Pantheon Report

Generated at 2018-12-11 01:32:54 (UTC).

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

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.
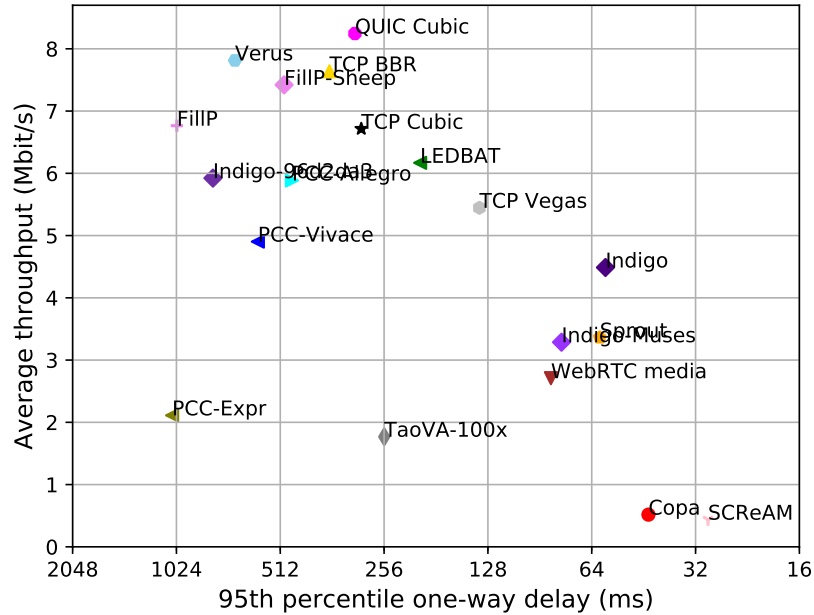
```
System info:
Linux 4.15.0-1029-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912

Git summary:
branch: muses @ c6268d7c473682290bfe9901ef81a6b6a1e51d3c
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
```
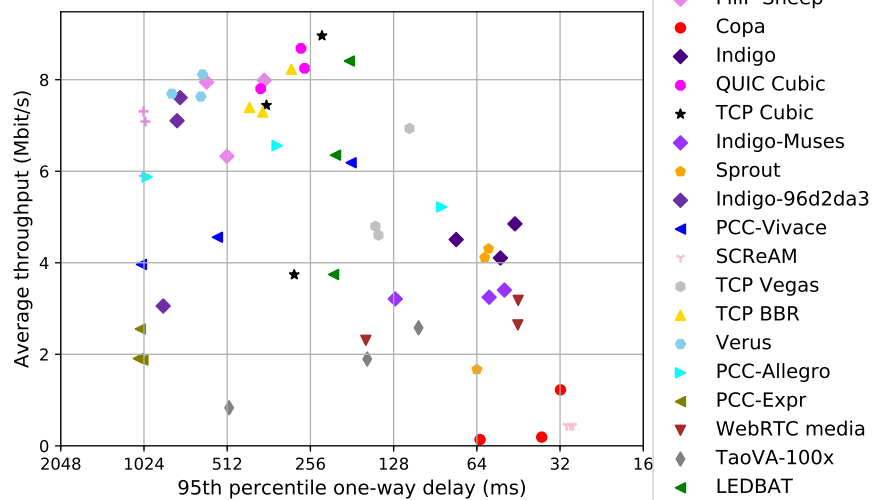
```
 M tools/plot.py
third_party/vivace @ 2baf86211435ae071a32f96b7d8c504587f5d7f4
third_party/webrtc @ 3f0cc2a9061a41b6f9dde4735770d143a1fa2851
```

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

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

scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	4.65	3.04	2.95	341.53	384.54	393.33	0.37	0.87	2.05
Copa	3	0.00	0.70	0.17	15.89	38.14	54.07	98.51	53.68	68.14
TCP Cubic	3	3.97	3.21	1.92	267.05	360.33	316.31	0.48	0.91	2.26
FillP	3	4.06	2.90	2.43	949.87	1019.42	1058.07	4.55	7.27	21.49
FillP-Sheep	3	3.67	3.45	4.49	470.37	455.01	560.76	1.51	1.30	2.87
Indigo	3	2.18	2.30	2.39	52.78	60.62	64.34	0.09	0.27	0.62
Indigo-96d2da3	3	3.50	2.22	3.05	750.67	781.83	653.15	3.01	6.48	1.84
LEDBAT	3	4.32	2.22	1.14	186.16	217.31	225.57	0.31	0.54	1.67
Indigo-Muses	3	1.66	1.58	1.76	84.19	68.31	68.73	0.08	0.06	0.10
PCC-Allegro	3	3.43	2.66	2.08	456.34	477.95	495.85	1.86	2.62	5.15
PCC-Expr	3	0.83	1.39	1.18	712.32	1056.04	1057.80	76.36	71.51	73.41
QUIC Cubic	3	5.99	2.30	2.29	282.55	326.60	350.82	0.69	1.63	3.42
SCReAM	3	0.22	0.22	0.22	26.09	26.20	29.60	0.00	0.00	0.35
Sprout	3	1.82	1.43	1.79	58.43	58.91	67.63	0.21	0.14	0.00
TaoVA-100x	3	1.06	0.67	0.79	207.20	213.94	537.15	65.65	67.79	66.83
TCP Vegas	3	2.47	2.61	3.77	141.99	122.83	130.09	0.06	0.10	0.25
Verus	3	5.10	3.39	1.50	642.64	763.40	689.20	1.23	3.25	5.88
PCC-Vivace	3	3.19	1.97	1.24	614.00	564.73	568.12	3.80	7.19	18.24
WebRTC media	3	1.45	0.95	0.31	70.79	96.21	100.61	0.07	0.12	0.86

```
Run 1: Statistics of TCP BBR

Start at: 2018-12-11 00:39:36
End at: 2018-12-11 00:40:06
Local clock offset: 3.519 ms
Remote clock offset: -1.8 ms


# Below is generated by plot.py at 2018-12-11 01:32:03
# Datalink statistics
-- Total of 3 flows:
Average throughput: 8.23 Mbit/s
95th percentile per-packet one-way delay: 300.011 ms
Loss rate: 0.46%
-- Flow 1:
Average throughput: 4.86 Mbit/s
95th percentile per-packet one-way delay: 251.221 ms
Loss rate: 0.20%
-- Flow 2:
Average throughput: 3.10 Mbit/s
95th percentile per-packet one-way delay: 306.687 ms
Loss rate: 0.50%
-- Flow 3:
Average throughput: 3.99 Mbit/s
95th percentile per-packet one-way delay: 337.100 ms
Loss rate: 1.35%
```
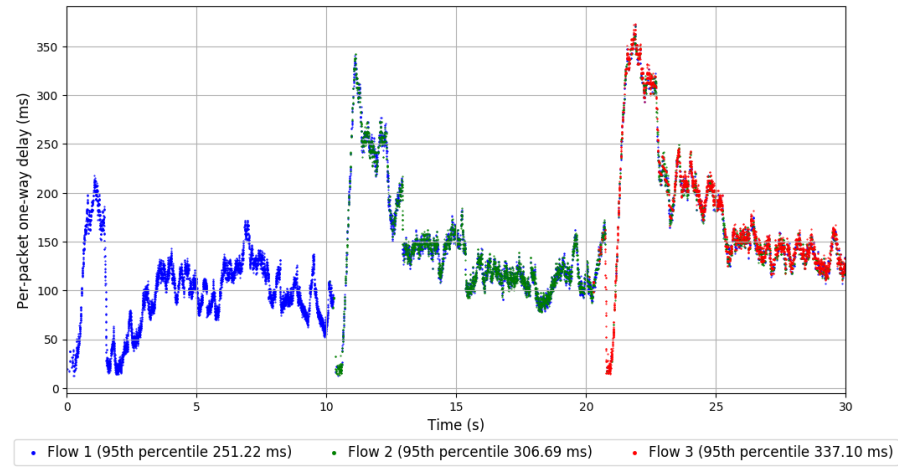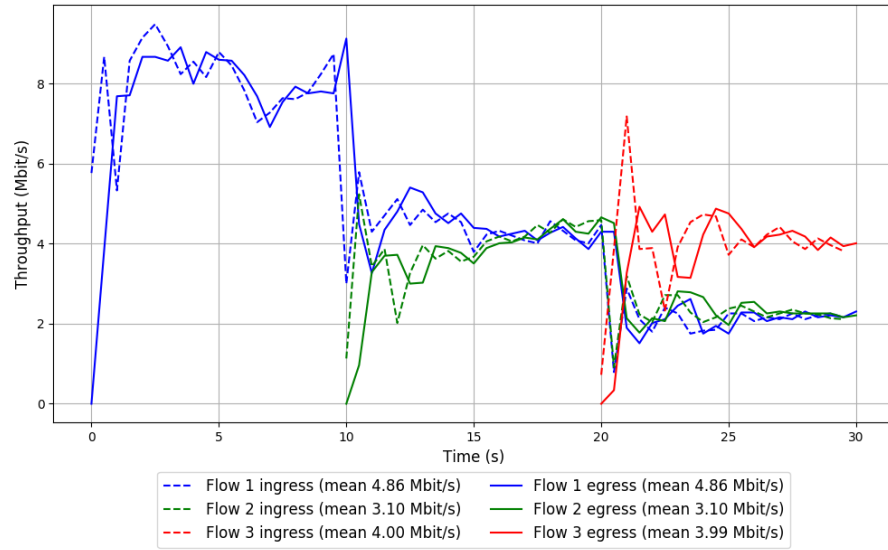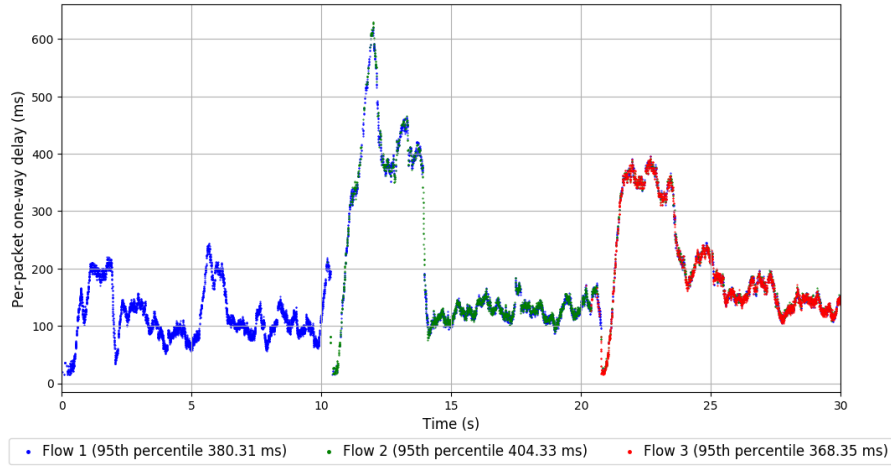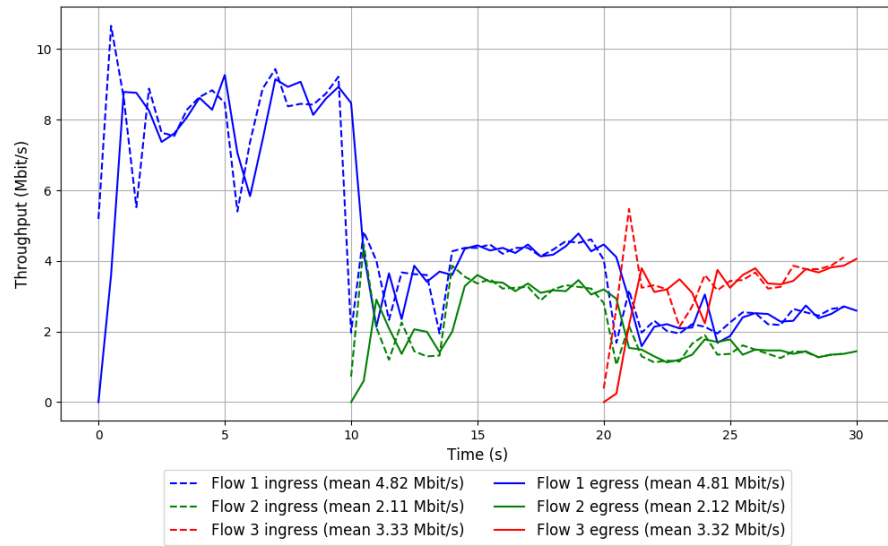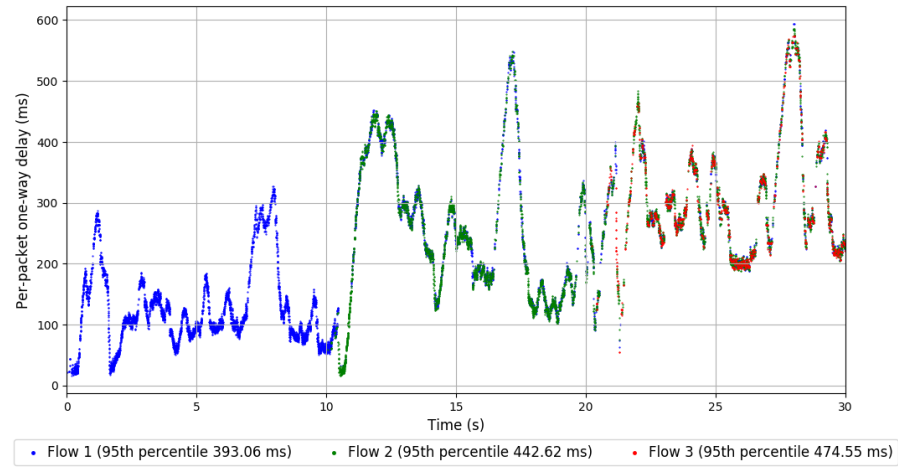
Run 1: Report of TCP BBR — Data Link

```
Run 2: Statistics of TCP BBR

Start at: 2018-12-11 01:00:57
End at: 2018-12-11 01:01:27
Local clock offset: 2.151 ms
Remote clock offset: -1.712 ms


# Below is generated by plot.py at 2018-12-11 01:32:03
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.29 Mbit/s
95th percentile per-packet one-way delay: 380.744 ms
Loss rate: 0.59%
-- Flow 1:
Average throughput: 4.81 Mbit/s
95th percentile per-packet one-way delay: 380.314 ms
Loss rate: 0.33%
-- Flow 2:
Average throughput: 2.12 Mbit/s
95th percentile per-packet one-way delay: 404.327 ms
Loss rate: 0.43%
-- Flow 3:
Average throughput: 3.32 Mbit/s
95th percentile per-packet one-way delay: 368.353 ms
Loss rate: 1.92%
```
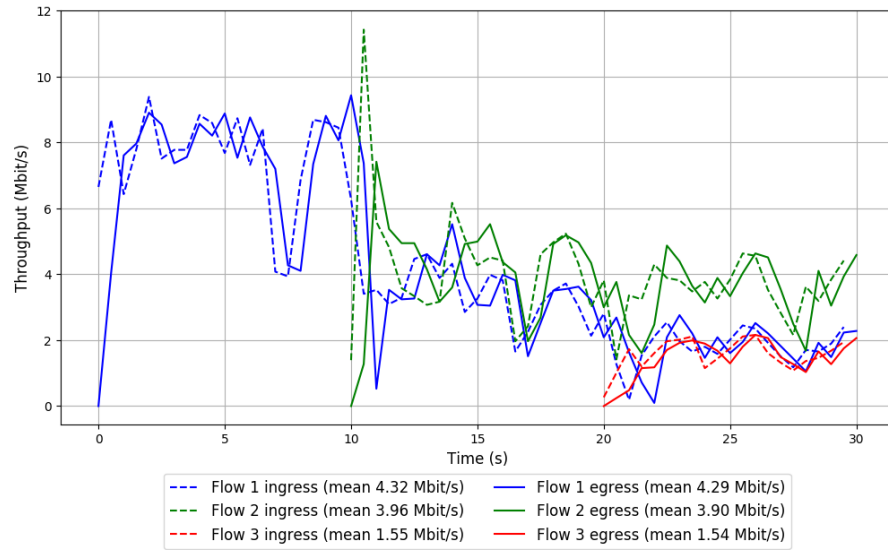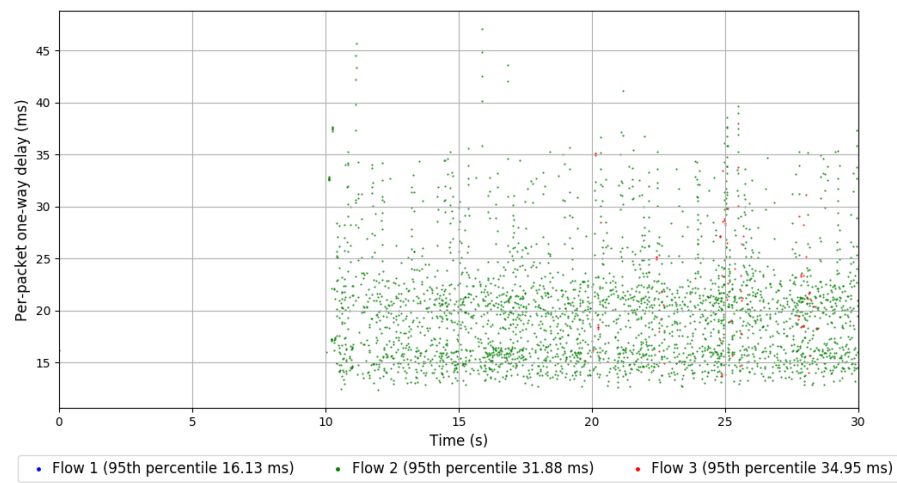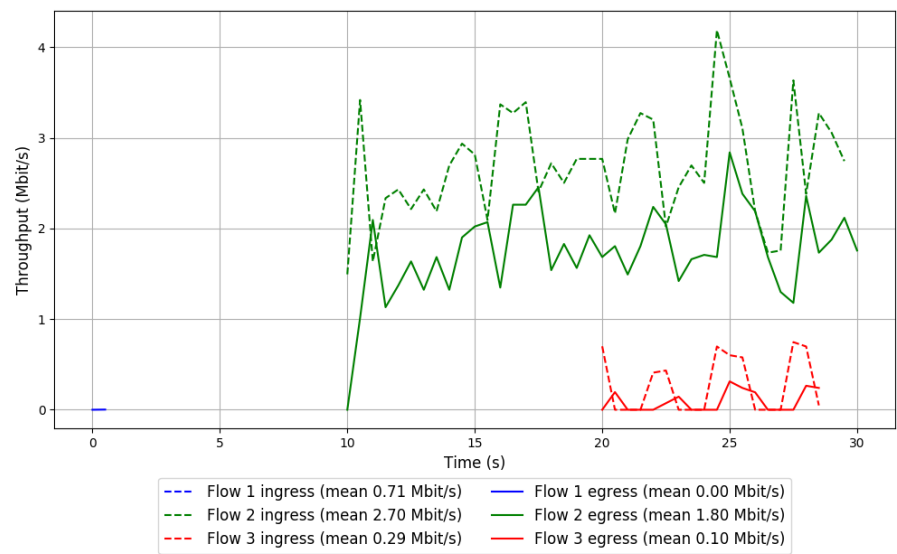
Run 2: Report of TCP BBR — Data Link

Flow 1 ingress (mean 4.82 Mbit/s) — Flow 1 egress (mean 4.81 Mbit/s)
Flow 2 ingress (mean 2.11 Mbit/s) — Flow 2 egress (mean 2.12 Mbit/s)
Flow 3 ingress (mean 3.33 Mbit/s) — Flow 3 egress (mean 3.32 Mbit/s)

Flow 1 (95th percentile 380.31 ms)   Flow 2 (95th percentile 404.33 ms)   Flow 3 (95th percentile 368.35 ms)

```
Run 3: Statistics of TCP BBR

Start at: 2018-12-11 01:22:16
End at: 2018-12-11 01:22:46
Local clock offset: -1.278 ms
Remote clock offset: -1.505 ms


# Below is generated by plot.py at 2018-12-11 01:32:03
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.39 Mbit/s
95th percentile per-packet one-way delay: 425.117 ms
Loss rate: 1.12%
-- Flow 1:
Average throughput: 4.29 Mbit/s
95th percentile per-packet one-way delay: 393.061 ms
Loss rate: 0.57%
-- Flow 2:
Average throughput: 3.90 Mbit/s
95th percentile per-packet one-way delay: 442.615 ms
Loss rate: 1.68%
-- Flow 3:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 474.549 ms
Loss rate: 2.87%
```

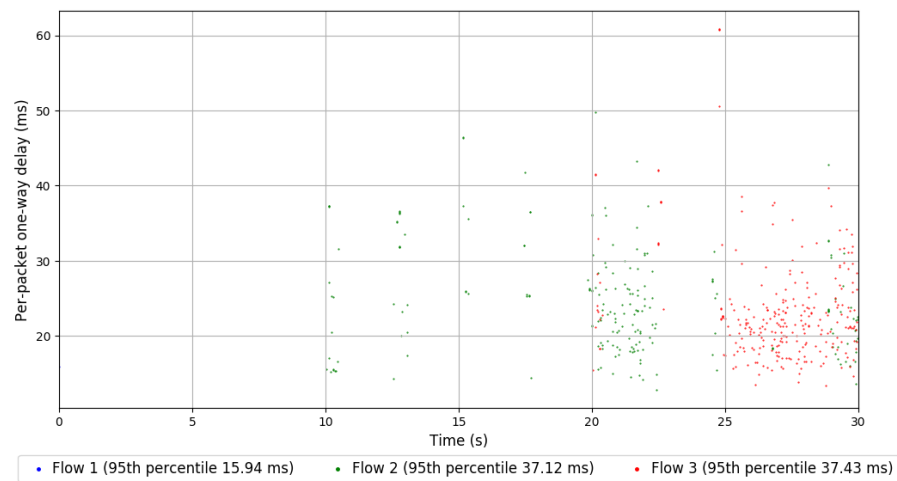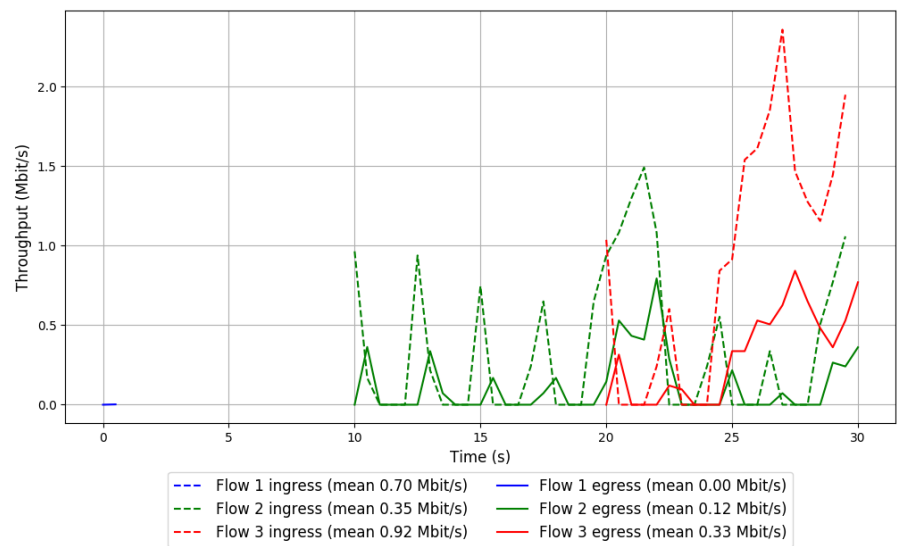Run 3: Report of TCP BBR — Data Link

```
Run 1: Statistics of Copa

Start at: 2018-12-11 00:44:07
End at: 2018-12-11 00:44:37
Local clock offset: 5.123 ms
Remote clock offset: -1.469 ms


# Below is generated by plot.py at 2018-12-11 01:32:03
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 31.888 ms
Loss rate: 34.90%
-- Flow 1:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 16.128 ms
Loss rate: 98.60%
-- Flow 2:
Average throughput: 1.80 Mbit/s
95th percentile per-packet one-way delay: 31.881 ms
Loss rate: 33.39%
-- Flow 3:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 34.950 ms
Loss rate: 66.15%
```

Run 1: Report of Copa — Data Link

--- Flow 1 ingress (mean 0.71 Mbit/s) —— Flow 1 egress (mean 0.00 Mbit/s)
--- Flow 2 ingress (mean 2.70 Mbit/s) —— Flow 2 egress (mean 1.80 Mbit/s)
--- Flow 3 ingress (mean 0.29 Mbit/s) —— Flow 3 egress (mean 0.10 Mbit/s)

• Flow 1 (95th percentile 16.13 ms)   • Flow 2 (95th percentile 31.88 ms)   • Flow 3 (95th percentile 34.95 ms)

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```
Run 2: Statistics of Copa

Start at: 2018-12-11 01:05:28
End at: 2018-12-11 01:05:58
Local clock offset: 1.718 ms
Remote clock offset: -1.064 ms


