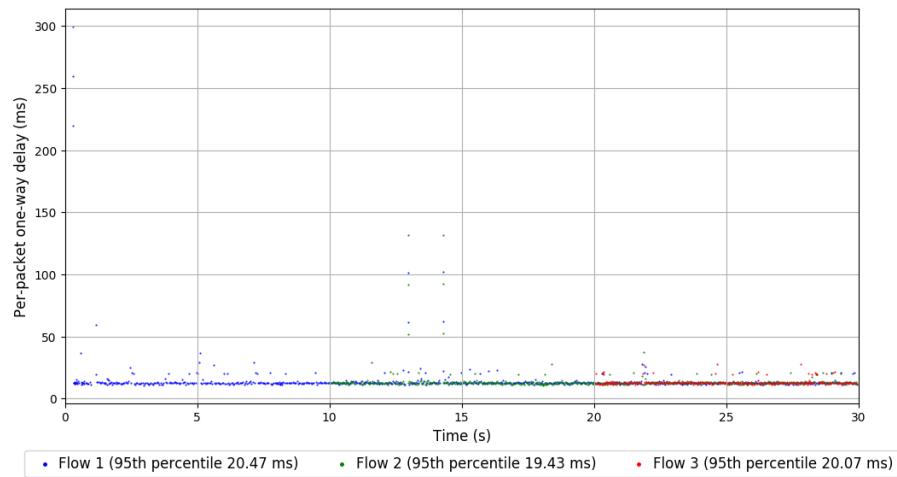
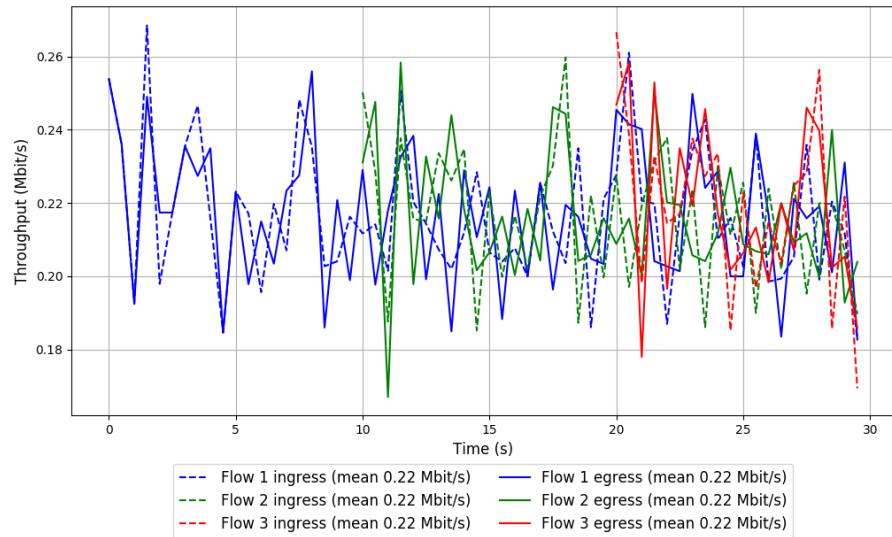


```
Run 1: Statistics of SCReAM

Start at: 2018-01-16 01:17:02
End at: 2018-01-16 01:17:32
Local clock offset: 2.539 ms
Remote clock offset: -2.331 ms

# Below is generated by plot.py at 2018-01-16 02:12:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 20.066 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.471 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 19.433 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.066 ms
Loss rate: 0.00%
```

Run 1: Report of SCReAM — Data Link

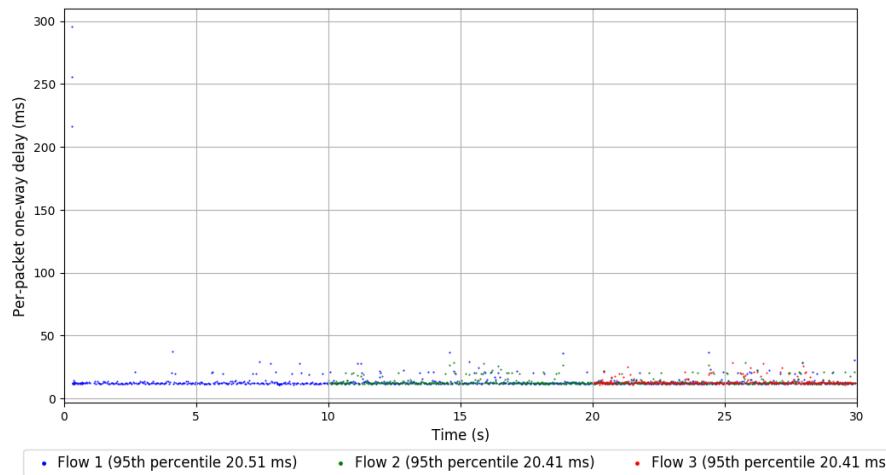
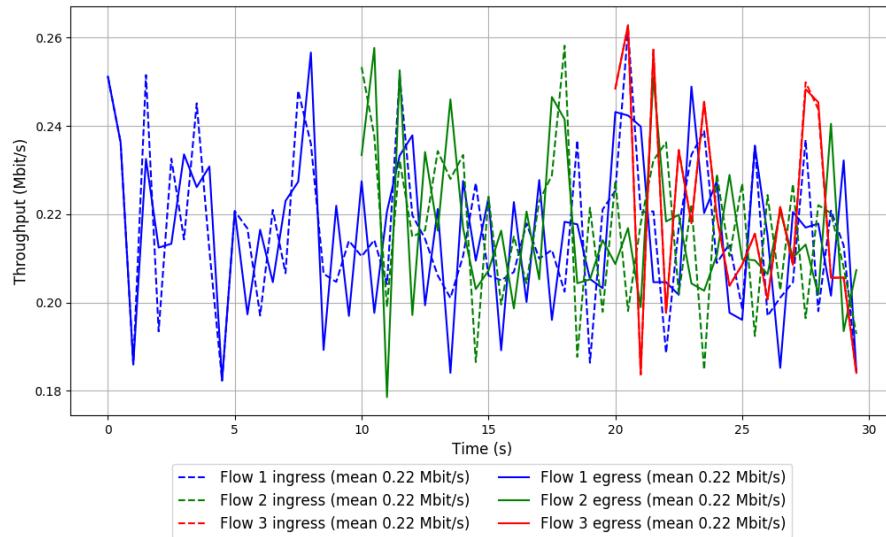


Run 2: Statistics of SCReAM

```
Start at: 2018-01-16 01:34:56
End at: 2018-01-16 01:35:26
Local clock offset: 4.042 ms
Remote clock offset: -2.345 ms

# Below is generated by plot.py at 2018-01-16 02:12:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 20.411 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.506 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.411 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 20.411 ms
Loss rate: 0.00%
```

## Run 2: Report of SCReAM — Data Link

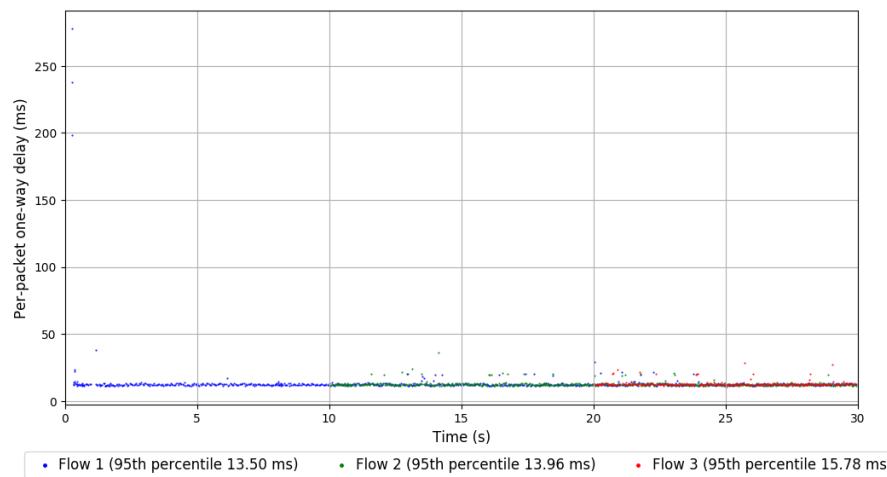
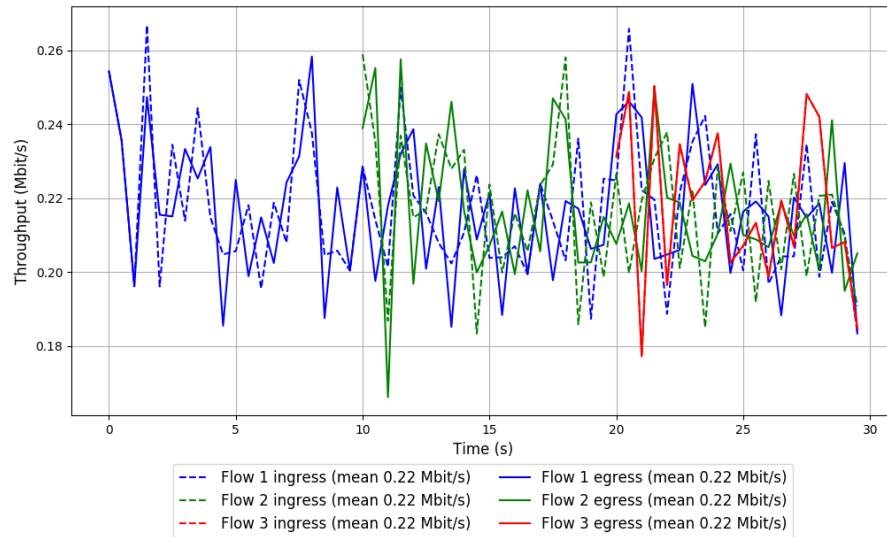


```
Run 3: Statistics of SCReAM
```

```
Start at: 2018-01-16 01:52:51
End at: 2018-01-16 01:53:21
Local clock offset: 3.768 ms
Remote clock offset: -2.736 ms

# Below is generated by plot.py at 2018-01-16 02:12:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 13.847 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.503 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 13.960 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 15.775 ms
Loss rate: 0.00%
```

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

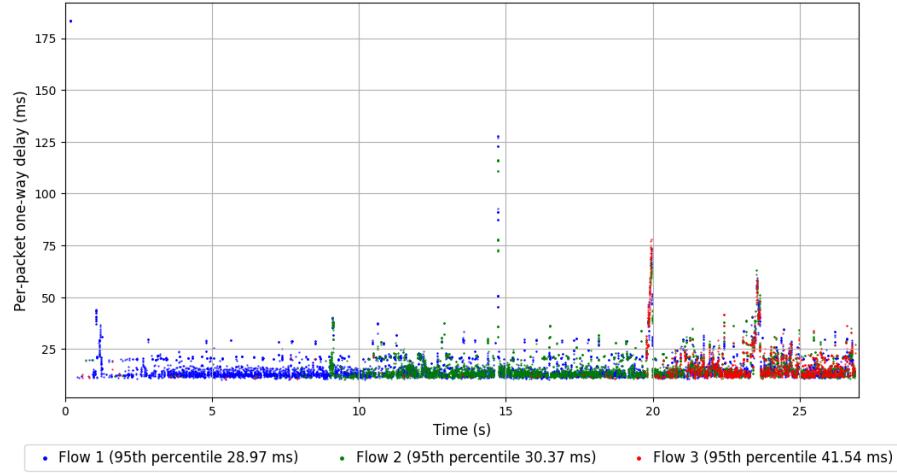
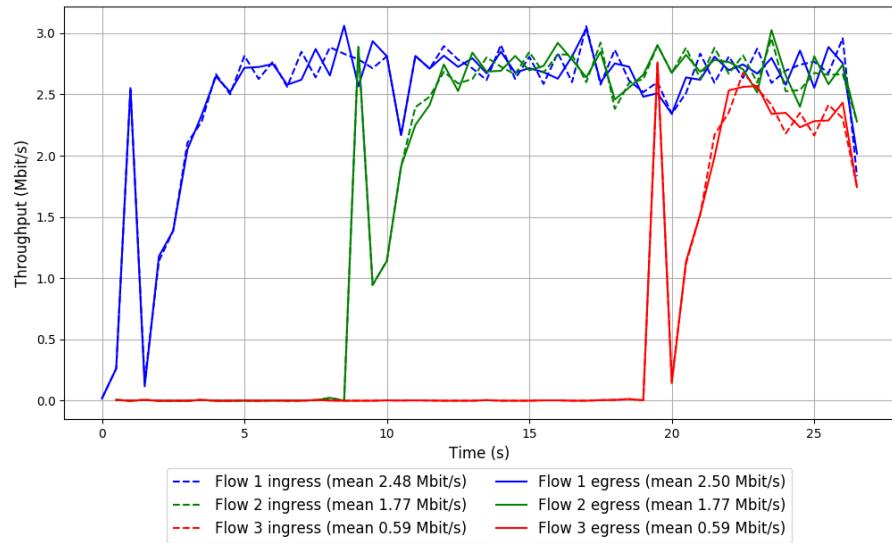


```
Run 1: Statistics of WebRTC media

Start at: 2018-01-16 01:31:22
End at: 2018-01-16 01:31:52
Local clock offset: 4.028 ms
Remote clock offset: -2.314 ms

# Below is generated by plot.py at 2018-01-16 02:12:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.81 Mbit/s
95th percentile per-packet one-way delay: 29.772 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 2.50 Mbit/s
95th percentile per-packet one-way delay: 28.973 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 1.77 Mbit/s
95th percentile per-packet one-way delay: 30.371 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 41.544 ms
Loss rate: 0.00%
```

