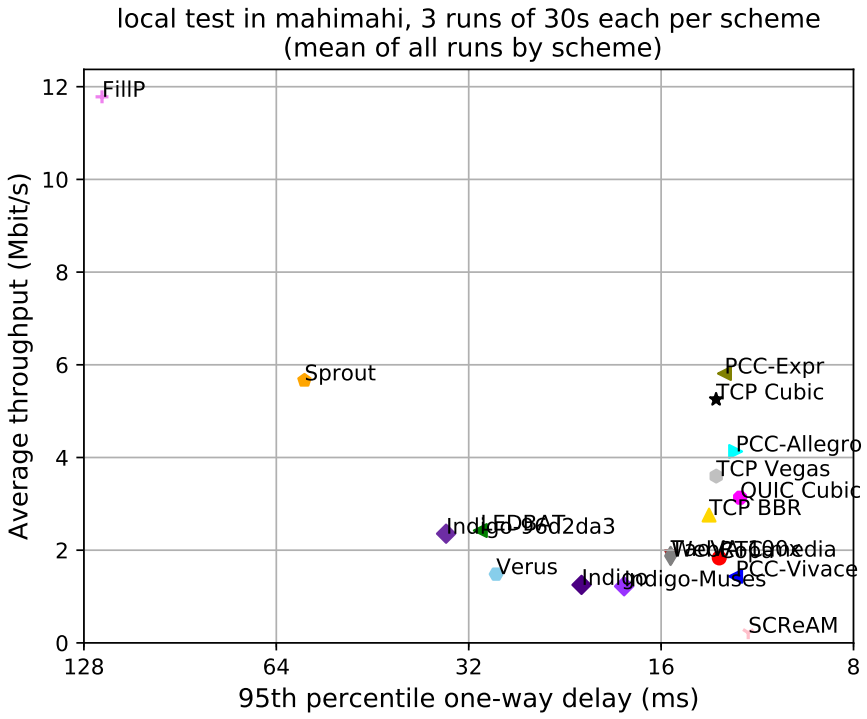
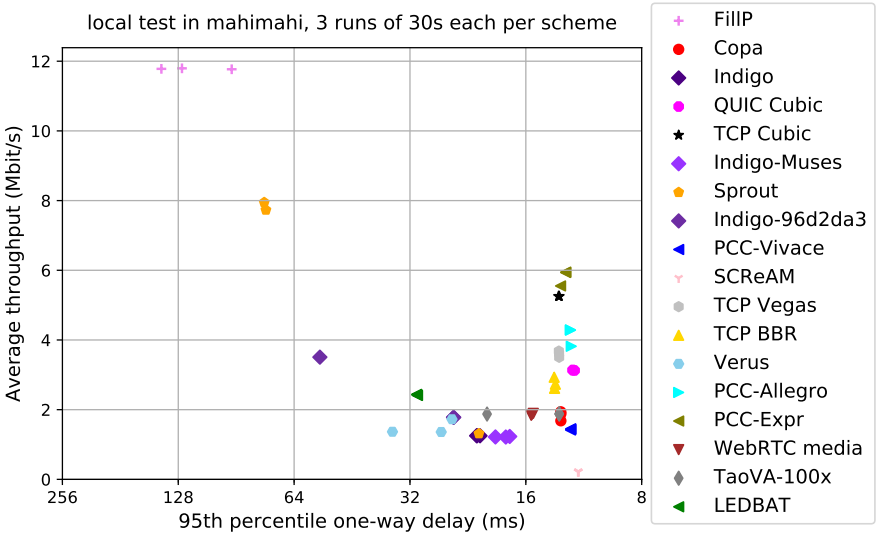
Pantheon Report

Generated at 2018-10-02 09:14:20 (UTC).
Tested in mahimahi: `mm-delay 10 mm-link 12mbps.trace 0.12mbps.trace`
Repeated the test of 18 congestion control schemes 3 times.
Each test lasted for 30 seconds running 1 flow.

```
System info:
Linux 4.15.0-1021-gcp
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 @ 2e19c0464530faa92c63f8217c9971438a26a3be
third_party/fillp @ 5332fc9127c63565e13f4933b336c02d1aabdac6
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
```


local test in mahimahi, 3 runs of 30s each per scheme
(mean of all runs by scheme)
Average throughput (Mbit/s)
95th percentile one-way delay (ms)
FillP
Sprout
PCC-Expr
TCP Cubic
PCC-Allegro
TCP Vegas
QUIC Cubic
TCP BBR
Indigo-96d2da3
LEDBAT
Verus
Indigo
Indigo-Muses
PCC-Vivace
SCReAM


local test in mahimahi, 3 runs of 30s each per scheme
Average throughput (Mbit/s)
95th percentile one-way delay (ms)
FillP
Copa
Indigo
QUIC Cubic
TCP Cubic
Indigo-Muses
Sprout
Indigo-96d2da3
PCC-Vivace
SCReAM
TCP Vegas
TCP BBR
Verus
PCC-Allegro
PCC-Expr
WebRTC media
TaoVA-100x
LEDBAT

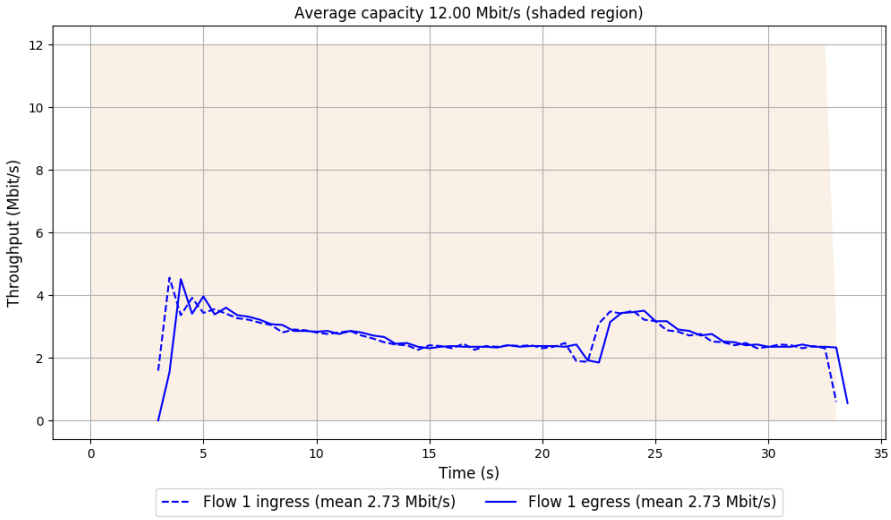
scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	2.76	13.46	0.05
Copa	3	1.83	12.98	0.09
TCP Cubic	3	5.25	13.13	0.05
FillP	3	11.78	119.92	0.25
Indigo	3	1.25	21.31	0.20
Indigo-96d2da3	3	2.36	34.72	0.14
LEDBAT	3	2.42	30.69	0.23
Indigo-Muses	3	1.22	18.28	0.12
PCC-Allegro	3	4.13	12.23	0.04
PCC-Expr	3	5.81	12.74	0.04
QUIC Cubic	3	3.13	12.04	0.05
SCReAM	3	0.22	11.69	0.09
Sprout	3	5.66	57.83	0.20
TaoVA-100x	3	1.88	15.46	0.07
TCP Vegas	3	3.60	13.12	0.03
Verus	3	1.49	28.99	0.19
PCC-Vivace	3	1.44	12.24	0.04
WebRTC media	3	1.86	15.42	0.02

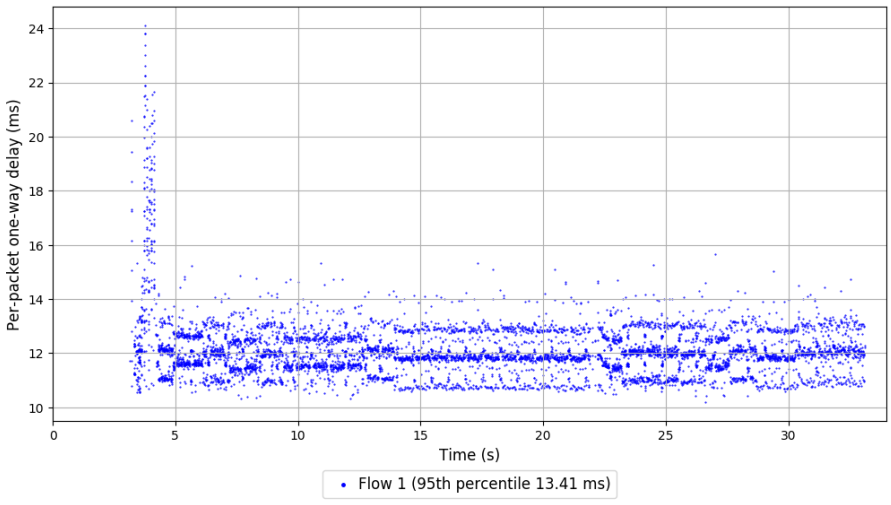
```
Run 1: Statistics of TCP BBR

Start at: 2018-10-02 08:46:26
End at: 2018-10-02 08:46:56

# Below is generated by plot.py at 2018-10-02 09:12:56
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 2.73 Mbit/s (22.8% utilization)
95th percentile per-packet one-way delay: 13.408 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 2.73 Mbit/s
95th percentile per-packet one-way delay: 13.408 ms
Loss rate: 0.03%
```

Run 1: Report of TCP BBR — Data Link



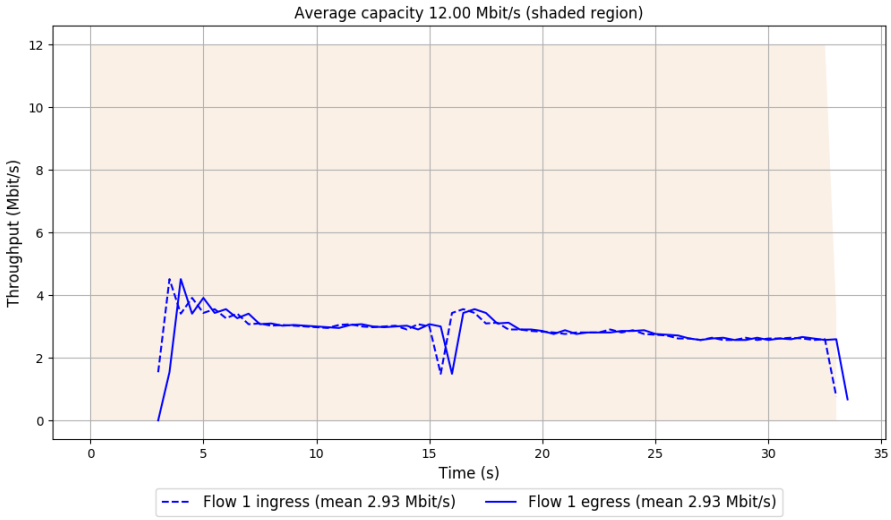


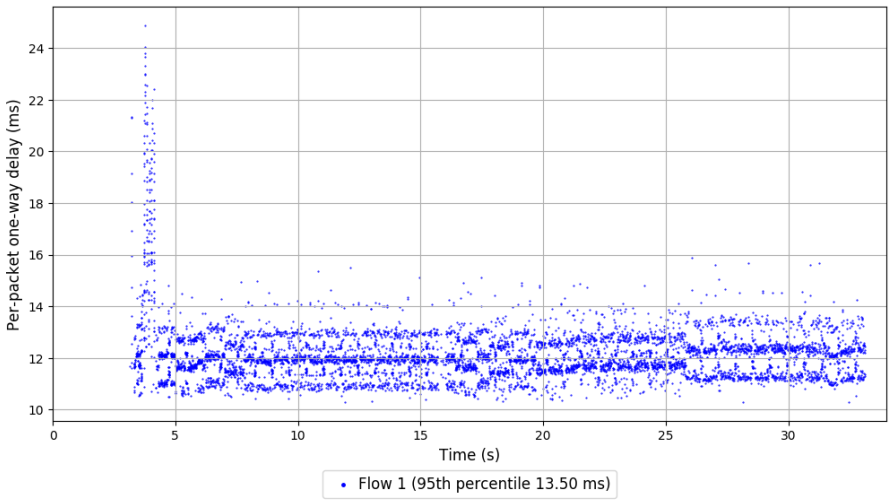
```
Run 2: Statistics of TCP BBR

Start at: 2018-10-02 08:56:57
End at: 2018-10-02 08:57:27

# Below is generated by plot.py at 2018-10-02 09:12:58
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 2.93 Mbit/s (24.4% utilization)
95th percentile per-packet one-way delay: 13.503 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 2.93 Mbit/s
95th percentile per-packet one-way delay: 13.503 ms
Loss rate: 0.05%
```

Run 2: Report of TCP BBR — Data Link



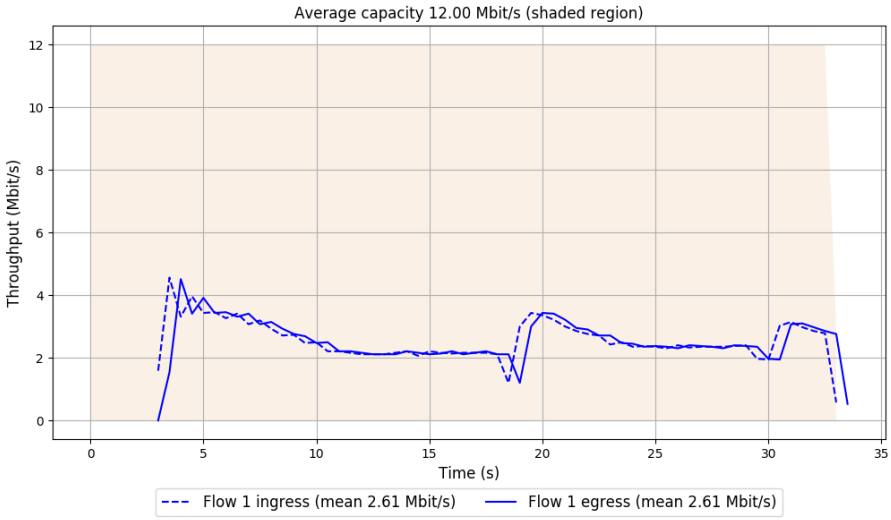


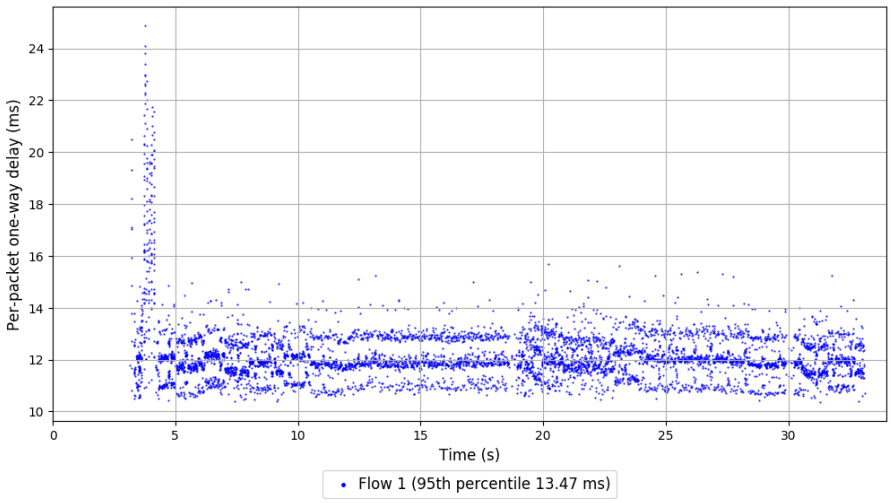
```
Run 3: Statistics of TCP BBR

Start at: 2018-10-02 09:07:28
End at: 2018-10-02 09:07:58

# Below is generated by plot.py at 2018-10-02 09:12:58
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 2.61 Mbit/s (21.8% utilization)
95th percentile per-packet one-way delay: 13.473 ms
Loss rate: 0.08%
-- Flow 1:
Average throughput: 2.61 Mbit/s
95th percentile per-packet one-way delay: 13.473 ms
Loss rate: 0.08%
```

Run 3: Report of TCP BBR — Data Link



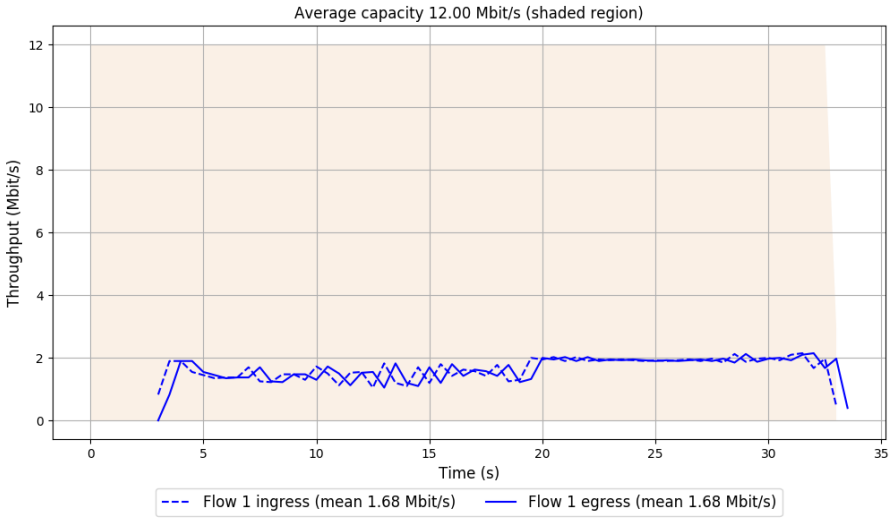


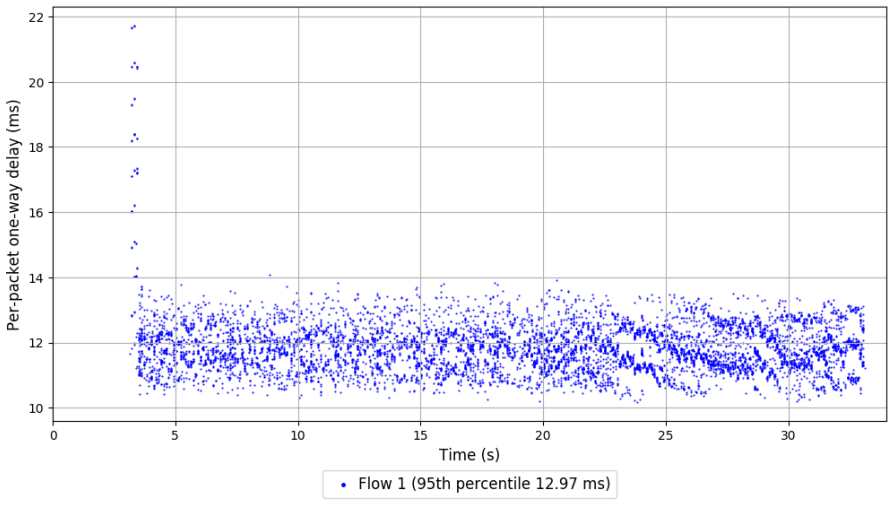
```
Run 1: Statistics of Copa

Start at: 2018-10-02 08:48:46
End at: 2018-10-02 08:49:16

# Below is generated by plot.py at 2018-10-02 09:12:59
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.68 Mbit/s (14.0% utilization)
95th percentile per-packet one-way delay: 12.975 ms
Loss rate: 0.08%
-- Flow 1:
Average throughput: 1.68 Mbit/s
95th percentile per-packet one-way delay: 12.975 ms
Loss rate: 0.08%
```

Run 1: Report of Copa — Data Link



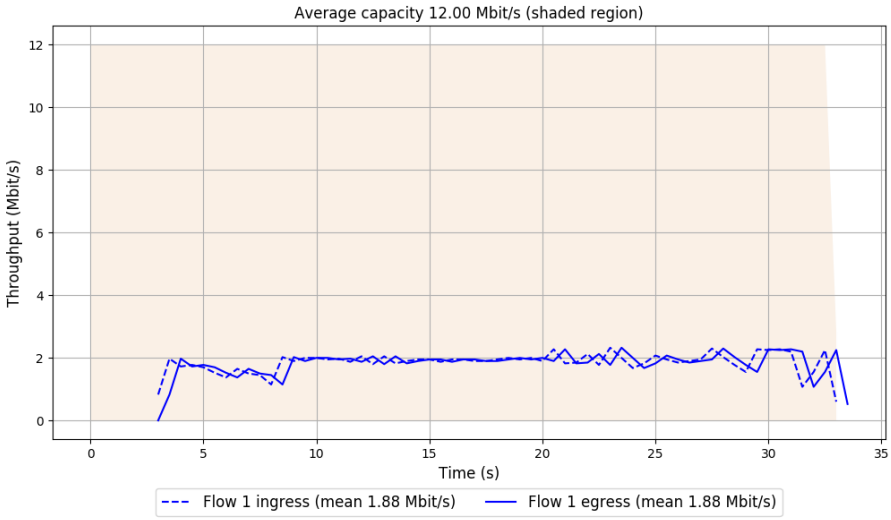


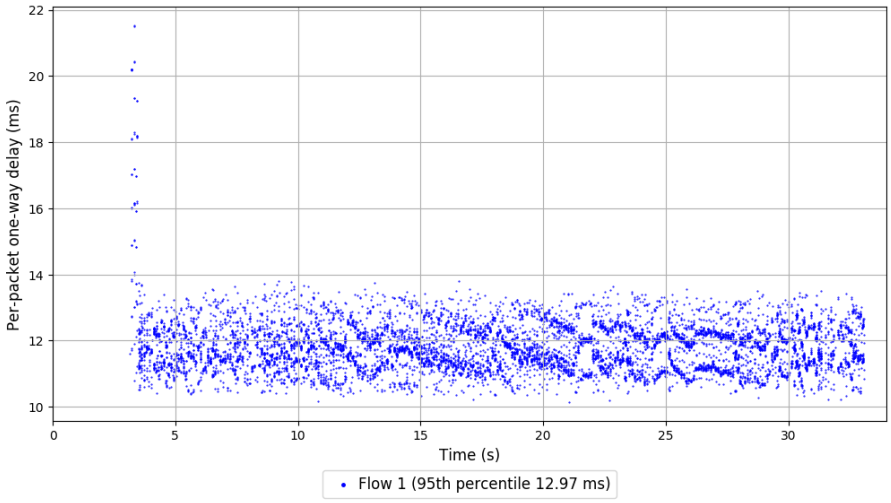
```
Run 2: Statistics of Copa

Start at: 2018-10-02 08:59:17
End at: 2018-10-02 08:59:47

# Below is generated by plot.py at 2018-10-02 09:12:59
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.88 Mbit/s (15.7% utilization)
95th percentile per-packet one-way delay: 12.974 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 1.88 Mbit/s
95th percentile per-packet one-way delay: 12.974 ms
Loss rate: 0.07%
```

