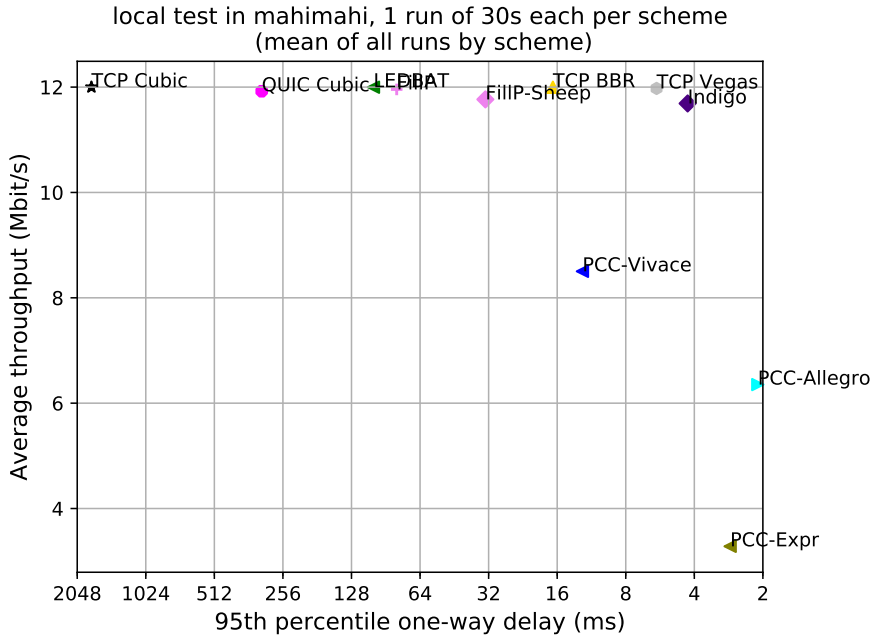
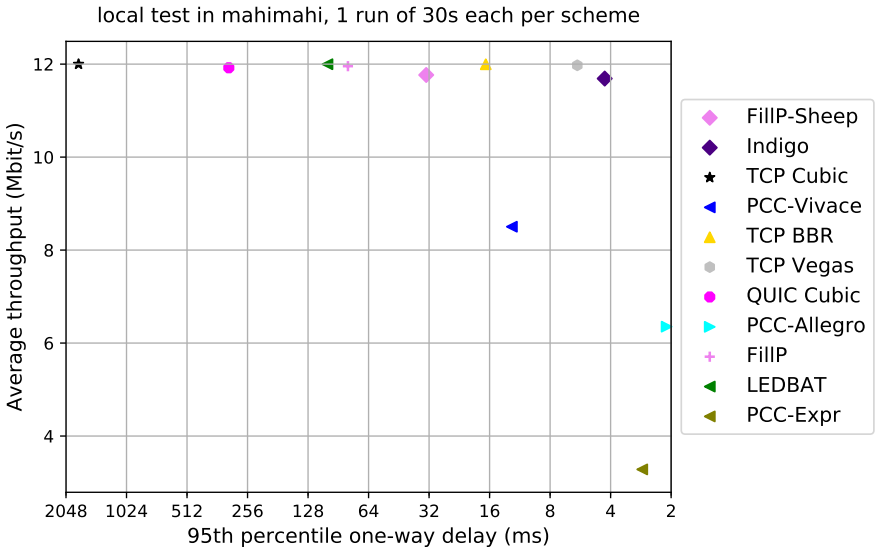
Pantheon Report

