

Pantheon Report

Generated at 2019-01-17 06:59:12 (UTC).

Tested in mahimahi: mm-delay 50 mm-link 60mbps.trace 60mbps.trace
--uplink-queue=droptail --uplink-queue-args=packets=1 --downlink-queue=droptail
--downlink-queue-args=packets=1

Repeated the test of 21 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

System info:

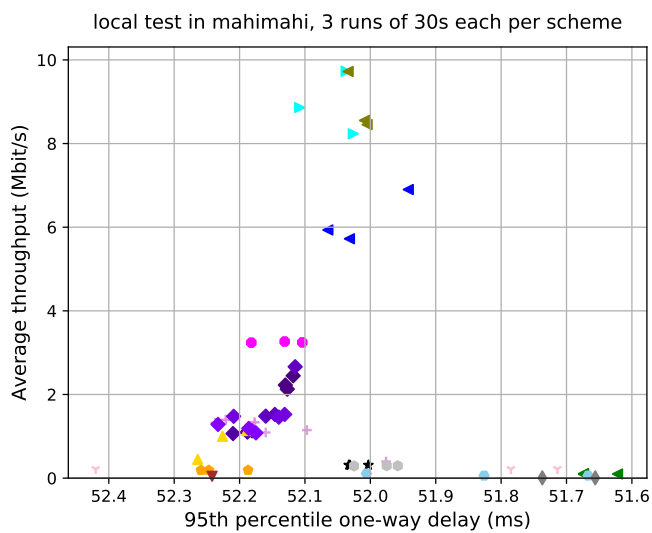
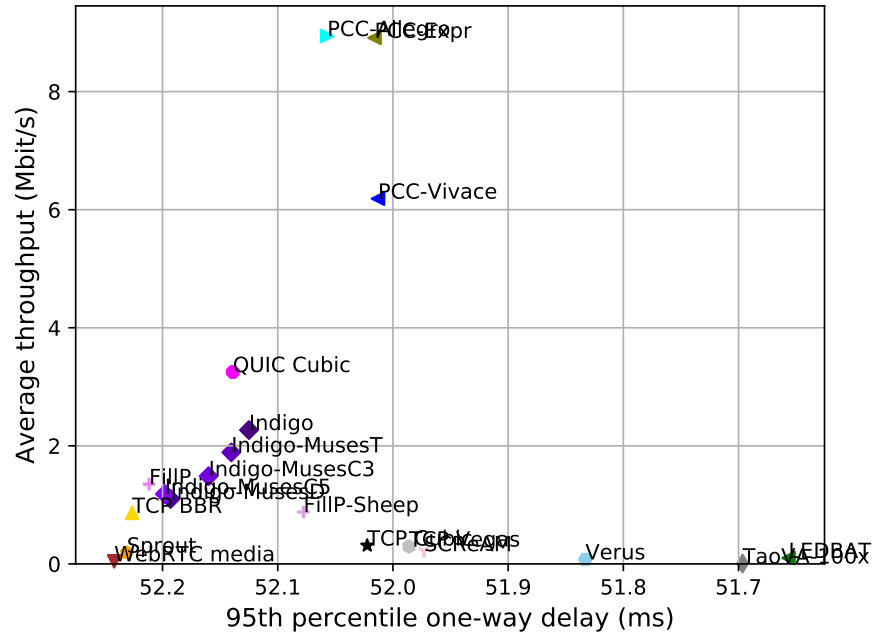
```
Linux 4.15.0-1026-gcp
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
```

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-quick @ 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, 3 runs of 30s each per scheme
(mean of all runs by scheme)



- + FiIIP
- + FiIIP-Sheep
- ◆ Indigo
- QUIC Cubic
- ★ TCP Cubic
- Sprout
- ◆ Indigo-MusesD
- ▲ PCC-Vivace
- ▽ SCReAM
- TCP Vegas
- ▲ LEDBAT
- Verus
- ▲ TCP BBR
- ◆ Indigo-MusesC5
- ◆ Indigo-MusesT
- ◆ Indigo-MusesC3
- ▼ WebRTC media
- ◆ TaoVA-100x
- ▲ PCC-Expr

scheme	# runs	mean avg tput (Mbit/s)	mean 95th-%ile delay (ms)	mean loss rate (%)
		flow 1	flow 1	flow 1
TCP BBR	3	0.86	52.23	41.24
Copa	0	N/A	N/A	N/A
TCP Cubic	3	0.31	52.02	8.29
FillP	3	1.35	52.21	46.61
FillP-Sheep	3	0.88	52.08	41.74
Indigo	3	2.27	52.12	97.33
Indigo-MusesC3	3	1.49	52.16	29.03
Indigo-MusesC5	3	1.18	52.20	45.26
Indigo-MusesD	3	1.10	52.19	37.57
Indigo-MusesT	3	1.89	52.14	21.56
LEDBAT	3	0.10	51.66	44.72
PCC-Allegro	3	8.94	52.06	2.76
PCC-Expr	3	8.91	52.02	7.19
QUIC Cubic	3	3.25	52.14	1.34
SReAM	3	0.21	51.97	0.17
Sprout	3	0.19	52.23	7.35
TaoVA-100x	2	0.01	51.70	51.91
TCP Vegas	3	0.29	51.99	11.00
Verus	3	0.08	51.83	59.14
PCC-Vivace	3	6.18	52.01	0.40
WebRTC media	1	0.04	52.24	27.02

Run 1: Statistics of TCP BBR

Start at: 2019-01-17 06:22:33

End at: 2019-01-17 06:23:03

Below is generated by plot.py at 2019-01-17 06:56:03

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.00 Mbit/s (1.7% utilization)

95th percentile per-packet one-way delay: 52.226 ms

Loss rate: 45.24%

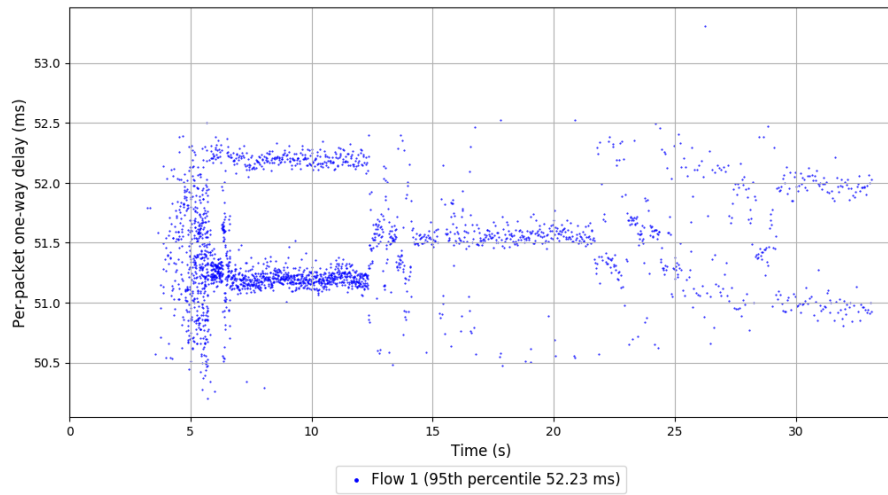
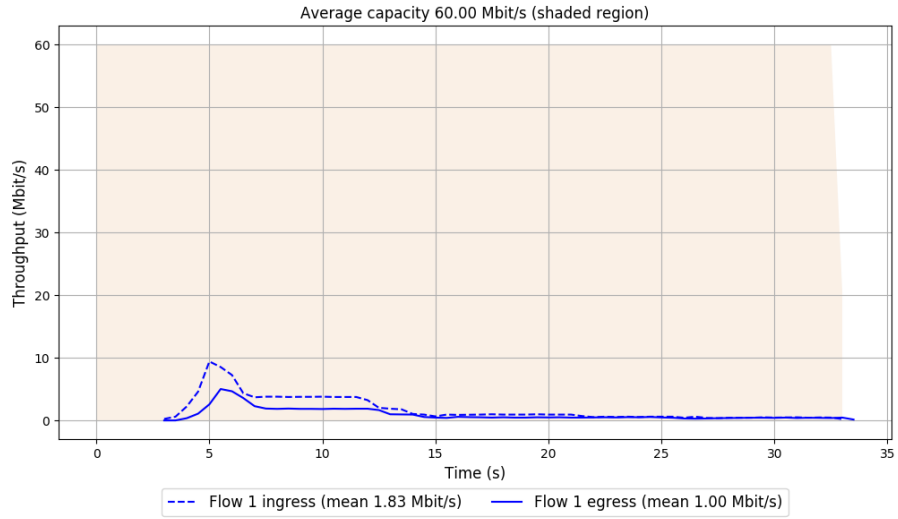
-- Flow 1:

Average throughput: 1.00 Mbit/s

95th percentile per-packet one-way delay: 52.226 ms

Loss rate: 45.24%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2019-01-17 06:35:08

End at: 2019-01-17 06:35:38

Below is generated by plot.py at 2019-01-17 06:56:03

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.14 Mbit/s (1.9% utilization)

95th percentile per-packet one-way delay: 52.189 ms

Loss rate: 46.26%

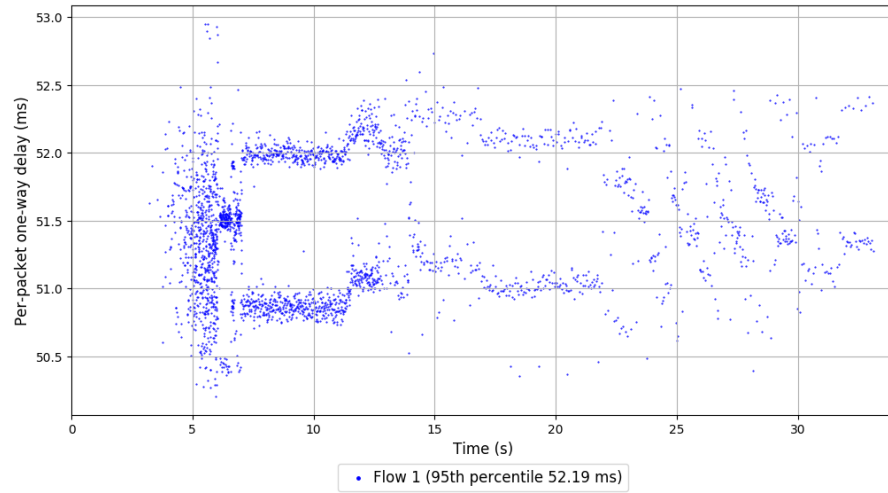
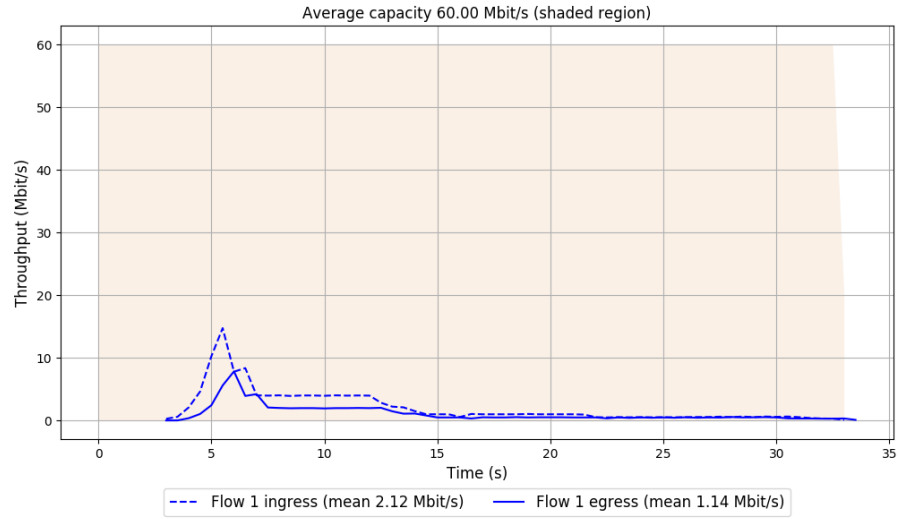
-- Flow 1:

Average throughput: 1.14 Mbit/s

95th percentile per-packet one-way delay: 52.189 ms

Loss rate: 46.26%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2019-01-17 06:47:43

End at: 2019-01-17 06:48:13

Below is generated by plot.py at 2019-01-17 06:56:03

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.45 Mbit/s (0.8% utilization)

95th percentile per-packet one-way delay: 52.264 ms

Loss rate: 32.23%

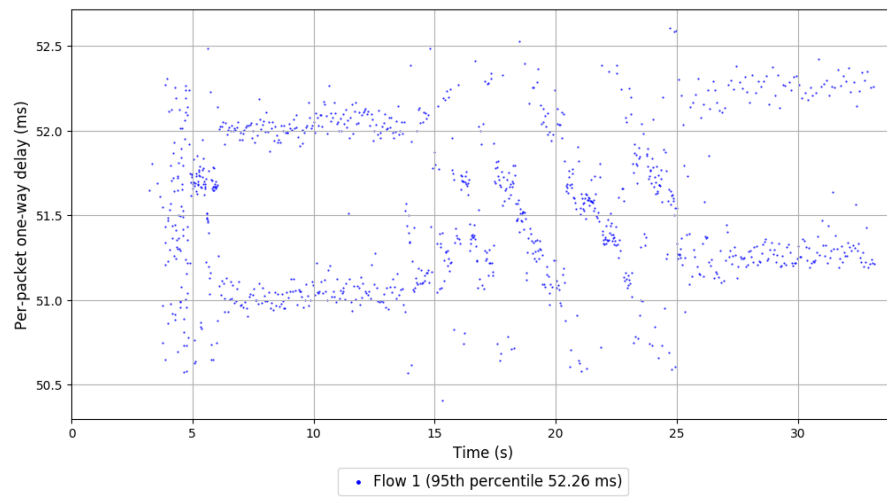
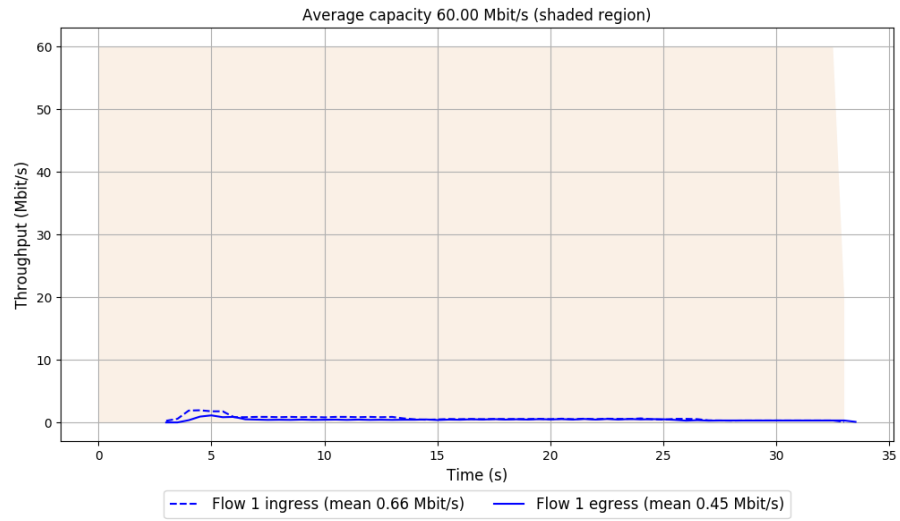
-- Flow 1:

Average throughput: 0.45 Mbit/s

95th percentile per-packet one-way delay: 52.264 ms

Loss rate: 32.23%

Run 3: Report of TCP BBR — Data Link

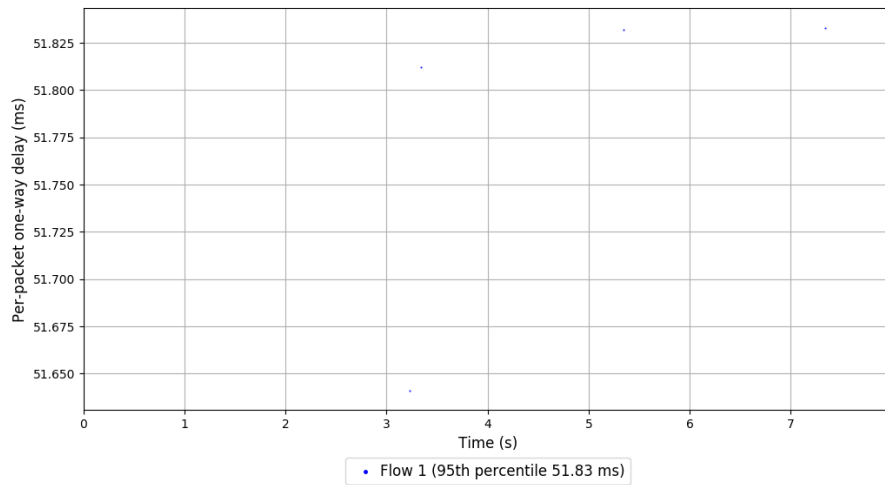
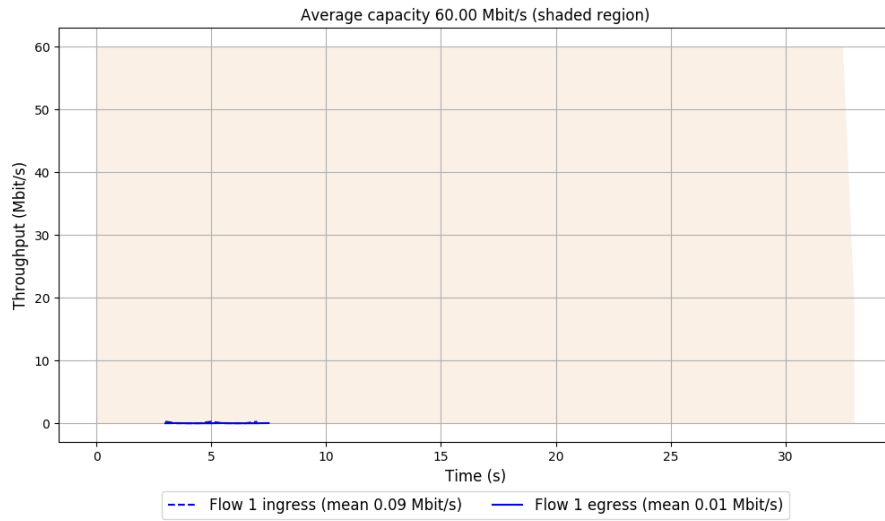


Run 1: Statistics of Copa

Start at: 2019-01-17 06:23:09

End at: 2019-01-17 06:23:39

Run 1: Report of Copa — Data Link

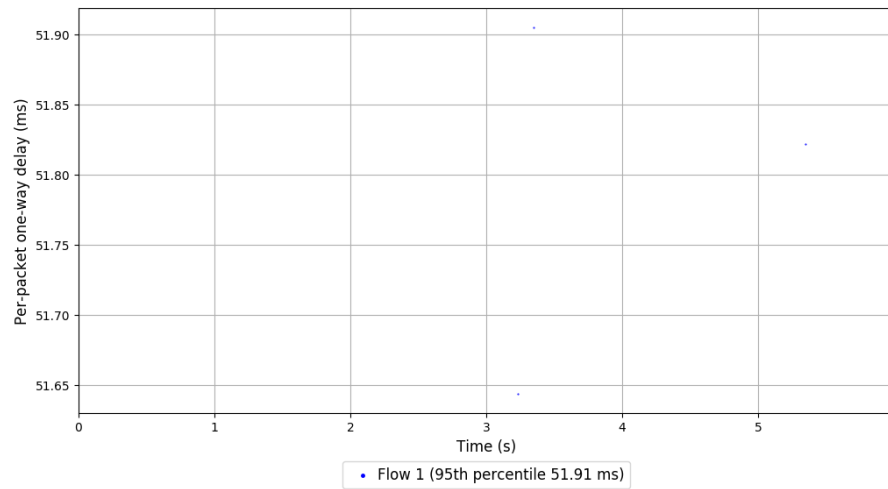
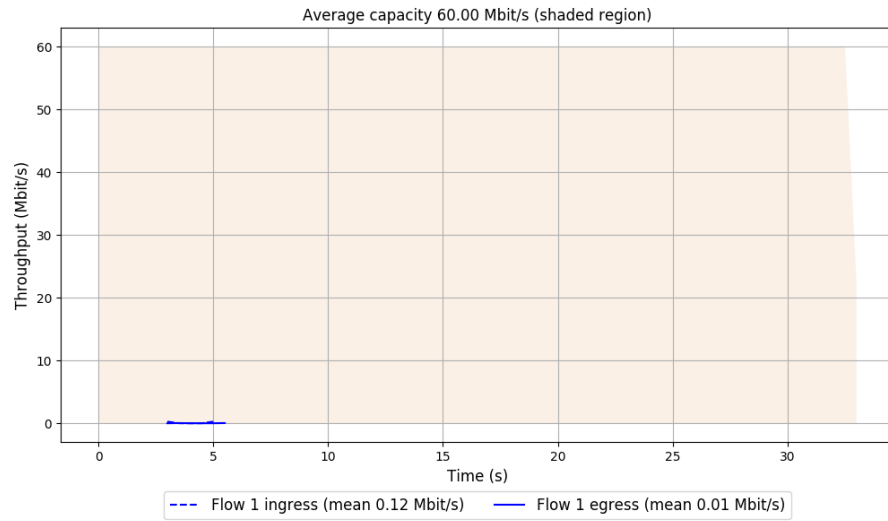


Run 2: Statistics of Copa

Start at: 2019-01-17 06:35:44

End at: 2019-01-17 06:36:14

Run 2: Report of Copa — Data Link

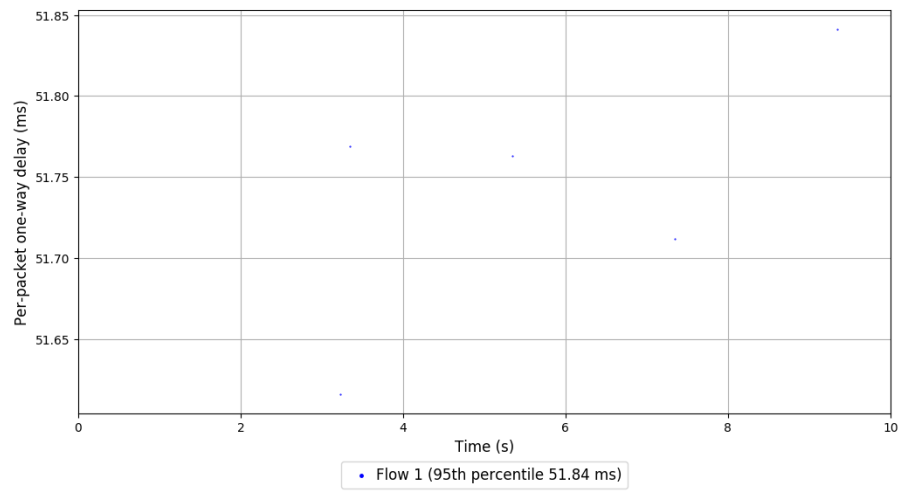
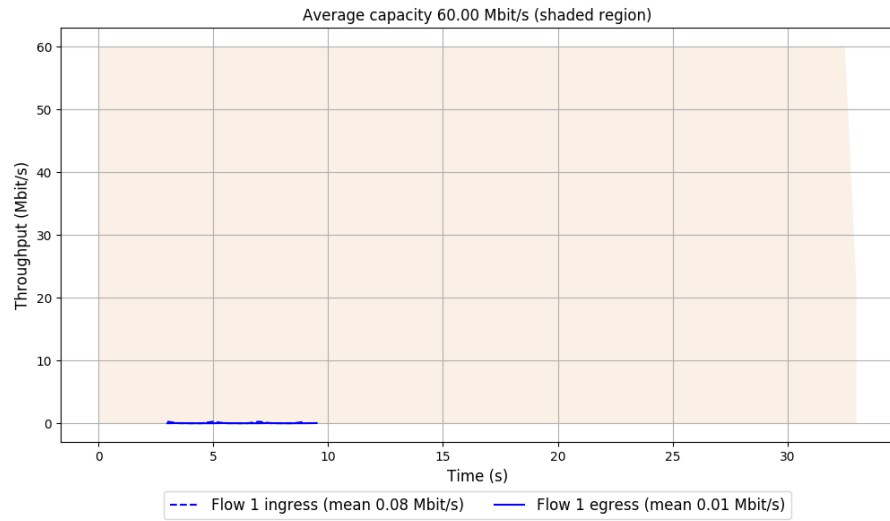


Run 3: Statistics of Copa

Start at: 2019-01-17 06:48:18

End at: 2019-01-17 06:48:48

Run 3: Report of Copa — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2019-01-17 06:25:33

End at: 2019-01-17 06:26:03

Below is generated by plot.py at 2019-01-17 06:56:03

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.31 Mbit/s (0.5% utilization)

95th percentile per-packet one-way delay: 52.003 ms

Loss rate: 8.15%

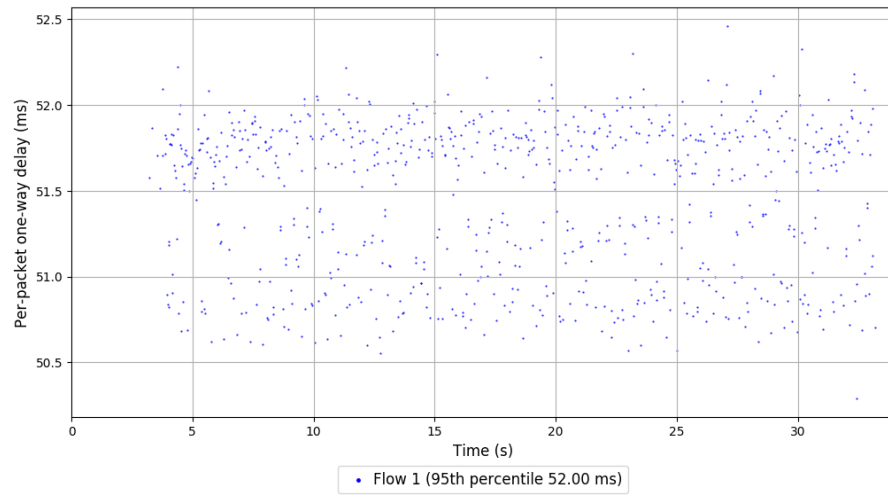
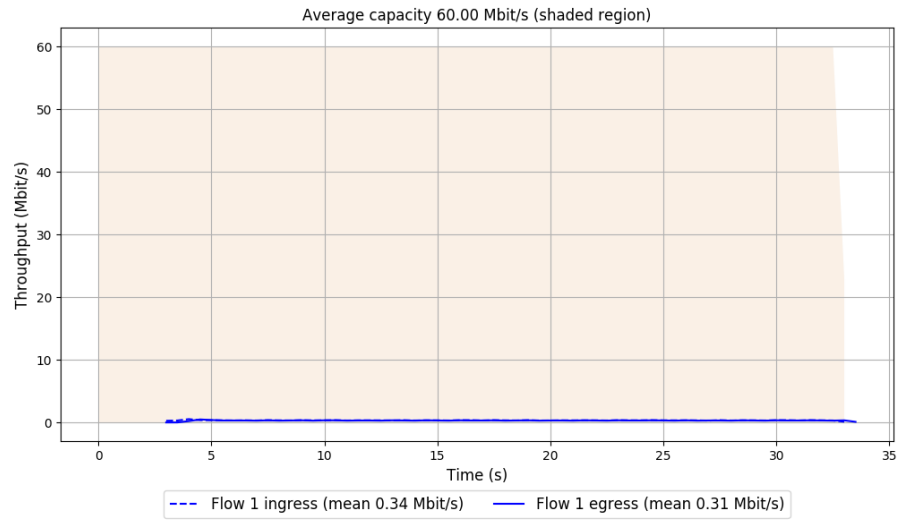
-- Flow 1:

Average throughput: 0.31 Mbit/s

95th percentile per-packet one-way delay: 52.003 ms

Loss rate: 8.15%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2019-01-17 06:38:08

End at: 2019-01-17 06:38:38

Below is generated by plot.py at 2019-01-17 06:56:03

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.31 Mbit/s (0.5% utilization)

95th percentile per-packet one-way delay: 52.031 ms

Loss rate: 8.59%

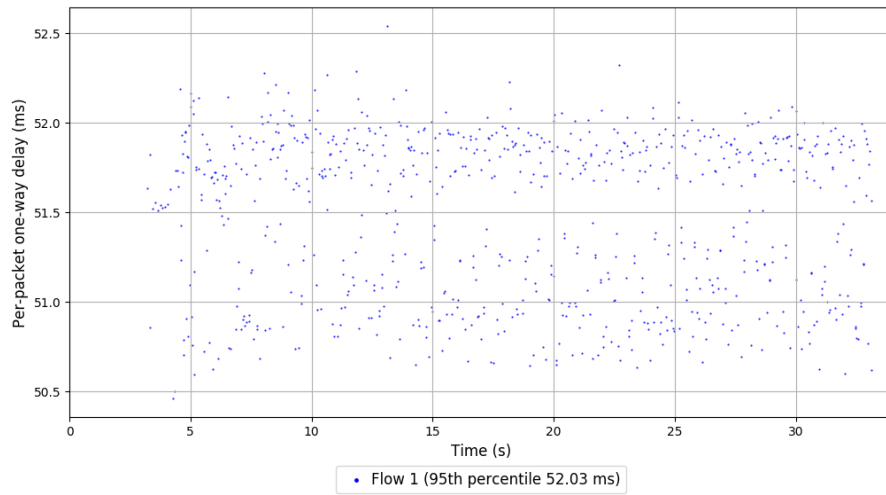
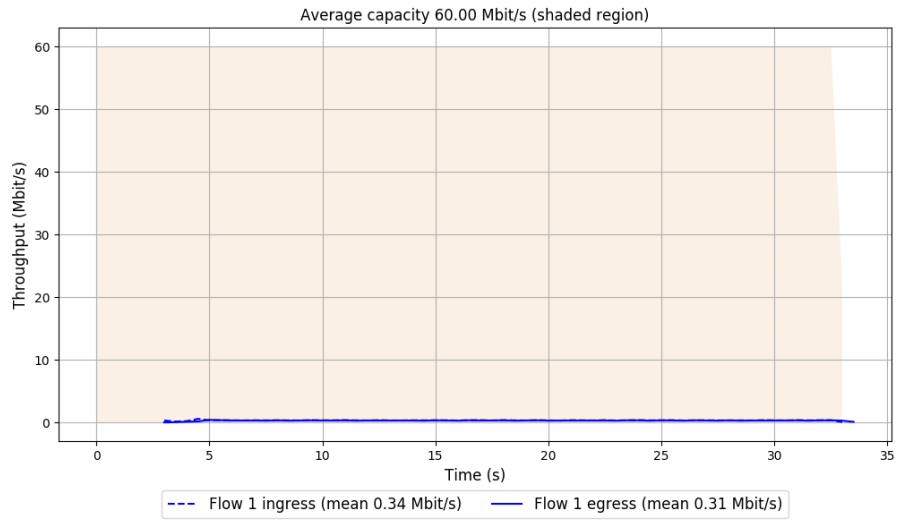
-- Flow 1:

Average throughput: 0.31 Mbit/s

95th percentile per-packet one-way delay: 52.031 ms

Loss rate: 8.59%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2019-01-17 06:50:42

End at: 2019-01-17 06:51:12

Below is generated by plot.py at 2019-01-17 06:56:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.31 Mbit/s (0.5% utilization)

95th percentile per-packet one-way delay: 52.033 ms

Loss rate: 8.14%

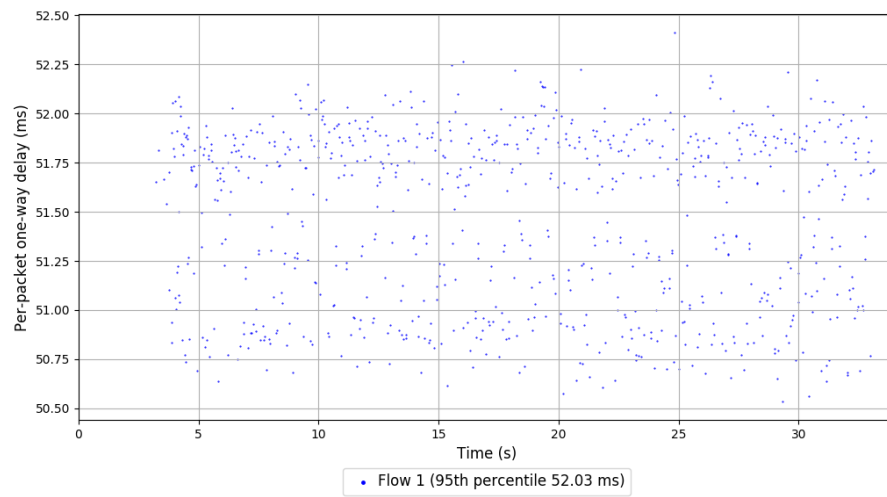
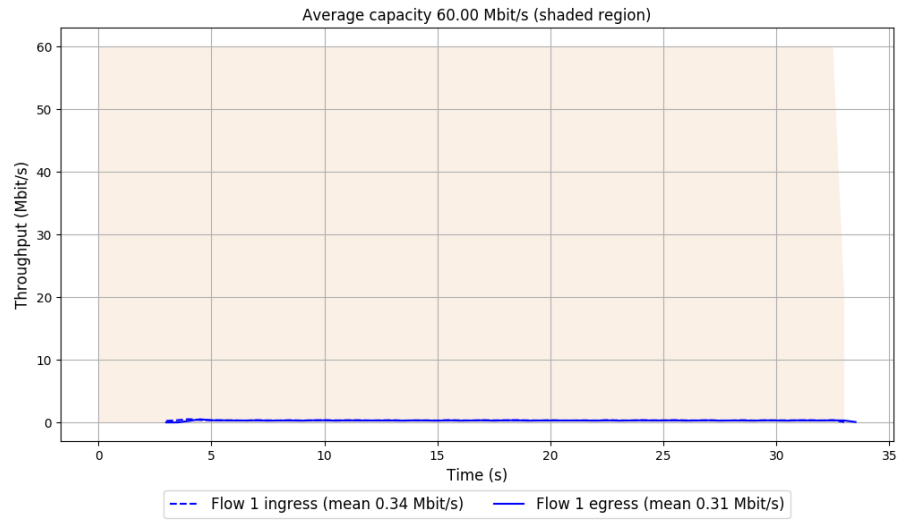
-- Flow 1:

Average throughput: 0.31 Mbit/s

95th percentile per-packet one-way delay: 52.033 ms

Loss rate: 8.14%

Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of FillP

Start at: 2019-01-17 06:23:45

End at: 2019-01-17 06:24:15

Below is generated by plot.py at 2019-01-17 06:56:26

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.32 Mbit/s (2.2% utilization)

95th percentile per-packet one-way delay: 52.237 ms

Loss rate: 49.28%

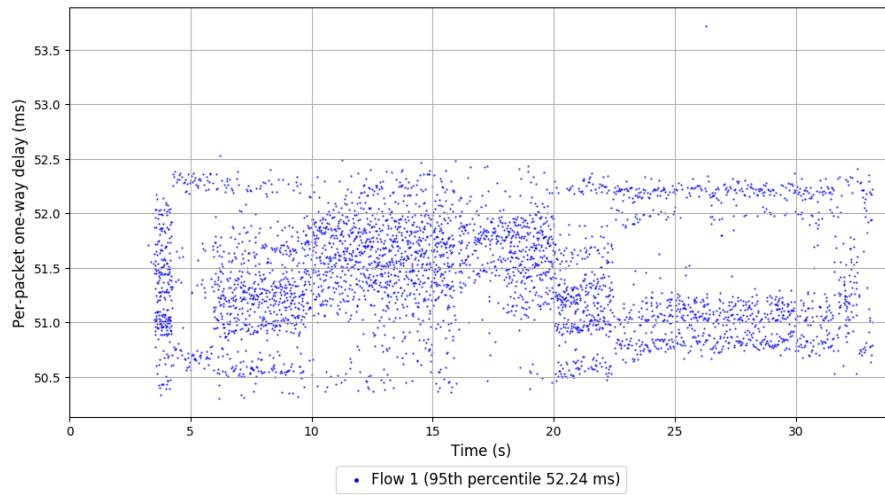
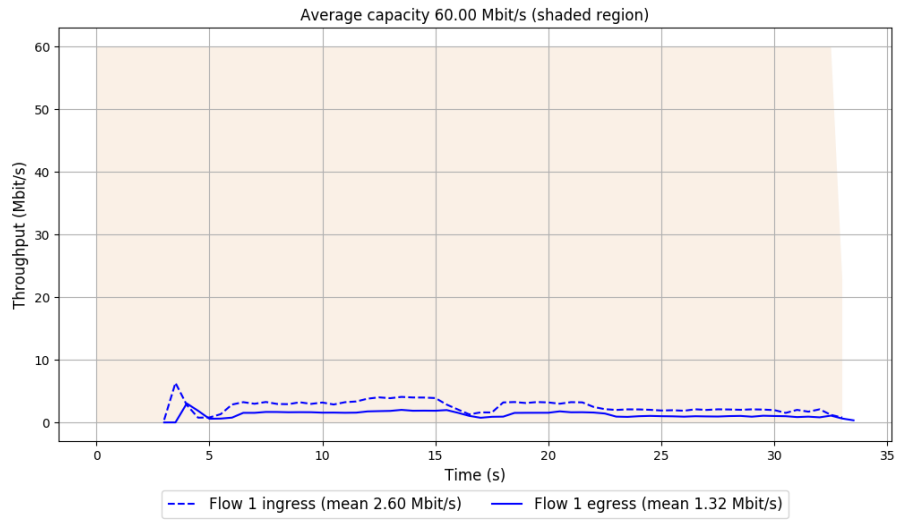
-- Flow 1:

Average throughput: 1.32 Mbit/s

95th percentile per-packet one-way delay: 52.237 ms

Loss rate: 49.28%

Run 1: Report of FillP — Data Link



Run 2: Statistics of FillP

Start at: 2019-01-17 06:36:20

End at: 2019-01-17 06:36:50

Below is generated by plot.py at 2019-01-17 06:56:28

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.39 Mbit/s (2.3% utilization)

95th percentile per-packet one-way delay: 52.221 ms

Loss rate: 47.84%

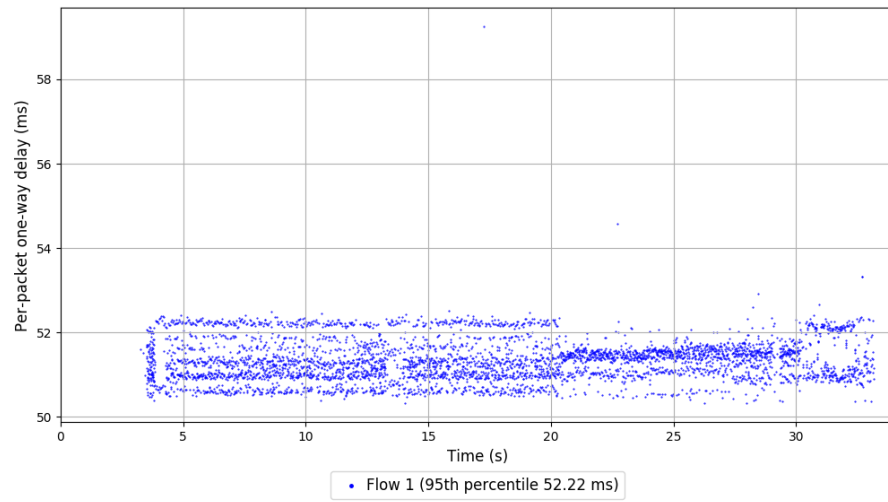
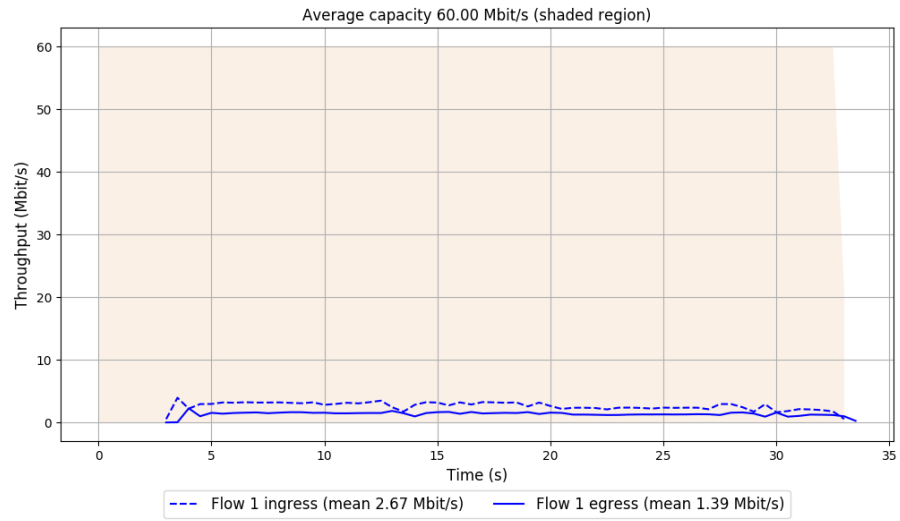
-- Flow 1:

Average throughput: 1.39 Mbit/s

95th percentile per-packet one-way delay: 52.221 ms

Loss rate: 47.84%

Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

Start at: 2019-01-17 06:48:54

End at: 2019-01-17 06:49:24

Below is generated by plot.py at 2019-01-17 06:56:28

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.33 Mbit/s (2.2% utilization)

95th percentile per-packet one-way delay: 52.177 ms

Loss rate: 42.71%

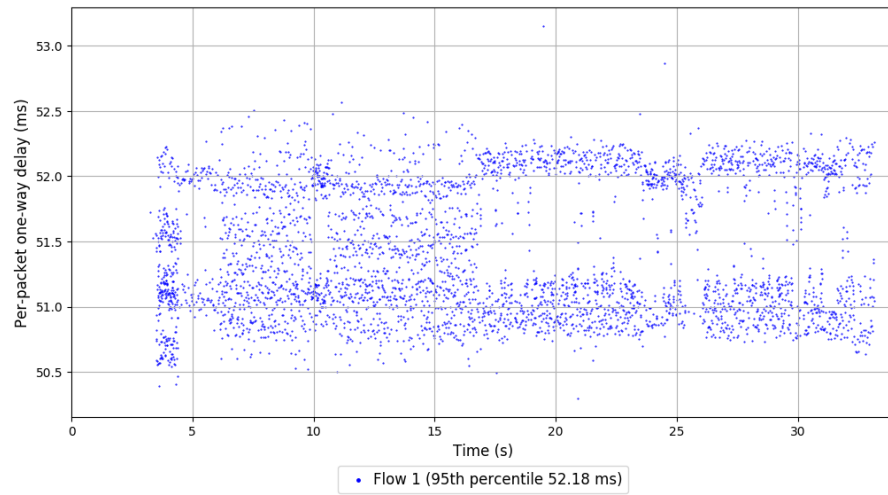
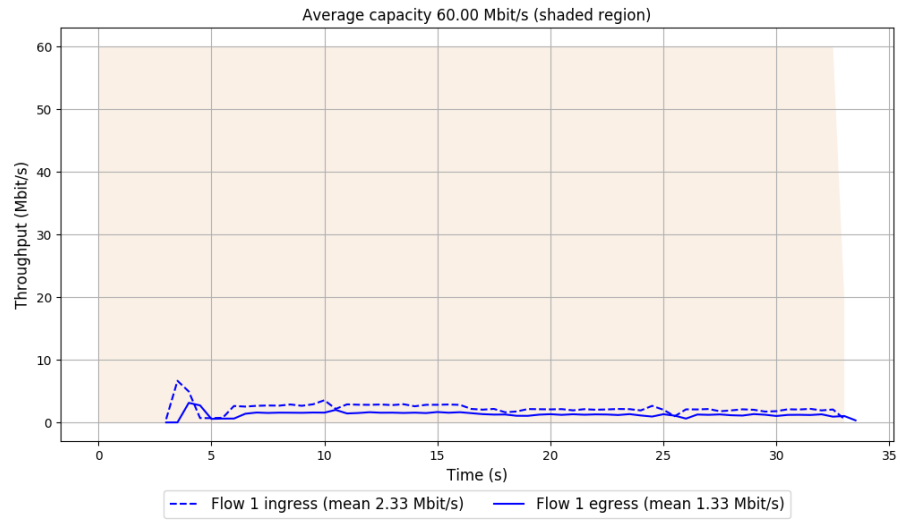
-- Flow 1:

Average throughput: 1.33 Mbit/s

95th percentile per-packet one-way delay: 52.177 ms

Loss rate: 42.71%

Run 3: Report of FillP — Data Link



Run 1: Statistics of FillP-Sheep

Start at: 2019-01-17 06:26:09

End at: 2019-01-17 06:26:39

Below is generated by plot.py at 2019-01-17 06:56:28

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.15 Mbit/s (1.9% utilization)

95th percentile per-packet one-way delay: 52.097 ms

Loss rate: 45.27%

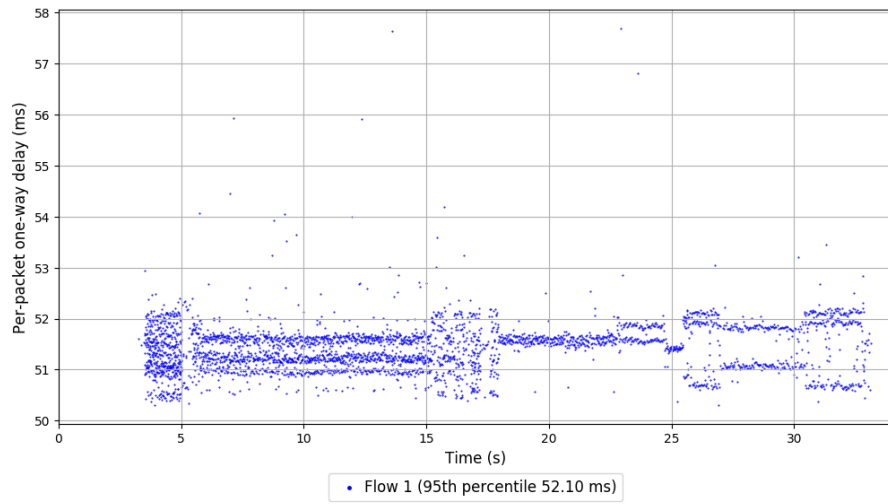
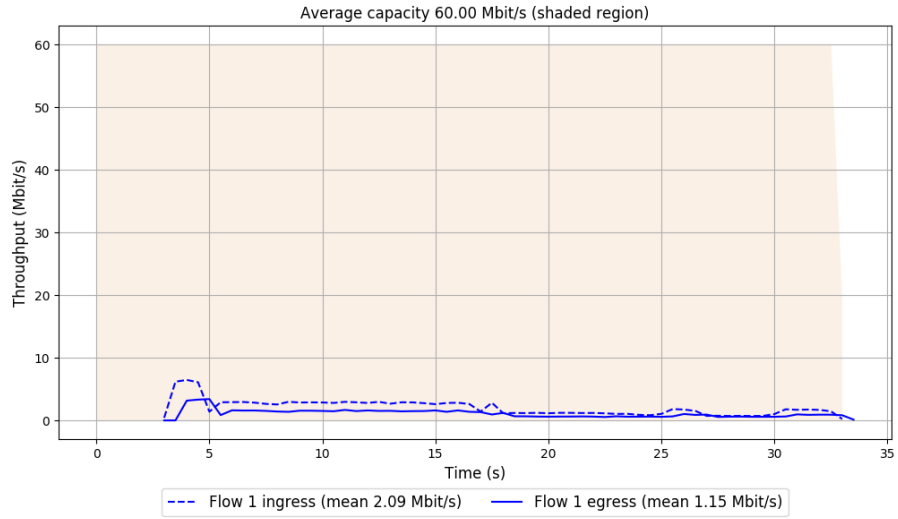
-- Flow 1:

Average throughput: 1.15 Mbit/s

95th percentile per-packet one-way delay: 52.097 ms

Loss rate: 45.27%

Run 1: Report of FillP-Sheep — Data Link



Run 2: Statistics of FillP-Sheep

Start at: 2019-01-17 06:38:43

End at: 2019-01-17 06:39:13

Below is generated by plot.py at 2019-01-17 06:56:28

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.09 Mbit/s (1.8% utilization)

95th percentile per-packet one-way delay: 52.160 ms

Loss rate: 46.18%

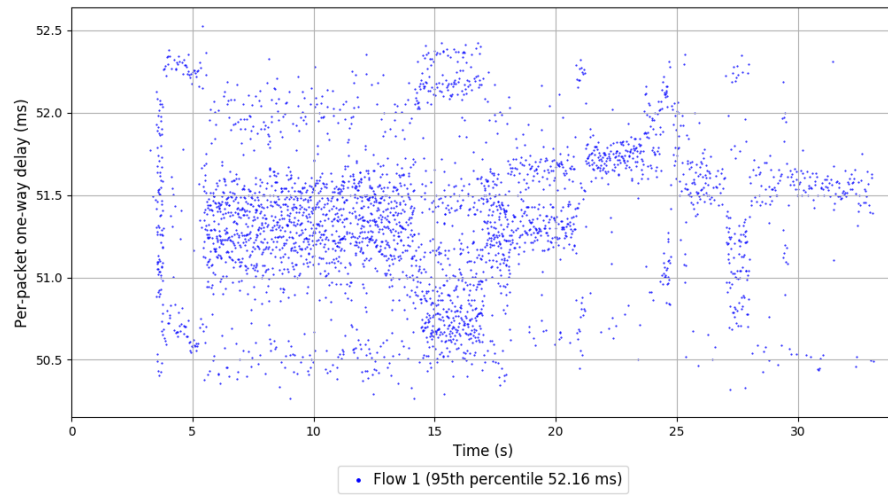
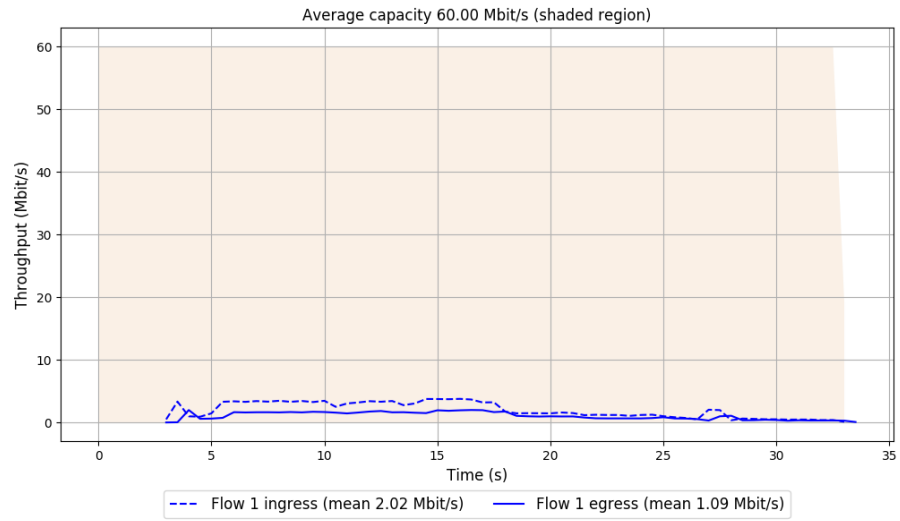
-- Flow 1:

Average throughput: 1.09 Mbit/s

95th percentile per-packet one-way delay: 52.160 ms

Loss rate: 46.18%

Run 2: Report of FillP-Sheep — Data Link



Run 3: Statistics of FillP-Sheep

Start at: 2019-01-17 06:51:18

End at: 2019-01-17 06:51:48

Below is generated by plot.py at 2019-01-17 06:56:28

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.40 Mbit/s (0.7% utilization)

