

Pantheon Report

Generated at 2019-01-03 04:17:22 (UTC).

Data path: Colombia cellular on ppp0 (*remote*) → AWS Brazil 2 on ens5 (*local*).

Repeated the test of 19 congestion control schemes 3 times.

Each test lasted for 30 seconds running 1 flow.

NTP offsets were measured against `gps.ntp.br` and have been applied to correct the timestamps in logs.

System info:

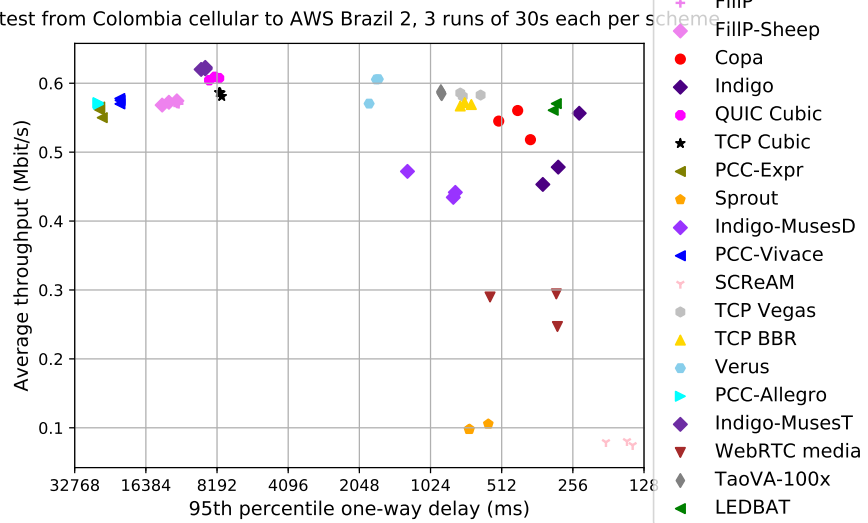
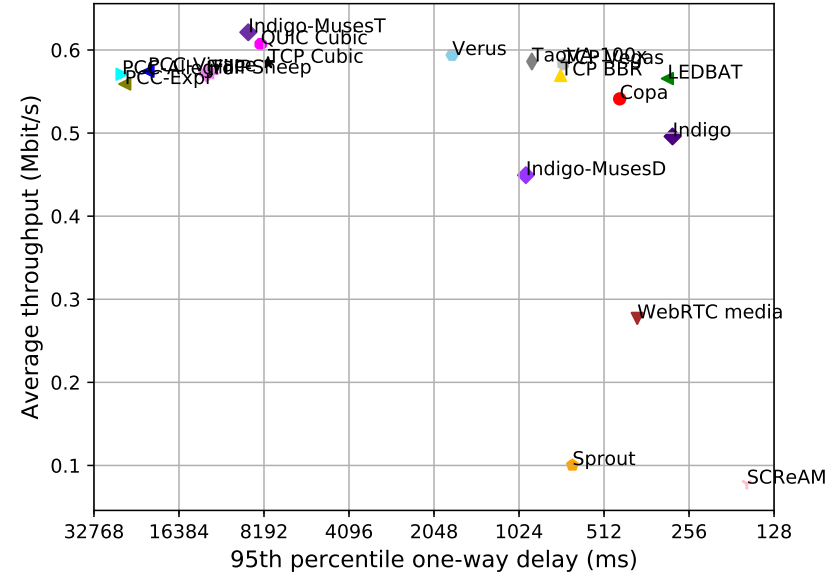
```
Linux 4.15.0-1029-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
```

