

## Pantheon Report

Generated at 2019-01-17 10:18:03 (UTC).

Tested in mahimahi: mm-delay 30 mm-link 12mbps.trace 12mbps.trace  
--uplink-queue=droptail --uplink-queue-args=bytes=90000

Repeated the test of 21 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

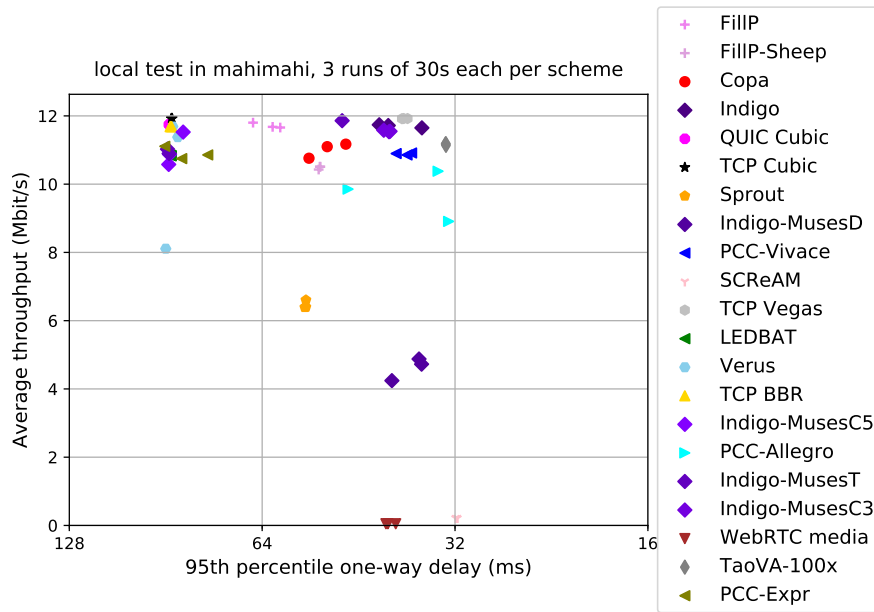
### System info:

```
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 @ d0153f8e594aa89e93b032143cedbdf58e562f4
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
```





scheme	# runs	mean avg tput (Mbit/s)	mean 95th-%ile delay (ms)	mean loss rate (%)
		flow 1	flow 1	flow 1
TCP BBR	3	11.68	88.86	1.89
Copa	3	11.01	50.71	0.21
TCP Cubic	3	11.93	88.56	0.51
FillP	3	11.71	62.58	0.86
FillP-Sheep	3	10.48	52.06	0.76
Indigo	3	11.70	39.58	0.13
Indigo-MusesC3	3	11.56	40.78	0.13
Indigo-MusesC5	3	10.99	87.94	4.67
Indigo-MusesD	3	4.62	37.55	0.03
Indigo-MusesT	3	11.26	75.79	6.73
LEDBAT	3	10.84	88.86	0.22
PCC-Allegro	3	9.71	37.92	0.87
PCC-Expr	3	10.91	84.70	0.63
QUIC Cubic	3	11.75	89.39	0.87
SReAM	3	0.21	31.81	0.09
Sprout	3	6.47	54.76	0.12
TaoVA-100x	3	11.17	33.08	0.58
TCP Vegas	3	11.92	38.39	0.24
Verus	3	10.39	88.48	27.92
PCC-Vivace	3	10.89	38.33	0.11
WebRTC media	3	0.05	40.45	0.00

Run 1: Statistics of TCP BBR

Start at: 2019-01-17 09:43:54

End at: 2019-01-17 09:44:24

# Below is generated by plot.py at 2019-01-17 10:14:50

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.68 Mbit/s (97.4% utilization)

95th percentile per-packet one-way delay: 89.095 ms

Loss rate: 1.95%

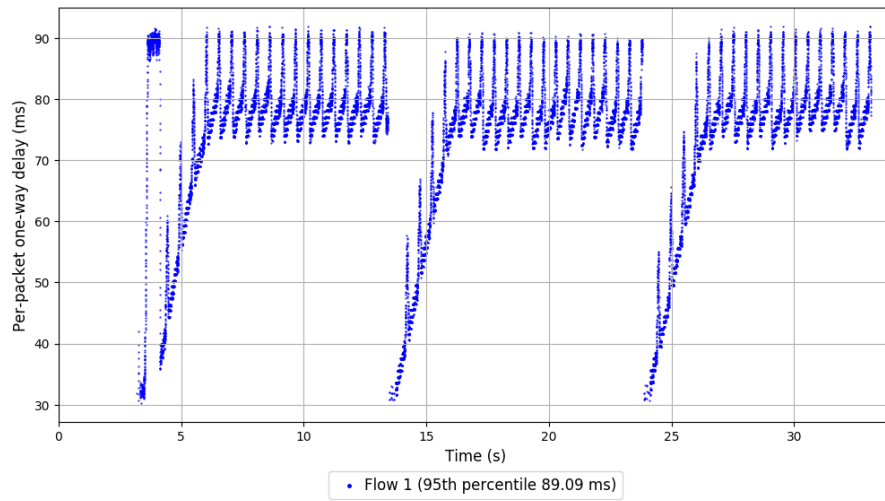
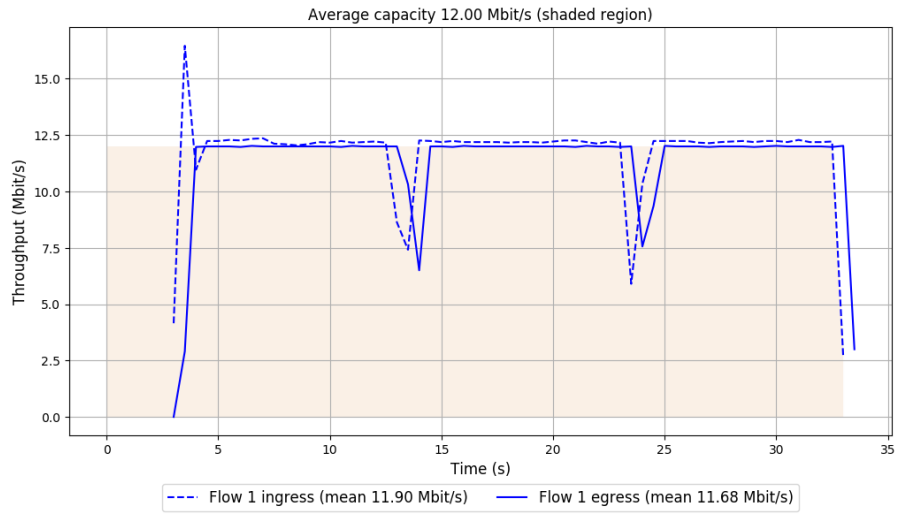
-- Flow 1:

Average throughput: 11.68 Mbit/s

95th percentile per-packet one-way delay: 89.095 ms

Loss rate: 1.95%

# Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2019-01-17 09:56:23

End at: 2019-01-17 09:56:53

# Below is generated by plot.py at 2019-01-17 10:14:50

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.68 Mbit/s (97.4% utilization)

95th percentile per-packet one-way delay: 88.602 ms

Loss rate: 1.81%

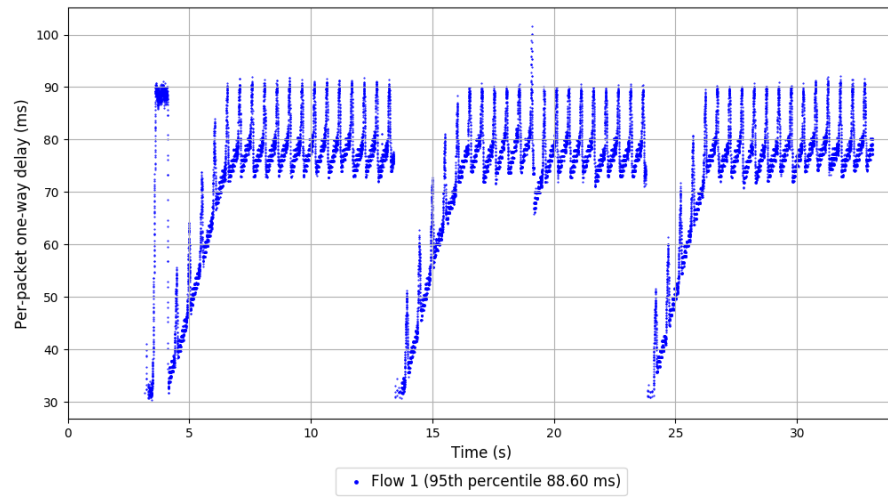
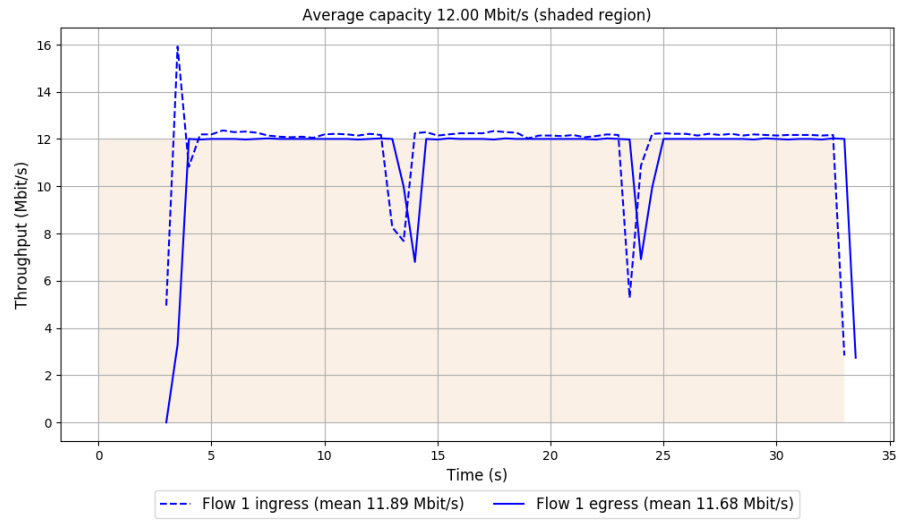
-- Flow 1:

Average throughput: 11.68 Mbit/s

95th percentile per-packet one-way delay: 88.602 ms

Loss rate: 1.81%

## Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2019-01-17 10:08:50

End at: 2019-01-17 10:09:20

# Below is generated by plot.py at 2019-01-17 10:14:51

# 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: 88.882 ms

Loss rate: 1.90%

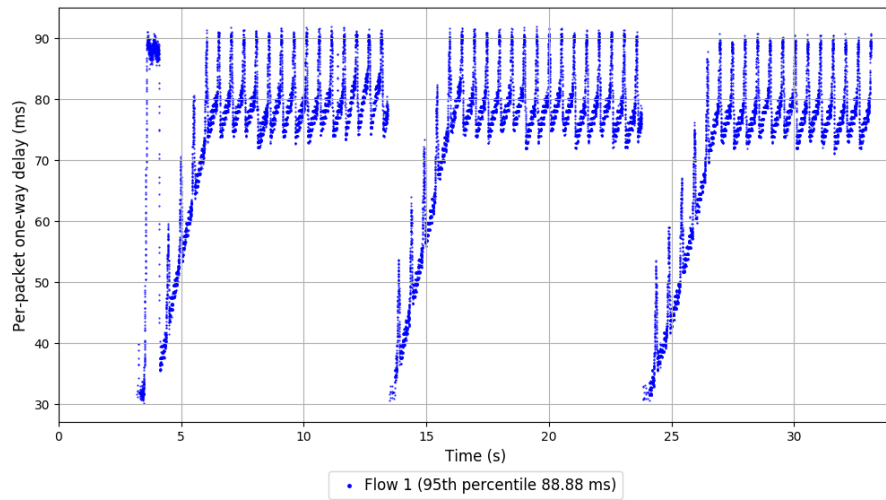
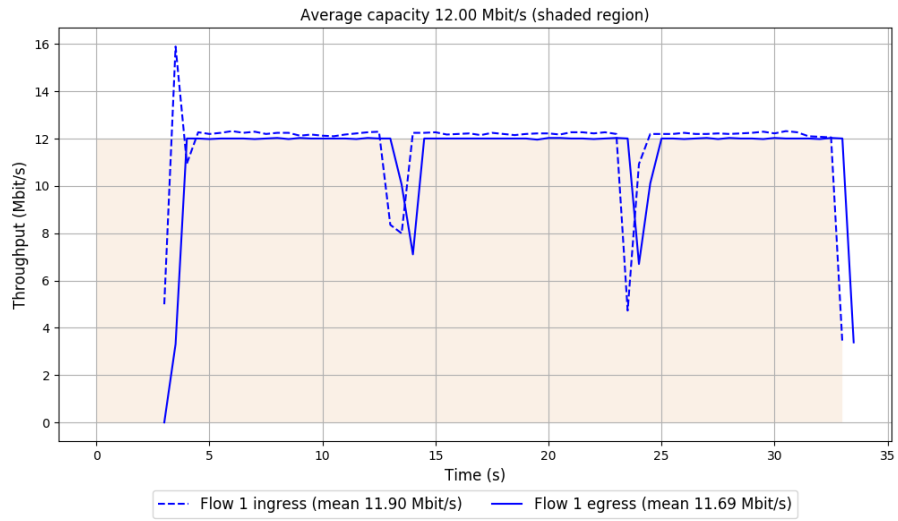
-- Flow 1:

Average throughput: 11.69 Mbit/s

95th percentile per-packet one-way delay: 88.882 ms

Loss rate: 1.90%

### Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

Start at: 2019-01-17 09:38:33

End at: 2019-01-17 09:39:03

# Below is generated by plot.py at 2019-01-17 10:15:05

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.10 Mbit/s (92.5% utilization)

95th percentile per-packet one-way delay: 50.659 ms

Loss rate: 0.10%

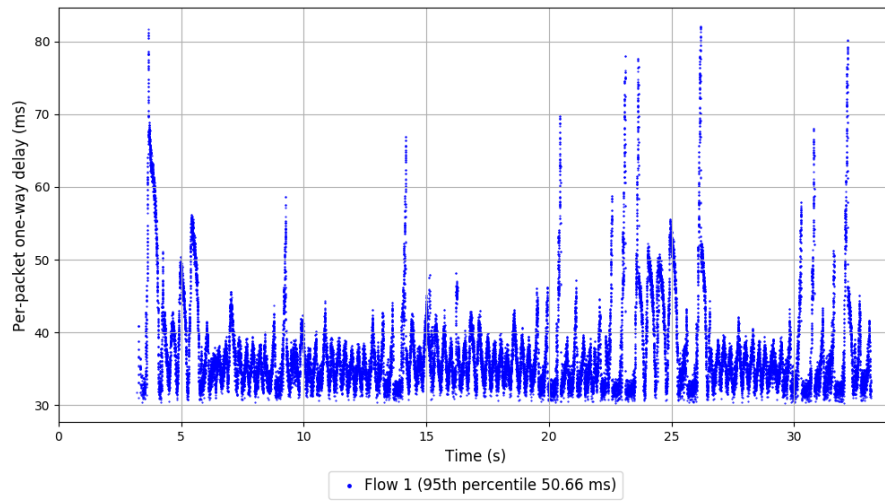
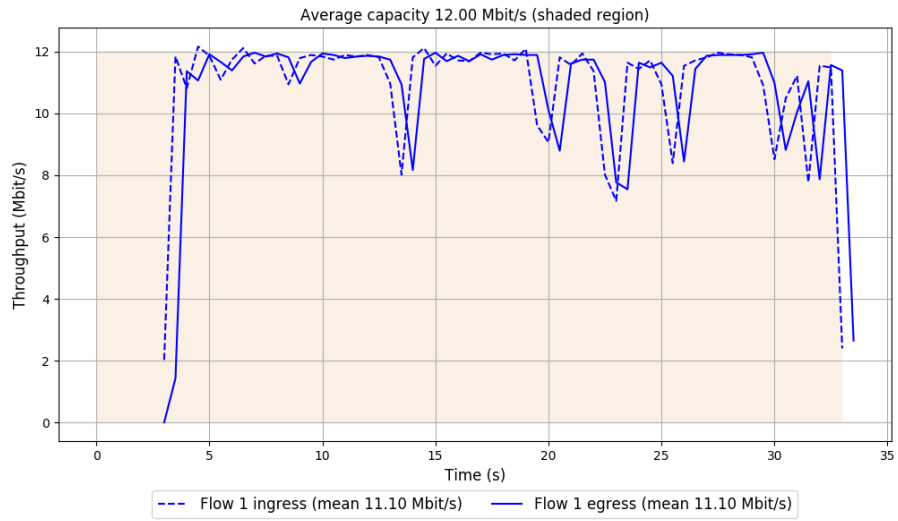
-- Flow 1:

Average throughput: 11.10 Mbit/s

95th percentile per-packet one-way delay: 50.659 ms

Loss rate: 0.10%

# Run 1: Report of Copa — Data Link



Run 2: Statistics of Copa

Start at: 2019-01-17 09:51:01

End at: 2019-01-17 09:51:31

# Below is generated by plot.py at 2019-01-17 10:15:05

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.76 Mbit/s (89.7% utilization)

95th percentile per-packet one-way delay: 54.090 ms

Loss rate: 0.40%

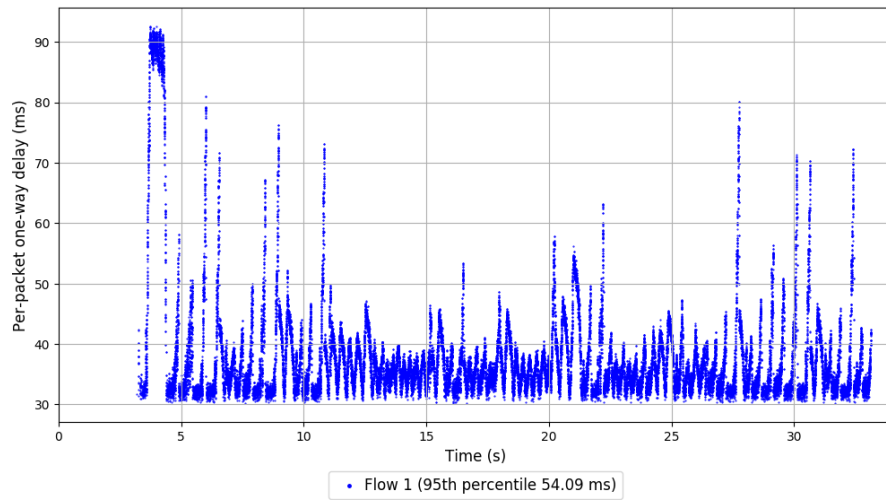
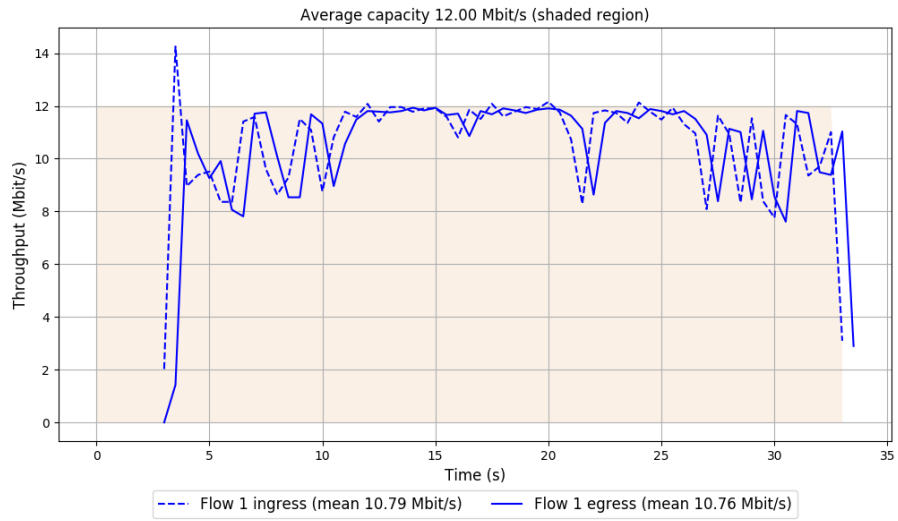
-- Flow 1:

Average throughput: 10.76 Mbit/s

95th percentile per-packet one-way delay: 54.090 ms

Loss rate: 0.40%

## Run 2: Report of Copa — Data Link



Run 3: Statistics of Copa

Start at: 2019-01-17 10:03:29

End at: 2019-01-17 10:03:59

# Below is generated by plot.py at 2019-01-17 10:15:05

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.17 Mbit/s (93.1% utilization)

95th percentile per-packet one-way delay: 47.382 ms

Loss rate: 0.14%

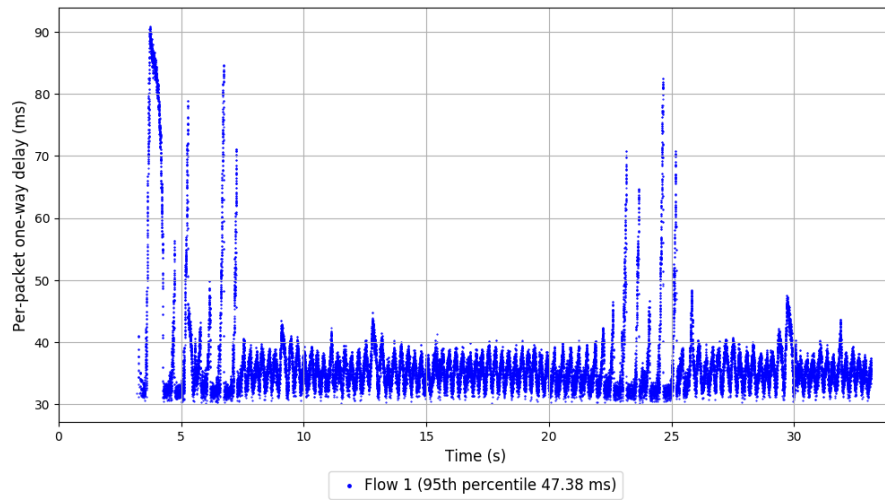
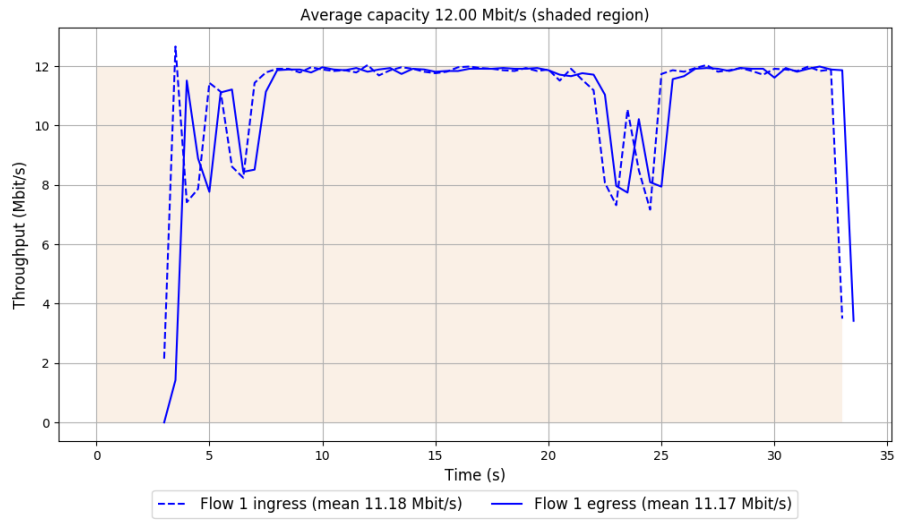
-- Flow 1:

Average throughput: 11.17 Mbit/s

95th percentile per-packet one-way delay: 47.382 ms

Loss rate: 0.14%

### Run 3: Report of Copa — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2019-01-17 09:36:46

End at: 2019-01-17 09:37:16

# Below is generated by plot.py at 2019-01-17 10:15:05

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.93 Mbit/s (99.4% utilization)

95th percentile per-packet one-way delay: 88.715 ms

Loss rate: 0.54%

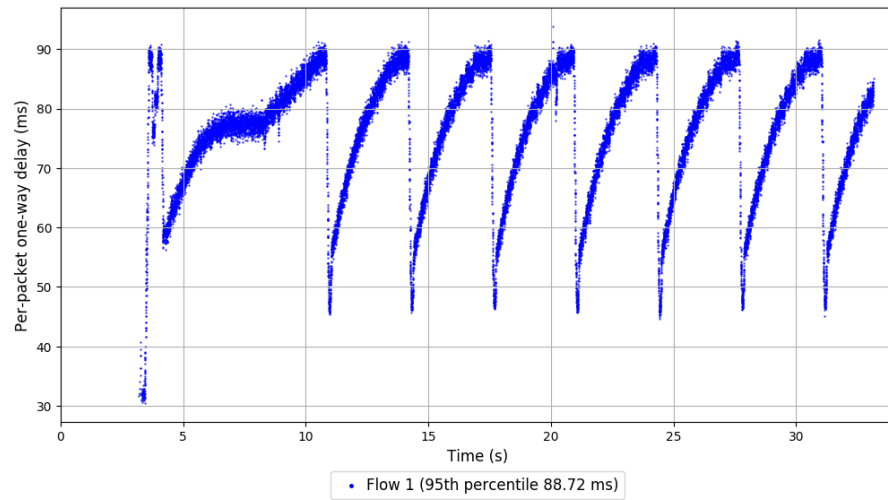
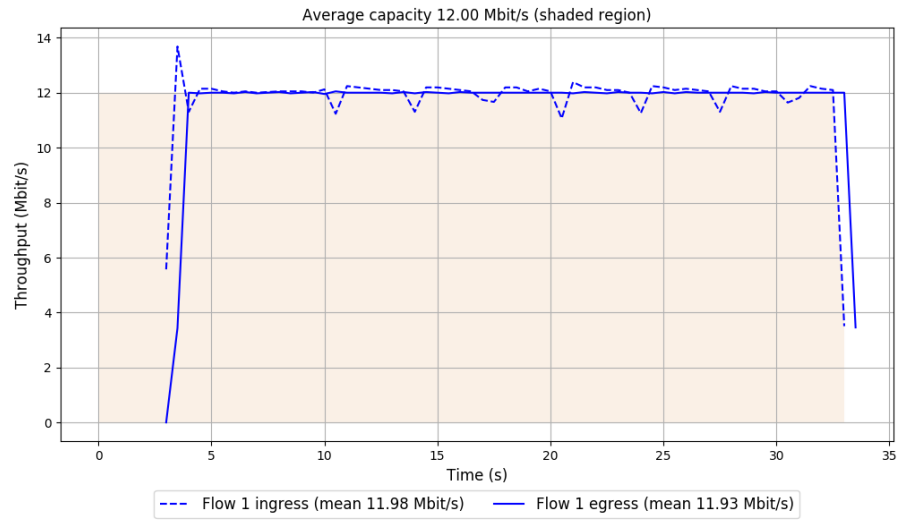
-- Flow 1:

