Pantheon Report

Generated at 2020-03-04 00:02:24 (UTC).

Tested in mahimahi: `mm-delay 28 mm-loss uplink 0.0477 mm-link 10mbps.trace 10mbps.trace --uplink-queue=droptail --uplink-queue-args=packets=14`

Repeated the test of 3 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

```
System info:
Linux 5.3.0-26-generic
net.core.default_qdisc = fq
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 @ 5230039929bcff0162ad78d7bd333530839804bc
third_party/aurora @ f3e943d61015b39960854ba6391797e0c7984d74
third_party/aurora-model @ e292c316c23fb837255c4e142e40590d154bbe95
third_party/eagle-plus @ 60ee690834d063b6c89918acda629f6031ba1734
 D .gitmodule
 M net-em/net-em/net_em/envs/connect-Eagle/CMakeFiles/Makefile.cmake
 M net-em/net-em/net_em/envs/connect-Eagle/connect-Eagle/Sender.cpp
 M net-em/net-em/net_em/envs/logs/log.txt
 M net-em/net-em/net_em/envs/net_em_env.py
third_party/eagle-v1 @ c68d985e042be5c30704c0aee48c363861951a95
third_party/eagle-v2 @ c8a1737b3c84d7d49eada5b8785045d272a70120
third_party/eagle-v3 @ 50d676bd6e47e3e29a3ce914a6e50b2c6f15136b
 M sender-receiver/sender-receiver/sender_receiver/__pycache__/__init__.cpython-36.pyc
 M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/__init__.cpython-36.pyc
 M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/datagram_pb2.cpython-36.
 M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/helpers.cpython-36.pyc
 M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/project_root.cpython-36.
