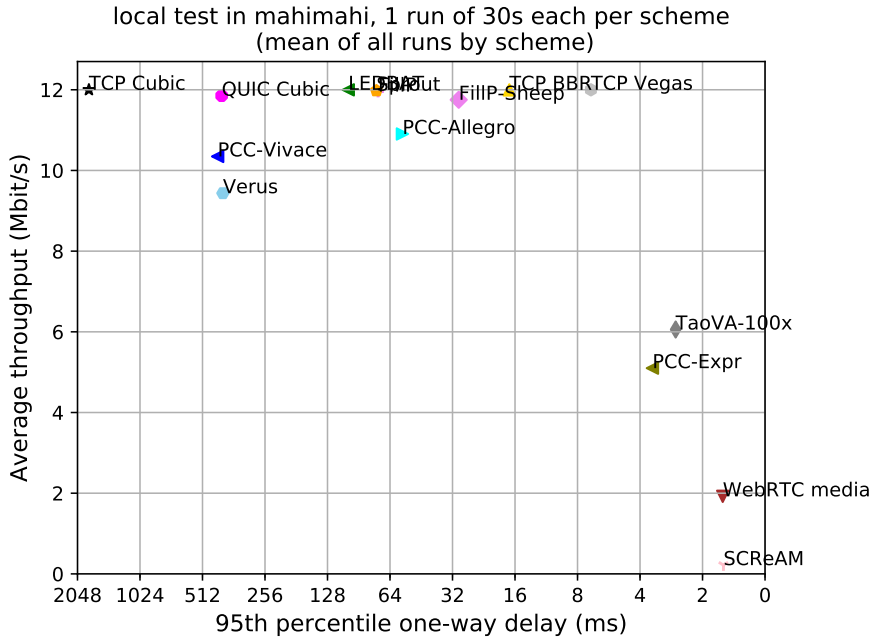
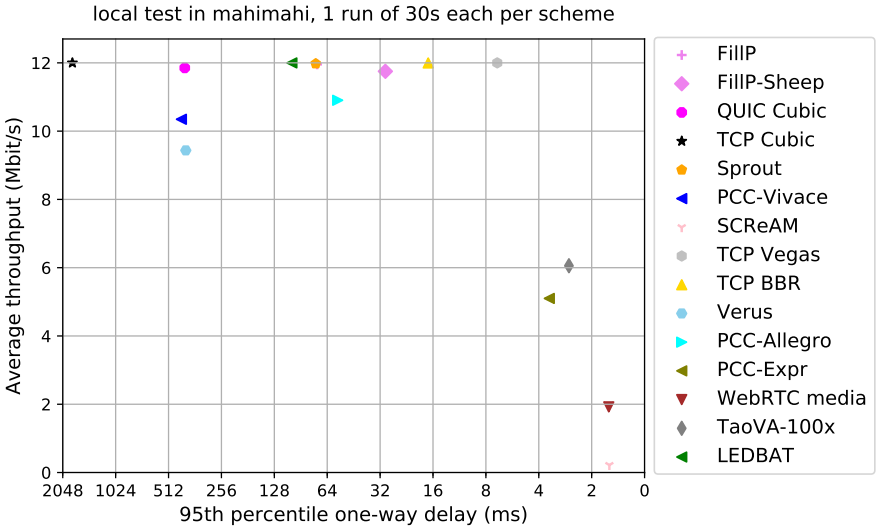
Pantheon Report

Generated at 2022-03-02 20:15:39 (UTC).
Tested in mahimahi: `mm-link 12mbps.trace 12mbps.trace`
Repeated the test of 17 congestion control schemes once.
Each test lasted for 30 seconds running 1 flow.

```
System info:
Linux 4.15.0-169-generic
net.core.default_qdisc = fq_codel
net.core.rmem_default = 212992
net.core.rmem_max = 212992
net.core.wmem_default = 212992
net.core.wmem_max = 212992
net.ipv4.tcp_rmem = 4096 131072 6291456
net.ipv4.tcp_wmem = 4096 16384 4194304

Git summary:
branch: master @ 99ce503a4b7f0c69e0a7c7e25dfa3753c361252a
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfe58e562f4
third_party/indigo @ 463d89b09699a57bfdfbae351646df6a60040b90
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
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, 1 run of 30s each per scheme
(mean of all runs by scheme)
TCP Cubic
QUIC Cubic
FillP-Sheep
TCP BBR
TCP Vegas
PCC-Allegro
PCC-Vivace
Verus
TaoVA-100x
PCC-Expr
WebRTC media
SCReAM
Average throughput (Mbit/s)
95th percentile one-way delay (ms)
0
2
4
6
8
10
12
2048
1024
512
256
128
64
32
16
8
4
2
0


local test in mahimahi, 1 run of 30s each per scheme
FillP
FillP-Sheep
QUIC Cubic
TCP Cubic
Sprout
PCC-Vivace
SCReAM
TCP Vegas
TCP BBR
Verus
PCC-Allegro
PCC-Expr
WebRTC media
TaoVA-100x
LEDBAT
Average throughput (Mbit/s)
95th percentile one-way delay (ms)
0
2
4
6
8
10
12
2048
1024
512
256
128
64
32
16
8
4
2
0

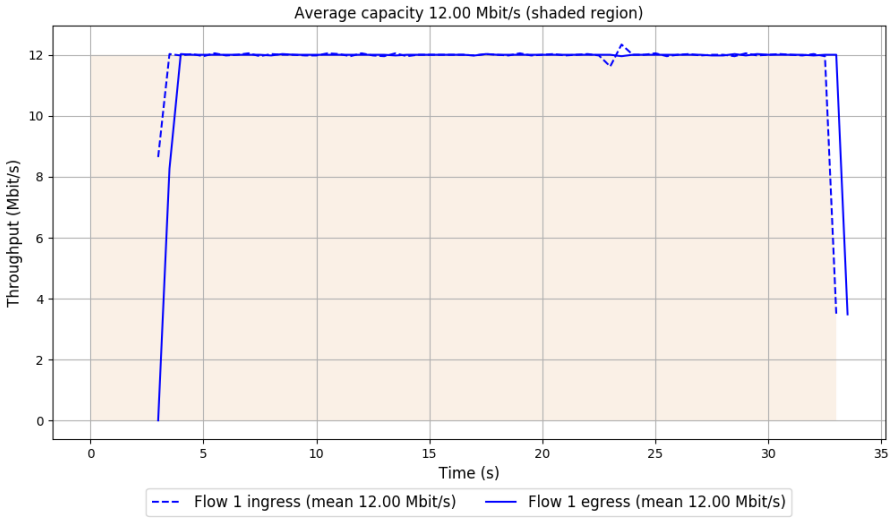
scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	1	12.00	17.04	0.05
Copa	0	N/A	N/A	N/A
TCP Cubic	1	12.00	1804.42	4.73
FillP	1	11.96	73.07	0.24
FillP-Sheep	1	11.75	29.87	0.09
Indigo	0	N/A	N/A	N/A
LEDBAT	1	12.00	101.74	0.33
PCC-Allegro	1	10.90	55.77	0.01
PCC-Expr	1	5.10	3.49	0.08
QUIC Cubic	1	11.85	413.95	1.51
SCReAM	1	0.22	1.33	0.00
Sprout	1	11.98	74.40	0.22
TaoVA-100x	1	6.06	2.69	0.00
TCP Vegas	1	12.00	6.89	0.02
Verus	1	9.44	408.35	0.00
PCC-Vivace	1	10.35	432.83	0.01
WebRTC media	1	1.92	1.35	0.01

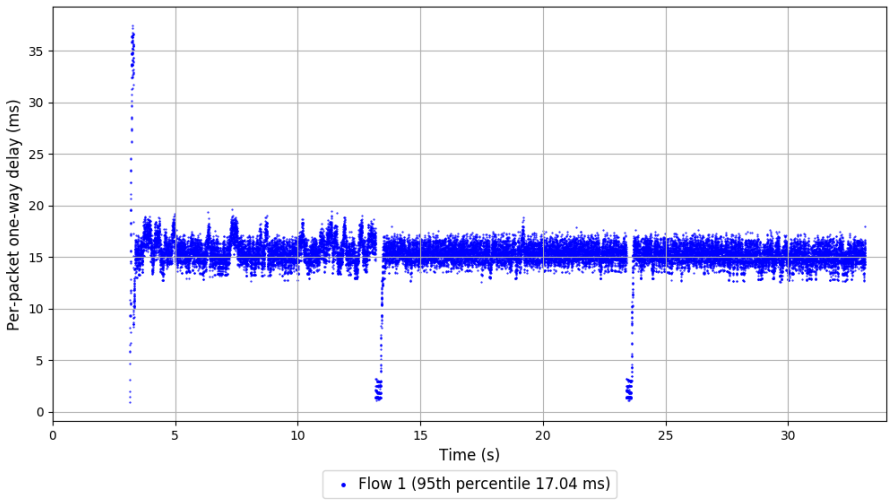
```
Run 1: Statistics of TCP BBR