Generated at 2025-04-18 01:01:11 (UTC).
Tested in mahimahi: `mm-link 12mbps.trace 12mbps.trace`
Repeated the test of 11 congestion control schemes once.
Each test lasted for 30 seconds running 1 flow.

```
System info:
Linux 5.4.0-150-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 @ 23e738ce5acae1d36e321886cd613b0b9401ac11
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
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
LEDBAT
FillP
FillP-Sheep
TCP BBR
TCP Vegas
Indigo
PCC-Vivace
PCC-Allegro
PCC-Expr
Average throughput (Mbit/s)
95th percentile one-way delay (ms)
12
10
8
6
4
2048
1024
512
256
128
64
32
16
8
4
2


local test in mahimahi, 1 run of 30s each per scheme
Average throughput (Mbit/s)
95th percentile one-way delay (ms)
FillP-Sheep
Indigo
TCP Cubic
PCC-Vivace
TCP BBR
TCP Vegas
QUIC Cubic
PCC-Allegro
FillP
LEDBAT
PCC-Expr

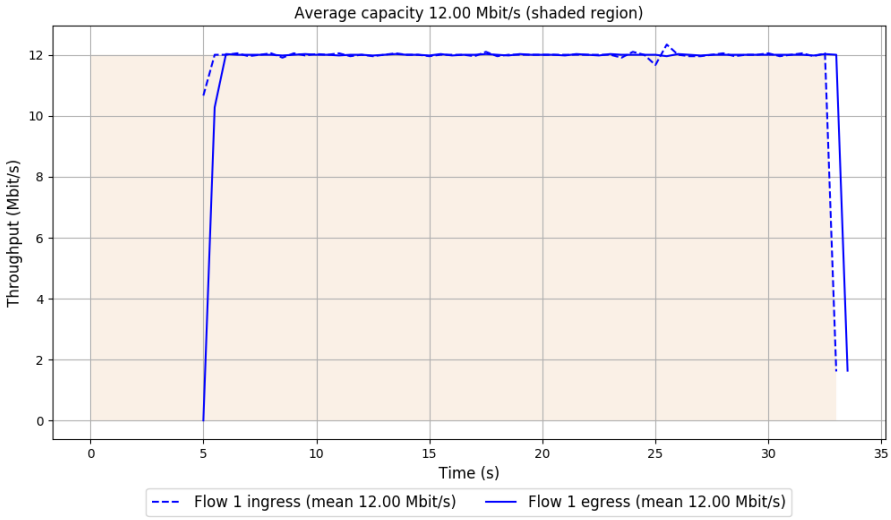
scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	1	12.00	16.71	0.05
TCP Cubic	1	12.00	1774.05	3.37
FillP	1	11.96	81.05	0.28
FillP-Sheep	1	11.77	33.06	0.09
Indigo	1	11.69	4.28	0.01
LEDBAT	1	12.00	102.52	0.33
PCC-Allegro	1	6.35	2.10	0.01
PCC-Expr	1	3.28	2.79	0.00
QUIC Cubic	1	11.92	317.22	1.21
TCP Vegas	1	11.97	5.86	0.01
PCC-Vivace	1	8.50	12.40	0.00

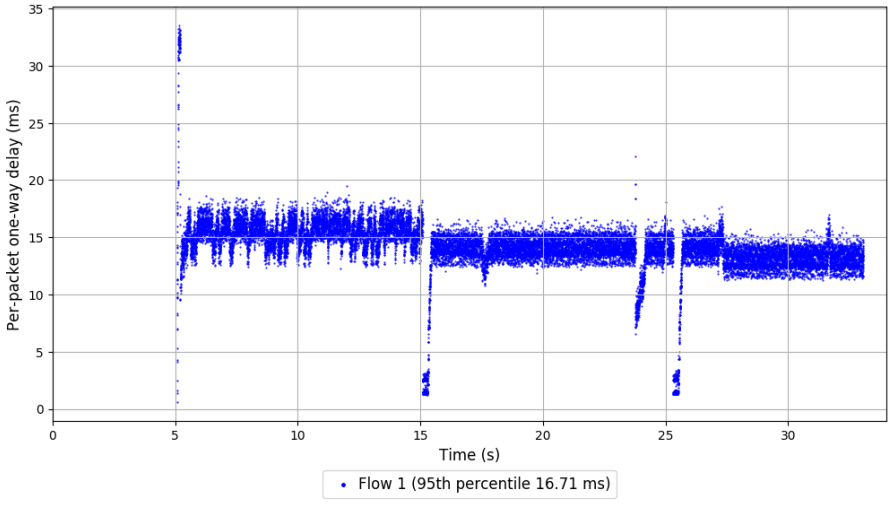
```
Run 1: Statistics of TCP BBR

Start at: 2025-04-18 00:48:49
End at: 2025-04-18 00:49:19

# Below is generated by plot.py at 2025-04-18 01:01:05
# 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: 16.714 ms
Loss rate: 0.05%
-- Flow 1:
Average throughput: 12.00 Mbit/s
95th percentile per-packet one-way delay: 16.714 ms
Loss rate: 0.05%
```

Run 1: Report of TCP BBR — Data Link



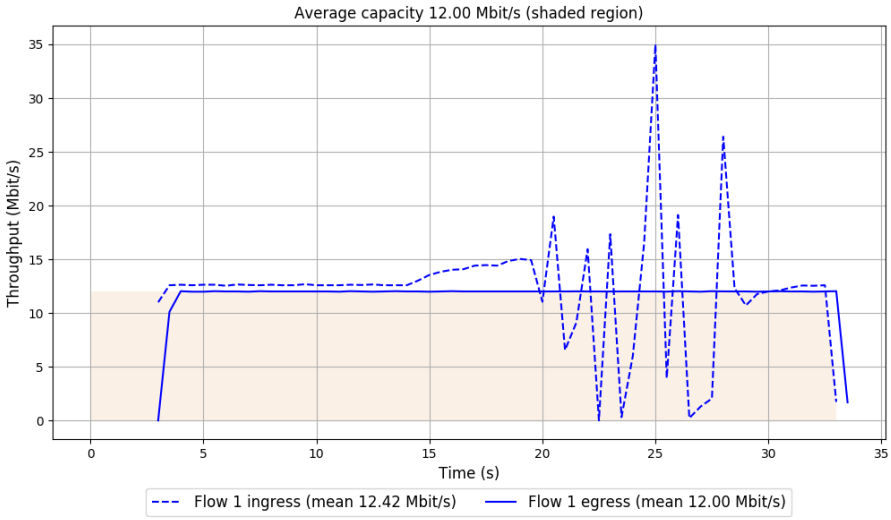


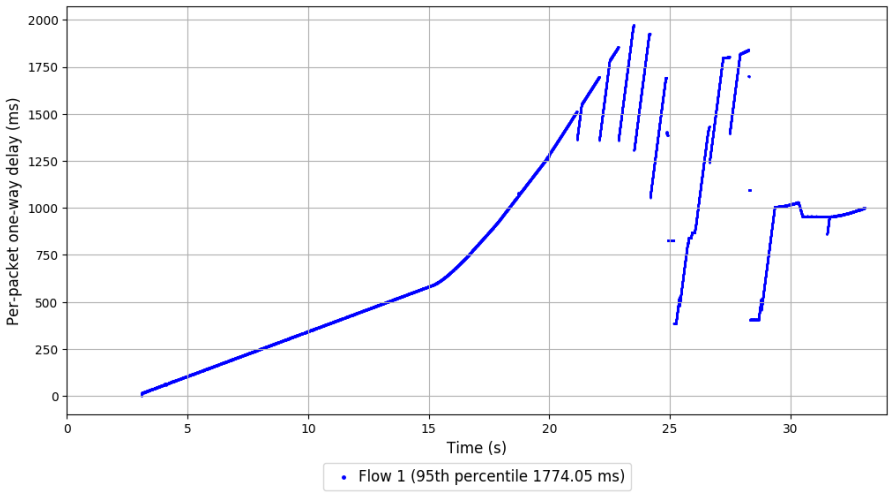
```
Run 1: Statistics of TCP Cubic

