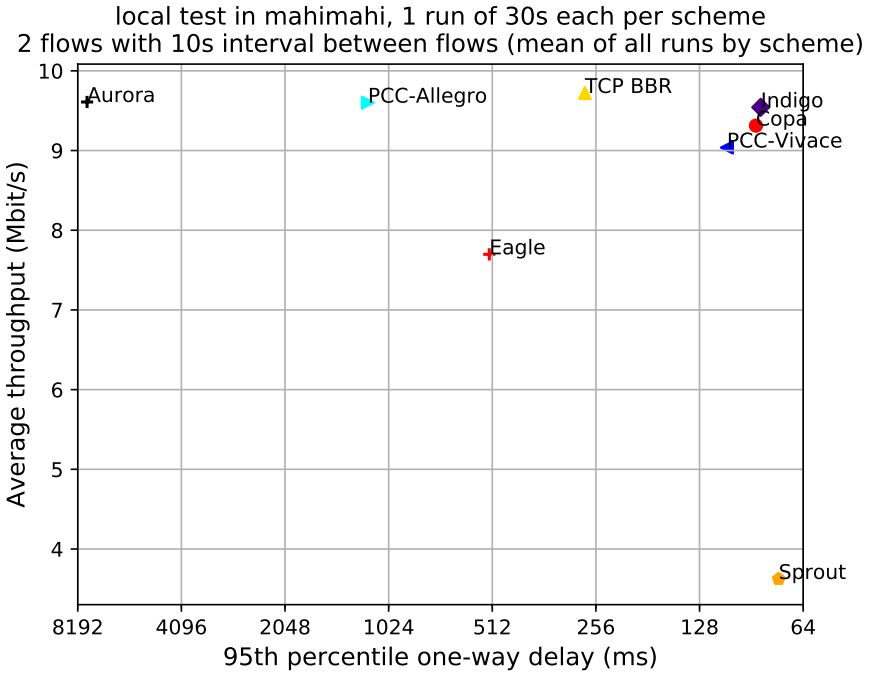
Pantheon Report

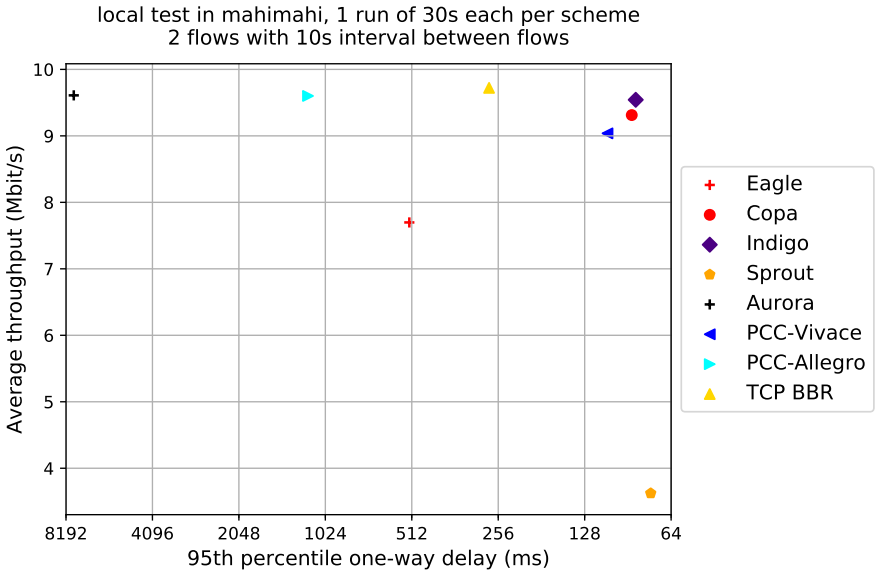
Generated at 2019-07-31 06:06:02 (UTC).
Tested in mahimahi: `mm-delay 50 mm-link 10mbps.trace 10mbps.trace`
Repeated the test of 8 congestion control schemes once.
Each test lasted for 30 seconds running 2 flows with 10-second interval between two flows.

```
System info:
Linux 4.15.0-54-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 87380 6291456
net.ipv4.tcp_wmem = 4096 16384 4194304
```

```
Git summary:
branch: master @ 62d8f37d8d652b91a3860998a516ad26633b94bd
third_party/aurora @ f3e943d61015b39960854ba6391797e0c7984d74
third_party/aurora-model @ e292c316c23fb837255c4e142e40590d154bbe95
third_party/eagle @ f66d3a824f0abdd3b1d0afc0cc323607b2c38eca
 M sender-receiver/sender-receiver/sender_receiver/envs/example-xentropy.py
 D sender-receiver/sender-receiver/sender_receiver/envs/model-xentropy.pt
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfe58e562f4
third_party/gold @ e47bed6d7495aa223eec8de2c7a43035967074ef
 M environment/__pycache__/datagram_pb2.cpython-36.opt-1.pyc
 M environment/__pycache__/datagram_pb2.cpython-36.pyc
 M environment/__pycache__/environment.cpython-36.opt-1.pyc
 M environment/__pycache__/helpers.cpython-36.opt-1.pyc
 M environment/__pycache__/helpers.cpython-36.pyc
 M environment/__pycache__/mahimahi.cpython-36.opt-1.pyc
 M environment/__pycache__/project_root.cpython-36.opt-1.pyc
 M environment/__pycache__/project_root.cpython-36.pyc