Average throughput: 11.93 Mbit/s

95th percentile per-packet one-way delay: 88.715 ms

Loss rate: 0.54%

### Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2019-01-17 09:49:14

End at: 2019-01-17 09:49:44

# Below is generated by plot.py at 2019-01-17 10:15:05

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.93 Mbit/s (99.4% utilization)

95th percentile per-packet one-way delay: 88.513 ms

Loss rate: 0.49%

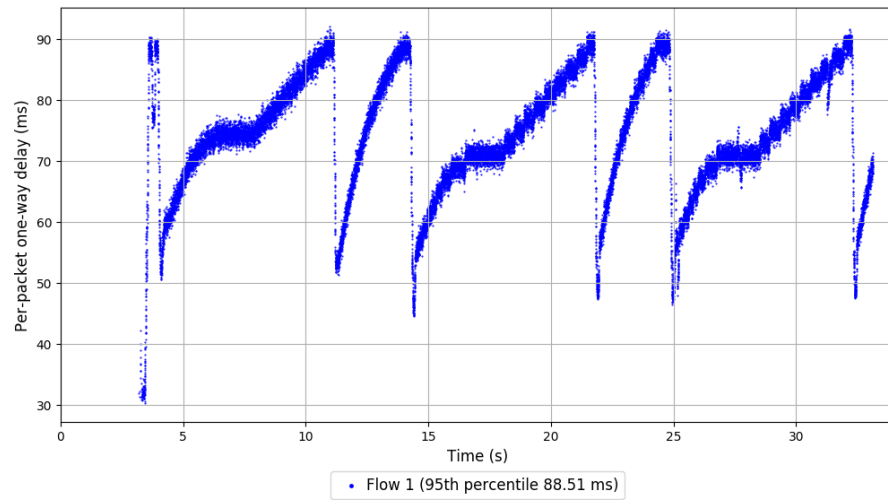
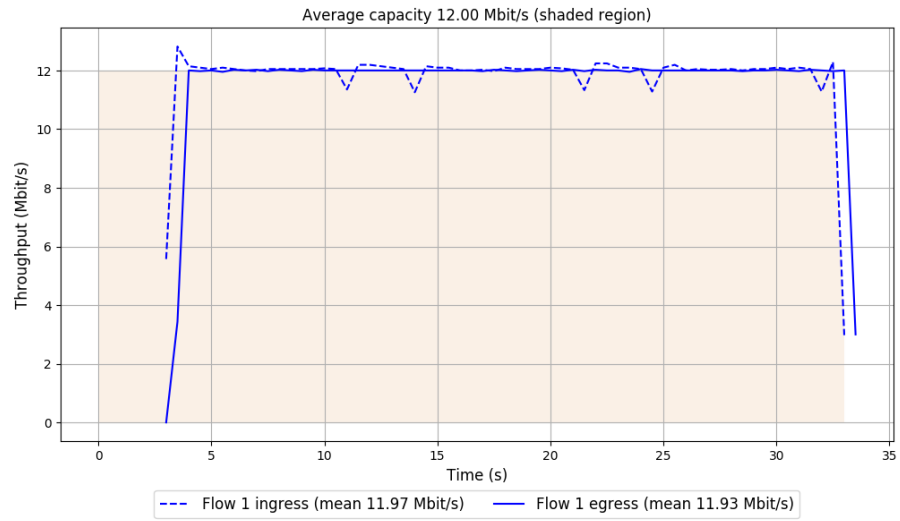
-- Flow 1:

Average throughput: 11.93 Mbit/s

95th percentile per-packet one-way delay: 88.513 ms

Loss rate: 0.49%

## Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2019-01-17 10:01:42

End at: 2019-01-17 10:02:12

# Below is generated by plot.py at 2019-01-17 10:15:19

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.93 Mbit/s (99.4% utilization)

95th percentile per-packet one-way delay: 88.460 ms

Loss rate: 0.49%

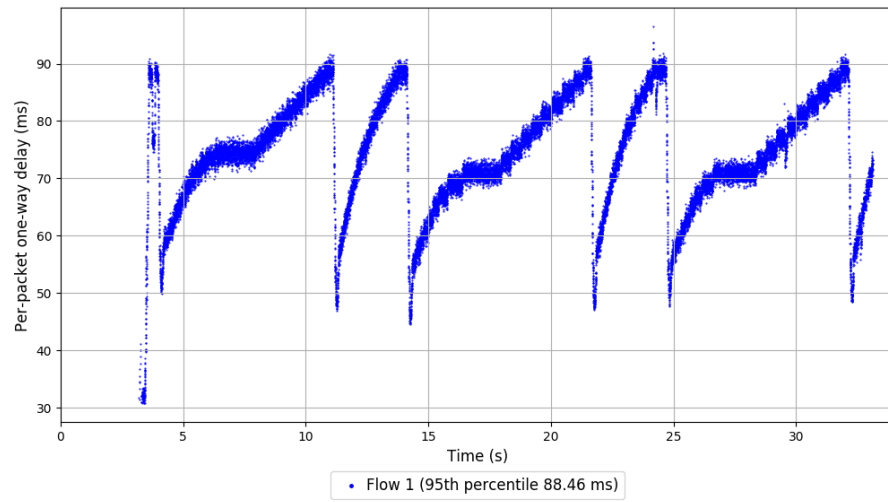
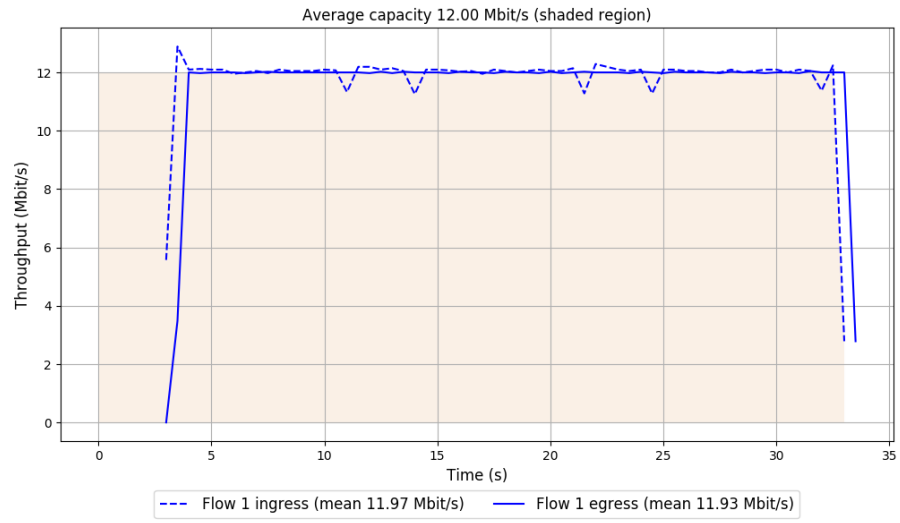
-- Flow 1:

Average throughput: 11.93 Mbit/s

95th percentile per-packet one-way delay: 88.460 ms

Loss rate: 0.49%

### Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of FillP

Start at: 2019-01-17 09:40:55

End at: 2019-01-17 09:41:25

# Below is generated by plot.py at 2019-01-17 10:15:23

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.80 Mbit/s (98.3% utilization)

95th percentile per-packet one-way delay: 66.131 ms

Loss rate: 0.92%

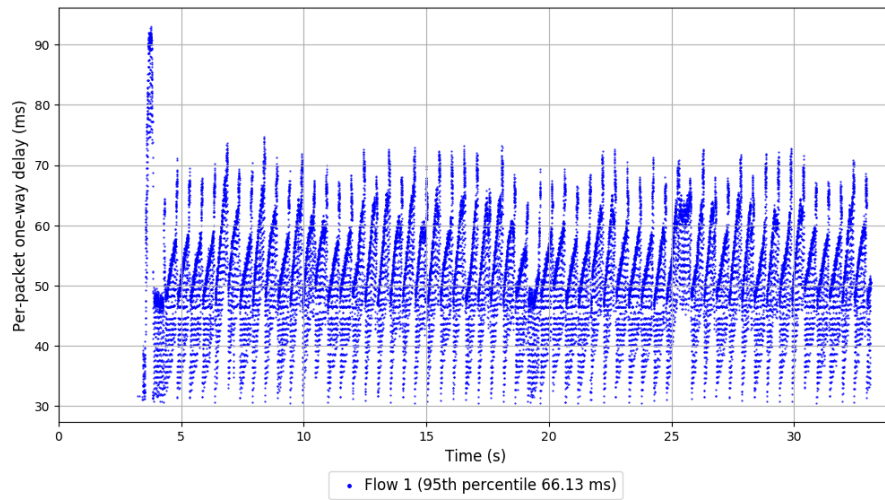
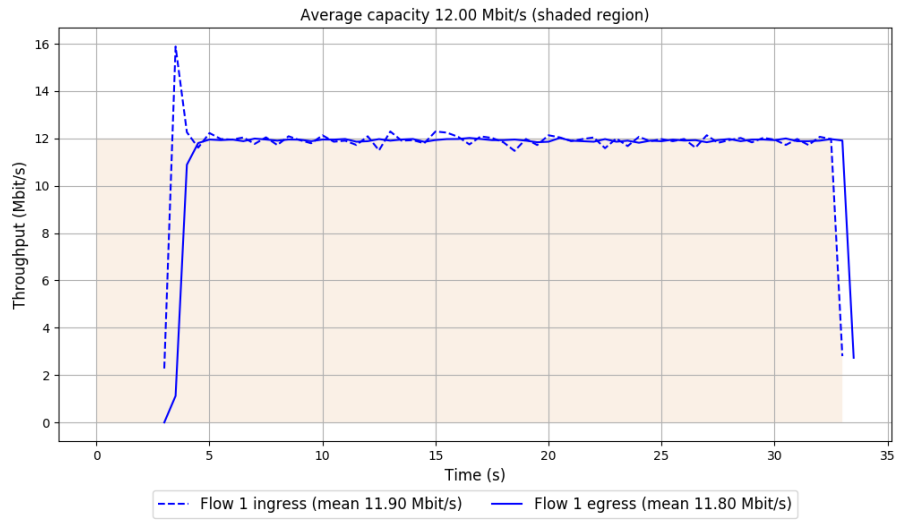
-- Flow 1:

Average throughput: 11.80 Mbit/s

95th percentile per-packet one-way delay: 66.131 ms

Loss rate: 0.92%

# Run 1: Report of FillP — Data Link



Run 2: Statistics of FillP

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

End at: 2019-01-17 09:53:54

# Below is generated by plot.py at 2019-01-17 10:15:23

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.66 Mbit/s (97.2% utilization)

95th percentile per-packet one-way delay: 59.974 ms

Loss rate: 0.82%

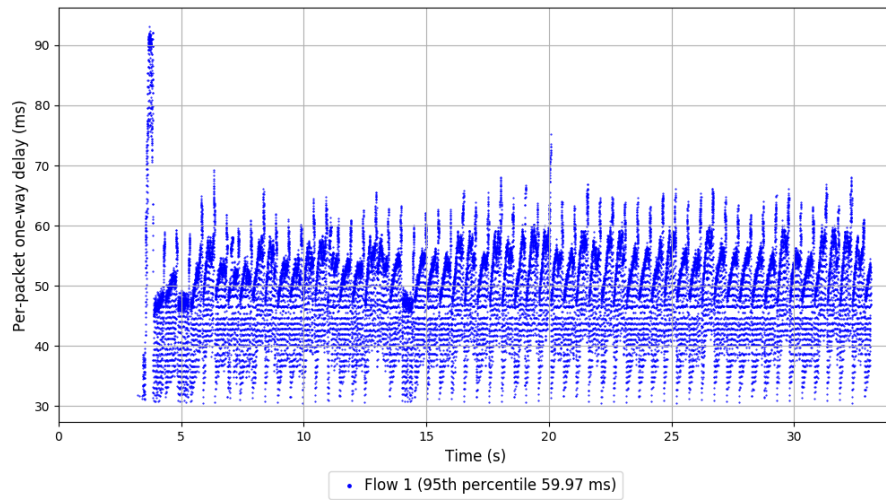
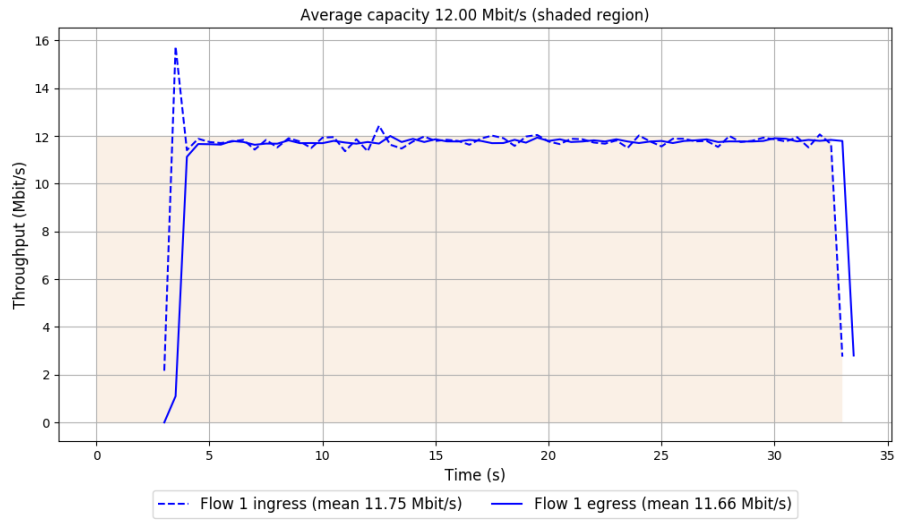
-- Flow 1:

Average throughput: 11.66 Mbit/s

95th percentile per-packet one-way delay: 59.974 ms

Loss rate: 0.82%

## Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

Start at: 2019-01-17 10:05:51

End at: 2019-01-17 10:06:21

# Below is generated by plot.py at 2019-01-17 10:15:23

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.68 Mbit/s (97.3% utilization)

95th percentile per-packet one-way delay: 61.638 ms

Loss rate: 0.83%

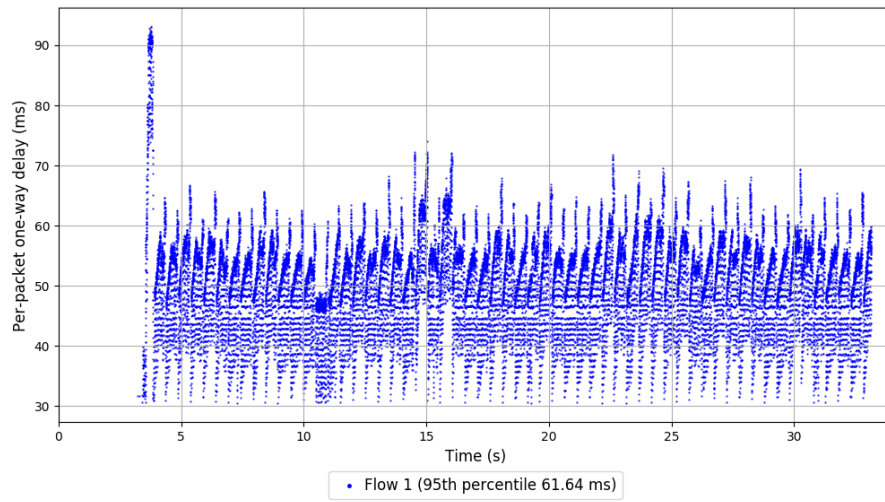
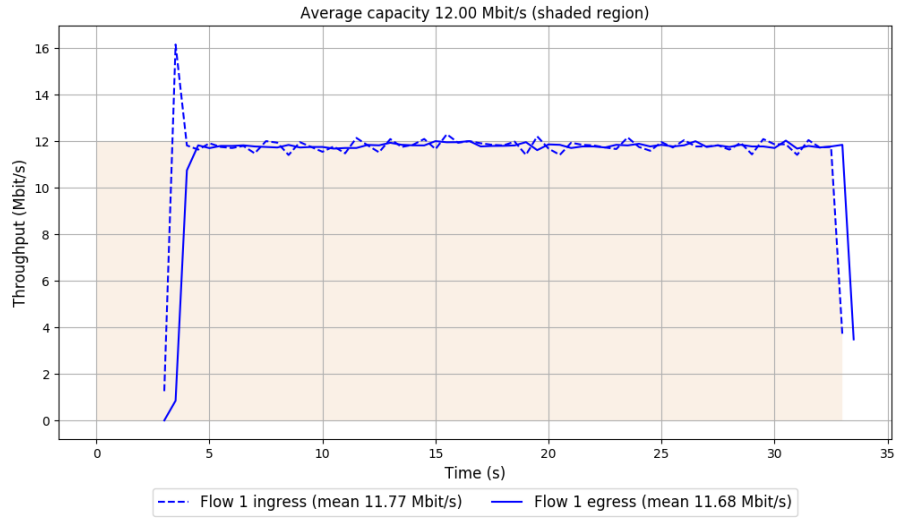
-- Flow 1:

Average throughput: 11.68 Mbit/s

95th percentile per-packet one-way delay: 61.638 ms

Loss rate: 0.83%

### Run 3: Report of FillP — Data Link



Run 1: Statistics of FillP-Sheep

Start at: 2019-01-17 09:44:30

End at: 2019-01-17 09:45:00

# Below is generated by plot.py at 2019-01-17 10:15:23

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.51 Mbit/s (87.6% utilization)

95th percentile per-packet one-way delay: 52.023 ms

Loss rate: 0.78%

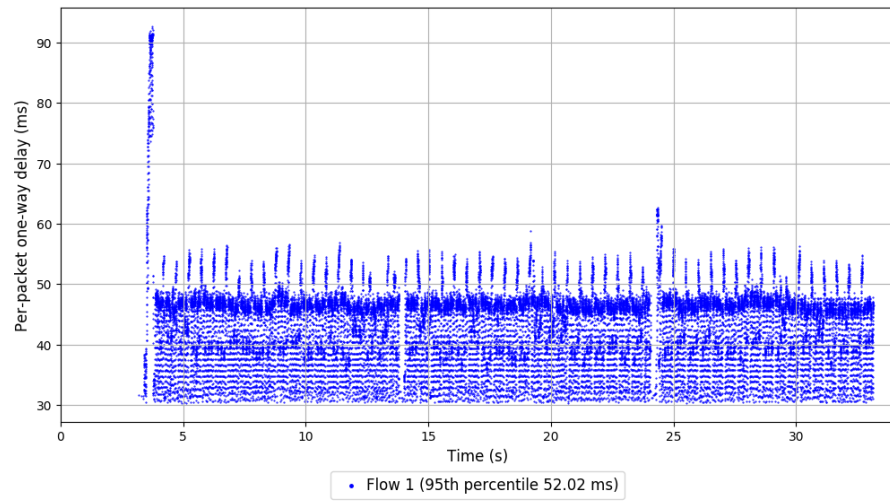
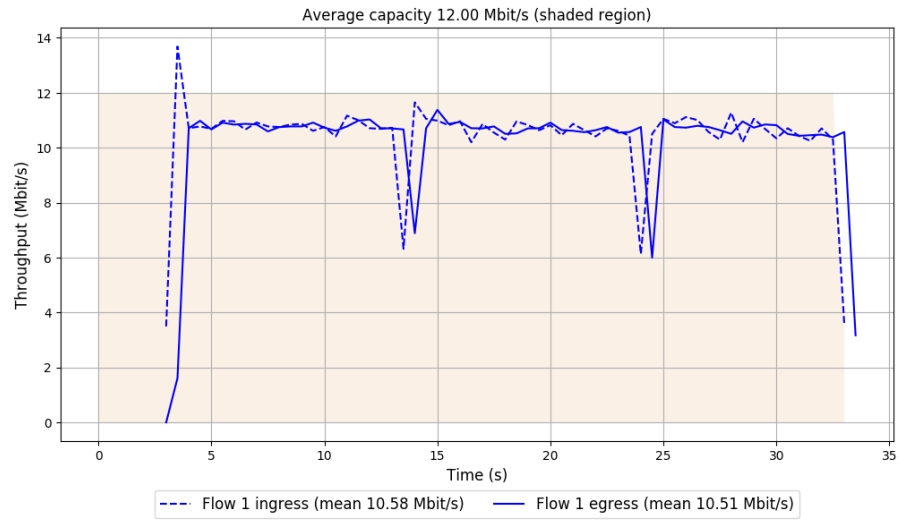
-- Flow 1:

Average throughput: 10.51 Mbit/s

95th percentile per-packet one-way delay: 52.023 ms

Loss rate: 0.78%

# Run 1: Report of FillP-Sheep — Data Link



Run 2: Statistics of FillP-Sheep

Start at: 2019-01-17 09:56:58

End at: 2019-01-17 09:57:28

# Below is generated by plot.py at 2019-01-17 10:15:33

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.51 Mbit/s (87.6% utilization)

95th percentile per-packet one-way delay: 51.925 ms

Loss rate: 0.73%

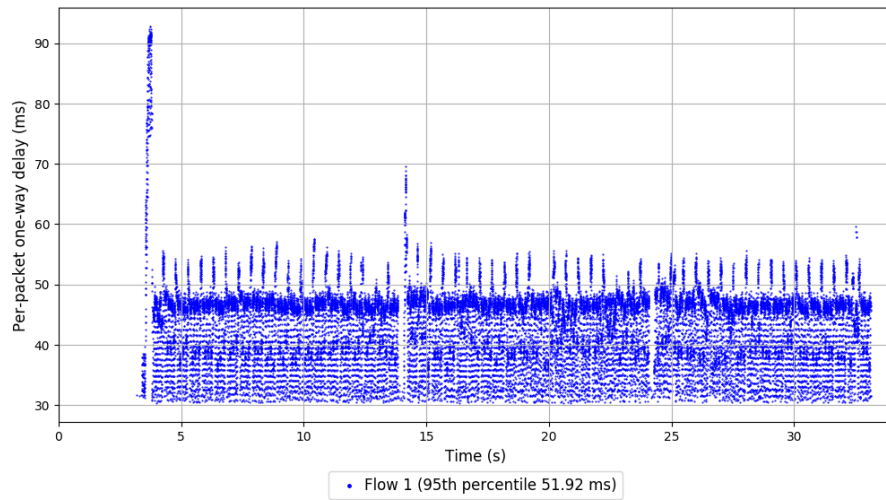
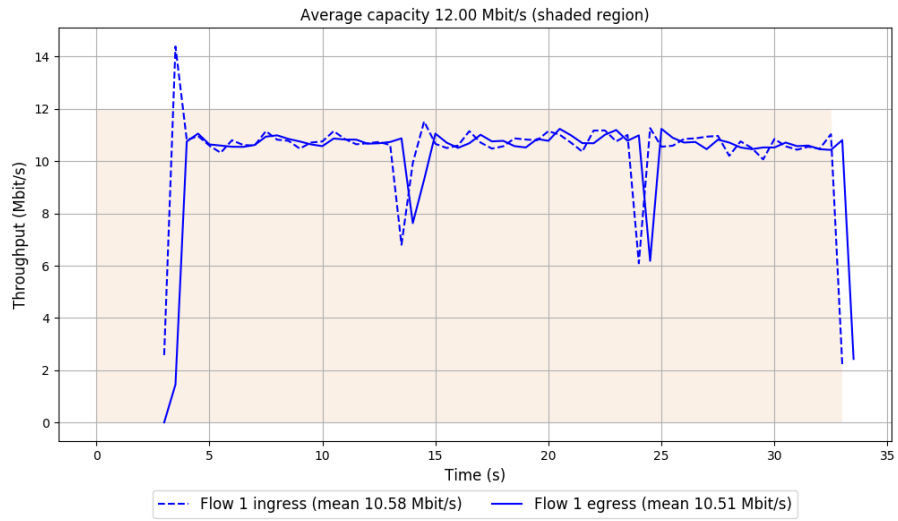
-- Flow 1:

Average throughput: 10.51 Mbit/s

95th percentile per-packet one-way delay: 51.925 ms

Loss rate: 0.73%

## Run 2: Report of FillP-Sheep — Data Link



Run 3: Statistics of FillP-Sheep

Start at: 2019-01-17 10:09:26

End at: 2019-01-17 10:09:56

# Below is generated by plot.py at 2019-01-17 10:15:34

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.43 Mbit/s (86.9% utilization)

95th percentile per-packet one-way delay: 52.239 ms

Loss rate: 0.77%

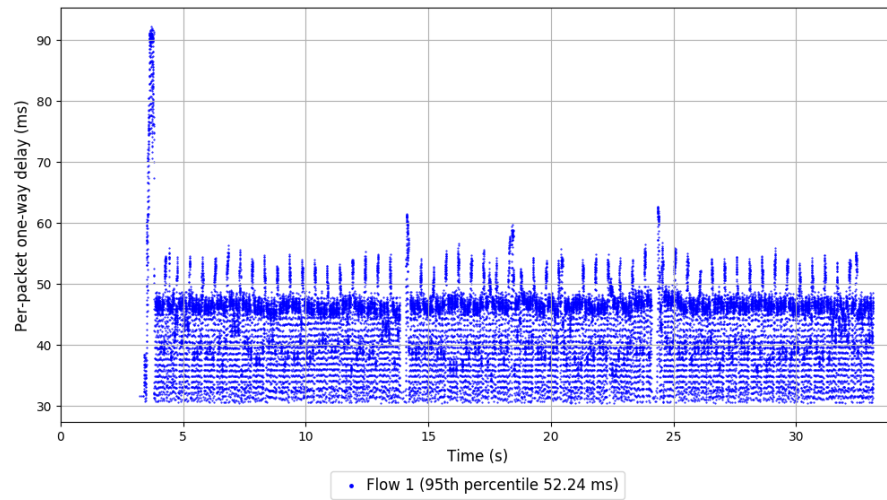
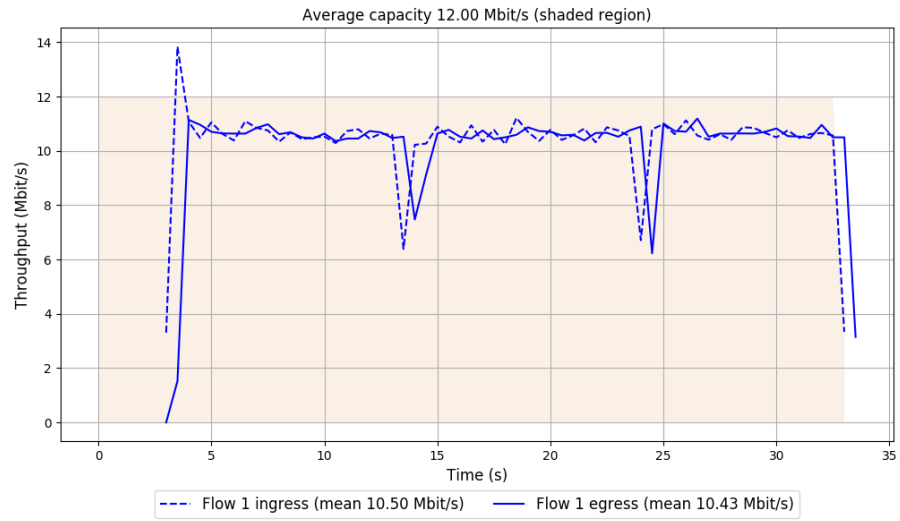
-- Flow 1:

Average throughput: 10.43 Mbit/s

95th percentile per-packet one-way delay: 52.239 ms

Loss rate: 0.77%

### Run 3: Report of FillP-Sheep — Data Link



Run 1: Statistics of Indigo

Start at: 2019-01-17 09:43:18

End at: 2019-01-17 09:43:49

# Below is generated by plot.py at 2019-01-17 10:15:34

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.74 Mbit/s (97.8% utilization)

95th percentile per-packet one-way delay: 42.019 ms

Loss rate: 0.13%

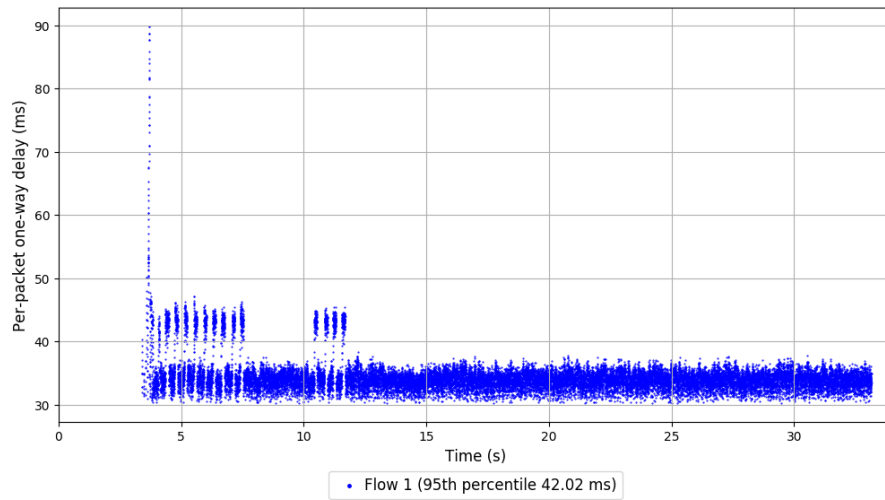
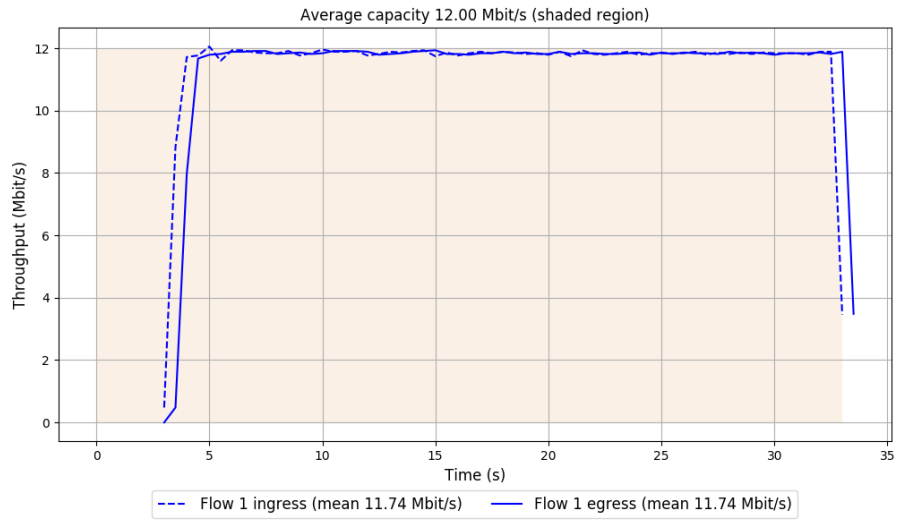
-- Flow 1:

Average throughput: 11.74 Mbit/s

95th percentile per-packet one-way delay: 42.019 ms

Loss rate: 0.13%

# Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2019-01-17 09:55:47

End at: 2019-01-17 09:56:17

# Below is generated by plot.py at 2019-01-17 10:15:45

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.65 Mbit/s (97.1% utilization)

95th percentile per-packet one-way delay: 36.048 ms

Loss rate: 0.13%

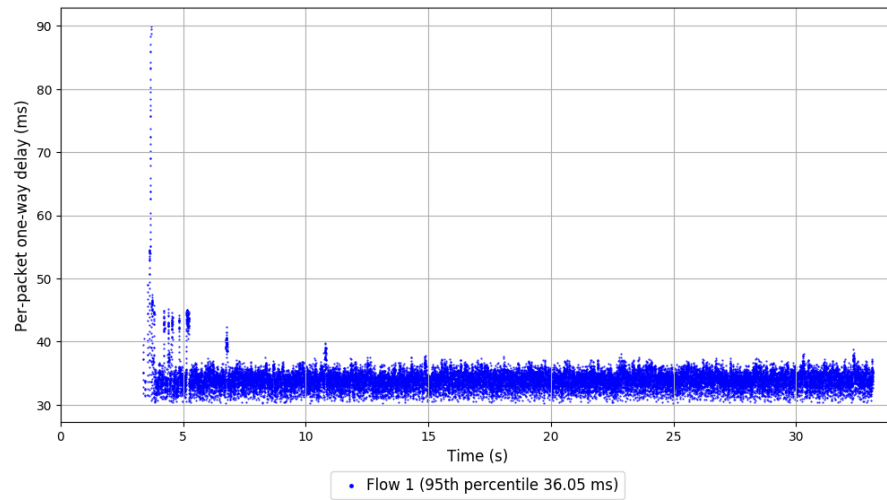
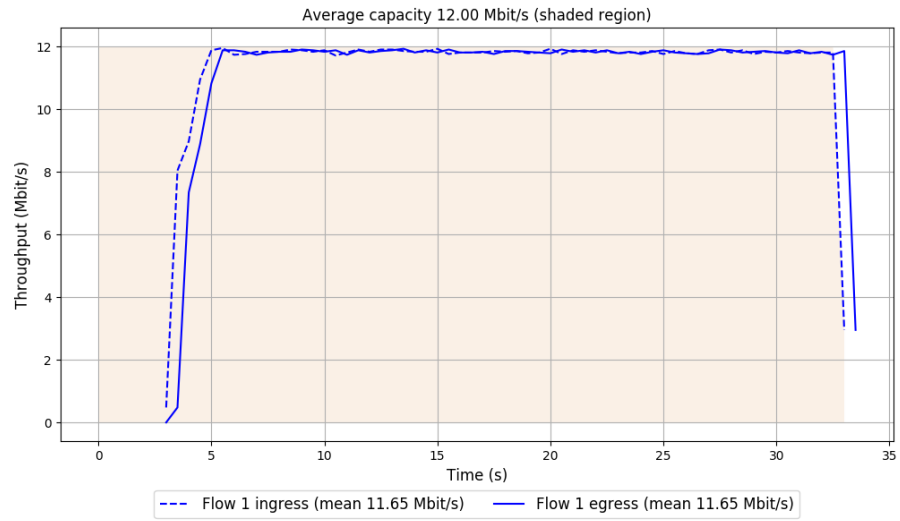
-- Flow 1:

Average throughput: 11.65 Mbit/s

95th percentile per-packet one-way delay: 36.048 ms

Loss rate: 0.13%

## Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2019-01-17 10:08:15

End at: 2019-01-17 10:08:45

# Below is generated by plot.py at 2019-01-17 10:15:47

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.72 Mbit/s (97.7% utilization)

95th percentile per-packet one-way delay: 40.676 ms

Loss rate: 0.12%

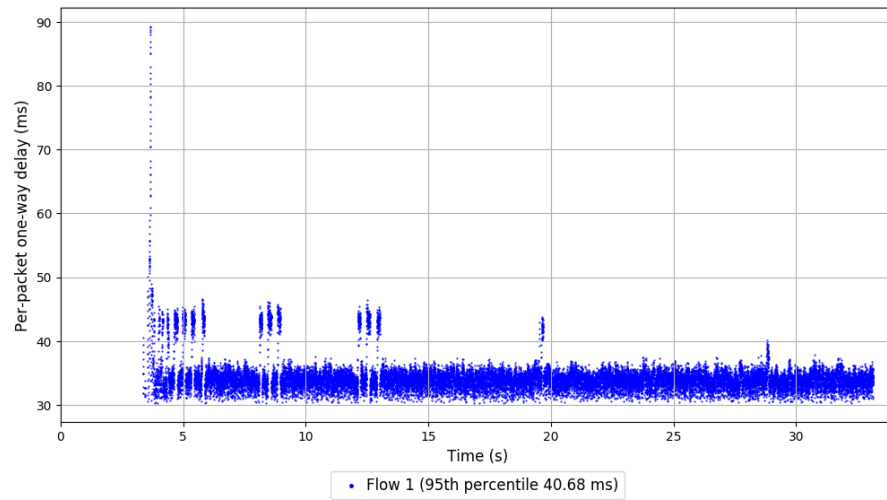
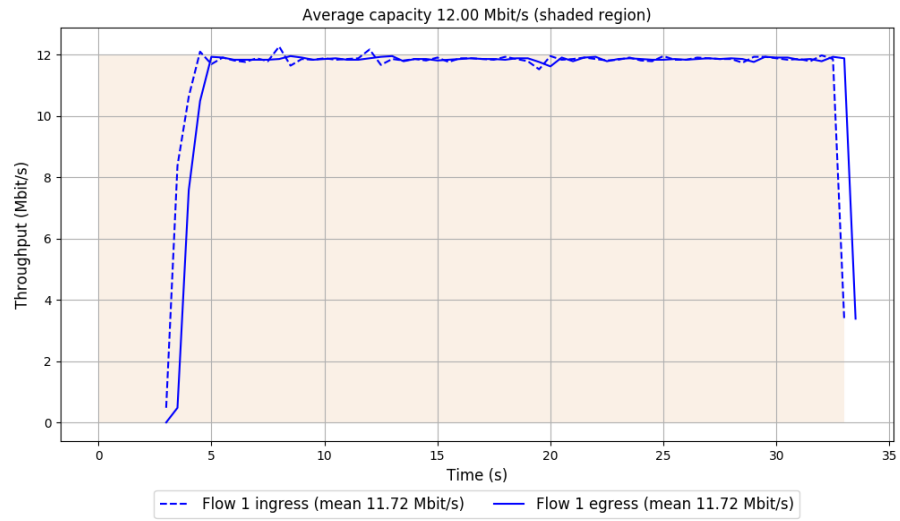
-- Flow 1:

Average throughput: 11.72 Mbit/s

95th percentile per-packet one-way delay: 40.676 ms

Loss rate: 0.12%

### Run 3: Report of Indigo — Data Link



Run 1: Statistics of Indigo-MusesC3

Start at: 2019-01-17 09:40:20

End at: 2019-01-17 09:40:50

# Below is generated by plot.py at 2019-01-17 10:15:50

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.54 Mbit/s (96.1% utilization)

95th percentile per-packet one-way delay: 40.571 ms

Loss rate: 0.12%

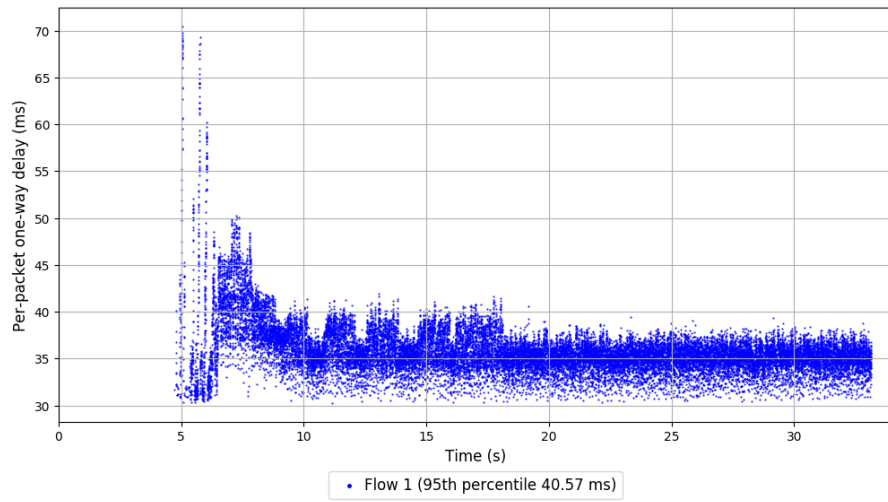
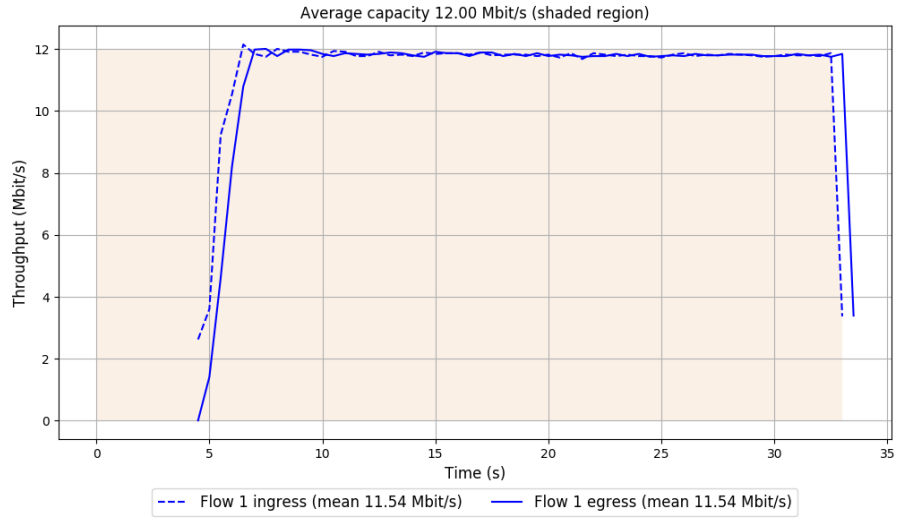
-- Flow 1:

Average throughput: 11.54 Mbit/s

95th percentile per-packet one-way delay: 40.571 ms

Loss rate: 0.12%

# Run 1: Report of Indigo-MusesC3 — Data Link



Run 2: Statistics of Indigo-MusesC3

Start at: 2019-01-17 09:52:48

End at: 2019-01-17 09:53:18

# Below is generated by plot.py at 2019-01-17 10:15:50

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.58 Mbit/s (96.5% utilization)

95th percentile per-packet one-way delay: 41.340 ms

Loss rate: 0.12%

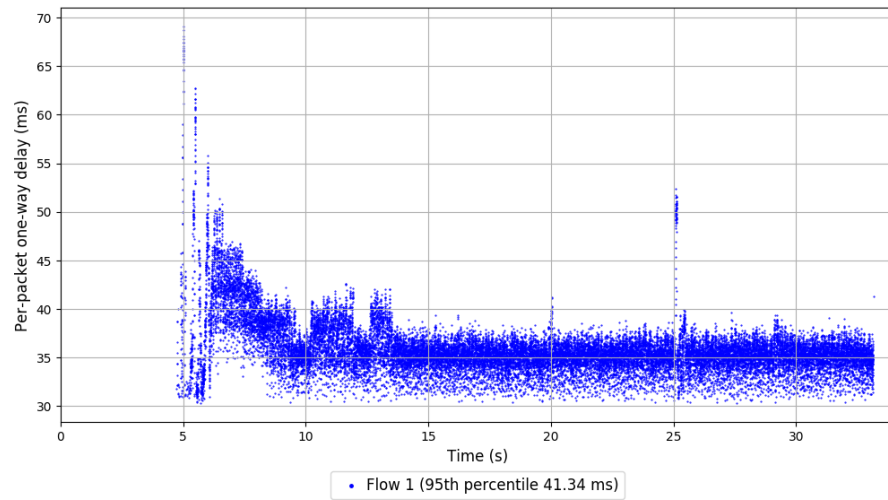
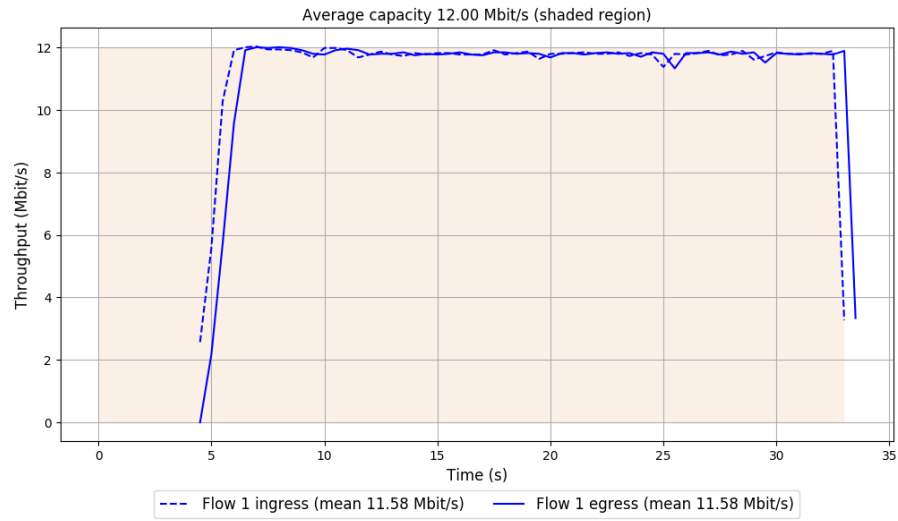
-- Flow 1:

Average throughput: 11.58 Mbit/s

95th percentile per-packet one-way delay: 41.340 ms

Loss rate: 0.12%

## Run 2: Report of Indigo-MusesC3 — Data Link



Run 3: Statistics of Indigo-MusesC3

Start at: 2019-01-17 10:05:16

End at: 2019-01-17 10:05:46

# Below is generated by plot.py at 2019-01-17 10:15:51

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.55 Mbit/s (96.2% utilization)

95th percentile per-packet one-way delay: 40.417 ms

Loss rate: 0.14%

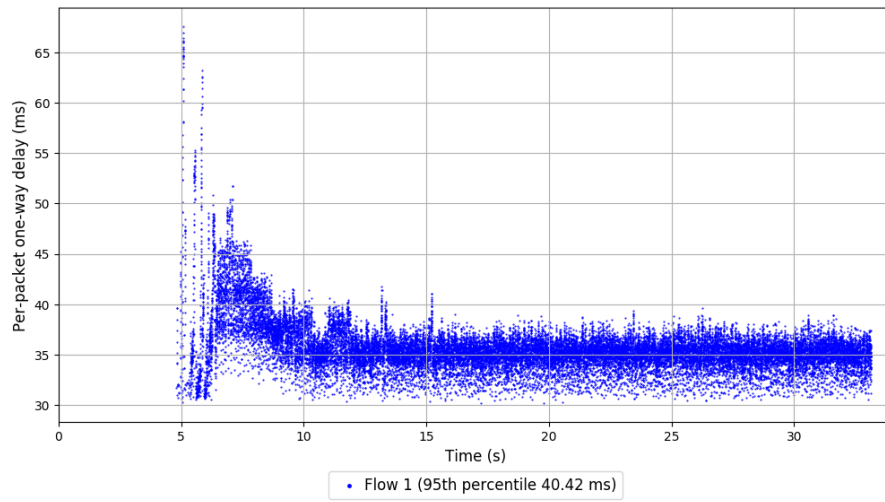
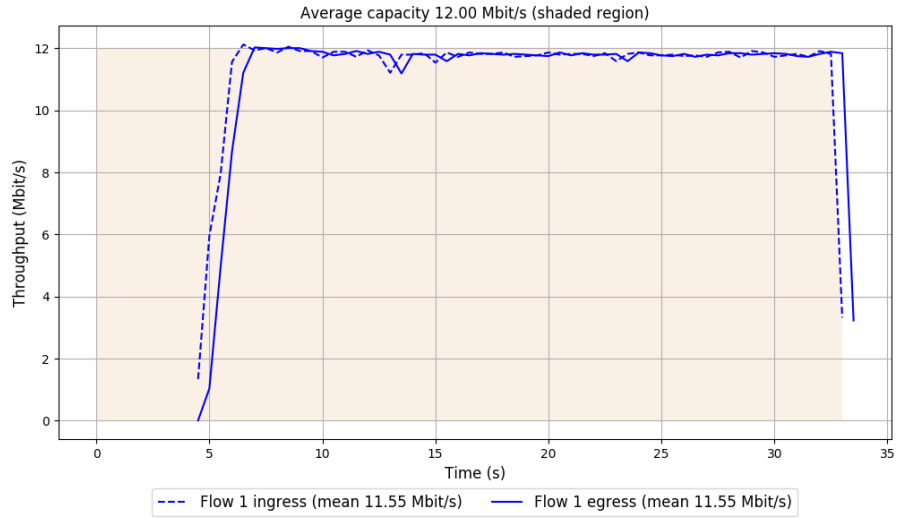
-- Flow 1:

Average throughput: 11.55 Mbit/s

95th percentile per-packet one-way delay: 40.417 ms

Loss rate: 0.14%

### Run 3: Report of Indigo-MusesC3 — Data Link



Run 1: Statistics of Indigo-MusesC5

Start at: 2019-01-17 09:48:03

End at: 2019-01-17 09:48:33

# Below is generated by plot.py at 2019-01-17 10:16:00

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.53 Mbit/s (96.0% utilization)

95th percentile per-packet one-way delay: 85.011 ms

Loss rate: 2.83%

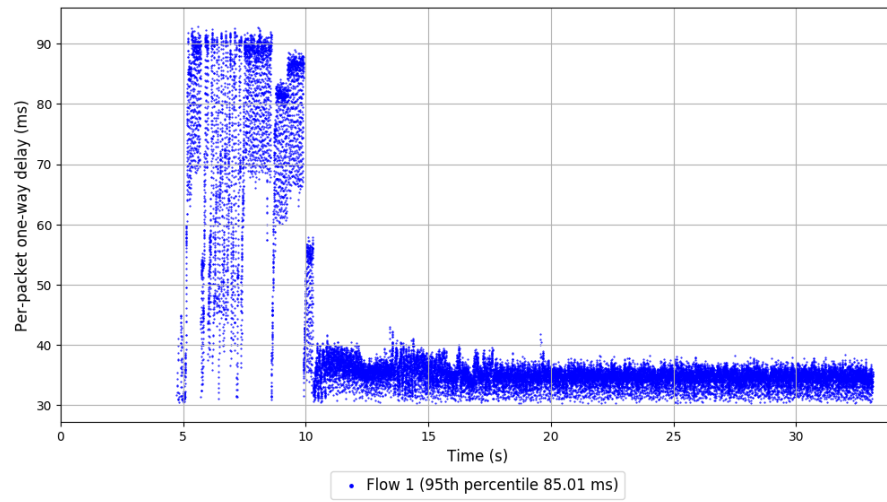
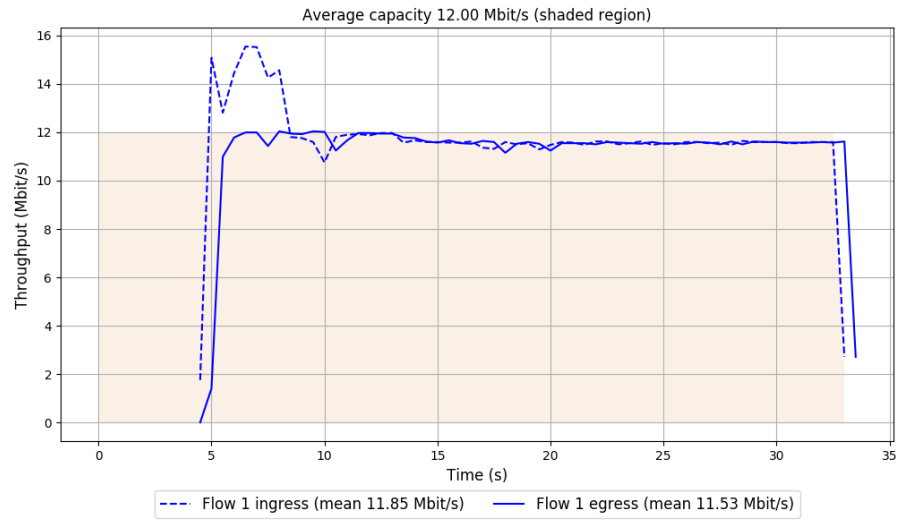
-- Flow 1:

Average throughput: 11.53 Mbit/s

95th percentile per-packet one-way delay: 85.011 ms

Loss rate: 2.83%

# Run 1: Report of Indigo-MusesC5 — Data Link



Run 2: Statistics of Indigo-MusesC5

Start at: 2019-01-17 10:00:31

End at: 2019-01-17 10:01:01

# Below is generated by plot.py at 2019-01-17 10:16:00

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.58 Mbit/s (88.1% utilization)

95th percentile per-packet one-way delay: 89.545 ms

Loss rate: 5.89%

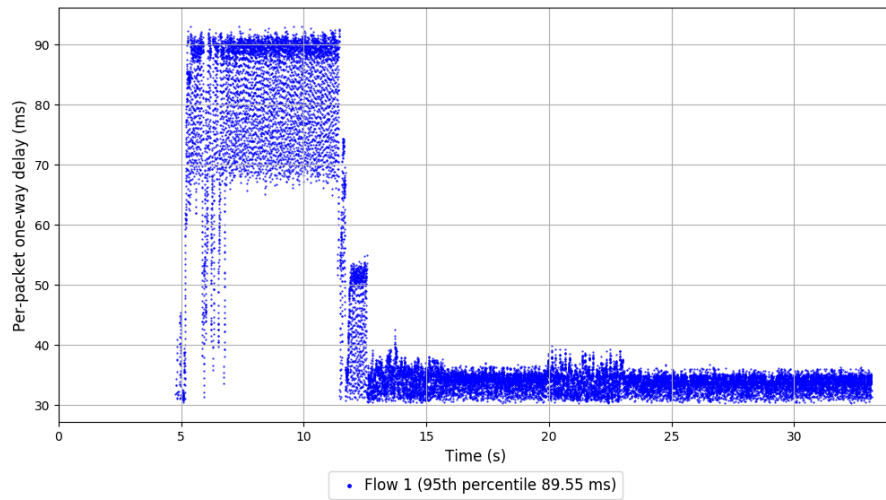
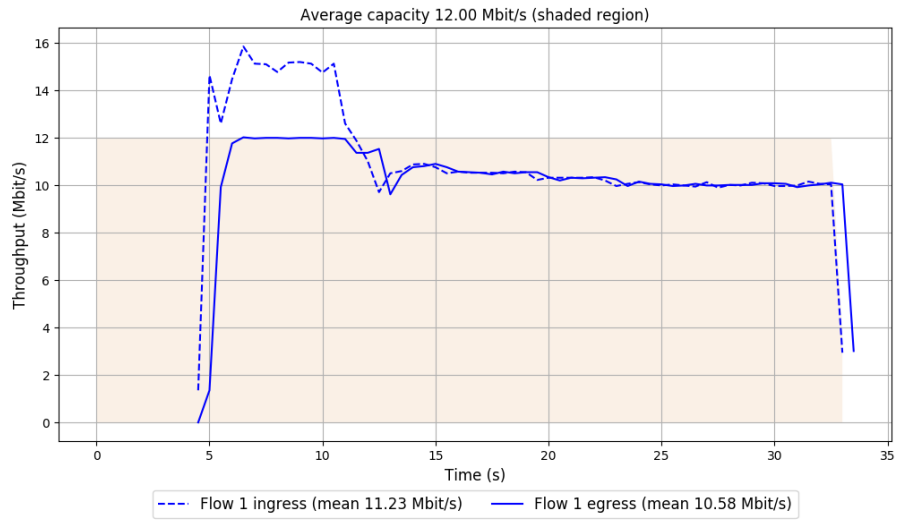
-- Flow 1:

Average throughput: 10.58 Mbit/s

95th percentile per-packet one-way delay: 89.545 ms

Loss rate: 5.89%

## Run 2: Report of Indigo-MusesC5 — Data Link



Run 3: Statistics of Indigo-MusesC5

Start at: 2019-01-17 10:12:59

End at: 2019-01-17 10:13:29

# Below is generated by plot.py at 2019-01-17 10:16:02

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.87 Mbit/s (90.6% utilization)

95th percentile per-packet one-way delay: 89.278 ms

Loss rate: 5.28%

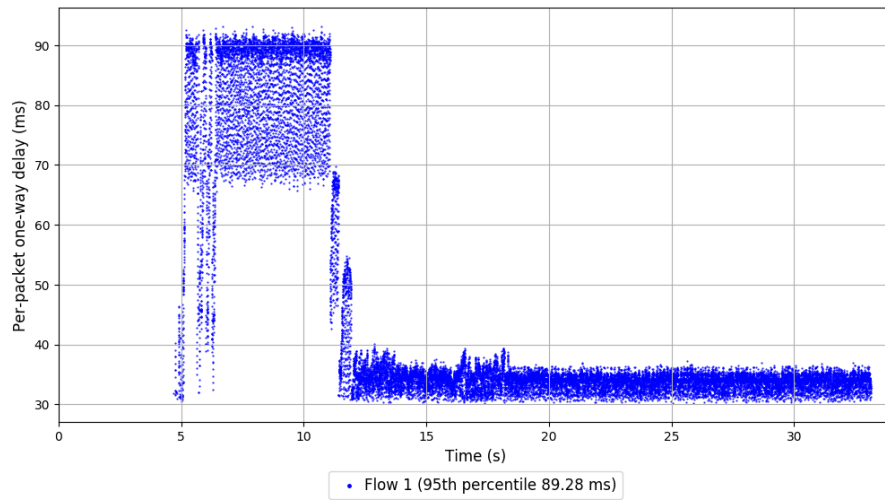
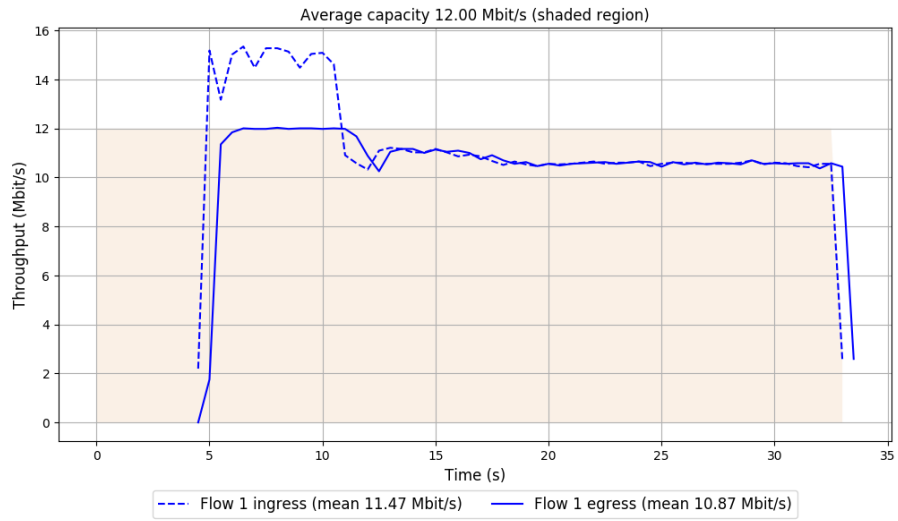
-- Flow 1:

Average throughput: 10.87 Mbit/s

95th percentile per-packet one-way delay: 89.278 ms

Loss rate: 5.28%

### Run 3: Report of Indigo-MusesC5 — Data Link



Run 1: Statistics of Indigo-MusesD

Start at: 2019-01-17 09:46:52

End at: 2019-01-17 09:47:22

# Below is generated by plot.py at 2019-01-17 10:16:02

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 4.73 Mbit/s (39.4% utilization)

95th percentile per-packet one-way delay: 36.088 ms

Loss rate: 0.02%

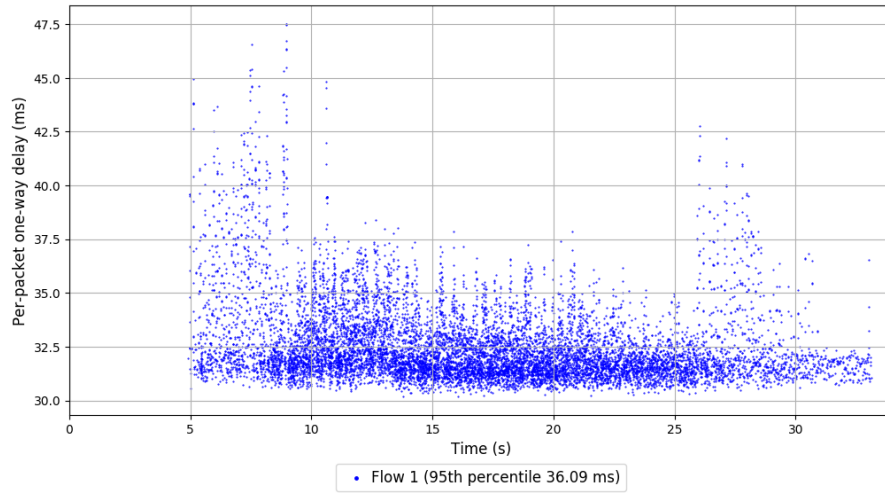
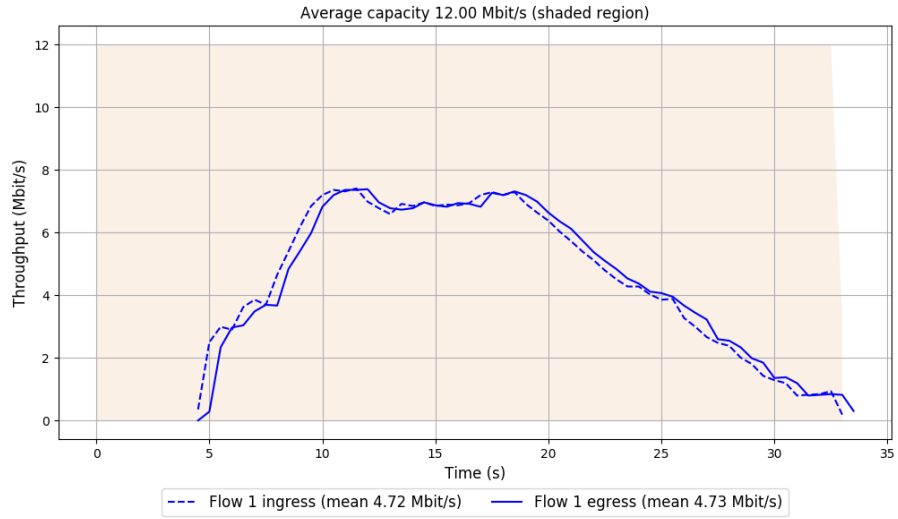
-- Flow 1:

Average throughput: 4.73 Mbit/s

95th percentile per-packet one-way delay: 36.088 ms

Loss rate: 0.02%

# Run 1: Report of Indigo-MusesD — Data Link



Run 2: Statistics of Indigo-MusesD

Start at: 2019-01-17 09:59:20

End at: 2019-01-17 09:59:50

# Below is generated by plot.py at 2019-01-17 10:16:03

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 4.24 Mbit/s (35.4% utilization)

95th percentile per-packet one-way delay: 40.151 ms

Loss rate: 0.05%

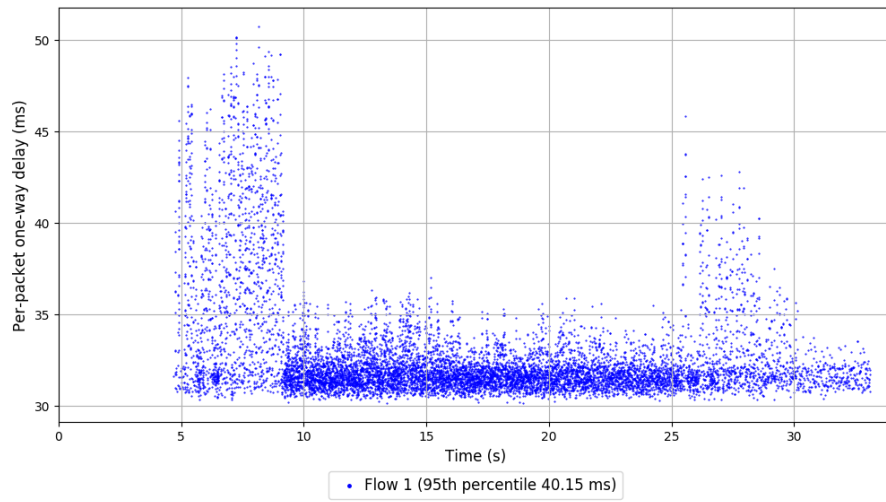
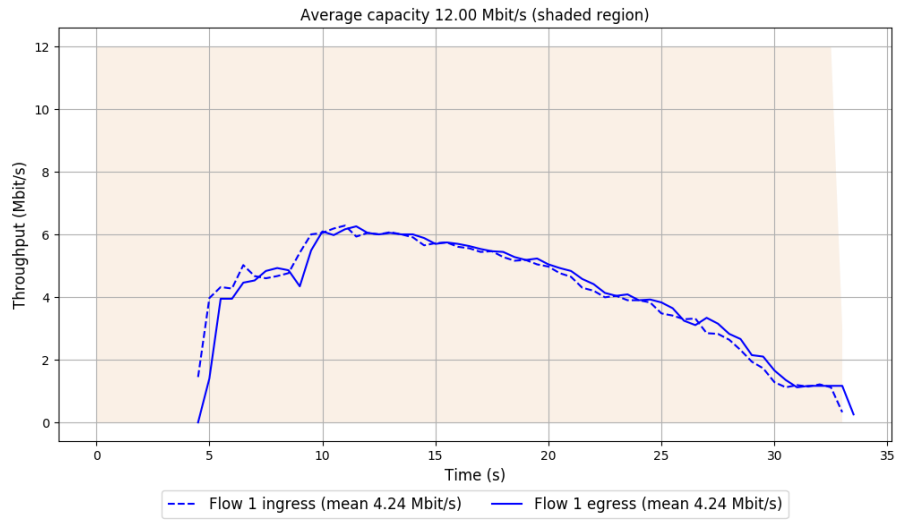
-- Flow 1:

Average throughput: 4.24 Mbit/s

95th percentile per-packet one-way delay: 40.151 ms

Loss rate: 0.05%

## Run 2: Report of Indigo-MusesD — Data Link



Run 3: Statistics of Indigo-MusesD

Start at: 2019-01-17 10:11:48

End at: 2019-01-17 10:12:18

# Below is generated by plot.py at 2019-01-17 10:16:07

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 4.88 Mbit/s (40.6% utilization)

95th percentile per-packet one-way delay: 36.421 ms

Loss rate: 0.02%

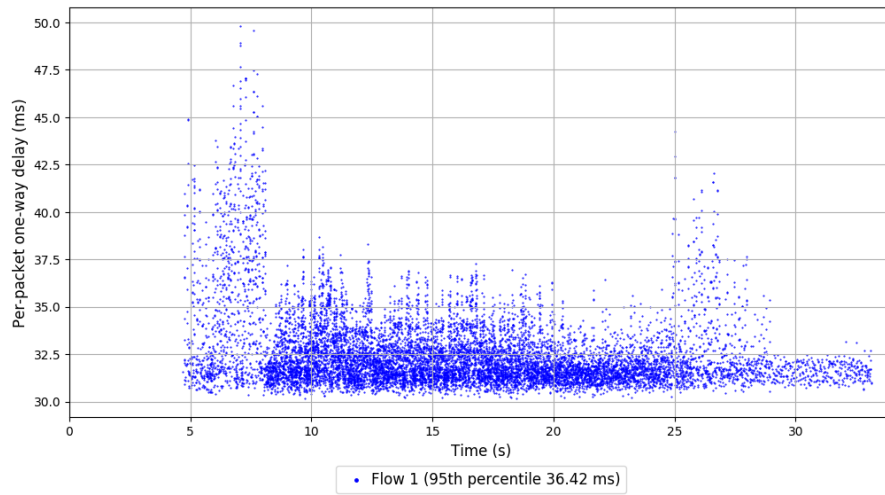
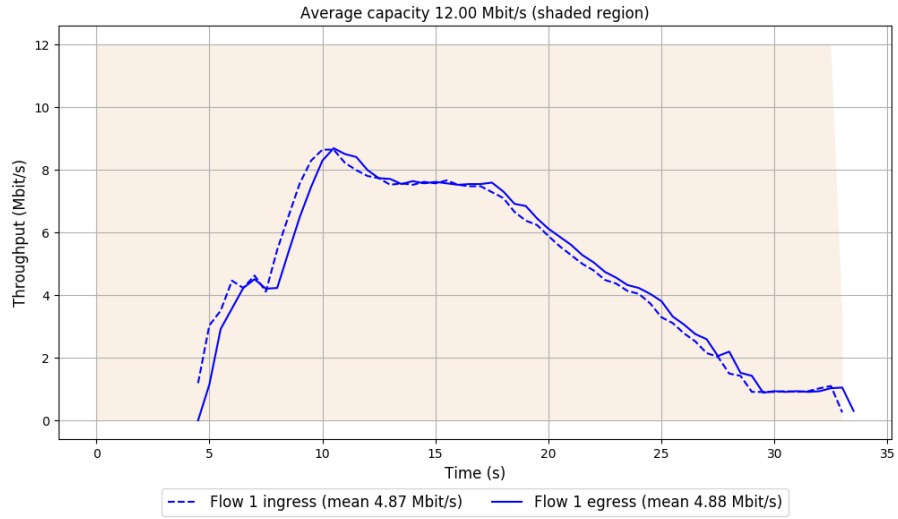
-- Flow 1:

Average throughput: 4.88 Mbit/s

95th percentile per-packet one-way delay: 36.421 ms

Loss rate: 0.02%

### Run 3: Report of Indigo-MusesD — Data Link



Run 1: Statistics of Indigo-MuseST

Start at: 2019-01-17 09:47:27

End at: 2019-01-17 09:47:57

# Below is generated by plot.py at 2019-01-17 10:16:16

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.86 Mbit/s (98.8% utilization)

95th percentile per-packet one-way delay: 48.013 ms

Loss rate: 0.15%

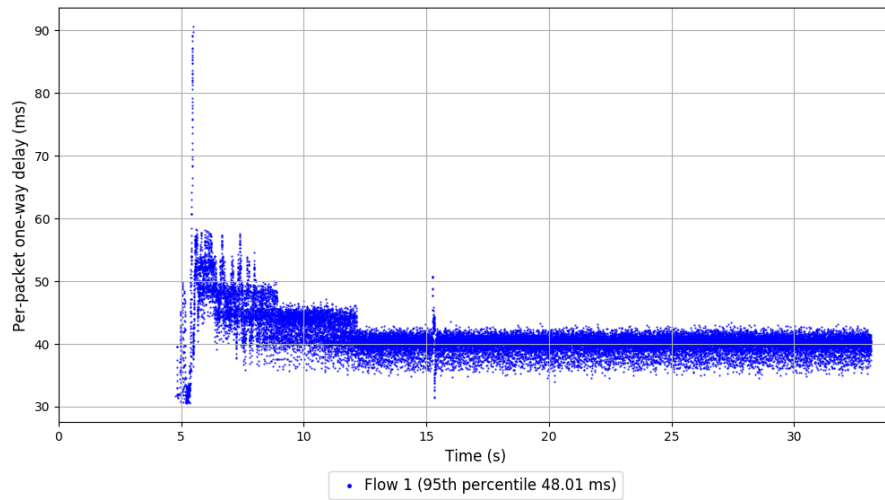
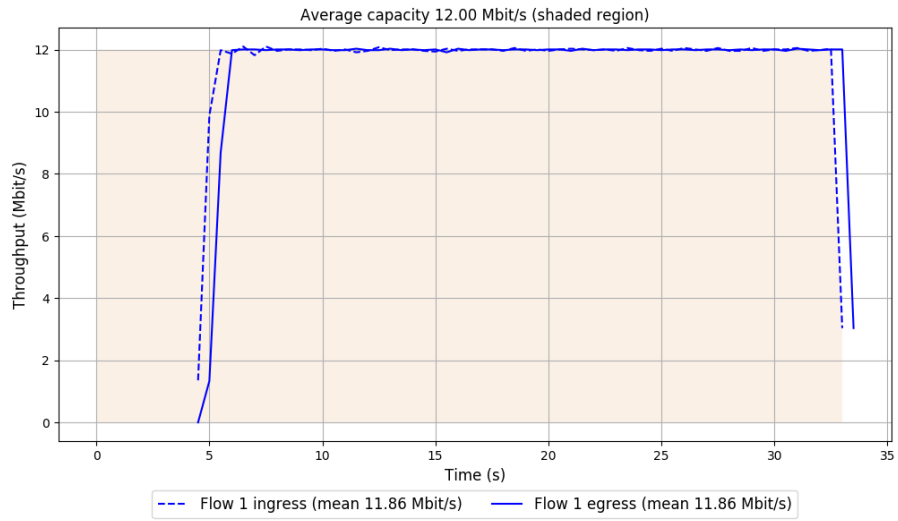
-- Flow 1:

Average throughput: 11.86 Mbit/s

95th percentile per-packet one-way delay: 48.013 ms

Loss rate: 0.15%

# Run 1: Report of Indigo-MusesT — Data Link



Run 2: Statistics of Indigo-MuseST

Start at: 2019-01-17 09:59:55

End at: 2019-01-17 10:00:25

# Below is generated by plot.py at 2019-01-17 10:16:16

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.90 Mbit/s (90.8% utilization)

95th percentile per-packet one-way delay: 89.420 ms

Loss rate: 8.28%

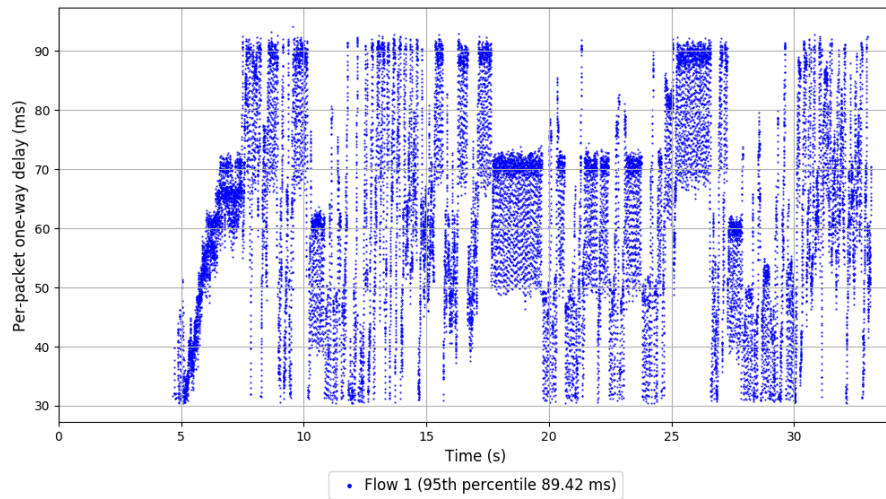
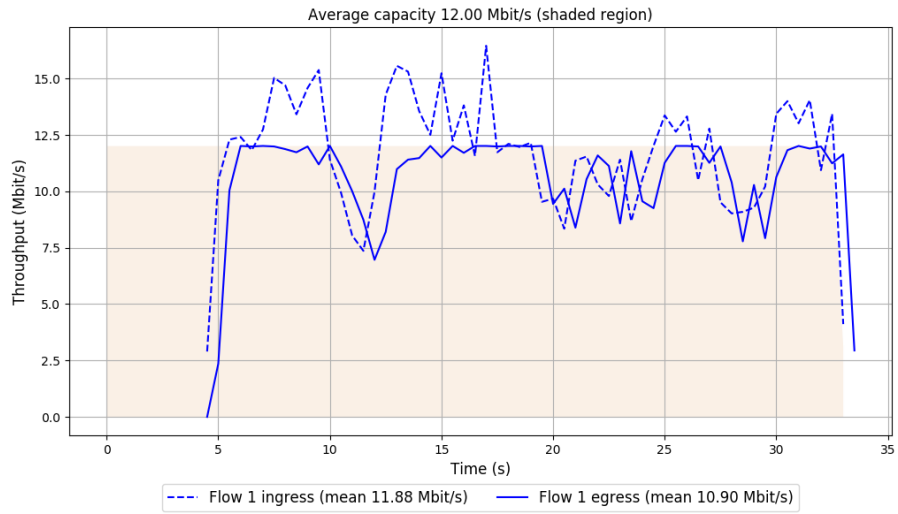
-- Flow 1:

Average throughput: 10.90 Mbit/s

95th percentile per-packet one-way delay: 89.420 ms

Loss rate: 8.28%

## Run 2: Report of Indigo-MusesT — Data Link



Run 3: Statistics of Indigo-MuseST

Start at: 2019-01-17 10:12:23

End at: 2019-01-17 10:12:53

# Below is generated by plot.py at 2019-01-17 10:16:27

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.03 Mbit/s (91.9% utilization)

95th percentile per-packet one-way delay: 89.943 ms

Loss rate: 11.76%

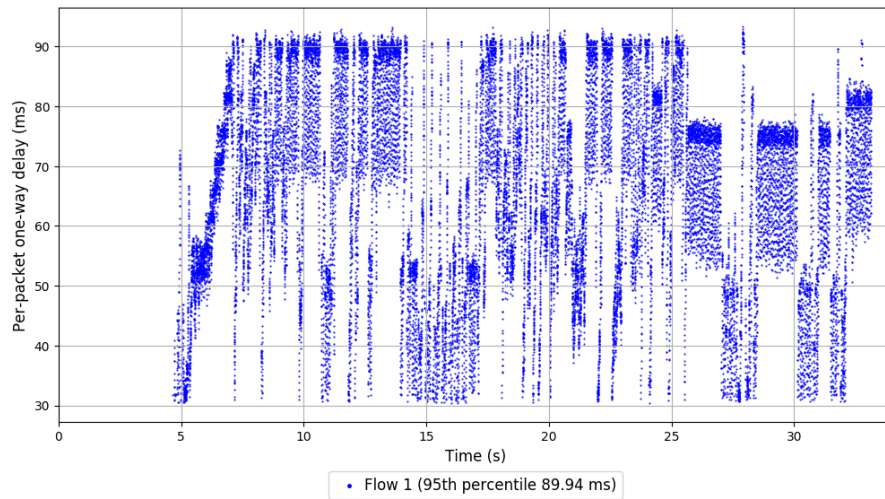
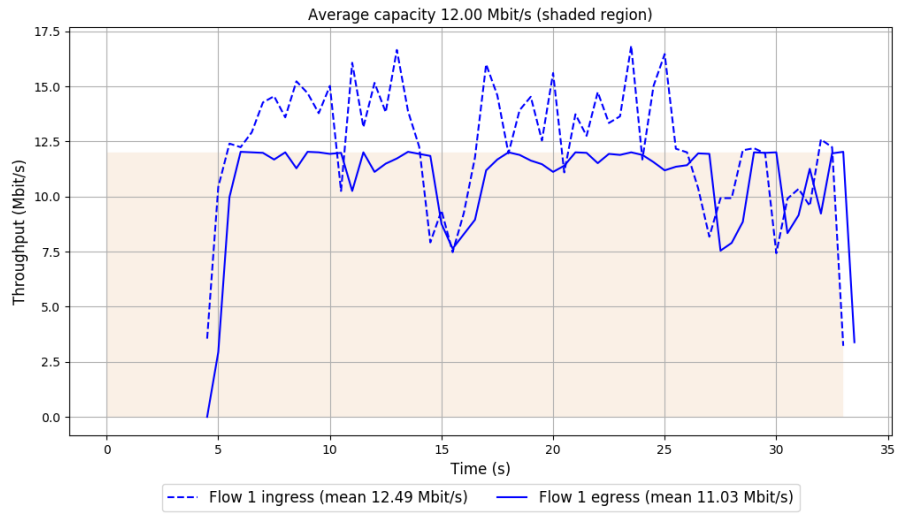
-- Flow 1:

Average throughput: 11.03 Mbit/s

95th percentile per-packet one-way delay: 89.943 ms

Loss rate: 11.76%

### Run 3: Report of Indigo-MusesT — Data Link



Run 1: Statistics of LEDBAT

Start at: 2019-01-17 09:42:43

End at: 2019-01-17 09:43:13

# Below is generated by plot.py at 2019-01-17 10:16:28

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.84 Mbit/s (90.4% utilization)