Start at: 2025-04-18 00:45:28
End at: 2025-04-18 00:45:58

# Below is generated by plot.py at 2025-04-18 01:01:06
# 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: 1774.051 ms
Loss rate: 3.37%
-- Flow 1:
Average throughput: 12.00 Mbit/s
95th percentile per-packet one-way delay: 1774.051 ms
Loss rate: 3.37%
```

Run 1: Report of TCP Cubic — Data Link



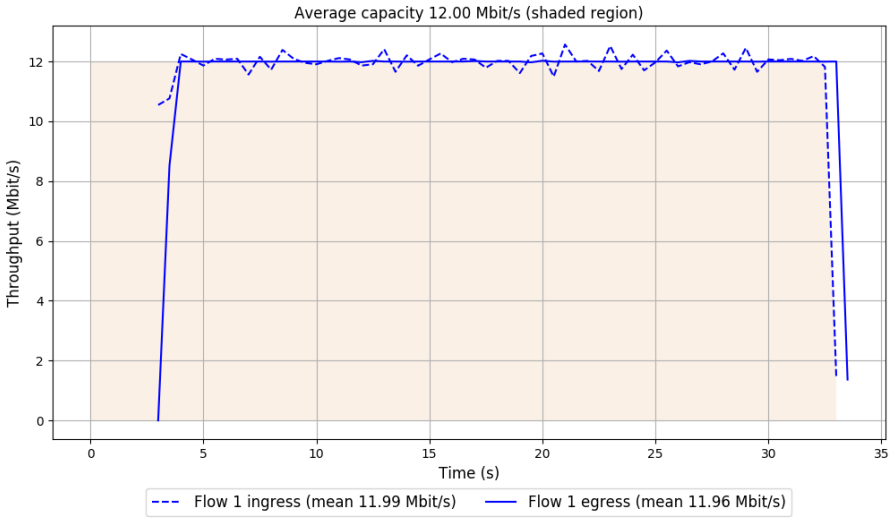


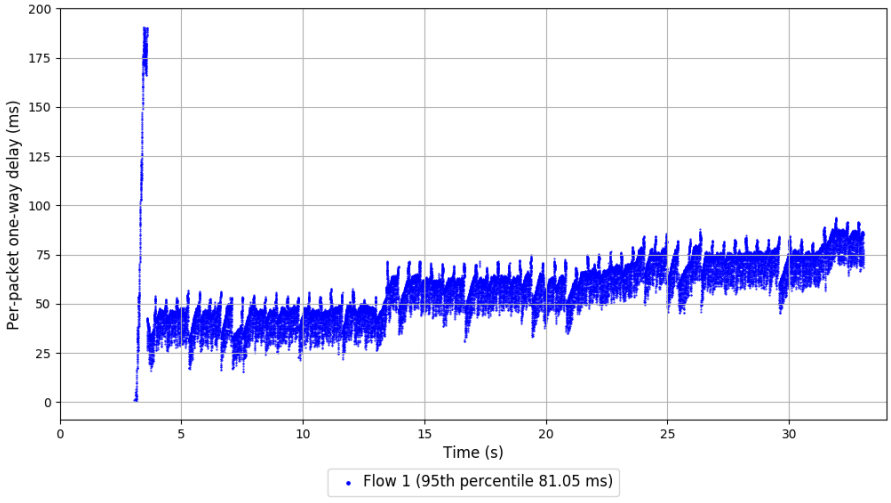
```
Run 1: Statistics of FillP