Git summary:

```
branch: muses @ c654af0b7d59d4ef4b914cfac404e1fc2e96dc68
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdfc58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecd90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ 65ac1b19bbefed0c6349ae986009b4fa8643c40a
third_party/muses-refactored @ 31f8f0ba8ef8b1da76c2bc0cd0a7850c33ff64fb
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 Colombia cellular to AWS Brazil 2, 3 runs of 30s each per scheme
(mean of all runs by scheme)



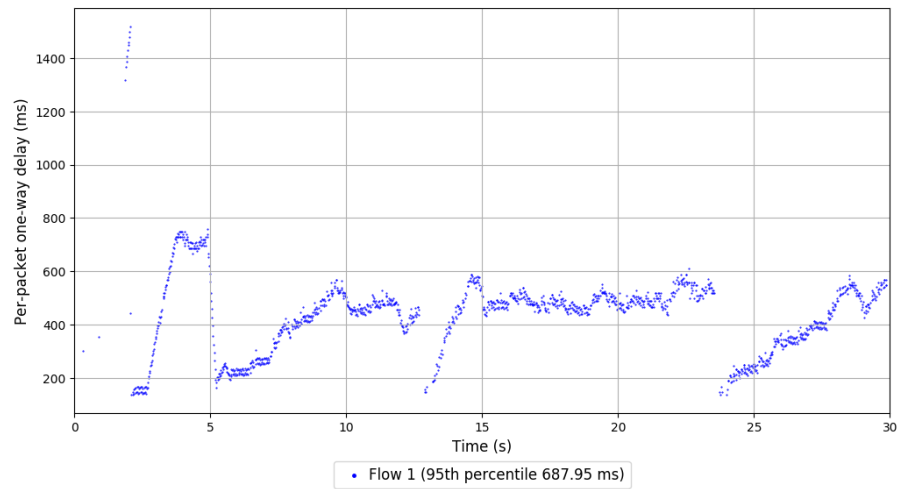
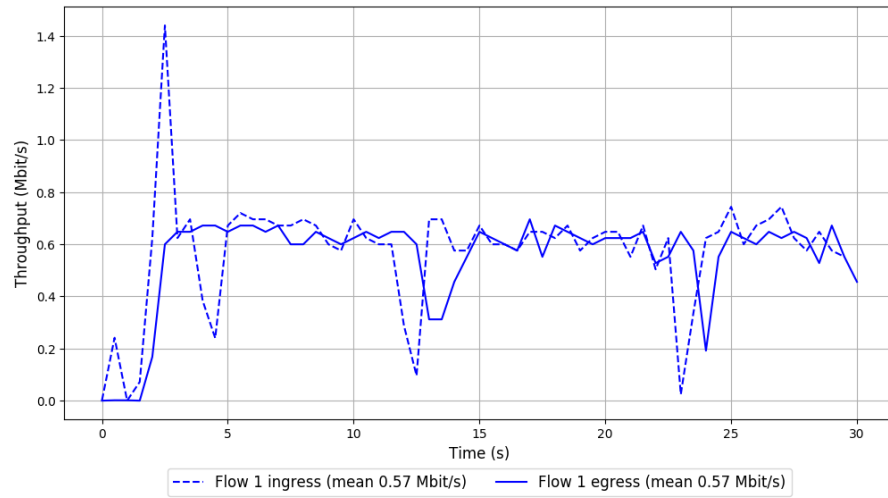
scheme	# runs	mean avg tput (Mbit/s) flow 1	mean 95th-%ile delay (ms) flow 1	mean loss rate (%) flow 1
TCP BBR	3	0.57	729.57	2.14
Copa	3	0.54	450.69	1.18
TCP Cubic	3	0.59	7926.87	30.67
FillP	3	0.57	12427.70	18.95
FillP-Sheep	3	0.57	13060.66	12.11
Indigo	3	0.50	292.90	0.86
Indigo-MusesD	3	0.45	968.71	1.32
Indigo-MusesT	3	0.62	9313.42	32.88
LEDBAT	2	0.56	305.45	1.21
PCC-Allegro	3	0.57	26067.01	98.50
PCC-Expr	3	0.56	25495.85	91.07
QUIC Cubic	3	0.61	8413.47	31.49
SCReAM	3	0.08	159.83	0.77
Sprout	3	0.10	662.62	0.73
TaoVA-100x	3	0.59	922.27	2.37
TCP Vegas	3	0.58	714.32	1.10
Verus	3	0.60	1766.56	3.38
PCC-Vivace	3	0.58	21094.14	70.41
WebRTC media	3	0.28	390.53	0.63

Run 1: Statistics of TCP BBR

Start at: 2019-01-03 03:17:01
End at: 2019-01-03 03:17:31
Local clock offset: -6.499 ms
Remote clock offset: -0.205 ms

Below is generated by plot.py at 2019-01-03 04:16:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 687.950 ms
Loss rate: 2.16%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 687.950 ms
Loss rate: 2.16%

Run 1: Report of TCP BBR — Data Link



Run 2: Statistics of TCP BBR

Start at: 2019-01-03 03:38:38

End at: 2019-01-03 03:39:08

Local clock offset: -3.214 ms

Remote clock offset: -6.35 ms

Below is generated by plot.py at 2019-01-03 04:16:48

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 734.364 ms

Loss rate: 2.09%

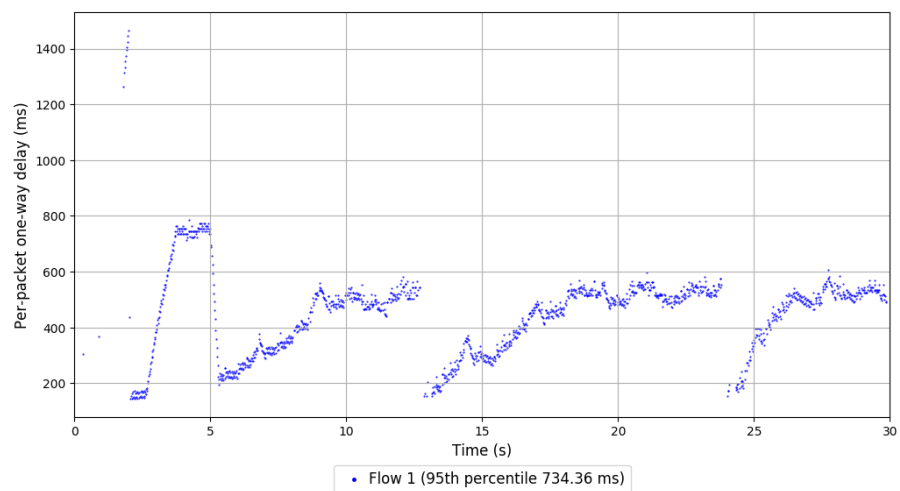
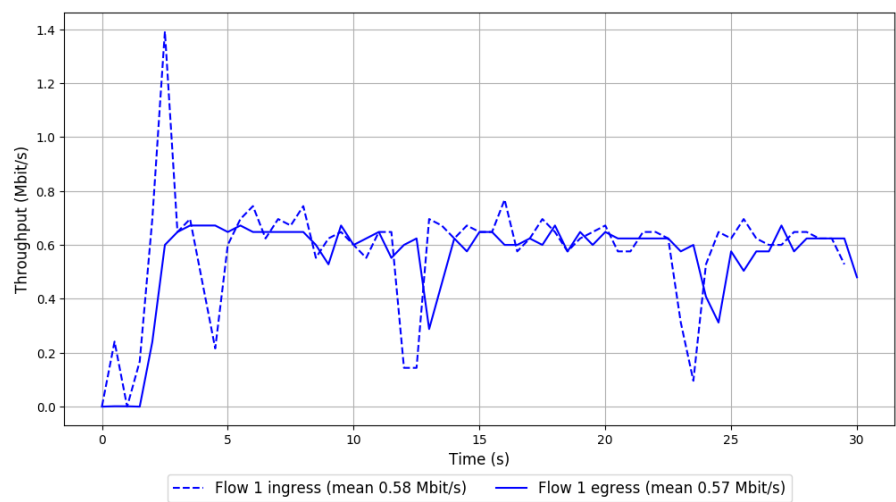
-- Flow 1:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 734.364 ms

Loss rate: 2.09%

Run 2: Report of TCP BBR — Data Link

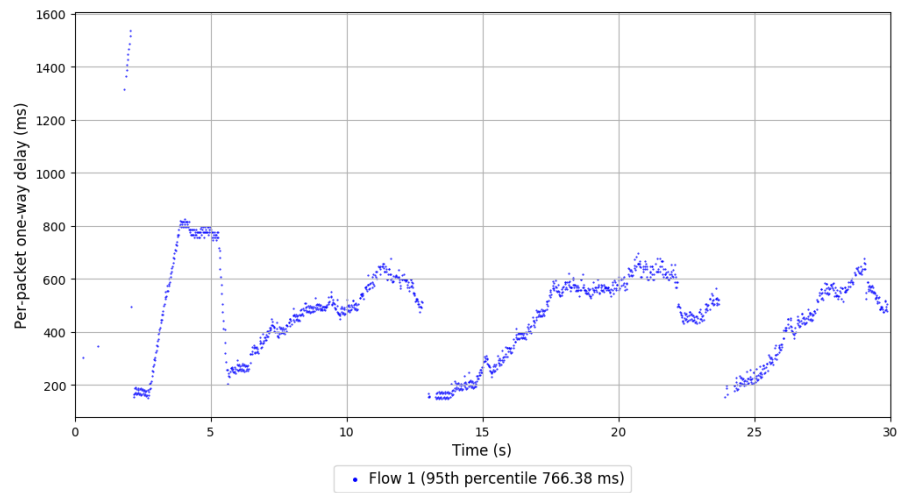
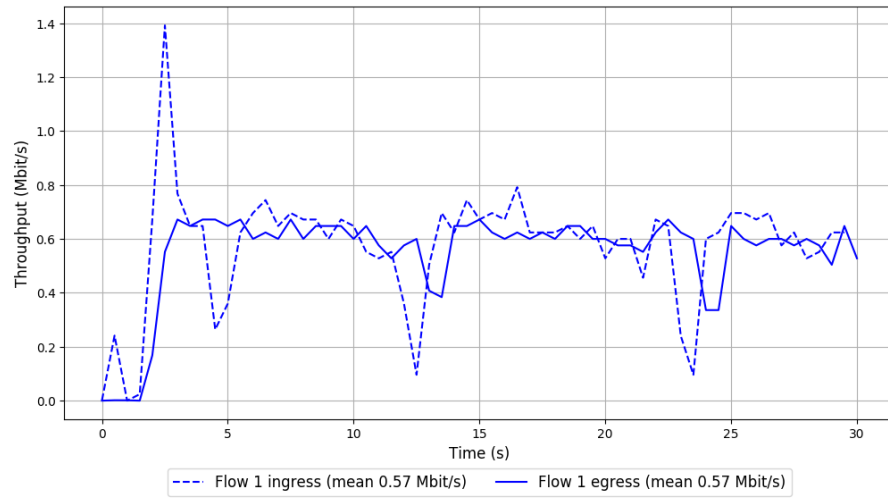


Run 3: Statistics of TCP BBR

Start at: 2019-01-03 04:00:13
End at: 2019-01-03 04:00:43
Local clock offset: -4.081 ms
Remote clock offset: -1.376 ms

Below is generated by plot.py at 2019-01-03 04:16:48
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 766.385 ms
Loss rate: 2.17%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 766.385 ms
Loss rate: 2.17%

Run 3: Report of TCP BBR — Data Link

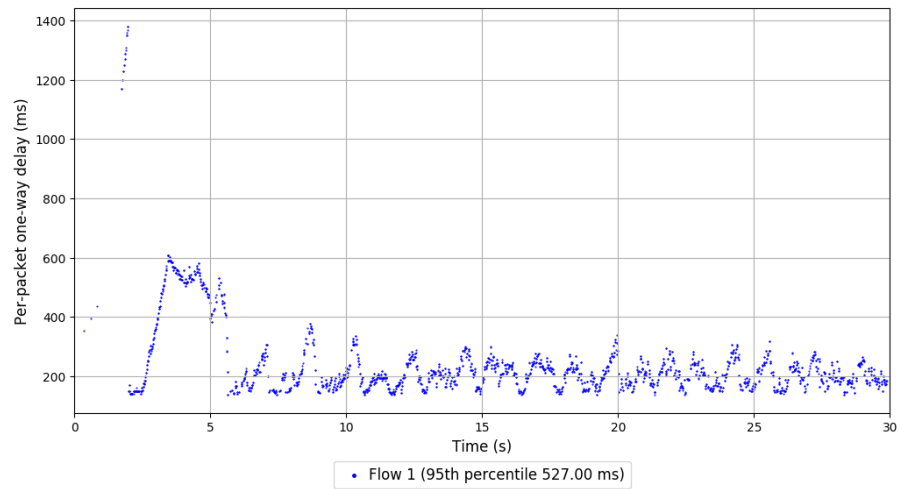
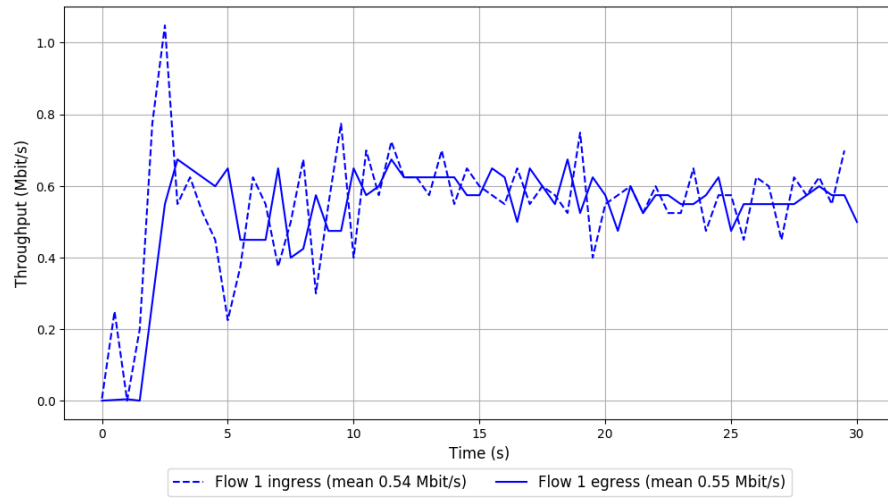


Run 1: Statistics of Copa

Start at: 2019-01-03 03:24:59
End at: 2019-01-03 03:25:29
Local clock offset: -7.045 ms
Remote clock offset: -1.066 ms

Below is generated by plot.py at 2019-01-03 04:16:49
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 527.002 ms
Loss rate: 1.30%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 527.002 ms
Loss rate: 1.30%

Run 1: Report of Copa — Data Link

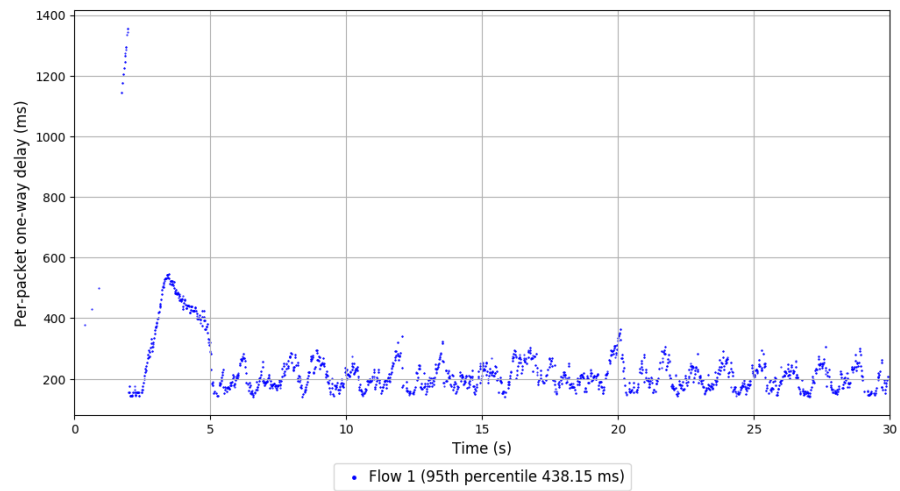
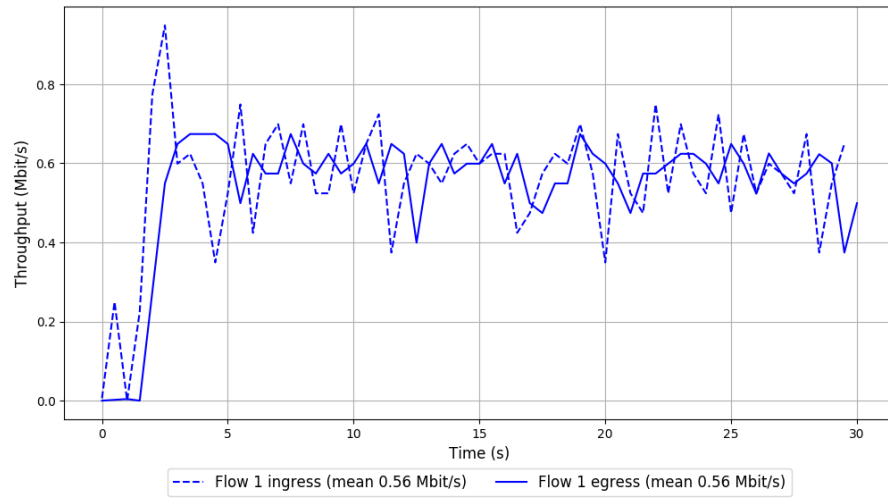


Run 2: Statistics of Copa

Start at: 2019-01-03 03:46:35
End at: 2019-01-03 03:47:05
Local clock offset: -3.278 ms
Remote clock offset: -7.392 ms

Below is generated by plot.py at 2019-01-03 04:16:49
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 438.153 ms
Loss rate: 1.12%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 438.153 ms
Loss rate: 1.12%

Run 2: Report of Copa — Data Link

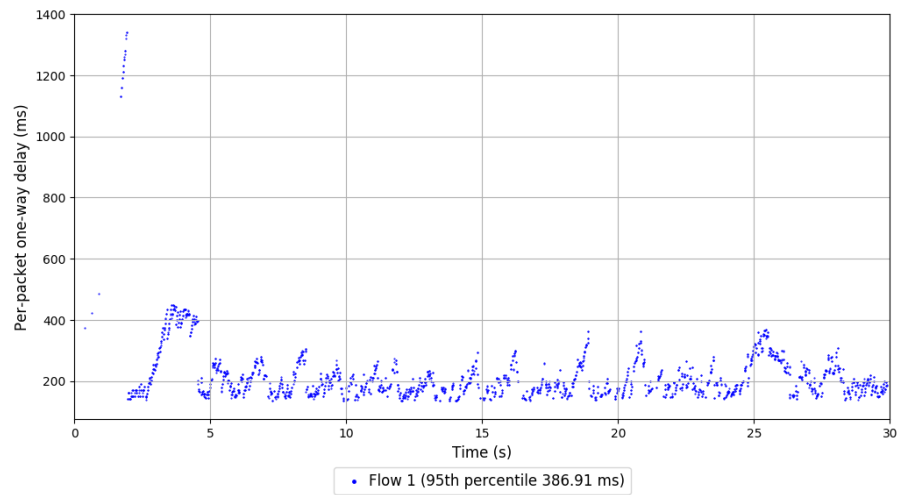
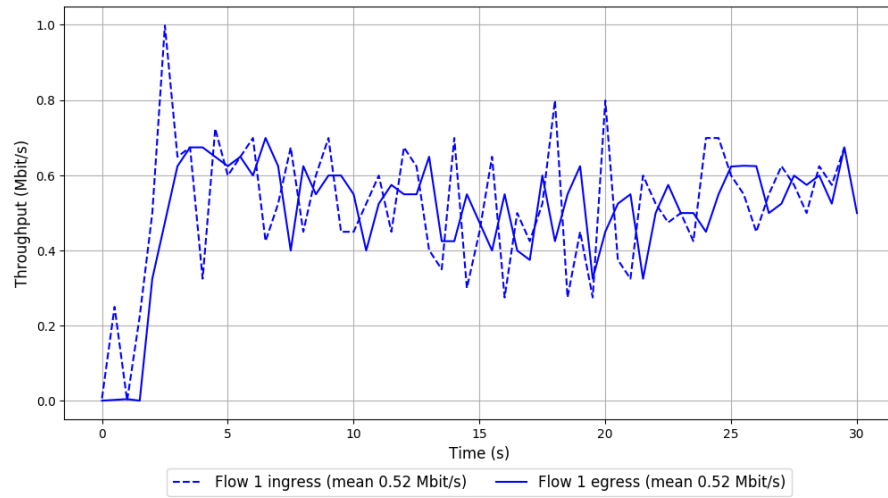


Run 3: Statistics of Copa

Start at: 2019-01-03 04:08:11
End at: 2019-01-03 04:08:41
Local clock offset: -5.406 ms
Remote clock offset: 4.911 ms

Below is generated by plot.py at 2019-01-03 04:16:49
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 386.914 ms
Loss rate: 1.13%
-- Flow 1:
Average throughput: 0.52 Mbit/s
95th percentile per-packet one-way delay: 386.914 ms
Loss rate: 1.13%

Run 3: Report of Copa — Data Link

