

Pantheon Report

Generated at 2018-09-06 13:34:45 (UTC).

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

Repeated the test of 18 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

NTP offsets were measured against `nets.org.sg` and have been applied to correct the timestamps in logs.

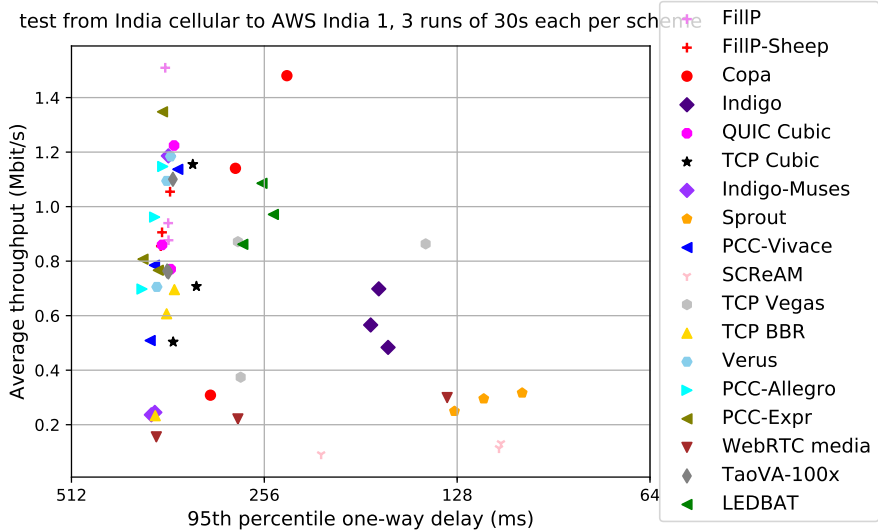
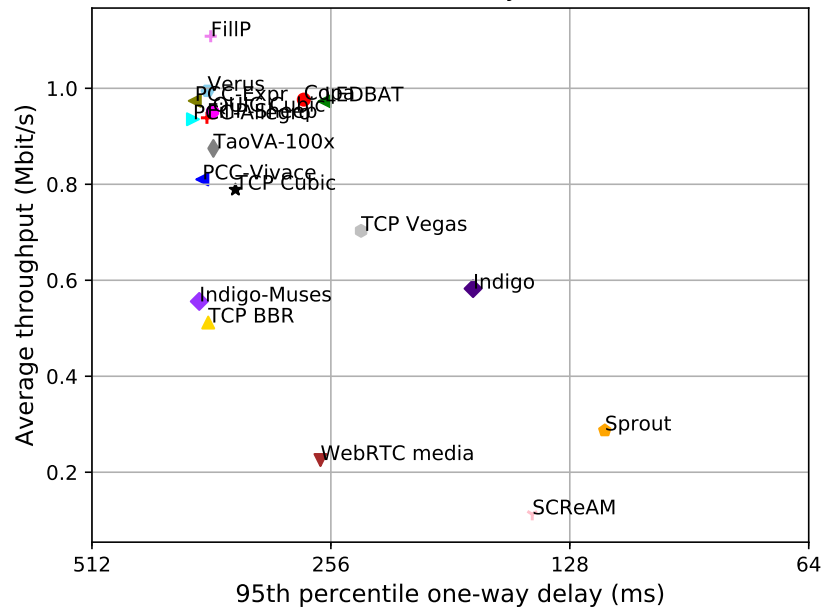
System info:

```
Linux 4.15.0-1020-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
net.ipv4.tcp_mem = 536870912 536870912 536870912
```

Git summary:

```
branch: muses @ f392ce15d580343f4432c3d7e068b3290f03eb4a
third_party/fillp @ d47f4fa1b454a5e3c0537115c5a28436dbd4b834
third_party/fillp-sheep @ daed0c84f98531712514b2231f43ec6901114ffe
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf5e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecd90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ a28d20fb82a95a965a3da65fd1eb71b8994e9b84
third_party/pantheon-tunnel @ cbfce6db5ff5740d4fe1771f813cd646339e1952
third_party/pcc @ 1afc958fa0d66d18b623c091a55fec872b4981e1
M receiver/src/buffer.h
M receiver/src/core.cpp
M sender/src/buffer.h
M sender/src/core.cpp
third_party/pcc-experimental @ cd43e34e3f5f5613e8acd08fab92c4eb24f974ab
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ebc978f3cff42
third_party/scream-reproduce @ f099118d1421aa3131bf11ff1964974e1da3bdb2
M src/ScreamClient
M src/ScreamServer
third_party/sprout @ 366e35c6178b01e31d4a46ad18c74f9415f19a26
third_party/verus @ d4b447ea74c6c60a261149af2629562939f9a494
M src/verus.hpp
M tools/plot.py
third_party/vivace @ 2baf86211435ae071a32f96b7d8c504587f5d7f4
third_party/webrtc @ 3f0cc2a9061a41b6f9dde4735770d143a1fa2851
```

test from India cellular to AWS India 1, 3 runs of 30s each per scheme
(mean of all runs by 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	0.51	365.40	9.37
Copa	3	0.98	276.90	3.27
TCP Cubic	3	0.79	337.67	3.64
FillP	3	1.11	362.79	48.56
FillP-Sheep	3	0.94	366.77	26.17
Indigo	3	0.58	169.47	1.84
LEDBAT	3	0.97	260.84	0.90
Indigo-Muses	3	0.56	375.02	43.17
PCC-Allegro	3	0.94	381.96	69.92
PCC-Expr	3	0.98	379.95	85.06
QUIC Cubic	3	0.95	360.76	9.57
SCReAM	3	0.11	142.73	0.50
Sprout	3	0.29	115.63	1.49
TaoVA-100x	3	0.87	359.99	25.35
TCP Vegas	3	0.70	234.52	1.22
Verus	3	0.99	366.22	38.95
PCC-Vivace	3	0.81	371.73	36.76
WebRTC media	3	0.23	263.85	11.14

Run 1: Statistics of TCP BBR

Start at: 2018-09-06 12:45:32

End at: 2018-09-06 12:46:02

Local clock offset: 2.357 ms

Remote clock offset: -3.188 ms

Below is generated by plot.py at 2018-09-06 13:34:12

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.61 Mbit/s

95th percentile per-packet one-way delay: 363.697 ms

Loss rate: 7.74%

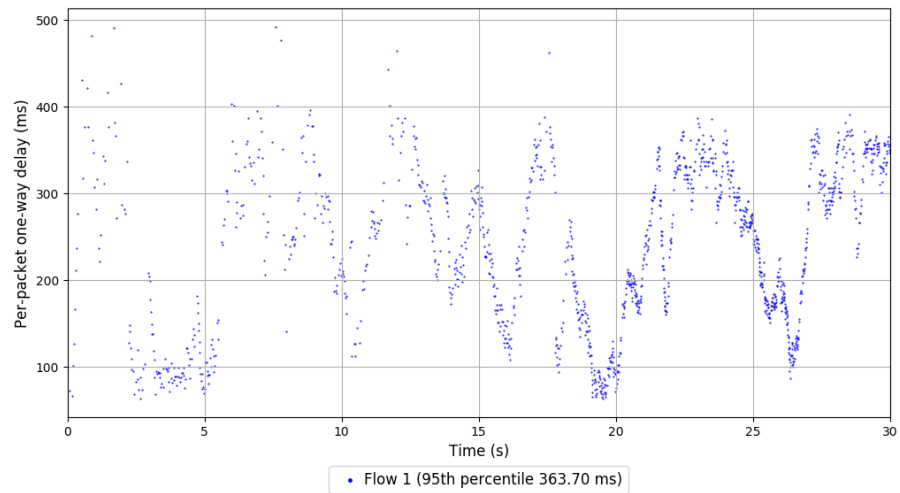
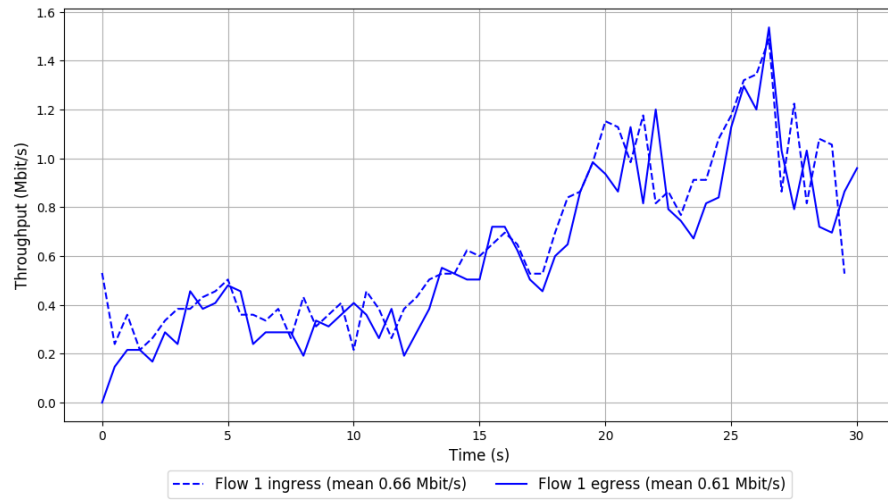
-- Flow 1:

Average throughput: 0.61 Mbit/s

95th percentile per-packet one-way delay: 363.697 ms

Loss rate: 7.74%

Run 1: Report of TCP BBR — Data Link

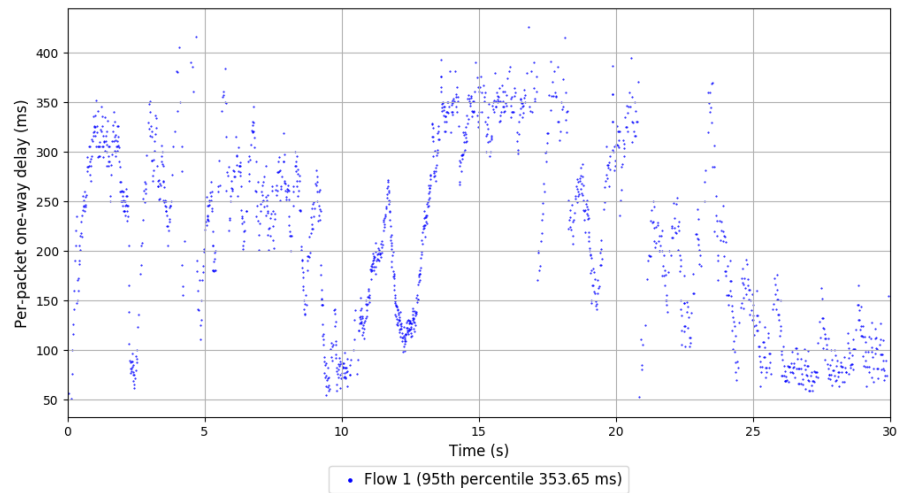
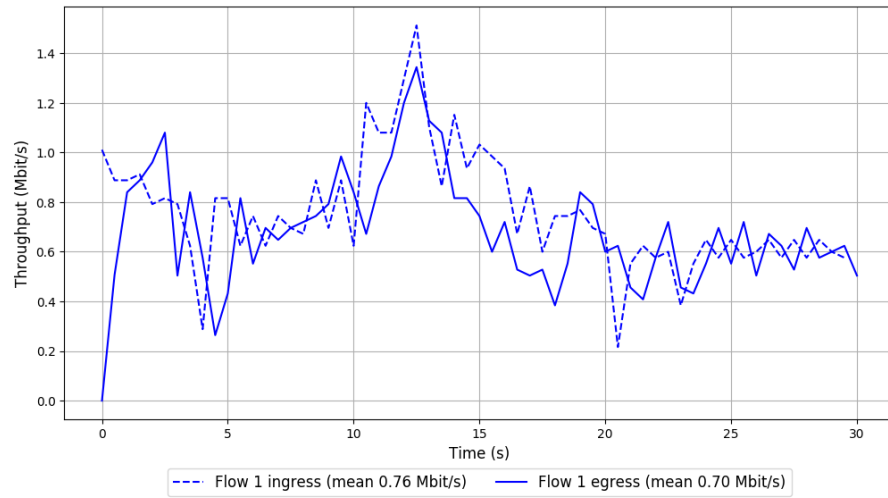


Run 2: Statistics of TCP BBR

Start at: 2018-09-06 13:05:08
End at: 2018-09-06 13:05:38
Local clock offset: -6.218 ms
Remote clock offset: -6.372 ms

Below is generated by plot.py at 2018-09-06 13:34:13
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 353.651 ms
Loss rate: 8.79%
-- Flow 1:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 353.651 ms
Loss rate: 8.79%

Run 2: Report of TCP BBR — Data Link



Run 3: Statistics of TCP BBR

Start at: 2018-09-06 13:24:44

End at: 2018-09-06 13:25:14

Local clock offset: 0.412 ms

Remote clock offset: -3.056 ms

Below is generated by plot.py at 2018-09-06 13:34:13

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.23 Mbit/s

95th percentile per-packet one-way delay: 378.859 ms

Loss rate: 11.58%

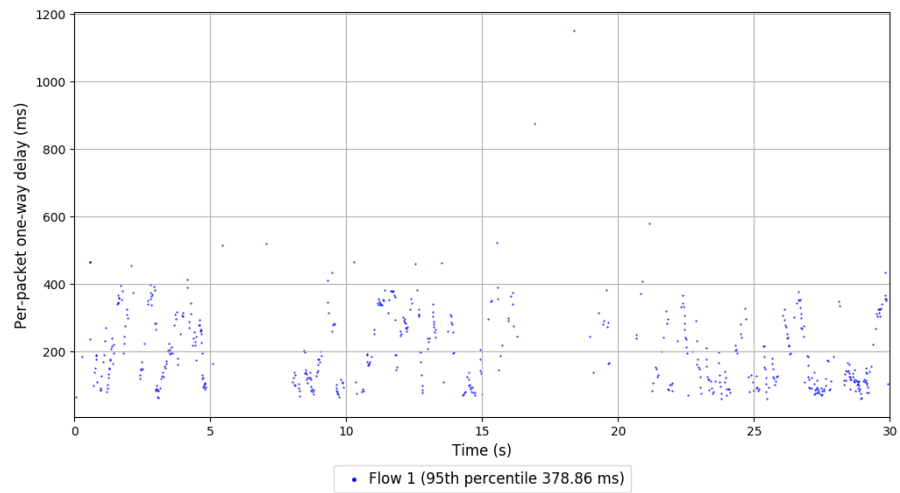
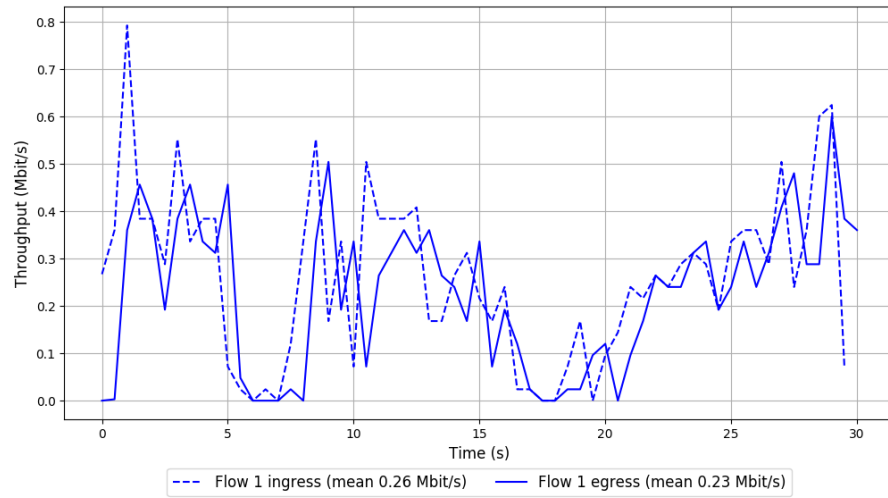
-- Flow 1:

Average throughput: 0.23 Mbit/s

95th percentile per-packet one-way delay: 378.859 ms

Loss rate: 11.58%

Run 3: Report of TCP BBR — Data Link

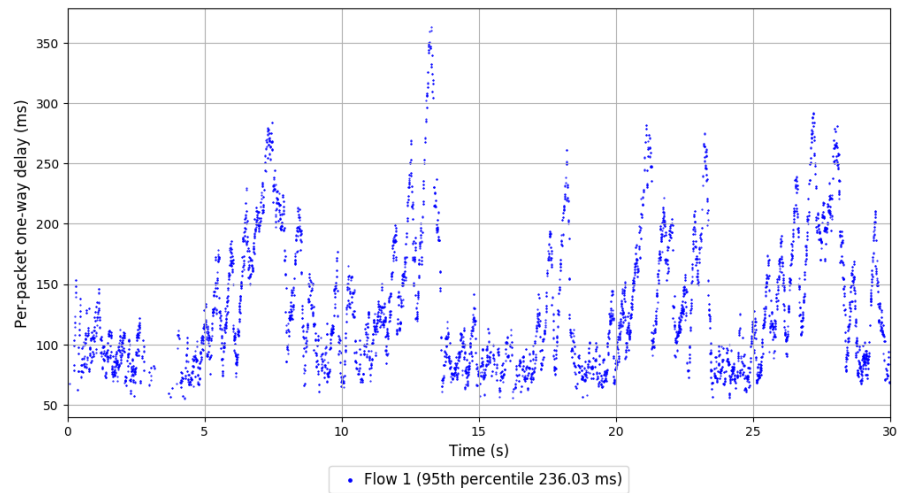
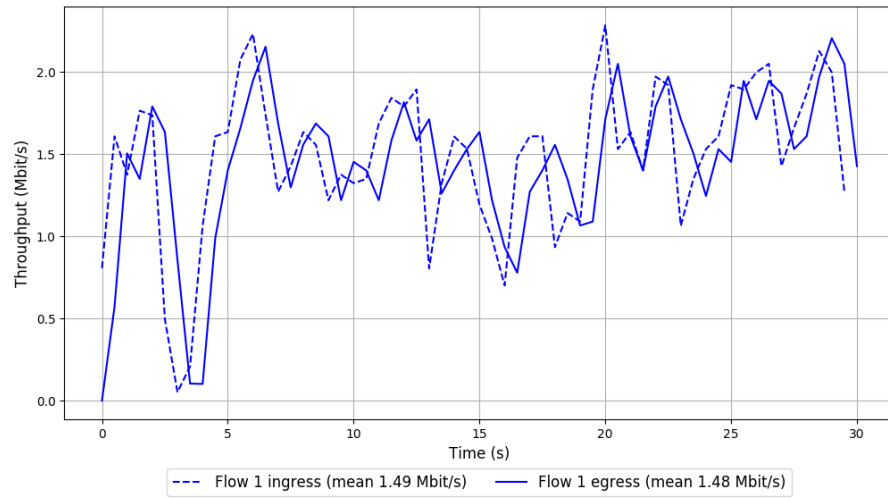


Run 1: Statistics of Copa

Start at: 2018-09-06 12:51:00
End at: 2018-09-06 12:51:30
Local clock offset: 0.185 ms
Remote clock offset: -2.212 ms

Below is generated by plot.py at 2018-09-06 13:34:16
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.48 Mbit/s
95th percentile per-packet one-way delay: 236.034 ms
Loss rate: 0.62%
-- Flow 1:
Average throughput: 1.48 Mbit/s
95th percentile per-packet one-way delay: 236.034 ms
Loss rate: 0.62%

Run 1: Report of Copa — Data Link

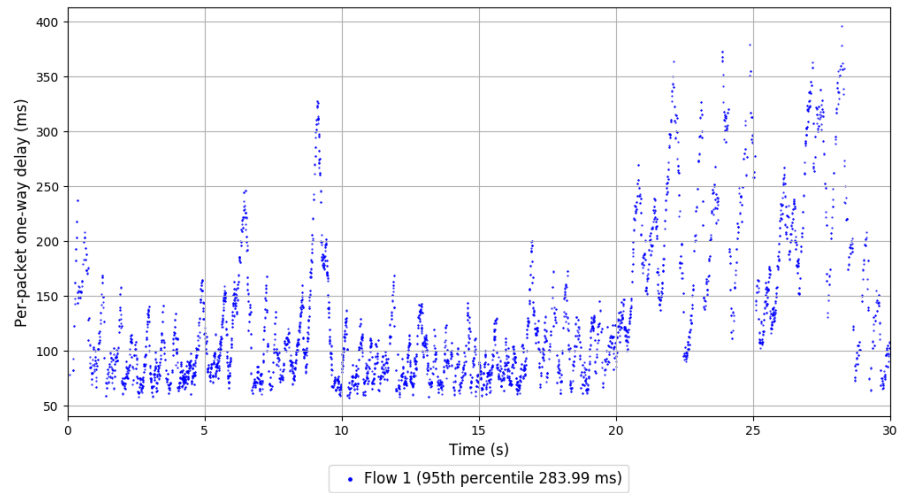
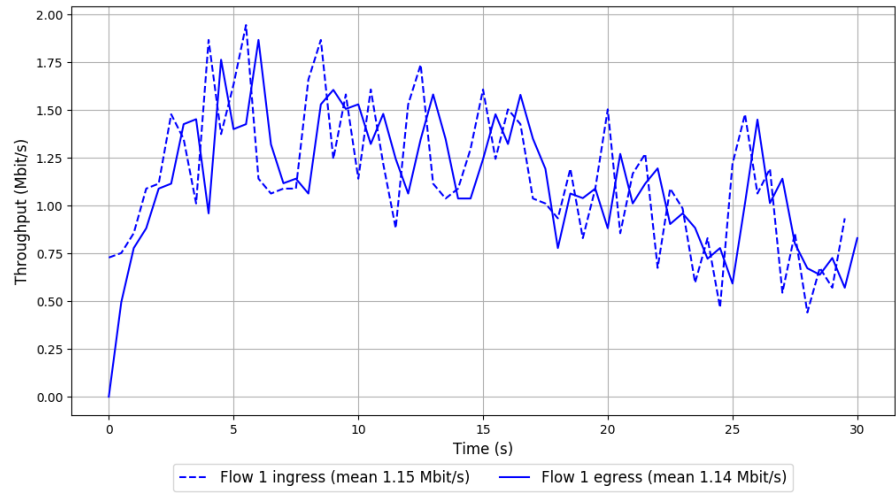


Run 2: Statistics of Copa

Start at: 2018-09-06 13:10:34
End at: 2018-09-06 13:11:04
Local clock offset: -0.461 ms
Remote clock offset: -3.373 ms

Below is generated by plot.py at 2018-09-06 13:34:16
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 283.985 ms
Loss rate: 0.94%
-- Flow 1:
Average throughput: 1.14 Mbit/s
95th percentile per-packet one-way delay: 283.985 ms
Loss rate: 0.94%