 M environment/__pycache__/receiver.cpython-36.opt-1.pyc
 M environment/__pycache__/receiver.cpython-36.pyc
 M environment/logs.txt
 M model
third_party/goldLSTM @ 6b512ee75b163fd680d7bf3cde4cf6d6aa7102c4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
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
2 flows with 10s interval between flows (mean of all runs by scheme)
Average throughput (Mbit/s)
95th percentile one-way delay (ms)
Aurora
PCC-Allegro
TCP BBR
Indigo
Copa
PCC-Vivace
Eagle
Sprout
10
9
8
7
6
5
4
8192
4096
2048
1024
512
256
128
64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2 flows with 10s interval between flows
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95th percentile one-way delay (ms)
Eagle
Copa
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Sprout
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PCC-Vivace
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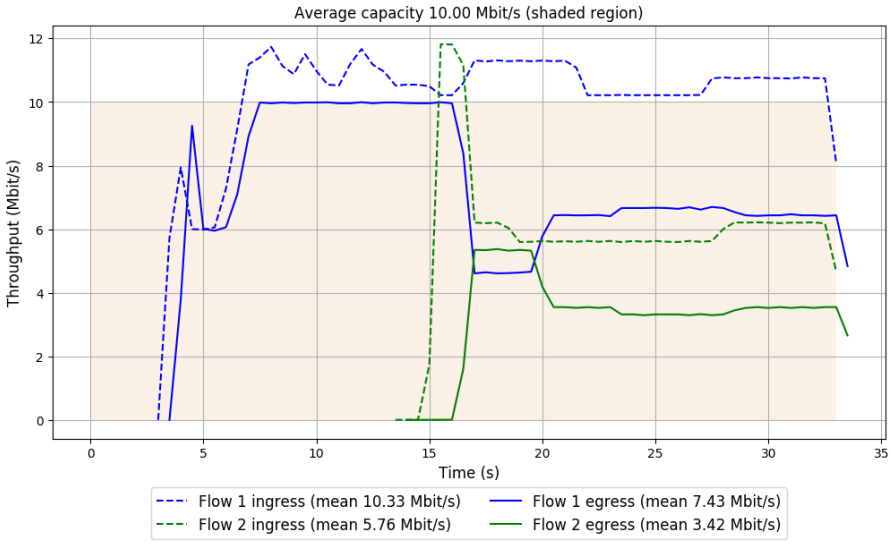
scheme	# runs	mean avg tput (Mbit/s)		mean 95th-%ile delay (ms)		mean loss rate (%)	
		flow 1	flow 2	flow 1	flow 2	flow 1	flow 2
Aurora	1	7.43	3.42	7592.96	7889.71	28.25	43.09
TCP BBR	1	7.12	3.92	263.37	310.54	0.47	0.87
Copa	1	7.41	2.86	94.81	77.41	0.07	0.06
Eagle	1	7.16	0.82	532.37	288.99	0.18	0.08
Indigo	1	6.50	4.60	75.44	104.43	0.09	0.52
PCC-Allegro	1	8.27	2.01	1172.24	1189.27	3.92	6.05
Sprout	1	2.25	2.08	75.07	75.80	0.39	0.00
PCC-Vivace	1	7.89	1.74	101.90	127.22	0.13	0.28

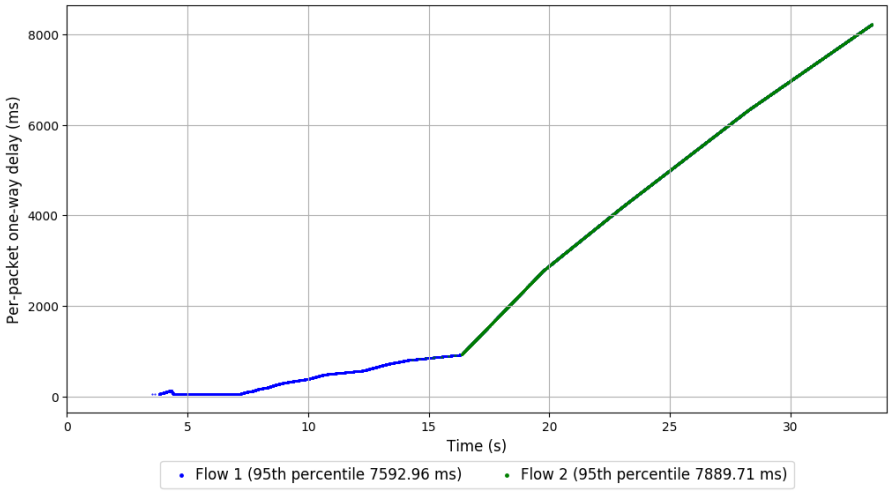
```
Run 1: Statistics of Aurora

