

Pantheon Report

Generated at 2019-03-18 19:05:47 (UTC).

Data path: AWS California 1 on ens5 (*local*) → Stanford cellular on ppp0 (*remote*).

Repeated the test of 21 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

NTP offsets were measured against `time.stanford.edu` and have been applied to correct the timestamps in logs.

System info:

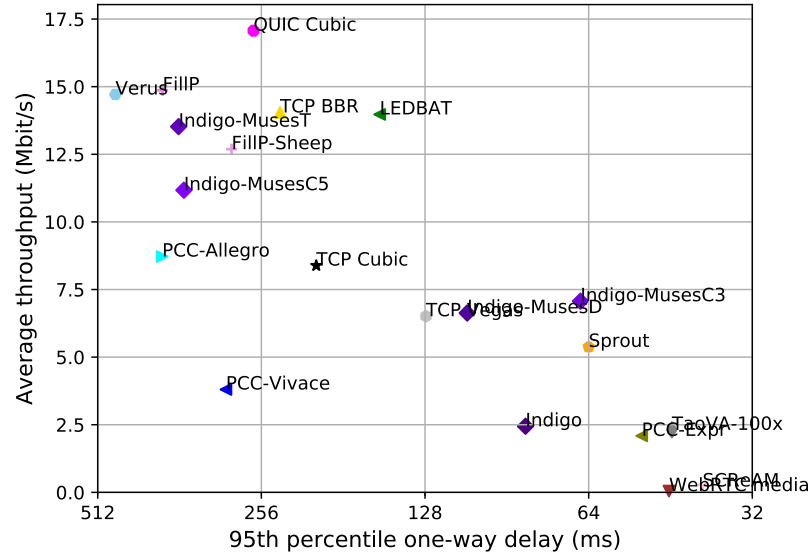
```
Linux 4.15.0-1033-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
```

Git summary:

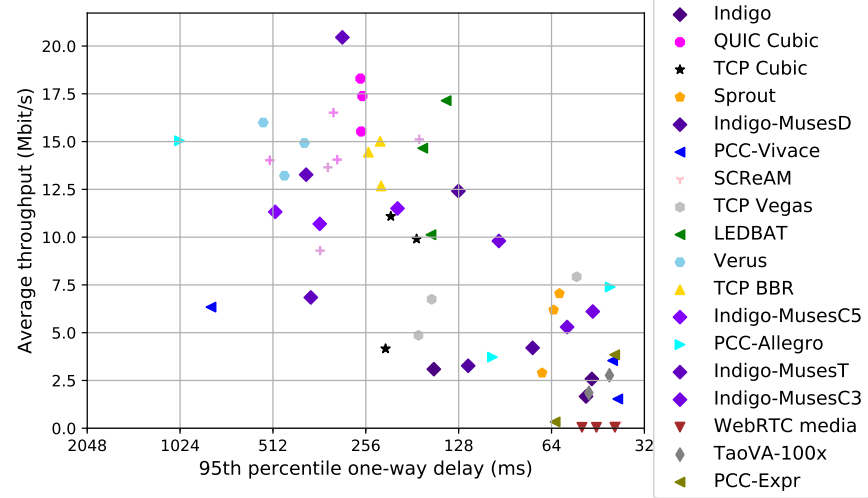
```
branch: muses @ 7a686f7c2ed0a333082c0bab1fa5c921ab47e6ee
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf5e58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecd90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ 5ce721187ad823da20955337730c746486ca4966
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

test from AWS California 1 to Stanford cellular, 3 runs of 30s each per scheme
(mean of all runs by scheme)



test from AWS California 1 to Stanford cellular, 3 runs of 30s each per scheme



scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	14.05	236.51	0.54
Copa	0	N/A	N/A	N/A
TCP Cubic	3	8.38	202.88	0.40
FillP	3	14.86	388.98	0.86
FillP-Sheep	3	12.69	290.46	0.38
Indigo	3	2.44	83.63	0.12
Indigo-MusesC3	3	7.07	66.28	0.11
Indigo-MusesC5	3	11.17	355.45	0.25
Indigo-MusesD	3	6.63	107.06	0.10
Indigo-MusesT	3	13.52	363.49	0.53
LEDBAT	3	13.97	155.11	0.31
PCC-Allegro	3	8.72	389.72	3.54
PCC-Expr	2	2.09	51.13	74.02
QUIC Cubic	3	17.07	264.66	0.54
SCReAM	3	0.22	39.51	0.13
Sprout	3	5.38	64.01	0.21
TaoVA-100x	2	2.31	44.99	52.12
TCP Vegas	3	6.51	127.48	0.06
Verus	3	14.71	475.09	1.65
PCC-Vivace	3	3.80	297.52	0.13
WebRTC media	3	0.05	45.55	0.00

Run 1: Statistics of TCP BBR

Start at: 2019-03-18 17:50:05

End at: 2019-03-18 17:50:35

Local clock offset: -0.437 ms

Remote clock offset: 1.474 ms

Below is generated by plot.py at 2019-03-18 19:04:37

Datalink statistics

-- Total of 1 flow:

Average throughput: 12.68 Mbit/s

95th percentile per-packet one-way delay: 228.328 ms

Loss rate: 0.50%

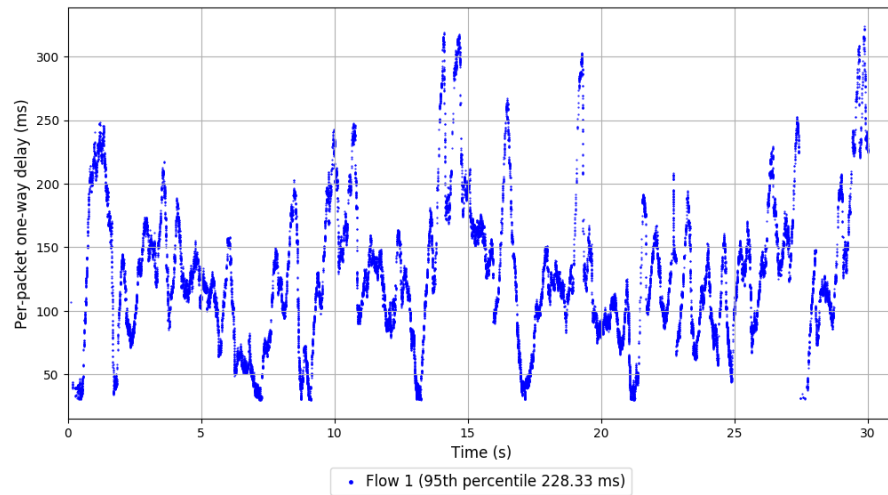
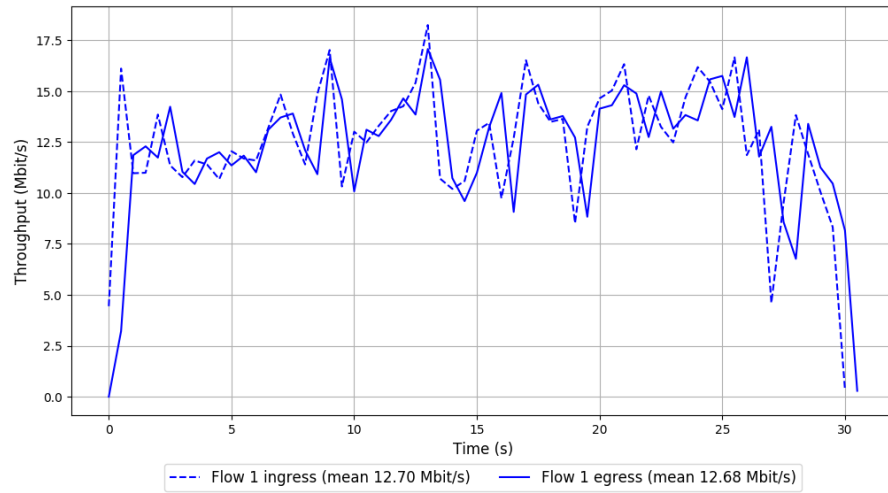
-- Flow 1:

Average throughput: 12.68 Mbit/s

95th percentile per-packet one-way delay: 228.328 ms

Loss rate: 0.50%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2019-03-18 18:15:52

End at: 2019-03-18 18:16:22

Local clock offset: -0.718 ms

Remote clock offset: 0.961 ms

Below is generated by plot.py at 2019-03-18 19:04:40

Datalink statistics

-- Total of 1 flow:

Average throughput: 14.45 Mbit/s

95th percentile per-packet one-way delay: 251.219 ms

Loss rate: 0.48%

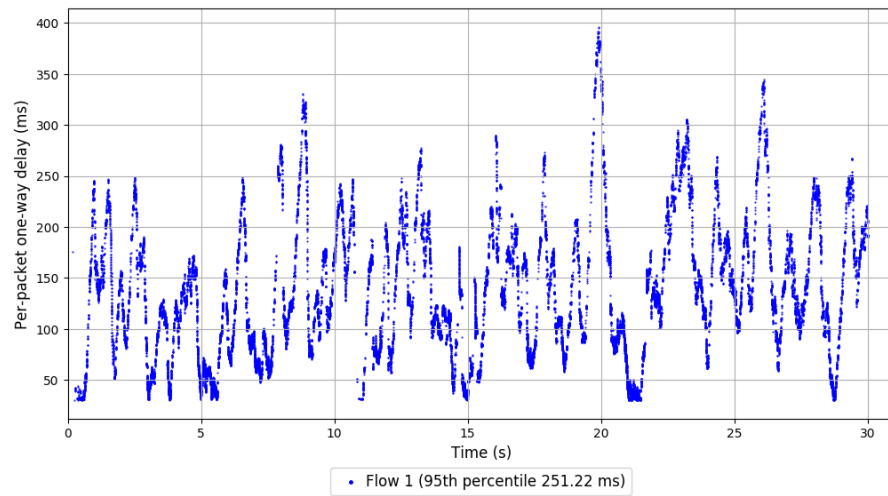
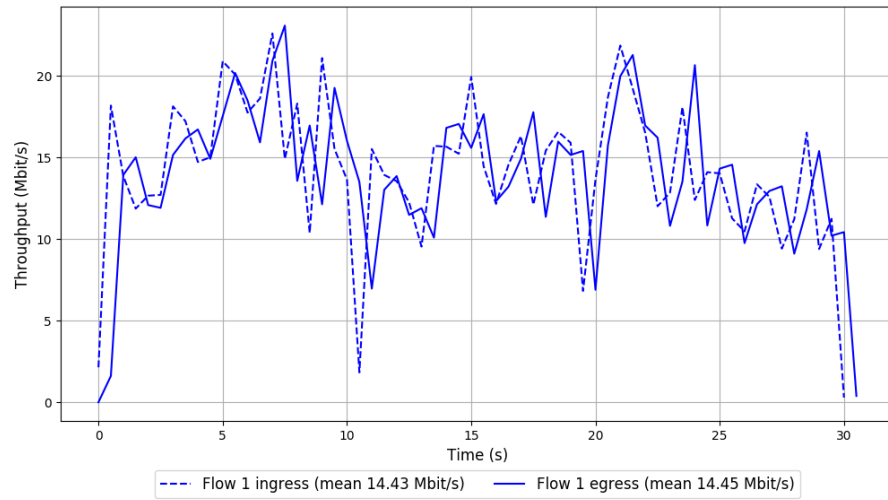
-- Flow 1:

Average throughput: 14.45 Mbit/s

95th percentile per-packet one-way delay: 251.219 ms

Loss rate: 0.48%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2019-03-18 18:41:41

End at: 2019-03-18 18:42:11

Local clock offset: -1.729 ms

Remote clock offset: 0.743 ms

Below is generated by plot.py at 2019-03-18 19:04:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 15.02 Mbit/s

95th percentile per-packet one-way delay: 229.976 ms

Loss rate: 0.65%

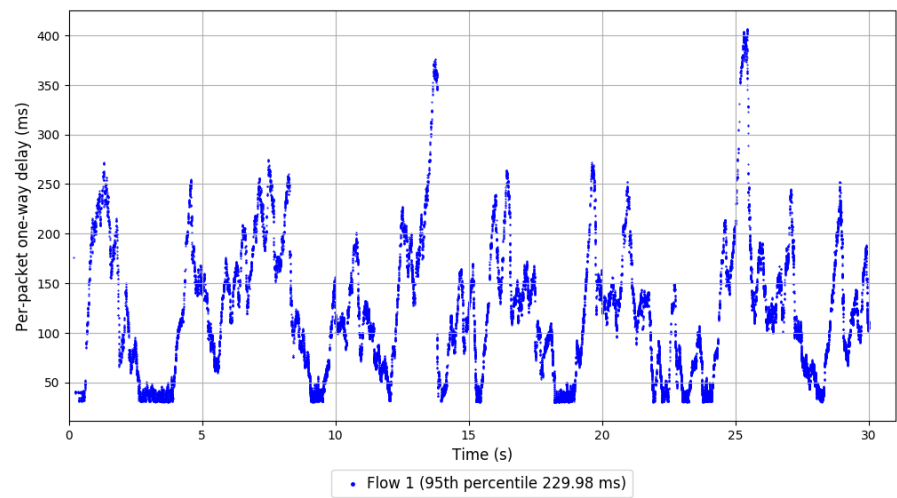
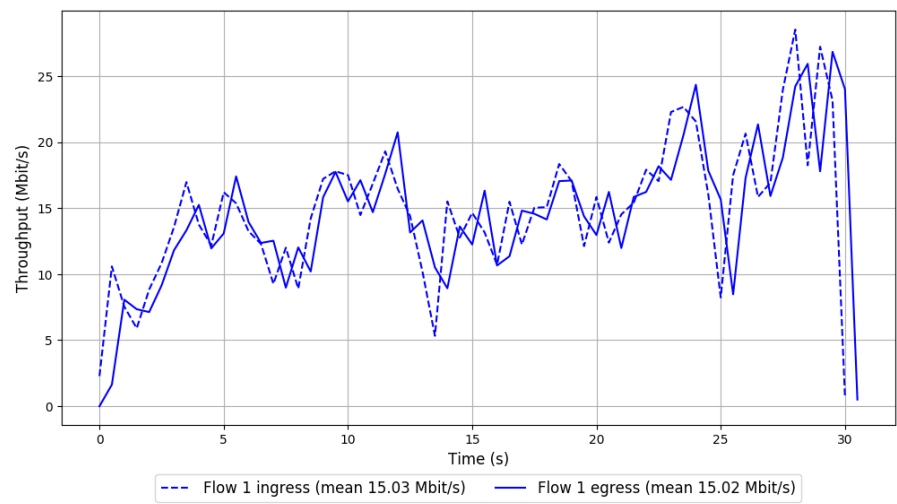
-- Flow 1:

Average throughput: 15.02 Mbit/s

95th percentile per-packet one-way delay: 229.976 ms

Loss rate: 0.65%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

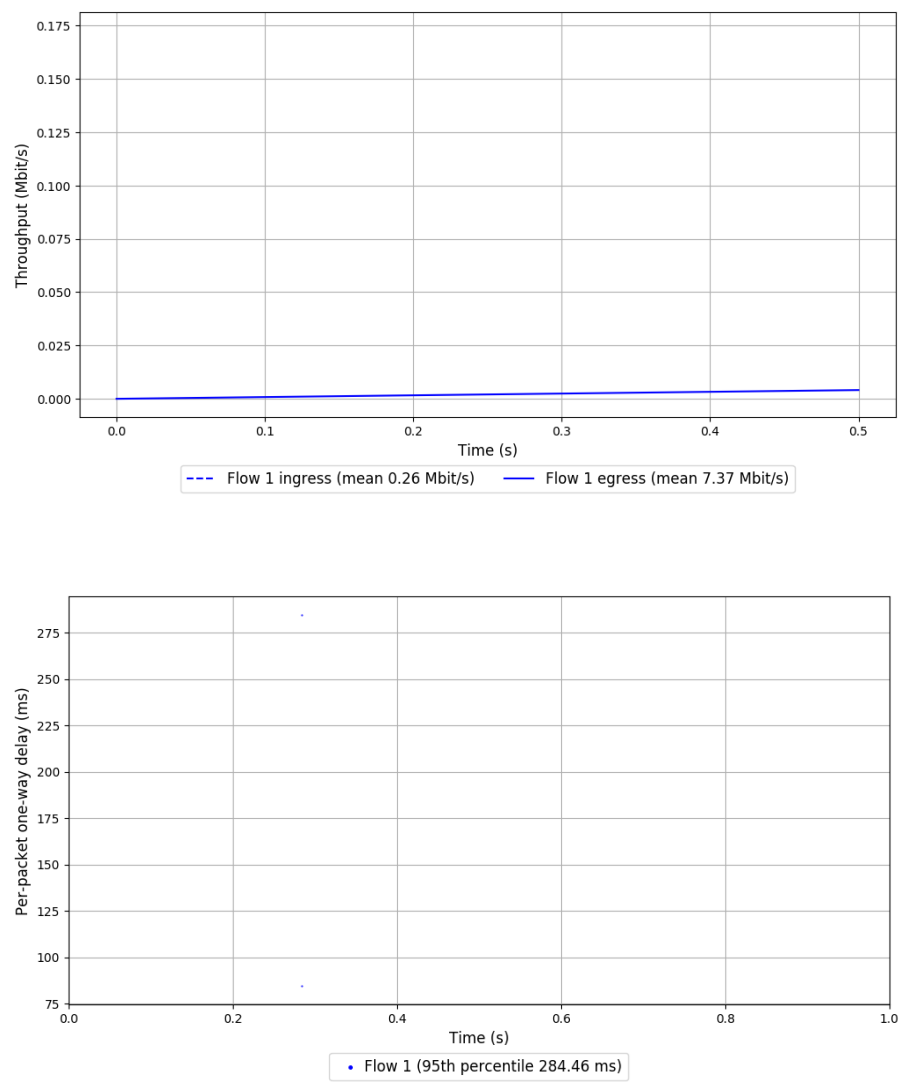
Start at: 2019-03-18 18:08:30

End at: 2019-03-18 18:09:01

Local clock offset: -0.289 ms

Remote clock offset: 1.331 ms

Run 1: Report of Copa — Data Link



Run 2: Statistics of Copa

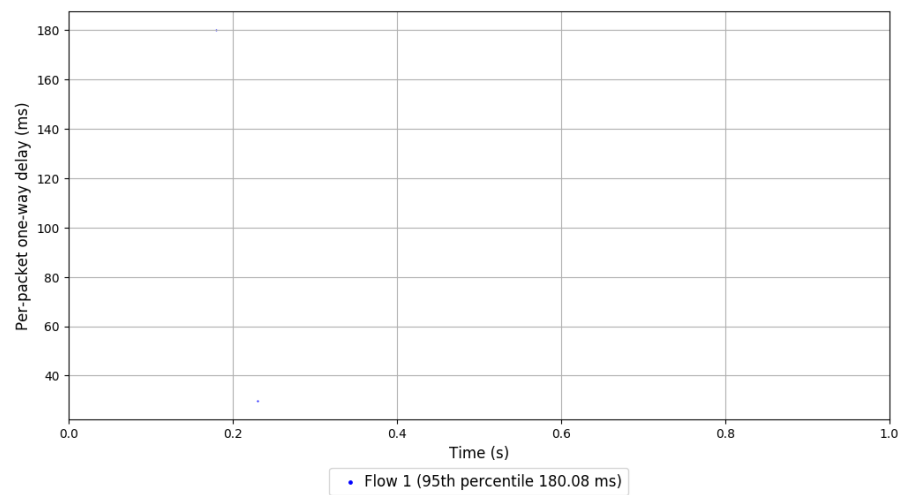
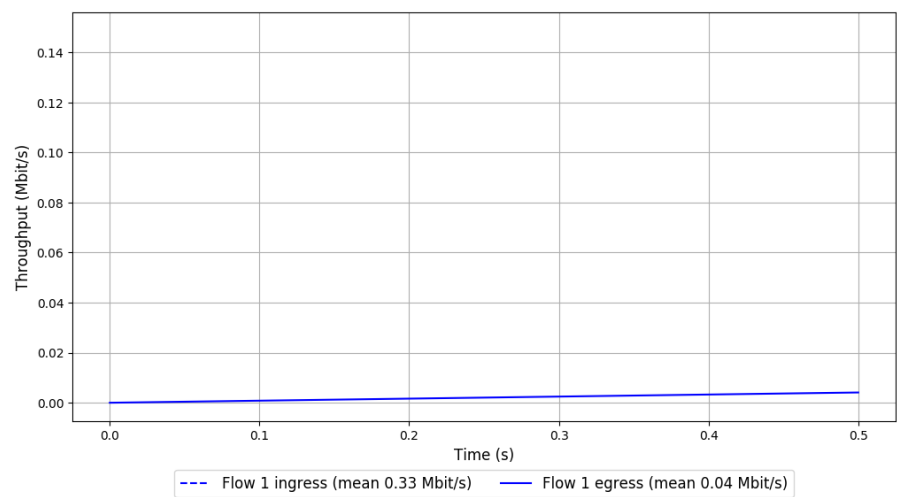
Start at: 2019-03-18 18:34:20

End at: 2019-03-18 18:34:50

Local clock offset: -1.325 ms

Remote clock offset: 1.096 ms

Run 2: Report of Copa — Data Link



Run 3: Statistics of Copa

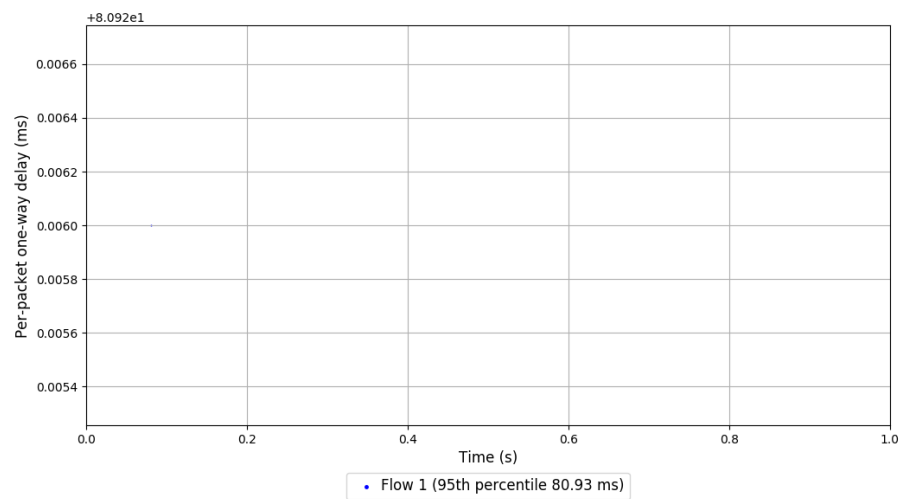
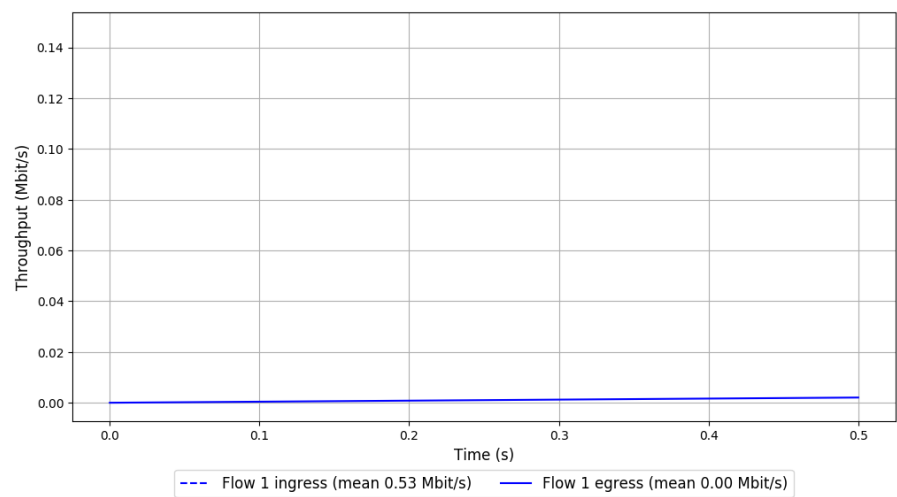
Start at: 2019-03-18 19:00:06

End at: 2019-03-18 19:00:36

Local clock offset: -0.481 ms

Remote clock offset: 0.245 ms

Run 3: Report of Copa — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2019-03-18 18:09:44

End at: 2019-03-18 18:10:14

Local clock offset: -0.357 ms

Remote clock offset: 1.236 ms

Below is generated by plot.py at 2019-03-18 19:04:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 11.09 Mbit/s

95th percentile per-packet one-way delay: 212.444 ms

Loss rate: 0.22%

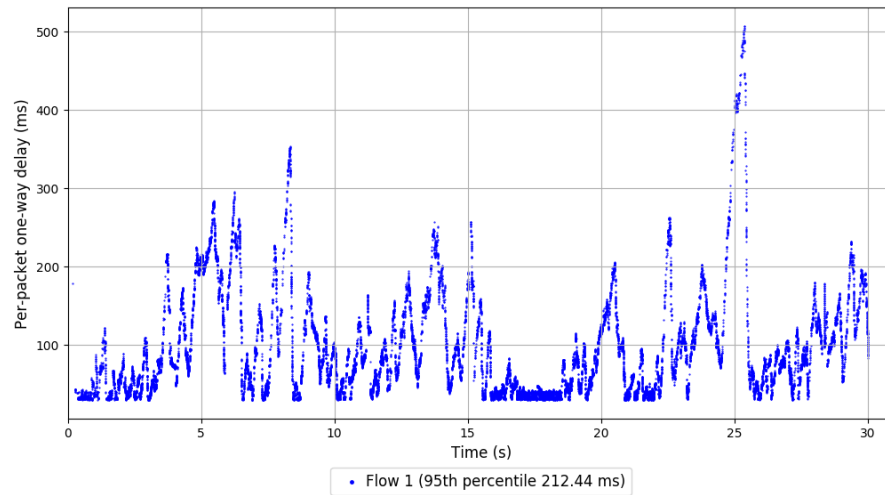
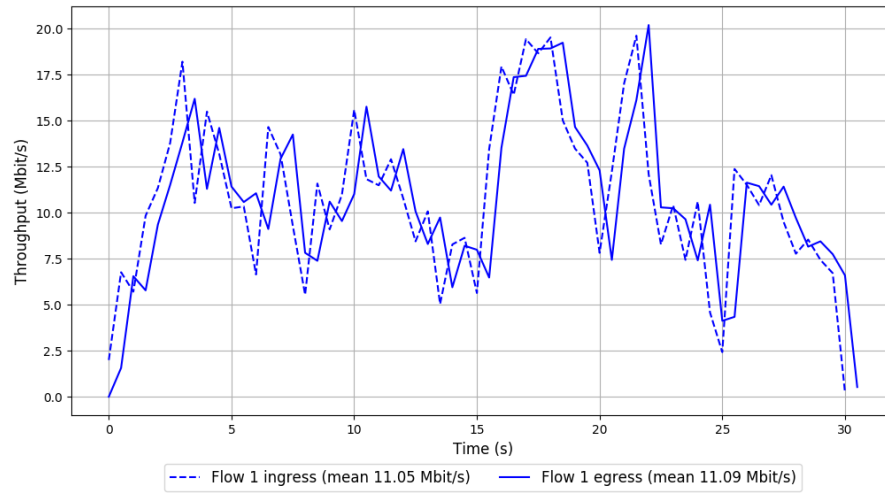
-- Flow 1:

Average throughput: 11.09 Mbit/s

95th percentile per-packet one-way delay: 212.444 ms

Loss rate: 0.22%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2019-03-18 18:35:34

End at: 2019-03-18 18:36:04

Local clock offset: -1.389 ms

Remote clock offset: 1.241 ms

Below is generated by plot.py at 2019-03-18 19:04:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 4.16 Mbit/s

95th percentile per-packet one-way delay: 220.937 ms

Loss rate: 0.73%

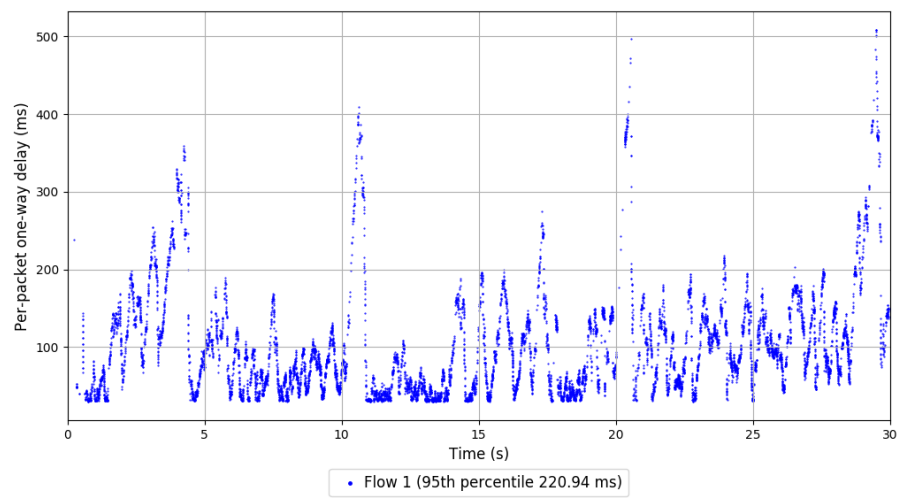
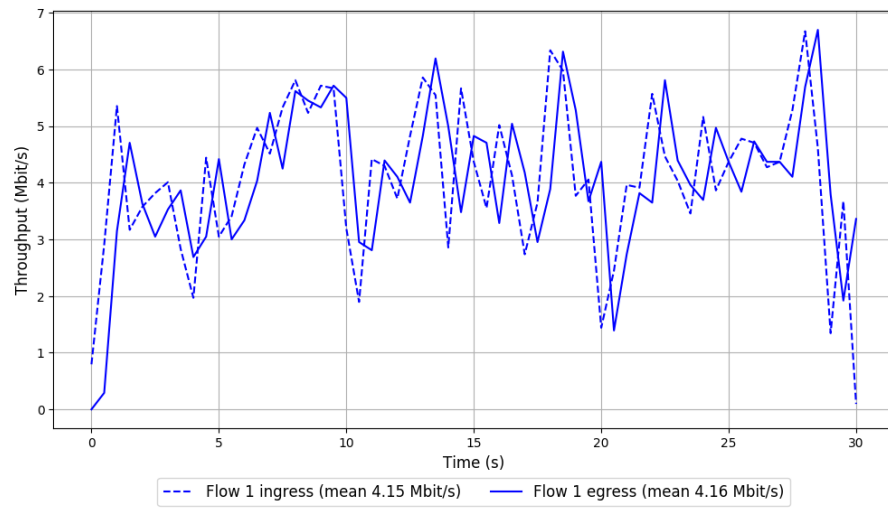
-- Flow 1:

Average throughput: 4.16 Mbit/s

95th percentile per-packet one-way delay: 220.937 ms

Loss rate: 0.73%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2019-03-18 19:01:19

End at: 2019-03-18 19:01:49

Local clock offset: -0.447 ms

Remote clock offset: 0.251 ms

Below is generated by plot.py at 2019-03-18 19:04:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 9.90 Mbit/s

95th percentile per-packet one-way delay: 175.244 ms

Loss rate: 0.26%

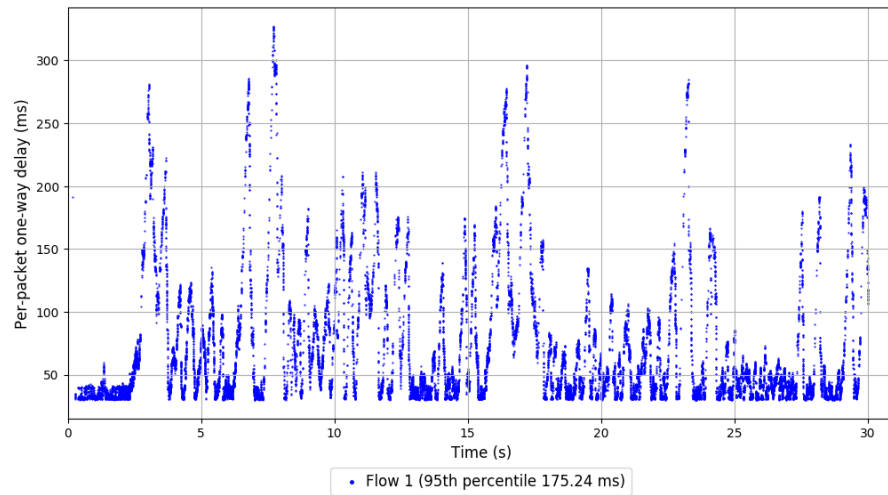
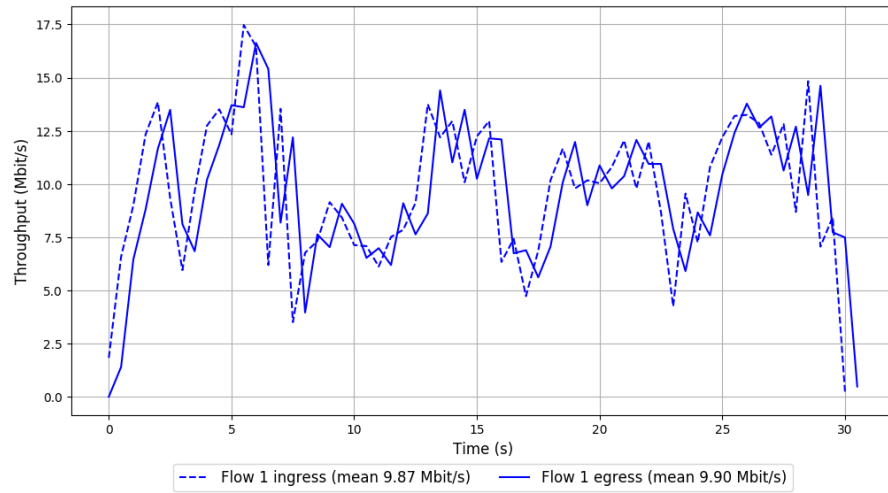
-- Flow 1:

Average throughput: 9.90 Mbit/s

95th percentile per-packet one-way delay: 175.244 ms

Loss rate: 0.26%

Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of FillP

Start at: 2019-03-18 18:06:03

End at: 2019-03-18 18:06:33

Local clock offset: -0.203 ms

Remote clock offset: 1.59 ms

Below is generated by plot.py at 2019-03-18 19:04:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 14.05 Mbit/s

95th percentile per-packet one-way delay: 316.849 ms

Loss rate: 0.79%

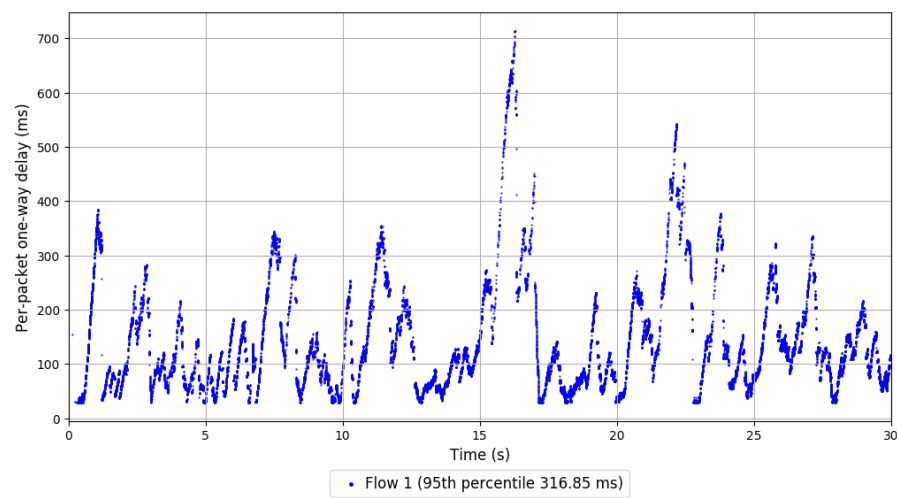
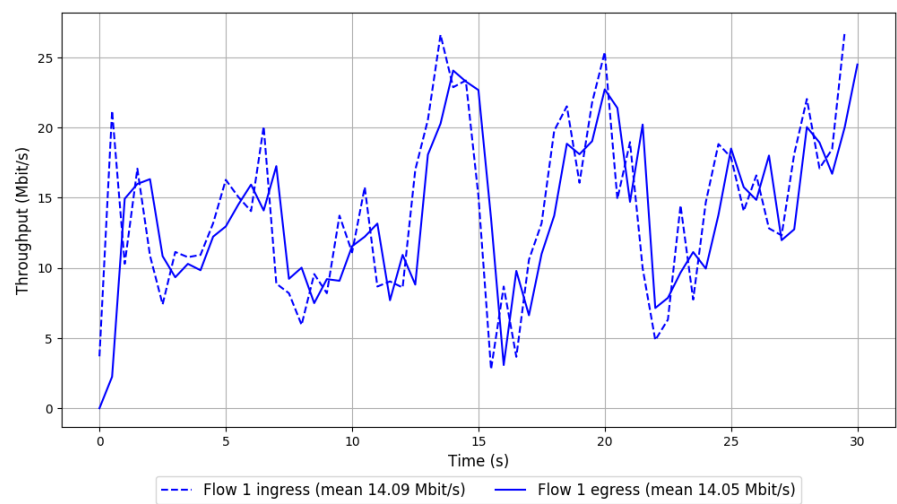
-- Flow 1:

Average throughput: 14.05 Mbit/s

95th percentile per-packet one-way delay: 316.849 ms

Loss rate: 0.79%

Run 1: Report of FillP — Data Link



Run 2: Statistics of FillP

Start at: 2019-03-18 18:31:53

End at: 2019-03-18 18:32:23

Local clock offset: -1.19 ms

Remote clock offset: 1.156 ms

Below is generated by plot.py at 2019-03-18 19:04:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 14.02 Mbit/s

95th percentile per-packet one-way delay: 524.156 ms

Loss rate: 1.15%

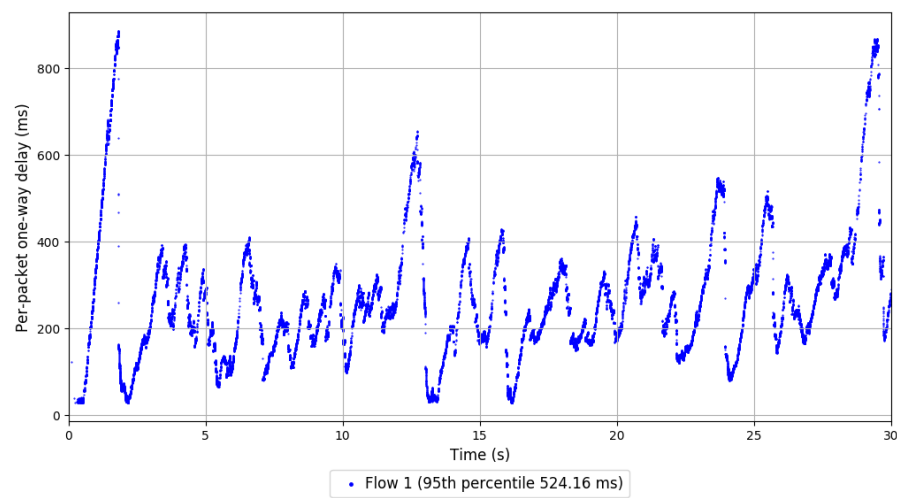
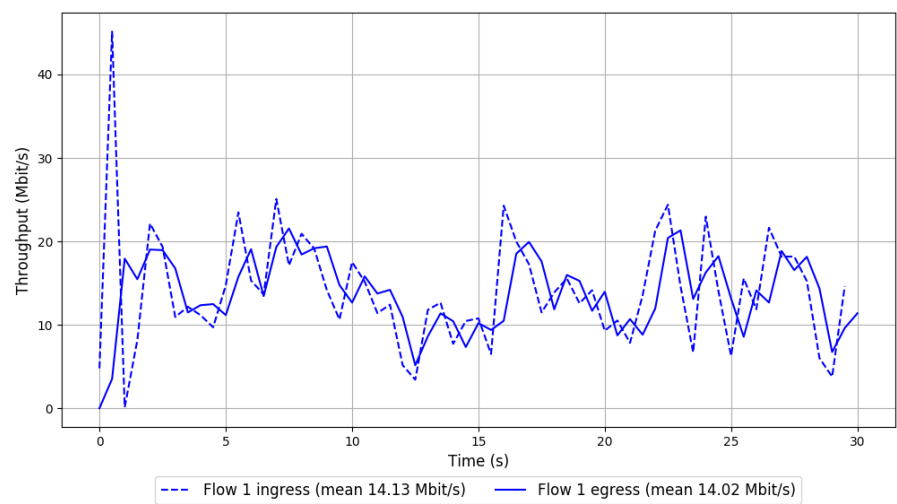
-- Flow 1:

Average throughput: 14.02 Mbit/s

95th percentile per-packet one-way delay: 524.156 ms

Loss rate: 1.15%

Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

Start at: 2019-03-18 18:57:38

End at: 2019-03-18 18:58:08

Local clock offset: -0.571 ms

Remote clock offset: 0.25 ms

Below is generated by plot.py at 2019-03-18 19:04:53

Datalink statistics

-- Total of 1 flow:

Average throughput: 16.51 Mbit/s

95th percentile per-packet one-way delay: 325.927 ms

Loss rate: 0.65%

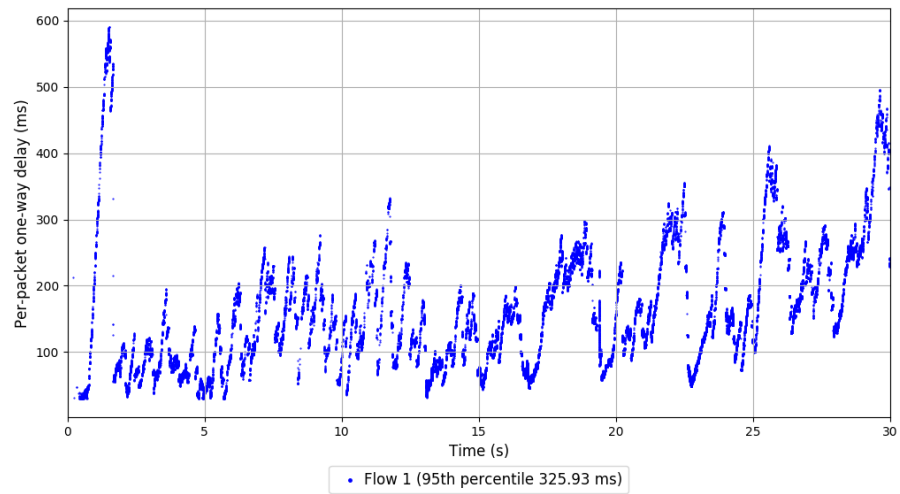
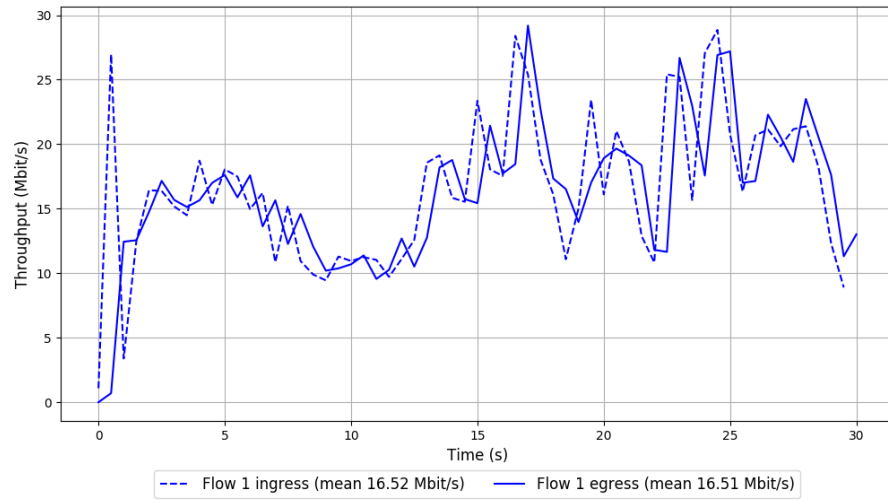
-- Flow 1:

Average throughput: 16.51 Mbit/s

95th percentile per-packet one-way delay: 325.927 ms

Loss rate: 0.65%

Run 3: Report of FillP — Data Link



