Pantheon Report

Generated at 2018-09-06 18:39:11 (UTC).

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

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.
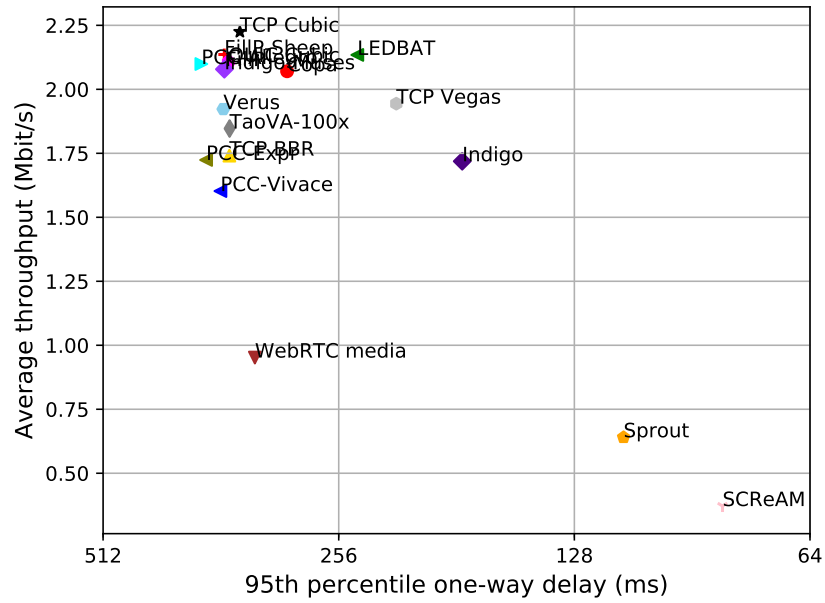
```
System info:
Linux 4.15.0-1020-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
net.ipv4.tcp_mem = 536870912 536870912 536870912
```
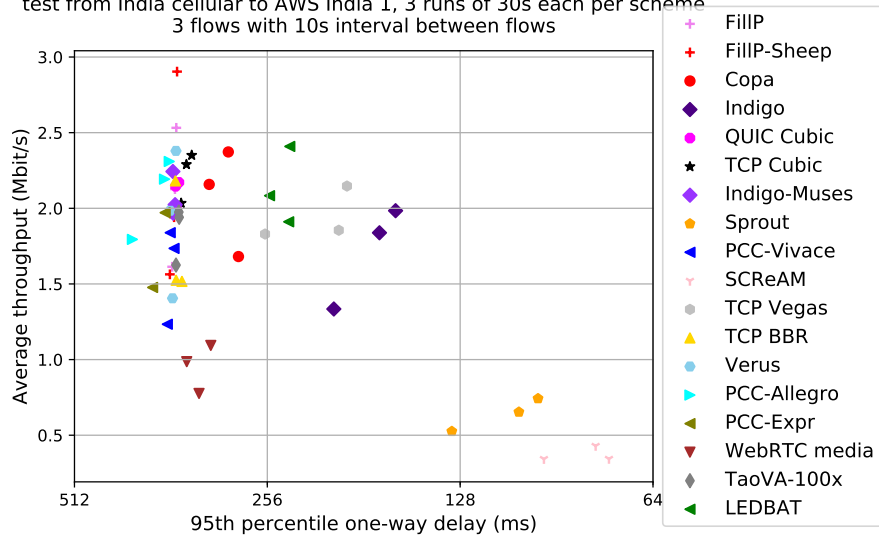
```
Git summary:
branch: muses @ f392ce15d580343f4432c3d7e068b3290f03eb4a
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfe58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ a28d20fb82a95a965a3da65fd1eb71b8994e9b84
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
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
 M src/verus.hpp
 M tools/plot.py
third_party/vivace @ 2baf86211435ae071a32f96b7d8c504587f5d7f4
third_party/webrtc @ 3f0cc2a9061a41b6f9dde4735770d143a1fa2851
```

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

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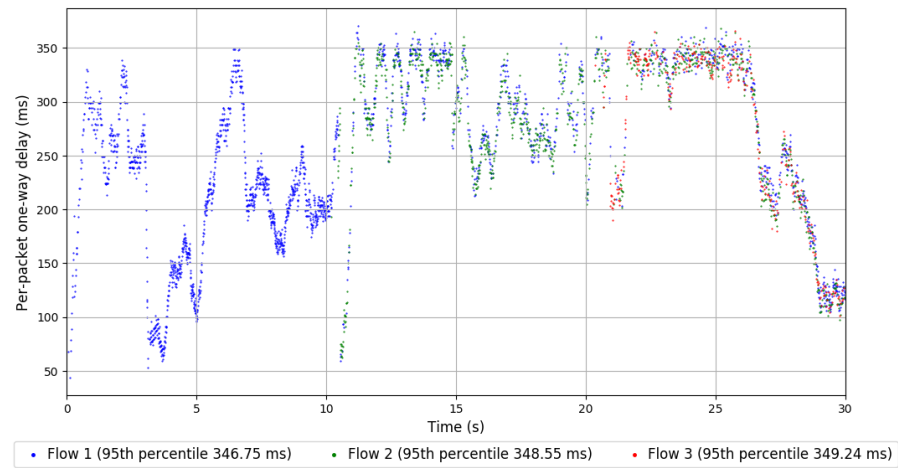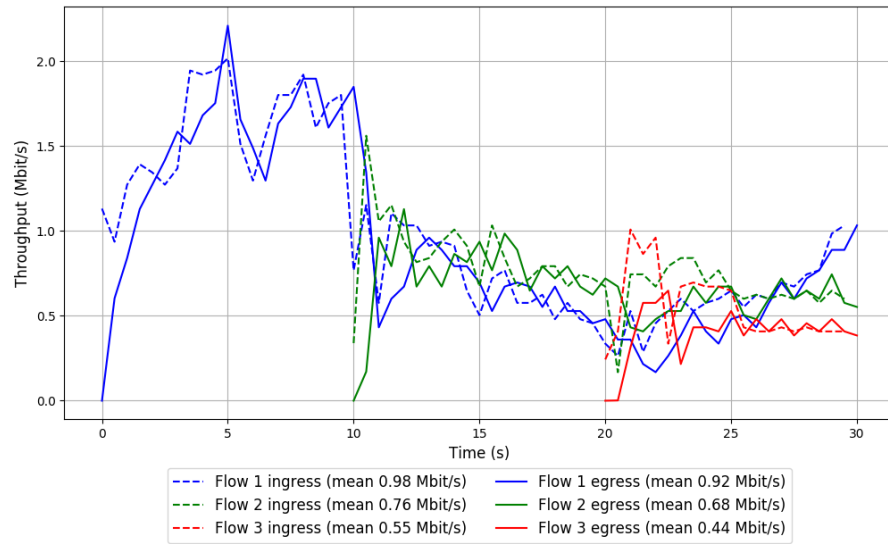3 flows with 10s interval between flows

scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	1.02	0.78	0.64	351.85	354.16	352.73	7.68	14.93	20.50
Copa	3	1.21	0.87	0.86	279.54	301.51	336.17	0.91	1.62	4.17
TCP Cubic	3	1.30	1.07	0.67	337.28	345.56	345.38	2.24	4.28	6.41
FillP	3	1.24	0.85	0.93	357.49	355.75	358.25	47.75	32.86	42.93
FillP-Sheep	3	1.27	0.91	0.83	354.64	360.71	362.25	30.68	44.52	64.65
Indigo	3	0.84	0.90	0.87	159.74	180.76	197.01	0.76	0.55	1.13
LEDBAT	3	1.29	0.87	0.83	233.92	247.36	272.69	0.21	1.33	2.70
Indigo-Muses	3	1.65	0.45	0.39	357.84	359.15	361.44	33.73	47.39	43.43
PCC-Allegro	3	1.22	0.90	0.89	361.69	366.20	769.27	48.04	61.98	83.46
PCC-Expr	2	1.30	0.40	0.67	365.85	476.67	375.47	76.12	87.28	81.43
QUIC Cubic	3	1.32	0.86	0.69	352.62	353.39	357.84	5.95	9.52	14.86
SCReAM	3	0.17	0.20	0.21	81.42	83.45	87.06	0.58	0.37	0.34
Sprout	3	0.34	0.30	0.32	106.81	106.69	141.11	0.75	1.10	1.94
TaoVA-100x	3	1.23	0.51	0.92	348.54	359.03	356.49	15.92	42.47	32.12
TCP Vegas	3	0.93	0.79	1.50	178.87	235.82	231.64	0.39	0.71	1.03
Verus	3	1.63	0.40	0.14	356.98	371.43	354.36	23.24	65.17	51.26
PCC-Vivace	3	0.90	0.75	0.64	360.91	365.18	361.54	35.89	48.93	54.87
WebRTC media	3	0.41	0.39	0.16	312.69	329.39	338.20	1.99	3.25	7.32

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```
Run 1: Statistics of TCP BBR

Start at: 2018-09-06 17:39:45
End at: 2018-09-06 17:40:15
Local clock offset: -0.419 ms
Remote clock offset: -6.408 ms


# Below is generated by plot.py at 2018-09-06 18:38:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.52 Mbit/s
95th percentile per-packet one-way delay: 347.936 ms
Loss rate: 9.00%
-- Flow 1:
Average throughput: 0.92 Mbit/s
95th percentile per-packet one-way delay: 346.747 ms
Loss rate: 5.50%
-- Flow 2:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 348.554 ms
Loss rate: 10.69%
-- Flow 3:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 349.241 ms
Loss rate: 23.07%
```
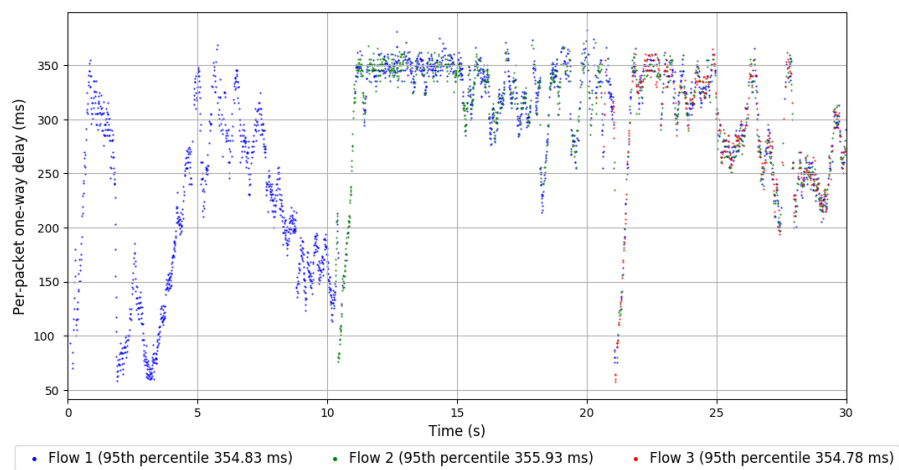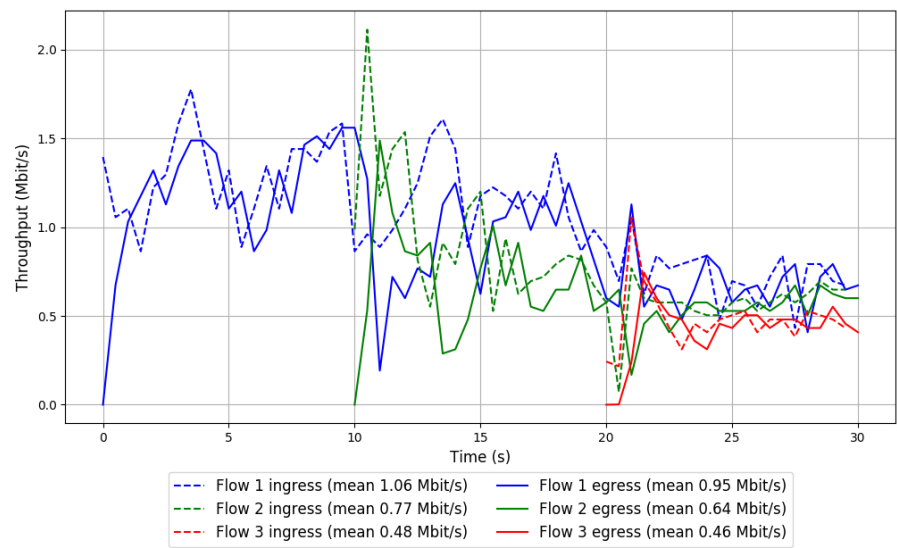
Run 1: Report of TCP BBR — Data Link

Flow 1 ingress (mean 0.98 Mbit/s) --- Flow 1 egress (mean 0.92 Mbit/s)
Flow 2 ingress (mean 0.76 Mbit/s) --- Flow 2 egress (mean 0.68 Mbit/s)
Flow 3 ingress (mean 0.55 Mbit/s) --- Flow 3 egress (mean 0.44 Mbit/s)

Flow 1 (95th percentile 346.75 ms)   Flow 2 (95th percentile 348.55 ms)   Flow 3 (95th percentile 349.24 ms)

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```
Run 2: Statistics of TCP BBR

Start at: 2018-09-06 17:59:51
End at: 2018-09-06 18:00:21
Local clock offset: 2.063 ms
Remote clock offset: -6.589 ms


# Below is generated by plot.py at 2018-09-06 18:38:27
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.52 Mbit/s
95th percentile per-packet one-way delay: 355.245 ms
Loss rate: 12.13%
-- Flow 1:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 354.835 ms
Loss rate: 10.14%
-- Flow 2:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 355.928 ms
Loss rate: 17.47%
-- Flow 3:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 354.782 ms
Loss rate: 8.26%
```
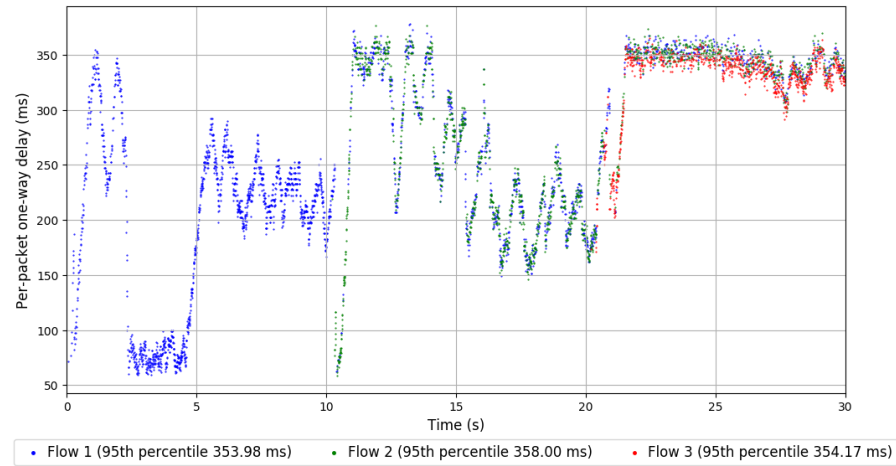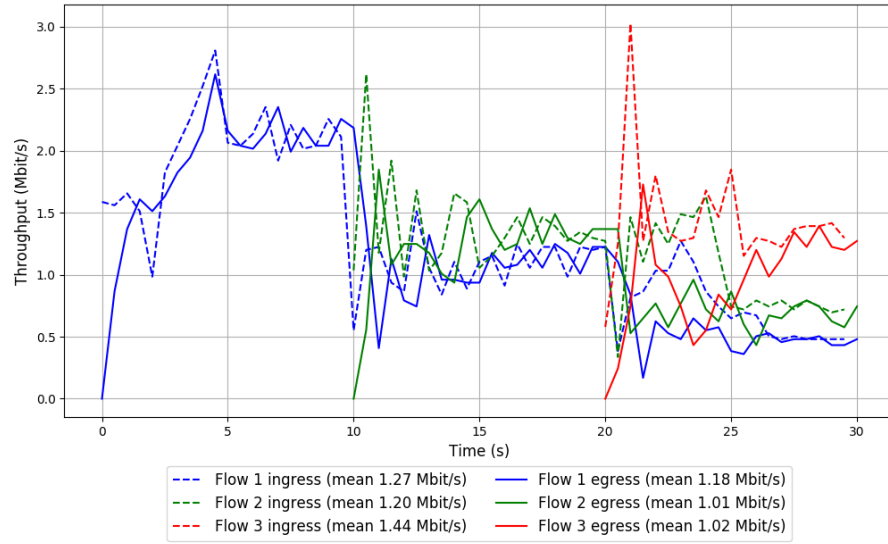
Run 2: Report of TCP BBR — Data Link

Flow 1 ingress (mean 1.06 Mbit/s)   Flow 1 egress (mean 0.95 Mbit/s)
Flow 2 ingress (mean 0.77 Mbit/s)   Flow 2 egress (mean 0.64 Mbit/s)
Flow 3 ingress (mean 0.48 Mbit/s)   Flow 3 egress (mean 0.46 Mbit/s)

Flow 1 (95th percentile 354.83 ms)   Flow 2 (95th percentile 355.93 ms)   Flow 3 (95th percentile 354.78 ms)

```
Run 3: Statistics of TCP BBR

Start at: 2018-09-06 18:19:55
End at: 2018-09-06 18:20:25
Local clock offset: 2.302 ms
Remote clock offset: -4.599 ms


# Below is generated by plot.py at 2018-09-06 18:38:28
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.18 Mbit/s
95th percentile per-packet one-way delay: 356.202 ms
Loss rate: 14.57%
-- Flow 1:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 353.975 ms
Loss rate: 7.41%
-- Flow 2:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 358.005 ms
Loss rate: 16.63%
-- Flow 3:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 354.171 ms
Loss rate: 30.17%
```
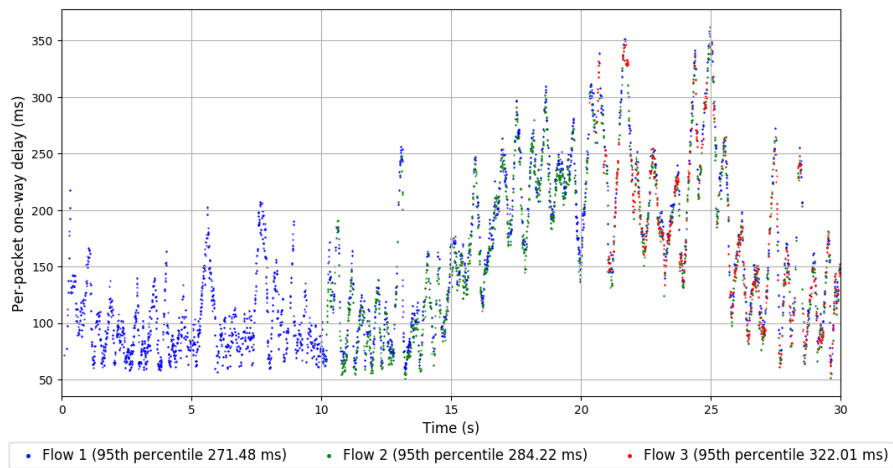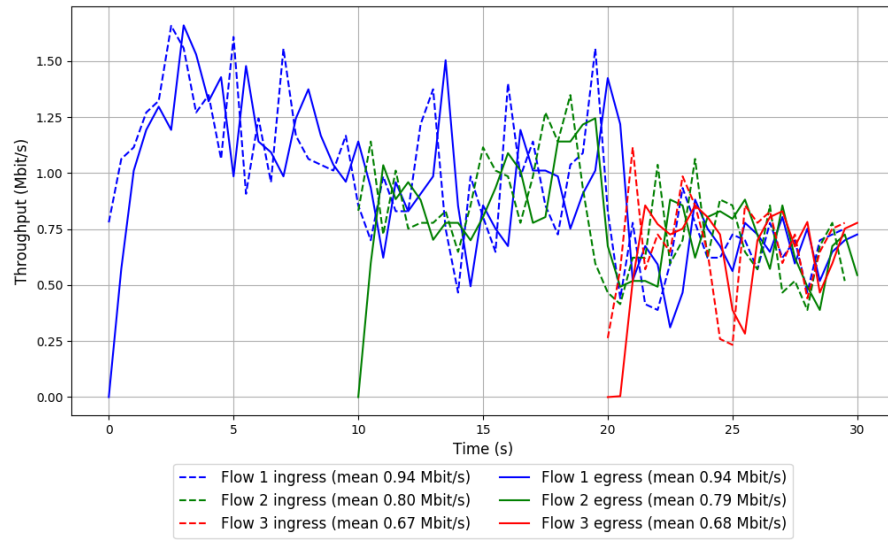
Run 3: Report of TCP BBR — Data Link

Flow 1 ingress (mean 1.27 Mbit/s)   Flow 1 egress (mean 1.18 Mbit/s)
Flow 2 ingress (mean 1.20 Mbit/s)   Flow 2 egress (mean 1.01 Mbit/s)
Flow 3 ingress (mean 1.44 Mbit/s)   Flow 3 egress (mean 1.02 Mbit/s)

Flow 1 (95th percentile 353.98 ms)   Flow 2 (95th percentile 358.00 ms)   Flow 3 (95th percentile 354.17 ms)
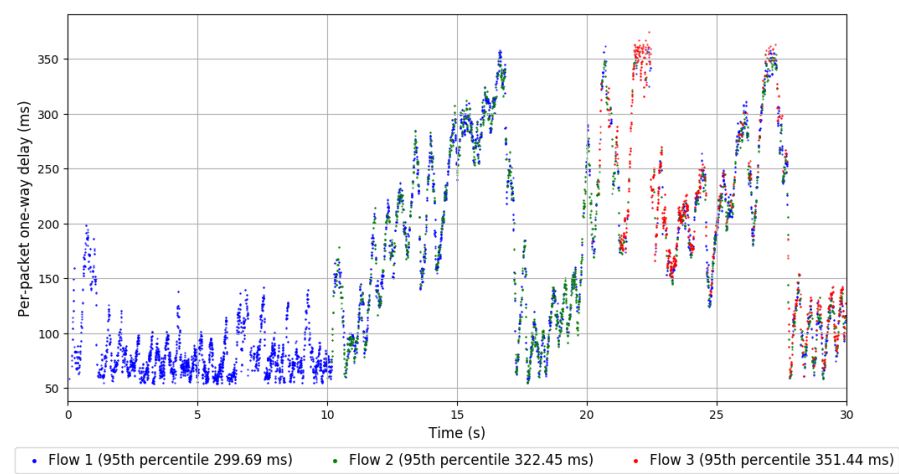
```
Run 1: Statistics of Copa

Start at: 2018-09-06 17:45:20
End at: 2018-09-06 17:45:50
Local clock offset: 1.029 ms
Remote clock offset: -6.744 ms


# Below is generated by plot.py at 2018-09-06 18:38:30
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.68 Mbit/s
95th percentile per-packet one-way delay: 283.964 ms
Loss rate: 1.09%
-- Flow 1:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 271.477 ms
Loss rate: 0.92%
-- Flow 2:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 284.223 ms
Loss rate: 1.17%
-- Flow 3:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 322.010 ms
Loss rate: 1.61%
```
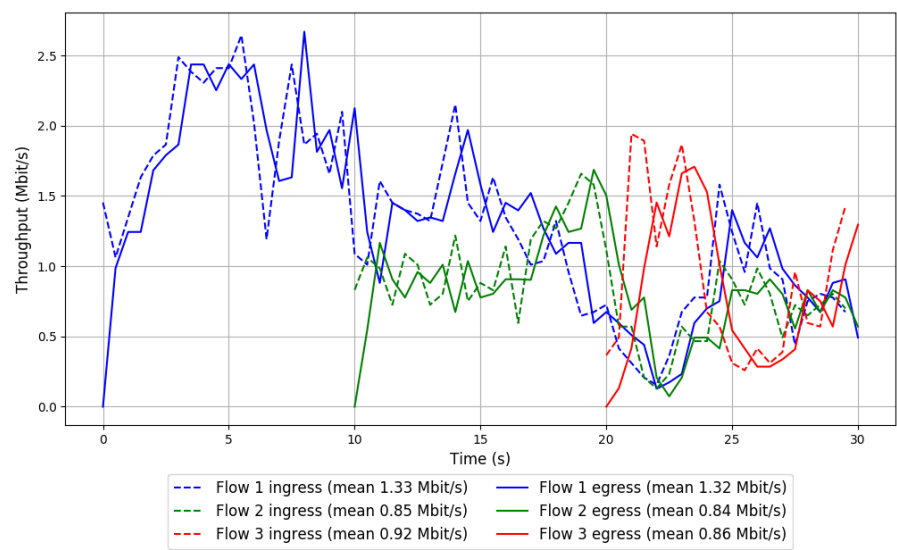
Run 1: Report of Copa — Data Link

- - - Flow 1 ingress (mean 0.94 Mbit/s)	—— Flow 1 egress (mean 0.94 Mbit/s)
- - - Flow 2 ingress (mean 0.80 Mbit/s)	—— Flow 2 egress (mean 0.79 Mbit/s)
- - - Flow 3 ingress (mean 0.67 Mbit/s)	—— Flow 3 egress (mean 0.68 Mbit/s)

• Flow 1 (95th percentile 271.48 ms)   • Flow 2 (95th percentile 284.22 ms)   • Flow 3 (95th percentile 322.01 ms)

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```
Run 2: Statistics of Copa

Start at: 2018-09-06 18:05:25
End at: 2018-09-06 18:05:55
Local clock offset: -0.704 ms
Remote clock offset: -7.733 ms