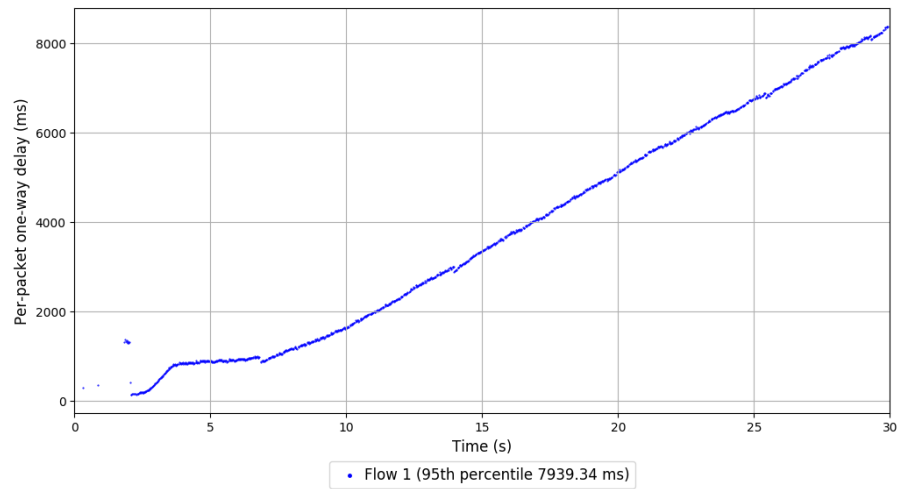
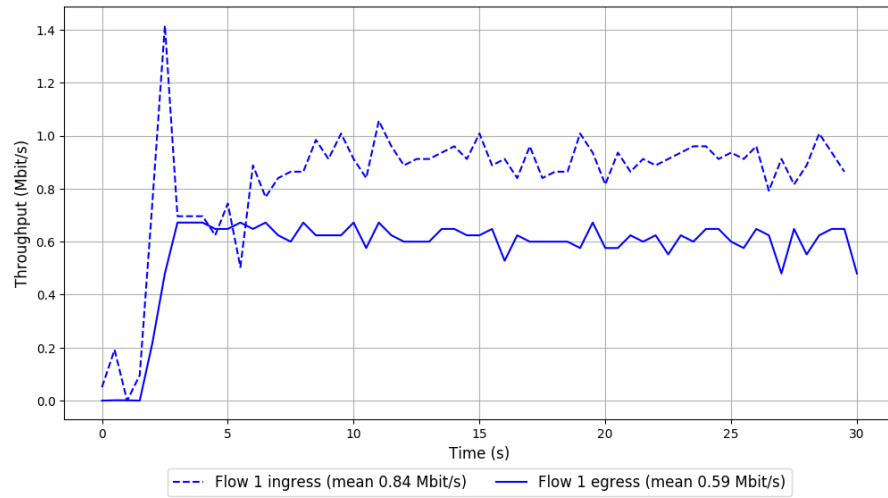


Run 1: Statistics of TCP Cubic

Start at: 2019-01-03 03:29:33
End at: 2019-01-03 03:30:03
Local clock offset: -5.48 ms
Remote clock offset: -5.395 ms

Below is generated by plot.py at 2019-01-03 04:16:49
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 7939.336 ms
Loss rate: 30.75%
-- Flow 1:
Average throughput: 0.59 Mbit/s
95th percentile per-packet one-way delay: 7939.336 ms
Loss rate: 30.75%

Run 1: Report of TCP Cubic — Data Link

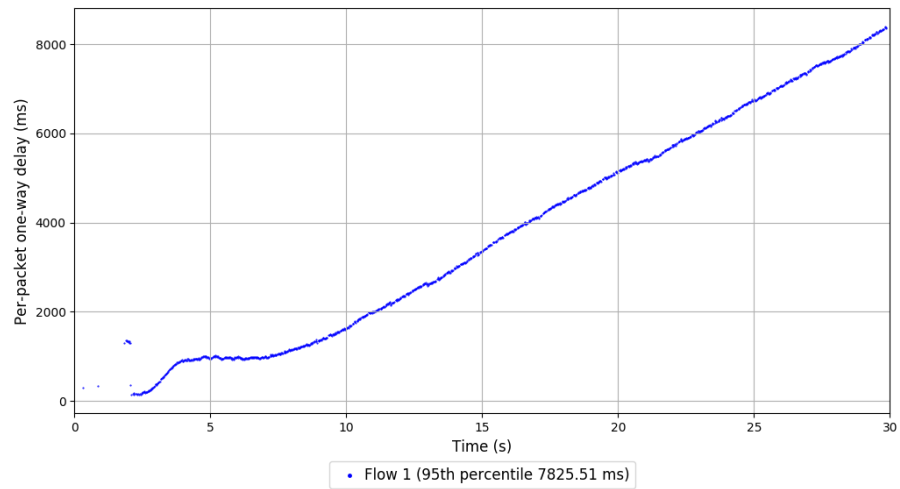
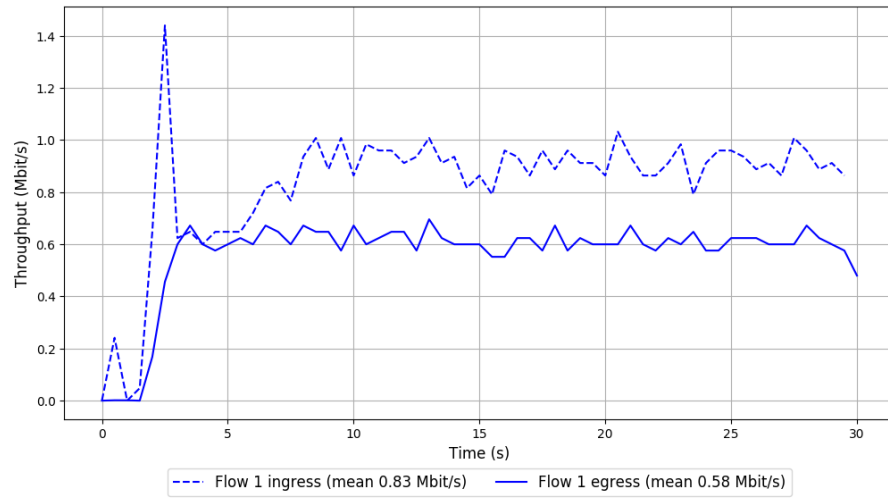


Run 2: Statistics of TCP Cubic

Start at: 2019-01-03 03:51:08
End at: 2019-01-03 03:51:38
Local clock offset: -2.297 ms
Remote clock offset: -4.179 ms

Below is generated by plot.py at 2019-01-03 04:16:49
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 7825.510 ms
Loss rate: 31.07%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 7825.510 ms
Loss rate: 31.07%

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

Start at: 2019-01-03 04:12:44

End at: 2019-01-03 04:13:14

Local clock offset: -6.682 ms

Remote clock offset: 1.622 ms

Below is generated by plot.py at 2019-01-03 04:16:52

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.59 Mbit/s

95th percentile per-packet one-way delay: 8015.773 ms

Loss rate: 30.20%

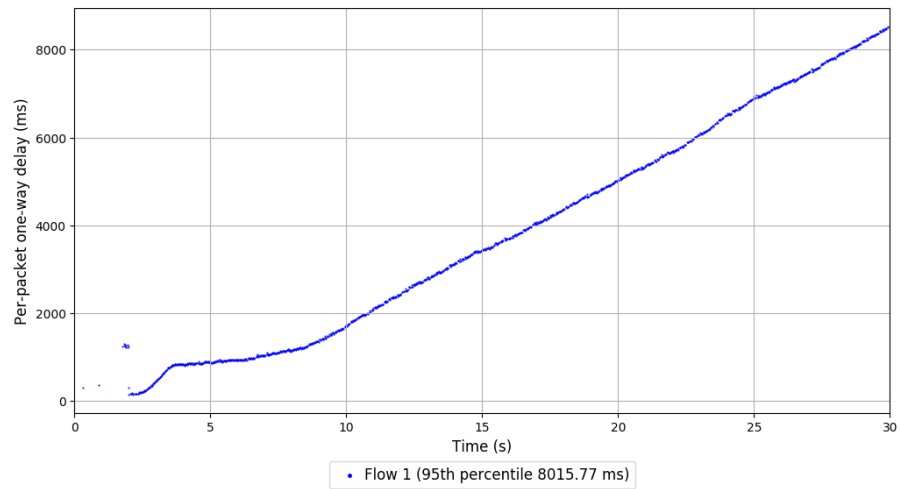
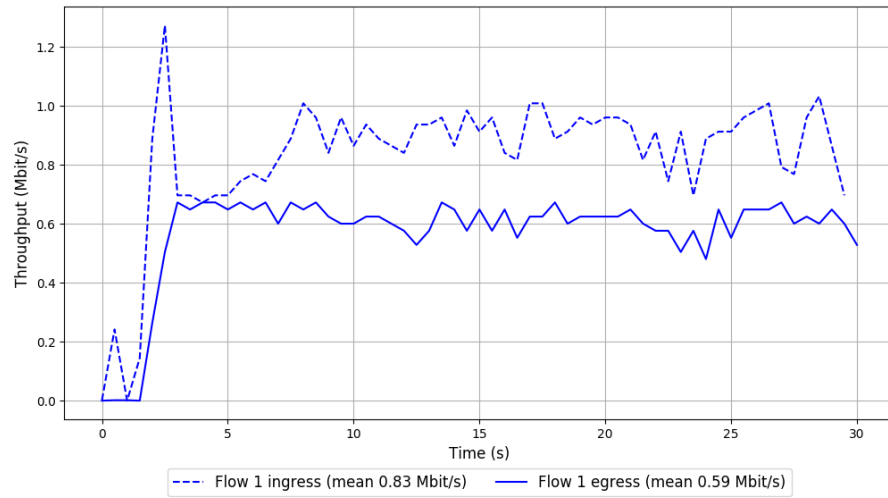
-- Flow 1:

Average throughput: 0.59 Mbit/s

95th percentile per-packet one-way delay: 8015.773 ms

Loss rate: 30.20%

Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of FillP

Start at: 2019-01-03 03:13:36

End at: 2019-01-03 03:14:06

Local clock offset: -6.502 ms

Remote clock offset: 0.356 ms

Below is generated by plot.py at 2019-01-03 04:16:52

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 12983.257 ms

Loss rate: 19.85%

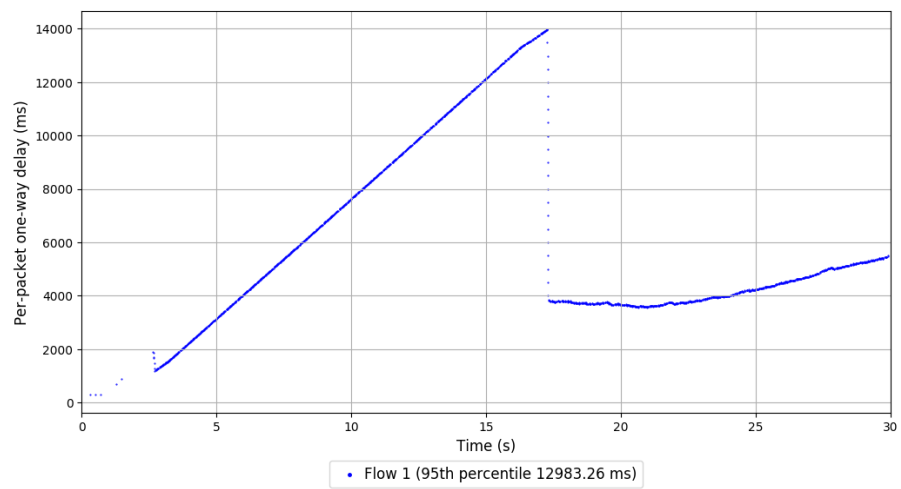
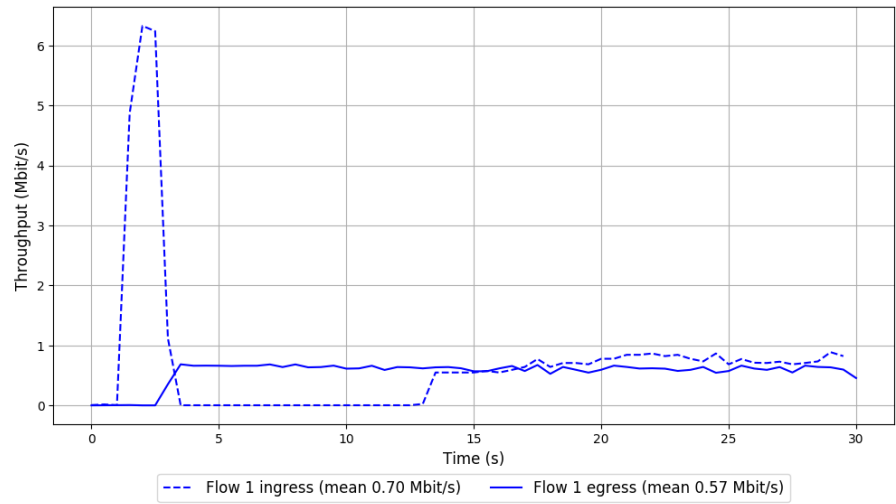
-- Flow 1:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 12983.257 ms

Loss rate: 19.85%

Run 1: Report of FillP — Data Link

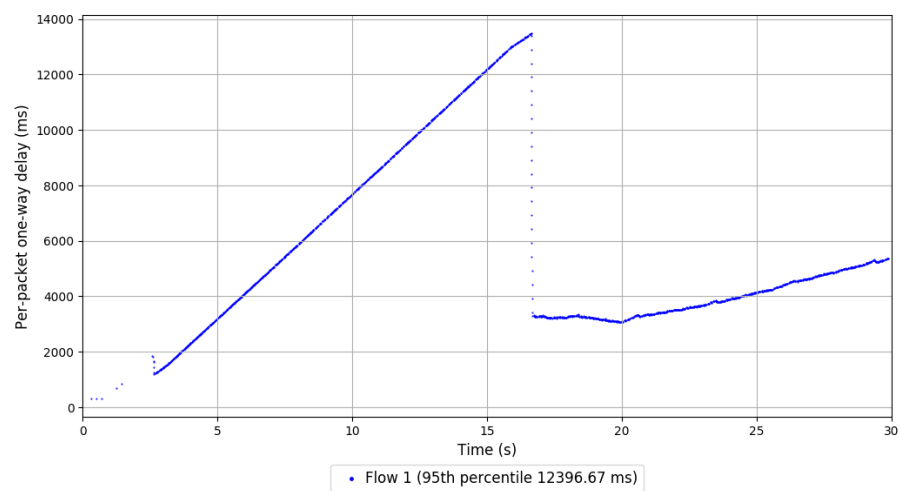
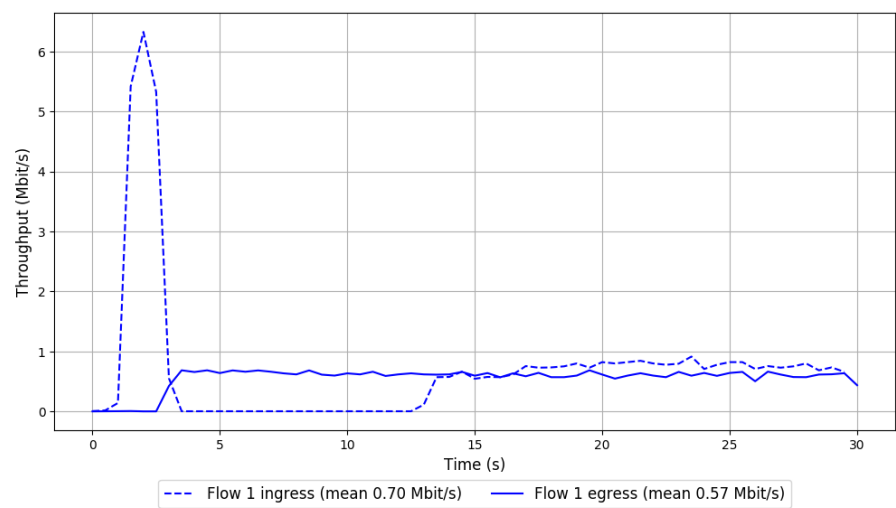


Run 2: Statistics of FillP

Start at: 2019-01-03 03:35:13
End at: 2019-01-03 03:35:43
Local clock offset: -4.416 ms
Remote clock offset: -2.191 ms

Below is generated by plot.py at 2019-01-03 04:16:53
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 12396.667 ms
Loss rate: 19.52%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 12396.667 ms
Loss rate: 19.52%

Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

Start at: 2019-01-03 03:56:49

End at: 2019-01-03 03:57:19

Local clock offset: -3.853 ms

Remote clock offset: 0.768 ms

Below is generated by plot.py at 2019-01-03 04:16:53

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 11903.163 ms

Loss rate: 17.48%

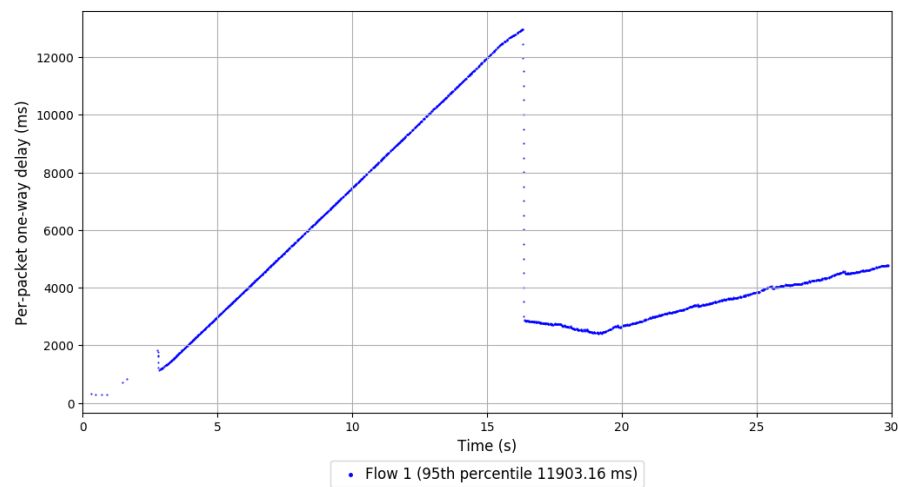
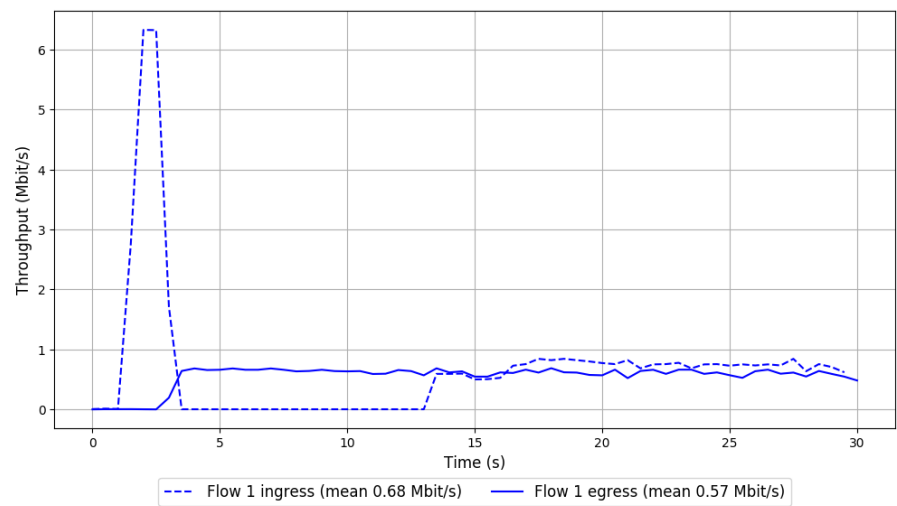
-- Flow 1:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 11903.163 ms

Loss rate: 17.48%

Run 3: Report of FillP — Data Link

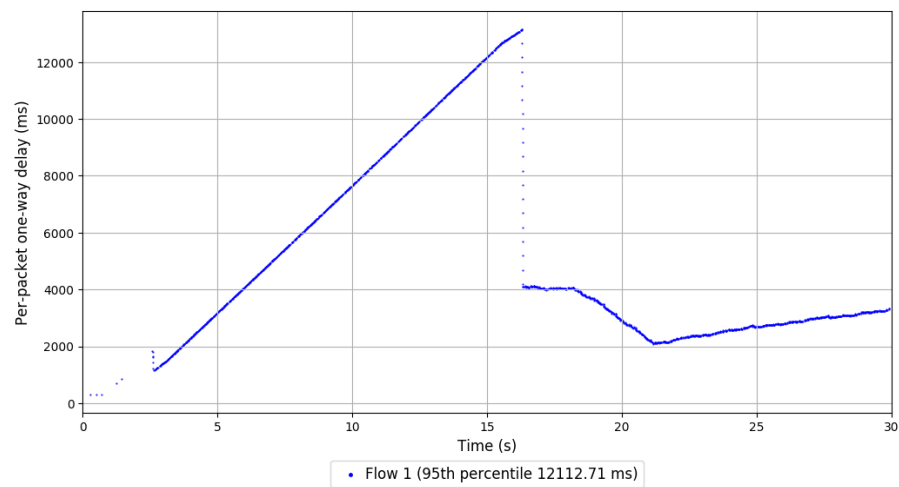
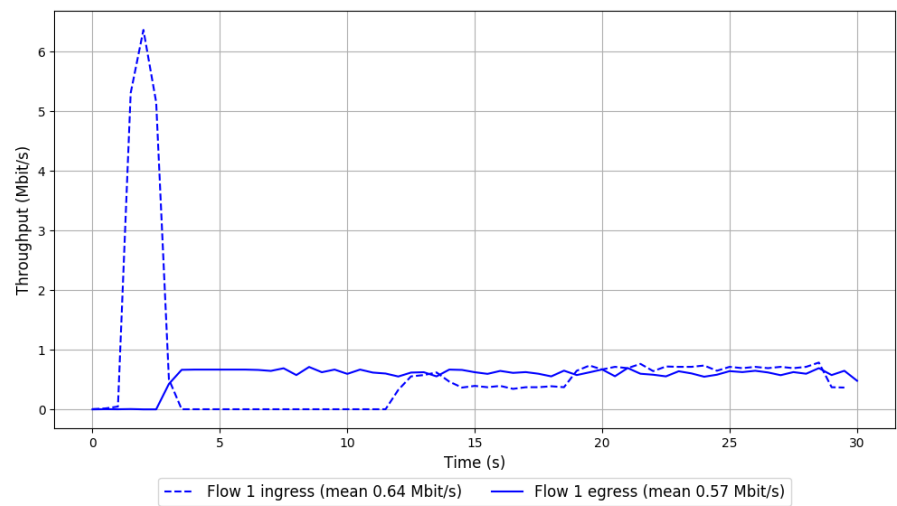


Run 1: Statistics of FillP-Sheep

Start at: 2019-01-03 03:26:07
End at: 2019-01-03 03:26:37
Local clock offset: -6.694 ms
Remote clock offset: -4.659 ms

Below is generated by plot.py at 2019-01-03 04:16:53
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 12112.712 ms
Loss rate: 10.93%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 12112.712 ms
Loss rate: 10.93%

Run 1: Report of FillP-Sheep — Data Link

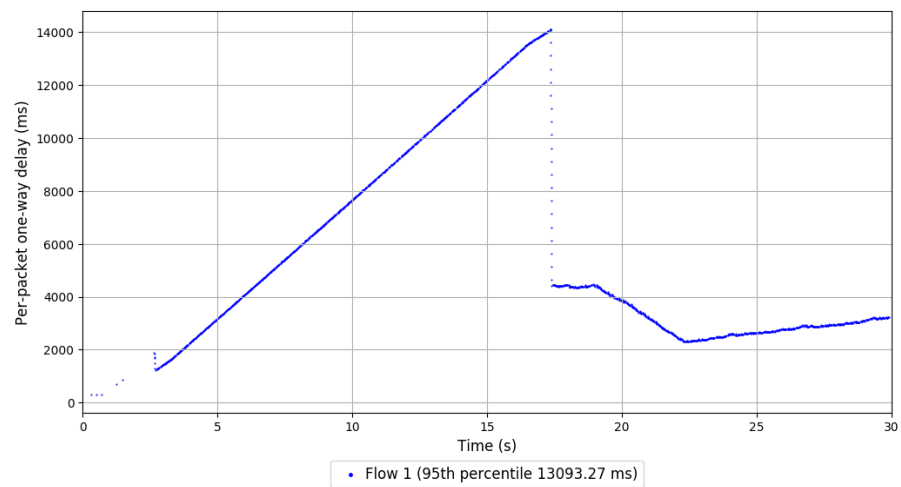
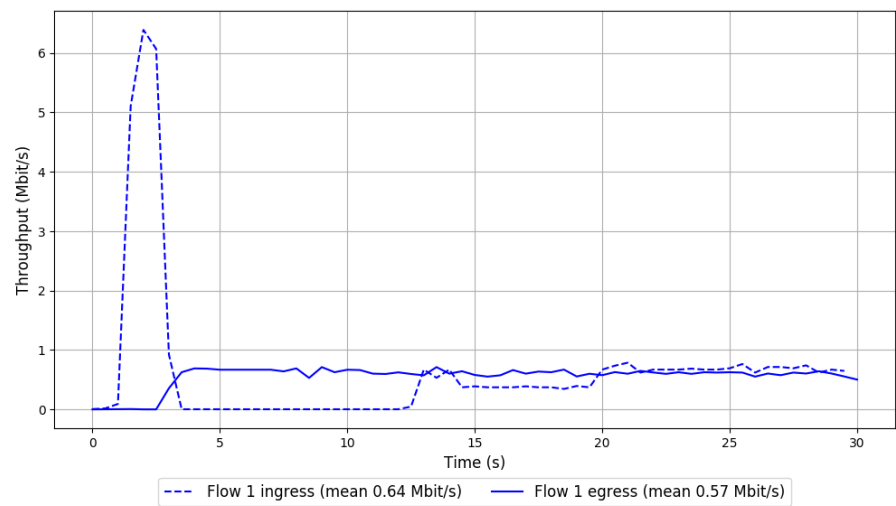


Run 2: Statistics of FillP-Sheep

Start at: 2019-01-03 03:47:43
End at: 2019-01-03 03:48:13
Local clock offset: -3.224 ms
Remote clock offset: -7.487 ms

Below is generated by plot.py at 2019-01-03 04:16:54
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 13093.268 ms
Loss rate: 11.78%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 13093.268 ms
Loss rate: 11.78%

Run 2: Report of FillP-Sheep — Data Link



Run 3: Statistics of FillP-Sheep

Start at: 2019-01-03 04:09:19