Start at: 2019-07-31 06:00:50
End at: 2019-07-31 06:01:20

# Below is generated by plot.py at 2019-07-31 06:05:58
# Datalink statistics
-- Total of 2 flows:
Average capacity: 10.00 Mbit/s
Average throughput: 9.61 Mbit/s (96.1% utilization)
95th percentile per-packet one-way delay: 7697.506 ms
Loss rate: 32.26%
-- Flow 1:
Average throughput: 7.43 Mbit/s
95th percentile per-packet one-way delay: 7592.956 ms
Loss rate: 28.25%
-- Flow 2:
Average throughput: 3.42 Mbit/s
95th percentile per-packet one-way delay: 7889.708 ms
Loss rate: 43.09%
```

Run 1: Report of Aurora — Data Link



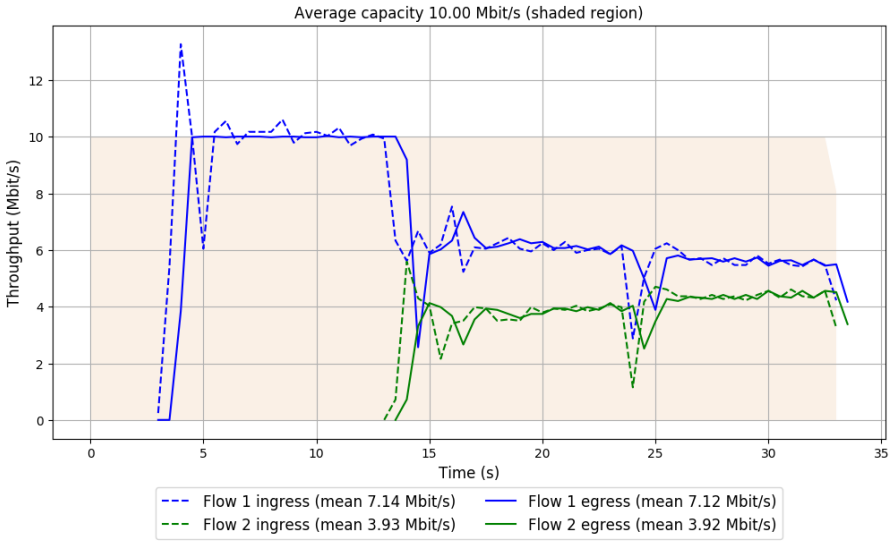


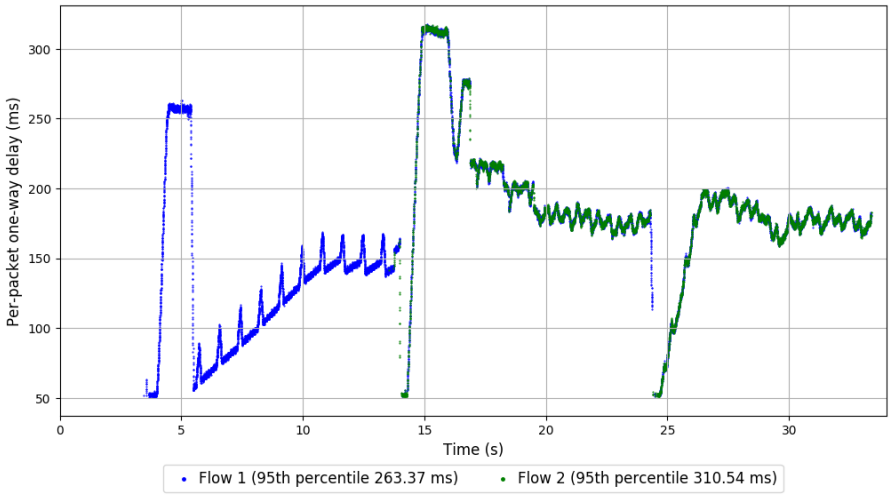
```
Run 1: Statistics of TCP BBR