Run 1: Statistics of FillP-Sheep

Start at: 2019-03-18 18:07:17

End at: 2019-03-18 18:07:47

Local clock offset: -0.227 ms

Remote clock offset: 1.425 ms

Below is generated by plot.py at 2019-03-18 19:04:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 15.12 Mbit/s

95th percentile per-packet one-way delay: 171.725 ms

Loss rate: 0.38%

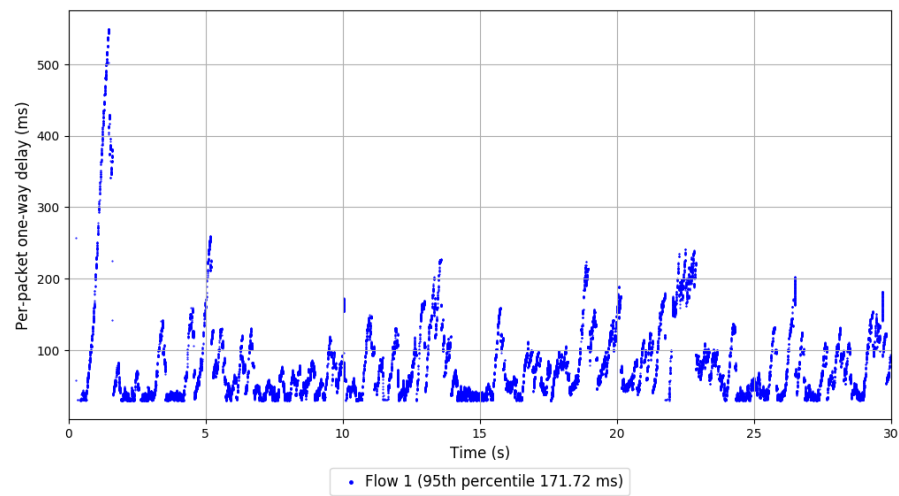
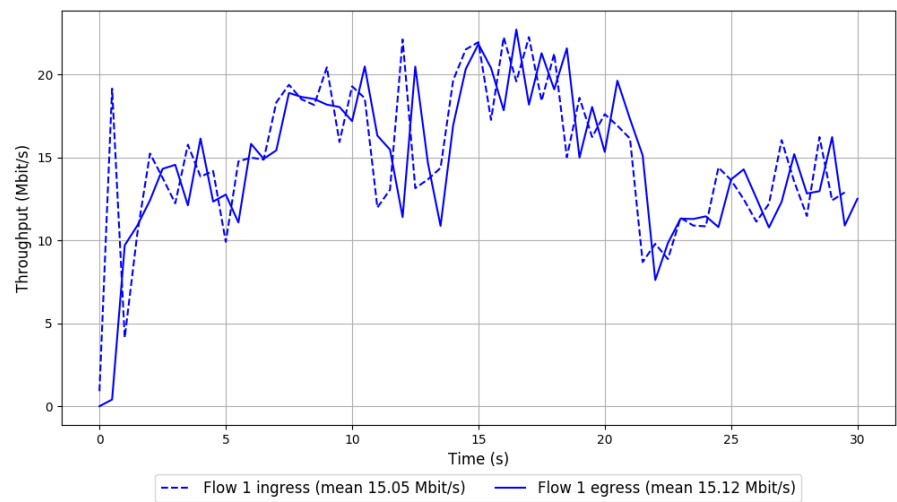
-- Flow 1:

Average throughput: 15.12 Mbit/s

95th percentile per-packet one-way delay: 171.725 ms

Loss rate: 0.38%

Run 1: Report of FillP-Sheep — Data Link



Run 2: Statistics of FillP-Sheep

Start at: 2019-03-18 18:33:07

End at: 2019-03-18 18:33:37

Local clock offset: -1.241 ms

Remote clock offset: 1.086 ms

Below is generated by plot.py at 2019-03-18 19:04:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 9.30 Mbit/s

95th percentile per-packet one-way delay: 359.909 ms

Loss rate: 0.55%

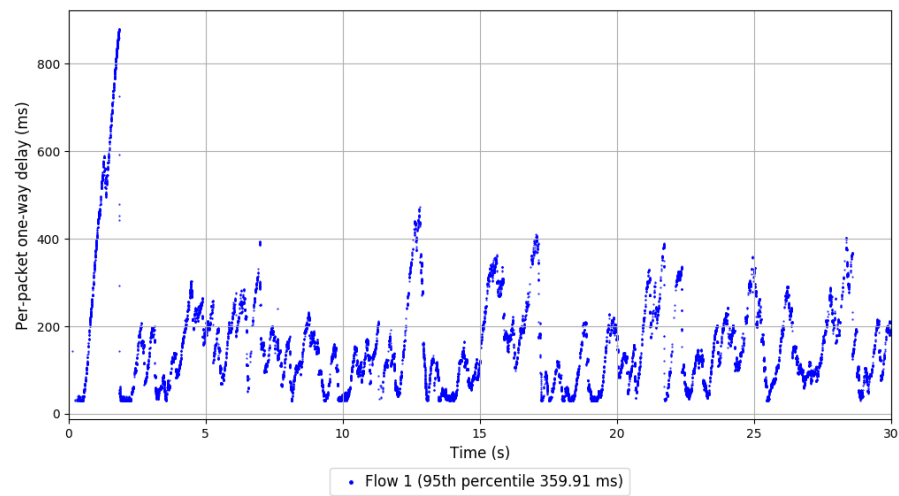
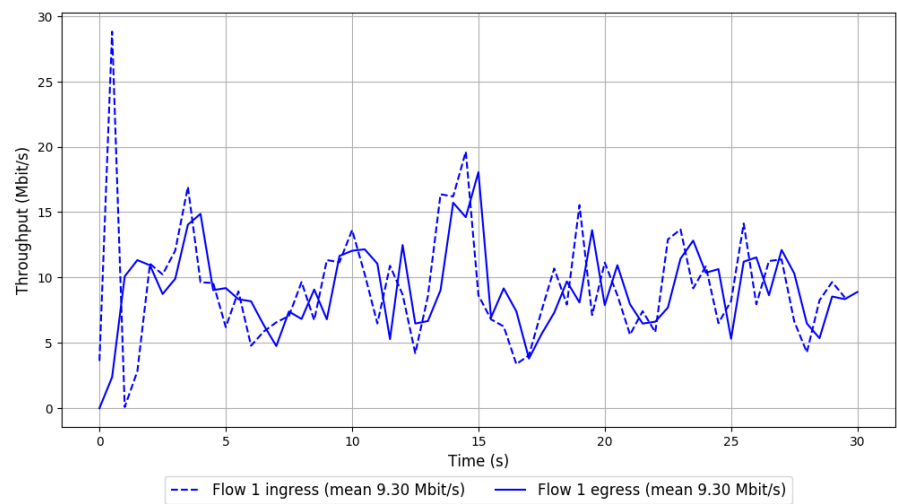
-- Flow 1:

Average throughput: 9.30 Mbit/s

95th percentile per-packet one-way delay: 359.909 ms

Loss rate: 0.55%

Run 2: Report of FillP-Sheep — Data Link



Run 3: Statistics of FillP-Sheep

Start at: 2019-03-18 18:58:52

End at: 2019-03-18 18:59:22

Local clock offset: -0.52 ms

Remote clock offset: 0.162 ms

Below is generated by plot.py at 2019-03-18 19:04:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 13.65 Mbit/s

95th percentile per-packet one-way delay: 339.748 ms

Loss rate: 0.22%

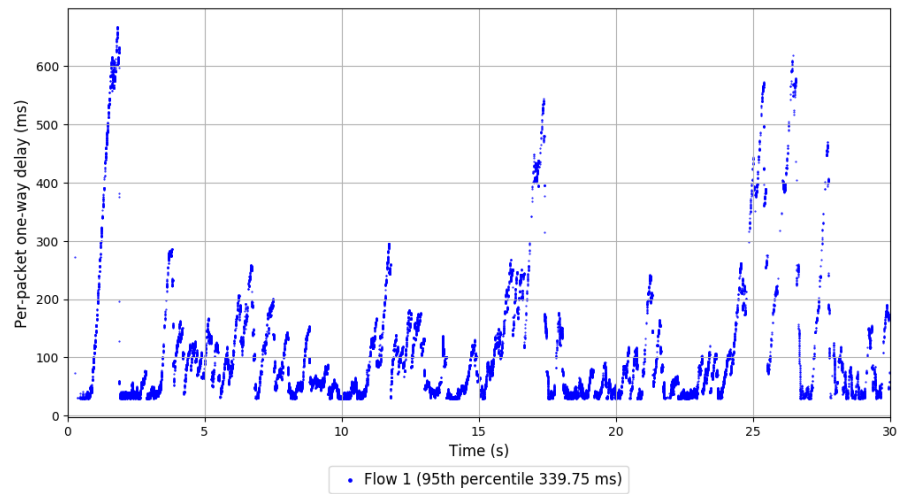
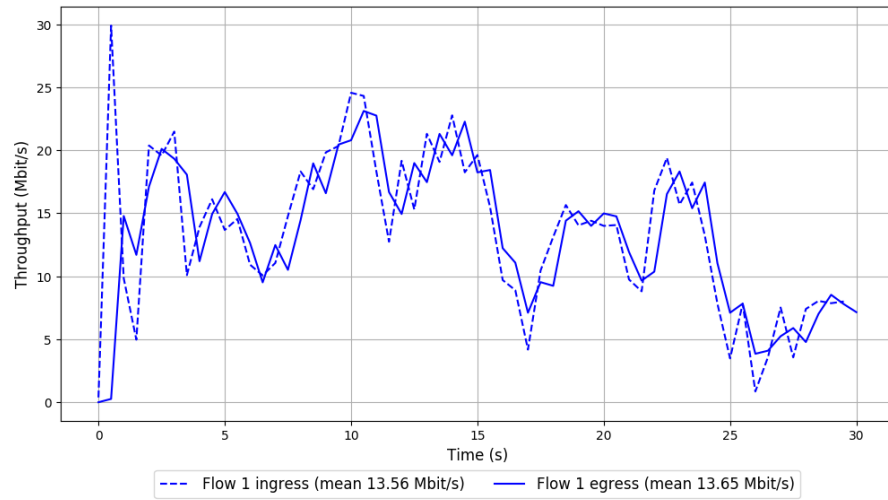
-- Flow 1:

Average throughput: 13.65 Mbit/s

95th percentile per-packet one-way delay: 339.748 ms

Loss rate: 0.22%

Run 3: Report of FillP-Sheep — Data Link



Run 1: Statistics of Indigo

Start at: 2019-03-18 18:10:57

End at: 2019-03-18 18:11:27

Local clock offset: -0.391 ms

Remote clock offset: 1.217 ms

Below is generated by plot.py at 2019-03-18 19:04:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.58 Mbit/s

95th percentile per-packet one-way delay: 47.369 ms

Loss rate: 0.08%

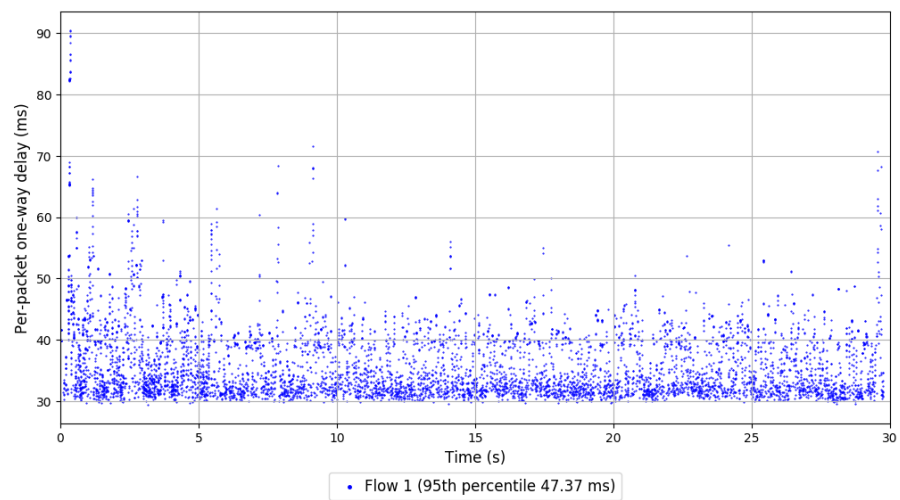
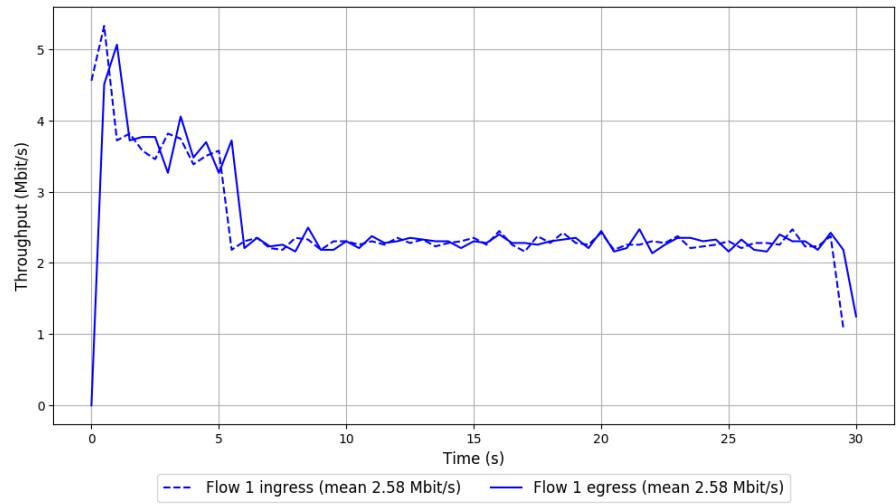
-- Flow 1:

Average throughput: 2.58 Mbit/s

95th percentile per-packet one-way delay: 47.369 ms

Loss rate: 0.08%

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2019-03-18 18:36:47

End at: 2019-03-18 18:37:17

Local clock offset: -1.438 ms

Remote clock offset: 1.254 ms

Below is generated by plot.py at 2019-03-18 19:04:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 3.09 Mbit/s

95th percentile per-packet one-way delay: 154.061 ms

Loss rate: 0.14%

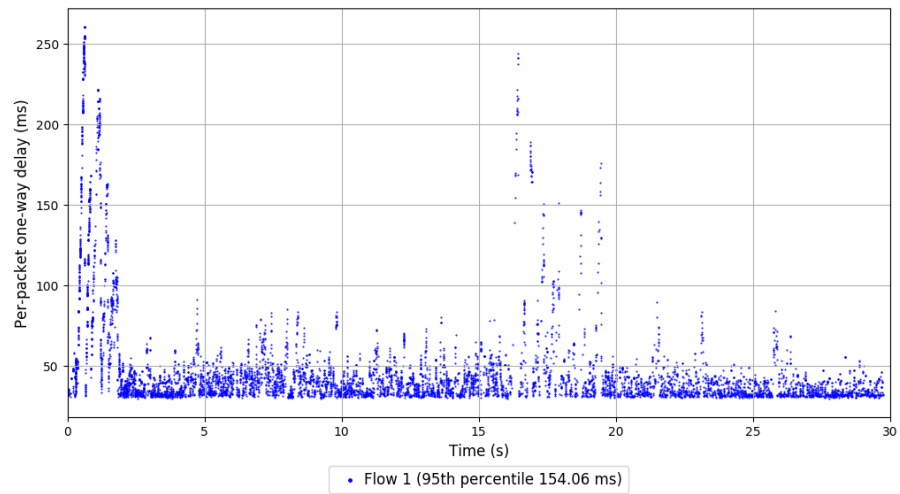
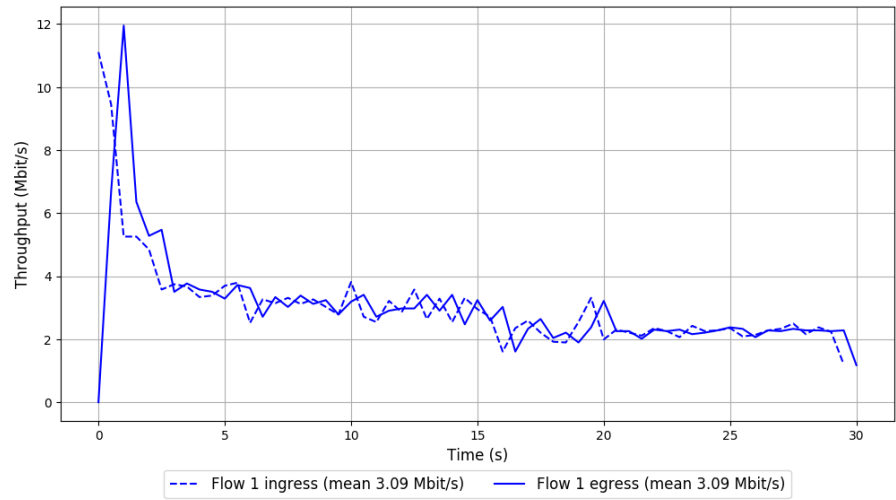
-- Flow 1:

Average throughput: 3.09 Mbit/s

95th percentile per-packet one-way delay: 154.061 ms

Loss rate: 0.14%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2019-03-18 19:02:33

End at: 2019-03-18 19:03:03

Local clock offset: -0.41 ms

Remote clock offset: 0.253 ms

Below is generated by plot.py at 2019-03-18 19:04:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.66 Mbit/s

95th percentile per-packet one-way delay: 49.474 ms

Loss rate: 0.15%

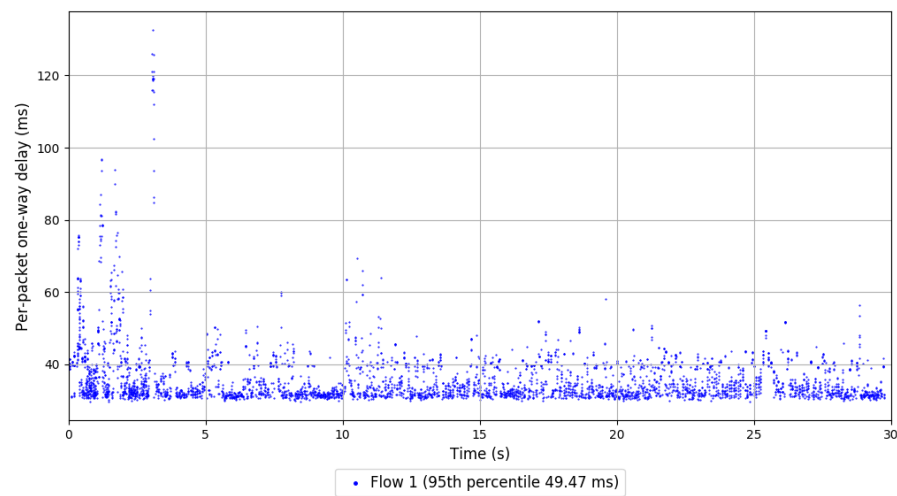
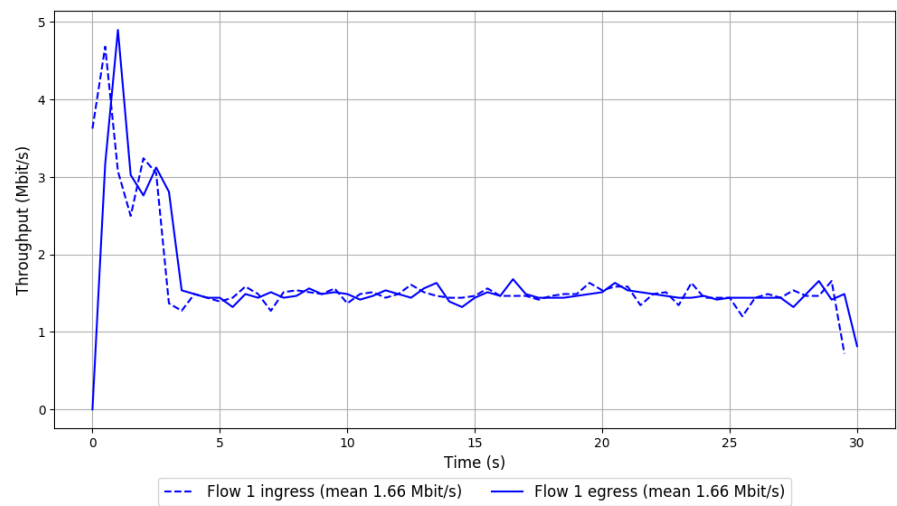
-- Flow 1:

Average throughput: 1.66 Mbit/s

95th percentile per-packet one-way delay: 49.474 ms

Loss rate: 0.15%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of Indigo-MusesC3

Start at: 2019-03-18 17:56:13

End at: 2019-03-18 17:56:43

Local clock offset: -0.015 ms

Remote clock offset: 1.78 ms

Below is generated by plot.py at 2019-03-18 19:04:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 9.80 Mbit/s

95th percentile per-packet one-way delay: 94.823 ms

Loss rate: 0.18%

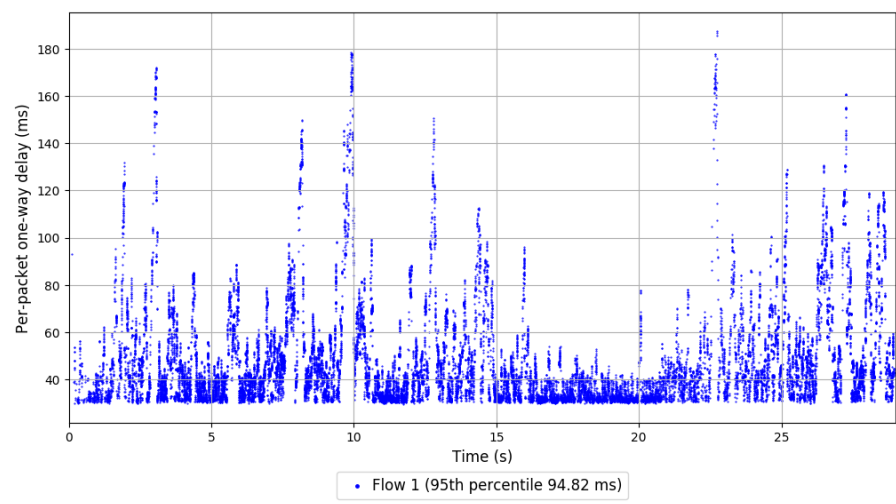
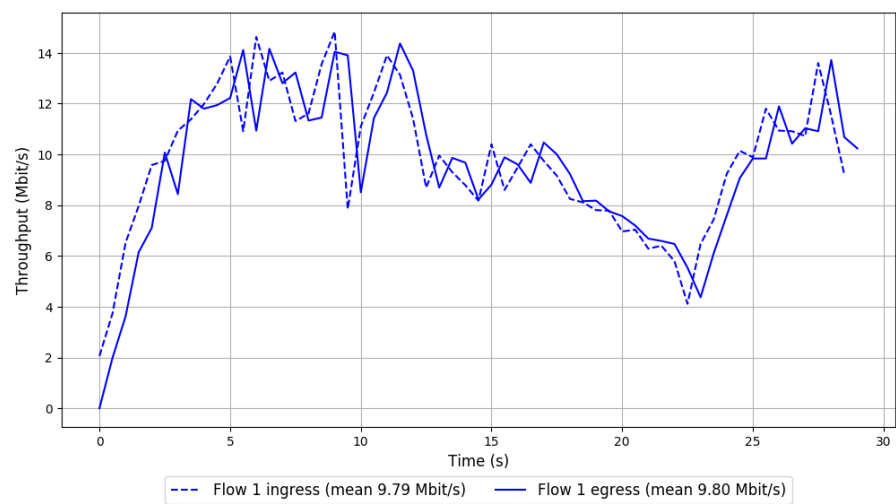
-- Flow 1:

Average throughput: 9.80 Mbit/s

95th percentile per-packet one-way delay: 94.823 ms

Loss rate: 0.18%

Run 1: Report of Indigo-MusesC3 — Data Link



Run 2: Statistics of Indigo-MusesC3

Start at: 2019-03-18 18:22:04

End at: 2019-03-18 18:22:34

Local clock offset: -0.785 ms

Remote clock offset: 1.012 ms

Below is generated by plot.py at 2019-03-18 19:04:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 5.30 Mbit/s

95th percentile per-packet one-way delay: 56.974 ms

Loss rate: 0.10%

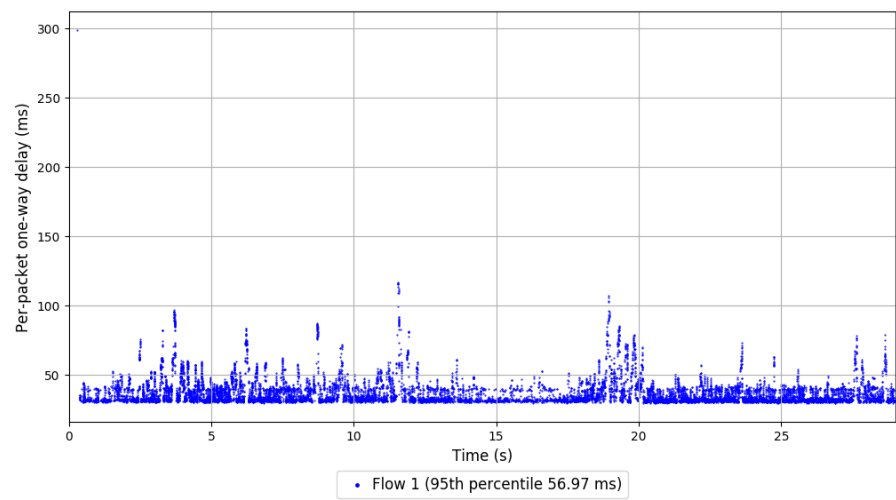
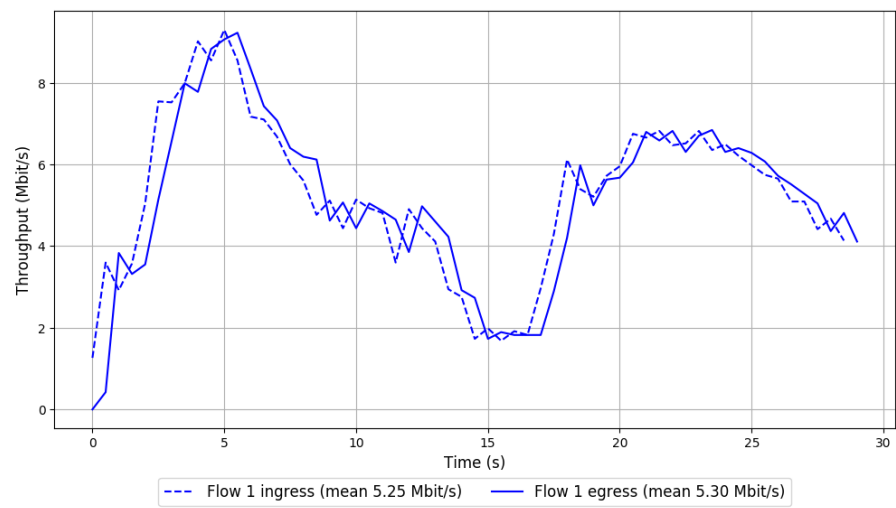
-- Flow 1:

Average throughput: 5.30 Mbit/s

95th percentile per-packet one-way delay: 56.974 ms

Loss rate: 0.10%

Run 2: Report of Indigo-MusesC3 — Data Link



Run 3: Statistics of Indigo-MusesC3

Start at: 2019-03-18 18:47:49

End at: 2019-03-18 18:48:19

Local clock offset: -1.715 ms

Remote clock offset: 0.305 ms

Below is generated by plot.py at 2019-03-18 19:04:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 6.11 Mbit/s

95th percentile per-packet one-way delay: 47.034 ms

Loss rate: 0.05%

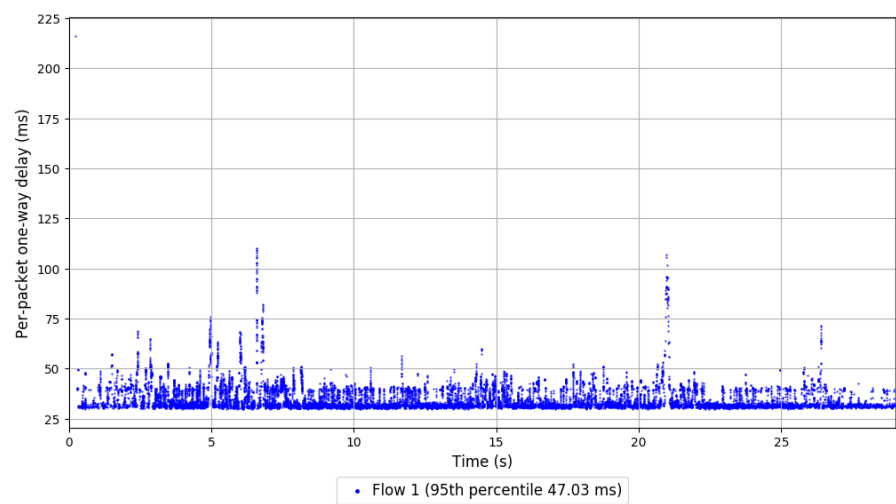
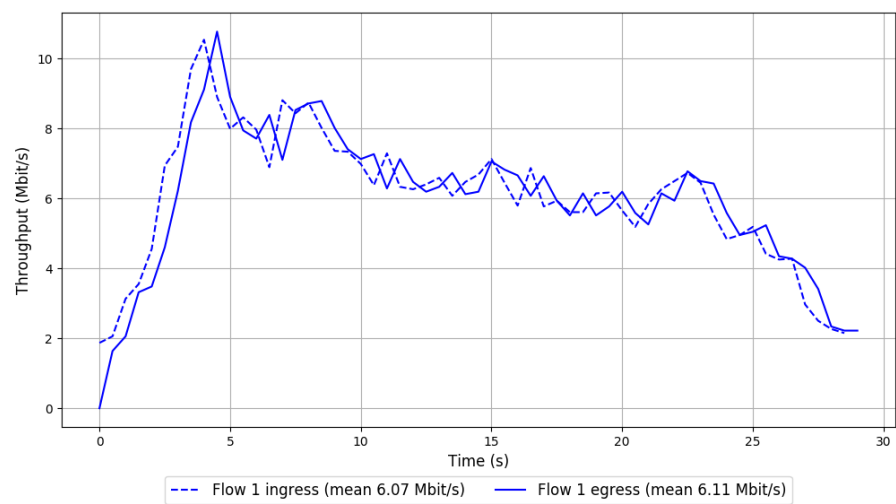
-- Flow 1:

Average throughput: 6.11 Mbit/s

95th percentile per-packet one-way delay: 47.034 ms

Loss rate: 0.05%

Run 3: Report of Indigo-MusesC3 — Data Link



Run 1: Statistics of Indigo-MusesC5

Start at: 2019-03-18 17:57:27

End at: 2019-03-18 17:57:57

Local clock offset: 0.083 ms

Remote clock offset: 1.767 ms

Below is generated by plot.py at 2019-03-18 19:04:59

Datalink statistics

-- Total of 1 flow:

Average throughput: 11.50 Mbit/s

95th percentile per-packet one-way delay: 202.009 ms

Loss rate: 0.02%

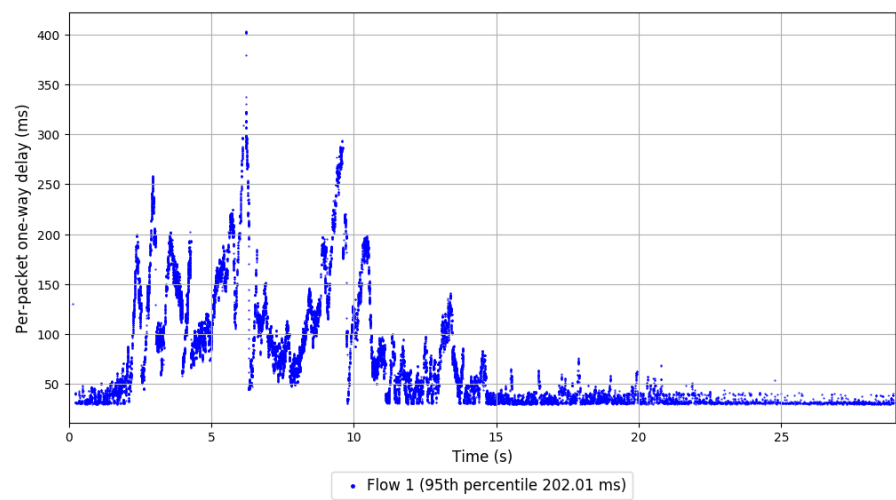
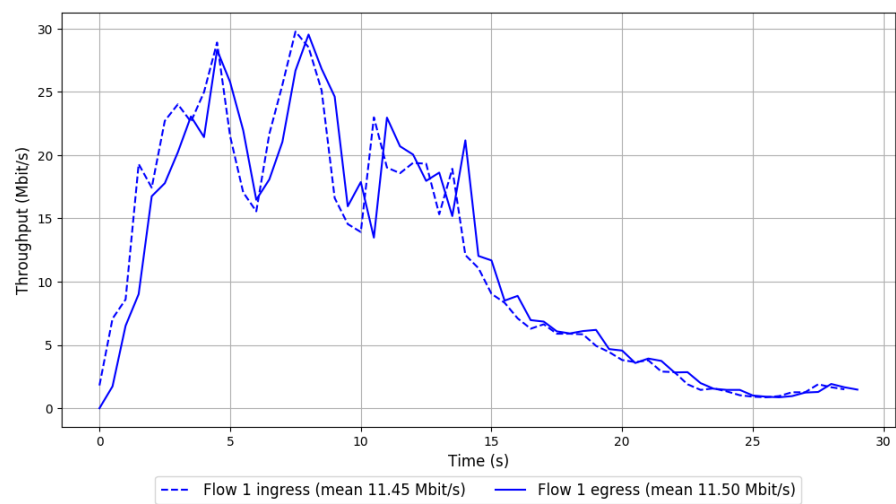
-- Flow 1:

Average throughput: 11.50 Mbit/s

95th percentile per-packet one-way delay: 202.009 ms

Loss rate: 0.02%

Run 1: Report of Indigo-MusesC5 — Data Link



Run 2: Statistics of Indigo-MusesC5

Start at: 2019-03-18 18:23:18

End at: 2019-03-18 18:23:48

Local clock offset: -0.836 ms

Remote clock offset: 0.97 ms

Below is generated by plot.py at 2019-03-18 19:05:03

Datalink statistics

-- Total of 1 flow:

Average throughput: 11.32 Mbit/s

95th percentile per-packet one-way delay: 503.341 ms

Loss rate: 0.59%

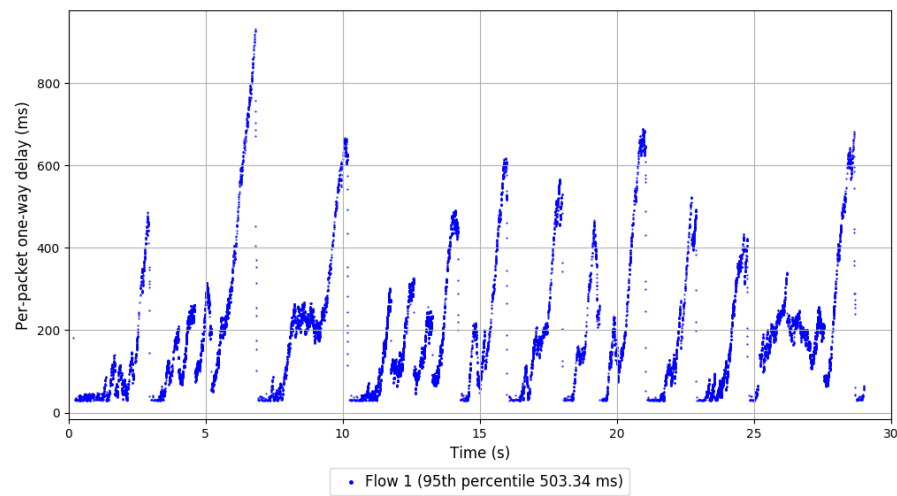
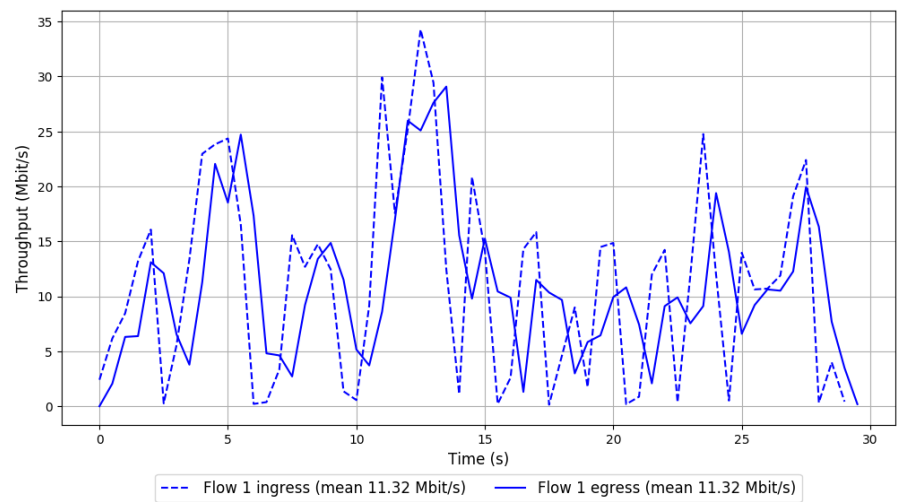
-- Flow 1:

Average throughput: 11.32 Mbit/s

95th percentile per-packet one-way delay: 503.341 ms

Loss rate: 0.59%

Run 2: Report of Indigo-MusesC5 — Data Link



Run 3: Statistics of Indigo-MusesC5

Start at: 2019-03-18 18:49:03

End at: 2019-03-18 18:49:33

Local clock offset: -1.451 ms

Remote clock offset: 0.359 ms

Below is generated by plot.py at 2019-03-18 19:05:03

Datalink statistics

-- Total of 1 flow:

Average throughput: 10.69 Mbit/s

95th percentile per-packet one-way delay: 360.990 ms

Loss rate: 0.14%

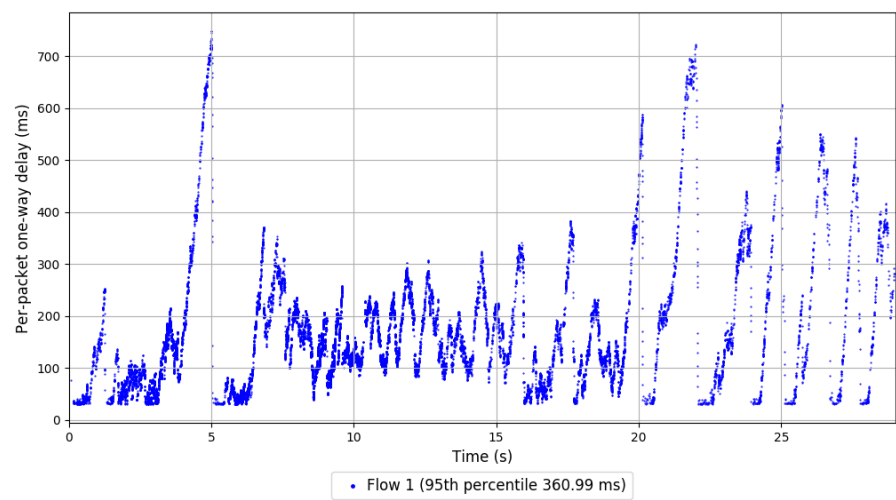
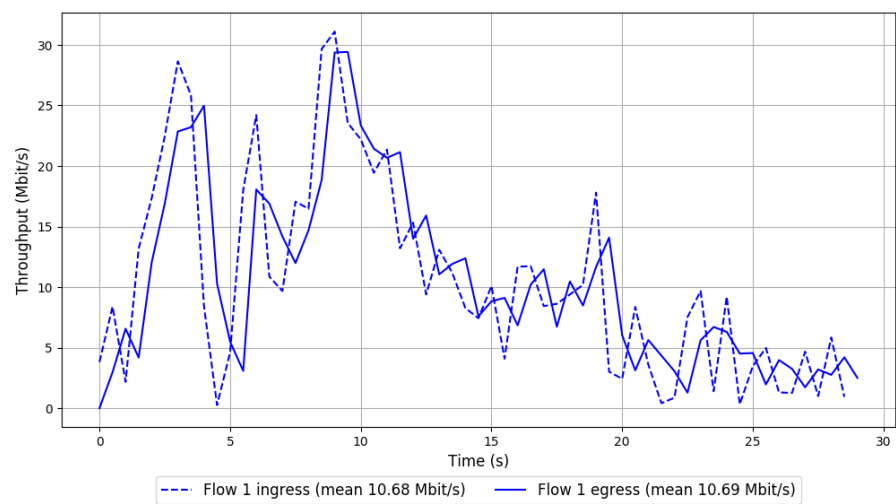
-- Flow 1:

Average throughput: 10.69 Mbit/s

95th percentile per-packet one-way delay: 360.990 ms

Loss rate: 0.14%

Run 3: Report of Indigo-MusesC5 — Data Link

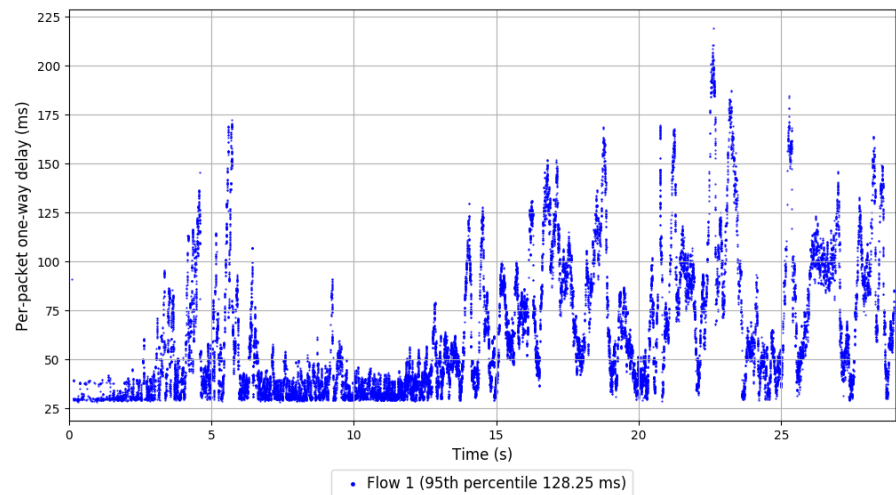
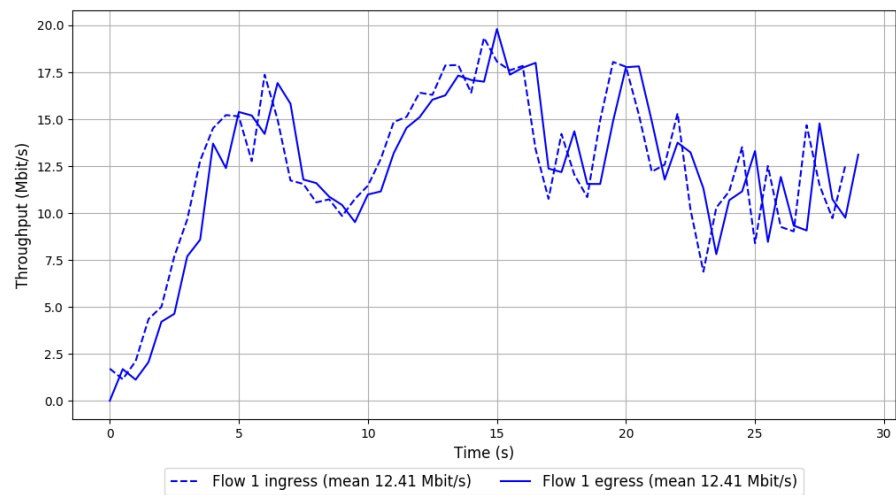