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

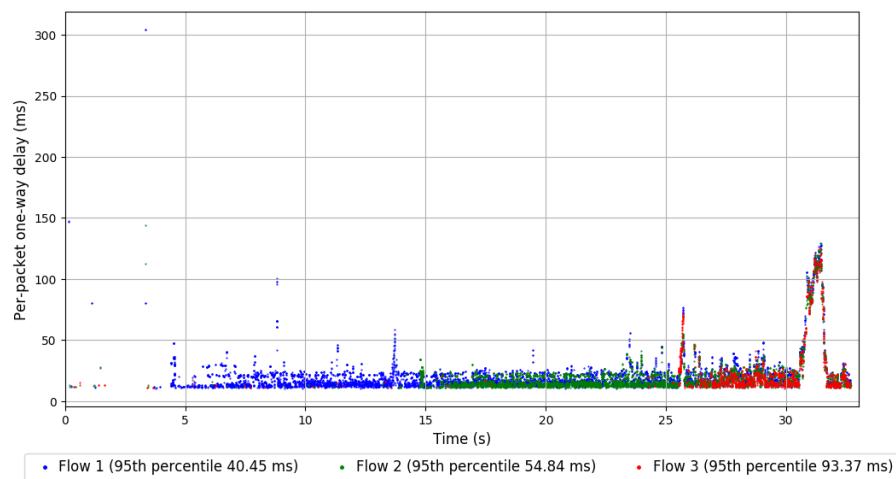
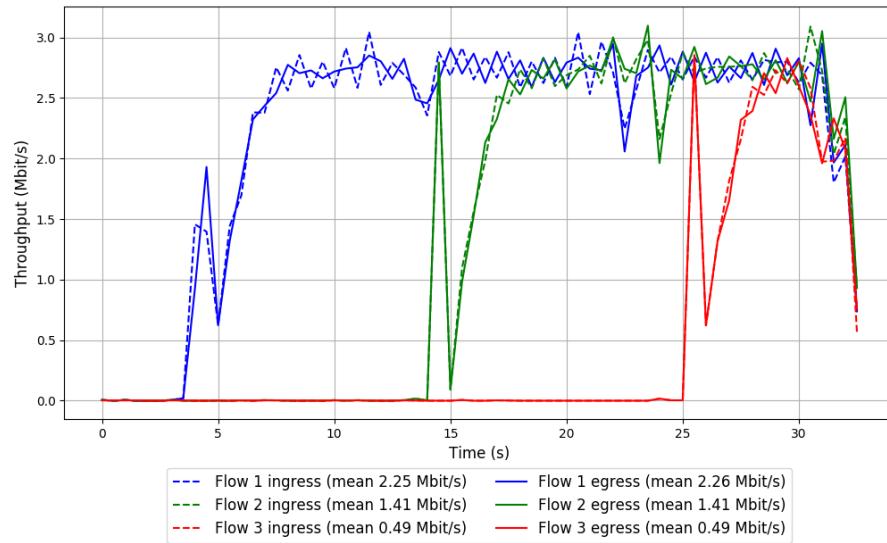


```
Run 2: Statistics of WebRTC media

Start at: 2018-01-16 01:49:16
End at: 2018-01-16 01:49:46
Local clock offset: 3.742 ms
Remote clock offset: -2.637 ms

# Below is generated by plot.py at 2018-01-16 02:12:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.15 Mbit/s
95th percentile per-packet one-way delay: 54.835 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 40.446 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 54.835 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 93.368 ms
Loss rate: 0.00%
```

Run 2: Report of WebRTC media — Data Link

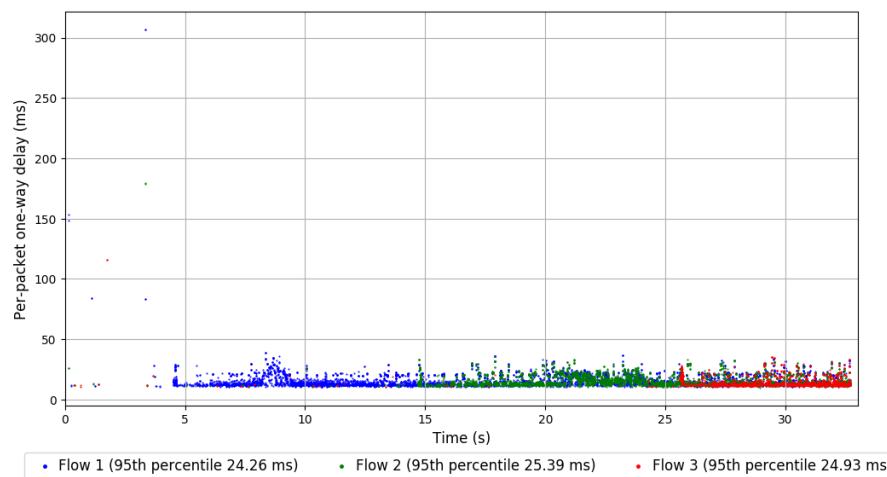
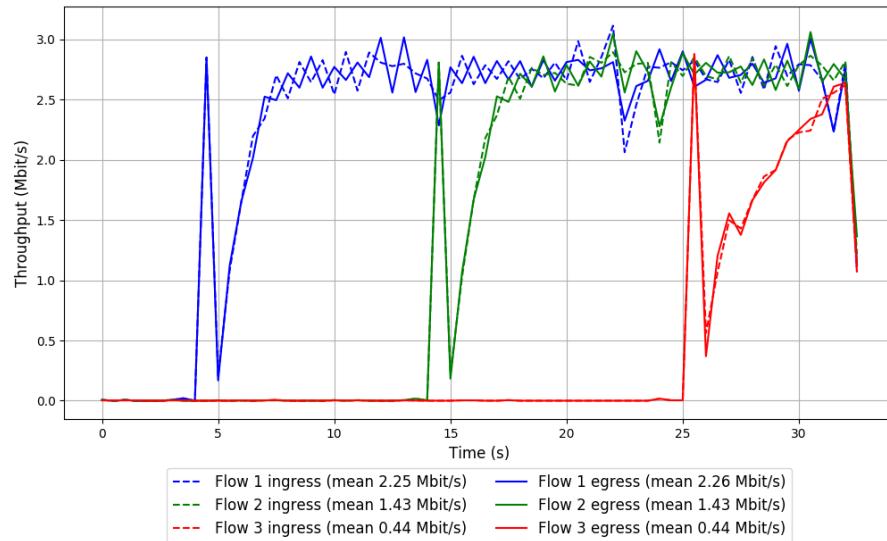


```
Run 3: Statistics of WebRTC media

Start at: 2018-01-16 02:07:13
End at: 2018-01-16 02:07:43
Local clock offset: 2.788 ms
Remote clock offset: -2.85 ms

# Below is generated by plot.py at 2018-01-16 02:12:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.13 Mbit/s
95th percentile per-packet one-way delay: 24.623 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 24.260 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.43 Mbit/s
95th percentile per-packet one-way delay: 25.392 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 24.934 ms
Loss rate: 0.00%
```

Run 3: Report of WebRTC media — Data Link

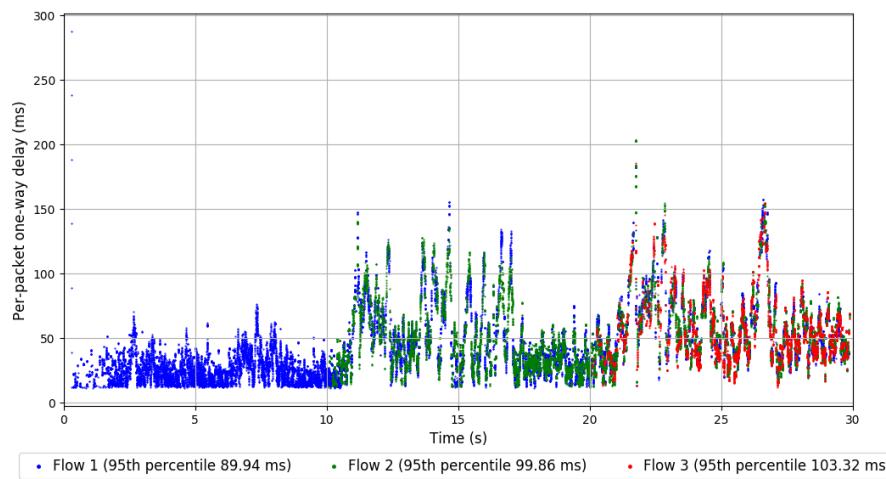
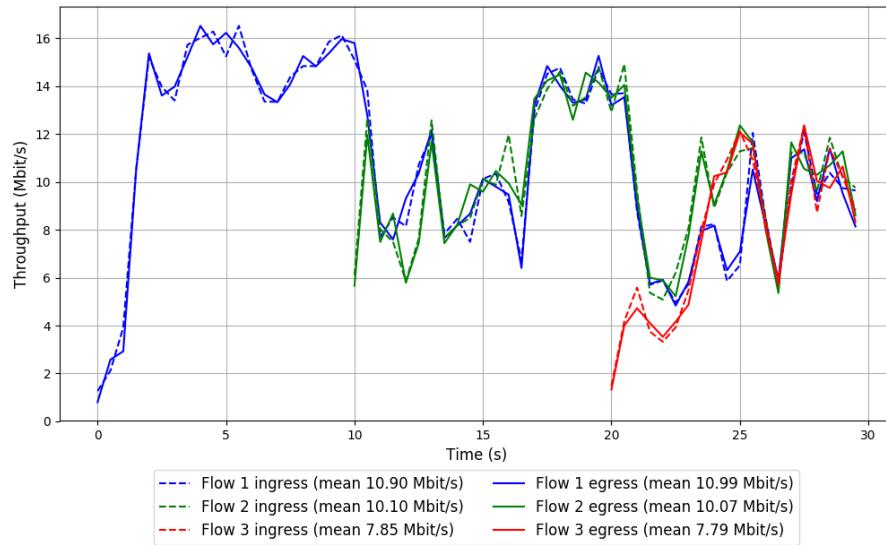