Start at: 2025-04-18 00:44:54
End at: 2025-04-18 00:45:24

# Below is generated by plot.py at 2025-04-18 01:01:06
# 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: 81.045 ms
Loss rate: 0.28%
-- Flow 1:
Average throughput: 11.96 Mbit/s
95th percentile per-packet one-way delay: 81.045 ms
Loss rate: 0.28%
```

Run 1: Report of FillP — Data Link



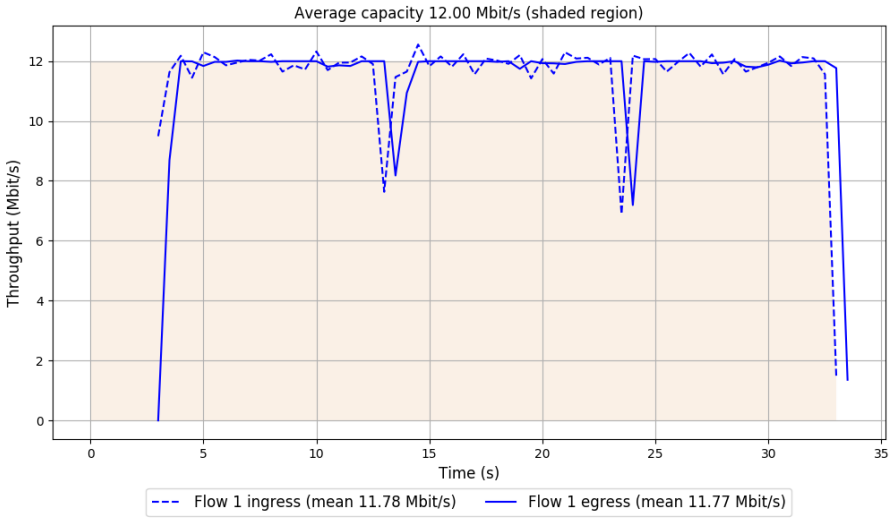


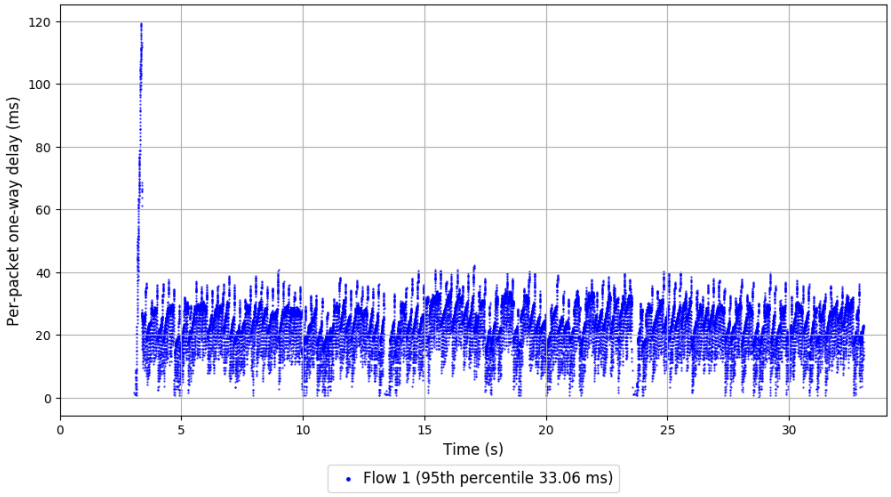
```
Run 1: Statistics of FillP-Sheep

