Pantheon Report

Generated at 2019-01-17 09:33:50 (UTC).

Tested in mahimahi: `mm-delay 10 mm-link 60mbps.trace 60mbps.trace --uplink-queue=droptail --uplink-queue-args=packets=1 --downlink-queue=droptail --downlink-queue-args=packets=1`

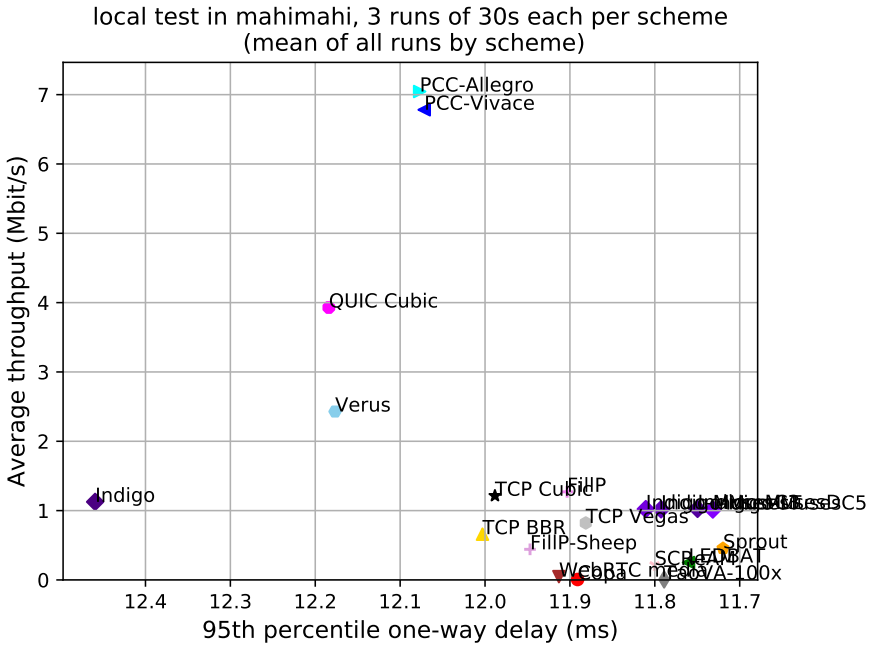
Repeated the test of 21 congestion control schemes 3 times.

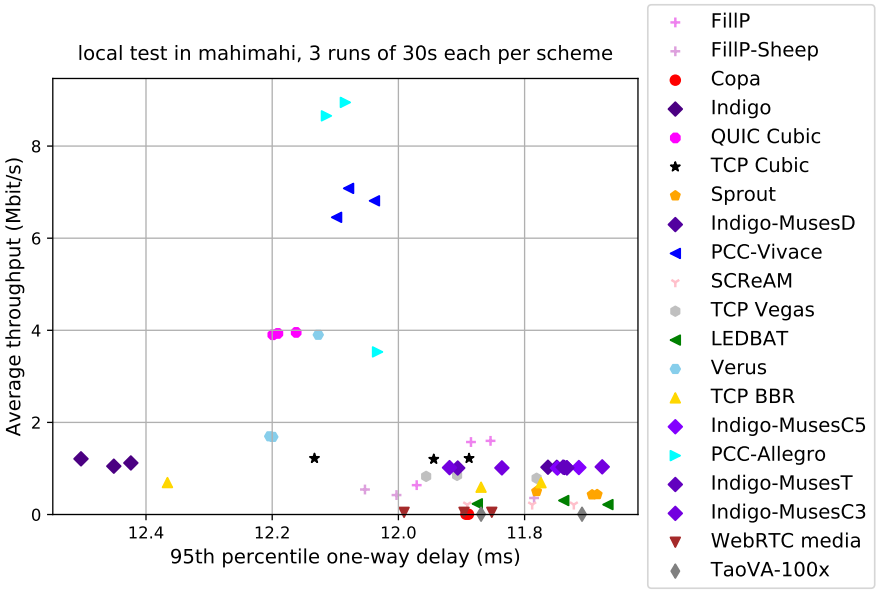
Each test lasted for 30 seconds running 1 flow.

```
System info:
Linux 4.15.0-1026-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 @ c80a283586bf7b0cc1fe08c69c8f60d56498f81c
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfe58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ c3eee875824760ec5b2fd207fefe166e1afe2170
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)
PCC-Allegro
PCC-Vivace
QUIC Cubic
Verus
Indigo
TCP Cubic
FillP
TCP Vegas
TCP BBR
FillP-Sheep
Sprout
LEDBAT
WebRTC media
TaoVA-100x


local test in mahimahi, 3 runs of 30s each per scheme
Average throughput (Mbit/s)
95th percentile one-way delay (ms)
FillP
FillP-Sheep
Copa
Indigo
QUIC Cubic
TCP Cubic
Sprout
Indigo-MusesD
PCC-Vivace
SCReAM
TCP Vegas
LEDBAT
Verus
TCP BBR
Indigo-MusesC5
PCC-Allegro
Indigo-MusesT
Indigo-MusesC3
WebRTC media
TaoVA-100x

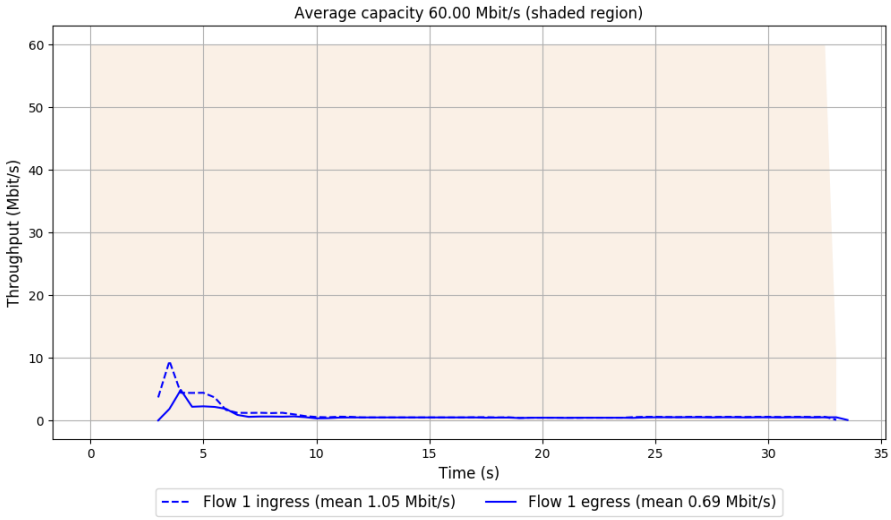
scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	0.66	12.00	34.00
Copa	2	0.01	11.89	90.36
TCP Cubic	3	1.21	11.99	8.70
FillP	3	1.27	11.90	48.08
FillP-Sheep	3	0.44	11.95	40.53
Indigo	3	1.13	12.46	96.11
Indigo-MusesC3	3	1.02	11.81	16.46
Indigo-MusesC5	3	1.02	11.73	15.57
Indigo-MusesD	3	1.02	11.75	19.71
Indigo-MusesT	3	1.02	11.79	18.47
LEDBAT	3	0.25	11.76	49.88
PCC-Allegro	3	7.05	12.08	3.42
PCC-Expr	0	N/A	N/A	N/A
QUIC Cubic	3	3.93	12.18	8.51
SCReAM	3	0.21	11.80	0.00
Sprout	3	0.46	11.72	11.30
TaoVA-100x	2	0.01	11.79	51.91
TCP Vegas	3	0.82	11.88	16.50
Verus	3	2.43	12.18	97.88
PCC-Vivace	3	6.78	12.07	0.96
WebRTC media	3	0.05	11.91	24.60

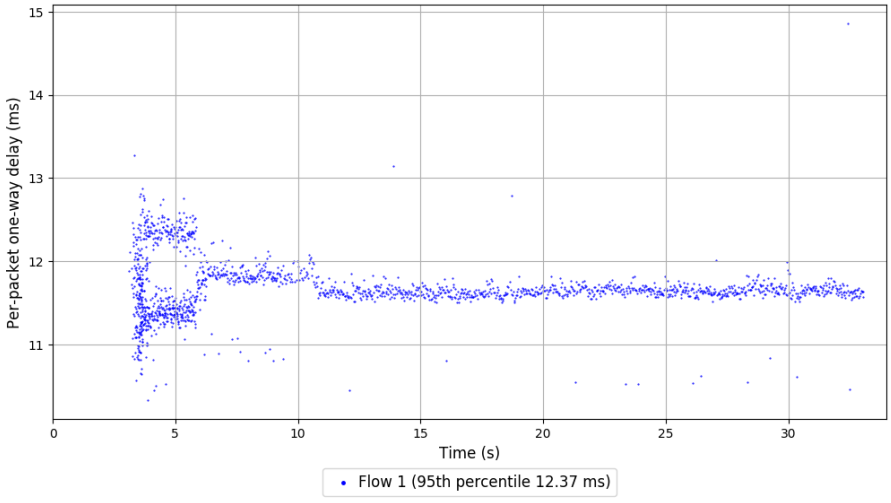
```
Run 1: Statistics of TCP BBR

Start at: 2019-01-17 08:55:01
End at: 2019-01-17 08:55:31

# Below is generated by plot.py at 2019-01-17 09:30:34
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.69 Mbit/s (1.2% utilization)
95th percentile per-packet one-way delay: 12.366 ms
Loss rate: 34.00%
-- Flow 1:
Average throughput: 0.69 Mbit/s
95th percentile per-packet one-way delay: 12.366 ms
Loss rate: 34.00%
```

Run 1: Report of TCP BBR — Data Link



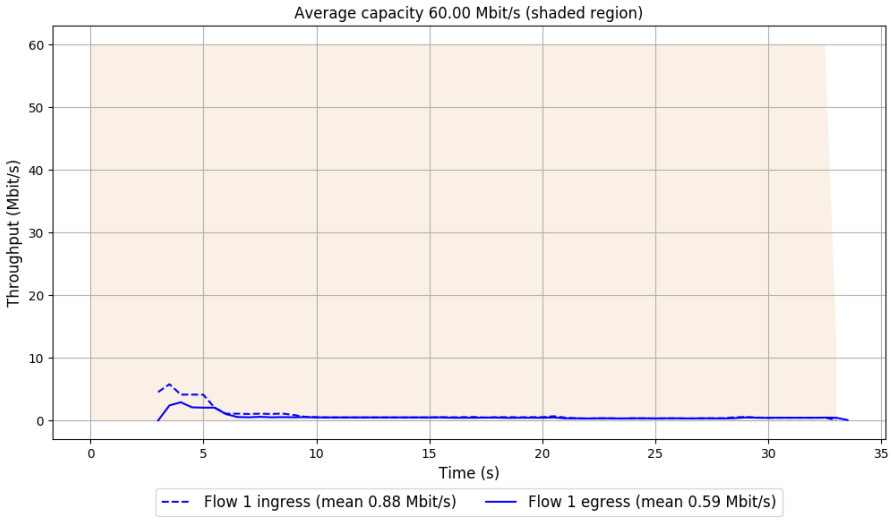


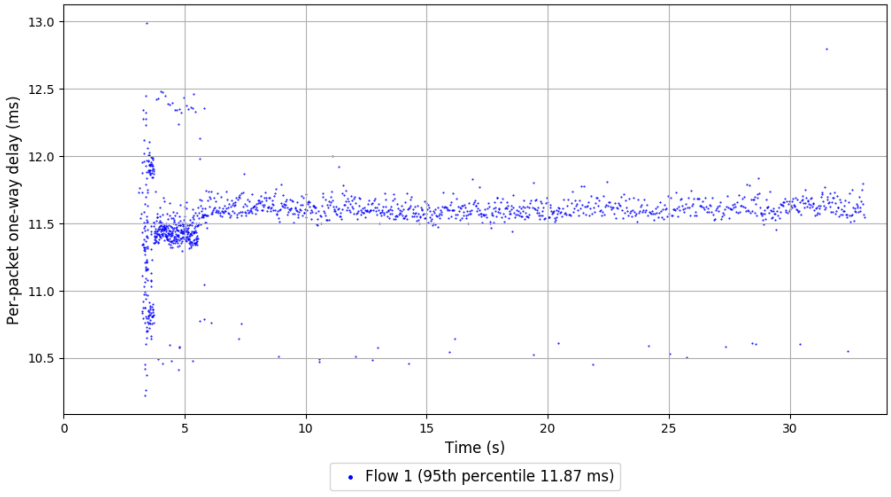
```
Run 2: Statistics of TCP BBR

Start at: 2019-01-17 09:07:41
End at: 2019-01-17 09:08:11

# Below is generated by plot.py at 2019-01-17 09:30:34
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.59 Mbit/s (1.0% utilization)
95th percentile per-packet one-way delay: 11.869 ms
Loss rate: 32.82%
-- Flow 1:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 11.869 ms
Loss rate: 32.82%
```

Run 2: Report of TCP BBR — Data Link



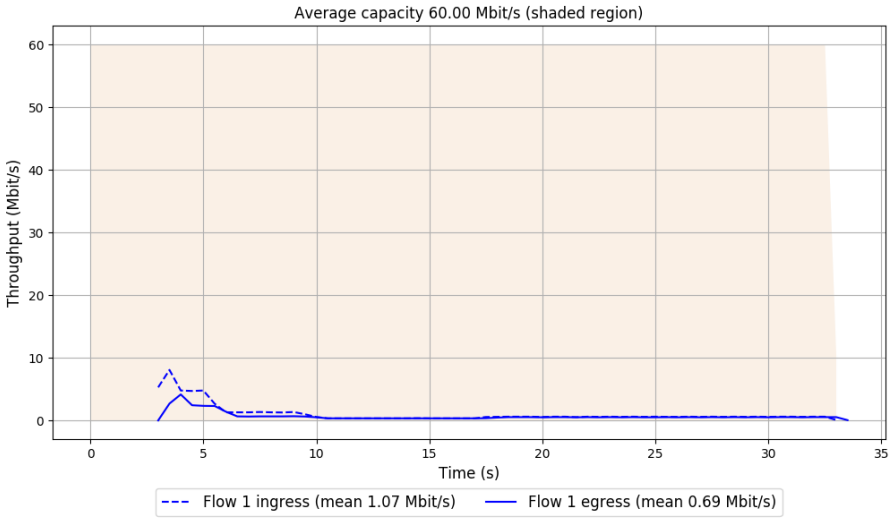


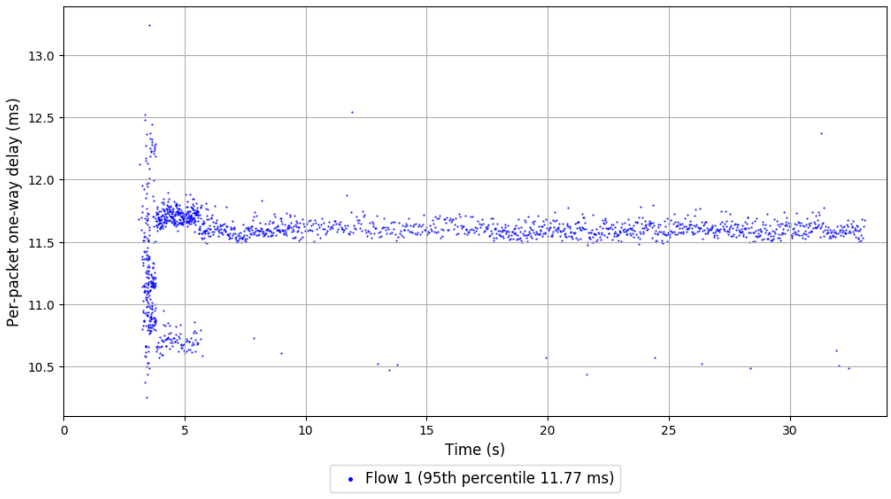
```
Run 3: Statistics of TCP BBR

Start at: 2019-01-17 09:20:18
End at: 2019-01-17 09:20:48

# Below is generated by plot.py at 2019-01-17 09:30:34
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.69 Mbit/s (1.2% utilization)
95th percentile per-packet one-way delay: 11.774 ms
Loss rate: 35.18%
-- Flow 1:
Average throughput: 0.69 Mbit/s
95th percentile per-packet one-way delay: 11.774 ms
Loss rate: 35.18%
```

Run 3: Report of TCP BBR — Data Link

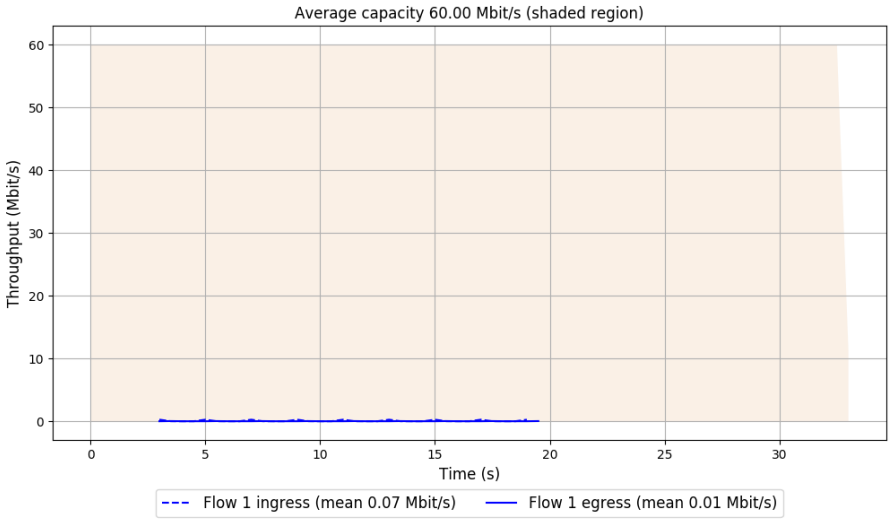


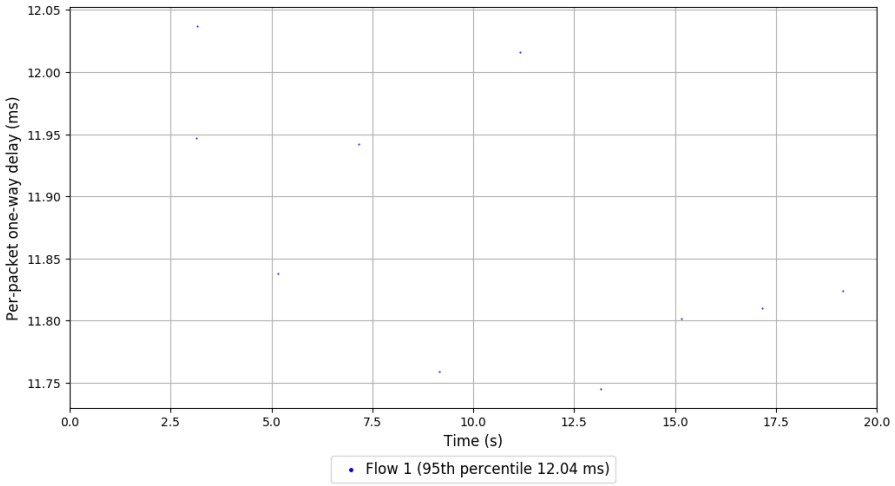


```
Run 1: Statistics of Copa

Start at: 2019-01-17 08:51:56
End at: 2019-01-17 08:52:26
```

Run 1: Report of Copa — Data Link



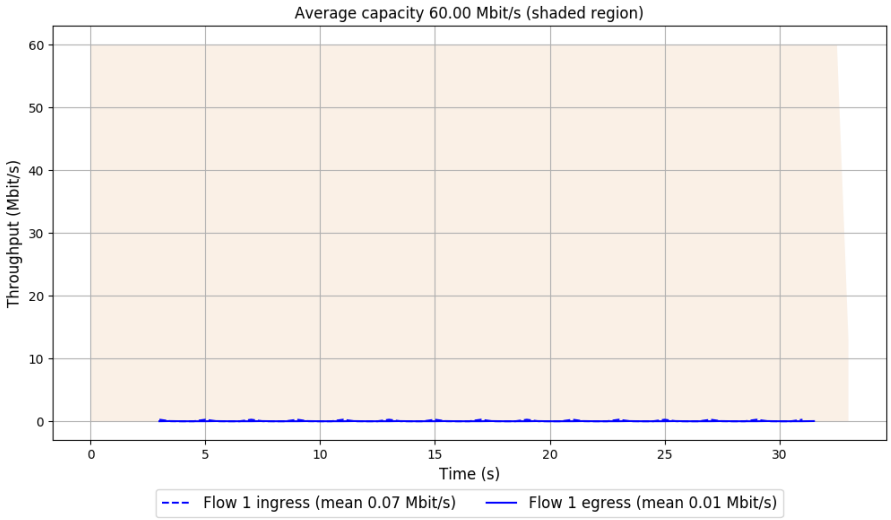


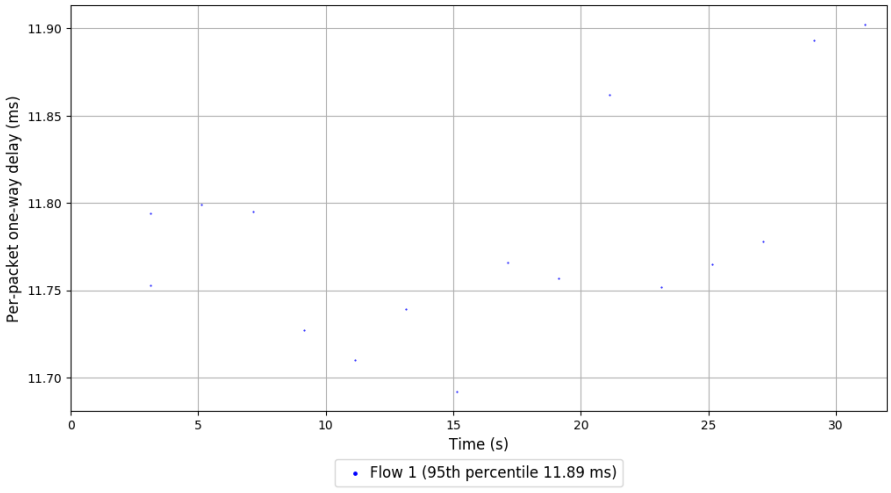
```
Run 2: Statistics of Copa

Start at: 2019-01-17 09:04:35
End at: 2019-01-17 09:05:05

# Below is generated by plot.py at 2019-01-17 09:30:34
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.01 Mbit/s (0.0% utilization)
95th percentile per-packet one-way delay: 11.893 ms
Loss rate: 90.36%
-- Flow 1:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 11.893 ms
Loss rate: 90.36%
```

Run 2: Report of Copa — Data Link



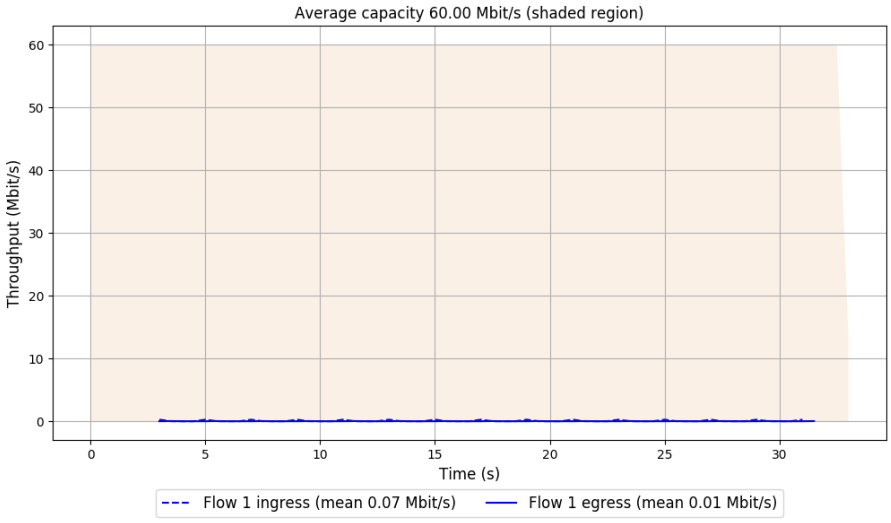


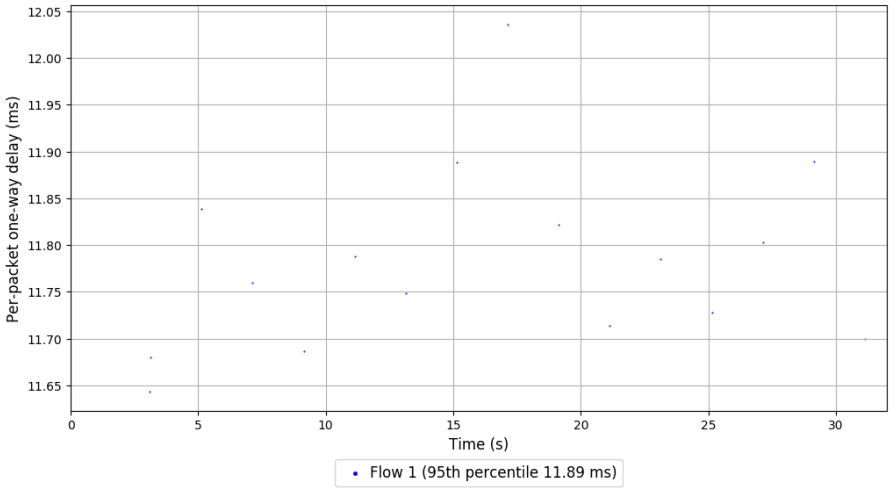
```
Run 3: Statistics of Copa