Run 2: Report of Copa — Data Link



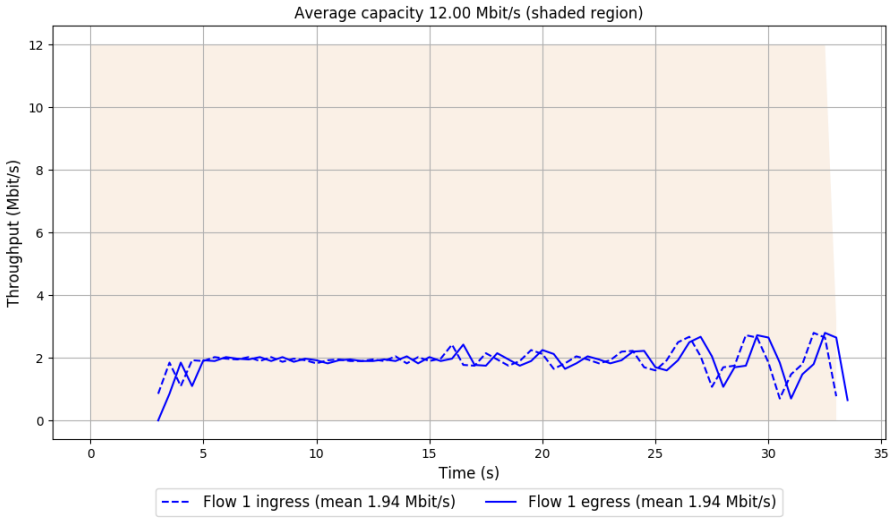


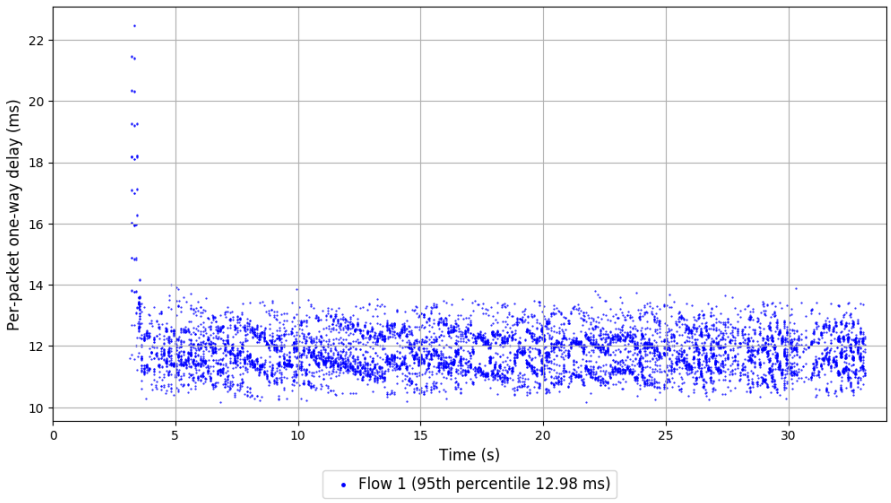
```
Run 3: Statistics of Copa

Start at: 2018-10-02 09:09:48
End at: 2018-10-02 09:10:18

# Below is generated by plot.py at 2018-10-02 09:13:00
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.94 Mbit/s (16.2% utilization)
95th percentile per-packet one-way delay: 12.981 ms
Loss rate: 0.11%
-- Flow 1:
Average throughput: 1.94 Mbit/s
95th percentile per-packet one-way delay: 12.981 ms
Loss rate: 0.11%
```

Run 3: Report of Copa — Data Link



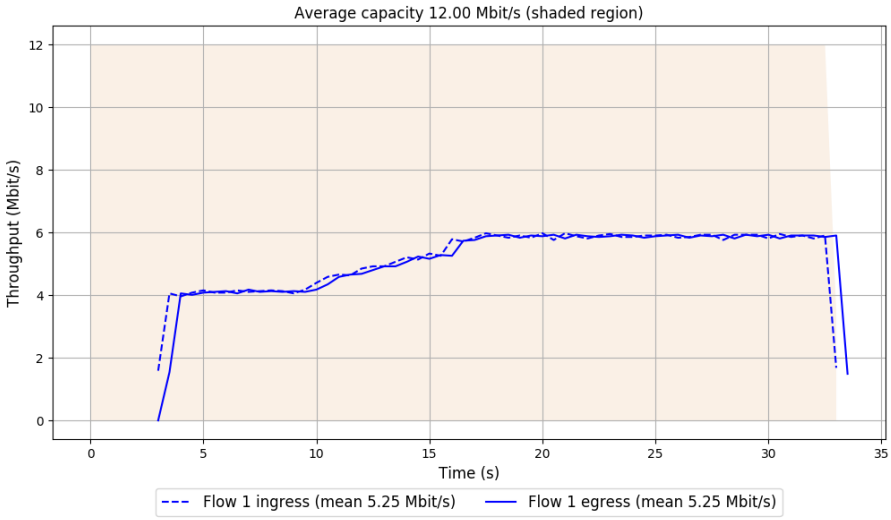


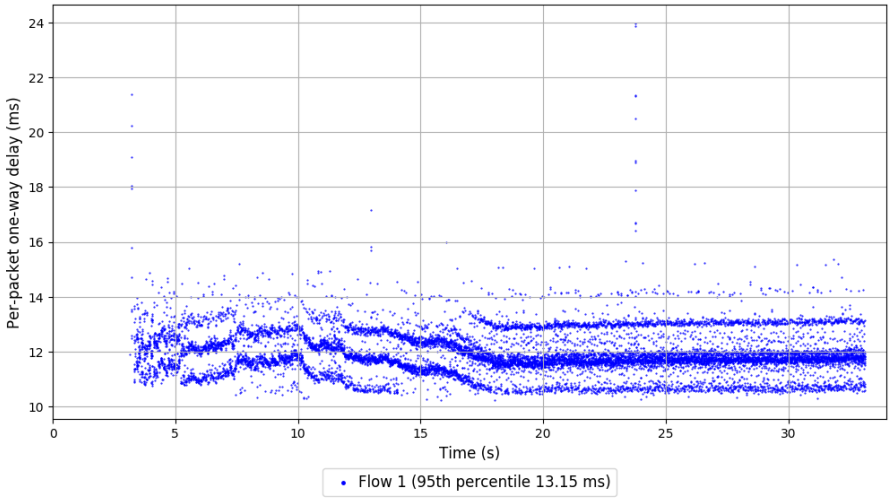
```
Run 1: Statistics of TCP Cubic

Start at: 2018-10-02 08:47:01
End at: 2018-10-02 08:47:31

# Below is generated by plot.py at 2018-10-02 09:13:02
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 5.25 Mbit/s (43.8% utilization)
95th percentile per-packet one-way delay: 13.151 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 5.25 Mbit/s
95th percentile per-packet one-way delay: 13.151 ms
Loss rate: 0.06%
```

Run 1: Report of TCP Cubic — Data Link



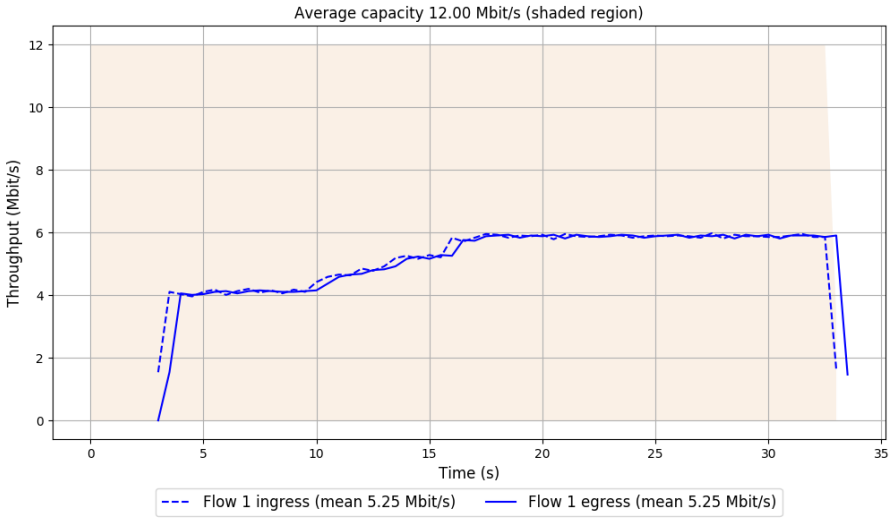


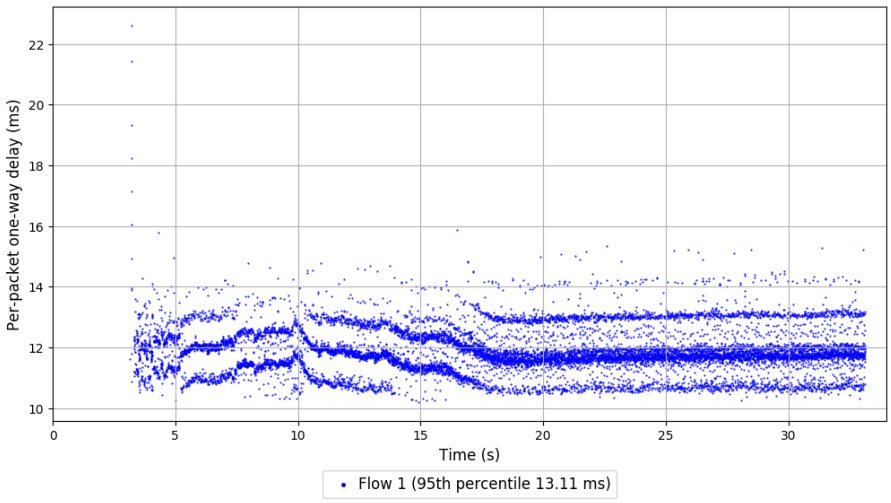
```
Run 2: Statistics of TCP Cubic

Start at: 2018-10-02 08:57:32
End at: 2018-10-02 08:58:02

# Below is generated by plot.py at 2018-10-02 09:13:02
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 5.25 Mbit/s (43.8% utilization)
95th percentile per-packet one-way delay: 13.108 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 5.25 Mbit/s
95th percentile per-packet one-way delay: 13.108 ms
Loss rate: 0.05%
```

Run 2: Report of TCP Cubic — Data Link



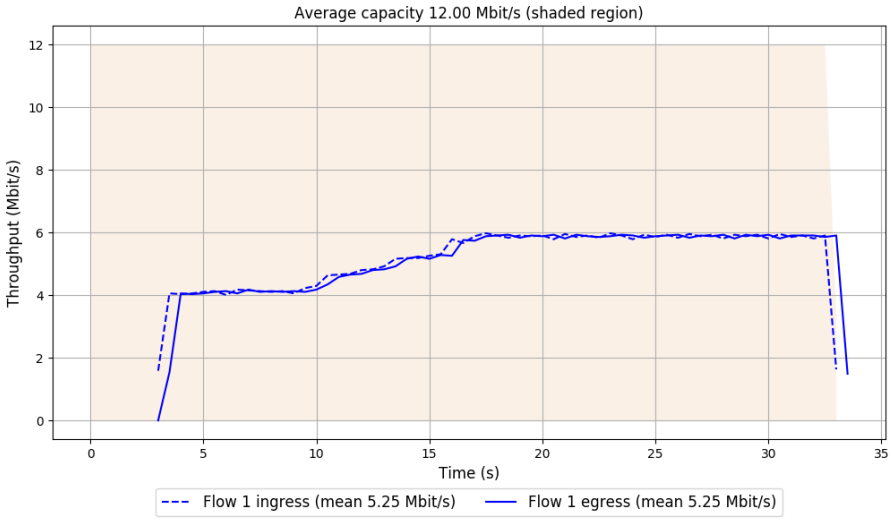


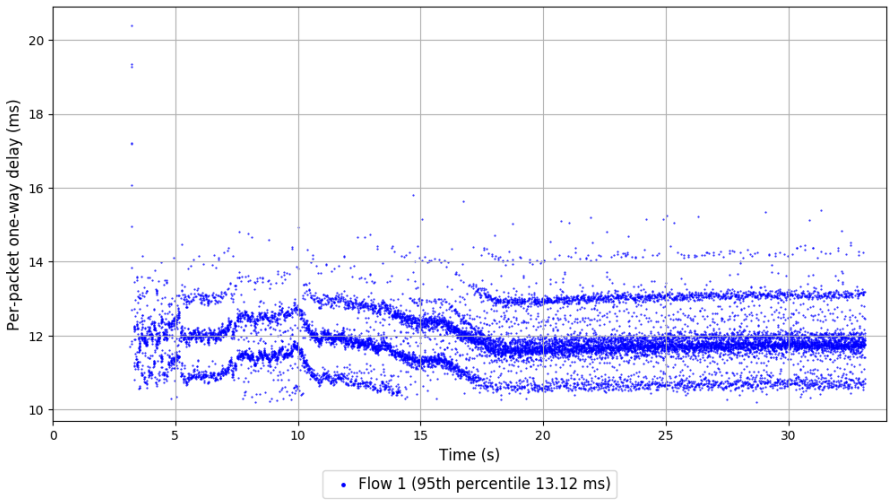
```
Run 3: Statistics of TCP Cubic

Start at: 2018-10-02 09:08:03
End at: 2018-10-02 09:08:33

# Below is generated by plot.py at 2018-10-02 09:13:11
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 5.25 Mbit/s (43.8% utilization)
95th percentile per-packet one-way delay: 13.117 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 5.25 Mbit/s
95th percentile per-packet one-way delay: 13.117 ms
Loss rate: 0.05%
```

Run 3: Report of TCP Cubic — Data Link



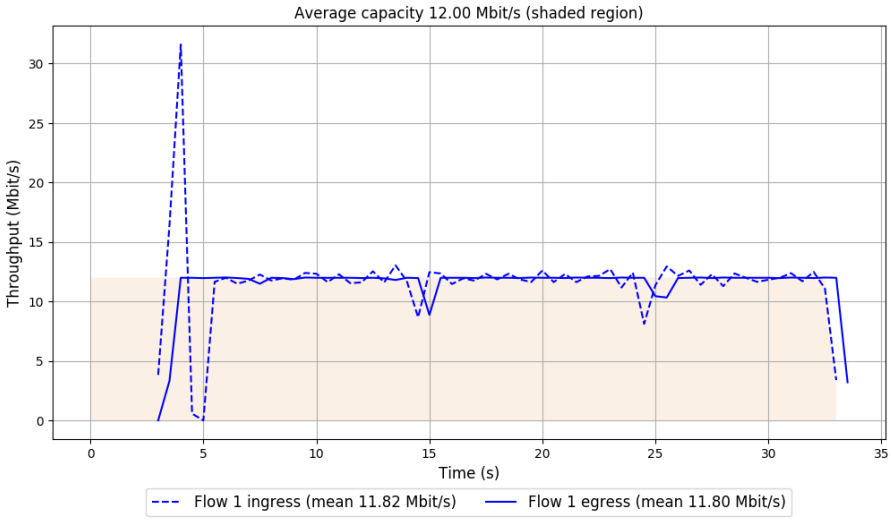


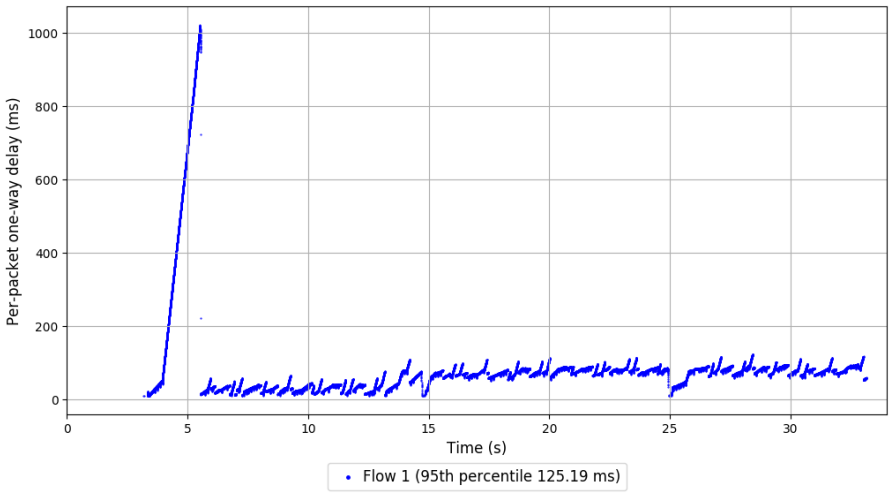
```
Run 1: Statistics of FillP

Start at: 2018-10-02 08:42:56
End at: 2018-10-02 08:43:26

# Below is generated by plot.py at 2018-10-02 09:13:25
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 11.80 Mbit/s (98.3% utilization)
95th percentile per-packet one-way delay: 125.189 ms
Loss rate: 0.22%
-- Flow 1:
Average throughput: 11.80 Mbit/s
95th percentile per-packet one-way delay: 125.189 ms
Loss rate: 0.22%
```

Run 1: Report of FillP — Data Link



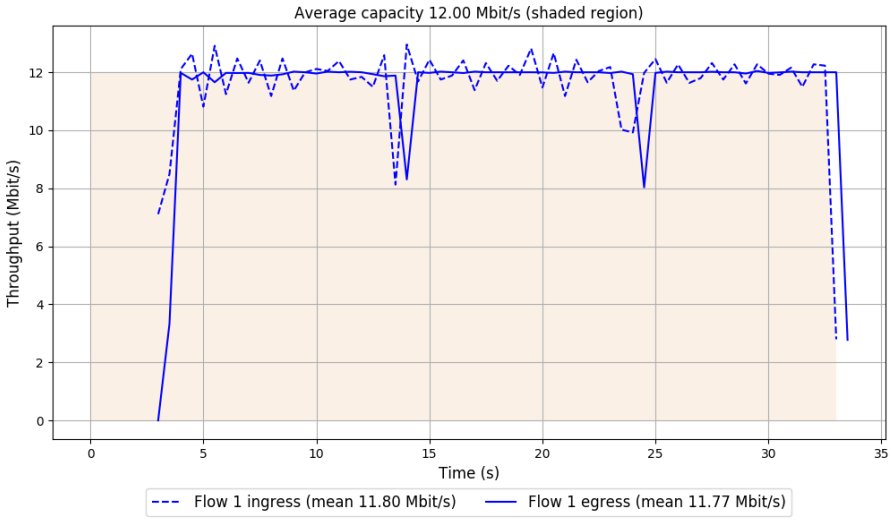


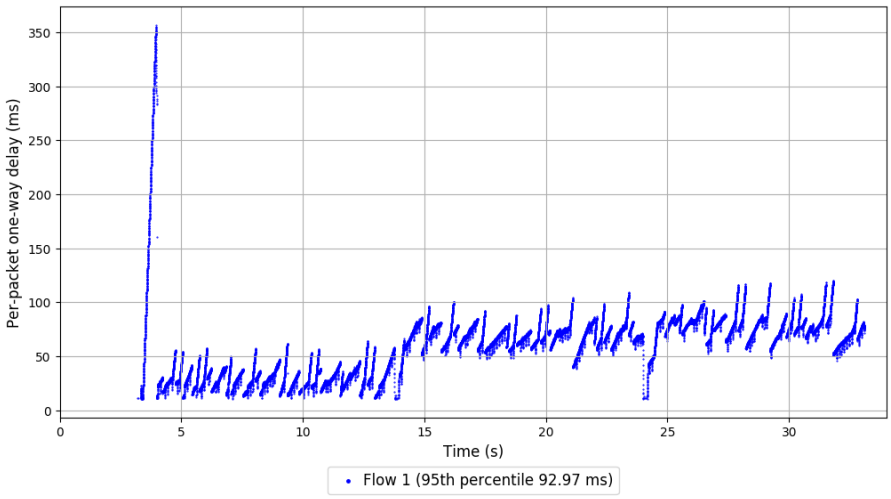
```
Run 2: Statistics of FillP

Start at: 2018-10-02 08:53:26
End at: 2018-10-02 08:53:56

# Below is generated by plot.py at 2018-10-02 09:13:26
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 11.77 Mbit/s (98.1% utilization)
95th percentile per-packet one-way delay: 92.969 ms
Loss rate: 0.28%
-- Flow 1:
Average throughput: 11.77 Mbit/s
95th percentile per-packet one-way delay: 92.969 ms
Loss rate: 0.28%
```

Run 2: Report of FillP — Data Link



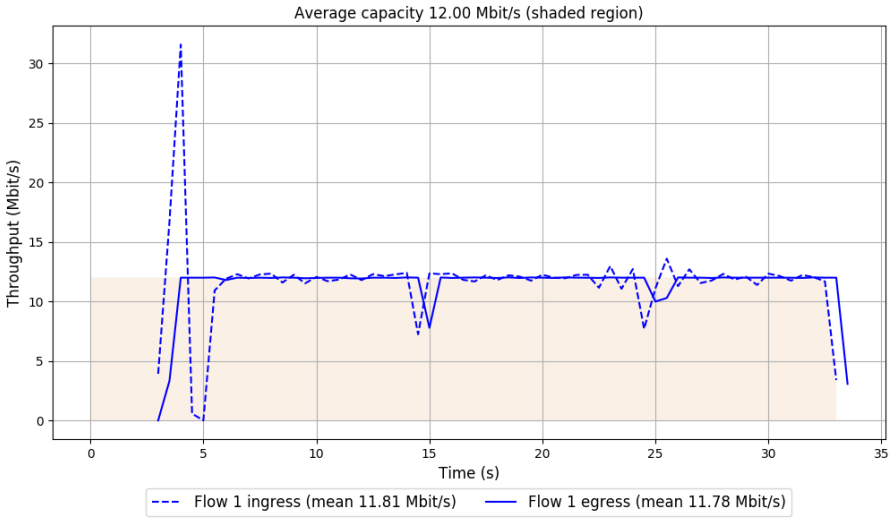


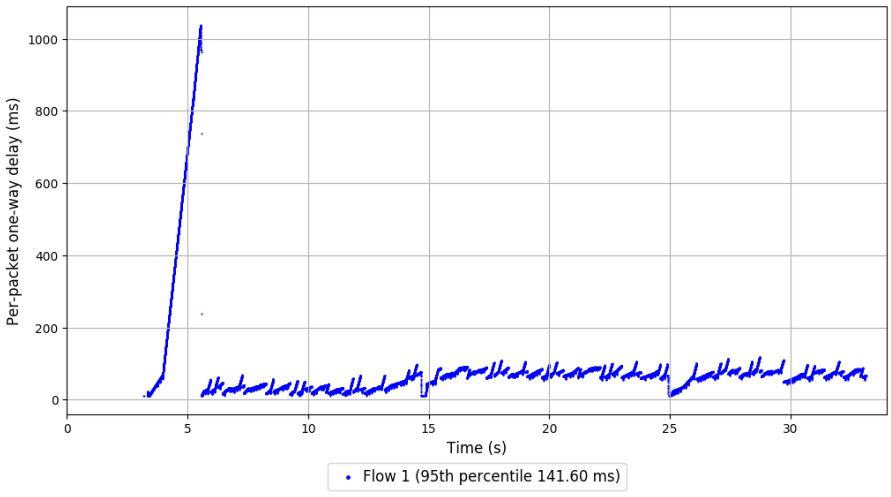
```
Run 3: Statistics of FillP

Start at: 2018-10-02 09:03:57
End at: 2018-10-02 09:04:27

# Below is generated by plot.py at 2018-10-02 09:13:27
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 11.78 Mbit/s (98.2% utilization)
95th percentile per-packet one-way delay: 141.597 ms
Loss rate: 0.26%
-- Flow 1:
Average throughput: 11.78 Mbit/s
95th percentile per-packet one-way delay: 141.597 ms
Loss rate: 0.26%
```