Run 1: Statistics of Sprout

```
Start at: 2018-01-16 01:25:25
End at: 2018-01-16 01:25:55
Local clock offset: 3.548 ms
Remote clock offset: -2.328 ms

# Below is generated by plot.py at 2018-01-16 02:12:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 20.32 Mbit/s
95th percentile per-packet one-way delay: 95.734 ms
Loss rate: 0.51%
-- Flow 1:
Average throughput: 10.99 Mbit/s
95th percentile per-packet one-way delay: 89.945 ms
Loss rate: 0.34%
-- Flow 2:
Average throughput: 10.07 Mbit/s
95th percentile per-packet one-way delay: 99.863 ms
Loss rate: 0.50%
-- Flow 3:
Average throughput: 7.79 Mbit/s
95th percentile per-packet one-way delay: 103.317 ms
Loss rate: 1.30%
```

## Run 1: Report of Sprout — Data Link

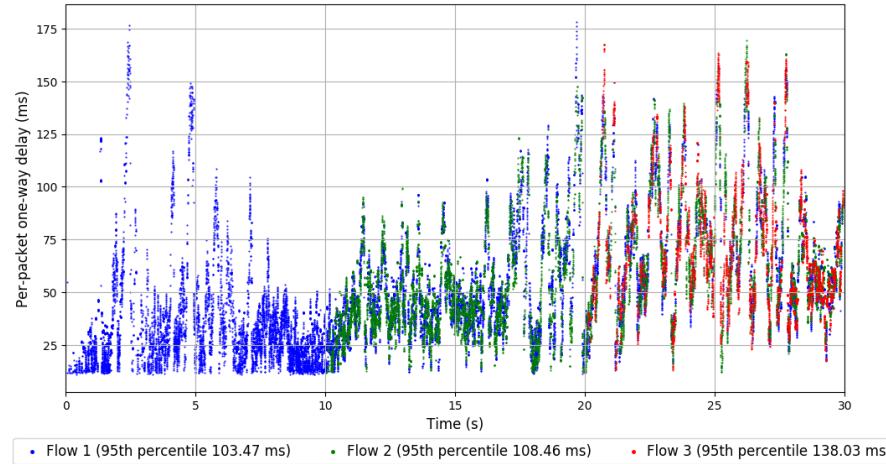
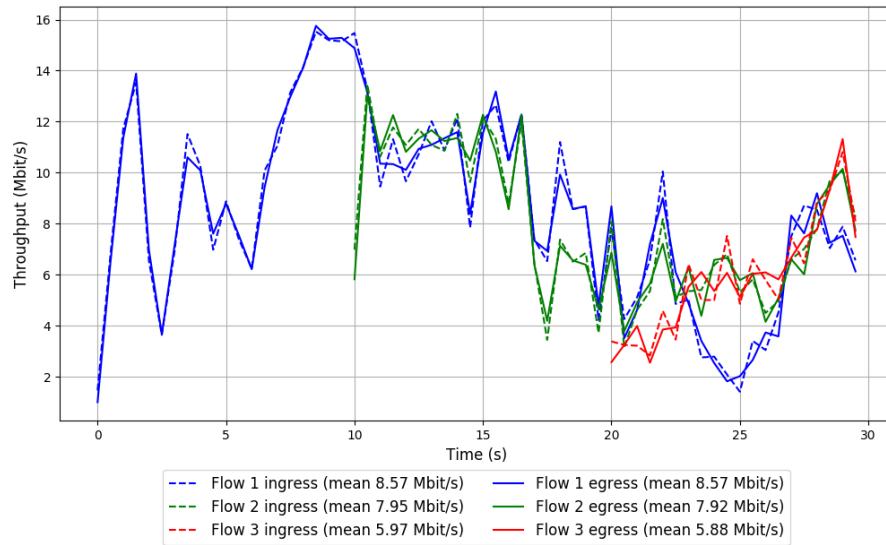


Run 2: Statistics of Sprout

```
Start at: 2018-01-16 01:43:17
End at: 2018-01-16 01:43:47
Local clock offset: 3.864 ms
Remote clock offset: -2.615 ms

# Below is generated by plot.py at 2018-01-16 02:12:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 15.78 Mbit/s
95th percentile per-packet one-way delay: 109.772 ms
Loss rate: 0.44%
-- Flow 1:
Average throughput: 8.57 Mbit/s
95th percentile per-packet one-way delay: 103.473 ms
Loss rate: 0.24%
-- Flow 2:
Average throughput: 7.92 Mbit/s
95th percentile per-packet one-way delay: 108.458 ms
Loss rate: 0.42%
-- Flow 3:
Average throughput: 5.88 Mbit/s
95th percentile per-packet one-way delay: 138.025 ms
Loss rate: 1.37%
```

## Run 2: Report of Sprout — Data Link

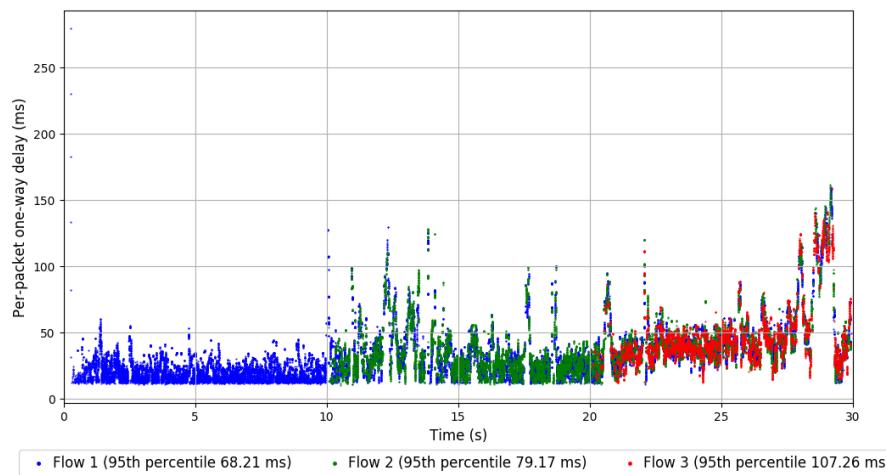
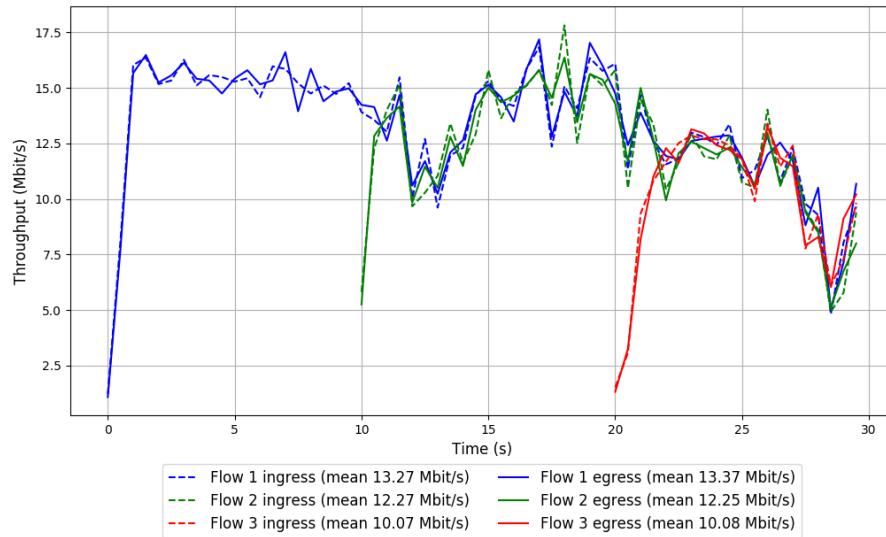


Run 3: Statistics of Sprout

```
Start at: 2018-01-16 02:01:13
End at: 2018-01-16 02:01:43
Local clock offset: 3.198 ms
Remote clock offset: -2.744 ms

# Below is generated by plot.py at 2018-01-16 02:12:57
# Datalink statistics
-- Total of 3 flows:
Average throughput: 24.93 Mbit/s
95th percentile per-packet one-way delay: 74.925 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 13.37 Mbit/s
95th percentile per-packet one-way delay: 68.208 ms
Loss rate: 0.04%
-- Flow 2:
Average throughput: 12.25 Mbit/s
95th percentile per-packet one-way delay: 79.174 ms
Loss rate: 0.34%
-- Flow 3:
Average throughput: 10.08 Mbit/s
95th percentile per-packet one-way delay: 107.259 ms
Loss rate: 0.02%
```

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

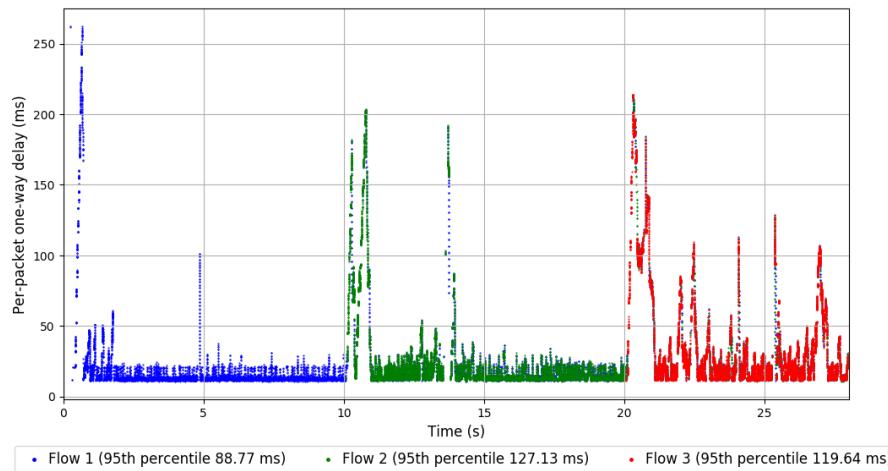
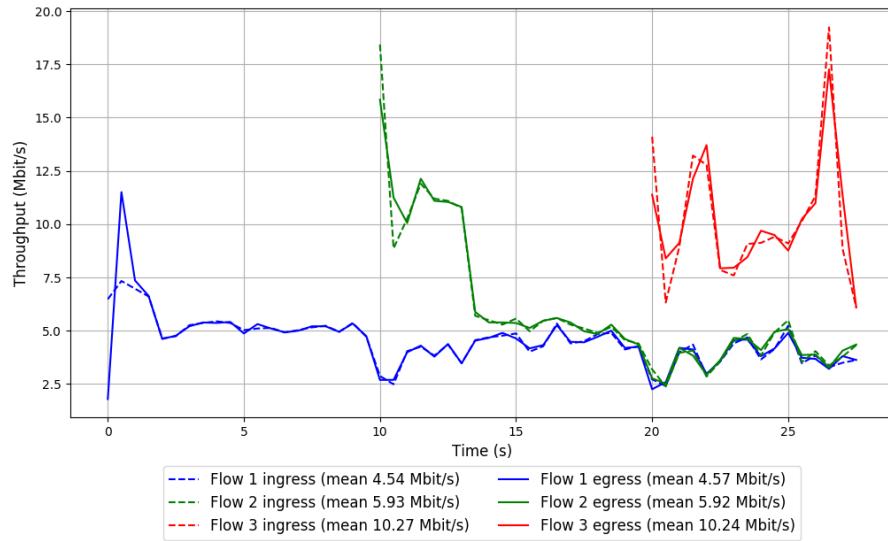


Run 1: Statistics of TaoVA-100x

```
Start at: 2018-01-16 01:23:00
End at: 2018-01-16 01:23:30
Local clock offset: 3.153 ms
Remote clock offset: -2.279 ms

# Below is generated by plot.py at 2018-01-16 02:12:57
# Datalink statistics
-- Total of 3 flows:
Average throughput: 11.35 Mbit/s
95th percentile per-packet one-way delay: 109.140 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 4.57 Mbit/s
95th percentile per-packet one-way delay: 88.769 ms
Loss rate: 0.03%
-- Flow 2:
Average throughput: 5.92 Mbit/s
95th percentile per-packet one-way delay: 127.127 ms
Loss rate: 0.05%
-- Flow 3:
Average throughput: 10.24 Mbit/s
95th percentile per-packet one-way delay: 119.636 ms
Loss rate: 0.13%
```