Start at: 2019-01-17 09:17:15
End at: 2019-01-17 09:17:45

# Below is generated by plot.py at 2019-01-17 09:30:34
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.01 Mbit/s (0.0% utilization)
95th percentile per-packet one-way delay: 11.889 ms
Loss rate: 90.36%
-- Flow 1:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 11.889 ms
Loss rate: 90.36%
```

Run 3: Report of Copa — Data Link



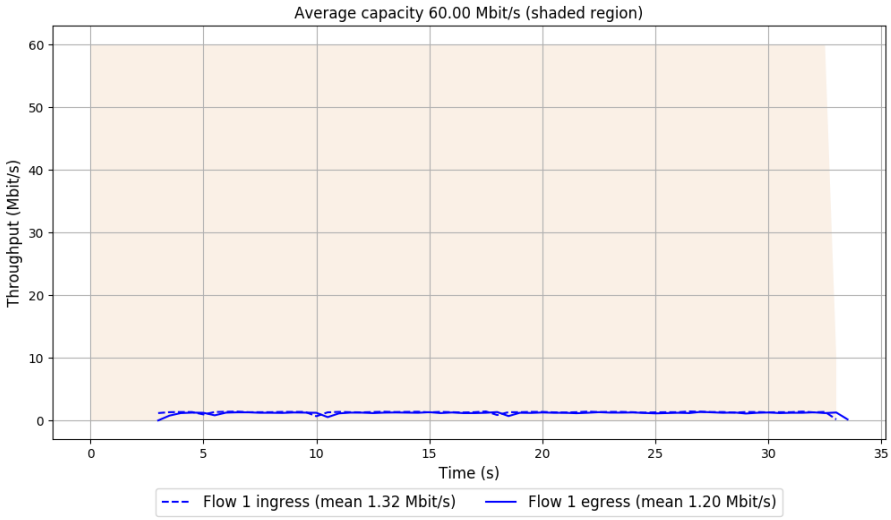


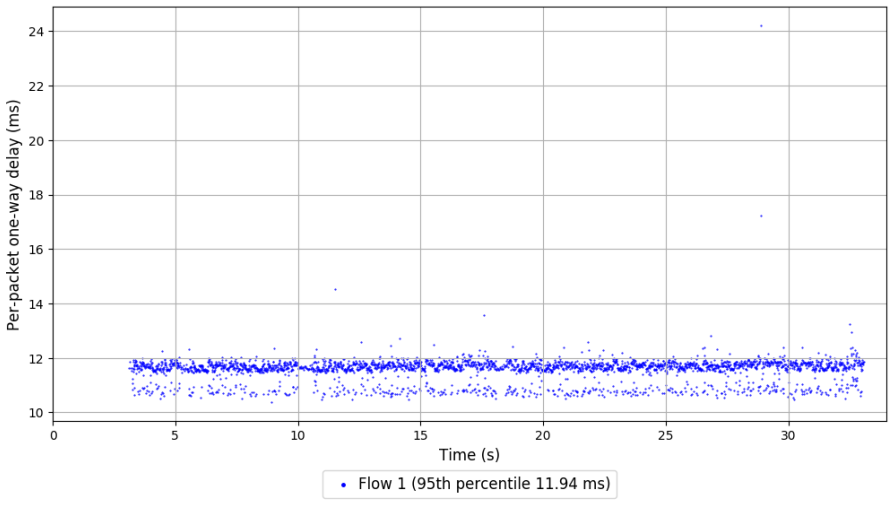
```
Run 1: Statistics of TCP Cubic

Start at: 2019-01-17 08:52:32
End at: 2019-01-17 08:53:02

# Below is generated by plot.py at 2019-01-17 09:30:35
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.20 Mbit/s (2.0% utilization)
95th percentile per-packet one-way delay: 11.944 ms
Loss rate: 8.82%
-- Flow 1:
Average throughput: 1.20 Mbit/s
95th percentile per-packet one-way delay: 11.944 ms
Loss rate: 8.82%
```

Run 1: Report of TCP Cubic — Data Link



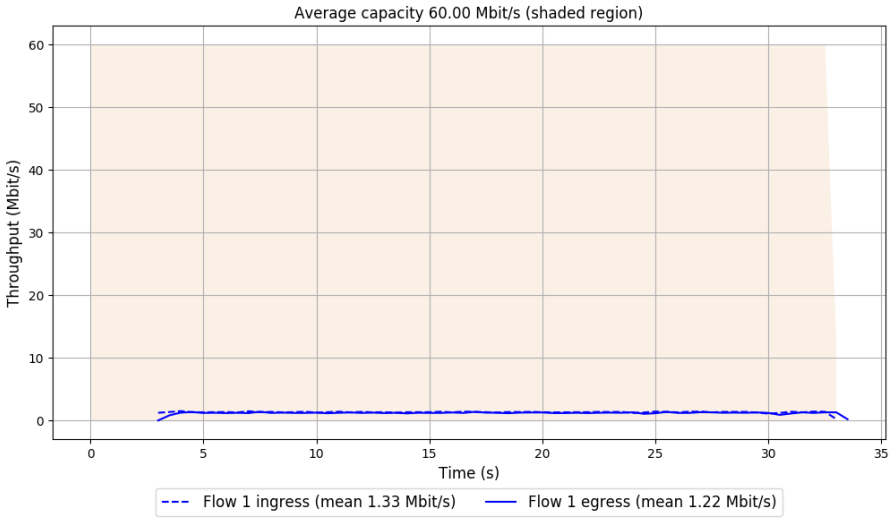


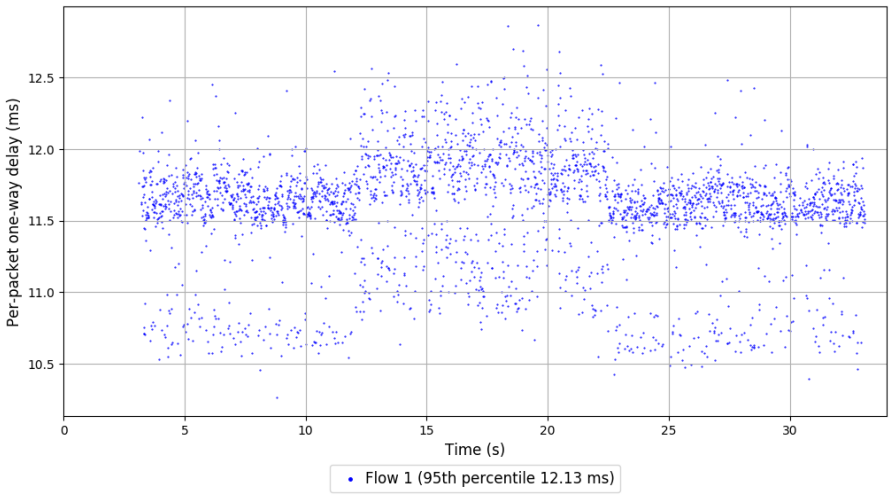
```
Run 2: Statistics of TCP Cubic

Start at: 2019-01-17 09:05:11
End at: 2019-01-17 09:05:41

# Below is generated by plot.py at 2019-01-17 09:30:35
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.22 Mbit/s (2.0% utilization)
95th percentile per-packet one-way delay: 12.133 ms
Loss rate: 8.52%
-- Flow 1:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 12.133 ms
Loss rate: 8.52%
```

Run 2: Report of TCP Cubic — Data Link



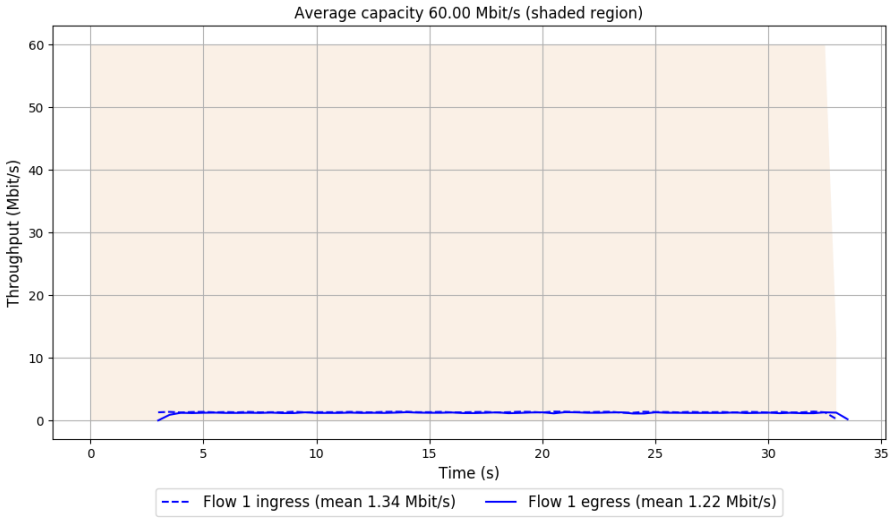


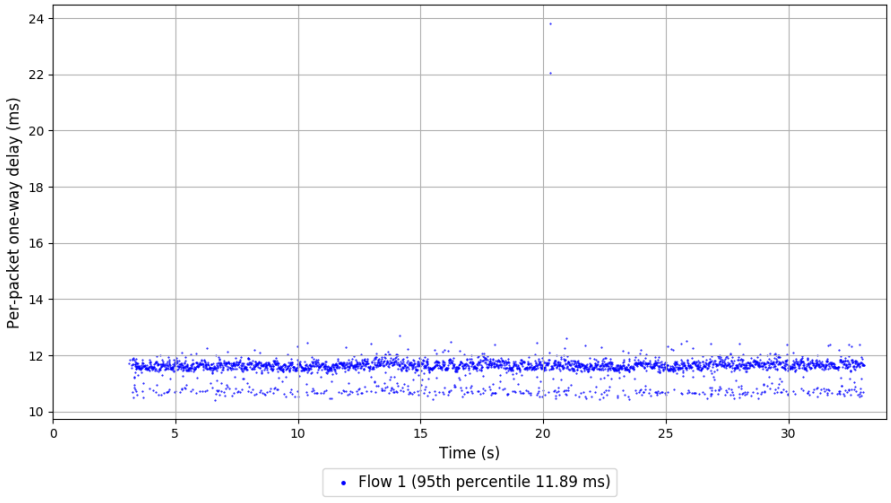
```
Run 3: Statistics of TCP Cubic

Start at: 2019-01-17 09:17:50
End at: 2019-01-17 09:18:20

# Below is generated by plot.py at 2019-01-17 09:30:50
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.22 Mbit/s (2.0% utilization)
95th percentile per-packet one-way delay: 11.888 ms
Loss rate: 8.77%
-- Flow 1:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 11.888 ms
Loss rate: 8.77%
```

Run 3: Report of TCP Cubic — Data Link



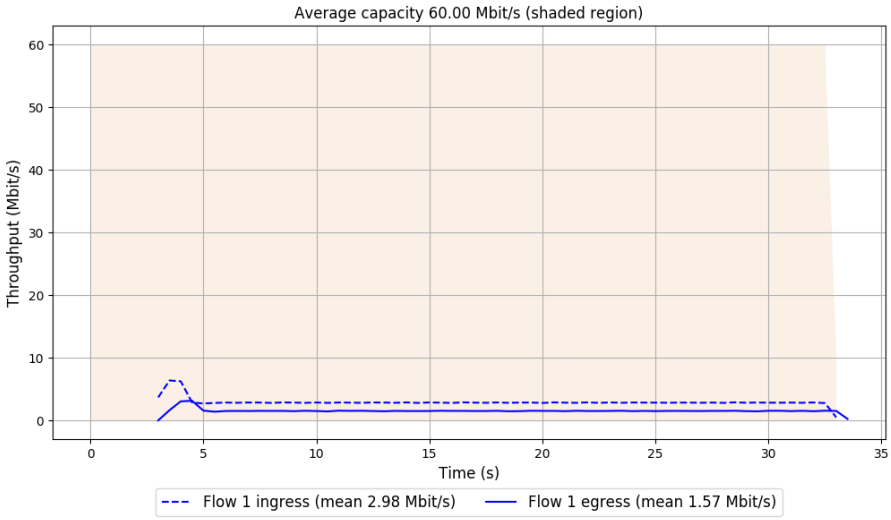


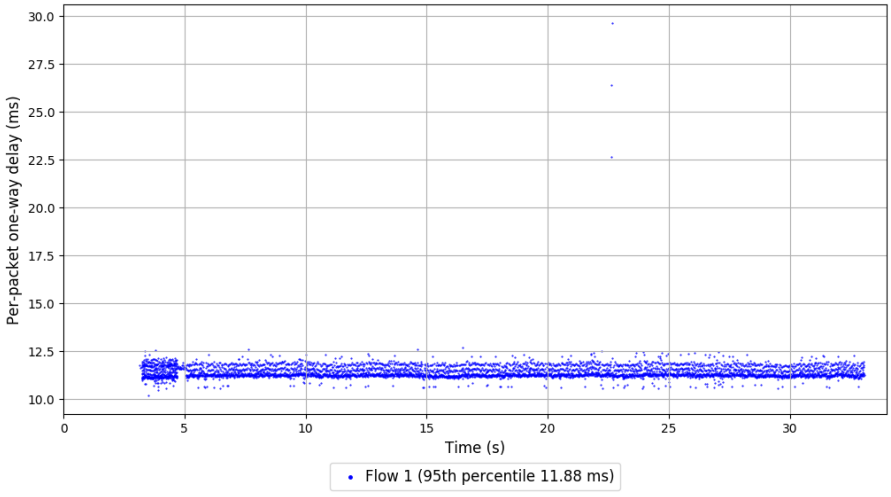
```
Run 1: Statistics of FillP

Start at: 2019-01-17 08:58:00
End at: 2019-01-17 08:58:30

# Below is generated by plot.py at 2019-01-17 09:30:55
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.57 Mbit/s (2.6% utilization)
95th percentile per-packet one-way delay: 11.885 ms
Loss rate: 47.20%
-- Flow 1:
Average throughput: 1.57 Mbit/s
95th percentile per-packet one-way delay: 11.885 ms
Loss rate: 47.20%
```

Run 1: Report of FillP — Data Link



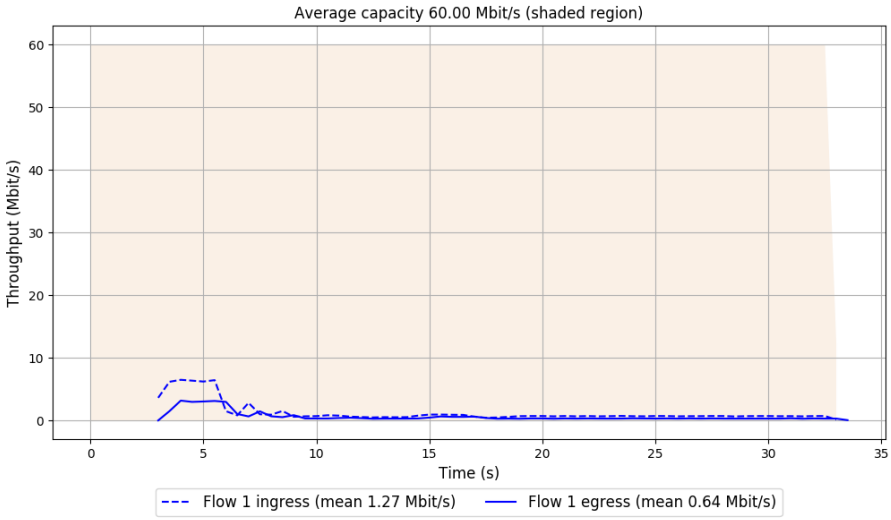


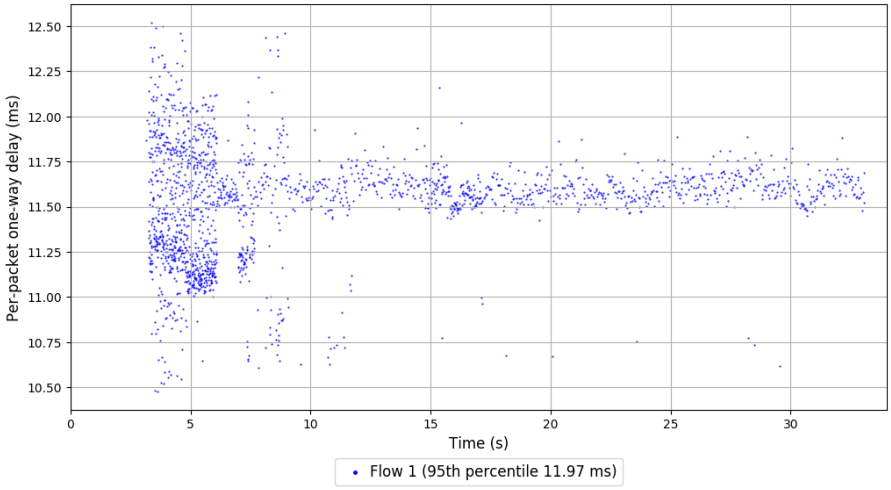
```
Run 2: Statistics of FillP

Start at: 2019-01-17 09:10:39
End at: 2019-01-17 09:11:09

# Below is generated by plot.py at 2019-01-17 09:30:55
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.64 Mbit/s (1.1% utilization)
95th percentile per-packet one-way delay: 11.971 ms
Loss rate: 50.01%
-- Flow 1:
Average throughput: 0.64 Mbit/s
95th percentile per-packet one-way delay: 11.971 ms
Loss rate: 50.01%
```

Run 2: Report of FillP — Data Link



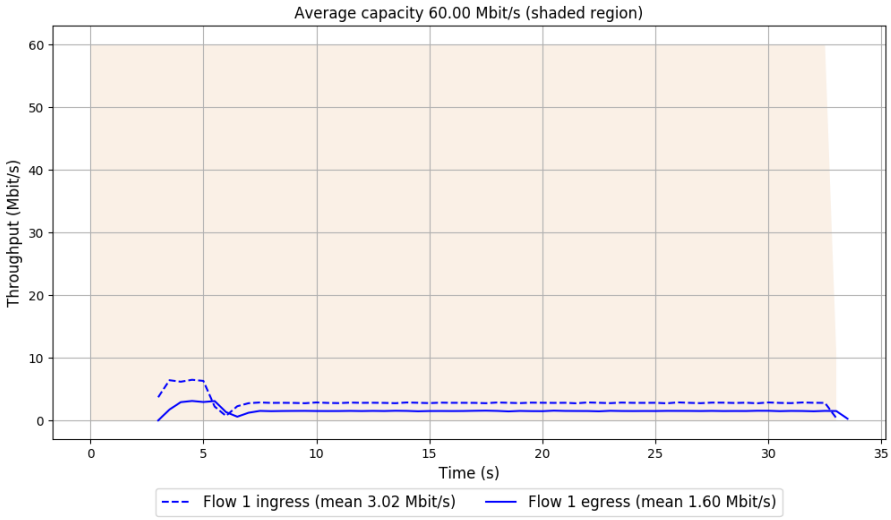


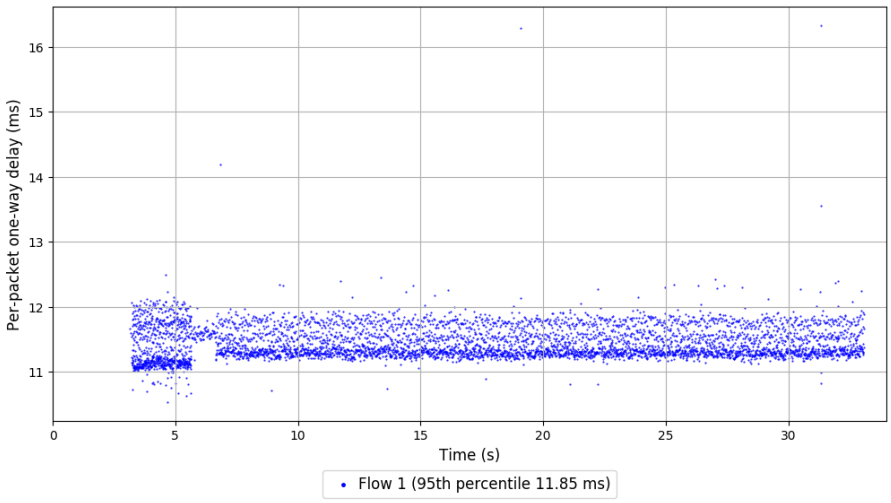
```
Run 3: Statistics of FillP

Start at: 2019-01-17 09:23:17
End at: 2019-01-17 09:23:47

# Below is generated by plot.py at 2019-01-17 09:30:56
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.60 Mbit/s (2.7% utilization)
95th percentile per-packet one-way delay: 11.854 ms
Loss rate: 47.03%
-- Flow 1:
Average throughput: 1.60 Mbit/s
95th percentile per-packet one-way delay: 11.854 ms
Loss rate: 47.03%
```

Run 3: Report of FillP — Data Link



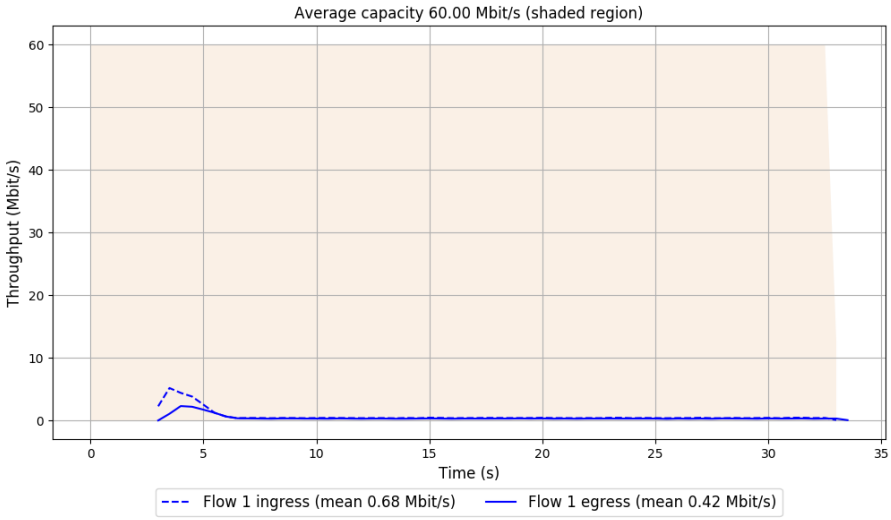


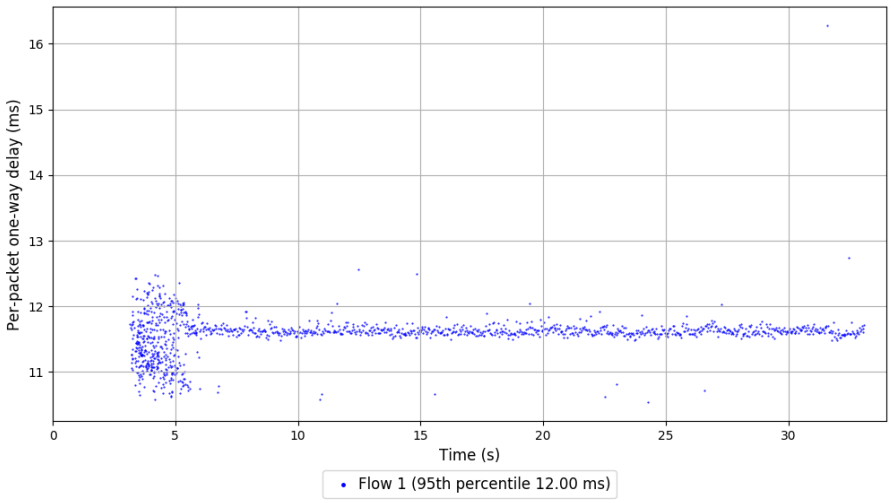
```
Run 1: Statistics of FillP-Sheep

Start at: 2019-01-17 09:01:00
End at: 2019-01-17 09:01:30

# Below is generated by plot.py at 2019-01-17 09:30:56
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.42 Mbit/s (0.7% utilization)
95th percentile per-packet one-way delay: 12.003 ms
Loss rate: 38.20%
-- Flow 1:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 12.003 ms
Loss rate: 38.20%
```

Run 1: Report of FillP-Sheep — Data Link



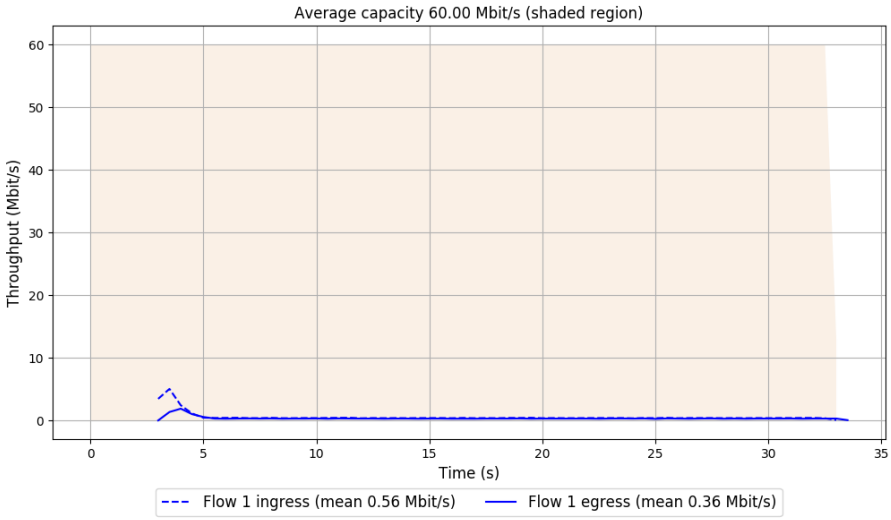


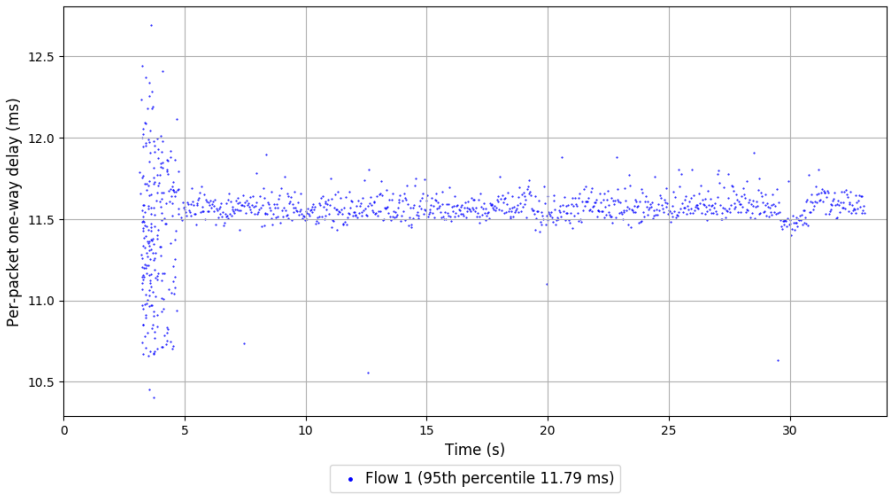
```
Run 2: Statistics of FillP-Sheep