Start at: 2022-03-02 20:08:55
End at: 2022-03-02 20:09:25

# Below is generated by plot.py at 2022-03-02 20:15:34
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 12.00 Mbit/s (100.0% utilization)
95th percentile per-packet one-way delay: 17.040 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 12.00 Mbit/s
95th percentile per-packet one-way delay: 17.040 ms
Loss rate: 0.05%
```

Run 1: Report of TCP BBR — Data Link

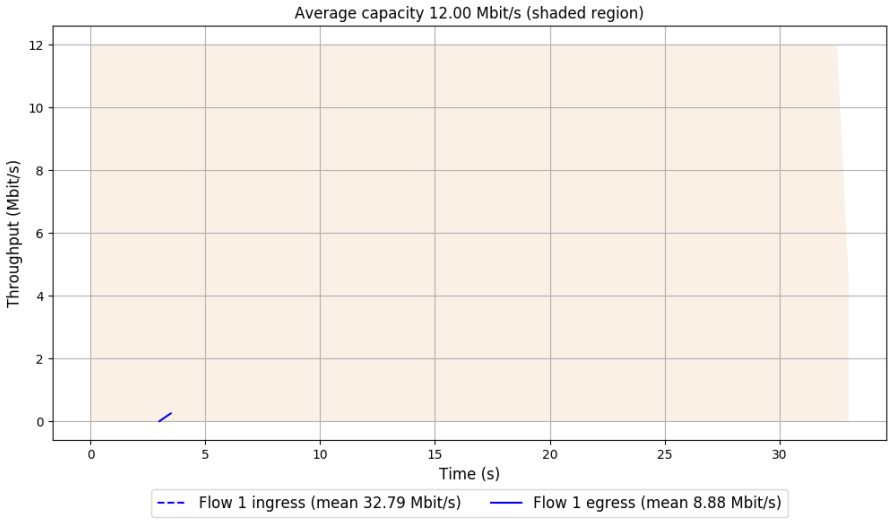


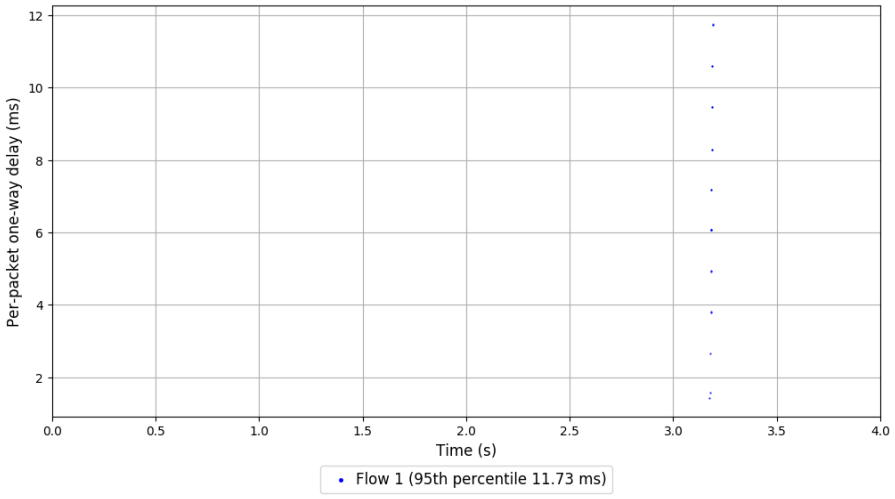


```
Run 1: Statistics of Copa

Start at: 2022-03-02 20:04:56
End at: 2022-03-02 20:05:26
```

Run 1: Report of Copa — Data Link



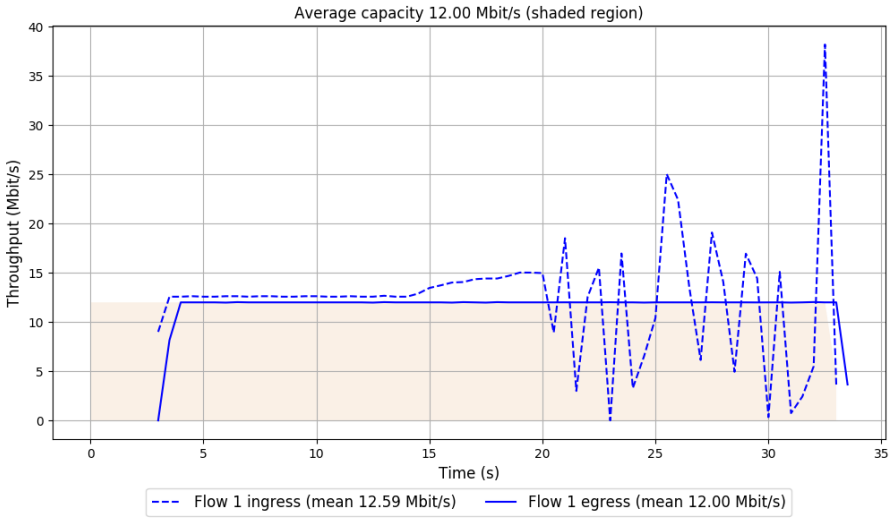


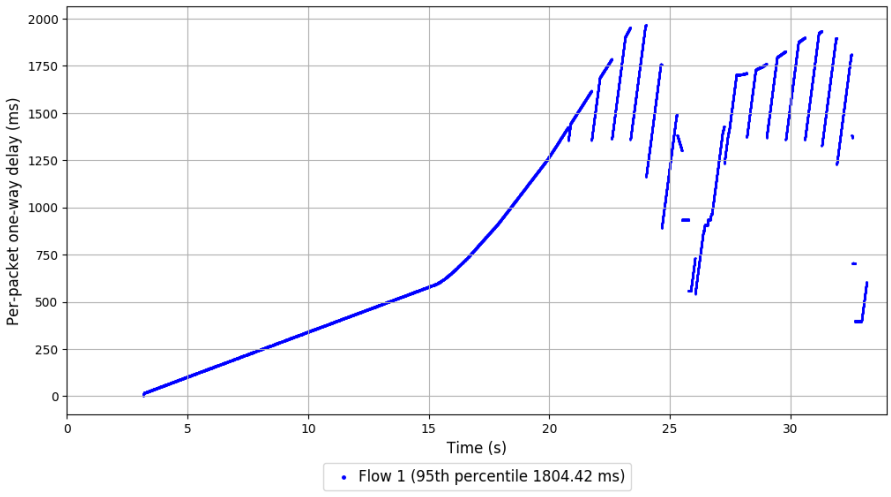
```
Run 1: Statistics of TCP Cubic

