Pantheon Report

Generated at 2018-12-02 14:08:02 (UTC).

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

Repeated the test of 19 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.
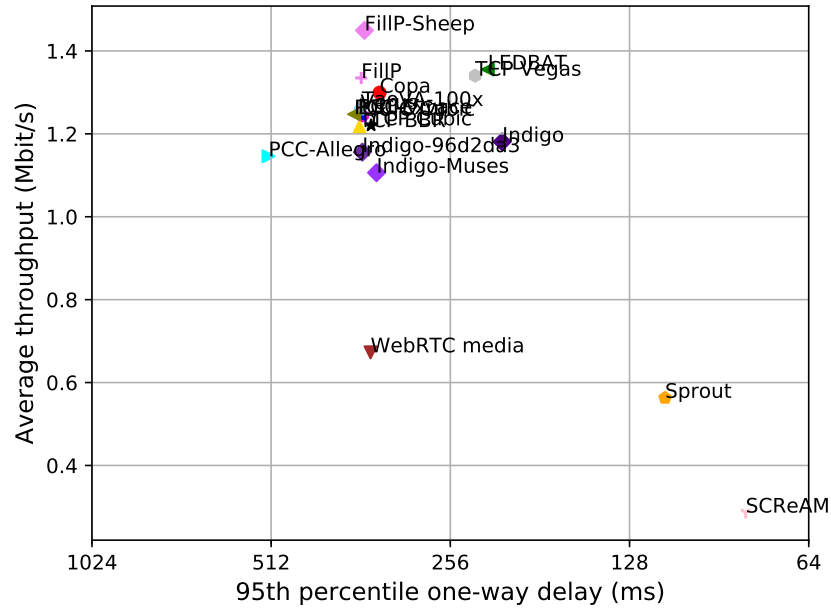
```
System info:
Linux 4.15.0-1027-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912

Git summary:
branch: muses @ 7b6dad87cde3ab65f7c4052140eb54098aa58e9d
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfe58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/indigo-96d2da3 @ 8413272d46f8aa0bcb967ed7048b6a8f994abb95
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ 65ac1b19bbefed0c6349ae986009b4fa8643c40a
third_party/pantheon-tunnel @ f866d3f58d27afd942717625ee3a354cc2e802bd
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
```
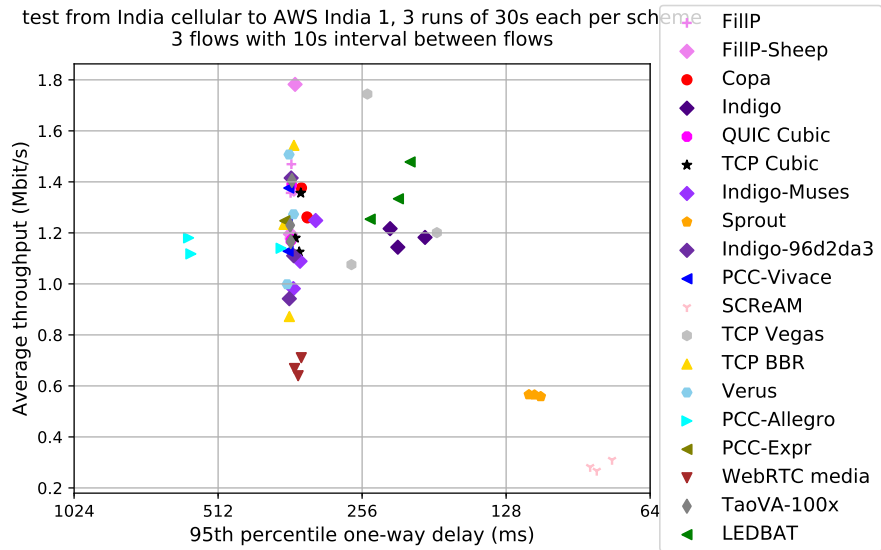
```
 M tools/plot.py
third_party/vivace @ 2baf86211435ae071a32f96b7d8c504587f5d7f4
third_party/webrtc @ 3f0cc2a9061a41b6f9dde4735770d143a1fa2851
```

test from 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
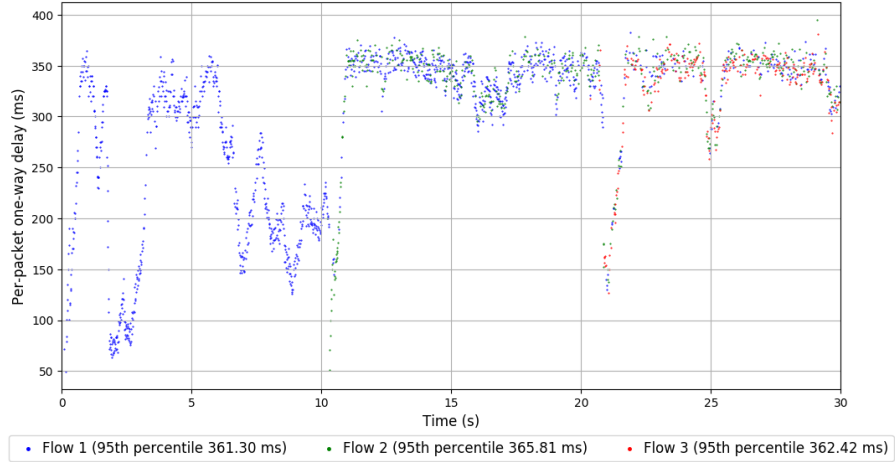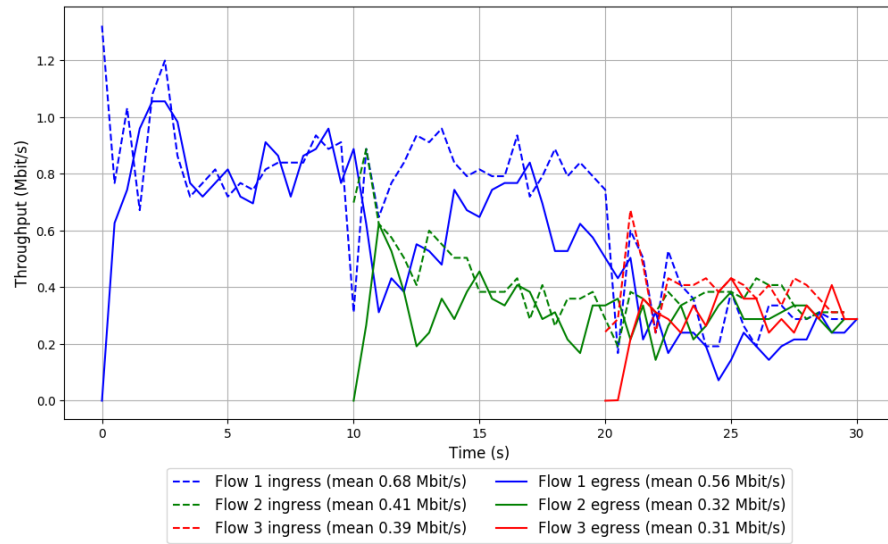3 flows with 10s interval between flows

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	0.77	0.52	0.33	357.60	368.65	360.06	11.48	18.00	22.38
Copa	3	0.81	0.50	0.50	322.48	340.86	353.06	1.71	3.27	10.11
TCP Cubic	3	0.74	0.48	0.52	343.68	349.25	350.17	3.05	4.83	8.80
FillP	3	0.84	0.58	0.36	359.88	362.86	362.50	27.00	43.41	63.50
FillP-Sheep	3	0.81	0.71	0.55	352.81	358.33	359.20	11.43	26.70	45.54
Indigo	3	0.62	0.49	0.73	195.85	226.98	216.49	1.28	2.34	3.41
Indigo-96d2da3	3	0.68	0.48	0.53	355.32	362.07	364.39	24.05	38.56	44.75
LEDBAT	3	0.73	0.60	0.69	204.89	236.93	225.60	0.77	1.14	2.87
Indigo-Muses	3	0.65	0.49	0.43	322.38	340.75	362.17	4.68	10.66	12.18
PCC-Allegro	3	0.73	0.52	0.30	370.49	693.25	623.00	67.65	90.87	91.83
PCC-Expr	1	1.25	0.00	0.00	371.44	346.28	348.89	89.63	84.62	92.31
QUIC Cubic	3	0.72	0.54	0.54	359.35	359.29	361.06	9.49	13.22	19.81
SCReAM	3	0.12	0.15	0.20	77.63	81.74	80.69	1.06	0.94	1.05
Sprout	3	0.29	0.28	0.27	108.31	110.63	119.74	0.87	0.88	2.89
TaoVA-100x	3	0.68	0.72	0.46	362.72	361.57	360.07	36.33	35.89	53.25
TCP Vegas	3	0.70	0.62	0.67	206.22	205.43	271.59	1.05	2.05	3.49
Verus	3	0.96	0.41	0.13	361.49	363.34	410.71	23.89	53.62	66.99
PCC-Vivace	3	0.76	0.61	0.29	361.55	366.46	361.79	43.90	56.33	74.82
WebRTC media	3	0.27	0.23	0.18	341.34	340.54	352.78	4.06	6.81	9.23

```
Run 1: Statistics of TCP BBR

Start at: 2018-12-02 13:17:20
End at: 2018-12-02 13:17:50
Local clock offset: 2.172 ms
Remote clock offset: -3.881 ms


# Below is generated by plot.py at 2018-12-02 14:07:17
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 363.300 ms
Loss rate: 19.43%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 361.299 ms
Loss rate: 17.24%
-- Flow 2:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 365.814 ms
Loss rate: 22.92%
-- Flow 3:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 362.422 ms
Loss rate: 23.52%
```
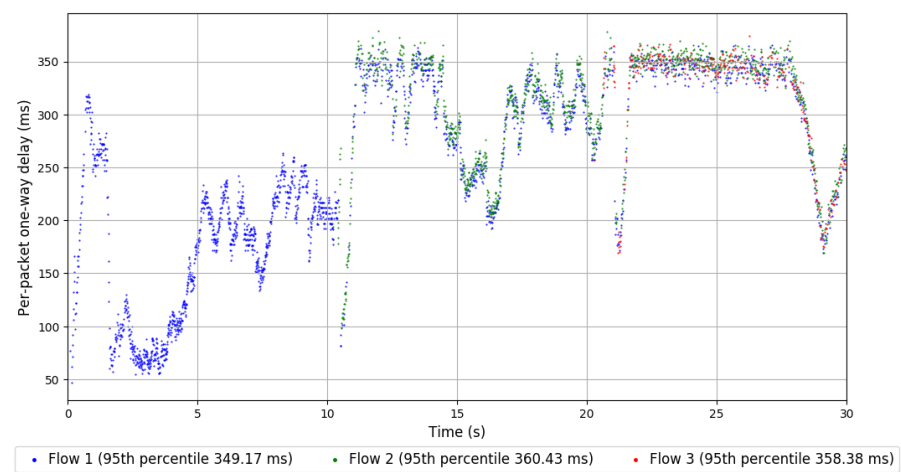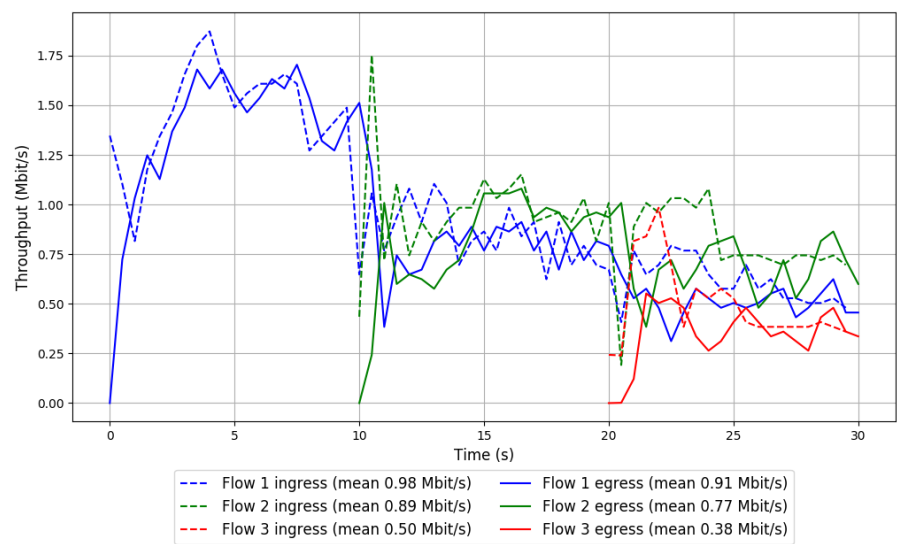
Run 1: Report of TCP BBR — Data Link

- Flow 1 ingress (mean 0.68 Mbit/s)
- Flow 1 egress (mean 0.56 Mbit/s)
- Flow 2 ingress (mean 0.41 Mbit/s)
- Flow 2 egress (mean 0.32 Mbit/s)
- Flow 3 ingress (mean 0.39 Mbit/s)
- Flow 3 egress (mean 0.31 Mbit/s)

- Flow 1 (95th percentile 361.30 ms)
- Flow 2 (95th percentile 365.81 ms)
- Flow 3 (95th percentile 362.42 ms)

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```
Run 2: Statistics of TCP BBR

Start at: 2018-12-02 13:38:39
End at: 2018-12-02 13:39:09
Local clock offset: 3.674 ms
Remote clock offset: -4.302 ms


# Below is generated by plot.py at 2018-12-02 14:07:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 355.475 ms
Loss rate: 11.37%
-- Flow 1:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 349.168 ms
Loss rate: 6.99%
-- Flow 2:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 360.429 ms
Loss rate: 14.39%
-- Flow 3:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 358.385 ms
Loss rate: 26.45%
```
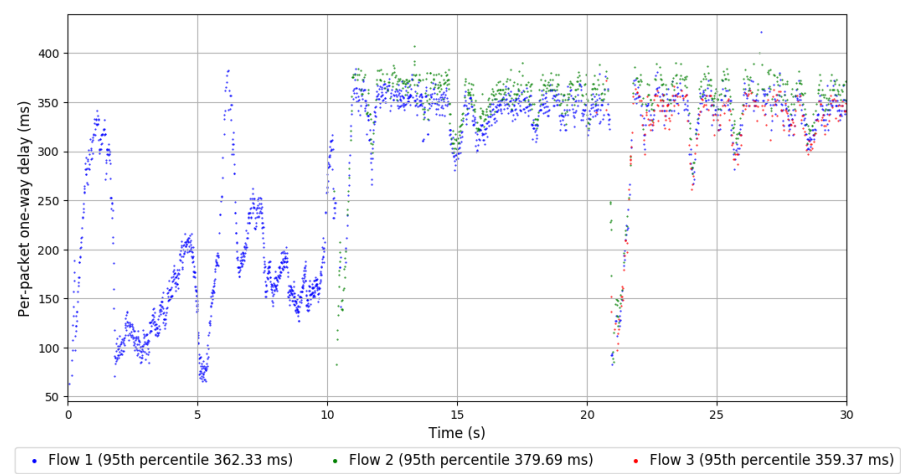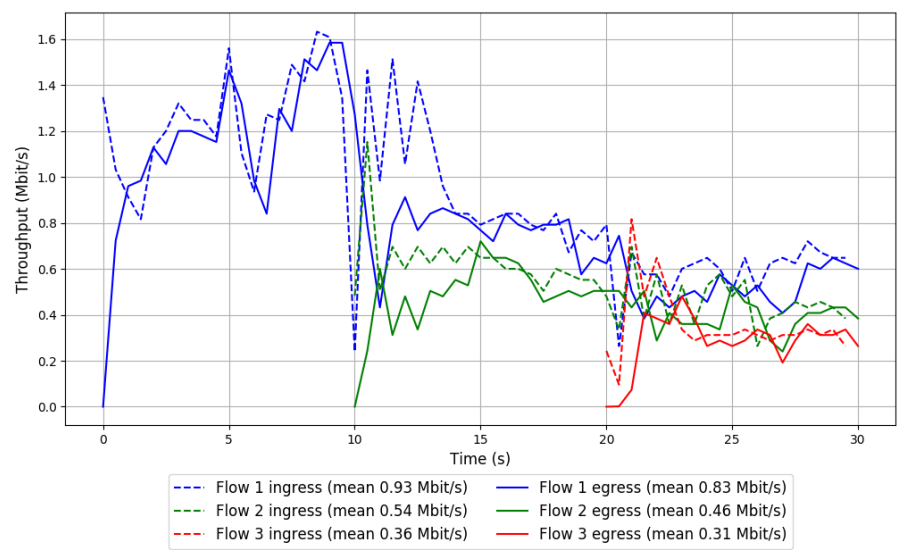
Run 2: Report of TCP BBR — Data Link

```
Run 3: Statistics of TCP BBR

Start at: 2018-12-02 13:59:55
End at: 2018-12-02 14:00:25
Local clock offset: 5.137 ms
Remote clock offset: -4.89 ms


# Below is generated by plot.py at 2018-12-02 14:07:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 372.847 ms
Loss rate: 12.47%
-- Flow 1:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 362.330 ms
Loss rate: 10.21%
-- Flow 2:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 379.695 ms
Loss rate: 16.70%
-- Flow 3:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 359.369 ms
Loss rate: 17.16%
```
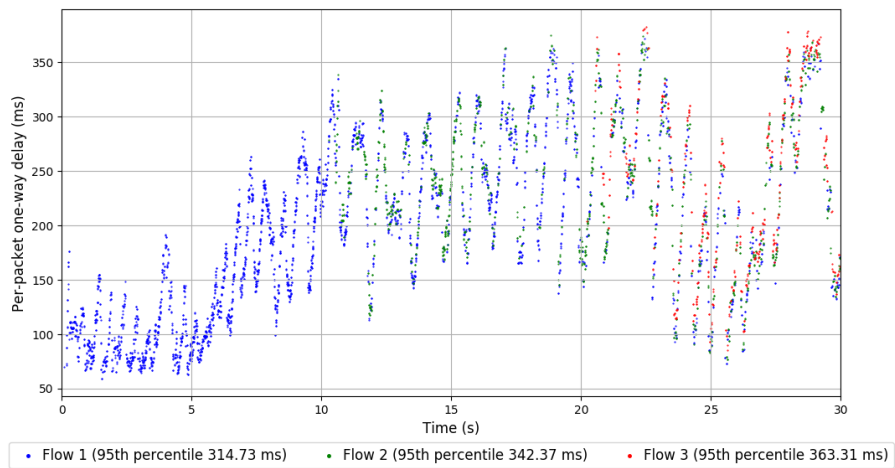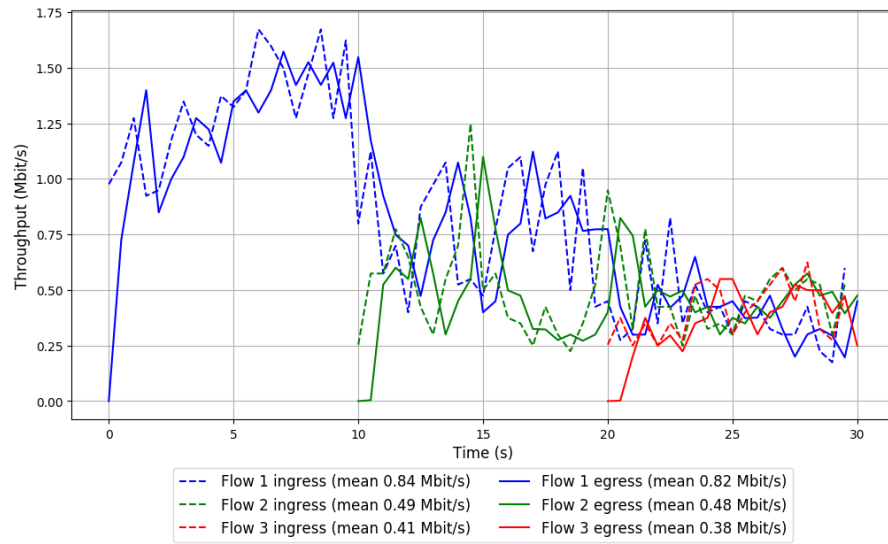
Run 3: Report of TCP BBR — Data Link

Flow 1 ingress (mean 0.93 Mbit/s)   Flow 1 egress (mean 0.83 Mbit/s)
Flow 2 ingress (mean 0.54 Mbit/s)   Flow 2 egress (mean 0.46 Mbit/s)
Flow 3 ingress (mean 0.36 Mbit/s)   Flow 3 egress (mean 0.31 Mbit/s)

Flow 1 (95th percentile 362.33 ms)   Flow 2 (95th percentile 379.69 ms)   Flow 3 (95th percentile 359.37 ms)

```
Run 1: Statistics of Copa

Start at: 2018-12-02 13:10:34
End at: 2018-12-02 13:11:04
Local clock offset: 4.125 ms
Remote clock offset: -5.091 ms


# Below is generated by plot.py at 2018-12-02 14:07:21
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.26 Mbit/s
95th percentile per-packet one-way delay: 333.078 ms
Loss rate: 3.32%
-- Flow 1:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 314.730 ms
Loss rate: 2.15%
-- Flow 2:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 342.369 ms
Loss rate: 3.94%
-- Flow 3:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 363.305 ms
Loss rate: 9.07%
```
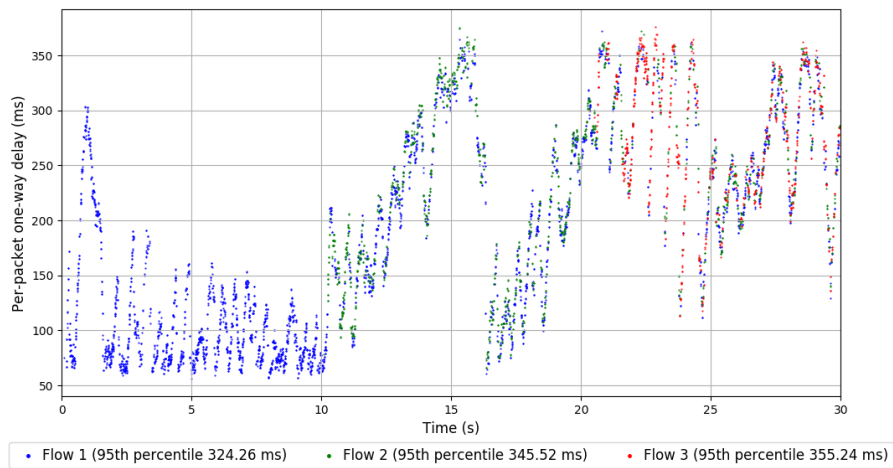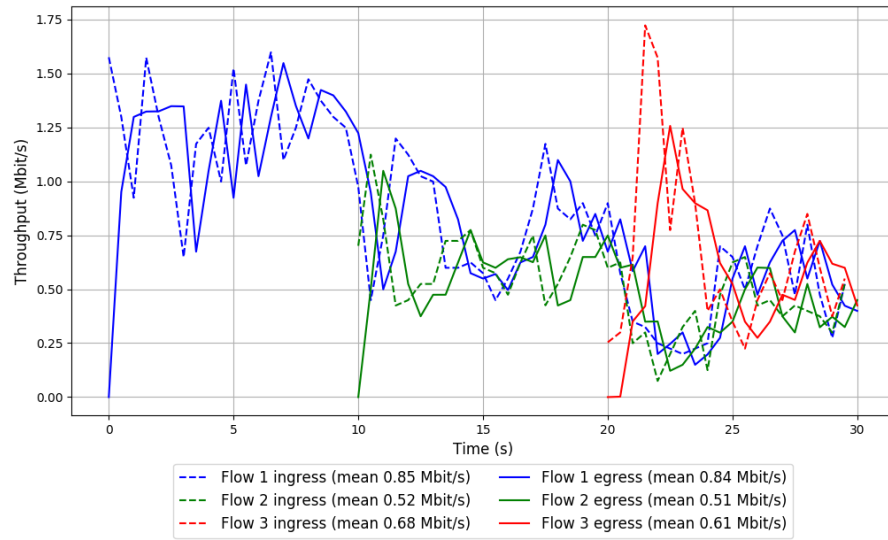
Run 1: Report of Copa — Data Link

Flow 1 ingress (mean 0.84 Mbit/s) --- Flow 1 egress (mean 0.82 Mbit/s)
Flow 2 ingress (mean 0.49 Mbit/s) --- Flow 2 egress (mean 0.48 Mbit/s)
Flow 3 ingress (mean 0.41 Mbit/s) --- Flow 3 egress (mean 0.38 Mbit/s)

Flow 1 (95th percentile 314.73 ms) Flow 2 (95th percentile 342.37 ms) Flow 3 (95th percentile 363.31 ms)
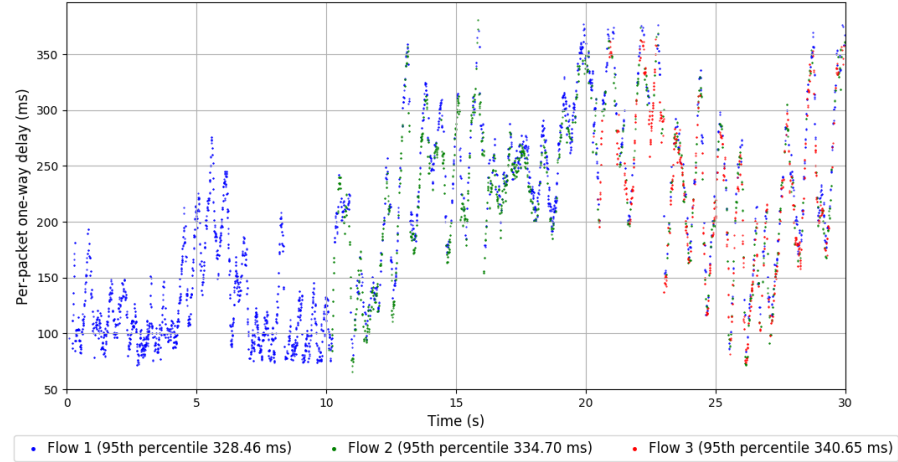
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```
Run 2: Statistics of Copa

Start at: 2018-12-02 13:31:52
End at: 2018-12-02 13:32:22
Local clock offset: 6.114 ms
Remote clock offset: -4.871 ms


# Below is generated by plot.py at 2018-12-02 14:07:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.38 Mbit/s
95th percentile per-packet one-way delay: 342.817 ms
Loss rate: 3.63%
-- Flow 1:
Average throughput: 0.84 Mbit/s
95th percentile per-packet one-way delay: 324.258 ms
Loss rate: 1.38%
-- Flow 2:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 345.522 ms
Loss rate: 3.23%
-- Flow 3:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 355.239 ms
Loss rate: 12.82%
```
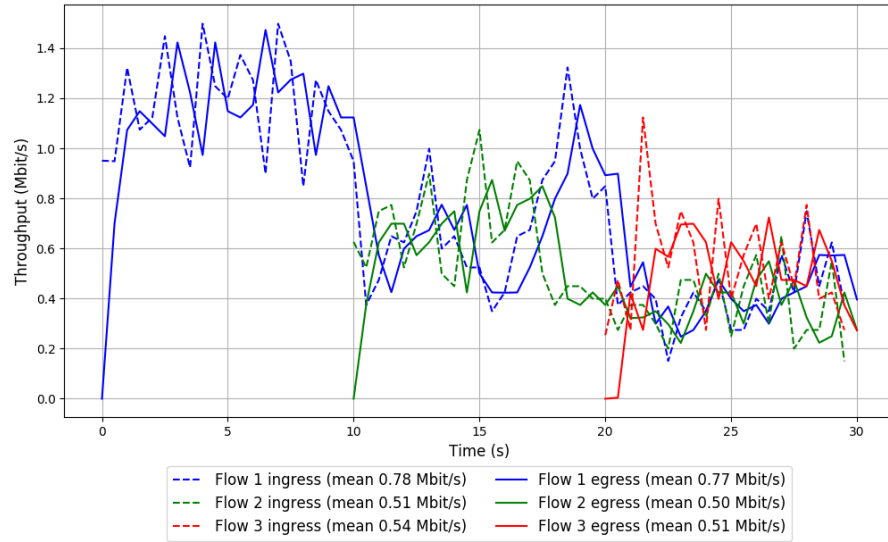
Run 2: Report of Copa — Data Link

```
Run 3: Statistics of Copa

Start at: 2018-12-02 13:53:12
End at: 2018-12-02 13:53:42
Local clock offset: 2.829 ms
Remote clock offset: -4.793 ms


# Below is generated by plot.py at 2018-12-02 14:07:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.26 Mbit/s
95th percentile per-packet one-way delay: 333.727 ms
Loss rate: 2.83%
-- Flow 1:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 328.456 ms
Loss rate: 1.61%
-- Flow 2:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 334.697 ms
Loss rate: 2.63%
-- Flow 3:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 340.647 ms
Loss rate: 8.45%
```
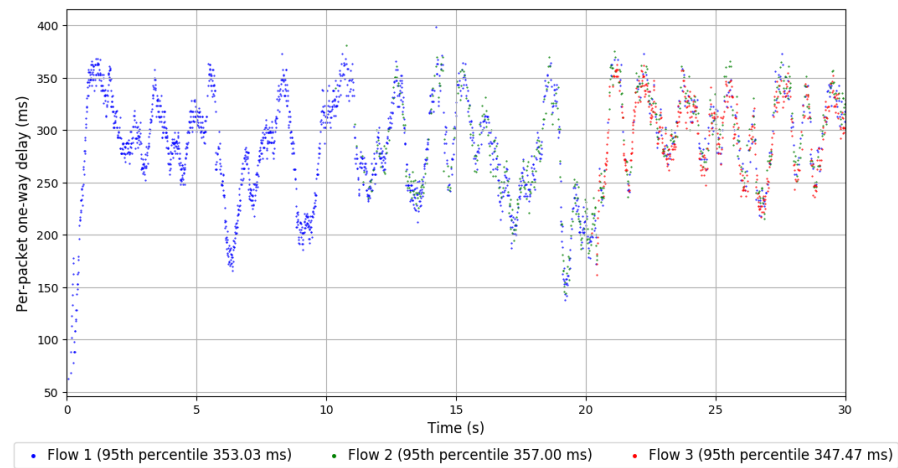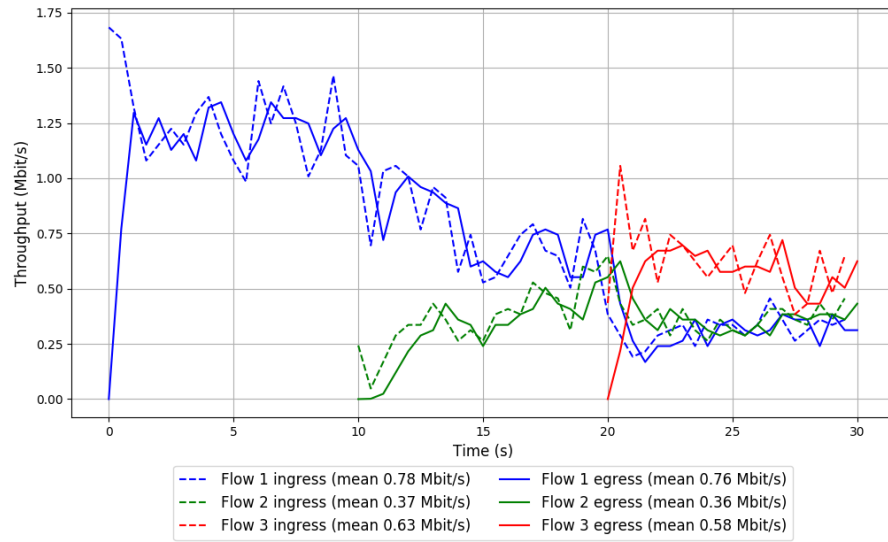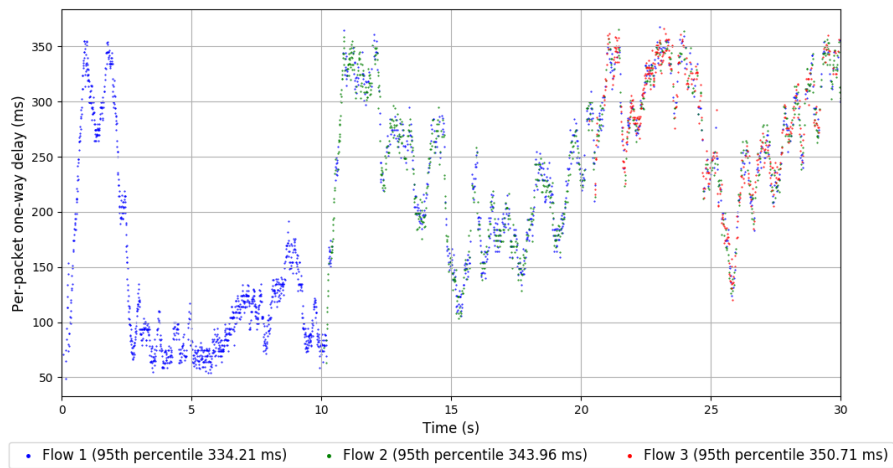
Run 3: Report of Copa — Data Link

