Pantheon Report

Generated at 2018-09-07 13:56:14 (UTC).

Data path: AWS India 1 on ens5 (*local*) →India cellular on ppp0 (*remote*).

Repeated the test of 18 congestion control schemes 3 times.

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

NTP offsets were measured against nets.org.sg and have been applied to correct the timestamps in logs.
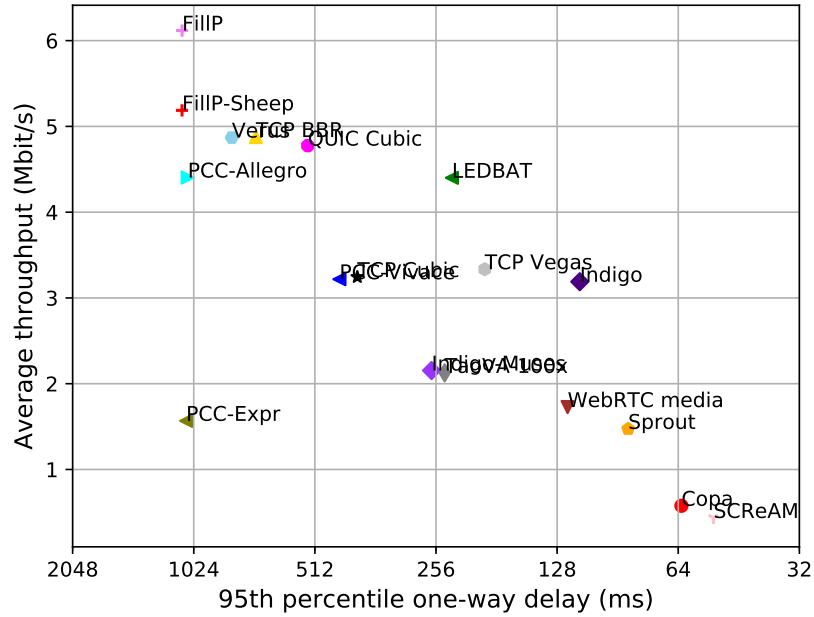
```
System info:
Linux 4.15.0-1020-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
net.ipv4.tcp_mem = 536870912 536870912 536870912
```
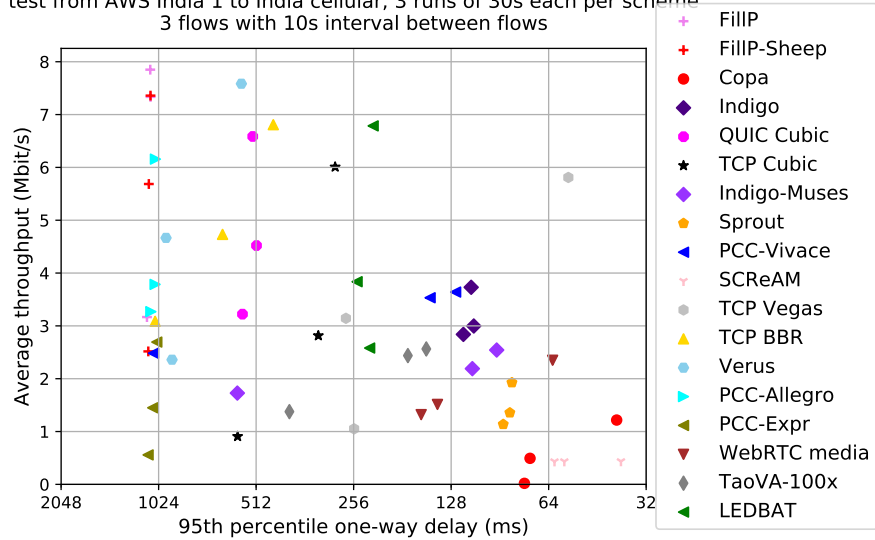
```
Git summary:
branch: muses @ e0a9b05ad97d268013b7cc9a9c95637b593a1b4c
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfe58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ 7631aea3923a3598767c87765ae5103aca0678d3
third_party/pantheon-tunnel @ cbfce6db5ff5740dafe1771f813cd646339e1952
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/pcc-experimental @ cd43e34e3f5f5613e8acd08fab92c4eb24f974ab
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream-reproduce @ f099118d1421aa3131bf11ff1964974e1da3bdb2
 M src/ScreamClient
 M src/ScreamServer
third_party/sprout @ 366e35c6178b01e31d4a46ad18c74f9415f19a26
 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 @ 2baf86211435ae071a32f96b7d8c504587f5d7f4
third_party/webrtc @ 3f0cc2a9061a41b6f9dde4735770d143a1fa2851
```

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

test from AWS India 1 to India cellular, 3 runs of 30s each per scheme
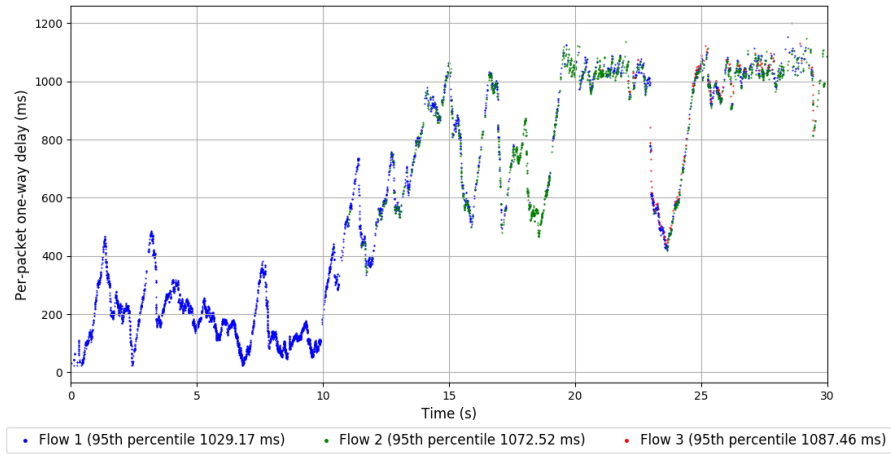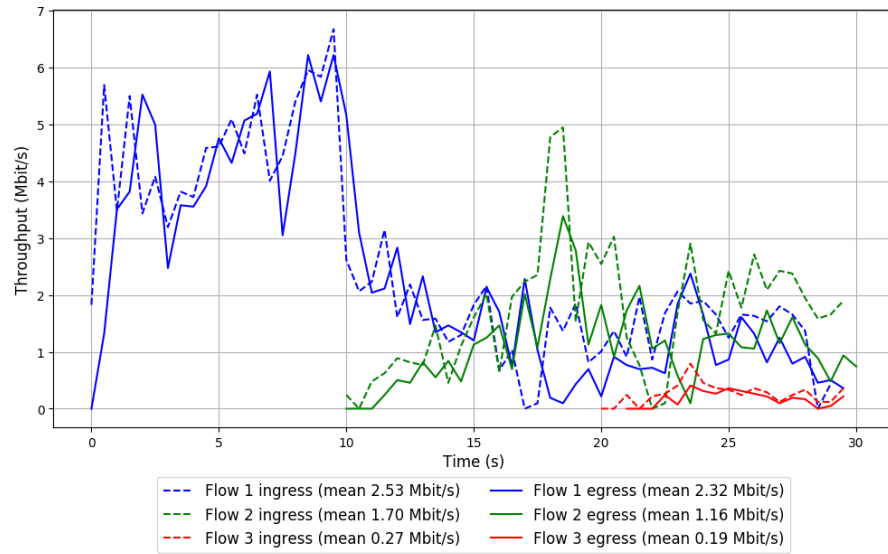## 3 flows with 10s interval between flows

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	3.12	2.05	1.27	658.86	740.79	817.09	3.09	11.94	14.79
Copa	3	0.00	0.64	0.48	46.17	62.38	78.86	98.21	50.98	62.64
TCP Cubic	3	1.93	1.31	1.35	344.89	420.32	481.08	0.82	1.44	2.70
FillP	3	4.22	2.32	1.44	1088.36	1098.94	1097.66	61.03	41.85	62.07
FillP-Sheep	3	2.19	3.81	1.92	1100.35	1088.33	1095.33	37.79	48.04	65.82
Indigo	3	1.65	1.55	1.56	94.19	133.62	123.30	0.06	0.14	0.38
LEDBAT	3	3.14	1.52	0.76	218.93	244.95	280.95	0.32	0.37	1.65
Indigo-Muses	3	1.04	1.03	1.34	195.46	242.84	292.74	0.30	0.31	1.31
PCC-Allegro	3	2.68	1.76	1.73	1038.28	1069.10	1082.62	12.80	20.98	47.21
PCC-Expr	3	0.75	0.67	1.22	360.83	802.52	1078.44	74.77	76.57	79.32
QUIC Cubic	3	2.88	2.30	1.17	500.66	552.40	627.20	0.97	1.76	4.31
SCReAM	3	0.22	0.22	0.22	48.13	45.61	52.28	0.08	0.06	0.35
Sprout	3	0.87	0.54	0.75	72.07	96.05	97.95	0.31	0.25	0.70
TaoVA-100x	3	1.56	0.58	0.54	220.93	227.06	219.26	47.08	67.95	69.95
TCP Vegas	3	1.92	1.35	1.56	200.67	159.62	197.18	0.19	0.22	0.73
Verus	3	3.59	1.62	0.74	834.25	777.79	722.78	3.31	2.67	4.96
PCC-Vivace	3	1.61	1.55	1.84	434.63	465.76	451.17	6.72	11.61	15.03
WebRTC media	3	0.84	0.61	0.28	135.52	115.87	92.52	0.10	0.06	0.40

```
Run 1: Statistics of TCP BBR

Start at: 2018-09-07 13:14:06
End at: 2018-09-07 13:14:36
Local clock offset: 0.653 ms
Remote clock offset: -2.698 ms


# Below is generated by plot.py at 2018-09-07 13:55:26
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.09 Mbit/s
95th percentile per-packet one-way delay: 1049.560 ms
Loss rate: 16.75%
-- Flow 1:
Average throughput: 2.32 Mbit/s
95th percentile per-packet one-way delay: 1029.169 ms
Loss rate: 8.39%
-- Flow 2:
Average throughput: 1.16 Mbit/s
95th percentile per-packet one-way delay: 1072.519 ms
Loss rate: 33.30%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 1087.457 ms
Loss rate: 39.71%
```
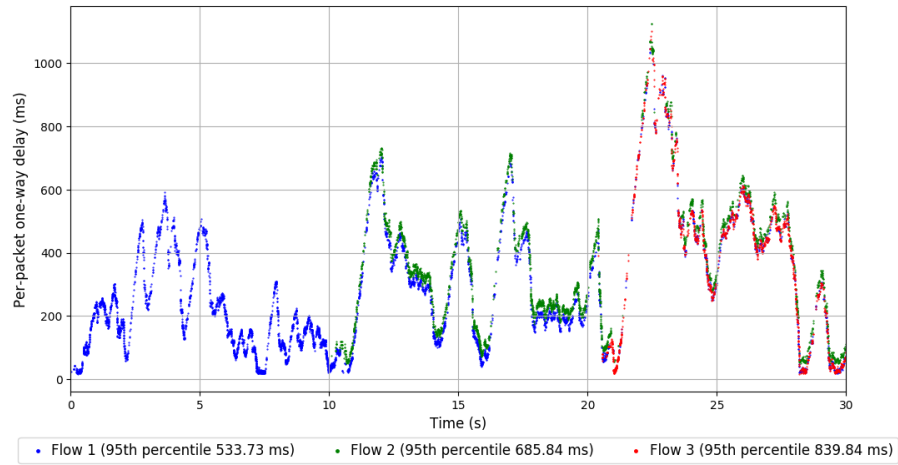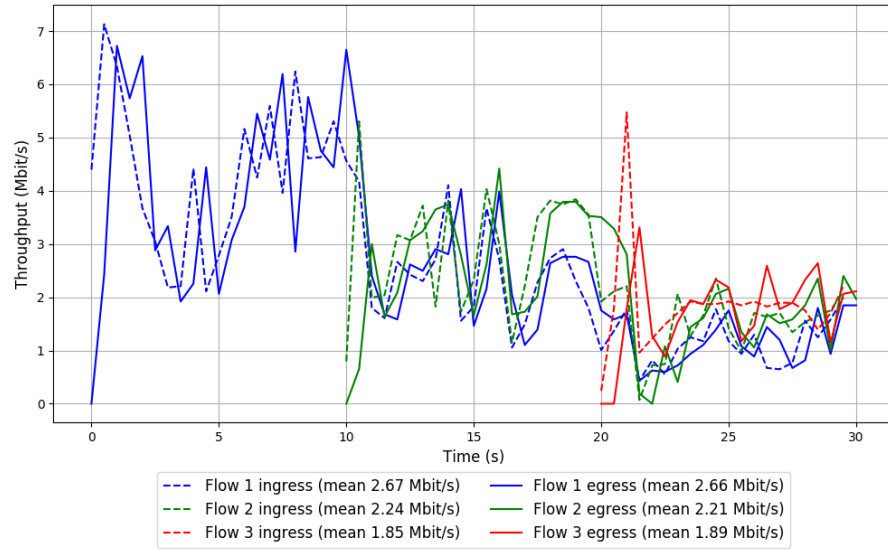
Run 1: Report of TCP BBR — Data Link

- - - - Flow 1 ingress (mean 2.53 Mbit/s) ——— Flow 1 egress (mean 2.32 Mbit/s)
- - - - Flow 2 ingress (mean 1.70 Mbit/s) ——— Flow 2 egress (mean 1.16 Mbit/s)
- - - - Flow 3 ingress (mean 0.27 Mbit/s) ——— Flow 3 egress (mean 0.19 Mbit/s)

- Flow 1 (95th percentile 1029.17 ms)　　　- Flow 2 (95th percentile 1072.52 ms)　　　- Flow 3 (95th percentile 1087.46 ms)
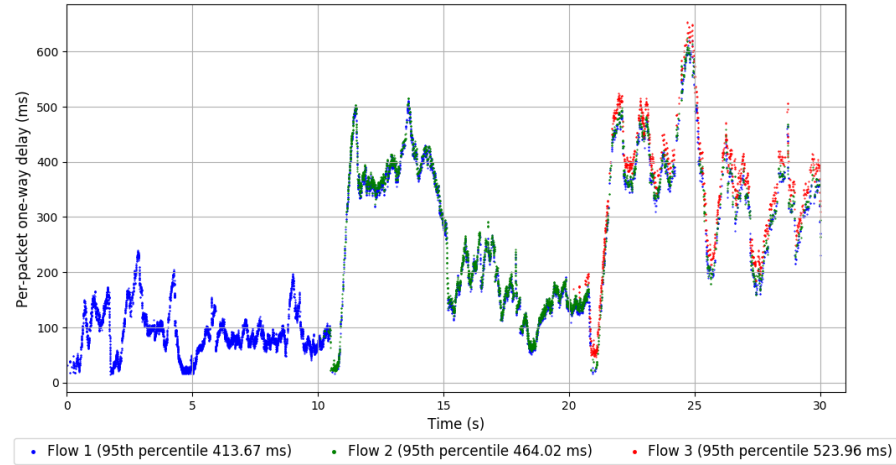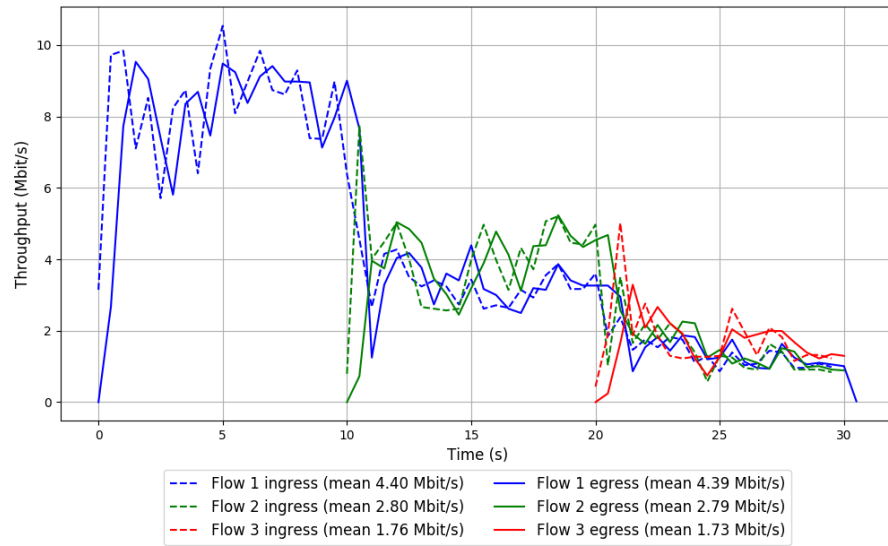
```
Run 2: Statistics of TCP BBR

Start at: 2018-09-07 13:34:25
End at: 2018-09-07 13:34:55
Local clock offset: -1.955 ms
Remote clock offset: -3.477 ms


# Below is generated by plot.py at 2018-09-07 13:55:28
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.73 Mbit/s
95th percentile per-packet one-way delay: 649.978 ms
Loss rate: 1.11%
-- Flow 1:
Average throughput: 2.66 Mbit/s
95th percentile per-packet one-way delay: 533.734 ms
Loss rate: 0.60%
-- Flow 2:
Average throughput: 2.21 Mbit/s
95th percentile per-packet one-way delay: 685.836 ms
Loss rate: 1.82%
-- Flow 3:
Average throughput: 1.89 Mbit/s
95th percentile per-packet one-way delay: 839.843 ms
Loss rate: 1.63%
```
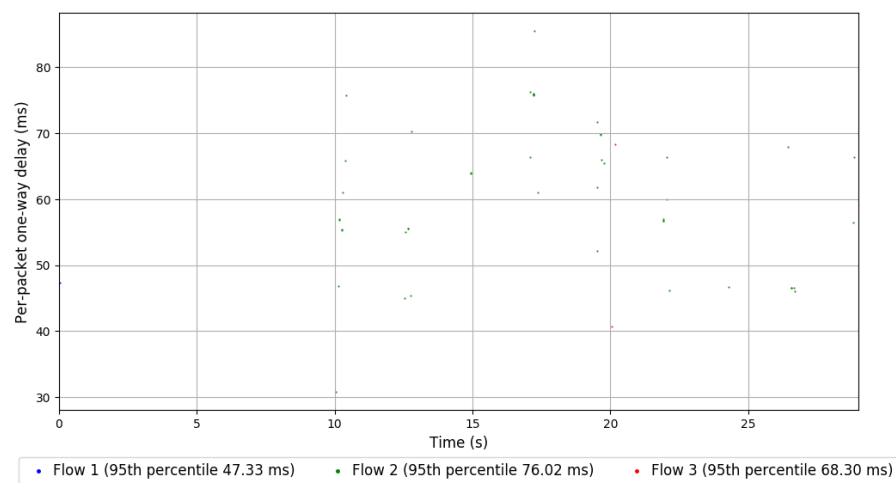
Run 2: Report of TCP BBR — Data Link

```
Run 3: Statistics of TCP BBR

Start at: 2018-09-07 13:54:41
End at: 2018-09-07 13:55:11
Local clock offset: 2.299 ms
Remote clock offset: -2.499 ms


# Below is generated by plot.py at 2018-09-07 13:55:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.81 Mbit/s
95th percentile per-packet one-way delay: 453.168 ms
Loss rate: 0.63%
-- Flow 1:
Average throughput: 4.39 Mbit/s
95th percentile per-packet one-way delay: 413.671 ms
Loss rate: 0.28%
-- Flow 2:
Average throughput: 2.79 Mbit/s
95th percentile per-packet one-way delay: 464.019 ms
Loss rate: 0.69%
-- Flow 3:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 523.962 ms
Loss rate: 3.02%
```
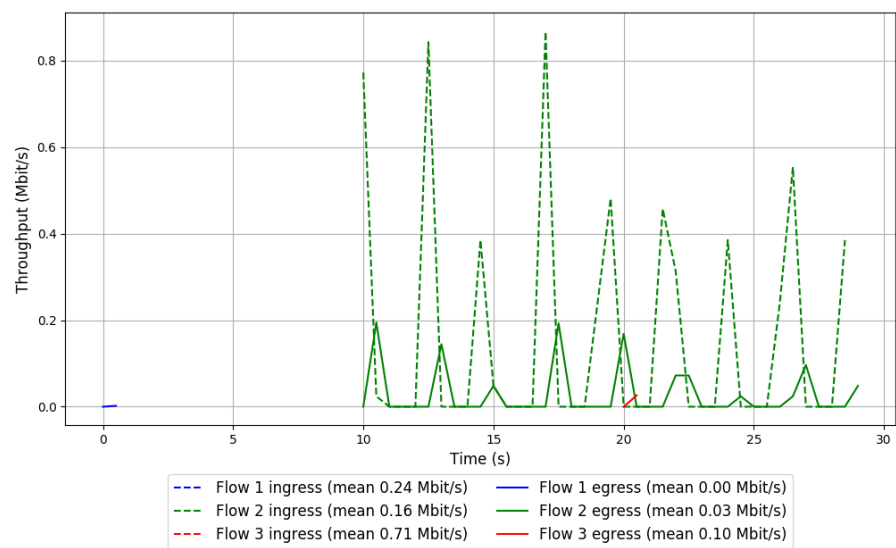
Run 3: Report of TCP BBR — Data Link

Flow 1 ingress (mean 4.40 Mbit/s) — — —   Flow 1 egress (mean 4.39 Mbit/s) ———
Flow 2 ingress (mean 2.80 Mbit/s) — — —   Flow 2 egress (mean 2.79 Mbit/s) ———
Flow 3 ingress (mean 1.76 Mbit/s) — — —   Flow 3 egress (mean 1.73 Mbit/s) ———

Flow 1 (95th percentile 413.67 ms)   •   Flow 2 (95th percentile 464.02 ms)   •   Flow 3 (95th percentile 523.96 ms)
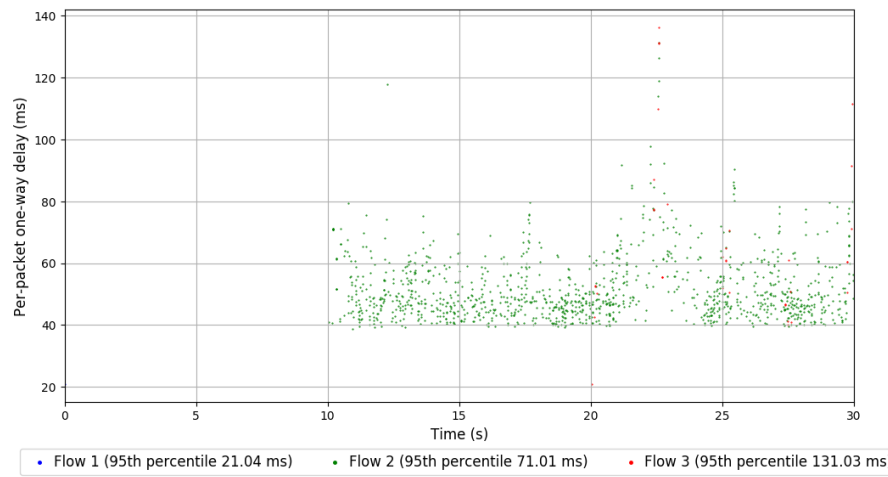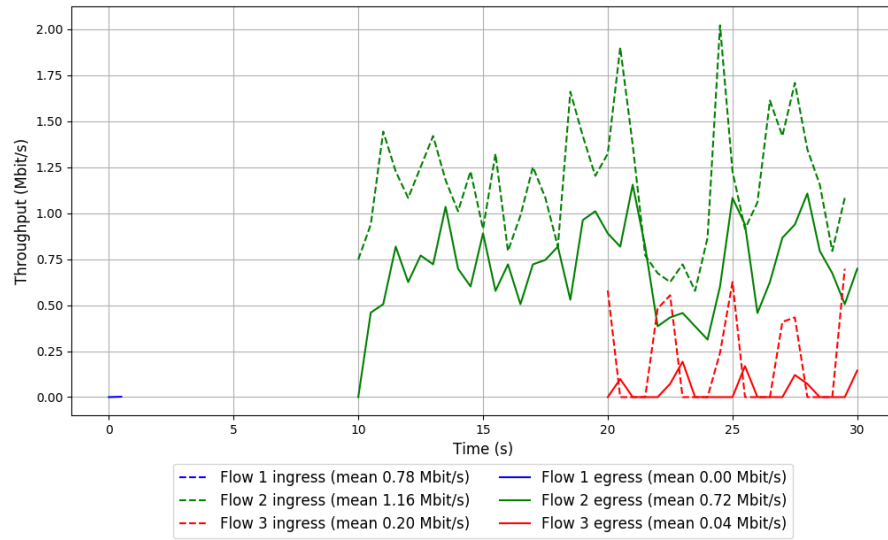
```
Run 1: Statistics of Copa

Start at: 2018-09-07 12:56:12
End at: 2018-09-07 12:56:42
Local clock offset: 1.14 ms
Remote clock offset: -5.028 ms


# Below is generated by plot.py at 2018-09-07 13:55:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 76.024 ms
Loss rate: 82.09%
-- Flow 1:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 47.329 ms
Loss rate: 97.24%
-- Flow 2:
Average throughput: 0.03 Mbit/s
95th percentile per-packet one-way delay: 76.024 ms
Loss rate: 81.90%
-- Flow 3:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 68.302 ms
Loss rate: 82.17%
```
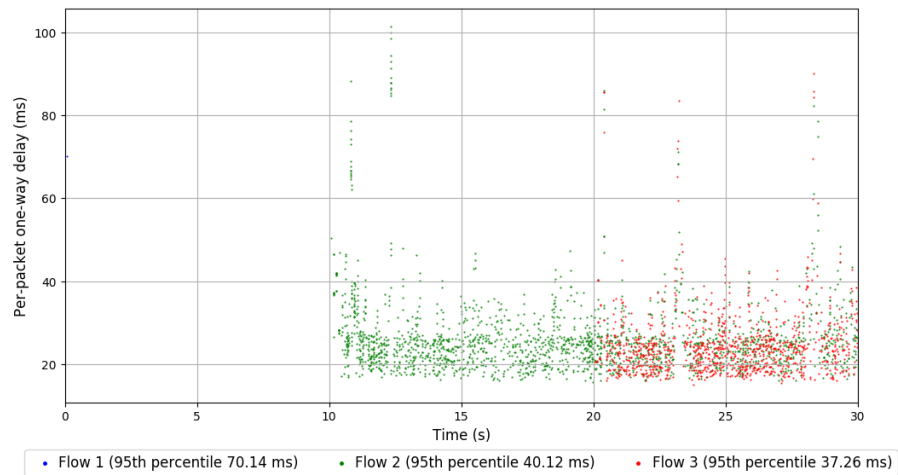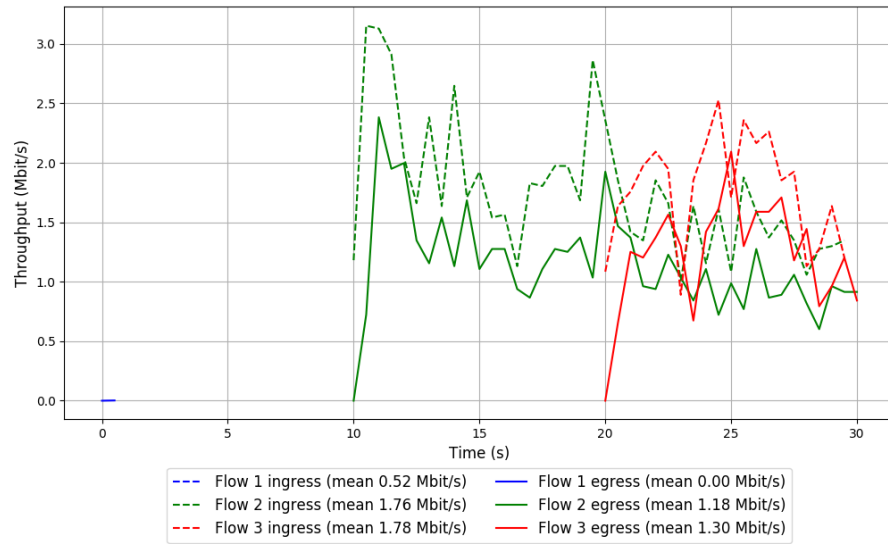
Run 1: Report of Copa — Data Link