Start at: 2019-07-31 06:00:15
End at: 2019-07-31 06:00:45

# Below is generated by plot.py at 2019-07-31 06:05:58
# Datalink statistics
-- Total of 2 flows:
Average capacity: 10.00 Mbit/s
Average throughput: 9.72 Mbit/s (97.2% utilization)
95th percentile per-packet one-way delay: 275.522 ms
Loss rate: 0.58%
-- Flow 1:
Average throughput: 7.12 Mbit/s
95th percentile per-packet one-way delay: 263.374 ms
Loss rate: 0.47%
-- Flow 2:
Average throughput: 3.92 Mbit/s
95th percentile per-packet one-way delay: 310.537 ms
Loss rate: 0.87%
```

Run 1: Report of TCP BBR — Data Link



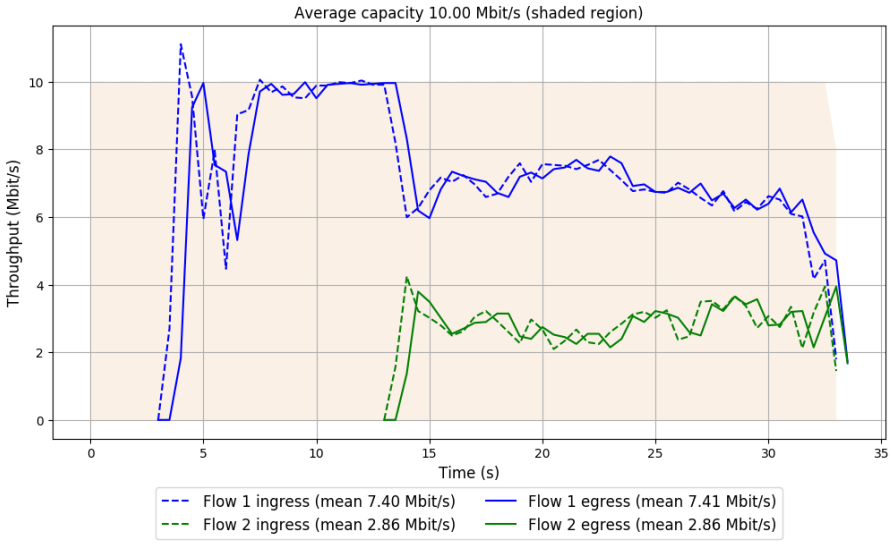


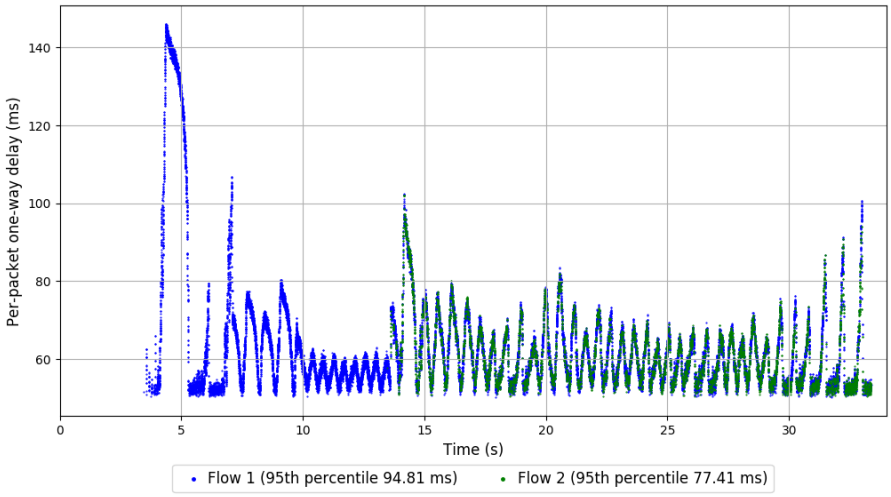
```
Run 1: Statistics of Copa