Run 2: Report of Copa — Data Link



Run 3: Statistics of Copa

Start at: 2018-09-06 13:30:09

End at: 2018-09-06 13:30:39

Local clock offset: 1.102 ms

Remote clock offset: -1.14 ms

Below is generated by plot.py at 2018-09-06 13:34:16

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.31 Mbit/s

95th percentile per-packet one-way delay: 310.682 ms

Loss rate: 8.26%

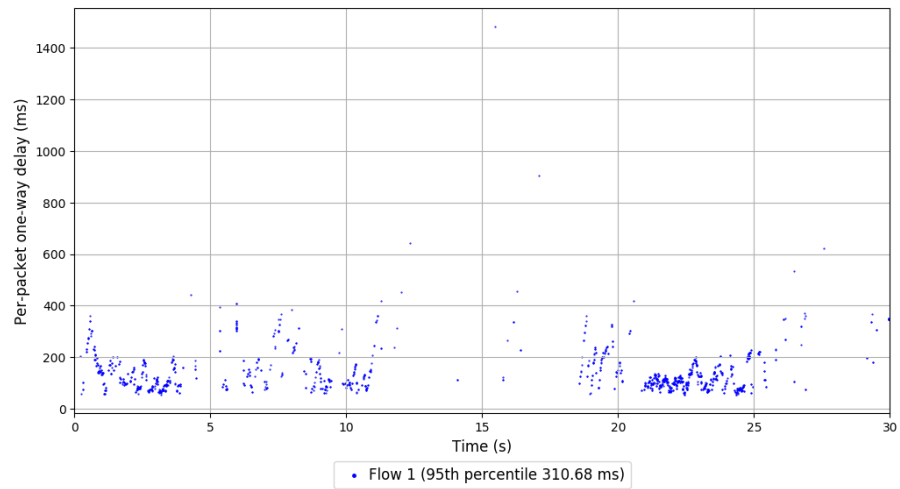
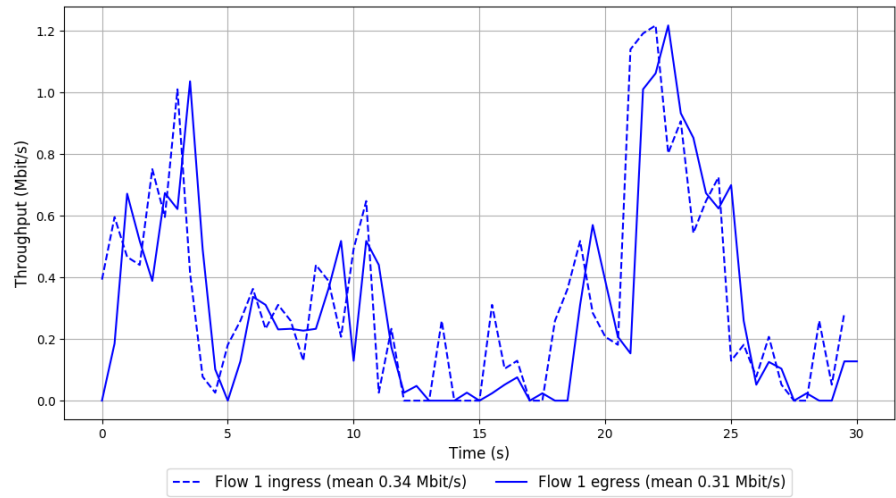
-- Flow 1:

Average throughput: 0.31 Mbit/s

95th percentile per-packet one-way delay: 310.682 ms

Loss rate: 8.26%

Run 3: Report of Copa — Data Link

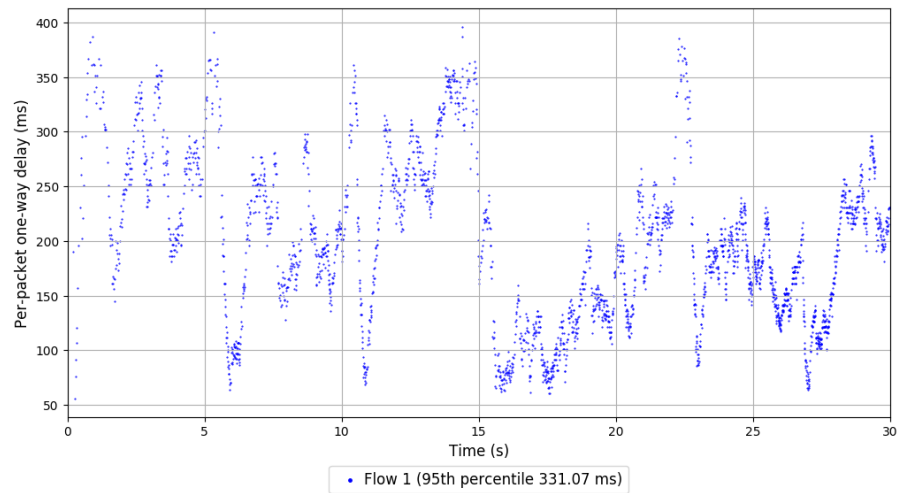
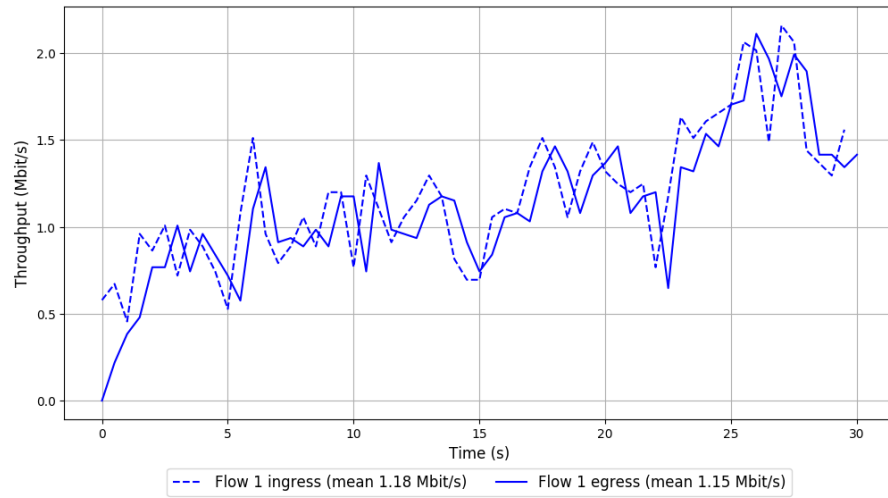


Run 1: Statistics of TCP Cubic

Start at: 2018-09-06 12:40:04
End at: 2018-09-06 12:40:34
Local clock offset: -1.696 ms
Remote clock offset: -3.309 ms

Below is generated by plot.py at 2018-09-06 13:34:16
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.15 Mbit/s
95th percentile per-packet one-way delay: 331.071 ms
Loss rate: 2.78%
-- Flow 1:
Average throughput: 1.15 Mbit/s
95th percentile per-packet one-way delay: 331.071 ms
Loss rate: 2.78%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2018-09-06 12:59:42

End at: 2018-09-06 13:00:12

Local clock offset: -2.381 ms

Remote clock offset: -0.23 ms

Below is generated by plot.py at 2018-09-06 13:34:16

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.50 Mbit/s

95th percentile per-packet one-way delay: 355.199 ms

Loss rate: 5.00%

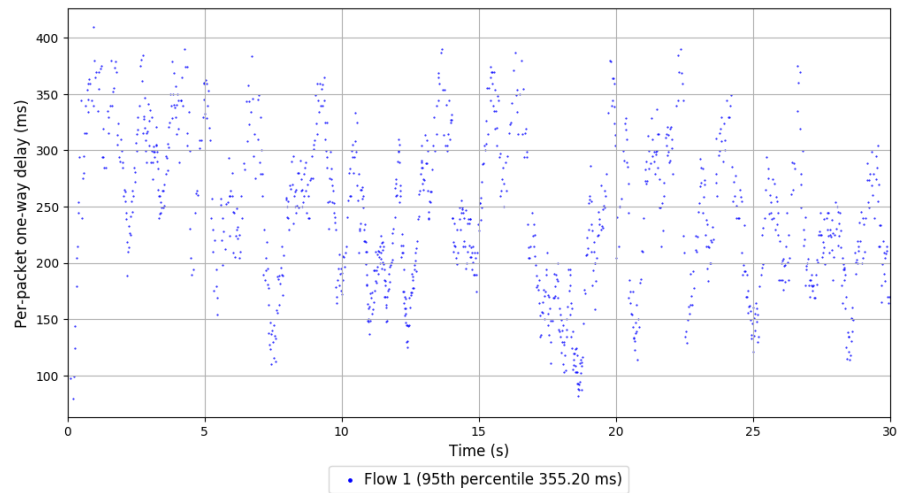
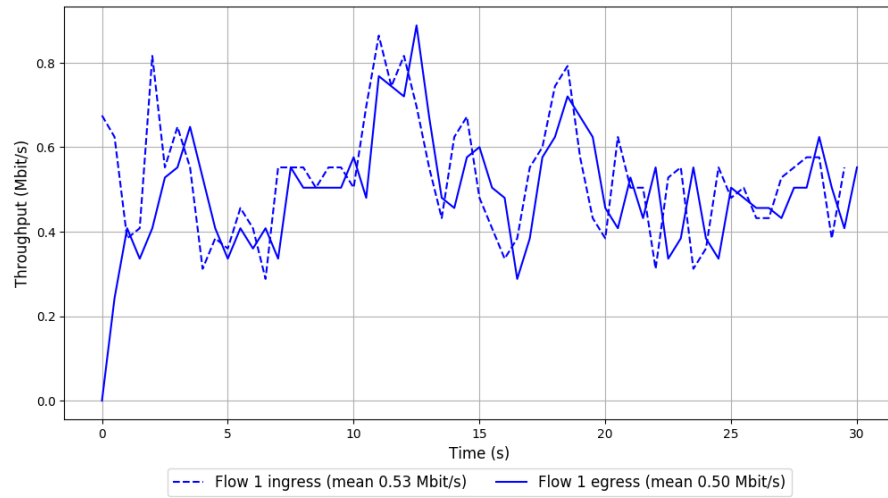
-- Flow 1:

Average throughput: 0.50 Mbit/s

95th percentile per-packet one-way delay: 355.199 ms

Loss rate: 5.00%

Run 2: Report of TCP Cubic — Data Link

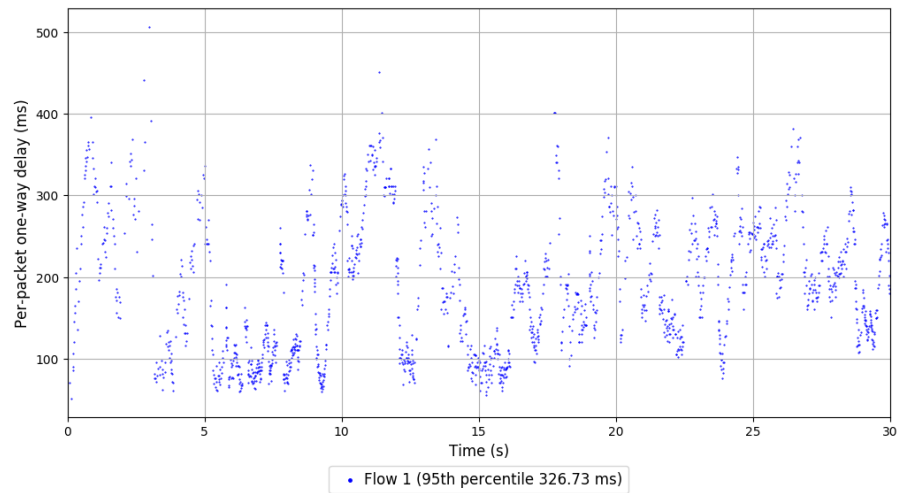
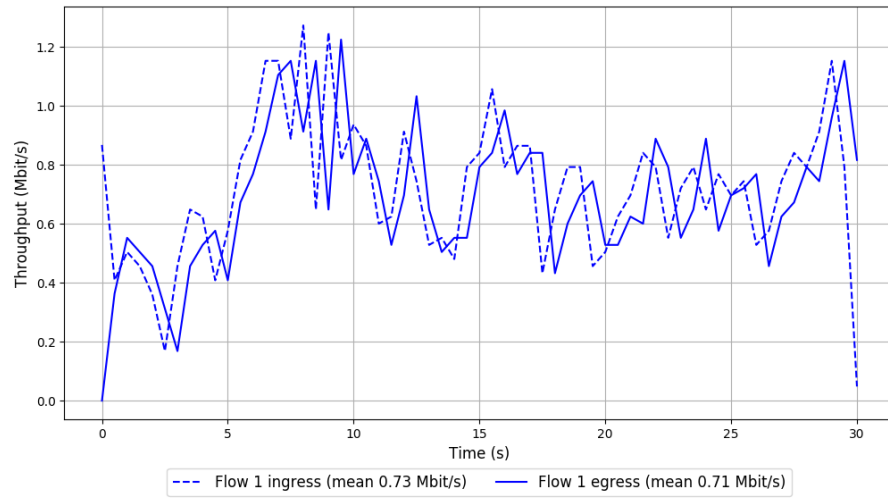


Run 3: Statistics of TCP Cubic

Start at: 2018-09-06 13:19:17
End at: 2018-09-06 13:19:47
Local clock offset: -1.71 ms
Remote clock offset: -2.406 ms

Below is generated by plot.py at 2018-09-06 13:34:16
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 326.729 ms
Loss rate: 3.13%
-- Flow 1:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 326.729 ms
Loss rate: 3.13%

Run 3: Report of TCP Cubic — Data Link

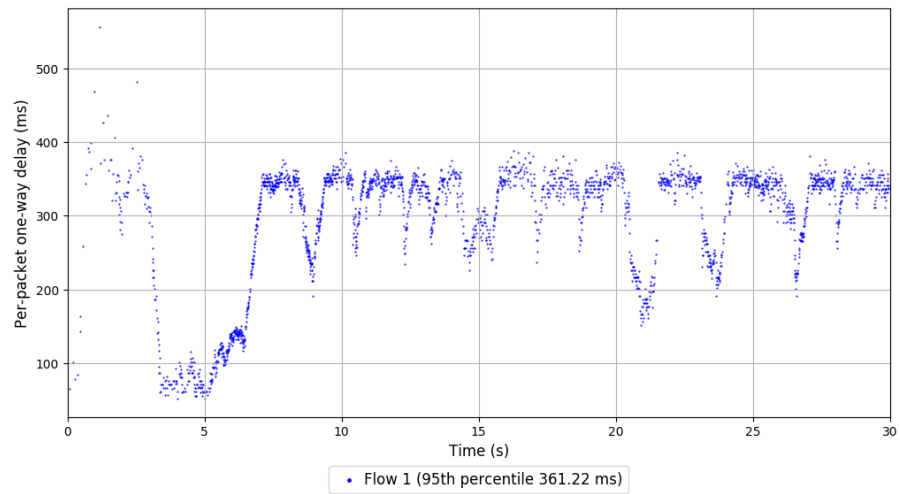
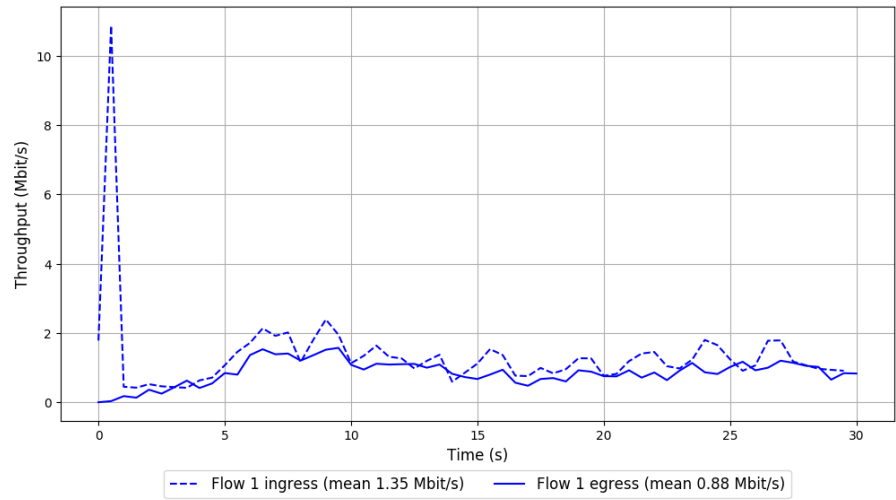


Run 1: Statistics of FillP

Start at: 2018-09-06 12:38:58
End at: 2018-09-06 12:39:28
Local clock offset: 0.525 ms
Remote clock offset: -4.104 ms

Below is generated by plot.py at 2018-09-06 13:34:16
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.88 Mbit/s
95th percentile per-packet one-way delay: 361.217 ms
Loss rate: 35.27%
-- Flow 1:
Average throughput: 0.88 Mbit/s
95th percentile per-packet one-way delay: 361.217 ms
Loss rate: 35.27%

Run 1: Report of FillP — Data Link

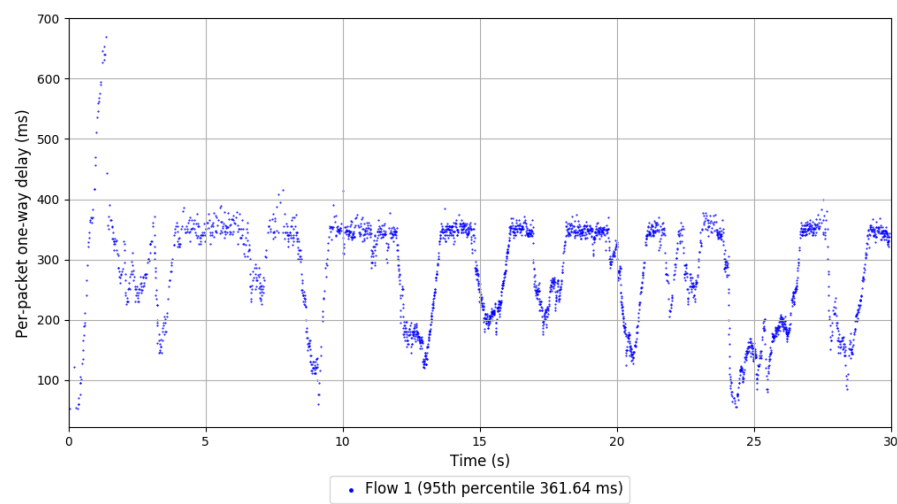
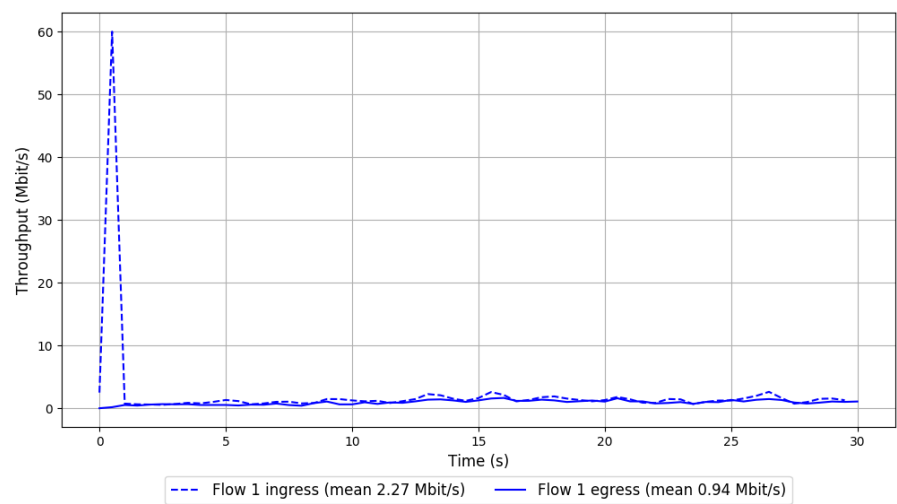


Run 2: Statistics of FillP

Start at: 2018-09-06 12:58:36
End at: 2018-09-06 12:59:06
Local clock offset: -0.29 ms
Remote clock offset: -0.745 ms

Below is generated by plot.py at 2018-09-06 13:34:17
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 361.645 ms
Loss rate: 58.75%
-- Flow 1:
Average throughput: 0.94 Mbit/s
95th percentile per-packet one-way delay: 361.645 ms
Loss rate: 58.75%

Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

Start at: 2018-09-06 13:18:11

End at: 2018-09-06 13:18:41

Local clock offset: 0.237 ms

Remote clock offset: -2.61 ms

Below is generated by plot.py at 2018-09-06 13:34:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.51 Mbit/s

95th percentile per-packet one-way delay: 365.498 ms

Loss rate: 51.66%

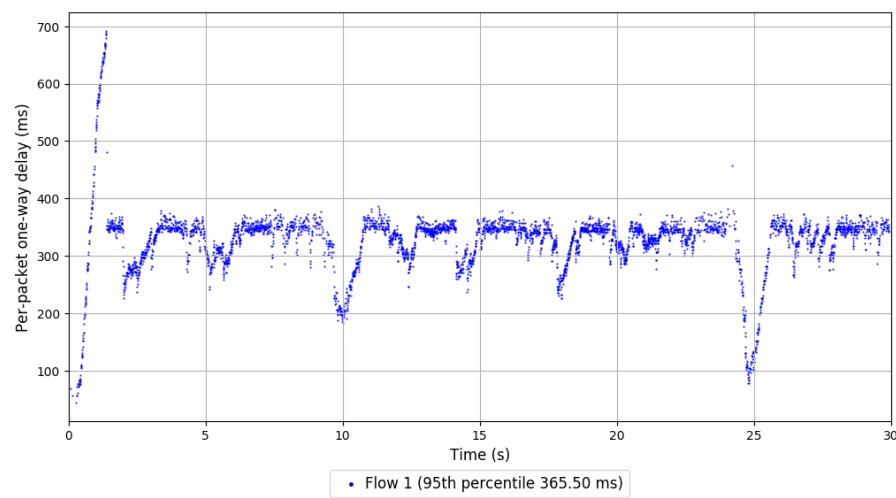
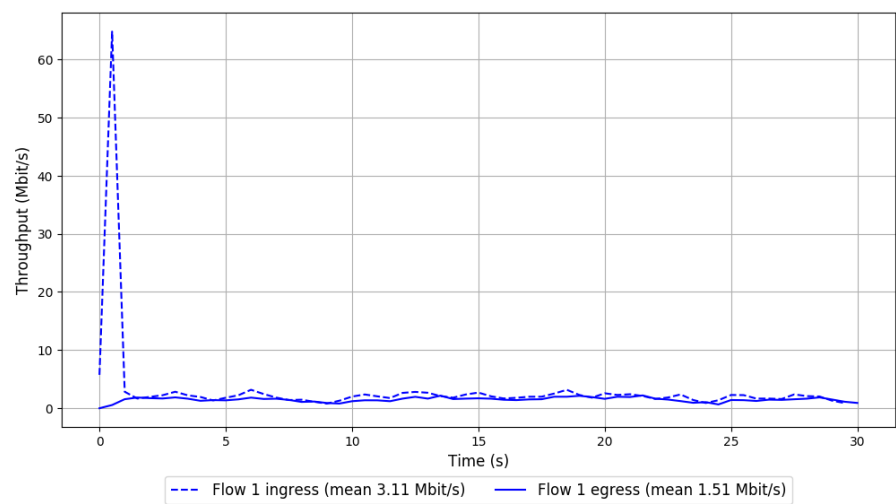
-- Flow 1:

Average throughput: 1.51 Mbit/s

95th percentile per-packet one-way delay: 365.498 ms

Loss rate: 51.66%

Run 3: Report of FillP — Data Link

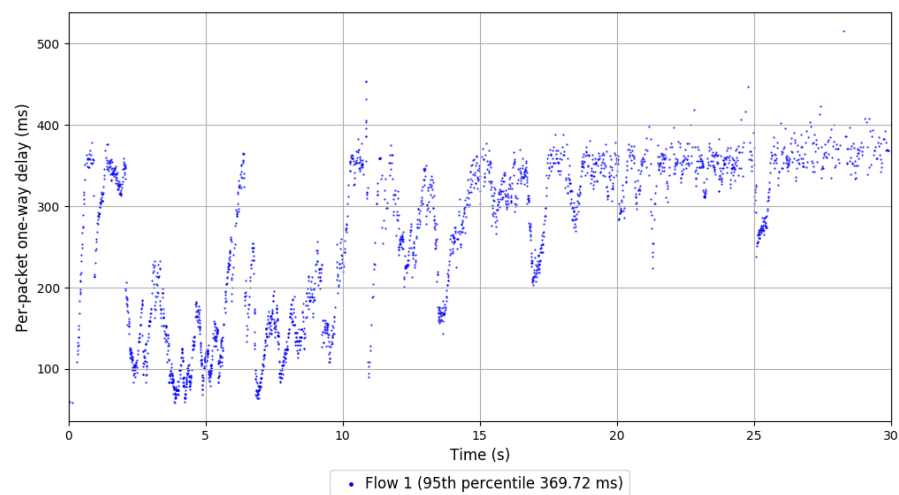
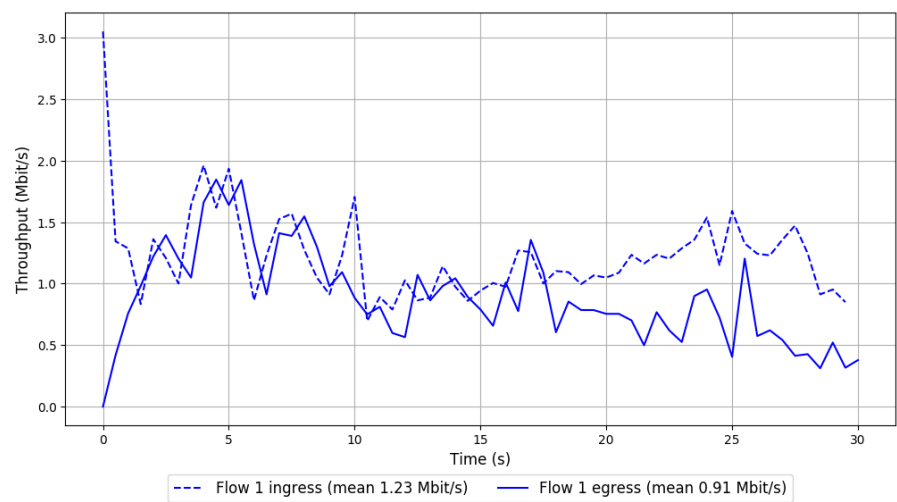


Run 1: Statistics of FillP-Sheep

Start at: 2018-09-06 12:54:15
End at: 2018-09-06 12:54:45
Local clock offset: -0.359 ms
Remote clock offset: -3.282 ms

Below is generated by plot.py at 2018-09-06 13:34:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 369.722 ms
Loss rate: 26.30%
-- Flow 1:
Average throughput: 0.91 Mbit/s
95th percentile per-packet one-way delay: 369.722 ms
Loss rate: 26.30%

Run 1: Report of FillP-Sheep — Data Link

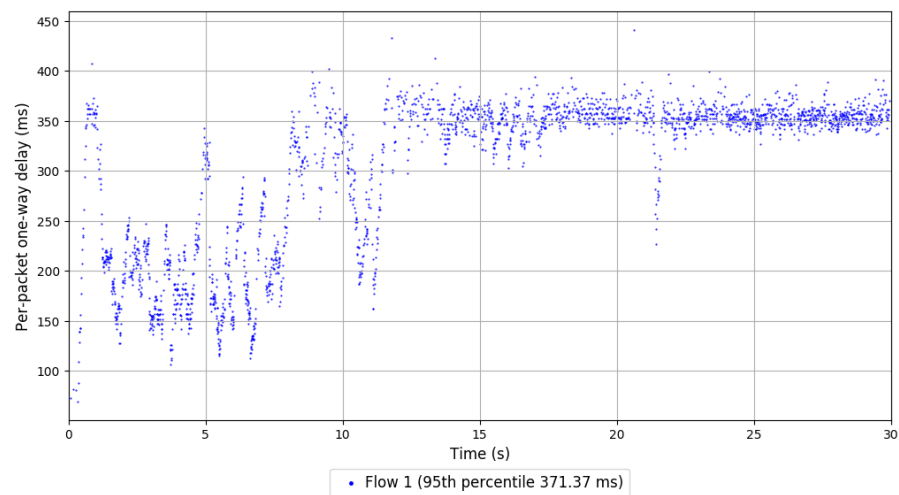
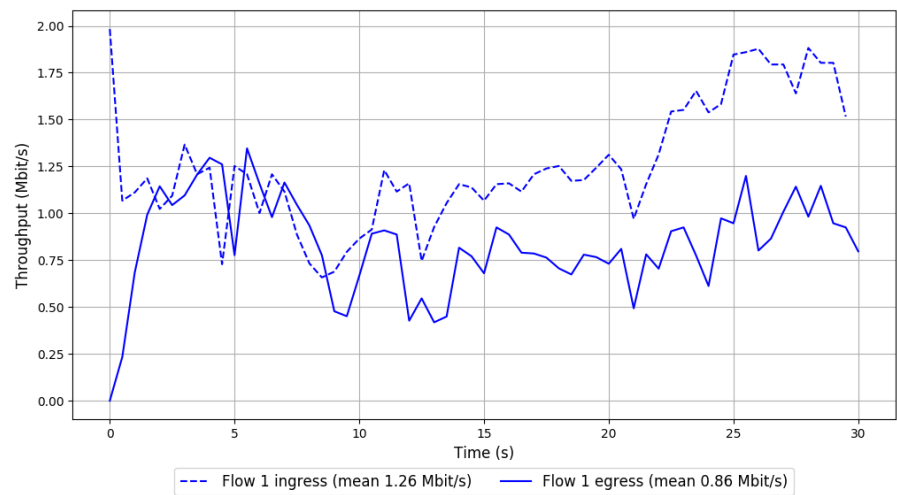


Run 2: Statistics of FillP-Sheep

Start at: 2018-09-06 13:13:50
End at: 2018-09-06 13:14:20
Local clock offset: -2.596 ms
Remote clock offset: -2.923 ms

Below is generated by plot.py at 2018-09-06 13:34:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 371.368 ms
Loss rate: 32.20%
-- Flow 1:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 371.368 ms
Loss rate: 32.20%

Run 2: Report of FillP-Sheep — Data Link

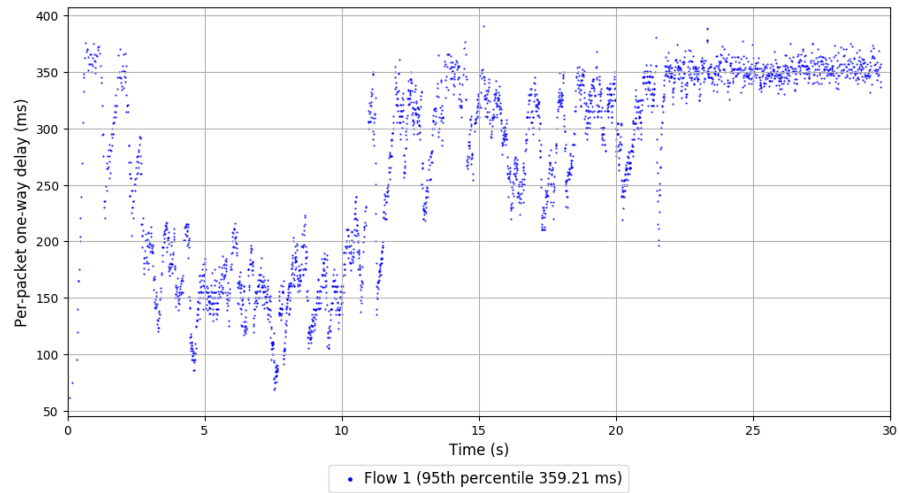
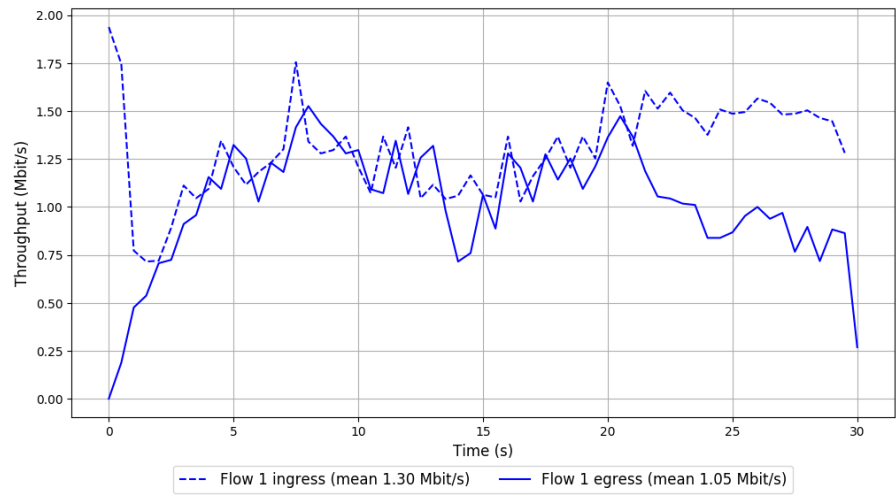


Run 3: Statistics of FillP-Sheep

Start at: 2018-09-06 13:33:34
End at: 2018-09-06 13:34:04
Local clock offset: -0.224 ms
Remote clock offset: -3.012 ms

Below is generated by plot.py at 2018-09-06 13:34:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 359.207 ms
Loss rate: 20.02%
-- Flow 1:
Average throughput: 1.05 Mbit/s
95th percentile per-packet one-way delay: 359.207 ms
Loss rate: 20.02%

Run 3: Report of FillP-Sheep — Data Link

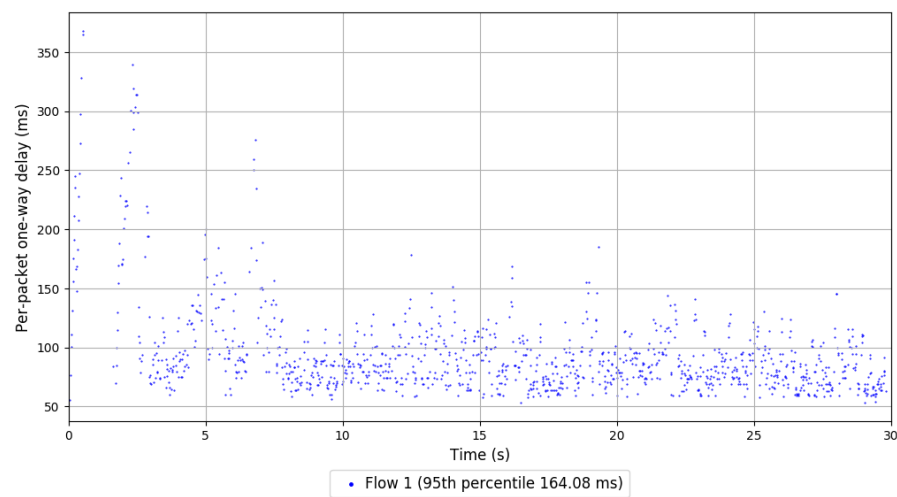
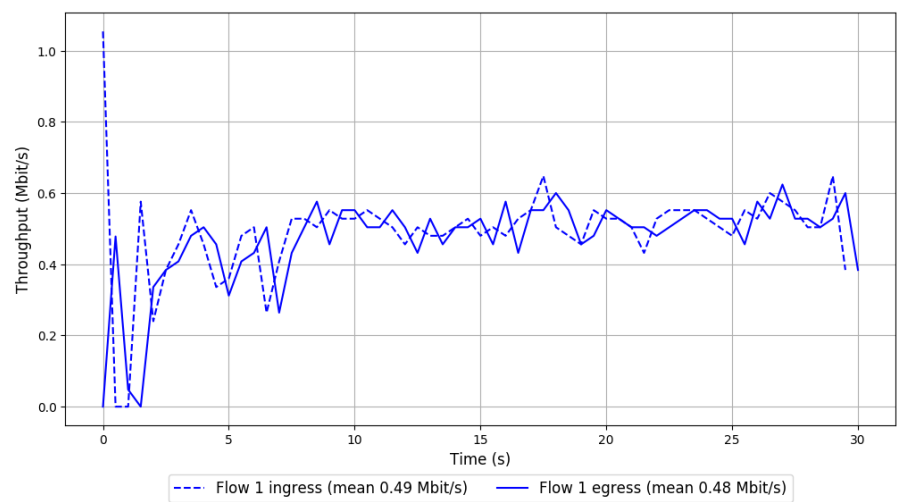


```
Run 1: Statistics of Indigo

Start at: 2018-09-06 12:46:37
End at: 2018-09-06 12:47:07
Local clock offset: -0.071 ms
Remote clock offset: -2.539 ms

# Below is generated by plot.py at 2018-09-06 13:34:20
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 164.077 ms
Loss rate: 2.44%
-- Flow 1:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 164.077 ms
Loss rate: 2.44%
```

Run 1: Report of Indigo — Data Link

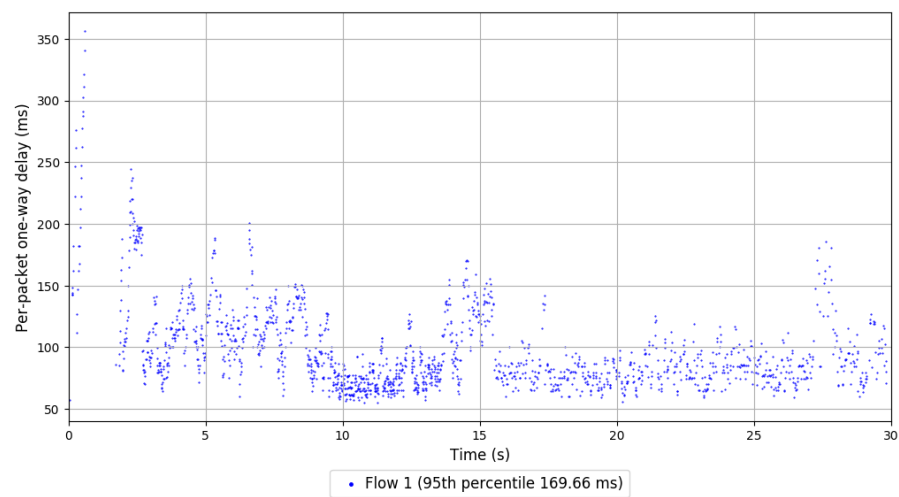
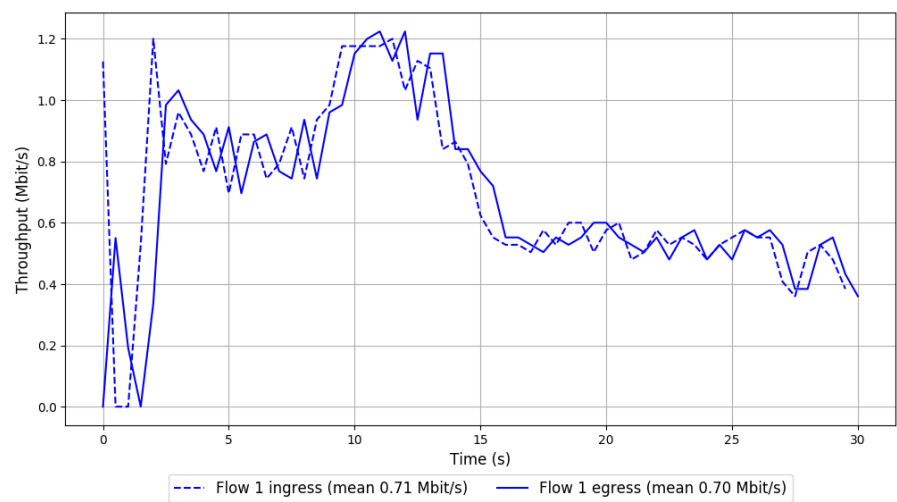


Run 2: Statistics of Indigo

Start at: 2018-09-06 13:06:13
End at: 2018-09-06 13:06:43
Local clock offset: -2.513 ms
Remote clock offset: -2.777 ms

Below is generated by plot.py at 2018-09-06 13:34:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 169.660 ms
Loss rate: 1.48%
-- Flow 1:
Average throughput: 0.70 Mbit/s
95th percentile per-packet one-way delay: 169.660 ms
Loss rate: 1.48%

Run 2: Report of Indigo — Data Link

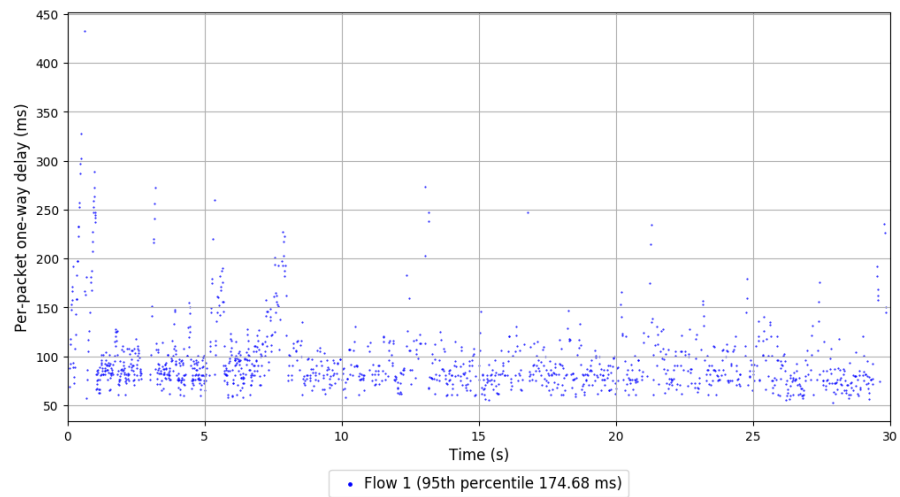
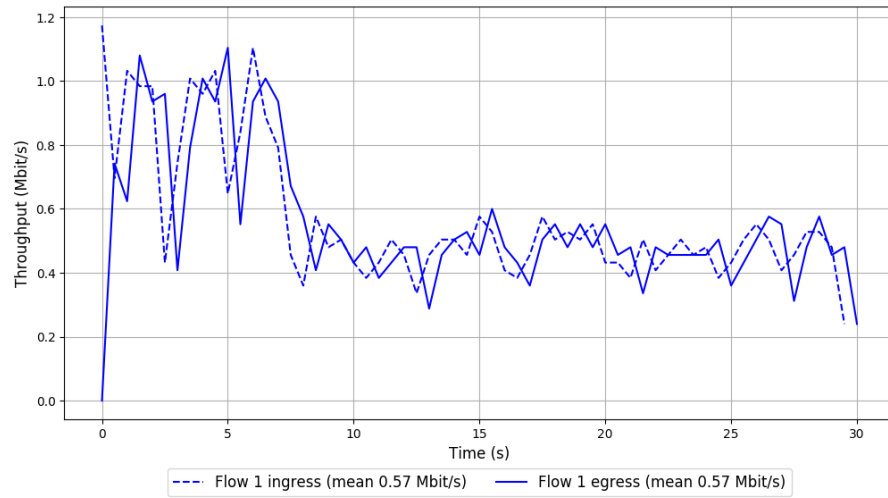


Run 3: Statistics of Indigo

Start at: 2018-09-06 13:25:49
End at: 2018-09-06 13:26:19
Local clock offset: 2.186 ms
Remote clock offset: -2.473 ms

Below is generated by plot.py at 2018-09-06 13:34:21
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 174.676 ms
Loss rate: 1.61%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 174.676 ms
Loss rate: 1.61%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of LEDBAT

Start at: 2018-09-06 12:35:42

End at: 2018-09-06 12:36:12

Local clock offset: 1.986 ms

Remote clock offset: -2.644 ms

Below is generated by plot.py at 2018-09-06 13:34:21

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.86 Mbit/s

95th percentile per-packet one-way delay: 276.566 ms

Loss rate: 1.17%

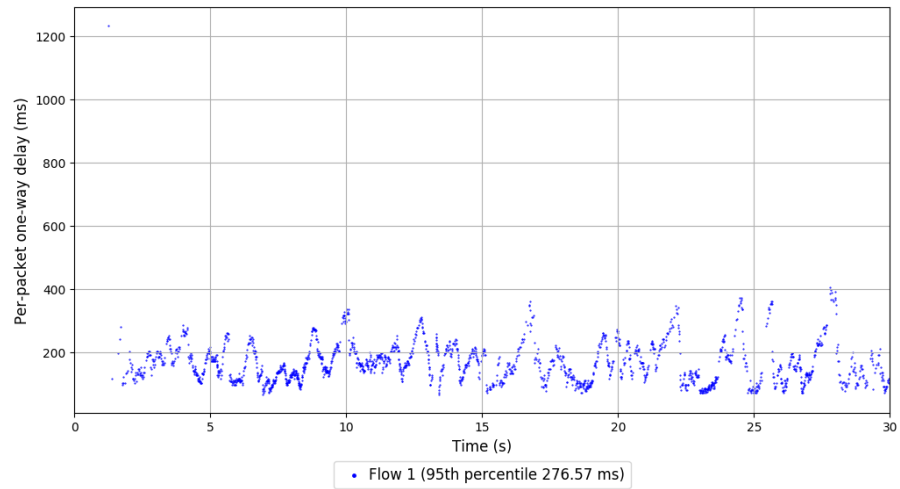
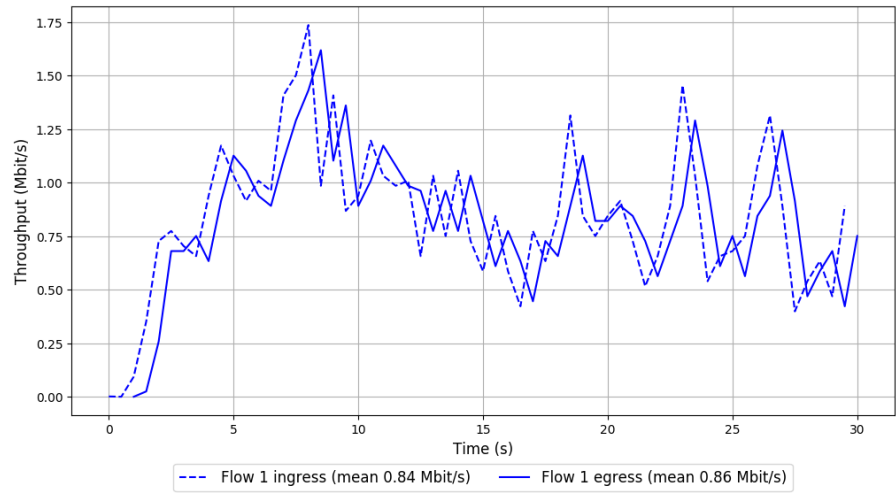
-- Flow 1:

Average throughput: 0.86 Mbit/s

95th percentile per-packet one-way delay: 276.566 ms

Loss rate: 1.17%

Run 1: Report of LEDBAT — Data Link

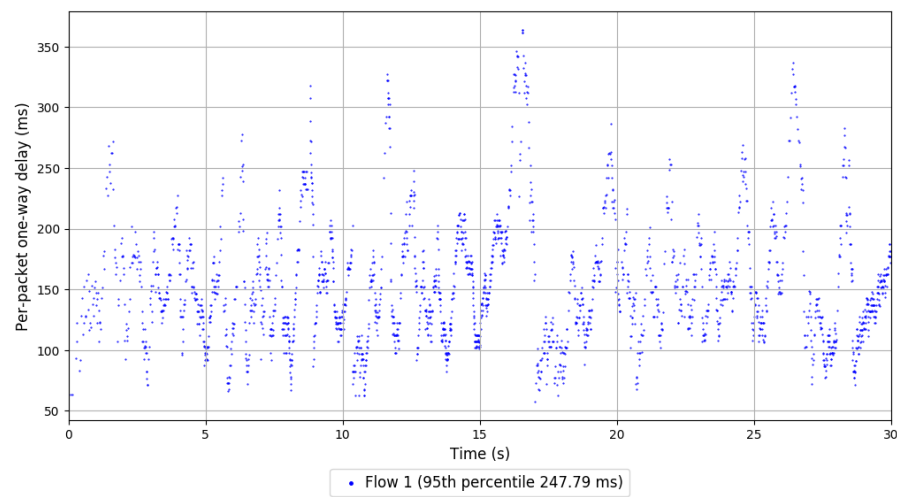
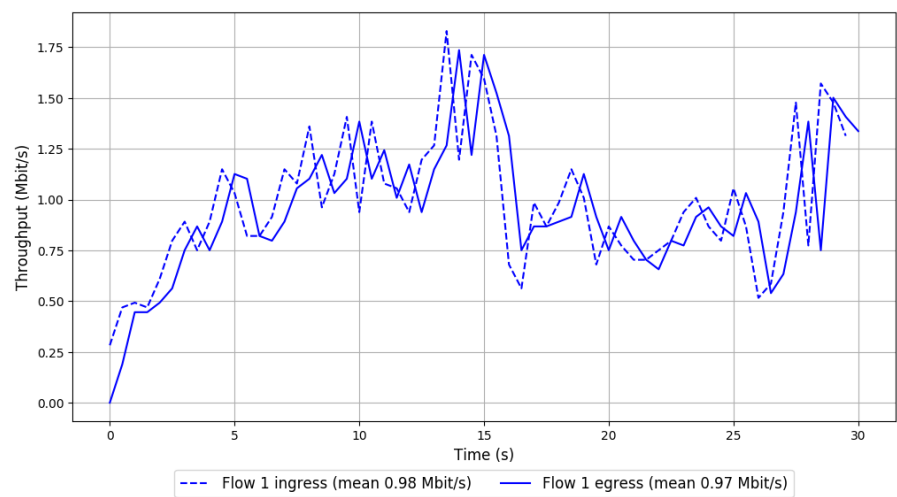


Run 2: Statistics of LEDBAT

Start at: 2018-09-06 12:55:21
End at: 2018-09-06 12:55:51
Local clock offset: 0.189 ms
Remote clock offset: -0.382 ms

Below is generated by plot.py at 2018-09-06 13:34:23
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 247.794 ms
Loss rate: 0.96%
-- Flow 1:
Average throughput: 0.97 Mbit/s
95th percentile per-packet one-way delay: 247.794 ms
Loss rate: 0.96%

Run 2: Report of LEDBAT — Data Link

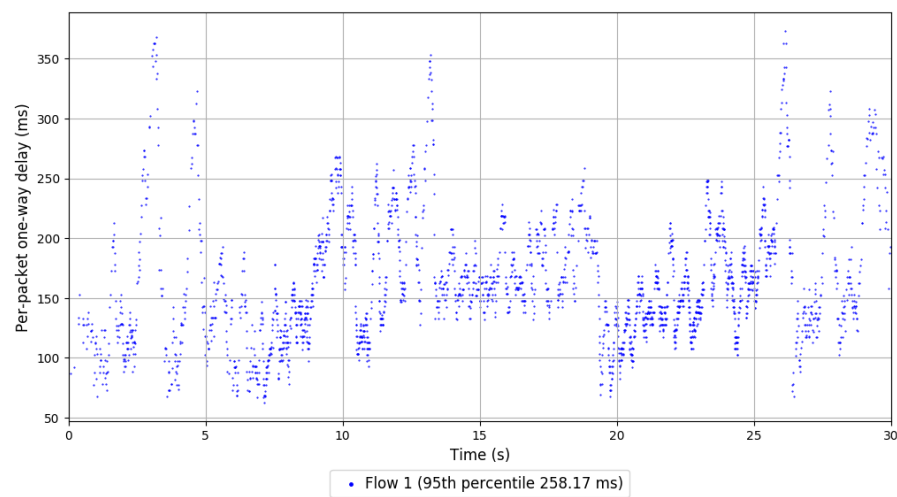
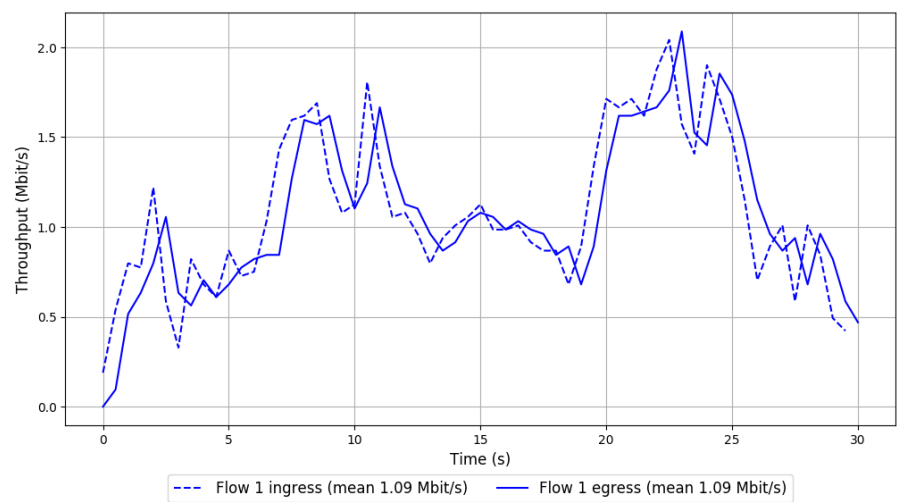


Run 3: Statistics of LEDBAT

Start at: 2018-09-06 13:14:56
End at: 2018-09-06 13:15:26
Local clock offset: -0.02 ms
Remote clock offset: -3.263 ms

Below is generated by plot.py at 2018-09-06 13:34:23
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 258.171 ms
Loss rate: 0.58%
-- Flow 1:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 258.171 ms
Loss rate: 0.58%

Run 3: Report of LEDBAT — Data Link

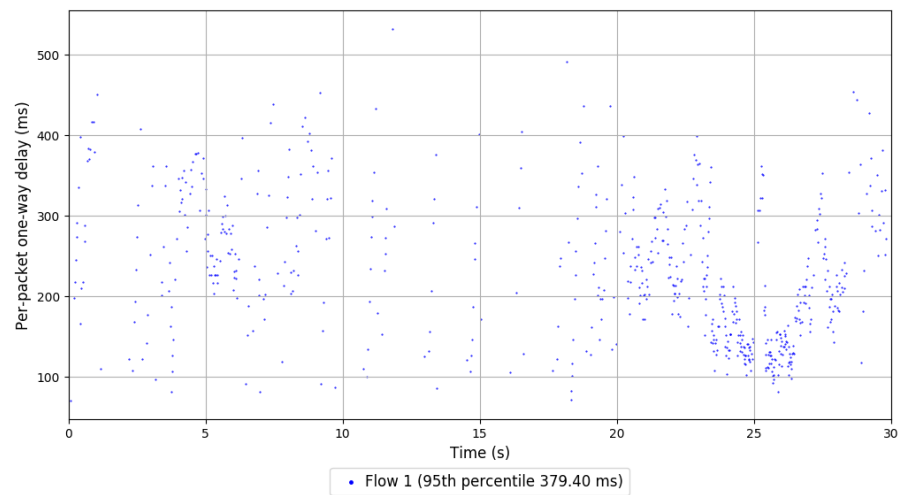
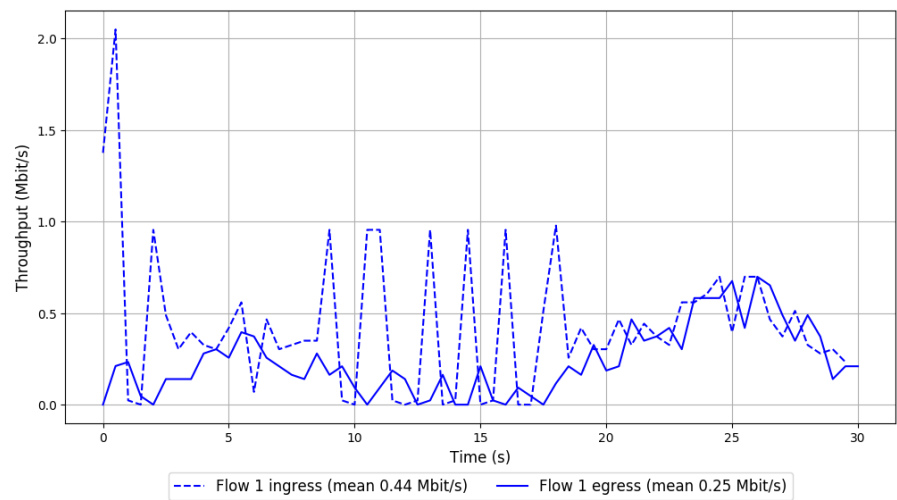


```
Run 1: Statistics of Indigo-Muses

Start at: 2018-09-06 12:49:54
End at: 2018-09-06 12:50:24
Local clock offset: 1.722 ms
Remote clock offset: -3.821 ms

# Below is generated by plot.py at 2018-09-06 13:34:23
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 379.399 ms
Loss rate: 44.60%
-- Flow 1:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 379.399 ms
Loss rate: 44.60%
```

Run 1: Report of Indigo-Muses — Data Link



Run 2: Statistics of Indigo-Muses

Start at: 2018-09-06 13:09:29

End at: 2018-09-06 13:09:59

Local clock offset: -0.296 ms

Remote clock offset: -2.82 ms

Below is generated by plot.py at 2018-09-06 13:34:24

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.19 Mbit/s

95th percentile per-packet one-way delay: 361.454 ms

Loss rate: 34.06%

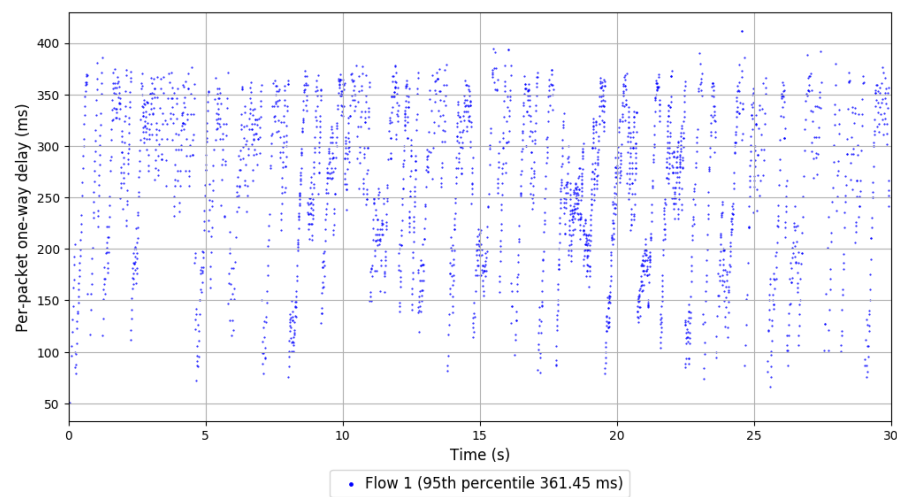
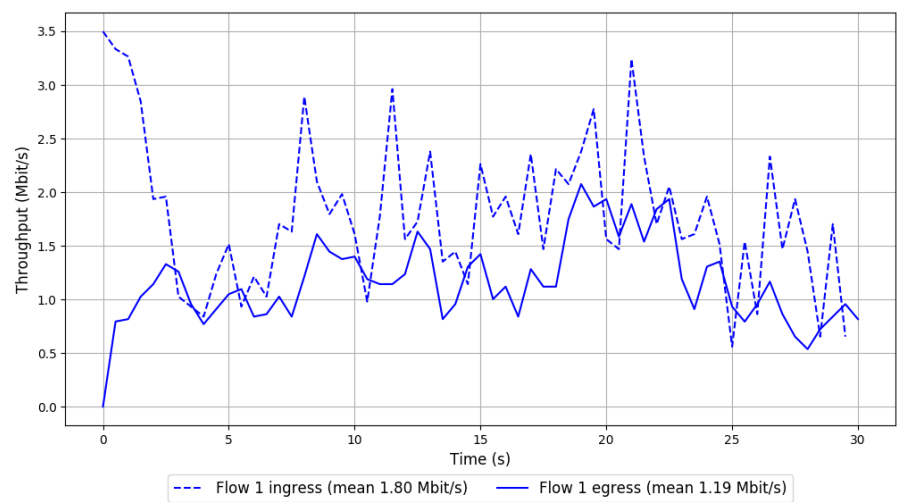
-- Flow 1:

Average throughput: 1.19 Mbit/s

95th percentile per-packet one-way delay: 361.454 ms

Loss rate: 34.06%

Run 2: Report of Indigo-Muses — Data Link



Run 3: Statistics of Indigo-Muses

Start at: 2018-09-06 13:29:04

End at: 2018-09-06 13:29:34

Local clock offset: -2.282 ms

Remote clock offset: -1.88 ms

Below is generated by plot.py at 2018-09-06 13:34:24

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.24 Mbit/s

95th percentile per-packet one-way delay: 384.194 ms

Loss rate: 50.85%

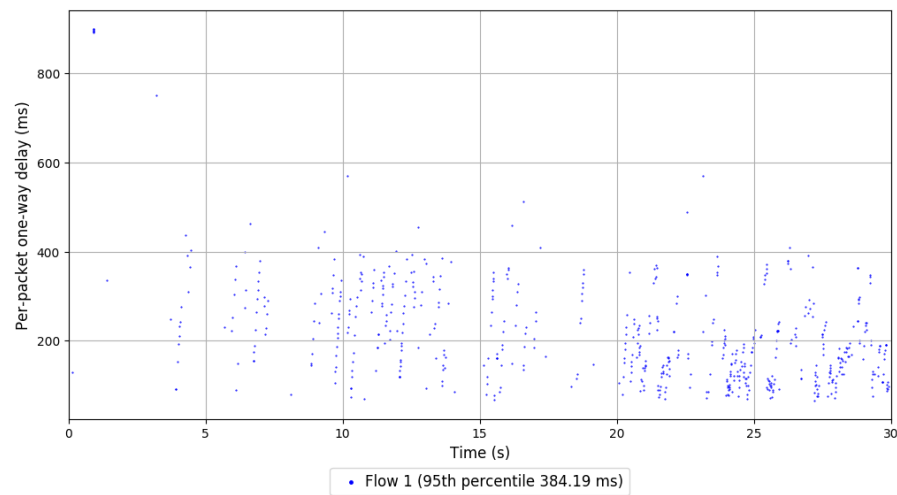
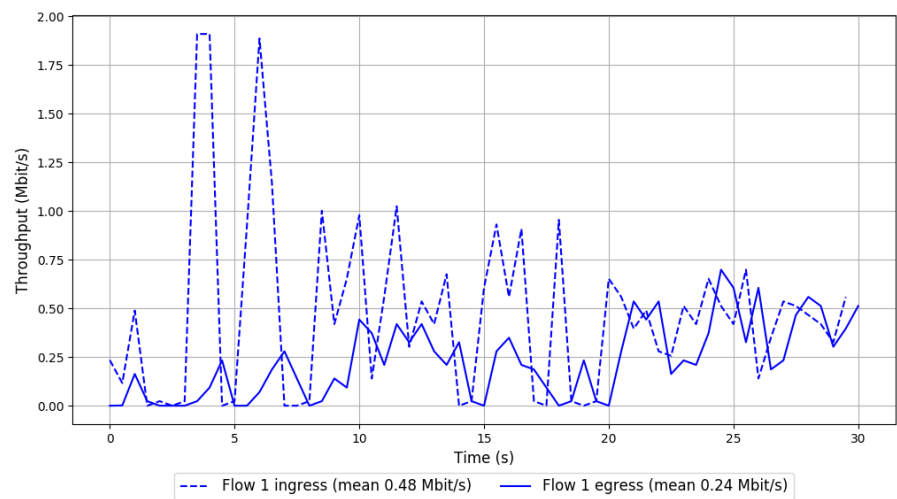
-- Flow 1:

Average throughput: 0.24 Mbit/s

95th percentile per-packet one-way delay: 384.194 ms

Loss rate: 50.85%

Run 3: Report of Indigo-Muses — Data Link



Run 1: Statistics of PCC-Allegro

Start at: 2018-09-06 12:47:42

End at: 2018-09-06 12:48:12

Local clock offset: 0.065 ms

Remote clock offset: -3.344 ms

Below is generated by plot.py at 2018-09-06 13:34:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.70 Mbit/s

95th percentile per-packet one-way delay: 397.361 ms

Loss rate: 98.06%

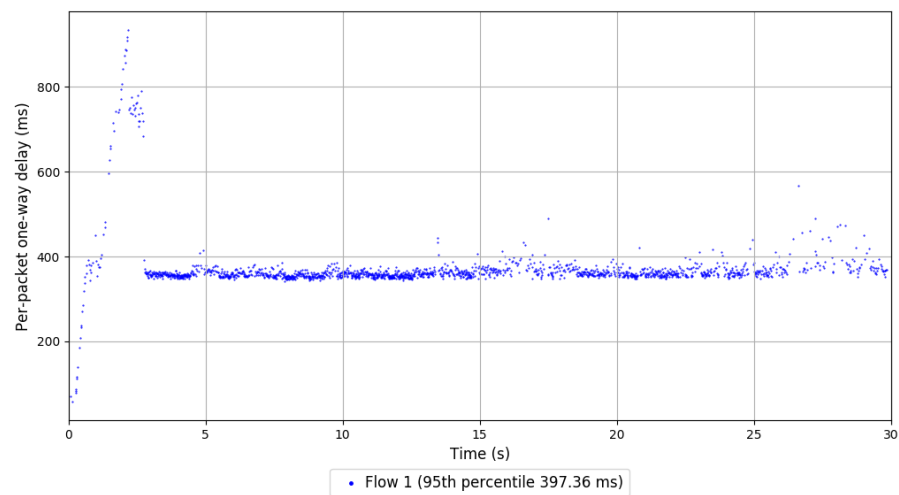
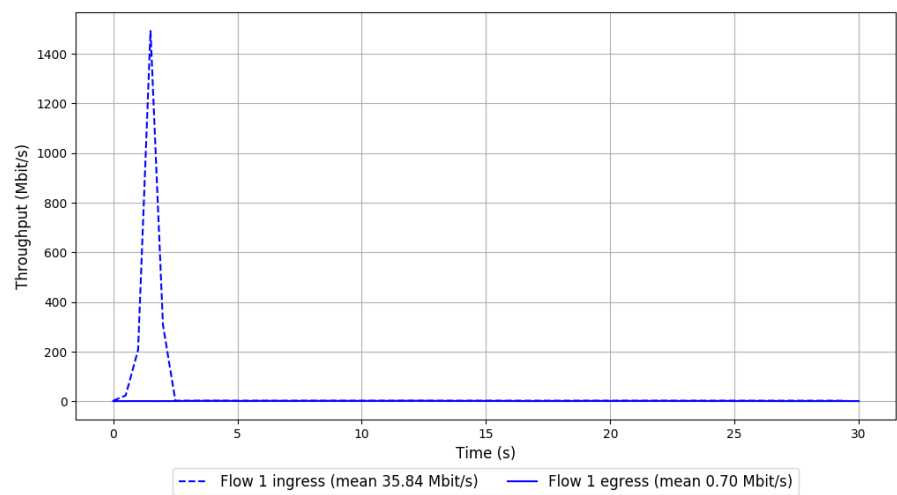
-- Flow 1:

Average throughput: 0.70 Mbit/s

95th percentile per-packet one-way delay: 397.361 ms

Loss rate: 98.06%

Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

Start at: 2018-09-06 13:07:19

End at: 2018-09-06 13:07:49

Local clock offset: -2.413 ms

Remote clock offset: -2.68 ms

Below is generated by plot.py at 2018-09-06 13:34:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.96 Mbit/s

