Pantheon Report

Generated at 2018-01-31 11:52:28 (UTC).

Data path: AWS Brazil 2 Ethernet (*local*) →Colombia ppp0 (*remote*).

Repeated the test of 17 congestion control schemes 3 times.

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

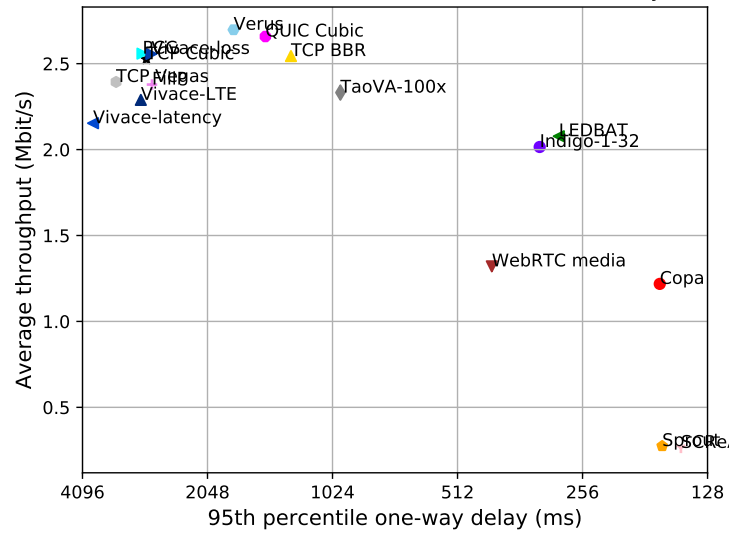Increased UDP receive buffer to 16 MB (default) and 32 MB (max).

Tested BBR with qdisc of Fair Queuing (`fq`), and other schemes with the default Linux qdisc (`pfifo_fast`).

NTP offsets were measured against `gps.ntp.br` and have been applied to correct the timestamps in logs.

```
Git summary:
branch: master @ 70217998b3c9a7166a95460a70c0854d1326e100
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
 M datagrump/sender.cc
third_party/fillp @ fb9c9ab842e5614ad52911a76fb9bd1c1b0dca86
third_party/genericCC @ 80b516c448f795fd6e9675f7177b69c622f07da8
third_party/indigo @ a9b2060d39e4da2e8987e893e3eca2a6c7cd0ab9
third_party/indigo-1-layer-128-unit @ 3ae9e4ef4230db7484501f82ce8b377695f2f66d
third_party/indigo-1-layer-32-unit @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/indigo-1-layer-32-unit-no-calib @ 1f3a7f75b41135ed5b540c0fd3505939528e2a5f
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/koho_cc @ f0f2e693303aee82ea808e6928eac4f1083a6681
 M datagrump/sender.cc
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ fb1053193c2861da659ba9013db26744ccfcf993
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
 M receiver/src/buffer.h
 M receiver/src/core.cpp
 M sender/src/buffer.h
 M sender/src/core.cpp
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream @ c3370fd7bd17265a79aeb34e4016ad23f5965885
third_party/sourdough @ f1a14bffe749737437f61b1eaeeb30b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375eee2665089ce
 M src/examples/cellsim.cc
 M src/examples/sproutbt2.cc
 M src/network/sproutconn.cc
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
 M src/verus.hpp
 M tools/plot.py
third_party/vivace @ 7a4ba531e75b4a6f66f5c4580192120401784ce3
third_party/webrtc @ a488197ddd041ace68a42849b2540ad834825f42
```
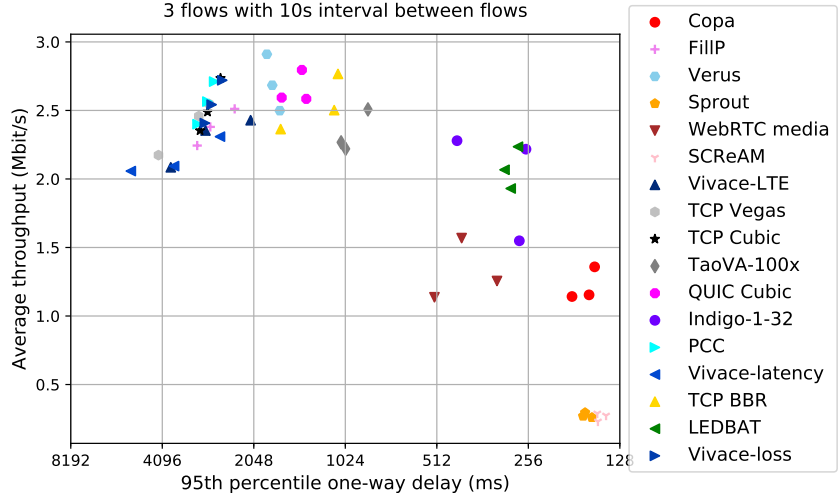
test from AWS Brazil 2 Ethernet to Colombia ppp0, 3 runs of 30s each per scheme
3 flows with 10s interval between flows (mean of all runs by scheme)

test from AWS Brazil 2 Ethernet to Colombia ppp0, 3 runs of 30s each per scheme
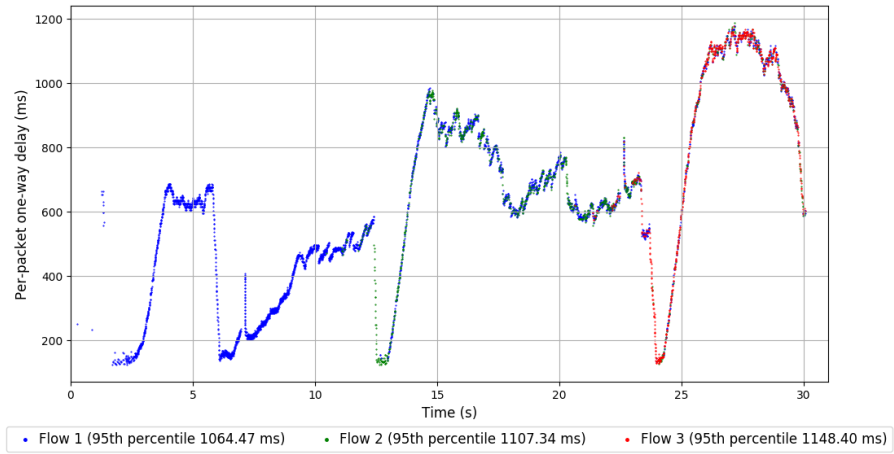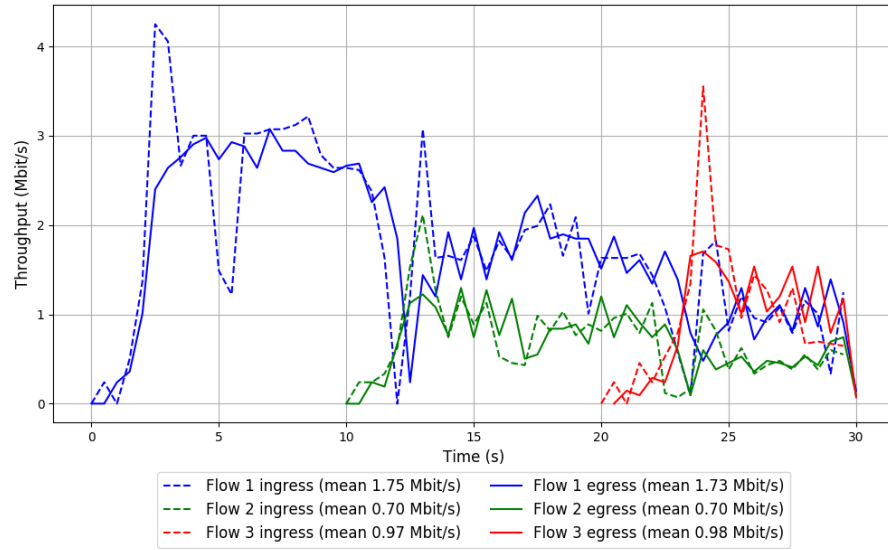3 flows with 10s interval between flows

scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	1.71	0.90	0.77	1240.53	1295.96	1180.54	1.20	2.66	4.72
TCP Cubic	3	2.28	0.37	0.08	2869.62	2889.45	2850.07	12.67	16.58	49.37
LEDBAT	3	1.61	0.50	0.43	285.77	289.60	299.21	0.47	0.67	1.69
PCC	3	1.54	1.57	0.00	2918.00	2956.76	2927.03	55.14	65.14	18.26
QUIC Cubic	3	2.12	0.67	0.26	1446.13	1537.46	1573.38	4.25	8.43	23.65
SCReAM	3	0.08	0.19	0.16	138.55	148.33	146.74	0.13	0.25	0.32
WebRTC media	3	0.82	0.39	0.12	413.05	473.03	391.28	0.14	0.26	1.62
Sprout	3	0.12	0.14	0.19	180.92	166.38	164.13	0.39	0.39	0.85
TaoVA-100x	3	1.30	1.06	1.00	703.91	1054.98	1117.82	0.60	1.25	2.54
TCP Vegas	3	1.75	0.96	0.12	3210.96	3021.89	2464.47	11.13	32.07	38.04
Verus	3	2.69	0.01	0.01	1772.57	1762.49	1744.02	5.41	4.92	9.70
Copa	3	0.63	0.60	0.56	161.93	165.99	188.00	0.11	0.15	0.47
FillP	3	1.48	1.38	0.24	2635.88	2658.82	2505.20	33.97	68.62	88.27
Indigo-1-32	3	1.10	1.05	0.69	255.51	455.47	317.66	0.15	0.66	0.76
Vivace-latency	3	1.35	1.21	0.00	3781.41	3927.89	3948.64	13.62	22.80	18.60
Vivace-loss	3	2.26	0.00	1.00	2784.32	2767.87	2818.56	34.21	19.66	54.00
Vivace-LTE	3	1.50	1.20	0.00	2954.90	2976.38	2943.60	15.55	22.81	9.82

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```
Run 1: Statistics of TCP BBR

Start at: 2018-01-31 10:51:50
End at: 2018-01-31 10:52:20
Local clock offset: 0.385 ms
Remote clock offset: -5.606 ms


# Below is generated by plot.py at 2018-01-31 11:51:42
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.50 Mbit/s
95th percentile per-packet one-way delay: 1113.841 ms
Loss rate: 1.72%
-- Flow 1:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 1064.473 ms
Loss rate: 1.28%
-- Flow 2:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 1107.335 ms
Loss rate: 2.07%
-- Flow 3:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 1148.398 ms
Loss rate: 3.62%
```

Run 1: Report of TCP BBR — Data Link

Legend:
- Flow 1 ingress (mean 1.75 Mbit/s)
- Flow 1 egress (mean 1.73 Mbit/s)
- Flow 2 ingress (mean 0.70 Mbit/s)
- Flow 2 egress (mean 0.70 Mbit/s)
- Flow 3 ingress (mean 0.97 Mbit/s)
- Flow 3 egress (mean 0.98 Mbit/s)

Legend:
- Flow 1 (95th percentile 1064.47 ms)
- Flow 2 (95th percentile 1107.34 ms)
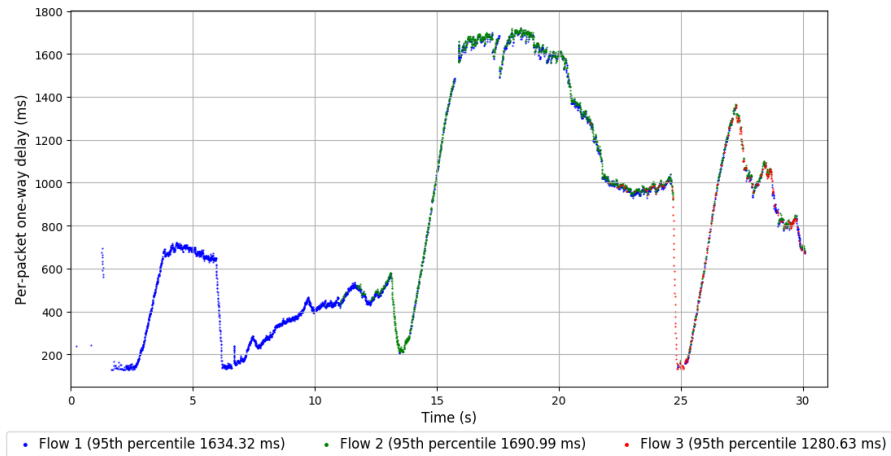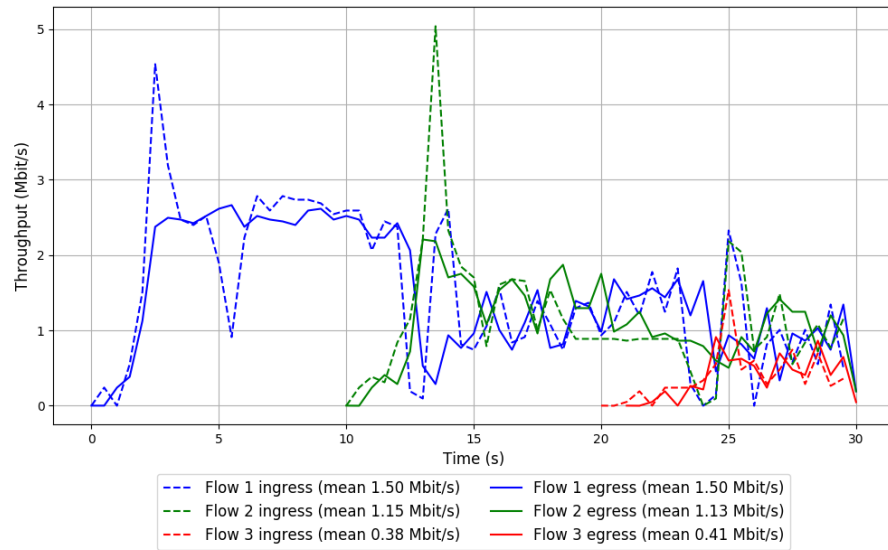- Flow 3 (95th percentile 1148.40 ms)

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```
Run 2: Statistics of TCP BBR

Start at: 2018-01-31 11:14:35
End at: 2018-01-31 11:15:05
Local clock offset: 0.508 ms
Remote clock offset: -0.318 ms


# Below is generated by plot.py at 2018-01-31 11:51:42
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.36 Mbit/s
95th percentile per-packet one-way delay: 1671.287 ms
Loss rate: 1.76%
-- Flow 1:
Average throughput: 1.50 Mbit/s
95th percentile per-packet one-way delay: 1634.324 ms
Loss rate: 0.75%
-- Flow 2:
Average throughput: 1.13 Mbit/s
95th percentile per-packet one-way delay: 1690.990 ms
Loss rate: 3.15%
-- Flow 3:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 1280.633 ms
Loss rate: 5.38%
```

Run 2: Report of TCP BBR — Data Link

Legend:
- Flow 1 ingress (mean 1.50 Mbit/s)
- Flow 1 egress (mean 1.50 Mbit/s)
- Flow 2 ingress (mean 1.15 Mbit/s)
- Flow 2 egress (mean 1.13 Mbit/s)
- Flow 3 ingress (mean 0.38 Mbit/s)
- Flow 3 egress (mean 0.41 Mbit/s)

Legend:
- Flow 1 (95th percentile 1634.32 ms)
- Flow 2 (95th percentile 1690.99 ms)
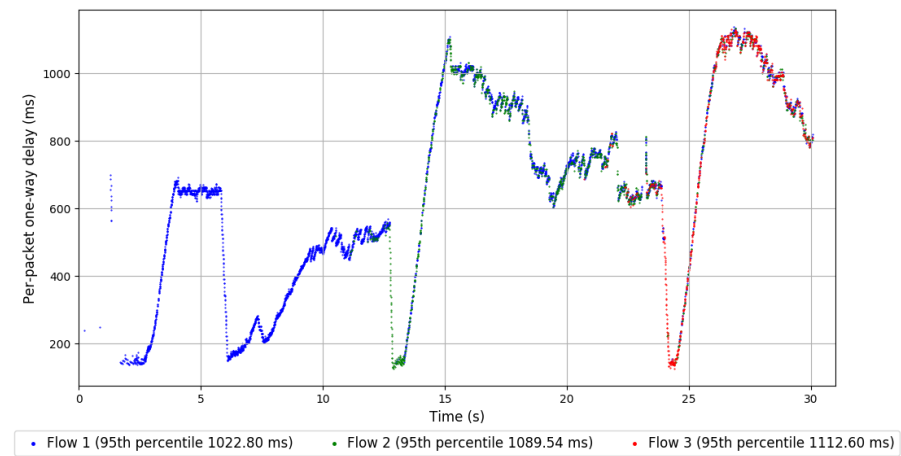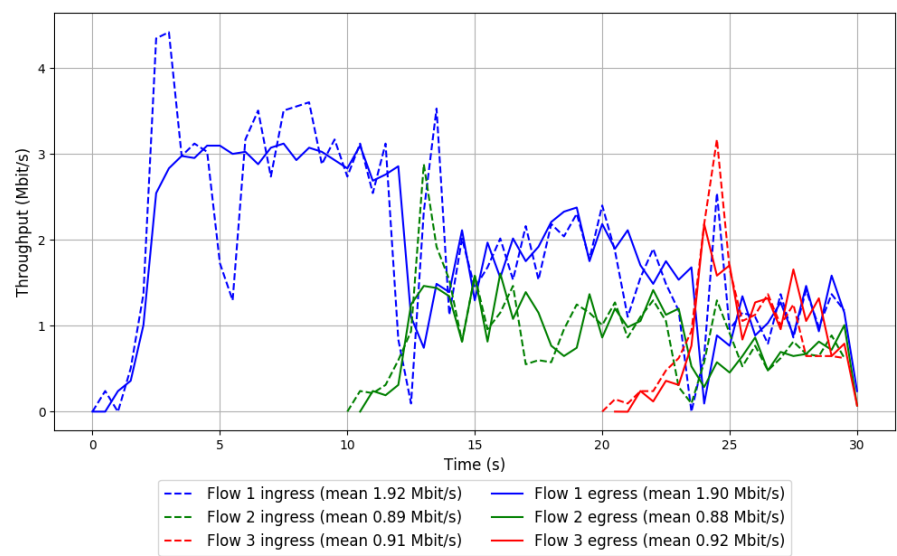- Flow 3 (95th percentile 1280.63 ms)

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```
Run 3: Statistics of TCP BBR

Start at: 2018-01-31 11:37:23
End at: 2018-01-31 11:37:53
Local clock offset: 0.458 ms
Remote clock offset: -1.481 ms


# Below is generated by plot.py at 2018-01-31 11:51:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.77 Mbit/s
95th percentile per-packet one-way delay: 1082.629 ms
Loss rate: 2.22%
-- Flow 1:
Average throughput: 1.90 Mbit/s
95th percentile per-packet one-way delay: 1022.801 ms
Loss rate: 1.58%
-- Flow 2:
Average throughput: 0.88 Mbit/s
95th percentile per-packet one-way delay: 1089.543 ms
Loss rate: 2.77%
-- Flow 3:
Average throughput: 0.92 Mbit/s
95th percentile per-packet one-way delay: 1112.601 ms
Loss rate: 5.16%
```

Run 3: Report of TCP BBR — Data Link

- - - - Flow 1 ingress (mean 1.92 Mbit/s)   —— Flow 1 egress (mean 1.90 Mbit/s)
- - - - Flow 2 ingress (mean 0.89 Mbit/s)   —— Flow 2 egress (mean 0.88 Mbit/s)
- - - - Flow 3 ingress (mean 0.91 Mbit/s)   —— Flow 3 egress (mean 0.92 Mbit/s)

• Flow 1 (95th percentile 1022.80 ms)   • Flow 2 (95th percentile 1089.54 ms)   • Flow 3 (95th percentile 1112.60 ms)
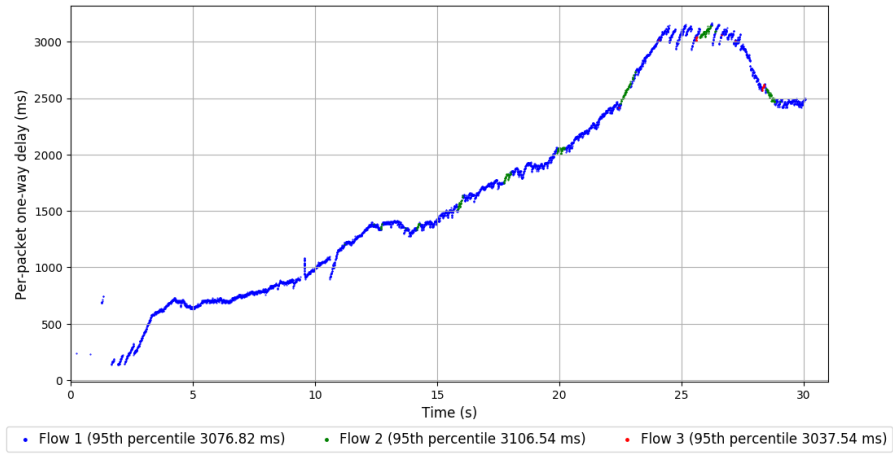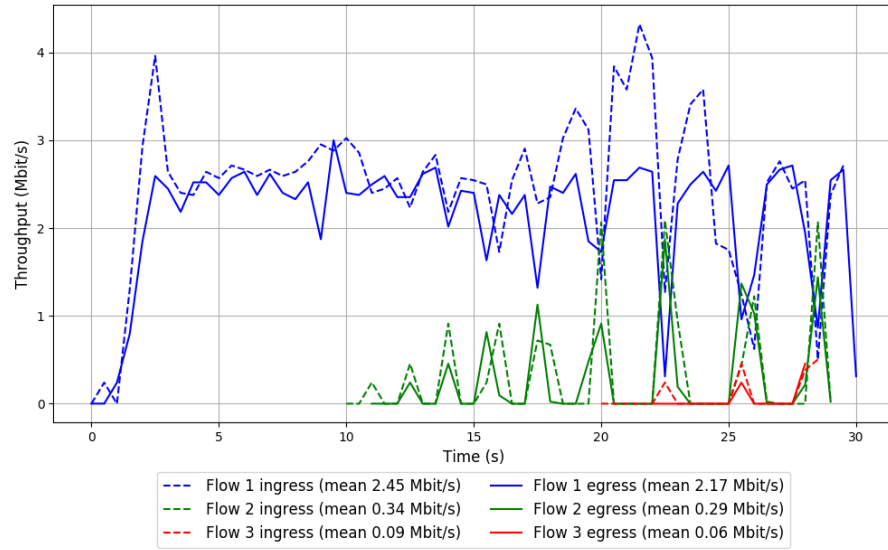
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```
Run 1: Statistics of TCP Cubic

Start at: 2018-01-31 10:54:21
End at: 2018-01-31 10:54:51
Local clock offset: 0.457 ms
Remote clock offset: -0.787 ms


# Below is generated by plot.py at 2018-01-31 11:51:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.35 Mbit/s
95th percentile per-packet one-way delay: 3077.288 ms
Loss rate: 13.15%
-- Flow 1:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 3076.820 ms
Loss rate: 12.01%
-- Flow 2:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 3106.540 ms
Loss rate: 20.85%
-- Flow 3:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 3037.542 ms
Loss rate: 55.80%
```

Run 1: Report of TCP Cubic — Data Link

Flow 1 ingress (mean 2.45 Mbit/s)   Flow 1 egress (mean 2.17 Mbit/s)
Flow 2 ingress (mean 0.34 Mbit/s)   Flow 2 egress (mean 0.29 Mbit/s)
Flow 3 ingress (mean 0.09 Mbit/s)   Flow 3 egress (mean 0.06 Mbit/s)