Start at: 2022-03-02 20:06:38
End at: 2022-03-02 20:07:08

# Below is generated by plot.py at 2022-03-02 20:15:34
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 12.00 Mbit/s (100.0% utilization)
95th percentile per-packet one-way delay: 1804.422 ms
Loss rate: 4.73%
-- Flow 1:
Average throughput: 12.00 Mbit/s
95th percentile per-packet one-way delay: 1804.422 ms
Loss rate: 4.73%
```

Run 1: Report of TCP Cubic — Data Link



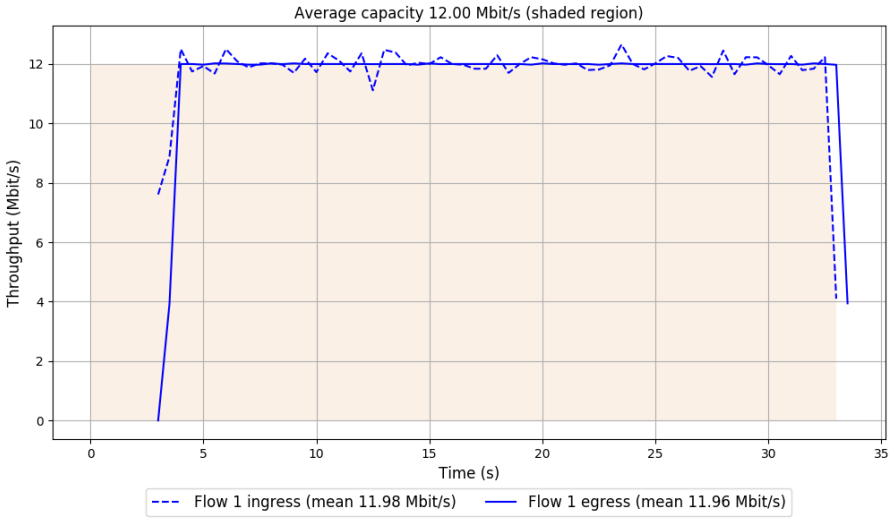


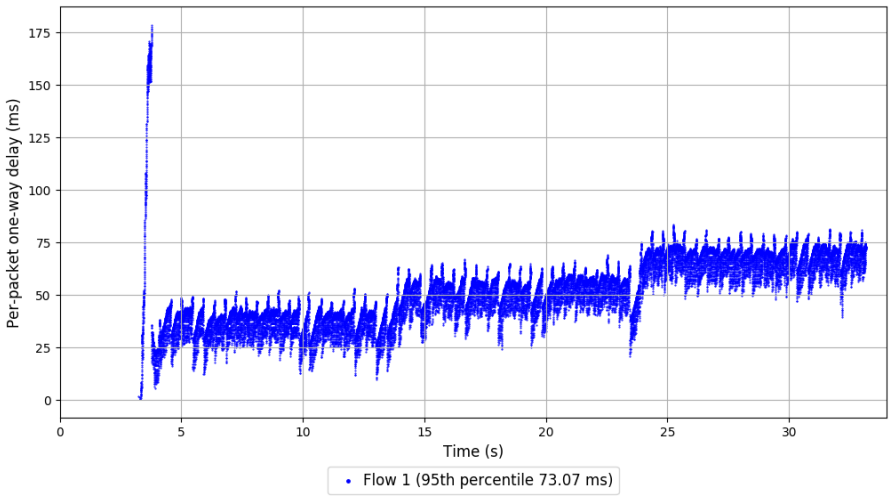
```
Run 1: Statistics of FillP

Start at: 2022-03-02 20:10:04
End at: 2022-03-02 20:10:34

# Below is generated by plot.py at 2022-03-02 20:15:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 11.96 Mbit/s (99.6% utilization)
95th percentile per-packet one-way delay: 73.069 ms
Loss rate: 0.24%
-- Flow 1:
Average throughput: 11.96 Mbit/s
95th percentile per-packet one-way delay: 73.069 ms
Loss rate: 0.24%
```

Run 1: Report of FillP — Data Link



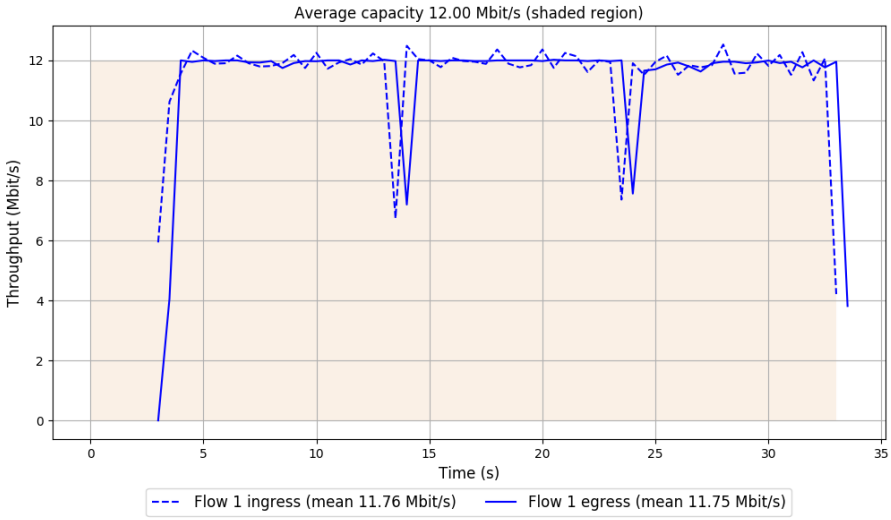


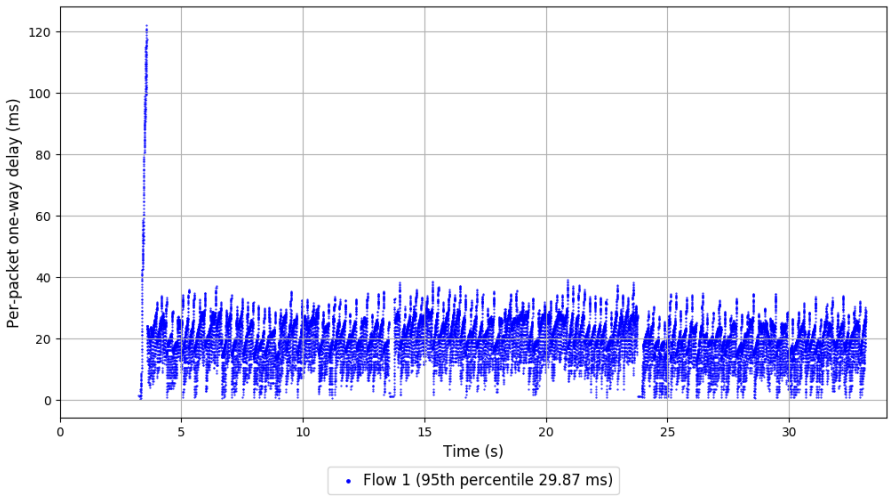
```
Run 1: Statistics of FillP-Sheep