95th percentile per-packet one-way delay: 51.976 ms

Loss rate: 33.76%

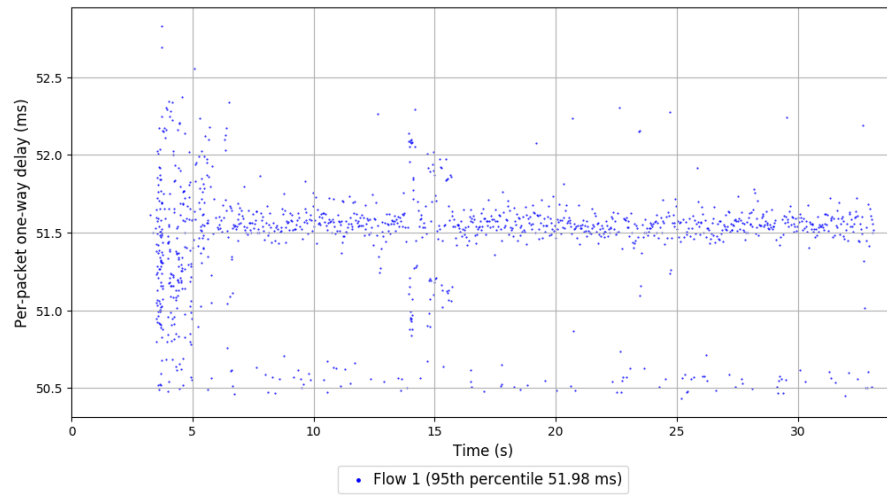
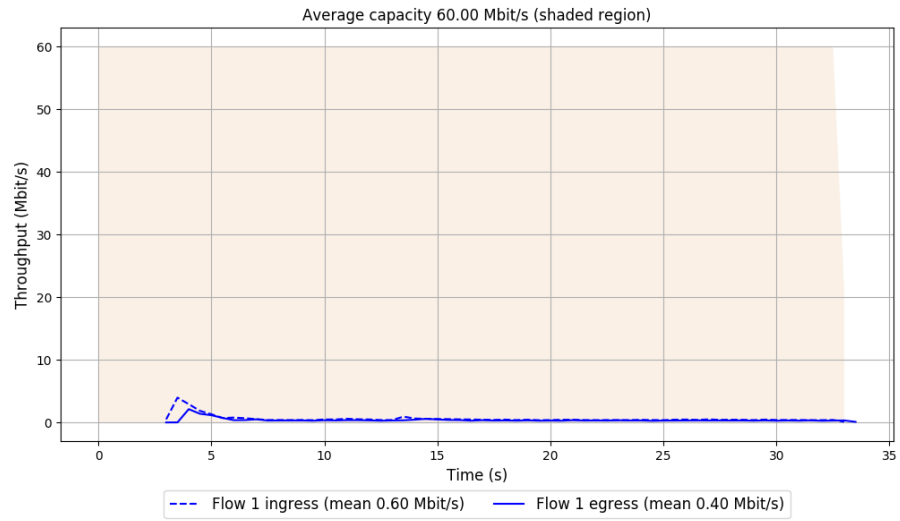
-- Flow 1:

Average throughput: 0.40 Mbit/s

95th percentile per-packet one-way delay: 51.976 ms

Loss rate: 33.76%

Run 3: Report of FillP-Sheep — Data Link



Run 1: Statistics of Indigo

Start at: 2019-01-17 06:20:45

End at: 2019-01-17 06:21:15

Below is generated by plot.py at 2019-01-17 06:56:53

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 2.13 Mbit/s (3.5% utilization)

95th percentile per-packet one-way delay: 52.127 ms

Loss rate: 97.40%

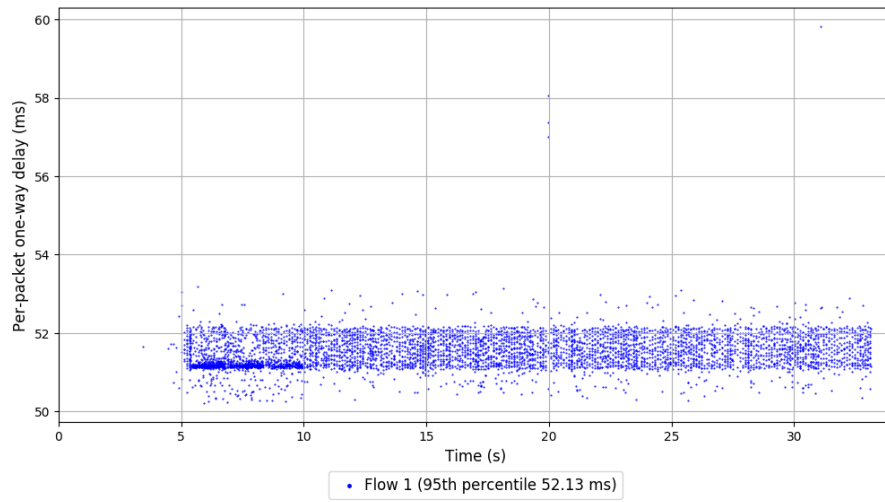
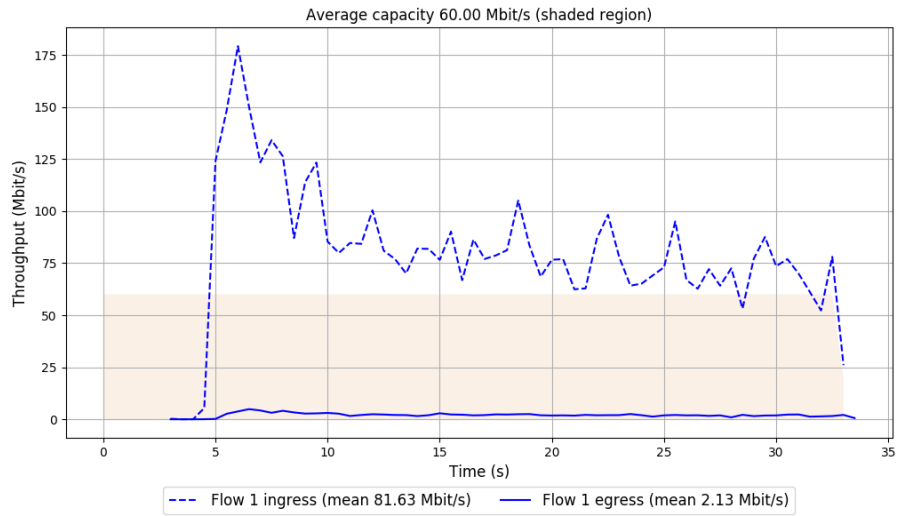
-- Flow 1:

Average throughput: 2.13 Mbit/s

95th percentile per-packet one-way delay: 52.127 ms

Loss rate: 97.40%

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2019-01-17 06:33:19

End at: 2019-01-17 06:33:49

Below is generated by plot.py at 2019-01-17 06:57:10

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 2.23 Mbit/s (3.7% utilization)

95th percentile per-packet one-way delay: 52.130 ms

Loss rate: 97.29%

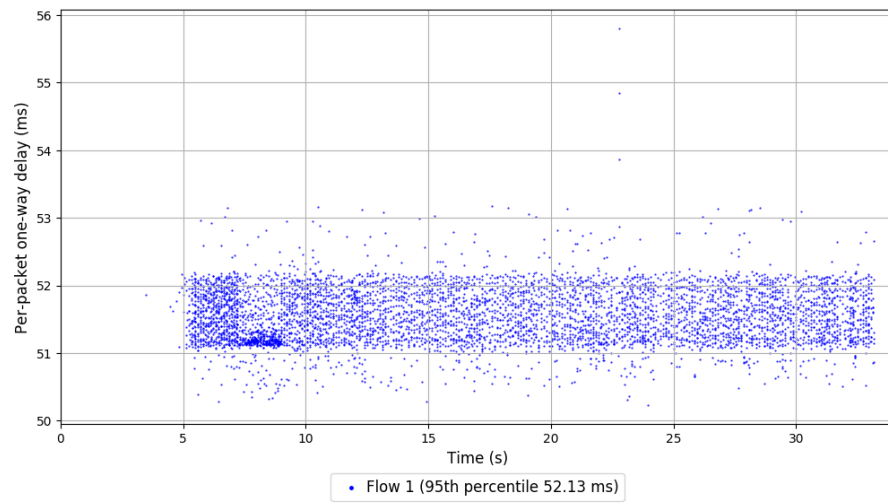
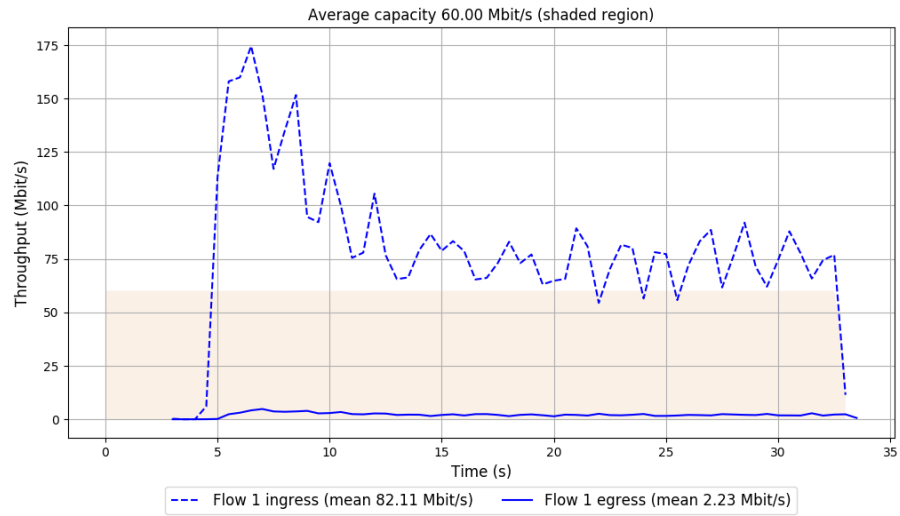
-- Flow 1:

Average throughput: 2.23 Mbit/s

95th percentile per-packet one-way delay: 52.130 ms

Loss rate: 97.29%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2019-01-17 06:45:54

End at: 2019-01-17 06:46:24

Below is generated by plot.py at 2019-01-17 06:57:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 2.45 Mbit/s (4.1% utilization)

95th percentile per-packet one-way delay: 52.118 ms

Loss rate: 97.31%

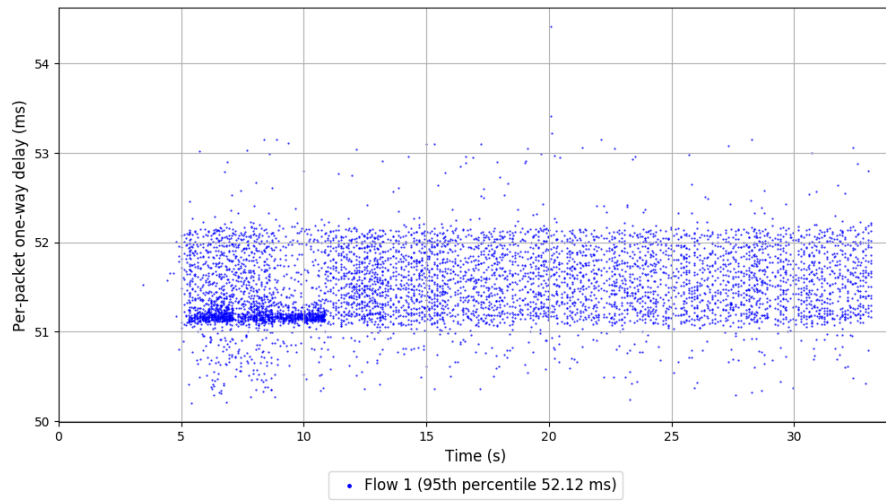
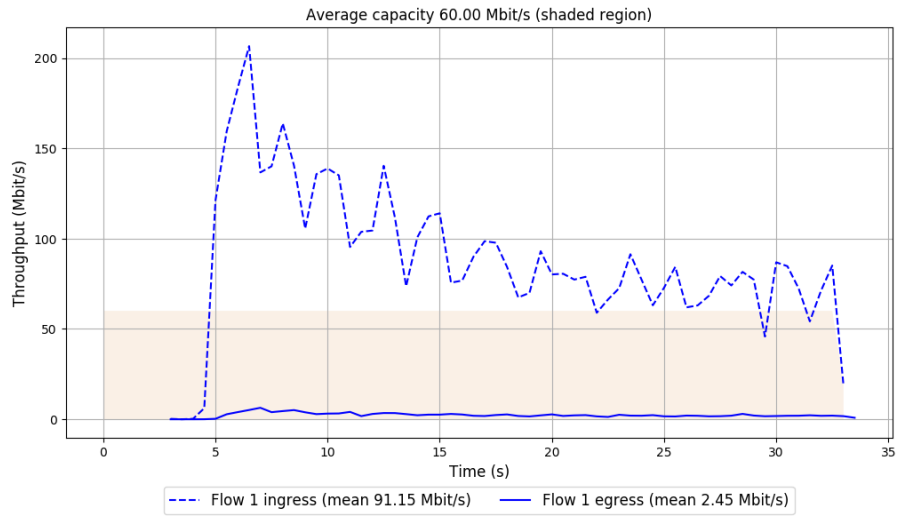
-- Flow 1:

Average throughput: 2.45 Mbit/s

95th percentile per-packet one-way delay: 52.118 ms

Loss rate: 97.31%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of Indigo-MusesC3

Start at: 2019-01-17 06:29:09

End at: 2019-01-17 06:29:39

Below is generated by plot.py at 2019-01-17 06:57:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.48 Mbit/s (2.5% utilization)

95th percentile per-packet one-way delay: 52.209 ms

Loss rate: 29.90%

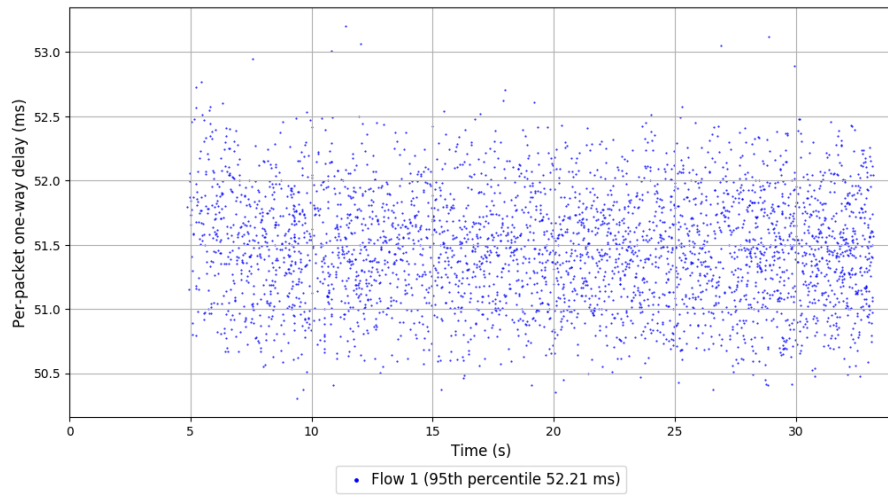
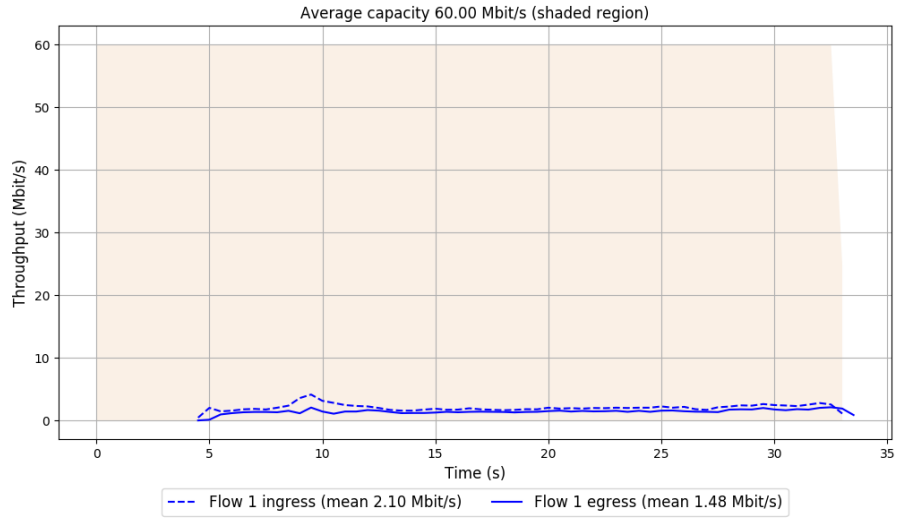
-- Flow 1:

Average throughput: 1.48 Mbit/s

95th percentile per-packet one-way delay: 52.209 ms

Loss rate: 29.90%

Run 1: Report of Indigo-MusesC3 — Data Link



Run 2: Statistics of Indigo-MusesC3

Start at: 2019-01-17 06:41:43

End at: 2019-01-17 06:42:13

Below is generated by plot.py at 2019-01-17 06:57:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.52 Mbit/s (2.5% utilization)

95th percentile per-packet one-way delay: 52.131 ms

Loss rate: 28.01%

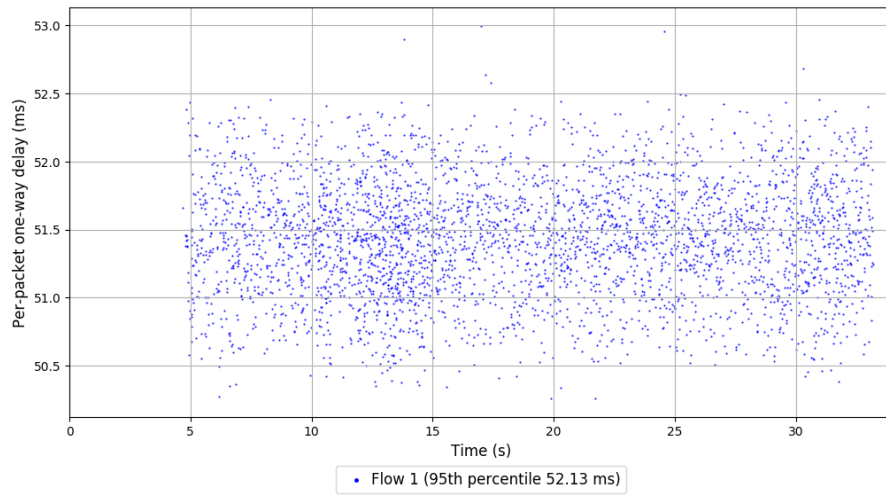
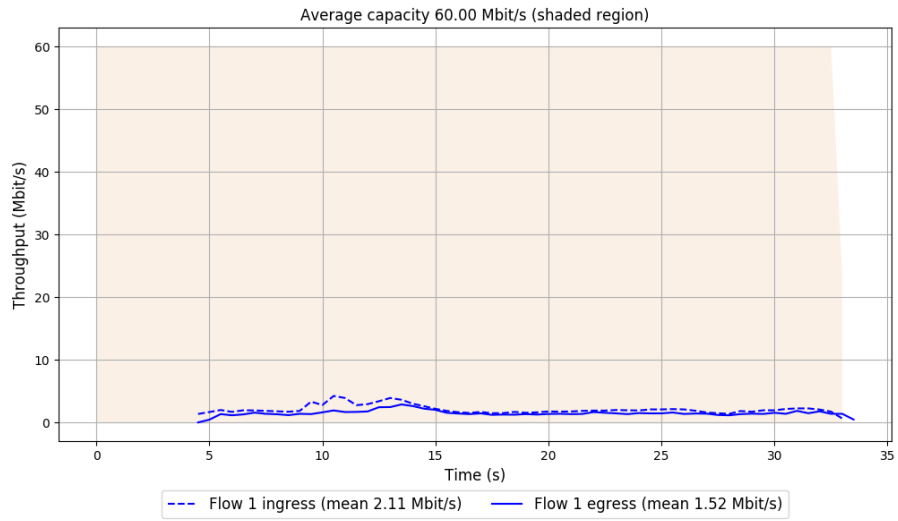
-- Flow 1:

Average throughput: 1.52 Mbit/s

95th percentile per-packet one-way delay: 52.131 ms

Loss rate: 28.01%

Run 2: Report of Indigo-MusesC3 — Data Link



Run 3: Statistics of Indigo-MusesC3

Start at: 2019-01-17 06:54:17

End at: 2019-01-17 06:54:48

Below is generated by plot.py at 2019-01-17 06:57:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.46 Mbit/s (2.4% utilization)

95th percentile per-packet one-way delay: 52.140 ms

Loss rate: 29.18%

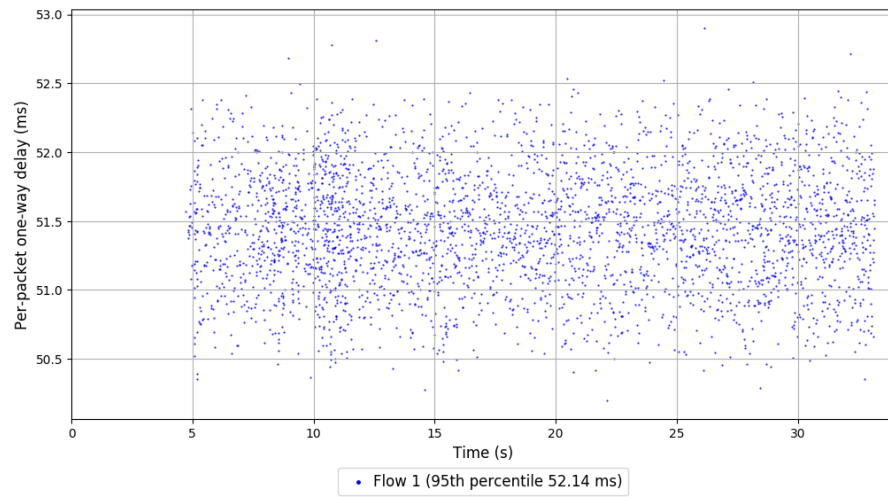
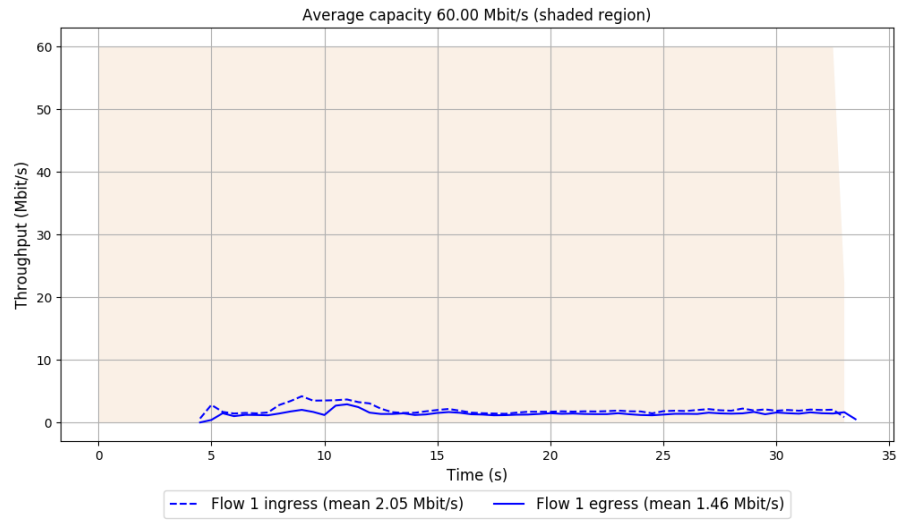
-- Flow 1:

Average throughput: 1.46 Mbit/s

95th percentile per-packet one-way delay: 52.140 ms

Loss rate: 29.18%

Run 3: Report of Indigo-MusesC3 — Data Link



Run 1: Statistics of Indigo-MusesC5

Start at: 2019-01-17 06:20:09

End at: 2019-01-17 06:20:39

Below is generated by plot.py at 2019-01-17 06:57:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.19 Mbit/s (2.0% utilization)

95th percentile per-packet one-way delay: 52.186 ms

Loss rate: 49.86%

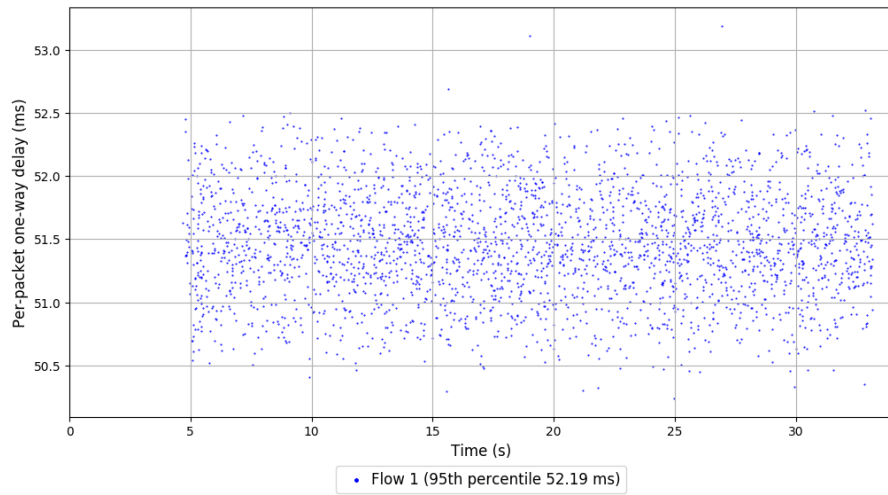
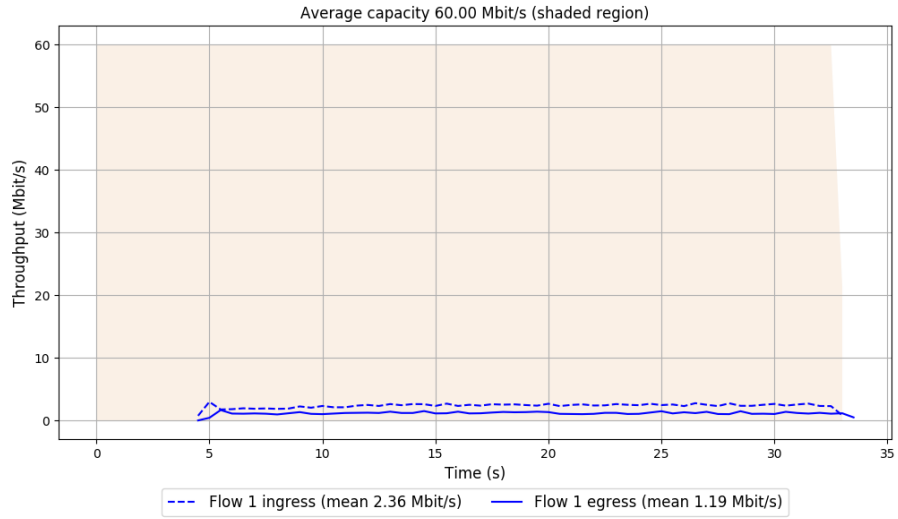
-- Flow 1:

Average throughput: 1.19 Mbit/s

95th percentile per-packet one-way delay: 52.186 ms

Loss rate: 49.86%

Run 1: Report of Indigo-MusesC5 — Data Link



Run 2: Statistics of Indigo-MusesC5

Start at: 2019-01-17 06:32:44

End at: 2019-01-17 06:33:14

Below is generated by plot.py at 2019-01-17 06:57:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.08 Mbit/s (1.8% utilization)