Flow 1 ingress (mean 0.24 Mbit/s)   Flow 1 egress (mean 0.00 Mbit/s)
Flow 2 ingress (mean 0.16 Mbit/s)   Flow 2 egress (mean 0.03 Mbit/s)
Flow 3 ingress (mean 0.71 Mbit/s)   Flow 3 egress (mean 0.10 Mbit/s)

Flow 1 (95th percentile 47.33 ms)   Flow 2 (95th percentile 76.02 ms)   Flow 3 (95th percentile 68.30 ms)

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```
Run 2: Statistics of Copa

Start at: 2018-09-07 13:16:20
End at: 2018-09-07 13:16:50
Local clock offset: 0.329 ms
Remote clock offset: -2.322 ms


# Below is generated by plot.py at 2018-09-07 13:55:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 73.056 ms
Loss rate: 41.31%
-- Flow 1:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 21.035 ms
Loss rate: 98.60%
-- Flow 2:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 71.008 ms
Loss rate: 37.90%
-- Flow 3:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 131.026 ms
Loss rate: 78.40%
```
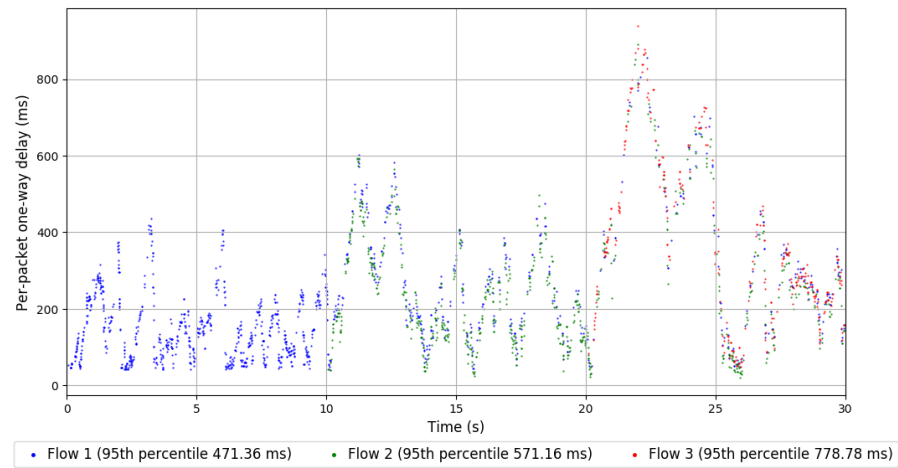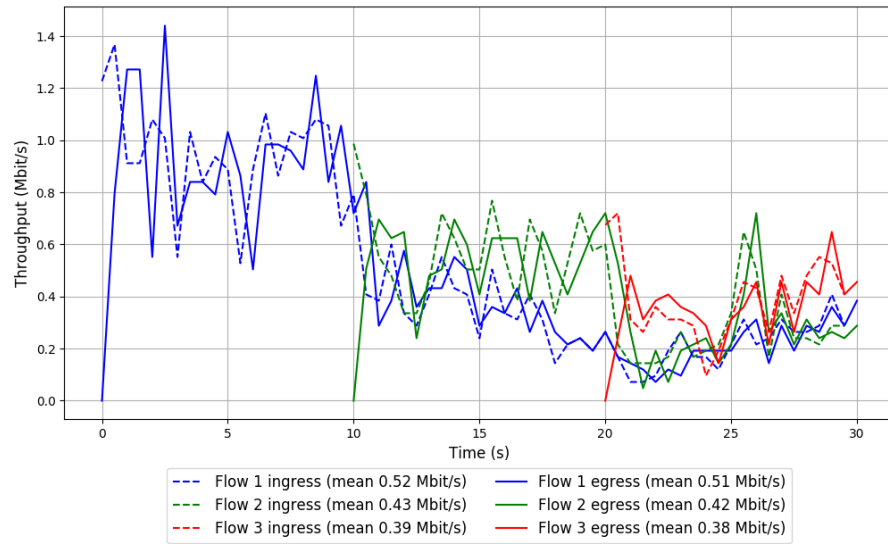
Run 2: Report of Copa — Data Link

Flow 1 ingress (mean 0.78 Mbit/s)   Flow 1 egress (mean 0.00 Mbit/s)
Flow 2 ingress (mean 1.16 Mbit/s)   Flow 2 egress (mean 0.72 Mbit/s)
Flow 3 ingress (mean 0.20 Mbit/s)   Flow 3 egress (mean 0.04 Mbit/s)

Flow 1 (95th percentile 21.04 ms)   Flow 2 (95th percentile 71.01 ms)   Flow 3 (95th percentile 131.03 ms)

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```
Run 3: Statistics of Copa

Start at: 2018-09-07 13:36:41
End at: 2018-09-07 13:37:11
Local clock offset: 0.118 ms
Remote clock offset: -3.322 ms


# Below is generated by plot.py at 2018-09-07 13:55:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 39.464 ms
Loss rate: 31.32%
-- Flow 1:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 70.139 ms
Loss rate: 98.80%
-- Flow 2:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 40.115 ms
Loss rate: 33.15%
-- Flow 3:
Average throughput: 1.30 Mbit/s
95th percentile per-packet one-way delay: 37.257 ms
Loss rate: 27.36%
```
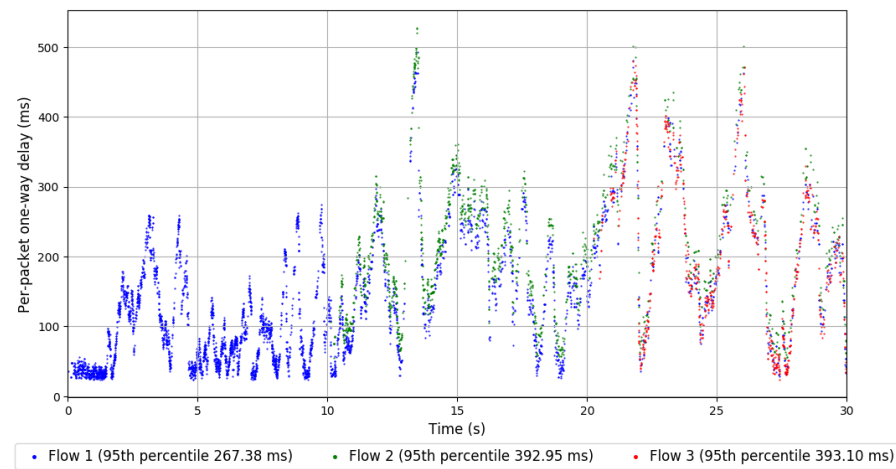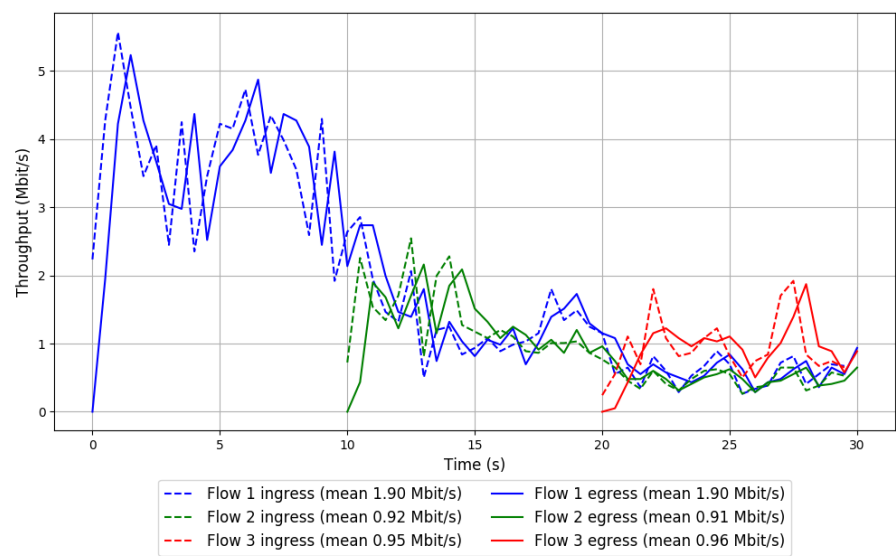
Run 3: Report of Copa — Data Link

Flow 1 ingress (mean 0.52 Mbit/s) --- Flow 1 egress (mean 0.00 Mbit/s)
Flow 2 ingress (mean 1.76 Mbit/s) --- Flow 2 egress (mean 1.18 Mbit/s)
Flow 3 ingress (mean 1.78 Mbit/s) --- Flow 3 egress (mean 1.30 Mbit/s)

Flow 1 (95th percentile 70.14 ms)   Flow 2 (95th percentile 40.12 ms)   Flow 3 (95th percentile 37.26 ms)
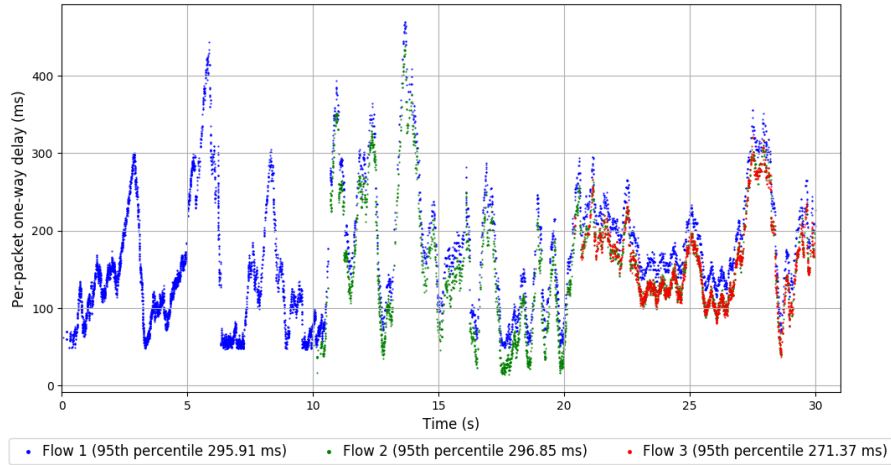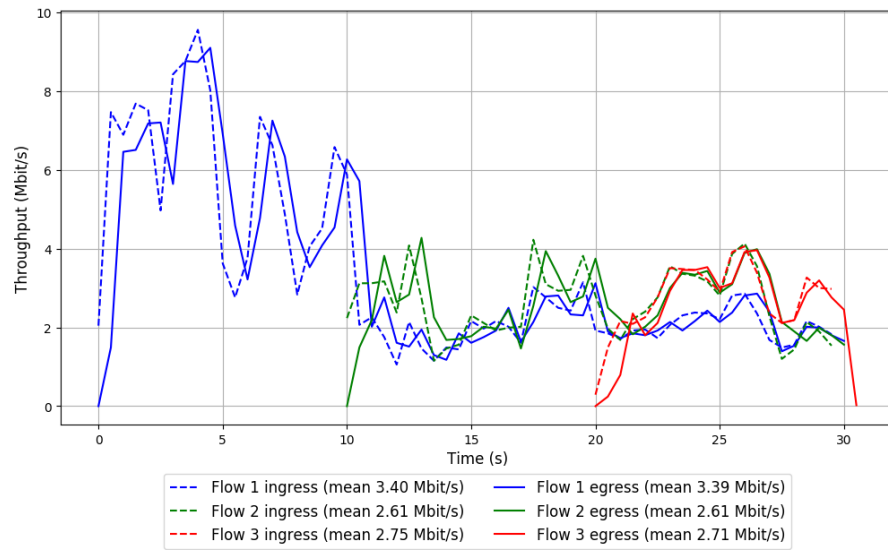
16

```
Run 1: Statistics of TCP Cubic

Start at: 2018-09-07 13:07:24
End at: 2018-09-07 13:07:54
Local clock offset: 1.286 ms
Remote clock offset: -2.665 ms


# Below is generated by plot.py at 2018-09-07 13:55:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 584.034 ms
Loss rate: 2.37%
-- Flow 1:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 471.362 ms
Loss rate: 1.48%
-- Flow 2:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 571.159 ms
Loss rate: 2.82%
-- Flow 3:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 778.776 ms
Loss rate: 4.94%
```

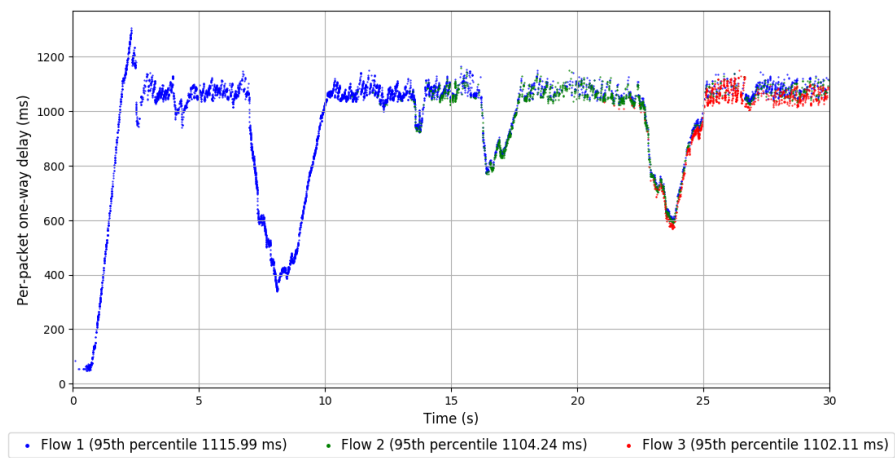Run 1: Report of TCP Cubic — Data Link

```
Run 2: Statistics of TCP Cubic

Start at: 2018-09-07 13:27:35
End at: 2018-09-07 13:28:05
Local clock offset: -2.562 ms
Remote clock offset: -2.446 ms


# Below is generated by plot.py at 2018-09-07 13:55:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.82 Mbit/s
95th percentile per-packet one-way delay: 329.011 ms
Loss rate: 0.50%
-- Flow 1:
Average throughput: 1.90 Mbit/s
95th percentile per-packet one-way delay: 267.382 ms
Loss rate: 0.34%
-- Flow 2:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 392.946 ms
Loss rate: 0.85%
-- Flow 3:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 393.100 ms
Loss rate: 0.76%
```
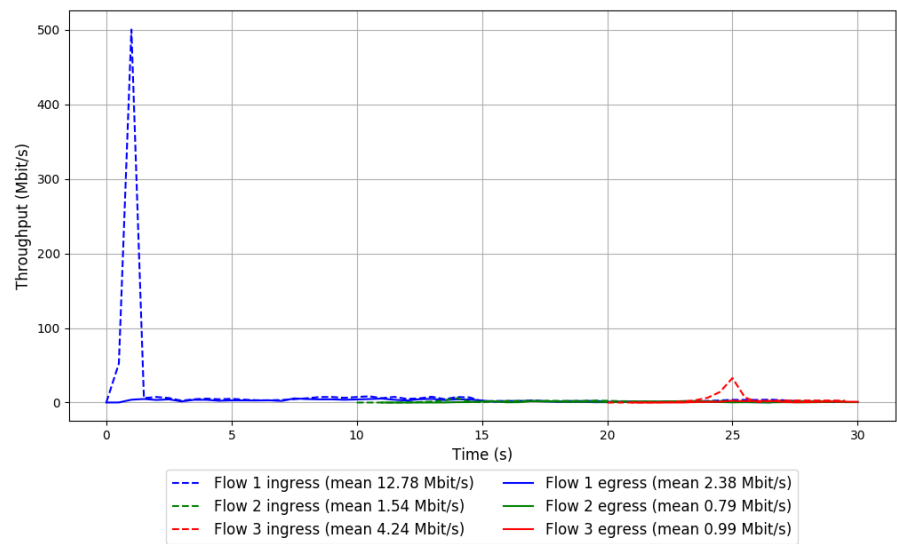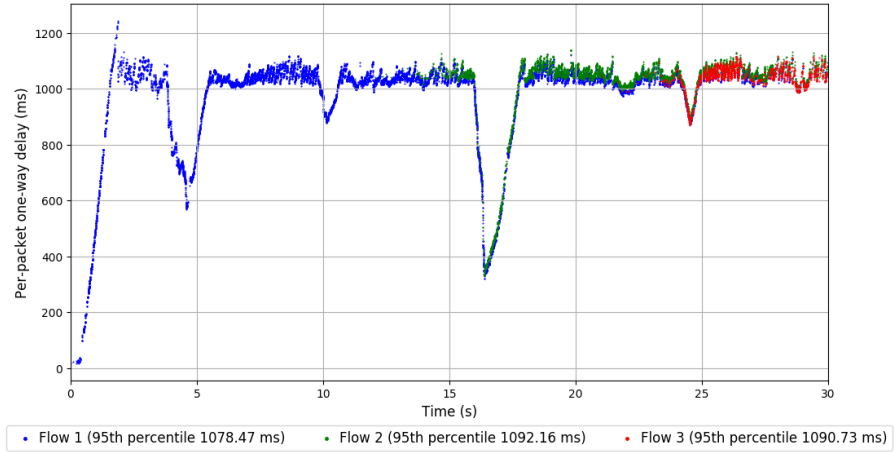
Run 2: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 1.90 Mbit/s)   Flow 1 egress (mean 1.90 Mbit/s)
Flow 2 ingress (mean 0.92 Mbit/s)   Flow 2 egress (mean 0.91 Mbit/s)
Flow 3 ingress (mean 0.95 Mbit/s)   Flow 3 egress (mean 0.96 Mbit/s)

Flow 1 (95th percentile 267.38 ms)   Flow 2 (95th percentile 392.95 ms)   Flow 3 (95th percentile 393.10 ms)

```
Run 3: Statistics of TCP Cubic

Start at: 2018-09-07 13:47:56
End at: 2018-09-07 13:48:26
Local clock offset: 2.969 ms
Remote clock offset: -2.149 ms


# Below is generated by plot.py at 2018-09-07 13:55:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.01 Mbit/s
95th percentile per-packet one-way delay: 291.939 ms
Loss rate: 0.91%
-- Flow 1:
Average throughput: 3.39 Mbit/s
95th percentile per-packet one-way delay: 295.914 ms
Loss rate: 0.65%
-- Flow 2:
Average throughput: 2.61 Mbit/s
95th percentile per-packet one-way delay: 296.845 ms
Loss rate: 0.64%
-- Flow 3:
Average throughput: 2.71 Mbit/s
95th percentile per-packet one-way delay: 271.368 ms
Loss rate: 2.41%
```

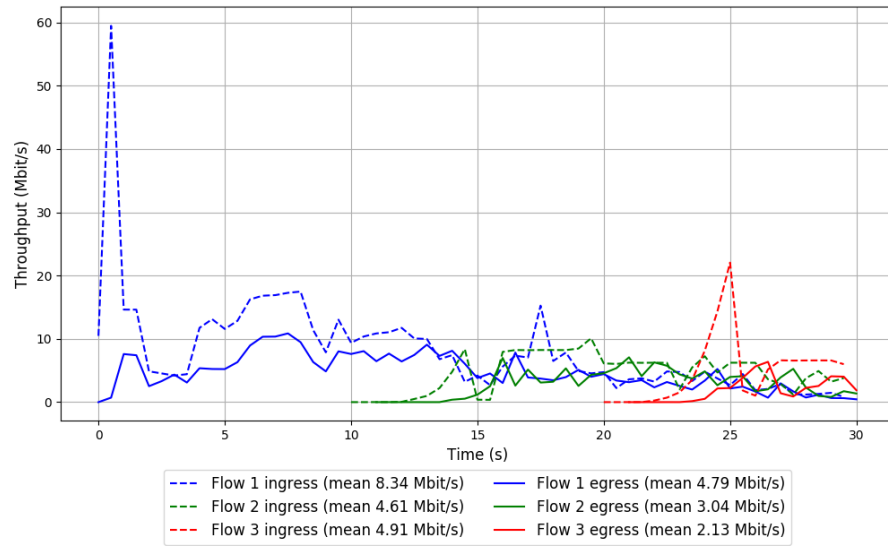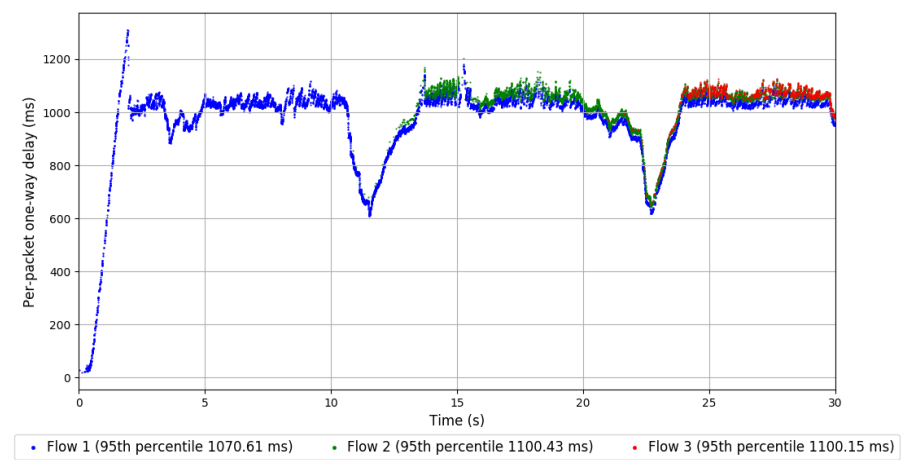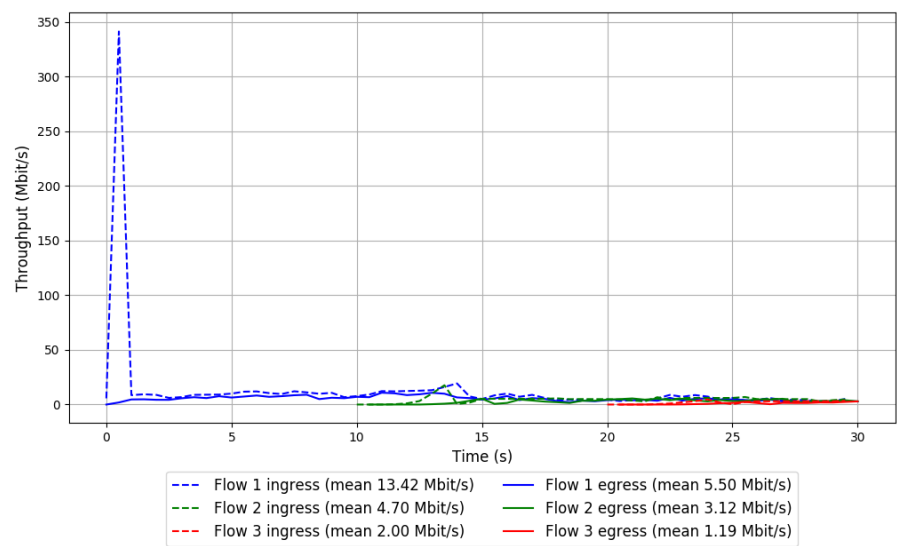Run 3: Report of TCP Cubic — Data Link

```
Run 1: Statistics of FillP

Start at: 2018-09-07 13:11:52
End at: 2018-09-07 13:12:22
Local clock offset: 0.805 ms
Remote clock offset: -2.664 ms

# Below is generated by plot.py at 2018-09-07 13:55:34
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.17 Mbit/s
95th percentile per-packet one-way delay: 1112.378 ms
Loss rate: 79.24%
-- Flow 1:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 1115.994 ms
Loss rate: 81.46%
-- Flow 2:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 1104.245 ms
Loss rate: 51.62%
-- Flow 3:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 1102.112 ms
Loss rate: 79.18%
```