Flow 1 (95th percentile 3076.82 ms)   Flow 2 (95th percentile 3106.54 ms)   Flow 3 (95th percentile 3037.54 ms)

```
Run 2: Statistics of TCP Cubic

Start at: 2018-01-31 11:17:07
End at: 2018-01-31 11:17:37
Local clock offset: 0.489 ms
Remote clock offset: -6.98 ms


# Below is generated by plot.py at 2018-01-31 11:51:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.49 Mbit/s
95th percentile per-packet one-way delay: 2907.158 ms
Loss rate: 13.03%
-- Flow 1:
Average throughput: 2.32 Mbit/s
95th percentile per-packet one-way delay: 2906.787 ms
Loss rate: 13.13%
-- Flow 2:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 2917.610 ms
Loss rate: 6.17%
-- Flow 3:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 2808.092 ms
Loss rate: 50.59%
```
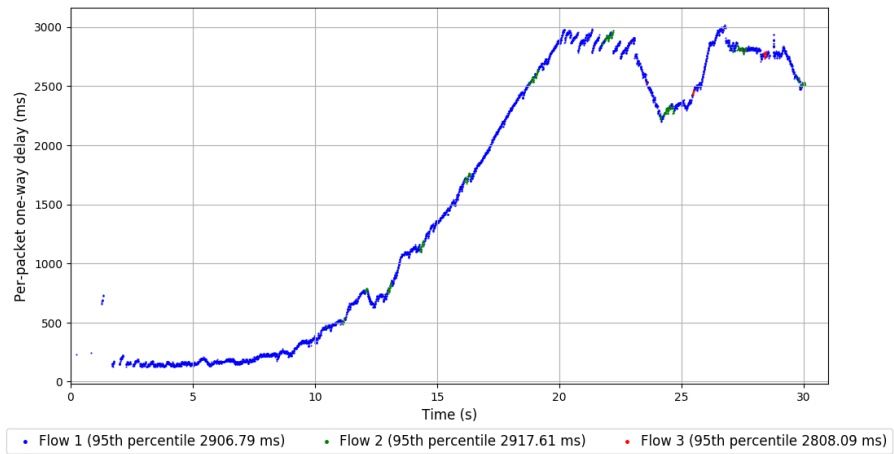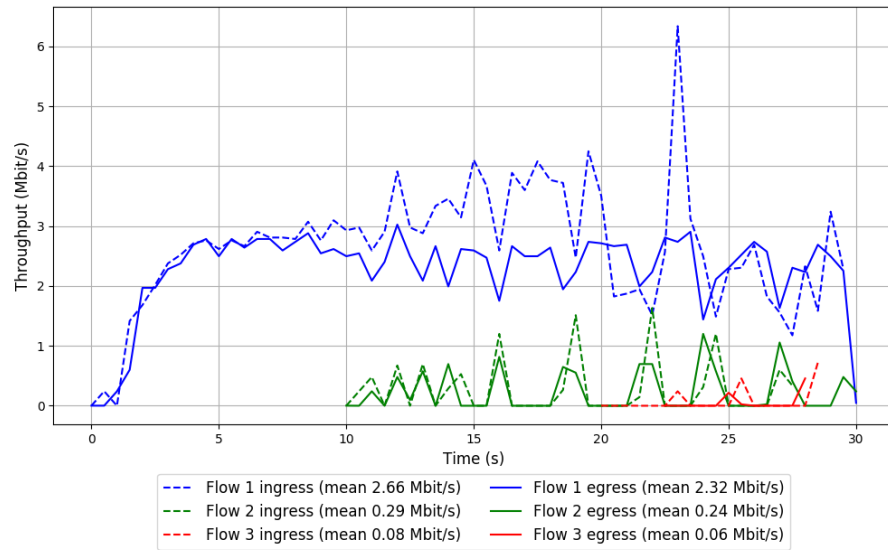
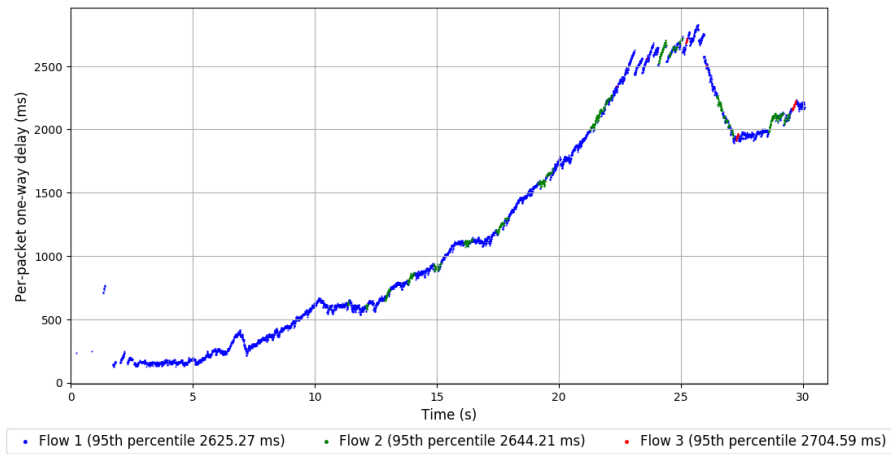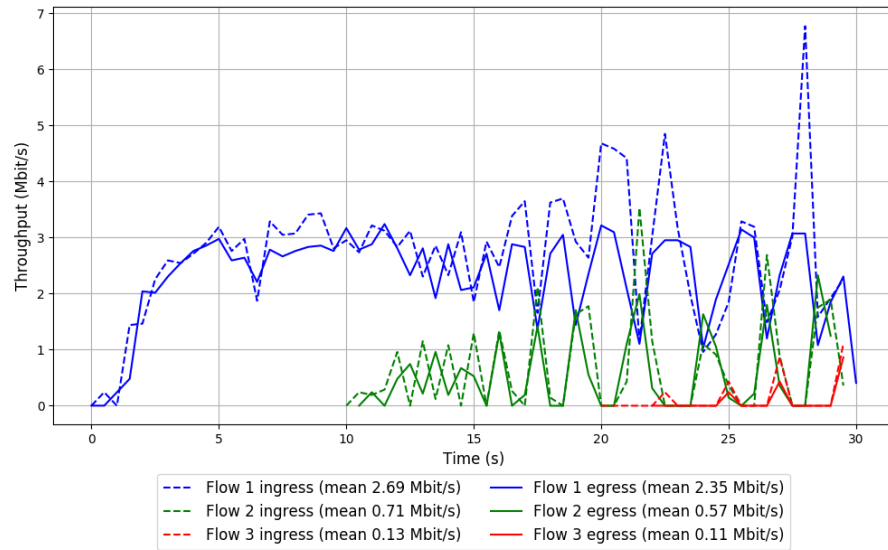Run 2: Report of TCP Cubic — Data Link

```
Run 3: Statistics of TCP Cubic

Start at: 2018-01-31 11:39:54
End at: 2018-01-31 11:40:24
Local clock offset: 0.454 ms
Remote clock offset: -1.534 ms


# Below is generated by plot.py at 2018-01-31 11:51:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.74 Mbit/s
95th percentile per-packet one-way delay: 2634.987 ms
Loss rate: 14.69%
-- Flow 1:
Average throughput: 2.35 Mbit/s
95th percentile per-packet one-way delay: 2625.267 ms
Loss rate: 12.86%
-- Flow 2:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 2644.212 ms
Loss rate: 22.72%
-- Flow 3:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 2704.590 ms
Loss rate: 41.73%
```

Run 3: Report of TCP Cubic — Data Link

- Flow 1 ingress (mean 2.69 Mbit/s)
- Flow 1 egress (mean 2.35 Mbit/s)
- Flow 2 ingress (mean 0.71 Mbit/s)
- Flow 2 egress (mean 0.57 Mbit/s)
- Flow 3 ingress (mean 0.13 Mbit/s)
- Flow 3 egress (mean 0.11 Mbit/s)

- Flow 1 (95th percentile 2625.27 ms)
- Flow 2 (95th percentile 2644.21 ms)
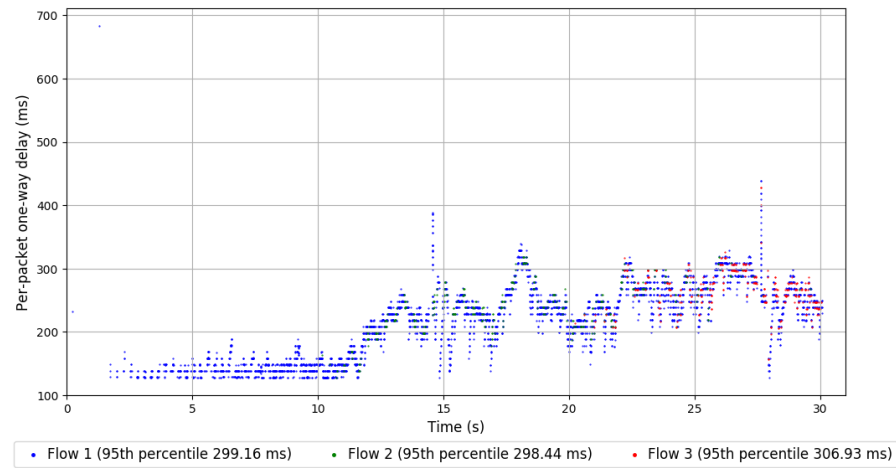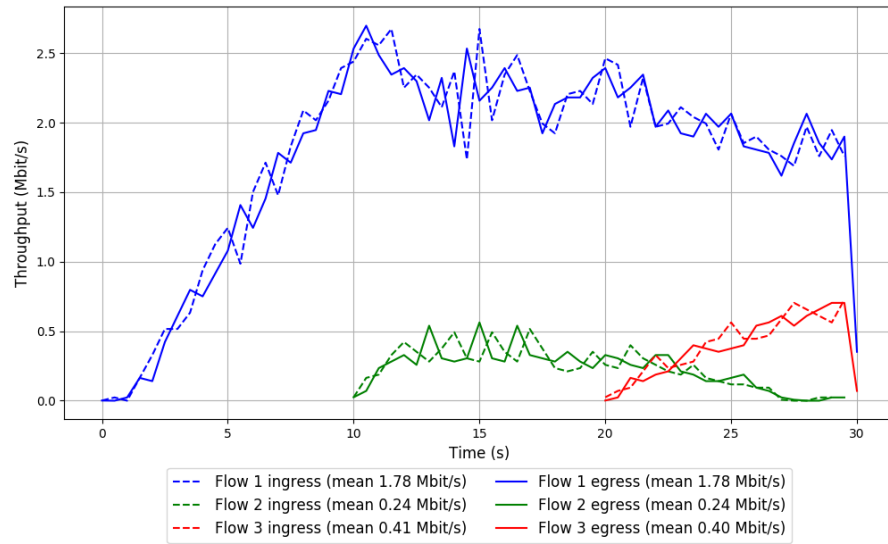- Flow 3 (95th percentile 2704.59 ms)

```
Run 1: Statistics of LEDBAT

Start at: 2018-01-31 10:53:06
End at: 2018-01-31 10:53:36
Local clock offset: 0.467 ms
Remote clock offset: -5.564 ms


# Below is generated by plot.py at 2018-01-31 11:51:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 306.664 ms
Loss rate: 0.64%
-- Flow 1:
Average throughput: 1.78 Mbit/s
95th percentile per-packet one-way delay: 299.156 ms
Loss rate: 0.55%
-- Flow 2:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 298.443 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 306.928 ms
Loss rate: 2.59%
```

Run 1: Report of LEDBAT — Data Link

Flow 1 ingress (mean 1.78 Mbit/s) — — —   Flow 1 egress (mean 1.78 Mbit/s) ———
Flow 2 ingress (mean 0.24 Mbit/s) — — —   Flow 2 egress (mean 0.24 Mbit/s) ———
Flow 3 ingress (mean 0.41 Mbit/s) — — —   Flow 3 egress (mean 0.40 Mbit/s) ———

Flow 1 (95th percentile 299.16 ms)   Flow 2 (95th percentile 298.44 ms)   Flow 3 (95th percentile 306.93 ms)

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```
Run 2: Statistics of LEDBAT

Start at: 2018-01-31 11:15:50
End at: 2018-01-31 11:16:20
Local clock offset: 0.486 ms
Remote clock offset: -2.12 ms


# Below is generated by plot.py at 2018-01-31 11:51:43
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.93 Mbit/s
95th percentile per-packet one-way delay: 292.656 ms
Loss rate: 0.45%
-- Flow 1:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 282.982 ms
Loss rate: 0.52%
-- Flow 2:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 293.453 ms
Loss rate: 0.37%
-- Flow 3:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 303.582 ms
Loss rate: 0.00%
```
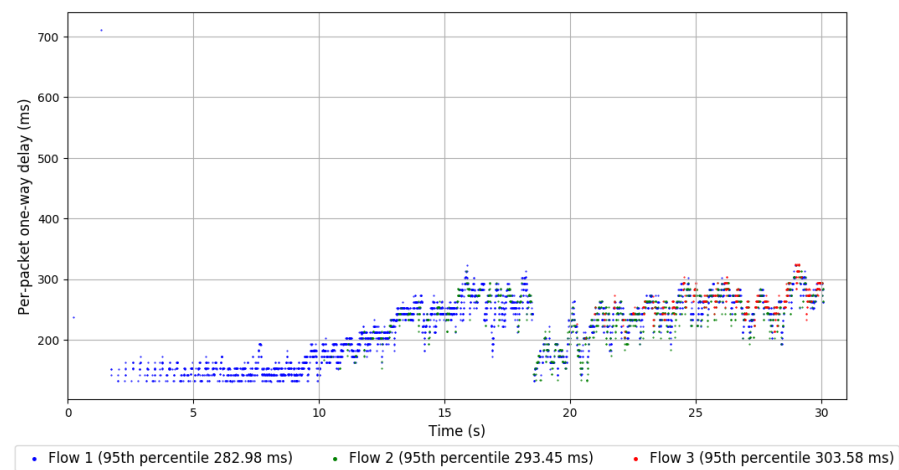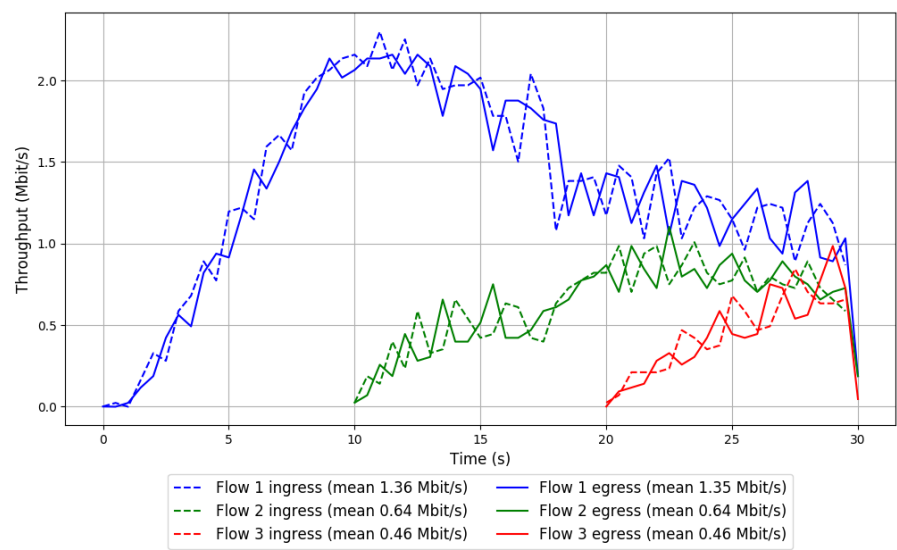
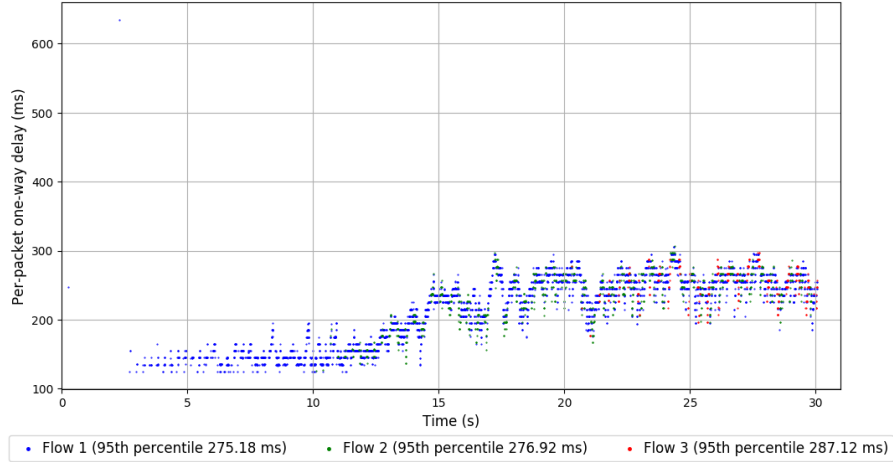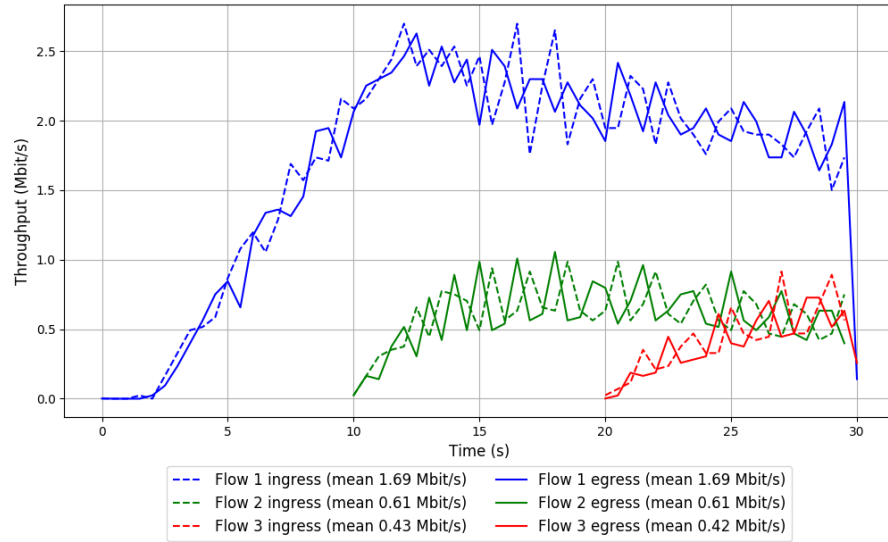## Run 2: Report of LEDBAT — Data Link

```
Run 3: Statistics of LEDBAT

Start at: 2018-01-31 11:38:39
End at: 2018-01-31 11:39:09
Local clock offset: 0.378 ms
Remote clock offset: -2.361 ms


# Below is generated by plot.py at 2018-01-31 11:51:46
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.24 Mbit/s
95th percentile per-packet one-way delay: 276.904 ms
Loss rate: 0.72%
-- Flow 1:
Average throughput: 1.69 Mbit/s
95th percentile per-packet one-way delay: 275.182 ms
Loss rate: 0.35%
-- Flow 2:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 276.919 ms
Loss rate: 1.64%
-- Flow 3:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 287.125 ms
Loss rate: 2.49%
```
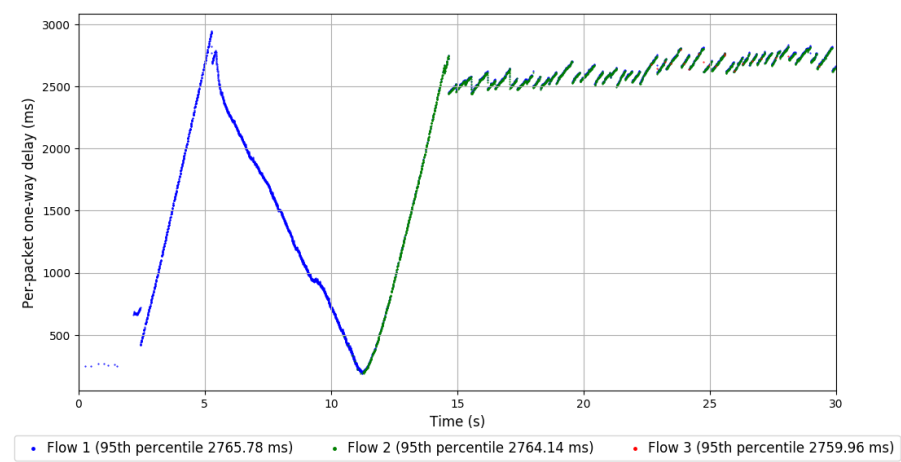
Run 3: Report of LEDBAT — Data Link

- Flow 1 ingress (mean 1.69 Mbit/s) — Flow 1 egress (mean 1.69 Mbit/s)
- Flow 2 ingress (mean 0.61 Mbit/s) — Flow 2 egress (mean 0.61 Mbit/s)
- Flow 3 ingress (mean 0.43 Mbit/s) — Flow 3 egress (mean 0.42 Mbit/s)

- Flow 1 (95th percentile 275.18 ms) • Flow 2 (95th percentile 276.92 ms) • Flow 3 (95th percentile 287.12 ms)
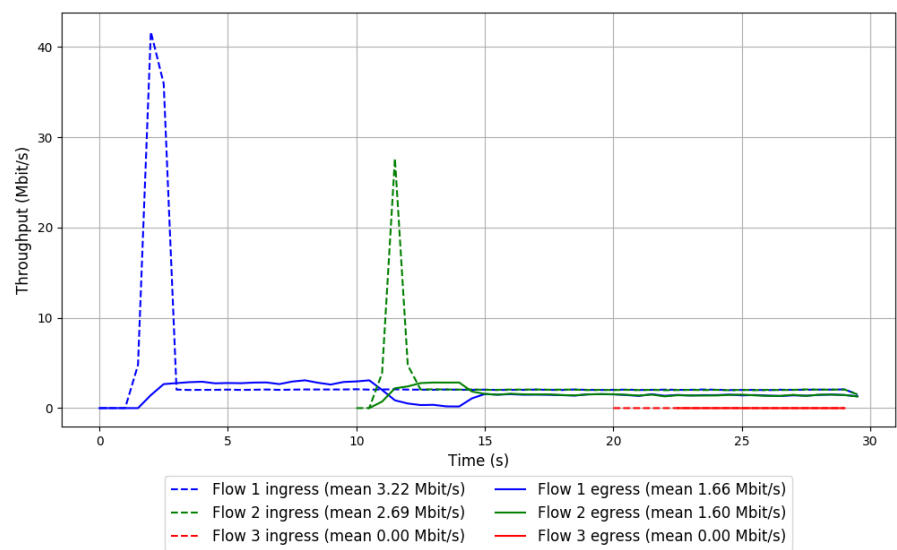
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```
Run 1: Statistics of PCC

Start at: 2018-01-31 10:49:18
End at: 2018-01-31 10:49:48
Local clock offset: 0.38 ms
Remote clock offset: -5.478 ms


# Below is generated by plot.py at 2018-01-31 11:51:51
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.71 Mbit/s
95th percentile per-packet one-way delay: 2765.373 ms
Loss rate: 46.16%
-- Flow 1:
Average throughput: 1.66 Mbit/s
95th percentile per-packet one-way delay: 2765.777 ms
Loss rate: 48.53%
-- Flow 2:
Average throughput: 1.60 Mbit/s
95th percentile per-packet one-way delay: 2764.136 ms
Loss rate: 41.93%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2759.964 ms
Loss rate: 20.58%
```
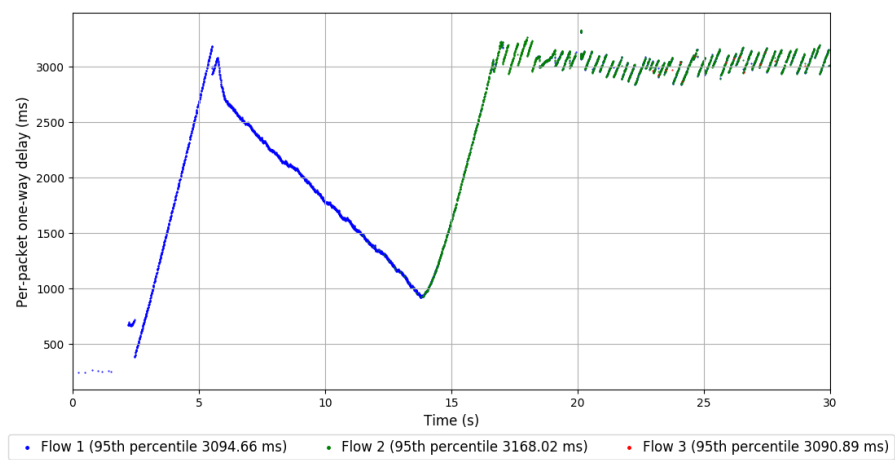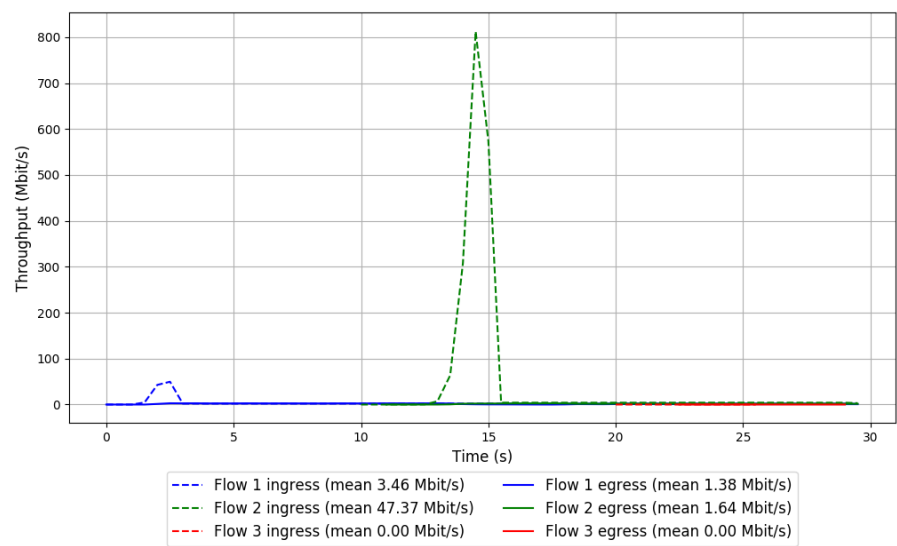
Run 1: Report of PCC — Data Link