Flow 1 ingress (mean 0.78 Mbit/s)   Flow 1 egress (mean 0.77 Mbit/s)
Flow 2 ingress (mean 0.51 Mbit/s)   Flow 2 egress (mean 0.50 Mbit/s)
Flow 3 ingress (mean 0.54 Mbit/s)   Flow 3 egress (mean 0.51 Mbit/s)

Flow 1 (95th percentile 328.46 ms)   Flow 2 (95th percentile 334.70 ms)   Flow 3 (95th percentile 340.65 ms)

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```
Run 1: Statistics of TCP Cubic

Start at: 2018-12-02 13:09:27
End at: 2018-12-02 13:09:57
Local clock offset: 3.844 ms
Remote clock offset: -5.985 ms

# Below is generated by plot.py at 2018-12-02 14:07:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 353.001 ms
Loss rate: 4.73%
-- Flow 1:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 353.031 ms
Loss rate: 3.68%
-- Flow 2:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 356.995 ms
Loss rate: 4.91%
-- Flow 3:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 347.472 ms
Loss rate: 8.48%
```

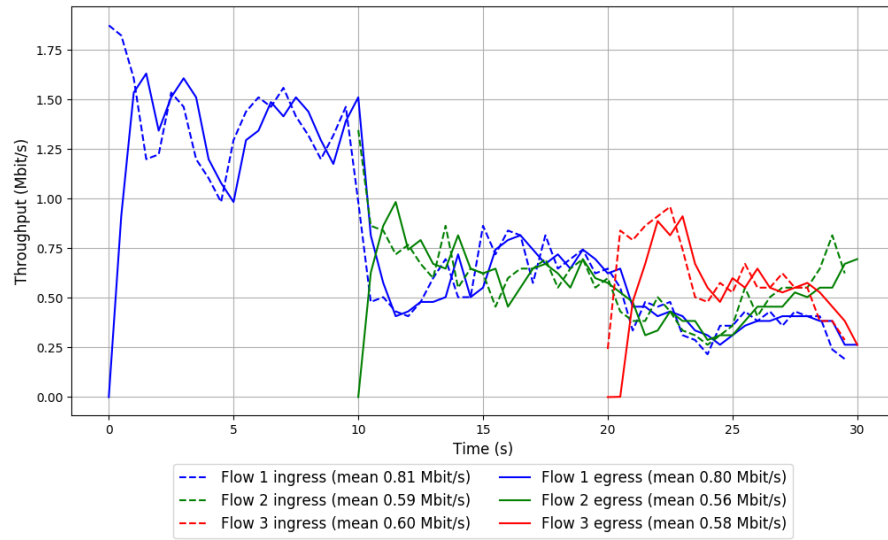Run 1: Report of TCP Cubic — Data Link

```
Run 2: Statistics of TCP Cubic

Start at: 2018-12-02 13:30:45
End at: 2018-12-02 13:31:15
Local clock offset: 0.515 ms
Remote clock offset: -4.821 ms


# Below is generated by plot.py at 2018-12-02 14:07:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.36 Mbit/s
95th percentile per-packet one-way delay: 343.940 ms
Loss rate: 3.70%
-- Flow 1:
Average throughput: 0.80 Mbit/s
95th percentile per-packet one-way delay: 334.212 ms
Loss rate: 2.41%
-- Flow 2:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 343.964 ms
Loss rate: 4.49%
-- Flow 3:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 350.713 ms
Loss rate: 7.40%
```
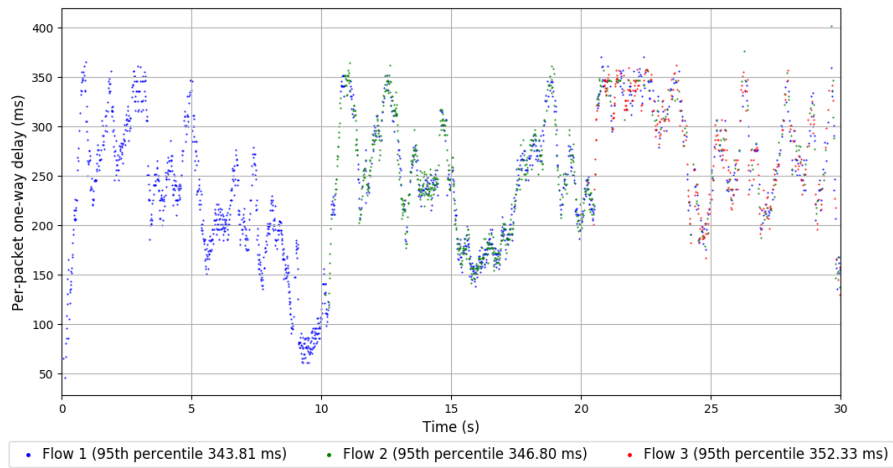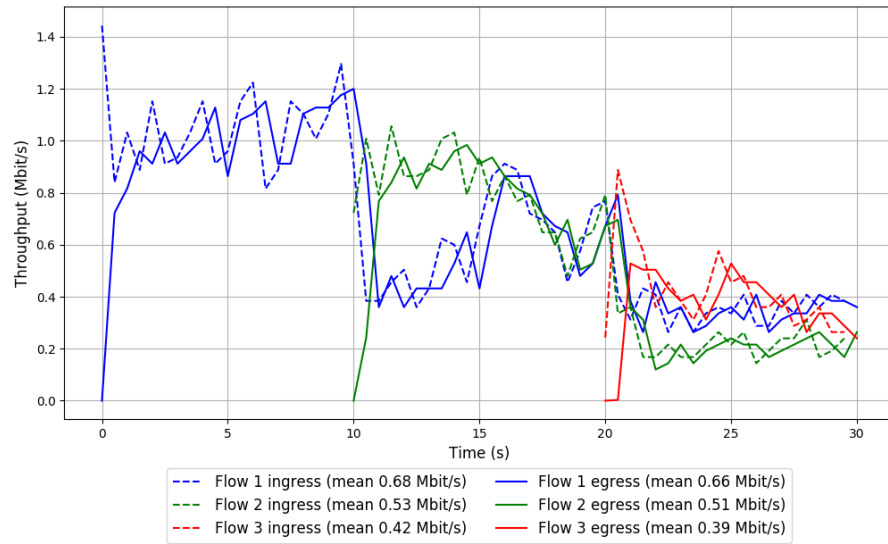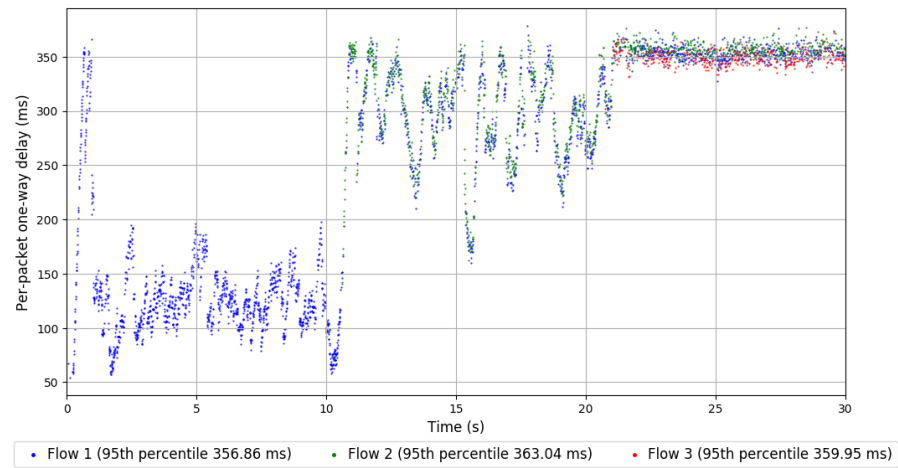
Run 2: Report of TCP Cubic — Data Link

- Flow 1 ingress (mean 0.81 Mbit/s) — Flow 1 egress (mean 0.80 Mbit/s)
- Flow 2 ingress (mean 0.59 Mbit/s) — Flow 2 egress (mean 0.56 Mbit/s)
- Flow 3 ingress (mean 0.60 Mbit/s) — Flow 3 egress (mean 0.58 Mbit/s)

- Flow 1 (95th percentile 334.21 ms)   - Flow 2 (95th percentile 343.96 ms)   - Flow 3 (95th percentile 350.71 ms)

```
Run 3: Statistics of TCP Cubic

Start at: 2018-12-02 13:52:04
End at: 2018-12-02 13:52:34
Local clock offset: 2.148 ms
Remote clock offset: -5.085 ms


# Below is generated by plot.py at 2018-12-02 14:07:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.13 Mbit/s
95th percentile per-packet one-way delay: 346.466 ms
Loss rate: 4.56%
-- Flow 1:
Average throughput: 0.66 Mbit/s
95th percentile per-packet one-way delay: 343.809 ms
Loss rate: 3.06%
-- Flow 2:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 346.799 ms
Loss rate: 5.08%
-- Flow 3:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 352.334 ms
Loss rate: 10.51%
```
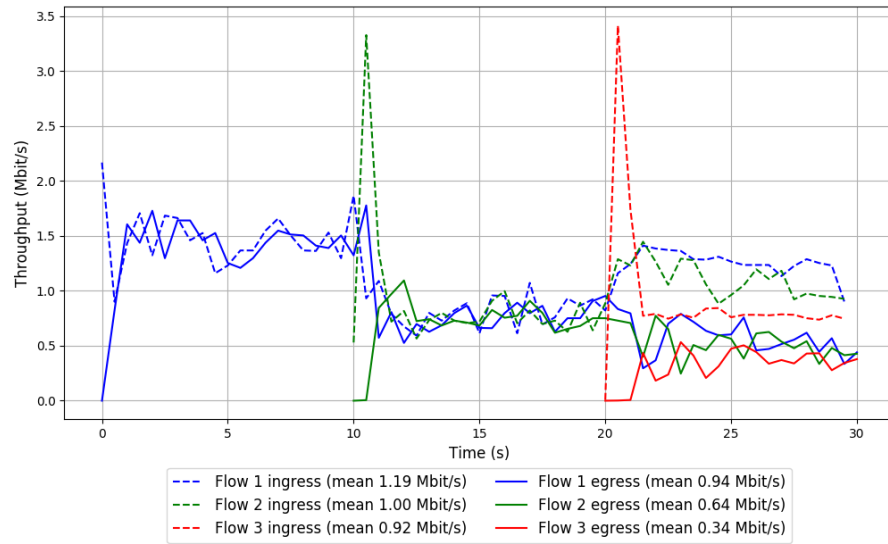
Run 3: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 0.68 Mbit/s) — — —   Flow 1 egress (mean 0.66 Mbit/s) ———
Flow 2 ingress (mean 0.53 Mbit/s) — — —   Flow 2 egress (mean 0.51 Mbit/s) ———
Flow 3 ingress (mean 0.42 Mbit/s) — — —   Flow 3 egress (mean 0.39 Mbit/s) ———

Flow 1 (95th percentile 343.81 ms)   Flow 2 (95th percentile 346.80 ms)   Flow 3 (95th percentile 352.33 ms)
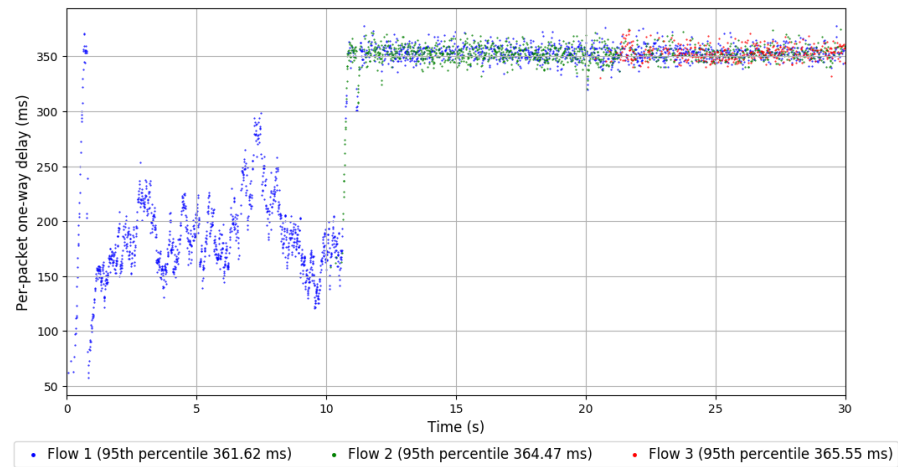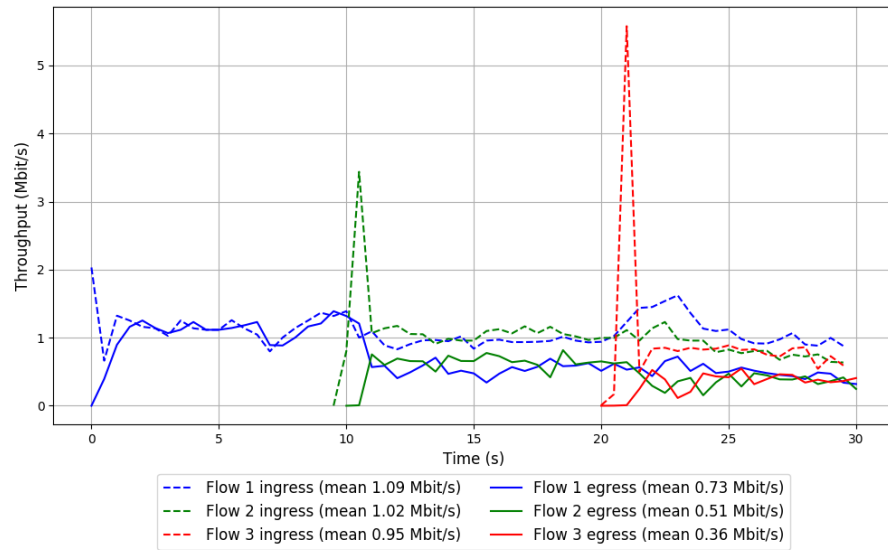
```
Run 1: Statistics of FillP

Start at: 2018-12-02 13:22:56
End at: 2018-12-02 13:23:26
Local clock offset: 1.833 ms
Remote clock offset: -4.753 ms


# Below is generated by plot.py at 2018-12-02 14:07:25
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.47 Mbit/s
95th percentile per-packet one-way delay: 359.826 ms
Loss rate: 32.26%
-- Flow 1:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 356.862 ms
Loss rate: 21.55%
-- Flow 2:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 363.035 ms
Loss rate: 36.94%
-- Flow 3:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 359.948 ms
Loss rate: 63.79%
```
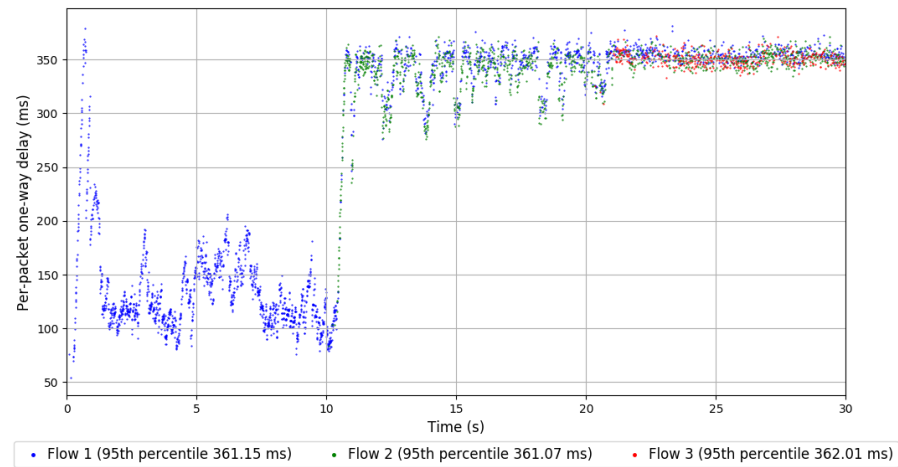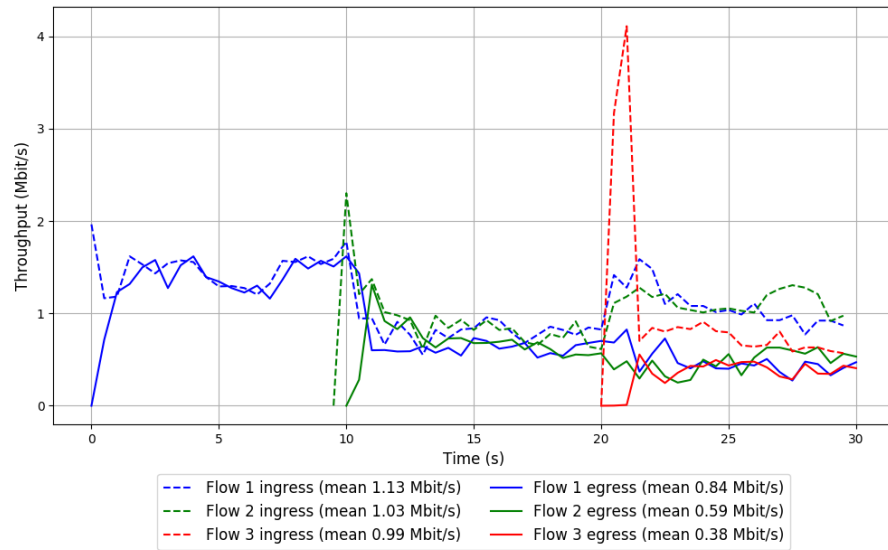
Run 1: Report of FillP — Data Link

- - - - Flow 1 ingress (mean 1.19 Mbit/s)   —— Flow 1 egress (mean 0.94 Mbit/s)
- - - - Flow 2 ingress (mean 1.00 Mbit/s)   —— Flow 2 egress (mean 0.64 Mbit/s)
- - - - Flow 3 ingress (mean 0.92 Mbit/s)   —— Flow 3 egress (mean 0.34 Mbit/s)

- Flow 1 (95th percentile 356.86 ms)   • Flow 2 (95th percentile 363.04 ms)   • Flow 3 (95th percentile 359.95 ms)

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```
Run 2: Statistics of FillP

Start at: 2018-12-02 13:44:15
End at: 2018-12-02 13:44:45
Local clock offset: 2.855 ms
Remote clock offset: -5.074 ms


# Below is generated by plot.py at 2018-12-02 14:07:26
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 363.142 ms
Loss rate: 43.65%
-- Flow 1:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 361.616 ms
Loss rate: 33.57%
-- Flow 2:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 364.471 ms
Loss rate: 50.54%
-- Flow 3:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 365.550 ms
Loss rate: 63.77%
```

Run 2: Report of FillP — Data Link

```
Run 3: Statistics of FillP

Start at: 2018-12-02 14:05:30
End at: 2018-12-02 14:06:00
Local clock offset: 3.292 ms
Remote clock offset: -2.012 ms

# Below is generated by plot.py at 2018-12-02 14:07:26
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.36 Mbit/s
95th percentile per-packet one-way delay: 361.149 ms
Loss rate: 36.92%
-- Flow 1:
Average throughput: 0.84 Mbit/s
95th percentile per-packet one-way delay: 361.149 ms
Loss rate: 25.89%
-- Flow 2:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 361.069 ms
Loss rate: 42.75%
-- Flow 3:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 362.010 ms
Loss rate: 62.95%
```
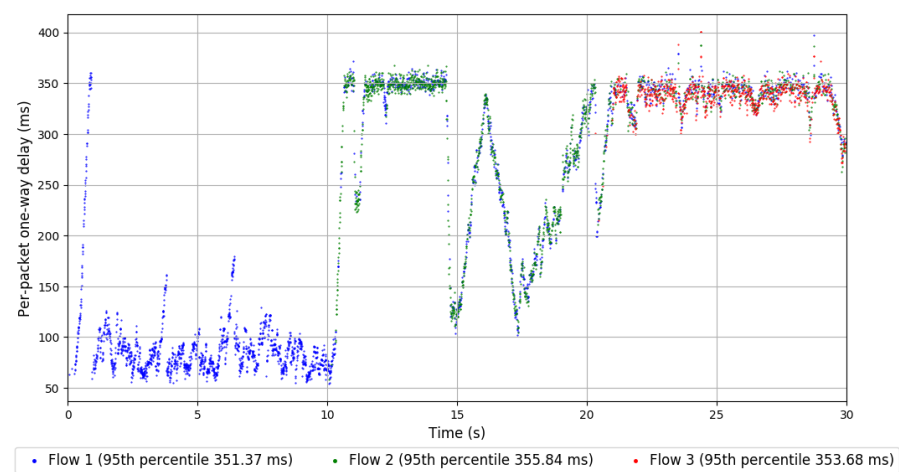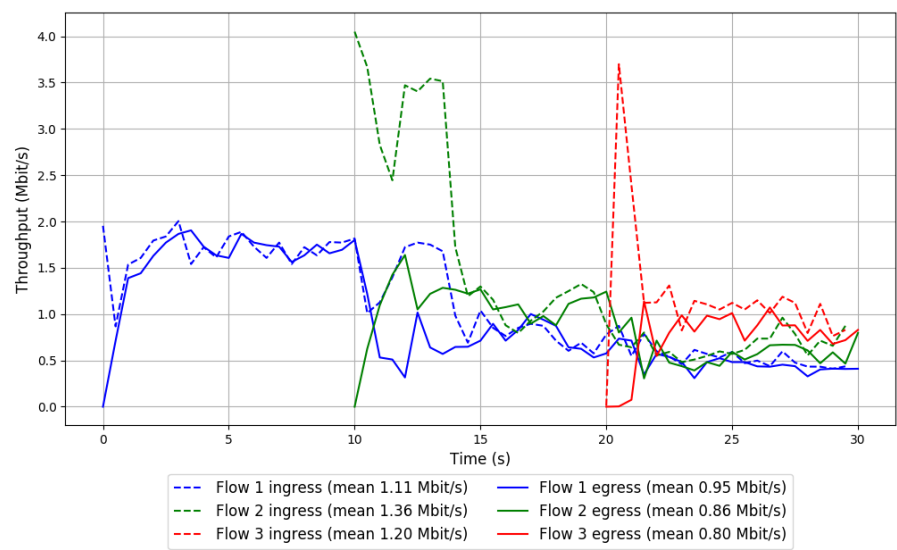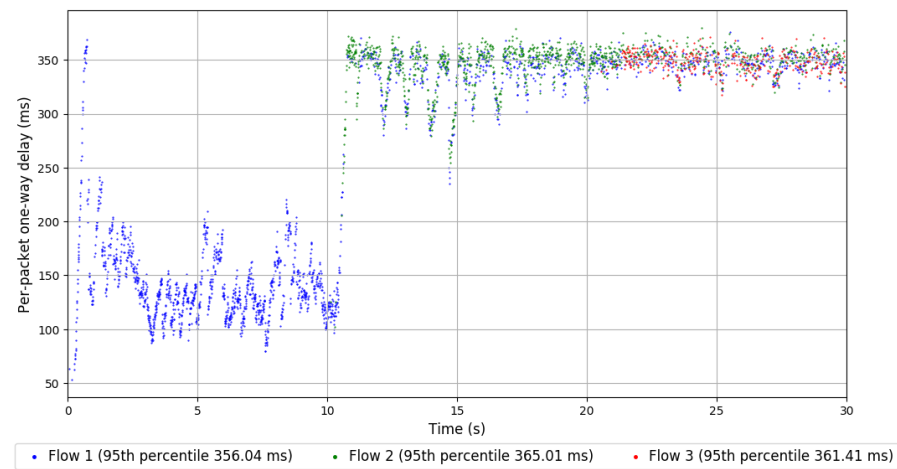
Run 3: Report of FillP — Data Link