End at: 2019-01-03 04:09:49

Local clock offset: -5.558 ms

Remote clock offset: 4.838 ms

Below is generated by plot.py at 2019-01-03 04:16:54

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 13976.012 ms

Loss rate: 13.61%

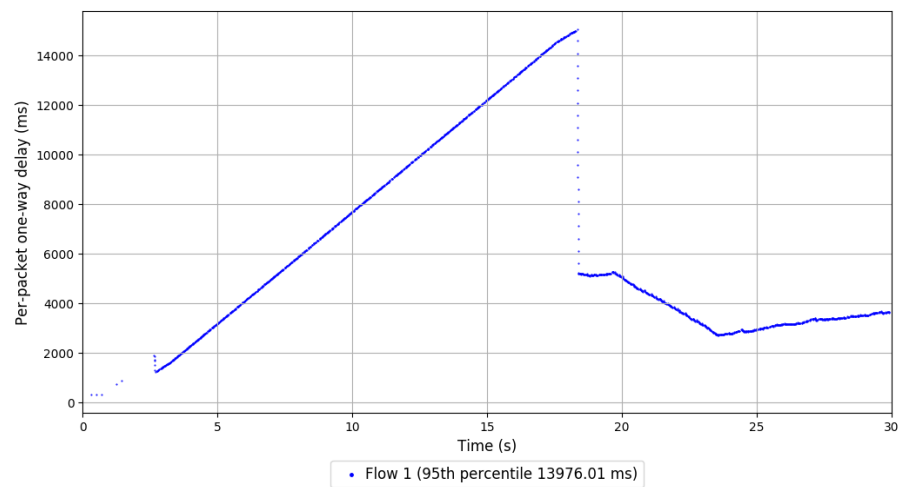
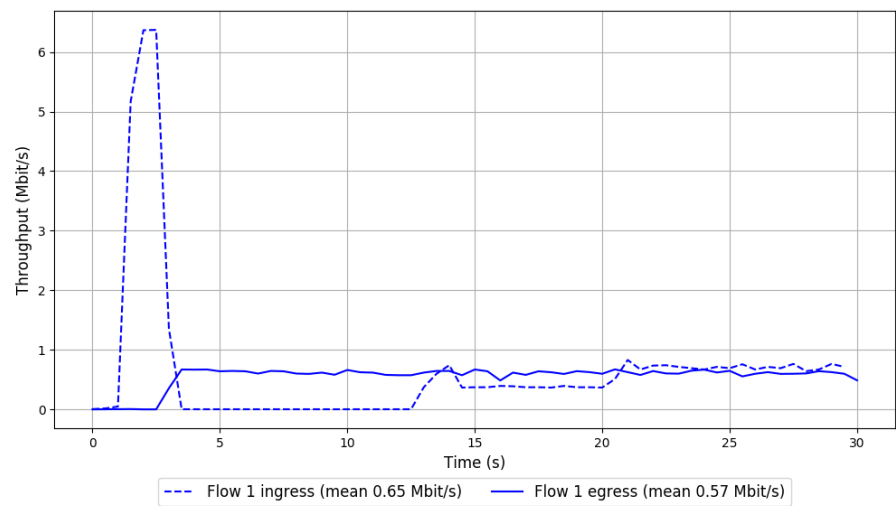
-- Flow 1:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 13976.012 ms

Loss rate: 13.61%

Run 3: Report of FillP-Sheep — Data Link



Run 1: Statistics of Indigo

Start at: 2019-01-03 03:28:24

End at: 2019-01-03 03:28:54

Local clock offset: -5.079 ms

Remote clock offset: -5.202 ms

Below is generated by plot.py at 2019-01-03 04:16:54

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.48 Mbit/s

95th percentile per-packet one-way delay: 295.177 ms

Loss rate: 0.76%

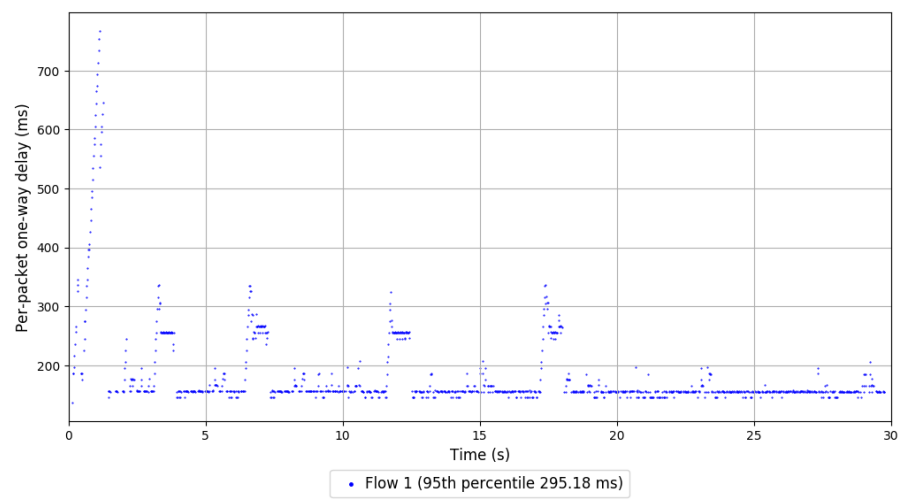
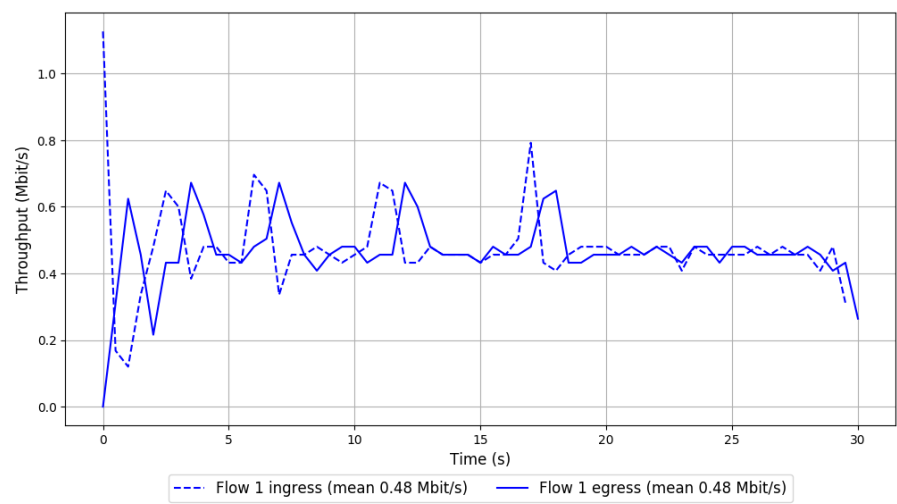
-- Flow 1:

Average throughput: 0.48 Mbit/s

95th percentile per-packet one-way delay: 295.177 ms

Loss rate: 0.76%

Run 1: Report of Indigo — Data Link

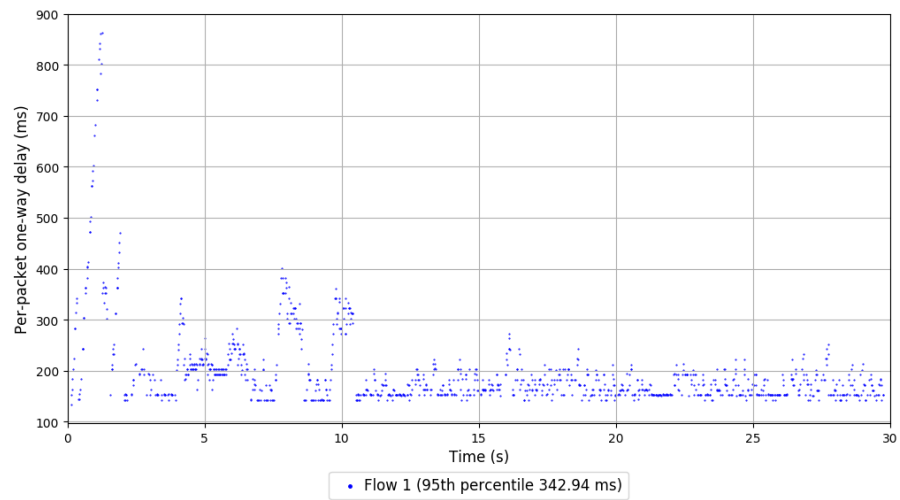
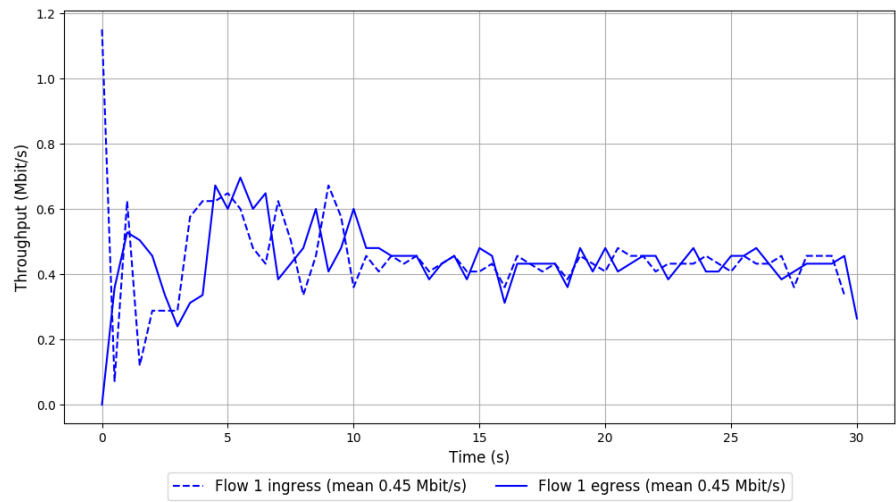


Run 2: Statistics of Indigo

Start at: 2019-01-03 03:50:00
End at: 2019-01-03 03:50:30
Local clock offset: -3.098 ms
Remote clock offset: -3.815 ms

Below is generated by plot.py at 2019-01-03 04:16:56
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 342.935 ms
Loss rate: 0.89%
-- Flow 1:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 342.935 ms
Loss rate: 0.89%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2019-01-03 04:11:36

End at: 2019-01-03 04:12:06

Local clock offset: -6.504 ms

Remote clock offset: 1.589 ms

Below is generated by plot.py at 2019-01-03 04:16:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.56 Mbit/s

95th percentile per-packet one-way delay: 240.584 ms

Loss rate: 0.94%

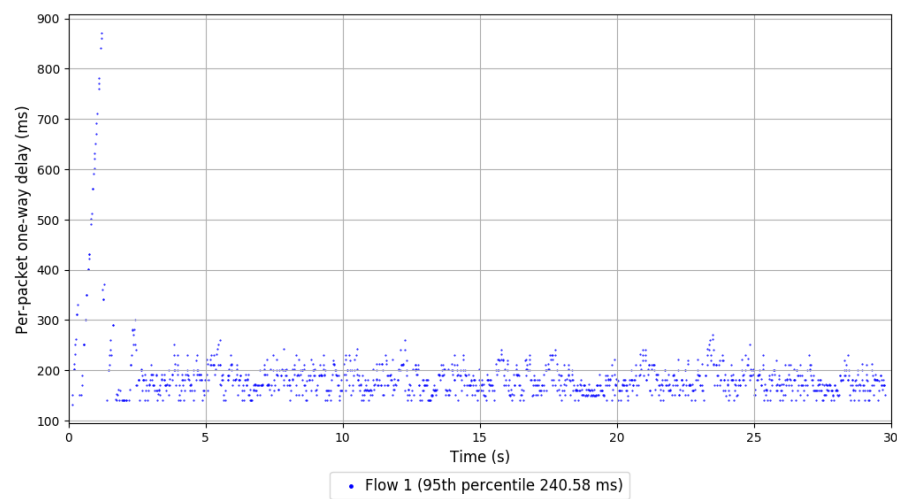
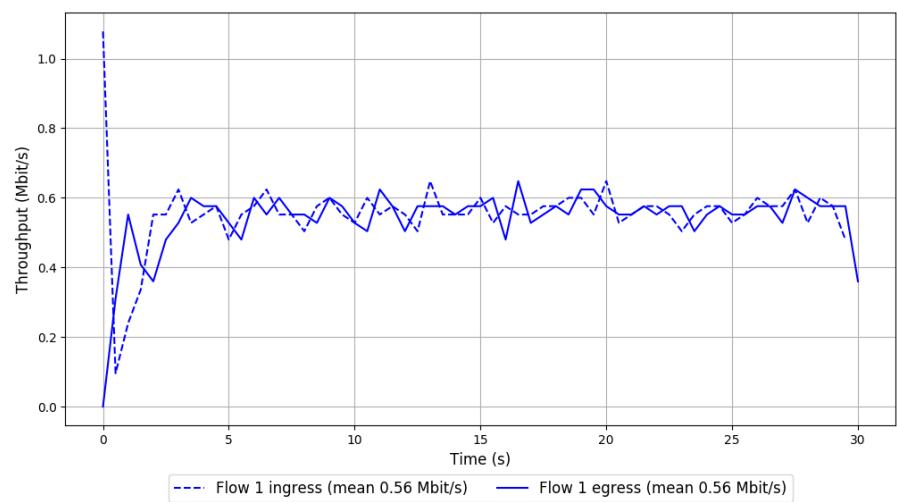
-- Flow 1:

Average throughput: 0.56 Mbit/s

95th percentile per-packet one-way delay: 240.584 ms

Loss rate: 0.94%

Run 3: Report of Indigo — Data Link

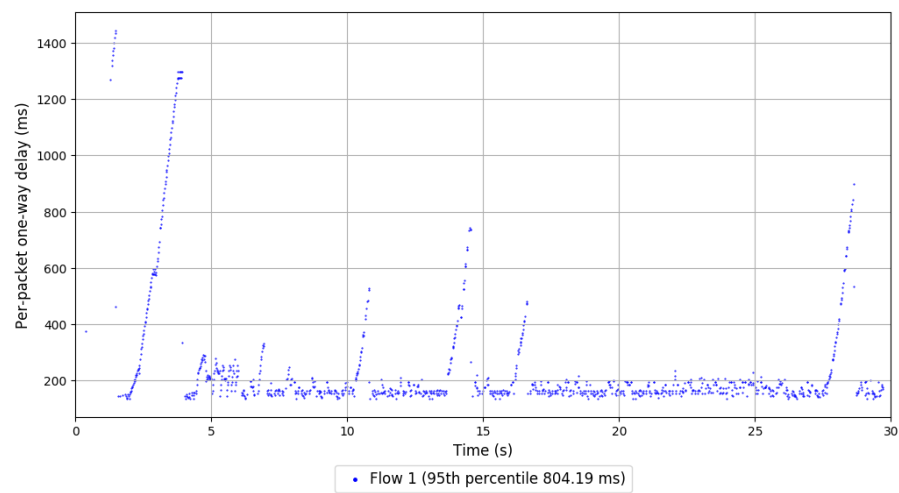
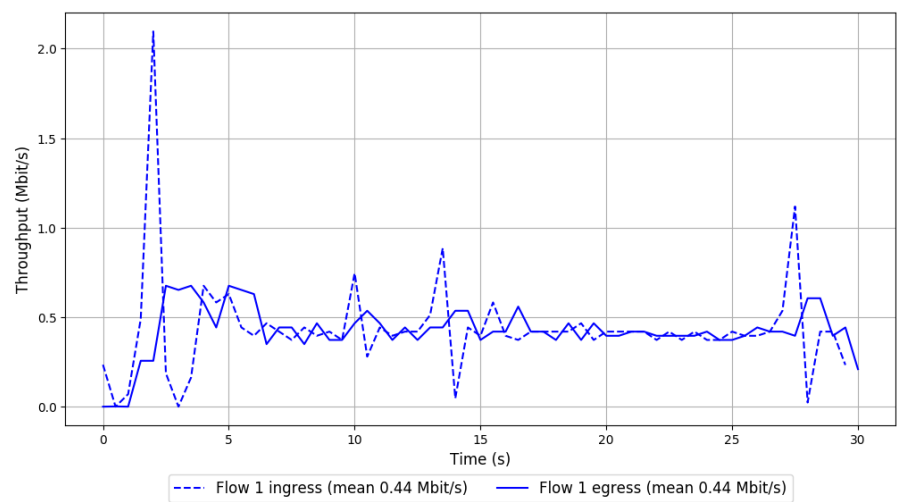


Run 1: Statistics of Indigo-MusesD

Start at: 2019-01-03 03:18:09
End at: 2019-01-03 03:18:39
Local clock offset: -7.286 ms
Remote clock offset: -0.411 ms

Below is generated by plot.py at 2019-01-03 04:16:57
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 804.192 ms
Loss rate: 0.71%
-- Flow 1:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 804.192 ms
Loss rate: 0.71%

Run 1: Report of Indigo-MusesD — Data Link



Run 2: Statistics of Indigo-MusesD

Start at: 2019-01-03 03:39:46

End at: 2019-01-03 03:40:16

Local clock offset: -3.032 ms

Remote clock offset: -6.61 ms

Below is generated by plot.py at 2019-01-03 04:16:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.43 Mbit/s

95th percentile per-packet one-way delay: 820.138 ms

Loss rate: 2.58%

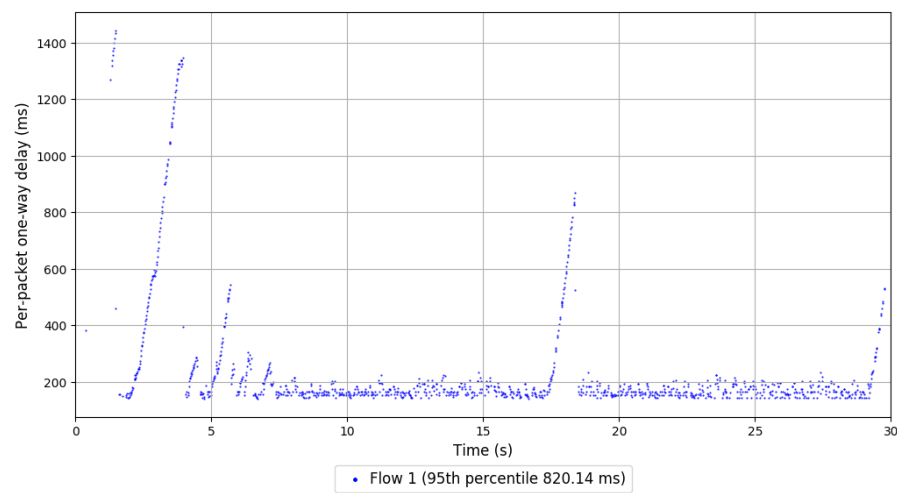
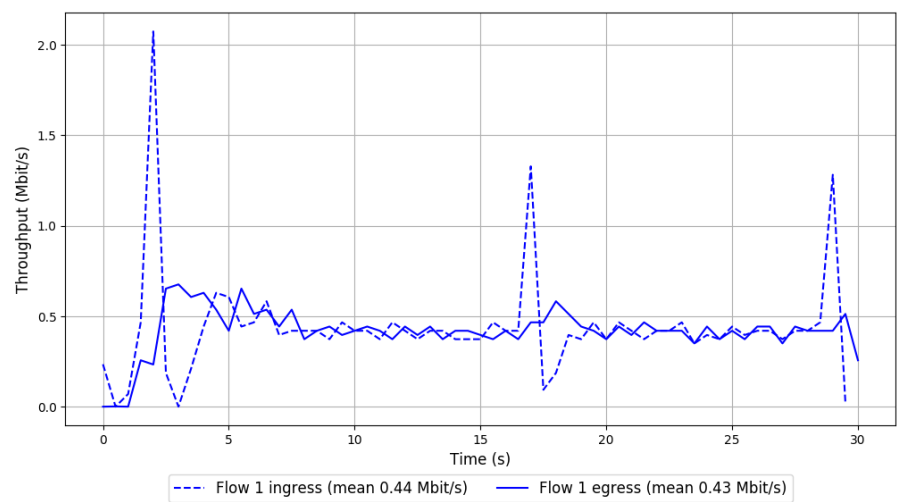
-- Flow 1:

Average throughput: 0.43 Mbit/s

95th percentile per-packet one-way delay: 820.138 ms

Loss rate: 2.58%

Run 2: Report of Indigo-MusesD — Data Link



Run 3: Statistics of Indigo-MusesD

Start at: 2019-01-03 04:01:21

End at: 2019-01-03 04:01:51

Local clock offset: -5.12 ms

Remote clock offset: 2.66 ms

Below is generated by plot.py at 2019-01-03 04:16:57

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.47 Mbit/s

95th percentile per-packet one-way delay: 1281.803 ms

Loss rate: 0.67%

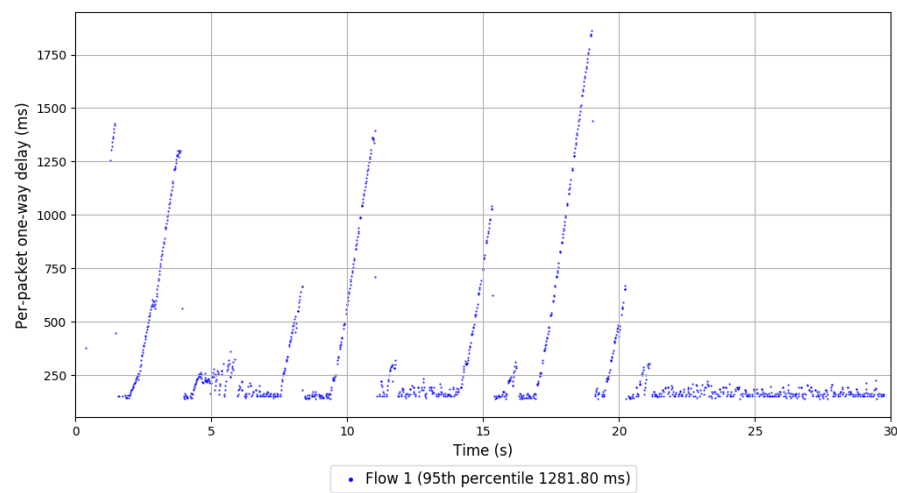
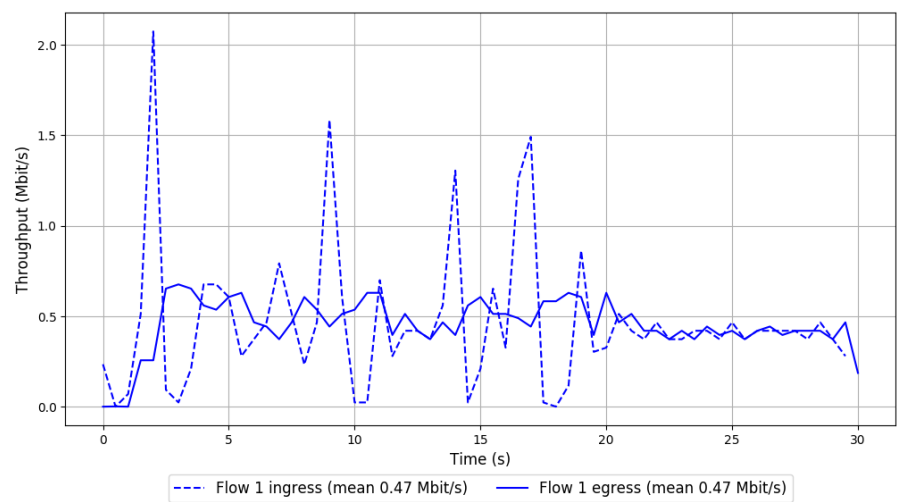
-- Flow 1:

Average throughput: 0.47 Mbit/s

95th percentile per-packet one-way delay: 1281.803 ms

Loss rate: 0.67%

Run 3: Report of Indigo-MusesD — Data Link



Run 1: Statistics of Indigo-MusesT

Start at: 2019-01-03 03:12:27

End at: 2019-01-03 03:12:57

Local clock offset: -6.586 ms

Remote clock offset: 0.555 ms

Below is generated by plot.py at 2019-01-03 04:16:58

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.62 Mbit/s

95th percentile per-packet one-way delay: 9189.539 ms

Loss rate: 32.50%