Start at: 2025-04-18 00:44:21
End at: 2025-04-18 00:44:51

# Below is generated by plot.py at 2025-04-18 01:01:06
# 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: 33.064 ms
Loss rate: 0.09%
-- Flow 1:
Average throughput: 11.77 Mbit/s
95th percentile per-packet one-way delay: 33.064 ms
Loss rate: 0.09%
```

Run 1: Report of FillP-Sheep — Data Link



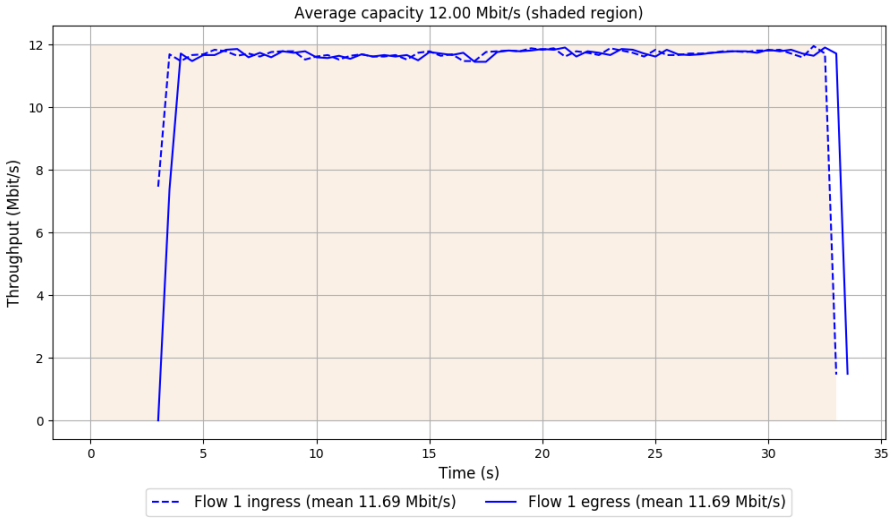


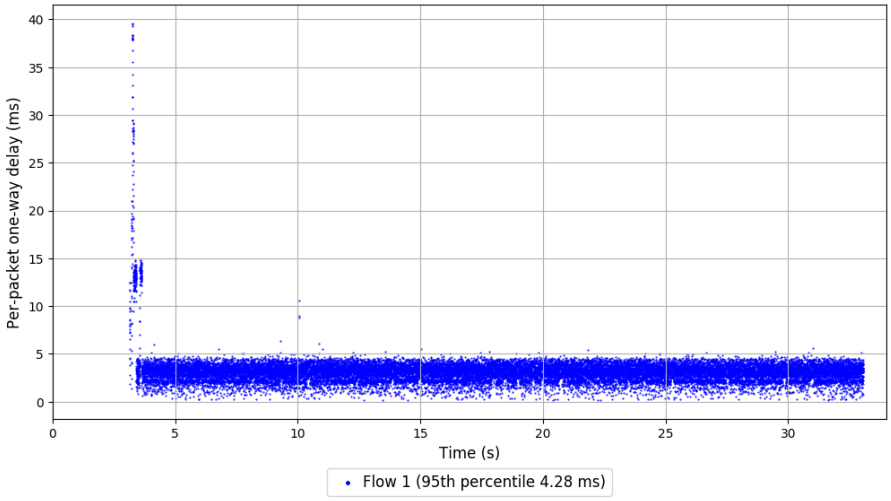
```
Run 1: Statistics of Indigo

Start at: 2025-04-18 00:48:16
End at: 2025-04-18 00:48:46

# Below is generated by plot.py at 2025-04-18 01:01:06
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 11.69 Mbit/s (97.4% utilization)
95th percentile per-packet one-way delay: 4.280 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 11.69 Mbit/s
95th percentile per-packet one-way delay: 4.280 ms
Loss rate: 0.01%
```

Run 1: Report of Indigo — Data Link



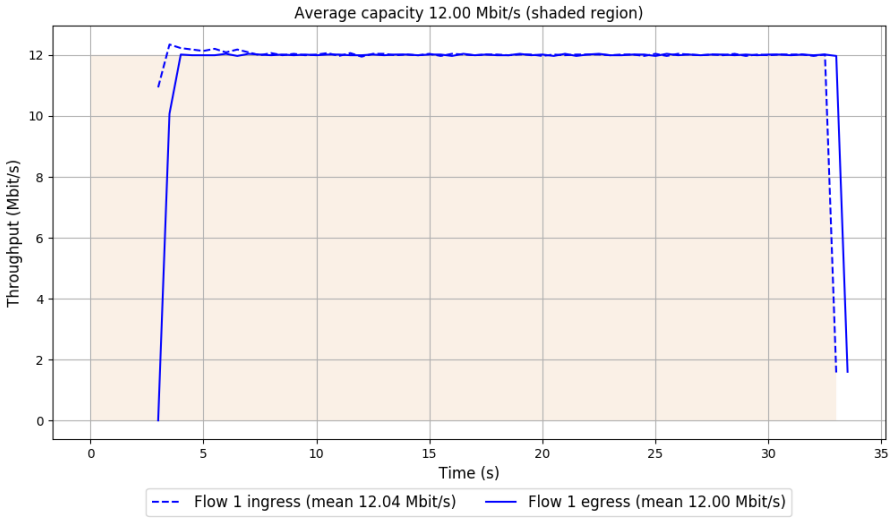


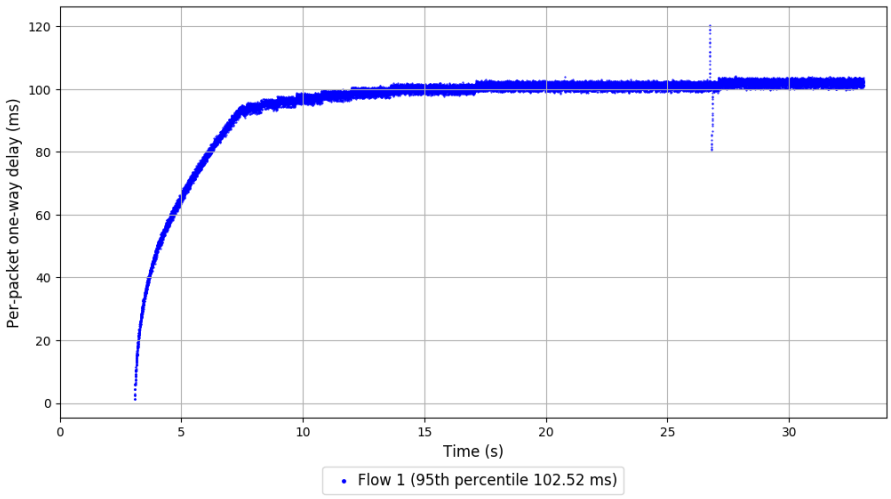
```
Run 1: Statistics of LEDBAT