95th percentile per-packet one-way delay: 52.175 ms

Loss rate: 40.60%

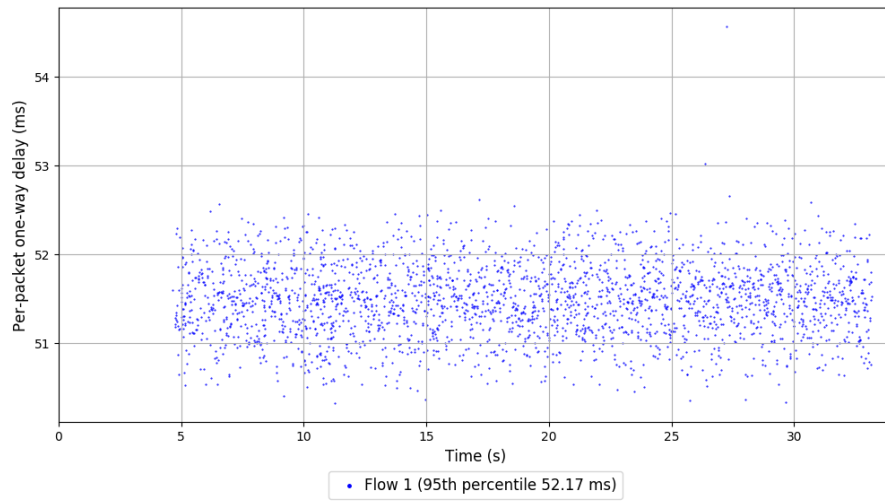
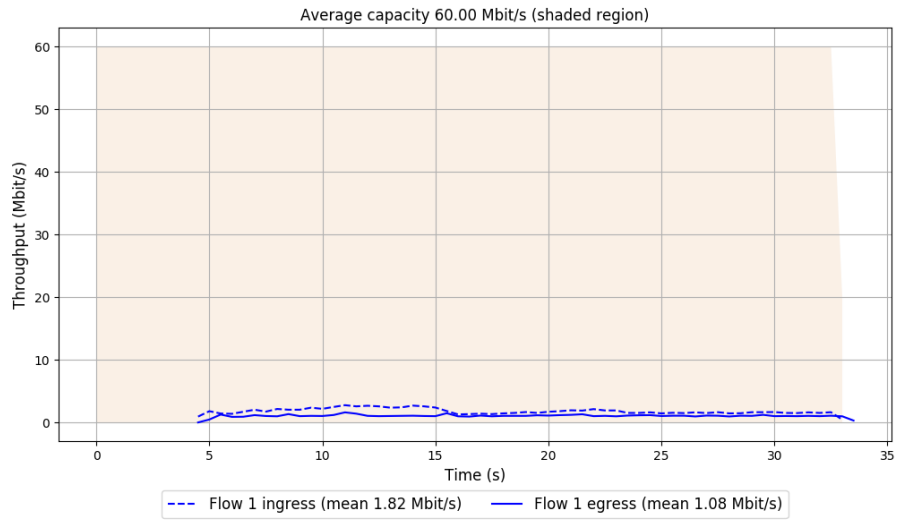
-- Flow 1:

Average throughput: 1.08 Mbit/s

95th percentile per-packet one-way delay: 52.175 ms

Loss rate: 40.60%

Run 2: Report of Indigo-MusesC5 — Data Link



Run 3: Statistics of Indigo-MusesC5

Start at: 2019-01-17 06:45:18

End at: 2019-01-17 06:45:48

Below is generated by plot.py at 2019-01-17 06:57:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.28 Mbit/s (2.1% utilization)

95th percentile per-packet one-way delay: 52.233 ms

Loss rate: 45.33%

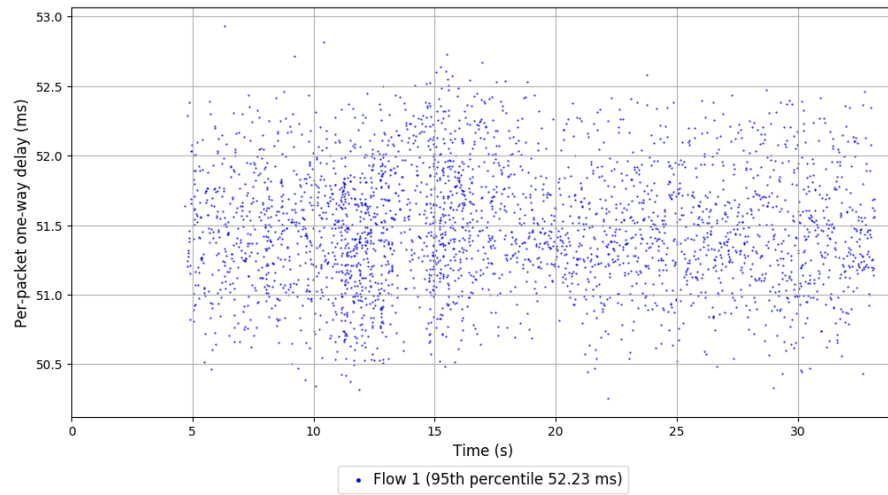
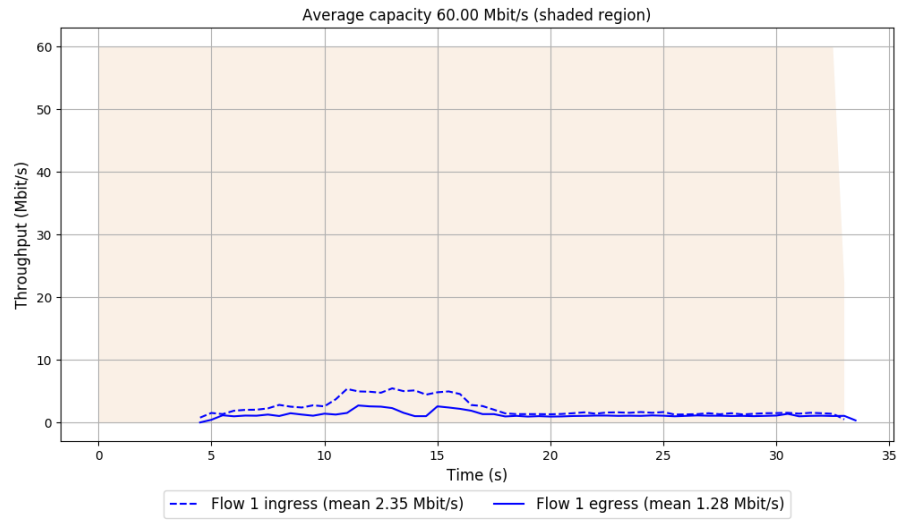
-- Flow 1:

Average throughput: 1.28 Mbit/s

95th percentile per-packet one-way delay: 52.233 ms

Loss rate: 45.33%

Run 3: Report of Indigo-MusesC5 — Data Link



Run 1: Statistics of Indigo-MusesD

Start at: 2019-01-17 06:21:57

End at: 2019-01-17 06:22:27

Below is generated by plot.py at 2019-01-17 06:57:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.10 Mbit/s (1.8% utilization)

95th percentile per-packet one-way delay: 52.188 ms

Loss rate: 37.95%

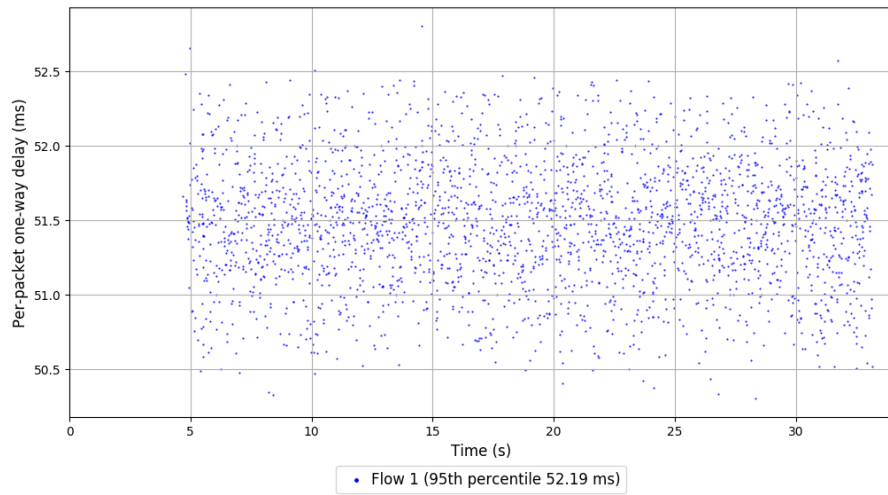
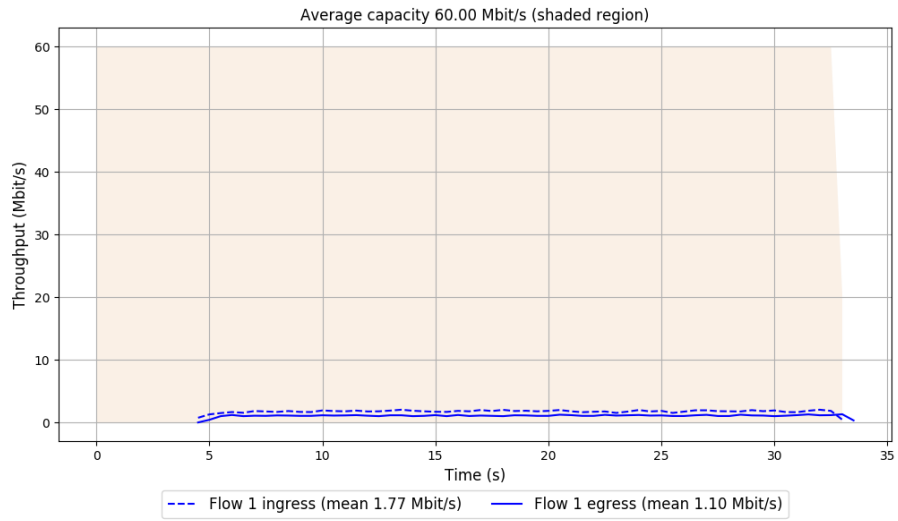
-- Flow 1:

Average throughput: 1.10 Mbit/s

95th percentile per-packet one-way delay: 52.188 ms

Loss rate: 37.95%

Run 1: Report of Indigo-MusesD — Data Link



Run 2: Statistics of Indigo-MusesD

Start at: 2019-01-17 06:34:32

End at: 2019-01-17 06:35:02

Below is generated by plot.py at 2019-01-17 06:57:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.13 Mbit/s (1.9% utilization)

95th percentile per-packet one-way delay: 52.181 ms

Loss rate: 37.72%

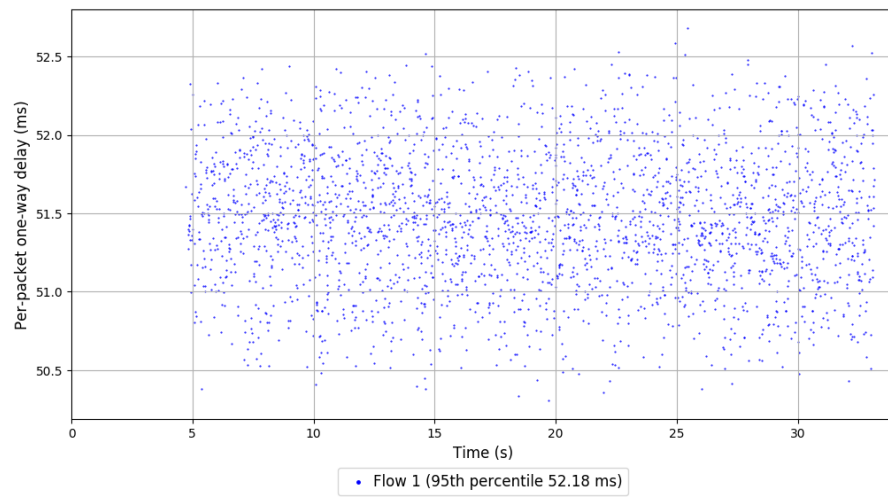
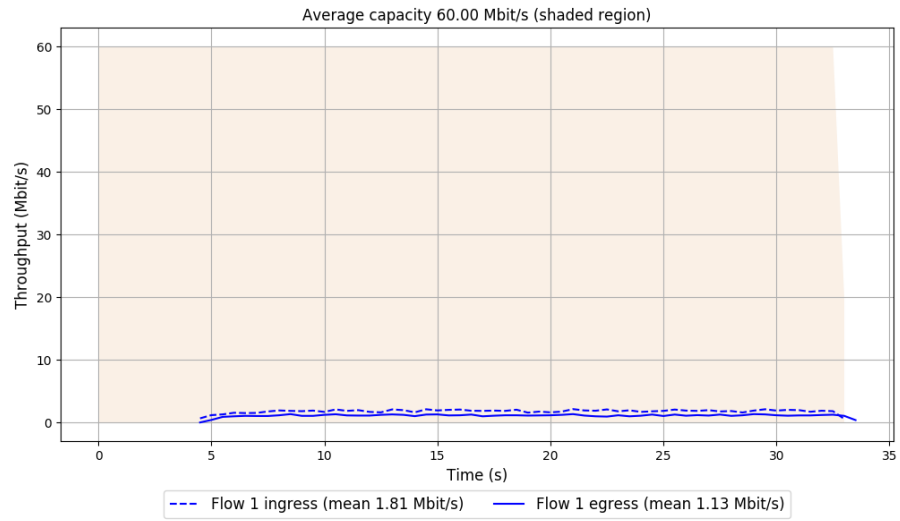
-- Flow 1:

Average throughput: 1.13 Mbit/s

95th percentile per-packet one-way delay: 52.181 ms

Loss rate: 37.72%

Run 2: Report of Indigo-MusesD — Data Link



Run 3: Statistics of Indigo-MusesD

Start at: 2019-01-17 06:47:07

End at: 2019-01-17 06:47:37

Below is generated by plot.py at 2019-01-17 06:57:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.07 Mbit/s (1.8% utilization)

95th percentile per-packet one-way delay: 52.210 ms

Loss rate: 37.04%

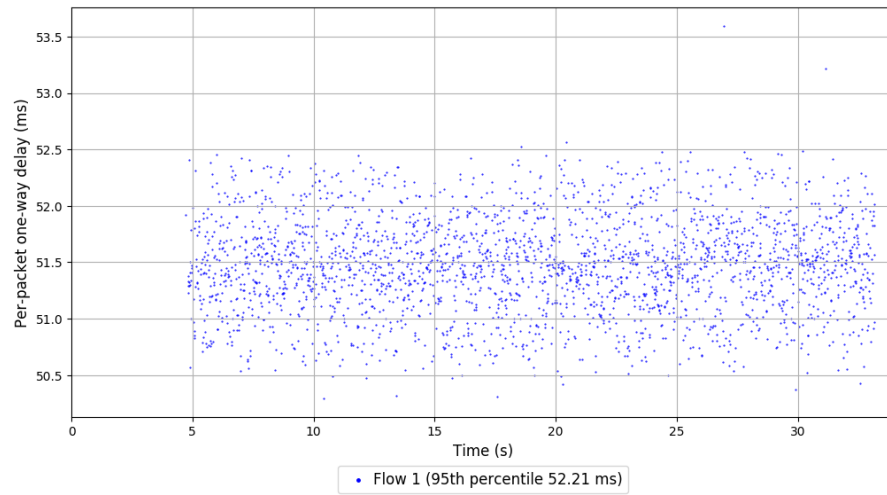
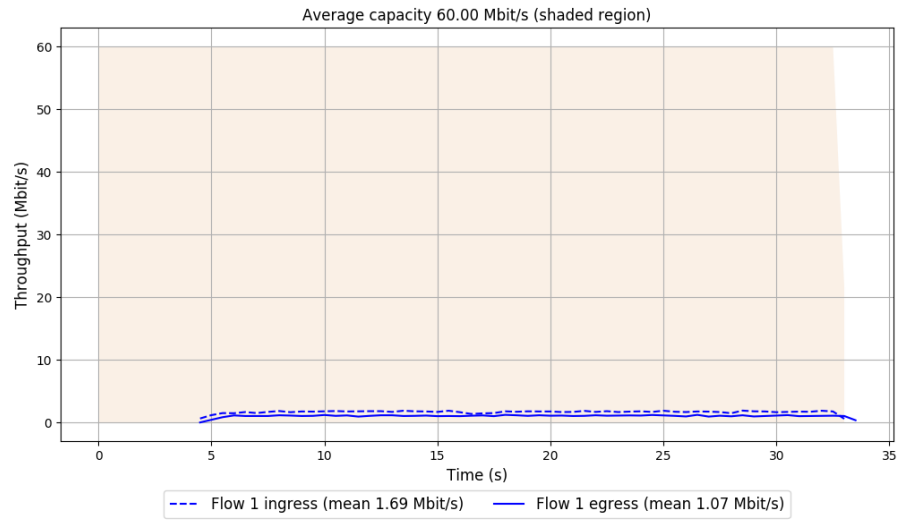
-- Flow 1:

Average throughput: 1.07 Mbit/s

95th percentile per-packet one-way delay: 52.210 ms

Loss rate: 37.04%

Run 3: Report of Indigo-MusesD — Data Link



Run 1: Statistics of Indigo-MuseST

Start at: 2019-01-17 06:18:57

End at: 2019-01-17 06:19:27

Below is generated by plot.py at 2019-01-17 06:57:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.52 Mbit/s (2.5% utilization)

95th percentile per-packet one-way delay: 52.146 ms

Loss rate: 21.03%

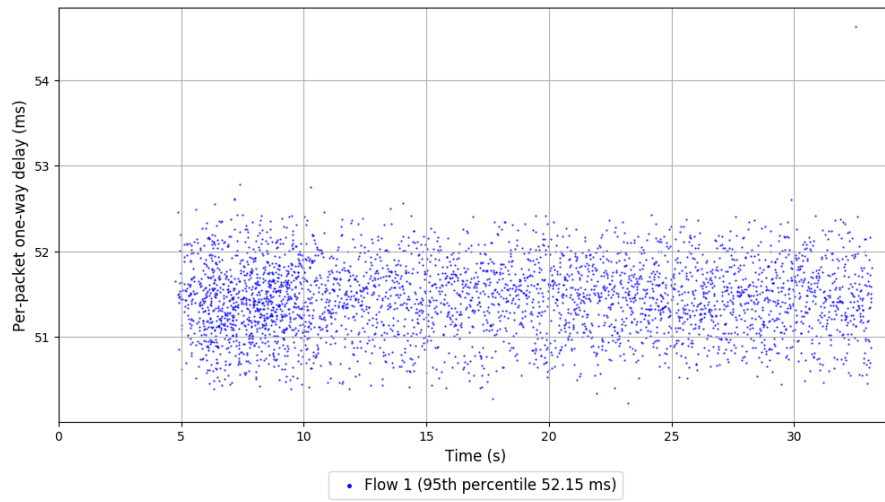
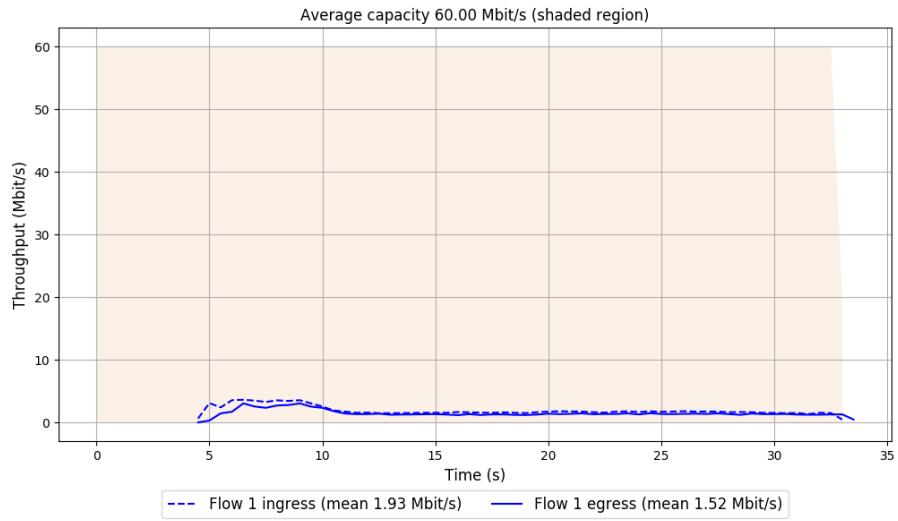
-- Flow 1:

Average throughput: 1.52 Mbit/s

95th percentile per-packet one-way delay: 52.146 ms

Loss rate: 21.03%

Run 1: Report of Indigo-MusesT — Data Link



Run 2: Statistics of Indigo-MuseST

Start at: 2019-01-17 06:31:32

End at: 2019-01-17 06:32:02

Below is generated by plot.py at 2019-01-17 06:57:20

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 2.66 Mbit/s (4.4% utilization)

95th percentile per-packet one-way delay: 52.115 ms

Loss rate: 19.60%

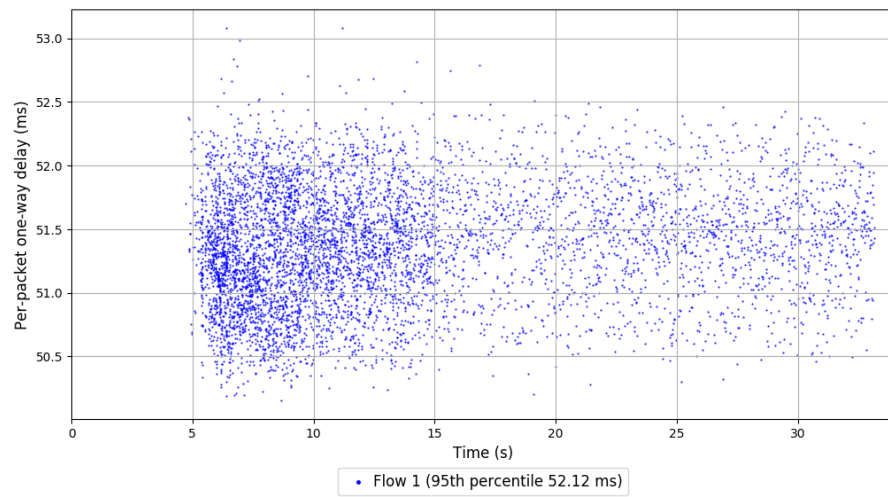
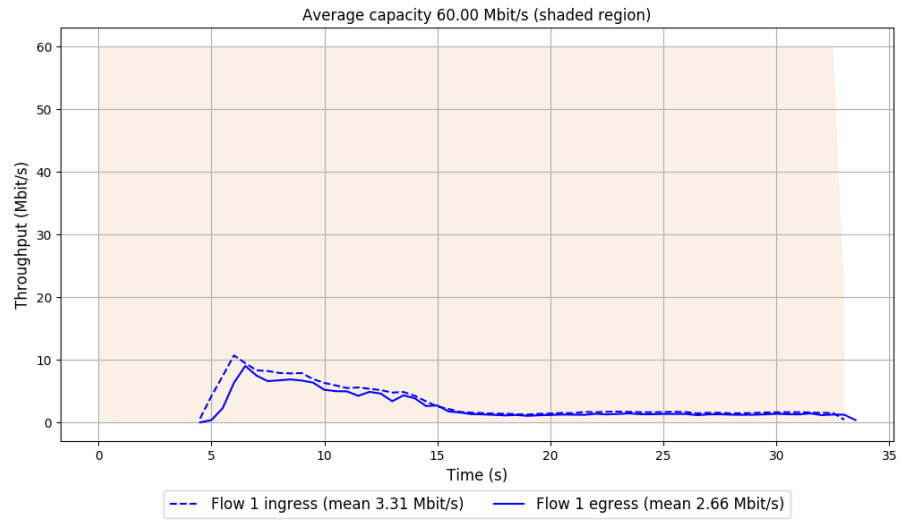
-- Flow 1:

Average throughput: 2.66 Mbit/s

95th percentile per-packet one-way delay: 52.115 ms

Loss rate: 19.60%

Run 2: Report of Indigo-MusesT — Data Link



Run 3: Statistics of Indigo-MuseST

Start at: 2019-01-17 06:44:06

End at: 2019-01-17 06:44:36

Below is generated by plot.py at 2019-01-17 06:57:36

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 1.48 Mbit/s (2.5% utilization)

95th percentile per-packet one-way delay: 52.160 ms

Loss rate: 24.05%

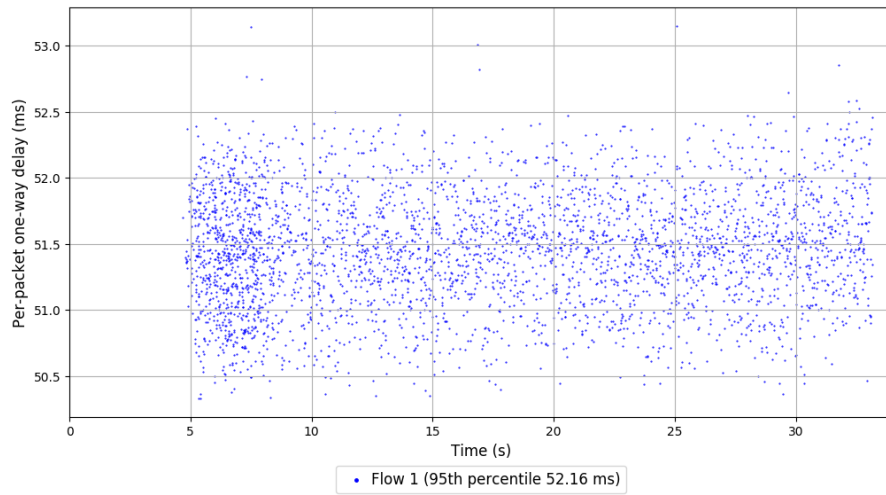
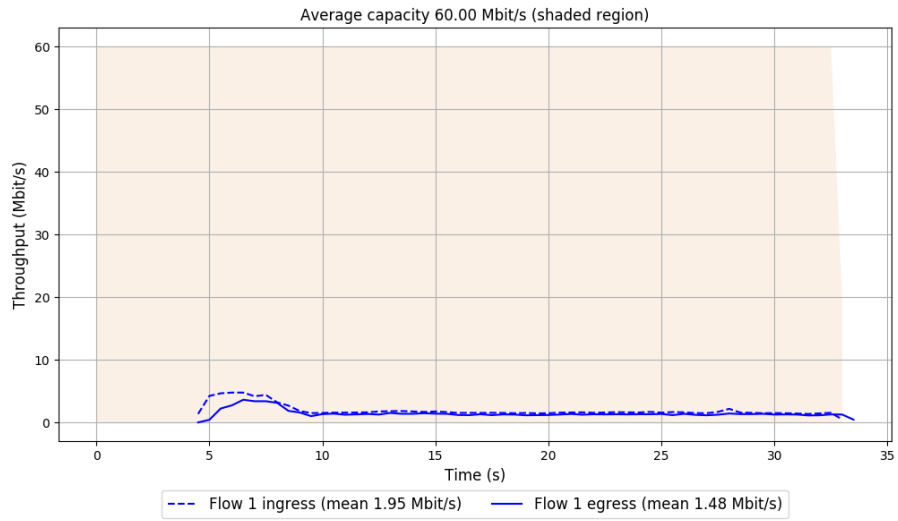
-- Flow 1:

Average throughput: 1.48 Mbit/s

95th percentile per-packet one-way delay: 52.160 ms

Loss rate: 24.05%

Run 3: Report of Indigo-MusesT — Data Link



Run 1: Statistics of LEDBAT

Start at: 2019-01-17 06:27:57

End at: 2019-01-17 06:28:27

Below is generated by plot.py at 2019-01-17 06:57:38

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.09 Mbit/s (0.2% utilization)