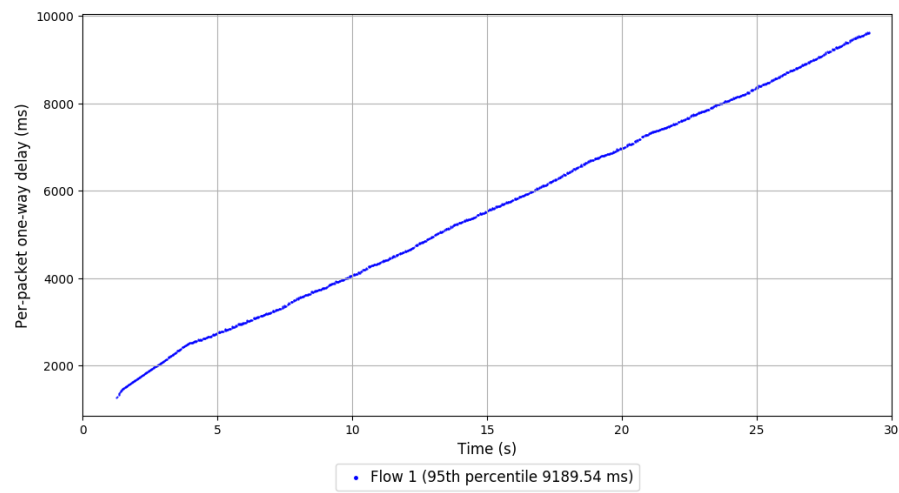
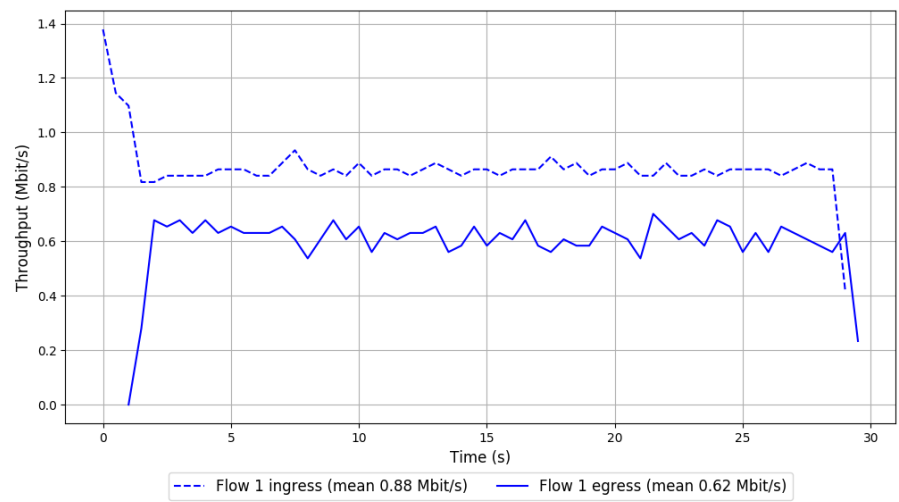
-- Flow 1:

Average throughput: 0.62 Mbit/s

95th percentile per-packet one-way delay: 9189.539 ms

Loss rate: 32.50%

Run 1: Report of Indigo-MusesT — Data Link



Run 2: Statistics of Indigo-MusesT

Start at: 2019-01-03 03:34:05

End at: 2019-01-03 03:34:35

Local clock offset: -4.535 ms

Remote clock offset: -2.091 ms

Below is generated by plot.py at 2019-01-03 04:16:59

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.62 Mbit/s

95th percentile per-packet one-way delay: 9563.798 ms

Loss rate: 33.68%

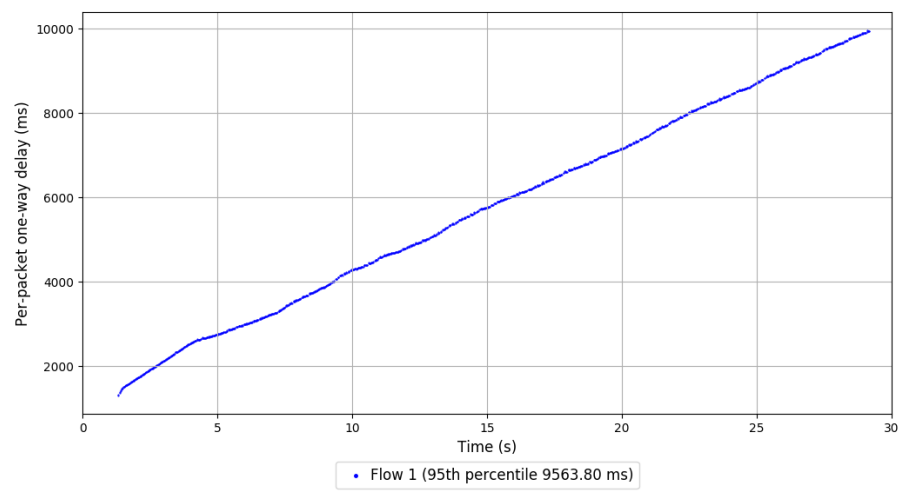
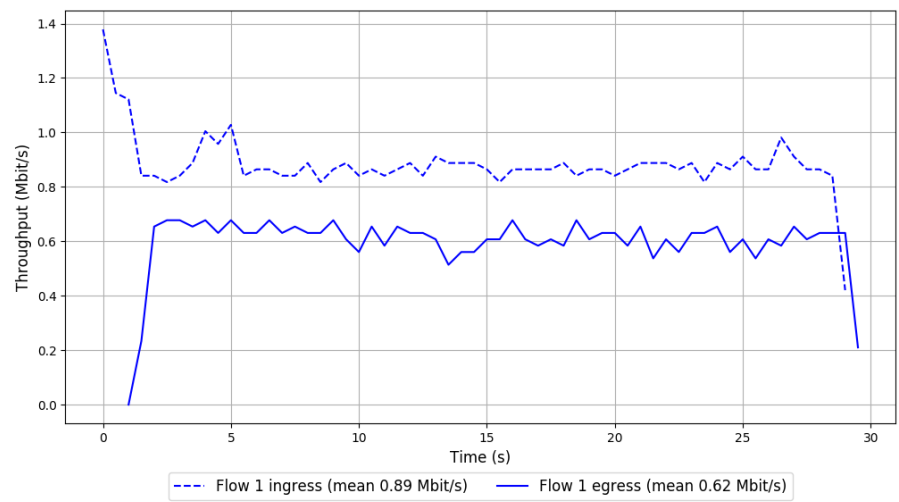
-- Flow 1:

Average throughput: 0.62 Mbit/s

95th percentile per-packet one-way delay: 9563.798 ms

Loss rate: 33.68%

Run 2: Report of Indigo-MusesT — Data Link

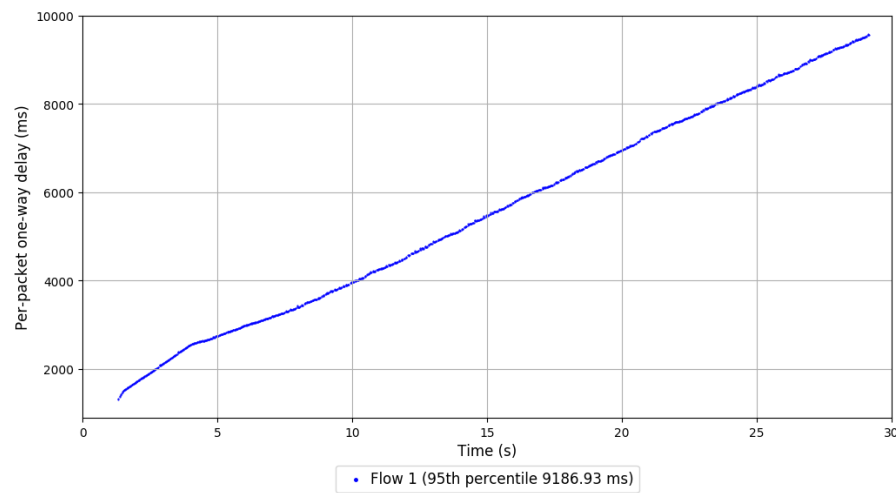
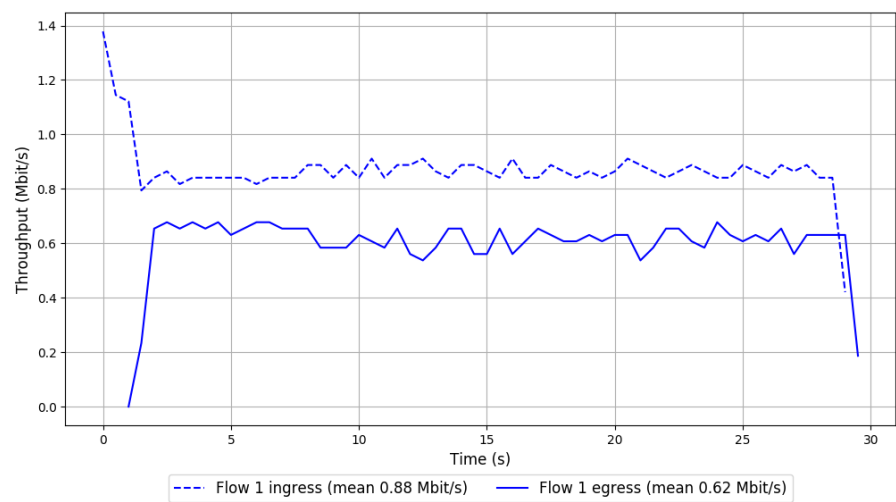


Run 3: Statistics of Indigo-MusesT

Start at: 2019-01-03 03:55:41
End at: 2019-01-03 03:56:11
Local clock offset: -2.787 ms
Remote clock offset: -3.912 ms

Below is generated by plot.py at 2019-01-03 04:16:59
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 9186.929 ms
Loss rate: 32.47%
-- Flow 1:
Average throughput: 0.62 Mbit/s
95th percentile per-packet one-way delay: 9186.929 ms
Loss rate: 32.47%

Run 3: Report of Indigo-MusesT — Data Link

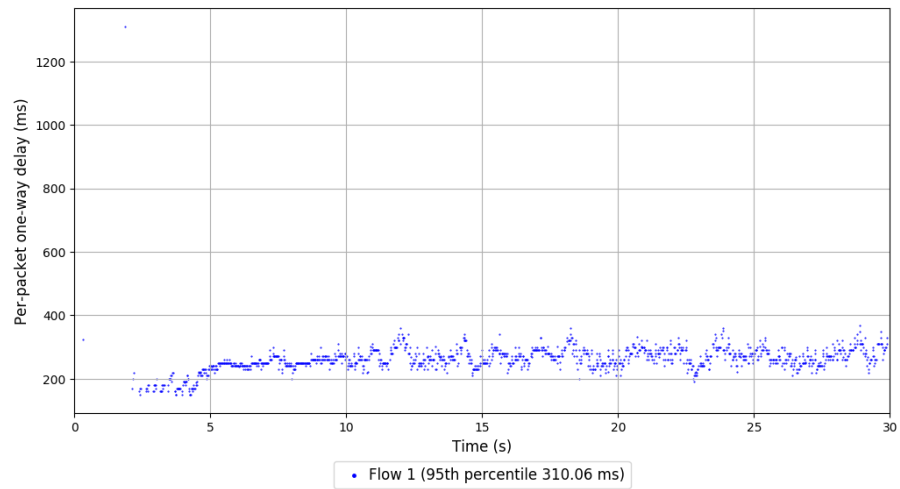
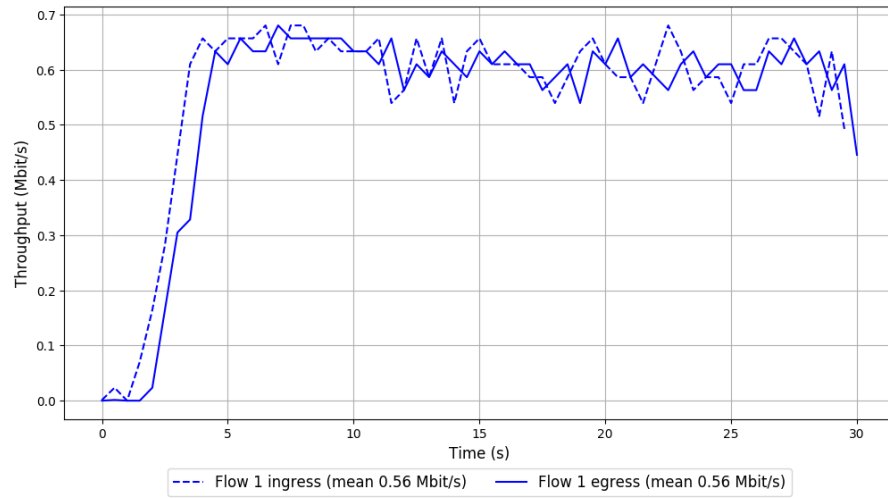


Run 1: Statistics of LEDBAT

Start at: 2019-01-03 03:22:43
End at: 2019-01-03 03:23:13
Local clock offset: -6.577 ms
Remote clock offset: -4.365 ms

Below is generated by plot.py at 2019-01-03 04:17:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 310.062 ms
Loss rate: 1.12%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 310.062 ms
Loss rate: 1.12%

Run 1: Report of LEDBAT — Data Link

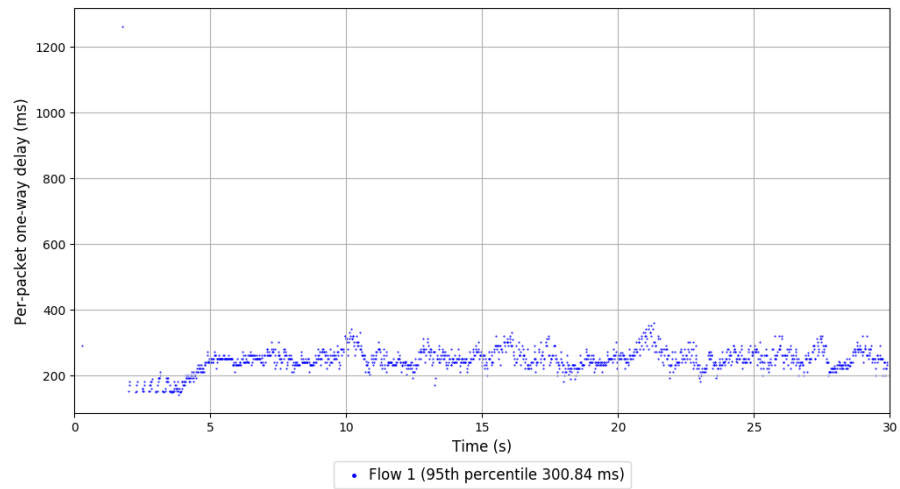
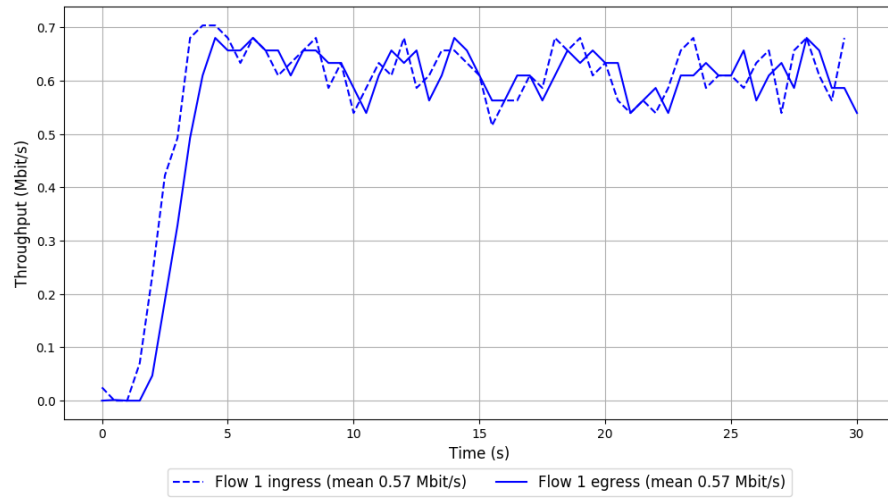


Run 2: Statistics of LEDBAT

Start at: 2019-01-03 03:44:19
End at: 2019-01-03 03:44:49
Local clock offset: -2.664 ms
Remote clock offset: -6.931 ms

Below is generated by plot.py at 2019-01-03 04:17:00
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 300.837 ms
Loss rate: 1.30%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 300.837 ms
Loss rate: 1.30%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

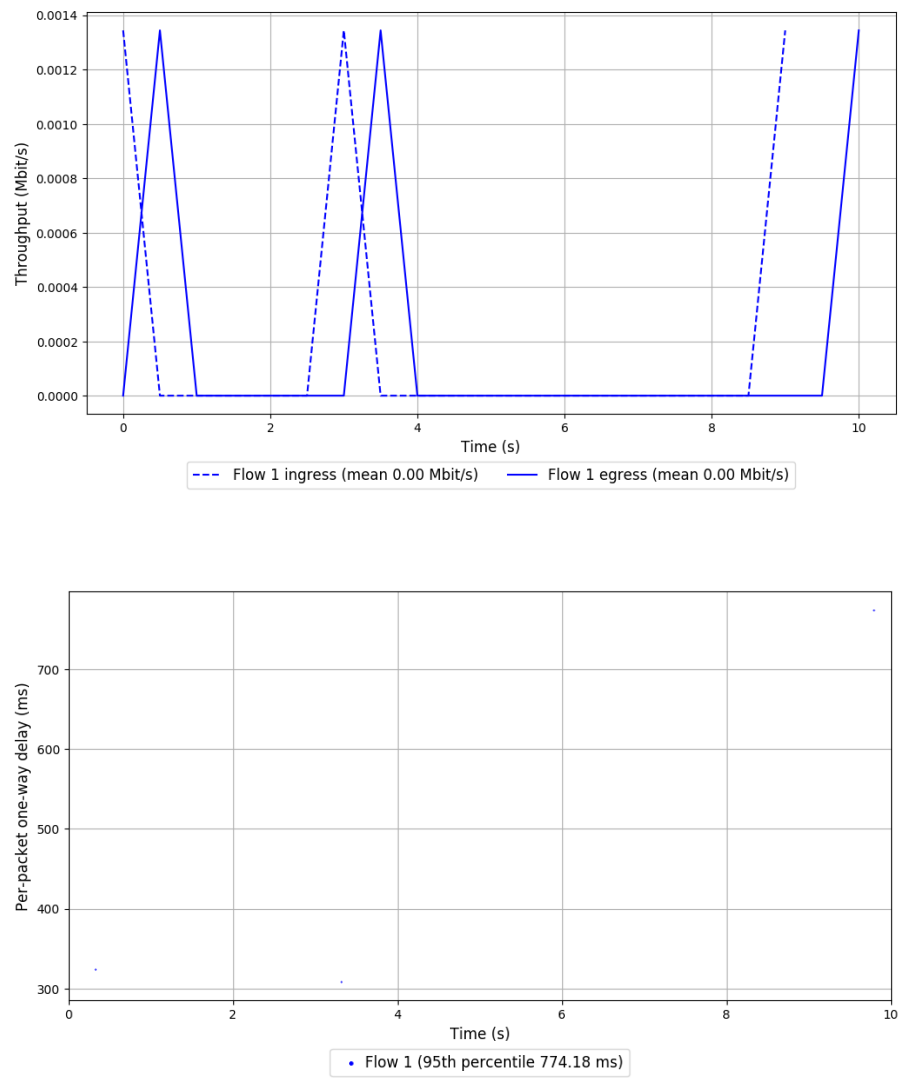
Start at: 2019-01-03 04:05:55

End at: 2019-01-03 04:06:25

Local clock offset: -5.127 ms

Remote clock offset: 4.368 ms

Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of PCC-Allegro

Start at: 2019-01-03 03:20:25

End at: 2019-01-03 03:20:55

Local clock offset: -6.518 ms

Remote clock offset: -0.602 ms

Below is generated by plot.py at 2019-01-03 04:17:19

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 26089.458 ms

Loss rate: 98.48%

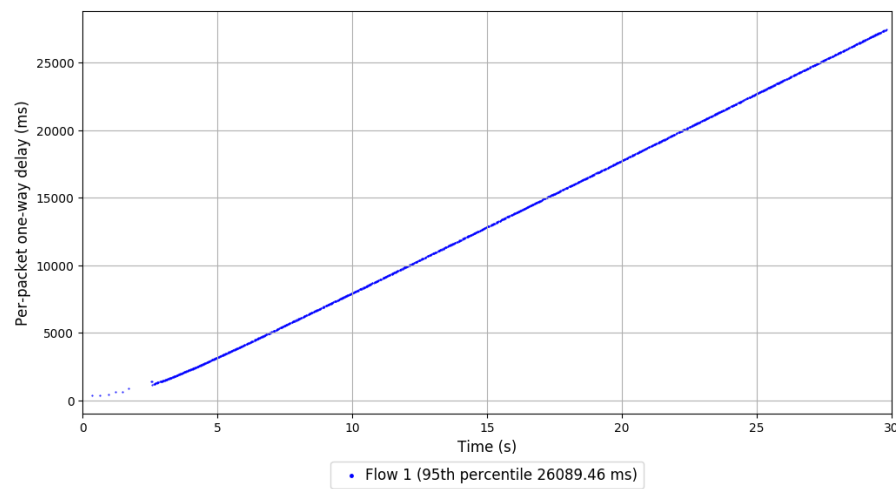
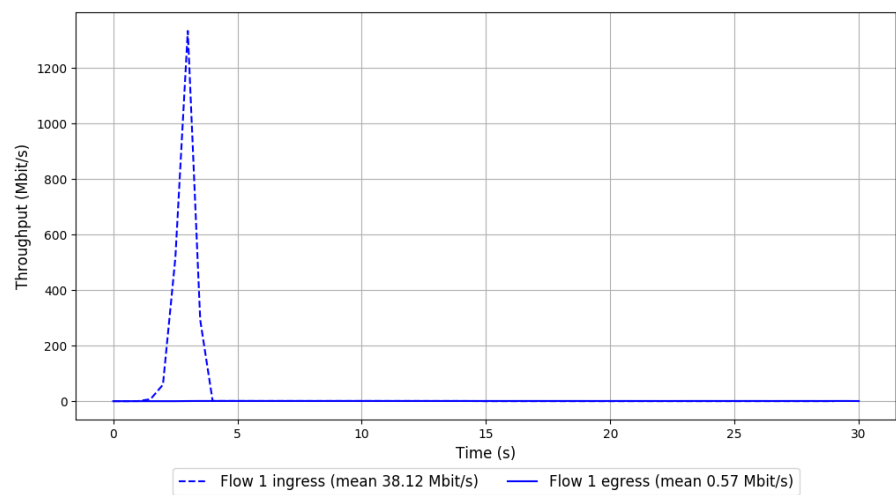
-- Flow 1:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 26089.458 ms

Loss rate: 98.48%

Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

Start at: 2019-01-03 03:42:02

End at: 2019-01-03 03:42:32

Local clock offset: -3.595 ms

Remote clock offset: -7.005 ms

Below is generated by plot.py at 2019-01-03 04:17:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 26098.151 ms

Loss rate: 98.49%

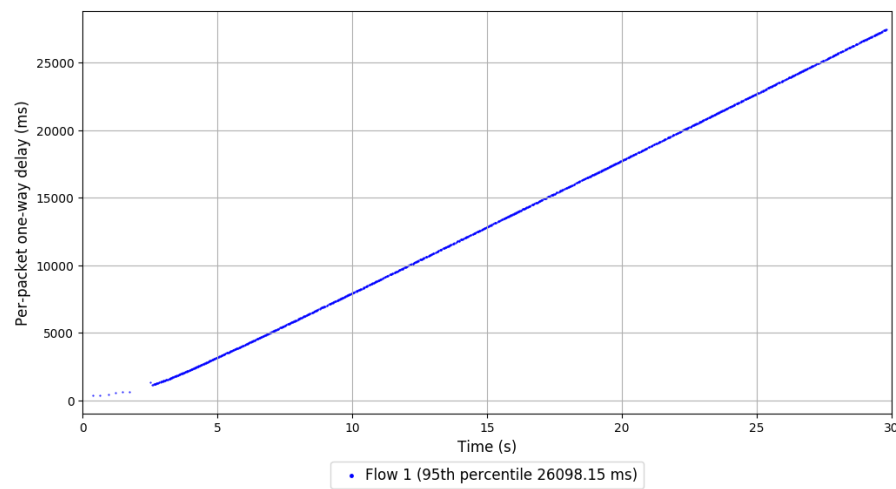
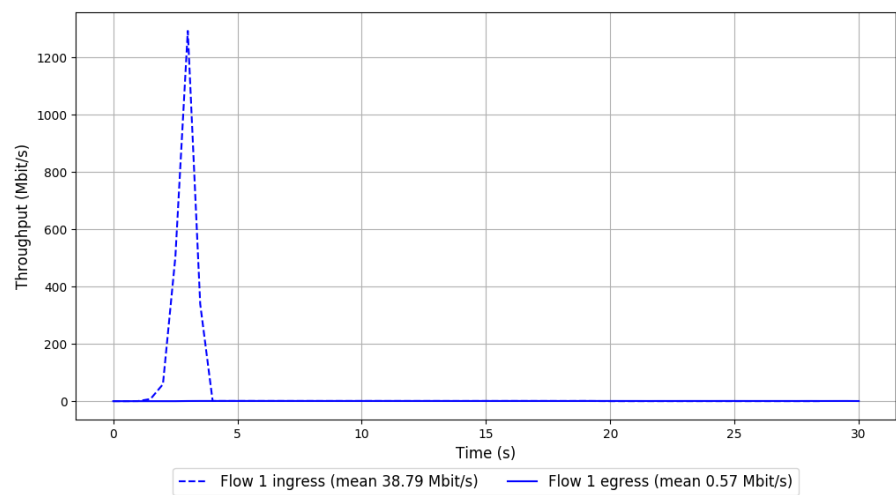
-- Flow 1:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 26098.151 ms

Loss rate: 98.49%

Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

Start at: 2019-01-03 04:03:37

End at: 2019-01-03 04:04:07

Local clock offset: -5.566 ms

Remote clock offset: -0.168 ms

Below is generated by plot.py at 2019-01-03 04:17:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 26013.416 ms

Loss rate: 98.52%

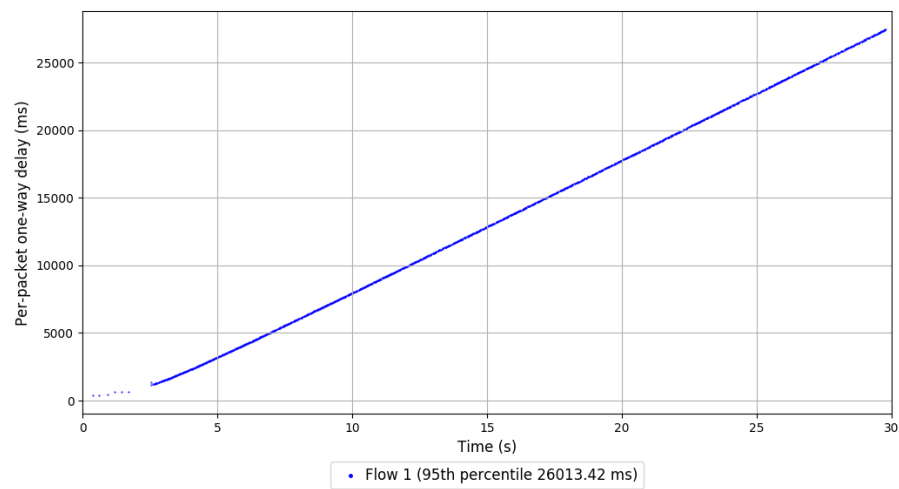
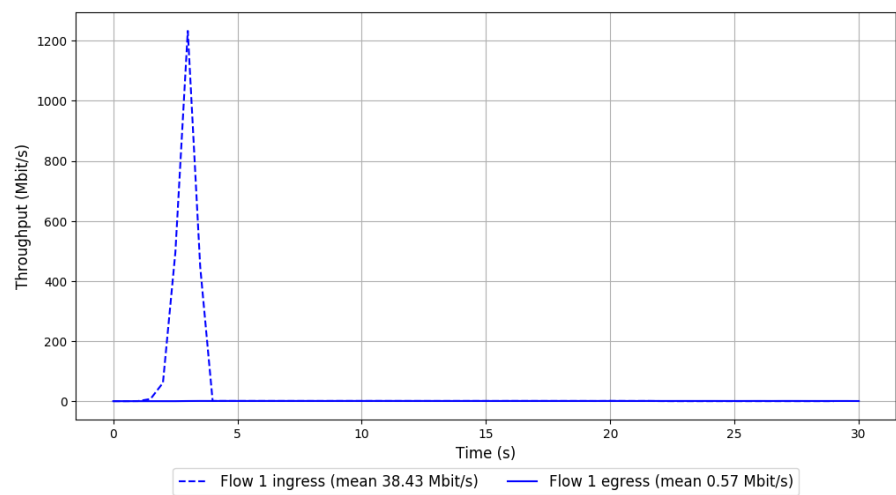
-- Flow 1:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 26013.416 ms

Loss rate: 98.52%

Run 3: Report of PCC-Allegro — Data Link

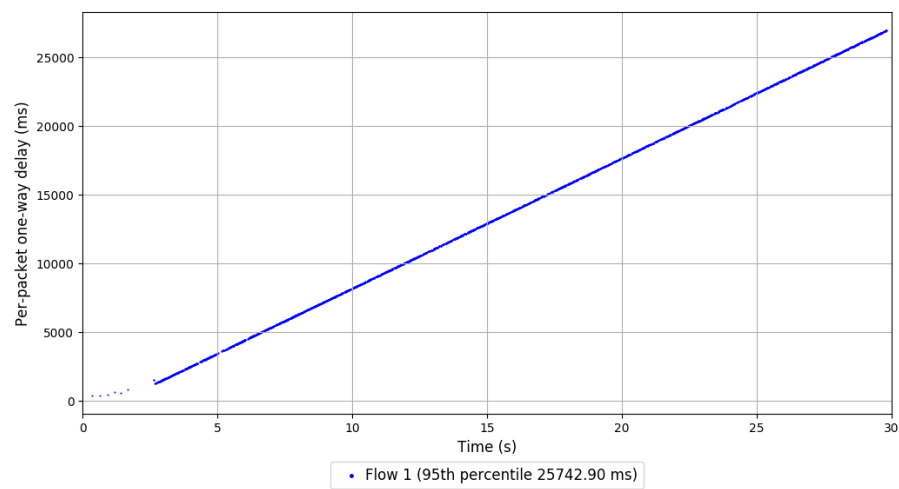
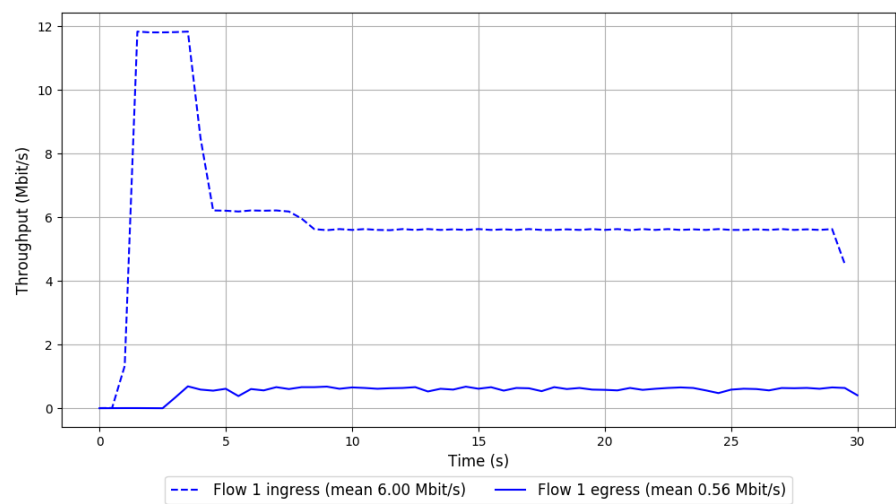