Start at: 2022-03-02 20:04:22
End at: 2022-03-02 20:04:52

# Below is generated by plot.py at 2022-03-02 20:15:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 11.75 Mbit/s (97.9% utilization)
95th percentile per-packet one-way delay: 29.872 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 11.75 Mbit/s
95th percentile per-packet one-way delay: 29.872 ms
Loss rate: 0.09%
```

Run 1: Report of FillP-Sheep — Data Link





```
Run 1: Statistics of Indigo

Start at: 2022-03-02 20:05:30
End at: 2022-03-02 20:06:00
```

Run 1: Report of Indigo — Data Link

Figure is missing

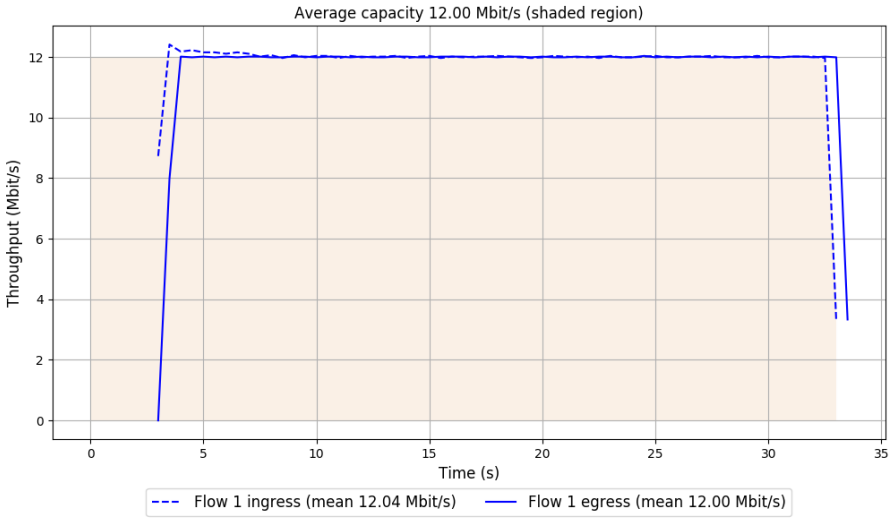
Figure is missing

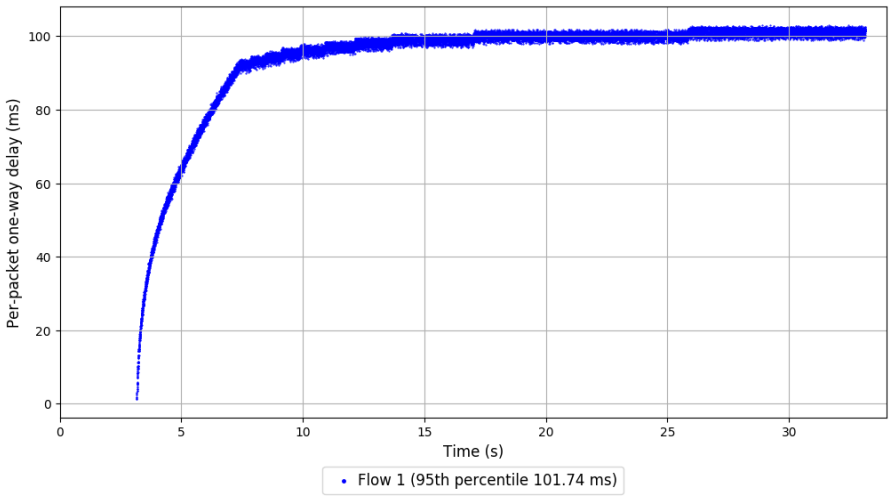
```
Run 1: Statistics of LEDBAT

Start at: 2022-03-02 20:12:55
End at: 2022-03-02 20:13:25

# Below is generated by plot.py at 2022-03-02 20:15:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 12.00 Mbit/s (100.0% utilization)
95th percentile per-packet one-way delay: 101.739 ms
Loss rate: 0.33%
-- Flow 1:
Average throughput: 12.00 Mbit/s
95th percentile per-packet one-way delay: 101.739 ms
Loss rate: 0.33%
```

Run 1: Report of LEDBAT — Data Link



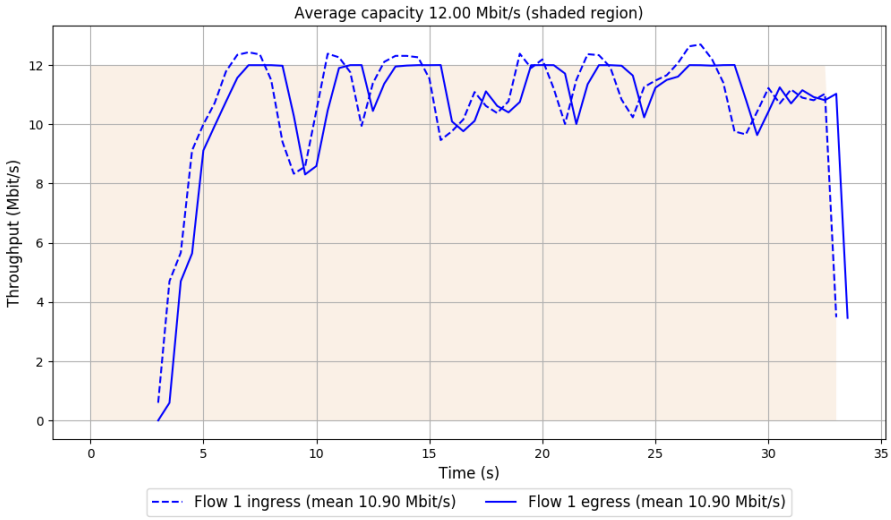


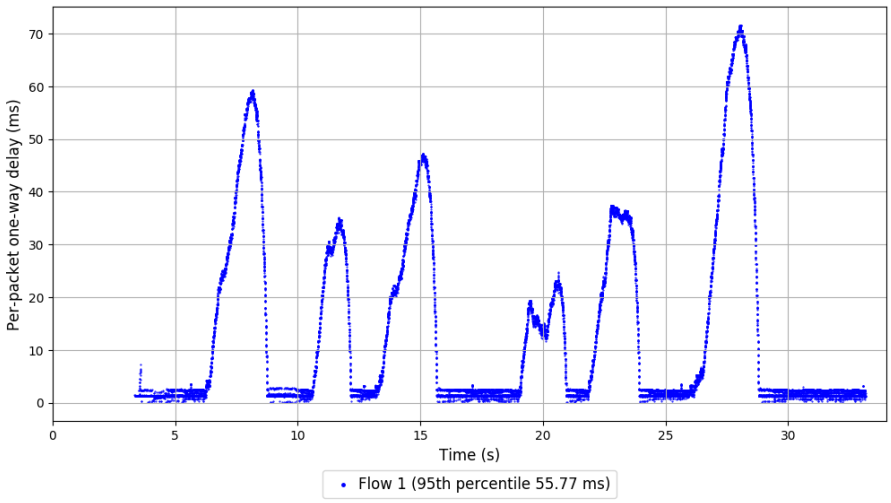
```
Run 1: Statistics of PCC-Allegro