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

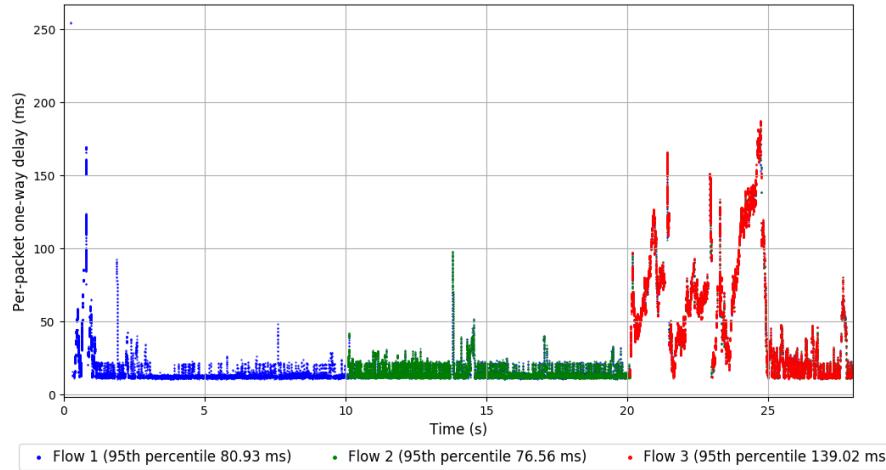
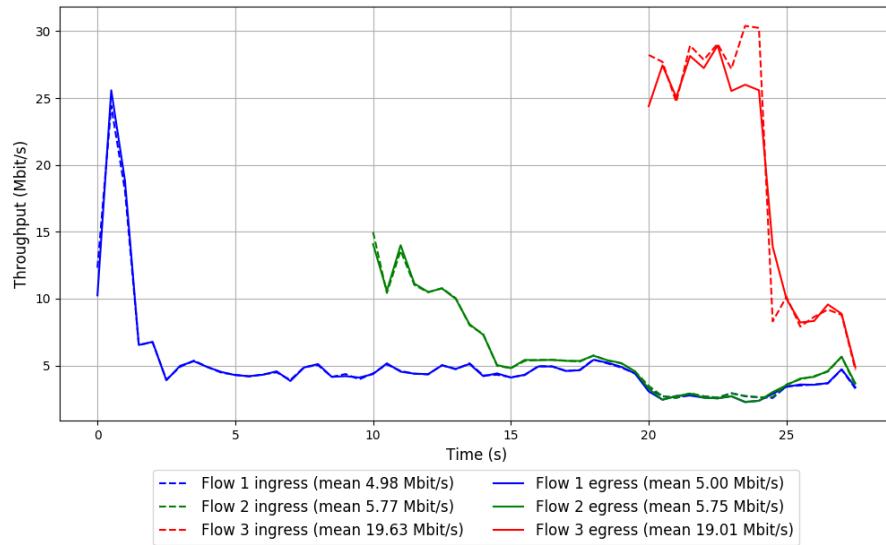


Run 2: Statistics of TaoVA-100x

```
Start at: 2018-01-16 01:40:53
End at: 2018-01-16 01:41:23
Local clock offset: 3.866 ms
Remote clock offset: -2.584 ms

# Below is generated by plot.py at 2018-01-16 02:12:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 14.17 Mbit/s
95th percentile per-packet one-way delay: 126.091 ms
Loss rate: 1.50%
-- Flow 1:
Average throughput: 5.00 Mbit/s
95th percentile per-packet one-way delay: 80.934 ms
Loss rate: 0.39%
-- Flow 2:
Average throughput: 5.75 Mbit/s
95th percentile per-packet one-way delay: 76.556 ms
Loss rate: 0.49%
-- Flow 3:
Average throughput: 19.01 Mbit/s
95th percentile per-packet one-way delay: 139.018 ms
Loss rate: 3.17%
```

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

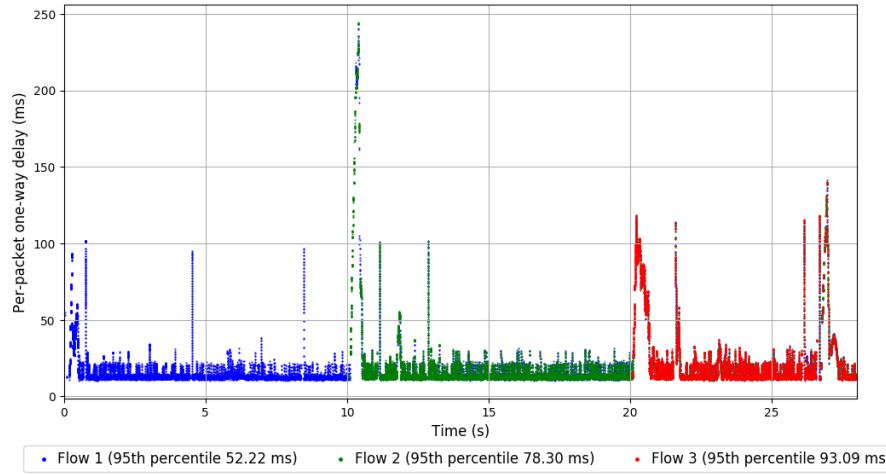
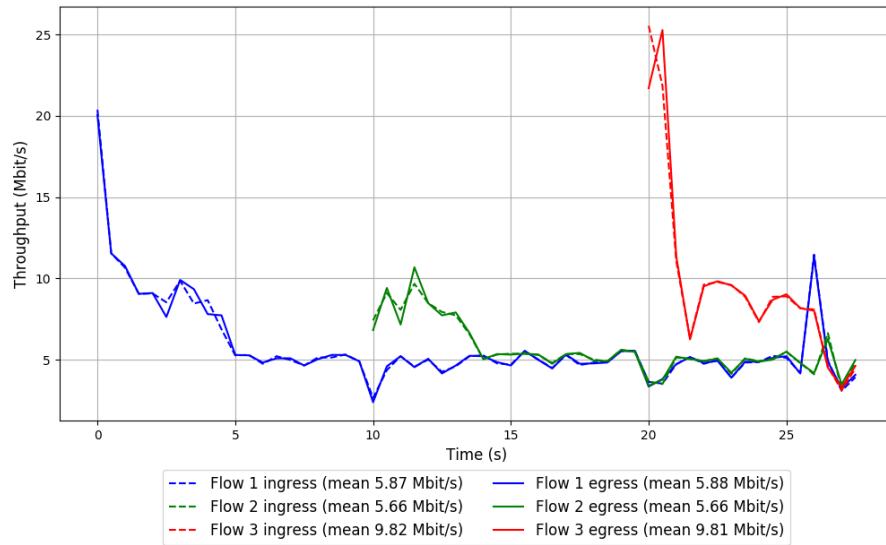


Run 3: Statistics of TaoVA-100x

```
Start at: 2018-01-16 01:58:49
End at: 2018-01-16 01:59:19
Local clock offset: 3.517 ms
Remote clock offset: -2.686 ms

# Below is generated by plot.py at 2018-01-16 02:12:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 12.31 Mbit/s
95th percentile per-packet one-way delay: 78.691 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 5.88 Mbit/s
95th percentile per-packet one-way delay: 52.223 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 5.66 Mbit/s
95th percentile per-packet one-way delay: 78.300 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 9.81 Mbit/s
95th percentile per-packet one-way delay: 93.087 ms
Loss rate: 0.00%
```

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

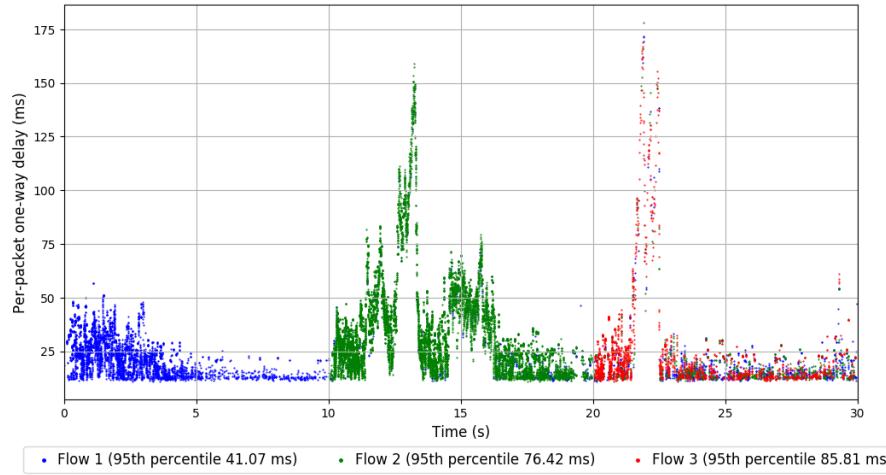
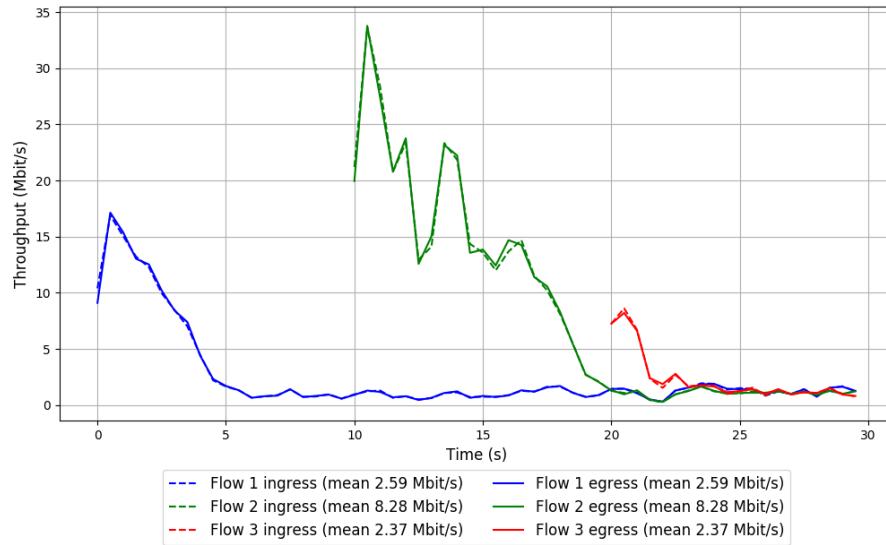


Run 1: Statistics of TCP Vegas

```
Start at: 2018-01-16 01:32:33
End at: 2018-01-16 01:33:03
Local clock offset: 4.053 ms
Remote clock offset: -2.294 ms

# Below is generated by plot.py at 2018-01-16 02:12:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 8.87 Mbit/s
95th percentile per-packet one-way delay: 66.849 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.59 Mbit/s
95th percentile per-packet one-way delay: 41.074 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 8.28 Mbit/s
95th percentile per-packet one-way delay: 76.425 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 2.37 Mbit/s
95th percentile per-packet one-way delay: 85.809 ms
Loss rate: 0.00%
```