- Flow 1 ingress (mean 1.13 Mbit/s)
- Flow 2 ingress (mean 1.03 Mbit/s)
- Flow 3 ingress (mean 0.99 Mbit/s)
- Flow 1 egress (mean 0.84 Mbit/s)
- Flow 2 egress (mean 0.59 Mbit/s)
- Flow 3 egress (mean 0.38 Mbit/s)

- Flow 1 (95th percentile 361.15 ms)
- Flow 2 (95th percentile 361.07 ms)
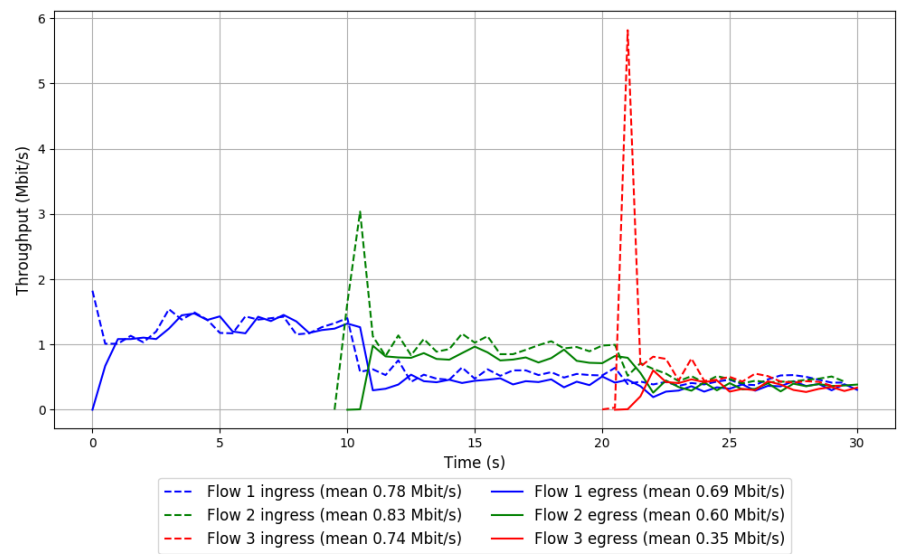- Flow 3 (95th percentile 362.01 ms)

28

```
Run 1: Statistics of FillP-Sheep

Start at: 2018-12-02 13:04:59
End at: 2018-12-02 13:05:29
Local clock offset: -0.369 ms
Remote clock offset: -5.53 ms


# Below is generated by plot.py at 2018-12-02 14:07:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.78 Mbit/s
95th percentile per-packet one-way delay: 353.463 ms
Loss rate: 26.48%
-- Flow 1:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 351.368 ms
Loss rate: 14.92%
-- Flow 2:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 355.841 ms
Loss rate: 36.80%
-- Flow 3:
Average throughput: 0.80 Mbit/s
95th percentile per-packet one-way delay: 353.676 ms
Loss rate: 35.24%
```

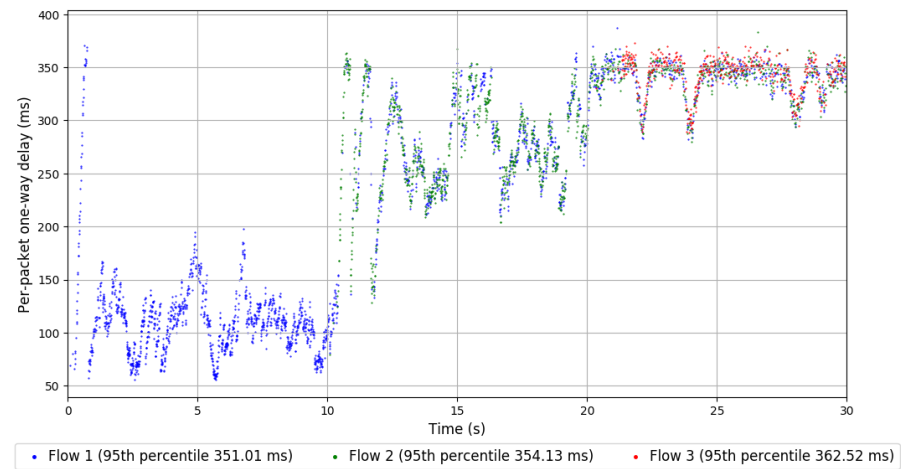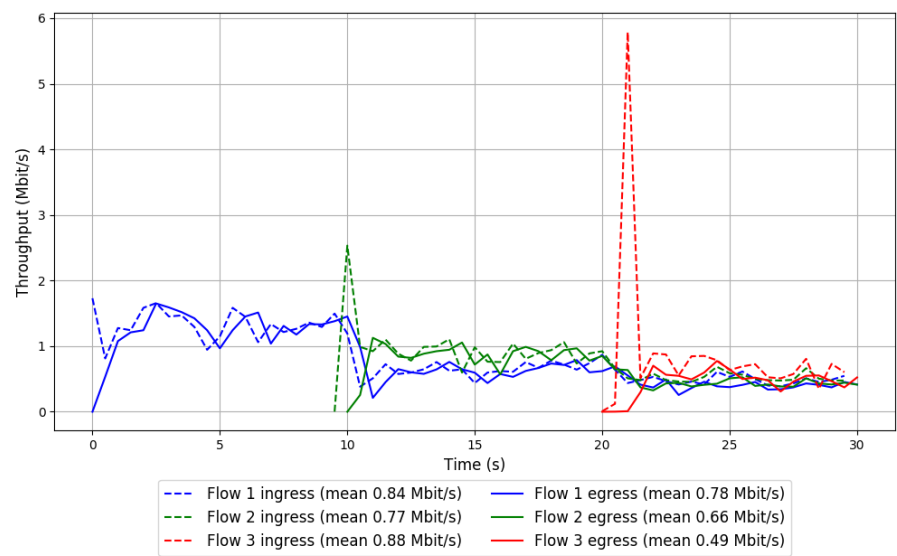# Run 1: Report of FillP-Sheep — Data Link

Flow 1 ingress (mean 1.11 Mbit/s) --- Flow 1 egress (mean 0.95 Mbit/s)
Flow 2 ingress (mean 1.36 Mbit/s) --- Flow 2 egress (mean 0.86 Mbit/s)
Flow 3 ingress (mean 1.20 Mbit/s) --- Flow 3 egress (mean 0.80 Mbit/s)

Flow 1 (95th percentile 351.37 ms) Flow 2 (95th percentile 355.84 ms) Flow 3 (95th percentile 353.68 ms)

30

```
Run 2: Statistics of FillP-Sheep

Start at: 2018-12-02 13:26:16
End at: 2018-12-02 13:26:46
Local clock offset: 3.375 ms
Remote clock offset: -3.861 ms


# Below is generated by plot.py at 2018-12-02 14:07:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.20 Mbit/s
95th percentile per-packet one-way delay: 361.438 ms
Loss rate: 24.45%
-- Flow 1:
Average throughput: 0.69 Mbit/s
95th percentile per-packet one-way delay: 356.037 ms
Loss rate: 12.15%
-- Flow 2:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 365.015 ms
Loss rate: 28.18%
-- Flow 3:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 361.414 ms
Loss rate: 55.24%
```

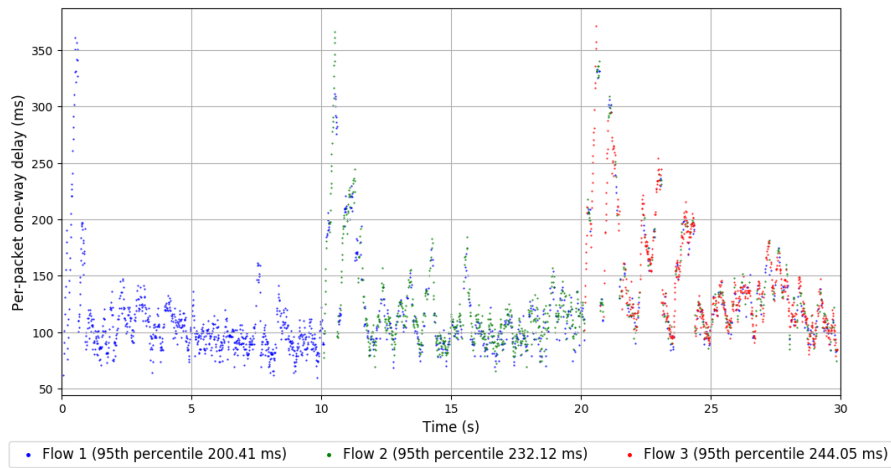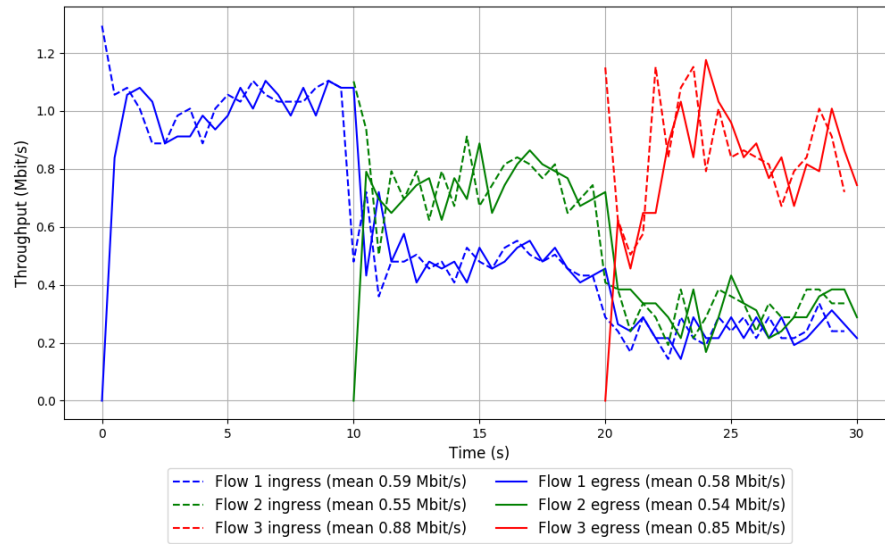Run 2: Report of FillP-Sheep — Data Link

Flow 1 ingress (mean 0.78 Mbit/s)   Flow 1 egress (mean 0.69 Mbit/s)
Flow 2 ingress (mean 0.83 Mbit/s)   Flow 2 egress (mean 0.60 Mbit/s)
Flow 3 ingress (mean 0.74 Mbit/s)   Flow 3 egress (mean 0.35 Mbit/s)

Flow 1 (95th percentile 356.04 ms)   Flow 2 (95th percentile 365.01 ms)   Flow 3 (95th percentile 361.41 ms)

```
Run 3: Statistics of FillP-Sheep

Start at: 2018-12-02 13:47:36
End at: 2018-12-02 13:48:06
Local clock offset: 5.102 ms
Remote clock offset: -4.688 ms


# Below is generated by plot.py at 2018-12-02 14:07:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.37 Mbit/s
95th percentile per-packet one-way delay: 355.536 ms
Loss rate: 16.58%
-- Flow 1:
Average throughput: 0.78 Mbit/s
95th percentile per-packet one-way delay: 351.013 ms
Loss rate: 7.23%
-- Flow 2:
Average throughput: 0.66 Mbit/s
95th percentile per-packet one-way delay: 354.133 ms
Loss rate: 15.11%
-- Flow 3:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 362.521 ms
Loss rate: 46.14%
```

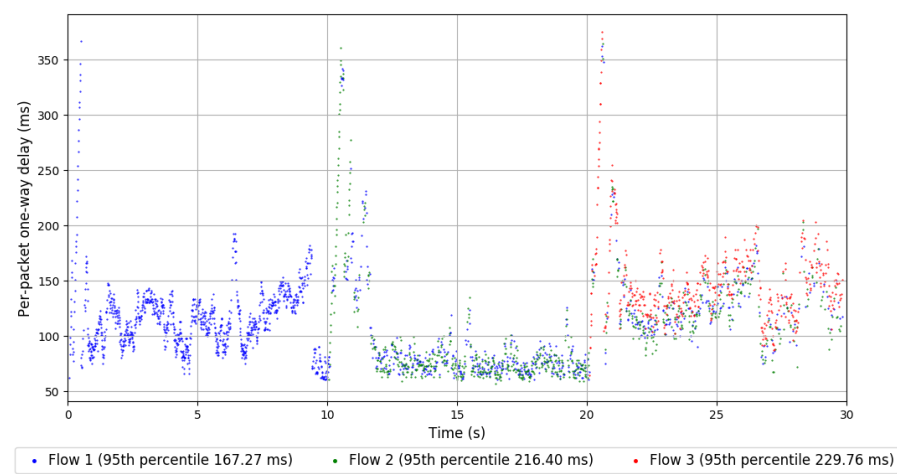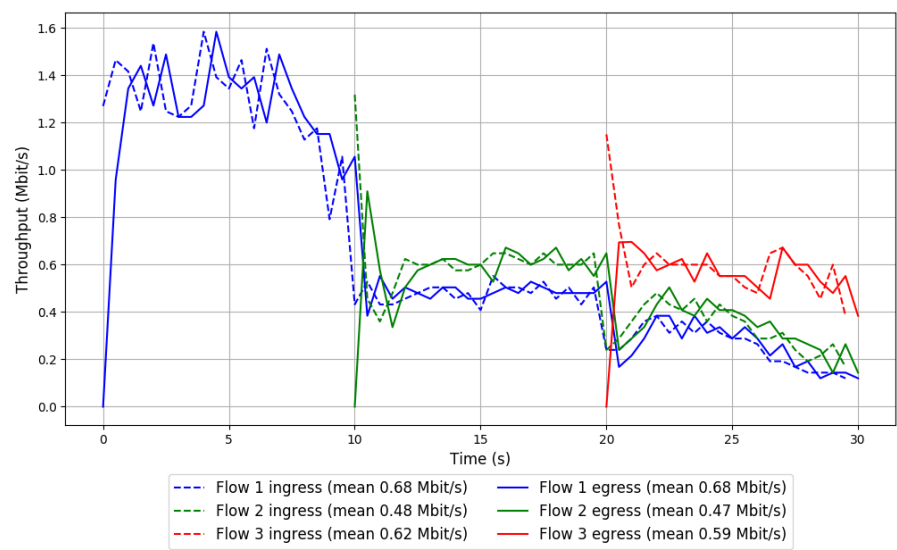Run 3: Report of FillP-Sheep — Data Link

```
Run 1: Statistics of Indigo

Start at: 2018-12-02 13:21:49
End at: 2018-12-02 13:22:19
Local clock offset: 5.633 ms
Remote clock offset: -4.843 ms


# Below is generated by plot.py at 2018-12-02 14:07:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 223.720 ms
Loss rate: 2.39%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 200.414 ms
Loss rate: 1.43%
-- Flow 2:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 232.115 ms
Loss rate: 2.86%
-- Flow 3:
Average throughput: 0.85 Mbit/s
95th percentile per-packet one-way delay: 244.054 ms
Loss rate: 3.77%
```
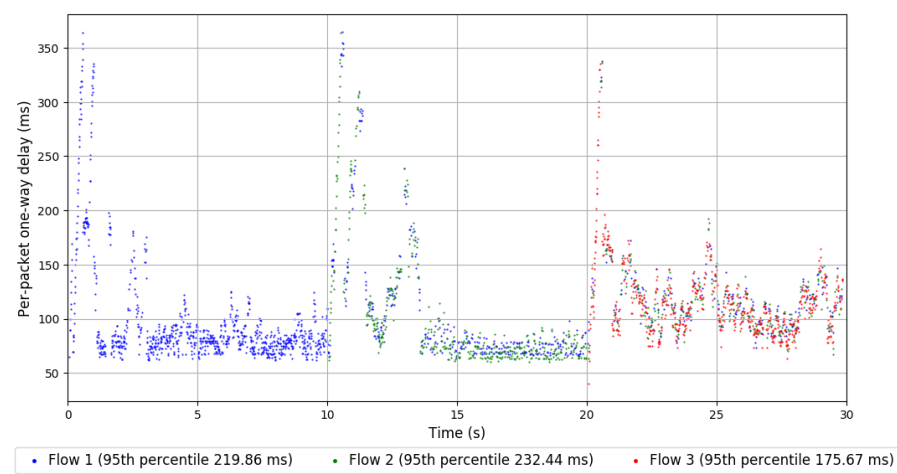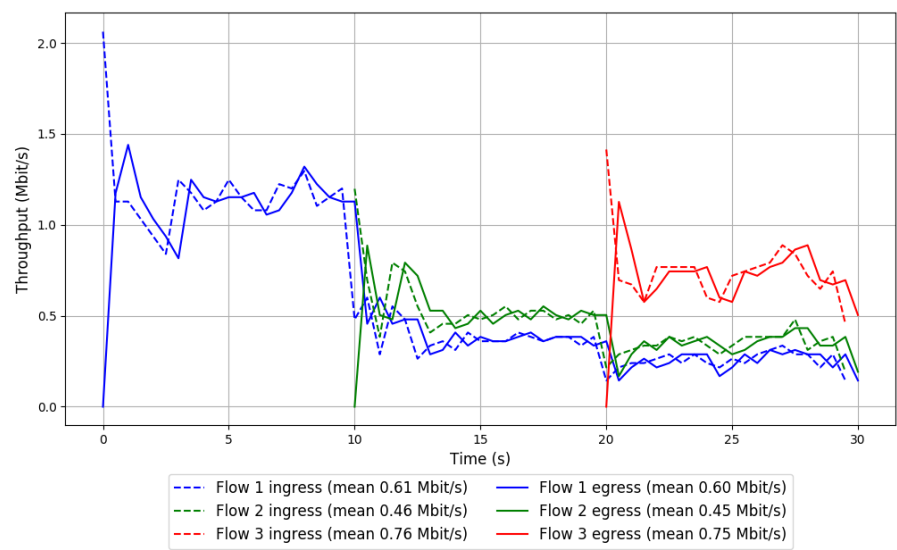
Run 1: Report of Indigo — Data Link

```
Run 2: Statistics of Indigo

Start at: 2018-12-02 13:43:08
End at: 2018-12-02 13:43:38
Local clock offset: 2.665 ms
Remote clock offset: -5.376 ms


# Below is generated by plot.py at 2018-12-02 14:07:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 189.115 ms
Loss rate: 1.81%
-- Flow 1:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 167.268 ms
Loss rate: 0.77%
-- Flow 2:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 216.395 ms
Loss rate: 1.89%
-- Flow 3:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 229.758 ms
Loss rate: 5.17%
```
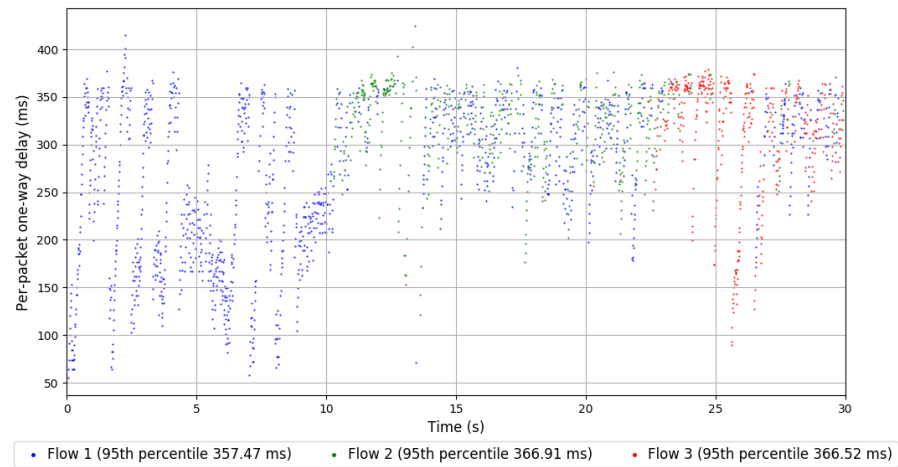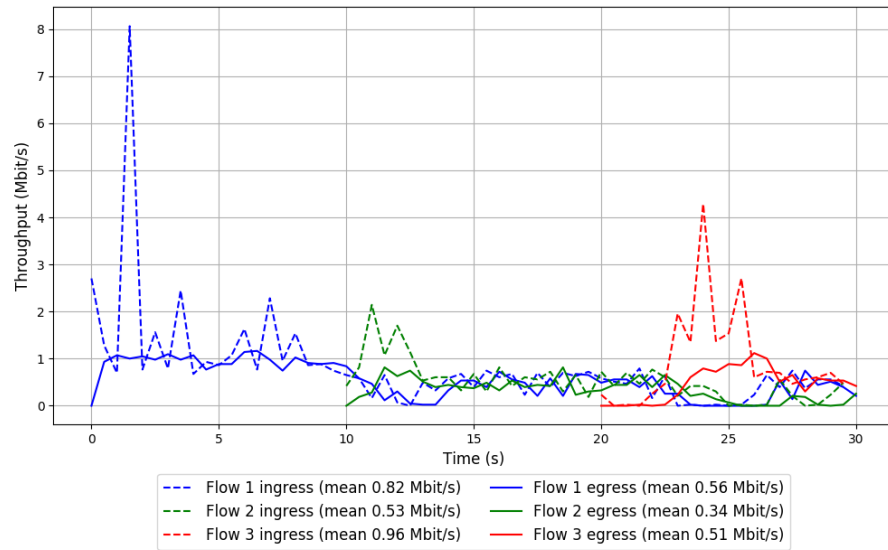
Run 2: Report of Indigo — Data Link

- - - Flow 1 ingress (mean 0.68 Mbit/s)   —— Flow 1 egress (mean 0.68 Mbit/s)
- - - Flow 2 ingress (mean 0.48 Mbit/s)   —— Flow 2 egress (mean 0.47 Mbit/s)
- - - Flow 3 ingress (mean 0.62 Mbit/s)   —— Flow 3 egress (mean 0.59 Mbit/s)

- Flow 1 (95th percentile 167.27 ms)   • Flow 2 (95th percentile 216.40 ms)   • Flow 3 (95th percentile 229.76 ms)

```
Run 3: Statistics of Indigo

Start at: 2018-12-02 14:04:23
End at: 2018-12-02 14:04:53
Local clock offset: 1.486 ms
Remote clock offset: -4.214 ms


# Below is generated by plot.py at 2018-12-02 14:07:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 215.588 ms
Loss rate: 1.73%
-- Flow 1:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 219.862 ms
Loss rate: 1.65%
-- Flow 2:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 232.438 ms
Loss rate: 2.26%
-- Flow 3:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 175.666 ms
Loss rate: 1.29%
```

Run 3: Report of Indigo — Data Link

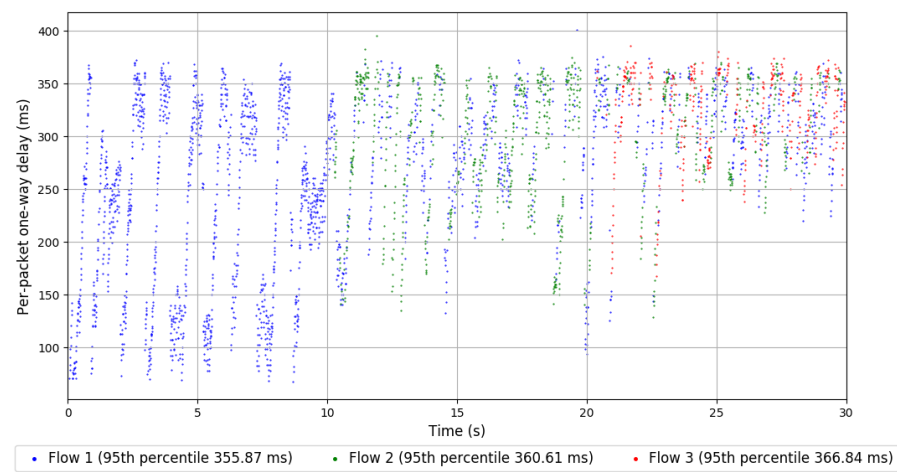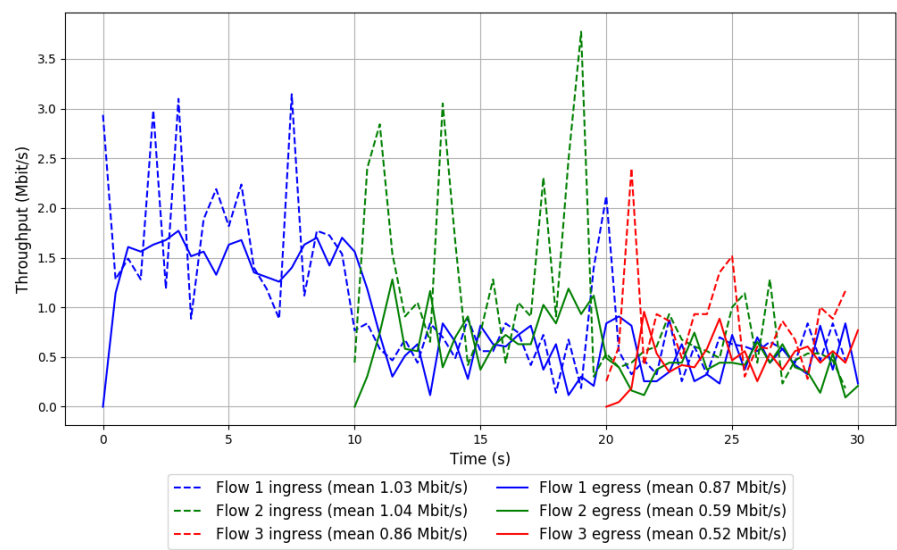Flow 1 ingress (mean 0.61 Mbit/s)   Flow 1 egress (mean 0.60 Mbit/s)
Flow 2 ingress (mean 0.46 Mbit/s)   Flow 2 egress (mean 0.45 Mbit/s)
Flow 3 ingress (mean 0.76 Mbit/s)   Flow 3 egress (mean 0.75 Mbit/s)