Run 1: Report of FillP — Data Link

```
Run 2: Statistics of FillP

Start at: 2018-09-07 13:32:10
End at: 2018-09-07 13:32:40
Local clock offset: -2.371 ms
Remote clock offset: -3.236 ms


# Below is generated by plot.py at 2018-09-07 13:55:39
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.34 Mbit/s
95th percentile per-packet one-way delay: 1084.454 ms
Loss rate: 43.73%
-- Flow 1:
Average throughput: 4.79 Mbit/s
95th percentile per-packet one-way delay: 1078.471 ms
Loss rate: 42.64%
-- Flow 2:
Average throughput: 3.04 Mbit/s
95th percentile per-packet one-way delay: 1092.157 ms
Loss rate: 37.53%
-- Flow 3:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 1090.735 ms
Loss rate: 61.00%
```
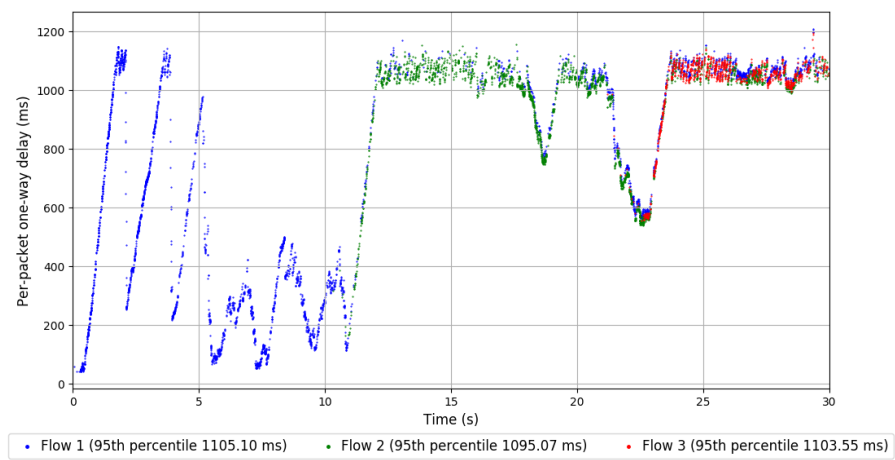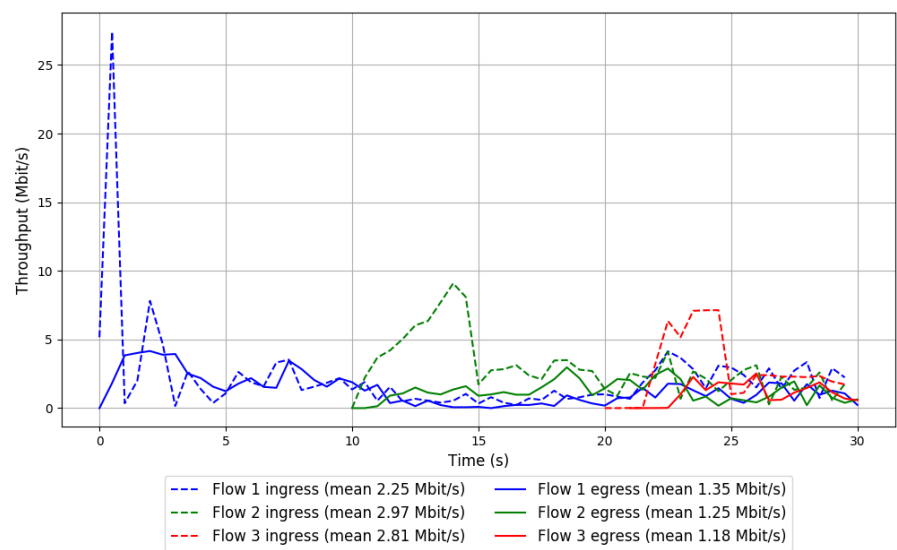
Run 2: Report of FillP — Data Link

```
Run 3: Statistics of FillP

Start at: 2018-09-07 13:52:25
End at: 2018-09-07 13:52:55
Local clock offset: -0.506 ms
Remote clock offset: -3.103 ms


# Below is generated by plot.py at 2018-09-07 13:55:42
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.85 Mbit/s
95th percentile per-packet one-way delay: 1086.676 ms
Loss rate: 54.39%
-- Flow 1:
Average throughput: 5.50 Mbit/s
95th percentile per-packet one-way delay: 1070.609 ms
Loss rate: 59.00%
-- Flow 2:
Average throughput: 3.12 Mbit/s
95th percentile per-packet one-way delay: 1100.433 ms
Loss rate: 36.41%
-- Flow 3:
Average throughput: 1.19 Mbit/s
95th percentile per-packet one-way delay: 1100.146 ms
Loss rate: 46.03%
```

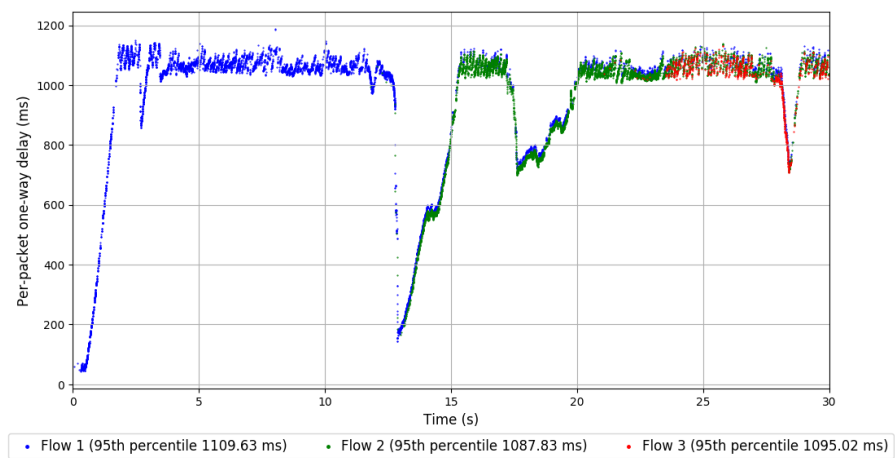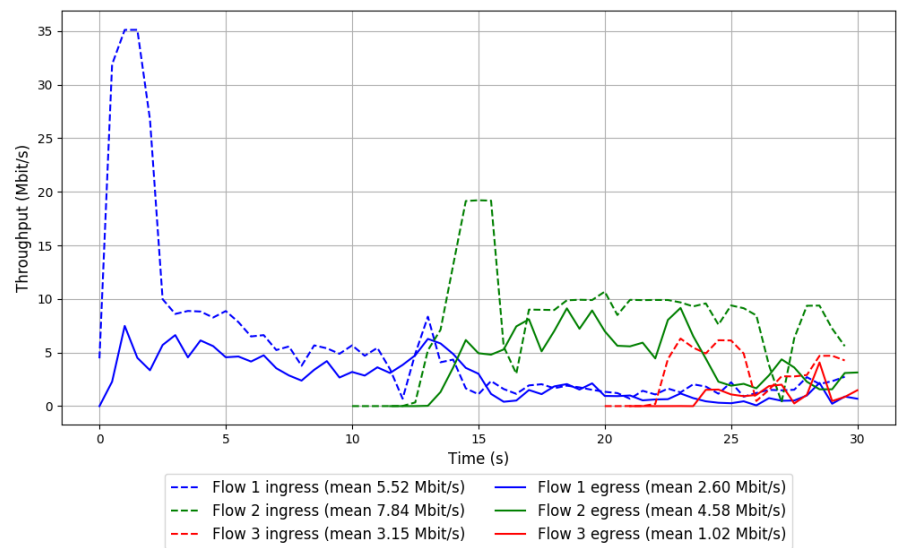# Run 3: Report of FillP — Data Link

Flow 1 ingress (mean 13.42 Mbit/s)   Flow 1 egress (mean 5.50 Mbit/s)
Flow 2 ingress (mean 4.70 Mbit/s)   Flow 2 egress (mean 3.12 Mbit/s)
Flow 3 ingress (mean 2.00 Mbit/s)   Flow 3 egress (mean 1.19 Mbit/s)

Flow 1 (95th percentile 1070.61 ms)   Flow 2 (95th percentile 1100.43 ms)   Flow 3 (95th percentile 1100.15 ms)
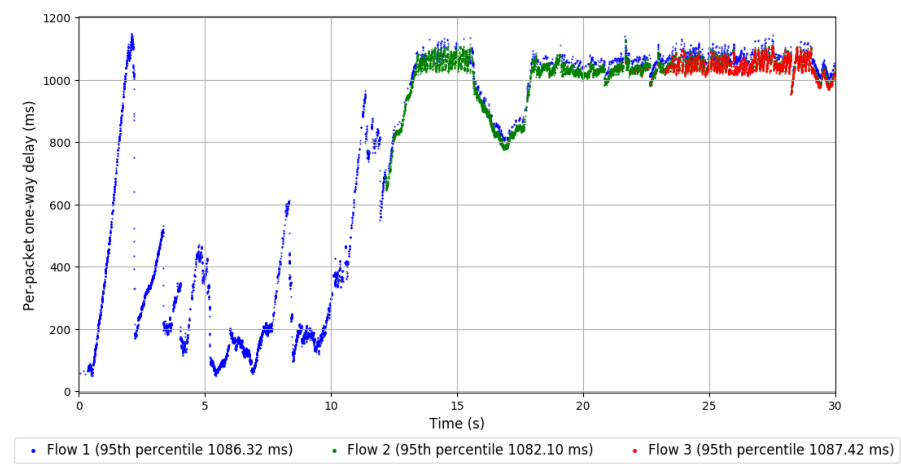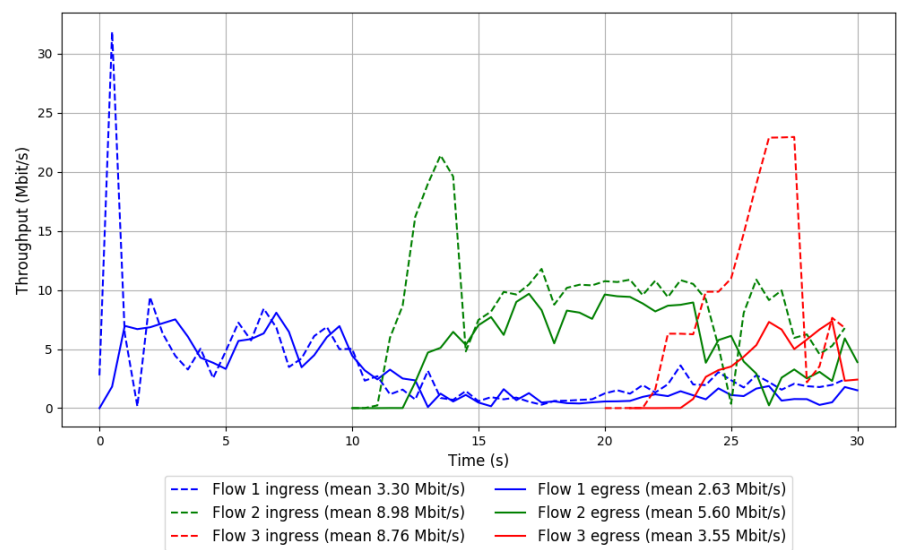
28

```
Run 1: Statistics of FillP-Sheep

Start at: 2018-09-07 13:02:55
End at: 2018-09-07 13:03:25
Local clock offset: -2.359 ms
Remote clock offset: -2.632 ms


# Below is generated by plot.py at 2018-09-07 13:55:42
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.52 Mbit/s
95th percentile per-packet one-way delay: 1101.941 ms
Loss rate: 51.24%
-- Flow 1:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 1105.100 ms
Loss rate: 39.86%
-- Flow 2:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 1095.068 ms
Loss rate: 58.56%
-- Flow 3:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 1103.551 ms
Loss rate: 63.06%
```

Run 1: Report of FillP-Sheep — Data Link

```
Run 2: Statistics of FillP-Sheep

Start at: 2018-09-07 13:23:04
End at: 2018-09-07 13:23:34
Local clock offset: -1.902 ms
Remote clock offset: -2.018 ms


# Below is generated by plot.py at 2018-09-07 13:55:42
# Datalink statistics
-- Total of 3 flows:
Average throughput: 5.69 Mbit/s
95th percentile per-packet one-way delay: 1097.757 ms
Loss rate: 51.86%
-- Flow 1:
Average throughput: 2.60 Mbit/s
95th percentile per-packet one-way delay: 1109.632 ms
Loss rate: 53.00%
-- Flow 2:
Average throughput: 4.58 Mbit/s
95th percentile per-packet one-way delay: 1087.834 ms
Loss rate: 46.83%
-- Flow 3:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 1095.019 ms
Loss rate: 70.88%
```

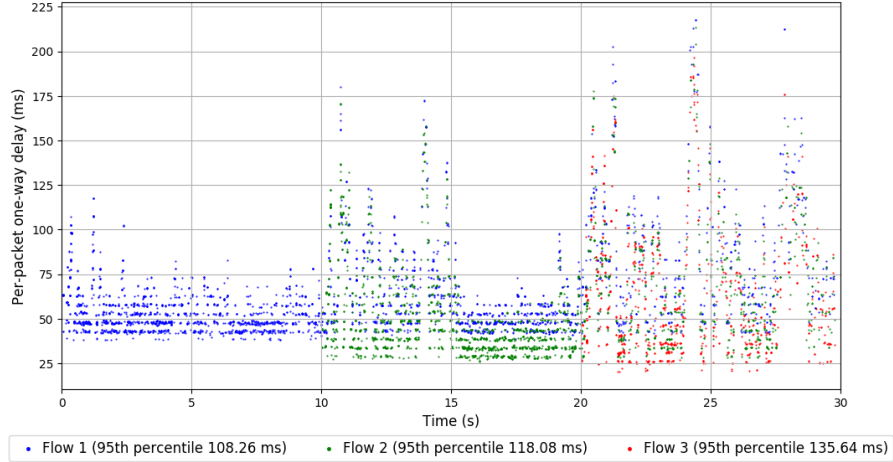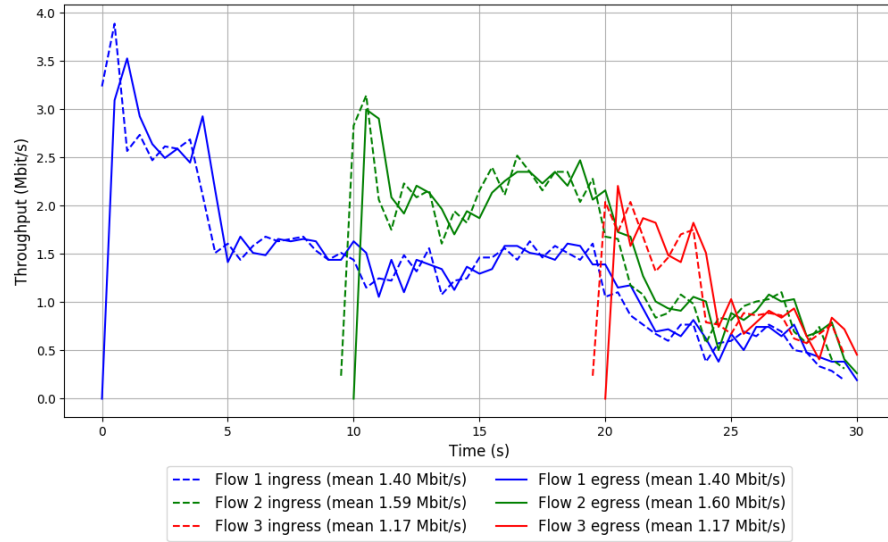Run 2: Report of FillP-Sheep — Data Link

Flow 1 ingress (mean 5.52 Mbit/s)   Flow 1 egress (mean 2.60 Mbit/s)
Flow 2 ingress (mean 7.84 Mbit/s)   Flow 2 egress (mean 4.58 Mbit/s)
Flow 3 ingress (mean 3.15 Mbit/s)   Flow 3 egress (mean 1.02 Mbit/s)

Flow 1 (95th percentile 1109.63 ms)   Flow 2 (95th percentile 1087.83 ms)   Flow 3 (95th percentile 1095.02 ms)

```
Run 3: Statistics of FillP-Sheep

Start at: 2018-09-07 13:43:26
End at: 2018-09-07 13:43:56
Local clock offset: -1.77 ms
Remote clock offset: -3.299 ms


# Below is generated by plot.py at 2018-09-07 13:55:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.36 Mbit/s
95th percentile per-packet one-way delay: 1084.791 ms
Loss rate: 39.69%
-- Flow 1:
Average throughput: 2.63 Mbit/s
95th percentile per-packet one-way delay: 1086.319 ms
Loss rate: 20.51%
-- Flow 2:
Average throughput: 5.60 Mbit/s
95th percentile per-packet one-way delay: 1082.095 ms
Loss rate: 38.72%
-- Flow 3:
Average throughput: 3.55 Mbit/s
95th percentile per-packet one-way delay: 1087.423 ms
Loss rate: 63.53%
```
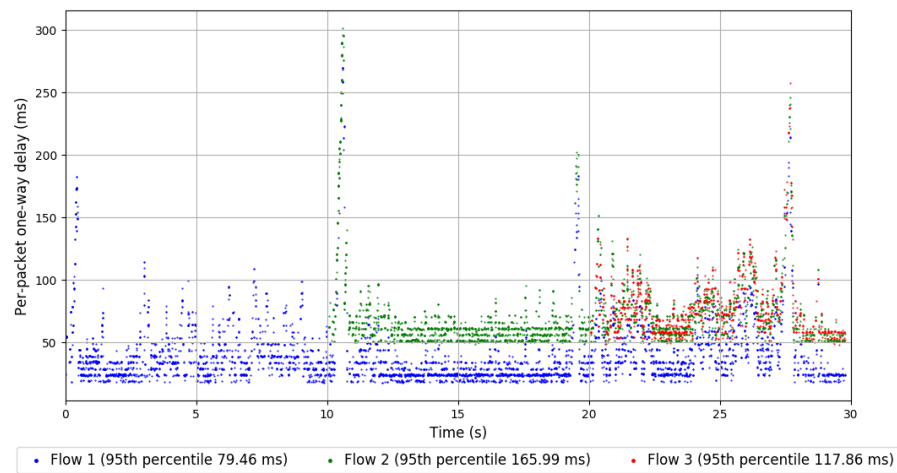
Run 3: Report of FillP-Sheep — Data Link

```
Run 1: Statistics of Indigo

Start at: 2018-09-07 13:10:44
End at: 2018-09-07 13:11:14
Local clock offset: 0.979 ms
Remote clock offset: -1.66 ms


# Below is generated by plot.py at 2018-09-07 13:55:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.84 Mbit/s
95th percentile per-packet one-way delay: 117.341 ms
Loss rate: 0.10%
-- Flow 1:
Average throughput: 1.40 Mbit/s
95th percentile per-packet one-way delay: 108.263 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.60 Mbit/s
95th percentile per-packet one-way delay: 118.076 ms
Loss rate: 0.15%
-- Flow 3:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 135.644 ms
Loss rate: 0.32%
```
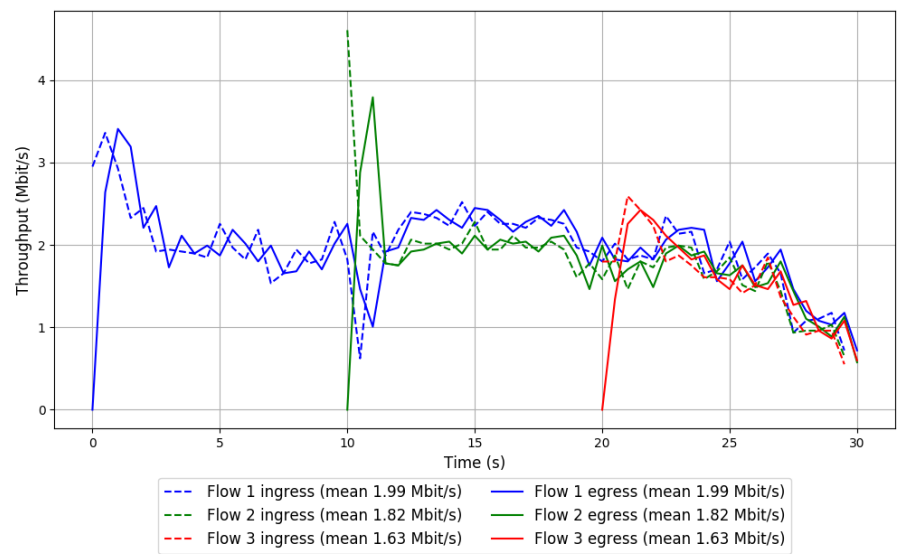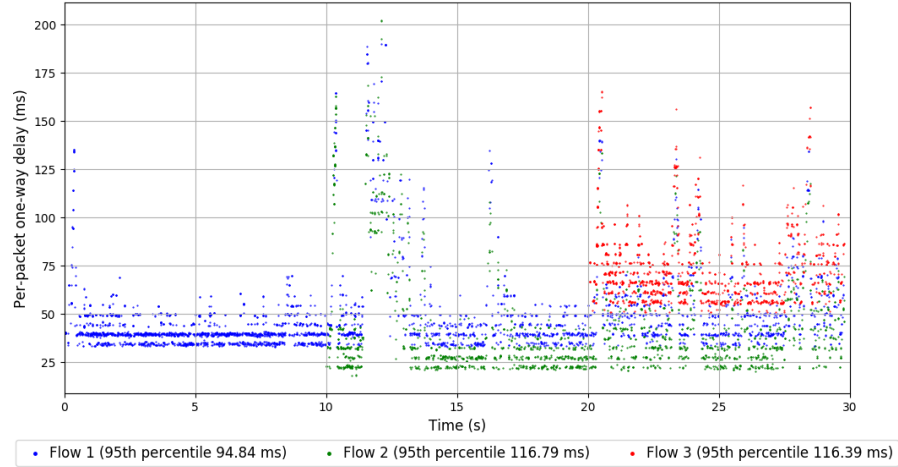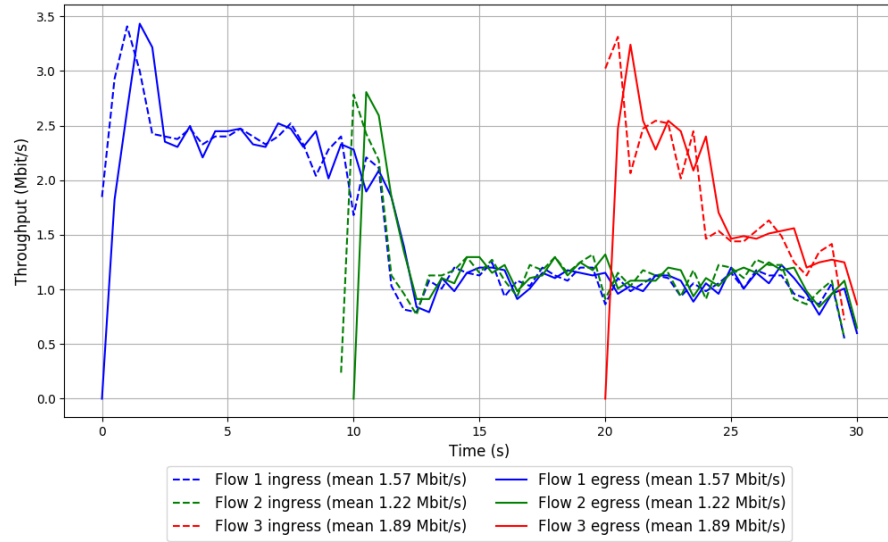
Run 1: Report of Indigo — Data Link

```
Run 2: Statistics of Indigo

Start at: 2018-09-07 13:31:02
End at: 2018-09-07 13:31:32
Local clock offset: -1.904 ms
Remote clock offset: -3.24 ms

# Below is generated by plot.py at 2018-09-07 13:55:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.73 Mbit/s
95th percentile per-packet one-way delay: 111.003 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 1.99 Mbit/s
95th percentile per-packet one-way delay: 79.457 ms
Loss rate: 0.06%
-- Flow 2:
Average throughput: 1.82 Mbit/s
95th percentile per-packet one-way delay: 165.985 ms
Loss rate: 0.23%
-- Flow 3:
Average throughput: 1.63 Mbit/s
95th percentile per-packet one-way delay: 117.864 ms
Loss rate: 0.23%
```
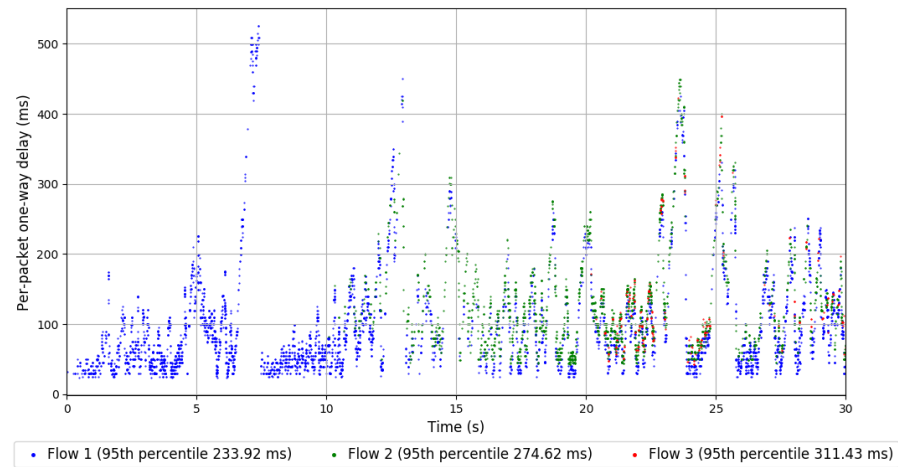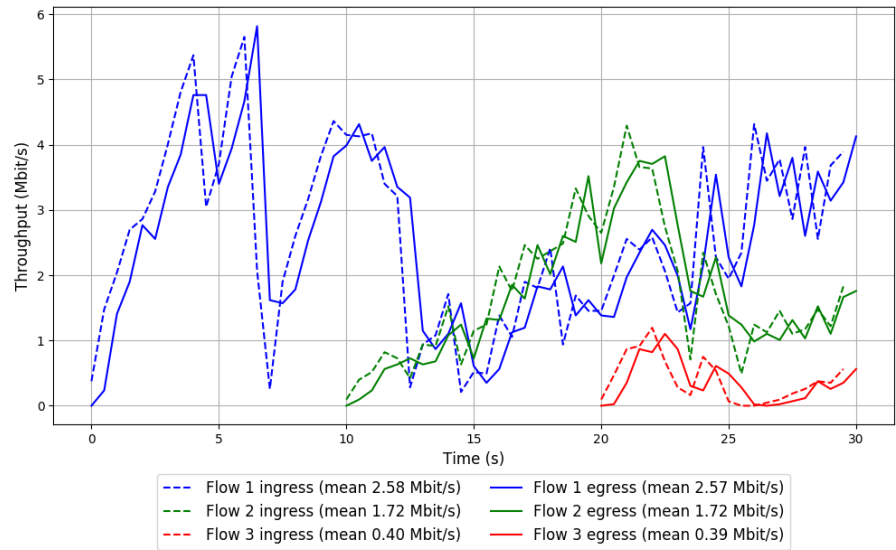
Run 2: Report of Indigo — Data Link

```
Run 3: Statistics of Indigo

Start at: 2018-09-07 13:51:17
End at: 2018-09-07 13:51:47
Local clock offset: -1.763 ms
Remote clock offset: -3.155 ms


# Below is generated by plot.py at 2018-09-07 13:55:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.00 Mbit/s
95th percentile per-packet one-way delay: 108.971 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 1.57 Mbit/s
95th percentile per-packet one-way delay: 94.836 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 116.792 ms
Loss rate: 0.05%
-- Flow 3:
Average throughput: 1.89 Mbit/s
95th percentile per-packet one-way delay: 116.388 ms
Loss rate: 0.59%
```
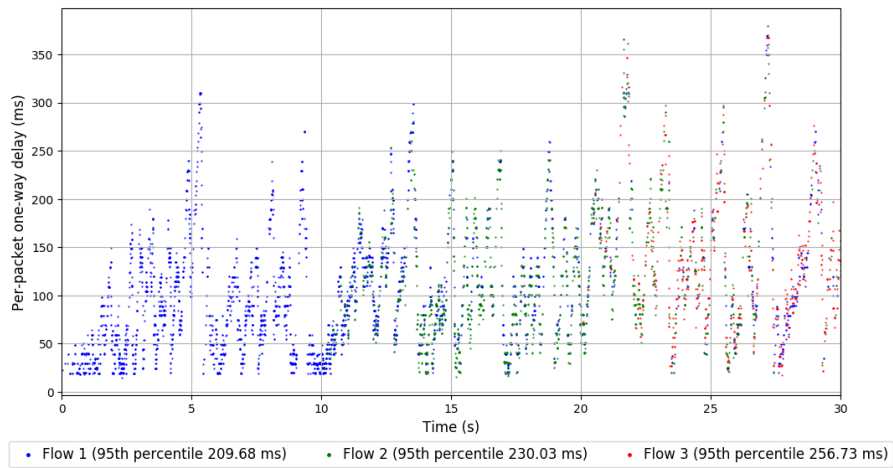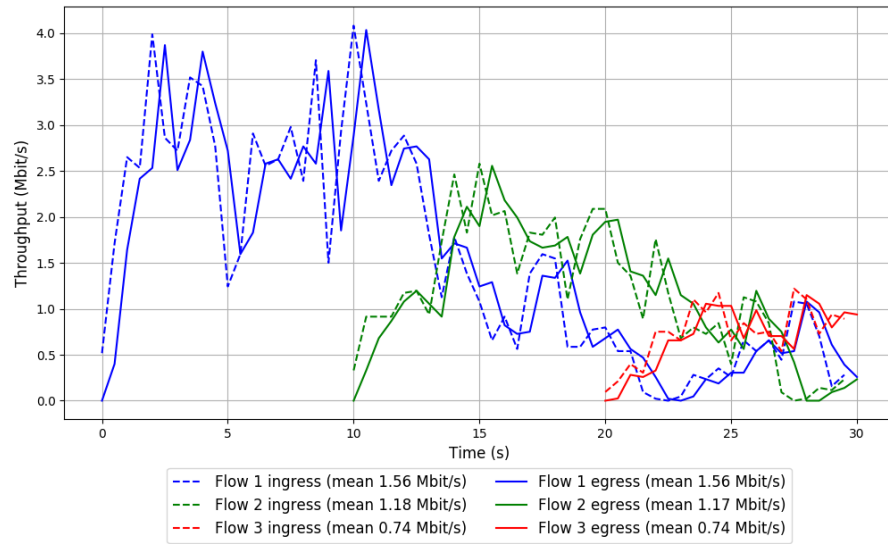
Run 3: Report of Indigo — Data Link