 M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/receiver.cpython-36.pyc
 M sender-receiver/sender-receiver/sender_receiver/envs/__pycache__/sender_receiver_env.cpyt
 M sender-receiver/sender-receiver/sender_receiver/envs/connect-Eagle/connect-Eagle/Sender.c
 M sender-receiver/sender-receiver/sender_receiver/envs/experts/helpers_bbr.py
 M sender-receiver/sender-receiver/sender_receiver/envs/experts/python_bbr.py
 M sender-receiver/sender-receiver/sender_receiver/envs/logs/action_prob_logs.txt
 M sender-receiver/sender-receiver/sender_receiver/envs/logs/log.txt
 D sender-receiver/sender-receiver/sender_receiver/envs/models/training_models/model-xentrop
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 M sender-receiver/sender-receiver/sender_receiver/envs/models/training_models/model-xentrop
 M sender-receiver/sender-receiver/sender_receiver/envs/sender_receiver_env.py
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfe58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel @ f866d3f58d27afd942717625ee3a354cc2e802bd
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
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
third_party/vivace @ 2baf86211435ae071a32f96b7d8c504587f5d7f4
third_party/webrtc @ 3f0cc2a9061a41b6f9dde4735770d143a1fa2851
```
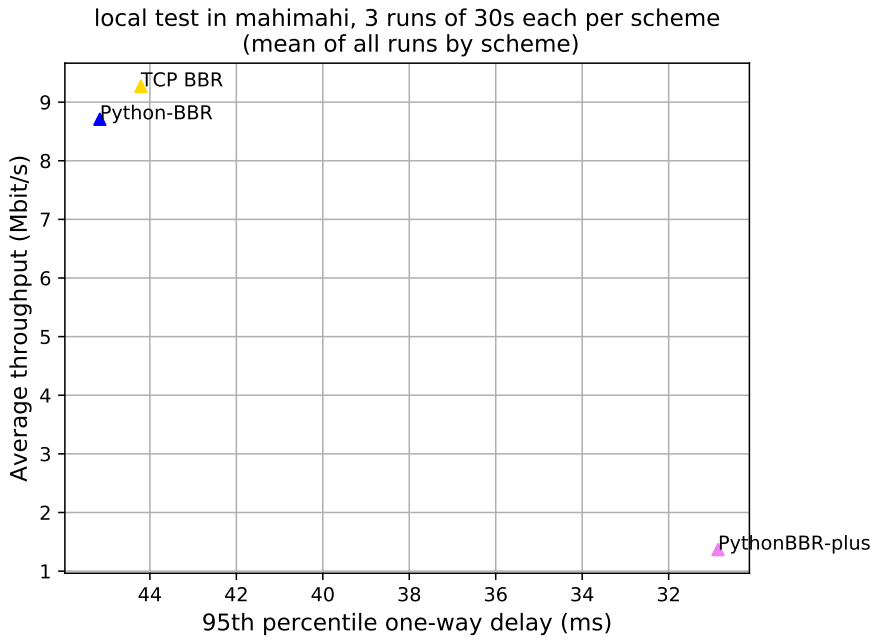
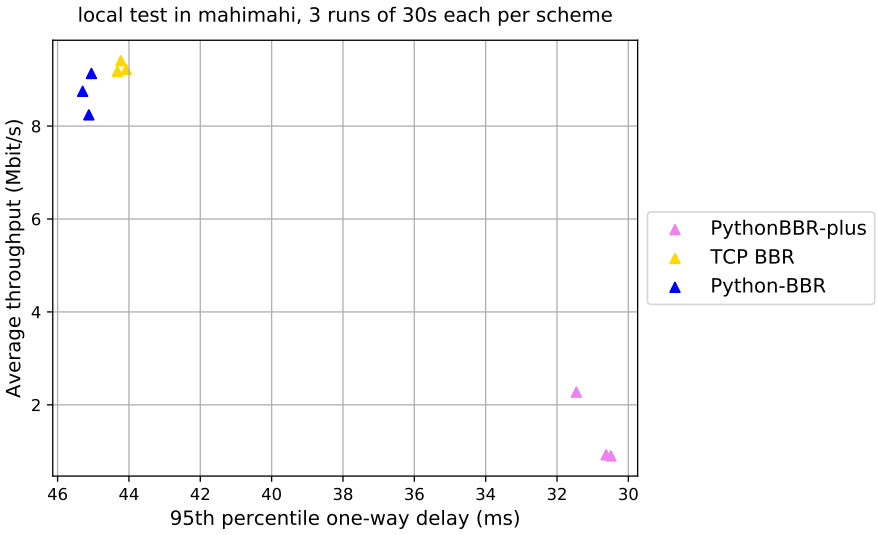
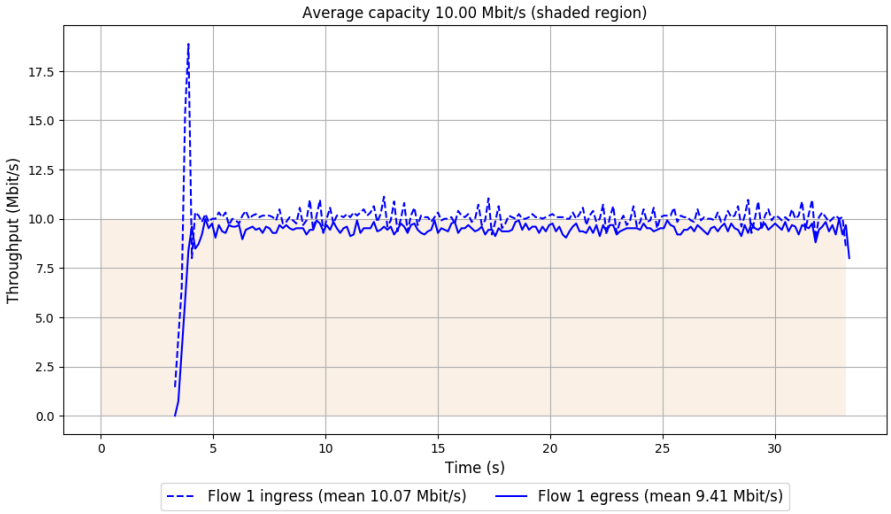