# Below is generated by plot.py at 2018-09-06 18:38:31
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.16 Mbit/s
95th percentile per-packet one-way delay: 315.468 ms
Loss rate: 2.10%
-- Flow 1:
Average throughput: 1.32 Mbit/s
95th percentile per-packet one-way delay: 299.695 ms
Loss rate: 0.97%
-- Flow 2:
Average throughput: 0.84 Mbit/s
95th percentile per-packet one-way delay: 322.450 ms
Loss rate: 1.85%
-- Flow 3:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 351.436 ms
Loss rate: 7.46%
```
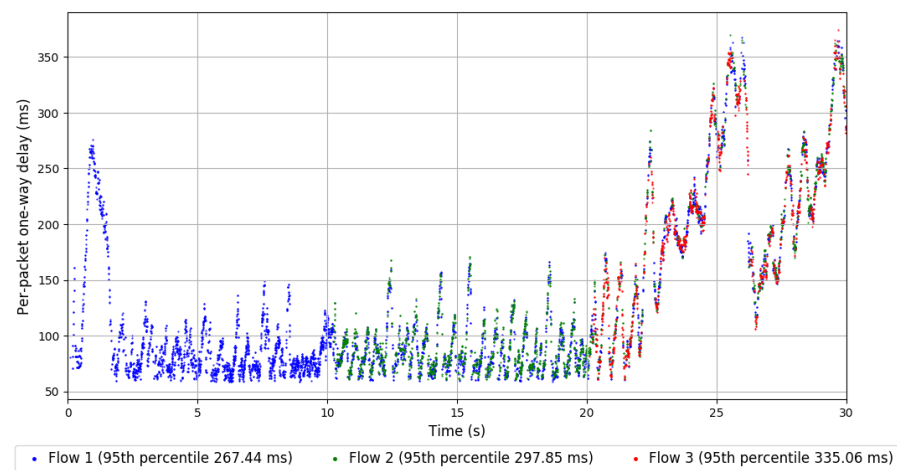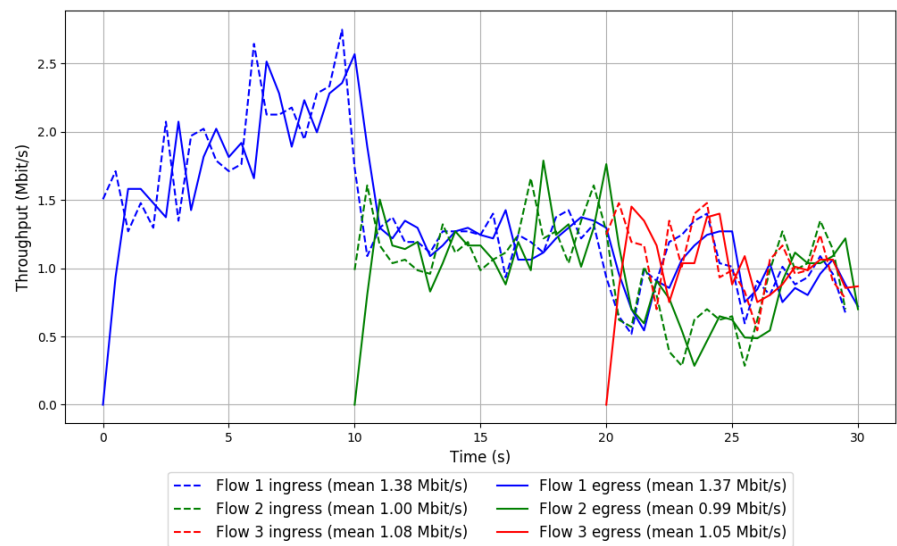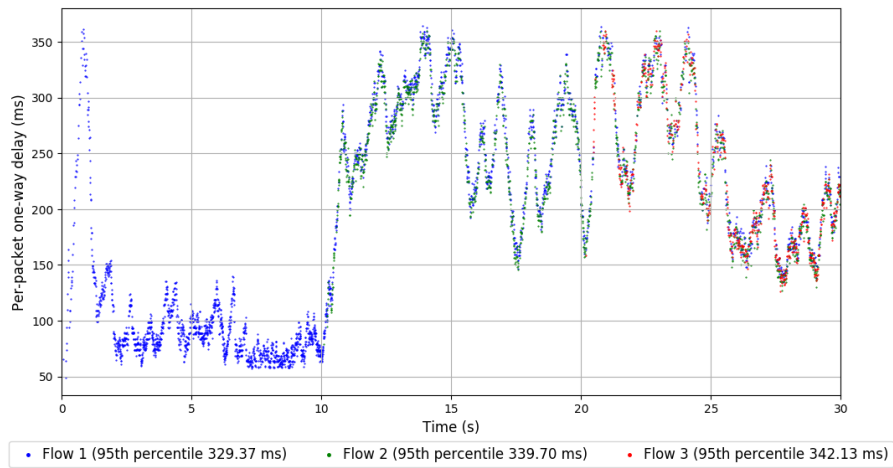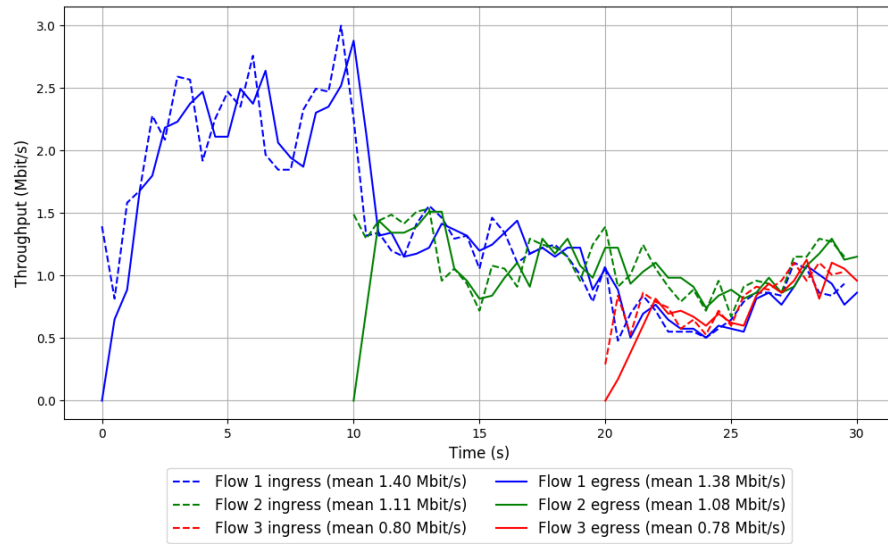
Run 2: Report of Copa — Data Link

Flow 1 ingress (mean 1.33 Mbit/s) — Flow 1 egress (mean 1.32 Mbit/s)
Flow 2 ingress (mean 0.85 Mbit/s) — Flow 2 egress (mean 0.84 Mbit/s)
Flow 3 ingress (mean 0.92 Mbit/s) — Flow 3 egress (mean 0.86 Mbit/s)

Flow 1 (95th percentile 299.69 ms) · Flow 2 (95th percentile 322.45 ms) · Flow 3 (95th percentile 351.44 ms)
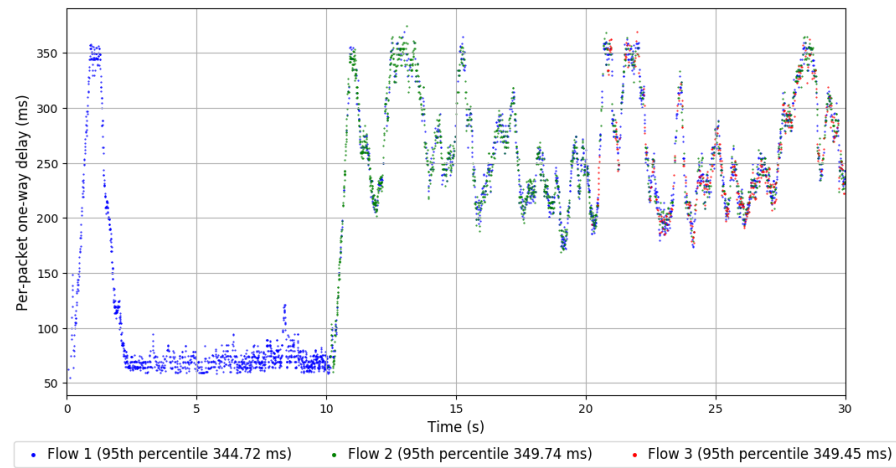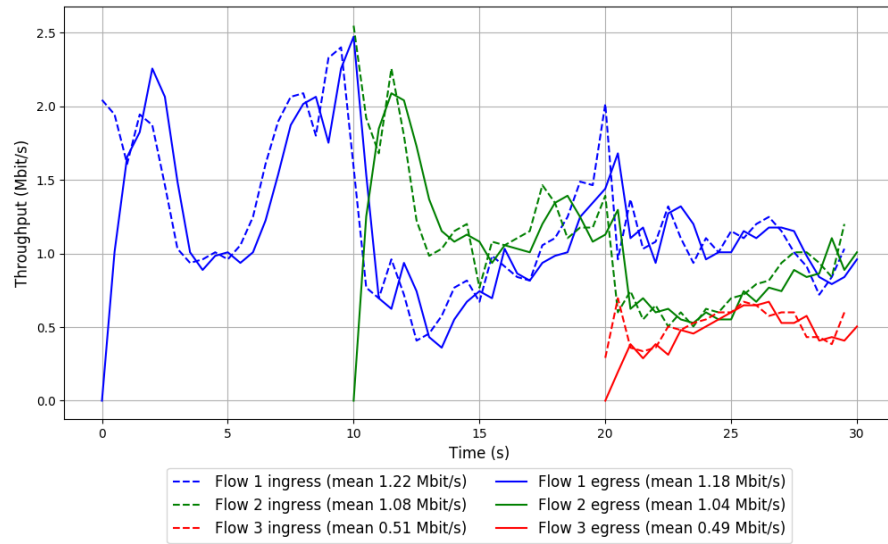
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```
Run 3: Statistics of Copa

Start at: 2018-09-06 18:25:30
End at: 2018-09-06 18:26:00
Local clock offset: 2.118 ms
Remote clock offset: -4.45 ms


# Below is generated by plot.py at 2018-09-06 18:38:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.37 Mbit/s
95th percentile per-packet one-way delay: 294.529 ms
Loss rate: 1.50%
-- Flow 1:
Average throughput: 1.37 Mbit/s
95th percentile per-packet one-way delay: 267.440 ms
Loss rate: 0.83%
-- Flow 2:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 297.847 ms
Loss rate: 1.83%
-- Flow 3:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 335.058 ms
Loss rate: 3.45%
```

Run 3: Report of Copa — Data Link

Flow 1 ingress (mean 1.38 Mbit/s)   Flow 1 egress (mean 1.37 Mbit/s)
Flow 2 ingress (mean 1.00 Mbit/s)   Flow 2 egress (mean 0.99 Mbit/s)
Flow 3 ingress (mean 1.08 Mbit/s)   Flow 3 egress (mean 1.05 Mbit/s)

Flow 1 (95th percentile 267.44 ms)   Flow 2 (95th percentile 297.85 ms)   Flow 3 (95th percentile 335.06 ms)

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```
Run 1: Statistics of TCP Cubic

Start at: 2018-09-06 17:56:30
End at: 2018-09-06 17:57:00
Local clock offset: -1.534 ms
Remote clock offset: -6.569 ms


# Below is generated by plot.py at 2018-09-06 18:38:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.35 Mbit/s
95th percentile per-packet one-way delay: 335.958 ms
Loss rate: 2.46%
-- Flow 1:
Average throughput: 1.38 Mbit/s
95th percentile per-packet one-way delay: 329.367 ms
Loss rate: 1.77%
-- Flow 2:
Average throughput: 1.08 Mbit/s
95th percentile per-packet one-way delay: 339.697 ms
Loss rate: 3.09%
-- Flow 3:
Average throughput: 0.78 Mbit/s
95th percentile per-packet one-way delay: 342.134 ms
Loss rate: 4.37%
```
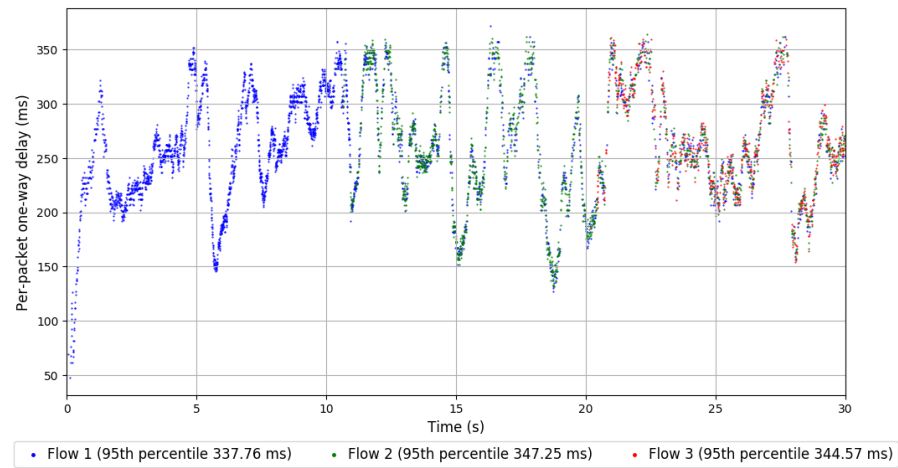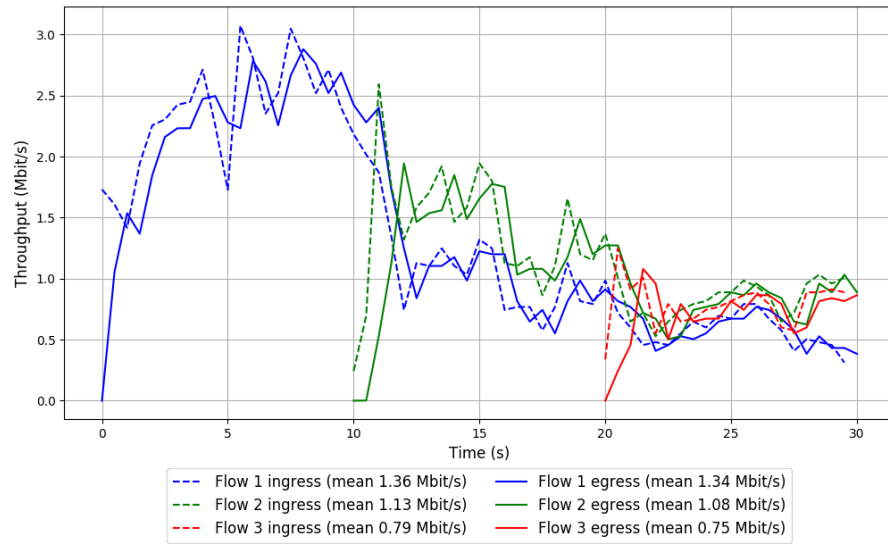
Run 1: Report of TCP Cubic — Data Link

```
Run 2: Statistics of TCP Cubic

Start at: 2018-09-06 18:16:34
End at: 2018-09-06 18:17:04
Local clock offset: 0.285 ms
Remote clock offset: -5.214 ms


# Below is generated by plot.py at 2018-09-06 18:38:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.03 Mbit/s
95th percentile per-packet one-way delay: 348.900 ms
Loss rate: 3.50%
-- Flow 1:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 344.721 ms
Loss rate: 2.83%
-- Flow 2:
Average throughput: 1.04 Mbit/s
95th percentile per-packet one-way delay: 349.735 ms
Loss rate: 3.74%
-- Flow 3:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 349.452 ms
Loss rate: 7.26%
```
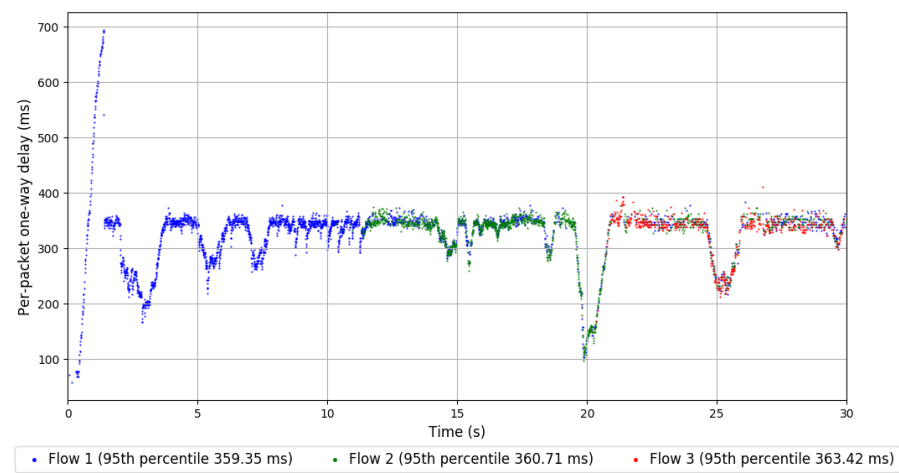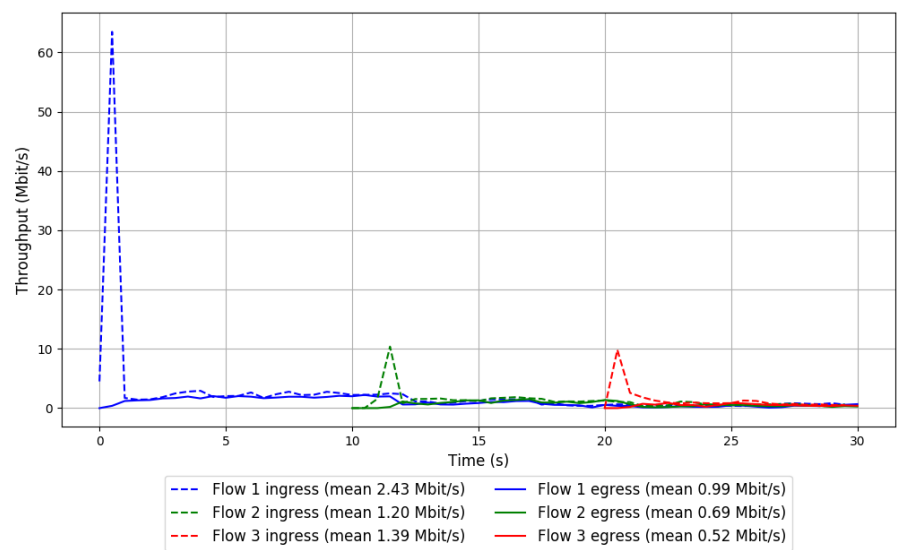
Run 2: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 1.22 Mbit/s) --- Flow 1 egress (mean 1.18 Mbit/s)
Flow 2 ingress (mean 1.08 Mbit/s) --- Flow 2 egress (mean 1.04 Mbit/s)
Flow 3 ingress (mean 0.51 Mbit/s) --- Flow 3 egress (mean 0.49 Mbit/s)

Flow 1 (95th percentile 344.72 ms)   Flow 2 (95th percentile 349.74 ms)   Flow 3 (95th percentile 349.45 ms)

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```
Run 3: Statistics of TCP Cubic

Start at: 2018-09-06 18:36:40
End at: 2018-09-06 18:37:10
Local clock offset: -0.696 ms
Remote clock offset: -4.654 ms


# Below is generated by plot.py at 2018-09-06 18:38:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.29 Mbit/s
95th percentile per-packet one-way delay: 342.367 ms
Loss rate: 3.96%
-- Flow 1:
Average throughput: 1.34 Mbit/s
95th percentile per-packet one-way delay: 337.757 ms
Loss rate: 2.12%
-- Flow 2:
Average throughput: 1.08 Mbit/s
95th percentile per-packet one-way delay: 347.251 ms
Loss rate: 6.01%
-- Flow 3:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 344.568 ms
Loss rate: 7.60%
```
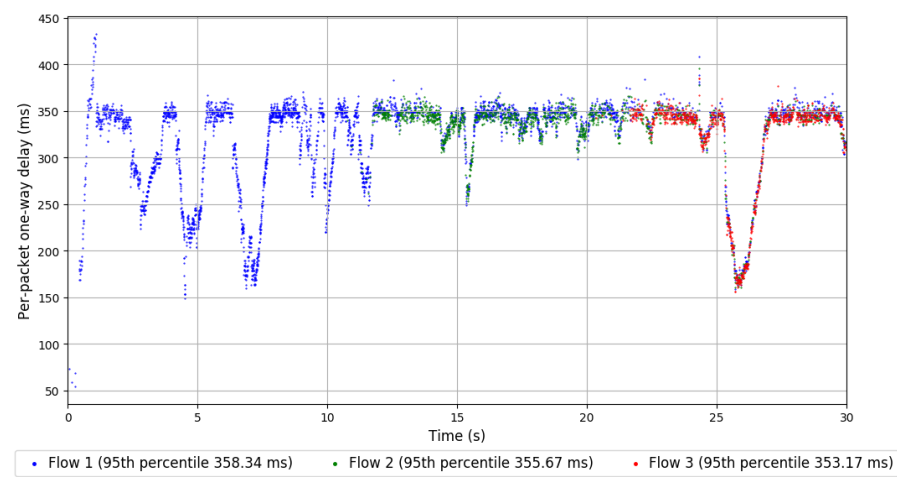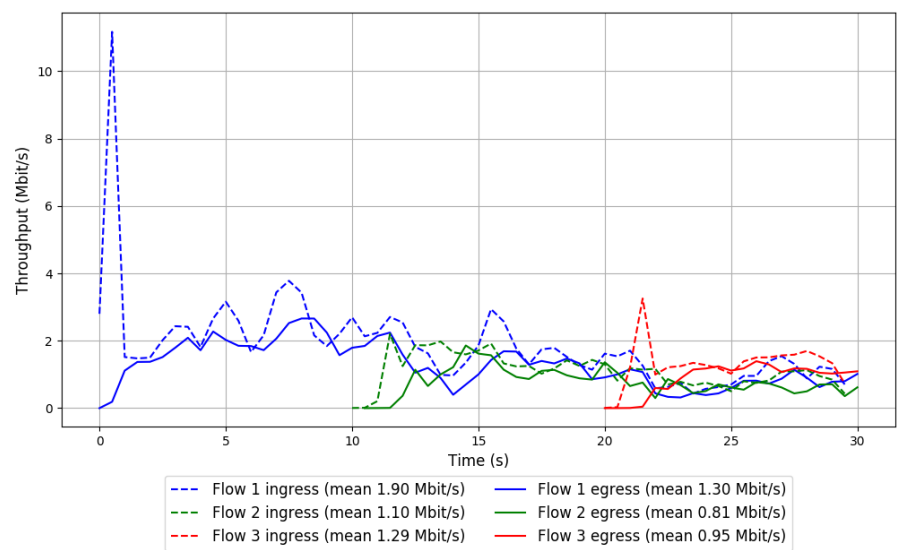
Run 3: Report of TCP Cubic — Data Link

- - - Flow 1 ingress (mean 1.36 Mbit/s)   —— Flow 1 egress (mean 1.34 Mbit/s)
- - - Flow 2 ingress (mean 1.13 Mbit/s)   —— Flow 2 egress (mean 1.08 Mbit/s)
- - - Flow 3 ingress (mean 0.79 Mbit/s)   —— Flow 3 egress (mean 0.75 Mbit/s)

• Flow 1 (95th percentile 337.76 ms)   • Flow 2 (95th percentile 347.25 ms)   • Flow 3 (95th percentile 344.57 ms)

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```
Run 1: Statistics of FillP

Start at: 2018-09-06 17:44:13
End at: 2018-09-06 17:44:43
Local clock offset: 0.829 ms
Remote clock offset: -6.782 ms


# Below is generated by plot.py at 2018-09-06 18:38:34
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.61 Mbit/s
95th percentile per-packet one-way delay: 360.380 ms
Loss rate: 56.38%
-- Flow 1:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 359.351 ms
Loss rate: 59.27%
-- Flow 2:
Average throughput: 0.69 Mbit/s
95th percentile per-packet one-way delay: 360.709 ms
Loss rate: 43.55%
-- Flow 3:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 363.421 ms
Loss rate: 63.48%
```
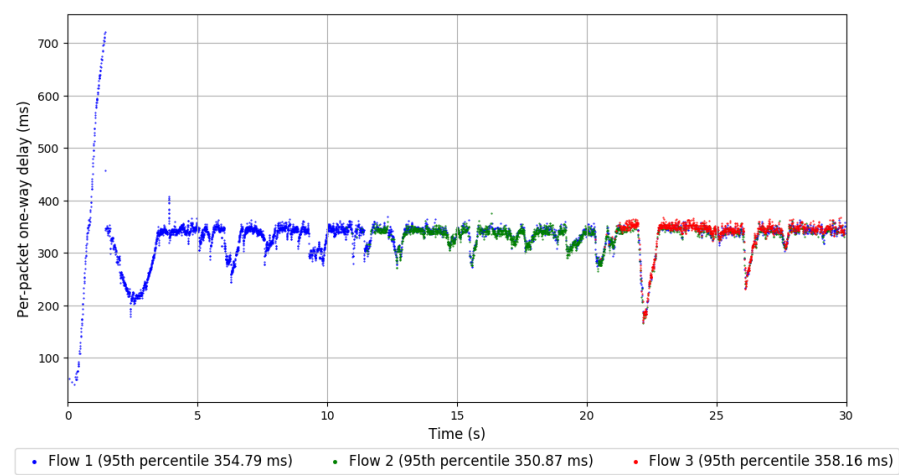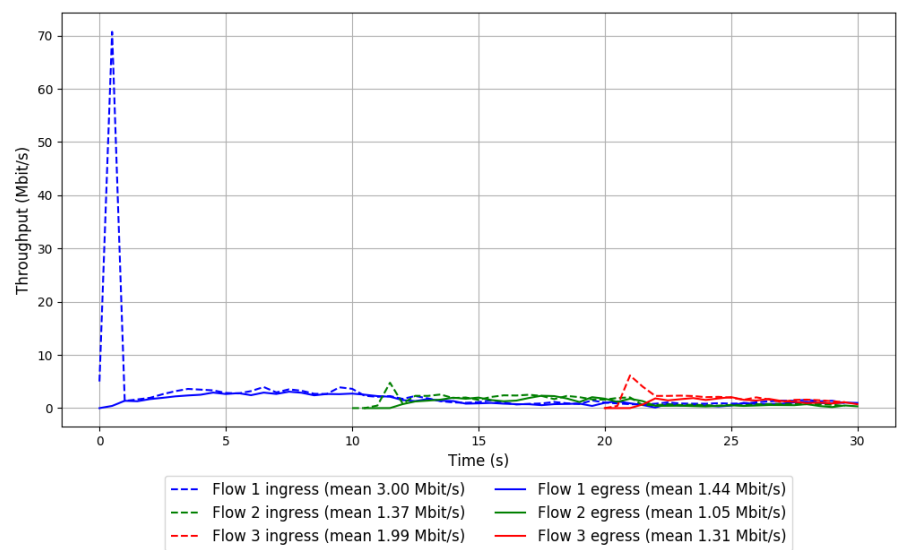
Run 1: Report of FillP — Data Link

```
Run 2: Statistics of FillP

Start at: 2018-09-06 18:04:18
End at: 2018-09-06 18:04:48
Local clock offset: 0.095 ms
Remote clock offset: -7.991 ms