Start at: 2019-07-31 06:03:46
End at: 2019-07-31 06:04:16

# Below is generated by plot.py at 2019-07-31 06:05:58
# Datalink statistics
-- Total of 2 flows:
Average capacity: 10.00 Mbit/s
Average throughput: 9.31 Mbit/s (93.1% utilization)
95th percentile per-packet one-way delay: 87.755 ms
Loss rate: 0.07%
-- Flow 1:
Average throughput: 7.41 Mbit/s
95th percentile per-packet one-way delay: 94.808 ms
Loss rate: 0.07%
-- Flow 2:
Average throughput: 2.86 Mbit/s
95th percentile per-packet one-way delay: 77.408 ms
Loss rate: 0.06%
```

Run 1: Report of Copa — Data Link



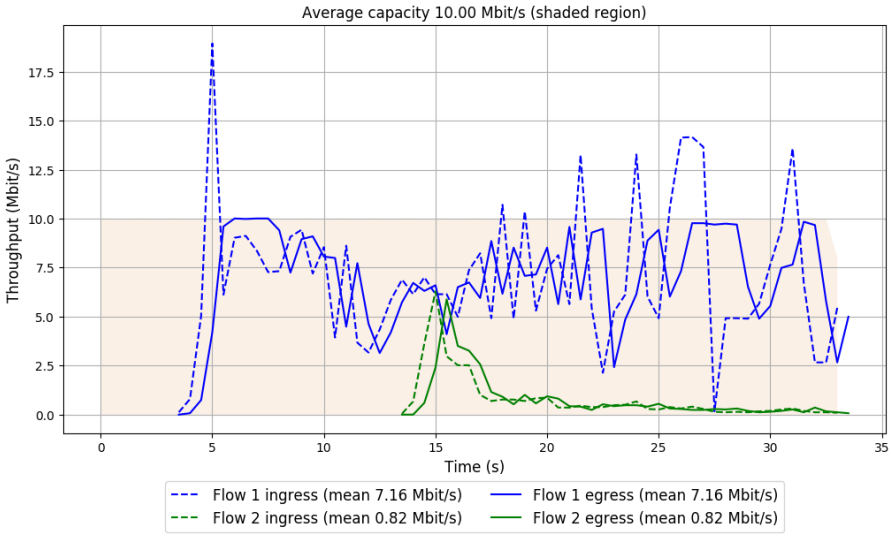


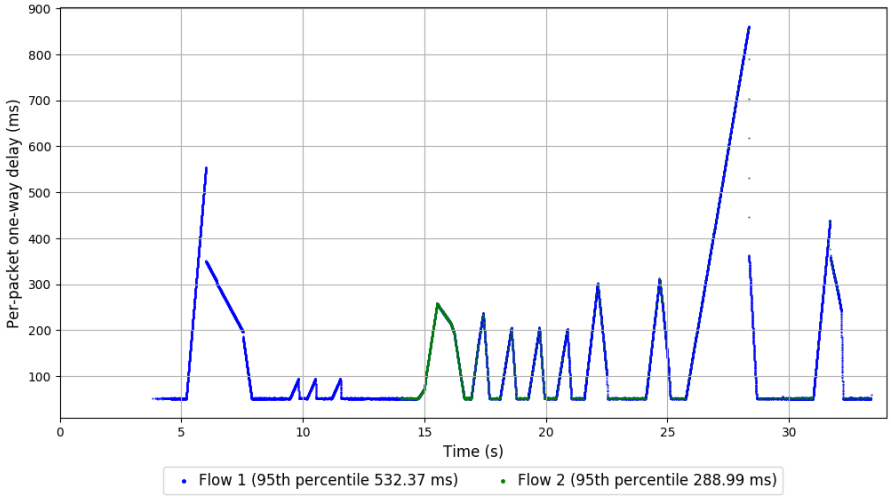
```
Run 1: Statistics of Eagle