Flow 1 (95th percentile 219.86 ms)   Flow 2 (95th percentile 232.44 ms)   Flow 3 (95th percentile 175.67 ms)

```
Run 1: Statistics of Indigo-96d2da3

Start at: 2018-12-02 13:18:27
End at: 2018-12-02 13:18:57
Local clock offset: 1.858 ms
Remote clock offset: -5.225 ms

# Below is generated by plot.py at 2018-12-02 14:07:31
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 363.429 ms
Loss rate: 36.72%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 357.470 ms
Loss rate: 32.31%
-- Flow 2:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 366.907 ms
Loss rate: 36.37%
-- Flow 3:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 366.524 ms
Loss rate: 48.40%
```

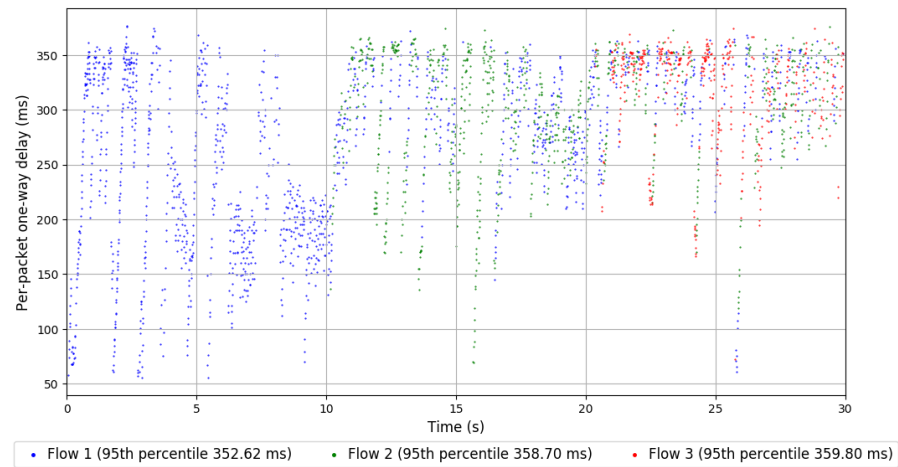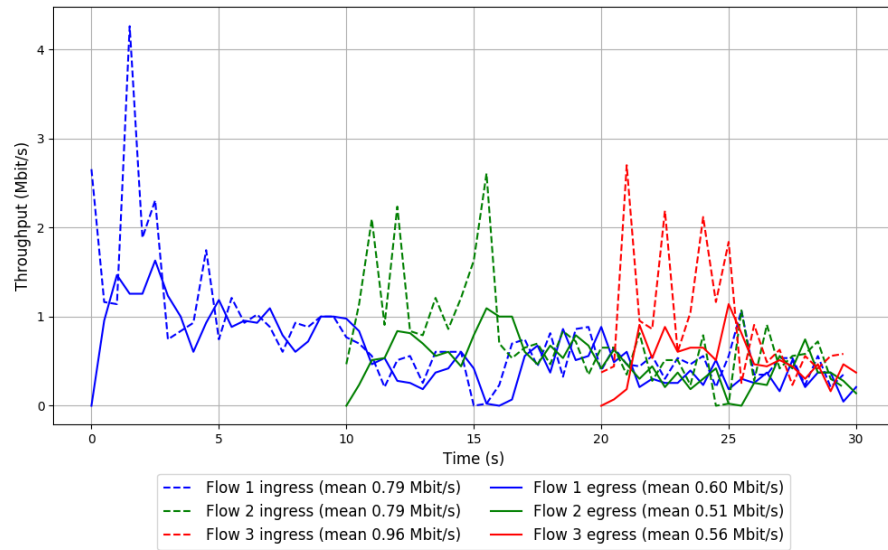Run 1: Report of Indigo-96d2da3 — Data Link

```
Run 2: Statistics of Indigo-96d2da3

Start at: 2018-12-02 13:39:46
End at: 2018-12-02 13:40:16
Local clock offset: 4.992 ms
Remote clock offset: -5.093 ms


# Below is generated by plot.py at 2018-12-02 14:07:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 360.195 ms
Loss rate: 29.55%
-- Flow 1:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 355.871 ms
Loss rate: 16.29%
-- Flow 2:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 360.612 ms
Loss rate: 44.27%
-- Flow 3:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 366.839 ms
Loss rate: 41.81%
```

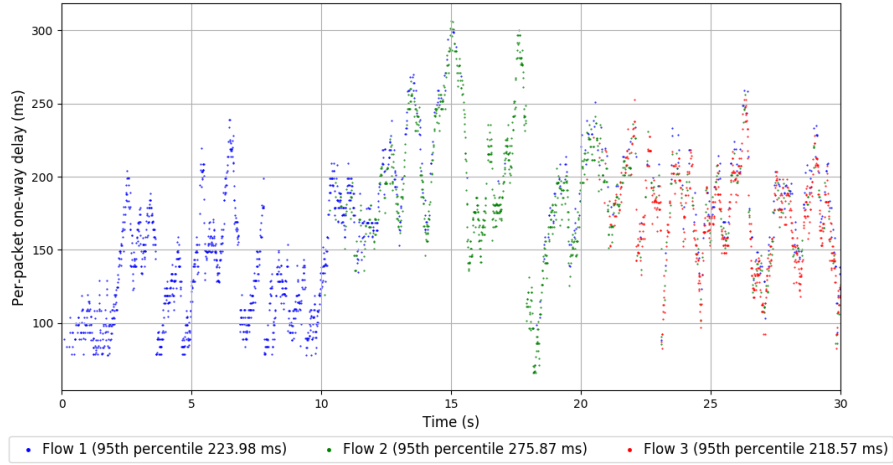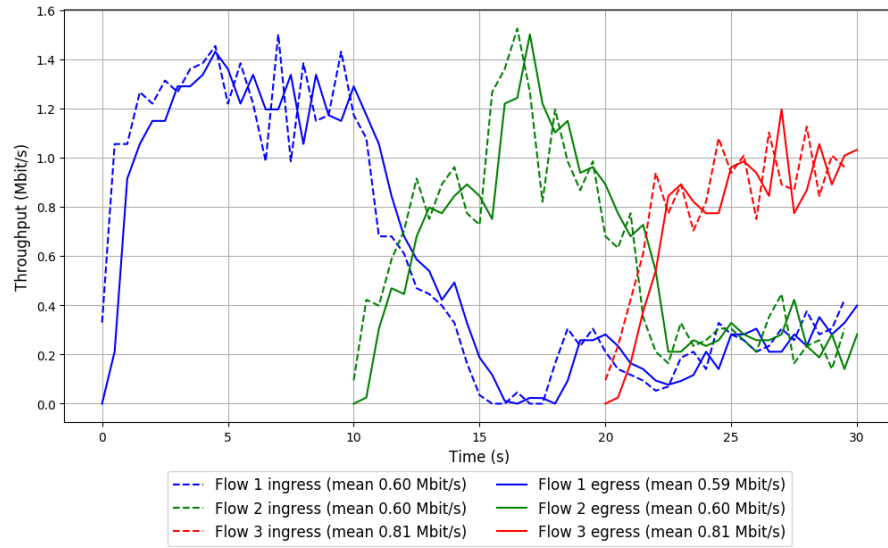Run 2: Report of Indigo-96d2da3 — Data Link

```
Run 3: Statistics of Indigo-96d2da3

Start at: 2018-12-02 14:01:02
End at: 2018-12-02 14:01:32
Local clock offset: -0.145 ms
Remote clock offset: -5.104 ms


# Below is generated by plot.py at 2018-12-02 14:07:33
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.11 Mbit/s
95th percentile per-packet one-way delay: 355.871 ms
Loss rate: 31.25%
-- Flow 1:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 352.621 ms
Loss rate: 23.56%
-- Flow 2:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 358.703 ms
Loss rate: 35.04%
-- Flow 3:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 359.796 ms
Loss rate: 44.03%
```

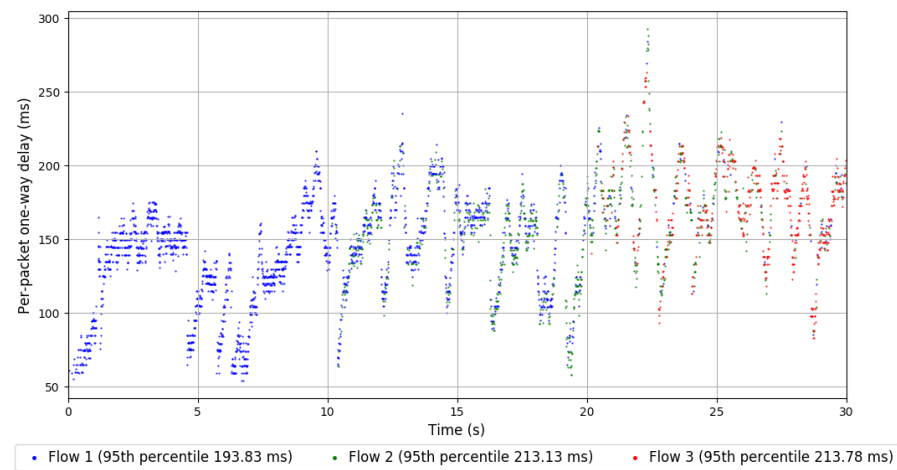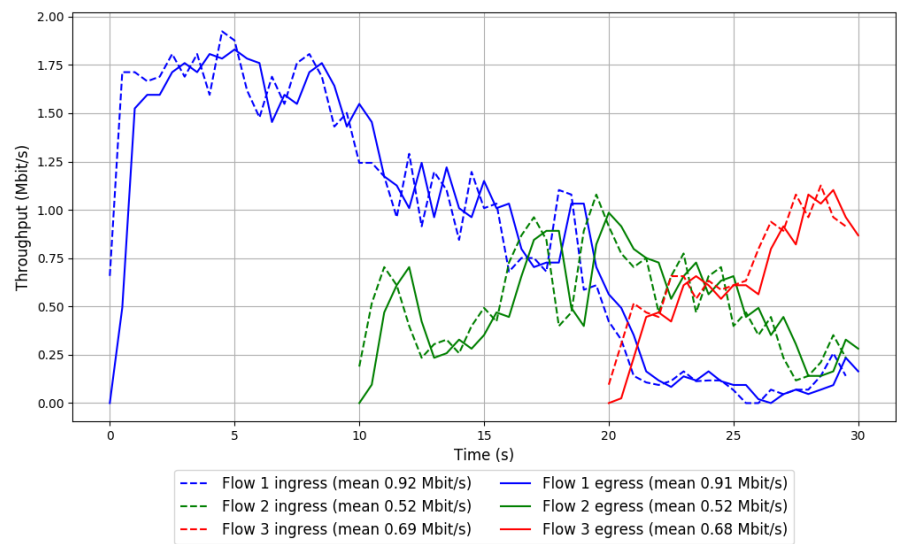Run 3: Report of Indigo-96d2da3 — Data Link

```
Run 1: Statistics of LEDBAT

Start at: 2018-12-02 13:08:20
End at: 2018-12-02 13:08:50
Local clock offset: 4.309 ms
Remote clock offset: -4.934 ms

# Below is generated by plot.py at 2018-12-02 14:07:34
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 246.270 ms
Loss rate: 1.27%
-- Flow 1:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 223.979 ms
Loss rate: 1.25%
-- Flow 2:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 275.871 ms
Loss rate: 0.88%
-- Flow 3:
Average throughput: 0.81 Mbit/s
95th percentile per-packet one-way delay: 218.574 ms
Loss rate: 1.90%
```
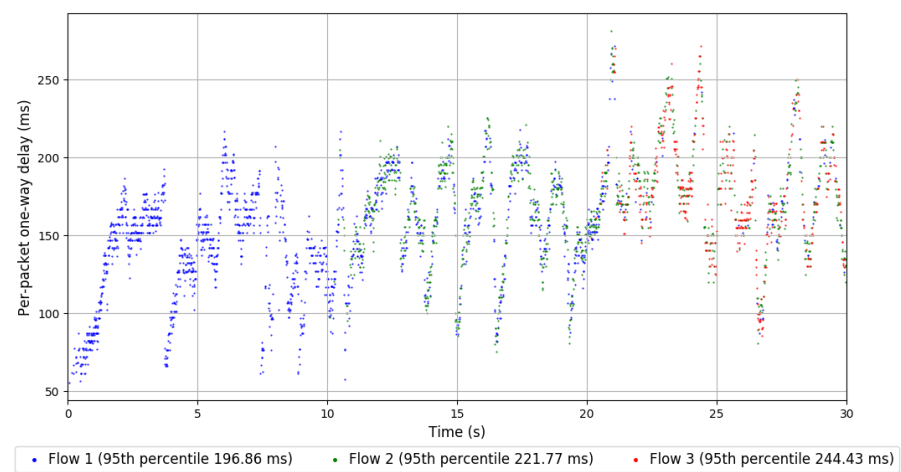
Run 1: Report of LEDBAT — Data Link

```
Run 2: Statistics of LEDBAT

Start at: 2018-12-02 13:29:39
End at: 2018-12-02 13:30:09
Local clock offset: 2.33 ms
Remote clock offset: -5.525 ms


# Below is generated by plot.py at 2018-12-02 14:07:34
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.48 Mbit/s
95th percentile per-packet one-way delay: 203.210 ms
Loss rate: 1.10%
-- Flow 1:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 193.830 ms
Loss rate: 0.60%
-- Flow 2:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 213.134 ms
Loss rate: 1.01%
-- Flow 3:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 213.781 ms
Loss rate: 3.23%
```

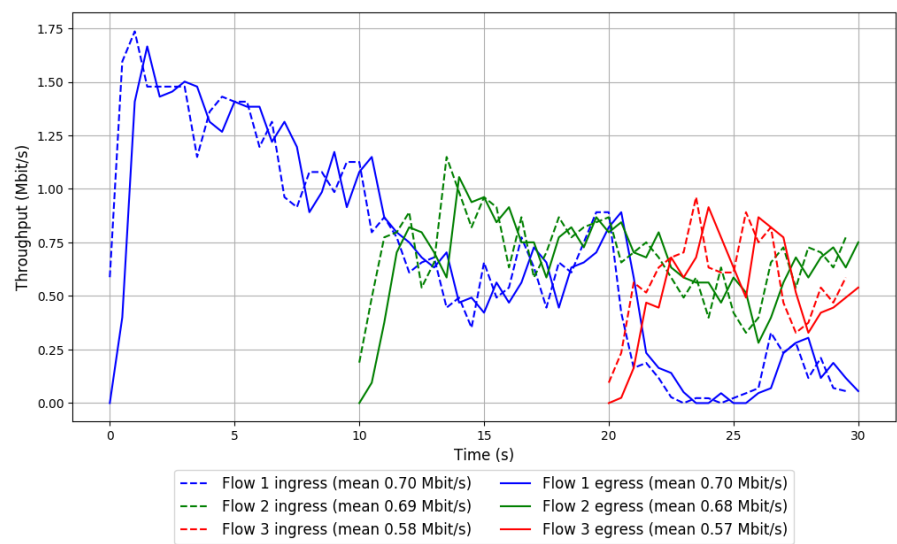# Run 2: Report of LEDBAT — Data Link

```
Run 3: Statistics of LEDBAT

Start at: 2018-12-02 13:50:57
End at: 2018-12-02 13:51:27
Local clock offset: 2.463 ms
Remote clock offset: -4.555 ms

# Below is generated by plot.py at 2018-12-02 14:07:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.33 Mbit/s
95th percentile per-packet one-way delay: 214.984 ms
Loss rate: 1.25%
-- Flow 1:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 196.858 ms
Loss rate: 0.45%
-- Flow 2:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 221.771 ms
Loss rate: 1.53%
-- Flow 3:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 244.434 ms
Loss rate: 3.48%
```
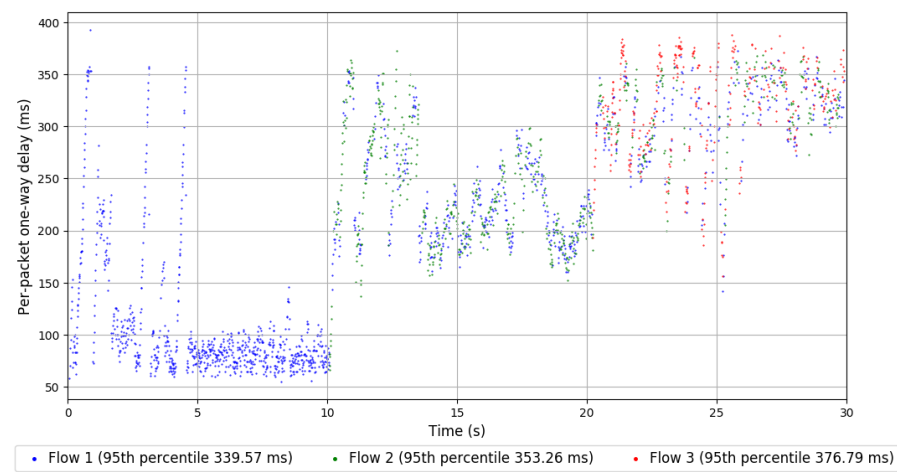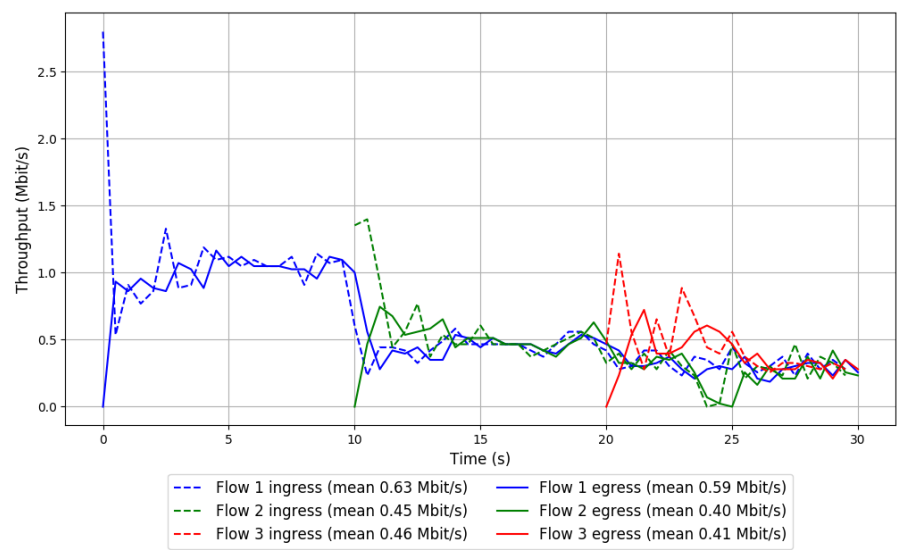
Run 3: Report of LEDBAT — Data Link

```
Run 1: Statistics of Indigo-Muses

Start at: 2018-12-02 13:20:42
End at: 2018-12-02 13:21:12
Local clock offset: 3.314 ms
Remote clock offset: -5.136 ms


# Below is generated by plot.py at 2018-12-02 14:07:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 356.472 ms
Loss rate: 9.60%
-- Flow 1:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 339.575 ms
Loss rate: 6.98%
-- Flow 2:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 353.264 ms
Loss rate: 13.28%
-- Flow 3:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 376.791 ms
Loss rate: 13.16%
```

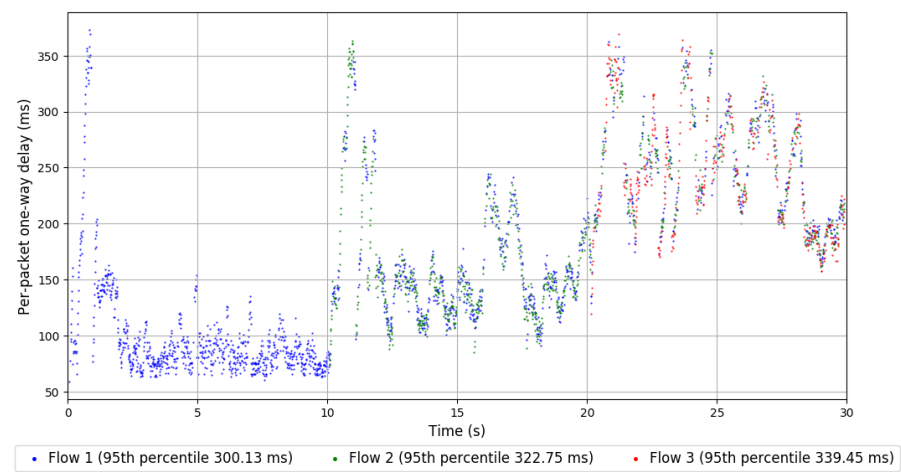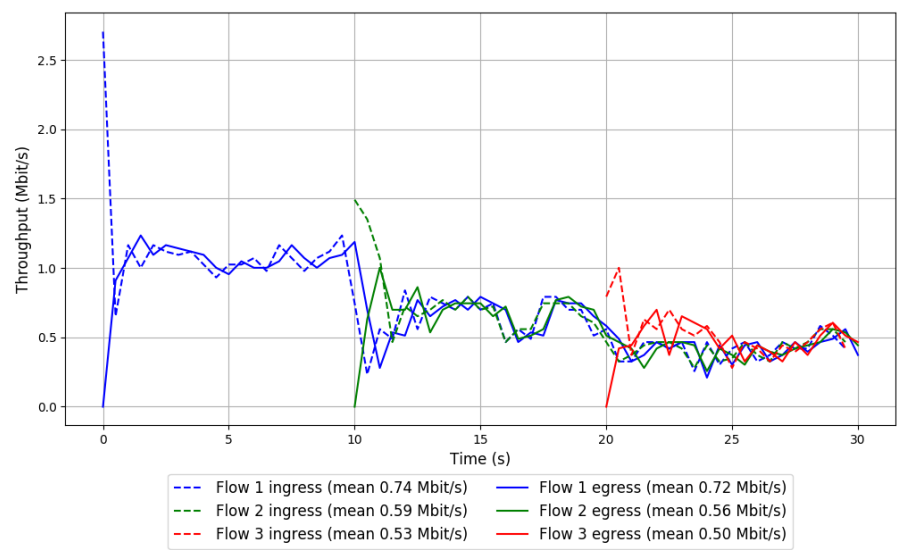Run 1: Report of Indigo-Muses — Data Link

```
Run 2: Statistics of Indigo-Muses

Start at: 2018-12-02 13:42:02
End at: 2018-12-02 13:42:32
Local clock offset: 2.668 ms
Remote clock offset: -5.235 ms

# Below is generated by plot.py at 2018-12-02 14:07:35
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 320.134 ms
Loss rate: 4.79%
-- Flow 1:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 300.131 ms
Loss rate: 3.17%
-- Flow 2:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 322.751 ms
Loss rate: 6.30%
-- Flow 3:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 339.452 ms
Loss rate: 8.17%
```

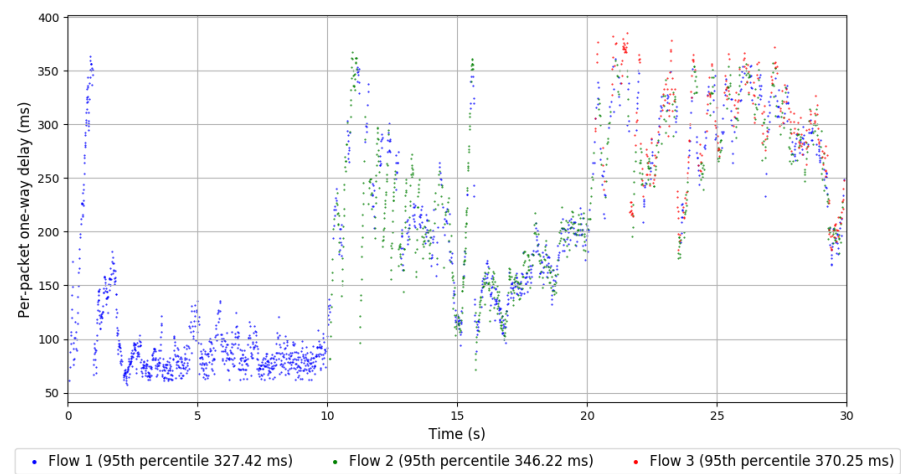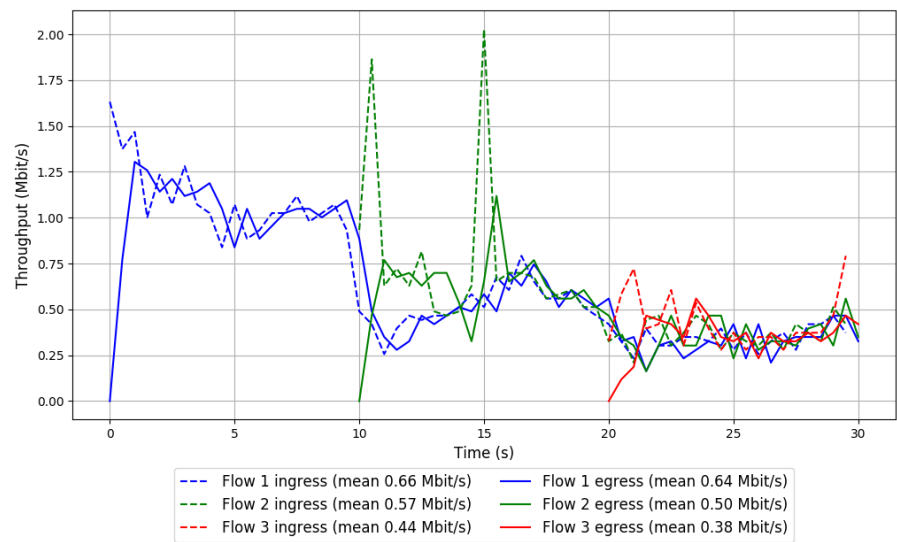Run 2: Report of Indigo-Muses — Data Link

```
Run 3: Statistics of Indigo-Muses

Start at: 2018-12-02 14:03:17
End at: 2018-12-02 14:03:47
Local clock offset: 2.808 ms
Remote clock offset: -3.279 ms


# Below is generated by plot.py at 2018-12-02 14:07:36
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 345.131 ms
Loss rate: 7.99%
-- Flow 1:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 327.424 ms
Loss rate: 3.90%
-- Flow 2:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 346.222 ms
Loss rate: 12.40%
-- Flow 3:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 370.253 ms
Loss rate: 15.22%
```