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

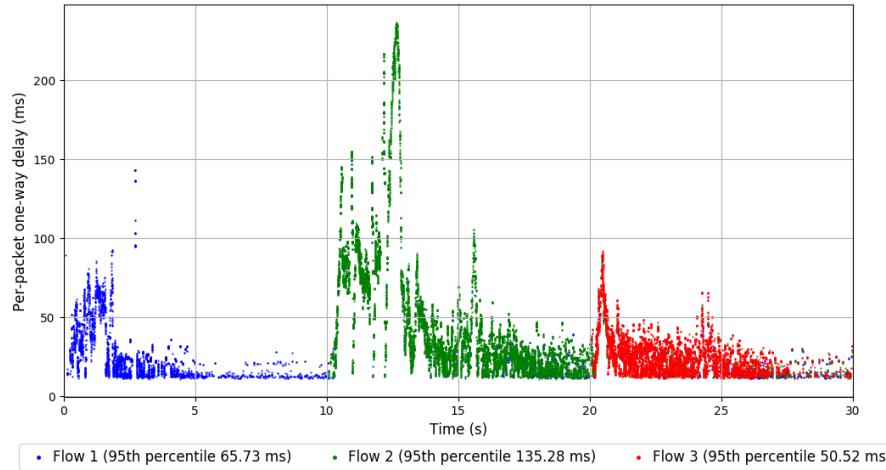
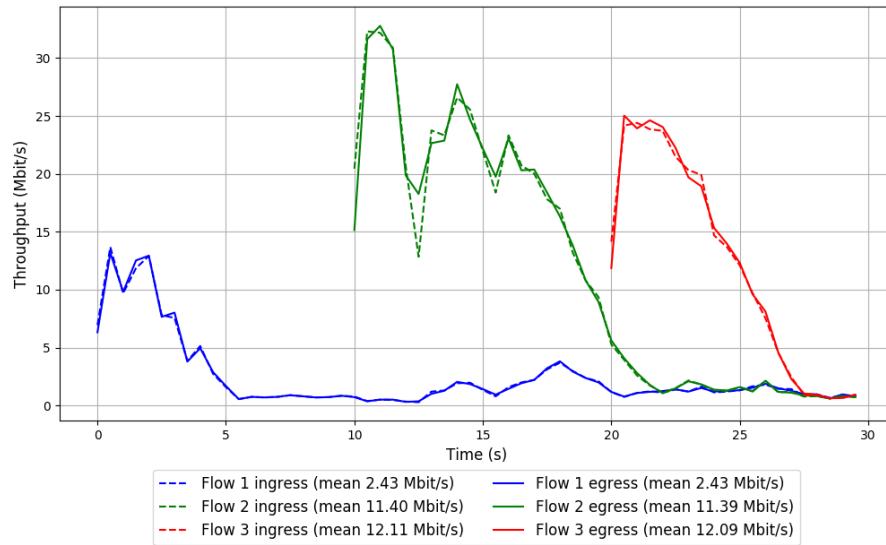


Run 2: Statistics of TCP Vegas

```
Start at: 2018-01-16 01:50:27
End at: 2018-01-16 01:50:57
Local clock offset: 3.672 ms
Remote clock offset: -2.66 ms

# Below is generated by plot.py at 2018-01-16 02:13:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 14.06 Mbit/s
95th percentile per-packet one-way delay: 102.822 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.43 Mbit/s
95th percentile per-packet one-way delay: 65.729 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 11.39 Mbit/s
95th percentile per-packet one-way delay: 135.277 ms
Loss rate: 0.01%
-- Flow 3:
Average throughput: 12.09 Mbit/s
95th percentile per-packet one-way delay: 50.519 ms
Loss rate: 0.00%
```

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

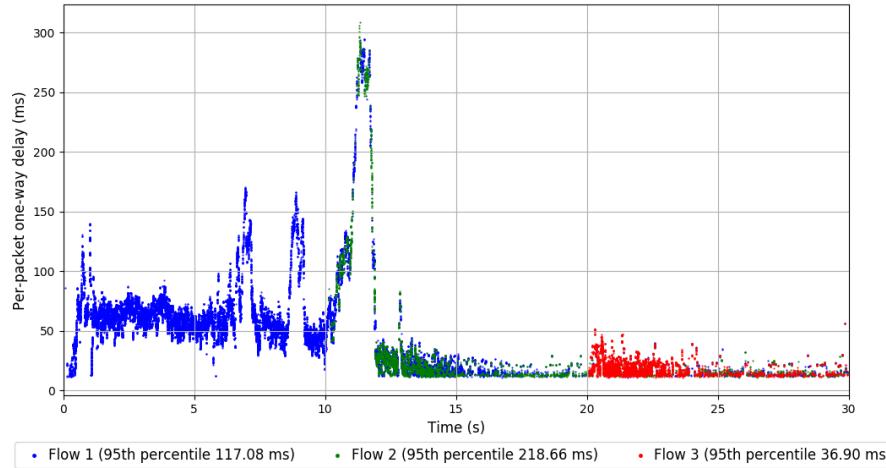
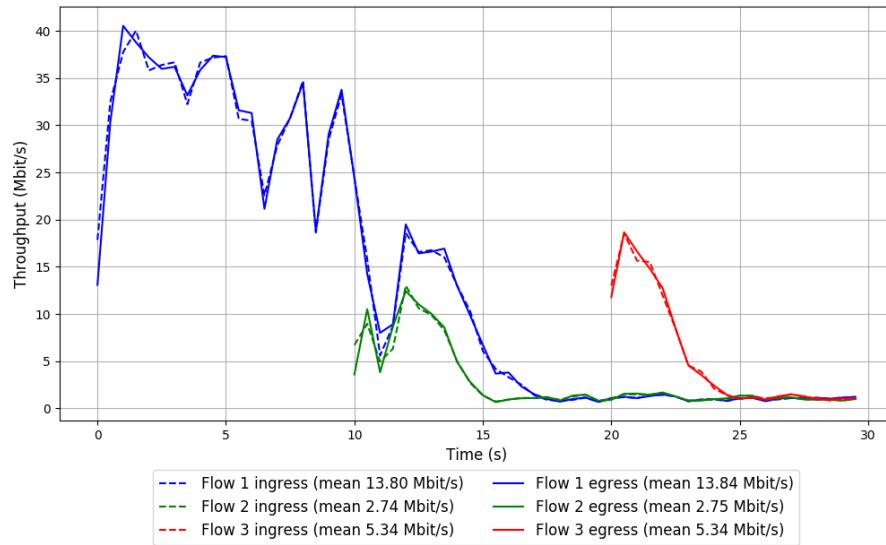


Run 3: Statistics of TCP Vegas

```
Start at: 2018-01-16 02:08:24
End at: 2018-01-16 02:08:54
Local clock offset: 2.645 ms
Remote clock offset: -2.853 ms

# Below is generated by plot.py at 2018-01-16 02:13:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 17.44 Mbit/s
95th percentile per-packet one-way delay: 117.761 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 13.84 Mbit/s
95th percentile per-packet one-way delay: 117.083 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.75 Mbit/s
95th percentile per-packet one-way delay: 218.659 ms
Loss rate: 0.02%
-- Flow 3:
Average throughput: 5.34 Mbit/s
95th percentile per-packet one-way delay: 36.900 ms
Loss rate: 0.00%
```

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

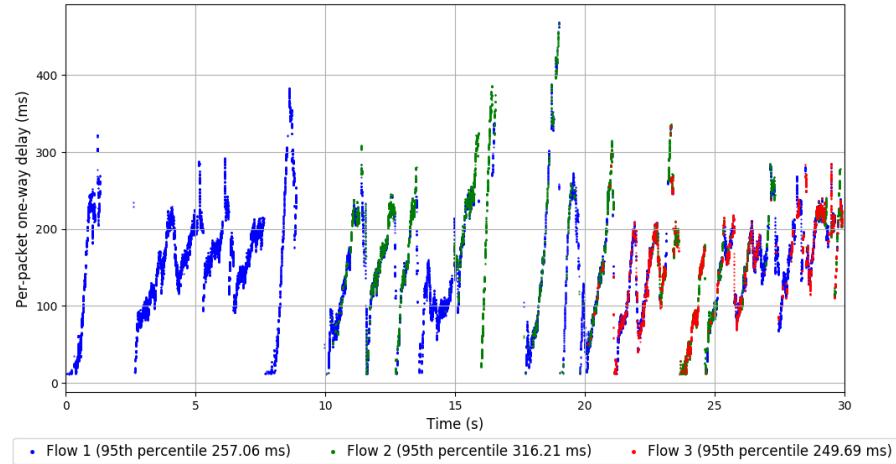
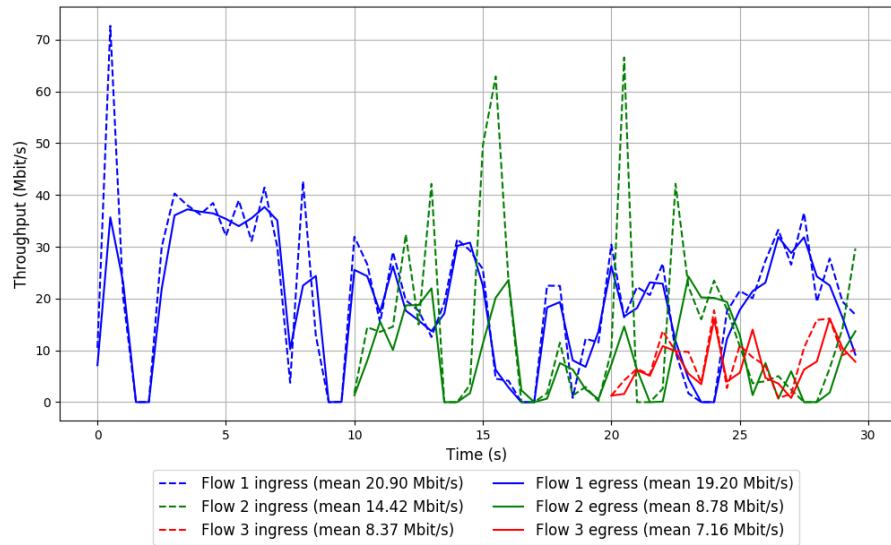


Run 1: Statistics of Verus

```
Start at: 2018-01-16 01:19:25
End at: 2018-01-16 01:19:55
Local clock offset: 2.799 ms
Remote clock offset: -2.399 ms

# Below is generated by plot.py at 2018-01-16 02:13:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 27.39 Mbit/s
95th percentile per-packet one-way delay: 270.373 ms
Loss rate: 17.40%
-- Flow 1:
Average throughput: 19.20 Mbit/s
95th percentile per-packet one-way delay: 257.059 ms
Loss rate: 8.15%
-- Flow 2:
Average throughput: 8.78 Mbit/s
95th percentile per-packet one-way delay: 316.212 ms
Loss rate: 38.53%
-- Flow 3:
Average throughput: 7.16 Mbit/s
95th percentile per-packet one-way delay: 249.688 ms
Loss rate: 14.81%
```

## Run 1: Report of Verus — Data Link

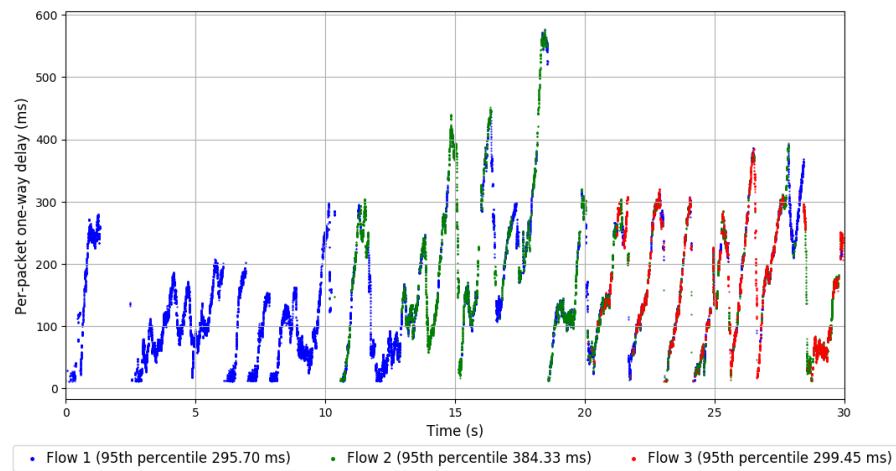
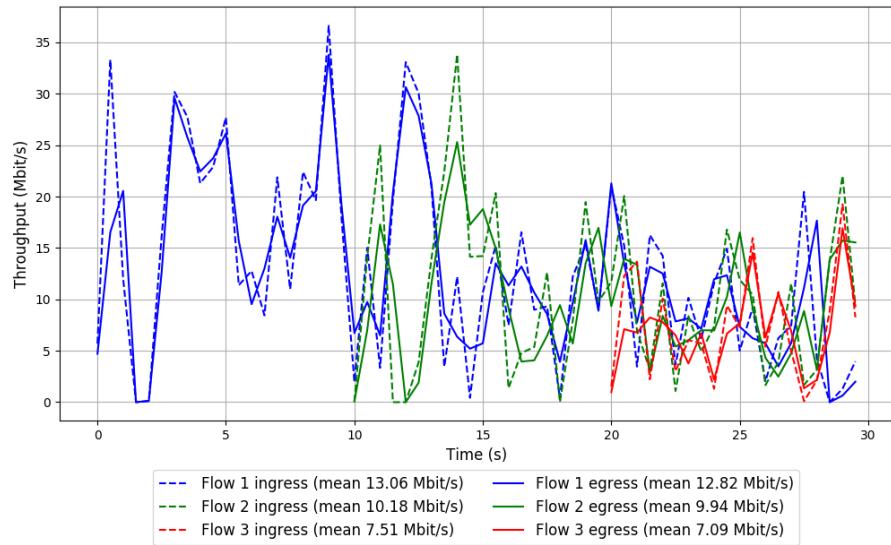