Flow 1 ingress (mean 1.57 Mbit/s) ---- Flow 1 egress (mean 1.57 Mbit/s)
Flow 2 ingress (mean 1.22 Mbit/s) ---- Flow 2 egress (mean 1.22 Mbit/s)
Flow 3 ingress (mean 1.89 Mbit/s) ---- Flow 3 egress (mean 1.89 Mbit/s)

Flow 1 (95th percentile 94.84 ms)   Flow 2 (95th percentile 116.79 ms)   Flow 3 (95th percentile 116.39 ms)

40

```
Run 1: Statistics of LEDBAT

Start at: 2018-09-07 12:57:18
End at: 2018-09-07 12:57:48
Local clock offset: -0.641 ms
Remote clock offset: -5.454 ms

# Below is generated by plot.py at 2018-09-07 13:55:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.84 Mbit/s
95th percentile per-packet one-way delay: 249.836 ms
Loss rate: 0.52%
-- Flow 1:
Average throughput: 2.57 Mbit/s
95th percentile per-packet one-way delay: 233.917 ms
Loss rate: 0.53%
-- Flow 2:
Average throughput: 1.72 Mbit/s
95th percentile per-packet one-way delay: 274.623 ms
Loss rate: 0.31%
-- Flow 3:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 311.430 ms
Loss rate: 2.08%
```

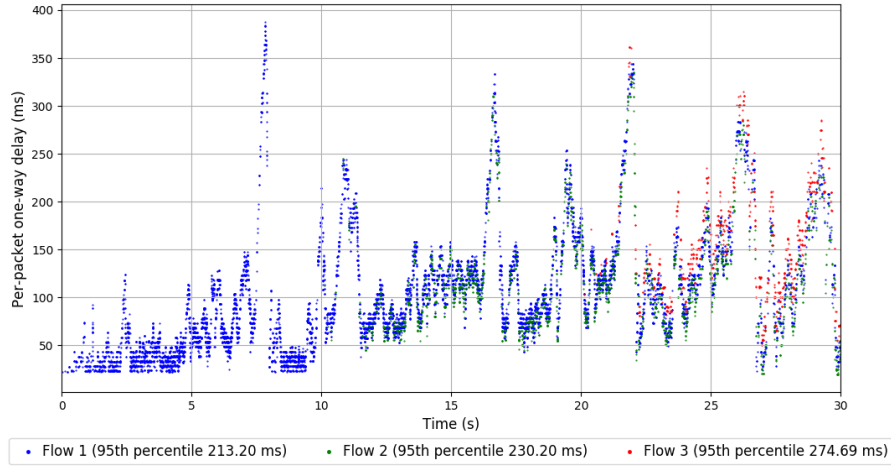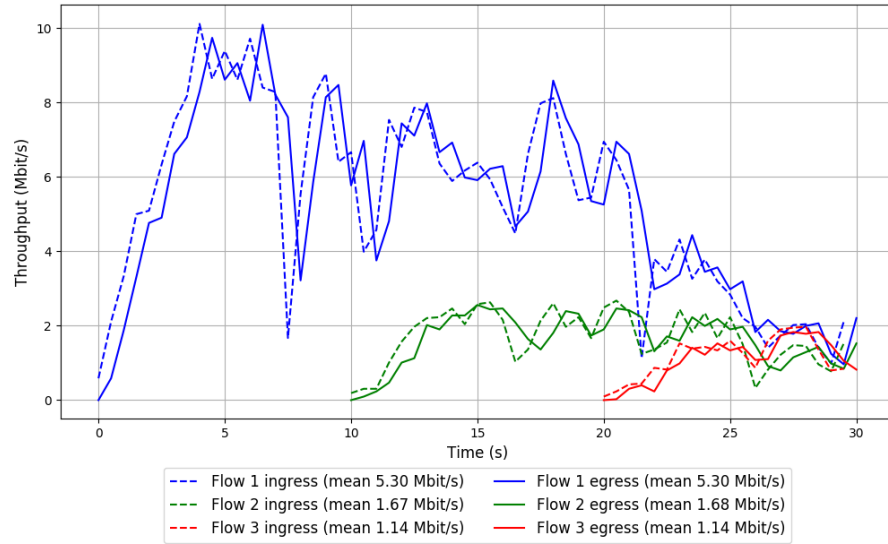Run 1: Report of LEDBAT — Data Link

```
Run 2: Statistics of LEDBAT

Start at: 2018-09-07 13:17:26
End at: 2018-09-07 13:17:56
Local clock offset: 1.197 ms
Remote clock offset: -2.358 ms


# Below is generated by plot.py at 2018-09-07 13:55:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.58 Mbit/s
95th percentile per-packet one-way delay: 228.478 ms
Loss rate: 0.38%
-- Flow 1:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 209.681 ms
Loss rate: 0.28%
-- Flow 2:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 230.027 ms
Loss rate: 0.25%
-- Flow 3:
Average throughput: 0.74 Mbit/s
95th percentile per-packet one-way delay: 256.728 ms
Loss rate: 1.43%
```
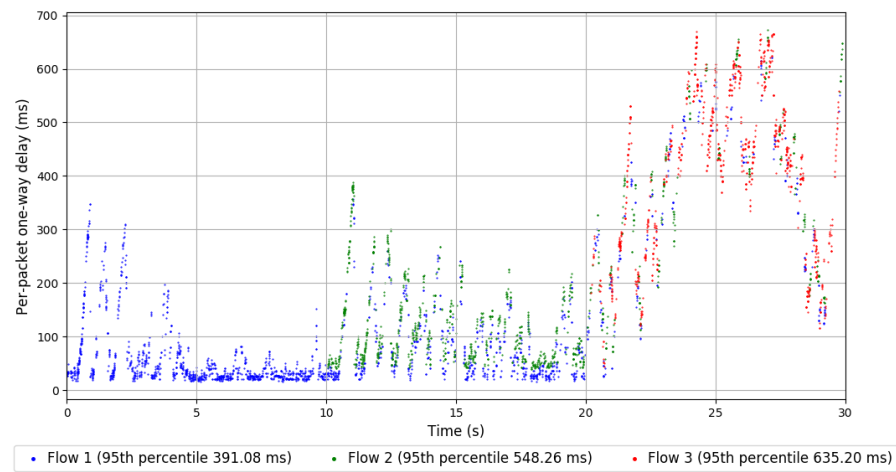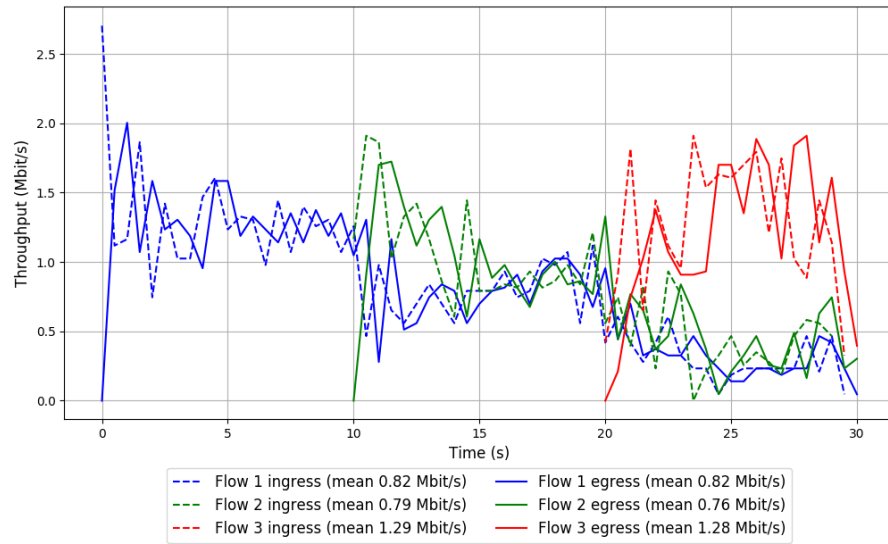
Run 2: Report of LEDBAT — Data Link

- Flow 1 ingress (mean 1.56 Mbit/s)
- Flow 1 egress (mean 1.56 Mbit/s)
- Flow 2 ingress (mean 1.18 Mbit/s)
- Flow 2 egress (mean 1.17 Mbit/s)
- Flow 3 ingress (mean 0.74 Mbit/s)
- Flow 3 egress (mean 0.74 Mbit/s)

- Flow 1 (95th percentile 209.68 ms)
- Flow 2 (95th percentile 230.03 ms)
- Flow 3 (95th percentile 256.73 ms)

```
Run 3: Statistics of LEDBAT

Start at: 2018-09-07 13:37:48
End at: 2018-09-07 13:38:18
Local clock offset: 1.27 ms
Remote clock offset: -3.265 ms


# Below is generated by plot.py at 2018-09-07 13:55:48
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.79 Mbit/s
95th percentile per-packet one-way delay: 222.882 ms
Loss rate: 0.30%
-- Flow 1:
Average throughput: 5.30 Mbit/s
95th percentile per-packet one-way delay: 213.198 ms
Loss rate: 0.16%
-- Flow 2:
Average throughput: 1.68 Mbit/s
95th percentile per-packet one-way delay: 230.197 ms
Loss rate: 0.56%
-- Flow 3:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 274.686 ms
Loss rate: 1.45%
```
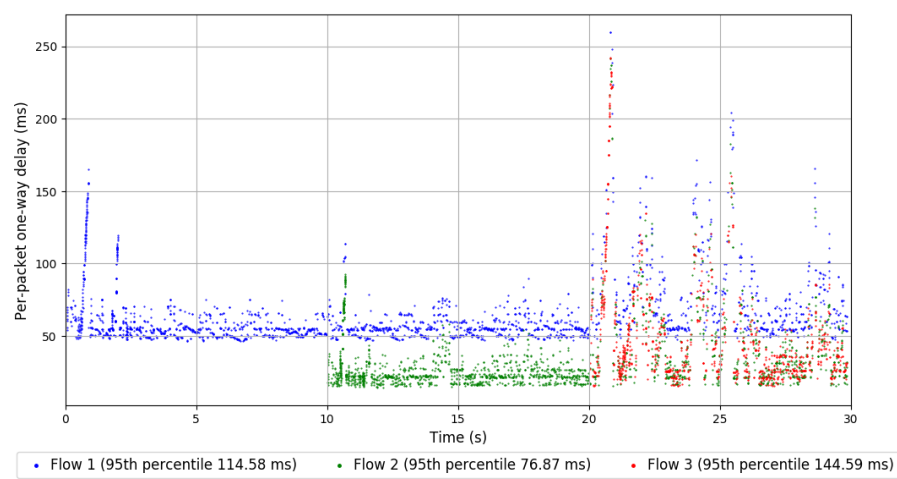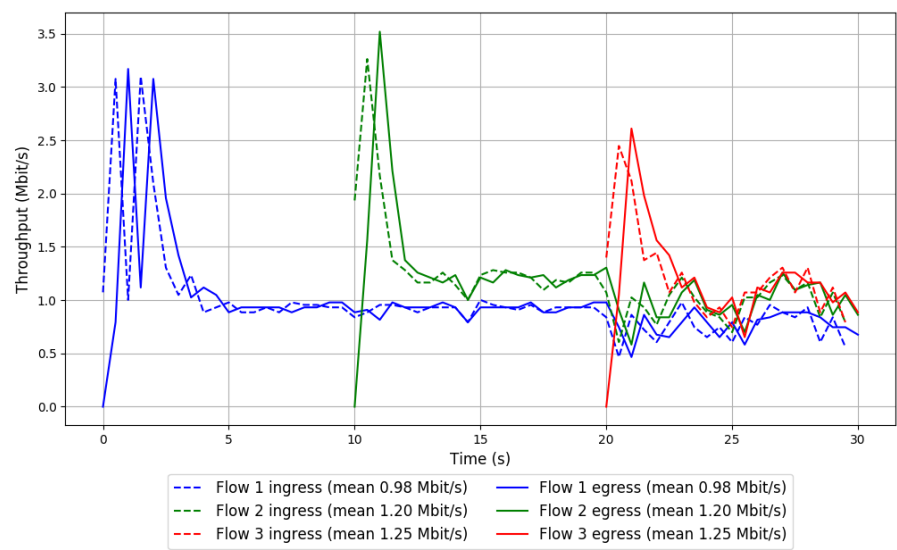
Run 3: Report of LEDBAT — Data Link

Flow 1 ingress (mean 5.30 Mbit/s)   — Flow 1 egress (mean 5.30 Mbit/s)
Flow 2 ingress (mean 1.67 Mbit/s)   — Flow 2 egress (mean 1.68 Mbit/s)
Flow 3 ingress (mean 1.14 Mbit/s)   — Flow 3 egress (mean 1.14 Mbit/s)

Flow 1 (95th percentile 213.20 ms)   Flow 2 (95th percentile 230.20 ms)   Flow 3 (95th percentile 274.69 ms)
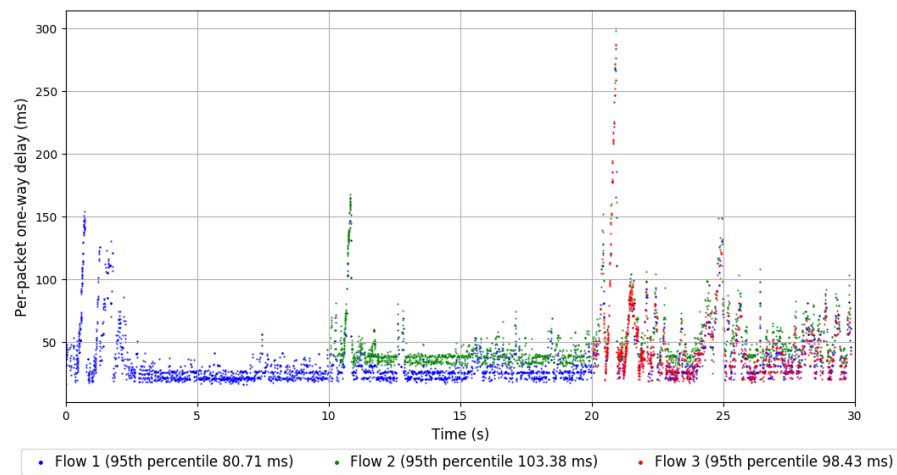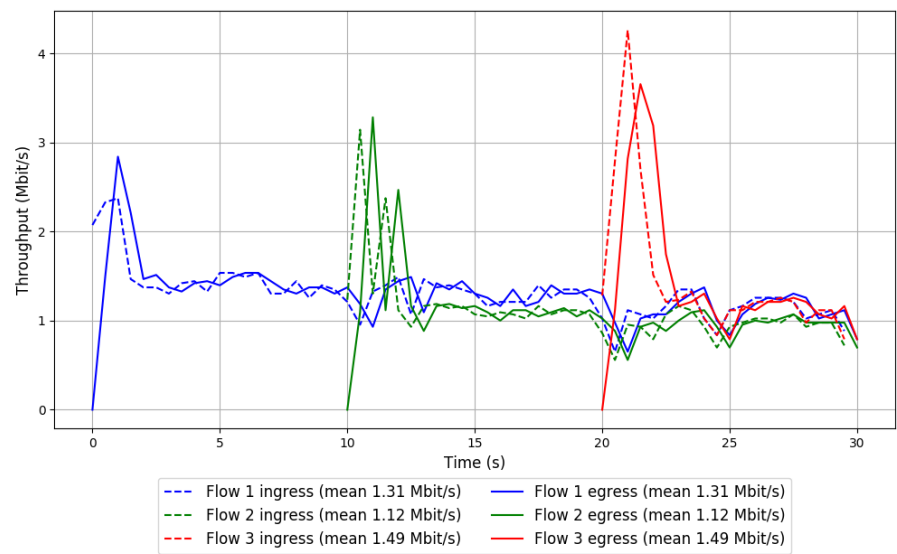
46

```
Run 1: Statistics of Indigo-Muses

Start at: 2018-09-07 13:09:37
End at: 2018-09-07 13:10:07
Local clock offset: -0.869 ms
Remote clock offset: -2.581 ms


# Below is generated by plot.py at 2018-09-07 13:55:48
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 585.107 ms
Loss rate: 1.36%
-- Flow 1:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 391.076 ms
Loss rate: 0.67%
-- Flow 2:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 548.260 ms
Loss rate: 0.62%
-- Flow 3:
Average throughput: 1.28 Mbit/s
95th percentile per-packet one-way delay: 635.199 ms
Loss rate: 3.59%
```

Run 1: Report of Indigo-Muses — Data Link

```
Run 2: Statistics of Indigo-Muses

Start at: 2018-09-07 13:29:50
End at: 2018-09-07 13:30:20
Local clock offset: 0.142 ms
Remote clock offset: -2.862 ms


# Below is generated by plot.py at 2018-09-07 13:55:48
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 110.085 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 114.579 ms
Loss rate: 0.04%
-- Flow 2:
Average throughput: 1.20 Mbit/s
95th percentile per-packet one-way delay: 76.870 ms
Loss rate: 0.05%
-- Flow 3:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 144.591 ms
Loss rate: 0.10%
```
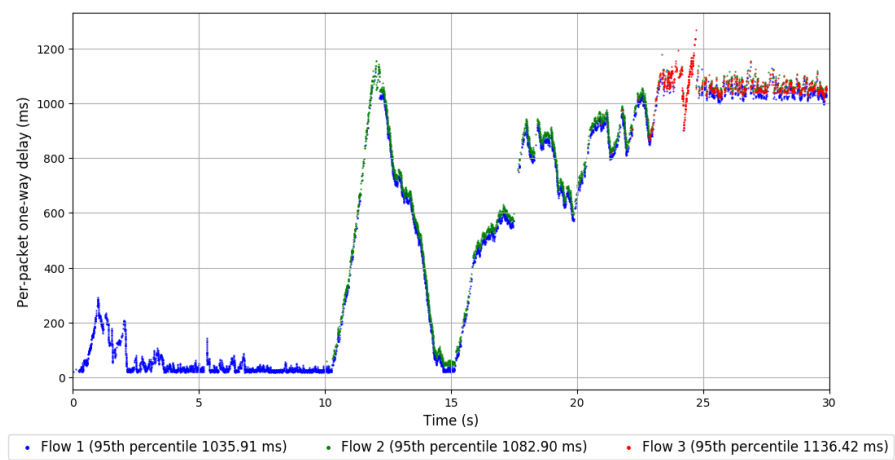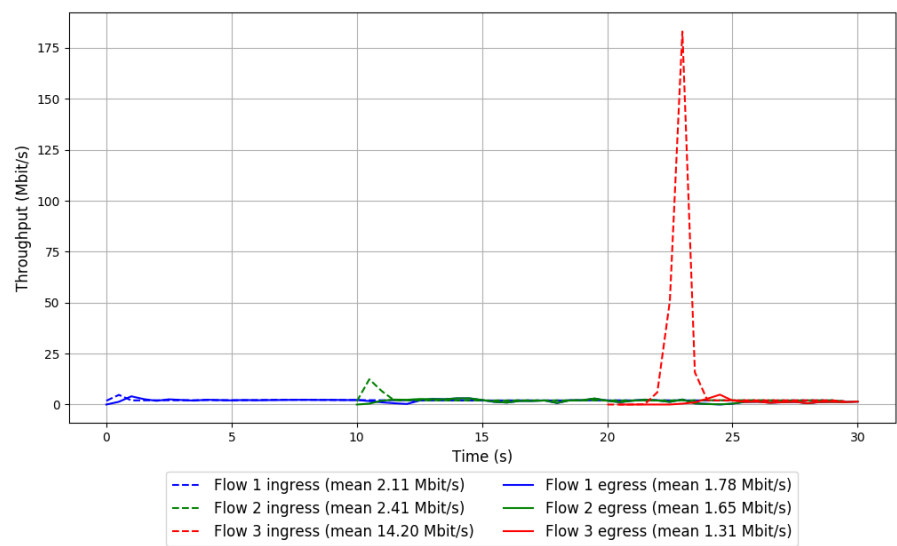
Run 2: Report of Indigo-Muses — Data Link

```
Run 3: Statistics of Indigo-Muses

Start at: 2018-09-07 13:50:10
End at: 2018-09-07 13:50:40
Local clock offset: 0.556 ms
Remote clock offset: -1.733 ms


# Below is generated by plot.py at 2018-09-07 13:55:48
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.54 Mbit/s
95th percentile per-packet one-way delay: 92.596 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 80.712 ms
Loss rate: 0.18%
-- Flow 2:
Average throughput: 1.12 Mbit/s
95th percentile per-packet one-way delay: 103.382 ms
Loss rate: 0.26%
-- Flow 3:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 98.427 ms
Loss rate: 0.24%
```
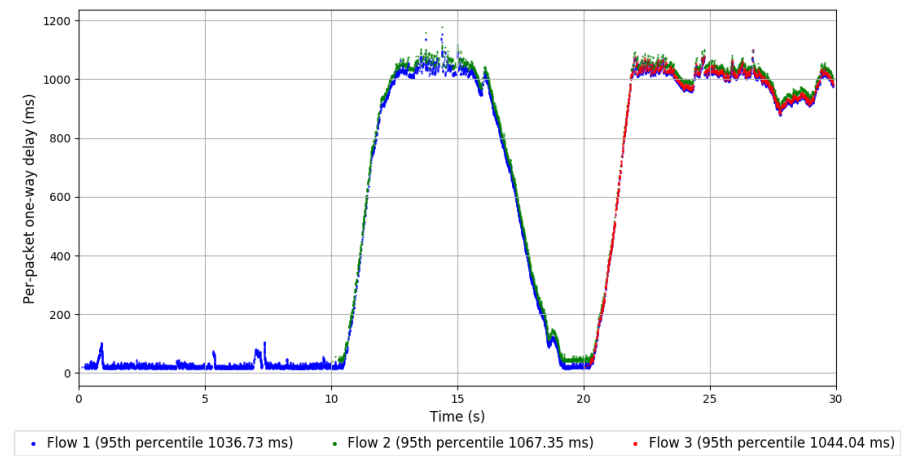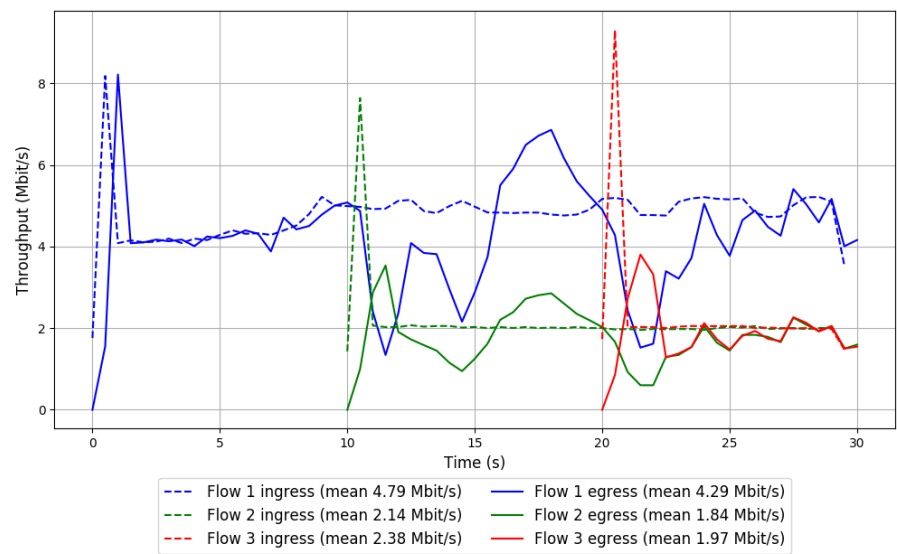
Run 3: Report of Indigo-Muses — Data Link

```
Run 1: Statistics of PCC-Allegro

Start at: 2018-09-07 13:00:41
End at: 2018-09-07 13:01:11
Local clock offset: -1.878 ms
Remote clock offset: -0.869 ms


# Below is generated by plot.py at 2018-09-07 13:55:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.27 Mbit/s
95th percentile per-packet one-way delay: 1081.836 ms
Loss rate: 61.10%
-- Flow 1:
Average throughput: 1.78 Mbit/s
95th percentile per-packet one-way delay: 1035.909 ms
Loss rate: 15.67%
-- Flow 2:
Average throughput: 1.65 Mbit/s
95th percentile per-packet one-way delay: 1082.896 ms
Loss rate: 31.74%
-- Flow 3:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 1136.418 ms
Loss rate: 91.66%
```