# Below is generated by plot.py at 2018-09-06 18:38:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 356.791 ms
Loss rate: 30.72%
-- Flow 1:
Average throughput: 1.30 Mbit/s
95th percentile per-packet one-way delay: 358.341 ms
Loss rate: 31.87%
-- Flow 2:
Average throughput: 0.81 Mbit/s
95th percentile per-packet one-way delay: 355.671 ms
Loss rate: 28.94%
-- Flow 3:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 353.172 ms
Loss rate: 28.65%
```
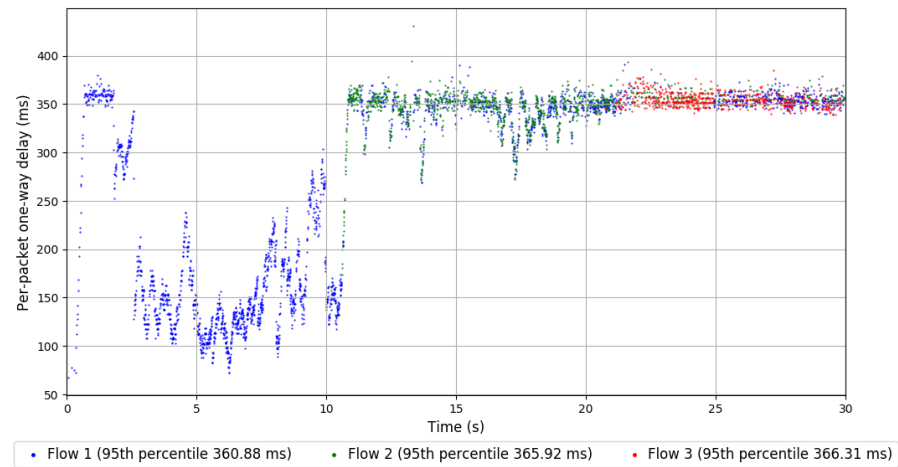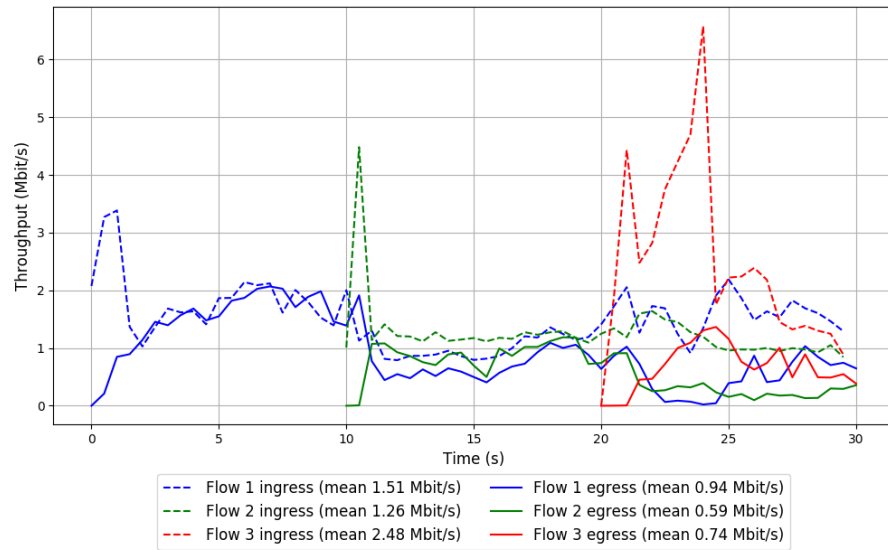
Run 2: Report of FillP — Data Link

Flow 1 ingress (mean 1.90 Mbit/s) — — — Flow 1 egress (mean 1.30 Mbit/s)
Flow 2 ingress (mean 1.10 Mbit/s) — — — Flow 2 egress (mean 0.81 Mbit/s)
Flow 3 ingress (mean 1.29 Mbit/s) — — — Flow 3 egress (mean 0.95 Mbit/s)

Flow 1 (95th percentile 358.34 ms) • Flow 2 (95th percentile 355.67 ms) • Flow 3 (95th percentile 353.17 ms)

```
Run 3: Statistics of FillP

Start at: 2018-09-06 18:24:22
End at: 2018-09-06 18:24:52
Local clock offset: -2.034 ms
Remote clock offset: -4.589 ms


# Below is generated by plot.py at 2018-09-06 18:38:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.53 Mbit/s
95th percentile per-packet one-way delay: 355.070 ms
Loss rate: 44.70%
-- Flow 1:
Average throughput: 1.44 Mbit/s
95th percentile per-packet one-way delay: 354.787 ms
Loss rate: 52.12%
-- Flow 2:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 350.870 ms
Loss rate: 26.08%
-- Flow 3:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 358.162 ms
Loss rate: 36.66%
```

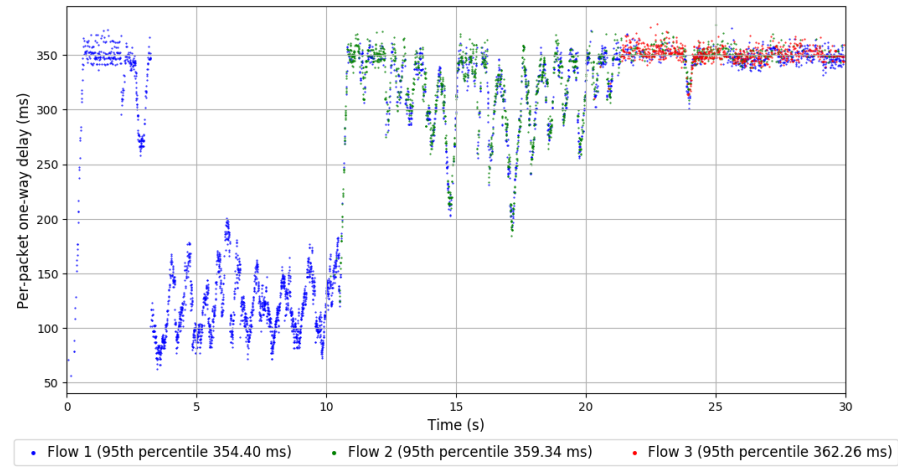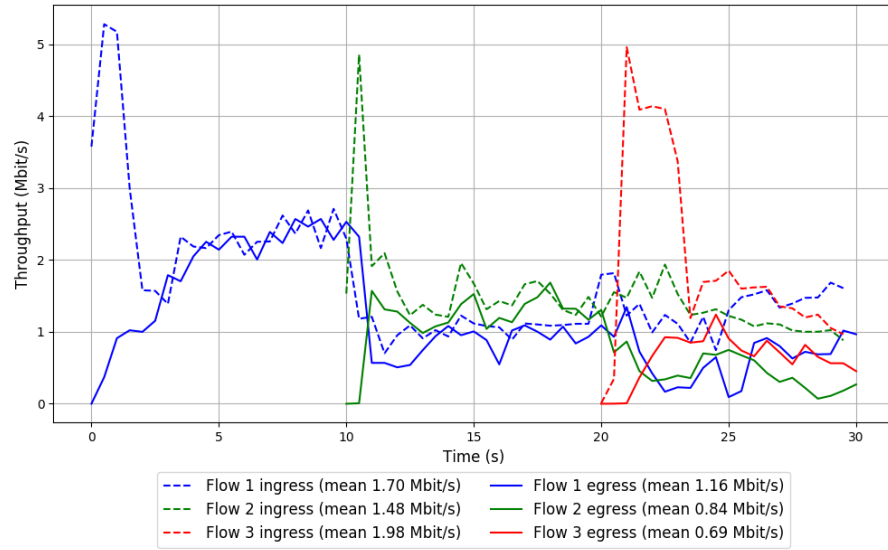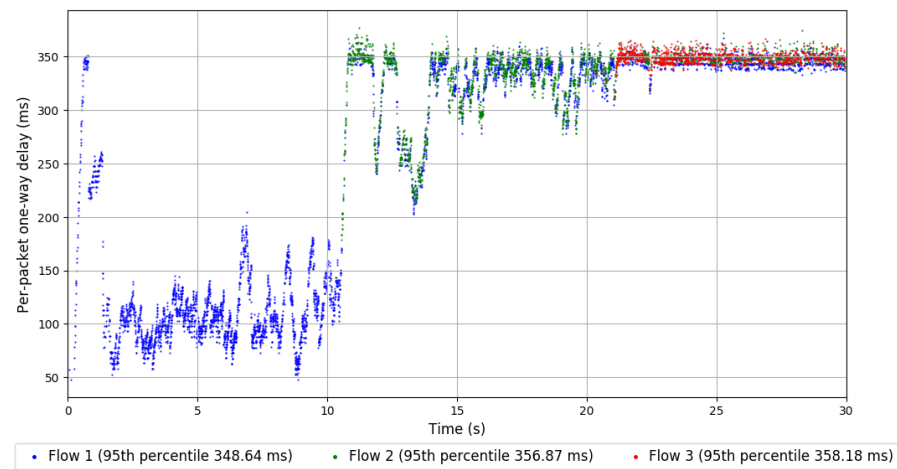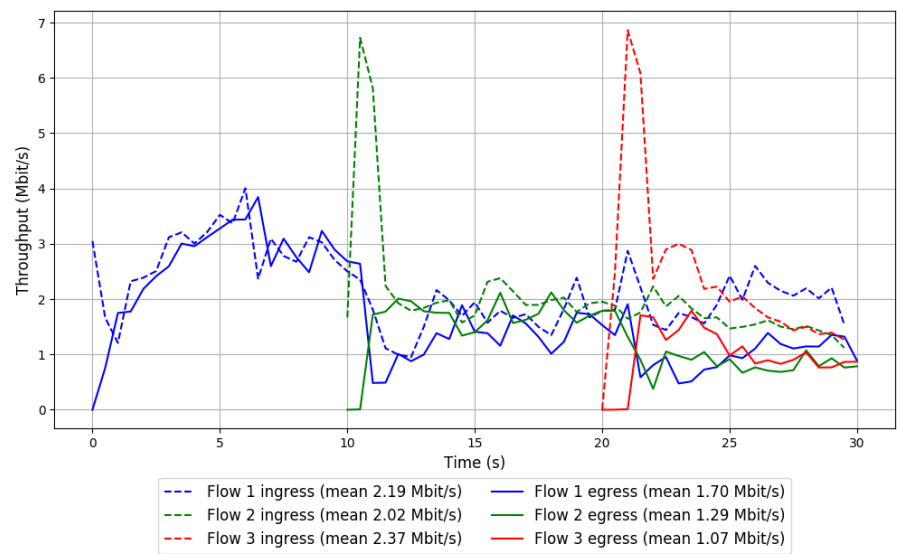Run 3: Report of FillP — Data Link

27

```
Run 1: Statistics of FillP-Sheep

Start at: 2018-09-06 17:43:05
End at: 2018-09-06 17:43:35
Local clock offset: 1.345 ms
Remote clock offset: -6.302 ms


# Below is generated by plot.py at 2018-09-06 18:38:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 363.359 ms
Loss rate: 50.77%
-- Flow 1:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 360.881 ms
Loss rate: 38.10%
-- Flow 2:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 365.920 ms
Loss rate: 53.17%
-- Flow 3:
Average throughput: 0.74 Mbit/s
95th percentile per-packet one-way delay: 366.305 ms
Loss rate: 71.58%
```

Run 1: Report of FillP-Sheep — Data Link

Flow 1 ingress (mean 1.51 Mbit/s) --- Flow 1 egress (mean 0.94 Mbit/s)
Flow 2 ingress (mean 1.26 Mbit/s) --- Flow 2 egress (mean 0.59 Mbit/s)
Flow 3 ingress (mean 2.48 Mbit/s) --- Flow 3 egress (mean 0.74 Mbit/s)

Flow 1 (95th percentile 360.88 ms)   Flow 2 (95th percentile 365.92 ms)   Flow 3 (95th percentile 366.31 ms)

```
Run 2: Statistics of FillP-Sheep

Start at: 2018-09-06 18:03:11
End at: 2018-09-06 18:03:41
Local clock offset: 0.755 ms
Remote clock offset: -7.943 ms


# Below is generated by plot.py at 2018-09-06 18:38:38
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.94 Mbit/s
95th percentile per-packet one-way delay: 357.909 ms
Loss rate: 42.07%
-- Flow 1:
Average throughput: 1.16 Mbit/s
95th percentile per-packet one-way delay: 354.401 ms
Loss rate: 31.71%
-- Flow 2:
Average throughput: 0.84 Mbit/s
95th percentile per-packet one-way delay: 359.342 ms
Loss rate: 43.79%
-- Flow 3:
Average throughput: 0.69 Mbit/s
95th percentile per-packet one-way delay: 362.257 ms
Loss rate: 66.19%
```

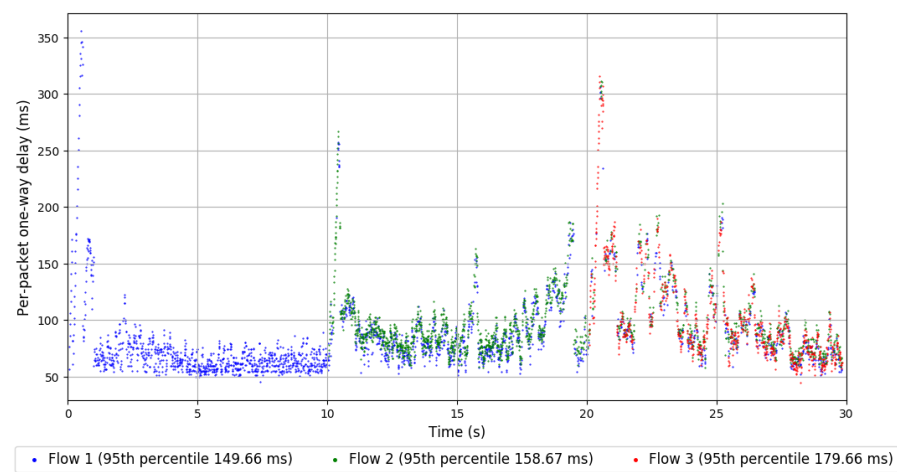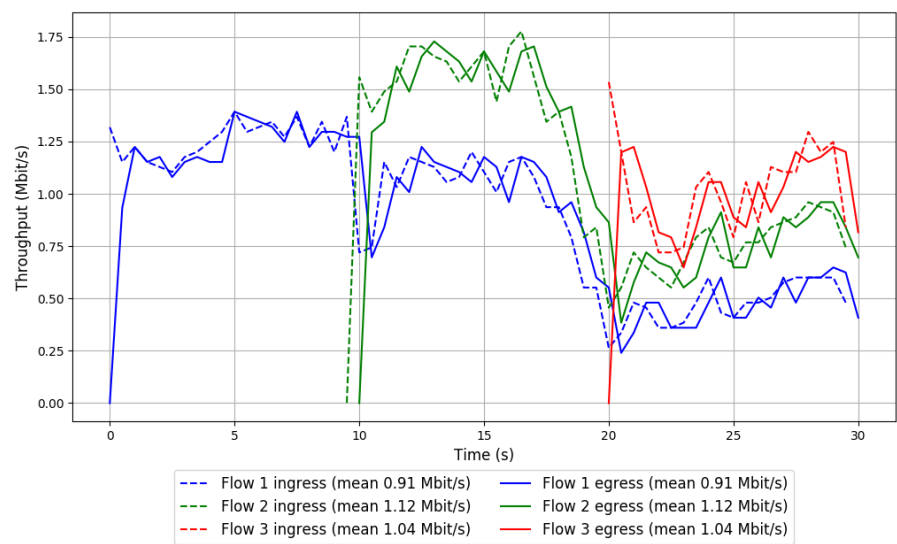Run 2: Report of FillP-Sheep — Data Link

Flow 1 ingress (mean 1.70 Mbit/s) --- Flow 1 egress (mean 1.16 Mbit/s) ---
Flow 2 ingress (mean 1.48 Mbit/s) --- Flow 2 egress (mean 0.84 Mbit/s) ---
Flow 3 ingress (mean 1.98 Mbit/s) --- Flow 3 egress (mean 0.69 Mbit/s) ---

Flow 1 (95th percentile 354.40 ms)   Flow 2 (95th percentile 359.34 ms)   Flow 3 (95th percentile 362.26 ms)

31

```
Run 3: Statistics of FillP-Sheep

Start at: 2018-09-06 18:23:15
End at: 2018-09-06 18:23:45
Local clock offset: -0.349 ms
Remote clock offset: -5.798 ms


# Below is generated by plot.py at 2018-09-06 18:38:41
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.90 Mbit/s
95th percentile per-packet one-way delay: 354.092 ms
Loss rate: 32.88%
-- Flow 1:
Average throughput: 1.70 Mbit/s
95th percentile per-packet one-way delay: 348.645 ms
Loss rate: 22.22%
-- Flow 2:
Average throughput: 1.29 Mbit/s
95th percentile per-packet one-way delay: 356.872 ms
Loss rate: 36.60%
-- Flow 3:
Average throughput: 1.07 Mbit/s
95th percentile per-packet one-way delay: 358.178 ms
Loss rate: 56.18%
```

Run 3: Report of FillP-Sheep — Data Link
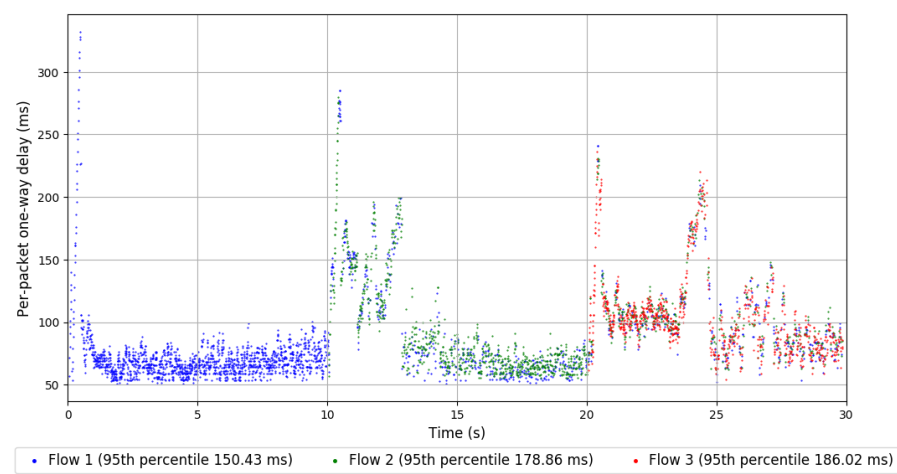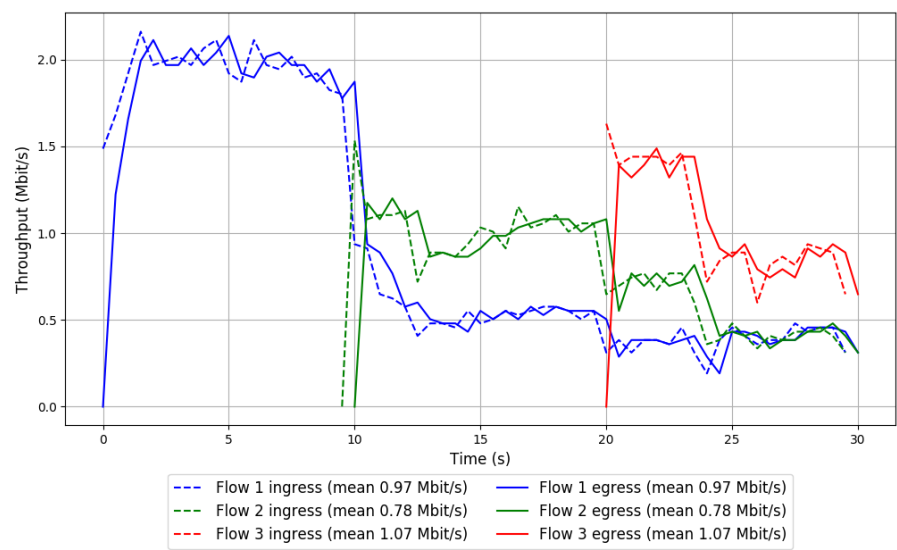

Flow 1 ingress (mean 2.19 Mbit/s) --- Flow 1 egress (mean 1.70 Mbit/s)
Flow 2 ingress (mean 2.02 Mbit/s) --- Flow 2 egress (mean 1.29 Mbit/s)
Flow 3 ingress (mean 2.37 Mbit/s) --- Flow 3 egress (mean 1.07 Mbit/s)

Flow 1 (95th percentile 348.64 ms)   Flow 2 (95th percentile 356.87 ms)   Flow 3 (95th percentile 358.18 ms)

```
Run 1: Statistics of Indigo

Start at: 2018-09-06 17:55:23
End at: 2018-09-06 17:55:53
Local clock offset: -1.959 ms
Remote clock offset: -6.18 ms


# Below is generated by plot.py at 2018-09-06 18:38:41
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.98 Mbit/s
95th percentile per-packet one-way delay: 161.445 ms
Loss rate: 0.89%
-- Flow 1:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 149.663 ms
Loss rate: 0.88%
-- Flow 2:
Average throughput: 1.12 Mbit/s
95th percentile per-packet one-way delay: 158.669 ms
Loss rate: 0.65%
-- Flow 3:
Average throughput: 1.04 Mbit/s
95th percentile per-packet one-way delay: 179.661 ms
Loss rate: 1.41%
```
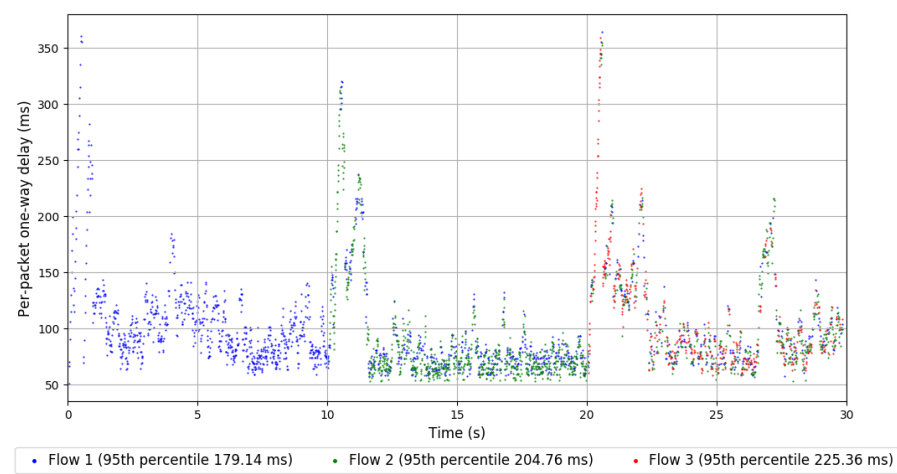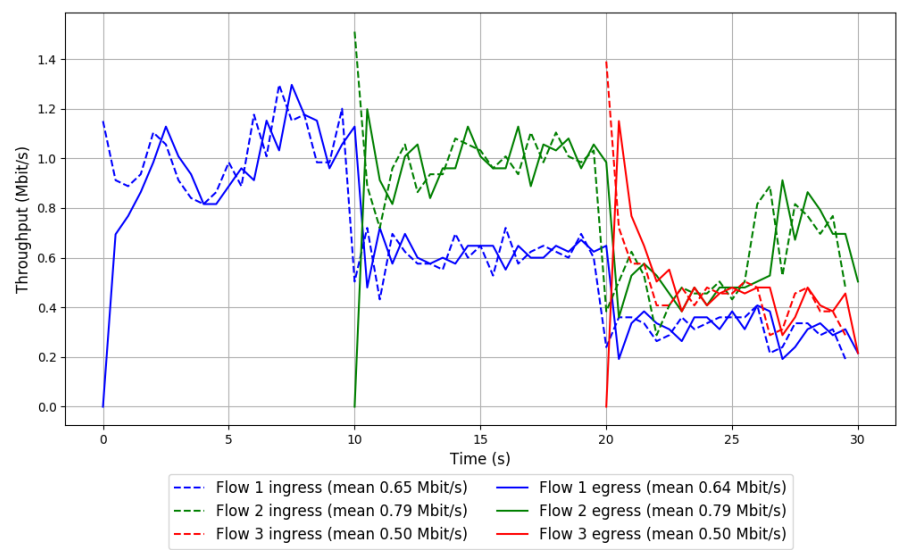
Run 1: Report of Indigo — Data Link

```
Run 2: Statistics of Indigo

Start at: 2018-09-06 18:15:28
End at: 2018-09-06 18:15:58
Local clock offset: 1.658 ms
Remote clock offset: -4.908 ms


# Below is generated by plot.py at 2018-09-06 18:38:41
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.84 Mbit/s
95th percentile per-packet one-way delay: 171.071 ms
Loss rate: 0.41%
-- Flow 1:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 150.430 ms
Loss rate: 0.17%
-- Flow 2:
Average throughput: 0.78 Mbit/s
95th percentile per-packet one-way delay: 178.862 ms
Loss rate: 0.46%
-- Flow 3:
Average throughput: 1.07 Mbit/s
95th percentile per-packet one-way delay: 186.018 ms
Loss rate: 1.02%
```
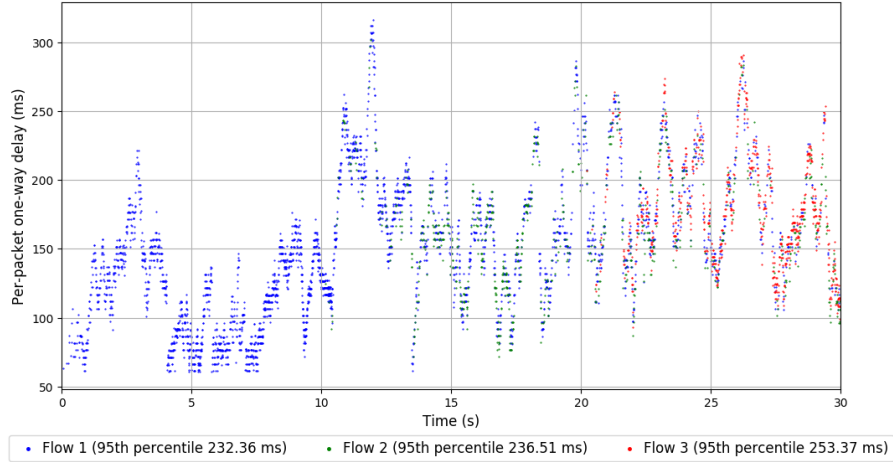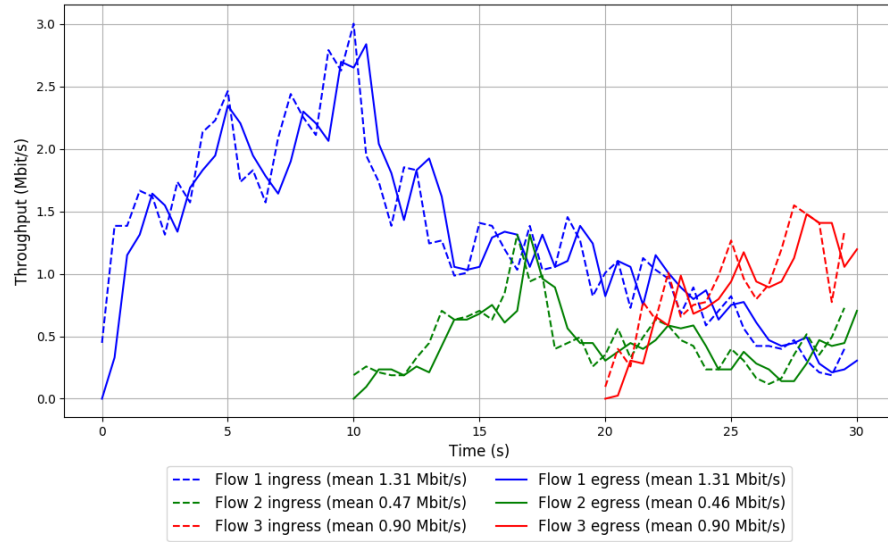
Run 2: Report of Indigo — Data Link