# Below is generated by plot.py at 2018-12-11 01:32:03
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 37.282 ms
Loss rate: 64.65%
-- Flow 1:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 15.936 ms
Loss rate: 98.33%
-- Flow 2:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 37.118 ms
Loss rate: 64.58%
-- Flow 3:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 37.426 ms
Loss rate: 64.47%
```
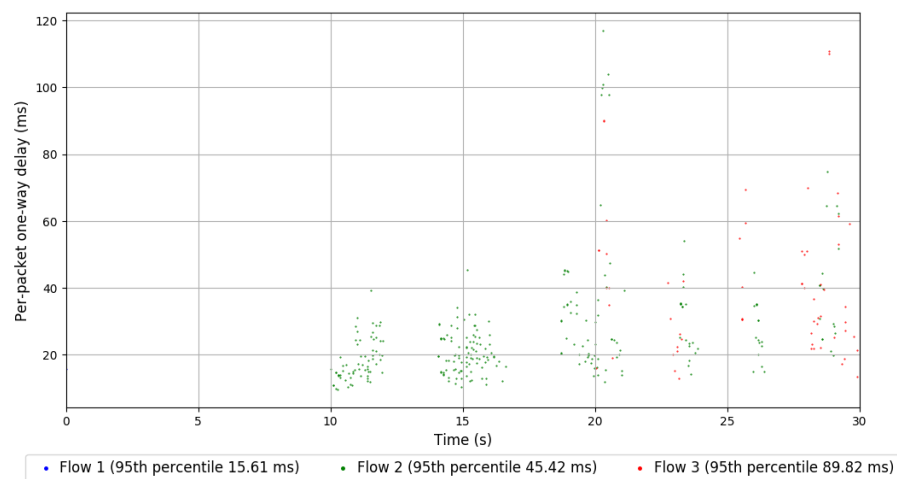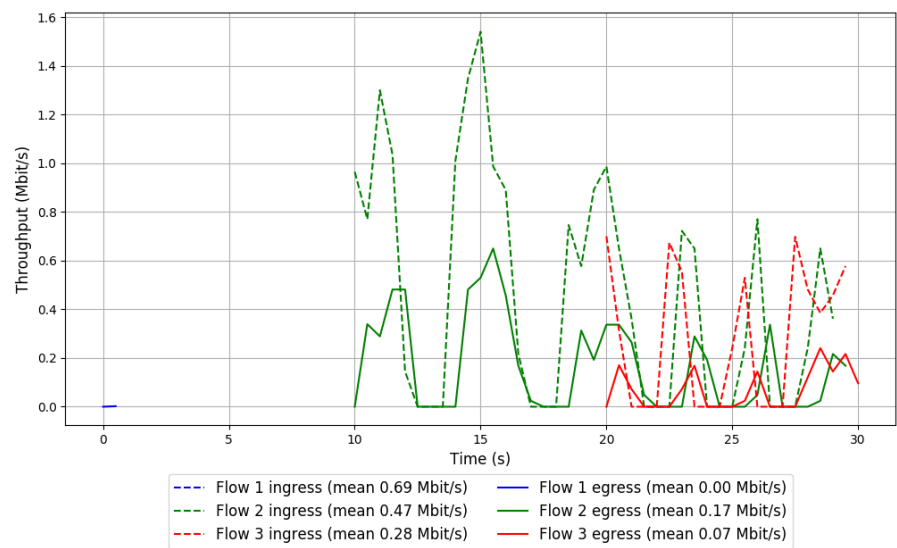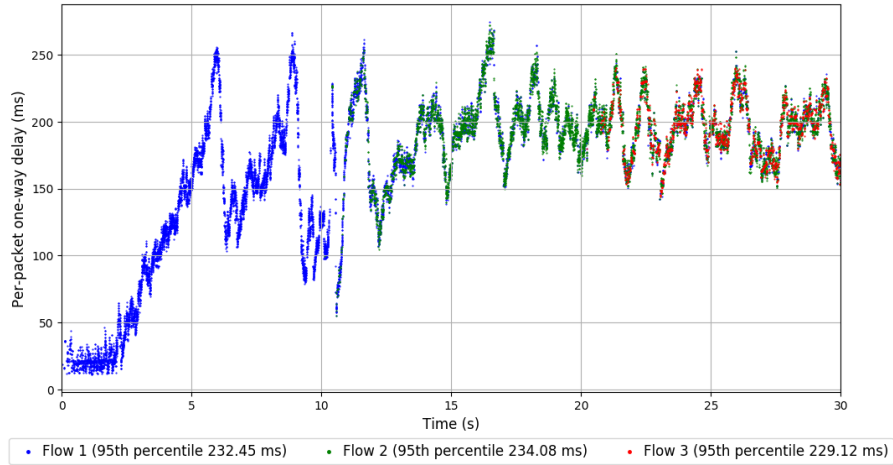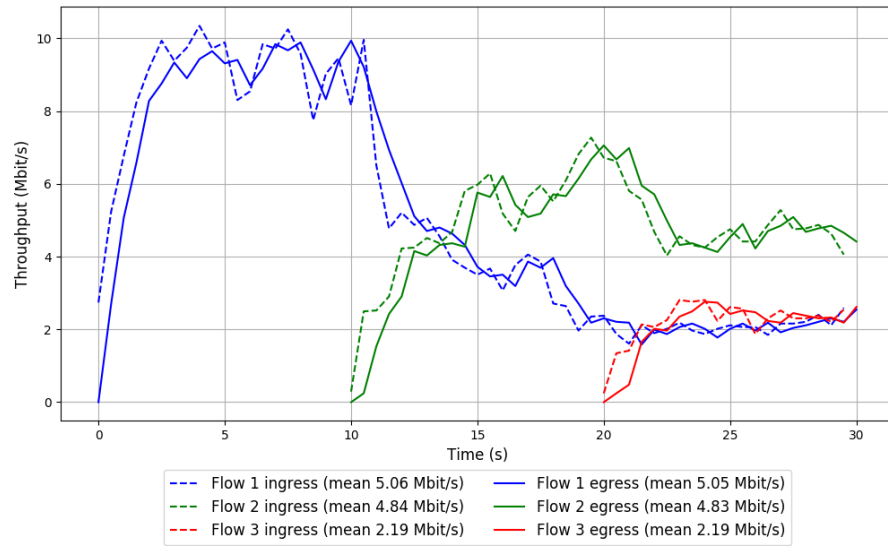
Run 2: Report of Copa — Data Link

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```
Run 3: Statistics of Copa

Start at: 2018-12-11 01:26:45
End at: 2018-12-11 01:27:15
Local clock offset: 3.345 ms
Remote clock offset: -1.26 ms


# Below is generated by plot.py at 2018-12-11 01:32:03
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 62.321 ms
Loss rate: 65.81%
-- Flow 1:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 15.610 ms
Loss rate: 98.60%
-- Flow 2:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 45.419 ms
Loss rate: 63.06%
-- Flow 3:
Average throughput: 0.07 Mbit/s
95th percentile per-packet one-way delay: 89.820 ms
Loss rate: 73.79%
```
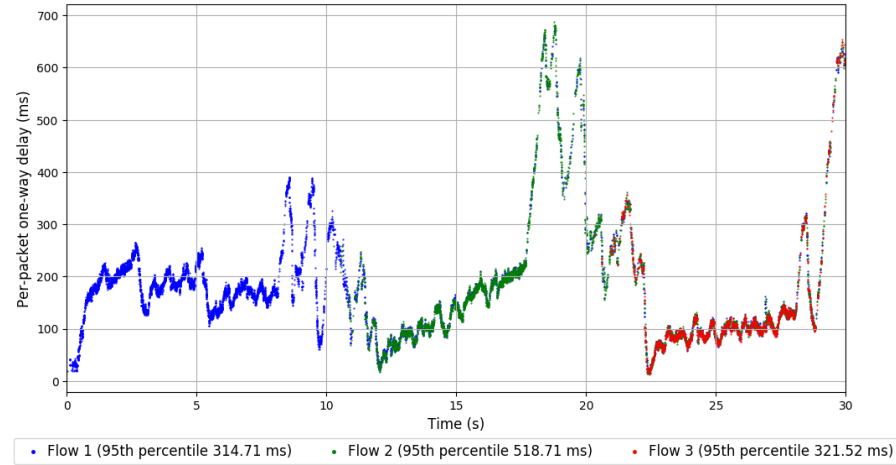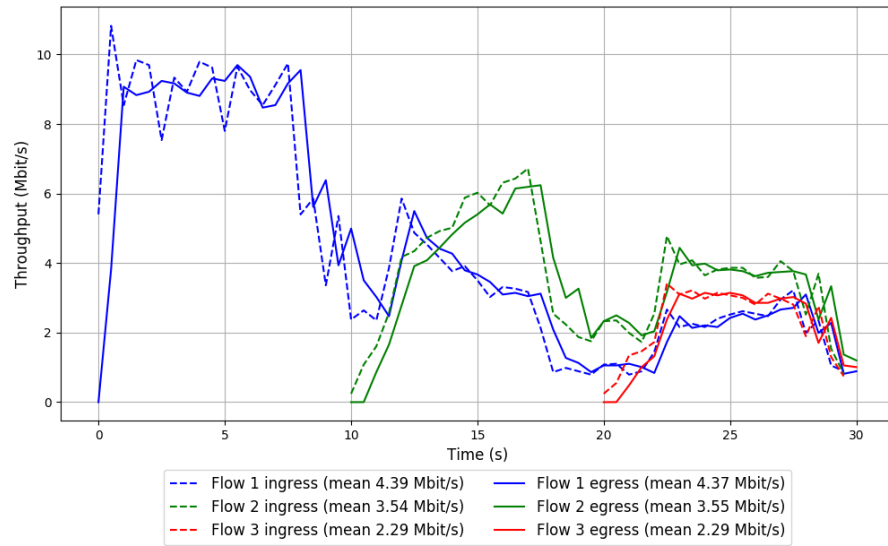
Run 3: Report of Copa — Data Link

```
Run 1: Statistics of TCP Cubic

Start at: 2018-12-11 00:42:59
End at: 2018-12-11 00:43:29
Local clock offset: 4.583 ms
Remote clock offset: -1.316 ms


# Below is generated by plot.py at 2018-12-11 01:32:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 8.96 Mbit/s
95th percentile per-packet one-way delay: 232.461 ms
Loss rate: 0.65%
-- Flow 1:
Average throughput: 5.05 Mbit/s
95th percentile per-packet one-way delay: 232.451 ms
Loss rate: 0.36%
-- Flow 2:
Average throughput: 4.83 Mbit/s
95th percentile per-packet one-way delay: 234.083 ms
Loss rate: 0.81%
-- Flow 3:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 229.121 ms
Loss rate: 2.03%
```
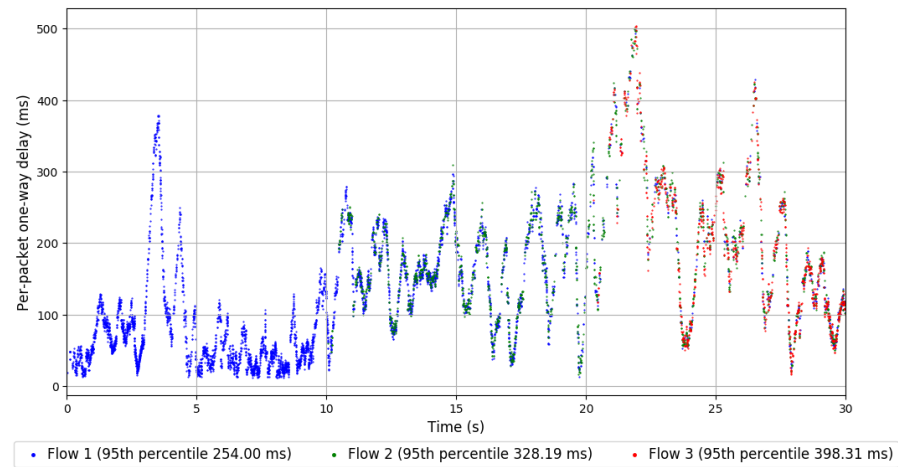
Run 1: Report of TCP Cubic — Data Link

```
Run 2: Statistics of TCP Cubic

Start at: 2018-12-11 01:04:20
End at: 2018-12-11 01:04:50
Local clock offset: 4.083 ms
Remote clock offset: -0.651 ms


# Below is generated by plot.py at 2018-12-11 01:32:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.44 Mbit/s
95th percentile per-packet one-way delay: 369.096 ms
Loss rate: 0.89%
-- Flow 1:
Average throughput: 4.37 Mbit/s
95th percentile per-packet one-way delay: 314.708 ms
Loss rate: 0.52%
-- Flow 2:
Average throughput: 3.55 Mbit/s
95th percentile per-packet one-way delay: 518.713 ms
Loss rate: 1.00%
-- Flow 3:
Average throughput: 2.29 Mbit/s
95th percentile per-packet one-way delay: 321.516 ms
Loss rate: 2.63%
```
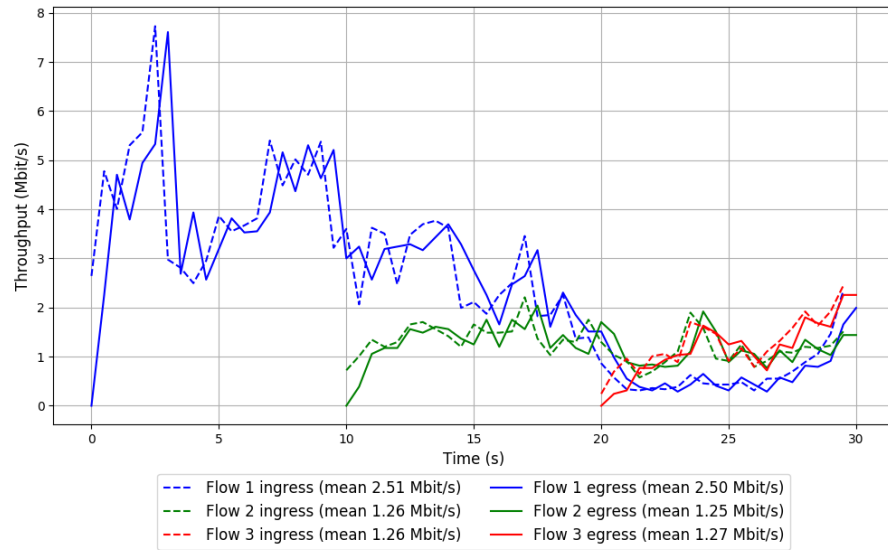
Run 2: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 4.39 Mbit/s) — Flow 1 egress (mean 4.37 Mbit/s)
Flow 2 ingress (mean 3.54 Mbit/s) — Flow 2 egress (mean 3.55 Mbit/s)
Flow 3 ingress (mean 2.29 Mbit/s) — Flow 3 egress (mean 2.29 Mbit/s)

Flow 1 (95th percentile 314.71 ms) · Flow 2 (95th percentile 518.71 ms) · Flow 3 (95th percentile 321.52 ms)

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```
Run 3: Statistics of TCP Cubic

Start at: 2018-12-11 01:25:38
End at: 2018-12-11 01:26:08
Local clock offset: 2.115 ms
Remote clock offset: -0.853 ms


# Below is generated by plot.py at 2018-12-11 01:32:04
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.74 Mbit/s
95th percentile per-packet one-way delay: 292.957 ms
Loss rate: 0.82%
-- Flow 1:
Average throughput: 2.50 Mbit/s
95th percentile per-packet one-way delay: 254.002 ms
Loss rate: 0.57%
-- Flow 2:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 328.190 ms
Loss rate: 0.91%
-- Flow 3:
Average throughput: 1.27 Mbit/s
95th percentile per-packet one-way delay: 398.307 ms
Loss rate: 2.11%
```
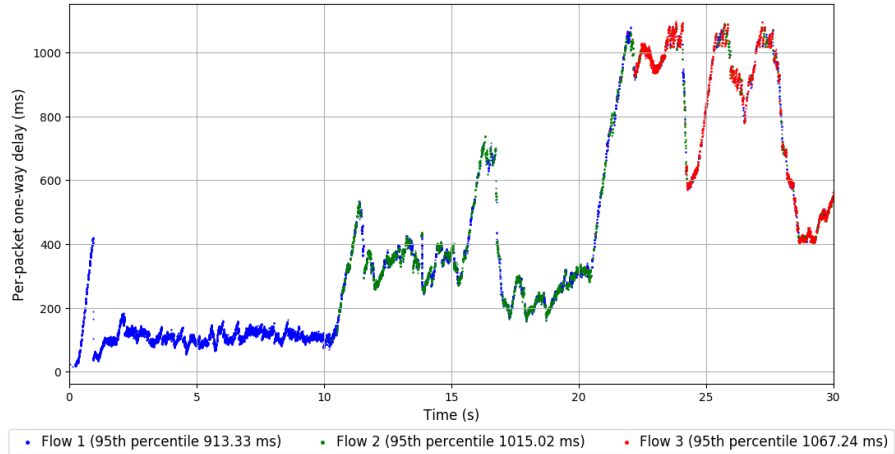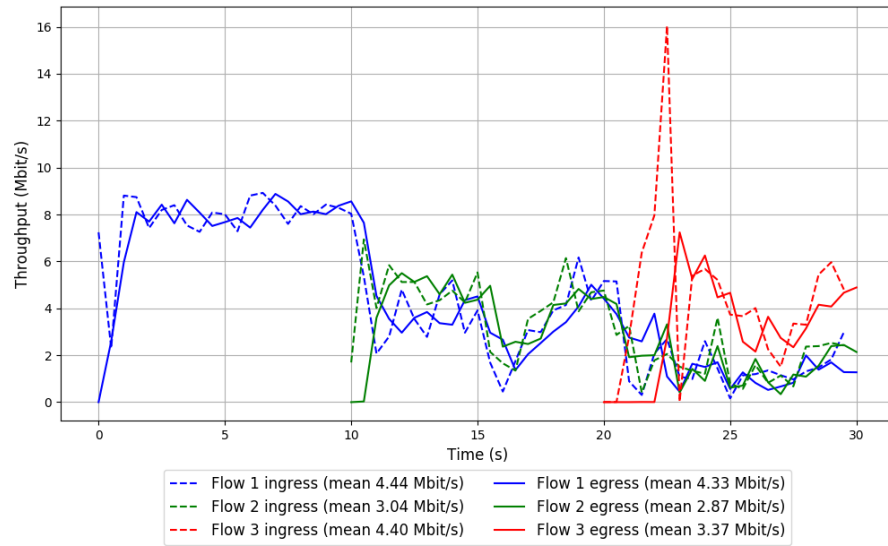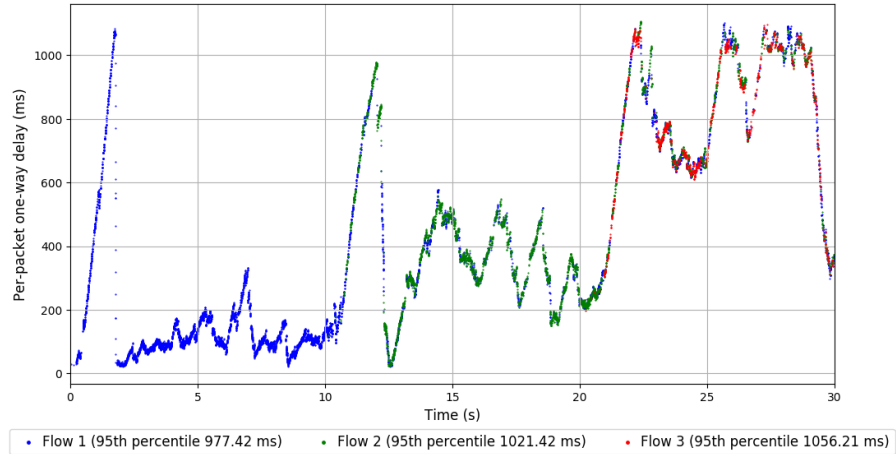
Run 3: Report of TCP Cubic — Data Link

- - - Flow 1 ingress (mean 2.51 Mbit/s) ——— Flow 1 egress (mean 2.50 Mbit/s)
- - - Flow 2 ingress (mean 1.26 Mbit/s) ——— Flow 2 egress (mean 1.25 Mbit/s)
- - - Flow 3 ingress (mean 1.26 Mbit/s) ——— Flow 3 egress (mean 1.27 Mbit/s)

- Flow 1 (95th percentile 254.00 ms)   • Flow 2 (95th percentile 328.19 ms)   • Flow 3 (95th percentile 398.31 ms)
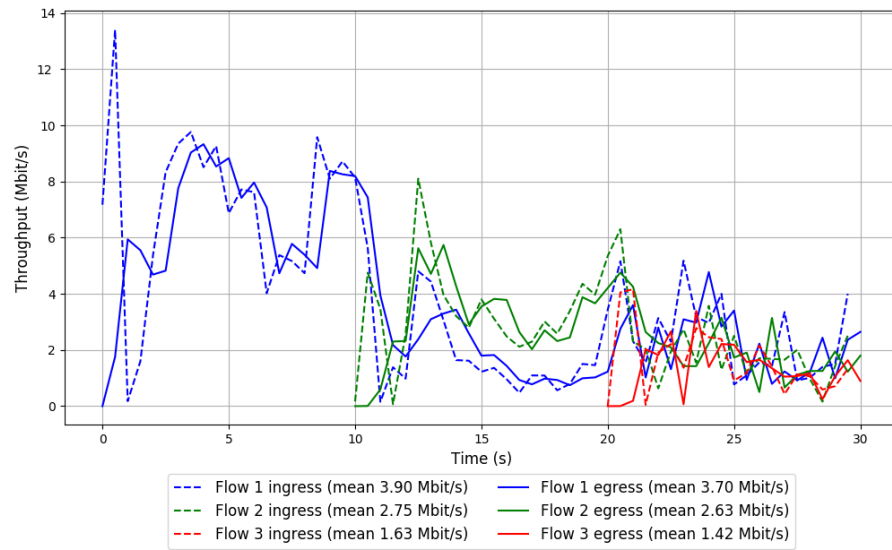
```
Run 1: Statistics of FillP

Start at: 2018-12-11 00:30:40
End at: 2018-12-11 00:31:10
Local clock offset: 2.12 ms
Remote clock offset: -0.94 ms

# Below is generated by plot.py at 2018-12-11 01:32:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.31 Mbit/s
95th percentile per-packet one-way delay: 1027.747 ms
Loss rate: 7.87%
-- Flow 1:
Average throughput: 4.33 Mbit/s
95th percentile per-packet one-way delay: 913.326 ms
Loss rate: 2.83%
-- Flow 2:
Average throughput: 2.87 Mbit/s
95th percentile per-packet one-way delay: 1015.018 ms
Loss rate: 6.03%
-- Flow 3:
Average throughput: 3.37 Mbit/s
95th percentile per-packet one-way delay: 1067.240 ms
Loss rate: 25.74%
```
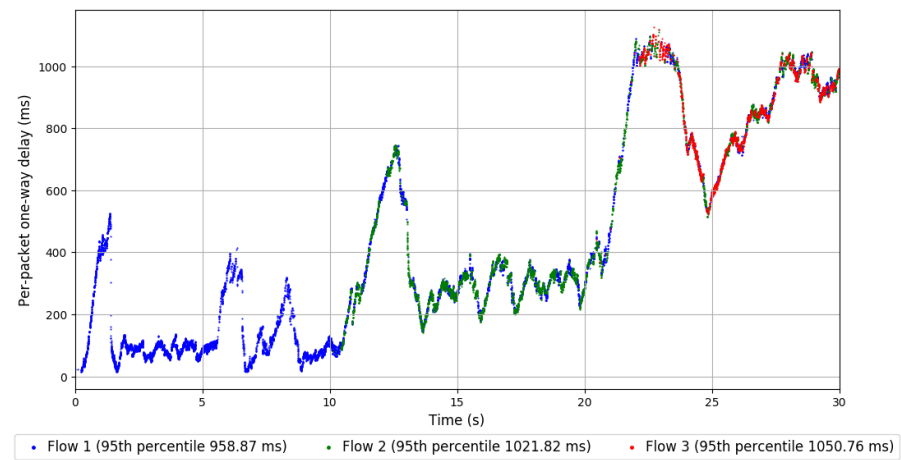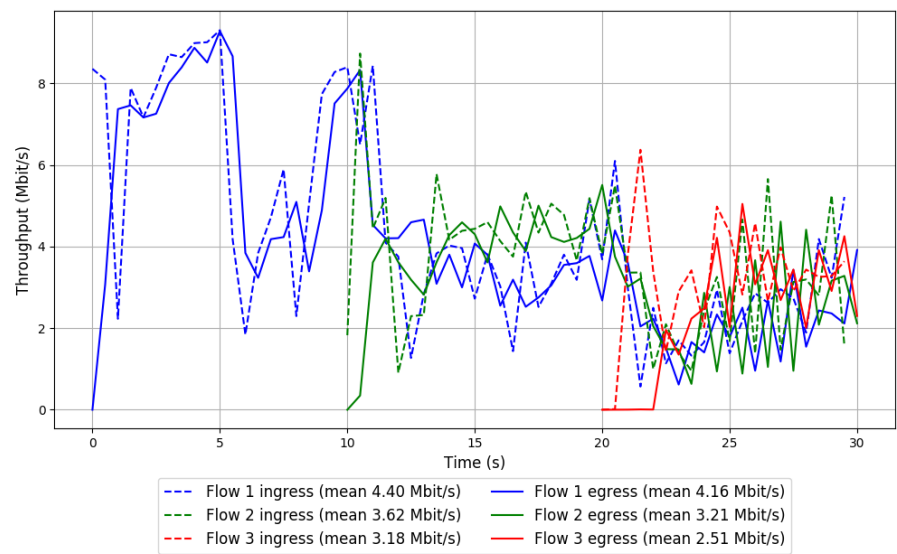
Run 1: Report of FillP — Data Link

```
Run 2: Statistics of FillP

Start at: 2018-12-11 00:51:58
End at: 2018-12-11 00:52:28
Local clock offset: -4.846 ms
Remote clock offset: -1.865 ms


# Below is generated by plot.py at 2018-12-11 01:32:05
# Datalink statistics
-- Total of 3 flows:
Average throughput: 5.90 Mbit/s
95th percentile per-packet one-way delay: 1023.451 ms
Loss rate: 5.84%
-- Flow 1:
Average throughput: 3.70 Mbit/s
95th percentile per-packet one-way delay: 977.416 ms
Loss rate: 5.15%
-- Flow 2:
Average throughput: 2.63 Mbit/s
95th percentile per-packet one-way delay: 1021.421 ms
Loss rate: 4.79%
-- Flow 3:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 1056.215 ms
Loss rate: 14.39%
```
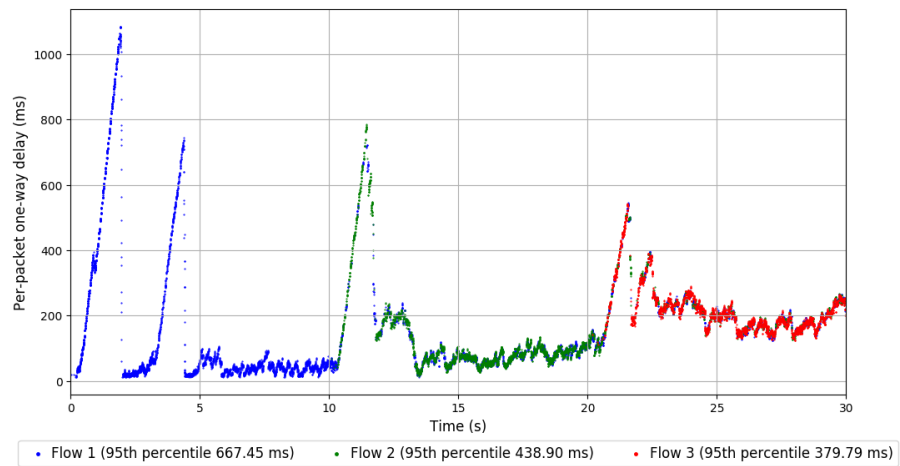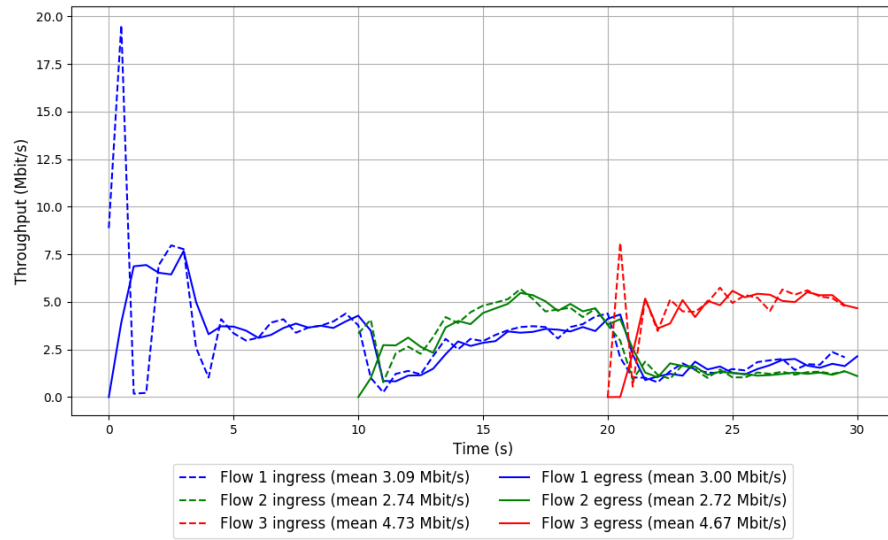
Run 2: Report of FillP — Data Link

Flow 1 ingress (mean 3.90 Mbit/s) --- Flow 1 egress (mean 3.70 Mbit/s)
Flow 2 ingress (mean 2.75 Mbit/s) --- Flow 2 egress (mean 2.63 Mbit/s)
Flow 3 ingress (mean 1.63 Mbit/s) --- Flow 3 egress (mean 1.42 Mbit/s)

Flow 1 (95th percentile 977.42 ms) • Flow 2 (95th percentile 1021.42 ms) • Flow 3 (95th percentile 1056.21 ms)

```
Run 3: Statistics of FillP

Start at: 2018-12-11 01:13:17
End at: 2018-12-11 01:13:47
Local clock offset: 2.396 ms
Remote clock offset: -0.834 ms