Start at: 2019-01-17 09:13:40
End at: 2019-01-17 09:14:10

# Below is generated by plot.py at 2019-01-17 09:30:56
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.36 Mbit/s (0.6% utilization)
95th percentile per-packet one-way delay: 11.785 ms
Loss rate: 36.49%
-- Flow 1:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 11.785 ms
Loss rate: 36.49%
```

Run 2: Report of FillP-Sheep — Data Link



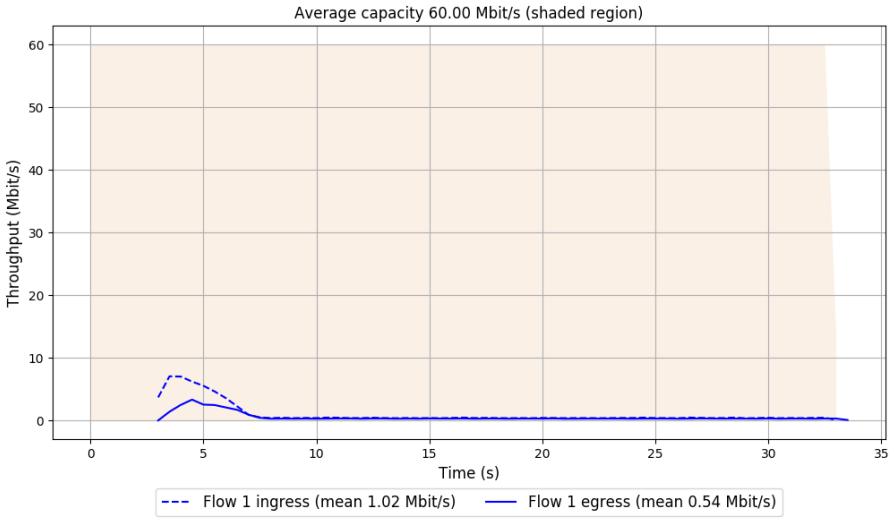


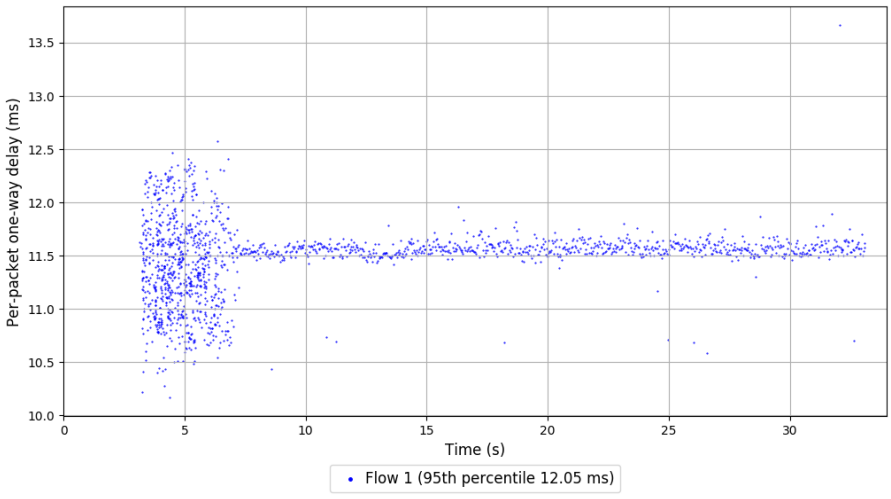
```
Run 3: Statistics of FillP-Sheep

Start at: 2019-01-17 09:26:22
End at: 2019-01-17 09:26:52

# Below is generated by plot.py at 2019-01-17 09:30:56
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.54 Mbit/s (0.9% utilization)
95th percentile per-packet one-way delay: 12.053 ms
Loss rate: 46.89%
-- Flow 1:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 12.053 ms
Loss rate: 46.89%
```

Run 3: Report of FillP-Sheep — Data Link



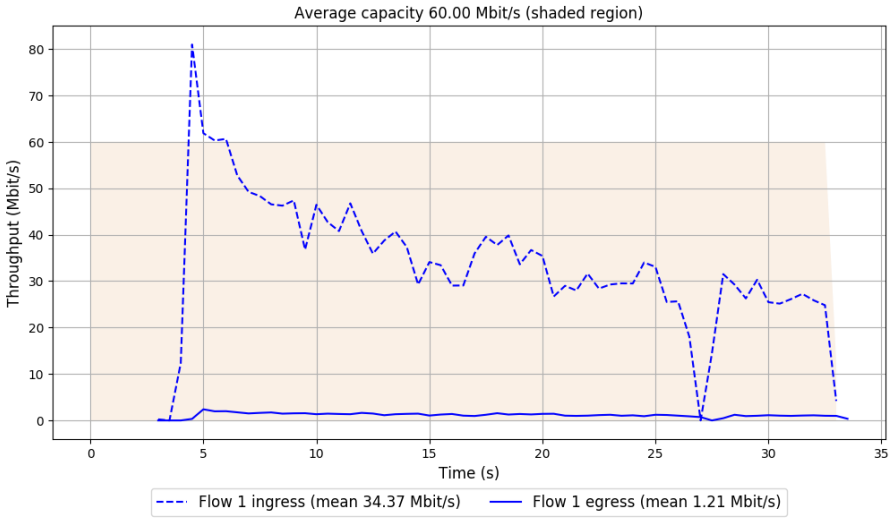


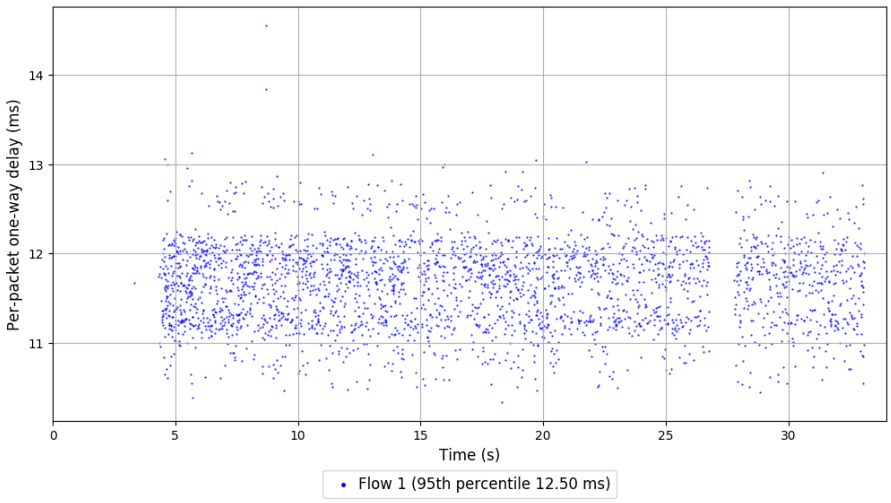
```
Run 1: Statistics of Indigo

Start at: 2019-01-17 09:01:36
End at: 2019-01-17 09:02:06

# Below is generated by plot.py at 2019-01-17 09:31:02
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.21 Mbit/s (2.0% utilization)
95th percentile per-packet one-way delay: 12.503 ms
Loss rate: 96.48%
-- Flow 1:
Average throughput: 1.21 Mbit/s
95th percentile per-packet one-way delay: 12.503 ms
Loss rate: 96.48%
```

Run 1: Report of Indigo — Data Link



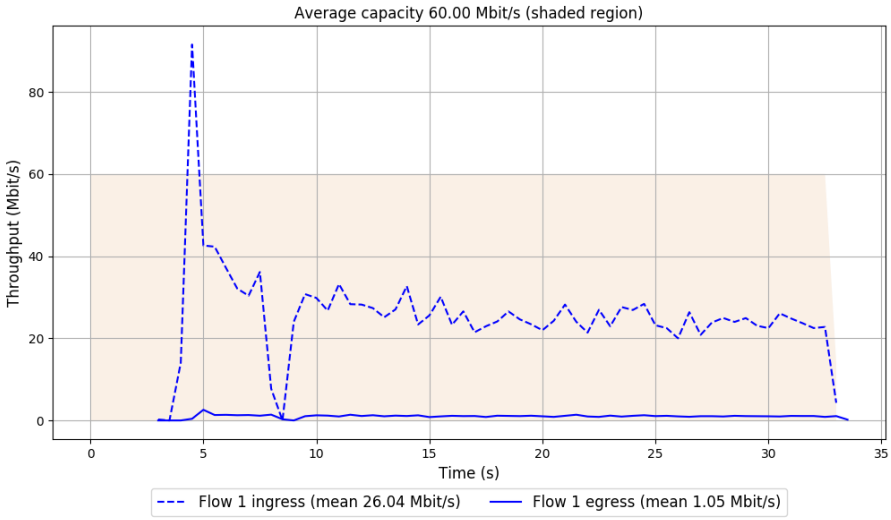


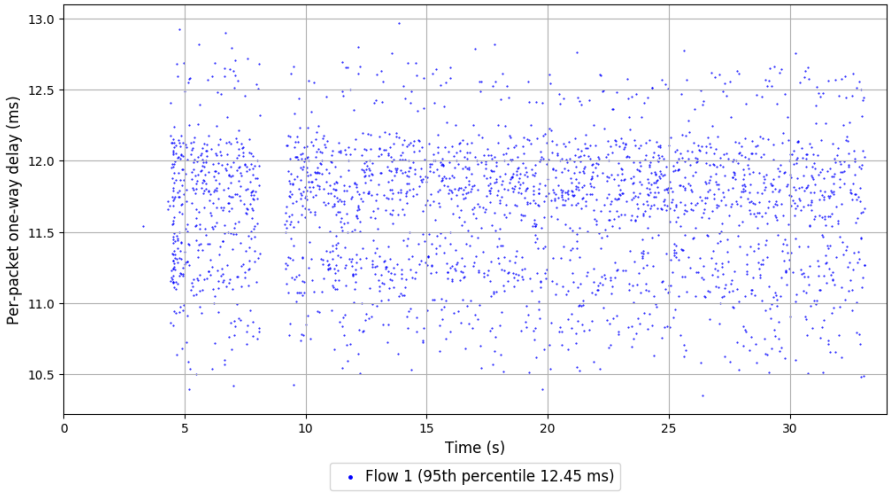
```
Run 2: Statistics of Indigo

Start at: 2019-01-17 09:14:15
End at: 2019-01-17 09:14:45

# Below is generated by plot.py at 2019-01-17 09:31:20
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.05 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 12.451 ms
Loss rate: 95.97%
-- Flow 1:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 12.451 ms
Loss rate: 95.97%
```

Run 2: Report of Indigo — Data Link



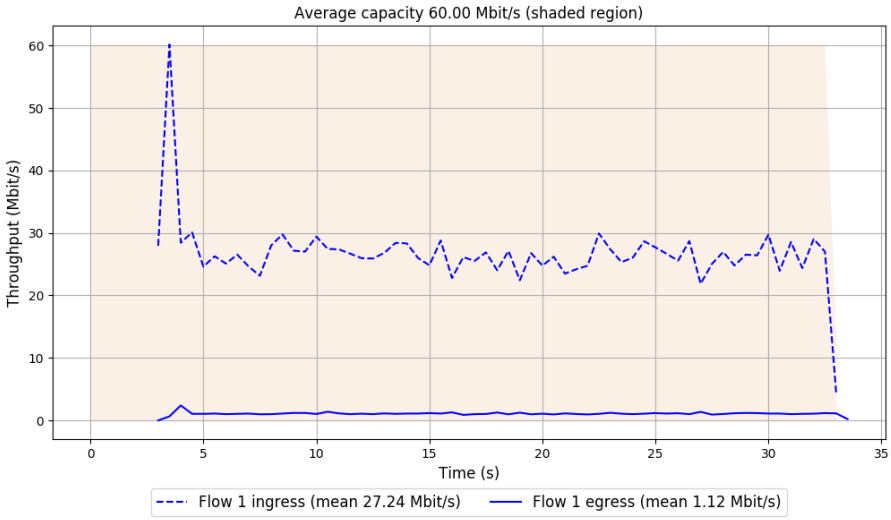


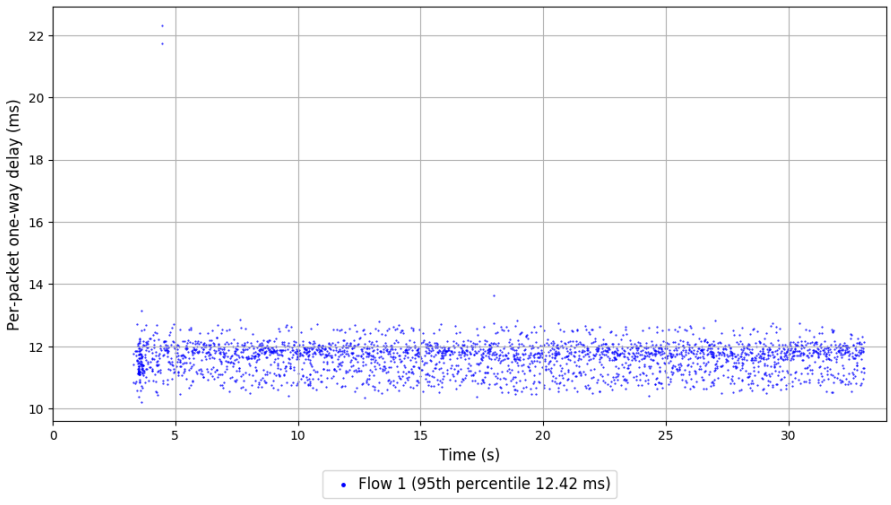
```
Run 3: Statistics of Indigo

Start at: 2019-01-17 09:26:58
End at: 2019-01-17 09:27:28

# Below is generated by plot.py at 2019-01-17 09:31:21
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.12 Mbit/s (1.9% utilization)
95th percentile per-packet one-way delay: 12.424 ms
Loss rate: 95.89%
-- Flow 1:
Average throughput: 1.12 Mbit/s
95th percentile per-packet one-way delay: 12.424 ms
Loss rate: 95.89%
```

Run 3: Report of Indigo — Data Link



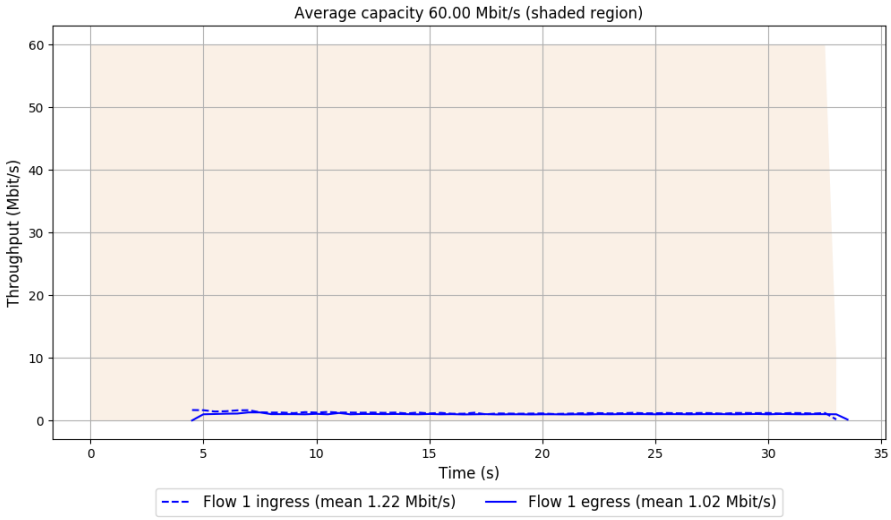


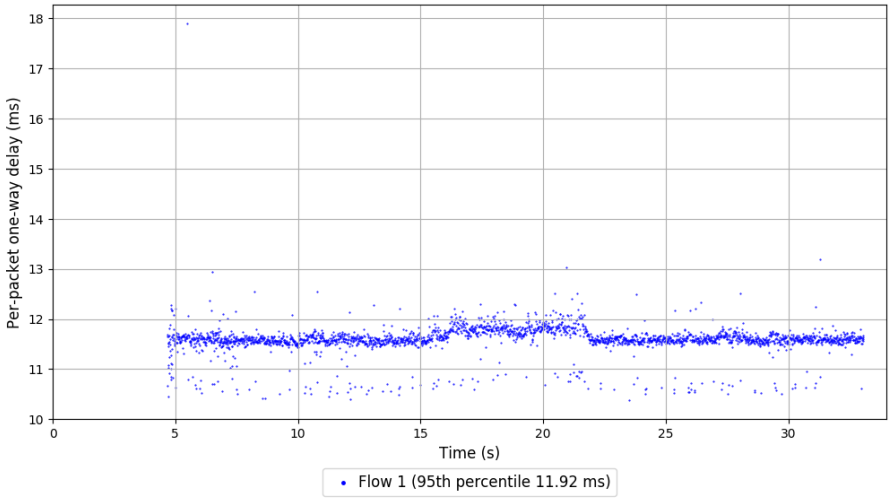
```
Run 1: Statistics of Indigo-MusesC3

Start at: 2019-01-17 08:56:48
End at: 2019-01-17 08:57:18

# Below is generated by plot.py at 2019-01-17 09:31:21
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.02 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 11.919 ms
Loss rate: 16.63%
-- Flow 1:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 11.919 ms
Loss rate: 16.63%
```

Run 1: Report of Indigo-MusesC3 — Data Link



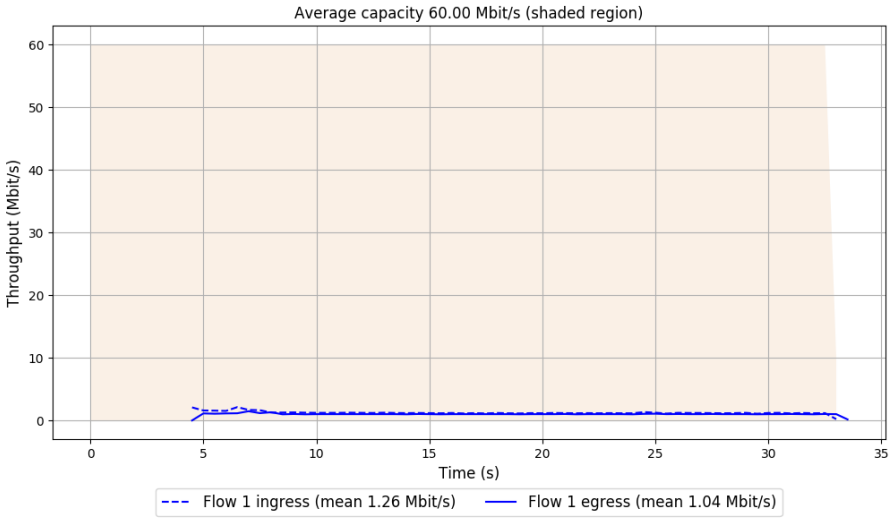


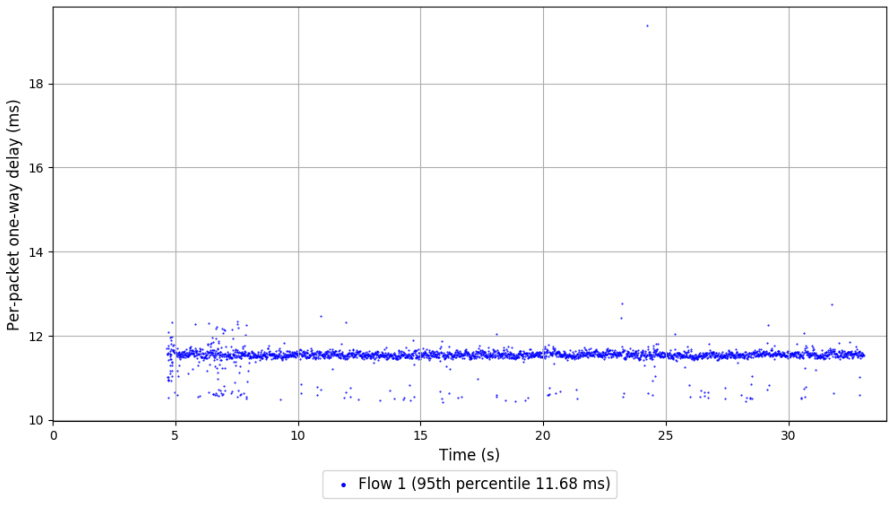
```
Run 2: Statistics of Indigo-MusesC3

Start at: 2019-01-17 09:09:28
End at: 2019-01-17 09:09:58

# Below is generated by plot.py at 2019-01-17 09:31:21
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.04 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 11.677 ms
Loss rate: 17.73%
-- Flow 1:
Average throughput: 1.04 Mbit/s
95th percentile per-packet one-way delay: 11.677 ms
Loss rate: 17.73%
```

Run 2: Report of Indigo-MusesC3 — Data Link



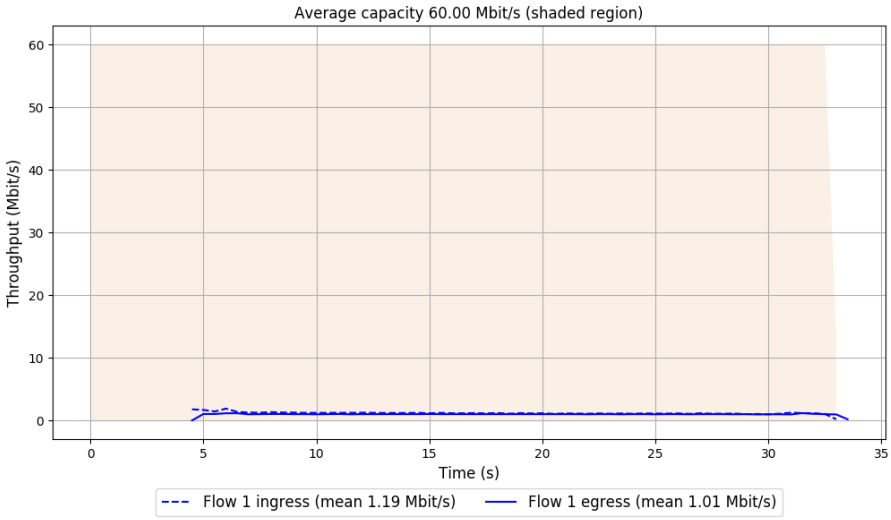


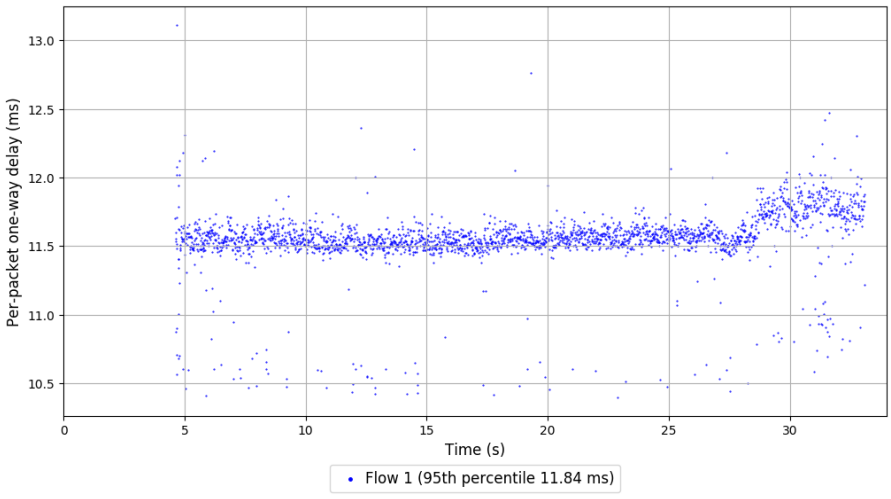
```
Run 3: Statistics of Indigo-MusesC3

Start at: 2019-01-17 09:22:06
End at: 2019-01-17 09:22:36

# Below is generated by plot.py at 2019-01-17 09:31:21
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.01 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 11.836 ms
Loss rate: 15.03%
-- Flow 1:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 11.836 ms
Loss rate: 15.03%
```

Run 3: Report of Indigo-MusesC3 — Data Link



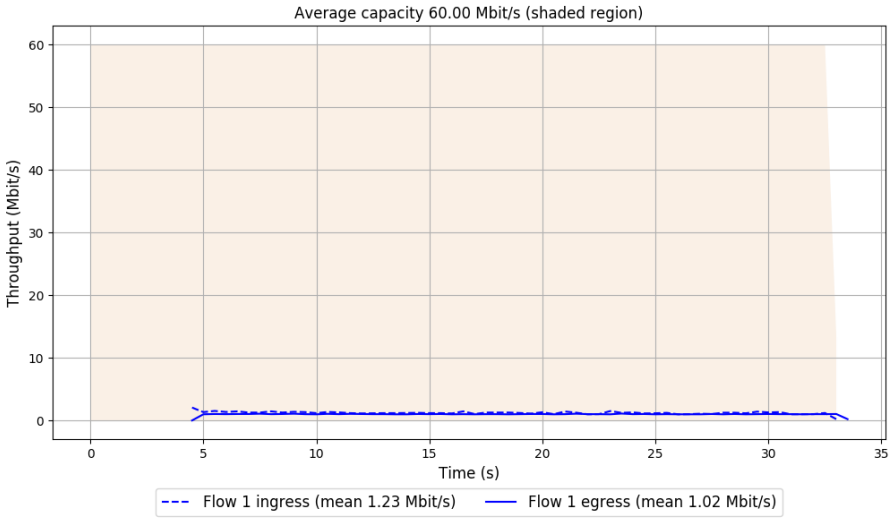


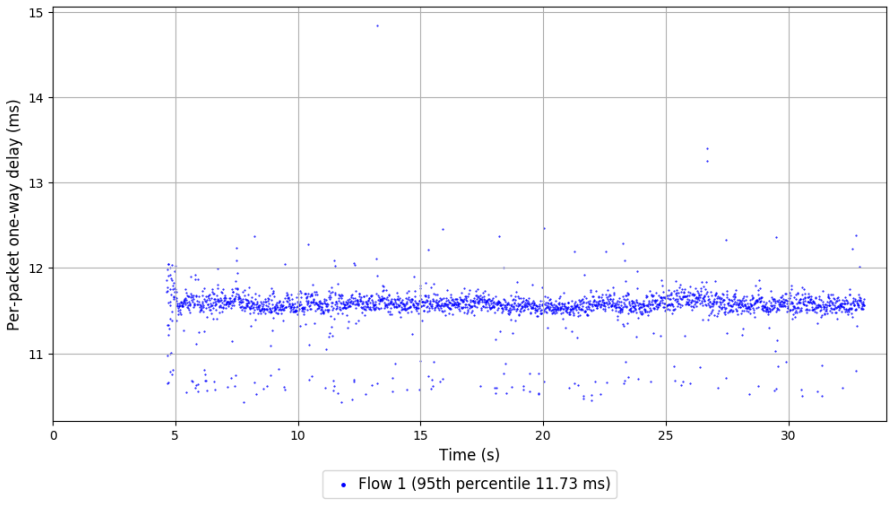
```
Run 1: Statistics of Indigo-MusesC5