95th percentile per-packet one-way delay: 51.674 ms

Loss rate: 46.27%

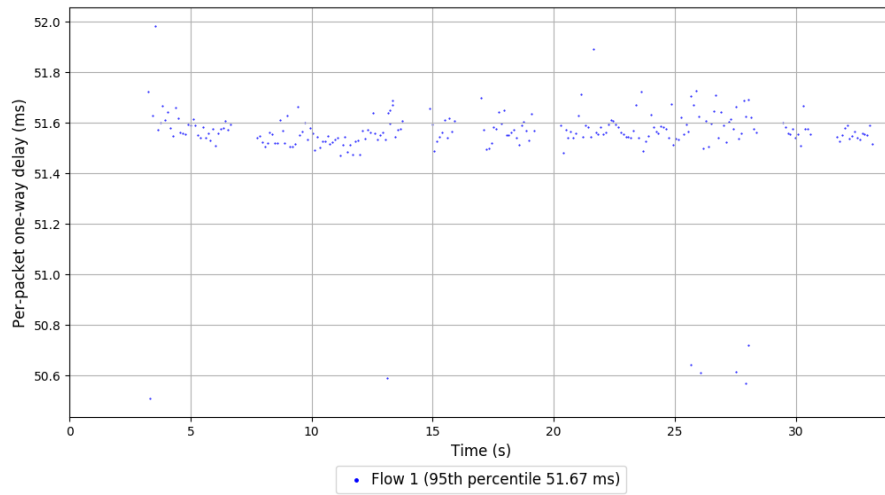
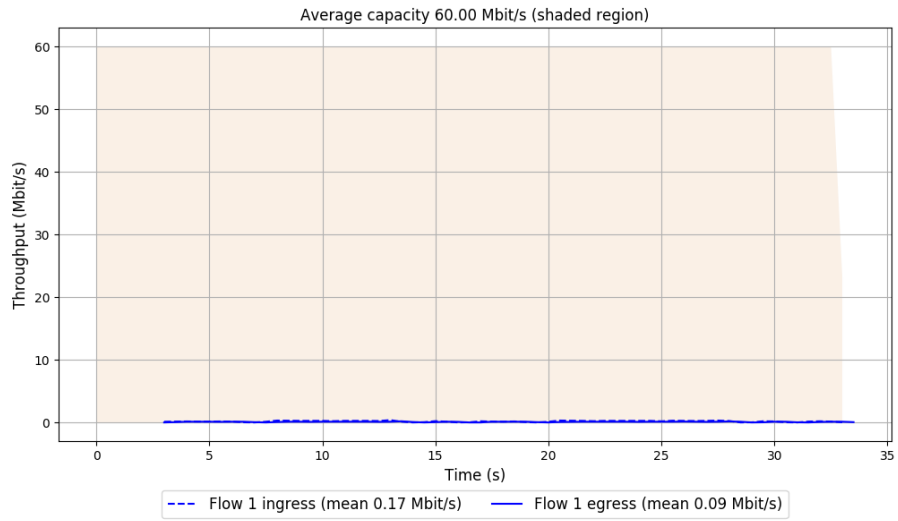
-- Flow 1:

Average throughput: 0.09 Mbit/s

95th percentile per-packet one-way delay: 51.674 ms

Loss rate: 46.27%

Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2019-01-17 06:40:32

End at: 2019-01-17 06:41:02

Below is generated by plot.py at 2019-01-17 06:57:38

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.10 Mbit/s (0.2% utilization)

95th percentile per-packet one-way delay: 51.622 ms

Loss rate: 37.98%

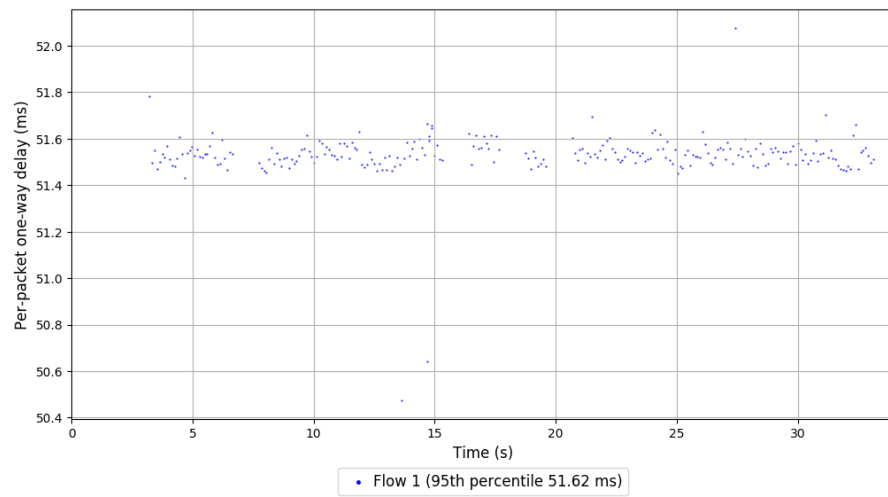
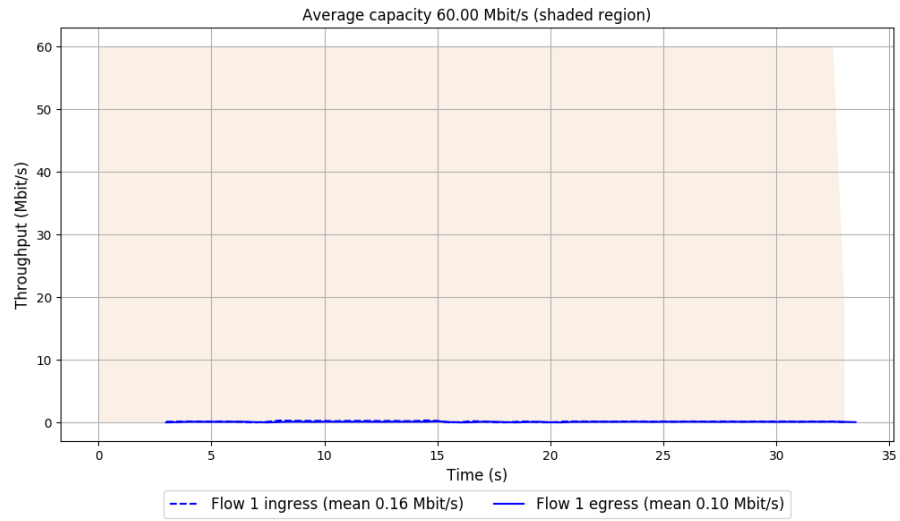
-- Flow 1:

Average throughput: 0.10 Mbit/s

95th percentile per-packet one-way delay: 51.622 ms

Loss rate: 37.98%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2019-01-17 06:53:06

End at: 2019-01-17 06:53:36

Below is generated by plot.py at 2019-01-17 06:57:39

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.11 Mbit/s (0.2% utilization)

95th percentile per-packet one-way delay: 51.674 ms

Loss rate: 49.90%

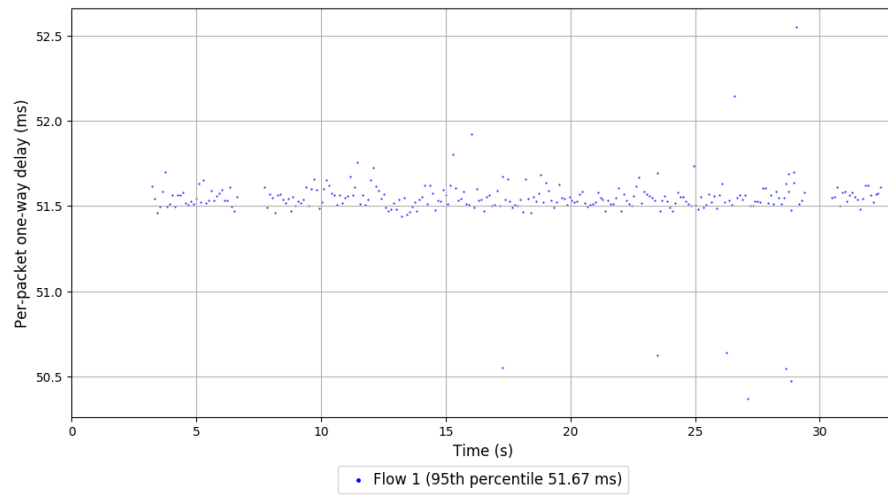
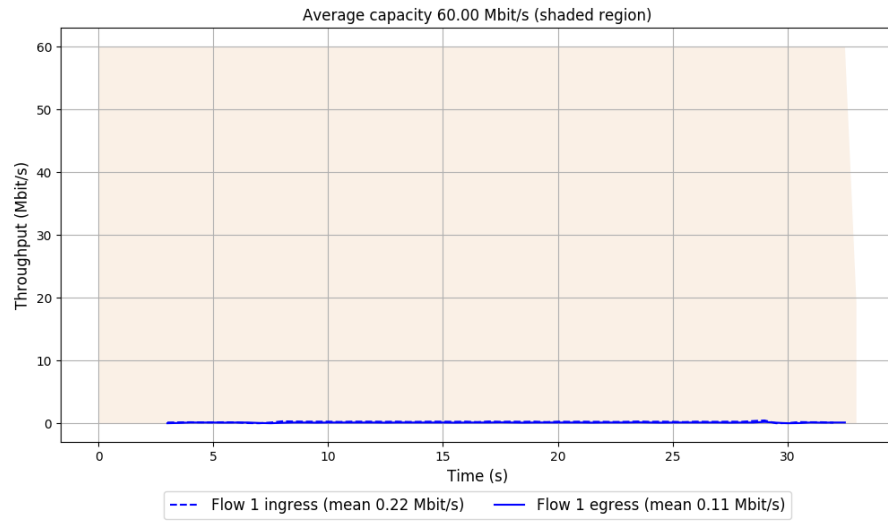
-- Flow 1:

Average throughput: 0.11 Mbit/s

95th percentile per-packet one-way delay: 51.674 ms

Loss rate: 49.90%

Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of PCC-Allegro

Start at: 2019-01-17 06:24:21

End at: 2019-01-17 06:24:51

Below is generated by plot.py at 2019-01-17 06:57:50

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 9.73 Mbit/s (16.2% utilization)

95th percentile per-packet one-way delay: 52.037 ms

Loss rate: 2.75%

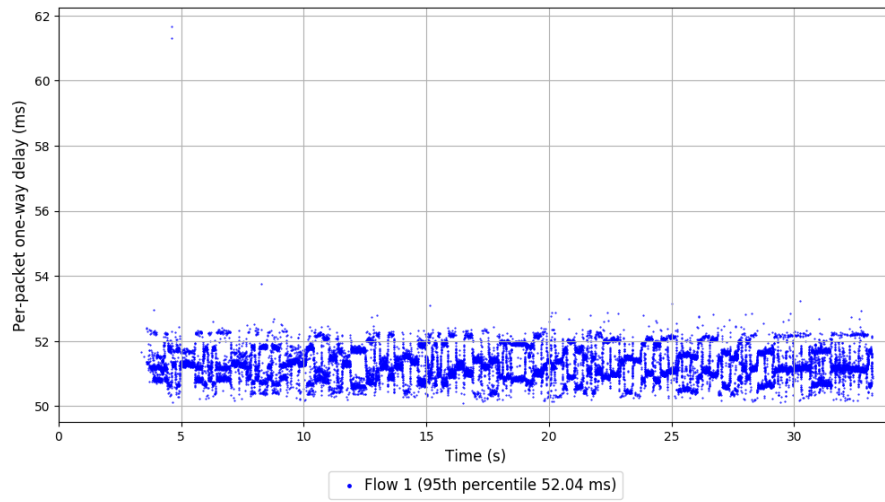
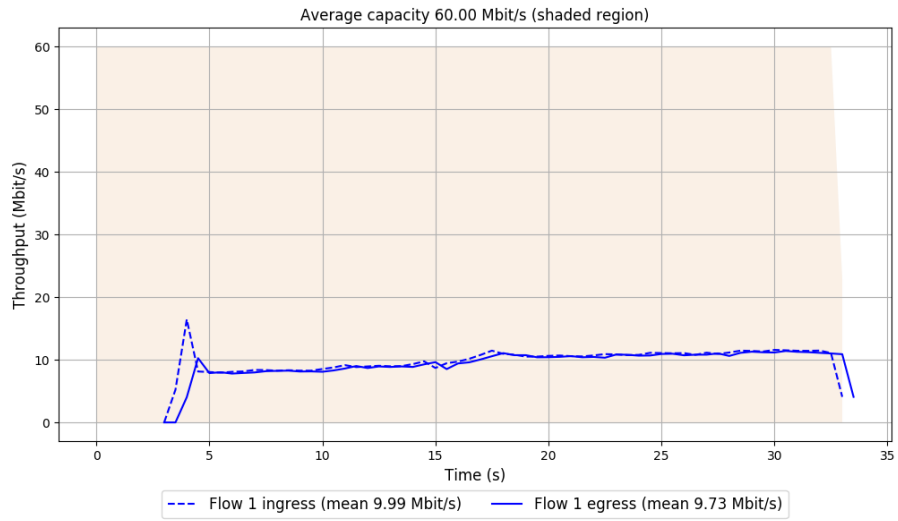
-- Flow 1:

Average throughput: 9.73 Mbit/s

95th percentile per-packet one-way delay: 52.037 ms

Loss rate: 2.75%

Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

Start at: 2019-01-17 06:36:55

End at: 2019-01-17 06:37:25

Below is generated by plot.py at 2019-01-17 06:57:50

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 8.23 Mbit/s (13.7% utilization)

95th percentile per-packet one-way delay: 52.026 ms

Loss rate: 2.78%

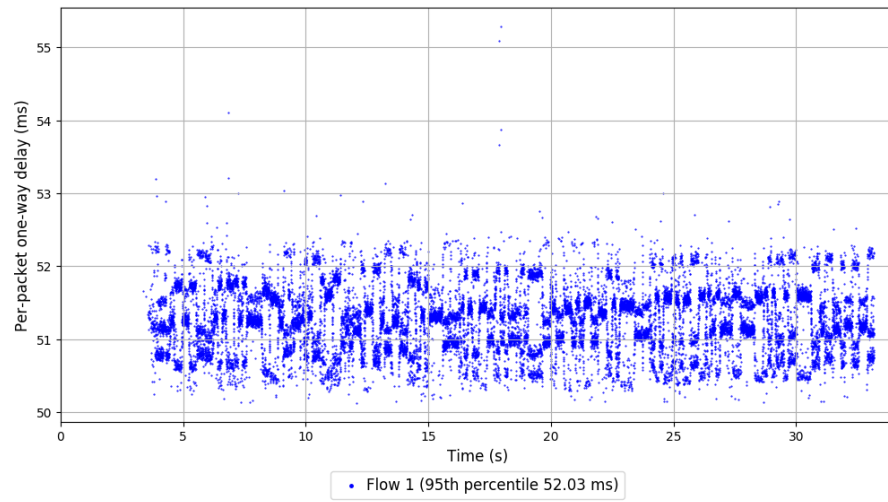
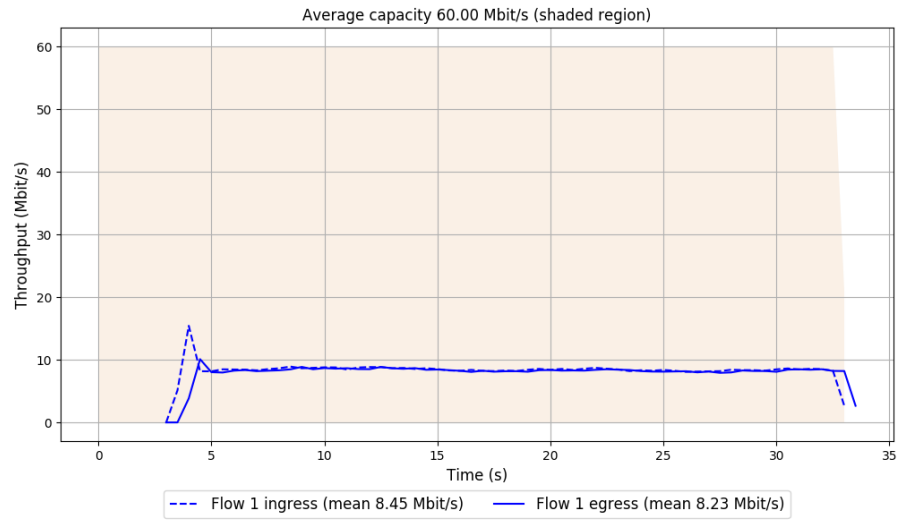
-- Flow 1:

Average throughput: 8.23 Mbit/s

95th percentile per-packet one-way delay: 52.026 ms

Loss rate: 2.78%

Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

Start at: 2019-01-17 06:49:30

End at: 2019-01-17 06:50:00

Below is generated by plot.py at 2019-01-17 06:57:51

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 8.86 Mbit/s (14.8% utilization)

95th percentile per-packet one-way delay: 52.108 ms

Loss rate: 2.76%

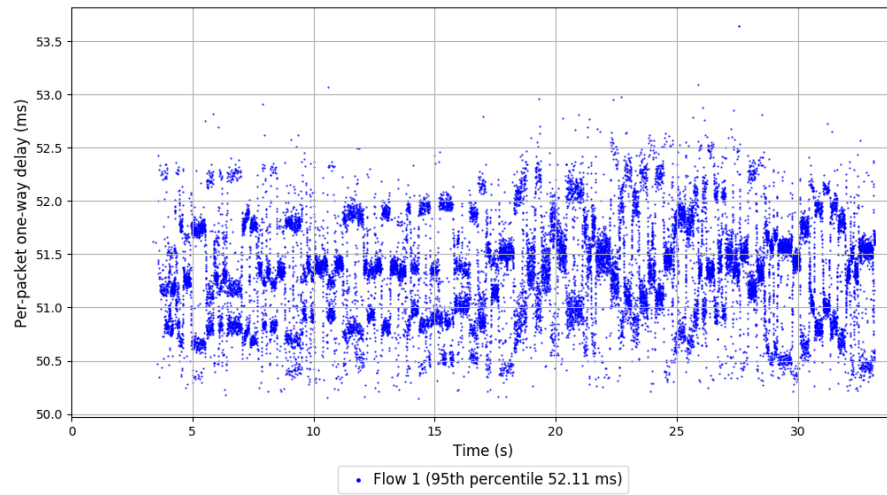
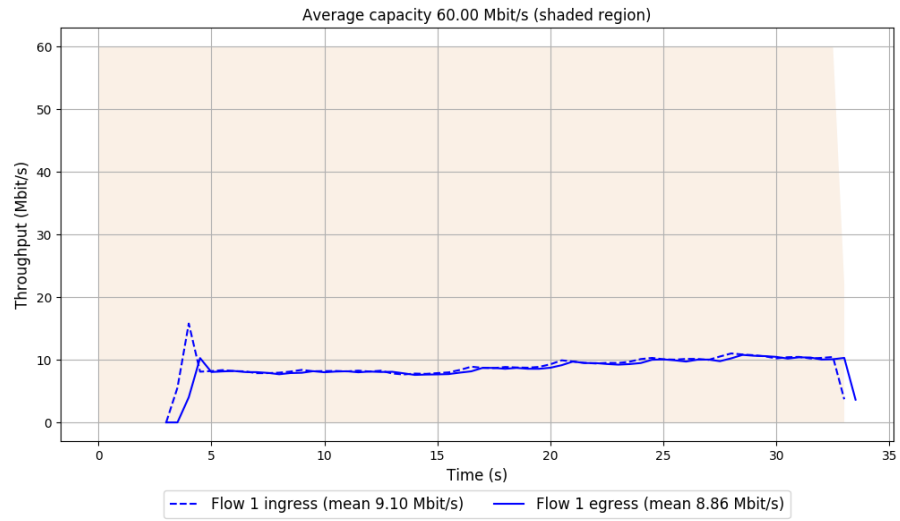
-- Flow 1:

Average throughput: 8.86 Mbit/s

95th percentile per-packet one-way delay: 52.108 ms

Loss rate: 2.76%

Run 3: Report of PCC-Allegro — Data Link



Run 1: Statistics of PCC-Expr

Start at: 2019-01-17 06:27:21

End at: 2019-01-17 06:27:51

Below is generated by plot.py at 2019-01-17 06:57:56

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 9.72 Mbit/s (16.2% utilization)

95th percentile per-packet one-way delay: 52.034 ms

Loss rate: 9.18%

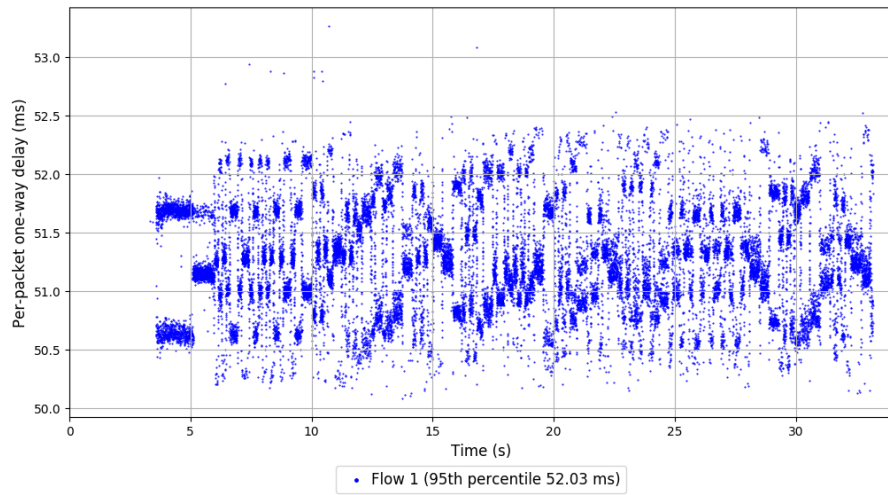
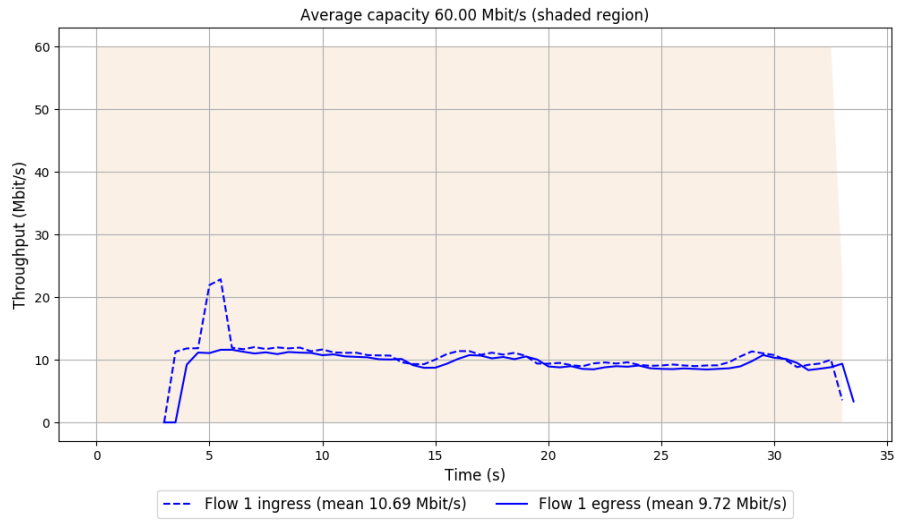
-- Flow 1:

Average throughput: 9.72 Mbit/s

95th percentile per-packet one-way delay: 52.034 ms

Loss rate: 9.18%

Run 1: Report of PCC-Expr — Data Link



Run 2: Statistics of PCC-Expr

Start at: 2019-01-17 06:39:55

End at: 2019-01-17 06:40:25

Below is generated by plot.py at 2019-01-17 06:58:14

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 8.45 Mbit/s (14.1% utilization)

95th percentile per-packet one-way delay: 52.005 ms

Loss rate: 6.19%

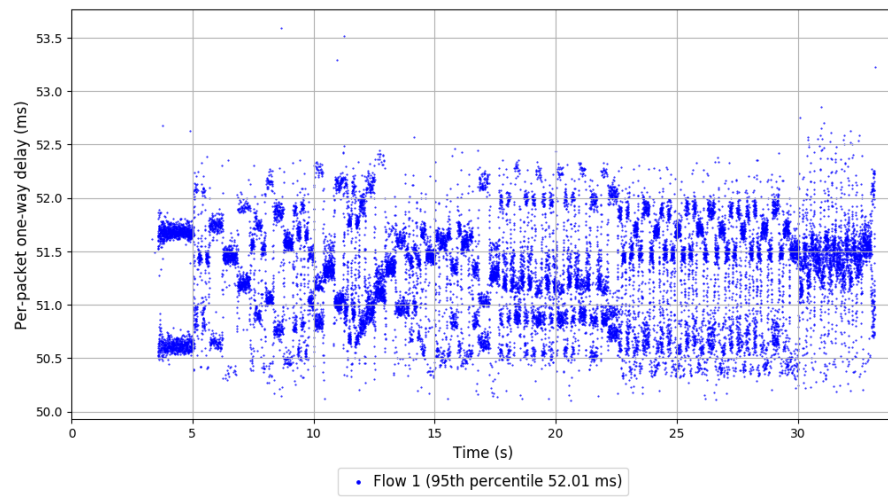
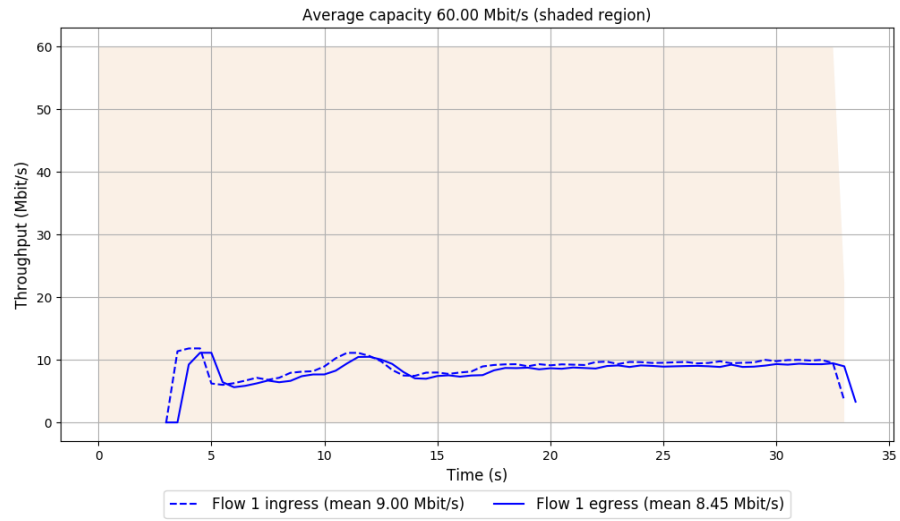
-- Flow 1:

Average throughput: 8.45 Mbit/s

95th percentile per-packet one-way delay: 52.005 ms

Loss rate: 6.19%

Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

Start at: 2019-01-17 06:52:30

End at: 2019-01-17 06:53:00

Below is generated by plot.py at 2019-01-17 06:58:17

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 8.55 Mbit/s (14.3% utilization)

95th percentile per-packet one-way delay: 52.009 ms

Loss rate: 6.21%

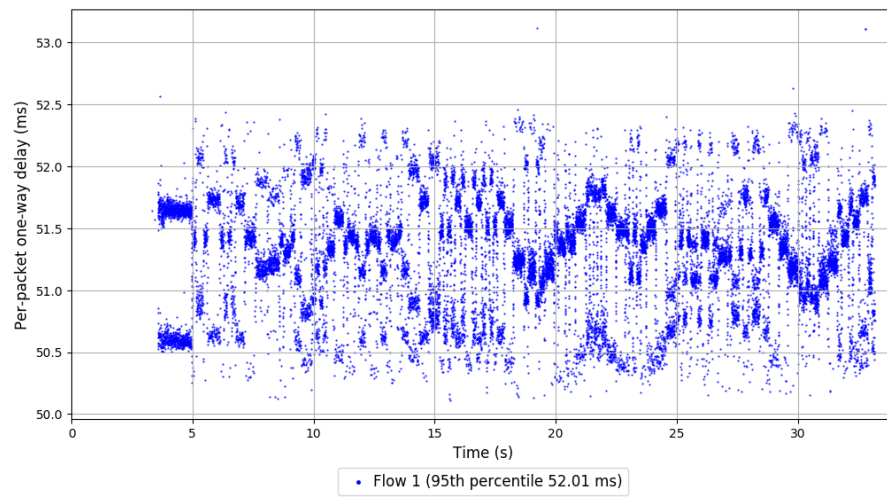
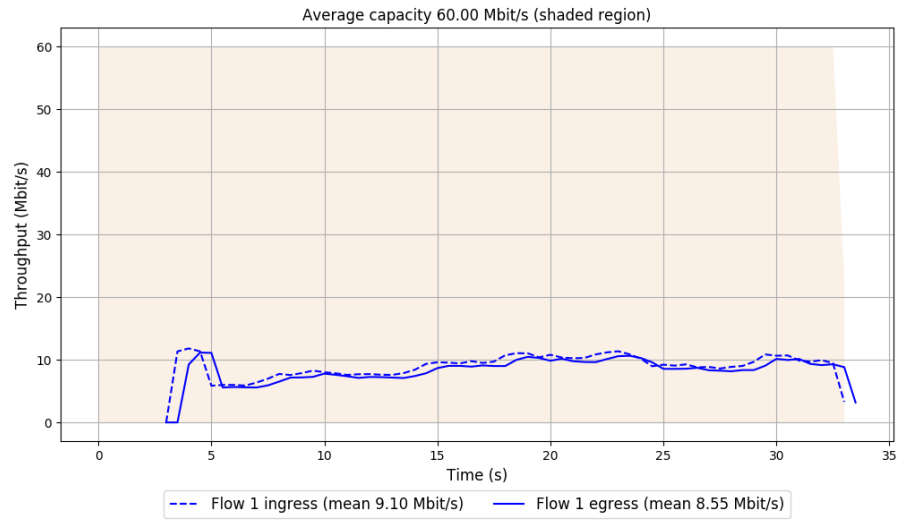
-- Flow 1:

Average throughput: 8.55 Mbit/s

95th percentile per-packet one-way delay: 52.009 ms

Loss rate: 6.21%

Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2019-01-17 06:29:45

End at: 2019-01-17 06:30:15

Below is generated by plot.py at 2019-01-17 06:58:17

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 3.27 Mbit/s (5.4% utilization)

95th percentile per-packet one-way delay: 52.131 ms

Loss rate: 1.37%

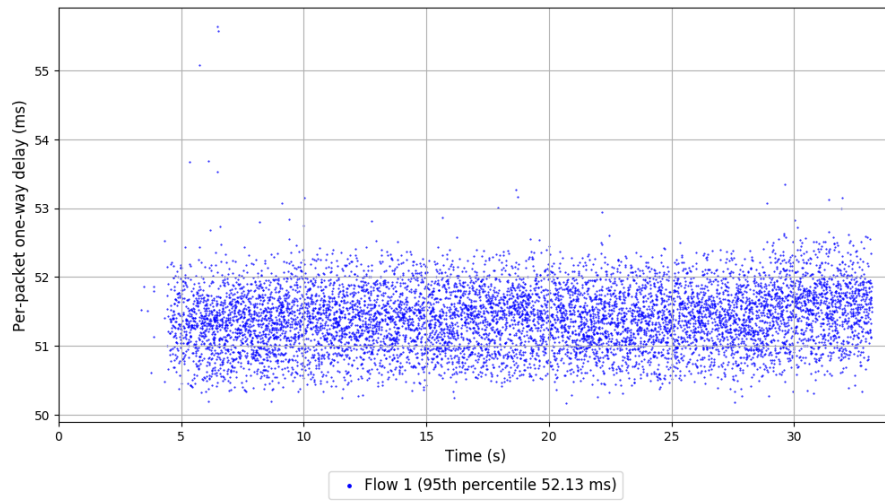
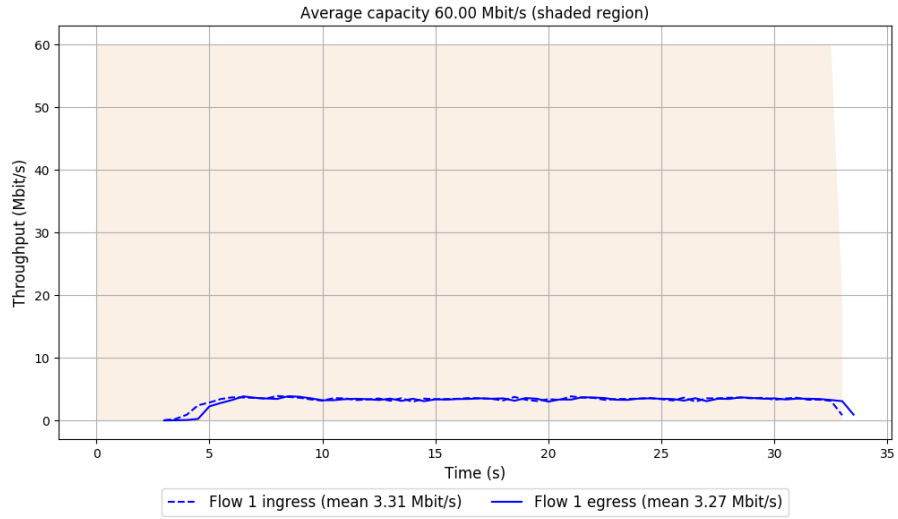
-- Flow 1:

Average throughput: 3.27 Mbit/s

95th percentile per-packet one-way delay: 52.131 ms

Loss rate: 1.37%

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2019-01-17 06:42:19

End at: 2019-01-17 06:42:49

Below is generated by plot.py at 2019-01-17 06:58:17

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 3.24 Mbit/s (5.4% utilization)

95th percentile per-packet one-way delay: 52.104 ms

Loss rate: 1.34%

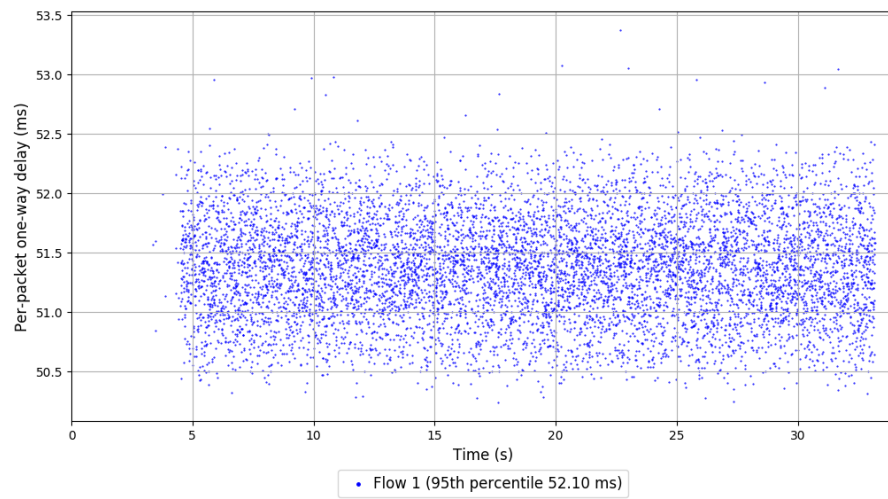
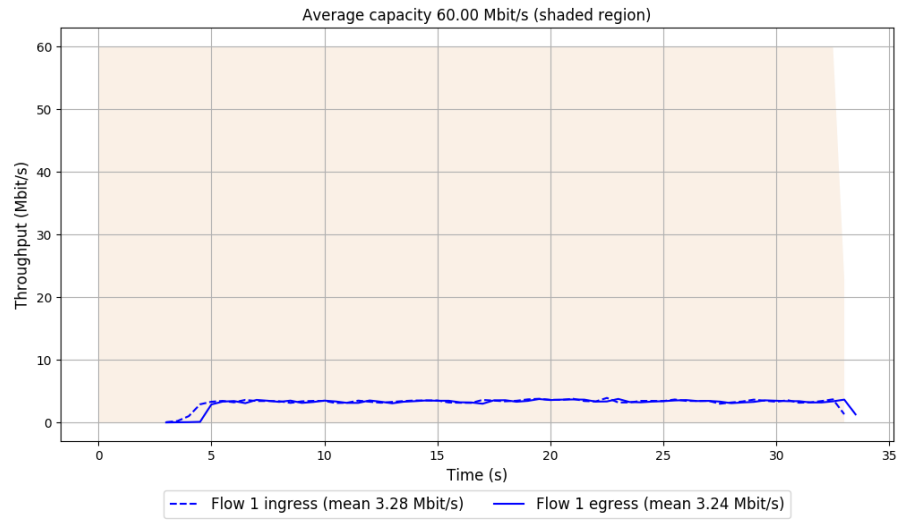
-- Flow 1:

Average throughput: 3.24 Mbit/s

95th percentile per-packet one-way delay: 52.104 ms

Loss rate: 1.34%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2019-01-17 06:54:53

End at: 2019-01-17 06:55:23

Below is generated by plot.py at 2019-01-17 06:58:18

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 3.24 Mbit/s (5.4% utilization)

95th percentile per-packet one-way delay: 52.182 ms

Loss rate: 1.30%

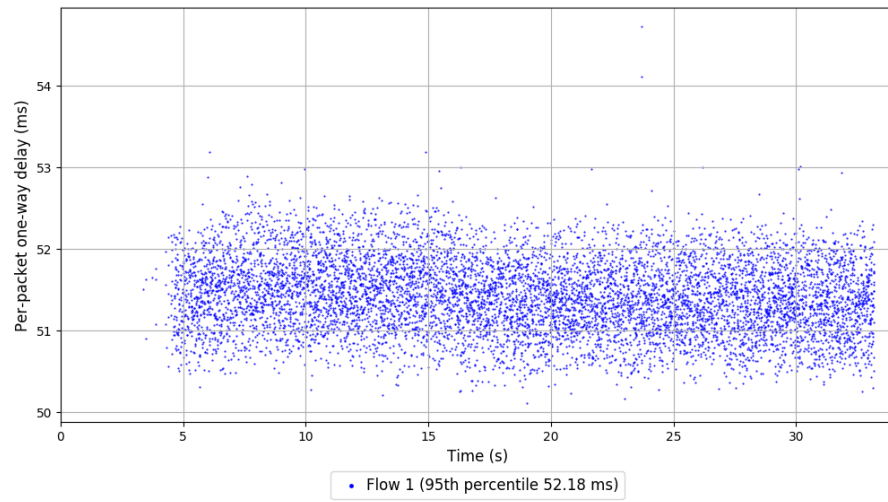
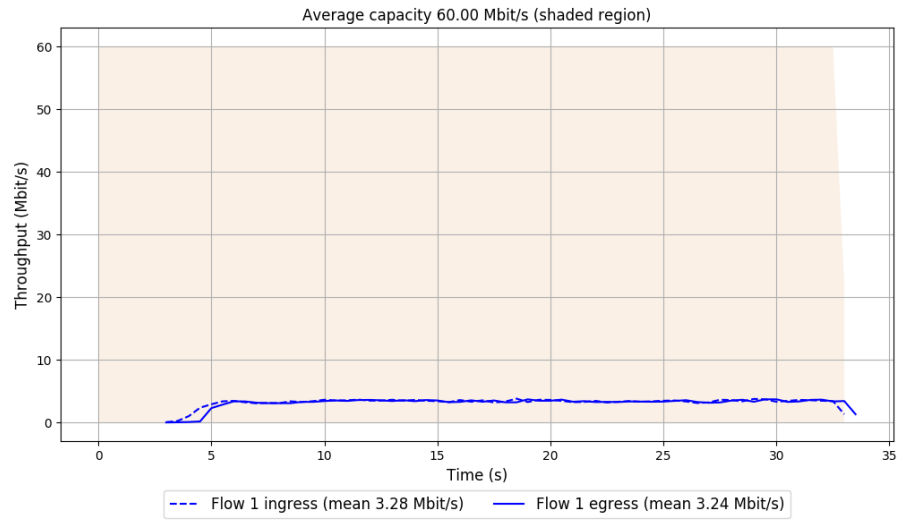
-- Flow 1:

Average throughput: 3.24 Mbit/s

95th percentile per-packet one-way delay: 52.182 ms

Loss rate: 1.30%

Run 3: Report of QUIC Cubic — Data Link



Run 1: Statistics of SCReAM

Start at: 2019-01-17 06:19:33

End at: 2019-01-17 06:20:03

Below is generated by plot.py at 2019-01-17 06:58:18

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.21 Mbit/s (0.4% utilization)

95th percentile per-packet one-way delay: 51.785 ms

Loss rate: 0.26%

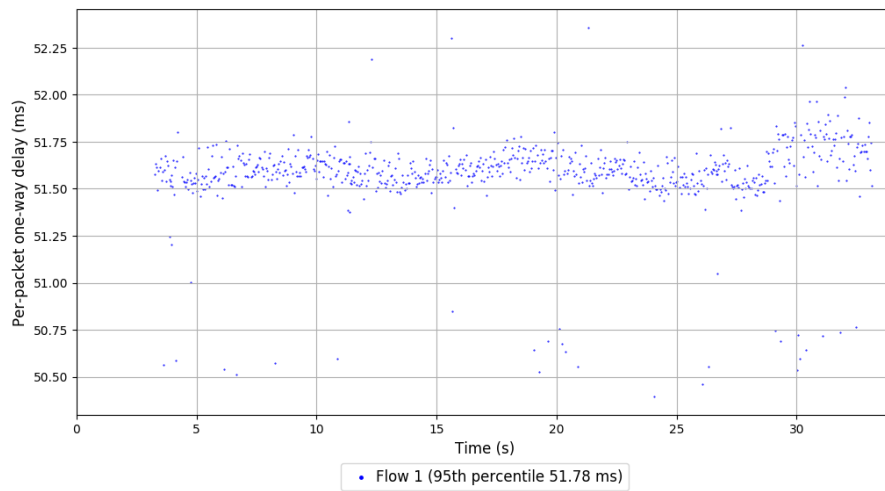
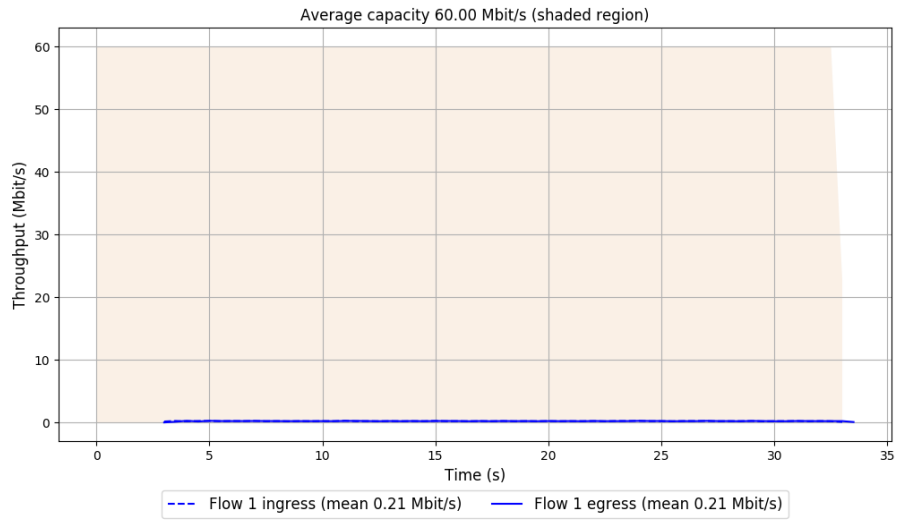
-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 51.785 ms

Loss rate: 0.26%

Run 1: Report of SCReAM — Data Link



Run 2: Statistics of SCReAM

Start at: 2019-01-17 06:32:08

End at: 2019-01-17 06:32:38

Below is generated by plot.py at 2019-01-17 06:58:18

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.22 Mbit/s (0.4% utilization)

95th percentile per-packet one-way delay: 51.714 ms

Loss rate: 0.13%

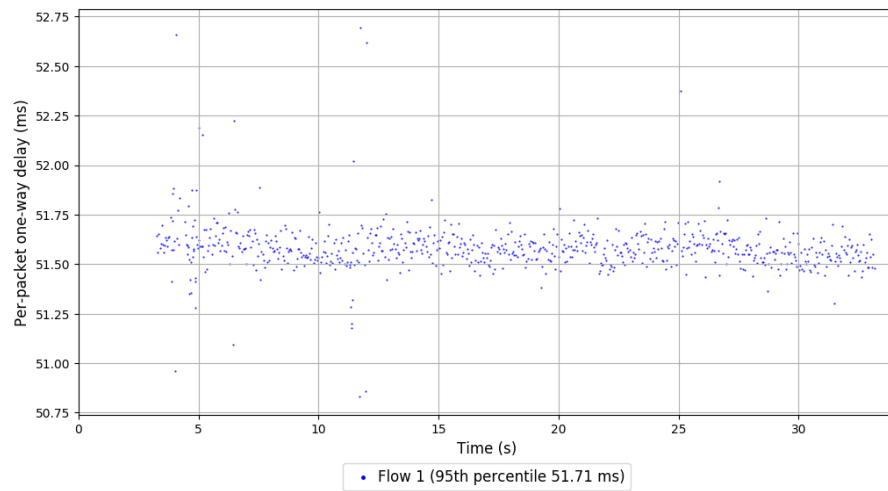
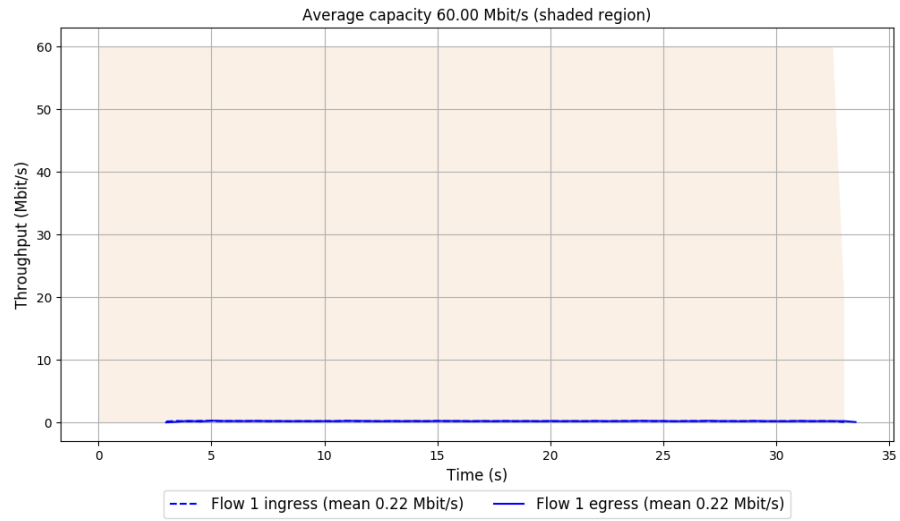
-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 51.714 ms

Loss rate: 0.13%

Run 2: Report of SCReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2019-01-17 06:44:42

End at: 2019-01-17 06:45:12

Below is generated by plot.py at 2019-01-17 06:58:22

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.21 Mbit/s (0.4% utilization)

95th percentile per-packet one-way delay: 52.420 ms

Loss rate: 0.13%

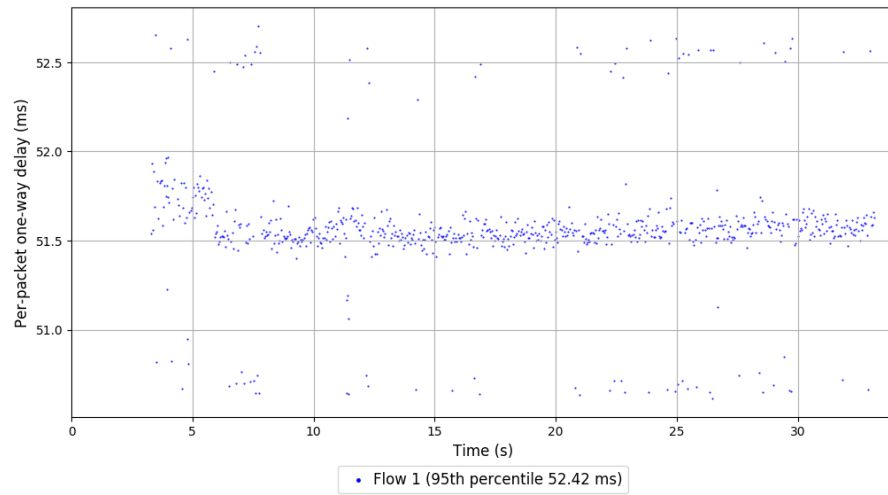
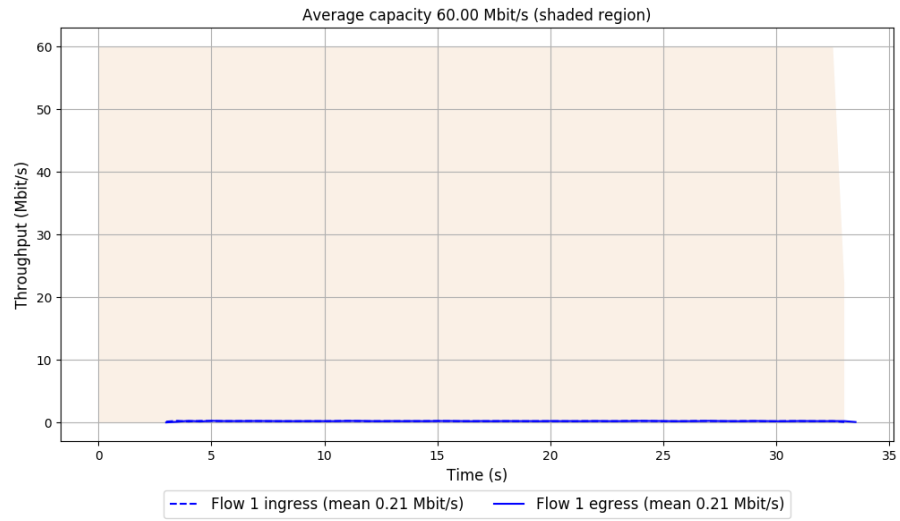
-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 52.420 ms

Loss rate: 0.13%

Run 3: Report of SCReAM — Data Link



Run 1: Statistics of Sprout

Start at: 2019-01-17 06:21:22

End at: 2019-01-17 06:21:52

Below is generated by plot.py at 2019-01-17 06:58:30

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.19 Mbit/s (0.3% utilization)

95th percentile per-packet one-way delay: 52.187 ms

Loss rate: 7.60%

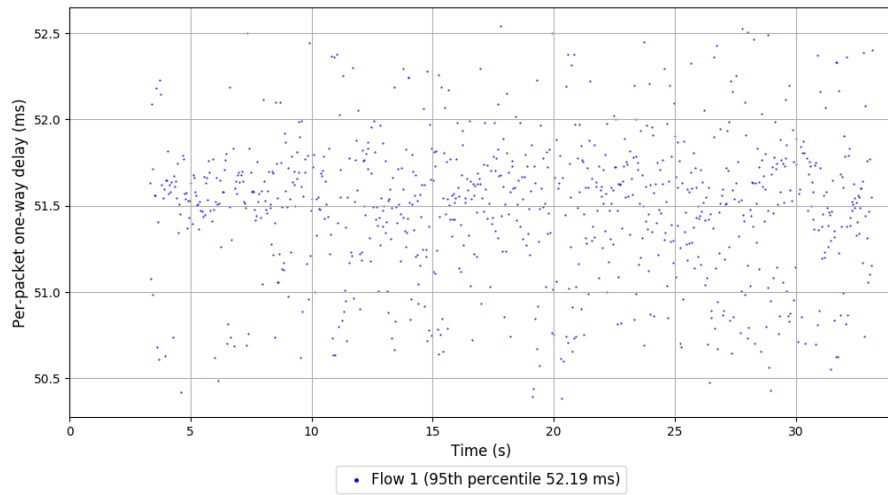
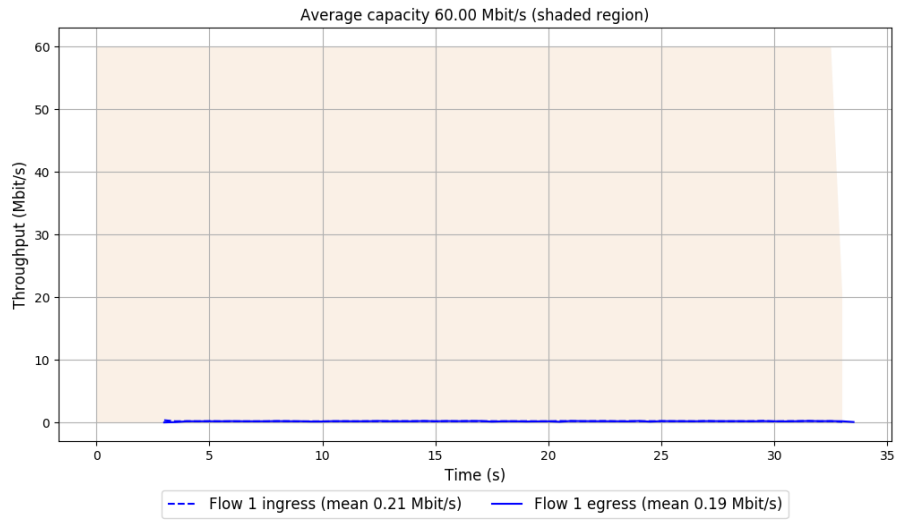
-- Flow 1:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 52.187 ms