Flow 1 ingress (mean 3.22 Mbit/s)   Flow 1 egress (mean 1.66 Mbit/s)
Flow 2 ingress (mean 2.69 Mbit/s)   Flow 2 egress (mean 1.60 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s)   Flow 3 egress (mean 0.00 Mbit/s)

• Flow 1 (95th percentile 2765.78 ms)   • Flow 2 (95th percentile 2764.14 ms)   • Flow 3 (95th percentile 2759.96 ms)

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```
Run 2: Statistics of PCC

Start at: 2018-01-31 11:12:03
End at: 2018-01-31 11:12:33
Local clock offset: 0.519 ms
Remote clock offset: -5.943 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.40 Mbit/s
95th percentile per-packet one-way delay: 3135.094 ms
Loss rate: 93.17%
-- Flow 1:
Average throughput: 1.38 Mbit/s
95th percentile per-packet one-way delay: 3094.663 ms
Loss rate: 60.26%
-- Flow 2:
Average throughput: 1.64 Mbit/s
95th percentile per-packet one-way delay: 3168.017 ms
Loss rate: 96.79%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 3090.890 ms
Loss rate: 18.39%
```
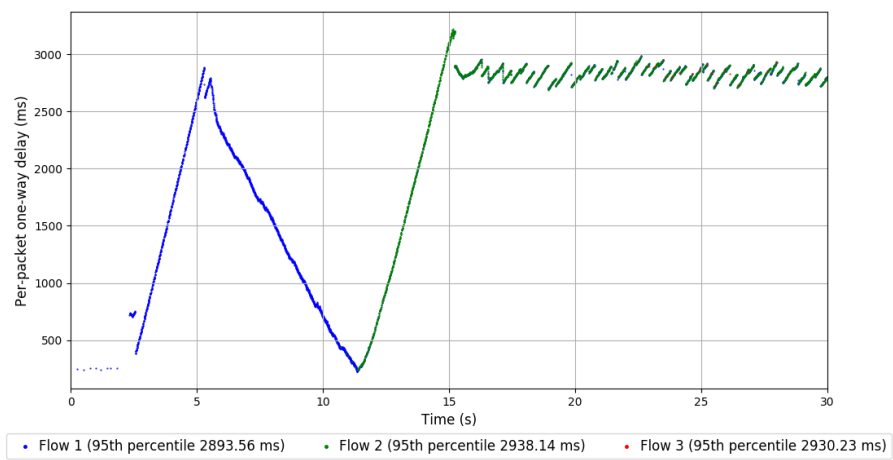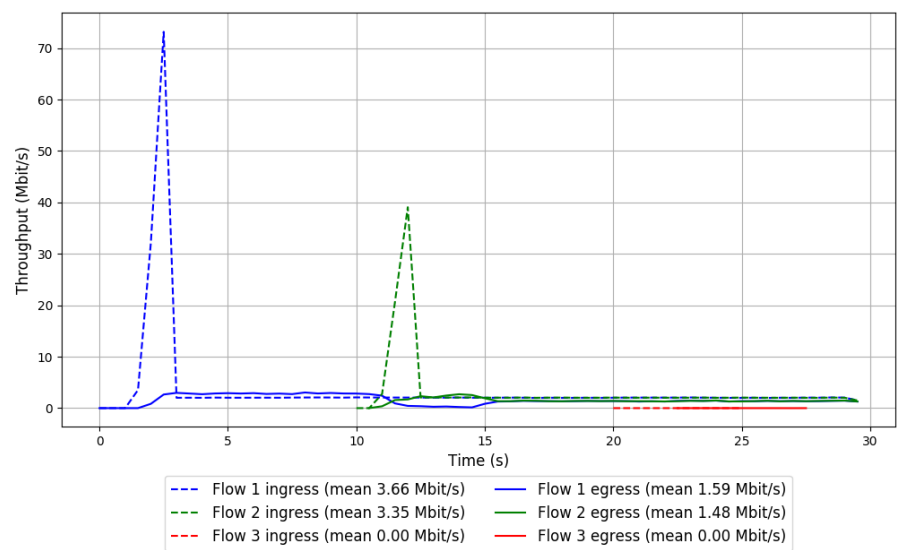
Run 2: Report of PCC — Data Link

Flow 1 ingress (mean 3.46 Mbit/s) --- Flow 1 egress (mean 1.38 Mbit/s) ---
Flow 2 ingress (mean 47.37 Mbit/s) --- Flow 2 egress (mean 1.64 Mbit/s) ---
Flow 3 ingress (mean 0.00 Mbit/s) --- Flow 3 egress (mean 0.00 Mbit/s) ---

• Flow 1 (95th percentile 3094.66 ms)   • Flow 2 (95th percentile 3168.02 ms)   • Flow 3 (95th percentile 3090.89 ms)

```
Run 3: Statistics of PCC

Start at: 2018-01-31 11:34:49
End at: 2018-01-31 11:35:19
Local clock offset: 0.45 ms
Remote clock offset: -2.559 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.56 Mbit/s
95th percentile per-packet one-way delay: 2910.267 ms
Loss rate: 56.65%
-- Flow 1:
Average throughput: 1.59 Mbit/s
95th percentile per-packet one-way delay: 2893.563 ms
Loss rate: 56.62%
-- Flow 2:
Average throughput: 1.48 Mbit/s
95th percentile per-packet one-way delay: 2938.137 ms
Loss rate: 56.71%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2930.231 ms
Loss rate: 15.80%
```
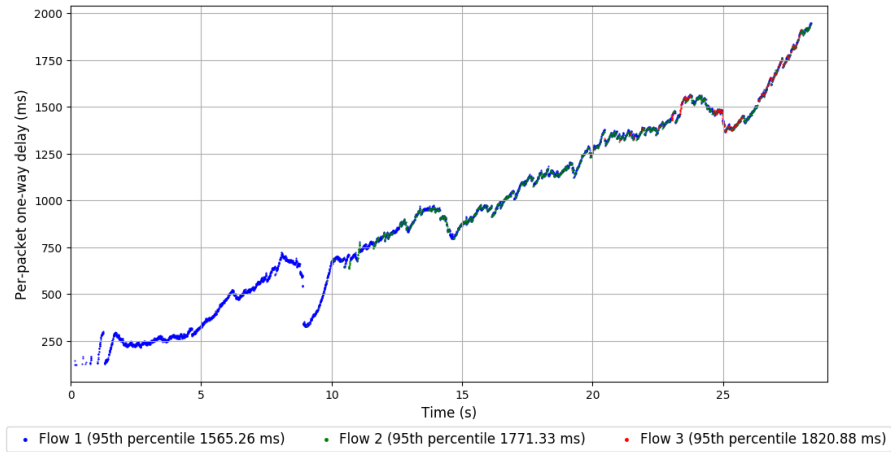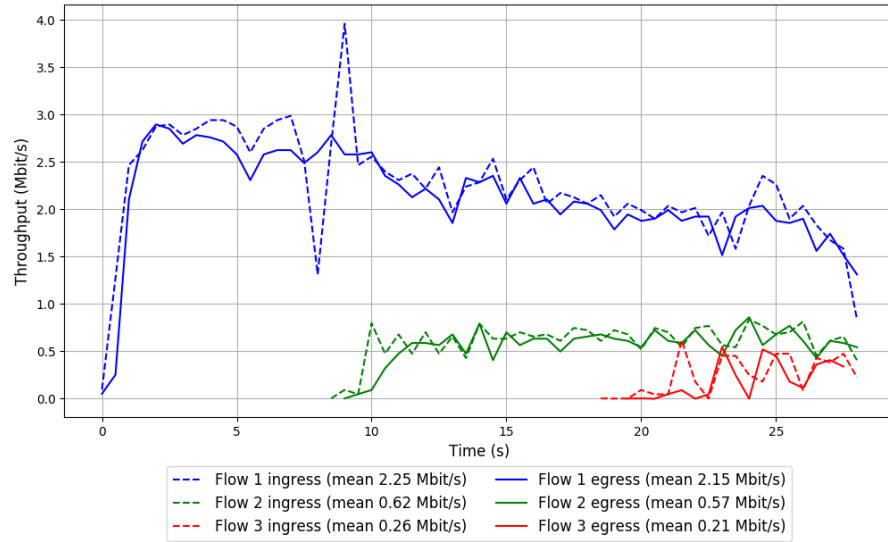
Run 3: Report of PCC — Data Link

Legend:
- Flow 1 ingress (mean 3.66 Mbit/s)
- Flow 1 egress (mean 1.59 Mbit/s)
- Flow 2 ingress (mean 3.35 Mbit/s)
- Flow 2 egress (mean 1.48 Mbit/s)
- Flow 3 ingress (mean 0.00 Mbit/s)
- Flow 3 egress (mean 0.00 Mbit/s)

Legend:
- Flow 1 (95th percentile 2893.56 ms)
- Flow 2 (95th percentile 2938.14 ms)
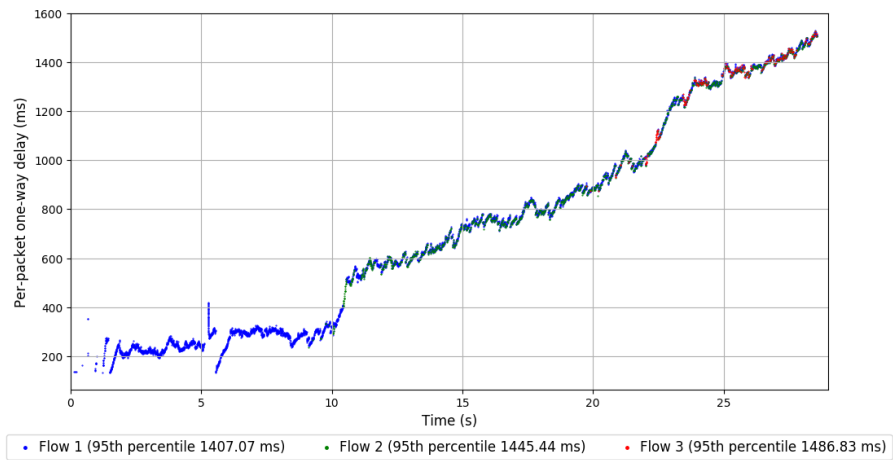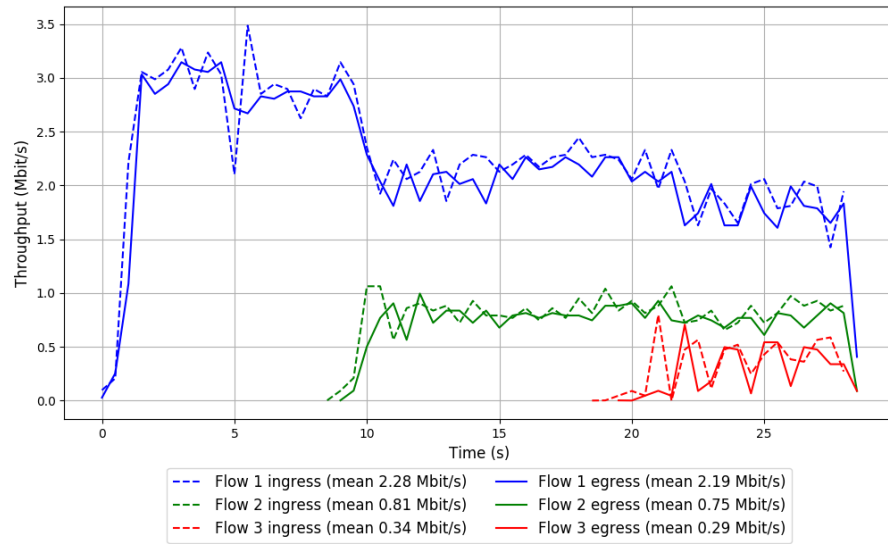- Flow 3 (95th percentile 2930.23 ms)

```
Run 1: Statistics of QUIC Cubic

Start at: 2018-01-31 10:59:25
End at: 2018-01-31 10:59:55
Local clock offset: 0.496 ms
Remote clock offset: -6.686 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.59 Mbit/s
95th percentile per-packet one-way delay: 1657.985 ms
Loss rate: 6.35%
-- Flow 1:
Average throughput: 2.15 Mbit/s
95th percentile per-packet one-way delay: 1565.261 ms
Loss rate: 4.87%
-- Flow 2:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 1771.325 ms
Loss rate: 9.21%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 1820.878 ms
Loss rate: 31.07%
```
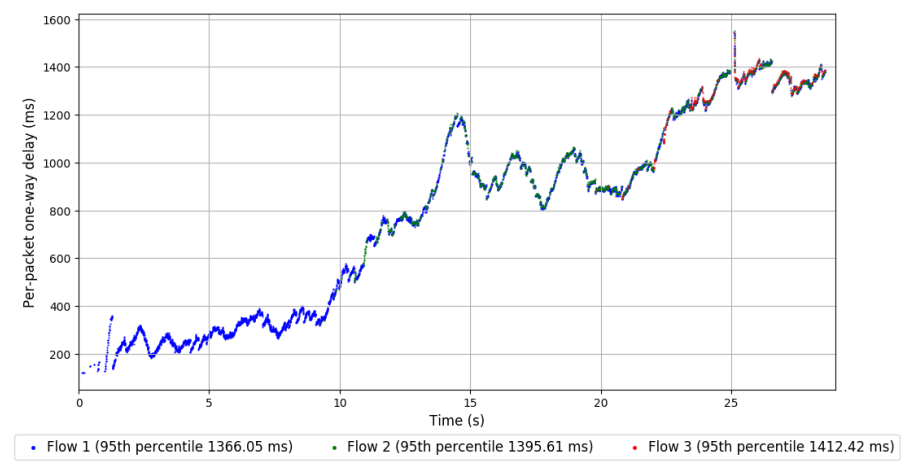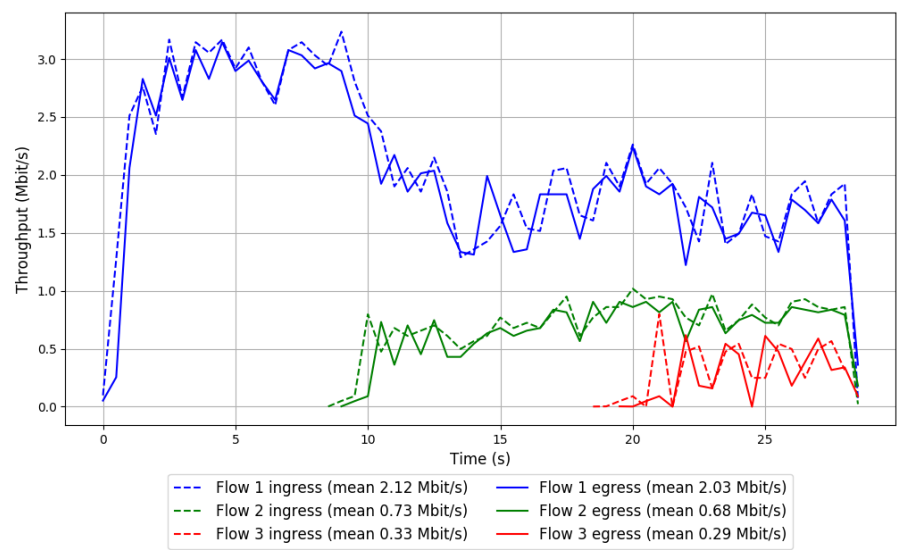
Run 1: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 2.25 Mbit/s)   Flow 1 egress (mean 2.15 Mbit/s)
Flow 2 ingress (mean 0.62 Mbit/s)   Flow 2 egress (mean 0.57 Mbit/s)
Flow 3 ingress (mean 0.26 Mbit/s)   Flow 3 egress (mean 0.21 Mbit/s)

Flow 1 (95th percentile 1565.26 ms)   Flow 2 (95th percentile 1771.33 ms)   Flow 3 (95th percentile 1820.88 ms)

29

```
Run 2: Statistics of QUIC Cubic

Start at: 2018-01-31 11:22:10
End at: 2018-01-31 11:22:40
Local clock offset: 0.469 ms
Remote clock offset: -1.367 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.80 Mbit/s
95th percentile per-packet one-way delay: 1422.822 ms
Loss rate: 5.37%
-- Flow 1:
Average throughput: 2.19 Mbit/s
95th percentile per-packet one-way delay: 1407.074 ms
Loss rate: 3.92%
-- Flow 2:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 1445.444 ms
Loss rate: 8.15%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 1486.834 ms
Loss rate: 20.79%
```

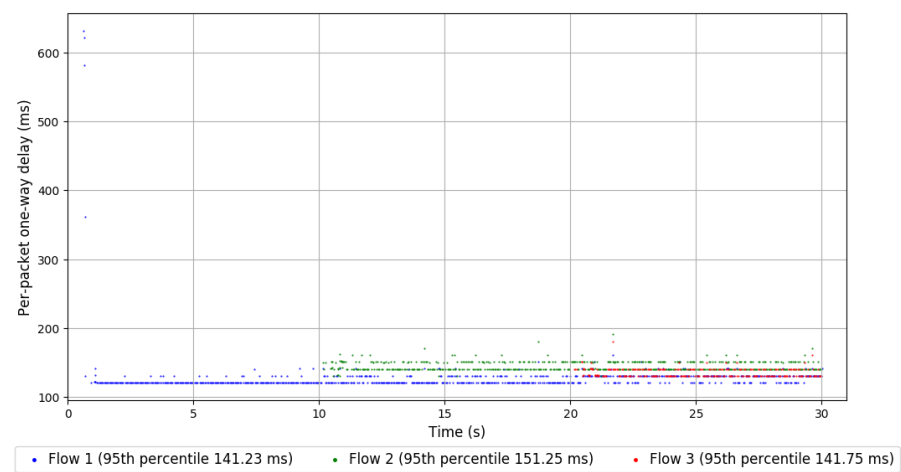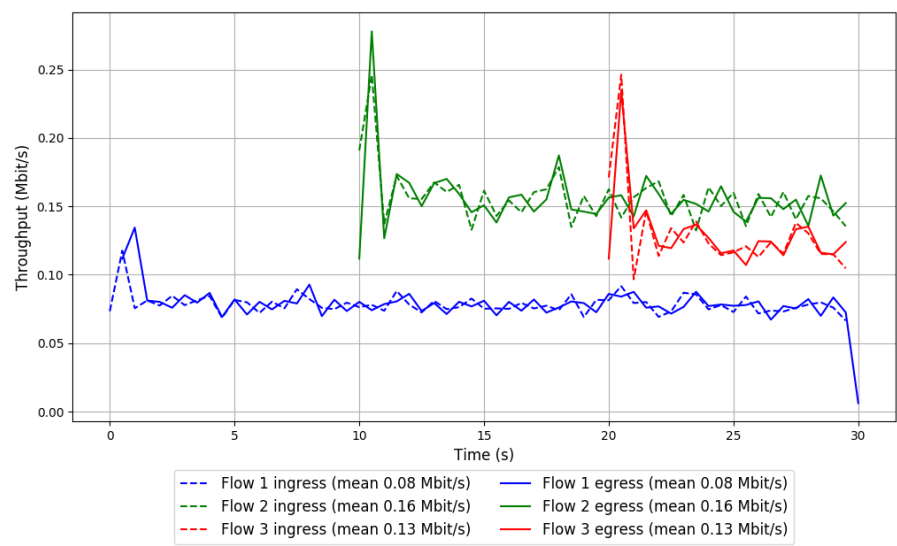Run 2: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 2.28 Mbit/s) --- Flow 1 egress (mean 2.19 Mbit/s)
Flow 2 ingress (mean 0.81 Mbit/s) --- Flow 2 egress (mean 0.75 Mbit/s)
Flow 3 ingress (mean 0.34 Mbit/s) --- Flow 3 egress (mean 0.29 Mbit/s)

Flow 1 (95th percentile 1407.07 ms)   Flow 2 (95th percentile 1445.44 ms)   Flow 3 (95th percentile 1486.83 ms)
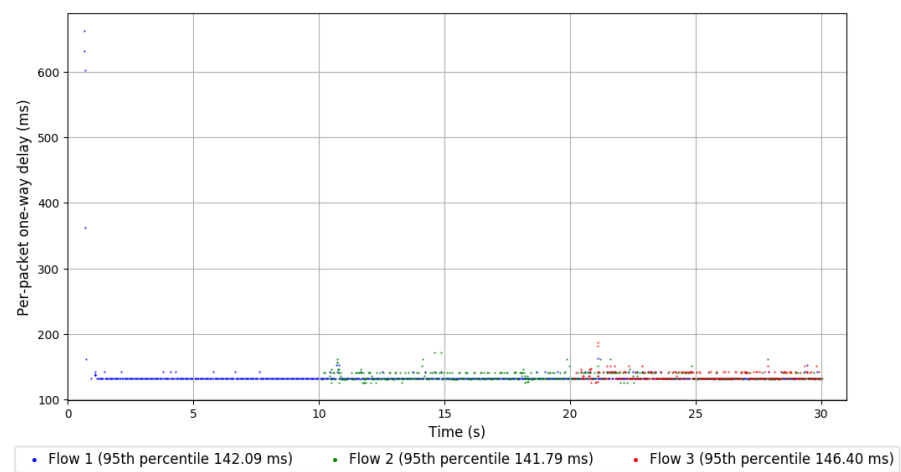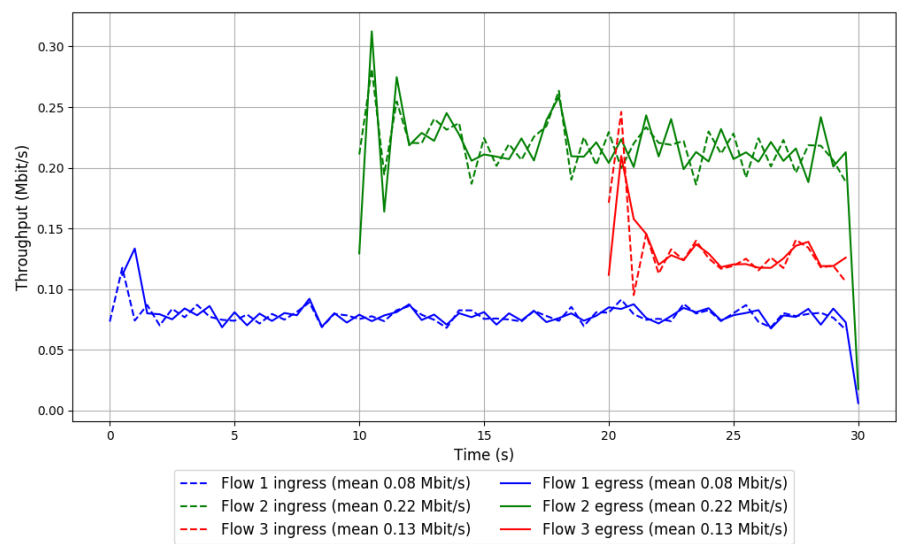
31

```
Run 3: Statistics of QUIC Cubic

Start at: 2018-01-31 11:44:58
End at: 2018-01-31 11:45:28
Local clock offset: 0.37 ms
Remote clock offset: -6.964 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.58 Mbit/s
95th percentile per-packet one-way delay: 1376.265 ms
Loss rate: 5.30%
-- Flow 1:
Average throughput: 2.03 Mbit/s
95th percentile per-packet one-way delay: 1366.051 ms
Loss rate: 3.96%
-- Flow 2:
Average throughput: 0.68 Mbit/s
95th percentile per-packet one-way delay: 1395.611 ms
Loss rate: 7.94%
-- Flow 3:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 1412.425 ms
Loss rate: 19.09%
```

Run 3: Report of QUIC Cubic — Data Link

Flow 1 ingress (mean 2.12 Mbit/s) --- Flow 1 egress (mean 2.03 Mbit/s)
Flow 2 ingress (mean 0.73 Mbit/s) --- Flow 2 egress (mean 0.68 Mbit/s)
Flow 3 ingress (mean 0.33 Mbit/s) --- Flow 3 egress (mean 0.29 Mbit/s)

Flow 1 (95th percentile 1366.05 ms) · Flow 2 (95th percentile 1395.61 ms) · Flow 3 (95th percentile 1412.42 ms)

33

