

Pantheon Report

Generated at 2019-01-25 18:49:19 (UTC).

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

Repeated the test of 21 congestion control schemes 3 times.

Each test lasted for 30 seconds running 3 flows with 10-second interval between two flows.

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

System info:

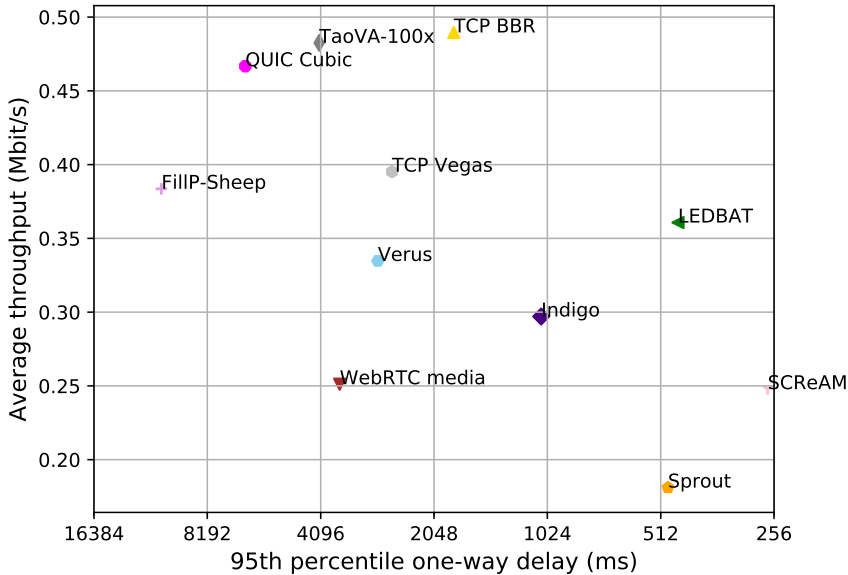
```
Linux 4.15.0-1031-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
```

Git summary:

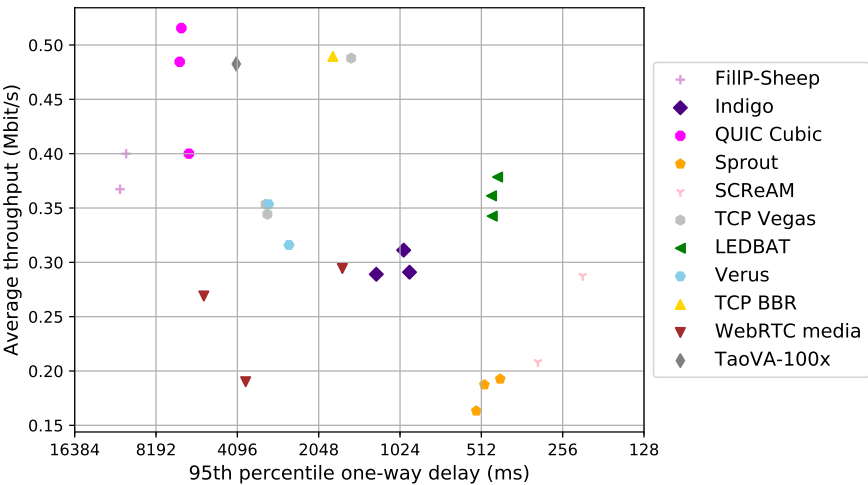
```
branch: muses @ 0b8e9a949603c3842368430acf469eec3b941f9f
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf5e58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ d9c5ea33091330aca25ecd105ab2db6d34d5c40d
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
3 flows with 10s interval between flows (mean of all runs by scheme)



test from Colombia cellular to AWS Brazil 2, 3 runs of 30s each per scheme
3 flows with 10s interval between flows



scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	1	0.30	0.20	0.25	1374.09	1858.85	1905.04	4.35	7.97	22.72
Copa	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TCP Cubic	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
FillP	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
FillP-Sheep	2	0.38	0.01	0.00	10982.88	6219.00	5478.67	19.38	0.00	89.21
Indigo	3	0.14	0.15	0.18	1141.60	926.73	1012.25	0.47	1.12	1.69
Indigo-MusesC3	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Indigo-MusesC5	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Indigo-MusesD	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Indigo-MusesT	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LEDBAT	3	0.20	0.15	0.21	475.28	451.80	448.83	0.55	1.24	4.68
PCC-Allegro	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PCC-Expr	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
QUIC Cubic	3	0.45	0.03	0.00	6498.09	6431.95	6497.87	22.41	0.94	58.33
SCReAM	2	0.13	0.12	0.13	250.90	274.69	287.99	0.59	0.87	2.12
Sprout	3	0.09	0.09	0.09	956.32	391.33	457.92	1.05	0.93	3.50
TaoVA-100x	1	0.30	0.20	0.20	3388.82	4027.77	4692.96	4.64	10.47	20.51
TCP Vegas	3	0.26	0.17	0.09	2598.72	2626.39	2468.69	4.09	9.19	35.73
Verus	2	0.32	0.01	0.01	2887.88	2666.12	1768.88	5.69	4.65	13.25
PCC-Vivace	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WebRTC media	3	0.14	0.08	0.03	3548.52	3619.49	3354.89	3.36	11.80	17.95

Run 1: Statistics of TCP BBR

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 1: Report of TCP BBR — Data Link

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Run 2: Statistics of TCP BBR

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 2: Report of TCP BBR — Data Link

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Run 3: Statistics of TCP BBR

Start at: 2019-01-25 18:45:35

End at: 2019-01-25 18:46:05

Local clock offset: -3.398 ms

Remote clock offset: 6.633 ms

Below is generated by plot.py at 2019-01-25 18:48:46

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.49 Mbit/s

95th percentile per-packet one-way delay: 1814.734 ms

Loss rate: 8.66%

-- Flow 1:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 1374.091 ms

Loss rate: 4.35%

-- Flow 2:

Average throughput: 0.20 Mbit/s

95th percentile per-packet one-way delay: 1858.845 ms

Loss rate: 7.97%

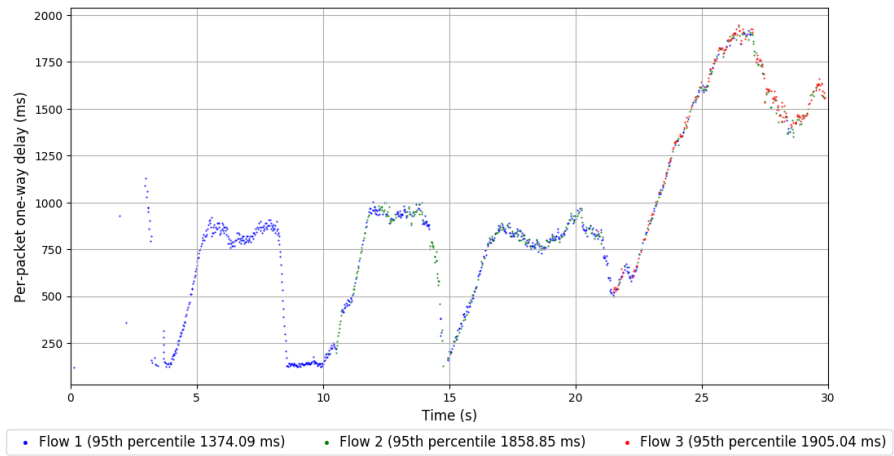
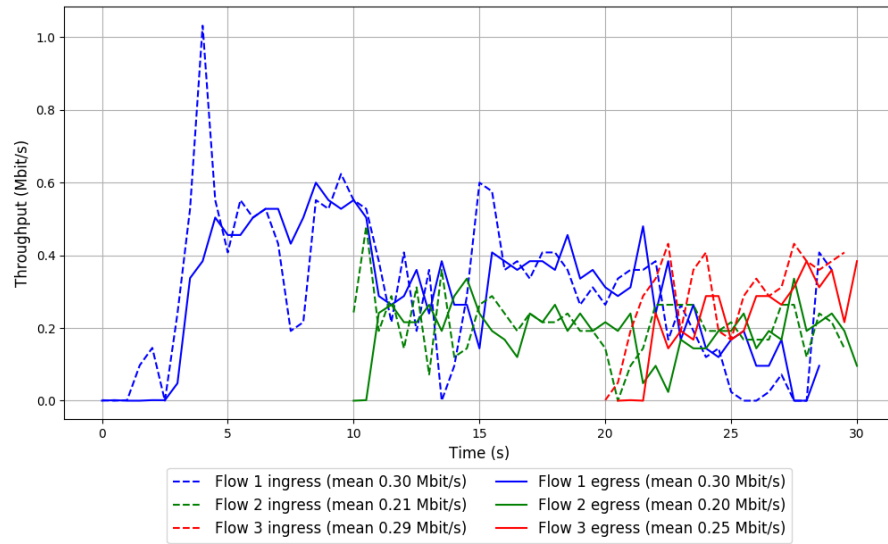
-- Flow 3:

Average throughput: 0.25 Mbit/s

95th percentile per-packet one-way delay: 1905.035 ms

Loss rate: 22.72%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 1: Report of Copa — Data Link

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Run 2: Statistics of Copa