# Below is generated by plot.py at 2018-12-11 01:32:10
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.09 Mbit/s
95th percentile per-packet one-way delay: 1012.111 ms
Loss rate: 9.80%
-- Flow 1:
Average throughput: 4.16 Mbit/s
95th percentile per-packet one-way delay: 958.866 ms
Loss rate: 5.68%
-- Flow 2:
Average throughput: 3.21 Mbit/s
95th percentile per-packet one-way delay: 1021.817 ms
Loss rate: 10.99%
-- Flow 3:
Average throughput: 2.51 Mbit/s
95th percentile per-packet one-way delay: 1050.760 ms
Loss rate: 24.34%
```

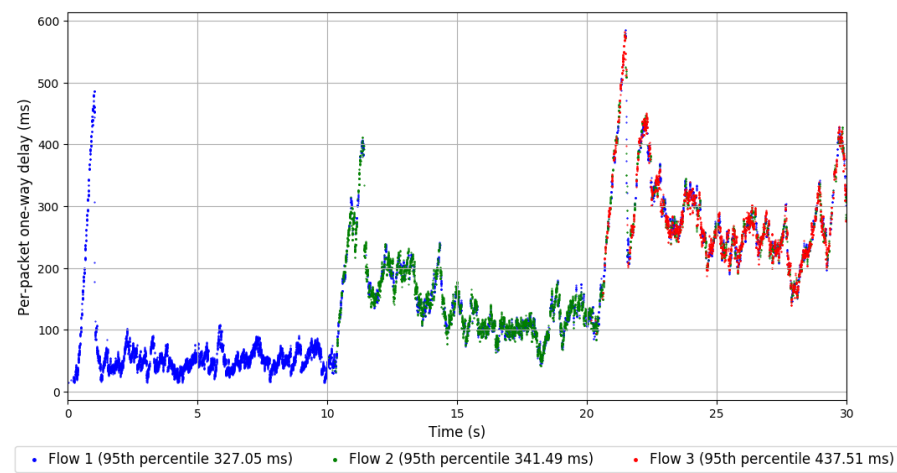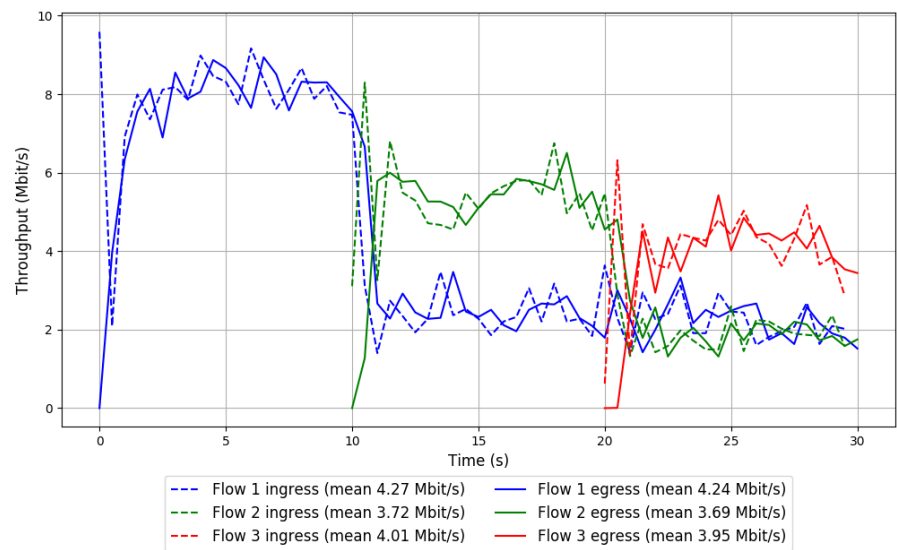# Run 3: Report of FillP — Data Link

```
Run 1: Statistics of FillP-Sheep

Start at: 2018-12-11 00:34:01
End at: 2018-12-11 00:34:31
Local clock offset: 5.586 ms
Remote clock offset: -1.409 ms


# Below is generated by plot.py at 2018-12-11 01:32:13
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.33 Mbit/s
95th percentile per-packet one-way delay: 513.245 ms
Loss rate: 2.39%
-- Flow 1:
Average throughput: 3.00 Mbit/s
95th percentile per-packet one-way delay: 667.454 ms
Loss rate: 3.16%
-- Flow 2:
Average throughput: 2.72 Mbit/s
95th percentile per-packet one-way delay: 438.896 ms
Loss rate: 0.82%
-- Flow 3:
Average throughput: 4.67 Mbit/s
95th percentile per-packet one-way delay: 379.789 ms
Loss rate: 2.70%
```
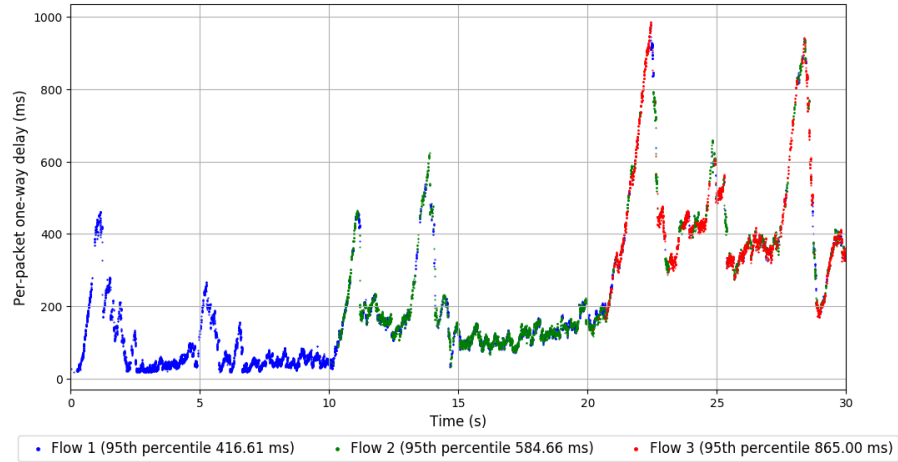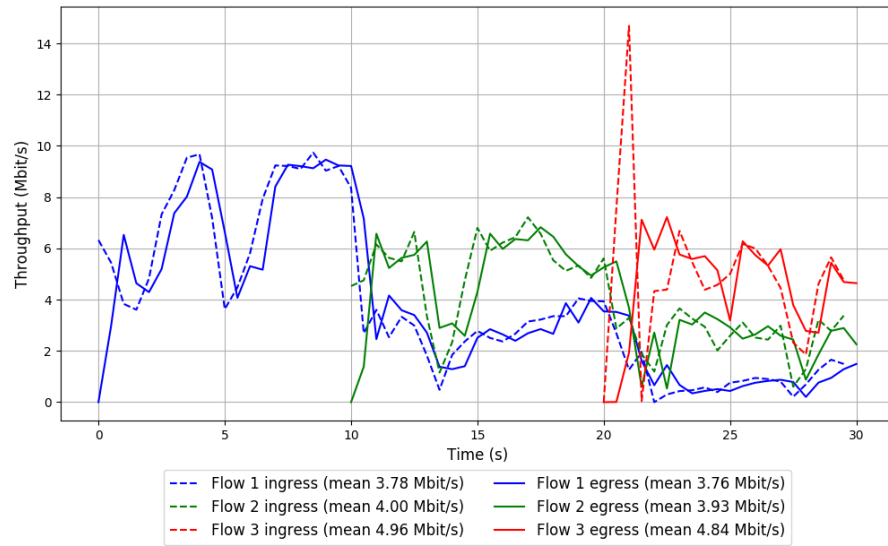
Run 1: Report of FillP-Sheep — Data Link

Flow 1 ingress (mean 3.09 Mbit/s) — Flow 1 egress (mean 3.00 Mbit/s)
Flow 2 ingress (mean 2.74 Mbit/s) — Flow 2 egress (mean 2.72 Mbit/s)
Flow 3 ingress (mean 4.73 Mbit/s) — Flow 3 egress (mean 4.67 Mbit/s)

Flow 1 (95th percentile 667.45 ms)   Flow 2 (95th percentile 438.90 ms)   Flow 3 (95th percentile 379.79 ms)

```
Run 2: Statistics of FillP-Sheep

Start at: 2018-12-11 00:55:20
End at: 2018-12-11 00:55:50
Local clock offset: 1.757 ms
Remote clock offset: -0.619 ms


# Below is generated by plot.py at 2018-12-11 01:32:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.99 Mbit/s
95th percentile per-packet one-way delay: 375.853 ms
Loss rate: 1.09%
-- Flow 1:
Average throughput: 4.24 Mbit/s
95th percentile per-packet one-way delay: 327.045 ms
Loss rate: 0.69%
-- Flow 2:
Average throughput: 3.69 Mbit/s
95th percentile per-packet one-way delay: 341.488 ms
Loss rate: 1.03%
-- Flow 3:
Average throughput: 3.95 Mbit/s
95th percentile per-packet one-way delay: 437.506 ms
Loss rate: 2.50%
```
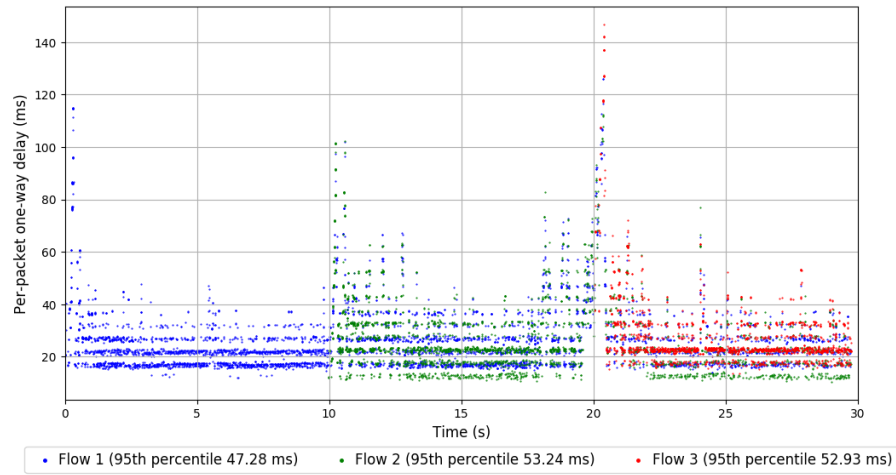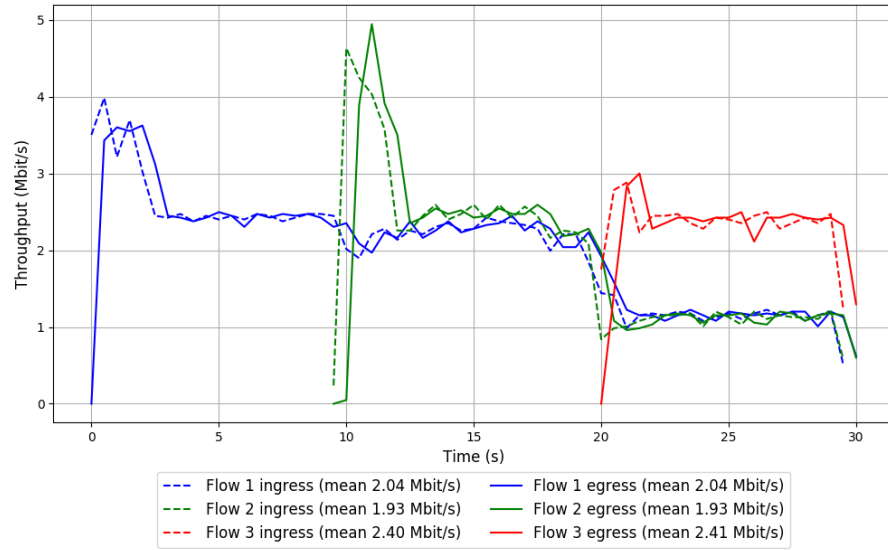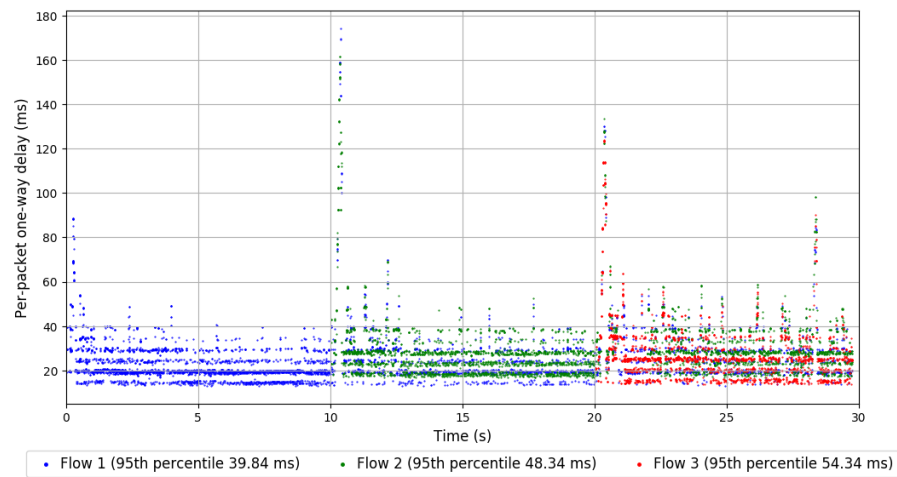
Run 2: Report of FillP-Sheep — Data Link

Flow 1 ingress (mean 4.27 Mbit/s)   Flow 1 egress (mean 4.24 Mbit/s)
Flow 2 ingress (mean 3.72 Mbit/s)   Flow 2 egress (mean 3.69 Mbit/s)
Flow 3 ingress (mean 4.01 Mbit/s)   Flow 3 egress (mean 3.95 Mbit/s)

Flow 1 (95th percentile 327.05 ms)   Flow 2 (95th percentile 341.49 ms)   Flow 3 (95th percentile 437.51 ms)

```
Run 3: Statistics of FillP-Sheep

Start at: 2018-12-11 01:16:40
End at: 2018-12-11 01:17:10
Local clock offset: -3.245 ms
Remote clock offset: -1.147 ms


# Below is generated by plot.py at 2018-12-11 01:32:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.95 Mbit/s
95th percentile per-packet one-way delay: 607.979 ms
Loss rate: 1.68%
-- Flow 1:
Average throughput: 3.76 Mbit/s
95th percentile per-packet one-way delay: 416.612 ms
Loss rate: 0.67%
-- Flow 2:
Average throughput: 3.93 Mbit/s
95th percentile per-packet one-way delay: 584.660 ms
Loss rate: 2.04%
-- Flow 3:
Average throughput: 4.84 Mbit/s
95th percentile per-packet one-way delay: 865.000 ms
Loss rate: 3.41%
```

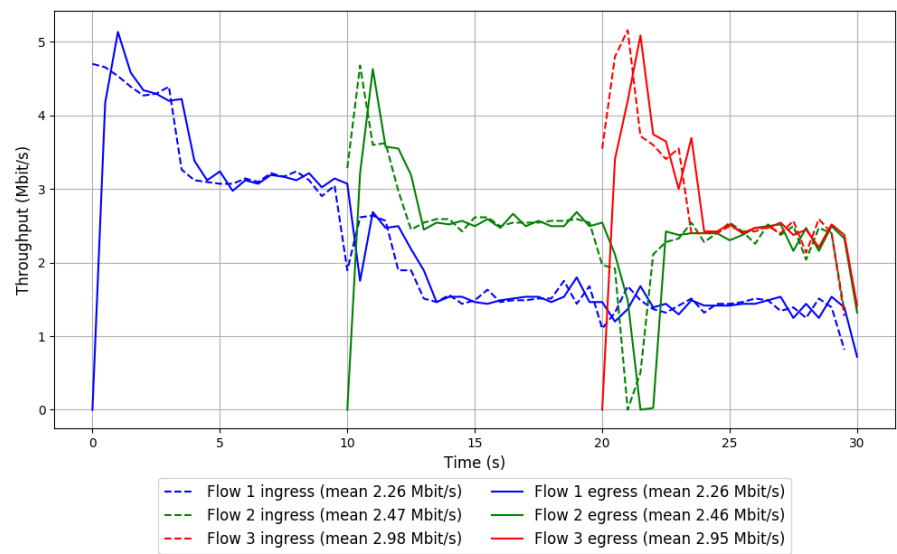Run 3: Report of FillP-Sheep — Data Link

```
Run 1: Statistics of Indigo

Start at: 2018-12-11 00:35:08
End at: 2018-12-11 00:35:38
Local clock offset: 4.292 ms
Remote clock offset: -1.081 ms


# Below is generated by plot.py at 2018-12-11 01:32:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.10 Mbit/s
95th percentile per-packet one-way delay: 52.588 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 2.04 Mbit/s
95th percentile per-packet one-way delay: 47.283 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.93 Mbit/s
95th percentile per-packet one-way delay: 53.241 ms
Loss rate: 0.06%
-- Flow 3:
Average throughput: 2.41 Mbit/s
95th percentile per-packet one-way delay: 52.928 ms
Loss rate: 0.20%
```
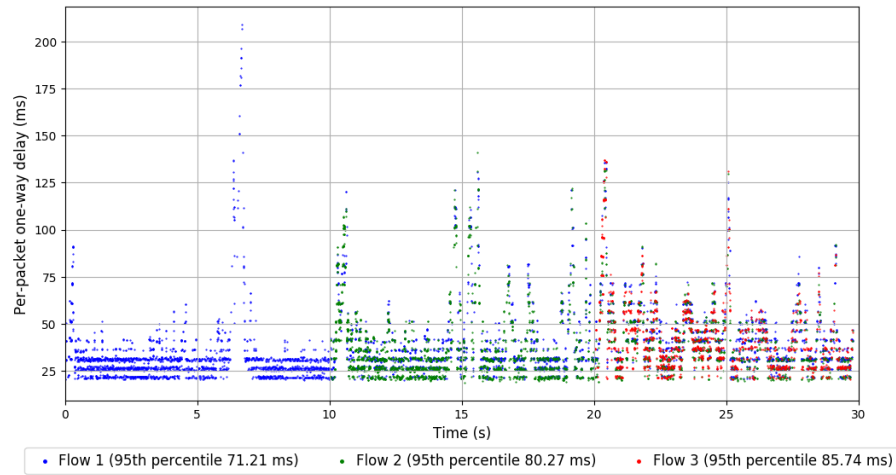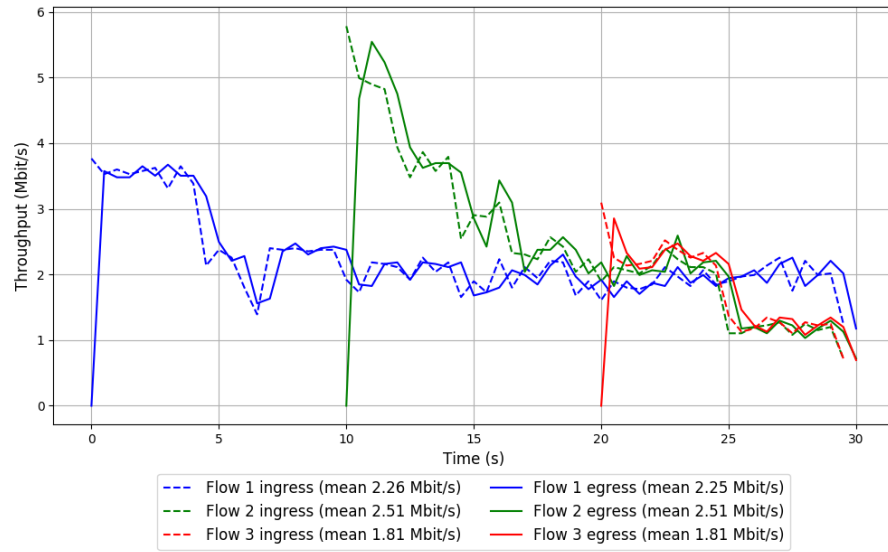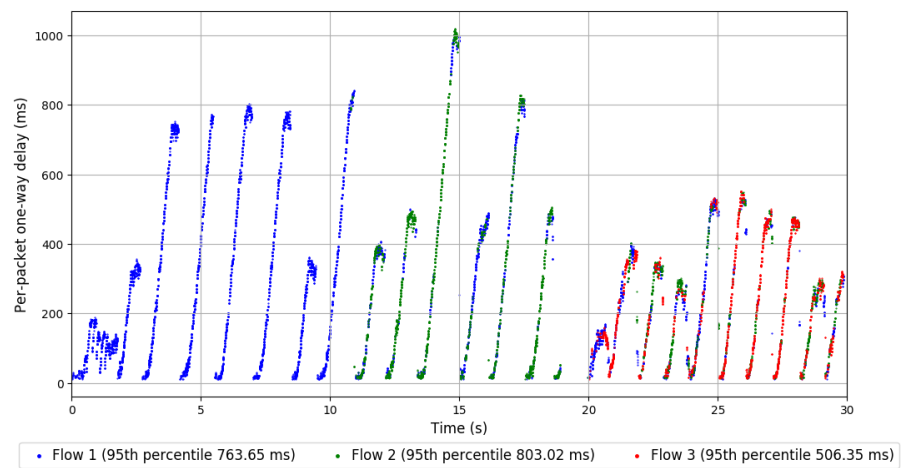
Run 1: Report of Indigo — Data Link

```
Run 2: Statistics of Indigo

Start at: 2018-12-11 00:56:27
End at: 2018-12-11 00:56:57
Local clock offset: 3.347 ms
Remote clock offset: -1.164 ms


# Below is generated by plot.py at 2018-12-11 01:32:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.85 Mbit/s
95th percentile per-packet one-way delay: 46.597 ms
Loss rate: 0.56%
-- Flow 1:
Average throughput: 2.26 Mbit/s
95th percentile per-packet one-way delay: 39.843 ms
Loss rate: 0.14%
-- Flow 2:
Average throughput: 2.46 Mbit/s
95th percentile per-packet one-way delay: 48.343 ms
Loss rate: 0.64%
-- Flow 3:
Average throughput: 2.95 Mbit/s
95th percentile per-packet one-way delay: 54.339 ms
Loss rate: 1.40%
```
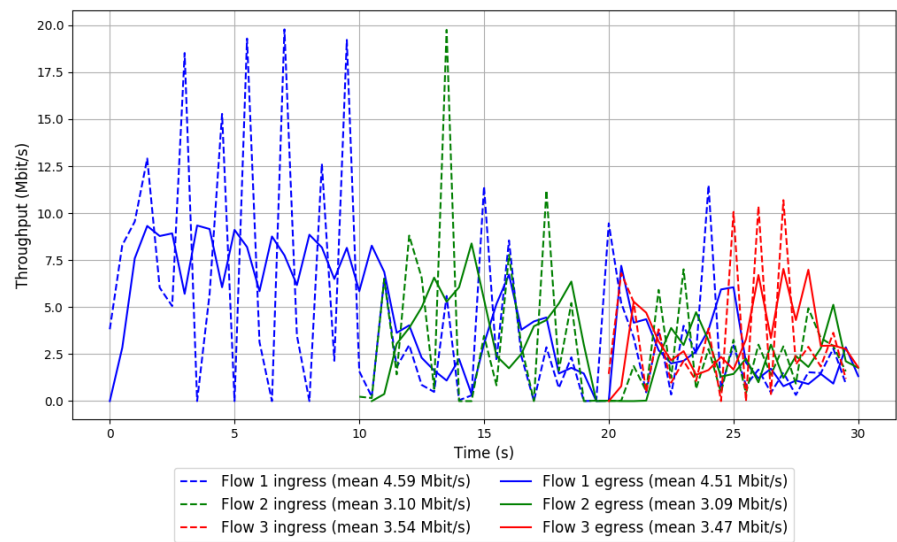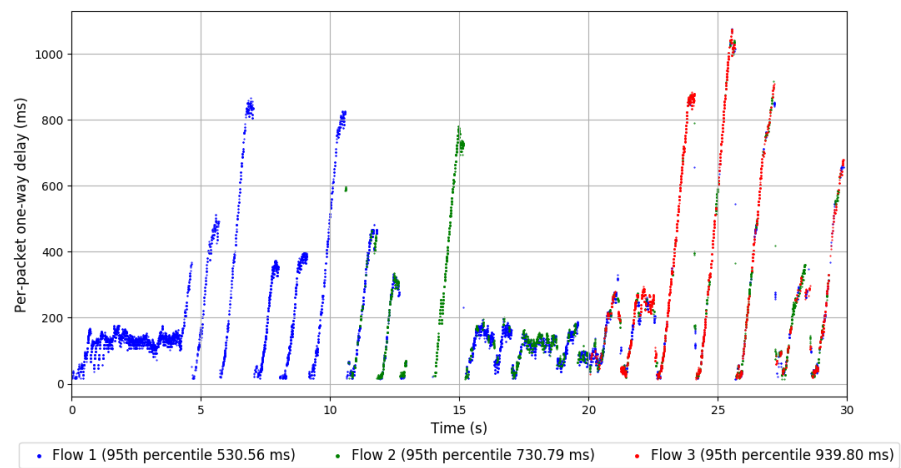
Run 2: Report of Indigo — Data Link

```
Run 3: Statistics of Indigo

Start at: 2018-12-11 01:17:48
End at: 2018-12-11 01:18:18
Local clock offset: -1.826 ms
Remote clock offset: -1.726 ms


# Below is generated by plot.py at 2018-12-11 01:32:15
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.51 Mbit/s
95th percentile per-packet one-way delay: 76.009 ms
Loss rate: 0.14%
-- Flow 1:
Average throughput: 2.25 Mbit/s
95th percentile per-packet one-way delay: 71.212 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 2.51 Mbit/s
95th percentile per-packet one-way delay: 80.270 ms
Loss rate: 0.12%
-- Flow 3:
Average throughput: 1.81 Mbit/s
95th percentile per-packet one-way delay: 85.742 ms
Loss rate: 0.27%
```
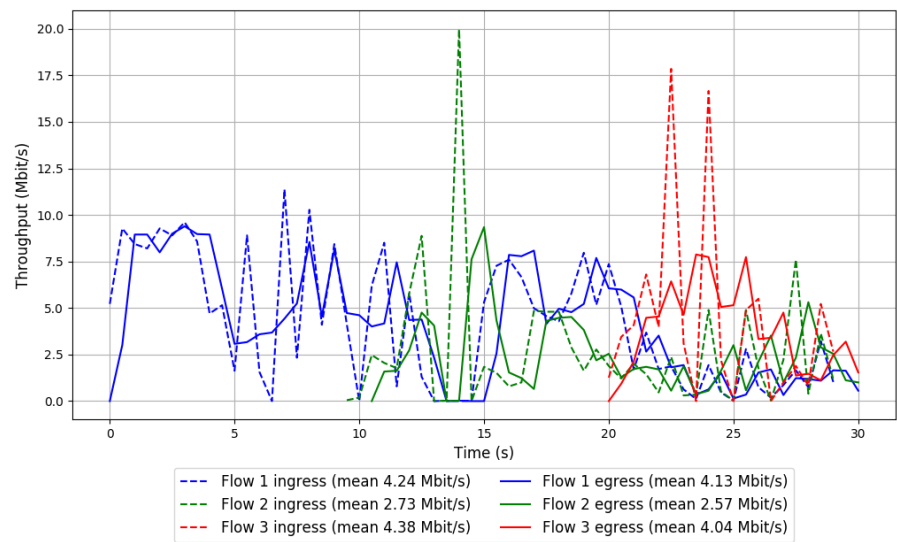
Run 3: Report of Indigo — Data Link

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

Start at: 2018-12-11 00:46:22
End at: 2018-12-11 00:46:52
Local clock offset: 5.37 ms
Remote clock offset: -1.664 ms

# Below is generated by plot.py at 2018-12-11 01:32:16
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.61 Mbit/s
95th percentile per-packet one-way delay: 757.855 ms
Loss rate: 1.89%
-- Flow 1:
Average throughput: 4.51 Mbit/s
95th percentile per-packet one-way delay: 763.652 ms
Loss rate: 0.93%
-- Flow 2:
Average throughput: 3.09 Mbit/s
95th percentile per-packet one-way delay: 803.025 ms
Loss rate: 4.36%
-- Flow 3:
Average throughput: 3.47 Mbit/s
95th percentile per-packet one-way delay: 506.348 ms
Loss rate: 1.25%
```
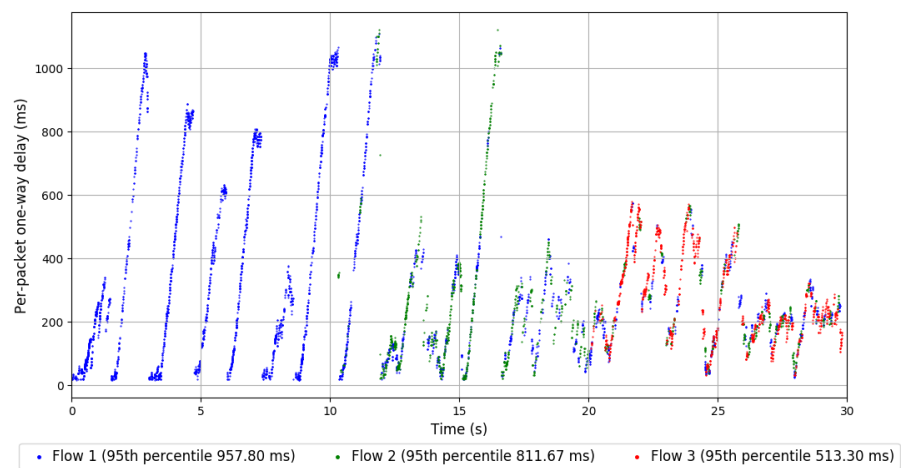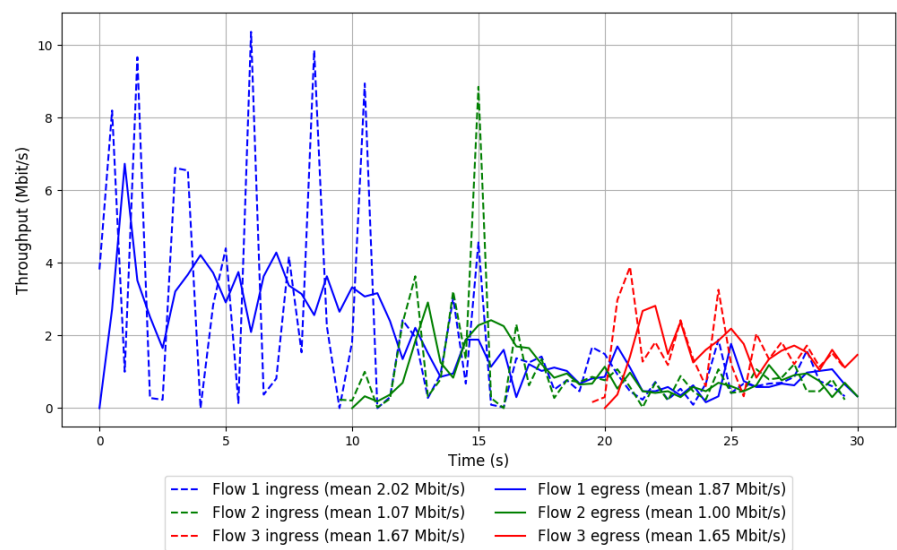
Run 1: Report of Indigo-96d2da3 — Data Link