Start at: 2019-07-31 05:59:40
End at: 2019-07-31 06:00:10

# Below is generated by plot.py at 2019-07-31 06:05:58
# Datalink statistics
-- Total of 2 flows:
Average capacity: 10.00 Mbit/s
Average throughput: 7.70 Mbit/s (77.0% utilization)
95th percentile per-packet one-way delay: 522.234 ms
Loss rate: 0.17%
-- Flow 1:
Average throughput: 7.16 Mbit/s
95th percentile per-packet one-way delay: 532.373 ms
Loss rate: 0.18%
-- Flow 2:
Average throughput: 0.82 Mbit/s
95th percentile per-packet one-way delay: 288.991 ms
Loss rate: 0.08%
```

Run 1: Report of Eagle — Data Link



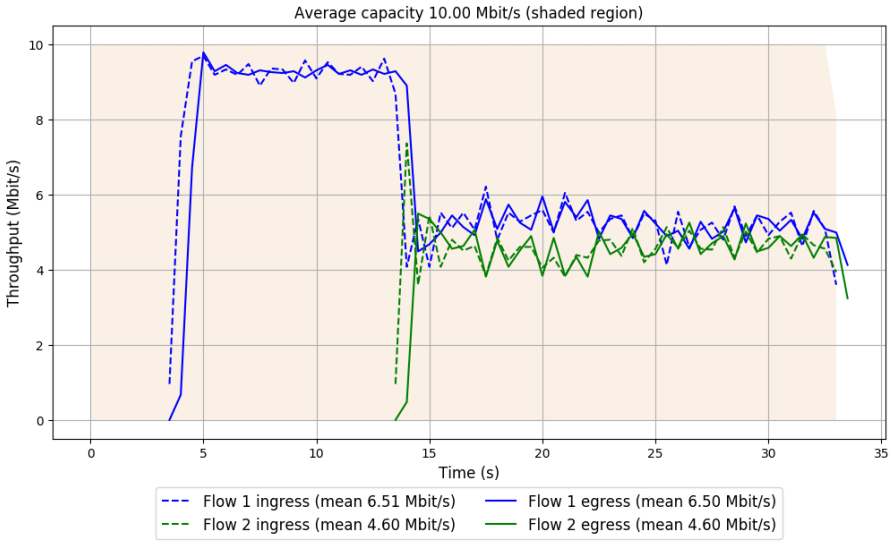


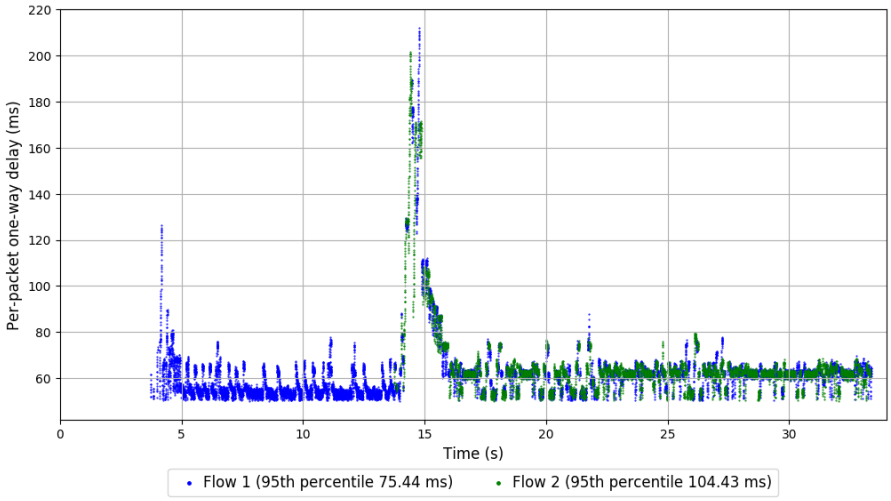
```
Run 1: Statistics of Indigo