Start at: 2025-04-18 00:49:23
End at: 2025-04-18 00:49:53

# Below is generated by plot.py at 2025-04-18 01:01:06
# 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: 102.517 ms
Loss rate: 0.33%
-- Flow 1:
Average throughput: 12.00 Mbit/s
95th percentile per-packet one-way delay: 102.517 ms
Loss rate: 0.33%
```

Run 1: Report of LEDBAT — Data Link



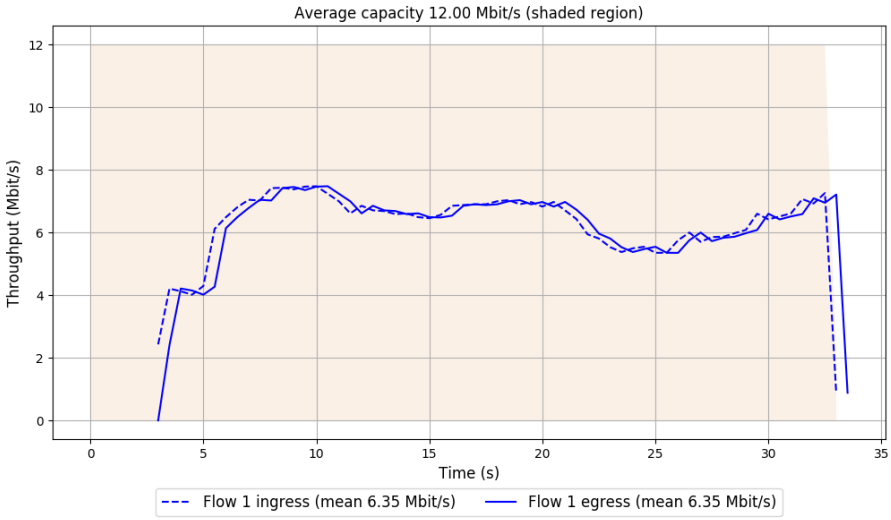


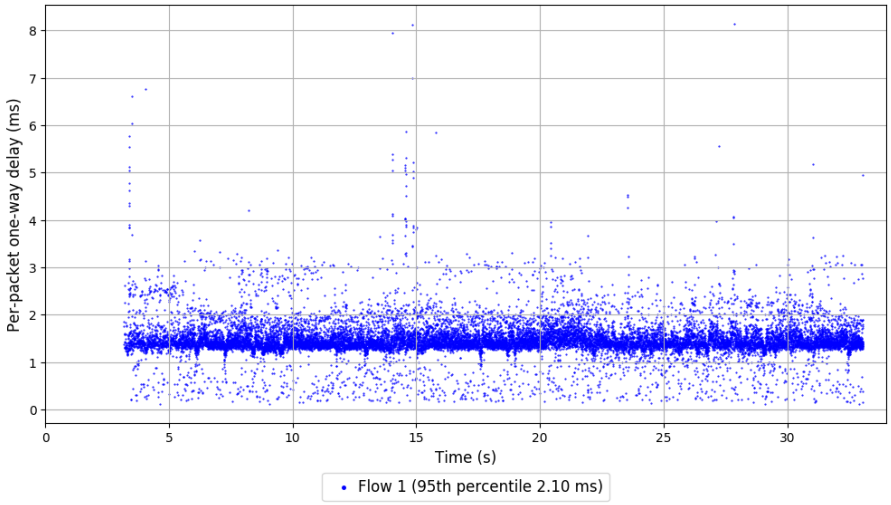
```
Run 1: Statistics of PCC-Allegro