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 2: Report of Copa — Data Link

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Run 3: Statistics of Copa

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 3: Report of Copa — Data Link

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Run 1: Statistics of TCP Cubic

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 1: Report of TCP Cubic — Data Link

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Figure is missing

Run 2: Statistics of TCP Cubic

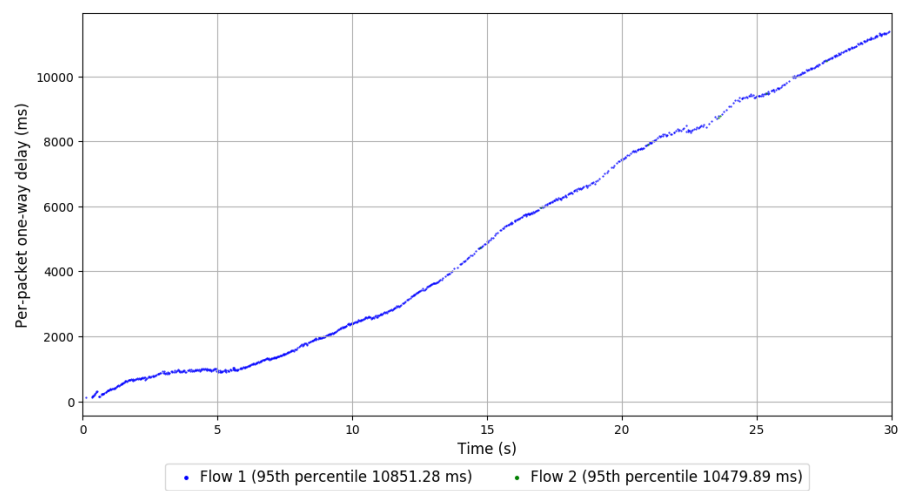
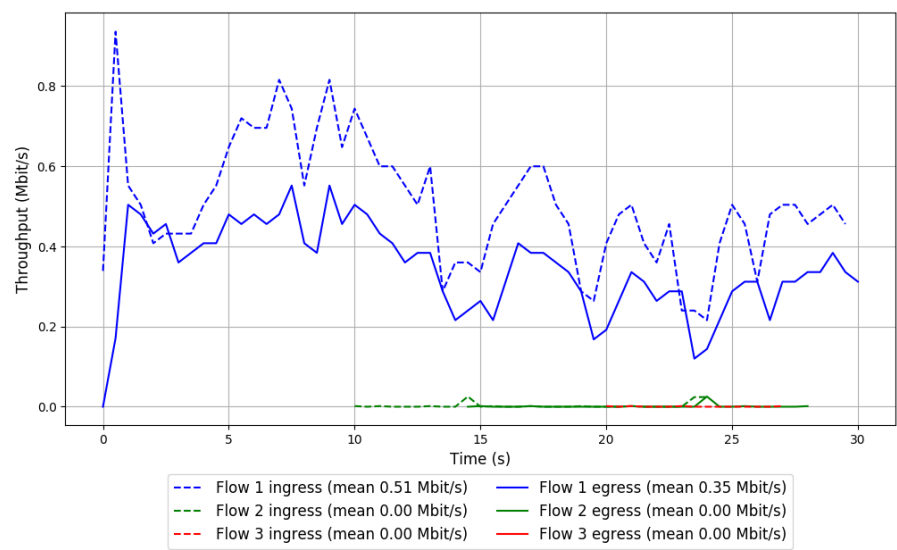
Start at: 2019-01-25 18:11:03

End at: 2019-01-25 18:11:33

Local clock offset: -1.154 ms

Remote clock offset: 5.569 ms

Run 2: Report of TCP Cubic — Data Link



Run 3: Statistics of TCP Cubic

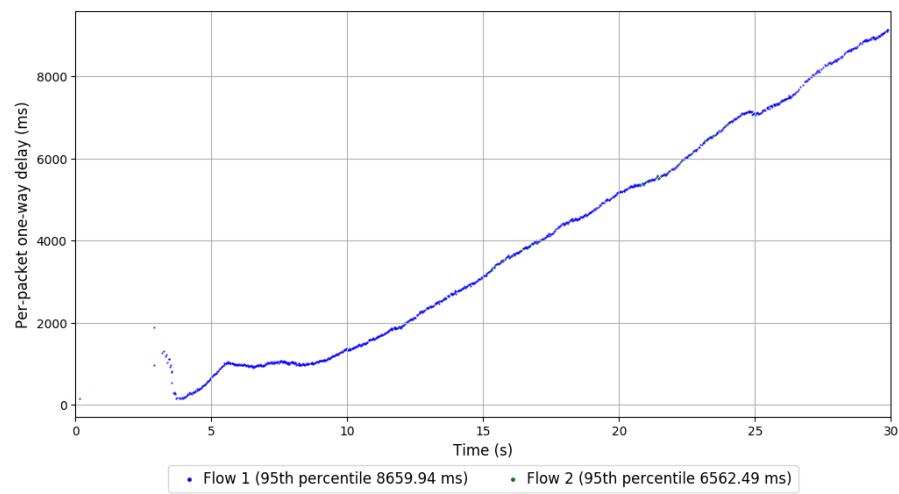
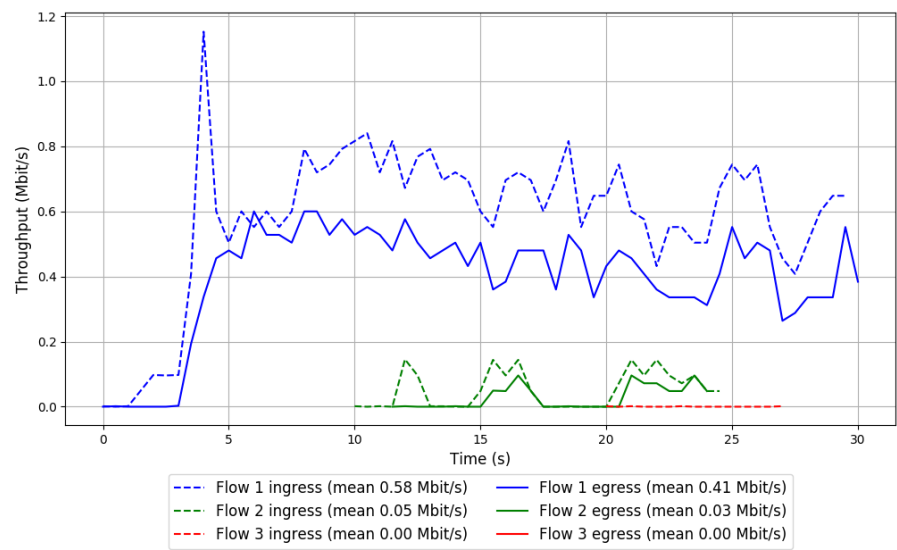
Start at: 2019-01-25 18:37:55

End at: 2019-01-25 18:38:25

Local clock offset: -2.173 ms

Remote clock offset: 2.853 ms

Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of FillP

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 1: Report of FillP — Data Link

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Figure is missing

Run 2: Statistics of FillP

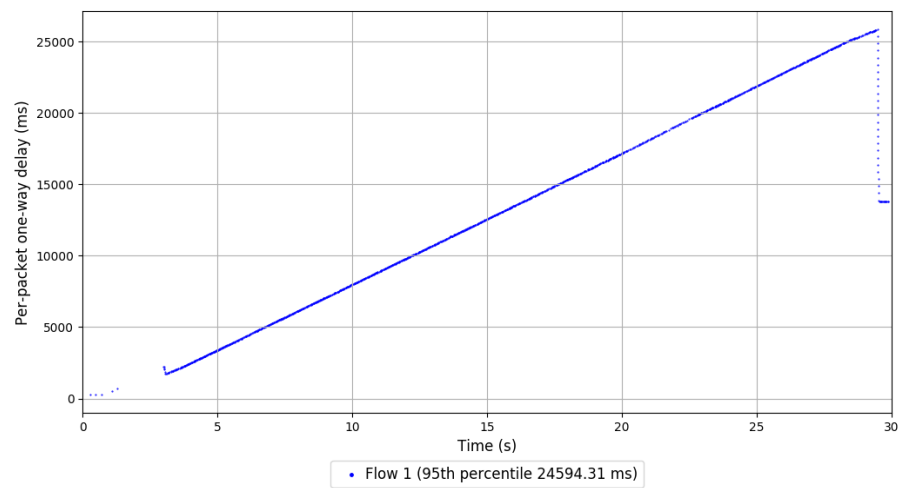
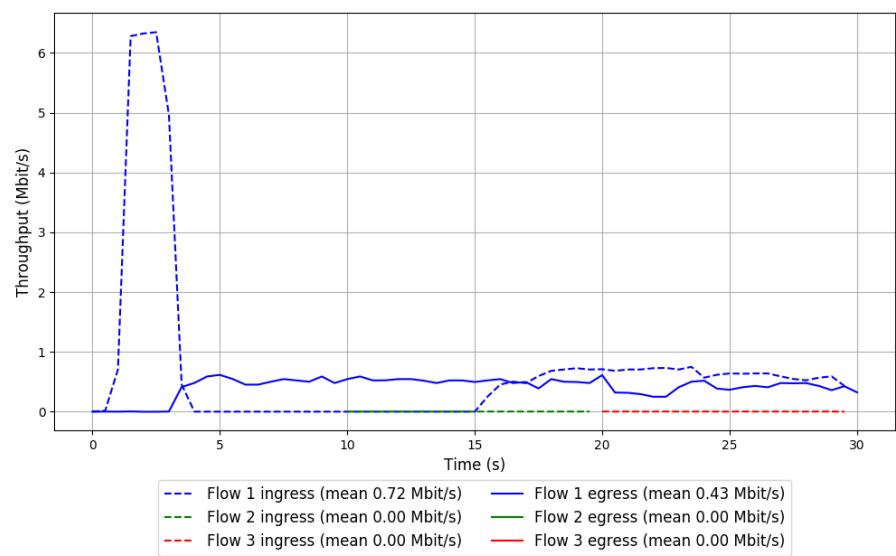
Start at: 2019-01-25 18:12:17

End at: 2019-01-25 18:12:47

Local clock offset: -1.898 ms

Remote clock offset: 5.34 ms

Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

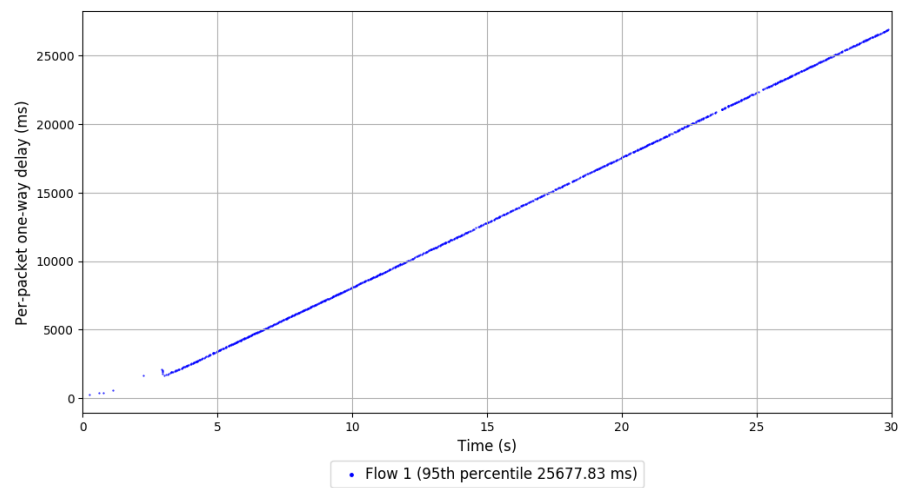
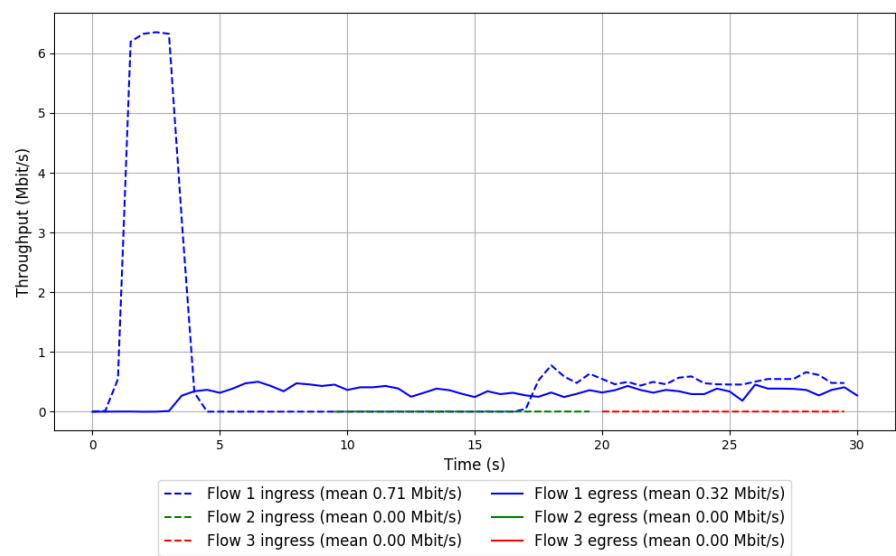
Start at: 2019-01-25 18:39:09

End at: 2019-01-25 18:39:39

Local clock offset: -2.226 ms

Remote clock offset: 8.172 ms

Run 3: Report of FillP — Data Link



Run 1: Statistics of FillP-Sheep

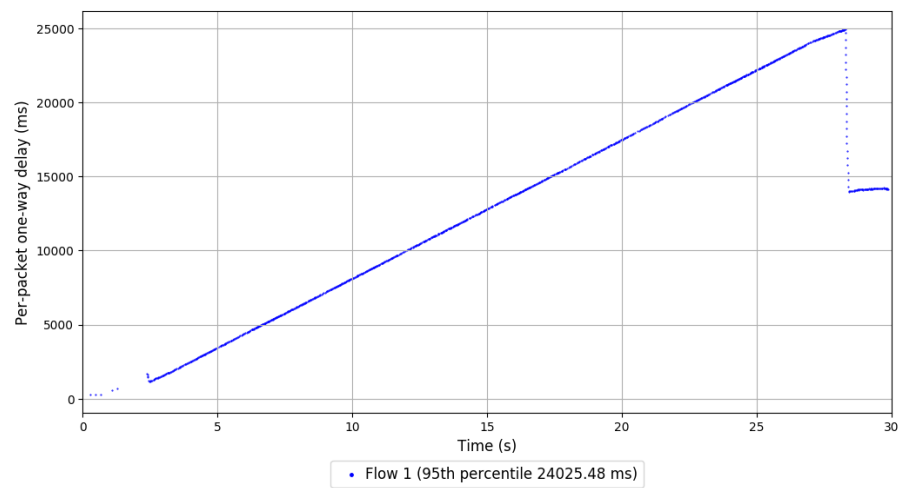
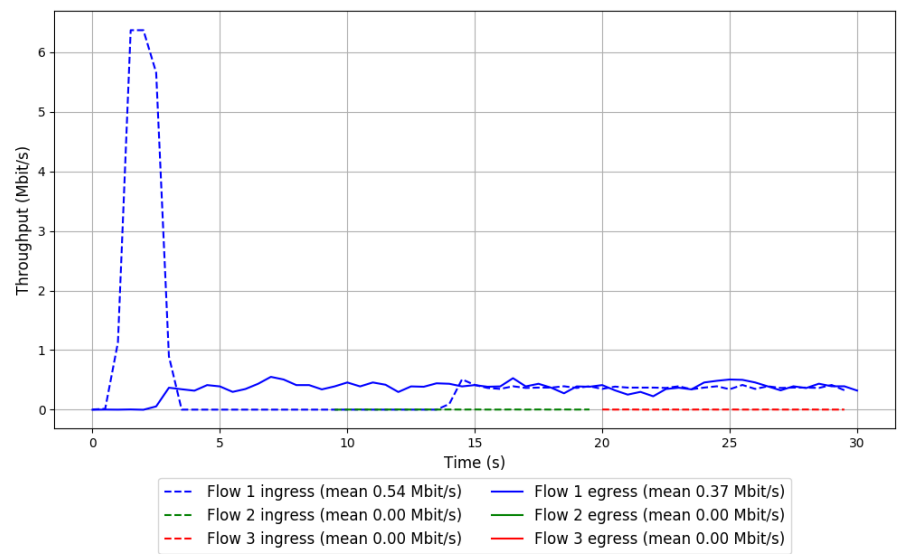
Start at: 2019-01-25 17:27:40

End at: 2019-01-25 17:28:10

Local clock offset: -1.538 ms

Remote clock offset: 9.307 ms

Run 1: Report of FillP-Sheep — Data Link



Run 2: Statistics of FillP-Sheep

Start at: 2019-01-25 17:55:38

End at: 2019-01-25 17:56:08

Local clock offset: -1.681 ms

Remote clock offset: 9.461 ms

Below is generated by plot.py at 2019-01-25 18:48:47

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.37 Mbit/s

95th percentile per-packet one-way delay: 11131.531 ms

Loss rate: 22.45%

-- Flow 1:

Average throughput: 0.36 Mbit/s

95th percentile per-packet one-way delay: 11334.437 ms

Loss rate: 22.30%

-- Flow 2:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 6059.488 ms

Loss rate: 0.00%

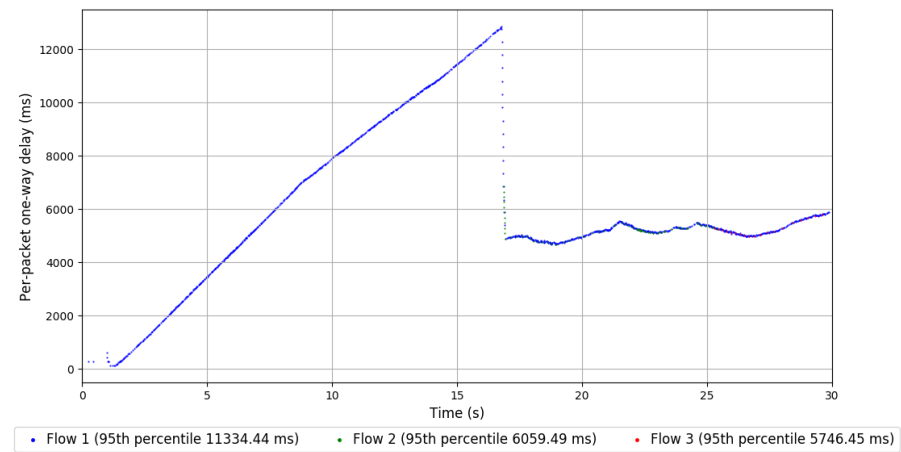
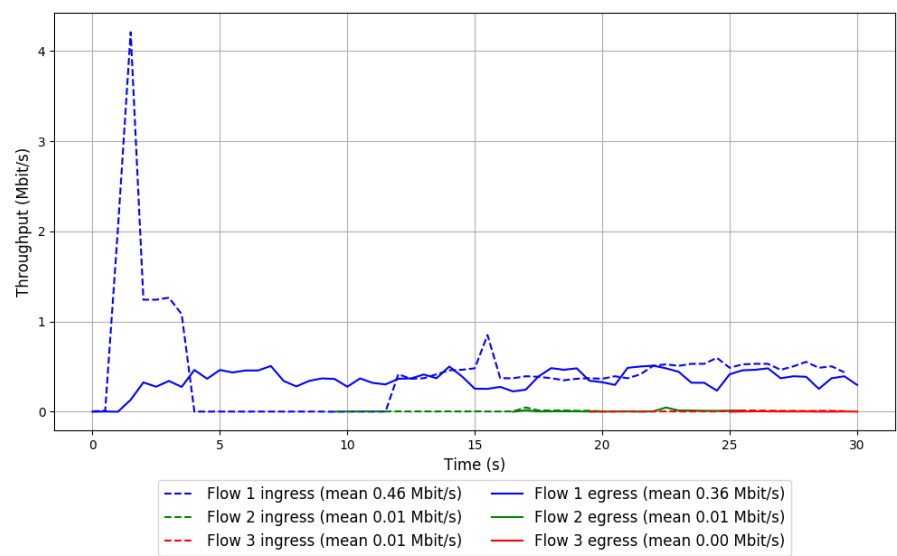
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 5746.453 ms

Loss rate: 79.55%

Run 2: Report of FillP-Sheep — Data Link



Run 3: Statistics of FillP-Sheep

Start at: 2019-01-25 18:22:44

End at: 2019-01-25 18:23:14

Local clock offset: -1.824 ms

Remote clock offset: 9.255 ms

Below is generated by plot.py at 2019-01-25 18:48:47

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.40 Mbit/s

95th percentile per-packet one-way delay: 10566.694 ms

Loss rate: 27.57%

-- Flow 1:

Average throughput: 0.40 Mbit/s

95th percentile per-packet one-way delay: 10631.313 ms

Loss rate: 16.46%

-- Flow 2:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 6378.506 ms

Loss rate: 0.00%

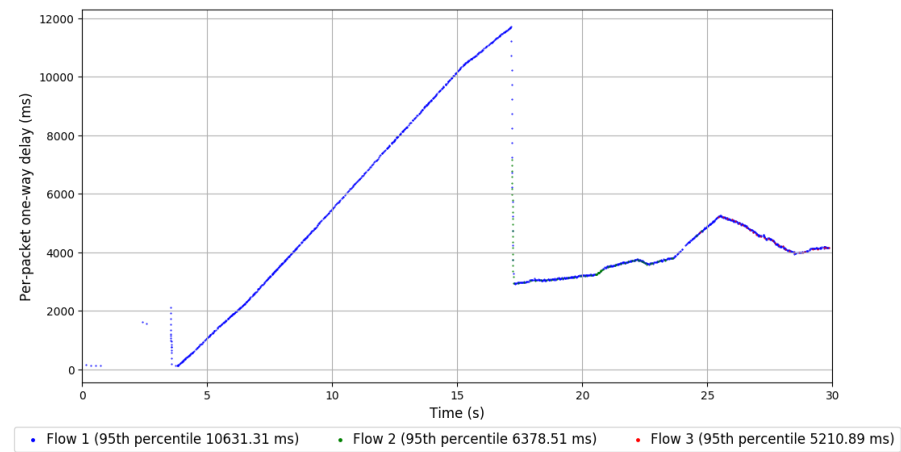
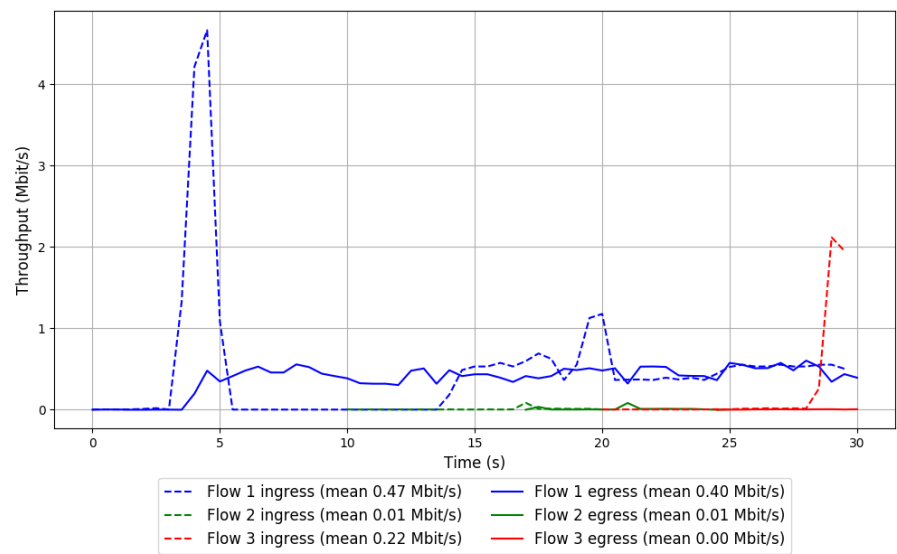
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 5210.892 ms

Loss rate: 98.87%

Run 3: Report of FillP-Sheep — Data Link

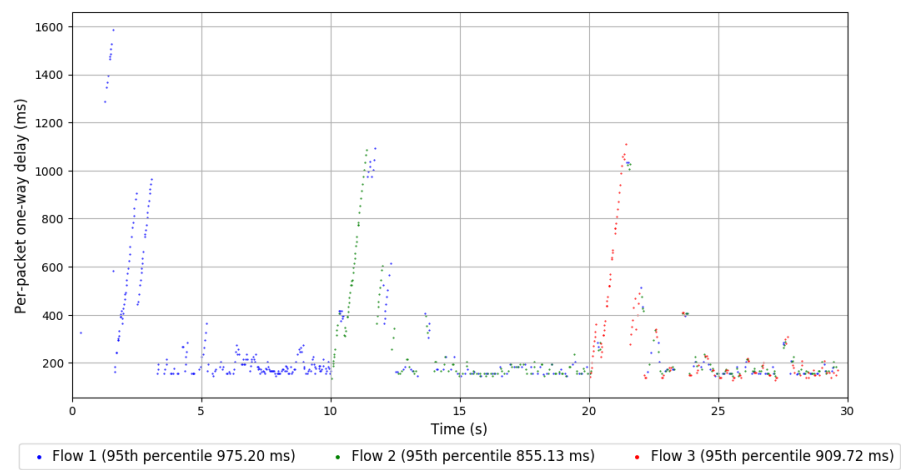
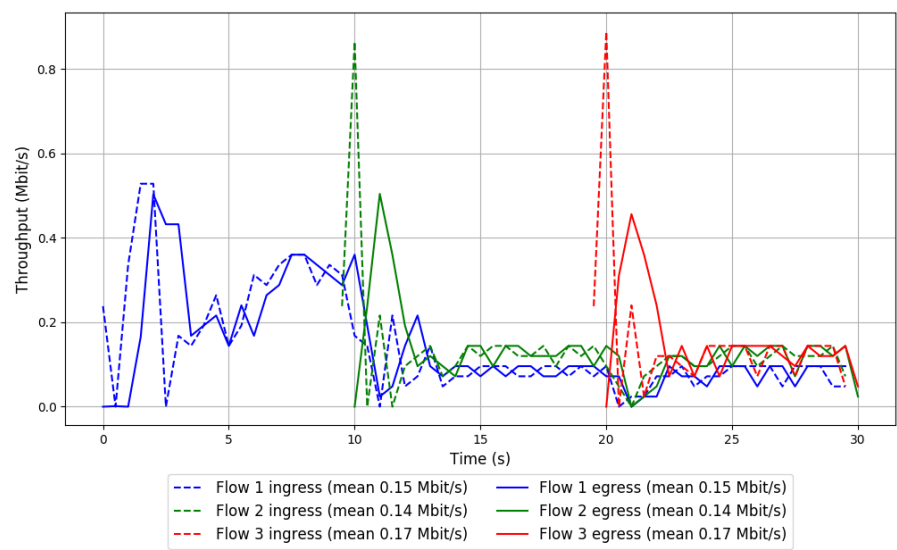