```
Run 1: Statistics of SCReAM

Start at: 2018-01-31 10:56:54
End at: 2018-01-31 10:57:24
Local clock offset: 0.473 ms
Remote clock offset: -6.535 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 151.129 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 141.233 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 151.254 ms
Loss rate: 0.39%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 141.746 ms
Loss rate: 0.34%
```
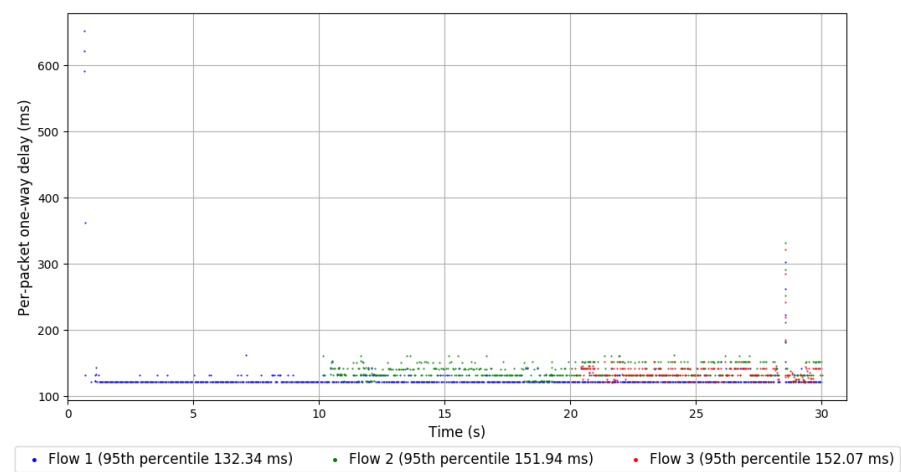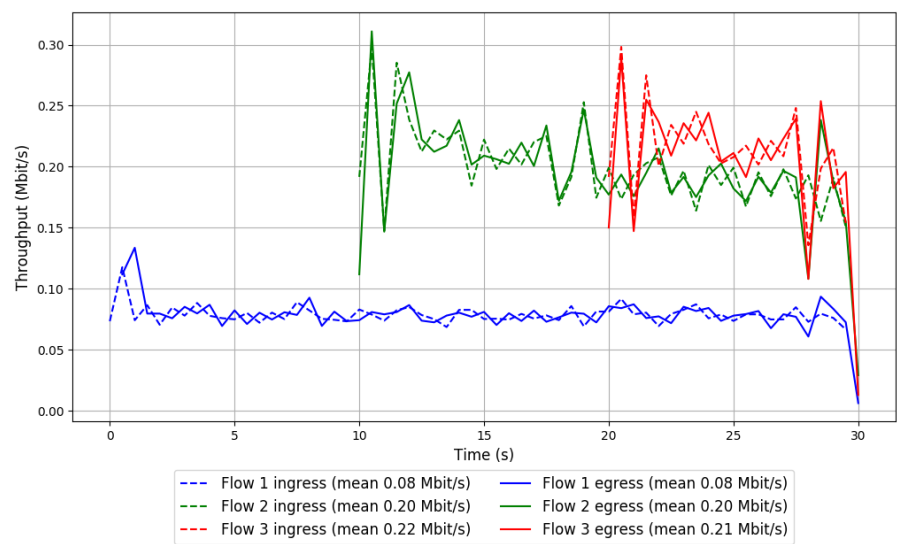
Run 1: Report of SCReAM — Data Link

```
Run 2: Statistics of SCReAM

Start at: 2018-01-31 11:19:39
End at: 2018-01-31 11:20:09
Local clock offset: 0.462 ms
Remote clock offset: -6.156 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 142.092 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 142.092 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 141.792 ms
Loss rate: 0.19%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 146.398 ms
Loss rate: 0.34%
```
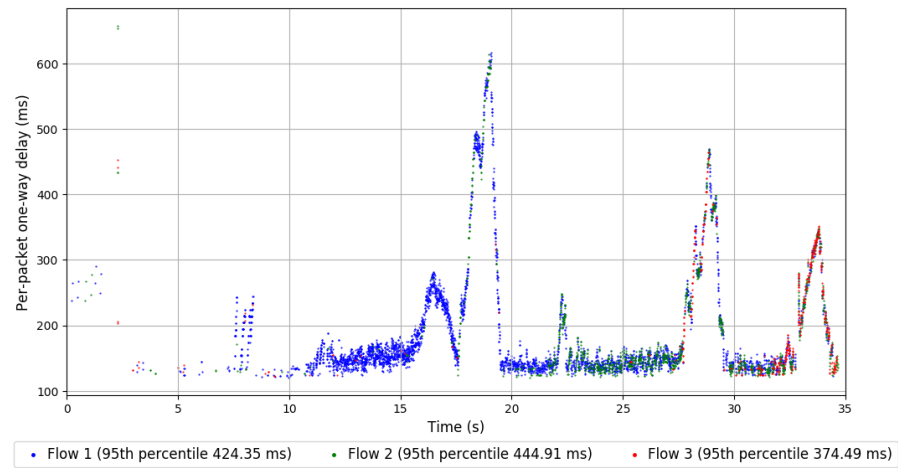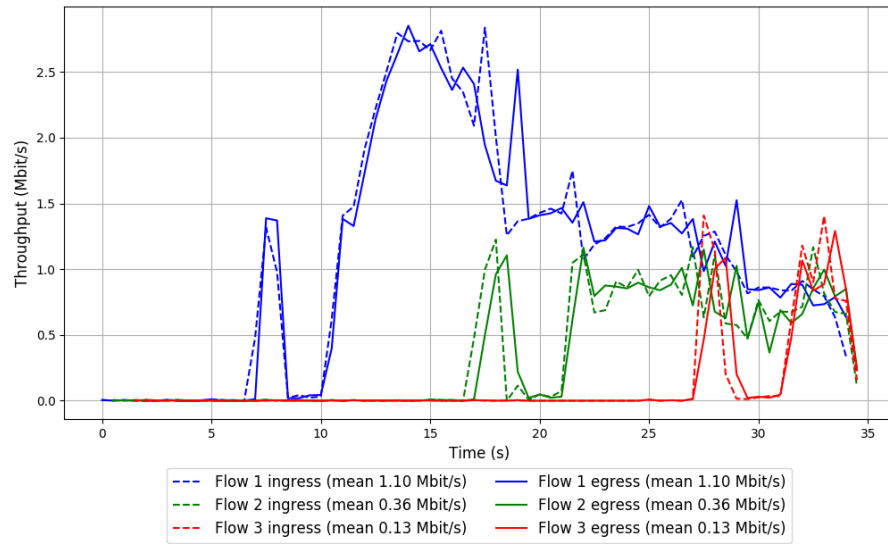
Run 2: Report of SCReAM — Data Link

```
Run 3: Statistics of SCReAM

Start at: 2018-01-31 11:42:26
End at: 2018-01-31 11:42:56
Local clock offset: 0.465 ms
Remote clock offset: -6.214 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 151.882 ms
Loss rate: 0.18%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 132.335 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 151.935 ms
Loss rate: 0.16%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 152.067 ms
Loss rate: 0.28%
```

Run 3: Report of SCReAM — Data Link

```
Run 1: Statistics of WebRTC media

Start at: 2018-01-31 10:48:02
End at: 2018-01-31 10:48:32
Local clock offset: 0.434 ms
Remote clock offset: -1.579 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.57 Mbit/s
95th percentile per-packet one-way delay: 424.287 ms
Loss rate: 0.21%
-- Flow 1:
Average throughput: 1.10 Mbit/s
95th percentile per-packet one-way delay: 424.348 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 444.907 ms
Loss rate: 0.30%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 374.486 ms
Loss rate: 1.79%
```
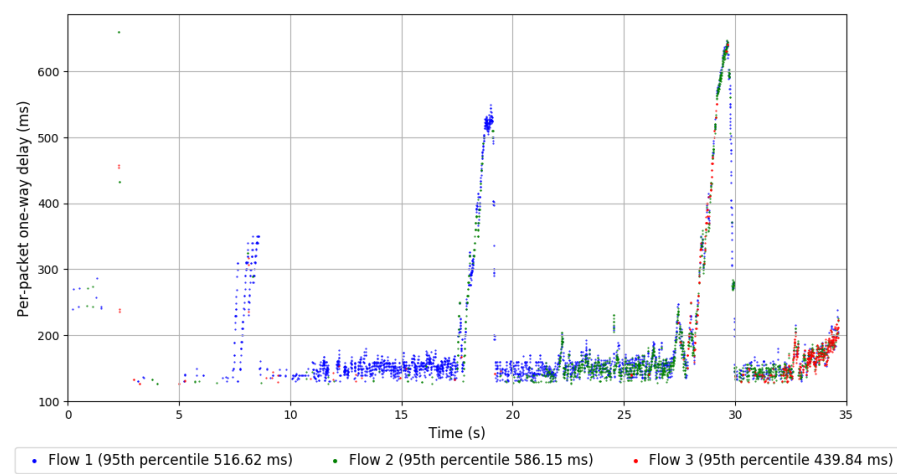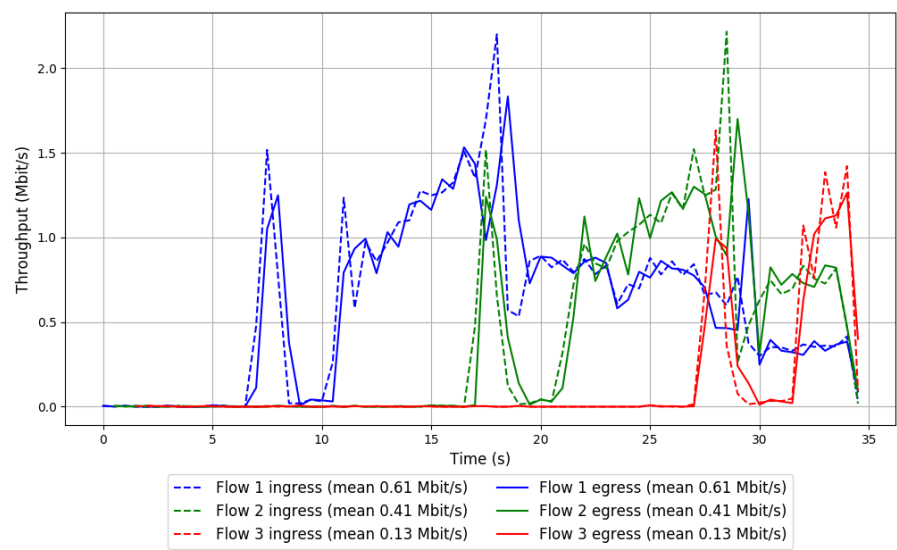
Run 1: Report of WebRTC media — Data Link

Flow 1 ingress (mean 1.10 Mbit/s) Flow 1 egress (mean 1.10 Mbit/s)
Flow 2 ingress (mean 0.36 Mbit/s) Flow 2 egress (mean 0.36 Mbit/s)
Flow 3 ingress (mean 0.13 Mbit/s) Flow 3 egress (mean 0.13 Mbit/s)

Flow 1 (95th percentile 424.35 ms)   Flow 2 (95th percentile 444.91 ms)   Flow 3 (95th percentile 374.49 ms)

```
Run 2: Statistics of WebRTC media

Start at: 2018-01-31 11:10:47
End at: 2018-01-31 11:11:17
Local clock offset: 0.52 ms
Remote clock offset: -1.06 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 521.286 ms
Loss rate: 0.62%
-- Flow 1:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 516.623 ms
Loss rate: 0.29%
-- Flow 2:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 586.147 ms
Loss rate: 0.34%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 439.844 ms
Loss rate: 3.06%
```
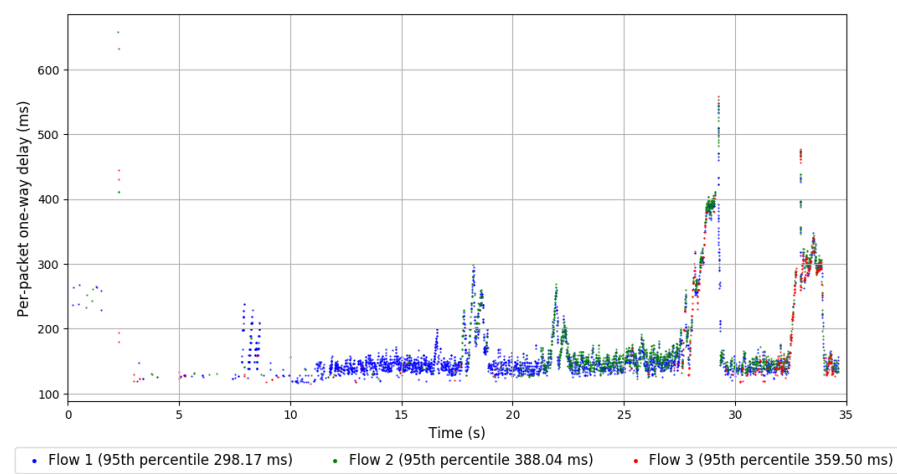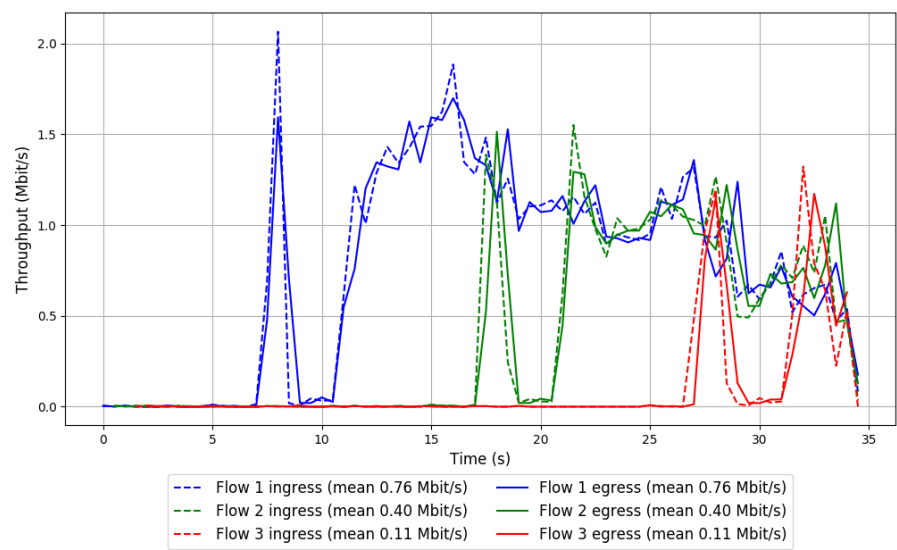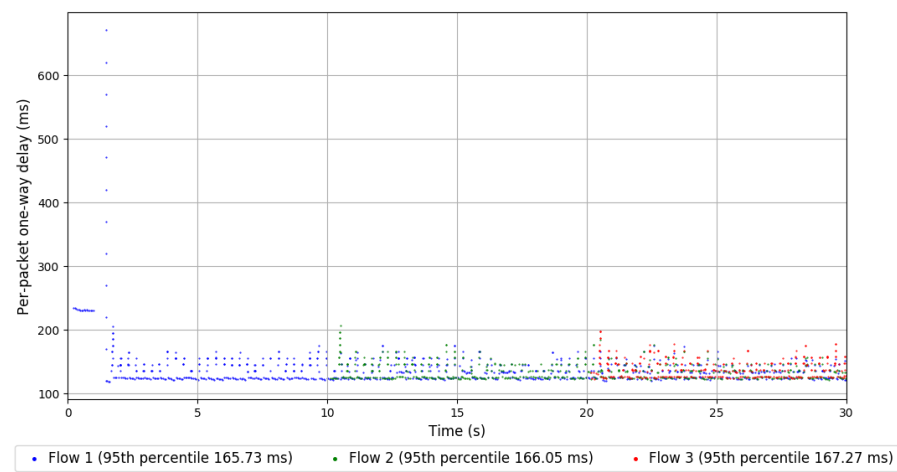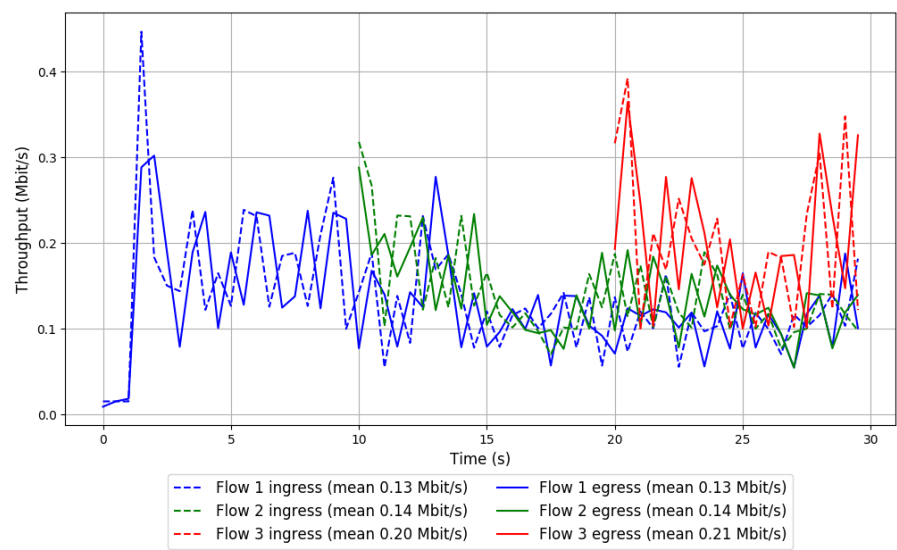
Run 2: Report of WebRTC media — Data Link

```
Run 3: Statistics of WebRTC media

Start at: 2018-01-31 11:33:33
End at: 2018-01-31 11:34:03
Local clock offset: 0.454 ms
Remote clock offset: -6.5 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.26 Mbit/s
95th percentile per-packet one-way delay: 324.579 ms
Loss rate: 0.12%
-- Flow 1:
Average throughput: 0.76 Mbit/s
95th percentile per-packet one-way delay: 298.168 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 388.040 ms
Loss rate: 0.14%
-- Flow 3:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 359.504 ms
Loss rate: 0.02%
```
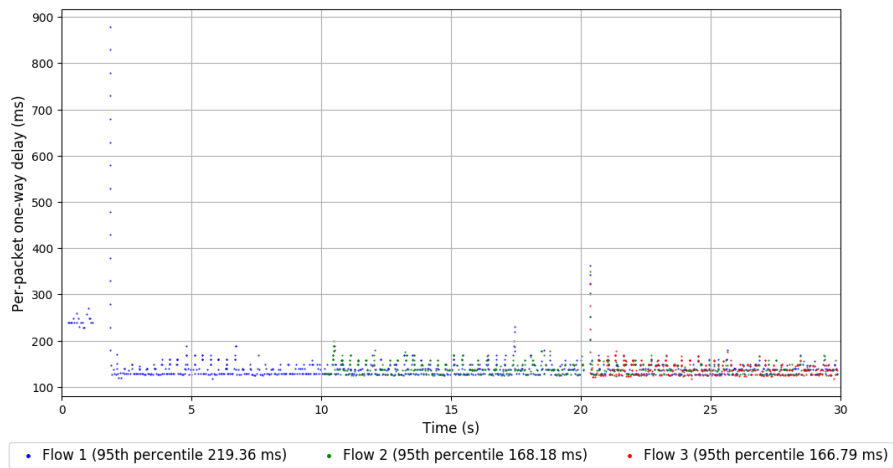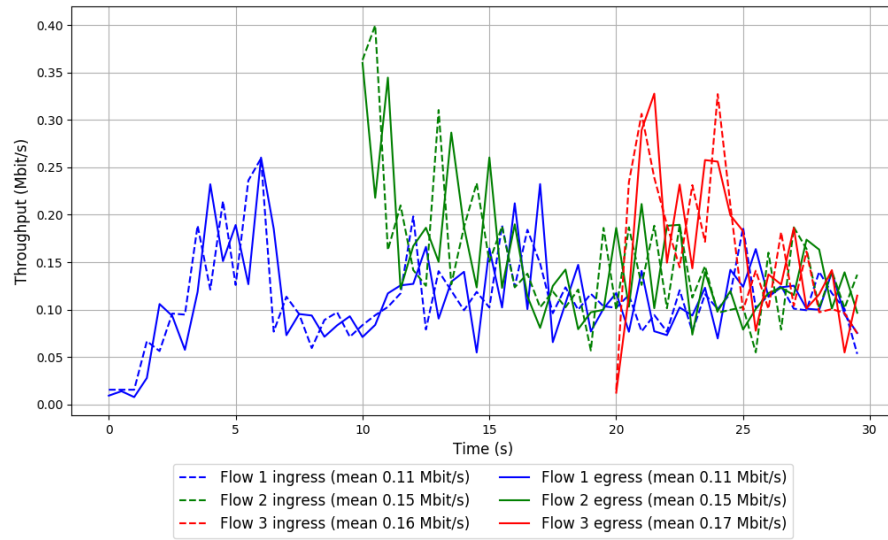
Run 3: Report of WebRTC media — Data Link

```
Run 1: Statistics of Sprout

Start at: 2018-01-31 11:01:56
End at: 2018-01-31 11:02:26
Local clock offset: 0.495 ms
Remote clock offset: -6.709 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 166.552 ms
Loss rate: 0.63%
-- Flow 1:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 165.734 ms
Loss rate: 1.07%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 166.048 ms
Loss rate: 0.42%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 167.272 ms
Loss rate: 0.04%
```
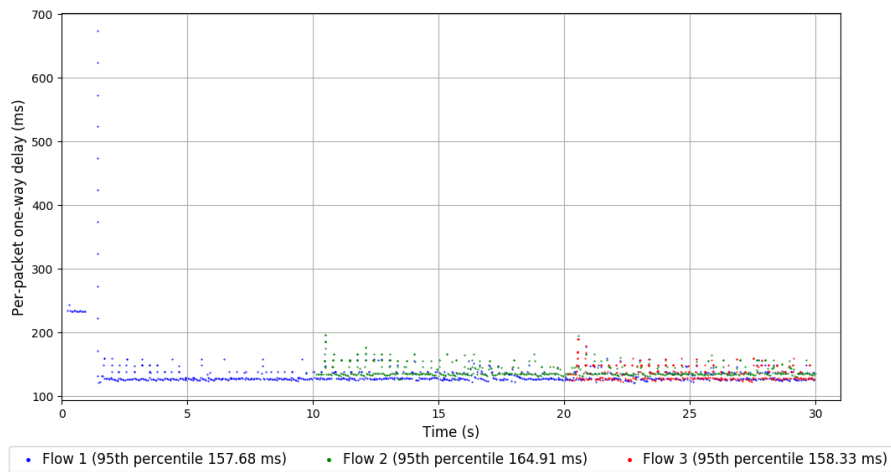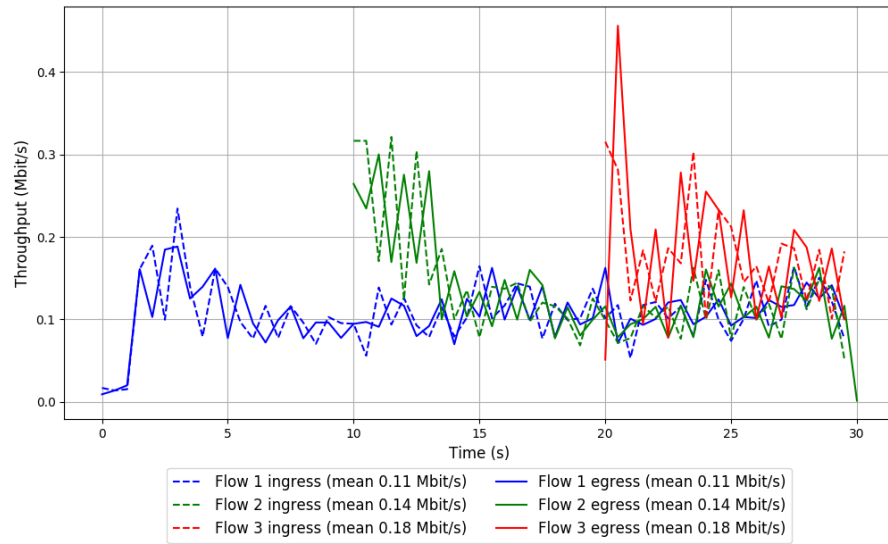
Run 1: Report of Sprout — Data Link

Flow 1 ingress (mean 0.13 Mbit/s)   Flow 1 egress (mean 0.13 Mbit/s)
Flow 2 ingress (mean 0.14 Mbit/s)   Flow 2 egress (mean 0.14 Mbit/s)
Flow 3 ingress (mean 0.20 Mbit/s)   Flow 3 egress (mean 0.21 Mbit/s)

Flow 1 (95th percentile 165.73 ms)   Flow 2 (95th percentile 166.05 ms)   Flow 3 (95th percentile 167.27 ms)

47