Start at: 2019-07-31 06:01:26
End at: 2019-07-31 06:01:56

# Below is generated by plot.py at 2019-07-31 06:05:58
# Datalink statistics
-- Total of 2 flows:
Average capacity: 10.00 Mbit/s
Average throughput: 9.54 Mbit/s (95.4% utilization)
95th percentile per-packet one-way delay: 85.002 ms
Loss rate: 0.22%
-- Flow 1:
Average throughput: 6.50 Mbit/s
95th percentile per-packet one-way delay: 75.435 ms
Loss rate: 0.09%
-- Flow 2:
Average throughput: 4.60 Mbit/s
95th percentile per-packet one-way delay: 104.430 ms
Loss rate: 0.52%
```

Run 1: Report of Indigo — Data Link



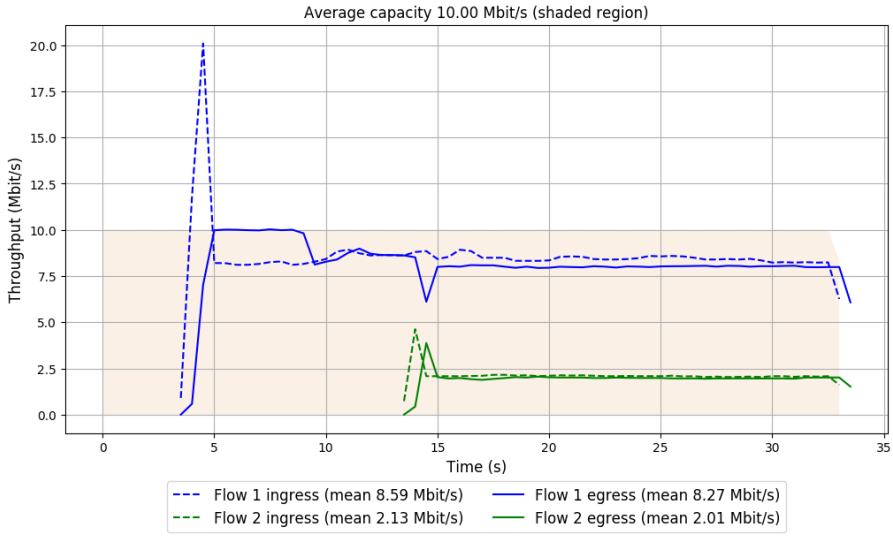


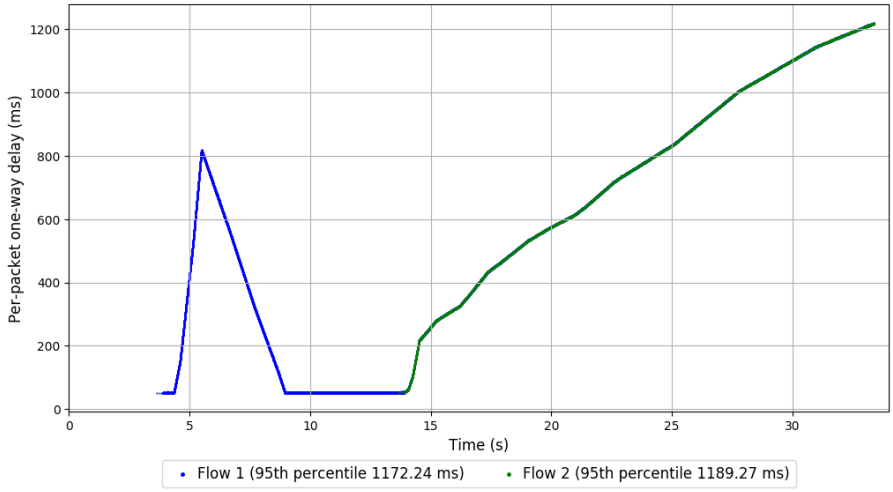
```
Run 1: Statistics of PCC-Allegro