```
Run 1: Statistics of PCC-Expr

Start at: 2019-01-03 03:30:41
End at: 2019-01-03 03:31:11
Local clock offset: -5.198 ms
Remote clock offset: -5.356 ms

# Below is generated by plot.py at 2019-01-03 04:17:20
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 25742.896 ms
Loss rate: 90.78%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 25742.896 ms
Loss rate: 90.78%
```

Run 1: Report of PCC-Expr — Data Link

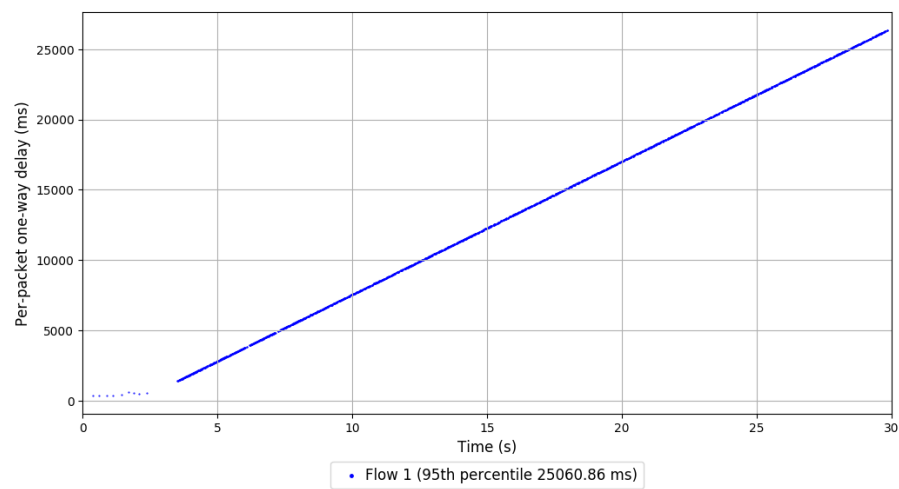
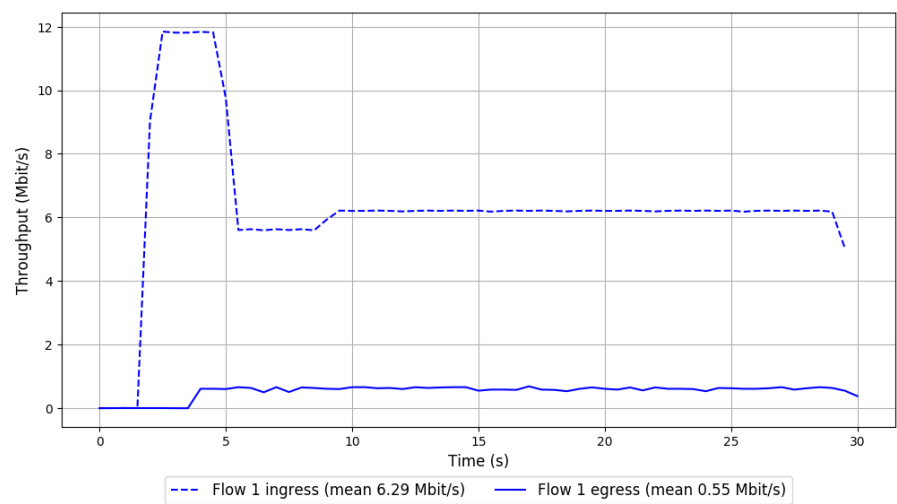


Run 2: Statistics of PCC-Expr

Start at: 2019-01-03 03:52:16
End at: 2019-01-03 03:52:46
Local clock offset: -3.062 ms
Remote clock offset: -6.881 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 25060.864 ms
Loss rate: 91.40%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 25060.864 ms
Loss rate: 91.40%

Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

Start at: 2019-01-03 04:13:53

End at: 2019-01-03 04:14:23

Local clock offset: -5.903 ms

Remote clock offset: 2.058 ms

Below is generated by plot.py at 2019-01-03 04:17:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 25683.789 ms

Loss rate: 91.03%

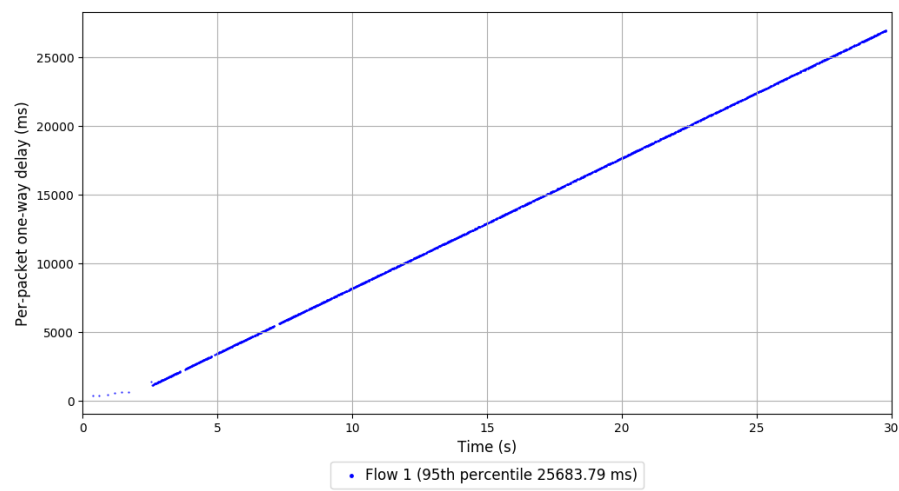
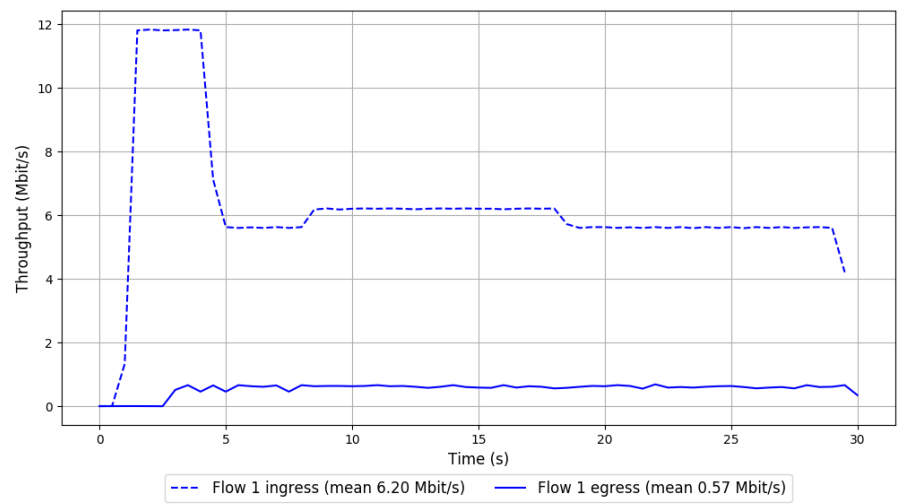
-- Flow 1:

Average throughput: 0.57 Mbit/s

95th percentile per-packet one-way delay: 25683.789 ms

Loss rate: 91.03%

Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2019-01-03 03:14:44

End at: 2019-01-03 03:15:14

Local clock offset: -7.279 ms

Remote clock offset: 0.226 ms

Below is generated by plot.py at 2019-01-03 04:17:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.60 Mbit/s

95th percentile per-packet one-way delay: 8836.780 ms

Loss rate: 32.67%

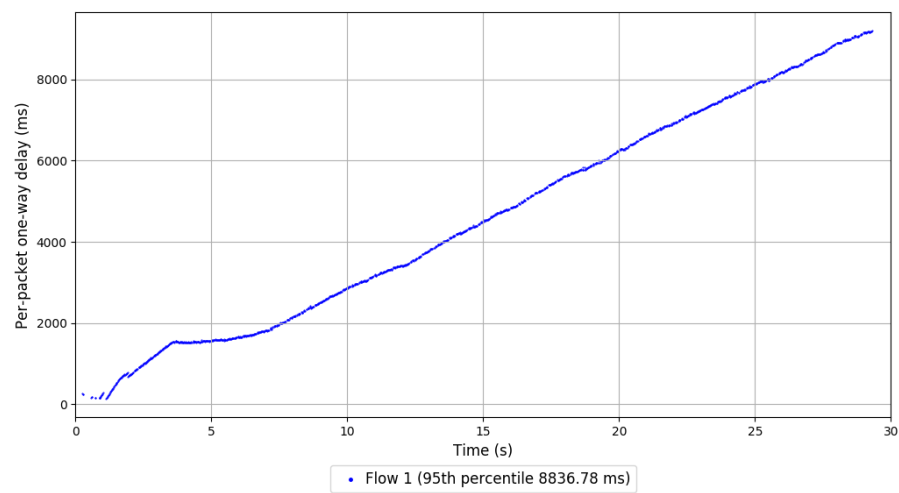
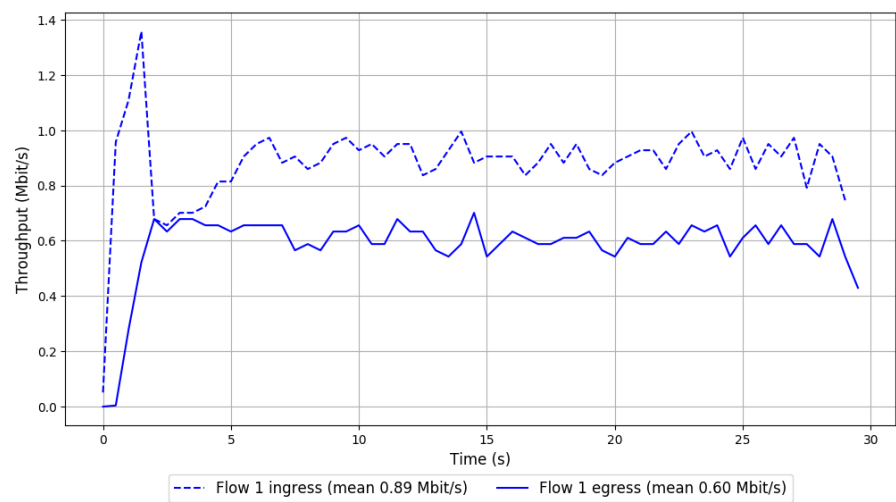
-- Flow 1:

Average throughput: 0.60 Mbit/s

95th percentile per-packet one-way delay: 8836.780 ms

Loss rate: 32.67%

Run 1: Report of QUIC Cubic — Data Link

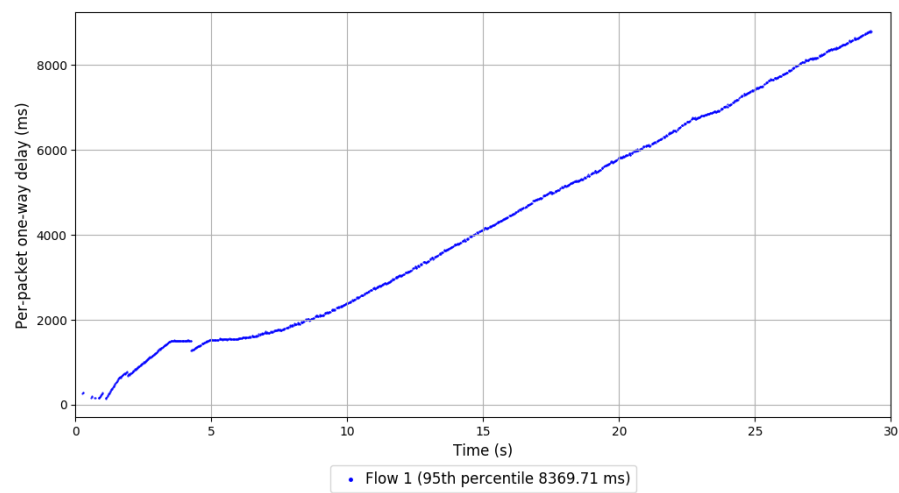
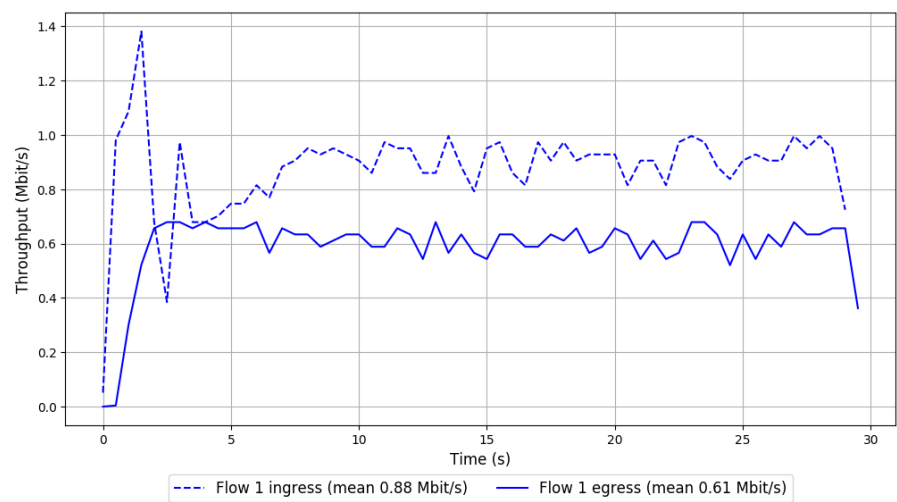


Run 2: Statistics of QUIC Cubic

Start at: 2019-01-03 03:36:21
End at: 2019-01-03 03:36:51
Local clock offset: -4.255 ms
Remote clock offset: -2.426 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 8369.712 ms
Loss rate: 31.66%
-- Flow 1:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 8369.712 ms
Loss rate: 31.66%

Run 2: Report of QUIC Cubic — Data Link

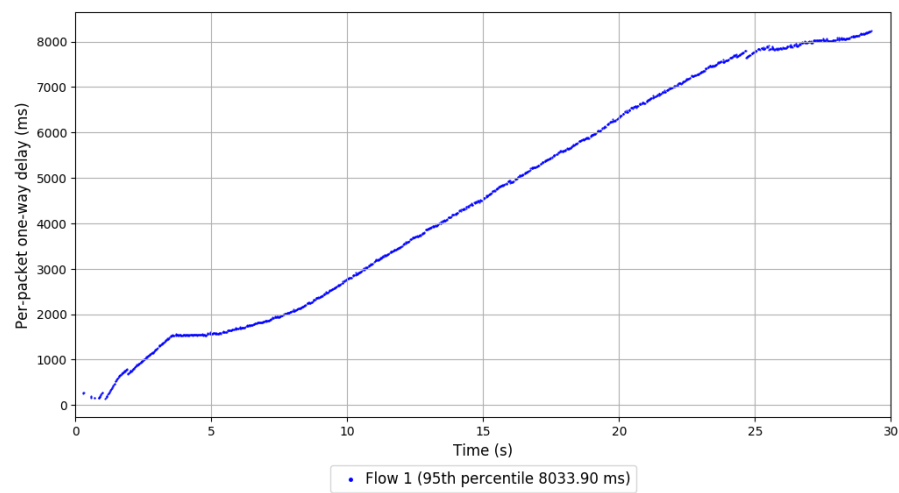
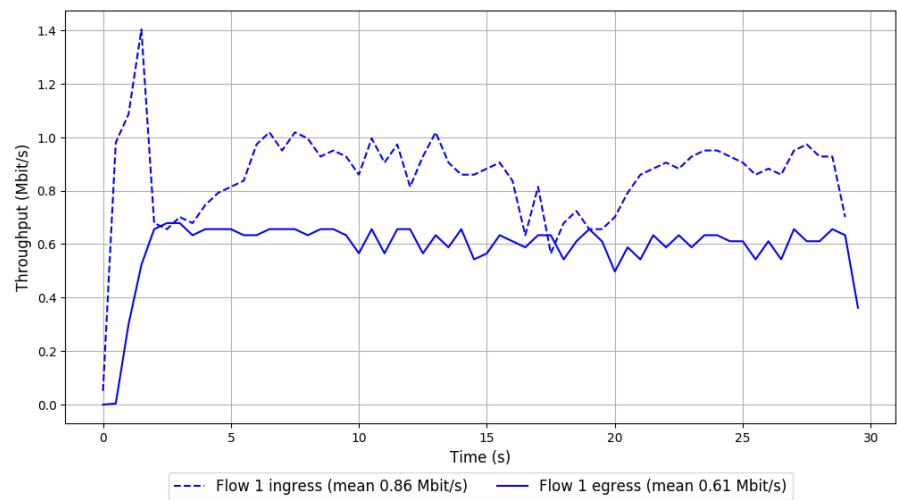


Run 3: Statistics of QUIC Cubic

Start at: 2019-01-03 03:57:57
End at: 2019-01-03 03:58:27
Local clock offset: -4.261 ms
Remote clock offset: -2.368 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 8033.904 ms
Loss rate: 30.15%
-- Flow 1:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 8033.904 ms
Loss rate: 30.15%

Run 3: Report of QUIC Cubic — Data Link

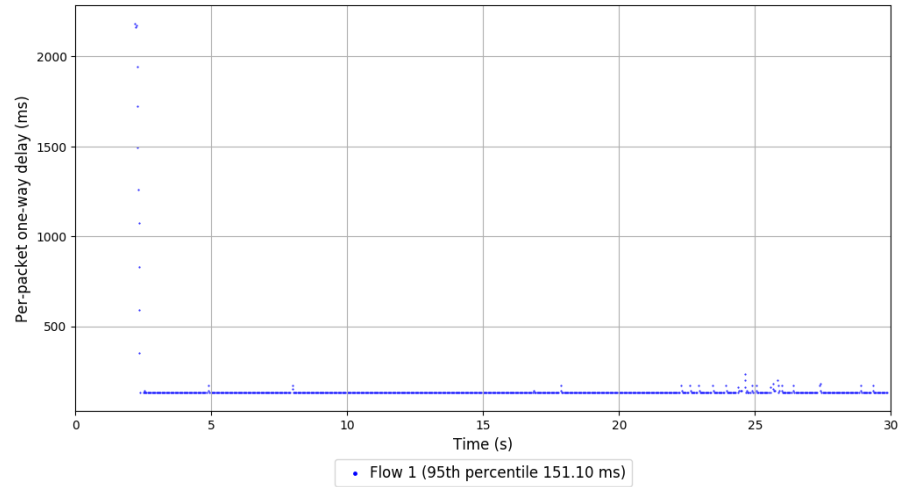
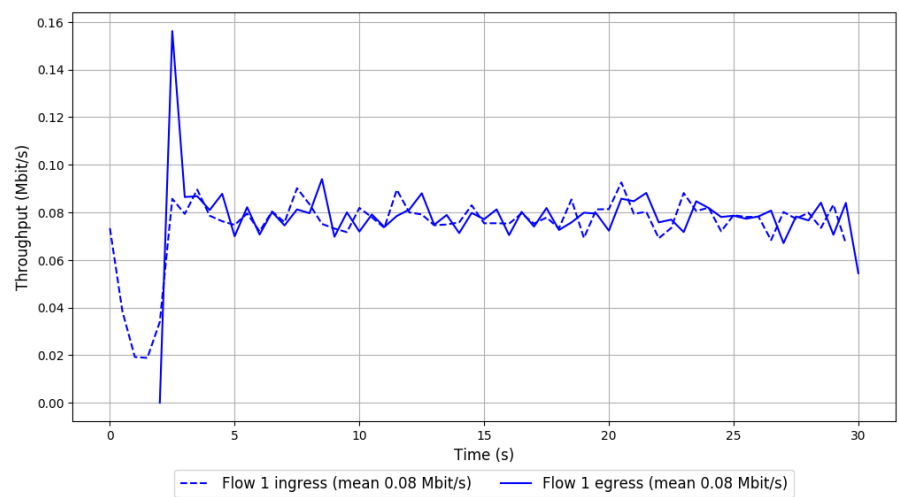


Run 1: Statistics of SCReAM

Start at: 2019-01-03 03:31:49
End at: 2019-01-03 03:32:19
Local clock offset: -5.018 ms
Remote clock offset: -1.796 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 151.105 ms
Loss rate: 0.68%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 151.105 ms
Loss rate: 0.68%

Run 1: Report of SReAM — Data Link

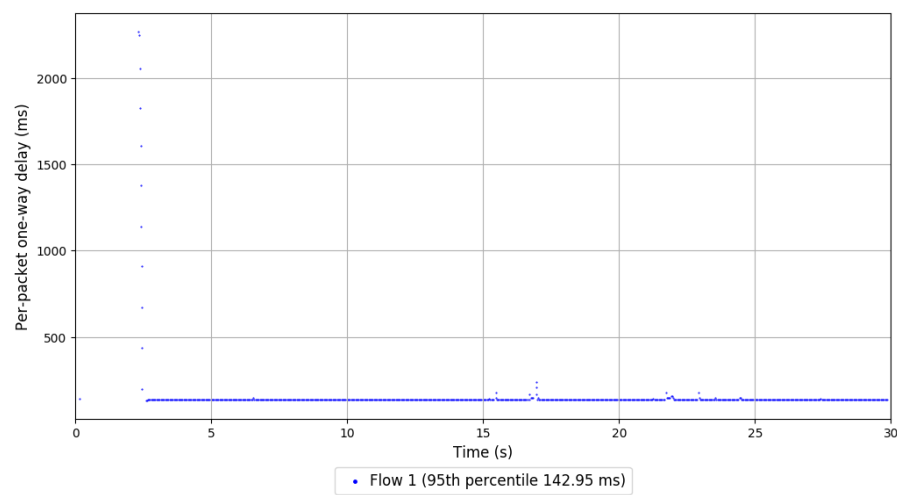
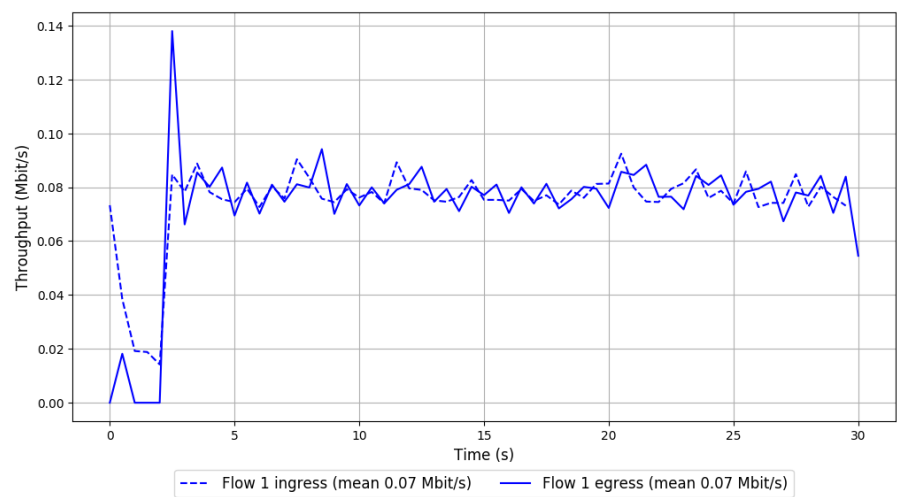


Run 2: Statistics of SCReAM

Start at: 2019-01-03 03:53:25
End at: 2019-01-03 03:53:55
Local clock offset: -2.192 ms
Remote clock offset: -5.829 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.07 Mbit/s
95th percentile per-packet one-way delay: 142.954 ms
Loss rate: 0.82%
-- Flow 1:
Average throughput: 0.07 Mbit/s
95th percentile per-packet one-way delay: 142.954 ms
Loss rate: 0.82%

Run 2: Report of SReAM — Data Link



Run 3: Statistics of SCReAM

Start at: 2019-01-03 04:15:01

End at: 2019-01-03 04:15:31

Local clock offset: -6.064 ms

Remote clock offset: 1.879 ms

Below is generated by plot.py at 2019-01-03 04:17:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 185.418 ms

Loss rate: 0.82%

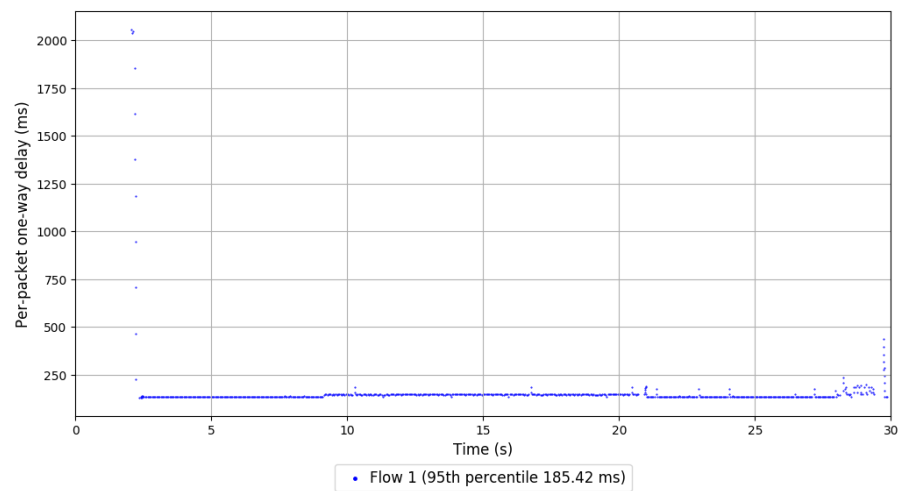
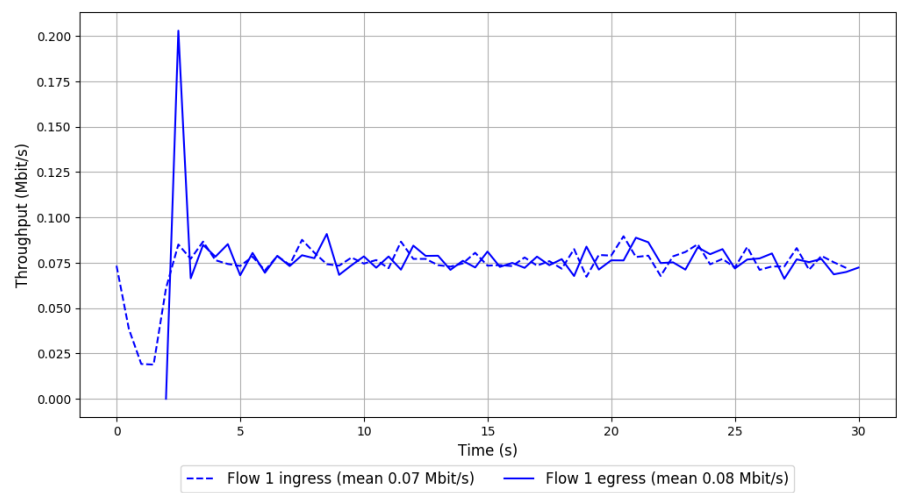
-- Flow 1:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 185.418 ms

Loss rate: 0.82%

Run 3: Report of SReAM — Data Link

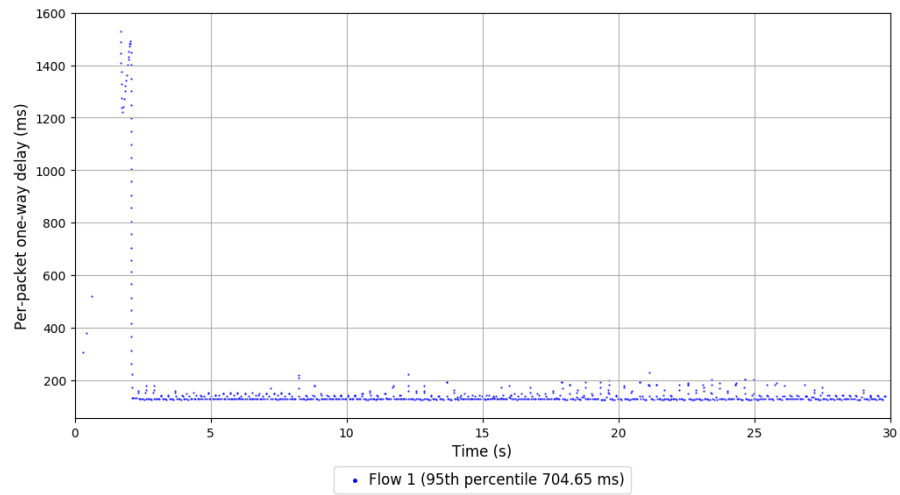
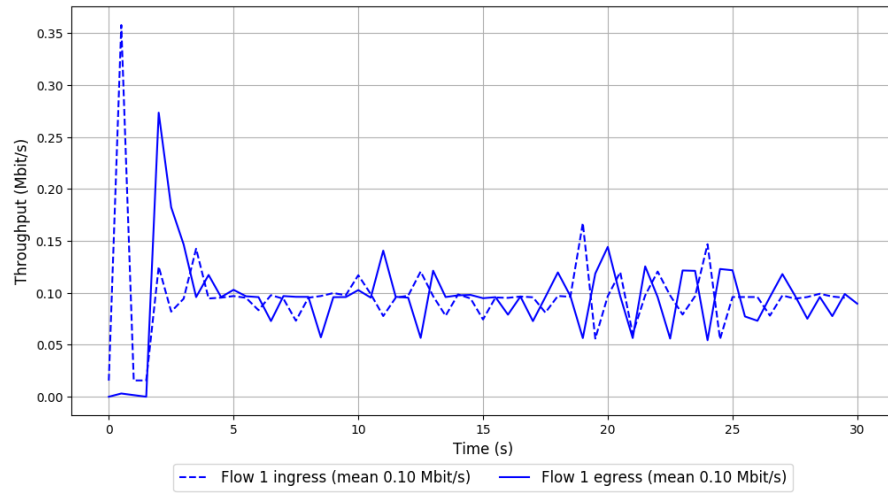


Run 1: Statistics of Sprout

Start at: 2019-01-03 03:21:35
End at: 2019-01-03 03:22:05
Local clock offset: -6.557 ms
Remote clock offset: -0.486 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 704.655 ms
Loss rate: 0.84%
-- Flow 1:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 704.655 ms
Loss rate: 0.84%

Run 1: Report of Sprout — Data Link

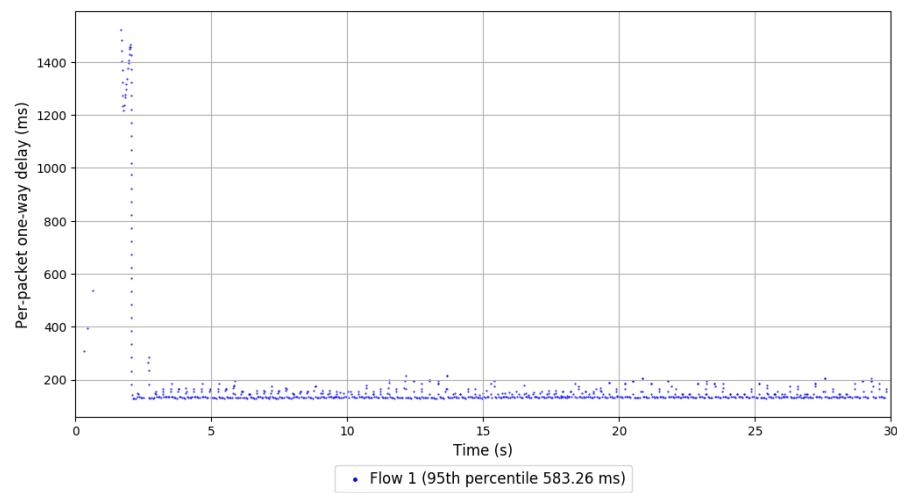
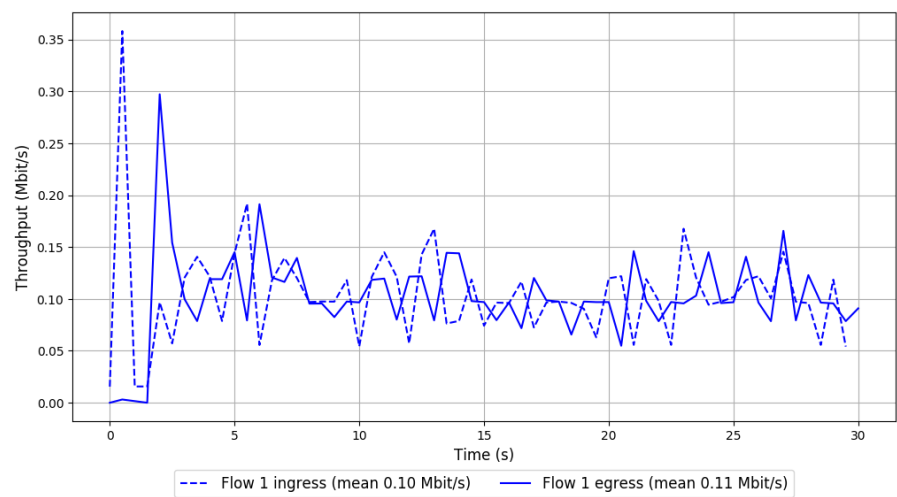


Run 2: Statistics of Sprout

Start at: 2019-01-03 03:43:11
End at: 2019-01-03 03:43:41
Local clock offset: -3.503 ms
Remote clock offset: -6.943 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 583.265 ms
Loss rate: 0.13%
-- Flow 1:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 583.265 ms
Loss rate: 0.13%

Run 2: Report of Sprout — Data Link

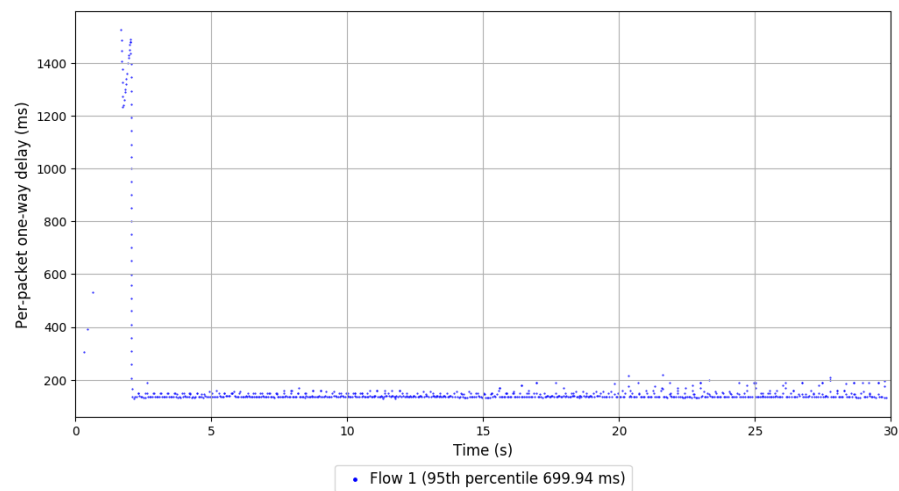
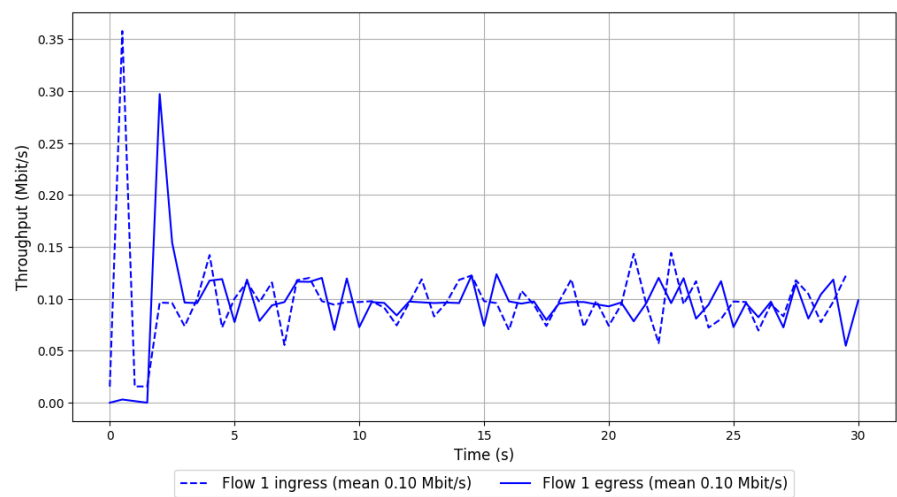


Run 3: Statistics of Sprout

Start at: 2019-01-03 04:04:47
End at: 2019-01-03 04:05:17
Local clock offset: -5.772 ms
Remote clock offset: 0.273 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 699.939 ms
Loss rate: 1.21%
-- Flow 1:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 699.939 ms
Loss rate: 1.21%

Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

Start at: 2019-01-03 03:15:52

End at: 2019-01-03 03:16:23

Local clock offset: -7.271 ms

Remote clock offset: 0.117 ms

Below is generated by plot.py at 2019-01-03 04:17:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.59 Mbit/s