```
Run 3: Statistics of Indigo

Start at: 2018-09-06 18:35:33
End at: 2018-09-06 18:36:03
Local clock offset: 2.159 ms
Remote clock offset: -5.205 ms


# Below is generated by plot.py at 2018-09-06 18:38:41
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.33 Mbit/s
95th percentile per-packet one-way delay: 201.561 ms
Loss rate: 0.93%
-- Flow 1:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 179.136 ms
Loss rate: 1.24%
-- Flow 2:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 204.756 ms
Loss rate: 0.53%
-- Flow 3:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 225.357 ms
Loss rate: 0.97%
```
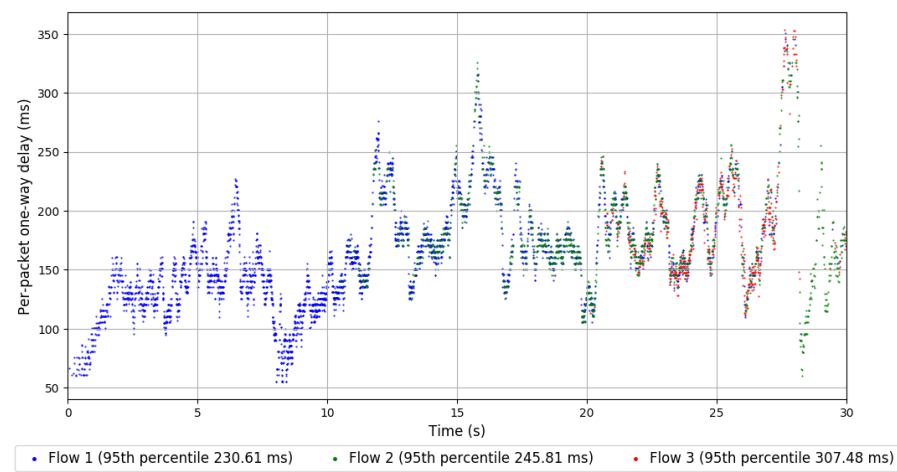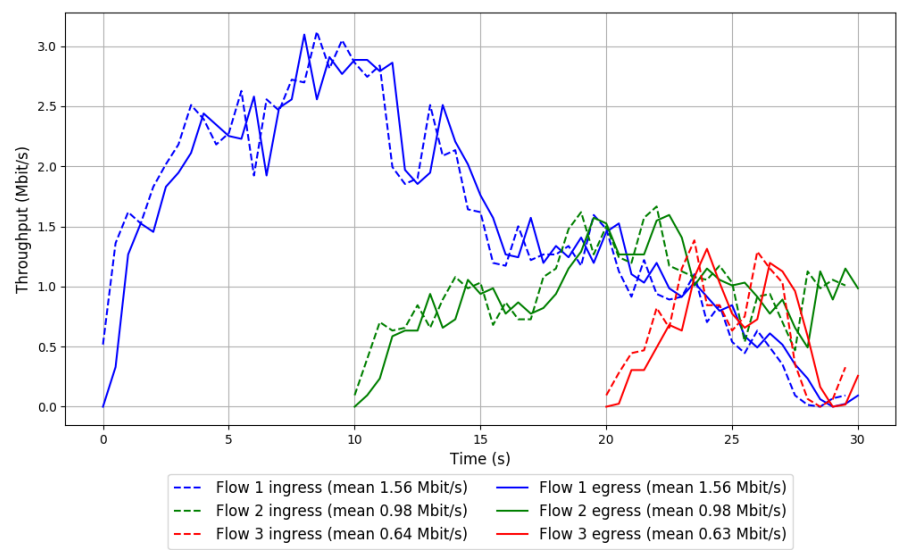
Run 3: Report of Indigo — Data Link

```
Run 1: Statistics of LEDBAT

Start at: 2018-09-06 17:46:28
End at: 2018-09-06 17:46:58
Local clock offset: 3.371 ms
Remote clock offset: -6.618 ms


# Below is generated by plot.py at 2018-09-06 18:38:41
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 237.077 ms
Loss rate: 0.98%
-- Flow 1:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 232.359 ms
Loss rate: 0.48%
-- Flow 2:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 236.509 ms
Loss rate: 1.75%
-- Flow 3:
Average throughput: 0.90 Mbit/s
95th percentile per-packet one-way delay: 253.367 ms
Loss rate: 2.34%
```
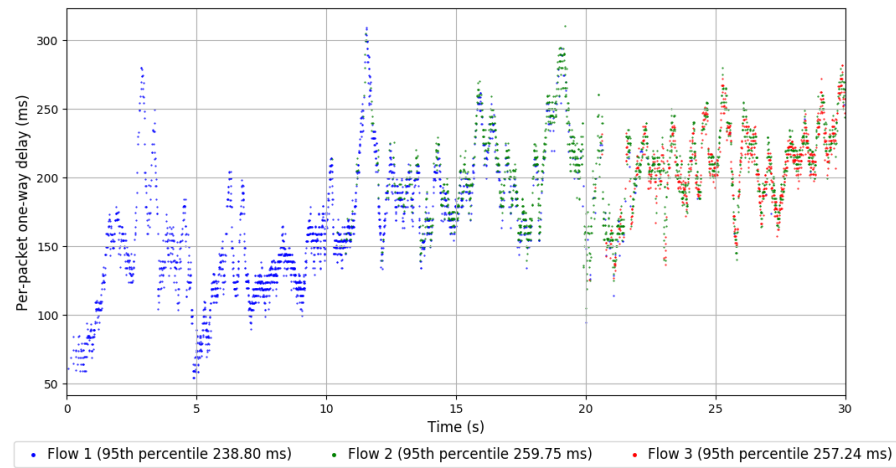
Run 1: Report of LEDBAT — Data Link

Flow 1 ingress (mean 1.31 Mbit/s) --- Flow 1 egress (mean 1.31 Mbit/s)
Flow 2 ingress (mean 0.47 Mbit/s) --- Flow 2 egress (mean 0.46 Mbit/s)
Flow 3 ingress (mean 0.90 Mbit/s) --- Flow 3 egress (mean 0.90 Mbit/s)

Flow 1 (95th percentile 232.36 ms)   Flow 2 (95th percentile 236.51 ms)   Flow 3 (95th percentile 253.37 ms)
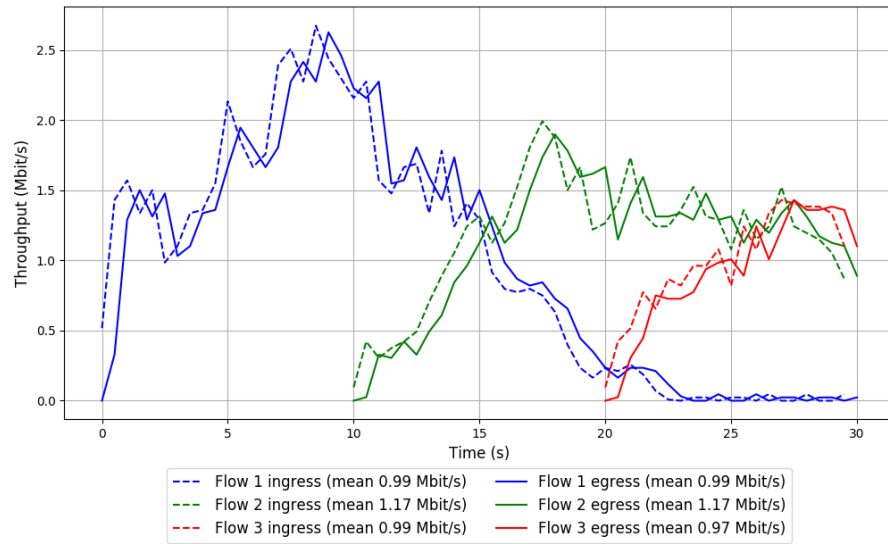
41

```
Run 2: Statistics of LEDBAT

Start at: 2018-09-06 18:06:32
End at: 2018-09-06 18:07:02
Local clock offset: -0.794 ms
Remote clock offset: -6.486 ms


# Below is generated by plot.py at 2018-09-06 18:38:42
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.41 Mbit/s
95th percentile per-packet one-way delay: 236.144 ms
Loss rate: 0.58%
-- Flow 1:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 230.609 ms
Loss rate: 0.08%
-- Flow 2:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 245.807 ms
Loss rate: 1.14%
-- Flow 3:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 307.477 ms
Loss rate: 2.55%
```
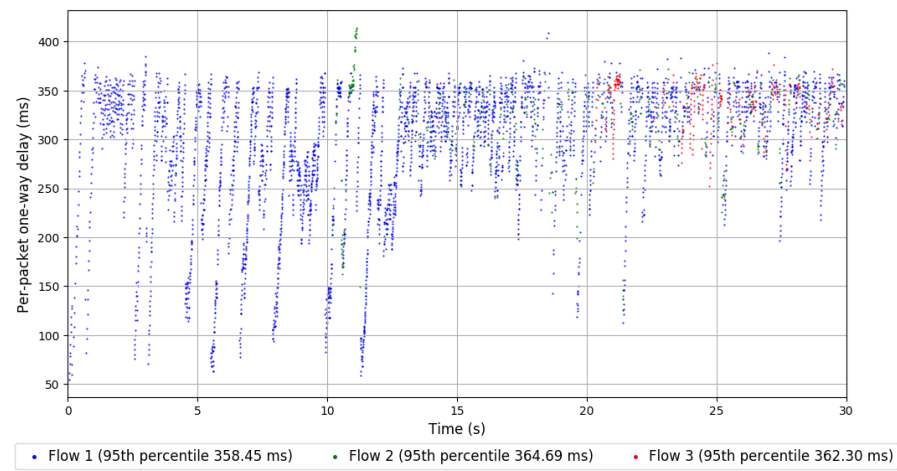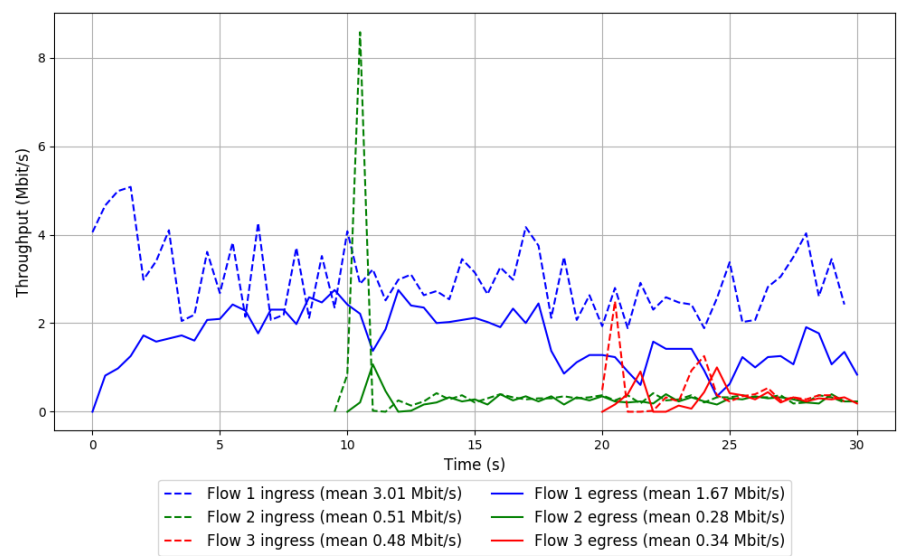
Run 2: Report of LEDBAT — Data Link

Flow 1 ingress (mean 1.56 Mbit/s)   Flow 1 egress (mean 1.56 Mbit/s)
Flow 2 ingress (mean 0.98 Mbit/s)   Flow 2 egress (mean 0.98 Mbit/s)
Flow 3 ingress (mean 0.64 Mbit/s)   Flow 3 egress (mean 0.63 Mbit/s)

Flow 1 (95th percentile 230.61 ms)   Flow 2 (95th percentile 245.81 ms)   Flow 3 (95th percentile 307.48 ms)

```
Run 3: Statistics of LEDBAT

Start at: 2018-09-06 18:26:37
End at: 2018-09-06 18:27:07
Local clock offset: 0.672 ms
Remote clock offset: -5.478 ms


# Below is generated by plot.py at 2018-09-06 18:38:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.08 Mbit/s
95th percentile per-packet one-way delay: 253.973 ms
Loss rate: 0.95%
-- Flow 1:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 238.802 ms
Loss rate: 0.08%
-- Flow 2:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 259.752 ms
Loss rate: 1.10%
-- Flow 3:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 257.235 ms
Loss rate: 3.22%
```
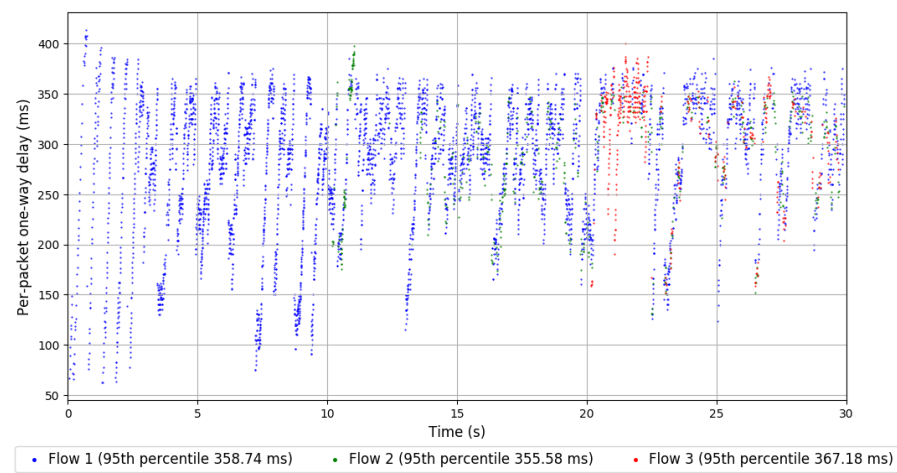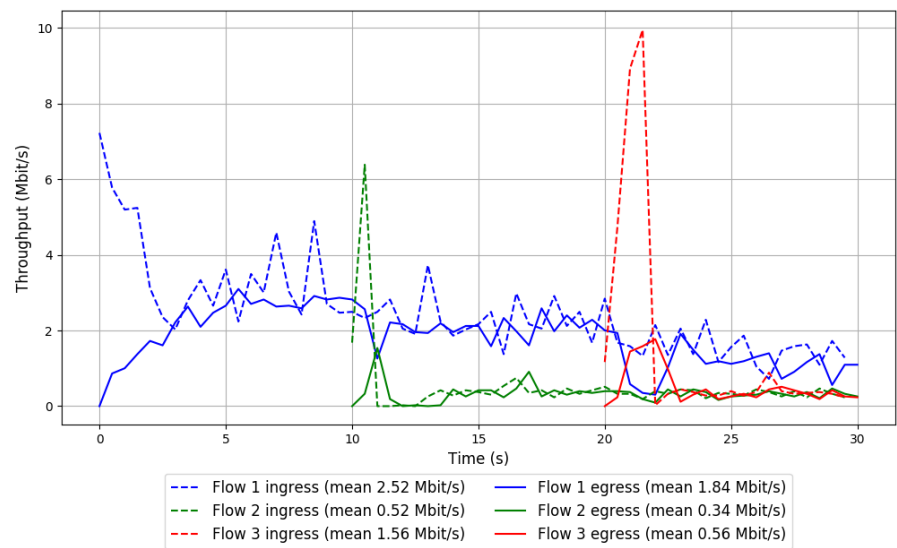
Run 3: Report of LEDBAT — Data Link

Flow 1 ingress (mean 0.99 Mbit/s) — Flow 1 egress (mean 0.99 Mbit/s)
Flow 2 ingress (mean 1.17 Mbit/s) — Flow 2 egress (mean 1.17 Mbit/s)
Flow 3 ingress (mean 0.99 Mbit/s) — Flow 3 egress (mean 0.97 Mbit/s)

Flow 1 (95th percentile 238.80 ms) · Flow 2 (95th percentile 259.75 ms) · Flow 3 (95th percentile 257.24 ms)
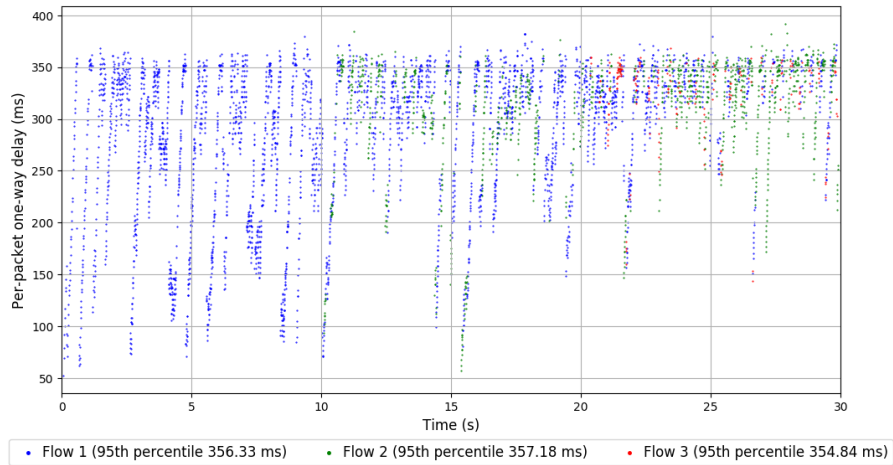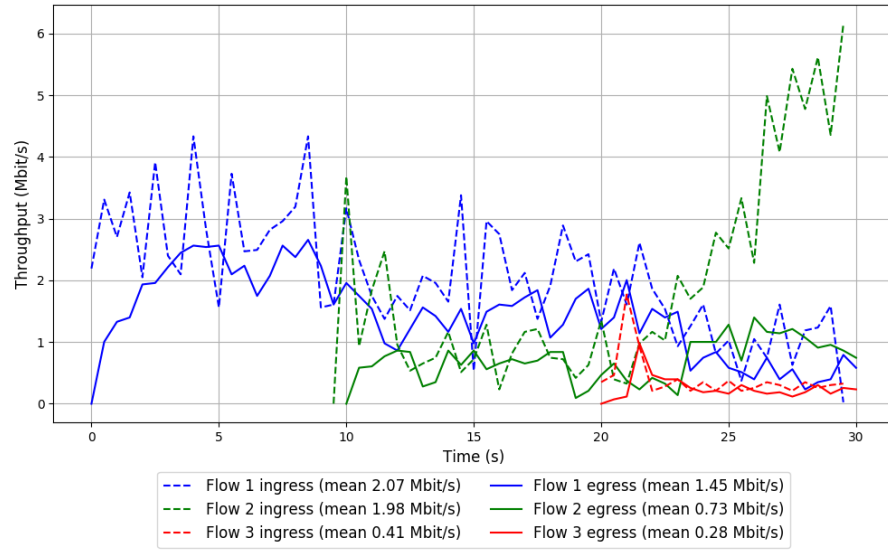
45

```
Run 1: Statistics of Indigo-Muses

Start at: 2018-09-06 17:48:41
End at: 2018-09-06 17:49:11
Local clock offset: 3.17 ms
Remote clock offset: -6.149 ms


# Below is generated by plot.py at 2018-09-06 18:38:44
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.97 Mbit/s
95th percentile per-packet one-way delay: 359.150 ms
Loss rate: 43.85%
-- Flow 1:
Average throughput: 1.67 Mbit/s
95th percentile per-packet one-way delay: 358.447 ms
Loss rate: 44.36%
-- Flow 2:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 364.695 ms
Loss rate: 45.18%
-- Flow 3:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 362.299 ms
Loss rate: 31.45%
```

Run 1: Report of Indigo-Muses — Data Link

Flow 1 ingress (mean 3.01 Mbit/s) — — — Flow 1 egress (mean 1.67 Mbit/s) ———
Flow 2 ingress (mean 0.51 Mbit/s) — — — Flow 2 egress (mean 0.28 Mbit/s) ———
Flow 3 ingress (mean 0.48 Mbit/s) — — — Flow 3 egress (mean 0.34 Mbit/s) ———

Flow 1 (95th percentile 358.45 ms) • Flow 2 (95th percentile 364.69 ms) • Flow 3 (95th percentile 362.30 ms)

```
Run 2: Statistics of Indigo-Muses

Start at: 2018-09-06 18:08:46
End at: 2018-09-06 18:09:16
Local clock offset: 2.101 ms
Remote clock offset: -6.383 ms


# Below is generated by plot.py at 2018-09-06 18:38:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.24 Mbit/s
95th percentile per-packet one-way delay: 359.413 ms
Loss rate: 33.46%
-- Flow 1:
Average throughput: 1.84 Mbit/s
95th percentile per-packet one-way delay: 358.741 ms
Loss rate: 27.04%
-- Flow 2:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 355.584 ms
Loss rate: 33.82%
-- Flow 3:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 367.184 ms
Loss rate: 64.93%
```

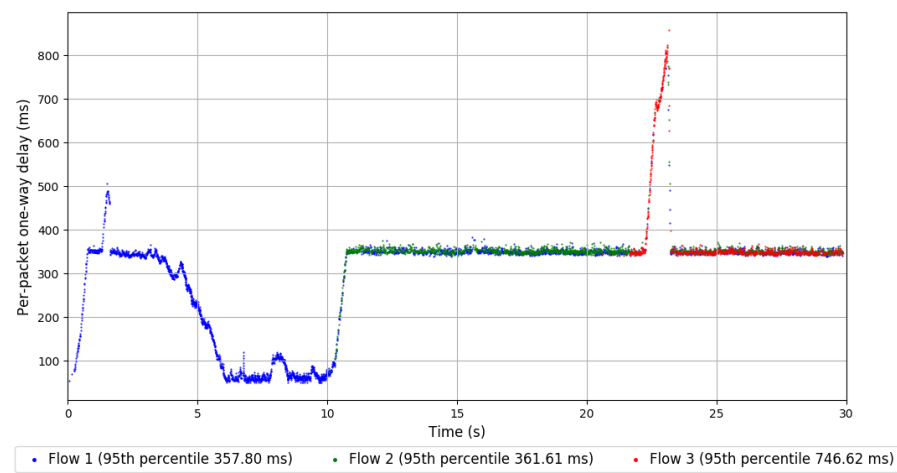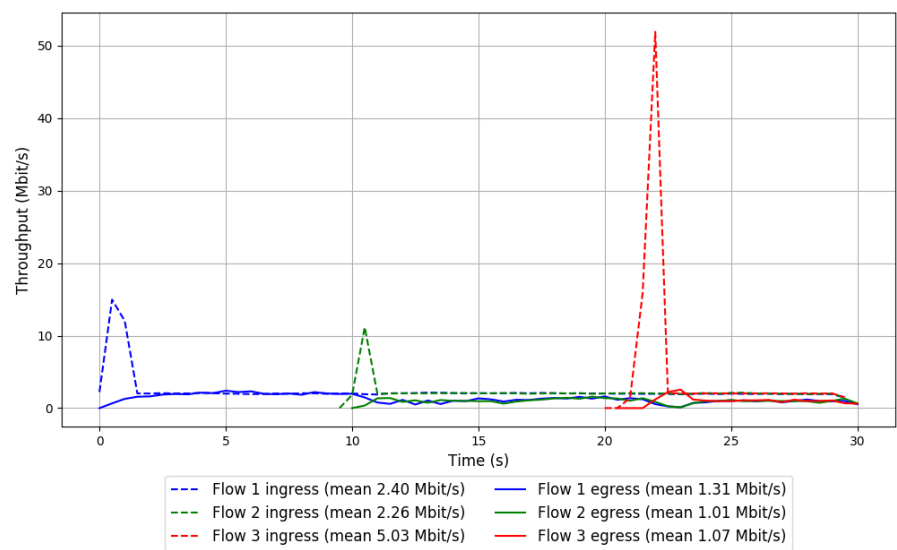Run 2: Report of Indigo-Muses — Data Link

```
Run 3: Statistics of Indigo-Muses

Start at: 2018-09-06 18:28:50
End at: 2018-09-06 18:29:20
Local clock offset: 1.303 ms
Remote clock offset: -4.474 ms