95th percentile per-packet one-way delay: 88.892 ms

Loss rate: 0.21%

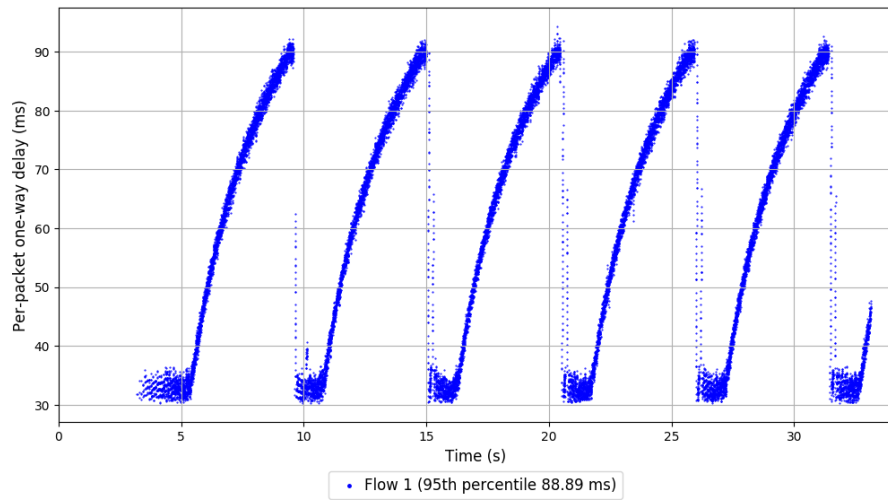
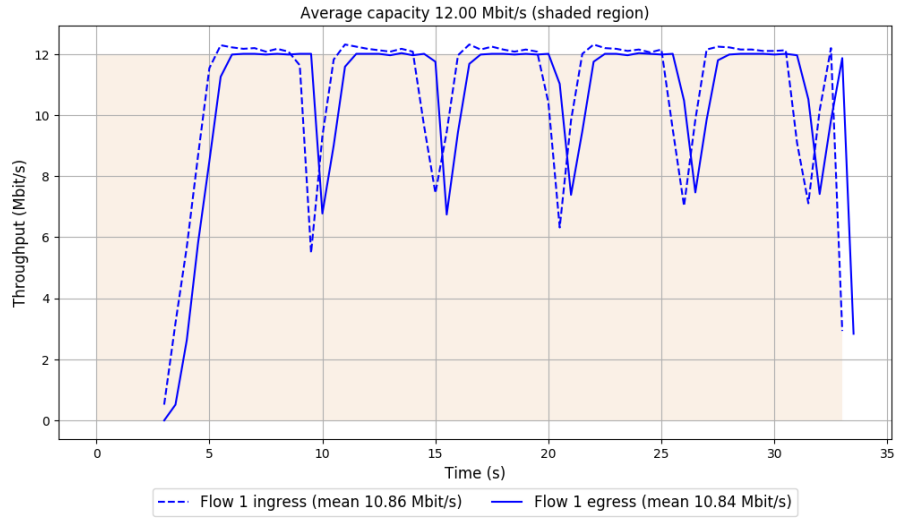
-- Flow 1:

Average throughput: 10.84 Mbit/s

95th percentile per-packet one-way delay: 88.892 ms

Loss rate: 0.21%

Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2019-01-17 09:55:11

End at: 2019-01-17 09:55:41

# Below is generated by plot.py at 2019-01-17 10:16:29

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.84 Mbit/s (90.3% utilization)

95th percentile per-packet one-way delay: 88.946 ms

Loss rate: 0.23%

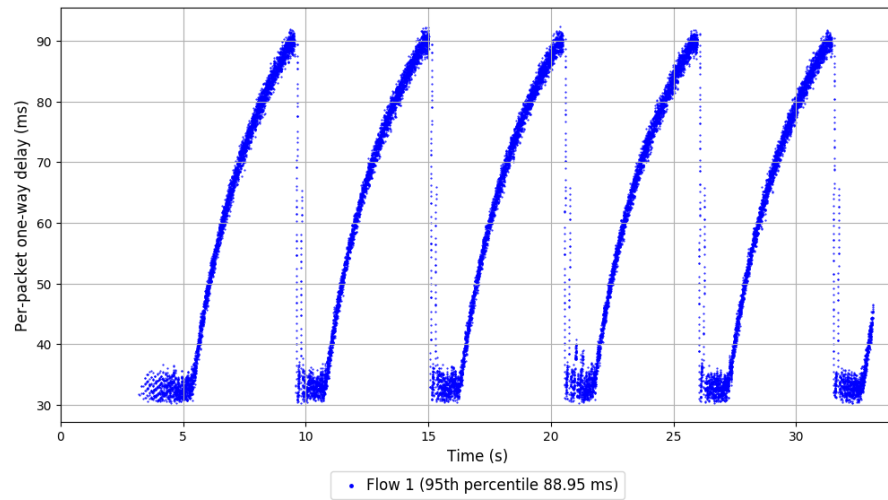
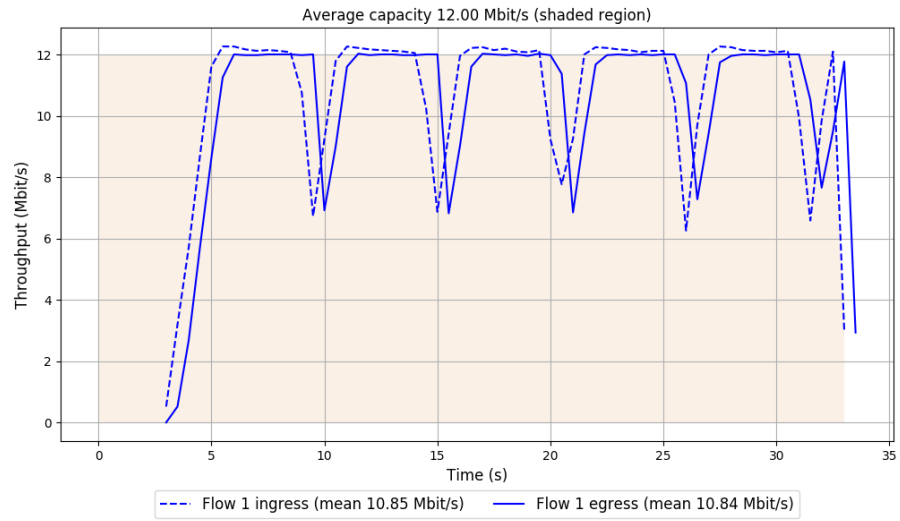
-- Flow 1:

Average throughput: 10.84 Mbit/s

95th percentile per-packet one-way delay: 88.946 ms

Loss rate: 0.23%

## Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2019-01-17 10:07:39

End at: 2019-01-17 10:08:09

# Below is generated by plot.py at 2019-01-17 10:16:30

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.83 Mbit/s (90.2% utilization)

95th percentile per-packet one-way delay: 88.750 ms

Loss rate: 0.21%

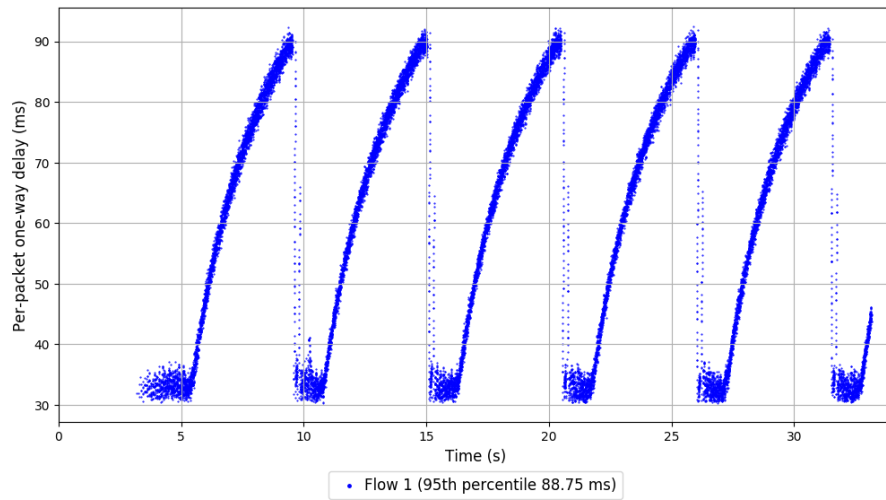
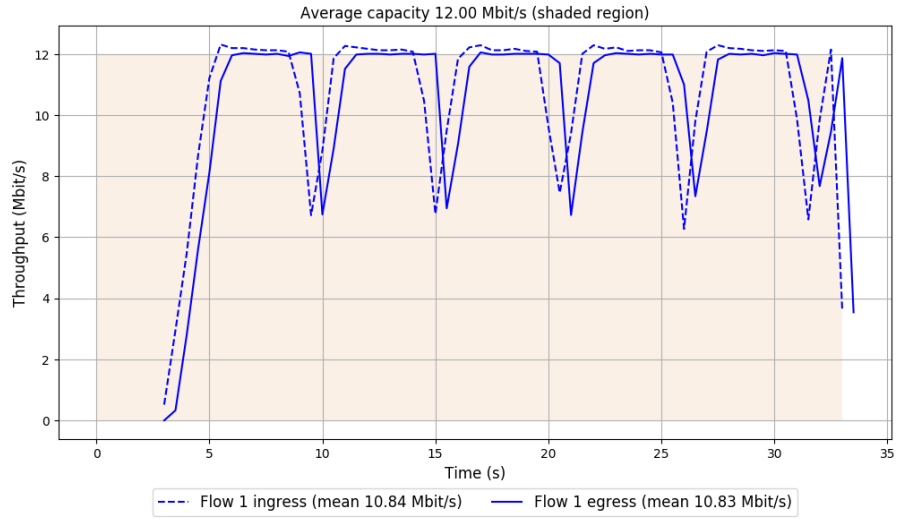
-- Flow 1:

Average throughput: 10.83 Mbit/s

95th percentile per-packet one-way delay: 88.750 ms

Loss rate: 0.21%

### Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of PCC-Allegro

Start at: 2019-01-17 09:37:22

End at: 2019-01-17 09:37:52

# Below is generated by plot.py at 2019-01-17 10:16:31

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.38 Mbit/s (86.5% utilization)

95th percentile per-packet one-way delay: 34.008 ms

Loss rate: 0.71%

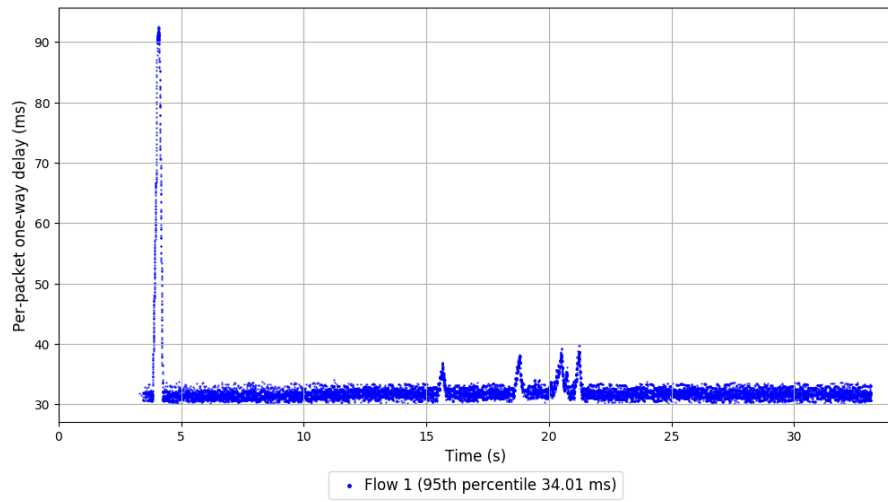
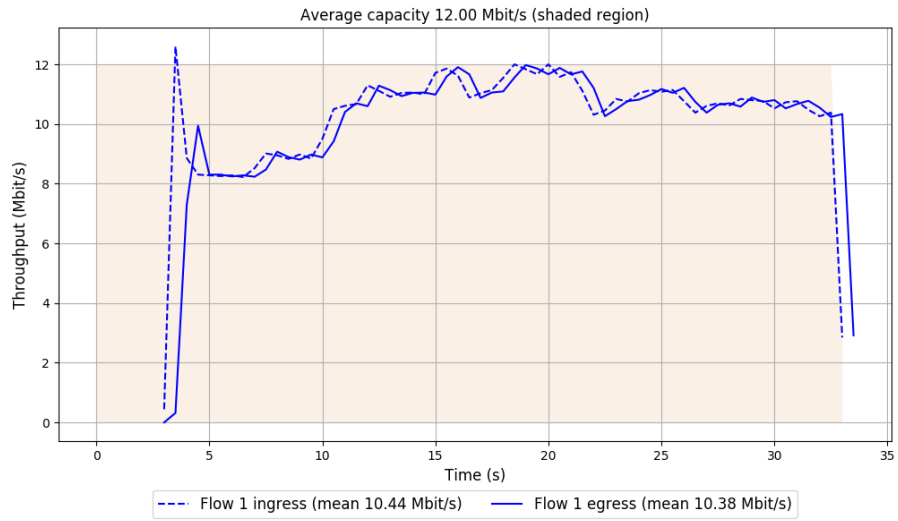
-- Flow 1:

Average throughput: 10.38 Mbit/s

95th percentile per-packet one-way delay: 34.008 ms

Loss rate: 0.71%

# Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

Start at: 2019-01-17 09:49:50

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

# Below is generated by plot.py at 2019-01-17 10:16:32

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 8.91 Mbit/s (74.2% utilization)

95th percentile per-packet one-way delay: 32.746 ms

Loss rate: 0.89%

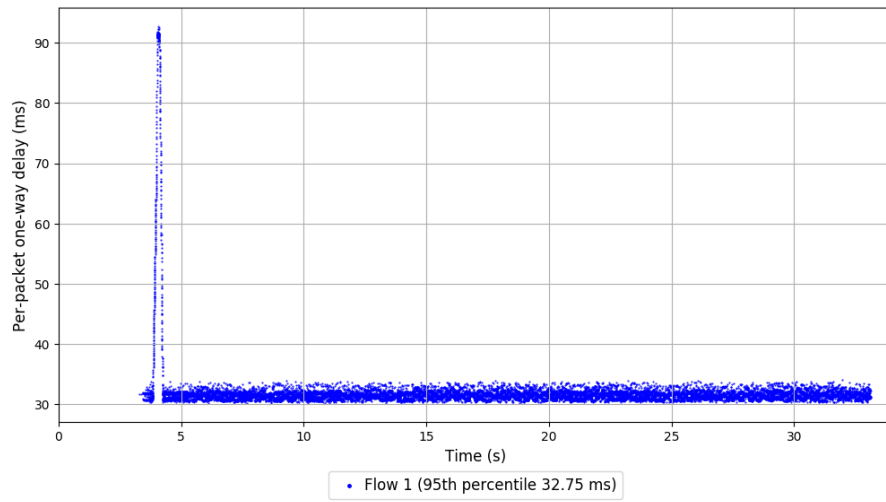
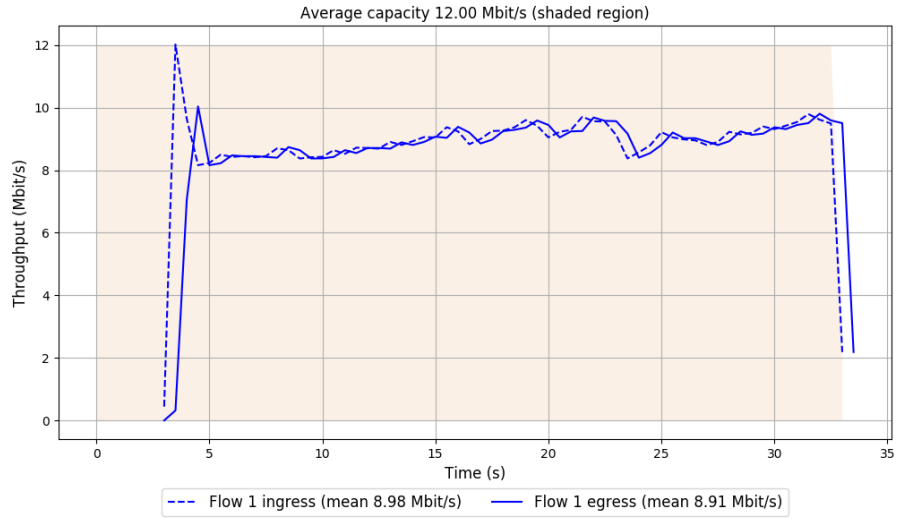
-- Flow 1:

Average throughput: 8.91 Mbit/s

95th percentile per-packet one-way delay: 32.746 ms

Loss rate: 0.89%

## Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

Start at: 2019-01-17 10:02:18

End at: 2019-01-17 10:02:48

# Below is generated by plot.py at 2019-01-17 10:16:42

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 9.85 Mbit/s (82.1% utilization)

95th percentile per-packet one-way delay: 46.996 ms

Loss rate: 1.00%

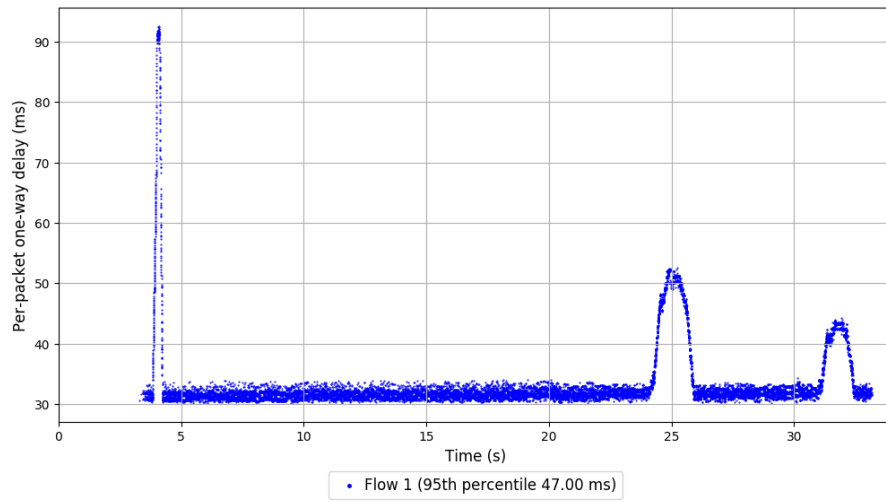
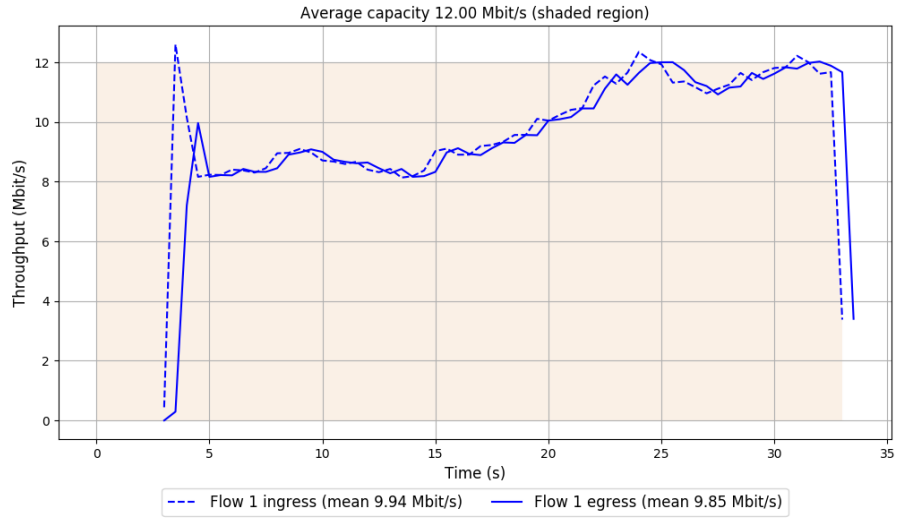
-- Flow 1:

Average throughput: 9.85 Mbit/s

95th percentile per-packet one-way delay: 46.996 ms

Loss rate: 1.00%

### Run 3: Report of PCC-Allegro — Data Link



Run 1: Statistics of PCC-Expr

Start at: 2019-01-17 09:37:57

End at: 2019-01-17 09:38:27

# Below is generated by plot.py at 2019-01-17 10:17:03

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.11 Mbit/s (92.6% utilization)

95th percentile per-packet one-way delay: 90.825 ms

Loss rate: 1.30%

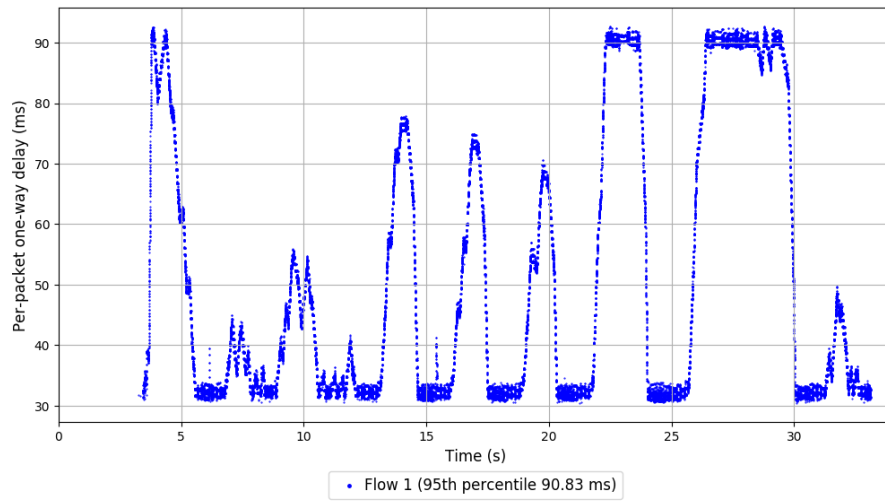
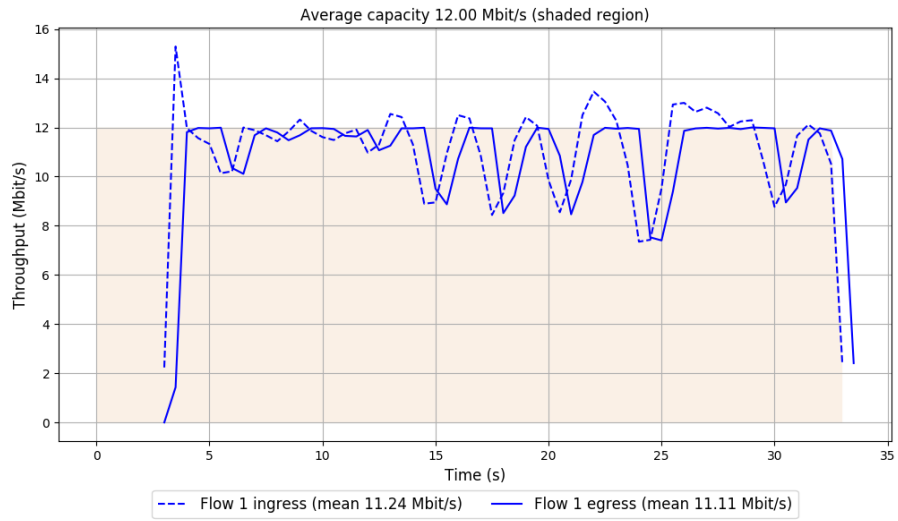
-- Flow 1:

Average throughput: 11.11 Mbit/s

95th percentile per-packet one-way delay: 90.825 ms

Loss rate: 1.30%

# Run 1: Report of PCC-Expr — Data Link



Run 2: Statistics of PCC-Expr

Start at: 2019-01-17 09:50:25

End at: 2019-01-17 09:50:55

# Below is generated by plot.py at 2019-01-17 10:17:08

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.86 Mbit/s (90.5% utilization)

95th percentile per-packet one-way delay: 77.833 ms

Loss rate: 0.42%

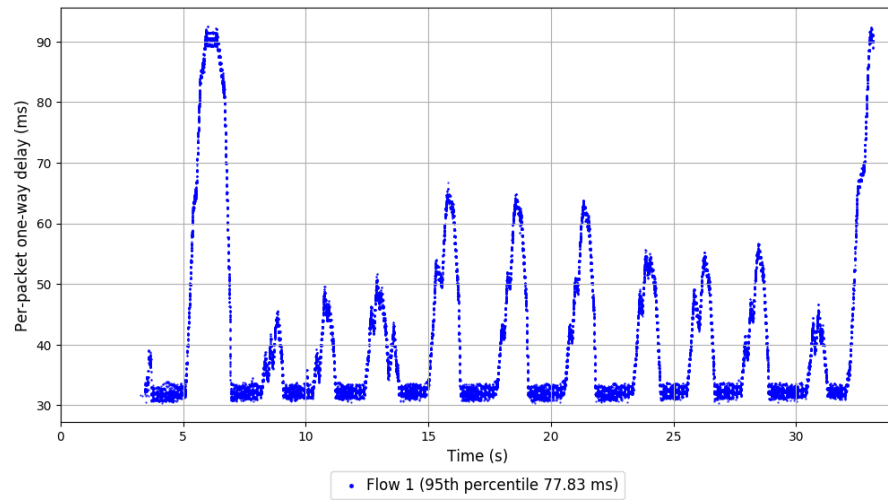
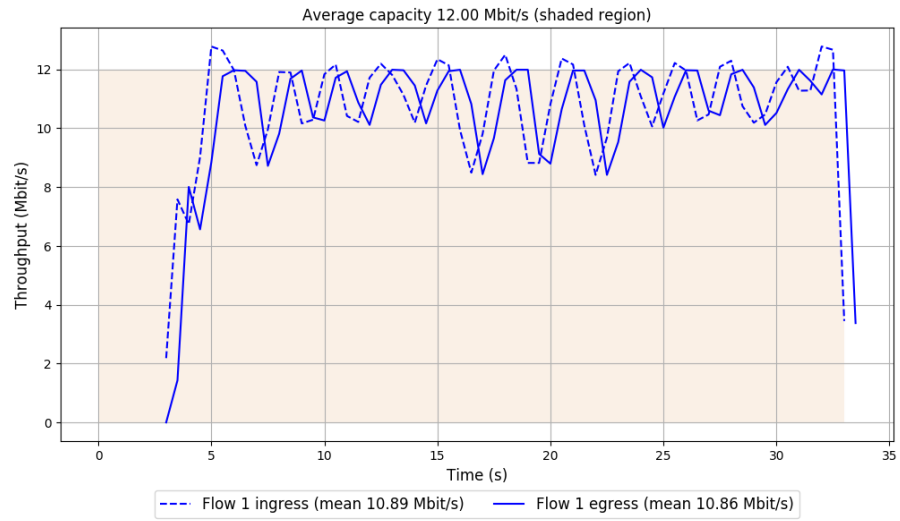
-- Flow 1:

Average throughput: 10.86 Mbit/s

95th percentile per-packet one-way delay: 77.833 ms

Loss rate: 0.42%

## Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

Start at: 2019-01-17 10:02:53

End at: 2019-01-17 10:03:23

# Below is generated by plot.py at 2019-01-17 10:17:09

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.75 Mbit/s (89.6% utilization)