Start at: 2019-01-17 09:04:00
End at: 2019-01-17 09:04:30

# Below is generated by plot.py at 2019-01-17 09:31:21
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.02 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 11.733 ms
Loss rate: 17.64%
-- Flow 1:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 11.733 ms
Loss rate: 17.64%
```

Run 1: Report of Indigo-MusesC5 — Data Link



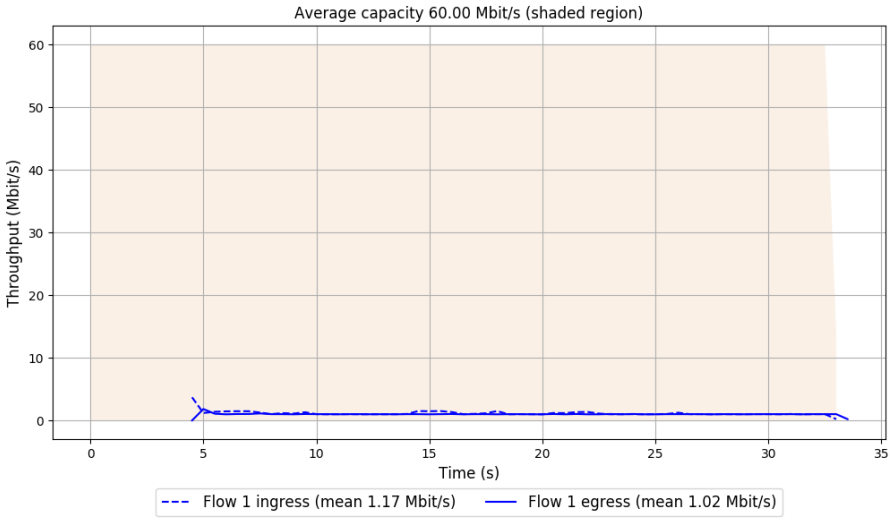


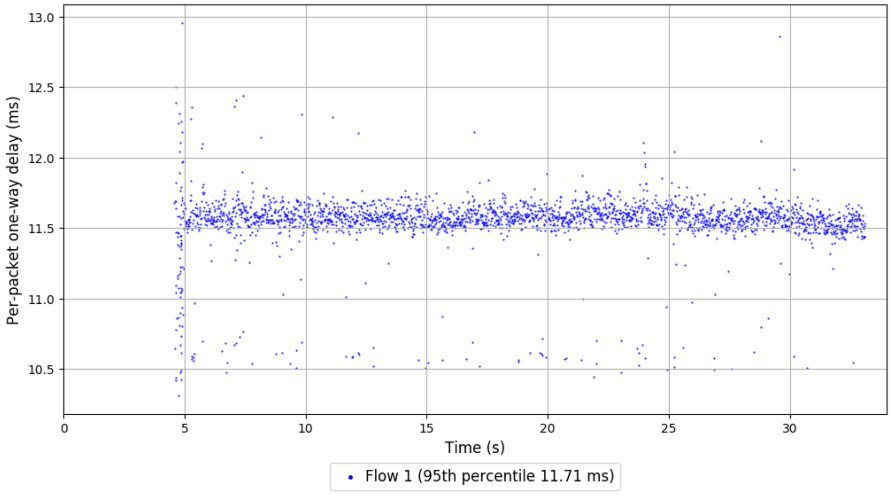
```
Run 2: Statistics of Indigo-MusesC5

Start at: 2019-01-17 09:16:39
End at: 2019-01-17 09:17:09

# Below is generated by plot.py at 2019-01-17 09:31:21
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.02 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 11.714 ms
Loss rate: 12.50%
-- Flow 1:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 11.714 ms
Loss rate: 12.50%
```

Run 2: Report of Indigo-MusesC5 — Data Link



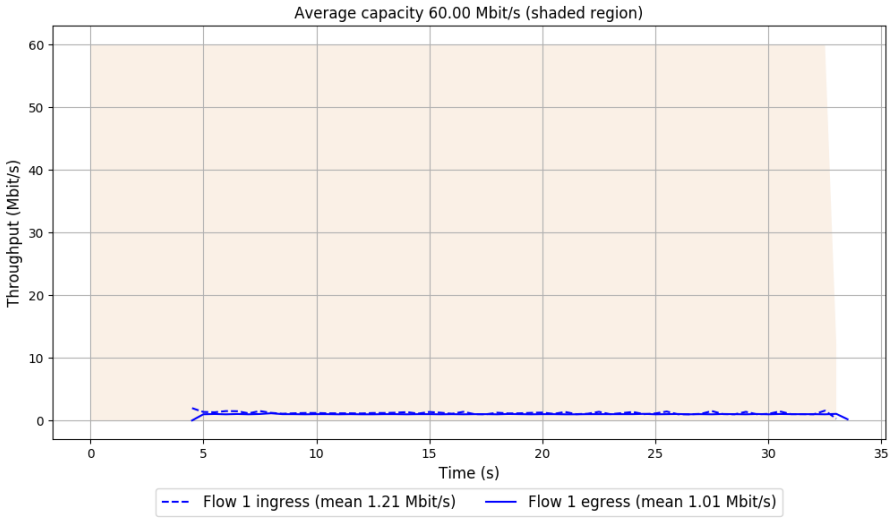


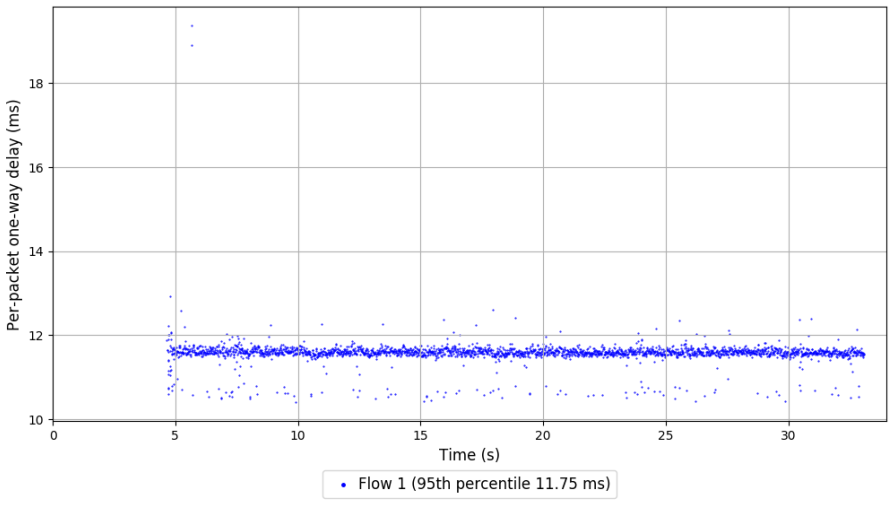
```
Run 3: Statistics of Indigo-MusesC5

Start at: 2019-01-17 09:29:22
End at: 2019-01-17 09:29:52

# Below is generated by plot.py at 2019-01-17 09:31:24
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.01 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 11.748 ms
Loss rate: 16.57%
-- Flow 1:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 11.748 ms
Loss rate: 16.57%
```

Run 3: Report of Indigo-MusesC5 — Data Link



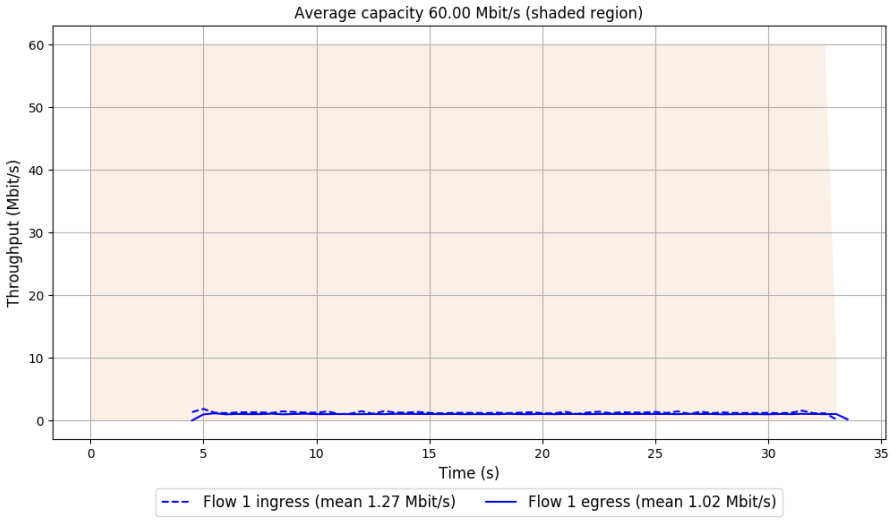


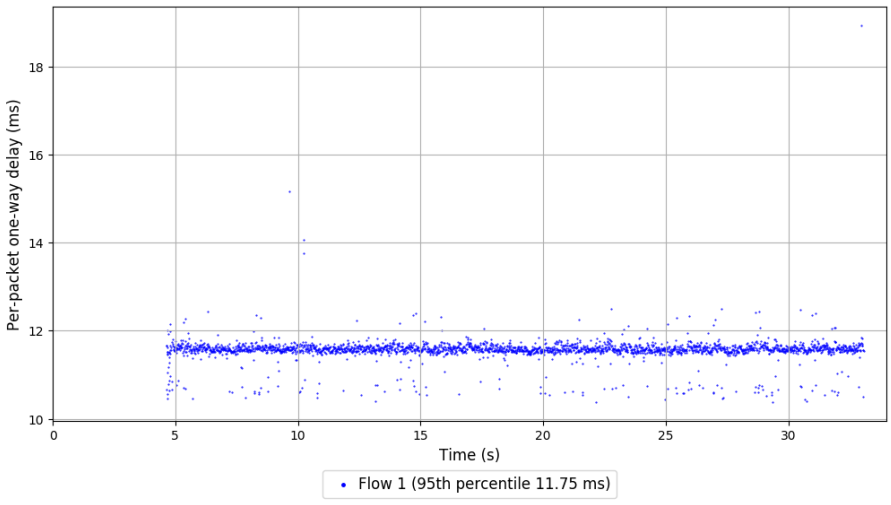
```
Run 1: Statistics of Indigo-MusesD

Start at: 2019-01-17 08:58:35
End at: 2019-01-17 08:59:05

# Below is generated by plot.py at 2019-01-17 09:31:33
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.02 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 11.749 ms
Loss rate: 19.01%
-- Flow 1:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 11.749 ms
Loss rate: 19.01%
```

Run 1: Report of Indigo-MusesD — Data Link



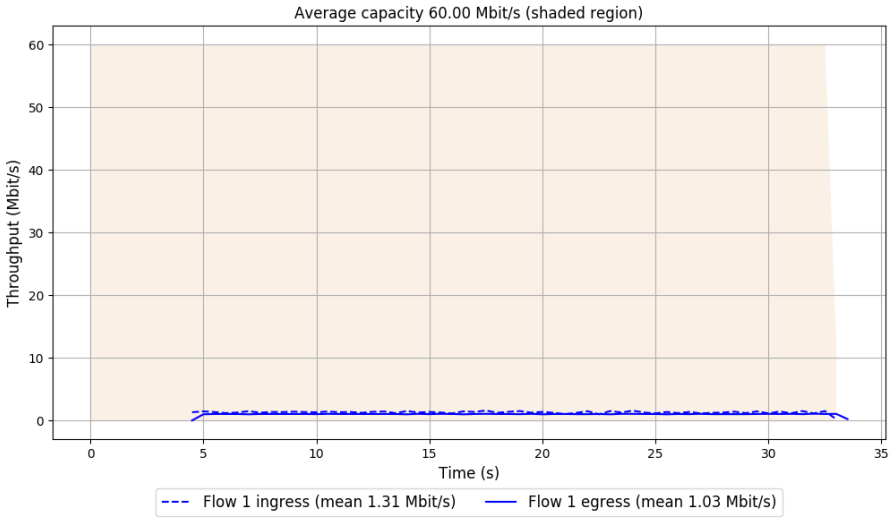


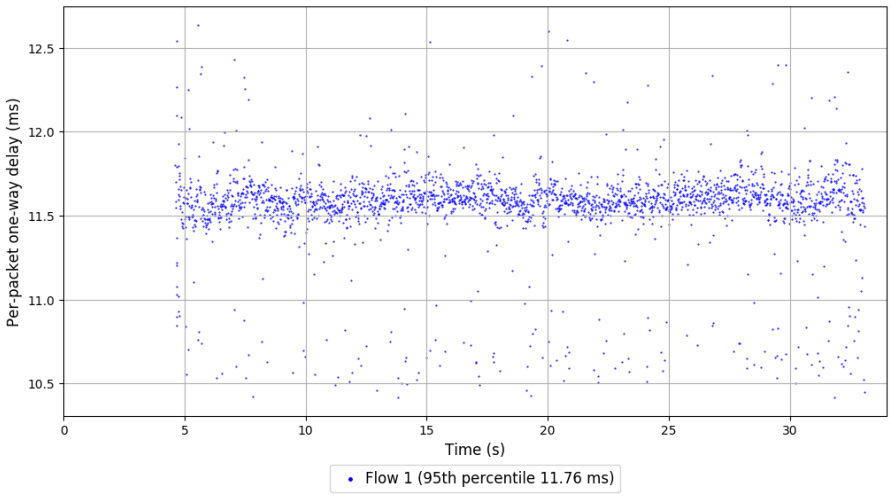
```
Run 2: Statistics of Indigo-MusesD

Start at: 2019-01-17 09:11:15
End at: 2019-01-17 09:11:45

# Below is generated by plot.py at 2019-01-17 09:31:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.03 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 11.763 ms
Loss rate: 21.84%
-- Flow 1:
Average throughput: 1.03 Mbit/s
95th percentile per-packet one-way delay: 11.763 ms
Loss rate: 21.84%
```

Run 2: Report of Indigo-MusesD — Data Link



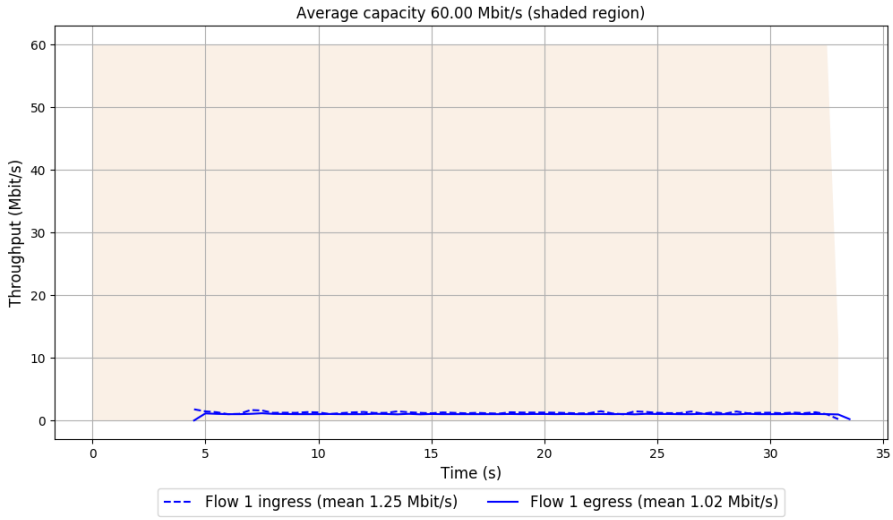


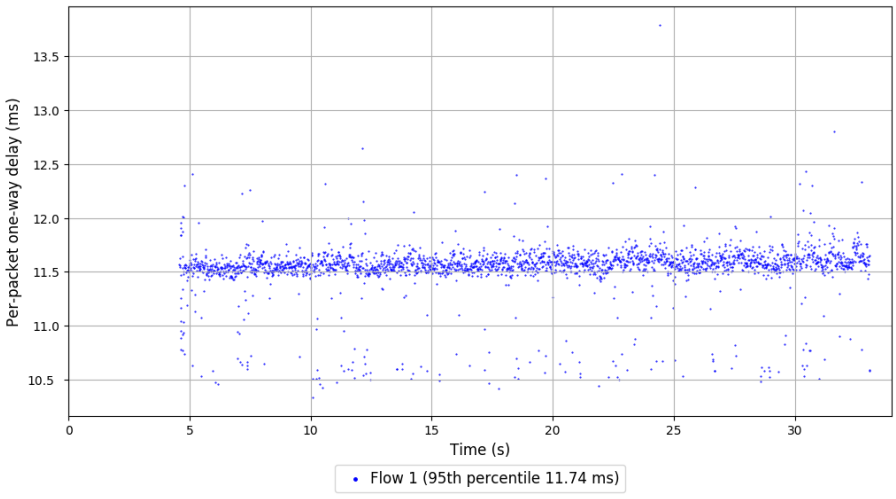
```
Run 3: Statistics of Indigo-MusesD

Start at: 2019-01-17 09:23:53
End at: 2019-01-17 09:24:23

# Below is generated by plot.py at 2019-01-17 09:31:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.02 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 11.737 ms
Loss rate: 18.28%
-- Flow 1:
Average throughput: 1.02 Mbit/s
95th percentile per-packet one-way delay: 11.737 ms
Loss rate: 18.28%
```

Run 3: Report of Indigo-MusesD — Data Link



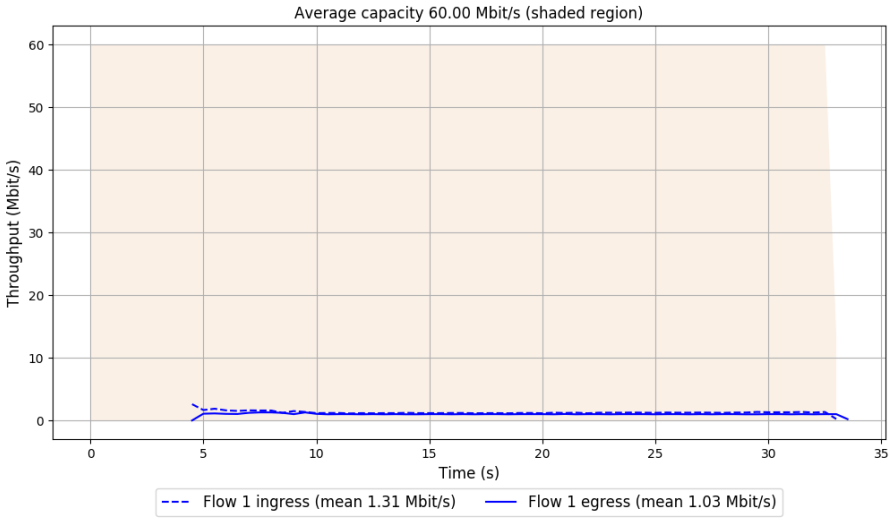


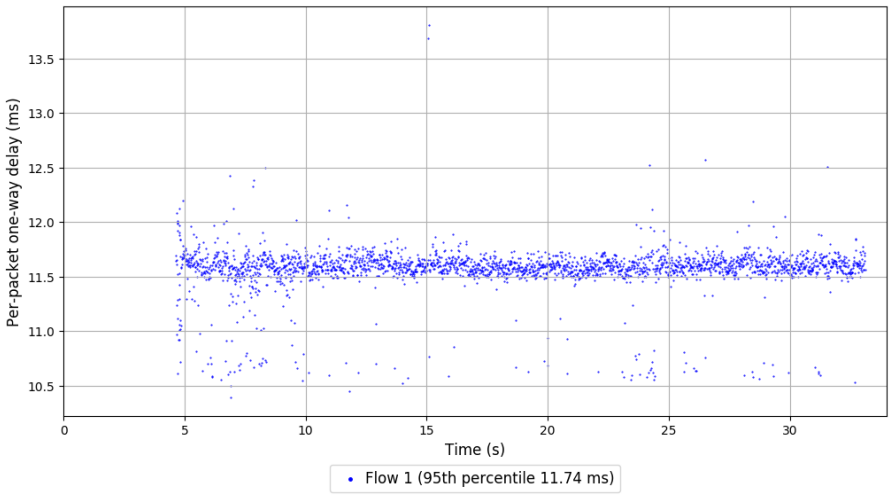
```
Run 1: Statistics of Indigo-MusesT

Start at: 2019-01-17 09:02:48
End at: 2019-01-17 09:03:18

# Below is generated by plot.py at 2019-01-17 09:31:37
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.03 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 11.739 ms
Loss rate: 21.17%
-- Flow 1:
Average throughput: 1.03 Mbit/s
95th percentile per-packet one-way delay: 11.739 ms
Loss rate: 21.17%
```

Run 1: Report of Indigo-MusesT — Data Link



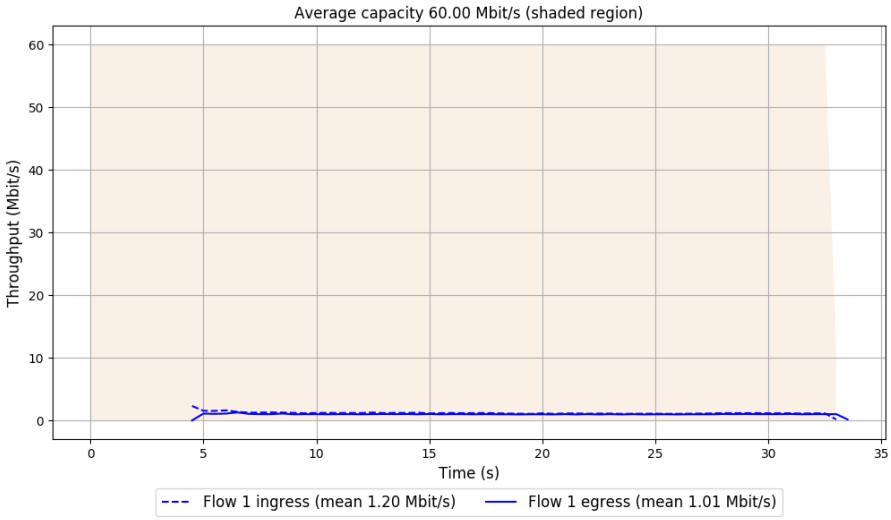


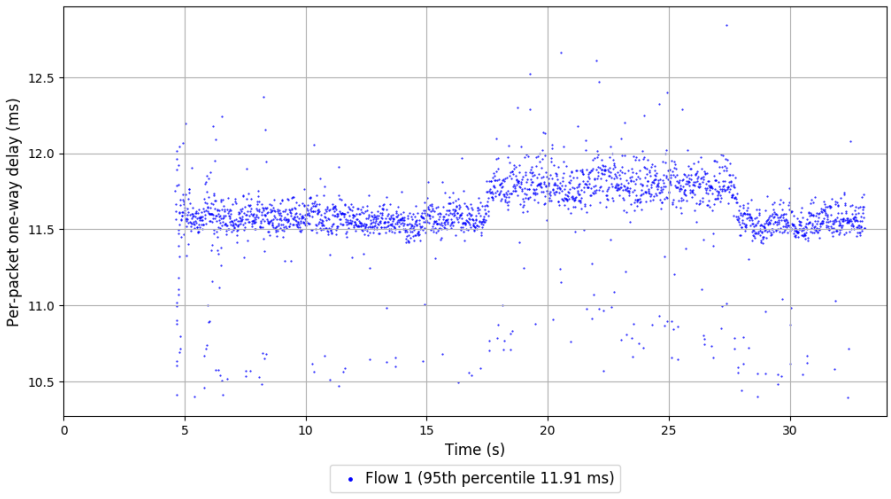
```
Run 2: Statistics of Indigo-MusesT

Start at: 2019-01-17 09:15:27
End at: 2019-01-17 09:15:57

# Below is generated by plot.py at 2019-01-17 09:31:37
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.01 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 11.906 ms
Loss rate: 15.68%
-- Flow 1:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 11.906 ms
Loss rate: 15.68%
```

Run 2: Report of Indigo-MusesT — Data Link



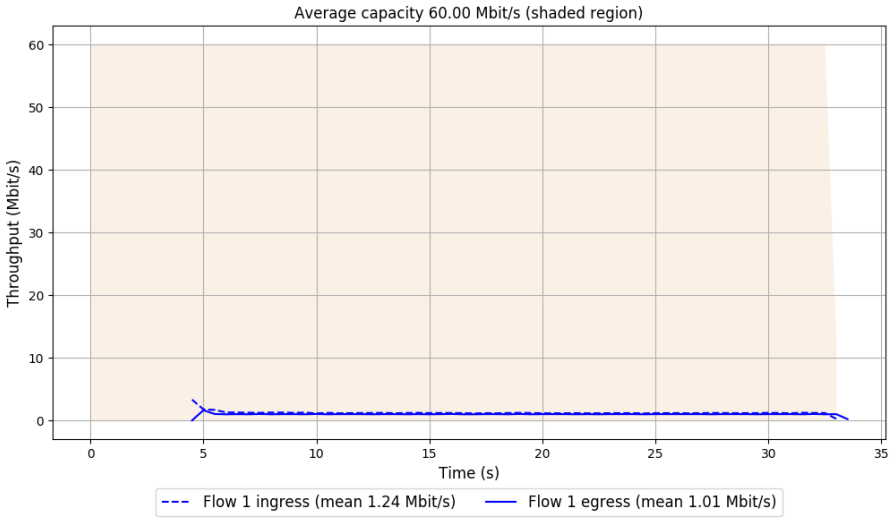


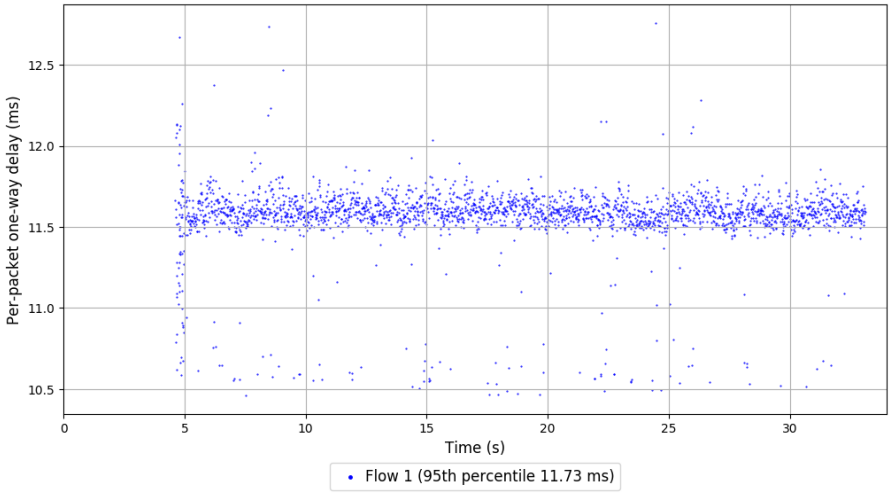
```
Run 3: Statistics of Indigo-MusesT