```
Run 2: Statistics of Sprout

Start at: 2018-01-31 11:24:42
End at: 2018-01-31 11:25:12
Local clock offset: 0.411 ms
Remote clock offset: -2.244 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 169.083 ms
Loss rate: 0.34%
-- Flow 1:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 219.357 ms
Loss rate: 0.07%
-- Flow 2:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 168.180 ms
Loss rate: 0.74%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 166.788 ms
Loss rate: 0.15%
```
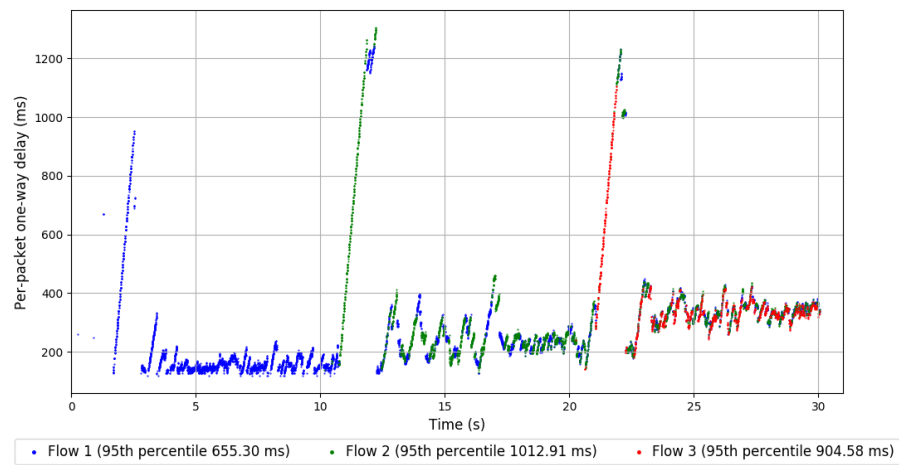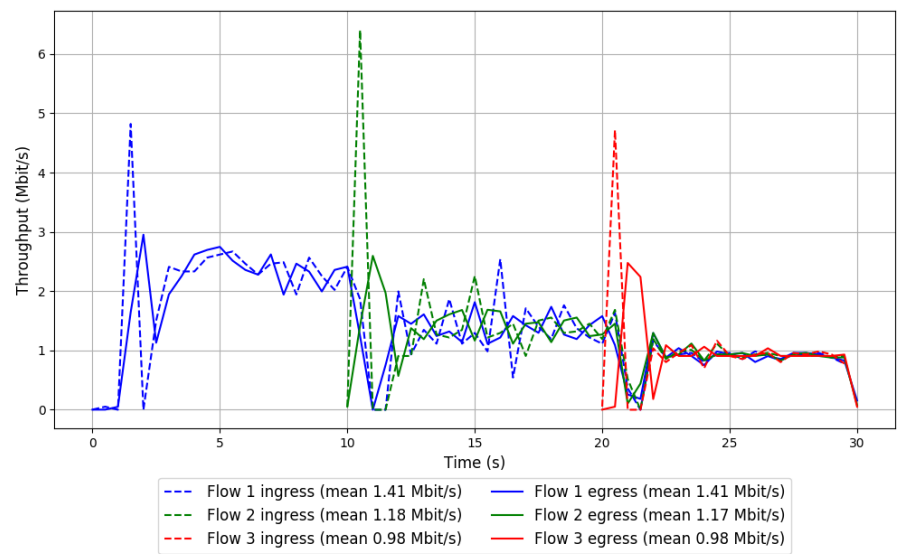
Run 2: Report of Sprout — Data Link

```
Run 3: Statistics of Sprout

Start at: 2018-01-31 11:47:29
End at: 2018-01-31 11:47:59
Local clock offset: 0.425 ms
Remote clock offset: -6.996 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 158.168 ms
Loss rate: 0.56%
-- Flow 1:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 157.683 ms
Loss rate: 0.02%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 164.912 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 158.334 ms
Loss rate: 2.35%
```

Run 3: Report of Sprout — Data Link

Flow 1 ingress (mean 0.11 Mbit/s)   Flow 1 egress (mean 0.11 Mbit/s)
Flow 2 ingress (mean 0.14 Mbit/s)   Flow 2 egress (mean 0.14 Mbit/s)
Flow 3 ingress (mean 0.18 Mbit/s)   Flow 3 egress (mean 0.18 Mbit/s)

Flow 1 (95th percentile 157.68 ms)   Flow 2 (95th percentile 164.91 ms)   Flow 3 (95th percentile 158.33 ms)

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

Start at: 2018-01-31 10:44:14
End at: 2018-01-31 10:44:44
Local clock offset: 0.425 ms
Remote clock offset: -6.231 ms

# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.51 Mbit/s
95th percentile per-packet one-way delay: 862.568 ms
Loss rate: 0.99%
-- Flow 1:
Average throughput: 1.41 Mbit/s
95th percentile per-packet one-way delay: 655.305 ms
Loss rate: 0.46%
-- Flow 2:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 1012.908 ms
Loss rate: 1.37%
-- Flow 3:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 904.577 ms
Loss rate: 2.38%
```
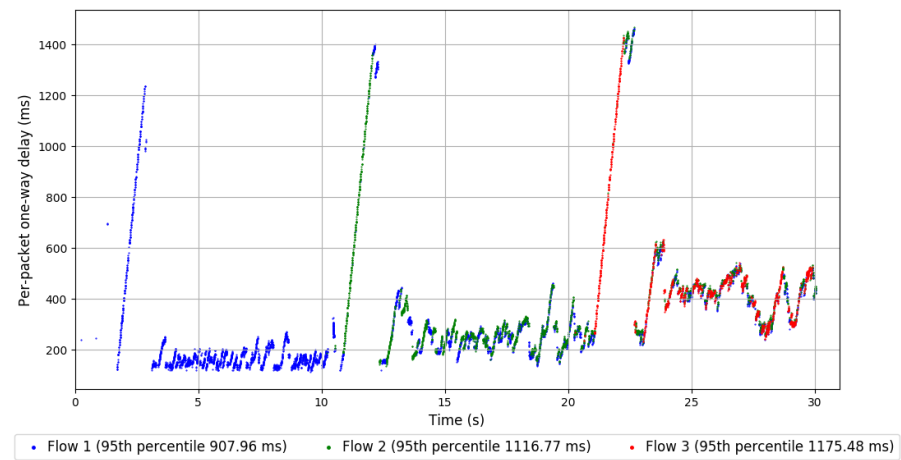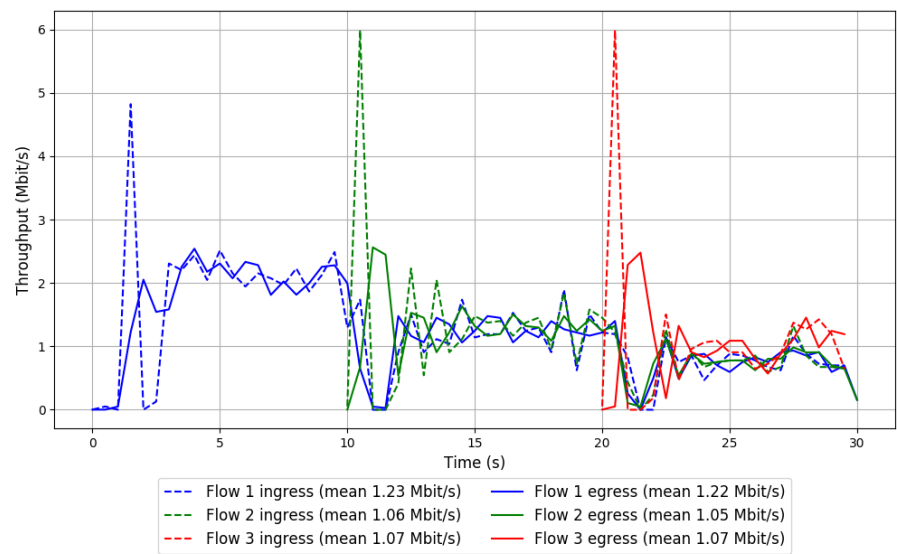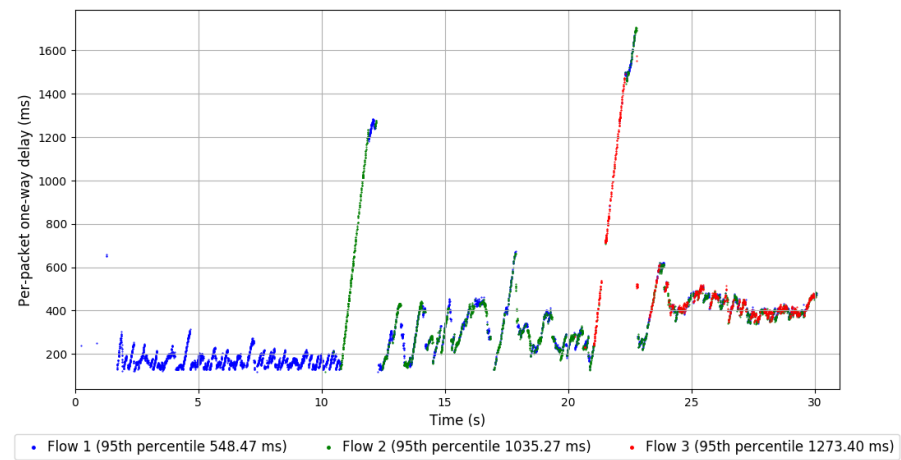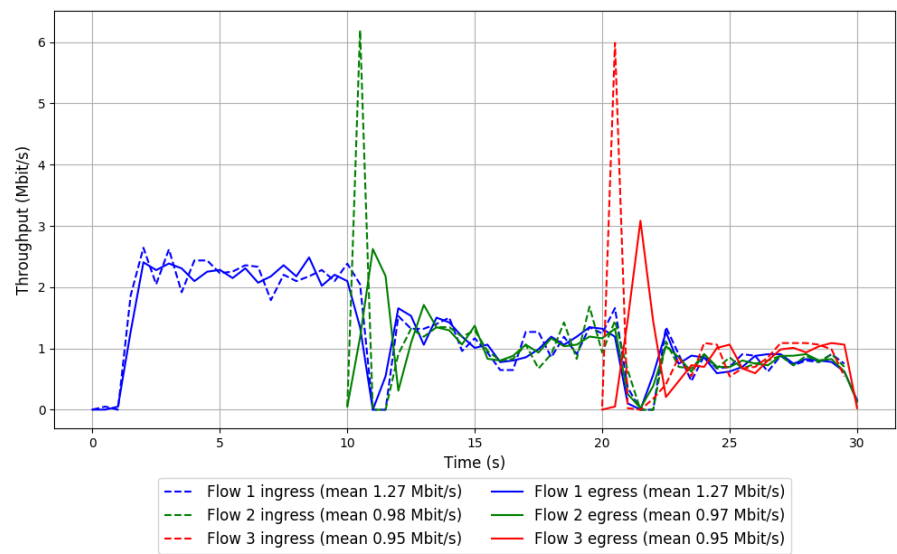
Run 1: Report of TaoVA-100x — Data Link

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

Start at: 2018-01-31 11:06:59
End at: 2018-01-31 11:07:29
Local clock offset: 0.511 ms
Remote clock offset: -6.83 ms

# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.27 Mbit/s
95th percentile per-packet one-way delay: 1057.077 ms
Loss rate: 1.06%
-- Flow 1:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 907.962 ms
Loss rate: 0.56%
-- Flow 2:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 1116.769 ms
Loss rate: 0.92%
-- Flow 3:
Average throughput: 1.07 Mbit/s
95th percentile per-packet one-way delay: 1175.484 ms
Loss rate: 3.04%
```
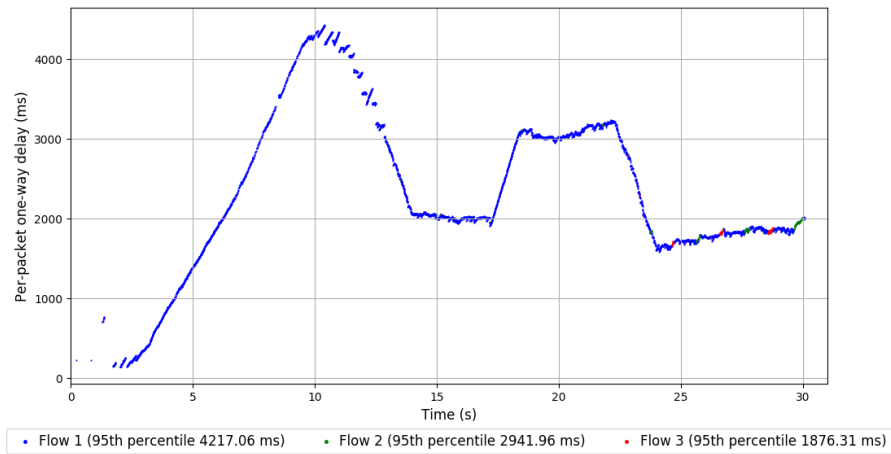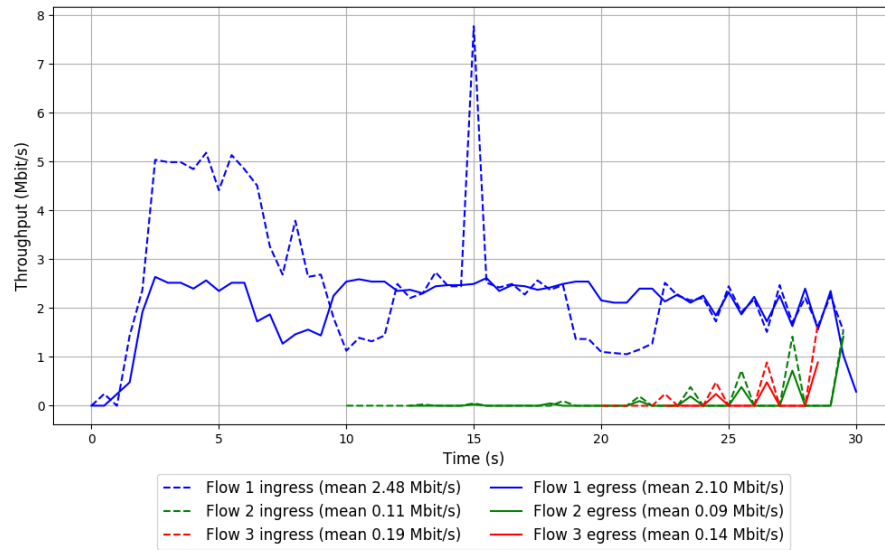
Run 2: Report of TaoVA-100x — Data Link

Flow 1 ingress (mean 1.23 Mbit/s) --- Flow 1 egress (mean 1.22 Mbit/s)
Flow 2 ingress (mean 1.06 Mbit/s) --- Flow 2 egress (mean 1.05 Mbit/s)
Flow 3 ingress (mean 1.07 Mbit/s) --- Flow 3 egress (mean 1.07 Mbit/s)

Flow 1 (95th percentile 907.96 ms)   Flow 2 (95th percentile 1116.77 ms)   Flow 3 (95th percentile 1175.48 ms)
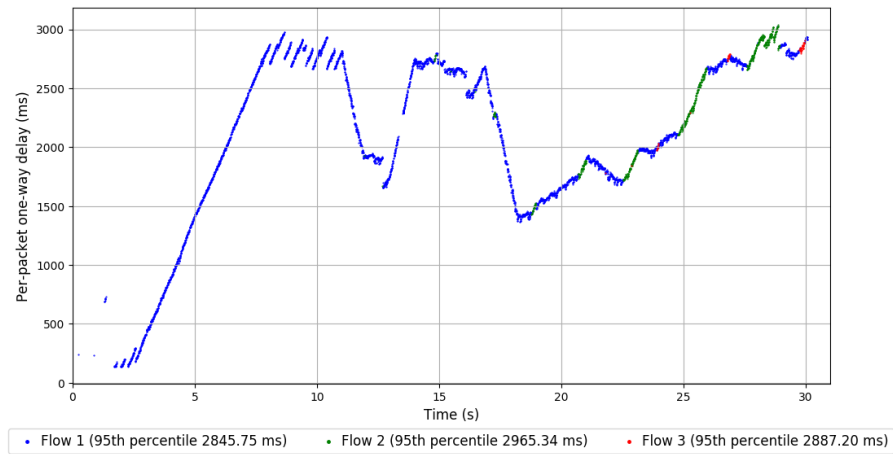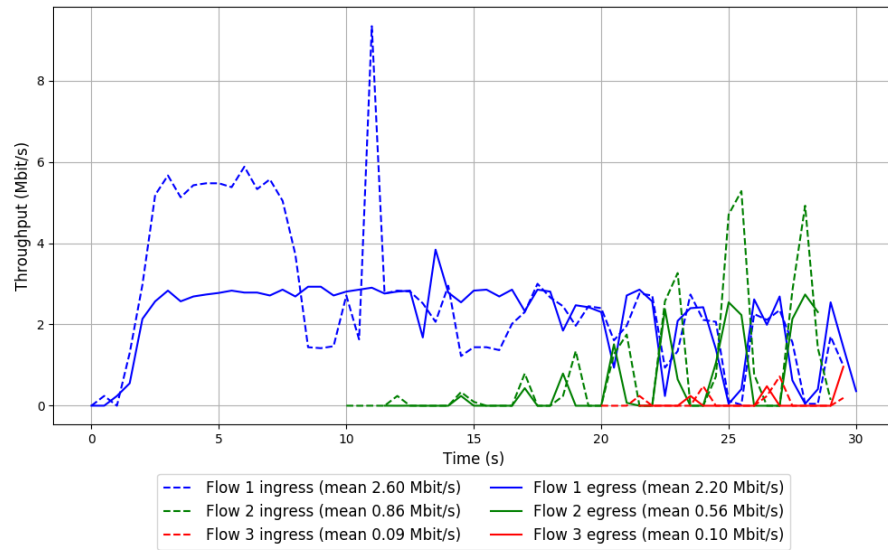
```
Run 3: Statistics of TaoVA-100x

Start at: 2018-01-31 11:29:45
End at: 2018-01-31 11:30:15
Local clock offset: 0.416 ms
Remote clock offset: -6.291 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.22 Mbit/s
95th percentile per-packet one-way delay: 1021.295 ms
Loss rate: 1.18%
-- Flow 1:
Average throughput: 1.27 Mbit/s
95th percentile per-packet one-way delay: 548.474 ms
Loss rate: 0.78%
-- Flow 2:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 1035.273 ms
Loss rate: 1.46%
-- Flow 3:
Average throughput: 0.95 Mbit/s
95th percentile per-packet one-way delay: 1273.399 ms
Loss rate: 2.20%
```

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

Flow 1 ingress (mean 1.27 Mbit/s) — Flow 1 egress (mean 1.27 Mbit/s)
Flow 2 ingress (mean 0.98 Mbit/s) — Flow 2 egress (mean 0.97 Mbit/s)
Flow 3 ingress (mean 0.95 Mbit/s) — Flow 3 egress (mean 0.95 Mbit/s)

Flow 1 (95th percentile 548.47 ms) · Flow 2 (95th percentile 1035.27 ms) · Flow 3 (95th percentile 1273.40 ms)

```
Run 1: Statistics of TCP Vegas

Start at: 2018-01-31 11:03:11
End at: 2018-01-31 11:03:41
Local clock offset: 0.477 ms
Remote clock offset: -6.647 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.17 Mbit/s
95th percentile per-packet one-way delay: 4216.101 ms
Loss rate: 17.18%
-- Flow 1:
Average throughput: 2.10 Mbit/s
95th percentile per-packet one-way delay: 4217.055 ms
Loss rate: 15.91%
-- Flow 2:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 2941.960 ms
Loss rate: 34.70%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 1876.309 ms
Loss rate: 50.98%
```

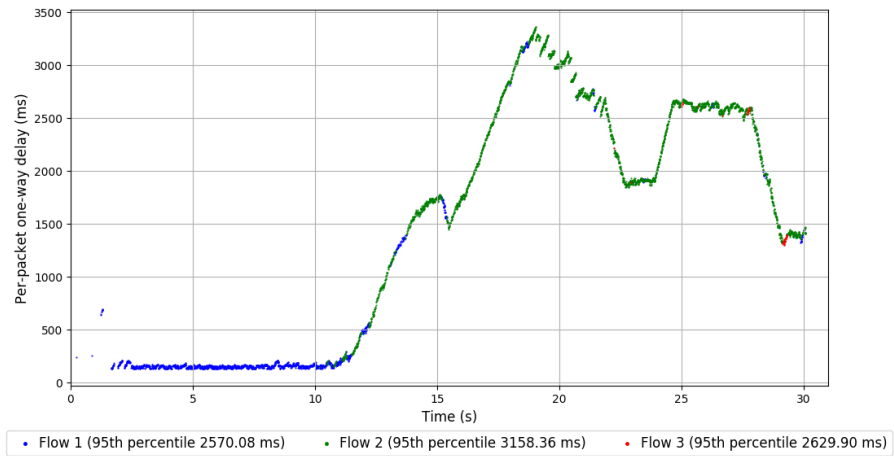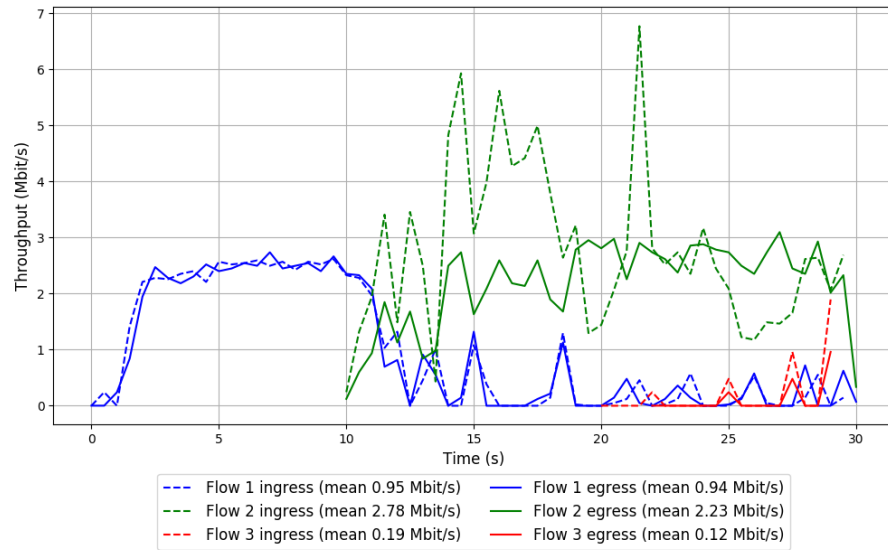Run 1: Report of TCP Vegas — Data Link