Run 3: Report of FillP — Data Link



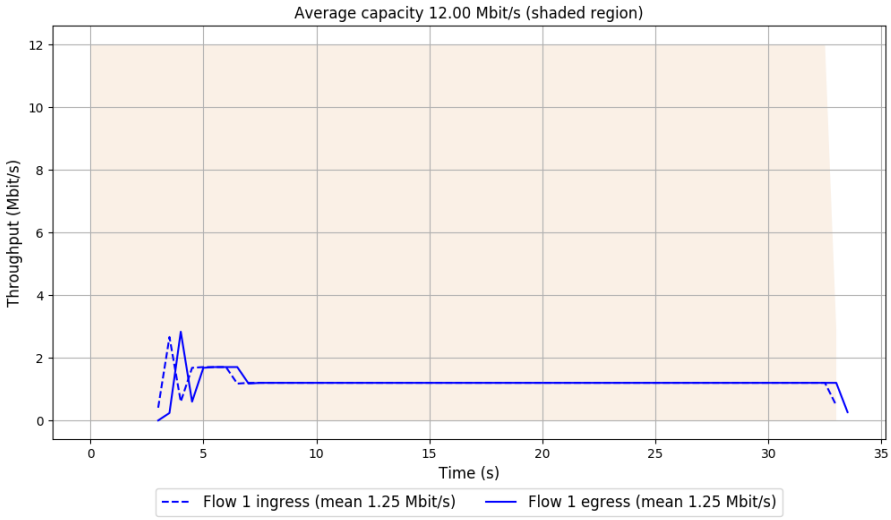


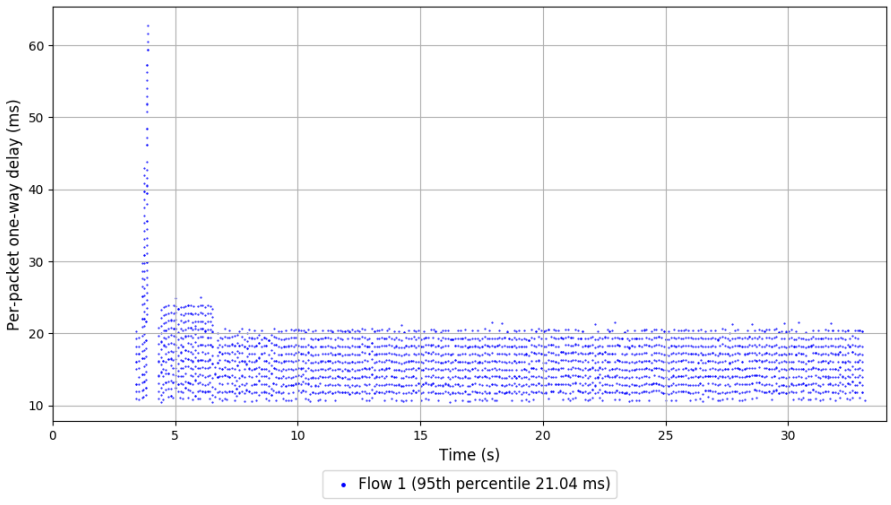
```
Run 1: Statistics of Indigo

Start at: 2018-10-02 08:45:16
End at: 2018-10-02 08:45:46

# Below is generated by plot.py at 2018-10-02 09:13:27
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.25 Mbit/s (10.4% utilization)
95th percentile per-packet one-way delay: 21.043 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 21.043 ms
Loss rate: 0.29%
```

Run 1: Report of Indigo — Data Link



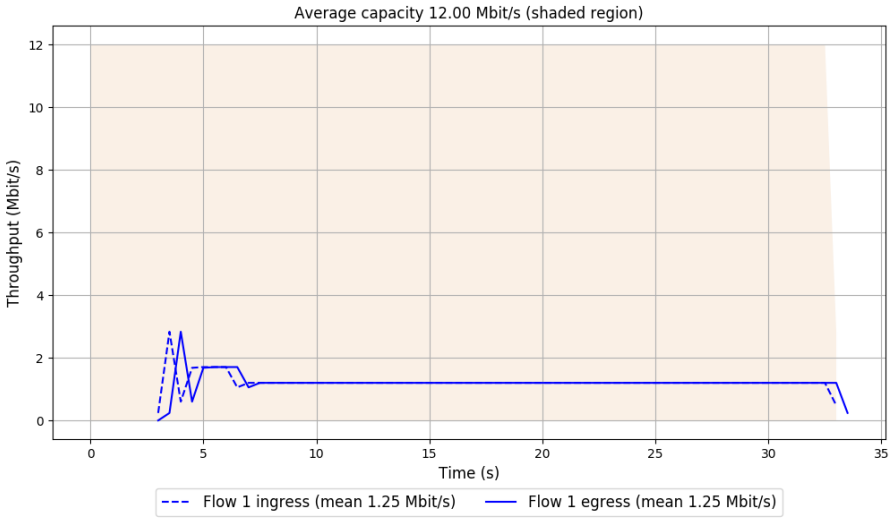


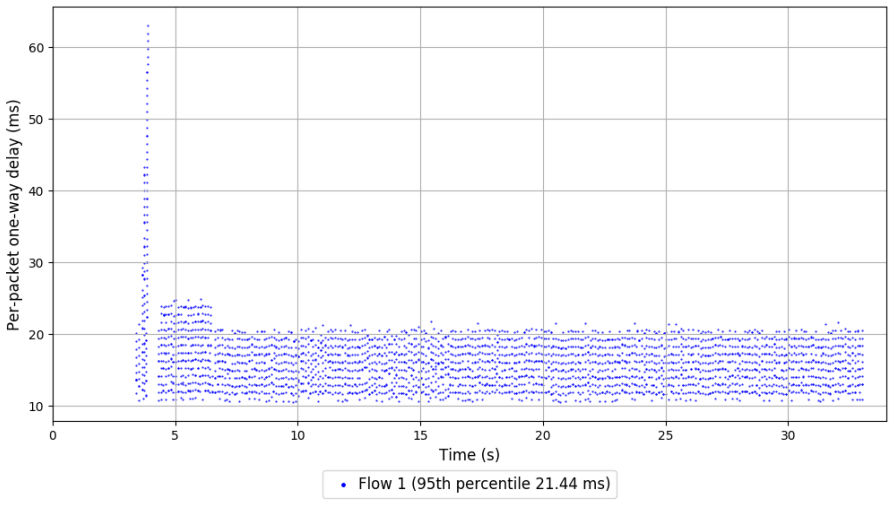
```
Run 2: Statistics of Indigo

Start at: 2018-10-02 08:55:47
End at: 2018-10-02 08:56:17

# Below is generated by plot.py at 2018-10-02 09:13:27
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.25 Mbit/s (10.4% utilization)
95th percentile per-packet one-way delay: 21.437 ms
Loss rate: 0.32%
-- Flow 1:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 21.437 ms
Loss rate: 0.32%
```

Run 2: Report of Indigo — Data Link



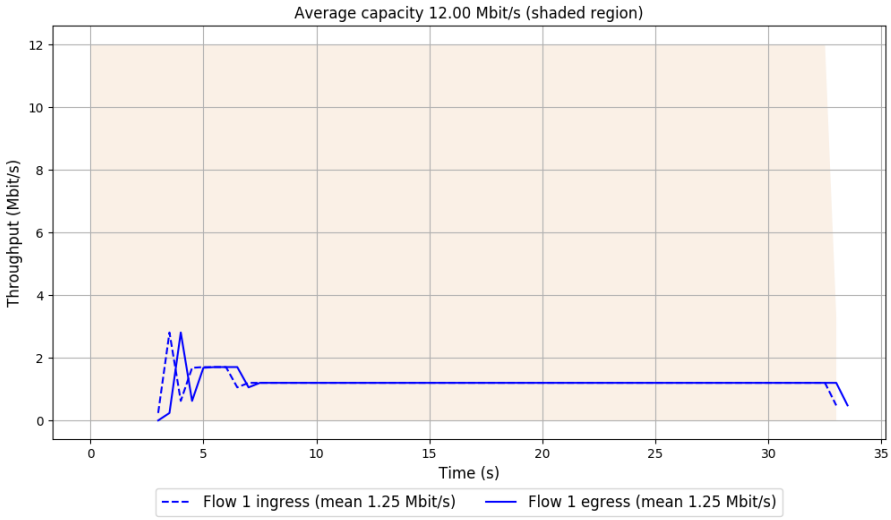


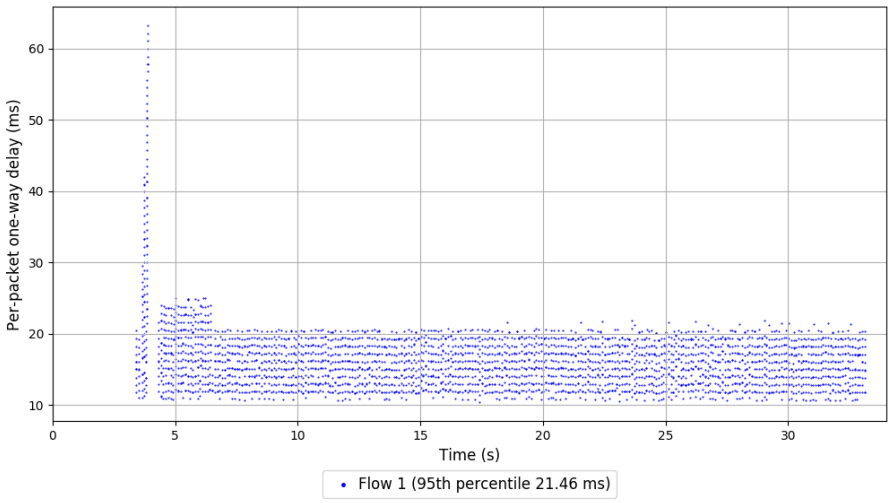
```
Run 3: Statistics of Indigo

Start at: 2018-10-02 09:06:18
End at: 2018-10-02 09:06:48

# Below is generated by plot.py at 2018-10-02 09:13:27
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.25 Mbit/s (10.4% utilization)
95th percentile per-packet one-way delay: 21.459 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.25 Mbit/s
95th percentile per-packet one-way delay: 21.459 ms
Loss rate: 0.00%
```

Run 3: Report of Indigo — Data Link



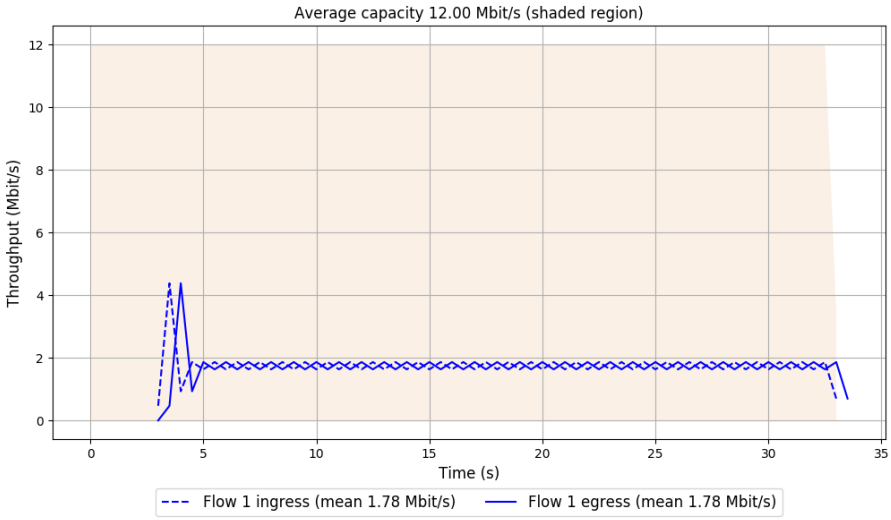


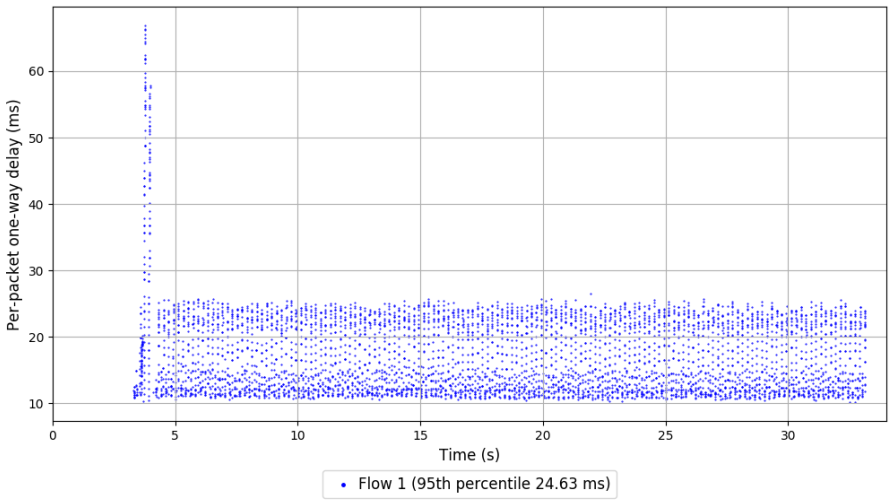
```
Run 1: Statistics of Indigo-96d2da3

Start at: 2018-10-02 08:41:46
End at: 2018-10-02 08:42:16

# Below is generated by plot.py at 2018-10-02 09:13:27
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.78 Mbit/s (14.8% utilization)
95th percentile per-packet one-way delay: 24.634 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.78 Mbit/s
95th percentile per-packet one-way delay: 24.634 ms
Loss rate: 0.00%
```

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



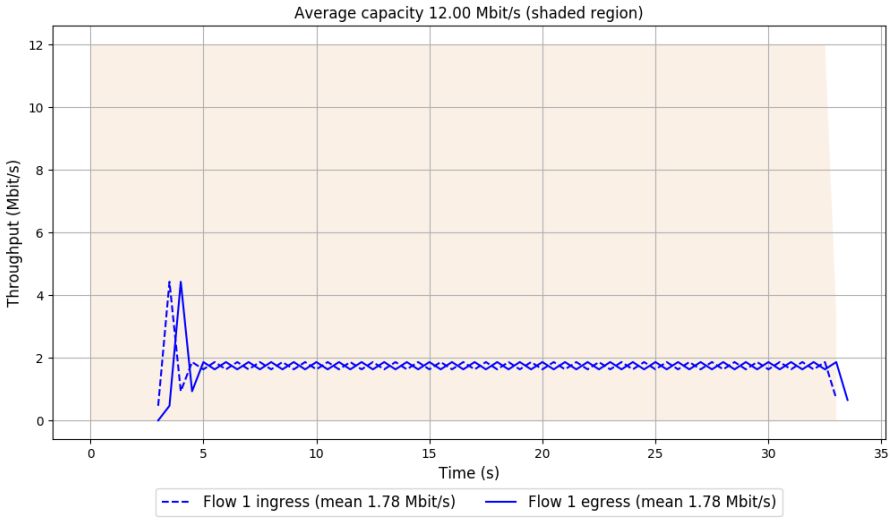


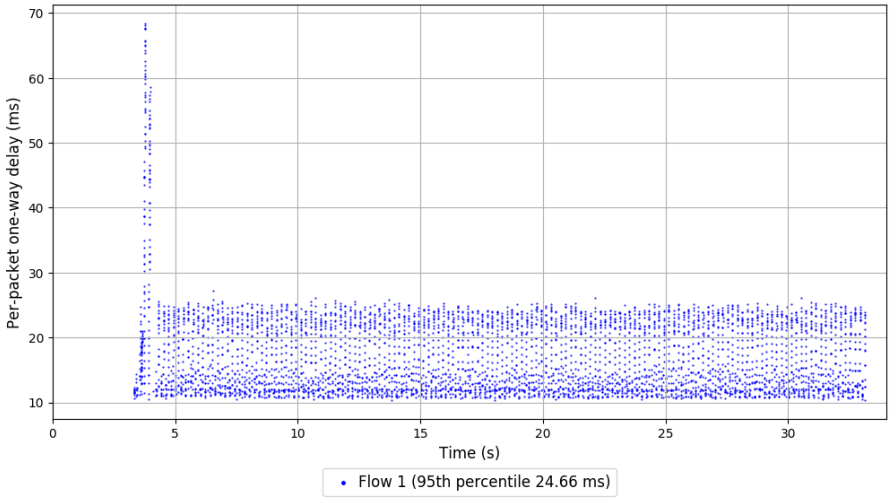
```
Run 2: Statistics of Indigo-96d2da3

Start at: 2018-10-02 08:52:17
End at: 2018-10-02 08:52:47

# Below is generated by plot.py at 2018-10-02 09:13:27
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.78 Mbit/s (14.8% utilization)
95th percentile per-packet one-way delay: 24.661 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 1.78 Mbit/s
95th percentile per-packet one-way delay: 24.661 ms
Loss rate: 0.04%
```

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



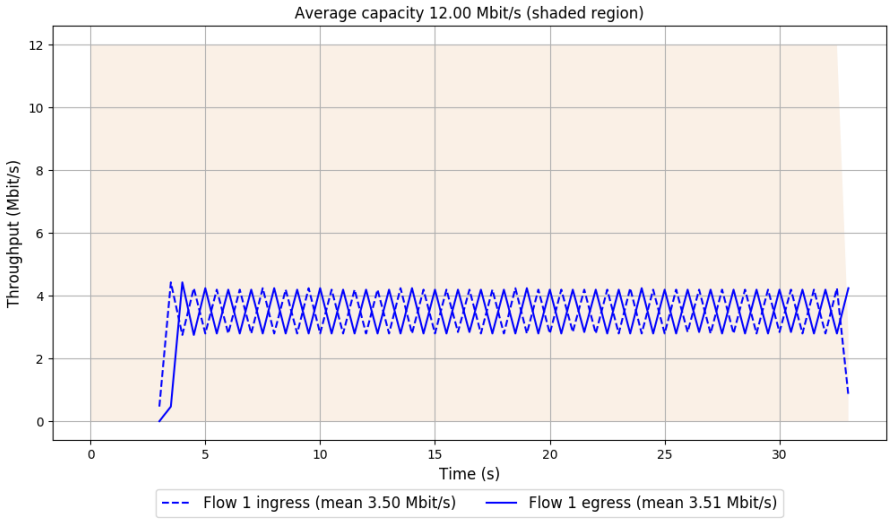


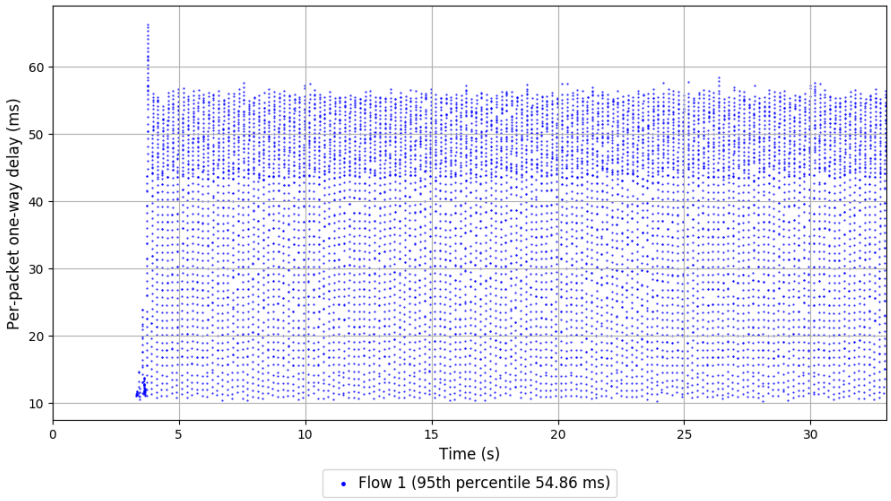
```
Run 3: Statistics of Indigo-96d2da3

Start at: 2018-10-02 09:02:47
End at: 2018-10-02 09:03:17

# Below is generated by plot.py at 2018-10-02 09:13:27
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 3.51 Mbit/s (29.2% utilization)
95th percentile per-packet one-way delay: 54.858 ms
Loss rate: 0.39%
-- Flow 1:
Average throughput: 3.51 Mbit/s
95th percentile per-packet one-way delay: 54.858 ms
Loss rate: 0.39%
```

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



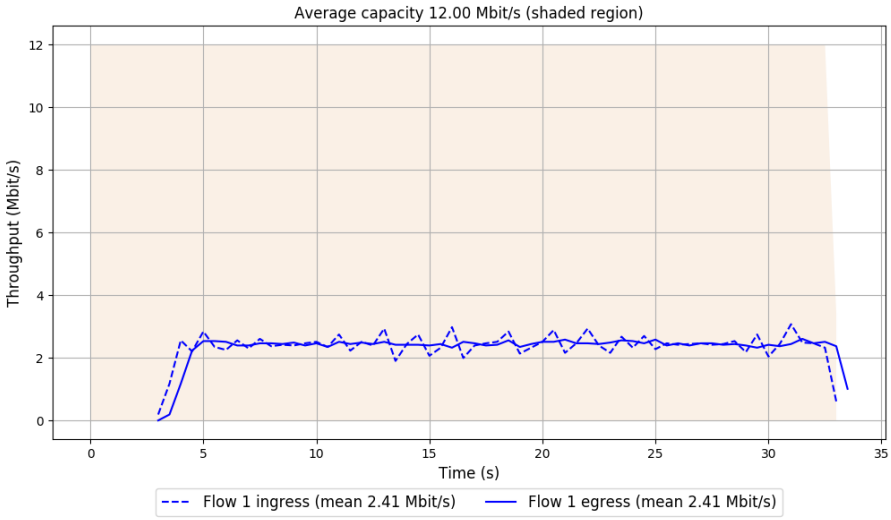


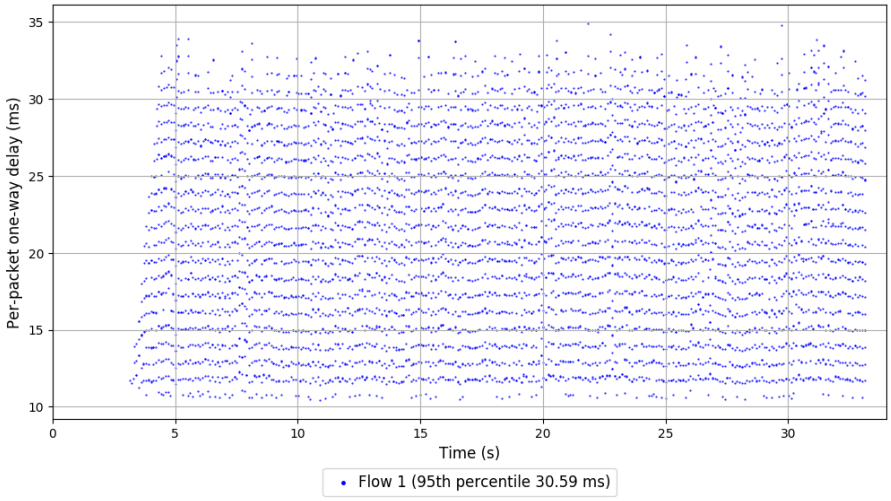
```
Run 1: Statistics of LEDBAT

Start at: 2018-10-02 08:44:41
End at: 2018-10-02 08:45:11

# Below is generated by plot.py at 2018-10-02 09:13:27
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 2.41 Mbit/s (20.1% utilization)
95th percentile per-packet one-way delay: 30.593 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 2.41 Mbit/s
95th percentile per-packet one-way delay: 30.593 ms
Loss rate: 0.00%
```