```
Run 1: Statistics of Indigo

Start at: 2019-01-25 17:31:24
End at: 2019-01-25 17:31:54
Local clock offset: -1.423 ms
Remote clock offset: 4.64 ms

# Below is generated by plot.py at 2019-01-25 18:48:50
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 944.436 ms
Loss rate: 0.98%
-- Flow 1:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 975.197 ms
Loss rate: 0.56%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 855.133 ms
Loss rate: 1.34%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 909.724 ms
Loss rate: 1.46%
```

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

Start at: 2019-01-25 17:59:19

End at: 2019-01-25 17:59:49

Local clock offset: -1.479 ms

Remote clock offset: 4.808 ms

Below is generated by plot.py at 2019-01-25 18:48:50

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 1253.375 ms

Loss rate: 0.70%

-- Flow 1:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 1426.570 ms

Loss rate: 0.32%

-- Flow 2:

Average throughput: 0.17 Mbit/s

95th percentile per-packet one-way delay: 1033.955 ms

Loss rate: 1.10%

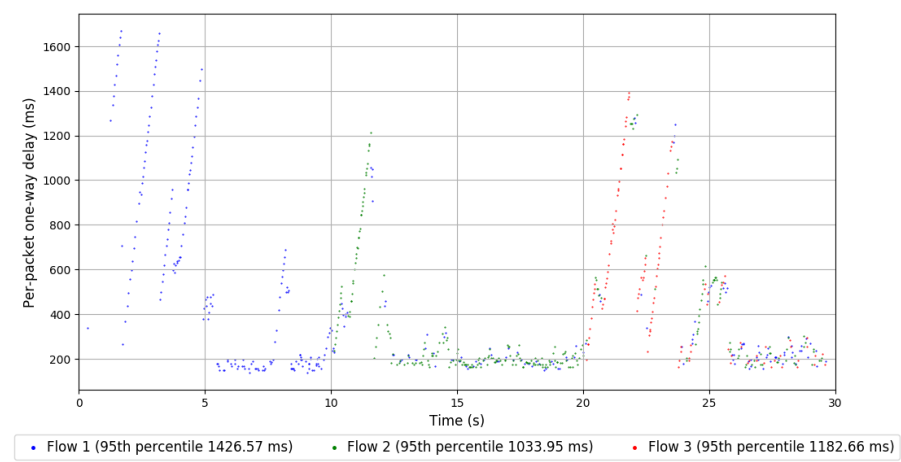
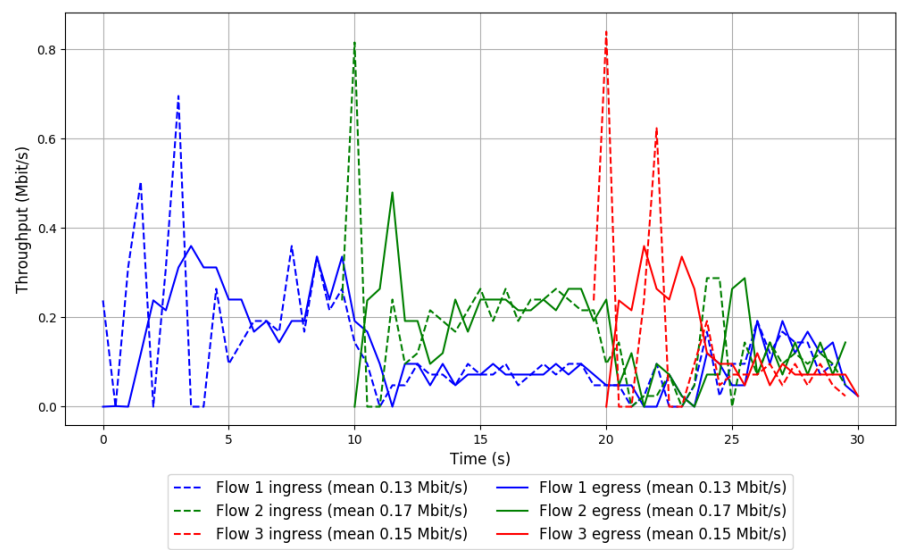
-- Flow 3:

Average throughput: 0.15 Mbit/s

95th percentile per-packet one-way delay: 1182.665 ms

Loss rate: 0.81%

Run 2: Report of Indigo — Data Link



Run 3: Statistics of Indigo

Start at: 2019-01-25 18:26:24

End at: 2019-01-25 18:26:54

Local clock offset: -1.818 ms

Remote clock offset: 3.661 ms

Below is generated by plot.py at 2019-01-25 18:48:50

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.31 Mbit/s

95th percentile per-packet one-way delay: 992.599 ms

Loss rate: 1.17%

-- Flow 1:

Average throughput: 0.15 Mbit/s

95th percentile per-packet one-way delay: 1023.018 ms

Loss rate: 0.54%

-- Flow 2:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 891.106 ms

Loss rate: 0.91%

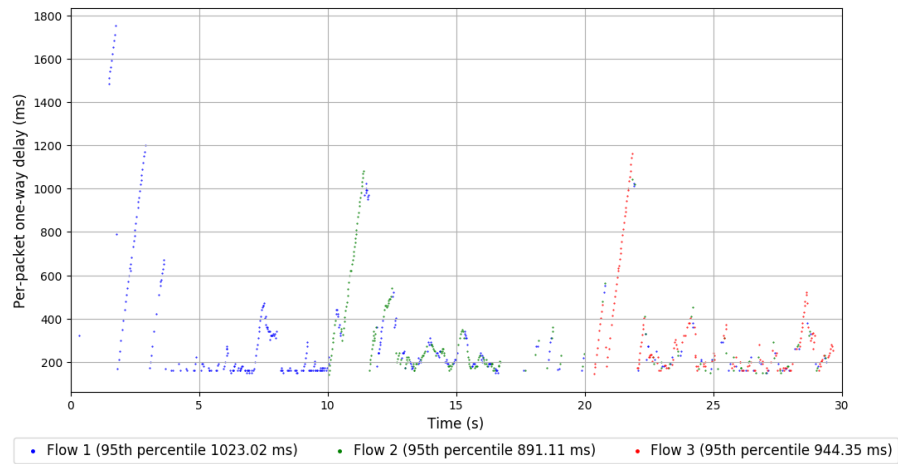
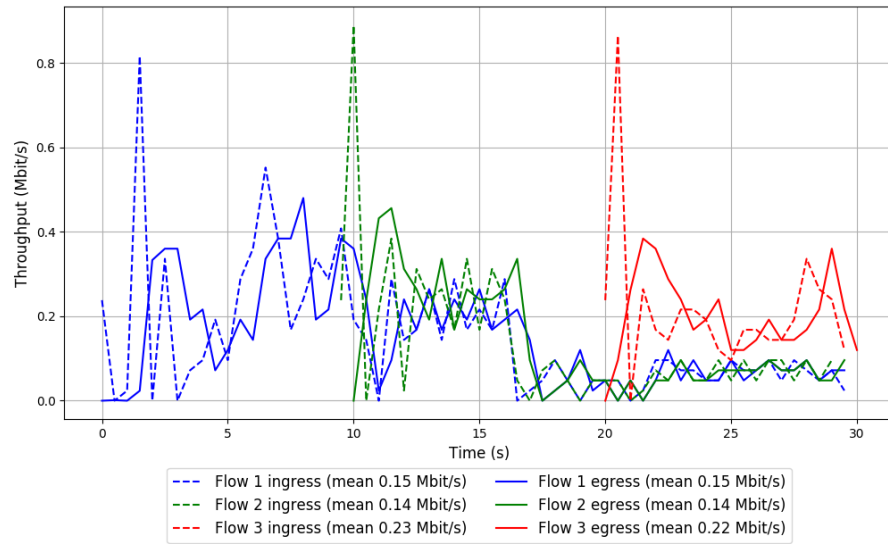
-- Flow 3:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 944.354 ms

Loss rate: 2.79%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of Indigo-MusesC3

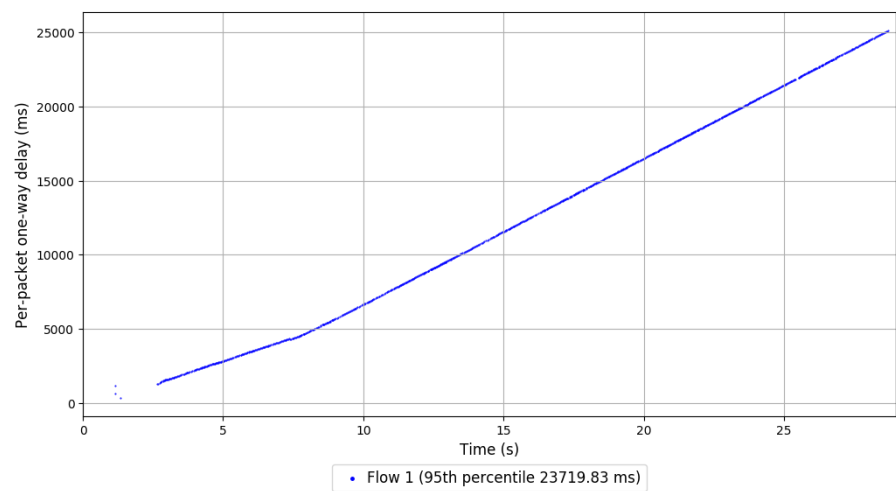
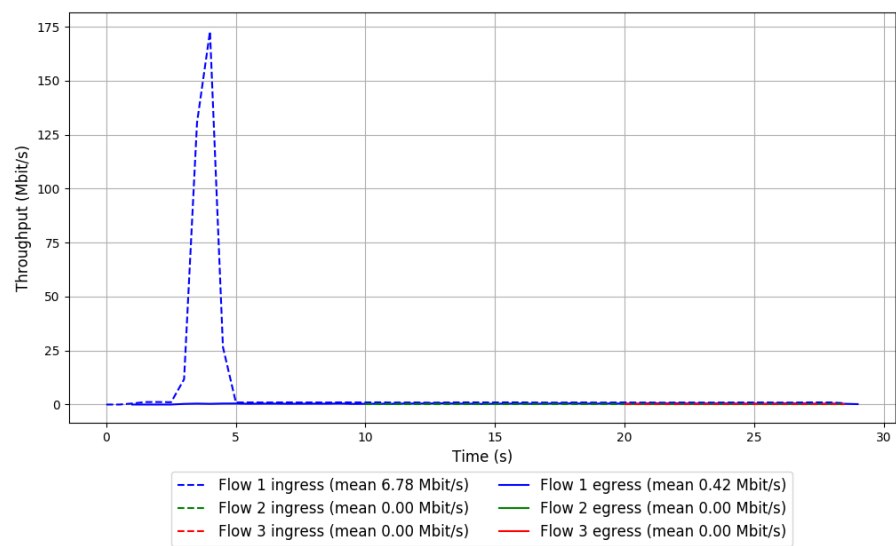
Start at: 2019-01-25 17:32:37

End at: 2019-01-25 17:33:07

Local clock offset: -2.263 ms

Remote clock offset: 8.865 ms

Run 1: Report of Indigo-MusesC3 — Data Link



Run 2: Statistics of Indigo-MusesC3

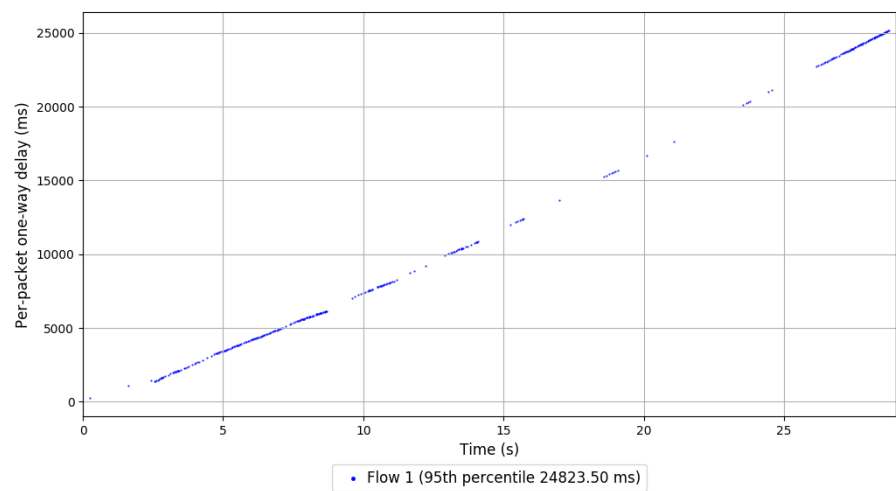
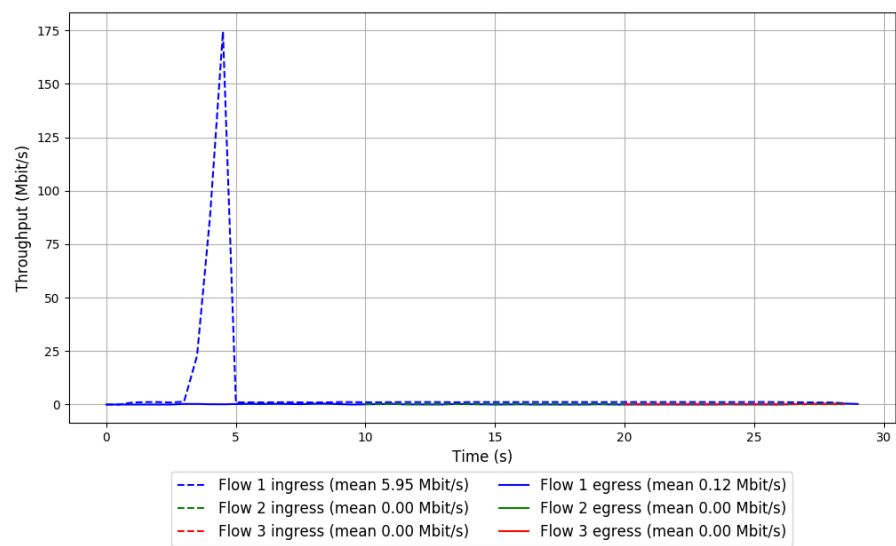
Start at: 2019-01-25 18:00:33

End at: 2019-01-25 18:01:03

Local clock offset: -1.533 ms

Remote clock offset: 4.882 ms

Run 2: Report of Indigo-MusesC3 — Data Link



Run 3: Statistics of Indigo-MusesC3