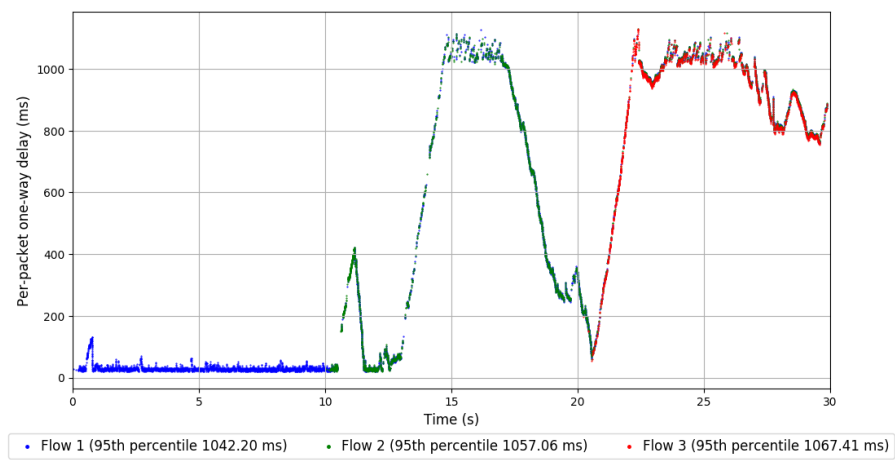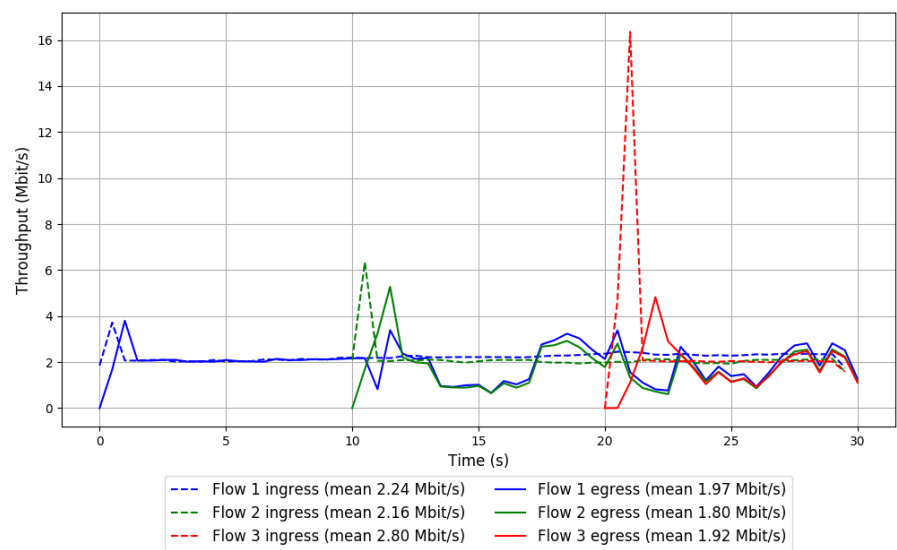Run 1: Report of PCC-Allegro — Data Link

```
Run 2: Statistics of PCC-Allegro

Start at: 2018-09-07 13:20:48
End at: 2018-09-07 13:21:18
Local clock offset: 2.087 ms
Remote clock offset: -3.147 ms


# Below is generated by plot.py at 2018-09-07 13:55:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.16 Mbit/s
95th percentile per-packet one-way delay: 1047.446 ms
Loss rate: 11.99%
-- Flow 1:
Average throughput: 4.29 Mbit/s
95th percentile per-packet one-way delay: 1036.732 ms
Loss rate: 10.47%
-- Flow 2:
Average throughput: 1.84 Mbit/s
95th percentile per-packet one-way delay: 1067.347 ms
Loss rate: 14.22%
-- Flow 3:
Average throughput: 1.97 Mbit/s
95th percentile per-packet one-way delay: 1044.043 ms
Loss rate: 17.20%
```

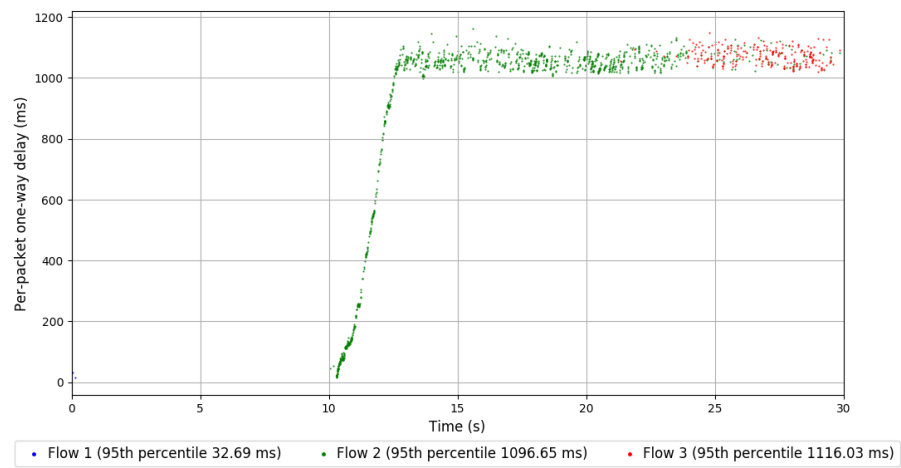Run 2: Report of PCC-Allegro — Data Link

```
Run 3: Statistics of PCC-Allegro

Start at: 2018-09-07 13:41:10
End at: 2018-09-07 13:41:40
Local clock offset: 0.36 ms
Remote clock offset: -2.502 ms


# Below is generated by plot.py at 2018-09-07 13:55:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.79 Mbit/s
95th percentile per-packet one-way delay: 1049.784 ms
Loss rate: 17.85%
-- Flow 1:
Average throughput: 1.97 Mbit/s
95th percentile per-packet one-way delay: 1042.197 ms
Loss rate: 12.26%
-- Flow 2:
Average throughput: 1.80 Mbit/s
95th percentile per-packet one-way delay: 1057.058 ms
Loss rate: 16.98%
-- Flow 3:
Average throughput: 1.92 Mbit/s
95th percentile per-packet one-way delay: 1067.407 ms
Loss rate: 32.78%
```

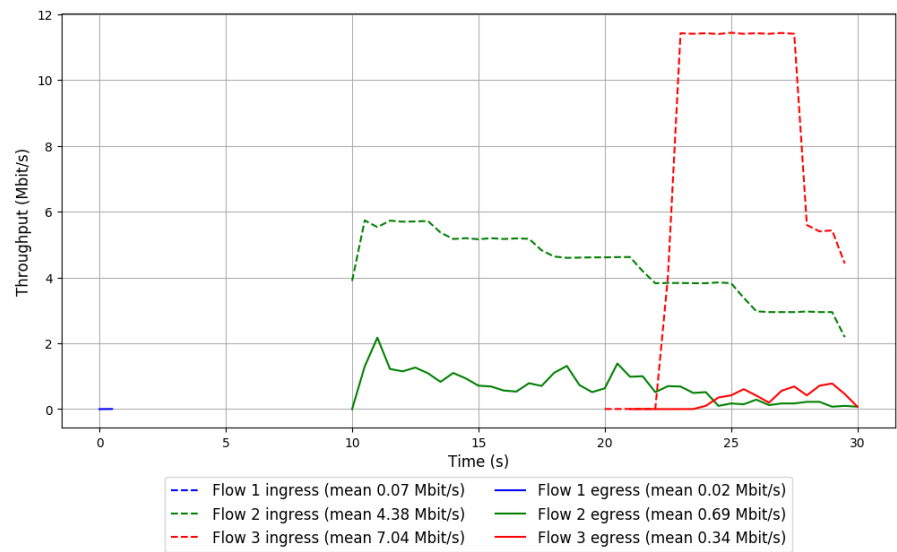Run 3: Report of PCC-Allegro — Data Link

```
Run 1: Statistics of PCC-Expr

Start at: 2018-09-07 13:12:59
End at: 2018-09-07 13:13:29
Local clock offset: 1.25 ms
Remote clock offset: -2.456 ms


# Below is generated by plot.py at 2018-09-07 13:55:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 1103.744 ms
Loss rate: 89.38%
-- Flow 1:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 32.686 ms
Loss rate: 85.71%
-- Flow 2:
Average throughput: 0.69 Mbit/s
95th percentile per-packet one-way delay: 1096.651 ms
Loss rate: 84.21%
-- Flow 3:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 1116.034 ms
Loss rate: 95.84%
```

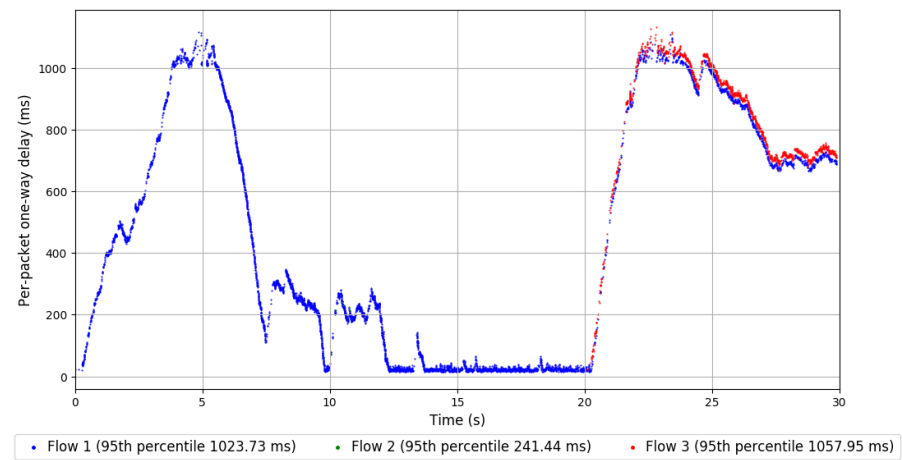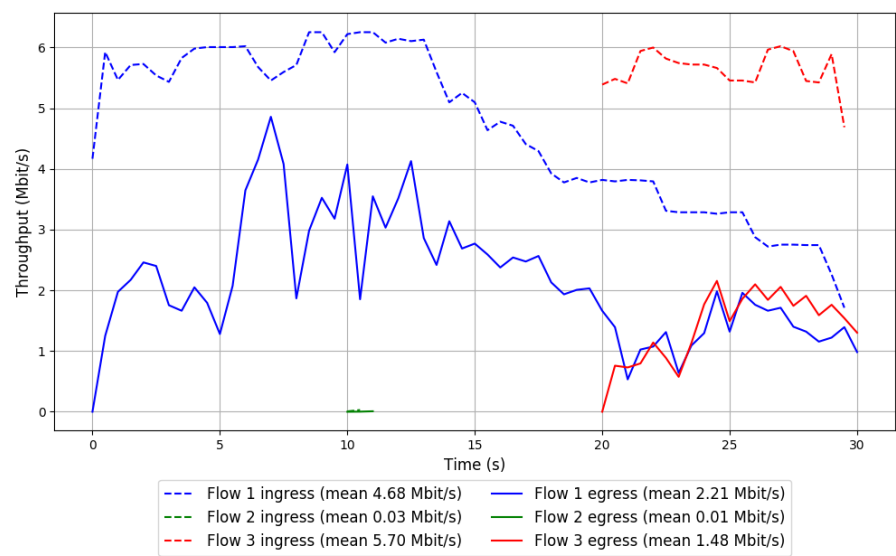Run 1: Report of PCC-Expr — Data Link

```
Run 2: Statistics of PCC-Expr

Start at: 2018-09-07 13:33:18
End at: 2018-09-07 13:33:48
Local clock offset: 1.29 ms
Remote clock offset: -1.978 ms


# Below is generated by plot.py at 2018-09-07 13:55:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.69 Mbit/s
95th percentile per-packet one-way delay: 1037.431 ms
Loss rate: 58.98%
-- Flow 1:
Average throughput: 2.21 Mbit/s
95th percentile per-packet one-way delay: 1023.734 ms
Loss rate: 52.89%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 241.442 ms
Loss rate: 70.59%
-- Flow 3:
Average throughput: 1.48 Mbit/s
95th percentile per-packet one-way delay: 1057.952 ms
Loss rate: 74.11%
```
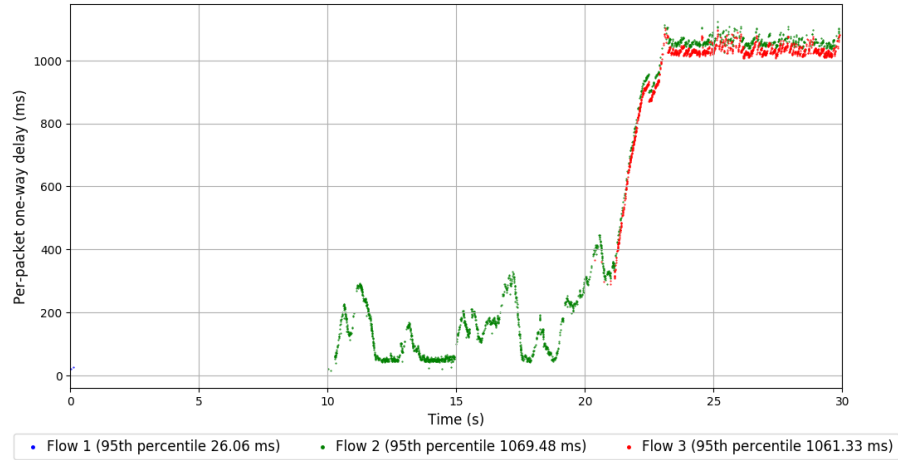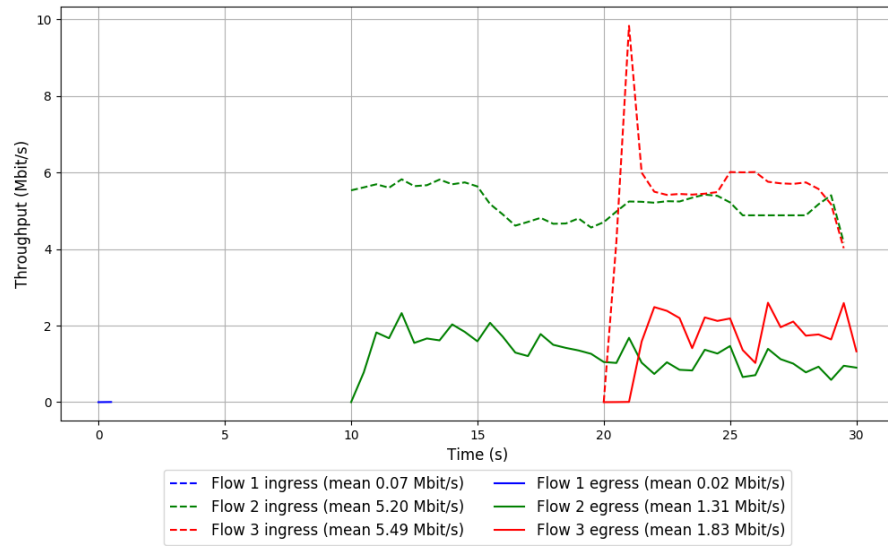
Run 2: Report of PCC-Expr — Data Link

```
Run 3: Statistics of PCC-Expr

Start at: 2018-09-07 13:53:33
End at: 2018-09-07 13:54:03
Local clock offset: 3.782 ms
Remote clock offset: -2.774 ms


# Below is generated by plot.py at 2018-09-07 13:55:54
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 1068.086 ms
Loss rate: 72.54%
-- Flow 1:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 26.062 ms
Loss rate: 85.71%
-- Flow 2:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 1069.480 ms
Loss rate: 74.92%
-- Flow 3:
Average throughput: 1.83 Mbit/s
95th percentile per-packet one-way delay: 1061.327 ms
Loss rate: 68.00%
```
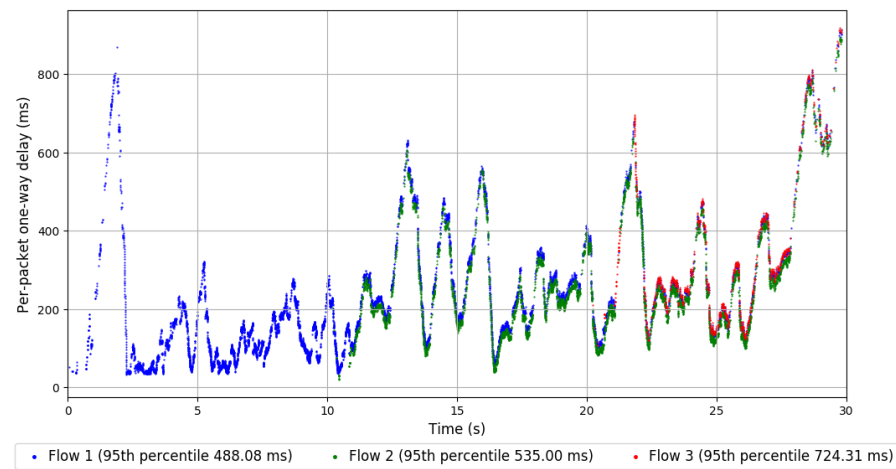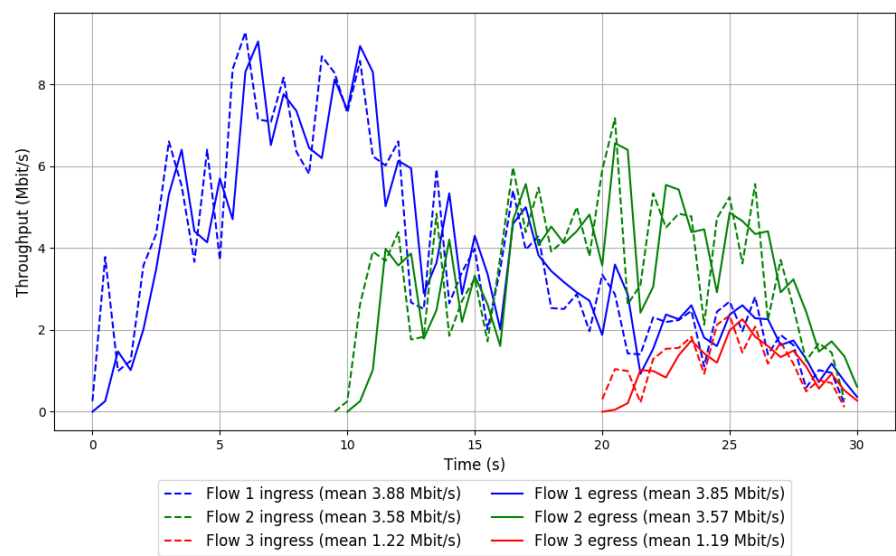
Run 3: Report of PCC-Expr — Data Link

- - - Flow 1 ingress (mean 0.07 Mbit/s) ——— Flow 1 egress (mean 0.02 Mbit/s)
- - - Flow 2 ingress (mean 5.20 Mbit/s) ——— Flow 2 egress (mean 1.31 Mbit/s)
- - - Flow 3 ingress (mean 5.49 Mbit/s) ——— Flow 3 egress (mean 1.83 Mbit/s)

• Flow 1 (95th percentile 26.06 ms)   • Flow 2 (95th percentile 1069.48 ms)   • Flow 3 (95th percentile 1061.33 ms)

```
Run 1: Statistics of QUIC Cubic

Start at: 2018-09-07 12:58:26
End at: 2018-09-07 12:58:56
Local clock offset: 2.212 ms
Remote clock offset: -4.989 ms

# Below is generated by plot.py at 2018-09-07 13:56:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.59 Mbit/s
95th percentile per-packet one-way delay: 524.465 ms
Loss rate: 1.33%
-- Flow 1:
Average throughput: 3.85 Mbit/s
95th percentile per-packet one-way delay: 488.082 ms
Loss rate: 0.88%
-- Flow 2:
Average throughput: 3.57 Mbit/s
95th percentile per-packet one-way delay: 534.998 ms
Loss rate: 1.53%
-- Flow 3:
Average throughput: 1.19 Mbit/s
95th percentile per-packet one-way delay: 724.307 ms
Loss rate: 4.55%
```
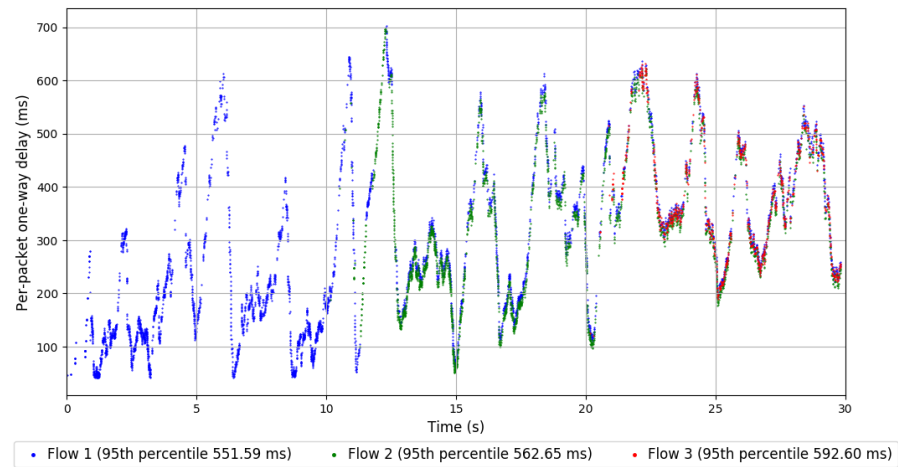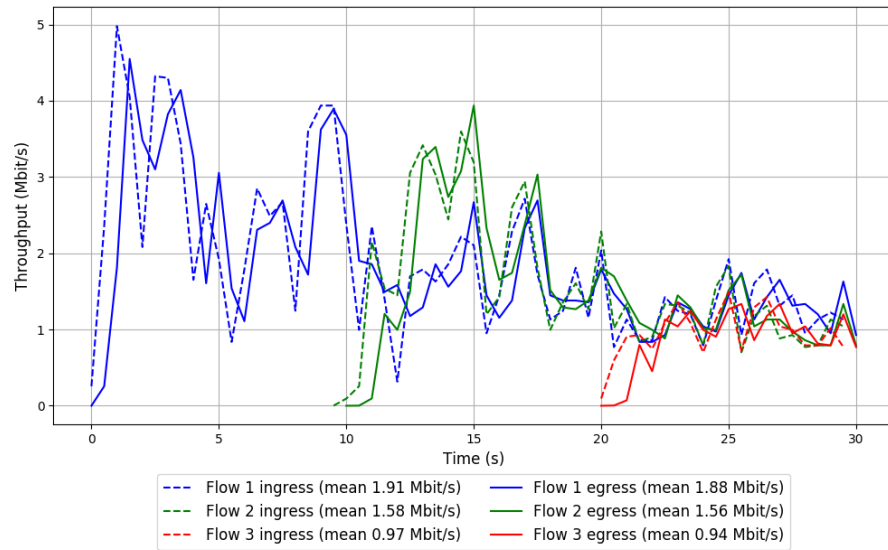
Run 1: Report of QUIC Cubic — Data Link

- Flow 1 ingress (mean 3.88 Mbit/s)
- Flow 1 egress (mean 3.85 Mbit/s)
- Flow 2 ingress (mean 3.58 Mbit/s)
- Flow 2 egress (mean 3.57 Mbit/s)
- Flow 3 ingress (mean 1.22 Mbit/s)
- Flow 3 egress (mean 1.19 Mbit/s)