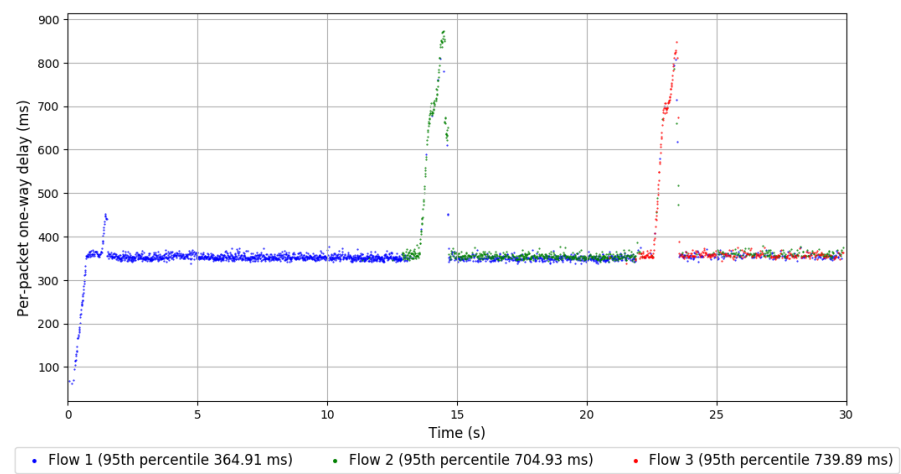# Run 3: Report of Indigo-Muses — Data Link

Flow 1 ingress (mean 0.66 Mbit/s)   Flow 1 egress (mean 0.64 Mbit/s)
Flow 2 ingress (mean 0.57 Mbit/s)   Flow 2 egress (mean 0.50 Mbit/s)
Flow 3 ingress (mean 0.44 Mbit/s)   Flow 3 egress (mean 0.38 Mbit/s)

Flow 1 (95th percentile 327.42 ms)   Flow 2 (95th percentile 346.22 ms)   Flow 3 (95th percentile 370.25 ms)
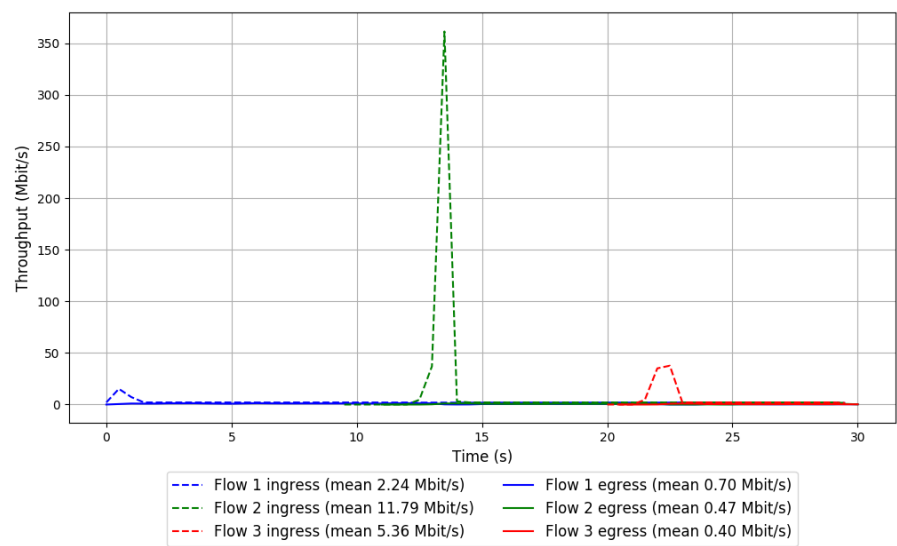
```
Run 1: Statistics of PCC-Allegro

Start at: 2018-12-02 13:13:54
End at: 2018-12-02 13:14:24
Local clock offset: 1.51 ms
Remote clock offset: -5.072 ms


# Below is generated by plot.py at 2018-12-02 14:07:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.12 Mbit/s
95th percentile per-packet one-way delay: 583.688 ms
Loss rate: 90.59%
-- Flow 1:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 364.908 ms
Loss rate: 68.63%
-- Flow 2:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 704.935 ms
Loss rate: 96.27%
-- Flow 3:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 739.891 ms
Loss rate: 93.15%
```

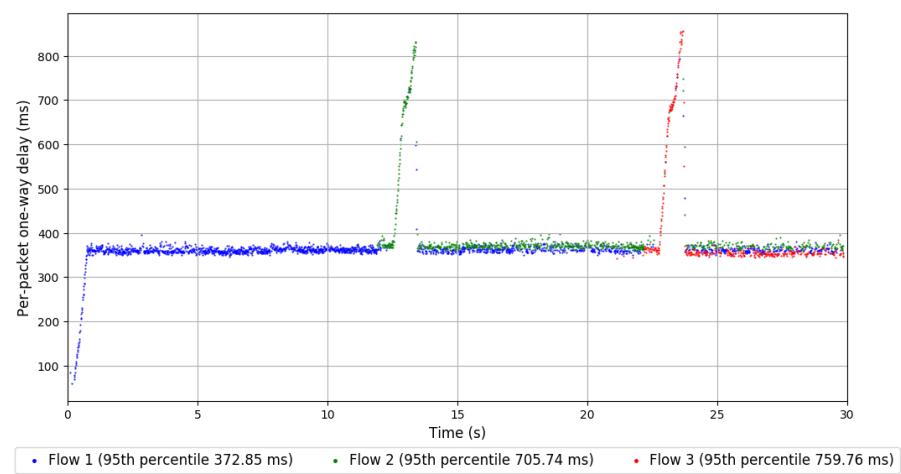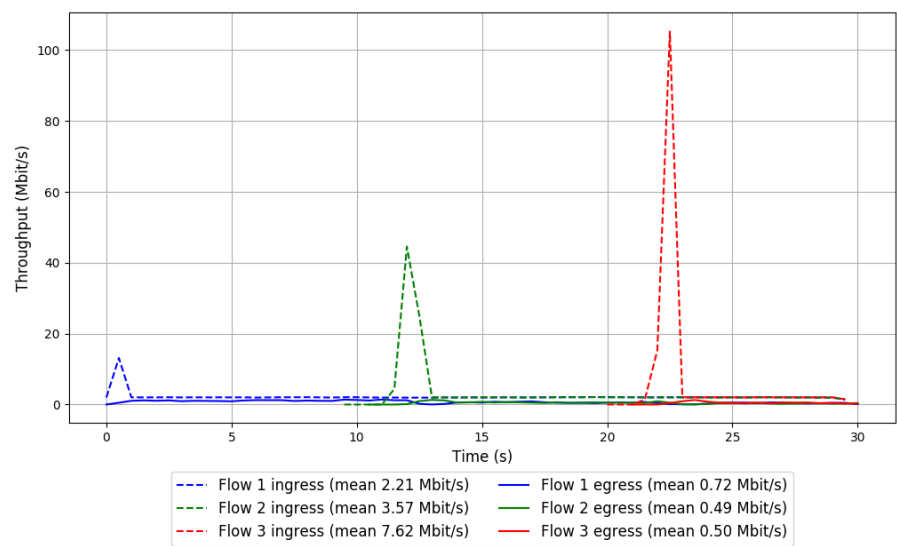Run 1: Report of PCC-Allegro — Data Link

Flow 1 ingress (mean 2.24 Mbit/s)   Flow 1 egress (mean 0.70 Mbit/s)
Flow 2 ingress (mean 11.79 Mbit/s)   Flow 2 egress (mean 0.47 Mbit/s)
Flow 3 ingress (mean 5.36 Mbit/s)   Flow 3 egress (mean 0.40 Mbit/s)

Flow 1 (95th percentile 364.91 ms)   Flow 2 (95th percentile 704.93 ms)   Flow 3 (95th percentile 739.89 ms)

```
Run 2: Statistics of PCC-Allegro

Start at: 2018-12-02 13:35:18
End at: 2018-12-02 13:35:48
Local clock offset: 4.202 ms
Remote clock offset: -4.895 ms


# Below is generated by plot.py at 2018-12-02 14:07:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 590.134 ms
Loss rate: 83.43%
-- Flow 1:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 372.847 ms
Loss rate: 67.62%
-- Flow 2:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 705.737 ms
Loss rate: 86.86%
-- Flow 3:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 759.763 ms
Loss rate: 94.14%
```

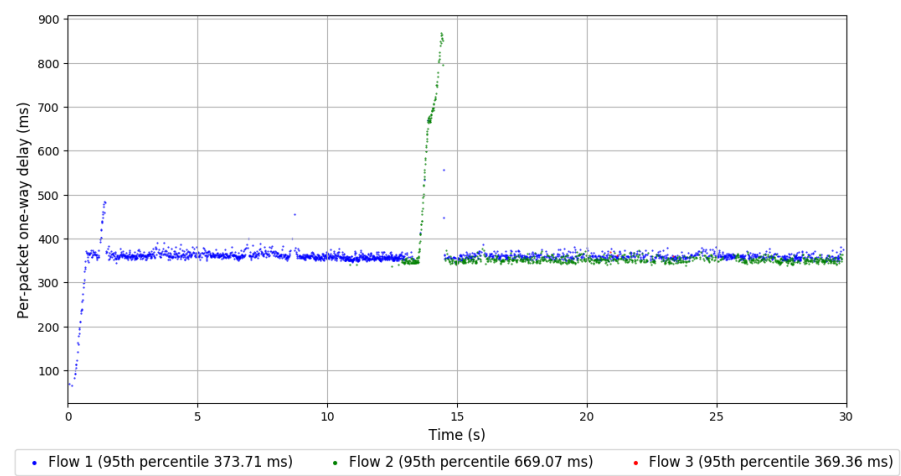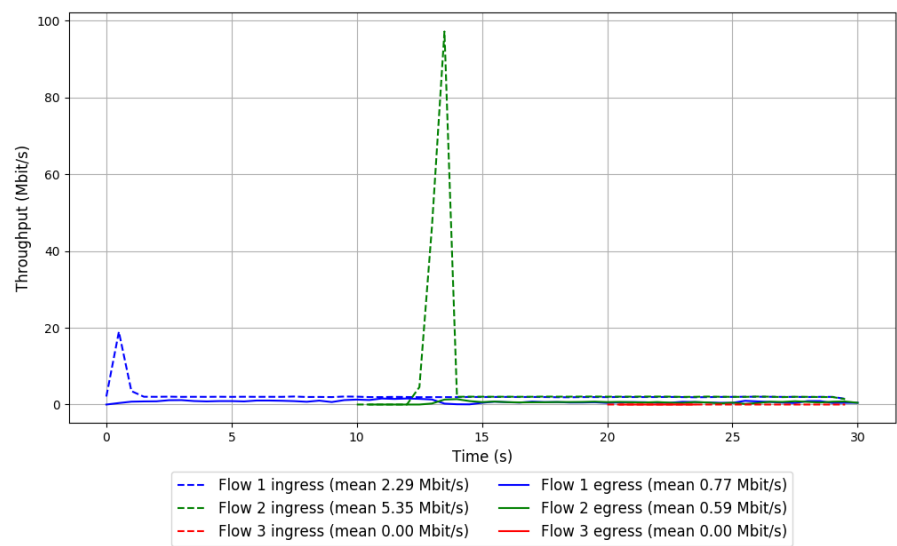Run 2: Report of PCC-Allegro — Data Link

Flow 1 ingress (mean 2.21 Mbit/s)   Flow 1 egress (mean 0.72 Mbit/s)
Flow 2 ingress (mean 3.57 Mbit/s)   Flow 2 egress (mean 0.49 Mbit/s)
Flow 3 ingress (mean 7.62 Mbit/s)   Flow 3 egress (mean 0.50 Mbit/s)

Flow 1 (95th percentile 372.85 ms)   Flow 2 (95th percentile 705.74 ms)   Flow 3 (95th percentile 759.76 ms)

```
Run 3: Statistics of PCC-Allegro

Start at: 2018-12-02 13:56:33
End at: 2018-12-02 13:57:03
Local clock offset: 0.639 ms
Remote clock offset: -4.295 ms


# Below is generated by plot.py at 2018-12-02 14:07:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 378.049 ms
Loss rate: 80.56%
-- Flow 1:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 373.707 ms
Loss rate: 66.69%
-- Flow 2:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 669.074 ms
Loss rate: 89.49%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 369.358 ms
Loss rate: 88.19%
```
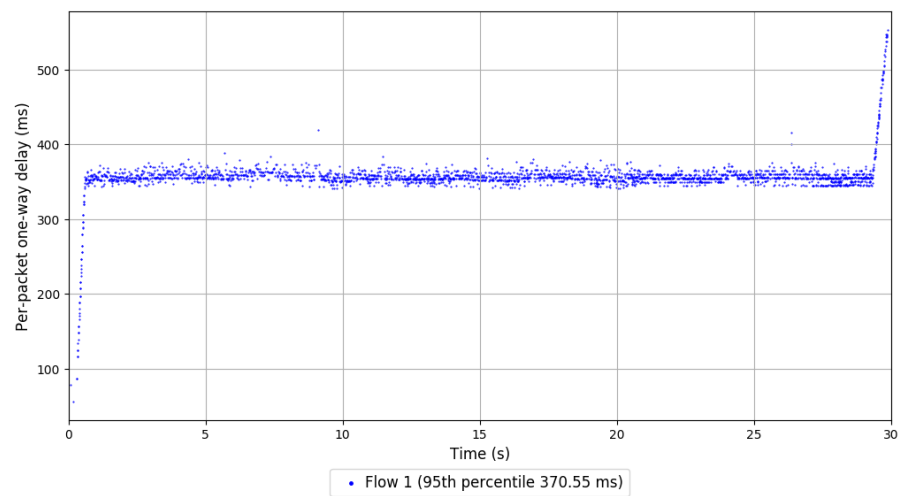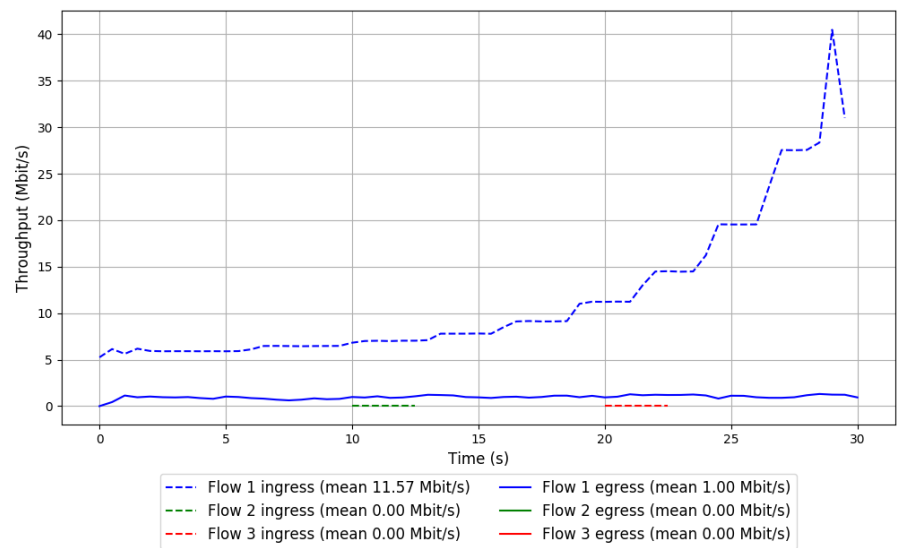
Run 3: Report of PCC-Allegro — Data Link

Flow 1 ingress (mean 2.29 Mbit/s) --- Flow 1 egress (mean 0.77 Mbit/s)
Flow 2 ingress (mean 5.35 Mbit/s) --- Flow 2 egress (mean 0.59 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s) --- Flow 3 egress (mean 0.00 Mbit/s)

• Flow 1 (95th percentile 373.71 ms) • Flow 2 (95th percentile 669.07 ms) • Flow 3 (95th percentile 369.36 ms)

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```
Run 1: Statistics of PCC-Expr

Start at: 2018-12-02 13:19:34
End at: 2018-12-02 13:20:04
Local clock offset: 1.848 ms
Remote clock offset: -4.887 ms
```
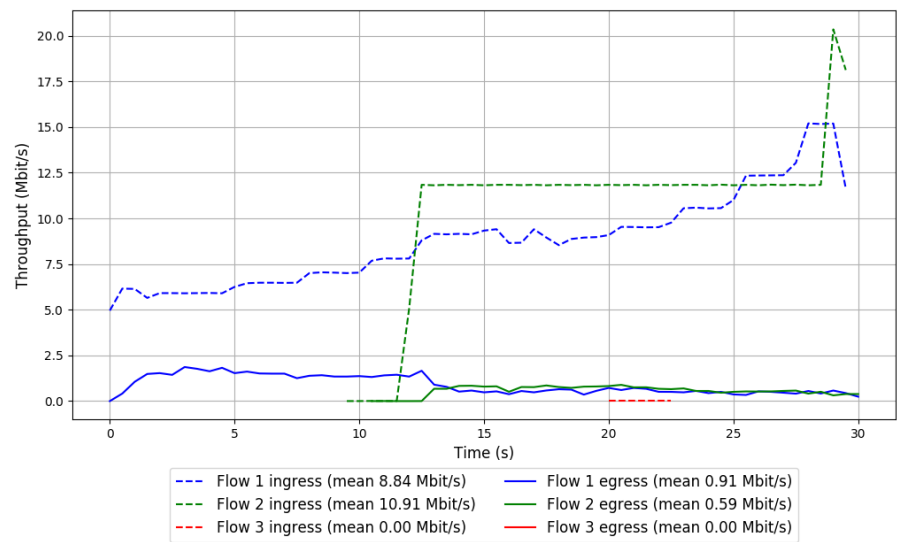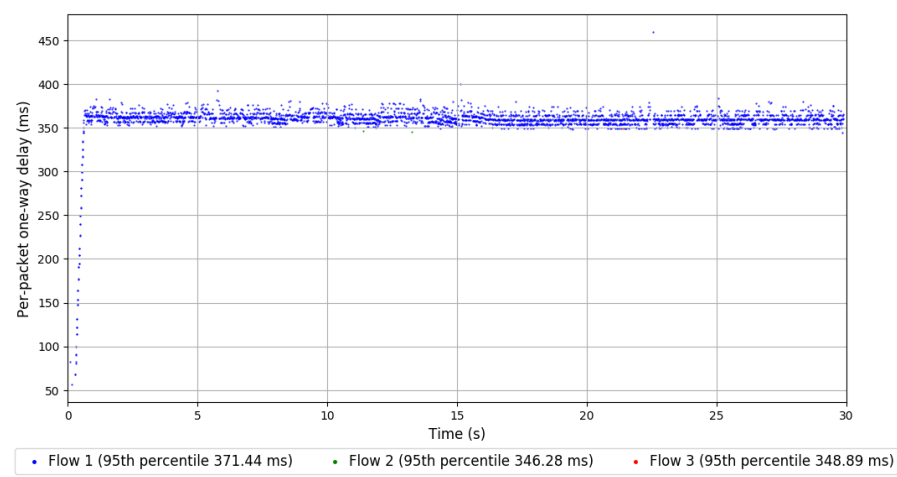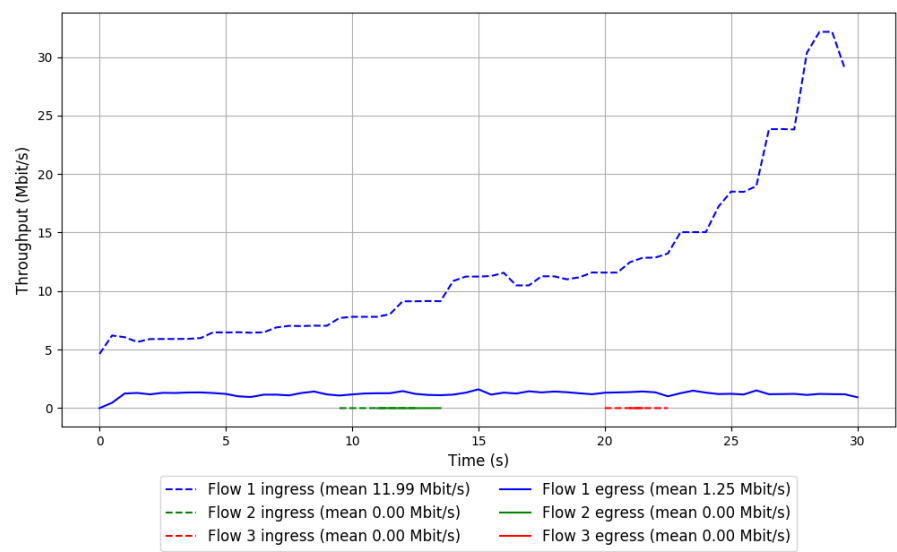
Run 1: Report of PCC-Expr — Data Link

Flow 1 ingress (mean 11.57 Mbit/s)
Flow 1 egress (mean 1.00 Mbit/s)
Flow 2 ingress (mean 0.00 Mbit/s)
Flow 2 egress (mean 0.00 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s)
Flow 3 egress (mean 0.00 Mbit/s)

Flow 1 (95th percentile 370.55 ms)

```
Run 2: Statistics of PCC-Expr

Start at: 2018-12-02 13:40:53
End at: 2018-12-02 13:41:23
Local clock offset: 3.617 ms
Remote clock offset: -4.672 ms
```

Run 2: Report of PCC-Expr — Data Link

```
Run 3: Statistics of PCC-Expr

Start at: 2018-12-02 14:02:09
End at: 2018-12-02 14:02:39
Local clock offset: 2.249 ms
Remote clock offset: -4.017 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 371.435 ms
Loss rate: 89.63%
-- Flow 1:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 371.435 ms
Loss rate: 89.63%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 346.278 ms
Loss rate: 84.62%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 348.891 ms
Loss rate: 92.31%
```

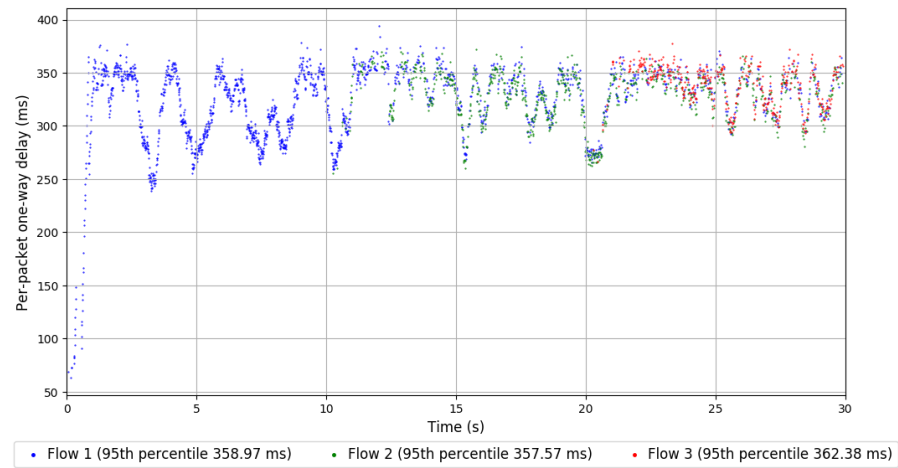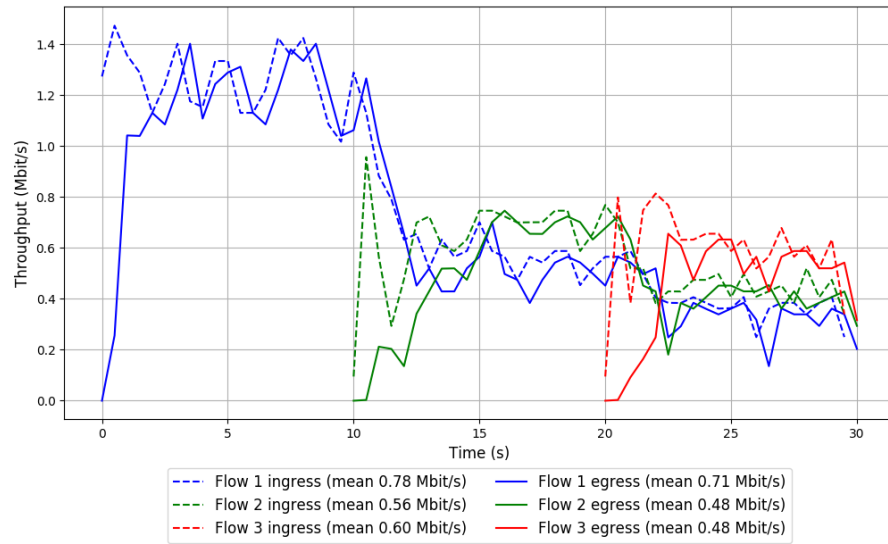## Run 3: Report of PCC-Expr — Data Link

```
Run 1: Statistics of QUIC Cubic

Start at: 2018-12-02 13:06:06
End at: 2018-12-02 13:06:36
Local clock offset: 3.142 ms
Remote clock offset: -4.592 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 359.292 ms
Loss rate: 13.13%
-- Flow 1:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 358.972 ms
Loss rate: 9.76%
-- Flow 2:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 357.568 ms
Loss rate: 15.47%
-- Flow 3:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 362.382 ms
Loss rate: 21.99%
```

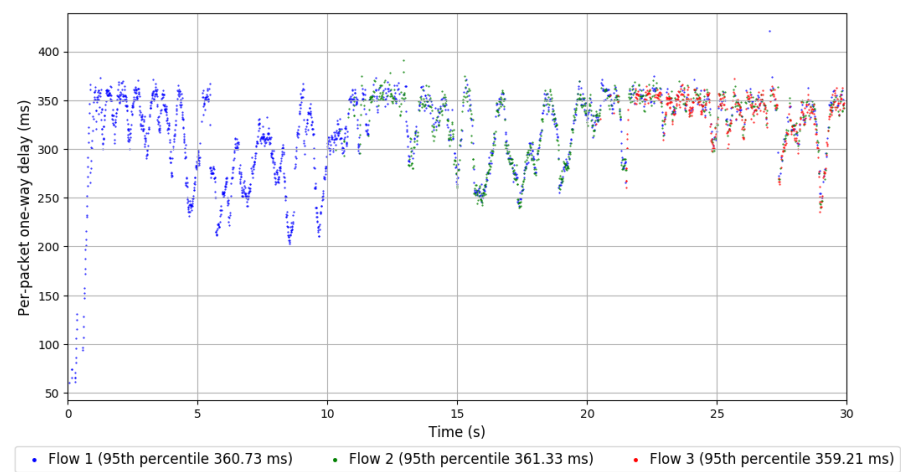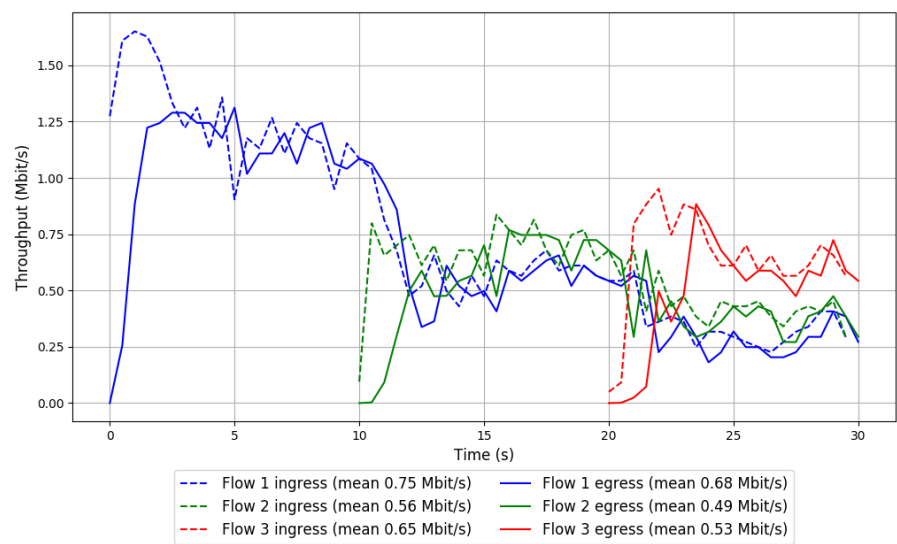Run 1: Report of QUIC Cubic — Data Link