Run 1: Report of LEDBAT — Data Link



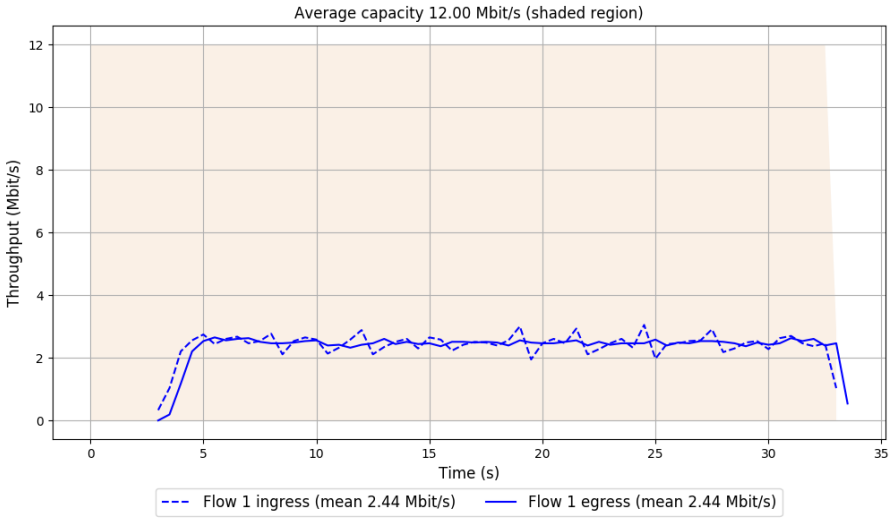


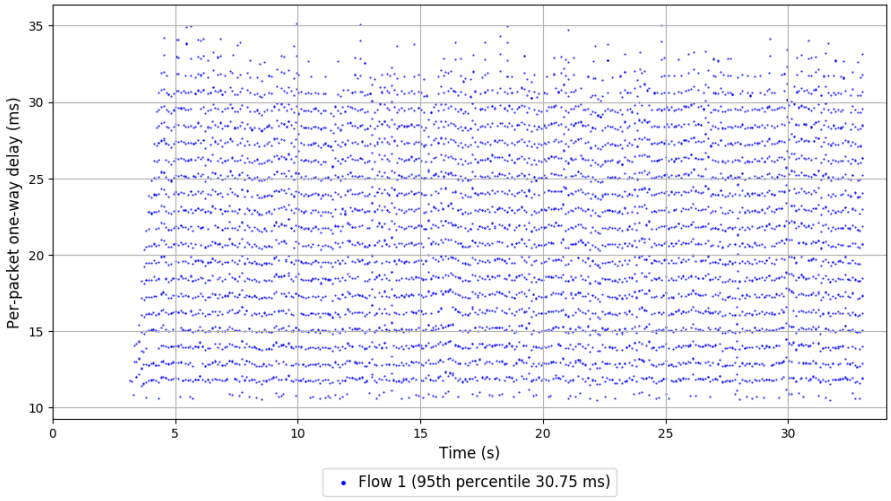
```
Run 2: Statistics of LEDBAT

Start at: 2018-10-02 08:55:12
End at: 2018-10-02 08:55:42

# Below is generated by plot.py at 2018-10-02 09:13:27
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 2.44 Mbit/s (20.3% utilization)
95th percentile per-packet one-way delay: 30.750 ms
Loss rate: 0.34%
-- Flow 1:
Average throughput: 2.44 Mbit/s
95th percentile per-packet one-way delay: 30.750 ms
Loss rate: 0.34%
```

Run 2: Report of LEDBAT — Data Link



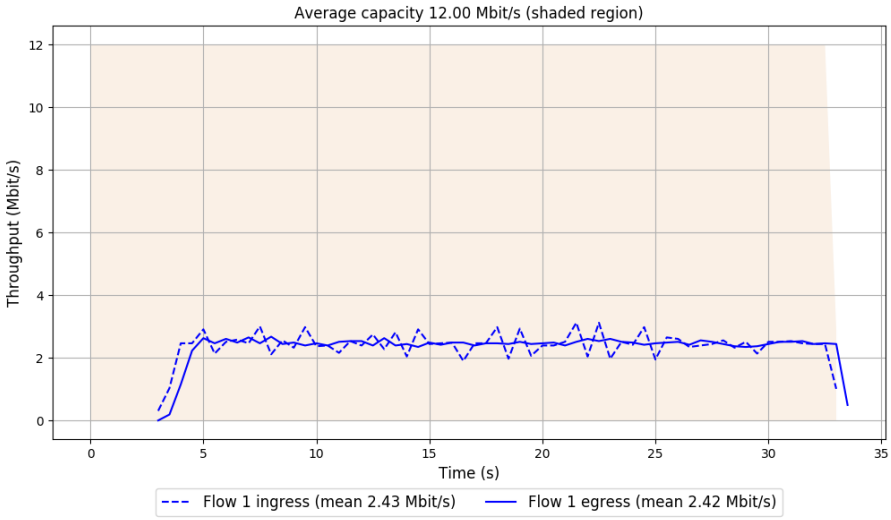


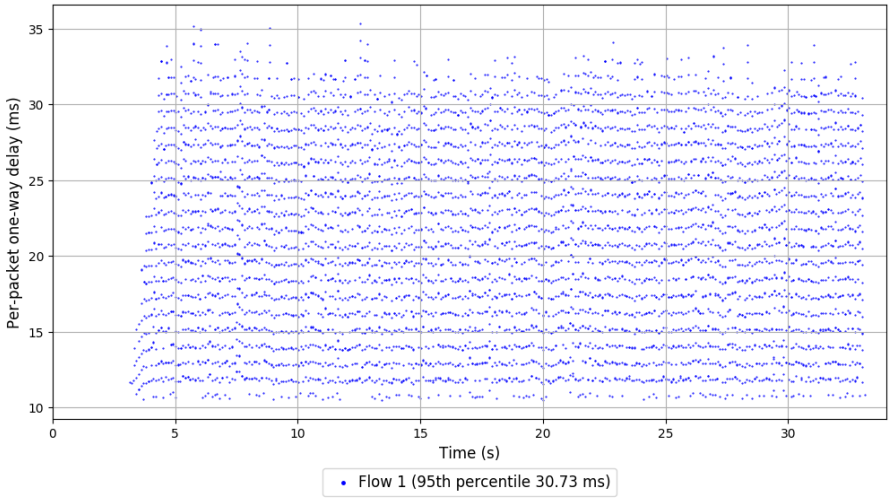
```
Run 3: Statistics of LEDBAT

Start at: 2018-10-02 09:05:43
End at: 2018-10-02 09:06:13

# Below is generated by plot.py at 2018-10-02 09:13:27
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 2.42 Mbit/s (20.2% utilization)
95th percentile per-packet one-way delay: 30.728 ms
Loss rate: 0.35%
-- Flow 1:
Average throughput: 2.42 Mbit/s
95th percentile per-packet one-way delay: 30.728 ms
Loss rate: 0.35%
```

Run 3: Report of LEDBAT — Data Link



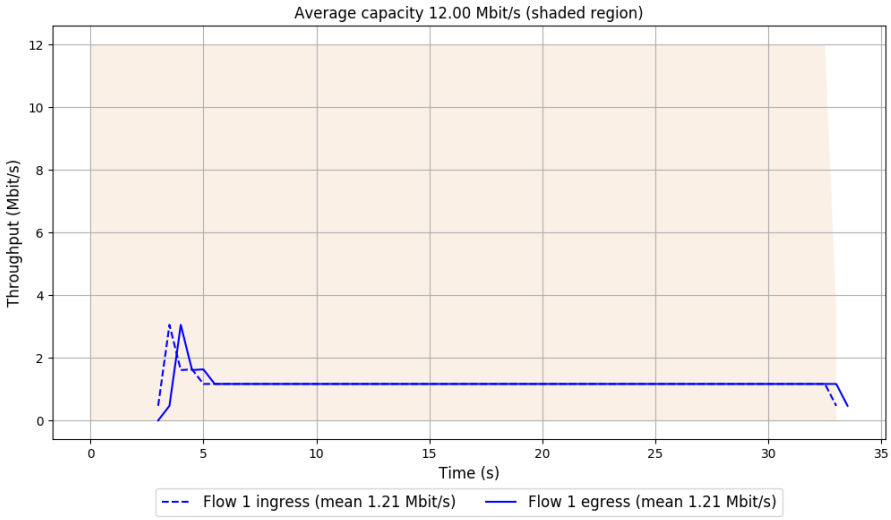


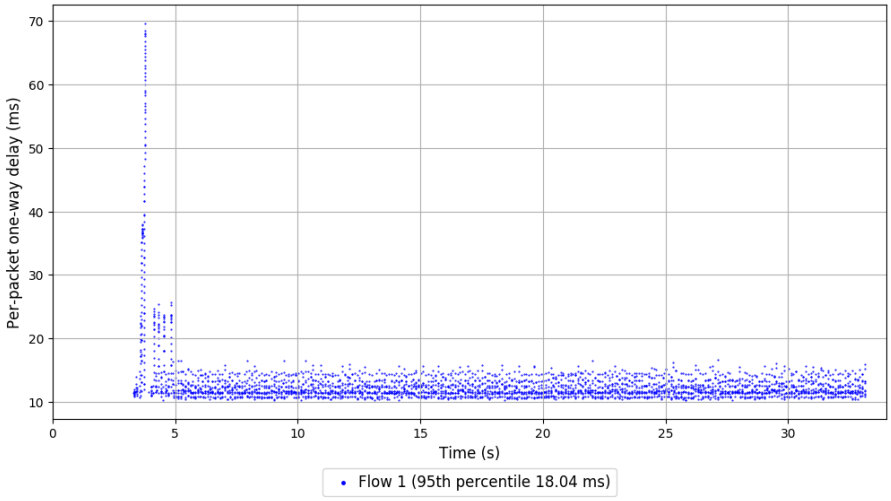
```
Run 1: Statistics of Indigo-Muses

Start at: 2018-10-02 08:42:21
End at: 2018-10-02 08:42:51

# Below is generated by plot.py at 2018-10-02 09:13:27
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.21 Mbit/s (10.1% utilization)
95th percentile per-packet one-way delay: 18.039 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.21 Mbit/s
95th percentile per-packet one-way delay: 18.039 ms
Loss rate: 0.00%
```

Run 1: Report of Indigo-Muses — Data Link



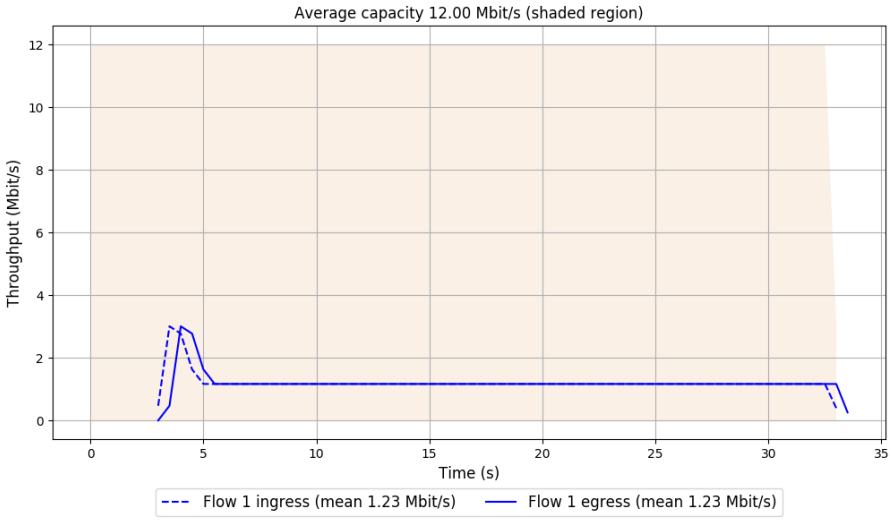


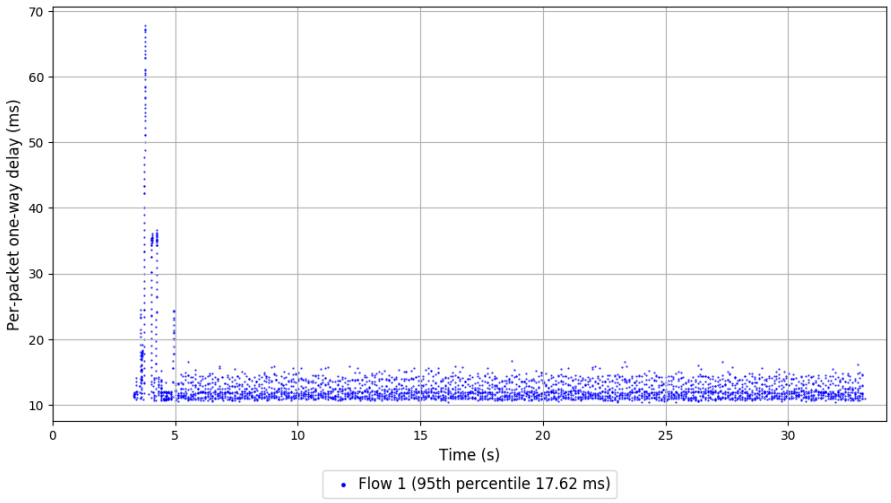
```
Run 2: Statistics of Indigo-Muses

Start at: 2018-10-02 08:52:51
End at: 2018-10-02 08:53:21

# Below is generated by plot.py at 2018-10-02 09:13:30
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.23 Mbit/s (10.3% utilization)
95th percentile per-packet one-way delay: 17.618 ms
Loss rate: 0.19%
-- Flow 1:
Average throughput: 1.23 Mbit/s
95th percentile per-packet one-way delay: 17.618 ms
Loss rate: 0.19%
```

Run 2: Report of Indigo-Muses — Data Link



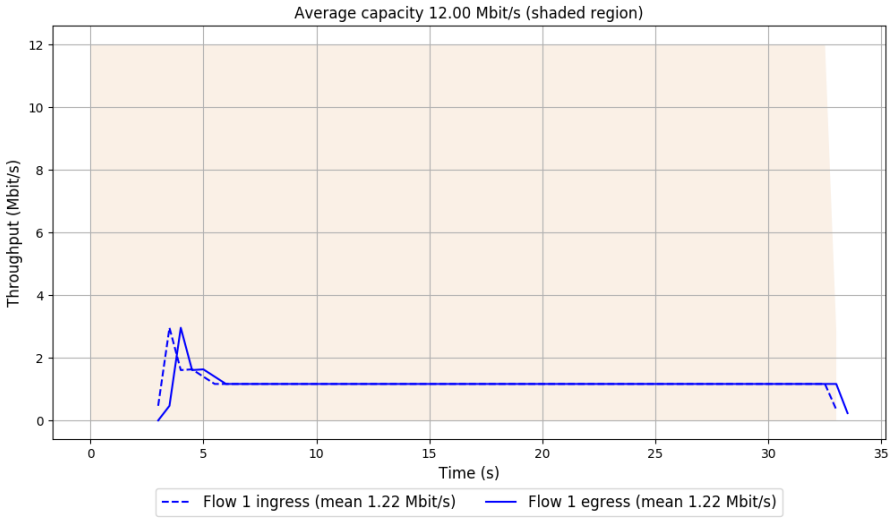


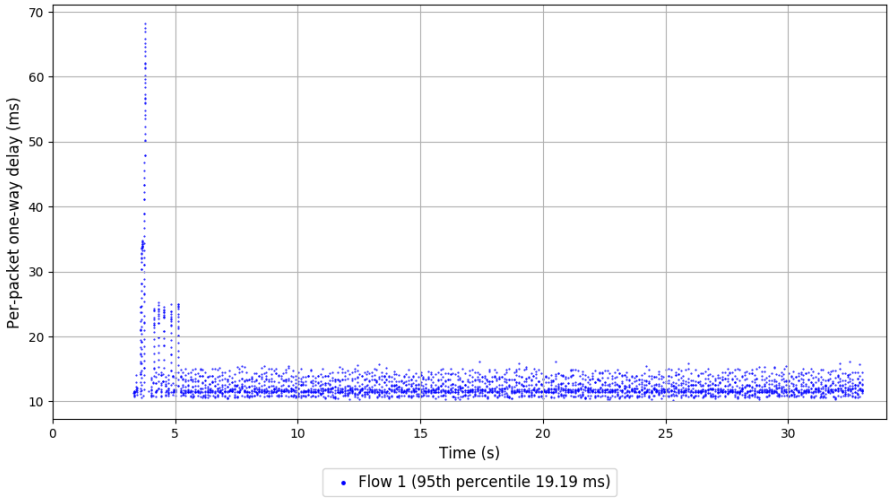
```
Run 3: Statistics of Indigo-Muses

Start at: 2018-10-02 09:03:23
End at: 2018-10-02 09:03:53

# Below is generated by plot.py at 2018-10-02 09:13:30
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.22 Mbit/s (10.1% utilization)
95th percentile per-packet one-way delay: 19.190 ms
Loss rate: 0.16%
-- Flow 1:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 19.190 ms
Loss rate: 0.16%
```

Run 3: Report of Indigo-Muses — Data Link



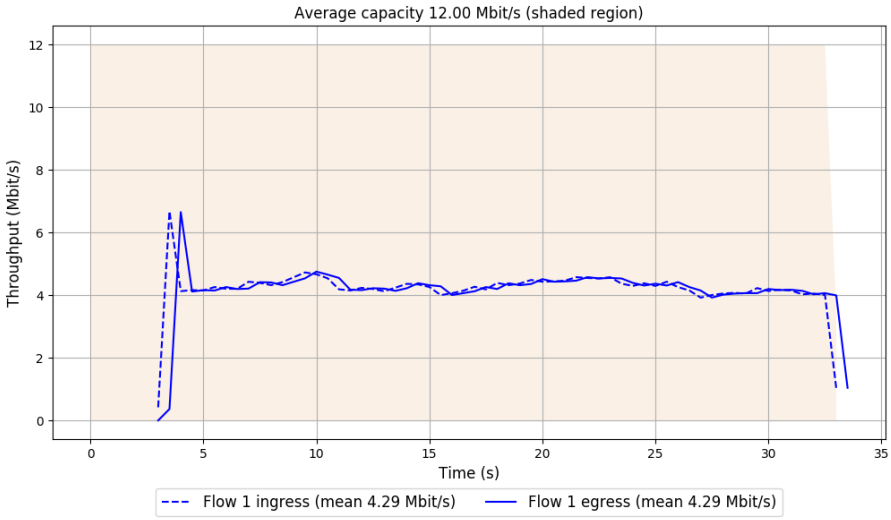


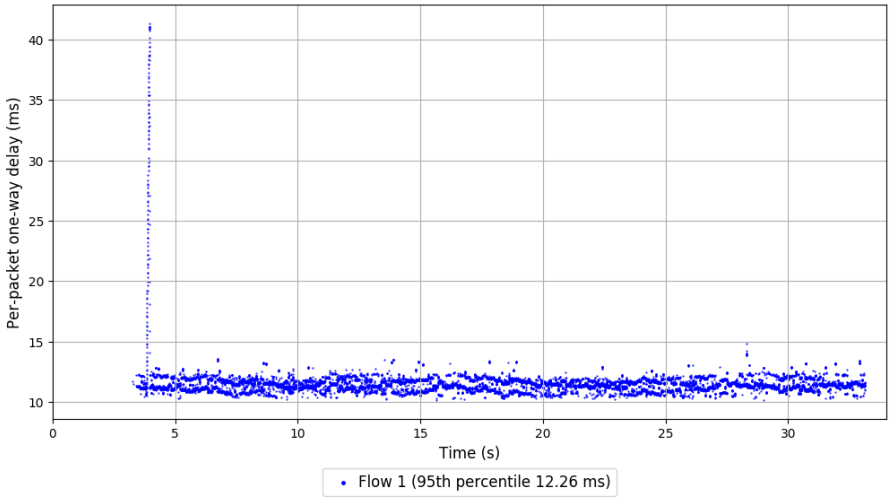
```
Run 1: Statistics of PCC-Allegro

Start at: 2018-10-02 08:49:56
End at: 2018-10-02 08:50:26

# Below is generated by plot.py at 2018-10-02 09:13:35
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 4.29 Mbit/s (35.7% utilization)
95th percentile per-packet one-way delay: 12.259 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 4.29 Mbit/s
95th percentile per-packet one-way delay: 12.259 ms
Loss rate: 0.04%
```

Run 1: Report of PCC-Allegro — Data Link



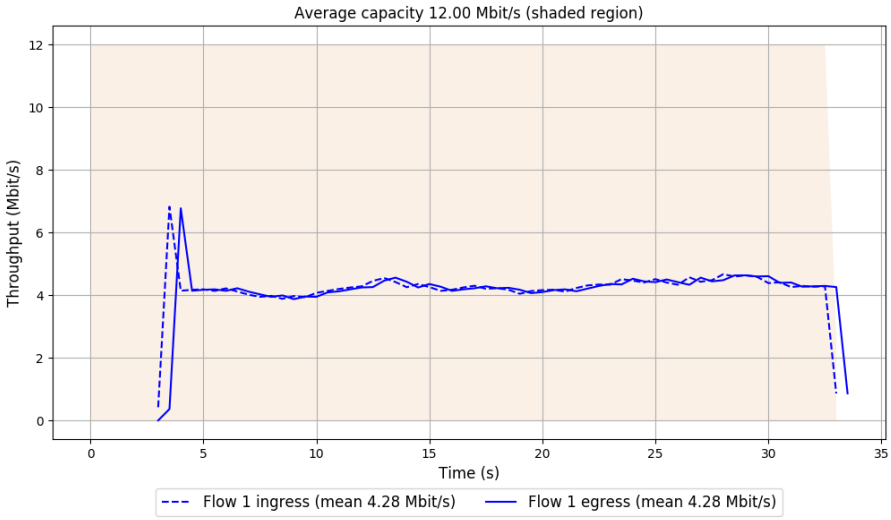


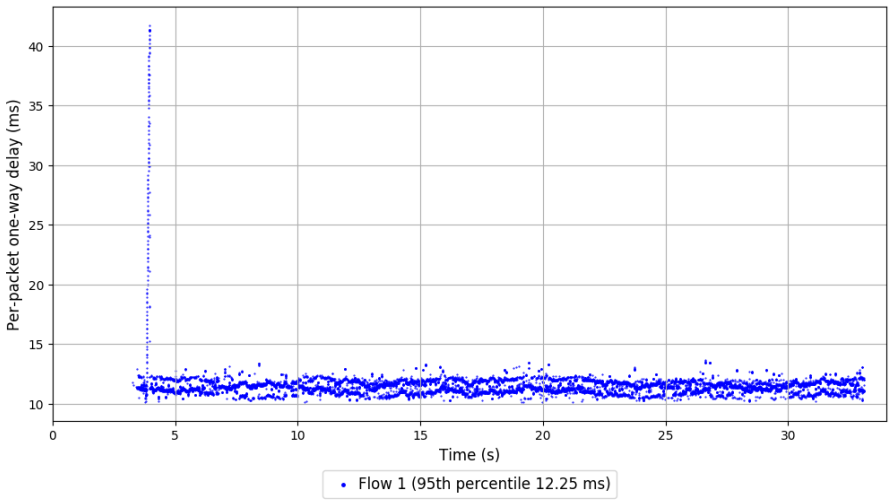
```
Run 2: Statistics of PCC-Allegro

Start at: 2018-10-02 09:00:27
End at: 2018-10-02 09:00:57

# Below is generated by plot.py at 2018-10-02 09:13:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 4.28 Mbit/s (35.7% utilization)
95th percentile per-packet one-way delay: 12.247 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 4.28 Mbit/s
95th percentile per-packet one-way delay: 12.247 ms
Loss rate: 0.04%
```