```
Run 1: Statistics of Indigo-MusesD

Start at: 2019-03-18 17:59:54
End at: 2019-03-18 18:00:24
Local clock offset: 0.06 ms
Remote clock offset: 1.858 ms

# Below is generated by plot.py at 2019-03-18 19:05:06
# Datalink statistics
-- Total of 1 flow:
Average throughput: 12.41 Mbit/s
95th percentile per-packet one-way delay: 128.245 ms
Loss rate: 0.23%
-- Flow 1:
Average throughput: 12.41 Mbit/s
95th percentile per-packet one-way delay: 128.245 ms
Loss rate: 0.23%
```

Run 1: Report of Indigo-MusesD — Data Link



Run 2: Statistics of Indigo-MusesD

Start at: 2019-03-18 18:25:45

End at: 2019-03-18 18:26:15

Local clock offset: -0.908 ms

Remote clock offset: 0.998 ms

Below is generated by plot.py at 2019-03-18 19:05:06

Datalink statistics

-- Total of 1 flow:

Average throughput: 3.27 Mbit/s

95th percentile per-packet one-way delay: 119.229 ms

Loss rate: 0.04%

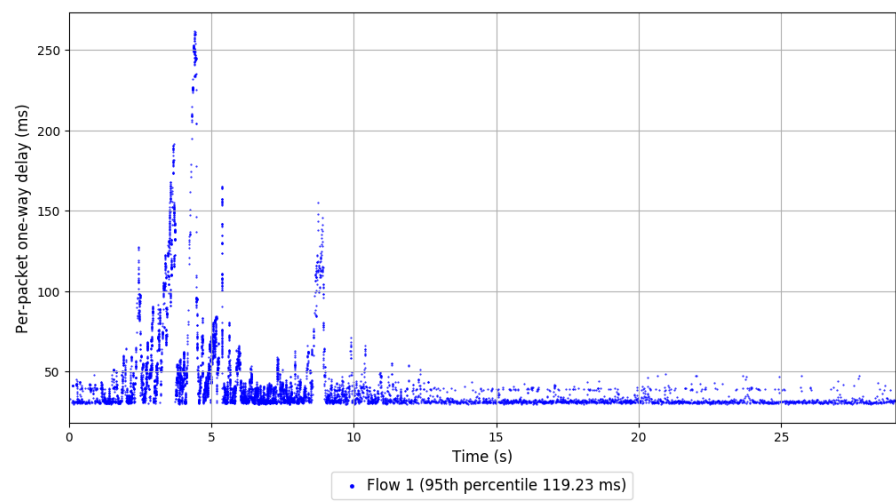
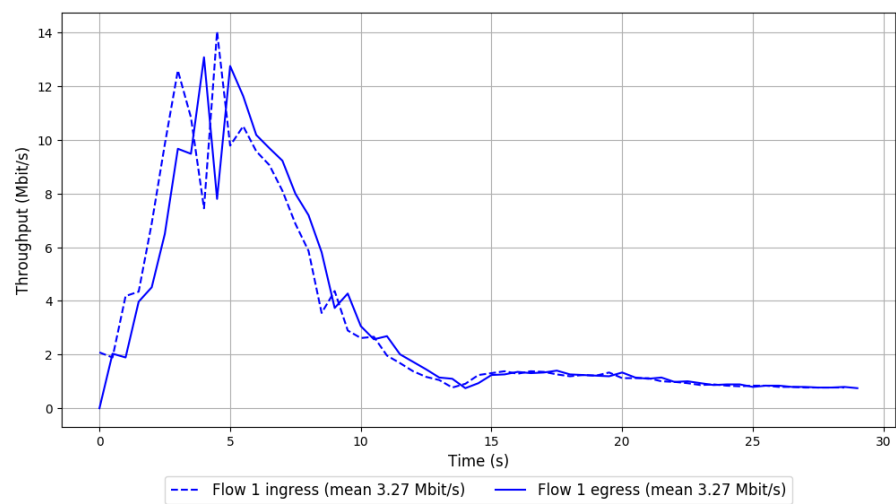
-- Flow 1:

Average throughput: 3.27 Mbit/s

95th percentile per-packet one-way delay: 119.229 ms

Loss rate: 0.04%

Run 2: Report of Indigo-MusesD — Data Link



Run 3: Statistics of Indigo-MusesD

Start at: 2019-03-18 18:51:30

End at: 2019-03-18 18:52:00

Local clock offset: -1.08 ms

Remote clock offset: 0.289 ms

Below is generated by plot.py at 2019-03-18 19:05:06

Datalink statistics

-- Total of 1 flow:

Average throughput: 4.21 Mbit/s

95th percentile per-packet one-way delay: 73.696 ms

Loss rate: 0.02%

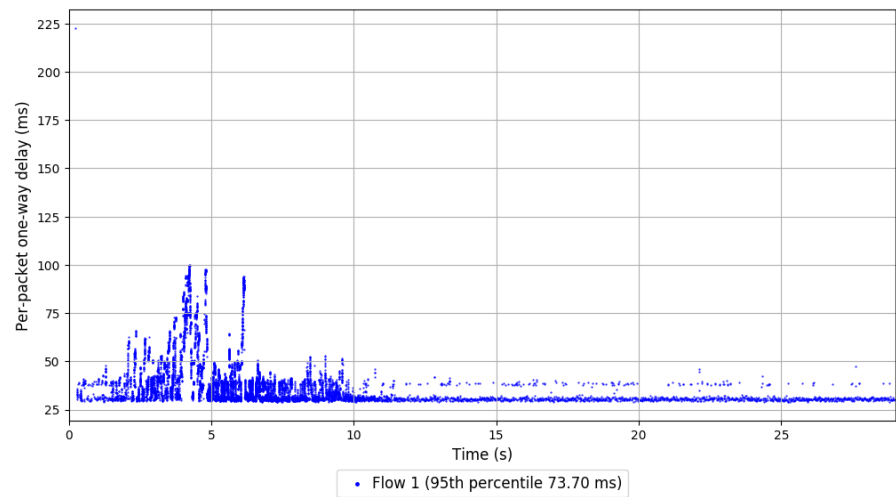
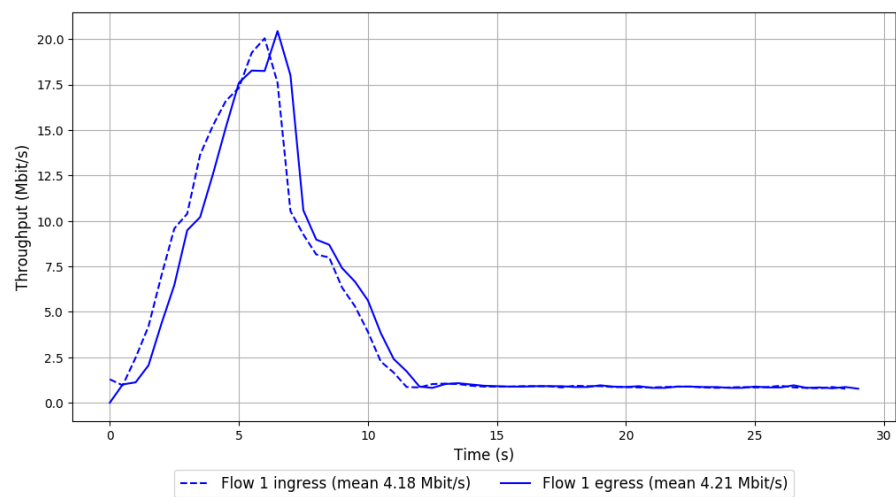
-- Flow 1:

Average throughput: 4.21 Mbit/s

95th percentile per-packet one-way delay: 73.696 ms

Loss rate: 0.02%

Run 3: Report of Indigo-MusesD — Data Link

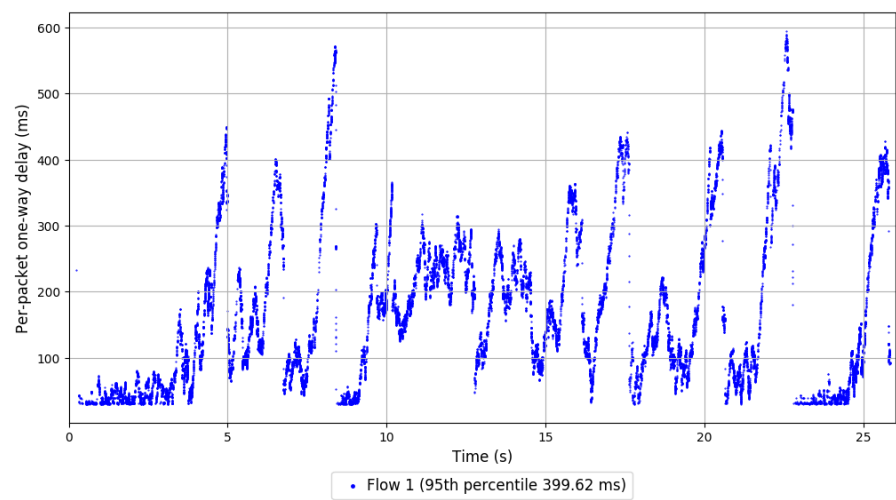
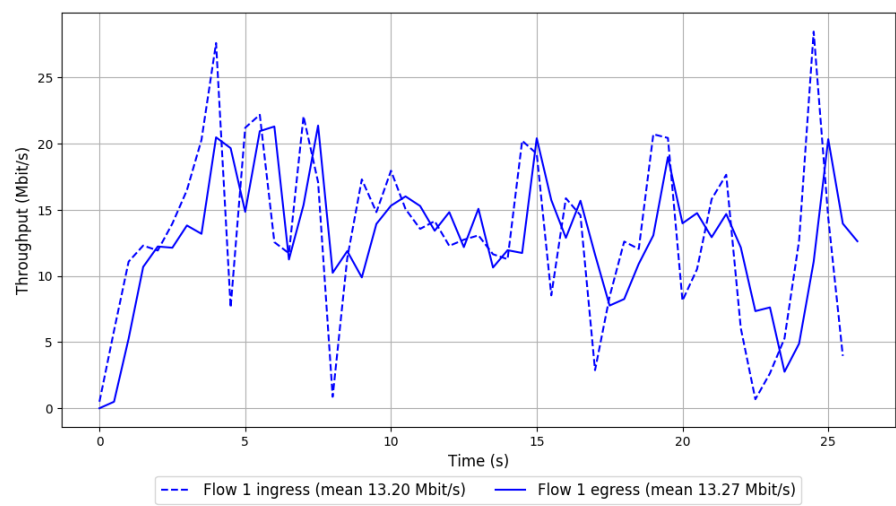


```
Run 1: Statistics of Indigo-MusesT

Start at: 2019-03-18 17:47:38
End at: 2019-03-18 17:48:08
Local clock offset: 0.262 ms
Remote clock offset: 1.345 ms

# Below is generated by plot.py at 2019-03-18 19:05:08
# Datalink statistics
-- Total of 1 flow:
Average throughput: 13.27 Mbit/s
95th percentile per-packet one-way delay: 399.623 ms
Loss rate: 0.37%
-- Flow 1:
Average throughput: 13.27 Mbit/s
95th percentile per-packet one-way delay: 399.623 ms
Loss rate: 0.37%
```

Run 1: Report of Indigo-MusesT — Data Link



Run 2: Statistics of Indigo-MusesT

Start at: 2019-03-18 18:13:24

End at: 2019-03-18 18:13:54

Local clock offset: -0.576 ms

Remote clock offset: 1.053 ms

Below is generated by plot.py at 2019-03-18 19:05:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 20.45 Mbit/s

95th percentile per-packet one-way delay: 304.967 ms

Loss rate: 0.05%

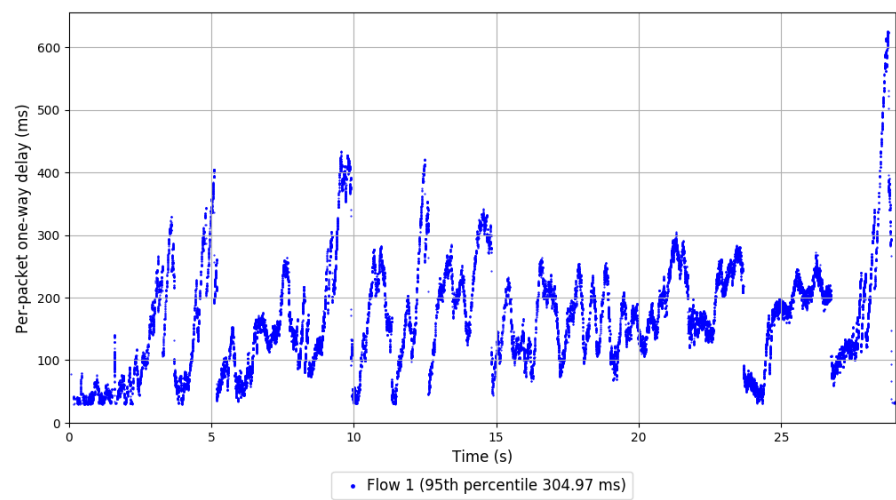
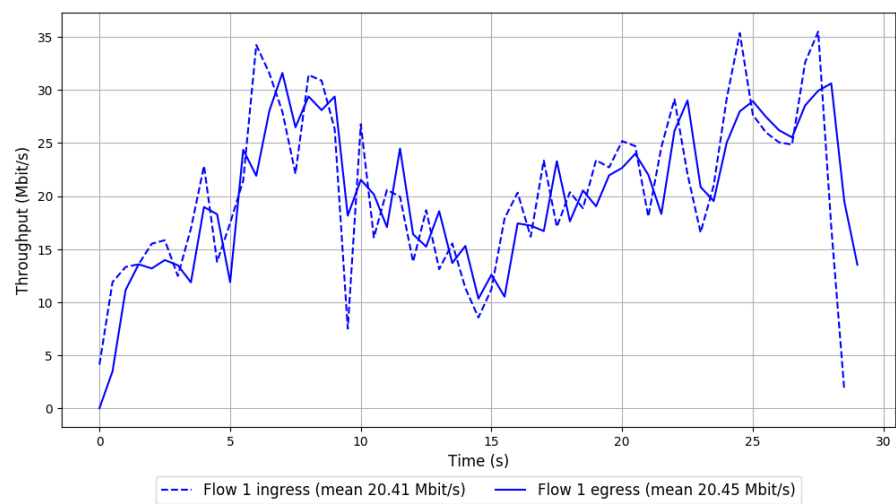
-- Flow 1:

Average throughput: 20.45 Mbit/s

95th percentile per-packet one-way delay: 304.967 ms

Loss rate: 0.05%

Run 2: Report of Indigo-MusesT — Data Link



Run 3: Statistics of Indigo-MusesT

Start at: 2019-03-18 18:39:14

End at: 2019-03-18 18:39:44

Local clock offset: -1.601 ms

Remote clock offset: 0.97 ms

Below is generated by plot.py at 2019-03-18 19:05:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 6.84 Mbit/s

95th percentile per-packet one-way delay: 385.891 ms

Loss rate: 1.16%

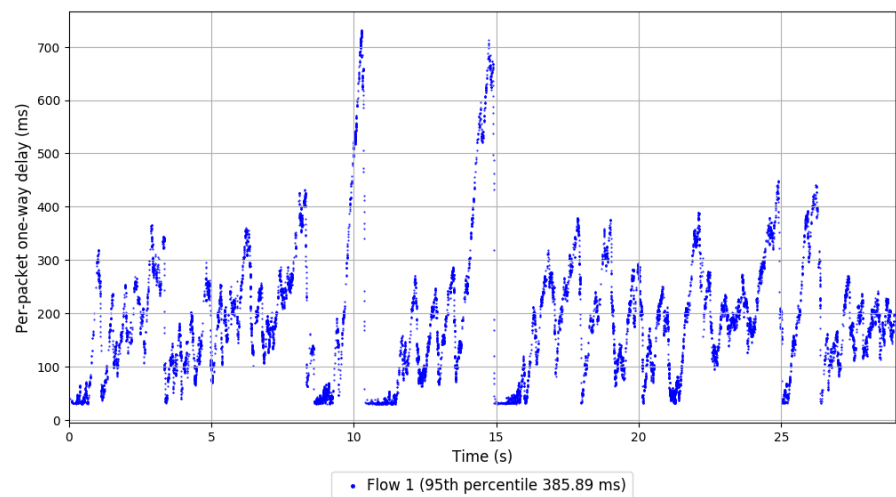
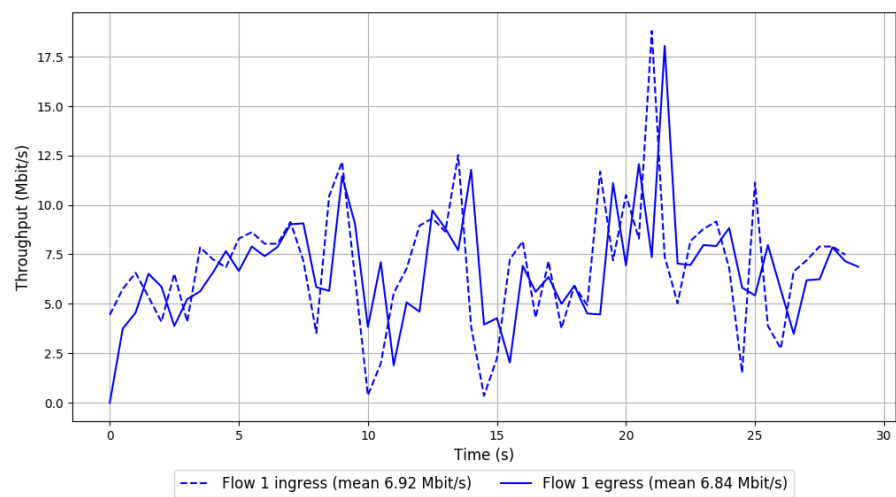
-- Flow 1:

Average throughput: 6.84 Mbit/s

95th percentile per-packet one-way delay: 385.891 ms

Loss rate: 1.16%

Run 3: Report of Indigo-MusesT — Data Link

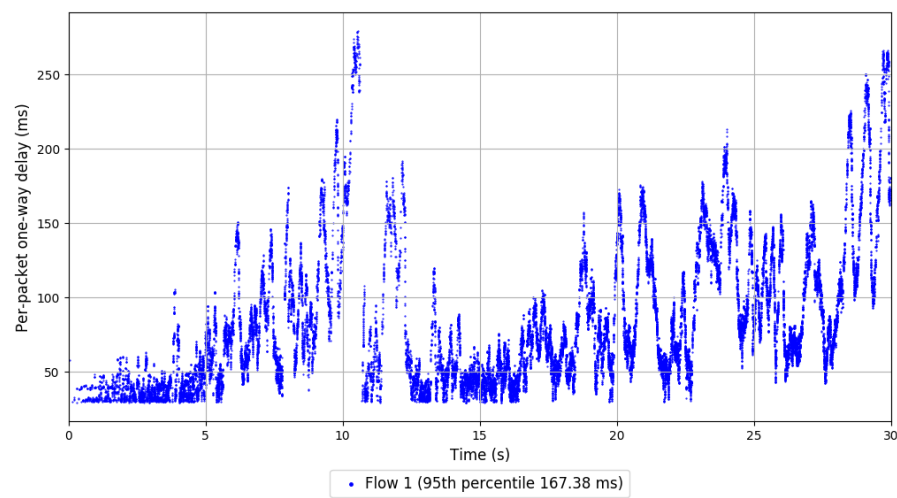
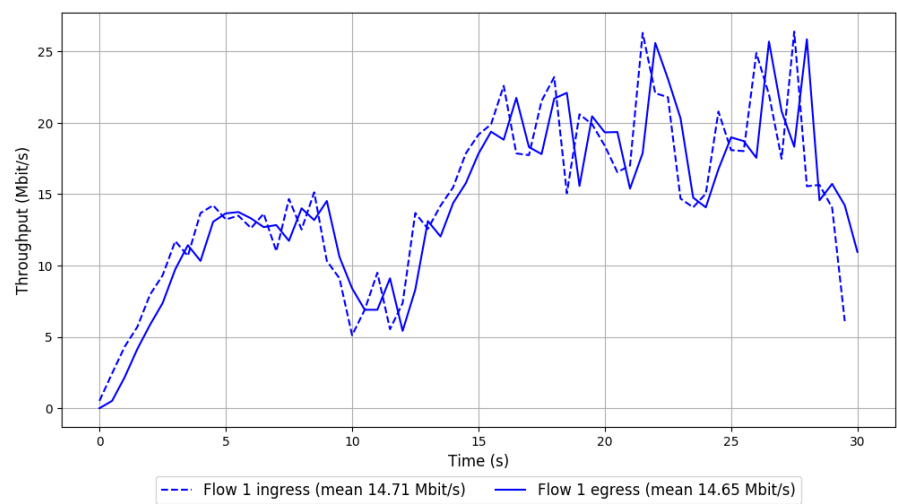