```
Run 2: Statistics of QUIC Cubic

Start at: 2018-12-02 13:27:23
End at: 2018-12-02 13:27:53
Local clock offset: 4.65 ms
Remote clock offset: -5.167 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 360.769 ms
Loss rate: 13.14%
-- Flow 1:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 360.725 ms
Loss rate: 10.13%
-- Flow 2:
Average throughput: 0.49 Mbit/s
95th percentile per-packet one-way delay: 361.329 ms
Loss rate: 14.87%
-- Flow 3:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 359.211 ms
Loss rate: 20.72%
```
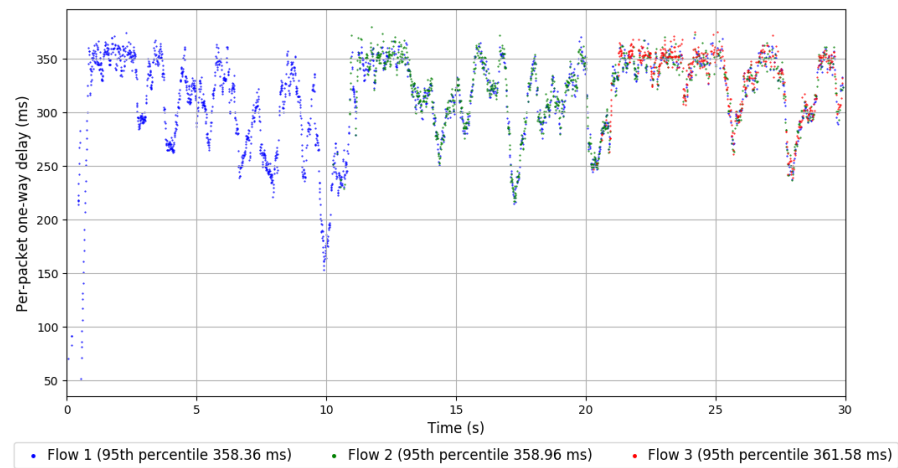
Run 2: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 0.75 Mbit/s)   Flow 1 egress (mean 0.68 Mbit/s)
Flow 2 ingress (mean 0.56 Mbit/s)   Flow 2 egress (mean 0.49 Mbit/s)
Flow 3 ingress (mean 0.65 Mbit/s)   Flow 3 egress (mean 0.53 Mbit/s)

Flow 1 (95th percentile 360.73 ms)   Flow 2 (95th percentile 361.33 ms)   Flow 3 (95th percentile 359.21 ms)
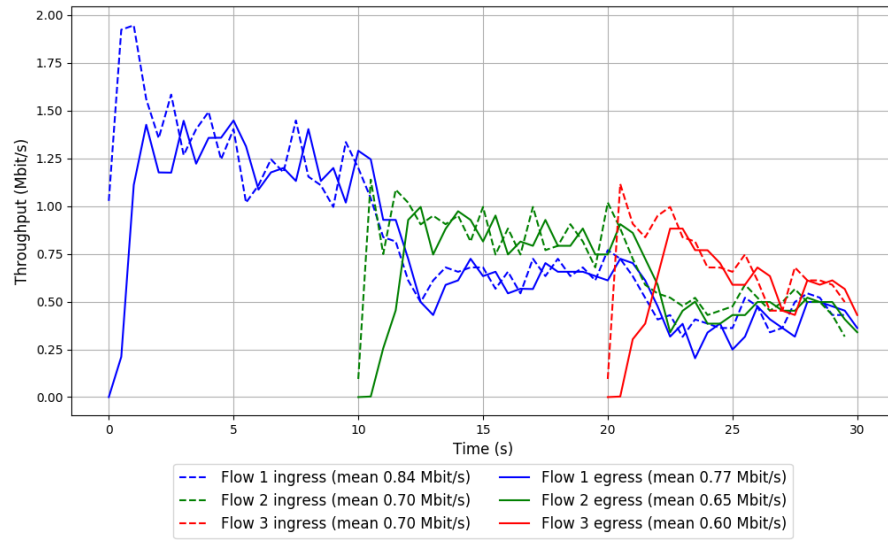
```
Run 3: Statistics of QUIC Cubic

Start at: 2018-12-02 13:48:43
End at: 2018-12-02 13:49:13
Local clock offset: 3.513 ms
Remote clock offset: -5.005 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.39 Mbit/s
95th percentile per-packet one-way delay: 359.320 ms
Loss rate: 10.03%
-- Flow 1:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 358.364 ms
Loss rate: 8.59%
-- Flow 2:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 358.962 ms
Loss rate: 9.32%
-- Flow 3:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 361.579 ms
Loss rate: 16.72%
```

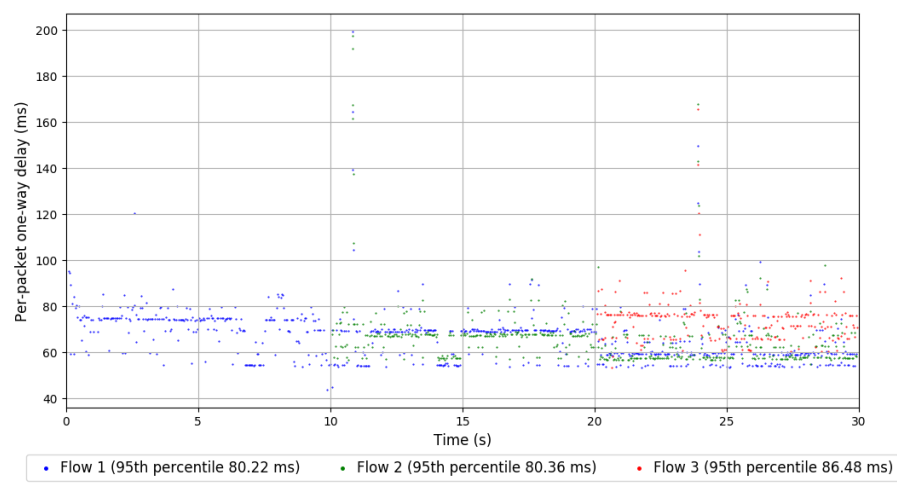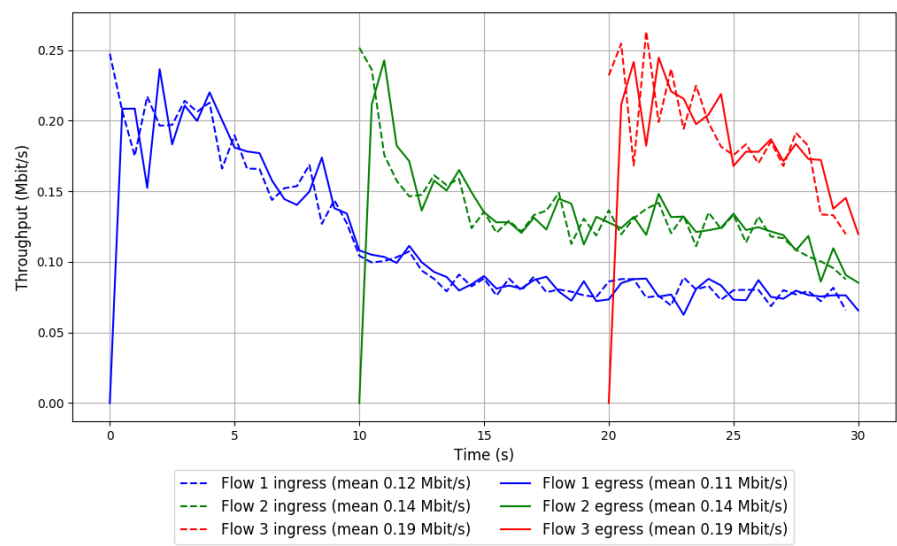Run 3: Report of QUIC Cubic — Data Link

```
Run 1: Statistics of SCReAM

Start at: 2018-12-02 13:11:40
End at: 2018-12-02 13:12:10
Local clock offset: 1.253 ms
Remote clock offset: -6.131 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 82.745 ms
Loss rate: 1.03%
-- Flow 1:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 80.223 ms
Loss rate: 1.26%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 80.357 ms
Loss rate: 0.63%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 86.478 ms
Loss rate: 1.16%
```
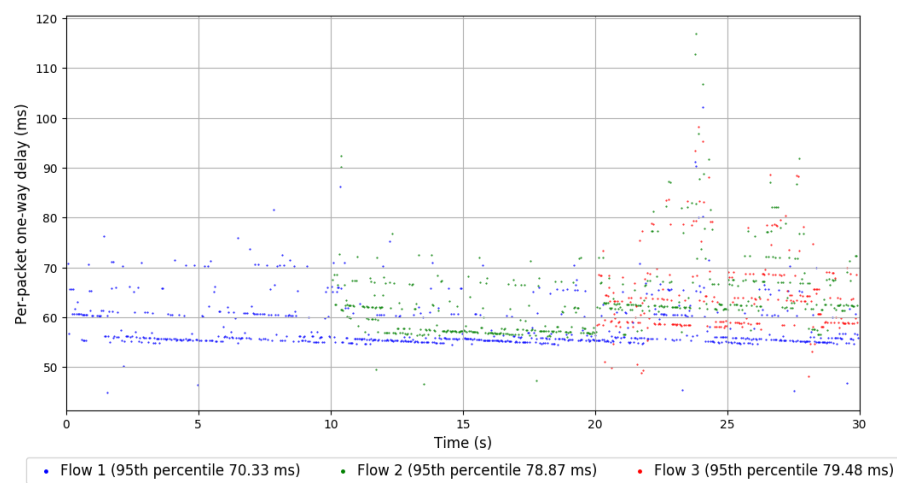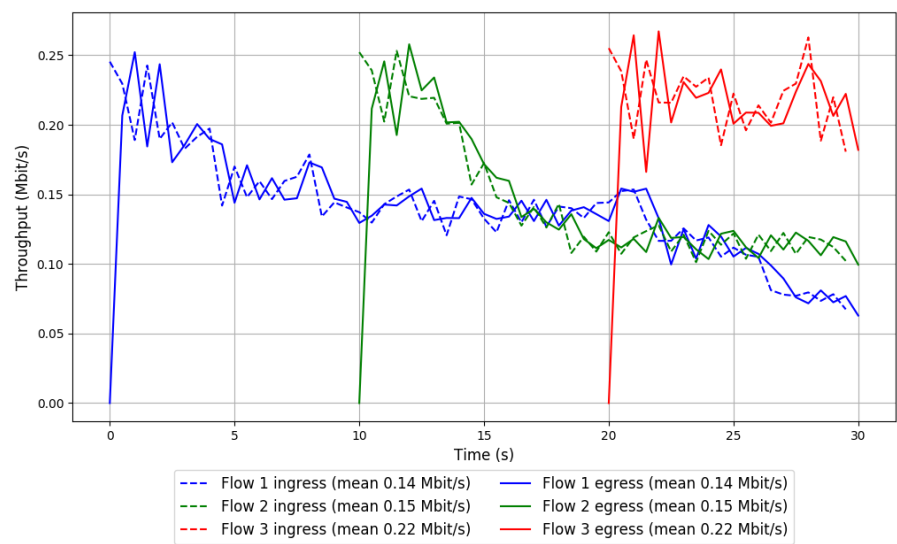
Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2018-12-02 13:32:59
End at: 2018-12-02 13:33:29
Local clock offset: 3.37 ms
Remote clock offset: -4.253 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 76.879 ms
Loss rate: 0.81%
-- Flow 1:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 70.328 ms
Loss rate: 0.85%
-- Flow 2:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 78.870 ms
Loss rate: 0.84%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 79.481 ms
Loss rate: 0.69%
```
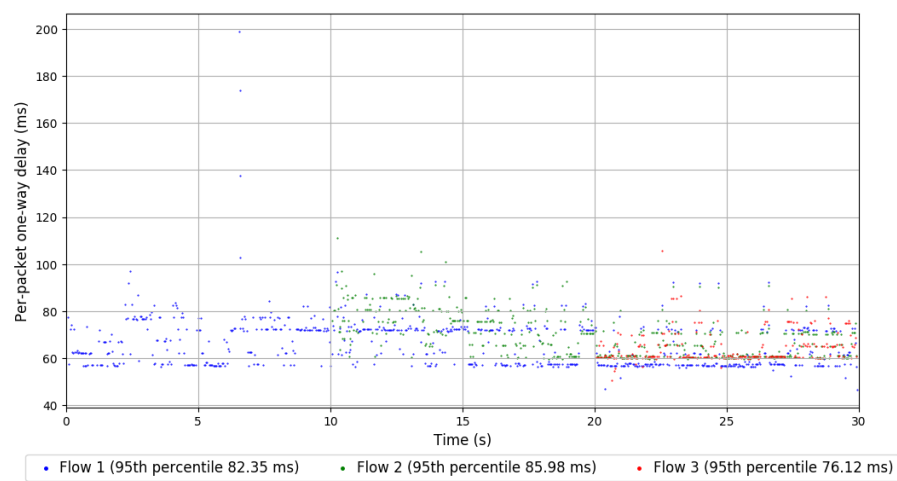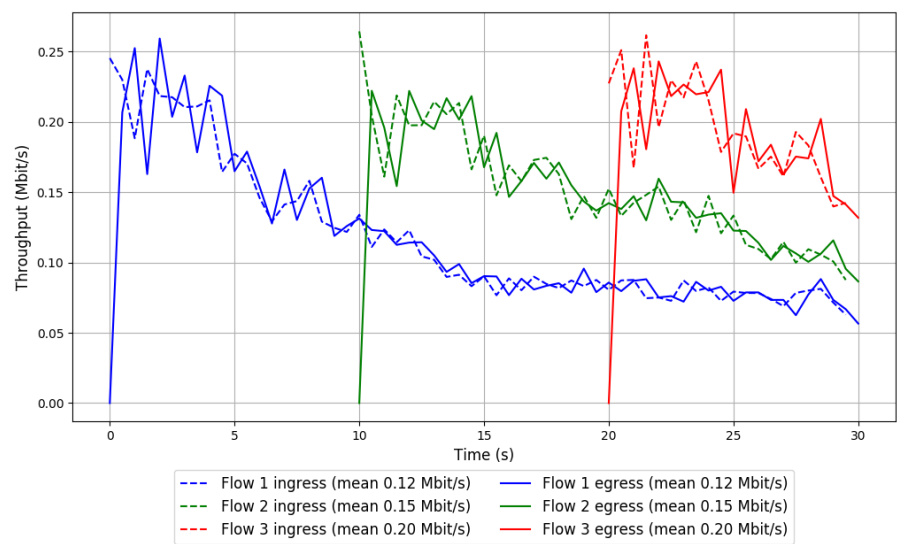
Run 2: Report of SCReAM — Data Link

```
Run 3: Statistics of SCReAM

Start at: 2018-12-02 13:54:19
End at: 2018-12-02 13:54:49
Local clock offset: 3.294 ms
Remote clock offset: -4.619 ms

# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 85.416 ms
Loss rate: 1.23%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 82.349 ms
Loss rate: 1.08%
-- Flow 2:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 85.984 ms
Loss rate: 1.36%
-- Flow 3:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 76.125 ms
Loss rate: 1.29%
```

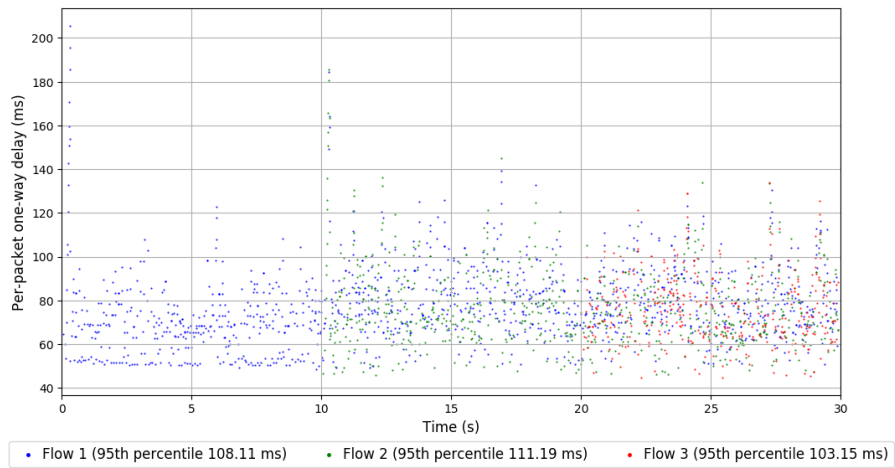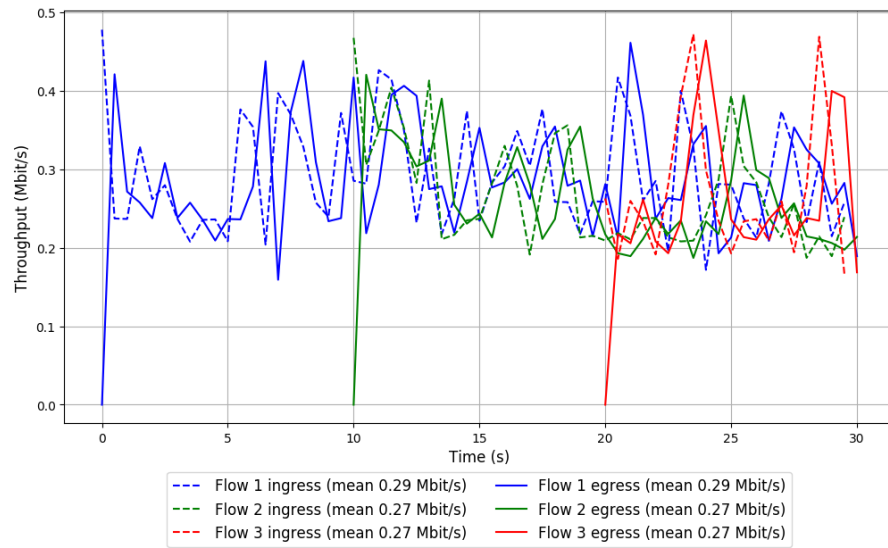# Run 3: Report of SCReAM — Data Link

```
Run 1: Statistics of Sprout

Start at: 2018-12-02 13:15:01
End at: 2018-12-02 13:15:31
Local clock offset: 1.995 ms
Remote clock offset: -4.454 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 108.378 ms
Loss rate: 1.07%
-- Flow 1:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 108.107 ms
Loss rate: 0.83%
-- Flow 2:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 111.185 ms
Loss rate: 1.22%
-- Flow 3:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 103.148 ms
Loss rate: 1.54%
```

Run 1: Report of Sprout — Data Link

Flow 1 ingress (mean 0.29 Mbit/s) --- Flow 1 egress (mean 0.29 Mbit/s)
Flow 2 ingress (mean 0.27 Mbit/s) --- Flow 2 egress (mean 0.27 Mbit/s)
Flow 3 ingress (mean 0.27 Mbit/s) --- Flow 3 egress (mean 0.27 Mbit/s)

Flow 1 (95th percentile 108.11 ms)   Flow 2 (95th percentile 111.19 ms)   Flow 3 (95th percentile 103.15 ms)
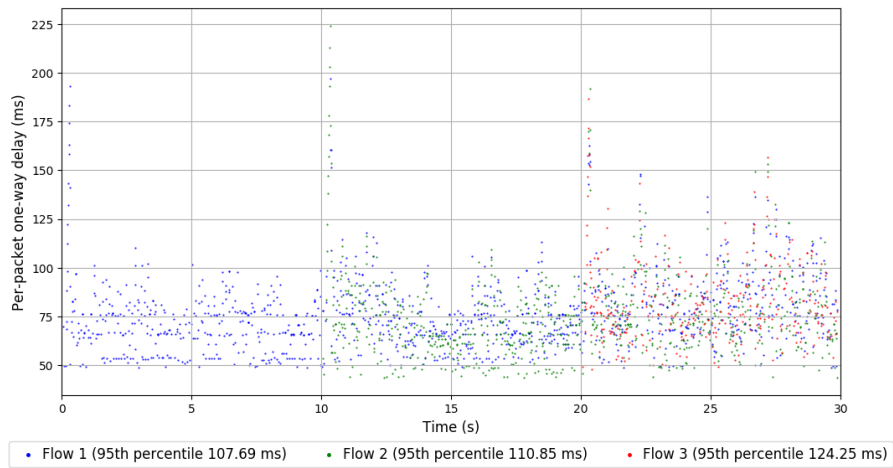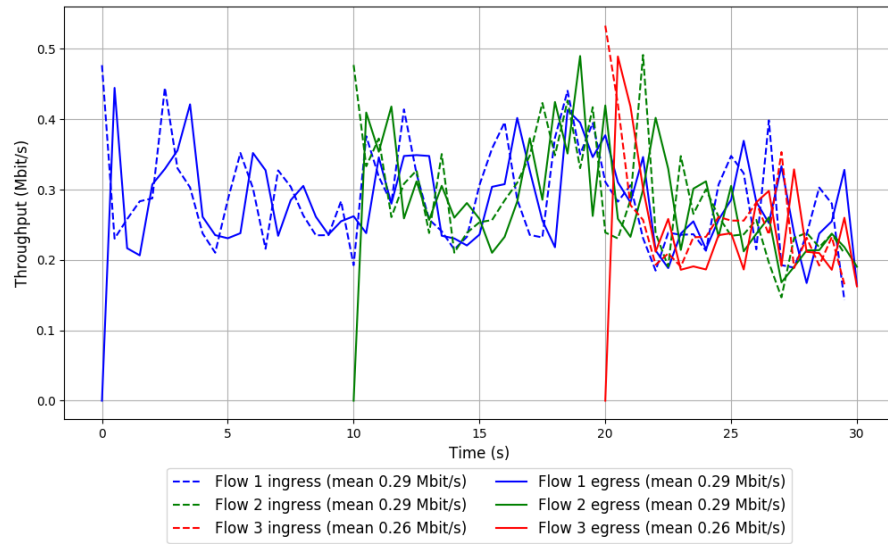
84

```
Run 2: Statistics of Sprout

Start at: 2018-12-02 13:36:26
End at: 2018-12-02 13:36:56
Local clock offset: 5.516 ms
Remote clock offset: -4.449 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 111.663 ms
Loss rate: 1.08%
-- Flow 1:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 107.689 ms
Loss rate: 0.61%
-- Flow 2:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 110.854 ms
Loss rate: 0.82%
-- Flow 3:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 124.254 ms
Loss rate: 3.24%
```
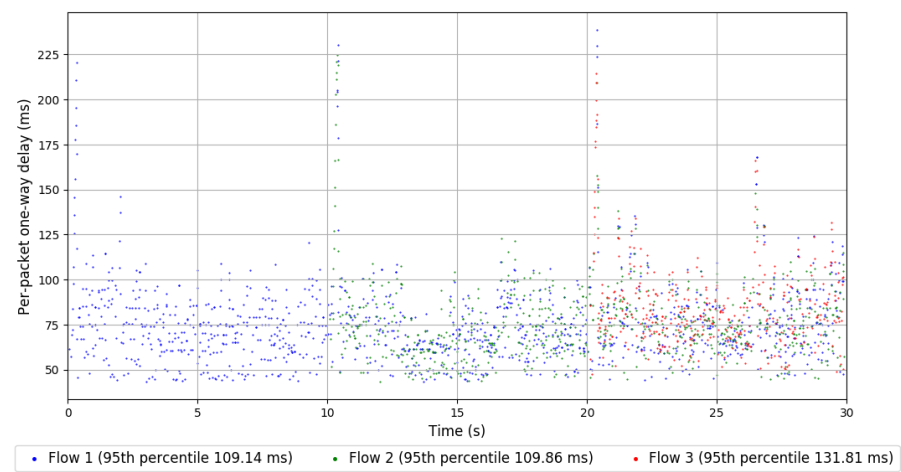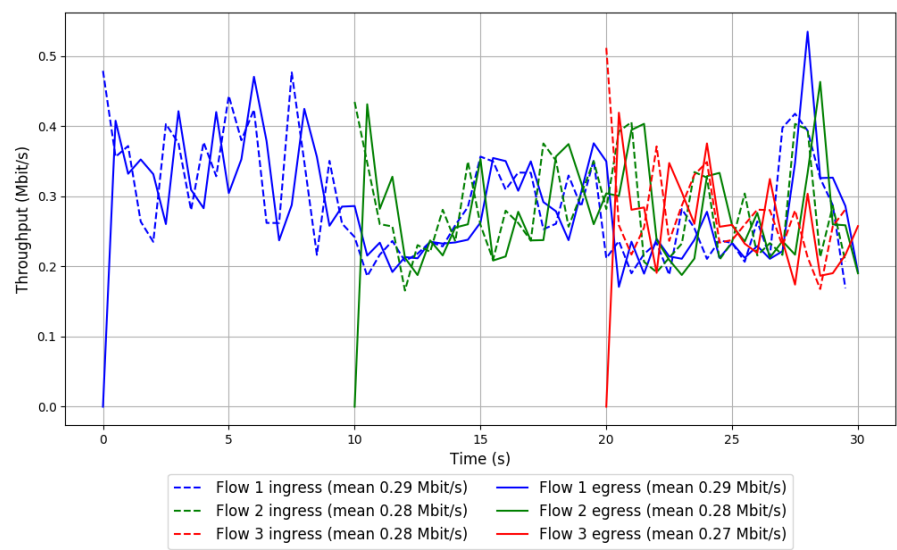
Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2018-12-02 13:57:40
End at: 2018-12-02 13:58:10
Local clock offset: 0.586 ms
Remote clock offset: -4.253 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 114.682 ms
Loss rate: 1.43%
-- Flow 1:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 109.141 ms
Loss rate: 1.17%
-- Flow 2:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 109.857 ms
Loss rate: 0.61%
-- Flow 3:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 131.806 ms
Loss rate: 3.89%
```
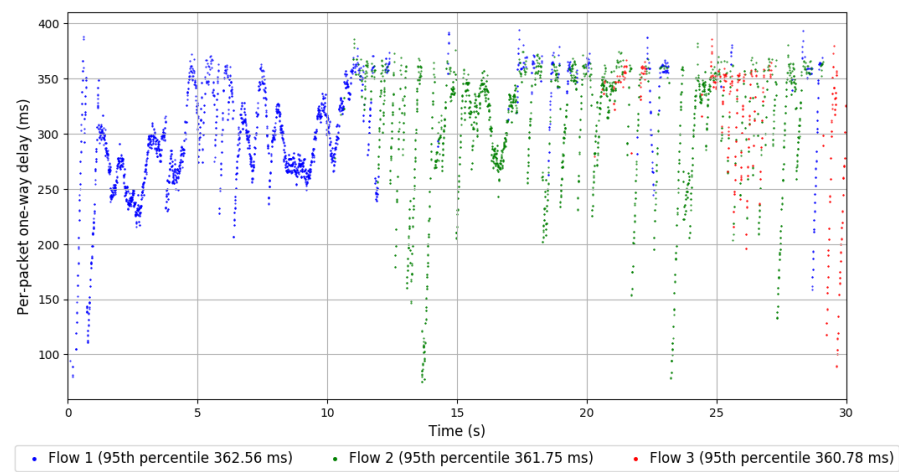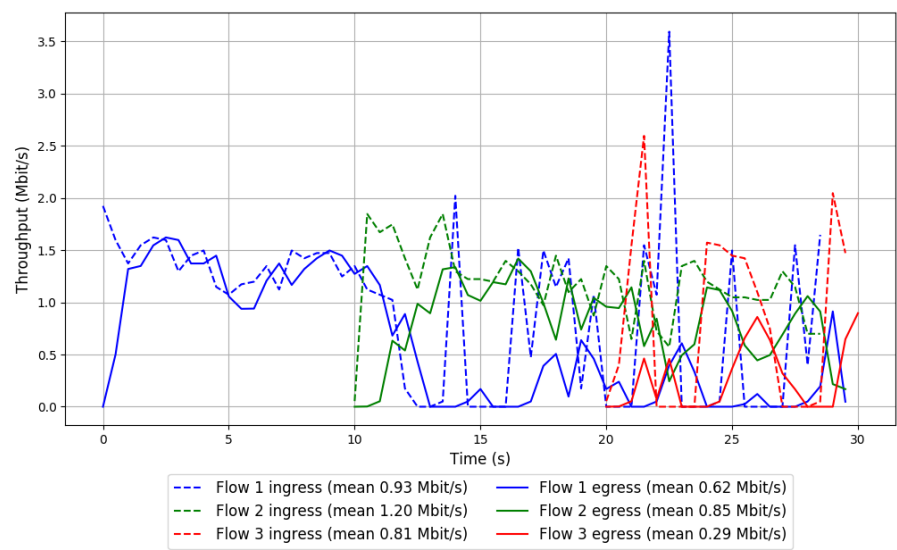
Run 3: Report of Sprout — Data Link

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

Start at: 2018-12-02 13:07:13
End at: 2018-12-02 13:07:43
Local clock offset: 3.395 ms
Remote clock offset: -5.528 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 361.772 ms
Loss rate: 35.72%
-- Flow 1:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 362.557 ms
Loss rate: 33.17%
-- Flow 2:
Average throughput: 0.85 Mbit/s
95th percentile per-packet one-way delay: 361.747 ms
Loss rate: 28.40%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 360.778 ms
Loss rate: 64.69%
```