# Below is generated by plot.py at 2018-09-06 18:38:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.02 Mbit/s
95th percentile per-packet one-way delay: 356.582 ms
Loss rate: 42.45%
-- Flow 1:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 356.334 ms
Loss rate: 29.80%
-- Flow 2:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 357.182 ms
Loss rate: 63.17%
-- Flow 3:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 354.841 ms
Loss rate: 33.90%
```

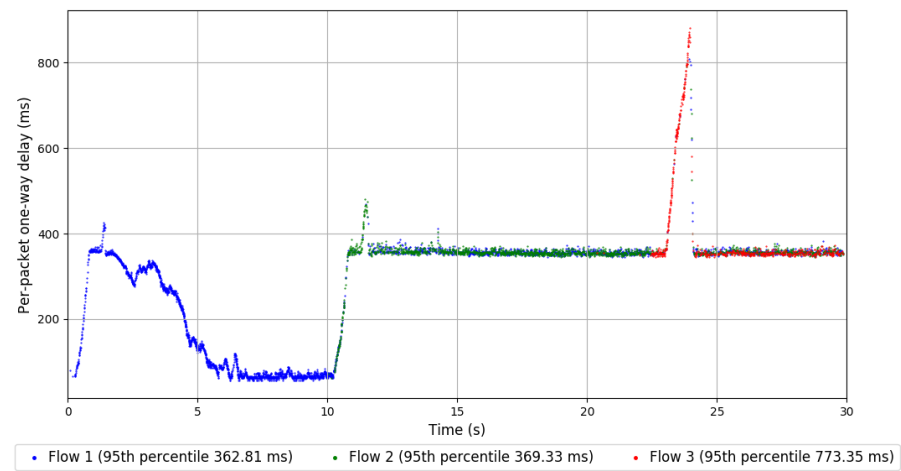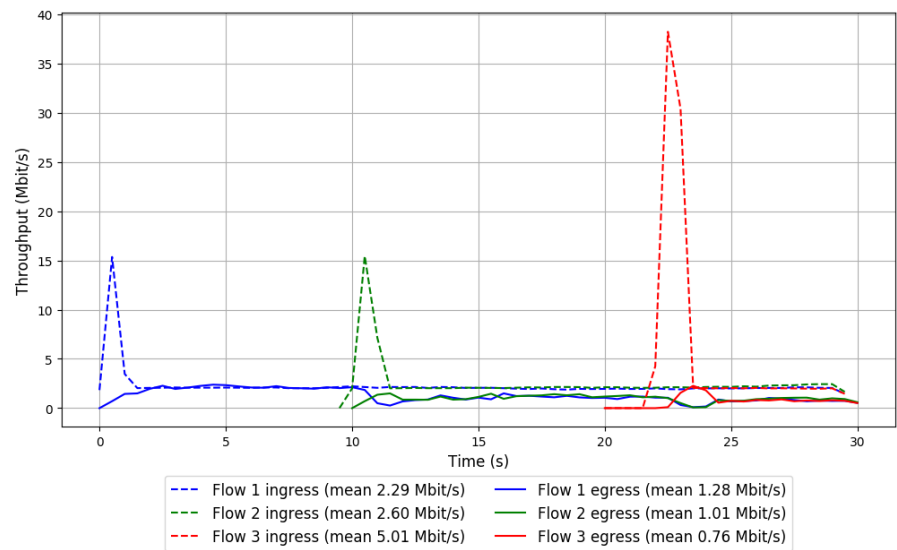Run 3: Report of Indigo-Muses — Data Link

Flow 1 ingress (mean 2.07 Mbit/s)   Flow 1 egress (mean 1.45 Mbit/s)
Flow 2 ingress (mean 1.98 Mbit/s)   Flow 2 egress (mean 0.73 Mbit/s)
Flow 3 ingress (mean 0.41 Mbit/s)   Flow 3 egress (mean 0.28 Mbit/s)

Flow 1 (95th percentile 356.33 ms)   Flow 2 (95th percentile 357.18 ms)   Flow 3 (95th percentile 354.84 ms)
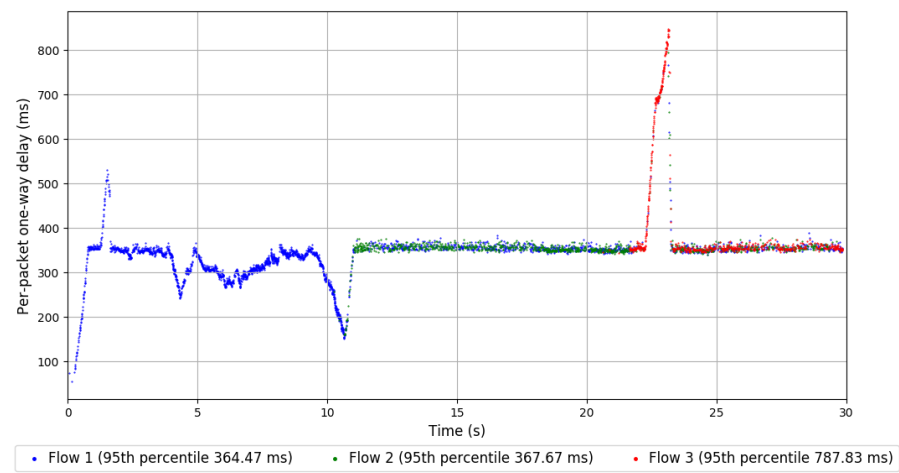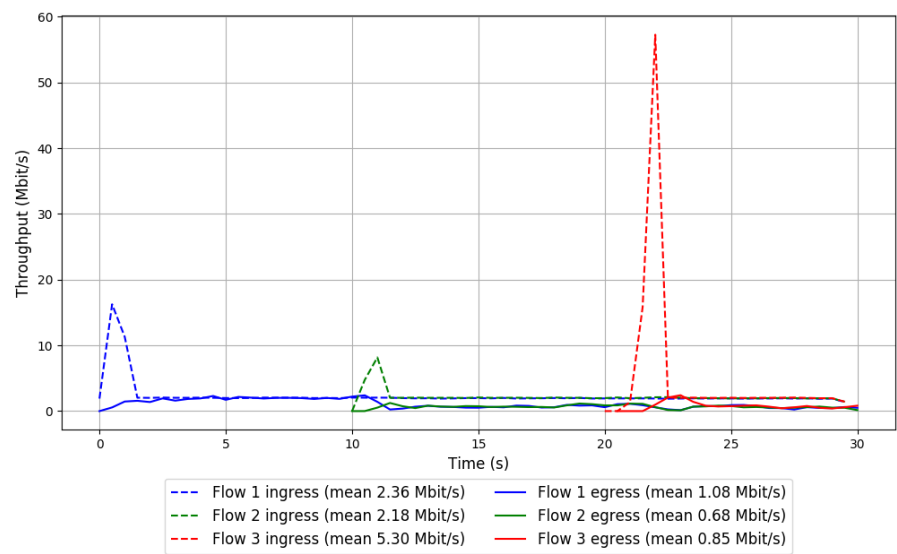
```
Run 1: Statistics of PCC-Allegro

Start at: 2018-09-06 17:53:09
End at: 2018-09-06 17:53:39
Local clock offset: 1.964 ms
Remote clock offset: -5.469 ms


# Below is generated by plot.py at 2018-09-06 18:38:47
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.31 Mbit/s
95th percentile per-packet one-way delay: 364.166 ms
Loss rate: 58.53%
-- Flow 1:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 357.795 ms
Loss rate: 45.56%
-- Flow 2:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 361.607 ms
Loss rate: 55.43%
-- Flow 3:
Average throughput: 1.07 Mbit/s
95th percentile per-packet one-way delay: 746.622 ms
Loss rate: 80.10%
```

Run 1: Report of PCC-Allegro — Data Link

Flow 1 ingress (mean 2.40 Mbit/s) Flow 1 egress (mean 1.31 Mbit/s)
Flow 2 ingress (mean 2.26 Mbit/s) Flow 2 egress (mean 1.01 Mbit/s)
Flow 3 ingress (mean 5.03 Mbit/s) Flow 3 egress (mean 1.07 Mbit/s)

Flow 1 (95th percentile 357.80 ms)   Flow 2 (95th percentile 361.61 ms)   Flow 3 (95th percentile 746.62 ms)

```
Run 2: Statistics of PCC-Allegro

Start at: 2018-09-06 18:13:14
End at: 2018-09-06 18:13:44
Local clock offset: 0.63 ms
Remote clock offset: -5.281 ms


# Below is generated by plot.py at 2018-09-06 18:38:49
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 370.436 ms
Loss rate: 61.41%
-- Flow 1:
Average throughput: 1.28 Mbit/s
95th percentile per-packet one-way delay: 362.812 ms
Loss rate: 44.29%
-- Flow 2:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 369.330 ms
Loss rate: 61.23%
-- Flow 3:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 773.349 ms
Loss rate: 85.32%
```

Run 2: Report of PCC-Allegro — Data Link
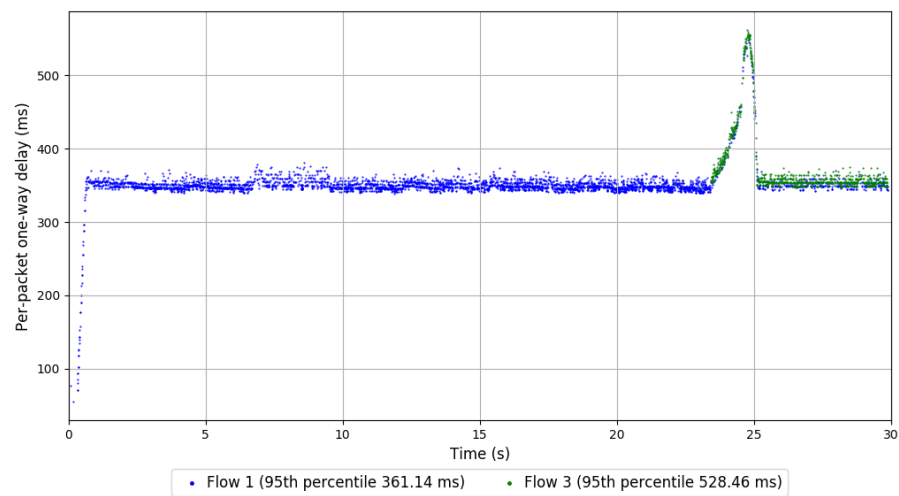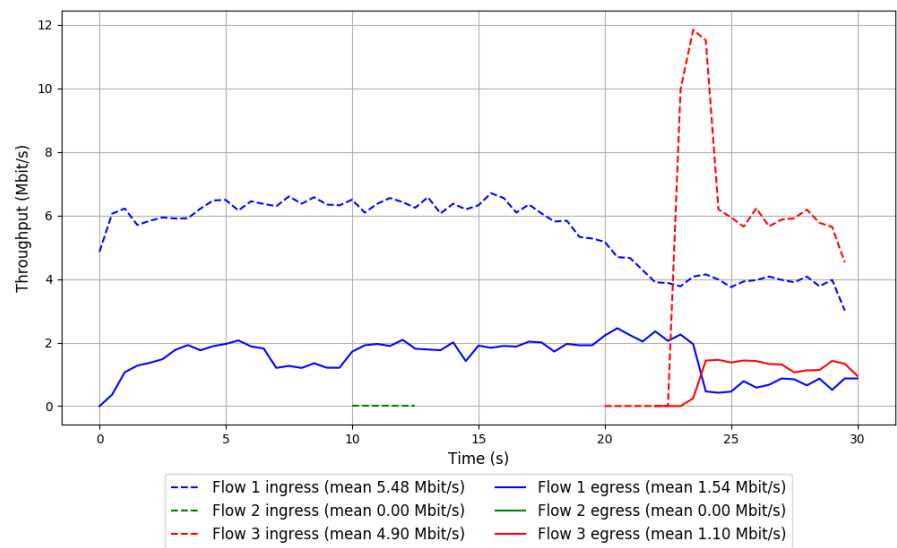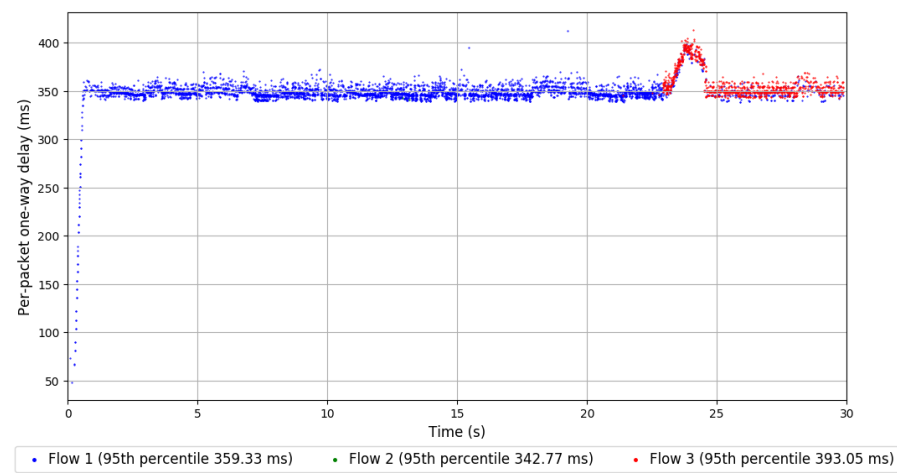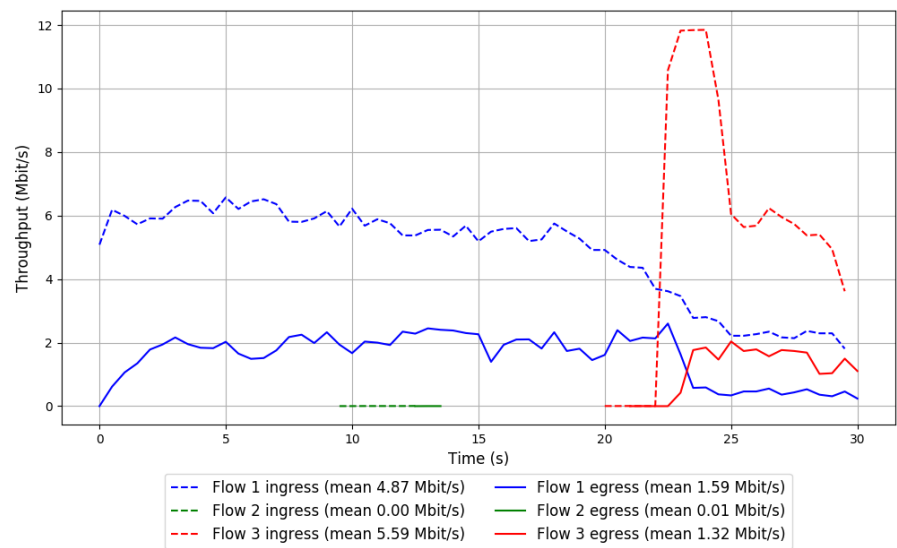
```
Run 3: Statistics of PCC-Allegro

Start at: 2018-09-06 18:33:19
End at: 2018-09-06 18:33:49
Local clock offset: 0.383 ms
Remote clock offset: -4.479 ms


# Below is generated by plot.py at 2018-09-06 18:38:49
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.79 Mbit/s
95th percentile per-packet one-way delay: 415.743 ms
Loss rate: 67.82%
-- Flow 1:
Average throughput: 1.08 Mbit/s
95th percentile per-packet one-way delay: 364.466 ms
Loss rate: 54.26%
-- Flow 2:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 367.667 ms
Loss rate: 69.29%
-- Flow 3:
Average throughput: 0.85 Mbit/s
95th percentile per-packet one-way delay: 787.826 ms
Loss rate: 84.97%
```

Run 3: Report of PCC-Allegro — Data Link

Flow 1 ingress (mean 2.36 Mbit/s) --- Flow 1 egress (mean 1.08 Mbit/s)
Flow 2 ingress (mean 2.18 Mbit/s) --- Flow 2 egress (mean 0.68 Mbit/s)
Flow 3 ingress (mean 5.30 Mbit/s) --- Flow 3 egress (mean 0.85 Mbit/s)

Flow 1 (95th percentile 364.47 ms)   Flow 2 (95th percentile 367.67 ms)   Flow 3 (95th percentile 787.83 ms)

```
Run 1: Statistics of PCC-Expr

Start at: 2018-09-06 17:49:48
End at: 2018-09-06 17:50:18
Local clock offset: 0.059 ms
Remote clock offset: -5.231 ms
```
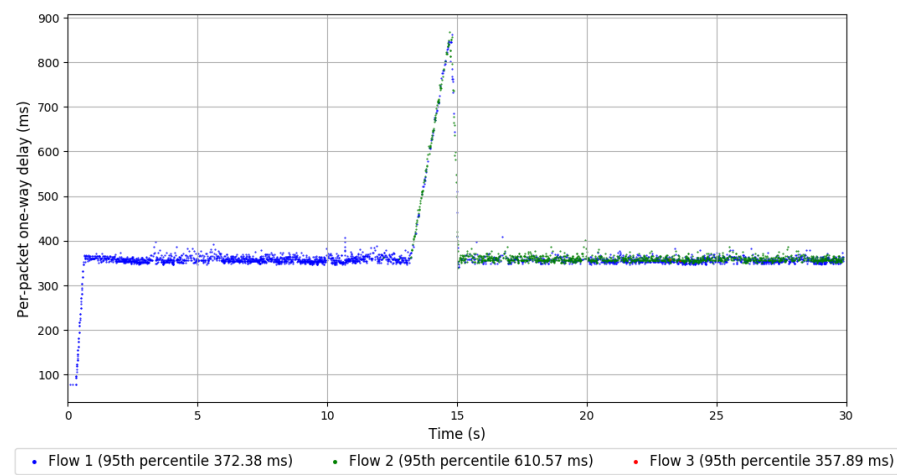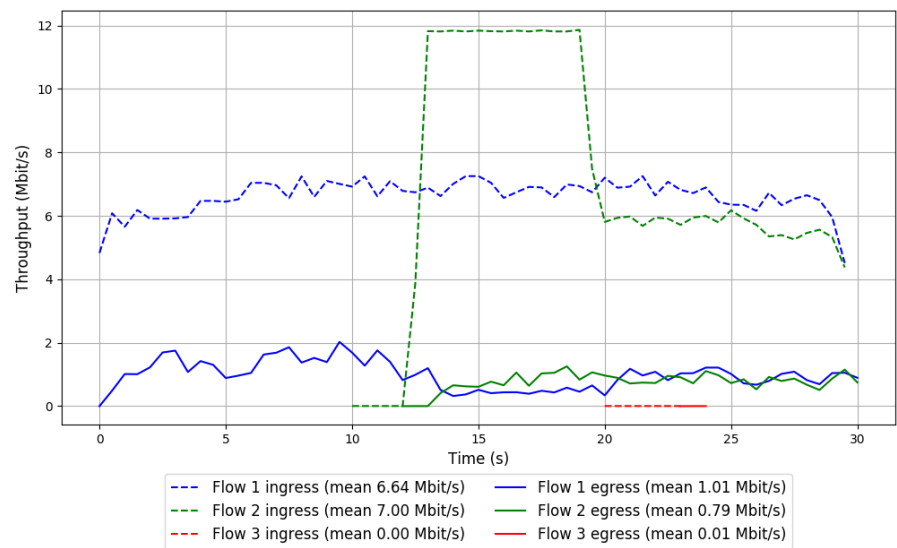
Run 1: Report of PCC-Expr — Data Link

```
Run 2: Statistics of PCC-Expr

Start at: 2018-09-06 18:09:53
End at: 2018-09-06 18:10:23
Local clock offset: 0.921 ms
Remote clock offset: -6.118 ms


# Below is generated by plot.py at 2018-09-06 18:38:56
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.97 Mbit/s
95th percentile per-packet one-way delay: 369.674 ms
Loss rate: 70.74%
-- Flow 1:
Average throughput: 1.59 Mbit/s
95th percentile per-packet one-way delay: 359.330 ms
Loss rate: 67.36%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 342.767 ms
Loss rate: 84.62%
-- Flow 3:
Average throughput: 1.32 Mbit/s
95th percentile per-packet one-way delay: 393.046 ms
Loss rate: 79.64%
```
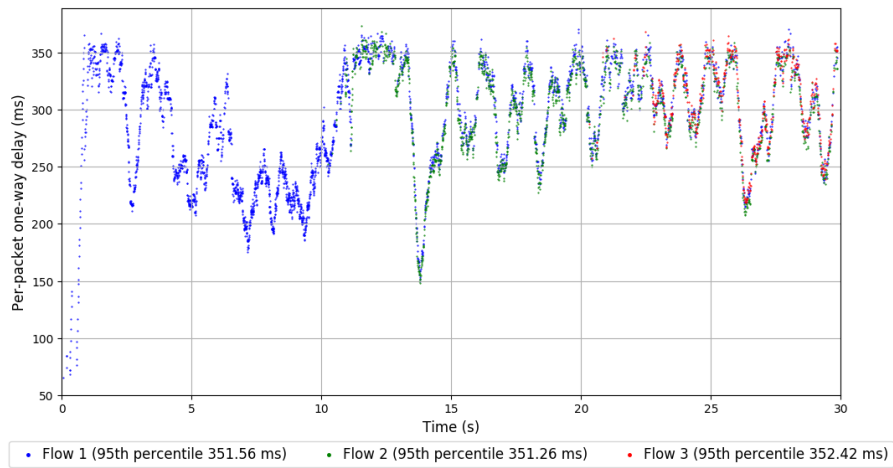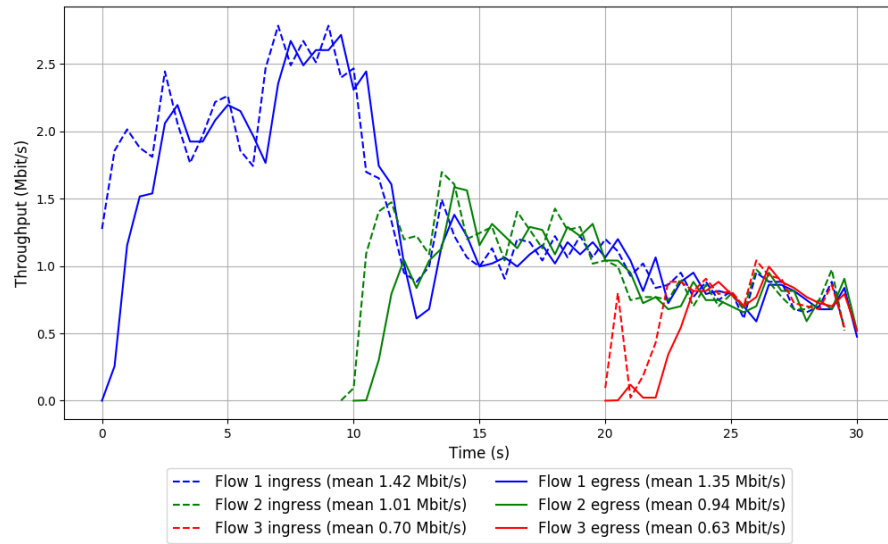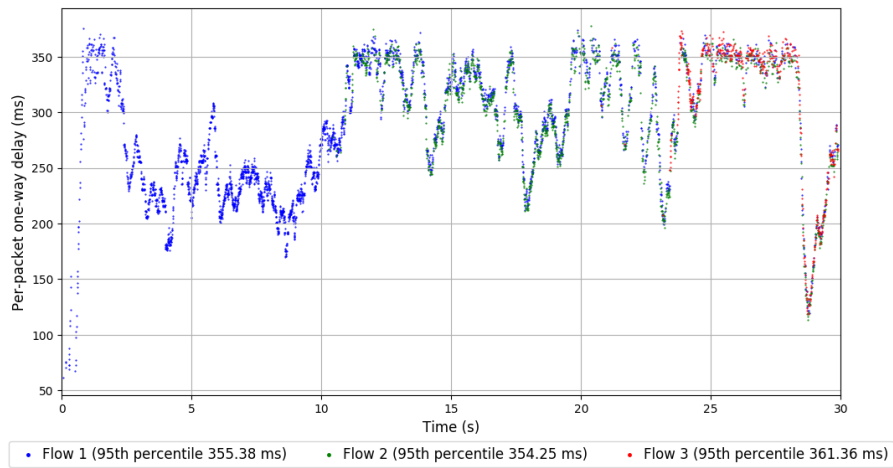
Run 2: Report of PCC-Expr — Data Link

```
Run 3: Statistics of PCC-Expr

Start at: 2018-09-06 18:29:57
End at: 2018-09-06 18:30:27
Local clock offset: 2.336 ms
Remote clock offset: -4.899 ms


# Below is generated by plot.py at 2018-09-06 18:39:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.48 Mbit/s
95th percentile per-packet one-way delay: 386.654 ms
Loss rate: 86.96%
-- Flow 1:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 372.378 ms
Loss rate: 84.87%
-- Flow 2:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 610.573 ms
Loss rate: 89.93%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 357.894 ms
Loss rate: 83.22%
```

Run 3: Report of PCC-Expr — Data Link

Flow 1 ingress (mean 6.64 Mbit/s)   Flow 1 egress (mean 1.01 Mbit/s)
Flow 2 ingress (mean 7.00 Mbit/s)   Flow 2 egress (mean 0.79 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s)   Flow 3 egress (mean 0.01 Mbit/s)

Flow 1 (95th percentile 372.38 ms)   Flow 2 (95th percentile 610.57 ms)   Flow 3 (95th percentile 357.89 ms)
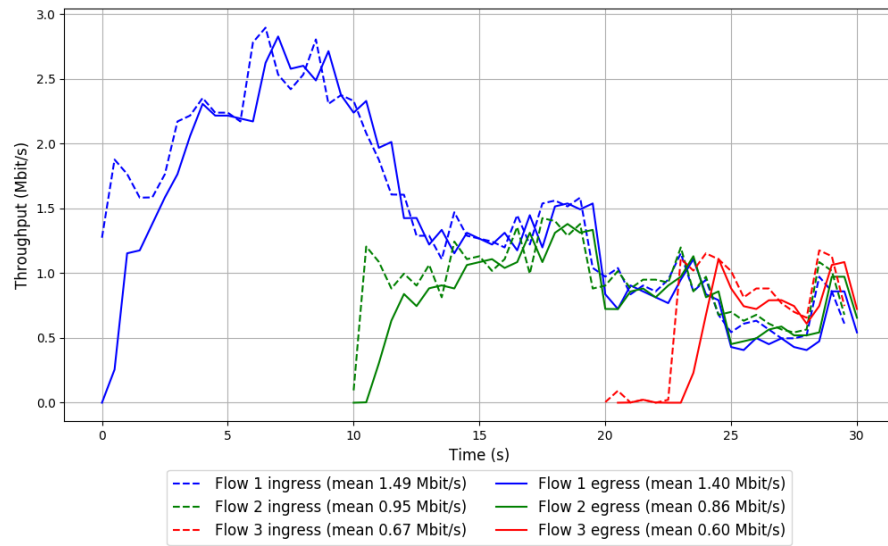
```
Run 1: Statistics of QUIC Cubic

Start at: 2018-09-06 17:47:35
End at: 2018-09-06 17:48:05
Local clock offset: 0.993 ms
Remote clock offset: -6.299 ms


# Below is generated by plot.py at 2018-09-06 18:39:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 351.728 ms
Loss rate: 6.87%
-- Flow 1:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 351.555 ms
Loss rate: 5.25%
-- Flow 2:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 351.265 ms
Loss rate: 8.52%
-- Flow 3:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 352.419 ms
Loss rate: 12.08%
```
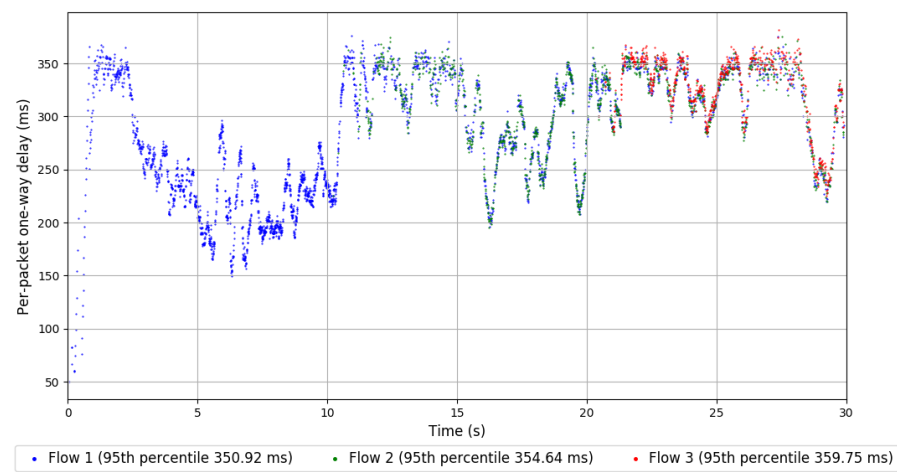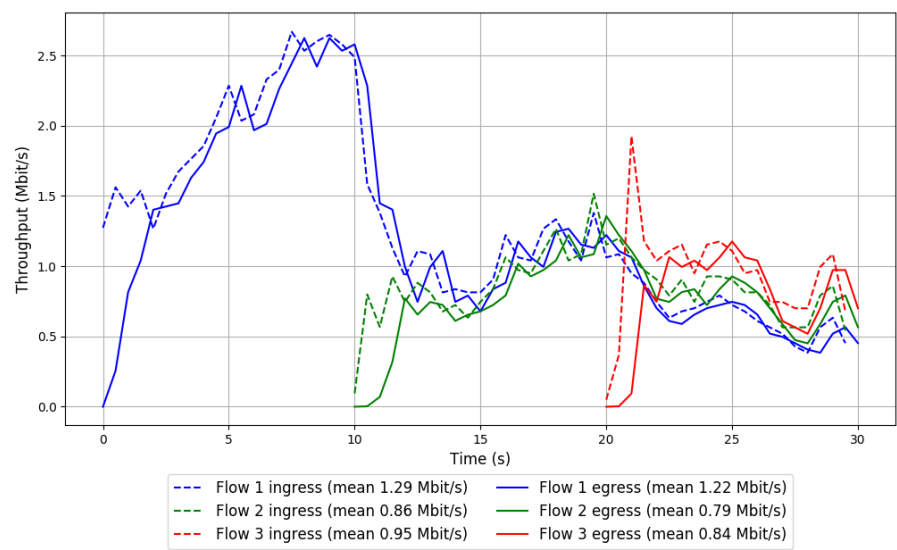
Run 1: Report of QUIC Cubic — Data Link