Run 2: Statistics of Verus

```
Start at: 2018-01-16 01:37:18
End at: 2018-01-16 01:37:48
Local clock offset: 4.065 ms
Remote clock offset: -2.483 ms

# Below is generated by plot.py at 2018-01-16 02:13:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 21.68 Mbit/s
95th percentile per-packet one-way delay: 318.831 ms
Loss rate: 2.76%
-- Flow 1:
Average throughput: 12.82 Mbit/s
95th percentile per-packet one-way delay: 295.699 ms
Loss rate: 1.98%
-- Flow 2:
Average throughput: 9.94 Mbit/s
95th percentile per-packet one-way delay: 384.329 ms
Loss rate: 3.05%
-- Flow 3:
Average throughput: 7.09 Mbit/s
95th percentile per-packet one-way delay: 299.452 ms
Loss rate: 6.08%
```

## Run 2: Report of Verus — Data Link

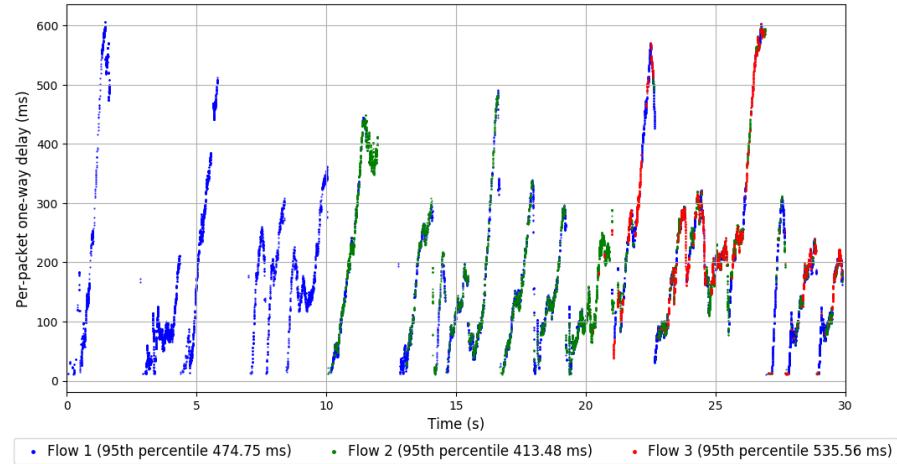
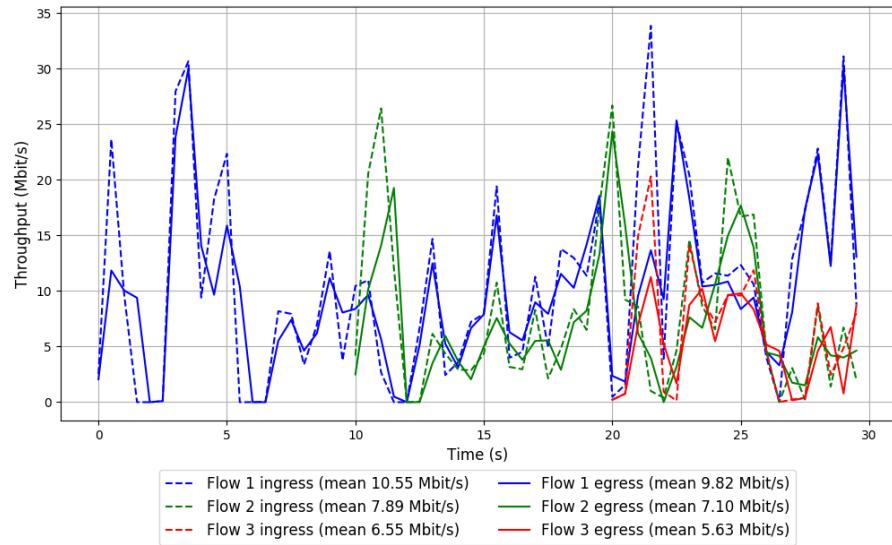


Run 3: Statistics of Verus

```
Start at: 2018-01-16 01:55:13
End at: 2018-01-16 01:55:43
Local clock offset: 3.839 ms
Remote clock offset: -2.74 ms

# Below is generated by plot.py at 2018-01-16 02:13:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 16.36 Mbit/s
95th percentile per-packet one-way delay: 464.692 ms
Loss rate: 8.48%
-- Flow 1:
Average throughput: 9.82 Mbit/s
95th percentile per-packet one-way delay: 474.749 ms
Loss rate: 6.66%
-- Flow 2:
Average throughput: 7.10 Mbit/s
95th percentile per-packet one-way delay: 413.479 ms
Loss rate: 9.59%
-- Flow 3:
Average throughput: 5.63 Mbit/s
95th percentile per-packet one-way delay: 535.564 ms
Loss rate: 14.69%
```

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

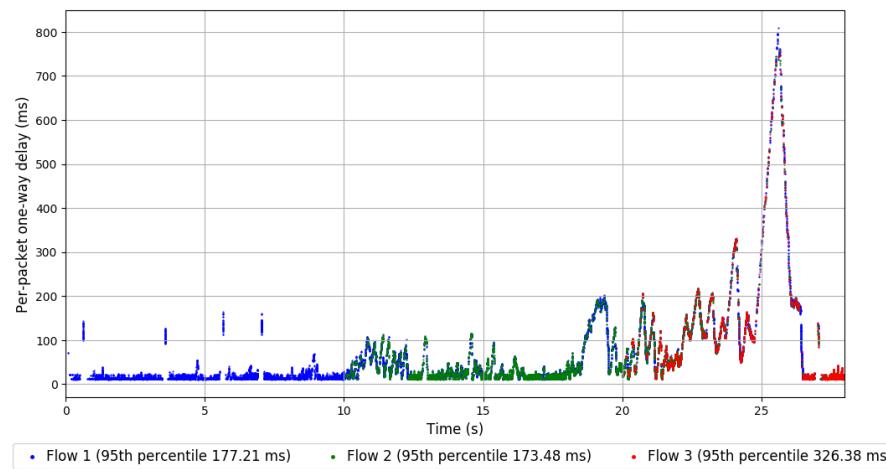
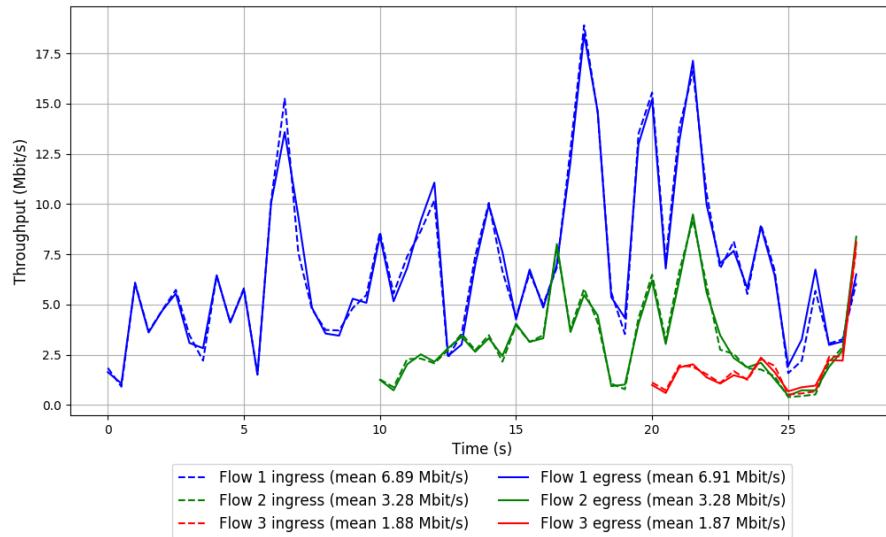


Run 1: Statistics of Copa

```
Start at: 2018-01-16 01:33:44
End at: 2018-01-16 01:34:14
Local clock offset: 4.045 ms
Remote clock offset: -2.417 ms

# Below is generated by plot.py at 2018-01-16 02:13:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 9.55 Mbit/s
95th percentile per-packet one-way delay: 180.683 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 6.91 Mbit/s
95th percentile per-packet one-way delay: 177.207 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 3.28 Mbit/s
95th percentile per-packet one-way delay: 173.480 ms
Loss rate: 0.13%
-- Flow 3:
Average throughput: 1.87 Mbit/s
95th percentile per-packet one-way delay: 326.385 ms
Loss rate: 0.35%
```

## Run 1: Report of Copa — Data Link

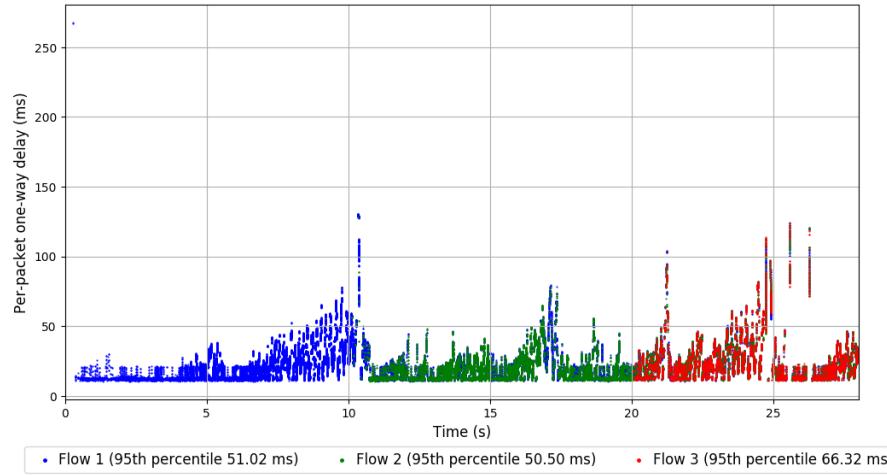
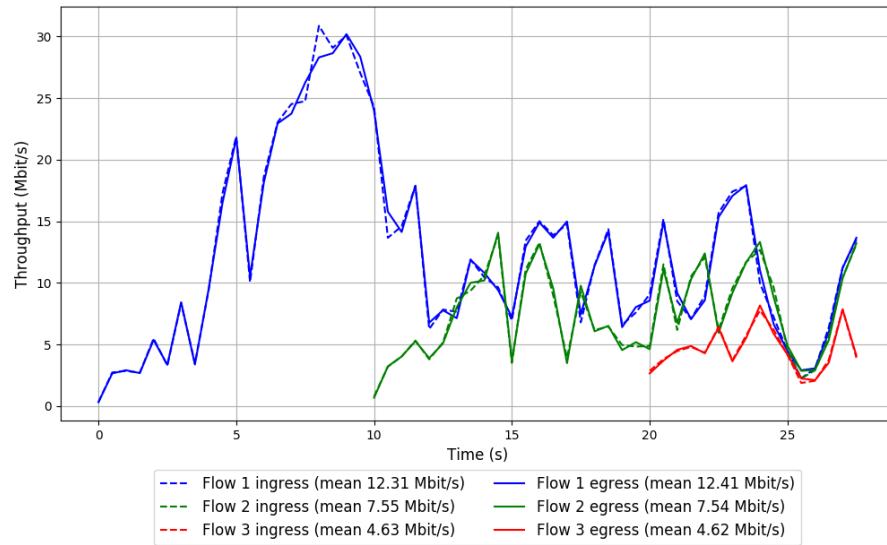