Loss rate: 7.60%

Run 1: Report of Sprout — Data Link



Run 2: Statistics of Sprout

Start at: 2019-01-17 06:33:56

End at: 2019-01-17 06:34:26

Below is generated by plot.py at 2019-01-17 06:58:31

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.19 Mbit/s (0.3% utilization)

95th percentile per-packet one-way delay: 52.259 ms

Loss rate: 7.27%

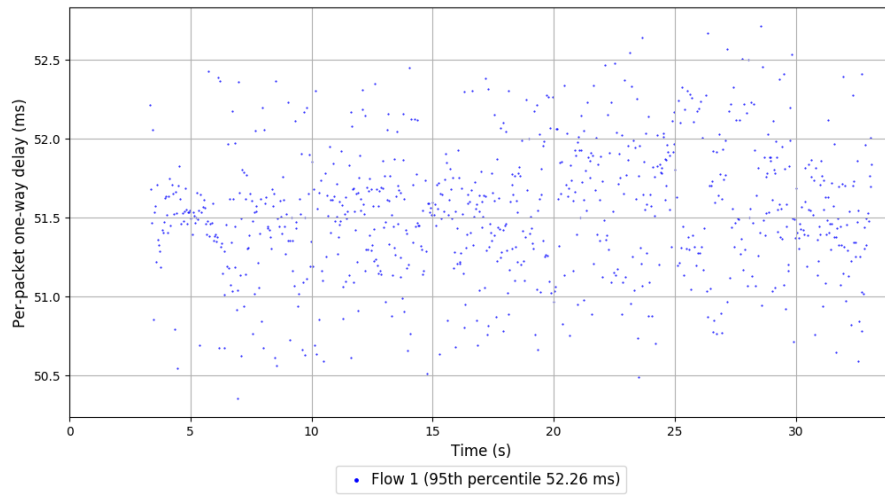
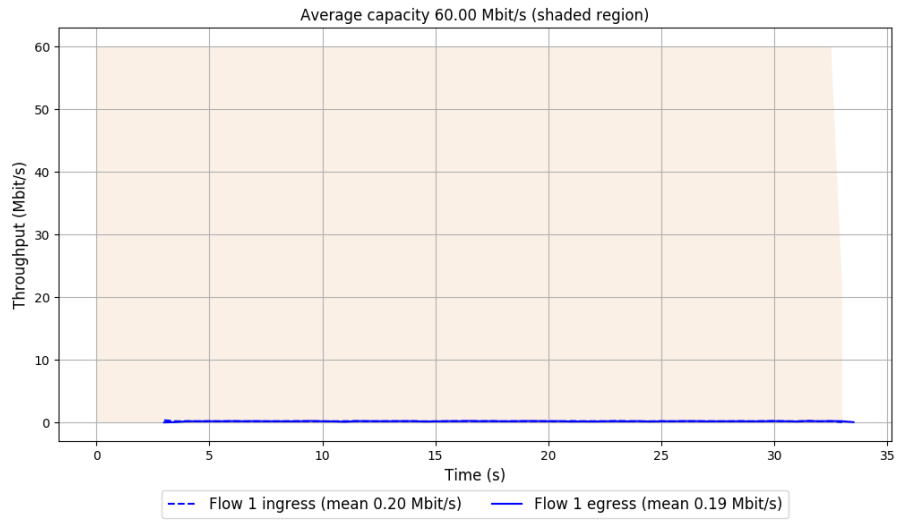
-- Flow 1:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 52.259 ms

Loss rate: 7.27%

Run 2: Report of Sprout — Data Link



Run 3: Statistics of Sprout

Start at: 2019-01-17 06:46:31

End at: 2019-01-17 06:47:01

Below is generated by plot.py at 2019-01-17 06:58:37

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.19 Mbit/s (0.3% utilization)

95th percentile per-packet one-way delay: 52.247 ms

Loss rate: 7.19%

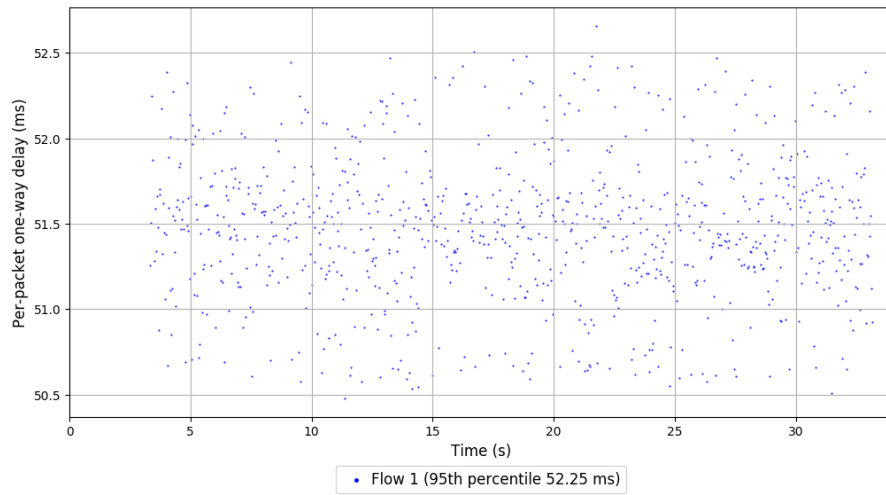
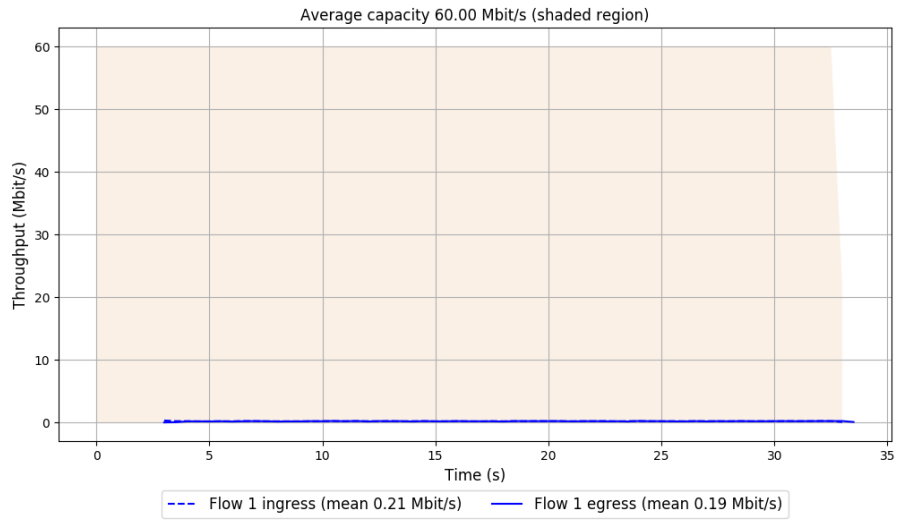
-- Flow 1:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 52.247 ms

Loss rate: 7.19%

Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

Start at: 2019-01-17 06:28:33

End at: 2019-01-17 06:29:03

Below is generated by plot.py at 2019-01-17 06:58:37

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.01 Mbit/s (0.0% utilization)

95th percentile per-packet one-way delay: 51.737 ms

Loss rate: 51.91%

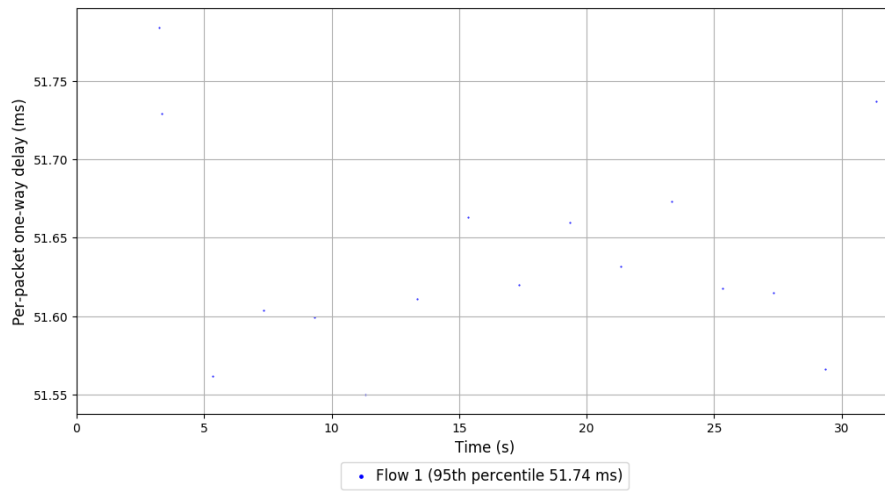
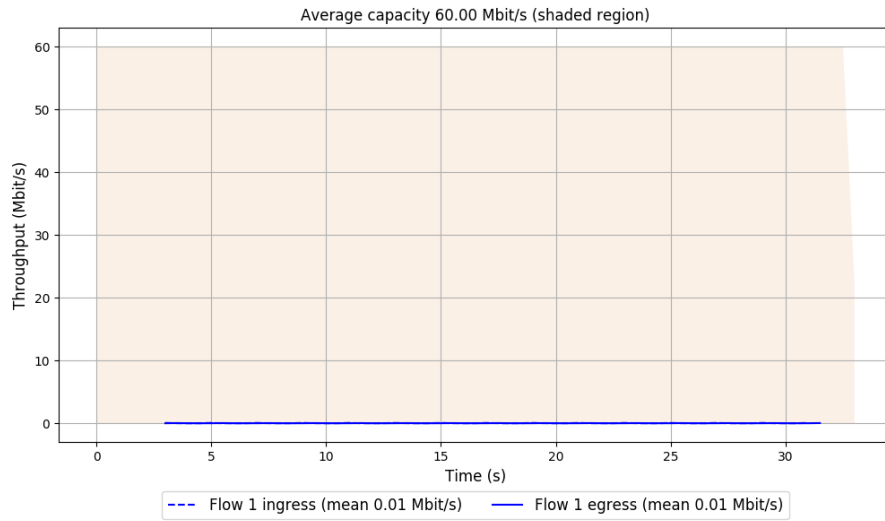
-- Flow 1:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 51.737 ms

Loss rate: 51.91%

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

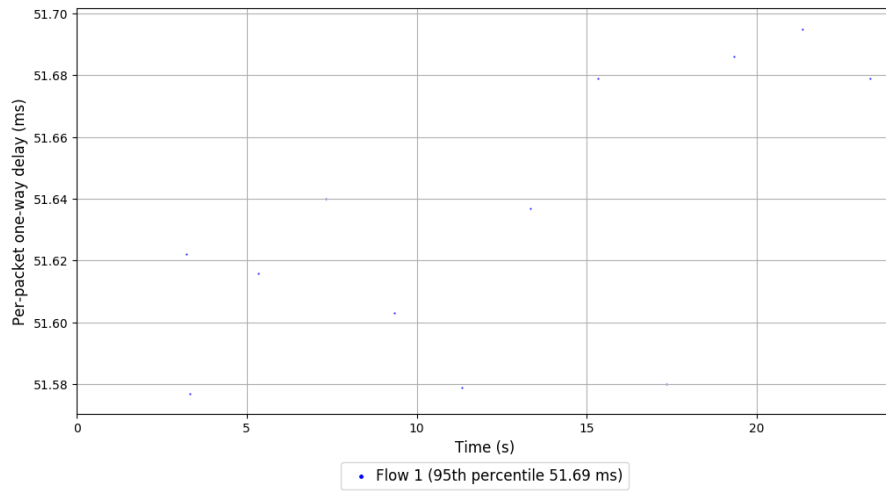
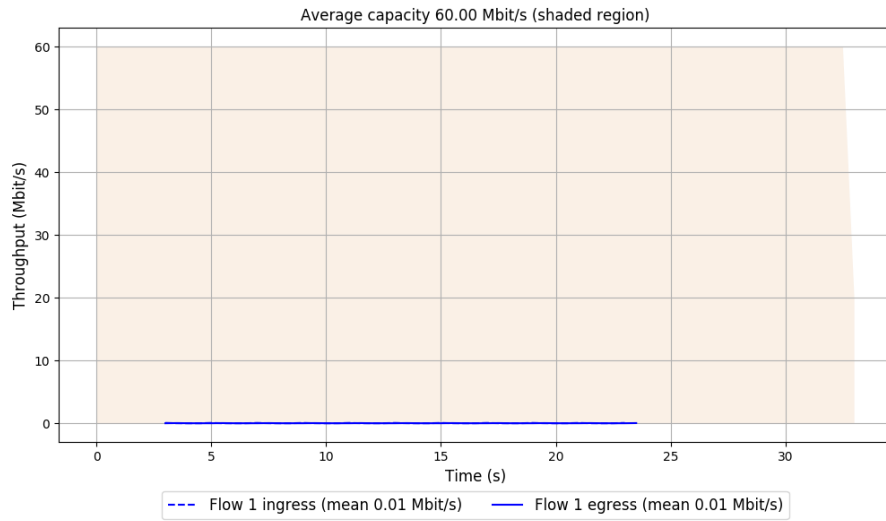


Run 2: Statistics of TaoVA-100x

Start at: 2019-01-17 06:41:07

End at: 2019-01-17 06:41:37

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



Run 3: Statistics of TaoVA-100x

Start at: 2019-01-17 06:53:42

End at: 2019-01-17 06:54:12

Below is generated by plot.py at 2019-01-17 06:58:40

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.01 Mbit/s (0.0% utilization)

95th percentile per-packet one-way delay: 51.656 ms

Loss rate: 51.91%

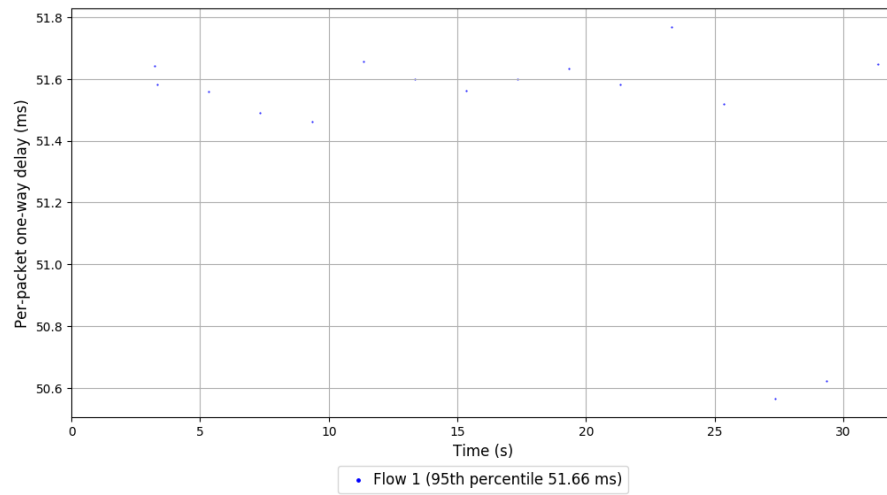
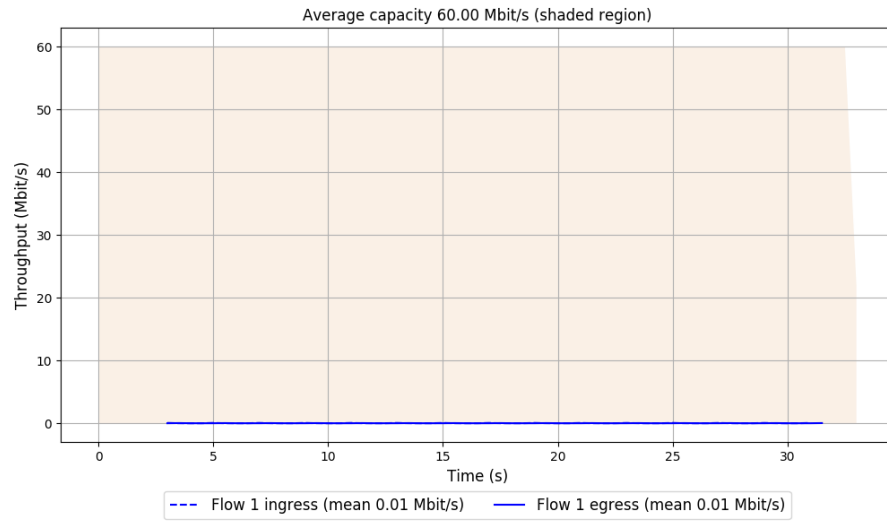
-- Flow 1:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 51.656 ms

Loss rate: 51.91%

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



Run 1: Statistics of TCP Vegas

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

End at: 2019-01-17 06:18:15

Below is generated by plot.py at 2019-01-17 06:58:42

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.29 Mbit/s (0.5% utilization)

95th percentile per-packet one-way delay: 52.025 ms

Loss rate: 11.04%

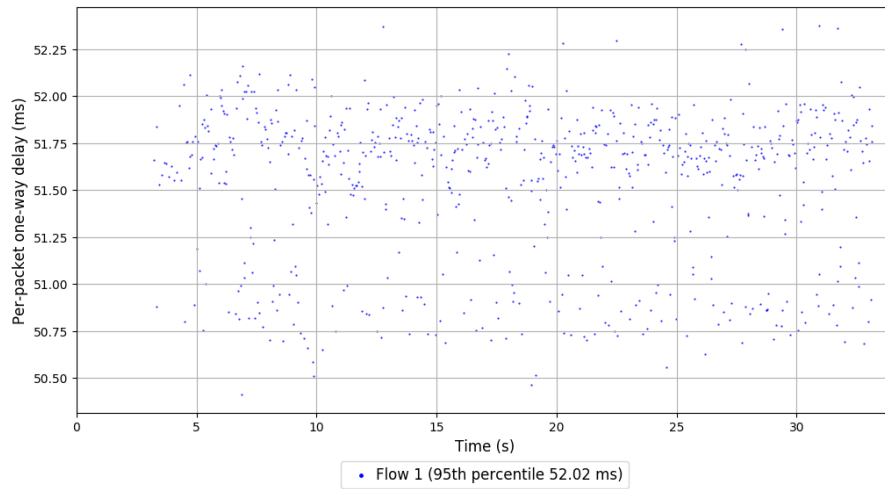
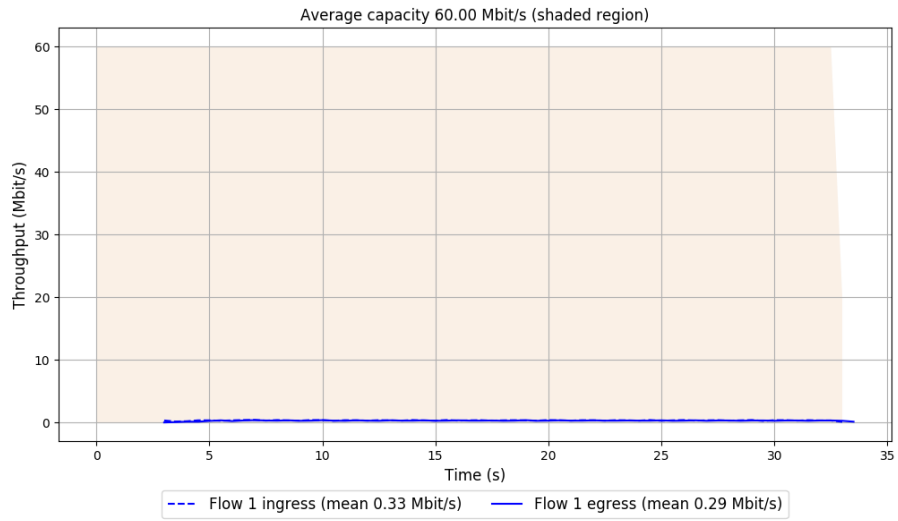
-- Flow 1:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 52.025 ms

Loss rate: 11.04%

Run 1: Report of TCP Vegas — Data Link



Run 2: Statistics of TCP Vegas

Start at: 2019-01-17 06:30:21

End at: 2019-01-17 06:30:51

Below is generated by plot.py at 2019-01-17 06:58:45

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.30 Mbit/s (0.5% utilization)

95th percentile per-packet one-way delay: 51.975 ms

Loss rate: 11.04%

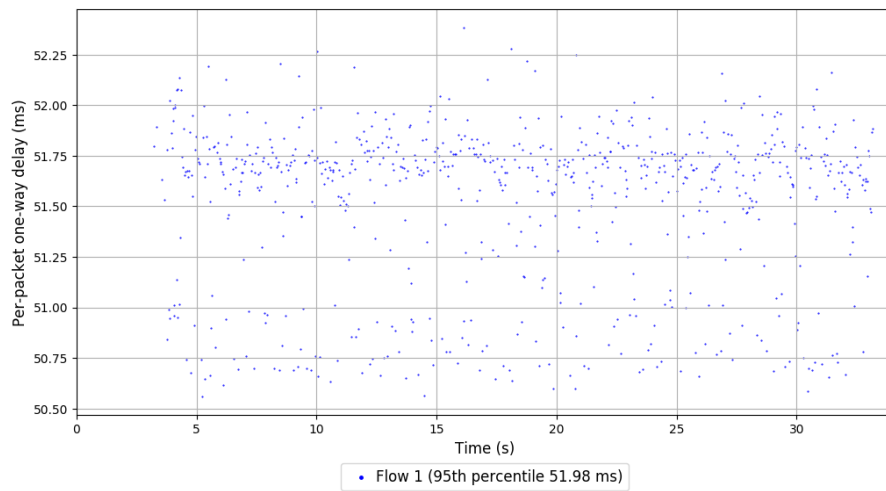
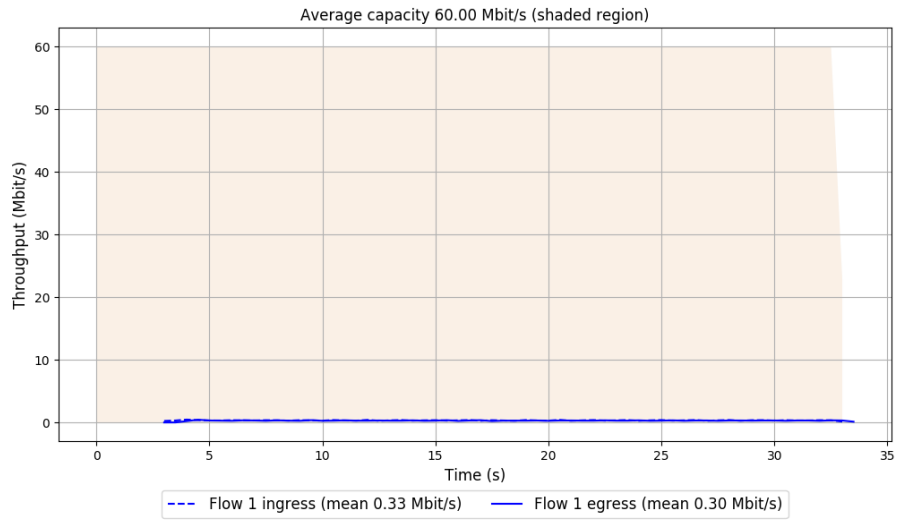
-- Flow 1:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 51.975 ms

Loss rate: 11.04%

Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2019-01-17 06:42:55

End at: 2019-01-17 06:43:25

Below is generated by plot.py at 2019-01-17 06:58:53

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.29 Mbit/s (0.5% utilization)

95th percentile per-packet one-way delay: 51.958 ms

Loss rate: 10.91%

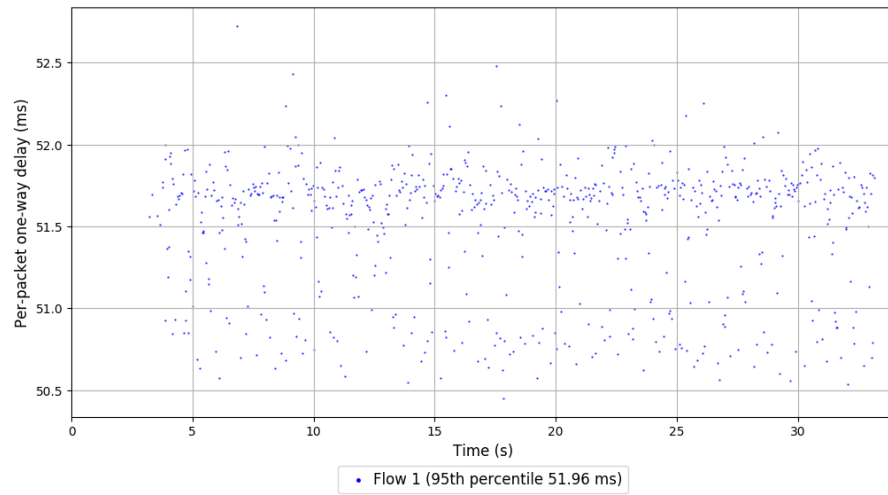
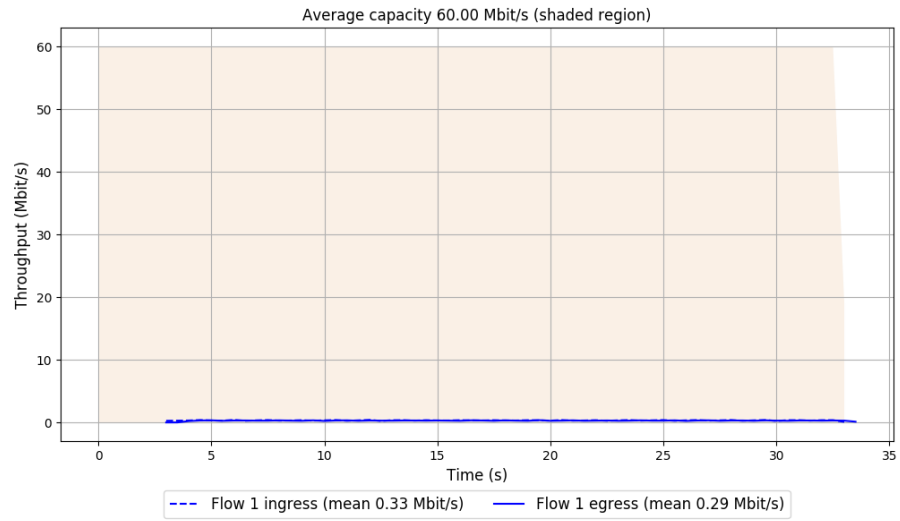
-- Flow 1:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 51.958 ms

Loss rate: 10.91%

Run 3: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2019-01-17 06:26:45

End at: 2019-01-17 06:27:15

Below is generated by plot.py at 2019-01-17 06:58:55

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.11 Mbit/s (0.2% utilization)