Start at: 2025-04-18 00:47:42
End at: 2025-04-18 00:48:12

# Below is generated by plot.py at 2025-04-18 01:01:06
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 6.35 Mbit/s (52.9% utilization)
95th percentile per-packet one-way delay: 2.105 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 6.35 Mbit/s
95th percentile per-packet one-way delay: 2.105 ms
Loss rate: 0.01%
```

Run 1: Report of PCC-Allegro — Data Link



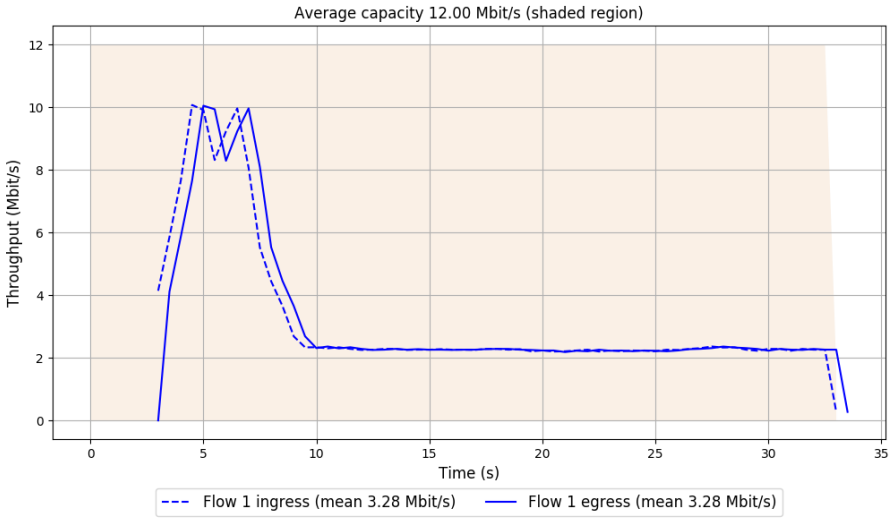


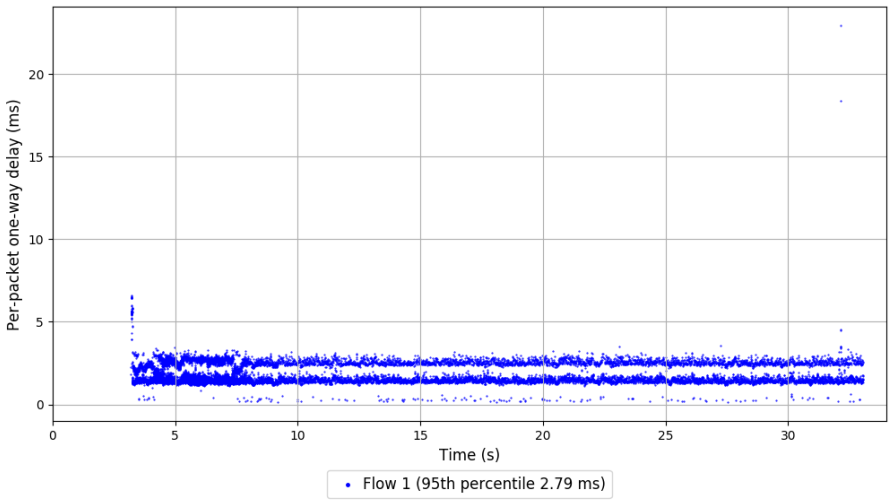
```
Run 1: Statistics of PCC-Expr

Start at: 2025-04-18 00:49:56
End at: 2025-04-18 00:50:26

# Below is generated by plot.py at 2025-04-18 01:01:06
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 3.28 Mbit/s (27.4% utilization)
95th percentile per-packet one-way delay: 2.785 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 3.28 Mbit/s
95th percentile per-packet one-way delay: 2.785 ms
Loss rate: 0.00%
```

Run 1: Report of PCC-Expr — Data Link



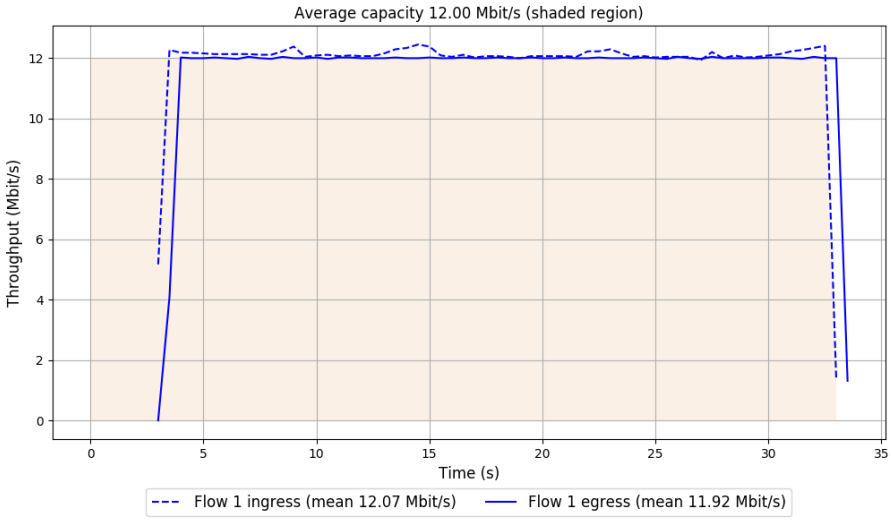


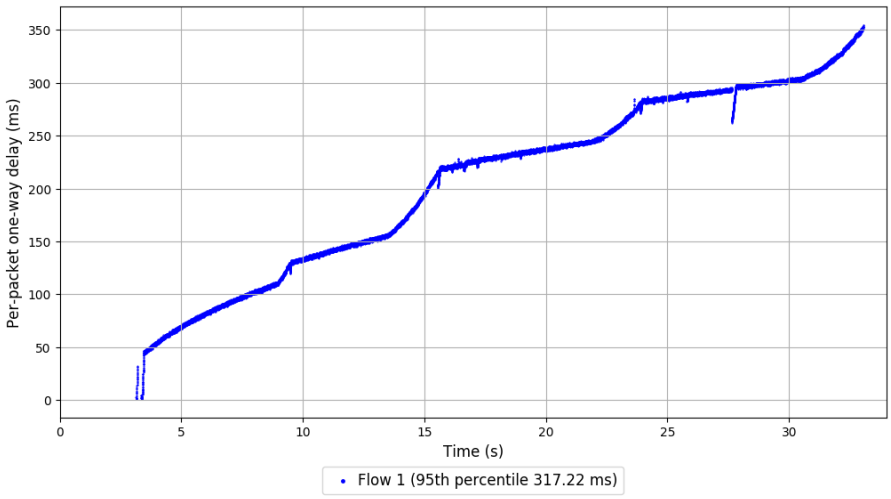
```
Run 1: Statistics of QUIC Cubic