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

Start at: 2018-12-11 01:07:42
End at: 2018-12-11 01:08:12
Local clock offset: -0.025 ms
Remote clock offset: -1.167 ms


# Below is generated by plot.py at 2018-12-11 01:32:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.10 Mbit/s
95th percentile per-packet one-way delay: 777.298 ms
Loss rate: 2.49%
-- Flow 1:
Average throughput: 4.13 Mbit/s
95th percentile per-packet one-way delay: 530.561 ms
Loss rate: 0.76%
-- Flow 2:
Average throughput: 2.57 Mbit/s
95th percentile per-packet one-way delay: 730.787 ms
Loss rate: 6.58%
-- Flow 3:
Average throughput: 4.04 Mbit/s
95th percentile per-packet one-way delay: 939.805 ms
Loss rate: 2.49%
```

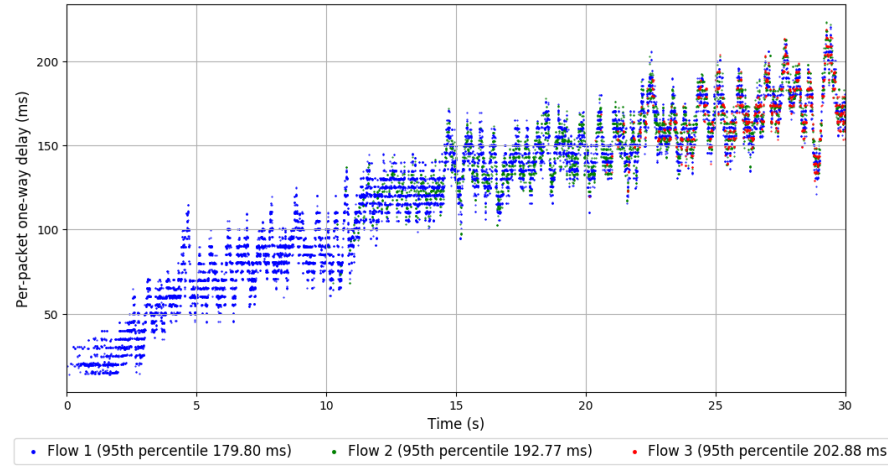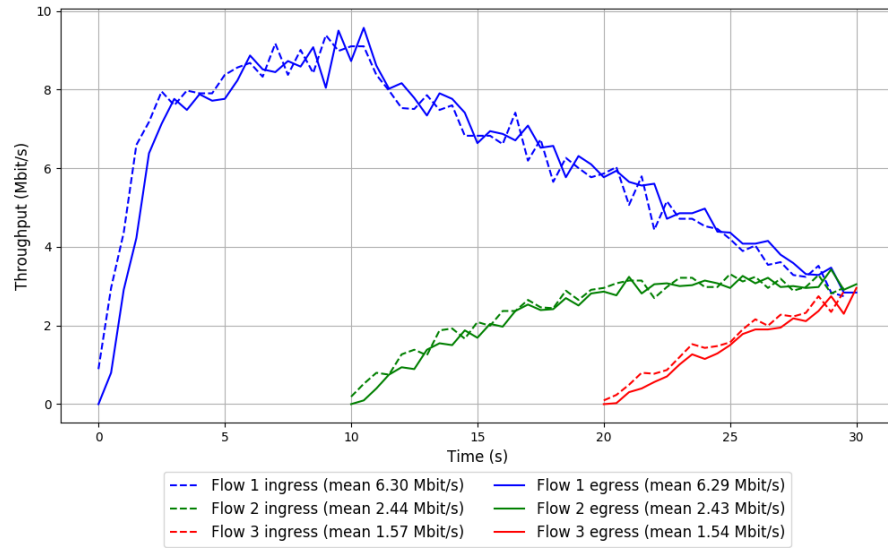Run 2: Report of Indigo-96d2da3 — Data Link

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

Start at: 2018-12-11 01:28:59
End at: 2018-12-11 01:29:29
Local clock offset: -0.767 ms
Remote clock offset: -1.506 ms


# Below is generated by plot.py at 2018-12-11 01:32:20
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.06 Mbit/s
95th percentile per-packet one-way delay: 872.427 ms
Loss rate: 6.65%
-- Flow 1:
Average throughput: 1.87 Mbit/s
95th percentile per-packet one-way delay: 957.801 ms
Loss rate: 7.33%
-- Flow 2:
Average throughput: 1.00 Mbit/s
95th percentile per-packet one-way delay: 811.668 ms
Loss rate: 8.50%
-- Flow 3:
Average throughput: 1.65 Mbit/s
95th percentile per-packet one-way delay: 513.297 ms
Loss rate: 1.78%
```

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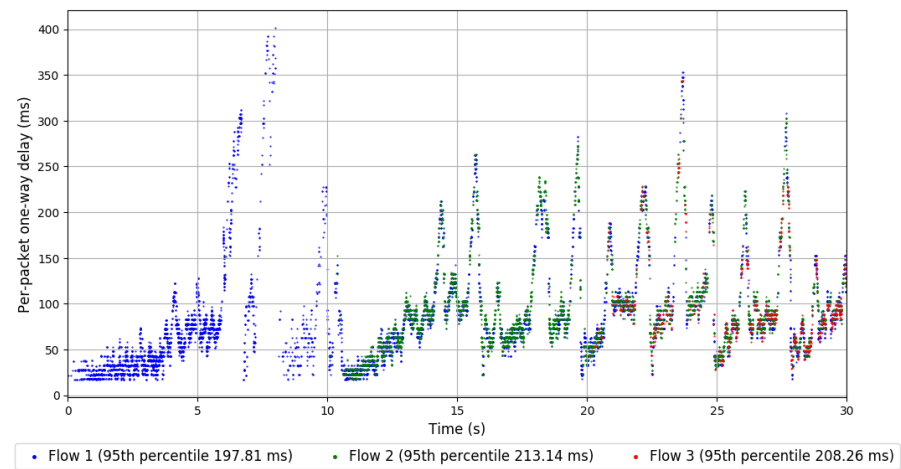

Flow 1 ingress (mean 2.02 Mbit/s)   Flow 1 egress (mean 1.87 Mbit/s)
Flow 2 ingress (mean 1.07 Mbit/s)   Flow 2 egress (mean 1.00 Mbit/s)
Flow 3 ingress (mean 1.67 Mbit/s)   Flow 3 egress (mean 1.65 Mbit/s)

Flow 1 (95th percentile 957.80 ms)   Flow 2 (95th percentile 811.67 ms)   Flow 3 (95th percentile 513.30 ms)
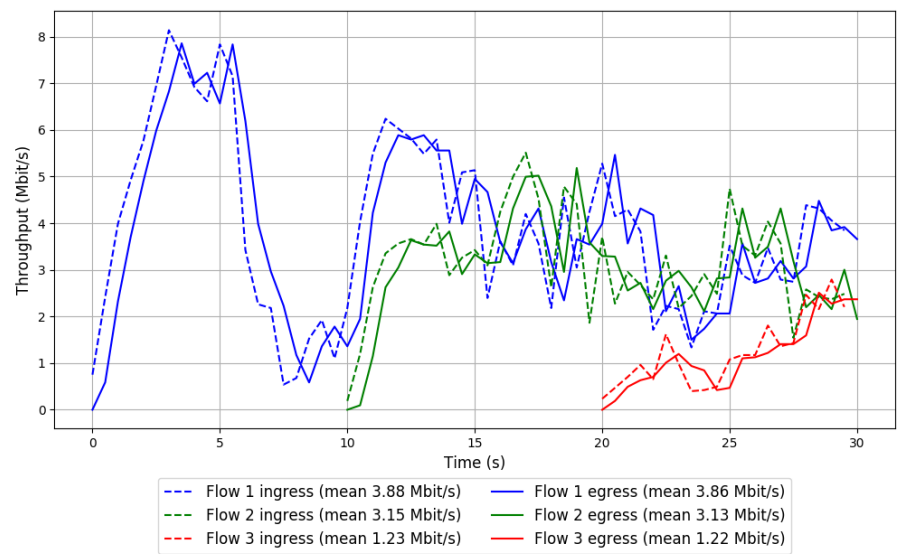
```
Run 1: Statistics of LEDBAT

Start at: 2018-12-11 00:45:14
End at: 2018-12-11 00:45:44
Local clock offset: 3.865 ms
Remote clock offset: -2.035 ms

# Below is generated by plot.py at 2018-12-11 01:32:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 8.41 Mbit/s
95th percentile per-packet one-way delay: 185.095 ms
Loss rate: 0.53%
-- Flow 1:
Average throughput: 6.29 Mbit/s
95th percentile per-packet one-way delay: 179.796 ms
Loss rate: 0.25%
-- Flow 2:
Average throughput: 2.43 Mbit/s
95th percentile per-packet one-way delay: 192.768 ms
Loss rate: 0.89%
-- Flow 3:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 202.881 ms
Loss rate: 2.85%
```
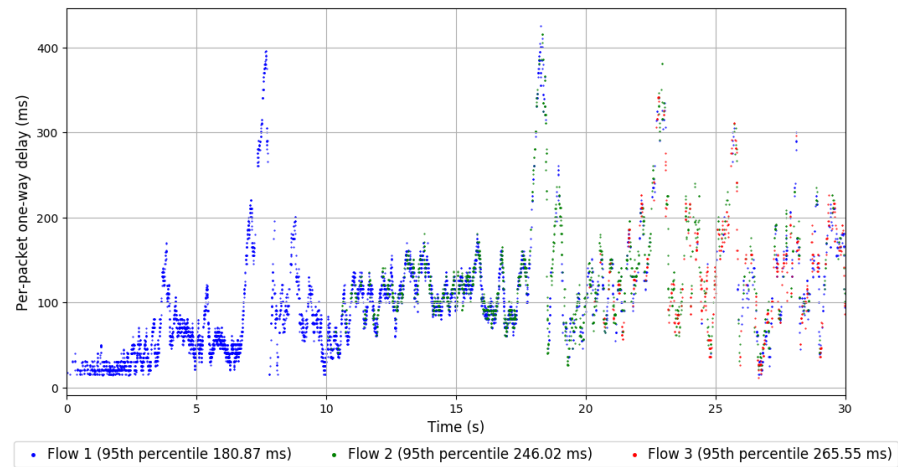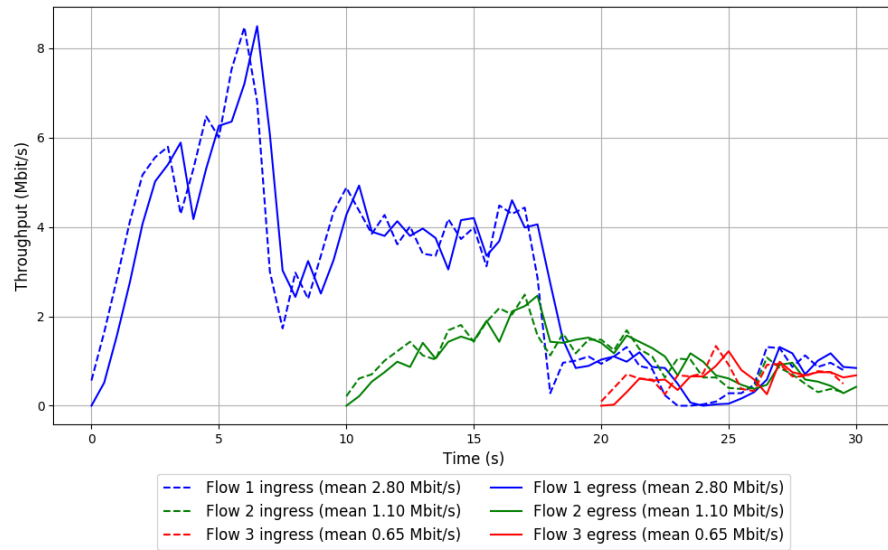
Run 1: Report of LEDBAT — Data Link

```
Run 2: Statistics of LEDBAT

Start at: 2018-12-11 01:06:34
End at: 2018-12-11 01:07:04
Local clock offset: 0.765 ms
Remote clock offset: -1.016 ms


# Below is generated by plot.py at 2018-12-11 01:32:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.35 Mbit/s
95th percentile per-packet one-way delay: 207.675 ms
Loss rate: 0.58%
-- Flow 1:
Average throughput: 3.86 Mbit/s
95th percentile per-packet one-way delay: 197.808 ms
Loss rate: 0.51%
-- Flow 2:
Average throughput: 3.13 Mbit/s
95th percentile per-packet one-way delay: 213.139 ms
Loss rate: 0.56%
-- Flow 3:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 208.262 ms
Loss rate: 1.24%
```
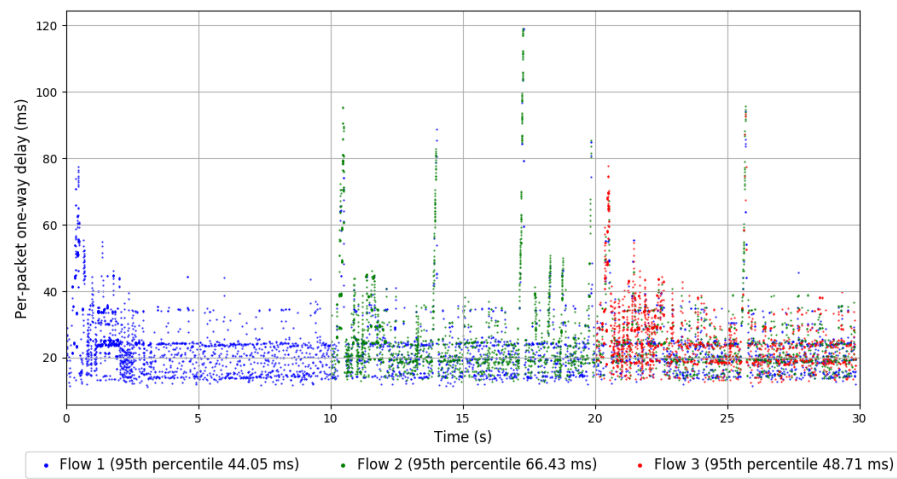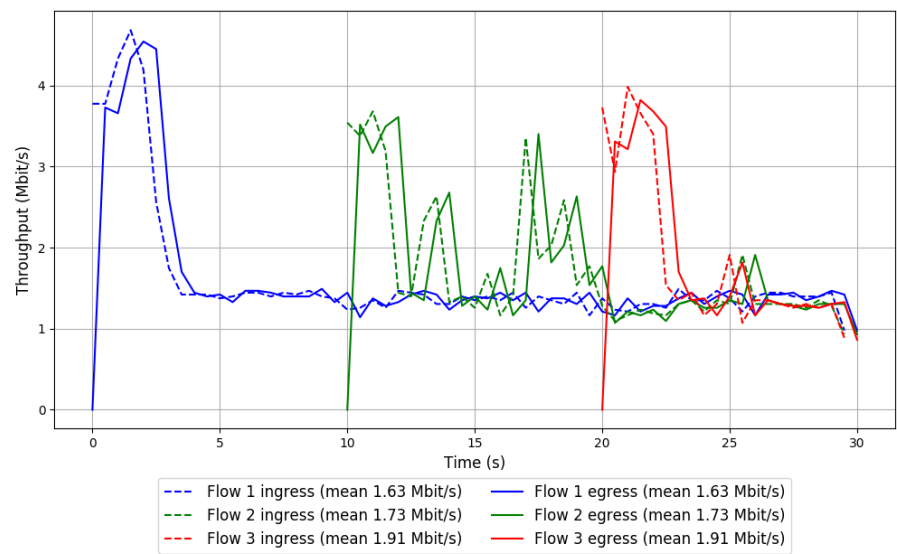
Run 2: Report of LEDBAT — Data Link

```
Run 3: Statistics of LEDBAT

Start at: 2018-12-11 01:27:52
End at: 2018-12-11 01:28:22
Local clock offset: 3.626 ms
Remote clock offset: -0.952 ms


# Below is generated by plot.py at 2018-12-11 01:32:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.74 Mbit/s
95th percentile per-packet one-way delay: 211.068 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 2.80 Mbit/s
95th percentile per-packet one-way delay: 180.869 ms
Loss rate: 0.17%
-- Flow 2:
Average throughput: 1.10 Mbit/s
95th percentile per-packet one-way delay: 246.017 ms
Loss rate: 0.16%
-- Flow 3:
Average throughput: 0.65 Mbit/s
95th percentile per-packet one-way delay: 265.553 ms
Loss rate: 0.91%
```
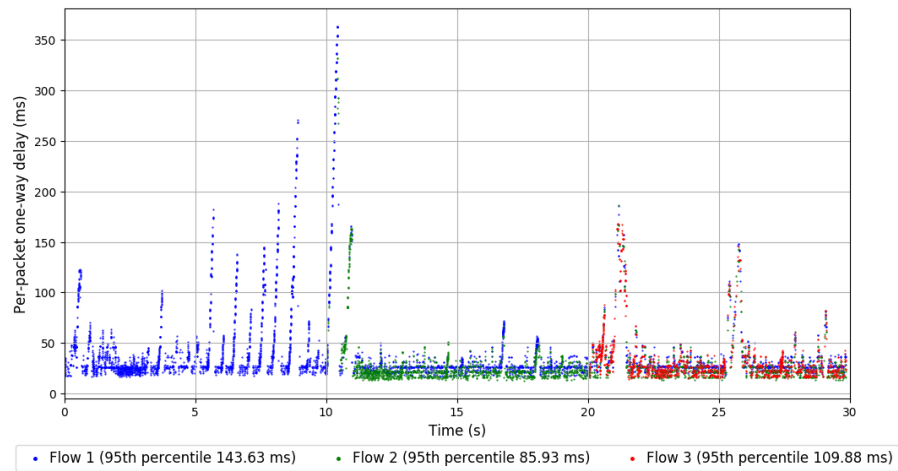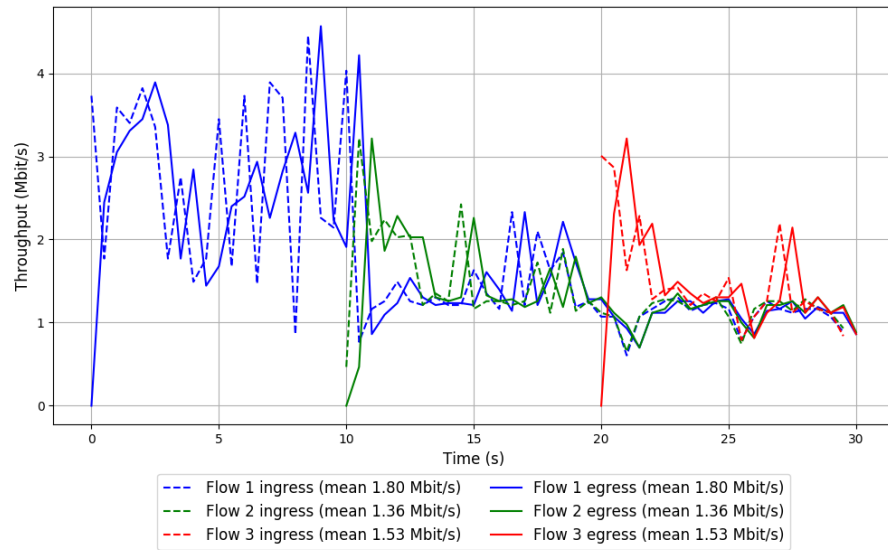
Run 3: Report of LEDBAT — Data Link

```
Run 1: Statistics of Indigo-Muses

Start at: 2018-12-11 00:31:47
End at: 2018-12-11 00:32:17
Local clock offset: 3.6 ms
Remote clock offset: -1.133 ms


# Below is generated by plot.py at 2018-12-11 01:32:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.40 Mbit/s
95th percentile per-packet one-way delay: 50.869 ms
Loss rate: 0.08%
-- Flow 1:
Average throughput: 1.63 Mbit/s
95th percentile per-packet one-way delay: 44.051 ms
Loss rate: 0.05%
-- Flow 2:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 66.427 ms
Loss rate: 0.10%
-- Flow 3:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 48.709 ms
Loss rate: 0.12%
```
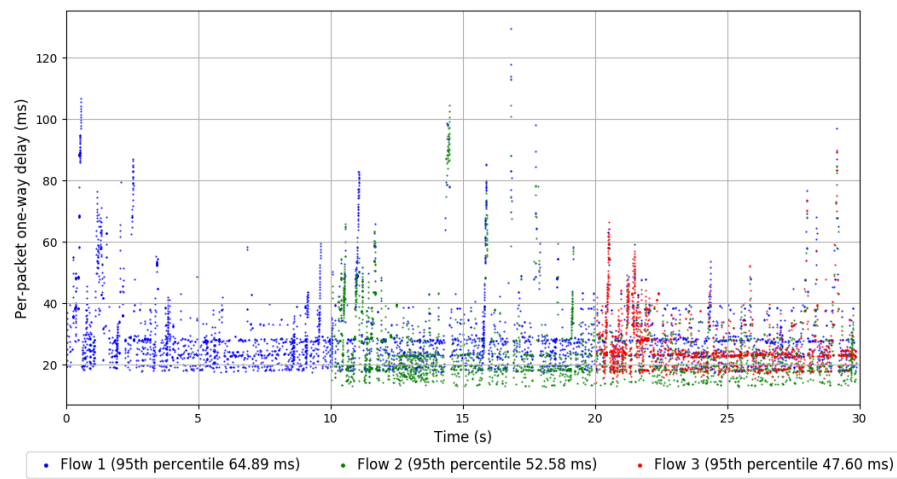
Run 1: Report of Indigo-Muses — Data Link

```
Run 2: Statistics of Indigo-Muses

Start at: 2018-12-11 00:53:05
End at: 2018-12-11 00:53:35
Local clock offset: 2.356 ms
Remote clock offset: -1.838 ms


# Below is generated by plot.py at 2018-12-11 01:32:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.21 Mbit/s
95th percentile per-packet one-way delay: 126.293 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 1.80 Mbit/s
95th percentile per-packet one-way delay: 143.626 ms
Loss rate: 0.11%
-- Flow 2:
Average throughput: 1.36 Mbit/s
95th percentile per-packet one-way delay: 85.929 ms
Loss rate: 0.09%
-- Flow 3:
Average throughput: 1.53 Mbit/s
95th percentile per-packet one-way delay: 109.875 ms
Loss rate: 0.00%
```

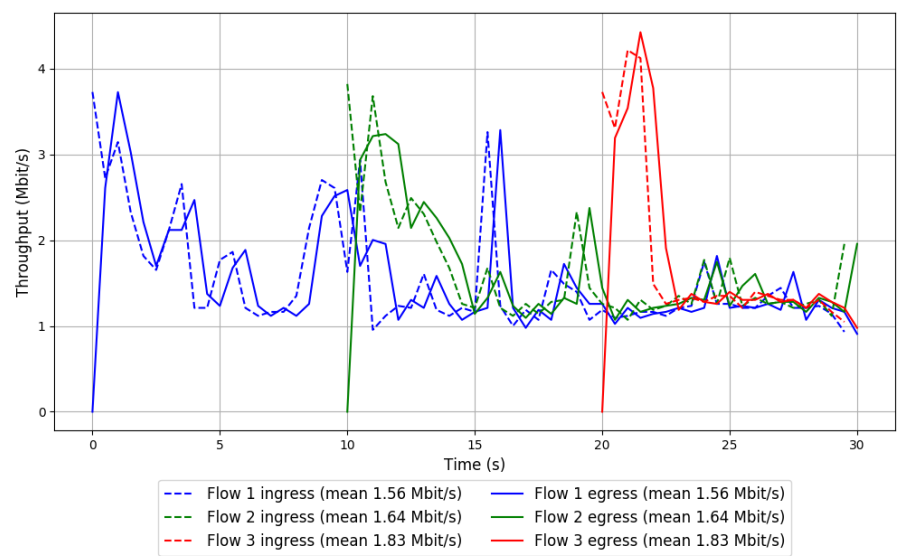Run 2: Report of Indigo-Muses — Data Link

```
Run 3: Statistics of Indigo-Muses

Start at: 2018-12-11 01:14:25
End at: 2018-12-11 01:14:55
Local clock offset: 1.075 ms
Remote clock offset: -0.798 ms

# Below is generated by plot.py at 2018-12-11 01:32:23
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.25 Mbit/s
95th percentile per-packet one-way delay: 57.763 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 64.885 ms
Loss rate: 0.08%
-- Flow 2:
Average throughput: 1.64 Mbit/s
95th percentile per-packet one-way delay: 52.583 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 1.83 Mbit/s
95th percentile per-packet one-way delay: 47.603 ms
Loss rate: 0.19%
```