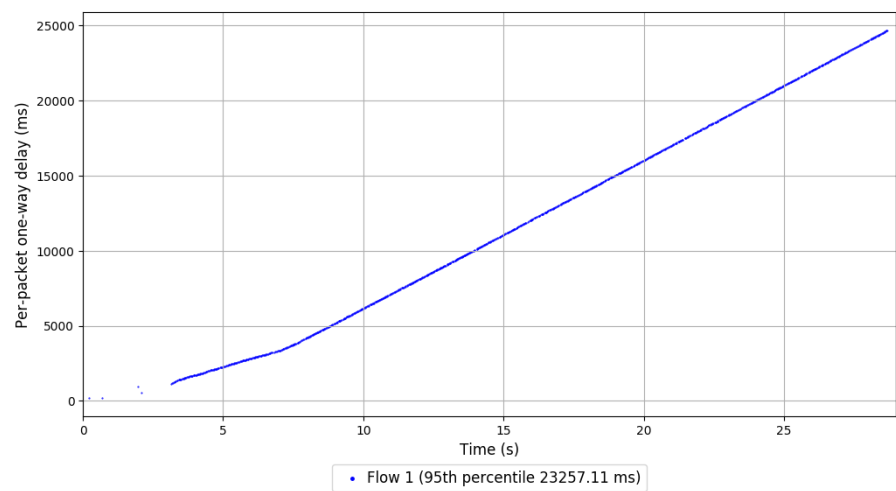
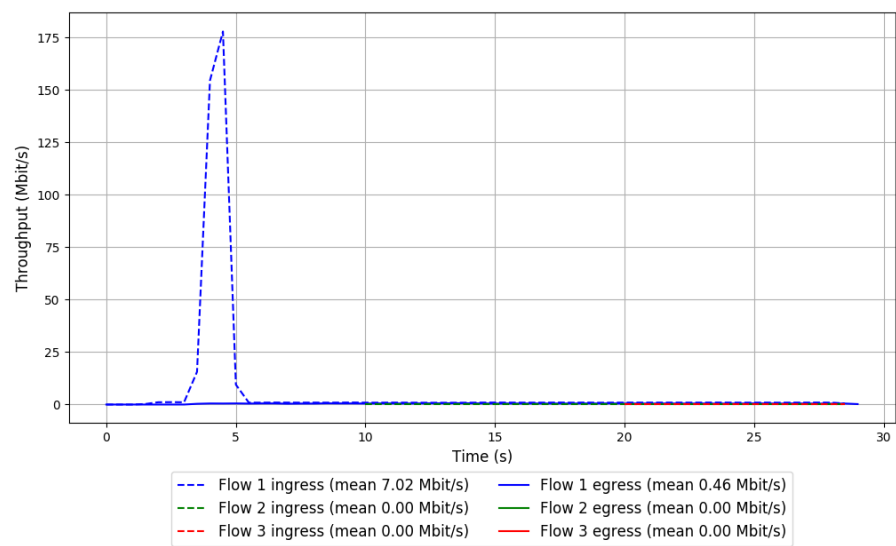
Start at: 2019-01-25 18:27:38

End at: 2019-01-25 18:28:08

Local clock offset: -1.726 ms

Remote clock offset: 7.658 ms

Run 3: Report of Indigo-MusesC3 — Data Link



Run 1: Statistics of Indigo-MusesC5

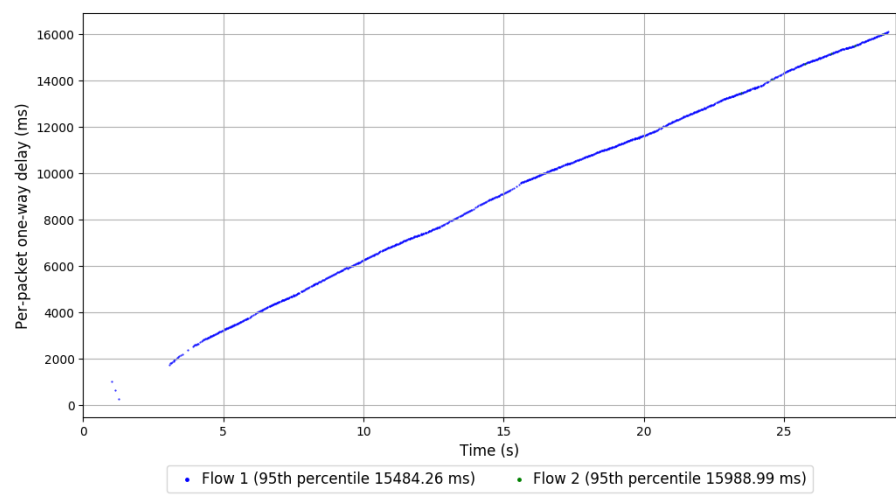
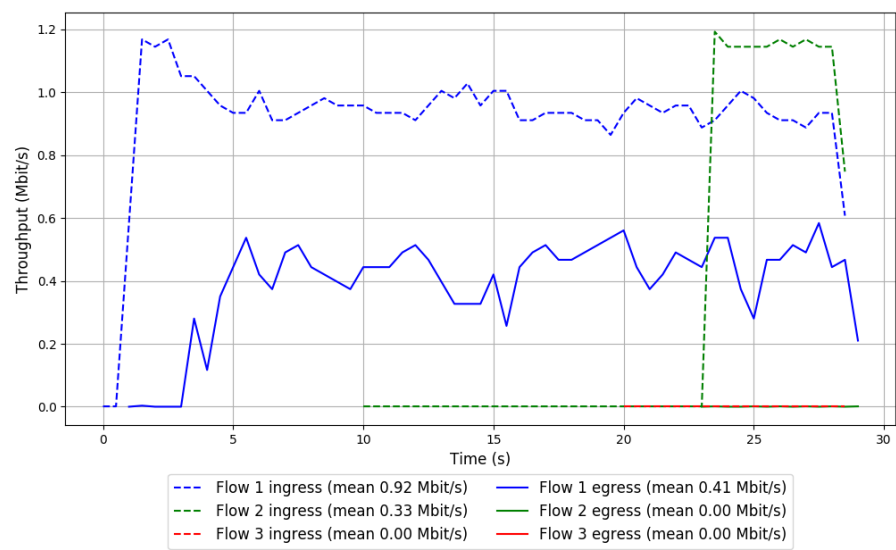
Start at: 2019-01-25 17:46:09

End at: 2019-01-25 17:46:39

Local clock offset: -1.164 ms

Remote clock offset: 10.564 ms

Run 1: Report of Indigo-MusesC5 — Data Link



Run 2: Statistics of Indigo-MusesC5

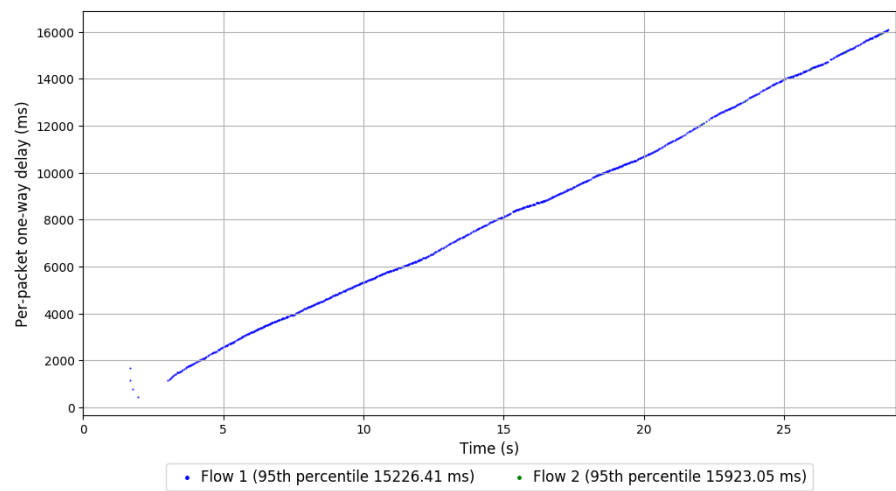
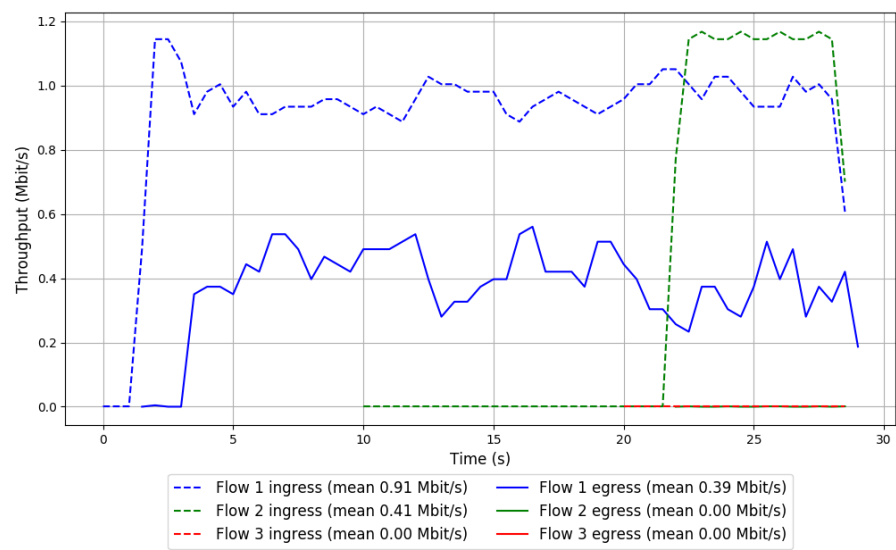
Start at: 2019-01-25 18:13:30

End at: 2019-01-25 18:14:00

Local clock offset: -1.14 ms

Remote clock offset: 10.722 ms

Run 2: Report of Indigo-MusesC5 — Data Link



Run 3: Statistics of Indigo-MusesC5

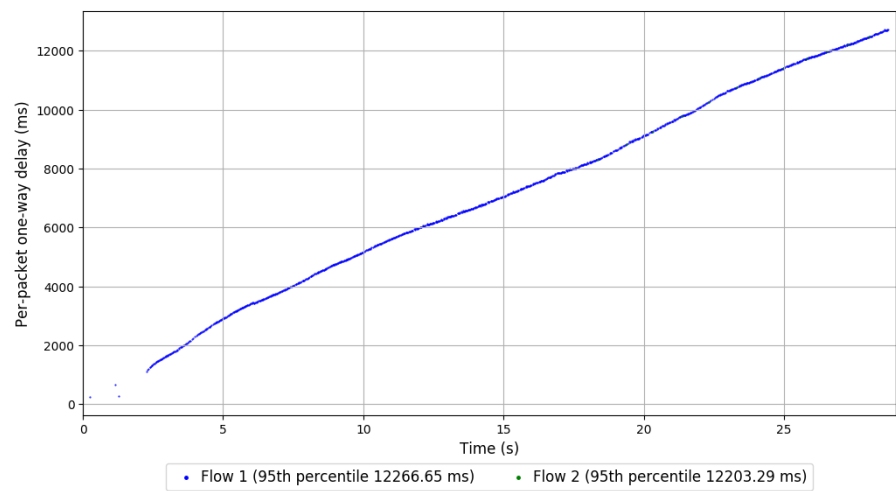
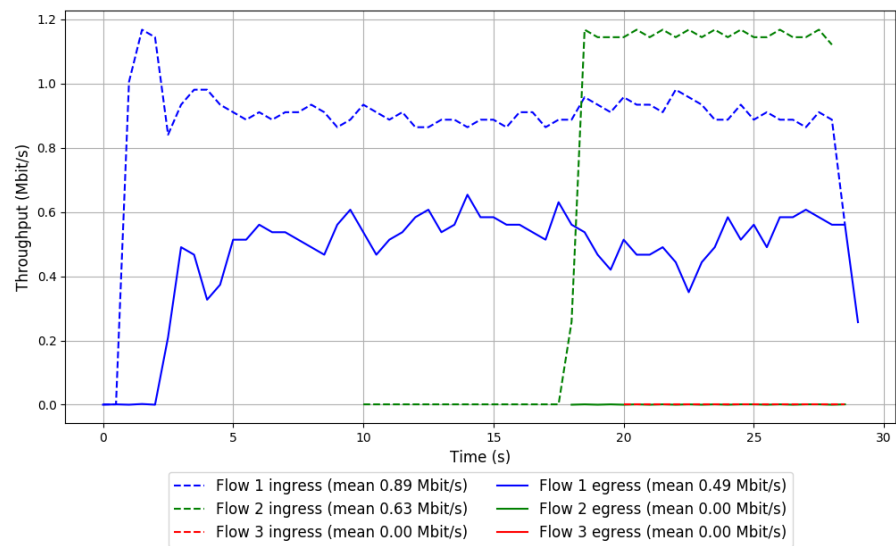
Start at: 2019-01-25 18:40:23

End at: 2019-01-25 18:40:53

Local clock offset: -2.307 ms

Remote clock offset: 8.19 ms

Run 3: Report of Indigo-MusesC5 — Data Link



Run 1: Statistics of Indigo-MusesD

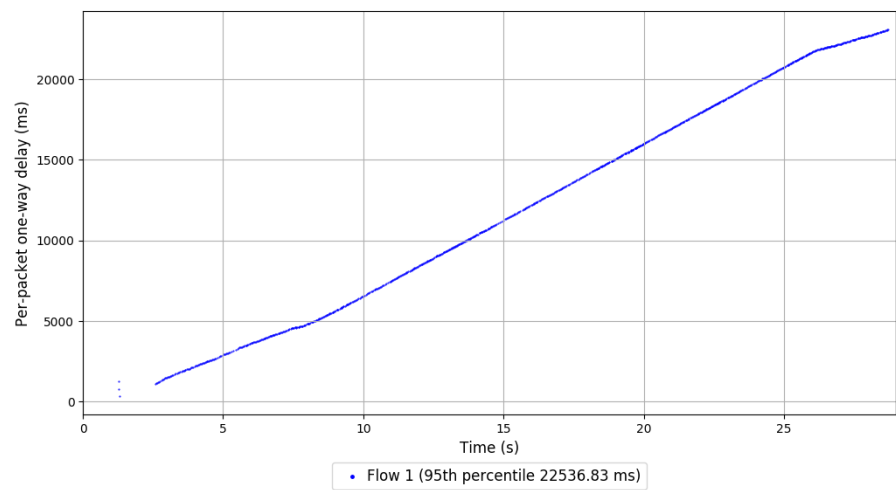
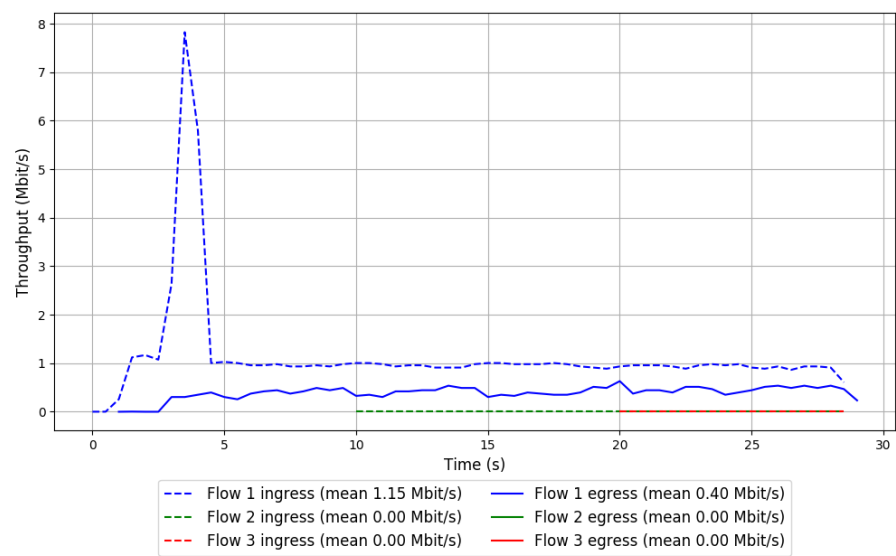
Start at: 2019-01-25 17:50:08

End at: 2019-01-25 17:50:38

Local clock offset: -1.046 ms

Remote clock offset: 9.418 ms

Run 1: Report of Indigo-MusesD — Data Link



Run 2: Statistics of Indigo-MusesD

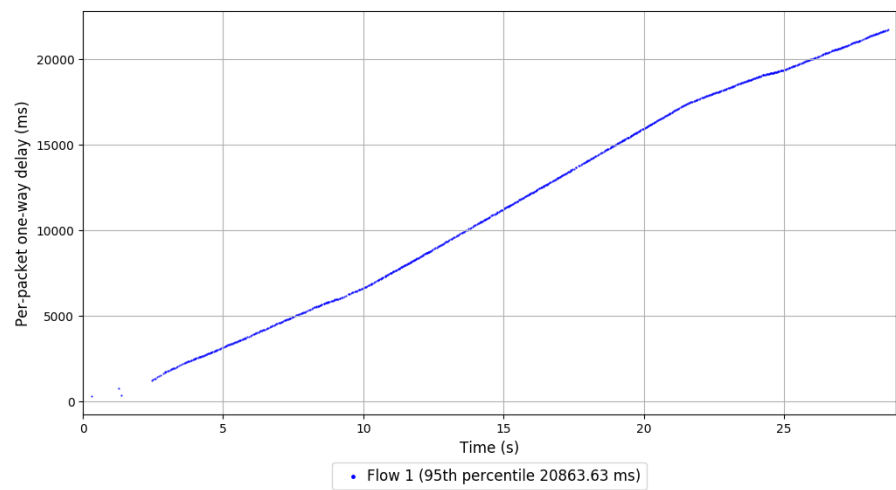
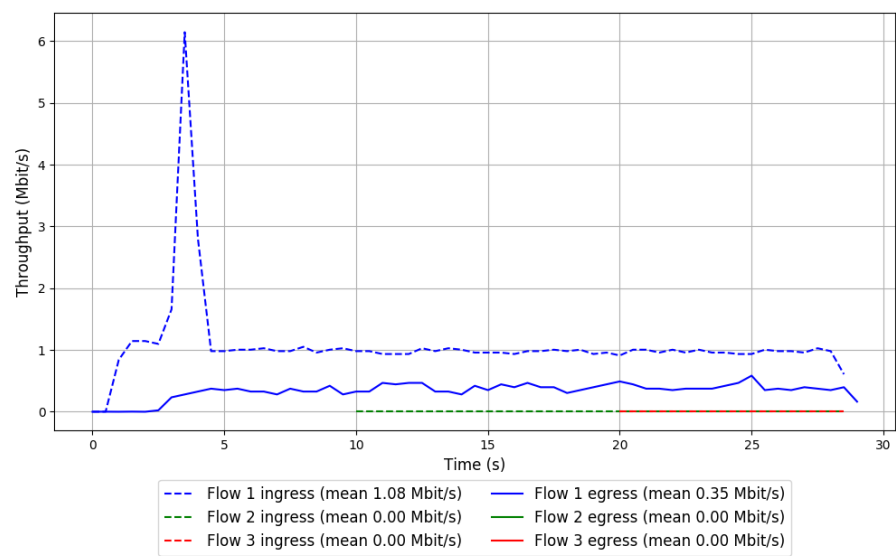
Start at: 2019-01-25 18:17:28

End at: 2019-01-25 18:17:58

Local clock offset: -1.882 ms

Remote clock offset: 9.301 ms

Run 2: Report of Indigo-MusesD — Data Link



Run 3: Statistics of Indigo-MusesD

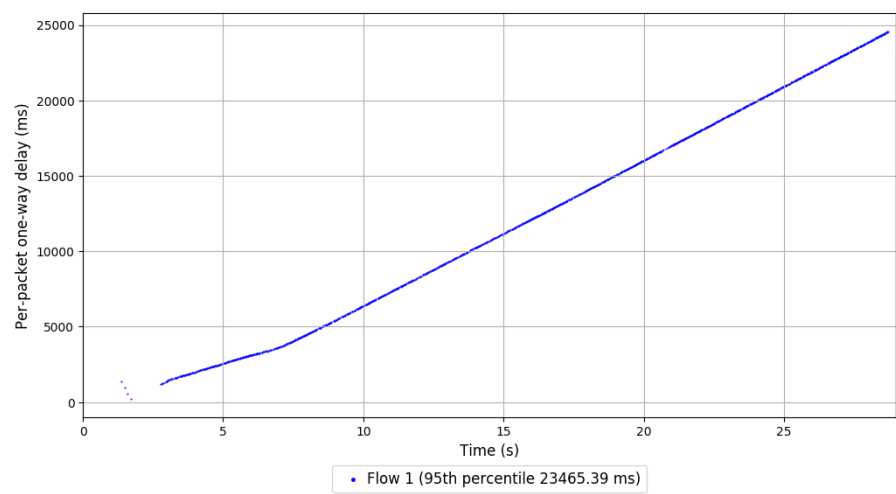
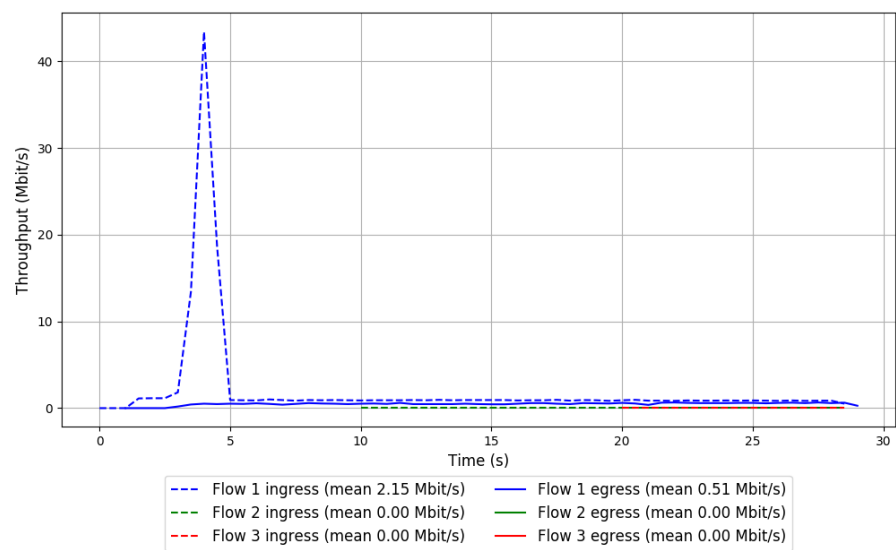
Start at: 2019-01-25 18:44:21

End at: 2019-01-25 18:44:51

Local clock offset: -2.525 ms

Remote clock offset: 2.75 ms

Run 3: Report of Indigo-MusesD — Data Link



Run 1: Statistics of Indigo-MusesT

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 1: Report of Indigo-MusesT — Data Link

Figure is missing

Figure is missing

Run 2: Statistics of Indigo-MusesT

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 2: Report of Indigo-MusesT — Data Link

Figure is missing

Figure is missing

Run 3: Statistics of Indigo-MusesT

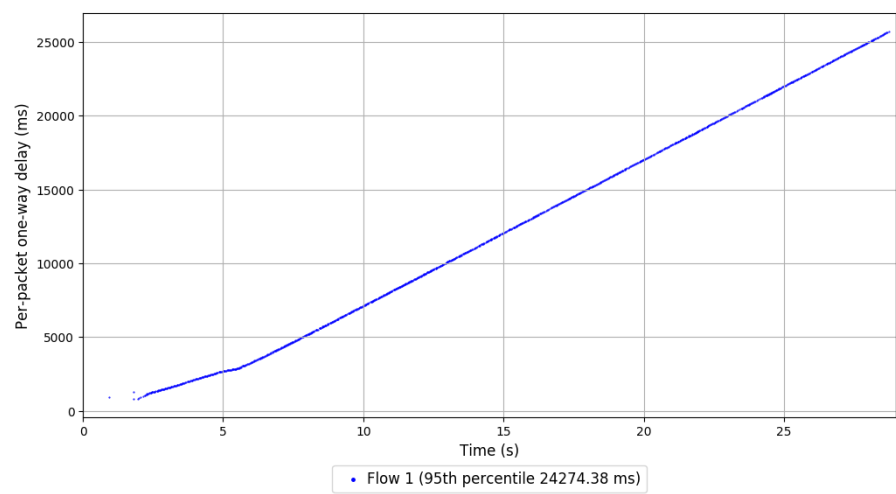
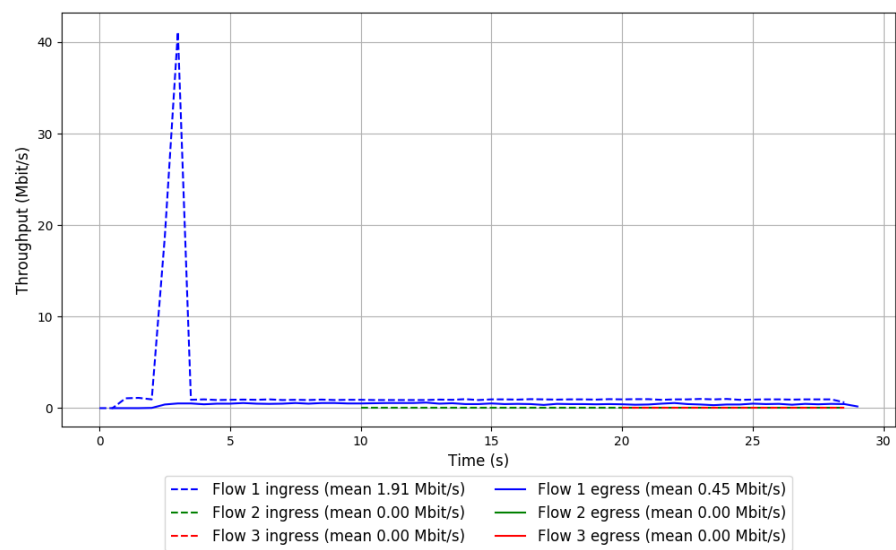
Start at: 2019-01-25 18:33:55

End at: 2019-01-25 18:34:25

Local clock offset: -2.492 ms

Remote clock offset: 3.101 ms

Run 3: Report of Indigo-MusesT — Data Link

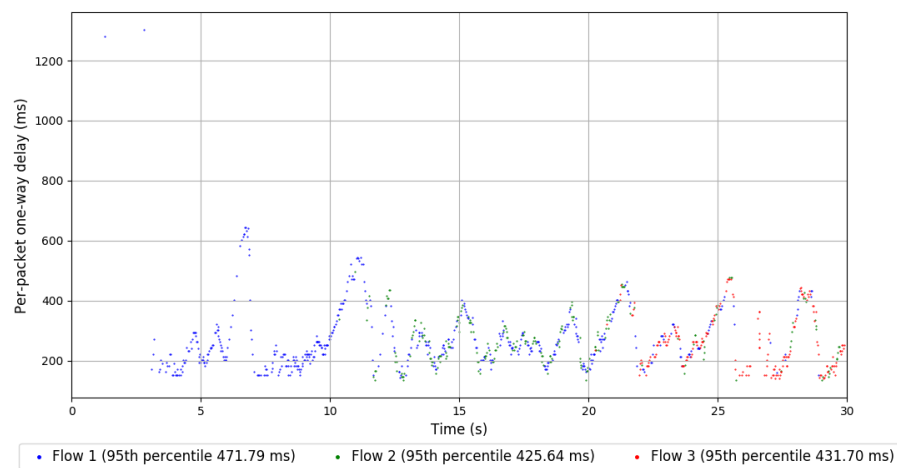
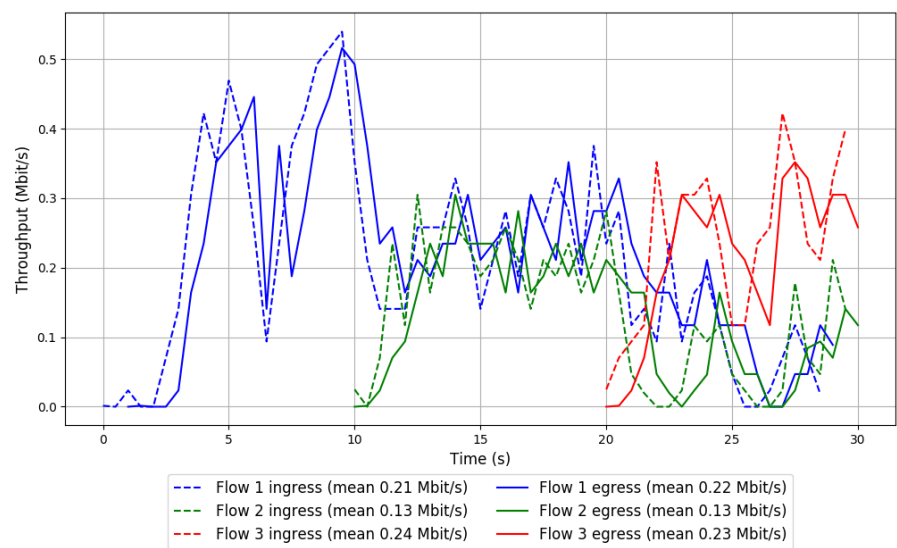