Start at: 2025-04-18 00:47:08
End at: 2025-04-18 00:47:39

# Below is generated by plot.py at 2025-04-18 01:01:09
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 11.92 Mbit/s (99.3% utilization)
95th percentile per-packet one-way delay: 317.219 ms
Loss rate: 1.21%
-- Flow 1:
Average throughput: 11.92 Mbit/s
95th percentile per-packet one-way delay: 317.219 ms
Loss rate: 1.21%
```

Run 1: Report of QUIC Cubic — Data Link



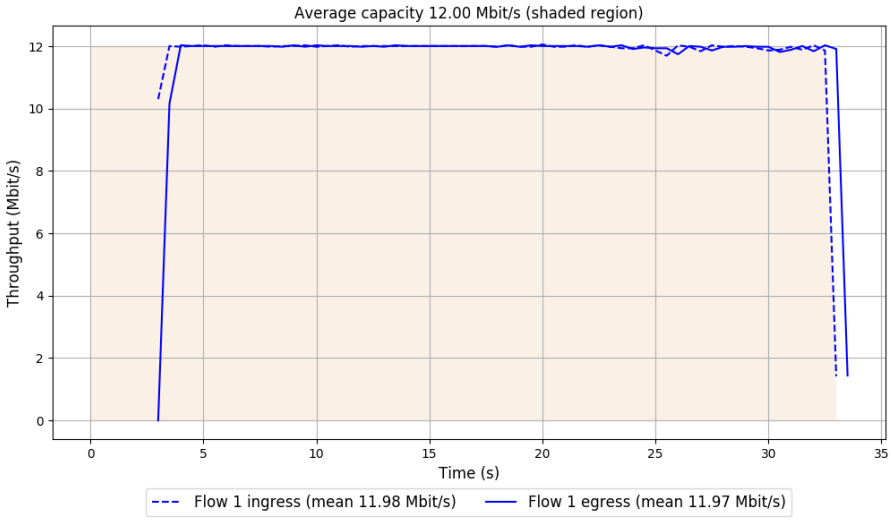


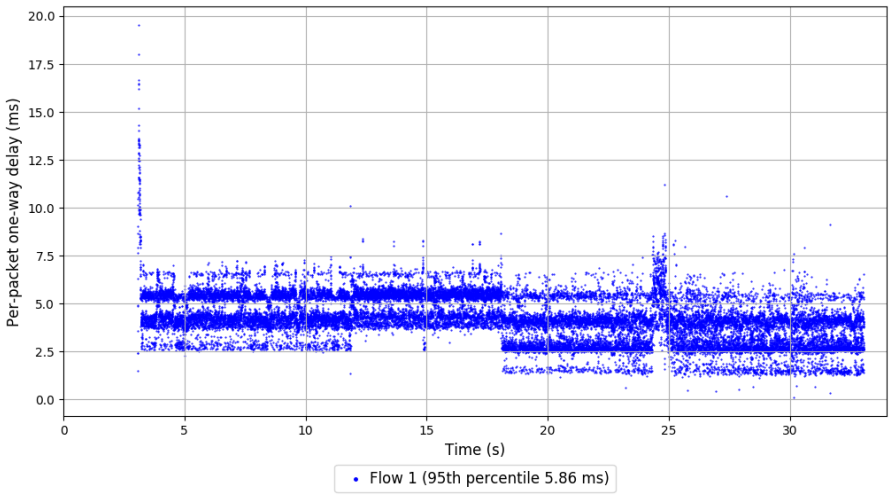
```
Run 1: Statistics of TCP Vegas

Start at: 2025-04-18 00:46:35
End at: 2025-04-18 00:47:05

# Below is generated by plot.py at 2025-04-18 01:01:10
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 11.97 Mbit/s (99.8% utilization)
95th percentile per-packet one-way delay: 5.858 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 11.97 Mbit/s
95th percentile per-packet one-way delay: 5.858 ms
Loss rate: 0.01%
```

Run 1: Report of TCP Vegas — Data Link





```
Run 1: Statistics of PCC-Vivace

Start at: 2025-04-18 00:46:01
End at: 2025-04-18 00:46:31

# Below is generated by plot.py at 2025-04-18 01:01:10
# Datalink statistics
-- Total of 1 flow:
Average capacity: 12.00 Mbit/s
Average throughput: 8.50 Mbit/s (70.9% utilization)
95th percentile per-packet one-way delay: 12.399 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 8.50 Mbit/s
95th percentile per-packet one-way delay: 12.399 ms
Loss rate: 0.00%
```

Run 1: Report of PCC-Vivace — Data Link