```
Run 1: Statistics of LEDBAT

Start at: 2019-03-18 17:58:41
End at: 2019-03-18 17:59:11
Local clock offset: 0.099 ms
Remote clock offset: 1.91 ms

# Below is generated by plot.py at 2019-03-18 19:05:20
# Datalink statistics
-- Total of 1 flow:
Average throughput: 14.65 Mbit/s
95th percentile per-packet one-way delay: 167.383 ms
Loss rate: 0.01%
-- Flow 1:
Average throughput: 14.65 Mbit/s
95th percentile per-packet one-way delay: 167.383 ms
Loss rate: 0.01%
```

Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2019-03-18 18:24:32

End at: 2019-03-18 18:25:02

Local clock offset: -0.861 ms

Remote clock offset: 0.973 ms

Below is generated by plot.py at 2019-03-18 19:05:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 10.12 Mbit/s

95th percentile per-packet one-way delay: 157.392 ms

Loss rate: 0.33%

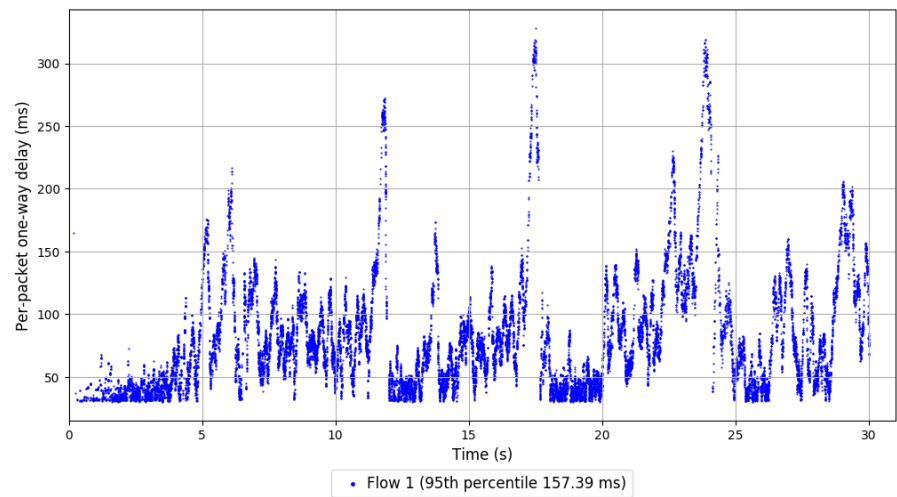
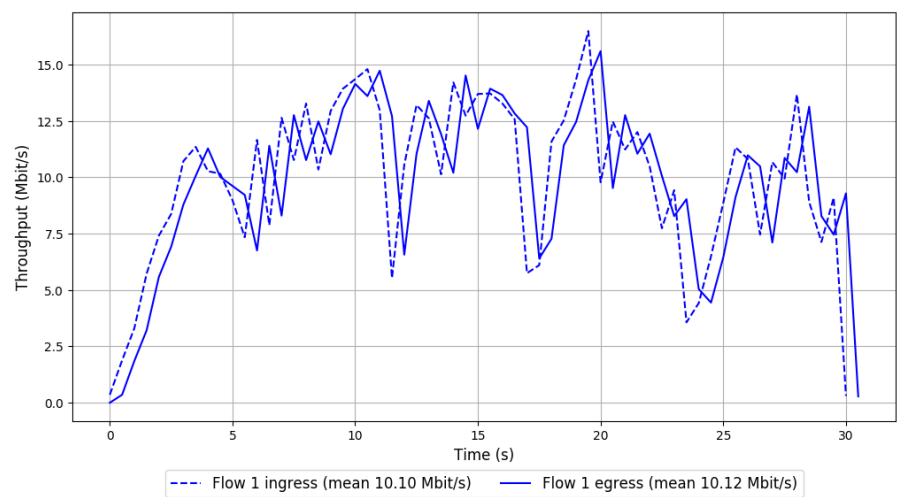
-- Flow 1:

Average throughput: 10.12 Mbit/s

95th percentile per-packet one-way delay: 157.392 ms

Loss rate: 0.33%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2019-03-18 18:50:16

End at: 2019-03-18 18:50:46

Local clock offset: -1.275 ms

Remote clock offset: 0.245 ms

Below is generated by plot.py at 2019-03-18 19:05:23

Datalink statistics

-- Total of 1 flow:

Average throughput: 17.14 Mbit/s

95th percentile per-packet one-way delay: 140.549 ms

Loss rate: 0.60%

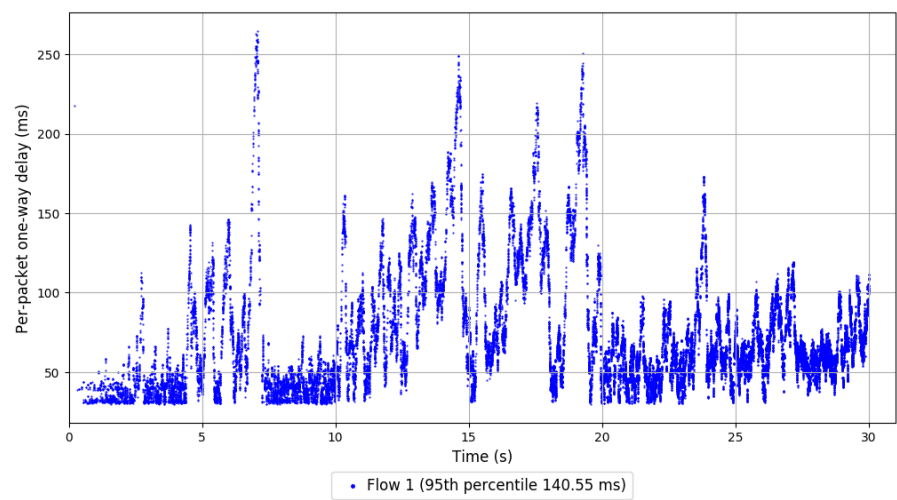
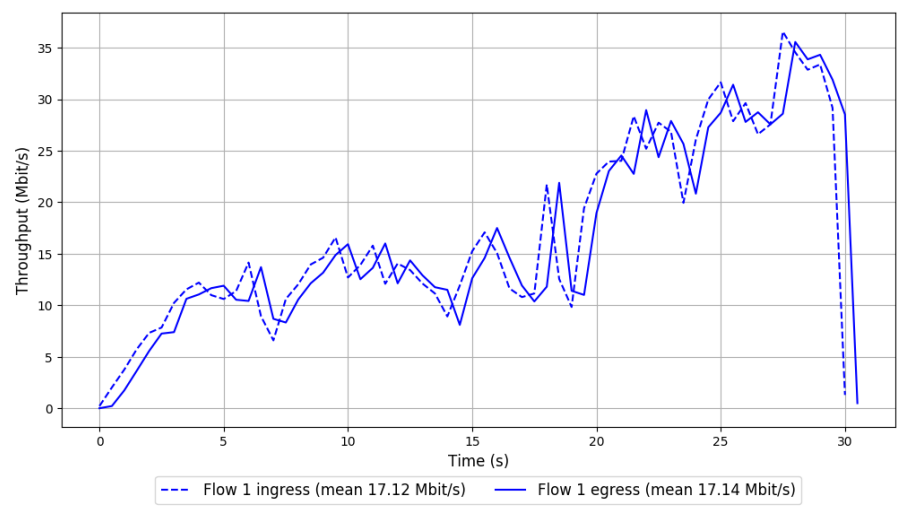
-- Flow 1:

Average throughput: 17.14 Mbit/s

95th percentile per-packet one-way delay: 140.549 ms

Loss rate: 0.60%

Run 3: Report of LEDBAT — Data Link

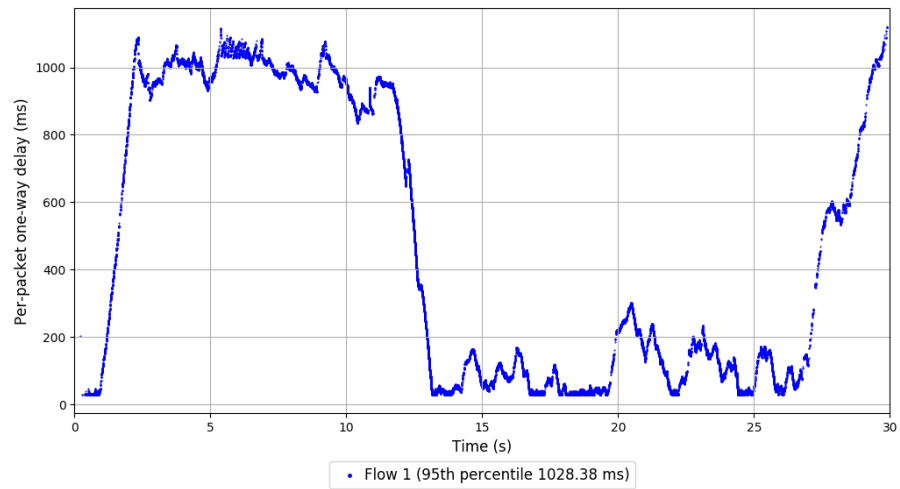
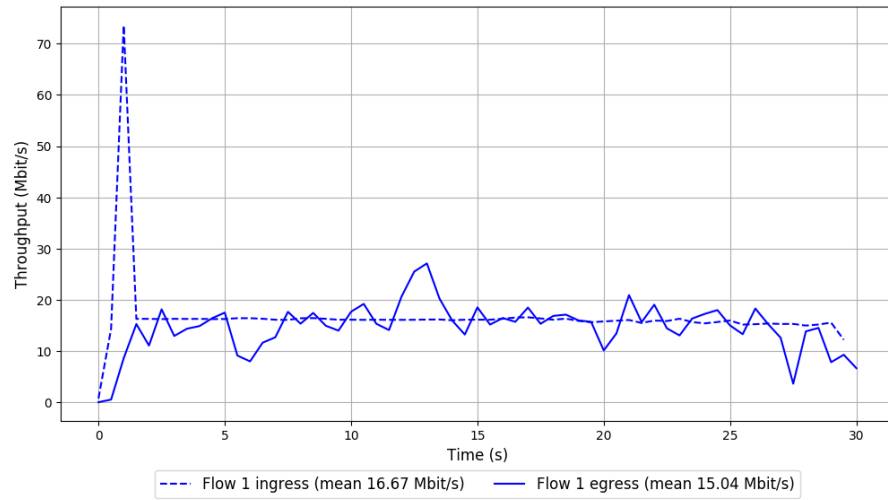


```
Run 1: Statistics of PCC-Allegro

Start at: 2019-03-18 18:02:22
End at: 2019-03-18 18:02:52
Local clock offset: -0.086 ms
Remote clock offset: 2.077 ms