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

Flow 1 ingress (mean 0.93 Mbit/s) Flow 1 egress (mean 0.62 Mbit/s)
Flow 2 ingress (mean 1.20 Mbit/s) Flow 2 egress (mean 0.85 Mbit/s)
Flow 3 ingress (mean 0.81 Mbit/s) Flow 3 egress (mean 0.29 Mbit/s)

Flow 1 (95th percentile 362.56 ms)   Flow 2 (95th percentile 361.75 ms)   Flow 3 (95th percentile 360.78 ms)
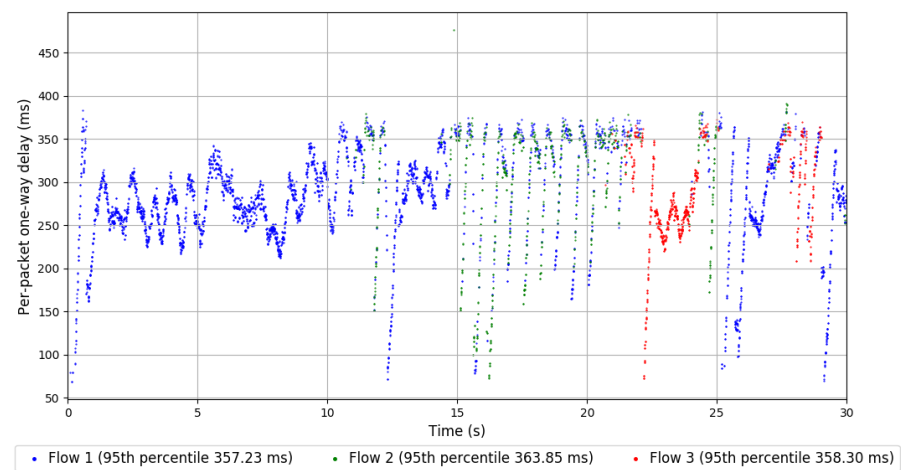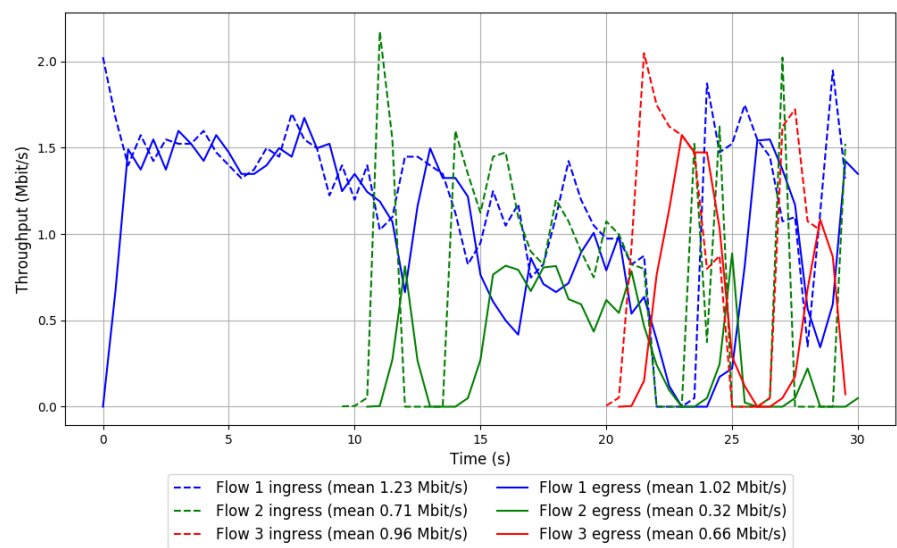
```
Run 2: Statistics of TaoVA-100x

Start at: 2018-12-02 13:28:31
End at: 2018-12-02 13:29:01
Local clock offset: 3.815 ms
Remote clock offset: -5.143 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 358.850 ms
Loss rate: 29.02%
-- Flow 1:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 357.231 ms
Loss rate: 17.23%
-- Flow 2:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 363.854 ms
Loss rate: 56.65%
-- Flow 3:
Average throughput: 0.66 Mbit/s
95th percentile per-packet one-way delay: 358.301 ms
Loss rate: 34.04%
```

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

Flow 1 ingress (mean 1.23 Mbit/s) ----- Flow 1 egress (mean 1.02 Mbit/s) ——
Flow 2 ingress (mean 0.71 Mbit/s) ----- Flow 2 egress (mean 0.32 Mbit/s) ——
Flow 3 ingress (mean 0.96 Mbit/s) ----- Flow 3 egress (mean 0.66 Mbit/s) ——

Flow 1 (95th percentile 357.23 ms) • Flow 2 (95th percentile 363.85 ms) • Flow 3 (95th percentile 358.30 ms)
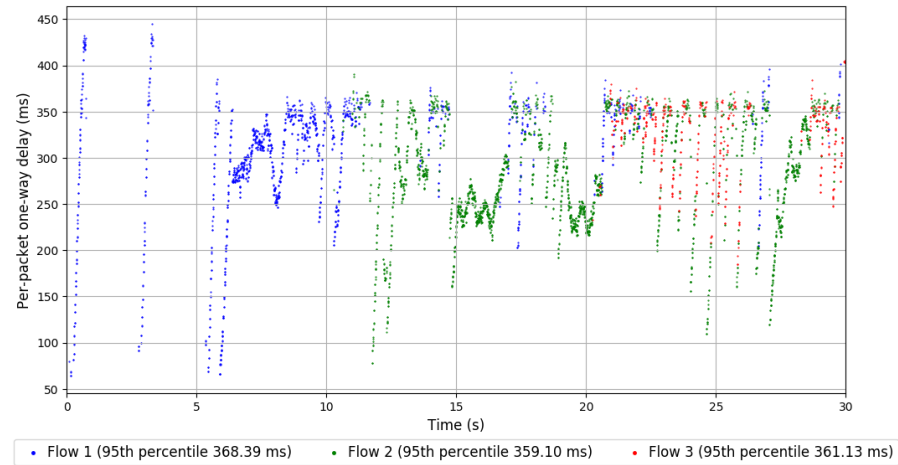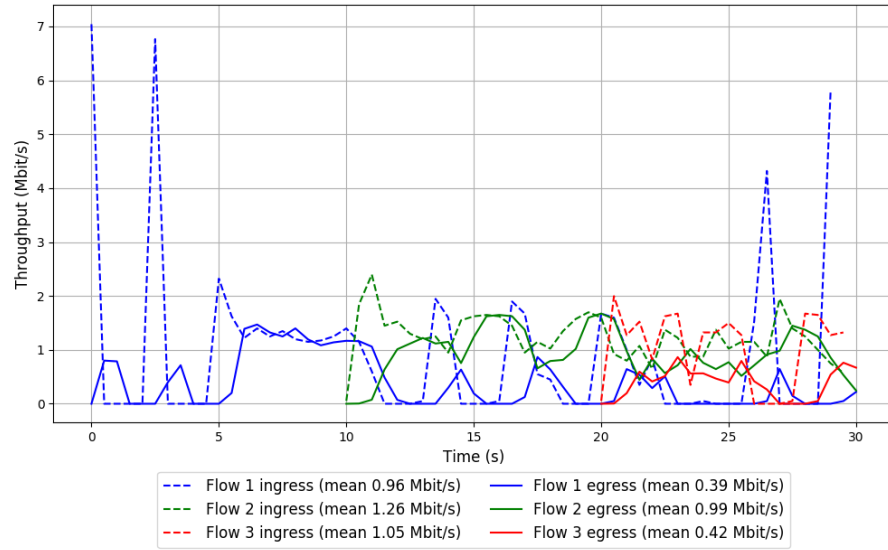
```
Run 3: Statistics of TaoVA-100x

Start at: 2018-12-02 13:49:50
End at: 2018-12-02 13:50:20
Local clock offset: 1.478 ms
Remote clock offset: -5.106 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 360.941 ms
Loss rate: 44.92%
-- Flow 1:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 368.387 ms
Loss rate: 58.59%
-- Flow 2:
Average throughput: 0.99 Mbit/s
95th percentile per-packet one-way delay: 359.102 ms
Loss rate: 22.63%
-- Flow 3:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 361.132 ms
Loss rate: 61.01%
```

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

Flow 1 ingress (mean 0.96 Mbit/s) --- Flow 1 egress (mean 0.39 Mbit/s) ---
Flow 2 ingress (mean 1.26 Mbit/s) --- Flow 2 egress (mean 0.99 Mbit/s) ---
Flow 3 ingress (mean 1.05 Mbit/s) --- Flow 3 egress (mean 0.42 Mbit/s) ---

Flow 1 (95th percentile 368.39 ms) · Flow 2 (95th percentile 359.10 ms) · Flow 3 (95th percentile 361.13 ms)
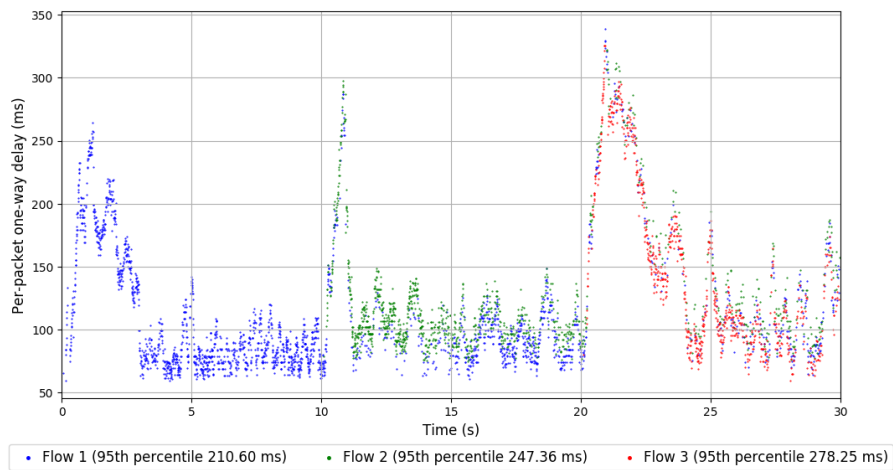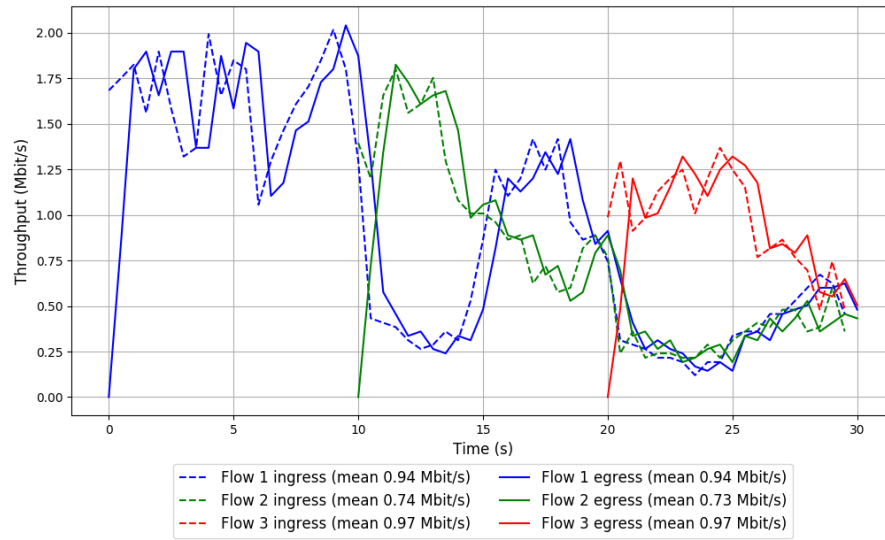
94

```
Run 1: Statistics of TCP Vegas

Start at: 2018-12-02 13:03:52
End at: 2018-12-02 13:04:22
Local clock offset: 0.991 ms
Remote clock offset: -5.785 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.74 Mbit/s
95th percentile per-packet one-way delay: 249.604 ms
Loss rate: 0.84%
-- Flow 1:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 210.600 ms
Loss rate: 0.64%
-- Flow 2:
Average throughput: 0.73 Mbit/s
95th percentile per-packet one-way delay: 247.358 ms
Loss rate: 0.98%
-- Flow 3:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 278.247 ms
Loss rate: 1.24%
```

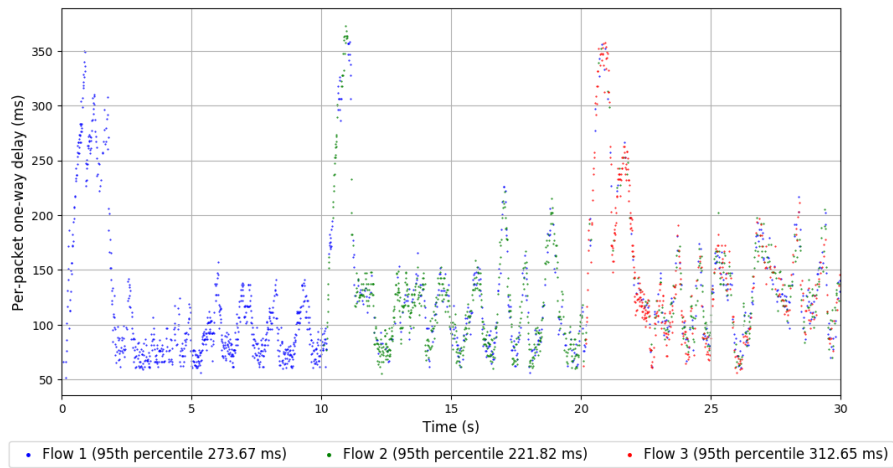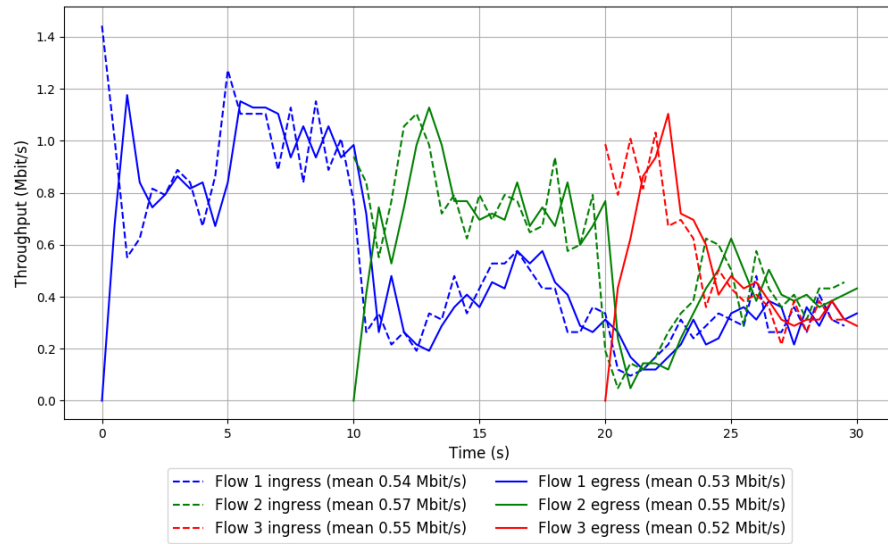## Run 1: Report of TCP Vegas — Data Link

```
Run 2: Statistics of TCP Vegas

Start at: 2018-12-02 13:25:09
End at: 2018-12-02 13:25:39
Local clock offset: 0.739 ms
Remote clock offset: -4.689 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.08 Mbit/s
95th percentile per-packet one-way delay: 269.504 ms
Loss rate: 2.47%
-- Flow 1:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 273.666 ms
Loss rate: 0.89%
-- Flow 2:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 221.823 ms
Loss rate: 3.27%
-- Flow 3:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 312.649 ms
Loss rate: 5.48%
```

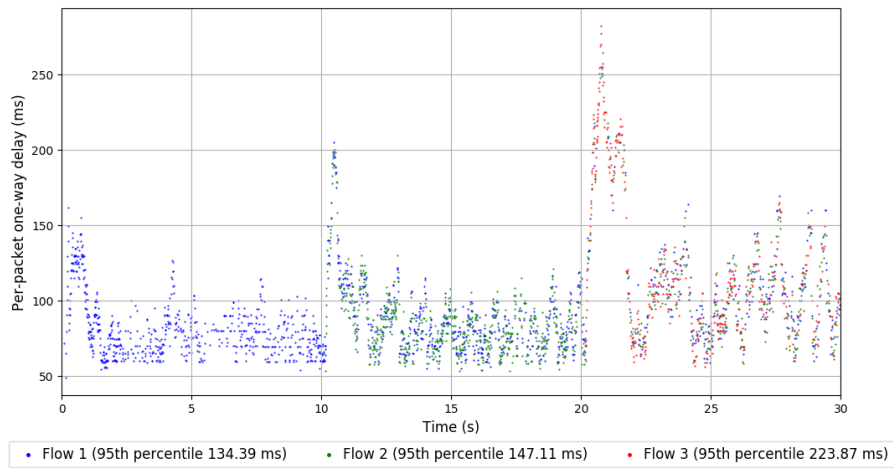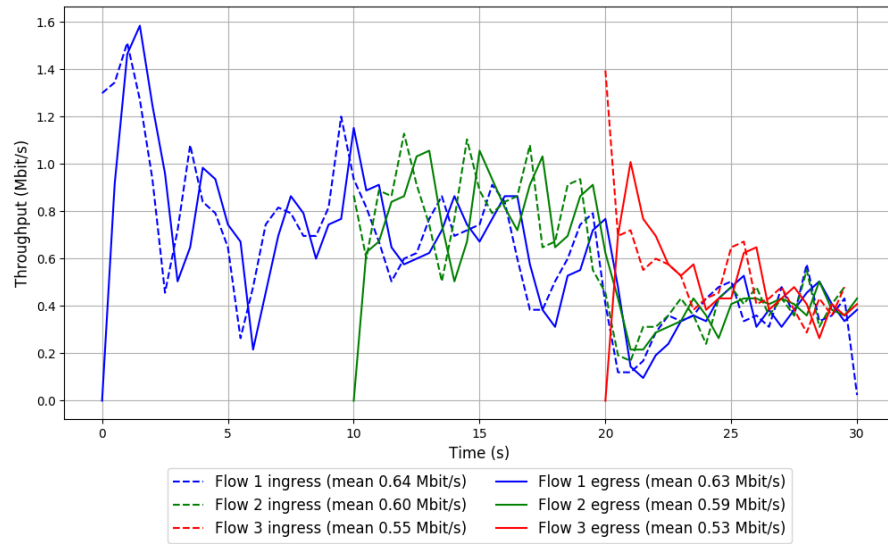Run 2: Report of TCP Vegas — Data Link

```
Run 3: Statistics of TCP Vegas

Start at: 2018-12-02 13:46:29
End at: 2018-12-02 13:46:59
Local clock offset: 2.861 ms
Remote clock offset: -4.067 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.20 Mbit/s
95th percentile per-packet one-way delay: 178.635 ms
Loss rate: 2.03%
-- Flow 1:
Average throughput: 0.63 Mbit/s
95th percentile per-packet one-way delay: 134.388 ms
Loss rate: 1.63%
-- Flow 2:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 147.110 ms
Loss rate: 1.89%
-- Flow 3:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 223.871 ms
Loss rate: 3.74%
```

Run 3: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 0.64 Mbit/s) — Flow 1 egress (mean 0.63 Mbit/s)
Flow 2 ingress (mean 0.60 Mbit/s) — Flow 2 egress (mean 0.59 Mbit/s)
Flow 3 ingress (mean 0.55 Mbit/s) — Flow 3 egress (mean 0.53 Mbit/s)

Flow 1 (95th percentile 134.39 ms) · Flow 2 (95th percentile 147.11 ms) · Flow 3 (95th percentile 223.87 ms)
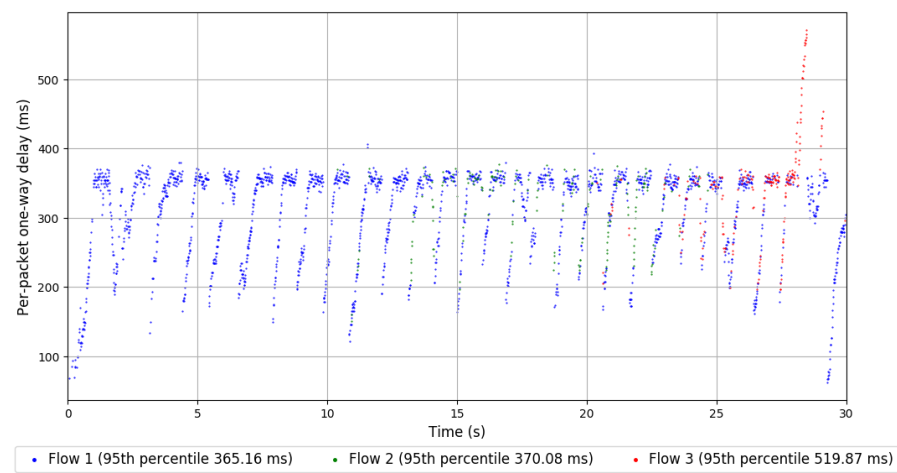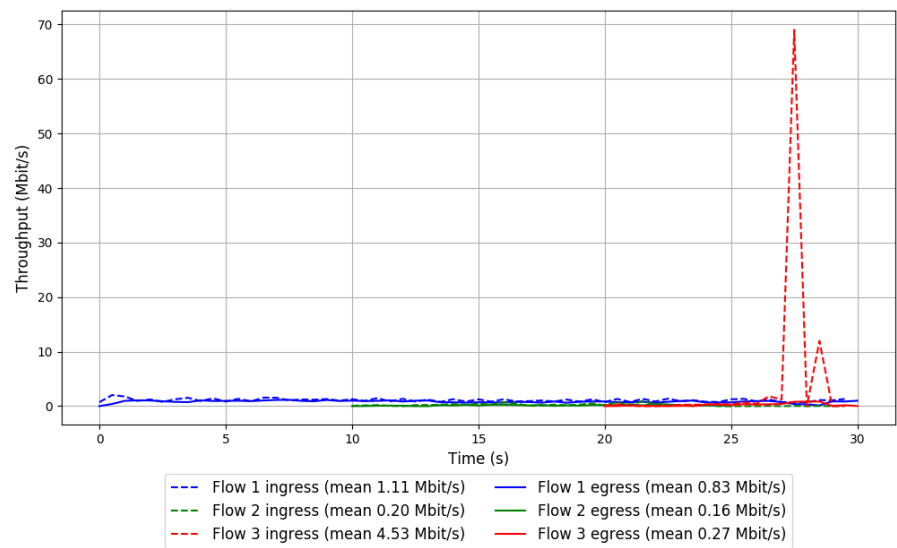
```
Run 1: Statistics of Verus

Start at: 2018-12-02 13:24:03
End at: 2018-12-02 13:24:33
Local clock offset: 3.623 ms
Remote clock offset: -4.932 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.00 Mbit/s
95th percentile per-packet one-way delay: 367.240 ms
Loss rate: 63.03%
-- Flow 1:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 365.159 ms
Loss rate: 24.68%
-- Flow 2:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 370.076 ms
Loss rate: 42.90%
-- Flow 3:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 519.871 ms
Loss rate: 93.98%
```

Run 1: Report of Verus — Data Link

- - - - Flow 1 ingress (mean 1.11 Mbit/s)   ——— Flow 1 egress (mean 0.83 Mbit/s)
- - - - Flow 2 ingress (mean 0.20 Mbit/s)   ——— Flow 2 egress (mean 0.16 Mbit/s)
- - - - Flow 3 ingress (mean 4.53 Mbit/s)   ——— Flow 3 egress (mean 0.27 Mbit/s)