```
Run 1: Statistics of LEDBAT

Start at: 2019-01-25 17:48:54
End at: 2019-01-25 17:49:24
Local clock offset: -1.916 ms
Remote clock offset: 10.3 ms

# Below is generated by plot.py at 2019-01-25 18:48:57
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 445.865 ms
Loss rate: 1.70%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 471.790 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 425.640 ms
Loss rate: 2.66%
-- Flow 3:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 431.703 ms
Loss rate: 4.97%
```

Run 1: Report of LEDBAT — Data Link



Run 2: Statistics of LEDBAT

Start at: 2019-01-25 18:16:15

End at: 2019-01-25 18:16:45

Local clock offset: -1.143 ms

Remote clock offset: 9.835 ms

Below is generated by plot.py at 2019-01-25 18:48:58

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.36 Mbit/s

95th percentile per-packet one-way delay: 469.645 ms

Loss rate: 0.76%

-- Flow 1:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 449.457 ms

Loss rate: 0.00%

-- Flow 2:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 491.071 ms

Loss rate: 0.00%

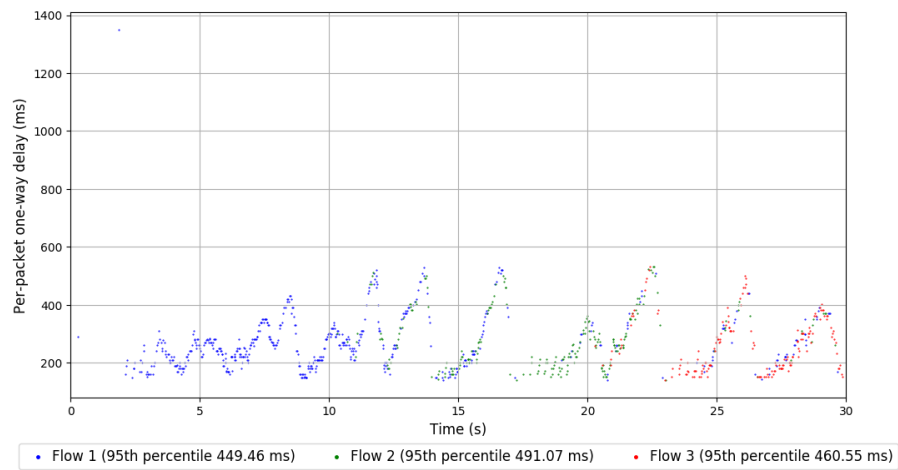
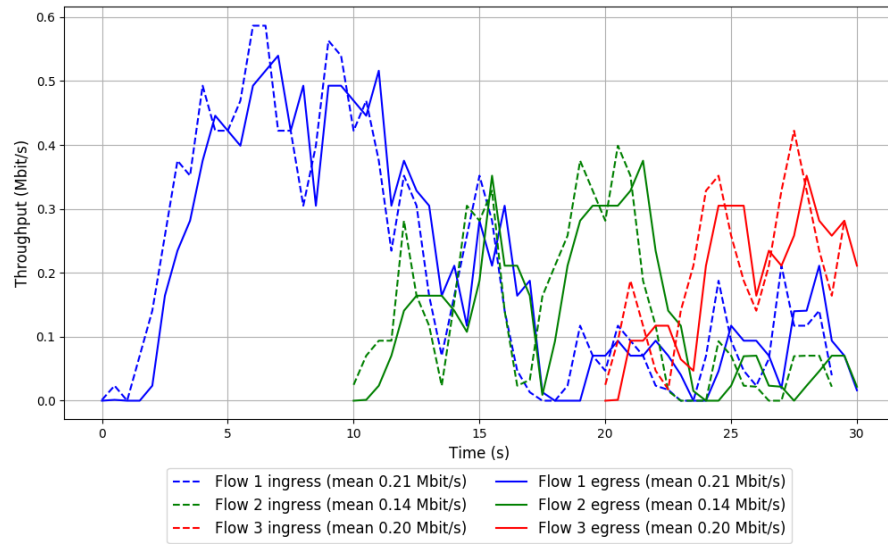
-- Flow 3:

Average throughput: 0.20 Mbit/s

95th percentile per-packet one-way delay: 460.552 ms

Loss rate: 4.03%

Run 2: Report of LEDBAT — Data Link



Run 3: Statistics of LEDBAT

Start at: 2019-01-25 18:43:07

End at: 2019-01-25 18:43:37

Local clock offset: -2.444 ms

Remote clock offset: 6.714 ms

Below is generated by plot.py at 2019-01-25 18:48:58

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.34 Mbit/s

95th percentile per-packet one-way delay: 466.707 ms

Loss rate: 2.15%

-- Flow 1:

Average throughput: 0.17 Mbit/s

95th percentile per-packet one-way delay: 504.596 ms

Loss rate: 1.65%

-- Flow 2:

Average throughput: 0.17 Mbit/s

95th percentile per-packet one-way delay: 438.675 ms

Loss rate: 1.07%

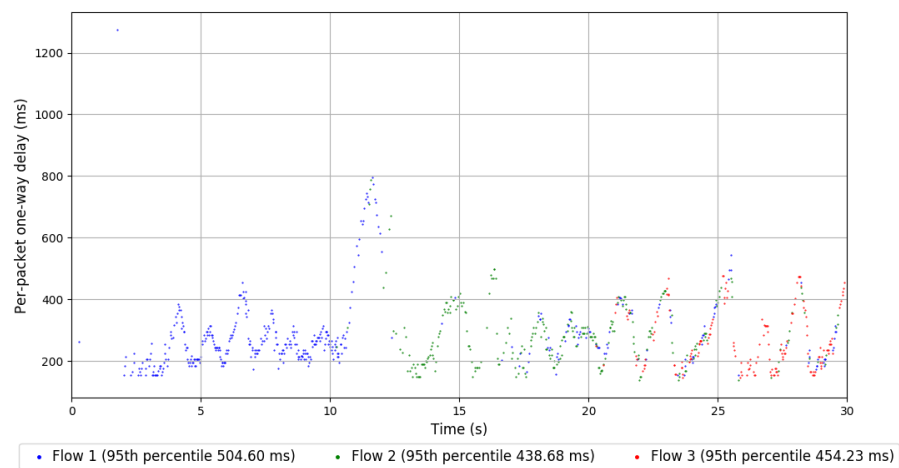
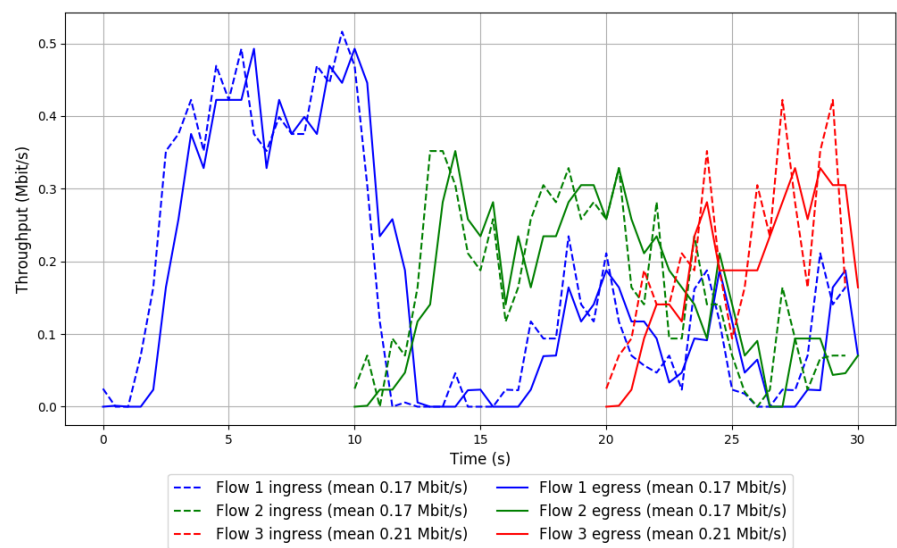
-- Flow 3:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 454.230 ms

Loss rate: 5.03%

Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of PCC-Allegro

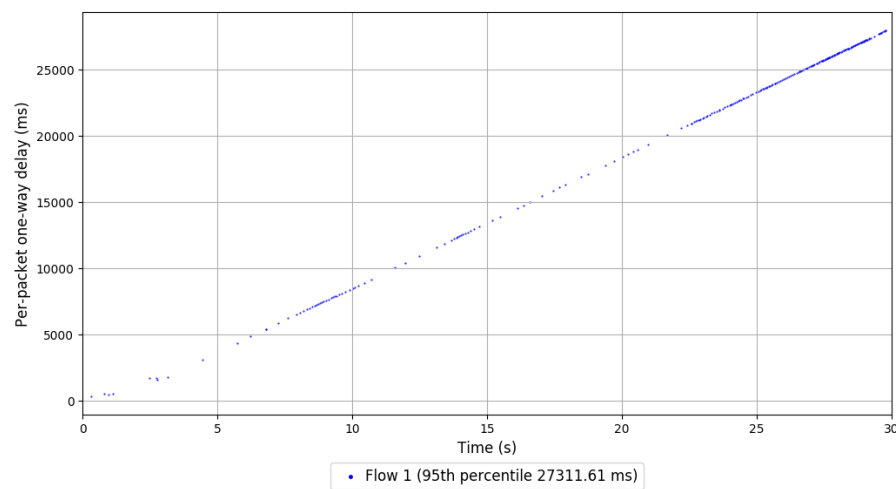
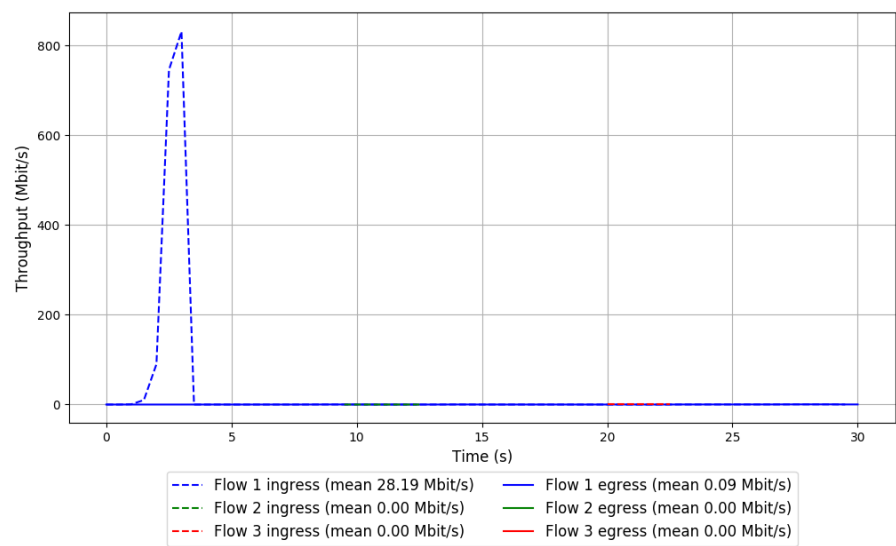
Start at: 2019-01-25 17:41:52

End at: 2019-01-25 17:42:22

Local clock offset: -1.379 ms

Remote clock offset: 5.141 ms

Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

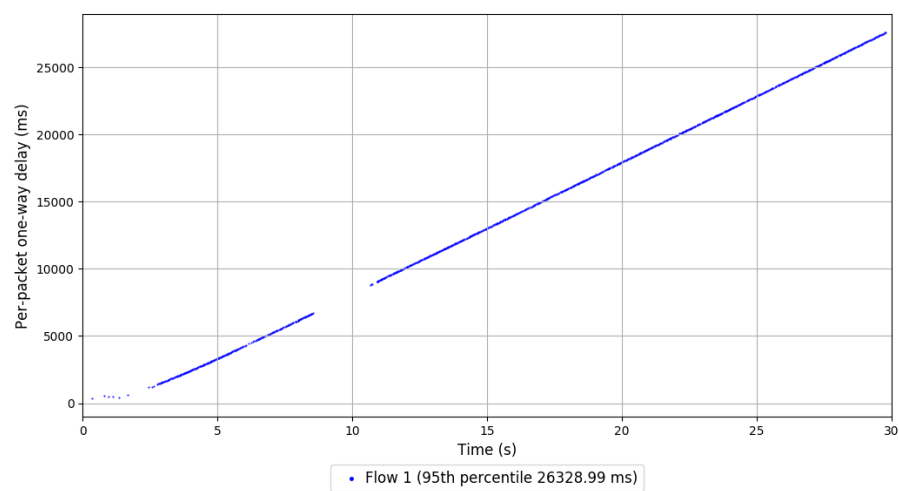
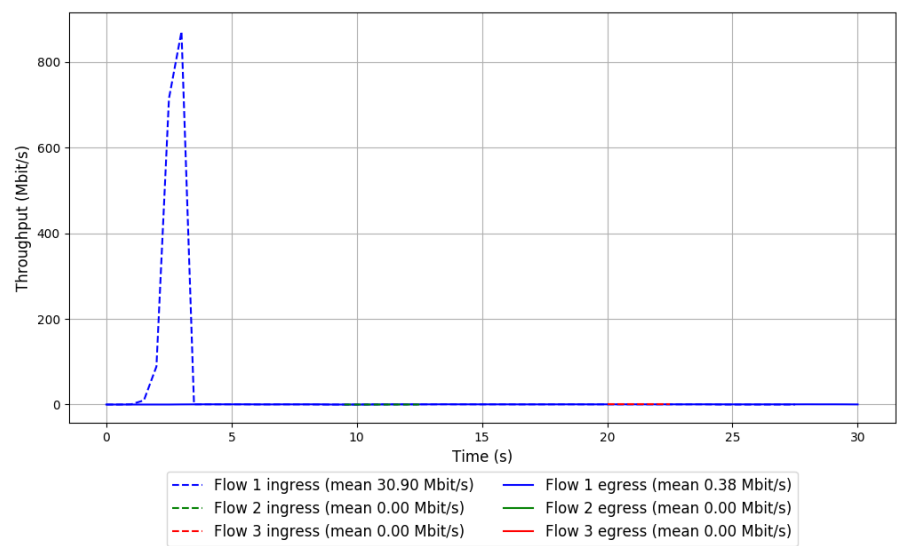
Start at: 2019-01-25 18:09:47

End at: 2019-01-25 18:10:17

Local clock offset: -1.141 ms

Remote clock offset: 10.799 ms

Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

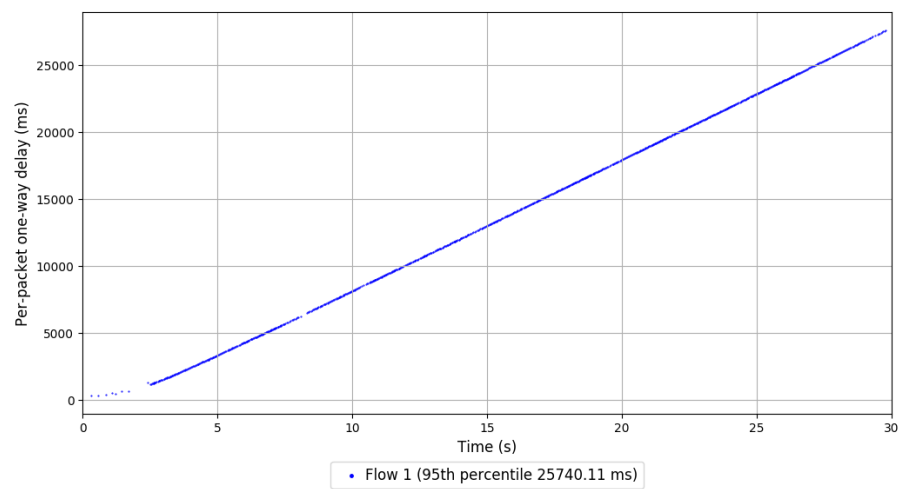
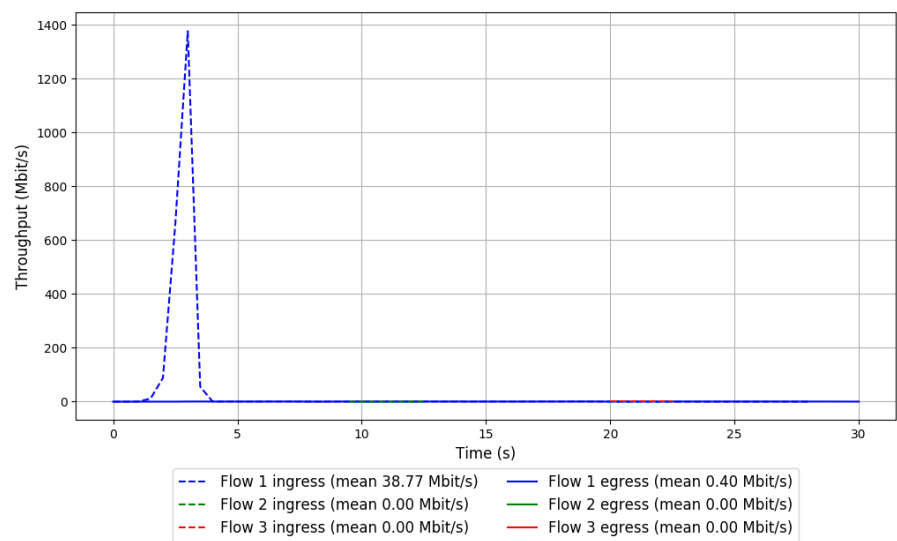
Start at: 2019-01-25 18:36:40

End at: 2019-01-25 18:37:10

Local clock offset: -2.003 ms

Remote clock offset: 5.737 ms

Run 3: Report of PCC-Allegro — Data Link



Run 1: Statistics of PCC-Expr

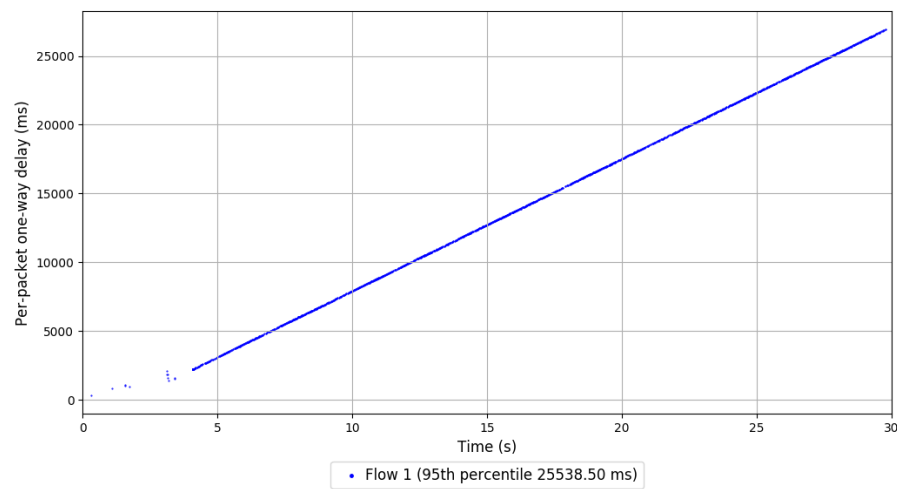
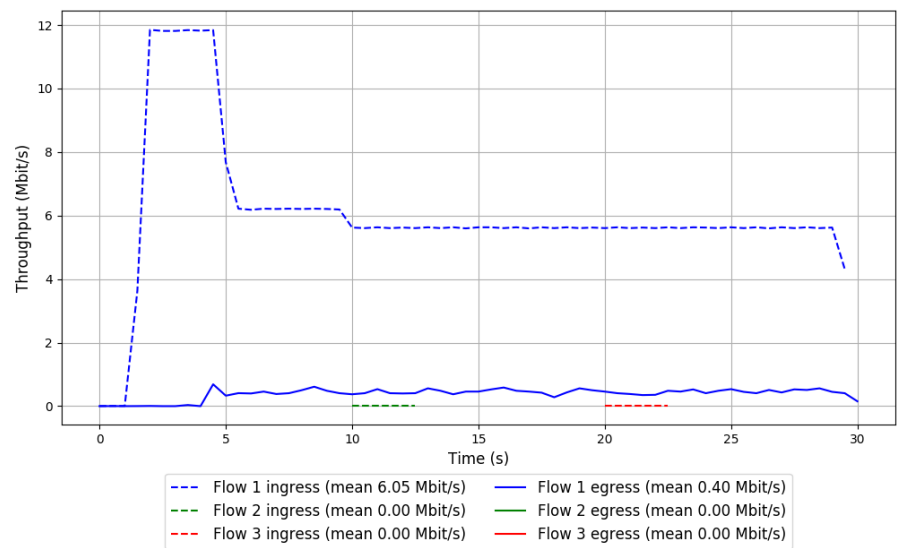
Start at: 2019-01-25 17:37:53

End at: 2019-01-25 17:38:23

Local clock offset: -1.438 ms

Remote clock offset: 4.858 ms

Run 1: Report of PCC-Expr — Data Link



Run 2: Statistics of PCC-Expr

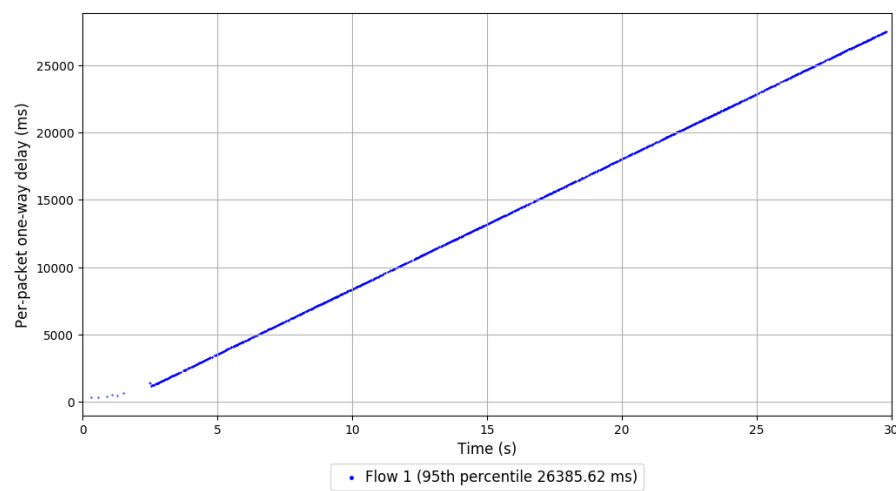
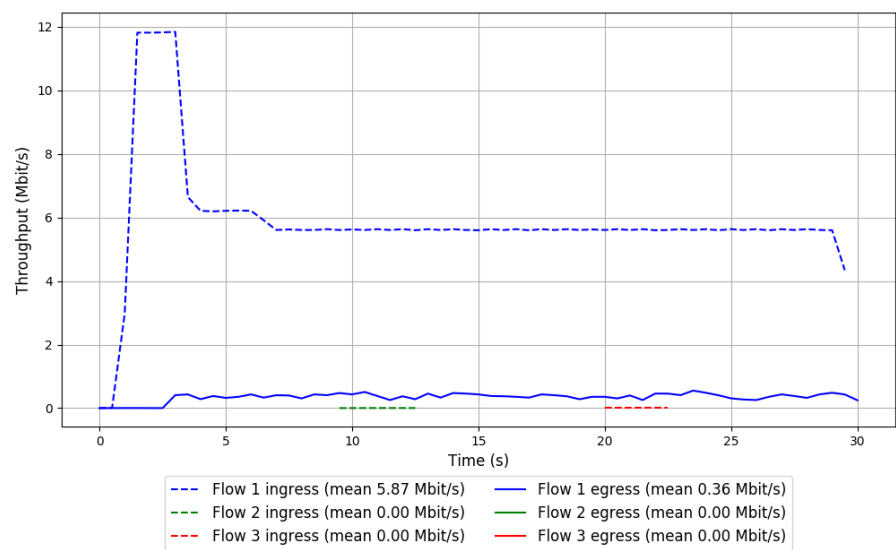
Start at: 2019-01-25 18:05:48

End at: 2019-01-25 18:06:18

Local clock offset: -1.807 ms

Remote clock offset: 6.328 ms

Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

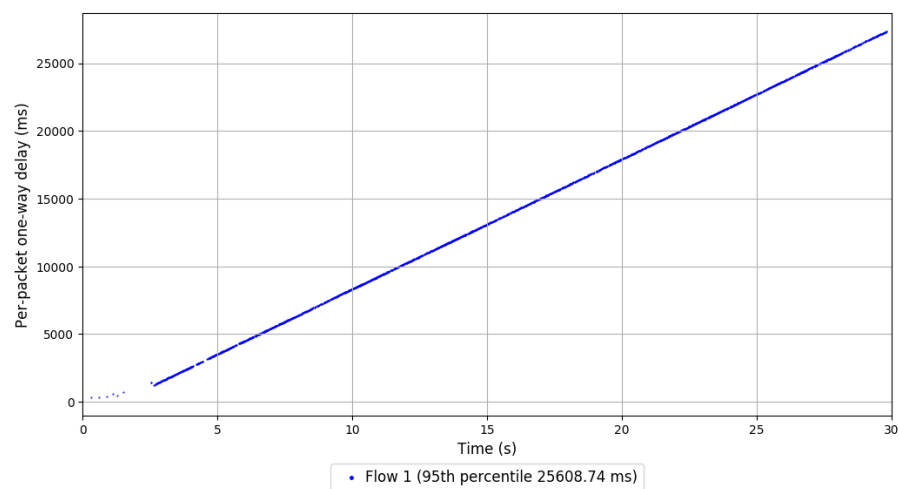
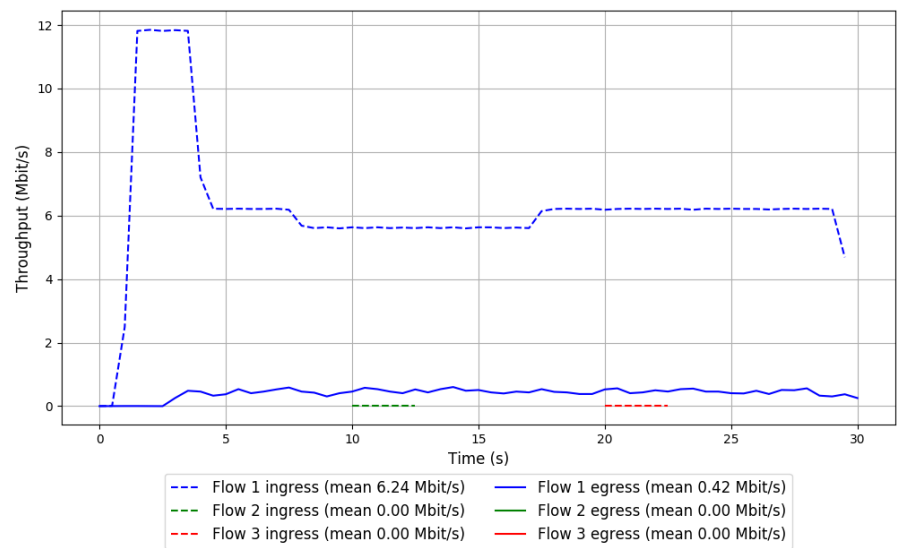
Start at: 2019-01-25 18:32:38

End at: 2019-01-25 18:33:08

Local clock offset: -1.472 ms

Remote clock offset: 1.715 ms

Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

Start at: 2019-01-25 17:36:40

End at: 2019-01-25 17:37:10

Local clock offset: -2.169 ms

Remote clock offset: 8.954 ms

Below is generated by plot.py at 2019-01-25 18:49:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.48 Mbit/s

95th percentile per-packet one-way delay: 6695.664 ms

Loss rate: 20.74%

-- Flow 1:

Average throughput: 0.47 Mbit/s

95th percentile per-packet one-way delay: 6695.677 ms

Loss rate: 21.32%

-- Flow 2:

Average throughput: 0.03 Mbit/s

95th percentile per-packet one-way delay: 6692.070 ms

Loss rate: 0.99%

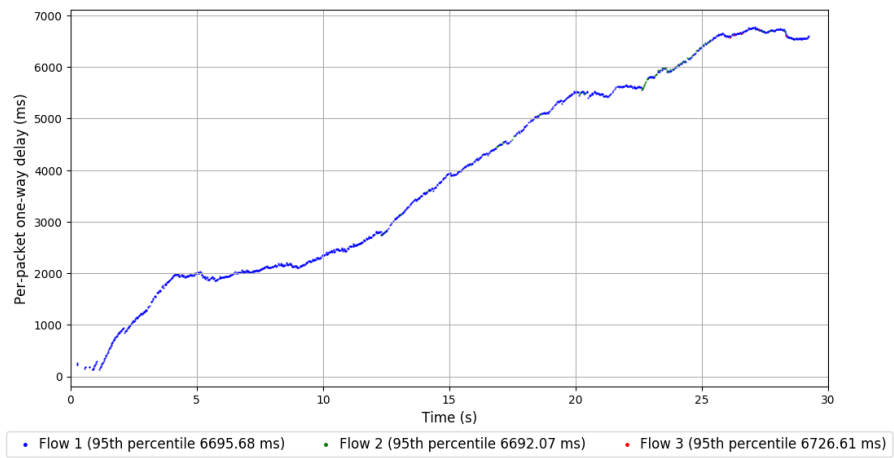
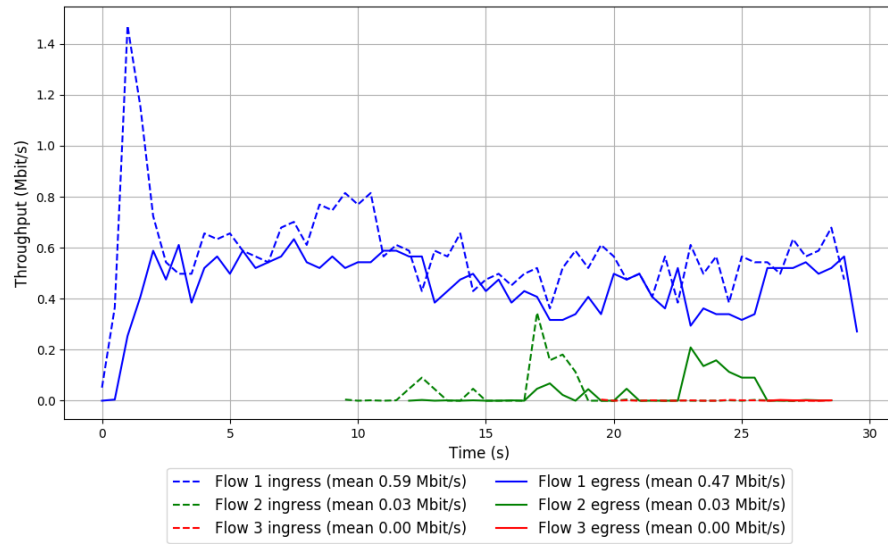
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 6726.606 ms

Loss rate: 58.33%

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

Start at: 2019-01-25 18:04:33

End at: 2019-01-25 18:05:03

Local clock offset: -1.764 ms