Start at: 2019-01-17 09:28:10
End at: 2019-01-17 09:28:40

# Below is generated by plot.py at 2019-01-17 09:31:41
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.01 Mbit/s (1.7% utilization)
95th percentile per-packet one-way delay: 11.733 ms
Loss rate: 18.56%
-- Flow 1:
Average throughput: 1.01 Mbit/s
95th percentile per-packet one-way delay: 11.733 ms
Loss rate: 18.56%
```

Run 3: Report of Indigo-MusesT — Data Link



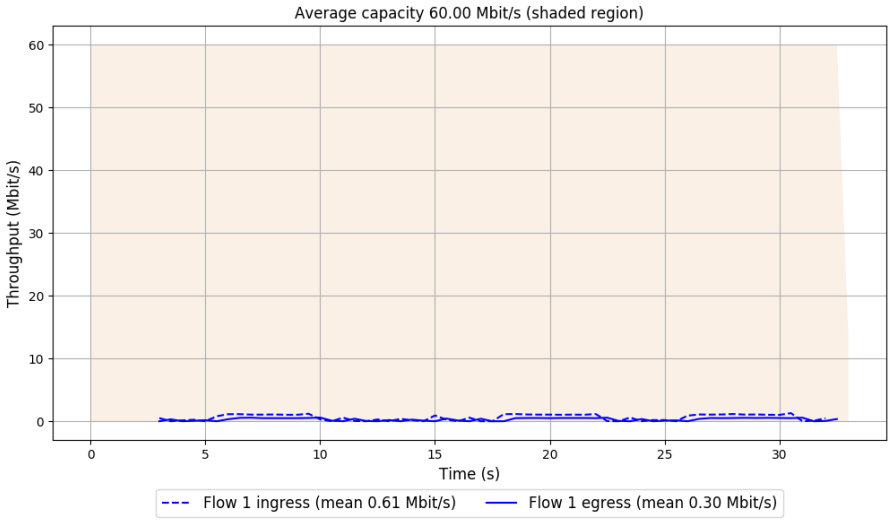


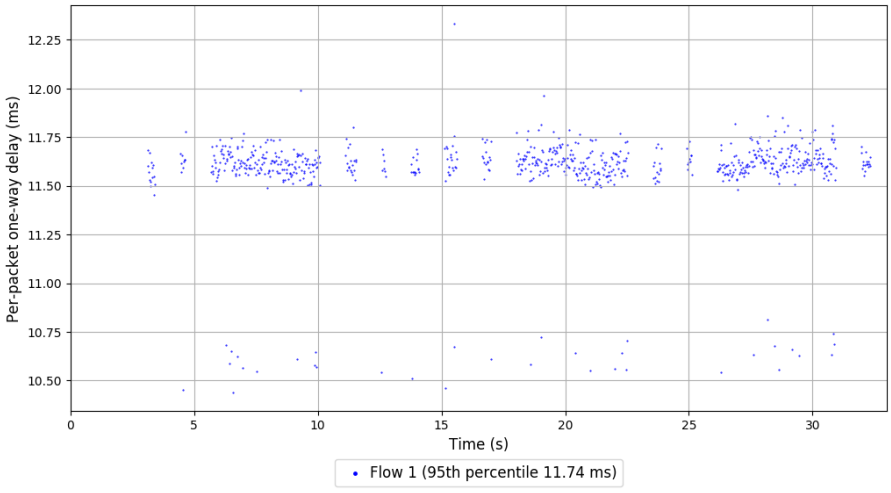
```
Run 1: Statistics of LEDBAT

Start at: 2019-01-17 08:55:37
End at: 2019-01-17 08:56:07

# Below is generated by plot.py at 2019-01-17 09:31:42
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.30 Mbit/s (0.5% utilization)
95th percentile per-packet one-way delay: 11.738 ms
Loss rate: 50.39%
-- Flow 1:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 11.738 ms
Loss rate: 50.39%
```

Run 1: Report of LEDBAT — Data Link



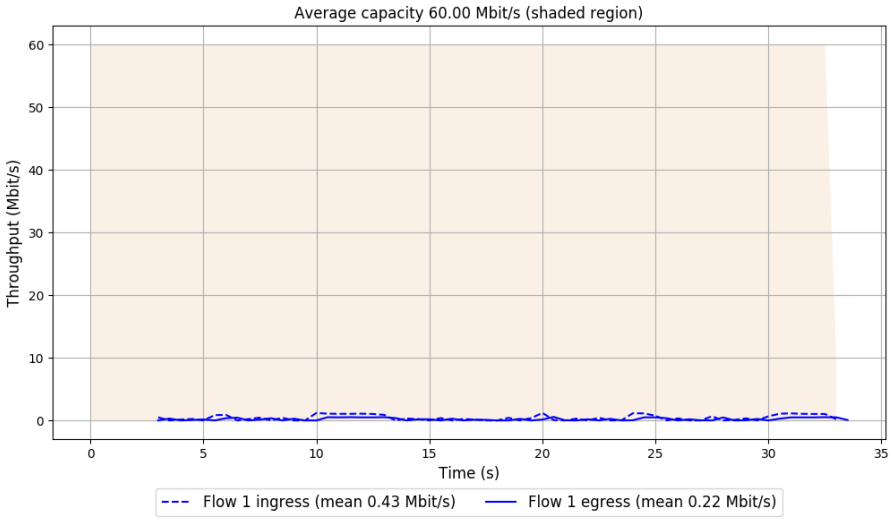


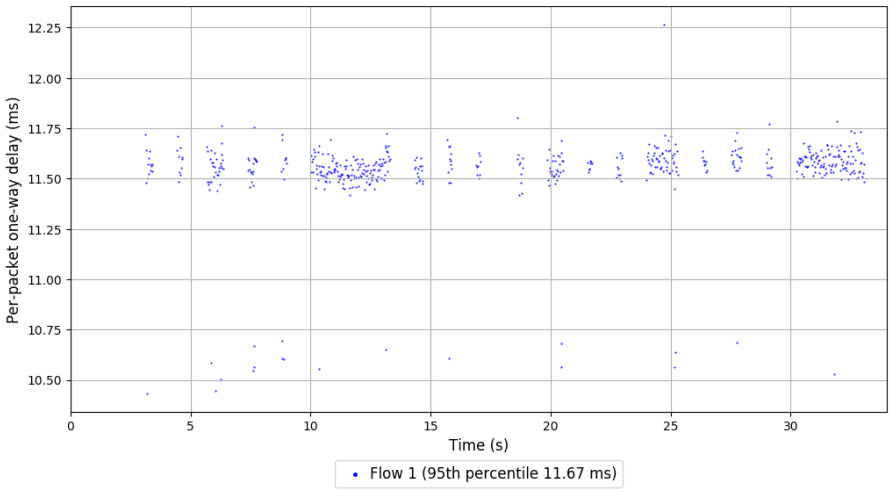
```
Run 2: Statistics of LEDBAT

Start at: 2019-01-17 09:08:16
End at: 2019-01-17 09:08:46

# Below is generated by plot.py at 2019-01-17 09:31:45
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.22 Mbit/s (0.4% utilization)
95th percentile per-packet one-way delay: 11.668 ms
Loss rate: 49.68%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 11.668 ms
Loss rate: 49.68%
```

Run 2: Report of LEDBAT — Data Link



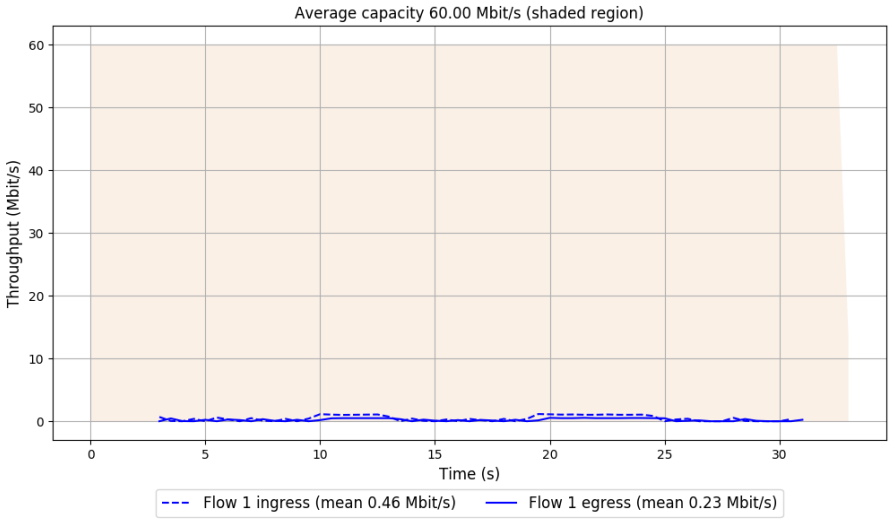


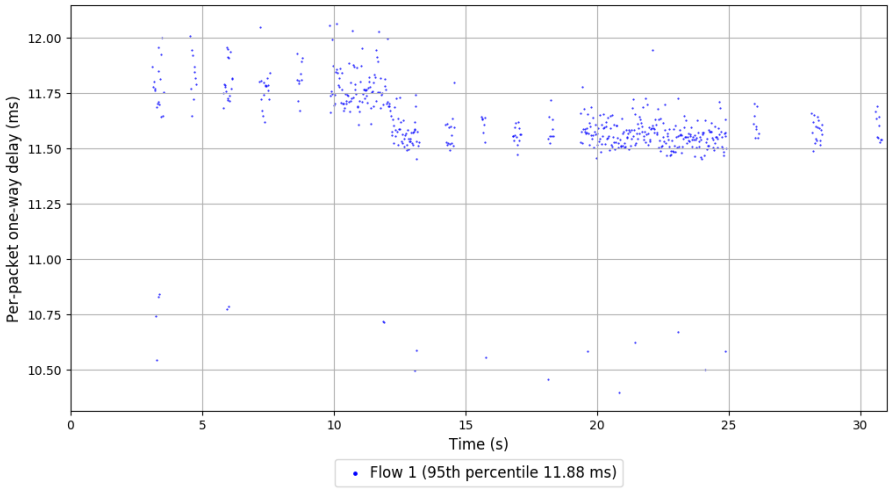
```
Run 3: Statistics of LEDBAT

Start at: 2019-01-17 09:20:54
End at: 2019-01-17 09:21:24

# Below is generated by plot.py at 2019-01-17 09:31:54
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.23 Mbit/s (0.4% utilization)
95th percentile per-packet one-way delay: 11.875 ms
Loss rate: 49.58%
-- Flow 1:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 11.875 ms
Loss rate: 49.58%
```

Run 3: Report of LEDBAT — Data Link



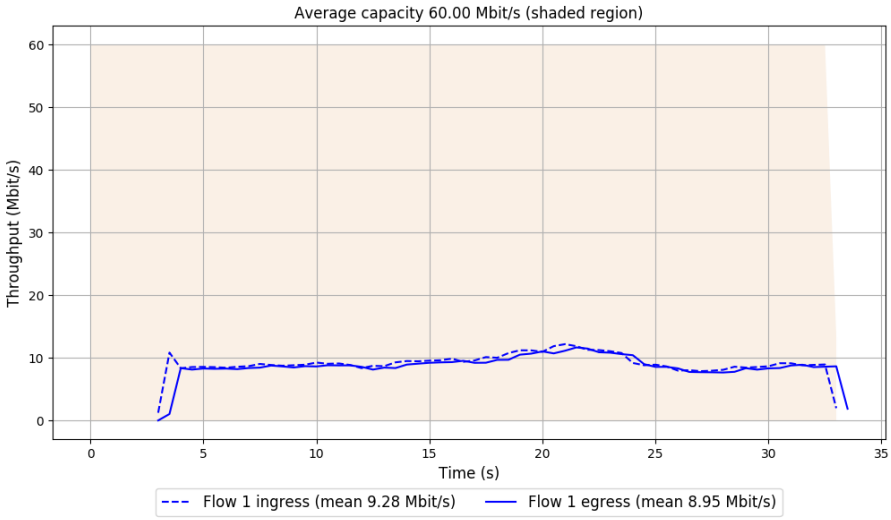


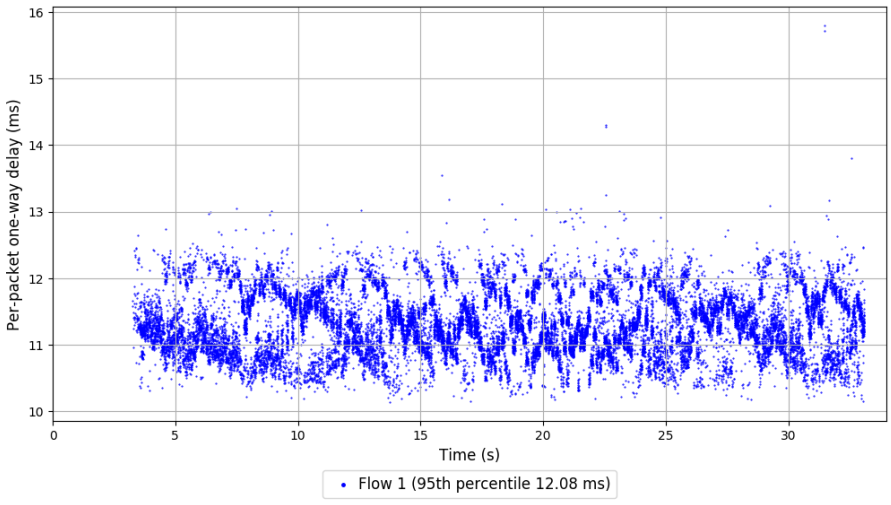
```
Run 1: Statistics of PCC-Allegro

Start at: 2019-01-17 09:03:24
End at: 2019-01-17 09:03:54

# Below is generated by plot.py at 2019-01-17 09:32:05
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 8.95 Mbit/s (14.9% utilization)
95th percentile per-packet one-way delay: 12.084 ms
Loss rate: 3.66%
-- Flow 1:
Average throughput: 8.95 Mbit/s
95th percentile per-packet one-way delay: 12.084 ms
Loss rate: 3.66%
```

Run 1: Report of PCC-Allegro — Data Link



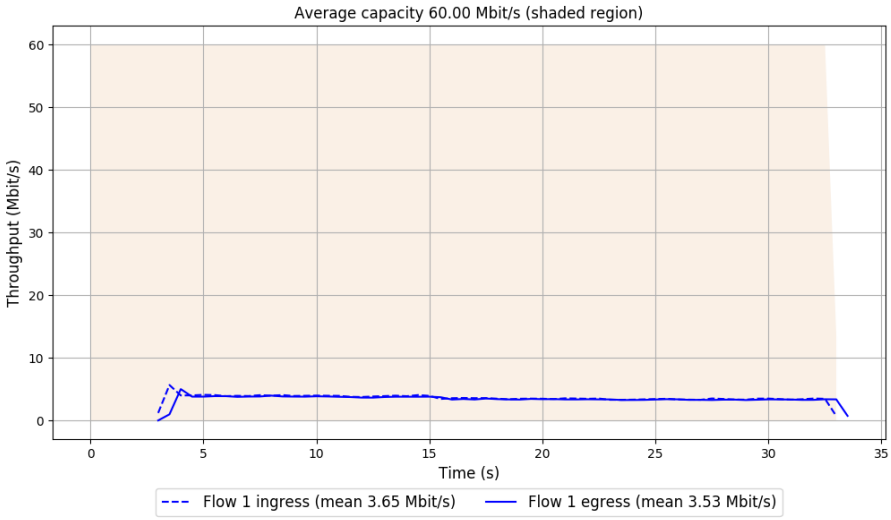


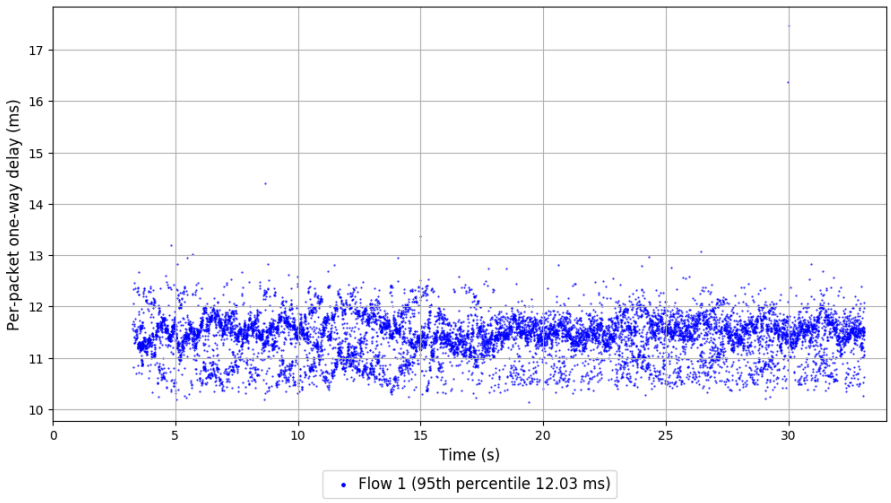
```
Run 2: Statistics of PCC-Allegro

Start at: 2019-01-17 09:16:03
End at: 2019-01-17 09:16:33

# Below is generated by plot.py at 2019-01-17 09:32:05
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 3.53 Mbit/s (5.9% utilization)
95th percentile per-packet one-way delay: 12.033 ms
Loss rate: 3.38%
-- Flow 1:
Average throughput: 3.53 Mbit/s
95th percentile per-packet one-way delay: 12.033 ms
Loss rate: 3.38%
```

Run 2: Report of PCC-Allegro — Data Link



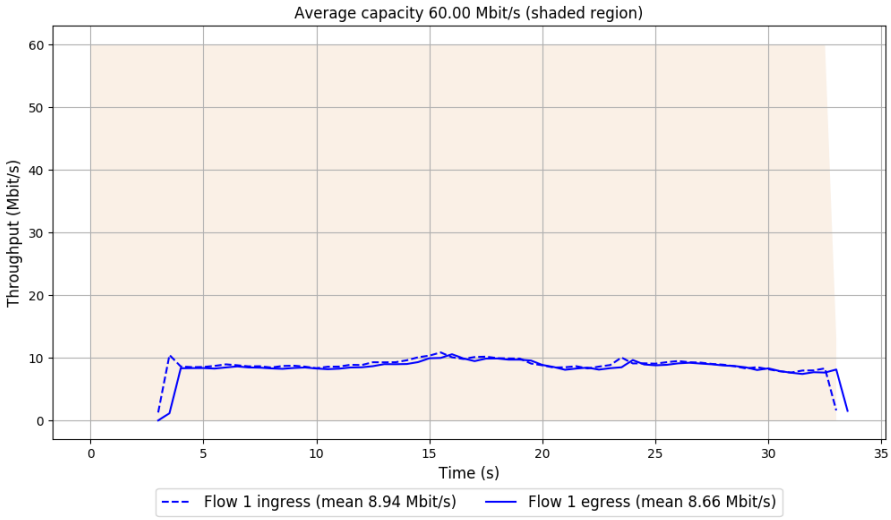


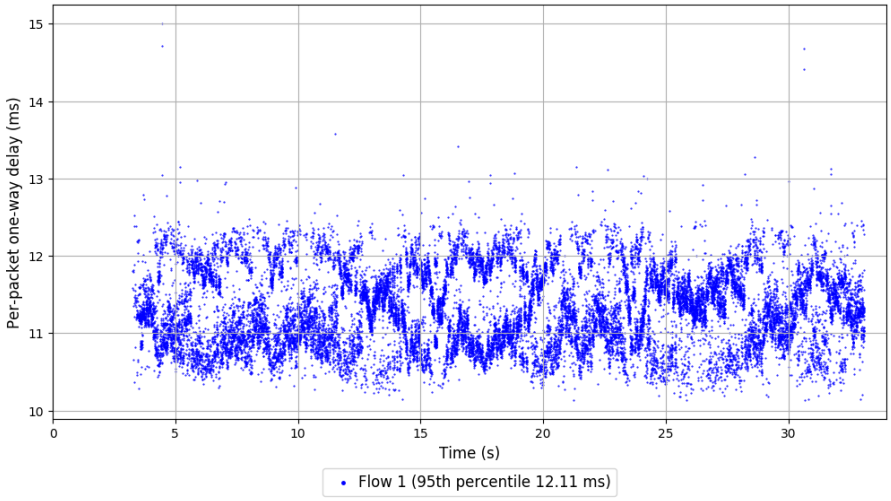
```
Run 3: Statistics of PCC-Allegro

Start at: 2019-01-17 09:28:46
End at: 2019-01-17 09:29:16

# Below is generated by plot.py at 2019-01-17 09:32:05
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 8.66 Mbit/s (14.4% utilization)
95th percentile per-packet one-way delay: 12.114 ms
Loss rate: 3.23%
-- Flow 1:
Average throughput: 8.66 Mbit/s
95th percentile per-packet one-way delay: 12.114 ms
Loss rate: 3.23%
```

Run 3: Report of PCC-Allegro — Data Link

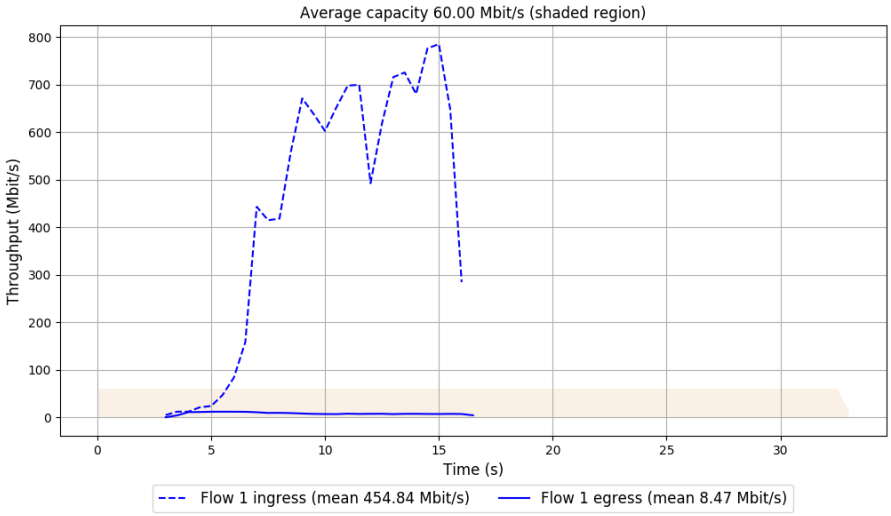


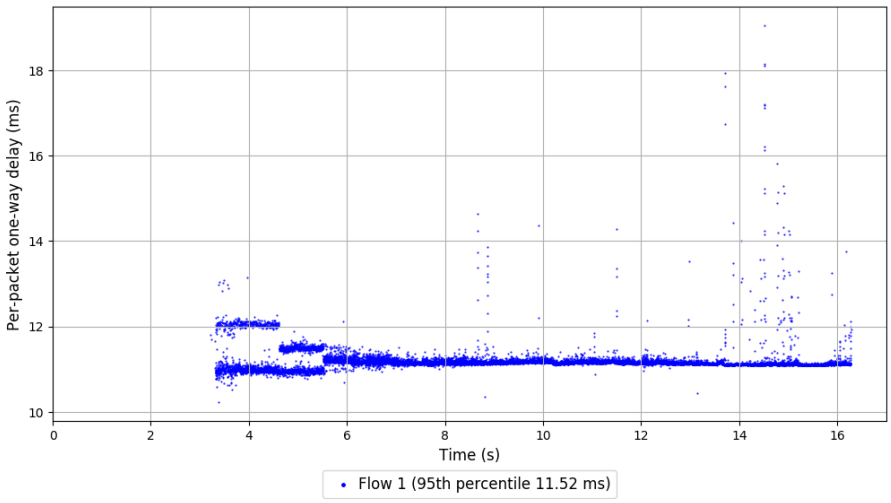


```
Run 1: Statistics of PCC-Expr

Start at: 2019-01-17 08:53:08
End at: 2019-01-17 08:53:38
```

Run 1: Report of PCC-Expr — Data Link

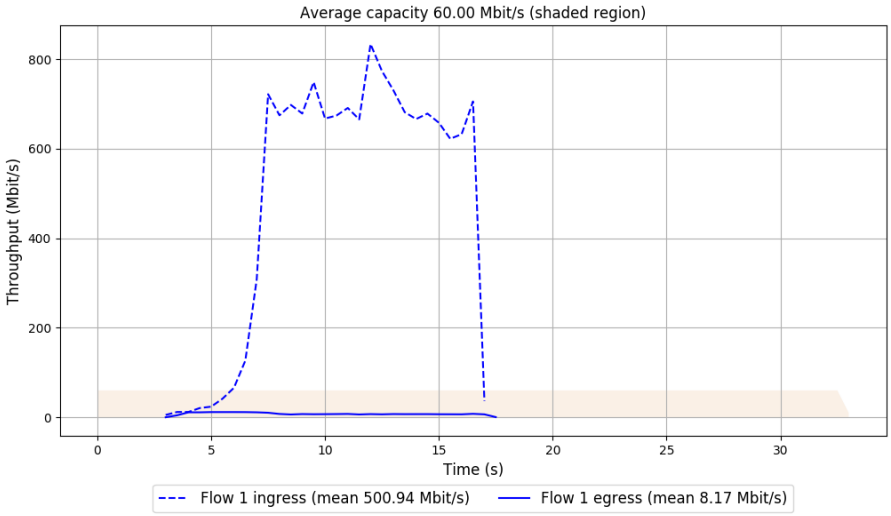


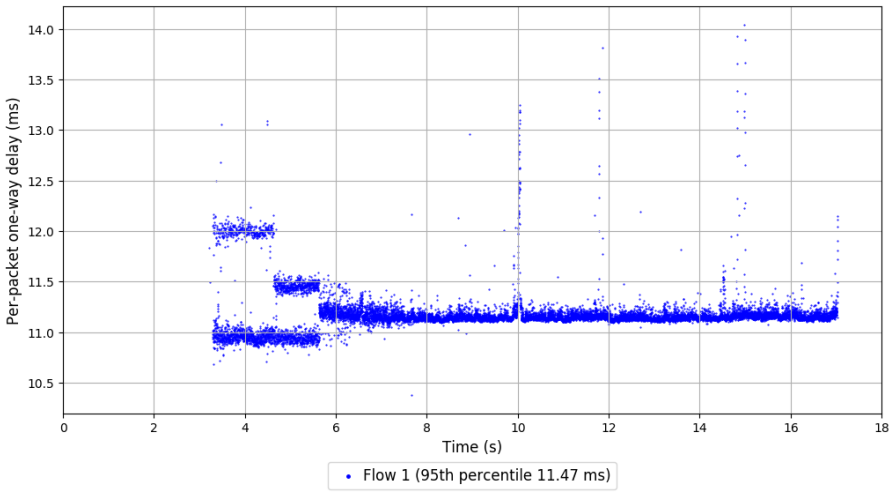