# Below is generated by plot.py at 2019-03-18 19:05:23
# Datalink statistics
-- Total of 1 flow:
Average throughput: 15.04 Mbit/s
95th percentile per-packet one-way delay: 1028.379 ms
Loss rate: 10.38%
-- Flow 1:
Average throughput: 15.04 Mbit/s
95th percentile per-packet one-way delay: 1028.379 ms
Loss rate: 10.38%
```

Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

Start at: 2019-03-18 18:28:13

End at: 2019-03-18 18:28:43

Local clock offset: -0.986 ms

Remote clock offset: 1.052 ms

Below is generated by plot.py at 2019-03-18 19:05:23

Datalink statistics

-- Total of 1 flow:

Average throughput: 3.72 Mbit/s

95th percentile per-packet one-way delay: 99.489 ms

Loss rate: 0.13%

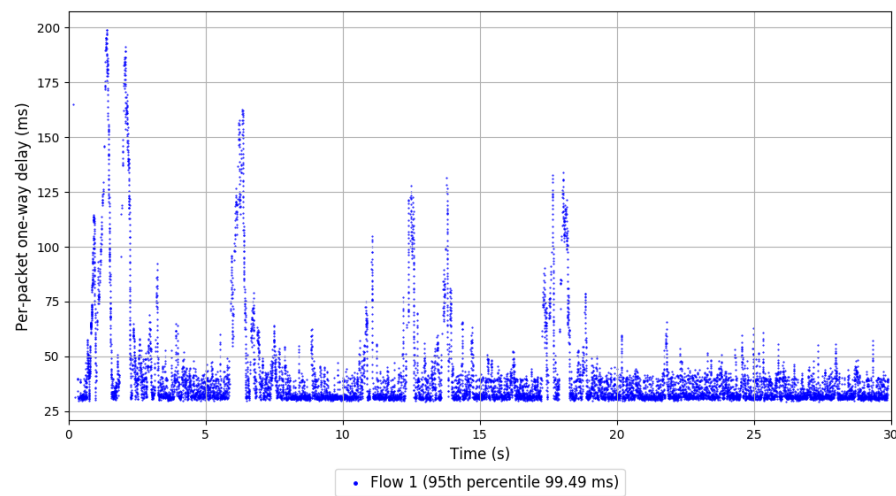
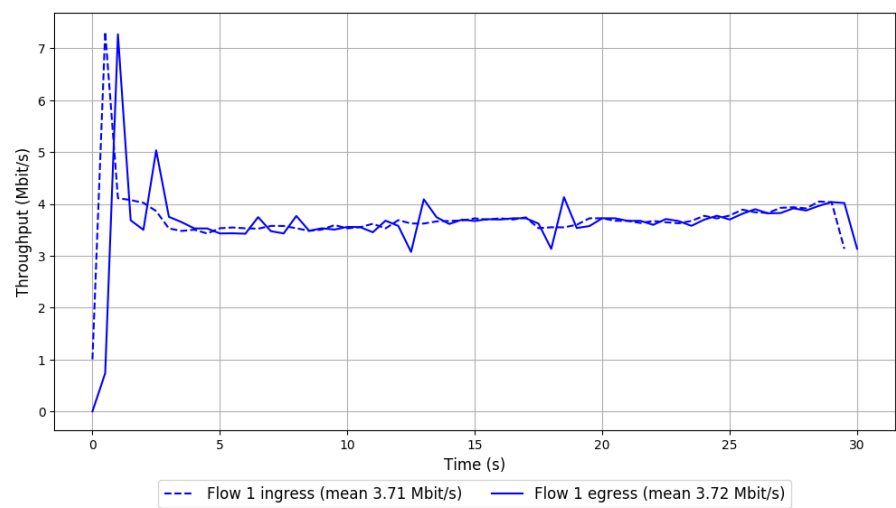
-- Flow 1:

Average throughput: 3.72 Mbit/s

95th percentile per-packet one-way delay: 99.489 ms

Loss rate: 0.13%

Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

Start at: 2019-03-18 18:53:58

End at: 2019-03-18 18:54:28

Local clock offset: -0.838 ms

Remote clock offset: 0.142 ms

Below is generated by plot.py at 2019-03-18 19:05:23

Datalink statistics

-- Total of 1 flow:

Average throughput: 7.39 Mbit/s

95th percentile per-packet one-way delay: 41.302 ms

Loss rate: 0.12%

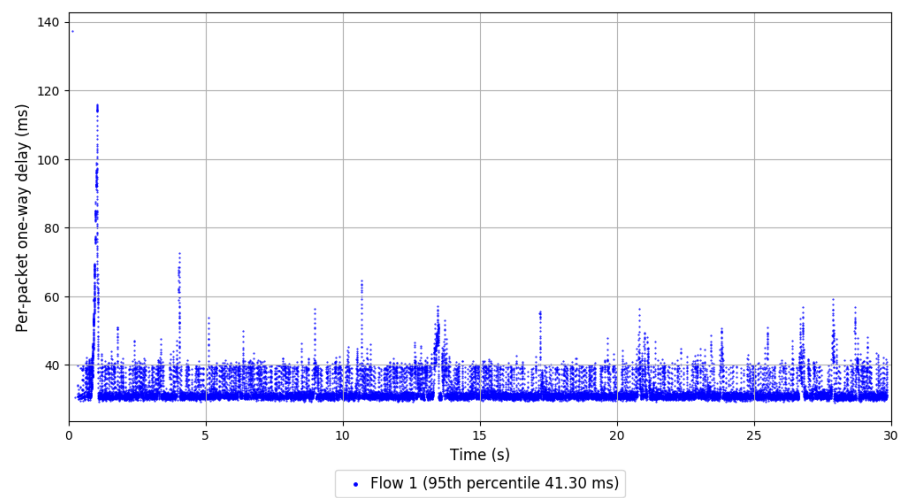
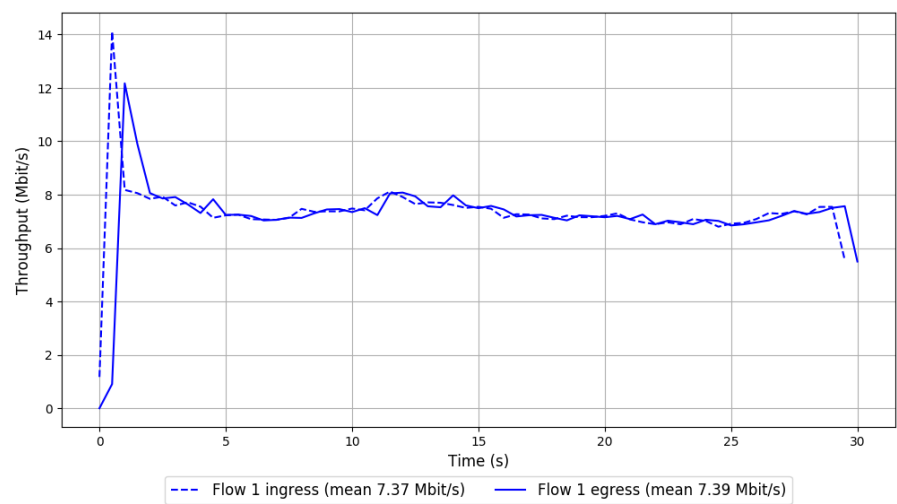
-- Flow 1:

Average throughput: 7.39 Mbit/s

95th percentile per-packet one-way delay: 41.302 ms

Loss rate: 0.12%

Run 3: Report of PCC-Allegro — Data Link



Run 1: Statistics of PCC-Expr

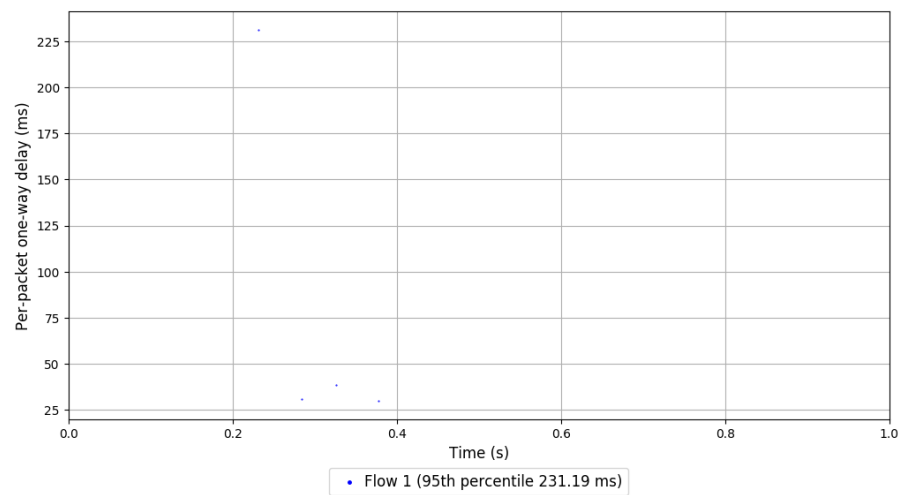
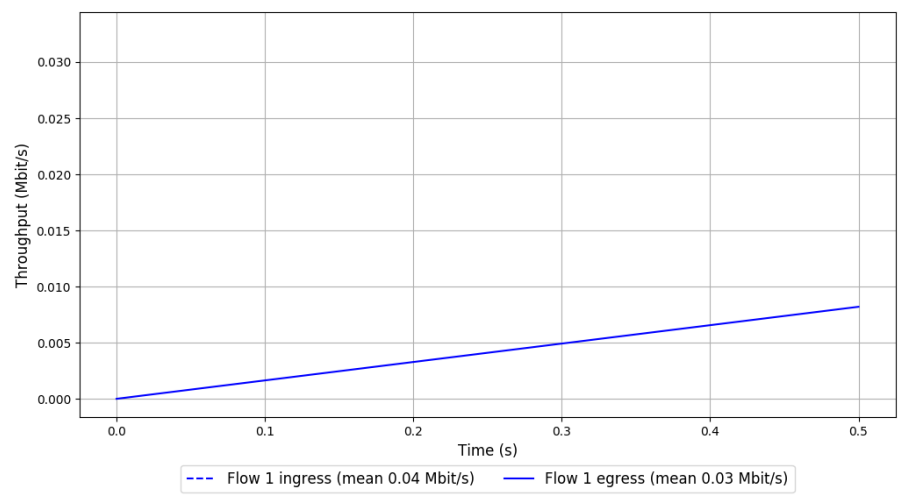
Start at: 2019-03-18 17:51:19

End at: 2019-03-18 17:51:49

Local clock offset: -0.357 ms

Remote clock offset: 1.554 ms

Run 1: Report of PCC-Expr — Data Link



Run 2: Statistics of PCC-Expr

Start at: 2019-03-18 18:17:05

End at: 2019-03-18 18:17:35

Local clock offset: -0.753 ms

Remote clock offset: 0.956 ms

Below is generated by plot.py at 2019-03-18 19:05:23

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.33 Mbit/s

95th percentile per-packet one-way delay: 62.305 ms

Loss rate: 96.42%

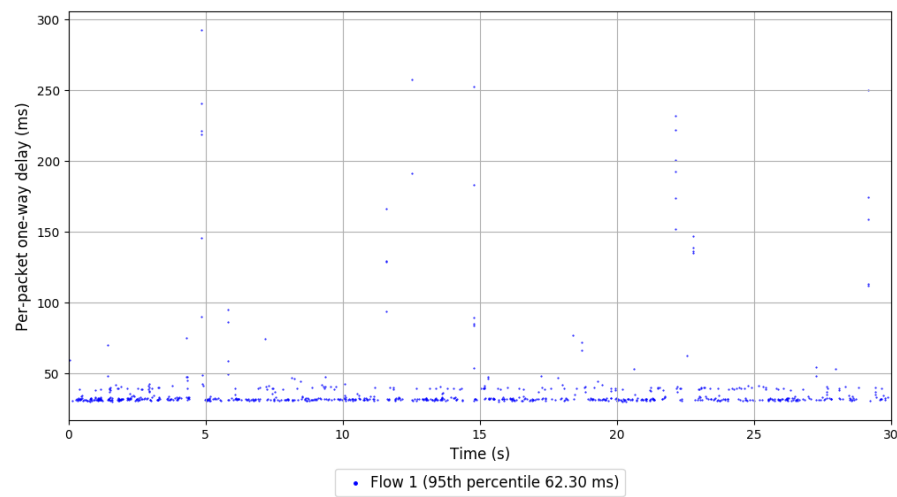
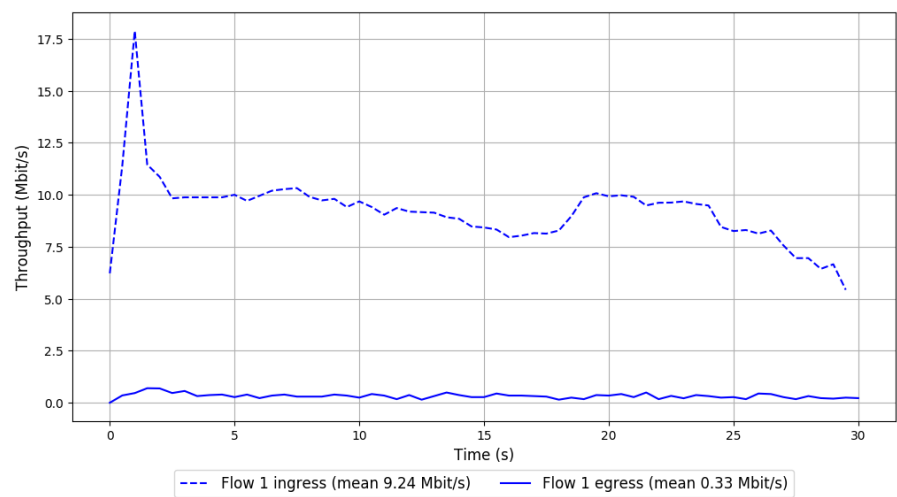
-- Flow 1:

Average throughput: 0.33 Mbit/s

95th percentile per-packet one-way delay: 62.305 ms

Loss rate: 96.42%

Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

Start at: 2019-03-18 18:42:55

End at: 2019-03-18 18:43:25

Local clock offset: -1.79 ms

Remote clock offset: 0.595 ms

Below is generated by plot.py at 2019-03-18 19:05:23

Datalink statistics

-- Total of 1 flow:

Average throughput: 3.85 Mbit/s

95th percentile per-packet one-way delay: 39.950 ms

Loss rate: 51.62%

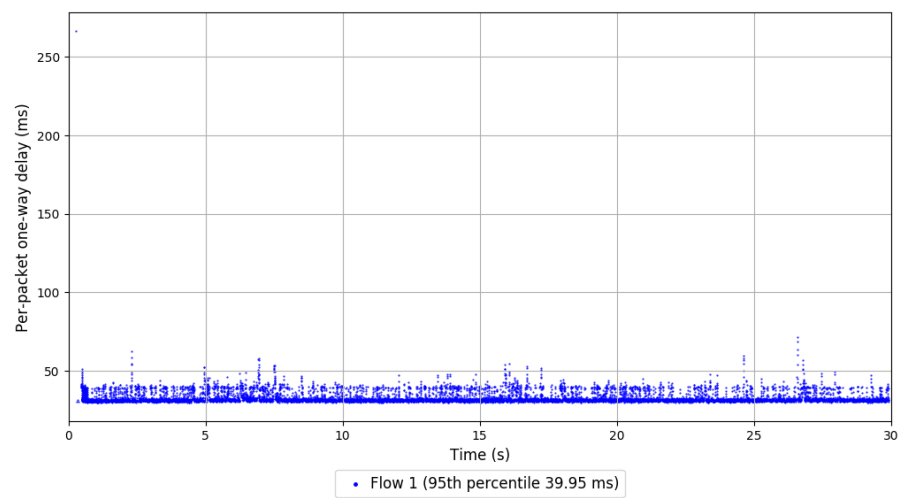
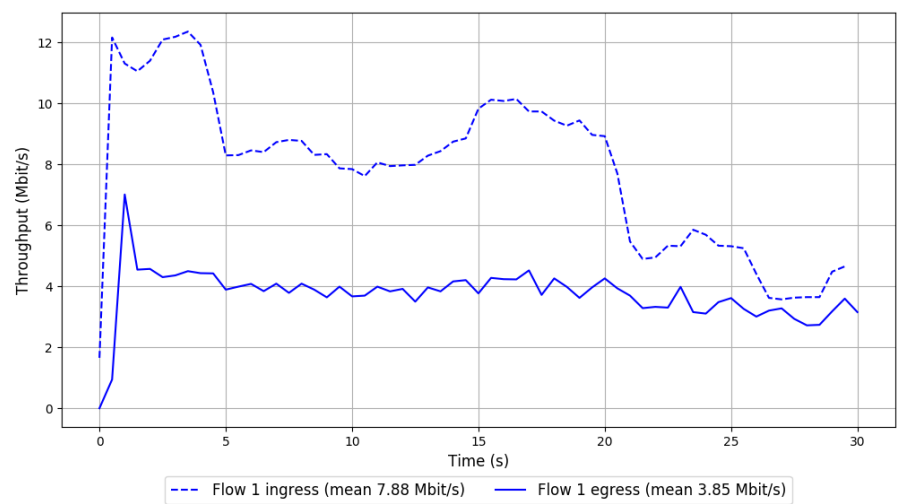
-- Flow 1:

Average throughput: 3.85 Mbit/s

95th percentile per-packet one-way delay: 39.950 ms

Loss rate: 51.62%

Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2019-03-18 18:01:08

End at: 2019-03-18 18:01:38

Local clock offset: 0.001 ms

Remote clock offset: 1.959 ms

Below is generated by plot.py at 2019-03-18 19:05:33

Datalink statistics

-- Total of 1 flow:

Average throughput: 15.53 Mbit/s

95th percentile per-packet one-way delay: 264.943 ms

Loss rate: 0.71%

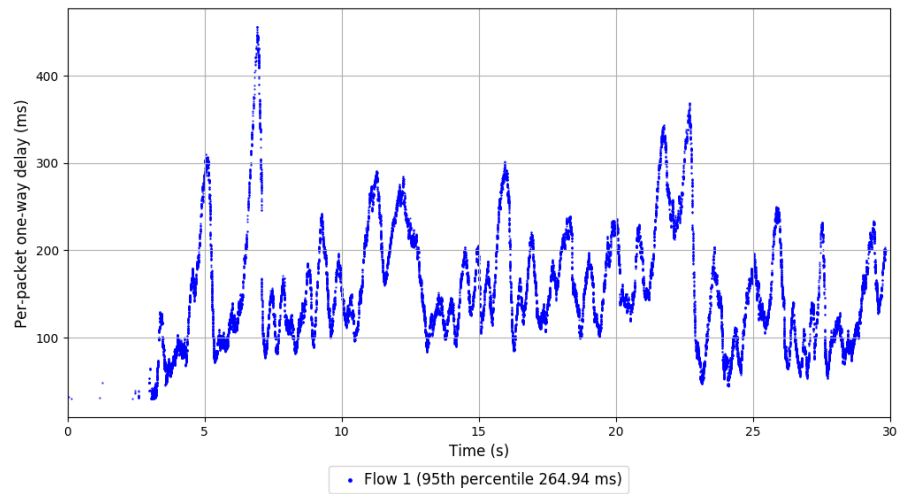
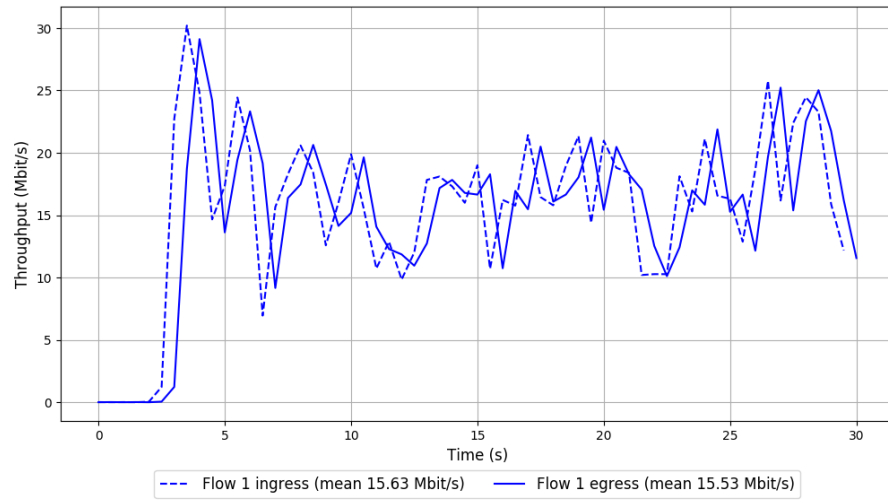
-- Flow 1:

Average throughput: 15.53 Mbit/s

95th percentile per-packet one-way delay: 264.943 ms

Loss rate: 0.71%

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2019-03-18 18:26:59

End at: 2019-03-18 18:27:29

Local clock offset: -0.96 ms

Remote clock offset: 1.002 ms

Below is generated by plot.py at 2019-03-18 19:05:36

Datalink statistics

-- Total of 1 flow:

Average throughput: 17.38 Mbit/s

95th percentile per-packet one-way delay: 262.654 ms

Loss rate: 0.56%

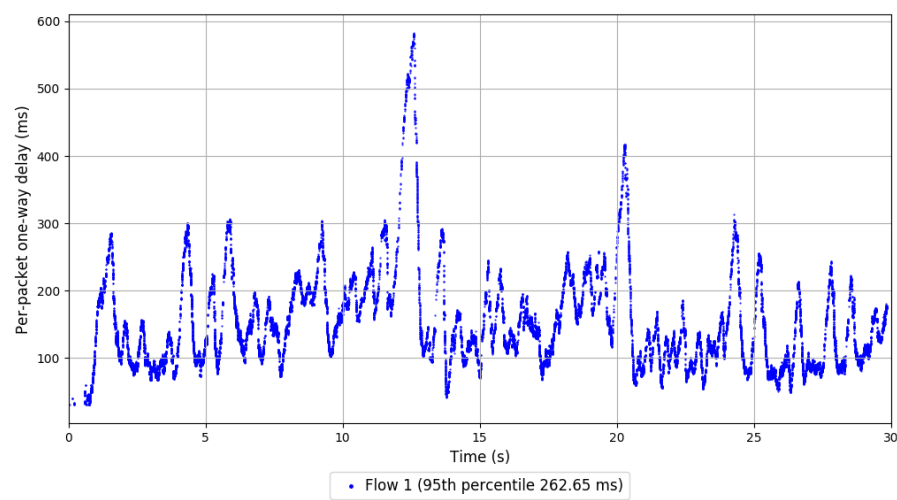
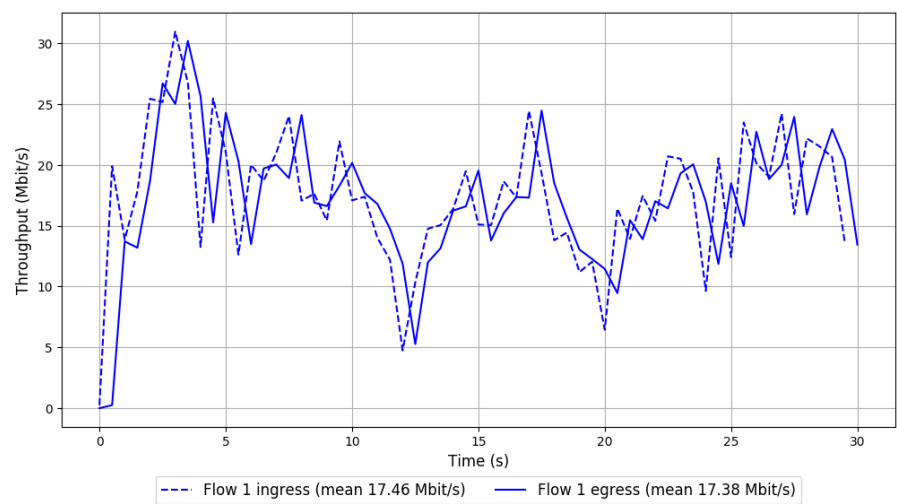
-- Flow 1:

Average throughput: 17.38 Mbit/s

95th percentile per-packet one-way delay: 262.654 ms

Loss rate: 0.56%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2019-03-18 18:52:44

End at: 2019-03-18 18:53:14

Local clock offset: -0.961 ms

Remote clock offset: 0.179 ms

Below is generated by plot.py at 2019-03-18 19:05:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 18.30 Mbit/s

95th percentile per-packet one-way delay: 266.375 ms

Loss rate: 0.35%

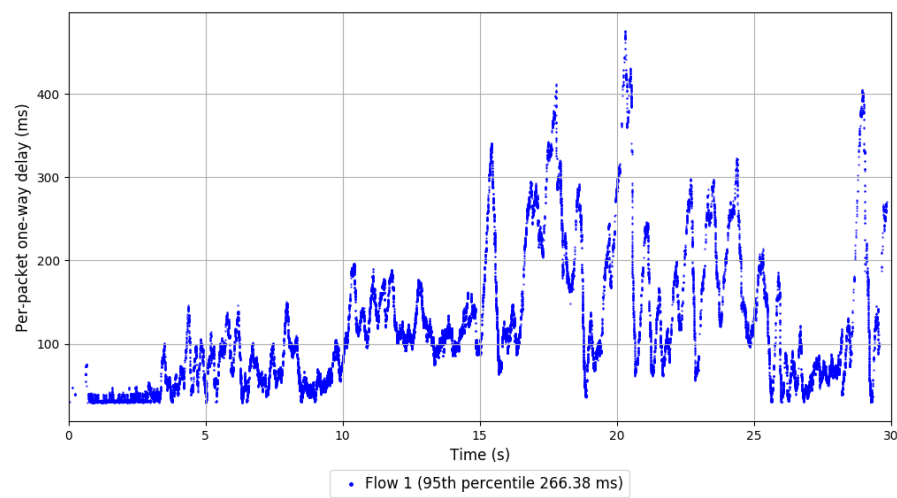
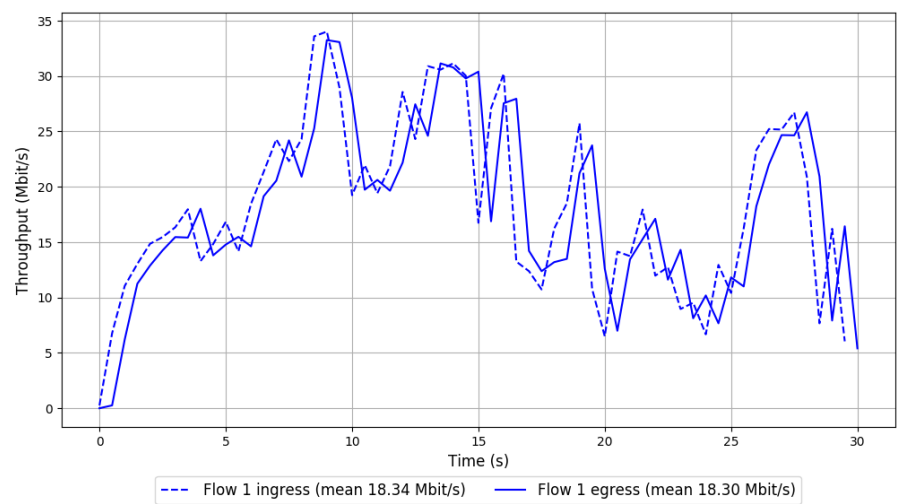
-- Flow 1:

Average throughput: 18.30 Mbit/s

95th percentile per-packet one-way delay: 266.375 ms

Loss rate: 0.35%

Run 3: Report of QUIC Cubic — Data Link



Run 1: Statistics of SCReAM

Start at: 2019-03-18 17:52:33

End at: 2019-03-18 17:53:03

Local clock offset: -0.144 ms

Remote clock offset: 1.569 ms

Below is generated by plot.py at 2019-03-18 19:05:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 39.429 ms

Loss rate: 0.13%

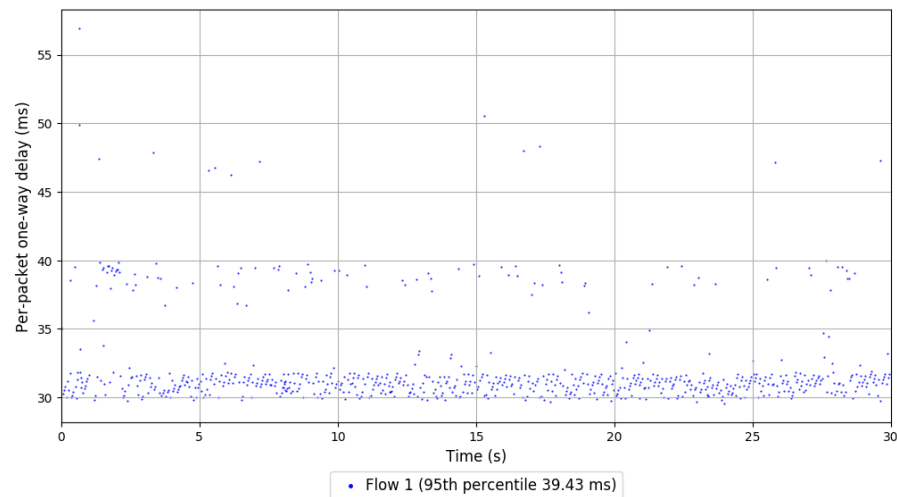
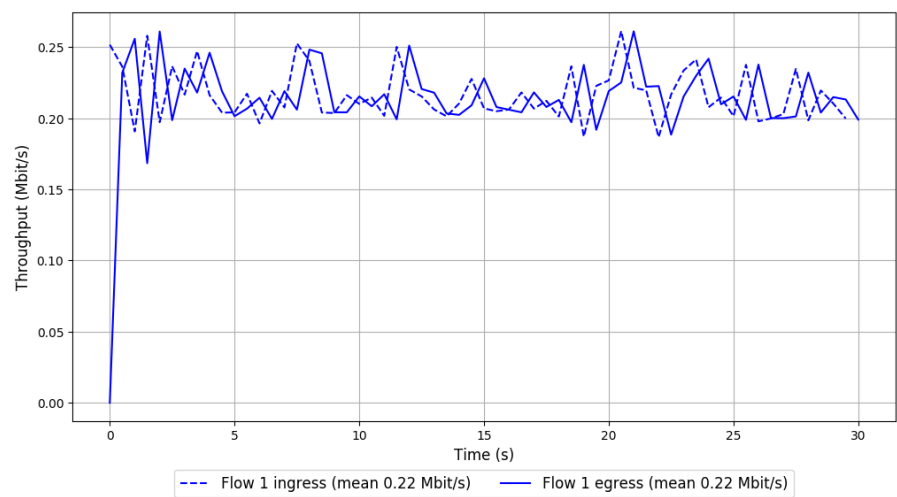
-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 39.429 ms

Loss rate: 0.13%

Run 1: Report of SReAM — Data Link



Run 2: Statistics of SCReAM

Start at: 2019-03-18 18:18:24

End at: 2019-03-18 18:18:54

Local clock offset: -0.751 ms

Remote clock offset: 0.97 ms