95th percentile per-packet one-way delay: 52.006 ms

Loss rate: 89.56%

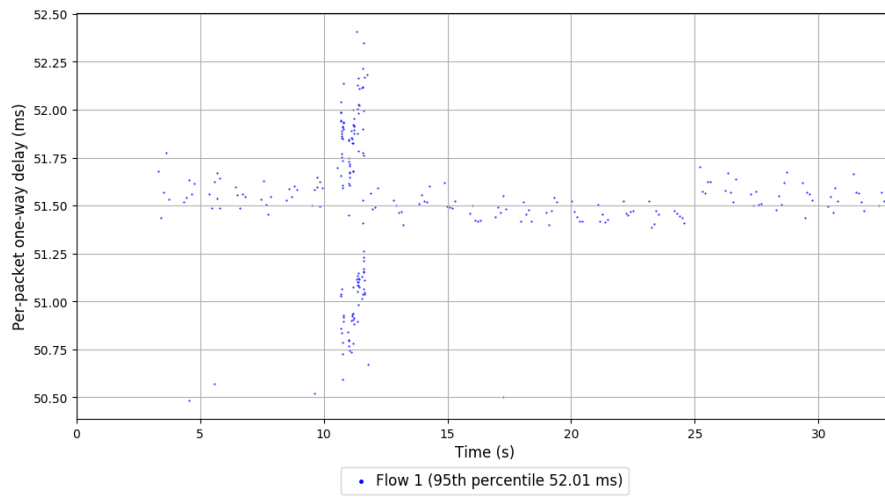
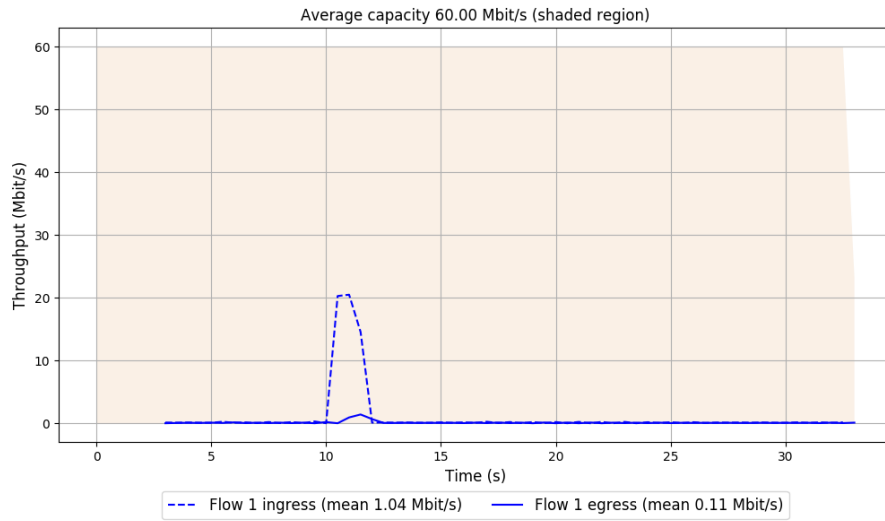
-- Flow 1:

Average throughput: 0.11 Mbit/s

95th percentile per-packet one-way delay: 52.006 ms

Loss rate: 89.56%

Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2019-01-17 06:39:19

End at: 2019-01-17 06:39:49

Below is generated by plot.py at 2019-01-17 06:59:00

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.06 Mbit/s (0.1% utilization)

95th percentile per-packet one-way delay: 51.826 ms

Loss rate: 43.73%

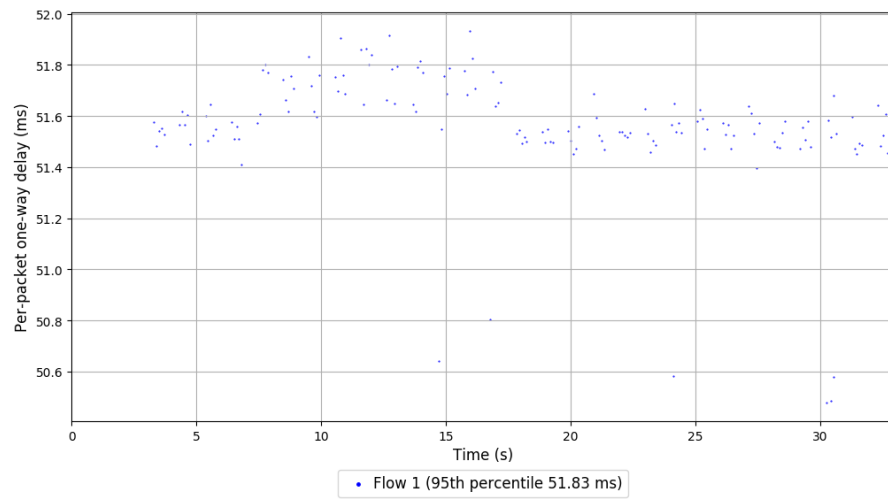
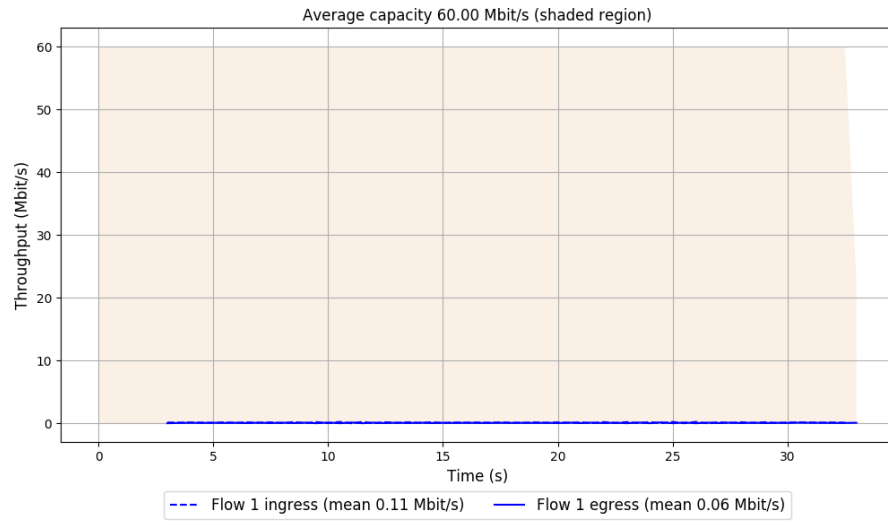
-- Flow 1:

Average throughput: 0.06 Mbit/s

95th percentile per-packet one-way delay: 51.826 ms

Loss rate: 43.73%

Run 2: Report of Verus — Data Link



Run 3: Statistics of Verus

Start at: 2019-01-17 06:51:54

End at: 2019-01-17 06:52:24

Below is generated by plot.py at 2019-01-17 06:59:01

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.06 Mbit/s (0.1% utilization)

95th percentile per-packet one-way delay: 51.667 ms

Loss rate: 44.12%

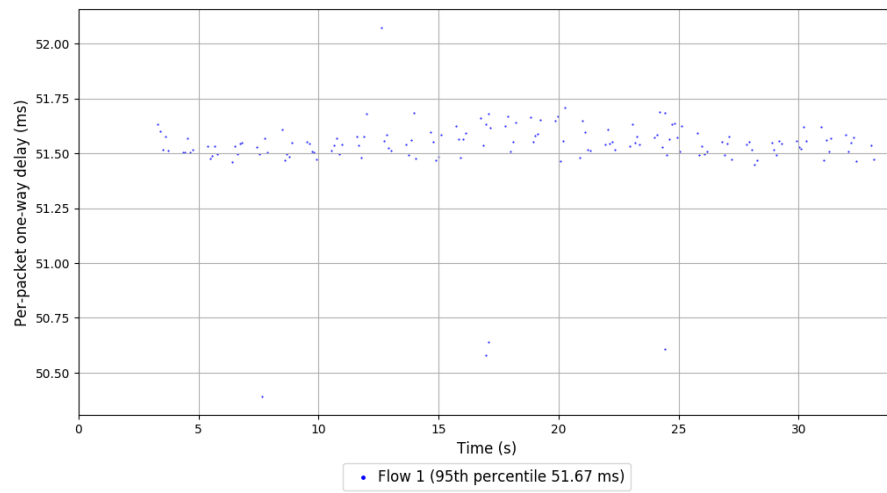
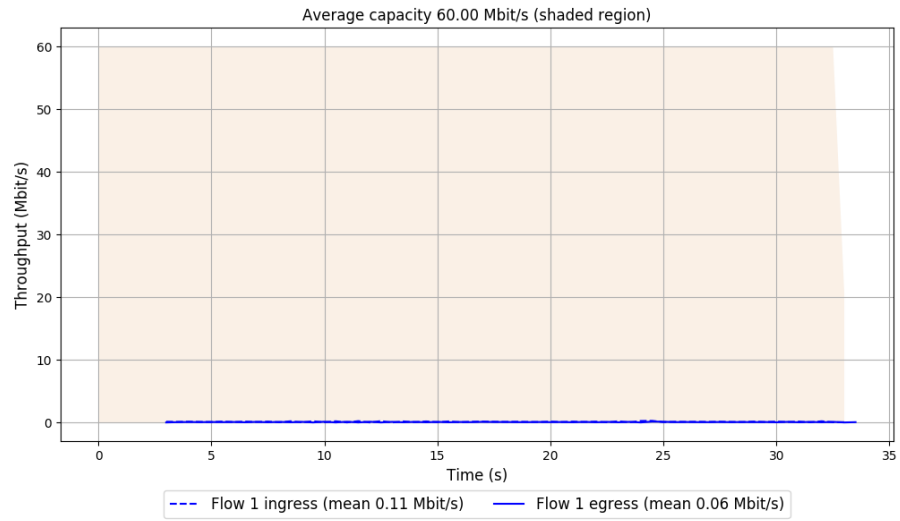
-- Flow 1:

Average throughput: 0.06 Mbit/s

95th percentile per-packet one-way delay: 51.667 ms

Loss rate: 44.12%

Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

Start at: 2019-01-17 06:24:57

End at: 2019-01-17 06:25:27

Below is generated by plot.py at 2019-01-17 06:59:08

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 5.93 Mbit/s (9.9% utilization)

95th percentile per-packet one-way delay: 52.065 ms

Loss rate: 0.59%

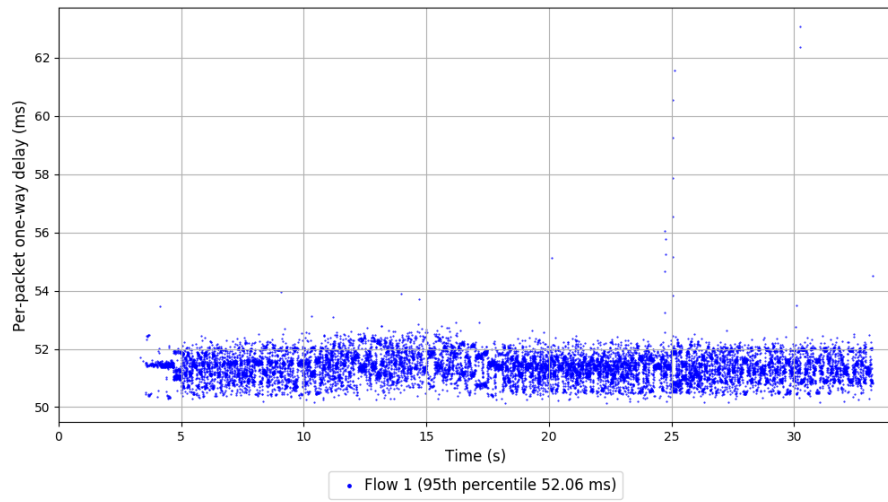
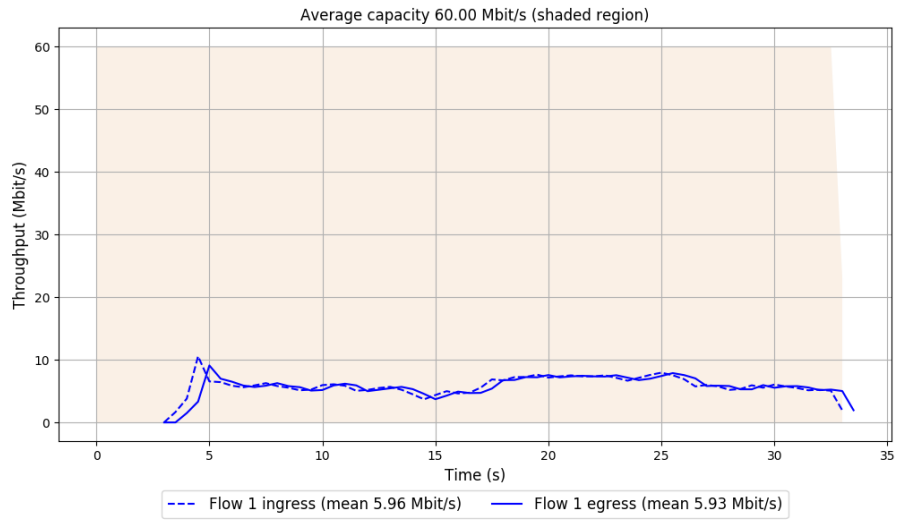
-- Flow 1:

Average throughput: 5.93 Mbit/s

95th percentile per-packet one-way delay: 52.065 ms

Loss rate: 0.59%

Run 1: Report of PCC-Vivace — Data Link



Run 2: Statistics of PCC-Vivace

Start at: 2019-01-17 06:37:31

End at: 2019-01-17 06:38:01

Below is generated by plot.py at 2019-01-17 06:59:09

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 6.90 Mbit/s (11.5% utilization)

95th percentile per-packet one-way delay: 51.942 ms

Loss rate: 0.19%

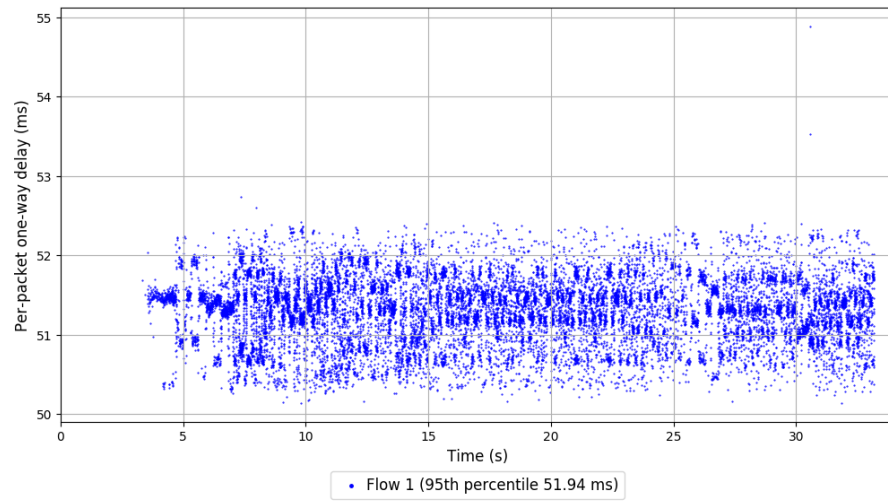
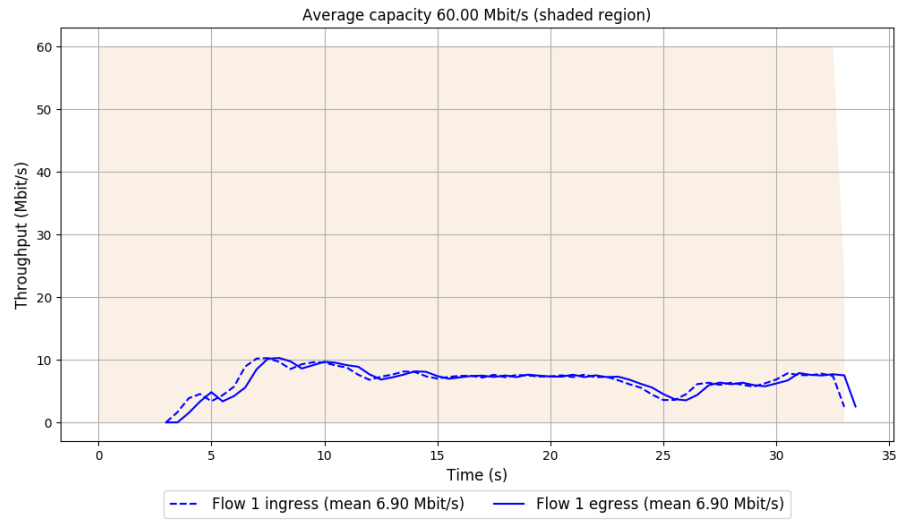
-- Flow 1:

Average throughput: 6.90 Mbit/s

95th percentile per-packet one-way delay: 51.942 ms

Loss rate: 0.19%

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

Start at: 2019-01-17 06:50:06

End at: 2019-01-17 06:50:36

Below is generated by plot.py at 2019-01-17 06:59:09

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 5.72 Mbit/s (9.5% utilization)

95th percentile per-packet one-way delay: 52.032 ms

Loss rate: 0.41%

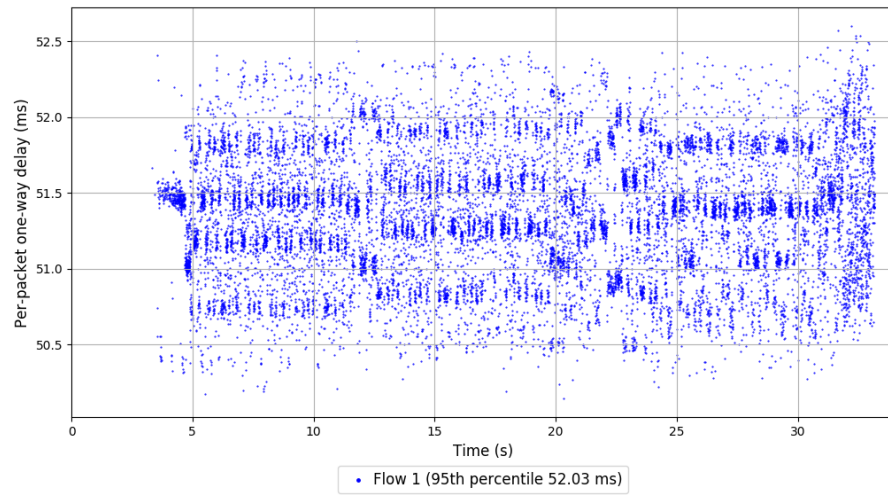
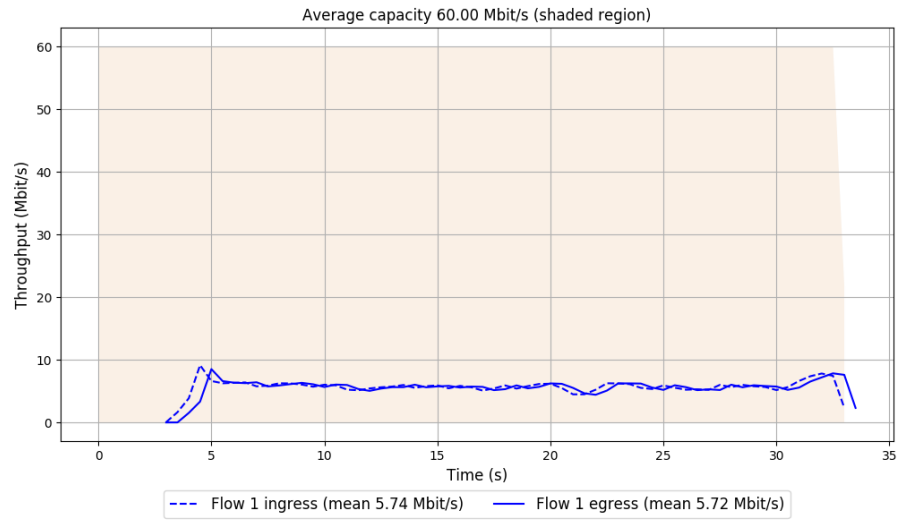
-- Flow 1:

Average throughput: 5.72 Mbit/s

95th percentile per-packet one-way delay: 52.032 ms

Loss rate: 0.41%

Run 3: Report of PCC-Vivace — Data Link



Run 1: Statistics of WebRTC media

Start at: 2019-01-17 06:18:21

End at: 2019-01-17 06:18:51

Below is generated by plot.py at 2019-01-17 06:59:09

Datalink statistics

-- Total of 1 flow:

Average capacity: 60.00 Mbit/s

Average throughput: 0.04 Mbit/s (0.1% utilization)

95th percentile per-packet one-way delay: 52.242 ms

Loss rate: 27.02%

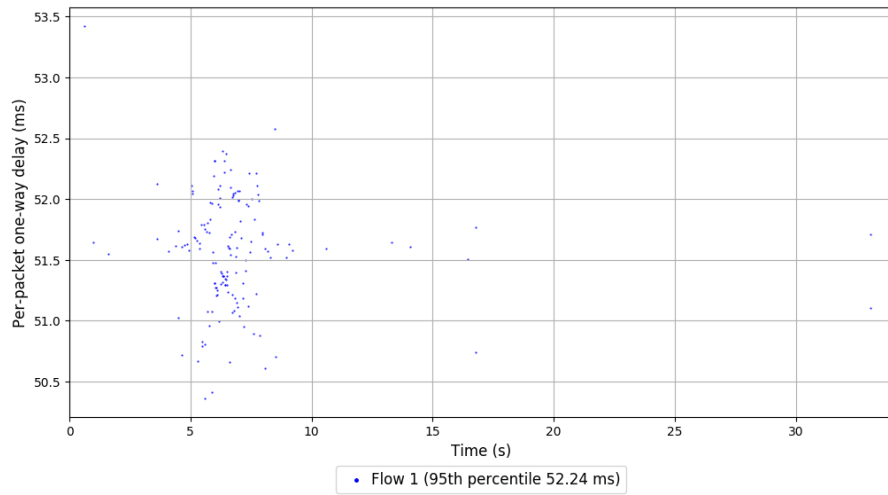
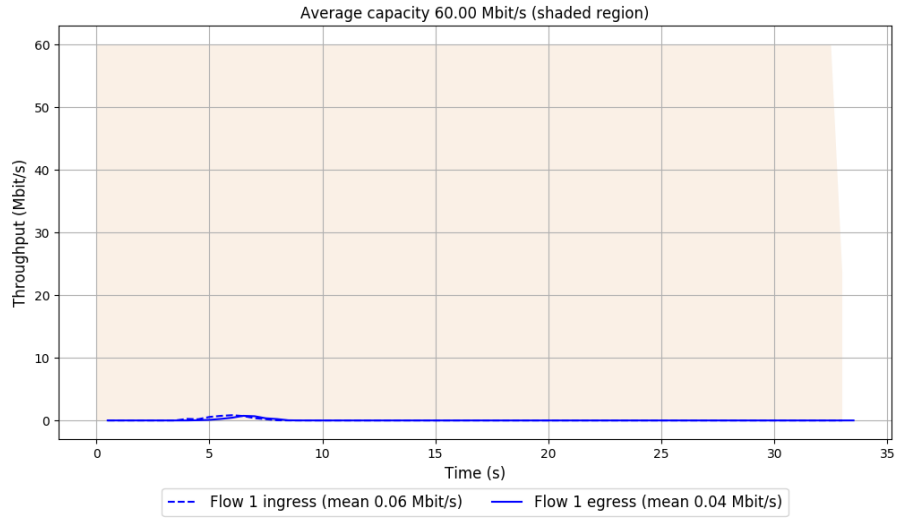
-- Flow 1:

Average throughput: 0.04 Mbit/s

95th percentile per-packet one-way delay: 52.242 ms

Loss rate: 27.02%

Run 1: Report of WebRTC media — Data Link

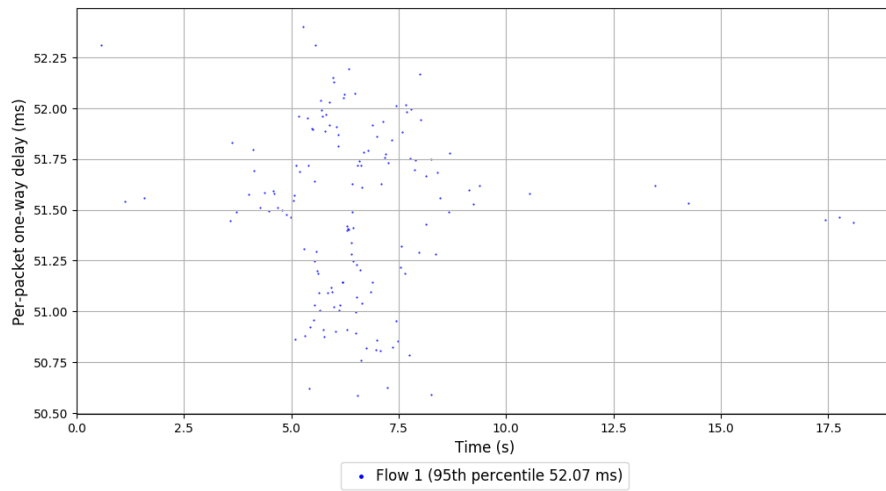
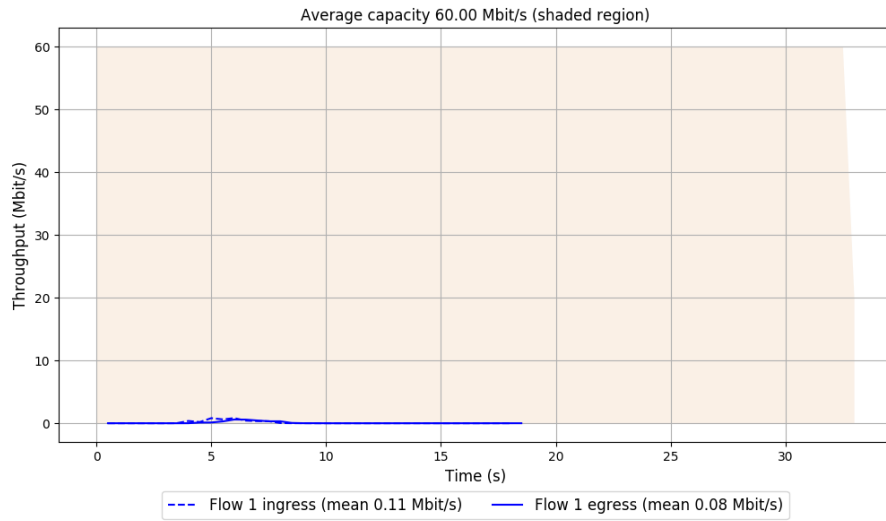


Run 2: Statistics of WebRTC media

Start at: 2019-01-17 06:30:56

End at: 2019-01-17 06:31:26

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2019-01-17 06:43:30

End at: 2019-01-17 06:44:00

Run 3: Report of WebRTC media — Data Link