```
Run 2: Statistics of PCC-Expr

Start at: 2019-01-17 09:05:47
End at: 2019-01-17 09:06:17
```

Run 2: Report of PCC-Expr — Data Link

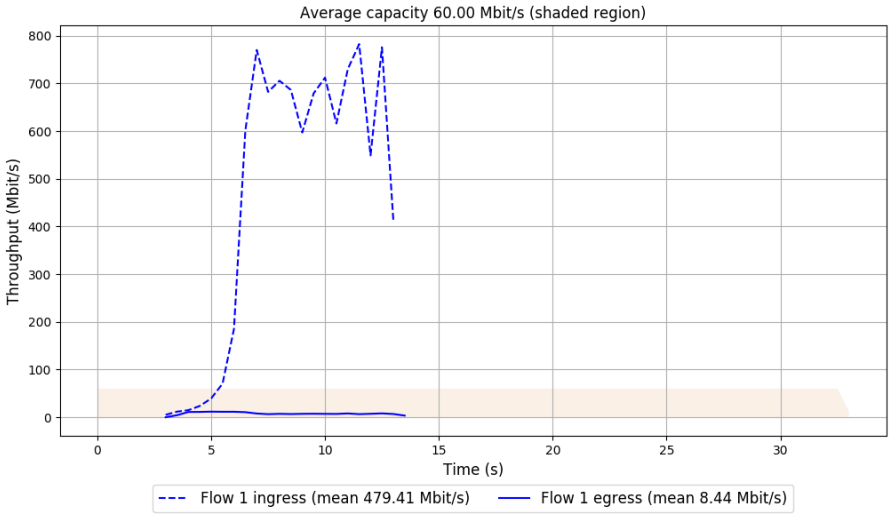


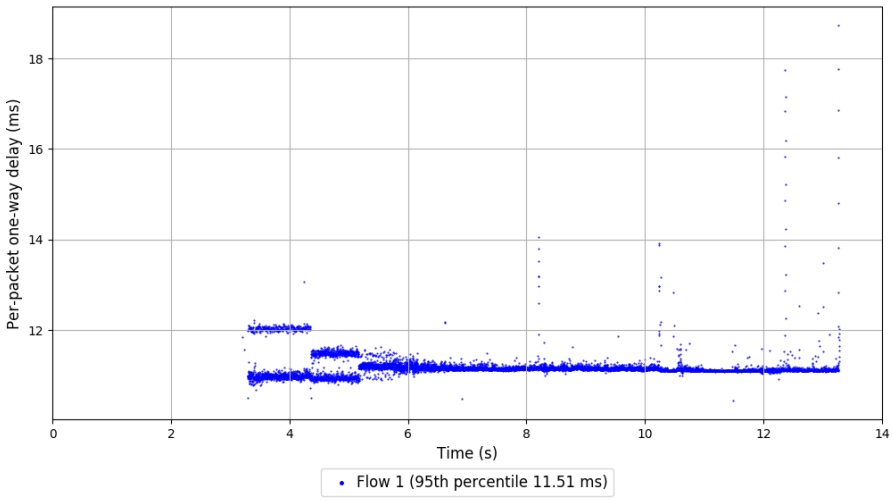


```
Run 3: Statistics of PCC-Expr

Start at: 2019-01-17 09:18:26
End at: 2019-01-17 09:18:56
```

Run 3: Report of PCC-Expr — Data Link



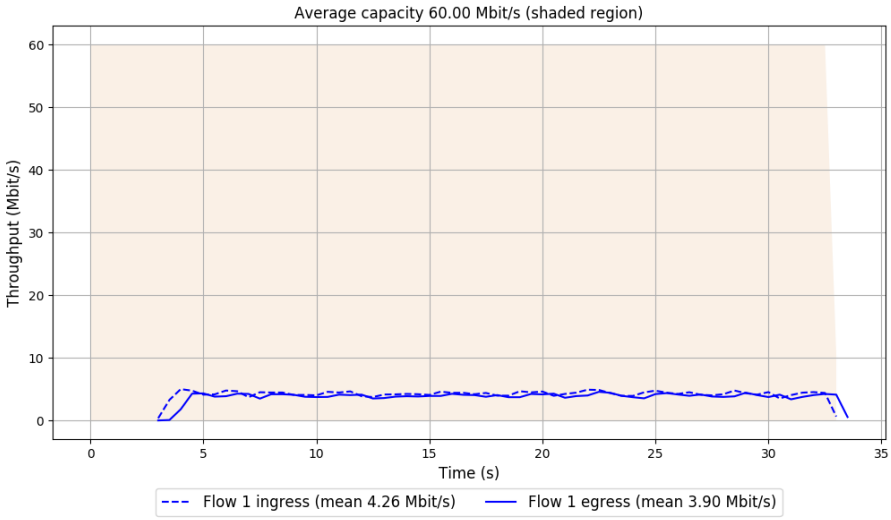


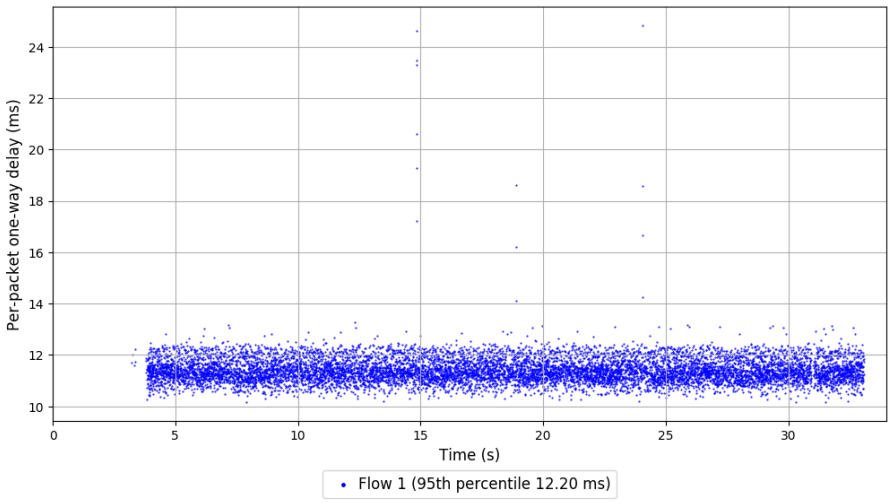
```
Run 1: Statistics of QUIC Cubic

Start at: 2019-01-17 08:56:12
End at: 2019-01-17 08:56:42

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 3.90 Mbit/s (6.5% utilization)
95th percentile per-packet one-way delay: 12.199 ms
Loss rate: 8.46%
-- Flow 1:
Average throughput: 3.90 Mbit/s
95th percentile per-packet one-way delay: 12.199 ms
Loss rate: 8.46%
```

Run 1: Report of QUIC Cubic — Data Link



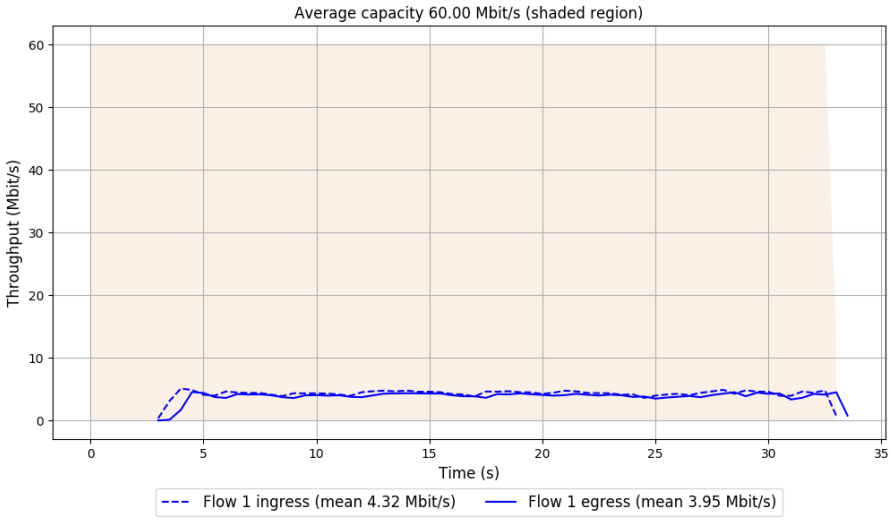


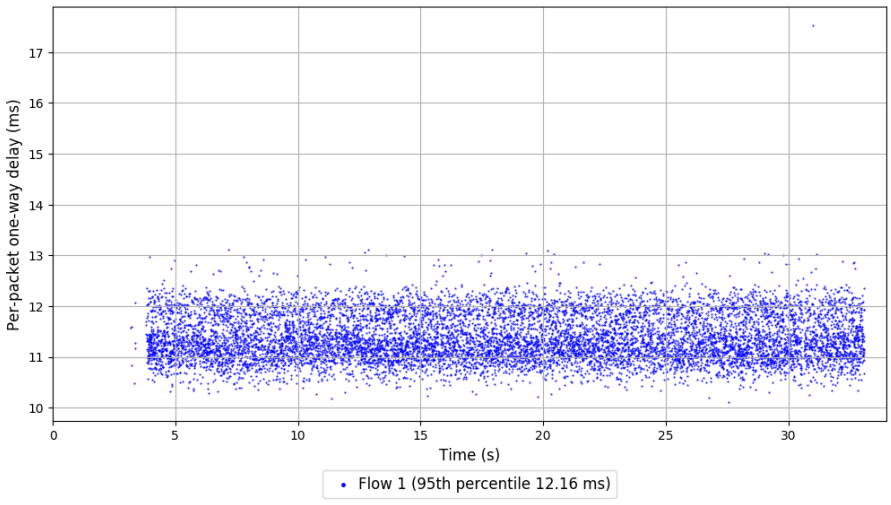
```
Run 2: Statistics of QUIC Cubic

Start at: 2019-01-17 09:08:52
End at: 2019-01-17 09:09:22

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 3.95 Mbit/s (6.6% utilization)
95th percentile per-packet one-way delay: 12.162 ms
Loss rate: 8.60%
-- Flow 1:
Average throughput: 3.95 Mbit/s
95th percentile per-packet one-way delay: 12.162 ms
Loss rate: 8.60%
```

Run 2: Report of QUIC Cubic — Data Link



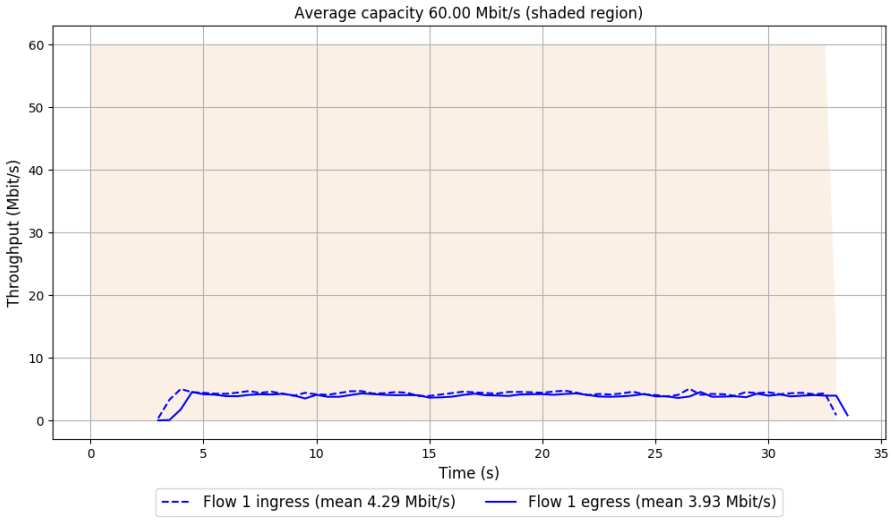


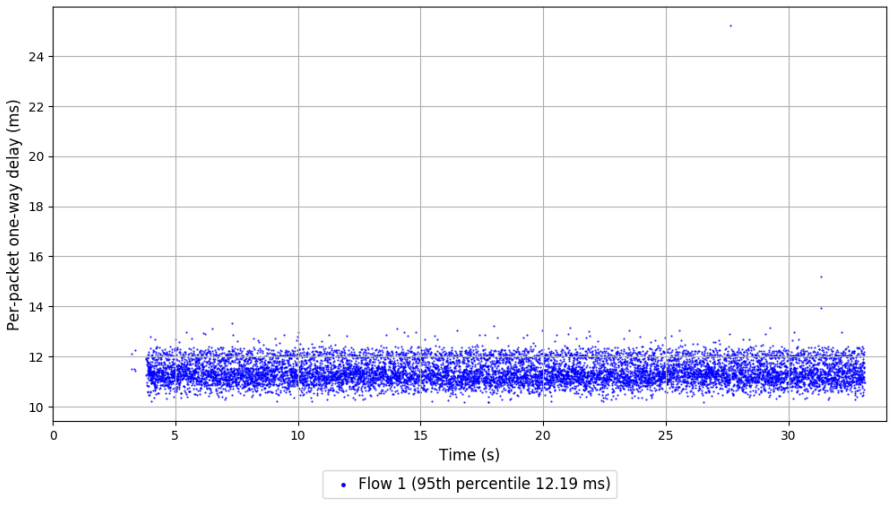
```
Run 3: Statistics of QUIC Cubic

Start at: 2019-01-17 09:21:30
End at: 2019-01-17 09:22:00

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 3.93 Mbit/s (6.6% utilization)
95th percentile per-packet one-way delay: 12.191 ms
Loss rate: 8.48%
-- Flow 1:
Average throughput: 3.93 Mbit/s
95th percentile per-packet one-way delay: 12.191 ms
Loss rate: 8.48%
```

Run 3: Report of QUIC Cubic — Data Link



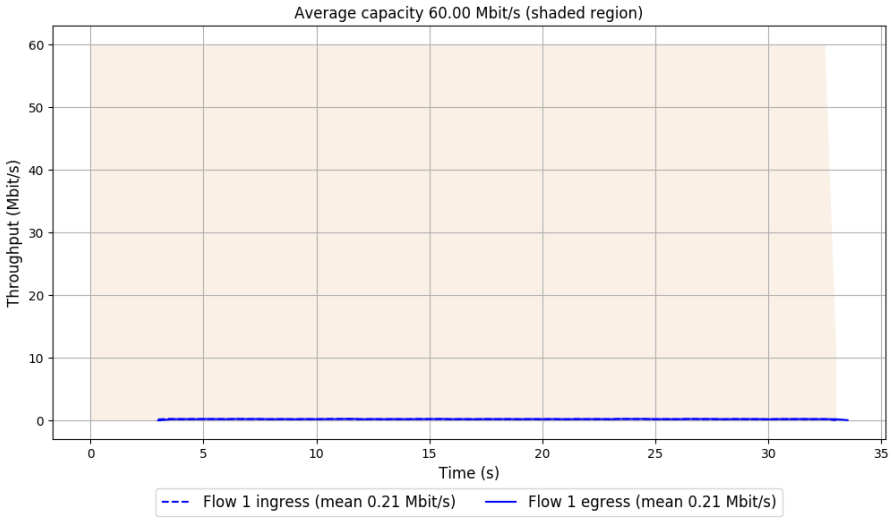


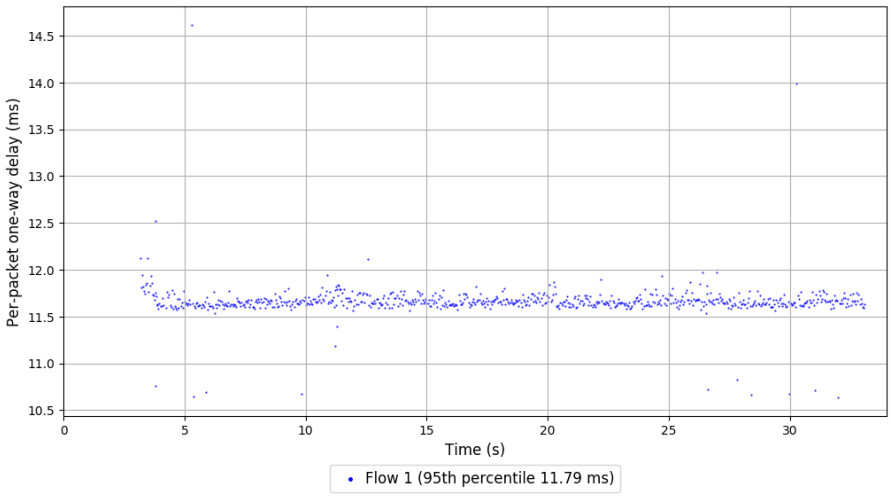
```
Run 1: Statistics of SCReAM

Start at: 2019-01-17 09:02:12
End at: 2019-01-17 09:02:42

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.21 Mbit/s (0.4% utilization)
95th percentile per-packet one-way delay: 11.788 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 11.788 ms
Loss rate: 0.00%
```

Run 1: Report of SCReAM — Data Link



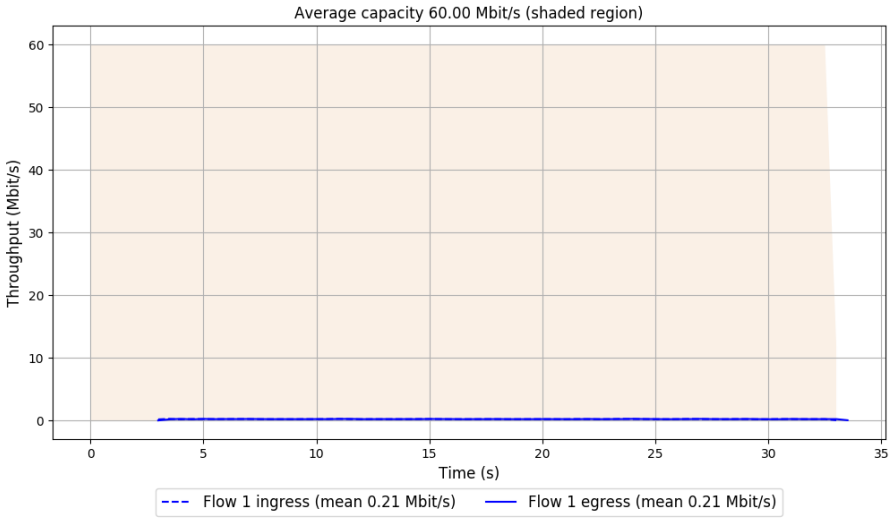


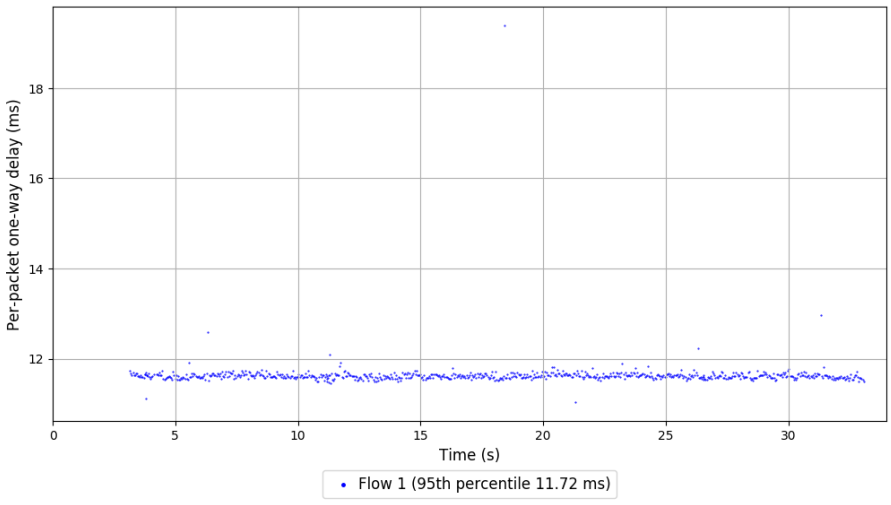
```
Run 2: Statistics of SCReAM

Start at: 2019-01-17 09:14:52
End at: 2019-01-17 09:15:22

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.21 Mbit/s (0.4% utilization)
95th percentile per-packet one-way delay: 11.722 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 11.722 ms
Loss rate: 0.00%
```

Run 2: Report of SCReAM — Data Link



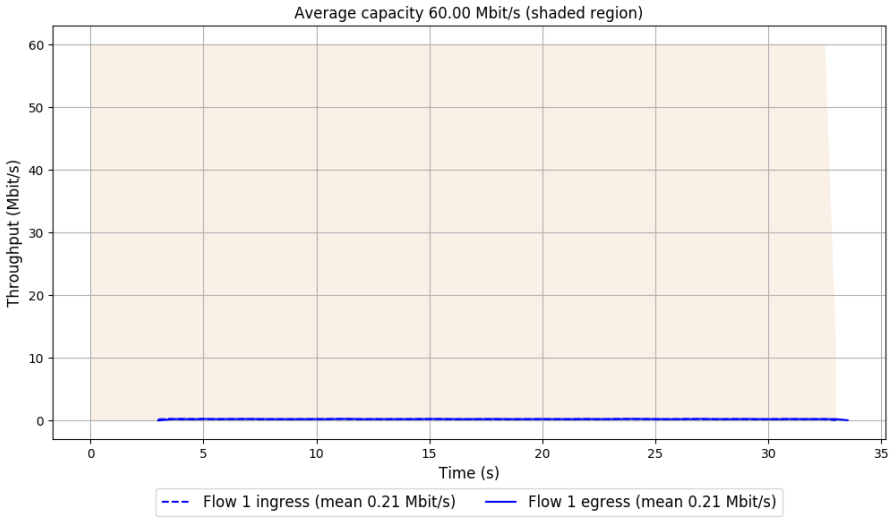


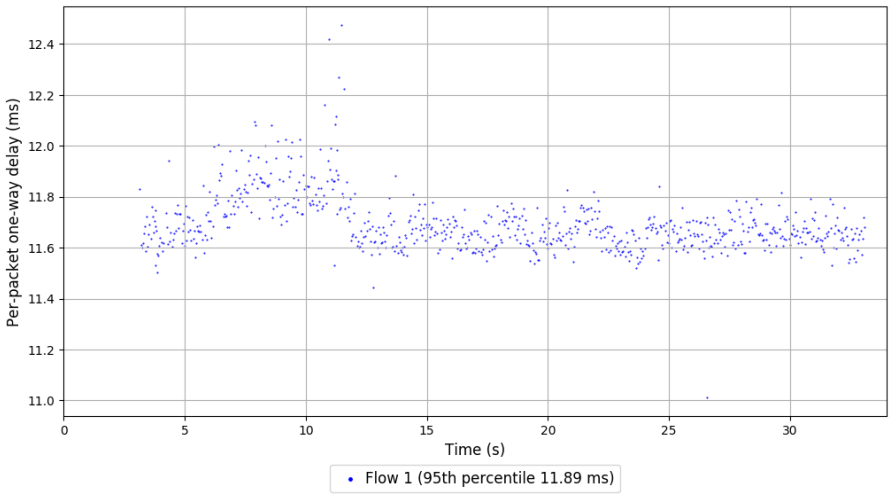
```
Run 3: Statistics of SCReAM

Start at: 2019-01-17 09:27:34
End at: 2019-01-17 09:28:04

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.21 Mbit/s (0.4% utilization)
95th percentile per-packet one-way delay: 11.891 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 11.891 ms
Loss rate: 0.00%
```

Run 3: Report of SCReAM — Data Link



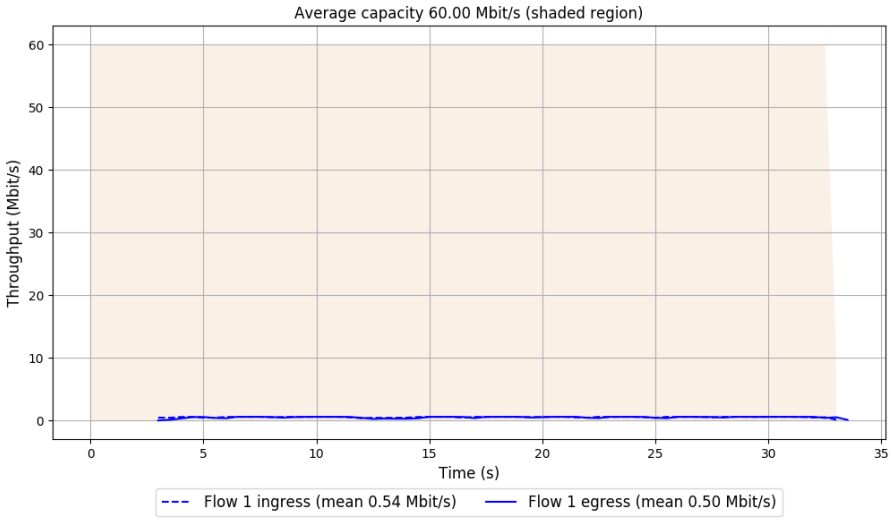


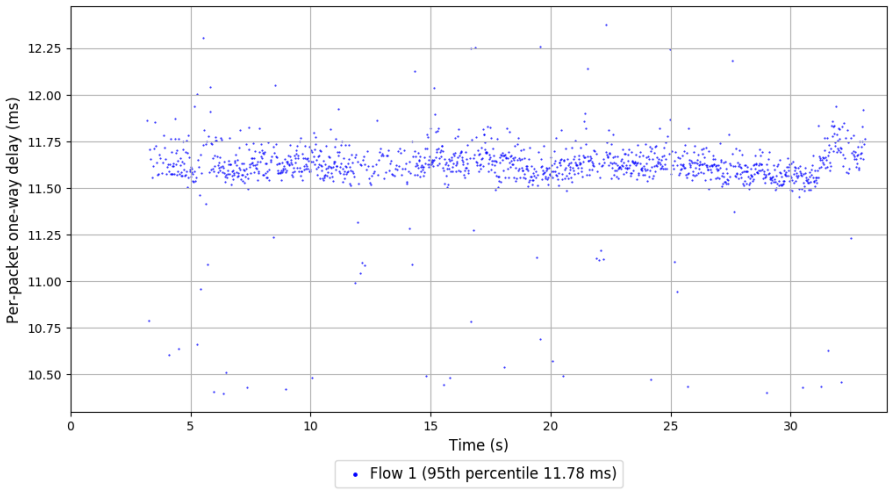
```
Run 1: Statistics of Sprout