95th percentile per-packet one-way delay: 923.553 ms

Loss rate: 2.39%

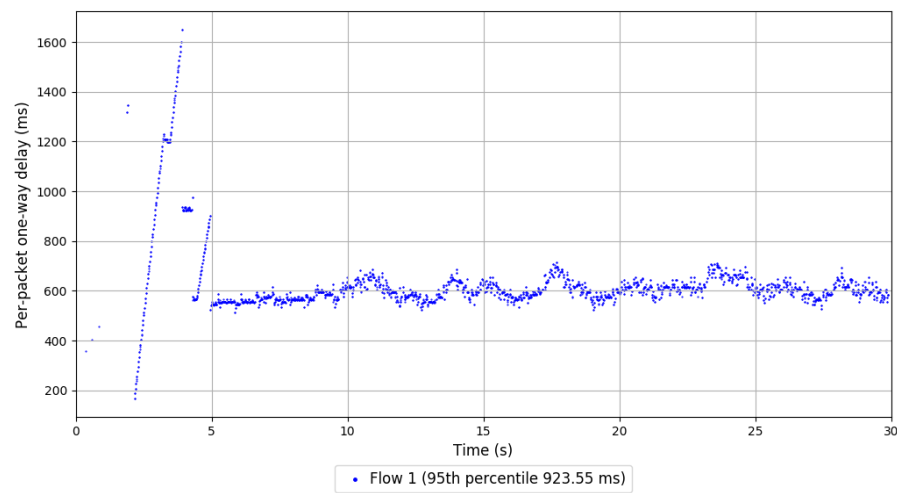
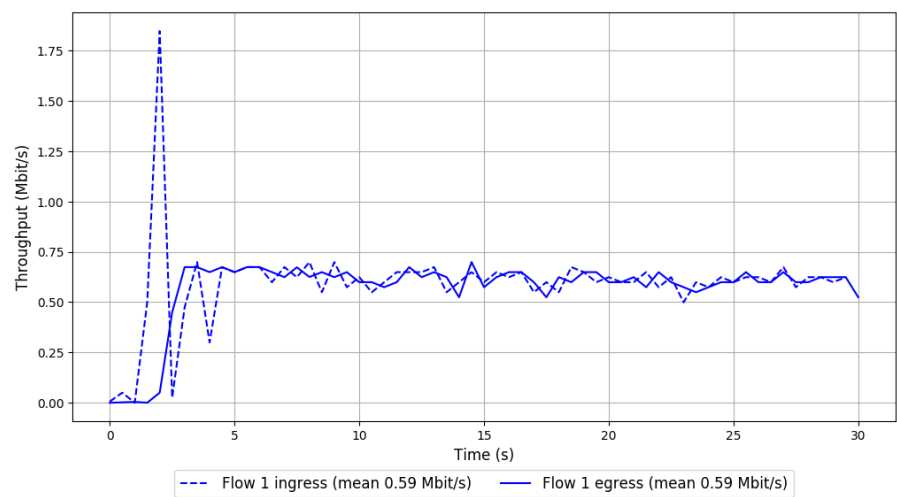
-- Flow 1:

Average throughput: 0.59 Mbit/s

95th percentile per-packet one-way delay: 923.553 ms

Loss rate: 2.39%

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

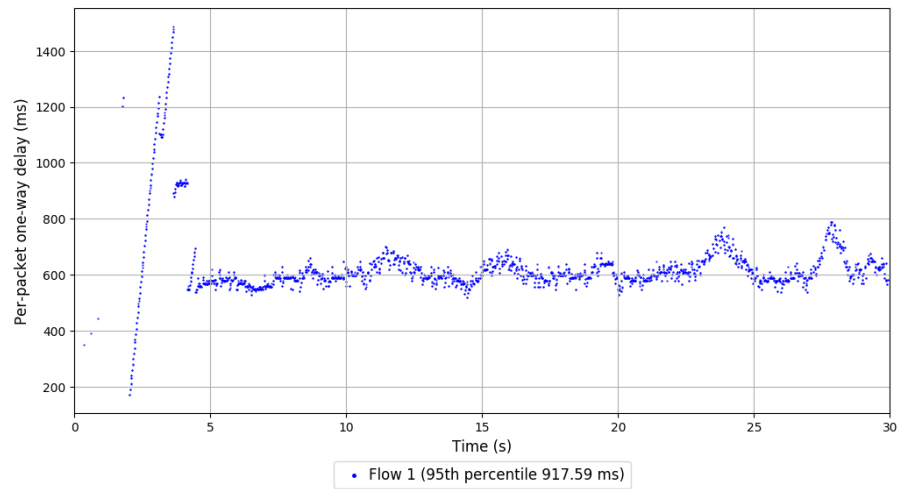
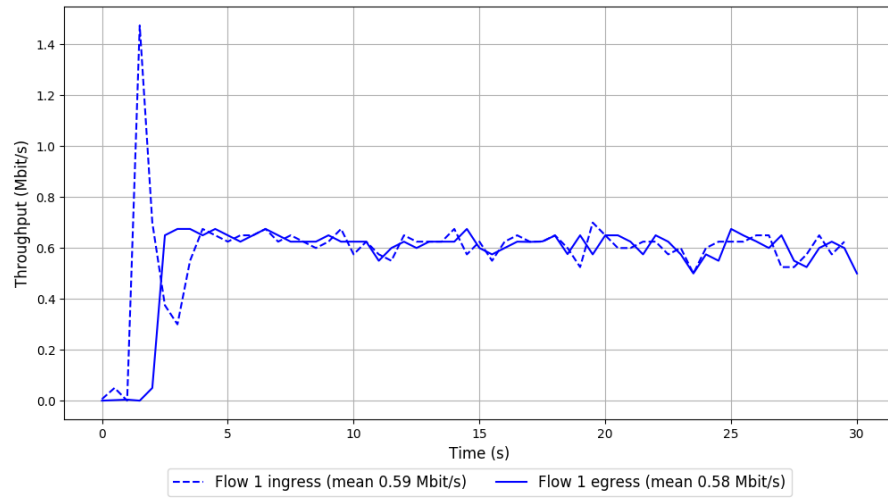


Run 2: Statistics of TaoVA-100x

Start at: 2019-01-03 03:37:29
End at: 2019-01-03 03:37:59
Local clock offset: -3.283 ms
Remote clock offset: -6.408 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 917.588 ms
Loss rate: 2.40%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 917.588 ms
Loss rate: 2.40%

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



Run 3: Statistics of TaoVA-100x

Start at: 2019-01-03 03:59:05

End at: 2019-01-03 03:59:35

Local clock offset: -3.798 ms

Remote clock offset: 1.825 ms

Below is generated by plot.py at 2019-01-03 04:17:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.59 Mbit/s

95th percentile per-packet one-way delay: 925.657 ms

Loss rate: 2.32%

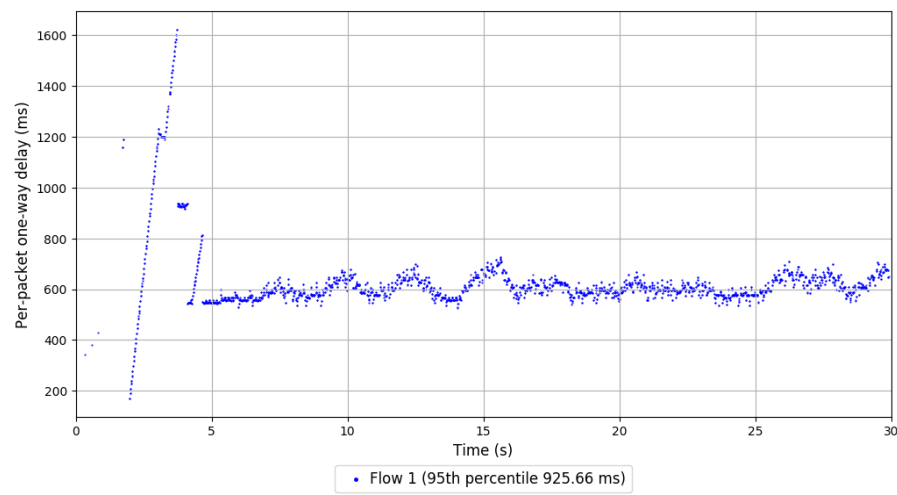
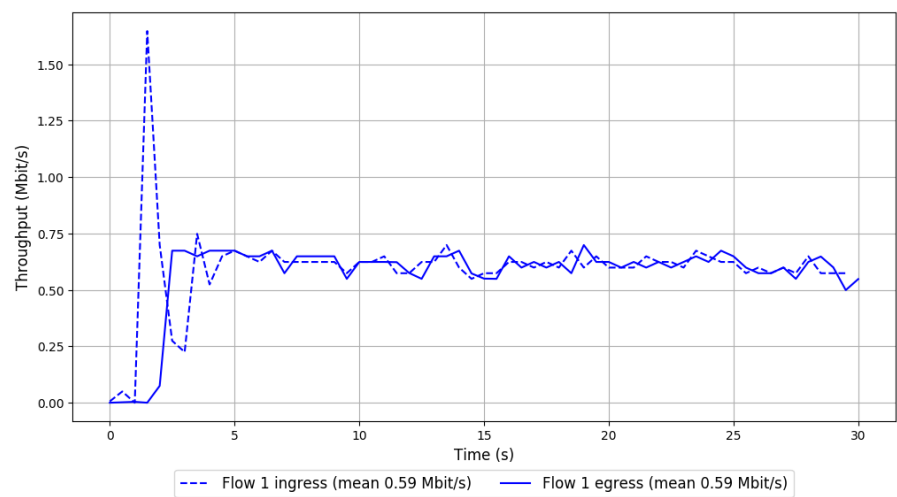
-- Flow 1:

Average throughput: 0.59 Mbit/s

95th percentile per-packet one-way delay: 925.657 ms

Loss rate: 2.32%

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

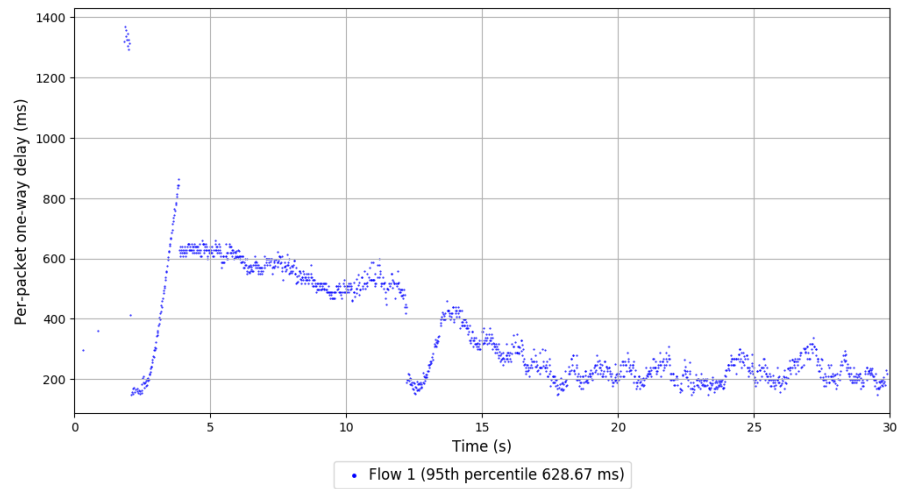
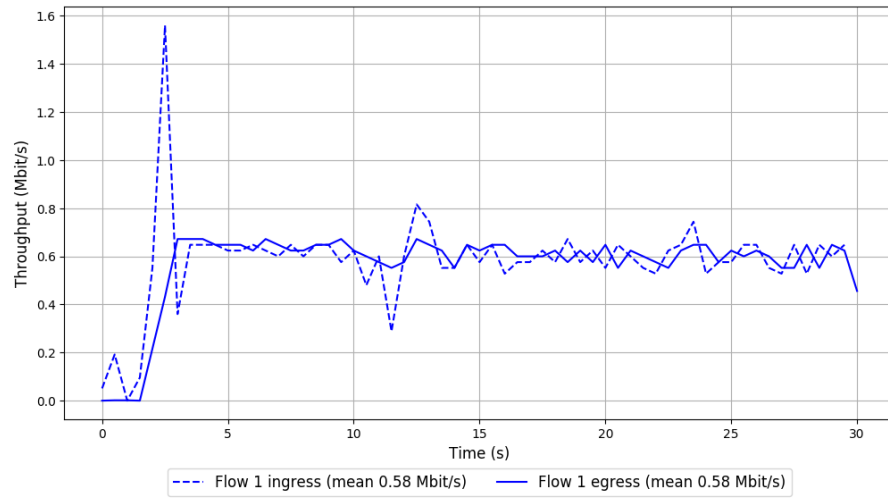


Run 1: Statistics of TCP Vegas

Start at: 2019-01-03 03:32:57
End at: 2019-01-03 03:33:27
Local clock offset: -4.045 ms
Remote clock offset: -5.654 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 628.674 ms
Loss rate: 1.17%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 628.674 ms
Loss rate: 1.17%

Run 1: Report of TCP Vegas — Data Link

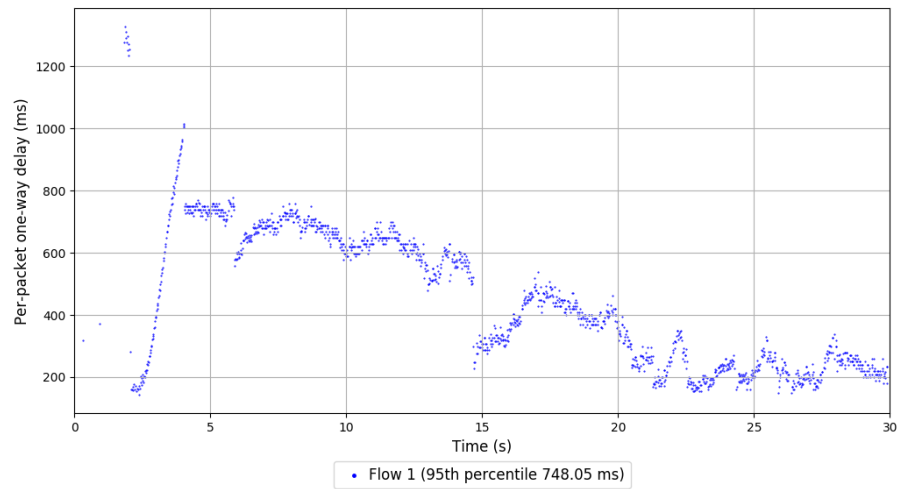
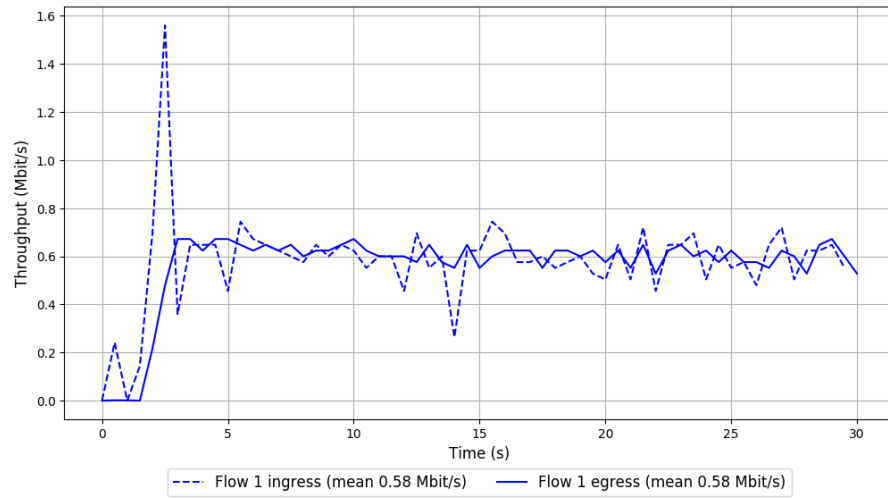


Run 2: Statistics of TCP Vegas

Start at: 2019-01-03 03:54:33
End at: 2019-01-03 03:55:03
Local clock offset: -2.276 ms
Remote clock offset: -4.677 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 748.052 ms
Loss rate: 0.97%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 748.052 ms
Loss rate: 0.97%

Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2019-01-03 04:16:09

End at: 2019-01-03 04:16:39

Local clock offset: -6.147 ms

Remote clock offset: 6.123 ms

Below is generated by plot.py at 2019-01-03 04:17:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.59 Mbit/s

95th percentile per-packet one-way delay: 766.227 ms

Loss rate: 1.16%

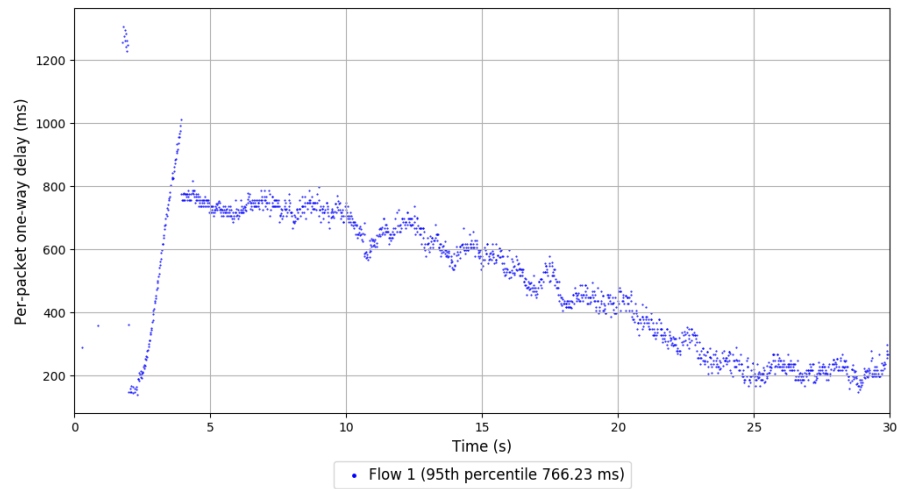
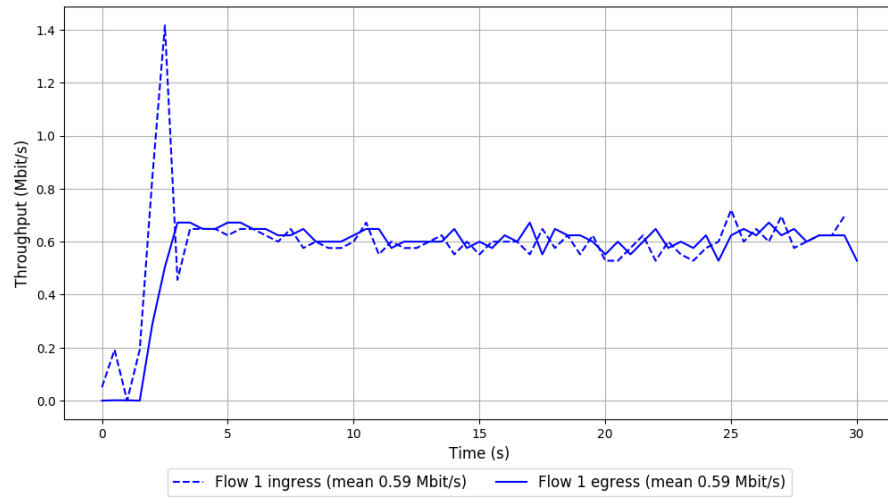
-- Flow 1:

Average throughput: 0.59 Mbit/s

95th percentile per-packet one-way delay: 766.227 ms

Loss rate: 1.16%

Run 3: Report of TCP Vegas — Data Link

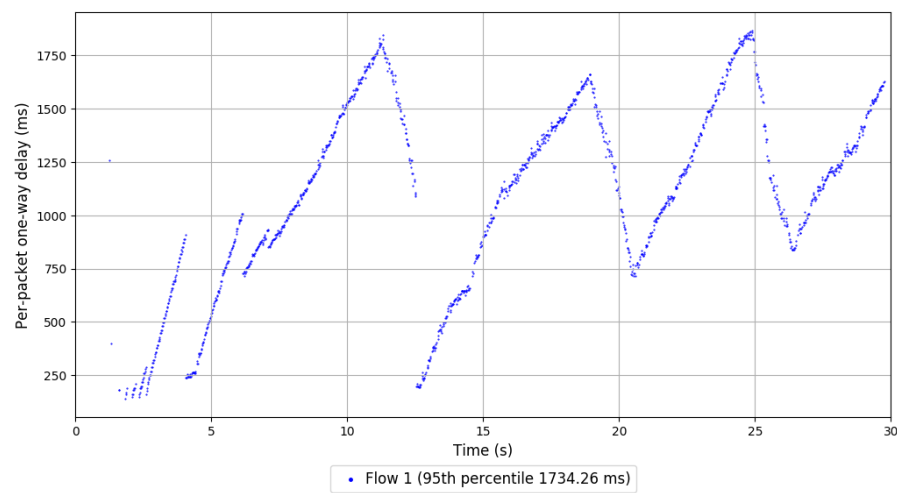
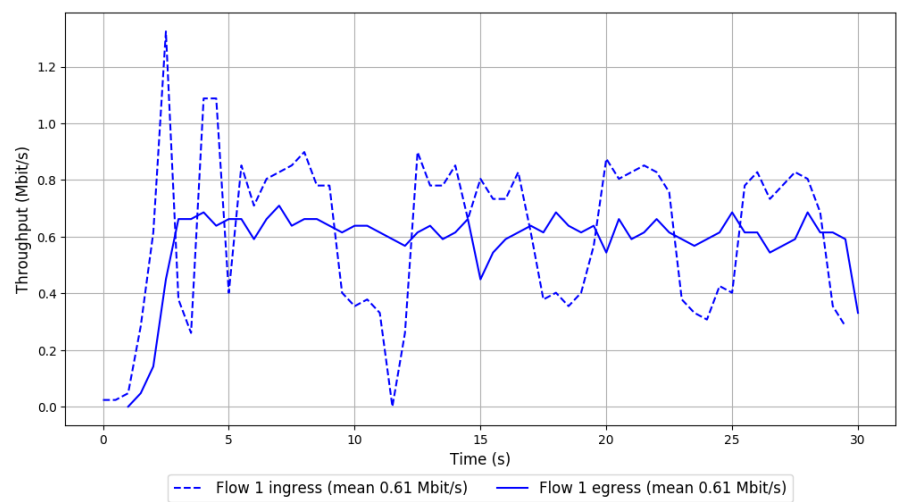


Run 1: Statistics of Verus

Start at: 2019-01-03 03:19:17
End at: 2019-01-03 03:19:47
Local clock offset: -7.353 ms
Remote clock offset: -4.057 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 1734.259 ms
Loss rate: 5.26%
-- Flow 1:
Average throughput: 0.61 Mbit/s
95th percentile per-packet one-way delay: 1734.259 ms
Loss rate: 5.26%

Run 1: Report of Verus — Data Link



Run 2: Statistics of Verus

Start at: 2019-01-03 03:40:54

End at: 2019-01-03 03:41:24

Local clock offset: -2.938 ms

Remote clock offset: -6.59 ms

Below is generated by plot.py at 2019-01-03 04:17:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.61 Mbit/s

95th percentile per-packet one-way delay: 1703.215 ms

Loss rate: 2.54%

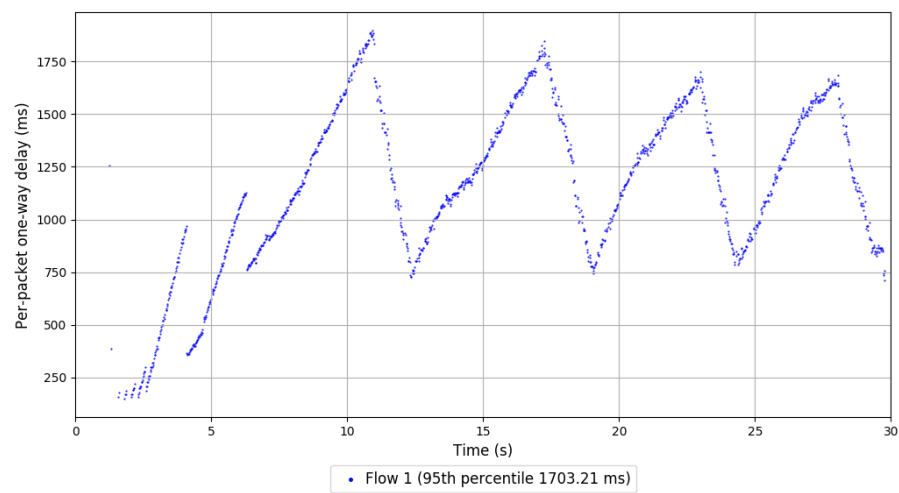
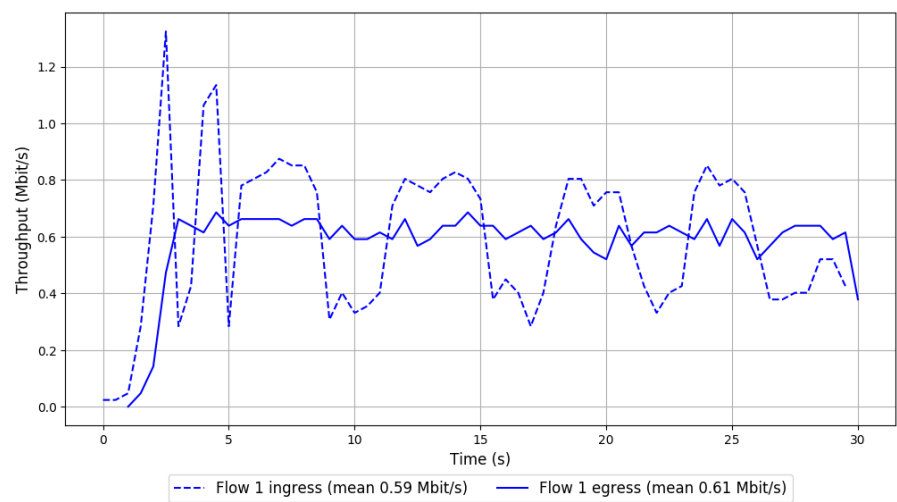
-- Flow 1:

Average throughput: 0.61 Mbit/s

95th percentile per-packet one-way delay: 1703.215 ms

Loss rate: 2.54%

Run 2: Report of Verus — Data Link

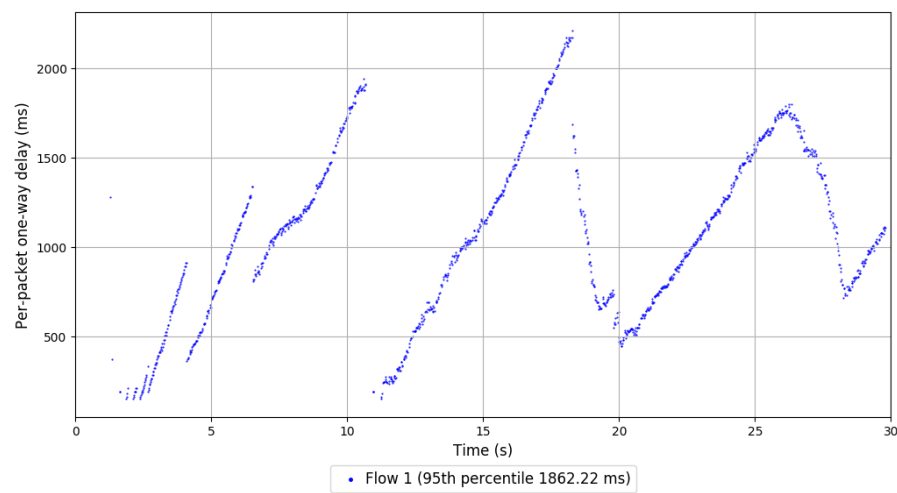
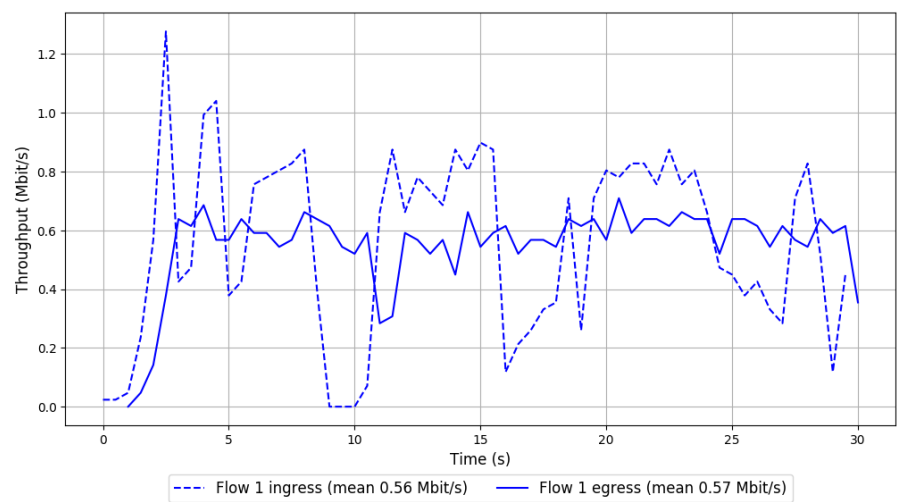


Run 3: Statistics of Verus

Start at: 2019-01-03 04:02:29
End at: 2019-01-03 04:02:59
Local clock offset: -5.341 ms
Remote clock offset: -0.432 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 1862.216 ms
Loss rate: 2.34%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 1862.216 ms
Loss rate: 2.34%

Run 3: Report of Verus — Data Link

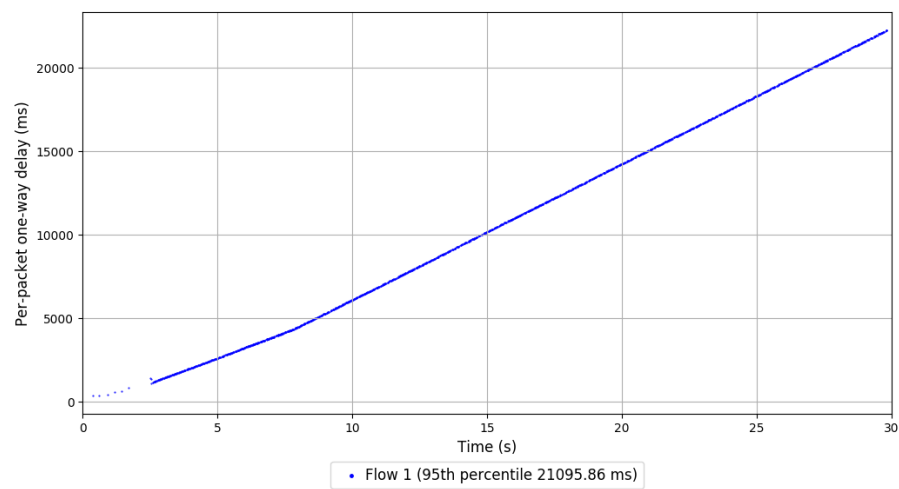
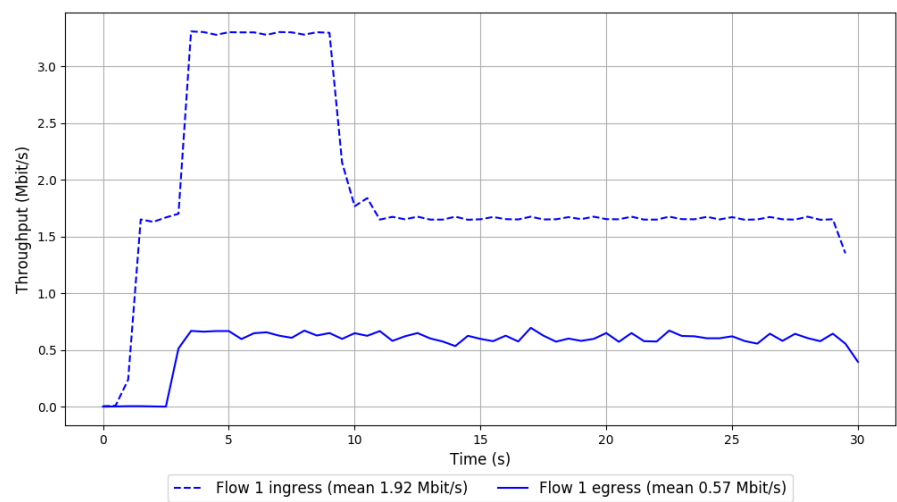


Run 1: Statistics of PCC-Vivace

Start at: 2019-01-03 03:27:16
End at: 2019-01-03 03:27:46
Local clock offset: -6.326 ms
Remote clock offset: -5.003 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21095.857 ms
Loss rate: 70.79%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 21095.857 ms
Loss rate: 70.79%

Run 1: Report of PCC-Vivace — Data Link

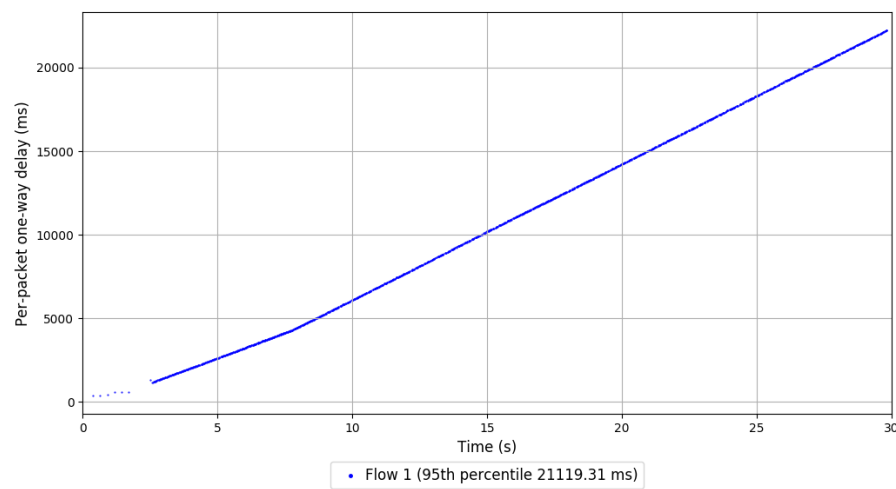
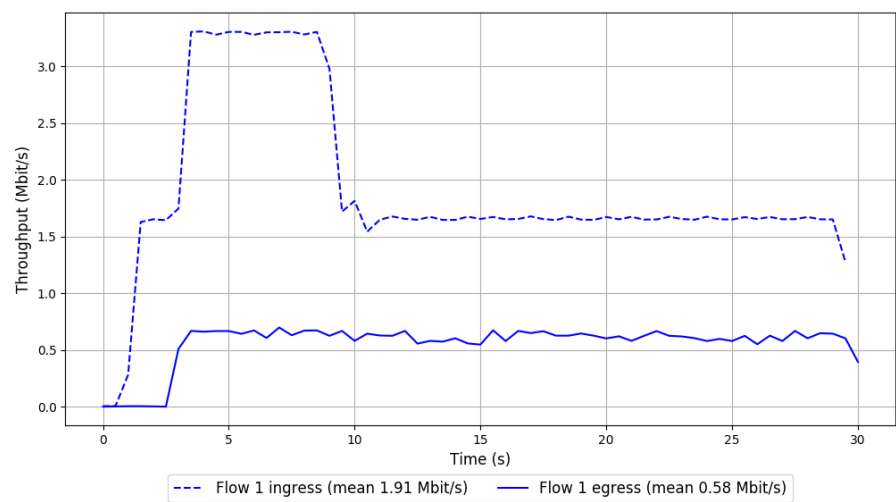


Run 2: Statistics of PCC-Vivace

Start at: 2019-01-03 03:48:51
End at: 2019-01-03 03:49:21
Local clock offset: -3.143 ms
Remote clock offset: -7.552 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 21119.314 ms
Loss rate: 70.15%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 21119.314 ms
Loss rate: 70.15%

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

Start at: 2019-01-03 04:10:27

End at: 2019-01-03 04:10:57

Local clock offset: -5.635 ms

Remote clock offset: 1.608 ms

Below is generated by plot.py at 2019-01-03 04:17:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.58 Mbit/s

95th percentile per-packet one-way delay: 21067.254 ms

Loss rate: 70.29%

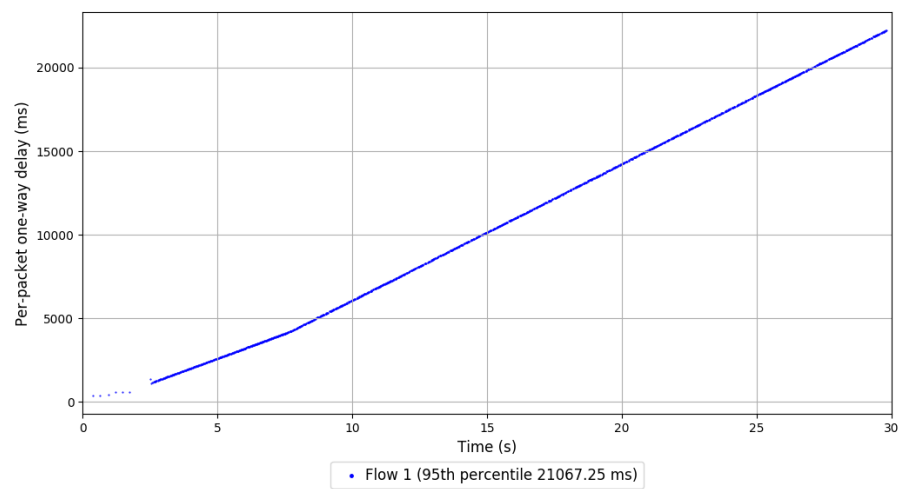
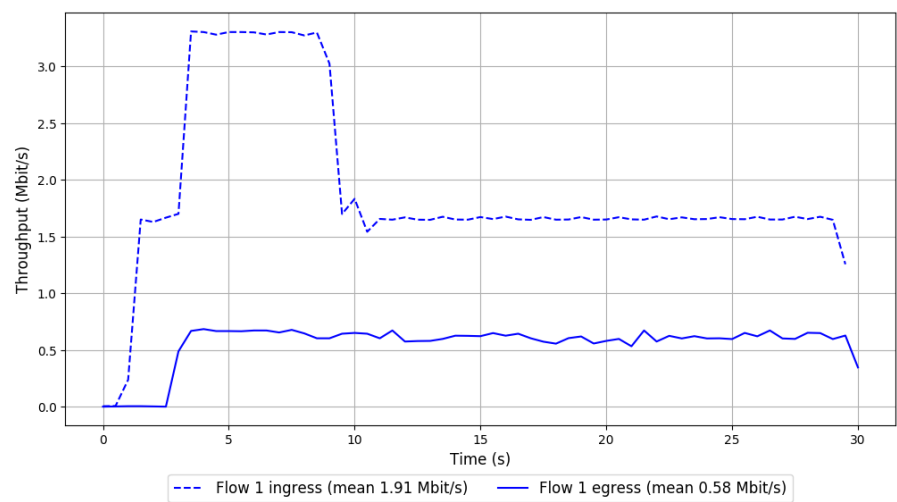
-- Flow 1:

Average throughput: 0.58 Mbit/s

95th percentile per-packet one-way delay: 21067.254 ms

Loss rate: 70.29%

Run 3: Report of PCC-Vivace — Data Link

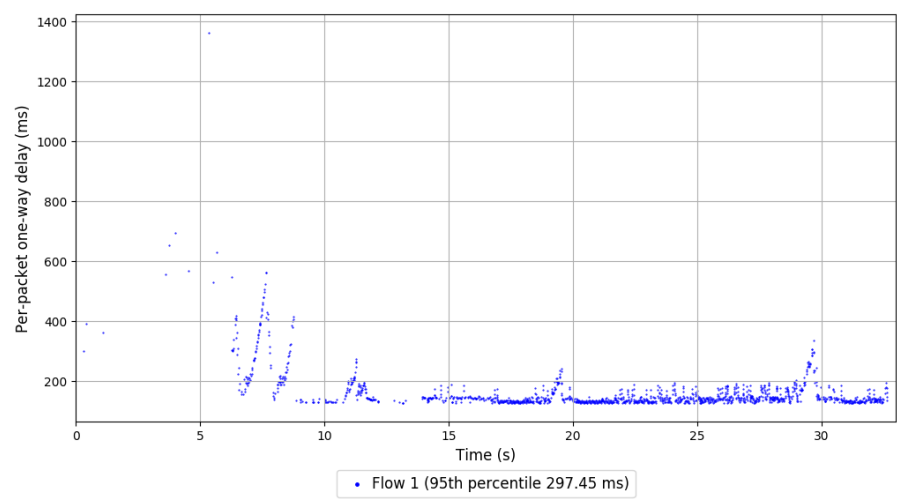
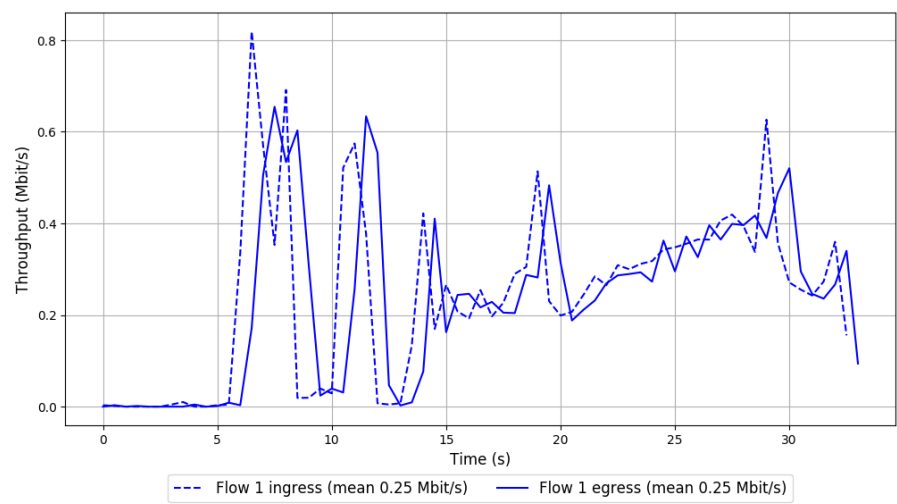