local test in mahimahi, 3 runs of 30s each per scheme
(mean of all runs by scheme)
TCP BBR
Python-BBR
PythonBBR-plus
Average throughput (Mbit/s)
95th percentile one-way delay (ms)
1
2
3
4
5
6
7
8
9
44
42
40
38
36
34
32

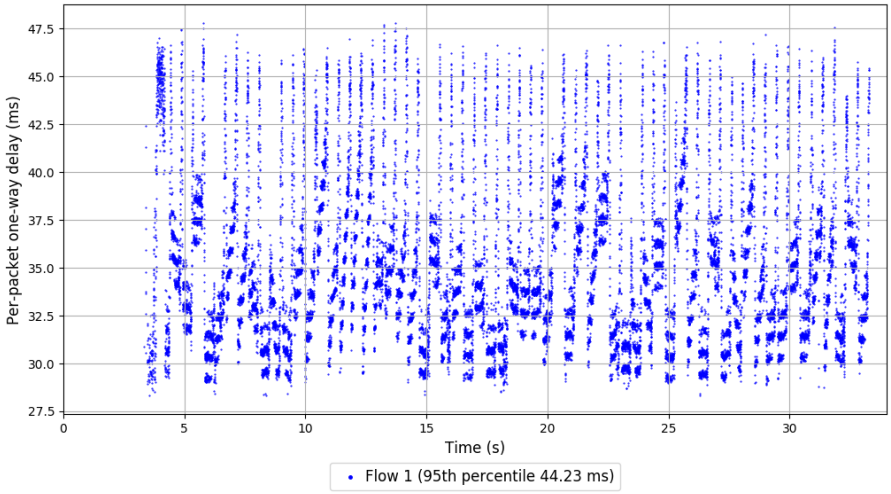

local test in mahimahi, 3 runs of 30s each per scheme
Average throughput (Mbit/s)
95th percentile one-way delay (ms)
PythonBBR-plus
TCP BBR
Python-BBR
2
4
6
8
46
44
42
40
38
36
34
32
30

scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	9.27	44.21	6.49
Python-BBR	3	8.71	45.16	8.88
PythonBBR-plus	3	1.37	30.86	4.86

```
Run 1: Statistics of TCP BBR

Start at: 2020-03-03 23:57:21
End at: 2020-03-03 23:57:51

# Below is generated by plot.py at 2020-03-04 00:02:22
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.41 Mbit/s (94.1% utilization)
95th percentile per-packet one-way delay: 44.226 ms
Loss rate: 6.63%
-- Flow 1:
Average throughput: 9.41 Mbit/s
95th percentile per-packet one-way delay: 44.226 ms
Loss rate: 6.63%
```

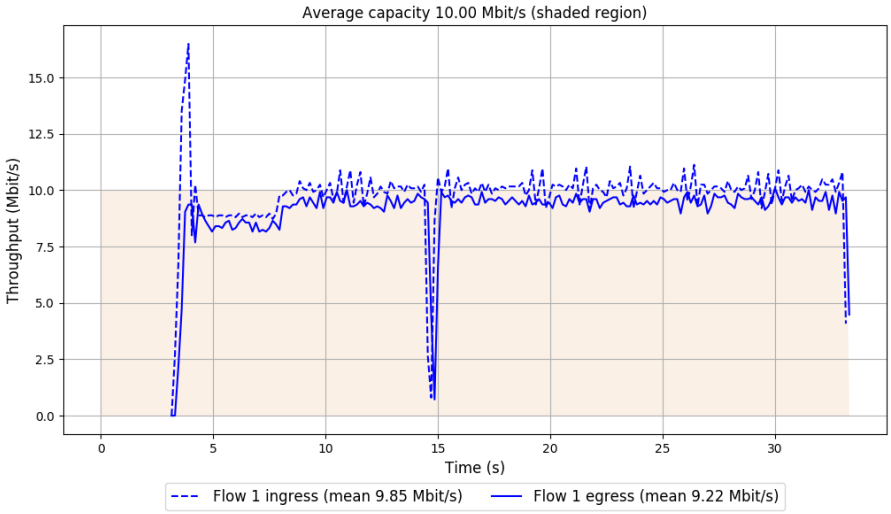
Run 1: Report of TCP BBR — Data Link

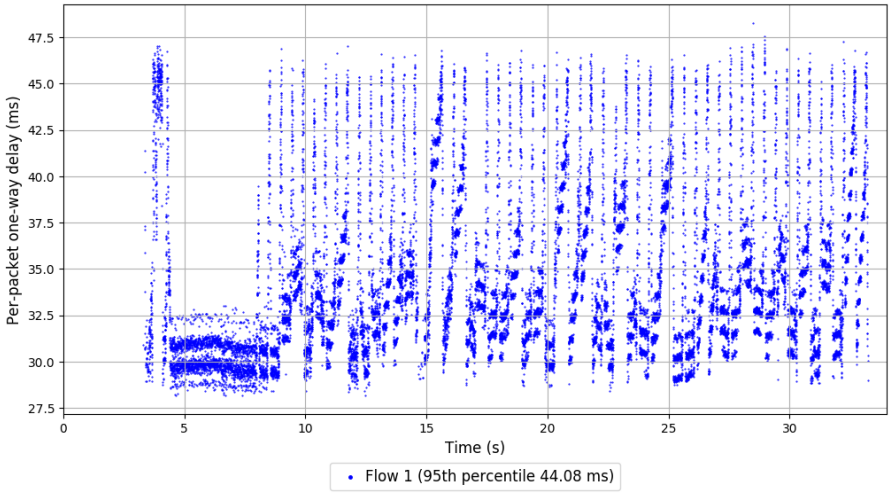




```
Run 2: Statistics of TCP BBR

Start at: 2020-03-03 23:59:04
End at: 2020-03-03 23:59:34

# Below is generated by plot.py at 2020-03-04 00:02:22
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.22 Mbit/s (92.2% utilization)
95th percentile per-packet one-way delay: 44.077 ms
Loss rate: 6.46%
-- Flow 1:
Average throughput: 9.22 Mbit/s
95th percentile per-packet one-way delay: 44.077 ms
Loss rate: 6.46%
```