95th percentile per-packet one-way delay: 85.453 ms

Loss rate: 0.16%

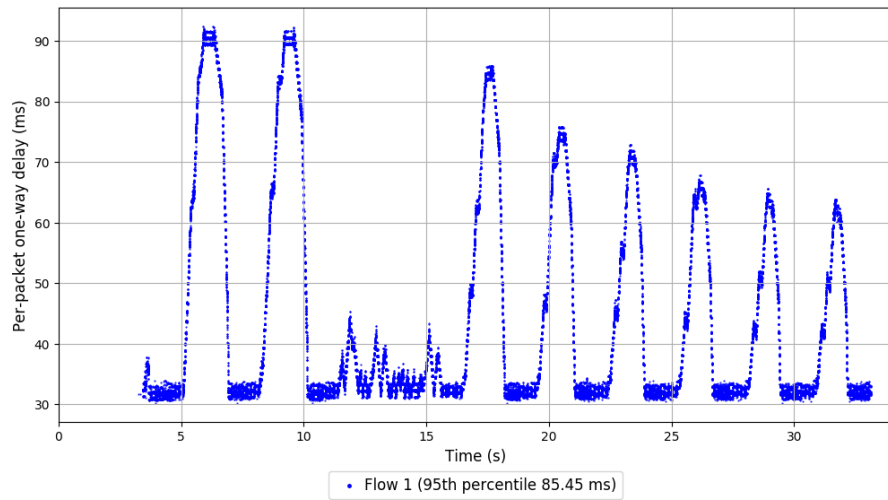
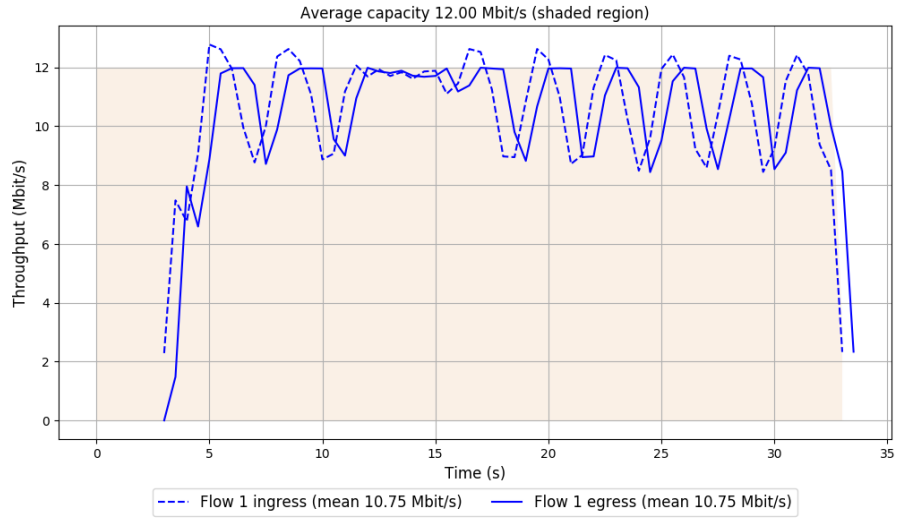
-- Flow 1:

Average throughput: 10.75 Mbit/s

95th percentile per-packet one-way delay: 85.453 ms

Loss rate: 0.16%

### Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2019-01-17 09:48:38

End at: 2019-01-17 09:49:08

# Below is generated by plot.py at 2019-01-17 10:17:09

# 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: 89.468 ms

Loss rate: 0.87%

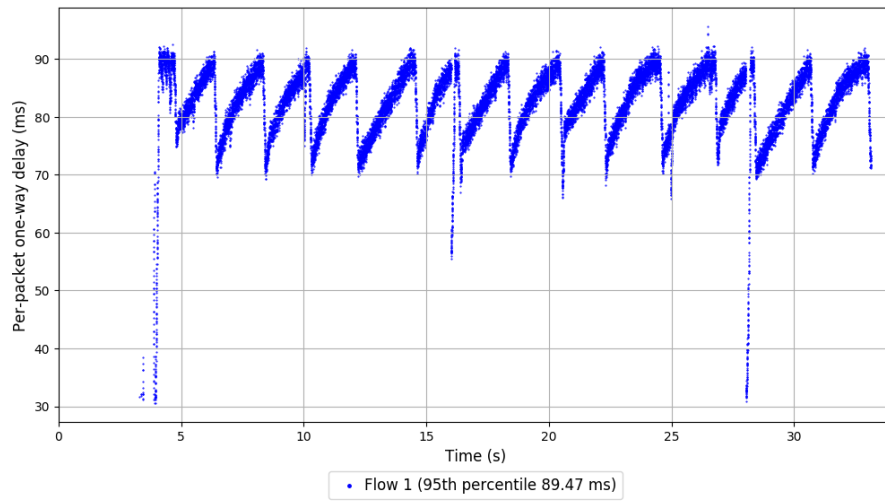
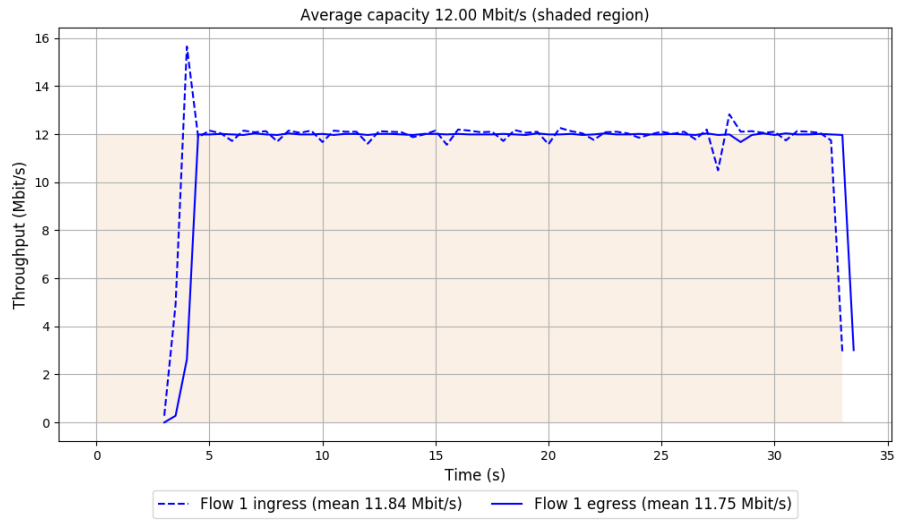
-- Flow 1:

Average throughput: 11.75 Mbit/s

95th percentile per-packet one-way delay: 89.468 ms

Loss rate: 0.87%

# Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2019-01-17 10:01:06

End at: 2019-01-17 10:01:36

# Below is generated by plot.py at 2019-01-17 10:17:09

# 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: 89.286 ms

Loss rate: 0.85%

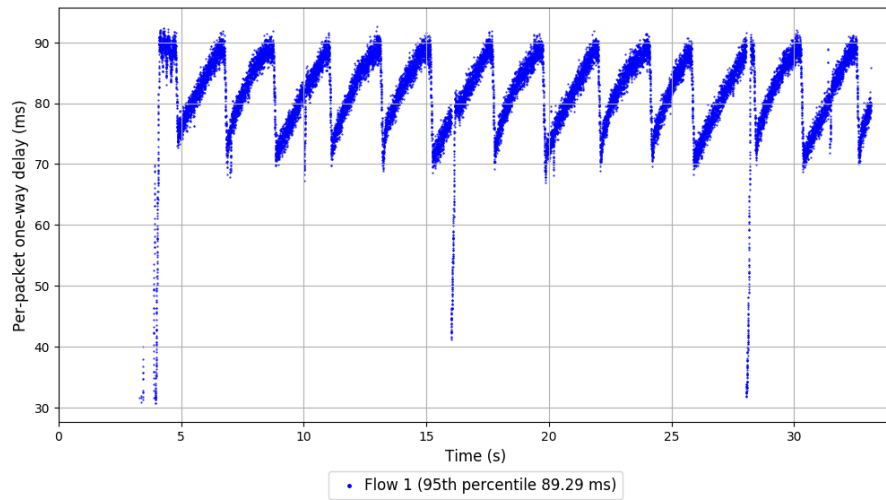
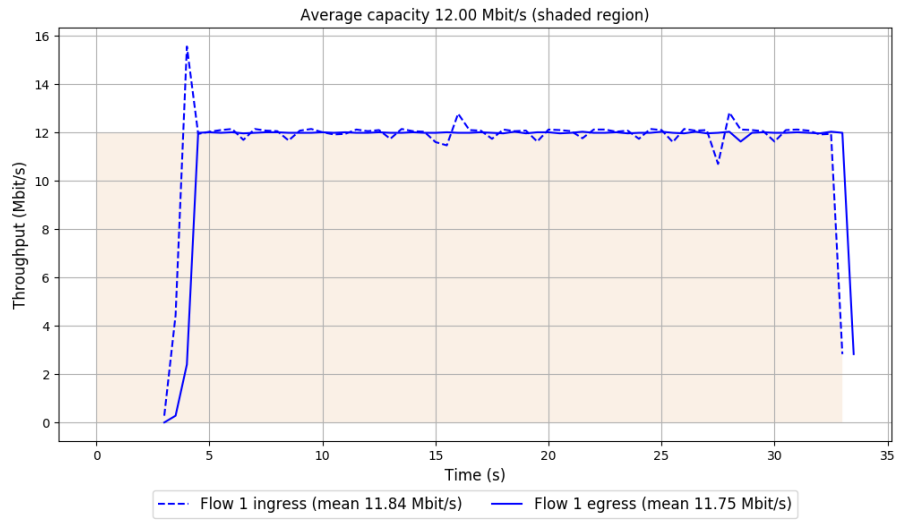
-- Flow 1:

Average throughput: 11.75 Mbit/s

95th percentile per-packet one-way delay: 89.286 ms

Loss rate: 0.85%

## Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2019-01-17 10:13:35

End at: 2019-01-17 10:14:05

# Below is generated by plot.py at 2019-01-17 10:17:09

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.74 Mbit/s (97.8% utilization)

95th percentile per-packet one-way delay: 89.412 ms

Loss rate: 0.90%

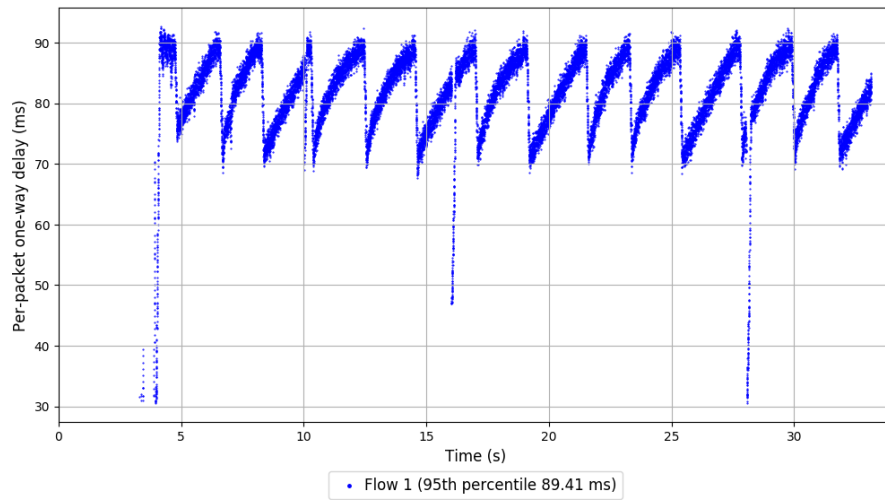
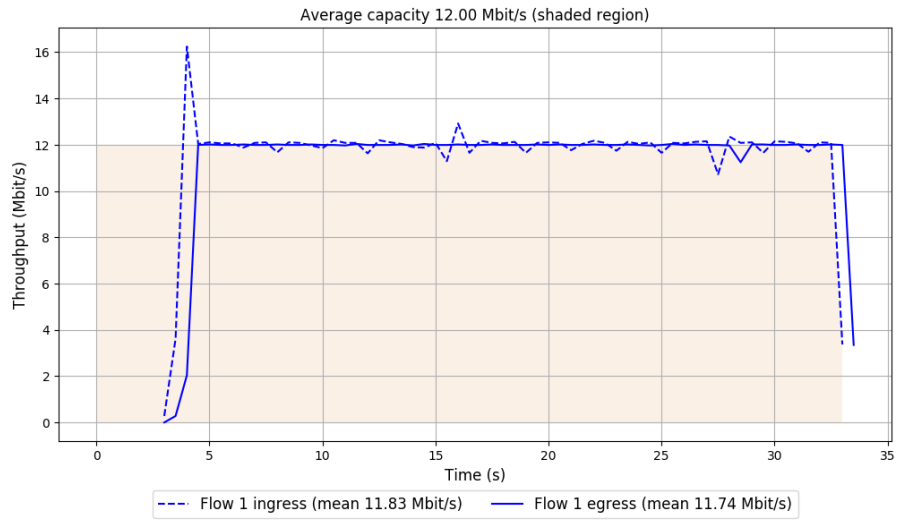
-- Flow 1:

Average throughput: 11.74 Mbit/s

95th percentile per-packet one-way delay: 89.412 ms

Loss rate: 0.90%

### Run 3: Report of QUIC Cubic — Data Link



Run 1: Statistics of SCReAM

Start at: 2019-01-17 09:46:17

End at: 2019-01-17 09:46:47

# Below is generated by plot.py at 2019-01-17 10:17:09

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 0.21 Mbit/s (1.8% utilization)

95th percentile per-packet one-way delay: 31.741 ms

Loss rate: 0.13%

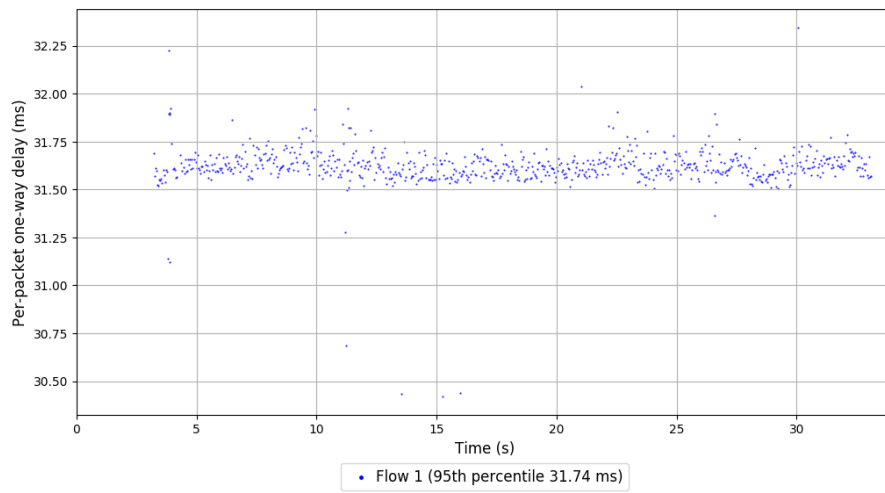
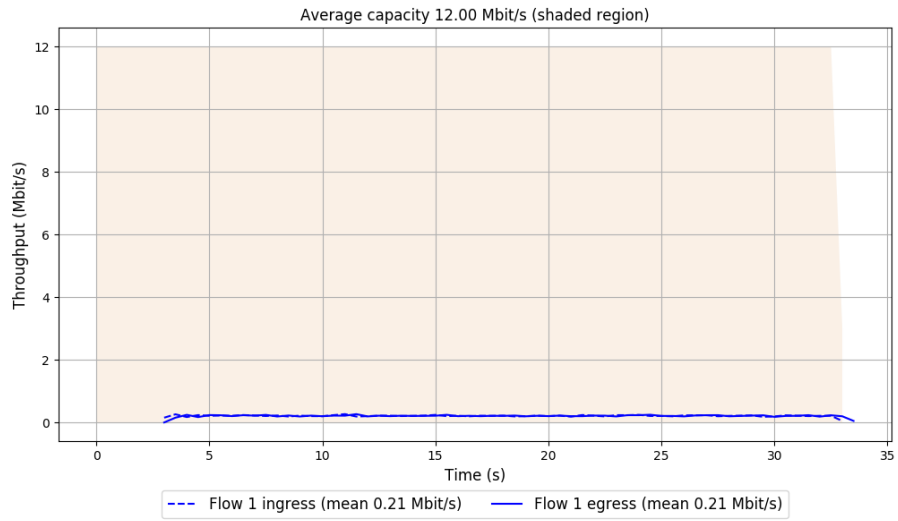
-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 31.741 ms

Loss rate: 0.13%

# Run 1: Report of SCReAM — Data Link



Run 2: Statistics of SCReAM

Start at: 2019-01-17 09:58:45

End at: 2019-01-17 09:59:15

# Below is generated by plot.py at 2019-01-17 10:17:09

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 0.21 Mbit/s (1.8% utilization)

95th percentile per-packet one-way delay: 31.944 ms

Loss rate: 0.13%

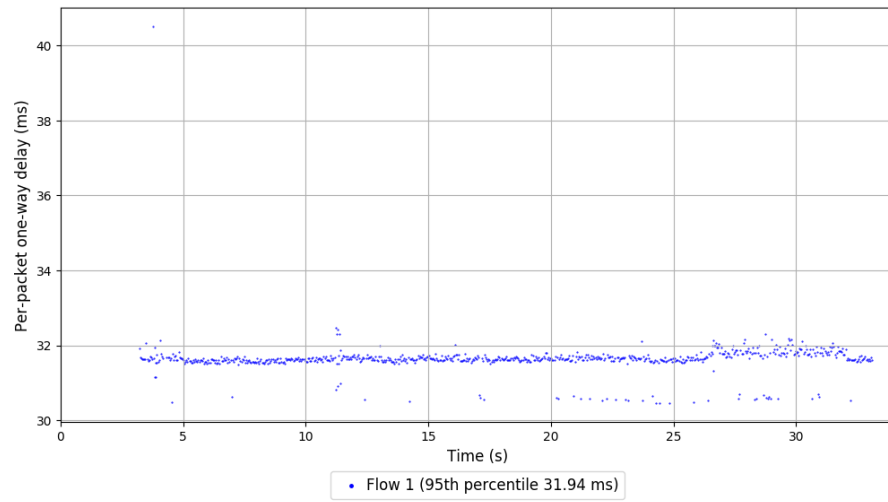
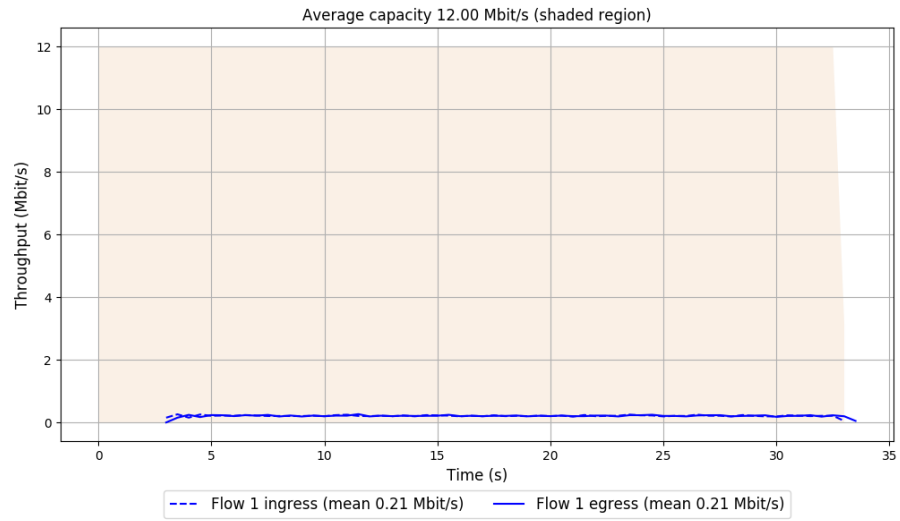
-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 31.944 ms

Loss rate: 0.13%

## Run 2: Report of SCReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2019-01-17 10:11:13

End at: 2019-01-17 10:11:43

# Below is generated by plot.py at 2019-01-17 10:17:09

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 0.21 Mbit/s (1.8% utilization)

95th percentile per-packet one-way delay: 31.748 ms

Loss rate: 0.00%

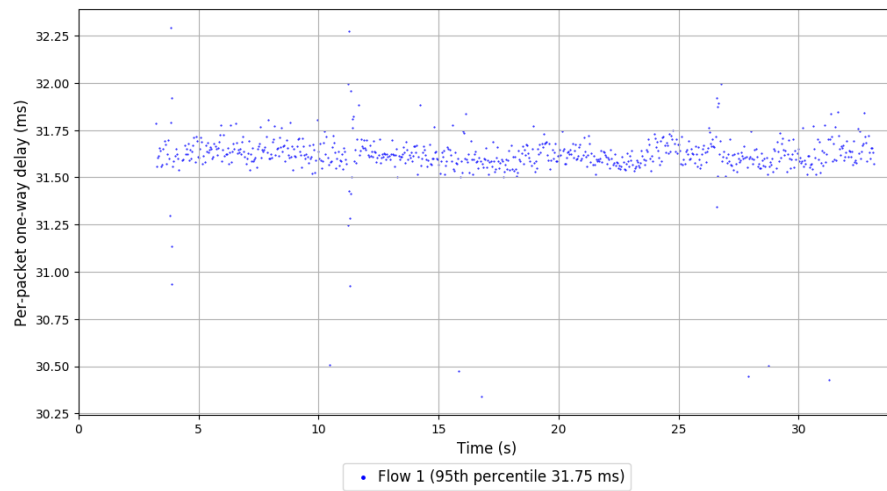
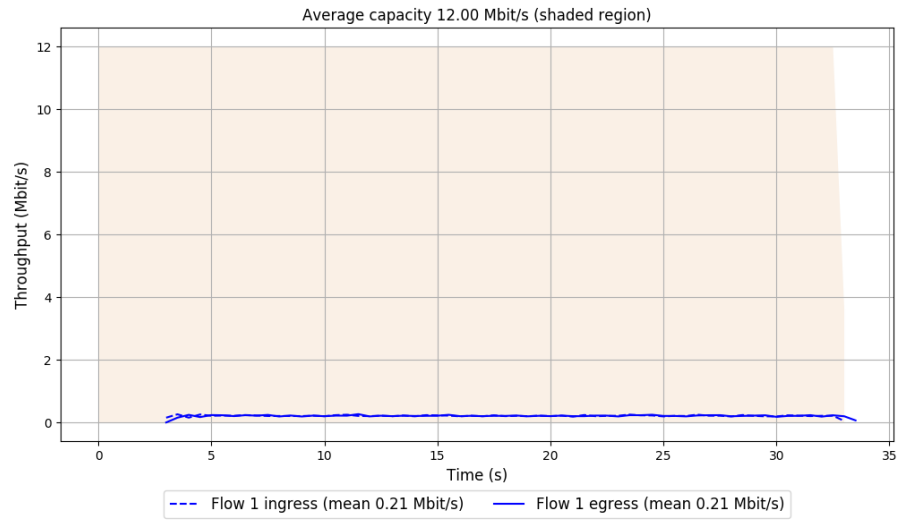
-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 31.748 ms

Loss rate: 0.00%

### Run 3: Report of SCReAM — Data Link



Run 1: Statistics of Sprout

Start at: 2019-01-17 09:45:41

End at: 2019-01-17 09:46:11

# Below is generated by plot.py at 2019-01-17 10:17:10

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 6.40 Mbit/s (53.3% utilization)

95th percentile per-packet one-way delay: 54.697 ms

Loss rate: 0.09%

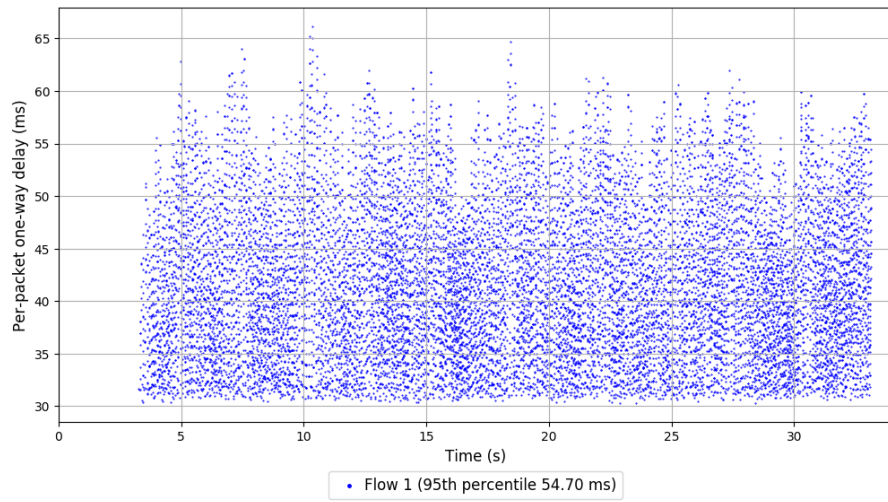
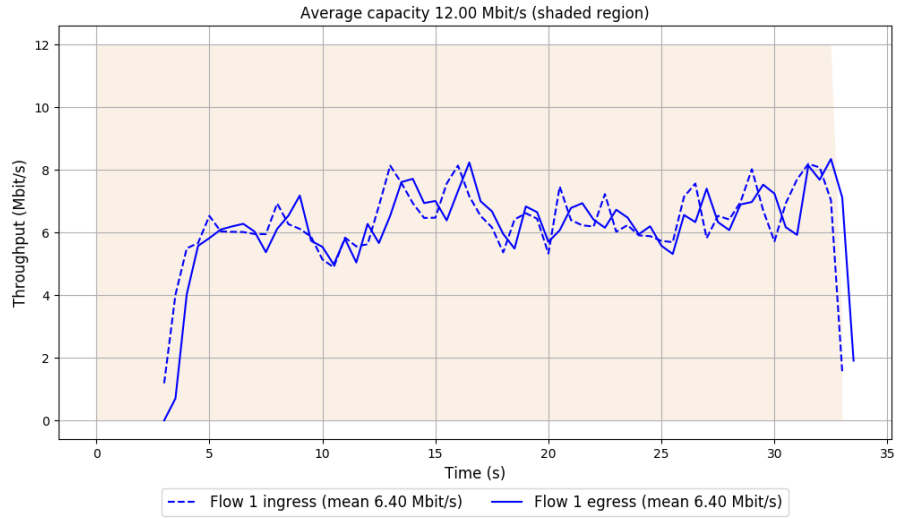
-- Flow 1:

Average throughput: 6.40 Mbit/s

95th percentile per-packet one-way delay: 54.697 ms

Loss rate: 0.09%

# Run 1: Report of Sprout — Data Link



Run 2: Statistics of Sprout

Start at: 2019-01-17 09:58:10

End at: 2019-01-17 09:58:40

# Below is generated by plot.py at 2019-01-17 10:17:14

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 6.61 Mbit/s (55.0% utilization)