Remote clock offset: 11.35 ms

Below is generated by plot.py at 2019-01-25 18:49:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.40 Mbit/s

95th percentile per-packet one-way delay: 6188.384 ms

Loss rate: 20.78%

-- Flow 1:

Average throughput: 0.38 Mbit/s

95th percentile per-packet one-way delay: 6188.791 ms

Loss rate: 21.50%

-- Flow 2:

Average throughput: 0.03 Mbit/s

95th percentile per-packet one-way delay: 6133.016 ms

Loss rate: 0.85%

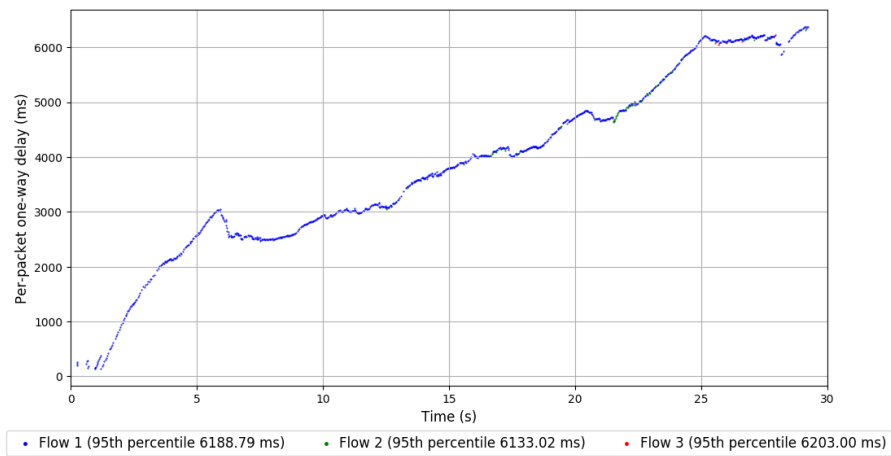
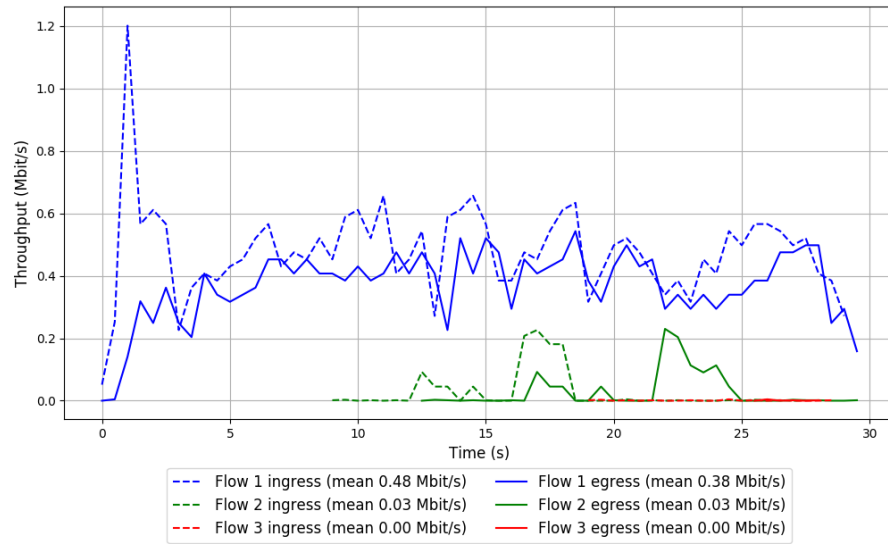
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 6203.000 ms

Loss rate: 58.33%

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

Start at: 2019-01-25 18:31:25

End at: 2019-01-25 18:31:55

Local clock offset: -2.043 ms

Remote clock offset: 8.555 ms

Below is generated by plot.py at 2019-01-25 18:49:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.52 Mbit/s

95th percentile per-packet one-way delay: 6600.781 ms

Loss rate: 23.80%

-- Flow 1:

Average throughput: 0.50 Mbit/s

95th percentile per-packet one-way delay: 6609.787 ms

Loss rate: 24.42%

-- Flow 2:

Average throughput: 0.03 Mbit/s

95th percentile per-packet one-way delay: 6470.757 ms

Loss rate: 0.99%

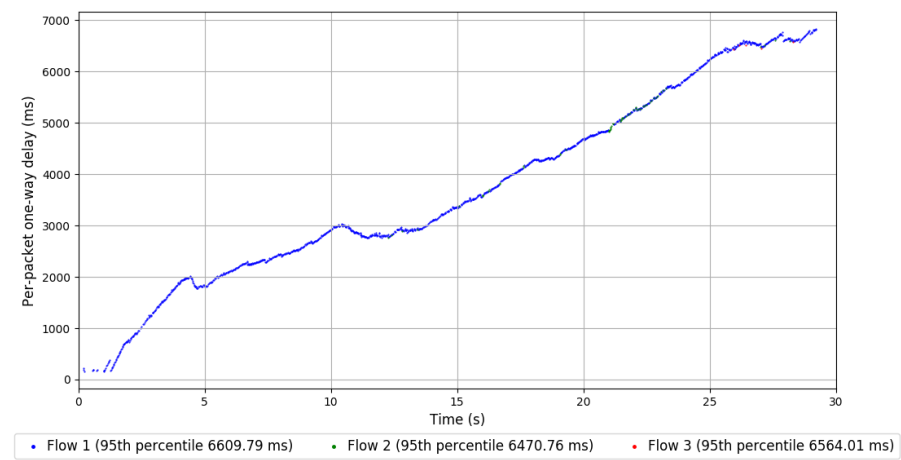
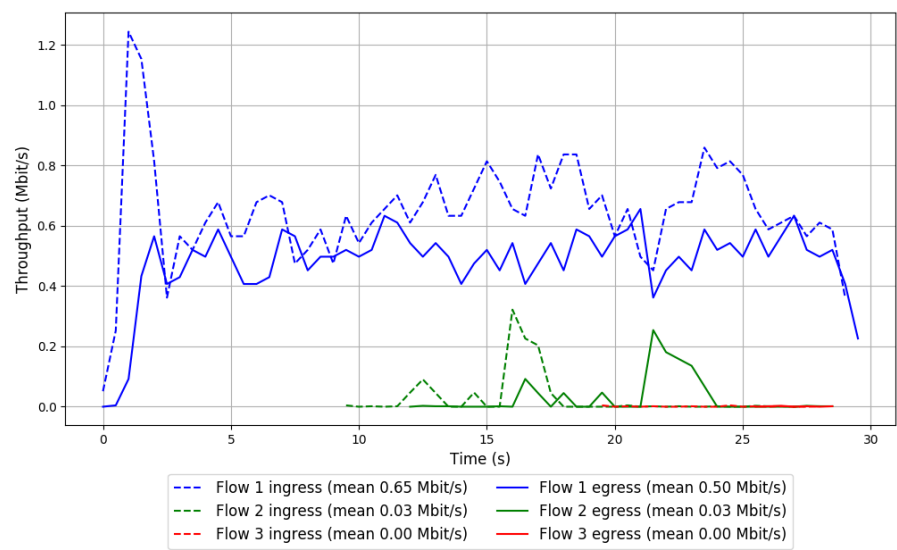
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 6564.010 ms

Loss rate: 58.33%

Run 3: Report of QUIC Cubic — Data Link



Run 1: Statistics of SCReAM

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 1: Report of SReAM — Data Link

Figure is missing

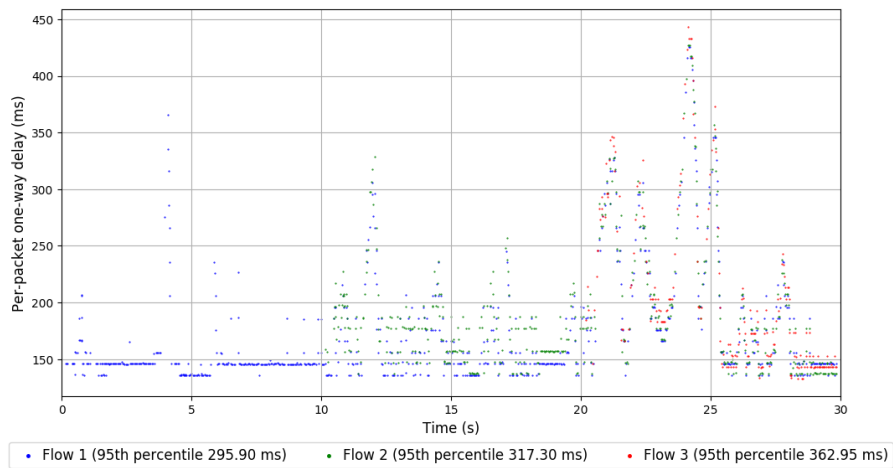
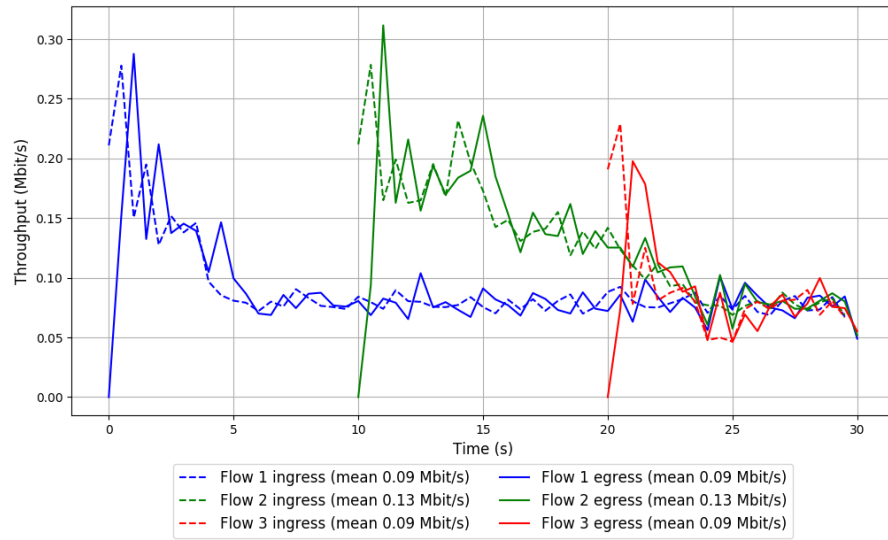
Figure is missing

Run 2: Statistics of SCReAM

Start at: 2019-01-25 18:21:30
End at: 2019-01-25 18:22:00
Local clock offset: -1.064 ms
Remote clock offset: 9.613 ms

Below is generated by plot.py at 2019-01-25 18:49:17
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 316.221 ms
Loss rate: 0.89%
-- Flow 1:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 295.900 ms
Loss rate: 0.67%
-- Flow 2:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 317.298 ms
Loss rate: 0.76%
-- Flow 3:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 362.946 ms
Loss rate: 1.98%

Run 2: Report of SReAM — Data Link

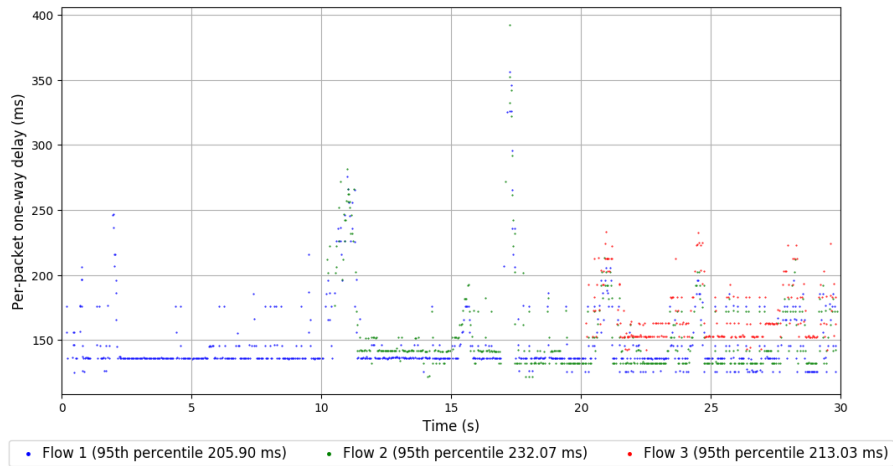
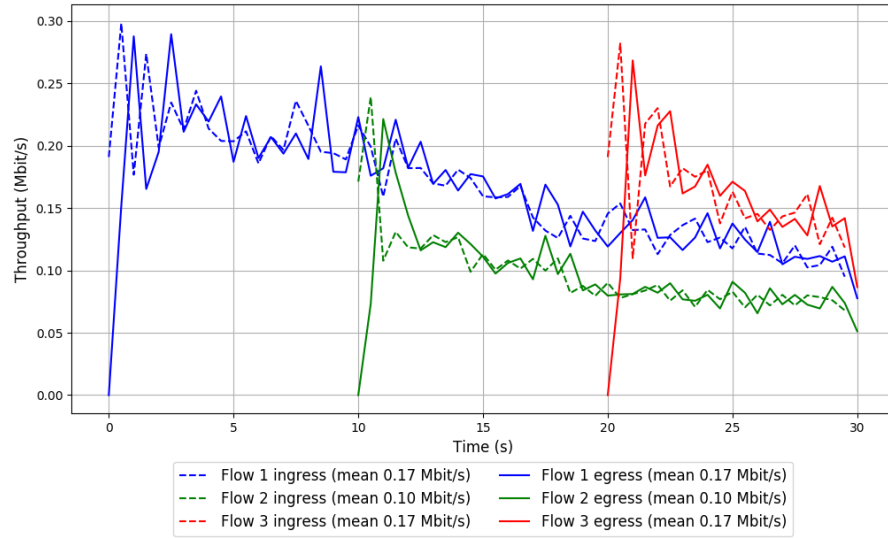


Run 3: Statistics of SCReAM

Start at: 2019-01-25 18:48:03
End at: 2019-01-25 18:48:33
Local clock offset: -3.396 ms
Remote clock offset: 2.644 ms

Below is generated by plot.py at 2019-01-25 18:49:17
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 215.862 ms
Loss rate: 0.95%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 205.900 ms
Loss rate: 0.52%
-- Flow 2:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 232.074 ms
Loss rate: 0.98%
-- Flow 3:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 213.028 ms
Loss rate: 2.25%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of Sprout

Start at: 2019-01-25 17:28:54

End at: 2019-01-25 17:29:24

Local clock offset: -1.525 ms

Remote clock offset: 3.302 ms

Below is generated by plot.py at 2019-01-25 18:49:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 436.002 ms

Loss rate: 2.04%

-- Flow 1:

Average throughput: 0.09 Mbit/s

95th percentile per-packet one-way delay: 946.118 ms

Loss rate: 1.66%

-- Flow 2:

Average throughput: 0.10 Mbit/s

95th percentile per-packet one-way delay: 363.925 ms

Loss rate: 1.20%

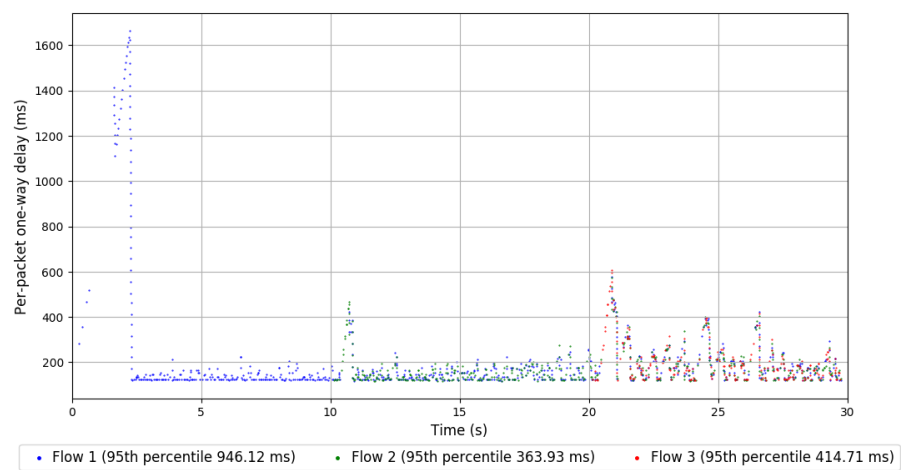
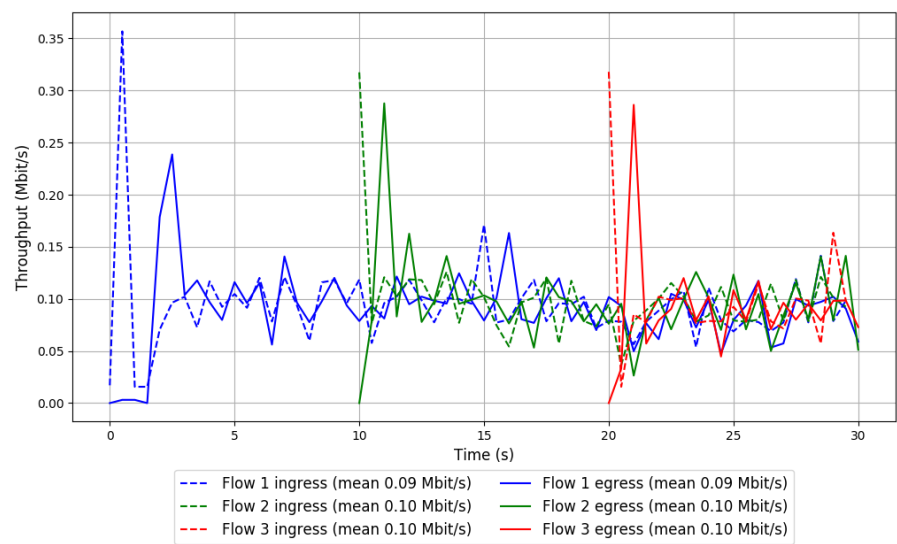
-- Flow 3:

Average throughput: 0.10 Mbit/s

95th percentile per-packet one-way delay: 414.709 ms

Loss rate: 4.80%

Run 1: Report of Sprout — Data Link

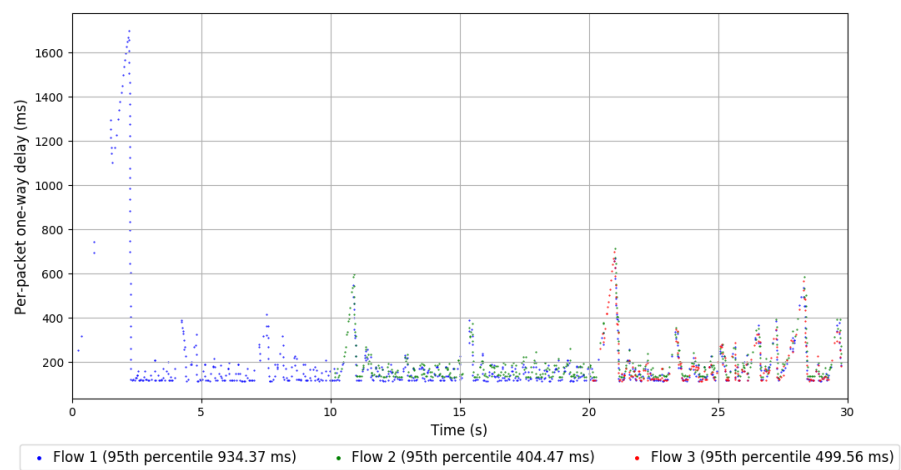
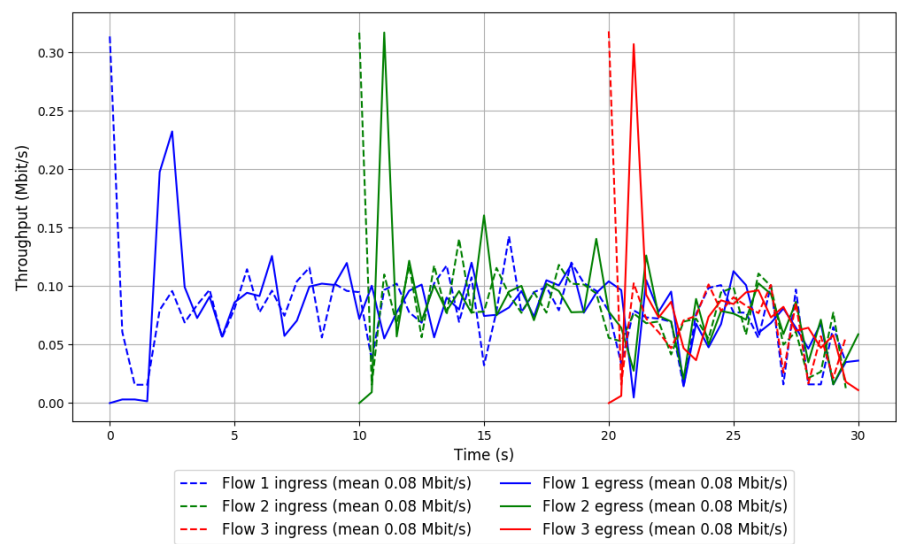


Run 2: Statistics of Sprout

Start at: 2019-01-25 17:56:52
End at: 2019-01-25 17:57:22
Local clock offset: -0.813 ms
Remote clock offset: 10.965 ms

Below is generated by plot.py at 2019-01-25 18:49:17
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 534.668 ms
Loss rate: 0.97%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 934.373 ms
Loss rate: 0.65%
-- Flow 2:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 404.467 ms
Loss rate: 0.29%
-- Flow 3:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 499.565 ms
Loss rate: 3.42%

Run 2: Report of Sprout — Data Link

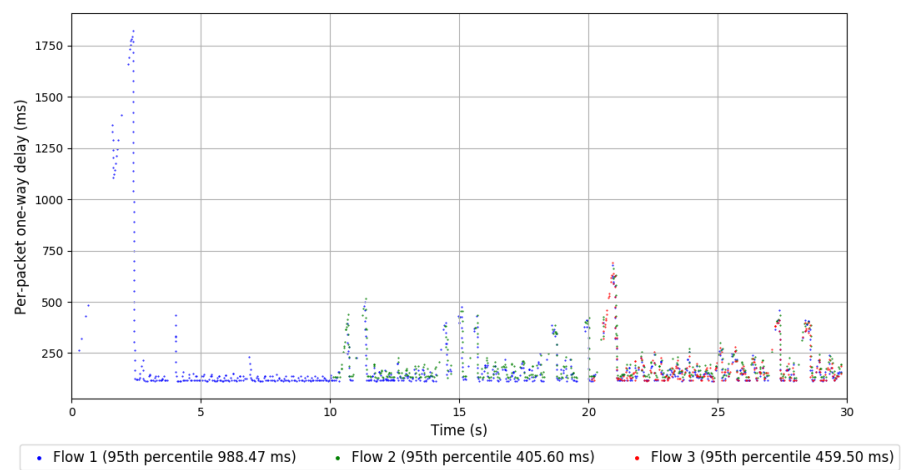
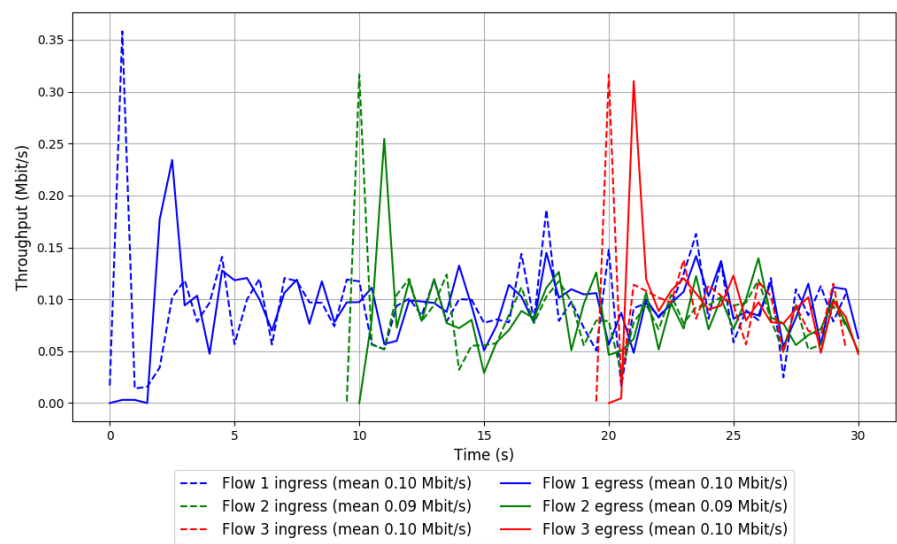


Run 3: Statistics of Sprout

Start at: 2019-01-25 18:23:57
End at: 2019-01-25 18:24:27
Local clock offset: -1.786 ms
Remote clock offset: 6.971 ms