- Flow 1 (95th percentile 488.08 ms)
- Flow 2 (95th percentile 535.00 ms)
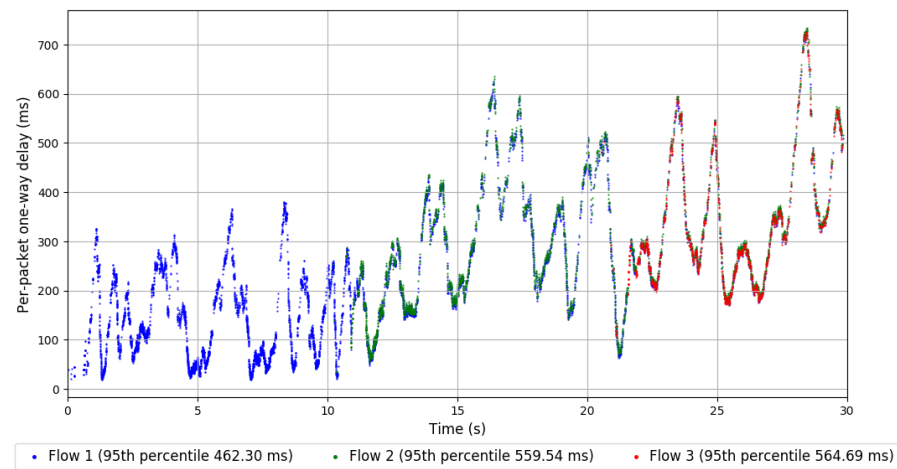- Flow 3 (95th percentile 724.31 ms)

```
Run 2: Statistics of QUIC Cubic

Start at: 2018-09-07 13:18:34
End at: 2018-09-07 13:19:04
Local clock offset: -1.786 ms
Remote clock offset: -2.655 ms


# Below is generated by plot.py at 2018-09-07 13:56:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.22 Mbit/s
95th percentile per-packet one-way delay: 564.137 ms
Loss rate: 1.74%
-- Flow 1:
Average throughput: 1.88 Mbit/s
95th percentile per-packet one-way delay: 551.590 ms
Loss rate: 1.27%
-- Flow 2:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 562.652 ms
Loss rate: 1.84%
-- Flow 3:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 592.599 ms
Loss rate: 4.17%
```
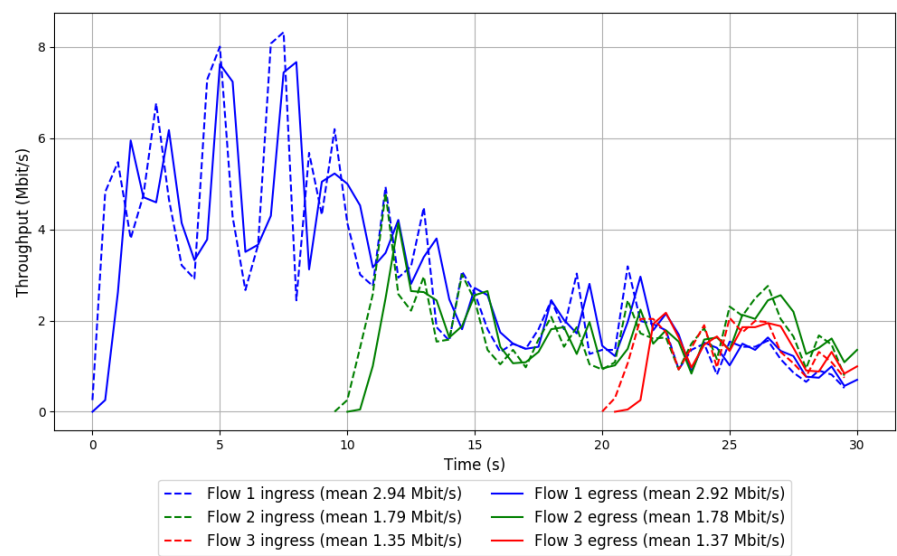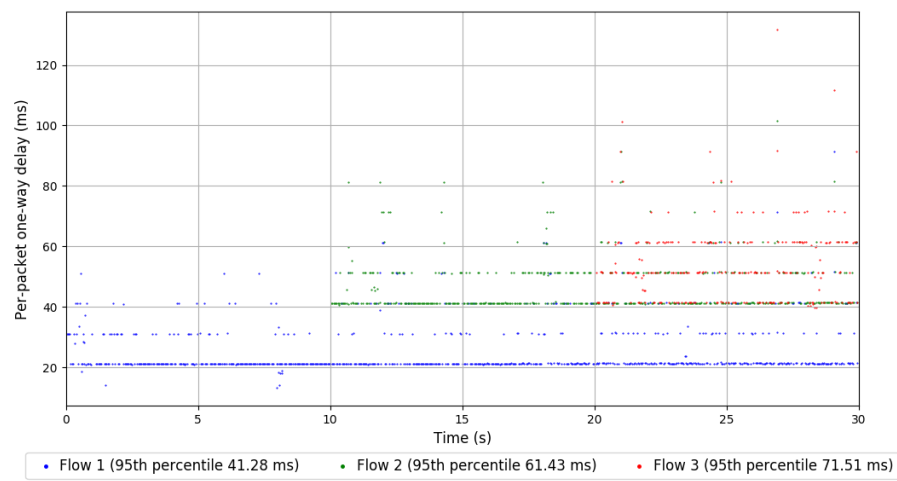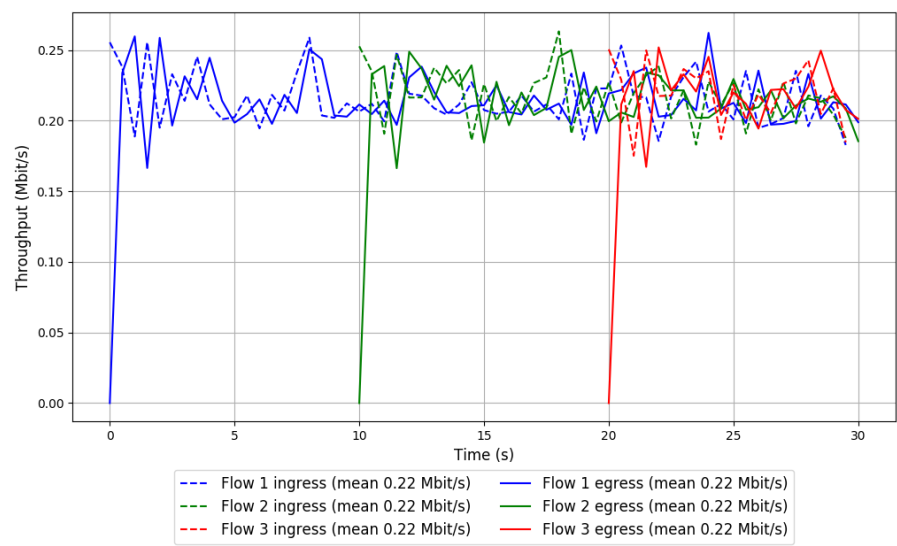
Run 2: Report of QUIC Cubic — Data Link

- - - - Flow 1 ingress (mean 1.91 Mbit/s)   —— Flow 1 egress (mean 1.88 Mbit/s)
- - - - Flow 2 ingress (mean 1.58 Mbit/s)   —— Flow 2 egress (mean 1.56 Mbit/s)
- - - - Flow 3 ingress (mean 0.97 Mbit/s)   —— Flow 3 egress (mean 0.94 Mbit/s)

- Flow 1 (95th percentile 551.59 ms)   • Flow 2 (95th percentile 562.65 ms)   • Flow 3 (95th percentile 592.60 ms)

```
Run 3: Statistics of QUIC Cubic

Start at: 2018-09-07 13:38:55
End at: 2018-09-07 13:39:25
Local clock offset: -1.945 ms
Remote clock offset: -2.463 ms


# Below is generated by plot.py at 2018-09-07 13:56:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.52 Mbit/s
95th percentile per-packet one-way delay: 510.609 ms
Loss rate: 1.40%
-- Flow 1:
Average throughput: 2.92 Mbit/s
95th percentile per-packet one-way delay: 462.301 ms
Loss rate: 0.77%
-- Flow 2:
Average throughput: 1.78 Mbit/s
95th percentile per-packet one-way delay: 559.539 ms
Loss rate: 1.91%
-- Flow 3:
Average throughput: 1.37 Mbit/s
95th percentile per-packet one-way delay: 564.689 ms
Loss rate: 4.20%
```

Run 3: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 2.94 Mbit/s) --- Flow 1 egress (mean 2.92 Mbit/s)
Flow 2 ingress (mean 1.79 Mbit/s) --- Flow 2 egress (mean 1.78 Mbit/s)
Flow 3 ingress (mean 1.35 Mbit/s) --- Flow 3 egress (mean 1.37 Mbit/s)

Flow 1 (95th percentile 462.30 ms)   Flow 2 (95th percentile 559.54 ms)   Flow 3 (95th percentile 564.69 ms)
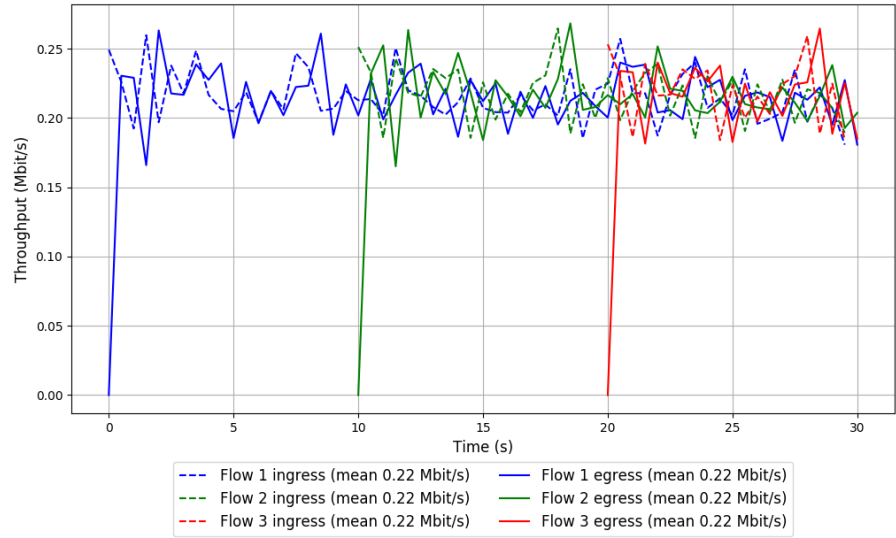
```
Run 1: Statistics of SCReAM

Start at: 2018-09-07 13:08:30
End at: 2018-09-07 13:09:00
Local clock offset: 1.198 ms
Remote clock offset: -2.971 ms

# Below is generated by plot.py at 2018-09-07 13:56:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 61.394 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 41.278 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 61.426 ms
Loss rate: 0.19%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 71.513 ms
Loss rate: 0.35%
```
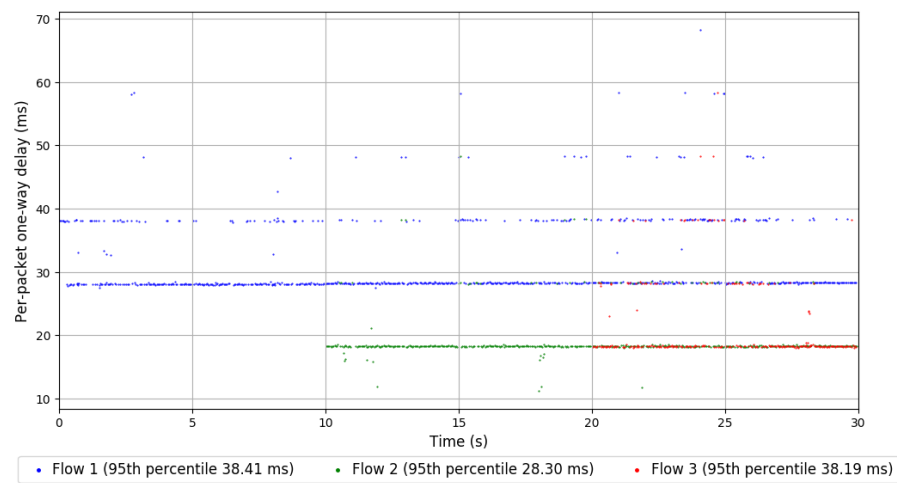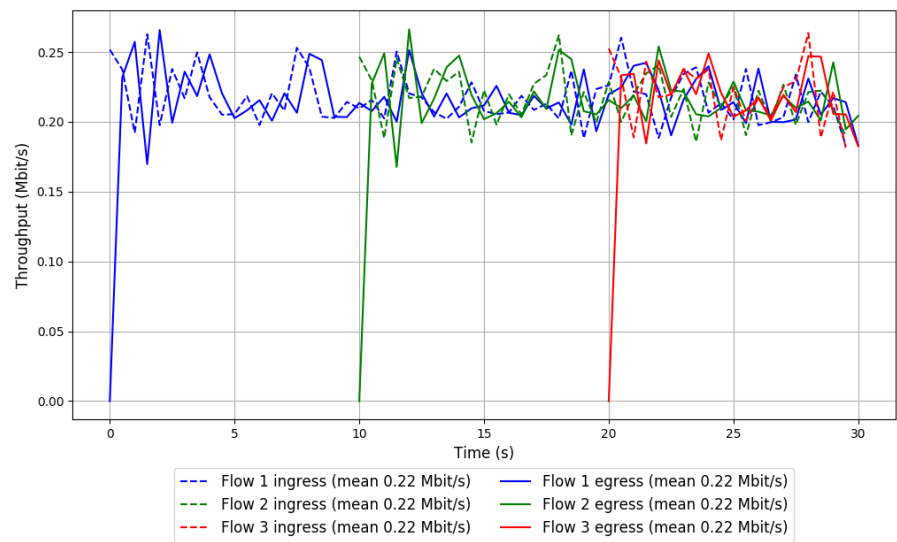
Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2018-09-07 13:28:42
End at: 2018-09-07 13:29:12
Local clock offset: -2.23 ms
Remote clock offset: -0.944 ms


# Below is generated by plot.py at 2018-09-07 13:56:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 57.256 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 64.716 ms
Loss rate: 0.12%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 47.117 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 47.126 ms
Loss rate: 0.36%
```
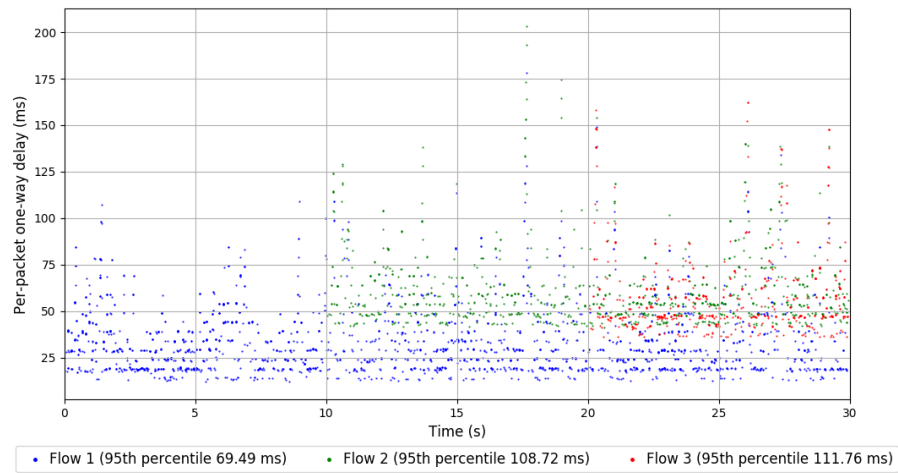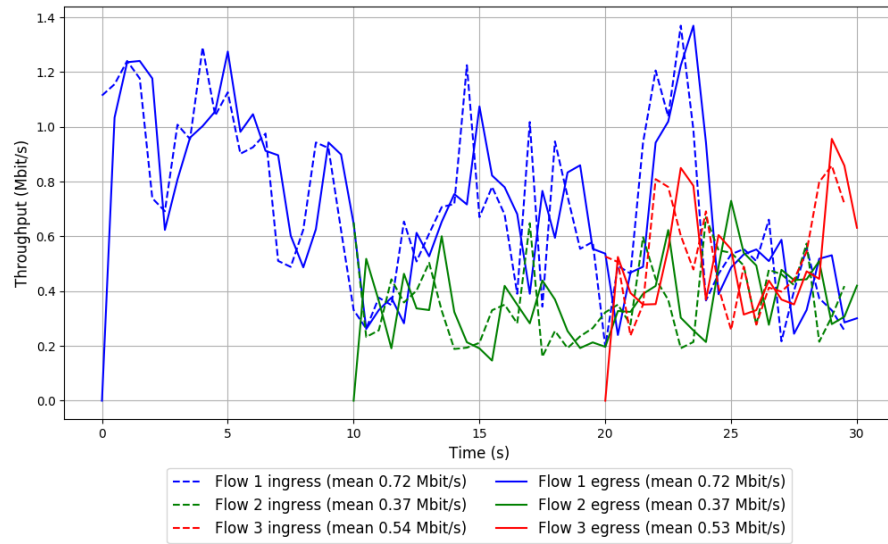
Run 2: Report of SCReAM — Data Link

```
Run 3: Statistics of SCReAM

Start at: 2018-09-07 13:49:03
End at: 2018-09-07 13:49:33
Local clock offset: 3.053 ms
Remote clock offset: -5.258 ms

# Below is generated by plot.py at 2018-09-07 13:56:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 38.282 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 38.411 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 28.297 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 38.191 ms
Loss rate: 0.35%
```
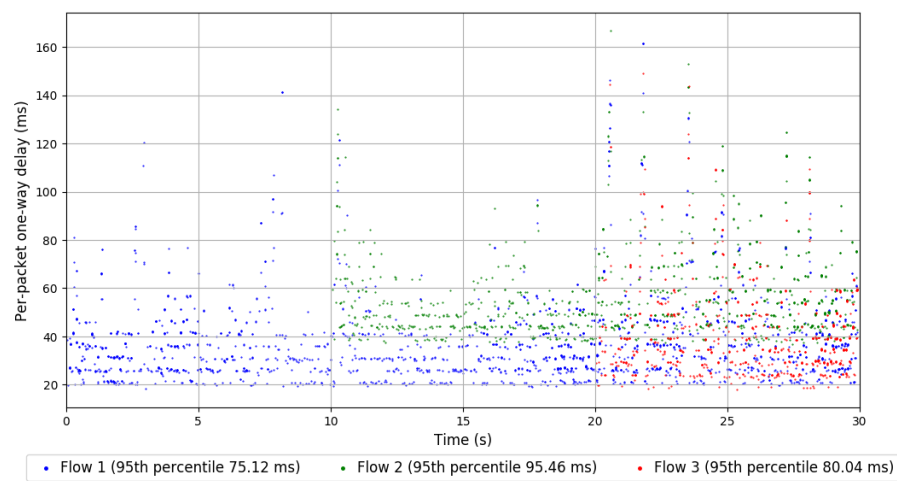
Run 3: Report of SCReAM — Data Link

```
Run 1: Statistics of Sprout

Start at: 2018-09-07 12:55:04
End at: 2018-09-07 12:55:34
Local clock offset: 1.628 ms
Remote clock offset: -2.261 ms

# Below is generated by plot.py at 2018-09-07 13:56:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 88.377 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 69.491 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 108.724 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 111.761 ms
Loss rate: 0.85%
```
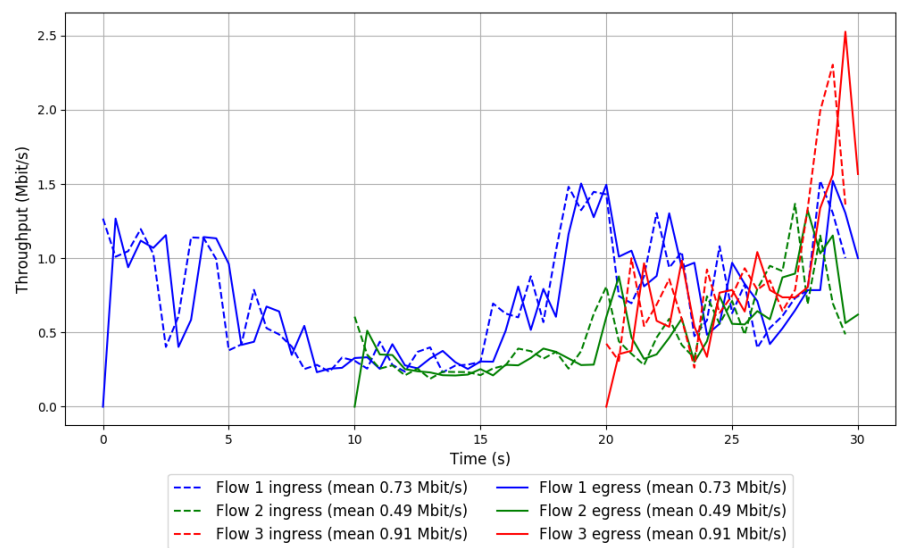
Run 1: Report of Sprout — Data Link

```
Run 2: Statistics of Sprout

Start at: 2018-09-07 13:15:13
End at: 2018-09-07 13:15:43
Local clock offset: 0.7 ms
Remote clock offset: -2.423 ms


# Below is generated by plot.py at 2018-09-07 13:56:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.36 Mbit/s
95th percentile per-packet one-way delay: 84.332 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 75.122 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 95.460 ms
Loss rate: 0.01%
-- Flow 3:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 80.039 ms
Loss rate: 0.01%
```
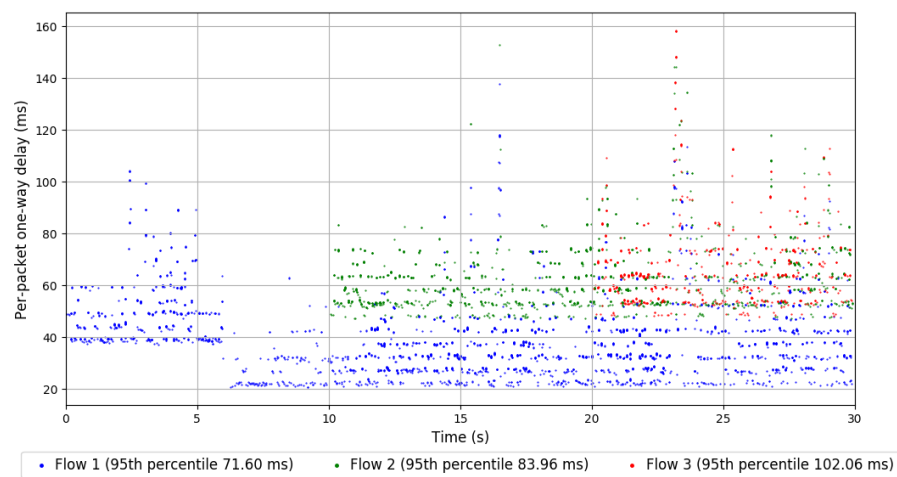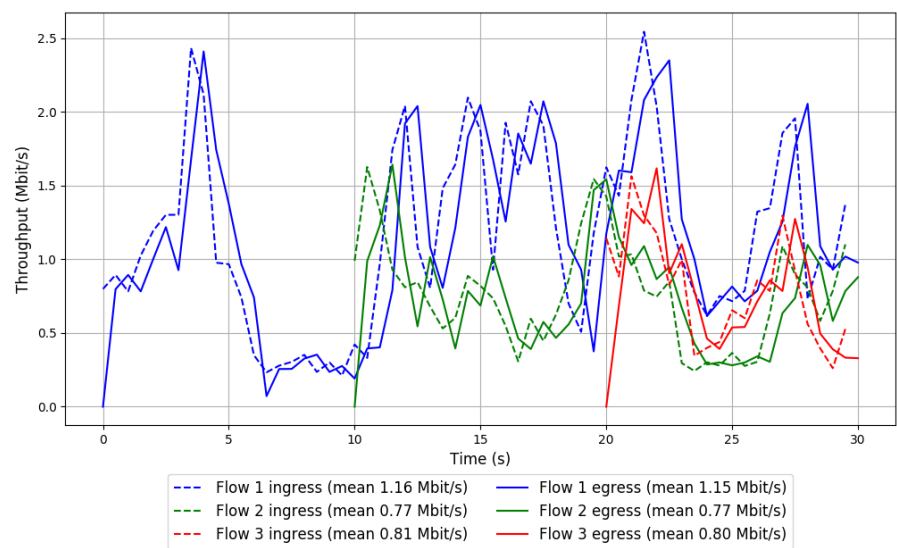
Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2018-09-07 13:35:33
End at: 2018-09-07 13:36:03
Local clock offset: 0.219 ms
Remote clock offset: -2.637 ms


# Below is generated by plot.py at 2018-09-07 13:56:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.93 Mbit/s
95th percentile per-packet one-way delay: 83.090 ms
Loss rate: 0.93%
-- Flow 1:
Average throughput: 1.15 Mbit/s
95th percentile per-packet one-way delay: 71.596 ms
Loss rate: 0.94%
-- Flow 2:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 83.956 ms
Loss rate: 0.73%
-- Flow 3:
Average throughput: 0.80 Mbit/s
95th percentile per-packet one-way delay: 102.063 ms
Loss rate: 1.25%
```
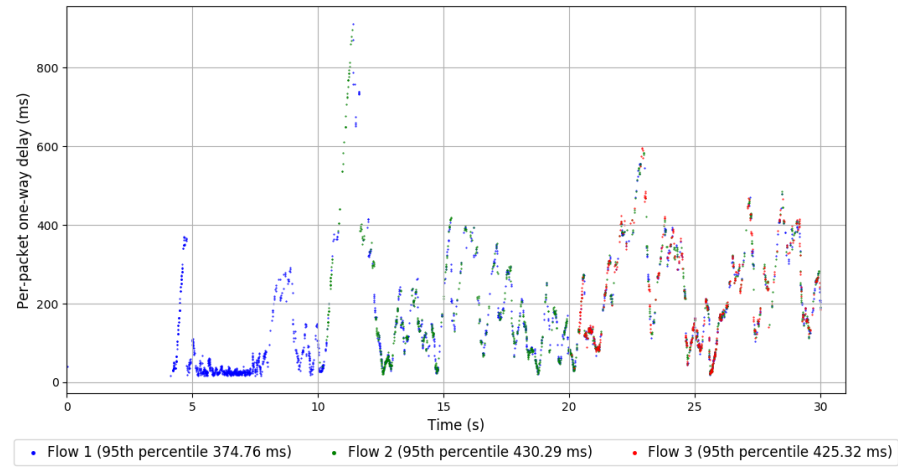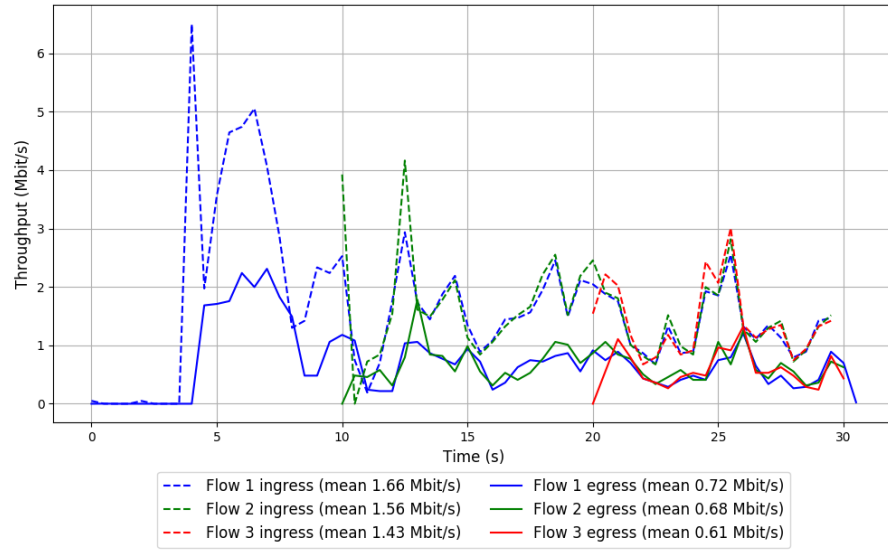
Run 3: Report of Sprout — Data Link

```
Run 1: Statistics of TaoVA-100x

Start at: 2018-09-07 13:04:03
End at: 2018-09-07 13:04:33
Local clock offset: 0.948 ms
Remote clock offset: -2.722 ms


# Below is generated by plot.py at 2018-09-07 13:56:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.38 Mbit/s
95th percentile per-packet one-way delay: 404.134 ms
Loss rate: 56.72%
-- Flow 1:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 374.762 ms
Loss rate: 56.53%
-- Flow 2:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 430.287 ms
Loss rate: 56.77%
-- Flow 3:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 425.319 ms
Loss rate: 57.28%
```