```
Run 2: Statistics of TCP Vegas

Start at: 2018-01-31 11:25:57
End at: 2018-01-31 11:26:27
Local clock offset: 0.476 ms
Remote clock offset: -1.295 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.55 Mbit/s
95th percentile per-packet one-way delay: 2875.922 ms
Loss rate: 20.20%
-- Flow 1:
Average throughput: 2.20 Mbit/s
95th percentile per-packet one-way delay: 2845.752 ms
Loss rate: 15.83%
-- Flow 2:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 2965.339 ms
Loss rate: 41.62%
-- Flow 3:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 2887.196 ms
Loss rate: 10.22%
```

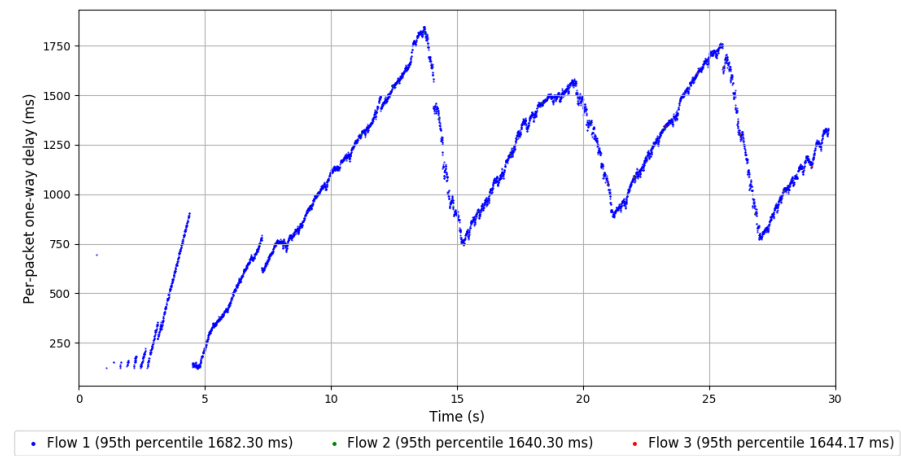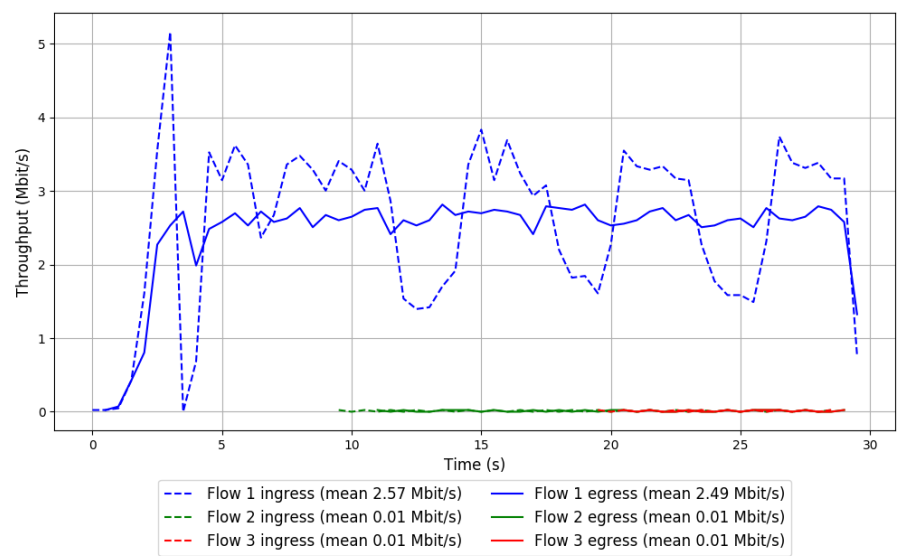Run 2: Report of TCP Vegas — Data Link

Flow 1 ingress (mean 2.60 Mbit/s)   Flow 1 egress (mean 2.20 Mbit/s)
Flow 2 ingress (mean 0.86 Mbit/s)   Flow 2 egress (mean 0.56 Mbit/s)
Flow 3 ingress (mean 0.09 Mbit/s)   Flow 3 egress (mean 0.10 Mbit/s)

Flow 1 (95th percentile 2845.75 ms)   Flow 2 (95th percentile 2965.34 ms)   Flow 3 (95th percentile 2887.20 ms)
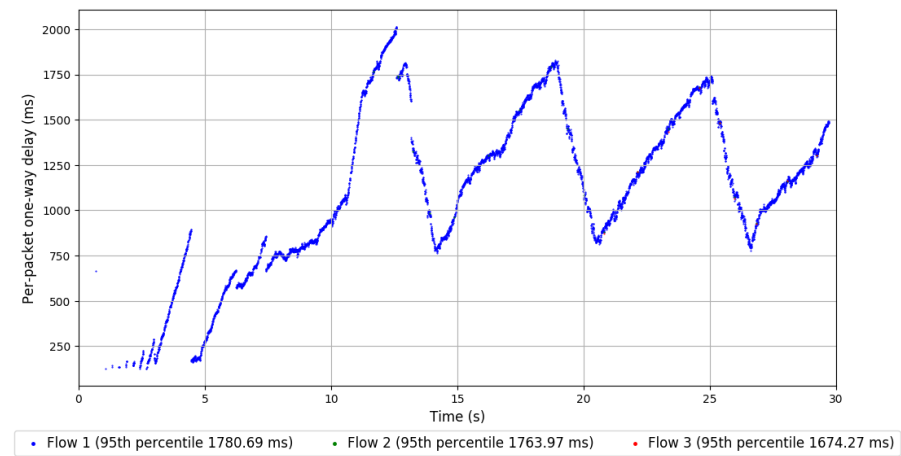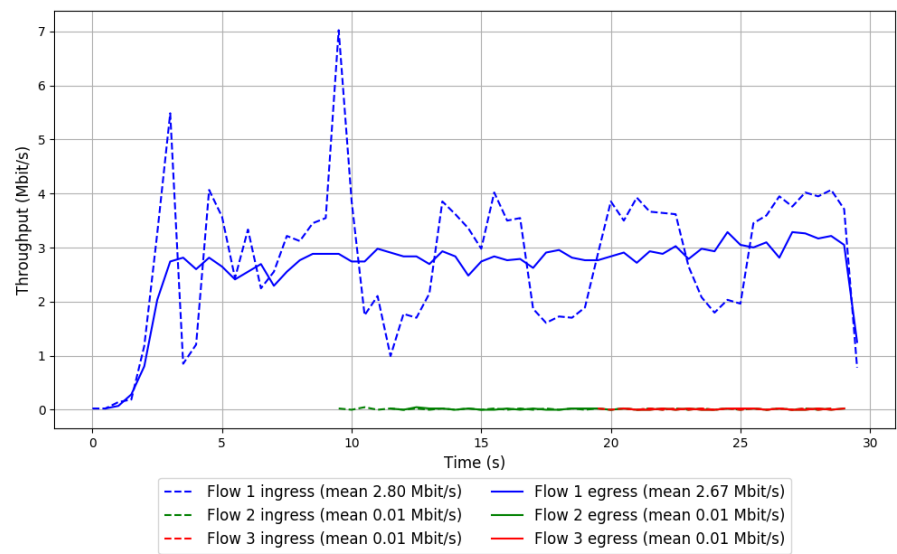
```
Run 3: Statistics of TCP Vegas

Start at: 2018-01-31 11:48:45
End at: 2018-01-31 11:49:15
Local clock offset: 0.438 ms
Remote clock offset: -1.138 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.46 Mbit/s
95th percentile per-packet one-way delay: 3107.331 ms
Loss rate: 14.52%
-- Flow 1:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 2570.083 ms
Loss rate: 1.64%
-- Flow 2:
Average throughput: 2.23 Mbit/s
95th percentile per-packet one-way delay: 3158.358 ms
Loss rate: 19.89%
-- Flow 3:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 2629.899 ms
Loss rate: 52.91%
```

Run 3: Report of TCP Vegas — Data Link

```
Run 1: Statistics of Verus

Start at: 2018-01-31 10:58:09
End at: 2018-01-31 10:58:39
Local clock offset: 0.48 ms
Remote clock offset: -6.531 ms


# Below is generated by plot.py at 2018-01-31 11:52:08
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.50 Mbit/s
95th percentile per-packet one-way delay: 1682.029 ms
Loss rate: 5.19%
-- Flow 1:
Average throughput: 2.49 Mbit/s
95th percentile per-packet one-way delay: 1682.298 ms
Loss rate: 5.19%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1640.298 ms
Loss rate: 5.00%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1644.167 ms
Loss rate: 10.00%
```

Run 1: Report of Verus — Data Link

```
Run 2: Statistics of Verus

Start at: 2018-01-31 11:20:54
End at: 2018-01-31 11:21:24
Local clock offset: 0.476 ms
Remote clock offset: -7.035 ms


# Below is generated by plot.py at 2018-01-31 11:52:09
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.68 Mbit/s
95th percentile per-packet one-way delay: 1780.685 ms
Loss rate: 6.39%
-- Flow 1:
Average throughput: 2.67 Mbit/s
95th percentile per-packet one-way delay: 1780.692 ms
Loss rate: 6.39%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1763.971 ms
Loss rate: 4.76%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1674.269 ms
Loss rate: 10.00%
```
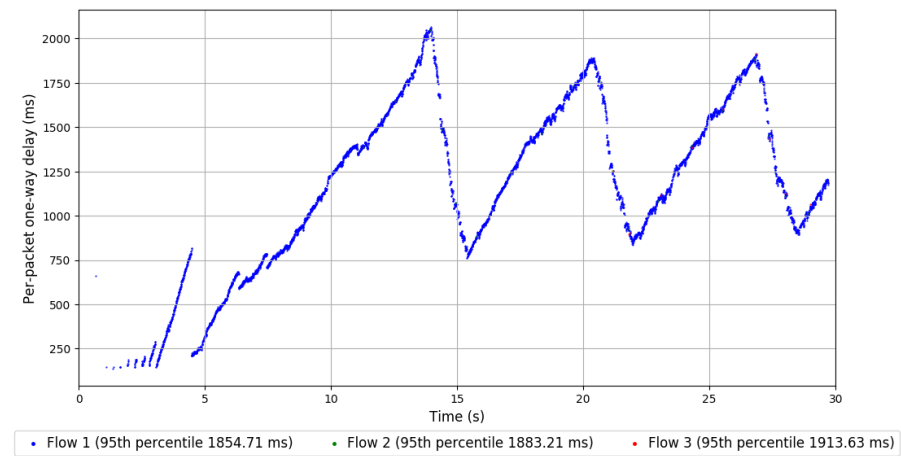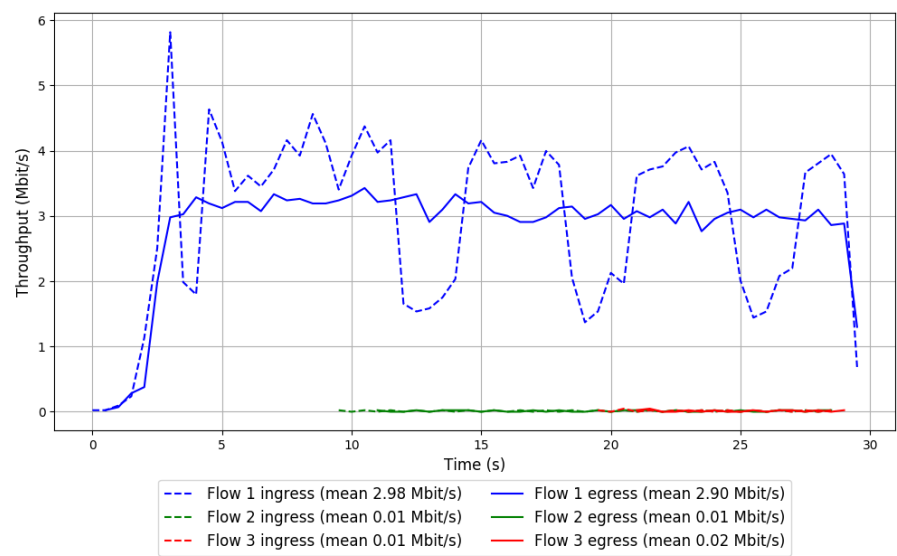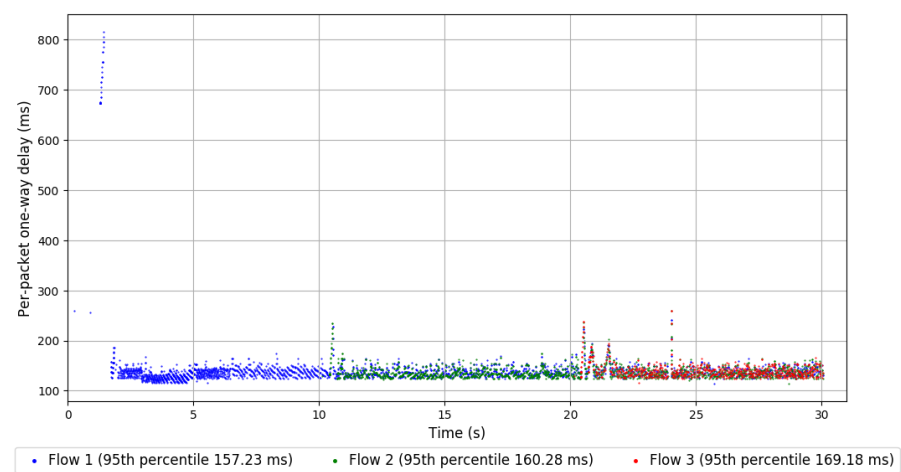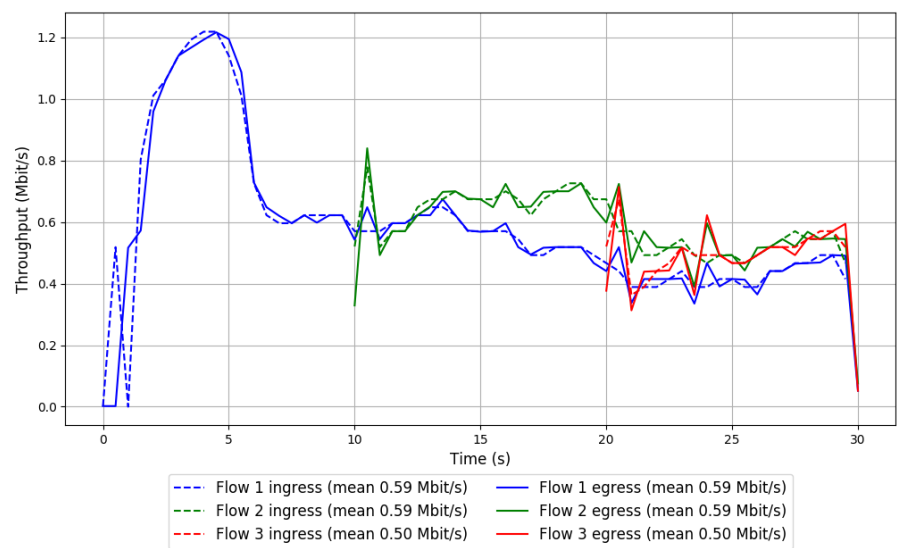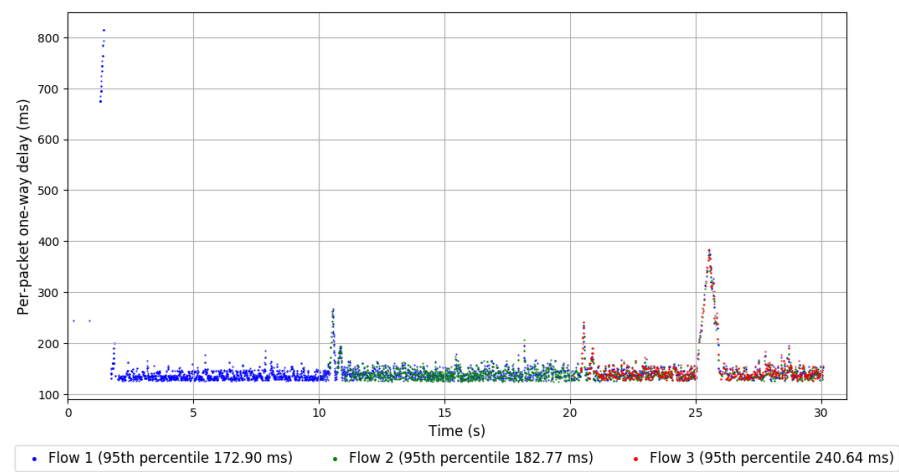
Run 2: Report of Verus — Data Link

```
Run 3: Statistics of Verus

Start at: 2018-01-31 11:43:41
End at: 2018-01-31 11:44:11
Local clock offset: 0.444 ms
Remote clock offset: -2.17 ms


# Below is generated by plot.py at 2018-01-31 11:52:10
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.91 Mbit/s
95th percentile per-packet one-way delay: 1854.984 ms
Loss rate: 4.64%
-- Flow 1:
Average throughput: 2.90 Mbit/s
95th percentile per-packet one-way delay: 1854.714 ms
Loss rate: 4.64%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1883.212 ms
Loss rate: 5.00%
-- Flow 3:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 1913.633 ms
Loss rate: 9.09%
```

Run 3: Report of Verus — Data Link

Flow 1 ingress (mean 2.98 Mbit/s) —— Flow 1 egress (mean 2.90 Mbit/s)
Flow 2 ingress (mean 0.01 Mbit/s) —— Flow 2 egress (mean 0.01 Mbit/s)
Flow 3 ingress (mean 0.01 Mbit/s) —— Flow 3 egress (mean 0.02 Mbit/s)

Flow 1 (95th percentile 1854.71 ms)   Flow 2 (95th percentile 1883.21 ms)   Flow 3 (95th percentile 1913.63 ms)
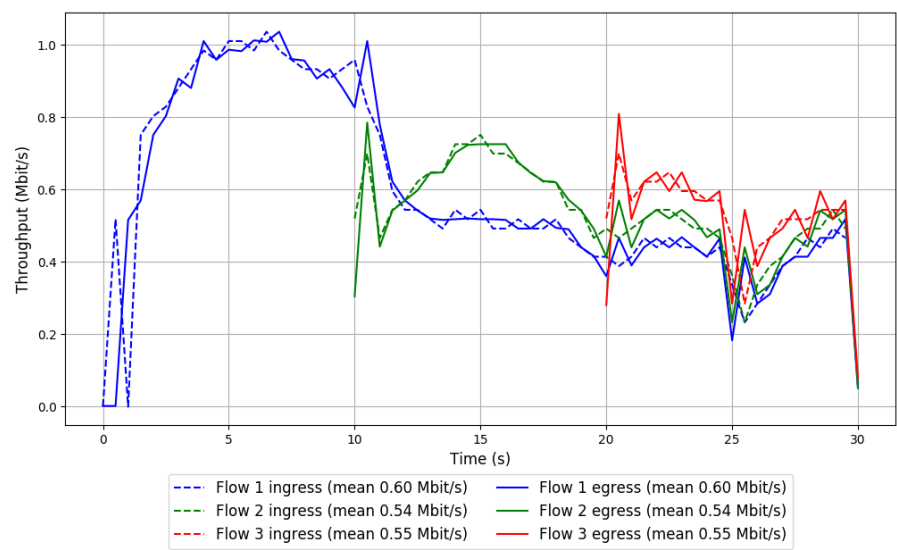
69

```
Run 1: Statistics of Copa

Start at: 2018-01-31 10:50:34
End at: 2018-01-31 10:51:04
Local clock offset: 0.45 ms
Remote clock offset: -6.347 ms

# Below is generated by plot.py at 2018-01-31 11:52:10
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.15 Mbit/s
95th percentile per-packet one-way delay: 161.620 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 157.226 ms
Loss rate: 0.07%
-- Flow 2:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 160.282 ms
Loss rate: 0.11%
-- Flow 3:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 169.182 ms
Loss rate: 0.52%
```
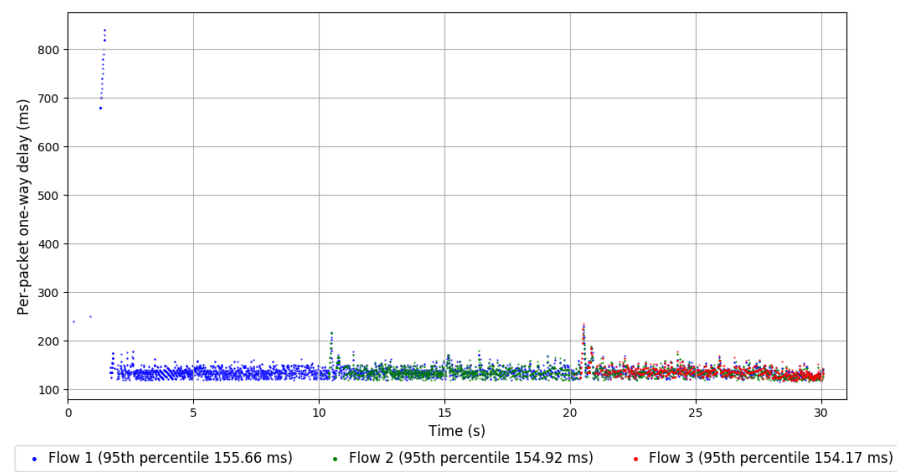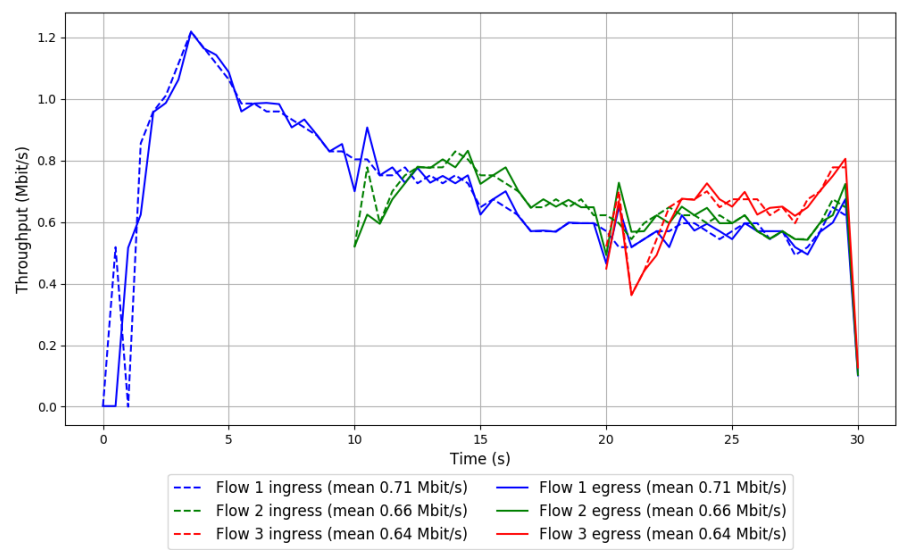
Run 1: Report of Copa — Data Link

```
Run 2: Statistics of Copa

Start at: 2018-01-31 11:13:19
End at: 2018-01-31 11:13:49
Local clock offset: 0.519 ms
Remote clock offset: -2.023 ms

# Below is generated by plot.py at 2018-01-31 11:52:10
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 183.901 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 172.899 ms
Loss rate: 0.15%
-- Flow 2:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 182.770 ms
Loss rate: 0.24%
-- Flow 3:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 240.639 ms
Loss rate: 0.48%
```
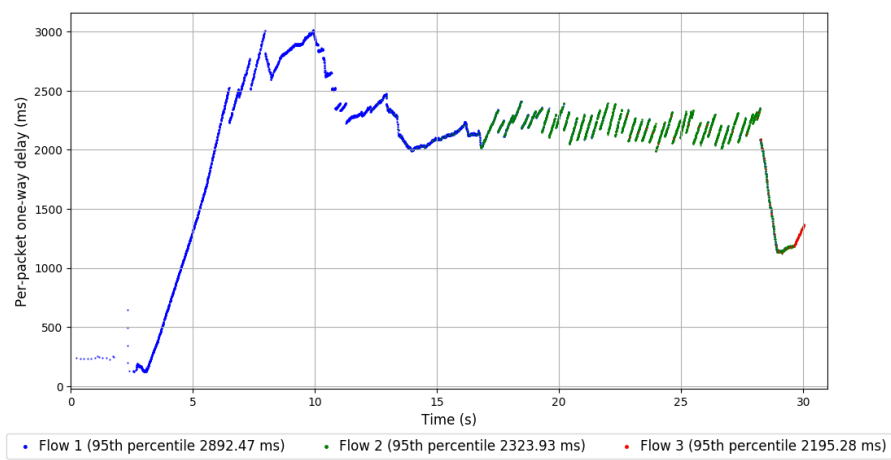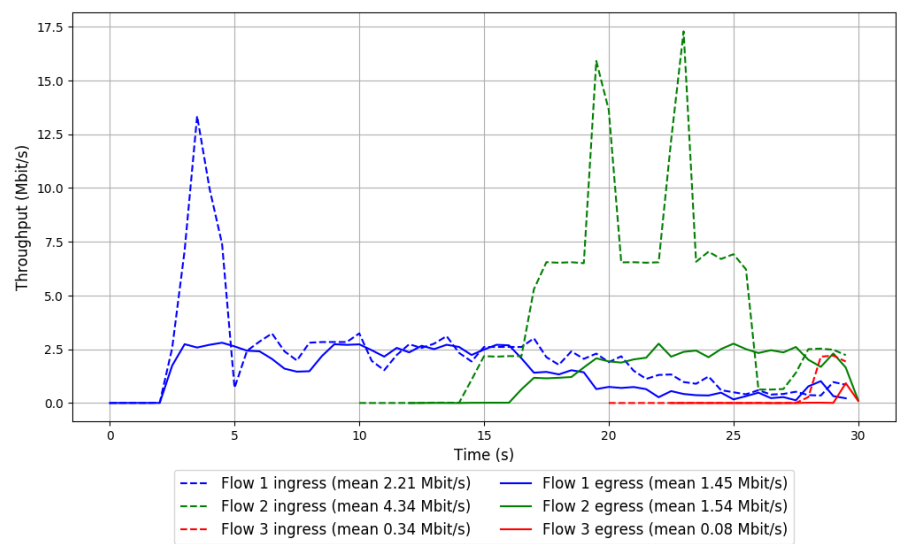
Run 2: Report of Copa — Data Link

```
Run 3: Statistics of Copa

Start at: 2018-01-31 11:36:04
End at: 2018-01-31 11:36:34
Local clock offset: 0.456 ms
Remote clock offset: -7.347 ms


# Below is generated by plot.py at 2018-01-31 11:52:10
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.36 Mbit/s
95th percentile per-packet one-way delay: 154.960 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 155.661 ms
Loss rate: 0.12%
-- Flow 2:
Average throughput: 0.66 Mbit/s
95th percentile per-packet one-way delay: 154.918 ms
Loss rate: 0.10%
-- Flow 3:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 154.170 ms
Loss rate: 0.41%
```

Run 3: Report of Copa — Data Link

75

```
Run 1: Statistics of FillP

Start at: 2018-01-31 10:45:30
End at: 2018-01-31 10:46:00
Local clock offset: 0.42 ms
Remote clock offset: -6.267 ms