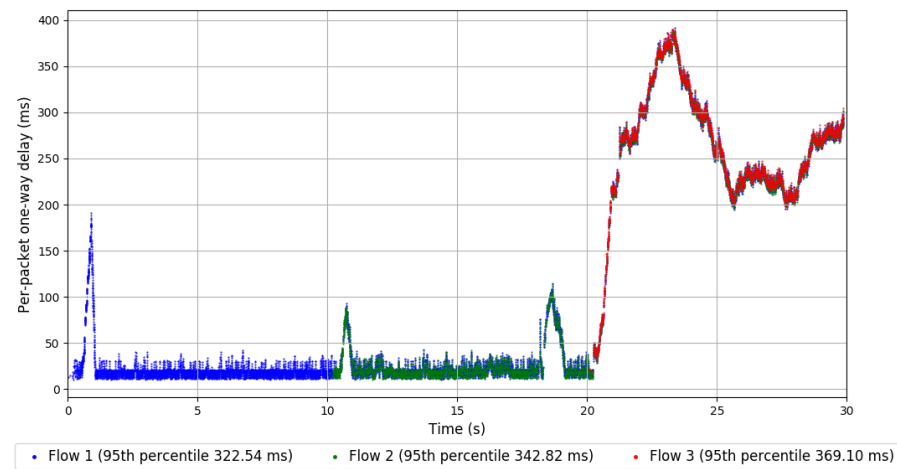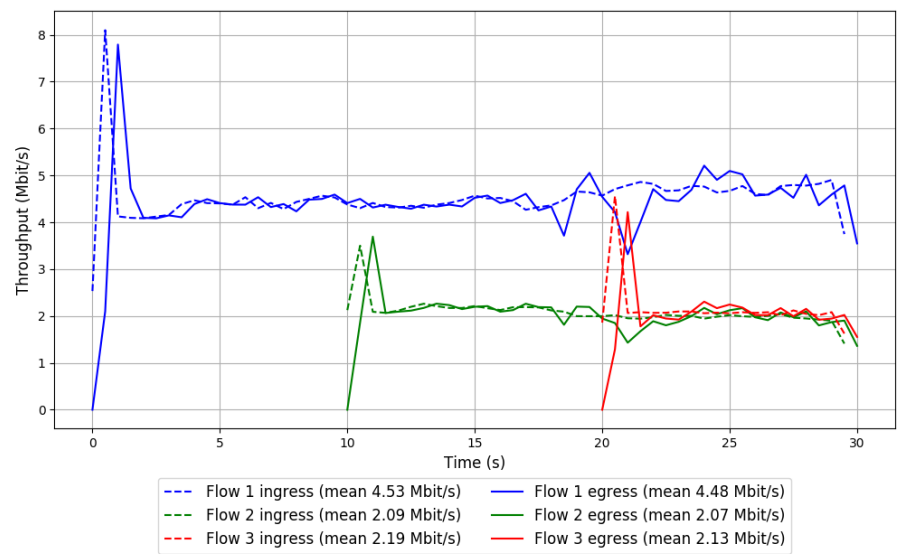Run 3: Report of Indigo-Muses — Data Link

```
Run 1: Statistics of PCC-Allegro

Start at: 2018-12-11 00:36:15
End at: 2018-12-11 00:36:45
Local clock offset: 5.383 ms
Remote clock offset: -1.529 ms


# Below is generated by plot.py at 2018-12-11 01:32:28
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.56 Mbit/s
95th percentile per-packet one-way delay: 337.933 ms
Loss rate: 1.41%
-- Flow 1:
Average throughput: 4.48 Mbit/s
95th percentile per-packet one-way delay: 322.537 ms
Loss rate: 1.17%
-- Flow 2:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 342.823 ms
Loss rate: 1.40%
-- Flow 3:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 369.098 ms
Loss rate: 2.92%
```

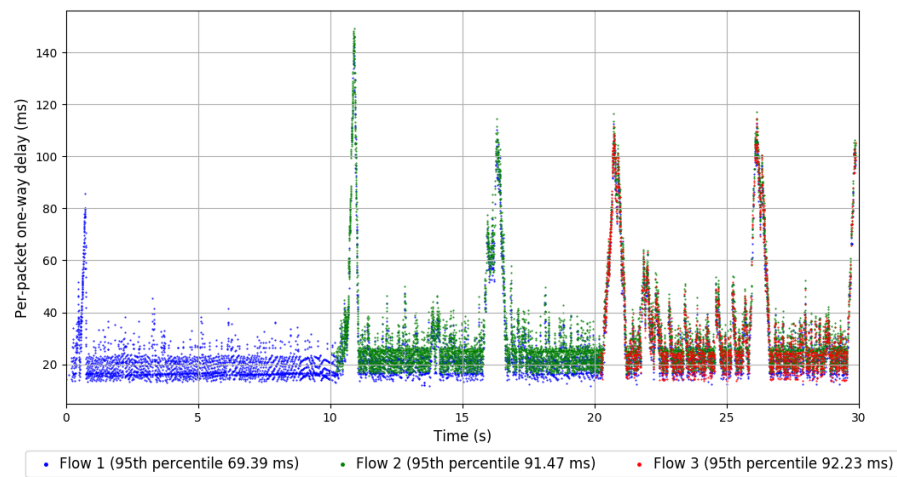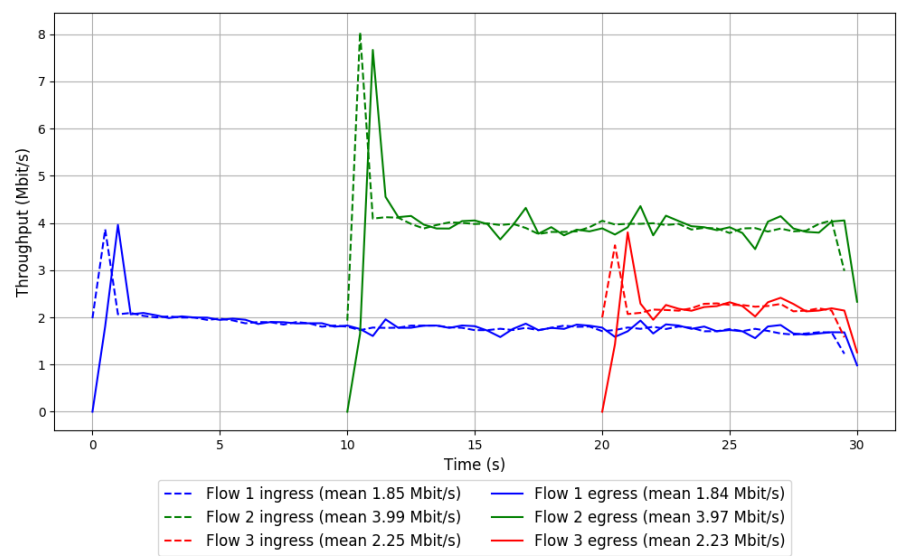# Run 1: Report of PCC-Allegro — Data Link

```
Run 2: Statistics of PCC-Allegro

Start at: 2018-12-11 00:57:35
End at: 2018-12-11 00:58:05
Local clock offset: 3.439 ms
Remote clock offset: -0.824 ms


# Below is generated by plot.py at 2018-12-11 01:32:29
# Datalink statistics
-- Total of 3 flows:
Average throughput: 5.22 Mbit/s
95th percentile per-packet one-way delay: 85.679 ms
Loss rate: 0.50%
-- Flow 1:
Average throughput: 1.84 Mbit/s
95th percentile per-packet one-way delay: 69.391 ms
Loss rate: 0.29%
-- Flow 2:
Average throughput: 3.97 Mbit/s
95th percentile per-packet one-way delay: 91.466 ms
Loss rate: 0.52%
-- Flow 3:
Average throughput: 2.23 Mbit/s
95th percentile per-packet one-way delay: 92.234 ms
Loss rate: 0.93%
```

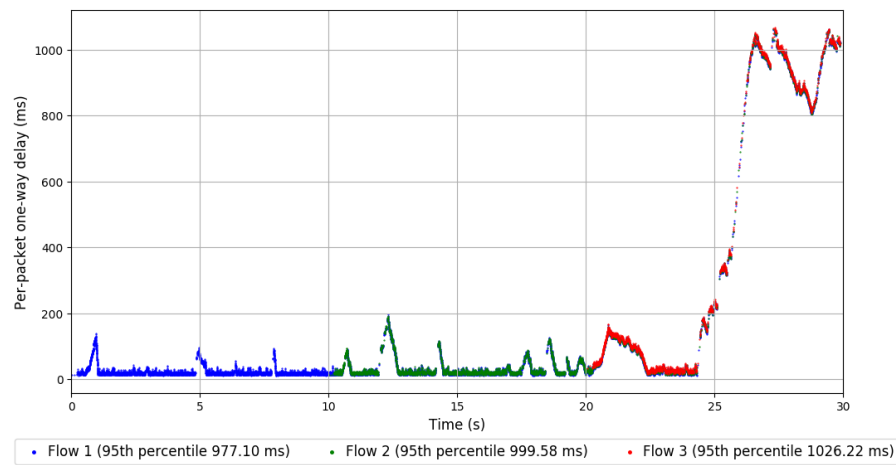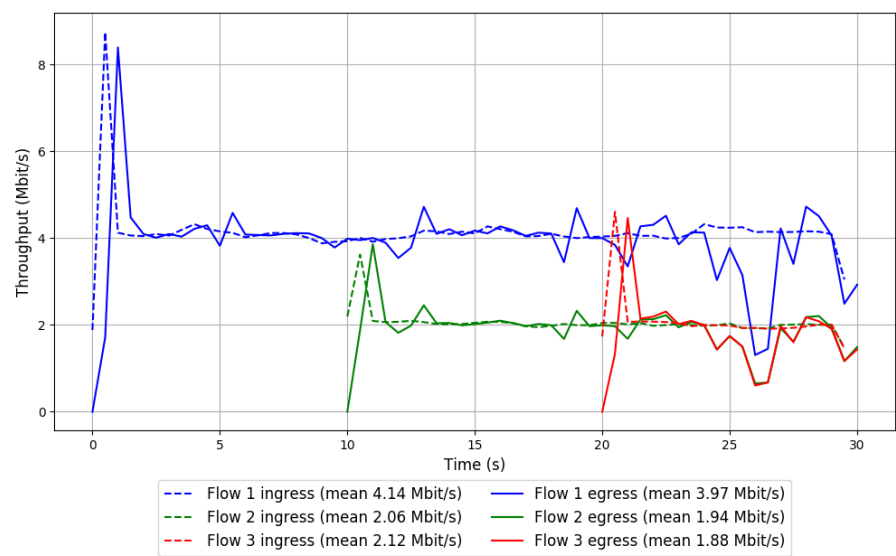Run 2: Report of PCC-Allegro — Data Link

```
Run 3: Statistics of PCC-Allegro

Start at: 2018-12-11 01:18:55
End at: 2018-12-11 01:19:25
Local clock offset: 2.192 ms
Remote clock offset: -1.612 ms


# Below is generated by plot.py at 2018-12-11 01:32:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 5.87 Mbit/s
95th percentile per-packet one-way delay: 997.183 ms
Loss rate: 5.36%
-- Flow 1:
Average throughput: 3.97 Mbit/s
95th percentile per-packet one-way delay: 977.098 ms
Loss rate: 4.12%
-- Flow 2:
Average throughput: 1.94 Mbit/s
95th percentile per-packet one-way delay: 999.575 ms
Loss rate: 5.94%
-- Flow 3:
Average throughput: 1.88 Mbit/s
95th percentile per-packet one-way delay: 1026.223 ms
Loss rate: 11.59%
```

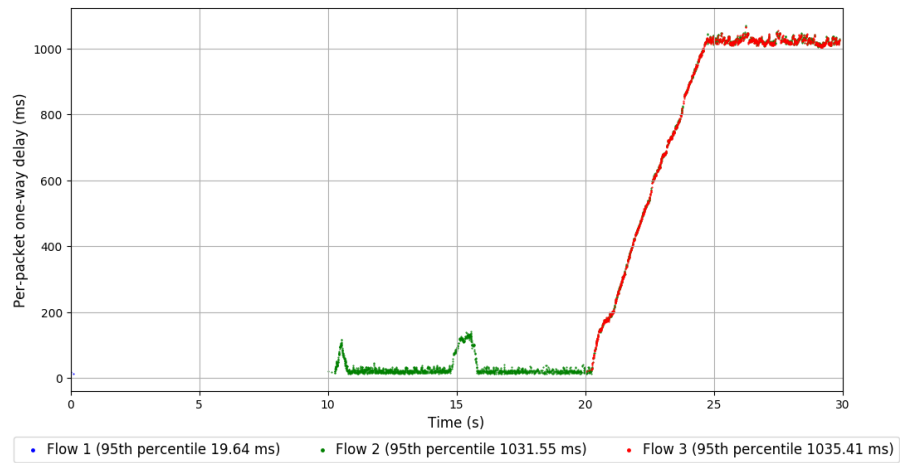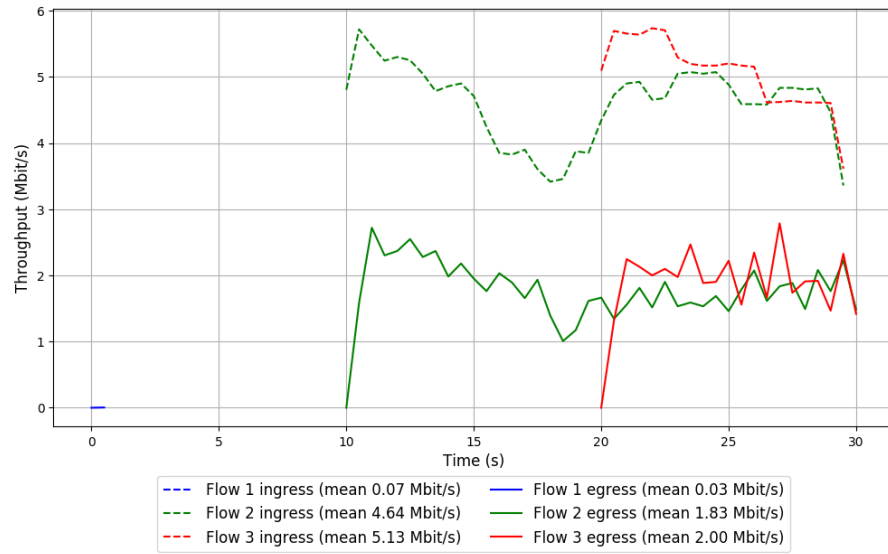Run 3: Report of PCC-Allegro — Data Link

```
Run 1: Statistics of PCC-Expr

Start at: 2018-12-11 00:29:33
End at: 2018-12-11 00:30:03
Local clock offset: 4.945 ms
Remote clock offset: -1.188 ms


# Below is generated by plot.py at 2018-12-11 01:32:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.87 Mbit/s
95th percentile per-packet one-way delay: 1033.313 ms
Loss rate: 60.79%
-- Flow 1:
Average throughput: 0.03 Mbit/s
95th percentile per-packet one-way delay: 19.642 ms
Loss rate: 85.71%
-- Flow 2:
Average throughput: 1.83 Mbit/s
95th percentile per-packet one-way delay: 1031.549 ms
Loss rate: 60.62%
-- Flow 3:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 1035.409 ms
Loss rate: 61.09%
```

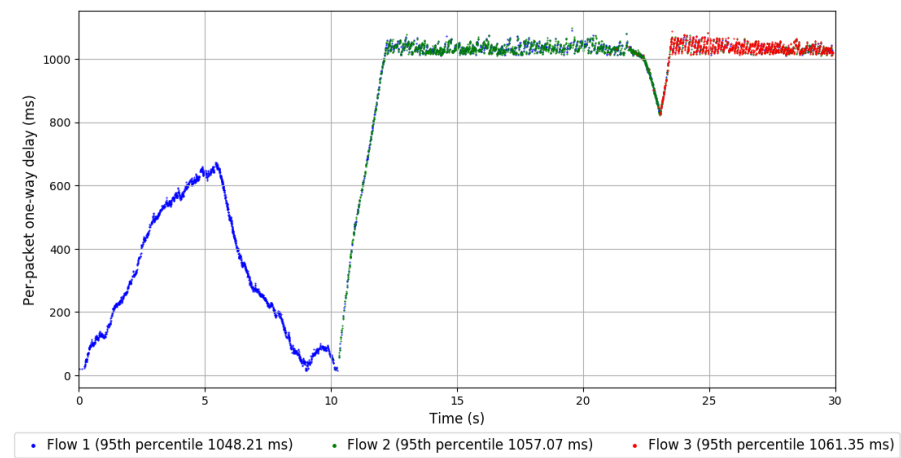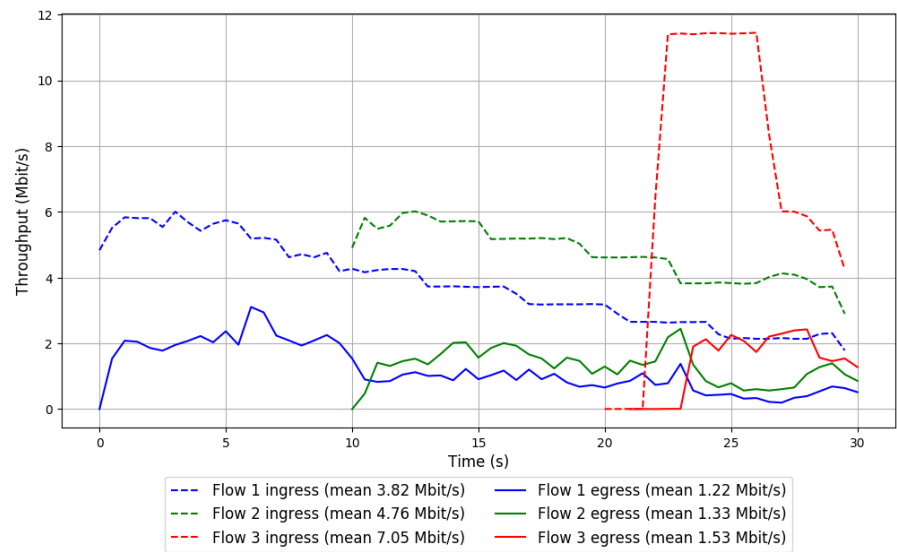Run 1: Report of PCC-Expr — Data Link

Flow 1 ingress (mean 0.07 Mbit/s) Flow 1 egress (mean 0.03 Mbit/s)
Flow 2 ingress (mean 4.64 Mbit/s) Flow 2 egress (mean 1.83 Mbit/s)
Flow 3 ingress (mean 5.13 Mbit/s) Flow 3 egress (mean 2.00 Mbit/s)

Flow 1 (95th percentile 19.64 ms) Flow 2 (95th percentile 1031.55 ms) Flow 3 (95th percentile 1035.41 ms)

```
Run 2: Statistics of PCC-Expr

Start at: 2018-12-11 00:50:50
End at: 2018-12-11 00:51:20
Local clock offset: 4.102 ms
Remote clock offset: -2.024 ms


# Below is generated by plot.py at 2018-12-11 01:32:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.55 Mbit/s
95th percentile per-packet one-way delay: 1055.519 ms
Loss rate: 72.61%
-- Flow 1:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 1048.207 ms
Loss rate: 68.13%
-- Flow 2:
Average throughput: 1.33 Mbit/s
95th percentile per-packet one-way delay: 1057.065 ms
Loss rate: 72.16%
-- Flow 3:
Average throughput: 1.53 Mbit/s
95th percentile per-packet one-way delay: 1061.348 ms
Loss rate: 80.56%
```

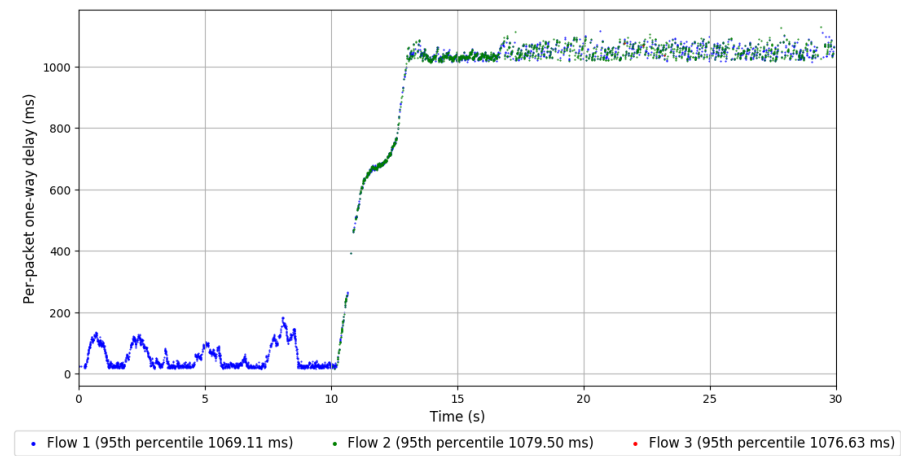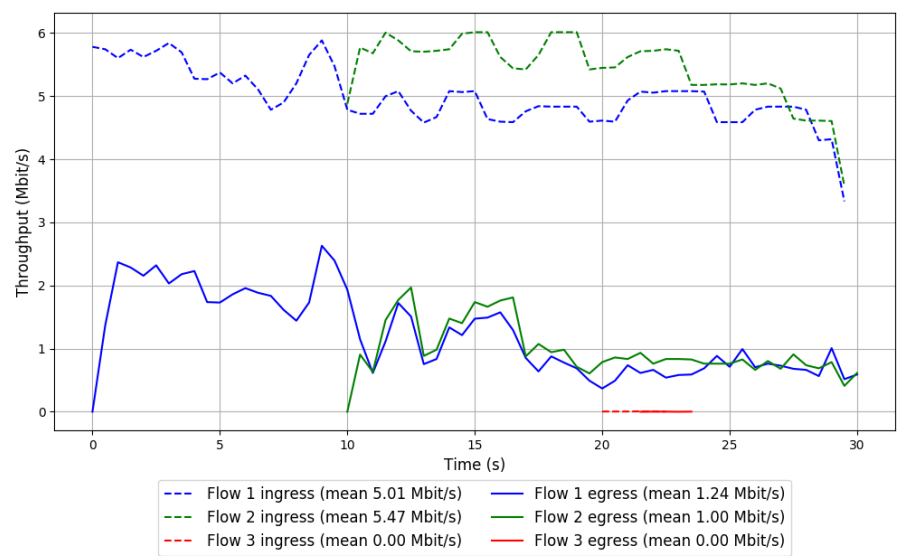Run 2: Report of PCC-Expr — Data Link

```
Run 3: Statistics of PCC-Expr

Start at: 2018-12-11 01:12:10
End at: 2018-12-11 01:12:40
Local clock offset: -2.741 ms
Remote clock offset: -1.264 ms


# Below is generated by plot.py at 2018-12-11 01:32:32
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.91 Mbit/s
95th percentile per-packet one-way delay: 1073.951 ms
Loss rate: 77.98%
-- Flow 1:
Average throughput: 1.24 Mbit/s
95th percentile per-packet one-way delay: 1069.110 ms
Loss rate: 75.24%
-- Flow 2:
Average throughput: 1.00 Mbit/s
95th percentile per-packet one-way delay: 1079.502 ms
Loss rate: 81.74%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 1076.633 ms
Loss rate: 78.57%
```

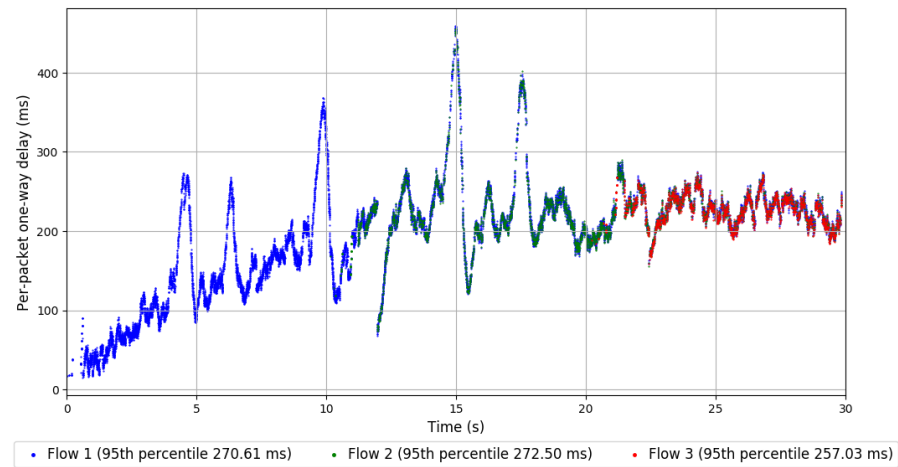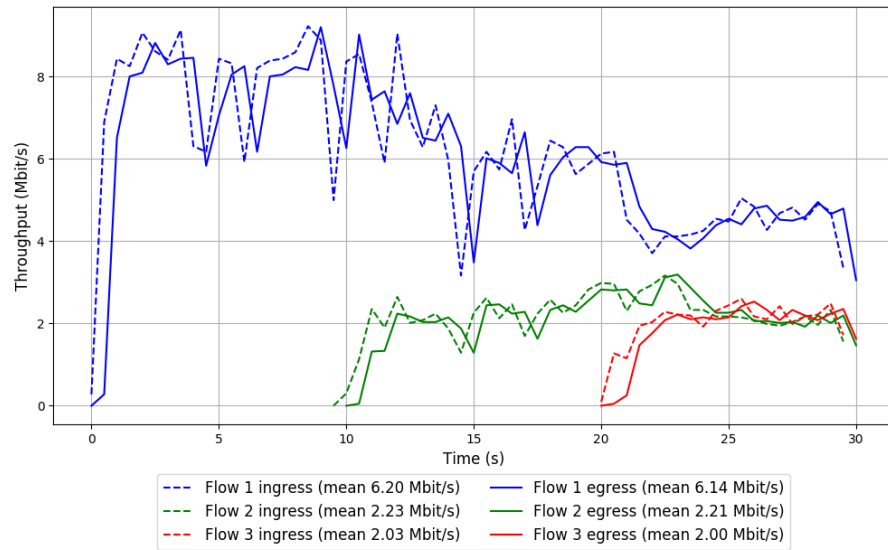## Run 3: Report of PCC-Expr — Data Link

Flow 1 ingress (mean 5.01 Mbit/s) --- Flow 1 egress (mean 1.24 Mbit/s)
Flow 2 ingress (mean 5.47 Mbit/s) --- Flow 2 egress (mean 1.00 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s) --- Flow 3 egress (mean 0.00 Mbit/s)

Flow 1 (95th percentile 1069.11 ms)   Flow 2 (95th percentile 1079.50 ms)   Flow 3 (95th percentile 1076.63 ms)

```
Run 1: Statistics of QUIC Cubic

Start at: 2018-12-11 00:32:54
End at: 2018-12-11 00:33:24
Local clock offset: 1.892 ms
Remote clock offset: -1.777 ms


# Below is generated by plot.py at 2018-12-11 01:32:36
# Datalink statistics
-- Total of 3 flows:
Average throughput: 8.25 Mbit/s
95th percentile per-packet one-way delay: 268.754 ms
Loss rate: 1.29%
-- Flow 1:
Average throughput: 6.14 Mbit/s
95th percentile per-packet one-way delay: 270.612 ms
Loss rate: 0.98%
-- Flow 2:
Average throughput: 2.21 Mbit/s
95th percentile per-packet one-way delay: 272.498 ms
Loss rate: 1.79%
-- Flow 3:
Average throughput: 2.00 Mbit/s
95th percentile per-packet one-way delay: 257.029 ms
Loss rate: 3.07%
```