```
# Below is generated by plot.py at 2019-01-25 18:49:17
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 499.020 ms
Loss rate: 1.24%
-- Flow 1:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 988.473 ms
Loss rate: 0.83%
-- Flow 2:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 405.604 ms
Loss rate: 1.31%
-- Flow 3:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 459.498 ms
Loss rate: 2.28%
```

Run 3: Report of Sprout — Data Link



Run 1: Statistics of TaoVA-100x

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

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

Figure is missing

Figure is missing

Run 2: Statistics of TaoVA-100x

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

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

Figure is missing

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Run 3: Statistics of TaoVA-100x

Start at: 2019-01-25 18:28:55

End at: 2019-01-25 18:29:25

Local clock offset: -1.007 ms

Remote clock offset: 2.297 ms

Below is generated by plot.py at 2019-01-25 18:49:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.48 Mbit/s

95th percentile per-packet one-way delay: 4133.088 ms

Loss rate: 8.29%

-- Flow 1:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 3388.823 ms

Loss rate: 4.64%

-- Flow 2:

Average throughput: 0.20 Mbit/s

95th percentile per-packet one-way delay: 4027.774 ms

Loss rate: 10.47%

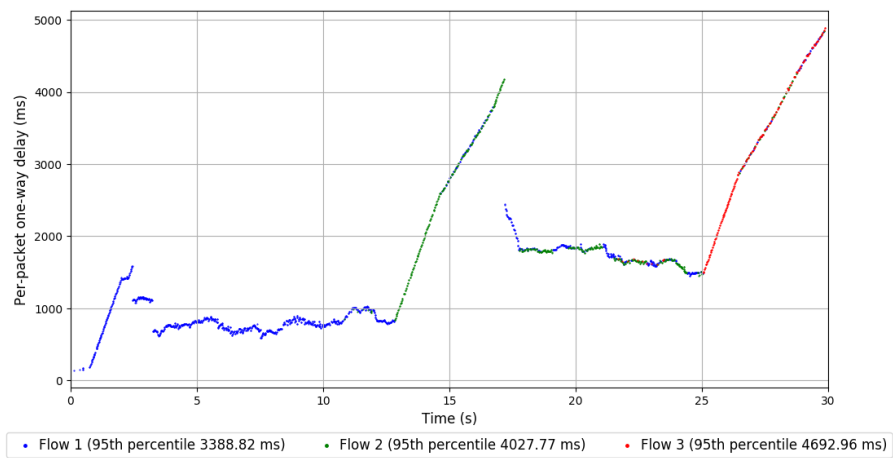
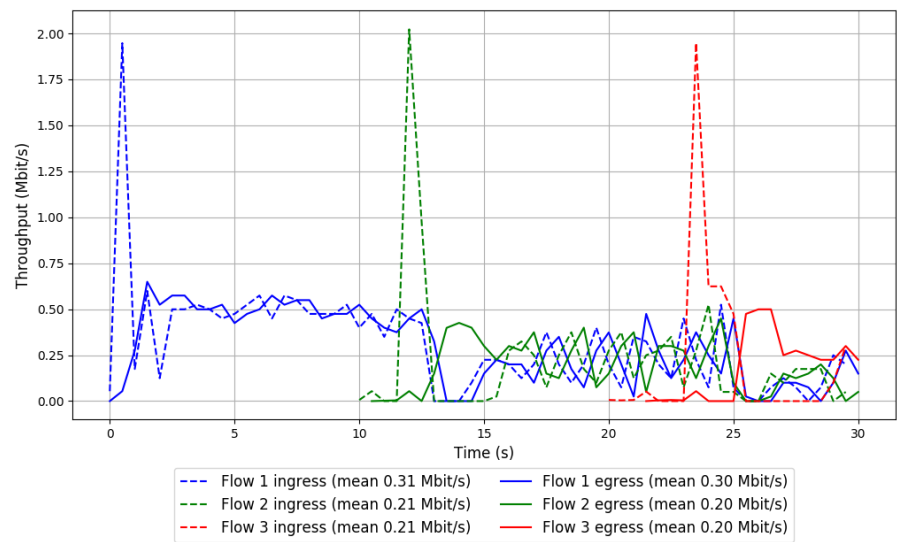
-- Flow 3:

Average throughput: 0.20 Mbit/s

95th percentile per-packet one-way delay: 4692.964 ms

Loss rate: 20.51%

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



Run 1: Statistics of TCP Vegas

Start at: 2019-01-25 17:30:09

End at: 2019-01-25 17:30:39

Local clock offset: -1.418 ms

Remote clock offset: 9.527 ms

Below is generated by plot.py at 2019-01-25 18:49:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.35 Mbit/s

95th percentile per-packet one-way delay: 3220.402 ms

Loss rate: 7.54%

-- Flow 1:

Average throughput: 0.27 Mbit/s

95th percentile per-packet one-way delay: 3070.146 ms

Loss rate: 5.43%

-- Flow 2:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 3290.757 ms

Loss rate: 11.83%

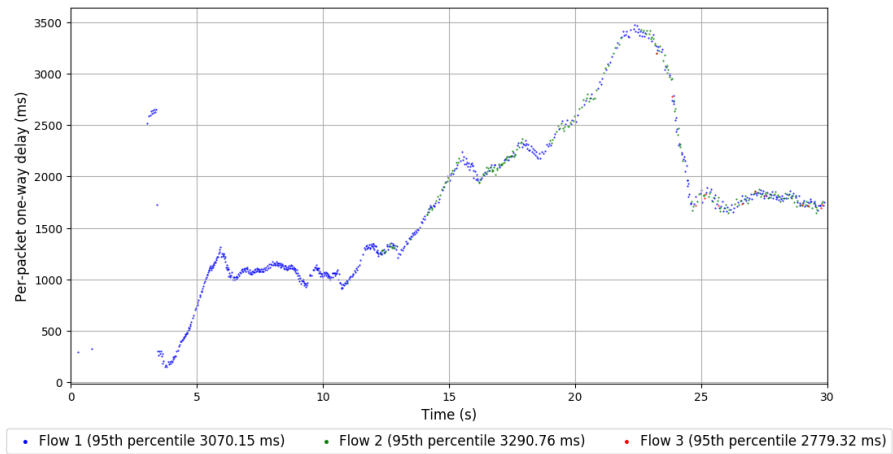
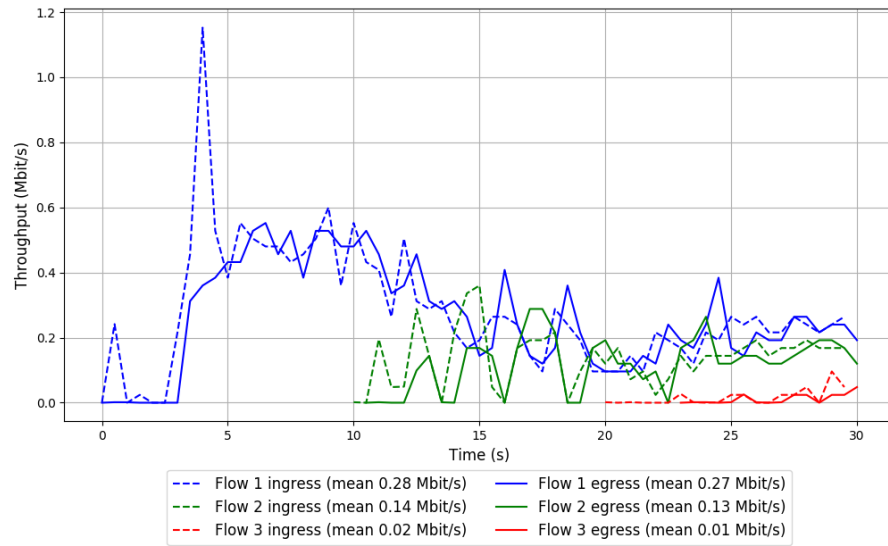
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 2779.319 ms

Loss rate: 44.88%

Run 1: Report of TCP Vegas — Data Link



Run 2: Statistics of TCP Vegas

Start at: 2019-01-25 17:58:06

End at: 2019-01-25 17:58:36

Local clock offset: -0.746 ms

Remote clock offset: 9.791 ms

Below is generated by plot.py at 2019-01-25 18:49:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.34 Mbit/s

95th percentile per-packet one-way delay: 3171.269 ms

Loss rate: 10.44%

-- Flow 1:

Average throughput: 0.23 Mbit/s

95th percentile per-packet one-way delay: 3063.967 ms

Loss rate: 5.08%

-- Flow 2:

Average throughput: 0.17 Mbit/s

95th percentile per-packet one-way delay: 3211.700 ms

Loss rate: 12.99%

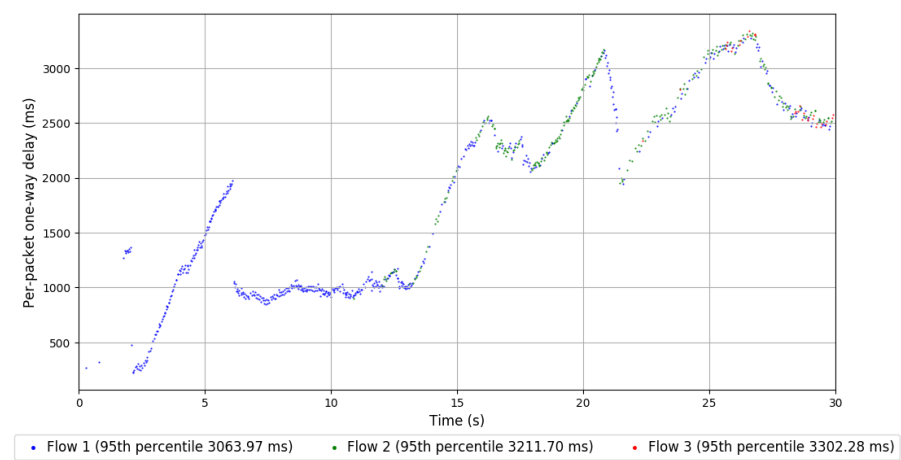
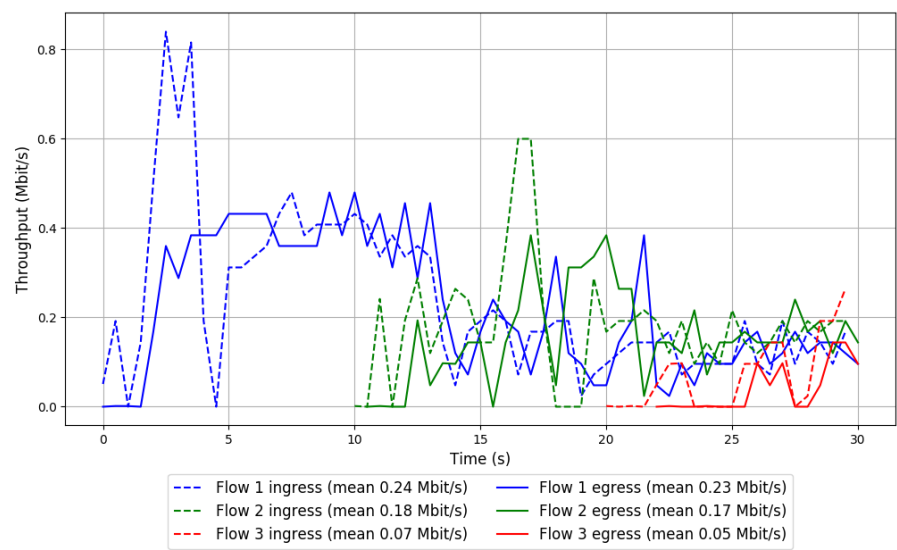
-- Flow 3:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 3302.280 ms

Loss rate: 51.51%

Run 2: Report of TCP Vegas — Data Link



Run 3: Statistics of TCP Vegas

Start at: 2019-01-25 18:25:11

End at: 2019-01-25 18:25:41

Local clock offset: -1.854 ms

Remote clock offset: 2.697 ms

Below is generated by plot.py at 2019-01-25 18:49:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.49 Mbit/s

95th percentile per-packet one-way delay: 1553.044 ms

Loss rate: 3.37%

-- Flow 1:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 1662.051 ms

Loss rate: 1.77%

-- Flow 2:

Average throughput: 0.20 Mbit/s

95th percentile per-packet one-way delay: 1376.700 ms

Loss rate: 2.75%

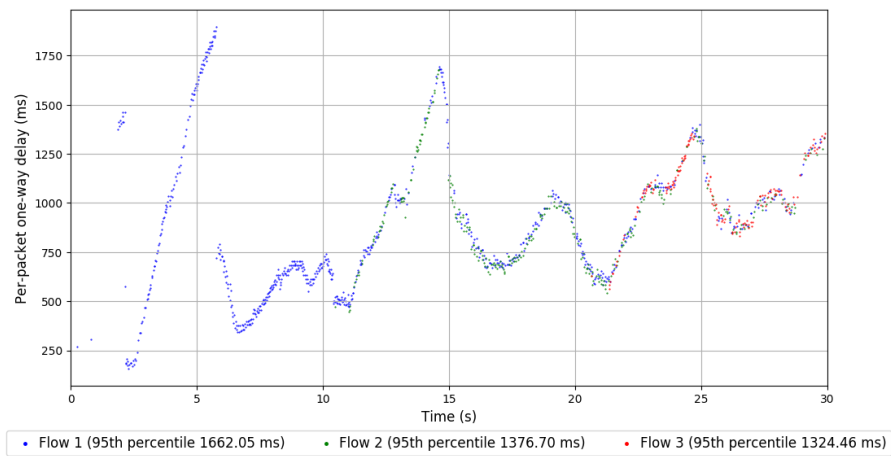
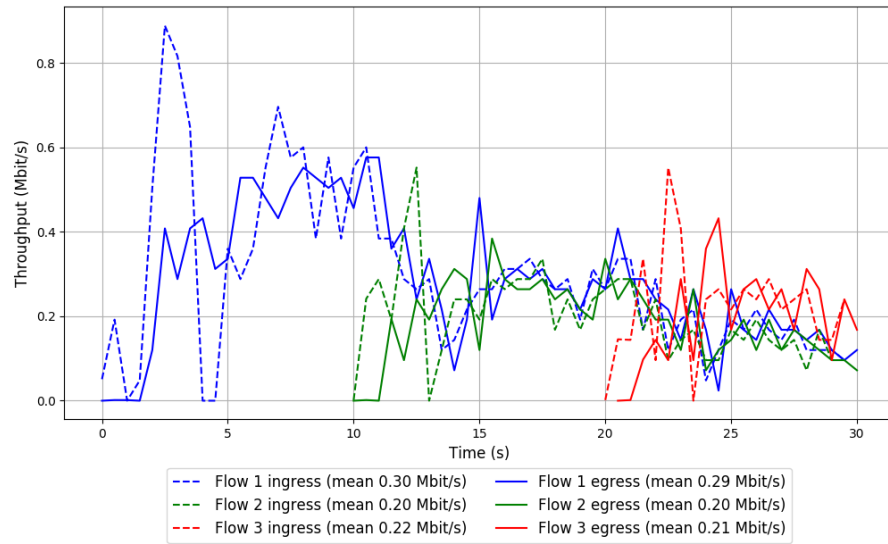
-- Flow 3:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 1324.465 ms

Loss rate: 10.80%

Run 3: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2019-01-25 17:40:38

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

Local clock offset: -1.334 ms

Remote clock offset: 4.95 ms

Below is generated by plot.py at 2019-01-25 18:49:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.32 Mbit/s