Run 2: Report of PCC-Allegro — Data Link



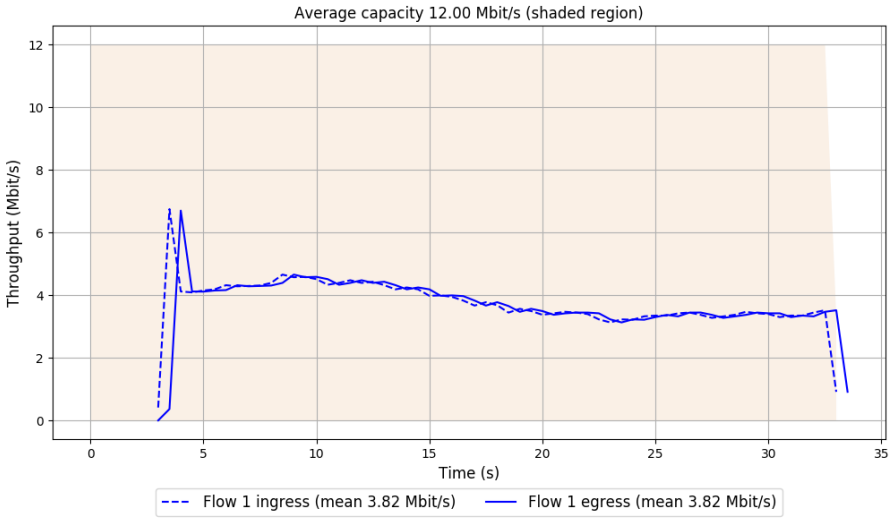


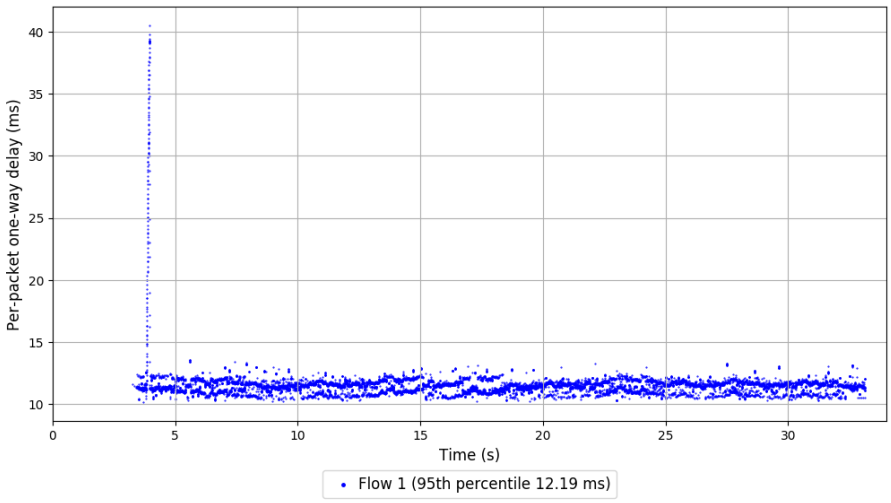
```
Run 3: Statistics of PCC-Allegro

Start at: 2018-10-02 09:10:58
End at: 2018-10-02 09:11:28

# Below is generated by plot.py at 2018-10-02 09:13:38
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 3.82 Mbit/s (31.8% utilization)
95th percentile per-packet one-way delay: 12.190 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 3.82 Mbit/s
95th percentile per-packet one-way delay: 12.190 ms
Loss rate: 0.03%
```

Run 3: Report of PCC-Allegro — Data Link



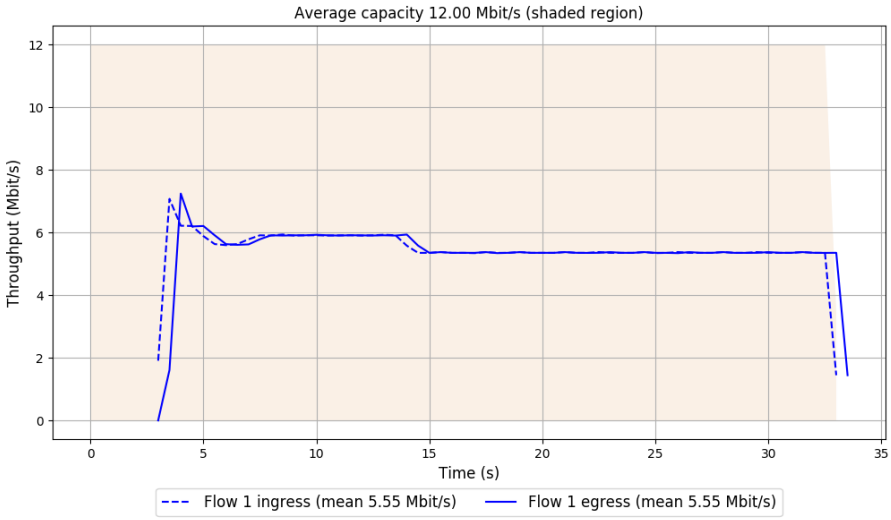


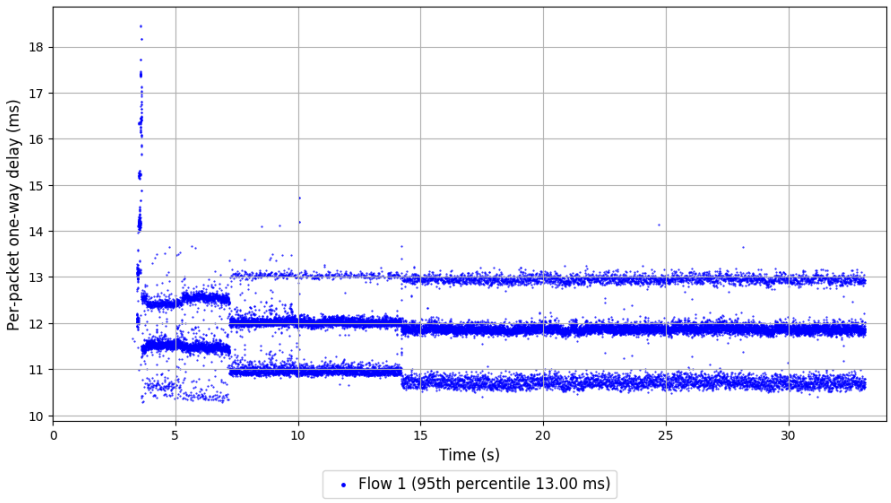
```
Run 1: Statistics of PCC-Expr

Start at: 2018-10-02 08:44:06
End at: 2018-10-02 08:44:36

# Below is generated by plot.py at 2018-10-02 09:13:48
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 5.55 Mbit/s (46.3% utilization)
95th percentile per-packet one-way delay: 13.000 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 5.55 Mbit/s
95th percentile per-packet one-way delay: 13.000 ms
Loss rate: 0.04%
```

Run 1: Report of PCC-Expr — Data Link



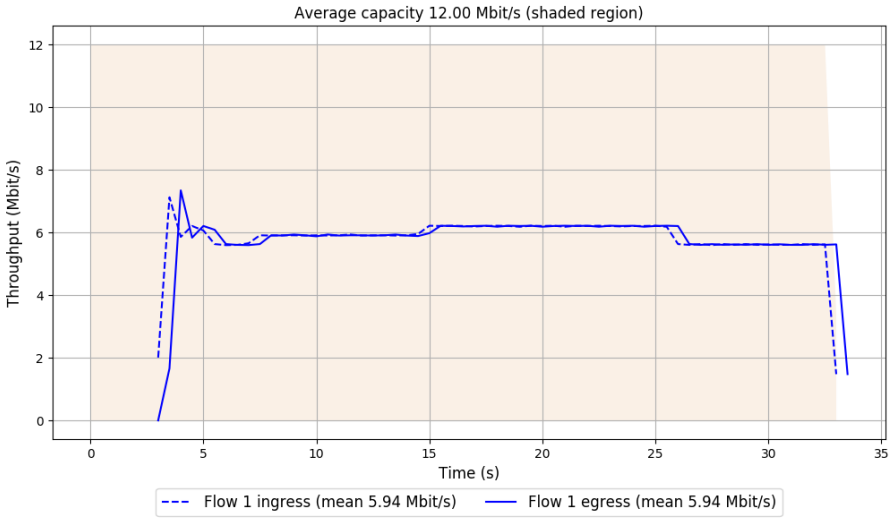


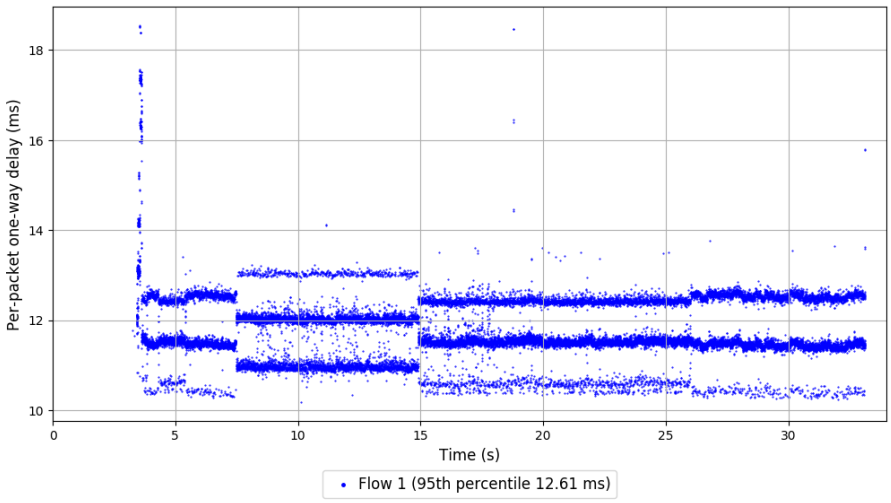
```
Run 2: Statistics of PCC-Expr

Start at: 2018-10-02 08:54:37
End at: 2018-10-02 08:55:07

# Below is generated by plot.py at 2018-10-02 09:13:51
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 5.94 Mbit/s (49.5% utilization)
95th percentile per-packet one-way delay: 12.609 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 5.94 Mbit/s
95th percentile per-packet one-way delay: 12.609 ms
Loss rate: 0.04%
```

Run 2: Report of PCC-Expr — Data Link



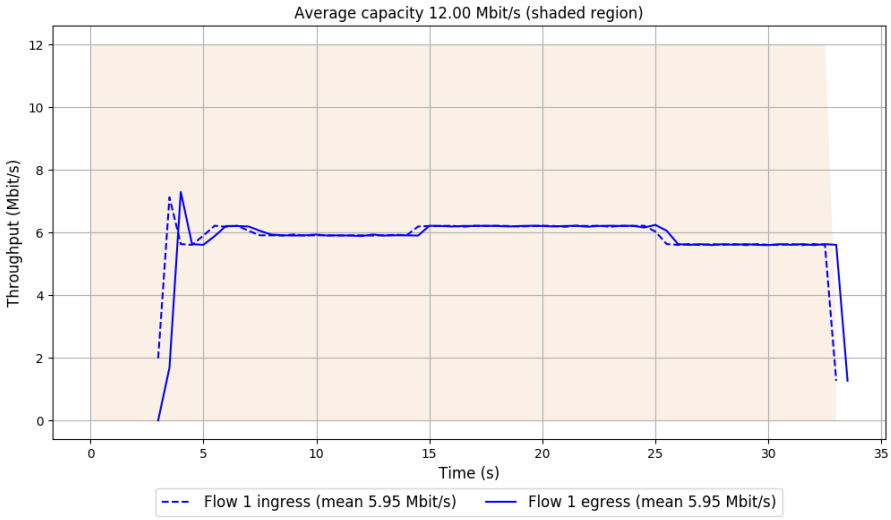


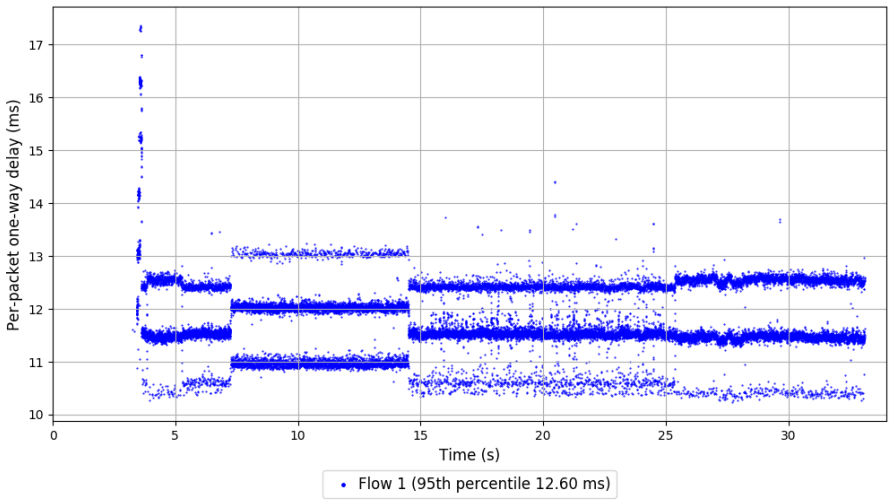
```
Run 3: Statistics of PCC-Expr

Start at: 2018-10-02 09:05:08
End at: 2018-10-02 09:05:38

# Below is generated by plot.py at 2018-10-02 09:13:51
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 5.95 Mbit/s (49.6% utilization)
95th percentile per-packet one-way delay: 12.599 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 5.95 Mbit/s
95th percentile per-packet one-way delay: 12.599 ms
Loss rate: 0.04%
```

Run 3: Report of PCC-Expr — Data Link



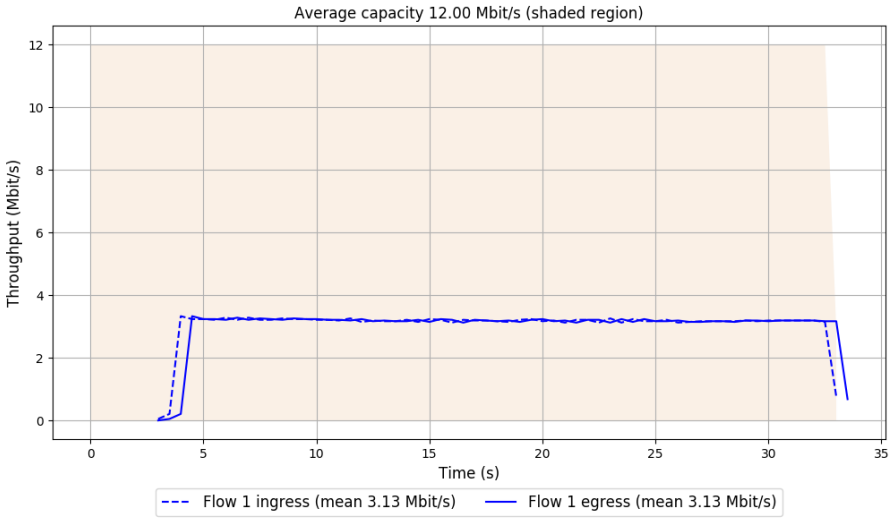


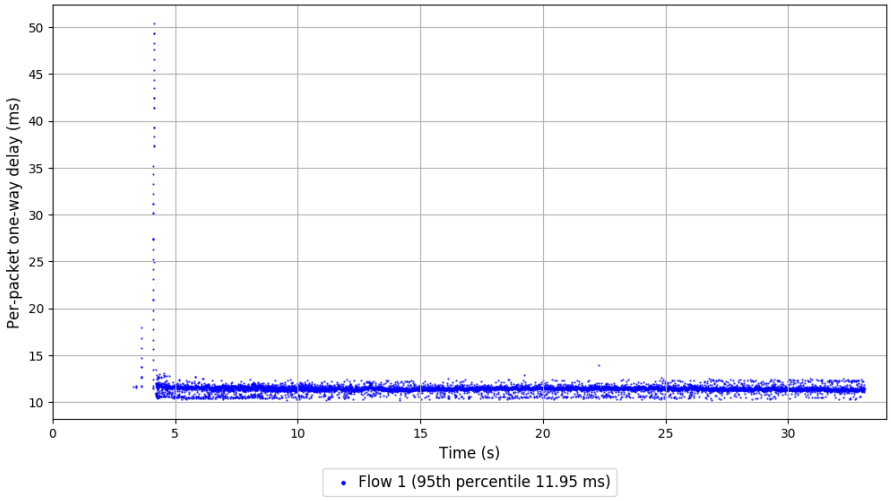
```
Run 1: Statistics of QUIC Cubic

Start at: 2018-10-02 08:45:51
End at: 2018-10-02 08:46:21

# Below is generated by plot.py at 2018-10-02 09:13:51
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 3.13 Mbit/s (26.0% utilization)
95th percentile per-packet one-way delay: 11.950 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 3.13 Mbit/s
95th percentile per-packet one-way delay: 11.950 ms
Loss rate: 0.05%
```

Run 1: Report of QUIC Cubic — Data Link



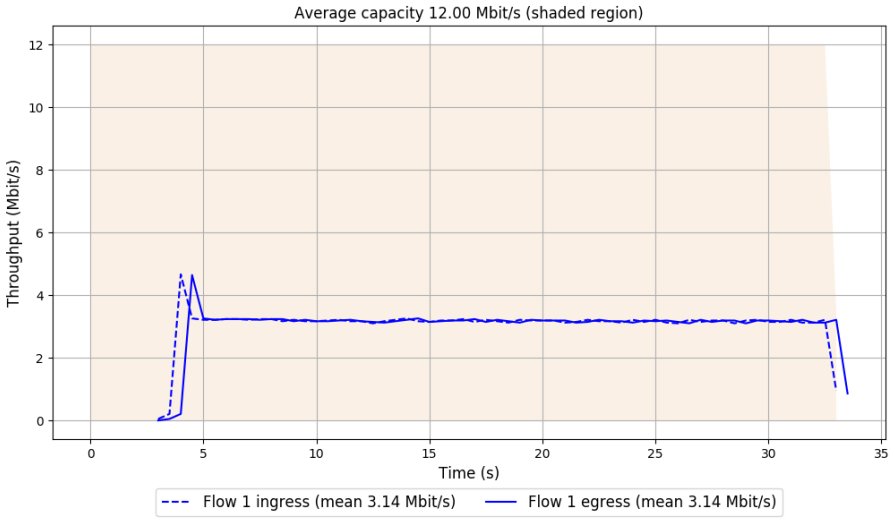


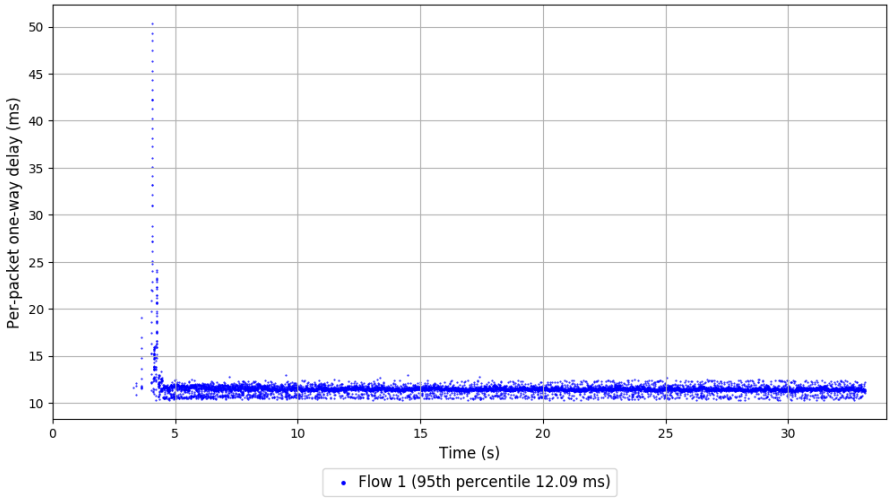
```
Run 2: Statistics of QUIC Cubic

Start at: 2018-10-02 08:56:22
End at: 2018-10-02 08:56:52

# Below is generated by plot.py at 2018-10-02 09:13:51
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 3.14 Mbit/s (26.1% utilization)
95th percentile per-packet one-way delay: 12.093 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 3.14 Mbit/s
95th percentile per-packet one-way delay: 12.093 ms
Loss rate: 0.05%
```