Start at: 2022-03-02 20:11:46
End at: 2022-03-02 20:12:16

# Below is generated by plot.py at 2022-03-02 20:15:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 10.90 Mbit/s (90.9% utilization)
95th percentile per-packet one-way delay: 55.767 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 10.90 Mbit/s
95th percentile per-packet one-way delay: 55.767 ms
Loss rate: 0.01%
```

Run 1: Report of PCC-Allegro — Data Link



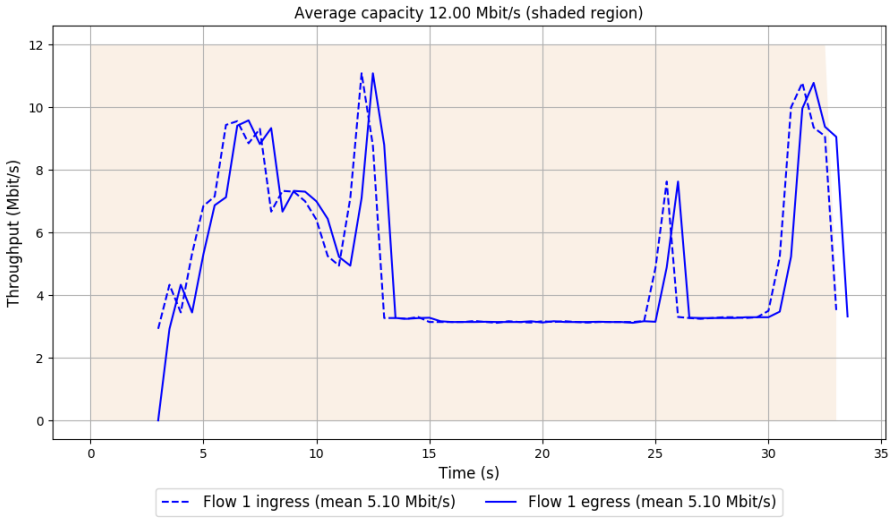


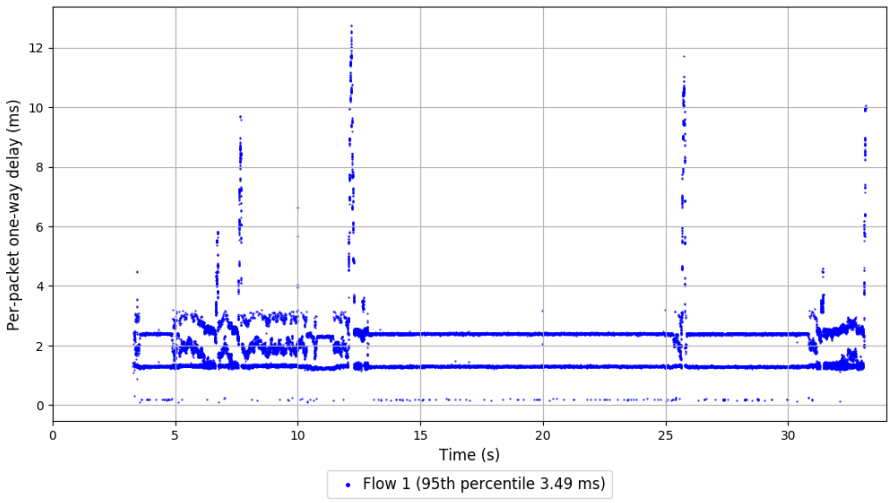
```
Run 1: Statistics of PCC-Expr

Start at: 2022-03-02 20:13:29
End at: 2022-03-02 20:13:59

# Below is generated by plot.py at 2022-03-02 20:15:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 5.10 Mbit/s (42.5% utilization)
95th percentile per-packet one-way delay: 3.487 ms
Loss rate: 0.08%
-- Flow 1:
Average throughput: 5.10 Mbit/s
95th percentile per-packet one-way delay: 3.487 ms
Loss rate: 0.08%
```

Run 1: Report of PCC-Expr — Data Link



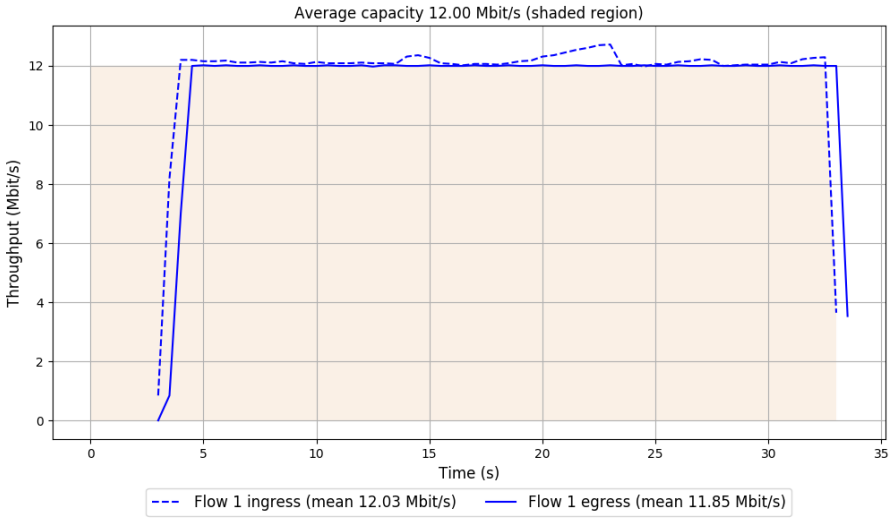


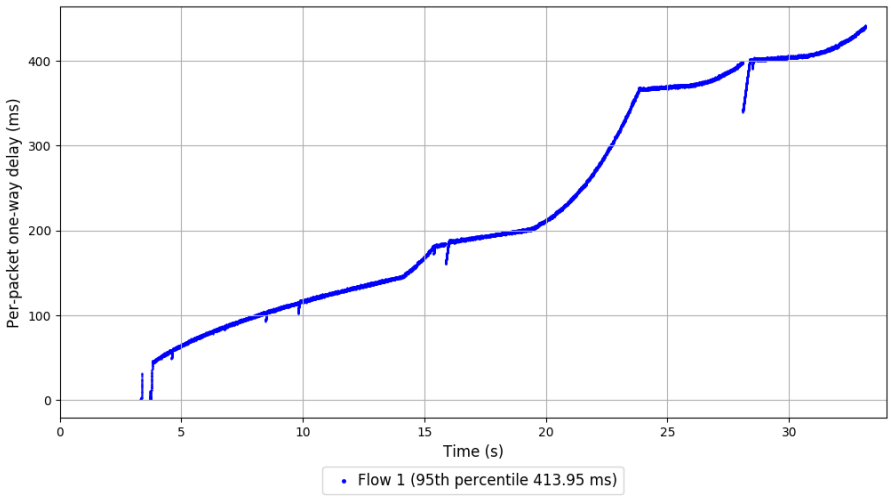
```
Run 1: Statistics of QUIC Cubic