95th percentile per-packet one-way delay: 2639.048 ms

Loss rate: 7.69%

-- Flow 1:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 2639.048 ms

Loss rate: 7.62%

-- Flow 2:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 2713.828 ms

Loss rate: 4.76%

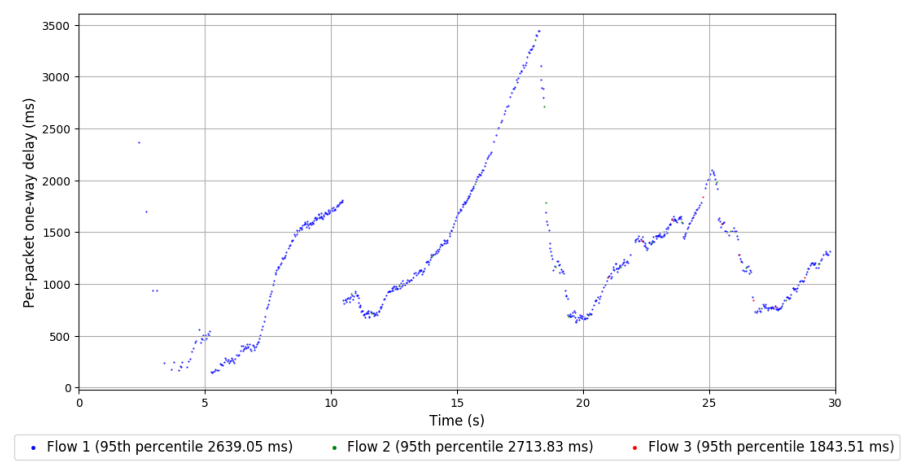
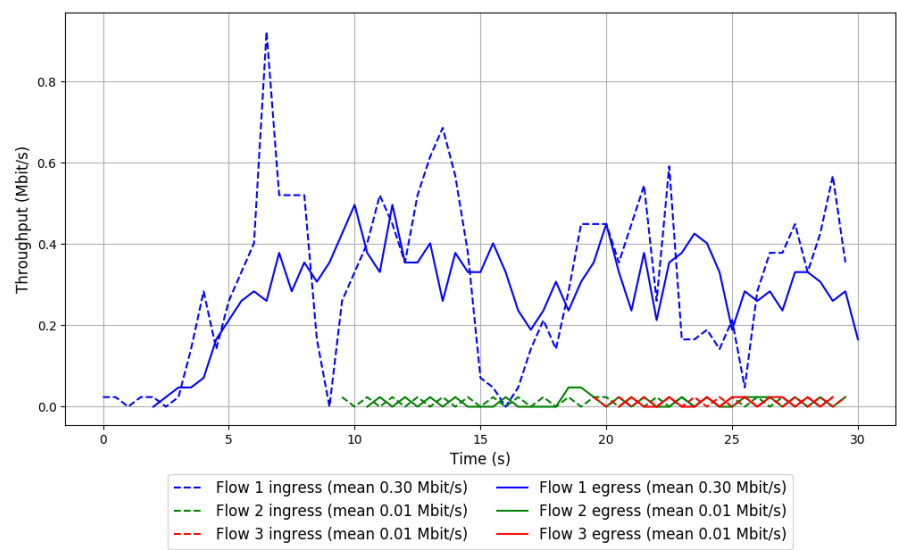
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 1843.512 ms

Loss rate: 18.18%

Run 1: Report of Verus — Data Link

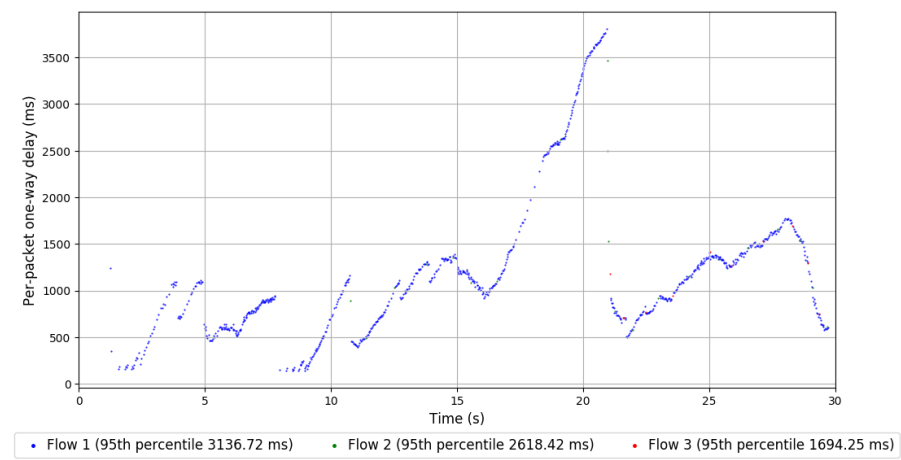
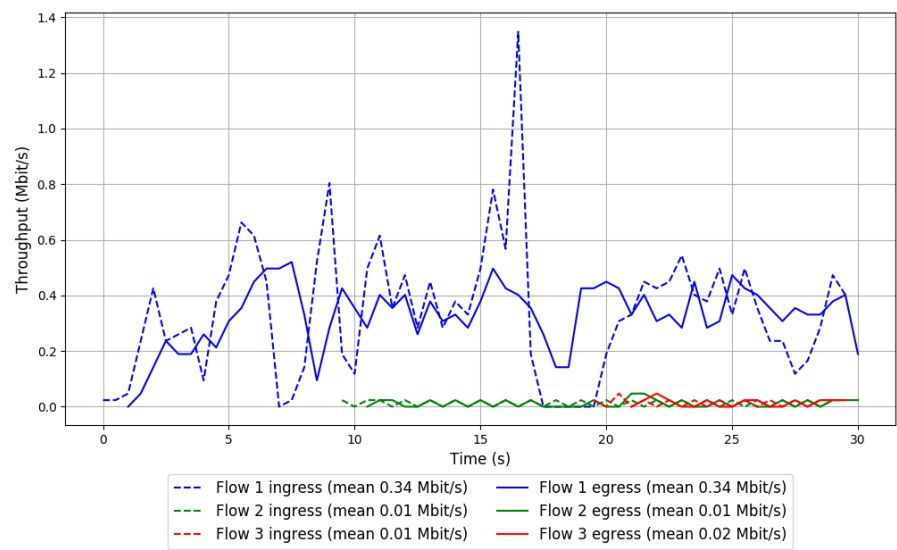


Run 2: Statistics of Verus

Start at: 2019-01-25 18:08:33
End at: 2019-01-25 18:09:03
Local clock offset: -1.875 ms
Remote clock offset: 10.444 ms

Below is generated by plot.py at 2019-01-25 18:49:17
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 3136.719 ms
Loss rate: 3.84%
-- Flow 1:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 3136.719 ms
Loss rate: 3.76%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 2618.419 ms
Loss rate: 4.55%
-- Flow 3:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 1694.248 ms
Loss rate: 8.33%

Run 2: Report of Verus — Data Link



Run 3: Statistics of Verus

/home/ubuntu/pantheon/data/2019-01-25T17-27-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 3: Report of Verus — Data Link

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Run 1: Statistics of PCC-Vivace

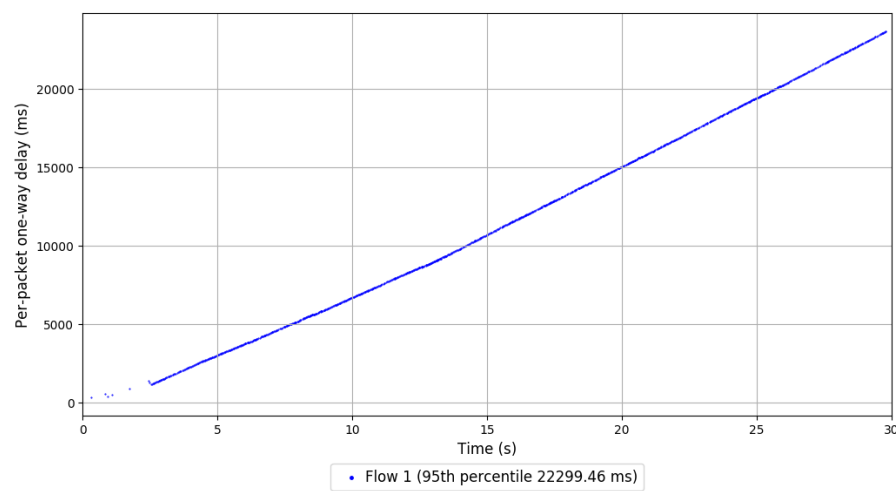
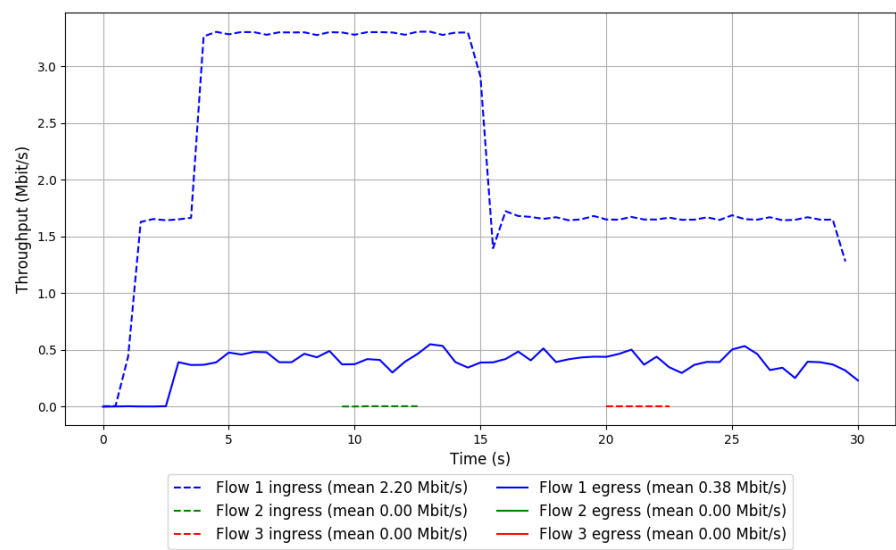
Start at: 2019-01-25 17:52:53

End at: 2019-01-25 17:53:23

Local clock offset: -0.944 ms

Remote clock offset: 9.716 ms

Run 1: Report of PCC-Vivace — Data Link



Run 2: Statistics of PCC-Vivace

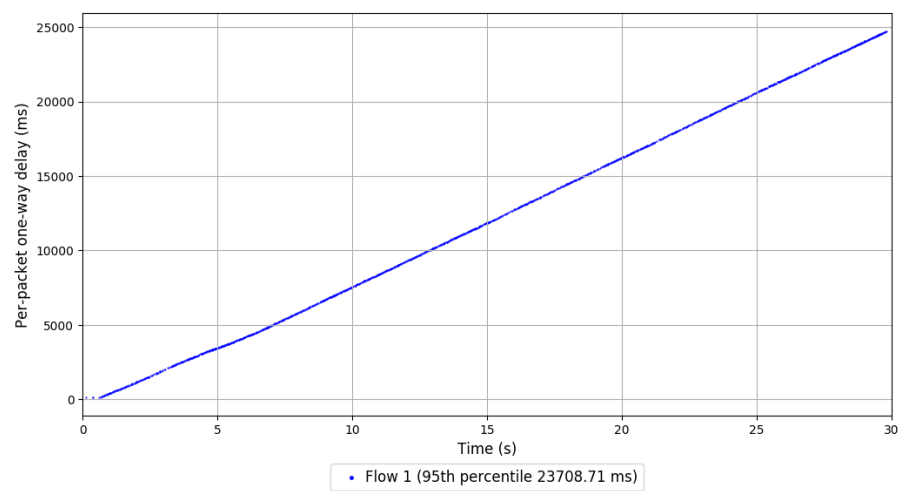
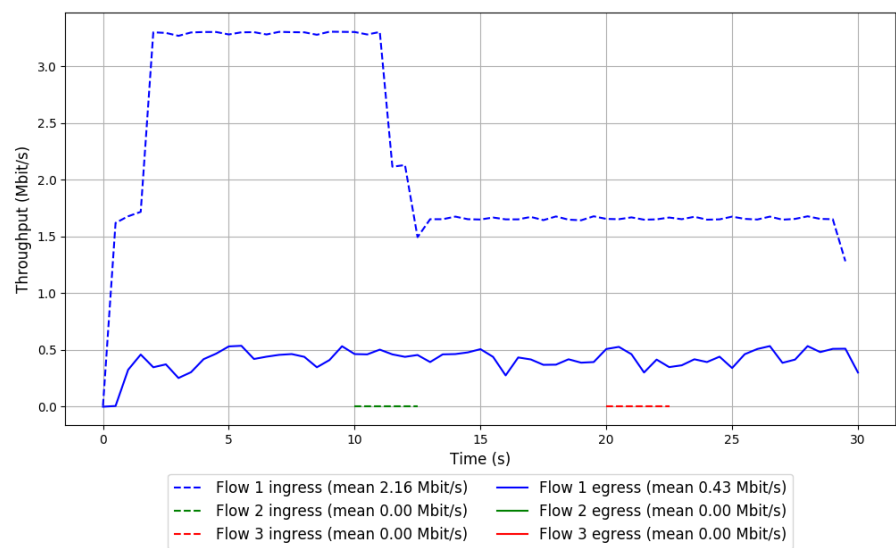
Start at: 2019-01-25 18:20:14

End at: 2019-01-25 18:20:44

Local clock offset: -1.083 ms

Remote clock offset: 9.917 ms

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

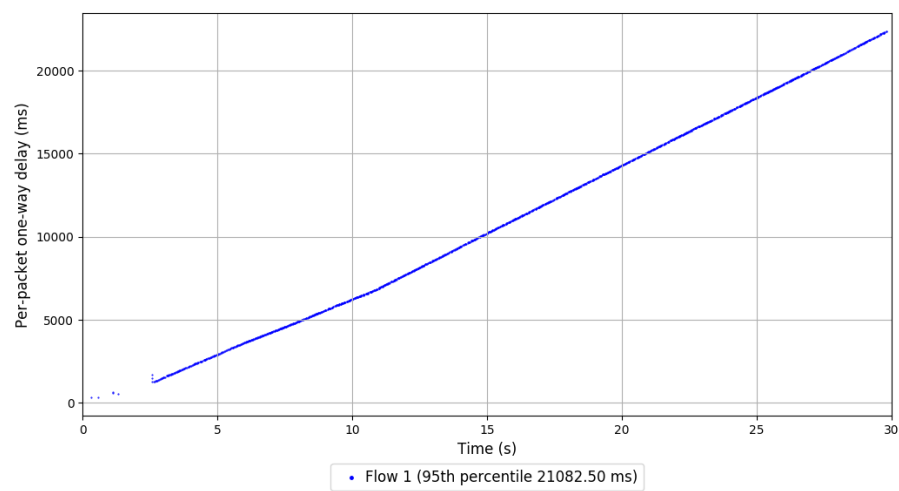
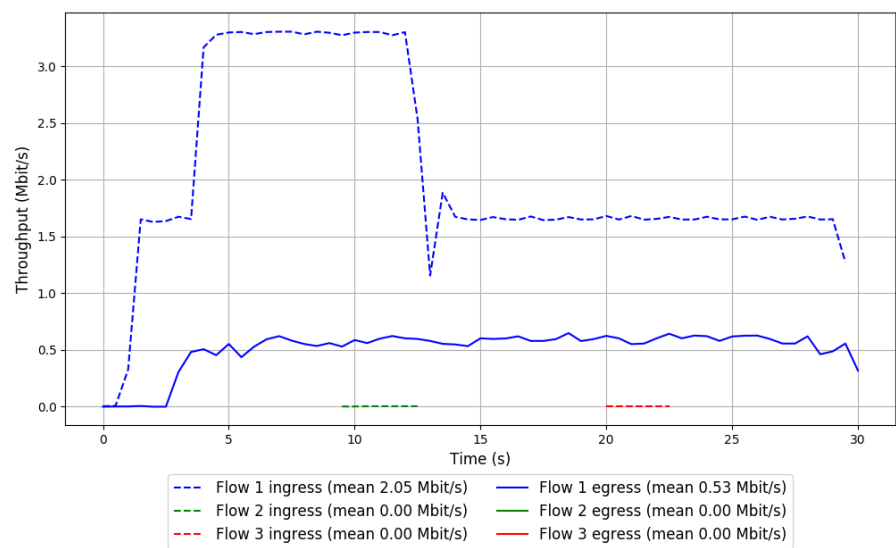
Start at: 2019-01-25 18:46:48

End at: 2019-01-25 18:47:18

Local clock offset: -2.608 ms

Remote clock offset: 6.63 ms

Run 3: Report of PCC-Vivace — Data Link



Run 1: Statistics of WebRTC media

Start at: 2019-01-25 17:35:24

End at: 2019-01-25 17:35:54

Local clock offset: -2.186 ms

Remote clock offset: 8.716 ms

Below is generated by plot.py at 2019-01-25 18:49:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 3816.265 ms

Loss rate: 7.80%

-- Flow 1:

Average throughput: 0.13 Mbit/s

95th percentile per-packet one-way delay: 3885.041 ms

Loss rate: 1.68%

-- Flow 2:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 3519.558 ms

Loss rate: 15.91%

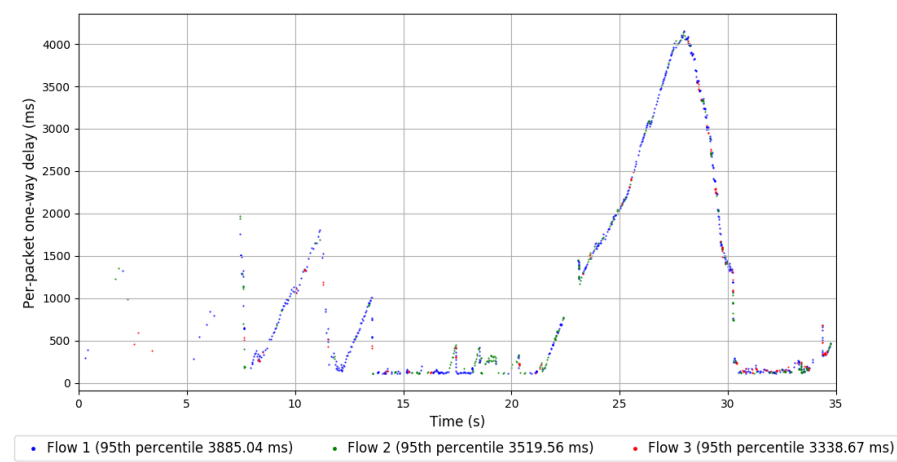
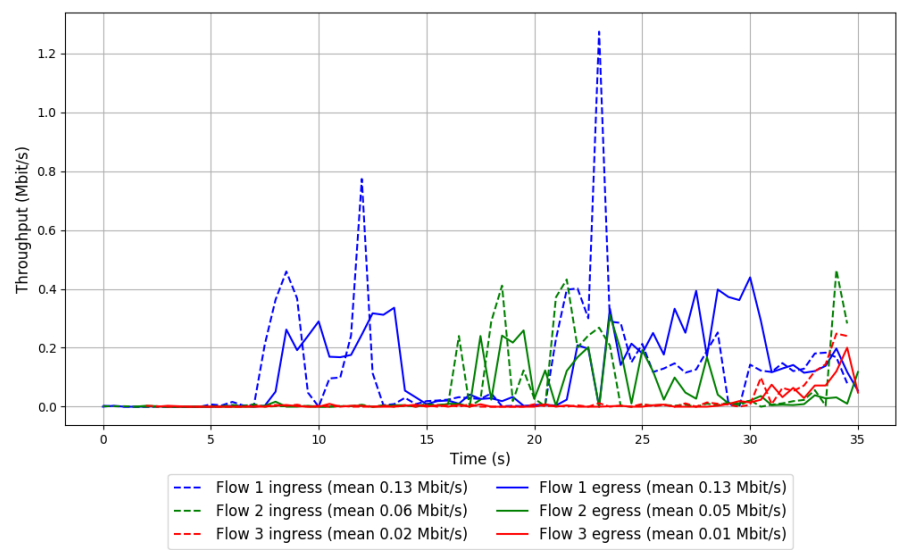
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 3338.671 ms

Loss rate: 27.79%

Run 1: Report of WebRTC media — Data Link

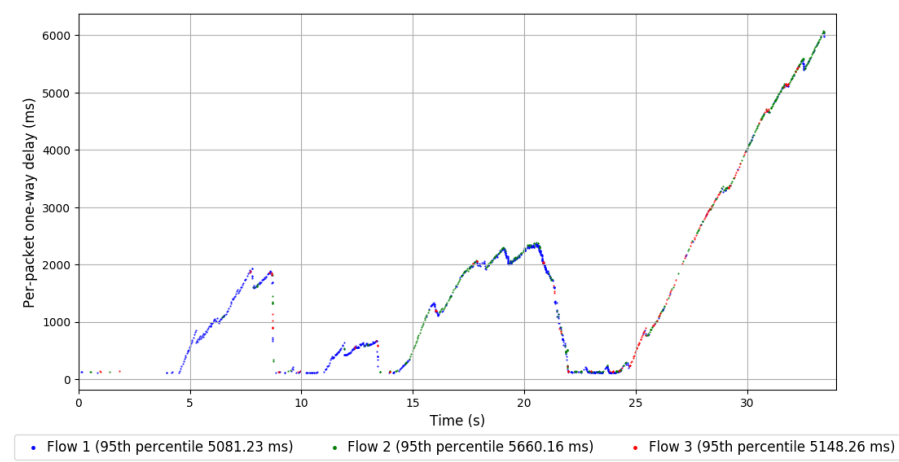
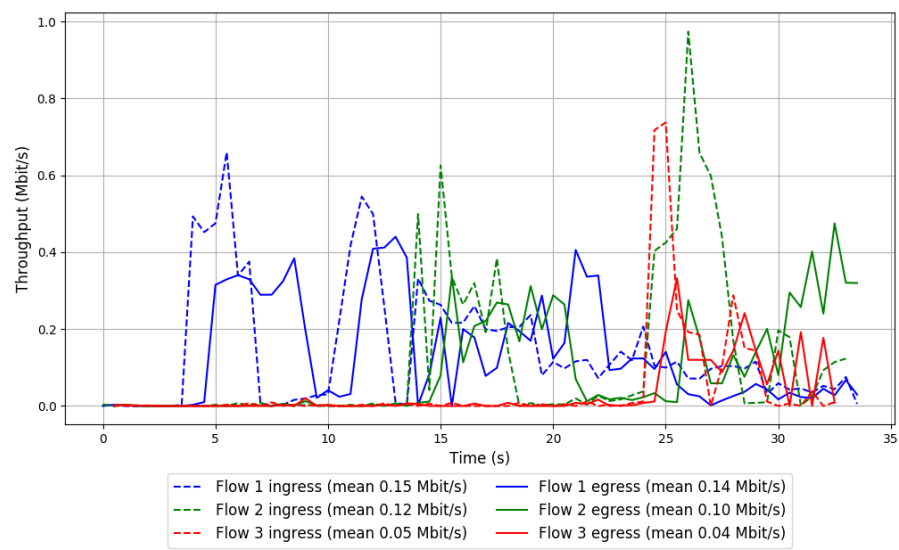


Run 2: Statistics of WebRTC media

Start at: 2019-01-25 18:03:18
End at: 2019-01-25 18:03:49
Local clock offset: -0.96 ms
Remote clock offset: 10.162 ms

Below is generated by plot.py at 2019-01-25 18:49:17
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 5451.422 ms
Loss rate: 14.06%
-- Flow 1:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 5081.235 ms
Loss rate: 8.15%
-- Flow 2:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 5660.165 ms
Loss rate: 17.28%
-- Flow 3:
Average throughput: 0.04 Mbit/s
95th percentile per-packet one-way delay: 5148.256 ms
Loss rate: 25.50%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2019-01-25 18:30:09

End at: 2019-01-25 18:30:39

Local clock offset: -1.783 ms

Remote clock offset: 6.126 ms

Below is generated by plot.py at 2019-01-25 18:49:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 1673.645 ms

Loss rate: 0.96%

-- Flow 1:

Average throughput: 0.15 Mbit/s

95th percentile per-packet one-way delay: 1679.274 ms

Loss rate: 0.25%

-- Flow 2:

Average throughput: 0.10 Mbit/s

95th percentile per-packet one-way delay: 1678.748 ms

Loss rate: 2.21%

-- Flow 3:

Average throughput: 0.05 Mbit/s

95th percentile per-packet one-way delay: 1577.740 ms

Loss rate: 0.55%

Run 3: Report of WebRTC media — Data Link