95th percentile per-packet one-way delay: 379.707 ms

Loss rate: 68.13%

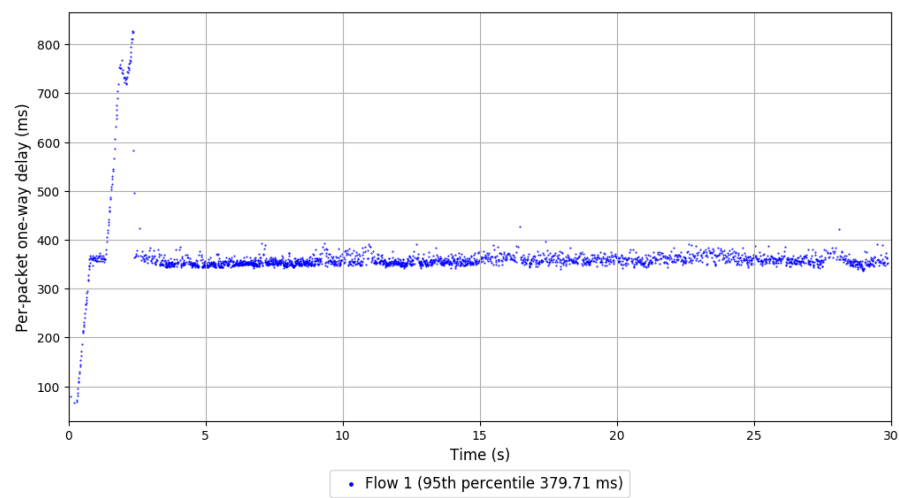
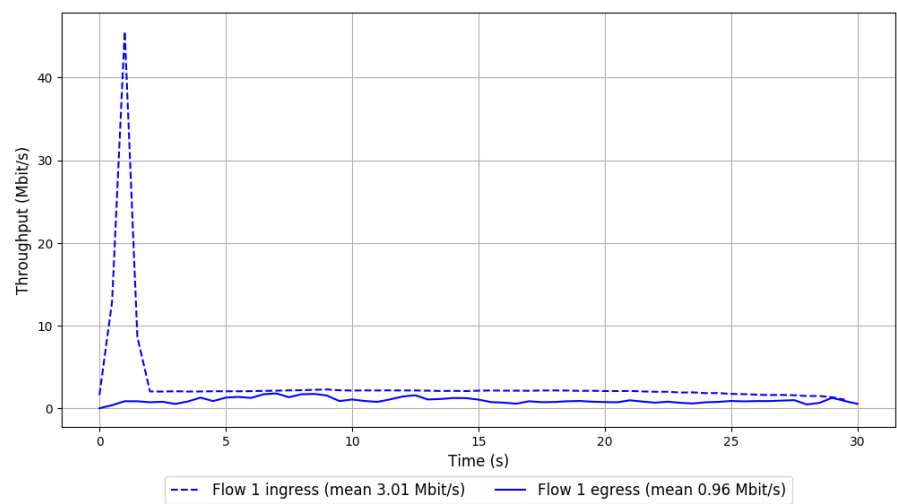
-- Flow 1:

Average throughput: 0.96 Mbit/s

95th percentile per-packet one-way delay: 379.707 ms

Loss rate: 68.13%

Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

Start at: 2018-09-06 13:26:54

End at: 2018-09-06 13:27:24

Local clock offset: 0.693 ms

Remote clock offset: -2.915 ms

Below is generated by plot.py at 2018-09-06 13:34:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.15 Mbit/s

95th percentile per-packet one-way delay: 368.817 ms

Loss rate: 43.56%

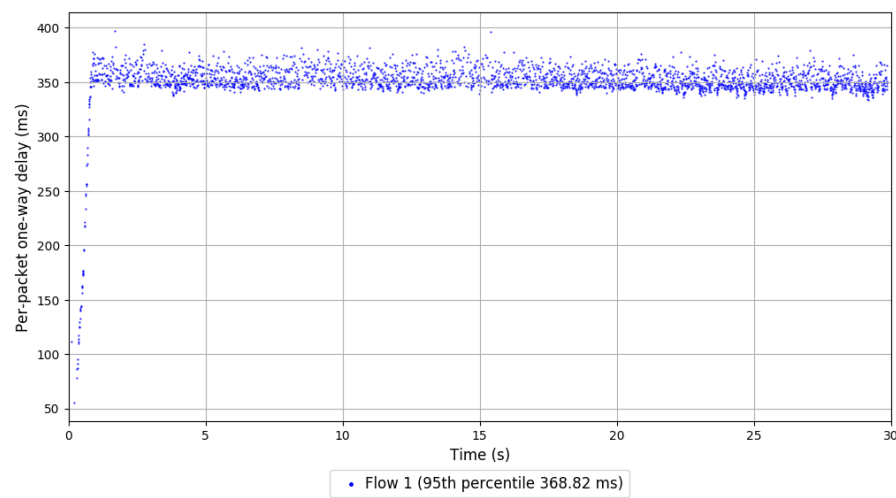
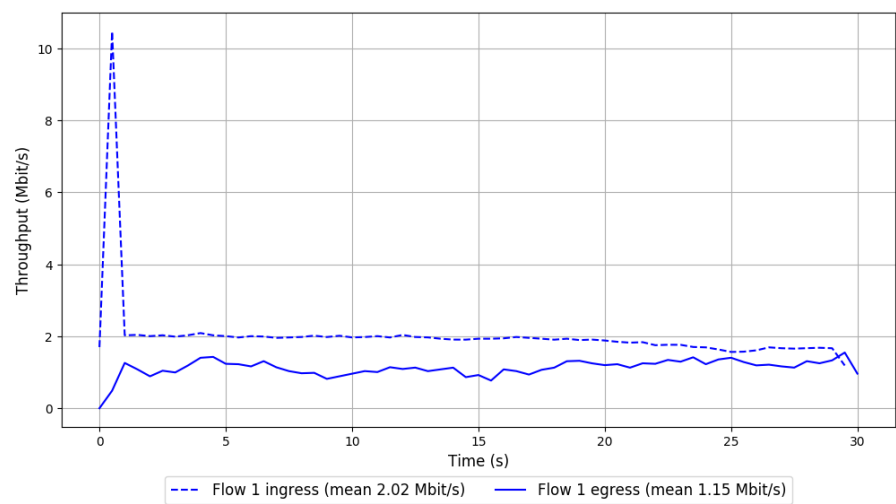
-- Flow 1:

Average throughput: 1.15 Mbit/s

95th percentile per-packet one-way delay: 368.817 ms

Loss rate: 43.56%

Run 3: Report of PCC-Allegro — Data Link

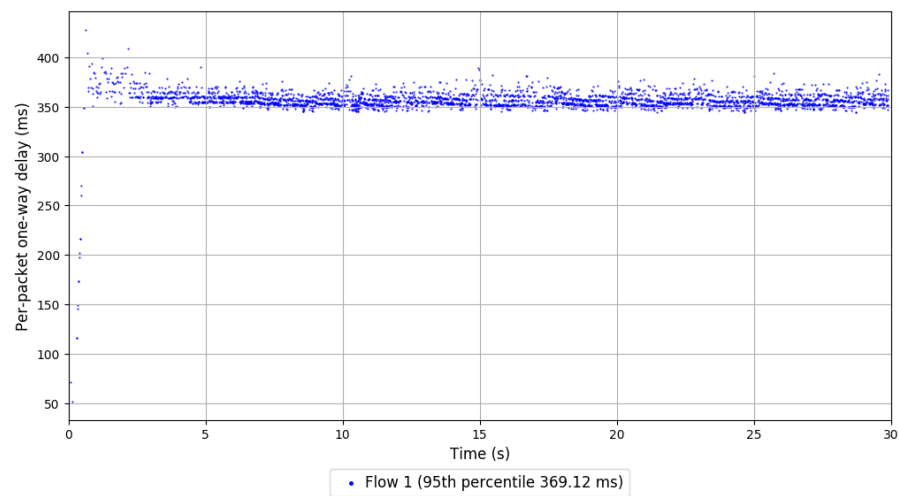
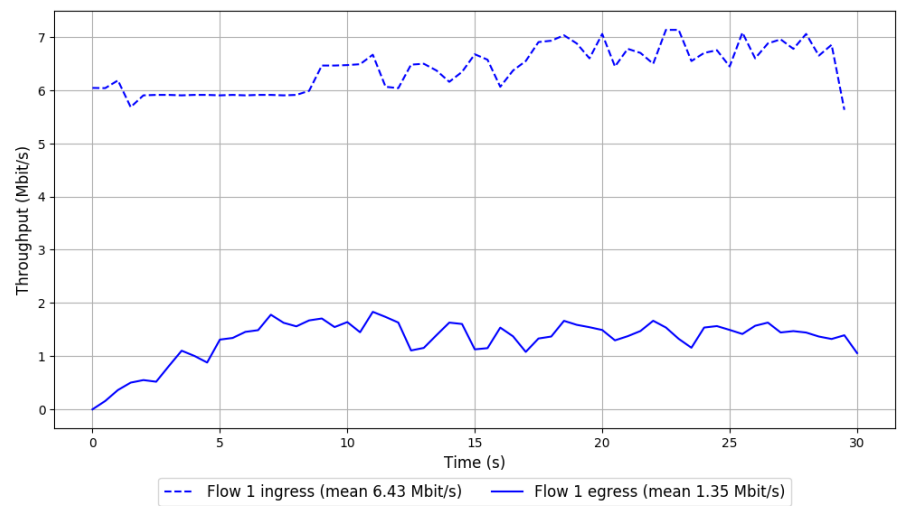


Run 1: Statistics of PCC-Expr

Start at: 2018-09-06 12:41:10
End at: 2018-09-06 12:41:40
Local clock offset: 2.357 ms
Remote clock offset: -3.672 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 369.125 ms
Loss rate: 79.09%
-- Flow 1:
Average throughput: 1.35 Mbit/s
95th percentile per-packet one-way delay: 369.125 ms
Loss rate: 79.09%

Run 1: Report of PCC-Expr — Data Link

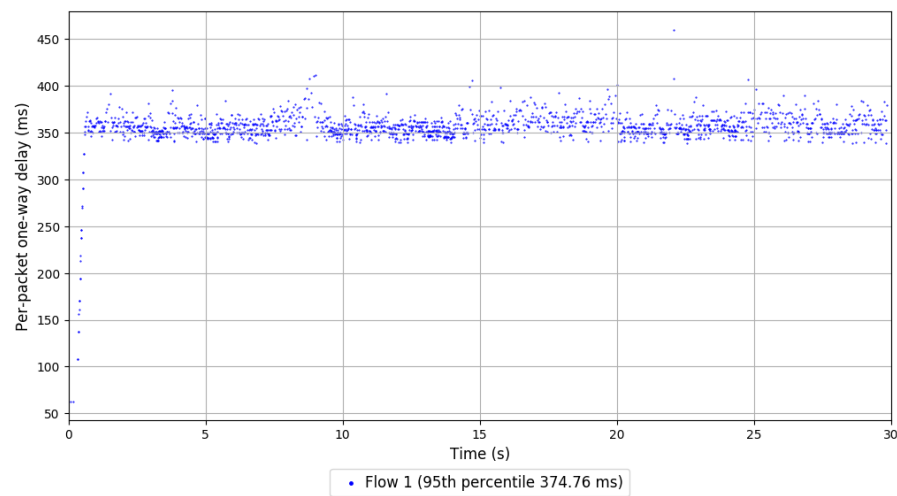
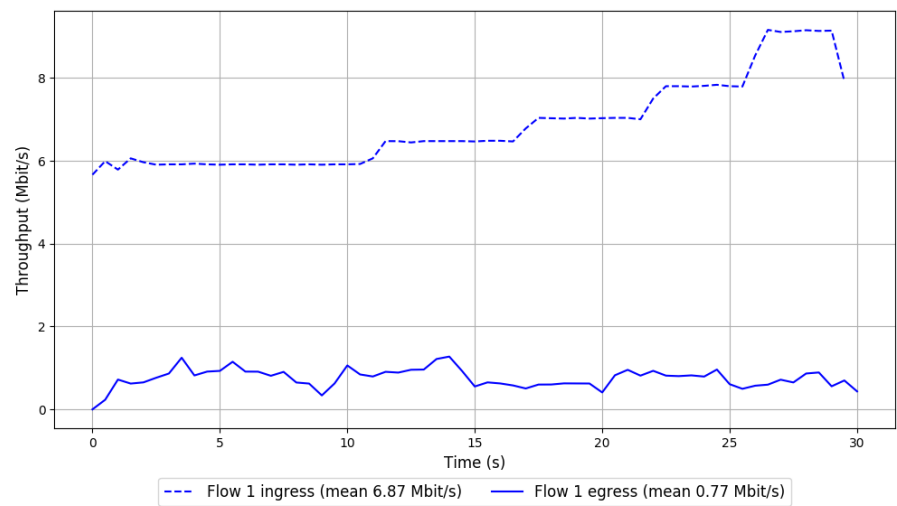


Run 2: Statistics of PCC-Expr

Start at: 2018-09-06 13:00:47
End at: 2018-09-06 13:01:17
Local clock offset: -1.176 ms
Remote clock offset: -0.429 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 374.758 ms
Loss rate: 88.87%
-- Flow 1:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 374.758 ms
Loss rate: 88.87%

Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

Start at: 2018-09-06 13:20:22

End at: 2018-09-06 13:20:52

Local clock offset: 2.494 ms

Remote clock offset: -2.667 ms

Below is generated by plot.py at 2018-09-06 13:34:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.81 Mbit/s

95th percentile per-packet one-way delay: 395.965 ms

Loss rate: 87.22%

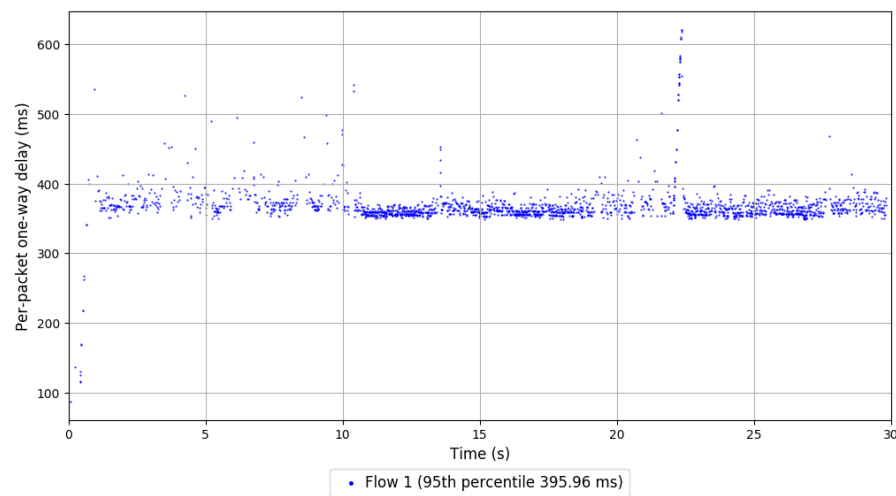
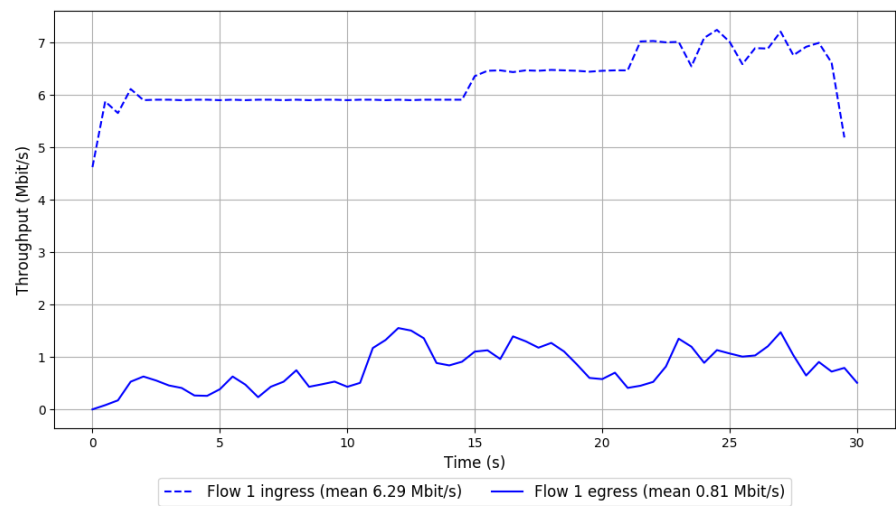
-- Flow 1:

Average throughput: 0.81 Mbit/s

95th percentile per-packet one-way delay: 395.965 ms

Loss rate: 87.22%

Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2018-09-06 12:36:48

End at: 2018-09-06 12:37:18

Local clock offset: 0.394 ms

Remote clock offset: -3.684 ms

Below is generated by plot.py at 2018-09-06 13:34:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.86 Mbit/s

95th percentile per-packet one-way delay: 369.733 ms

Loss rate: 9.40%

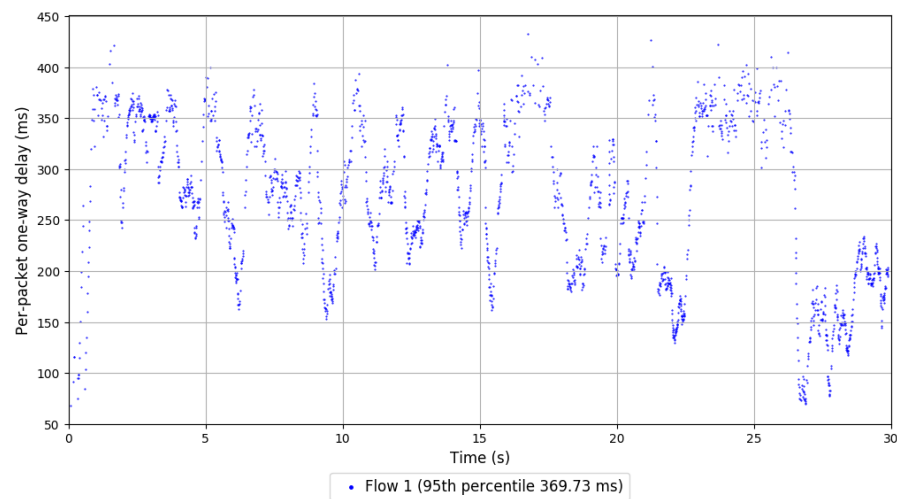
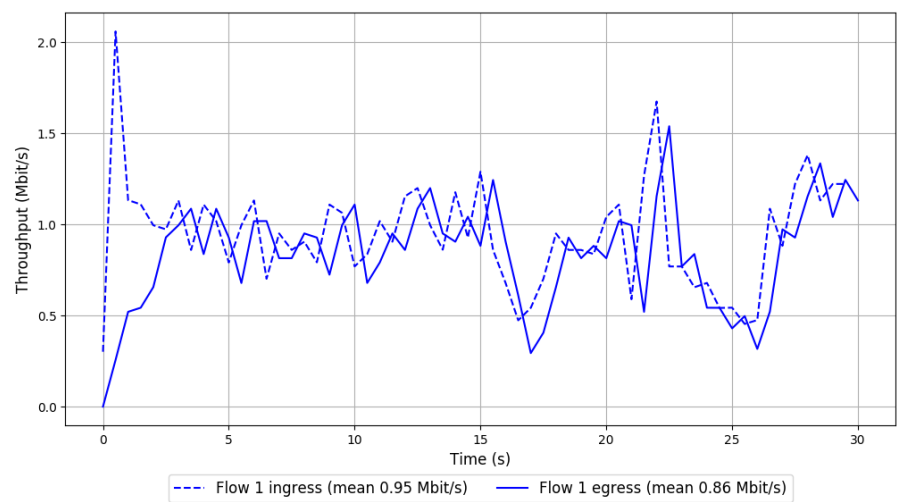
-- Flow 1:

Average throughput: 0.86 Mbit/s

95th percentile per-packet one-way delay: 369.733 ms

Loss rate: 9.40%

Run 1: Report of QUIC Cubic — Data Link

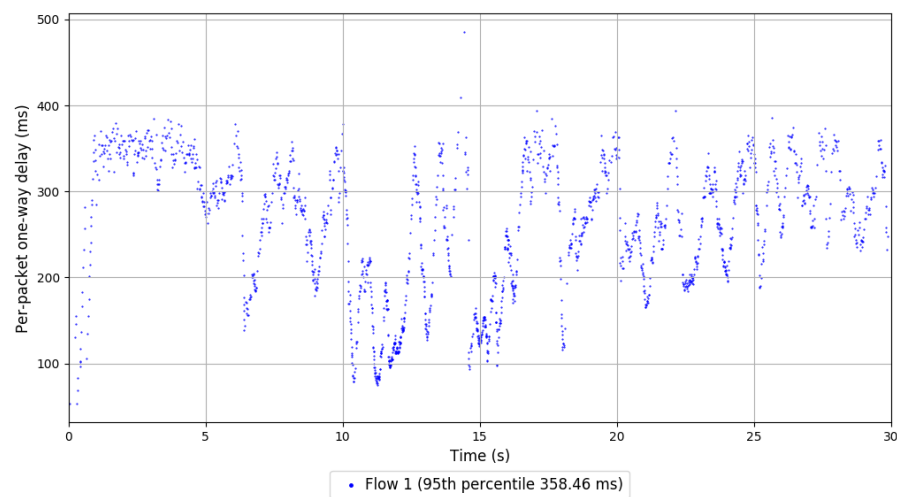
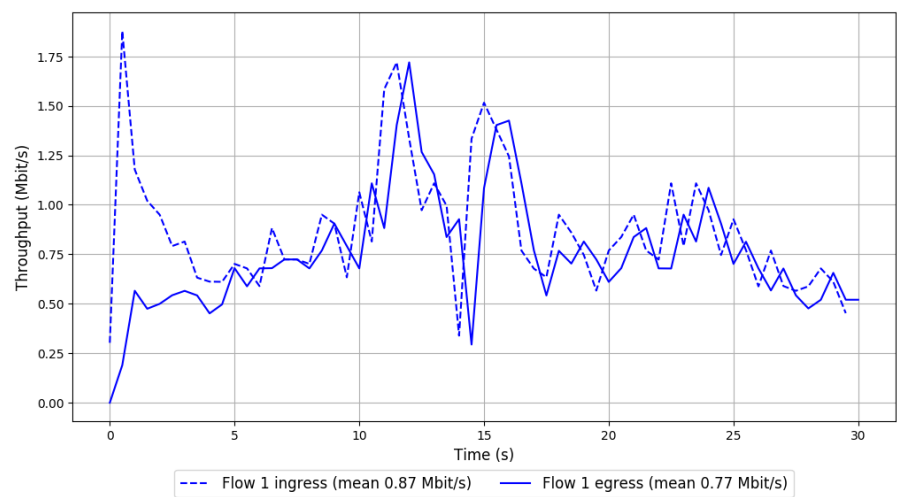


Run 2: Statistics of QUIC Cubic

Start at: 2018-09-06 12:56:26
End at: 2018-09-06 12:56:56
Local clock offset: -1.525 ms
Remote clock offset: -0.119 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 358.461 ms
Loss rate: 11.97%
-- Flow 1:
Average throughput: 0.77 Mbit/s
95th percentile per-packet one-way delay: 358.461 ms
Loss rate: 11.97%