```
Run 2: Statistics of QUIC Cubic

Start at: 2018-09-06 18:07:39
End at: 2018-09-06 18:08:09
Local clock offset: 1.333 ms
Remote clock offset: -6.351 ms


# Below is generated by plot.py at 2018-09-06 18:39:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.15 Mbit/s
95th percentile per-packet one-way delay: 356.014 ms
Loss rate: 8.64%
-- Flow 1:
Average throughput: 1.40 Mbit/s
95th percentile per-packet one-way delay: 355.383 ms
Loss rate: 6.41%
-- Flow 2:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 354.255 ms
Loss rate: 10.71%
-- Flow 3:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 361.360 ms
Loss rate: 17.70%
```
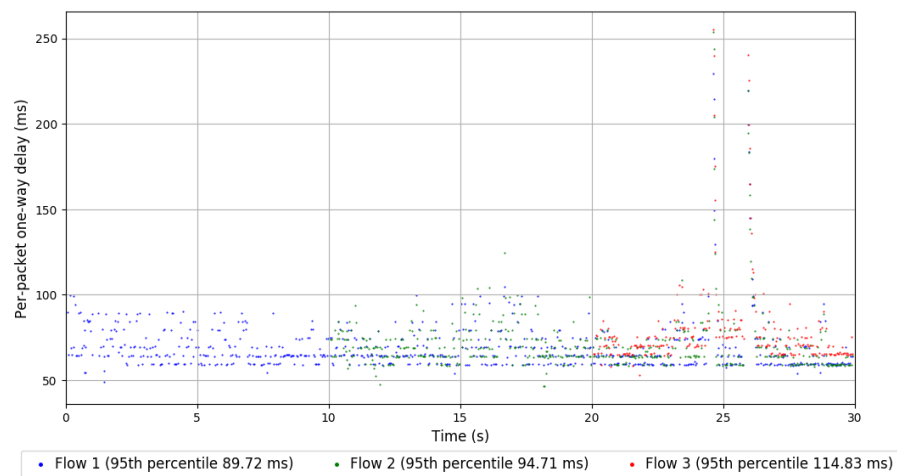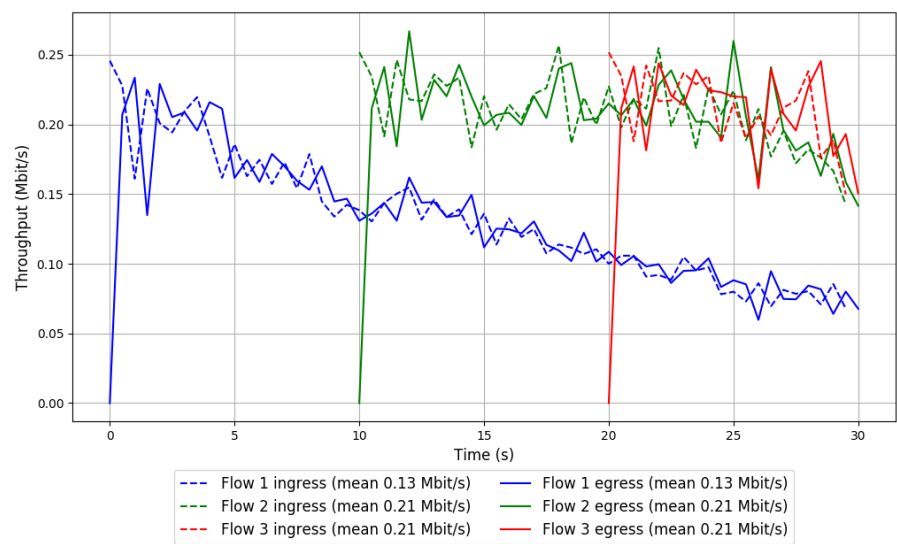
Run 2: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 1.49 Mbit/s)   Flow 1 egress (mean 1.40 Mbit/s)
Flow 2 ingress (mean 0.95 Mbit/s)   Flow 2 egress (mean 0.86 Mbit/s)
Flow 3 ingress (mean 0.67 Mbit/s)   Flow 3 egress (mean 0.60 Mbit/s)

Flow 1 (95th percentile 355.38 ms)   Flow 2 (95th percentile 354.25 ms)   Flow 3 (95th percentile 361.36 ms)

```
Run 3: Statistics of QUIC Cubic

Start at: 2018-09-06 18:27:44
End at: 2018-09-06 18:28:14
Local clock offset: -0.939 ms
Remote clock offset: -5.771 ms


# Below is generated by plot.py at 2018-09-06 18:39:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 354.743 ms
Loss rate: 8.26%
-- Flow 1:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 350.920 ms
Loss rate: 6.20%
-- Flow 2:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 354.639 ms
Loss rate: 9.34%
-- Flow 3:
Average throughput: 0.84 Mbit/s
95th percentile per-packet one-way delay: 359.745 ms
Loss rate: 14.81%
```

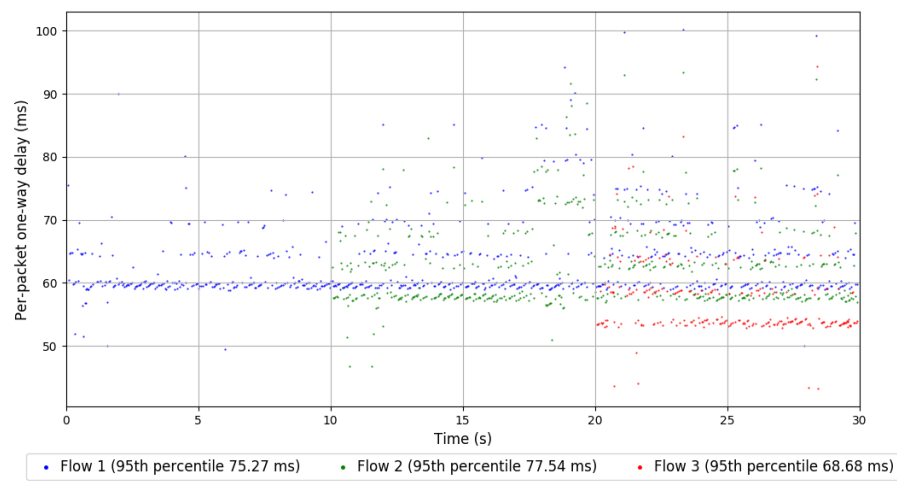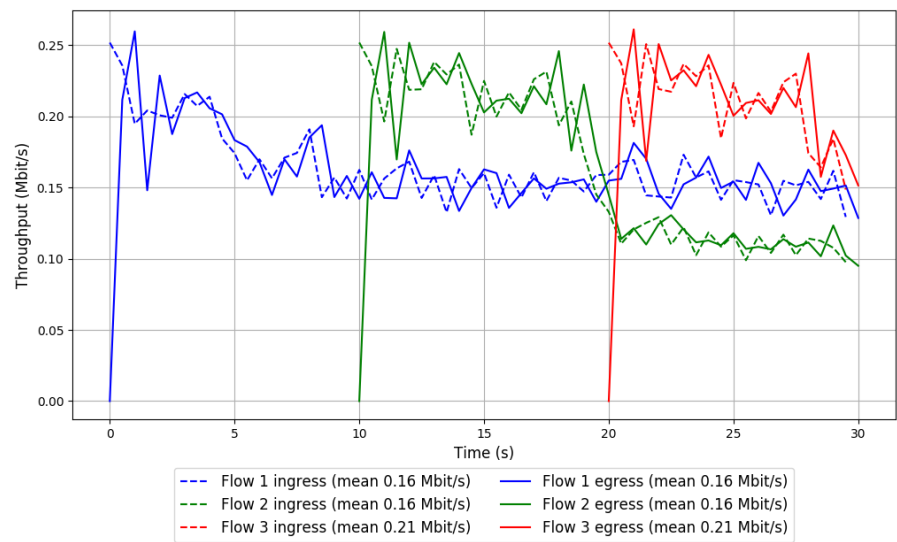Run 3: Report of QUIC Cubic — Data Link

```
Run 1: Statistics of SCReAM

Start at: 2018-09-06 17:52:03
End at: 2018-09-06 17:52:33
Local clock offset: 2.367 ms
Remote clock offset: -6.639 ms

# Below is generated by plot.py at 2018-09-06 18:39:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 94.720 ms
Loss rate: 0.40%
-- Flow 1:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 89.715 ms
Loss rate: 1.03%
-- Flow 2:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 94.713 ms
Loss rate: 0.08%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 114.832 ms
Loss rate: -0.16%
```
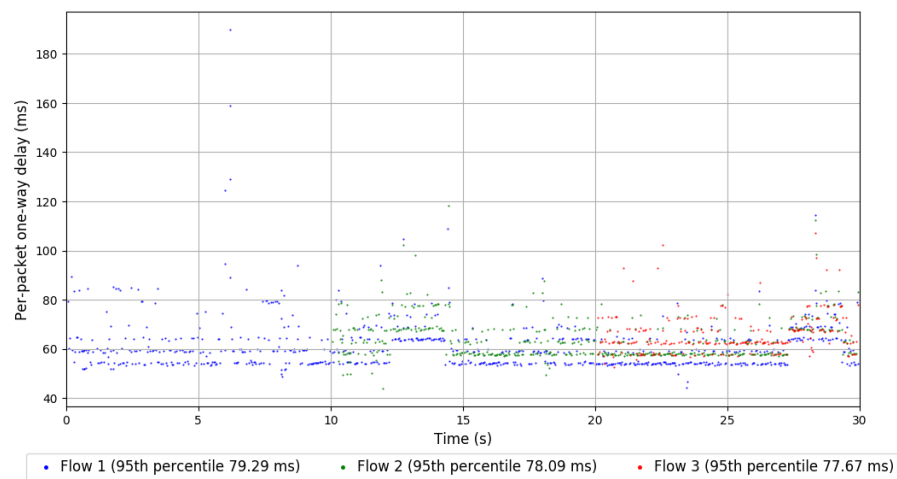
Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2018-09-06 18:12:07
End at: 2018-09-06 18:12:37
Local clock offset: -1.246 ms
Remote clock offset: -5.087 ms


# Below is generated by plot.py at 2018-09-06 18:39:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 74.976 ms
Loss rate: 0.57%
-- Flow 1:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 75.269 ms
Loss rate: 0.58%
-- Flow 2:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 77.539 ms
Loss rate: 0.63%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 68.681 ms
Loss rate: 0.47%
```
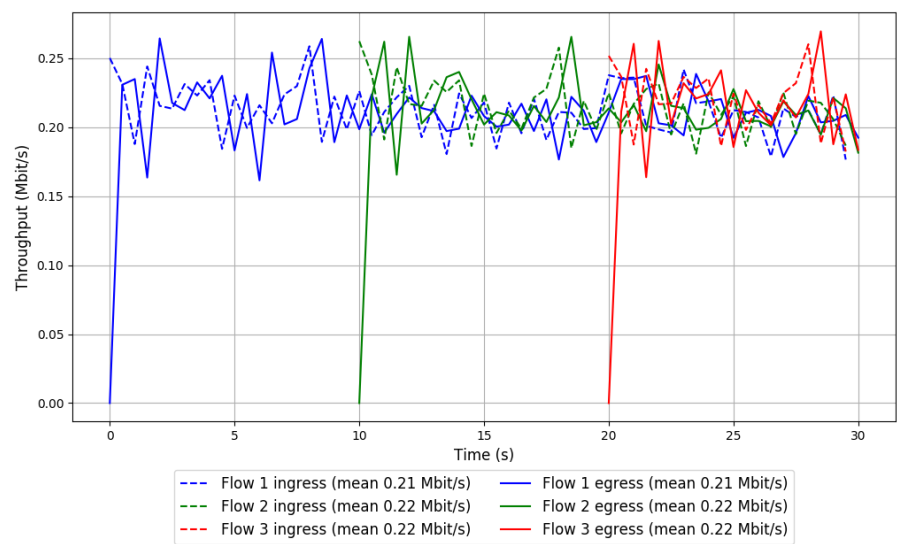
Run 2: Report of SCReAM — Data Link

```
Run 3: Statistics of SCReAM

Start at: 2018-09-06 18:32:13
End at: 2018-09-06 18:32:43
Local clock offset: 0.446 ms
Remote clock offset: -4.854 ms


# Below is generated by plot.py at 2018-09-06 18:39:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 78.654 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 79.291 ms
Loss rate: 0.12%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 78.091 ms
Loss rate: 0.39%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 77.669 ms
Loss rate: 0.70%
```
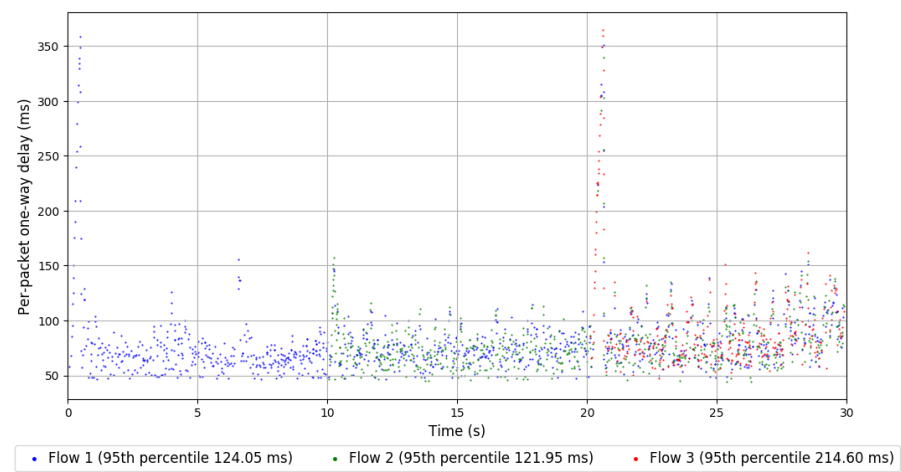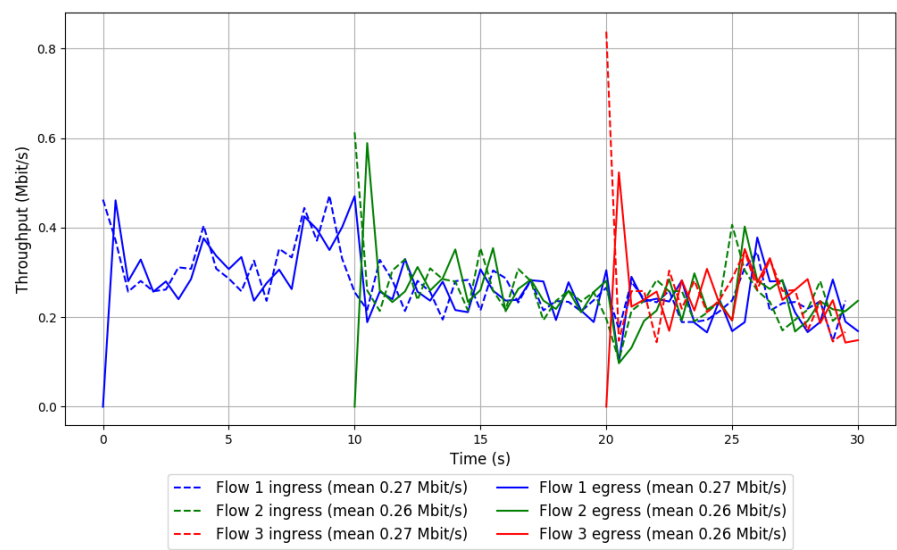
Run 3: Report of SCReAM — Data Link

```
Run 1: Statistics of Sprout

Start at: 2018-09-06 17:50:56
End at: 2018-09-06 17:51:26
Local clock offset: 2.155 ms
Remote clock offset: -5.048 ms


# Below is generated by plot.py at 2018-09-06 18:39:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 131.896 ms
Loss rate: 1.97%
-- Flow 1:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 124.054 ms
Loss rate: 1.45%
-- Flow 2:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 121.946 ms
Loss rate: 1.31%
-- Flow 3:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 214.603 ms
Loss rate: 4.81%
```
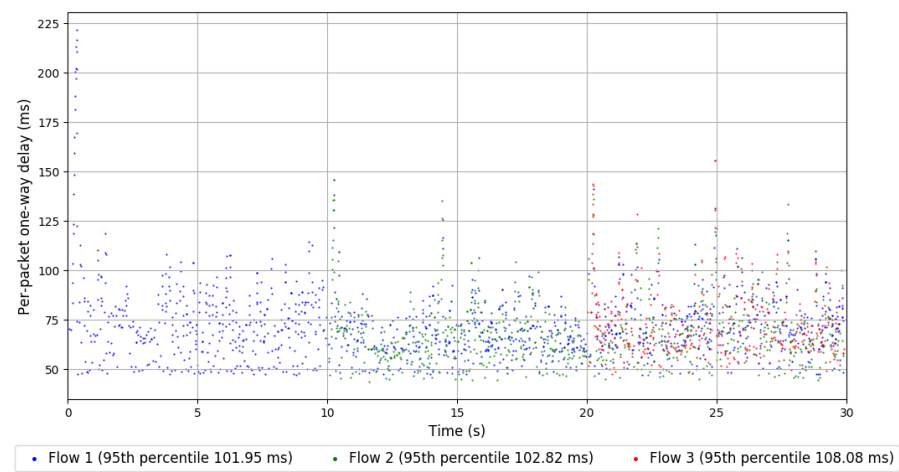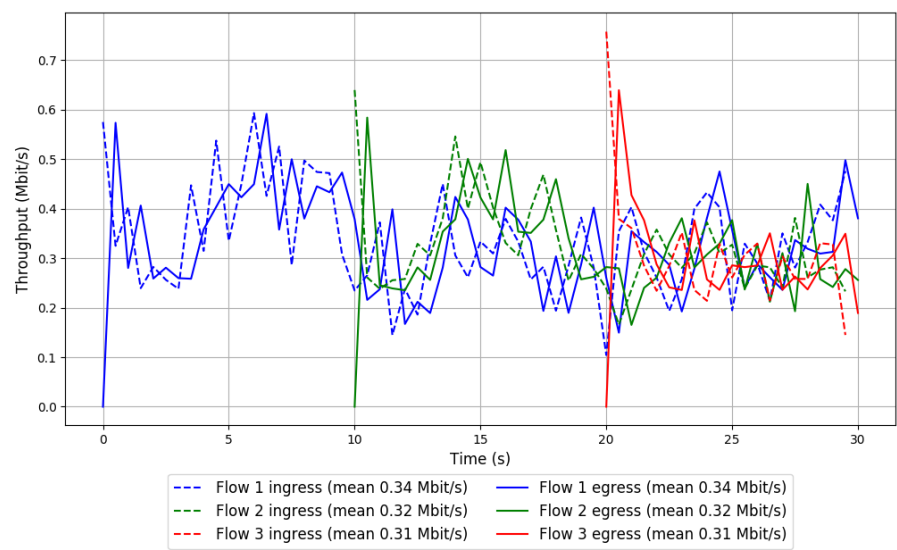
Run 1: Report of Sprout — Data Link

```
Run 2: Statistics of Sprout

Start at: 2018-09-06 18:11:01
End at: 2018-09-06 18:11:31
Local clock offset: 0.157 ms
Remote clock offset: -5.877 ms

# Below is generated by plot.py at 2018-09-06 18:39:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 103.638 ms
Loss rate: 0.66%
-- Flow 1:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 101.954 ms
Loss rate: 0.60%
-- Flow 2:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 102.824 ms
Loss rate: 0.89%
-- Flow 3:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 108.075 ms
Loss rate: 0.41%
```
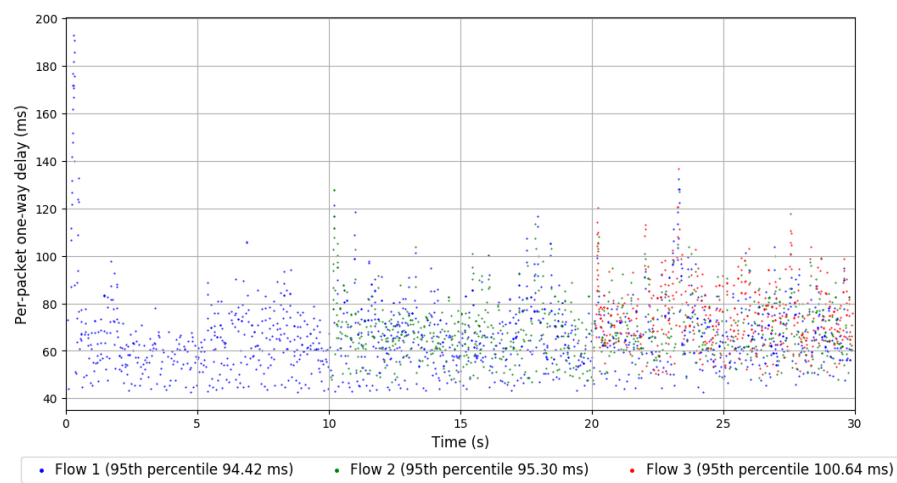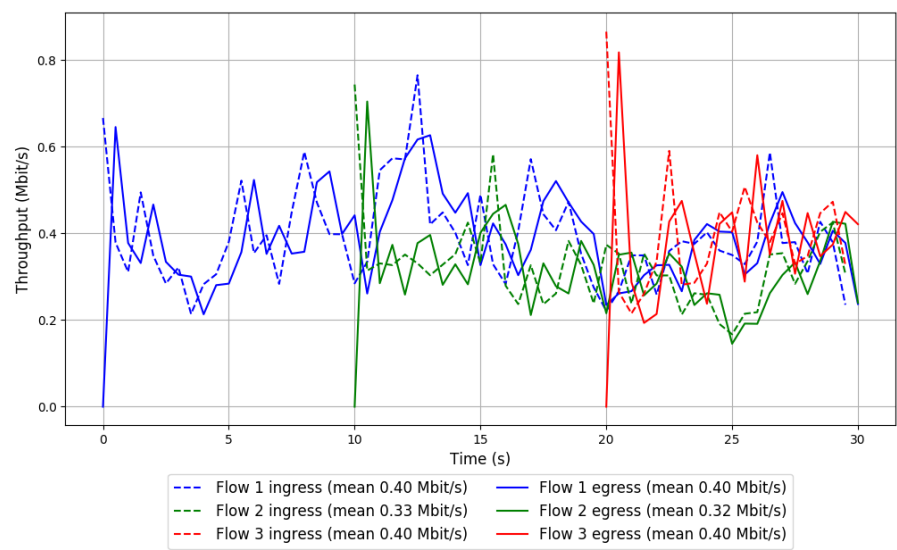
Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2018-09-06 18:31:05
End at: 2018-09-06 18:31:35
Local clock offset: 2.283 ms
Remote clock offset: -5.711 ms


# Below is generated by plot.py at 2018-09-06 18:39:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.74 Mbit/s
95th percentile per-packet one-way delay: 96.751 ms
Loss rate: 0.53%
-- Flow 1:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 94.421 ms
Loss rate: 0.19%
-- Flow 2:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 95.301 ms
Loss rate: 1.09%
-- Flow 3:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 100.640 ms
Loss rate: 0.60%
```

Run 3: Report of Sprout — Data Link

Flow 1 ingress (mean 0.40 Mbit/s)   Flow 1 egress (mean 0.40 Mbit/s)
Flow 2 ingress (mean 0.33 Mbit/s)   Flow 2 egress (mean 0.32 Mbit/s)
Flow 3 ingress (mean 0.40 Mbit/s)   Flow 3 egress (mean 0.40 Mbit/s)

Flow 1 (95th percentile 94.42 ms)   Flow 2 (95th percentile 95.30 ms)   Flow 3 (95th percentile 100.64 ms)
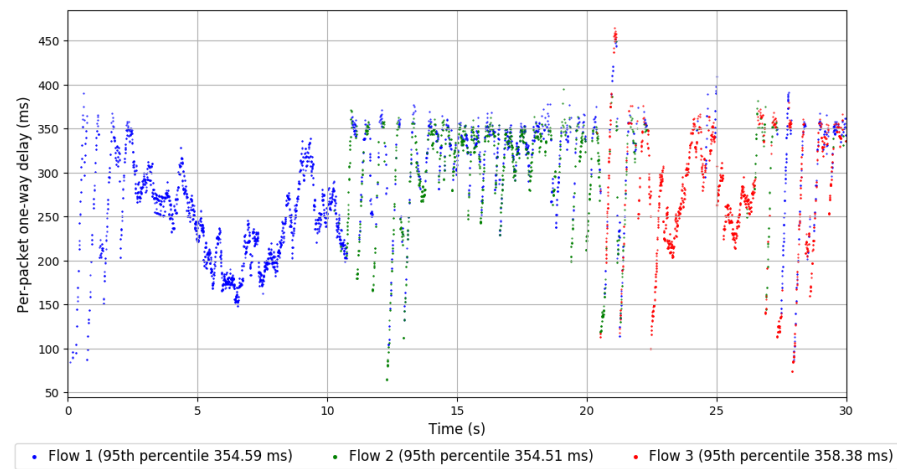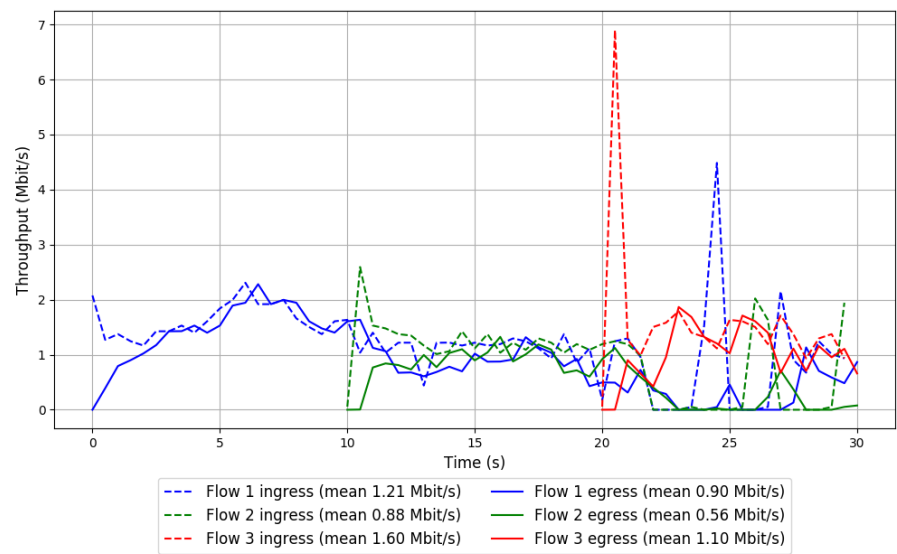
```
Run 1: Statistics of TaoVA-100x