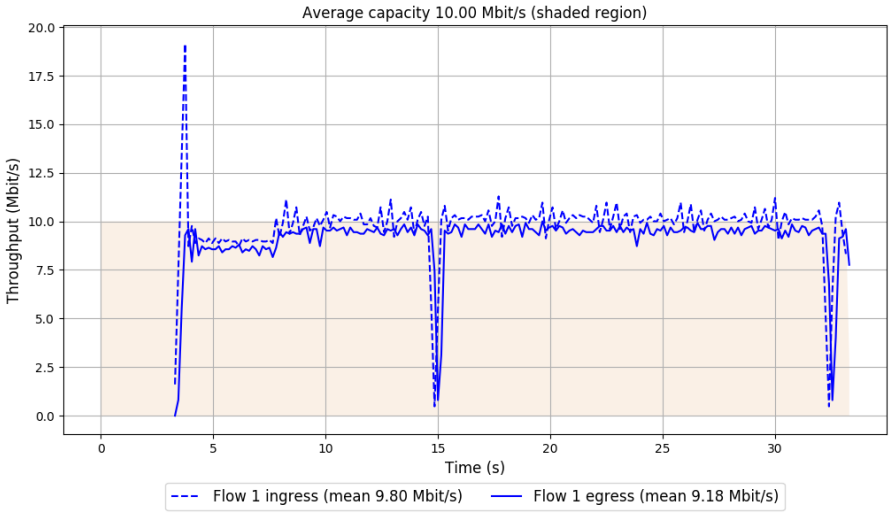
Run 2: Report of TCP BBR — Data Link

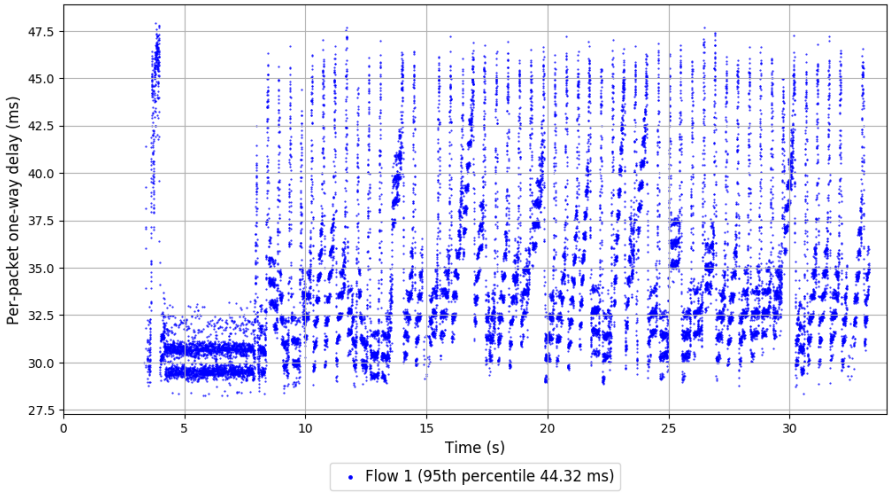




```
Run 3: Statistics of TCP BBR

Start at: 2020-03-04 00:00:47
End at: 2020-03-04 00:01:17

# Below is generated by plot.py at 2020-03-04 00:02:22
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.18 Mbit/s (91.8% utilization)
95th percentile per-packet one-way delay: 44.324 ms
Loss rate: 6.38%
-- Flow 1:
Average throughput: 9.18 Mbit/s
95th percentile per-packet one-way delay: 44.324 ms
Loss rate: 6.38%
```