Below is generated by plot.py at 2019-03-18 19:05:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 40.120 ms

Loss rate: 0.13%

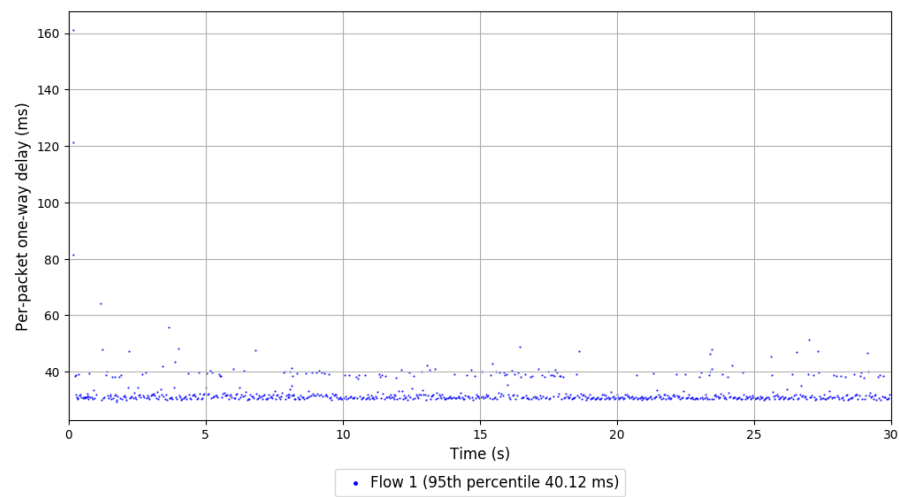
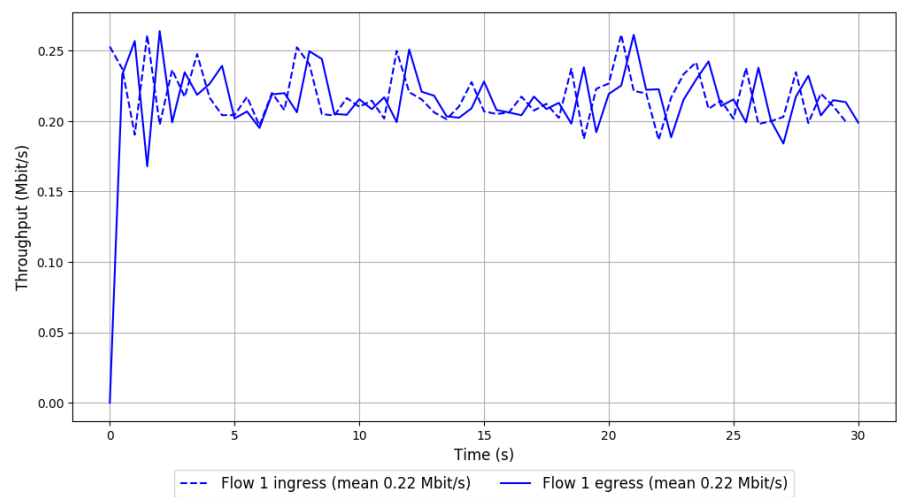
-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 40.120 ms

Loss rate: 0.13%

Run 2: Report of SReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2019-03-18 18:44:08

End at: 2019-03-18 18:44:38

Local clock offset: -1.871 ms

Remote clock offset: 0.5 ms

Below is generated by plot.py at 2019-03-18 19:05:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 38.981 ms

Loss rate: 0.13%

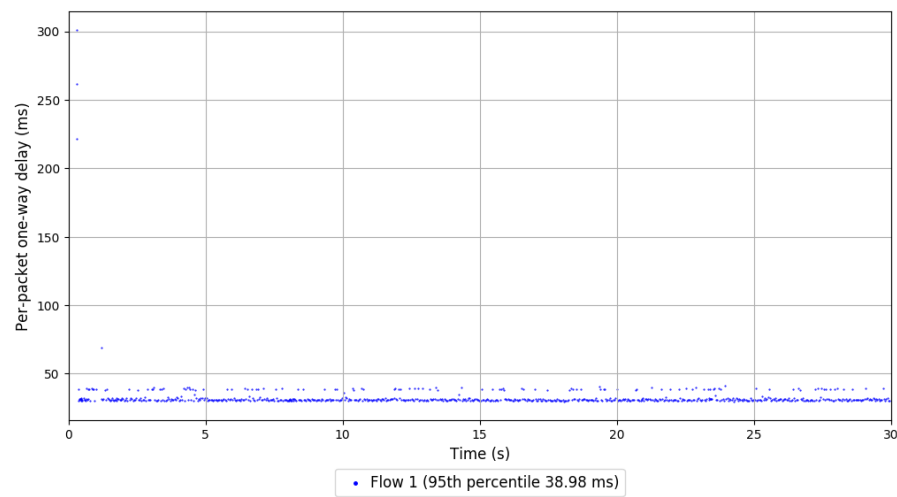
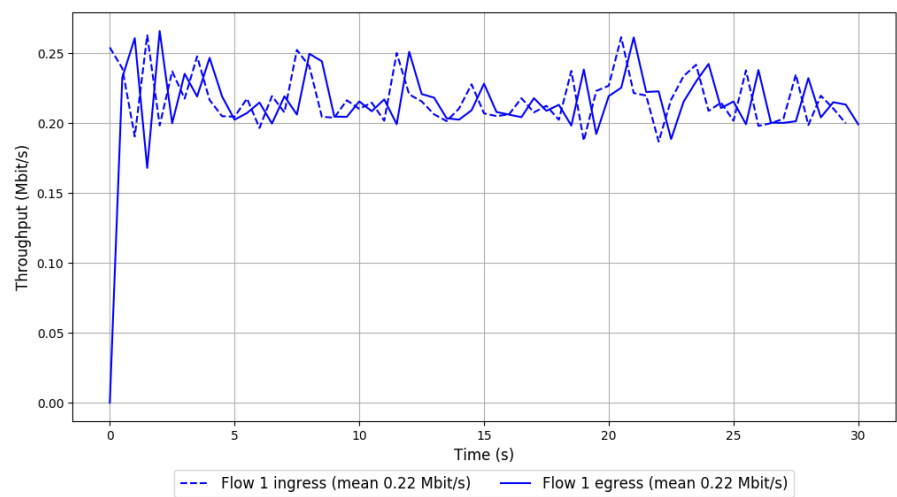
-- Flow 1:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 38.981 ms

Loss rate: 0.13%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of Sprout

Start at: 2019-03-18 18:03:36

End at: 2019-03-18 18:04:06

Local clock offset: -0.153 ms

Remote clock offset: 1.888 ms

Below is generated by plot.py at 2019-03-18 19:05:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 6.19 Mbit/s

95th percentile per-packet one-way delay: 63.027 ms

Loss rate: 0.20%

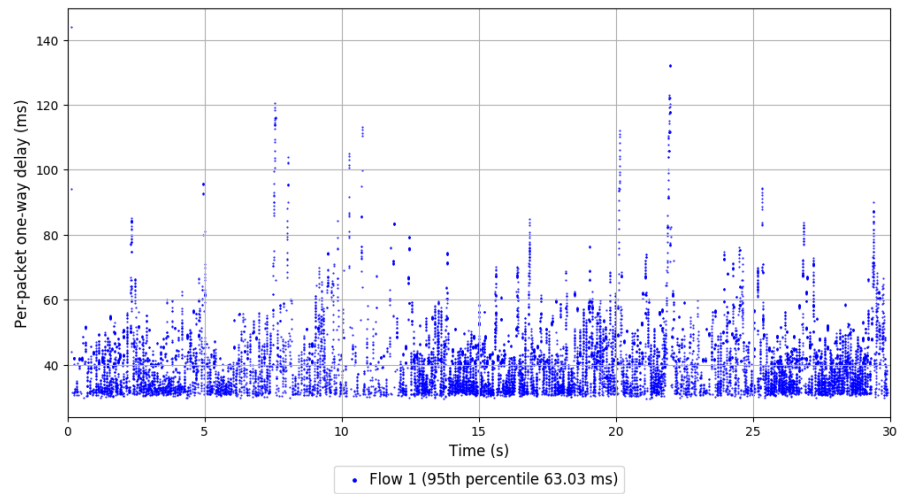
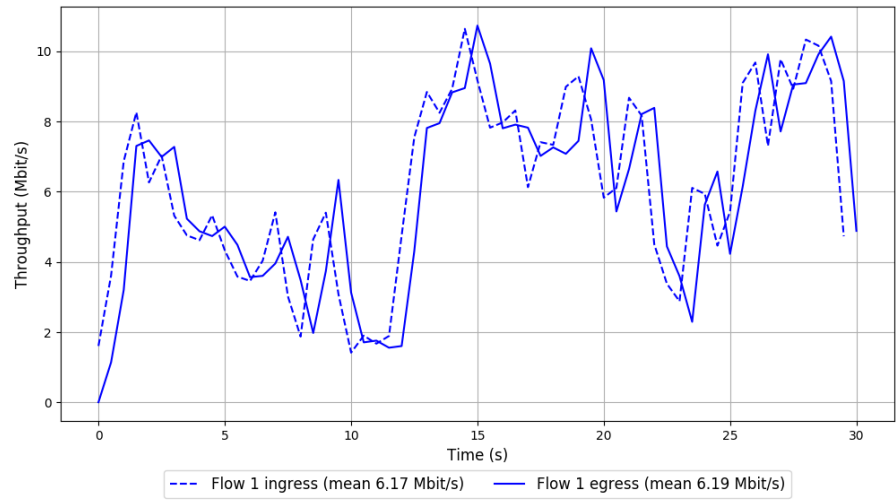
-- Flow 1:

Average throughput: 6.19 Mbit/s

95th percentile per-packet one-way delay: 63.027 ms

Loss rate: 0.20%

Run 1: Report of Sprout — Data Link



Run 2: Statistics of Sprout

Start at: 2019-03-18 18:29:26

End at: 2019-03-18 18:29:56

Local clock offset: -1.044 ms

Remote clock offset: 1.056 ms

Below is generated by plot.py at 2019-03-18 19:05:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.89 Mbit/s

95th percentile per-packet one-way delay: 68.669 ms

Loss rate: 0.30%

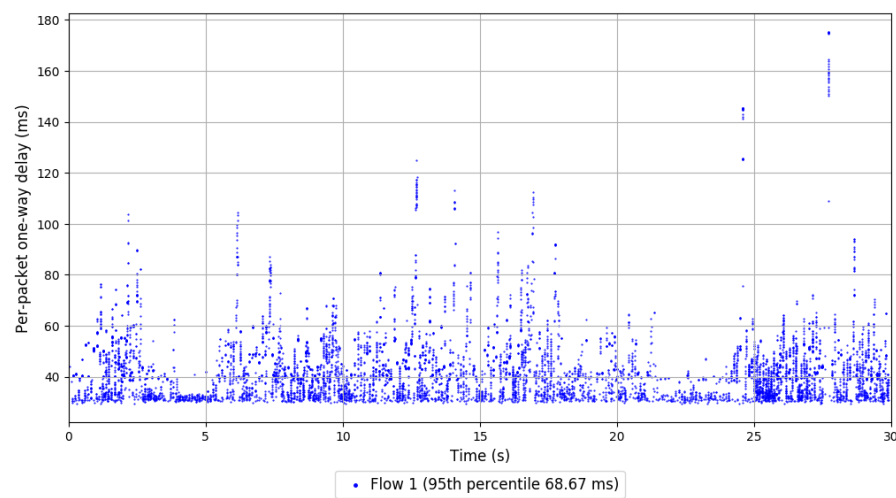
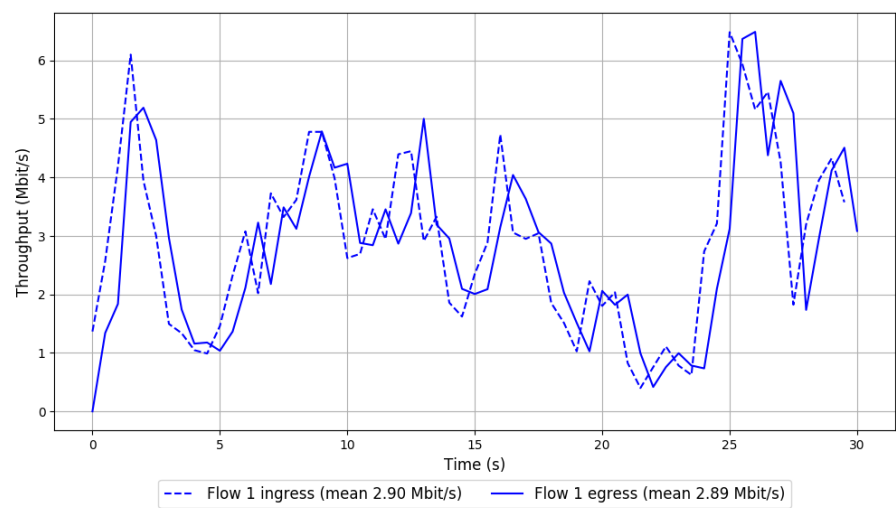
-- Flow 1:

Average throughput: 2.89 Mbit/s

95th percentile per-packet one-way delay: 68.669 ms

Loss rate: 0.30%

Run 2: Report of Sprout — Data Link



Run 3: Statistics of Sprout

Start at: 2019-03-18 18:55:11

End at: 2019-03-18 18:55:41

Local clock offset: -0.736 ms

Remote clock offset: 0.172 ms

Below is generated by plot.py at 2019-03-18 19:05:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 7.05 Mbit/s

95th percentile per-packet one-way delay: 60.337 ms

Loss rate: 0.14%

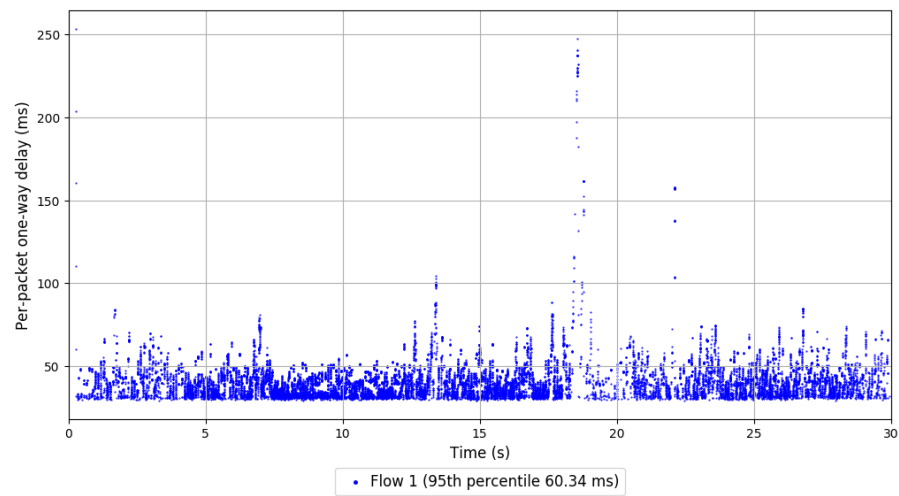
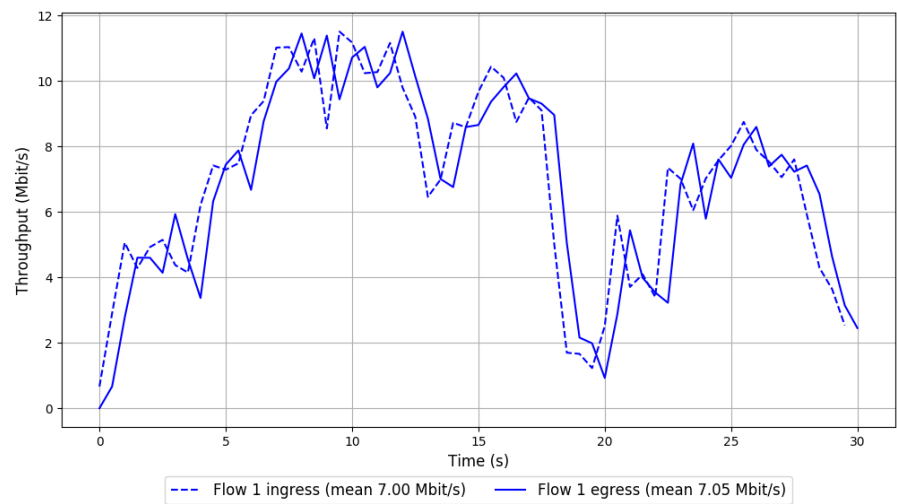
-- Flow 1:

Average throughput: 7.05 Mbit/s

95th percentile per-packet one-way delay: 60.337 ms

Loss rate: 0.14%

Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

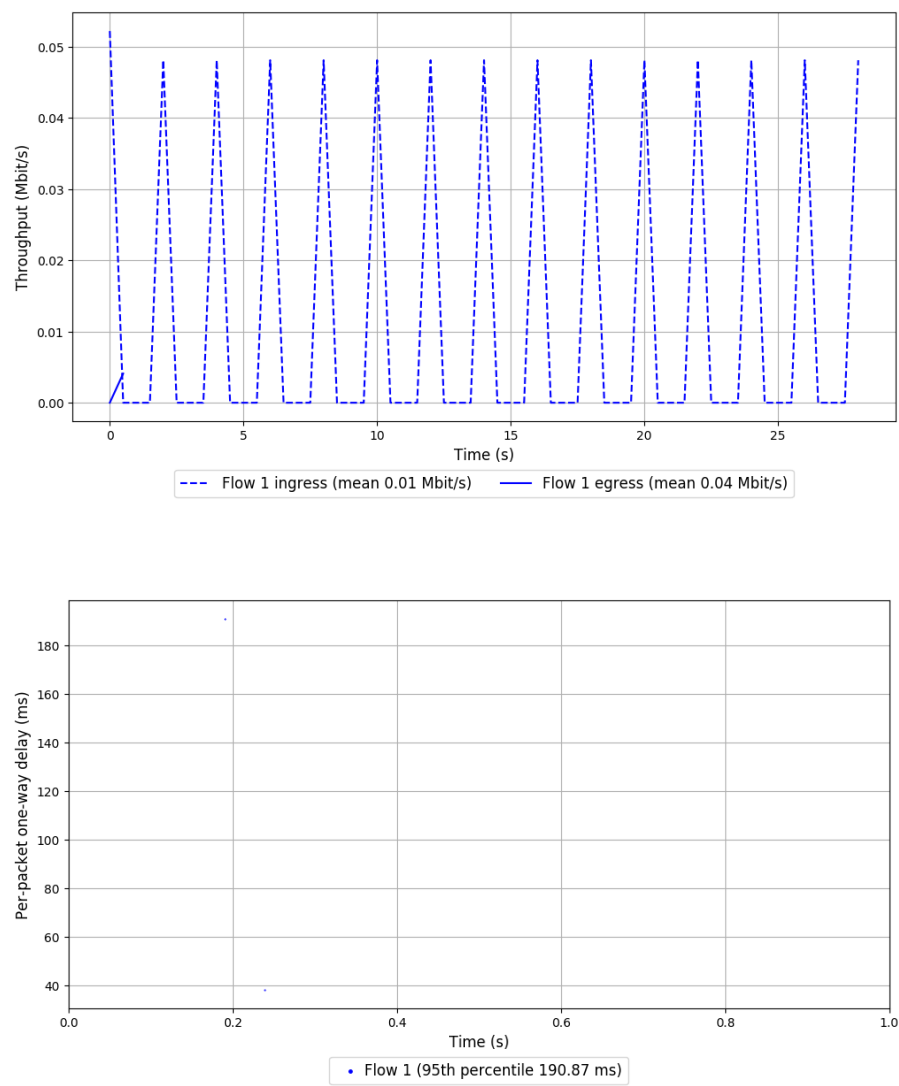
Start at: 2019-03-18 18:12:11

End at: 2019-03-18 18:12:41

Local clock offset: -0.459 ms

Remote clock offset: 1.155 ms

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



Run 2: Statistics of TaoVA-100x

Start at: 2019-03-18 18:38:00

End at: 2019-03-18 18:38:30

Local clock offset: -1.499 ms

Remote clock offset: 1.117 ms

Below is generated by plot.py at 2019-03-18 19:05:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.85 Mbit/s

95th percentile per-packet one-way delay: 48.440 ms

Loss rate: 61.06%

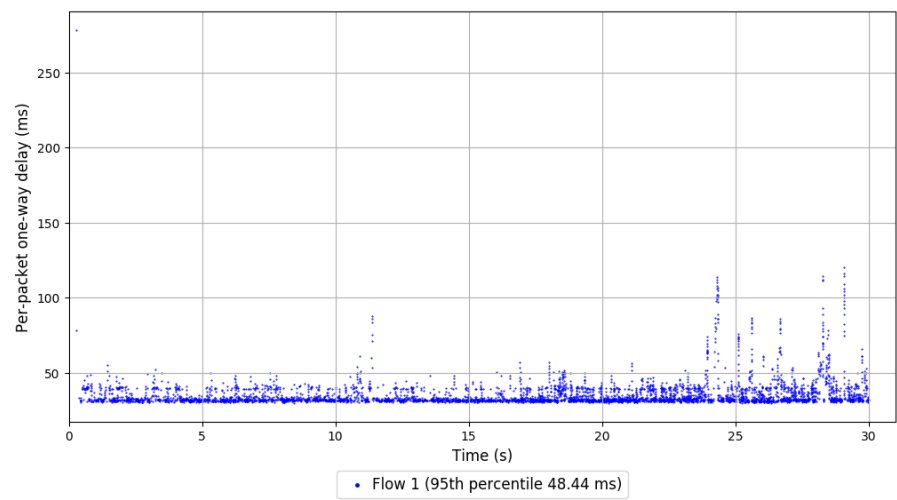
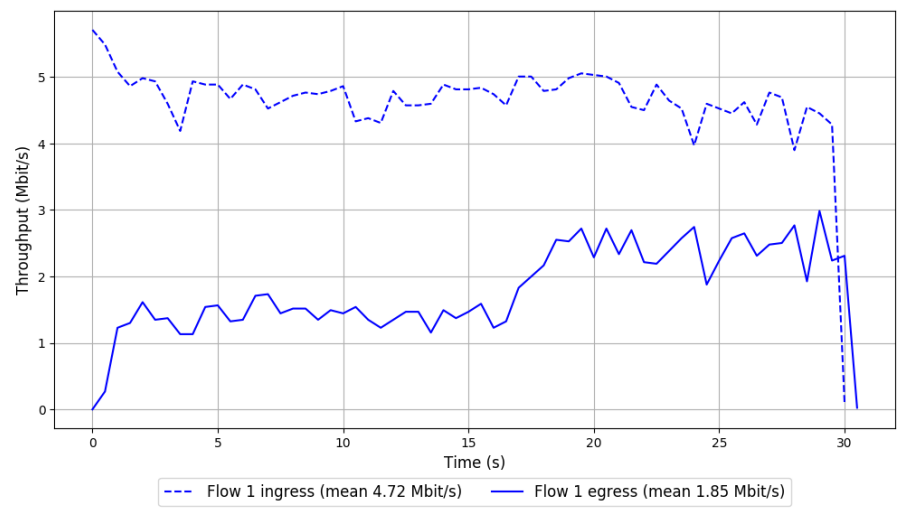
-- Flow 1:

Average throughput: 1.85 Mbit/s

95th percentile per-packet one-way delay: 48.440 ms

Loss rate: 61.06%

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



Run 3: Statistics of TaoVA-100x

Start at: 2019-03-18 19:03:46

End at: 2019-03-18 19:04:16

Local clock offset: -0.386 ms

Remote clock offset: 0.181 ms

Below is generated by plot.py at 2019-03-18 19:05:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 2.77 Mbit/s

95th percentile per-packet one-way delay: 41.534 ms

Loss rate: 43.17%

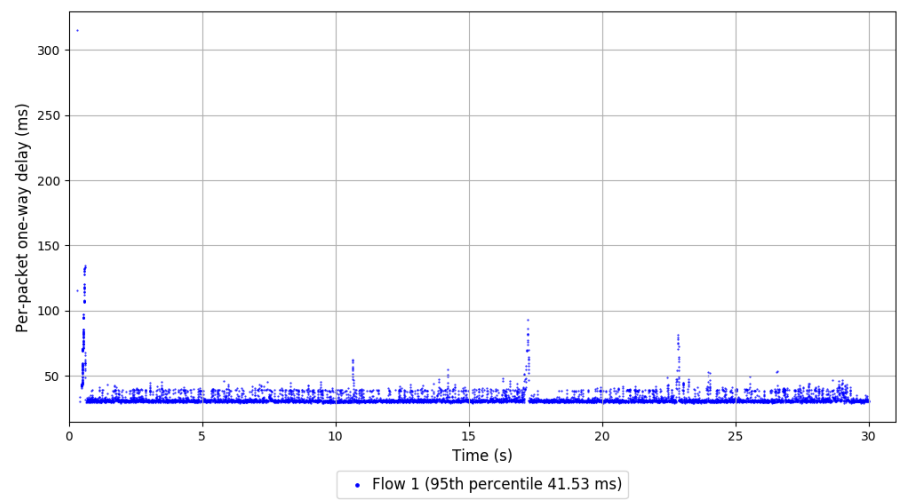
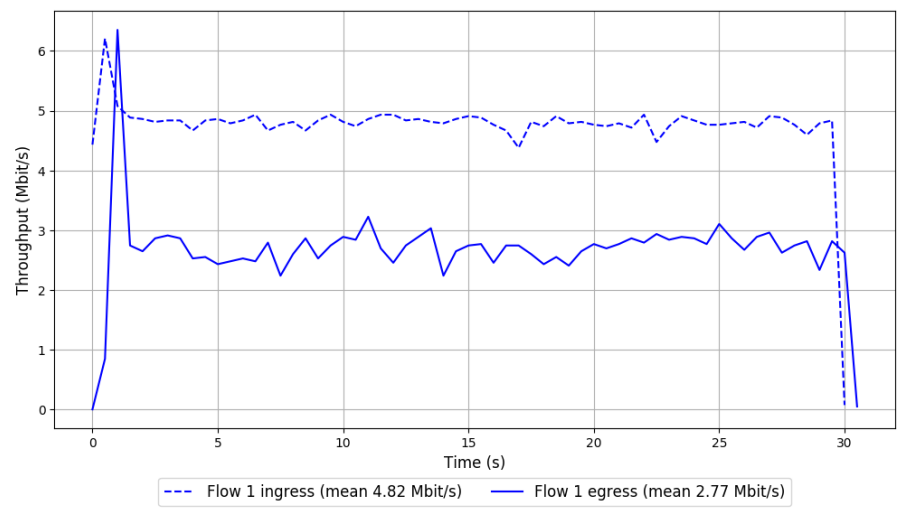
-- Flow 1:

Average throughput: 2.77 Mbit/s

95th percentile per-packet one-way delay: 41.534 ms

Loss rate: 43.17%

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



Run 1: Statistics of TCP Vegas

Start at: 2019-03-18 17:48:52

End at: 2019-03-18 17:49:22

Local clock offset: 0.701 ms

Remote clock offset: 1.406 ms

Below is generated by plot.py at 2019-03-18 19:05:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 4.86 Mbit/s

95th percentile per-packet one-way delay: 172.800 ms

Loss rate: 0.10%

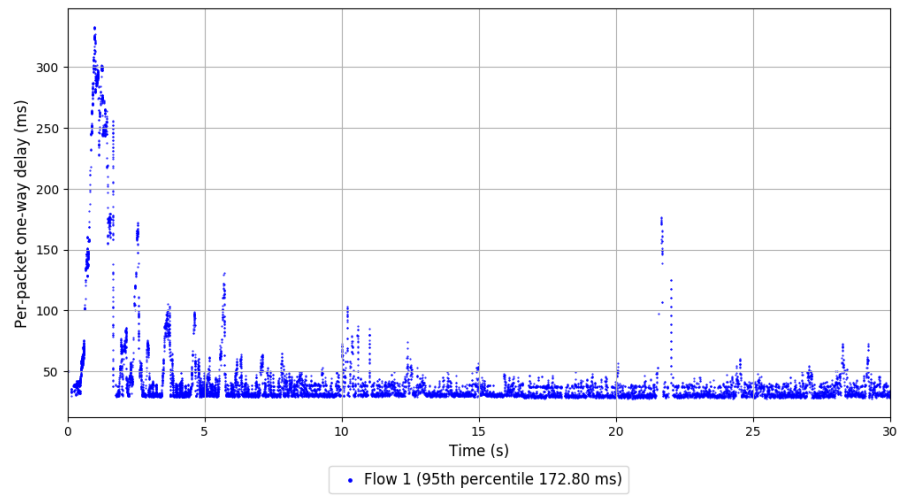
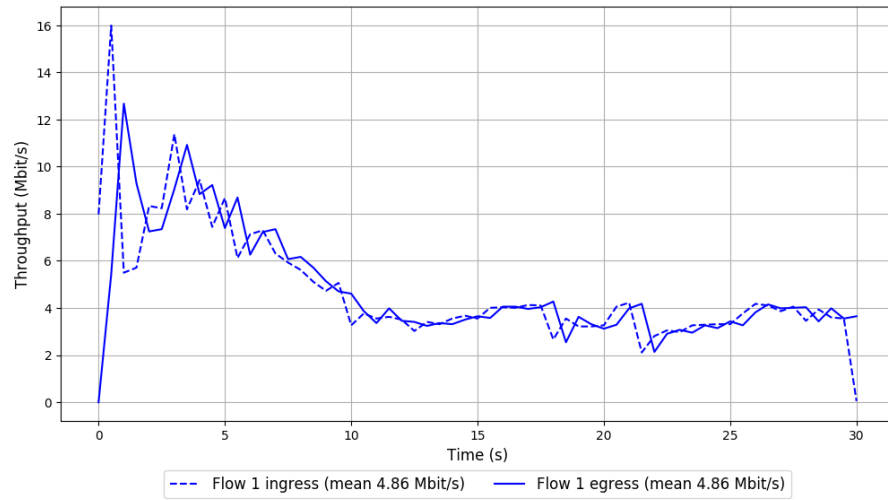
-- Flow 1:

Average throughput: 4.86 Mbit/s

95th percentile per-packet one-way delay: 172.800 ms

Loss rate: 0.10%

Run 1: Report of TCP Vegas — Data Link

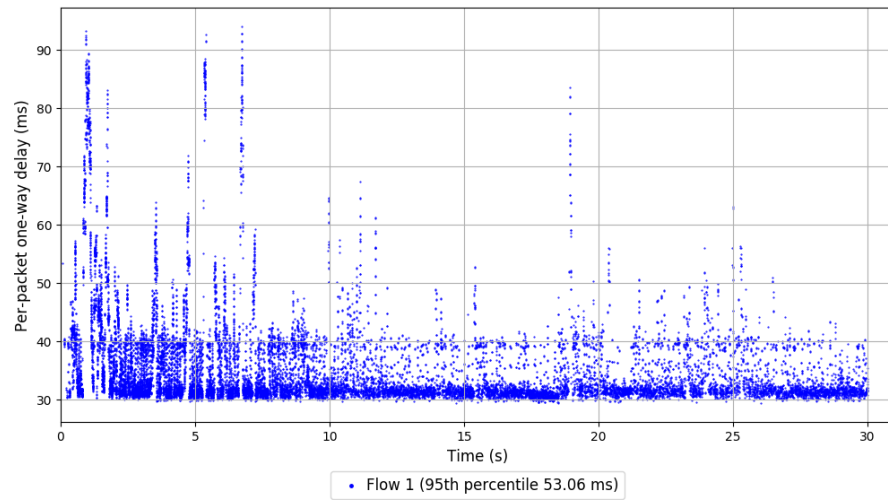
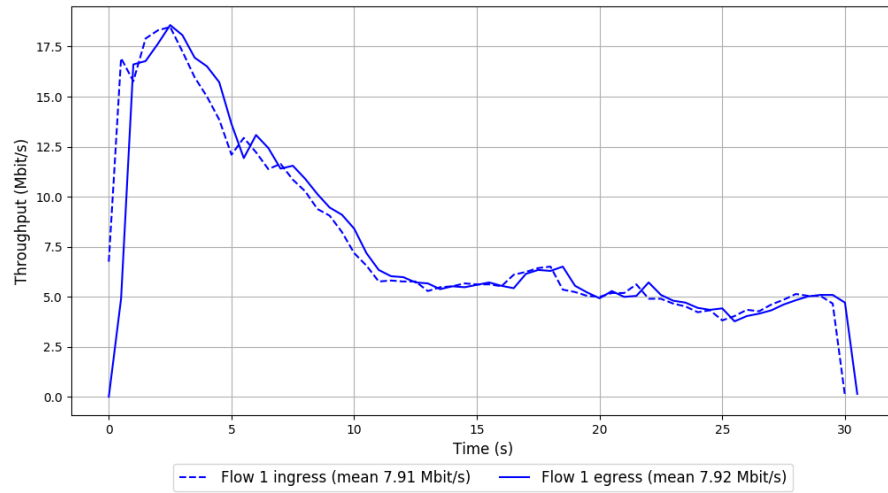


Run 2: Statistics of TCP Vegas

Start at: 2019-03-18 18:14:38
End at: 2019-03-18 18:15:08
Local clock offset: -0.647 ms
Remote clock offset: 1.014 ms

Below is generated by plot.py at 2019-03-18 19:05:41
Datalink statistics
-- Total of 1 flow:
Average throughput: 7.92 Mbit/s
95th percentile per-packet one-way delay: 53.060 ms
Loss rate: 0.04%
-- Flow 1:
Average throughput: 7.92 Mbit/s
95th percentile per-packet one-way delay: 53.060 ms
Loss rate: 0.04%

Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2019-03-18 18:40:27

End at: 2019-03-18 18:40:57

Local clock offset: -1.66 ms

Remote clock offset: 0.78 ms

Below is generated by plot.py at 2019-03-18 19:05:41