Start at: 2018-09-06 17:38:37
End at: 2018-09-06 17:39:07
Local clock offset: 2.357 ms
Remote clock offset: -7.023 ms


# Below is generated by plot.py at 2018-09-06 18:39:02
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.62 Mbit/s
95th percentile per-packet one-way delay: 355.439 ms
Loss rate: 30.13%
-- Flow 1:
Average throughput: 0.90 Mbit/s
95th percentile per-packet one-way delay: 354.590 ms
Loss rate: 25.47%
-- Flow 2:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 354.506 ms
Loss rate: 37.28%
-- Flow 3:
Average throughput: 1.10 Mbit/s
95th percentile per-packet one-way delay: 358.375 ms
Loss rate: 32.87%
```

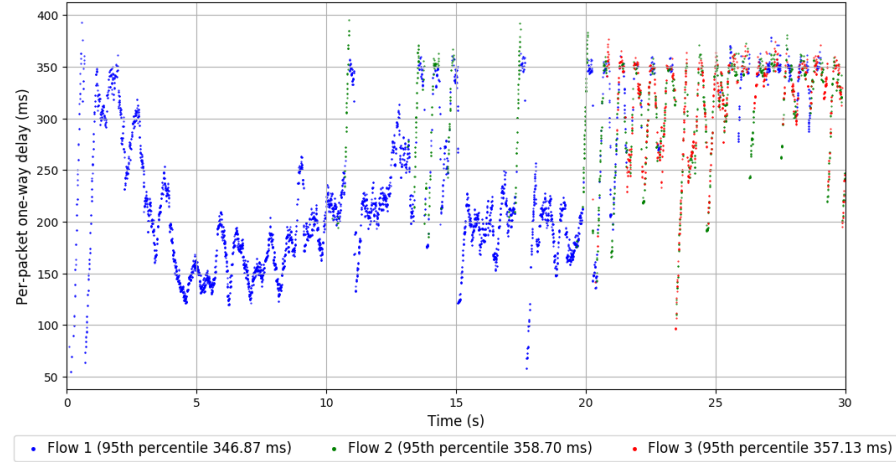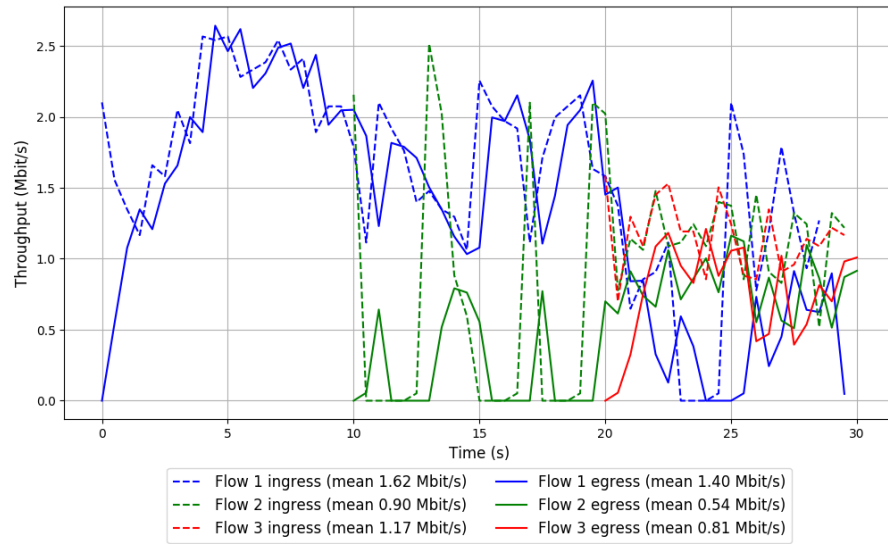Run 1: Report of TaoVA-100x — Data Link

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

Start at: 2018-09-06 17:58:44
End at: 2018-09-06 17:59:14
Local clock offset: 2.089 ms
Remote clock offset: -5.433 ms


# Below is generated by plot.py at 2018-09-06 18:39:03
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.98 Mbit/s
95th percentile per-packet one-way delay: 351.865 ms
Loss rate: 22.47%
-- Flow 1:
Average throughput: 1.40 Mbit/s
95th percentile per-packet one-way delay: 346.870 ms
Loss rate: 12.84%
-- Flow 2:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 358.702 ms
Loss rate: 41.17%
-- Flow 3:
Average throughput: 0.81 Mbit/s
95th percentile per-packet one-way delay: 357.127 ms
Loss rate: 32.11%
```

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

- Flow 1 ingress (mean 1.62 Mbit/s)
- Flow 1 egress (mean 1.40 Mbit/s)
- Flow 2 ingress (mean 0.90 Mbit/s)
- Flow 2 egress (mean 0.54 Mbit/s)
- Flow 3 ingress (mean 1.17 Mbit/s)
- Flow 3 egress (mean 0.81 Mbit/s)

- Flow 1 (95th percentile 346.87 ms)
- Flow 2 (95th percentile 358.70 ms)
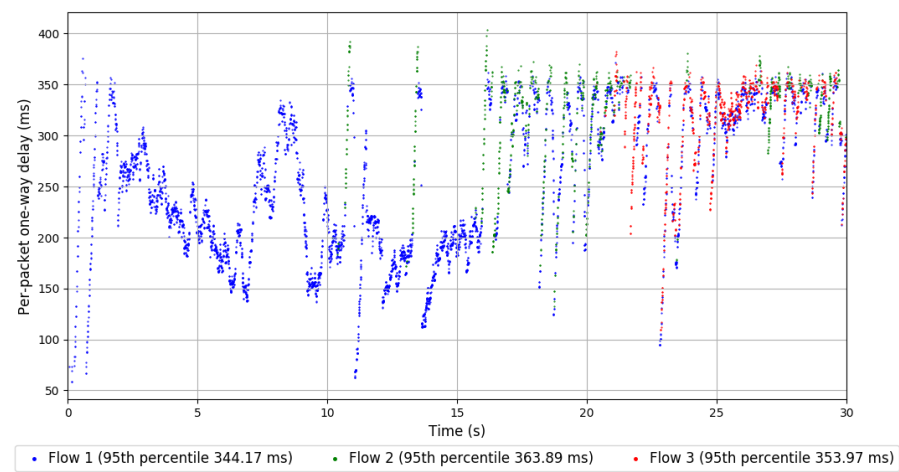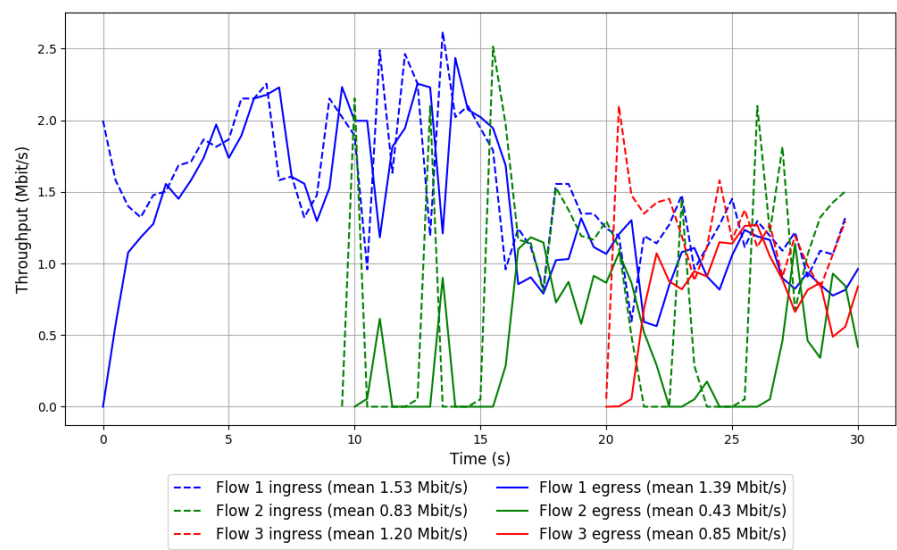- Flow 3 (95th percentile 357.13 ms)

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

Start at: 2018-09-06 18:18:48
End at: 2018-09-06 18:19:18
Local clock offset: -1.71 ms
Remote clock offset: -5.293 ms


# Below is generated by plot.py at 2018-09-06 18:39:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.94 Mbit/s
95th percentile per-packet one-way delay: 351.434 ms
Loss rate: 21.76%
-- Flow 1:
Average throughput: 1.39 Mbit/s
95th percentile per-packet one-way delay: 344.165 ms
Loss rate: 9.44%
-- Flow 2:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 363.893 ms
Loss rate: 48.96%
-- Flow 3:
Average throughput: 0.85 Mbit/s
95th percentile per-packet one-way delay: 353.972 ms
Loss rate: 31.38%
```
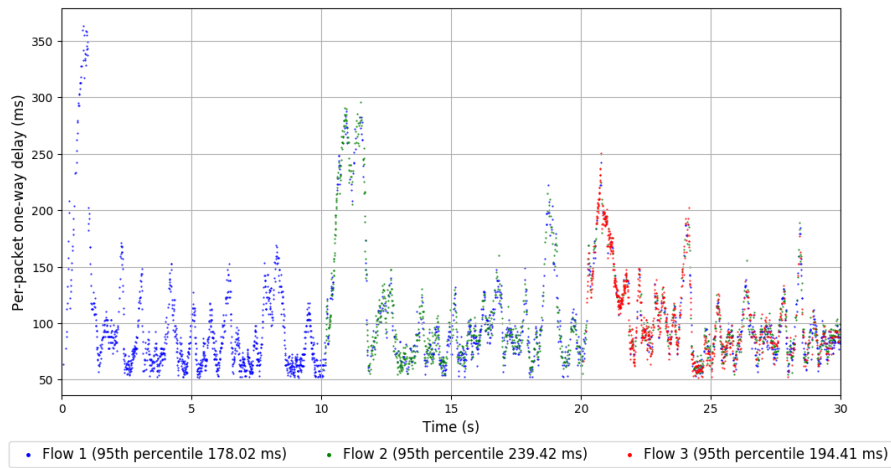
Run 3: Report of TaoVA-100x — Data Link

Flow 1 ingress (mean 1.53 Mbit/s) --- Flow 1 egress (mean 1.39 Mbit/s)
Flow 2 ingress (mean 0.83 Mbit/s) --- Flow 2 egress (mean 0.43 Mbit/s)
Flow 3 ingress (mean 1.20 Mbit/s) --- Flow 3 egress (mean 0.85 Mbit/s)

Flow 1 (95th percentile 344.17 ms) · Flow 2 (95th percentile 363.89 ms) · Flow 3 (95th percentile 353.97 ms)
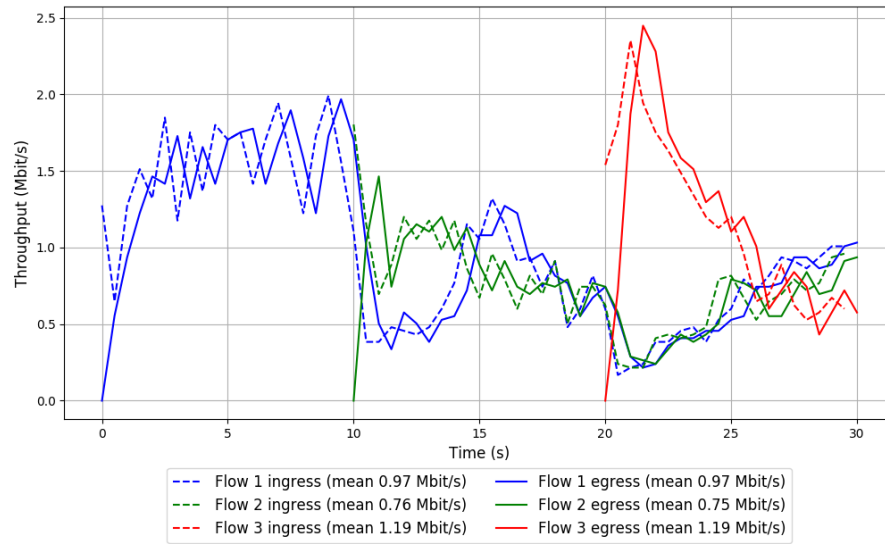
87

```
Run 1: Statistics of TCP Vegas

Start at: 2018-09-06 17:57:37
End at: 2018-09-06 17:58:07
Local clock offset: -0.497 ms
Remote clock offset: -6.145 ms


# Below is generated by plot.py at 2018-09-06 18:39:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.85 Mbit/s
95th percentile per-packet one-way delay: 197.998 ms
Loss rate: 0.94%
-- Flow 1:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 178.018 ms
Loss rate: 0.78%
-- Flow 2:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 239.419 ms
Loss rate: 1.27%
-- Flow 3:
Average throughput: 1.19 Mbit/s
95th percentile per-packet one-way delay: 194.408 ms
Loss rate: 0.92%
```
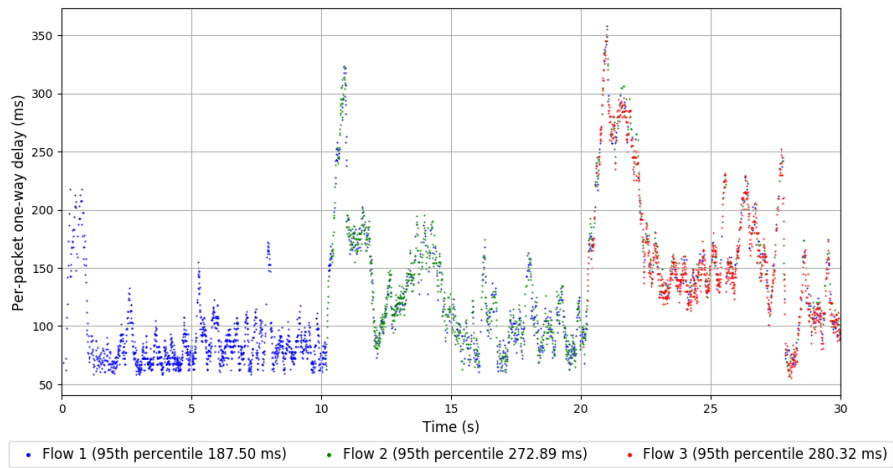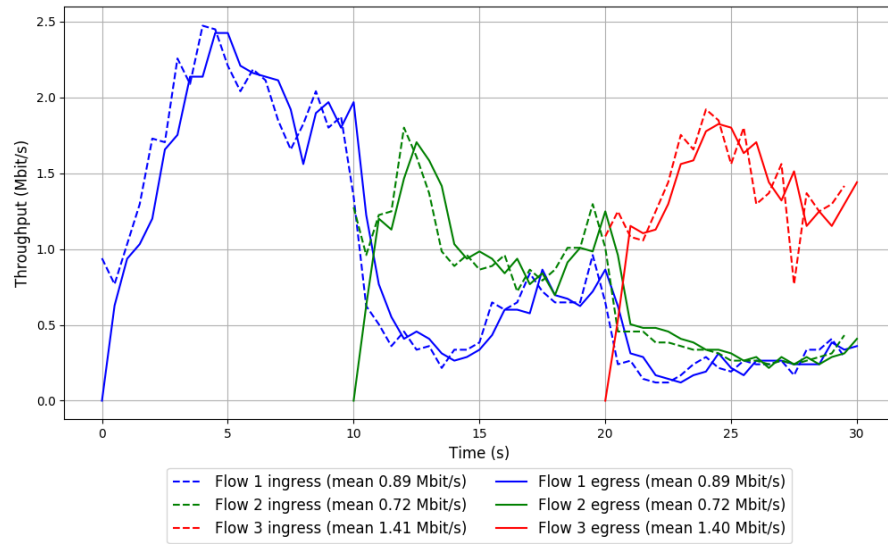
Run 1: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 0.97 Mbit/s) Flow 1 egress (mean 0.97 Mbit/s)
Flow 2 ingress (mean 0.76 Mbit/s) Flow 2 egress (mean 0.75 Mbit/s)
Flow 3 ingress (mean 1.19 Mbit/s) Flow 3 egress (mean 1.19 Mbit/s)

Flow 1 (95th percentile 178.02 ms)   Flow 2 (95th percentile 239.42 ms)   Flow 3 (95th percentile 194.41 ms)

```
Run 2: Statistics of TCP Vegas

Start at: 2018-09-06 18:17:41
End at: 2018-09-06 18:18:11
Local clock offset: 1.292 ms
Remote clock offset: -5.063 ms


# Below is generated by plot.py at 2018-09-06 18:39:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.83 Mbit/s
95th percentile per-packet one-way delay: 258.098 ms
Loss rate: 0.57%
-- Flow 1:
Average throughput: 0.89 Mbit/s
95th percentile per-packet one-way delay: 187.498 ms
Loss rate: 0.18%
-- Flow 2:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 272.893 ms
Loss rate: 0.58%
-- Flow 3:
Average throughput: 1.40 Mbit/s
95th percentile per-packet one-way delay: 280.320 ms
Loss rate: 1.29%
```

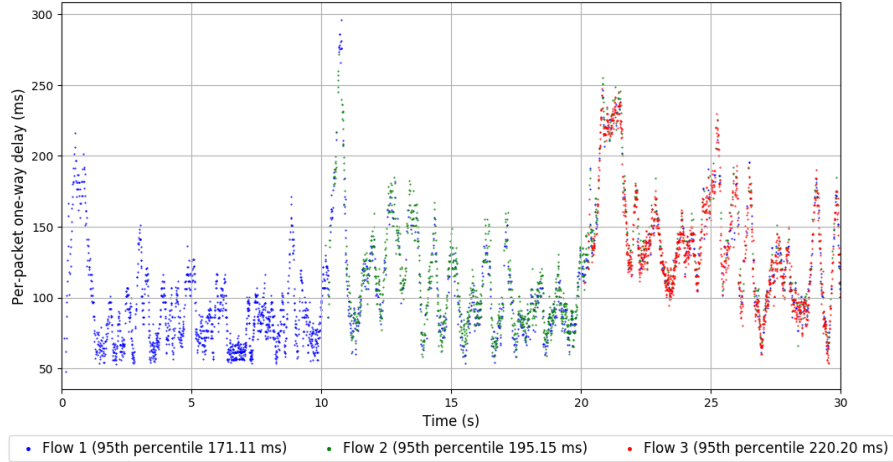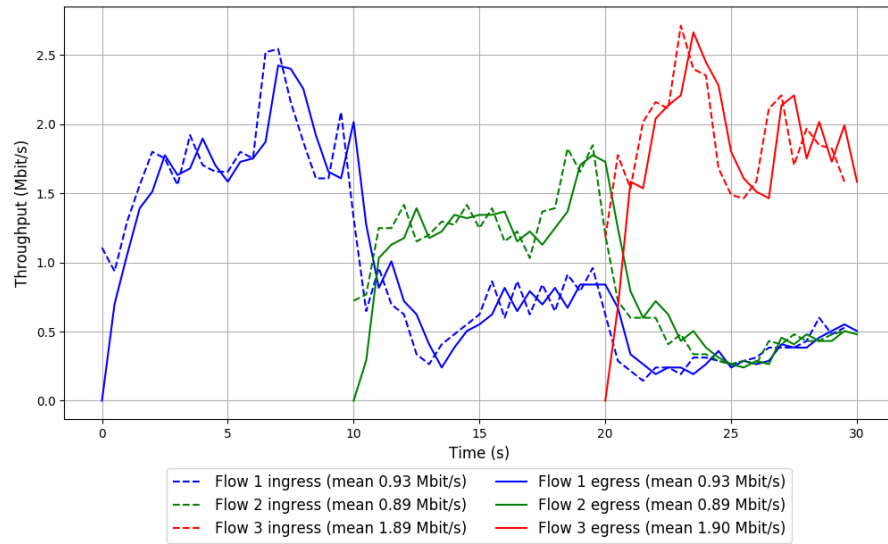Run 2: Report of TCP Vegas — Data Link

```
Run 3: Statistics of TCP Vegas

Start at: 2018-09-06 18:37:46
End at: 2018-09-06 18:38:16
Local clock offset: 0.836 ms
Remote clock offset: -4.153 ms


# Below is generated by plot.py at 2018-09-06 18:39:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.15 Mbit/s
95th percentile per-packet one-way delay: 192.261 ms
Loss rate: 0.43%
-- Flow 1:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 171.107 ms
Loss rate: 0.21%
-- Flow 2:
Average throughput: 0.89 Mbit/s
95th percentile per-packet one-way delay: 195.149 ms
Loss rate: 0.27%
-- Flow 3:
Average throughput: 1.90 Mbit/s
95th percentile per-packet one-way delay: 220.197 ms
Loss rate: 0.89%
```
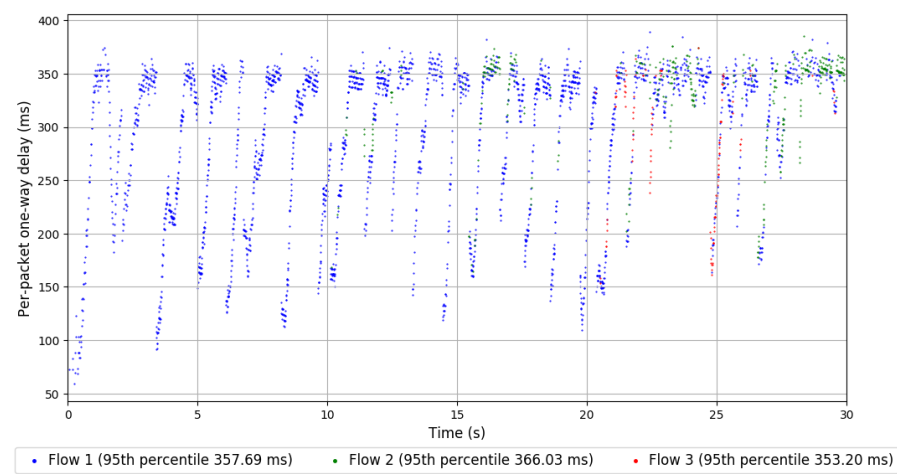
Run 3: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 0.93 Mbit/s)   Flow 1 egress (mean 0.93 Mbit/s)
Flow 2 ingress (mean 0.89 Mbit/s)   Flow 2 egress (mean 0.89 Mbit/s)
Flow 3 ingress (mean 1.89 Mbit/s)   Flow 3 egress (mean 1.90 Mbit/s)

Flow 1 (95th percentile 171.11 ms)   Flow 2 (95th percentile 195.15 ms)   Flow 3 (95th percentile 220.20 ms)
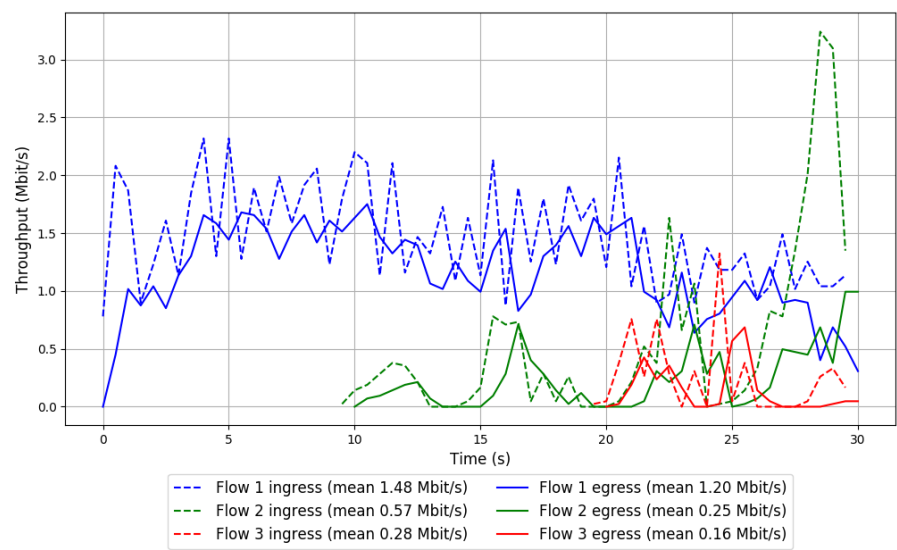
```
Run 1: Statistics of Verus

Start at: 2018-09-06 17:41:58
End at: 2018-09-06 17:42:28
Local clock offset: 1.329 ms
Remote clock offset: -6.119 ms