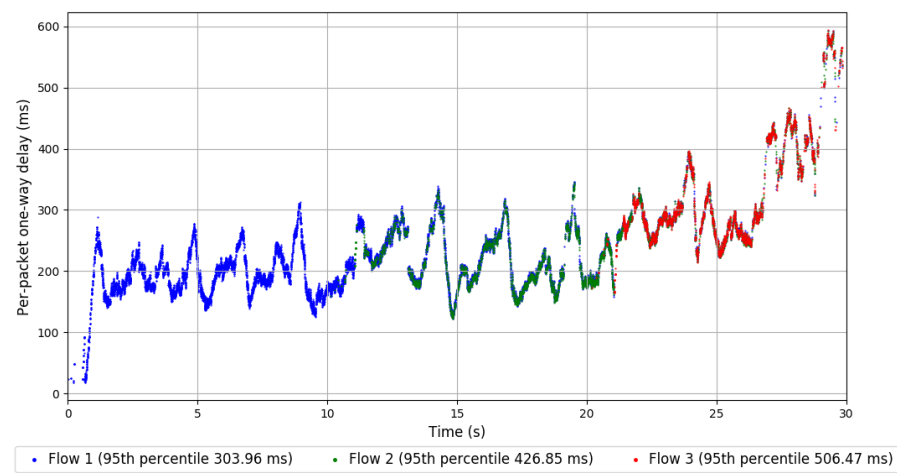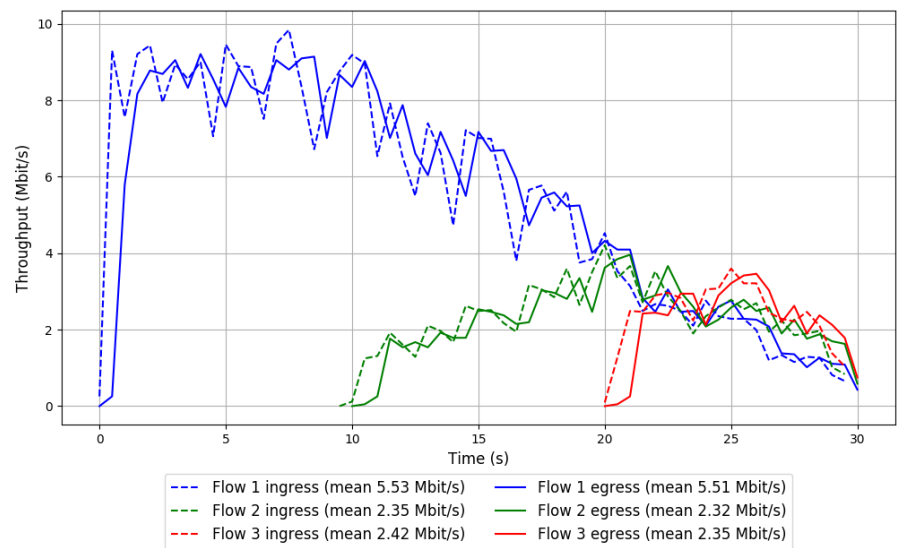Run 1: Report of QUIC Cubic — Data Link

```
Run 2: Statistics of QUIC Cubic

Start at: 2018-12-11 00:54:12
End at: 2018-12-11 00:54:42
Local clock offset: 1.026 ms
Remote clock offset: -1.363 ms


# Below is generated by plot.py at 2018-12-11 01:32:37
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.80 Mbit/s
95th percentile per-packet one-way delay: 387.283 ms
Loss rate: 1.17%
-- Flow 1:
Average throughput: 5.51 Mbit/s
95th percentile per-packet one-way delay: 303.963 ms
Loss rate: 0.53%
-- Flow 2:
Average throughput: 2.32 Mbit/s
95th percentile per-packet one-way delay: 426.847 ms
Loss rate: 1.87%
-- Flow 3:
Average throughput: 2.35 Mbit/s
95th percentile per-packet one-way delay: 506.469 ms
Loss rate: 4.25%
```

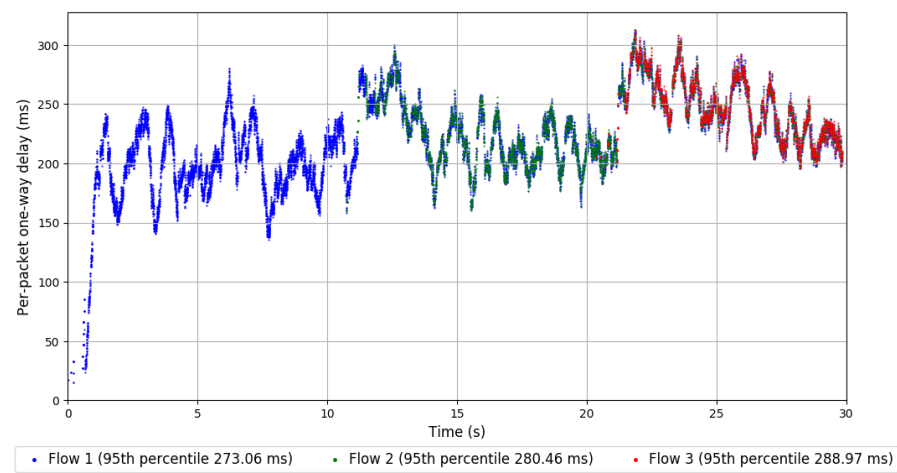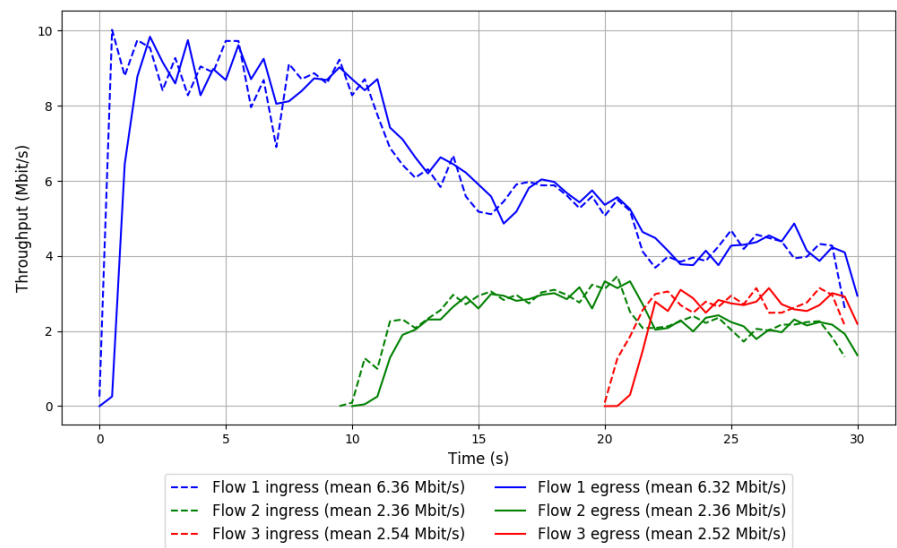Run 2: Report of QUIC Cubic — Data Link

```
Run 3: Statistics of QUIC Cubic

Start at: 2018-12-11 01:15:33
End at: 2018-12-11 01:16:03
Local clock offset: 2.391 ms
Remote clock offset: -1.609 ms


# Below is generated by plot.py at 2018-12-11 01:32:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 8.69 Mbit/s
95th percentile per-packet one-way delay: 276.956 ms
Loss rate: 0.92%
-- Flow 1:
Average throughput: 6.32 Mbit/s
95th percentile per-packet one-way delay: 273.065 ms
Loss rate: 0.57%
-- Flow 2:
Average throughput: 2.36 Mbit/s
95th percentile per-packet one-way delay: 280.457 ms
Loss rate: 1.23%
-- Flow 3:
Average throughput: 2.52 Mbit/s
95th percentile per-packet one-way delay: 288.969 ms
Loss rate: 2.95%
```
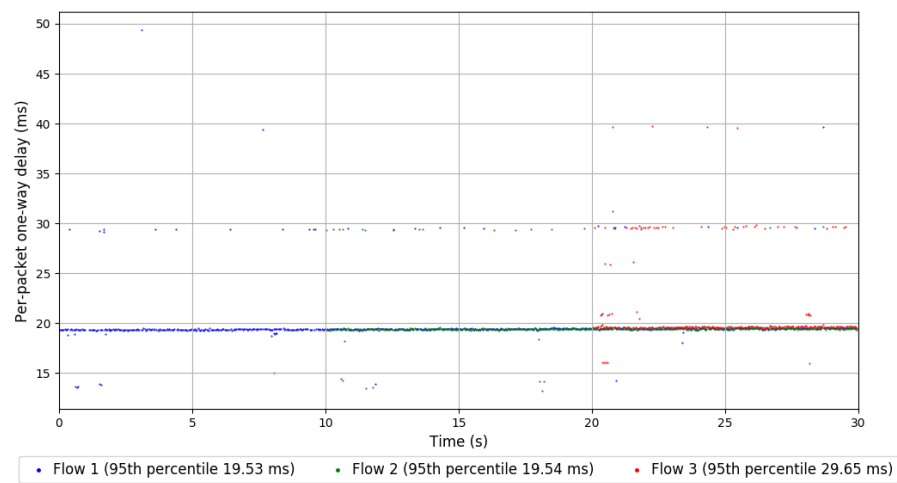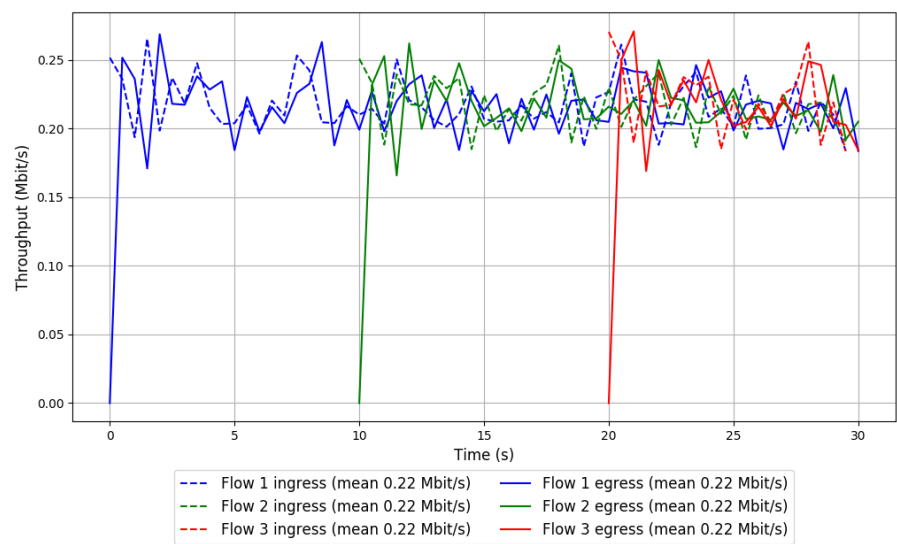
Run 3: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 6.36 Mbit/s) --- Flow 1 egress (mean 6.32 Mbit/s) ——
Flow 2 ingress (mean 2.36 Mbit/s) --- Flow 2 egress (mean 2.36 Mbit/s) ——
Flow 3 ingress (mean 2.54 Mbit/s) --- Flow 3 egress (mean 2.52 Mbit/s) ——

Flow 1 (95th percentile 273.06 ms)   Flow 2 (95th percentile 280.46 ms)   Flow 3 (95th percentile 288.97 ms)

```
Run 1: Statistics of SCReAM

Start at: 2018-12-11 00:47:29
End at: 2018-12-11 00:47:59
Local clock offset: 4.662 ms
Remote clock offset: -0.437 ms

# Below is generated by plot.py at 2018-12-11 01:32:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 29.370 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 19.528 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 19.542 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 29.654 ms
Loss rate: 0.35%
```
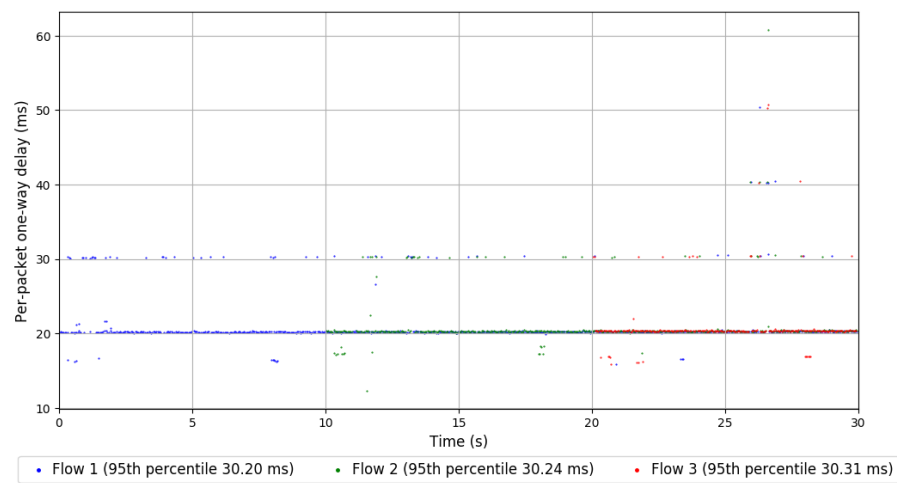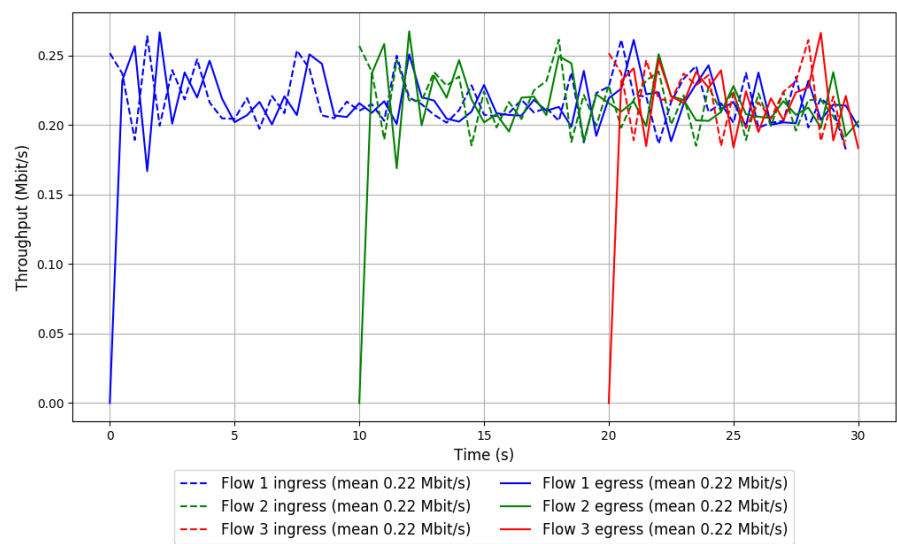
Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2018-12-11 01:08:50
End at: 2018-12-11 01:09:20
Local clock offset: 0.918 ms
Remote clock offset: -1.433 ms


# Below is generated by plot.py at 2018-12-11 01:32:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 30.242 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 30.201 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 30.242 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 30.314 ms
Loss rate: 0.35%
```
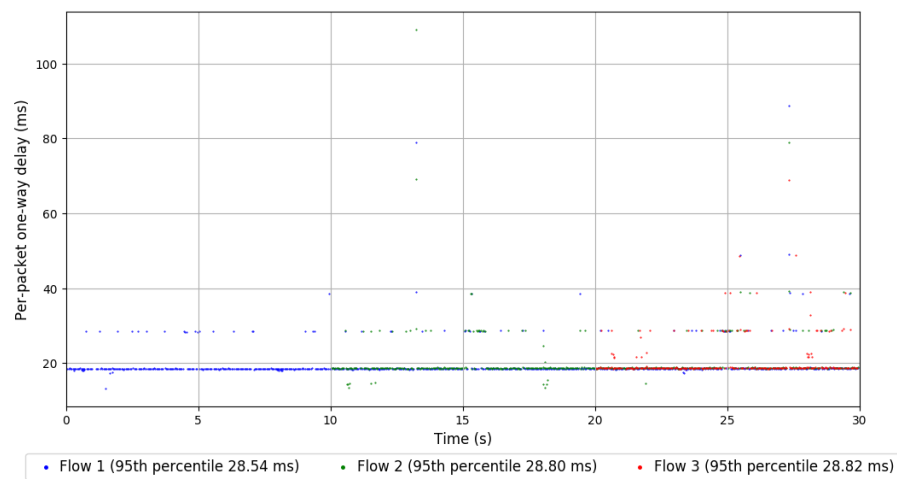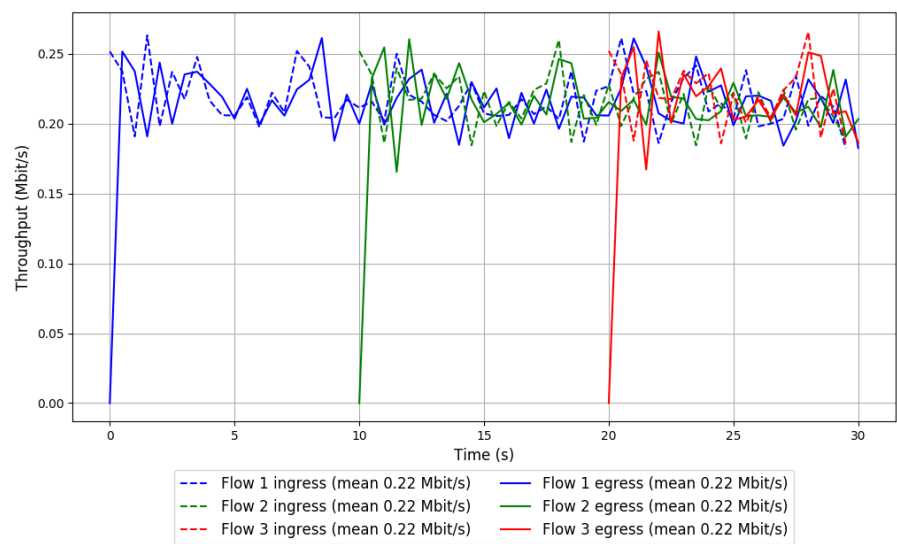
Run 2: Report of SCReAM — Data Link

```
Run 3: Statistics of SCReAM

Start at: 2018-12-11 01:30:06
End at: 2018-12-11 01:30:36
Local clock offset: 1.977 ms
Remote clock offset: -1.693 ms


# Below is generated by plot.py at 2018-12-11 01:32:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 28.755 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 28.537 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 28.802 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 28.823 ms
Loss rate: 0.36%
```
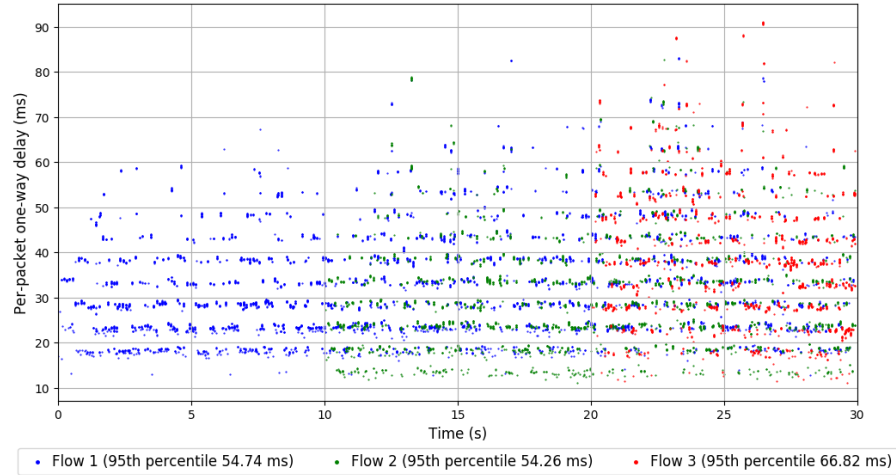
Run 3: Report of SCReAM — Data Link

Throughput (Mbit/s) vs Time (s)

- - - Flow 1 ingress (mean 0.22 Mbit/s) —— Flow 1 egress (mean 0.22 Mbit/s)
- - - Flow 2 ingress (mean 0.22 Mbit/s) —— Flow 2 egress (mean 0.22 Mbit/s)
- - - Flow 3 ingress (mean 0.22 Mbit/s) —— Flow 3 egress (mean 0.22 Mbit/s)

Per-packet one-way delay (ms) vs Time (s)

- Flow 1 (95th percentile 28.54 ms)   • Flow 2 (95th percentile 28.80 ms)   • Flow 3 (95th percentile 28.82 ms)

```
Run 1: Statistics of Sprout

Start at: 2018-12-11 00:40:44
End at: 2018-12-11 00:41:14
Local clock offset: 3.412 ms
Remote clock offset: -0.83 ms


# Below is generated by plot.py at 2018-12-11 01:32:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.31 Mbit/s
95th percentile per-packet one-way delay: 58.045 ms
Loss rate: 0.11%
-- Flow 1:
Average throughput: 2.22 Mbit/s
95th percentile per-packet one-way delay: 54.743 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.85 Mbit/s
95th percentile per-packet one-way delay: 54.258 ms
Loss rate: 0.37%
-- Flow 3:
Average throughput: 2.60 Mbit/s
95th percentile per-packet one-way delay: 66.816 ms
Loss rate: 0.00%
```
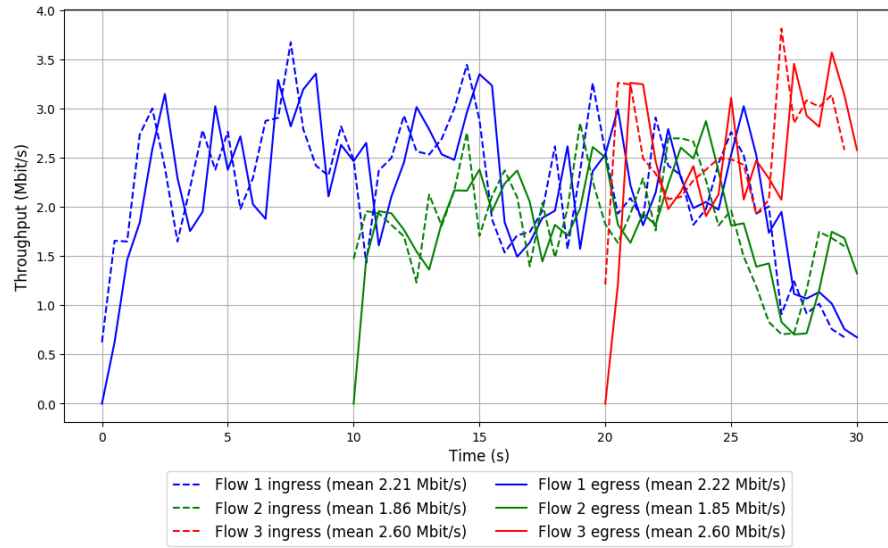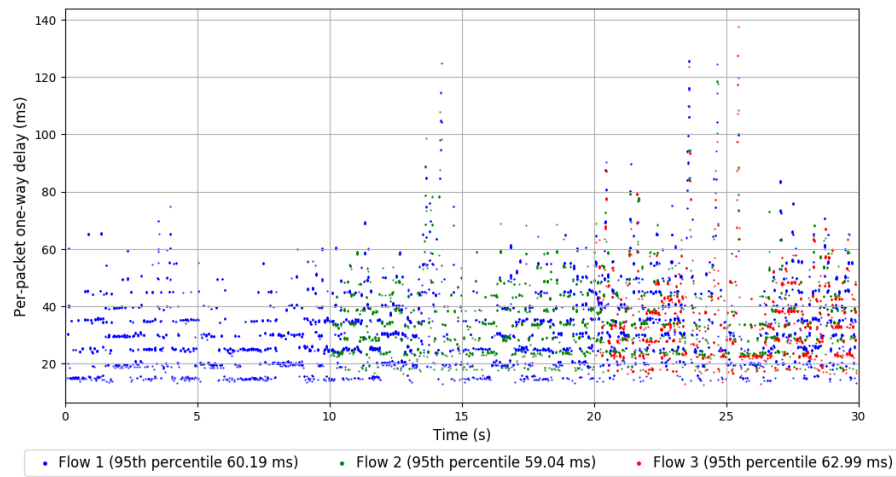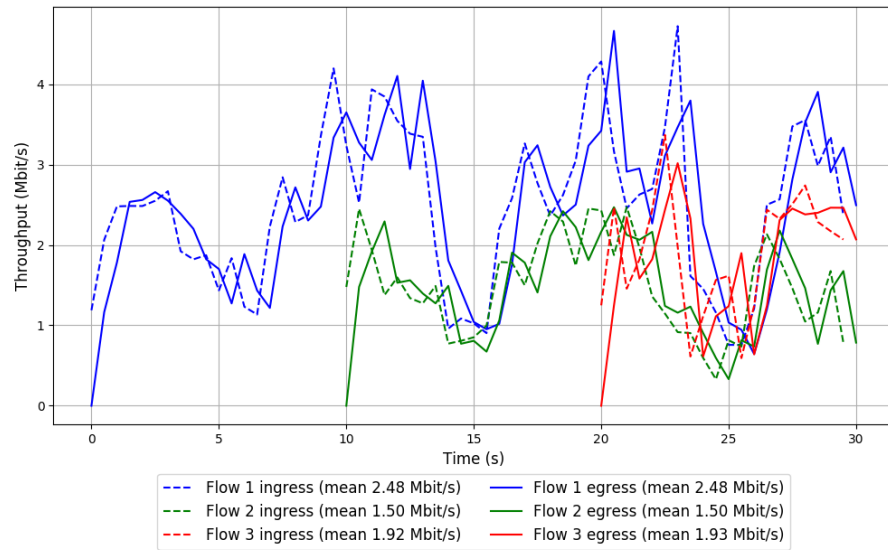
Run 1: Report of Sprout — Data Link

```
Run 2: Statistics of Sprout

Start at: 2018-12-11 01:02:05
End at: 2018-12-11 01:02:35
Local clock offset: 3.254 ms
Remote clock offset: -1.407 ms