Datalink statistics

-- Total of 1 flow:

Average throughput: 6.75 Mbit/s

95th percentile per-packet one-way delay: 156.584 ms

Loss rate: 0.05%

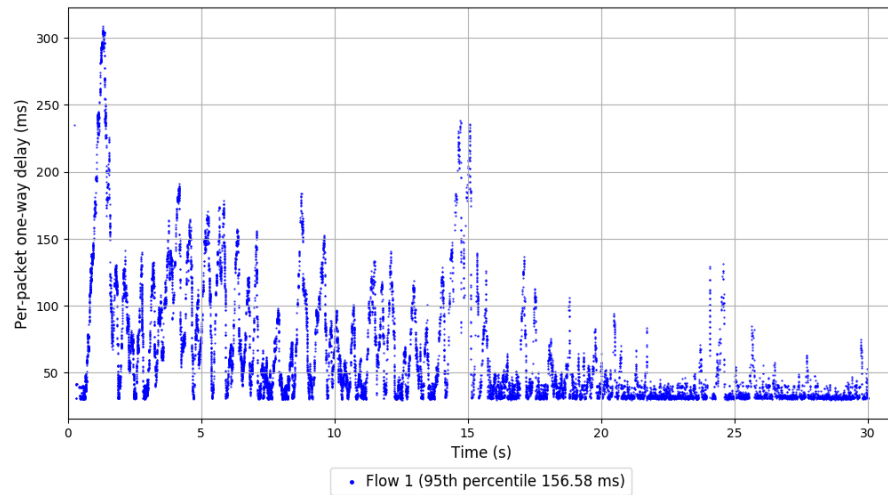
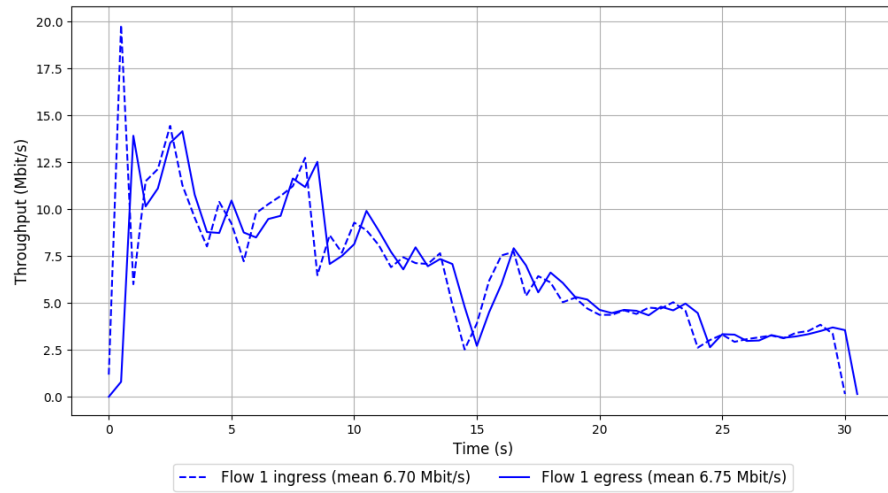
-- Flow 1:

Average throughput: 6.75 Mbit/s

95th percentile per-packet one-way delay: 156.584 ms

Loss rate: 0.05%

Run 3: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2019-03-18 17:54:59

End at: 2019-03-18 17:55:29

Local clock offset: -0.27 ms

Remote clock offset: 1.771 ms

Below is generated by plot.py at 2019-03-18 19:05:45

Datalink statistics

-- Total of 1 flow:

Average throughput: 16.00 Mbit/s

95th percentile per-packet one-way delay: 550.561 ms

Loss rate: 1.46%

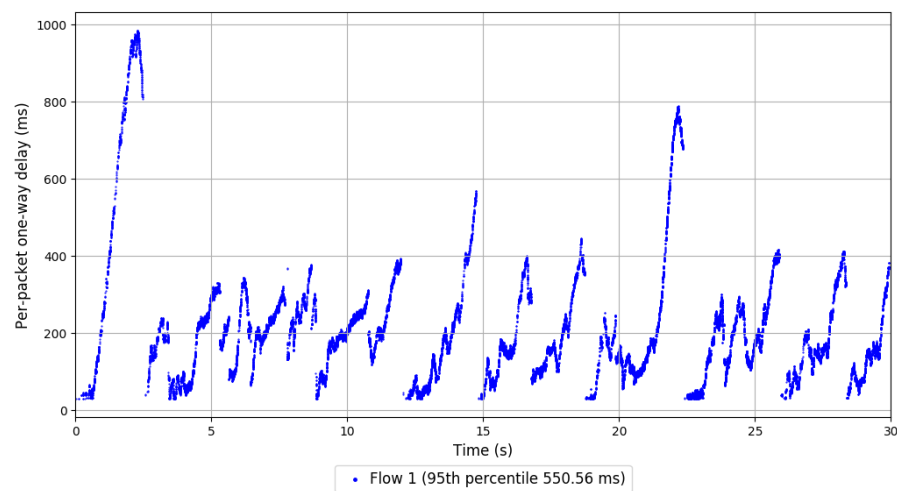
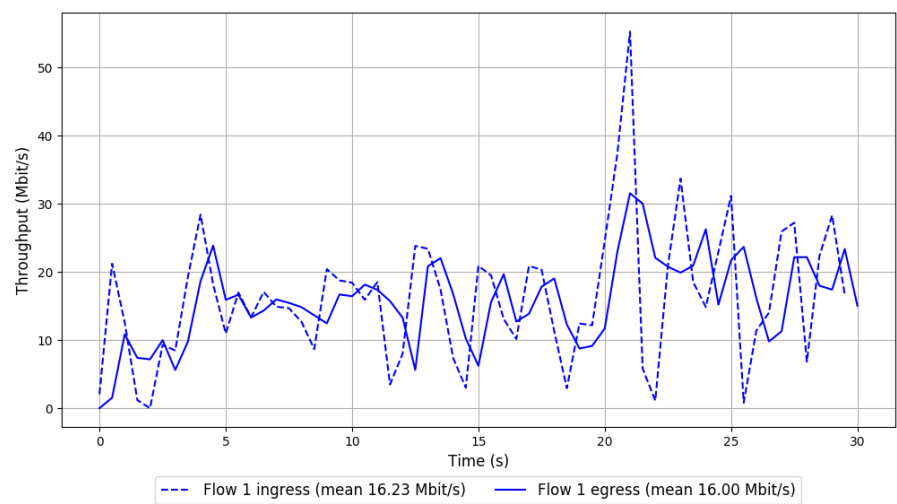
-- Flow 1:

Average throughput: 16.00 Mbit/s

95th percentile per-packet one-way delay: 550.561 ms

Loss rate: 1.46%

Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2019-03-18 18:20:50

End at: 2019-03-18 18:21:21

Local clock offset: -0.759 ms

Remote clock offset: 0.982 ms

Below is generated by plot.py at 2019-03-18 19:05:45

Datalink statistics

-- Total of 1 flow:

Average throughput: 13.21 Mbit/s

95th percentile per-packet one-way delay: 469.955 ms

Loss rate: 2.77%

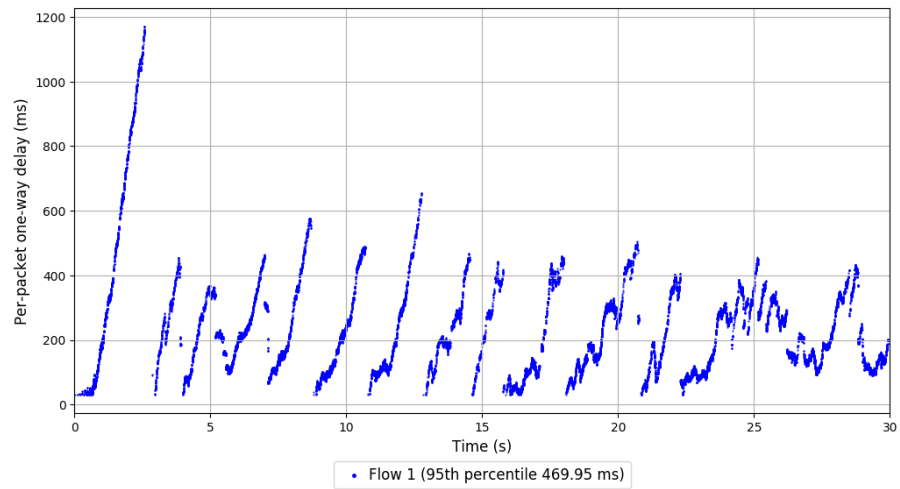
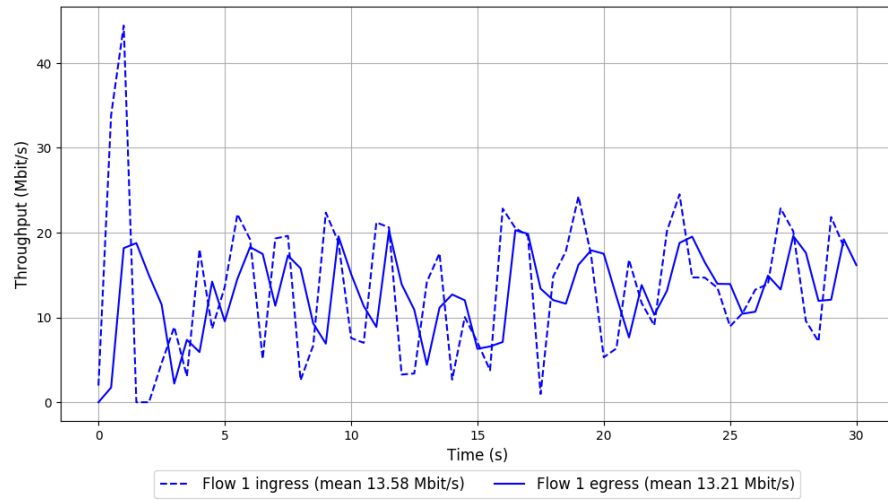
-- Flow 1:

Average throughput: 13.21 Mbit/s

95th percentile per-packet one-way delay: 469.955 ms

Loss rate: 2.77%

Run 2: Report of Verus — Data Link

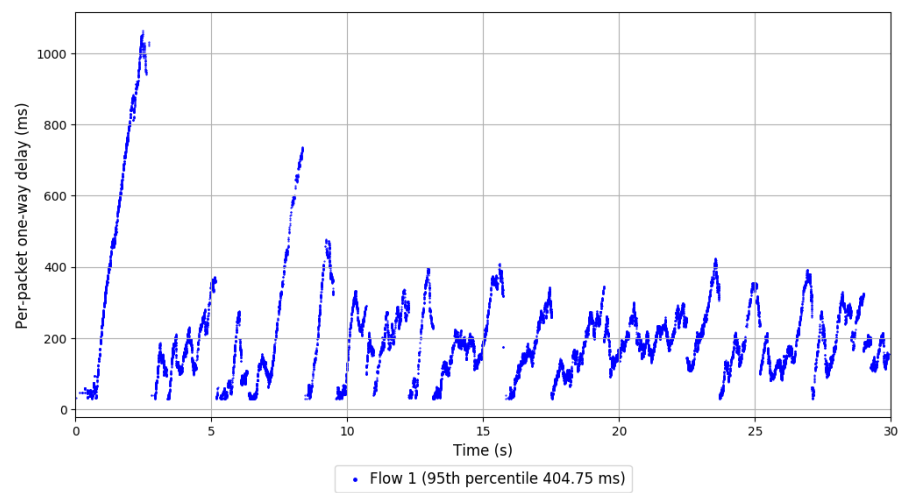
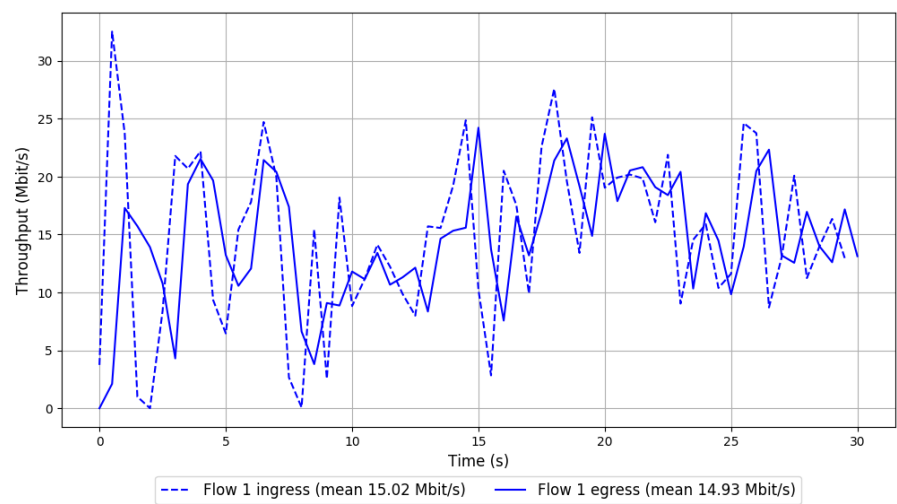


Run 3: Statistics of Verus

Start at: 2019-03-18 18:46:35
End at: 2019-03-18 18:47:05
Local clock offset: -1.984 ms
Remote clock offset: 0.452 ms

Below is generated by plot.py at 2019-03-18 19:05:45
Datalink statistics
-- Total of 1 flow:
Average throughput: 14.93 Mbit/s
95th percentile per-packet one-way delay: 404.749 ms
Loss rate: 0.73%
-- Flow 1:
Average throughput: 14.93 Mbit/s
95th percentile per-packet one-way delay: 404.749 ms
Loss rate: 0.73%

Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

Start at: 2019-03-18 18:04:49

End at: 2019-03-18 18:05:19

Local clock offset: -0.184 ms

Remote clock offset: 1.756 ms

Below is generated by plot.py at 2019-03-18 19:05:45

Datalink statistics

-- Total of 1 flow:

Average throughput: 6.34 Mbit/s

95th percentile per-packet one-way delay: 812.949 ms

Loss rate: 0.17%

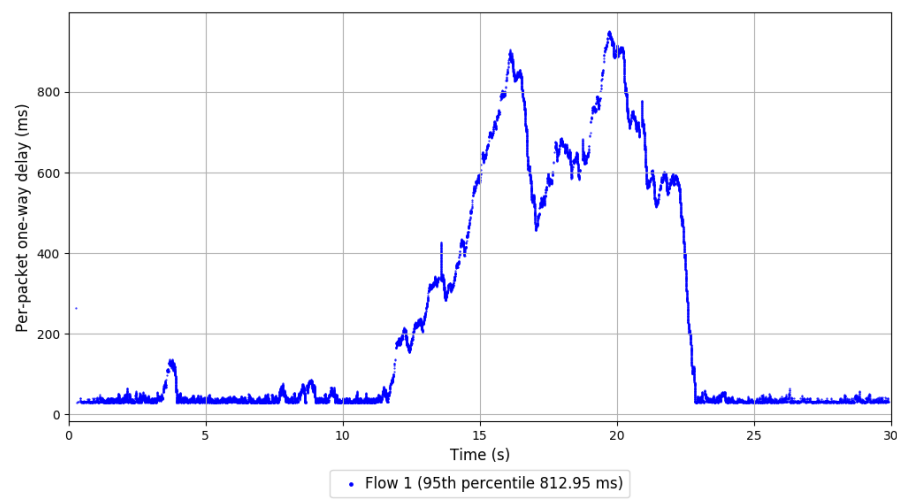
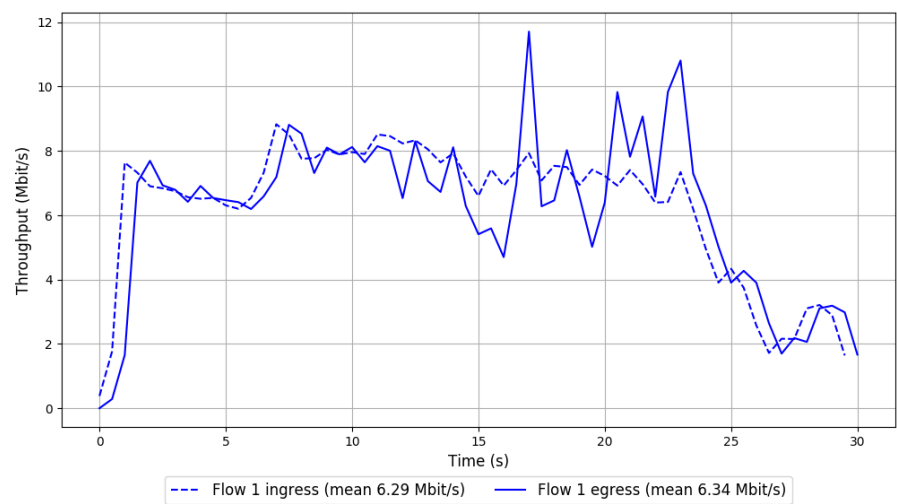
-- Flow 1:

Average throughput: 6.34 Mbit/s

95th percentile per-packet one-way delay: 812.949 ms

Loss rate: 0.17%

Run 1: Report of PCC-Vivace — Data Link



Run 2: Statistics of PCC-Vivace

Start at: 2019-03-18 18:30:39

End at: 2019-03-18 18:31:09

Local clock offset: -1.123 ms

Remote clock offset: 1.096 ms

Below is generated by plot.py at 2019-03-18 19:05:45

Datalink statistics

-- Total of 1 flow:

Average throughput: 3.54 Mbit/s

95th percentile per-packet one-way delay: 40.562 ms

Loss rate: 0.06%

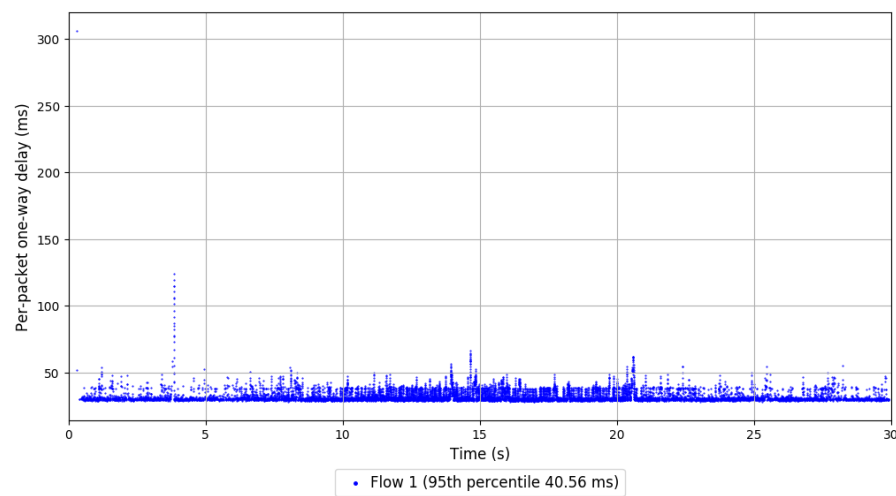
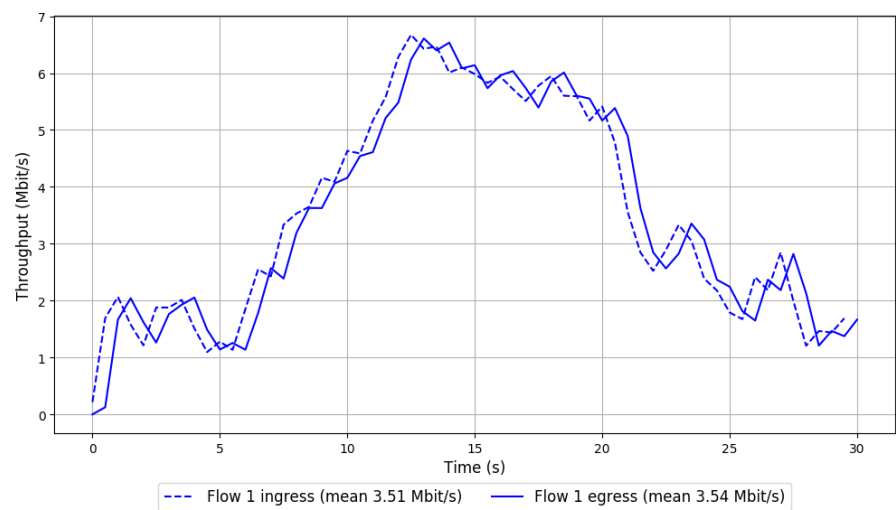
-- Flow 1:

Average throughput: 3.54 Mbit/s

95th percentile per-packet one-way delay: 40.562 ms

Loss rate: 0.06%

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

Start at: 2019-03-18 18:56:25

End at: 2019-03-18 18:56:55

Local clock offset: -0.641 ms

Remote clock offset: 0.224 ms

Below is generated by plot.py at 2019-03-18 19:05:45

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.53 Mbit/s

95th percentile per-packet one-way delay: 39.041 ms

Loss rate: 0.15%

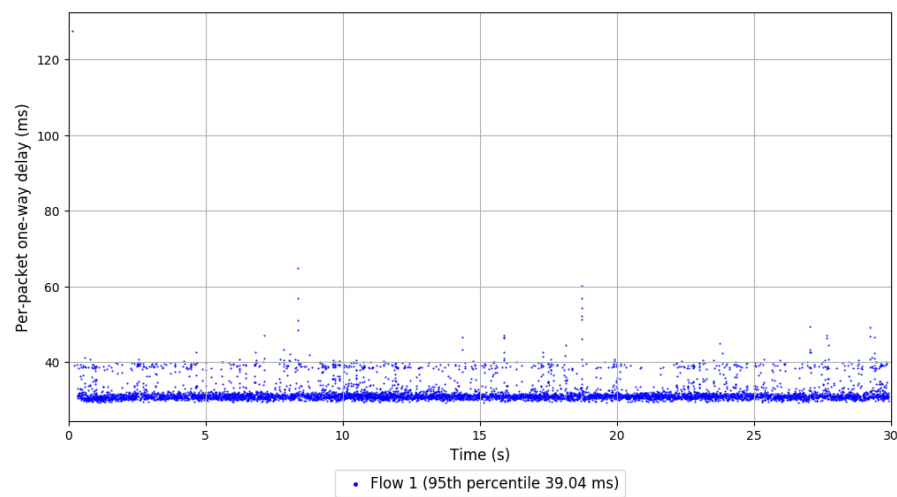
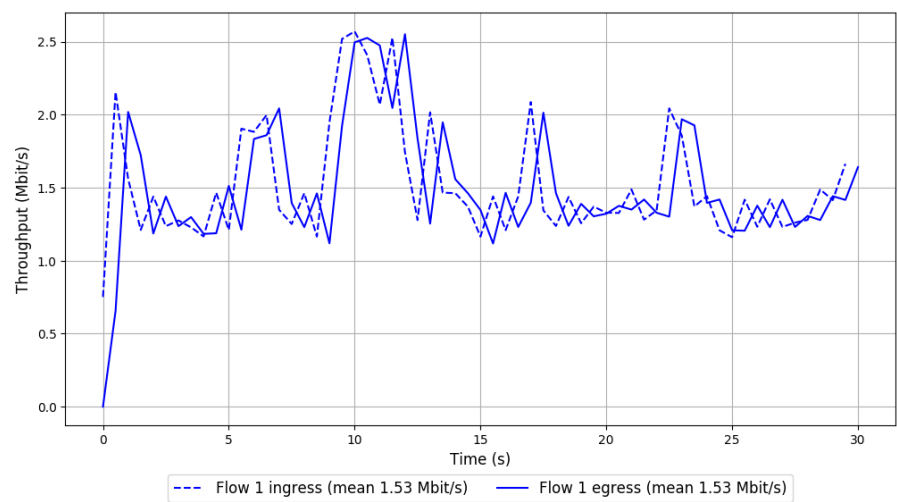
-- Flow 1:

Average throughput: 1.53 Mbit/s

95th percentile per-packet one-way delay: 39.041 ms

Loss rate: 0.15%

Run 3: Report of PCC-Vivace — Data Link



Run 1: Statistics of WebRTC media

Start at: 2019-03-18 17:53:46

End at: 2019-03-18 17:54:16

Local clock offset: -0.176 ms

Remote clock offset: 1.675 ms

Below is generated by plot.py at 2019-03-18 19:05:45

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 39.877 ms

Loss rate: 0.00%

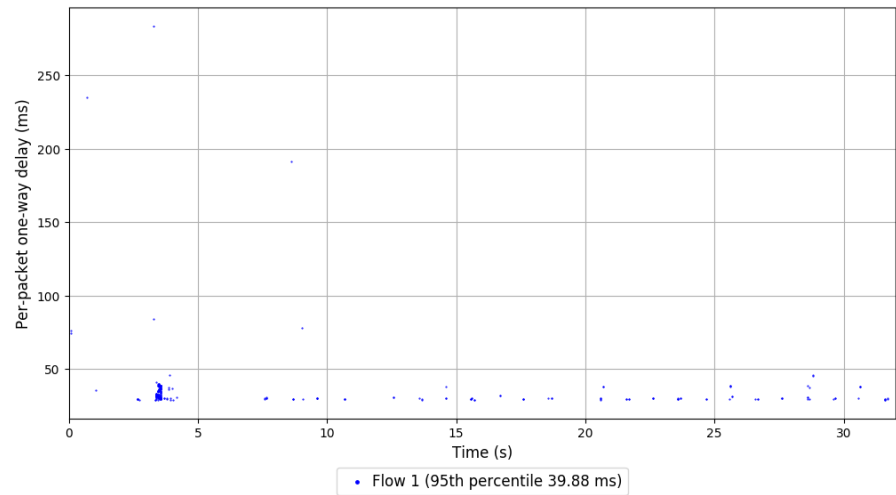
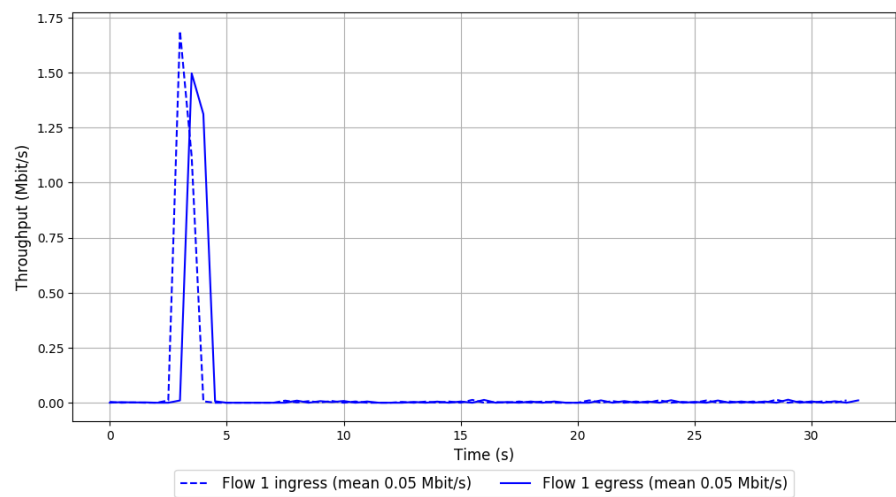
-- Flow 1:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 39.877 ms

Loss rate: 0.00%

Run 1: Report of WebRTC media — Data Link



Run 2: Statistics of WebRTC media

Start at: 2019-03-18 18:19:37

End at: 2019-03-18 18:20:07

Local clock offset: -0.758 ms

Remote clock offset: 1.019 ms

Below is generated by plot.py at 2019-03-18 19:05:45

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 50.997 ms

Loss rate: 0.00%

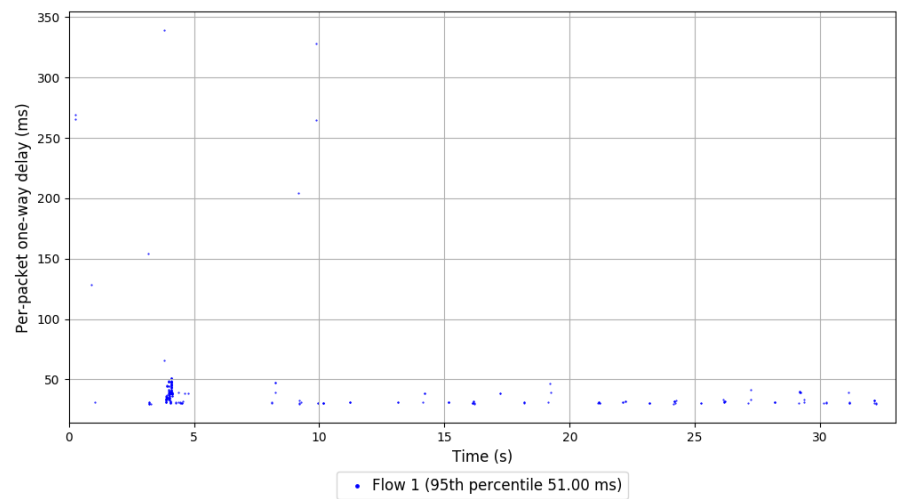
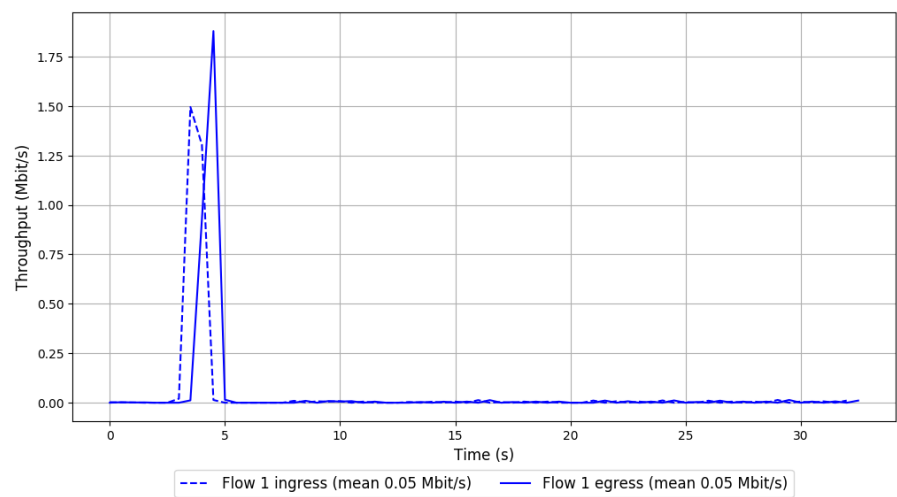
-- Flow 1:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 50.997 ms

Loss rate: 0.00%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2019-03-18 18:45:22

End at: 2019-03-18 18:45:52

Local clock offset: -1.911 ms

Remote clock offset: 0.455 ms

Below is generated by plot.py at 2019-03-18 19:05:45

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 45.779 ms

Loss rate: 0.00%

-- Flow 1:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 45.779 ms

Loss rate: 0.00%

Run 3: Report of WebRTC media — Data Link