Start at: 2019-01-17 08:53:49
End at: 2019-01-17 08:54:19

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.50 Mbit/s (0.8% utilization)
95th percentile per-packet one-way delay: 11.781 ms
Loss rate: 6.09%
-- Flow 1:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 11.781 ms
Loss rate: 6.09%
```

Run 1: Report of Sprout — Data Link



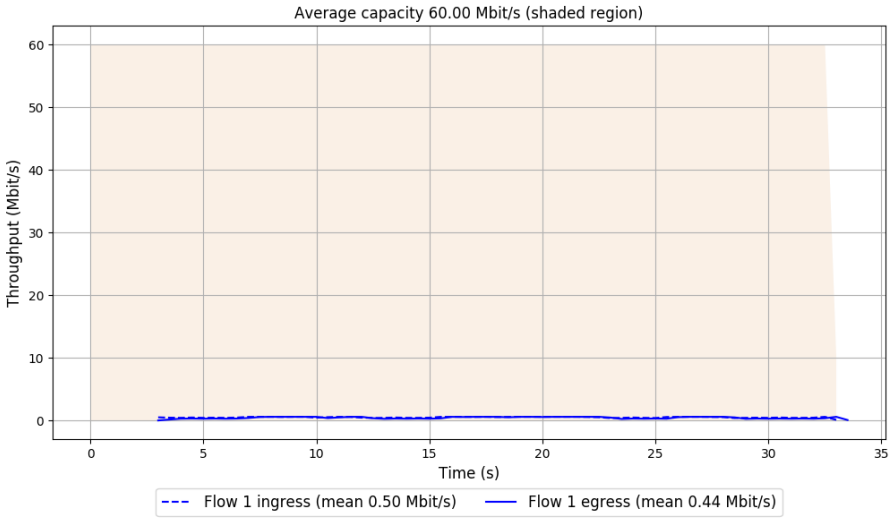


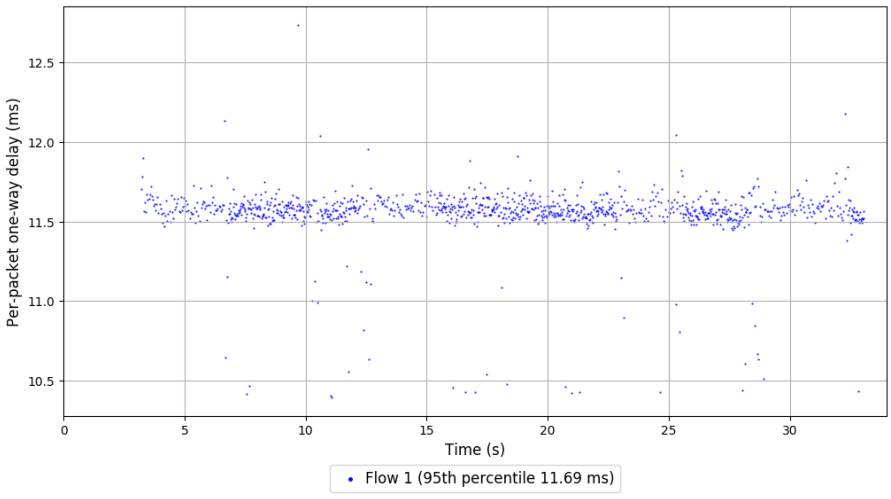
```
Run 2: Statistics of Sprout

Start at: 2019-01-17 09:06:29
End at: 2019-01-17 09:06:59

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.44 Mbit/s (0.7% utilization)
95th percentile per-packet one-way delay: 11.685 ms
Loss rate: 13.59%
-- Flow 1:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 11.685 ms
Loss rate: 13.59%
```

Run 2: Report of Sprout — Data Link



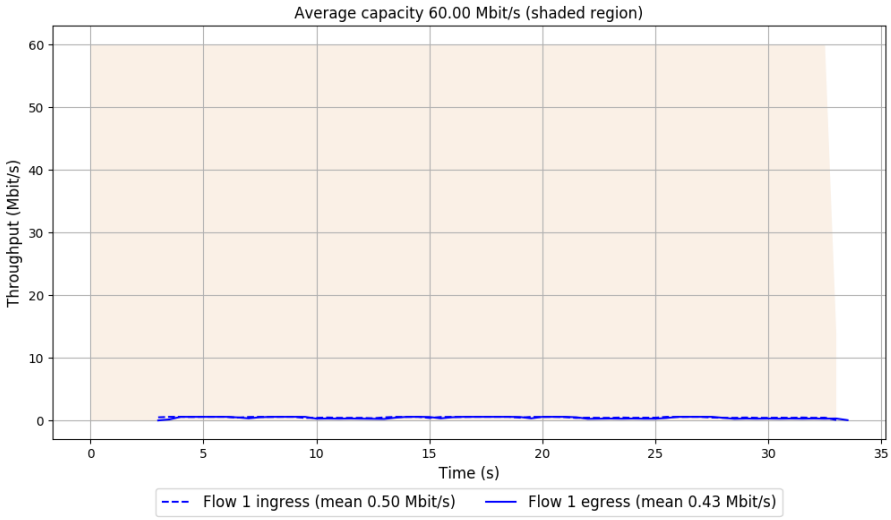


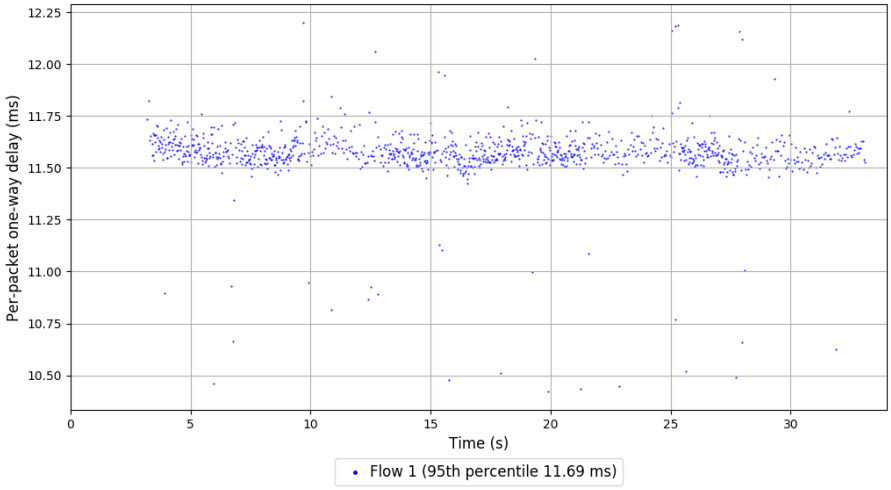
```
Run 3: Statistics of Sprout

Start at: 2019-01-17 09:19:07
End at: 2019-01-17 09:19:37

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.43 Mbit/s (0.7% utilization)
95th percentile per-packet one-way delay: 11.693 ms
Loss rate: 14.23%
-- Flow 1:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 11.693 ms
Loss rate: 14.23%
```

Run 3: Report of Sprout — Data Link



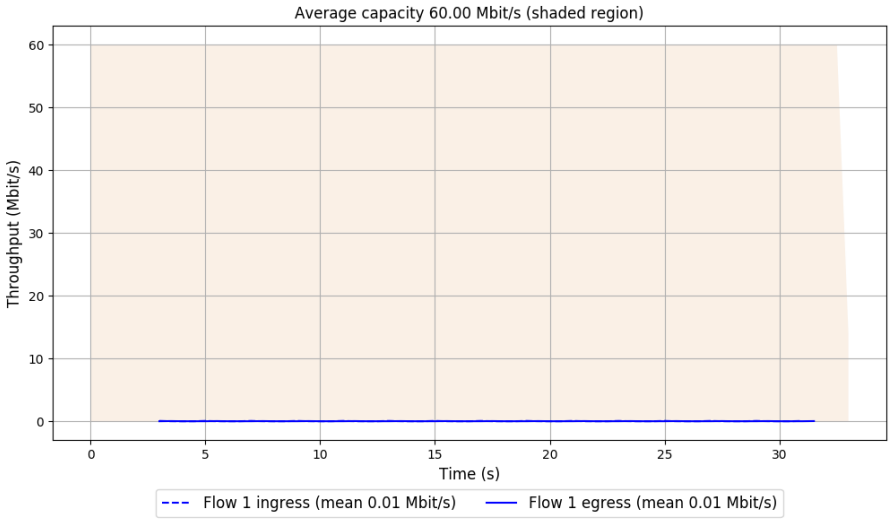


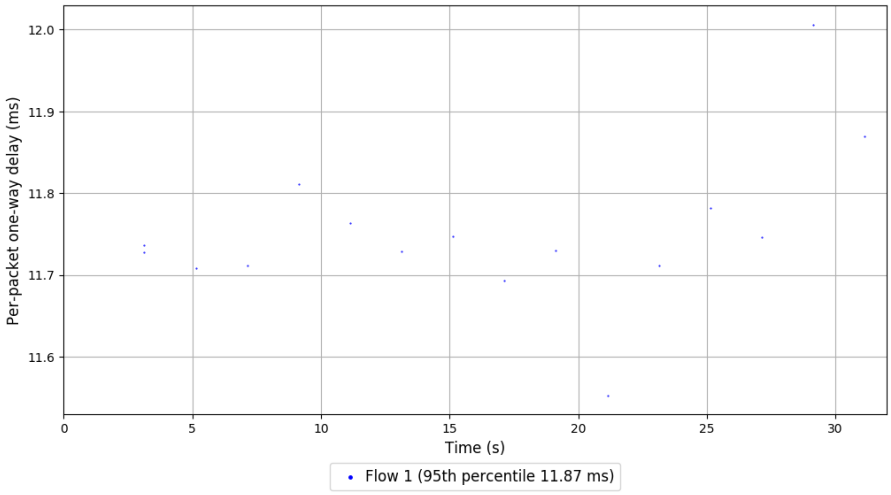
```
Run 1: Statistics of TaoVA-100x

Start at: 2019-01-17 08:59:47
End at: 2019-01-17 09:00:17

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.01 Mbit/s (0.0% utilization)
95th percentile per-packet one-way delay: 11.869 ms
Loss rate: 51.91%
-- Flow 1:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 11.869 ms
Loss rate: 51.91%
```

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



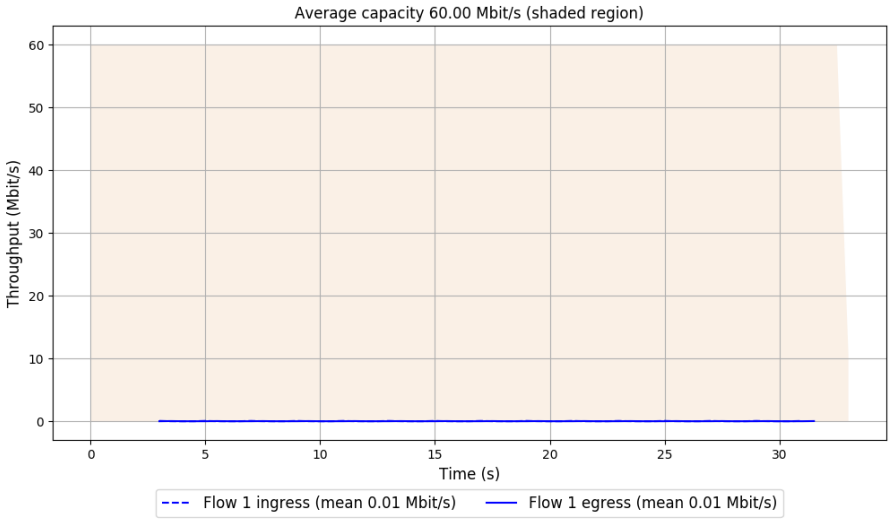


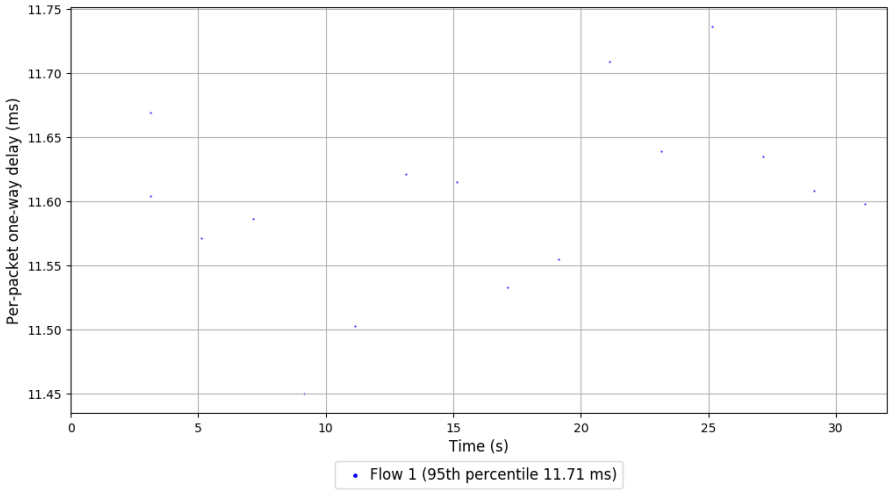
```
Run 2: Statistics of TaoVA-100x

Start at: 2019-01-17 09:12:27
End at: 2019-01-17 09:12:57

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.01 Mbit/s (0.0% utilization)
95th percentile per-packet one-way delay: 11.709 ms
Loss rate: 51.91%
-- Flow 1:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 11.709 ms
Loss rate: 51.91%
```

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

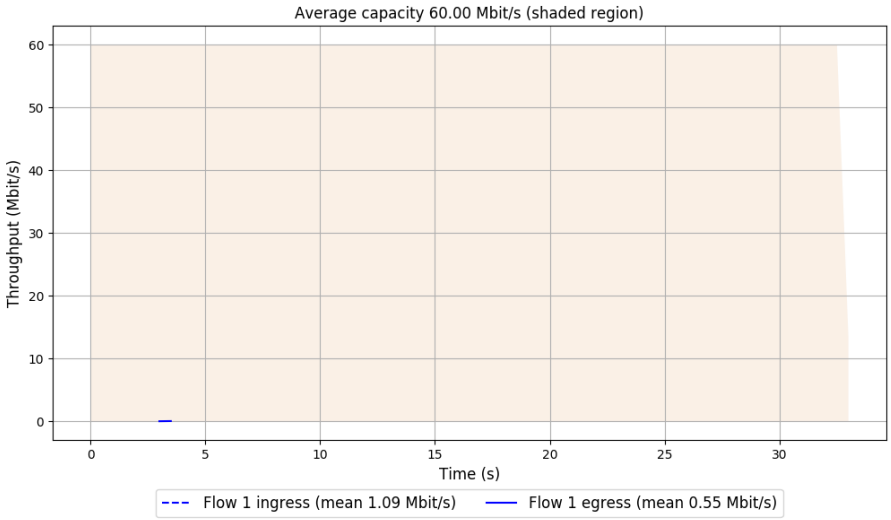


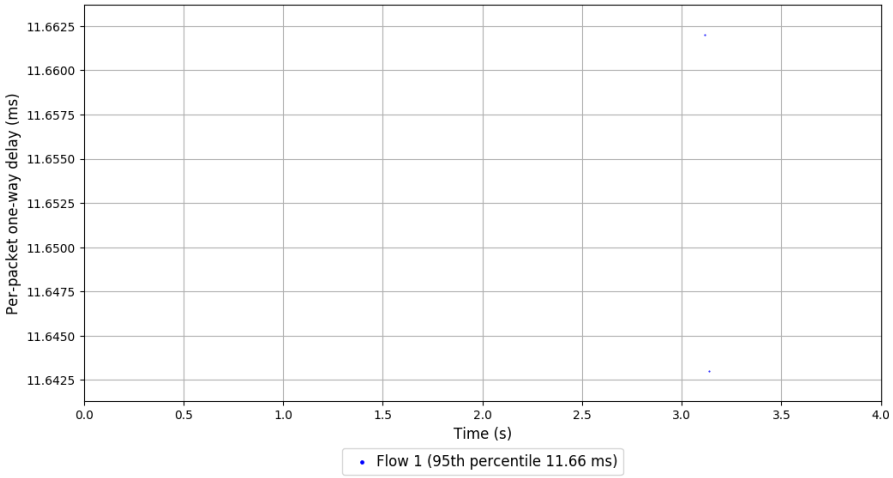


```
Run 3: Statistics of TaoVA-100x

Start at: 2019-01-17 09:25:05
End at: 2019-01-17 09:25:35
```

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



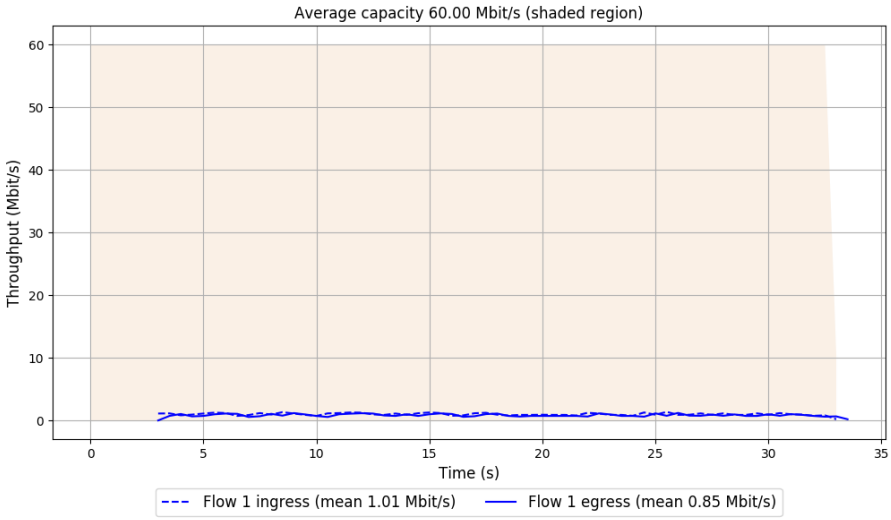


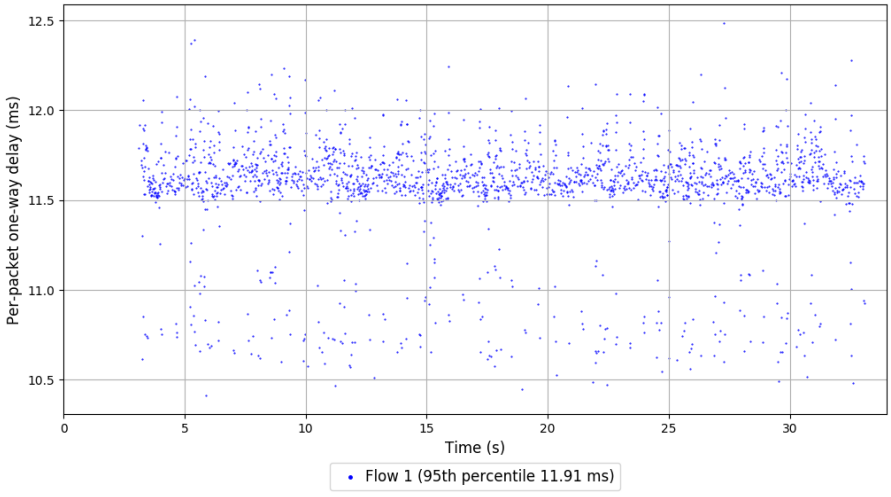
```
Run 1: Statistics of TCP Vegas

Start at: 2019-01-17 08:54:25
End at: 2019-01-17 08:54:55

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.85 Mbit/s (1.4% utilization)
95th percentile per-packet one-way delay: 11.907 ms
Loss rate: 15.70%
-- Flow 1:
Average throughput: 0.85 Mbit/s
95th percentile per-packet one-way delay: 11.907 ms
Loss rate: 15.70%
```

Run 1: Report of TCP Vegas — Data Link



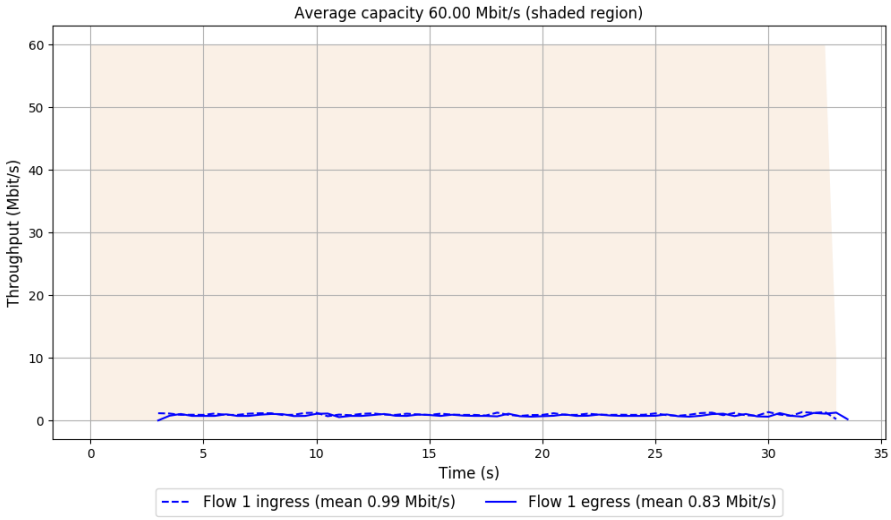


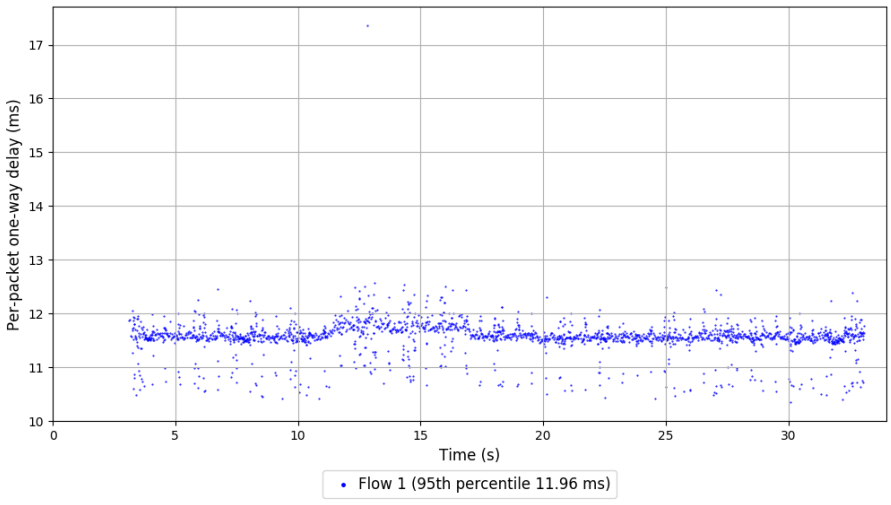
```
Run 2: Statistics of TCP Vegas

Start at: 2019-01-17 09:07:05
End at: 2019-01-17 09:07:35

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.83 Mbit/s (1.4% utilization)
95th percentile per-packet one-way delay: 11.956 ms
Loss rate: 16.35%
-- Flow 1:
Average throughput: 0.83 Mbit/s
95th percentile per-packet one-way delay: 11.956 ms
Loss rate: 16.35%
```

Run 2: Report of TCP Vegas — Data Link



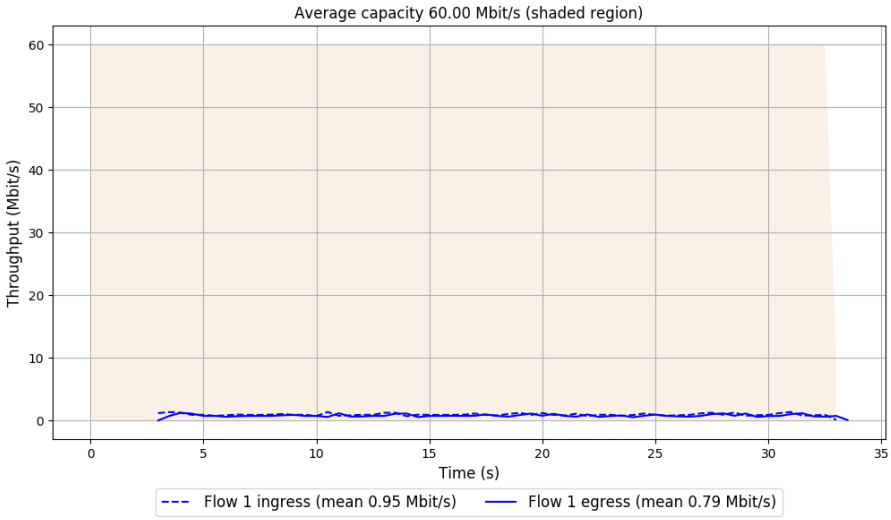


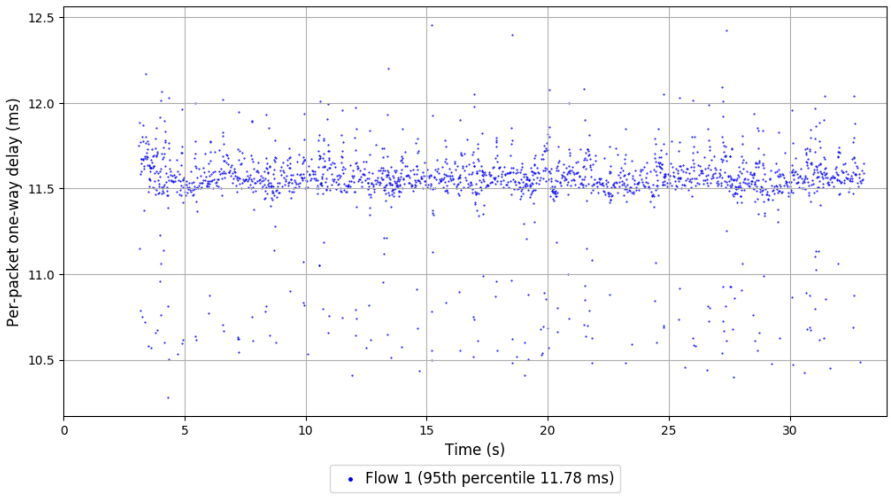
```
Run 3: Statistics of TCP Vegas