# Below is generated by plot.py at 2018-12-11 01:32:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.11 Mbit/s
95th percentile per-packet one-way delay: 59.932 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 2.48 Mbit/s
95th percentile per-packet one-way delay: 60.191 ms
Loss rate: 0.11%
-- Flow 2:
Average throughput: 1.50 Mbit/s
95th percentile per-packet one-way delay: 59.037 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 1.93 Mbit/s
95th percentile per-packet one-way delay: 62.993 ms
Loss rate: 0.00%
```
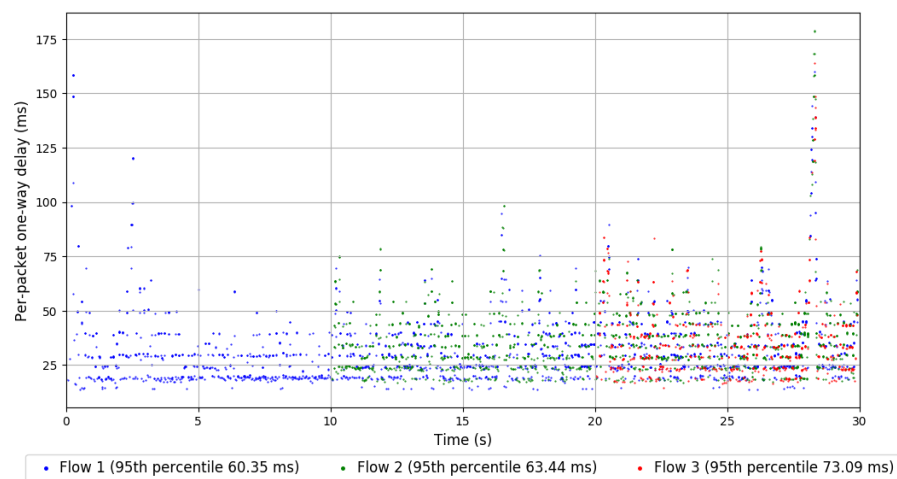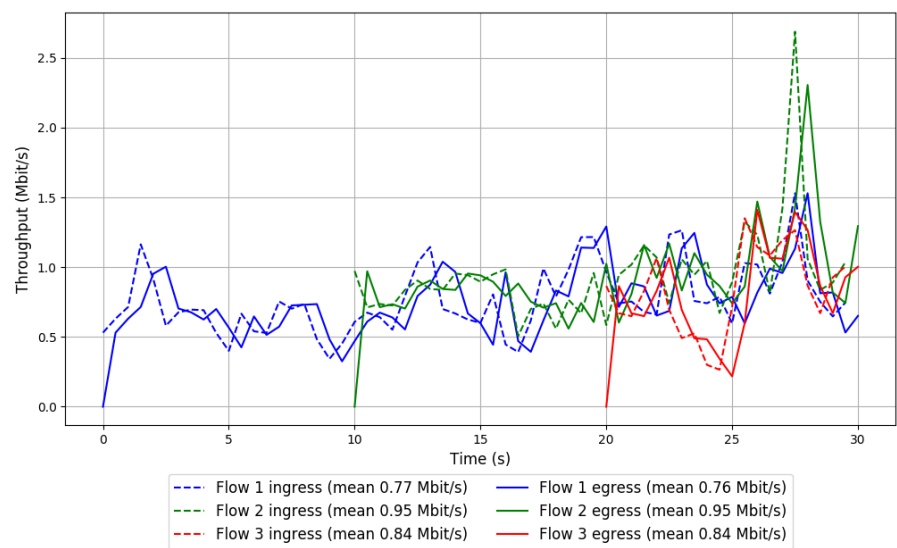
Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2018-12-11 01:23:24
End at: 2018-12-11 01:23:54
Local clock offset: -0.92 ms
Remote clock offset: -0.961 ms


# Below is generated by plot.py at 2018-12-11 01:32:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.67 Mbit/s
95th percentile per-packet one-way delay: 63.988 ms
Loss rate: 0.26%
-- Flow 1:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 60.352 ms
Loss rate: 0.51%
-- Flow 2:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 63.438 ms
Loss rate: 0.06%
-- Flow 3:
Average throughput: 0.84 Mbit/s
95th percentile per-packet one-way delay: 73.090 ms
Loss rate: 0.01%
```
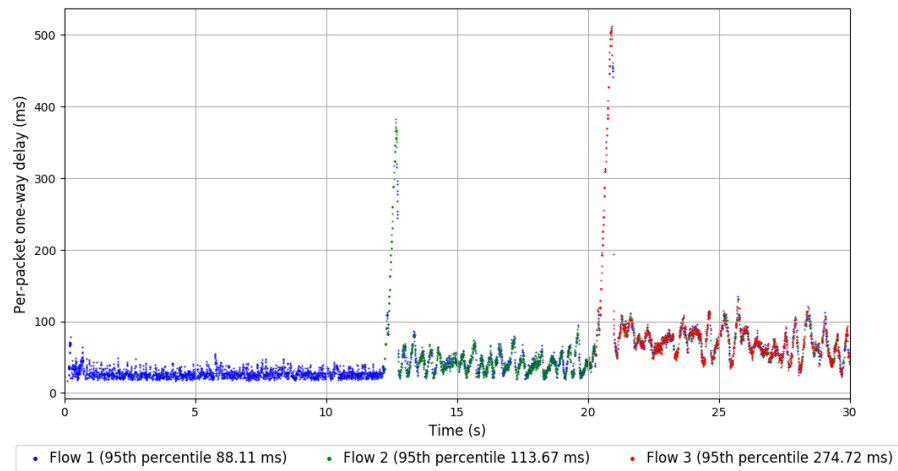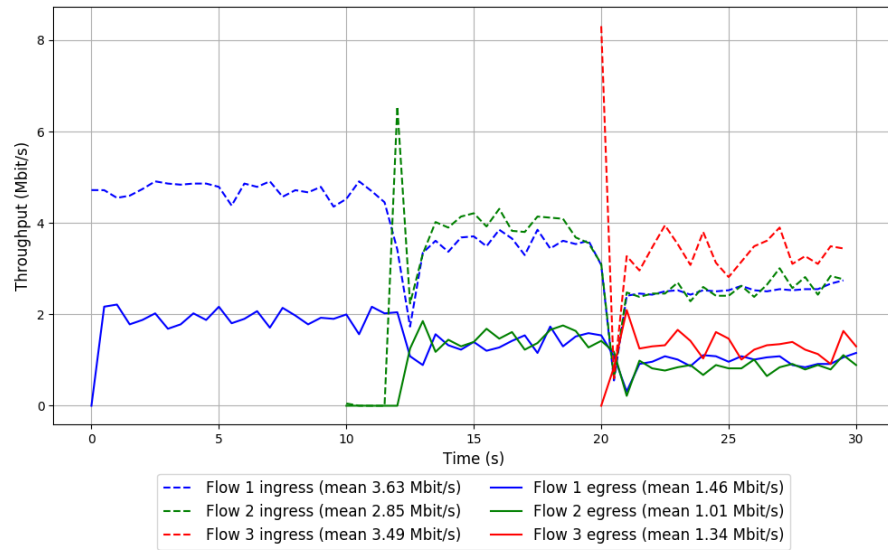
Run 3: Report of Sprout — Data Link

Flow 1 ingress (mean 0.77 Mbit/s)   Flow 1 egress (mean 0.76 Mbit/s)
Flow 2 ingress (mean 0.95 Mbit/s)   Flow 2 egress (mean 0.95 Mbit/s)
Flow 3 ingress (mean 0.84 Mbit/s)   Flow 3 egress (mean 0.84 Mbit/s)

Flow 1 (95th percentile 60.35 ms)   Flow 2 (95th percentile 63.44 ms)   Flow 3 (95th percentile 73.09 ms)

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

Start at: 2018-12-11 00:48:36
End at: 2018-12-11 00:49:06
Local clock offset: -0.375 ms
Remote clock offset: -0.539 ms


# Below is generated by plot.py at 2018-12-11 01:32:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.58 Mbit/s
95th percentile per-packet one-way delay: 104.000 ms
Loss rate: 61.42%
-- Flow 1:
Average throughput: 1.46 Mbit/s
95th percentile per-packet one-way delay: 88.106 ms
Loss rate: 59.65%
-- Flow 2:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 113.670 ms
Loss rate: 64.57%
-- Flow 3:
Average throughput: 1.34 Mbit/s
95th percentile per-packet one-way delay: 274.718 ms
Loss rate: 61.83%
```

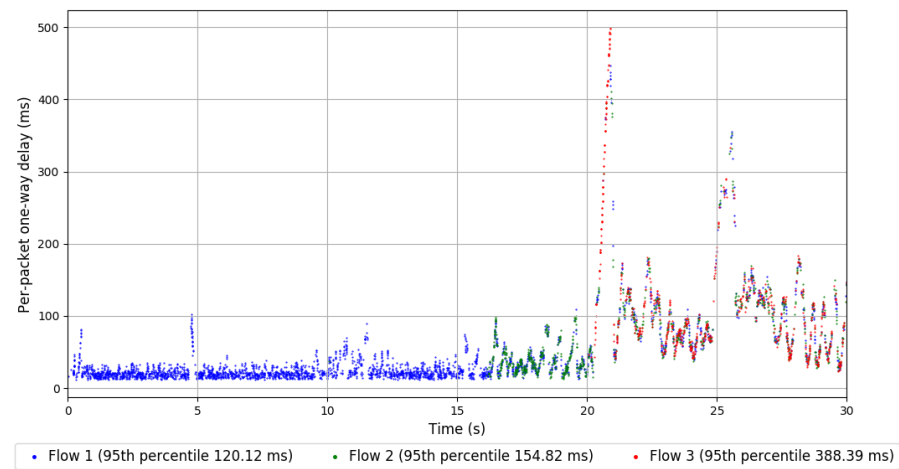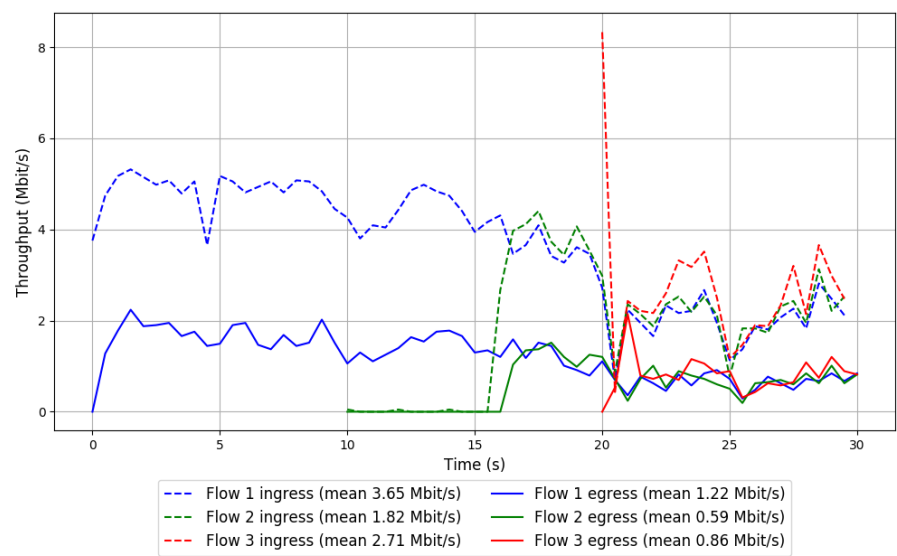Run 1: Report of TaoVA-100x — Data Link

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

Start at: 2018-12-11 01:09:56
End at: 2018-12-11 01:10:26
Local clock offset: 3.844 ms
Remote clock offset: -0.742 ms


# Below is generated by plot.py at 2018-12-11 01:32:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.90 Mbit/s
95th percentile per-packet one-way delay: 159.480 ms
Loss rate: 67.13%
-- Flow 1:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 120.121 ms
Loss rate: 66.54%
-- Flow 2:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 154.818 ms
Loss rate: 67.91%
-- Flow 3:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 388.386 ms
Loss rate: 68.48%
```

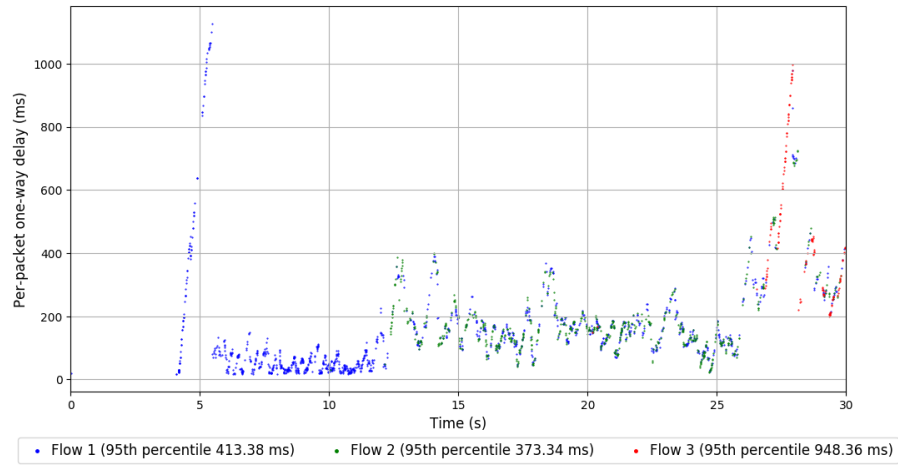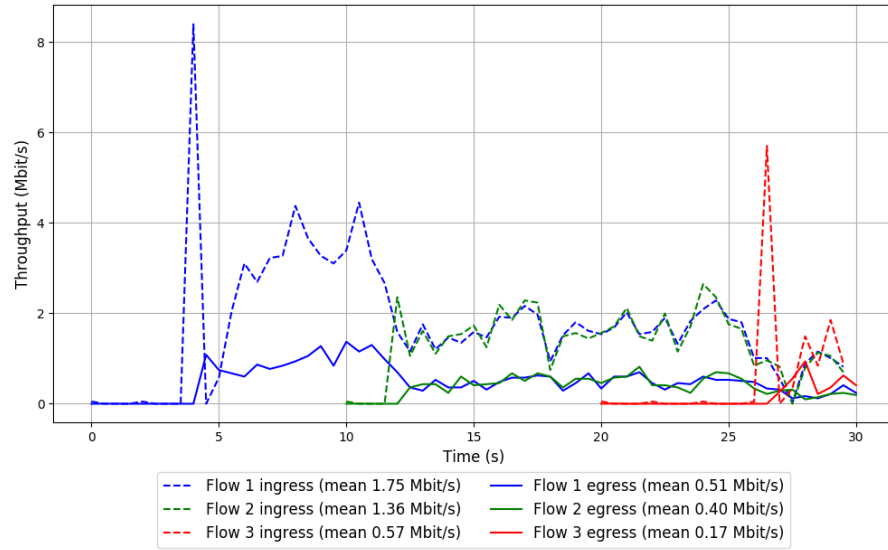Run 2: Report of TaoVA-100x — Data Link

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

Start at: 2018-12-11 01:31:13
End at: 2018-12-11 01:31:43
Local clock offset: -0.075 ms
Remote clock offset: -1.806 ms


# Below is generated by plot.py at 2018-12-11 01:32:40
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 503.693 ms
Loss rate: 70.76%
-- Flow 1:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 413.377 ms
Loss rate: 70.76%
-- Flow 2:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 373.341 ms
Loss rate: 70.88%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 948.355 ms
Loss rate: 70.19%
```

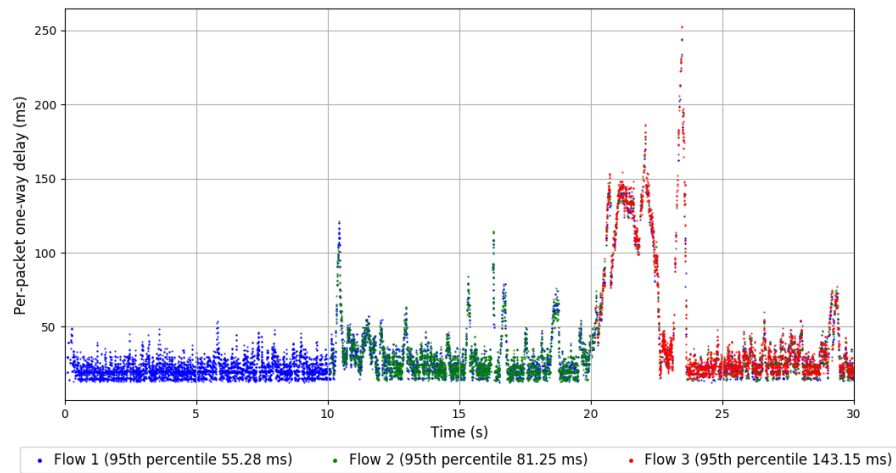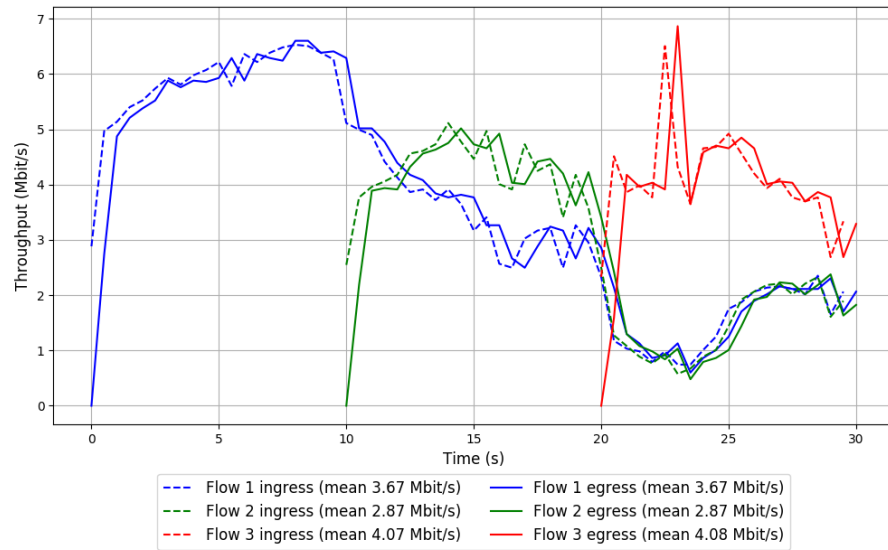Run 3: Report of TaoVA-100x — Data Link

```
Run 1: Statistics of TCP Vegas

Start at: 2018-12-11 00:28:26
End at: 2018-12-11 00:28:56
Local clock offset: 5.528 ms
Remote clock offset: -0.696 ms

# Below is generated by plot.py at 2018-12-11 01:32:47
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.94 Mbit/s
95th percentile per-packet one-way delay: 112.170 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 3.67 Mbit/s
95th percentile per-packet one-way delay: 55.280 ms
Loss rate: 0.02%
-- Flow 2:
Average throughput: 2.87 Mbit/s
95th percentile per-packet one-way delay: 81.247 ms
Loss rate: 0.10%
-- Flow 3:
Average throughput: 4.08 Mbit/s
95th percentile per-packet one-way delay: 143.147 ms
Loss rate: 0.27%
```

Run 1: Report of TCP Vegas — Data Link

```
Run 2: Statistics of TCP Vegas

Start at: 2018-12-11 00:49:43
End at: 2018-12-11 00:50:13
Local clock offset: 4.651 ms
Remote clock offset: -1.175 ms


# Below is generated by plot.py at 2018-12-11 01:32:47
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.80 Mbit/s
95th percentile per-packet one-way delay: 148.985 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 2.15 Mbit/s
95th percentile per-packet one-way delay: 249.768 ms
Loss rate: 0.11%
-- Flow 2:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 100.340 ms
Loss rate: 0.09%
-- Flow 3:
Average throughput: 3.79 Mbit/s
95th percentile per-packet one-way delay: 134.267 ms
Loss rate: 0.19%
```
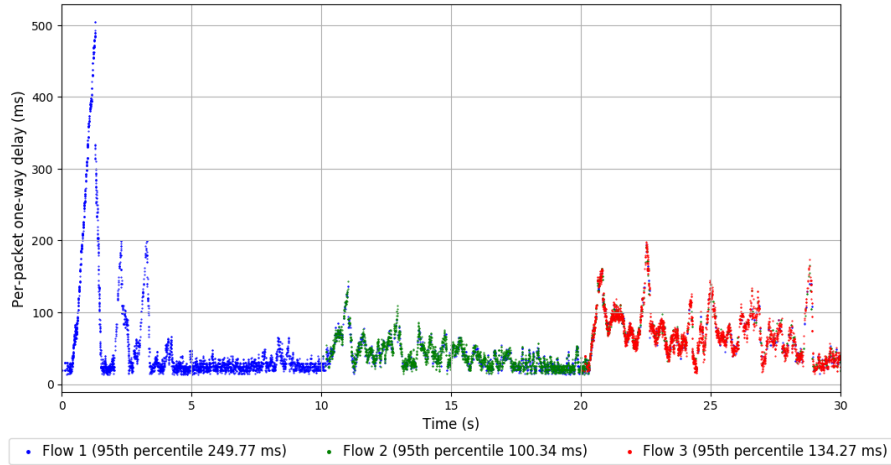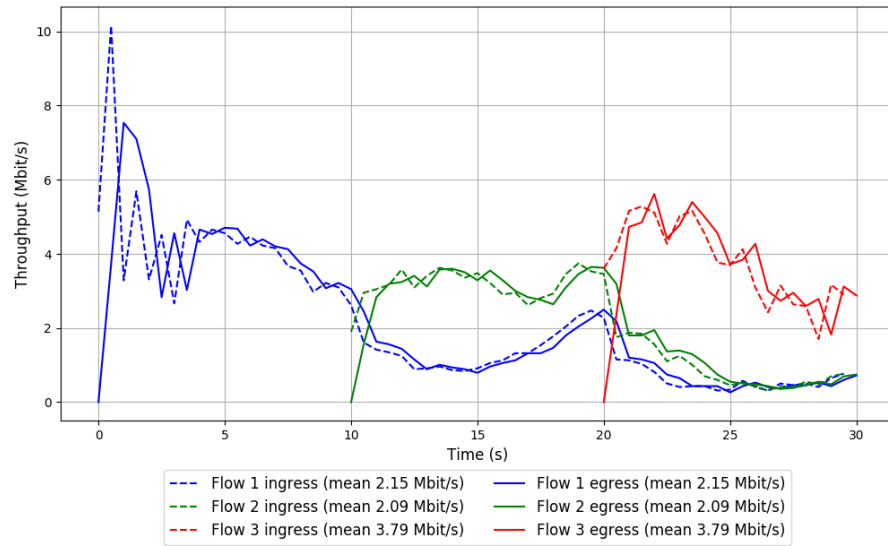
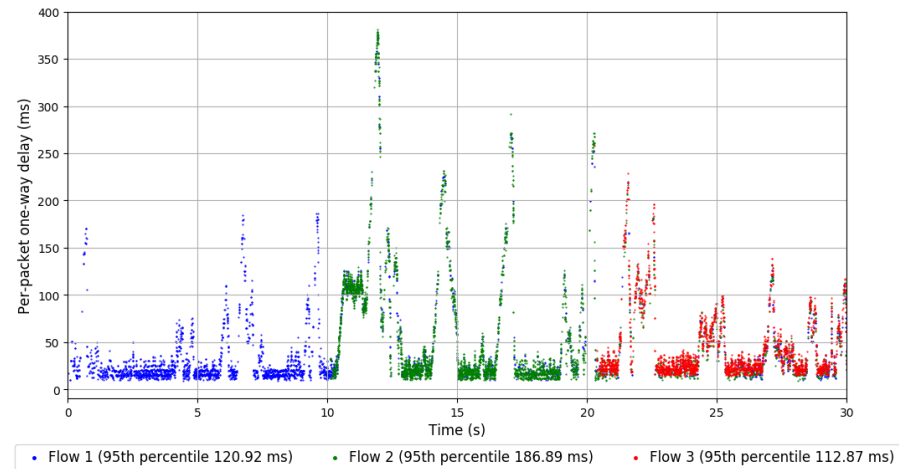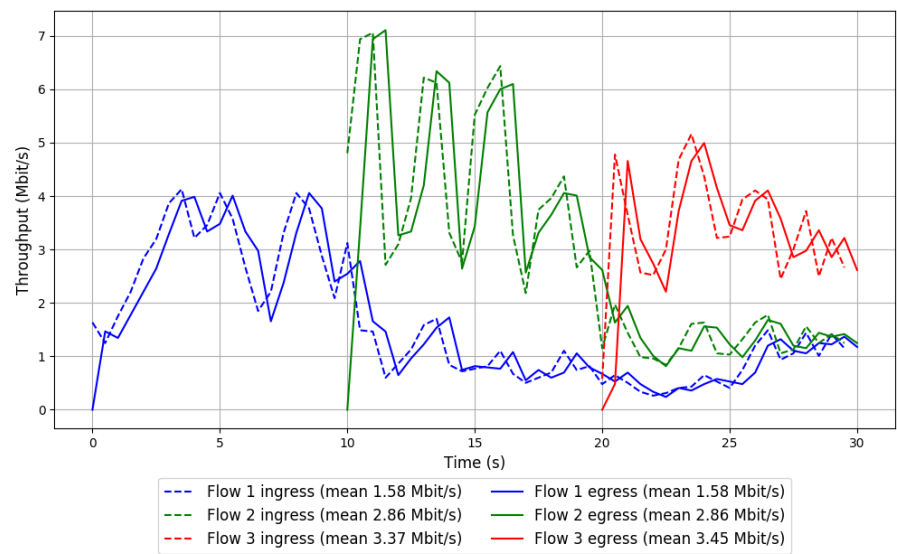Run 2: Report of TCP Vegas — Data Link

```
Run 3: Statistics of TCP Vegas

Start at: 2018-12-11 01:11:03
End at: 2018-12-11 01:11:33
Local clock offset: 3.461 ms
Remote clock offset: -1.572 ms


# Below is generated by plot.py at 2018-12-11 01:32:47
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.60 Mbit/s
95th percentile per-packet one-way delay: 145.241 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 1.58 Mbit/s
95th percentile per-packet one-way delay: 120.918 ms
Loss rate: 0.05%
-- Flow 2:
Average throughput: 2.86 Mbit/s
95th percentile per-packet one-way delay: 186.888 ms
Loss rate: 0.10%
-- Flow 3:
Average throughput: 3.45 Mbit/s
95th percentile per-packet one-way delay: 112.869 ms
Loss rate: 0.29%
```

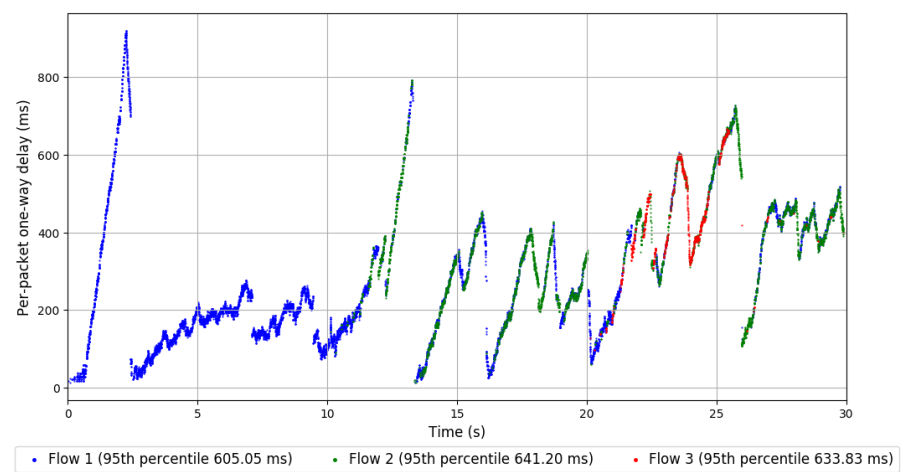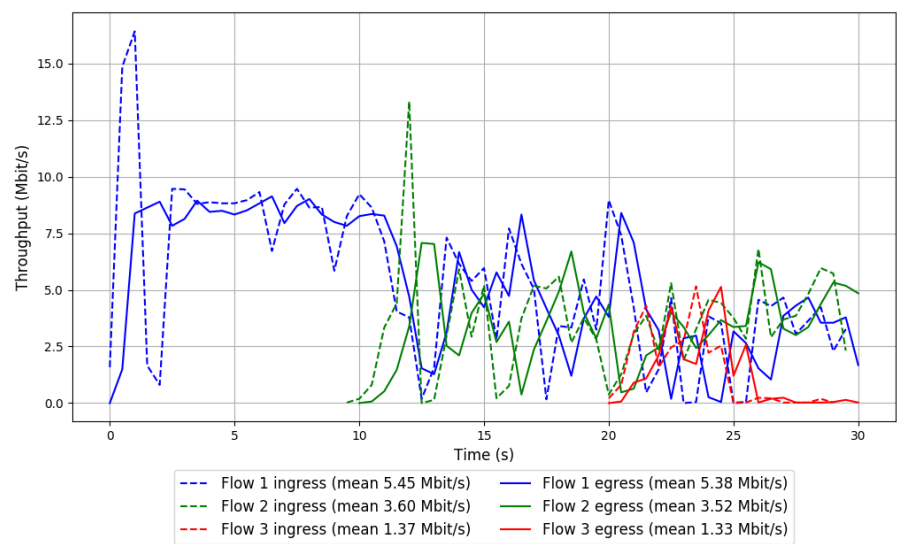Run 3: Report of TCP Vegas — Data Link

```
Run 1: Statistics of Verus

Start at: 2018-12-11 00:37:22
End at: 2018-12-11 00:37:52
Local clock offset: 3.409 ms
Remote clock offset: -1.126 ms