· Flow 1 (95th percentile 365.16 ms)   · Flow 2 (95th percentile 370.08 ms)   · Flow 3 (95th percentile 519.87 ms)
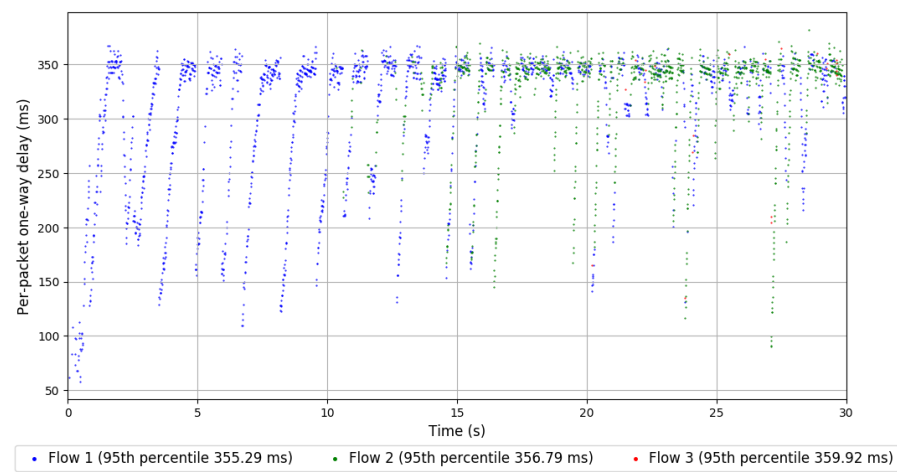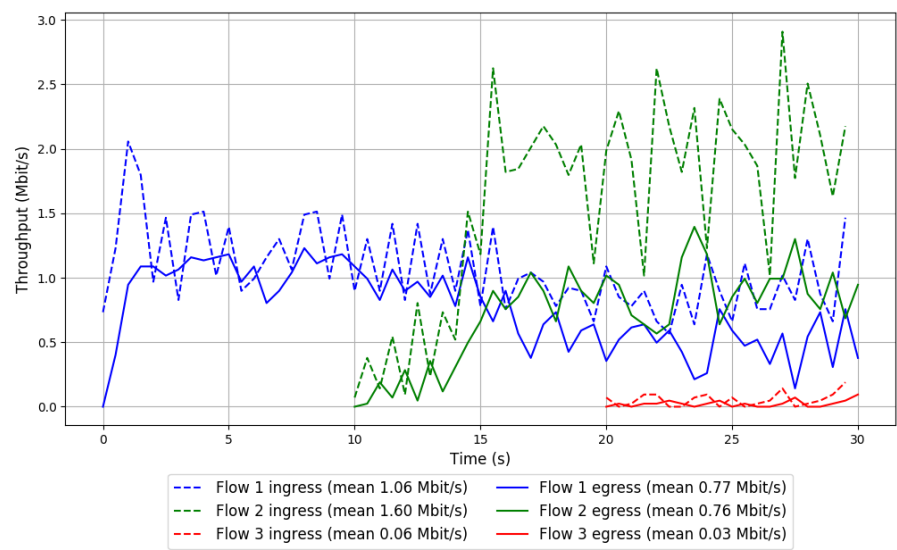
102

```
Run 2: Statistics of Verus

Start at: 2018-12-02 13:45:22
End at: 2018-12-02 13:45:52
Local clock offset: 1.105 ms
Remote clock offset: -4.804 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.27 Mbit/s
95th percentile per-packet one-way delay: 356.067 ms
Loss rate: 40.80%
-- Flow 1:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 355.285 ms
Loss rate: 27.89%
-- Flow 2:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 356.788 ms
Loss rate: 53.49%
-- Flow 3:
Average throughput: 0.03 Mbit/s
95th percentile per-packet one-way delay: 359.915 ms
Loss rate: 54.35%
```
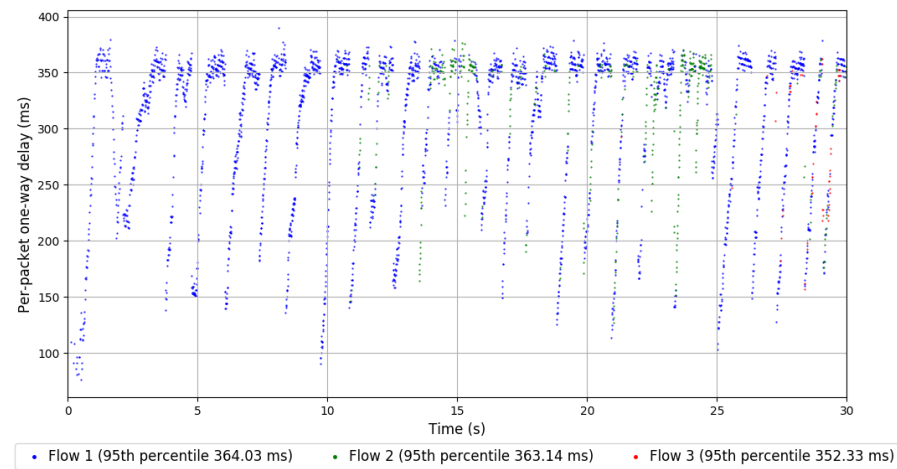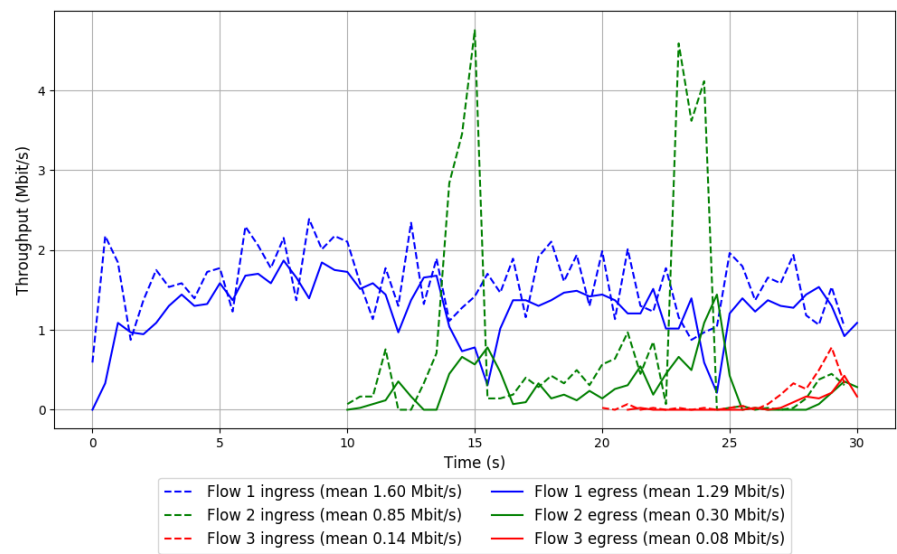
Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2018-12-02 14:06:37
End at: 2018-12-02 14:07:07
Local clock offset: 3.711 ms
Remote clock offset: -3.586 ms


# Below is generated by plot.py at 2018-12-02 14:07:58
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 363.902 ms
Loss rate: 31.31%
-- Flow 1:
Average throughput: 1.29 Mbit/s
95th percentile per-packet one-way delay: 364.031 ms
Loss rate: 19.11%
-- Flow 2:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 363.145 ms
Loss rate: 64.48%
-- Flow 3:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 352.334 ms
Loss rate: 52.63%
```
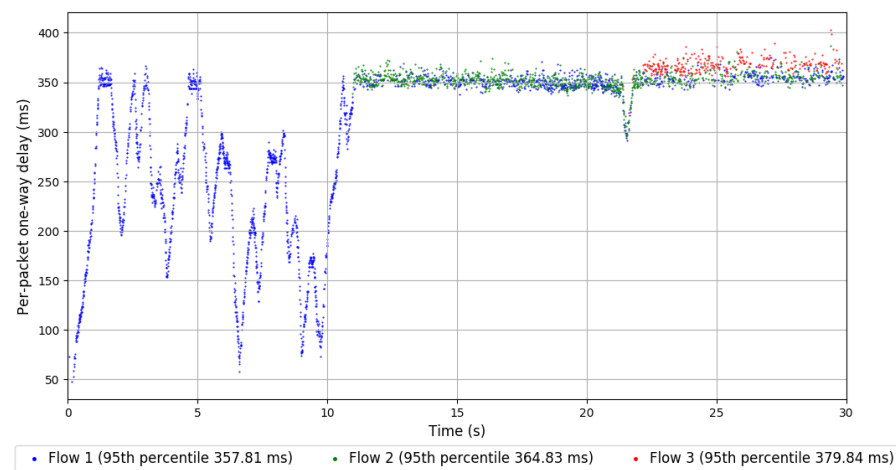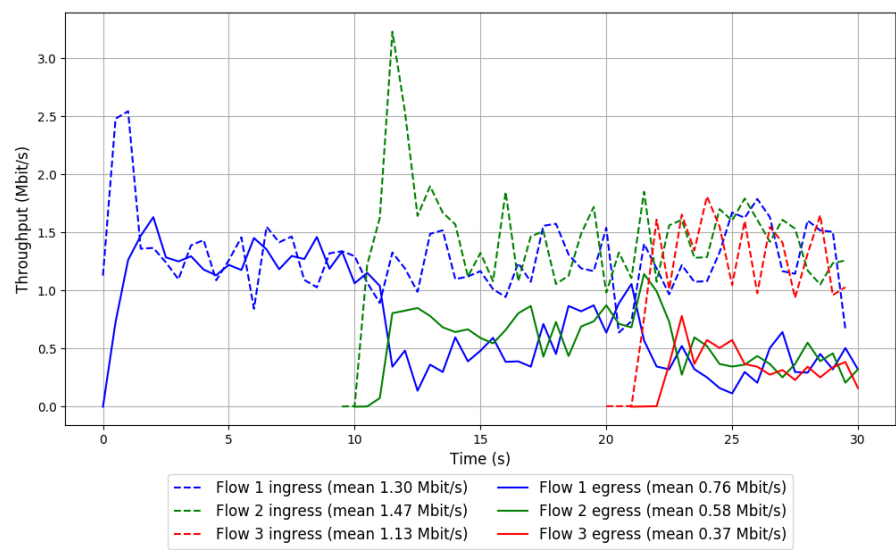
Run 3: Report of Verus — Data Link

```
Run 1: Statistics of PCC-Vivace

Start at: 2018-12-02 13:16:13
End at: 2018-12-02 13:16:43
Local clock offset: -0.371 ms
Remote clock offset: -5.375 ms


# Below is generated by plot.py at 2018-12-02 14:07:59
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.24 Mbit/s
95th percentile per-packet one-way delay: 367.218 ms
Loss rate: 53.22%
-- Flow 1:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 357.812 ms
Loss rate: 42.01%
-- Flow 2:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 364.831 ms
Loss rate: 60.92%
-- Flow 3:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 379.844 ms
Loss rate: 72.15%
```

Run 1: Report of PCC-Vivace — Data Link

Flow 1 ingress (mean 1.30 Mbit/s) --- Flow 1 egress (mean 0.76 Mbit/s) ---
Flow 2 ingress (mean 1.47 Mbit/s) --- Flow 2 egress (mean 0.58 Mbit/s) ---
Flow 3 ingress (mean 1.13 Mbit/s) --- Flow 3 egress (mean 0.37 Mbit/s) ---

Flow 1 (95th percentile 357.81 ms) • Flow 2 (95th percentile 364.83 ms) • Flow 3 (95th percentile 379.84 ms)
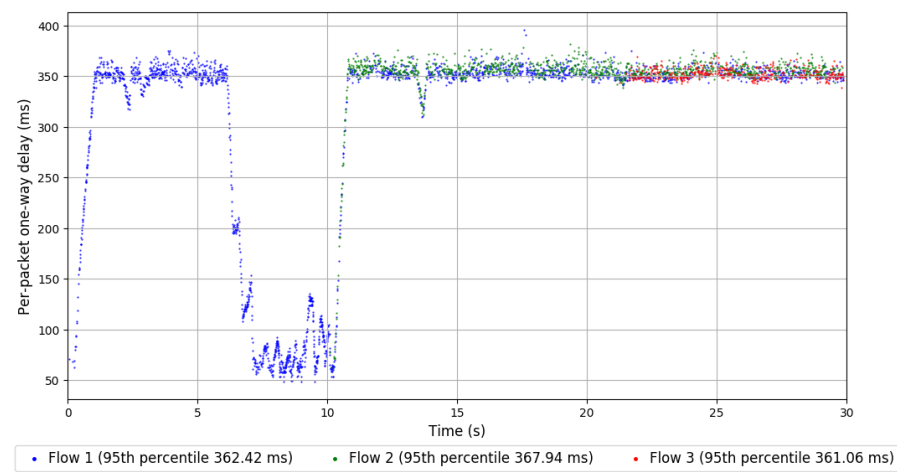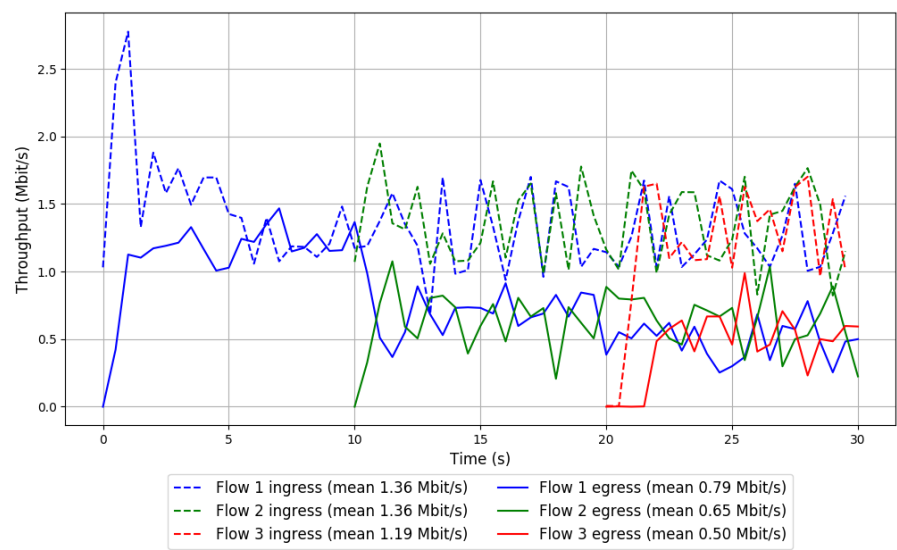
```
Run 2: Statistics of PCC-Vivace

Start at: 2018-12-02 13:37:32
End at: 2018-12-02 13:38:02
Local clock offset: 2.476 ms
Remote clock offset: -3.827 ms


# Below is generated by plot.py at 2018-12-02 14:08:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.38 Mbit/s
95th percentile per-packet one-way delay: 364.386 ms
Loss rate: 48.52%
-- Flow 1:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 362.424 ms
Loss rate: 42.41%
-- Flow 2:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 367.943 ms
Loss rate: 52.73%
-- Flow 3:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 361.057 ms
Loss rate: 59.99%
```

Run 2: Report of PCC-Vivace — Data Link

Flow 1 ingress (mean 1.36 Mbit/s)   Flow 1 egress (mean 0.79 Mbit/s)
Flow 2 ingress (mean 1.36 Mbit/s)   Flow 2 egress (mean 0.65 Mbit/s)
Flow 3 ingress (mean 1.19 Mbit/s)   Flow 3 egress (mean 0.50 Mbit/s)

Flow 1 (95th percentile 362.42 ms)   Flow 2 (95th percentile 367.94 ms)   Flow 3 (95th percentile 361.06 ms)
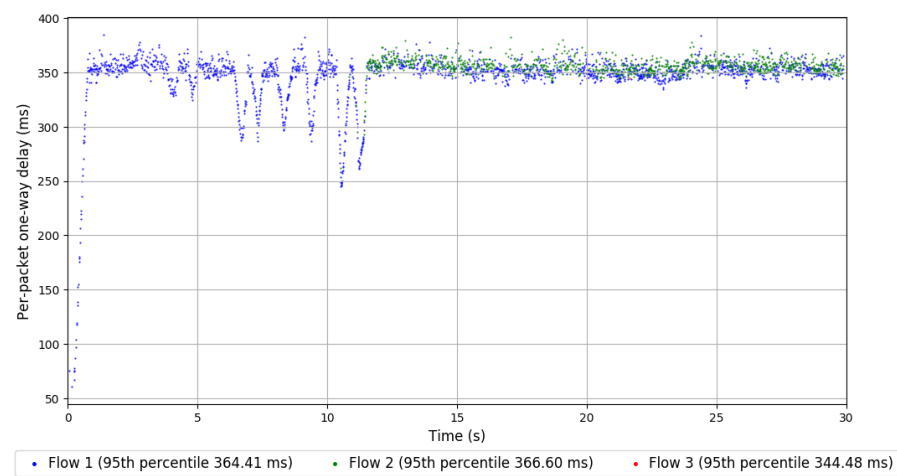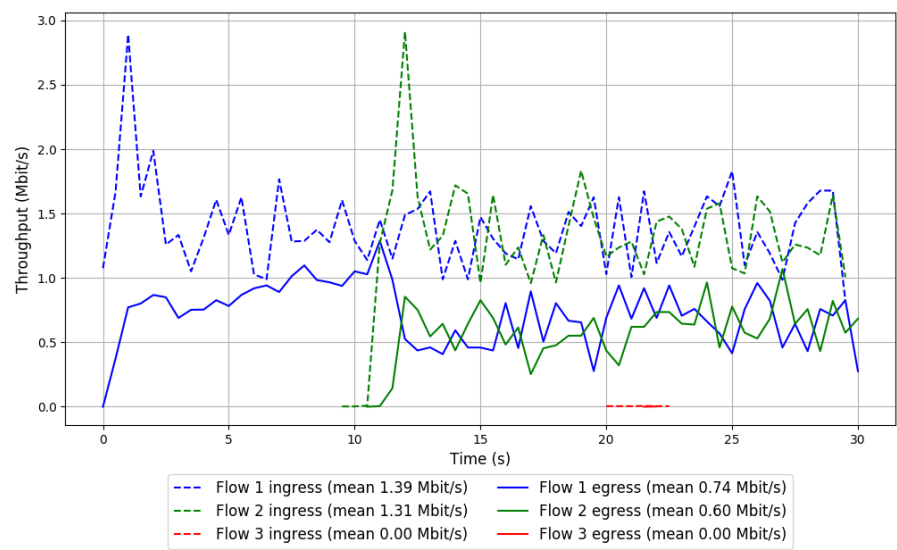
```
Run 3: Statistics of PCC-Vivace

Start at: 2018-12-02 13:58:48
End at: 2018-12-02 13:59:18
Local clock offset: 3.859 ms
Remote clock offset: -3.766 ms


# Below is generated by plot.py at 2018-12-02 14:08:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.13 Mbit/s
95th percentile per-packet one-way delay: 365.666 ms
Loss rate: 50.39%
-- Flow 1:
Average throughput: 0.74 Mbit/s
95th percentile per-packet one-way delay: 364.411 ms
Loss rate: 47.28%
-- Flow 2:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 366.596 ms
Loss rate: 55.33%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 344.479 ms
Loss rate: 92.31%
```

Run 3: Report of PCC-Vivace — Data Link

Flow 1 ingress (mean 1.39 Mbit/s) --- Flow 1 egress (mean 0.74 Mbit/s)
Flow 2 ingress (mean 1.31 Mbit/s) --- Flow 2 egress (mean 0.60 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s) --- Flow 3 egress (mean 0.00 Mbit/s)

Flow 1 (95th percentile 364.41 ms)   Flow 2 (95th percentile 366.60 ms)   Flow 3 (95th percentile 344.48 ms)

```
Run 1: Statistics of WebRTC media

Start at: 2018-12-02 13:12:47
End at: 2018-12-02 13:13:17
Local clock offset: 3.018 ms
Remote clock offset: -5.74 ms

# Below is generated by plot.py at 2018-12-02 14:08:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.67 Mbit/s
95th percentile per-packet one-way delay: 354.445 ms
Loss rate: 7.81%
-- Flow 1:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 361.893 ms
Loss rate: 5.80%
-- Flow 2:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 352.219 ms
Loss rate: 8.62%
-- Flow 3:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 349.546 ms
Loss rate: 11.74%
```
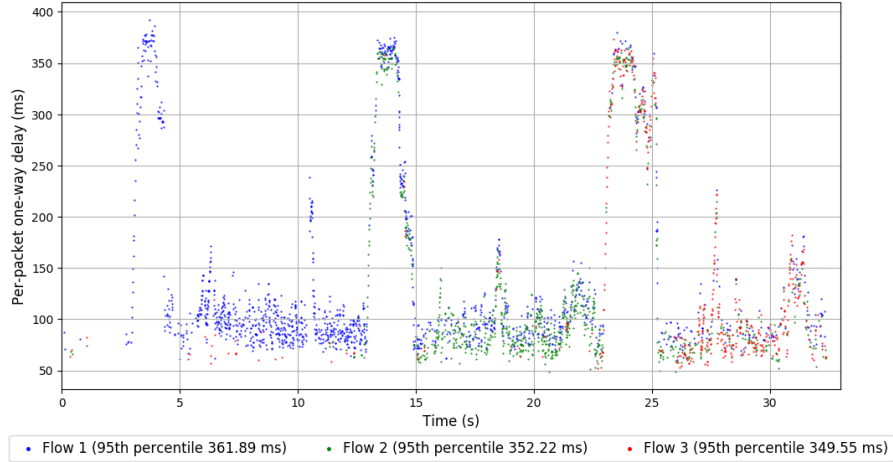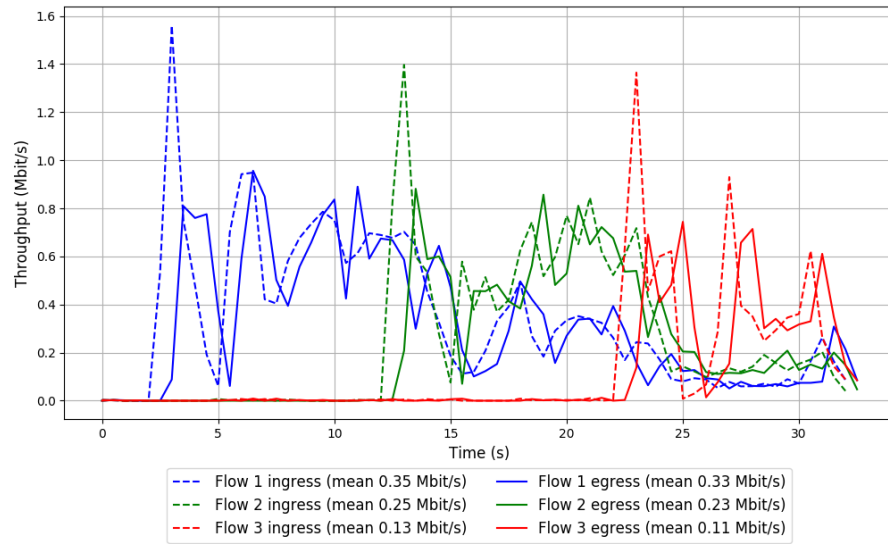
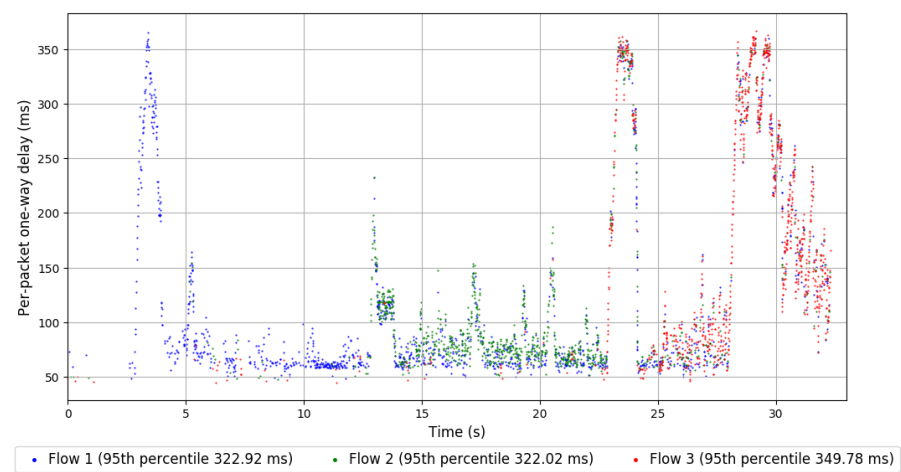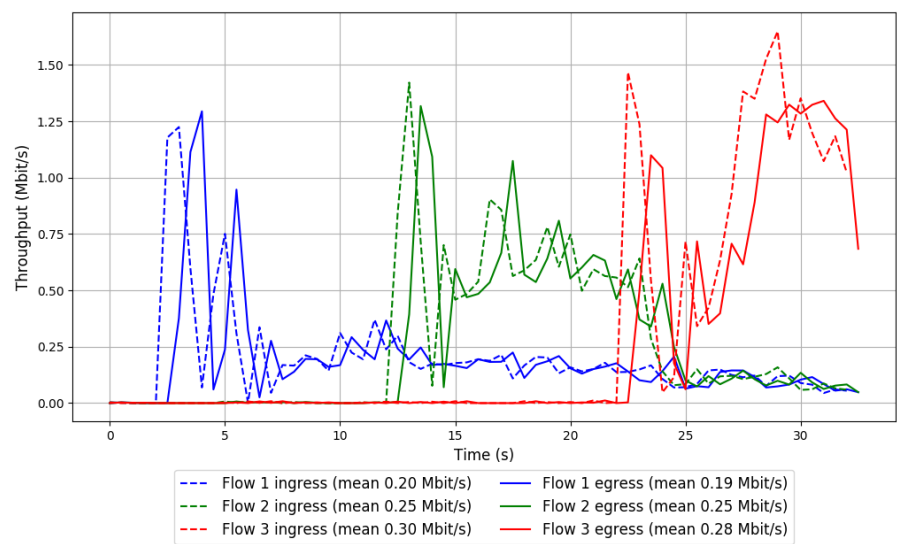Run 1: Report of WebRTC media — Data Link

```
Run 2: Statistics of WebRTC media

Start at: 2018-12-02 13:34:11
End at: 2018-12-02 13:34:41
Local clock offset: 6.161 ms
Remote clock offset: -4.479 ms


# Below is generated by plot.py at 2018-12-02 14:08:00
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 343.042 ms
Loss rate: 5.79%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 322.916 ms
Loss rate: 3.15%
-- Flow 2:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 322.016 ms
Loss rate: 3.49%
-- Flow 3:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 349.783 ms
Loss rate: 9.47%
```

Run 2: Report of WebRTC media — Data Link

```
Run 3: Statistics of WebRTC media

Start at: 2018-12-02 13:55:26
End at: 2018-12-02 13:55:56
Local clock offset: 1.211 ms
Remote clock offset: -7.897 ms


# Below is generated by plot.py at 2018-12-02 14:08:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 348.274 ms
Loss rate: 5.65%
-- Flow 1:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 339.206 ms
Loss rate: 3.23%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 347.387 ms
Loss rate: 8.31%
-- Flow 3:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 359.006 ms
Loss rate: 6.47%
```

Run 3: Report of WebRTC media — Data Link