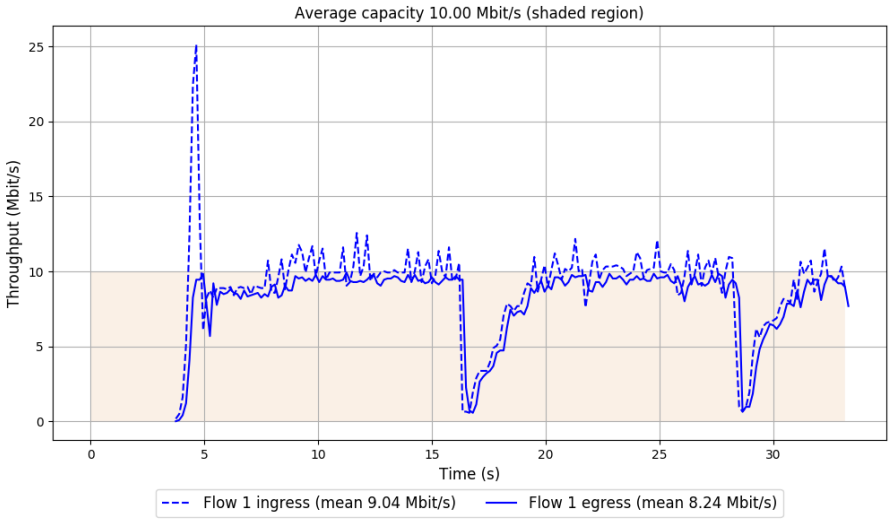
Run 3: Report of TCP BBR — Data Link

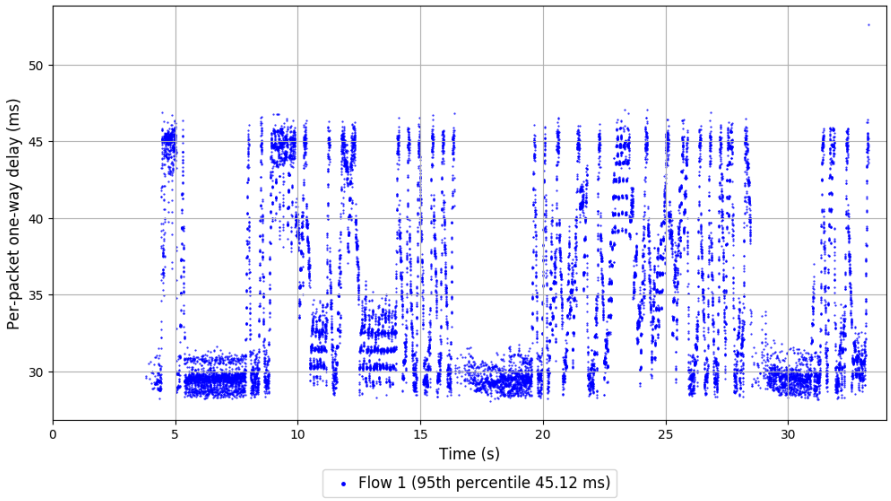




```
Run 1: Statistics of Python-BBR

Start at: 2020-03-03 23:57:56
End at: 2020-03-03 23:58:26

# Below is generated by plot.py at 2020-03-04 00:02:22
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 8.24 Mbit/s (82.4% utilization)
95th percentile per-packet one-way delay: 45.124 ms
Loss rate: 8.92%
-- Flow 1:
Average throughput: 8.24 Mbit/s
95th percentile per-packet one-way delay: 45.124 ms
Loss rate: 8.92%
```