# Below is generated by plot.py at 2018-12-11 01:32:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 8.12 Mbit/s
95th percentile per-packet one-way delay: 628.559 ms
Loss rate: 1.76%
-- Flow 1:
Average throughput: 5.38 Mbit/s
95th percentile per-packet one-way delay: 605.052 ms
Loss rate: 1.69%
-- Flow 2:
Average throughput: 3.52 Mbit/s
95th percentile per-packet one-way delay: 641.202 ms
Loss rate: 2.20%
-- Flow 3:
Average throughput: 1.33 Mbit/s
95th percentile per-packet one-way delay: 633.828 ms
Loss rate: 0.36%
```
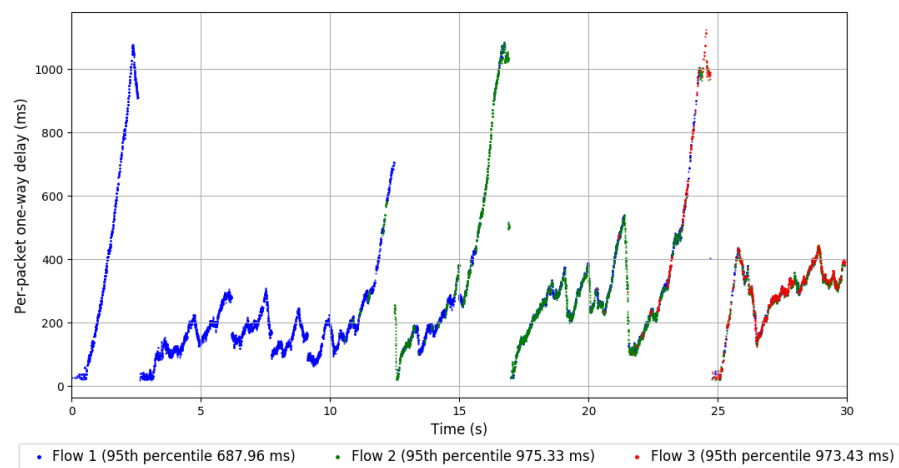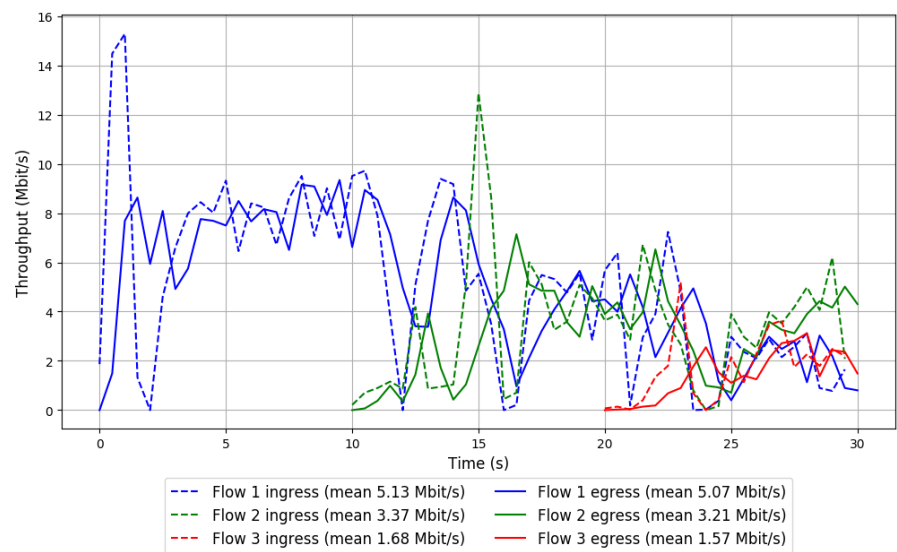
Run 1: Report of Verus — Data Link

```
Run 2: Statistics of Verus

Start at: 2018-12-11 00:58:42
End at: 2018-12-11 00:59:12
Local clock offset: 1.674 ms
Remote clock offset: -0.899 ms


# Below is generated by plot.py at 2018-12-11 01:32:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.69 Mbit/s
95th percentile per-packet one-way delay: 812.144 ms
Loss rate: 2.94%
-- Flow 1:
Average throughput: 5.07 Mbit/s
95th percentile per-packet one-way delay: 687.959 ms
Loss rate: 1.25%
-- Flow 2:
Average throughput: 3.21 Mbit/s
95th percentile per-packet one-way delay: 975.325 ms
Loss rate: 5.16%
-- Flow 3:
Average throughput: 1.57 Mbit/s
95th percentile per-packet one-way delay: 973.434 ms
Loss rate: 9.61%
```
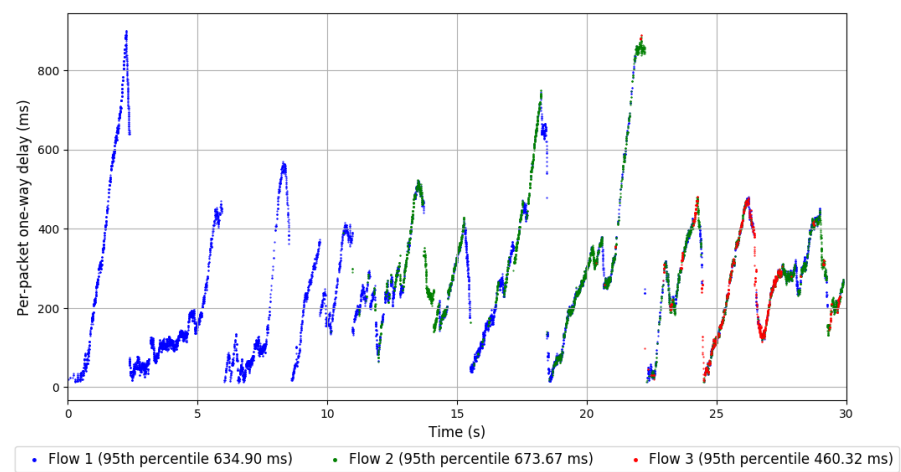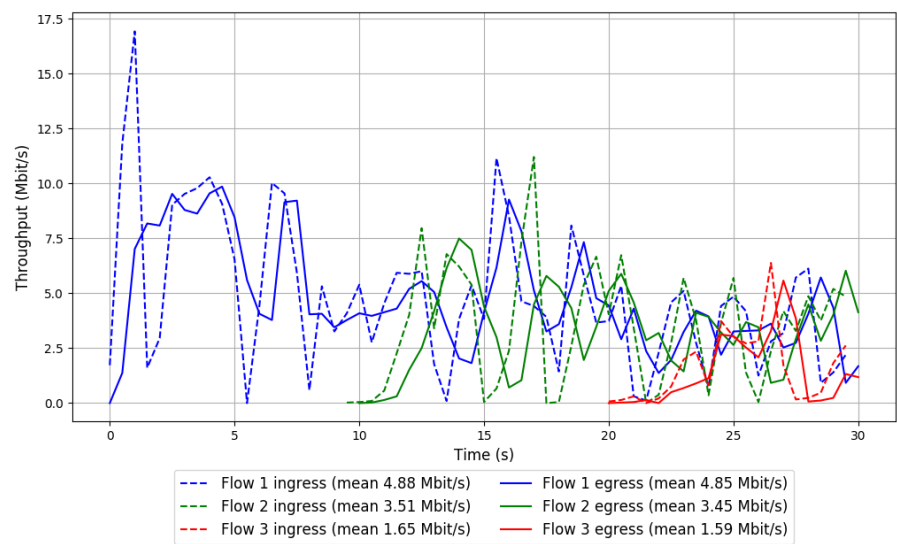
Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2018-12-11 01:20:02
End at: 2018-12-11 01:20:32
Local clock offset: 1.786 ms
Remote clock offset: -1.238 ms

# Below is generated by plot.py at 2018-12-11 01:32:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 7.63 Mbit/s
95th percentile per-packet one-way delay: 637.937 ms
Loss rate: 1.72%
-- Flow 1:
Average throughput: 4.85 Mbit/s
95th percentile per-packet one-way delay: 634.900 ms
Loss rate: 0.75%
-- Flow 2:
Average throughput: 3.45 Mbit/s
95th percentile per-packet one-way delay: 673.674 ms
Loss rate: 2.39%
-- Flow 3:
Average throughput: 1.59 Mbit/s
95th percentile per-packet one-way delay: 460.323 ms
Loss rate: 7.68%
```

Run 3: Report of Verus — Data Link

Flow 1 ingress (mean 4.88 Mbit/s)   Flow 1 egress (mean 4.85 Mbit/s)
Flow 2 ingress (mean 3.51 Mbit/s)   Flow 2 egress (mean 3.45 Mbit/s)
Flow 3 ingress (mean 1.65 Mbit/s)   Flow 3 egress (mean 1.59 Mbit/s)

Flow 1 (95th percentile 634.90 ms)   Flow 2 (95th percentile 673.67 ms)   Flow 3 (95th percentile 460.32 ms)
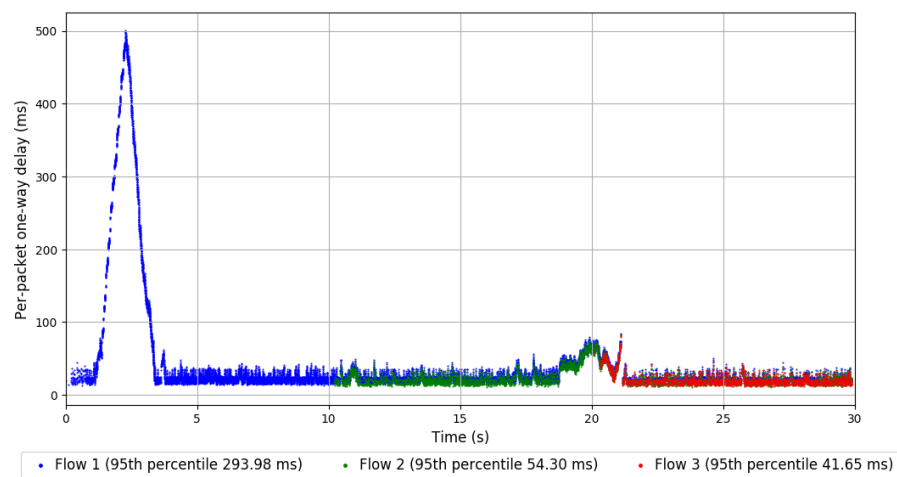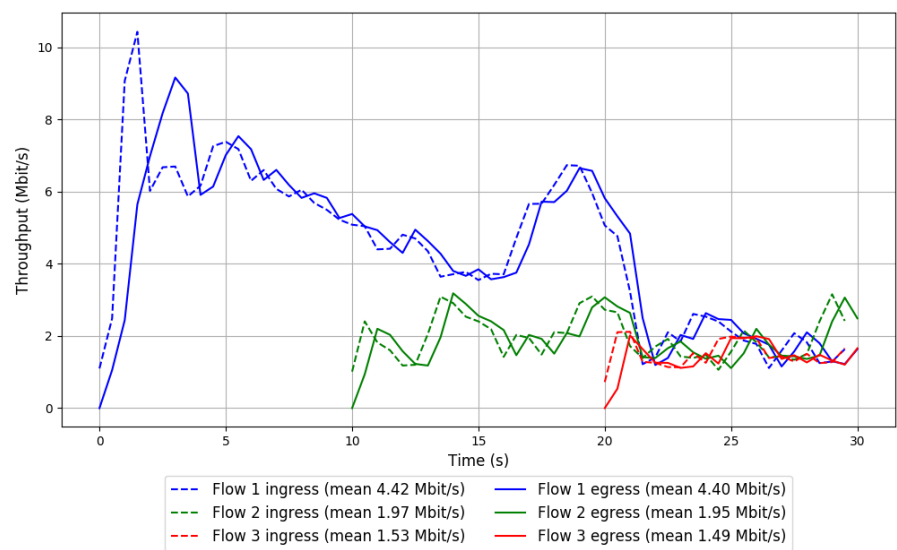
```
Run 1: Statistics of PCC-Vivace

Start at: 2018-12-11 00:41:51
End at: 2018-12-11 00:42:21
Local clock offset: 3.739 ms
Remote clock offset: -1.683 ms

# Below is generated by plot.py at 2018-12-11 01:32:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 6.19 Mbit/s
95th percentile per-packet one-way delay: 182.416 ms
Loss rate: 0.74%
-- Flow 1:
Average throughput: 4.40 Mbit/s
95th percentile per-packet one-way delay: 293.982 ms
Loss rate: 0.49%
-- Flow 2:
Average throughput: 1.95 Mbit/s
95th percentile per-packet one-way delay: 54.303 ms
Loss rate: 0.77%
-- Flow 3:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 41.652 ms
Loss rate: 2.82%
```

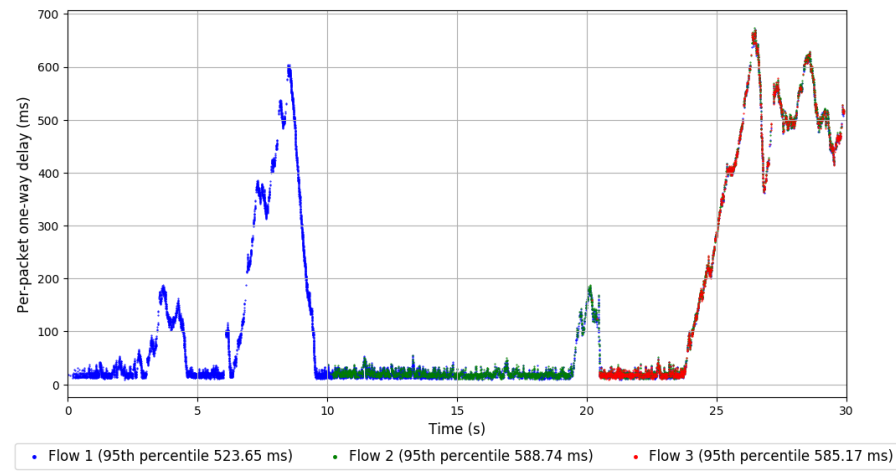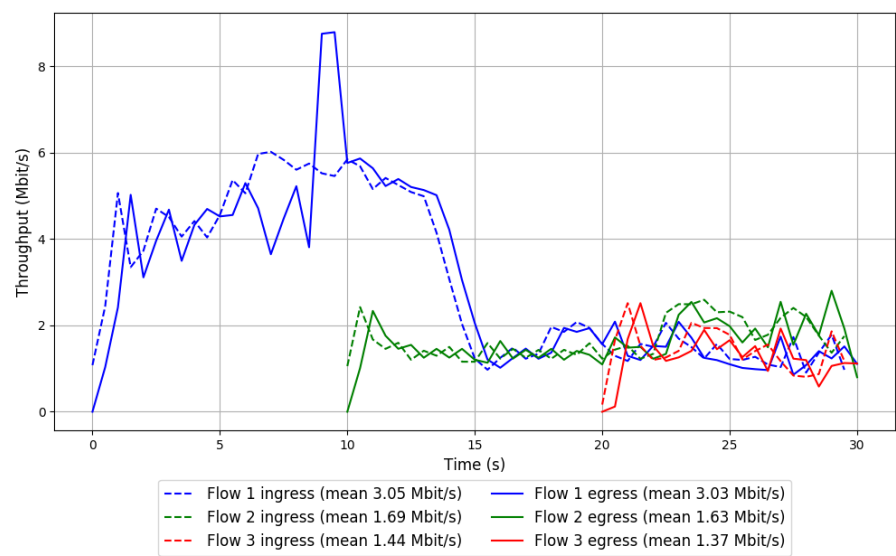Run 1: Report of PCC-Vivace — Data Link

```
Run 2: Statistics of PCC-Vivace

Start at: 2018-12-11 01:03:12
End at: 2018-12-11 01:03:42
Local clock offset: 4.048 ms
Remote clock offset: -1.111 ms


# Below is generated by plot.py at 2018-12-11 01:32:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 4.56 Mbit/s
95th percentile per-packet one-way delay: 555.427 ms
Loss rate: 1.93%
-- Flow 1:
Average throughput: 3.03 Mbit/s
95th percentile per-packet one-way delay: 523.650 ms
Loss rate: 0.84%
-- Flow 2:
Average throughput: 1.63 Mbit/s
95th percentile per-packet one-way delay: 588.744 ms
Loss rate: 3.18%
-- Flow 3:
Average throughput: 1.37 Mbit/s
95th percentile per-packet one-way delay: 585.166 ms
Loss rate: 5.96%
```

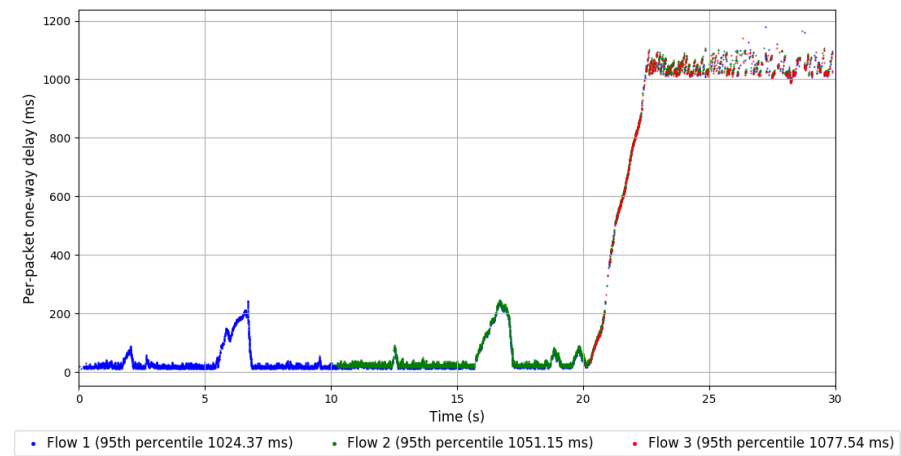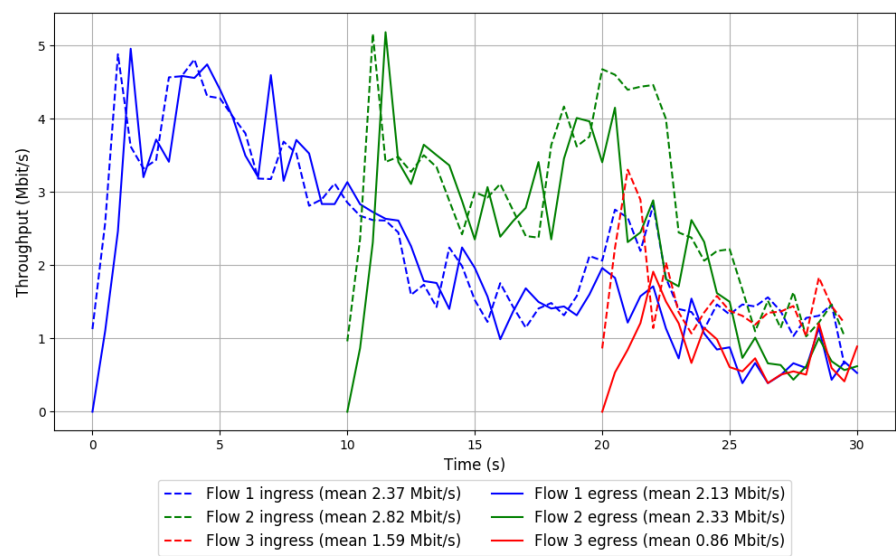Run 2: Report of PCC-Vivace — Data Link

```
Run 3: Statistics of PCC-Vivace

Start at: 2018-12-11 01:24:31
End at: 2018-12-11 01:25:01
Local clock offset: 2.838 ms
Remote clock offset: -0.996 ms


# Below is generated by plot.py at 2018-12-11 01:32:51
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.96 Mbit/s
95th percentile per-packet one-way delay: 1046.193 ms
Loss rate: 16.99%
-- Flow 1:
Average throughput: 2.13 Mbit/s
95th percentile per-packet one-way delay: 1024.374 ms
Loss rate: 10.08%
-- Flow 2:
Average throughput: 2.33 Mbit/s
95th percentile per-packet one-way delay: 1051.154 ms
Loss rate: 17.62%
-- Flow 3:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 1077.541 ms
Loss rate: 45.95%
```

Run 3: Report of PCC-Vivace — Data Link

Flow 1 ingress (mean 2.37 Mbit/s)   Flow 1 egress (mean 2.13 Mbit/s)
Flow 2 ingress (mean 2.82 Mbit/s)   Flow 2 egress (mean 2.33 Mbit/s)
Flow 3 ingress (mean 1.59 Mbit/s)   Flow 3 egress (mean 0.86 Mbit/s)

Flow 1 (95th percentile 1024.37 ms)   Flow 2 (95th percentile 1051.15 ms)   Flow 3 (95th percentile 1077.54 ms)
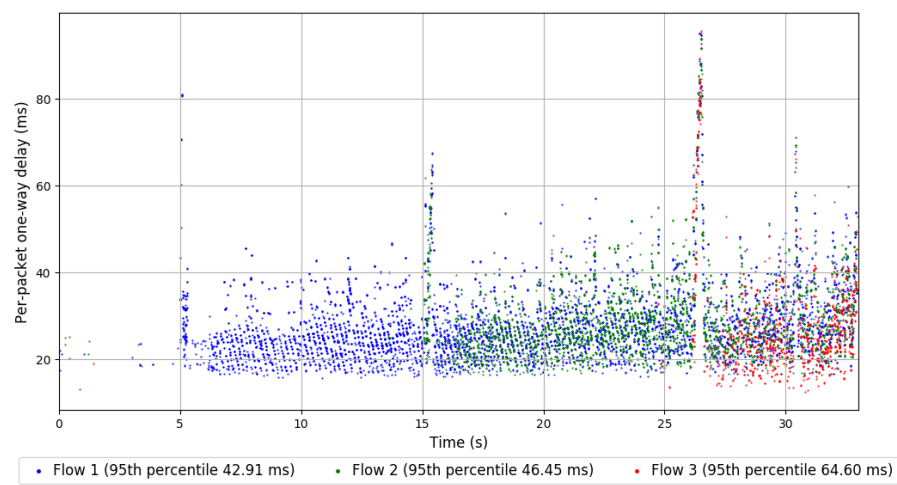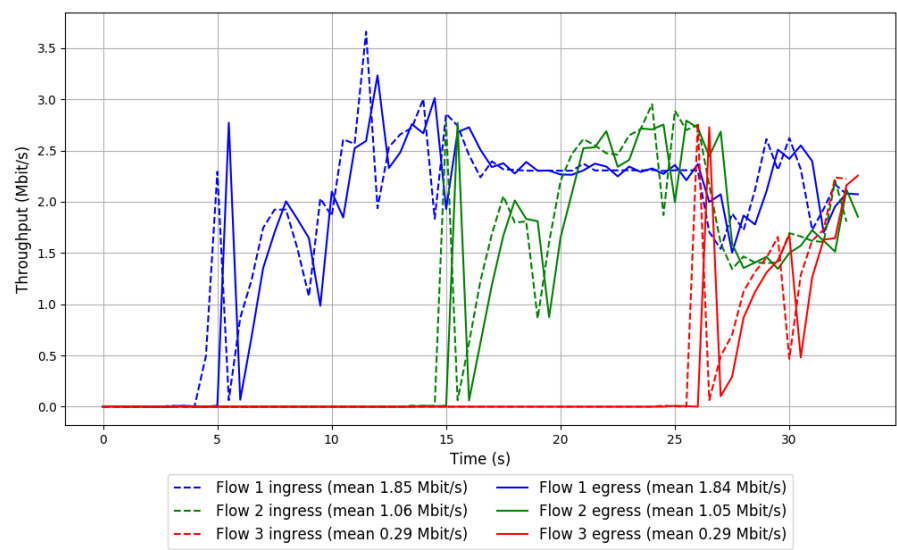
```
Run 1: Statistics of WebRTC media

Start at: 2018-12-11 00:38:30
End at: 2018-12-11 00:39:00
Local clock offset: 2.342 ms
Remote clock offset: -0.552 ms


# Below is generated by plot.py at 2018-12-11 01:32:51
# Datalink statistics
-- Total of 3 flows:
Average throughput: 3.18 Mbit/s
95th percentile per-packet one-way delay: 45.356 ms
Loss rate: 0.27%
-- Flow 1:
Average throughput: 1.84 Mbit/s
95th percentile per-packet one-way delay: 42.911 ms
Loss rate: 0.15%
-- Flow 2:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 46.450 ms
Loss rate: 0.30%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 64.600 ms
Loss rate: 0.92%
```

Run 1: Report of WebRTC media — Data Link

```
Run 2: Statistics of WebRTC media

Start at: 2018-12-11 00:59:50
End at: 2018-12-11 01:00:20
Local clock offset: 1.277 ms
Remote clock offset: -1.65 ms

# Below is generated by plot.py at 2018-12-11 01:32:52
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.64 Mbit/s
95th percentile per-packet one-way delay: 45.486 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 1.21 Mbit/s
95th percentile per-packet one-way delay: 43.003 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 45.552 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 65.671 ms
Loss rate: 0.87%
```
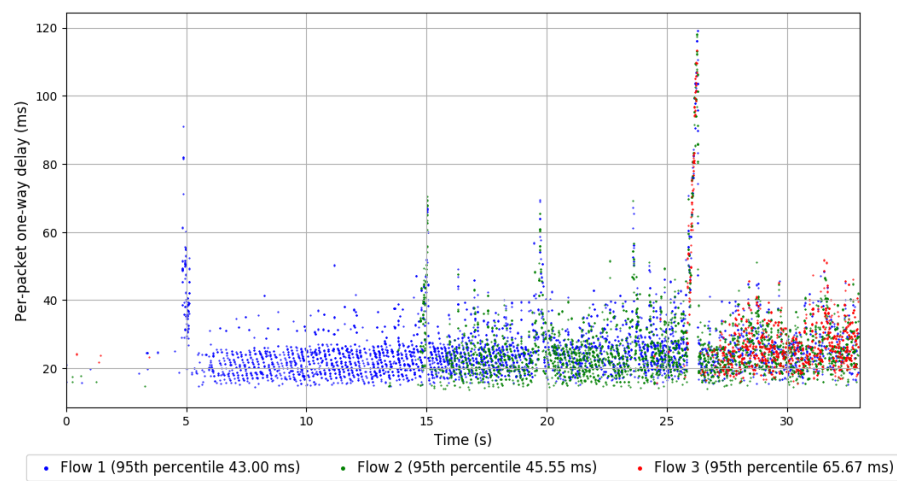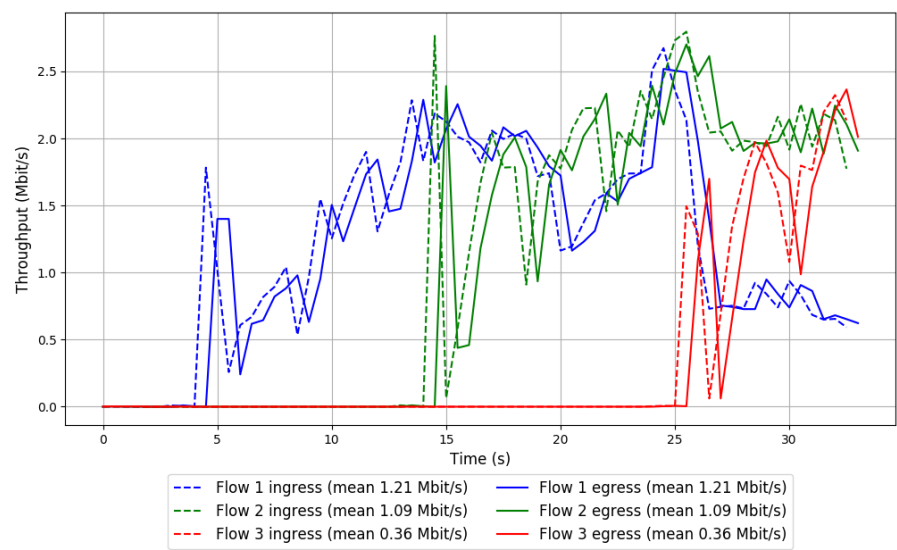
Run 2: Report of WebRTC media — Data Link

```
Run 3: Statistics of WebRTC media

Start at: 2018-12-11 01:21:09
End at: 2018-12-11 01:21:39
Local clock offset: -3.007 ms
Remote clock offset: -1.083 ms


# Below is generated by plot.py at 2018-12-11 01:32:52
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.31 Mbit/s
95th percentile per-packet one-way delay: 161.328 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 1.30 Mbit/s
95th percentile per-packet one-way delay: 126.452 ms
Loss rate: 0.06%
-- Flow 2:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 196.614 ms
Loss rate: 0.05%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 171.564 ms
Loss rate: 0.80%
```

Run 3: Report of WebRTC media — Data Link