Run 2: Report of QUIC Cubic — Data Link

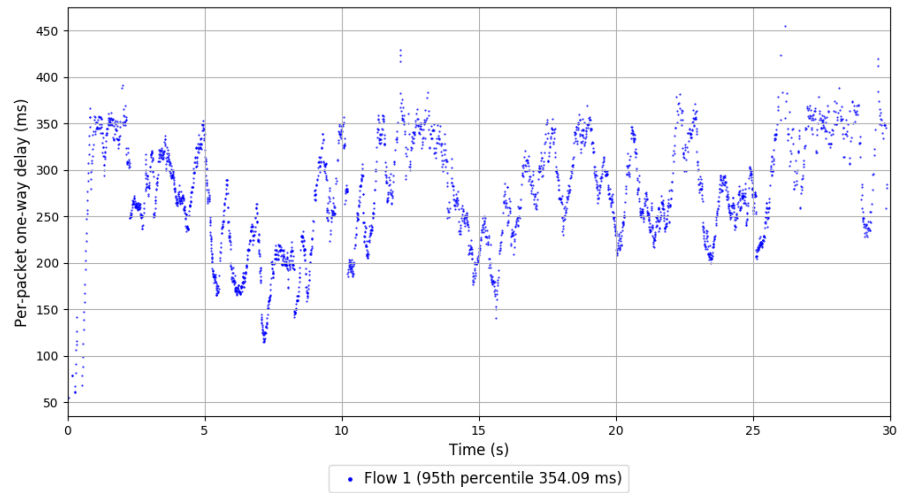
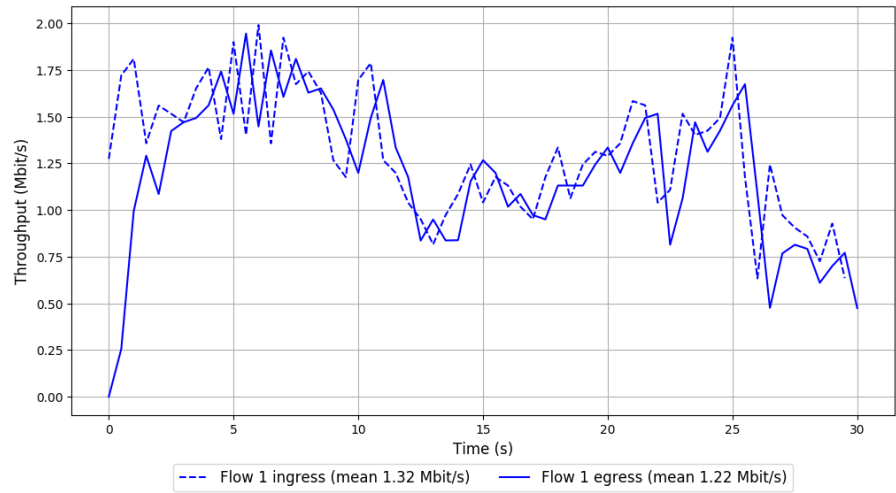


Run 3: Statistics of QUIC Cubic

Start at: 2018-09-06 13:16:01
End at: 2018-09-06 13:16:31
Local clock offset: 2.109 ms
Remote clock offset: -3.444 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 354.091 ms
Loss rate: 7.35%
-- Flow 1:
Average throughput: 1.22 Mbit/s
95th percentile per-packet one-way delay: 354.091 ms
Loss rate: 7.35%

Run 3: Report of QUIC Cubic — Data Link

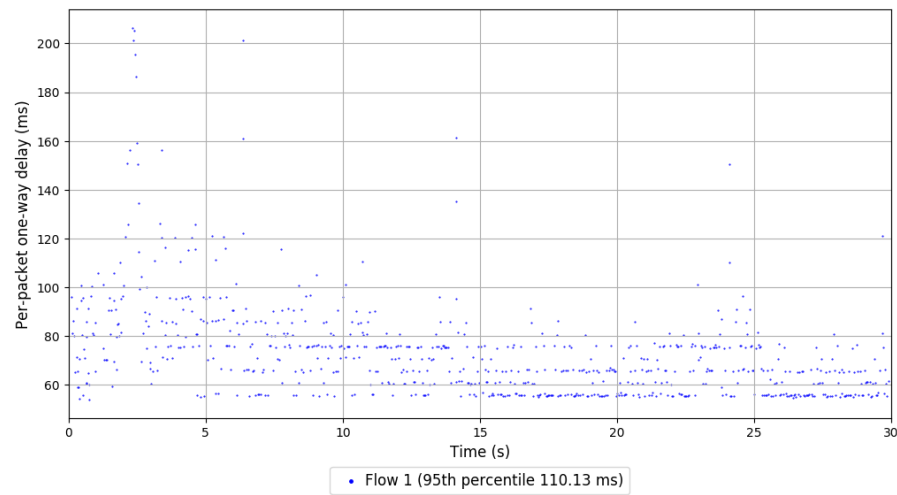
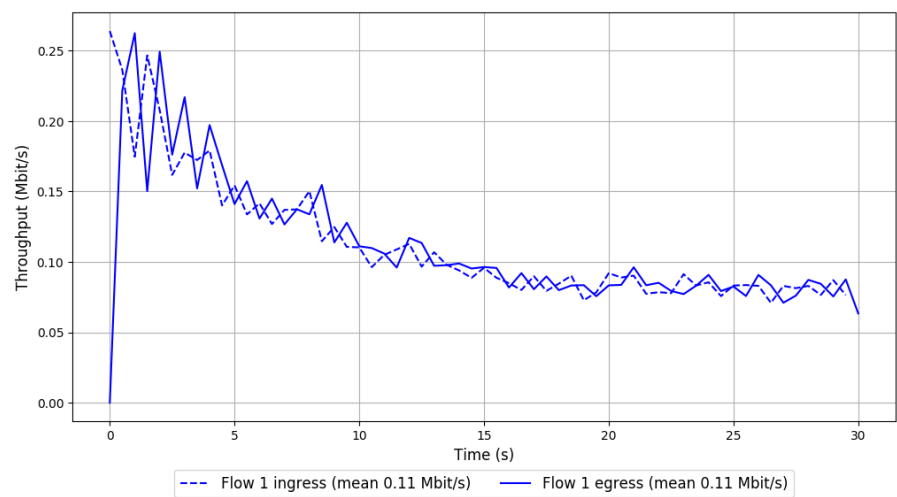


Run 1: Statistics of SCReAM

Start at: 2018-09-06 12:43:22
End at: 2018-09-06 12:43:52
Local clock offset: 1.764 ms
Remote clock offset: -3.646 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 110.126 ms
Loss rate: 0.28%
-- Flow 1:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 110.126 ms
Loss rate: 0.28%

Run 1: Report of SReAM — Data Link



Run 2: Statistics of SCReAM

Start at: 2018-09-06 13:02:58

End at: 2018-09-06 13:03:28

Local clock offset: 0.348 ms

Remote clock offset: 0.312 ms

Below is generated by plot.py at 2018-09-06 13:34:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 109.359 ms

Loss rate: 0.21%

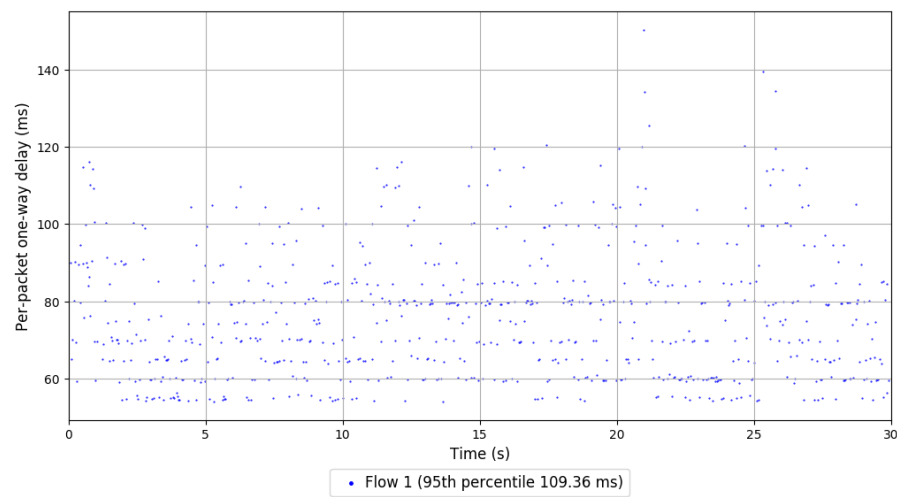
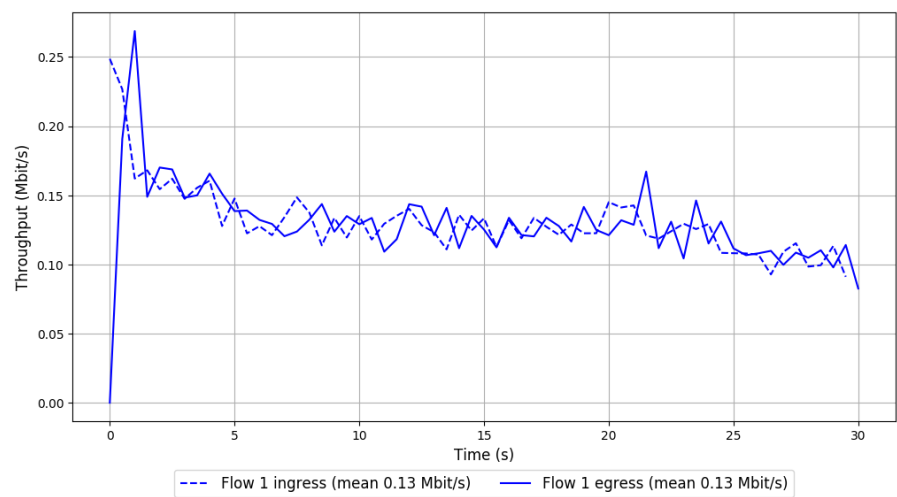
-- Flow 1:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 109.359 ms

Loss rate: 0.21%

Run 2: Report of SReAM — Data Link

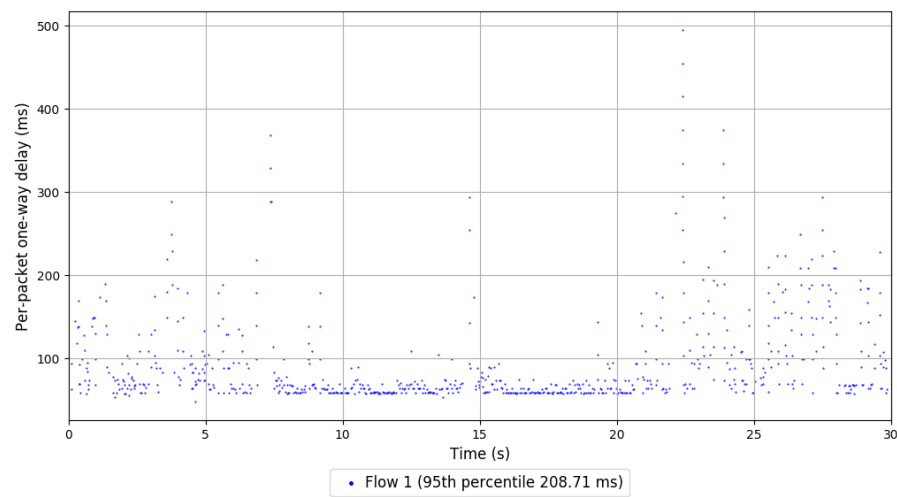
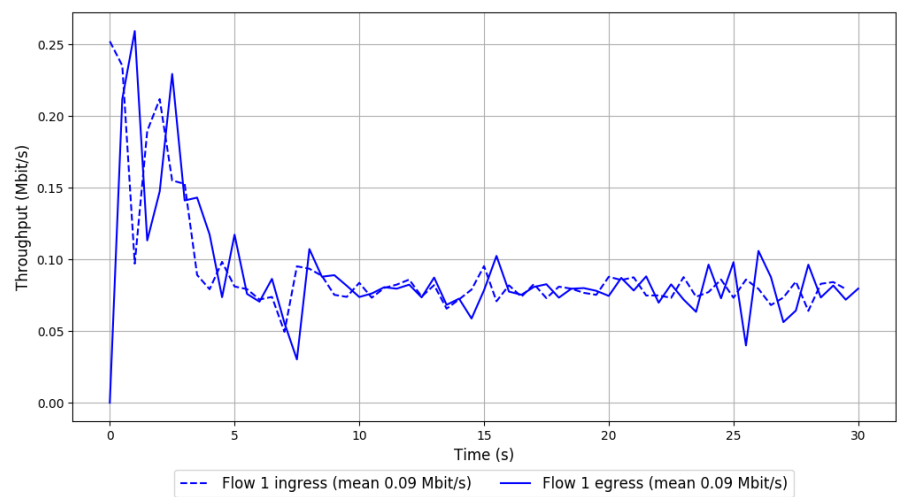


Run 3: Statistics of SCReAM

Start at: 2018-09-06 13:22:33
End at: 2018-09-06 13:23:03
Local clock offset: 2.691 ms
Remote clock offset: -3.221 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 208.710 ms
Loss rate: 1.00%
-- Flow 1:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 208.710 ms
Loss rate: 1.00%

Run 3: Report of SReAM — Data Link

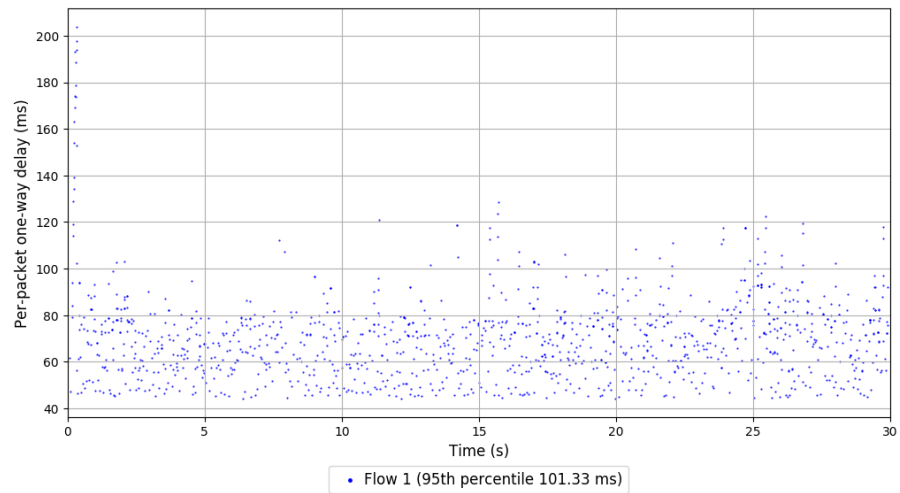
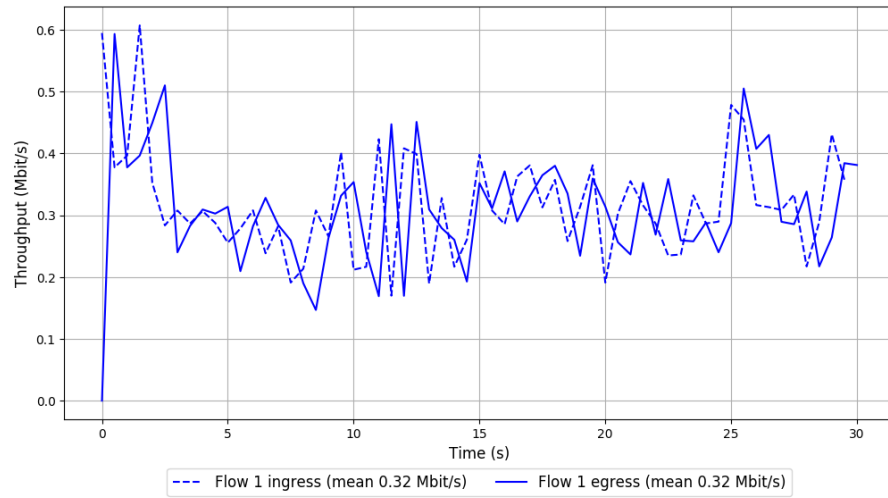


Run 1: Statistics of Sprout

Start at: 2018-09-06 12:44:27
End at: 2018-09-06 12:44:57
Local clock offset: -0.235 ms
Remote clock offset: -2.928 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 101.331 ms
Loss rate: 0.84%
-- Flow 1:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 101.331 ms
Loss rate: 0.84%

Run 1: Report of Sprout — Data Link

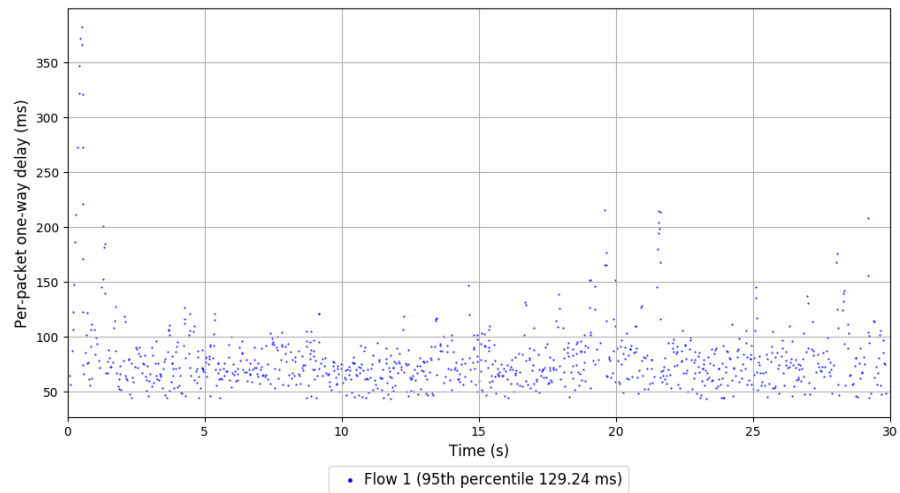
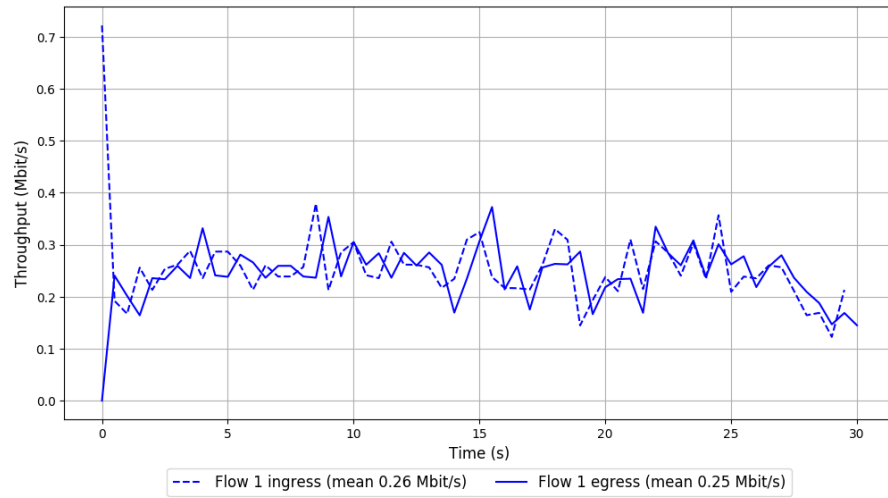


Run 2: Statistics of Sprout

Start at: 2018-09-06 13:04:03
End at: 2018-09-06 13:04:33
Local clock offset: -0.886 ms
Remote clock offset: -0.246 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 129.238 ms
Loss rate: 3.22%
-- Flow 1:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 129.238 ms
Loss rate: 3.22%

Run 2: Report of Sprout — Data Link

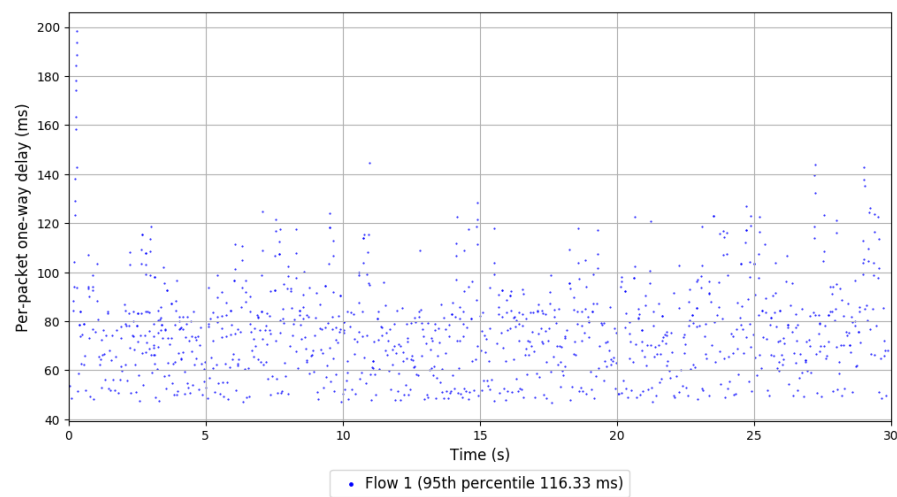
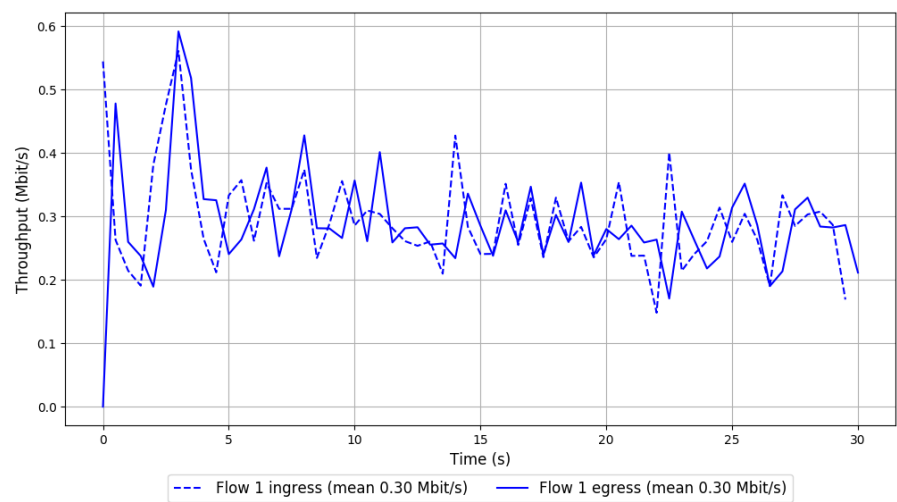


Run 3: Statistics of Sprout

Start at: 2018-09-06 13:23:39
End at: 2018-09-06 13:24:09
Local clock offset: 0.615 ms
Remote clock offset: -2.852 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 116.330 ms
Loss rate: 0.42%
-- Flow 1:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 116.330 ms
Loss rate: 0.42%

Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

Start at: 2018-09-06 12:42:16

End at: 2018-09-06 12:42:46

Local clock offset: -0.105 ms

Remote clock offset: -2.816 ms

Below is generated by plot.py at 2018-09-06 13:34:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.76 Mbit/s