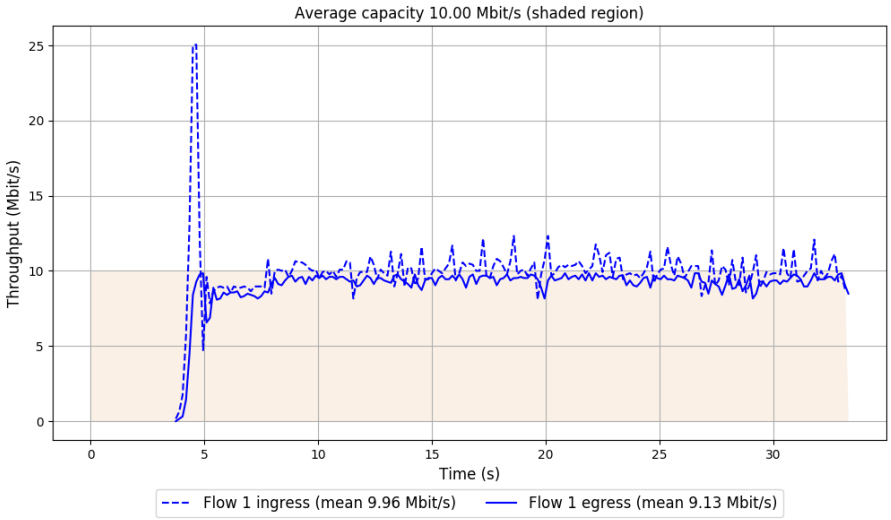
Run 1: Report of Python-BBR — Data Link

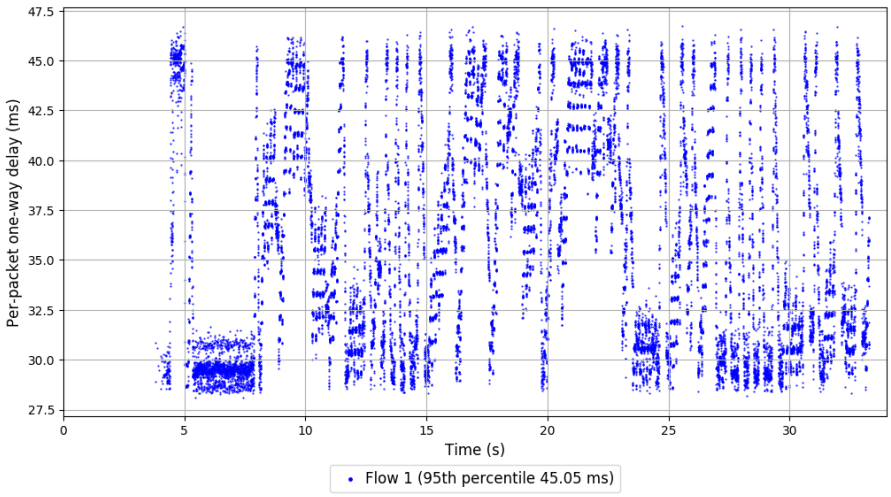




```
Run 2: Statistics of Python-BBR

Start at: 2020-03-03 23:59:38
End at: 2020-03-04 00:00:08

# Below is generated by plot.py at 2020-03-04 00:02:22
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 9.13 Mbit/s (91.3% utilization)
95th percentile per-packet one-way delay: 45.052 ms
Loss rate: 8.41%
-- Flow 1:
Average throughput: 9.13 Mbit/s
95th percentile per-packet one-way delay: 45.052 ms
Loss rate: 8.41%
```