# Below is generated by plot.py at 2018-09-06 18:39:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 359.902 ms
Loss rate: 27.83%
-- Flow 1:
Average throughput: 1.20 Mbit/s
95th percentile per-packet one-way delay: 357.686 ms
Loss rate: 19.76%
-- Flow 2:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 366.031 ms
Loss rate: 55.71%
-- Flow 3:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 353.200 ms
Loss rate: 44.49%
```

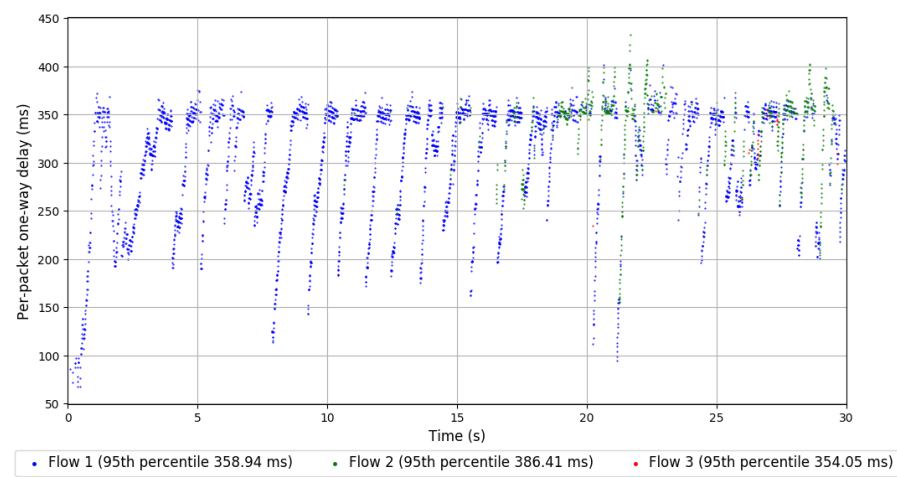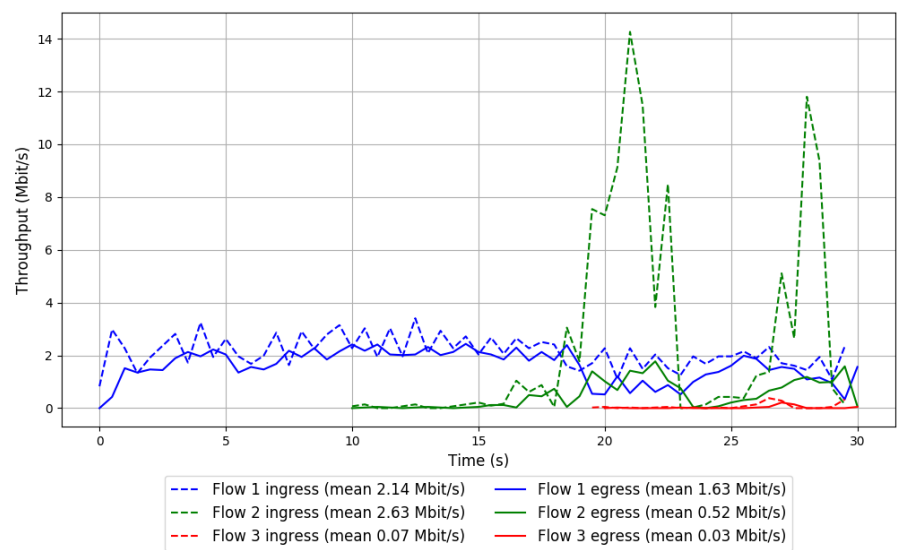Run 1: Report of Verus — Data Link

```
Run 2: Statistics of Verus

Start at: 2018-09-06 18:02:04
End at: 2018-09-06 18:02:34
Local clock offset: -1.9 ms
Remote clock offset: -12.82 ms


# Below is generated by plot.py at 2018-09-06 18:39:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.98 Mbit/s
95th percentile per-packet one-way delay: 363.121 ms
Loss rate: 49.40%
-- Flow 1:
Average throughput: 1.63 Mbit/s
95th percentile per-packet one-way delay: 358.940 ms
Loss rate: 23.95%
-- Flow 2:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 386.411 ms
Loss rate: 80.44%
-- Flow 3:
Average throughput: 0.03 Mbit/s
95th percentile per-packet one-way delay: 354.047 ms
Loss rate: 64.52%
```

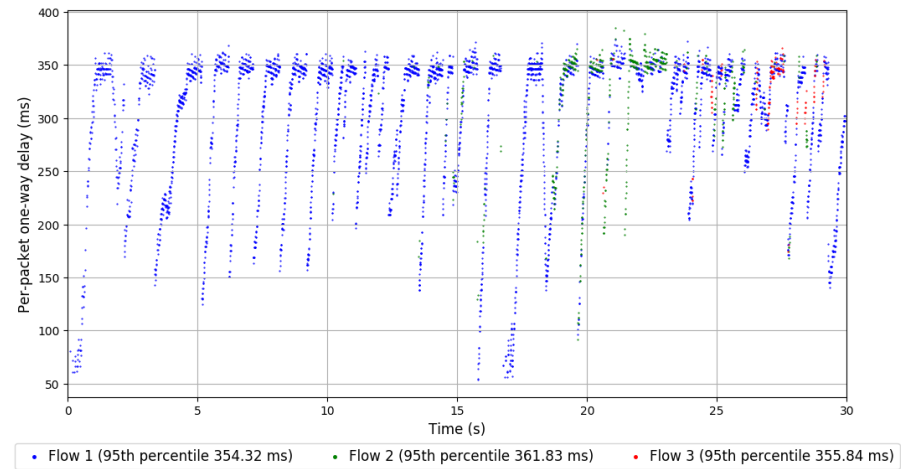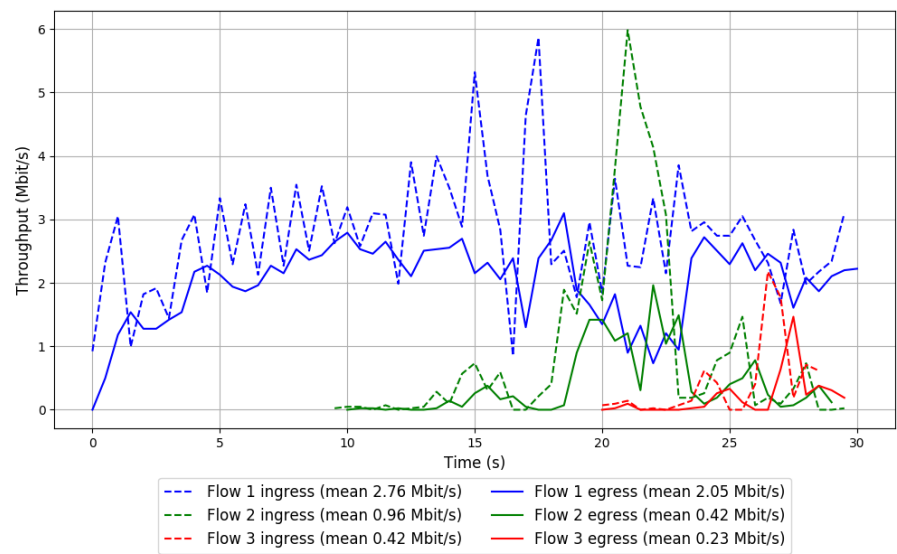Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2018-09-06 18:22:09
End at: 2018-09-06 18:22:39
Local clock offset: -0.742 ms
Remote clock offset: -4.885 ms


# Below is generated by plot.py at 2018-09-06 18:39:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 355.480 ms
Loss rate: 32.70%
-- Flow 1:
Average throughput: 2.05 Mbit/s
95th percentile per-packet one-way delay: 354.320 ms
Loss rate: 26.00%
-- Flow 2:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 361.835 ms
Loss rate: 59.37%
-- Flow 3:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 355.837 ms
Loss rate: 44.76%
```
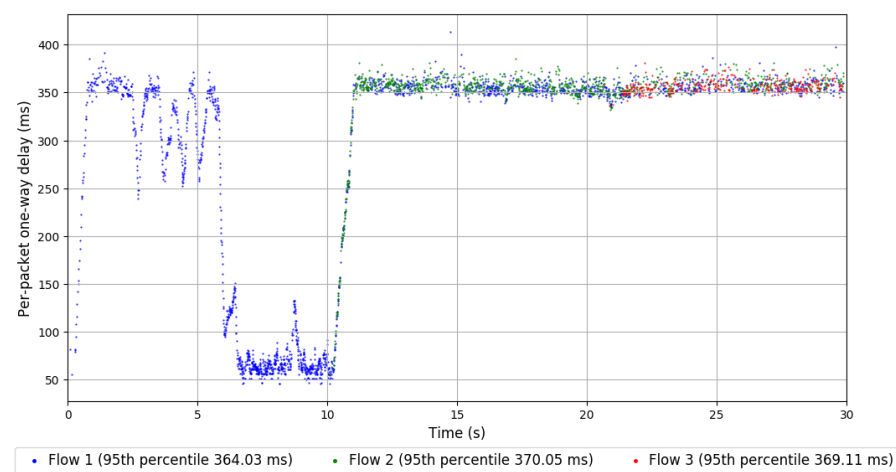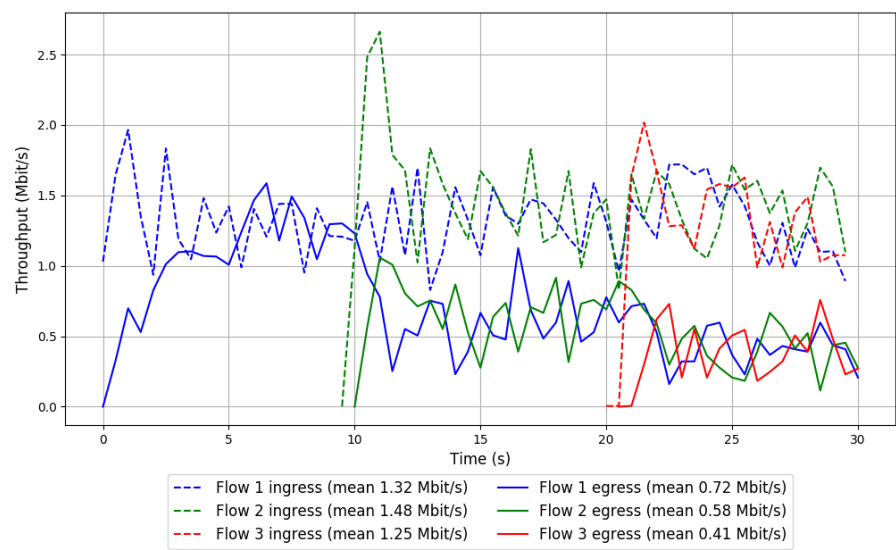
Run 3: Report of Verus — Data Link

```
Run 1: Statistics of PCC-Vivace

Start at: 2018-09-06 17:40:51
End at: 2018-09-06 17:41:21
Local clock offset: 4.076 ms
Remote clock offset: -5.997 ms


# Below is generated by plot.py at 2018-09-06 18:39:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 366.767 ms
Loss rate: 54.70%
-- Flow 1:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 364.031 ms
Loss rate: 45.35%
-- Flow 2:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 370.050 ms
Loss rate: 60.97%
-- Flow 3:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 369.106 ms
Loss rate: 69.70%
```

Run 1: Report of PCC-Vivace — Data Link

Flow 1 ingress (mean 1.32 Mbit/s) Flow 1 egress (mean 0.72 Mbit/s)
Flow 2 ingress (mean 1.48 Mbit/s) Flow 2 egress (mean 0.58 Mbit/s)
Flow 3 ingress (mean 1.25 Mbit/s) Flow 3 egress (mean 0.41 Mbit/s)

Flow 1 (95th percentile 364.03 ms) Flow 2 (95th percentile 370.05 ms) Flow 3 (95th percentile 369.11 ms)
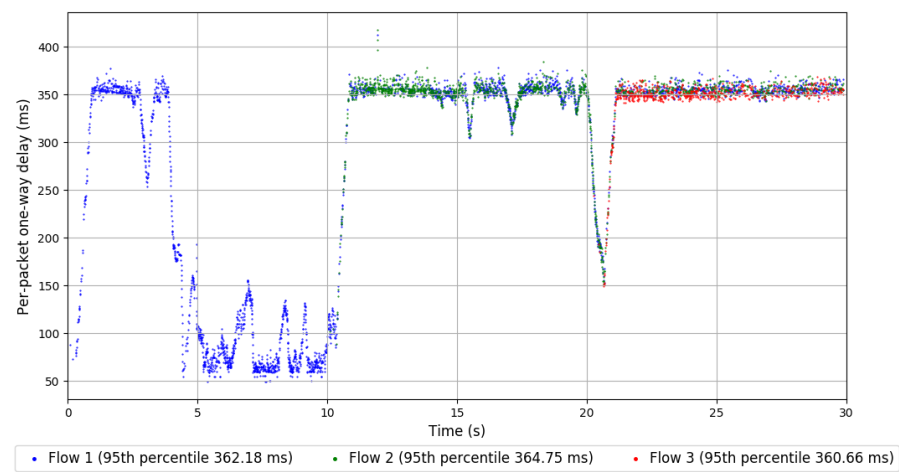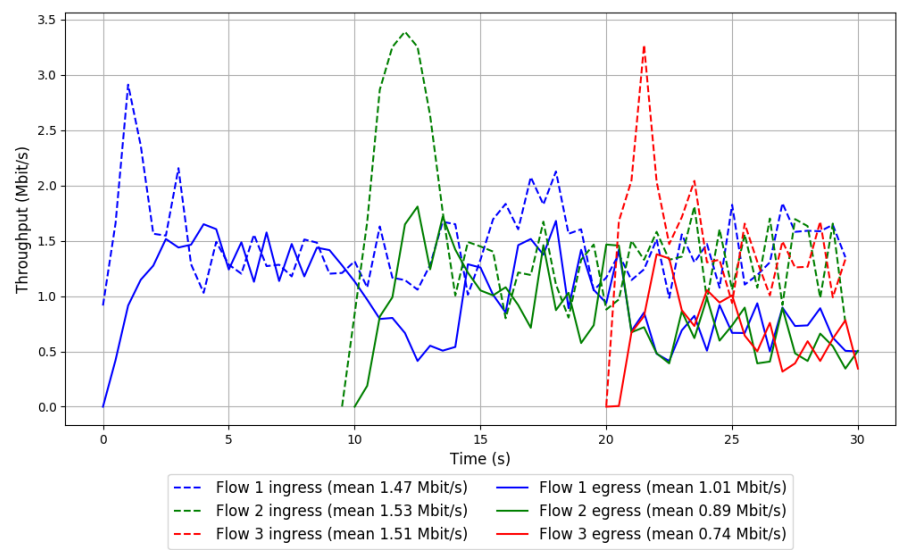
```
Run 2: Statistics of PCC-Vivace

Start at: 2018-09-06 18:00:57
End at: 2018-09-06 18:01:27
Local clock offset: 2.24 ms
Remote clock offset: -6.443 ms


# Below is generated by plot.py at 2018-09-06 18:39:09
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.84 Mbit/s
95th percentile per-packet one-way delay: 362.975 ms
Loss rate: 38.62%
-- Flow 1:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 362.176 ms
Loss rate: 31.19%
-- Flow 2:
Average throughput: 0.89 Mbit/s
95th percentile per-packet one-way delay: 364.749 ms
Loss rate: 42.55%
-- Flow 3:
Average throughput: 0.74 Mbit/s
95th percentile per-packet one-way delay: 360.657 ms
Loss rate: 52.46%
```

Run 2: Report of PCC-Vivace — Data Link

Flow 1 ingress (mean 1.47 Mbit/s) --- Flow 1 egress (mean 1.01 Mbit/s)
Flow 2 ingress (mean 1.53 Mbit/s) --- Flow 2 egress (mean 0.89 Mbit/s)
Flow 3 ingress (mean 1.51 Mbit/s) --- Flow 3 egress (mean 0.74 Mbit/s)

Flow 1 (95th percentile 362.18 ms)   Flow 2 (95th percentile 364.75 ms)   Flow 3 (95th percentile 360.66 ms)
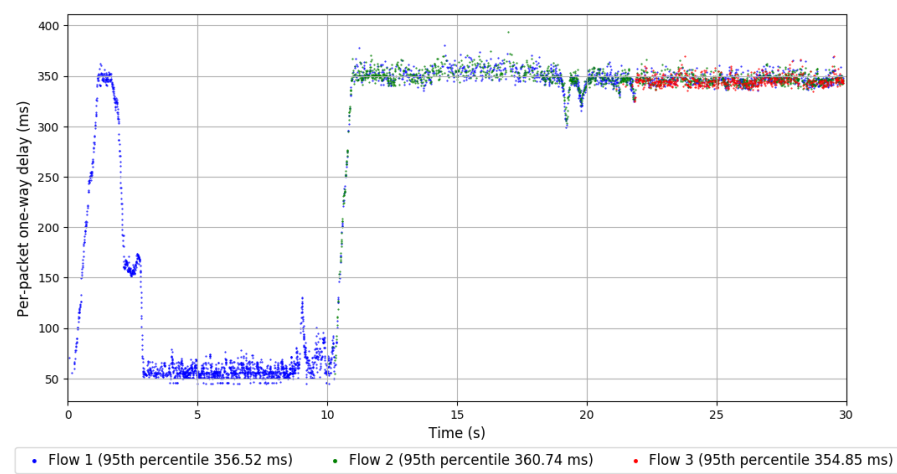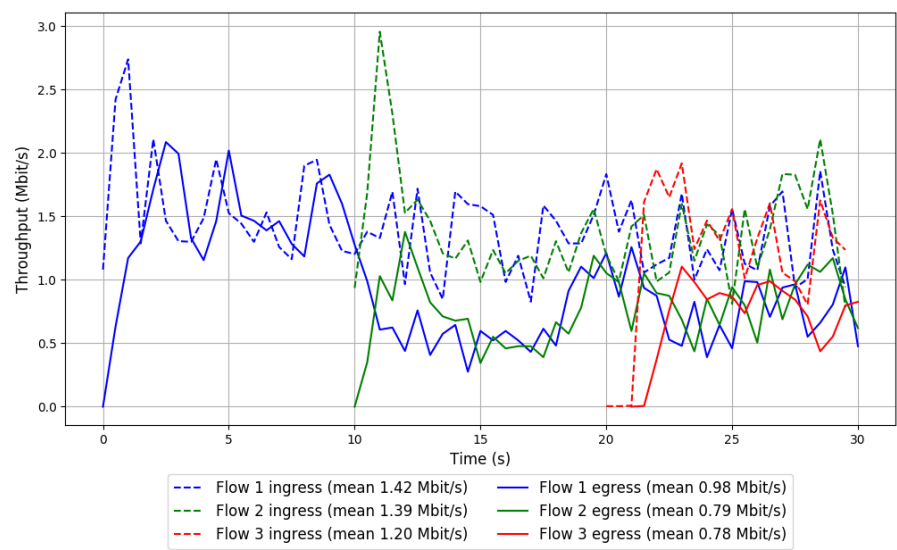
103

```
Run 3: Statistics of PCC-Vivace

Start at: 2018-09-06 18:21:02
End at: 2018-09-06 18:21:32
Local clock offset: -2.567 ms
Remote clock offset: -5.466 ms


# Below is generated by plot.py at 2018-09-06 18:39:09
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 357.987 ms
Loss rate: 36.87%
-- Flow 1:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 356.525 ms
Loss rate: 31.14%
-- Flow 2:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 360.735 ms
Loss rate: 43.26%
-- Flow 3:
Average throughput: 0.78 Mbit/s
95th percentile per-packet one-way delay: 354.851 ms
Loss rate: 42.45%
```

Run 3: Report of PCC-Vivace — Data Link

Flow 1 ingress (mean 1.42 Mbit/s)   Flow 1 egress (mean 0.98 Mbit/s)
Flow 2 ingress (mean 1.39 Mbit/s)   Flow 2 egress (mean 0.79 Mbit/s)
Flow 3 ingress (mean 1.20 Mbit/s)   Flow 3 egress (mean 0.78 Mbit/s)

Flow 1 (95th percentile 356.52 ms)   Flow 2 (95th percentile 360.74 ms)   Flow 3 (95th percentile 354.85 ms)
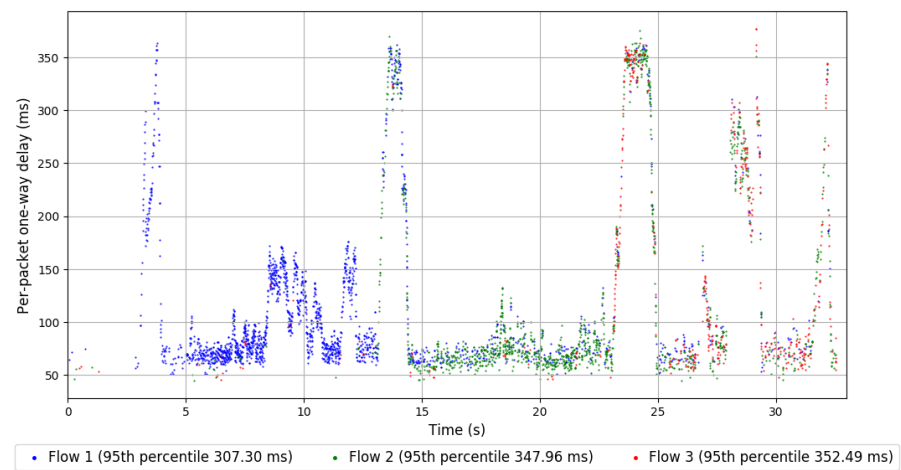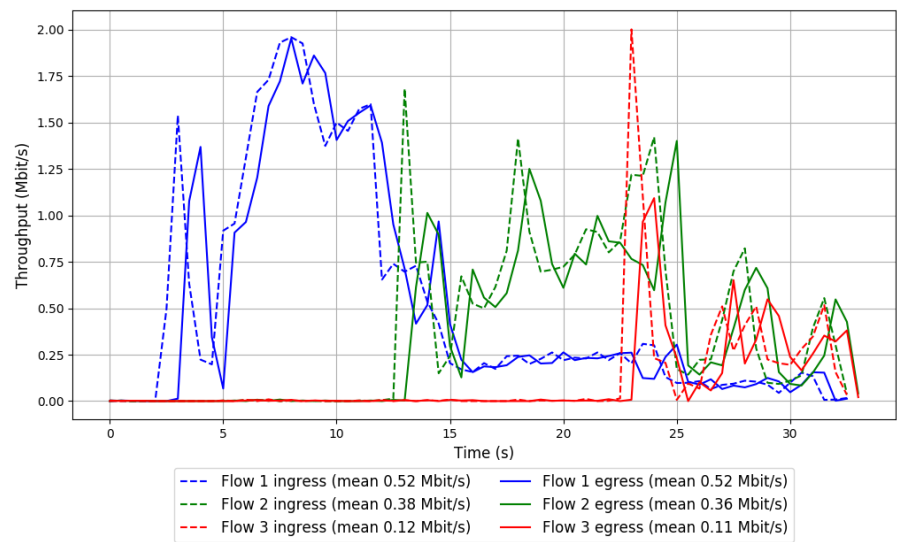
```
Run 1: Statistics of WebRTC media

Start at: 2018-09-06 17:54:17
End at: 2018-09-06 17:54:47
Local clock offset: 1.893 ms
Remote clock offset: -5.775 ms


# Below is generated by plot.py at 2018-09-06 18:39:09
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 342.004 ms
Loss rate: 3.97%
-- Flow 1:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 307.300 ms
Loss rate: 1.47%
-- Flow 2:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 347.960 ms
Loss rate: 5.42%
-- Flow 3:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 352.485 ms
Loss rate: 10.27%
```

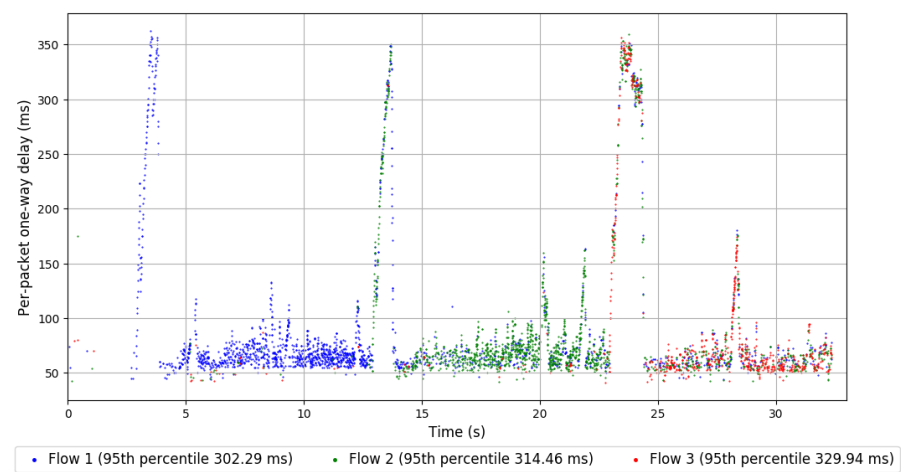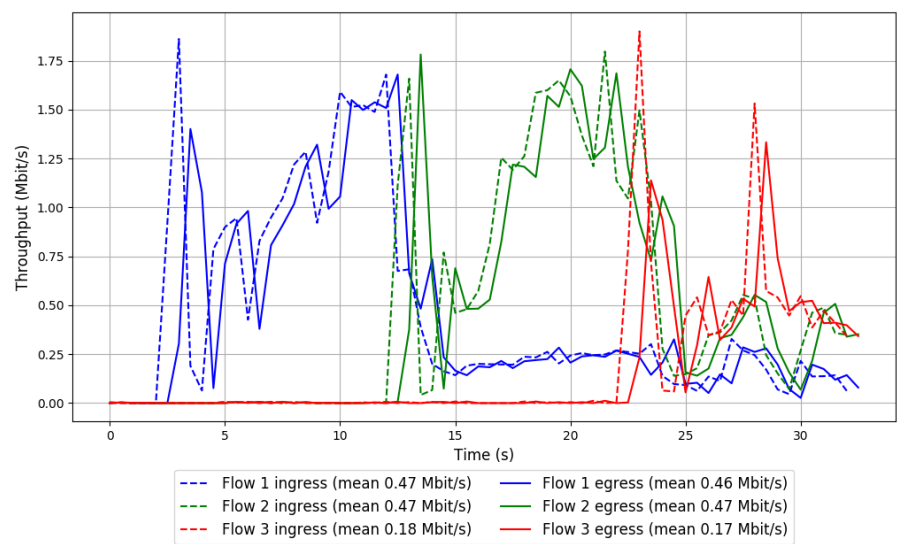Run 1: Report of WebRTC media — Data Link

```
Run 2: Statistics of WebRTC media

Start at: 2018-09-06 18:14:21
End at: 2018-09-06 18:14:51
Local clock offset: -2.195 ms
Remote clock offset: -5.073 ms


# Below is generated by plot.py at 2018-09-06 18:39:09
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 313.652 ms
Loss rate: 2.20%
-- Flow 1:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 302.293 ms
Loss rate: 0.91%
-- Flow 2:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 314.457 ms
Loss rate: 1.78%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 329.940 ms
Loss rate: 6.66%
```

Run 2: Report of WebRTC media — Data Link

```
Run 3: Statistics of WebRTC media

Start at: 2018-09-06 18:34:26
End at: 2018-09-06 18:34:56
Local clock offset: 2.529 ms
Remote clock offset: -4.476 ms


# Below is generated by plot.py at 2018-09-06 18:39:09
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.78 Mbit/s
95th percentile per-packet one-way delay: 327.198 ms
Loss rate: 3.50%
-- Flow 1:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 328.470 ms
Loss rate: 3.60%
-- Flow 2:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 325.740 ms
Loss rate: 2.54%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 332.164 ms
Loss rate: 5.02%
```

Run 3: Report of WebRTC media — Data Link