95th percentile per-packet one-way delay: 54.687 ms

Loss rate: 0.25%

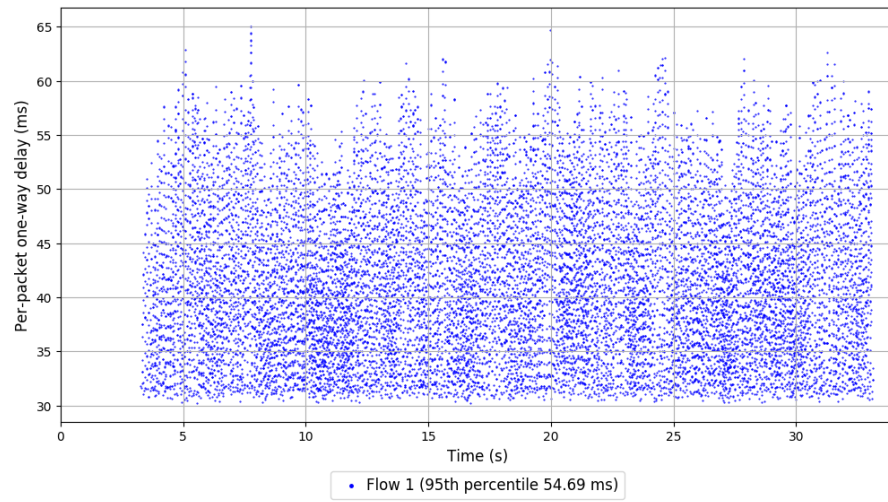
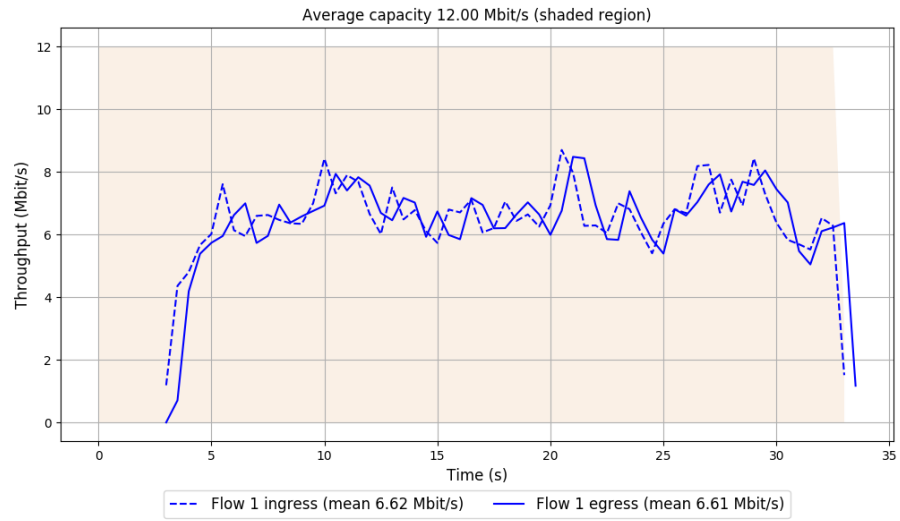
-- Flow 1:

Average throughput: 6.61 Mbit/s

95th percentile per-packet one-way delay: 54.687 ms

Loss rate: 0.25%

## Run 2: Report of Sprout — Data Link



Run 3: Statistics of Sprout

Start at: 2019-01-17 10:10:38

End at: 2019-01-17 10:11:08

# Below is generated by plot.py at 2019-01-17 10:17:16

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 6.39 Mbit/s (53.3% utilization)

95th percentile per-packet one-way delay: 54.902 ms

Loss rate: 0.01%

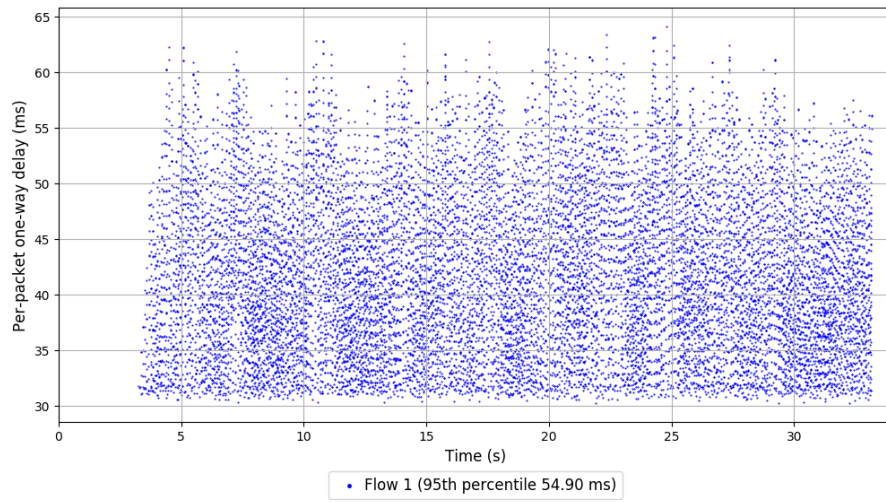
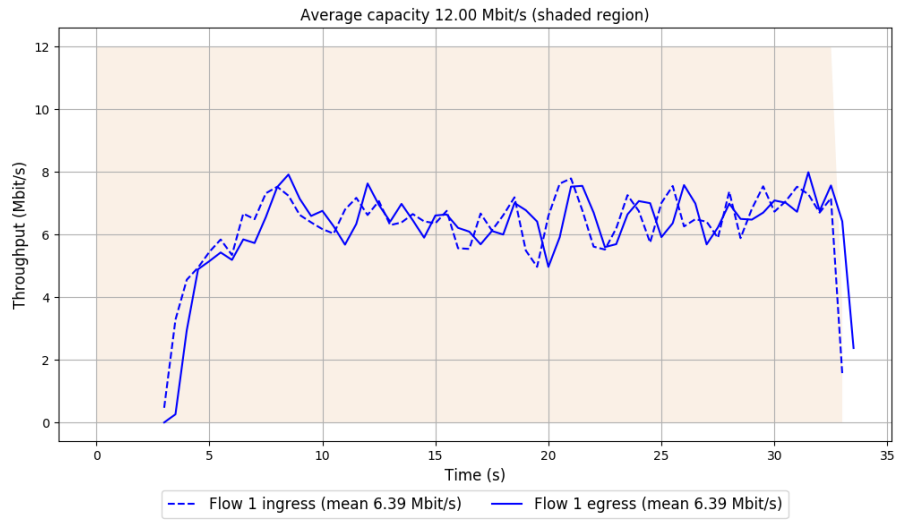
-- Flow 1:

Average throughput: 6.39 Mbit/s

95th percentile per-packet one-way delay: 54.902 ms

Loss rate: 0.01%

### Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

Start at: 2019-01-17 09:41:31

End at: 2019-01-17 09:42:01

# Below is generated by plot.py at 2019-01-17 10:17:41

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.14 Mbit/s (92.8% utilization)

95th percentile per-packet one-way delay: 33.060 ms

Loss rate: 0.58%

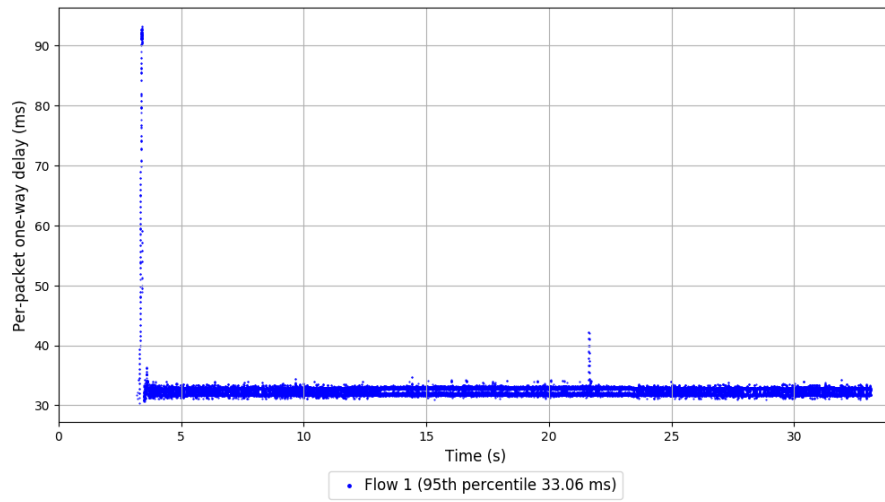
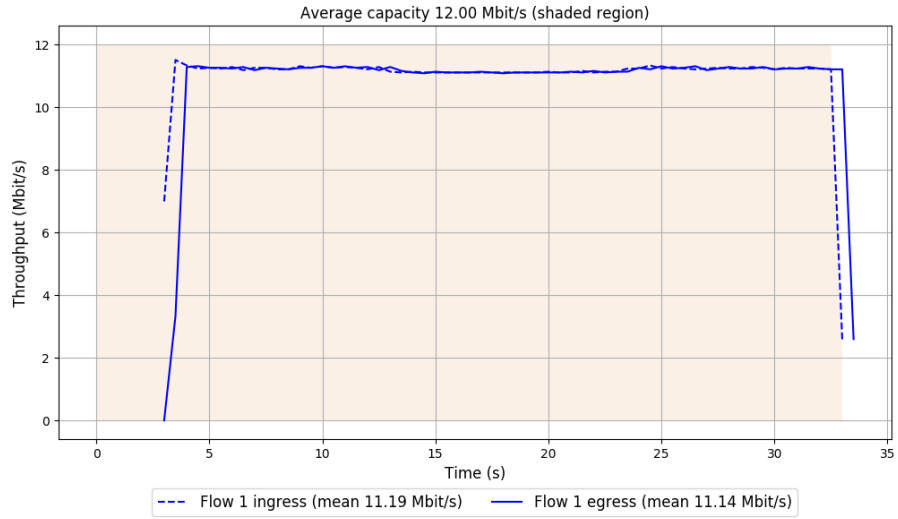
-- Flow 1:

Average throughput: 11.14 Mbit/s

95th percentile per-packet one-way delay: 33.060 ms

Loss rate: 0.58%

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



Run 2: Statistics of TaoVA-100x

Start at: 2019-01-17 09:53:59

End at: 2019-01-17 09:54:29

# Below is generated by plot.py at 2019-01-17 10:17:42

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.18 Mbit/s (93.2% utilization)

95th percentile per-packet one-way delay: 33.104 ms

Loss rate: 0.58%

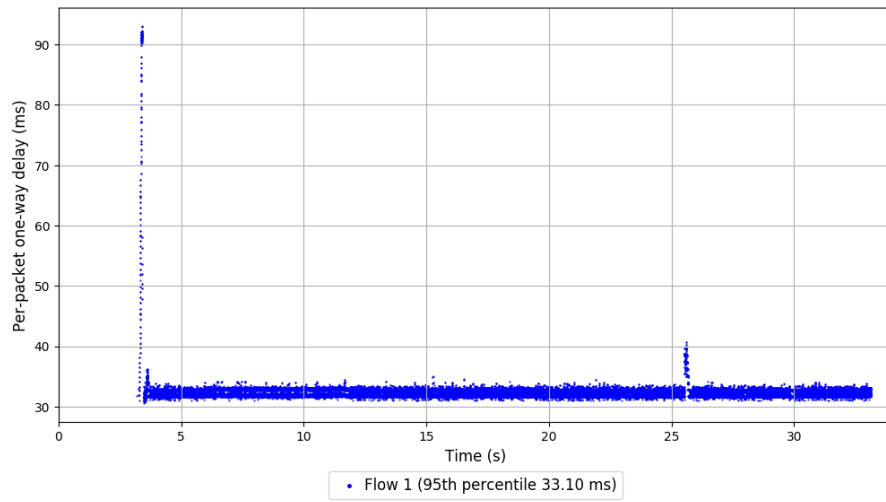
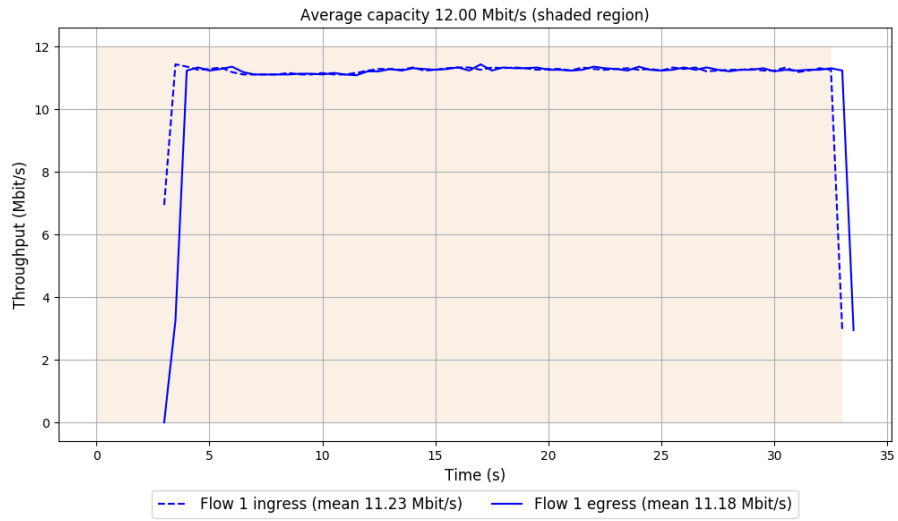
-- Flow 1:

Average throughput: 11.18 Mbit/s

95th percentile per-packet one-way delay: 33.104 ms

Loss rate: 0.58%

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



Run 3: Statistics of TaoVA-100x

Start at: 2019-01-17 10:06:27

End at: 2019-01-17 10:06:57

# Below is generated by plot.py at 2019-01-17 10:17:44

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.19 Mbit/s (93.2% utilization)

95th percentile per-packet one-way delay: 33.072 ms

Loss rate: 0.58%

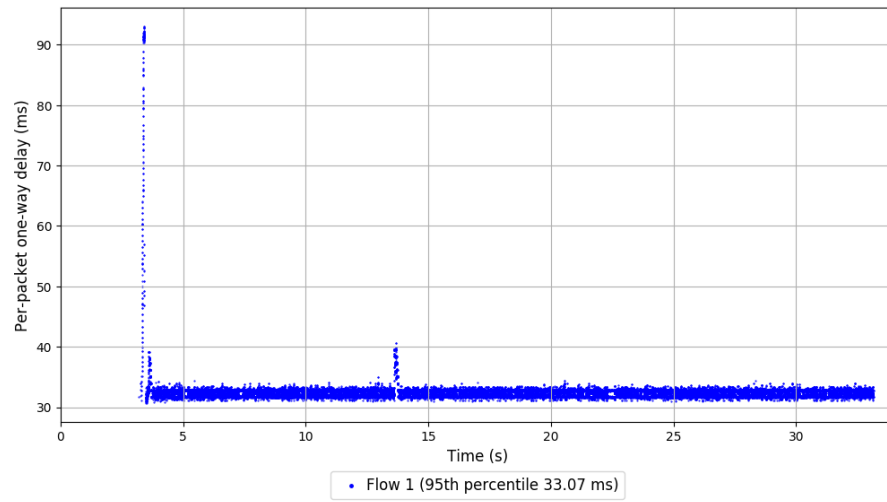
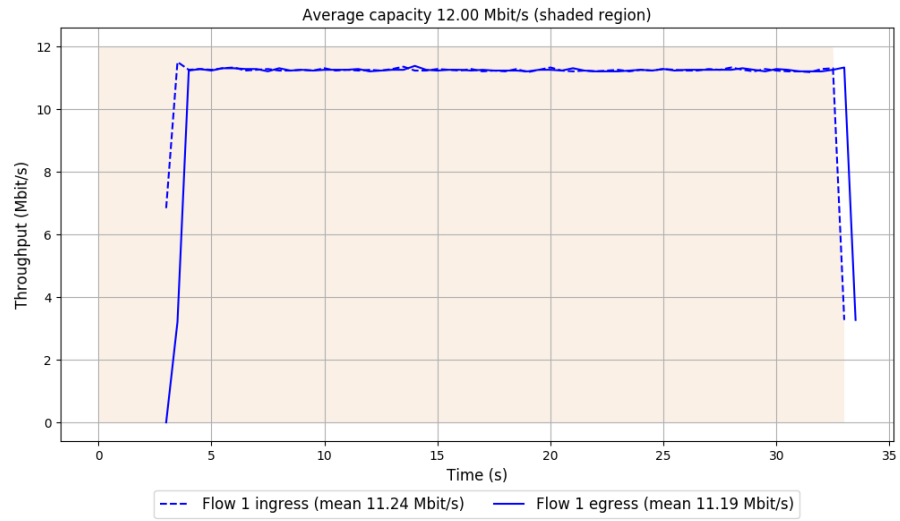
-- Flow 1:

Average throughput: 11.19 Mbit/s

95th percentile per-packet one-way delay: 33.072 ms

Loss rate: 0.58%

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



Run 1: Statistics of TCP Vegas

Start at: 2019-01-17 09:39:44

End at: 2019-01-17 09:40:14

# Below is generated by plot.py at 2019-01-17 10:17:44

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.92 Mbit/s (99.4% utilization)

95th percentile per-packet one-way delay: 38.484 ms

Loss rate: 0.25%

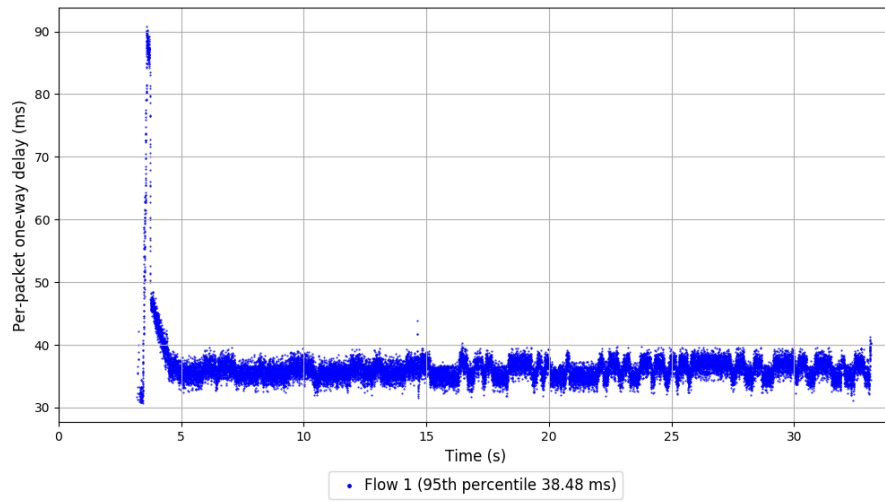
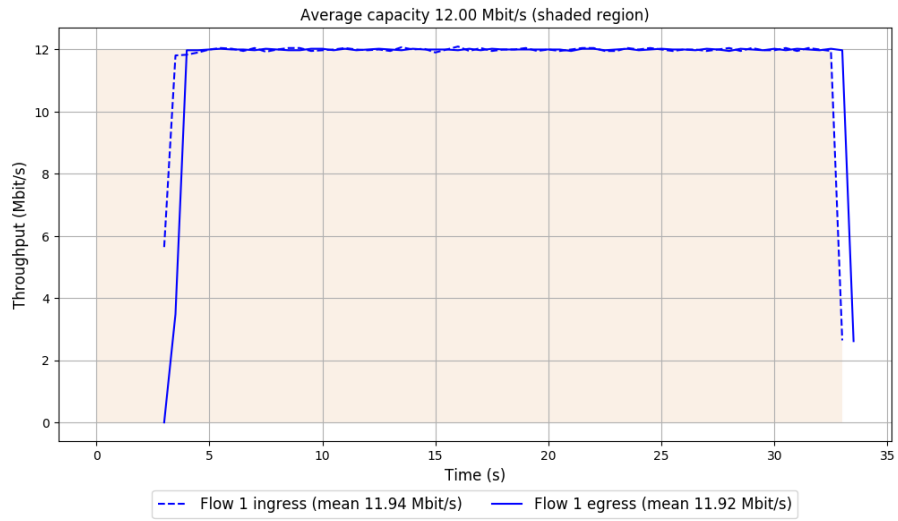
-- Flow 1:

Average throughput: 11.92 Mbit/s

95th percentile per-packet one-way delay: 38.484 ms

Loss rate: 0.25%

# Run 1: Report of TCP Vegas — Data Link



Run 2: Statistics of TCP Vegas

Start at: 2019-01-17 09:52:12

End at: 2019-01-17 09:52:42

# Below is generated by plot.py at 2019-01-17 10:17:44

# 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: 38.721 ms

Loss rate: 0.24%

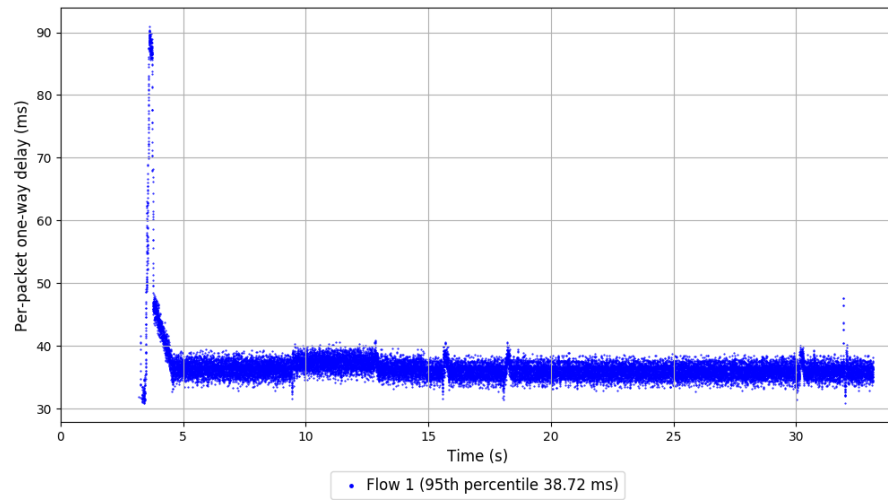
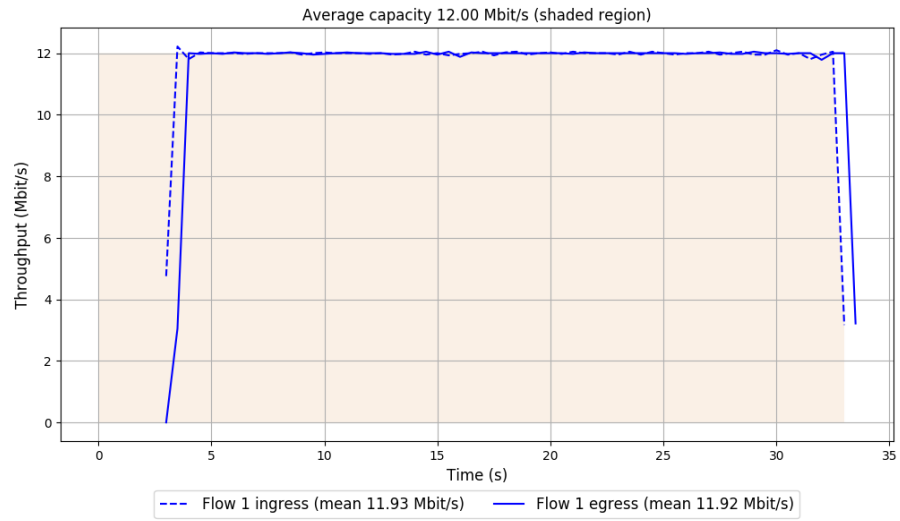
-- Flow 1:

Average throughput: 11.92 Mbit/s

95th percentile per-packet one-way delay: 38.721 ms

Loss rate: 0.24%

## Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2019-01-17 10:04:40

End at: 2019-01-17 10:05:10

# Below is generated by plot.py at 2019-01-17 10:17:44

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.92 Mbit/s (99.4% utilization)

95th percentile per-packet one-way delay: 37.957 ms

Loss rate: 0.23%

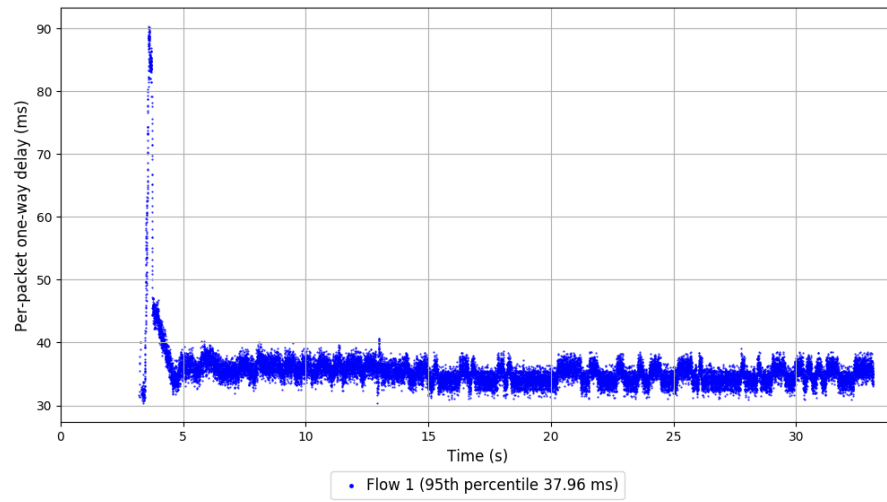
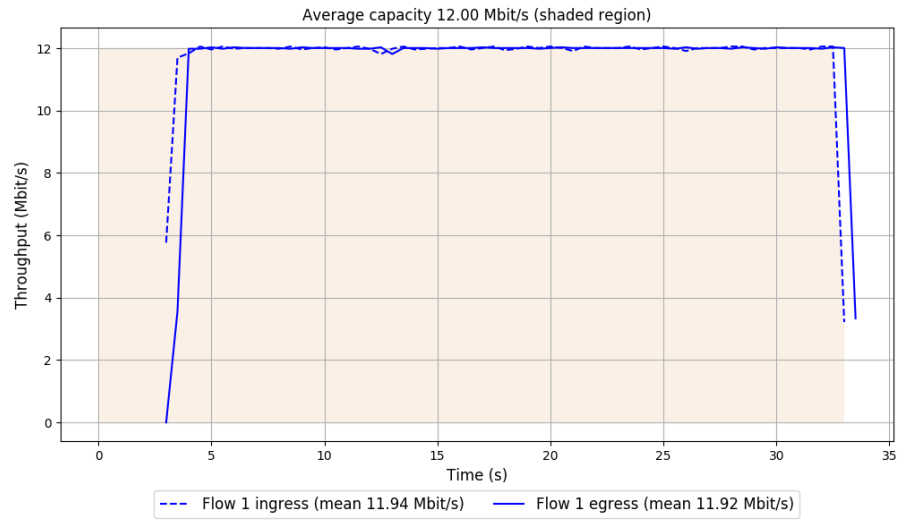
-- Flow 1:

Average throughput: 11.92 Mbit/s

95th percentile per-packet one-way delay: 37.957 ms

Loss rate: 0.23%

### Run 3: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2019-01-17 09:42:07

End at: 2019-01-17 09:42:37

# Below is generated by plot.py at 2019-01-17 10:17:44

# 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: 88.246 ms

Loss rate: 3.56%

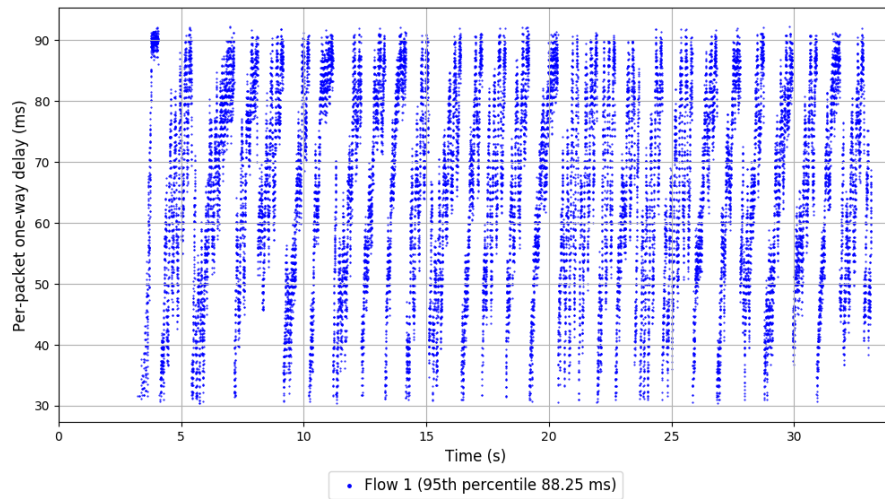
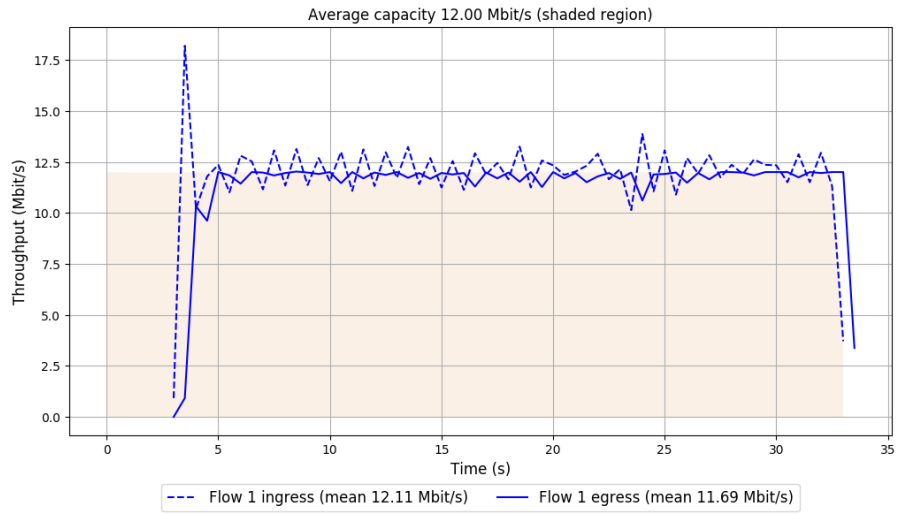
-- Flow 1:

Average throughput: 11.69 Mbit/s

95th percentile per-packet one-way delay: 88.246 ms

Loss rate: 3.56%

# Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2019-01-17 09:54:35

End at: 2019-01-17 09:55:05

# Below is generated by plot.py at 2019-01-17 10:17:50

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 8.11 Mbit/s (67.6% utilization)

95th percentile per-packet one-way delay: 90.502 ms

Loss rate: 75.12%

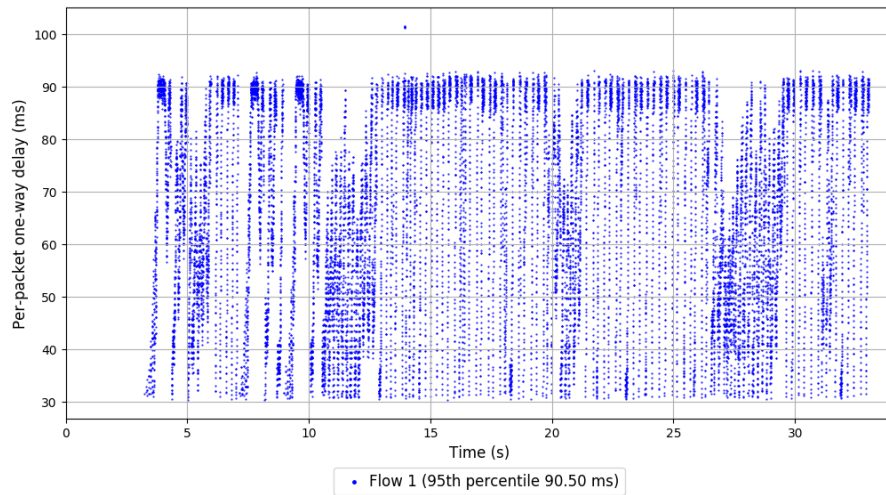
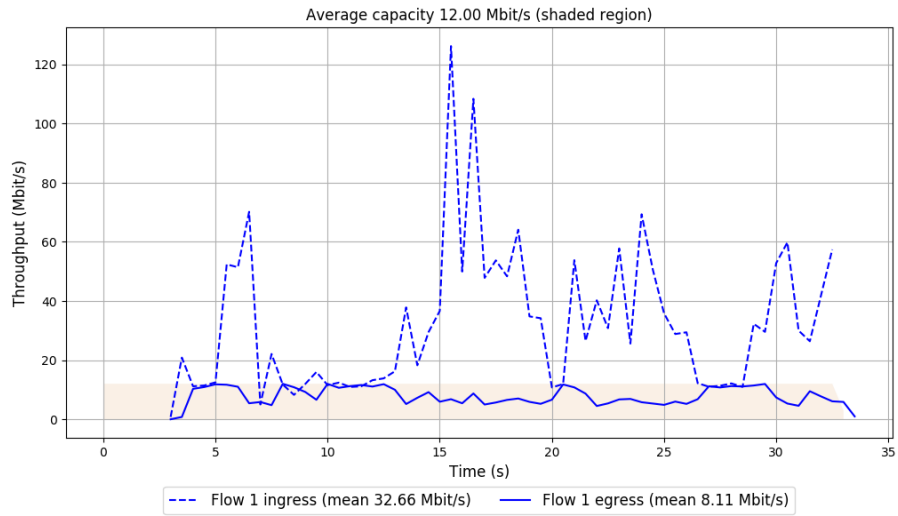
-- Flow 1:

Average throughput: 8.11 Mbit/s

95th percentile per-packet one-way delay: 90.502 ms

Loss rate: 75.12%

## Run 2: Report of Verus — Data Link



Run 3: Statistics of Verus

Start at: 2019-01-17 10:07:03

End at: 2019-01-17 10:07:33

# Below is generated by plot.py at 2019-01-17 10:17:59

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 11.38 Mbit/s (94.8% utilization)

95th percentile per-packet one-way delay: 86.685 ms

Loss rate: 5.08%

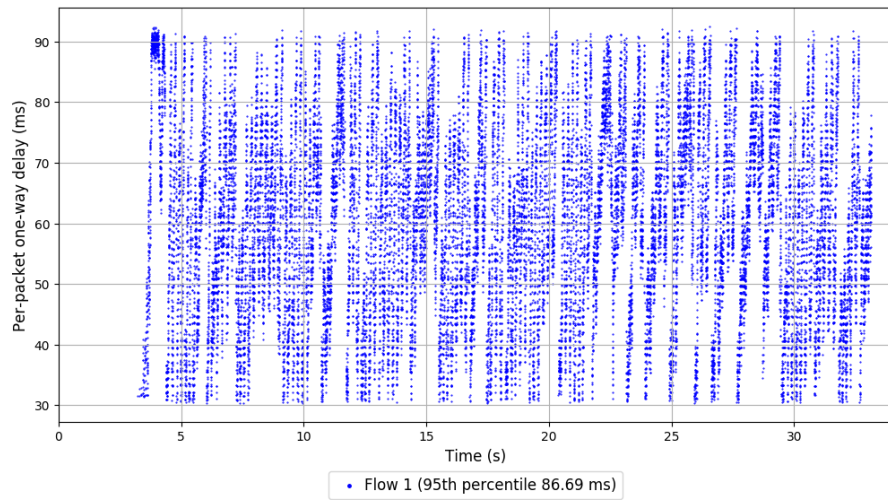
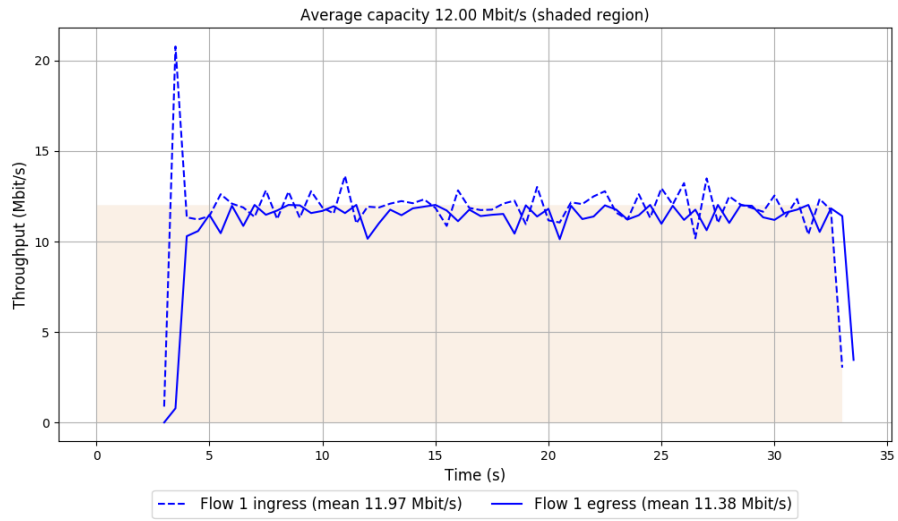
-- Flow 1:

Average throughput: 11.38 Mbit/s

95th percentile per-packet one-way delay: 86.685 ms

Loss rate: 5.08%

### Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

Start at: 2019-01-17 09:45:06

End at: 2019-01-17 09:45:36

# Below is generated by plot.py at 2019-01-17 10:18:00

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.90 Mbit/s (90.8% utilization)

95th percentile per-packet one-way delay: 39.547 ms

Loss rate: 0.11%

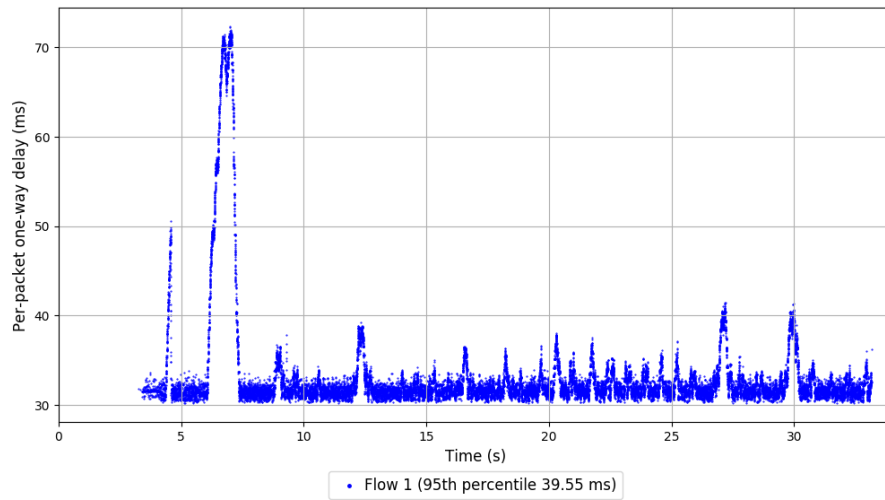
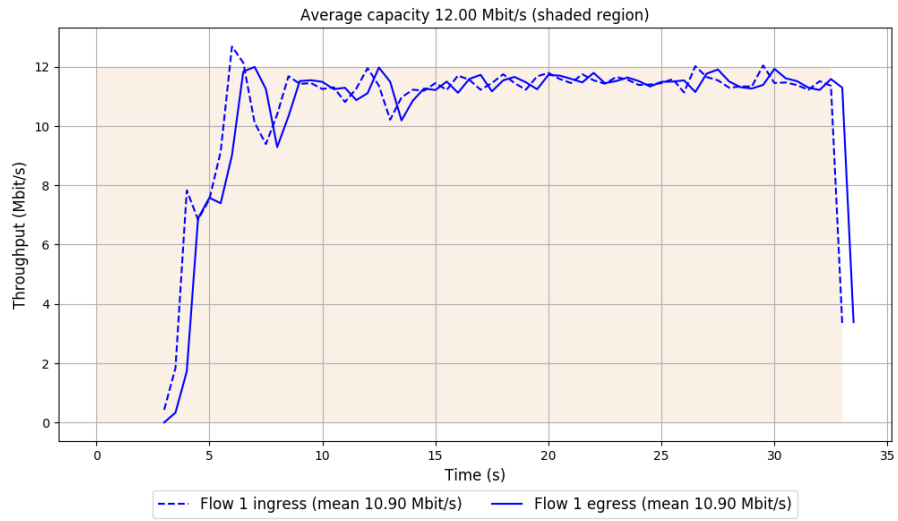
-- Flow 1:

Average throughput: 10.90 Mbit/s

95th percentile per-packet one-way delay: 39.547 ms

Loss rate: 0.11%

# Run 1: Report of PCC-Vivace — Data Link



Run 2: Statistics of PCC-Vivace

Start at: 2019-01-17 09:57:34

End at: 2019-01-17 09:58:04

# Below is generated by plot.py at 2019-01-17 10:18:00

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.86 Mbit/s (90.5% utilization)

95th percentile per-packet one-way delay: 38.029 ms

Loss rate: 0.10%

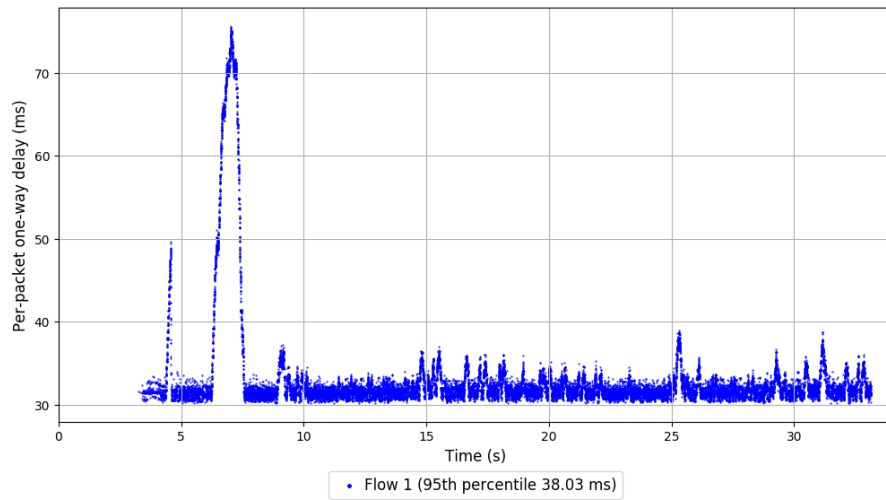
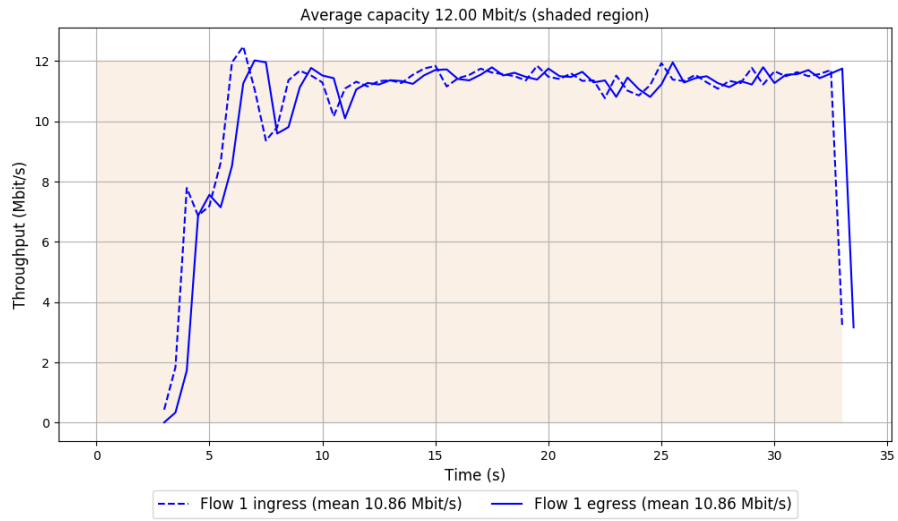
-- Flow 1:

Average throughput: 10.86 Mbit/s

95th percentile per-packet one-way delay: 38.029 ms

Loss rate: 0.10%

## Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

Start at: 2019-01-17 10:10:02

End at: 2019-01-17 10:10:32

# Below is generated by plot.py at 2019-01-17 10:18:00

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 10.91 Mbit/s (90.9% utilization)

95th percentile per-packet one-way delay: 37.411 ms

Loss rate: 0.11%

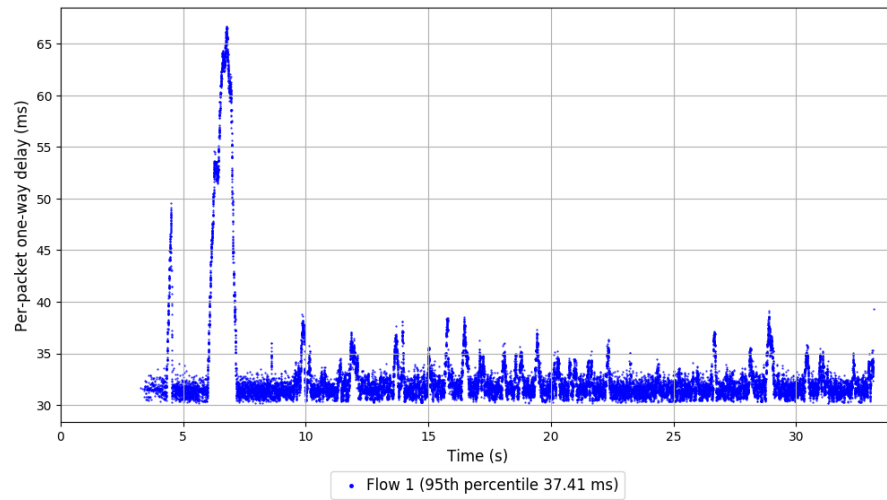
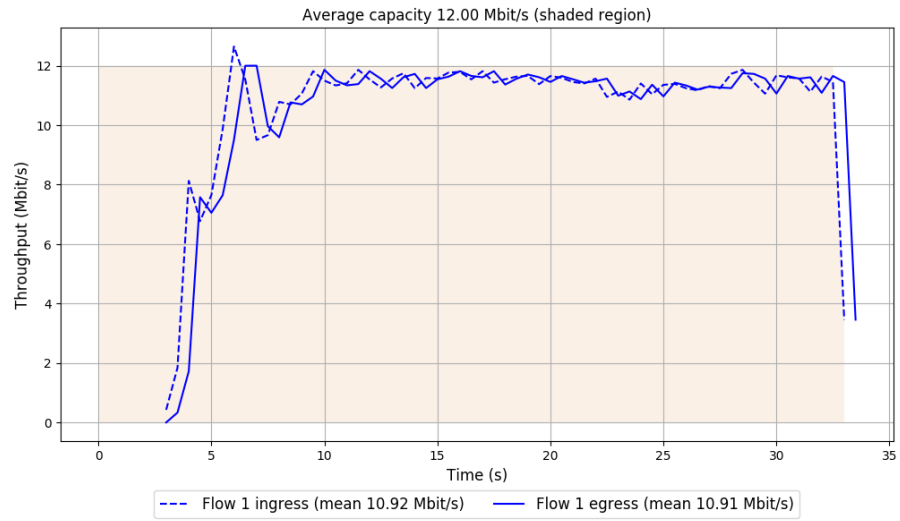
-- Flow 1:

Average throughput: 10.91 Mbit/s

95th percentile per-packet one-way delay: 37.411 ms

Loss rate: 0.11%

### Run 3: Report of PCC-Vivace — Data Link



Run 1: Statistics of WebRTC media

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

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

# Below is generated by plot.py at 2019-01-17 10:18:00

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 0.05 Mbit/s (0.4% utilization)

95th percentile per-packet one-way delay: 41.020 ms

Loss rate: 0.00%

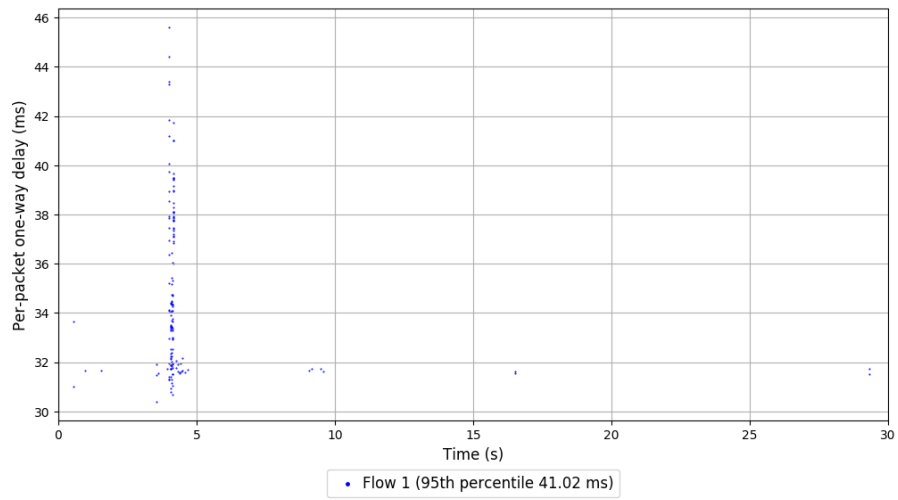
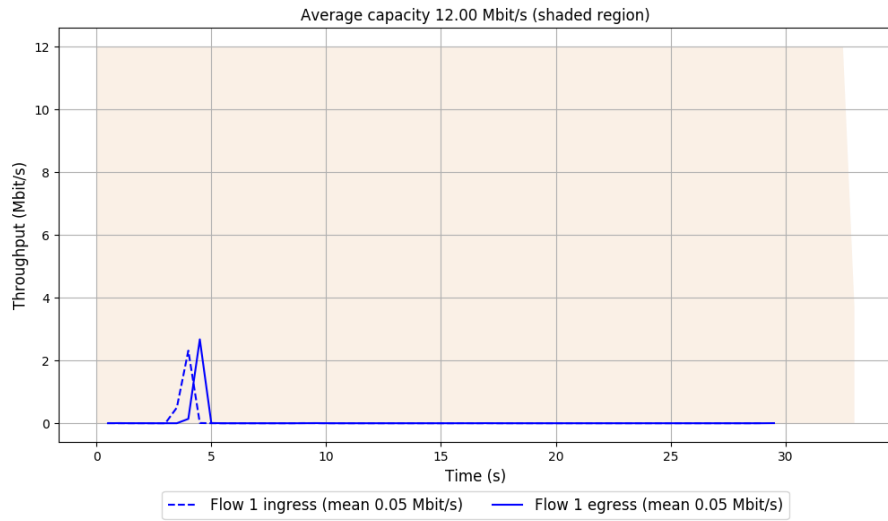
-- Flow 1:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 41.020 ms

Loss rate: 0.00%

# Run 1: Report of WebRTC media — Data Link



Run 2: Statistics of WebRTC media

Start at: 2019-01-17 09:51:37

End at: 2019-01-17 09:52:07

# Below is generated by plot.py at 2019-01-17 10:18:00

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 0.05 Mbit/s (0.4% utilization)

95th percentile per-packet one-way delay: 39.604 ms

Loss rate: 0.00%

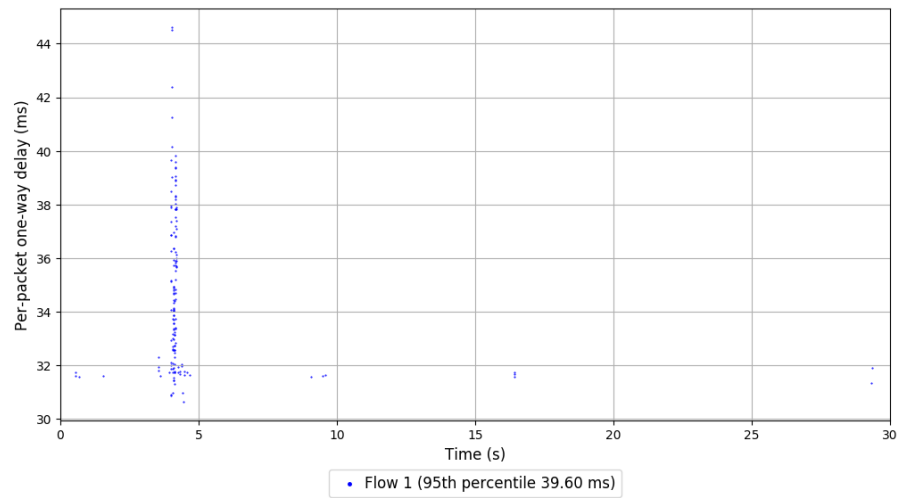
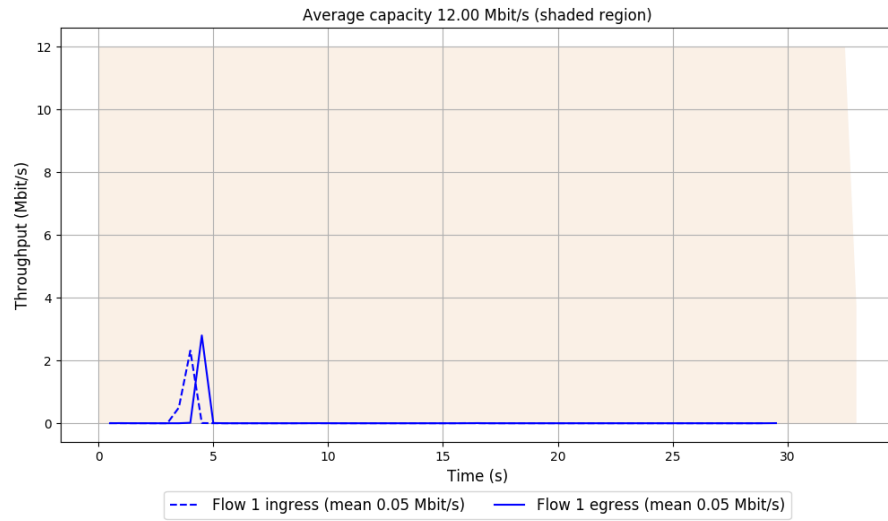
-- Flow 1:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 39.604 ms

Loss rate: 0.00%

## Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2019-01-17 10:04:05

End at: 2019-01-17 10:04:35

# Below is generated by plot.py at 2019-01-17 10:18:00

# Datalink statistics

-- Total of 1 flow:

Average capacity: 12.00 Mbit/s

Average throughput: 0.05 Mbit/s (0.4% utilization)

95th percentile per-packet one-way delay: 40.728 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 40.728 ms

Loss rate: 0.00%

### Run 3: Report of WebRTC media — Data Link