Start at: 2019-07-31 06:02:01
End at: 2019-07-31 06:02:31

# Below is generated by plot.py at 2019-07-31 06:05:58
# Datalink statistics
-- Total of 2 flows:
Average capacity: 10.00 Mbit/s
Average throughput: 9.60 Mbit/s (96.0% utilization)
95th percentile per-packet one-way delay: 1176.322 ms
Loss rate: 4.22%
-- Flow 1:
Average throughput: 8.27 Mbit/s
95th percentile per-packet one-way delay: 1172.236 ms
Loss rate: 3.92%
-- Flow 2:
Average throughput: 2.01 Mbit/s
95th percentile per-packet one-way delay: 1189.268 ms
Loss rate: 6.05%
```

Run 1: Report of PCC-Allegro — Data Link



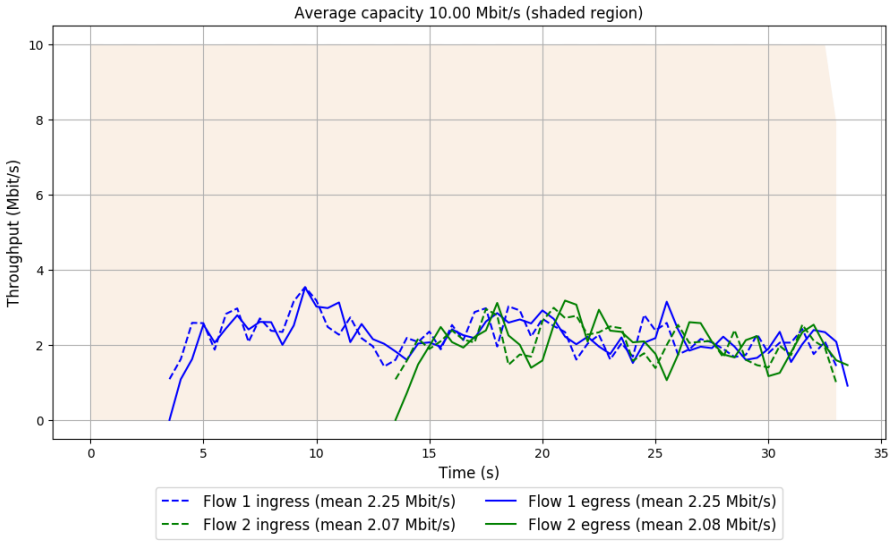


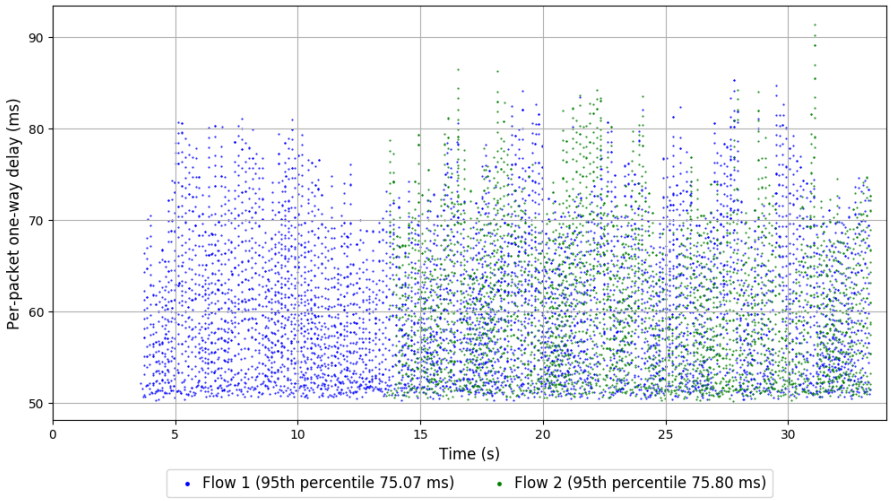
```
Run 1: Statistics of Sprout

Start at: 2019-07-31 06:03:11
End at: 2019-07-31 06:03:41

# Below is generated by plot.py at 2019-07-31 06:05:58
# Datalink statistics
-- Total of 2 flows:
Average capacity: 10.00 Mbit/s
Average throughput: 3.62 Mbit/s (36.2% utilization)
95th percentile per-packet one-way delay: 75.371 ms
Loss rate: 0.25%
-- Flow 1:
Average throughput: 2.25 Mbit/s
95th percentile per-packet one-way delay: 75.067 ms
Loss rate: 0.39%
-- Flow 2:
Average throughput: 2.08 Mbit/s
95th percentile per-packet one-way delay: 75.799 ms
Loss rate: 0.00%
```

Run 1: Report of Sprout — Data Link





```
Run 1: Statistics of PCC-Vivace

Start at: 2019-07-31 06:02:36
End at: 2019-07-31 06:03:06

# Below is generated by plot.py at 2019-07-31 06:05:59
# Datalink statistics
-- Total of 2 flows:
Average capacity: 10.00 Mbit/s
Average throughput: 9.04 Mbit/s (90.4% utilization)
95th percentile per-packet one-way delay: 106.608 ms
Loss rate: 0.15%
-- Flow 1:
Average throughput: 7.89 Mbit/s
95th percentile per-packet one-way delay: 101.899 ms
Loss rate: 0.13%
-- Flow 2:
Average throughput: 1.74 Mbit/s
95th percentile per-packet one-way delay: 127.225 ms
Loss rate: 0.28%
```

Run 1: Report of PCC-Vivace — Data Link