Run 2: Report of QUIC Cubic — Data Link



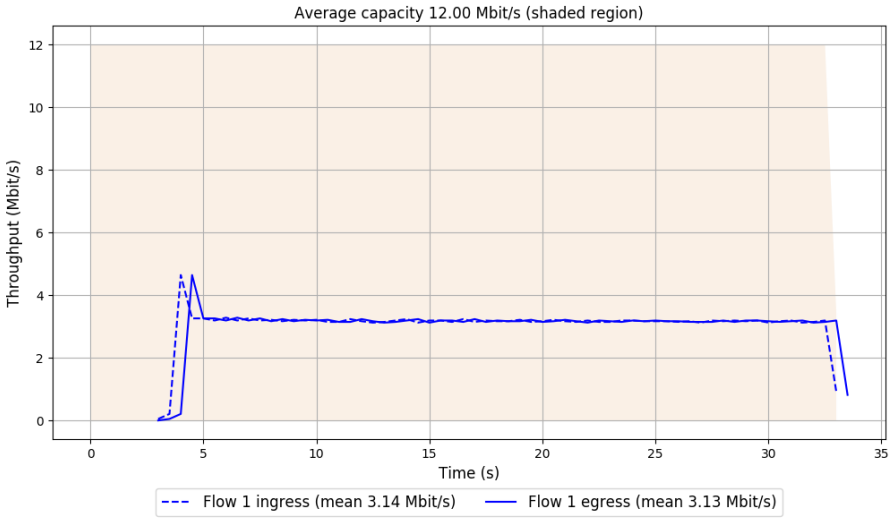


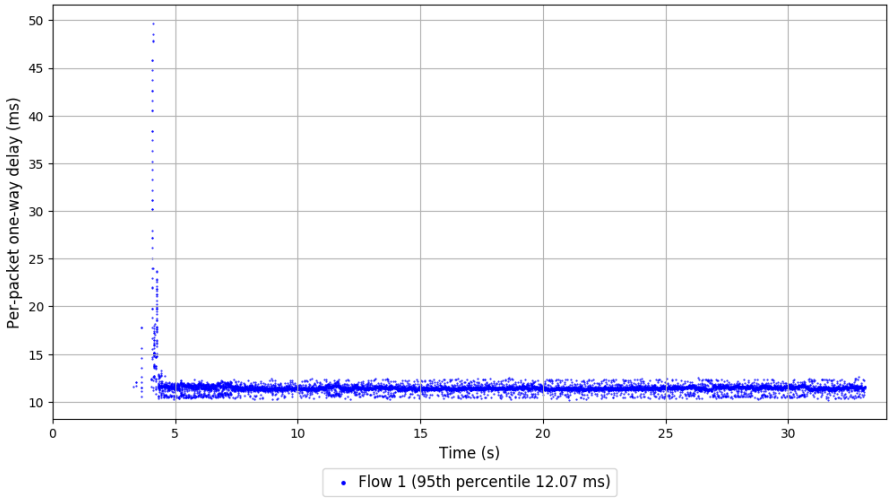
```
Run 3: Statistics of QUIC Cubic

Start at: 2018-10-02 09:06:53
End at: 2018-10-02 09:07:23

# Below is generated by plot.py at 2018-10-02 09:13:51
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 3.13 Mbit/s (26.1% utilization)
95th percentile per-packet one-way delay: 12.072 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 3.13 Mbit/s
95th percentile per-packet one-way delay: 12.072 ms
Loss rate: 0.06%
```

Run 3: Report of QUIC Cubic — Data Link



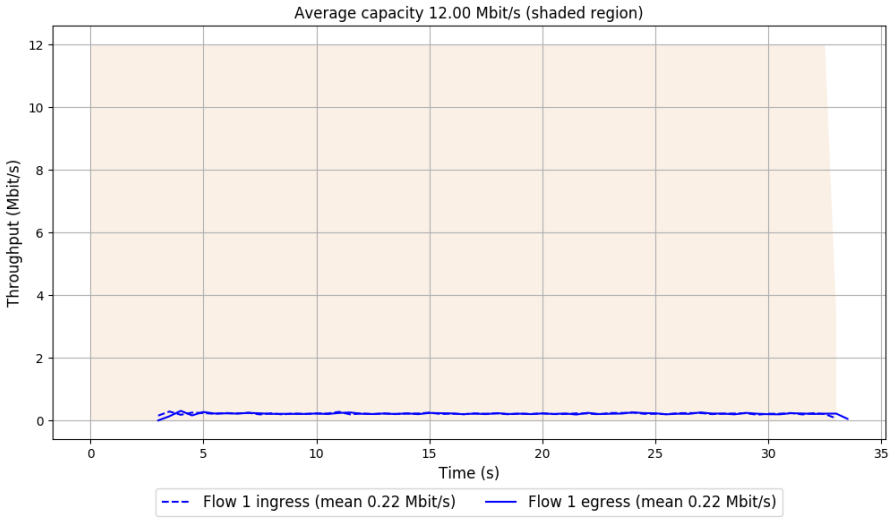


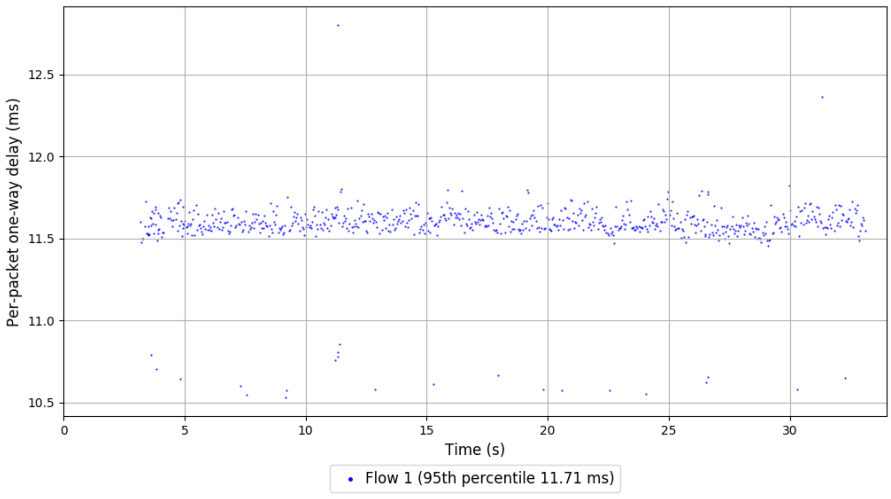
```
Run 1: Statistics of SCReAM

Start at: 2018-10-02 08:49:21
End at: 2018-10-02 08:49:51

# Below is generated by plot.py at 2018-10-02 09:13:51
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 0.22 Mbit/s (1.8% utilization)
95th percentile per-packet one-way delay: 11.706 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 11.706 ms
Loss rate: 0.13%
```

Run 1: Report of SCReAM — Data Link



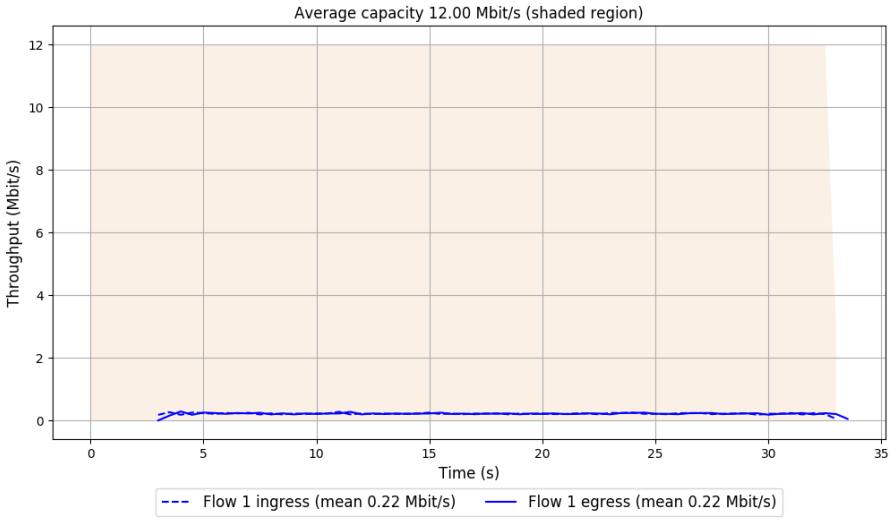


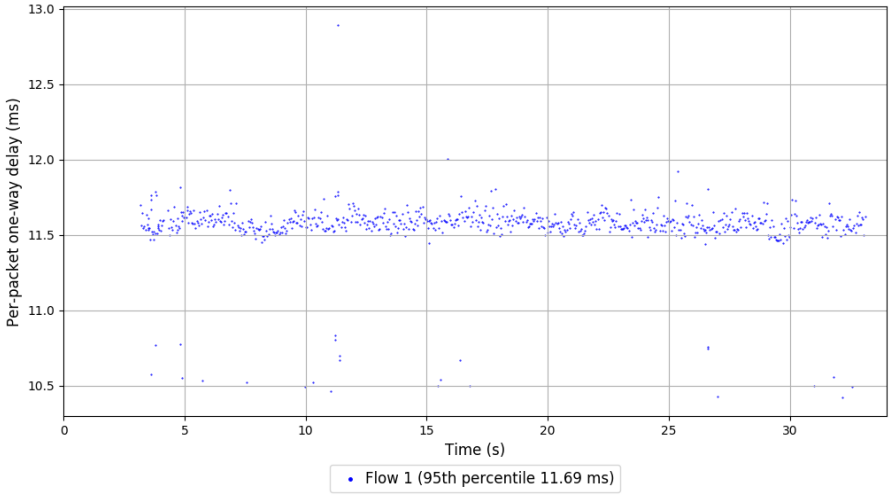
```
Run 2: Statistics of SCReAM

Start at: 2018-10-02 08:59:52
End at: 2018-10-02 09:00:22

# Below is generated by plot.py at 2018-10-02 09:13:51
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 0.22 Mbit/s (1.8% utilization)
95th percentile per-packet one-way delay: 11.690 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 11.690 ms
Loss rate: 0.00%
```

Run 2: Report of SCReAM — Data Link



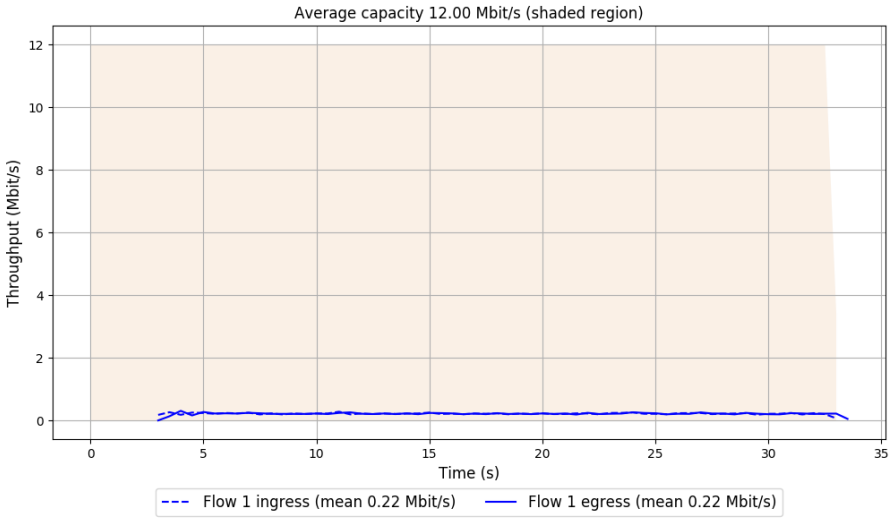


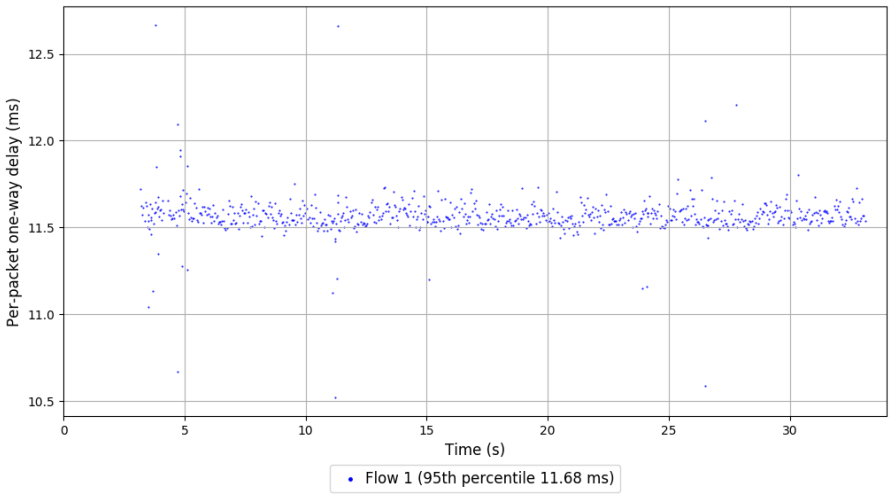
```
Run 3: Statistics of SCReAM

Start at: 2018-10-02 09:10:23
End at: 2018-10-02 09:10:53

# Below is generated by plot.py at 2018-10-02 09:13:51
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 0.22 Mbit/s (1.8% utilization)
95th percentile per-packet one-way delay: 11.676 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 11.676 ms
Loss rate: 0.13%
```

Run 3: Report of SCReAM — Data Link



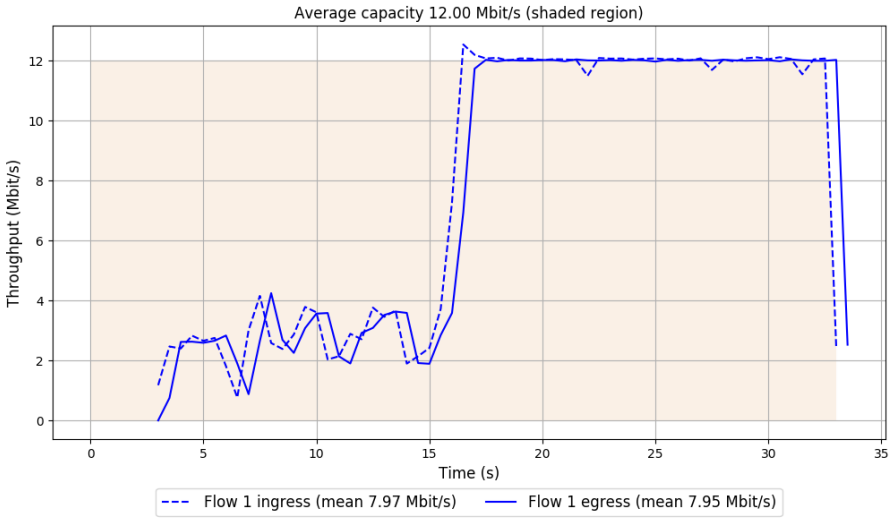


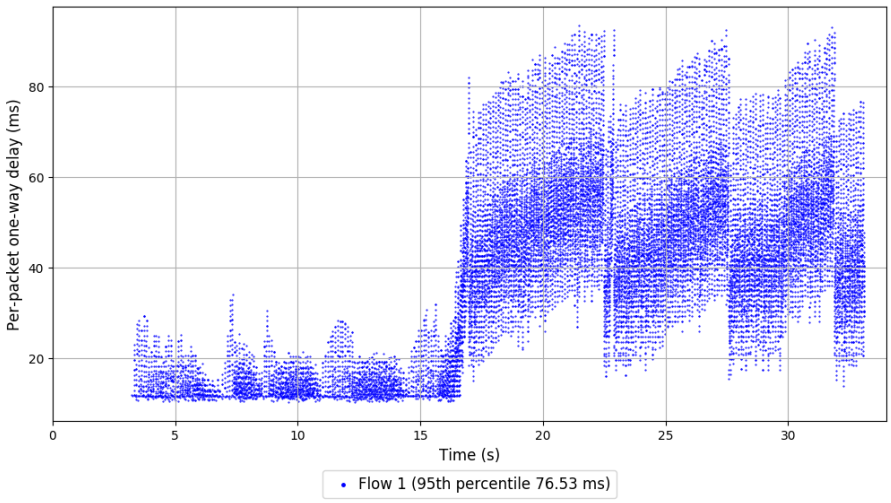
```
Run 1: Statistics of Sprout

Start at: 2018-10-02 08:41:11
End at: 2018-10-02 08:41:41

# Below is generated by plot.py at 2018-10-02 09:14:02
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 7.95 Mbit/s (66.2% utilization)
95th percentile per-packet one-way delay: 76.534 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 7.95 Mbit/s
95th percentile per-packet one-way delay: 76.534 ms
Loss rate: 0.29%
```

Run 1: Report of Sprout — Data Link



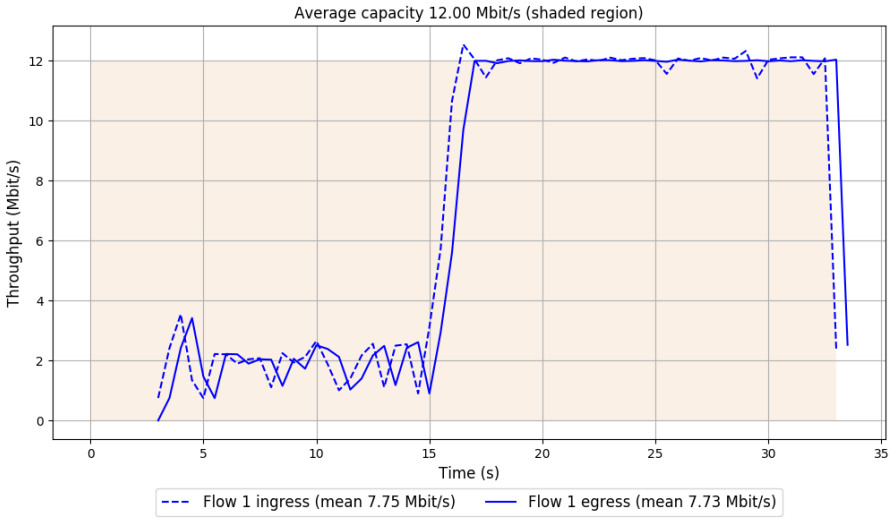


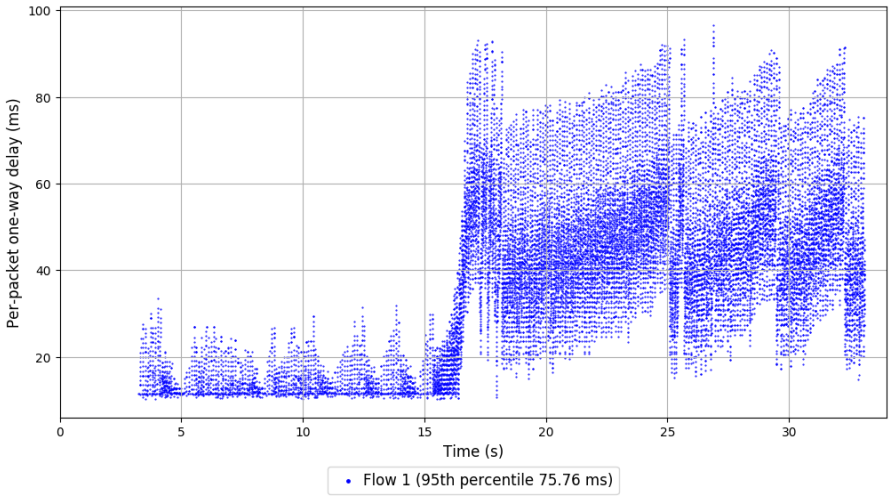
```
Run 2: Statistics of Sprout

Start at: 2018-10-02 08:51:41
End at: 2018-10-02 08:52:11

# Below is generated by plot.py at 2018-10-02 09:14:05
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 7.73 Mbit/s (64.4% utilization)
95th percentile per-packet one-way delay: 75.763 ms
Loss rate: 0.29%
-- Flow 1:
Average throughput: 7.73 Mbit/s
95th percentile per-packet one-way delay: 75.763 ms
Loss rate: 0.29%
```

Run 2: Report of Sprout — Data Link



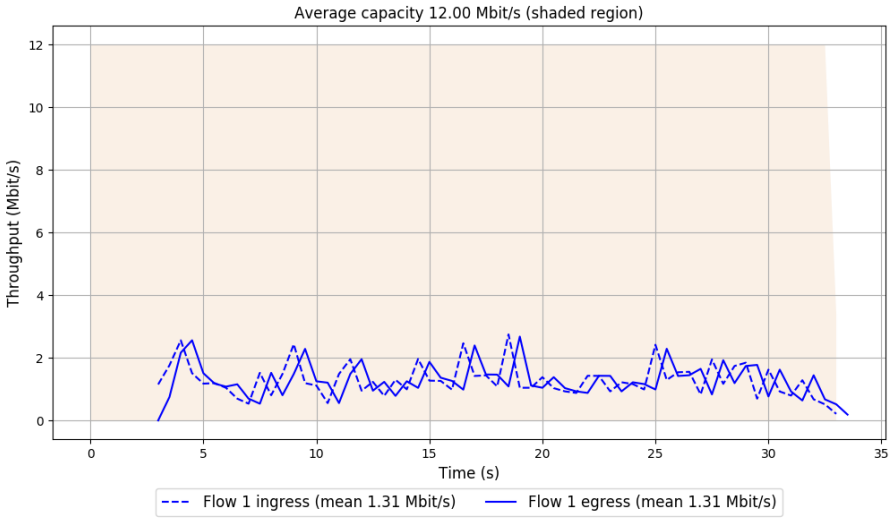


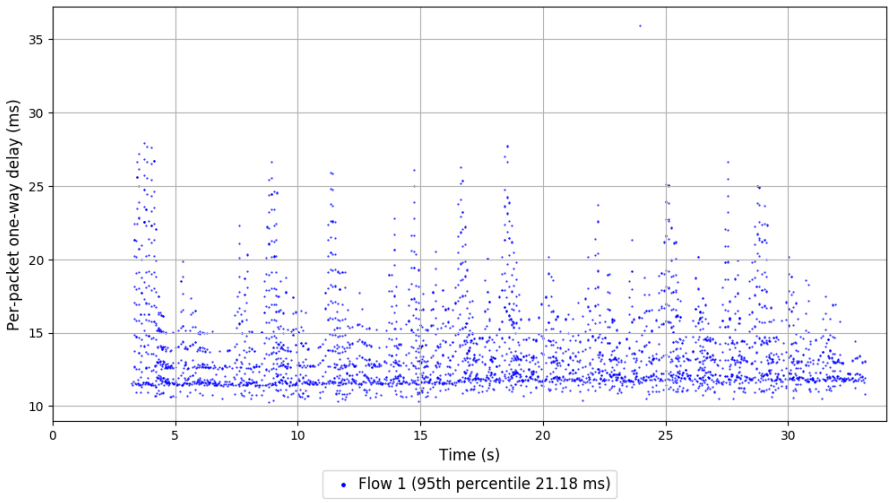
```
Run 3: Statistics of Sprout

Start at: 2018-10-02 09:02:13
End at: 2018-10-02 09:02:43

# Below is generated by plot.py at 2018-10-02 09:14:05
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.31 Mbit/s (10.9% utilization)
95th percentile per-packet one-way delay: 21.184 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 1.31 Mbit/s
95th percentile per-packet one-way delay: 21.184 ms
Loss rate: 0.03%
```