# Below is generated by plot.py at 2018-01-31 11:52:19
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.38 Mbit/s
95th percentile per-packet one-way delay: 2847.380 ms
Loss rate: 54.56%
-- Flow 1:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 2892.471 ms
Loss rate: 34.75%
-- Flow 2:
Average throughput: 1.54 Mbit/s
95th percentile per-packet one-way delay: 2323.934 ms
Loss rate: 68.59%
-- Flow 3:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 2195.278 ms
Loss rate: 83.73%
```

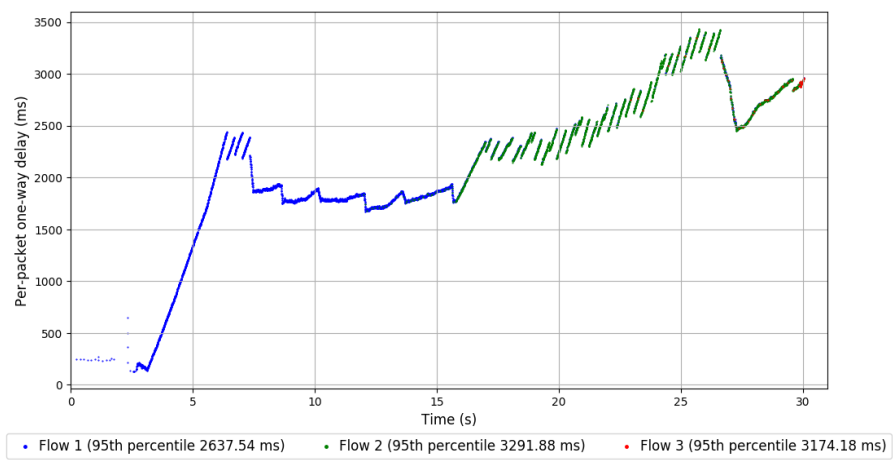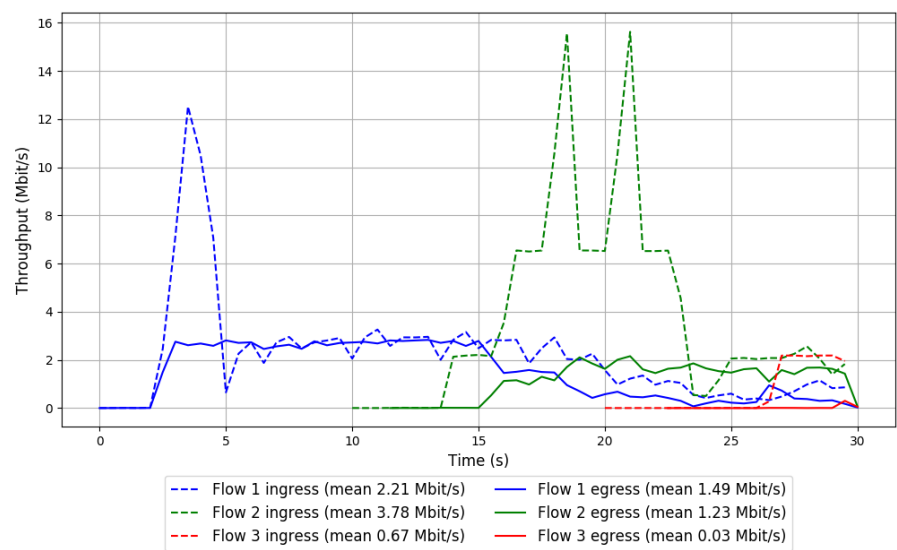# Run 1: Report of FillP — Data Link

```
Run 2: Statistics of FillP

Start at: 2018-01-31 11:08:15
End at: 2018-01-31 11:08:45
Local clock offset: 0.502 ms
Remote clock offset: -6.825 ms


# Below is generated by plot.py at 2018-01-31 11:52:19
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.24 Mbit/s
95th percentile per-packet one-way delay: 3143.878 ms
Loss rate: 54.92%
-- Flow 1:
Average throughput: 1.49 Mbit/s
95th percentile per-packet one-way delay: 2637.541 ms
Loss rate: 33.15%
-- Flow 2:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 3291.876 ms
Loss rate: 70.40%
-- Flow 3:
Average throughput: 0.03 Mbit/s
95th percentile per-packet one-way delay: 3174.177 ms
Loss rate: 96.83%
```
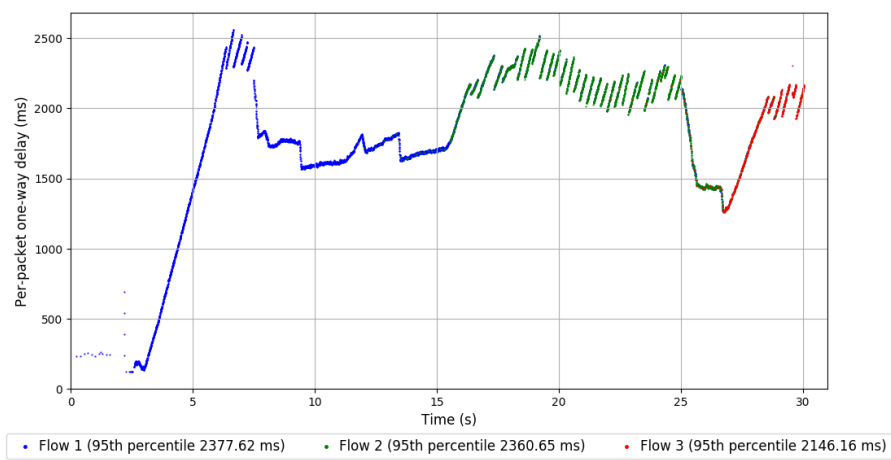
Run 2: Report of FillP — Data Link

```
Run 3: Statistics of FillP

Start at: 2018-01-31 11:31:01
End at: 2018-01-31 11:31:31
Local clock offset: 0.465 ms
Remote clock offset: -1.54 ms

# Below is generated by plot.py at 2018-01-31 11:52:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.51 Mbit/s
95th percentile per-packet one-way delay: 2367.078 ms
Loss rate: 57.05%
-- Flow 1:
Average throughput: 1.51 Mbit/s
95th percentile per-packet one-way delay: 2377.617 ms
Loss rate: 34.02%
-- Flow 2:
Average throughput: 1.38 Mbit/s
95th percentile per-packet one-way delay: 2360.651 ms
Loss rate: 66.86%
-- Flow 3:
Average throughput: 0.60 Mbit/s
95th percentile per-packet one-way delay: 2146.156 ms
Loss rate: 84.24%
```
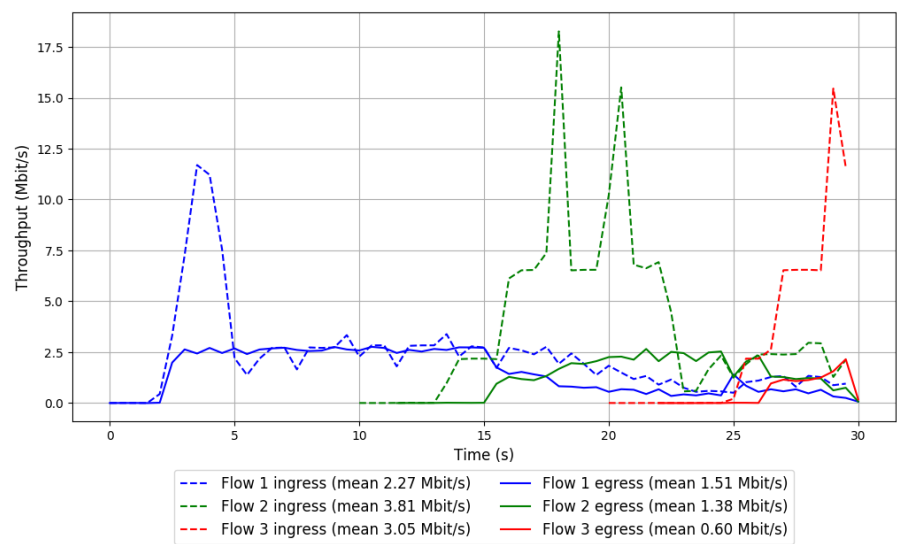
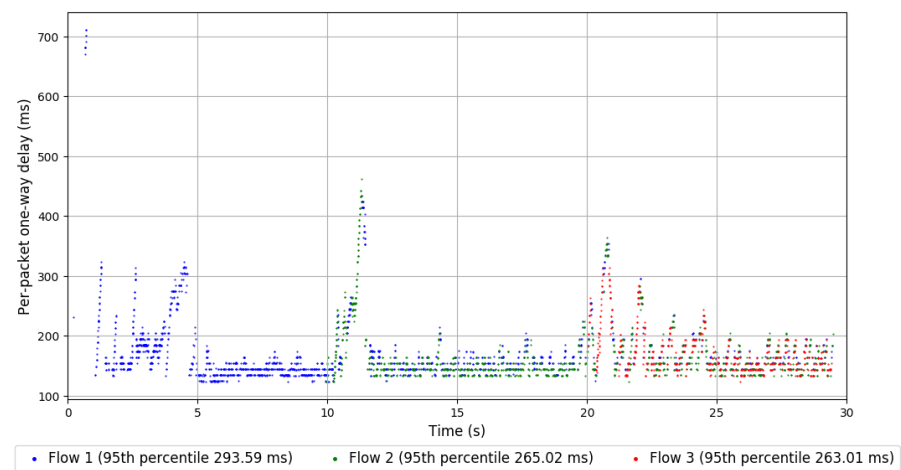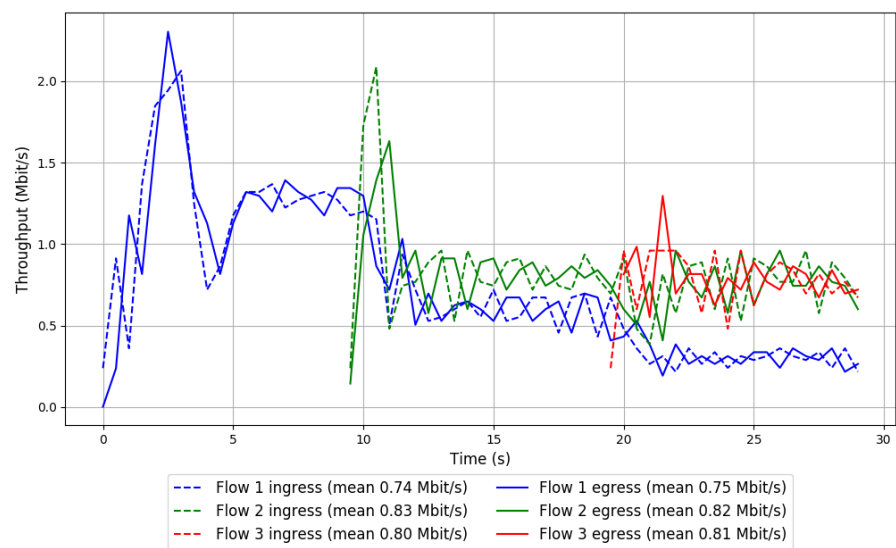Run 3: Report of FillP — Data Link

```
Run 1: Statistics of Indigo-1-32

Start at: 2018-01-31 11:00:40
End at: 2018-01-31 11:01:10
Local clock offset: 0.484 ms
Remote clock offset: -5.752 ms


# Below is generated by plot.py at 2018-01-31 11:52:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 1.55 Mbit/s
95th percentile per-packet one-way delay: 274.065 ms
Loss rate: 0.81%
-- Flow 1:
Average throughput: 0.75 Mbit/s
95th percentile per-packet one-way delay: 293.588 ms
Loss rate: 0.28%
-- Flow 2:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 265.022 ms
Loss rate: 1.19%
-- Flow 3:
Average throughput: 0.81 Mbit/s
95th percentile per-packet one-way delay: 263.014 ms
Loss rate: 1.57%
```

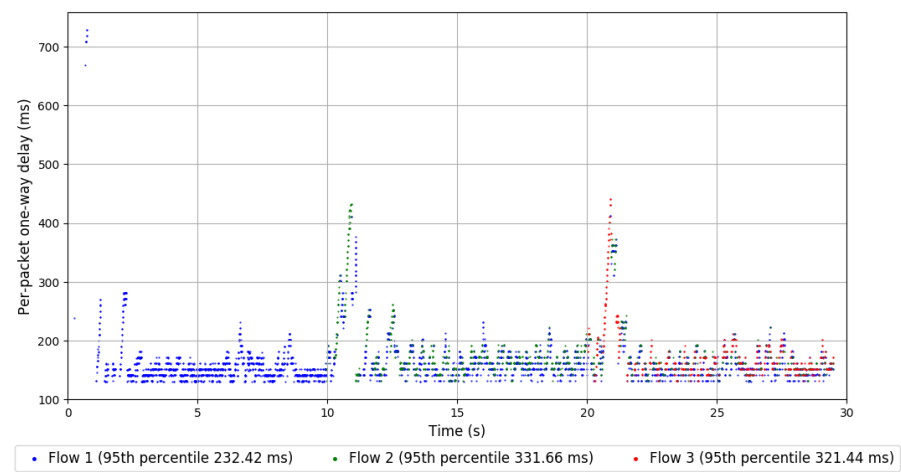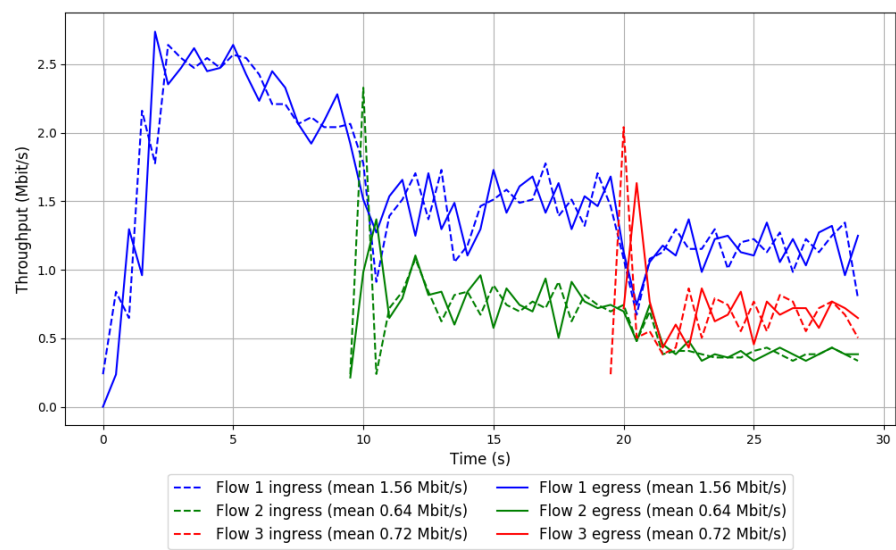Run 1: Report of Indigo-1-32 — Data Link

```
Run 2: Statistics of Indigo-1-32

Start at: 2018-01-31 11:23:26
End at: 2018-01-31 11:23:56
Local clock offset: 0.451 ms
Remote clock offset: -7.011 ms


# Below is generated by plot.py at 2018-01-31 11:52:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.22 Mbit/s
95th percentile per-packet one-way delay: 260.624 ms
Loss rate: 0.26%
-- Flow 1:
Average throughput: 1.56 Mbit/s
95th percentile per-packet one-way delay: 232.418 ms
Loss rate: 0.16%
-- Flow 2:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 331.656 ms
Loss rate: 0.39%
-- Flow 3:
Average throughput: 0.72 Mbit/s
95th percentile per-packet one-way delay: 321.438 ms
Loss rate: 0.70%
```

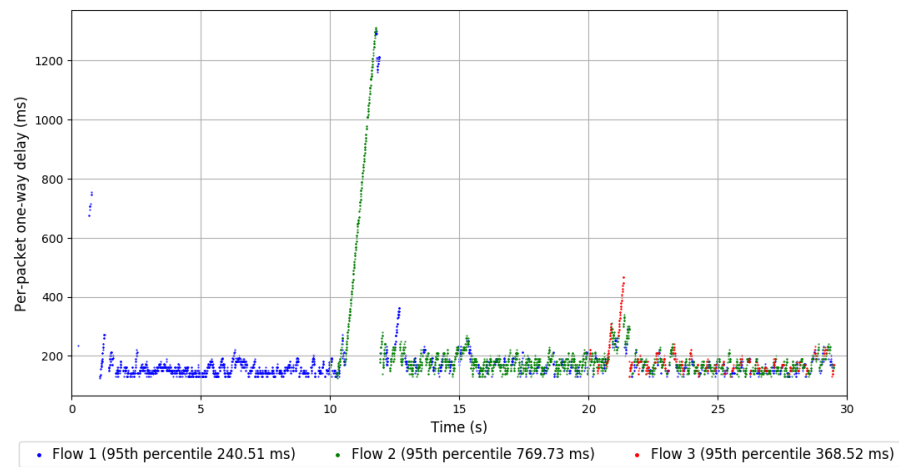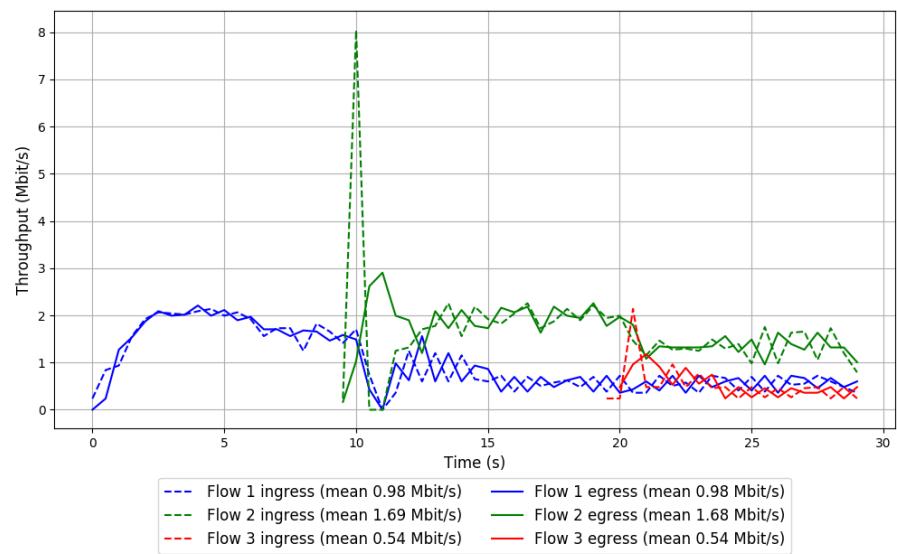# Run 2: Report of Indigo-1-32 — Data Link

```
Run 3: Statistics of Indigo-1-32

Start at: 2018-01-31 11:46:13
End at: 2018-01-31 11:46:44
Local clock offset: 0.44 ms
Remote clock offset: -6.891 ms


# Below is generated by plot.py at 2018-01-31 11:52:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.28 Mbit/s
95th percentile per-packet one-way delay: 439.349 ms
Loss rate: 0.20%
-- Flow 1:
Average throughput: 0.98 Mbit/s
95th percentile per-packet one-way delay: 240.509 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 1.68 Mbit/s
95th percentile per-packet one-way delay: 769.729 ms
Loss rate: 0.40%
-- Flow 3:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 368.524 ms
Loss rate: 0.00%
```

Run 3: Report of Indigo-1-32 — Data Link

Flow 1 ingress (mean 0.98 Mbit/s) --- Flow 1 egress (mean 0.98 Mbit/s) ---
Flow 2 ingress (mean 1.69 Mbit/s) --- Flow 2 egress (mean 1.68 Mbit/s) ---
Flow 3 ingress (mean 0.54 Mbit/s) --- Flow 3 egress (mean 0.54 Mbit/s) ---

• Flow 1 (95th percentile 240.51 ms)   • Flow 2 (95th percentile 769.73 ms)   • Flow 3 (95th percentile 368.52 ms)
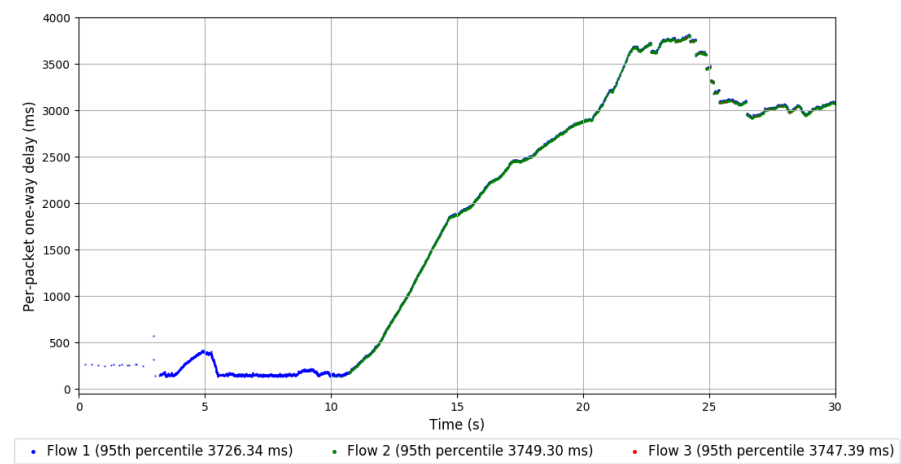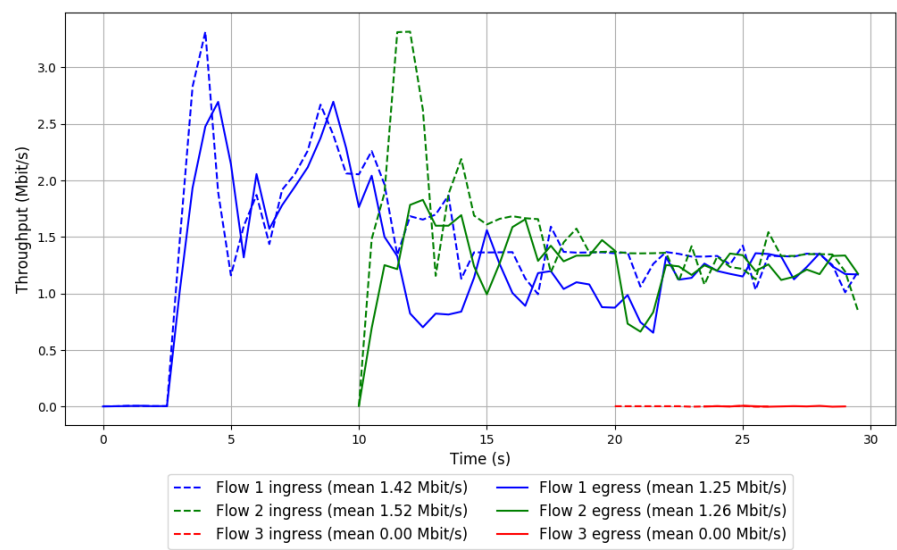
```
Run 1: Statistics of Vivace-latency

Start at: 2018-01-31 11:04:27
End at: 2018-01-31 11:04:57
Local clock offset: 0.427 ms
Remote clock offset: -1.032 ms


# Below is generated by plot.py at 2018-01-31 11:52:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 3745.952 ms
Loss rate: 14.41%
-- Flow 1:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 3726.342 ms
Loss rate: 12.35%
-- Flow 2:
Average throughput: 1.26 Mbit/s
95th percentile per-packet one-way delay: 3749.302 ms
Loss rate: 17.30%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 3747.387 ms
Loss rate: 9.20%
```
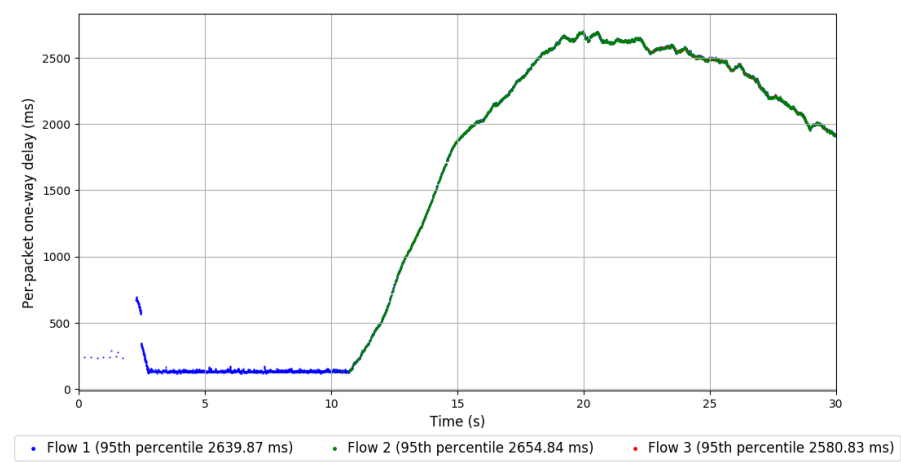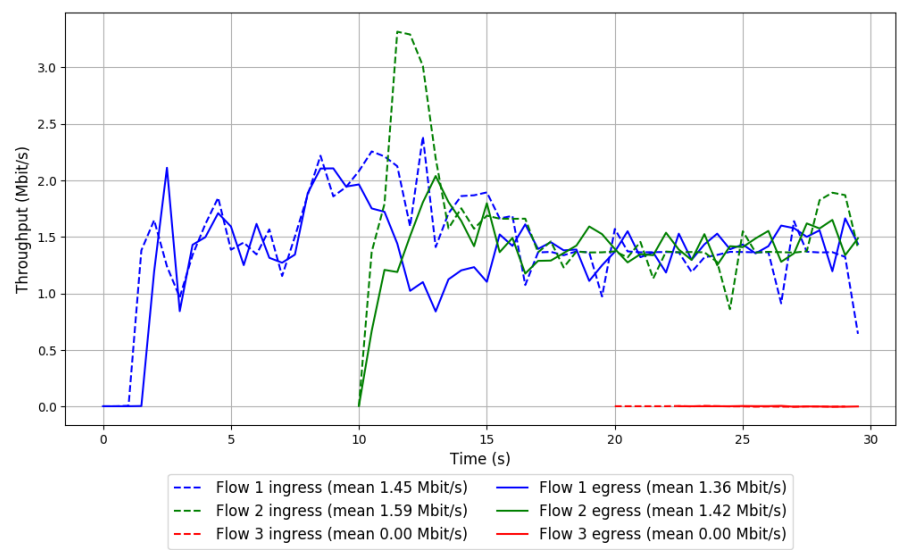
Run 1: Report of Vivace-latency — Data Link