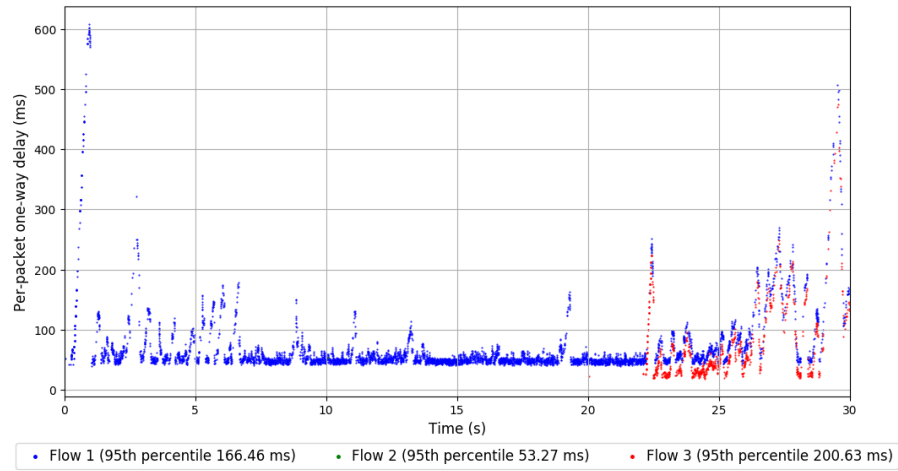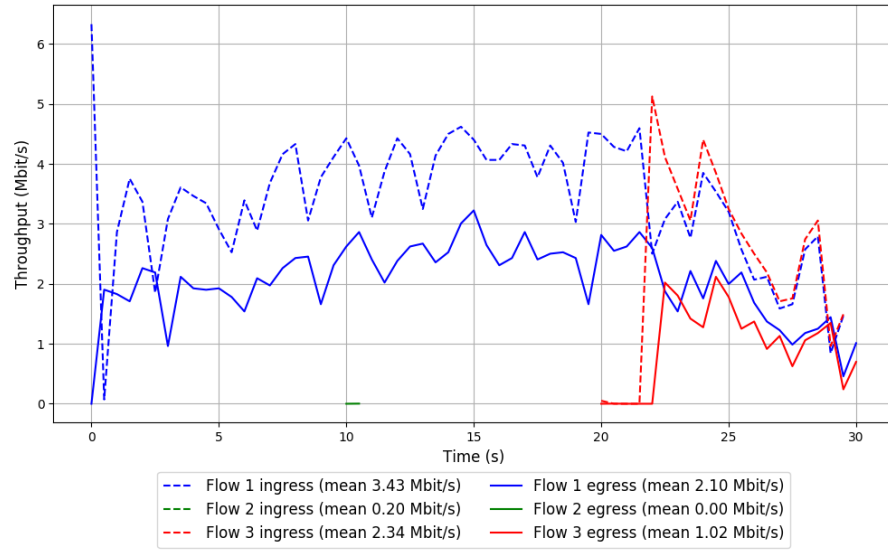# Run 1: Report of TaoVA-100x — Data Link

```
Run 2: Statistics of TaoVA-100x

Start at: 2018-09-07 13:24:12
End at: 2018-09-07 13:24:42
Local clock offset: -2.387 ms
Remote clock offset: -3.313 ms


# Below is generated by plot.py at 2018-09-07 13:56:02
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.44 Mbit/s
95th percentile per-packet one-way delay: 174.081 ms
Loss rate: 42.12%
-- Flow 1:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 166.463 ms
Loss rate: 38.81%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 53.269 ms
Loss rate: 95.92%
-- Flow 3:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 200.634 ms
Loss rate: 56.65%
```

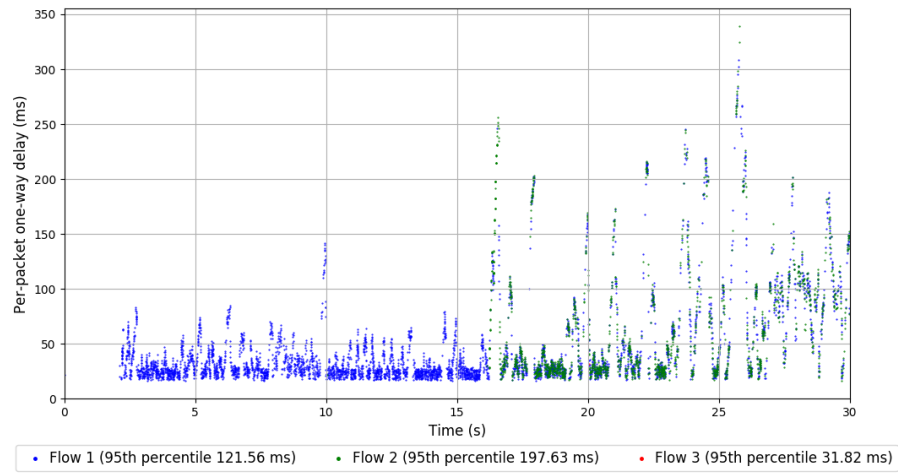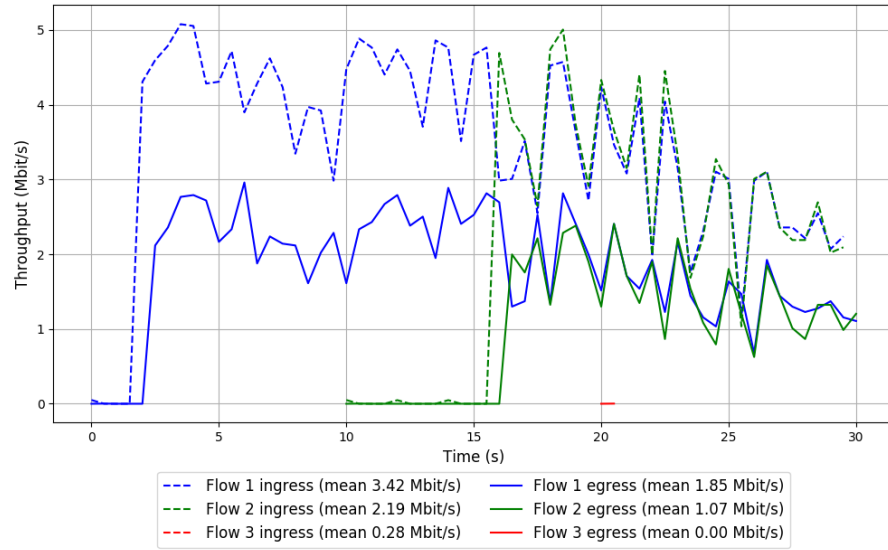Run 2: Report of TaoVA-100x — Data Link

```
Run 3: Statistics of TaoVA-100x

Start at: 2018-09-07 13:44:34
End at: 2018-09-07 13:45:04
Local clock offset: -1.405 ms
Remote clock offset: -3.423 ms


# Below is generated by plot.py at 2018-09-07 13:56:02
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.56 Mbit/s
95th percentile per-packet one-way delay: 152.712 ms
Loss rate: 47.49%
-- Flow 1:
Average throughput: 1.85 Mbit/s
95th percentile per-packet one-way delay: 121.559 ms
Loss rate: 45.91%
-- Flow 2:
Average throughput: 1.07 Mbit/s
95th percentile per-packet one-way delay: 197.626 ms
Loss rate: 51.16%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 31.822 ms
Loss rate: 95.92%
```
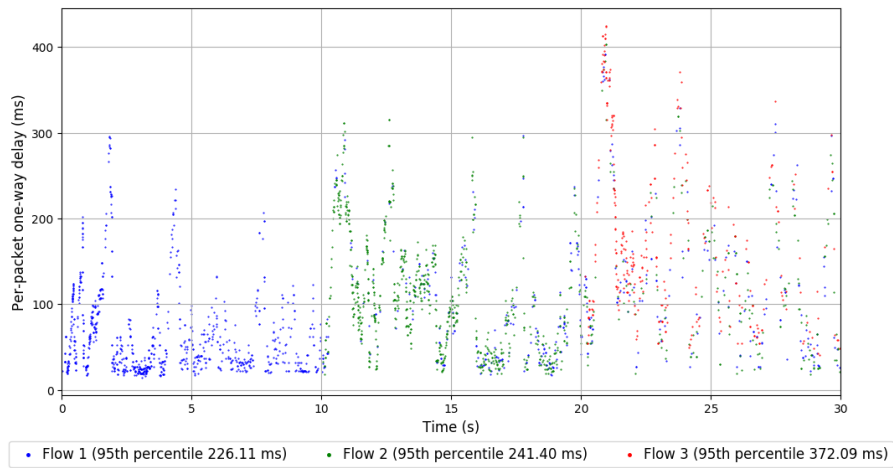
Run 3: Report of TaoVA-100x — Data Link

- Flow 1 ingress (mean 3.42 Mbit/s)
- Flow 1 egress (mean 1.85 Mbit/s)
- Flow 2 ingress (mean 2.19 Mbit/s)
- Flow 2 egress (mean 1.07 Mbit/s)
- Flow 3 ingress (mean 0.28 Mbit/s)
- Flow 3 egress (mean 0.00 Mbit/s)

- Flow 1 (95th percentile 121.56 ms)
- Flow 2 (95th percentile 197.63 ms)
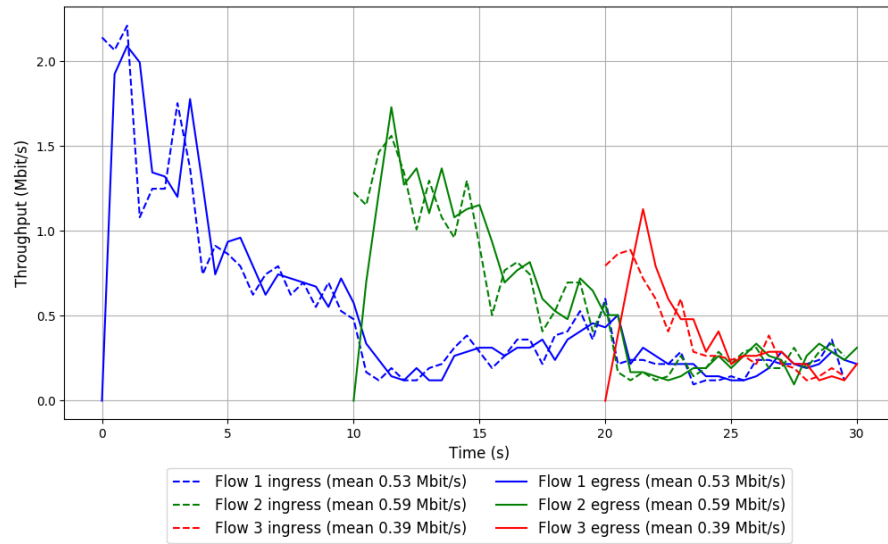- Flow 3 (95th percentile 31.82 ms)

```
Run 1: Statistics of TCP Vegas

Start at: 2018-09-07 13:06:17
End at: 2018-09-07 13:06:47
Local clock offset: 1.16 ms
Remote clock offset: -1.718 ms


# Below is generated by plot.py at 2018-09-07 13:56:02
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 255.108 ms
Loss rate: 0.49%
-- Flow 1:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 226.106 ms
Loss rate: 0.30%
-- Flow 2:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 241.402 ms
Loss rate: 0.41%
-- Flow 3:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 372.094 ms
Loss rate: 1.54%
```

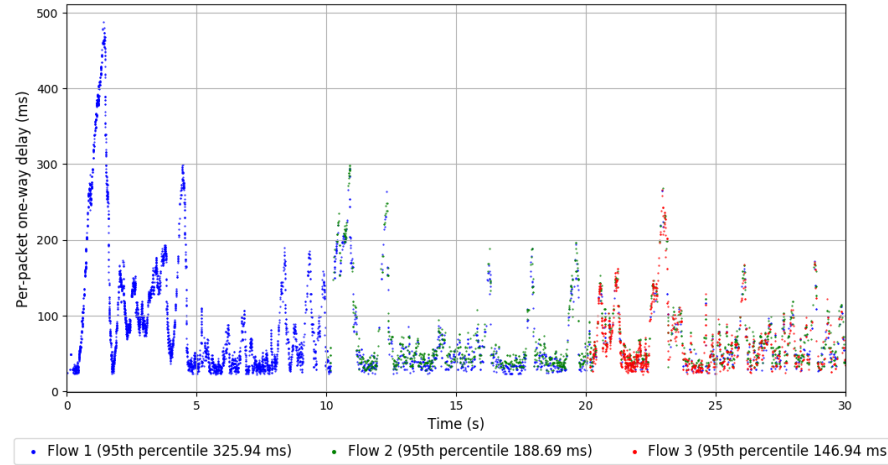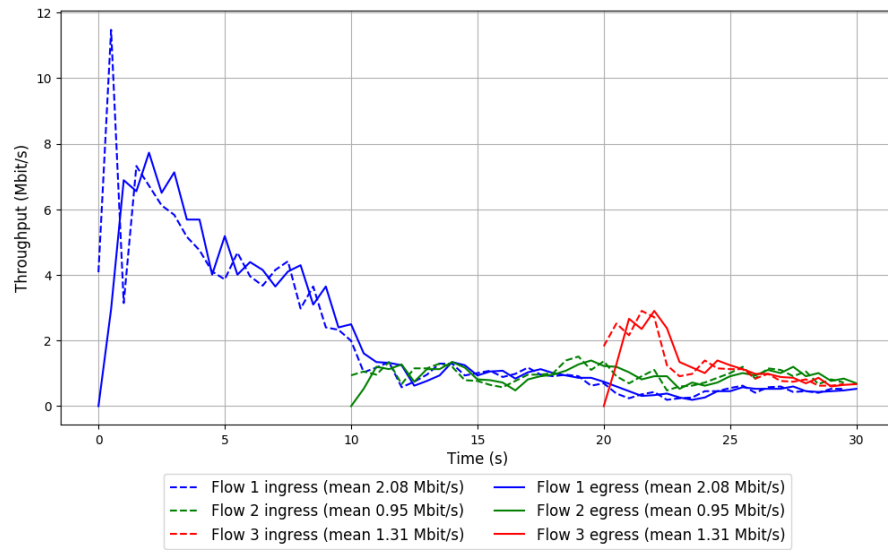Run 1: Report of TCP Vegas — Data Link

```
Run 2: Statistics of TCP Vegas

Start at: 2018-09-07 13:26:28
End at: 2018-09-07 13:26:58
Local clock offset: -2.089 ms
Remote clock offset: -2.462 ms


# Below is generated by plot.py at 2018-09-07 13:56:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.14 Mbit/s
95th percentile per-packet one-way delay: 270.424 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 2.08 Mbit/s
95th percentile per-packet one-way delay: 325.940 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 188.694 ms
Loss rate: 0.13%
-- Flow 3:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 146.945 ms
Loss rate: 0.28%
```
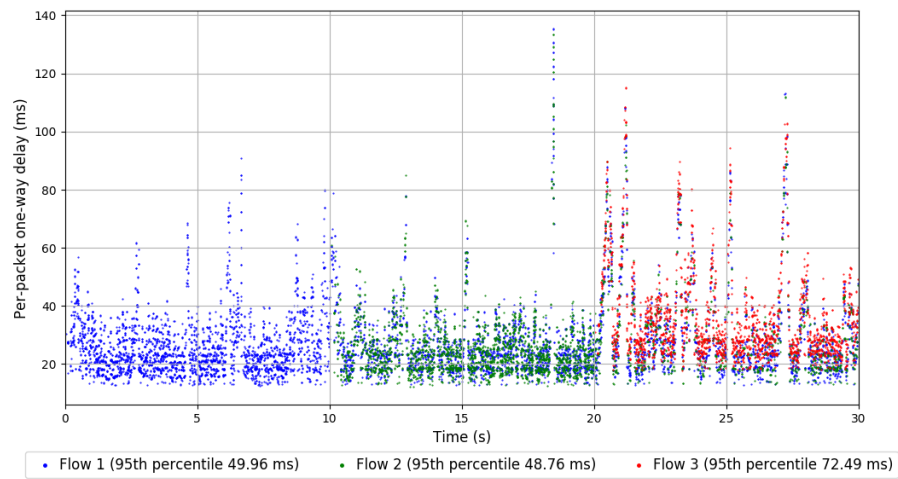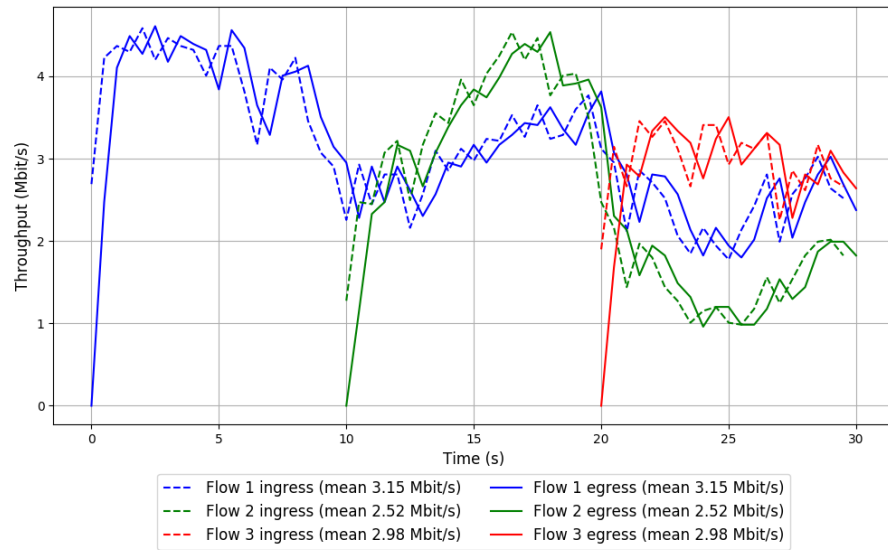
Run 2: Report of TCP Vegas — Data Link

```
Run 3: Statistics of TCP Vegas

Start at: 2018-09-07 13:46:49
End at: 2018-09-07 13:47:19
Local clock offset: 3.42 ms
Remote clock offset: -2.428 ms


# Below is generated by plot.py at 2018-09-07 13:56:09
# Datalink statistics
-- Total of 3 flows:
Average throughput: 5.81 Mbit/s
95th percentile per-packet one-way delay: 55.641 ms
Loss rate: 0.17%
-- Flow 1:
Average throughput: 3.15 Mbit/s
95th percentile per-packet one-way delay: 49.962 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 2.52 Mbit/s
95th percentile per-packet one-way delay: 48.760 ms
Loss rate: 0.12%
-- Flow 3:
Average throughput: 2.98 Mbit/s
95th percentile per-packet one-way delay: 72.492 ms
Loss rate: 0.36%
```
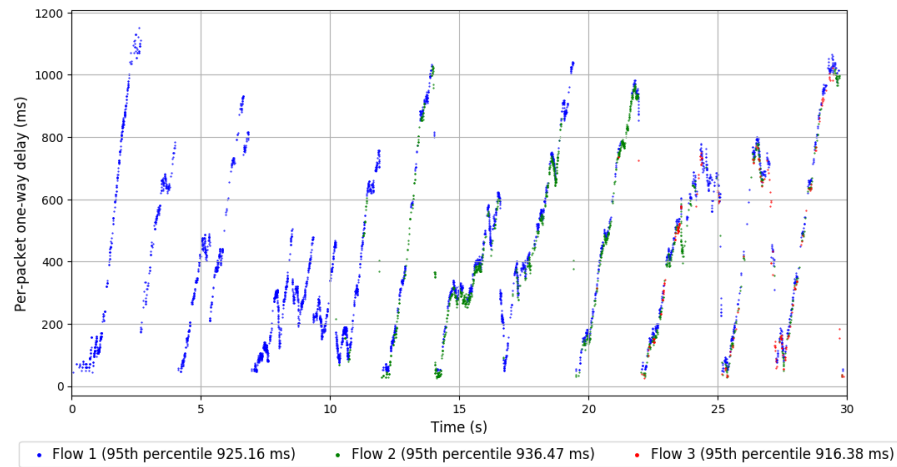
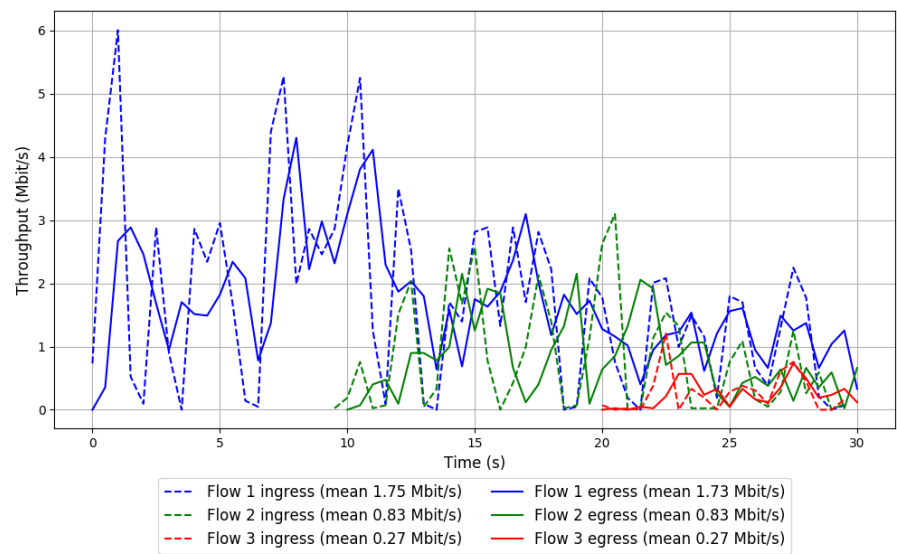Run 3: Report of TCP Vegas — Data Link

```
Run 1: Statistics of Verus

Start at: 2018-09-07 13:05:10
End at: 2018-09-07 13:05:40
Local clock offset: 0.409 ms
Remote clock offset: -2.677 ms


# Below is generated by plot.py at 2018-09-07 13:56:09
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.36 Mbit/s
95th percentile per-packet one-way delay: 930.739 ms
Loss rate: 1.78%
-- Flow 1:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 925.157 ms
Loss rate: 1.89%
-- Flow 2:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 936.467 ms
Loss rate: 1.36%
-- Flow 3:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 916.376 ms
Loss rate: 2.25%
```

Run 1: Report of Verus — Data Link

```
Run 2: Statistics of Verus

Start at: 2018-09-07 13:25:20
End at: 2018-09-07 13:25:50
Local clock offset: -1.346 ms
Remote clock offset: -2.35 ms


# Below is generated by plot.py at 2018-09-07 13:56:09
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.67 Mbit/s
95th percentile per-packet one-way delay: 971.273 ms
Loss rate: 6.86%
-- Flow 1:
Average throughput: 3.89 Mbit/s
95th percentile per-packet one-way delay: 1002.814 ms
Loss rate: 7.23%
-- Flow 2:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 857.312 ms
Loss rate: 4.85%
-- Flow 3:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 711.552 ms
Loss rate: 5.76%
```
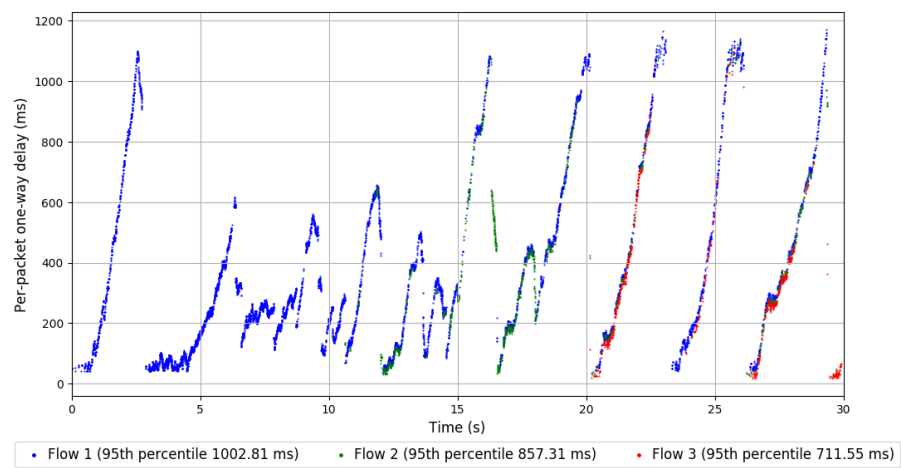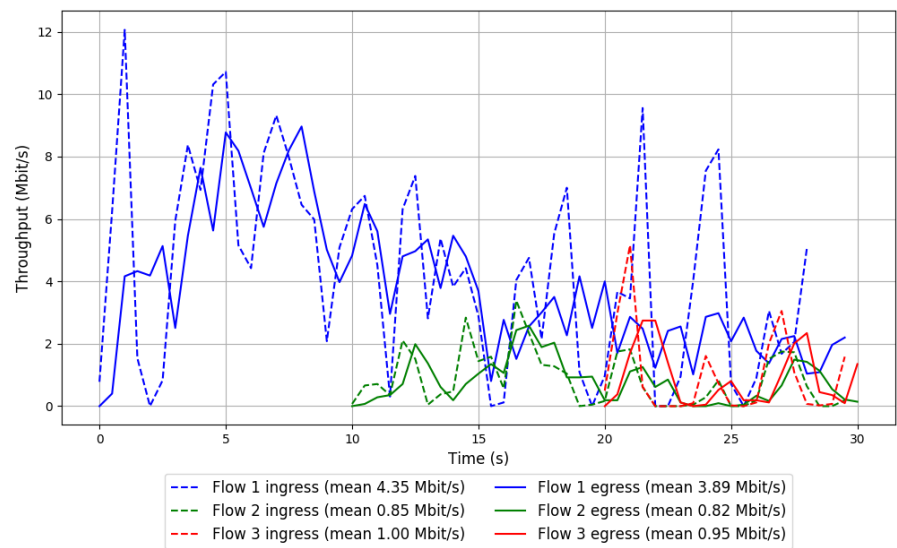
Run 2: Report of Verus — Data Link