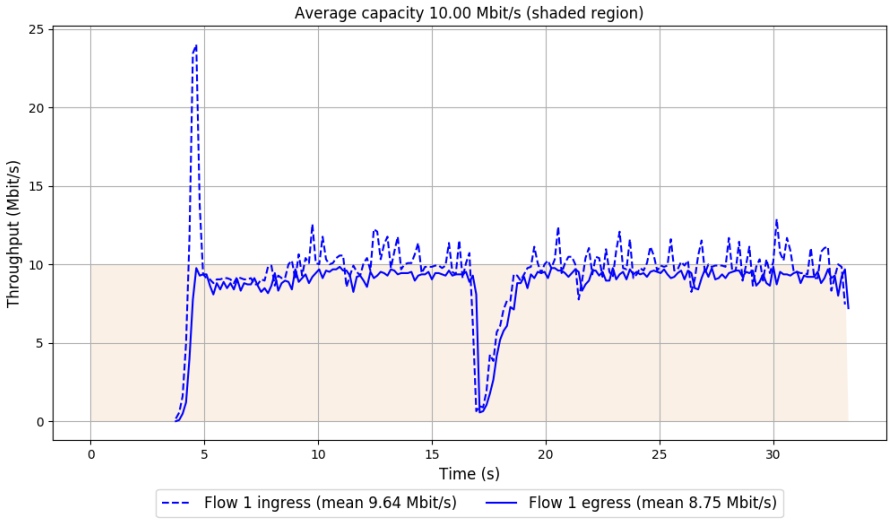
Run 2: Report of Python-BBR — Data Link

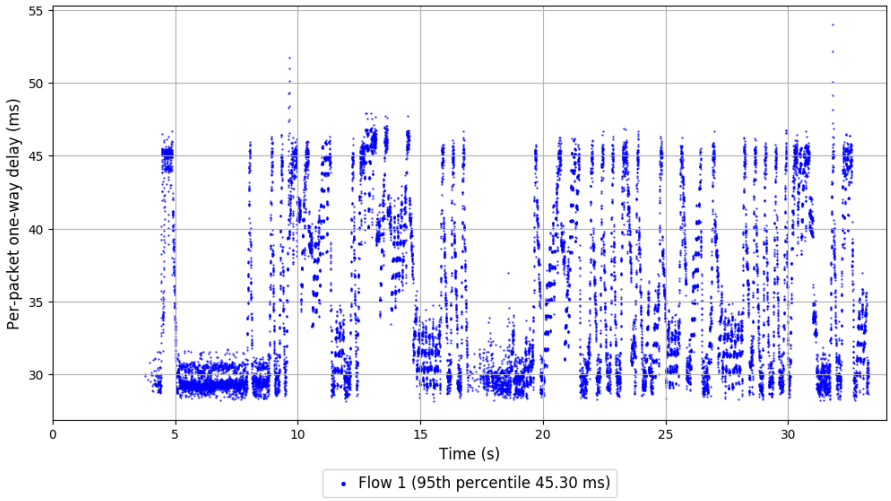




```
Run 3: Statistics of Python-BBR

Start at: 2020-03-04 00:01:21
End at: 2020-03-04 00:01:51

# Below is generated by plot.py at 2020-03-04 00:02:22
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 8.75 Mbit/s (87.5% utilization)
95th percentile per-packet one-way delay: 45.298 ms
Loss rate: 9.30%
-- Flow 1:
Average throughput: 8.75 Mbit/s
95th percentile per-packet one-way delay: 45.298 ms
Loss rate: 9.30%
```

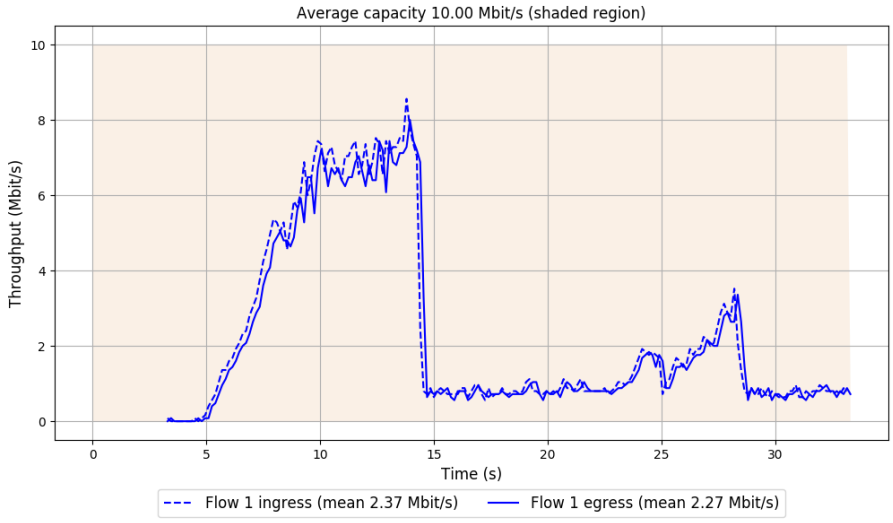
Run 3: Report of Python-BBR — Data Link

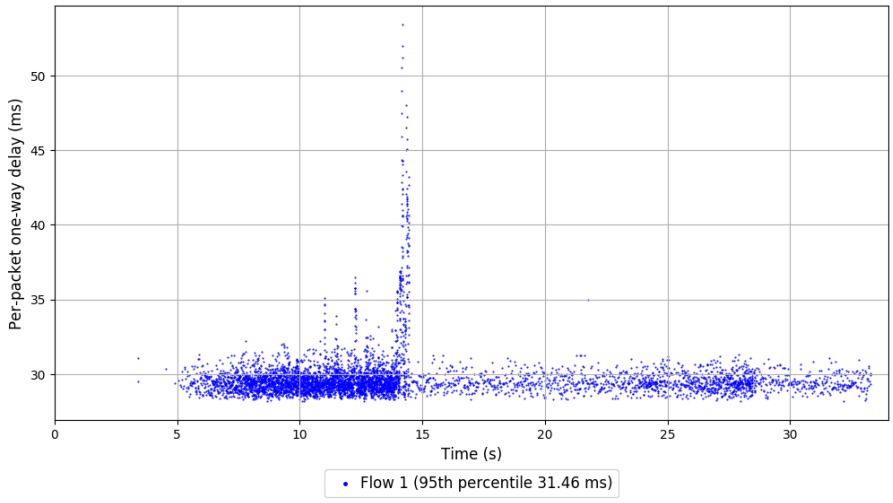




```
Run 1: Statistics of PythonBBR-plus

Start at: 2020-03-03 23:56:47
End at: 2020-03-03 23:57:17

# Below is generated by plot.py at 2020-03-04 00:02:22
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 2.27 Mbit/s (22.7% utilization)
95th percentile per-packet one-way delay: 31.458 ms
Loss rate: 4.28%
-- Flow 1:
Average throughput: 2.27 Mbit/s
95th percentile per-packet one-way delay: 31.458 ms
Loss rate: 4.28%
```