Run 3: Report of Sprout — Data Link



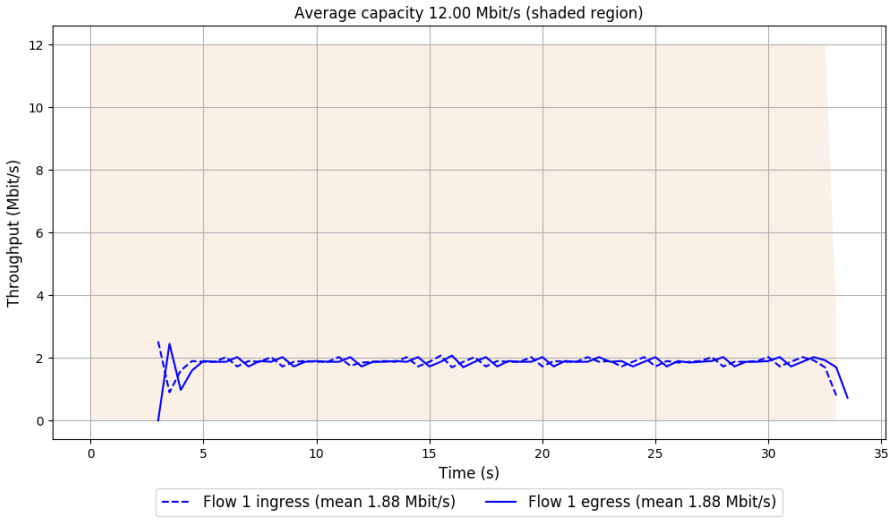


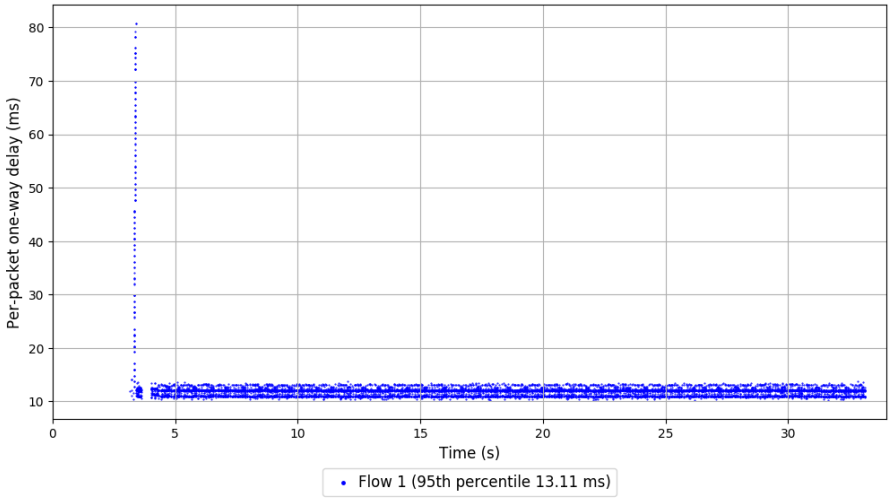
```
Run 1: Statistics of TaoVA-100x

Start at: 2018-10-02 08:50:31
End at: 2018-10-02 08:51:01

# Below is generated by plot.py at 2018-10-02 09:14:05
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.88 Mbit/s (15.7% utilization)
95th percentile per-packet one-way delay: 13.108 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 1.88 Mbit/s
95th percentile per-packet one-way delay: 13.108 ms
Loss rate: 0.07%
```

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



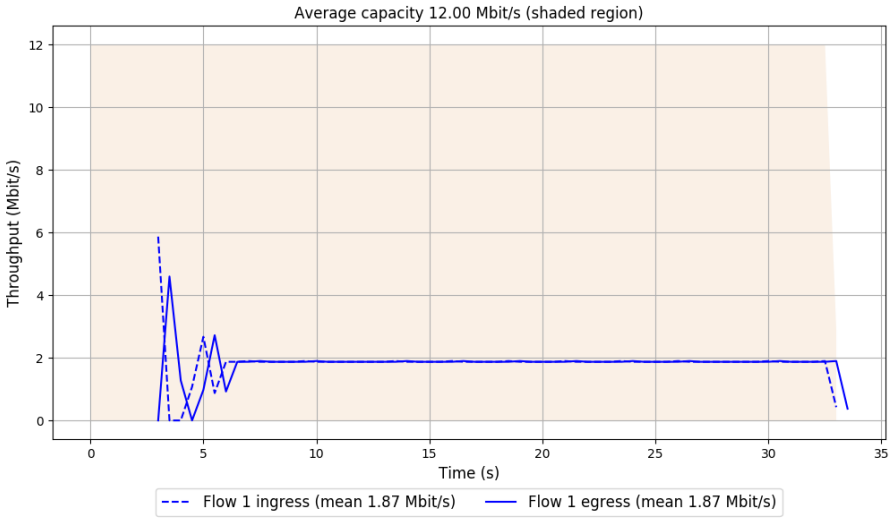


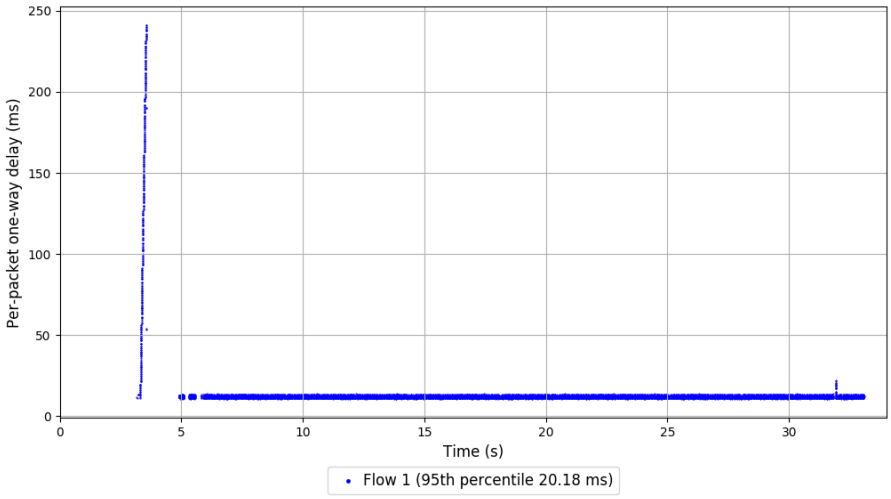
```
Run 2: Statistics of TaoVA-100x

Start at: 2018-10-02 09:01:02
End at: 2018-10-02 09:01:32

# Below is generated by plot.py at 2018-10-02 09:14:05
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.87 Mbit/s (15.6% utilization)
95th percentile per-packet one-way delay: 20.177 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 1.87 Mbit/s
95th percentile per-packet one-way delay: 20.177 ms
Loss rate: 0.04%
```

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



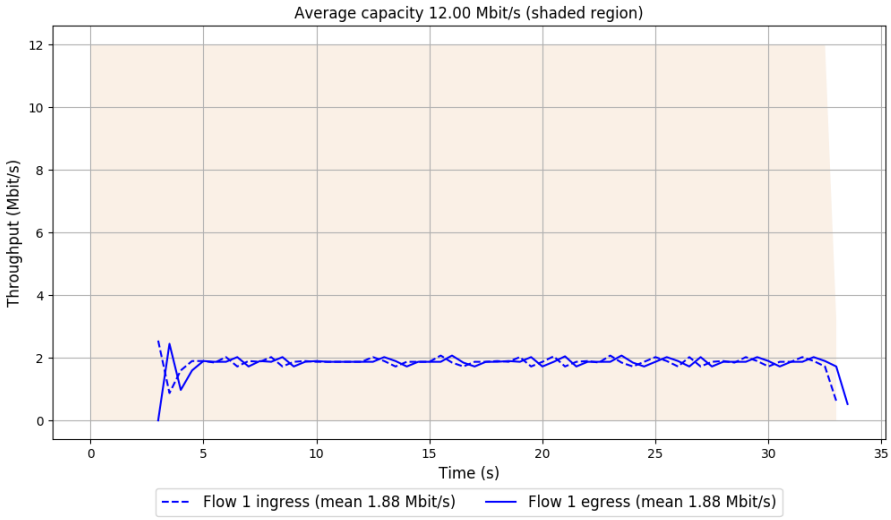


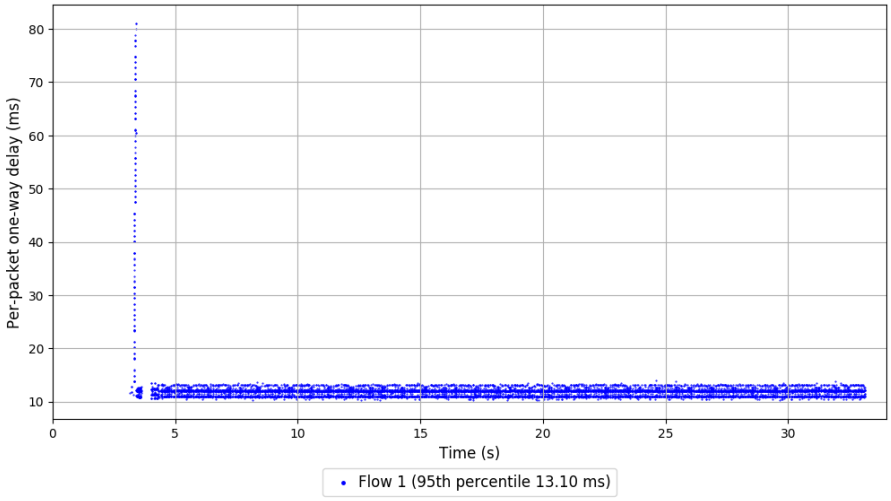
```
Run 3: Statistics of TaoVA-100x

Start at: 2018-10-02 09:11:33
End at: 2018-10-02 09:12:03

# Below is generated by plot.py at 2018-10-02 09:14:05
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.88 Mbit/s (15.6% utilization)
95th percentile per-packet one-way delay: 13.099 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 1.88 Mbit/s
95th percentile per-packet one-way delay: 13.099 ms
Loss rate: 0.09%
```

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



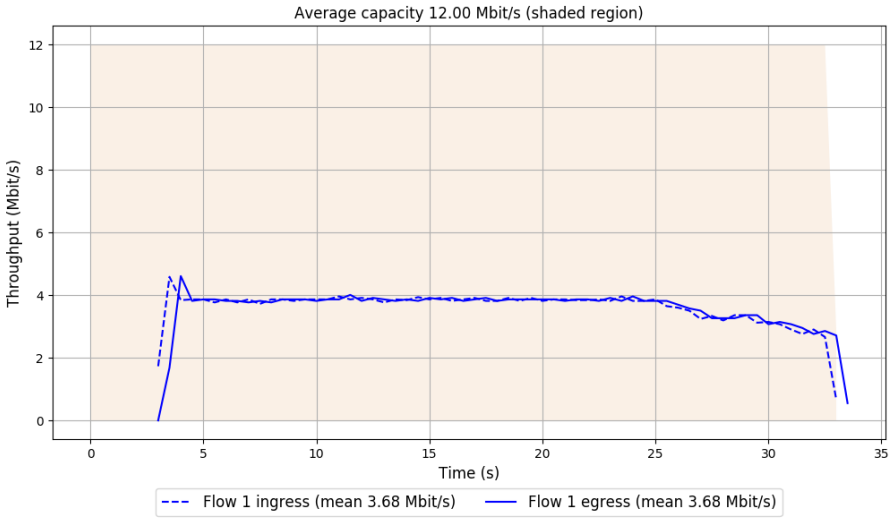


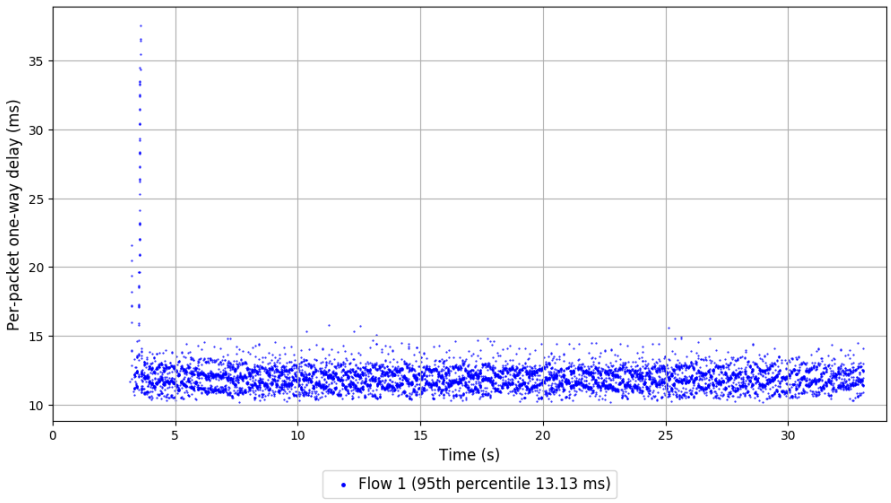
```
Run 1: Statistics of TCP Vegas

Start at: 2018-10-02 08:47:36
End at: 2018-10-02 08:48:06

# Below is generated by plot.py at 2018-10-02 09:14:05
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 3.68 Mbit/s (30.7% utilization)
95th percentile per-packet one-way delay: 13.133 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 3.68 Mbit/s
95th percentile per-packet one-way delay: 13.133 ms
Loss rate: 0.05%
```

Run 1: Report of TCP Vegas — Data Link



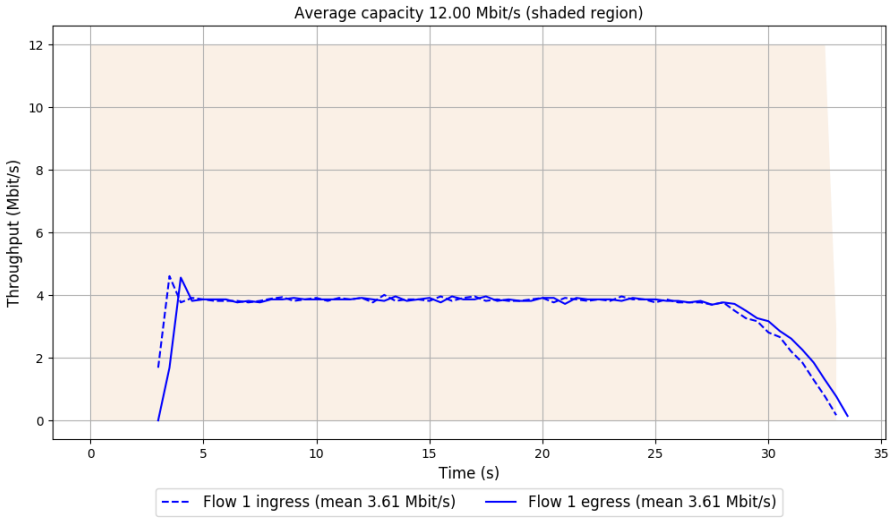


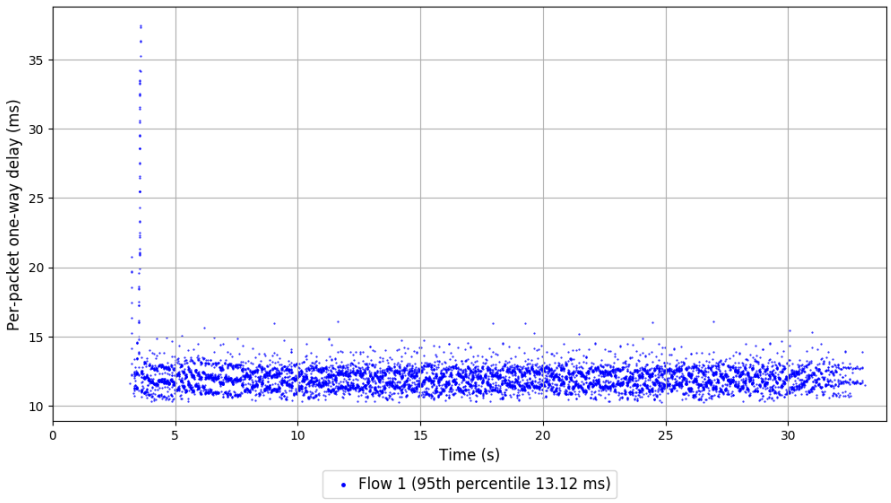
```
Run 2: Statistics of TCP Vegas

Start at: 2018-10-02 08:58:07
End at: 2018-10-02 08:58:37

# Below is generated by plot.py at 2018-10-02 09:14:05
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 3.61 Mbit/s (30.1% utilization)
95th percentile per-packet one-way delay: 13.115 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 3.61 Mbit/s
95th percentile per-packet one-way delay: 13.115 ms
Loss rate: 0.01%
```

Run 2: Report of TCP Vegas — Data Link



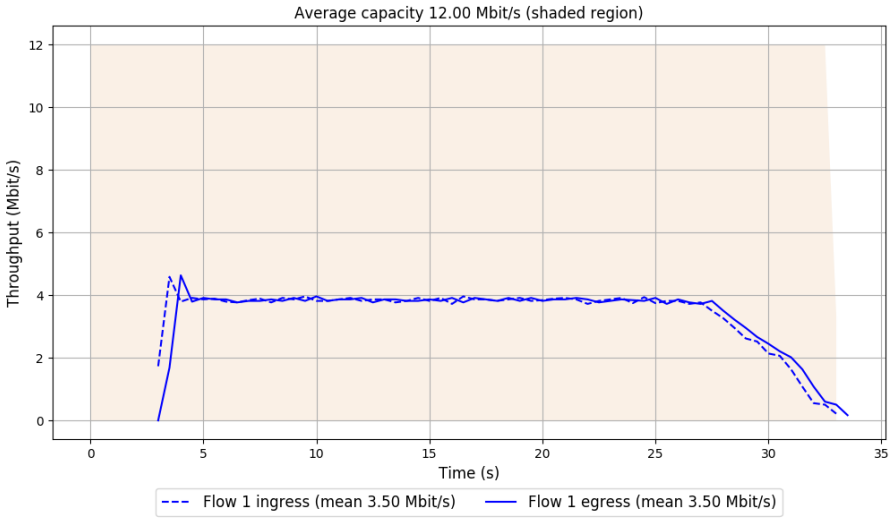


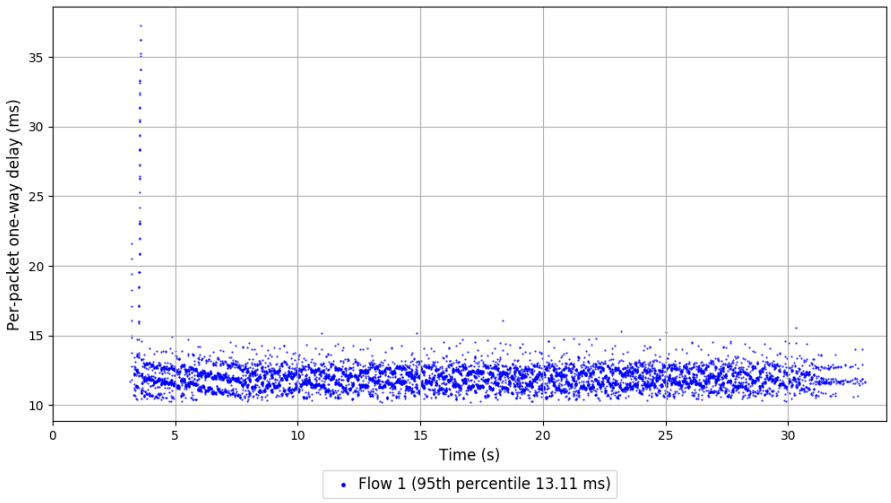
```
Run 3: Statistics of TCP Vegas

Start at: 2018-10-02 09:08:38
End at: 2018-10-02 09:09:08

# Below is generated by plot.py at 2018-10-02 09:14:08
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 3.50 Mbit/s (29.2% utilization)
95th percentile per-packet one-way delay: 13.108 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 3.50 Mbit/s
95th percentile per-packet one-way delay: 13.108 ms
Loss rate: 0.02%
```

Run 3: Report of TCP Vegas — Data Link



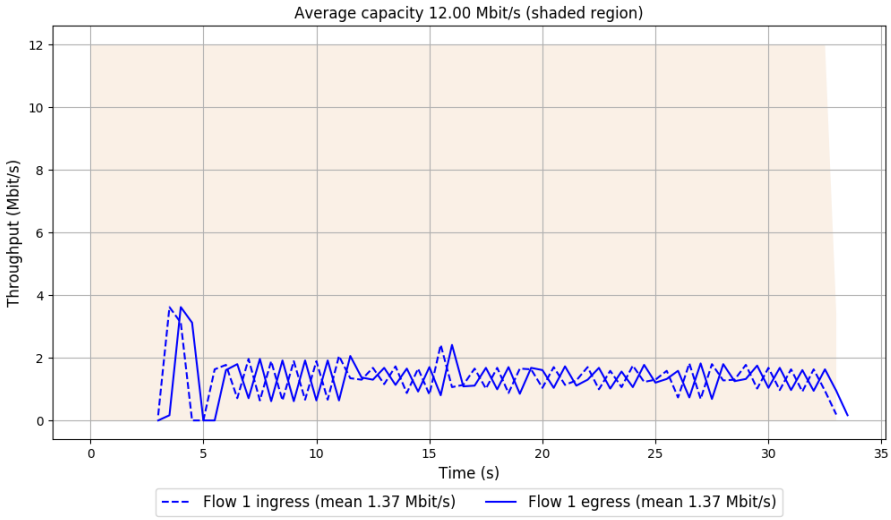


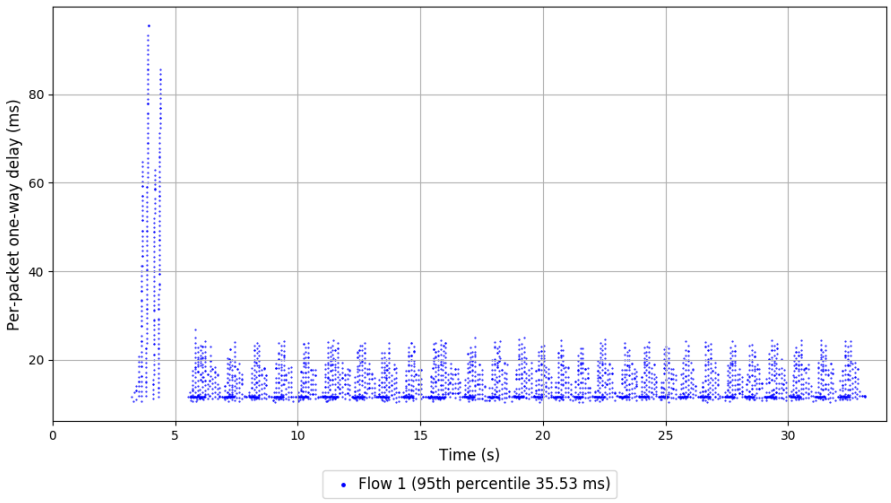
```
Run 1: Statistics of Verus

Start at: 2018-10-02 08:43:31
End at: 2018-10-02 08:44:01

# Below is generated by plot.py at 2018-10-02 09:14:10
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.37 Mbit/s (11.4% utilization)
95th percentile per-packet one-way delay: 35.534 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 1.37 Mbit/s
95th percentile per-packet one-way delay: 35.534 ms
Loss rate: 0.03%
```