Start at: 2019-01-17 09:19:42
End at: 2019-01-17 09:20:12

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.79 Mbit/s (1.3% utilization)
95th percentile per-packet one-way delay: 11.781 ms
Loss rate: 17.44%
-- Flow 1:
Average throughput: 0.79 Mbit/s
95th percentile per-packet one-way delay: 11.781 ms
Loss rate: 17.44%
```

Run 3: Report of TCP Vegas — Data Link



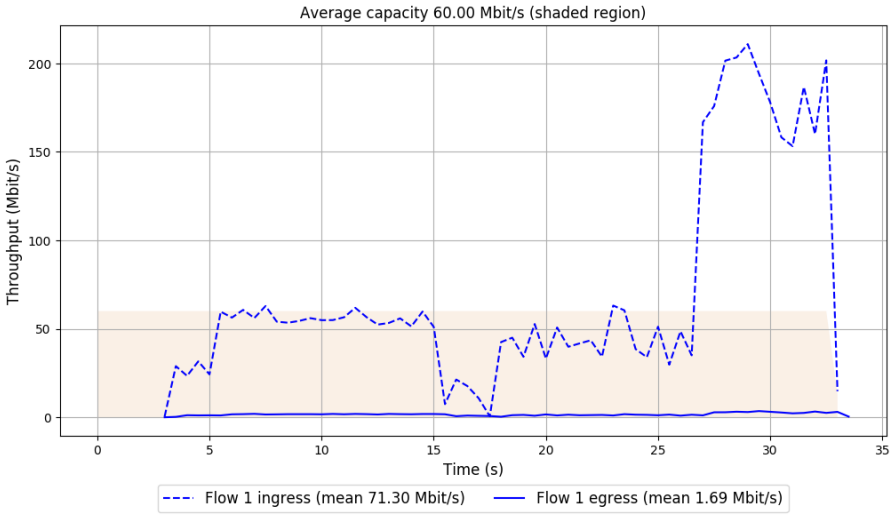


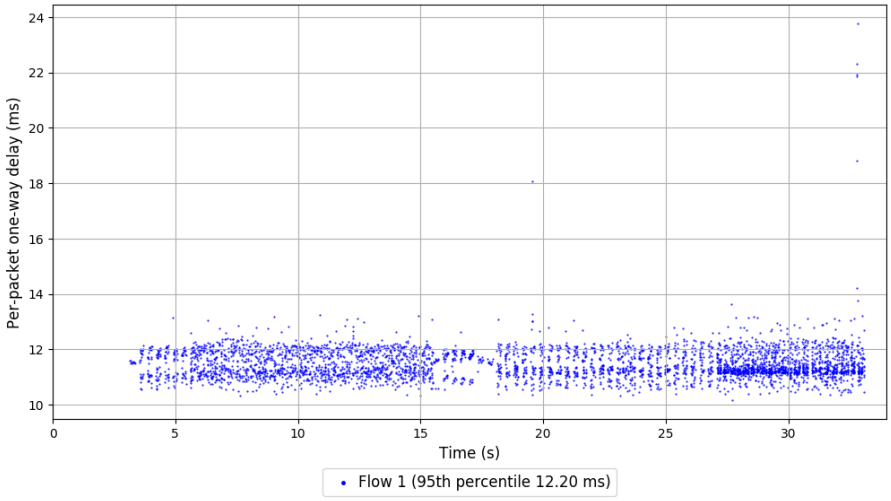
```
Run 1: Statistics of Verus

Start at: 2019-01-17 09:00:23
End at: 2019-01-17 09:00:53

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.69 Mbit/s (2.8% utilization)
95th percentile per-packet one-way delay: 12.199 ms
Loss rate: 97.64%
-- Flow 1:
Average throughput: 1.69 Mbit/s
95th percentile per-packet one-way delay: 12.199 ms
Loss rate: 97.64%
```

Run 1: Report of Verus — Data Link



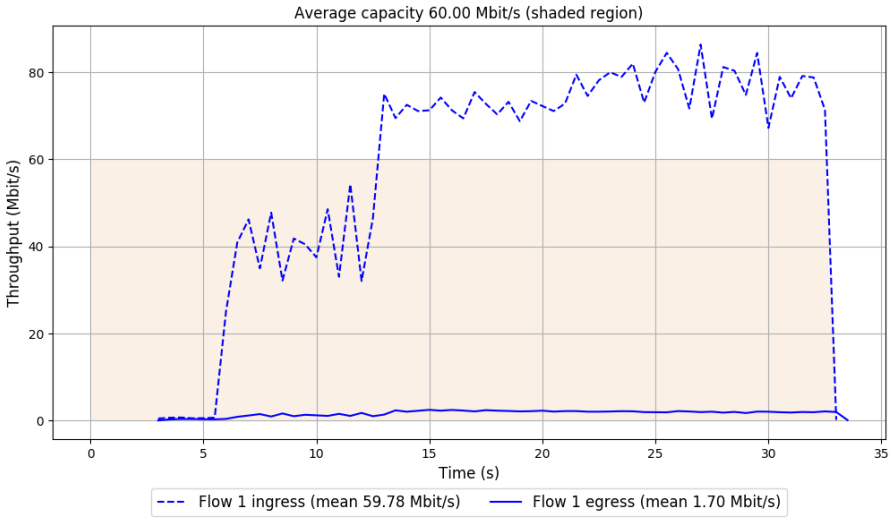


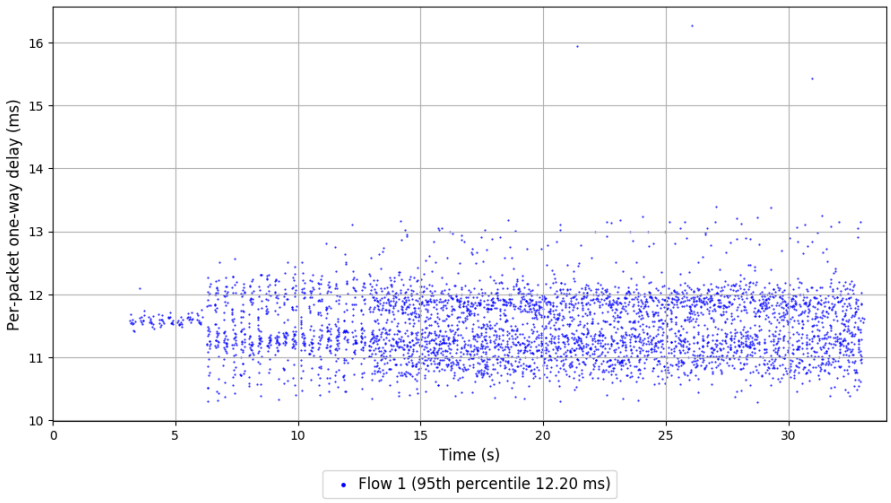
```
Run 2: Statistics of Verus

Start at: 2019-01-17 09:13:03
End at: 2019-01-17 09:13:33

# Below is generated by plot.py at 2019-01-17 09:33:46
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 1.70 Mbit/s (2.8% utilization)
95th percentile per-packet one-way delay: 12.204 ms
Loss rate: 97.16%
-- Flow 1:
Average throughput: 1.70 Mbit/s
95th percentile per-packet one-way delay: 12.204 ms
Loss rate: 97.16%
```

Run 2: Report of Verus — Data Link



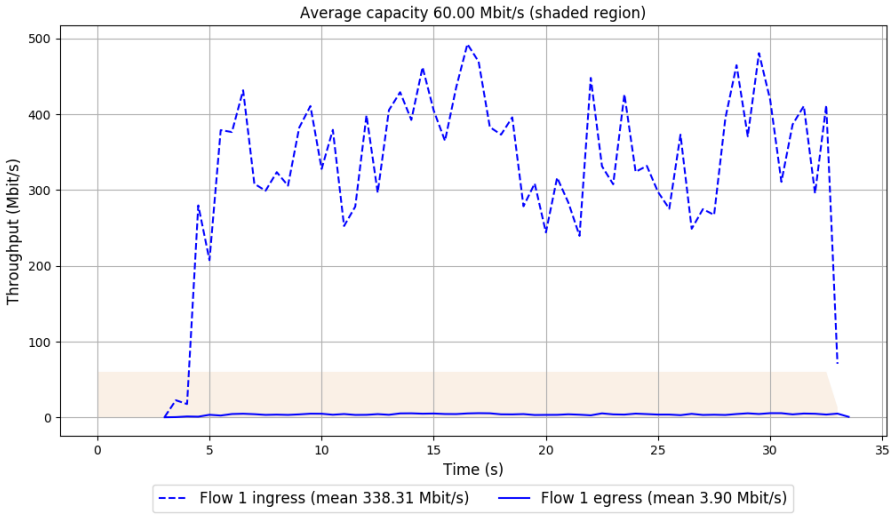


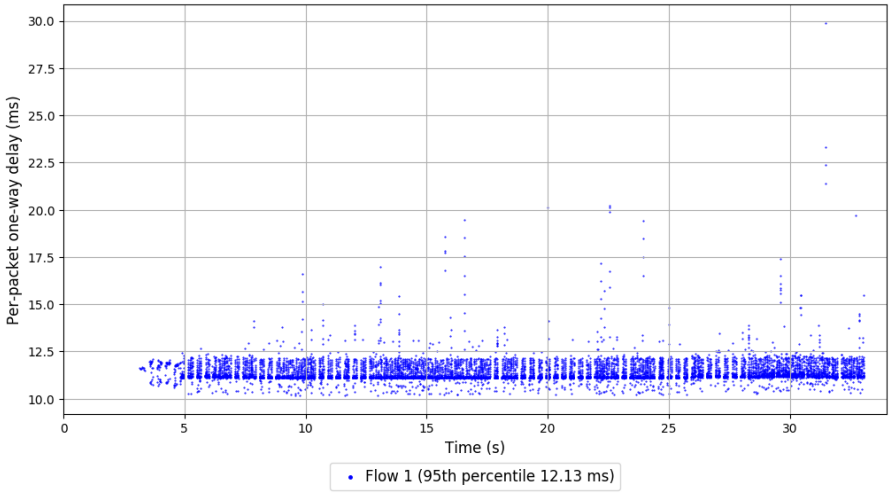
```
Run 3: Statistics of Verus

Start at: 2019-01-17 09:25:41
End at: 2019-01-17 09:26:11

# Below is generated by plot.py at 2019-01-17 09:33:48
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 3.90 Mbit/s (6.5% utilization)
95th percentile per-packet one-way delay: 12.127 ms
Loss rate: 98.85%
-- Flow 1:
Average throughput: 3.90 Mbit/s
95th percentile per-packet one-way delay: 12.127 ms
Loss rate: 98.85%
```

Run 3: Report of Verus — Data Link



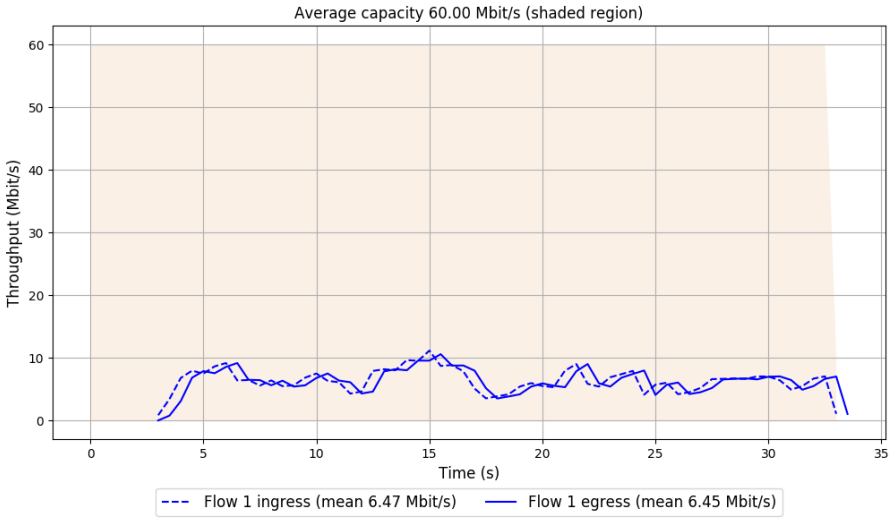


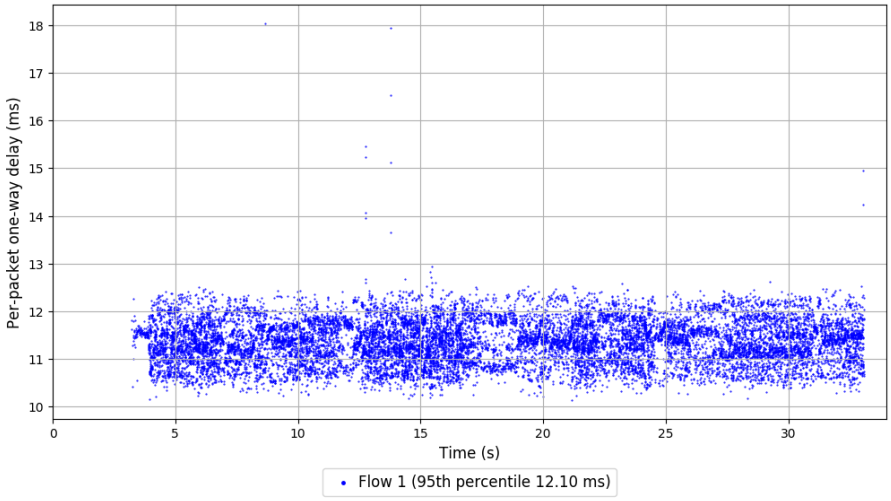
```
Run 1: Statistics of PCC-Vivace

Start at: 2019-01-17 08:59:11
End at: 2019-01-17 08:59:41

# Below is generated by plot.py at 2019-01-17 09:33:48
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 6.45 Mbit/s (10.8% utilization)
95th percentile per-packet one-way delay: 12.098 ms
Loss rate: 0.31%
-- Flow 1:
Average throughput: 6.45 Mbit/s
95th percentile per-packet one-way delay: 12.098 ms
Loss rate: 0.31%
```

Run 1: Report of PCC-Vivace — Data Link



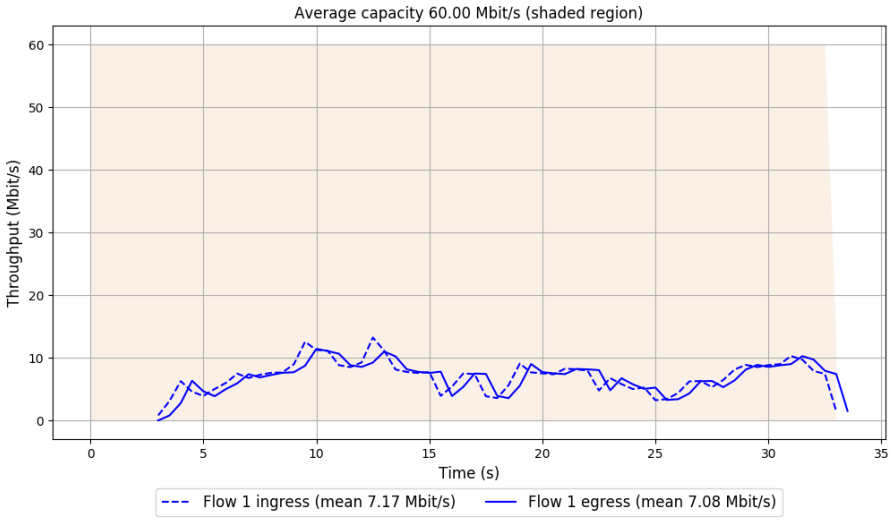


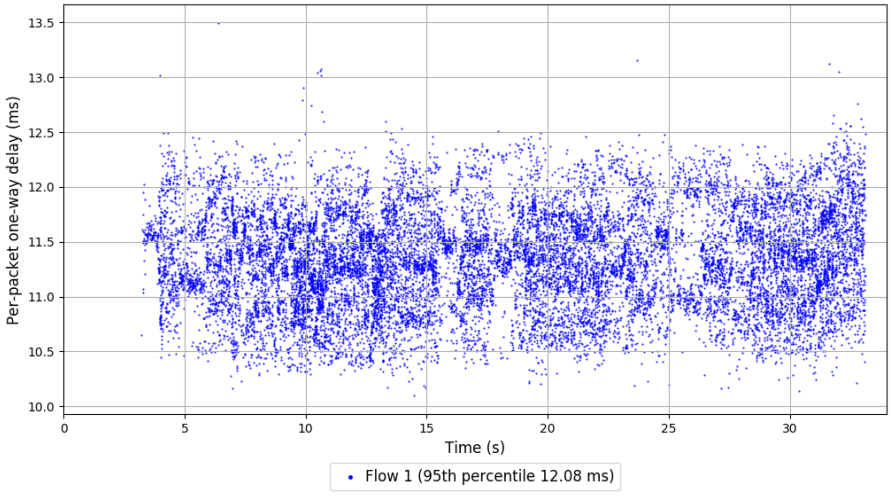
```
Run 2: Statistics of PCC-Vivace

Start at: 2019-01-17 09:11:51
End at: 2019-01-17 09:12:21

# Below is generated by plot.py at 2019-01-17 09:33:48
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 7.08 Mbit/s (11.8% utilization)
95th percentile per-packet one-way delay: 12.079 ms
Loss rate: 1.28%
-- Flow 1:
Average throughput: 7.08 Mbit/s
95th percentile per-packet one-way delay: 12.079 ms
Loss rate: 1.28%
```

Run 2: Report of PCC-Vivace — Data Link



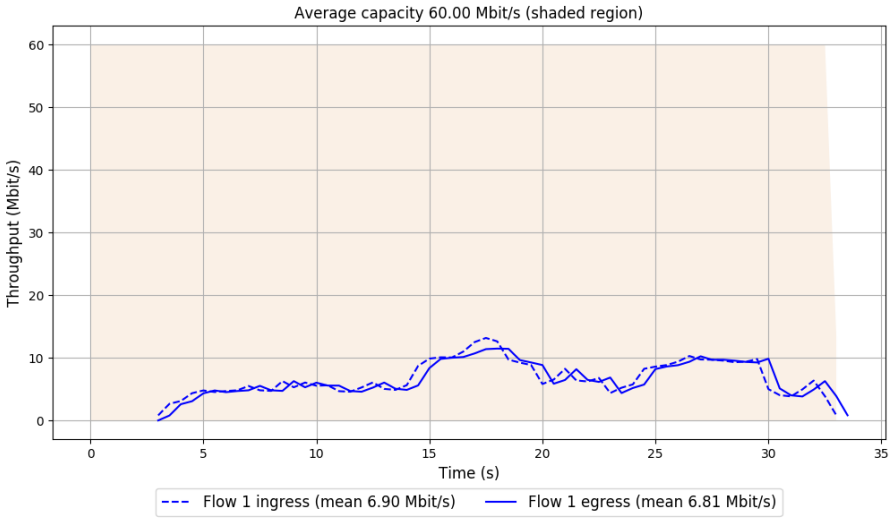


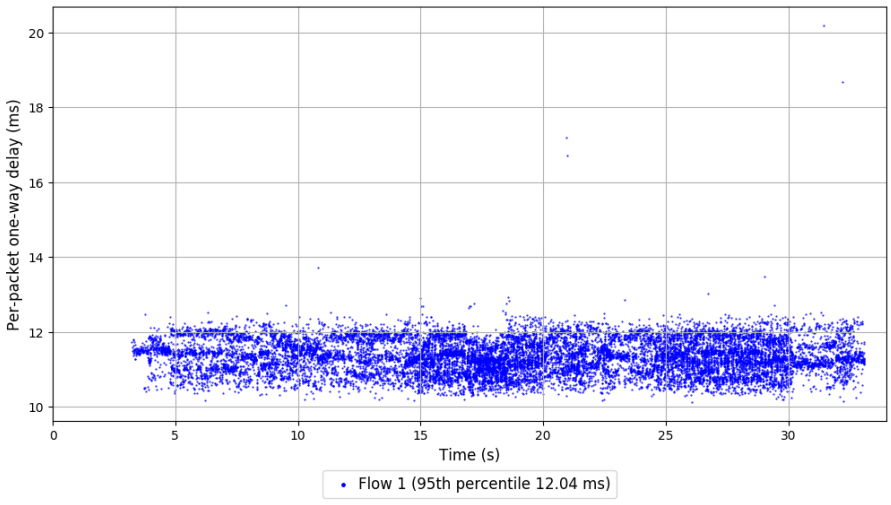
```
Run 3: Statistics of PCC-Vivace

Start at: 2019-01-17 09:24:29
End at: 2019-01-17 09:24:59

# Below is generated by plot.py at 2019-01-17 09:33:48
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 6.81 Mbit/s (11.4% utilization)
95th percentile per-packet one-way delay: 12.038 ms
Loss rate: 1.28%
-- Flow 1:
Average throughput: 6.81 Mbit/s
95th percentile per-packet one-way delay: 12.038 ms
Loss rate: 1.28%
```

Run 3: Report of PCC-Vivace — Data Link



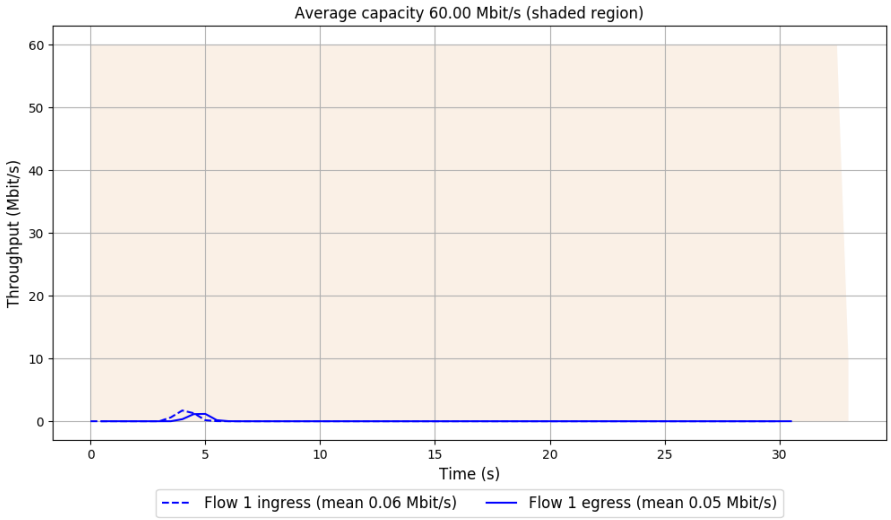


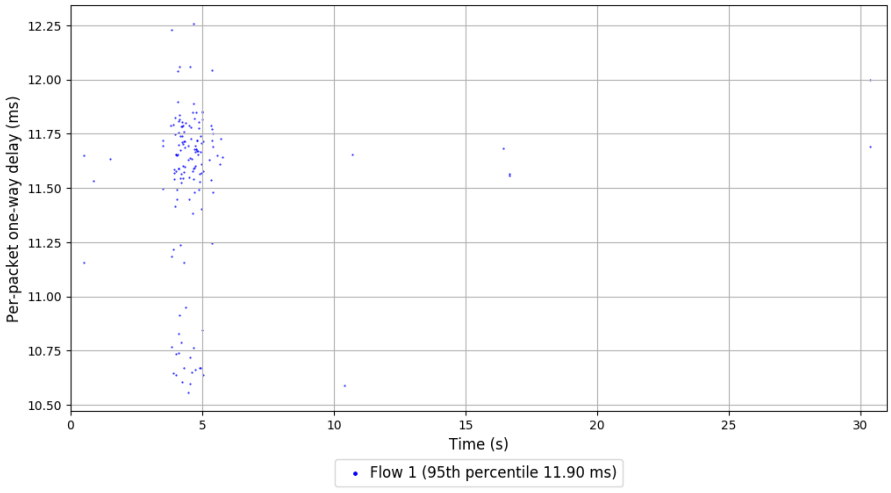
```
Run 1: Statistics of WebRTC media

Start at: 2019-01-17 08:57:24
End at: 2019-01-17 08:57:54

# Below is generated by plot.py at 2019-01-17 09:33:48
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.05 Mbit/s (0.1% utilization)
95th percentile per-packet one-way delay: 11.896 ms
Loss rate: 25.39%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 11.896 ms
Loss rate: 25.39%
```

Run 1: Report of WebRTC media — Data Link



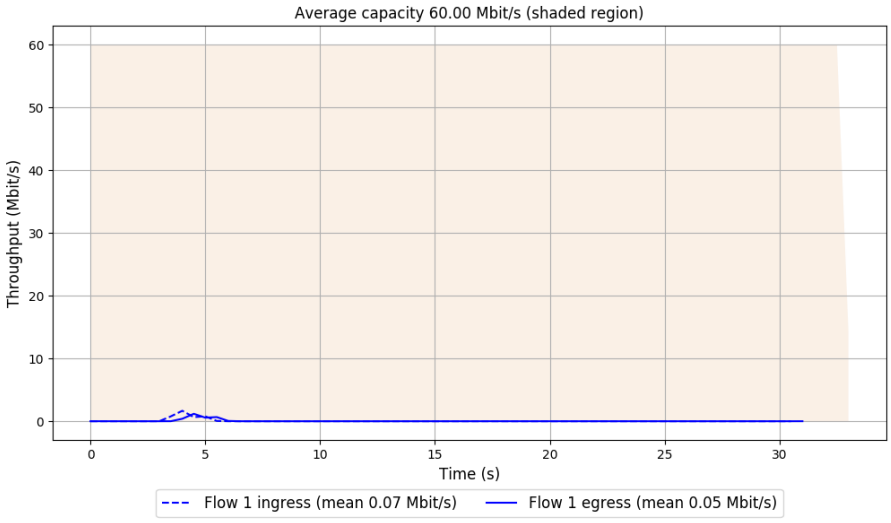


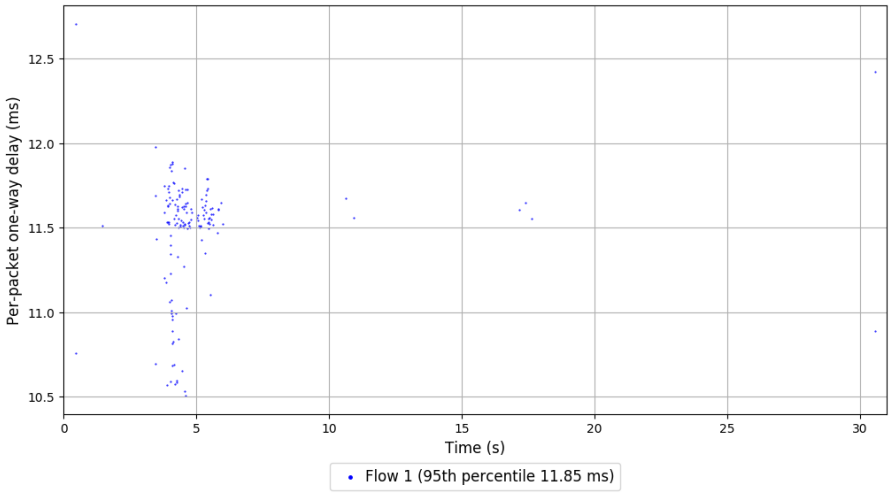
```
Run 2: Statistics of WebRTC media

Start at: 2019-01-17 09:10:04
End at: 2019-01-17 09:10:34

# Below is generated by plot.py at 2019-01-17 09:33:48
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.05 Mbit/s (0.1% utilization)
95th percentile per-packet one-way delay: 11.852 ms
Loss rate: 27.16%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 11.852 ms
Loss rate: 27.16%
```

Run 2: Report of WebRTC media — Data Link





```
Run 3: Statistics of WebRTC media

Start at: 2019-01-17 09:22:41
End at: 2019-01-17 09:23:11

# Below is generated by plot.py at 2019-01-17 09:33:48
# Datalink statistics
-- Total of 1 flow:
Average capacity: 60.00 Mbit/s
Average throughput: 0.05 Mbit/s (0.1% utilization)
95th percentile per-packet one-way delay: 11.991 ms
Loss rate: 21.26%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 11.991 ms
Loss rate: 21.26%
```

Run 3: Report of WebRTC media — Data Link