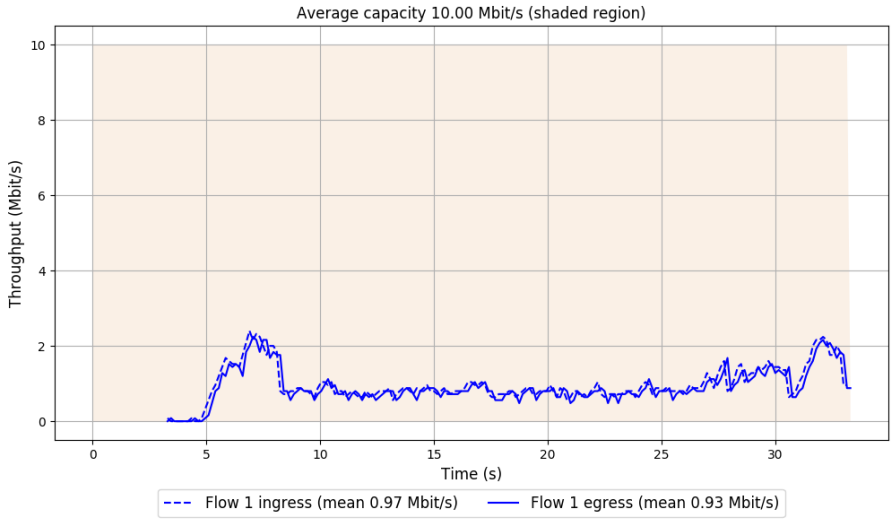
Run 1: Report of PythonBBR-plus — Data Link

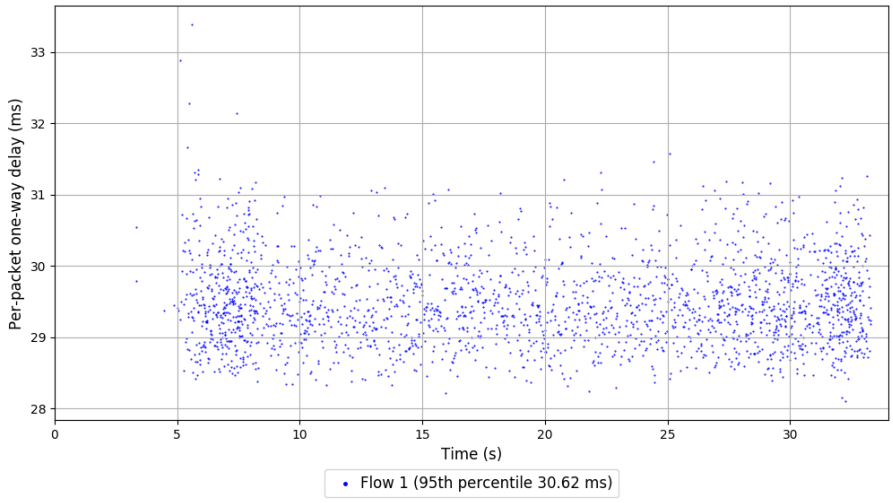




```
Run 2: Statistics of PythonBBR-plus

Start at: 2020-03-03 23:58:30
End at: 2020-03-03 23:59:00

# Below is generated by plot.py at 2020-03-04 00:02:22
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 0.93 Mbit/s (9.3% utilization)
95th percentile per-packet one-way delay: 30.624 ms
Loss rate: 4.98%
-- Flow 1:
Average throughput: 0.93 Mbit/s
95th percentile per-packet one-way delay: 30.624 ms
Loss rate: 4.98%
```

Run 2: Report of PythonBBR-plus — Data Link





```
Run 3: Statistics of PythonBBR-plus

Start at: 2020-03-04 00:00:13
End at: 2020-03-04 00:00:43

# Below is generated by plot.py at 2020-03-04 00:02:22
# Datalink statistics
-- Total of 1 flow:
Average capacity: 10.00 Mbit/s
Average throughput: 0.90 Mbit/s (9.0% utilization)
95th percentile per-packet one-way delay: 30.491 ms
Loss rate: 5.31%
-- Flow 1:
Average throughput: 0.90 Mbit/s
95th percentile per-packet one-way delay: 30.491 ms
Loss rate: 5.31%
```

Run 3: Report of PythonBBR-plus — Data Link