```
Run 1: Statistics of WebRTC media

Start at: 2019-01-03 03:23:51
End at: 2019-01-03 03:24:21
Local clock offset: -6.605 ms
Remote clock offset: -0.785 ms

# Below is generated by plot.py at 2019-01-03 04:17:20
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 297.452 ms
Loss rate: 0.97%
-- Flow 1:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 297.452 ms
Loss rate: 0.97%
```

Run 1: Report of WebRTC media — Data Link

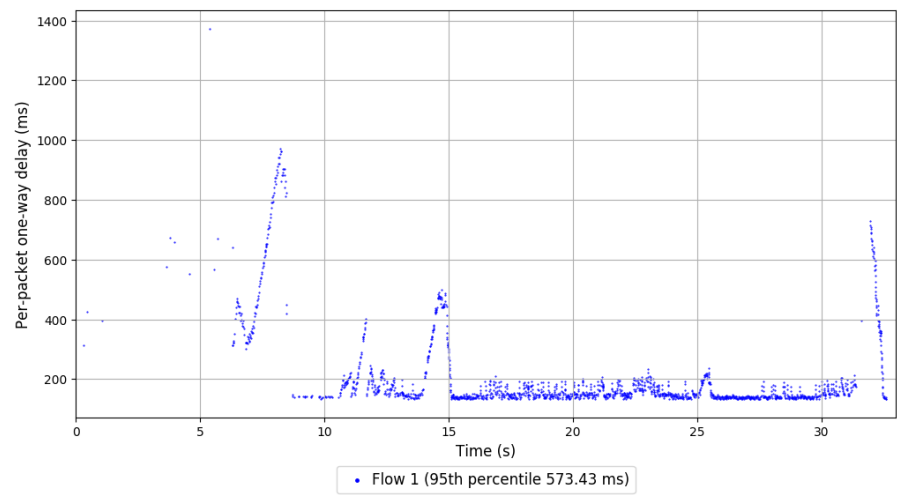
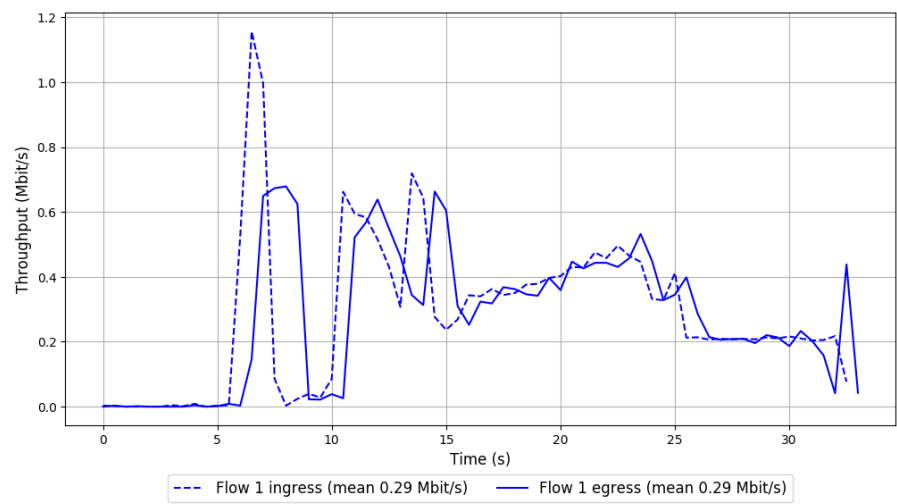


Run 2: Statistics of WebRTC media

Start at: 2019-01-03 03:45:27
End at: 2019-01-03 03:45:57
Local clock offset: -2.586 ms
Remote clock offset: -3.727 ms

Below is generated by plot.py at 2019-01-03 04:17:20
Datalink statistics
-- Total of 1 flow:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 573.433 ms
Loss rate: 0.49%
-- Flow 1:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 573.433 ms
Loss rate: 0.49%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2019-01-03 04:07:03

End at: 2019-01-03 04:07:33

Local clock offset: -6.075 ms

Remote clock offset: 4.633 ms

Below is generated by plot.py at 2019-01-03 04:17:20

Datalink statistics

-- Total of 1 flow:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 300.691 ms

Loss rate: 0.44%

-- Flow 1:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 300.691 ms

Loss rate: 0.44%

Run 3: Report of WebRTC media — Data Link