Start at: 2022-03-02 20:11:12
End at: 2022-03-02 20:11:42

# Below is generated by plot.py at 2022-03-02 20:15:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 11.85 Mbit/s (98.8% utilization)
95th percentile per-packet one-way delay: 413.952 ms
Loss rate: 1.51%
-- Flow 1:
Average throughput: 11.85 Mbit/s
95th percentile per-packet one-way delay: 413.952 ms
Loss rate: 1.51%
```

Run 1: Report of QUIC Cubic — Data Link



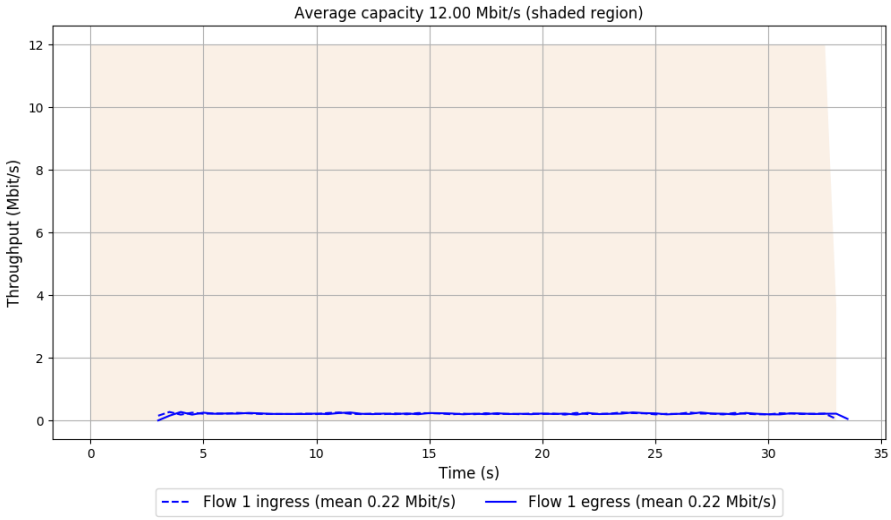


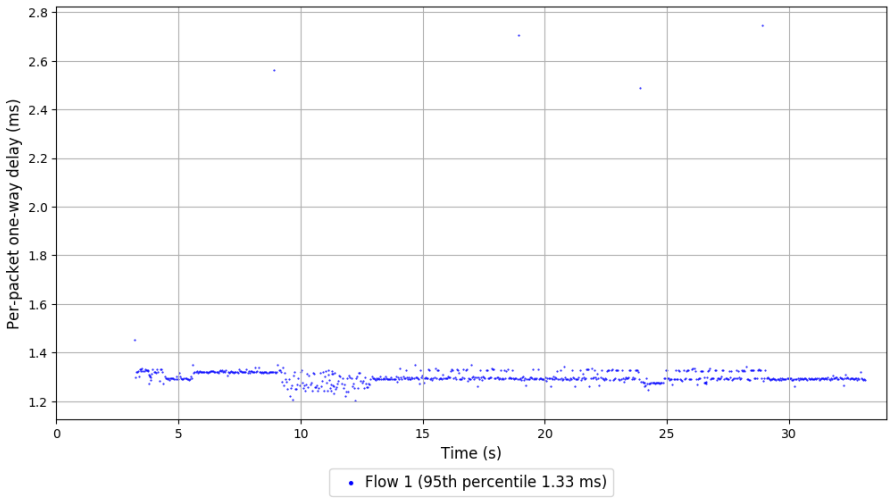
```
Run 1: Statistics of SCReAM

Start at: 2022-03-02 20:10:38
End at: 2022-03-02 20:11:08

# Below is generated by plot.py at 2022-03-02 20:15:36
# 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: 1.331 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 1.331 ms
Loss rate: 0.00%
```

Run 1: Report of SCReAM — Data Link



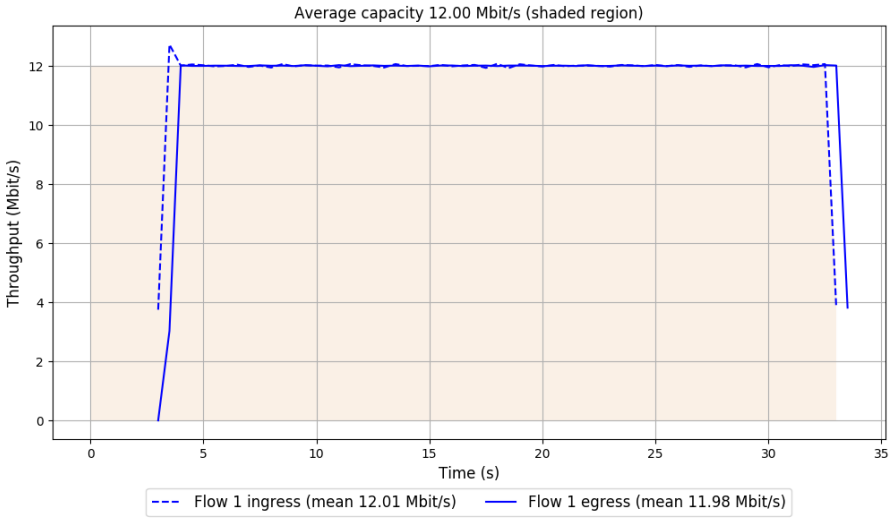


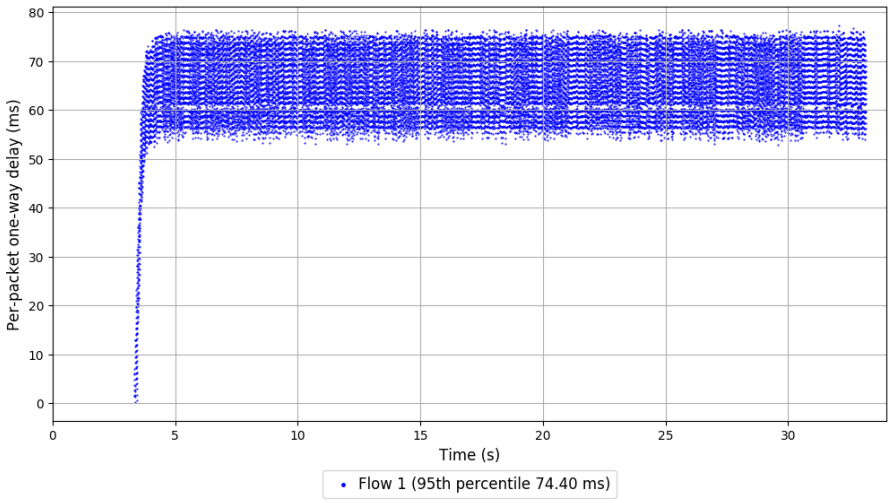
```
Run 1: Statistics of Sprout