95th percentile per-packet one-way delay: 361.346 ms

Loss rate: 34.60%

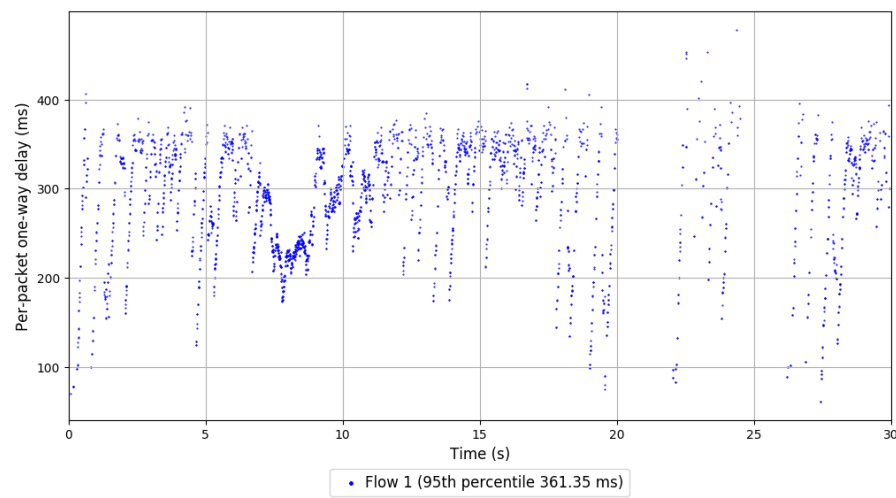
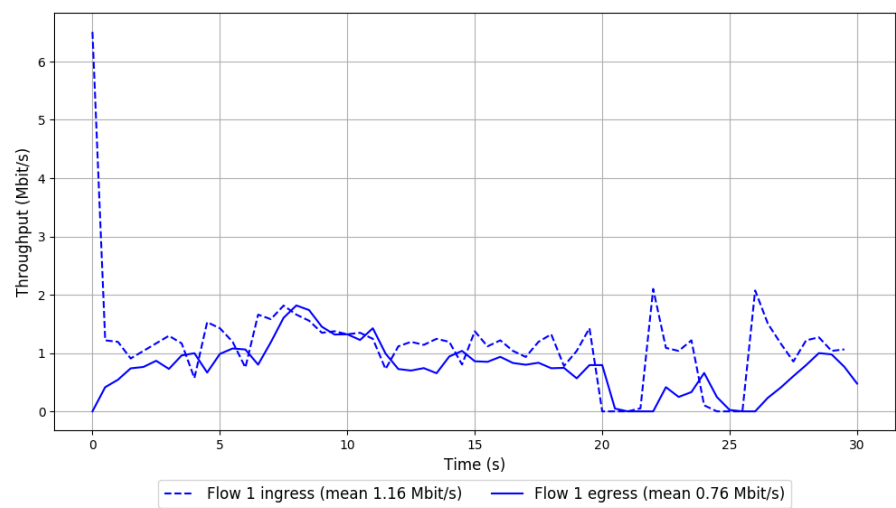
-- Flow 1:

Average throughput: 0.76 Mbit/s

95th percentile per-packet one-way delay: 361.346 ms

Loss rate: 34.60%

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



Run 2: Statistics of TaoVA-100x

Start at: 2018-09-06 13:01:53

End at: 2018-09-06 13:02:23

Local clock offset: 0.334 ms

Remote clock offset: -0.847 ms

Below is generated by plot.py at 2018-09-06 13:34:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.76 Mbit/s

95th percentile per-packet one-way delay: 363.063 ms

Loss rate: 31.50%

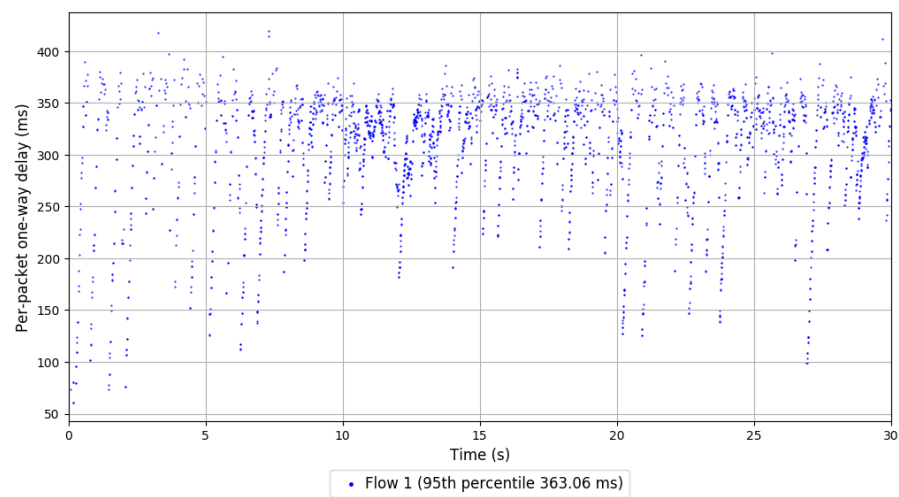
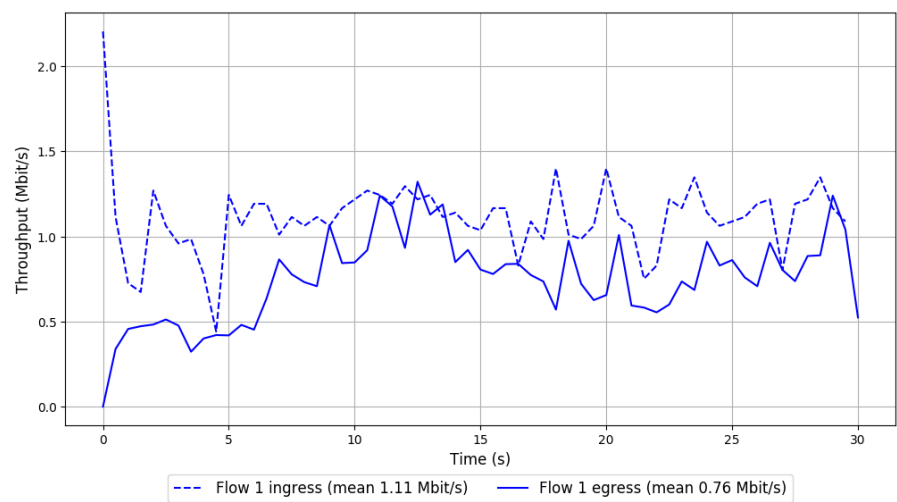
-- Flow 1:

Average throughput: 0.76 Mbit/s

95th percentile per-packet one-way delay: 363.063 ms

Loss rate: 31.50%

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



Run 3: Statistics of TaoVA-100x

Start at: 2018-09-06 13:21:28

End at: 2018-09-06 13:21:58

Local clock offset: -1.184 ms

Remote clock offset: -2.33 ms

Below is generated by plot.py at 2018-09-06 13:34:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.10 Mbit/s

95th percentile per-packet one-way delay: 355.570 ms

Loss rate: 9.94%

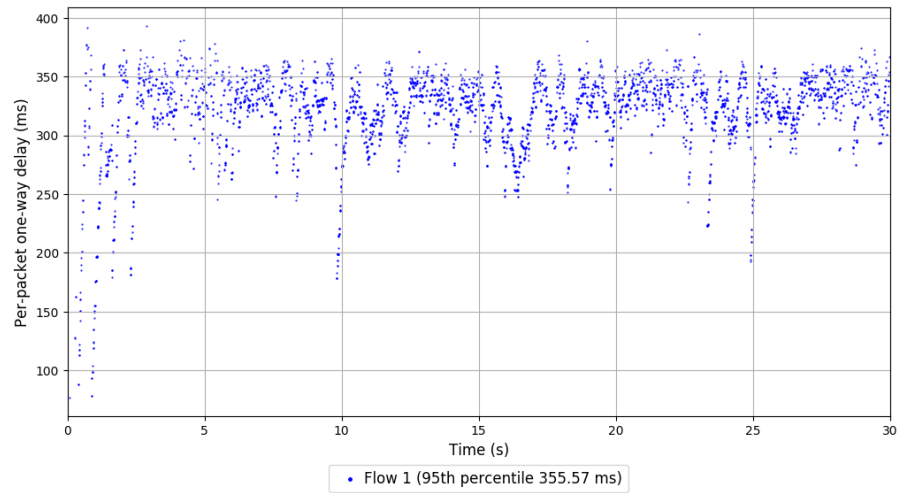
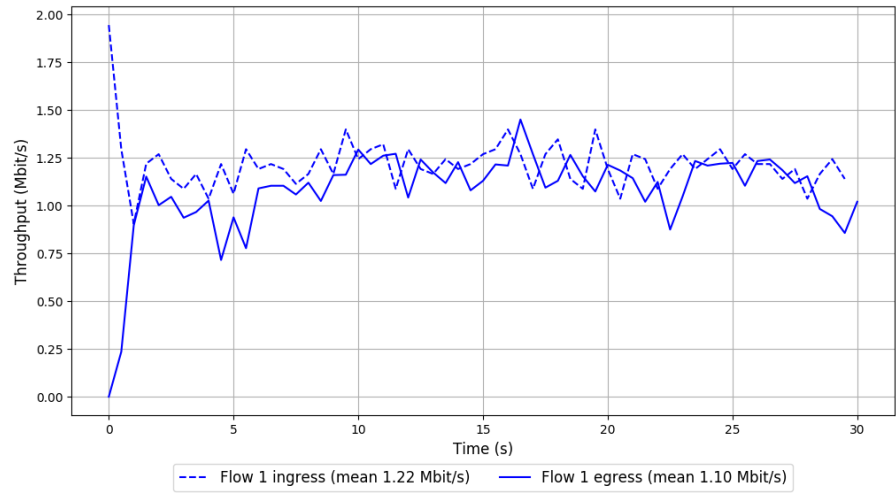
-- Flow 1:

Average throughput: 1.10 Mbit/s

95th percentile per-packet one-way delay: 355.570 ms

Loss rate: 9.94%

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

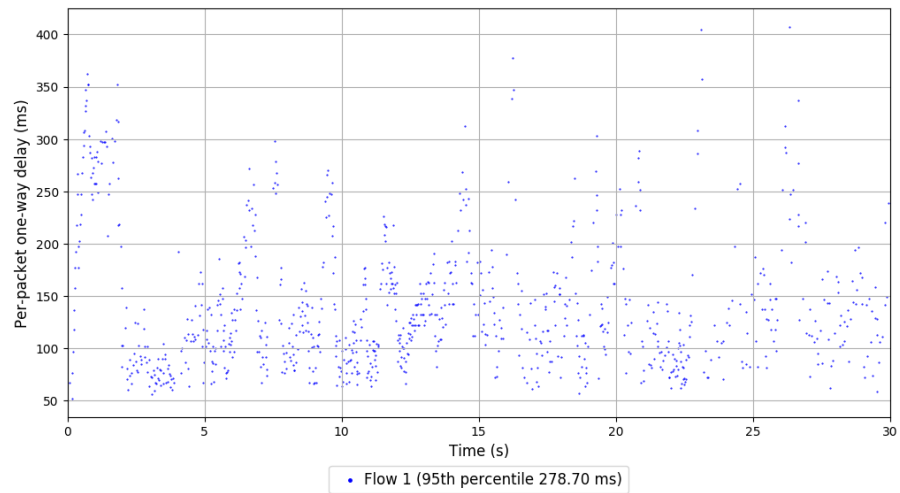
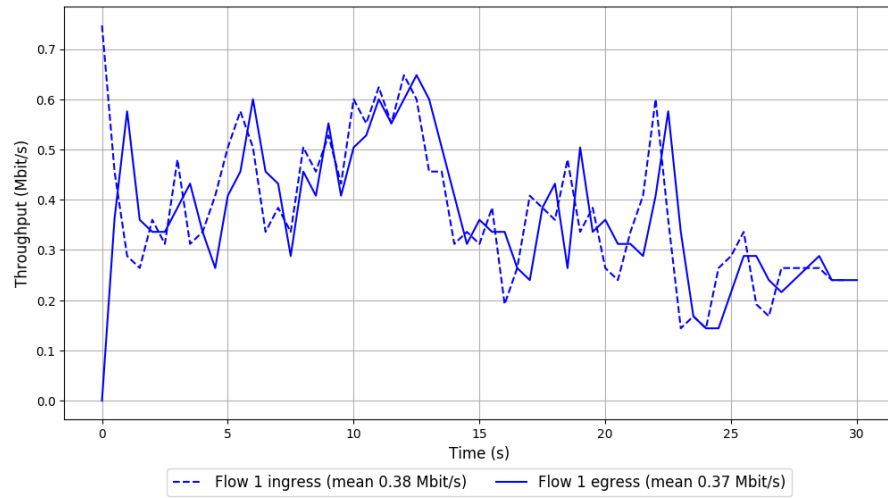


Run 1: Statistics of TCP Vegas

Start at: 2018-09-06 12:48:49
End at: 2018-09-06 12:49:19
Local clock offset: 0.159 ms
Remote clock offset: -3.552 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 278.703 ms
Loss rate: 1.06%
-- Flow 1:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 278.703 ms
Loss rate: 1.06%

Run 1: Report of TCP Vegas — Data Link

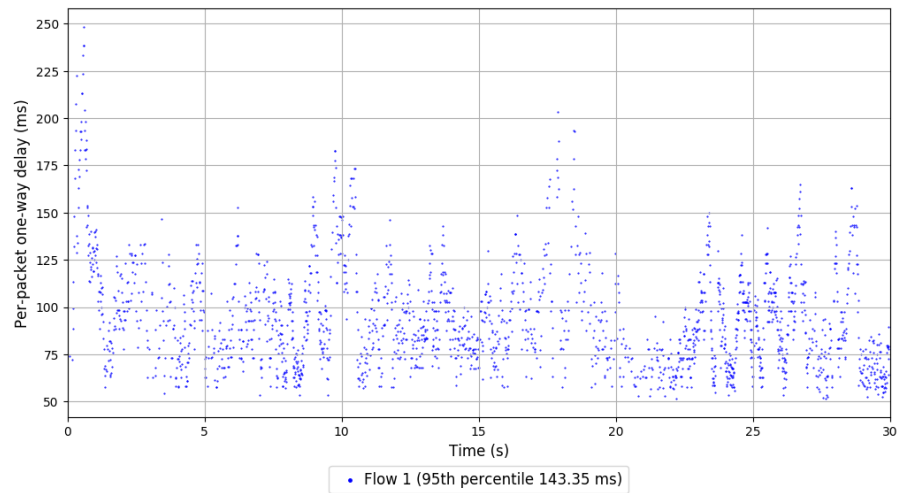
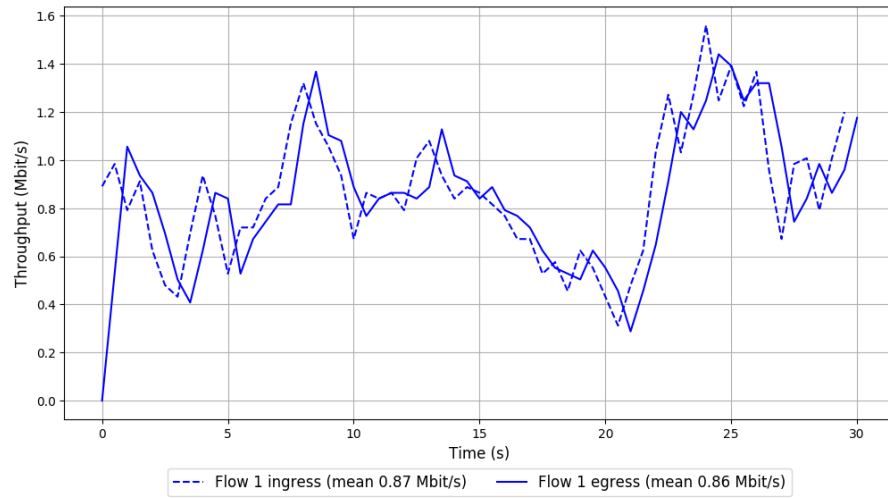


Run 2: Statistics of TCP Vegas

Start at: 2018-09-06 13:08:24
End at: 2018-09-06 13:08:54
Local clock offset: -3.61 ms
Remote clock offset: -2.328 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 143.347 ms
Loss rate: 0.78%
-- Flow 1:
Average throughput: 0.86 Mbit/s
95th percentile per-packet one-way delay: 143.347 ms
Loss rate: 0.78%

Run 2: Report of TCP Vegas — Data Link

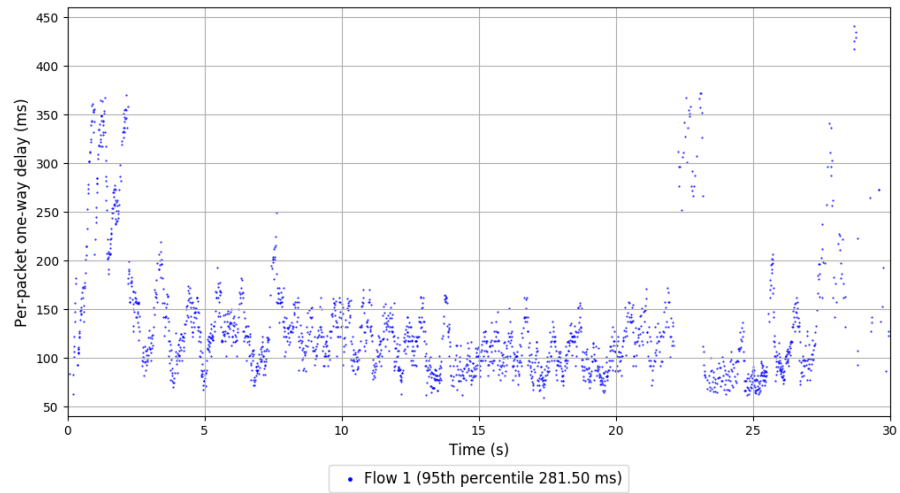
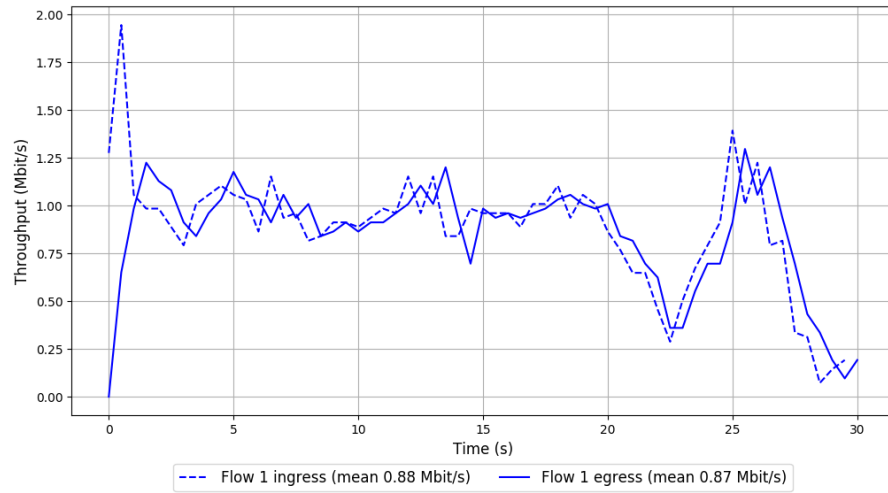


Run 3: Statistics of TCP Vegas

Start at: 2018-09-06 13:27:59
End at: 2018-09-06 13:28:29
Local clock offset: 0.694 ms
Remote clock offset: -2.178 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 281.504 ms
Loss rate: 1.81%
-- Flow 1:
Average throughput: 0.87 Mbit/s
95th percentile per-packet one-way delay: 281.504 ms
Loss rate: 1.81%

Run 3: Report of TCP Vegas — Data Link

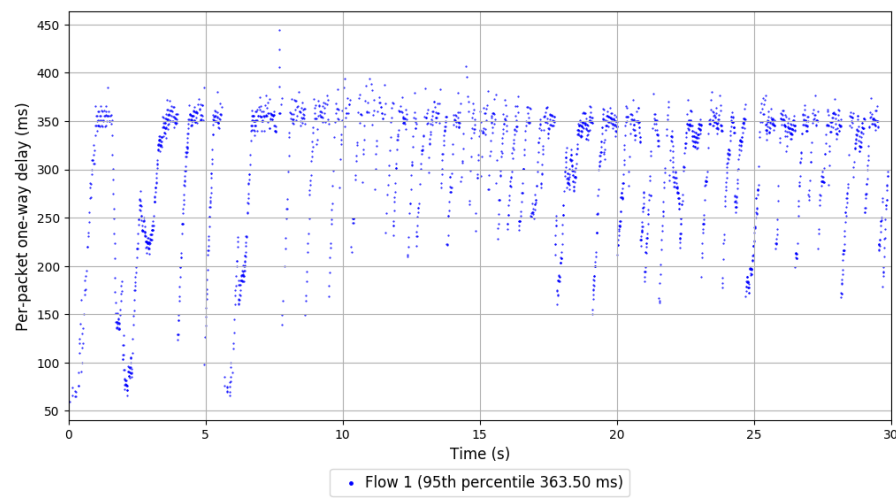
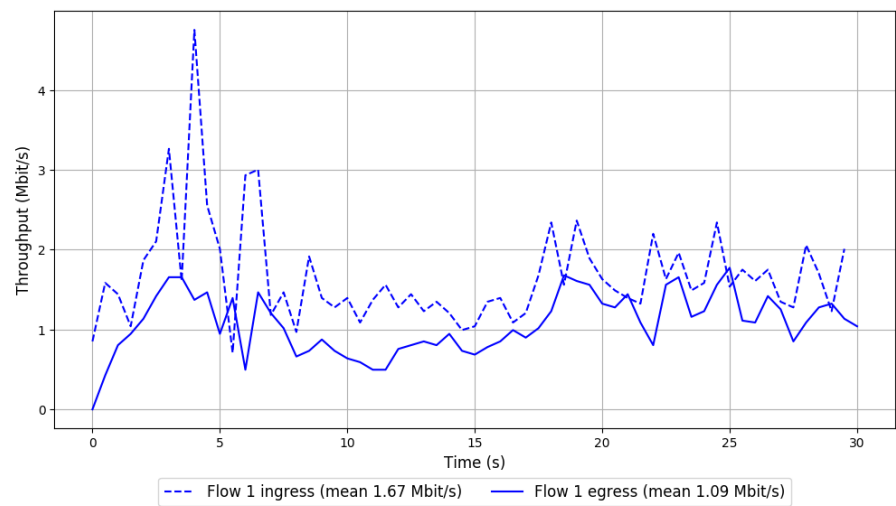


Run 1: Statistics of Verus

Start at: 2018-09-06 12:53:10
End at: 2018-09-06 12:53:40
Local clock offset: -1.79 ms
Remote clock offset: -2.997 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 363.505 ms
Loss rate: 34.76%
-- Flow 1:
Average throughput: 1.09 Mbit/s
95th percentile per-packet one-way delay: 363.505 ms
Loss rate: 34.76%