Run 2: Statistics of Copa

```
Start at: 2018-01-16 01:51:39
End at: 2018-01-16 01:52:09
Local clock offset: 3.765 ms
Remote clock offset: -2.679 ms

# Below is generated by plot.py at 2018-01-16 02:13:28
# Datalink statistics
-- Total of 3 flows:
Average throughput: 18.62 Mbit/s
95th percentile per-packet one-way delay: 51.946 ms
Loss rate: 0.08%
-- Flow 1:
Average throughput: 12.41 Mbit/s
95th percentile per-packet one-way delay: 51.025 ms
Loss rate: 0.05%
-- Flow 2:
Average throughput: 7.54 Mbit/s
95th percentile per-packet one-way delay: 50.496 ms
Loss rate: 0.12%
-- Flow 3:
Average throughput: 4.62 Mbit/s
95th percentile per-packet one-way delay: 66.320 ms
Loss rate: 0.17%
```

## Run 2: Report of Copa — Data Link

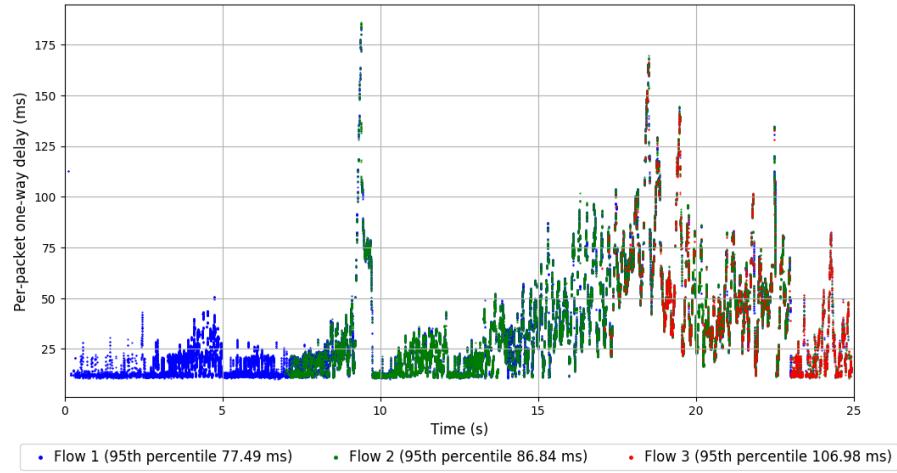
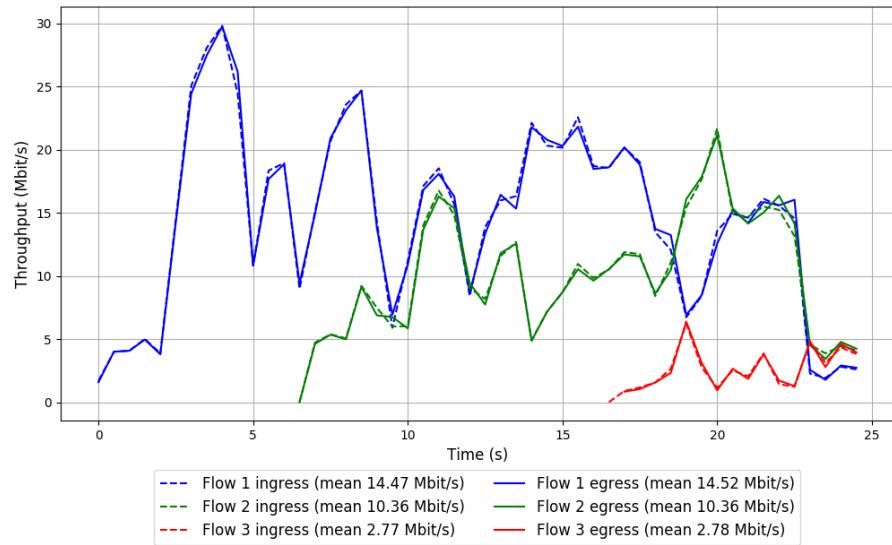


Run 3: Statistics of Copa

```
Start at: 2018-01-16 02:09:35
End at: 2018-01-16 02:10:05
Local clock offset: 2.56 ms
Remote clock offset: -2.872 ms

# Below is generated by plot.py at 2018-01-16 02:13:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 22.89 Mbit/s
95th percentile per-packet one-way delay: 81.453 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 14.52 Mbit/s
95th percentile per-packet one-way delay: 77.494 ms
Loss rate: 0.01%
-- Flow 2:
Average throughput: 10.36 Mbit/s
95th percentile per-packet one-way delay: 86.842 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 2.78 Mbit/s
95th percentile per-packet one-way delay: 106.985 ms
Loss rate: 0.00%
```

### Run 3: Report of Copa — Data Link

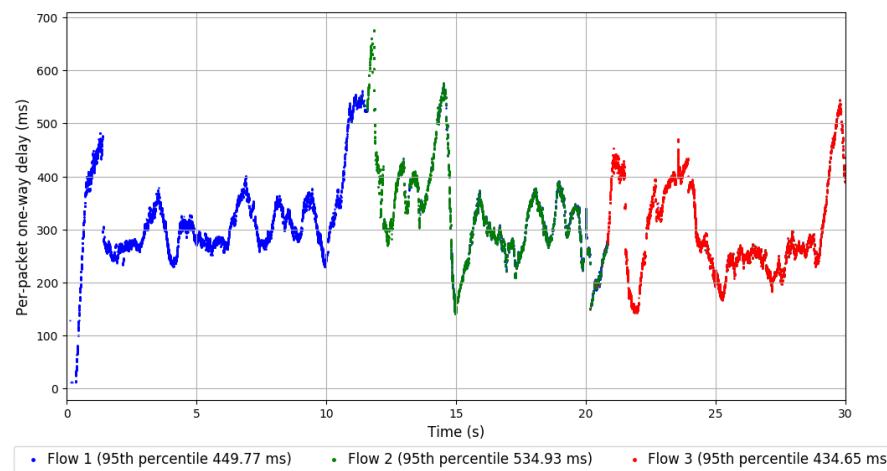
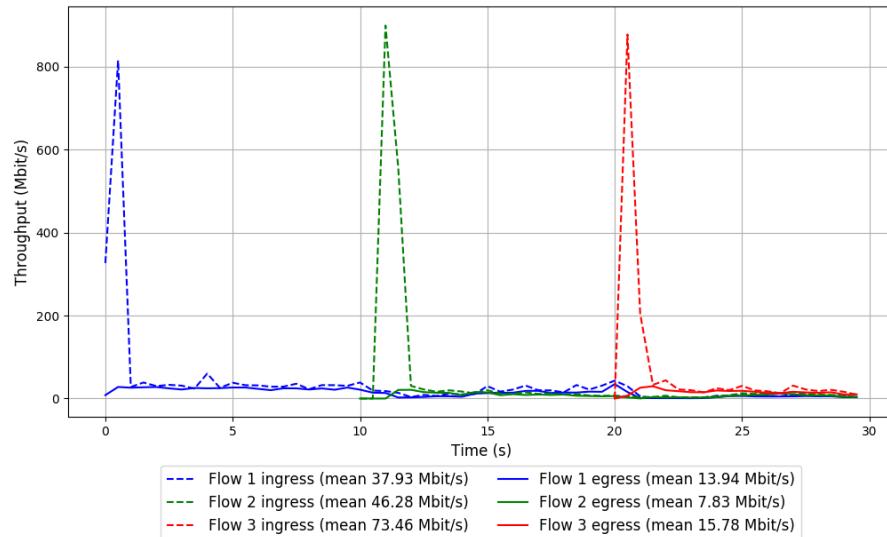


```
Run 1: Statistics of FillP

Start at: 2018-01-16 01:24:12
End at: 2018-01-16 01:24:42
Local clock offset: 3.398 ms
Remote clock offset: -2.326 ms

# Below is generated by plot.py at 2018-01-16 02:13:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 24.27 Mbit/s
95th percentile per-packet one-way delay: 460.886 ms
Loss rate: 74.01%
-- Flow 1:
Average throughput: 13.94 Mbit/s
95th percentile per-packet one-way delay: 449.774 ms
Loss rate: 63.38%
-- Flow 2:
Average throughput: 7.83 Mbit/s
95th percentile per-packet one-way delay: 534.932 ms
Loss rate: 83.34%
-- Flow 3:
Average throughput: 15.78 Mbit/s
95th percentile per-packet one-way delay: 434.654 ms
Loss rate: 78.78%
```

## Run 1: Report of FillP — Data Link

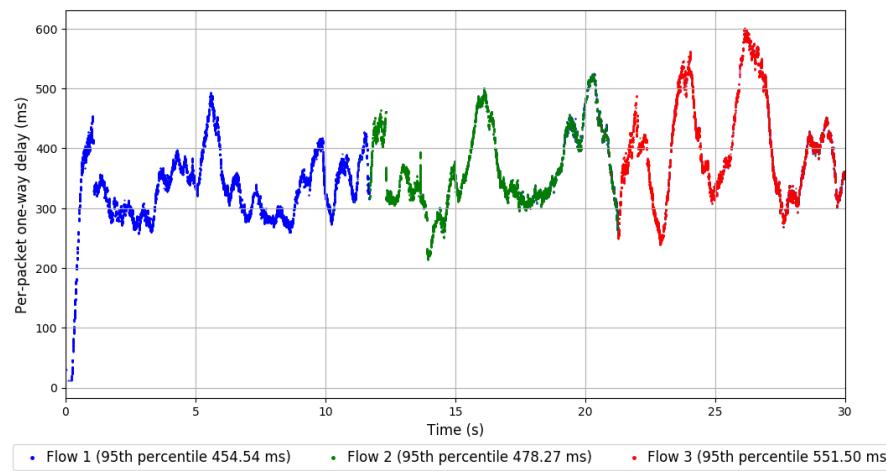
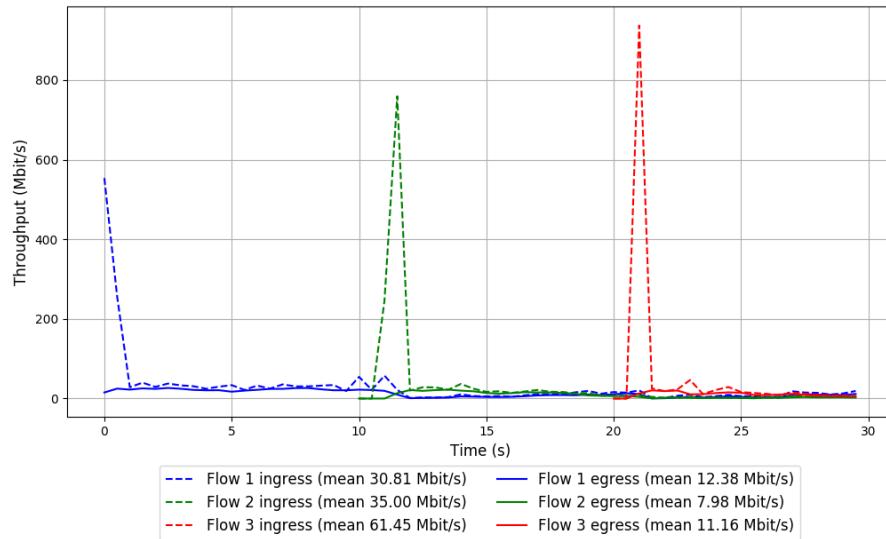