Start at: 2022-03-02 20:07:12
End at: 2022-03-02 20:07:42

# Below is generated by plot.py at 2022-03-02 20:15:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 11.98 Mbit/s (99.8% utilization)
95th percentile per-packet one-way delay: 74.399 ms
Loss rate: 0.22%
-- Flow 1:
Average throughput: 11.98 Mbit/s
95th percentile per-packet one-way delay: 74.399 ms
Loss rate: 0.22%
```

Run 1: Report of Sprout — Data Link



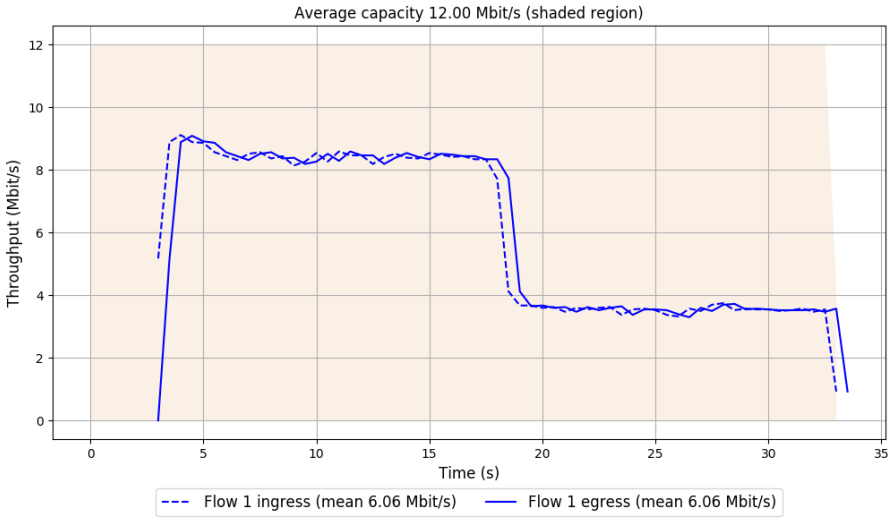


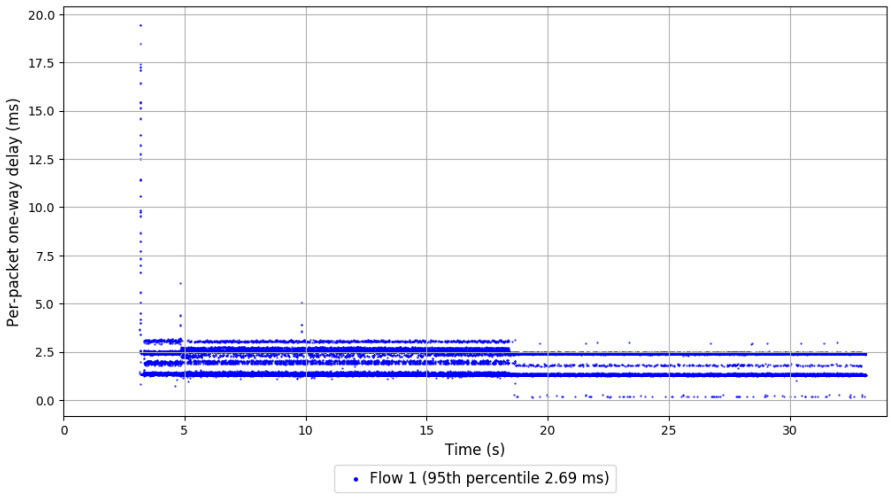
```
Run 1: Statistics of TaoVA-100x

Start at: 2022-03-02 20:09:29
End at: 2022-03-02 20:10:00

# Below is generated by plot.py at 2022-03-02 20:15:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 6.06 Mbit/s (50.5% utilization)
95th percentile per-packet one-way delay: 2.695 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 6.06 Mbit/s
95th percentile per-packet one-way delay: 2.695 ms
Loss rate: 0.00%
```

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



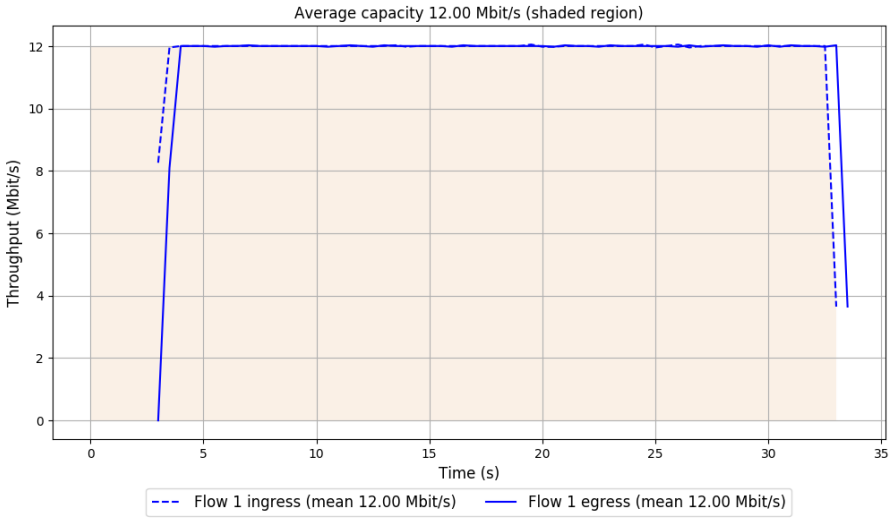


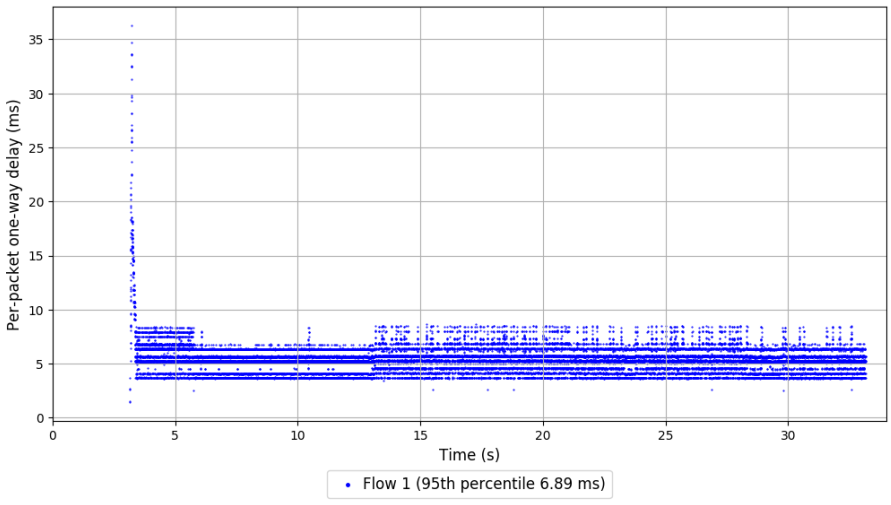
```
Run 1: Statistics of TCP Vegas