Flow 1 ingress (mean 4.35 Mbit/s) — — — Flow 1 egress (mean 3.89 Mbit/s)
Flow 2 ingress (mean 0.85 Mbit/s) — — — Flow 2 egress (mean 0.82 Mbit/s)
Flow 3 ingress (mean 1.00 Mbit/s) — — — Flow 3 egress (mean 0.95 Mbit/s)

Flow 1 (95th percentile 1002.81 ms)   Flow 2 (95th percentile 857.31 ms)   Flow 3 (95th percentile 711.55 ms)
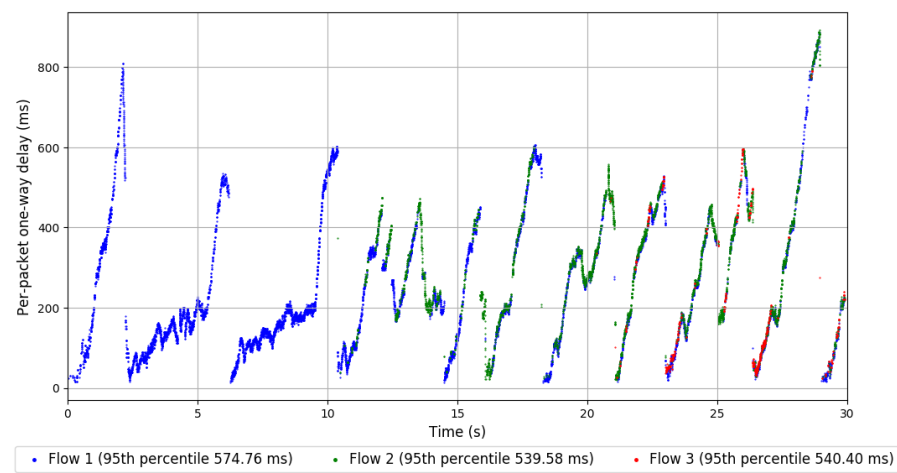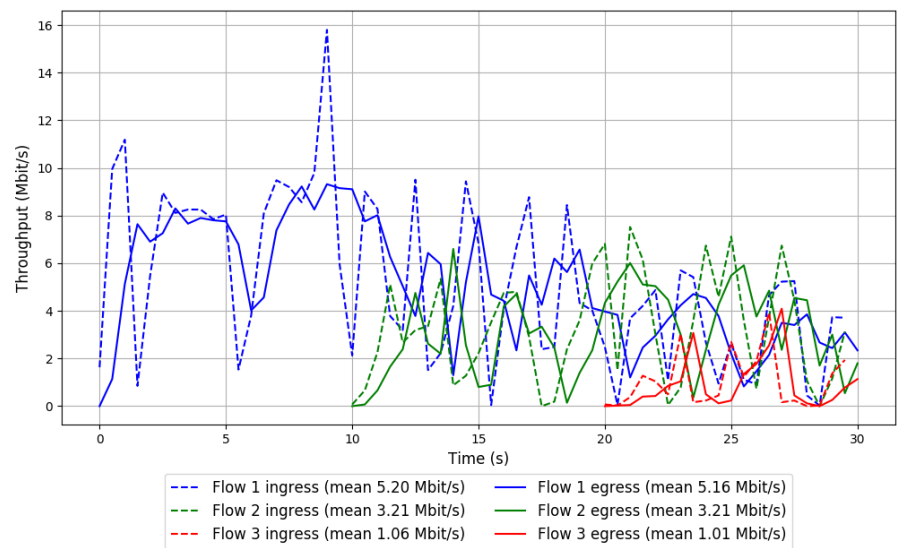
```
Run 3: Statistics of Verus

Start at: 2018-09-07 13:45:41
End at: 2018-09-07 13:46:11
Local clock offset: 1.114 ms
Remote clock offset: -3.049 ms


# Below is generated by plot.py at 2018-09-07 13:56:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.58 Mbit/s
95th percentile per-packet one-way delay: 568.503 ms
Loss rate: 1.36%
-- Flow 1:
Average throughput: 5.16 Mbit/s
95th percentile per-packet one-way delay: 574.765 ms
Loss rate: 0.81%
-- Flow 2:
Average throughput: 3.21 Mbit/s
95th percentile per-packet one-way delay: 539.582 ms
Loss rate: 1.80%
-- Flow 3:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 540.405 ms
Loss rate: 6.87%
```

Run 3: Report of Verus — Data Link

```
Run 1: Statistics of PCC-Vivace

Start at: 2018-09-07 13:01:48
End at: 2018-09-07 13:02:18
Local clock offset: 2.16 ms
Remote clock offset: -1.92 ms


# Below is generated by plot.py at 2018-09-07 13:56:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.48 Mbit/s
95th percentile per-packet one-way delay: 1062.129 ms
Loss rate: 26.89%
-- Flow 1:
Average throughput: 1.55 Mbit/s
95th percentile per-packet one-way delay: 1056.261 ms
Loss rate: 19.61%
-- Flow 2:
Average throughput: 0.88 Mbit/s
95th percentile per-packet one-way delay: 1067.279 ms
Loss rate: 33.71%
-- Flow 3:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 1070.220 ms
Loss rate: 40.22%
```
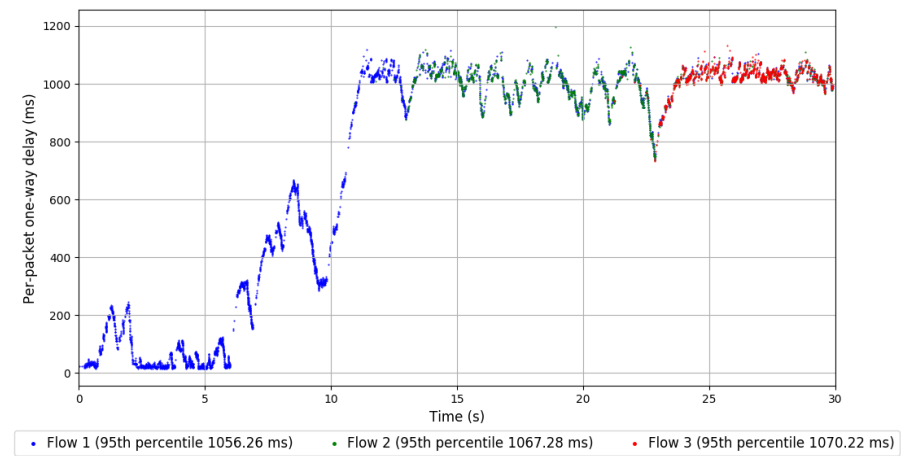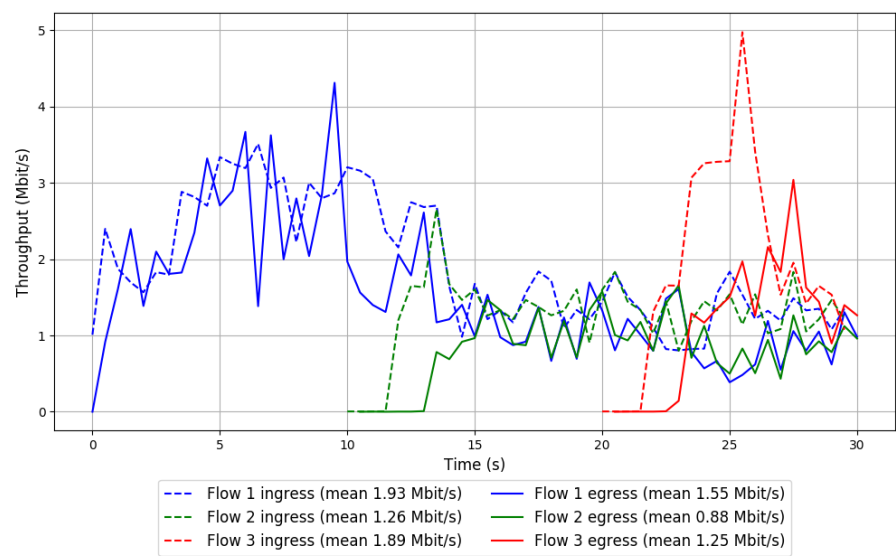
Run 1: Report of PCC-Vivace — Data Link

Flow 1 ingress (mean 1.93 Mbit/s) --- Flow 1 egress (mean 1.55 Mbit/s)
Flow 2 ingress (mean 1.26 Mbit/s) --- Flow 2 egress (mean 0.88 Mbit/s)
Flow 3 ingress (mean 1.89 Mbit/s) --- Flow 3 egress (mean 1.25 Mbit/s)

Flow 1 (95th percentile 1056.26 ms) • Flow 2 (95th percentile 1067.28 ms) • Flow 3 (95th percentile 1070.22 ms)
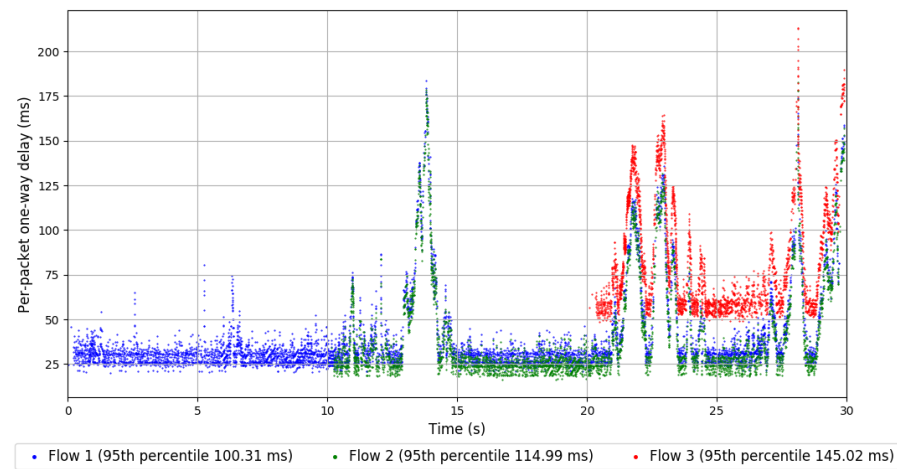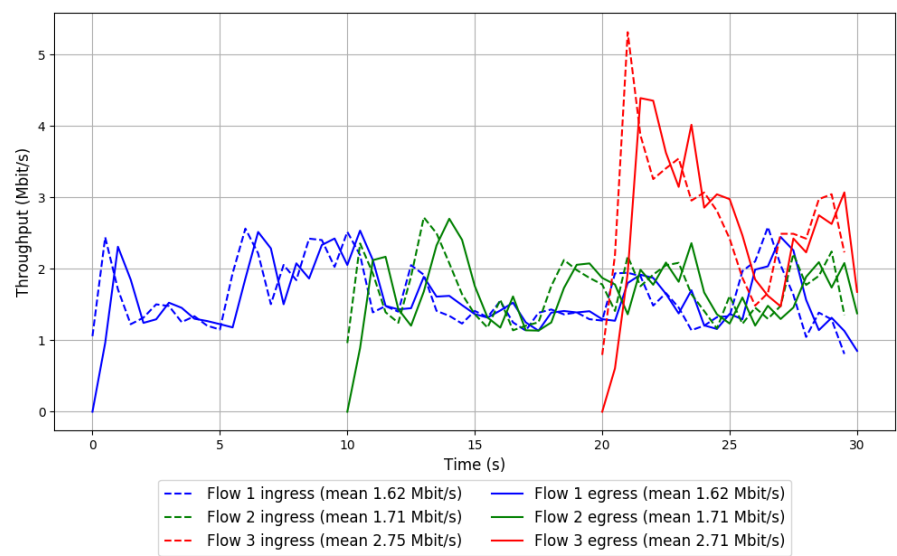
```
Run 2: Statistics of PCC-Vivace

Start at: 2018-09-07 13:21:56
End at: 2018-09-07 13:22:26
Local clock offset: -0.817 ms
Remote clock offset: -2.021 ms


# Below is generated by plot.py at 2018-09-07 13:56:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.64 Mbit/s
95th percentile per-packet one-way delay: 123.991 ms
Loss rate: 0.82%
-- Flow 1:
Average throughput: 1.62 Mbit/s
95th percentile per-packet one-way delay: 100.312 ms
Loss rate: 0.25%
-- Flow 2:
Average throughput: 1.71 Mbit/s
95th percentile per-packet one-way delay: 114.987 ms
Loss rate: 0.58%
-- Flow 3:
Average throughput: 2.71 Mbit/s
95th percentile per-packet one-way delay: 145.023 ms
Loss rate: 2.13%
```

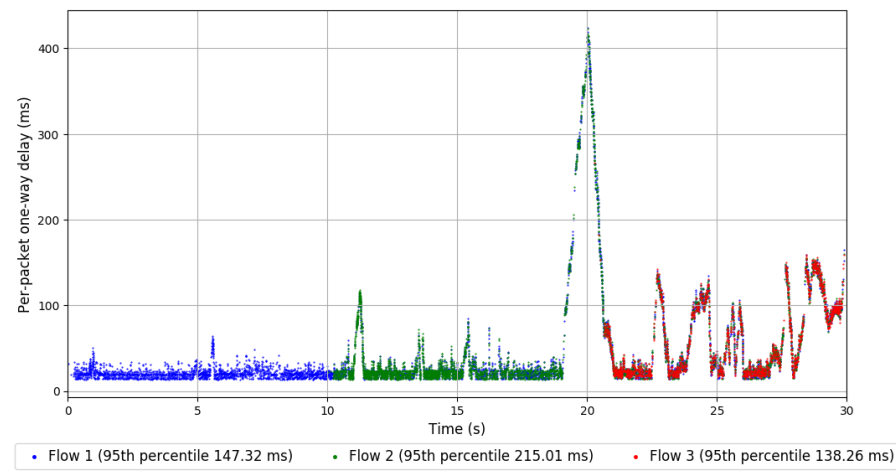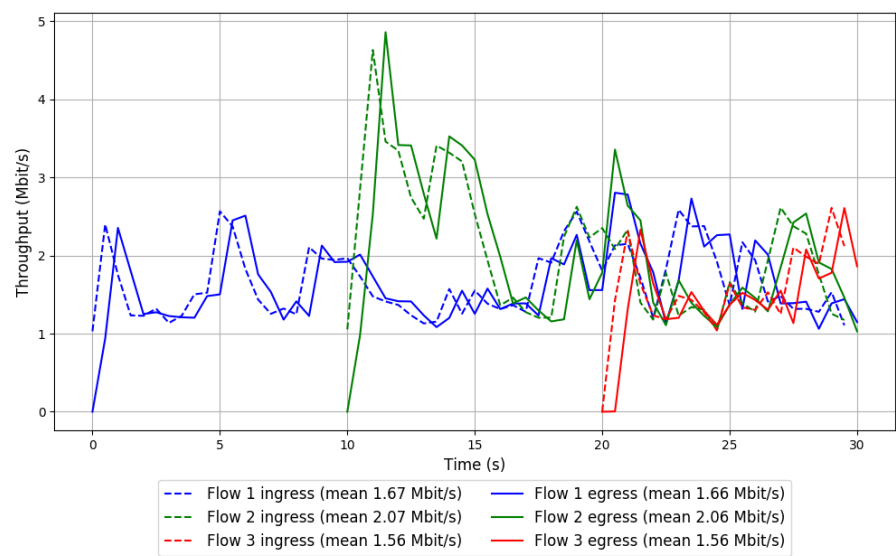Run 2: Report of PCC-Vivace — Data Link

```
Run 3: Statistics of PCC-Vivace

Start at: 2018-09-07 13:42:18
End at: 2018-09-07 13:42:48
Local clock offset: 1.082 ms
Remote clock offset: -2.828 ms


# Below is generated by plot.py at 2018-09-07 13:56:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.53 Mbit/s
95th percentile per-packet one-way delay: 148.674 ms
Loss rate: 0.75%
-- Flow 1:
Average throughput: 1.66 Mbit/s
95th percentile per-packet one-way delay: 147.324 ms
Loss rate: 0.31%
-- Flow 2:
Average throughput: 2.06 Mbit/s
95th percentile per-packet one-way delay: 215.015 ms
Loss rate: 0.55%
-- Flow 3:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 138.262 ms
Loss rate: 2.73%
```

Run 3: Report of PCC-Vivace — Data Link

Flow 1 ingress (mean 1.67 Mbit/s)   Flow 1 egress (mean 1.66 Mbit/s)
Flow 2 ingress (mean 2.07 Mbit/s)   Flow 2 egress (mean 2.06 Mbit/s)
Flow 3 ingress (mean 1.56 Mbit/s)   Flow 3 egress (mean 1.56 Mbit/s)

Flow 1 (95th percentile 147.32 ms)   Flow 2 (95th percentile 215.01 ms)   Flow 3 (95th percentile 138.26 ms)
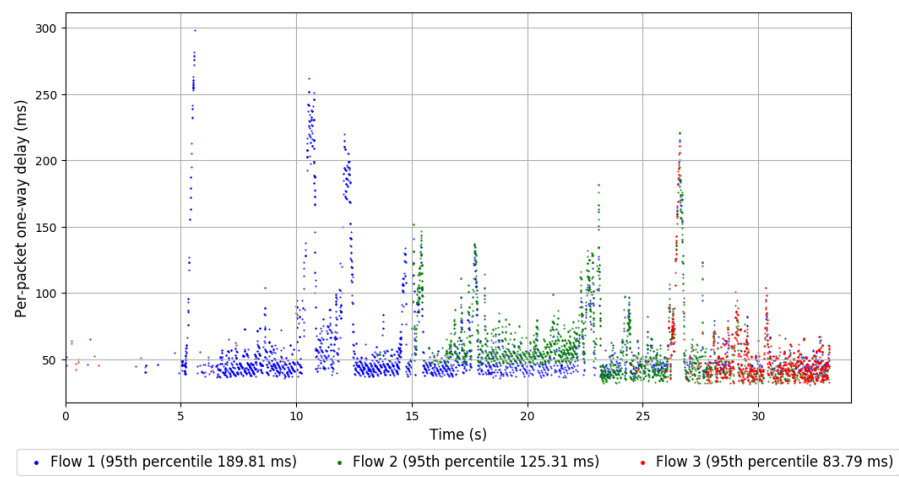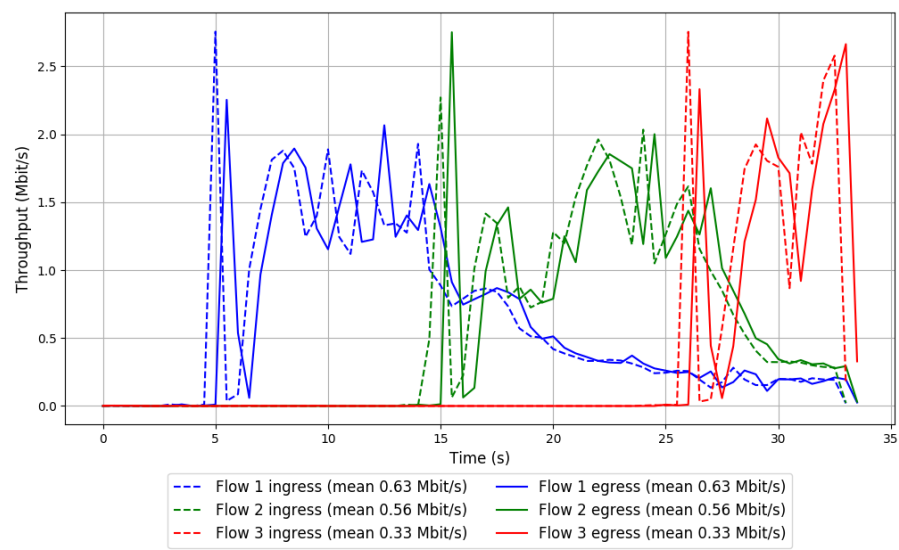
```
Run 1: Statistics of WebRTC media

Start at: 2018-09-07 12:59:34
End at: 2018-09-07 13:00:04
Local clock offset: 1.523 ms
Remote clock offset: -2.186 ms


# Below is generated by plot.py at 2018-09-07 13:56:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 141.072 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 189.806 ms
Loss rate: 0.03%
-- Flow 2:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 125.313 ms
Loss rate: 0.03%
-- Flow 3:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 83.790 ms
Loss rate: 0.17%
```
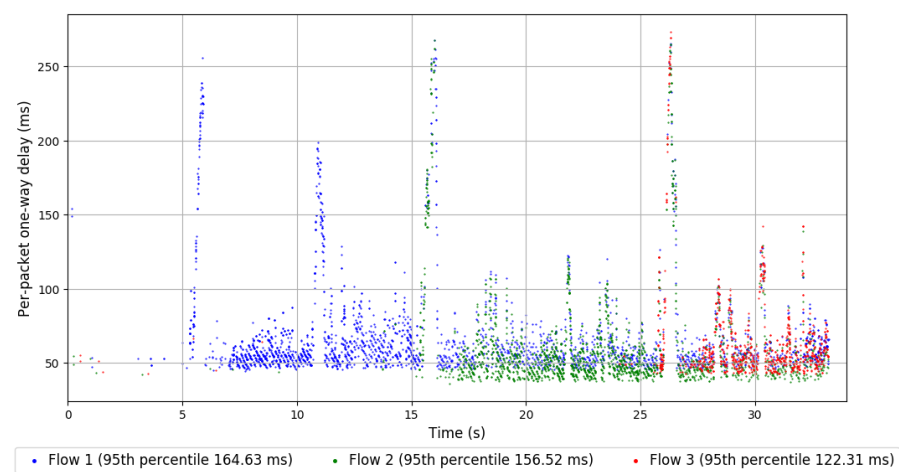
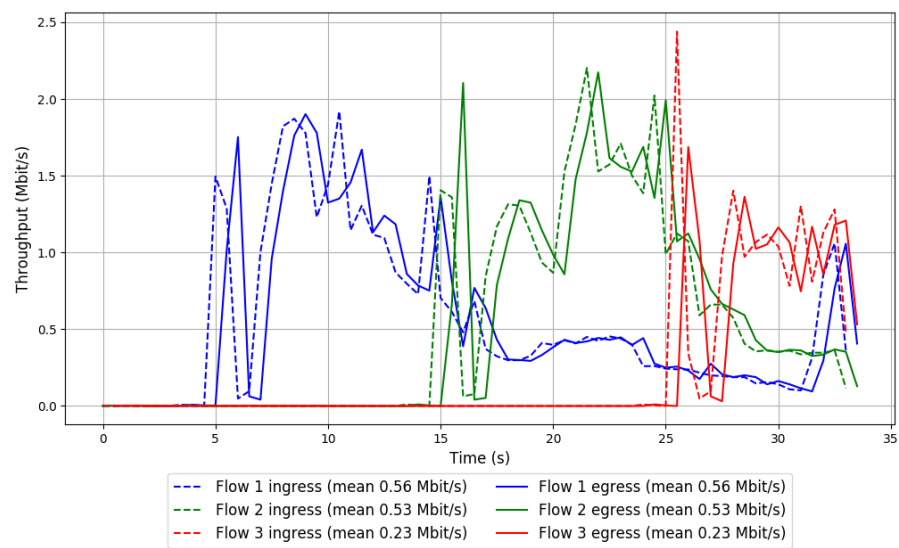Run 1: Report of WebRTC media — Data Link

```
Run 2: Statistics of WebRTC media

Start at: 2018-09-07 13:19:41
End at: 2018-09-07 13:20:11
Local clock offset: 2.02 ms
Remote clock offset: -2.888 ms


# Below is generated by plot.py at 2018-09-07 13:56:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.32 Mbit/s
95th percentile per-packet one-way delay: 158.369 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 164.627 ms
Loss rate: 0.23%
-- Flow 2:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 156.522 ms
Loss rate: 0.09%
-- Flow 3:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 122.311 ms
Loss rate: 0.90%
```

Run 2: Report of WebRTC media — Data Link

```
Run 3: Statistics of WebRTC media

Start at: 2018-09-07 13:40:02
End at: 2018-09-07 13:40:32
Local clock offset: -1.922 ms
Remote clock offset: -2.68 ms

# Below is generated by plot.py at 2018-09-07 13:56:12
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.35 Mbit/s
95th percentile per-packet one-way delay: 62.222 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 1.34 Mbit/s
95th percentile per-packet one-way delay: 52.128 ms
Loss rate: 0.04%
-- Flow 2:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 65.768 ms
Loss rate: 0.06%
-- Flow 3:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 71.467 ms
Loss rate: 0.14%
```

Run 3: Report of WebRTC media — Data Link