```
Run 2: Statistics of Vivace-latency

Start at: 2018-01-31 11:27:13
End at: 2018-01-31 11:27:43
Local clock offset: 0.469 ms
Remote clock offset: -7.133 ms


# Below is generated by plot.py at 2018-01-31 11:52:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.31 Mbit/s
95th percentile per-packet one-way delay: 2645.932 ms
Loss rate: 8.11%
-- Flow 1:
Average throughput: 1.36 Mbit/s
95th percentile per-packet one-way delay: 2639.868 ms
Loss rate: 6.13%
-- Flow 2:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 2654.836 ms
Loss rate: 10.84%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2580.834 ms
Loss rate: 7.18%
```

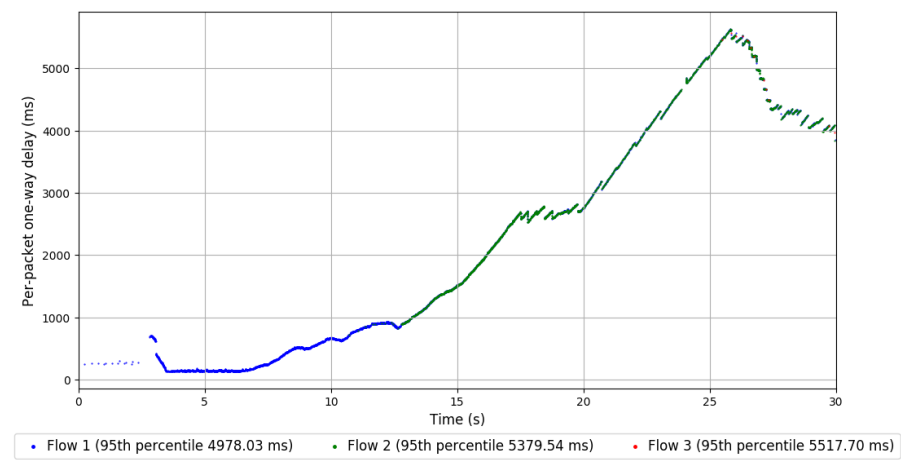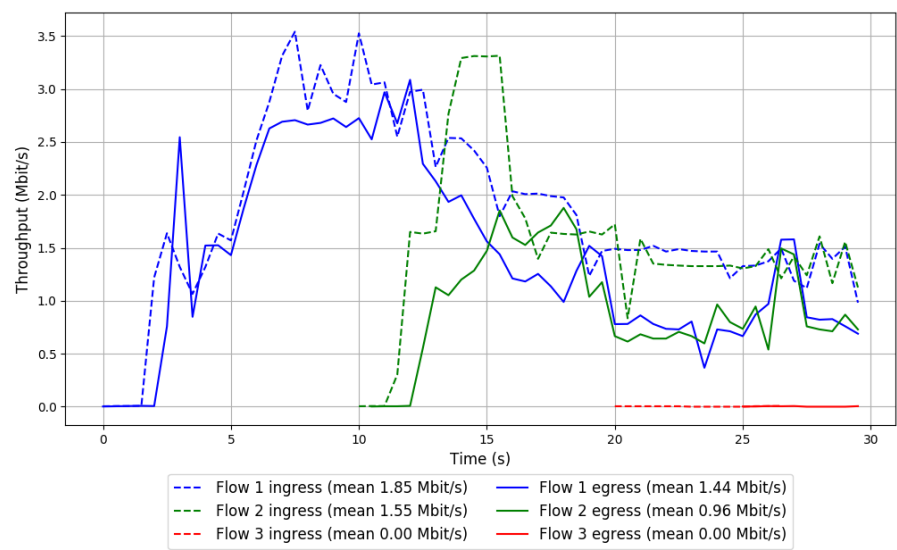# Run 2: Report of Vivace-latency — Data Link

```
Run 3: Statistics of Vivace-latency

Start at: 2018-01-31 11:50:00
End at: 2018-01-31 11:50:30
Local clock offset: 0.436 ms
Remote clock offset: -1.132 ms


# Below is generated by plot.py at 2018-01-31 11:52:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.06 Mbit/s
95th percentile per-packet one-way delay: 5198.471 ms
Loss rate: 28.80%
-- Flow 1:
Average throughput: 1.44 Mbit/s
95th percentile per-packet one-way delay: 4978.028 ms
Loss rate: 22.39%
-- Flow 2:
Average throughput: 0.96 Mbit/s
95th percentile per-packet one-way delay: 5379.537 ms
Loss rate: 40.27%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 5517.705 ms
Loss rate: 39.42%
```

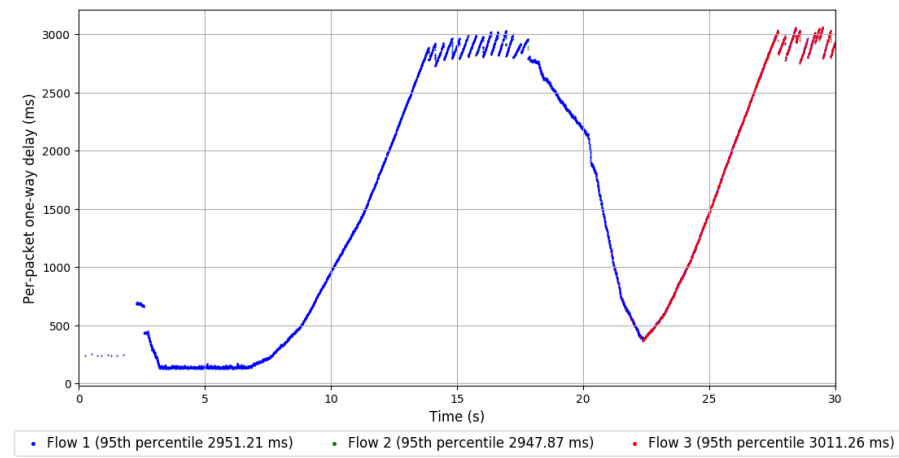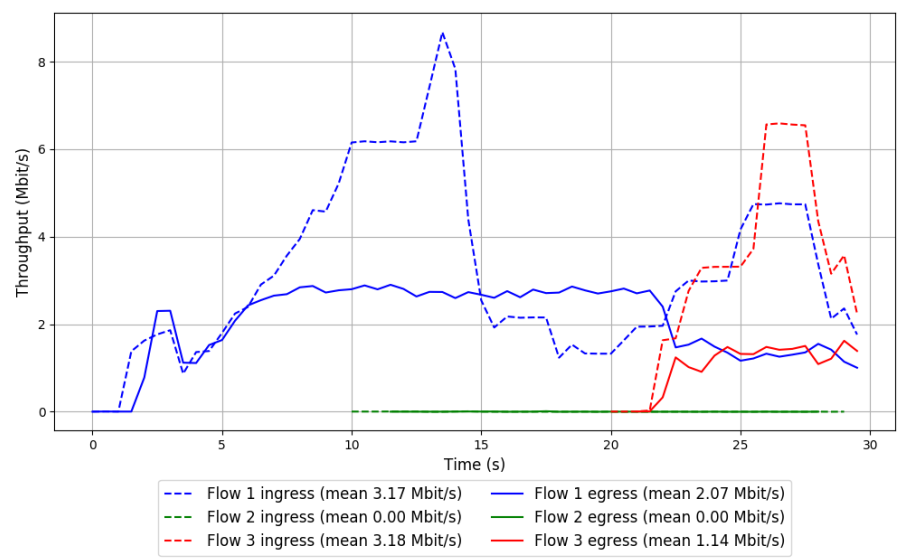## Run 3: Report of Vivace-latency — Data Link

```
Run 1: Statistics of Vivace-loss

Start at: 2018-01-31 10:55:38
End at: 2018-01-31 10:56:08
Local clock offset: 0.465 ms
Remote clock offset: -5.607 ms


# Below is generated by plot.py at 2018-01-31 11:52:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.41 Mbit/s
95th percentile per-packet one-way delay: 2967.464 ms
Loss rate: 43.27%
-- Flow 1:
Average throughput: 2.07 Mbit/s
95th percentile per-packet one-way delay: 2951.209 ms
Loss rate: 35.12%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2947.873 ms
Loss rate: 10.92%
-- Flow 3:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 3011.259 ms
Loss rate: 67.97%
```

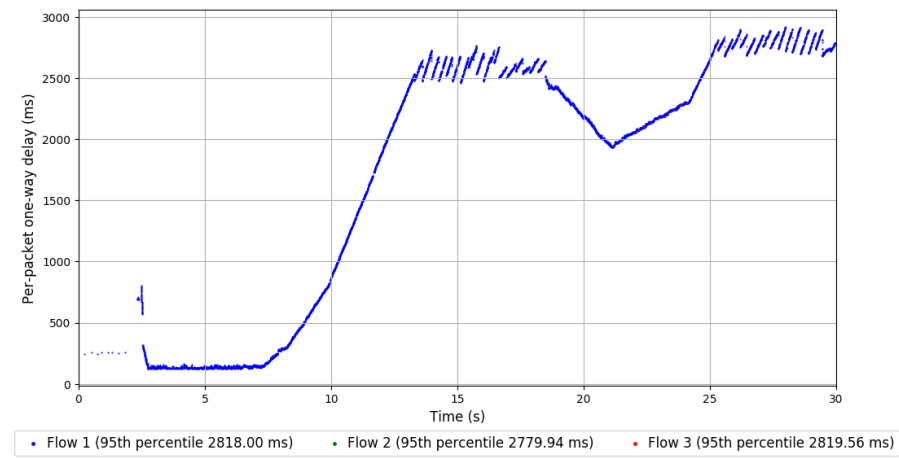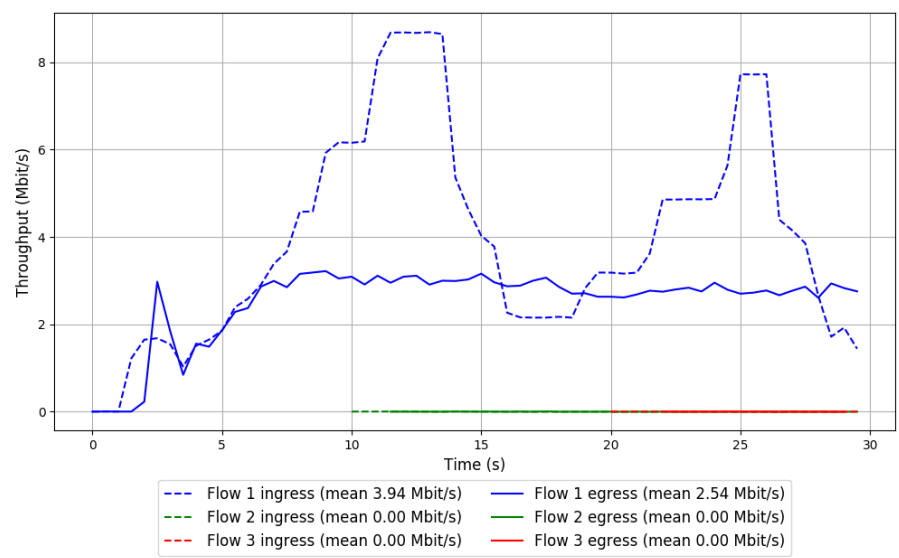Run 1: Report of Vivace-loss — Data Link

```
Run 2: Statistics of Vivace-loss

Start at: 2018-01-31 11:18:23
End at: 2018-01-31 11:18:53
Local clock offset: 0.487 ms
Remote clock offset: -6.992 ms


# Below is generated by plot.py at 2018-01-31 11:52:22
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.54 Mbit/s
95th percentile per-packet one-way delay: 2817.859 ms
Loss rate: 35.82%
-- Flow 1:
Average throughput: 2.54 Mbit/s
95th percentile per-packet one-way delay: 2818.001 ms
Loss rate: 35.83%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2779.939 ms
Loss rate: 19.55%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2819.556 ms
Loss rate: 23.27%
```

Run 2: Report of Vivace-loss — Data Link

```
Run 3: Statistics of Vivace-loss

Start at: 2018-01-31 11:41:10
End at: 2018-01-31 11:41:40
Local clock offset: 0.41 ms
Remote clock offset: -2.32 ms


# Below is generated by plot.py at 2018-01-31 11:52:25
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.72 Mbit/s
95th percentile per-packet one-way delay: 2600.713 ms
Loss rate: 46.03%
-- Flow 1:
Average throughput: 2.18 Mbit/s
95th percentile per-packet one-way delay: 2583.759 ms
Loss rate: 31.69%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2575.801 ms
Loss rate: 28.51%
-- Flow 3:
Average throughput: 1.87 Mbit/s
95th percentile per-packet one-way delay: 2624.856 ms
Loss rate: 70.77%
```
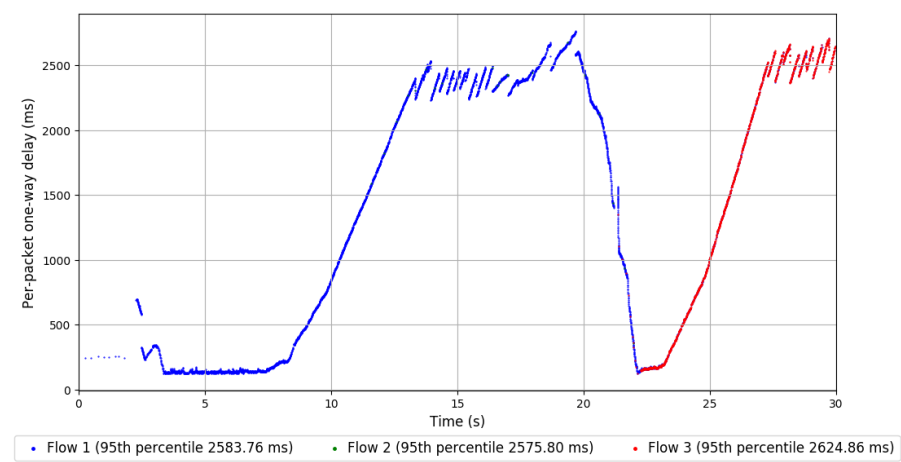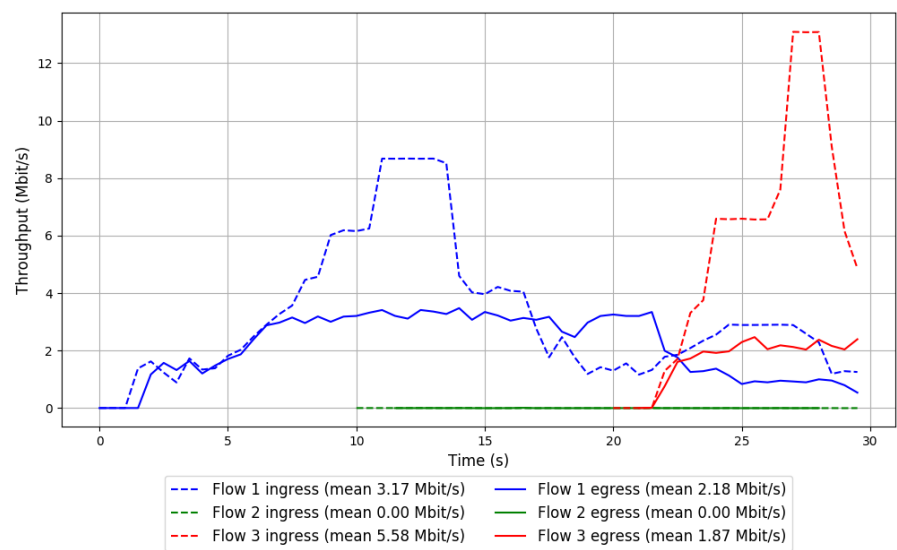
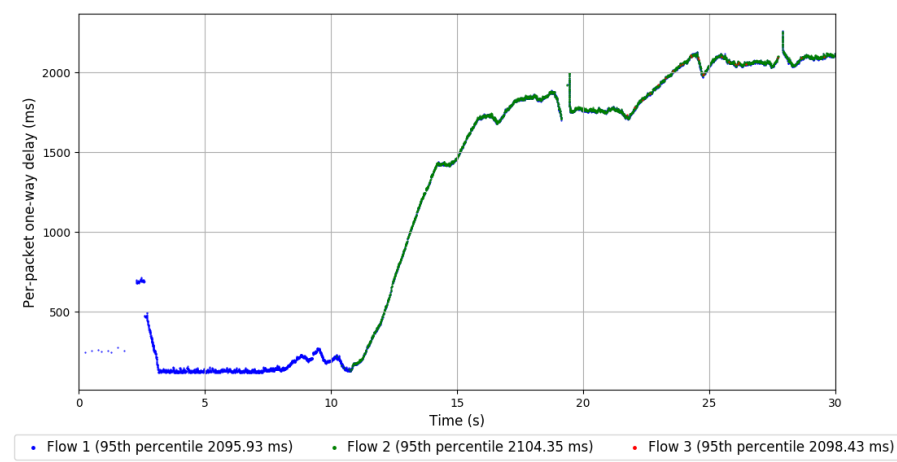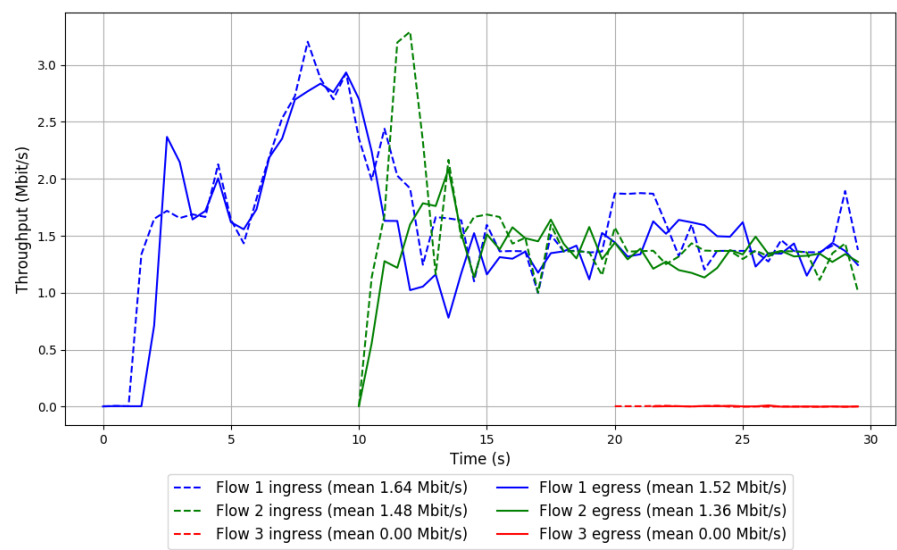Run 3: Report of Vivace-loss — Data Link

```
Run 1: Statistics of Vivace-LTE

Start at: 2018-01-31 10:46:46
End at: 2018-01-31 10:47:16
Local clock offset: 0.446 ms
Remote clock offset: -5.351 ms


# Below is generated by plot.py at 2018-01-31 11:52:25
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.43 Mbit/s
95th percentile per-packet one-way delay: 2098.007 ms
Loss rate: 7.90%
-- Flow 1:
Average throughput: 1.52 Mbit/s
95th percentile per-packet one-way delay: 2095.926 ms
Loss rate: 7.28%
-- Flow 2:
Average throughput: 1.36 Mbit/s
95th percentile per-packet one-way delay: 2104.346 ms
Loss rate: 8.93%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2098.435 ms
Loss rate: 7.33%
```

Run 1: Report of Vivace-LTE — Data Link

Flow 1 ingress (mean 1.64 Mbit/s)   Flow 1 egress (mean 1.52 Mbit/s)
Flow 2 ingress (mean 1.48 Mbit/s)   Flow 2 egress (mean 1.36 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s)   Flow 3 egress (mean 0.00 Mbit/s)

• Flow 1 (95th percentile 2095.93 ms)   • Flow 2 (95th percentile 2104.35 ms)   • Flow 3 (95th percentile 2098.43 ms)
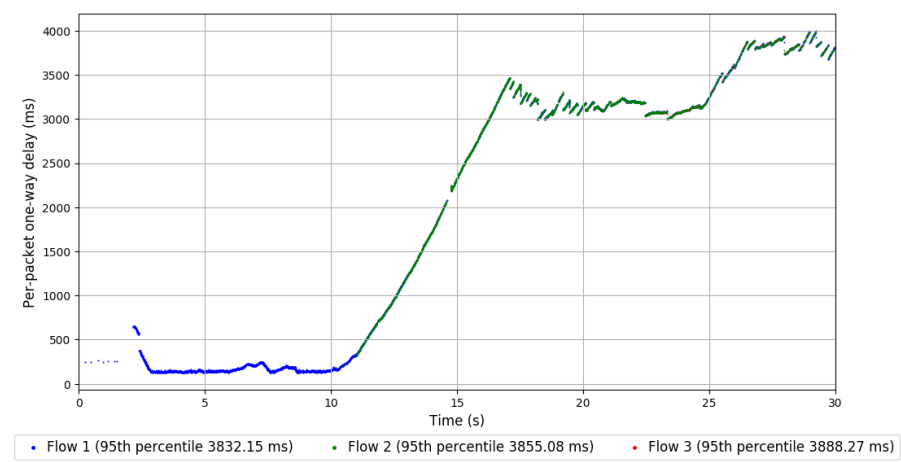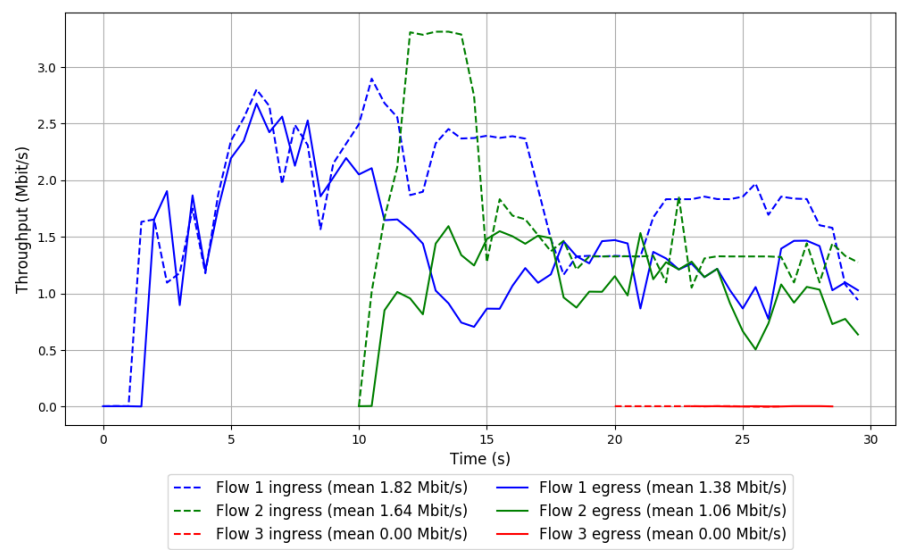
```
Run 2: Statistics of Vivace-LTE

Start at: 2018-01-31 11:09:31
End at: 2018-01-31 11:10:01
Local clock offset: 0.501 ms
Remote clock offset: -1.025 ms


# Below is generated by plot.py at 2018-01-31 11:52:25
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.09 Mbit/s
95th percentile per-packet one-way delay: 3840.542 ms
Loss rate: 28.57%
-- Flow 1:
Average throughput: 1.38 Mbit/s
95th percentile per-packet one-way delay: 3832.149 ms
Loss rate: 24.58%
-- Flow 2:
Average throughput: 1.06 Mbit/s
95th percentile per-packet one-way delay: 3855.077 ms
Loss rate: 35.24%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 3888.271 ms
Loss rate: 10.61%
```

Run 2: Report of Vivace-LTE — Data Link

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```
Run 3: Statistics of Vivace-LTE

Start at: 2018-01-31 11:32:17
End at: 2018-01-31 11:32:47
Local clock offset: 0.419 ms
Remote clock offset: -1.637 ms


# Below is generated by plot.py at 2018-01-31 11:52:26
# Datalink statistics
-- Total of 3 flows:
Average throughput: 2.35 Mbit/s
95th percentile per-packet one-way delay: 2952.701 ms
Loss rate: 18.07%
-- Flow 1:
Average throughput: 1.60 Mbit/s
95th percentile per-packet one-way delay: 2936.621 ms
Loss rate: 14.78%
-- Flow 2:
Average throughput: 1.17 Mbit/s
95th percentile per-packet one-way delay: 2969.723 ms
Loss rate: 24.27%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2844.099 ms
Loss rate: 11.51%
```

Run 3: Report of Vivace-LTE — Data Link

Flow 1 ingress (mean 1.87 Mbit/s) --- Flow 1 egress (mean 1.60 Mbit/s)
Flow 2 ingress (mean 1.49 Mbit/s) --- Flow 2 egress (mean 1.17 Mbit/s)
Flow 3 ingress (mean 0.00 Mbit/s) --- Flow 3 egress (mean 0.00 Mbit/s)

Flow 1 (95th percentile 2936.62 ms) • Flow 2 (95th percentile 2969.72 ms) • Flow 3 (95th percentile 2844.10 ms)