Run 1: Report of Verus — Data Link

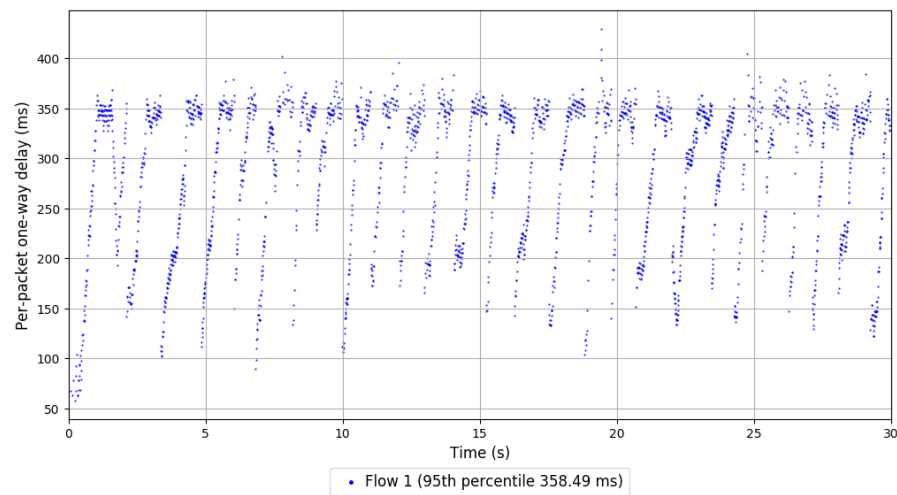
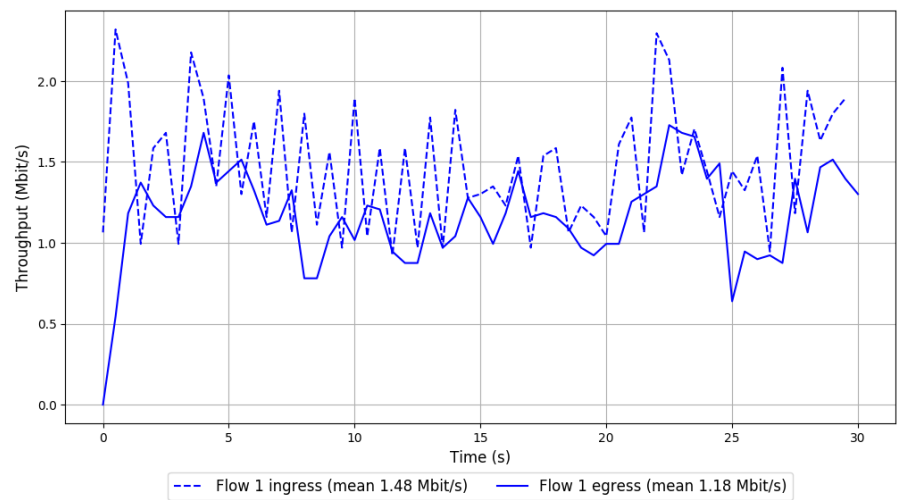


Run 2: Statistics of Verus

Start at: 2018-09-06 13:12:45
End at: 2018-09-06 13:13:15
Local clock offset: -2.669 ms
Remote clock offset: -3.072 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 358.493 ms
Loss rate: 20.40%
-- Flow 1:
Average throughput: 1.18 Mbit/s
95th percentile per-packet one-way delay: 358.493 ms
Loss rate: 20.40%

Run 2: Report of Verus — Data Link

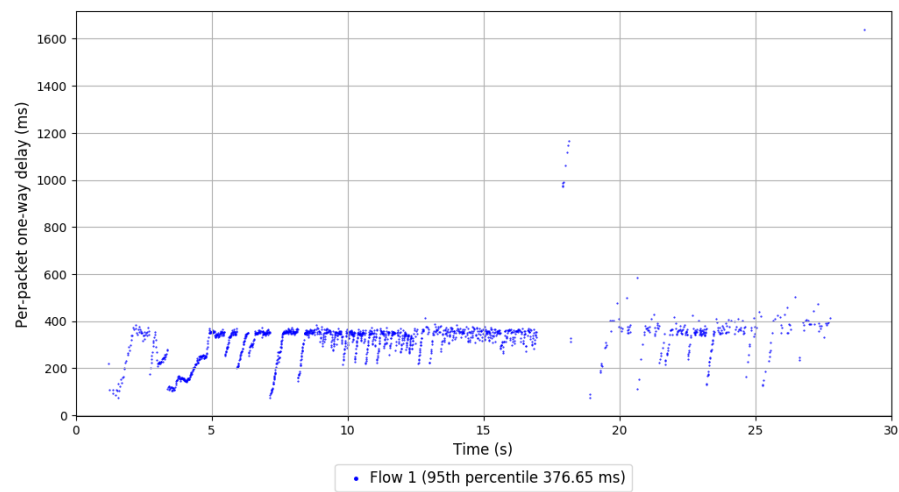
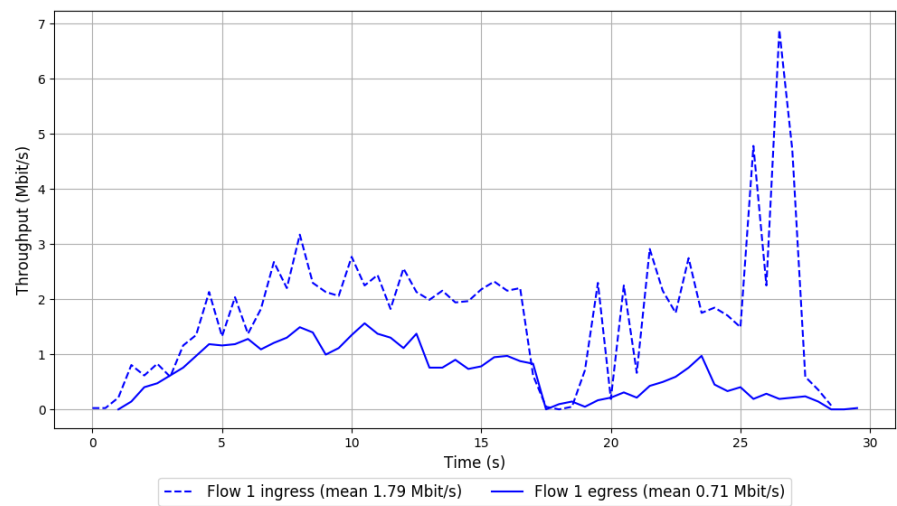


Run 3: Statistics of Verus

Start at: 2018-09-06 13:32:28
End at: 2018-09-06 13:32:58
Local clock offset: 0.882 ms
Remote clock offset: -0.548 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 376.652 ms
Loss rate: 61.69%
-- Flow 1:
Average throughput: 0.71 Mbit/s
95th percentile per-packet one-way delay: 376.652 ms
Loss rate: 61.69%

Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

Start at: 2018-09-06 12:37:53

End at: 2018-09-06 12:38:23

Local clock offset: -1.191 ms

Remote clock offset: -2.44 ms

Below is generated by plot.py at 2018-09-06 13:34:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 1.14 Mbit/s

95th percentile per-packet one-way delay: 349.372 ms

Loss rate: 8.17%

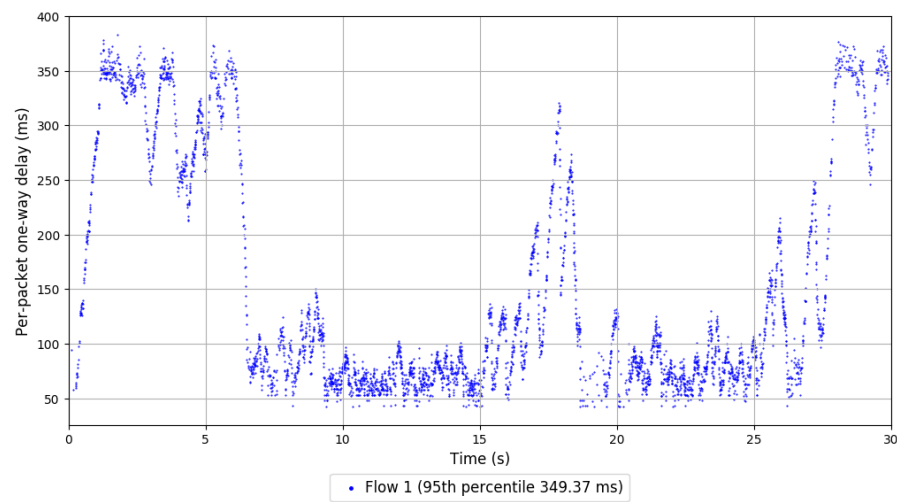
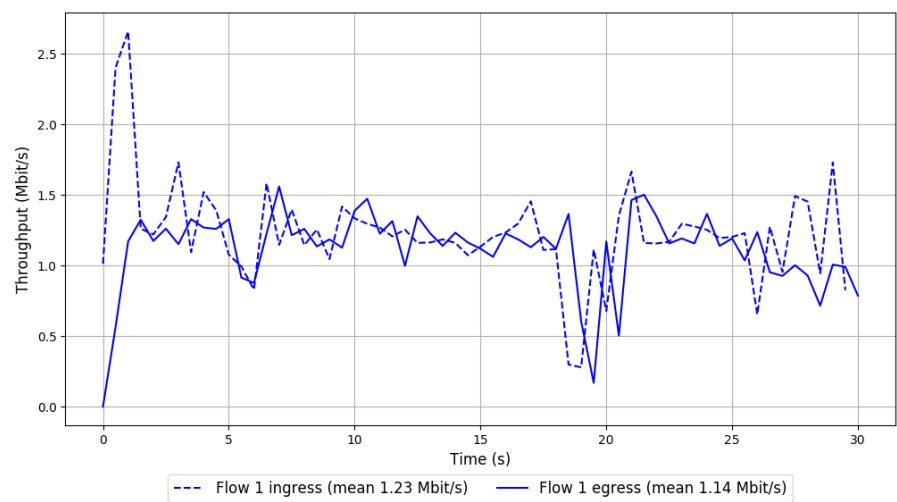
-- Flow 1:

Average throughput: 1.14 Mbit/s

95th percentile per-packet one-way delay: 349.372 ms

Loss rate: 8.17%

Run 1: Report of PCC-Vivace — Data Link



Run 2: Statistics of PCC-Vivace

Start at: 2018-09-06 12:57:31

End at: 2018-09-06 12:58:01

Local clock offset: 0.498 ms

Remote clock offset: 0.339 ms

Below is generated by plot.py at 2018-09-06 13:34:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.51 Mbit/s

95th percentile per-packet one-way delay: 385.885 ms

Loss rate: 61.27%

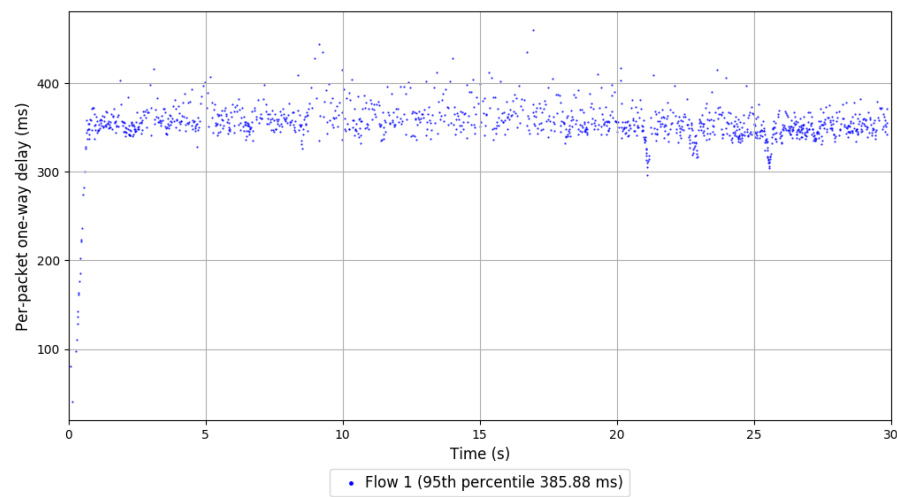
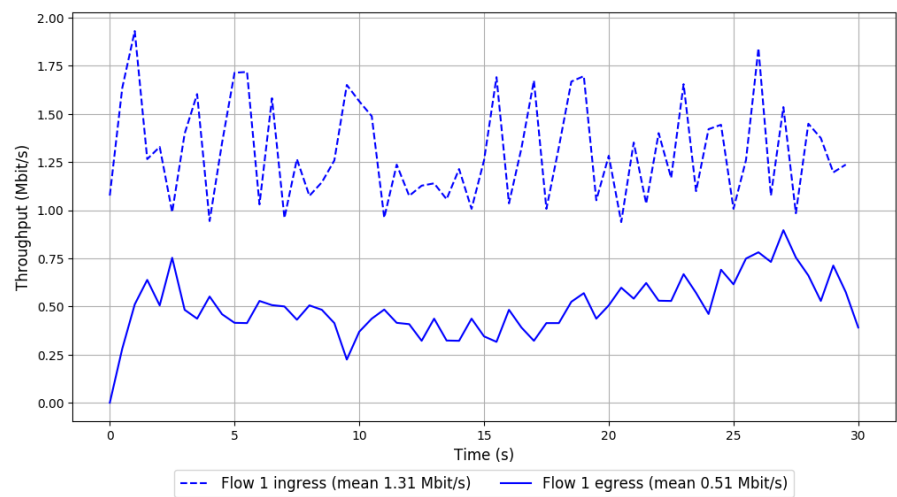
-- Flow 1:

Average throughput: 0.51 Mbit/s

95th percentile per-packet one-way delay: 385.885 ms

Loss rate: 61.27%

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

Start at: 2018-09-06 13:17:06

End at: 2018-09-06 13:17:36

Local clock offset: 1.68 ms

Remote clock offset: -3.022 ms

Below is generated by plot.py at 2018-09-06 13:34:44

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.79 Mbit/s

95th percentile per-packet one-way delay: 379.937 ms

Loss rate: 40.83%

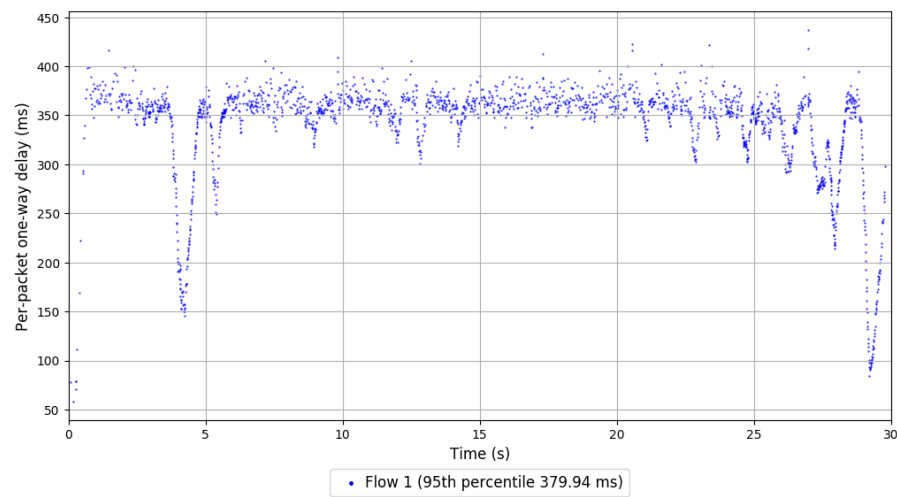
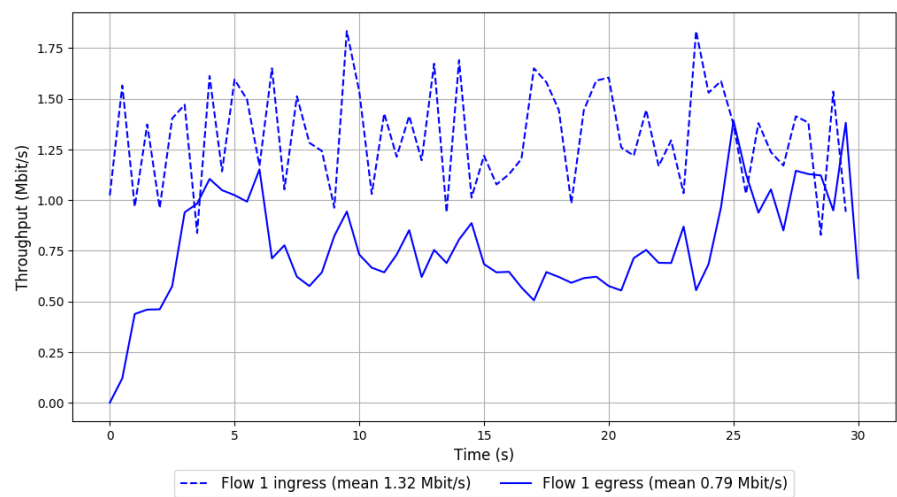
-- Flow 1:

Average throughput: 0.79 Mbit/s

95th percentile per-packet one-way delay: 379.937 ms

Loss rate: 40.83%

Run 3: Report of PCC-Vivace — Data Link

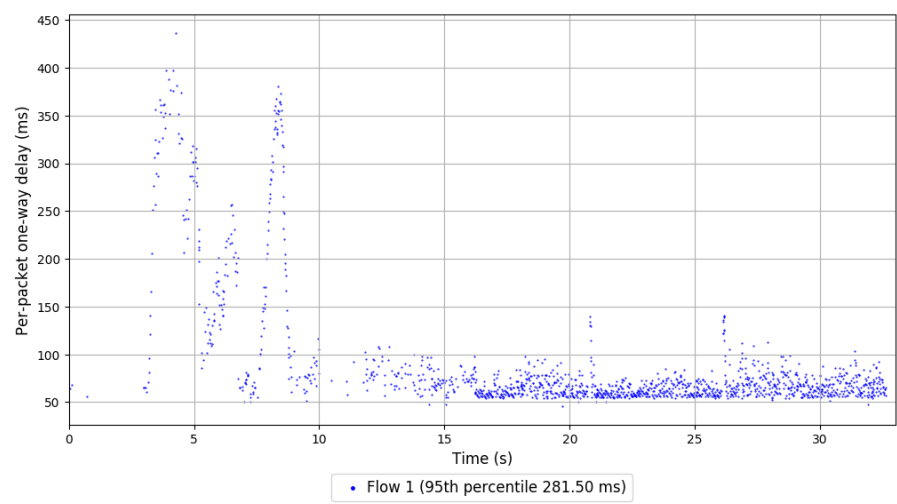
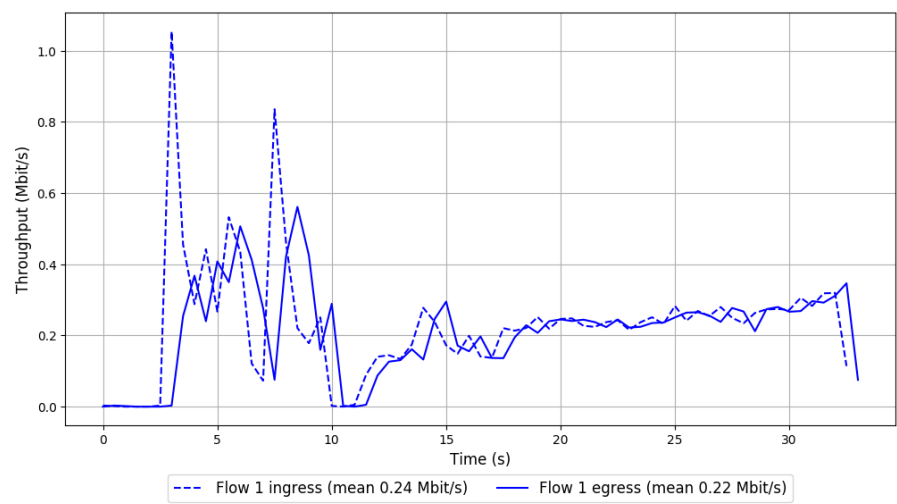


```
Run 1: Statistics of WebRTC media

Start at: 2018-09-06 12:52:05
End at: 2018-09-06 12:52:35
Local clock offset: -0.136 ms
Remote clock offset: -2.535 ms

# Below is generated by plot.py at 2018-09-06 13:34:44
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 281.496 ms
Loss rate: 6.15%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 281.496 ms
Loss rate: 6.15%
```

Run 1: Report of WebRTC media — Data Link

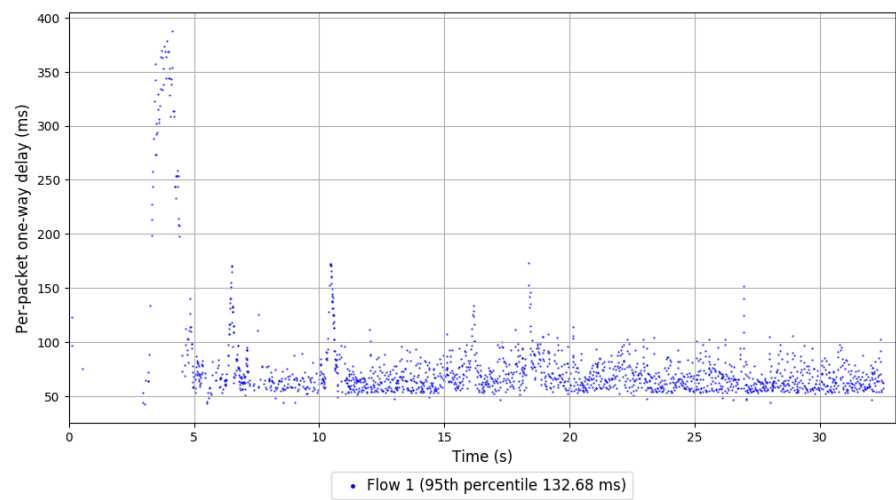
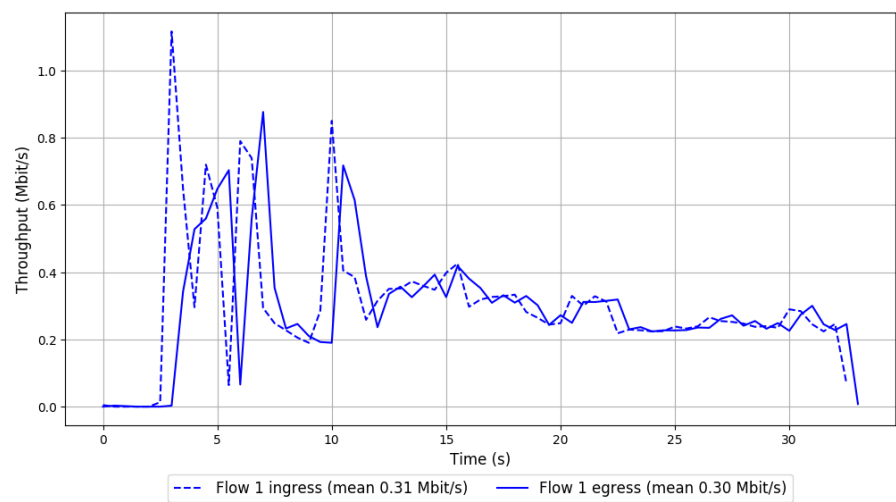


Run 2: Statistics of WebRTC media

Start at: 2018-09-06 13:11:40
End at: 2018-09-06 13:12:10
Local clock offset: -0.885 ms
Remote clock offset: -1.952 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 132.677 ms
Loss rate: 3.44%
-- Flow 1:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 132.677 ms
Loss rate: 3.44%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2018-09-06 13:31:15
End at: 2018-09-06 13:31:45
Local clock offset: -1.812 ms
Remote clock offset: -0.411 ms

Below is generated by plot.py at 2018-09-06 13:34:44
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 377.379 ms
Loss rate: 23.82%
-- Flow 1:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 377.379 ms
Loss rate: 23.82%

Run 3: Report of WebRTC media — Data Link