Start at: 2022-03-02 20:08:21
End at: 2022-03-02 20:08:51

# Below is generated by plot.py at 2022-03-02 20:15:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 12.00 Mbit/s (100.0% utilization)
95th percentile per-packet one-way delay: 6.895 ms
Loss rate: 0.02%
-- Flow 1:
Average throughput: 12.00 Mbit/s
95th percentile per-packet one-way delay: 6.895 ms
Loss rate: 0.02%
```

Run 1: Report of TCP Vegas — Data Link



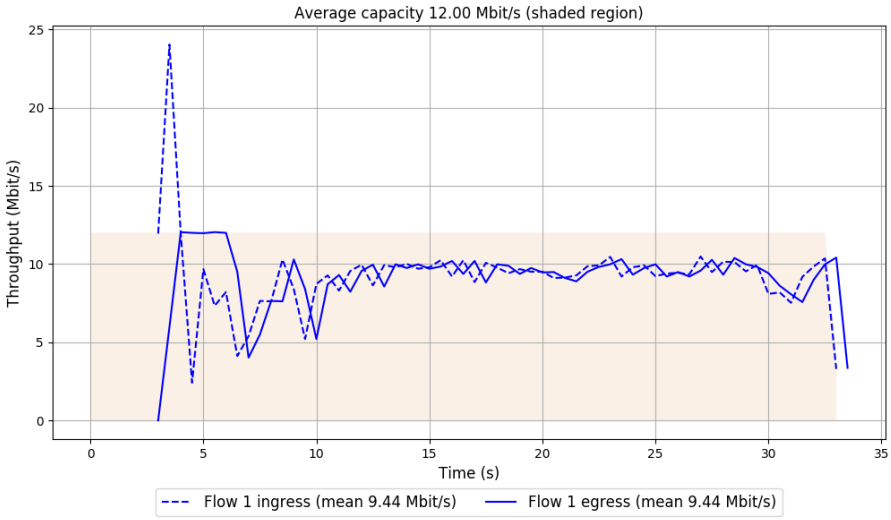


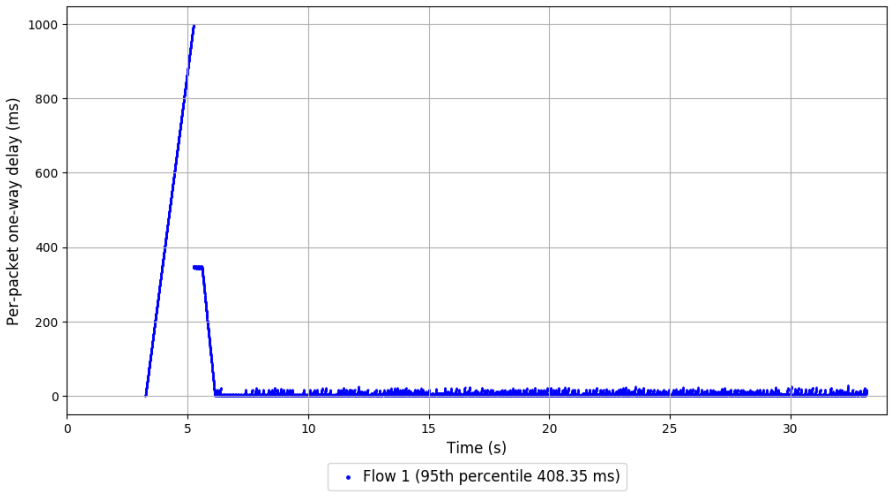
```
Run 1: Statistics of Verus

Start at: 2022-03-02 20:06:04
End at: 2022-03-02 20:06:34

# Below is generated by plot.py at 2022-03-02 20:15:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 9.44 Mbit/s (78.6% utilization)
95th percentile per-packet one-way delay: 408.354 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 9.44 Mbit/s
95th percentile per-packet one-way delay: 408.354 ms
Loss rate: 0.00%
```

Run 1: Report of Verus — Data Link



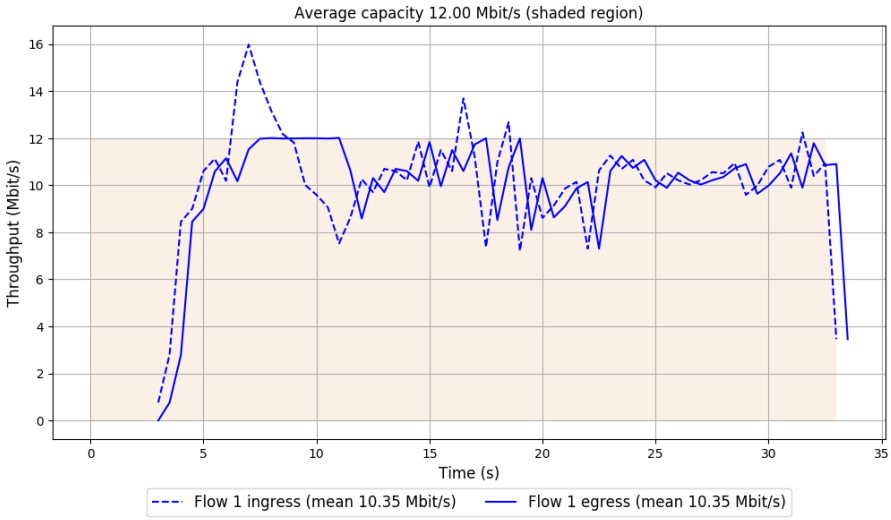


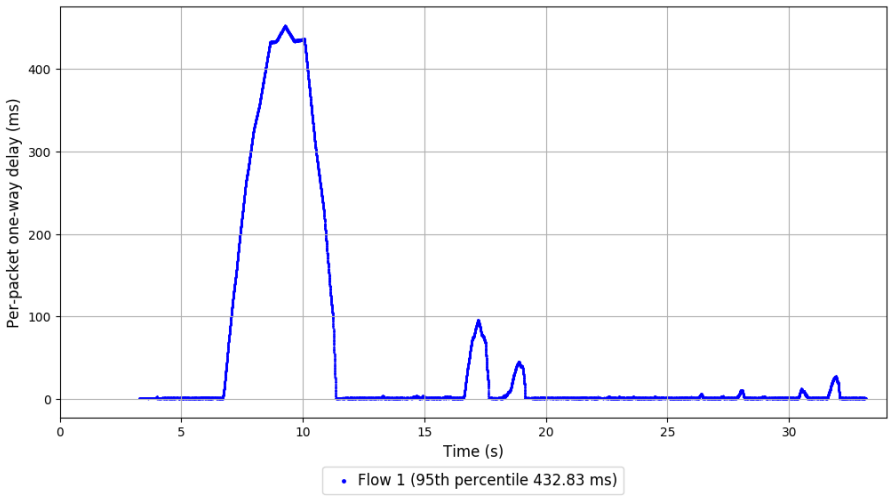
```
Run 1: Statistics of PCC-Vivace

Start at: 2022-03-02 20:07:46
End at: 2022-03-02 20:08:16

# Below is generated by plot.py at 2022-03-02 20:15:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 10.35 Mbit/s (86.2% utilization)
95th percentile per-packet one-way delay: 432.831 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 10.35 Mbit/s
95th percentile per-packet one-way delay: 432.831 ms
Loss rate: 0.01%
```

Run 1: Report of PCC-Vivace — Data Link





```
Run 1: Statistics of WebRTC media

Start at: 2022-03-02 20:12:21
End at: 2022-03-02 20:12:51

# Below is generated by plot.py at 2022-03-02 20:15:36
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 1.92 Mbit/s (16.0% utilization)
95th percentile per-packet one-way delay: 1.354 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 1.92 Mbit/s
95th percentile per-packet one-way delay: 1.354 ms
Loss rate: 0.01%
```

Run 1: Report of WebRTC media — Data Link