Run 1: Report of Verus — Data Link



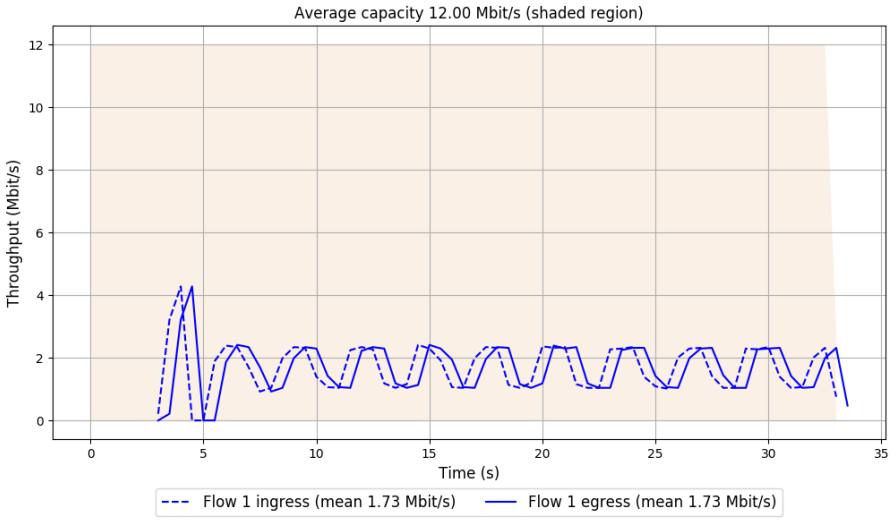


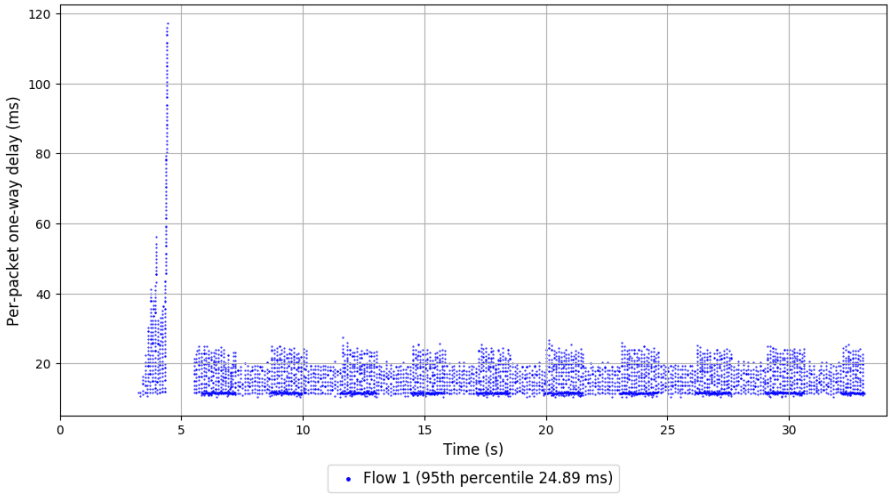
```
Run 2: Statistics of Verus

Start at: 2018-10-02 08:54:02
End at: 2018-10-02 08:54:32

# Below is generated by plot.py at 2018-10-02 09:14:12
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.73 Mbit/s (14.4% utilization)
95th percentile per-packet one-way delay: 24.889 ms
Loss rate: 0.30%
-- Flow 1:
Average throughput: 1.73 Mbit/s
95th percentile per-packet one-way delay: 24.889 ms
Loss rate: 0.30%
```

Run 2: Report of Verus — Data Link



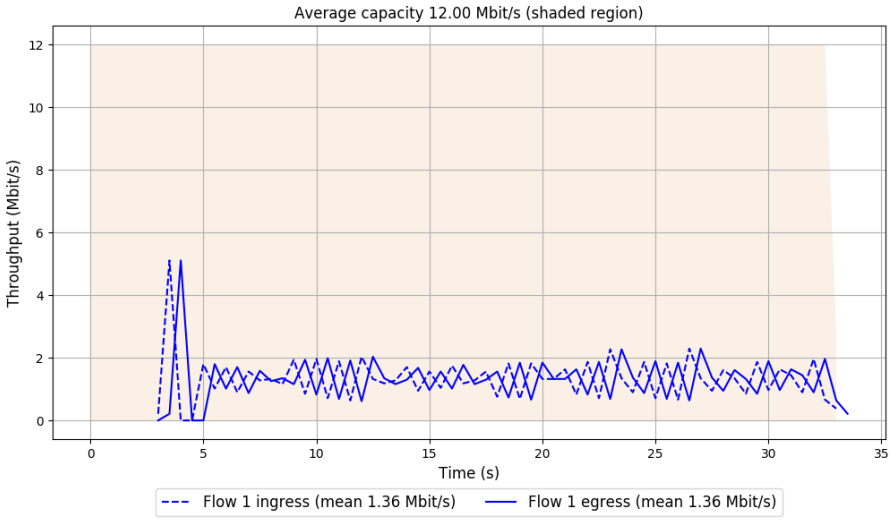


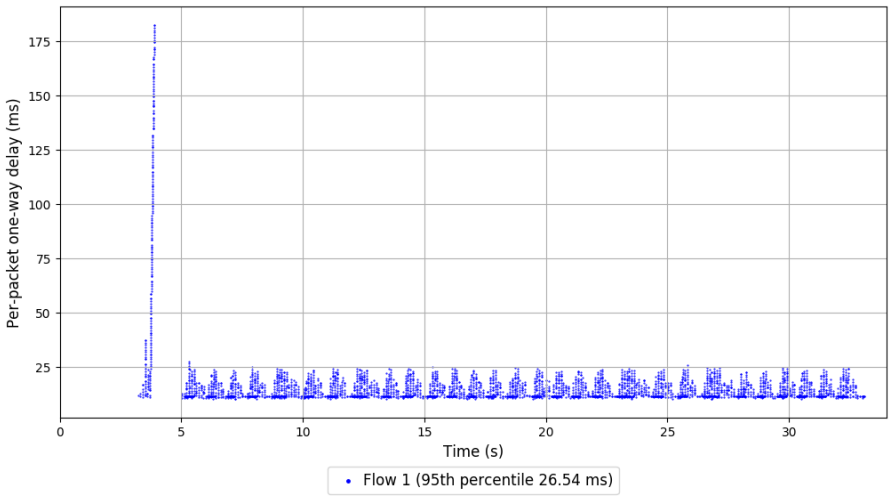
```
Run 3: Statistics of Verus

Start at: 2018-10-02 09:04:33
End at: 2018-10-02 09:05:03

# Below is generated by plot.py at 2018-10-02 09:14:12
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.36 Mbit/s (11.3% utilization)
95th percentile per-packet one-way delay: 26.543 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 1.36 Mbit/s
95th percentile per-packet one-way delay: 26.543 ms
Loss rate: 0.23%
```

Run 3: Report of Verus — Data Link



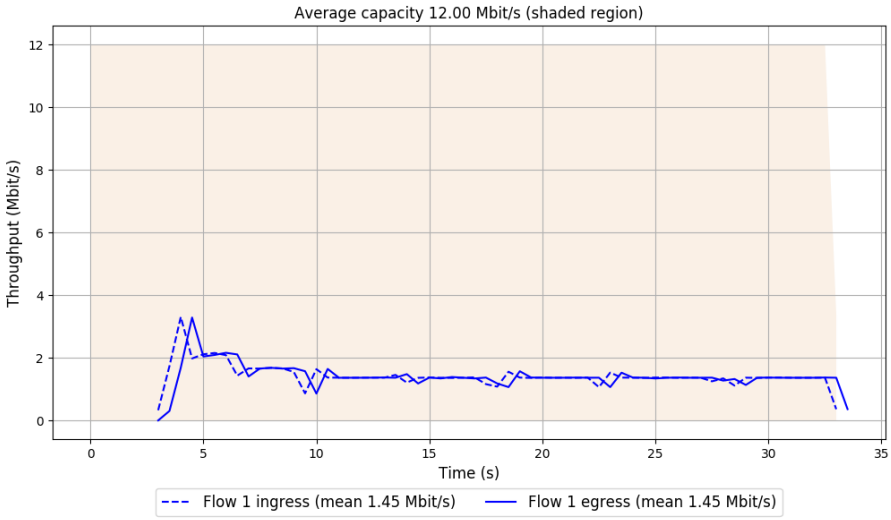


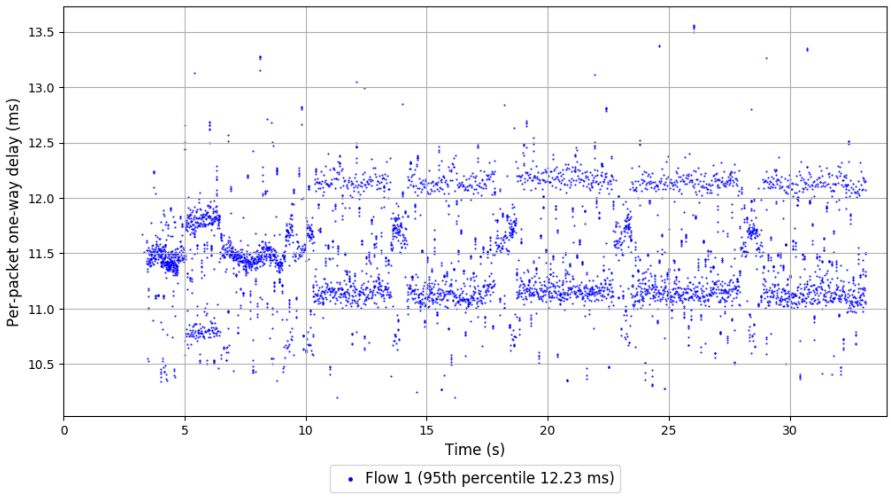
```
Run 1: Statistics of PCC-Vivace

Start at: 2018-10-02 08:48:11
End at: 2018-10-02 08:48:41

# Below is generated by plot.py at 2018-10-02 09:14:14
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.45 Mbit/s (12.1% utilization)
95th percentile per-packet one-way delay: 12.233 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 1.45 Mbit/s
95th percentile per-packet one-way delay: 12.233 ms
Loss rate: 0.03%
```

Run 1: Report of PCC-Vivace — Data Link



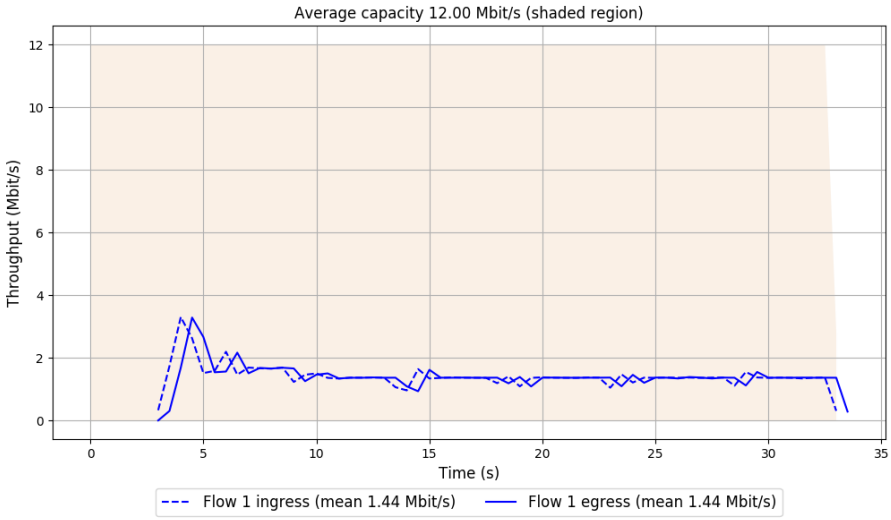


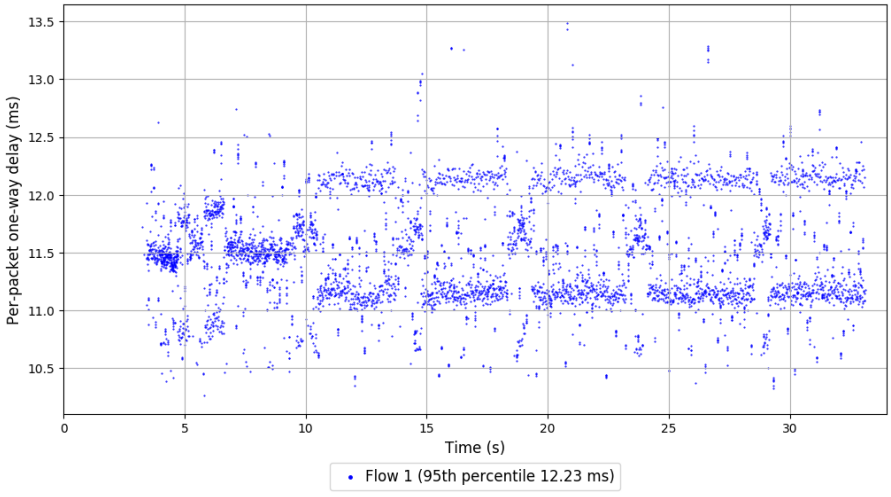
```
Run 2: Statistics of PCC-Vivace

Start at: 2018-10-02 08:58:42
End at: 2018-10-02 08:59:12

# Below is generated by plot.py at 2018-10-02 09:14:15
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.44 Mbit/s (12.0% utilization)
95th percentile per-packet one-way delay: 12.228 ms
Loss rate: 0.06%
-- Flow 1:
Average throughput: 1.44 Mbit/s
95th percentile per-packet one-way delay: 12.228 ms
Loss rate: 0.06%
```

Run 2: Report of PCC-Vivace — Data Link



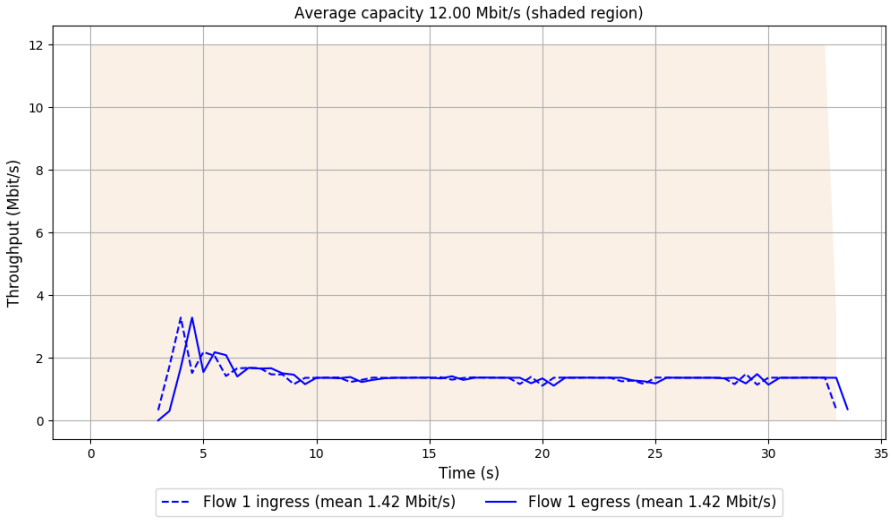


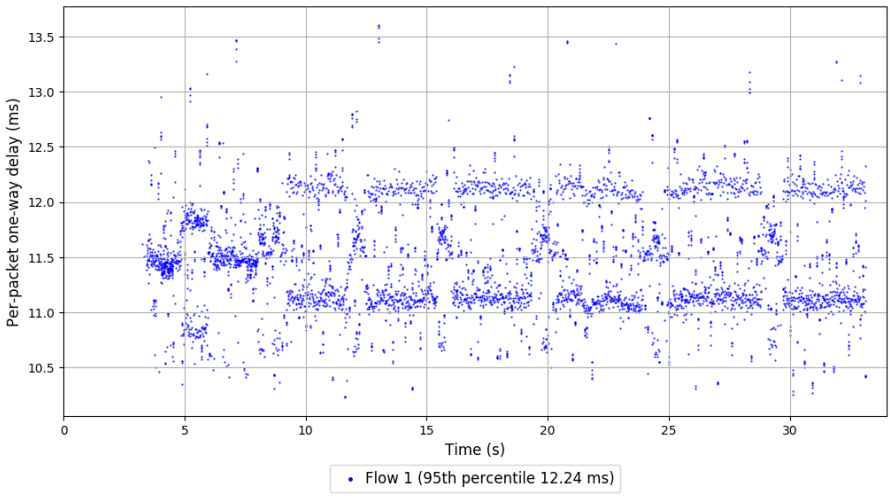
```
Run 3: Statistics of PCC-Vivace

Start at: 2018-10-02 09:09:13
End at: 2018-10-02 09:09:43

# Below is generated by plot.py at 2018-10-02 09:14:15
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.42 Mbit/s (11.8% utilization)
95th percentile per-packet one-way delay: 12.245 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 1.42 Mbit/s
95th percentile per-packet one-way delay: 12.245 ms
Loss rate: 0.03%
```

Run 3: Report of PCC-Vivace — Data Link



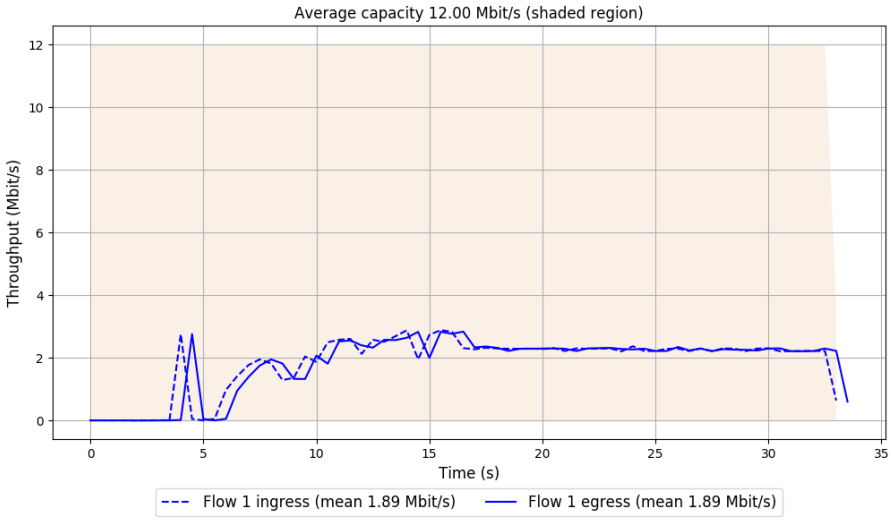


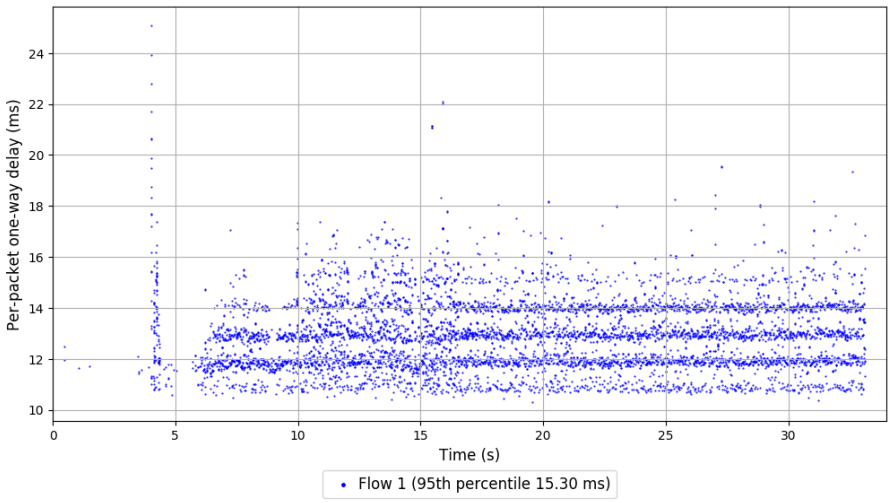
```
Run 1: Statistics of WebRTC media

Start at: 2018-10-02 08:51:06
End at: 2018-10-02 08:51:36

# Below is generated by plot.py at 2018-10-02 09:14:16
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.89 Mbit/s (15.8% utilization)
95th percentile per-packet one-way delay: 15.303 ms
Loss rate: 0.03%
-- Flow 1:
Average throughput: 1.89 Mbit/s
95th percentile per-packet one-way delay: 15.303 ms
Loss rate: 0.03%
```

Run 1: Report of WebRTC media — Data Link



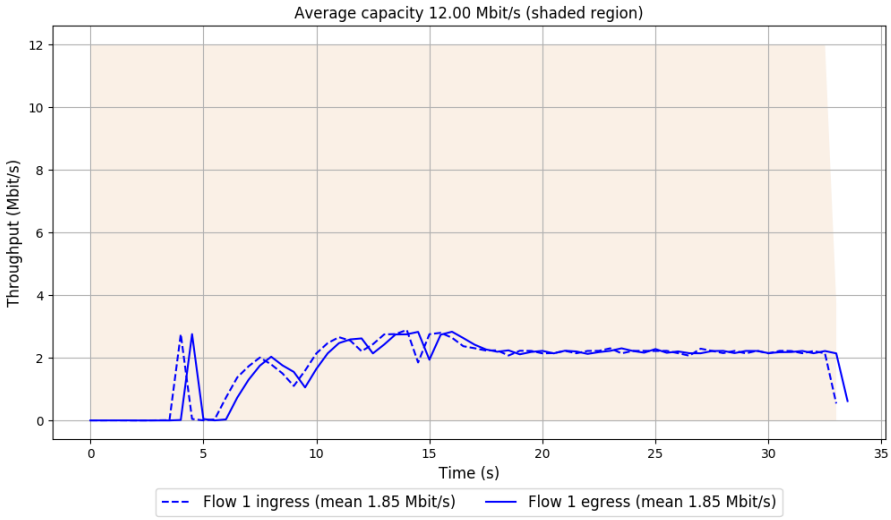


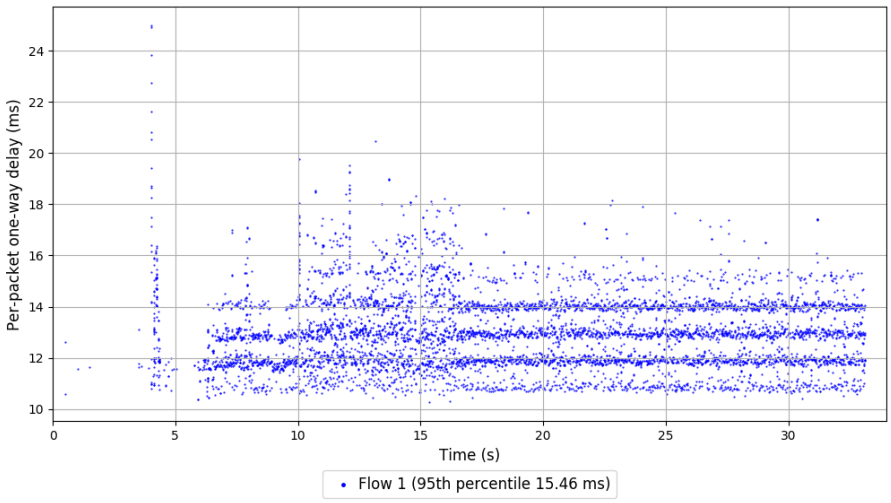
```
Run 2: Statistics of WebRTC media

Start at: 2018-10-02 09:01:37
End at: 2018-10-02 09:02:07

# Below is generated by plot.py at 2018-10-02 09:14:17
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.85 Mbit/s (15.4% utilization)
95th percentile per-packet one-way delay: 15.458 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 1.85 Mbit/s
95th percentile per-packet one-way delay: 15.458 ms
Loss rate: 0.00%
```

Run 2: Report of WebRTC media — Data Link





```
Run 3: Statistics of WebRTC media

Start at: 2018-10-02 09:12:08
End at: 2018-10-02 09:12:38

# Below is generated by plot.py at 2018-10-02 09:14:18
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.84 Mbit/s (15.3% utilization)
95th percentile per-packet one-way delay: 15.496 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 1.84 Mbit/s
95th percentile per-packet one-way delay: 15.496 ms
Loss rate: 0.02%
```

Run 3: Report of WebRTC media — Data Link