Run 2: Statistics of FillP

```
Start at: 2018-01-16 01:42:05
End at: 2018-01-16 01:42:35
Local clock offset: 3.903 ms
Remote clock offset: -2.599 ms

# Below is generated by plot.py at 2018-01-16 02:13:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 21.16 Mbit/s
95th percentile per-packet one-way delay: 491.096 ms
Loss rate: 71.60%
-- Flow 1:
Average throughput: 12.38 Mbit/s
95th percentile per-packet one-way delay: 454.536 ms
Loss rate: 59.83%
-- Flow 2:
Average throughput: 7.98 Mbit/s
95th percentile per-packet one-way delay: 478.274 ms
Loss rate: 77.51%
-- Flow 3:
Average throughput: 11.16 Mbit/s
95th percentile per-packet one-way delay: 551.498 ms
Loss rate: 82.64%
```

## Run 2: Report of FillP — Data Link

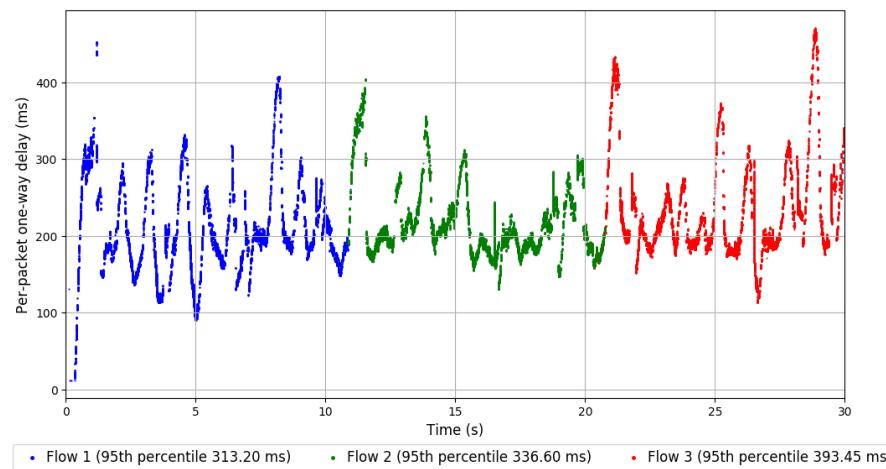
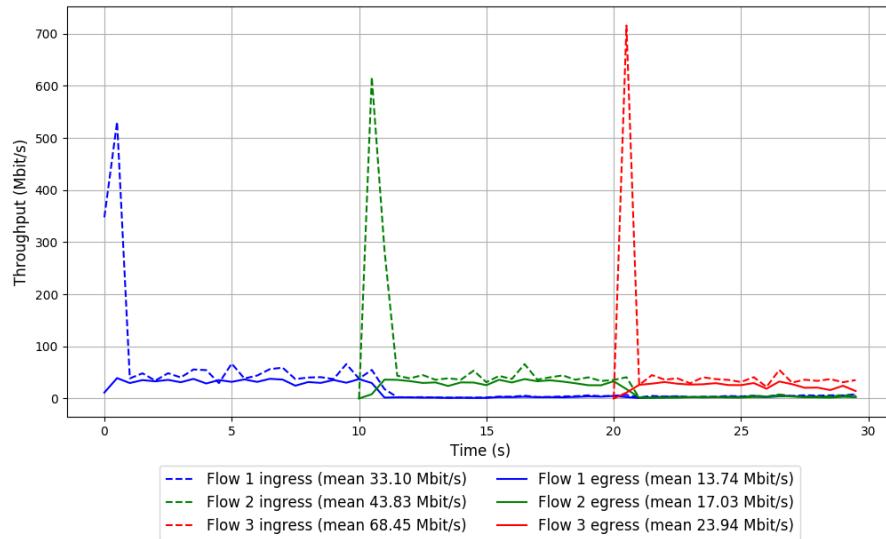


Run 3: Statistics of FillP

```
Start at: 2018-01-16 02:00:01
End at: 2018-01-16 02:00:31
Local clock offset: 3.408 ms
Remote clock offset: -2.703 ms

# Below is generated by plot.py at 2018-01-16 02:13:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 32.78 Mbit/s
95th percentile per-packet one-way delay: 337.782 ms
Loss rate: 61.57%
-- Flow 1:
Average throughput: 13.74 Mbit/s
95th percentile per-packet one-way delay: 313.202 ms
Loss rate: 58.64%
-- Flow 2:
Average throughput: 17.03 Mbit/s
95th percentile per-packet one-way delay: 336.595 ms
Loss rate: 61.73%
-- Flow 3:
Average throughput: 23.94 Mbit/s
95th percentile per-packet one-way delay: 393.446 ms
Loss rate: 65.63%
```

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

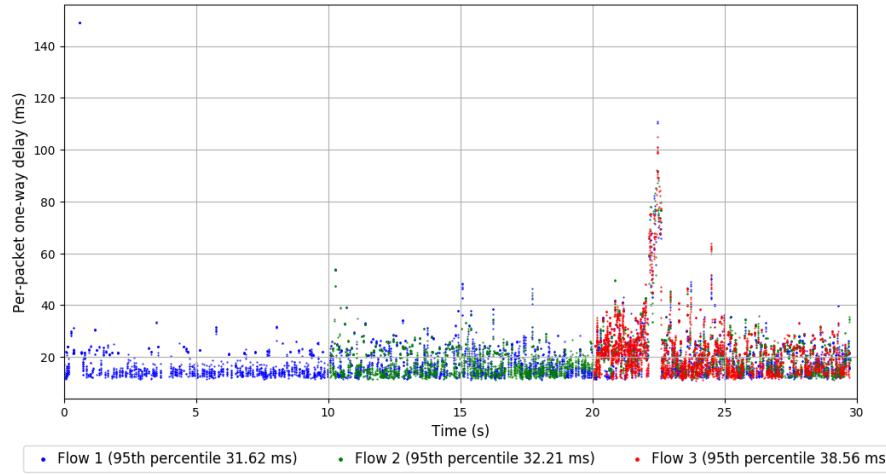
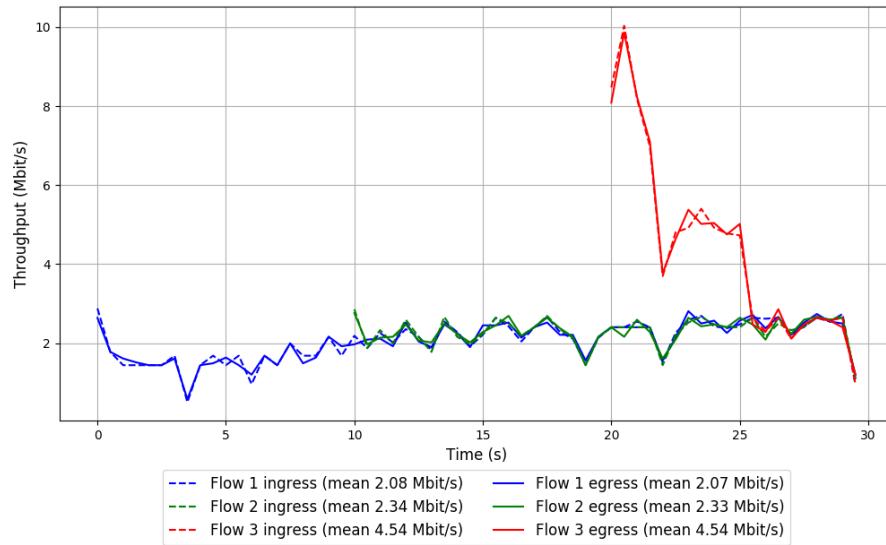


Run 1: Statistics of Indigo

```
Start at: 2018-01-16 01:26:36
End at: 2018-01-16 01:27:06
Local clock offset: 3.616 ms
Remote clock offset: -2.236 ms

# Below is generated by plot.py at 2018-01-16 02:13:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 5.10 Mbit/s
95th percentile per-packet one-way delay: 34.545 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 31.623 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 32.208 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 4.54 Mbit/s
95th percentile per-packet one-way delay: 38.561 ms
Loss rate: 0.00%
```

## Run 1: Report of Indigo — Data Link

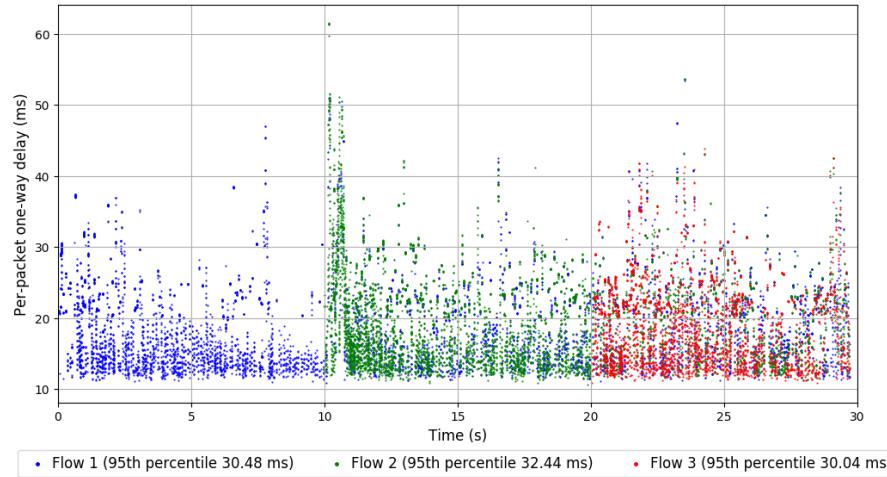
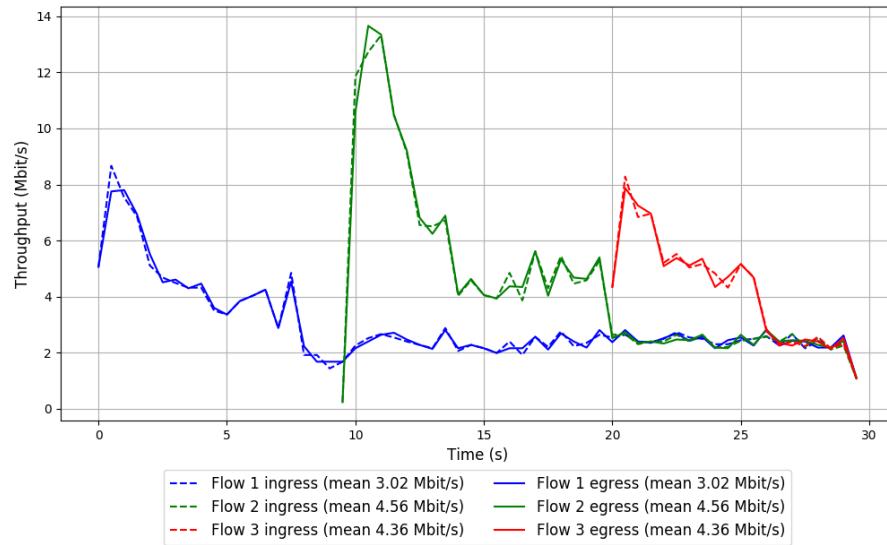


Run 2: Statistics of Indigo

```
Start at: 2018-01-16 01:44:29
End at: 2018-01-16 01:44:59
Local clock offset: 3.734 ms
Remote clock offset: -2.668 ms

# Below is generated by plot.py at 2018-01-16 02:13:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.47 Mbit/s
95th percentile per-packet one-way delay: 31.292 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 3.02 Mbit/s
95th percentile per-packet one-way delay: 30.480 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 4.56 Mbit/s
95th percentile per-packet one-way delay: 32.444 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 4.36 Mbit/s
95th percentile per-packet one-way delay: 30.035 ms
Loss rate: 0.00%
```

## Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

```
Start at: 2018-01-16 02:02:25
End at: 2018-01-16 02:02:55
Local clock offset: 3.194 ms
Remote clock offset: -2.658 ms

# Below is generated by plot.py at 2018-01-16 02:13:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 10.10 Mbit/s
95th percentile per-packet one-way delay: 48.572 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 3.50 Mbit/s
95th percentile per-packet one-way delay: 34.598 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 4.37 Mbit/s
95th percentile per-packet one-way delay: 45.879 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 11.37 Mbit/s
95th percentile per-packet one-way delay: 60.460 ms
Loss rate: 0.00%
```

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

